

Communicating Safety Significance of IP2 Tube Failure

EE/3

- For IP2, CCDP and LERF are close, creating confusion.

Analysis	Initiating Frequency	Conditional Core Damage Probability (CCDP) based on failure to isolate and cooldown	Large Early Release Frequency (LERF)
IP2 IPE for SGTR	1.3E-2/yr	$\approx 8\text{E-}5$	1E-6/yr
Feb. 2000 Tube Failure at IP2	1 per year	$< 1\text{E-}6$	$< 1\text{E-}6/\text{yr}$
NRC SDP Risk Assessment of IP2 Tube Failure	0.5 per year	1E-4*	5E-5/yr ($\approx 1\text{E-}4/\text{yr}$)

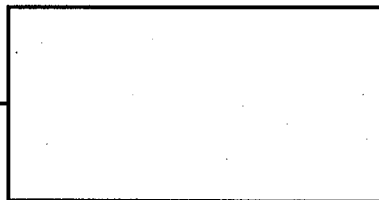
*Value based on NUREG-1150 Surry model and SPAR IP2 model

Risk Communication

Initiating Event

IP2 IPE SGTR

Mitigation



Operators fail to
Isolate and
Cooldown

Result

Safe Shutdown

Large Early Release

Frequency: 1.3E-2/yr

$\approx 8E-5$
(Conditional CDP)

1E-6/yr
(LERF)

Risk Communication

Initiating Event

Mitigation

Result

IP2Tube Failure (150 gpm)

Safe Shutdown

Large Early Release

Operators fail to
isolate and
Cooldown

Frequency: 1 per year

<1E-6
(Conditional CDP)

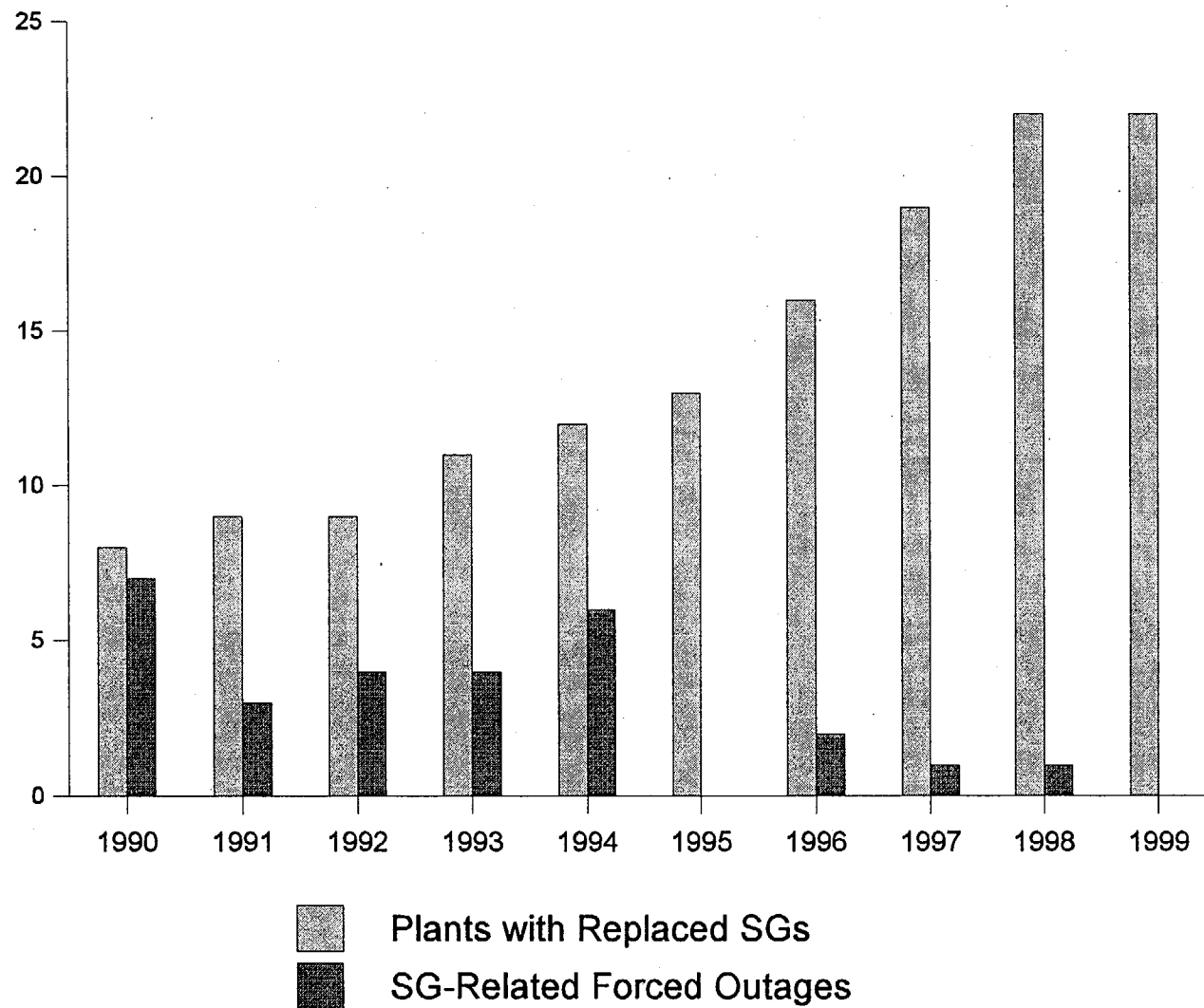
<1E-6/yr
(LERF)

