Appendix 15B. Figures

Figure 15-1. Illustration of Overtemperature and Overpower Δ T Protection

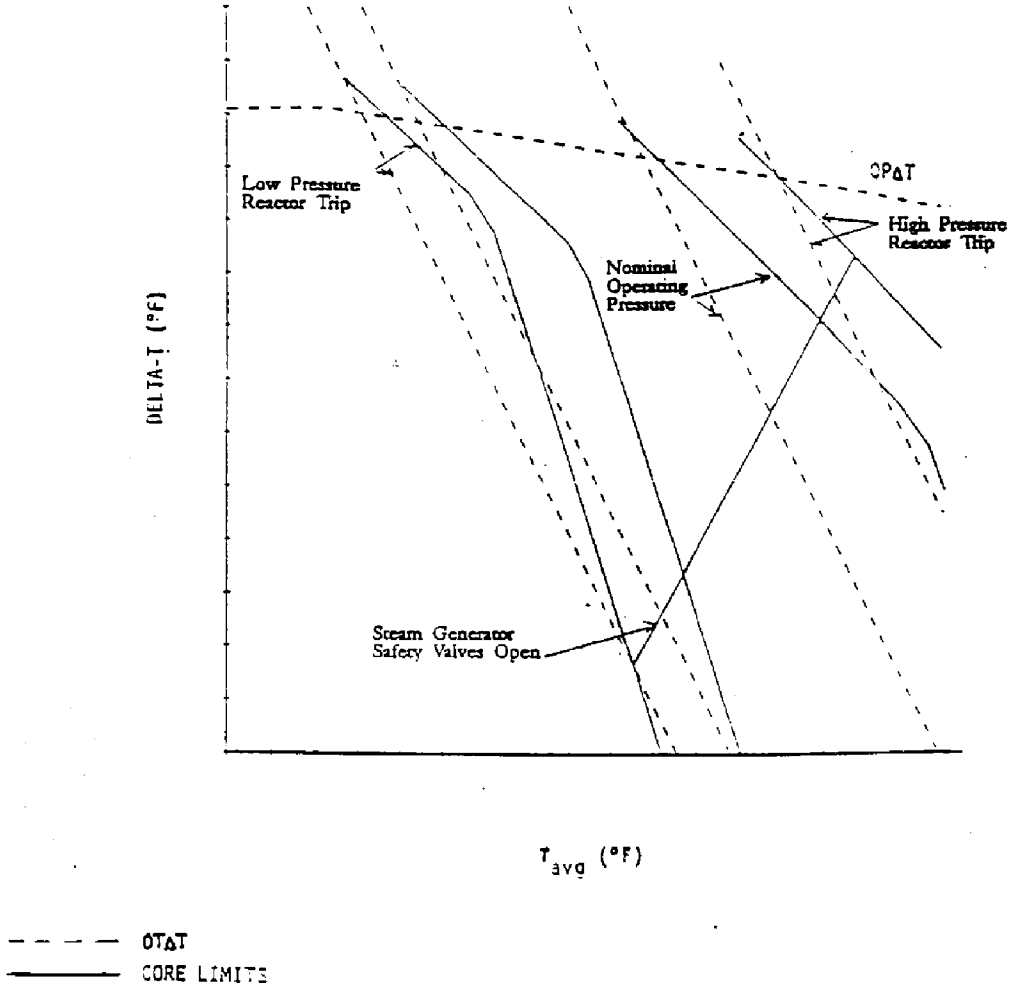


Figure 15-2. Deleted Per 1997 Update

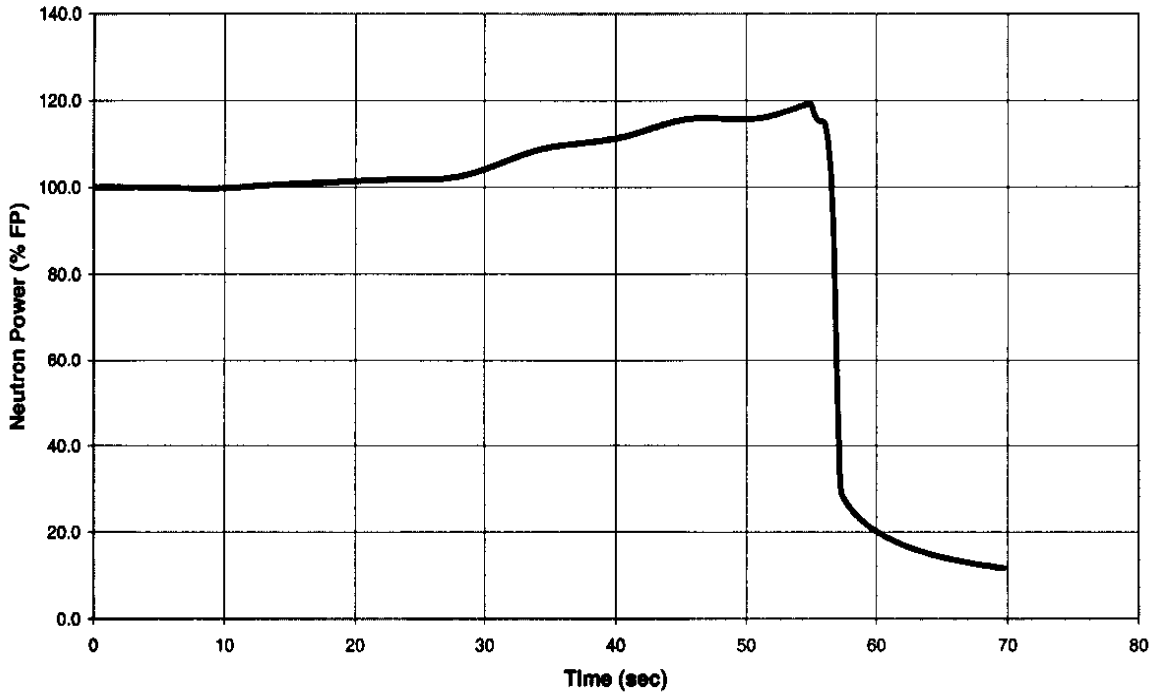
Figure 15-3. Deleted Per 1997 Update

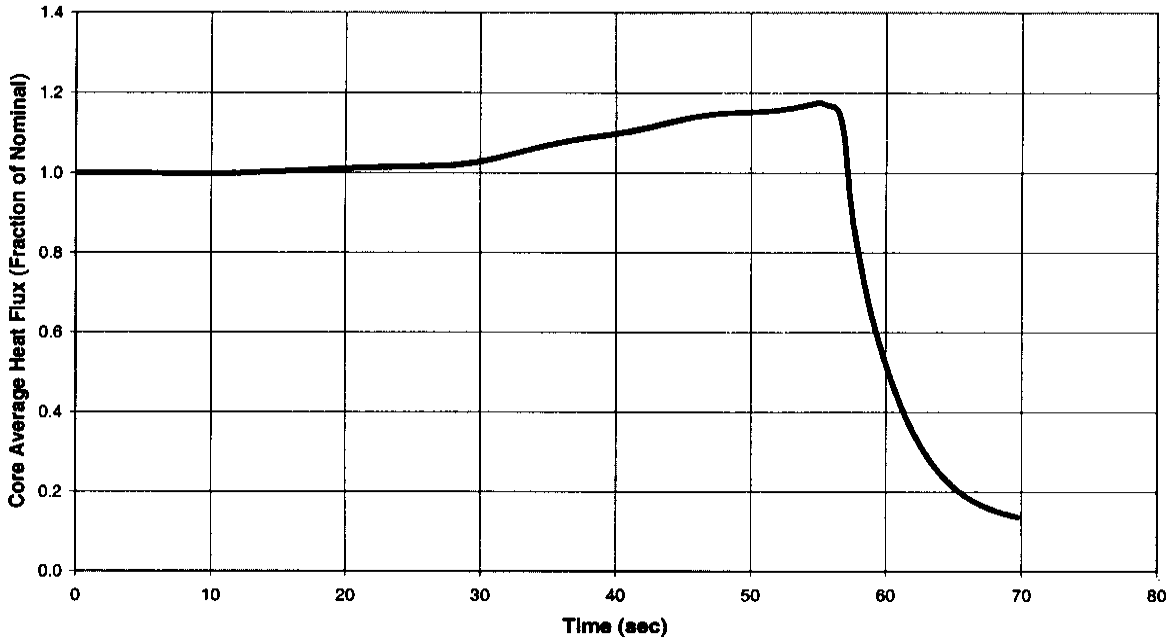
Figure 15-4. Deleted Per 2000 Update

Figure 15-5. Deleted Per 2000 Update

Figure 15-6. Deleted Per 2000 Update

Figure 15-7. Excessive Increase in Feedwater Flow




Core Average Heat Flux (Fraction of Nominal)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
60
70
80
Time (sec)

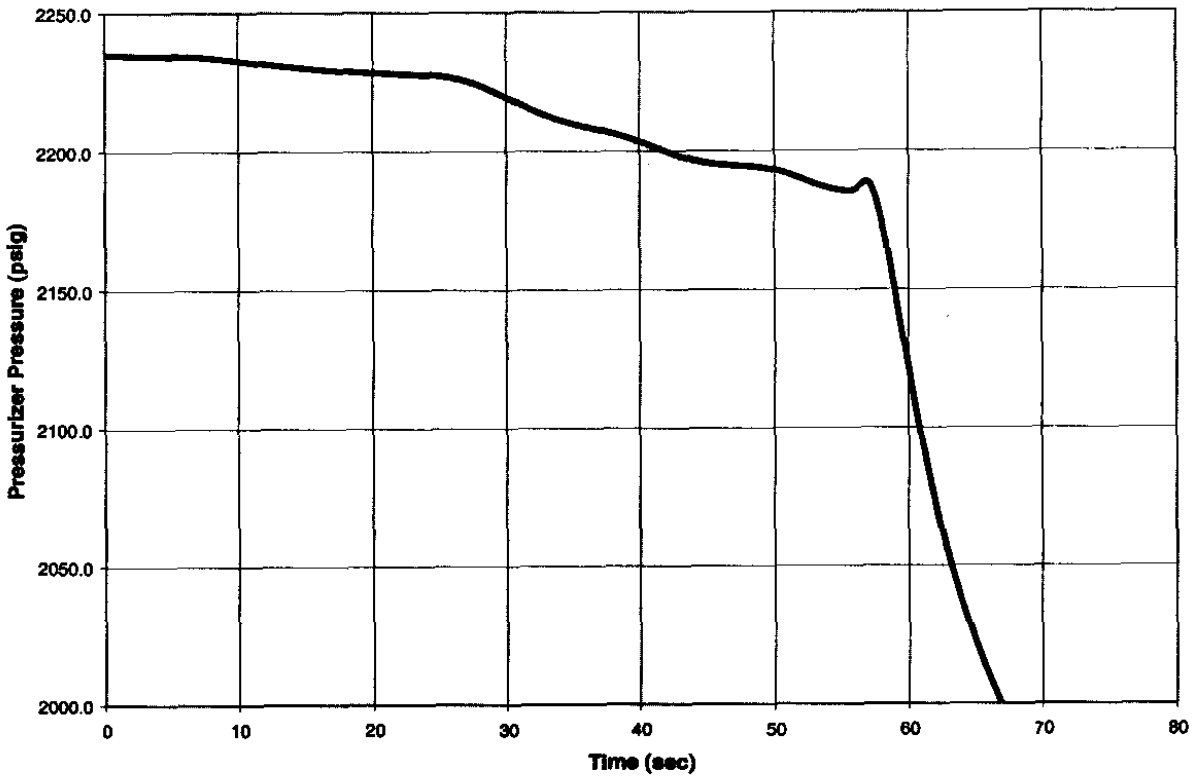
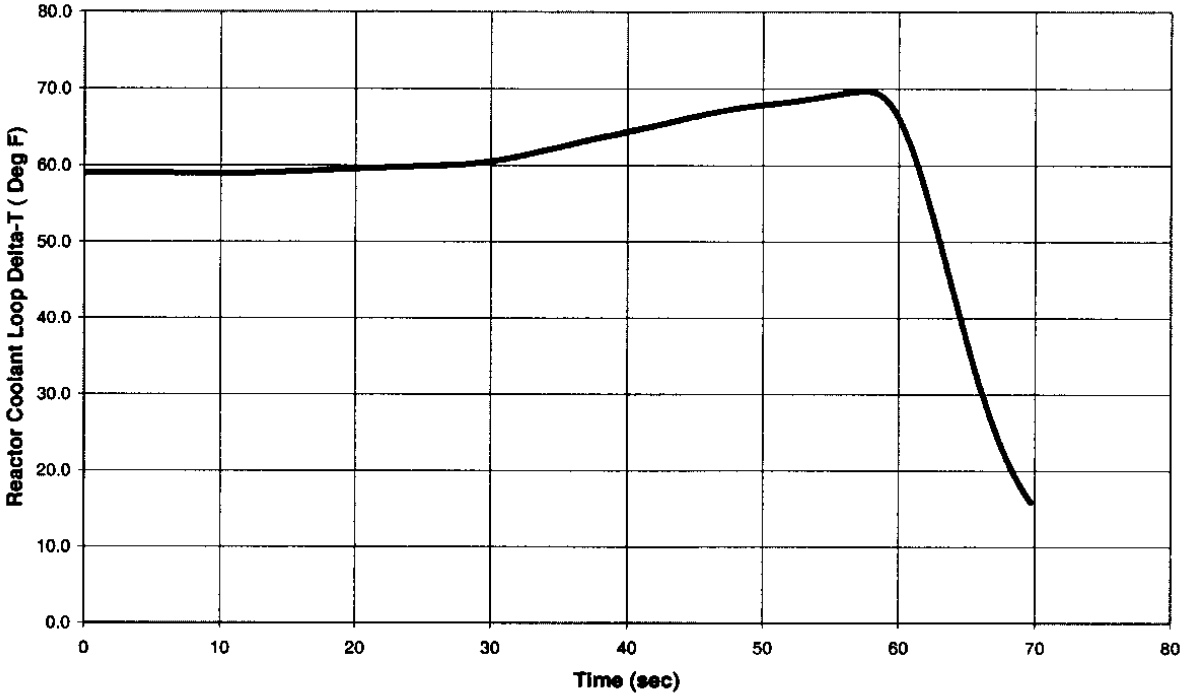
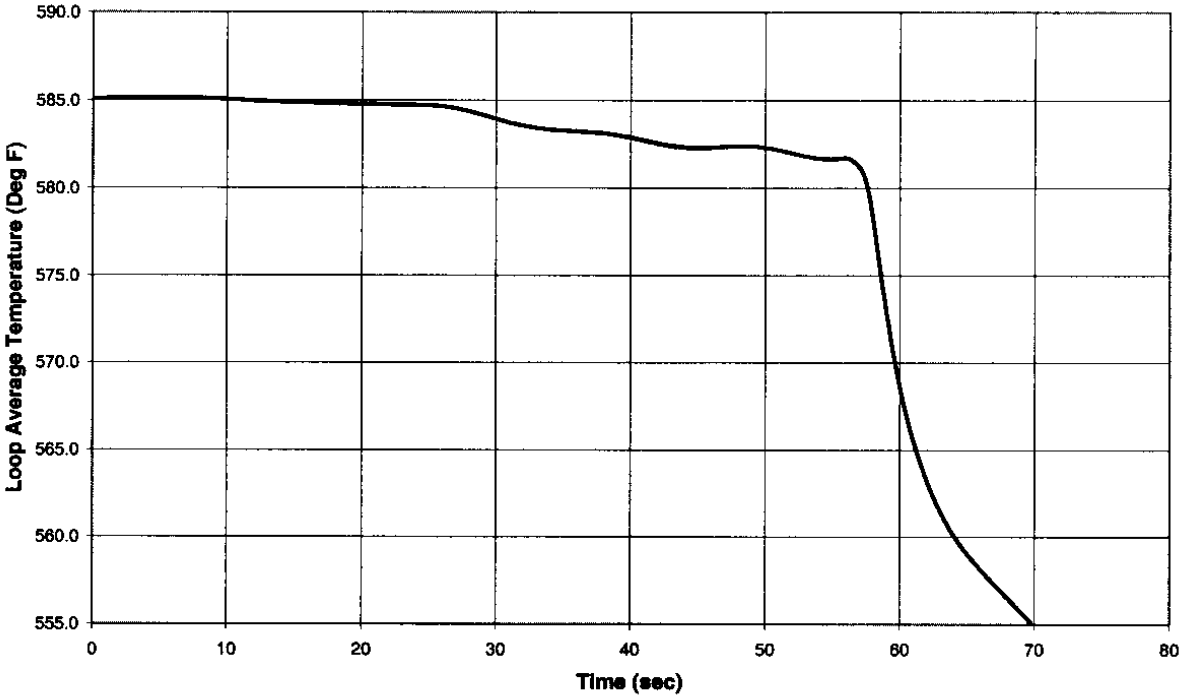

2250.0
2200.0
2150.0
2100.0
2050.0
2000.0
Pressurizer Pressure (psig)
0
10
20
30
40
50
60
70
80
Time (sec)

Figure 15-8. Excessive Increase in Feedwater Flow




590.0
585.0
580.0
575.0
570.0
565.0
560.0
555.0
Loop Average Temperature (Deg F)
0
10
20
30
40
50
60
70
80
Time (sec)

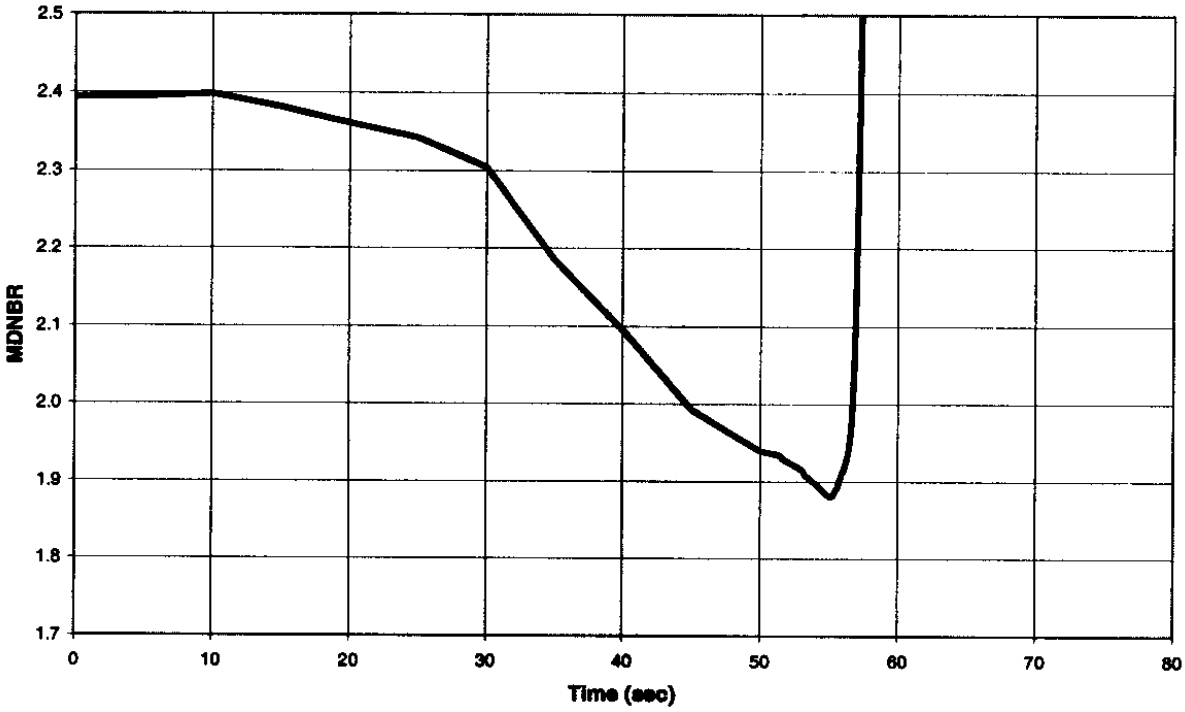

MDNBR
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
0
10
20
30
40
50
60
70
80
Time (sec)

Figure 15-9. Increase in Steam Flow

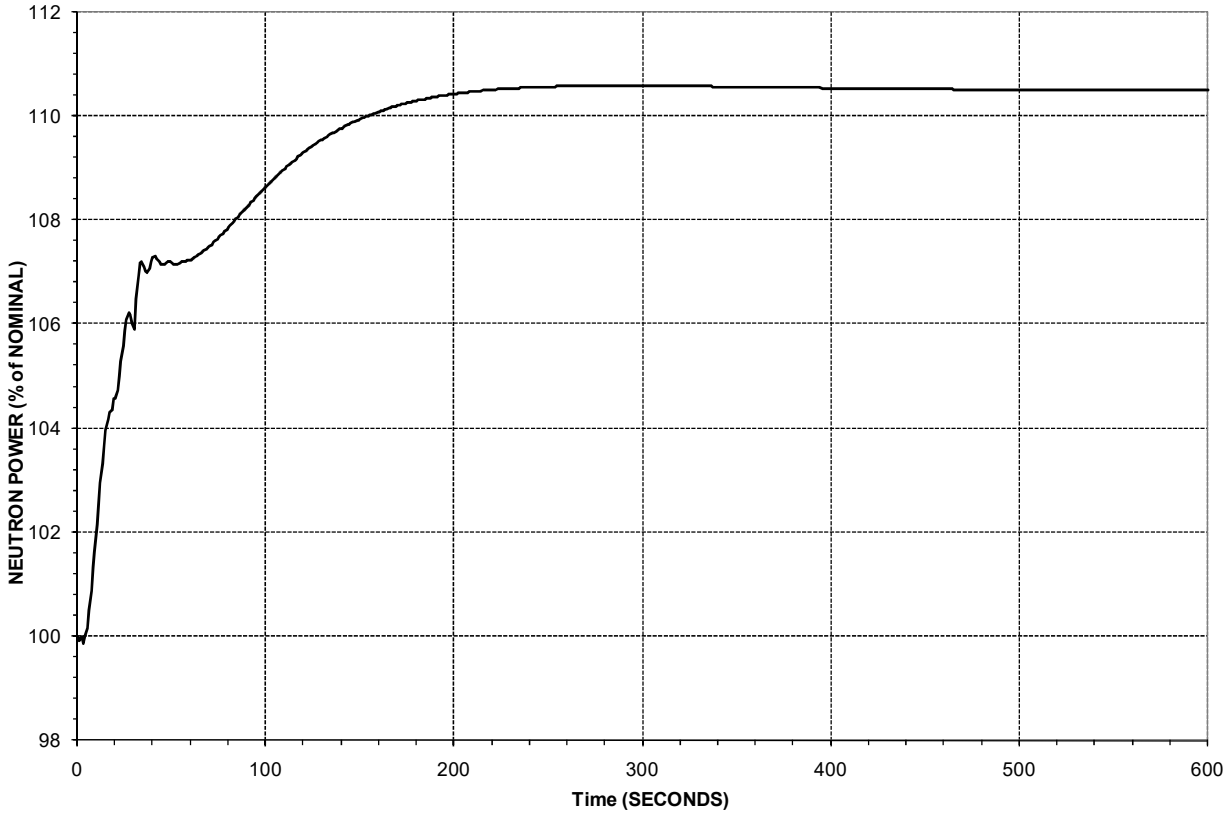


Figure 15-10. Increase in Steam Flow

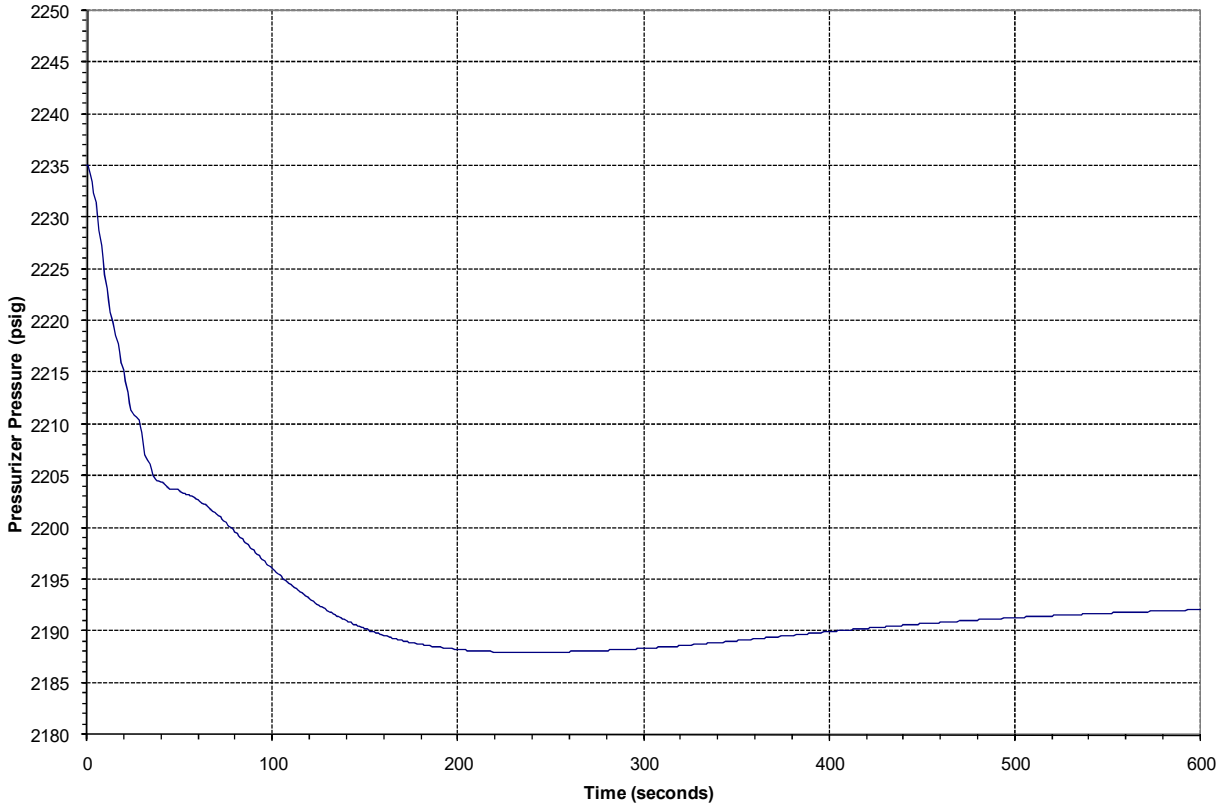


Figure 15-11. Increase in Steam Flow

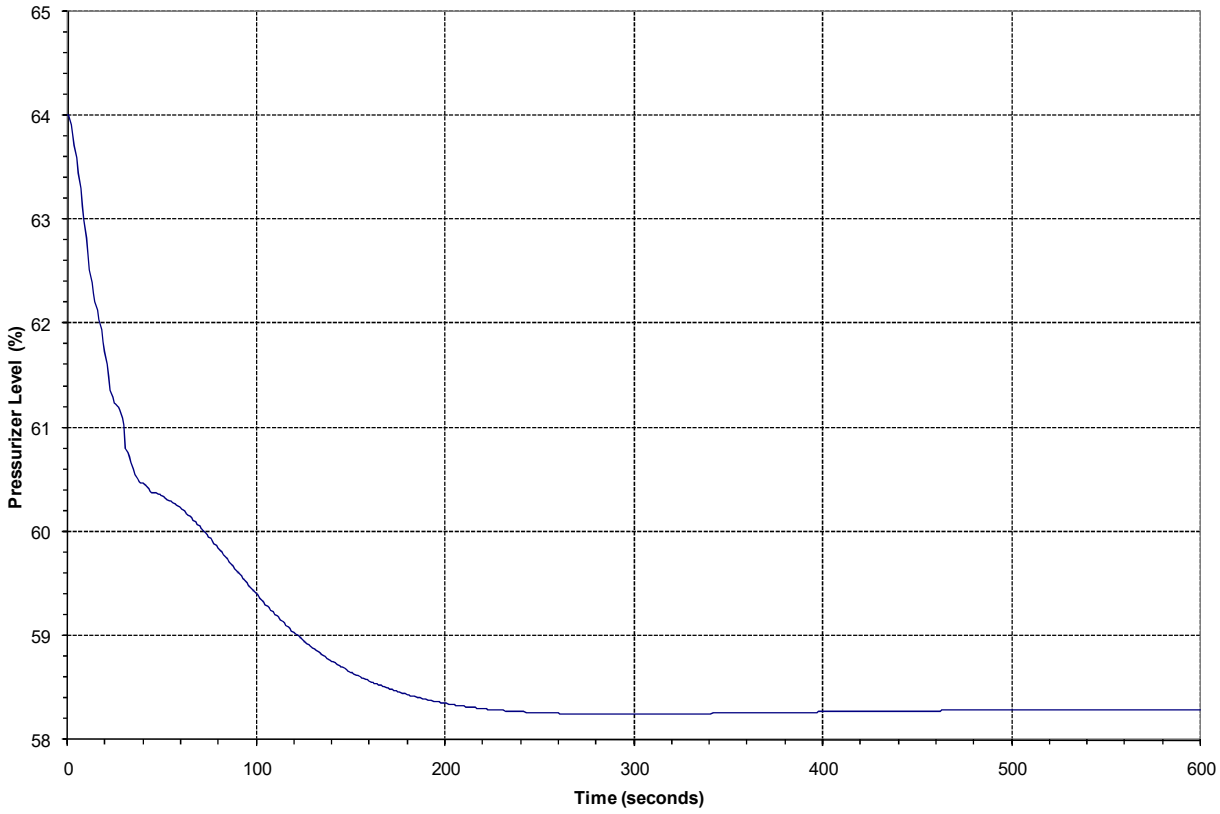


Figure 15-12. Increase in Steam Flow

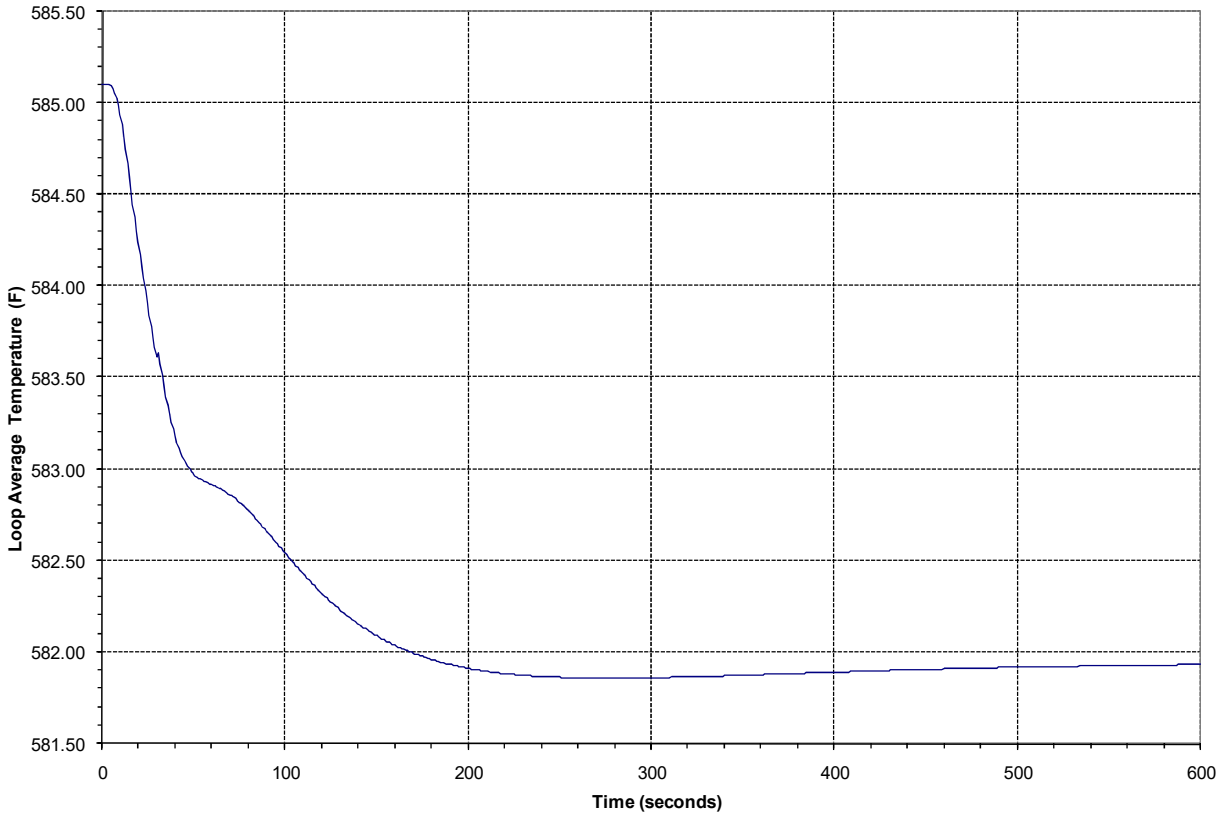


Figure 15-13. Deleted Per 2006 Update

Figure 15-14. Deleted Per 1997 Update

Figure 15-15. Deleted Per 1997 Update

Figure 15-16. Deleted Per 1997 Update

Figure 15-17. Reactivity Versus Temperature

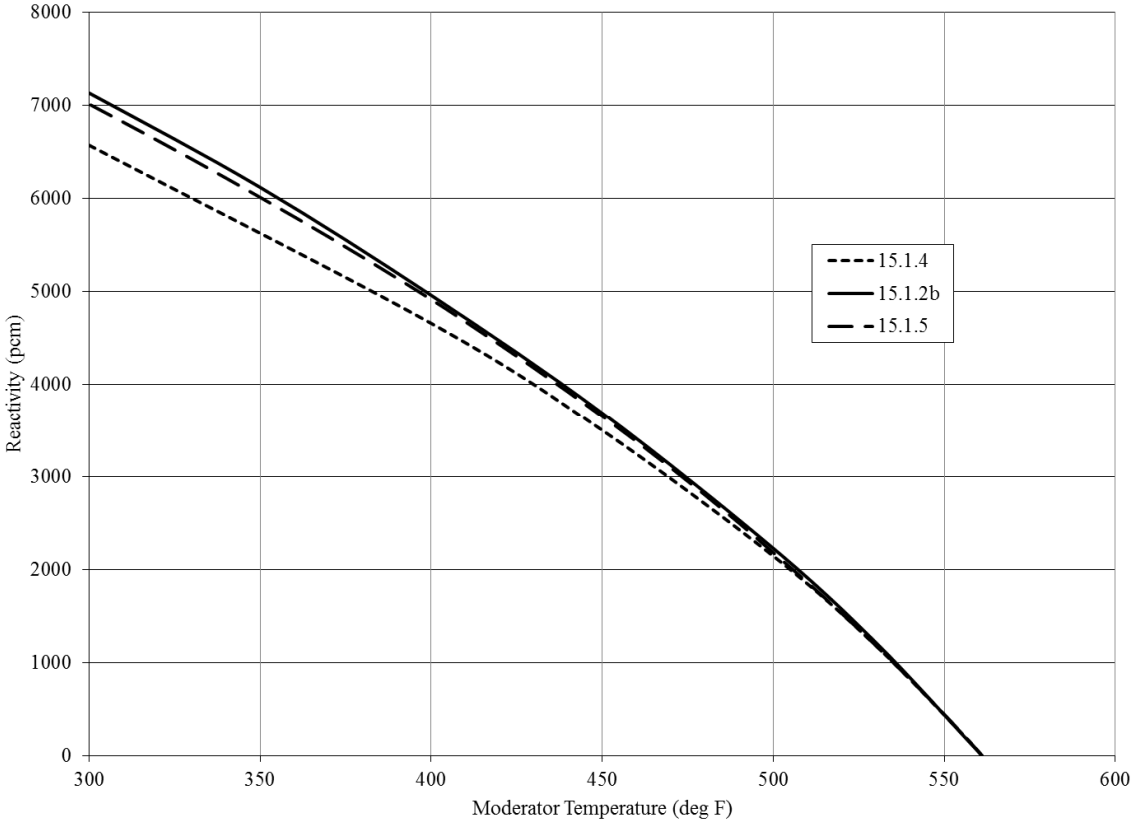
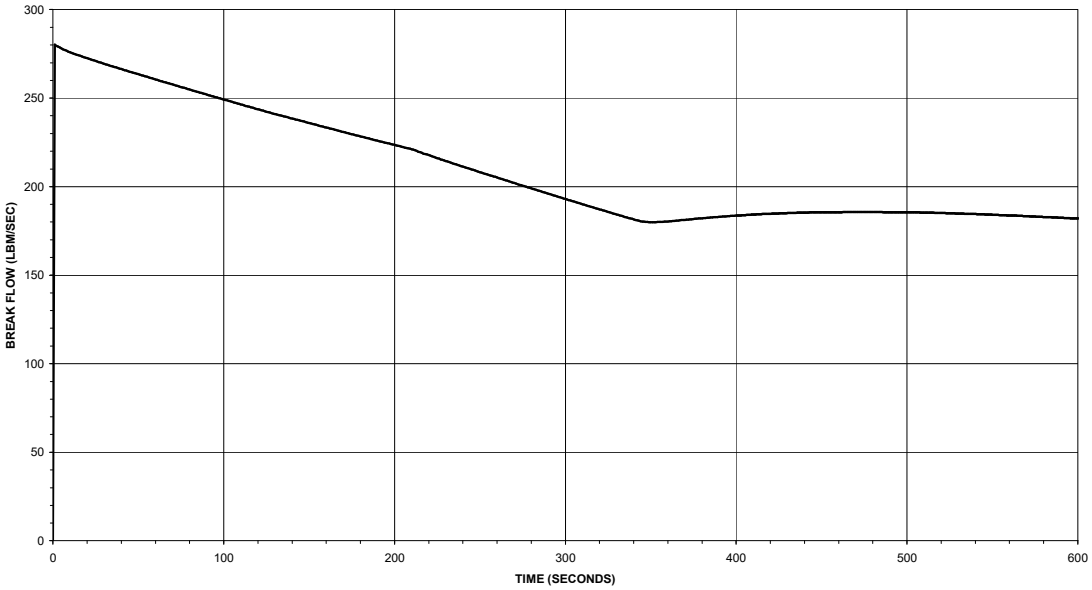
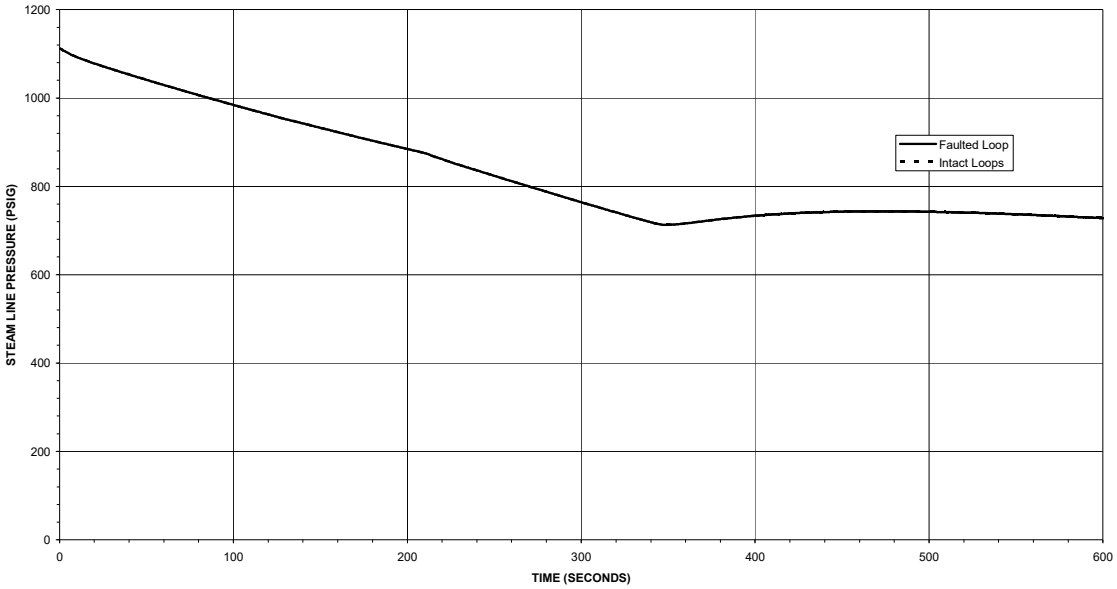
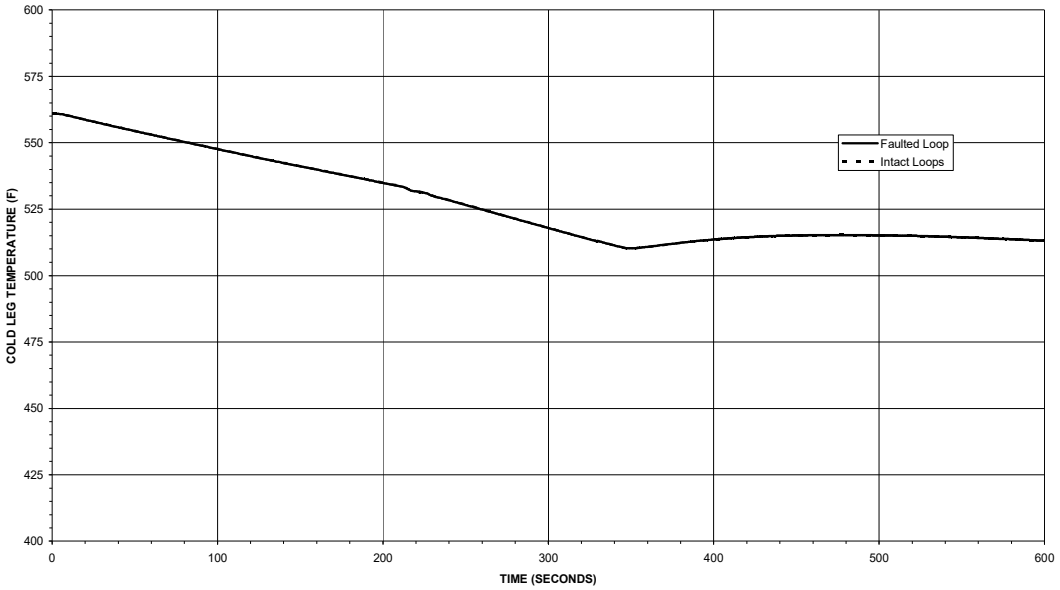


