

NOTE TO: J. Richardson

THRU: J. Burns

FROM: G. Arndt

SUBJECT: STATUS OF ORNL-HELD FUNDS REMAINING FROM FIN B0489, CONTAINMENT
LEAK RATE TESTING

The \$150,000 effort on Appendix J has been completed, with \$3,105 left over.

The \$50,000 supplementary effort on leak rate versus risk for DRA has been completed with \$7,933 left over.

The \$7,933 has been transferred within ORNL and consolidated with Dan Naus' \$3,105, leaving a balance of \$11,038.

This balance is being held in reserve by Dan Naus, ORNL, to provide consulting expertise, if needed, in the area of containment leak rate testing. Some of these funds - about half - may be used to have a potential subcontractor, Quadrex, answer some questions for NRR:CSB on the effects of diurnal temperature changes on leak rate tests. To date, however, Quadrex has not submitted the necessary material to ORNL to subcontract this review of test data.

G. Arndt
Gunter Arndt
Mechanical/Structural Engineering Branch
Division of Engineering Technology, RES

8506180028 850325
PDR FOIA
REYTB LAB5-143 PDR

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3/11/85

File Note:

On 20 February, 1985, I received from D. Naus, ORNL, Quadrex multi-level proposal to review NRC/CSB diurnal questions. These were passed to CSB on 20 Feb with request to review for acceptability.

On ~~about~~ 28 February 1985, I called D. Naus and told him NRC not interested in pursuing this potential work at Quadrex. The CSB found the lowest level proposal not in sufficient depth, and funds are not available for the mid level proposal.

D. Naus indicated the verbal information was sufficient, no letter is needed, and he would let Quadrex know that NRC is not interested in the proposal.

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ROUTING AND TRANSMITTAL SLIP

Date

9/16/83

TO: (Name, office symbol, room number,
building, Agency/Post)

Initials

Date

1. R. Blond

2. W. Milstead

3. W. Paseday

4. J. Shapaker

5.

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|--------------|----------------------|------------------|
| 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

F. Y. I.

This is a copy of the draft
program assumption sent to ORNL
to set up a final work request
with them.

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

FROM: (Name, org. symbol, Agency/Post)

G. Arndt

Room No.—Bldg.

258 NL

Phone No.

35860

5041-102

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

GPO : 1981 O - 341-509 (101)

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OK'd by Flannigan after talking w/
R. Blond on 10/26/82 and on earlier
date (?).

①

FY 1983 PROGRAM ASSUMPTION
DIVISION: DET

TITLE: CONTAINMENT LEAK TEST SENSITIVITY STUDY

FIN NO.: B0489
CONTRACTOR: ORNL
SITE: OAK RIDGE
STATE: TN

NRC TECHNICAL MONITOR: E. G. ARNDT

PRINCIPAL INVESTIGATOR: G. FLANNIGAN

BUDGET ACTIVITY:

FY 83 OBLIG: \$50K

FY 1983 WORK PERIOD: 11/1/82 - 2/1/83

OBJECTIVE:

DETERMINE WHETHER CURRENTLY SPECIFIED CONTAINMENT ALLOWABLE LEAK RATES SHOULD BE REVISED, AND, IF SO, HOW MUCH AND ON WHAT BASIS.

EVALUATE THE DESIRABILITY AND PRACTICALITY OF ESTABLISHING, EXPLICITLY IN APPENDIX J, A SINGLE LEAKAGE LIMITING CRITERION FOR ALL CONTAINMENT TYPES.

SCOPE:

DRAFT NUREG-0773, "REACTOR ACCIDENT SOURCE TERMS: DESIGN AND SITING PERSPECTIVES," DATED MARCH 1982, PRESENTS CURRENT INFORMATION ON REACTOR ACCIDENTS THAT HAVE BEEN ANALYZED FOR VARIOUS REACTOR DESIGNS, AND DEVELOPS A SET OF RADIOACTIVE RELEASES (SOURCE TERMS) IN CATEGORIES 1 THROUGH 5 WHICH REPRESENT THE SPECTRUM OF ACCIDENTS.

USING RELEASE FRACTIONS TO THE CONTAINMENT WHICH CORRESPONDS TO THESE SOURCE TERMS IN CATEGORIES 1 THROUGH 5:

- A. PERFORM A SENSITIVITY ANALYSIS (INCLUDE ALSO TEST COSTS VS CONFIDENCE LEVEL) IN WHICH THE CONTAINMENT DESIGN LEAK RATE IS ASSUMED TO BE 0.1%, 0.5%, 1.0%, 5.0%, 10%, 25%, 50%, and 100% (WT.%/DAY).
- B. DETERMINE THE OFFSITE RISK IN TERMS OF DOSE TO THE PUBLIC FROM EACH OF THESE POTENTIAL CONTAINMENT SOURCE TERMS,
- C. COMPARE RISK REDUCTION OF A SIMPLE GROSS CONTAINMENT INTEGRITY CHECK WITH THESE APPENDIX J LEAK RATE TESTS, AND
- D. EVALUATE THE DESIRABILITY AND PRACTICALITY OF ESTABLISHING, EXPLICITLY IN APPENDIX J, A SINGLE LEAKAGE LIMITING CRITERION FOR CONTAINMENT SYSTEMS THAT WOULD APPLY EQUALLY WELL TO:
 - a) LARGE, DRY PWR CONTAINMENTS,
 - b) TYPE I, II, AND III BWR CONTAINMENTS,
 - c) ICE CONDENSER CONTAINMENTS, AND
 - d) NEGATIVE PRESSURE CONTAINMENTS.

