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50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
AUTH.NAME AUTHOR AFFILIATION
UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
VARGA,S.A. Operating Reactors Branch 1

SUBJECT: Forwards response to NRC 820211 request for addl info re NUREG-0737,Item II.K.3.2,safety effect of power operated relief valve isolation sys.List of event tree initiating events considered included.

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FLORIDA POWER & LIGHT COMPANY

March 26, 1982
L-82-118

Office of Nuclear Reactor Regulation
Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Varga:

Re: Turkey Point Units 3 & 4
Docket Nos. 50-250 & 50-251
Post-TMI Requirements
NUREG-0737 Item II.K.3.2

Attached is our response to your request for additional information concerning NUREG-0737 Item II.K.3.2 which is contained in your letter of February 11, 1982. We trust that this additional information will allow you to complete your evaluation of this item with respect to Turkey Point Units 3 and 4.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

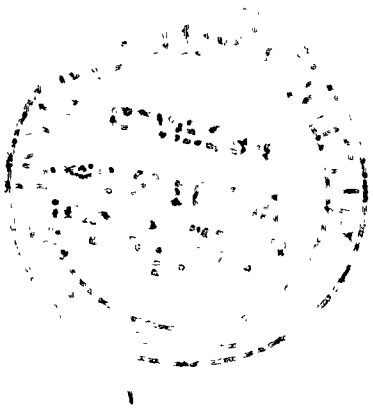
REU/PKG/ras

Attachment

cc: J.P. O'Reilly, Region II
Harold F. Reis, Esquire

A046
S11

PEOPLE . . . SERVING PEOPLE



ATTACHMENT

Re: Turkey Point Units 3 & 4
Docket Nos. 50-250 and 50-251
Post-TMI Requirements
NUREG-0737 ITEM II.K.3.2

1. A calculation of safety valve failure rates based on past histories of the operating plants designed by the NSSS vendors.

As discussed in WCAP-9804, Appendix II, no attempt was made to identify a safety valve failure probability based on actual demand. The lack of sufficient data precludes a statistical approach. This was recognized in both the WASH-1400 and EPRI NP-801 studies which used an "engineering estimate" for the safety valve failure rate. These studies also used the PORV failure probability value for that of the safety valve. Indeed, when one considers the ASME code requirements, the strict adherence to quality assurance specifications (i.e., Appendix B to 10 CFR 50), the design and manufacture of the safety valve, it may be surmised that the PORV failure rate is overly conservative when applied to the safety valve.

2. An analysis of the probability of a small-break LOCA caused by a stuck-open safety valve using the safety valve failure rate calculated in Question 1. Since operating data indicate that some plants operate with the block valve shut and others block all PORV's some of the time, the analysis provided should account for the additional challenges to the safety valves when PORV(s) are blocked intentionally.

The sensitivity analyses as presented in Tables 3.9 and 3.10 do account for the additional challenges to the safety valves when the PORV's are intentionally blocked. The values of 10, 55 (baseline), and 90 percent for PORV isolation were used to gain insight into the range of safety valve failure frequency obtainable. The frequency of a safety valve failing open did increase (from a total of .31E-05 to .15E-04 total) over the range from 10 to 90 percent.

3. Further clarification of the sources and the method used to determine the initiator event frequencies. Specifically, describe why only 16 transient initiators are considered in the Westinghouse generic report. Describe the method used to group the transient initiators and to arrive at the resultant frequencies.

As discussed in Section 3.1, the transients chosen as initiating events are only those transients which have the potential for opening the PORV; i.e., while the EPRI NP-801 study uses 41 transient initiators, not all would lead to PORV lifting. Additionally, the system response to certain transients is similar and permits enveloping analyses. For example, the loss of main feedwater event (transient number T1) envelopes 10 of the EPRI stated events.