Figure 15-18. Failure of a Steam Generator Safety or Dump Valve




1200
1000
800
600
400
200
0
STEAM LINE PRESSURE (PSIG)
0
100
200
300
400
500
600
TIME (SECONDS)
Faulted Loop
Intact Loops


600
575
550
525
500
475
450
425
400
COLD LEG TEMPERATURE (F)
0
100
200
300
400
500
600
TIME (SECONDS)
Faulted Loop
Intact Loops

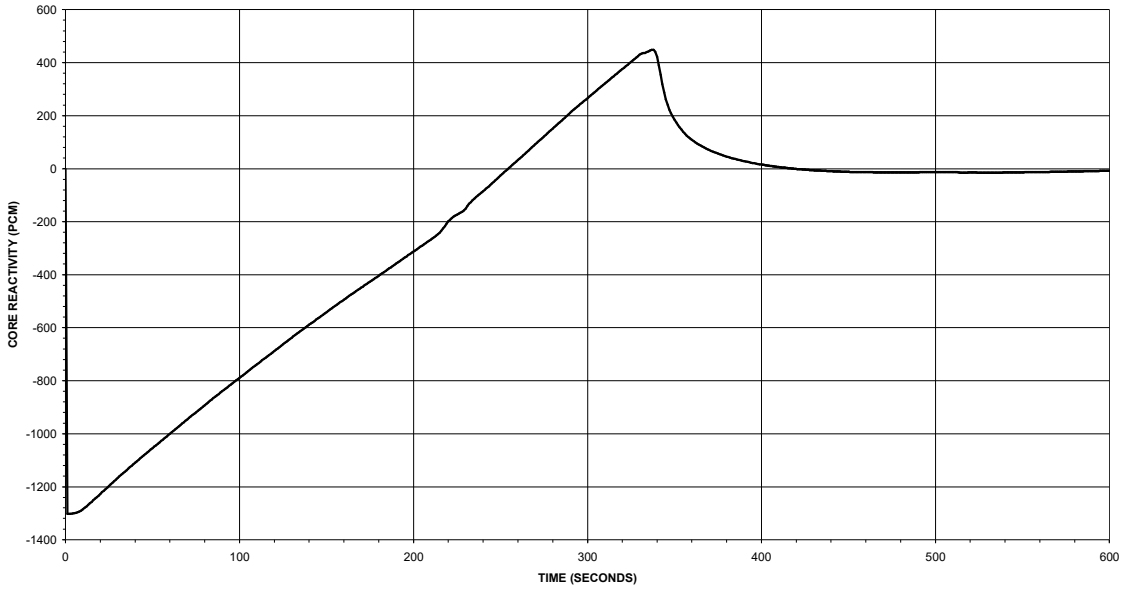
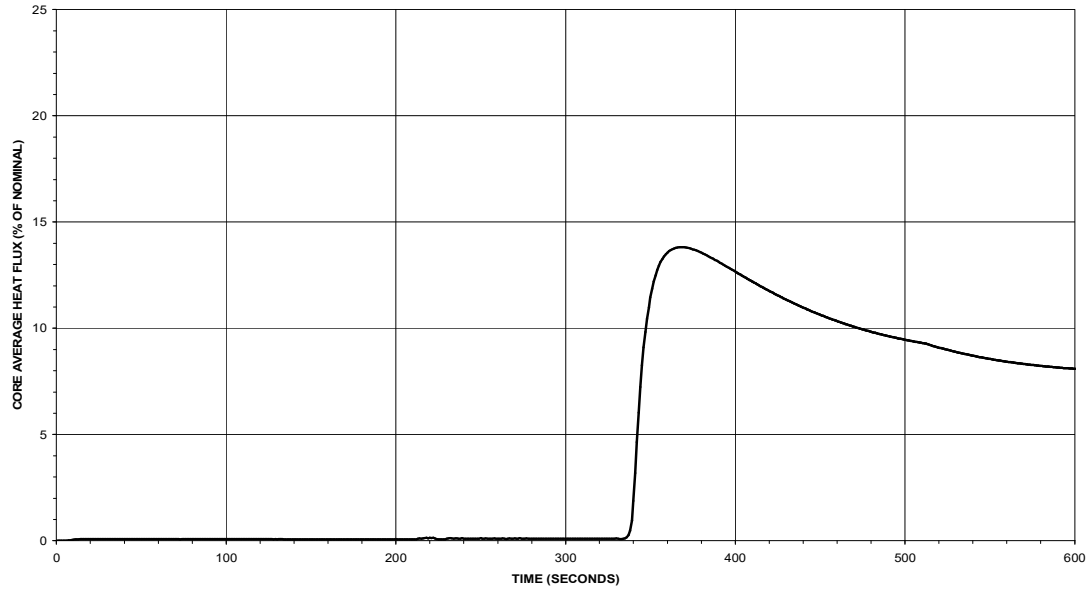
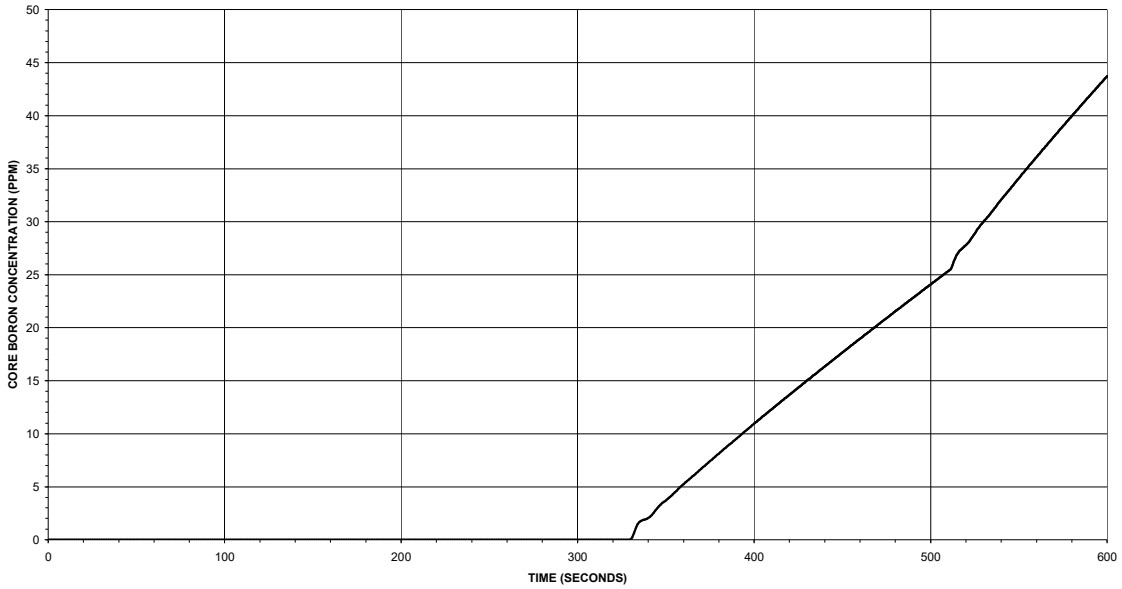
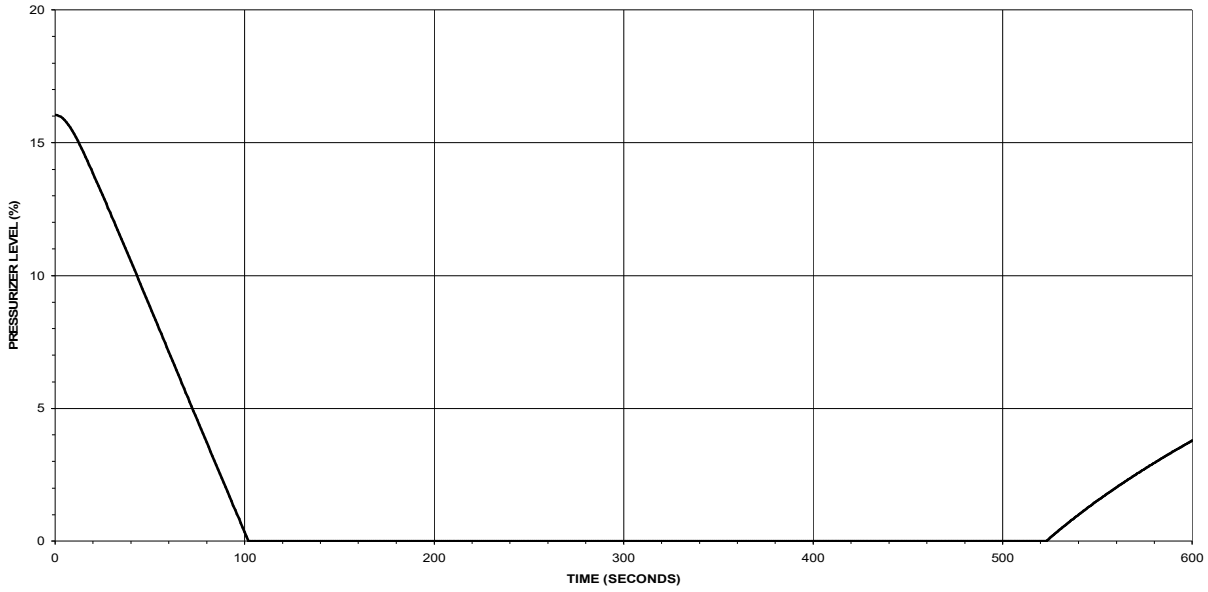

CORE REACTIVITY (PCM)
600
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
0
100
200
300
400
500
600
TIME (SECONDS)

Figure 15-19. Failure of a Steam Generator Safety or Dump Valve




CORE BORON CONCENTRATION (PPM)
TIME (SECONDS)
0
5
10
15
20
25
30
35
40
45
50
0
100
200
300
400
500
600


PRESSURIZER LEVEL (%)
20
15
10
5
0
0
100
200
300
400
500
600
TIME (SECONDS)

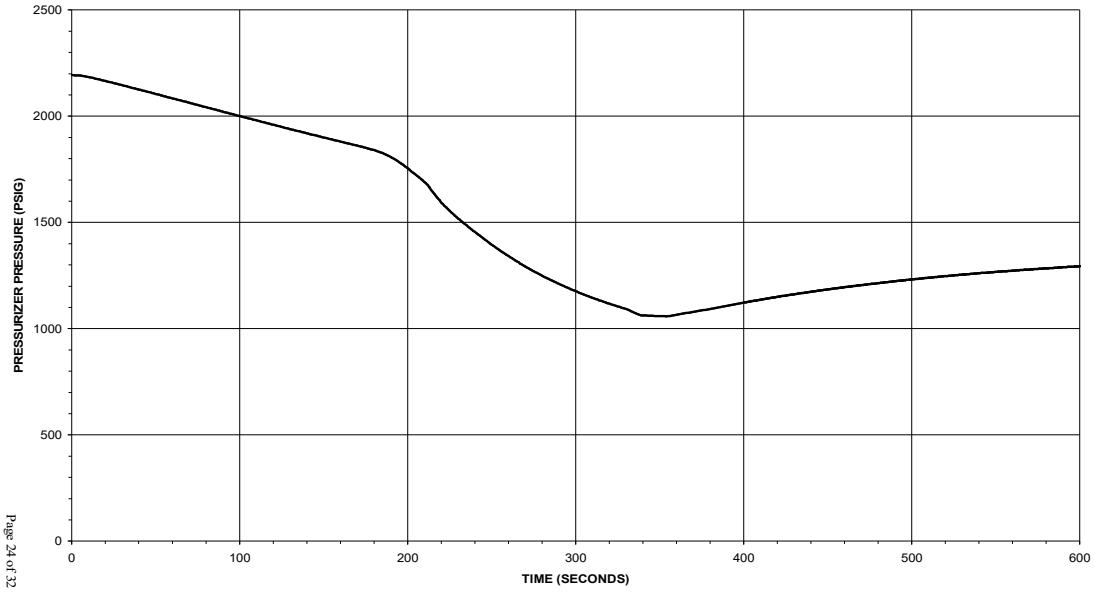

PRESSURIZER PRESSURE (PSIG)
2500
2000
1500
1000
500
0
0
100
200
300
400
500
600
TIME (SECONDS)

