LIMERICK GENERATING STATION UNITS 1 & 2

DESIGN ASSESSMENT REPORT

REVISION 9 PAGE CHANGES

The attached pages and tables are considered part of a controlled copy of the Limerick Generating Station DAR. This material should be incorporated into the DAR by following the instructions below.

<u>After the revised pages have been inserted, place the page that follows these instructions in the front of Volume 1.</u>

REMOVE	INSERT
VOLUME 1	
Table 1.4-1 (pgs 3 & 4)	Table 1.4-1 (pgs 3 & 4)
Table 5.6-1	Table 5.6-1
Page 6.6-1	Page 6.6-1
Pages 7.1-26e & -26f	Pages 7.1-26e & -26f

THIS DAR SET HAS BEEN UPDATED TO INCLUDE REVISIONS THROUGH 9 DATED 7/84.

TABLE 1.4-1 (Cont'd) (Page 3 of 4)

Valve	Set Pressure (psig)	Mass Flow (lbm/hr) at 103% of Spring Set Pressure
K*	1140	909,000
L	1130	901,500
M*	1140	909,000
N	1130	901,500
S*	1140	909,000

*ADS Valves

SAFETY RELIEF VALVE DISCHARGE LINES

Nominal Diameter 12"

Length, Number of Bends, and Air Volume for each SRV Pipe:

Valve	Bends	Length(1) (ft)	Volume(2) (ft^3)
A	9	144.5	94.3
B	7	116.4	74.2
C	7	118.2	75.7
D	9	144.9	94.8
E	9	137.4	89.1
F	11	136.3	88.3
G	11	136.6	88.5
H	11	140.5	91.2
J	7	118.6	76.0
K	12	134.0	86.2
L	10	134.3	86.5
M	13	137.0	88.2

TABLE 1.4-1 (Cont'd) (Page 4 of 4)

Valve	Bends	Length[1] (ft)	Volume[2] (ft^3)
N	10	144.5	93.8
S	12	142.3	93.2

(1) Line lengths are measured from the valve to the quencher inlet.
(2) Air volume is calculated up to pool normal water level.
(3) These values vary slightly from those actually used in the analysis. The difference in analysis results is negligible.
(4) Four of 87 downcomers are capped (Appendix J).

TABLE 5.6-1

LOAD COMBINATIONS AND STRESS LIMITS FOR BOP PIPING SYSTEMS

Equation	Condition	Load Combination	Stress Limit
1	Design	PD	NB-3652, NC-3600, ND-3600
2	Normal	PD + DW	NB-3654, NC-3600, ND-3600
3	Upset	(a) $PO+DW+(OBE^2+SRV_x^2)^{1/2}$ (b) $PO+DW+(RVC^2+OBE^2)^{1/2}$ (c) PO+DW+FV (d) PO+DW+OBE+RVO	NB-3654, NC-3600 ND-3600, ND-3600
4	Emergency	(a) $PO+DW+(OBE^2+SRV_{ADS}^2+SBA^2)^{1/2}$ (b) $PO+DW+(FV^2+OBE^2)^{1/2}$	NB-3655, NC-3600, ND-3600
5	Faulted	(a) $PO+DW+(OBE^2+SRV_{ADS}^2+IBA^2)^{1/2}$ (b) $PO+DW+(SSE^2+SRV_{ADS}^2+IBA^2)^{1/2}$ (c) $PO+DW+(SSE^2+DBA^2)^{1/2}$	NB-3656, ASME Code Case 1606

Notations:

- PD = Design pressure
- PO = Operating pressure
- DW = Dead weight
- OBE = Operating basis earthquake (inertia portion)
- SSE = Safe shutdown earthquake (inertia portion)
- SRV_x = Loads due to safety relief valve blow, axisymmetric or asymmetric
- SRV_{ADS} = Load due to automatic depressurization SRV blow, axisymmetric
- SBA = Small break accident[1]
- IBA = Intermediate break accident[1]
- DBA = Design basis accident[1]
- FV = Transient response of the piping system associated with fast valve closure (transients associated with valve closure times less than 5 seconds are considered)
- RVC = Transient response of the piping system associated with relief valve opening in a closed system
- RVO = Sustained load or response of the piping system associated with relief valve opening in an open system or last segment of the closed system with steady state load

TABLE 5.6-1 (Cont'd)

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(1) SBA, DBA, and IBA include all event-induced loads, as applicable, such as chugging, condensation oscillation, poolswell, annulus pressurization, etc.