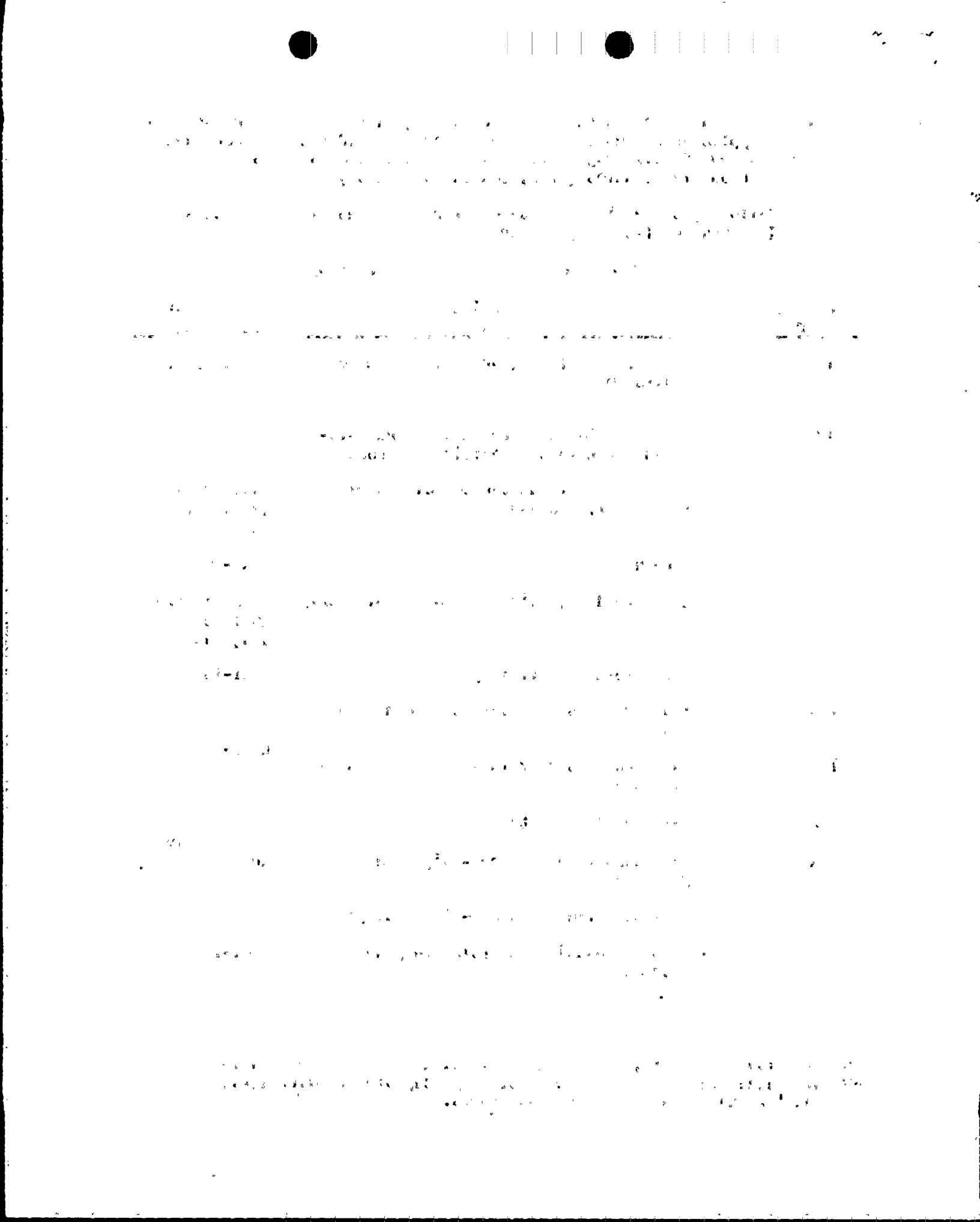
The source used to determine the event frequencies was EPRI report NP-801 where applicable. Those events not covered by EPRI were determined through conservative engineering judgment and used as a basis WASH-1400 or other ongoing studies (i.e., Indian Point/Zion).

The following table gives the source for each event frequency considered (EPRI events are listed by number):

EVENT TREE INITIATING EVENTS CONSIDERED

Transient Number	Transient Name	Source of Event Frequency
T1	Loss of main feedwater, offsite power available	*Conservative Engineering Judgment
T2	Loss of main feedwater due to and coincident with loss of offsite A/C Power	EPRI-35
T3	Loss of main feedwater coincident with loss of all A/C power	Conservative Engineering Judgment
T4	Turbine trip	EPRI-33
T5	Large load rejection without turbine trip	Conservative Engineering Judgment
T6	MSIV closure - all loops	EPRI-18
T7A	Inadvertent safety injection - high head plants**	EPRI-9
T7B	Inadvertent safety injection - low head plants**	
T8	Main feedline rupture	Conservative Engineering Judgment
T9A	Main steamline rupture - high head plants**	
T9B	Main steamline rupture - low head plants**	
T10	CVCS malfunction resulting in power increase	EPRI-11

*Combination of EPRI 15, 16, 21, 22, 23, 24, 26, 27, 28, 29 transients
** High head plants are those with SI pumps capable of challenging the PORV's. Low head plants are the others.



EVENT TREE INITIATING EVENTS CONSIDERED
(cont'd)

Transient Name	Transient Name	Source of Event Frequency
T11	Partial loss of reactor coolant flow (1 loop)	EPRI-1
T12	Complete loss of reactor coolant flow	EPRI-14
T13	Locked (or sheared) reactor coolant pump rotor	Conservative Engineering Judgment
T14	Uncontrolled bank withdrawal resulting in power increase	EPRI-2
T15	Inadvertent PORV opening	EPRI-8
T16	Excessive steam generator tube leakage or tube rupture	EPRI-26