Figure 15-20. Deleted Per 1997 Update

Figure 15-21. Steamline Break, Offsite Power Maintained

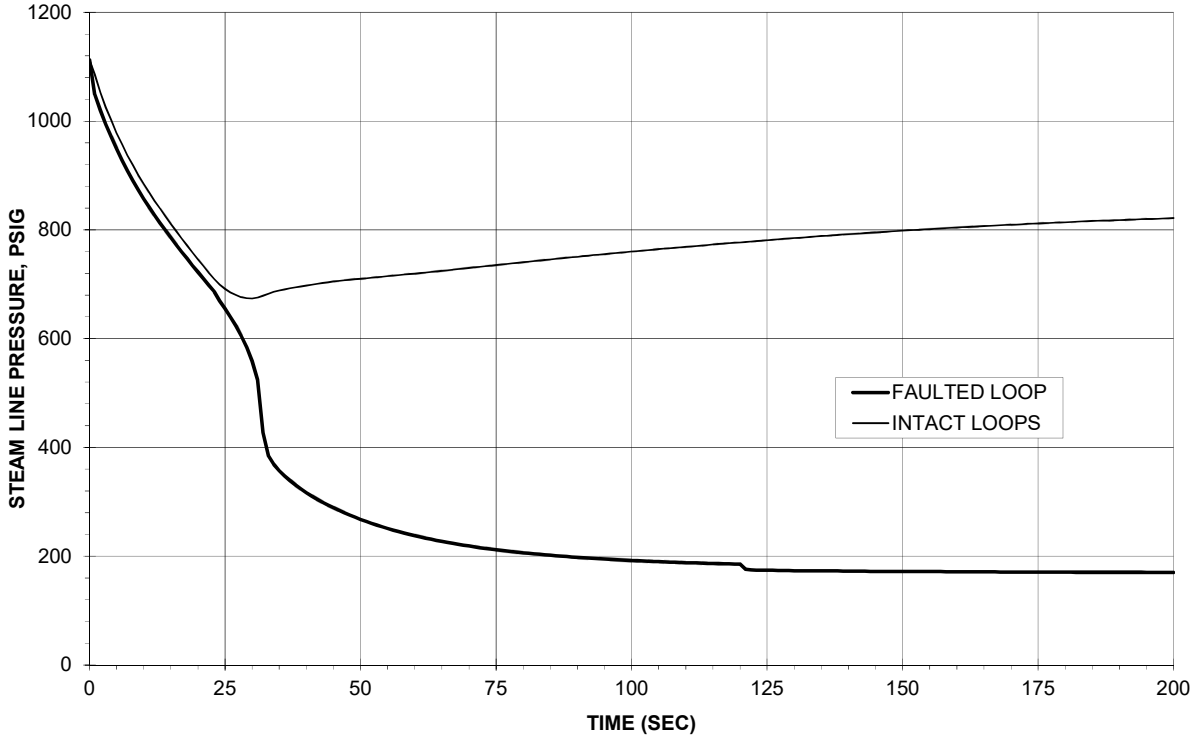


Figure 15-22. Steamline Break, Offsite Power Maintained

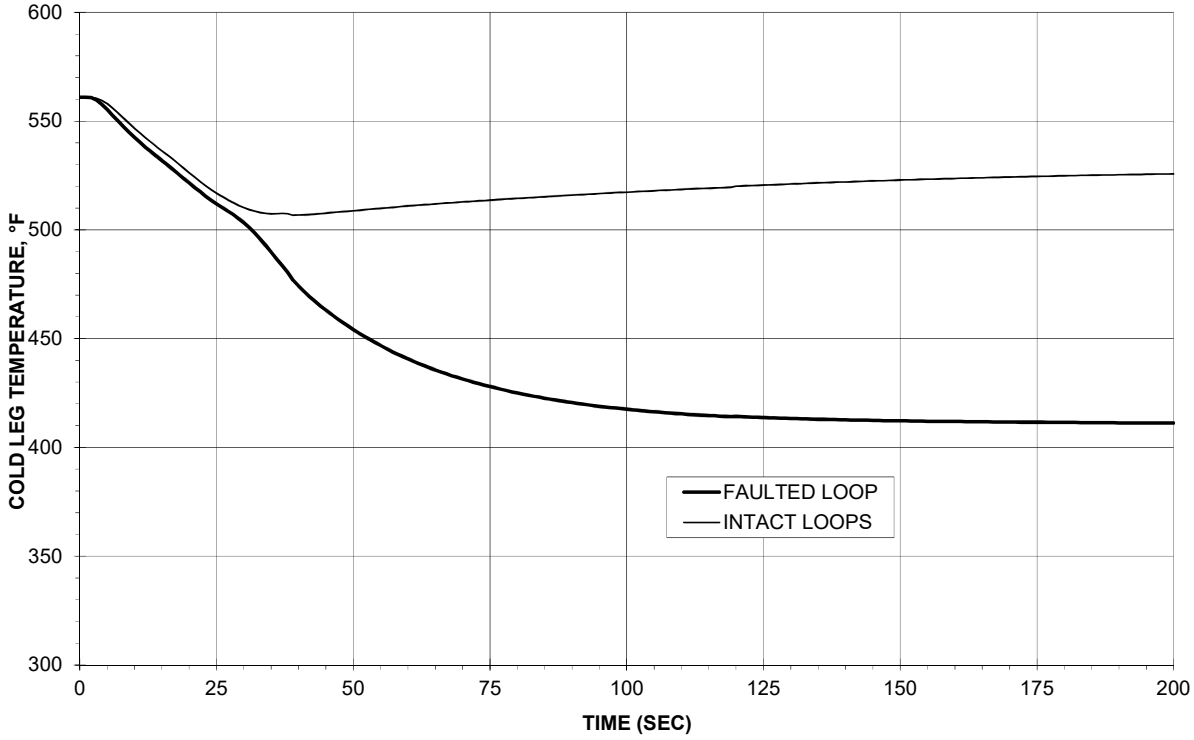


Figure 15-23. Steamline Break, Offsite Power Maintained

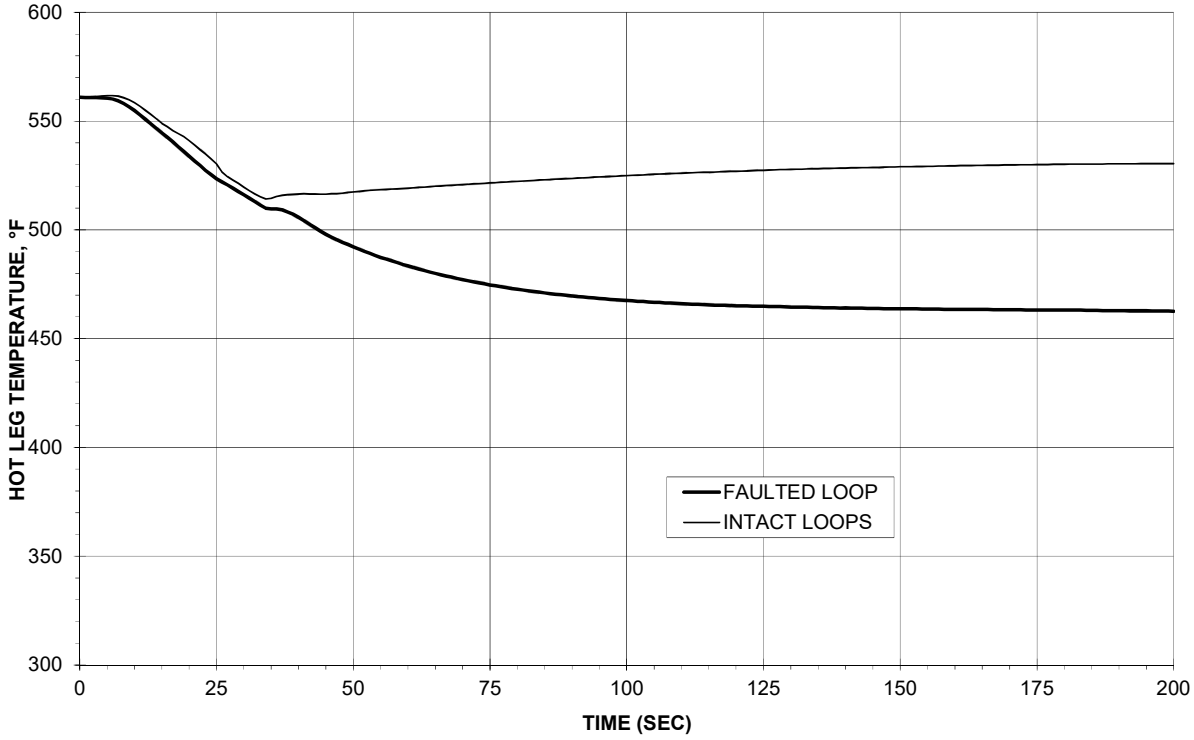


Figure 15-24. Steamline Break, Offsite Power Maintained

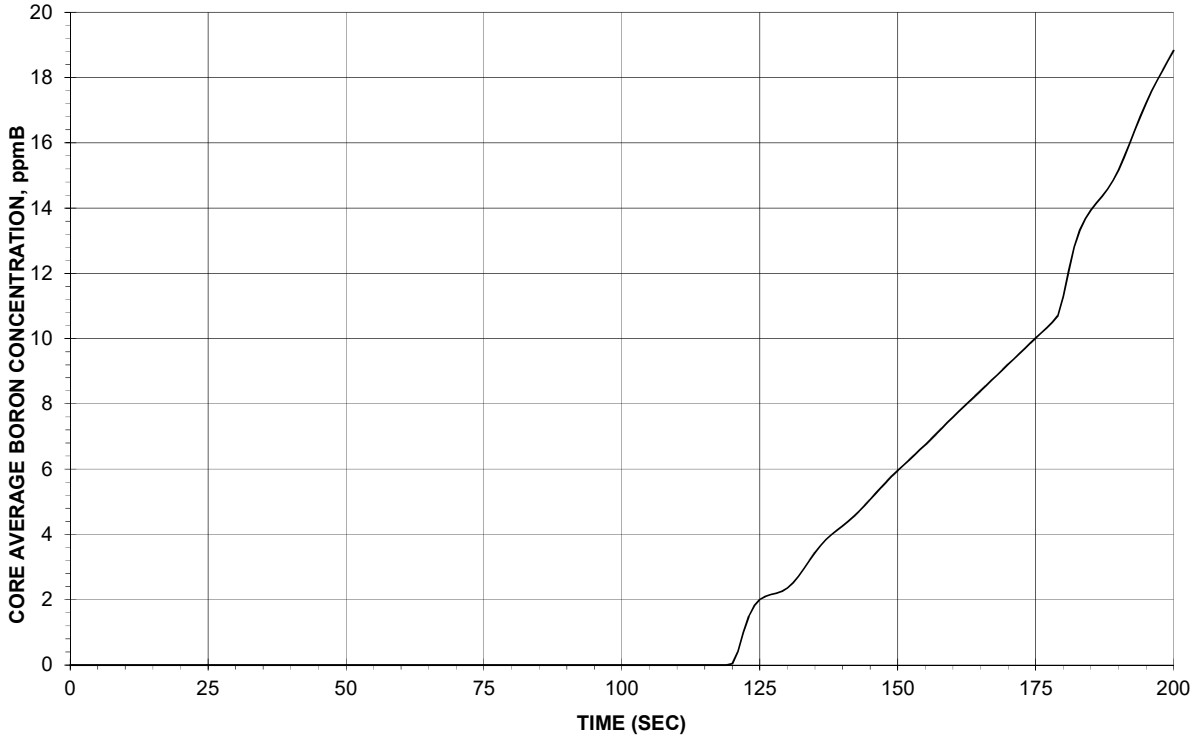


Figure 15-25. Steamline Break, Offsite Power Maintained

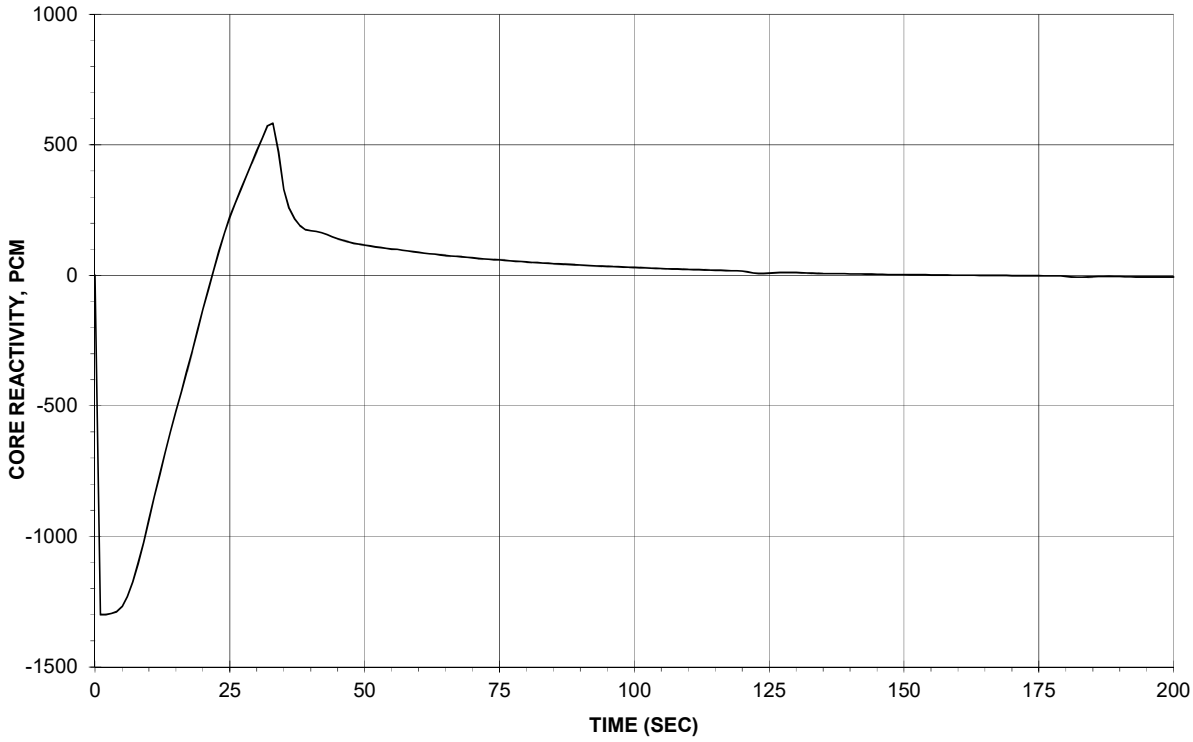


Figure 15-26. Steamline Break, Offsite Power Maintained

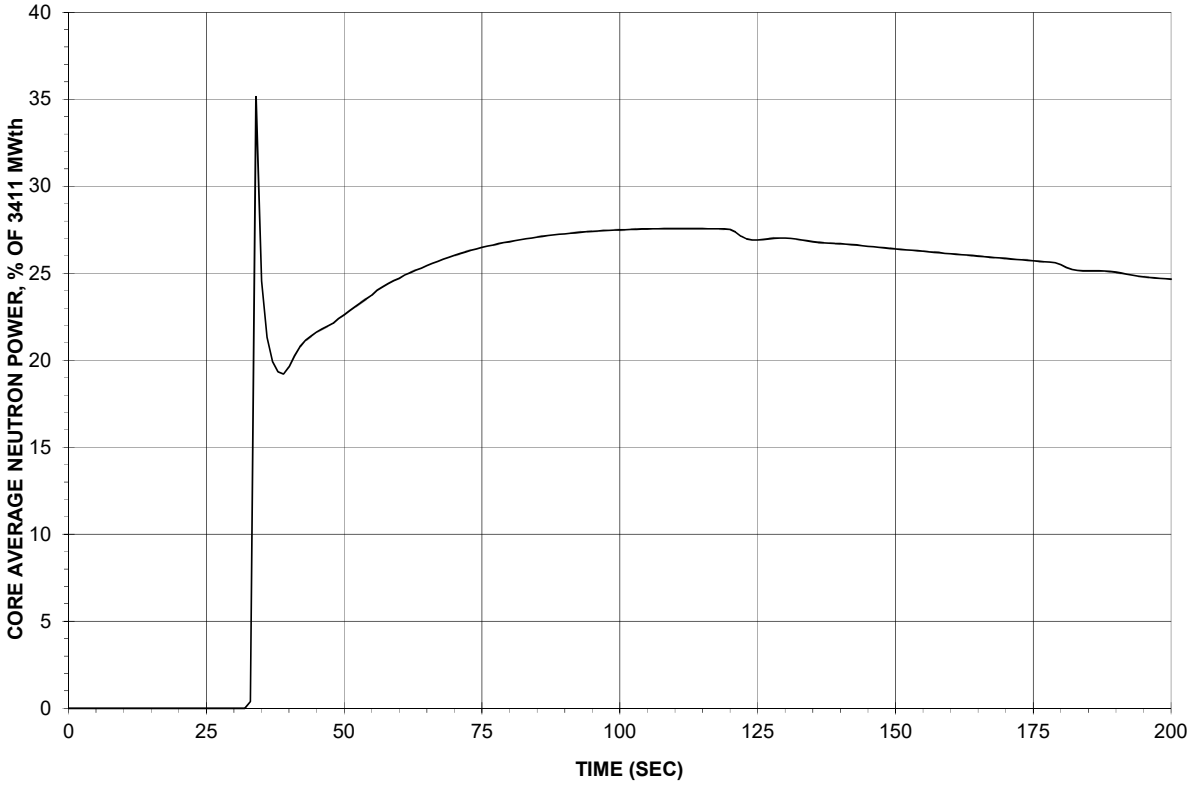


Figure 15-27. Turbine Trip, Maximum Secondary Pressure Case

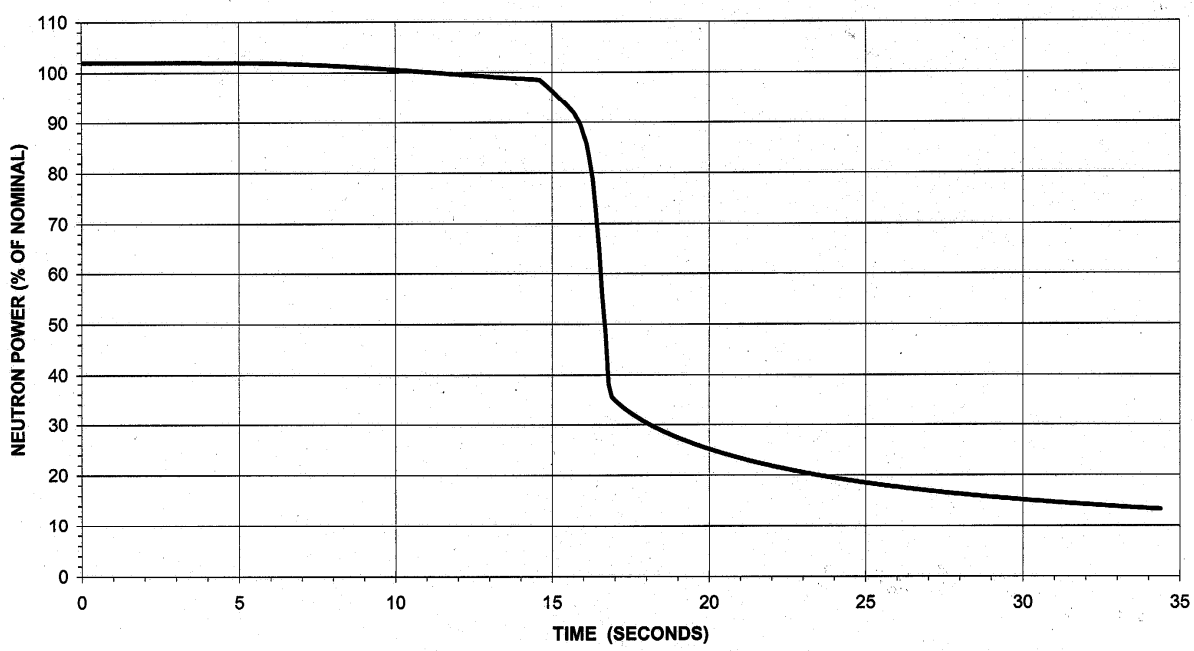


Figure 15-28. Turbine Trip, Maximum Secondary Pressure Case

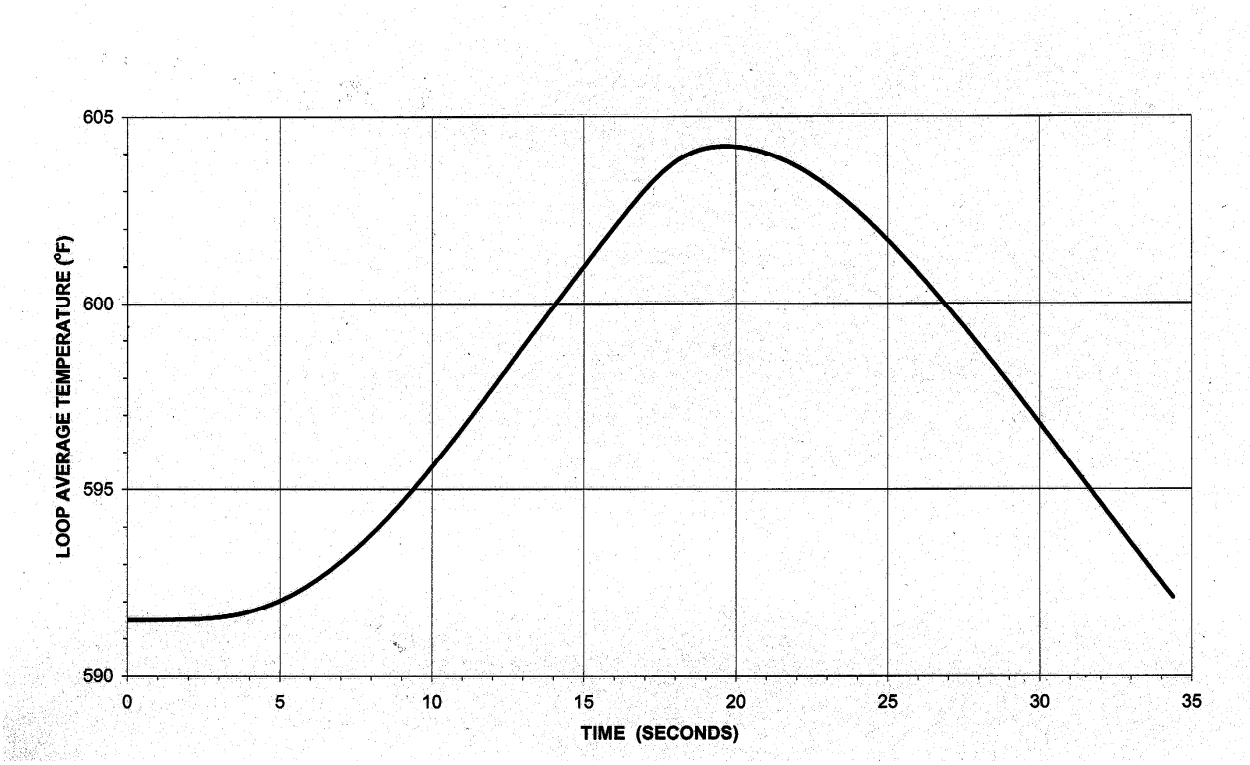


Figure 15-29. Turbine Trip, Maximum Secondary Pressure Case

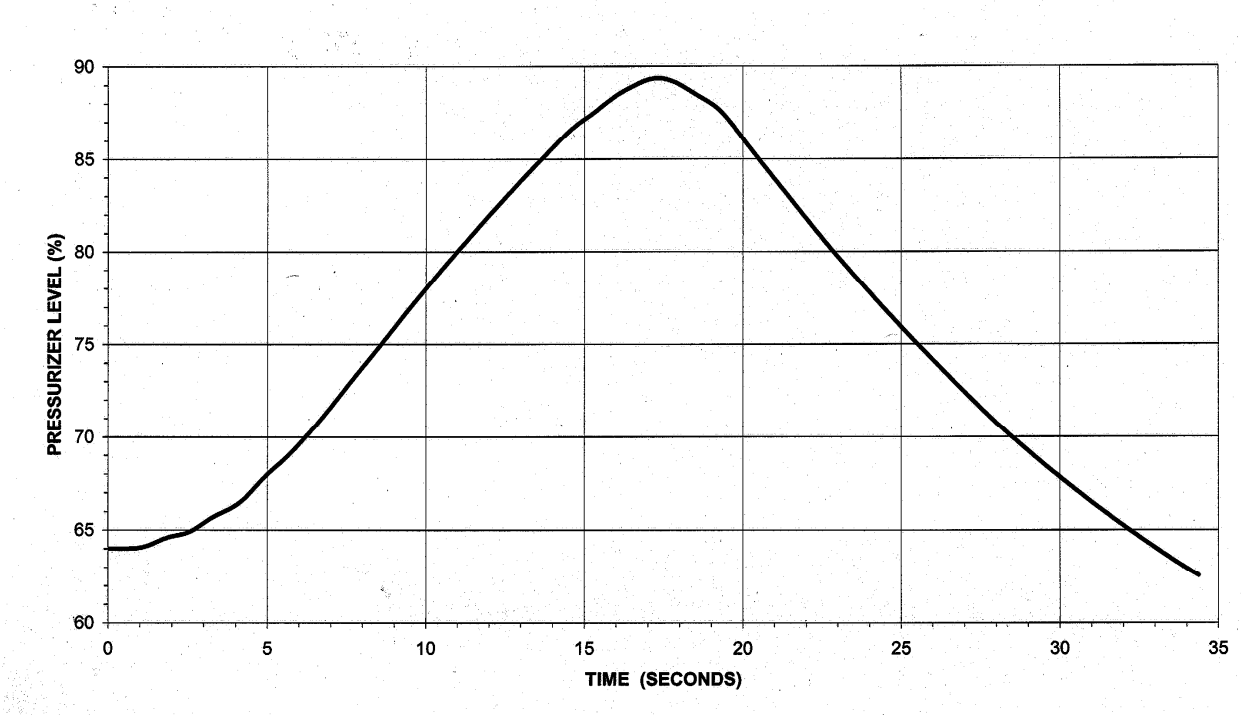


Figure 15-30. Turbine Trip, Maximum Secondary Pressure Case

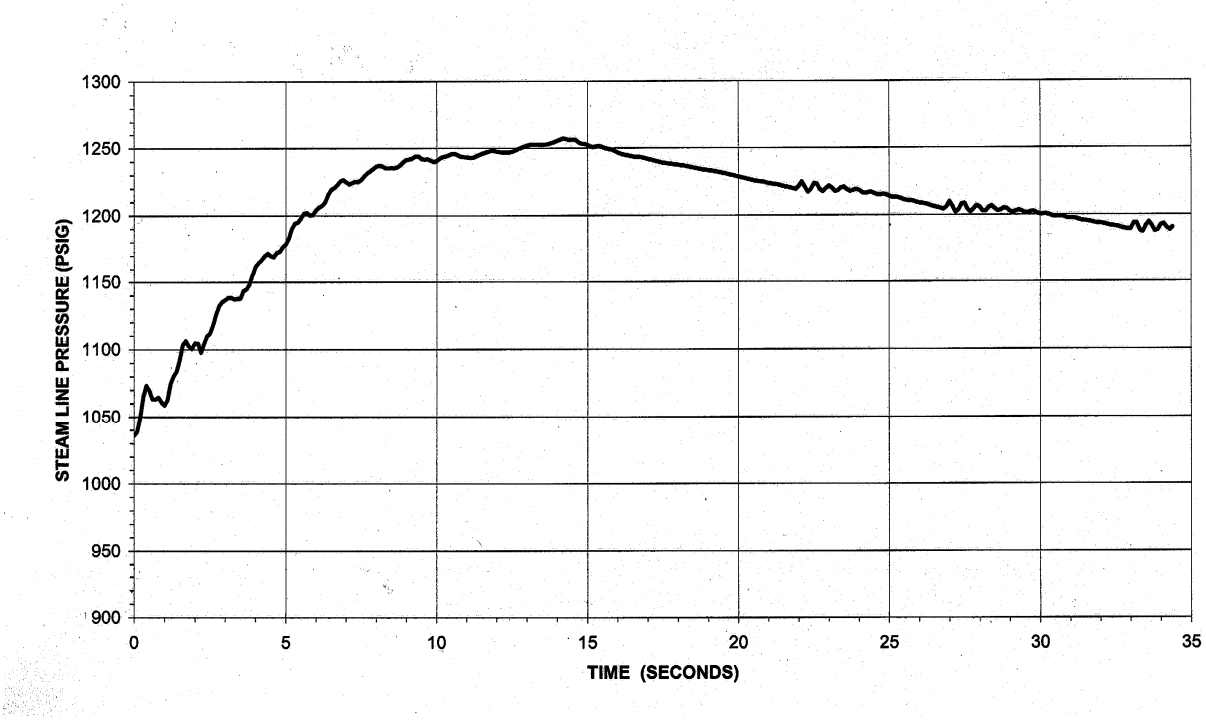


Figure 15-31. Turbine Trip, Maximum Secondary Pressure Case

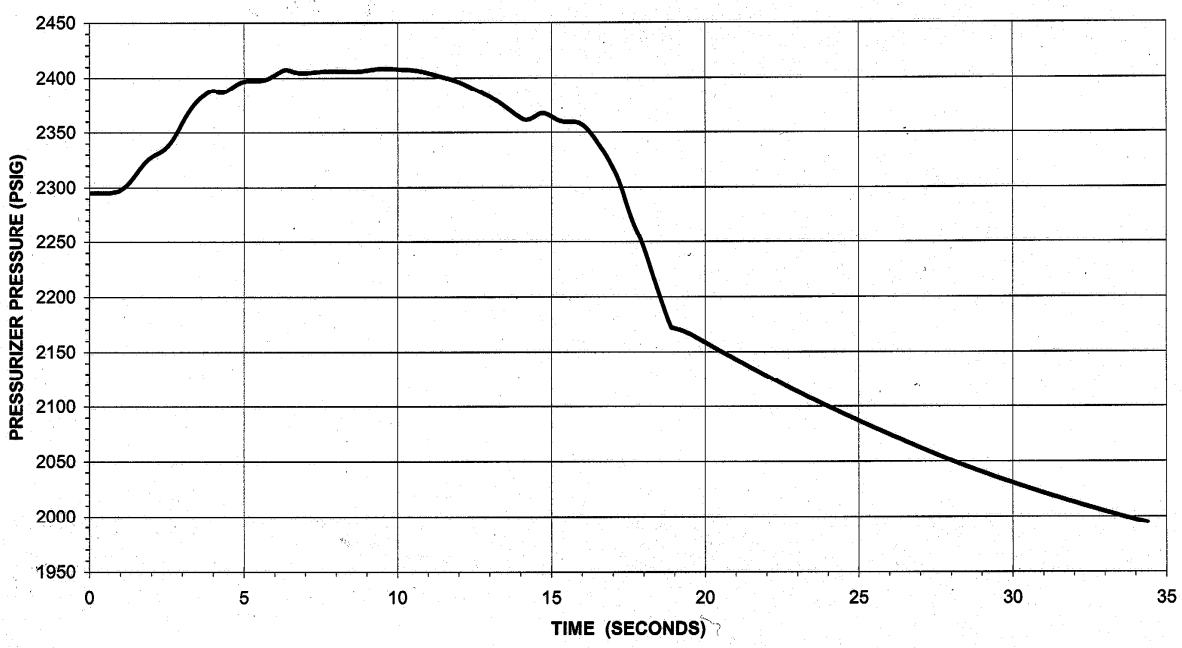


Figure 15-32. Turbine Trip, Maximum Primary Pressure Case

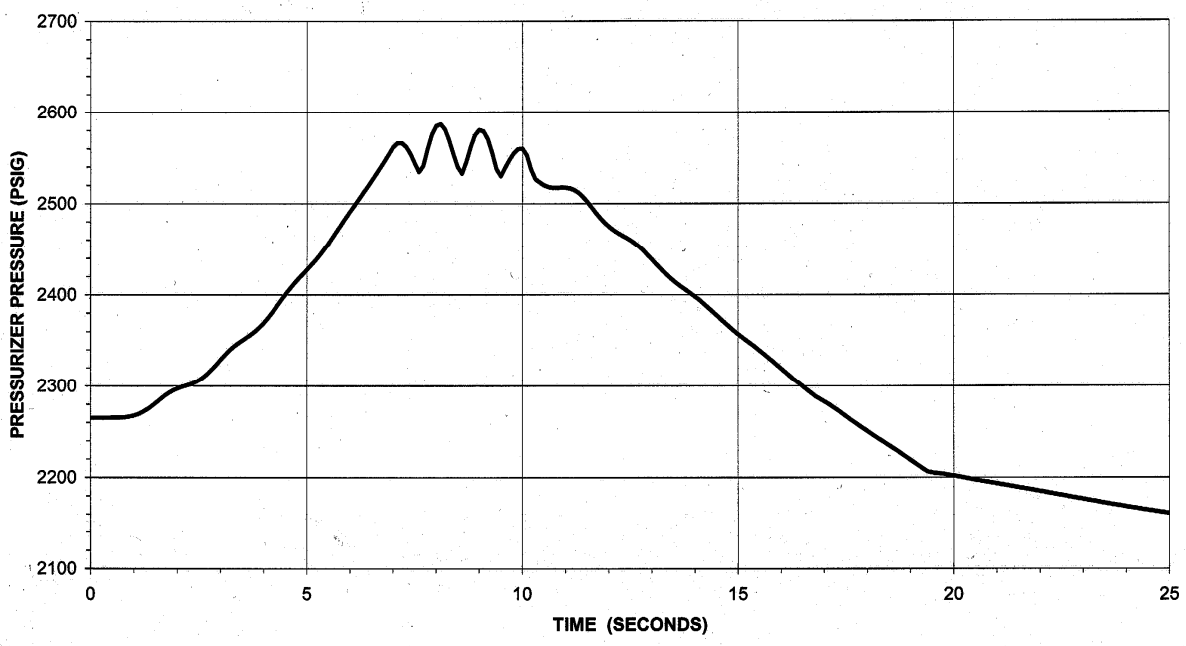


Figure 15-33. Feedwater System Pipe Break - Unit 2

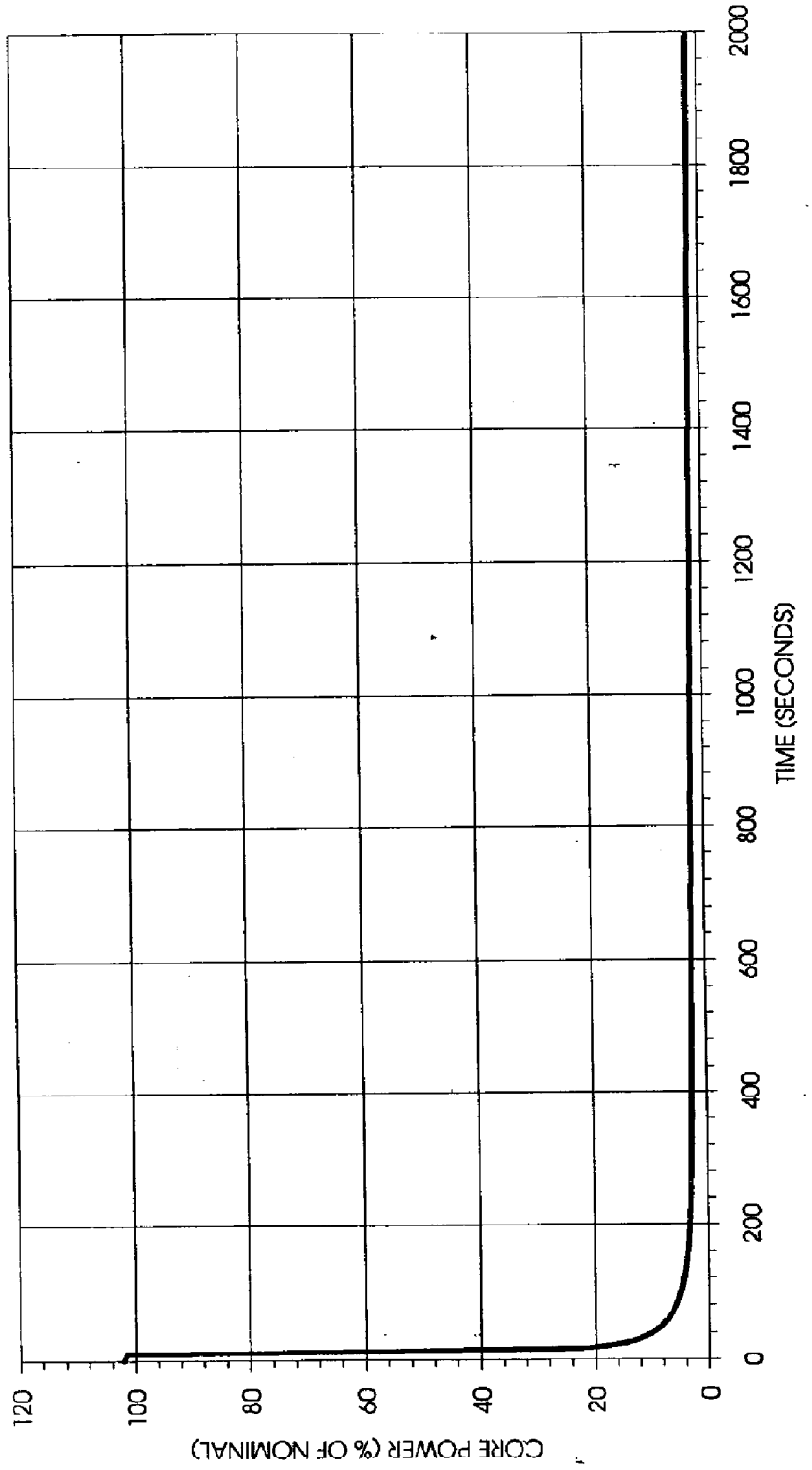


Figure 15-34. Feedwater System Pipe Break - Unit 2

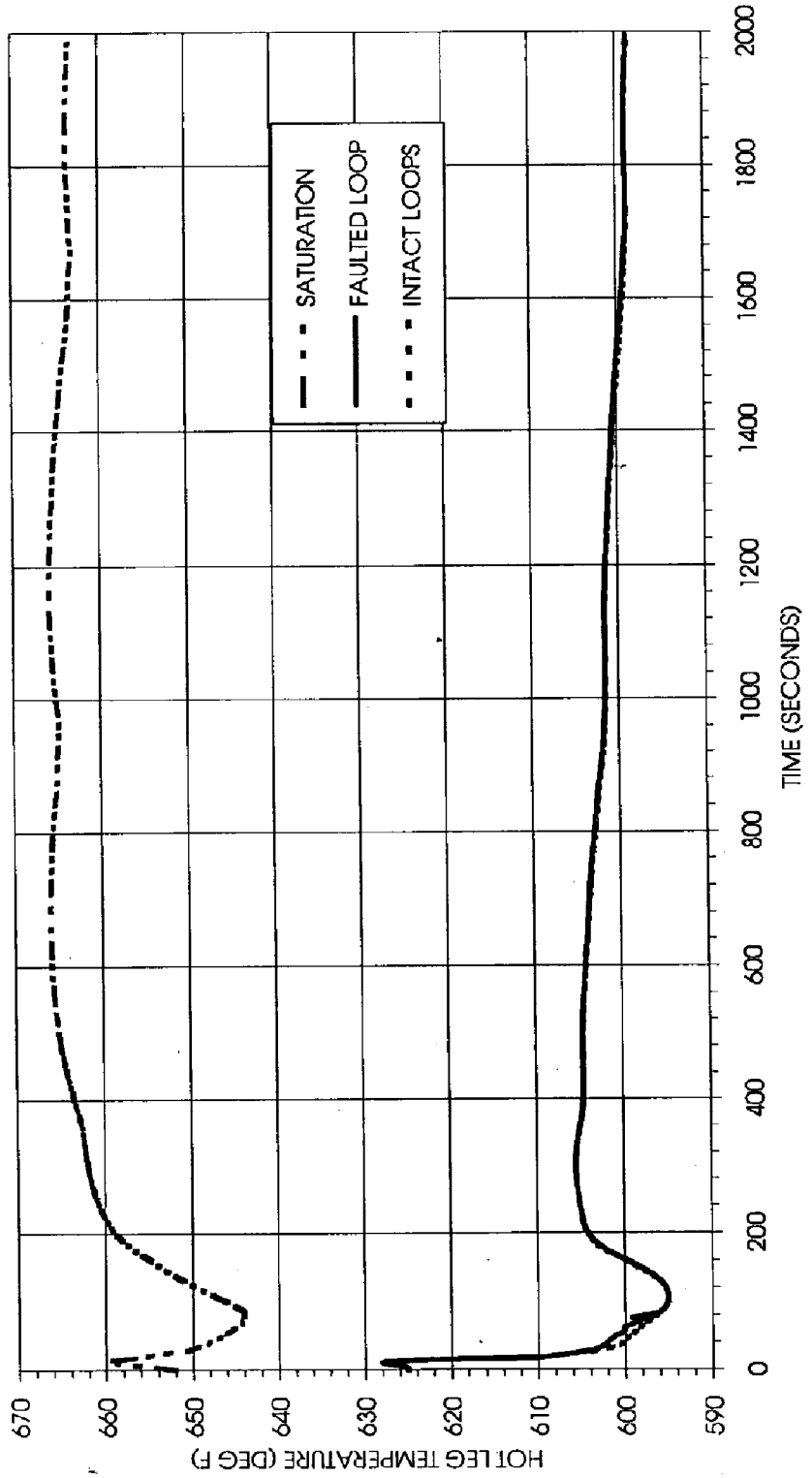


Figure 15-35. Deleted Per 2000 Update

Figure 15-36. Loss of Offsite Power

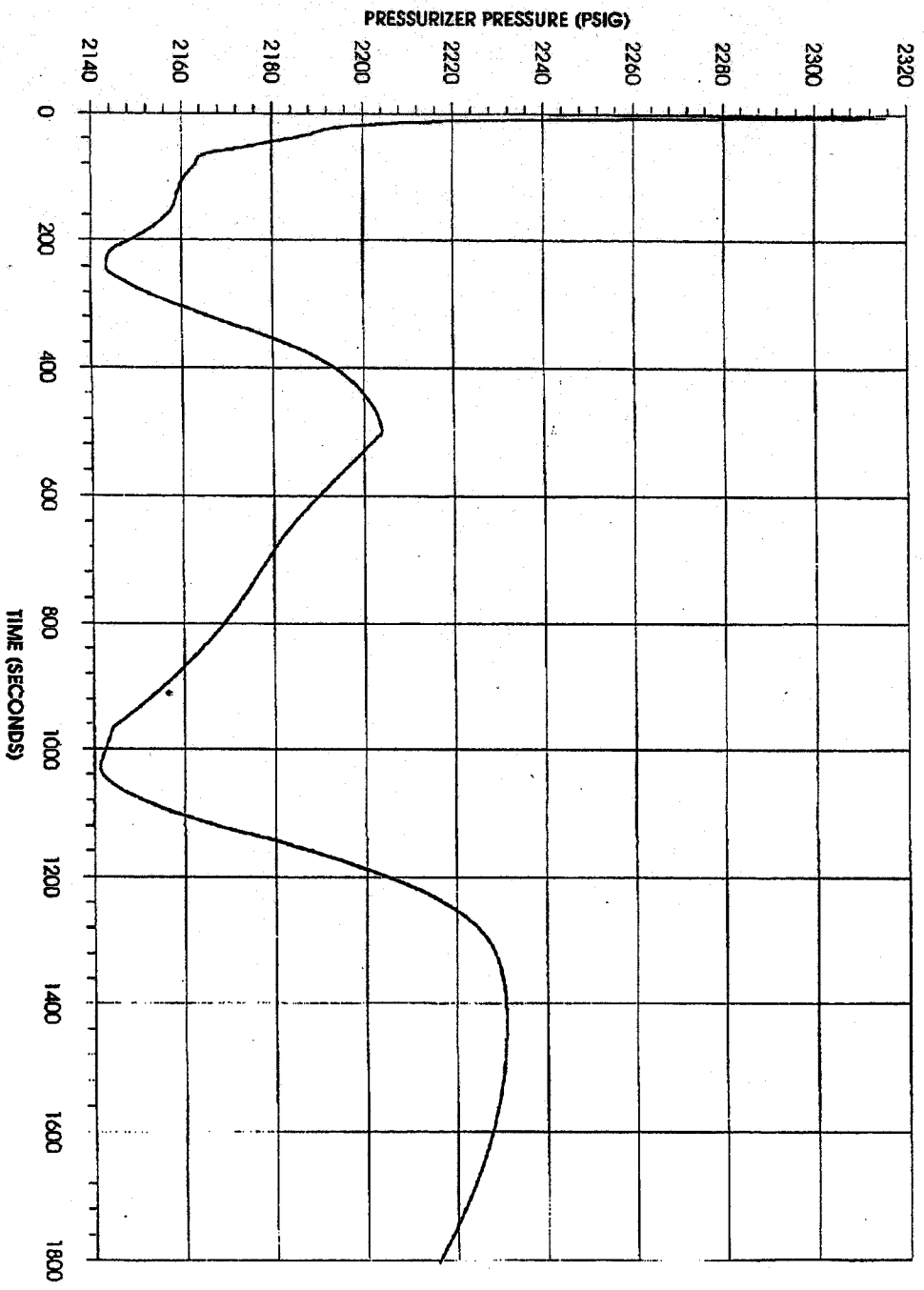


Figure 15-37. Loss of Offsite Power

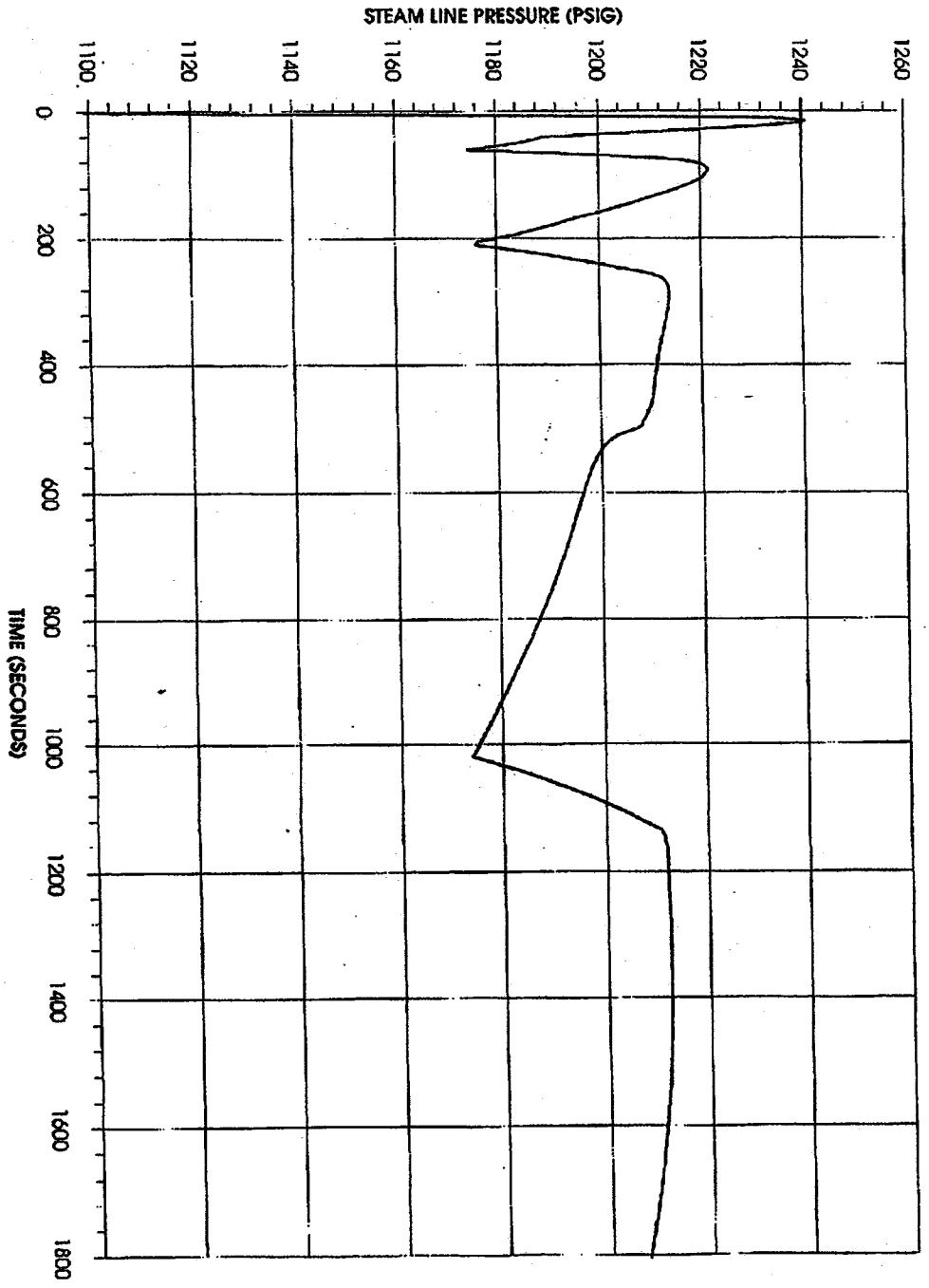


Figure 15-38. Loss of Offsite Power

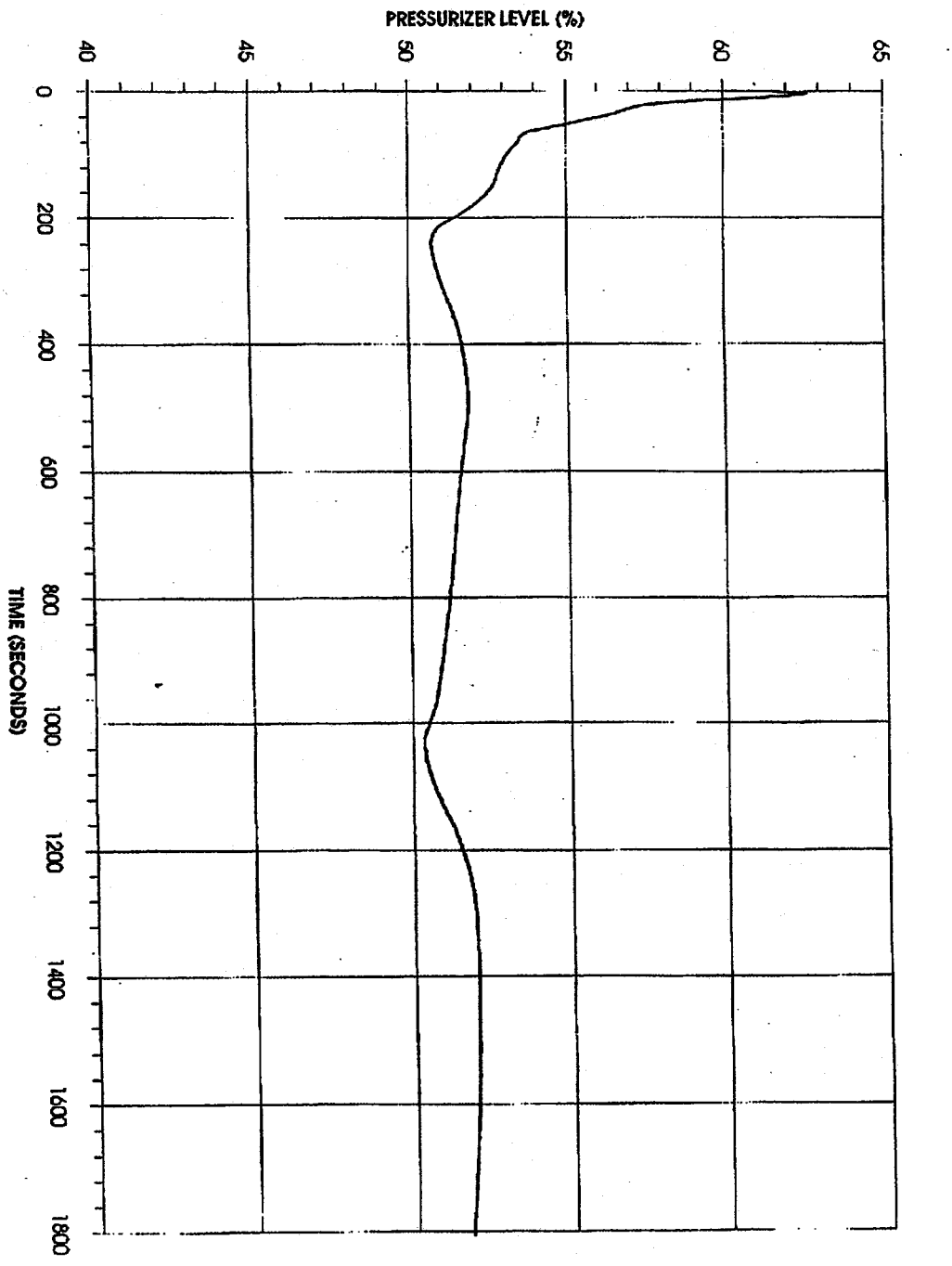


Figure 15-39. Loss of Offsite Power

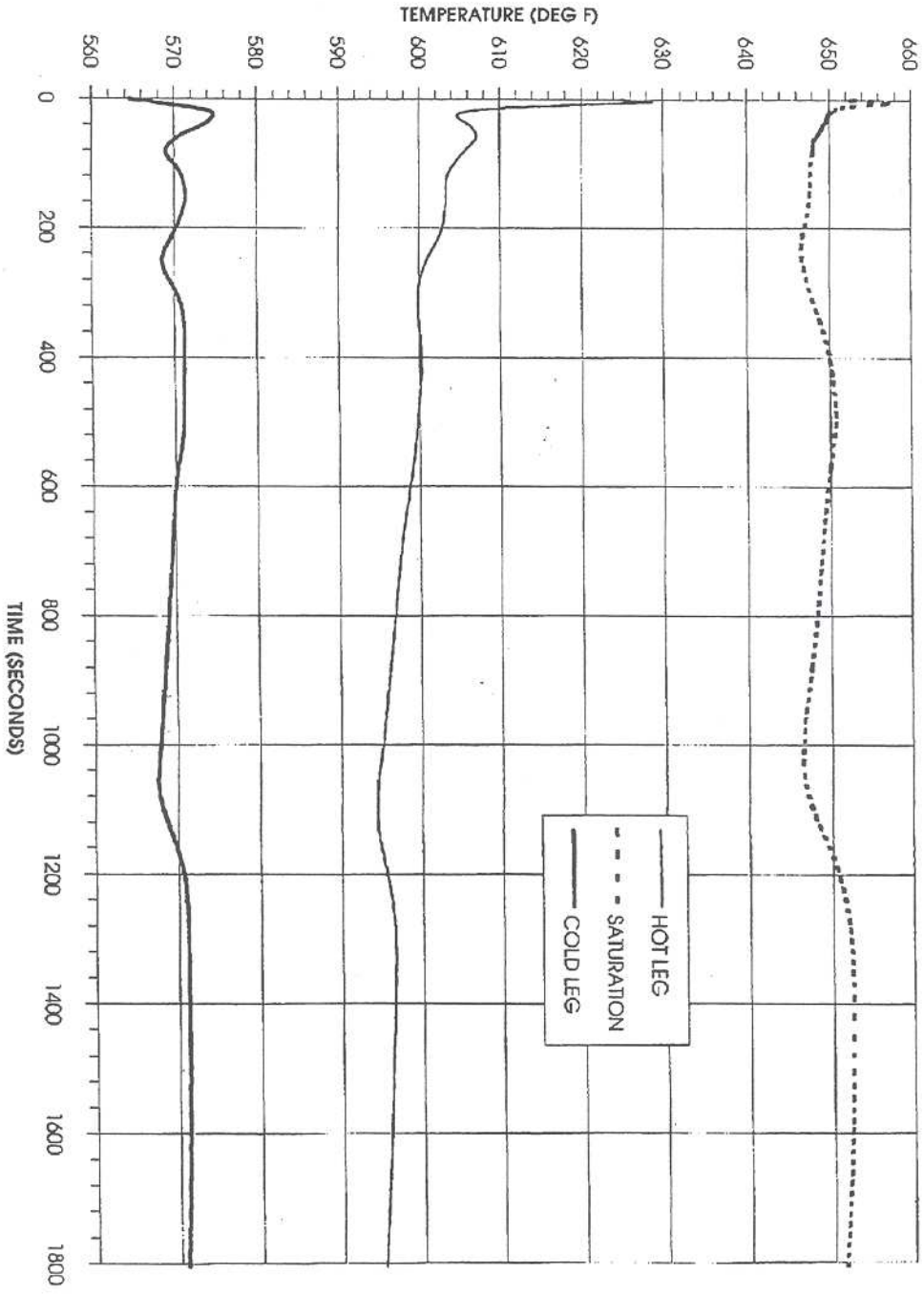


Figure 15-40. Loss of Offsite Power

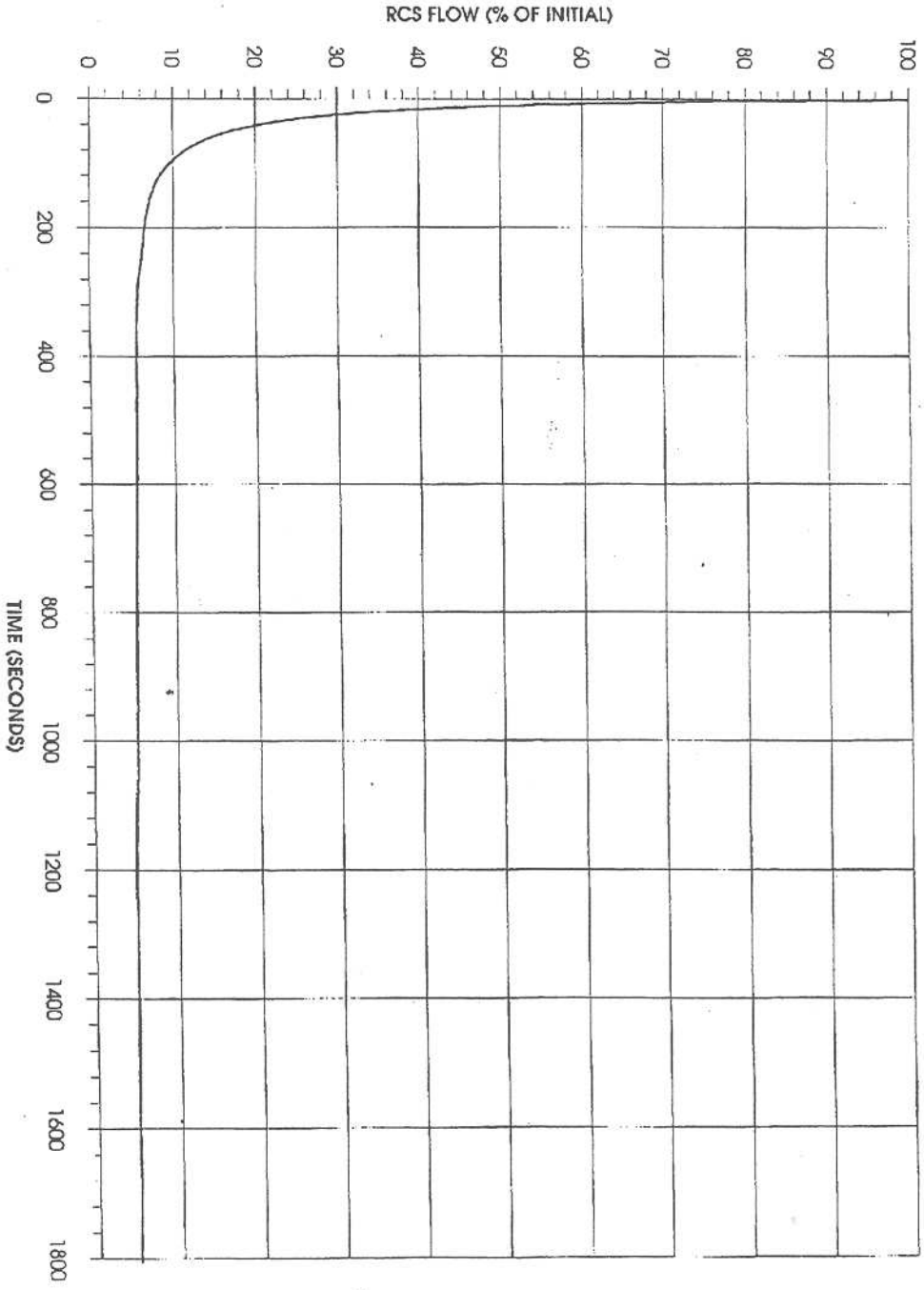
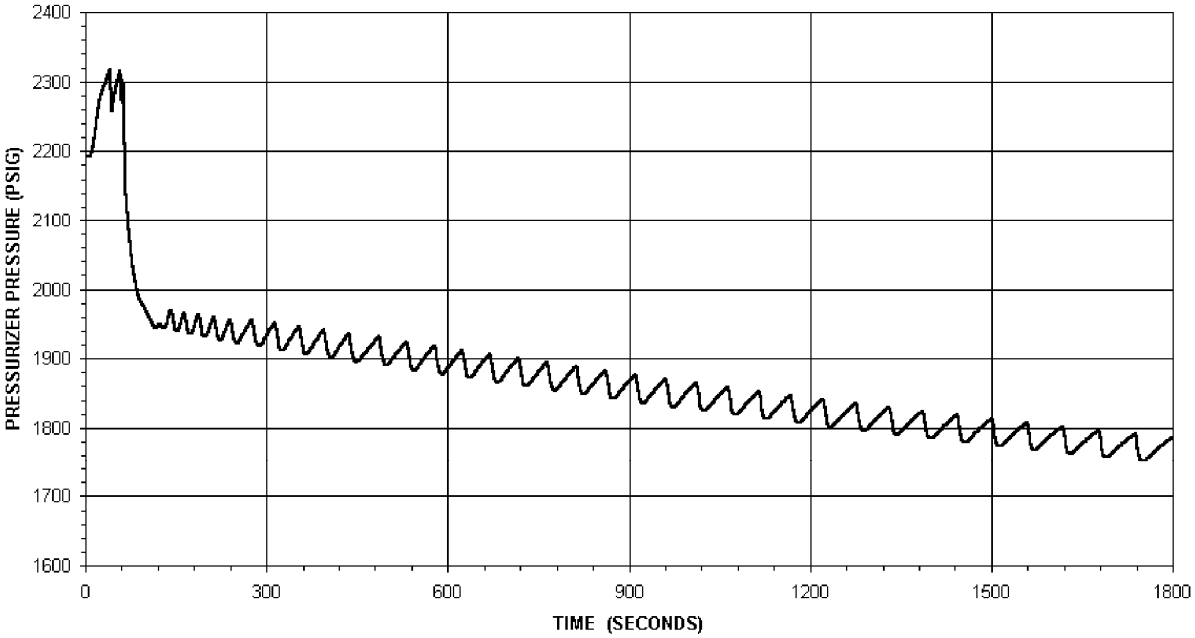


Figure 15-41. Unit 1 Loss of Normal Feedwater Long-Term Core Cooling Analysis



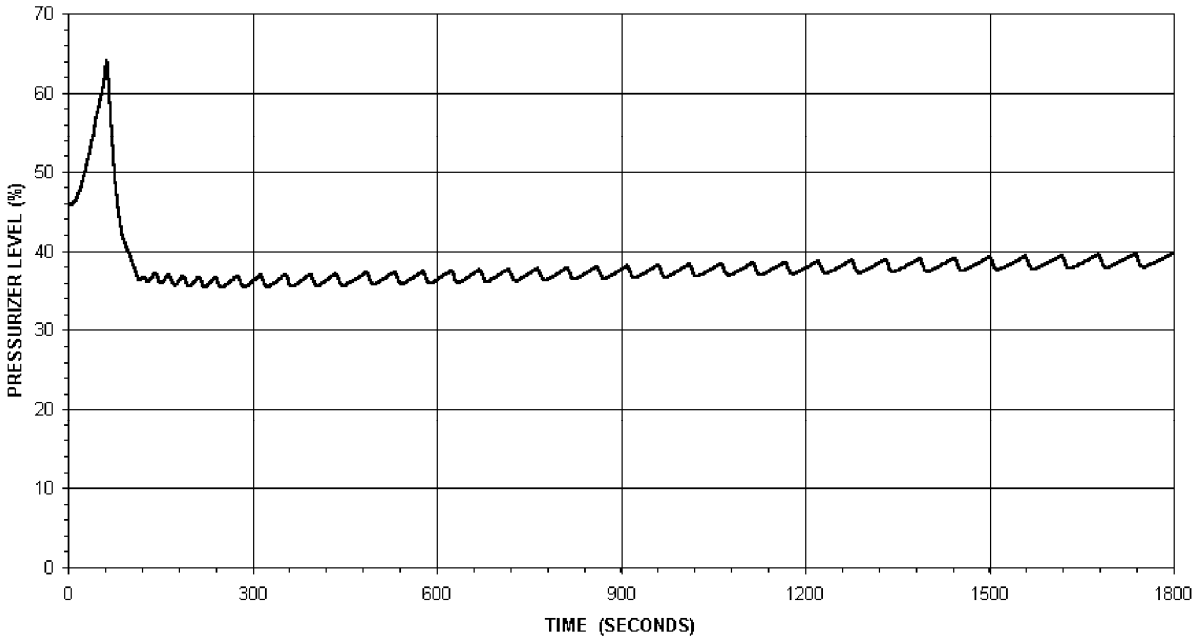
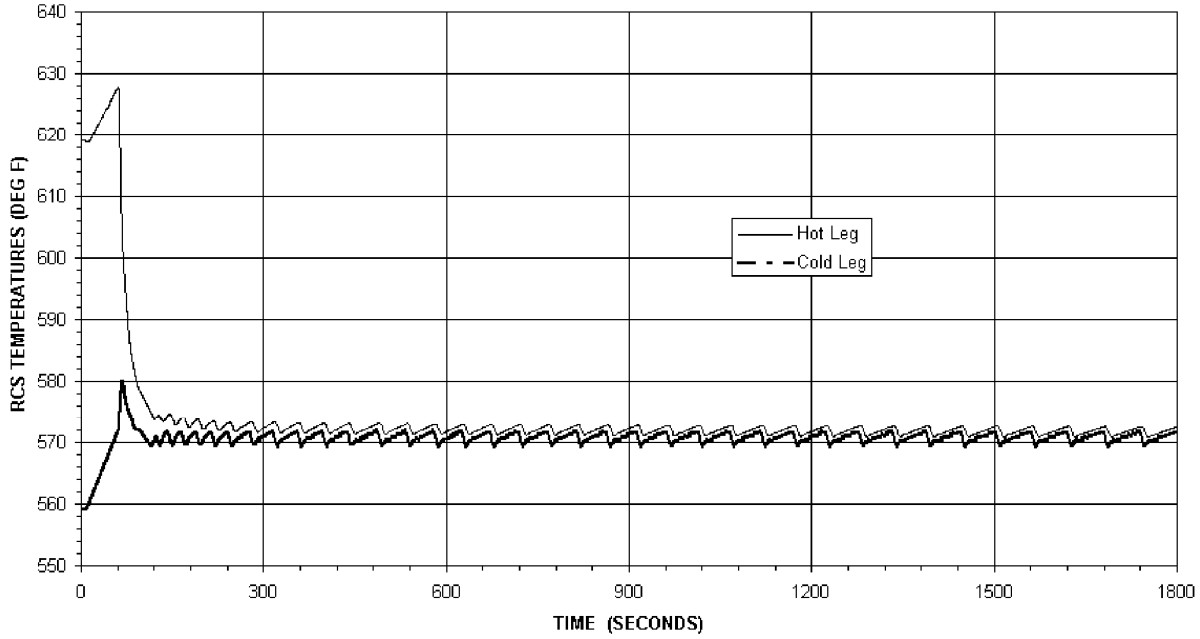

PRESSURIZER LEVEL (%)
70
60
50
40
30
20
10
0
0
300
600
900
1200
1500
1800
TIME (SECONDS)

Figure 15-42. Unit 1 Loss of Normal Feedwater Long-Term Core Cooling Analysis



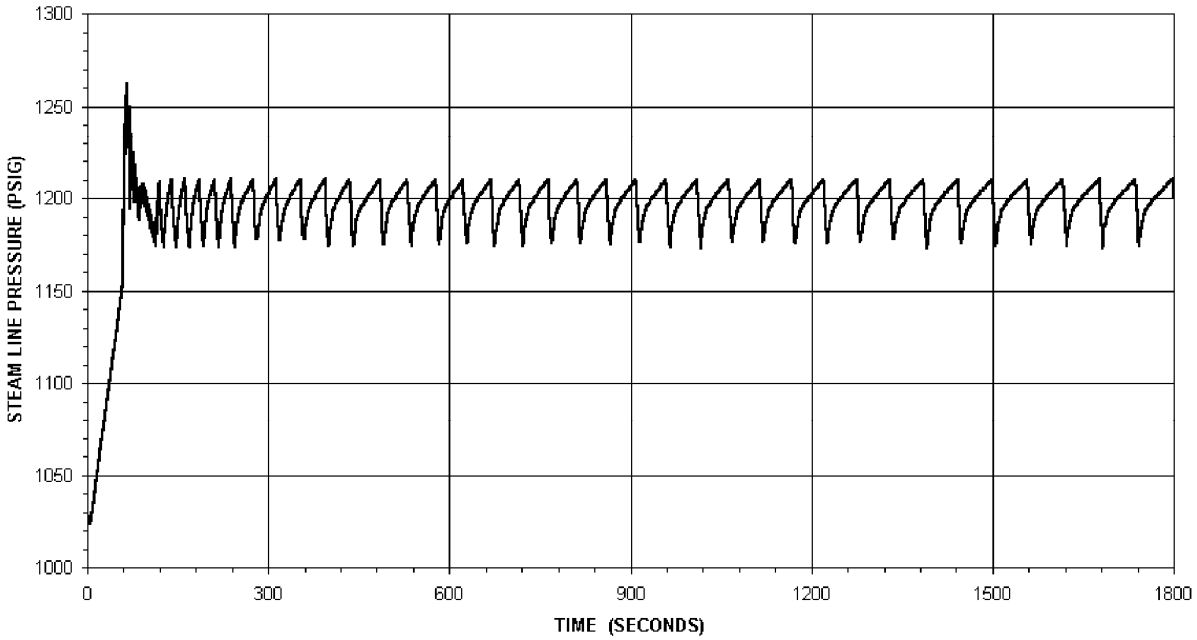

STEAM LINE PRESSURE (PSIG)
1300
1250
1200
1150
1100
1050
1000
0
300
600
900
1200
1500
1800
TIME (SECONDS)