THIS ANALYSIS WILL PROVIDE A BASIS FOR JUDGING WHETHER THE PRESENT APPENDIX J CONTAINMENT INTEGRATED LEAK RATE TEST CRITERIA ARE REALISTIC IN TERMS OF THEIR EFFECT ON PUBLIC RISK AND OPERATIONAL COSTS, AND SHOULD INCLUDE THE FOLLOWING:

- 1) WHETHER THERE IS A CORRELATION BETWEEN LEAKAGE TEST VALUES/TEST INTERVALS AND ESTIMATED ACTUAL LEAKAGE DURING INTERVALS BETWEEN TESTS (BASED ON LERS, AS-FOUND TESTS, ETC.).
- 2) REVIEW THE CURRENT 0.25L SAFETY MARGIN TO SEE WHETHER IT PROVIDES REASONABLE ASSURANCE THAT ACTUAL LEAKAGE DOES NOT EXCEED DESIGN VALUE.

OTHER REFERENCES

- NUREG - 0771, (FOR COMMENT) REGULATORY IMPACT OF NUCLEAR REACTOR ACCIDENT SOURCE TERM ASSUMPTIONS, JUNE 1981.
- NUREG - 0772, TECHNICAL BASIS FOR ESTIMATING FISSION PRODUCT BEHAVIOR DURING LWR ACCIDENTS, JUNE 1981.
- NUREG/CR - 2239 (DRAFT), TECHNICAL GUIDANCE FOR SITING CRITERIA DEVELOPMENT (2.3). DESCRIBES, IN PART, ACCIDENT SOURCE TERMS, RELEASE CHARACTERISTICS, AND UNCERTAINTIES IN SOURCE TERM MAGNITUDES.

4-17-82
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SS7-1 1257

2 100%

3 1/2% 12 hours

4 1% leak rate

5 1/2% "

Fin # B0489

WORK STATEMENT ADDENDUM

Appendix J Requirements/ Site Source Terms

Draft NUREG - 0773, "Reactor Accident Source Terms: Design and Siting Perspectives", dated March 1982, presents current information on reactor accidents that have been analyzed for various reactor designs, and develops a set of radioactive releases (source terms) in categories 1 through 5 which represent the spectrum of accidents.

alt.
2/7/82

Using release fractions to the containment which correspond to these source terms, ~~except for those corresponding to an assumed containment failure (i.e., SSI-1)~~, in categories 1 through 5: *(include test costs vs. confidence level)*
~~SSI-2~~

- A. Perform a sensitivity analysis, in which the containment design leak rate is assumed to be 0.1%, 0.5%, 1.0%, and 5.0% (wt.%/day). *10%, 20%, 50% and 100%*
- B. Determine the off-site risk, in terms of dose, to the public from each of these potential containment source terms, and
- C. Evaluate the desirability and practicality of establishing, explicitly in Appendix J, a single leakage limiting criterion for containment systems that would apply equally well to:
 - a) Large, dry PWR containments,
 - b) Type I, II, and III BWR containments,
 - c) Ice condenser containments, and
 - d) Negative pressure containments.

This analysis will provide a basis for judging whether the present Appendix J containment integrated leak rate test criteria are realistic in terms of their effect on public risk and operational costs, and should include the following:

- 1) Whether there is a correlation between leakage test values/test intervals and estimated actual leakage during intervals between tests (based on LERs, as-found tests, etc.).
- 2) Review the current 0.25L_a safety margin to see whether it provides reasonable assurance that actual leakage does not exceed design value.

Other References

0773
0772

NUREG-0772 Regulatory Impact Report (Walt Pasado)

- 2239 Safety Tech. Comm. / Staff

Not completely available outside NRC (~2-160K)

BA

9/16/82

Bill Milstead, SPEB

#9 2-4 958

Gross Containment Integrity Check

WASH 1400 Table 10

1000 fps velocity (MKI)

No overpressure failure \approx 25 vol. %/hr \approx 70,000 scf/hr \approx 2" ϕ hole

Mk I \approx 2" ϕ hole

PWR \approx 4"-5" ϕ hole

Ice Cond. \approx + 0.3 psi

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X

John Power
Nuclear Safety Analysis Center (NSAC)
Affiliated w/ EPRI
Works w/ INPO
Providing recommendations to BWR Owners' Group

Nov. 15, 1982

(415) 855-2394

Prior to presenting final report w/ recommendations on containment integrated and local leak testing, NSAC wants to informally discuss with NRC both sides philosophies toward leak testing - perhaps last 1/2 in January 1983.

On Dec 7, 8, 1982 in Orlando, The BWR Owners' Group will form a leak testing Subgroup. (Dave Helwig, Phil. Elect.)

Focus will first be on MSIVs leak control systems.

NRC contacts for MSIVs given by me:

Roger W. Woodruff, IE 492-4507

William C. Milstead SFE/NRR 492-4958 (prioritization)

William T. LeFave, ASB, NRR 492-9470 (hardware)

Millard L. Wohl, AEB, NRR 492-7065 (consequences)

I encouraged a dialogue, but noted that AppJ revision drafts could not be made available until released for public comment. This was OK with Mr. Power.

NSAC would like to look at accident scenarios and define potential critical leak paths. They also feel the leak test program needs improvement in many areas.

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