

U. S. NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-295COMMONWEALTH EDISON COMPANYZION NUCLEAR POWER STATION, UNIT 1ISSUANCE OF DIRECTOR'S DECISION UNDER 10 CFR 2.206REGARDING INTEGRATED CONTAINMENT LEAK RATE TESTINGAT COMMERCIAL NUCLEAR POWER FACILITIES

Notice is hereby given that the Director, Office of Nuclear Reactor Regulation, has issued a "Decision Pursuant to 10 CFR 2.206" concerning the letters dated March 6 and March 8, 1985 (Petition) filed by Dr. Zinovy V. Reytlatt requesting an immediate postponement of containment leak rate tests for all light-water reactors and debugging and revalidation of certain computer software used in determining leak rates.

The Petition further alleges that the Zion Unit 1 containment leak rate test performed in July 1984 was in error and, therefore, the Petitioner concludes that the Zion Unit 1 leak rates are in excess of regulatory limits.

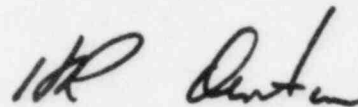
The Director, Office of Nuclear Reactor Regulation, has determined to deny Petitioner's request pursuant to 10 CFR 2.206. The reasons for this decision are explained in the "Director's Decision under 10 CFR 2.206" (DD-85- 10) which is available for public inspection in the Commission's Public Document Room located at 1717 H Street, N.W. Washington, DC 20555, and at the local public document room for the Zion Station, located at 2600 Emmaus Avenue, Zion, Illinois 60099.

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A copy of the Decision will be filed with the Secretary for Commission's review in accordance with 10 CFR 2.206 (c).

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

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in dark ink, appearing to read "HR Denton". The signature is written in a cursive, flowing style.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Docket No. 50-295
(10 CFR 2.206)

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

Dear Dr. Reytblatt:

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-), 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,

Original Signed by
H. R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

*Previously concurred:

CSB
*JKudrick
06/18/85

LB#2/DL/LA
*EHylton
06/11/85

LB#2/DL/PM
*ABournia:lb
06/11/85

LB#2/DL/BC
*WButler
05/12/85

AD/LA/DL
*Hilovak
06/17/85

OELD
*Hoefling
06/17/85

DD-85-
*H. R. Denton
06/24/85

NRR
JFunches
06/25/85

NRR
DEisenhut
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NRR
H. R. Denton
06/26/85

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 ban 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.

Original Signed by
H. R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

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

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06/18/85

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06/12/85

ADL/DLV
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06/24/85

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NRR
HDeaton
06/28/85

- 2 -

A copy of the Decision will be filed with the Secretary for Commission's review in accordance with 10 CFR 2.206 (c)

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

FOR THE NUCLEAR REGULATORY COMMISSION

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Harold R. Denton, Director
Office of Nuclear Reactor Regulation

LB#2/DL/LA
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NRR
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NRR
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NRR
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06/26/85

As indicated
Hole

April 30, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

SUBJECT: APPEAL OF MARCH 8, 1985 REGARDING VOLUMETRIX LEAK RATE COMPUTER PROGRAM

This letters acknowledges receipt of your letter to me of April 22, 1985 in which you inform me that my Appeal will be handled pursuant to 10 CFR 2.206, and that you decline to take an immediate action referring to Mr. Rehm's letter of February 20, 1985. You have enclosed a copy of a notice that has been filed with the Office of the Federal Register.

1. In my Appeals of March 8, 1985 the contents of Mr. Rehm's letter of February 20, 1985 was discussed. It was shown that no relevant substance had been presented in it that would justify the use of computer programs that do not perform addition. Furthermore, Mr. Rehm's letter is not technical. It does not address the proof of hazardous situation that might have resulted from the use of faulty computer program that I had requested to terminate, which technical proof is contained in both, my initial emergency relief petitions of January 9, 1985 and in my Appeals of March 8, 1985.

Therefore, your reference to Mr. Rehm's letter as basis for your decision is not consistent with 10 CFR 2.206.

I insist that the inability of a computer program to perform addition, the proof of which you have been presented with, mandates an immediate suspension of its use in safety related calculations. Accordingly, your action is kindly sought with this regard.

2. It appears that your determination on my March 6, 1985 Appeal which may, indeed, require days or even weeks as a reasonable time span, is going to be used as an excuse for not preparing a timely determination on my March 8, 1985 Appeal. The reasonable time span for your determination on the latter is estimated as a few hours if manual calculations are used. Instead of manual calculations, a pocket calculator can be used which will reduce the reasonable time for determination to a few minutes. I kindly suggest that my Appeals be considered separately, as submitted. I insist that your determination on my Appeal of March 8, 1985 be made in a matter of days.

I shall expect to receive your response in 10 (ten) working days.

Sincerely,

Z. Reutblatt

Zinovy V. Reutblatt, Chair
Department of Mathematics and
Computer Science
(704) 298-3325

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PDR MISC

PDR

Handwritten notes:
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THIS OR IN RESPONSE
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
Harold R. Denton, Director

In the Matter of

COMMONWEALTH EDISON COMPANY
(Zion Nuclear Power Station,
Unit 1)
AND ALL LIGHT-WATER REACTORS

Docket No. 50-295

(10 CFR § 2.206)

DIRECTOR'S DECISION UNDER 10 CFR § 2.206

INTRODUCTION

On March 6, 1985, Zinovy V. Raytblatt (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 to determine containment leak rates, including the Zion Unit 1,

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

On April 22, 1985, I acknowledged 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. 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 focussed 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. Petitioner's activity in this area parallels that of the NRC Staff which 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 recently 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 ANS-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 twice before had the opportunity to issue 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

1/ In the matter of Commonwealth Edison Company (LaSalle County Station, Units 1 and 2) and All Light-Water Reactors, DD-84-6, 19 NRC 891 (1984); In the Matter of Commonwealth Edison Company (Zion Nuclear Power Station, Unit 1), DD-85-2, ___ NRC ___ (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 [staff to provide most recent citation to the Regulatory Agenda including Federal Register cite, NUREG cite and date].

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 wrong as alleged by the Petitioner. The manner in which the mean containment temperature is calculated, 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 is properly evaluated. In essence, the equation is correct technically but oversimplifies and thus 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.

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

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

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 likely be flawed by the types of deficiencies alleged by the Petitioner such as the use of unjustified weighting coefficients. Such manipulation of data 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 unacceptable 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

^{5/} Ibid., at 894-895.

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. [Staff here to discuss these allegations. In addition, Staff to discuss how the NRC inspectors employ an independent computer program with the so-called "correct" ^{Do they?} equation to verify test results].

INSERT A

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 with a severe 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 more realistic weight coefficients, he has concluded that the Zion Unit 1 containment leak rates are in excess of regulatory limits. [Staff here discuss the allegations specific to Zion].

INSERT B

INSERT A

The Volumetric's computer program (software) was used in conducting the November/December 1984 containment integrated leak rate test (CILRT) at the Fermi, Unit 2 plant. NRC inspectors, as a matter of course, independently verify CILRT results, ~~using a staff computer program~~. 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.

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.

INSERT B

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 ~~(stated to be from a Zion test)~~ 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 (numbers 4 and 14) that had been declared "out-of-service" throughout the course of the test. Therefore, the computer program in use (not the Volumetrics program) was averaging, correctly, the readings of the seven "in-service" channels. The staff also is not aware of any "fraudulent" doubling option in the Volumetrics computer program, as the Petitioner alleges. In any event, such an option could not have been used in the cited Zion test since the Volumetrics computer program was not used.

With regard to the Petitioner's allegations concerning the validity of the verification test for the July 1984 Zion test, the NRC's Inspection Report describes the circumstances of the verification test and concludes that the test did confirm the acceptability of the CILRT. *IN ESSENCE, THE LICENSEES FOUND IT NECESSARY TO INCREASE THE IMPOSED LEAK RATE TO IMPROVE THE ACCURACY OF THE MEASUREMENT AND PERMIT A VERIFICATION OF THE ABILITY OF THE TEST INSTRUMENTATION SYSTEM TO DETECT LEAK RATES APPROACHING THE MAXIMUM ALLOWABLE LIMIT.*

11 LETTER TO C. FEED, V-P, C-E-CO., FROM J. KEPPLER, REGIONAL ADMINISTRATOR, REGION II, USNRC, DATED SEPTEMBER 7, 1984.

CONCLUSION

Petitioner sought immediate suspension of all containment leak rate testing and immediate initiation of actions to ban 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 ____ day of May 1985.

March 6, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

APPEAL

In the Matter of

COMMONWEALTH EDISON COMPANY

ON THE EMERGENCY RELIEF

(Zion Station, LaSalle County
Station)

DECISION

AND ALL LIGHT-WATER REACTORS

INTRODUCTION

On January 9, 1985, I, Reytblatt Zinovy V., in accordance with the provisions of 10 CFR 2.206, filed an emergency relief petition with the Office of the Executive Director for Operations seeking an immediate postponement of all integral containment leak rate tests until the NRC position on determining the weight coefficients is worked out and validated, the petition being supported by calculations of p. 2, a) on Pages 3, 4 of Exh. A. Continuation of integral leak rate testing under the present no-rule situation regarding the determination of weight coefficients, may lead to underestimating abnormally high leak rates to the degree that such leaks would appear to be within normal limits. Such misrepresentation according to Appendix J to 10 CFR, Part 50, constitutes a hazard to the public safety. The petition cites the Zion, Unit 1 containment where these weight coefficients were obviously incorrect which was confirmed by a failure of a verification test, as a containment where the estimate of the true leak rate is in excess of legal limits.

My petition, as stated in the NRC letter to me of February 20, 1985 (Exh. B), has been considered by the NRC staff, and was found to be providing an insufficient basis for emergency relief on the part of the NRC. The NRC Decision has not been supported by any essential calculations, discussion or references.

BACKGROUND

1. The ILRT (Integrated Leak Rate Test) is the ultimate, and the most important test to assure public safety in a case of a reactor accident involving release of radioactive substance into the containment building.

The general criteria for the testing are set forth in Appendix J to 10 CFR, Part 50, which specifies the testing methodology as presented in Ref. 1. Actual testing is done, mostly if not exclusively, on the exemption basis. Mostly, the Ref. 2 and Ref. 3. are used for guidance. These faulty documents have been pending with the NRC for endorsement for many years, the endorsement having been

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denied.

2. References 2 and 3 call for pressurizing a containment and monitoring pressure P and temperatures T at selected points as functions of time. The air mass, W, as a function of time, is subsequently determined in all actual tests performed within the U.S.A. in accordance with the equation:

$$W_{ANS} = k P / (\sum \alpha_i T_i); \sum \alpha_i = 1; 0 < \alpha_i \leq 0.1 \quad (1)$$

where α_i are certain coefficients ("weighting coefficients"), and K is a constant. This equation is an approximation to the equation:

$$W_{WRONG} = k P / \int_V T dv \quad (2)$$

that is, when the number of instruments is increasing, and the max α_i is decreasing, the difference between W_{WR} and W_{ANS} becomes smaller than any designated small number.

3. The leak rate, L, is defined as a ratio of the air mass change, δW , to the initial air mass, W_0 , per 24 hr. in percent, taken with the opposite sign, $-\delta W/W_0$. It follows from the Eq. 1 that

$$-L = \frac{\delta P}{P} - \frac{1}{\sum \alpha_i T_i} (\sum \alpha_i \delta T_i) + \epsilon \quad (3)$$

where symbol δ is self explanatory and ϵ is, generally speaking, smaller than other terms. Current actual calculation of L is simply a statistical processing based on Eq. 3.

4. Obviously, by assigning α_i or changing these coefficients, a significant change in the "determined" leak rate can be achieved. Regrettably, the δT_i are usually of different signs. Assuming, for example, that $T_1 = 10^\circ F$ and that $T_2 = -10^\circ F$ we see that when $\alpha_1 = \alpha_2 = 0.05$, then the contribution of sensors #1 and #2 to the "determined" leak rate is 0. If, however, in fact $\alpha_1 = 0.02$ and $\alpha_2 = 0.08$ then the error in the "determined" leak rate is $3 \times (0.08 - 0.02) \times 10^\circ \times 100\% / 500^\circ = 0.36\% / \text{day}$ which is five times more than the whole allowable leak rate for Zion and fifteen times more than the total allowable error! This example is based on realistic assumptions. With the conservative assumptions, error may be 50-100 times in excess of an allowable leak rate and 200-500 larger than the allowable error.

