PRESENTATION MATERIAL

PRESENTED BEFORE

NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEES ON CLASS-IX ACCIDENTS
AND REACTOR RADIOLOGICAL EFFECTS

FEBRUARY 22, 1983

MEETING TOPIC: SOURCE TERM PROGRAM

Presented by

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QUESTION: *Why establish Interim Source Terms pending completion of research? (i.e. Why disturb the status quo?)*

ANSWERS:

1) *The present extremely conservative source terms, including WASH-1400 and SST-1, are based on unrealistic assumptions - not scientific data.*

2) *Any scientifically determined interim source terms would be improvements over continuing with incorrect release estimates which have unfortunately been hallowed by the passage of time.*

3) *Important policy decisions (e.g. KI blocking agent distribution and other emergency planning activities) are being reached by policy makers on the basis of fundamentally wrong data provided to them by the reactor safety community.*

4) *This unscientific situation should not be permitted to continue simply because all of the confirmatory results are not in.*

5) *Enough is known NOW to promulgate much more realistic,* BUT STILL CONSERVATIVE, *interim source terms. All that is required is a thorough analysis with existing technology.*

6) *Important decisions affecting the public health and safety should be made on the basis of* THE BEST SCIENTIFIC DATA *which are available* AT THE TIME THE DECISIONS NEED TO BE REACHED.

