Oyster Creek Presentation to NRC Staff

July 28, 2000

Control Room Habitability

Radiological Consequence Analysis for Control Room Operators at Oyster Creek Nuclear Generating Station using the Alternate Source Term as an NEI Pilot Plant submitted March 31, 1997

Attachment 2

Agenda

Topic	**Presenter**
I. Background	Radvansky
II. Oyster Creek Control Room HVAC System Configuration	Radvansky
III. Discussion of Analysis	Metcalf
IV. Summary	Busch
V. NRC Feedback	

Background

Oyster Creek Profile

640 MWe BWR II, Mark I Containment,
Commercial Operation—December, 1969

Licensing Issue—Resolution of NUREG 0737
III.D.3.4 Thyroid Dose to CR Operator

Key Chronological Events

- 1982-1990 Upgrades to System;
  Formulation and Acceptance of Current Licensing Basis (CLB)—Whole Body and Skin Dose

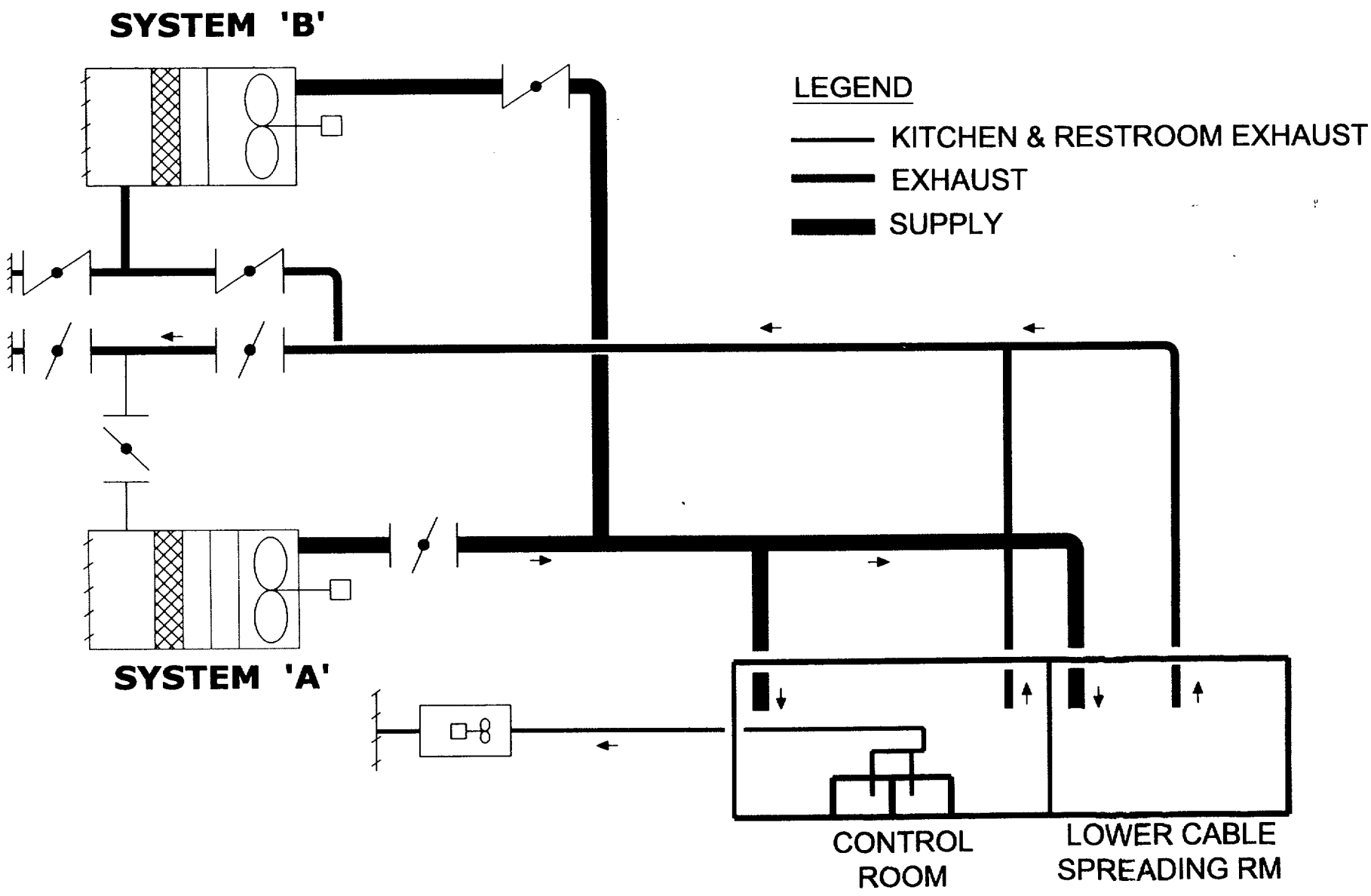
- 1996, Mar. NRC Request for Resolution of Thyroid Dose

