TMI UNIT 1
Control Room Habitability Meeting

November 21, 2000

Meeting Objectives

- Update NRC on Control Room Habitability submittal, analytical approach, system changes, and schedule.
- Obtain NRC Feedback
- Ensure submittal meets NRC's expectations for completeness and level of detail.

AGENDA

I. Licensing Background

- TMI-1 Control Room Habitability History
- TMI-1 Current Licensing Basis
- NEI Task Force Participation

II. TMI-1 Control Room Ventilation System and Tracer Gas Test Results

- System Operation
- Recent Modifications
- Tracer Gas Testing

III. Radiological Dose Calculations

- Use of Regulatory Guide 1.183
- Calculation Methodology
- Analysis Parameters
- Release Pathways
- Single Failure Assumptions
- Dose Results

IV. Summary

- License Amendment Application
  - Submittal Schedule
  - NRC Review Schedule
  - AST Full Scope Implementation

Licensing Background

- TMI Unit 1 Control Room Dose Initially Accepted by NRC SER, dated August 14, 1986

  - < 5 Rem Whole Body (0.73)
  - < 30 Rem Skin (15.3)
  - Thyroid Dose deferred to completion of alternate source-term effort

Licensing Background (Cont'd)

- TMI Unit 1 - Amendment No. 215, dated August 24, 1999
  - NRC approved MHA (LOCA) Control Room Dose for one (1) cycle only based on generic control room habitability concerns
    - 42.3 Rem Thyroid
    - 0.53 Rem Whole Body
    - 8.05 Rem Skin
  - Based on TID 14844 Source Term

Current Licensing Basis

- Amendment No. 215, dated August 24, 1999
  - TID 14844 Source-Term Analysis
  - 15 gph Technical Specification Allowed ESF Leakage Limit
  - Assumes 2/3 Trains of RB Cooling Fans & 2/2 Trains of RB Spray
  - ARCON 96 X/Q's for Control Room Intake
  - Reduced Calculated Iodine Release Fractions for ESF Leakage

Current Licensing Basis (Cont'd)

- Per Amendment No. 215 SER, a revised MHA Analysis with Control Room Habitability dose evaluation to be submitted by February 1, 2001 (at least 6 months prior to end of Cycle 13)

  - Addressing measured unfiltered inleakage to control room
  - Addressing limiting design basis accident
  - Implementing Alternate Source-Term Methodology
  - Requesting NRC Approval by August 1, 2001

Generic Control Room Habitability Issues

- PECO & AmerGen supporting NEI/NRC 99-03 Task Force efforts since 1999
- Actively participating on Licensing, Systems, and Analysis Subgroups
- Schedule - Industry/NRC Guidance was not finalized to support TMI Unit 1 MHA Analysis submittal date

Generic Control Room Habitability Issues (Cont'd)