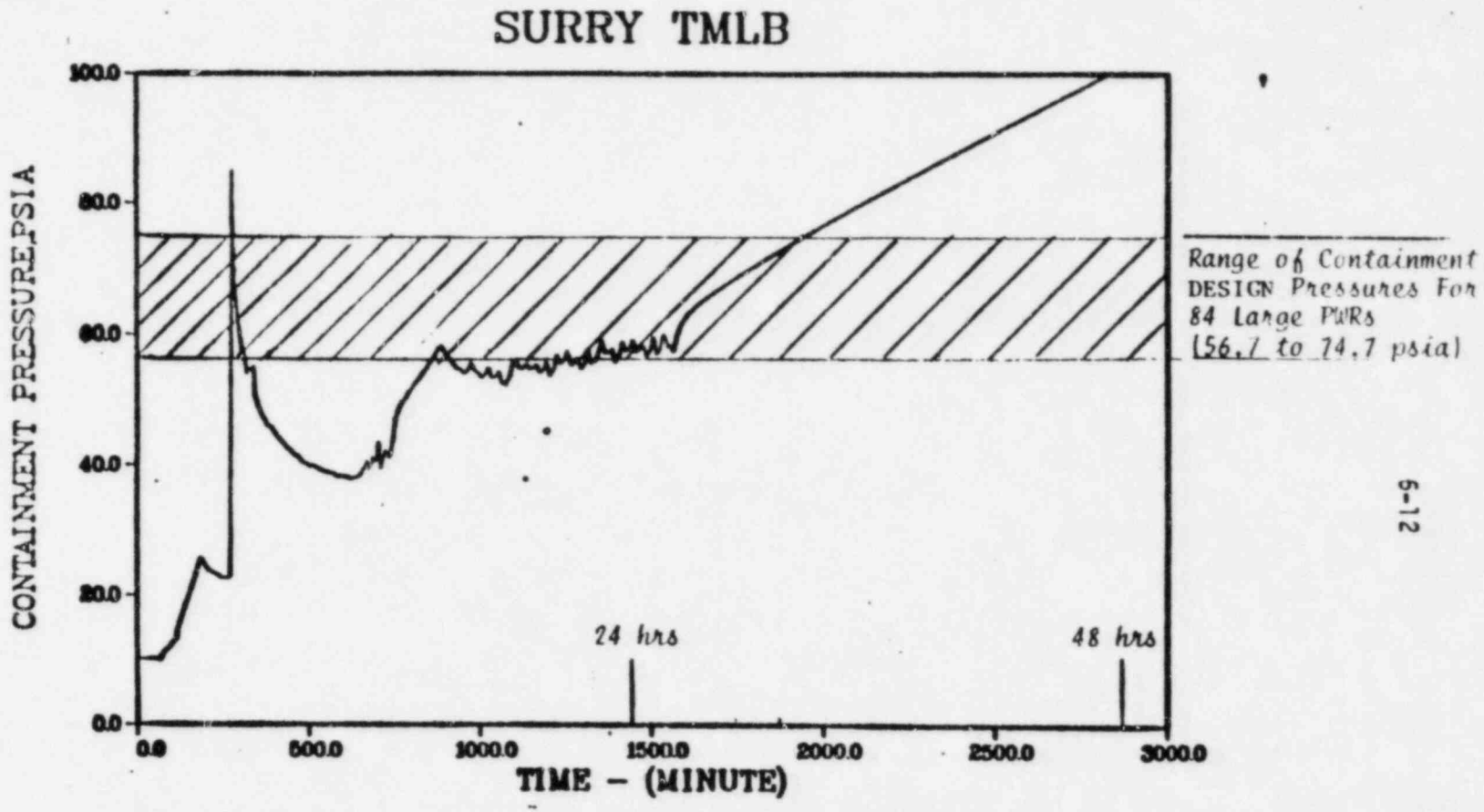
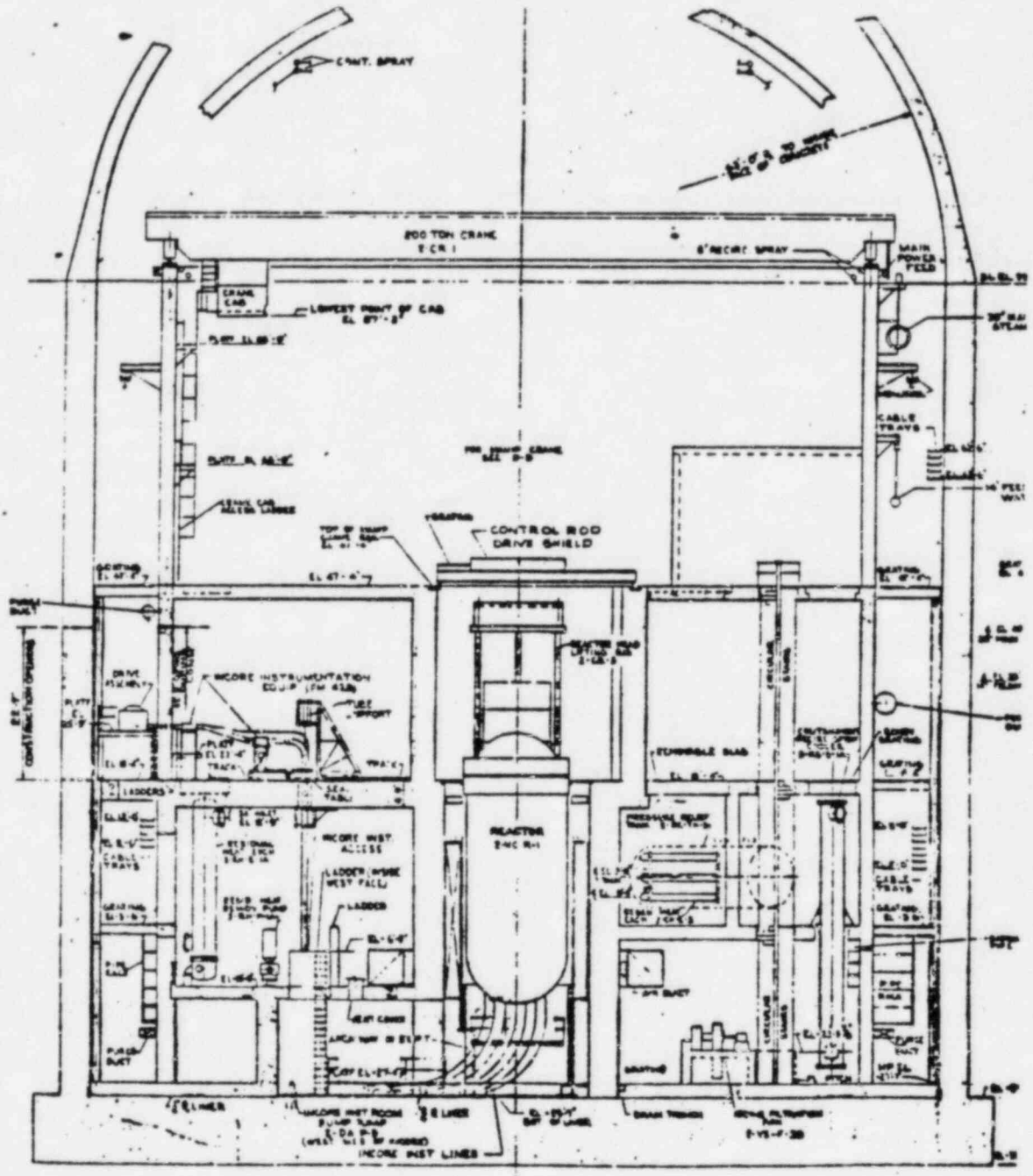
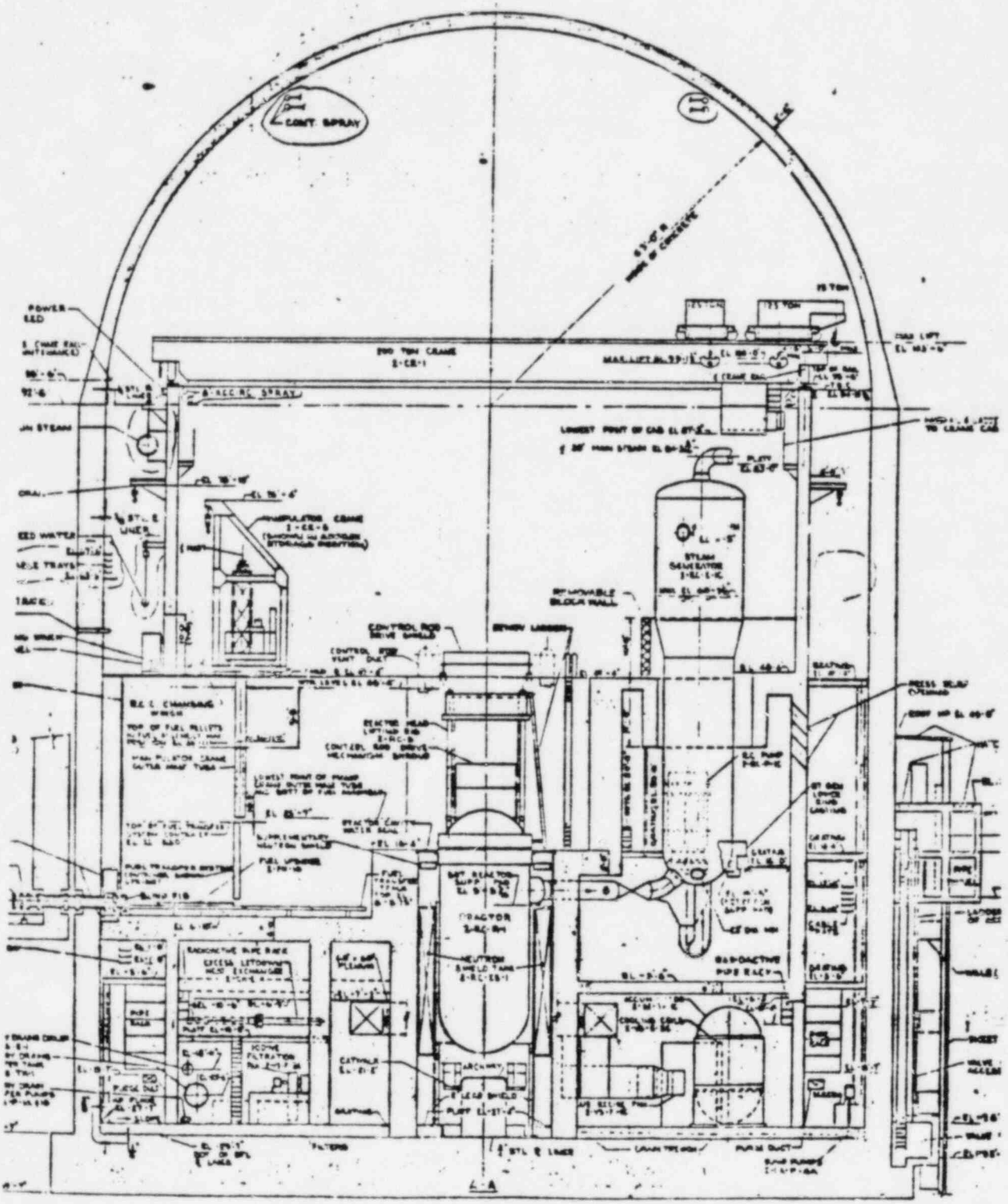