Risk Communication

<u>Initiating Event</u>	<u>Mitigation</u>	<u>Result</u>
SGTR >600 gpm	<div> <div></div> <p>Operators fail to isolate and Cooldown</p> </div>	Safe Shutdown
		Large Early Release
Frequency:	0.5 per year	<div> <div>1E-4</div> <div>(Conditional CDP)</div> </div> <div> <div>5E-5/yr</div> <div>(LERF)</div> </div>

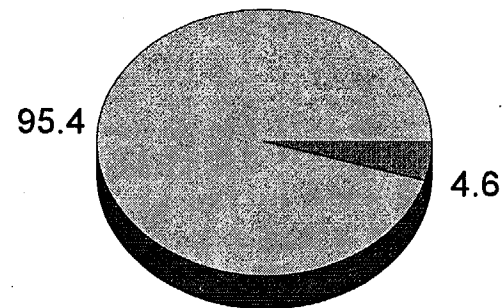
- For IP2, the CCDP and LERF are close, which creates confusion.

Number of SG Replacements vs. SG Forced Outages

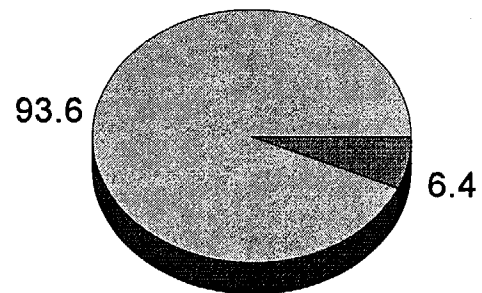


Fraction of Repaired SG Tubes

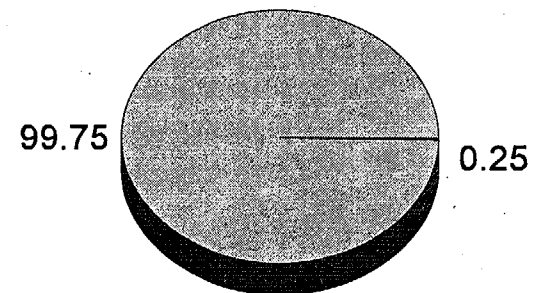