Any value of the leak rate can be "determined" from any set of the raw data just by changing the weight coefficients which is often done through the "locking out" option of computer programs for leak rate calculations. This was done on both, LaSalle and Zion plants.

5. Neither of References 1, 2, 3 provide guidance for determining the weight coefficients crucial for correct testing results. One of the methods still in practice is to assume them to be "all equal". Another deficient method is dividing the total containment volume into a few subvolumes and assuming that sensors falling into the same subvolume have the same weight coefficients. This method may be justified for compartmentalized containments where partition follows physically existing boundaries. For such containments as Zion 1, the results are obviously wrong. For example, (see Exh. C) by observation we see that there is no reason why coefficients of sensors #1 and #2 should be equal.

6. Although there is no guidance for determining of weight coefficients in the present regulatory documents, there is a provision for a so-called "verification" procedure. This procedure as set forth in Ref. 1, 2, 3 is fallacious. After the calculated leak rate, L_c , has been "determined", an additional known leak, L_{kn} , is superimposed, and the overall leak, L_{ov} , is "determined" in the same manner. If the following equation (approximately) holds,

$$L_{ov} - L_c \cong L_{kn} \quad (4)$$

then the assumed weight coefficients are believed to be correct. Obviously, L_{ov} and L_c may both be incorrect and satisfy the Equation (4). For example, assume that the real leak rate is 0.5%/day, and the "calculated" leak rate is 0.1%/day (which is a very realistic scenario). An additional leak of 0.1%/day is superimposed, so that the real leak becomes 0.6%/day. However, the "calculated" leak rate may turn out to be only 0.2%/day. Since $0.2 - 0.1 = 0.1$, the Eq. (4) is satisfied and the leak rate is reported as 0.1%/day whereas in fact it is 0.5%/day.

The above analytical considerations are fully substantiated by worked examples in Ref. 5 and Ref. 6.

7. The same statement is substantiated by absurd "negative" leak rates "determined" from actual raw test data. Of course, there are no negative real leaks but there is a lot of fraud, incompetence and a faulty methodology which allows to "determine" any leak rate from any set of the raw data.

8. The same statement is further substantiated by the absurd and unlawful practice of repeating a failed verification test until it "comes out" using the same weight coefficients. If there is any merit in a "verification" test why the practitioners of the art never analyze the basic assumptions about the weight coefficients after an unsuccessful "verification" test? What makes a "successful" verification test more credible than an unsuccessful test (Zion, 1983; Zion, 1984)?

9. Without any prejudice of bringing the following reason and any reason other than stated in my emergency relief petition to obtain your decision on temporary suspension of leak rate tests, I state that the conventional physics does not acknowledge the Eq. 2 for the gas mass. The conventional physics equation well known for at least 200 years ("the ideal gas law") is:

$$W_{\text{CORRECT}} = k \int \frac{P}{T} dV \quad (5)$$

The error due to the incorrect Eq. 2 or due to the approximation to the wrong equation in the form of Eq. 1 has been investigated in Ref. 6 theoretically, in Ref. 6, 7, 8 on worked examples and in Ref. 9 on actual data. With the exception of a few initial tests and tests under uniform conditions which are not realistically expected to occur without "equalizing-stabilizing", the use of the wrong Eq. 1, 2 may induce unacceptable errors.

10. Before proceeding to the discussion of the NRC decision on my petition, a brief evaluation of relevant documents is deemed to be important.

- a) As early as 1969, the Ref. 10 confirms that the Eq. 1 is incorrect;
- b) Several Reports submitted to Chairman of the ANS Group 56.8 in 1977-79, establish that the current methodology of leak testing is faulty (Ref. 11);

- c) June 1982. The Ref. 5 presents an example of the use of the wrong equation;
- d) Fall, 1982. The NRC initiates a study of the effect of the wrong equation on actual raw test data (Ref. 9). Several bad tests have been identified and covered up.
- e) January, 1983. A petition to Mr. Palladino for suspension of the faulty testing has been kindly submitted. The supporting Ref. 5 proves that "equalizing-stabilizing" and absence of a scientifically sound method for determining the weight coefficients are safety concerns. Petition has been denied, and no technical discussion to justify the denial has been presented.
- f) April, 1983. The assessment of the current methodology is presented to the NRC (Ref. 6). No technical response to this submittal on the part of the NRC has ever been presented. A few comments on the Ref. 6 can be found in Ref. 7 including comments on the weight coefficient problem. I quote from the page 48: "An important definition missing from the ANSI/ANS document is that concerning the sensor weighting factors. ...no clear technique is known to exist for determining them....A technique for determining weighting factors... should be developed..."
- g) April, 1983. A proprietary document is presented to the NRC containing a method for finding the weighting coefficients. I quote from the Page 10 of the proprietary document prepared by ORNL: "...Ref. 2 (ANSI/ANS Standard-Z.R.) does not contain a method for verifying the weight coefficients....Reytblatt proposes a technique for verification. These coefficients are of extreme importance in the mass calculations and must be correctly evaluated and verified. Reytblatt's procedure is the only one known to be available at present." The NRC refuses to cooperate in the development of the method.
- H) July, 1983. Petition to Mr. Palladino. No positive response.
- J) January 5, 1984. A presentation is given to the NRC at the meeting on LaSalle (Ref. 12). Without any prejudice to further investigation of improprieties involved in preparation of your decision of March 16, 1984 (which I am familiar with) on the petition of Mr. Gogol of CANP, the following comments apply to your decision:
- i) Regarding LaSalle data - you are in violation of 10 CFR, Part I, Subpart A in general and, specifically, of Paragraph 9.4 thereof by withholding the requested records;
- ii) Regarding the validity of the test - you are in violation of 10 CFR, Part 50, Appendix J through non-compliance with ANS N45-1972 which requires that no weighting coefficients shall exceed 0.1 whereas the Exh. g clearly shows the weight coefficient of the sensor #27 in excess of the legal limit;
- iii) Your discussion of deficiencies in the present methodology is non-technical and it is not, therefore, appropriate to indulge in exposing all numerous false or irrelevant statements contained in your discussion at this juncture. Such analysis was done, and it was shown that with the exception of a few trivial statement, all your statements are either incorrect or irrelevant.
- For example, on Page 4, line 12, you say: "...the equation presented in ANSI/ANS 56.8-1981 for calculation of containment air mass is not wrong.." Please, compare this to Page 49, line 16 from the bottom of Ref. 7: "...the EXTRAN formulation (This is a euphemism for the conventional physics ideal gas law equation - Z.R.) of the air mass equation is technically correct while the ANSI/ANS equation is not, because it is based on the invalid assumption that the containment air temperature is uniform."
- Another example is of more serious nature. I invite you to Page 8, line 13: "...Dr. Reytblatt has made a number of submittals to the NRC from May 26, 1982

to July 26, 1983 critiquing ILRT methodology. These submittals were uncollected and classified by Dr. Reythblatt as proprietary." This is a deliberate lie. Not a single of my submittals criticizing the ILRT methodology has been classified as proprietary. It is true that I submitted a proprietary document. However, this document does not discuss the errors of the present methodology and is neither referred nor used in the documents dealing strictly with criticism of the present methodology.

Your next sentence gives us a clue: "Consequently, no detailed discussion of these submittals is presented here. However, the NRC has reviewed these submittals and the overall conclusions...(you present four conclusions-Z.R.)." I kindly submit that the lie about proprietary status of documents containing criticism of the present leak rate methodology was invented precisely to avoid any technical discussion of the subject. I am familiar with four proprietary documents prepared by the NRC or its consultant in response to my proprietary document. One of these responses, indeed, contains a discussion of a few of my comments from one of my non-proprietary submittals. However, all the comments from these non-proprietary submittals discussed in the NRC consultant's review are either supported or claimed to be unimportant, none being shown incorrect.

As to your four conclusions on Page 8, they are obviously incorrect: (1) the fraudulent Zion tests required NRC action; (2) the notion of "proper stabilization" which was invented by Mr. Huang of NRC, is a nonsense. No wonder that he never stated what these conditions are. The notion of equalizing-stabilizing as used presently is meaningless and may serve as a tool of fraud (which actually occurred during fraudulent Zion tests); (3) all my findings and statements are independent of any assumptions. However, the present methodology is based on the assumptions which can not realistically be expected to occur; and (4) whether my "refinements" would alter the calculated leak rate or not, is irrelevant to the fact that the current methods are faulty.

iv) Please, be advised that the so-called Summary of the Meeting prepared by Mr. Schwencer grossly distorts the truth (compare to Exh. D)

v) Another deception is the numerical comparison of the results obtained using the wrong ANSI equation and the conventional physics equation from a set of LaSalle data (Exh. F). This example suggests that there were only 8 instruments whereas in fact, there were 28 in effect and 2 "locked out" instruments. Another possibility is that the example uses some sort of averaged data. However, averaged data should not be used - this is what physics tells us, because the average temperature concept is meaningless for the gas mass determination.

K) March 15, 1984. The faulty methodology is exposed at the ACRS Meeting(Exh. G)

L) June 12, 1984. The Draft Regulatory Guide prepared by Mr. Arndt and based on the deficient methodology is withdrawn from the ACRS by its own author.

M) July, 1984. Fraudulent Zion tests officially classified as deficient. New tests are performed with severe violation of rules.

N) December, 1984. The faulty Draft Regulatory Guide is not submitted to CRGR.

O) March, 1985. The faulty Draft Regulatory Guide is not submitted to CRGR.

P) Leak rate testing using the faulty methodology continues with possible acceptance of containments with abnormally high leak rate.

R) No investigation of past tests is done. The raw test data are not made

available for an independent review.

DISCUSSION OF THE NRC DECISION

1. Contents of the decision.

In his decision Mr. Rehm (a) acknowledges receipt and consideration of my petition; (b) confirms that the technical material in the petition has been made known to the NRC previously; (c) expresses satisfaction with the NRC review of a representative sample 1984 Zion test average temperature calculation based on current practice; and (d) states that my comments will be considered in the preparation of the "regulatory guide addressing ANSI/ANS 56.8-1091."

My petition is denied "since the review of prior correspondence reveals that no new issues have been raised by my petition."

2. Evaluation of the NRC response.

(a) My analytical proof of the fact that any value of leak rate can be "determined" from any set of the raw data (Page 3,4 of Exh. A) neither has been responded nor any reference disproving this fact has been brought by Mr. Rehm;

(b) My worked example illustrating grave consequences of the use of the wrong mass equation has not been responded;

(c) My charge that the absurd "negative" leak rates "determined" based on current practice, has not been responded nor any reference containing a plausible explanation of these absurd results has been brought;

(d) My charge that the present "verification" test is meaningless has not been responded nor any reference to the contrary of my statement has been presented;

(e) I charged that there was a severe violation of Appendix J to 10 CFR, Part 50 during the July, 1984, Zion test in that that when after the "unsuccessful" verification test, the basic assumptions of the test were not analysed but, instead, an unlawfully short test with the same obviously wrong weight coefficients, was performed and "successfully" verified. Since no repair was done between the tests, the containment conditions were identical during the first and the second tests. If the verification procedure had any merit, then the results of these tests should be identical. If they are not identical, then the most conservative result should have been chosen, that is, rejection of the test and reassessment of its basic assumptions.

Based on the first 43 data sets (the only data made available to me), and based on more realistic-conservative weight coefficients, I have established the real leak rate of the Zion, Unit 1 containment in excess of the legal limits. If the test were performed correctly, the wrong weight coefficients would have been detected, the estimate of the real leak rate would have been determined and the leaking paths would have been repaired as required by law.

This my charge has not been addressed in Mr. Rehm response. His reviewing of test average temperature calculation has nothing to do with this particular charge.

(f) Comparison between my charges and the NRC Decision arguments shows that these arguments as identified above, are either trivial ((a) and (b)) or irrelevant ((c)) and incorrect ((d)); please, see Exh. H which is an official FOIA list of comments and which does not contain any of my comments).

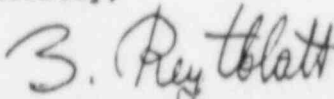
(g) My petition contains a new technical issue - invalidity of the Zion test. In addition to that, since other technical issues have not been addressed by the NRC on the technical level, and since no action has been done to stop the wrong testing, my petition in accordance with 10 CFR 2.206, provides a justified basis for emergency relief on the part of the NRC.