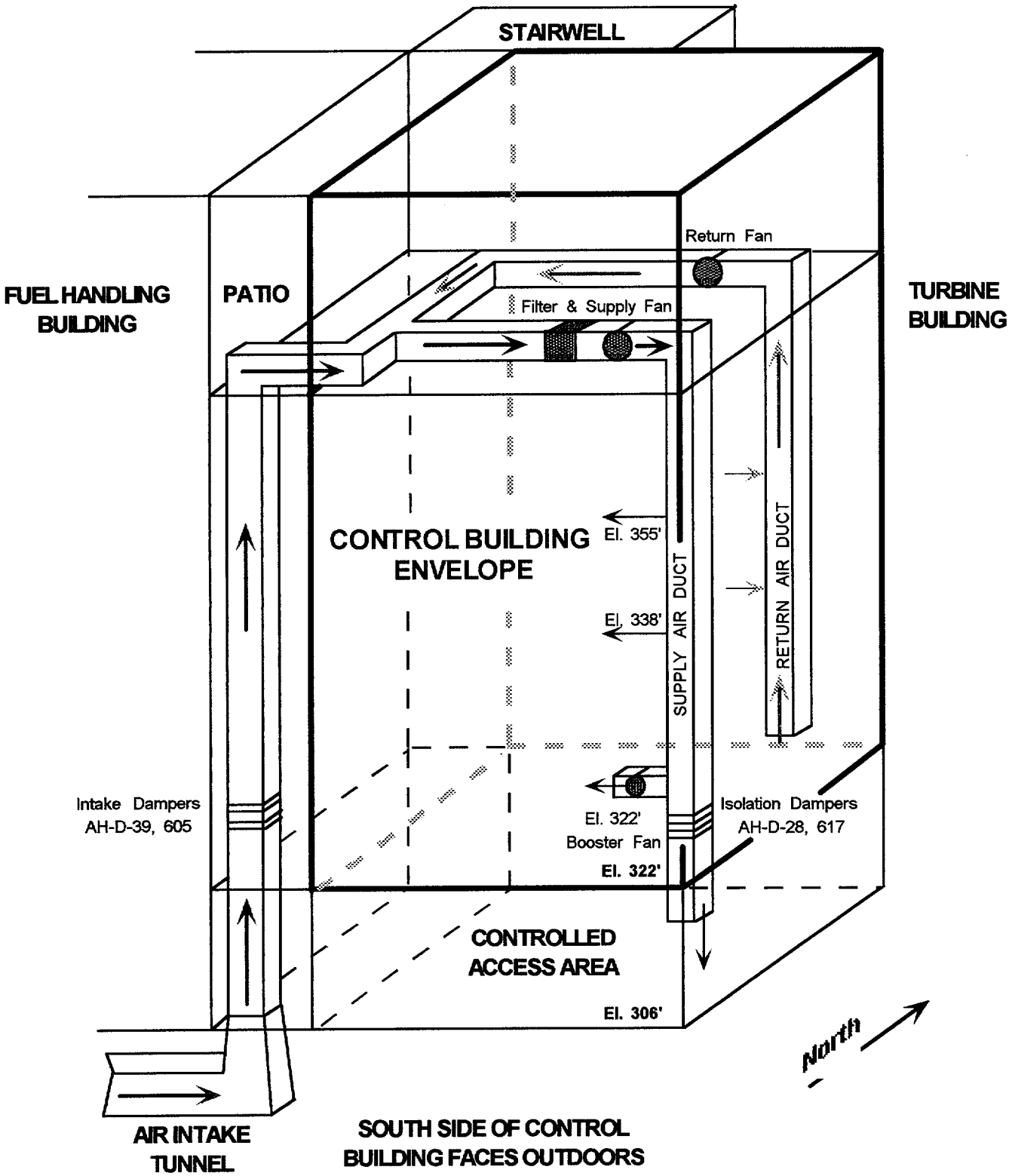
- Elements of NEI Draft Guidance implemented

  - Baseline Unfiltered Inleakage Test
  - CBE Integrity Walkdowns & Sealing, PM Program
  - Validated Analytical Assumptions
  - Utilize As-Built Information
  - ARCON 96

TMI-1 Control Building Ventilation System and Tracer Gas Test Results

CONTROL BUILDING VENTILATION ZONES

- **Control Room (CR)** - Elev. 355' of Control Bldg, excluding stairwell and Control Bldg. Hallway (Patio).
- **Control Building Emergency Envelope (CBE)** - Elevations 380', 355' (CR), 338' and 322' of the Control Building, excluding Patio and stairwell.
- **Control Building Hallway (Patio)** - Adjacent to west wall of CBE.
- **Controlled Access Area (CAA)** - Elevation 306' of the Control Building.



