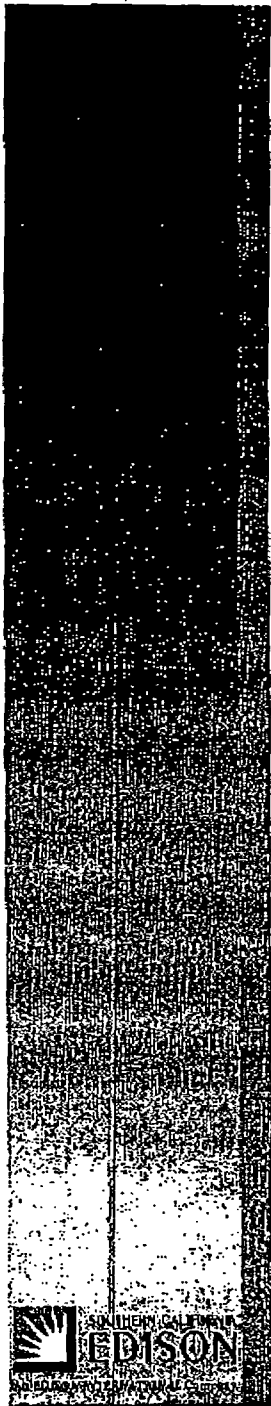


# ***Follow-up to Obstructed Sleeves at SONGS Unit 2***

## **March, 2004**





## ***Background***

- SONGS U2C13 outage, 10 of these sleeves contained an obstruction.
- A review of sleeve history determined that all of the affected sleeves were installed during the previous Refueling Outage (U2C12).
- SER from the NRC issued August 26, 1998, approved sleeve installation (Topical Report) and the Appendix H, EC examinations guidelines.



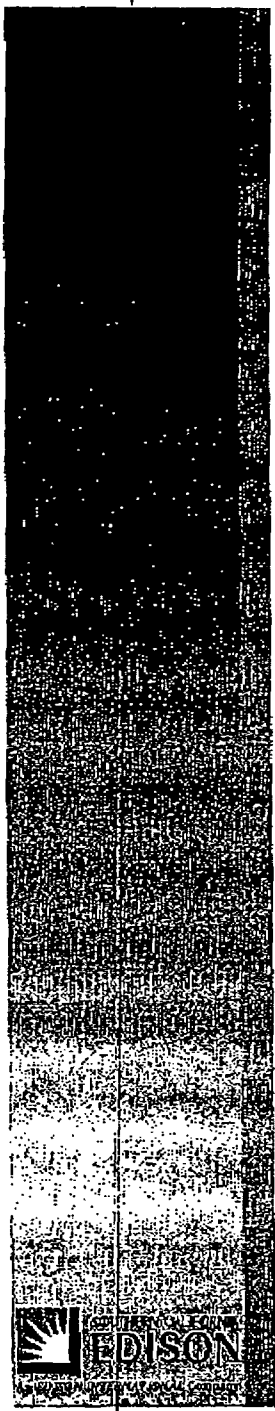
## *Cause*

- The cause of this condition is a leak path that allows water into the annulus between the tube and sleeve while the plant is at cold conditions.
- The most likely scenario involves leakage through a parent tube through-wall defect or through the sleeve-to-tube rolled joint.



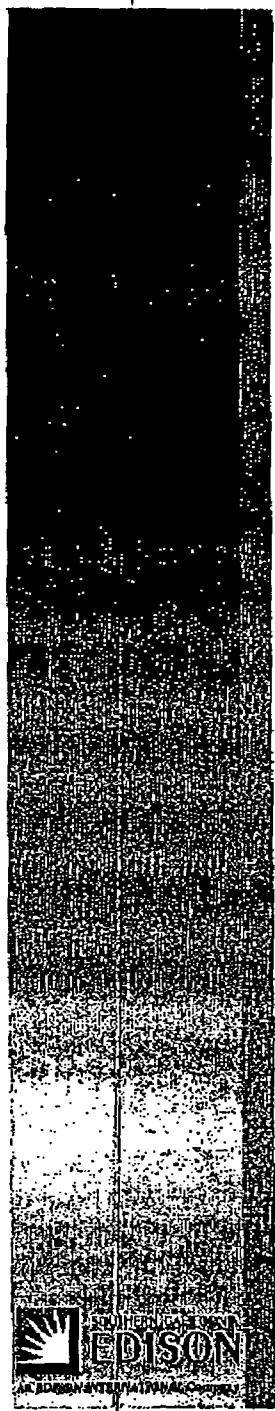
## ***NRC Questions***

- The NRC was informed
- As a result of these discussions, two questions require responses. These are:
  - Does the sleeve meet the design conditions evaluated in the topical report while in the collapsed condition?
  - Can ECT detect flaws in the parent tube behind the sleeve nickel band?