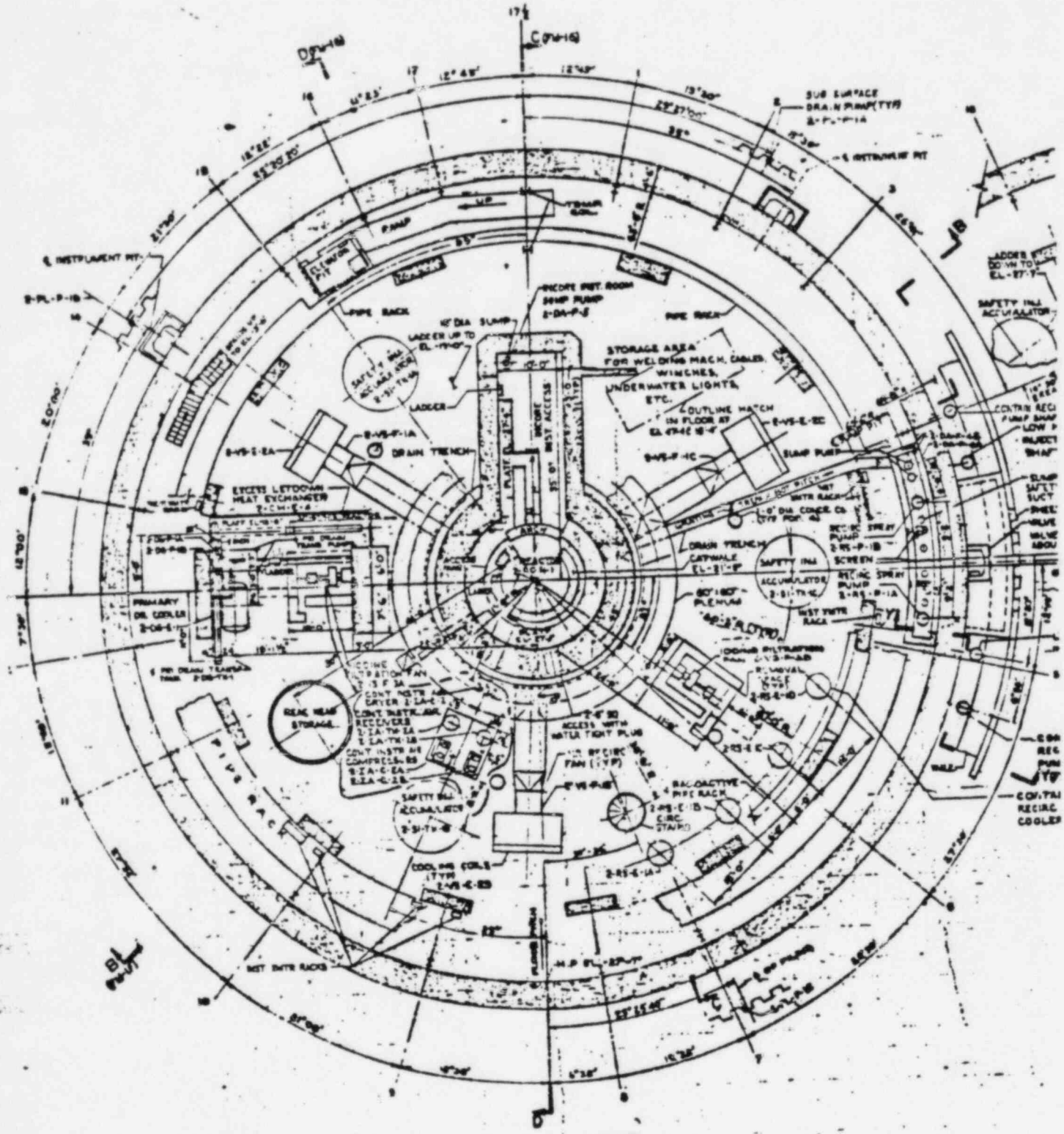
FIGURE 6.8. CONTAINMENT PRESSURE VERSUS TIME--TMLB' SEQUENCE