REQUESTS

1. Overturn the NRC decision of February 20, 1985 and immediately suspend all ILR testing until a scientifically sound methods of determination and verification of weight coefficients are developed.
2. Immediately stop using the wrong gas mass equation.
3. Please, be advised that 10 CFR 2.206 does not allow use of the arguments which are not substantiated. As shown in p. 10, J), Page 5 above, your decision of March 16, 1984 employed unsubstantiated and deceptive arguments. I request that your decision of March 16, 1984 be made null and void.
4. Please, be advised that 10 CFR provides for severe penalties for those preparing false statements. I kindly submit that an investigation be started immediately into the activities of Mesrrs. Arndt, Huang, Shapaker, Schwencer and Novak to determine to what degree, if any, a malicious intent to deceive the CANP was present in their actions.

I shall expect to receive your response in 20 (twenty) working days.

Sincerely,



Zinovy V. Reytlatt, Chair
Department of Mathematics and
Computer Science

LIST OF REFERENCES AND EXHIBITS

REFERENCES

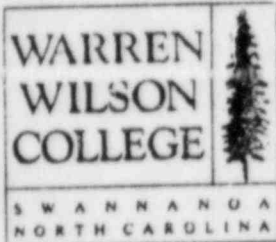
1. ANS N45-1972, Standard
2. ANSI/ANS 56.8-1981, Standard
3. BN-TOP-1, Bechtel
4. Memorandum from EXTRAN to NRC, July 1982
5. Memorandum from EXTRAN to NRC, January, 1983
6. Report "Critique....", EXTRAN, April 1983
7. NUREG-3549, ORNL
8. Letter to ORNL-ACRS of May, 1984
9. Containment Leak Rate Testing Investigation Program (Fin. No. B0489), NRC
10. Report on Leak Rate Testing, Batelle, 1969
11. SAD-307, Sargent & Lundy Report, 1979
12. Summary of the Meeting of January 5, 1984, prep. by Z. Reytblatt

EXHIBITS

- A. Emergency relief petition
- B. NRC Decision
- C. Zion sensor location
- D. Summary of the meeting on LaSalle
- E. LaSalle sensor location
- F. LaSalle related calculations
- G. ACRS related documents
- H. Official list of comments on Leak Rate Methodology /FOIA /

January 9, 1985

Exh. A.



THIS LETTER CONTAINS EMERGENCY RELIEF
MATERIALS

Mr. T. A. Rehm, Assistant for Operations
Office of the Executive Director
for Operations
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Rehm:

SUBJECT: LEAKAGE RATE TESTING

Thank you very much for your letter of October 30, 1984, responding to my letter to you of September 29, 1984. I received the Zion test data in early November. The present letter discusses your response and contains requests (REQUEST 2. and 3.) which I am hereby petitioning to treat separately as emergency relief requests.

BACKGROUND

For more than two years I have been submitting evidence to the NRC that the present methodology of leak rate testing is faulty to the extent that any "good" value of leak rate can be "determined" using this methodology.

I maintain that I have not received a technical response from the NRC to my technical submittals containing a criticism of the existing methodology.

I maintain that to prevent fraudulent and/or erroneous tests such as Zion tests some immediate actions are necessary; I proposed some such actions but nothing has been done so far.

Furthermore, I suggest that there are attempts underway to perpetuate this situation and to cover up the bad tests.

THE CONTENTS OF MY LETTER TO YOU OF SEPTEMBER 29, 1984

1. The contents of my previous letters to you and to Mr. Ross is brought out. Basically, I complained that I had not received a technical response from the NRC, that the ORNL Report had addressed only a few of my comments and had found no errors in them, and that even those of my comments which had been supported by the ORNL Report, were completely ignored in the Draft Regulatory Guide, and that my request to Mr. Palladino for banning the obviously erroneous features of testing had not been responded.

701 WARREN WILSON COLLEGE ROAD SWANNANOVA, NORTH CAROLINA 28778-2099 (704) 298-3325

An Equal Opportunity Institution

~~0543154270~~ bfp

2. The contents of your letter of September 7, 1984 was briefly presented. Basically, you informed me that the NRC accepted some of my comments and disagreed on others (no clues to identification provided), and that you intended to proceed with redrafting of the Reg. Guide and that the "results and conclusions of the NRC staff review process were documented in the February 13, 1984 memo from E. G. Arndt to R. D. Thompson."

3. In the following discussion it was demonstrated that not a single comment of my of those which had been addressed to by the NRC or its consultant, was proven to be incorrect. The discussion was followed by a conclusion summarizing the findings, and by requests of which the main were:

A. Provide a list of the basic comments to be incorporated into the redrafting process of the Draft Regulatory Guide.

B. Form an ad hoc committee or call for a meeting to conduct a constructive discussion of the leak rate methodology.

C. Review those parts of my submittals which have not yet been addressed to and provide a debriefing meeting with the reviewers who have evaluated the "Critique".

D. Prepare a positive response to my letter that I sent to Chairman Palladino and please immediately ban the use of the wrong equation and of equalizing-stabilizing.

E. Conduct an investigation into the activities of Mr. Arndt related to the cover-up of bad tests and impeding with comment review and with rulemaking.

F. Provide adequate leadership for efficient rulemaking related to the leak rate testing.

THE CONTENTS OF YOUR LETTER

1. You confirm the NRC intention to abolish a Rule which, in compliance with the Atomic Energy Act, specifies the methodology(ies) allowed for testing. Instead, you express your support for a "no rule" situation when the NRC staff would arbitrarily allow any methodology including the wrong BN-TOP-1 or ANSI/ANS 56.8-1981.

2. You state that "a regulatory guide is being prepared as the endorsement mechanism for ANSI/ANS 56.8-1981."

3. You state that "the more current draft of the guide is planned", that "it will be issued for a formal public review" and "comments will be invited when it is ready for a formal public review". These comments "will then be eventually addressed in a Public Comment Resolution Memo which will be made available when the regulatory guide is issued in final form."

4. You express a belief that availability of the Zion test data, the ACRS reponse, the FOIA request outstanding to ORNL in regard to acquiring their data, and the Division of Contracts response, would respond to the items I addressed in our meeting (of October 5, 1984) and my requests for information contained in my letter of September 29, 1984.

5. You express a disbelief that actions in regard of my requests A. through F. as shown above, are appropriate.

DISCUSSION

The numerals refer to your statements as expressed above.

1. I believe that the American people will never accept your dangerous attempt to destroy a law in favor of a judgement of an executive. The several fraudulent Zion tests (approved by the NRC!) provide an additional argument for a strict Rule to secure the public safety instead of relying on the NRC staff. The most urgent problem of today is to identify all the fraudulent and/or invalid tests which are among those accepted by the NRC staff.

2. Your confession is extremely significant. The ANSI/ANS 56.8 is a faulty document. It has been pending with the NRC for four years. Many comments (including my comments) have been collected. Instead of responding to these comments as provided by law, you rename the same faulty document and apply an "endorsement mechanism." By one bold stroke you are trying to dispose of all the existing obligations for responding to the already collected comments (for example, your almost three years old promise to respond to my comments would be thrown out). It is felt that the "endorsing mechanics" was introduced to cause a further extension and, possibly, perpetuation of loose testing under the pretext that more redrafting is needed.

Please, find enclosed my FOIA request for the disclosure of a list of the documents containing or relating to comments on ANSI/ANS 56.8-1981 in the NRC possession.

Since this letter is a public document I provide below the simplest proof that the ANSI/ANS 56.8 allows "determination" of any value of leak rate from any set of the raw data. Please, consider the points a) through c) as the materials supporting the emergency relief appeal (REQUEST 2.)

a) The ANSI/ANS 56.8-1981 states that

$$W = KP / (\sum \alpha_i T_i) \quad (1)$$

where W is the air mass, P is the air pressure, T_i are absolute temperatures at certain points and α_i are certain coefficients ("weighting coefficients"). Therefore, the leak rate, L , is:

$$L = \frac{\delta W}{W} = \frac{\delta P}{P} - \frac{1}{\sum \alpha_i T_i} \cdot \sum \alpha_i \frac{\delta T_i}{T_i} + \varepsilon$$

where symbol δ is self explanatory and ε is smaller than other terms. The only restriction that the ANSI/ANS imposes on α_i is that $0 < \alpha_i < 0.1$. No instructions for determining the weighting coefficients is provided. Obviously, by assigning α_i or changing them, a significant change in the "determined" leak rate can be achieved. Regrettably, the δT_i are usually of

different signs which leads to a conservative error in leak rates up to 0.05/day which may be 50 times in excess of an allowable leak rate and 200 times larger than the allowable error.

Not only are these weight coefficients "calculated" using arbitrary assumptions, but, also, the computer program developed by "Volumetrics" which has a fraudulent option for doubling of weight coefficients, has been allowed by the NRC. Furthermore, this fraudulent option has been used (for example, in Zion, November 1983, test, and, possibly in July, 1984, test).

b) The following is the worked example based on the LaSalle test typical data. The spatial temperature variation during the test was about 40°F, the time dependent temperature variation was about 20°F. No pressure change is assumed. Linear temperature distribution is assumed. A cylindrically shaped containment of 1 unit in height is assumed. Millions of ideal temperature sensors are assumed. With these assumptions, the gas mass according to the conventional physics ideal gas law is:

$$W = K P \int_0^1 \frac{dx}{T(x)}$$

The wrong ANSI/ANS equation (1) becomes:

$$W = K P / \int_0^1 T(x) dx$$

At the moment $t=0$,

$$T(x) = 500 + 40x$$

At the moment $t=12$ hr.,

$$T(x) = 520$$

Simple evaluations show that the leak determined using the wrong equation is 0. However, the real leak in this example is:

$$L = \frac{24}{12} \cdot 520 \left(-\frac{1}{520} + \frac{1}{40} \ln \frac{540}{500} \right) = 0.0015 / \text{day}$$

Thus, the use of the wrong equation may lead to non-detection of a leak which is two times higher than allowed for the Zion, Unit 1 and the error is seven times larger than the allowable error. It should be noted, that with the truly conservative assumptions errors may be hundreds of times larger than is allowed.

Many other "methods" to fudge the test results are described in my Report which has not been answered by the NRC.

c) The evidence that the present test methodology has yielded the wrong results is abundant. For example, the so-called negative leaks as recognized even by the NUREG-3549, are absurd. Obviously, the method producing absurd results is inconsistent. However, many negative leak rates have been "determined" using ANSI/ANS 56.8-1981.

The points a), b), c) provide the triad: an analytical proof, a worked example, and actual test results to substantiate a ban on all the tests using the ANSI/ANS 56.8 or similar methodologies.

d) It should be noted that the so called "verification test", in its present form, is meaningless as shown in my report by a worked example. This example has not been addressed in any of the NRC or its consultant's documents.

Since this letter is a public document, I would like to present an elementary analytic discussion, an example, and a brief discussion of actual "verifications".

i) According to ANSI/ANS 56.8, the test assumptions are "verified" when

$$L_{imp} \approx L_{res} - L_{cont} \quad (2)$$

where L_{imp} is a superimposed leak, L_{cont} is the containment calculated leak, and L_{res} is the resulting calculated leak. If the assumptions of the test (to be verified) are not correct, then both L_{res} and L_{cont} may not be correct, however, their difference may turn out to be correct. Therefore, condition (2) proves only the incompetence of its authors and nothing more.

ii) The situation is similar to that when you deposit \$3,000 and a bad teller "proves" that it was only \$2,000. The teller adds a known amount (say, \$1,000) and counts again the total. The bad teller finds the total to be \$3,000. He has "validated" his bad counting since $\$3,000 - \$2,000 = \$1,000$, that is exactly the added known amount. Unfortunately, "verifications" of this sort are accepted in the area of nuclear safety as the following actual event clearly demonstrates:

iii) A meaningless "verification" was performed during Zion test on July 29, 1984. It failed, which should have initiated (if the rules were followed) the analysis of basic assumptions of the test. If the analysis were done scientifically then important assumptions of the test would have been found incorrect, an estimate of the true leak rate would have been found (which, unfortunately, in this case was abnormally high), the leaking paths would have been identified and repaired. Instead, a second "verification" of the same assumptions was performed which "proved" that the test assumptions were correct. With no explanation the first "verification" was rejected and the second accepted. This resulted in acceptance of a containment with an abnormally high leak rate. I am quite certain that this situation will be of concern to the public.