All SGs



Original SGs

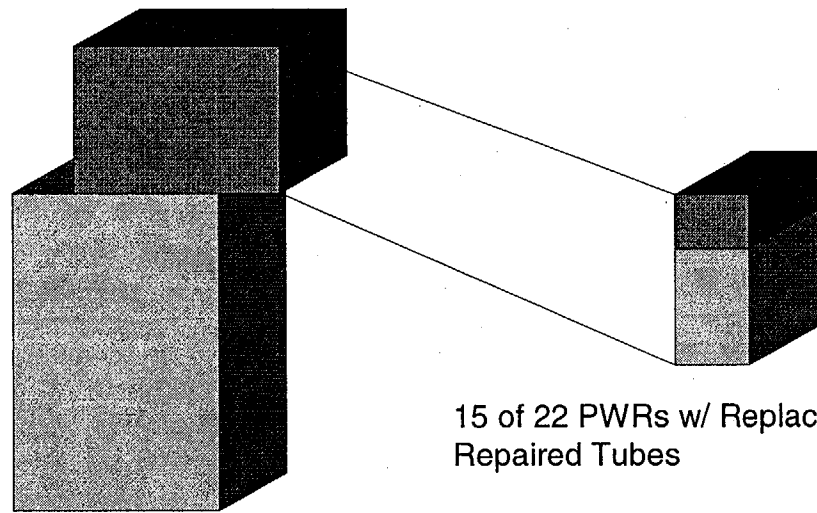


Replaced SGs



PWRs with Repaired SG Tubes

22 PWRs w/ Replaced SGs

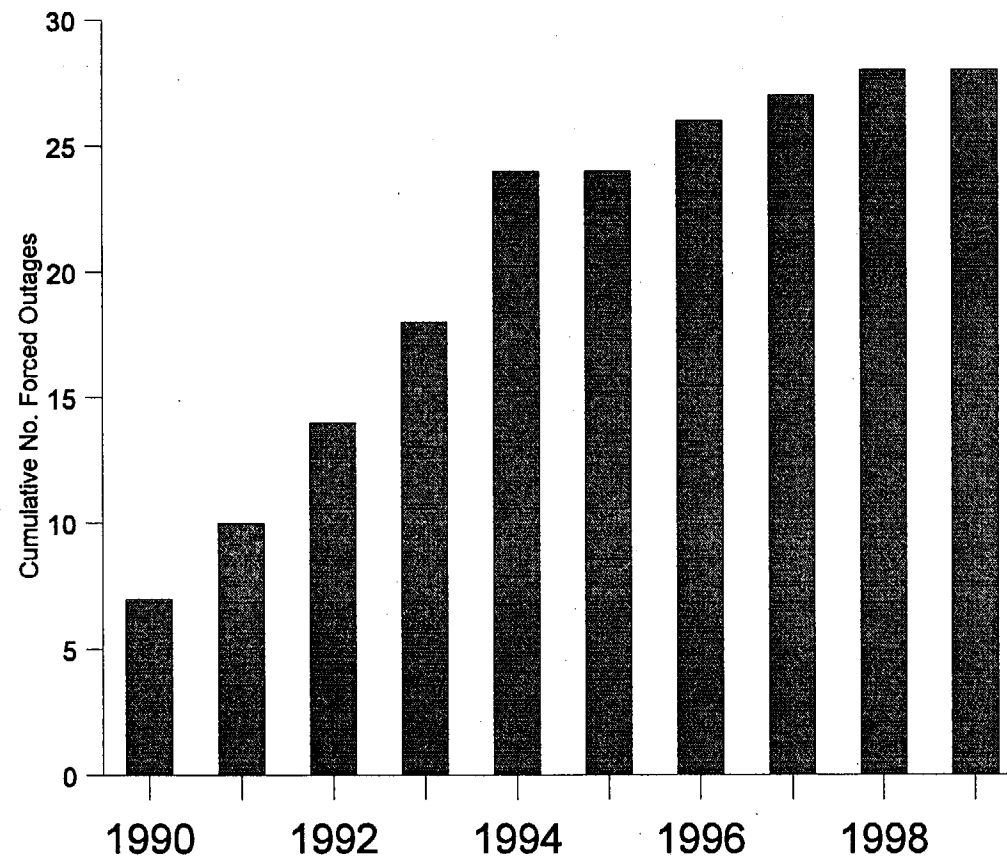


15 of 22 PWRs w/ Replaced SGs have Repaired Tubes

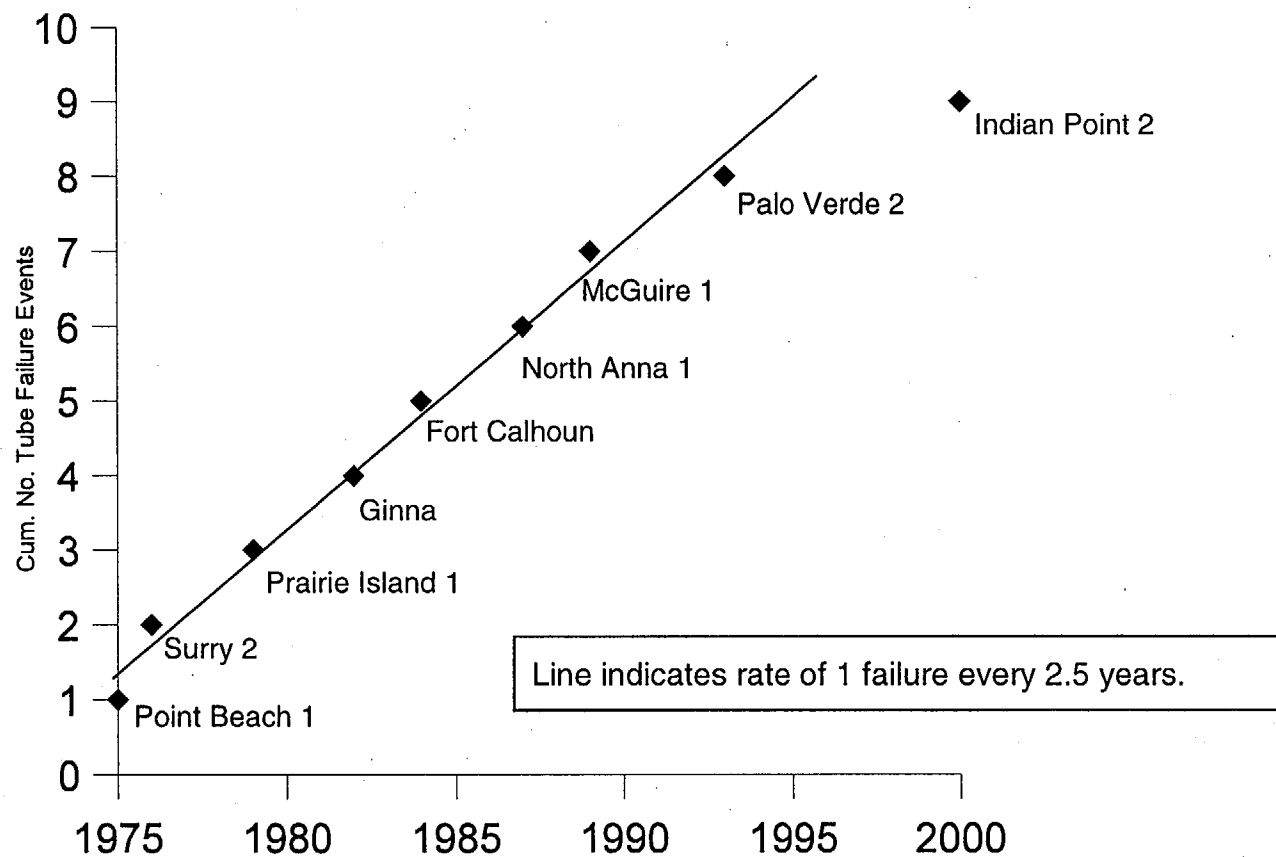
47 PWRs w/ Original SGs