SURRY 2 CONTAINMENT
SECTION VIEW NO. 1



SURRY 2 CONTAINMENT
SECTION VIEW NO. 2



PLAN EL -27'-7"

SURRY 2 CONTAINMENT
PLAN VIEW NO. 1

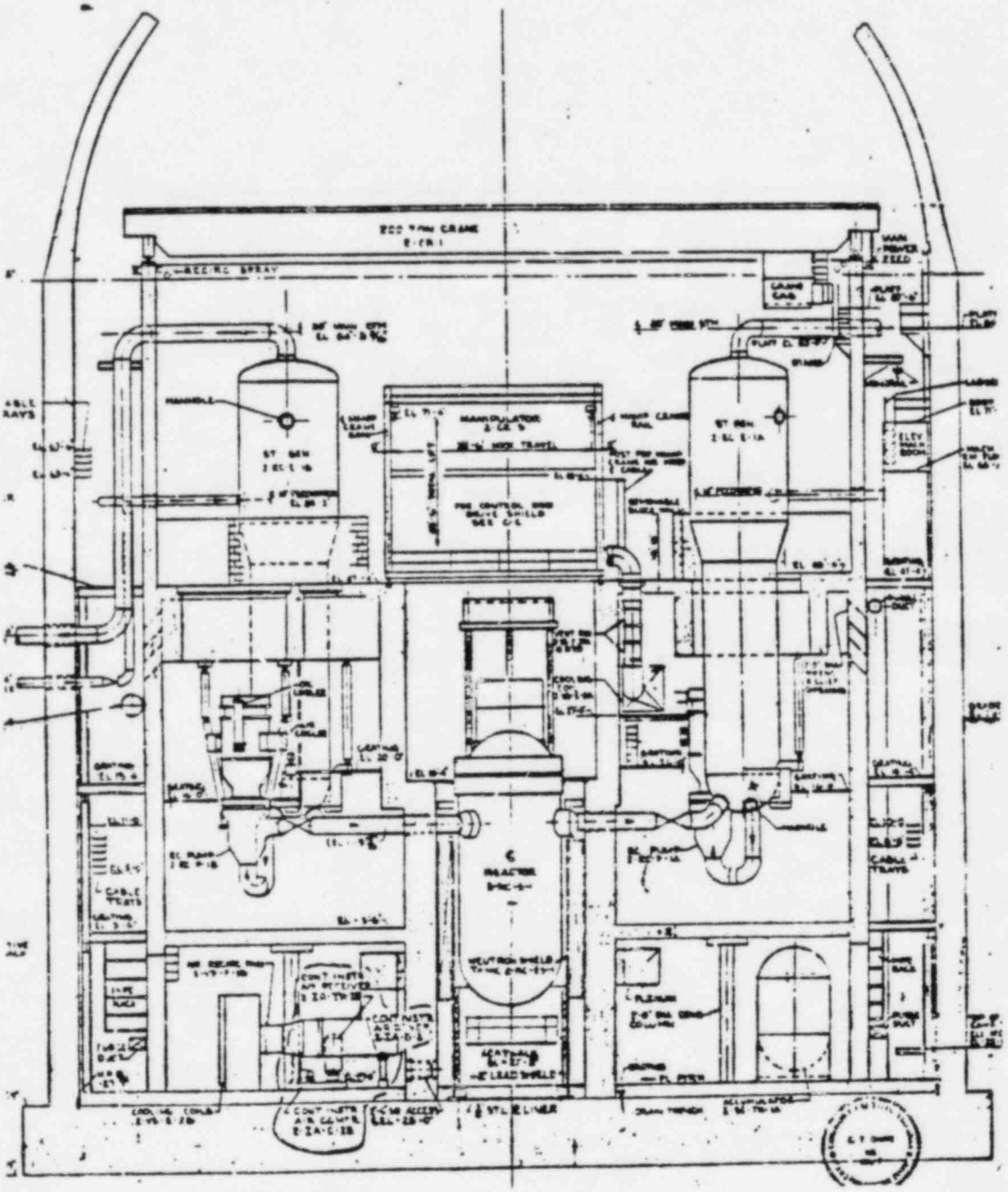
SOME COMMENTS ON NUREG-0956 (DRAFT) ANALYSIS OF AB-β SEQUENCE

- A single node containment model is grossly unrealistic and does not lead to best estimate releases.

  - During the period from start of core melt to core slump (i.e. 27 to 8[illegible] min), releases via the hot leg break would be into the steam generator compartment with a subsequent restrictive release path involving additional containment nodes.

  - Releases after pressure vessel meltthrough would be via three separate contiguous flow paths as follows: 1) In-core instrumentation tunnel, 2) Lower and upper reactor cavity, and 3) the RCS and steam generator compartment, with the majority of the aerosol flow expected to be via the in-core instrementation tunnel.

- The unisolated containment penetrations lead into contiguous buildings (e.g. auxiliary or safeguards buildings) or filter systems. Multinode modeling of the subcompartments in these buildings is required.



SURRY 2 CONTAINMENT
SECTION VIEW NO. 3

SOME COMMENTS ON NUREG-0956 (DRAFT) ANALYSIS OF V SEQUENCE

- A multinode model is required for: 1) the reactor vessel internals, 2) the RCS piping, 3) the smaller diameter ECCS piping, and 4) subcompartments in the auxiliary building. This model should include right angle bends and the T connections from the RCS to ECCS.