3. You grossly distort the procedure for preparation and issuance of Rules and Regulations as set out in 10 CFR.

a) Since you admitted that the future Reg. Guide is a "mechanism for endorsement of the ANSI/ANS 56.8" then all the comments on the ANSI/ANS 56.8 collected in the past four years must be responded to prior to any further work on the "mechanism."

b) The Draft Rule must be submitted to and discussed before the ACRS. Such discussion, as shown by the transcripts, has not taken place because of Mr. Arndt's withdrawal of the document.

c) The Public Comment Resolution Memo must precede the issuance of the document in final form to allow for corrections.

Your invitation to submit comments on the draft regulatory guide is appreciated. There are plans underway to present this document to the CFRG meeting. I am certain that you will extend your kindness and provide me with

the opportunity to participate in the coming CRGR meeting.

4. The Zion test data, although incomplete, were received here in November. 43 datasets from the July, 1984 test were present (about 15% of the total). The rest is, mostly, the incorrectly calculated intermediate values. However, even the incomplete data, to my great regret (I invested significant efforts in the plant), indicate that there existed an abnormally high leak there. I understand that the CANP will raise their concerns regarding this matter.

I received an adequate response from ACRS.

The Division of Contracts did not stand by its own invitation and cancelled scheduled debriefings after I came to the place of debriefing, financial losses and moral distress being incurred.

The ORNL denied my FOIA request on the ground that they had never possessed the raw data. As you know very well, this is not so. And if it were so, then the NRC confidence in a consultant who uses doubtful sources for his research would be more than strange. How could Mr. Arndt buy such research?

As you can see, my recent actions (FOIA requests) and my future actions (additional FOIA requests) are fully justified by the persistent noncooperation on the part of NRC and ORNL.

I certainly would appreciate your influence with the Division of Contracts for obtaining information through the debriefing process rather than through the FOIA as I indicated in my November letter to you.

5. I believe that you may modify your position regarding my requests B, C, E, and F, and respond to them. My requests A. and D. are superseded by the emergency relief petitions below.

The importance of my requests A. through F. for containment safety is undeniable.

They have not been addressed by the NRC previously.

In such circumstances at least an explanation must be given of reasons why these requests should not be responded to.

Your statement does not contain any explanation. I formally ask that you either respond to my requests or provide an explanation why they should not be responded to.

There are additional arguments for considering my requests of September 29, 1984:

B. What is wrong with an informal meeting where, say, Messrs. Arndt, Huang, Shapaker and other specialists could freely exchange their views? You must agree that the persistent refusal of the NRC staff to meet and to present their arguments may be interpreted as the absence of any sound arguments.

C. The NRC is in violation of the procedures covering treatment of the emergency relief petitions. The CANP in its emergency relief petition of September, 1982 referred to my Report as a source document. Mr. Denton's determination referred to the same report and stated that the answer to it had been prepared. Such a document, having been referred to in the official NRC determination, should be in the public domain. However, no such document exists as you yourself stated in our correspondence. I believe that it is in the best interests of the NRC to prepare the document that the NRC claimed

E/h.B



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

FEB 20 1985

Dr. Zinovy V. Reytlatt, Chairman
Department of Applied Mathematics &
Computer Science
Warren Wilson College
Swannanoa, North Carolina 28778

Dear Dr. Reytlatt:

This is to acknowledge receipt and consideration of your January 9, 1985 letter directed to me. The content of your letter has been reviewed by the NRC staff with the following comments, which I am passing on to you.

The technical material in your letter has previously been presented by you to the NRC staff in various forms, including written and oral presentations. The staff has had continued dialogue with you on issues related to containment leak rate testing extending over many years, which has included extensive correspondence on the subject. The technical issues raised in your most recent letter have all received NRC staff consideration. Although your specific reference to the software used in the 1984 Zion containment integrated leak rate test is new, the underlying subject is again that of proper use of weight coefficients, which has been previously raised by you and considered by the staff. In any event, the NRC staff has again reviewed a representative sample 1984 Zion test average temperature calculation and is satisfied with the results, based on current practice.

Since the review of prior correspondence reveals that no new technical issues have been raised by your January 9, 1985 letter, the letter provides an insufficient basis for emergency relief on the part of the NRC.

As noted in my letter to you of October 30, 1984, your comments will be considered in the preparation of the regulatory guide addressing ANSI/ANS 56.8-1091. We will follow our normal procedures with regard to public input, and further opportunities will exist for input from the public at large, as well as from you.

Sincerely,

T. A. Rehm
Assistant for Operations
Office of the Executive Director
for Operations

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had been prepared.

E. As I never denied, I have personal complaints against Mr. Arndt. These complaints will be presented at the appropriate moment. Therefore, I will avoid any conflict of interest which may develop during the proposed investigation. The evidence against Mr. Arndt fully substantiates an investigation. It is in the best interests of everybody to conduct this investigation as promptly as possible.

F. Facts speak for themselves. After five years of the "endorsement mechanics", the regulatory guide has been withdrawn by its own author without any attempt to defend his "mechanism." A new version scheduled for the December CRGR meeting has been postponed. The new amended version is not expected to be presented in March, 1985, according to some sources. Most of the currently performed tests run on exemptions. This is an abnormal situation. A shake-up in the Task leadership is imperative. If I understand the Division of Responsibilities of NRC, running tests on an exemption basis is of concern to the Assistant Director for Operations.

REQUESTS

1. Please, respond positively to my requests B through F as stated above.

2. Please, treat the request below as an emergency relief petition and respond to this item in 10 working days:

Immediately ban all the integral containment leakage rate tests until the NRC position on determining the weighting coefficients is worked out and validated. For background see the present letter.

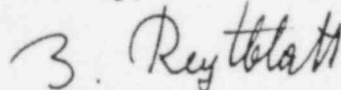
3. Please, treat the request below as an emergency relief petition and respond to this item in 10 working days:

Immediately ban use of the computer software of the type used at Zion test (Volumetrics) until it is rewritten and revalidated.

Ban doubling of the weight coefficients.

For background see Enclosure 1.

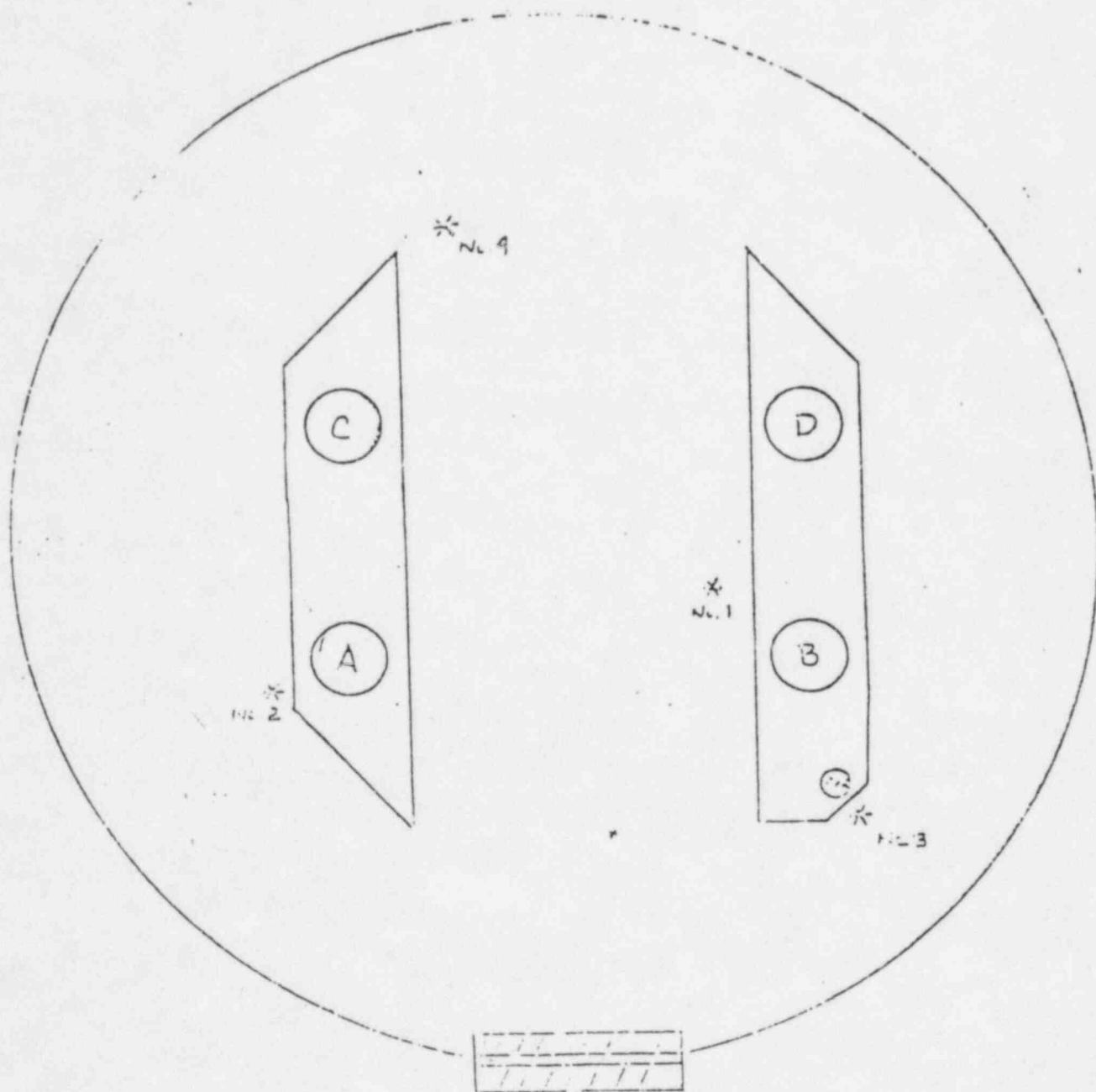
Sincerely,



Z. Reythblatt, Chair
Department of Applied Mathematics and
Computer Science

Exh. C

View Looking Down - Instrumentation Layout
(CABLES)



Exh D

EXTRAN, INC.

EXPERIMENTAL AND THEORETICAL RESEARCH AND ANALYSIS

P. O. BOX 2559

CHICAGO, ILLINOIS 60690

(312) 477-1776

February 20, 1984

Mr. Edward M. Gogol, Research Director
Citizens Against Nuclear Power
220 S. State St.
Chicago, IL 60604

Dear Mr. Gogol:

Thank you very much for sending me my copy of Mr. Denton's letter of February 9, 1984 and for commissioning me to prepare a discussion related to Mr. Schwencer's enclosed materials.

Background.

On January 4, 1984 a meeting on La Salle Station Unit 1 leak rate test was held at the NRC under Mr. T. Novack as Chairman. Immediately after the meeting I put down notes of the meeting. Comparison of these notes with the document prepared by Mr. Schwencer clearly indicates incompleteness of the "Summary" and, possibly, malicious intent of its author to grossly distort the real contents of the meeting by dropping out the most important points of discussion.

In my letter of January 16, 1984 to you I already presented some of the discussion at the meeting. Excuse me for presenting some of these materials again. I am enclosing, also, my response to Mrs. Denton and Schwencer's materials. As you know very well, I have never taken sides in your dispute with the NRC providing strictly scientific services and openly opposing your views on the nuclear energy. I regret that such gross distortion of truth as is presented in Mr. Schwencer's letter forced me to use the appropriate vocabulary.

NOTES OF THE MEETING ON LA SALLE UNIT 1 LEAK RATE TEST ON JANUARY 4, 1984

1. Mr. Novak opens the meeting. Several participants are taking notes. Mr. Novak promises to make minutes of the meeting available to every participant. He specifies no agenda and he invites the attendees to introduce themselves.
2. An employee of the NRC (Mr. Huang ?) introduces himself and states that both the NRC and the industry are satisfied with the current state of leak rate testing. He claims that he is not familiar with my "Critique..." and asks for a copy of it. He is explained that the document was sent to NRC almost a year ago and is available at the PDR.
3. Mr. Reytblatt introduces himself as a representative of Mr. Gogol and Chicago Branch of CANP concerning technical aspects of leak rate testing at the La Salle Station Unit 1. He asks Mr. Novak about the agenda of the meeting. He agrees that because Mrs. Arndt and Burns who are familiar with all the

materials which Mr. Reytblatt had sent to NRC, did not attend the meeting, the agenda should cover only the La Salle leak test.

4. Mr. Reytblatt states that the most important pieces of information concerning the La Salle Unit 1 leak rate test was not made available to him by his customer, CANP. He lists the following items:

- (a) location of instruments;
- (b) explicitly stated weight coefficients;
- (c) state of ventilation during the test;
- (d) individual temperature sensor readings; and
- (e) individual pressure gauge readings.

