

# BFN-25

## APPENDIX M

### REPORT ON PIPE FAILURES OUTSIDE CONTAINMENT IN THE BROWNS FERRY NUCLEAR PLANT

#### TABLE OF CONTENTS

M.1	Introduction .....	M.0-1
M.2	Pressure Analyses .....	M.0-2
M.3	Piping Design Philosophy .....	M.0-6
M.3.1	Piping From Reactor Vessel Through the Anchor Outside the Drywell .....	M.0-6
M.3.2	Piping From the Anchor Through Turbine Inset or Feedwater Pump Discharge .....	M.0-7
M.4	Breaks Postulated and Loading Effects Considered .....	M.0-7
M.5	Pipe Rupture Loads .....	M.0-8
M.5.1	Critical Crack Size Loading .....	M.0-9
M.5.2	Jet Expansion Considerations .....	M.0-10
M.5.3	Jet Impingement Loads .....	M.0-11
M.5.4	Break Size .....	M.0-12
M.6	Pipe Break Assumptions, Analysis, and Break Locations .....	M.0-12
M.6.1	Pipe Rupture Analysis .....	M.0-12
M.6.2	Case I - Circumferential Break Postulated at Point 1 .....	M.0-13
M.6.3	Case II - Circumferential Break Postulated at Points 2 and 3 .....	M.0-13
M.6.4	Case III - Circumferential Break Postulated at Points 4 and 5 .....	M.0-14
M.6.5	Case IV - Longitudinal Break Postulated at Point 1 .....	M.0-14
M.6.6	Case V - Longitudinal Breaks Postulated at and Between Points 2 and 3 .....	M.0-16
M.6.7	Case VI - Longitudinal Break Postulated at the Elbow in Main Steam Lines (Turbine Building) .....	M.0-16
M.6.8	Case VII - Critical Crack Loading .....	M.0-18
M.6.9	Additional High Energy Line Break Analysis .....	M.0-19
M.7	Structural Analysis .....	M.0-22
M.8	Effects on Safety-Related Components and Structures .....	M.0-23
M.9	Additional Work .....	M.0-25
M.10	Summary and Conclusions .....	M.0-25
M.11	References .....	M.0-26

BFN-25

APPENDIX M

LIST OF TABLES

<u>Table</u>	<u>Title</u>
M.0-1	Deleted
M.0-2	Deleted

## BFN-25

### LIST OF FIGURES

#### APPENDIX M

### LIST OF FIGURES

<u>Figure</u>	<u>Title</u>
M.0-1	Pipe Failure Analysis - Main Steam and Feedwater Vault Enclosure
M.0-2	Main Steam line Break Accident Mass of Coolant Lost Through Break
M.0-3	Jet Loading Model
M.0-4	Steam line Break Locations in Steam Vault
M.0-5	Feedwater Line Break Locations in Steam Vault
M.0-6	Jet Impingement Loading on RCIC Pump Discharge Line
M.0-7	Pipe Impact Analytical Model for Worst Pipe Break Inside Turbine Building