- The assumption that all flow goes back through the RCS after vessel meltthrough is unrealistic. A multinode model of the reactor cavity and in-core instrumentation tunnel flow paths is required, including appropriate flow splitting.

- Flow splitting into depressurized piping within the RCS must be realistically accounted for.

SOME COMMENTS ON CESIUM AND IODINE

- Virtually all of the Cs and I are released from the core prior to core slump.

  This occurs during the following time periods, per NUREG-0956 (DRAFT):

Sequence	Core Melt to Core Slump	Cs (Kg)	I (Kg)
TMLB'	201 to 270 minutes		
AB-B	27 to 57 minutes	95 of 131	10 of 124
V	37 to 64 minutes		

  Essentially all of the Iodine is in the form of CsI SALT

  Approximately 90% of the Cesium is in the form of CsOH

- There are tens of thousands of lbs of water (not water vapor) in which ~ 55 lbs of CsI and ~ 200 lbs of CsOH can dissolve.

- There are tens of thousands of lbs of steel in the RCS with which the ~ 200 lbs of CsOH can chemically react.

- There are ~ 1,000 lbs of other aerosols released from the core during the above listed time periods.

SOME COMMENTS ON TELURIUM re: NUREG-0956 (DRAFT)

- There are only 25.4 Kg (~ 56 lbs) of Te available in the core.

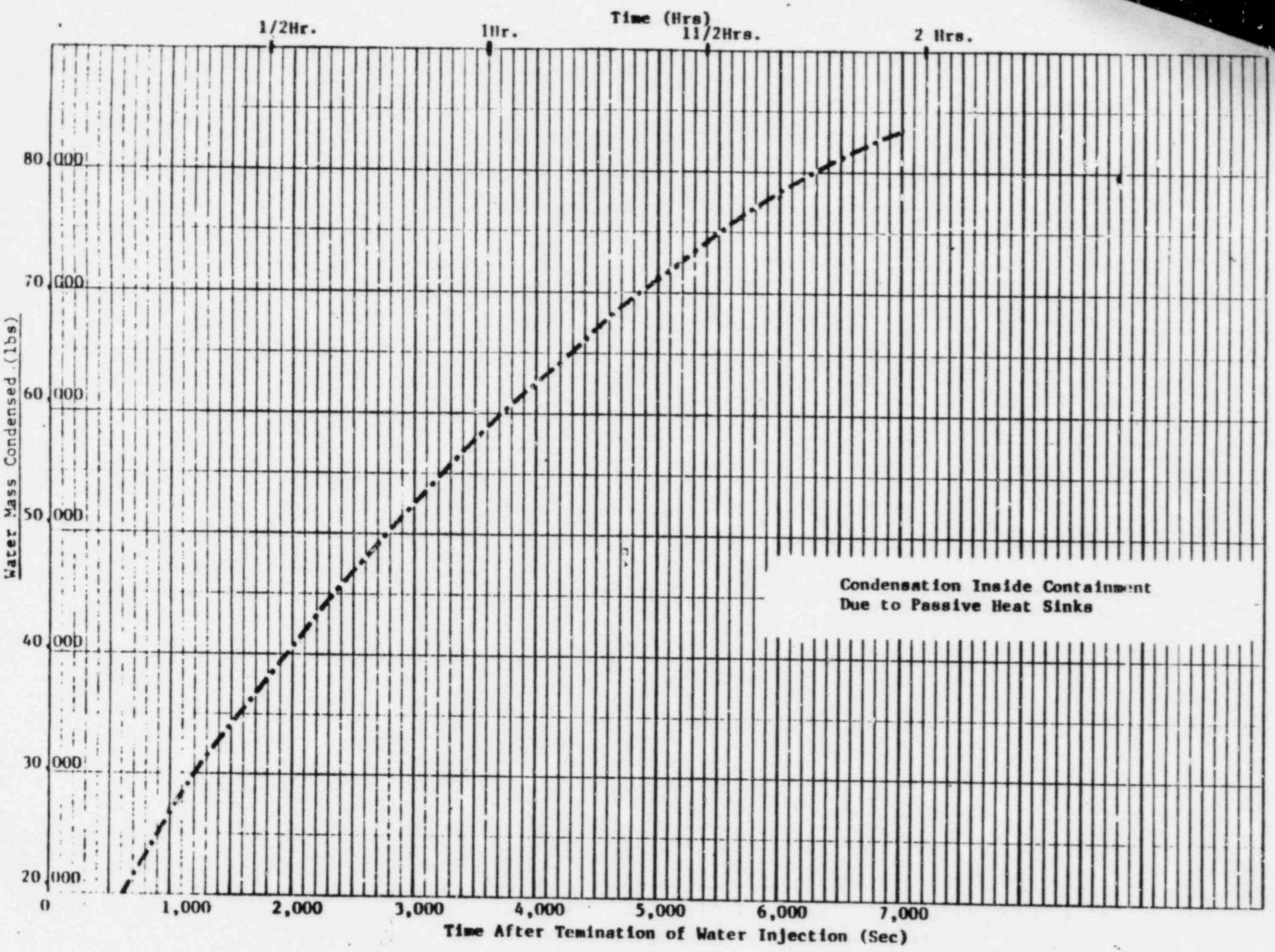
- Based on the data presented in Table 6.17:

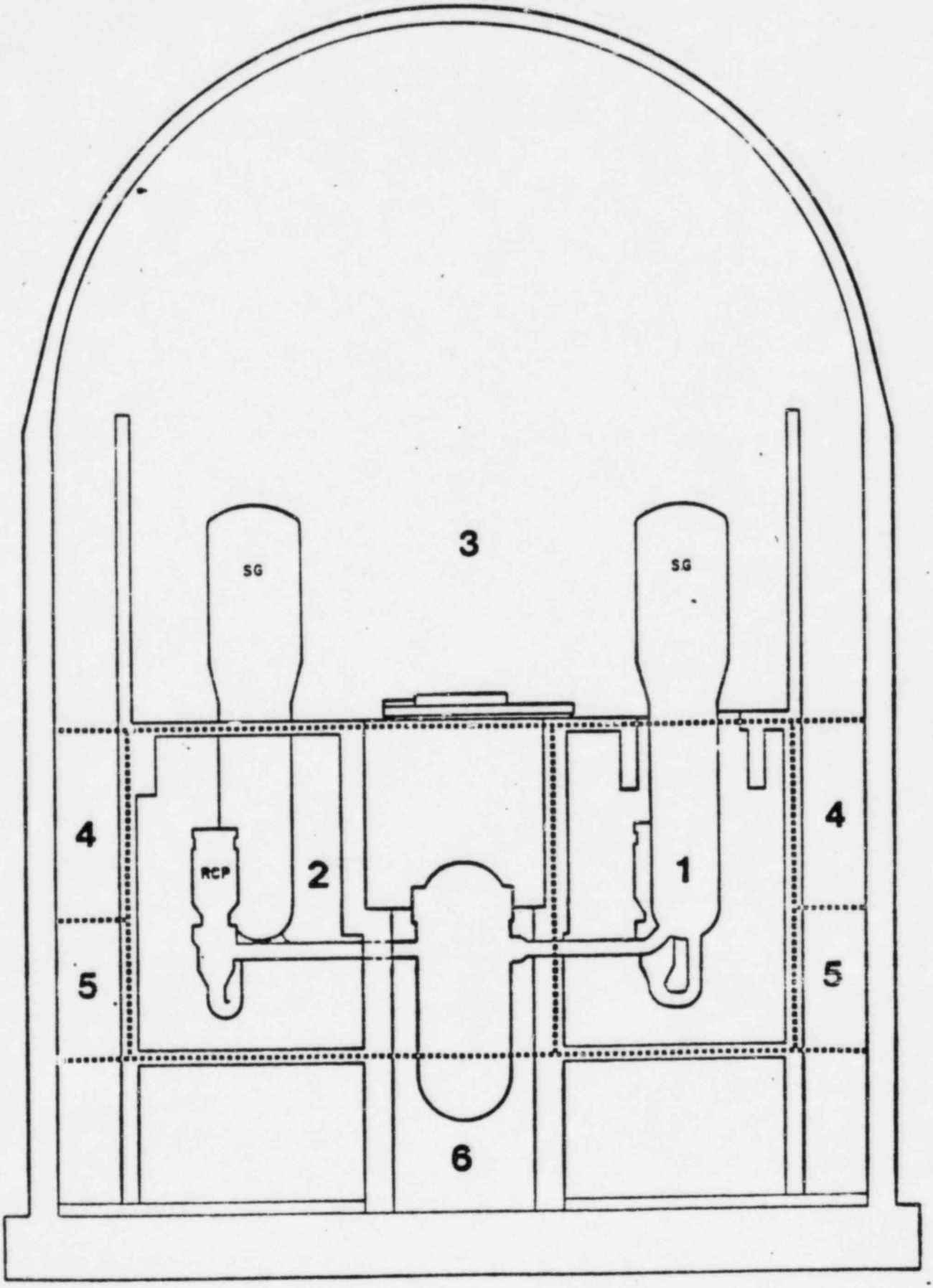
Sequence	Te In Core @ RPV Failure (Kg)	Te Released Prior To RPV Failure (Kg)
AB	5.9	19.5 (43 lbs)
AB-Te	25	0
TMLB'	0.004	25.4 (56 lbs)
V	1.53	23.9 (53 lbs)

- For these sequences the time of Te release is as follows:

Sequence	Melt Starts (min)	RPV Failure (min)	Elapsed Time (min)
AB	27	81	54
AB-Te	no release assumed prior to RPV failure		
TMLB'	201	275	74
V	37	88	51