Figure 15-43. Unit 1 Loss of Normal Feedwater Long-Term Core Cooling Analysis

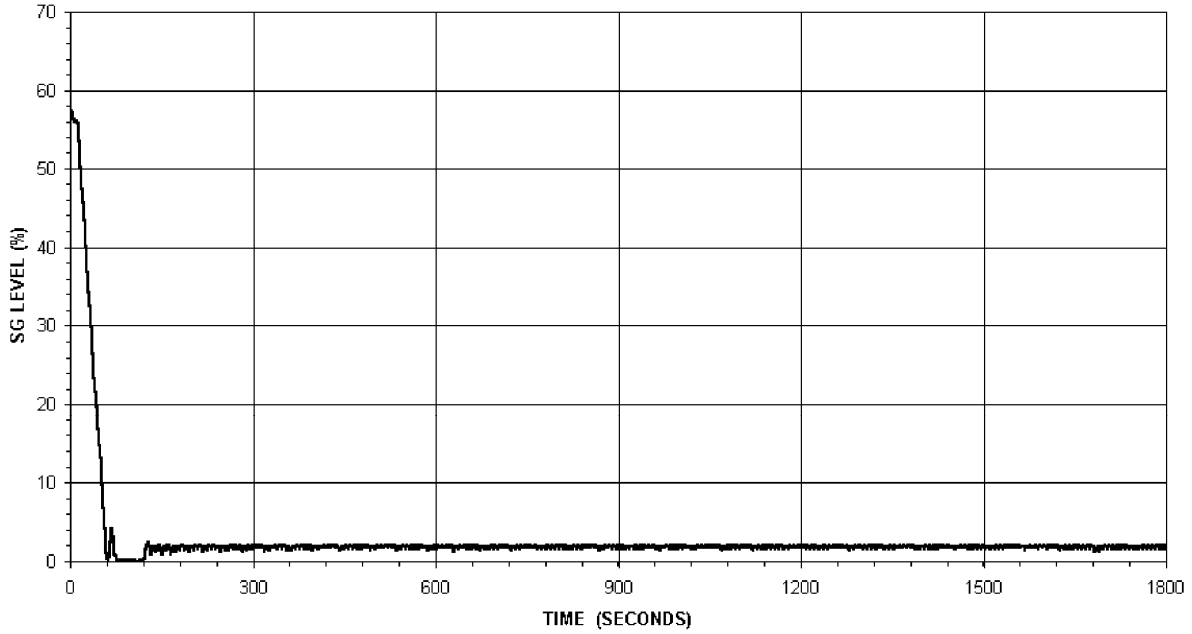


Figure 15-44. Deleted Per 1997 Update

Figure 15-45. Feedwater System Pipe Break - Unit 2

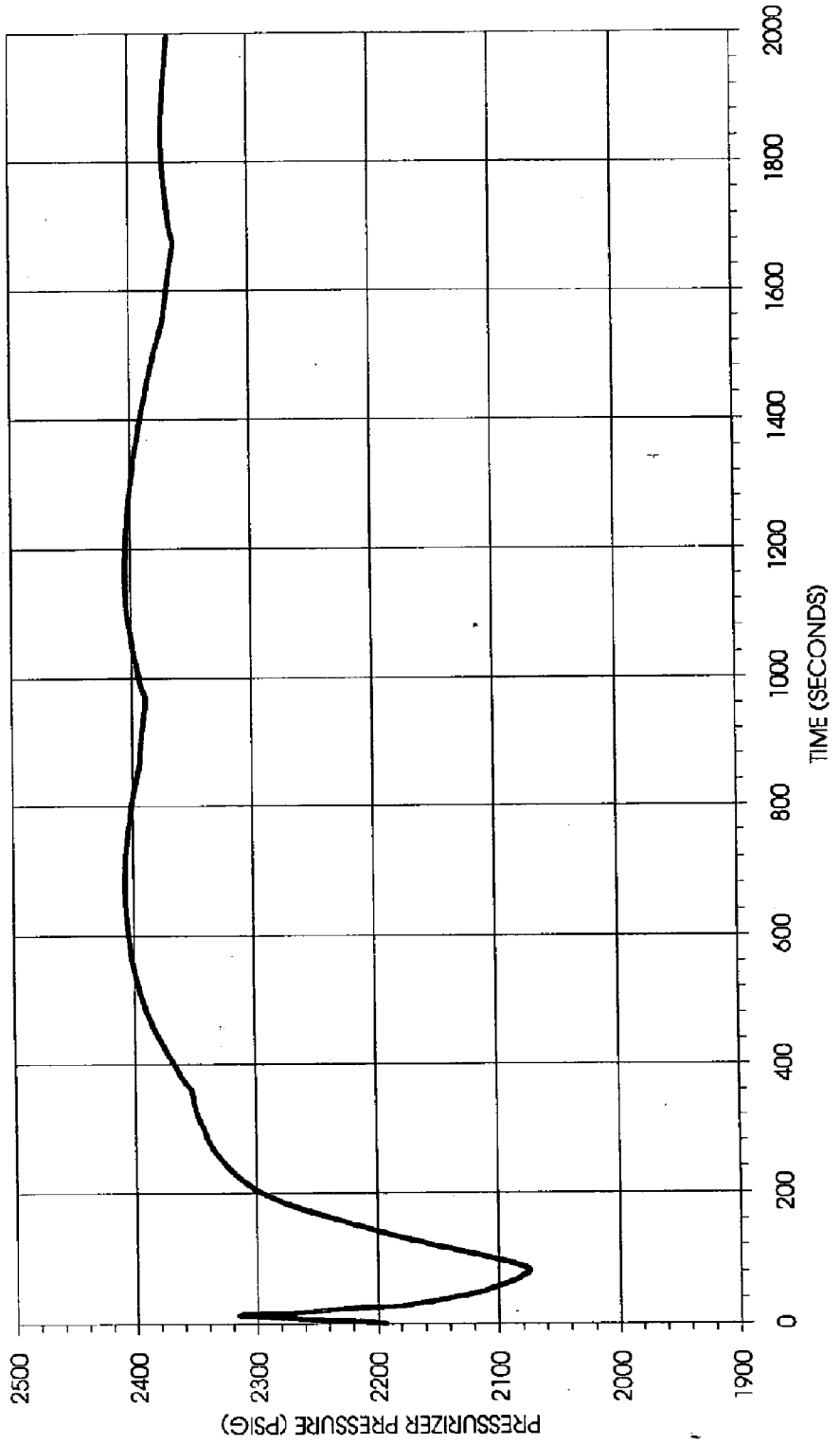


Figure 15-46. Feedwater System Pipe Break - Unit 2

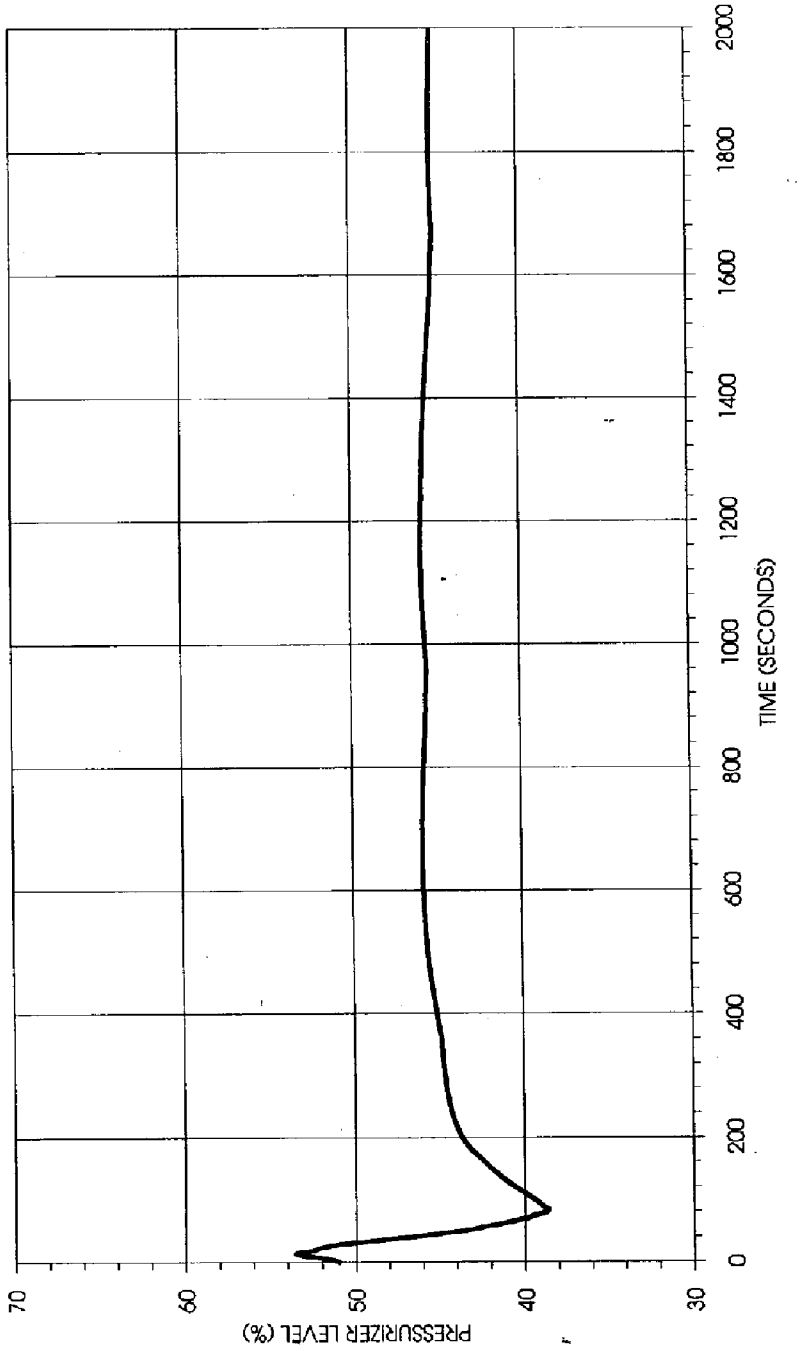


Figure 15-47. Feedwater System Pipe Break - Unit 2

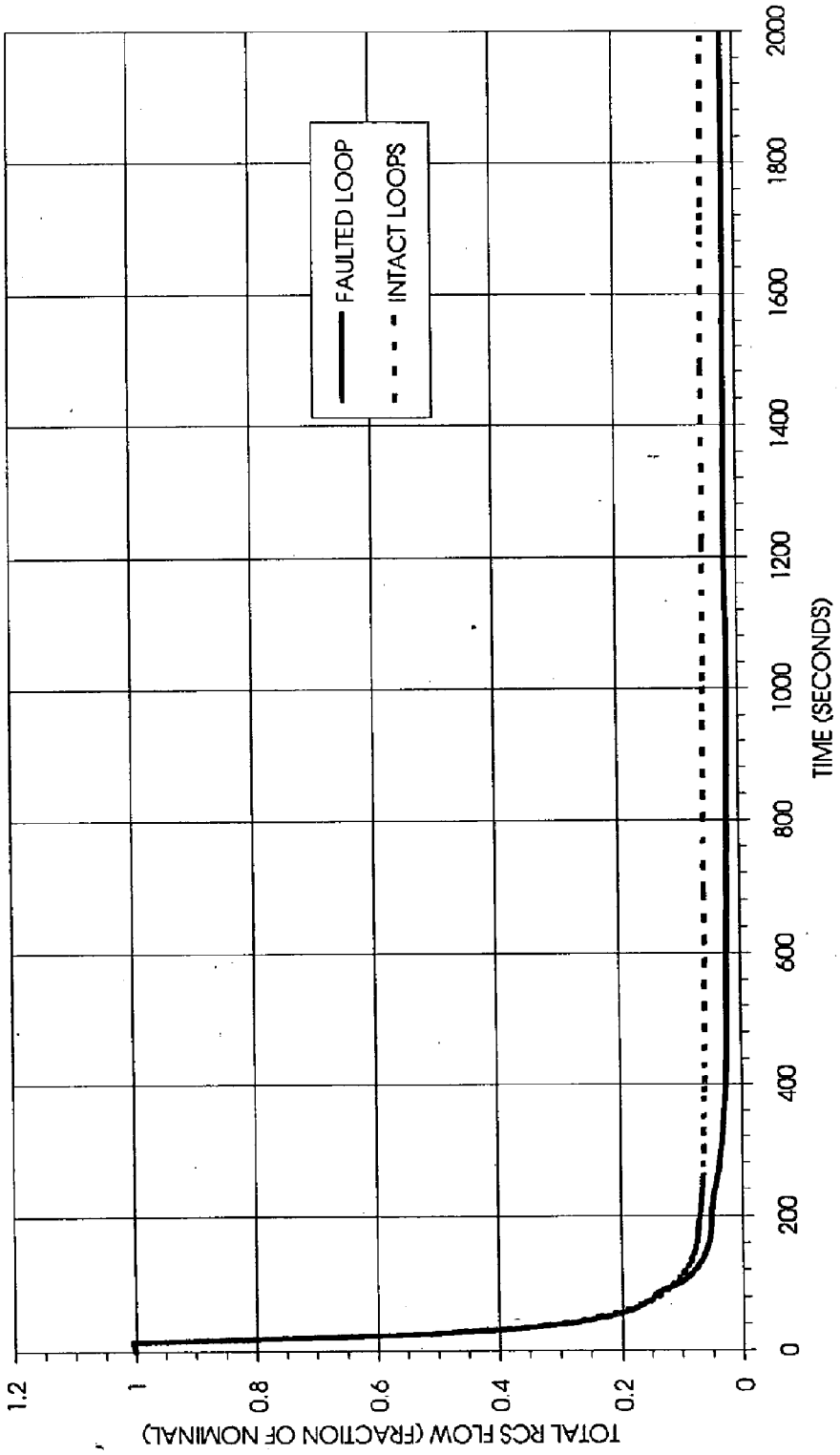


Figure 15-48. Feedwater System Pipe Break - Unit 2

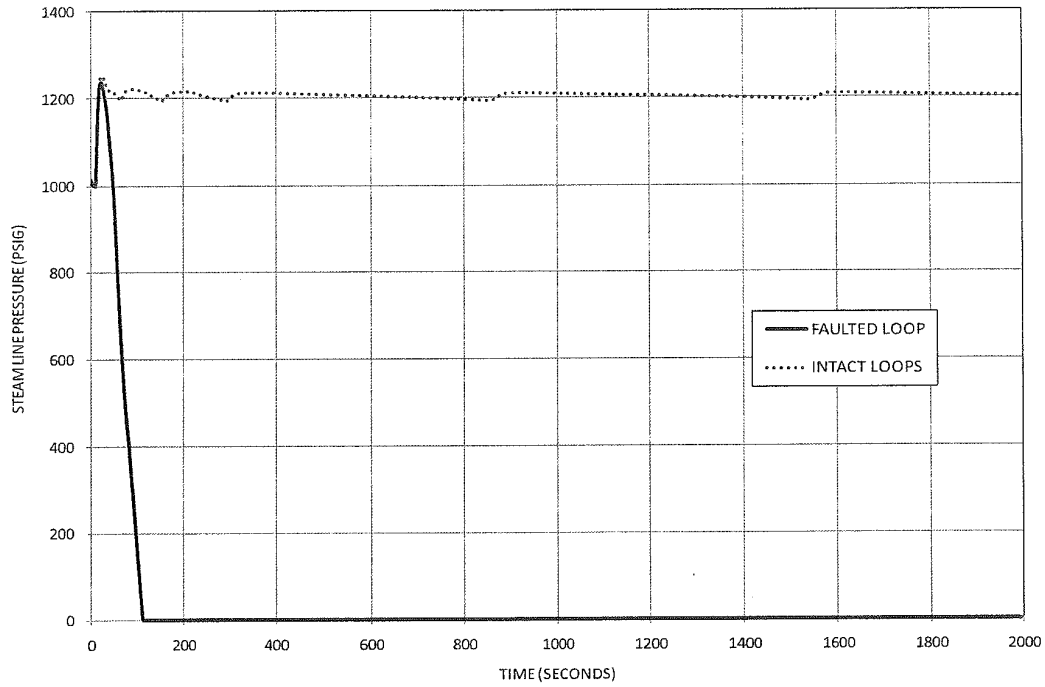


Figure 15-49. Feedwater System Pipe Break - Unit 2

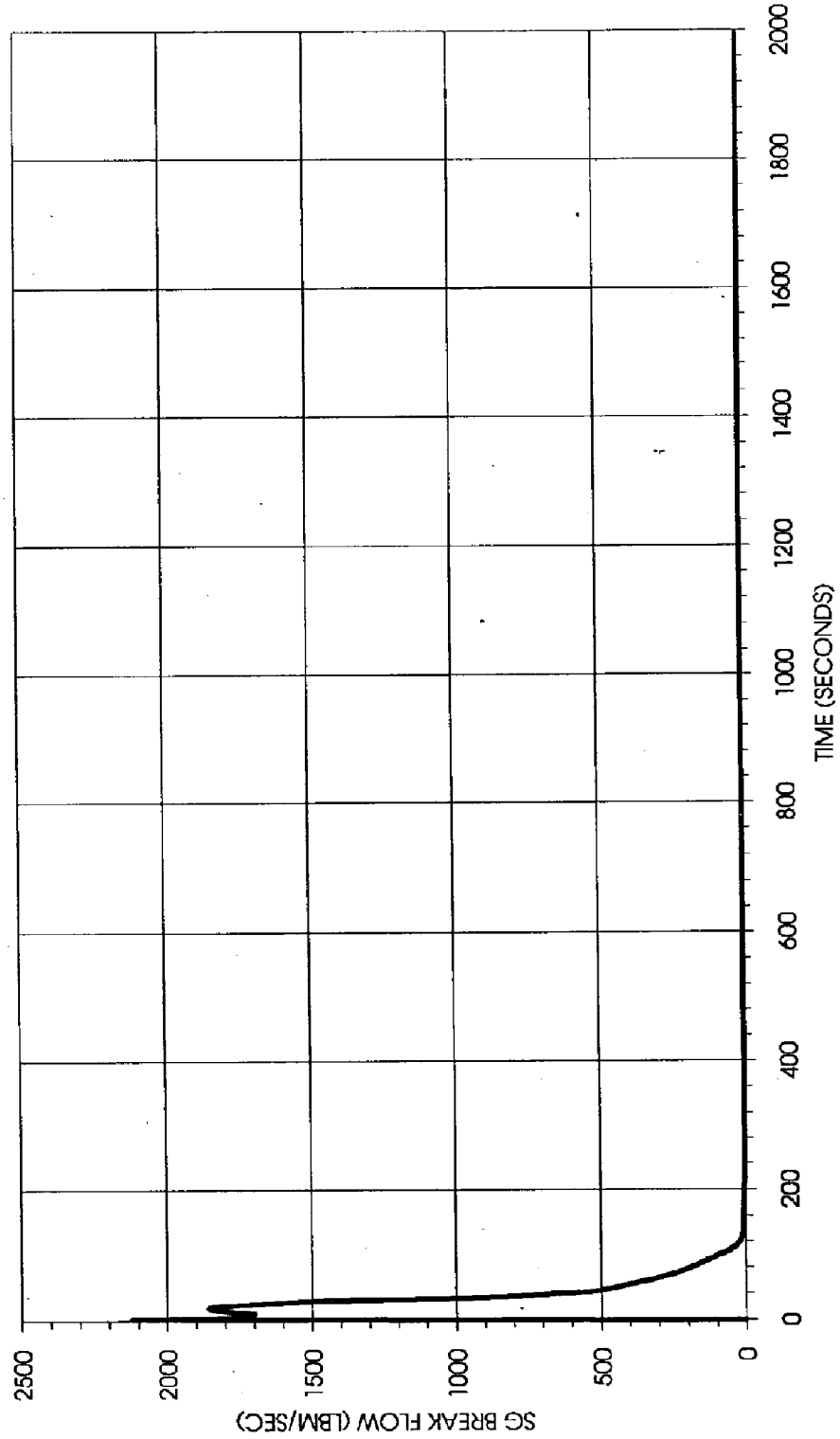


Figure 15-50. Deleted Per 2006 Update

Figure 15-51. Deleted Per 2006 Update

Figure 15-52. Deleted Per 1992 Update

Figure 15-53. Deleted Per 1992 Update

Figure 15-54. Reserved

Reserved for Future Use

Figure 15-55. Partial Loss of Forced Reactor Coolant Flow

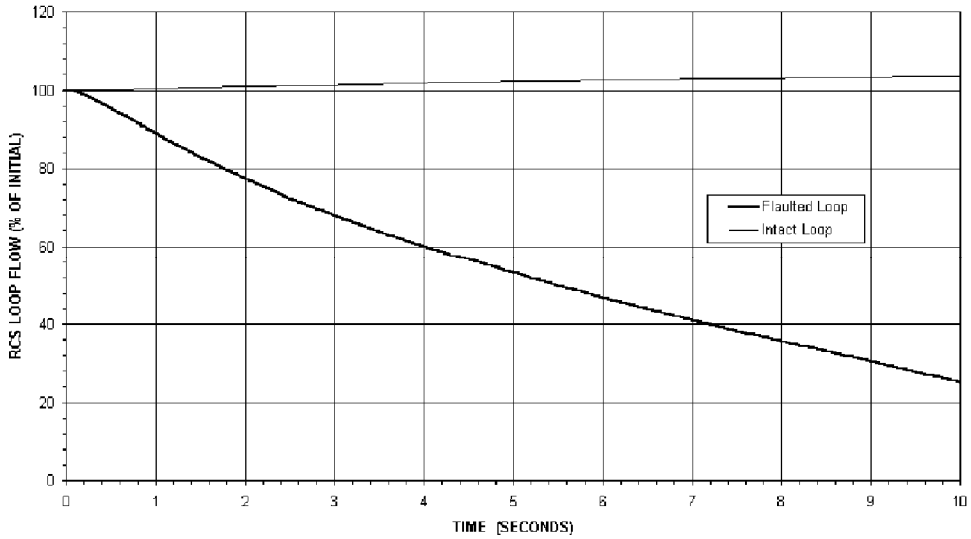


Figure 15-56. Partial Loss of Forced Reactor Coolant Flow

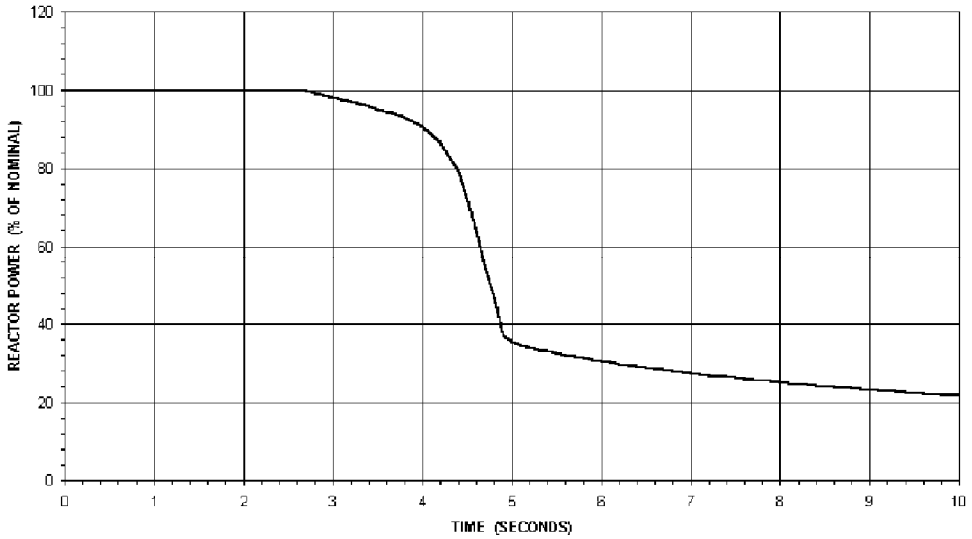


Figure 15-57. Partial Loss of Forced Reactor Coolant Flow

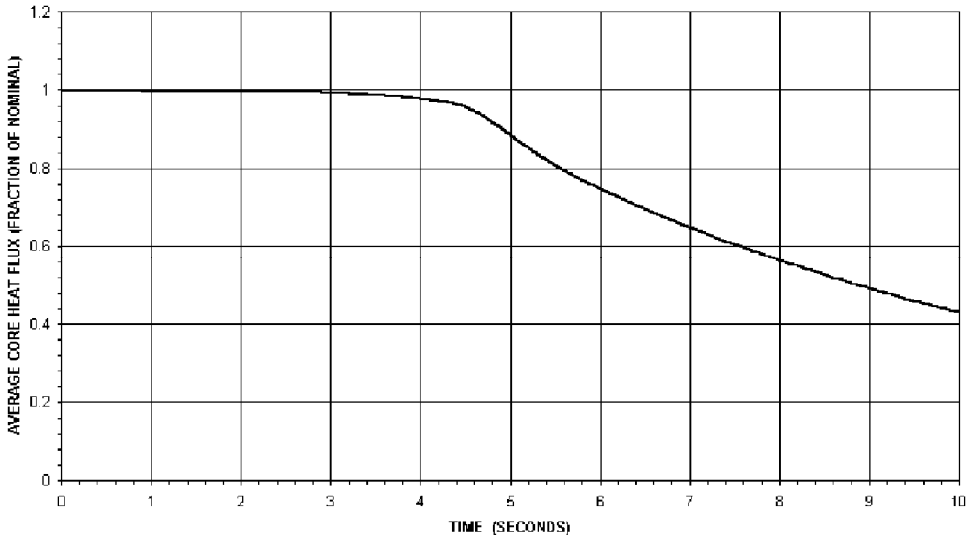


Figure 15-58. Partial Loss of Forced Reactor Coolant Flow

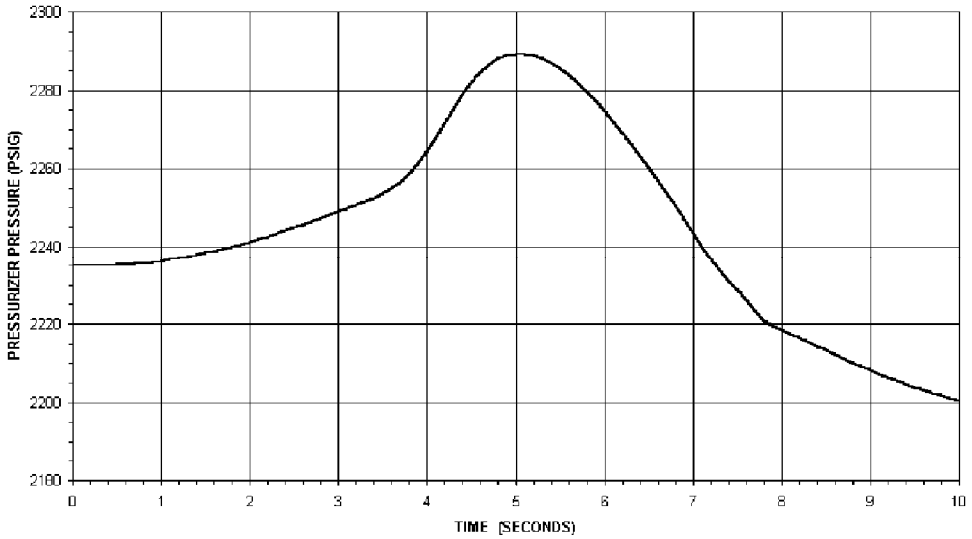


Figure 15-59. Deleted Per 2006 Update

Figure 15-60. Complete Loss of Forced Reactor Coolant Flow

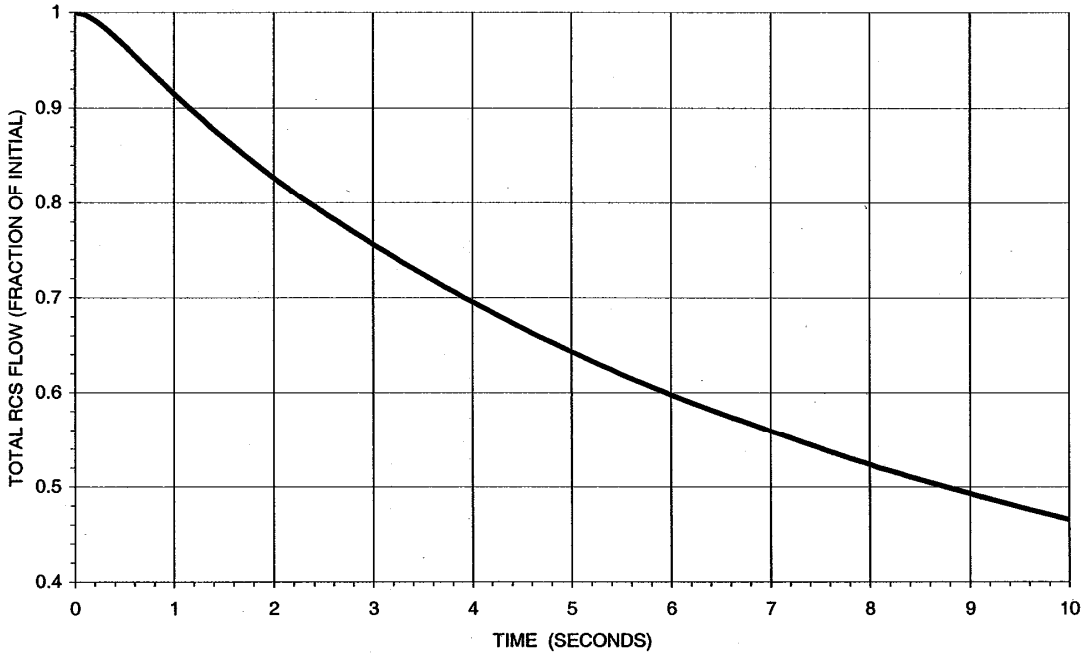


Figure 15-61. Complete Loss of Forced Reactor Coolant Flow

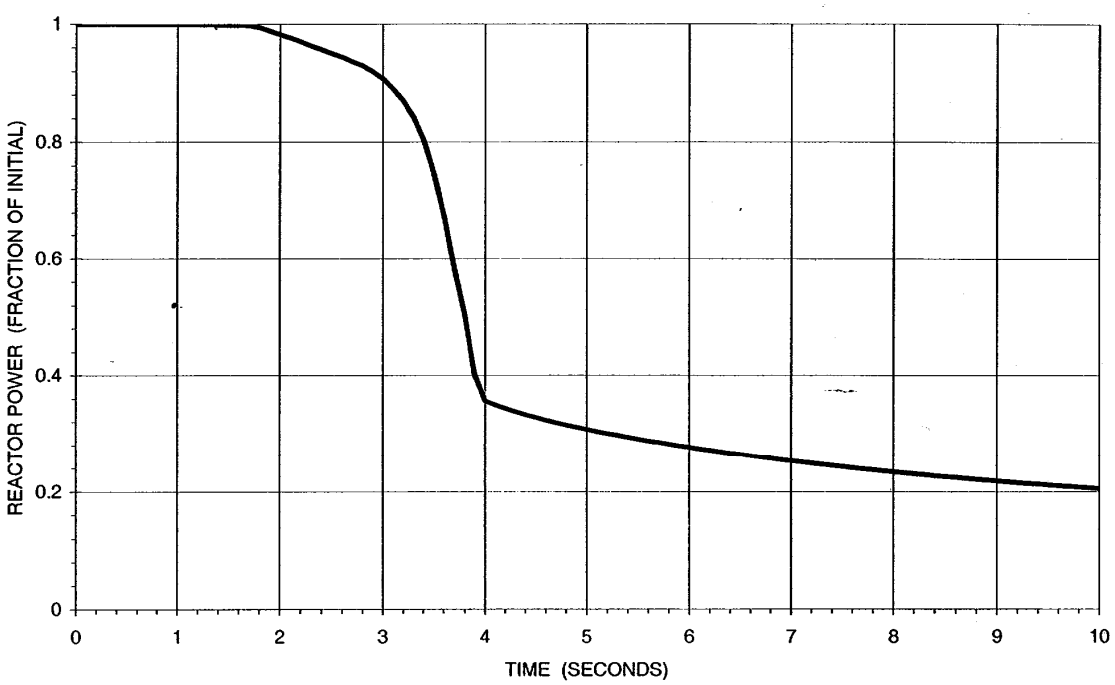


Figure 15-62. Complete Loss of Forced Reactor Coolant Flow

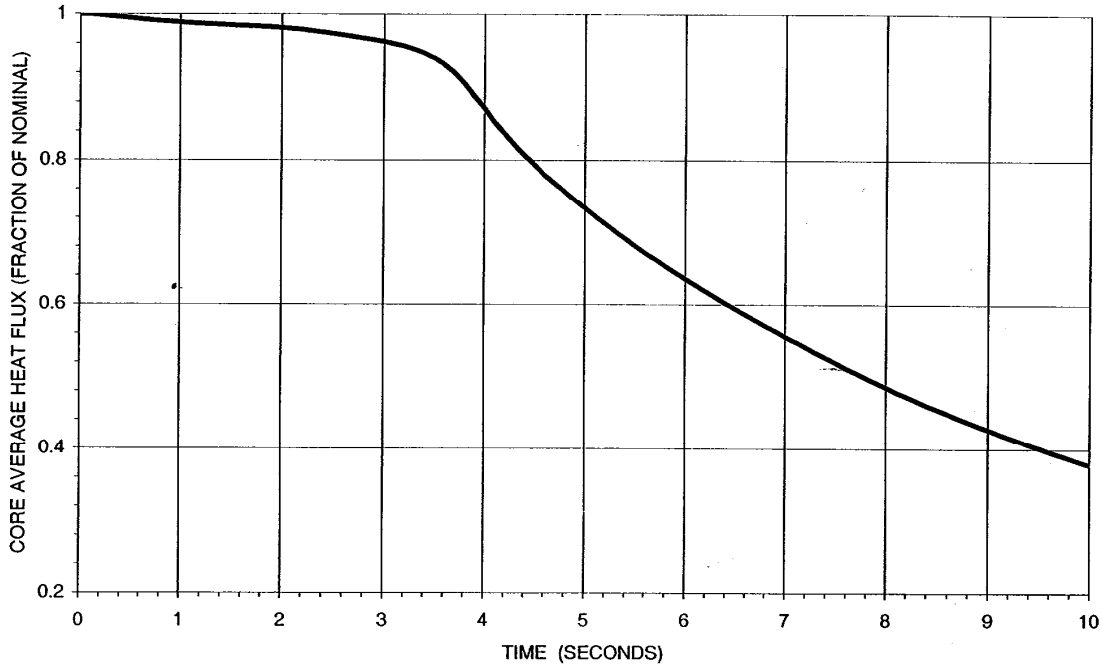


Figure 15-63. Complete Loss of Forced Reactor Coolant Flow

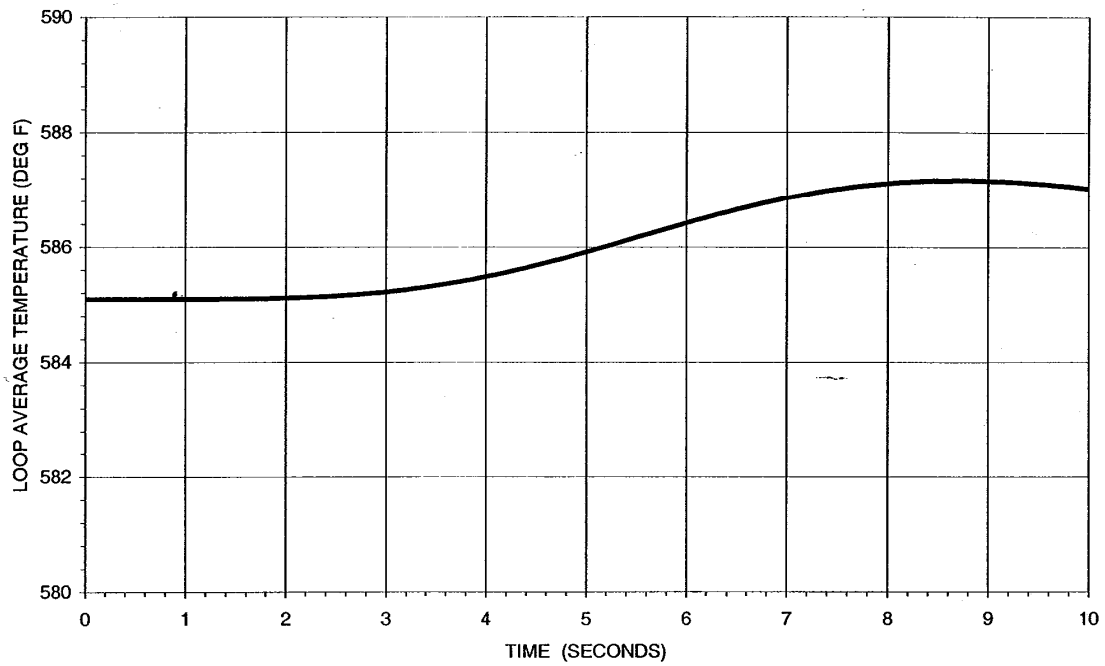


Figure 15-64. Complete Loss of Forced Reactor Coolant Flow

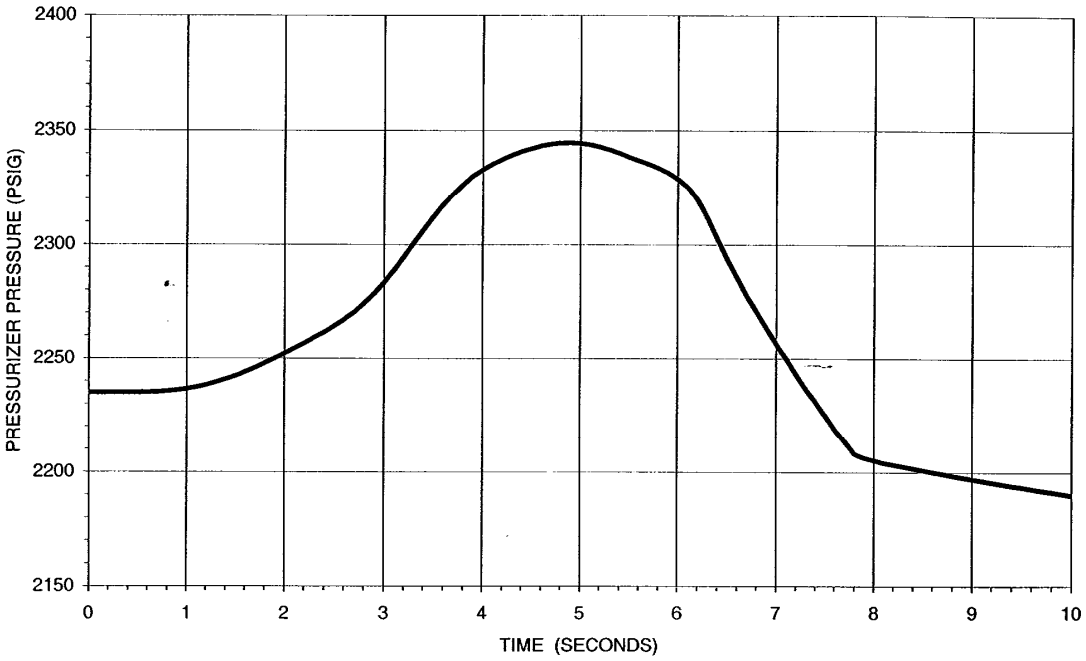


Figure 15-65. Deleted Per 2006 Update

Figure 15-66. Locked Rotor - Offsite Power Lost

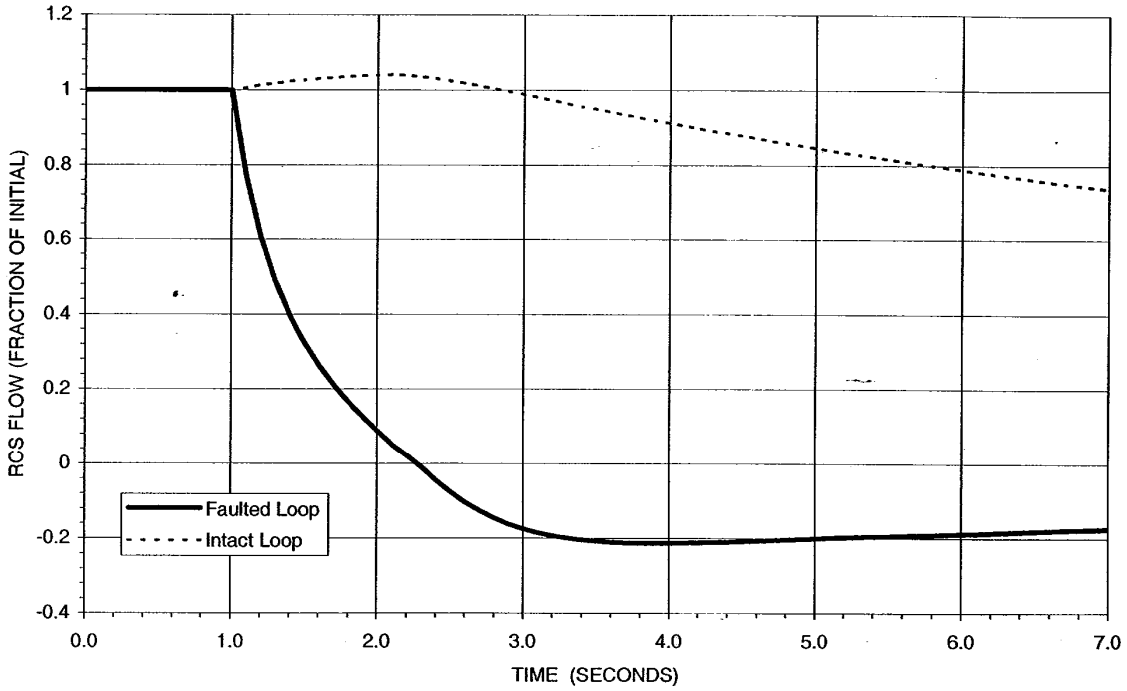


Figure 15-67. Bank Withdrawal at HZP