SIMPLIFIED VIEW OF CONTROL BUILDING

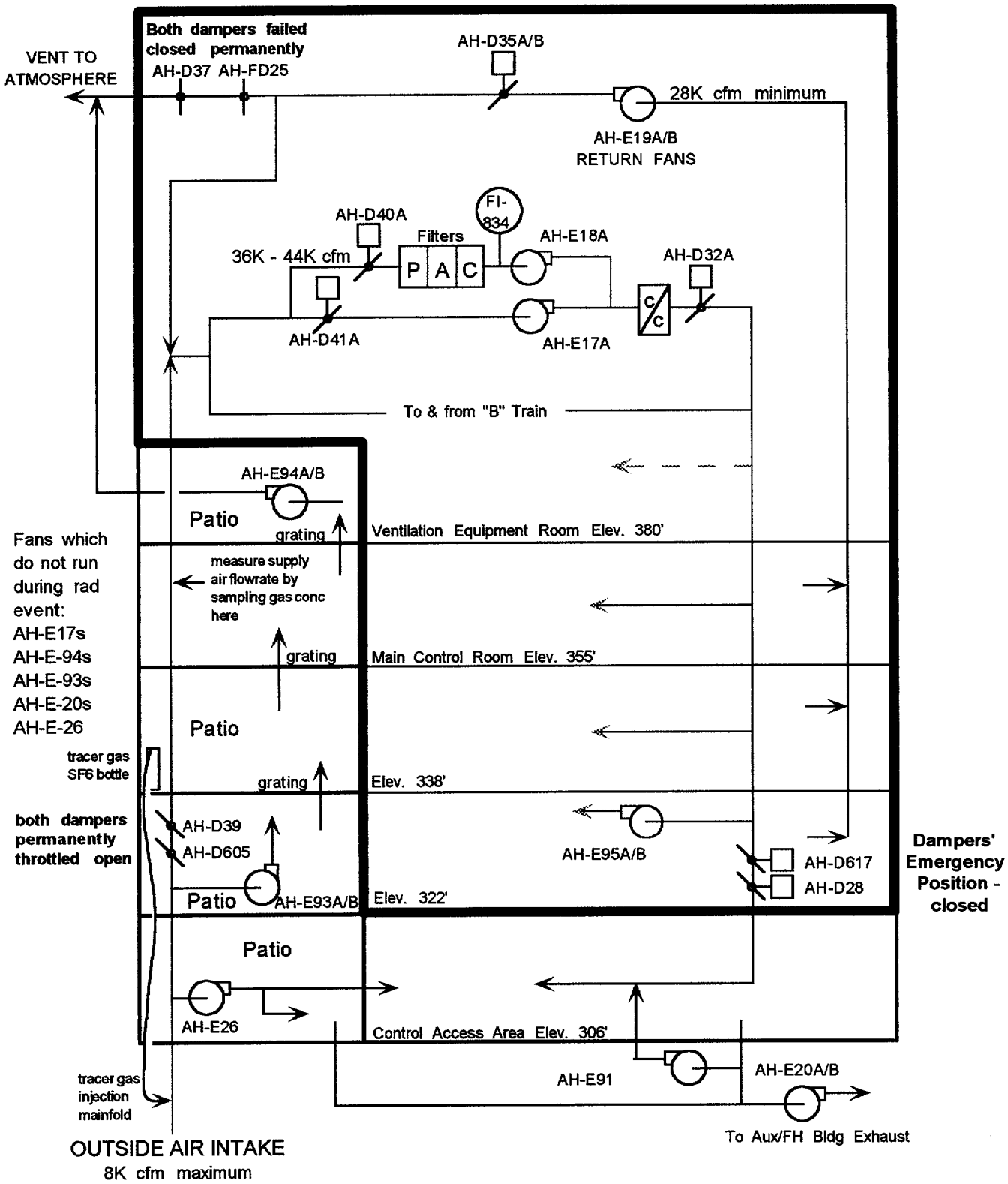
Normal System Operation

- 5000 - 6000 cfm fresh air is mixed with approx. 35000 cfm recirc. from 2nd - 4th floors.
- First floor exhausts through Aux/FH buildings exhaust stack.
- Remaining floors receive mixed air, and some exfiltration through doors and ingress/egress.

Emergency System Operation

- Normal Ventilation trips on Hi Radiation in Control Room or Hi RB Pressure.
- First floor isolated.
- Operators manually start Emergency fans.
- CBE air is recirculated through HEPA/Carbon banks.
- CBE is pressurized with outside air to maintain positive pressure with respect to adjacent areas.

CONTROL BUILDING ENVELOPE



TMI-1 CONTROL BUILDING VENTILATION SYSTEM

(Simplified drawing)

Habitability Modifications

- Address Single Failure Issues
  - Installed redundant 1st Floor Isolation damper.
  - Recirculation control damper removed.
  - Exhaust damper permanently closed.
  - Supply dampers maintained in fixed position
  - Second and Third floor smoke isolation dampers not removed or modified.
- Planned by August 2001:
  - Make Ventilation Equipment Rooms a permanent part of the Emergency Envelope (temporary walls were built for tracer gas test).

