

DEC 20 1978

50-410

MEETING SUMMARY DISTRIBUTION

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

DEC 20 1978

Docket Nos.: 50-358, 50-352/353, 50-367, 50-373/374, 50-387/388,
50-410, 50-322, 50-397

APPLICANT: Members of Mark II Owners Group

SUBJECT: MEETING WITH MARK II OWNERS GROUP TO DISCUSS THE STAFF'S
MARK II CONTAINMENT ACCEPTANCE CRITERIA - NOVEMBER 14, 1978

Background

The staff informed the owners of the lead Mark II facilities in its letter dated September 14, 1978, of the criteria that would be found acceptable for containment evaluation with respect to the pool dynamic loads. A meeting was held on October 19, 1978 with the Mark II owners for the purpose of having them identify those criteria for which they would propose to take exception. At this meeting, the Mark II owners provided the staff with a preliminary description of their proposed approach to resolve our concerns for those areas where they differed with our criteria. Following this meeting the staff provided the Mark II owners with information to clarify the staff's concerns related to the revised methodology for determining the maximum pool swell height. The primary purpose of the meeting on November 14, 1978 was to discuss the Mark II owners' revised methodology for calculating the maximum pool swell height.

An attendance list, copy of our questions, and meeting handouts are enclosed.

Summary

The owners for the lead Mark II plants (Zimmer, Shoreham and LaSalle) took exception to a number of the staff's load definition criteria. In this meeting the Mark II owners discussed the basis for two of these exceptions. These exceptions included the method of determining the maximum pool swell elevation and the associated wetwell pressure.

The Mark II owners originally specified a maximum pool swell elevation of 1.5 times vent submergence. While this specification was determined to be conservative for most of the tests conducted in the 4-T and EPRI subscale test facilities, we could not agree with the Mark II owners, that this was a conservative specification for all cases. The staff proposed in its criteria, that the maximum pool elevation be determined from the pool swell analytical model.

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The Mark II owners, in response to our criteria, proposed an alternative method to calculate the maximum pool swell elevation. This method utilizes the maximum reverse pressure differential on the diaphragm and the corresponding drywell pressure to determine the maximum wetwell pressure. The maximum pool elevation is then determined directly from the pool swell analytical model such that the maximum wetwell pressure not be exceeded. The Mark II owners provided justification for this methodology by comparing the calculated with the observed maximum pool swell and the associated wetwell pressure in the 4T facility.

The staff stated that this new method for calculating pool swell height and wetwell pressure appeared acceptable. However, our final review of this exception to our criteria would be conducted upon receipt of documentation from the Mark II owners, which should include a description and justification for this new methodology.



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Enclosures:
As Stated

cc: See attached pages



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Mark II Meeting
November 14

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L. J. Sobon	GE
L. C. S. Nieh	S&W
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R. L. O'Mara	S&W
H. Chau	Lilco
W. Museler	Lilco
J. E. Metcalf	S&W



Information Requested By NRC

To evaluate the acceptability of the new methodology proposed by the Mark II Owners Group (Response to Round 3 Question 020.68) for determination of the maximum pool swell elevation the staff will require the following information:

- 1) A precise description of how the maximum pool elevation is computed. Specifically:
 - a) How is the uplift differential pressure computed?
 - b) What is the value of drywell pressure used to determine wetwell pressure at maximum pool lift from (a)?
 - c) How is maximum uplift computed from (b)?
- 2) Predictions for maximum uplift shall be developed using the proposed methodology and compared with experimental results for the following 4T test runs:
 - a) All closed Phase I 9 and II foot submergence tests (Runs 27, 28, 29, 30, 31 and 35).
 - b) All Phase II 9 foot submergence tests (Runs 22 and 58).

The predictions shall be compared to the elevations corresponding to the location of the most elevated conductivity probe exhibiting froth activity during any given test. Each data point shall be distinguished by a run number. The source of the drywell pressure history used to develop the theoretical prediction shall be defined explicitly (i.e.: measured or analytic).

- 3) A prediction for maximum uplift shall be developed using the proposed methodology and compared with experimental results for Run 80 of the EPRI



1/13.3 scale 3D tests. In this case comparison with the maximum uplift deduced from the measured wetwell pressures will be acceptable.



NRC LEAD PLANT ACCEPTANCE CRITERIA REVIEW

NOVEMBER 1978 - SNPS APPLICATION

- I. Clarification of method proposed by Mark II response to NRC Question 020.68.
- A. Uplift differential pressure computed by NRC method as stated in NRC Question 020.69.
 - B. Drywell pressure obtained from LOCTVS and pool swell analytical model (PSAM) using "Application Assumptions" from Section 6.7 of NEDE-21544-P. Drywell pressure is that at end of pool swell (zero surface velocity).
 - C. Maximum swell height computed assuming a polytropic compression in the wetwell airspace ($k = 1.2$) and a final wetwell pressure equal to sum of the uplift differential pressure from "A." and the drywell pressure from "B."

Above method used by SNPS - alternate method is to run PSAM with $k = 1.2$ and obtain maximum swell height directly. Both approaches shown for comparison in Figs. 1 and 2.

- II. "020.68 method"/4T comparisons for runs 27, 28, 29, 30, 31 and 35 (Phase I) and runs 22 and 58 (Phase II).
- A. Discussion - 4T modeling
 - 1. 4T facility shown in proprietary Fig. 3 (based on Fig. 3-1 of NEDE-13442-P)
 - 2. Vent equivalent lengths used - 502 ft (Phase I)
- 336 ft (Phase II)
 - 3. Blowdown calculated on the basis of steam generator pressure decay shown in proprietary Fig. 4 (based on Fig. 5-1 of NEDE-13442-P.)

Run 31 modified for liquid initially in dip tube
 - B. Results
 - 1. Phase I LOCTVS/PSAM transients using "Applications Assumptions" provided in Figs. 5a and 5b through 10a and 10b.
 - "a" is drywell and wetwell pressure vs time, "b" is pool surface elevation vs time
 - Swell height calculated using "020.68 method" shown for comparison
 - Maximum measured drywell pressure shown for comparison



2. Comparison of Phase I calculated and observed maximum swell height shown on proprietary Fig. 11.
3. Phase II results similar
 - Run 22 max swell height calc'd - 37.7 ft
max swell height observed - Proprietary
 - Run 58 max swell height calc'd - 37.7 ft
max swell height observed - Proprietary

C. Conclusions

1. 1.5 vent submergence criterion provides adequate conservatism for 11 ft and 13.5 ft submergence cases
2. Only run 35 exceeds calculated value - close inspection of run 29 probe data shows that "splashing" after end of bulk pool swell is not very significant (see proprietary Fig. 12 based on Fig. 46-4 of NEDE-21061-P).
3. Margin between calculated and observed swell height increases with break size (and break area/unit vent area) due to:
 - Increased conservatism of using 2.5 psid uplift differential pressure
 - Greater conservatism in drywell pressure response (see proprietary Table 1)

