

OAK RIDGE NATIONAL LABORATORY

OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION



POST OFFICE BOX Y
OAK RIDGE, TENNESSEE 37830

March 29, 1984

Mr. Gunter Arndt
Mechanical/Structural Engineering Branch
Division of Engineering Technology
NL 238
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Gunter:

This letter summarizes our program on the Containment Leak Rate Testing Investigations (Fin. No. B0489) for the month of March 1984.

Technical Highlights

The final report for this program has been completed and distributed. An abstract of the report "Evaluation of Containment Leak Rate Testing Criteria (NUREG/CR-3549; ORNL/TM-8909)," follows:

Containment leaktightness is verified periodically through pressure tests and the measurement of the subsequent leakage. The verification process is composed of three types of test: Type A tests of the entire containment system; Type B tests of all containment penetrations, except isolation valves; and Type C tests of isolation valves. These tests are conducted in accordance with Appendix J of the *Code of Federal Regulations* and an industry standard, ANSI/ANS-56.8-1981. Revision of Appendix J, to reflect technological advances and testing experience, has been under consideration for years and has culminated in the issuance of a draft version of a proposed revision. To assist in the revision process, a review of the existing and proposed guidelines in light of utility test data and experience was conducted.

A review of 49 Type A test reports and 46 Type B and C test reports was accomplished. Exemption requests found in 25 reports and 100 Licensee Event Reports (LERs) were also reviewed. Two major findings of the data analysis were that Type A test durations of less than 24 h are practical and that almost all Type A test failures and delays were caused by excessive leakage through Type B- and C-tested components. Excessive valve leakage represented 38% of the LERs and highlighted the need for improved maintenance, repair, and testing of these components. Excessive airlock leakage was generally

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the result of worn, damaged, misaligned, or dirty door seals.

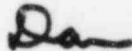
The proposed revision to Appendix J appears to be very responsive to the results of test experience and technological changes. One major change is the requirement that "as found" leakages must be reported as well as "as left" leakages. This change should help eliminate the poor performance of local leak testing programs. The clarification and rewording of several areas should help reduce the number of exemptions requested. The introduction of a regulatory guide provides a vehicle for the Nuclear Regulatory Commission to specify any exceptions to the relevant industry standards and to resolve areas of conflict.

Expenditures

	<u>Prior Fys</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>
Expenditure (\$K)	112	9	13	3	0	3	5*
Cumulative (\$K)	112	121	134	137	137	140	145

*Estimated

Sincerely,



D. J. Naus

DJN:ege

ROUTING AND TRANSMITTAL SLIP		Date
		4/11/84
TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. Jim Pulsipher		
2.		
3.		
4.		
5.		

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

REMARKS

1. Any suggested changes before I formally transmit this to ORNL?

2. Please provide RES some memo documentation that NRR wants #2 and that RSCB concurs.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Gunter Arndt	238 NL
	Phone No.
	37860

5041-102

☆ GPO : 1982 O - 381-529 (223)

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

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OK'd by J. Pulsipher via phone
4/12/84
E88

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NRR:CSB ILRT QUESTIONS

1. Which Type A tests exhibited diurnal effects and on what basis was this determination made?
2. For those tests that exhibited diurnal effects, was there some deficiency in the test program (instrumentation, procedures, etc.) that led to the diurnal effects?
3. What, if anything, could have been done before or during the test to eliminate, reduce, or account for the effects of perturbations in the containment environment on the measured leak rate (do not include analysis techniques)?
4. Can certain containment types be declared immune to diurnal effects (e.g., dual containments) or others (e.g., free-standing steel) particularly susceptible to diurnal effects?
5. Do measured air mass oscillations due to diurnal effects affect the calculated UCL leak rate so that the UCL is always a conservative measure of actual leak rate, or could actual leak rate possibly exceed UCL?
6. Is this a function of the magnitude of the measured air mass oscillations?
7. Do temperature changes appear to lag pressure changes in the containment during a test exhibiting diurnal effects?
8. What are the variations of RTD measurements, spatially and temporally, during tests exhibiting diurnal effects?
9. How do the EPRI reduced duration criteria handle diurnal effects?

Which Type A tests exhibited diurnal effects and on what basis was this determination made? For those tests that exhibited diurnal effects, was there some deficiency in the test program (instrumentation, procedures, etc.) that led to the diurnal effects? That is, what, if anything, could have been done before or during the test ^{to} eliminate, reduce, or account for the effects of perturbations in the containment environment on the measured leak rate (do not include analysis techniques)? Can certain containment types be declared immune to diurnal effects (e.g., dual containments) or others (e.g., free-standing steel) particularly susceptible to diurnal effects? Do measured air mass oscillations due to diurnal effects affect the calculated UCL leak rate so that the UCL is always a conservative measure of actual leak rate, or could actual leak rate possibly exceed UCL? Is this a function of the magnitude of the measured air mass oscillations? Do temperature changes appear to lag pressure changes in the containment during a test exhibiting diurnal effects? What are the variations of RTD measurements, spatially and temporally, during tests exhibiting diurnal effects? How do the EPRI reduced duration criteria handle diurnal effects?

Gunter, I'm going to get this retyped, but I thought I'd send you a copy of this to look at. I'll try to get the retyped copy to you by Friday.

DRAFT: 3/22/84 (pt)

Jim Pulipher

Which Type A tests exhibited diurnal effects? ^{AND ON WHAT BASIS WAS THIS} ~~How does one determine~~ ^{TIME MAP?} ~~that diurnal effects are present?~~ For those tests that exhibited diurnal effects, was there some deficiency in the test ^{PROGRAM} (instrumentation, procedures, etc.) that let ^{d TO} the diurnal effects ^{become apparent or} ~~troublesome?~~ That is, what, if anything, could have been done ^{BEFORE OR} during the test to ^{OR} account for, eliminate, ~~or~~ reduce the effects of ~~diurnal~~ ^{PERTURBATION} variations ^{CONTAINMENT} of the environment on the measured leak rate (do not include analysis techniques)? ^{CAN} ~~Are~~ ^{BE PERFORMED} certain containment types (e. g., dual containments) ~~seemingly~~ immune to diurnal effects, or others (e. g., free-standing steel) ^{TO DIURNAL EFFECTS} ~~that seem~~ particularly susceptible? Do measured air mass oscillations due to diurnal effects affect the calculated UCL leak rate so that the UCL is always a conservative measure of actual leak rate, or could actual leak rate possibly exceed UCL? Is this a function of the magnitude of the measured air mass oscillations? ^{DO} ~~Do~~ temperature changes ^{APPEAR TO} lag pressure changes in the containment during a test exhibiting diurnal effects? ~~By how much? Can this be accounted for with a better instrumentation system?~~ What are the variations of RTD measurements, spatially and temporally, during tests exhibiting diurnal effects? How do the EPRI reduced duration criteria handle diurnal effects?

I know there's too much here for them to answer with the money they have, but we put a lot of questions down so they can pick which ones they can answer.

JP

NOT
TO
CHANGE
CAN/LEAD
IS NOT
ISSUE
EVT. RATHER
EVT. AND
NOT RATHER
THE REASON
THE VOR.

AND:
• MORE RTD'S
• FINER SURVEY
• CLOSER SCRUTINY OF
RTD LOCATION
• FOR FORCED CIRC.
CONT. JATGOS