- 1996, Nov. Accepted as an NEI Pilot Plant for Use of Alternate Source Term in a Licensing Submittal

- 1997, Mar. Submittal Issued to NRC

- 2000, Apr. GPUN Letter Requesting Reactivation of Review; Remobilization of Project

Oyster Creek Control Room
HVAC System Configuration



CONTROL ROOM ENVELOPE
HVAC SYSTEM DIAGRAMMATIC

Discussion of Analysis

- Current Submittal Analytical Approach
- Analytical Model for Oyster Creek AST Application
- Changes from Current Licensing Basis
- Dose Results by Type
- Dose Results by Pathway
- Atmospheric Dispersion--LER 2000-006

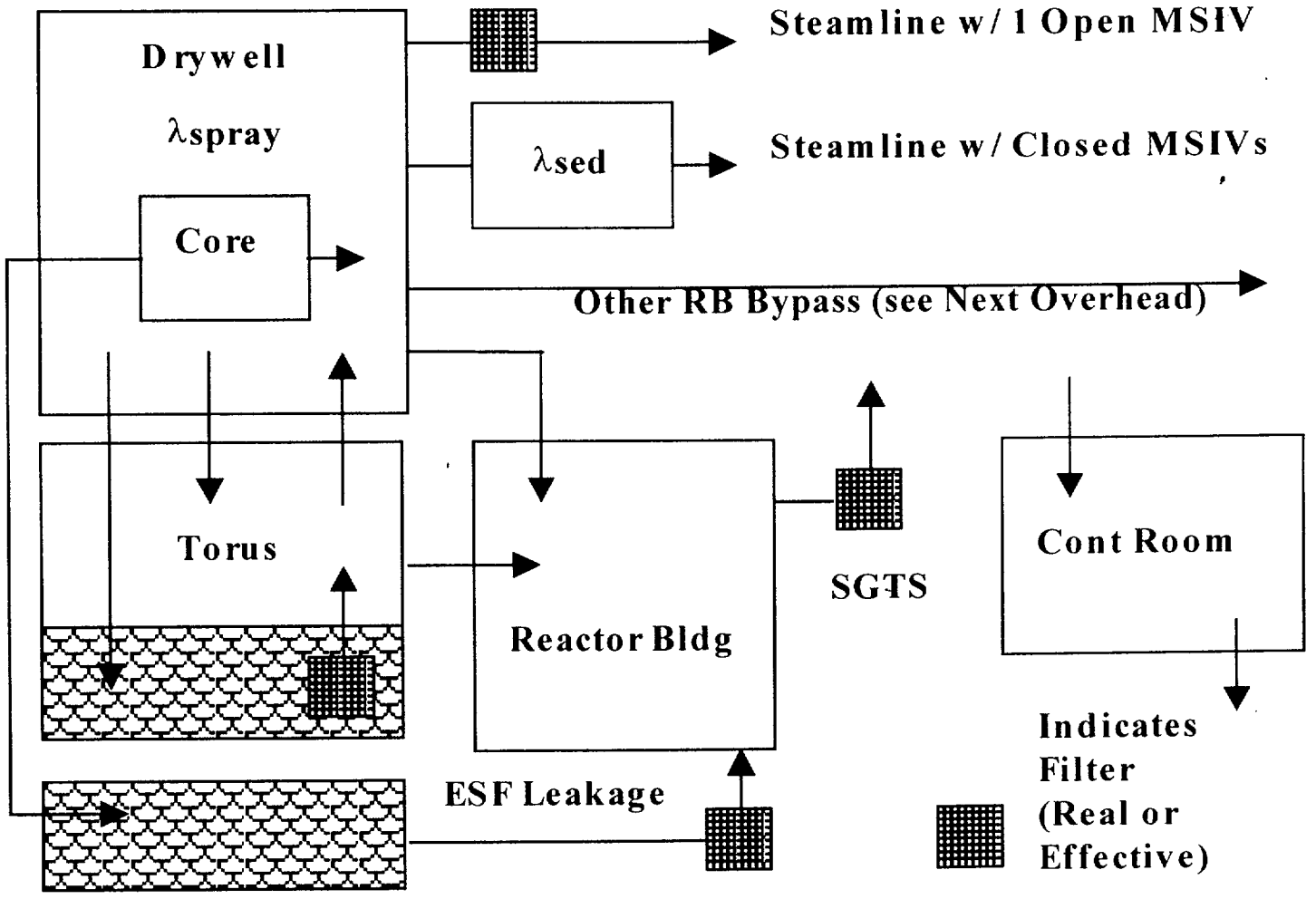
Current Submittal Analytical Approach

- Pilot Plant Application
- Some Aspects of CLB Retained
  - MSIV Leak Rate = $f(P_{DW})$
  - Occupancy Factors Based on Shifts
  - Same X/Qs
  - Same Shine Dose
- Steam Line Hold-Up Beyond Outboard MSIVs Not Credited (NRC Request--March 1996 Letter)
- Non-MSIV Bypass Added (NRC Request--March 1996 Letter)