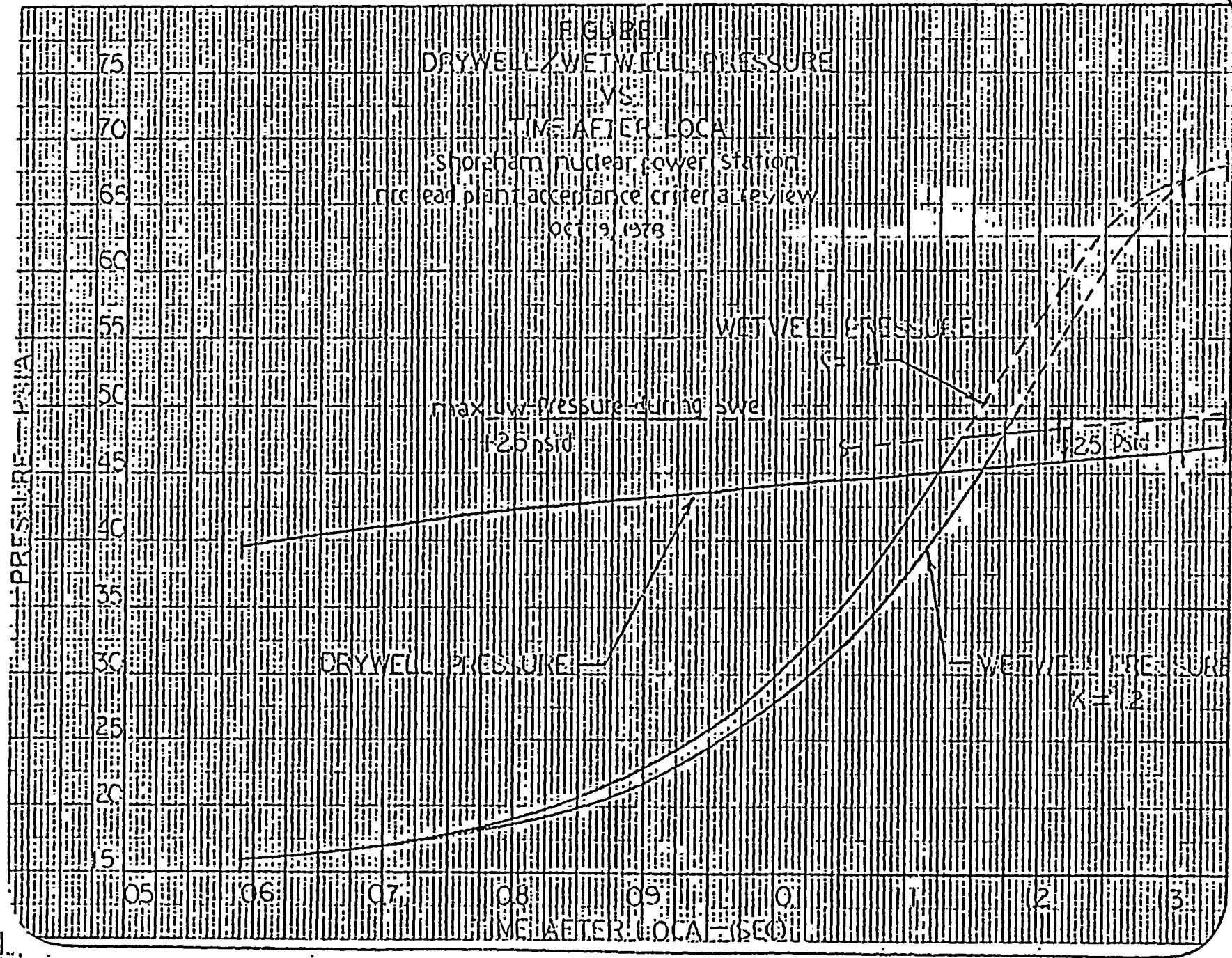
D. Implications for Shoreham

1. Refer to Fig. 13 (based on Fig. III-1 of Attachment 1 to NRC Lead Plant Acceptance Criteria) - SNPS drywell pressure history is somewhat greater than 4T run 31, either measured or calculated. Therefore, more conservatism expected in the application of "020.68 method" to SNPS than to 4T run 31.
2. Preliminary review of EPRI single cell results indicate single cell conservative compared to multivent. All other things equal, 4T will overpredict SNPS.
3. $K = 1.2$ more likely in 4T than in SNPS due to greater likelihood of significant heat transfer during swell. Again 4T will overpredict SNPS.
4. DBA for SNPS is liquid break - liquid breaks (Phase II, runs 36 and 37) expected to show even greater conservatism in application of "020.68 method." Additional information will be provided.

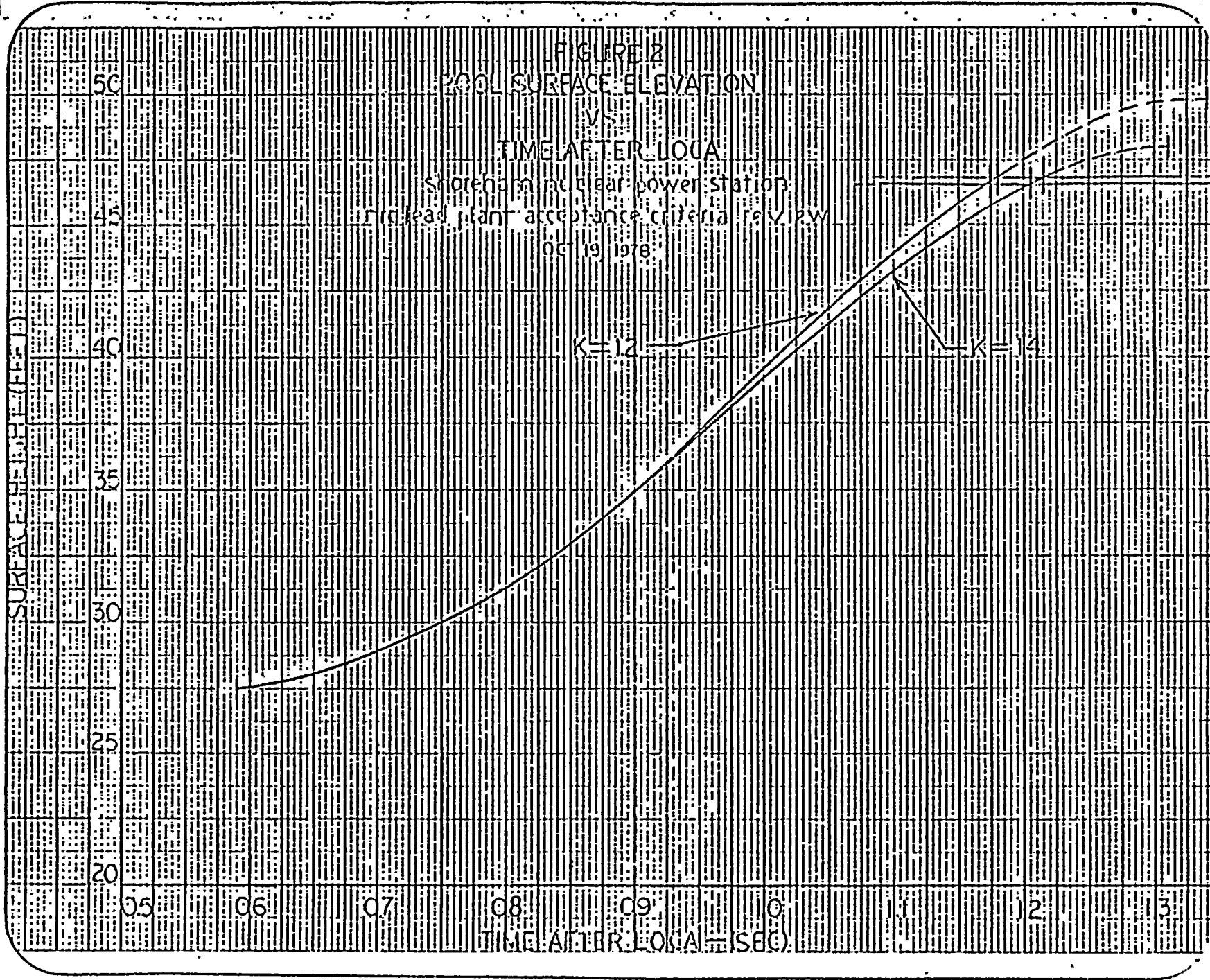


III. Calculation of swell height for EPRI-3D, run 80, not possible with "020.68 method." Drywell transient cannot be calculated for air blowdown.

