**Commonwealth Edison**
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August 19, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Zion Station Units 1 and 2
Containment Purge
NRC Docket Nos. 50-295 and 50-304

References (a): November 2, 1981, letter from F. G. Lentine to H. R. Denton.

(b): September 9, 1981, letter from S. A. Varga to L. O. DelGeorge.

(c): January 15, 1981, letter from S. A. Varga to J. S. Abel.

Dear Mr. Denton:

Reference (a) provided Commonwealth Edison's response to the NRC's report on the status of its long-term review of containment purging at Zion Station. That response provided a schedule for submittal of additional information on containment purge valve operability. This letter is submitted to provide an update to that schedule.

While the H. Pratt Co. assessment of valve operability has yielded preliminary results, Commonwealth Edison, the H. Pratt Co., and Nutech Engineers are presently engaged in a program of supplemental analyses to more accurately determine the maximum acceptable purge valve opening. This program is scheduled for completion in the Fall of 1982. Pending the completion of the program, Zion Station will continue to restrict purge valve opening to a maximum of 50°, in accordance with the requirements of the NRC's Interim Position (reference (c)). The following material, obtained from preliminary results of the program, is provided as additional justification for continued operation under the current procedural restrictions.

Attachment I to this letter provides a summary of stress values calculated by hand for a postulated hydrodynamic torque value of 112,000 in-lbs. Attachment II provides a summary of hydrodynamic torque values calculated by computer for various degrees of purge valve opening, under a conservative set of postulated accident conditions. These results indicate that the maximum allowable stresses of the valve components will not be exceeded if the initial valve position does not exceed 50° open.

Upon completion of the analysis program, a final report on purge valve operability will be pepared and submitted to the NRC. In the event that the final results indicate that the valves may not be operated in the fully open position, Commonwealth Edison will install permanent mechanical limiting devices to restrict valve opening to the maximum acceptable value demonstrated by the analyses.

Please any address questions regarding this matter to this office.

Very truly yours,

F. G. Lentine

F. G. Lentine
Nuclear Licensing Administrator

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Attachments

4809N

CALCULATED FOR A DYNAMIC TORQUE OF 112,000 IN-lbs.

## SUMMARY OF RESULTS

| PART | MAX. SHEAR STRESS (KSI) | MAX. BENDING STRESS. (KSI) | MAX COMPRESSIVE STRESS (KSI) | PERCENTAGE OF ALLOWABLE |
|---|---|---|---|---|
| SHAFT | | | | |
| @ PINS | 16.97 | — | — | 97%* |
| @ KEYWAY | 7.63 | — | — | 51% |
| @ BEARING | 12.47 | — | — | 83% |
| TAPER PINS | 7.13 | — | — | 48% |
| KEY | 9.37 | — | 14.99 | 62% |
| LEVER | — | 5.25 | — | 18% |

MAX. SHEAR STRESS FOR SHAFT = $\sqrt{(\sigma_{y/2})^2 + \tau^2}$

MAX. SHEAR STRESS FOR TAPER PINS = $\tau_{TORSION}$

MAX. SHEAR STRESS FOR KEY = $\tau_{SHEAR}$

MAX. COMPRESSIVE STRESS = $\sigma_{AXIAL}$

STRESS ALLOWABLE = $\sigma_{y/2}$ = 15 KSI FOR SHEAR

= $\sigma_y$ = 30 KSI FOR COMPRESSION

*BASED ON MAXIMUM DISTORTION ENERGY THEORY SHEAR STRESS ALLOWABLE OF 17.31 KSI

ATTACHMENT II

D-28504(7-3794-1)  TORQUE TABLE  1  4 / 14 / 82

JOB:ZION/COM.EDISON

SAT.STEAM/AIR MIXTURE WITH 1.4 LBS STEAM PER 1-LBS AIR
SPEC.GR.= .738255  MOL.WT.= 21.3872  KAPA(ISENT.EXP.)= 1.19775  R= 72.1972
GAS CONSTANT-CALC.
SONIC SPEED(MOVING MIXTR.)= 1371.29  FEET/SEC AT 283 DEG.