Current Submittal Analytical Approach (Cont)

- Pilot Plant Status Justification (October 1996)
- Unique/Interesting Features of Oyster Creek Application
  - Credit for Drywell Sprays
  - Integrated Containment T/H Analysis
  - Significant Potential for No pH Control
  - No Control Room Charcoal or Particulate Filters
  - Additional Non-MSIV Bypass Pathways
  - MSIV Leak Rate = $f(P_{DW})$
  - No Credit for Deposition Beyond Outboard MSIVs

Analytical Model for Oyster Creek AST Application



Analytical Model for OC AST Application (Cont)

- Other RB Bypass
  - Based on "Primary Containment Leakage Rate Testing Program", October 11, 1996
  - Lines Which
    - Originate in Primary Containment
    - Terminate Outside Secondary Containment
    - Not Water-Filled
  - Includes: 8" N_2 Pathway, 2" N_2 Pathway, TIP Purge, Instrument Air, Isolation Condenser Vents, Drywell Spray Test Lines
  - Treated in a Manner Similar to Main Steam Lines

Changes from Current Licensing Basis

Aspect	Current Licensing Basis	Current Submittal
Source Term	TID-14844	NUREG-1465
Containment Sprays*	Continuous for Pressure Reduction	Cycled for Activity Removal and Pressure Reduction
MSIV Leak = $f(P_{DW})$	Yes, with UFSAR DW Pressure	Yes, with Revised (MAAP4) Pressure
Deposition in Steam Lines*	Hold-Up Only	Up to Outboard MSIV
Pool Scrubbing*	No	Yes (Based on MAAP4 T/H)
Occupancy Factors	Four Shifts after 24 Hours	Five Shifts after 24 Hours
Pool pH	Not Applicable	Revaporization Included

*Additional Overheads

Containment Sprays

- MAAP4 Analysis Determines Frequency
- Consistent with EOPs, Now with SAGs
- Only Design Flow Credited
- Drywell Sprays
  - STARNAUA Analysis for Removal Rates
    - Realistic Impaction
    - Ignores Hygroscopicity and New Droplet Size Data
  - Fall Height Rigorously Considers Obstructions
  - Drywell Assumed to Be Well-Mixed
- Torus Sprays
  - SRP 6.5.2 Removal Rates (for Pool Bypass)

Deposition in Steam Lines (and Other RB Bypass Pathways)

- Steam Lines
  - Steam Line with One Open MSIV
    - Impaction at Inboard MSIV (DF = 2)
  - Steam Line with Closed MSIVs
    - Sedimentation (Well-Mixed) Between MSIVs
    - Calculated with STARNAUA
    - Impaction at Inboard MSIV Combined with Sedimentation Removal Rates (i.e., "Lambdas")

- Other Bypass Pathways
  - Sedimentation (Plug-Flow) in Piping within Secondary Containment (Large L/D)

Pool Scrubbing

- Treatment Consistent with SRP 6.5.5
- Drywell-to-Torus Flow Commences with Core Debris Relocation (Predicted by MAAP4)
- Approx 50% of Drywell Volume Transferred over 10 Minutes Leading to 40% Purge
- Pool DF = 2.3 (Approx 50% Pool Bypass)
- DF Effectively Much Smaller
- 10 Minutes of Return Flow Based on Drywell Spray Operation after Partial Drywell Purge
- Drywell and Torus Considered Well-Mixed after End of Release Period

Dose Results by Type

– Organic Iodine Inhalation Dose =	1.33 Rem
– Elemental Iodine Inhalation Dose (w/o Revolatilization) =	0.14 Rem
– Dose from Inhalation of Particulates =	2.17 Rem
– Revolatilized Iodine Inhalation Dose =	0.12 Rem
– External Dose (Activity Inside Control Room) =	0.37 Rem
– External Dose (Activity Outside Control Room (i.e., Plume) =	0.04 Rem
– External Shine (Containment/Core Spray) =	0.60 Rem
Total =	**4.77 Rem**

Dose Results by Pathway

- Steam Line with Stuck-Open Outboard MSIV = 2.35 Rem
- Steam Line with Closed MSIVs = 0.56 Rem
- Containment Leakage = 0.21 Rem
- ESF Leakage = 0.35 Rem
- Other (Non-MSIV) Secondary Containment Bypass = 0.70 Rem
- Containment and Core Spray Piping Shine = 0.60 Rem

Total = 4.77 Rem

Atmospheric Dispersion – LER 2000-006

- CLB and 1997 Submittal
  - Murphy-Campe
  - 1982-83 Meteorological Data
  - "A" Control Room Air Intake (Only Intake in 1985)

- Application of ARCON96
  - Ground-Level Release X/Qs Only Recalculated
  - Both "A" and "B" Air Intakes Considered
  - NRC Draft Guidance Employed
  - 1995-99 Meteorological Data
    - OC Meteorological Program Meets RG 1.23
    - Includes Statistical Analysis for Trends