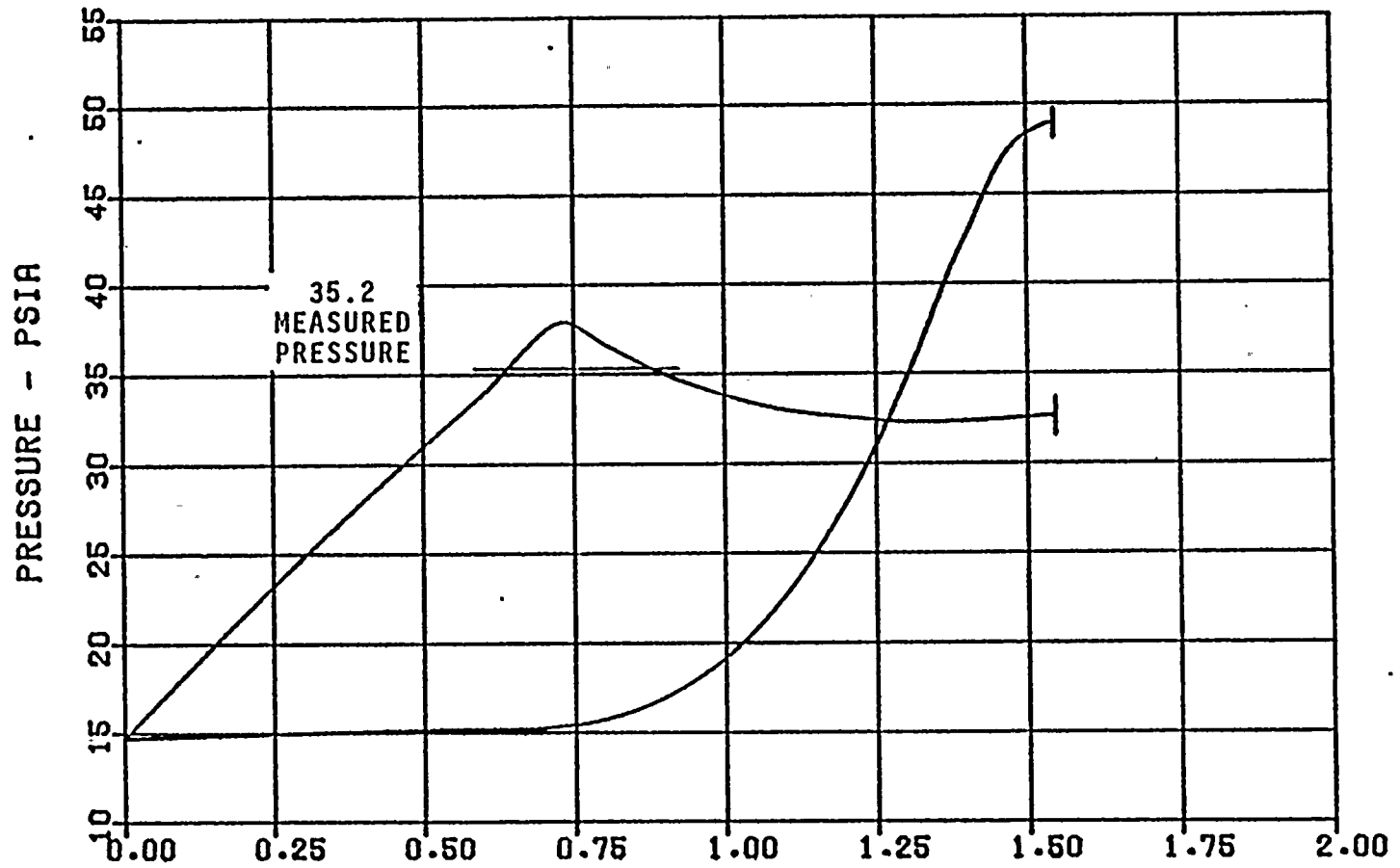








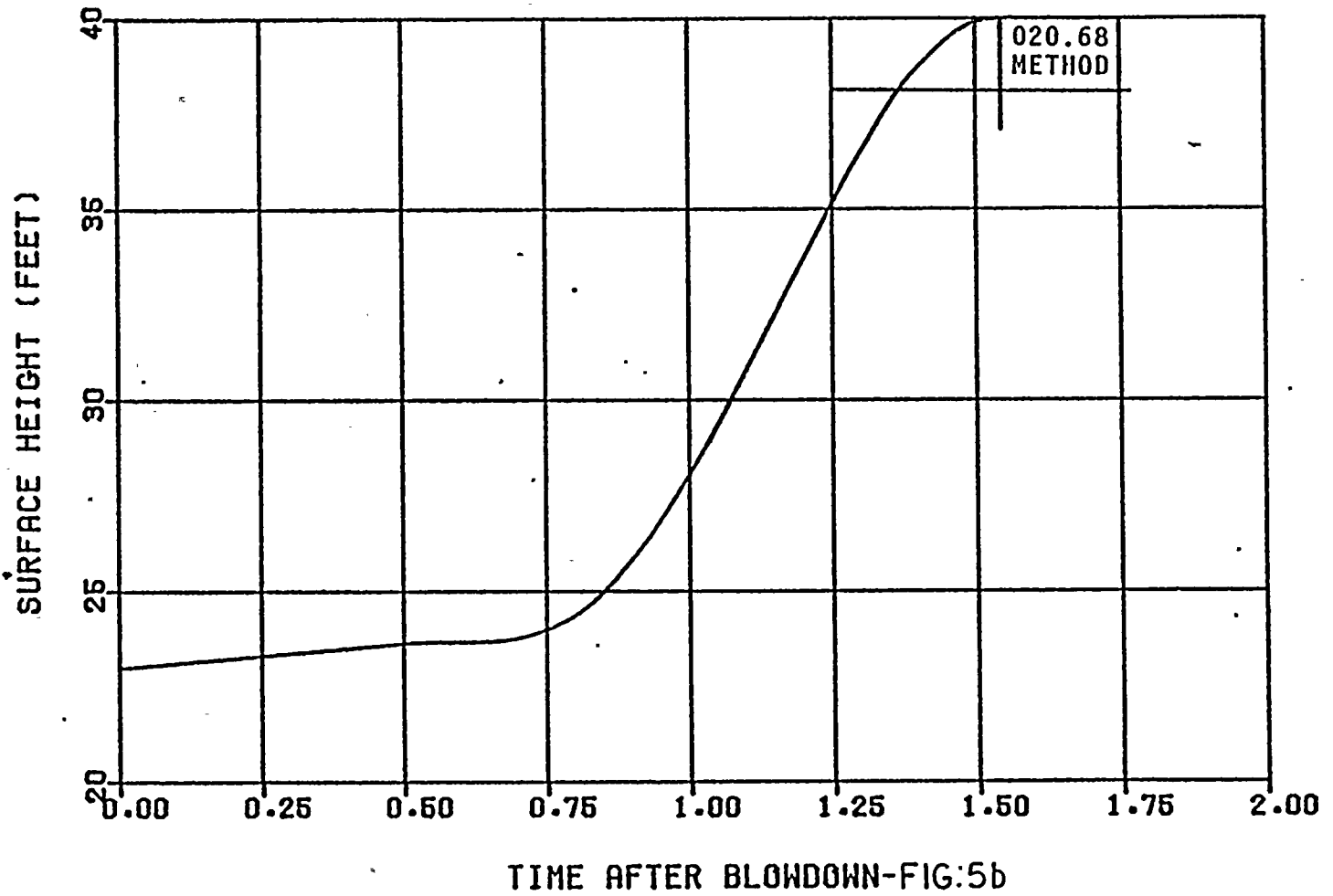




TIME AFTER BLOWDOWN—FIG. 5a

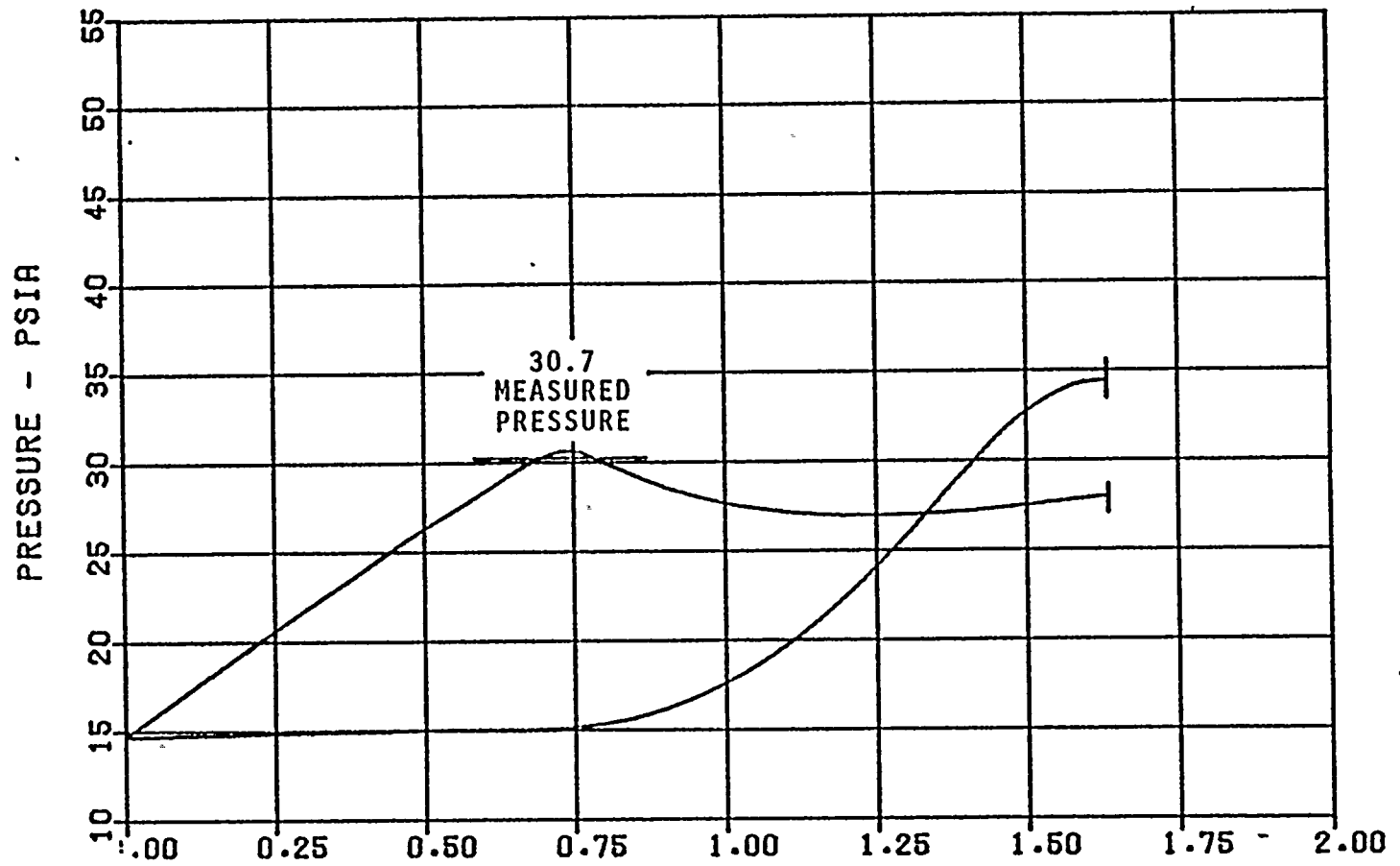
NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 27
NOV. 1978 - 2428 APPLICATION





NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 27
NOV. 1978 - SRSU8 APPLICATION

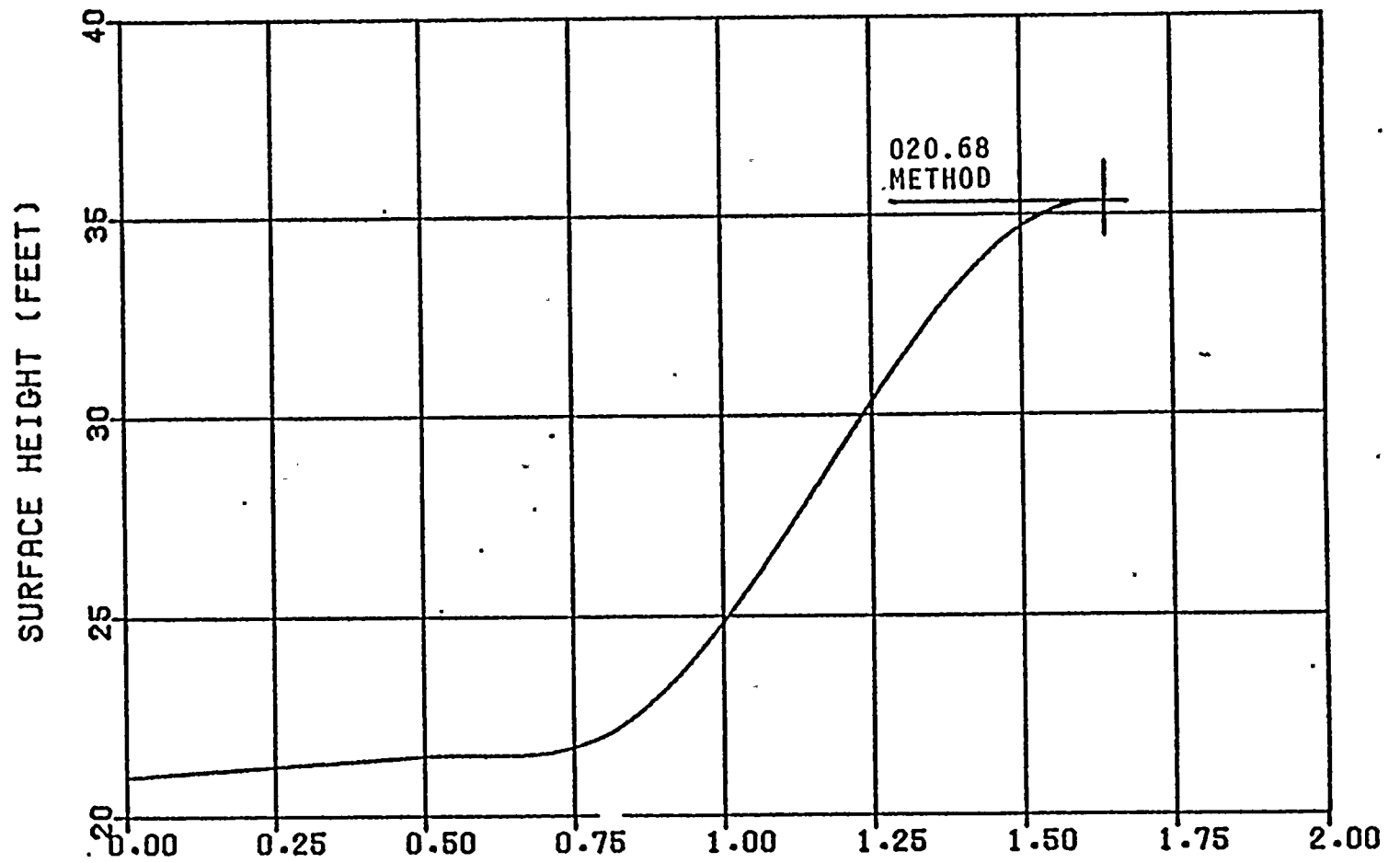




TIME AFTER BLOWDOWN-FIG. 6a

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 28
NOV. 1978 - SNPS APPLICATION