Tracer Gas Test Performance

- Performed August 20 - 21, 2000
- In accordance with ASTM E741-93 (constant injection)
- System in emergency lineup
- Quantified unfiltered inleakage for each emergency ventilation train.
- Used tracer gas method to quantify outside air supply flowrate.

Tracer Gas Test Results

- Unfiltered Inleakage Flowrates:
  - "A" Train = 233 ± 129 SCFM
  - "B" Train = 189 ± 103 SCFM
- During tests Pressure Differential data recorded
  - during each test 38 readings were taken from all rooms inside the CBE to adjacent areas outside envelope (all rooms positive).

RADIOLOGICAL

DOSE

CALCULATIONS

Use of Regulatory Guide 1.183

- Full Scope Application
  - Non-LOCA Accidents Reviewed
  - LOCA Is Bounding
  - EQ Dose Profile Evaluated
    - Sufficient Margins Remain For All Equipment
    - No Impact on Program or Equipment
  - Vital Area Access Reviewed
    - Current Analysis is Bounding
- All Clarifications Noted In Application
  - ESF Leakage Flashing Factor
  - Technical Justification Provided In Calc

Calculation Methodology

- RADTRAD 3.02
  - Parametric Studies Performed
    - Determined Compatibility With Current Design Inputs
    - Verified Adequate Conservatism
  - Inputs Validated and Verified (NEI 99-03)
    - Design Basis Information Used
  - Parameter Database For Release Model
    - Electronic Version To Be Provided For RADTRAD Input
  - Results Summary To Staff
  - Hard Copy Of Design Input Per RG

Analysis Parameters

- Core Isotopic Source Inventory
  - ORIGEN 2.1
  - Bounding 2-Yr Cycle Design
- Release Fractions & Timing
  - By Radionuclide Group
  - RCS, Gap, and Early In-Vessel Releases
- Chemical Form
  - Iodines
  - Sump pH >7 (Including Radiolysis of Hypalon)
- Ample CR Inleakage Margin
  - Four Times Measured Amount
- Existing X/Qs
  - CR Approved In 1998 (ARCON96)
  - Site Boundary Per RG 1.145

Release Pathways

- Containment Leakage
  - TS Rate Reduced After 24 Hrs
  - Ground Level Release
- ESF Leakage
  - Two Times TS Amount
  - Ground Level Release
  - Time-Dependent Iodine Flashing Factor

Release Pathways
(Continued)

- BWST Leakage
  - Conservative Time-Dependent Leak Rate
  - Ground Level Release
  - 10% Iodine Flashing Factor Per RG

- Containment Purge Release
  - TS RCS Activity
  - Containment Isolation Delayed For 1 Minute
  - No Charcoal Filtration Credit