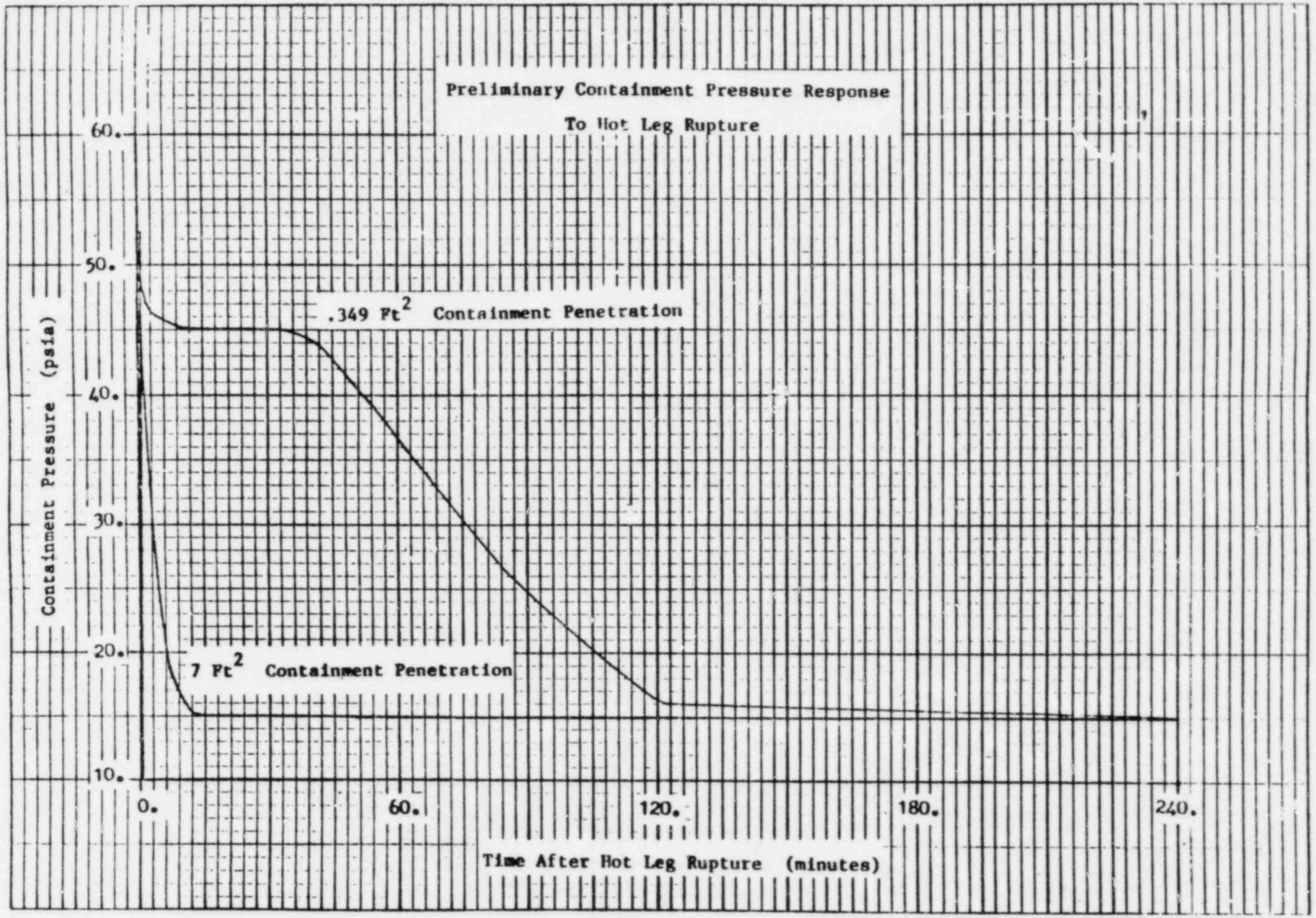
- The reactions of the ~ 50 lbs of Te with tens of thousands of lbs of metal in the RCS and water (not water vapor) in the RCS and in the building subcompartments must be quantified for the ~ 1 hour time period noted above and for subsequent time periods.