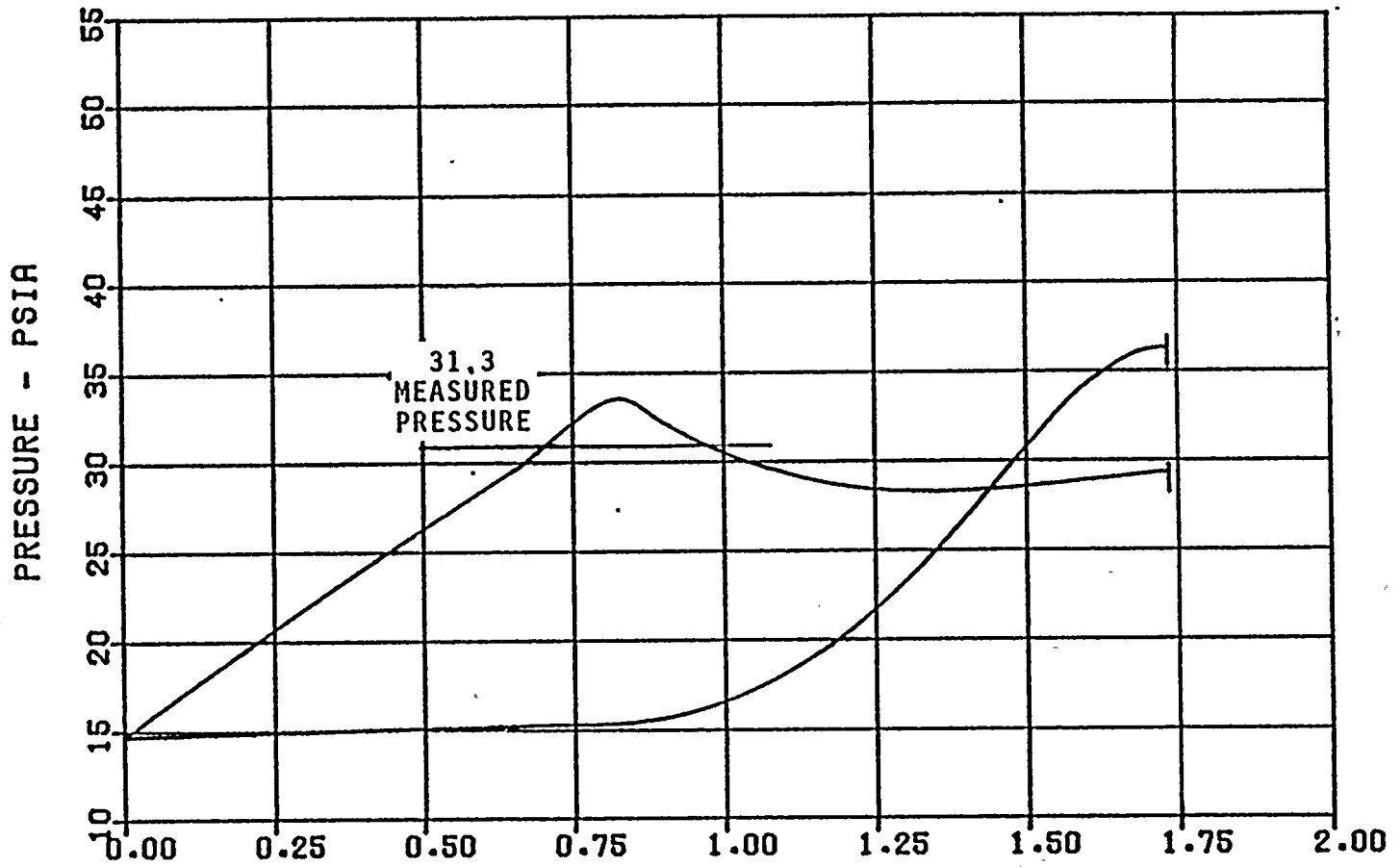




TIME AFTER BLOWDOWN-FIG. 6b

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 28
NOV. 1978 - SNPS APPLICATION

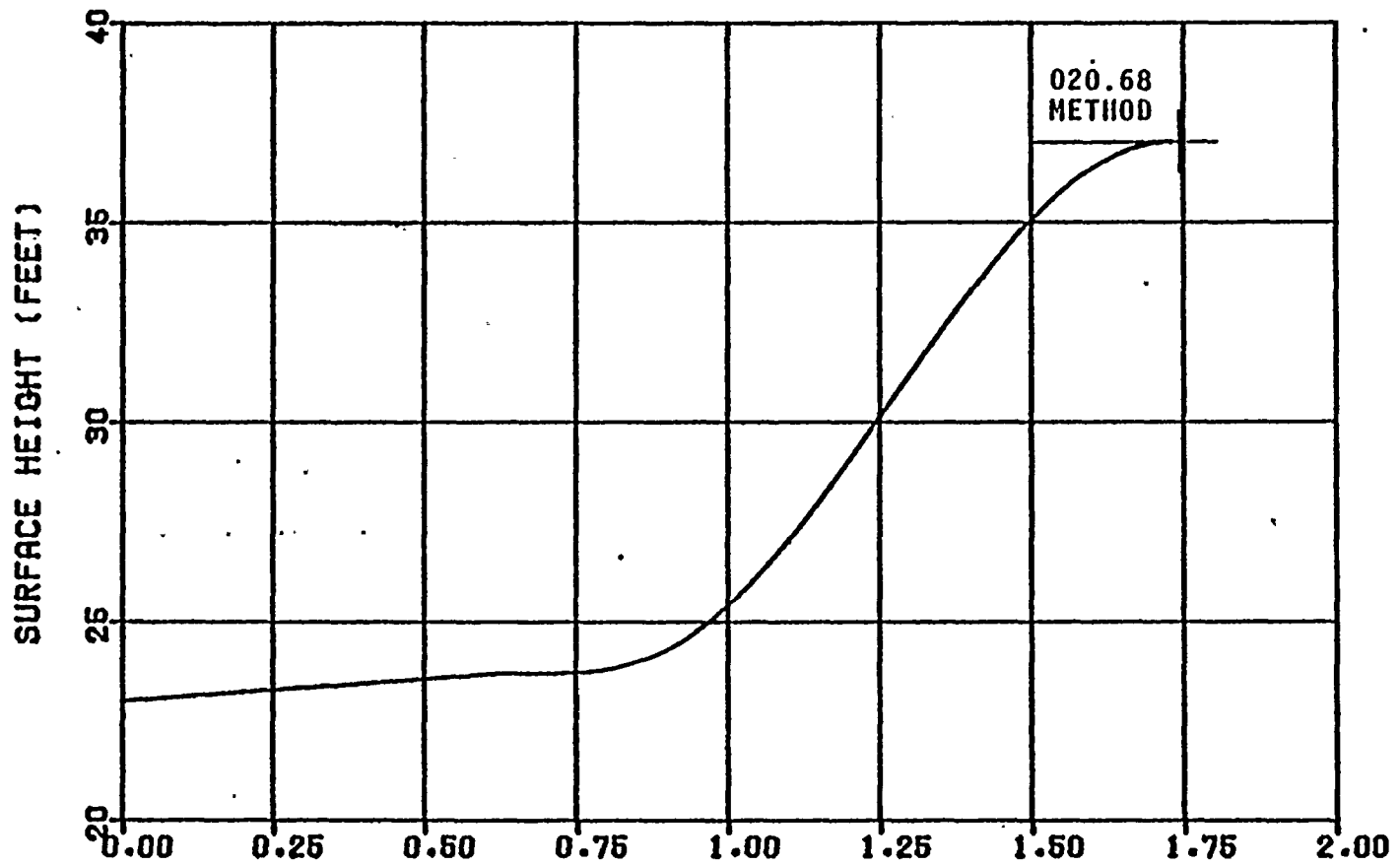




TIME AFTER BLOWDOWN-FIG. 7a

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION RUN - 29
NOV. 1978 - SKS APPLICATION

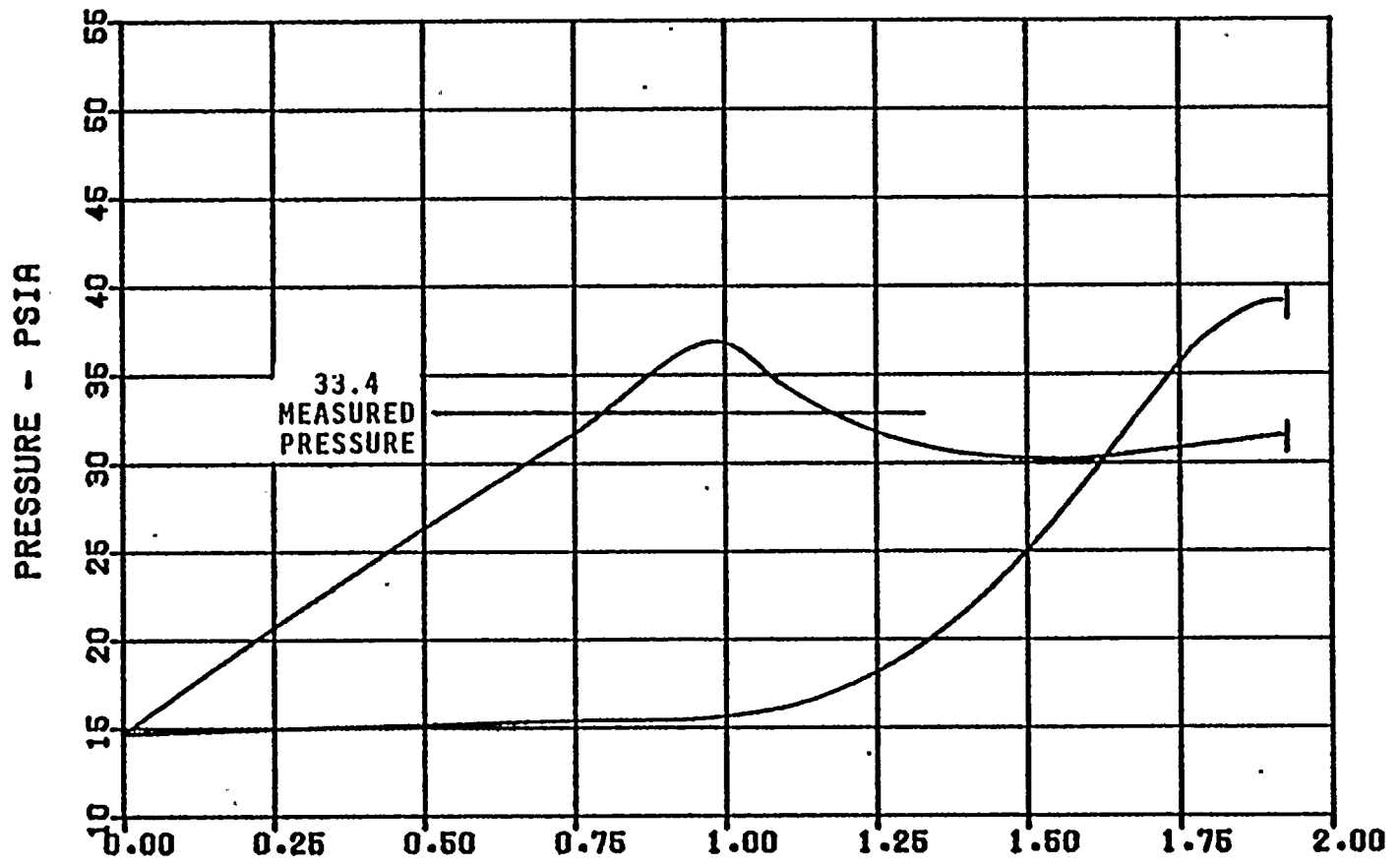




TIME AFTER BLOWDOWN-FIG. 7b

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 29
MAY. 1978 - GRS APPLICATION