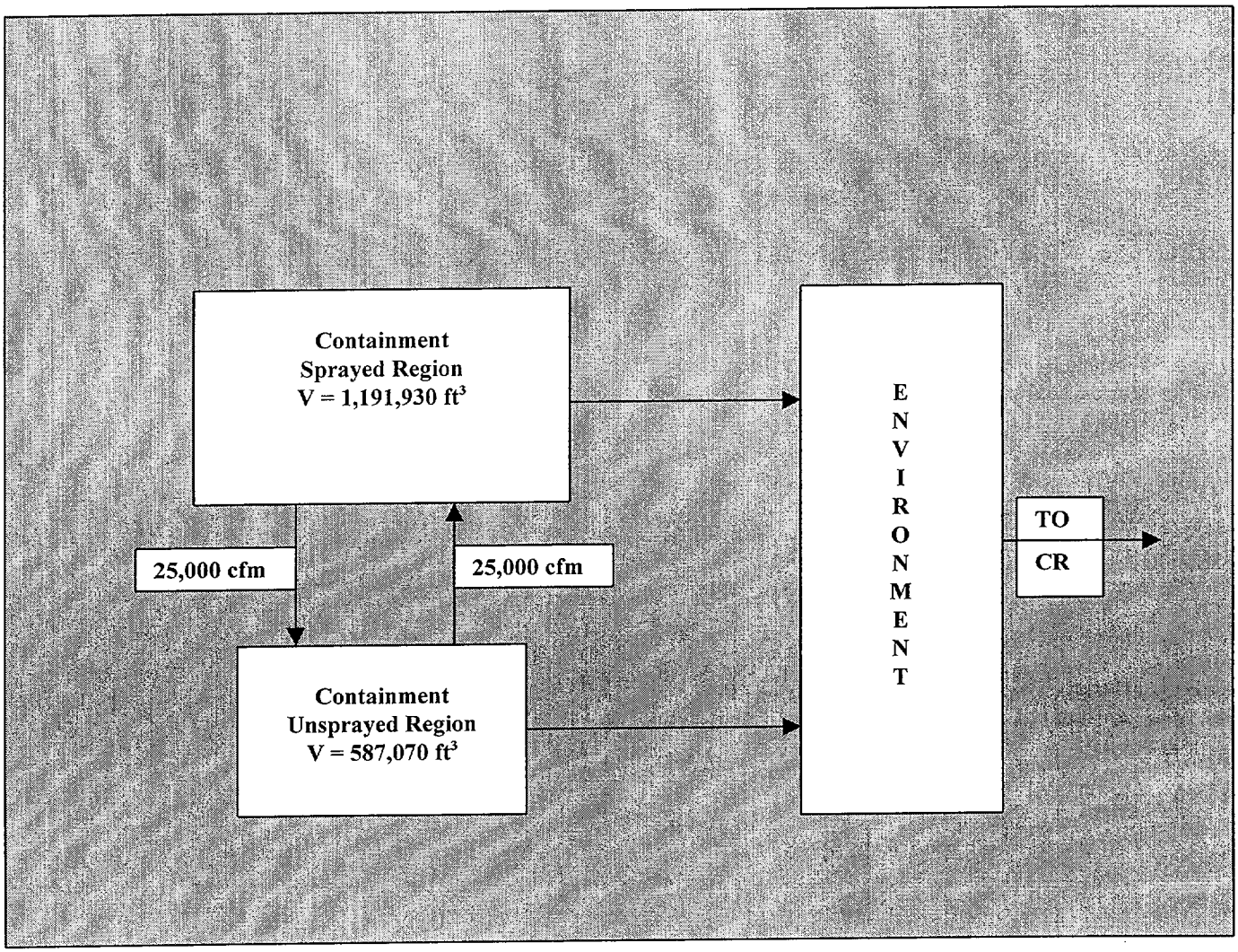
Single Failure Assumptions

- Two Trains Building Spray Maximizes Dose
  - Depletes BWST Faster
  - Spray Ends Before Major Release
  - ESF Leakage Starts Earlier