4. The Com. Ed. representative confirms that Mr. Reytblatt understood correctly what weight coefficients had been used. Mr. Reytblatt accepts this explanation which answers his item (b).

5. The Com. Ed. representative assures that no fans were used during the test. He adds that he personally opposes using fans and tries to avoid such practices. Mr. Reytblatt accepts this explanation which answers his item (c).

6. Mr. Reytblatt is shown sketches of instrument arrangement from a distance. He requests photocopies of just two pages. He is denied these materials. He insists that these two pages contain vital information because it appears that some of the weight coefficients, in reality, may have exceeded 0.1 which would make the test invalid. The meeting agrees that this information is essential. Mr. Novak promises to send these pages to Mr. Reytblatt directly. Mr. Reytblatt accepts this as a compromise to his item (a) question.

7. The meeting agrees that individual temperature sensor readings are essential in establishing leak rates. The Com. Ed. representative confirms that information in question is stored on tape and can be made available in a matter of minutes although the printout would be voluminous (about a hundred pages). Mr. Novak promises to send these materials directly to Mr. Reytblatt for unknown reasons.

8. There is a disagreement on item (e). The NRC representative brings out two contradictory reasons why such information (about 2-3 pages of computer output!) should not be made available to the public: (i) because instrument readings may have errors and (ii) because the readings should be close since they should be close. Dr. Reytblatt indicates that (i) theoretical bounds on pressure fluctuations within a containment require experimental verification of such fluctuations; (ii) that in some cases up to 6 pressure gauges were used during a test some of them showing substantial deviations in pressure change from the average pressure change, and (iii) no regulatory document permits substitution of the average pressure for individual pressure gauge readings.

The meeting agrees that individual pressure gauge readings are essential for leak rate determination. Mr. Novak promises to send these two pages to Mr. Reytblatt (instead of Mr. Gogol) or to send him a plausible explanation why such information should be withheld from the public.

9. At this point Mr. Novak invites questions to Mr. Reytblatt. Mr. Reytblatt is standing at the blackboard. He is illustrating his answers by deriving equations, bringing numerical examples, sketching etc. It should be noted that all the meeting participants had complete freedom to present a discussion and

only Mr. Reytlatt actually seized such an opportunity.

Mr. Reytlatt received several questions, such as: (i) is it true that if the conditions are stabilized then the correct method and the commonly used method yield the same result? and (ii) what's wrong with the verification test? Mr. Reytlatt answered these question and other questions to satisfaction of the audience. The summary of his discussion is presented below in form of Mr. Reytlatt's statements because none of these statements have been objected.

A. The present state of leak rate testing is unacceptable. Any value of the leak rate can be "determined" from any set of the raw data by manipulations which are permitted by the current regulatory documents.

B. The correct equation of air mass calculation is:

$$W = \text{const} \cdot \int_V \frac{P}{T} dv$$

and the approximate equation for tests is:

$$W = \text{const} \cdot P \cdot \sum \frac{\alpha_k}{T^{(k)}}$$

The commonly used equation

$$W = \text{const} \cdot P / (\sum \alpha_k T^{(k)})$$

is not an approximate equation because the more instruments are used, the closer the result is to the wrong equation:

$$W = \text{const} \cdot P / \int_V T dv$$

C. When the temperature spacial distribution is uniform, the wrong equation yields the same result as the correct equation. Such conditions may occur (although not very often) or may not occur naturally (they did not occur at La Salle).

D. When there is no temperature change in the containment, both equations yield the same L.R.=0. This did not occur at La Salle where temperature change in time of 140 F has been recorded.

E. Realistic theoretical bounds of the error due to the wrong equation are presented in Mr. Reytlatt's "Critique" and conservative bounds have been presented to the NRC in July, 1982 and January, 1983. These papers prove that leaks ten and even hundreds times larger than allowable may not be detected because the wrong equation was used. None of these papers have been responded by the NRC.

F. Artificial attempts to "equalize" or to "stabilize" temperatures may induce even greater errors (in terms of leak rates). These wrong practices were severely criticized by many practitioners of leak testing (by Dr. Hill of Bechtel, as an example). The whole notion of "stabilization" was invented either for the purpose of cheating or it resulted from an obvious mistake which my undergraduate students could spot in a few minutes. Worked examples show that "stabilization" as presented in the regulatory documents is, at least, meaningless, that is, abnormally high leak rates have not been detected by these documents despite conditions being "stabilized".

G. "Stabilization" as well as usage of the wrong equation should be immediately banned.

H. The so-called "verification test" as presented in regulatory documents is meaningless. Worked examples show that a leak 10 times greater than allowed has not been detected by the verification test. If L_1 , L_{imp} and L_2 are "measured", "superimposed" and "resulting" leaks, respectively, they are related by an equation:

$$L_1 + L_{imp} = L_2$$

In this equation, only L_{imp} is known, whereas procedures to determine two other quantities are the same and, therefore, correctness of these procedures can not be validated. Mr. Reytblatt indicates how this situation can be improved.

I. Regulatory documents are severely criticized for not providing guidance for the most important problems of testing - instrument placement and instrument set calibration including weight coefficients. Wrong weight coefficients may lead to non-detecting abnormally high leak rates.

J. Answering to the question from the audience, Mr. Reytblatt criticizes the regulatory documents for inconsistencies in Type A and Type B and C tests which may lead to serious abuses.

K. As a whole, the present regulatory documents do not provide necessary level of guidance and do not secure detection of abnormally high leak rates and, therefore they should be modified and their provisions allowing usage of wrong equation, ventilation, and other obvious abuses, should be immediately banned.

L. Mr. Reytblatt indicates that many of the questions raised at the meeting have been taken care of in the proprietary document submitted to the NRC in April, 1983. He indicates that there are many other deficiencies in the regulatory documents, which have not been discussed at the meeting because of lack of time and because he did not expect a discussion on general topic.

10. All questions of the audience were answered to their satisfaction. There was no mention of "volume weighted" or "mass weighted average" during the meeting. At the end of the meeting, Mr. Reytblatt made a statement that he did not see an immediate danger at La Salle Station and that he was not a member of CANP or any other group. He explained that, personally, he was for the nuclear power, however, he puts his commitment to high scientific standards above his preferences.

11. I considered calculations enclosed in Mr. Denton's letter. It is not clear what data he used, because only 28 sensors were used during the test, not 30 as he states. It is not clear what he means by the " " method. Since Mr. Denton of the NRC claims that the NRC does not have LaSalle data, it is most likely that another wrong equation was used to calculate T as a weighted harmonic average of averages in subvolumes. Nevertheless, to the contrary of Mr. Denton's statements, his calculations prove that the error in mass calculation at LaSalle was about:

Therefore, the possible error in leak rate due to the wrong equation may be about:

Of course, whether it is less or more than 13% can be determined only when the full data is examined. Considering that the allowable error is about 25% and that many other factors contribute to the error, it is irresponsible to ignore a 50% contribution to the error. Please, note that error of 0.08% is unacceptable for many plants, including Zion, and that realistic bounds are usually several times larger and conservative bounds 10 times larger. The present example, if valid, only confirms my point.

Sincerely,

Z. Reytblatt

Z. Reytblatt
President

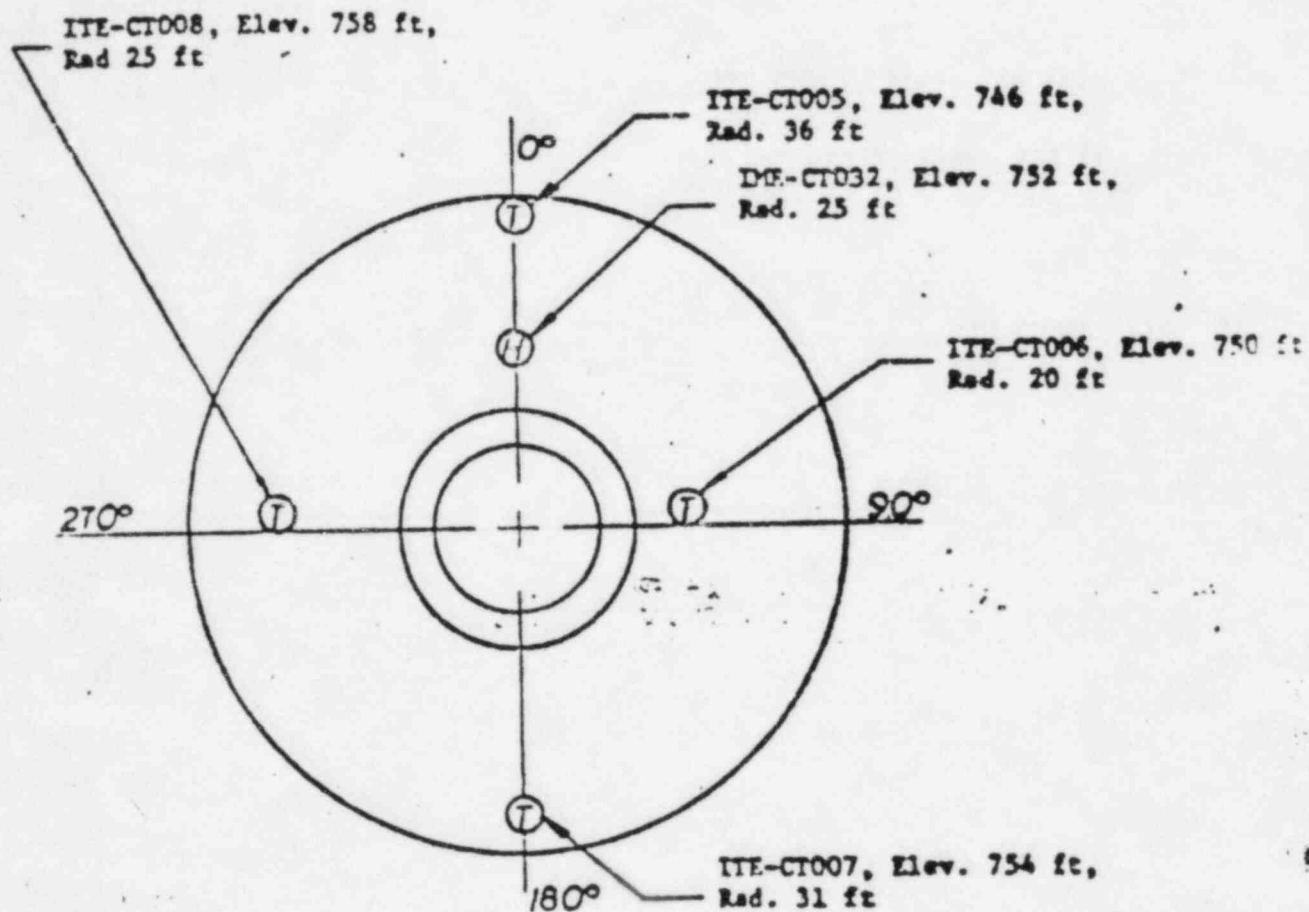


Fig. 2.7 - Plan View of Sensor Locations, Subvolume 7

Sub vol

WF

Exh. F

1	0.01031
2	0.01746
3	0.04130
4	0.09628
5	0.14063
6	0.01797
7	0.25769
8	0.41836

Data	Set F	\bar{T} mean $^{\circ}R$	$\frac{1}{T}$ mean $^{\circ}R$
2		556.41	556.10
4		556.45	556.17
42		556.91	556.57
86		557.24	556.90
142		557.69	557.23

These calls grossly distort the truth! not 8 then they were 28 sensors, are averages of 28 data are averages of 28 text on math or physics

① There are meaningless (see any text on math or physics)

② If these are meaningless (see any text on math or physics)

Handed to Dr. Rayblat 1/4/84

inty AS B.R.

Exh. C

EXTRAN, INC.
EXPERIMENTAL AND THEORETICAL RESEARCH AND ANALYSIS
P. O. BOX 2849
CHICAGO, ILLINOIS 60690
(312) 477-1776

STATEMENT TO THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

March 15, 1984

One of the most important characteristics of containment performance is its ability to contain radioactive gases during an accident.

Rules for leakage rate testing are set out in Appendix J to 10 CFR Part 50 which calls for leak testing in accordance with the obsolete standard ANS N45-1972.

Currently, tests are performed following the ANSI/ANS 56.8-1981 Standard pending with the NRC for endorsement.

Substantial evidence indicates that this document lacks important provisions and contains wrong provisions. Some of its provisions are loose so that any value of leak rate can be "determined" from any set of raw data using the faulty standard.