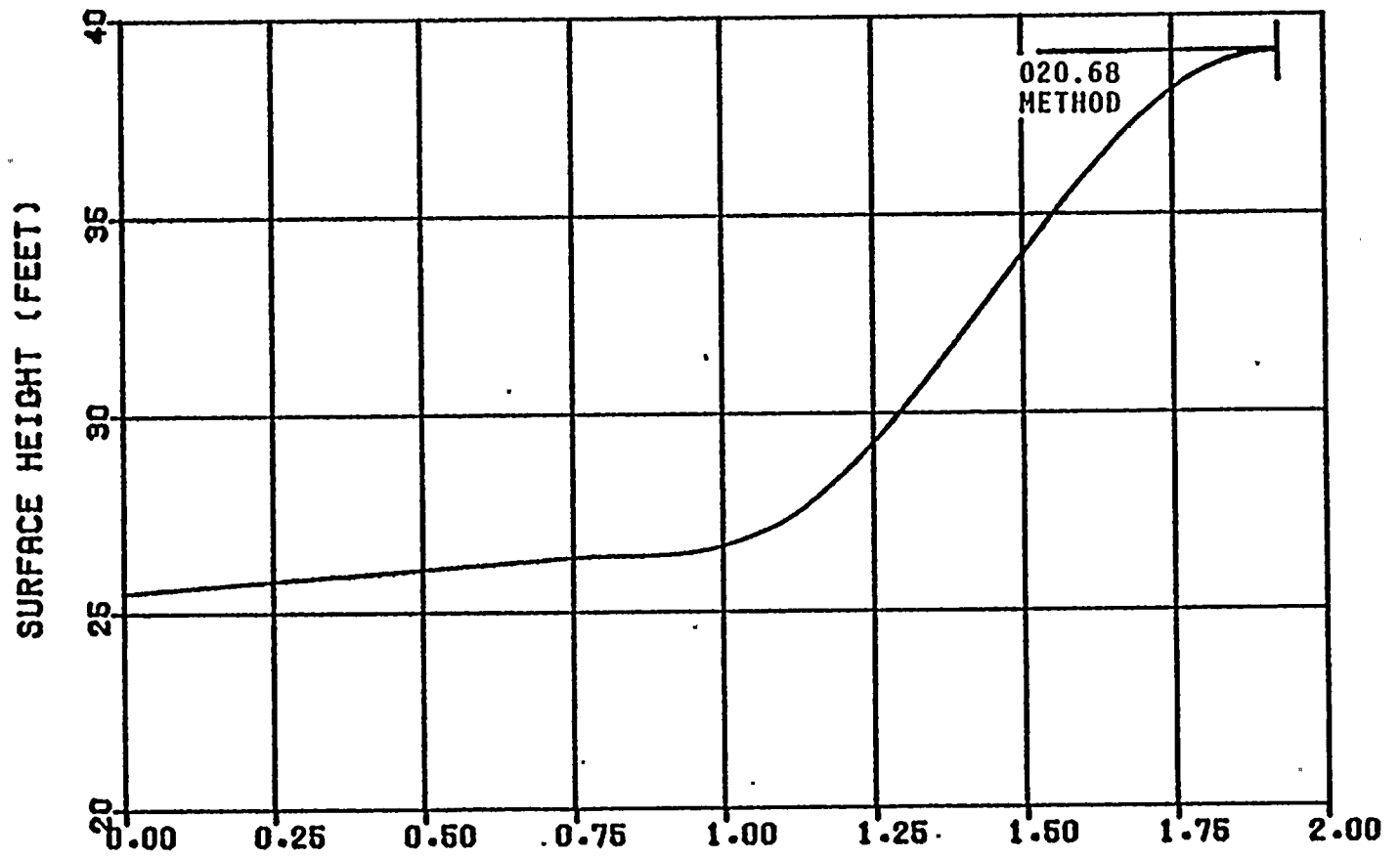




TIME AFTER BLOWDOWN—FIG. 8a

NRC LP APPLICATION CRITERIA REVIEW
4T PREDICTION - RUN 90
MAY. 1979 - SW'S APPLICATION



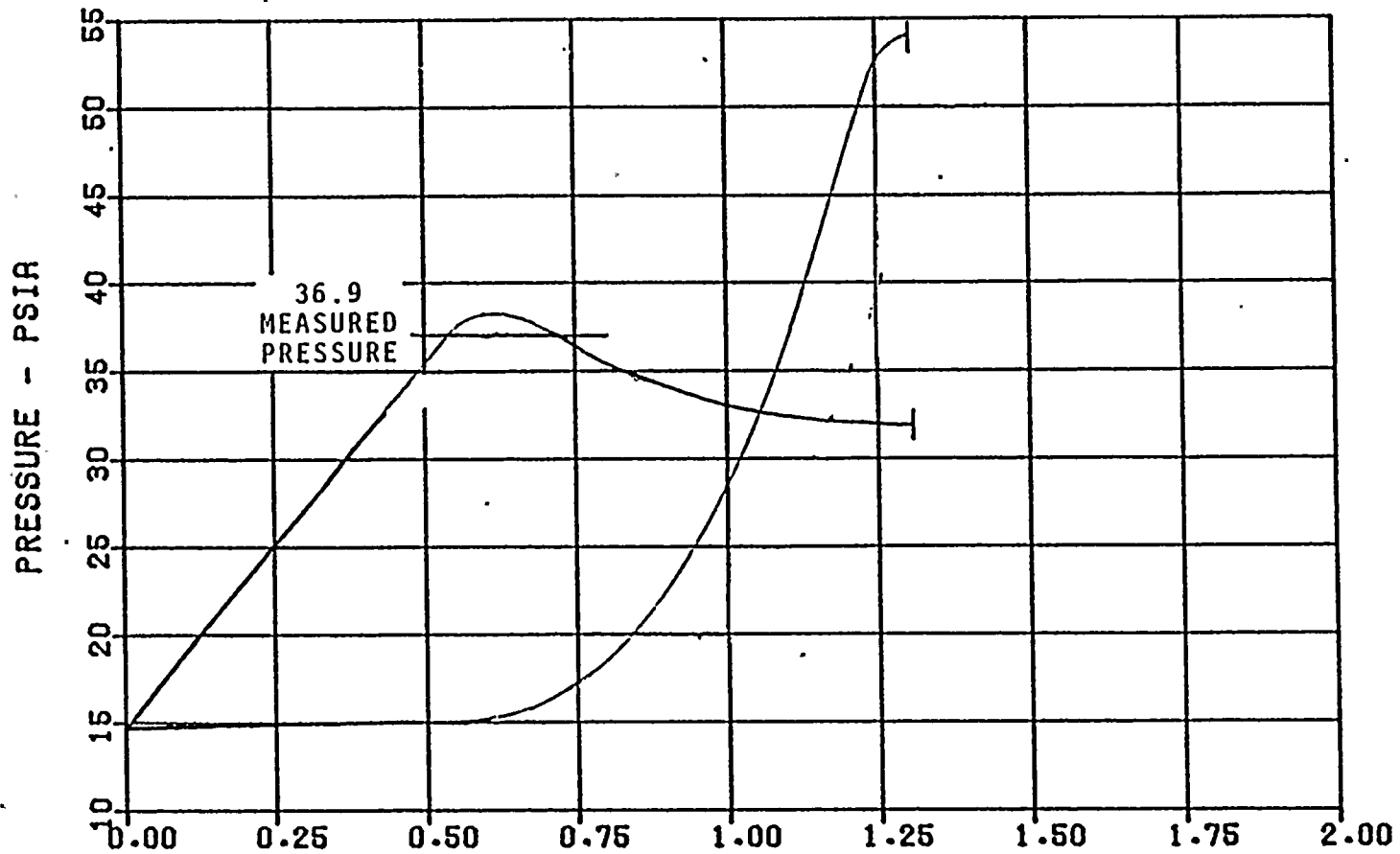


TIME AFTER BLOWDOWN—FIG. 8b

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION RUN - 90
NOV. 1979 - OURS APPLICATION