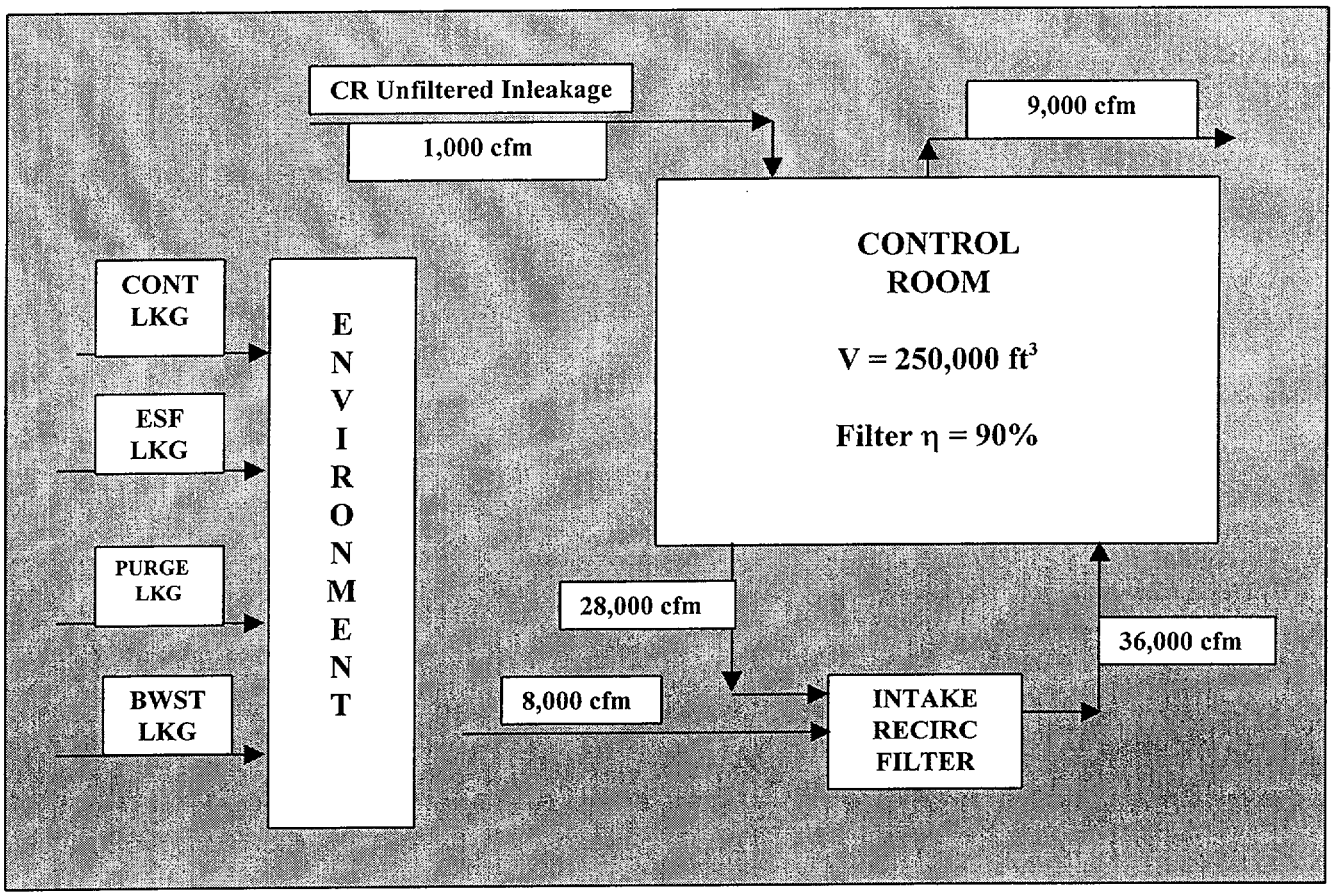
- Single Train Containment Mixing Fans

TMI Unit 1
Preliminary Dose Results
(Using AST)

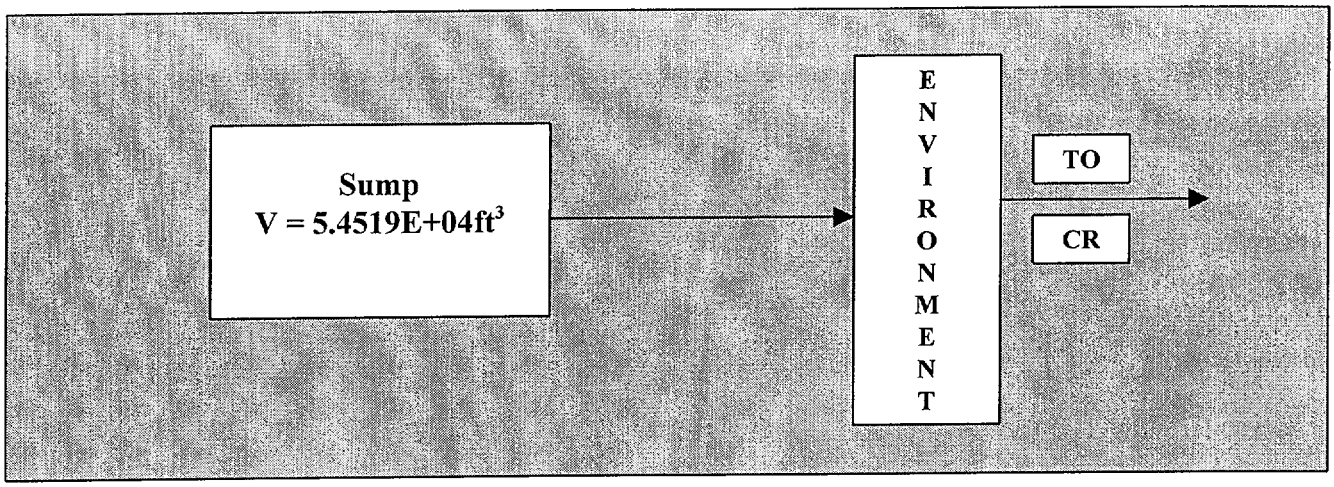
Post-LOCA Activity Release Path	Post-LOCA TEDE Dose (Rem)		
	Receptor Location		
	Control Room	EAB	LPZ
Containment Leakage	1.6183	23.987	13.723
ESF Leakage	1.4549	0.6202	0.7507
BWST Leakage	0.04506	0.00056	0.04789
Containment Purge	0.0059	0.03224	0.00564
Total	3.124	24.64	14.527
Allowable Limit	5.00	25.00	25.00