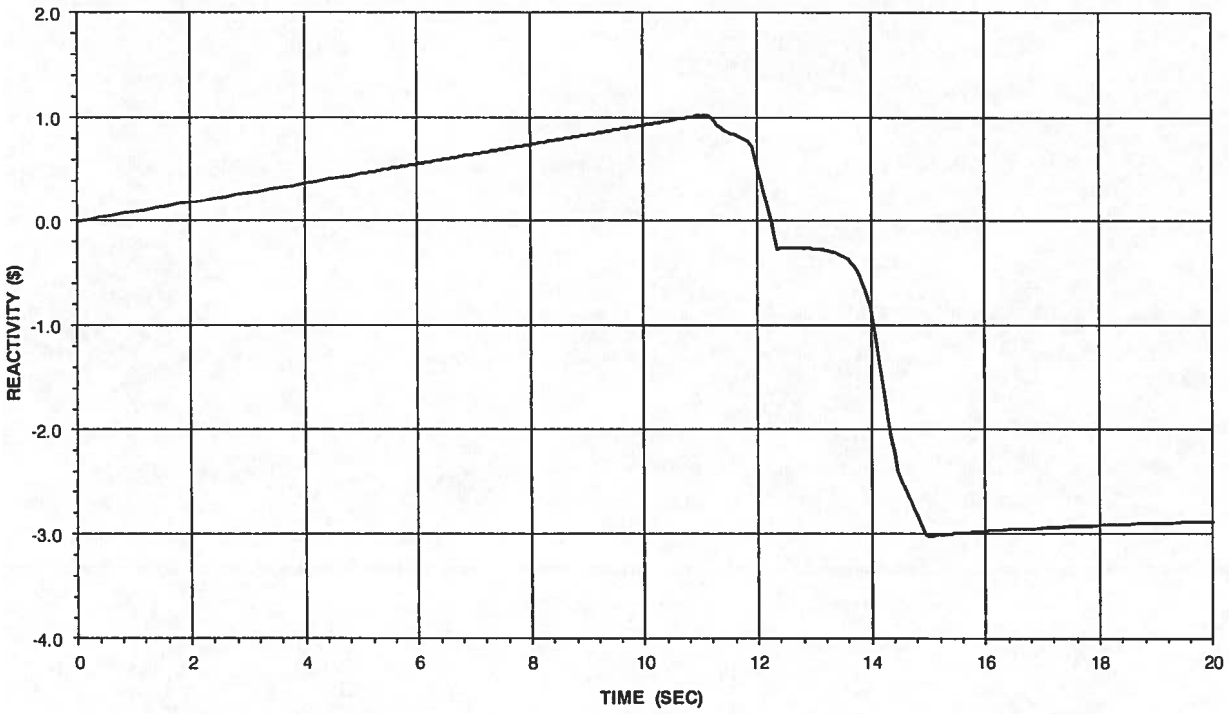


Figure 15-68. Bank Withdrawal at HZP

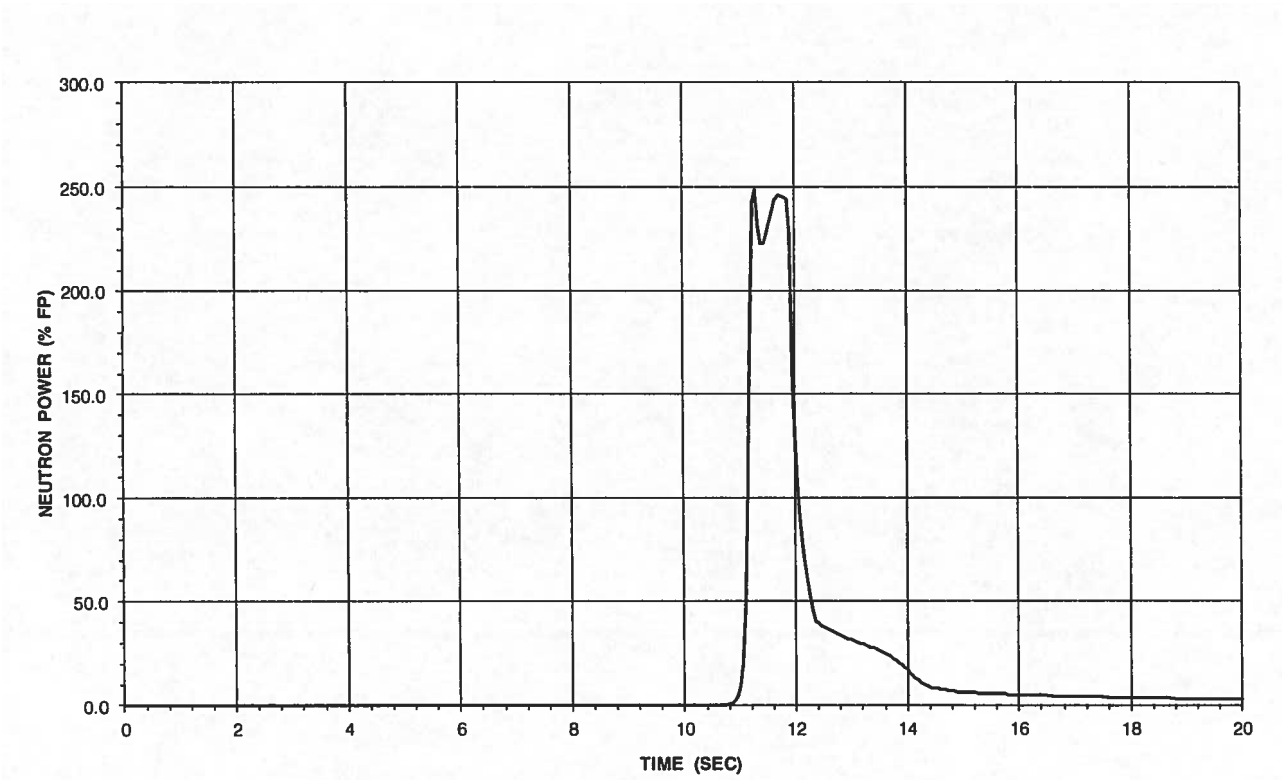


Figure 15-69. Bank Withdrawal at HZP

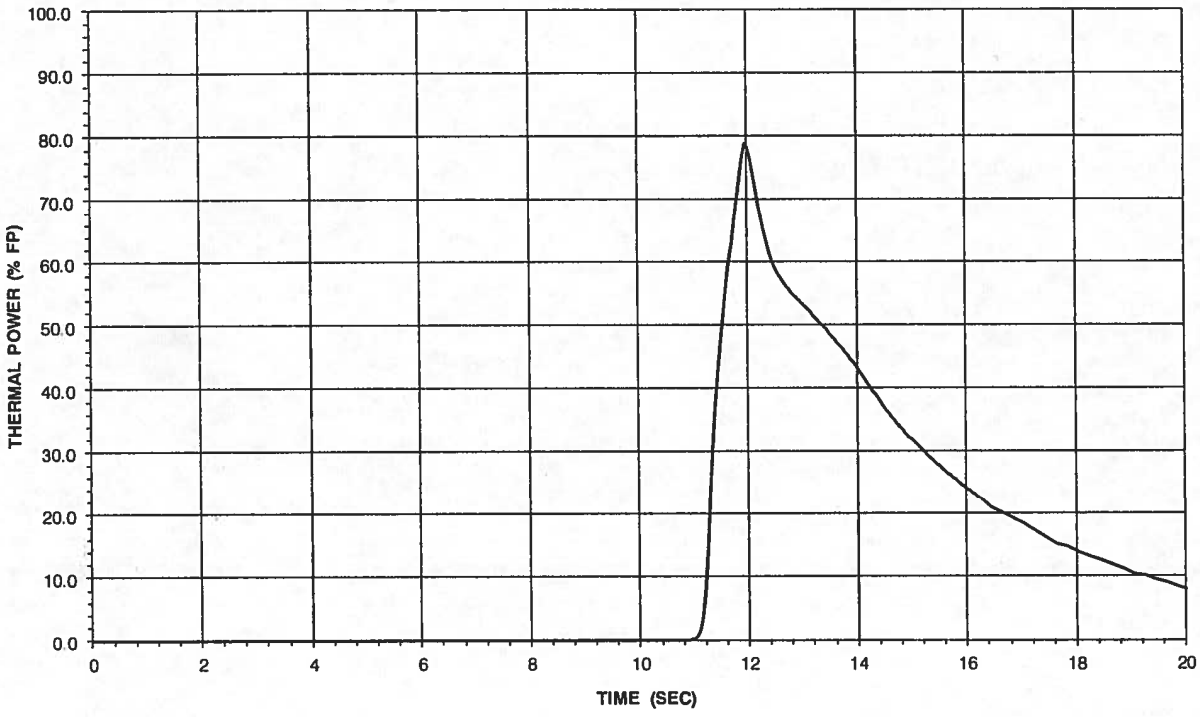


Figure 15-70. Bank Withdrawal at HZP

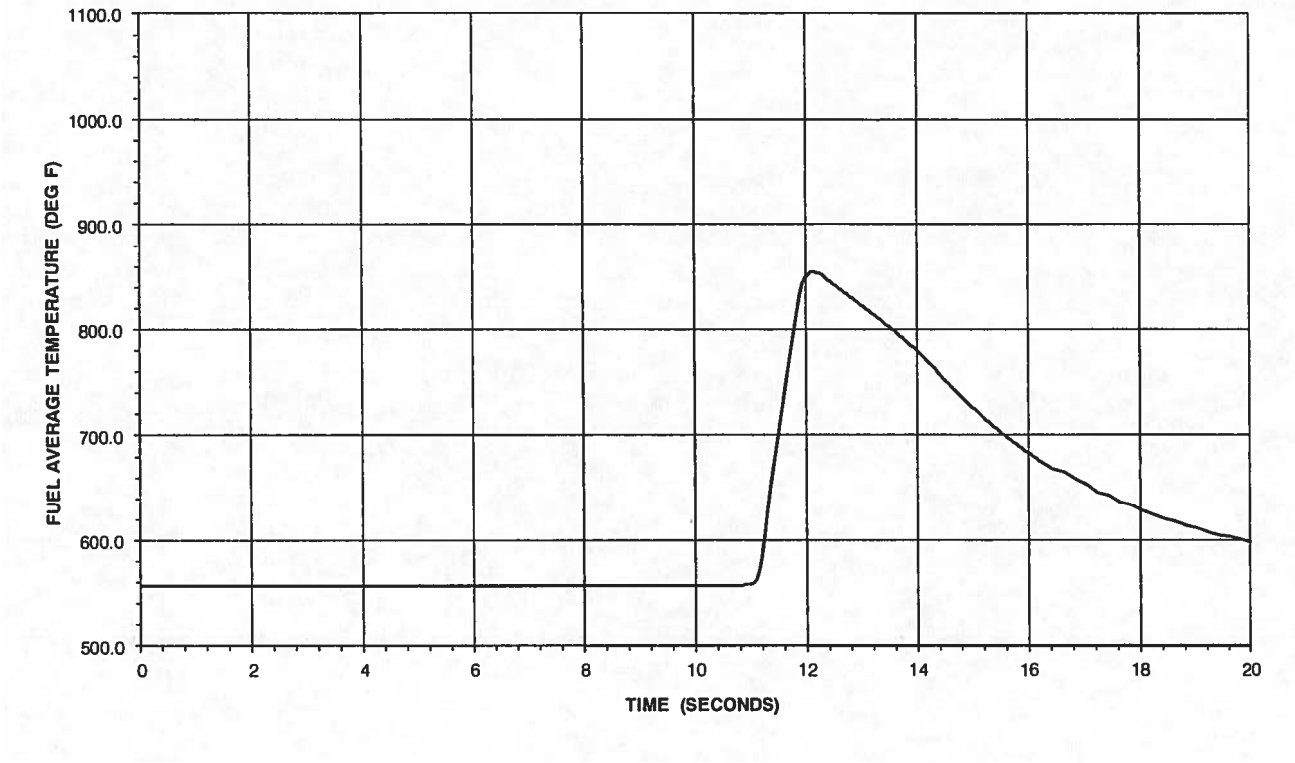


Figure 15-71. Bank Withdrawal at HZP

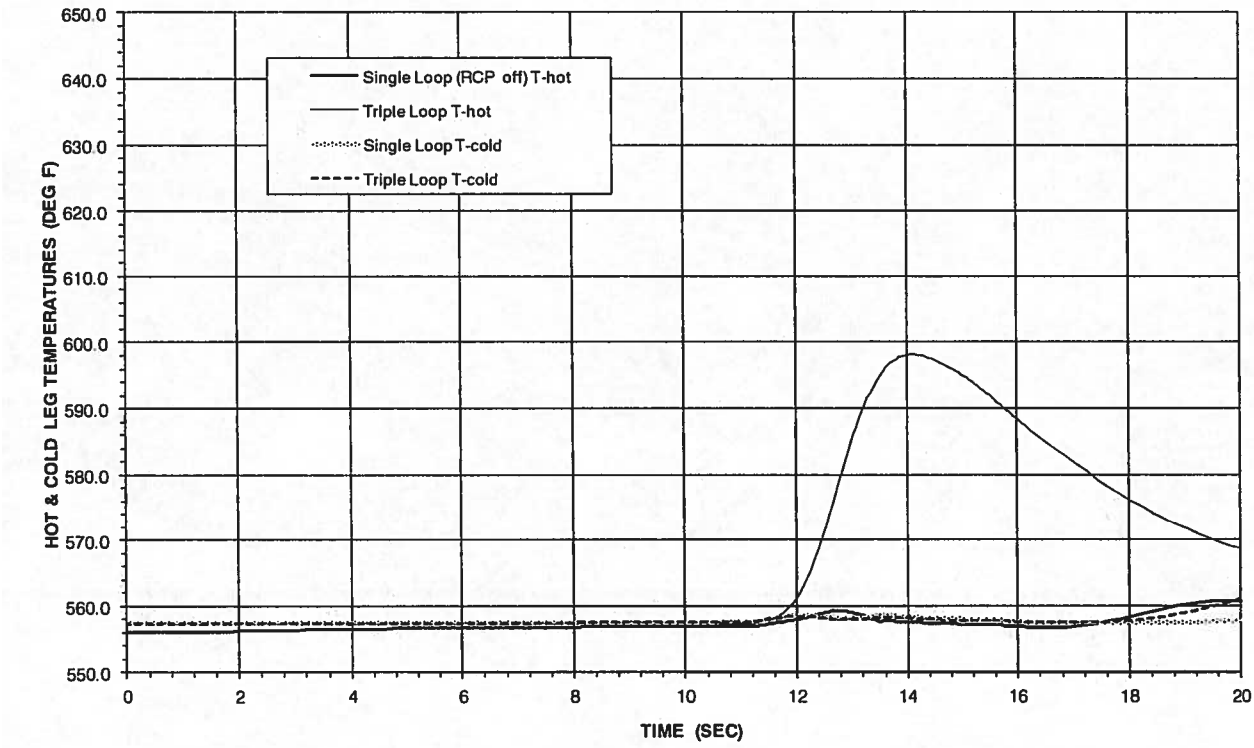


Figure 15-72. Bank Withdrawal at HZP

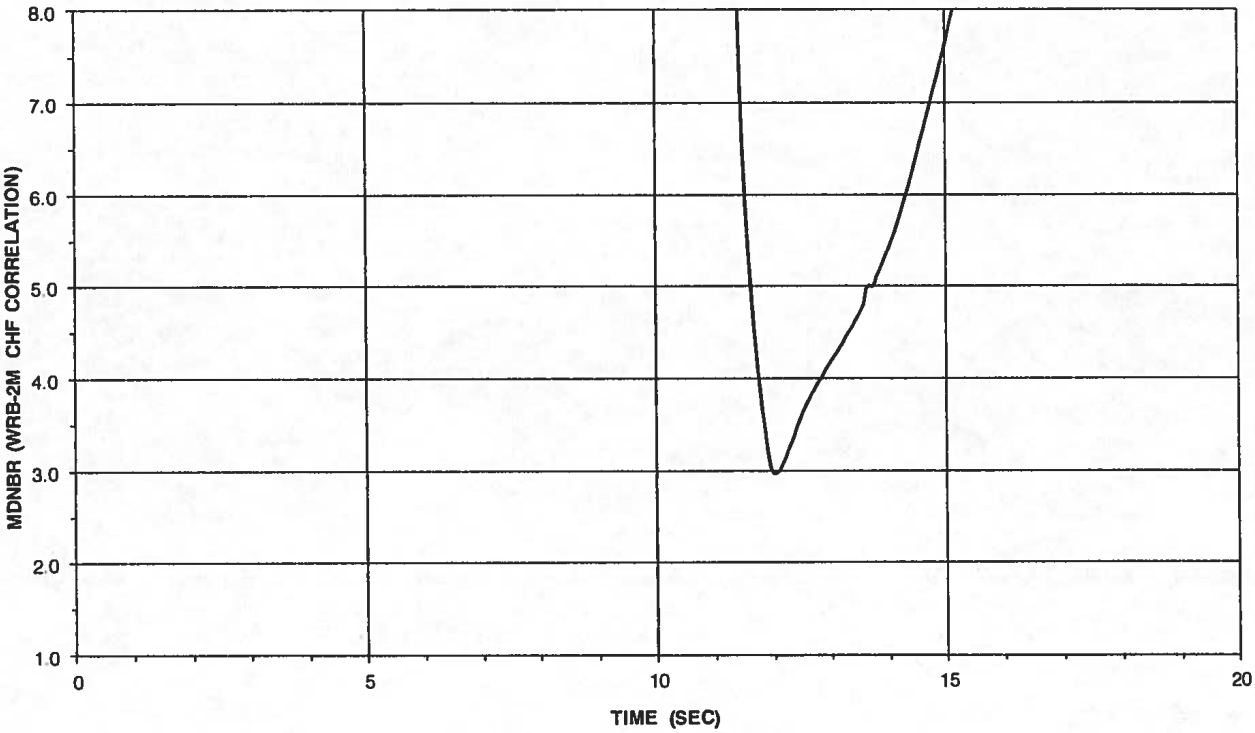


Figure 15-73. Uncontrolled RCCA Bank Withdrawal from 10% Power

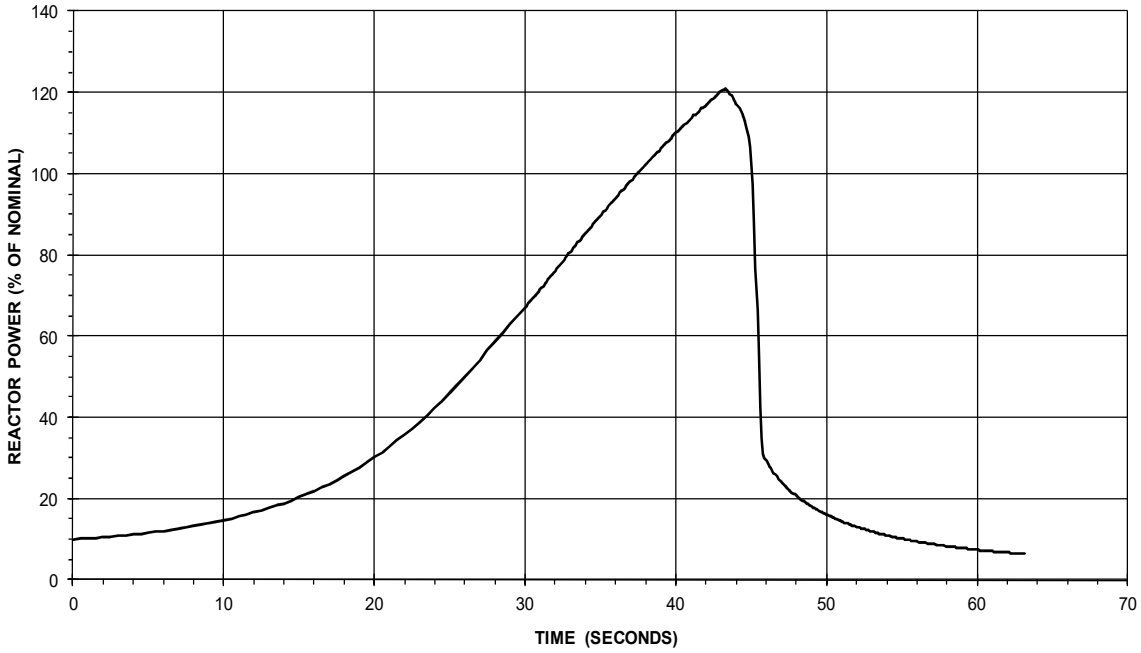


Figure 15-74. Uncontrolled RCCA Bank Withdrawal from 10% Power

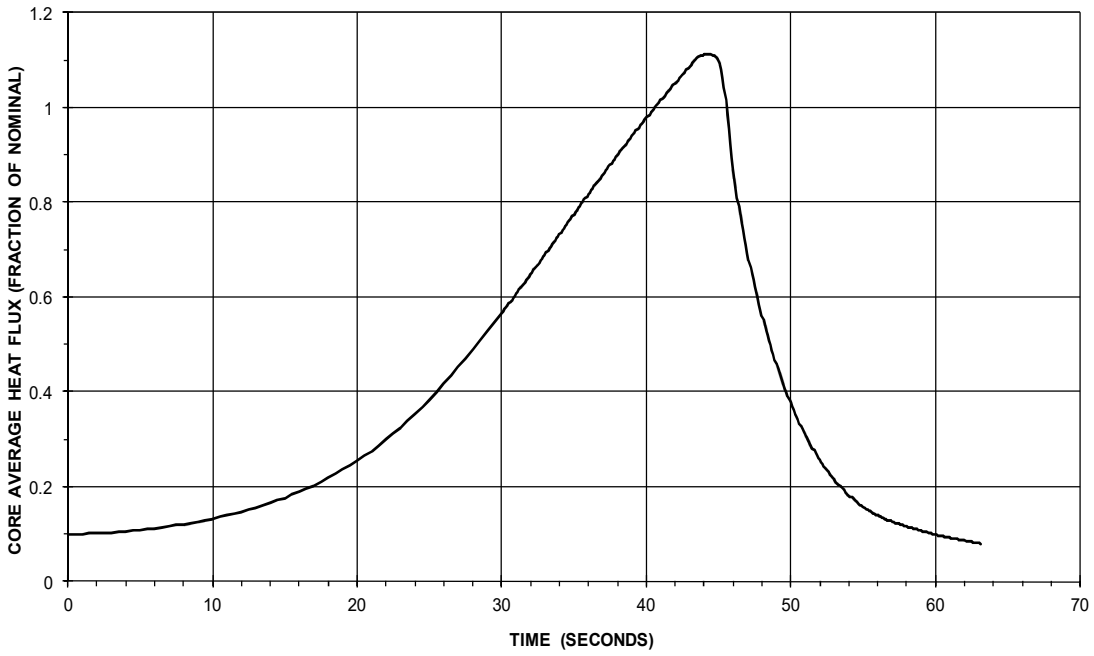


Figure 15-75. Uncontrolled RCCA Bank Withdrawal from 10% Power

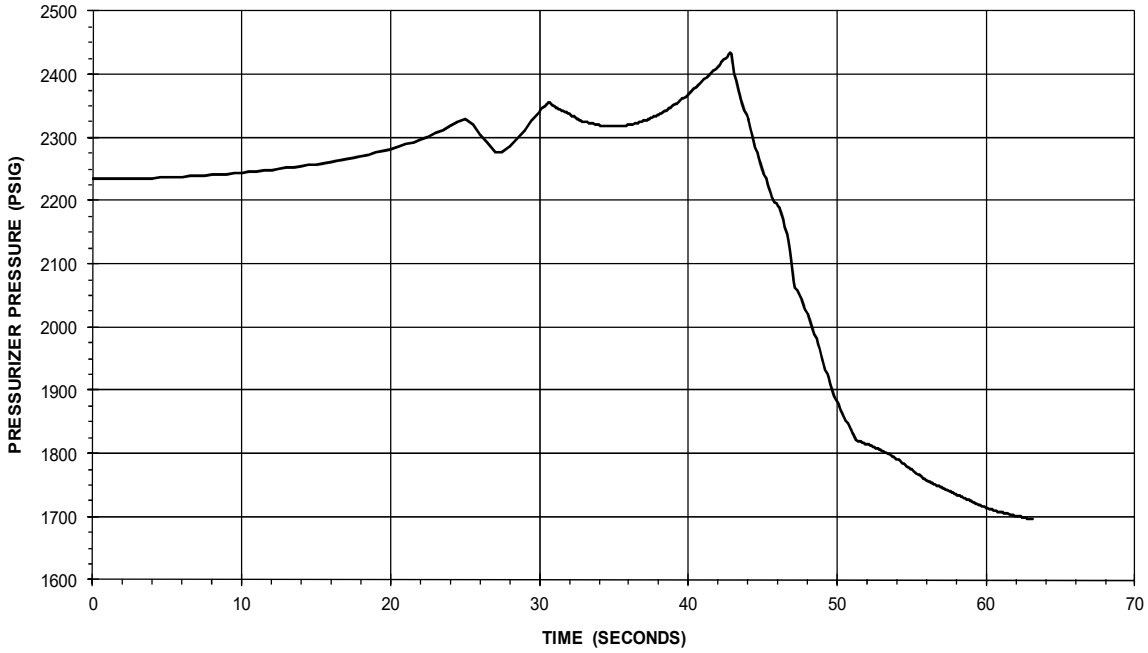


Figure 15-76. Uncontrolled RCCA Bank Withdrawal from 10% Power

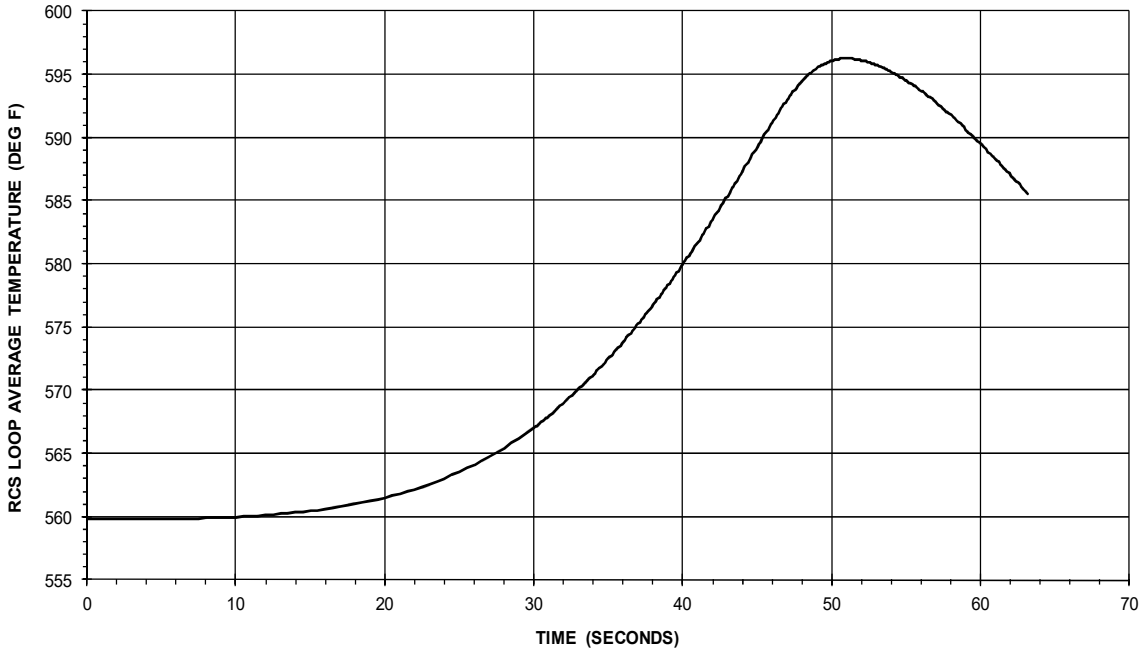


Figure 15-77. Deleted Per 2004 Update

Figure 15-78. Deleted Per 2004 Update

Figure 15-79. Deleted Per 2004 Update

Figure 15-80. Single RCCA Withdrawal

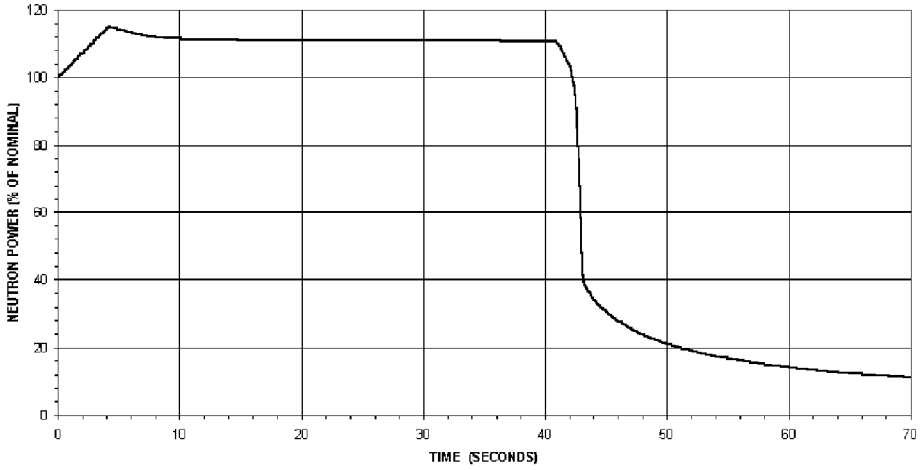


Figure 15-81. Deleted Per 1992 Update

Figure 15-82. Startup of a Reactor Coolant Pump at an Incorrect Temperature

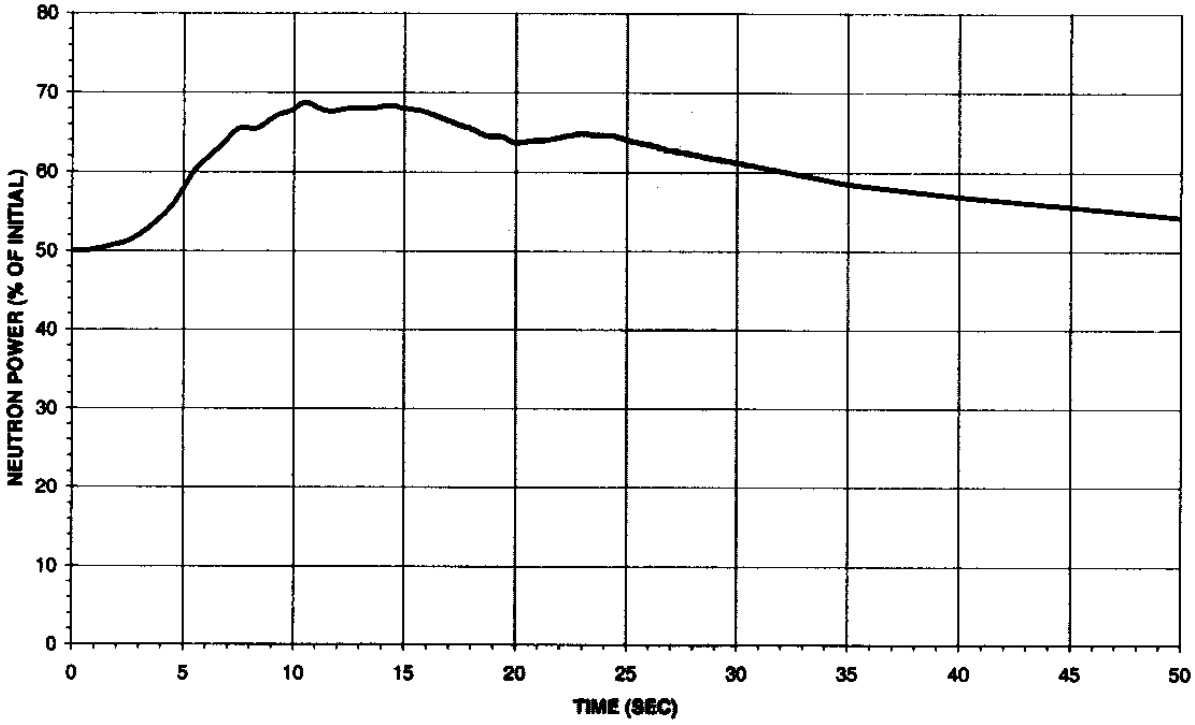


Figure 15-83. Startup of a Reactor Coolant Pump at an Incorrect Temperature

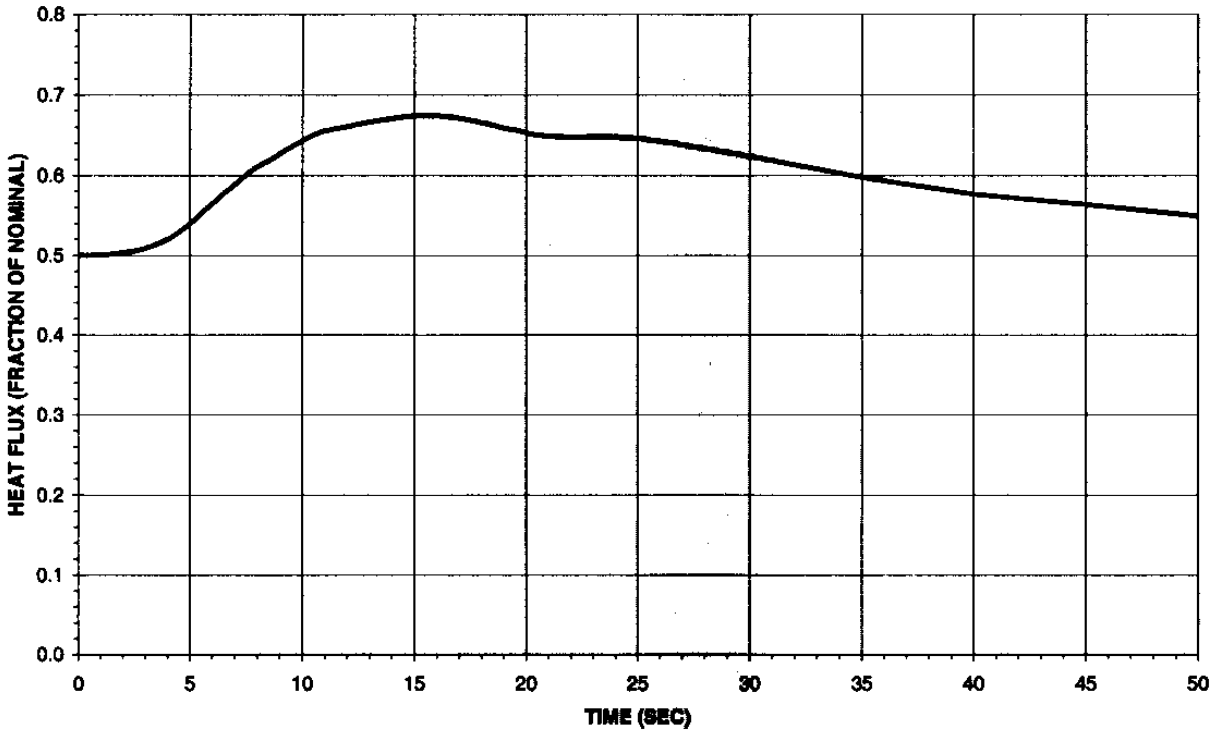


Figure 15-84. Startup of a Reactor Coolant Pump at an Incorrect Temperature

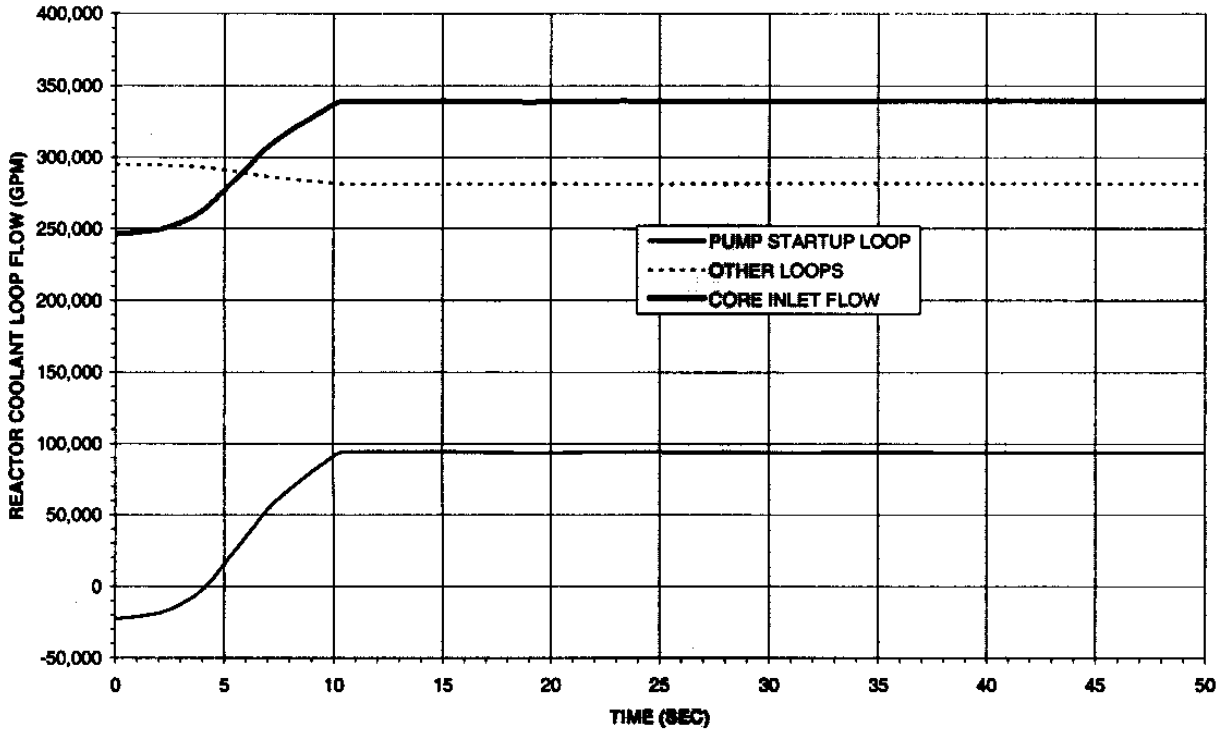


Figure 15-85. Startup of a Reactor Coolant Pump at an Incorrect Temperature

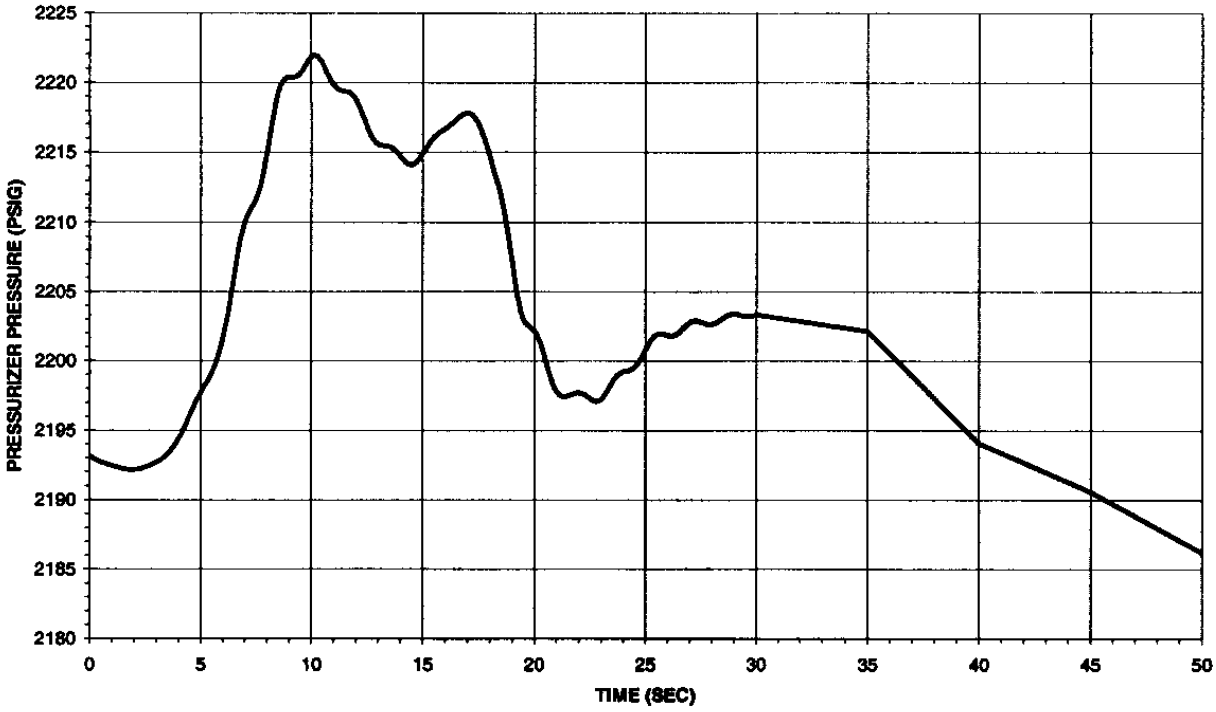


Figure 15-86. Startup of a Reactor Coolant Pump at an Incorrect Temperature

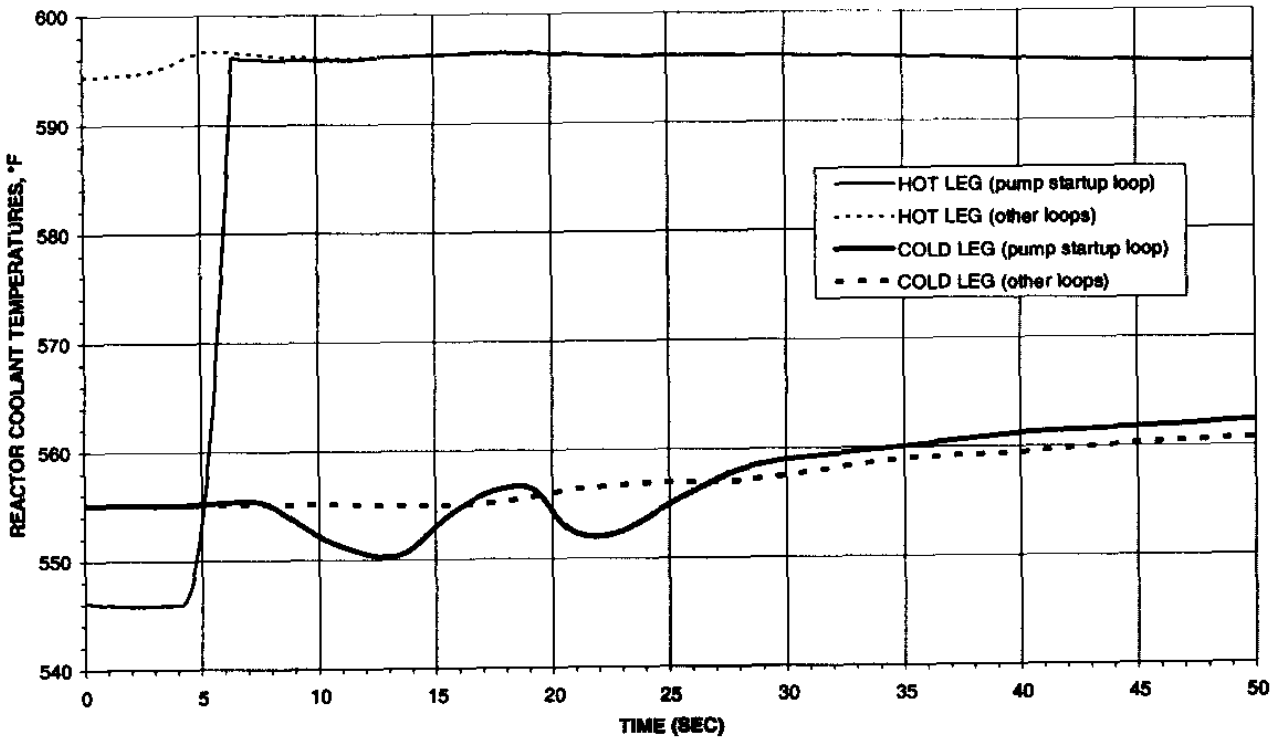


Figure 15-87. Interchange Between Region 1 and Region 3 Assembly

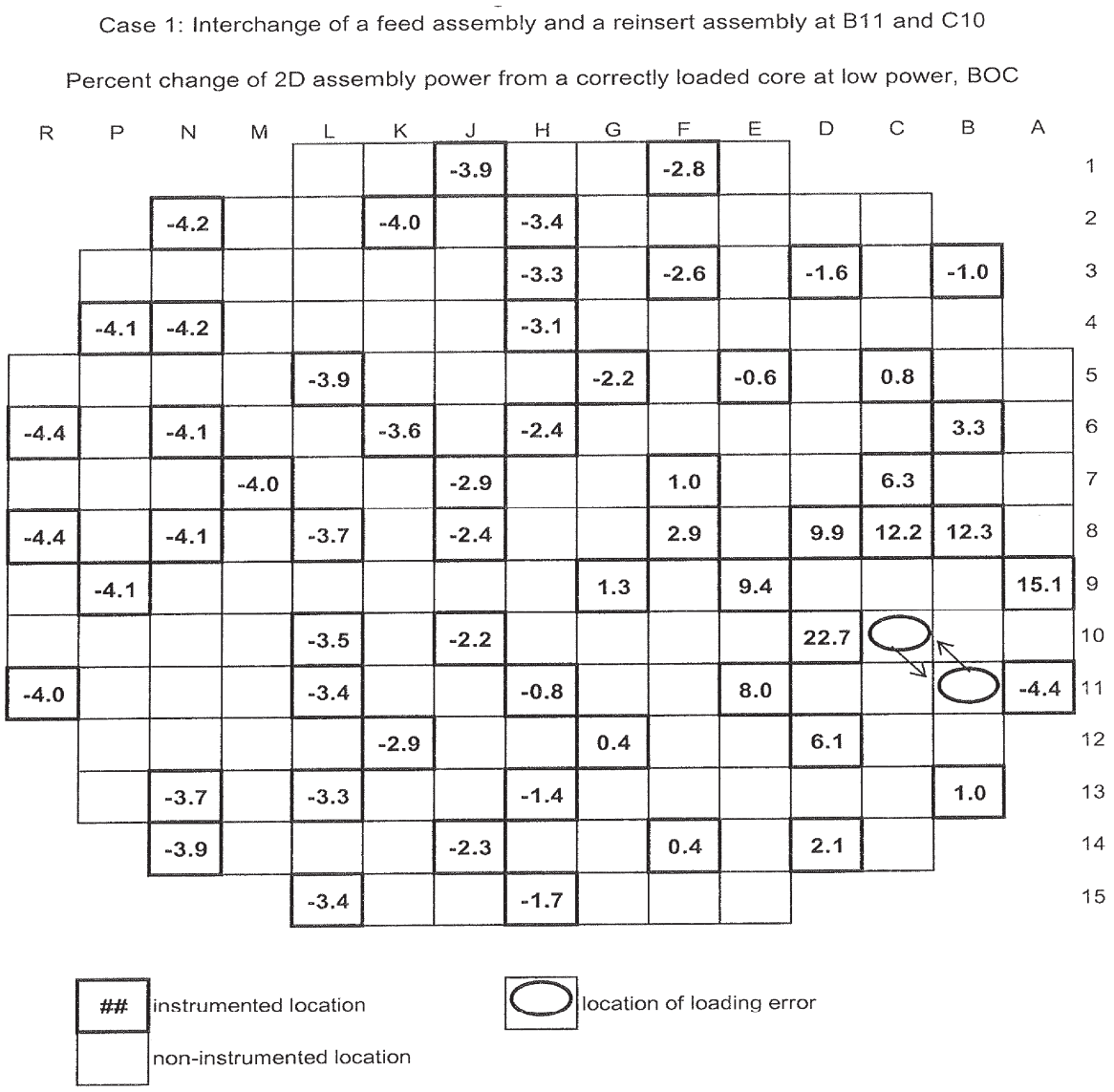


Figure 15-88. Interchange Between Region 1 and Region 2 Assembly, Burnable Poison Rods Being Retained by the Region 2 Assembly