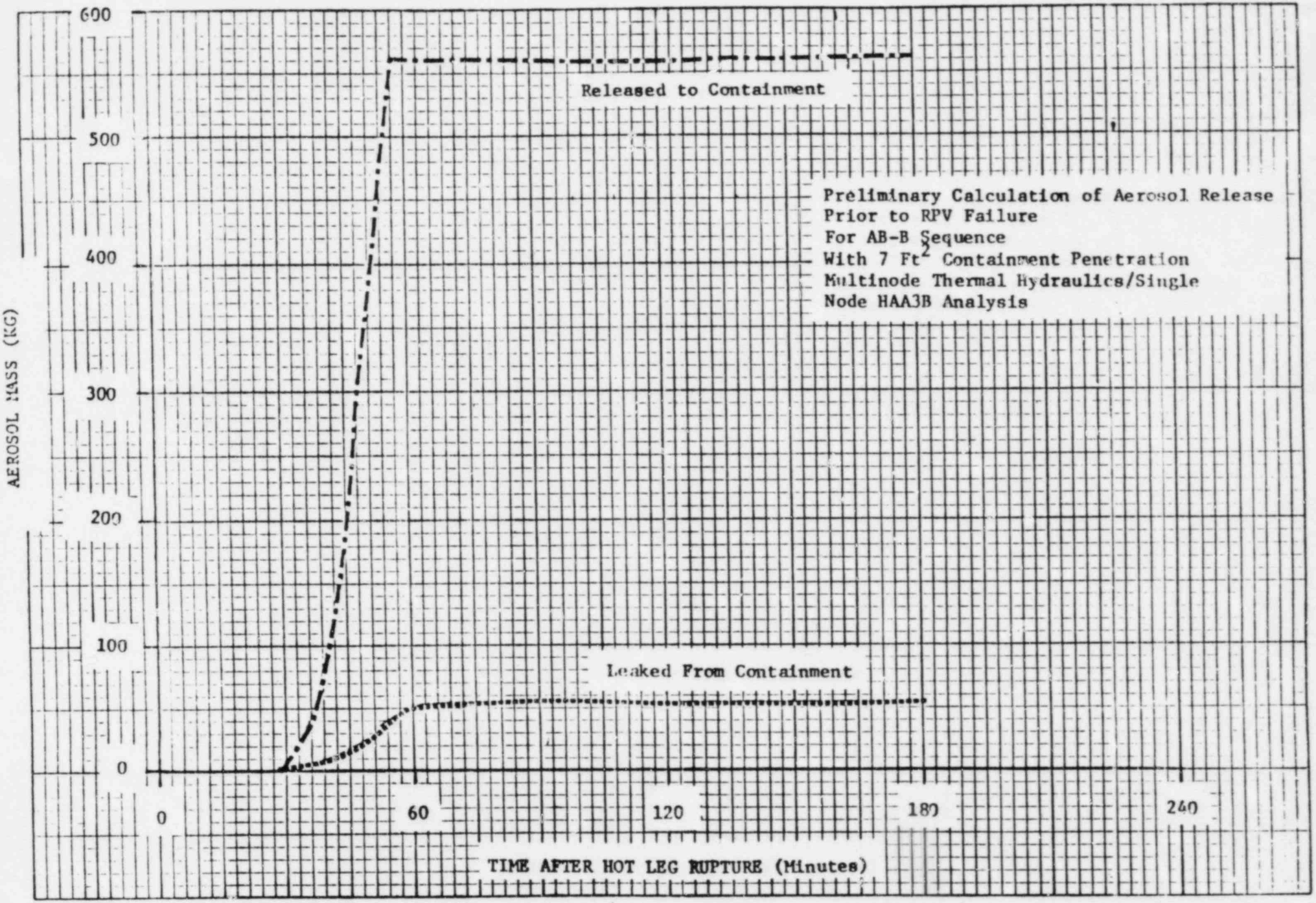

Time (Hrs)
1/2Hr.
1Hr.
1 1/2Hrs.
2 Hrs.
Water Mass Condensed (lbs)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
Time After Temination of Water Injection (Sec)
Condensation Inside Containment
Due to Passive Heat Sinks

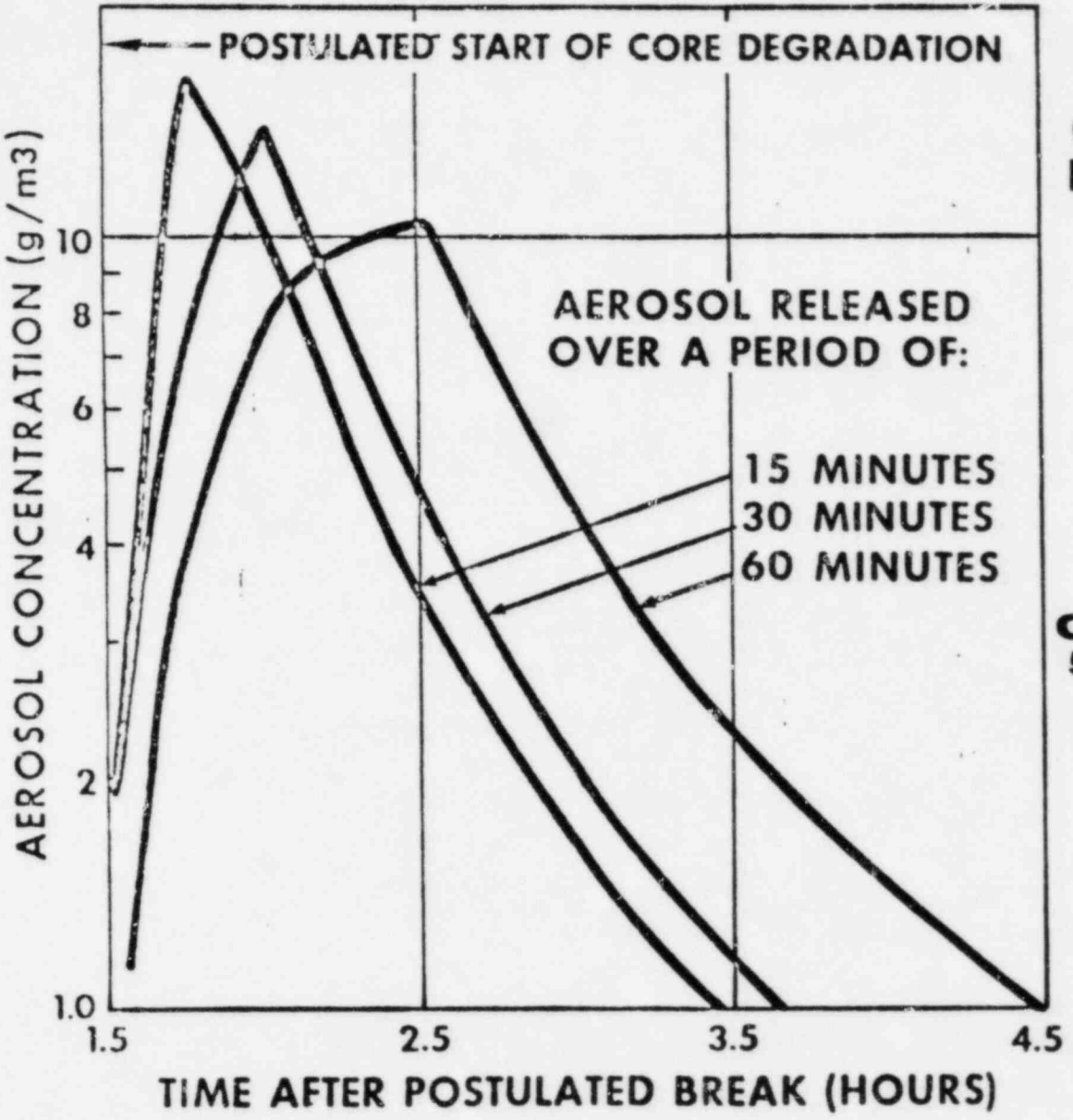


SWEC PRELIMINARY MULTINODE MODEL

SURRY CONTAINMENT







AIRBORNE AEROSOL CONCENTRATION IN CONTAINMENT ATMOSPHERE

AEROSOL MASS RELEASE - 1,000Kg

CONTAINMENT VOLUME - 54,000m³ (1.9×10⁶FT³)

FIGURE 3

STONE & WEBSTER