This evidence includes, but is not limited to, worked examples, theoretical analyses and, to the extent limited by non-availability of essential data (essential raw data have been withheld by the NRC), independent reviews of actual testing. Not a single piece of evidence which I presented to the NRC since the Spring of 1982 has been responded to. Out of four of my proposals aimed at improving the situation, only one has been reviewed, and that one by an incompetent and biased reviewer whose identity has not been revealed and whose "evaluation" has not been made available.

Basic deficiencies and errors of the present leak rate testing methodology as regulated by both faulty standards are:

1. Lack of recommendations for instrument arrangement;
2. Lack of recommendations for weight coefficient evaluation;
3. Lack of any procedures for the set-up calibration;
4. Allowing non-quantified "stabilization" with the meaningless "stabilization criterion";
5. Recommending a procedure for mass calculation which is equivalent to approximating the wrong equation:

$$W = c \cdot P / \int_V T dV$$

instead of the correct equation:

$$W = c \int_V \frac{P}{T} dV$$

6. Lack of quantified recommendations for blocking penetration paths during the test;
7. Loose recommendations on data discarding;
8. Loose recommendations on instrument quantity and quality;
9. Substitution of integral testing by local testing is not restricted;
10. Accuracy of local testing is not consistent with the requirements of integral testing, which allows one to underestimate the integral leak rate;
11. "Verification" procedures as presented are meaningless. That is, abnormally high leak rates may not be detected by either or both the verification test and the primary test.
12. Archiving requirements are so loose that they prevent a meaningful independent review. For example, one of my clients has been trying to obtain raw data for 8 months and has not been successful.

There are many other "deficiencies" which primarily are aimed at the facilitation of cheating and withholding evidence.

Review of materials made available to me by my client on La Salle, Unit 1 and Zion, Unit 1 Leak Rate tests leads to important conclusions:

The LaSalle Unit 1 test of 1982 may be invalid, with the leak rate, probably, of the order of the magnitude of the allowed leak rate (that is, no more than 2-5 times larger than allowed);

The Zion Unit 1 test of 1981 was fraudulent and there is no guarantee that the real leak is less than ten times the allowable leak rate.

I repeat my previous request, and I insist that a temporary ban on all leak rate testing be immediately imposed, and that the situation be promptly investigated and corrected.

Zinovy V. Reytblatt
President

EXTRAN, INC.
EXPERIMENTAL AND THEORETICAL RESEARCH AND ANALYSIS
P. O. BOX 2849
CHICAGO, ILLINOIS 60690
(312) 477-1776

May 18, 1984

Chairman,
Advisory Committee on
Reactor Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir:

This is concerning my presentation on March 15, 1984.

After the presentation I was told that I should be contacted regarding the matter. This did not happen.

In the same time, efforts are underway to perpetuate the wrong methodology of leak rate testing and to vindicate the past tests. During my presentation I presented some evidence that the LaSalle, Unit 1 test of 1982 was not a valid test and that the Zion, Unit 1 test of 1981 was fraudulent. I called for an investigation of both tests. Not a single of my accusations was answered by the NRC. Instead, the report ORNL/TM-8909 was sent to me. This report addresses only a few issues that I have raised and supports all of them with the exception of one, that is the significance of the wrong equation used in all past tests for the air mass calculation. There is a strong evidence that not only the authors' approach and methodology of investigation were incorrect, but that the "selectivness" in presenting the data can not be ruled out. I am enclosing my letters regarding this matter.

I suggest that the NRC (Dr. G. Arndt) and the ORNL should be heard on the Committee on the subject. This should be done as soon as possible and, definitely, before the passage of another faulty document prepared by Dr. Arndt and Mr. Dougan.

I suggest, further, that I should be notified on the time and place of such presentation(s) and that a discussion should be held where I could present my point of view.

Thank you very much for the opportunity to speak before the Committee. I hope to hear from you soon.

Sincerely,

~~8448284300~~ bfp
3. Reytblatt
Z. Reytblatt

Enclosure:
ZVR:psd

TYPICAL "REALISTIC ERROR RESULTING FROM ANSI/ANS EQUATION

in %/day (X 0.01)

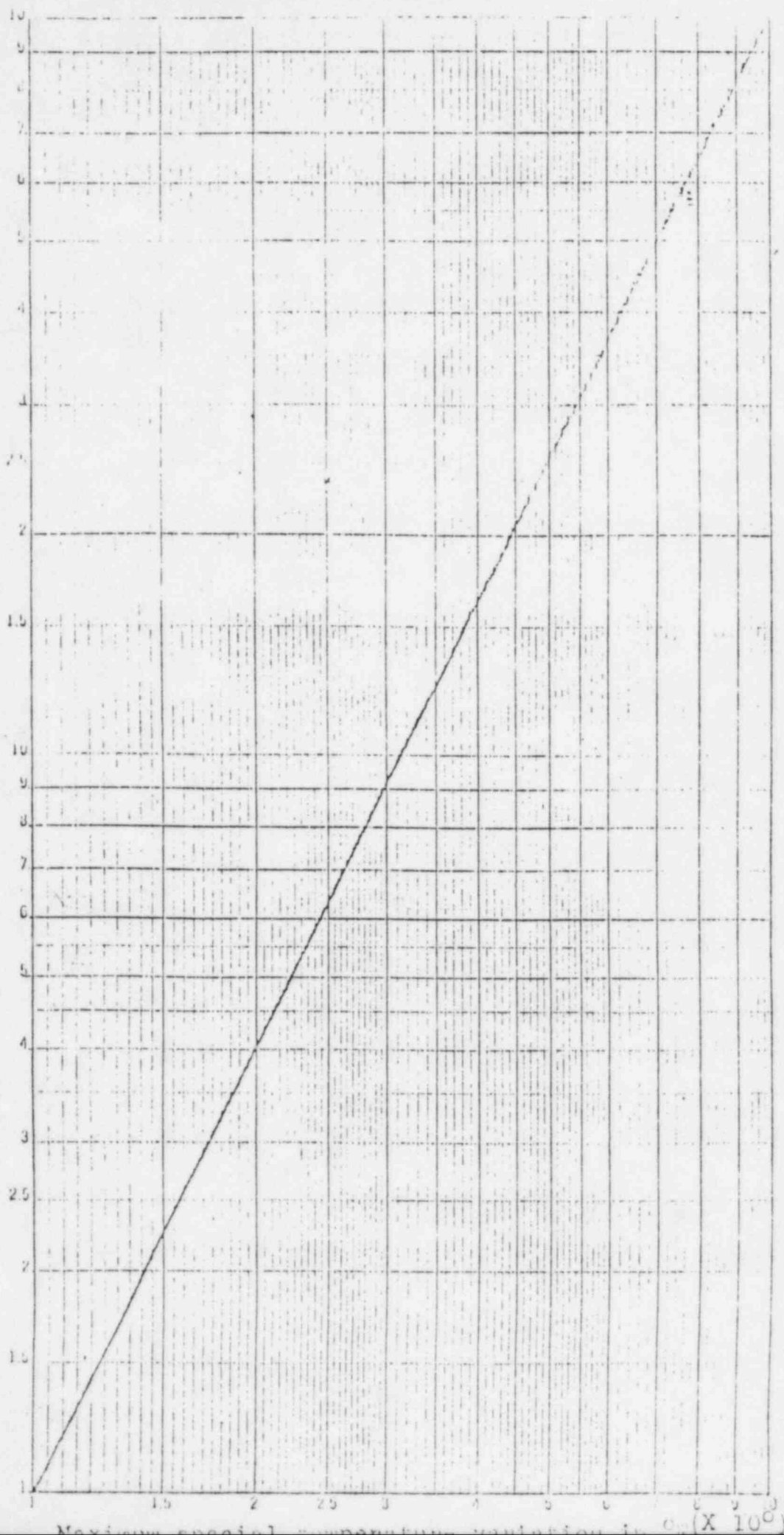


FIG. 1

Exhibit B.

"REALISTIC" SIMULATION OF ERRORS IN ANSI/ANS MASS
EQUATION VERSUS CONVENTIONAL IDEAL GAS LAW

Although simulation has no bearing on regulatory documents where only worked negative examples and conservative estimates (bounds) may provide basis for rulemaking, actual error magnitude can be grasped using simulation. Some results in this direction have been obtained by the ORNL. However, results published in the ORNL/TR-8909 fall out of the practically important range from 10° to 70°F. As is shown below, a totally wrong decision about "adequacy" of the wrong ANSI/ANS mass equation was based on such incomplete data. To fill this gap, an analytic investigation was done using various realistic assumptions on spacial temperature distribution. A typical relationship between the maximum spacial temperature distribution and the most likely error resulting from usage of the wrong ANSI/ANS equation is shown in Fig. 1. Actual errors can be several times larger or several times less than the most likely error (which is the so-called mathematical expectation).

A simple computer program was written to support the analytical solution (a typical run is shown in Fig. 2). Many computer simulations were done and these materials fully support our conclusion. The summary of the investigation is presented in Tab.1 and leads to an unquestionable conclusion that the incorrect ANSI/ANS equation can be used only when the allowable leak rate exceeds 0.5%/day and the temperature spatial variations are less than 100°F, providing that no "stabilizing-equalizing" is done. With any other conditions there is no guarantee that either an abnormally high leak rate will have passed undetected or that the uncertainty in leak rate will be abnormally high.

Exh. H.

APPENDIX

FOIA - 85-24

LIST OF DOCUMENTS WITH COMMENTS ON ANSI/ANS 56.8

1. 02/28/75 Memorandum for G. A. Arlotto from B. H. Grier, entitled, "Suggested Revisions and Clarifications to Appendix J, 10 CFR 50 and ANSI N45.4-1972 (AITS F14026H1) with enclosures (9 pages).
2. 07/01/75 Memorandum for Attendees from Gunter Arndt, entitled "Summary of Meeting to Review Comments on ANSI N274" (2 pages).
3. 06/16/77 Note for Gunter Arndt from K. V. Seyfrit, forwarding Regional Comments on ANS 274, Draft 1 (17 pages).
4. 06/23/77 Memorandum for S. Rurka from M. Kehnemuyi with comments on N274, Draft 1, Revision 3, dated 6/25/76 (9 pages).
5. 06/23/77 Same as #4, but with cover page marked up (9 pages).
6. 06/29/77 Memorandum for M. Kehnemuyi from R. Tedesco, entitled "ANS N274, Containment System Leakage Requirements" (20 pages).
7. 06/29/77 Same as #5, but partially marked up (20 pages).
8. 07/13/77 Memorandum for M. Kehnemuyi from D. Eisenhut, entitled "ANS N274, Containment System Leakage Requirements" (4 pages).
9. 08/03/77 Correspondence to Members of Work Group 56.8 from S. Rurka, with enclosures (34 pages).
10. 02/10/78 Correspondence to Members of Work Group 56.8 from S. Rurka, without enclosures (2 pages).
11. 02/14/78 Memorandum for K. Seyfrit, J. Shapaker, C. Grimes, entitled "ANS-50 Ballot on ANS 56.8 (N274)" (1 page).
12. 02/14/78 Correspondence to Members of ANS-50 from S. Rurka, with WG 56.8 responses to ANS 50 comments (35 pages).
13. 03/14/78 Ballot for D. Campbell from M. Kehnemuyi on ANS 56.8, Draft 2, February 1, 1978 (2 pages).
14. 03/30/78 To Arndt from _____, Ballot Tally Sheet of Power Reactor Systems Committee (1 page).
15. 12/18/78 Memorandum for S. Levine, et. al., from W. Morrison, entitled "National Standard Review Request," for ANS 56.8 Draft 2, Revision 3, without standard, (3 pages).