All PWRs with original SGs have had tube repairs

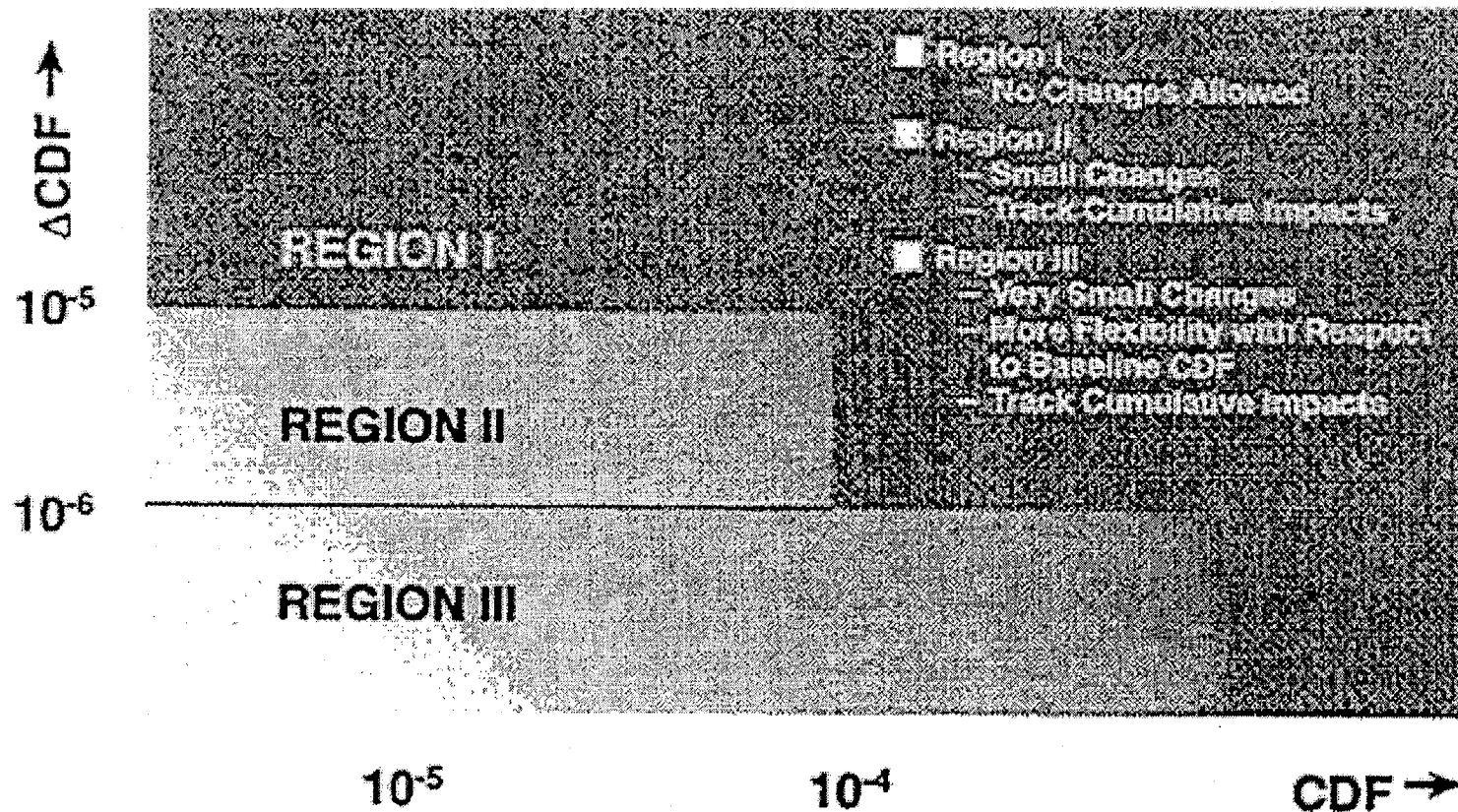
Rate of SG Forced Outages



Rate of SG Tube Failures



Reg. Guide 1.174 Acceptance Guidelines for Core Damage Frequency



Reg. Guide 1.174 Acceptance Guidelines for Large Early Release Frequency