ABSOL.MAX.TORQUE(FIRST SONIC)AT 72-68 DG.VLV.ANG.= 278022 IN-LBS @ 68 DEG.
MAX.TORQUE INCLUDES SIZE EFFECT(REYNOLDS NO.ETC)APPX. X 1.34343  FOR 41 IN
CH BASIC LINE I.D.
ALL PRESSURES USED:STATIC(TAP)PRESS.-ABSOLUTE;P2 INCL.RECOVERY PRESS.
(TORQUE)CALC'S VALIDITY:P1/P2>1.07;

VALVE TYPE: 42"-R1A8 CLASS 75
DISC SIZE: 40 INCHES OFFSET ASYMMETRIC DISC
SHAFT DIA.: 4.25 INCHES
BRG. COEF. OF FRCTN.: 5.00000E-03
SEATING FACTOR: 25
INLET PRESS.VAR.MAX.: 52.7 PSIA
OUTLET PRESSURE(P6): 21.6549 PSIA (72 DEG. ACTUAL PRESS.ONLY(VAR.))
MAX.ANG.FLOW RATE: 414288. CFM; 469946. SCFM; 25834.2 LB/MIN
CRIT.SONIC FLOW-90DG: 32614.9 LB/MIN AT 24.1622 INLET PSIA
VALVE INLET DENSITY: 6.23582E-02 LB/FT^3-MIN. .137905 LB/FT^3-MAX.
FULL OPEN DELTA P: 3.61678 PSI
SYSTEM CONDITIONS:
PIPE IN-PIPE-OUT -AND- AIR/STEAM MIXTURE SERVICE @ 283 DEG.F
MINIMUM 0.75 DIAM. PIPE DOWNSTREAM FROM CENT.LINE SHAFT.

P1 ABS. PRESSURE(ADJ.)FOLLOWS TIME/PRESS.TRANSIENT CURVE.

| ANGLE APPRX. | P1 PSIA | P2 PSIA | DELP PSI | PRESS. RATIO | FLOW (SCFM) | FLOW (LB/MIN) | TD ----INCHLBS---- | TB+TH | TD-TB-TH | TIME(LOCA) SEC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 23.83 | 19.06 | 4.77 | .800 | 469946 | 25834 | 35823 | 34 | 35789 | 1.00 |
| 85 | 26.95 | 19.06 | 7.89 | .707 | 559878 | 30778 | 71058 | 68 | 70989 | 1.52 |
| 80 | 29.39 | 19.06 | 10.33 | .649 | 598555 | 32904 | 98441 | 95 | 98346 | 2.03 |
| 75 | 31.51 | 19.06 | 12.45 | .605 | 616354 | 33882 | 184575 | 178 | 184397 | 2.50 |
| 72 | 32.65 | 18.06 | 14.59 | .553 CR | 535471 | 29436 | 278291 | 268 | 278022 | 2.76 |
| 70 | 33.35 | 19.06 | 14.28 | .572 | 516501 | 28393 | 248382 | 239 | 248142 | 2.93 |
| 65 | 34.88 | 19.06 | 15.82 | .547 | 475018 | 26113 | 242873 | 234 | 242638 | 3.30 |
| 60 | 36.10 | 19.06 | 17.04 | .528 | 417260 | 22937 | 163512 | 157 | 163354 | 3.60 |
| 55 | 36.98 | 19.06 | 17.92 | .515 | 359126 | 19742 | 128916 | 130 | 128786 | 3.82 |
| 50 | 37.52 | 19.06 | 18.46 | .508 | 297948 | 16379 | 90139 | 151 | 89988 | 3.95 |
| 45 | 37.70 | 19.06 | 18.64 | .506 | 305263 | 16781 | 74682 | 168 | 74513 | 4.00 |
| 40 | 37.98 | 19.06 | 18.92 | .502 | 220377 | 12114 | 56453 | 186 | 56267 | 4.05 |
| 35 | 38.81 | 19.06 | 19.75 | .491 | 159828 | 8786 | 37226 | 209 | 37016 | 4.18 |
| 30 | 40.14 | 19.06 | 21.08 | .475 | 130260 | 7160 | 23423 | 240 | 23183 | 4.40 |
| 25 | 41.91 | 19.06 | 22.85 | .455 | 94589 | 5199 | 17084 | 277 | 16806 | 4.70 |
| 20 | 44.01 | 19.06 | 24.95 | .433 | 58130 | 3195 | 13496 | 319 | 13177 | 5.07 |
| 15 | 46.33 | 19.06 | 27.27 | .411 | 32258 | 1773 | 6633 | 363 | 6269 | 5.50 |
| 10 | 48.72 | 19.06 | 29.65 | .391 | 16038 | 881 | 4479 | 408 | 4070 | 5.97 |
| 5 | 50.96 | 19.06 | 31.91 | .374 | 4994 | 274 | 3461 | 449 | 3012 | 6.46 |
| 0 | 52.70 | 14.70 | 38.00 | .279 | 0 | 0 | 42532 | 507 | 42024 | 7.00 |

SEATING [illegible] HUB SEAL TORQUE (M/M)= 42532 IN-LBS @ [illegible]