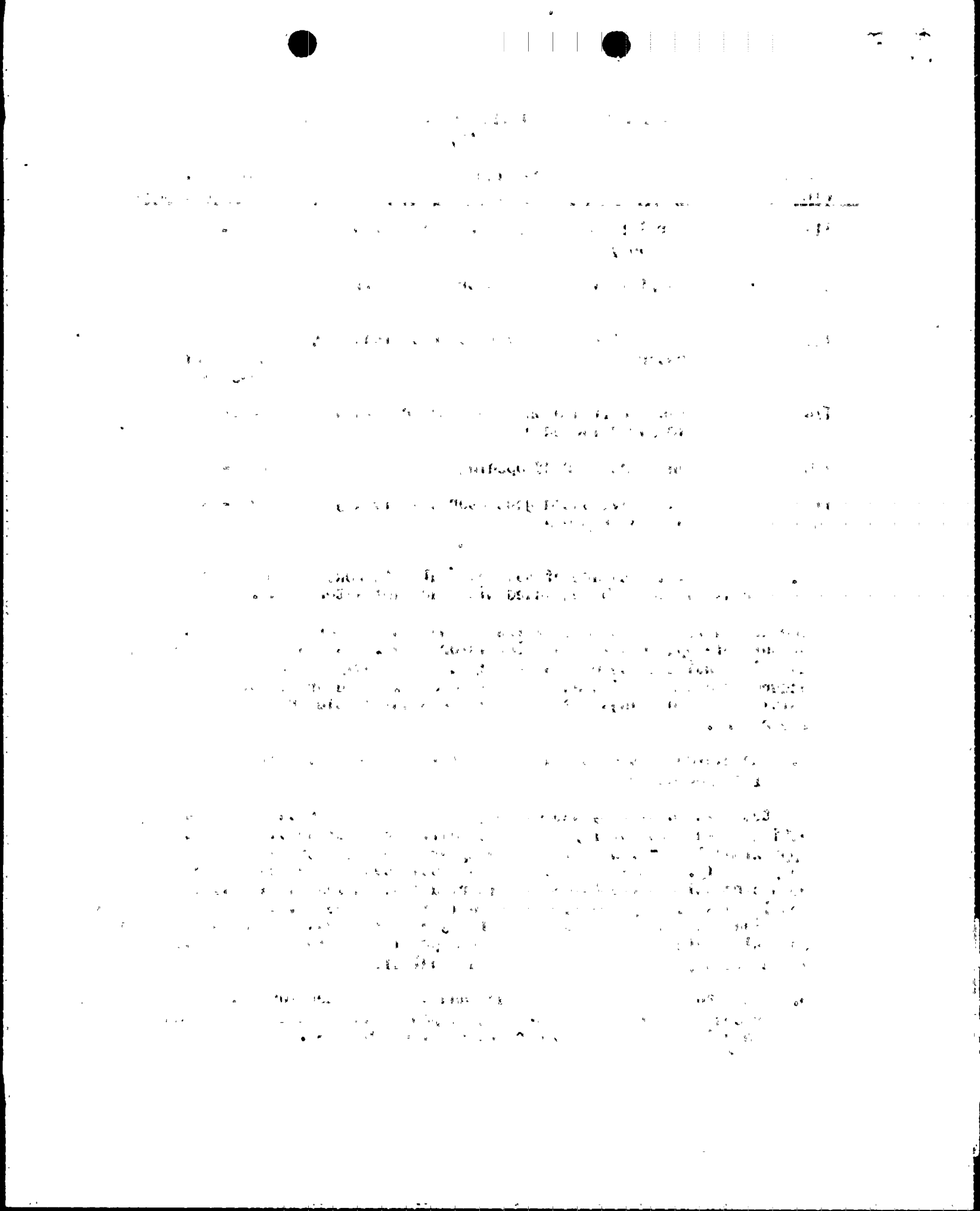
4. A justified estimate of how many multiple PORV openings per transient could be expanded with each initiator event.

The available data is insufficient to warrant calculation of the number of multiple openings for each initiator event. As discussed, the survey data is considered to be essentially complete only for those transients occurring after the issuance of Reference 7. An approximation of multiple PORV openings based on all transient initiators is discussed in the report.

5. An explanation of the analysis yielding the PORV failure rate of 1 x 10^{-3} per demand.

As stated in WCAP-9804, WASH-1400 (Reference 4 rather than Reference 3) estimates the probability of a PORV failing to reclose on demand to be approximately 10^{-2}, with lower and upper bounds of 10^{-3} and 10^{-1}, respectively. WASH-1400 treats these estimates as the median 5th and 95th percentiles of a lognormal distribution. Given the domestic Westinghouse data presented in Appendix 1 of WCAP-9804, the WASH-1400 distribution can be updated by applying Bayesian techniques. Statistical analysis yields a median estimate of approximately 10^{-3} per demand, which is the value used in the Westinghouse analysis.

6. Show that the assumptions made and credits taken for plant reconfigurations and non-design improvements in the Westinghouse generic report are appropriate for TP-3 and TP-4.



The information provided to Westinghouse by the utility pertaining to plant reconfigurations and non-design improvements is reflected in Table 1.3. The effects on the study due to these changes is discussed in Sections 3.4.2 and 3.4.3 with the concluions given in Section 4.0.