



General Electric Company
175 Cushman Avenue, San Jose, CA 95128

February 4, 1993

Docket No. STN 52-001

Chet Poslusny, Senior Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of the Nuclear Reactor Regulation

Subject: **Submittal Supporting Accelerated ABWR Review Schedule**

Dear Chet:

Enclosed is a comparison of SSAR and industry initiatives on piping design and analyses. This includes the potential elimination of the combination of AP + SSE. The justification for this elimination is provided under Note 2 on the last page.

Please provide a copy of this transmittal to David Terao.

Sincerely,

Jack Fox
Advanced Reactor Programs

cc: Maryann Herzog (GE)
Norman Fletcher (DOE)

JP93-22

9302110358 930204
PDR ADOCK 05200001
A PDR

See Attached List
2222
1/1

COMPARISON OF SSAR AND INDUSTRY INITIATIVES ON PIPING DESIGN AND ANALYSES

● IN NOVEMBER, IN A MEETING WITH ARC, STAFF MANAGEMENT ENCOURAGED INDUSTRY TO GET TOGETHER FOR THE PURPOSES OF:

- INCORPORATING INTO THE LEAD CERTIFICATION APPLICATION, TO THE MAXIMUM EXTENT PRACTICAL, INDUSTRY INITIATIVES PERTAINING TO PIPING.
- IDENTIFYING THE EXTENT TO WHICH THE LEAD CERTIFICATION APPLICATION COULD ACCOMMODATE THE INDUSTRY PIPING INITIATIVES.
- IDENTIFYING THOSE AREAS WHICH WILL NOT BE INCORPORATED IN THE DESIGN CERTIFICATION.

● ATTACHED IS A COMPARISON OF THE INDUSTRY INITIATIVE FOR PIPING AND THE ABWR SSAR APPROACH SHOWING AGREEMENT TO A HIGH DEGREE.

PLANT SEISMIC DESIGN BASES COMPARISON OF ABWR - INDUSTRY POSITIONS

INDUSTRY POSITION:

GROUND MOTION:

RG 1.60 ANCHORED TO 0.3g
GROUND MOTION APPLIED AT
SURFACE OF FREE FIELD

GEOLOGIC CATEGORIES:

MIN SHEAR WAVE VELOCITY OF
400 METERS/SEC. (1300 FPS)
PARAMETERS FOR SEVEN
CATEGORIES OF SOIL
CONDITIONS, PLUS RANGE OF
PROPERTIES FOR EACH
CATEGORY.

SSI MODEL AND ANALYSIS:

USE GENERAL GUIDELINES IN ASCE
STD 4-86 FOR MODEL
FOLLOW SRP AND ASCE 4-86 FOR
ANALYSIS
USE SOIL PROFILES CONSISTENT
WITH THE 7 SOIL
CATEGORIES, PLUS RANGE OF
PROPERTIES FOR EACH
CATEGORY.

ABWR SSAR POSITION

SAME
GROUND MOTION APPLIED AT
SURFACE FOR BASE CASE.
FOR PARAMETRIC CASE APPLY AT
ROCK OUTCROP FOR
SHALLOW SOIL SITES.

USE MIN SHEAR WAVE 305 MPS
(1000 FPS)
PLUS A RANGE OF SHEAR WAVE
VELOCITIES
12 DIFFERENT PROFILE ,
CONSIDERED

SAME

SAME

USE 12 DIFFERENT PROFILES.
(THESE FALL WITHIN THE RANGE
OF INDUSTRY PROFILES)

CONCLUSION:

ABWR ENVELOPE SHOULD
ENVELOPE RESULTS OF
INDUSTRY POSITION.