16. 01/09/79 Ballot for M. Weber from J. Shapaker, without enclosures, on ANS 56.8, Draft 2, Revision 3, November 15, 1978 (1 page).
17. 01/09/79 Same as #16 from A. Kasper, Combustion Engineering, Inc., with enclosures (8 pages).
18. 01/10/79 Memorandum for W. Morrison from L. Crocker, entitled "National Standard Review Request, ANS 56.8 (N274), Containment System Leakage Testing Requirements, Draft 2, Revision 3, November 15, 1978" (1 page).
19. 01/11/79 Memorandum for W. Morrison from E. Jordan, entitled "Review of Standard, Containment System Leakage Testing Requirements, Draft 2, Revision 3, dated November 15, 1978," (3 pages).
20. 01/11/79 Same as #18, but marked up (3 pages).
21. 01/17/79 Memorandum for W. Morrison from L. Shao, entitled "ANS 56.8 (N274), Containment System Leakage Testing Requirements, Draft 2, Revision 3, dated November 15, 1978 - Review of Standard," (2 pages).
22. 01/19/79 Memorandum for W. Morrison from D. Eisenhut, entitled "ANS 274, Containment System Leakage Testing Requirements," (4 pages)
23. 01/19/79 Original NUPPSCO Committee Ballot on ANS 56.8, Draft 2, Revision 3, with enclosures (17 pages).
24. 02/09/79 Revised ballot of #23 (14 pages).
25. 08/07/79 Letter to G. Arlotto from S. Rurka, forwarding Revision 3, Draft 3 (22 pages).
26. 10/15/79 Committee Correspondence for S. Rurka from G. Arlotto regarding 02/09/79 ballot and ANS 56.8 Revision 3, Draft 3, dated July 1979 (11 pages).
27. 09/10/70 Memorandum for G. Arndt from E. Adensam, entitled "Request for Review and Comment of ANS-N274" (1 page).
28. 09/26/79 Marked up N274 paragraphs from D. Lurie (15 pages).
29. 09/26/79 Comments on N274 resolution of G. Arlotto comments (20 pages).
30. 09/27/79 Memorandum for G. Arndt from D. Lurie, entitled "Draft 3, Revision 3, ANS 56.8/N274, Containment System Leakage Rate Requirements" (1 page).
31. 09/28/79 Memorandum for G. Arndt from E. Jordan, entitled "Comments on ANS N274, Draft 3 - July 1979 and Disposition of Comments" (4 pages).

32. 10/04/79 Routing slip to Gunter Arndt from Jim Pulsipher (1 page).
33. 02/08/80 Correspondence to Members of Work Group 56.8 from S. Rurka with marked up pages of ANS 56.8, Draft 3, dated July 1979 (22 pages).
34. 03/05/80 Routing slip to Gunter Arndt from Jim Pulsipher (1 page).
35. 12/29/81 Memorandum for Carl Johnson from G. Arndt, entitled "M.D. Weber 11/23/81 Letter to NUPPSCO Members" (2 pages).
36. 04/02/82 Memorandum for J. Shapaker from D. Lurie, entitled "Errors in American National Standard ANS-56.8-1981, Containment System Leakage Testing Requirements" (2 pages).
37. 07/02/82 Memorandum for P. Williams from D. Brinkman, entitled "Review of ANSI/ANS 56.8-1981" (2 pages).
38. 07/09/82 Notes on RRAB comments (1 page).
39. 07/15/82 Memorandum for L. Shao from J. Clark, entitled "ANSI/ANS-56.8-1981, Containment System Leakage Testing Requirements" (1 page).
40. 07/22/82 Memorandum for L. Shao from E. Jordan, entitled "Review of ANS 56.8 Containment System Leakage Testing Requirements" (2 pages).
41. 08/06/82 Memorandum for G. Arndt from F. Maura, entitled "Comments on ANSI/ANS 56.8 for Incorporation into RG (Working Paper A)" (4 pages).
42. 09/17/82 Memorandum for L. Shao from S. Hanauer, entitled "Review of ANSI/ANS 56.8-1981 "Containment System Leakage Testing Requirements," without enclosures (2 pages).
43. 01/04/83 Correspondence to Members of ANSI/ANS 56.8 Working Group from S. Rurka (34 pages).
44. 01/07/83 Memorandum for Z. Rosztoczy from W. Butler, entitled "Comments on Draft Regulatory Guide MS 021-5 and American National Standard ANSI-56.8-1981" (13 pages).
45. 01/18/83 D. Lurie comments on Appendix G to ANS 56.8-1981 (4 pages)
46. 05/17/83 Routing slip for J. Shapaker from G. Arndt with editorial comments for forwarding to ANS 56.8 Committee (5 pages).
47. 05/17/83 Same as #48, annotated (5 pages).

48. 05/22/84 Memorandum for C. P. Siess, et al., from Sam Duraiswamy, ACRS, entitled "Status Report - ACRS Subcommittee Meeting on the Regulatory Activities, June 12, 1984, Washington, D.C. (10 pages).
49. 06/12/84 Meeting transcript and minutes, Regulatory Activities Subcommittee, ACRS, June 12, 1984, ACRST-1321 and ACRS-2220.
50. 06/18/84 Letter to William J. Dircks, EDO, from J. C. Ebersole, Chairman, ACRS, entitled "ACRS Action on Regulatory Guides and Regulations" (2 pages).
51. undated Note sheet, entitled "ANS N274, Draft 1, Revision 3 6/25/76" "Summary of Contents" (1 page).
52. undated Revision #1 of 1/19/79 ballot comments (14 pages).
53. undated Notes on ANS 56.8, Draft 3 - July 1979 (9 pages).
54. undated Notes of ANS 56.8 committee meeting.

March 8, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

APPEAL

In the Matter of

COMMONWEALTH EDISON COMPANY,
VOLUMETRICS, Inc.
(Zion Station, LaSalle County
Station)
AND ALL LIGHT-WATER REACTORS
USING VOLUMETRICS SOFTWARE

ON THE EMERGENCY RELIEF
DECISION

INTRODUCTION

On January 9, 1985, the Petitioner filed an emergency relief petition with the Office of the Executive Director for Operations seeking an immediate termination of use of the Volumetrics computer program for processing leak rate test raw data until the software is debugged and revalidated, the petition being supported by the evidence from the Zion leak rate test showing that the program does not perform addition and/or division correctly which consequently may lead to underestimating abnormally high leak rates to the degree that such leak rates would appear to be within normal limits. Such misrepresentation according to Appendix J to 10 CFR constitutes a danger to public safety and requires your immediate action.

As stated in the NRC letter of February 20, 1985, to the Petitioner (Exh. B), the Petition has been considered by the NRC, and was found to be providing an unsufficient basis for emergency relief on the part of the NRC. The NRC Decision does not dispute the computer output supporting the Petition. The NRC Decision has not supported its Decision by any essential calculations, discussion or references.

BACKGROUND

Several fraudulent Zion tests employed the Volumetrics software. Many other tests which have not yet been found deficient, employed the same software. Regulations governing the safety related software provide for debugging and revalidating such software when mistakes in calculations have occurred.

DISCUSSION

1. Contents of the NRC Decision

The Decision (a) acknowledges receipt and consideration of the charge; (b) confirms that the charge is new; and (c) introduces a concept of an "underlying subject" which, it is claimed, has been previously raised by the Petitioner and considered by the staff. Further ((d)), the Decision informs on the NRC satisfaction with some different calculations, and (e) the Decision states that the charge is not new.

2. Discussion of the Decision

- (a), (b). The Petitioner agrees with the NRC statements.
- (c) The statement is irrelevant to the fact that the software does not handle properly arithmetic operations.
- (d) Rules governing usage of safety related computer software prohibit such usage after just one occurrence of an incorrect result has been disclosed, regardless of satisfaction or dissatisfaction of the NRC with other results. It is quite common that a faulty computer program yields the correct results most of the times, and the incorrect results - only in a few times. Such programs are not allowed for safety related calculations.
- (e) The Decision contradicts its own findings (see (b)). However, even the assumption that the Petition did not raise "new technical issues" is not a basis for a denial if it is shown, as it has undeniably been, that there are immediate safety concerns. It appears that the NRC Decision is deliberately confusing the Petitioner on the good reasons for emergency relief actions.

CONCLUSIONS

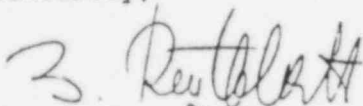
- 1. The NRC is in violation of 10 CFR, p. 2.206 by not responding to the concrete piece of evidence - failure of the software in question to perform arithmetic operations of addition and/or division.
- 2. The NRC arguments are either selfcontradictory or irrelevant.
- 3. The NRC failed to show why the software proven to produce an arithmetically wrong result at least once, should not be debugged and revalidated.

REQUESTS

- 1. Immediately revoke validating documents of the software in question, order the debugging and revalidation.
- 2. I am enclosing an FOIA request for the list of (validated) computer programs for processing of leak rate data, and for the listing of the Volumetrics faulty program. Your cooperation is kindly sought in accordance with 10 CFR, Part I, Subpart A, Paragraph 9.4.
- 3. In accordance with 10 CFR, Part I, Subpart A, Paragraph 9.4 and applicable provisions of the FOIA, 552 USC and amendments thereof, I request that all the records related to revalidation of the Volumetrics program in the future, be made available to me for inspection at the time of their submittal to the NRC or shortly thereafter and prior to finalizing the validation.

I shall expect to receive your response in 20 (twenty) working days.

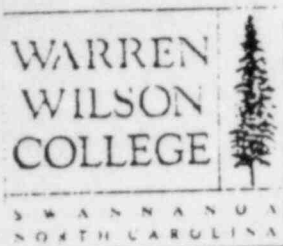
Sincerely,



Zinovy V. Reytblatt, Chair
Department of Mathematics and
Computer Science

Exh A

January 9, 1985



THIS LETTER CONTAINS EMERGENCY RELIEF
MATERIALS

Mr. T. A. Rehm, Assistant for Operations
Office of the Executive Director
for Operations
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Rehm:

SUBJECT: LEAKAGE RATE TESTING

Thank you very much for your letter of October 30, 1984, responding to my letter to you of September 29, 1984. I received the Zion test data in early November. The present letter discusses your response and contains requests (REQUEST 2. and 3.) which I am hereby petitioning to treat separately as emergency relief requests.

BACKGROUND

For more than two years I have been submitting evidence to the NRC that the present methodology of leak rate testing is faulty to the extent that a n y "g o o d" v a l u e o f l e a k r a t e c a n b e "d e t e r m i n e d" u s i n g this methodology.

I maintain that I have not received a technical response from the NRC to my technical submittals containing a criticism of the existing methodology.

I maintain that to prevent fraudulent and/or erroneous tests such as Zion tests some immediate actions are necessary; I proposed some such actions but nothing has been done so far.

Furthermore, I suggest that there are attempts underway to perpetuate this situation and to cover up the bad tests.

THE CONTENTS OF MY LETTER TO YOU OF SEPTEMBER 29, 1984

1. The contents of my previous letters to you and to Mr. Ross is brought out. Basically, I complained that I had not received a technical response from the NRC, that the ORNL Report had addressed only a few of my comments and had found no errors in them, and that even those of my comments which had been supported by the ORNL Report, were completely ignored in the Draft Regulatory Guide, and that my request to Mr. Palladino for banning the o b v i o u s l y erroneous features of testing had not been responded.

701 WARREN WILSON COLLEGE ROAD SWANNANOVA, NORTH CAROLINA 28778-2099 (704) 298-3325

An Equal Opportunity Institution

~~0503150298 050308~~
PDR ADOCK 05000295
P FIR

2. The contents of your letter of September 7, 1984 was briefly presented. Basically, you informed me that the NRC accepted some of my comments and disagreed on others (no clues to identification provided), and that you intended to proceed with redrafting of the Reg. Guide and that the "results and conclusions of the NRC staff review process were documented in the February 13, 1984 memo from E. G. Arndt to R. D. Thompson."

3. In the following discussion it was demonstrated that not a single comment of my of those which had been addressed to by the NRC or its consultant, was proven to be incorrect. The discussion was followed by a conclusion summarizing the findings, and by requests of which the main were:

A. Provide a list of the basic comments to be incorporated into the redrafting process of the Draft Regulatory Guide.

B. Form an ad hoc committee or call for a meeting to conduct a constructive discussion of the leak rate methodology.

C. Review those parts of my submittals which have not yet been addressed to and provide a debriefing meeting with the reviewers who have evaluated the "Critique".

D. Prepare a positive response to my letter that I sent to Chairman Palladino and please immediately ban the use of the wrong equation and of equalizing-stabilizing.

E. Conduct an investigation into the activities of Mr. Arndt related to the cover-up of bad tests and impeding with comment review and with rulemaking.

F. Provide adequate leadership for efficient rulemaking related to the leak rate testing.

THE CONTENTS OF YOUR LETTER

1. You confirm the NRC intention to abolish a Rule which, in compliance with the Atomic Energy Act, specifies the methodology(ies) allowed for testing. Instead, you express your support for a "no rule" situation when the NRC staff would arbitrarily allow any methodology including the wrong BN-TOP-1 or ANSI/ANS 56.8-1981.