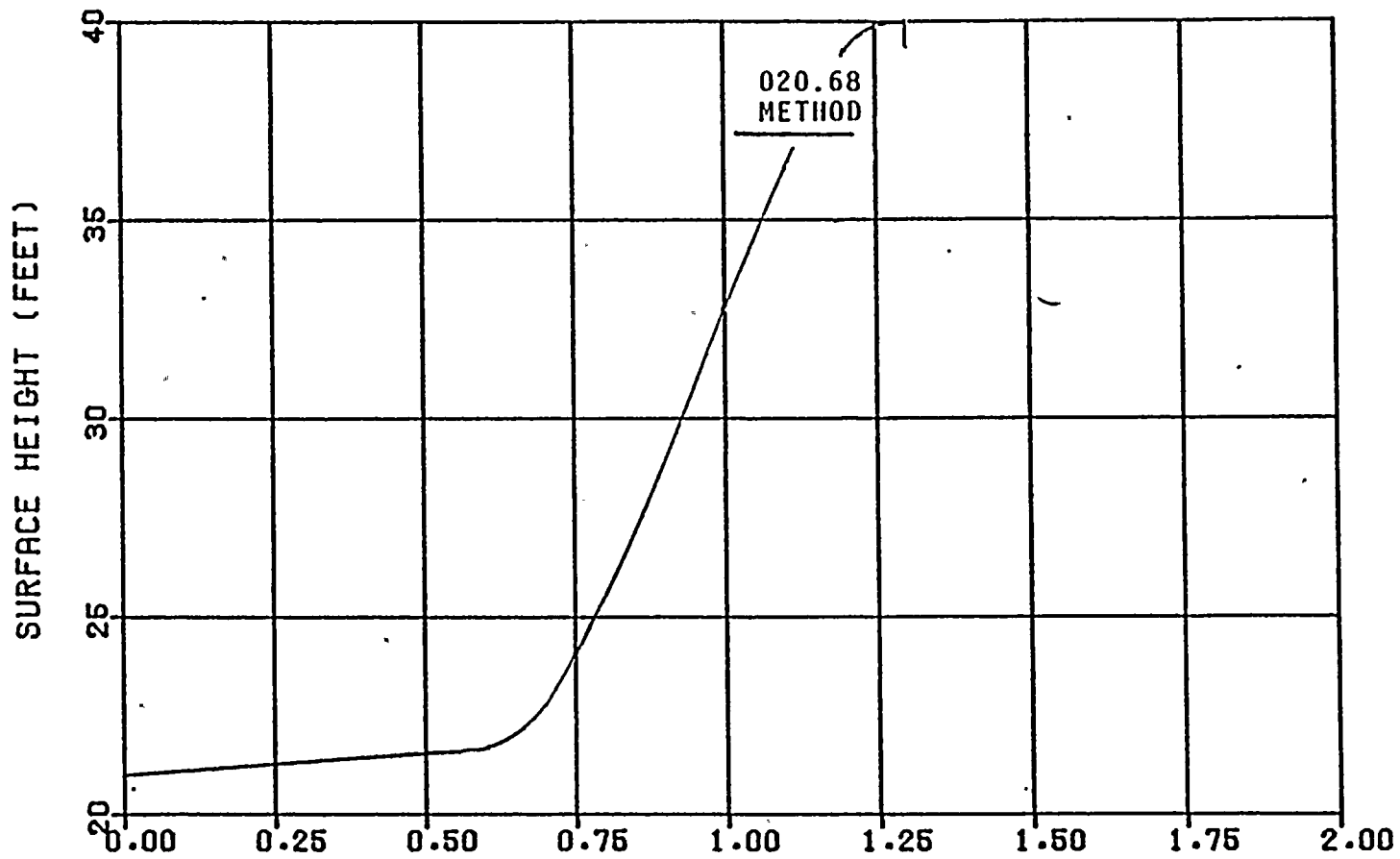
)



TIME AFTER BLOWDOWN - FIG. 9a'

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 91 WATER SLUD
NOV. 1978 - SRS APPLICATION

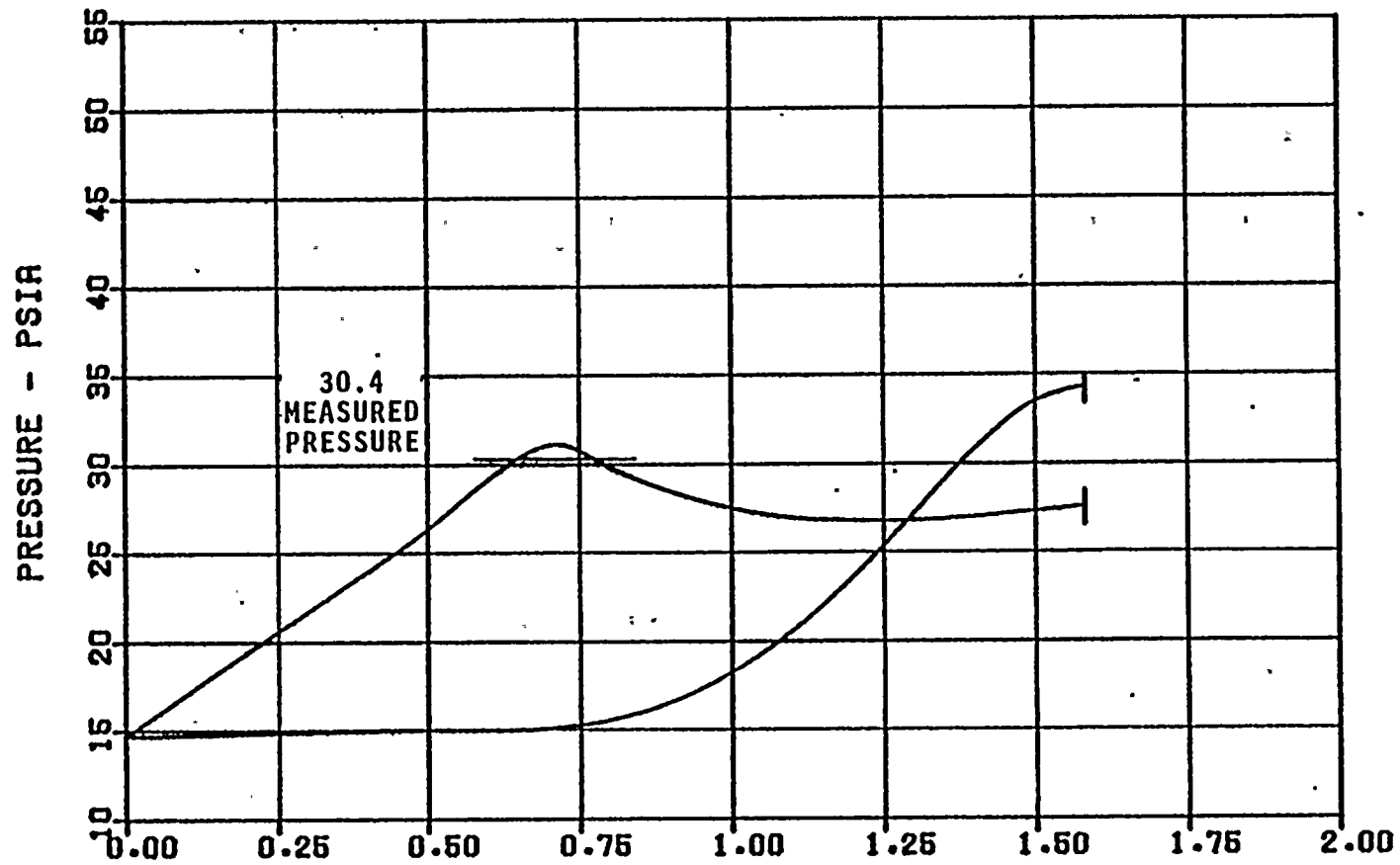




TIME AFTER BLOWDOWN- FIG 9b

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 31
NOV. 1978 - SOURCE APPLICATION