PIPING DESIGN AND ANALYSIS

COMPARISON OF ABWR - INDUSTRY POSITIONS

INDUSTRY POSITION

PIPING SEISMIC INPUT:

MAKE ENVELOPE AND INDIVIDUAL
FRS SETS AVAILABLE
EMPHASIZE INDIVIDUAL FRS
SETS TO MINIMIZE SUPPORTS

DAMPING

USE MAX APPROVED DAMPING.
DAMPING OBJECTIVES ARE:
USE 6% FOR SSE
USE CC N-411 WITH T-H
USE CC N-411 FOR ISM

USE APPROVED METHODS FOR
COMBINING MODES ABOVE ZPA
(PREFER ALGEBRAIC SUM)

COMBINE INERTIA AND SAM BY SRSS

COMBINE DYNAMIC LOADS BY SRSS

DO NOT COMBINE LOCA AND SSE

WHERE APPROPRIATE, REPLACE
SNUBBERS WITH:
- LIMIT STOPS
- ENERGY ABSORBERS

DYNAMIC STRESS CRITERIA:
USE PFDRRP CRIT. WHEN APPROVED
USE DESIGN-BY-RULE WHEN
APPROVED

ABWR SSAR POSITION

DESIGN/ANALYZE FOR ENVELOPE
FRS.

USE INDIVIDUAL FRS SETS ONLY IF
DESIGN OBJECTIVES^(NOTE 1) NOT MET
WITH ENVELOPE FRS.

SAME

SAME

SAME

SAME

(HOPEFULLY)
THE ABWR SSAR HAS ELIMINATED
THE COMBINATION OF
AP + SSE^(NOTE 2).

SAME

SAME

CONCLUSION:

NO SIGNIFICANT ABWR-
INDUSTRY DIFFERENCES

I. NOMENCLATURE:

FRS - FLOOR RESPONSE SPECTRA

CC N-411 - AN ASME CODE CASE THAT PERMITS USE OF DAMPING HIGHER THAN RG 1.61. APPROVED WITH CONDITIONS BY NRC.

T-H - TIME-HISTORY METHOD FOR DYNAMIC ANALYSIS OF EQUIPMENT

ISM - INDEPENDENT SUPPORT MOTION - A DYNAMIC ANALYSIS METHOD FOR PERFORMING RESPONSE SPECTRA ANALYSIS THAT CONSIDERS MOTION OF EACH SUPPORT POINT INDEPENDENTLY.

ZPA - ZERO PERIOD ACCELERATION

SAM - SEISMIC ANCHOR MOTIONS - REFERS TO EFFECTS ON PIPING OF RELATIVE MOTION OF VARIOUS SUPPORT POINTS

PFDRRP - PIPING AND FITTING DYNAMIC RESPONSE RESEARCH PROGRAM - THE EPRI/GE/NRC PROGRAM FOR TESTING PIPE FITTINGS AND SYSTEMS FOR RESPONSE TO VARIOUS DYNAMIC LOADS.

II. NOTES:

1. DESIGN OBJECTIVES (PIPING) - ELIMINATE ALL SNUBBERS, OPTIMIZE PIPE SUPPORT SYSTEMS
2. SINCE AP, NOW DEFINED IN SSAR AS LOCA₇, IS MORE SEVERE THAN LOCA_{1,6} THE ABWR POSITION APPROACHES THAT OF INDUSTRY.

JUSTIFICATION FOR ELIMINATING THIS COMBINATION IS:

- AP AND SSE ARE INDEPENDENT EVENTS, EACH WITH A VERY LOW PROBABILITY OF OCCURRENCE. THE PROBABILITY OF THESE TWO EVENTS OCCURRING SIMULTANEOUSLY IS EXTREMELY REMOTE.

- SHORT DURATION OF AP LOAD (ONLY 0.3 SECONDS), FURTHER REDUCES PROBABILITY OF SIMULTANEOUS OCCURRENCE WITH SSE.

- AP IS RESULT OF A POSTULATED RUPTURE AT SPECIFIC LOCATION (RPV NOZZLE) AND IN SPECIFIC PIPING SYSTEMS.