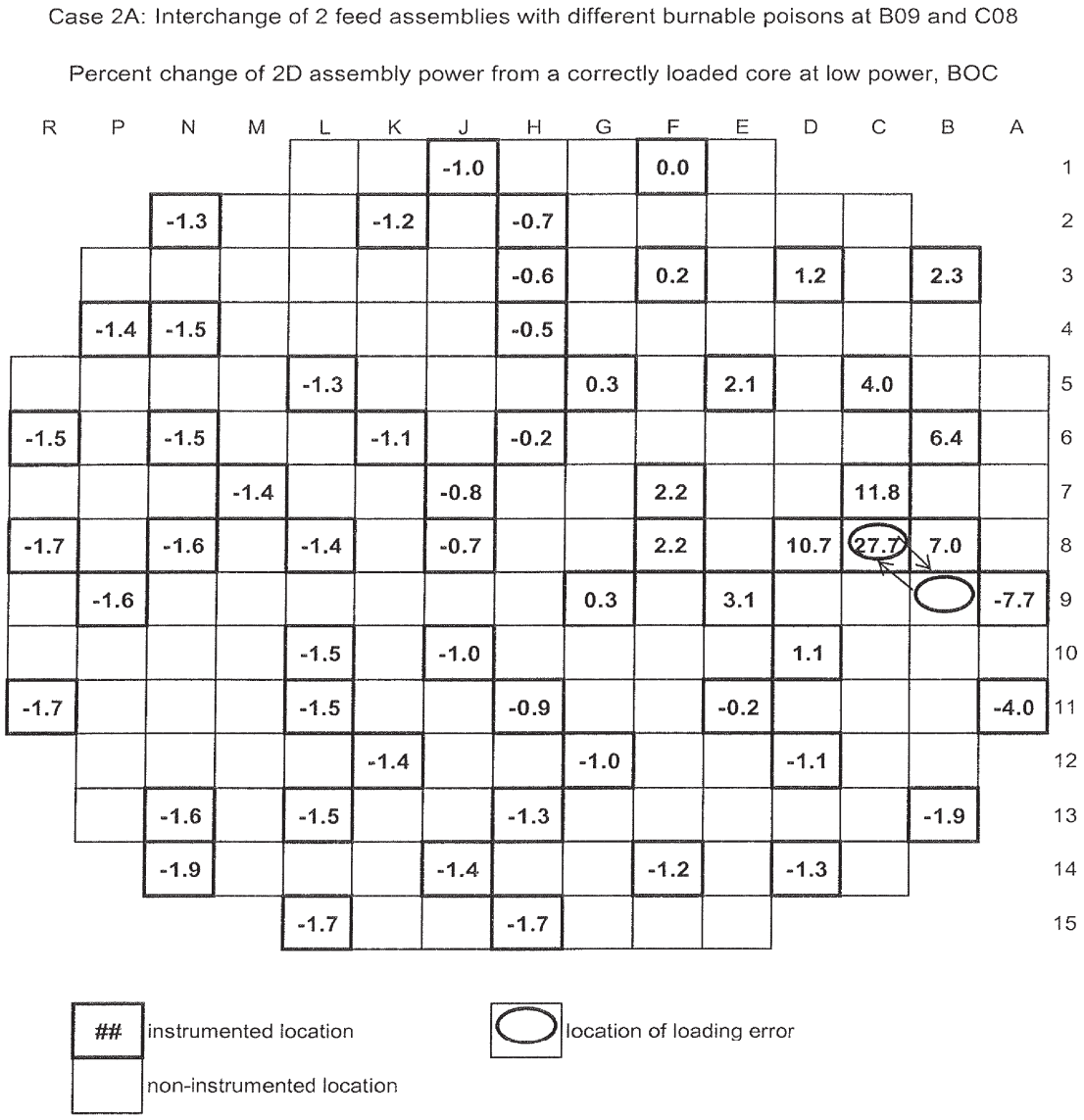


Figure 15-89. Interchange Between Region 1 and Region 2 Assembly, Burnable Poison Rod Being Transferred to the Region 1 Assembly

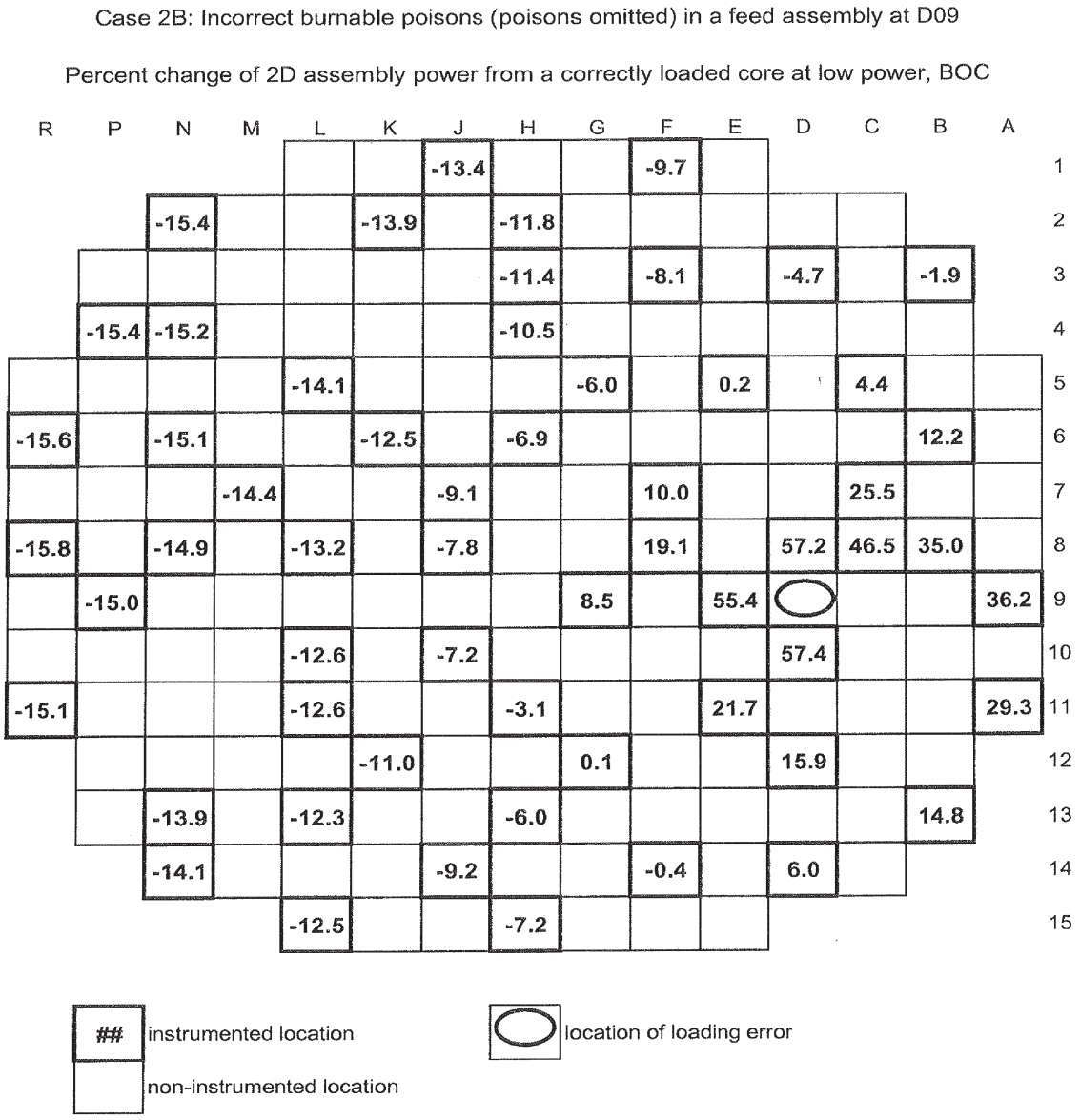


Figure 15-90. Enrichment Error: A Region 2 Assembly Loaded into the Core Central Position

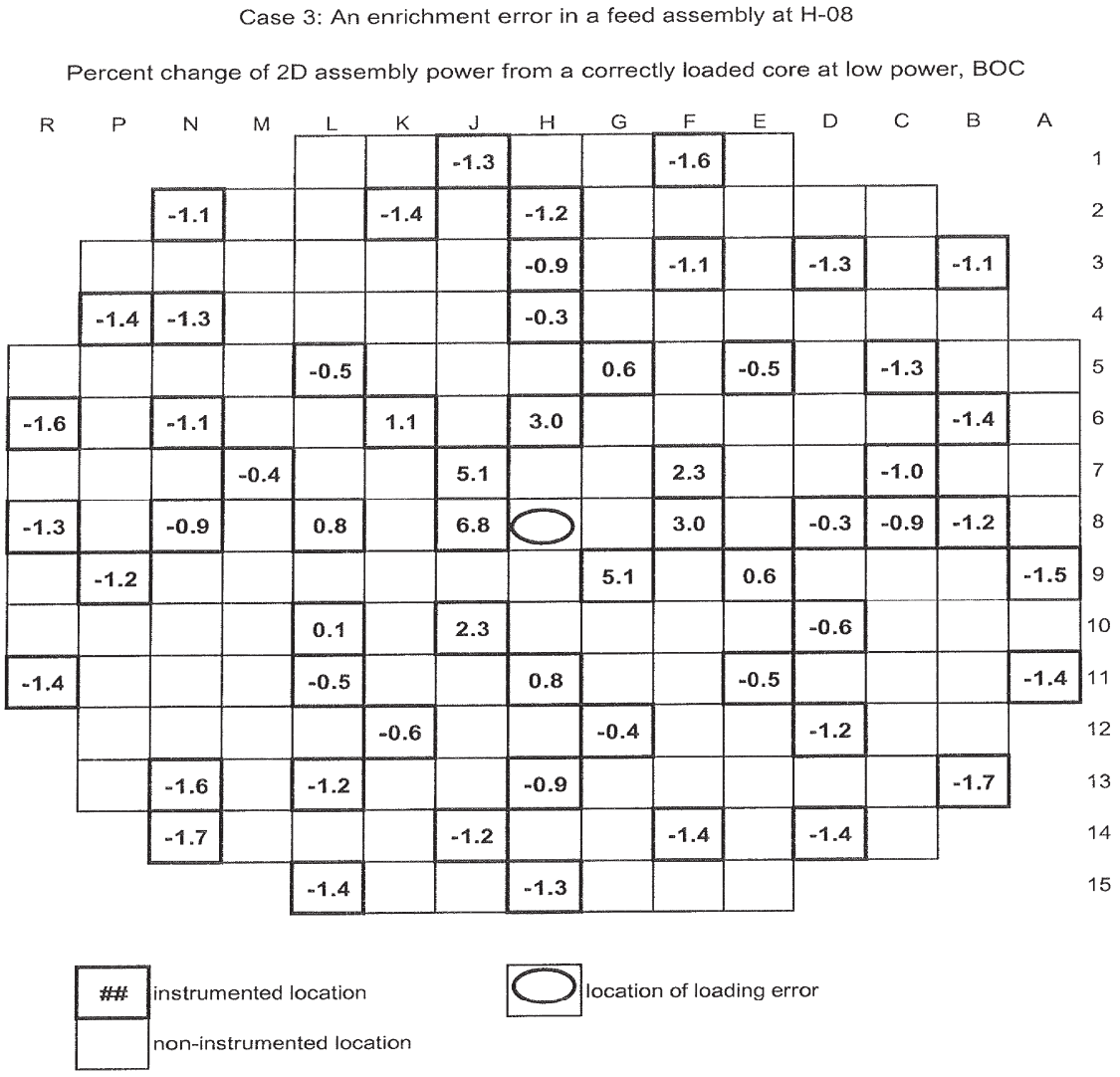


Figure 15-91. Loading A Region 2 Assembly into a Region 1 Position Near Core Periphery

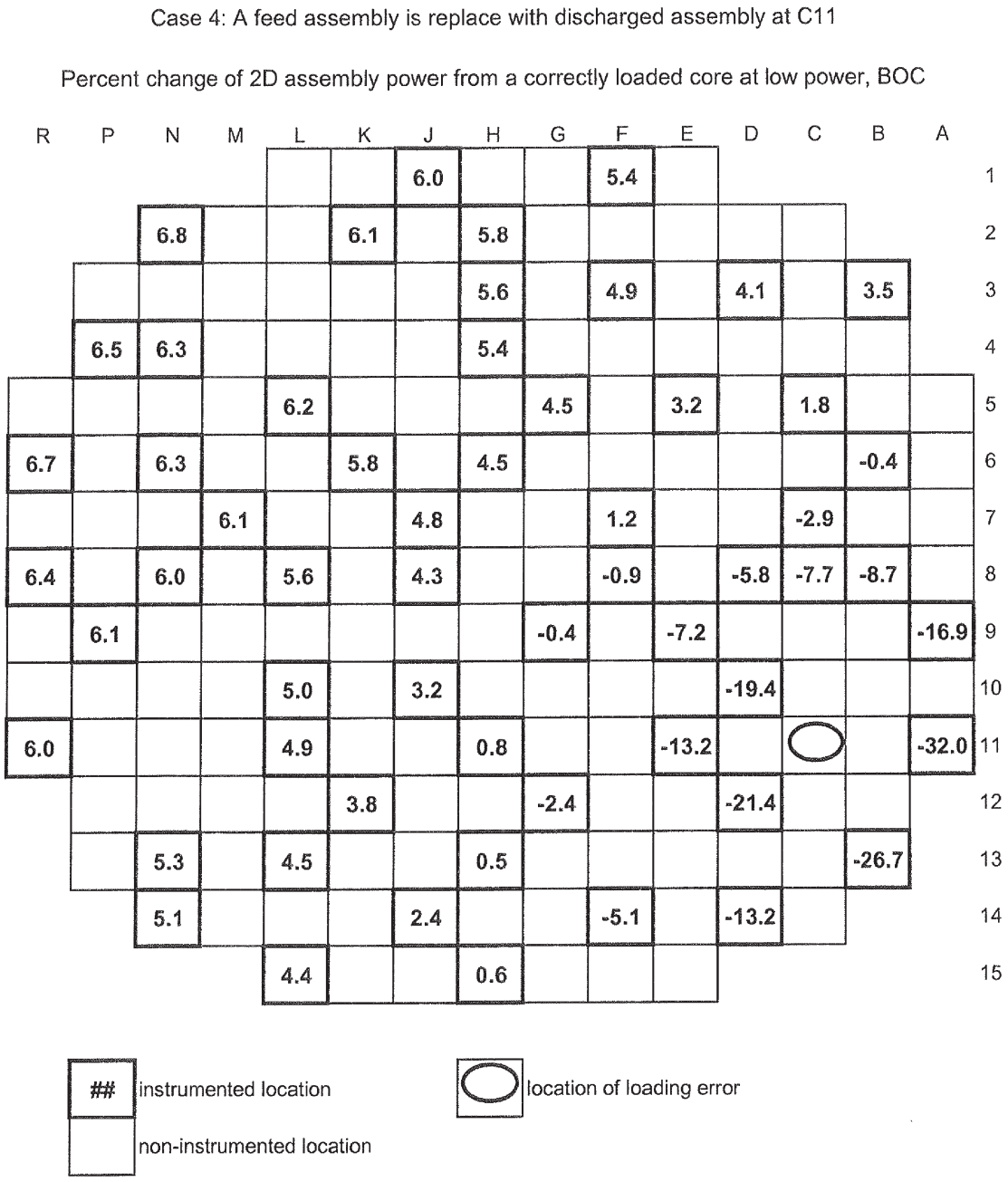


Figure 15-92. Single RCCA Withdrawal

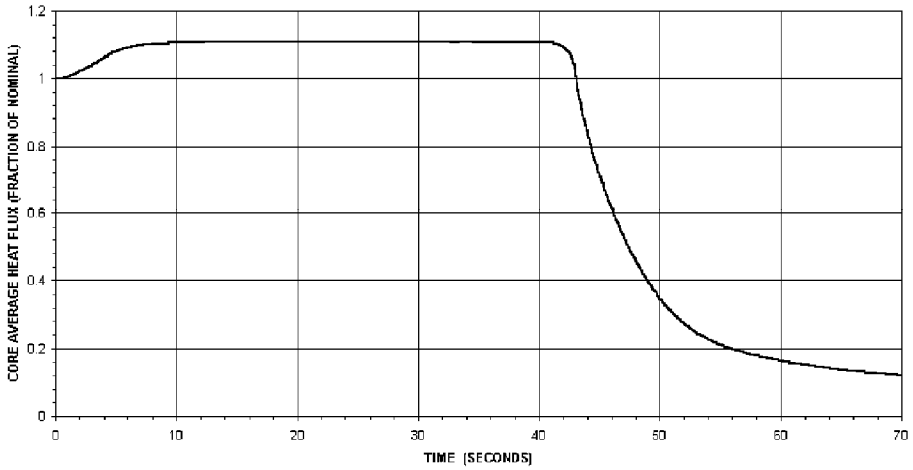


Figure 15-93. Single RCCA Withdrawal

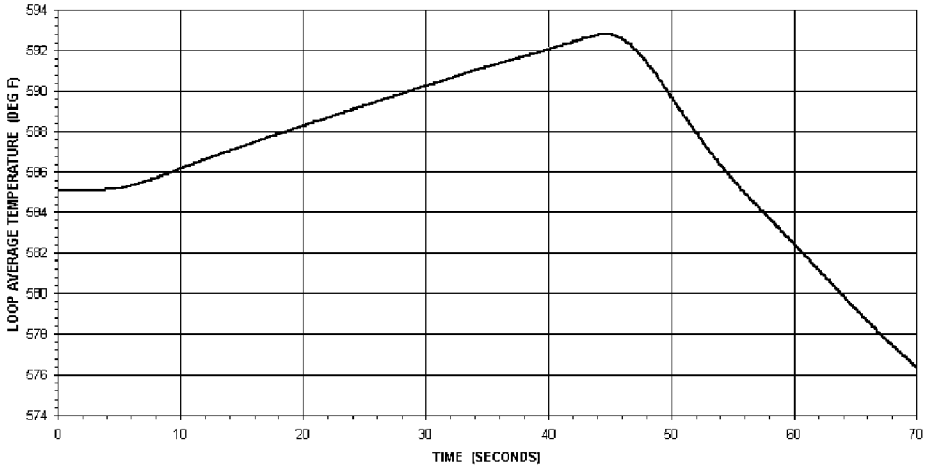


Figure 15-94. Single RCCA Withdrawal

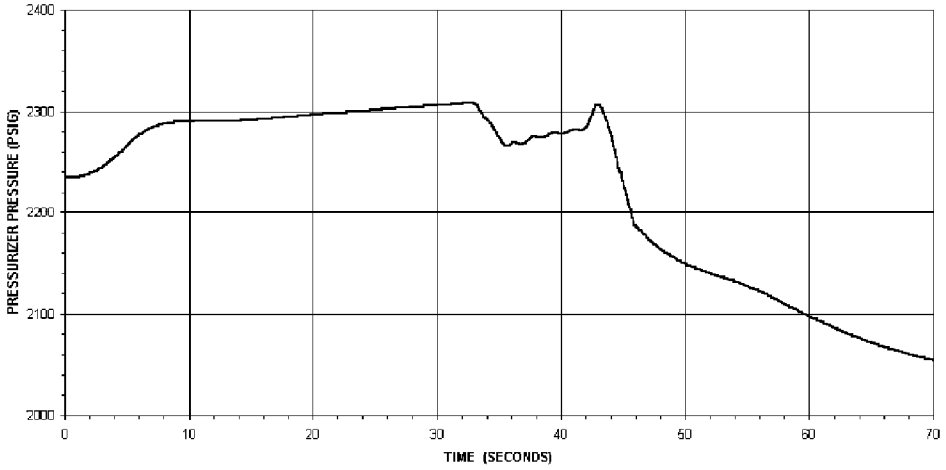


Figure 15-95. Dropped Rod Accident

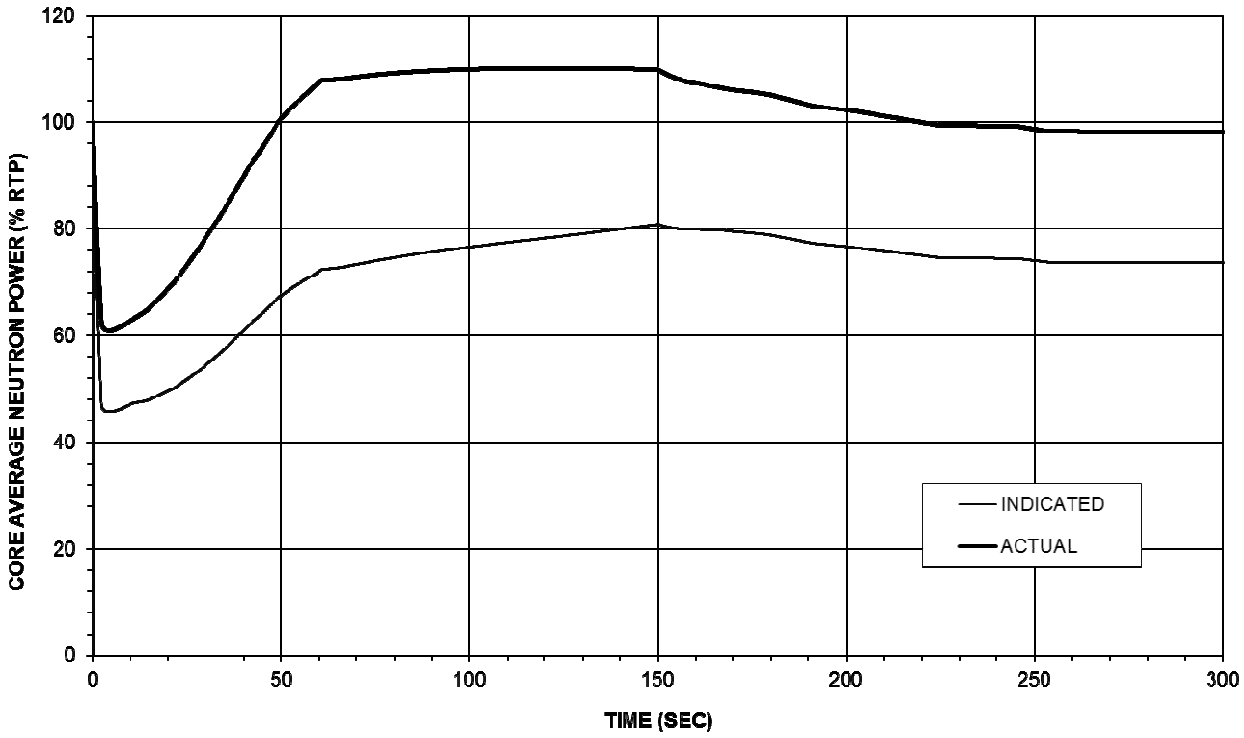


Figure 15-96. Deleted Per 1992 Update

Figure 15-97. Deleted Per 1995 Update

Figure 15-98. Deleted Per 1995 Update

Figure 15.99. Deleted Per 1995 Update

Figure 15-100. Inadvertent Opening of a Pressurizer Safety Valve

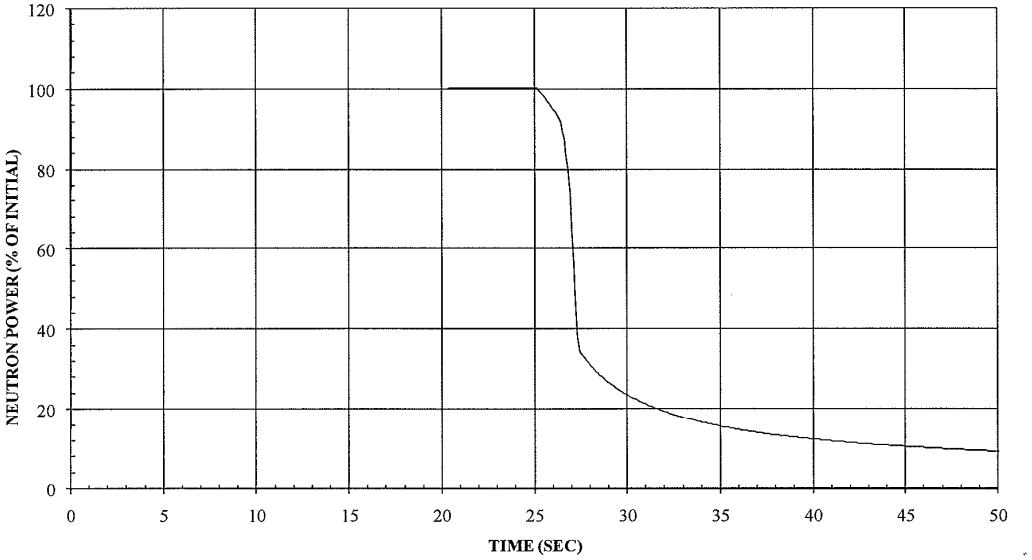
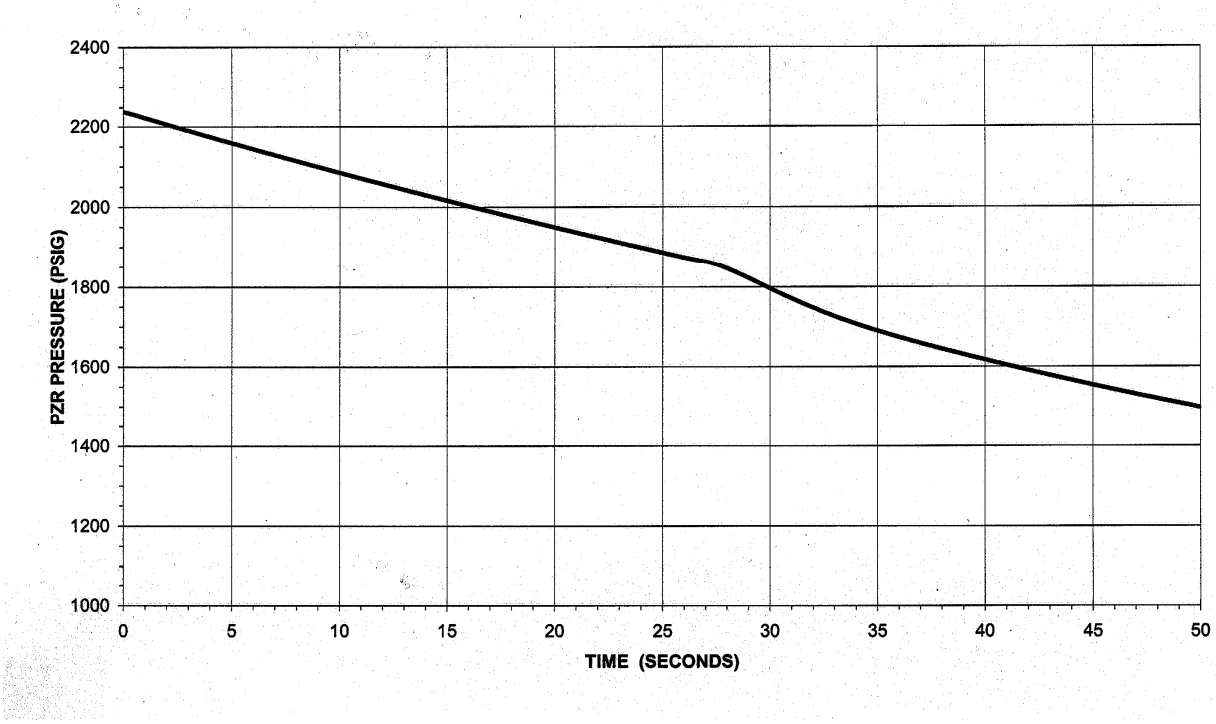


Figure 15-101. Inadvertent Opening of a Pressurizer Safety Valve



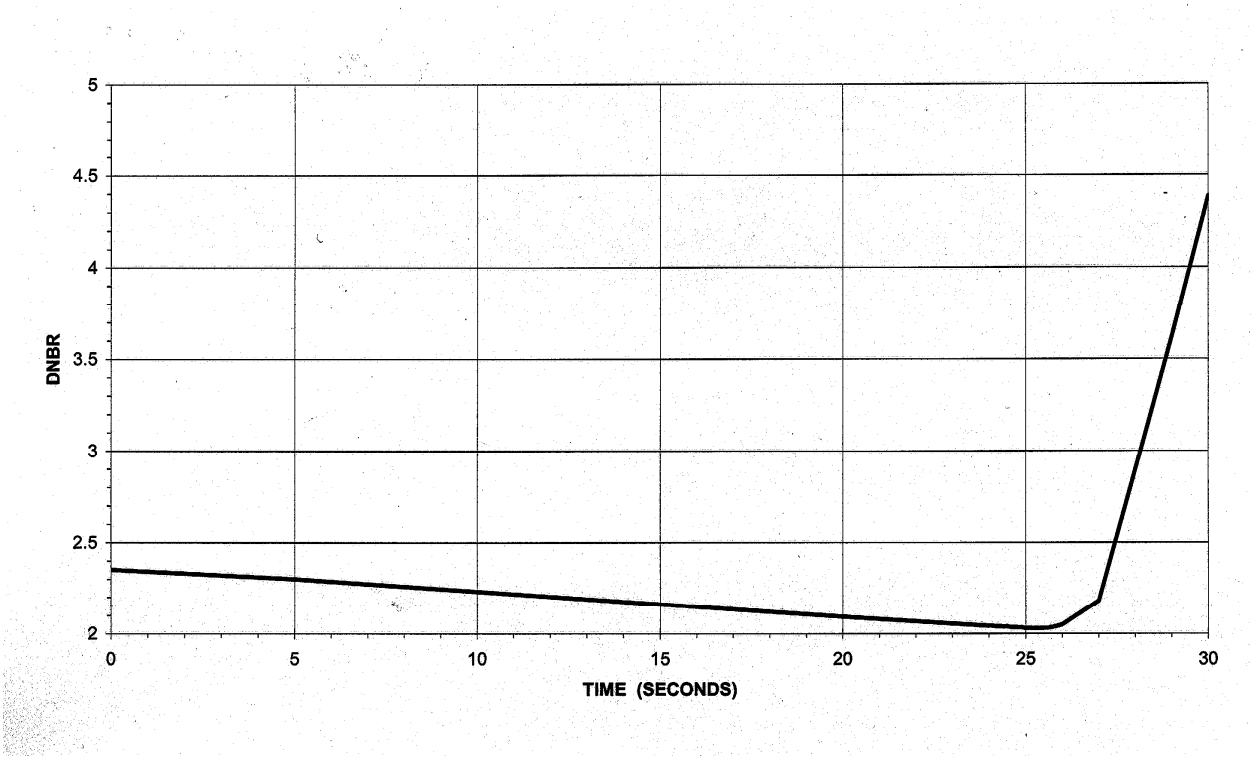

DNBR
5
4.5
4
3.5
3
2.5
2
0
5
10
15
20
25
30
TIME (SECONDS)