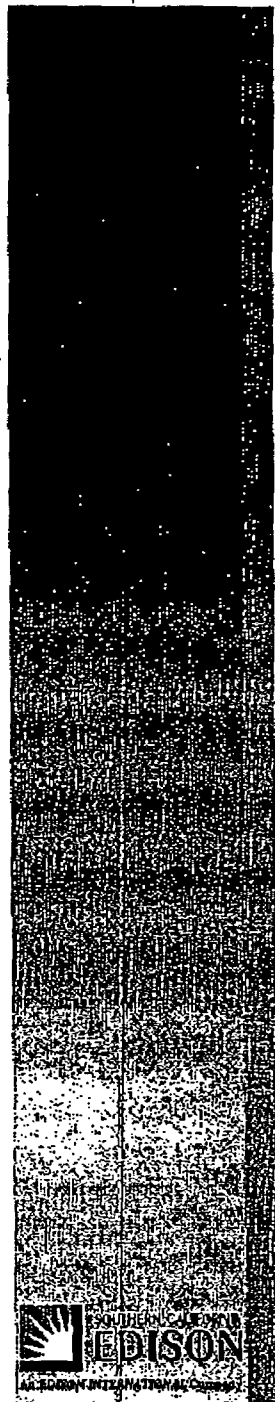
## ***Does the sleeve meet the design conditions ?***

- Westinghouse has evaluated this phenomenon as it has occurred at other plants.
- Since the Beaver Valley design and operating conditions are similar to those of SONGS, the conclusions in that letter are applicable.
- Both the upper and lower joints were unaffected by the bulging, Westinghouse concludes that the obstructed sleeves were capable of withstanding all specified conditions defined in the topical report. As a result, the sleeve was capable of performing its design function over the full operating cycle.



## ***Can ECT detect flaws in the parent tube behind the sleeve nickel band?***

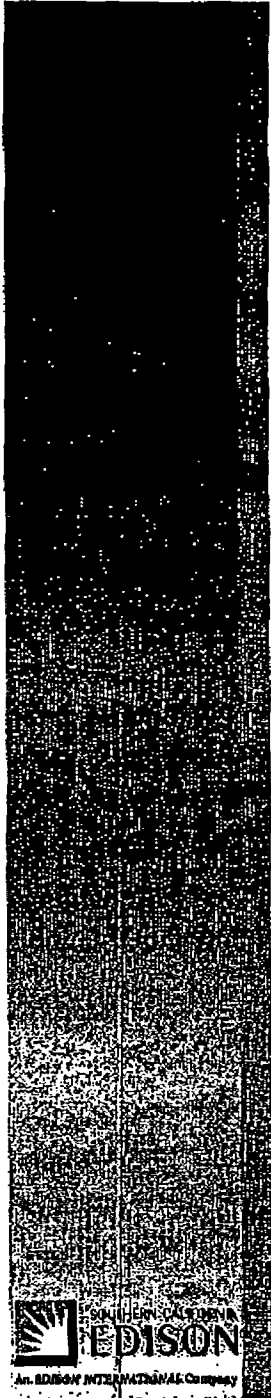
- The presence of nickel in the rolled joint region makes it difficult to interpret eddy current signals in this area. This condition results in the probability that flaws behind the 1/2-inch wide nickel band and the 1/2-inch wide microlok band would not be detected during the sleeve inspection program using current techniques.



## ***EC Examination***

- The sleeve examination program was presented in the sleeve installation (Topical Report) and the Appendix H, EC examinations guidelines. There were no simulated defects located in the parent tube region behind the nickel and microlok bands of the rolled joint.