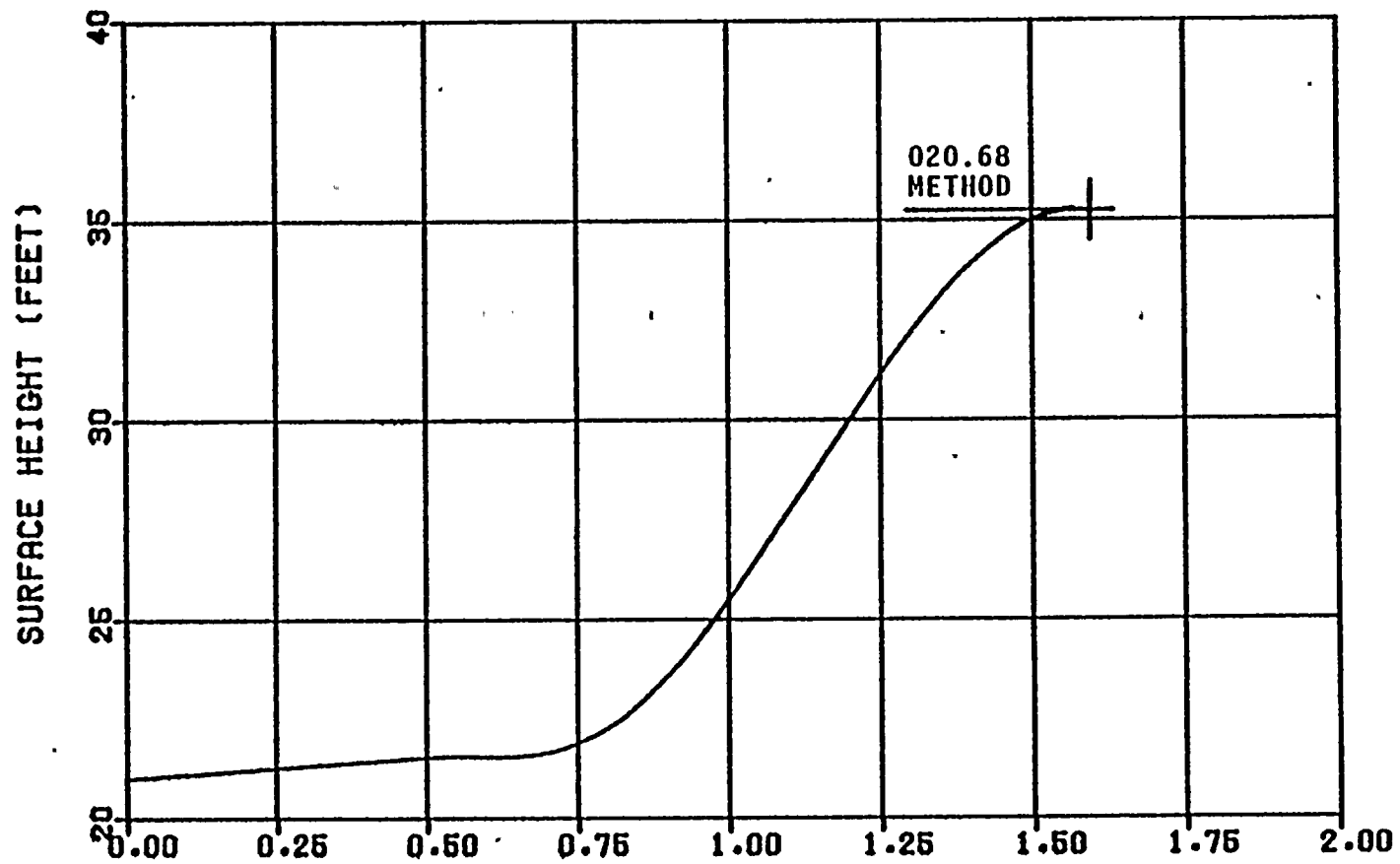




TIME AFTER BLOWDOWN-FIG. 10a

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 95
NOV. 1978 - SWS APPLICATION





TIME AFTER BLOWDOWN-FIG. 10b

NRC LP ACCEPTANCE CRITERIA REVIEW
4T PREDICTION - RUN 95
NOV. 1978 - SOPS APPLICATION



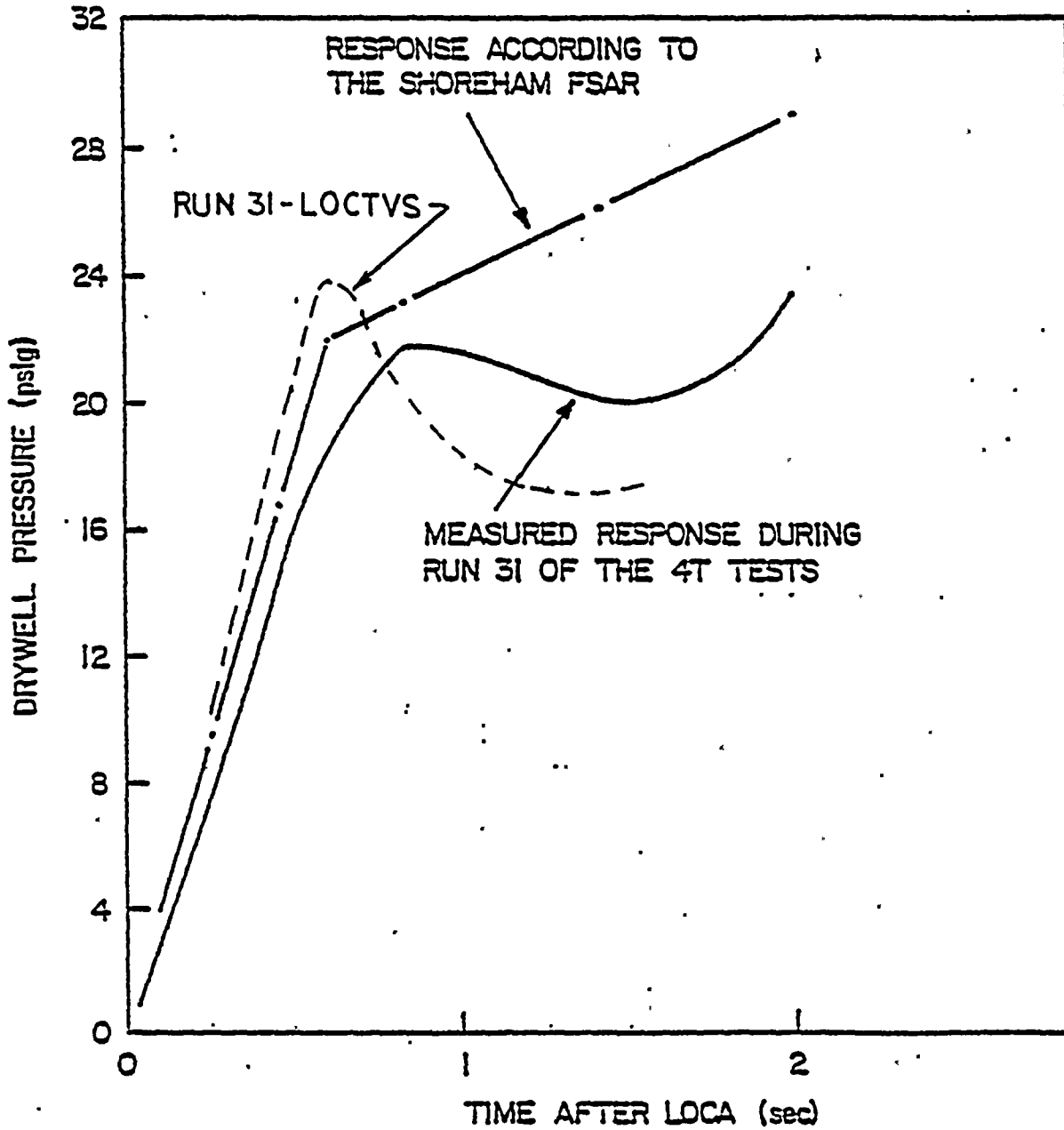


FIGURE 13 . COMPARISON OF 4T AND SHOREHAM DRYWELL PRESSURE RESPONSE TO THE DBA LOCA



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