Figure 15-102. Deleted Per 1997 Update

Figure 15-103. Steam Generator Tube Rupture

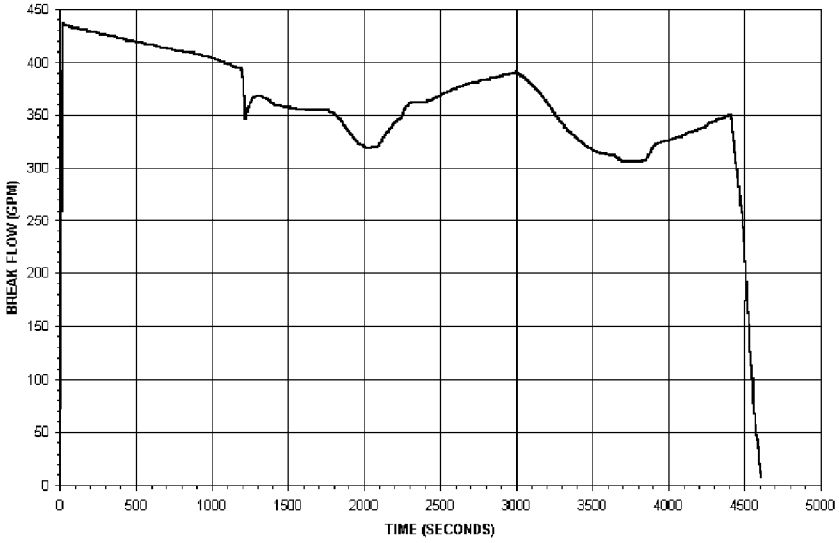


Figure 15-104. Steam Generator Tube Rupture

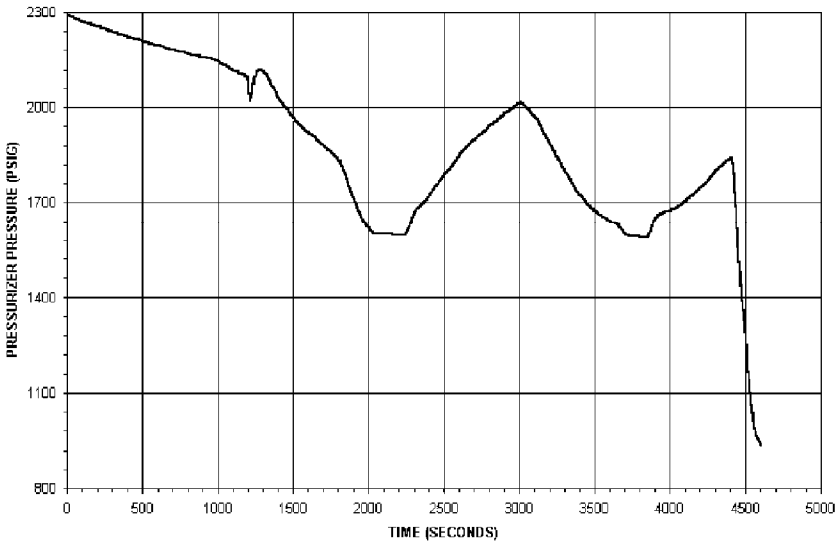


Figure 15-105. Steam Generator Tube Rupture

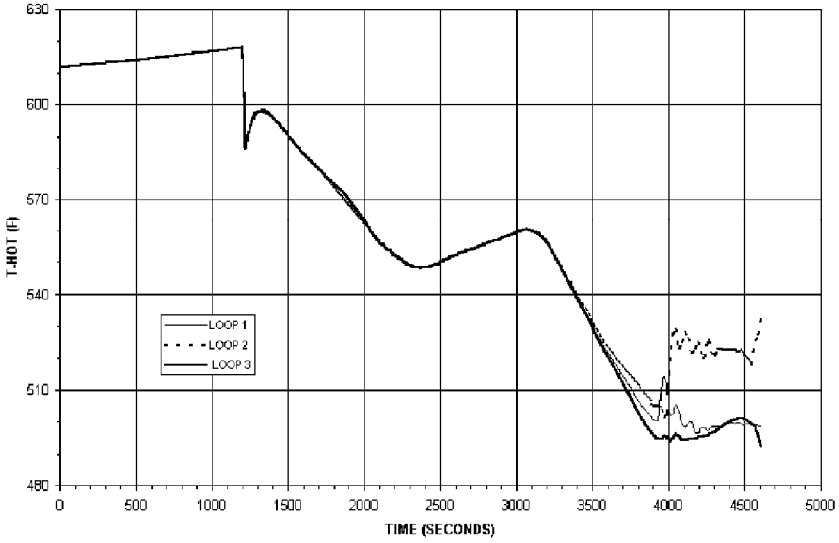


Figure 15-106. Steam Generator Tube Rupture

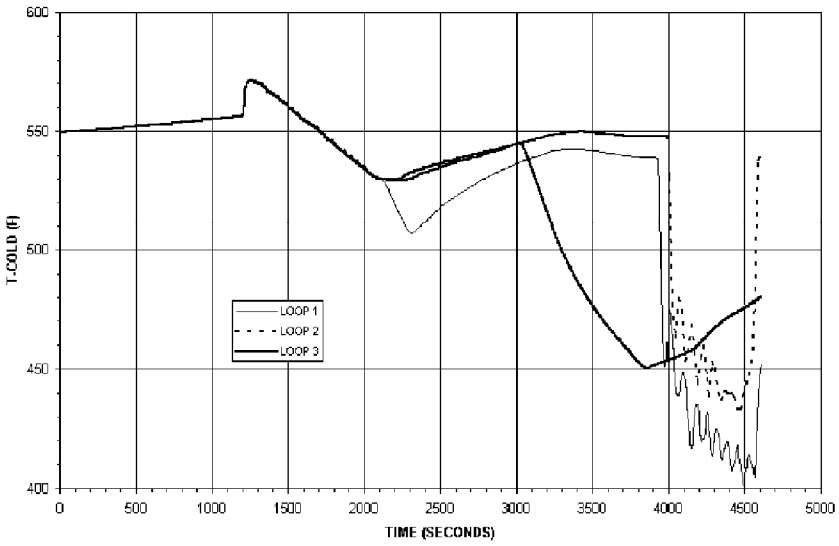


Figure 15-107. Steam Generator Tube Rupture

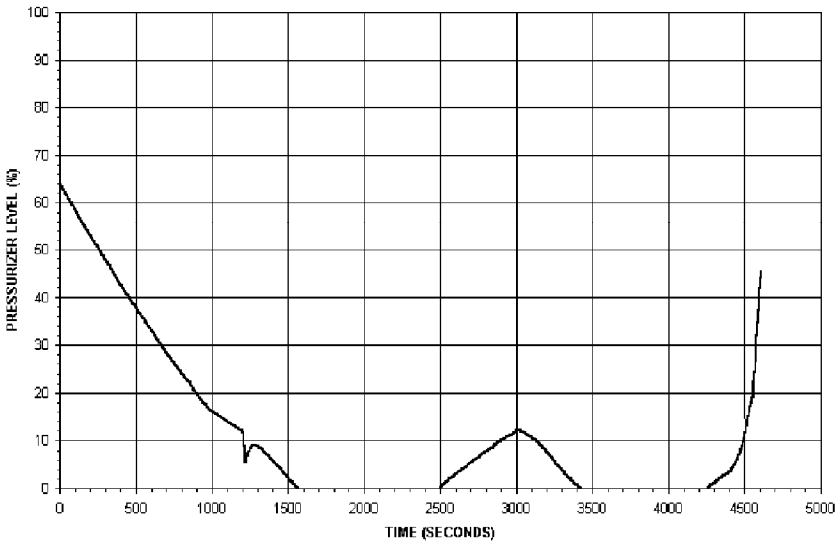


Figure 15-108. Steam Generator Tube Rupture

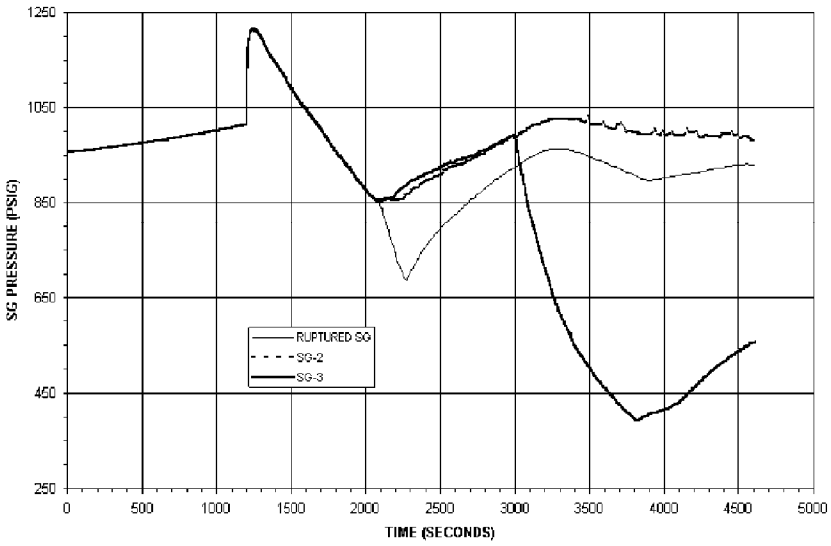


Figure 15-109. Deleted Per 2001 Update

Figure 15-110. Deleted Per 1995 Update

Figure 15-111. Deleted Per 2001 Update

Figure 15-112. Deleted Per 1995 Update

Figure 15-113. Deleted Per 1995 Update

Figure 15-114. Deleted Per 1995 Update

Figure 15-115. Deleted Per 1995 Update

Figure 15-116. Deleted Per 1995 Update

Figure 15-117. Deleted Per 1995 Update

Figure 15-118. Deleted Per 1994 Update

Figure 15-119. Deleted Per 1994 Update

Figure 15-120. Deleted Per 1994 Update

Figure 15-121. Deleted Per 1994 Update

Figure 15-122. Deleted Per 1994 Update

Figure 15-123. Deleted Per 1994 Update

Figure 15-124. Deleted Per 1994 Update

Figure 15-125. Deleted Per 1994 Update

Figure 15-126. Deleted Per 1994 Update

Figure 15-127. Deleted Per 1994 Update

Figure 15-128. Deleted Per 1994 Update

Figure 15-129. Deleted Per 1994 Update

Figure 15-130. Deleted Per 1994 Update

Figure 15-131. Deleted Per 1994 Update

Figure 15-132. Deleted Per 1994 Update

Figure 15-133. Deleted Per 1994 Update

Figure 15-134. Deleted Per 1994 Update

Figure 15-135. Deleted Per 1994 Update

Figure 15-136. Deleted Per 1994 Update

Figure 15-137. Deleted Per 1994 Update

Figure 15-138. Deleted Per 1994 Update

Figure 15-139. Deleted Per 1994 Update

Figure 15-140. Deleted Per 1994 Update

Figure 15-141. Deleted Per 1994 Update

Figure 15-142. Deleted Per 1994 Update

Figure 15-143. Deleted Per 1994 Update

Figure 15-144. Deleted Per 1994 Update

Figure 15-145. Deleted Per 1994 Update

Figure 15-146. Deleted Per 1994 Update

Figure 15-147. Deleted Per 1994 Update

Figure 15-148. Deleted Per 1994 Update

Figure 15-149. Deleted Per 1994 Update

Figure 15-150. Deleted Per 1994 Update

Figure 15-151. Deleted Per 1994 Update

Figure 15-152. Deleted Per 1994 Update

Figure 15-153. Deleted Per 1994 Update

Figure 15-154. Deleted Per 2000 Update

Figure 15-155. Deleted Per 1995 Update

Figure 15-156. Deleted Per 2000 Update

Figure 15-157. Deleted Per 2000 Update

Figure 15-158. Deleted Per 2000 Update

Figure 15-159. Deleted Per 2000 Update

Figure 15-160. Deleted Per 2000 Update

Figure 15-161. Deleted Per 2000 Update

Figure 15-162. Deleted Per 2000 Update

Figure 15-163. Deleted Per 2000 Update

Figure 15-164. Deleted Per 2000 Update

Figure 15-165. Deleted Per 2000 Update

Figure 15-166. Deleted Per 2000 Update

Figure 15-167. Deleted Per 2000 Update

Figure 15-168. Deleted Per 2000 Update

Figure 15-169. Deleted Per 2001 Update

Figure 15-170. Deleted Per 2000 Update

Figure 15-171. Deleted Per 2000 Update

Figure 15-172. Deleted Per 2000 Update

Figure 15-173. Deleted Per 2000 Update

Figure 15-174. Deleted Per 2000 Update

Figure 15-175. Deleted Per 2000 Update

Figure 15-176. Deleted Per 2000 Update

Figure 15-177. Deleted Per 2000 Update

Figure 15-178. Deleted Per 2000 Update

Figure 15-179. Deleted Per 2000 Update

Figure 15-180. Deleted Per 2000 Update

Figure 15-181. Deleted Per 2000 Update

Figure 15-182. Deleted Per 1995 Update

Figure 15-183. Deleted Per 1995 Update

Figure 15-184. Deleted Per 1995 Update

Figure 15-185. Deleted Per 1995 Update

Figure 15-186. Deleted Per 1995 Update

Figure 15-187. Deleted Per 1995 Update

Figure 15-188. Deleted Per 2001 Update

Figure 15-189. Deleted Per 2001 Update

Figure 15-190. Deleted Per 2001 Update

Figure 15-191. Deleted Per 2001 Update

Figure 15-192. Locked Rotor - Offsite Power Lost

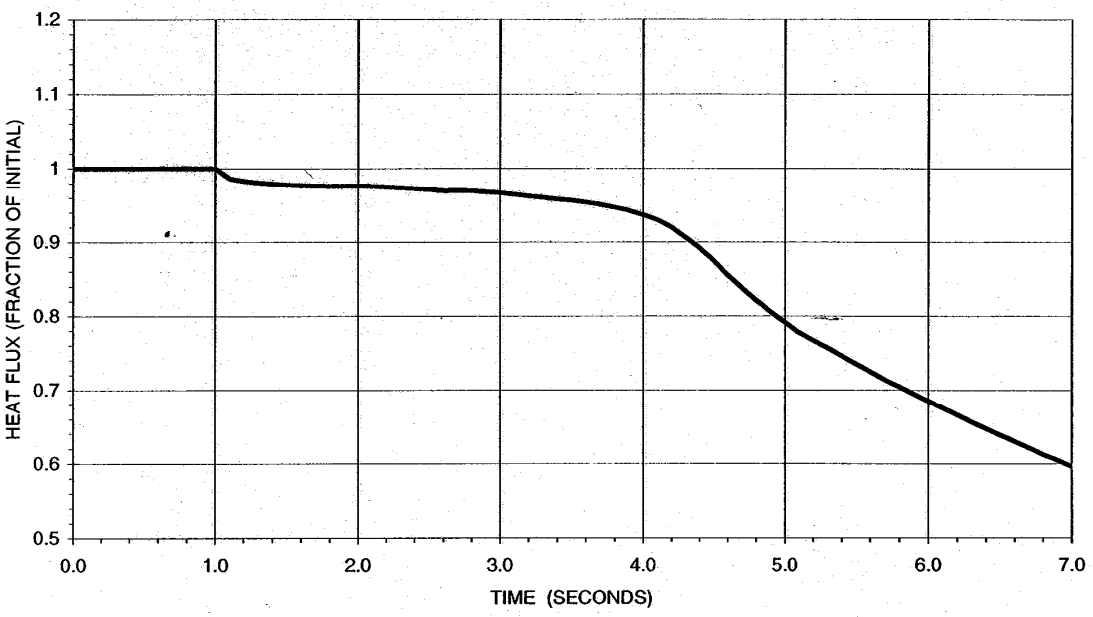


Figure 15-193. Locked Rotor - Offsite Power Lost

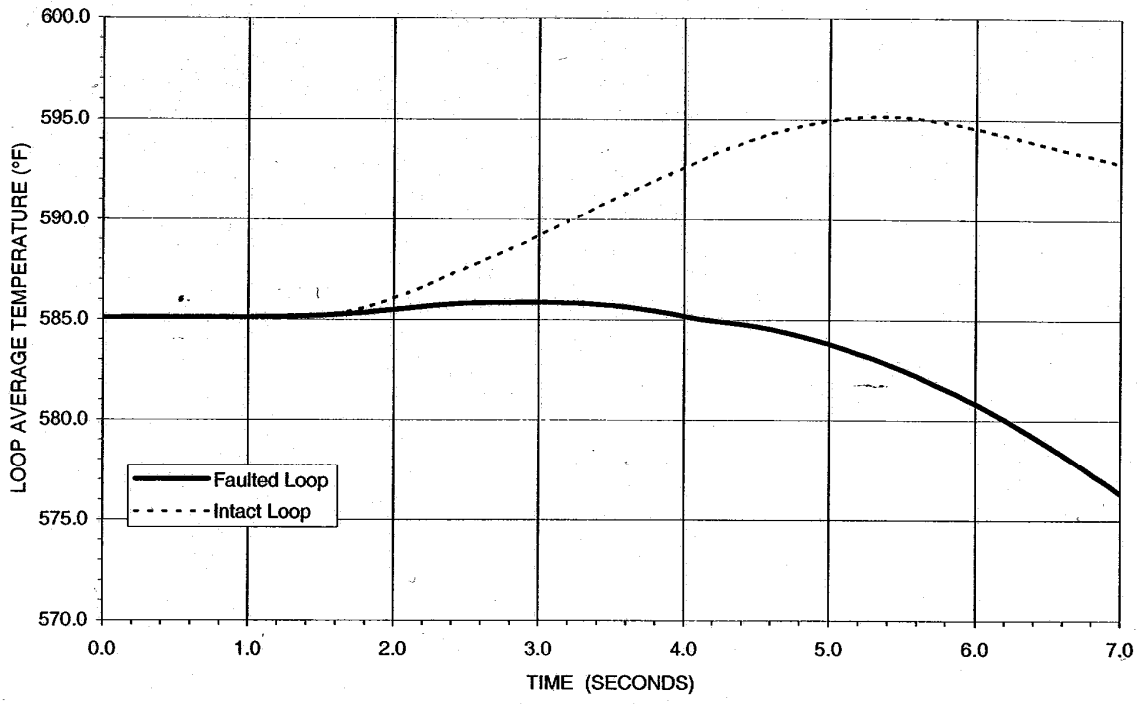


Figure 15-194. Locked Rotor - Offsite Power Lost

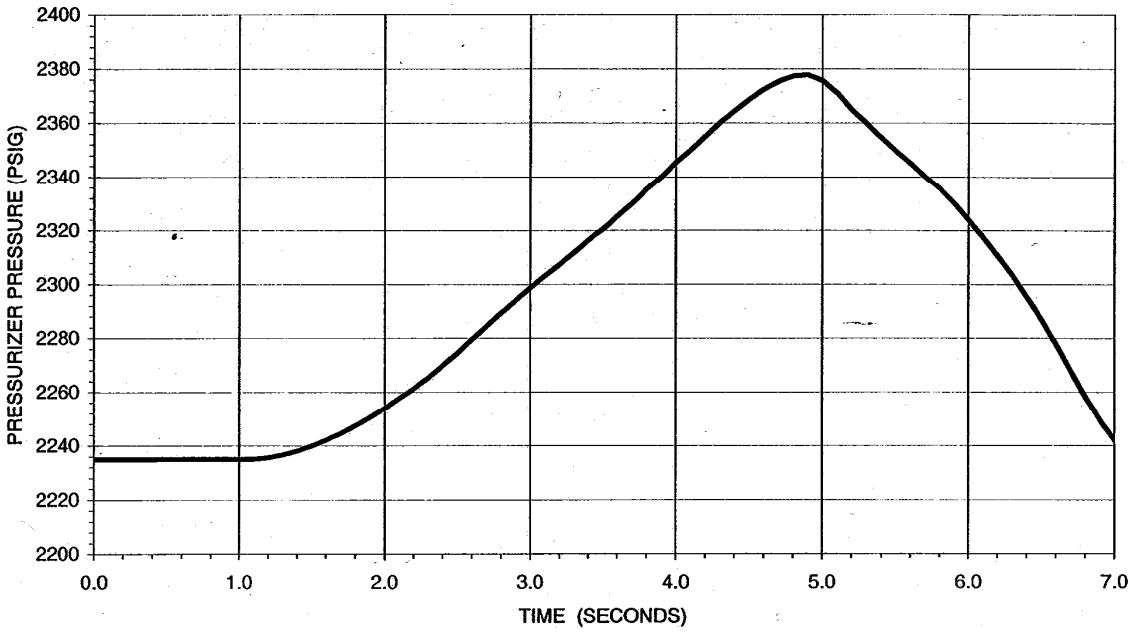


Figure 15-195. Locked Rotor - Offsite Power Maintained

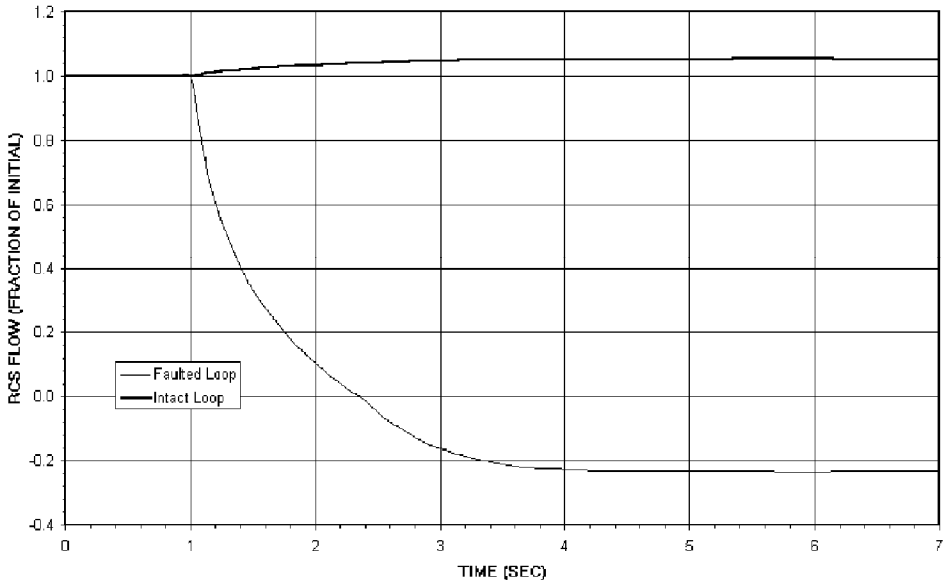


Figure 15-196. Locked Rotor - Offsite Power Lost

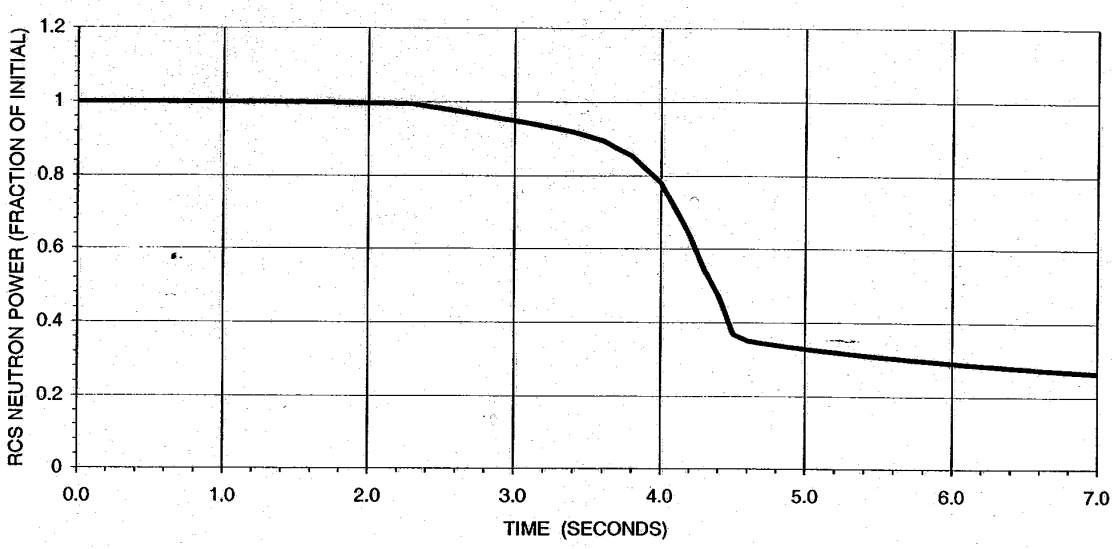


Figure 15-197. Dropped Rod Accident

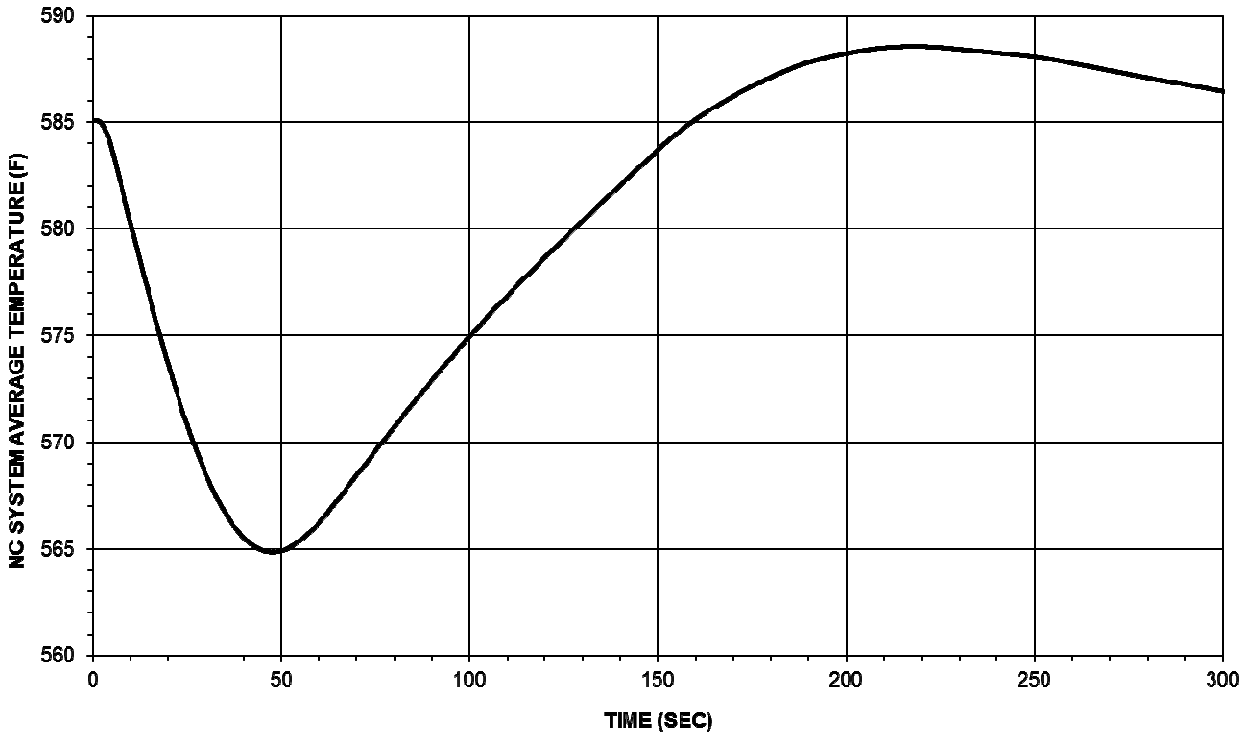


Figure 15-198. Dropped Rod Accident

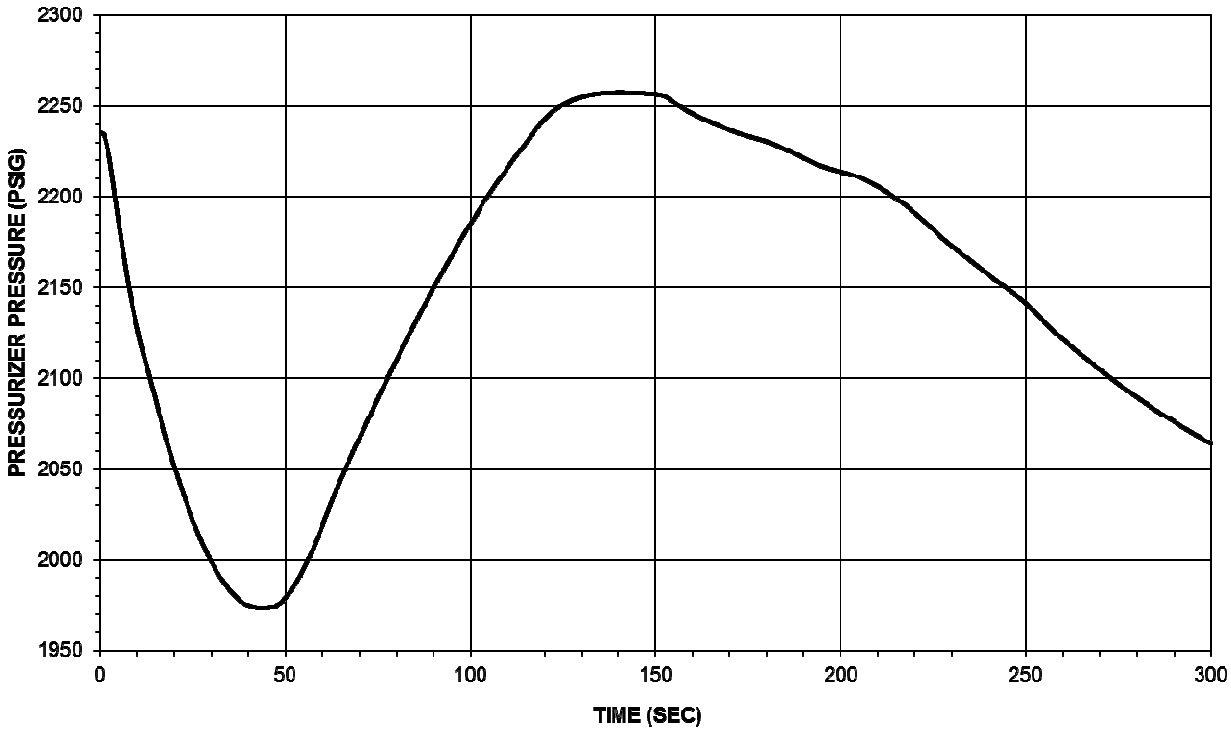


Figure 15-199. Dropped Rod Accident

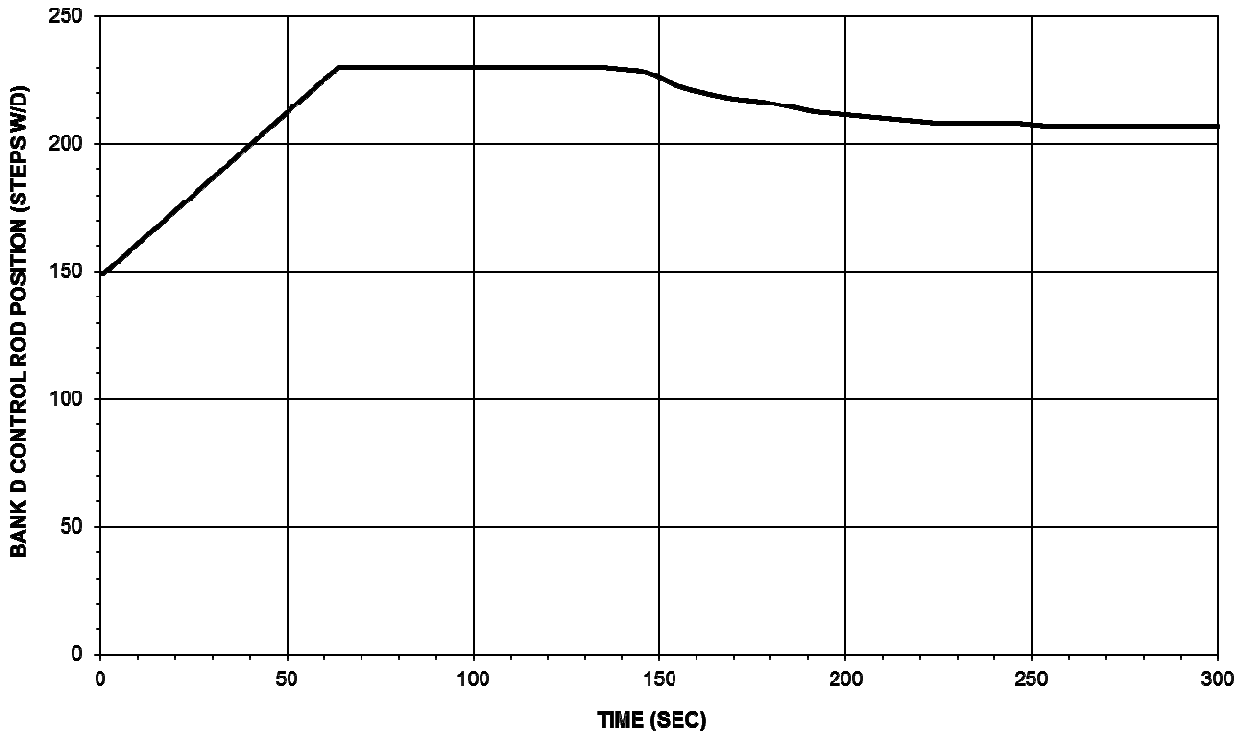


Figure 15-200. Dropped Rod Accident

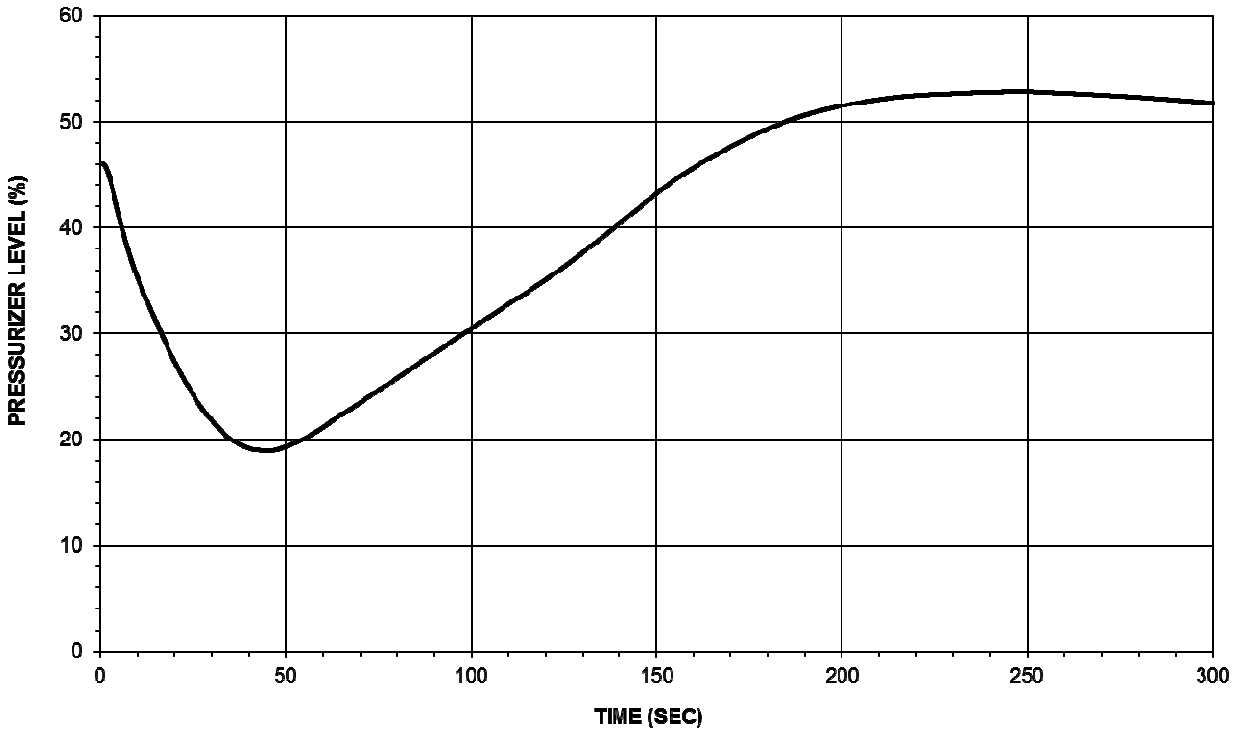


Figure 15-201. Rod Ejection Accident (BOC,HFP)

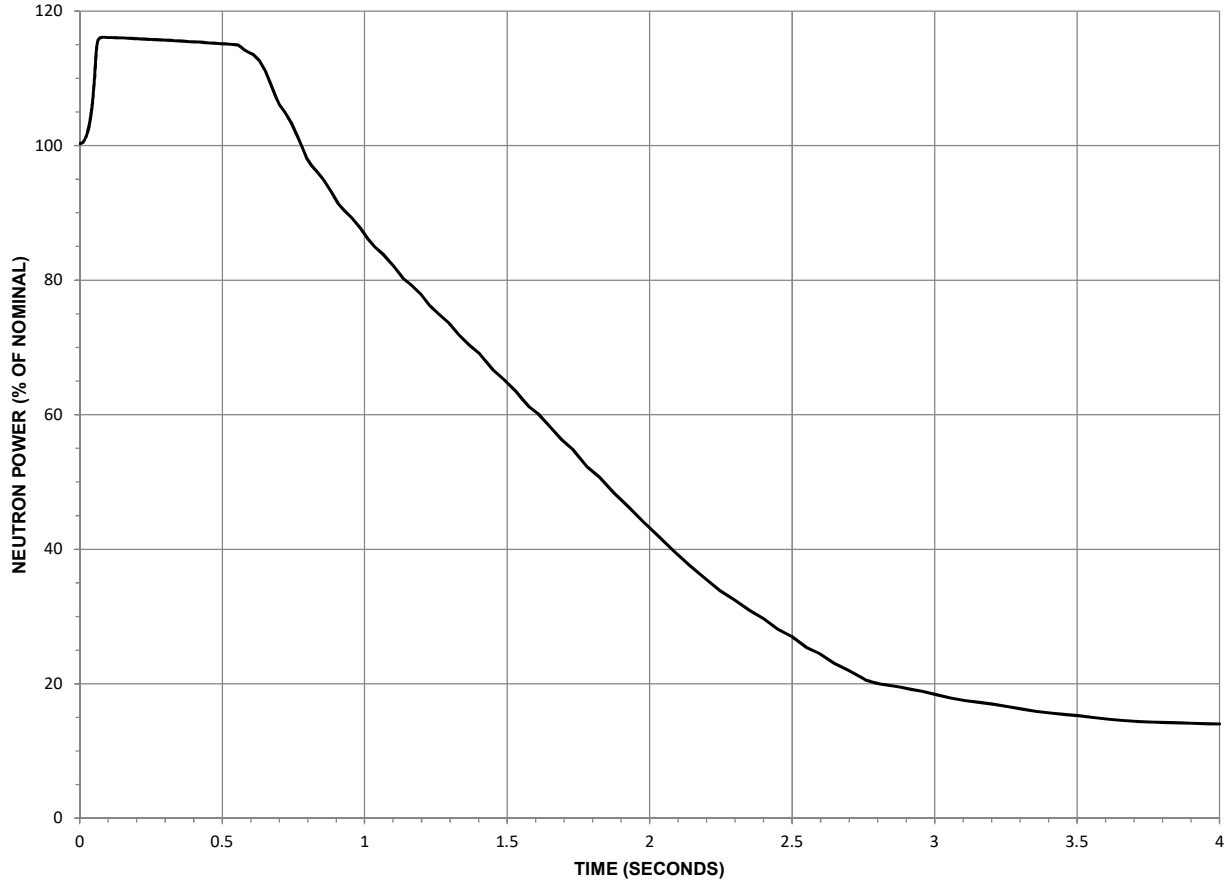


Figure 15-202. Rod Ejection Accident (EOC,HZP)