2. You state that "a regulatory guide is being prepared as the endorsement mechanism for ANSI/ANS 56.8-1981."

3. You state that "the more current draft of the guide is planned", that "it will be issued for a formal public review" and "comments will be invited when it is ready for a formal public review". These comments "will then be eventually addressed in a Public Comment Resolution Memo which will be made available when the regulatory guide is issued in final form."

4. You express a belief that availability of the Zion test data, the ACRS response, the FOIA request outstanding to ORNL in regard to acquiring their data, and the Division of Contracts response, would respond to the items I addressed in our meeting (cf October 5, 1984) and my requests for information contained in my letter of September 29, 1984.

5. You express a disbelief that actions in regard of my requests A. through F. as shown above, are appropriate.

DISCUSSION

The numerals refer to your statements as expressed above.

1. I believe that the American people will never accept your dangerous attempt to destroy a law in favor of a judgement of an executive. The several fraudulent Zion tests (approved by the NRC!) provide an additional argument for a strict Rule to secure the public safety instead of relying on the NRC staff. The most urgent problem of today is to identify all the fraudulent and/or invalid tests which are among those accepted by the NRC staff.

2. Your confession is extremely significant. The ANSI/ANS 56.8 is a faulty document. It has been pending with the NRC for four years. Many comments (including my comments) have been collected. Instead of responding to these comments as provided by law, you rename the same faulty document and apply an "endorsement mechanism." By one bold stroke you are trying to dispose of all the existing obligations for responding to the already collected comments (for example, your almost three years old promise to respond to my comments would be thrown out). It is felt that the "endorsing mechanics" was introduced to cause a further extension and, possibly, perpetuation of loose testing under the pretext that more redrafting is needed.

Please, find enclosed my FOIA request for the disclosure of a list of the documents containing or relating to comments on ANSI/ANS 56.8-1981 in the NRC possession.

Since this letter is a public document I provide below the simplest proof that the ANSI/ANS 56.8 allows "determination" of any value of leak rate from any set of the raw data. Please, consider the points a) through c) as the materials supporting the emergency relief appeal (REQUEST 2.)

a) The ANSI/ANS 56.8-1981 states that

$$W = KP / (\sum \alpha_i T_i) \quad (1)$$

where W is the air mass, P is the air pressure, T_i are absolute temperatures at certain points and α_i are certain coefficients ("weighting coefficients"). Therefore, the leak rate, L , is:

$$L = \frac{\delta W}{W} = \frac{\delta P}{P} - \frac{1}{\sum \alpha_i T_i} \cdot \sum \alpha_i \frac{\delta T_i}{T_i} + \varepsilon$$

where symbol δ is self explanatory and ε is smaller than other terms. The only restriction that the ANSI/ANS imposes on α_i is that $0 < \alpha_i < 0.1$. No instructions for determining the weighting coefficients is provided. Obviously, by assigning α_i or changing them, a significant change in the "determined" leak rate can be achieved. Regrettably, the δT_i are usually of

different signs which leads to a conservative error in leak rates up to 0.05/day which may be 50 times in excess of an allowable leak rate and 200 times larger than the allowable error.

Not only are these weight coefficients "calculated" using arbitrary assumptions, but, also, the computer program developed by "Volumetrics" which has a fraudulent option for doubling of weight coefficients, has been allowed by the NRC. Furthermore, this fraudulent option has been used (for example, in Zion, November 1983, test, and, possibly in July, 1984, test).

b) The following is the worked example based on the LaSalle test typical data. The spatial temperature variation during the test was about 40°F, the time dependent temperature variation was about 20°F. No pressure change is assumed. Linear temperature distribution is assumed. A cylindrically shaped containment of 1 unit in height is assumed. Millions of ideal temperature sensors are assumed. With these assumptions, the gas mass according to the conventional physics ideal gas law is:

$$W = K P \int_0^1 \frac{dx}{T(x)}$$

The wrong ANSI/ANS equation (1) becomes:

$$W = K P / \int_0^1 T(x) dx$$

At the moment $t=0$,

$$T(x) = 500 + 40x$$

At the moment $t=12$ hr.,

$$T(x) = 520$$

Simple evaluations show that the leak determined using the wrong equation is 0. However, the real leak in this example is:

$$L = \frac{24}{12} \cdot 520 \left(-\frac{1}{520} + \frac{1}{40} \ln \frac{540}{500} \right) = 0.0015 / \text{day}$$

Thus, the use of the wrong equation may lead to non-detection of a leak which is two times higher than allowed for the Zion, Unit 1 and the error is seven times larger than the allowable error. It should be noted, that with the truly conservative assumptions errors may be hundreds of times larger than is allowed.

Many other "methods" to fudge the test results are described in my Report which has not been answered by the NRC.

c) The evidence that the present test methodology has yielded the wrong results is abundant. For example, the so-called negative leaks as recognized even by the NUREG-3549, are absurd. Obviously, the method producing absurd results is inconsistent. However, many negative leak rates have been "determined" using ANSI/ANS 56.8-1981.

The points a), b), c) provide the triad: an analytical proof, a worked example, and actual test results to substantiate a ban on all the tests using the ANSI/ANS 56.8 or similar methodologies.

d) It should be noted that the so called "verification test", in its present form, is meaningless as shown in my report by a worked example. This example has not been addressed in any of the NRC or its consultant's documents.

Since this letter is a public document, I would like to present an elementary analytic discussion, an example, and a brief discussion of actual "verifications".

i) According to ANSI/ANS 56.8, the test assumptions are "verified" when

$$L_{imp} \approx L_{res} - L_{cont} \quad (2)$$

where L_{imp} is a superimposed leak, L_{cont} is the containment calculated leak, and L_{res} is the resulting calculated leak. If the assumptions of the test (to be verified) are not correct, then both L_{res} and L_{cont} may not be correct, however, their difference may turn out to be correct. Therefore, condition (2) proves only the incompetence of its authors and nothing more.

ii) The situation is similar to that when you deposit \$3,000 and a bad teller "proves" that it was only \$2,000. The teller adds a known amount (say, \$1,000) and counts again the total. The bad teller finds the total to be \$3,000. He has "validated" his bad counting since $\$3,000 - \$2,000 = \$1,000$; that is exactly the added known amount. Unfortunately, "verifications" of this sort are accepted in the area of nuclear safety as the following actual event clearly demonstrates:

iii) A meaningless "verification" was performed during Zion test on July 29, 1984. It failed, which should have initiated (if the rules were followed) the analysis of basic assumptions of the test. If the analysis were done scientifically then important assumptions of the test would have been found incorrect, an estimate of the true leak rate would have been found (which, unfortunately, in this case was abnormally high), the leaking paths would have been identified and repaired. Instead, a second "verification" of the same assumptions was performed which "proved" that the test assumptions were correct. With no explanation the first "verification" was rejected and the second accepted. This resulted in acceptance of a containment with an abnormally high leak rate. I am quite certain that this situation will be of concern to the public.

3. You grossly distort the procedure for preparation and issuance of Rules and Regulations as set out in 10 CFR.

a) Since you admitted that the future Reg. Guide is a "mechanism for endorsement of the ANSI/ANS 56.8" then all the comments on the ANSI/ANS 56.8 collected in the past four years must be responded to prior to any further work on the "mechanism."

b) The Draft Rule must be submitted to and discussed before the ACRS. Such discussion, as shown by the transcripts, has not taken place because of Mr. Arndt's withdrawal of the document.

c) The Public Comment Resolution Memo must precede the issuance of the document in final form to allow for corrections.

Your invitation to submit comments on the draft regulatory guide is appreciated. There are plans underway to present this document to the CRGR meeting. I am certain that you will extend your kindness and provide me with

the opportunity to participate in the coming CRGR meeting.

4. The Zion test data, although incomplete, were received here in November. 43 datasets from the July, 1984 test were present (about 15% of the total). The rest is, mostly, the incorrectly calculated intermediate values. However, even the incomplete data, to my great regret (I invested significant efforts in the plant), indicate that there existed an abnormally high leak there. I understand that the CANP will raise their concerns regarding this matter.

I received an adequate response from ACRS.

The Division of Contracts did not stand by its own invitation and cancelled scheduled debriefings after I came to the place of debriefing, financial losses and moral distress being incurred.

The ORNL denied my FOIA request on the ground that they had never possessed the raw data. As you know very well, this is not so. And if it were so, then the NRC confidence in a consultant who uses doubtful sources for his research would be more than strange. How could Mr. Arndt buy such research?

As you can see, my recent actions (FOIA requests) and my future actions (additional FOIA requests) are fully justified by the persistent noncooperation on the part of NRC and ORNL.

I certainly would appreciate your influence with the Division of Contracts for obtaining information through the debriefing process rather than through the FOIA as I indicated in my November letter to you.

5. I believe that you may modify your position regarding my requests B, C, E, and F, and respond to them. My requests A. and D. are superseded by the emergency relief petitions below.

The importance of my requests A. through F. for containment safety is undeniable.

They have not been addressed by the NRC previously.

In such circumstances at least an explanation must be given of reasons why these requests should not be responded to.

Your statement does not contain any explanation. I formally ask that you either respond to my requests or provide an explanation why they should not be responded to.

There are additional arguments for considering my requests of September 29, 1984:

B. What is wrong with an informal meeting where, say, Messrs. Arndt, Huang, Shapaker and other specialists could freely exchange their views? You must agree that the persistent refusal of the NRC staff to meet and to present their arguments may be interpreted as the absence of any sound arguments.

C. The NRC is in violation of the procedures covering treatment of the emergency relief petitions. The CANP in its emergency relief petition of September, 1982 referred to my Report as a source document. Mr. Denton's determination referred to the same report and stated that the answer to it had been prepared. Such a document, having been referred to in the official NRC determination, should be in the public domain. However, no such document exists as you yourself stated in our correspondence. I believe that it is in the best interests of the NRC to prepare the document that the NRC claimed

had been prepared.

E. As I never denied, I have personal complaints against Mr. Arndt. These complaints will be presented at the appropriate moment. Therefore, I will avoid any conflict of interest which may develop during the proposed investigation. The evidence against Mr. Arndt fully substantiates an investigation. It is in the best interests of everybody to conduct this investigation as promptly as possible.

F. Facts speak for themselves. After five years of the "endorsement mechanics", the regulatory guide has been withdrawn by its own author without any attempt to defend his "mechanism." A new version scheduled for the December CRGR meeting has been postponed. The new amended version is not expected to be presented in March, 1985, according to some sources. Most of the currently performed tests run on exemptions. This is an abnormal situation. A shake-up in the Task leadership is imperative. If I understand the Division of Responsibilities of NRC, running tests on an exemption basis is of concern to the Assistant Director for Operations.

REQUESTS

1. Please, respond positively to my requests B through F as stated above.
2. Please, treat the request below as an emergency relief petition and respond to this item in 10 working days:

Immediately ban all the integral containment leakage rate tests until the NRC position on determining the weighting coefficients is worked out and validated. For background see the present letter.

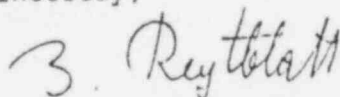
3. Please, treat the request below as an emergency relief petition and respond to this item in 10 working days:

Immediately ban use of the computer software of the type used at Zion test (Volumetrics) until it is rewritten and revalidated.

Ban doubling of the weight coefficients.

For background see Enclosure 1.

Sincerely,



Z. Reytblatt, Chair
Department of Applied Mathematics and
Computer Science

DEFICIENCIES IN ZION (VOLUMETRICS) SOFTWARE

The following channels were specified for subvolume 2 during the December, 1983 leak rate test of Zion, Unit 1: 2,3,4,8,9,13,14,18,19 (the total of nine).

The subvolume average temperature was not calculated correctly by the program. For example, using the dataset #302 determine:

Channel	Temperature
2	71.83
3	72.07
4	67.42
8	71.14
9	71.18
13	69.08
14	71.03
18	67.14
19	70.97

Average 70.206

Volumetrics 70.487

Error 0.281

One explanation is that the program was not properly debugged. Another possibility is that the fraudulent "doubling" option has been executed (that is doubling of certain weight coefficients to "determine" more favorable leak rate). Whatever the reason, since such error may not have been systematic, the absolute error in the leak rate (at 12 hr. test duration) is of the order $0.281 \times 0.32 \times 24 / (12 \times 500) = 0.04\%/day$ which exceeds the total allowable error.

Z. Reytblatt

Z. Reytblatt

CPFEW TICKET NO. 000492 2.206

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