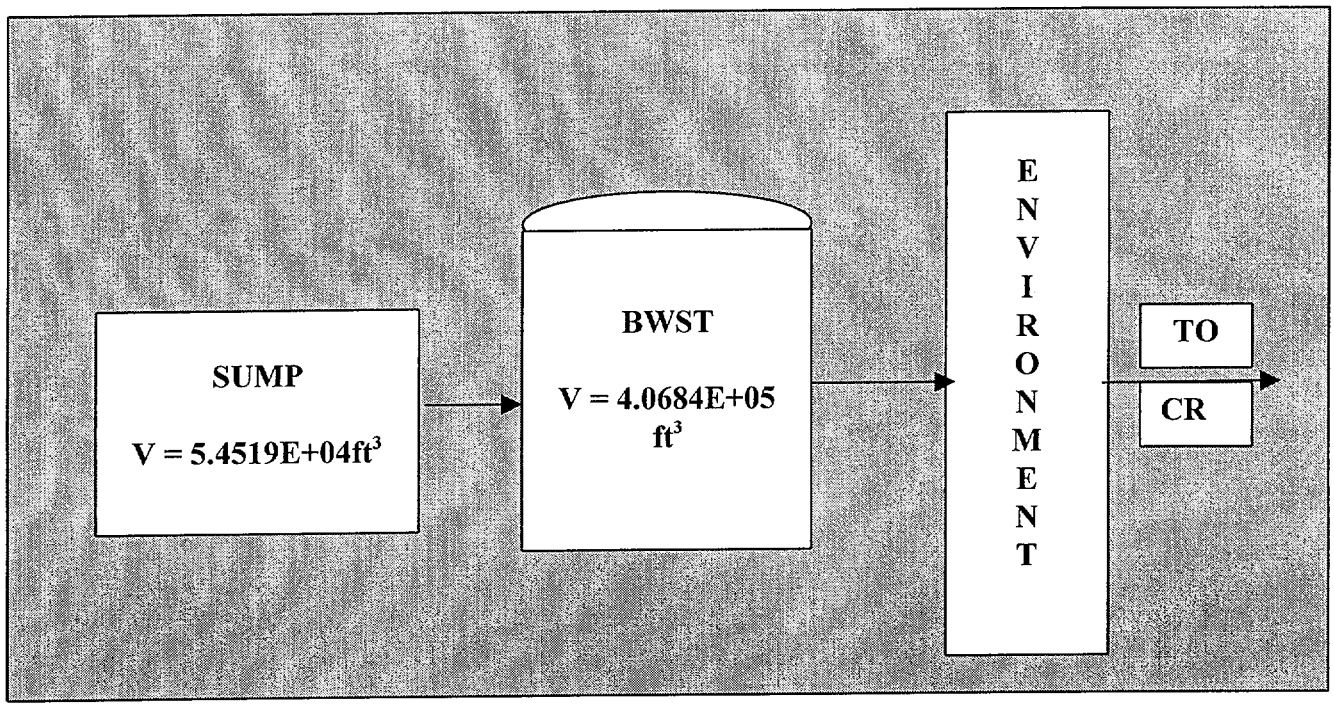
TMI-1 Containment Leakage RADTRAD Nodalization



TMI-1 Control Room RADTRAD Nodalization



TMI-1 ESF Leakage RADTRAD Nodalization



TMI-1 BWST Leakage RADTRAD Nodalization

Summary

- TMI Unit 1 Amendment Request Submittal Scheduled for February 1, 2001
  - 10 CFR 50.67 Full Scope Application for use of Alternate Source Term
  - Analysis Complies with Regulatory Guide 1.183
  - Other Methods and Assumptions Previously Approved
- Amendment Request Establishes Cycle 14 Technical Specification Allowable ESF Leak Rate
  - Amendment Requested by August 1, 2001, to Support Cycle 14 Startup - October 1, 2001