6.6 BOP PIPING, QUENCHER, AND QUENCHER SUPPORT CAPABILITY SUPPORT ASSESSMENT CRITERIA

BOP piping systems in the containment and reactor enclosure are analyzed in accordance with ASME Section III, Division 1 (1971 Edition with Addenda through Winter 1972 for Class 2 and 3 piping, and 1977 Edition through Summer 1979 Addenda for Class 1 piping and Class 2 and 3 flanges), subsections NB-3600, NC-3600, and ND-3600, and ANSI B31.1 (Power Piping Code) for the loading described in Table 5.6-1. In addition to these code requirements, when piping is required to deliver rated flow during or following an emergency or faulted event, the functional capability requirement shall be met for the load combinations with the event.

The quencher and quencher support are designed in accordance with ASME Section III, Division 1 (1977 Edition with Addenda through Summer 1979), subsections NC-3200 and NF-3000, respectively, for the loading discussed in Section 5.6.3.

coefficient to take into account the effects of both multifrequency excitation and multimode response. The static coefficient used for structurally complex equivalent is justified and is consistent with Regulatory Guide 1.100 guidelines.

7.1.6.1.4.1.2 Testing

Dynamic adequacy for some equipment is established by providing dynamic test data instead of performing dynamic analysis. Such data must conform to one of the following:

a. Performance data of equipment that has been subjected to equal of greater dynamic loads (considering appropriate frequency range) than those to be experienced under the specified dynamic loading conditions.

b. Test data from comparable equipment previously tested under similar conditions that has been subjected to equal or greater dynamic loads than those specified.

c. Actual testing of equipment in operating conditions simulating, as closely as possible, the actual installation, the required loadings and load combinations.

The equipment to be tested is mounted in a manner that simulates the actual service mounting. Sufficient monitoring devices are used to evaluate the performance of the equipment. With the appropriate test method selected, the equipment is considered to be qualified when the test response spectra (TRS) envelopes the required response spectra (RRS) and the equipment does not malfunction or fail. A new test does not need to be conducted if equipment requires only minor modifications such as additional bracings or change in switch model, etc, and if proper justification is given to show that the modifications would not jeopardize the strength and function of the equipment.

7.1.6.1.4.1.3 Combined Analysis and Testing

This method has not been used in the NSSS piping and safety-related equipment adequacy evaluations.

7.1.7 BOP EQUIPMENT ASSESSMENT METHODOLOGY

Safety-related equipment located within the containment, the reactor enclosure, and the control structure are subjected to hydrodynamic loads due to SRV and LOCA (SBA, IBA, and DBA) discharge effects principally originating in the suppression pool of the containment structure. The equipment and equipment supports are assessed to verify their adequacy to withstand these hydrodynamic loads in combination with seismic and all other applicable loads in accordance with the load combinations given in Table 5.8-1. In addition, safety-related active pumps and valves located within the containment, the reactor enclosure, and the control structure are qualified for operability during seismic and hydrodynamic events.

7.1.7.1 Dynamic Loads

7.1.7.1.1 SRV Discharge Loads

Loadings associated with the axisymmetric and asymmetric SRV discharges are described in Chapters 3 and 4. Acceleration response spectra at the various elevations where the equipment are located have been generated for all appropriate pressure history traces (Figures 4.1-25 through 4.1-27) for damping values of 1/2, 1, 2, and 5 percent.

7.1.7.1.2 LOCA Related Loads

Loadings associated with loss-of-coolant accident (LOCA) are described in Chapters 3 and 4. The various LOCA loadings considered include condensation oscillation and chugging (Section 4.2.2). Acceleration response spectra at various elevations where the equipment are located have been generated for the above LOCA loads for damping values of 1/2, 1, 2, and 5 percent.