## ***Conclusions***

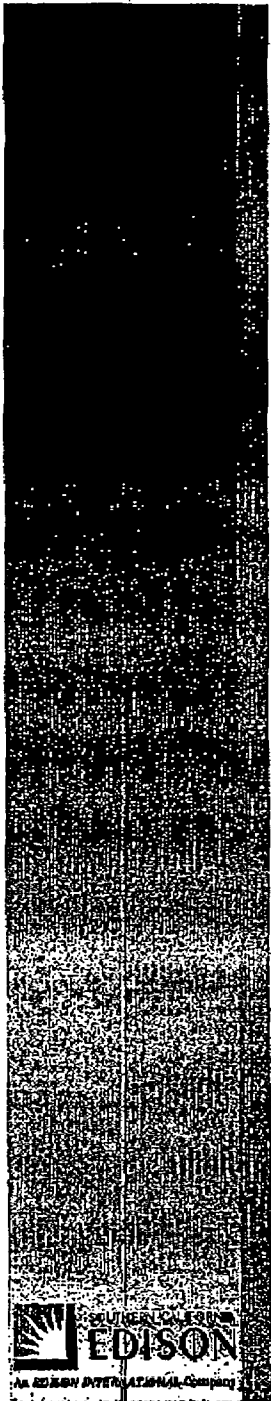
- Possible that small undetected flaws may exist in the roll zone of the parent tube behind these bands in sleeves installed prior to 2C12.





## ***Why not a concern***

- The qualification of this joint has shown that the nickel acts as a gasket material and isolates the joint region from the primary fluid flowing through the sleeve.
- Any cracks that form have a preference for the axial direction, i.e., normal to the maximum stress. Even if the flaw propagates outside of the roll zone, subsequent sleeve inspections will detect it in the region above or below it.
- If an undetected through-wall flaw exists behind the nickel band, the rolling process will have the effect of capturing the flaw in the rolled region, flowing nickel into and/or over the flaw.



## ***Why not a concern***

- For the current outage, inspection confirmed that this region was free of detectable flaws before sleeve installation. Post-installation testing of the sleeves is also performed with a rotating probe. This inspection is repeated during each subsequent refueling outage for each sleeve. All 10 Bulged sleeves have been plugged.



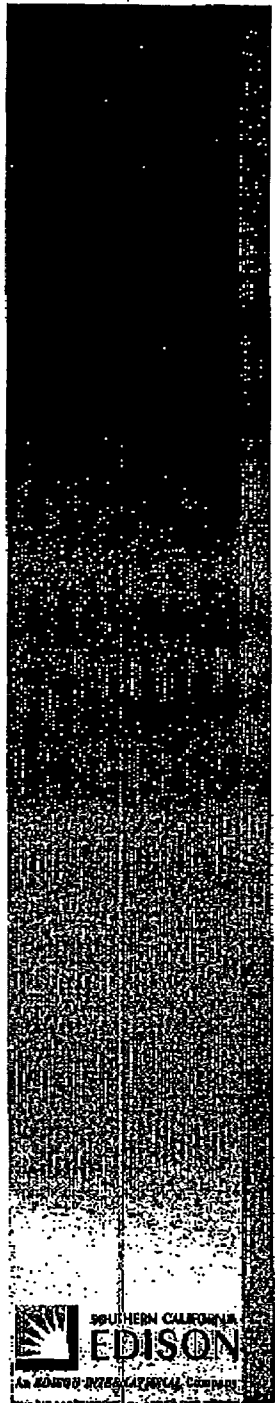
## ***Why not a concern***

- If a new flaw develops below the sleeve, then this too will be detected during the next inspection cycle.
- In conclusion, the presence of the nickel and microlok bands will limit the capability to detect small flaws in the parent tube behind the band. The potential presence of these flaws, however, will not affect the design function of the sleeve.



## ***Conclusion***

- With collapsed sleeves, SCE and Westinghouse conclude that the obstructed sleeves were capable of withstanding all specified conditions defined in the topical report. As a result, the sleeve was capable of performing its design function over the full operating cycle.
- The presence of the nickel and microlok bands will limit the capability to detect small flaws in the parent tube behind the band. The potential presence of these flaws, however, will not affect the design function of the sleeve.



## ***Status***

- Unit 2 bulged sleeves have been plugged
- OA written to address the issues discussed, due by 3/20 – Mode 4.
- LCS 3.2.100 linear heat rate (LHR) has been changed.