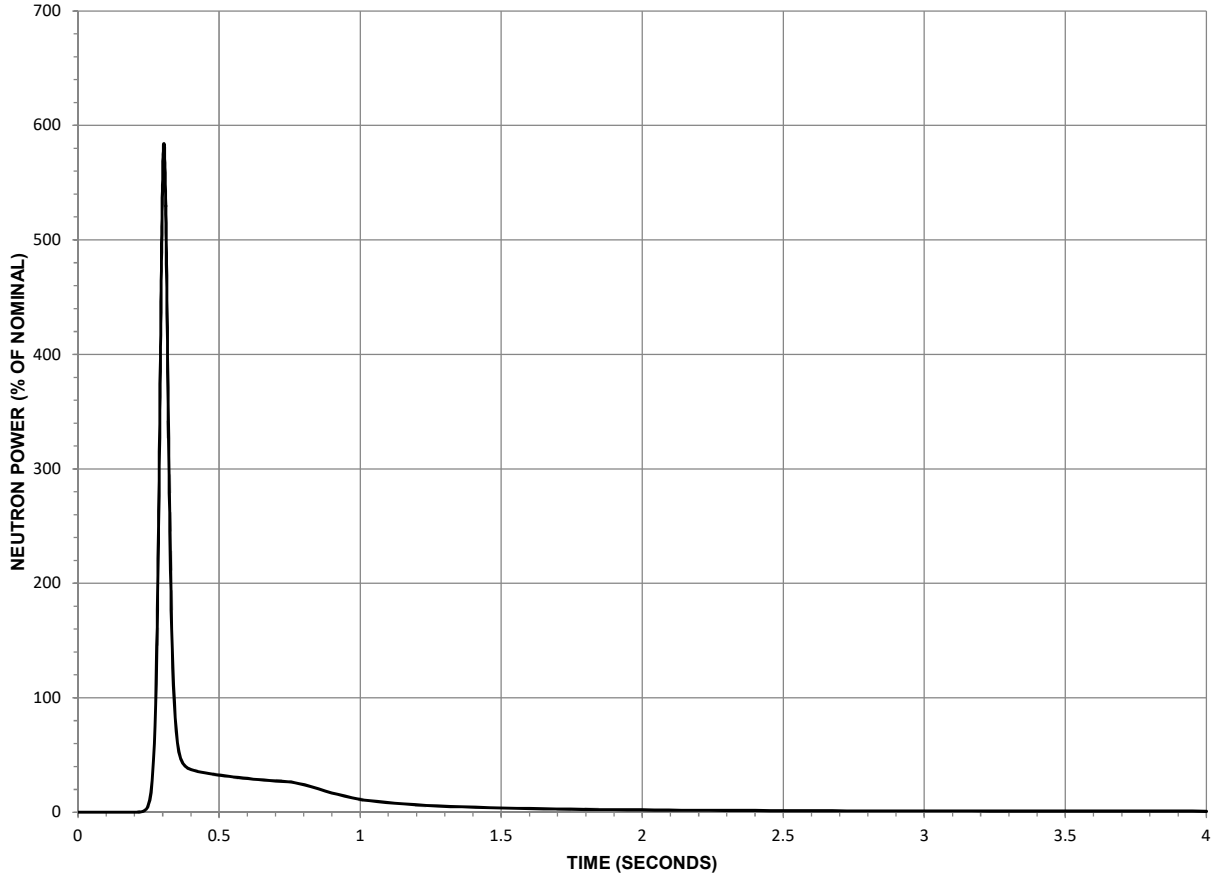


Figure 15-203. Bank Withdrawal at HZP - Peak RCS Pressure

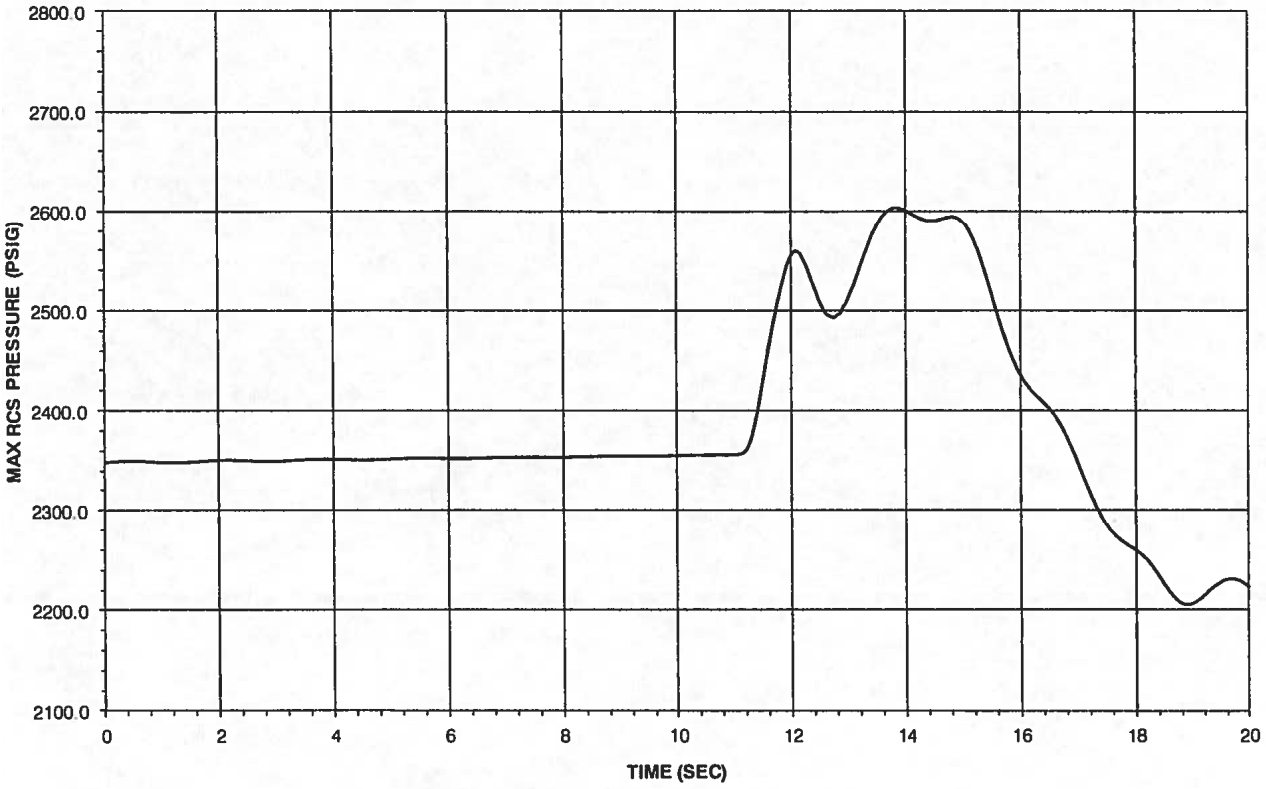


Figure 15-204. Uncontrolled RCCA Bank Withdrawal from 8% Power

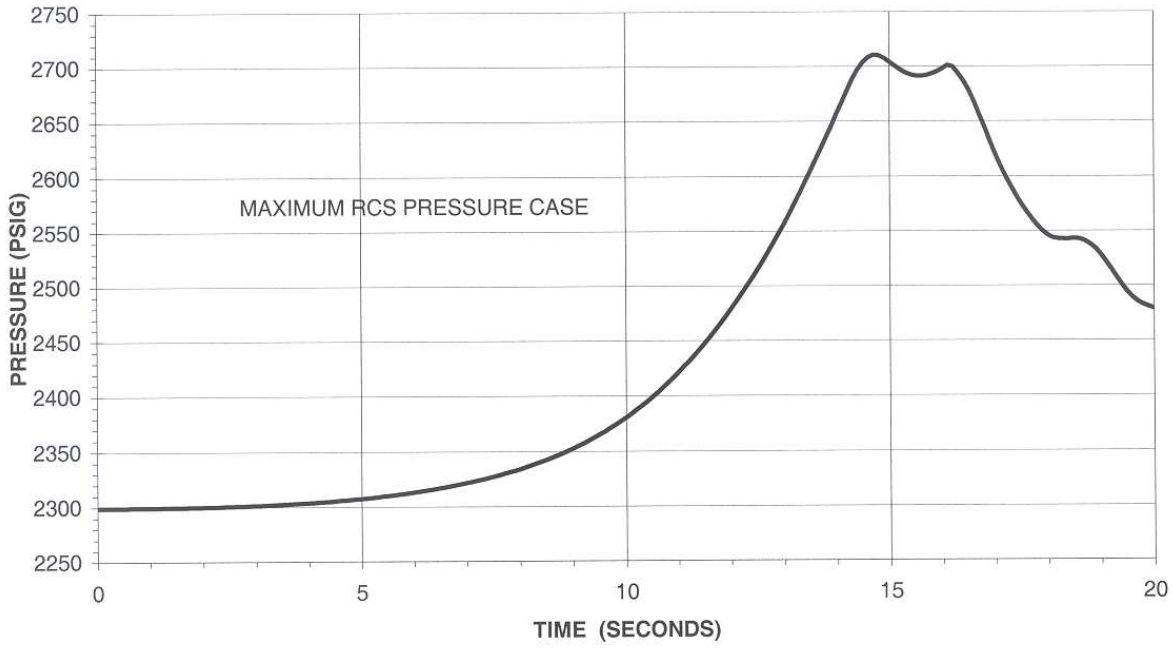


Figure 15-205. Steamline Break, Offsite Power Maintained

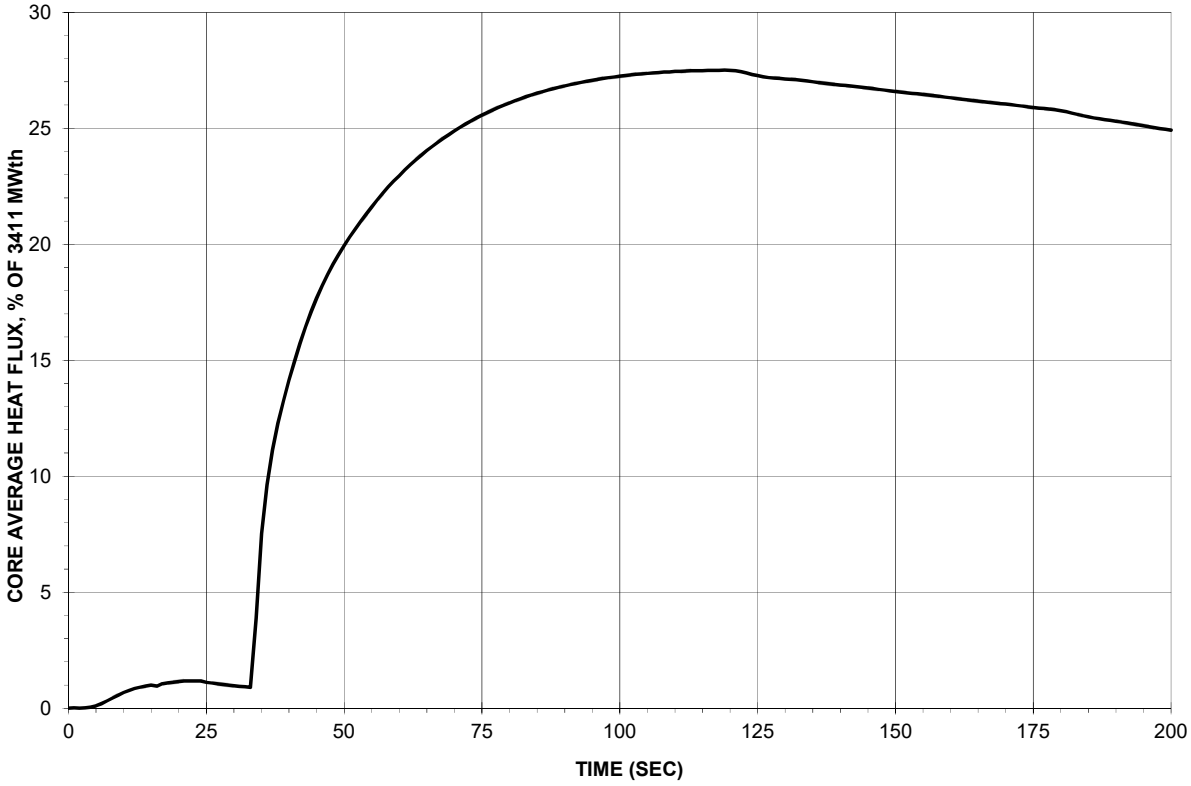


Figure 15-206. Steamline Break, Offsite Power Maintained

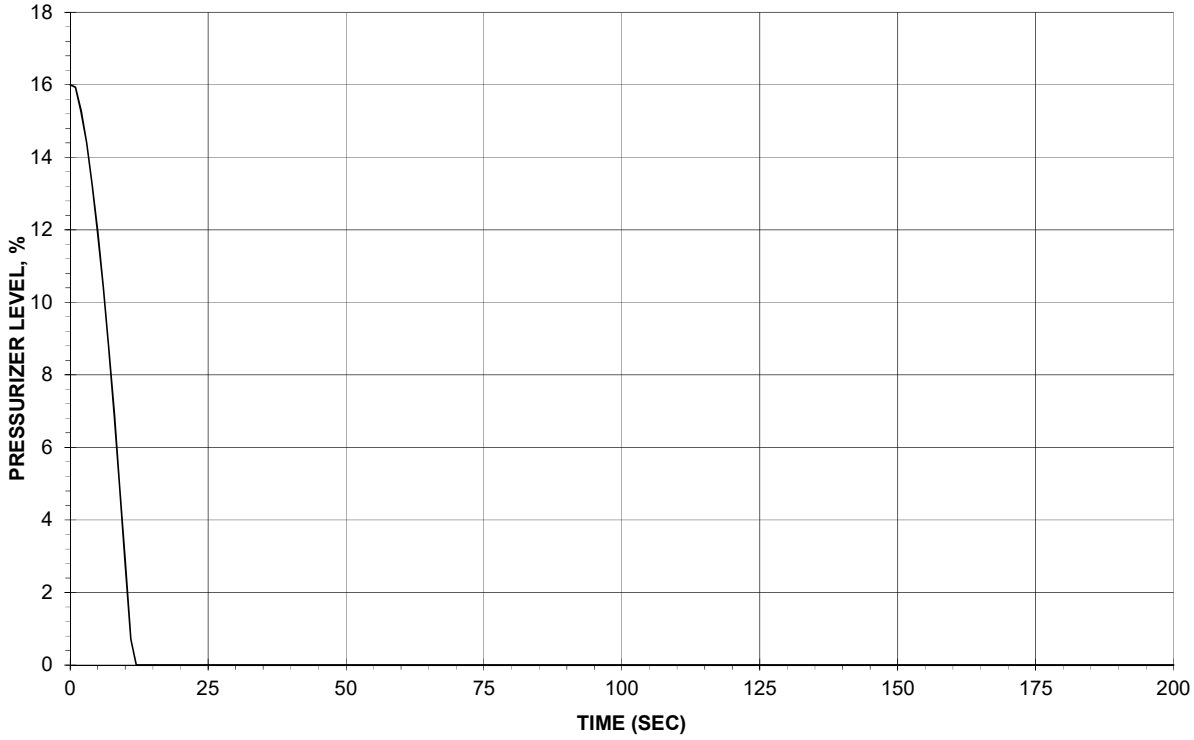


Figure 15-207. Steamline Break, Offsite Power Maintained

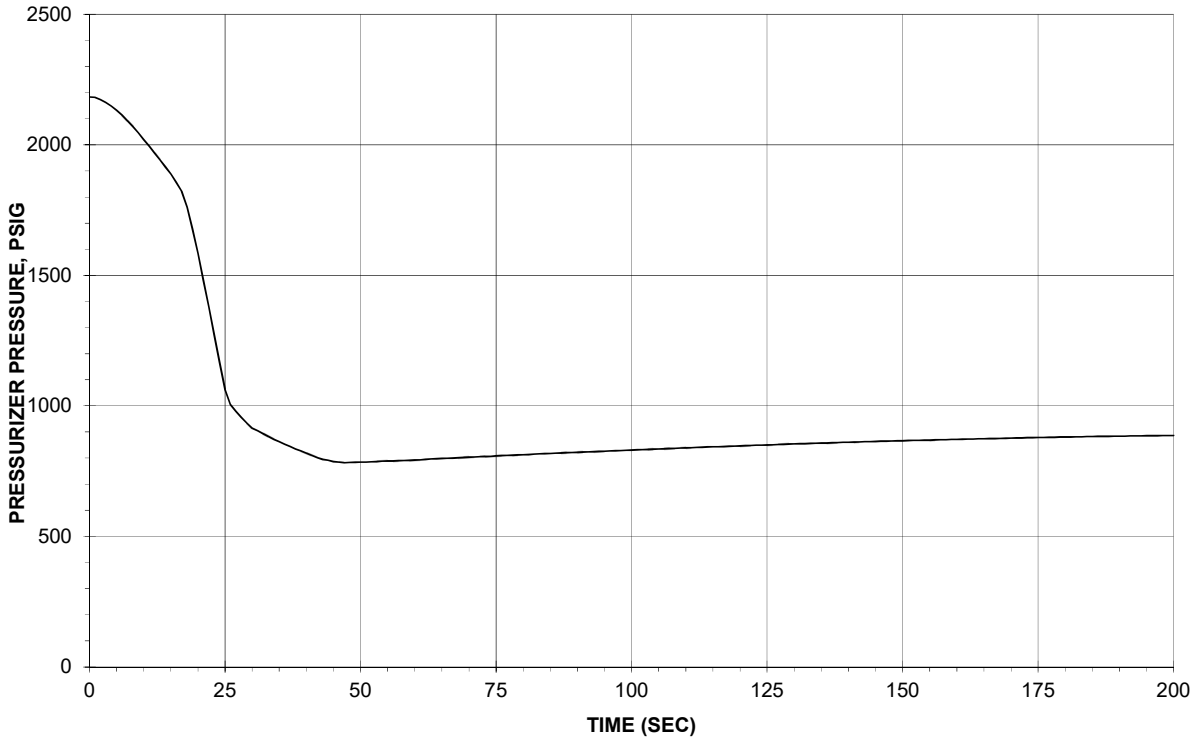


Figure 15-208. Steamline Break, Offsite Power Maintained

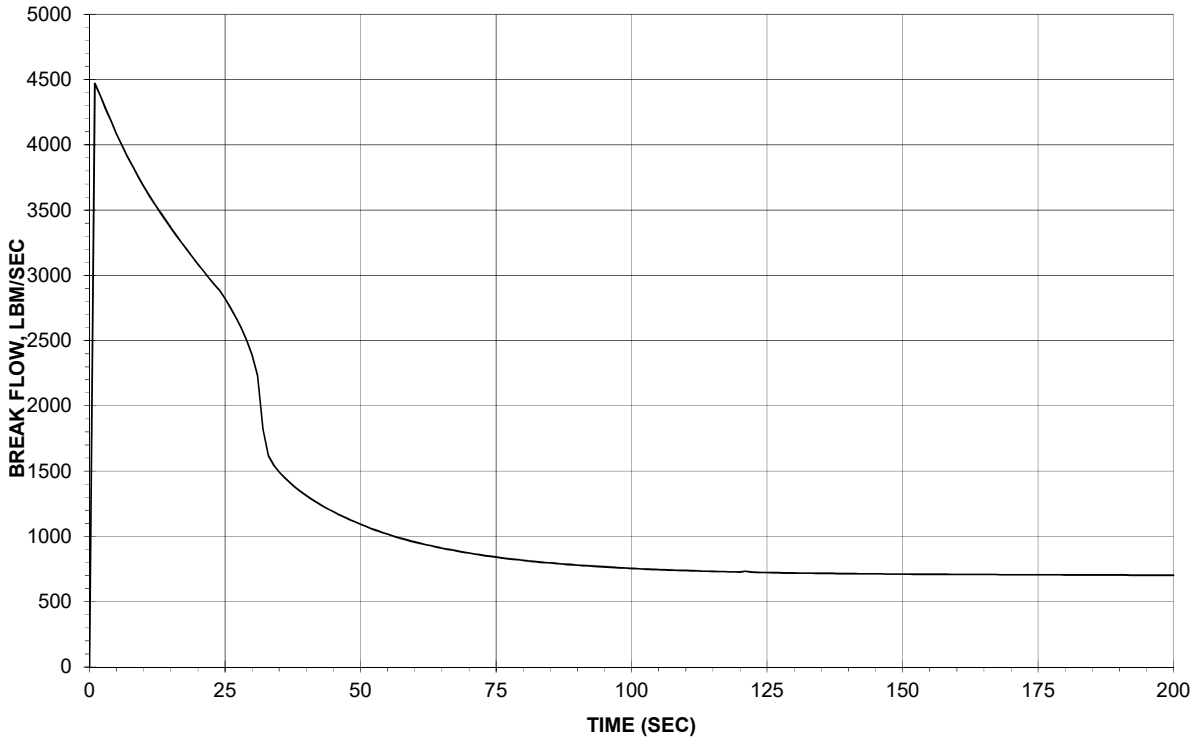


Figure 15-209. Steamline Break, Offsite Power Maintained

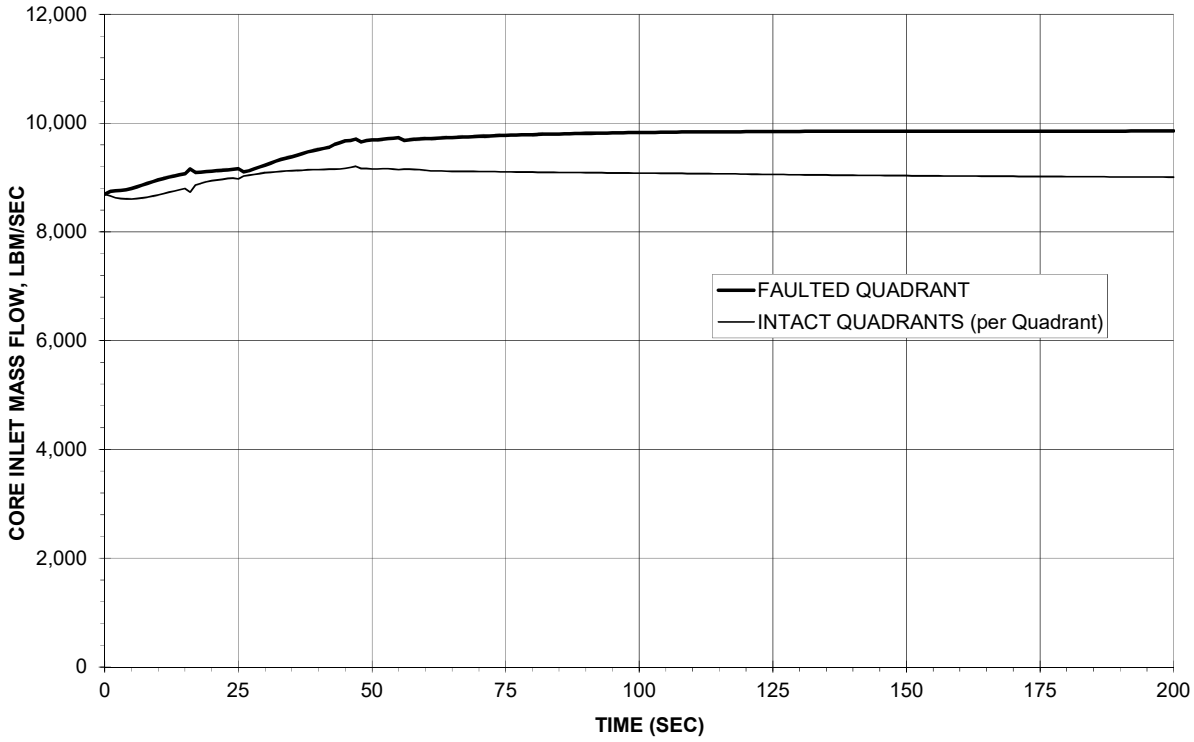


Figure 15-210. Steamline Break, Offsite Power Lost

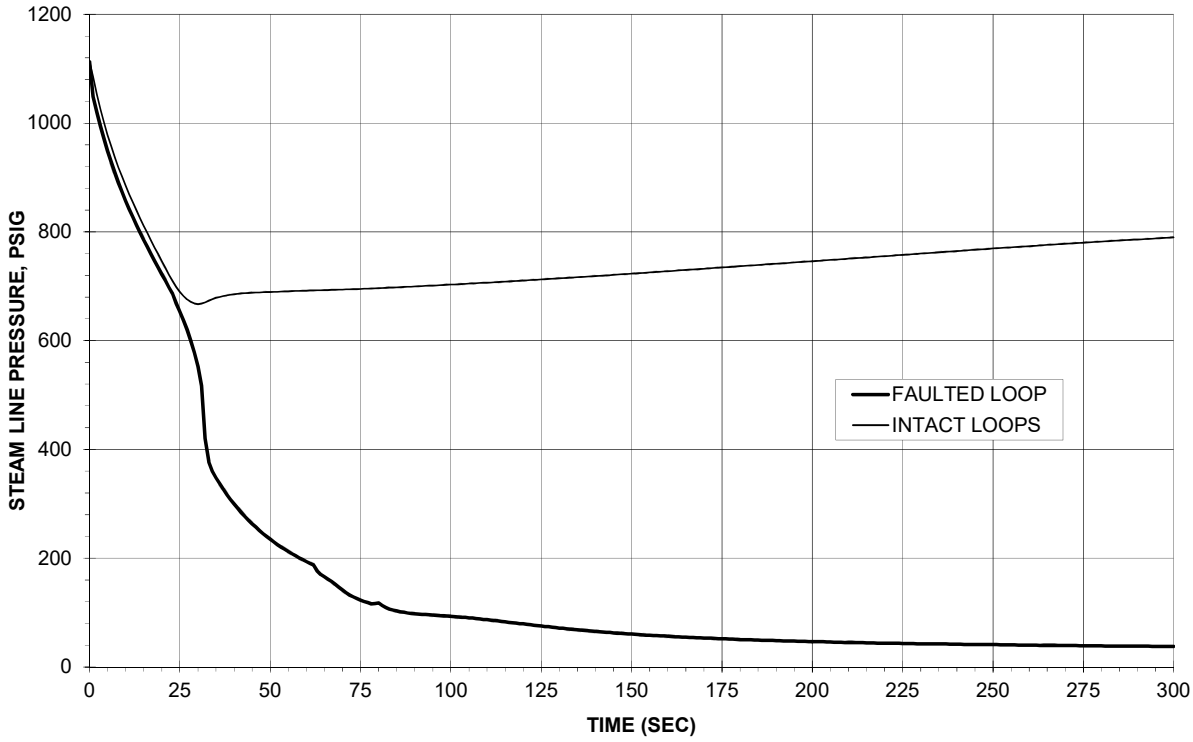


Figure 15-211. Steamline Break, Offsite Power Lost

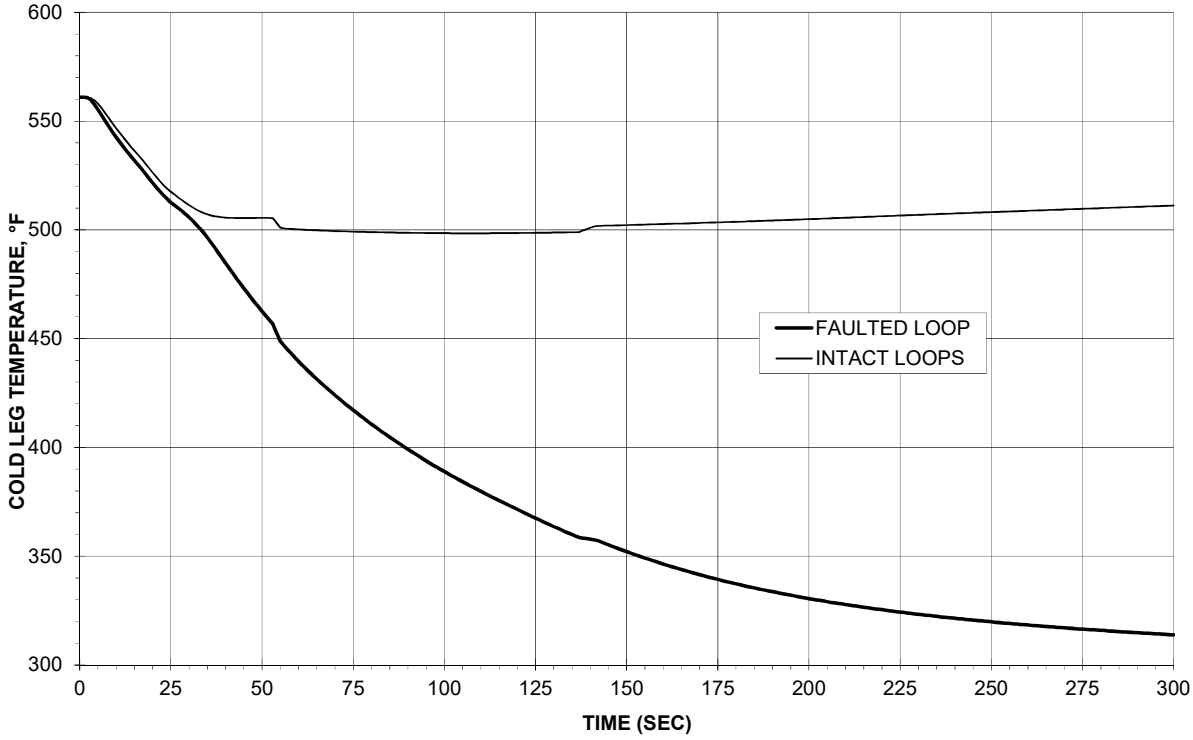


Figure 15-212. Steamline Break, Offsite Power Lost

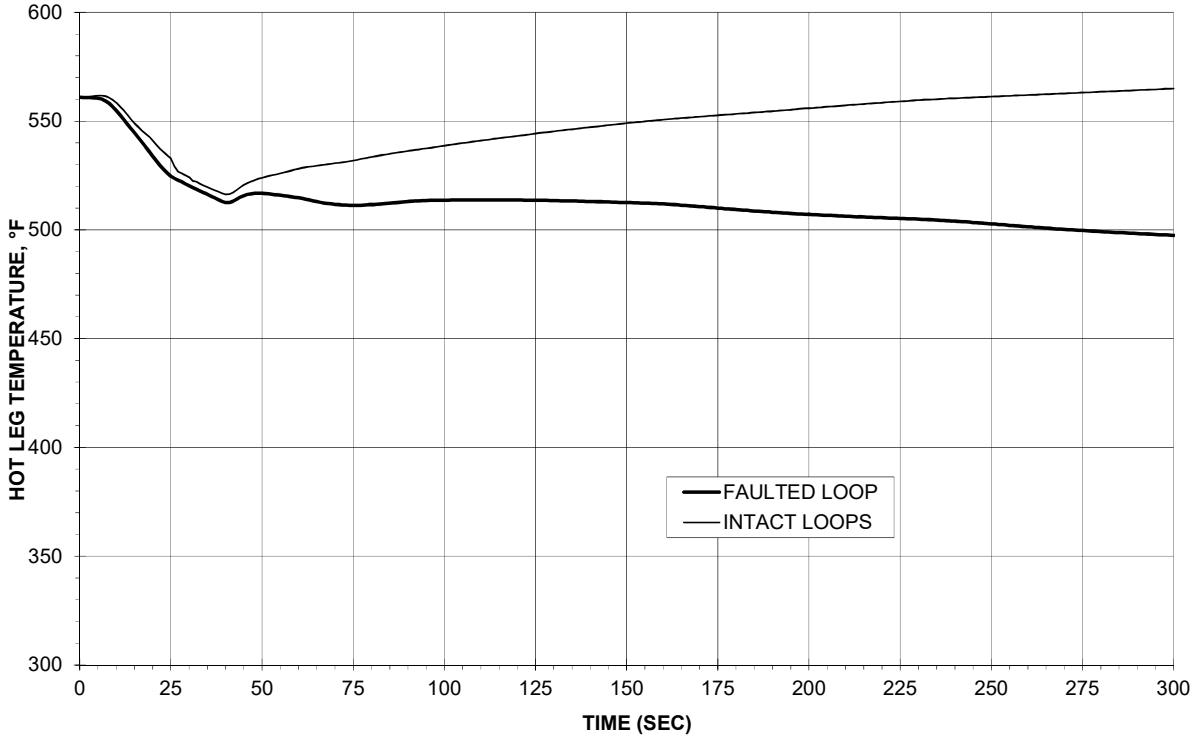


Figure 15-213. Steamline Break, Offsite Power Lost

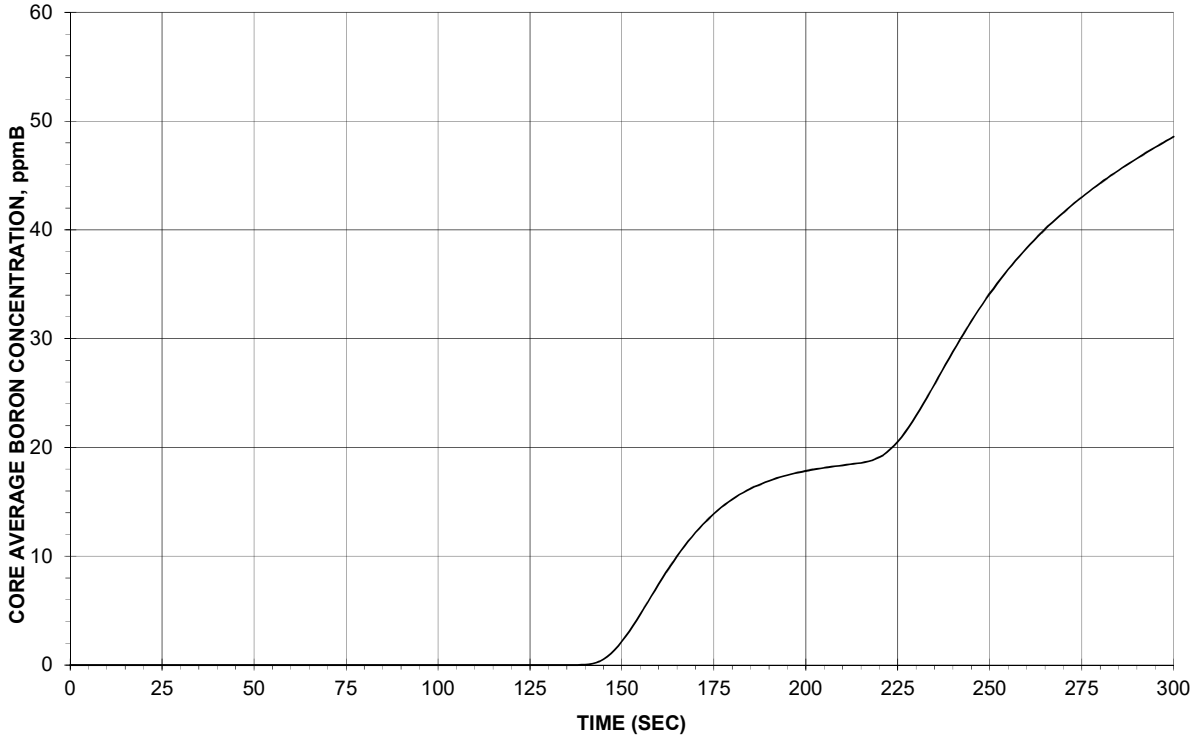


Figure 15-214. Steamline Break, Offsite Power Lost

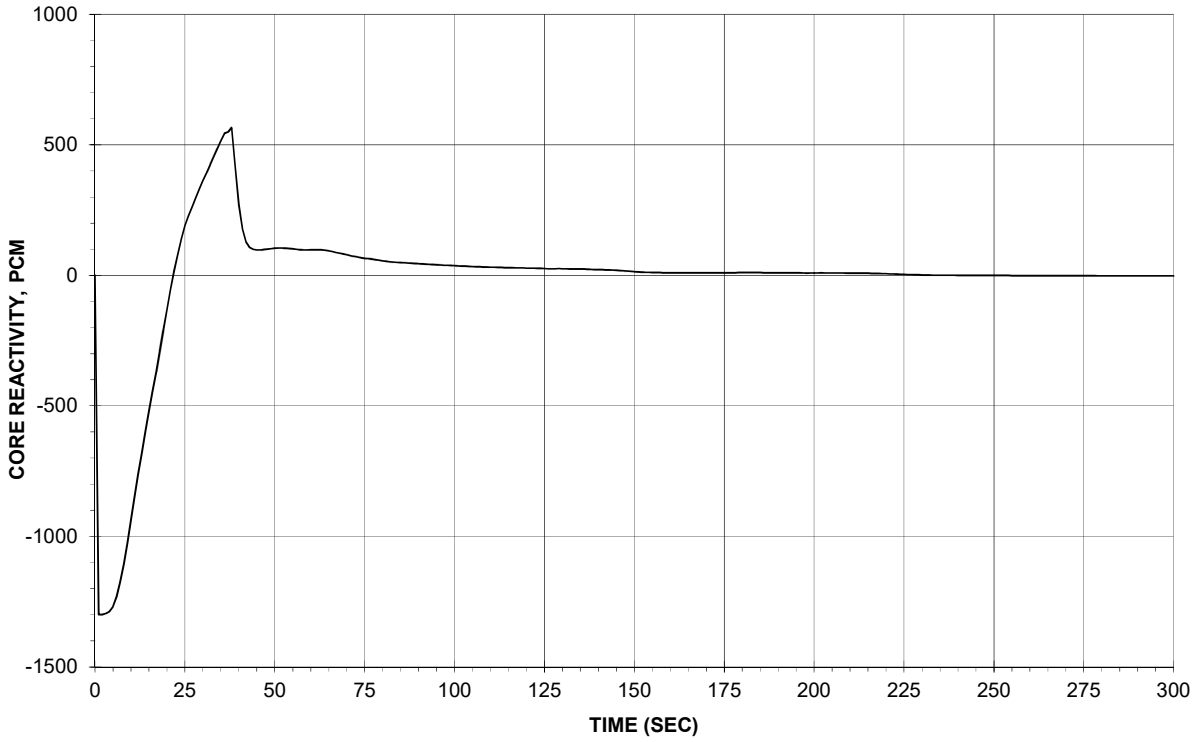


Figure 15-215. Steamline Break, Offsite Power Lost

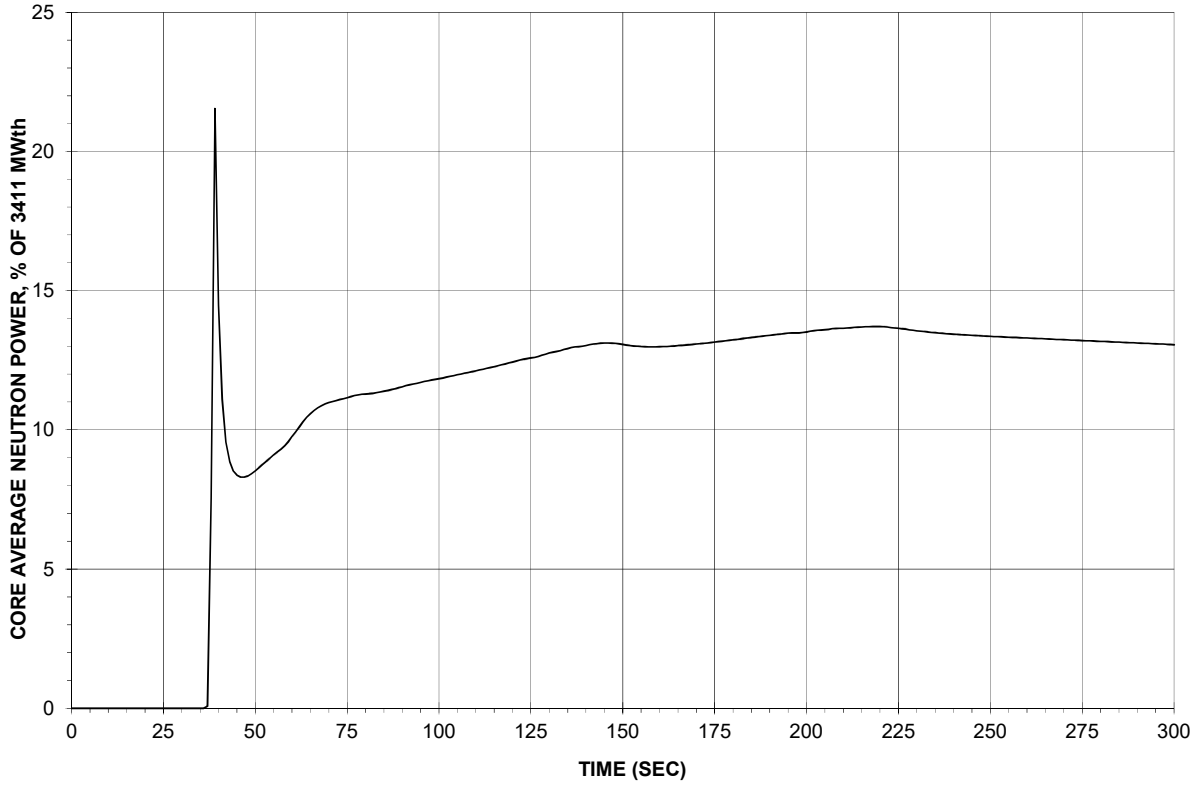


Figure 15-216. Steamline Break, Offsite Power Lost

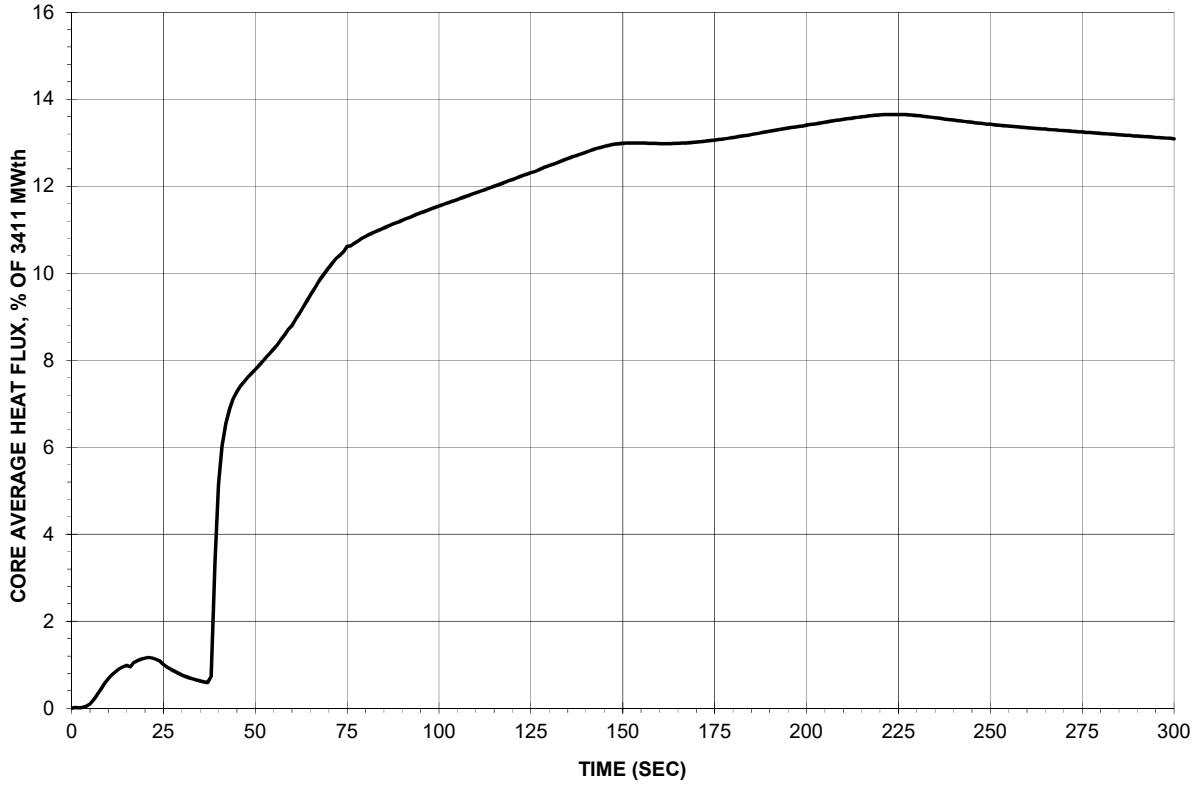


Figure 15-217. Steamline Break, Offsite Power Lost

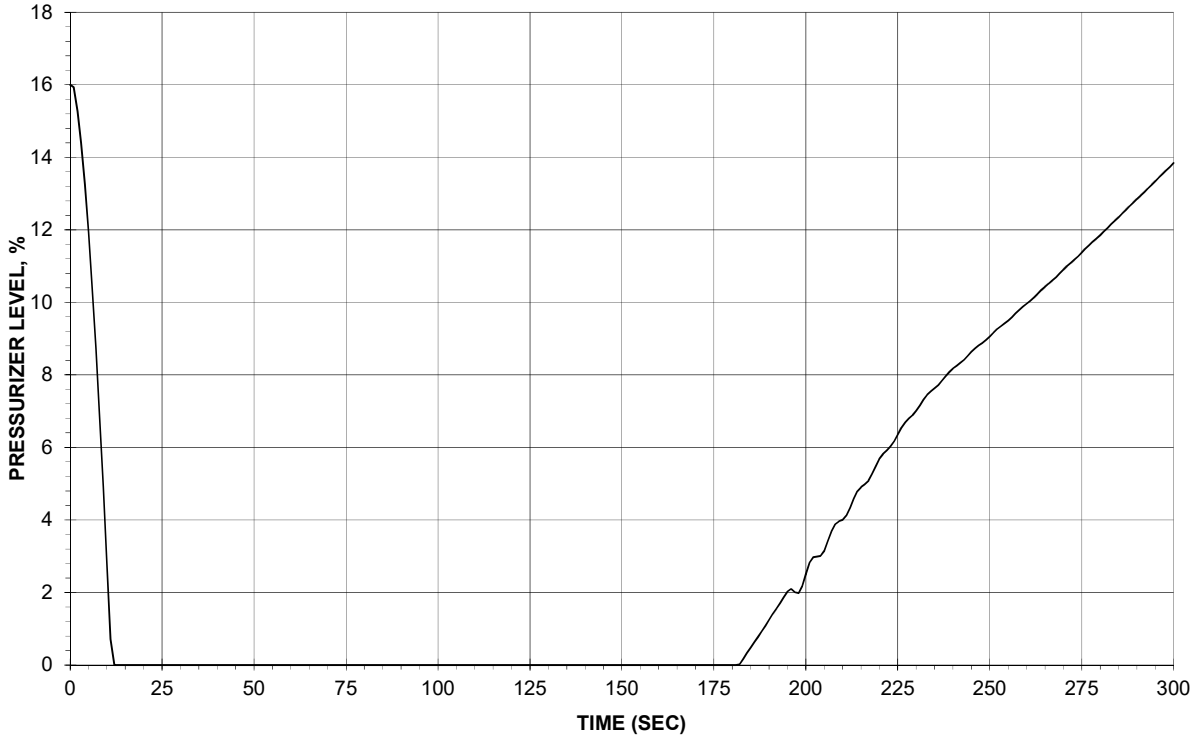


Figure 15-218. Steamline Break, Offsite Power Lost

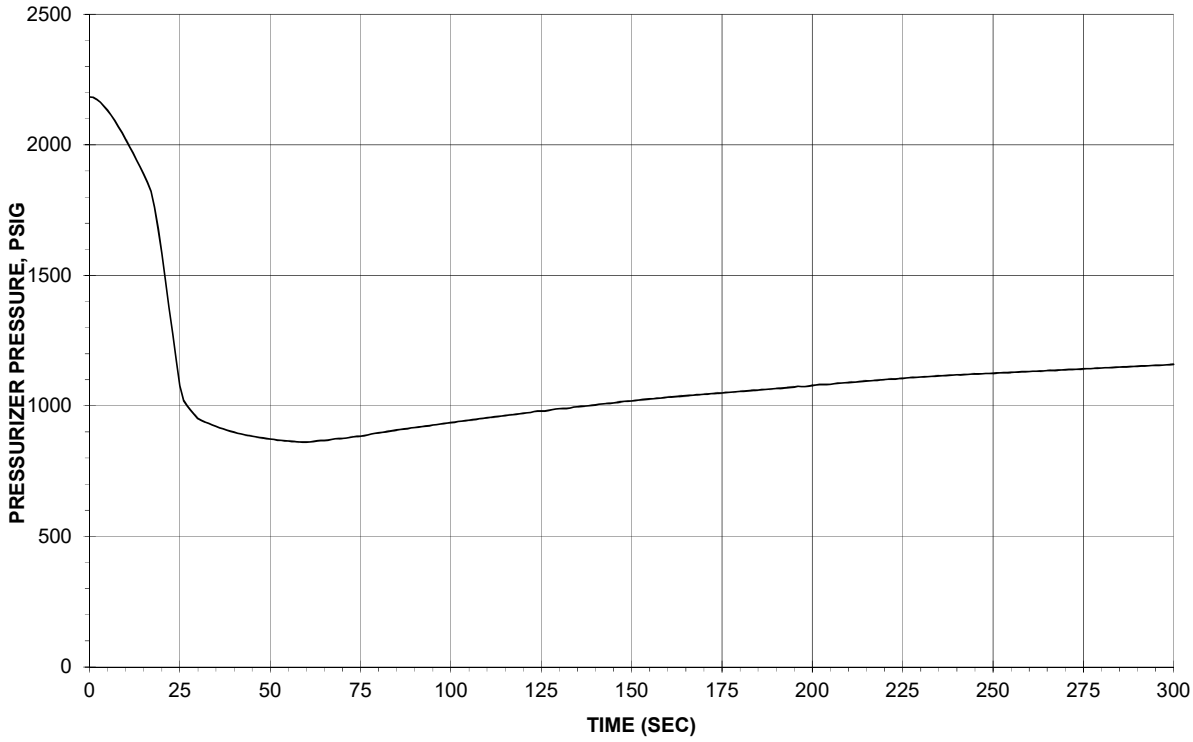


Figure 15-219. Steamline Break, Offsite Power Lost

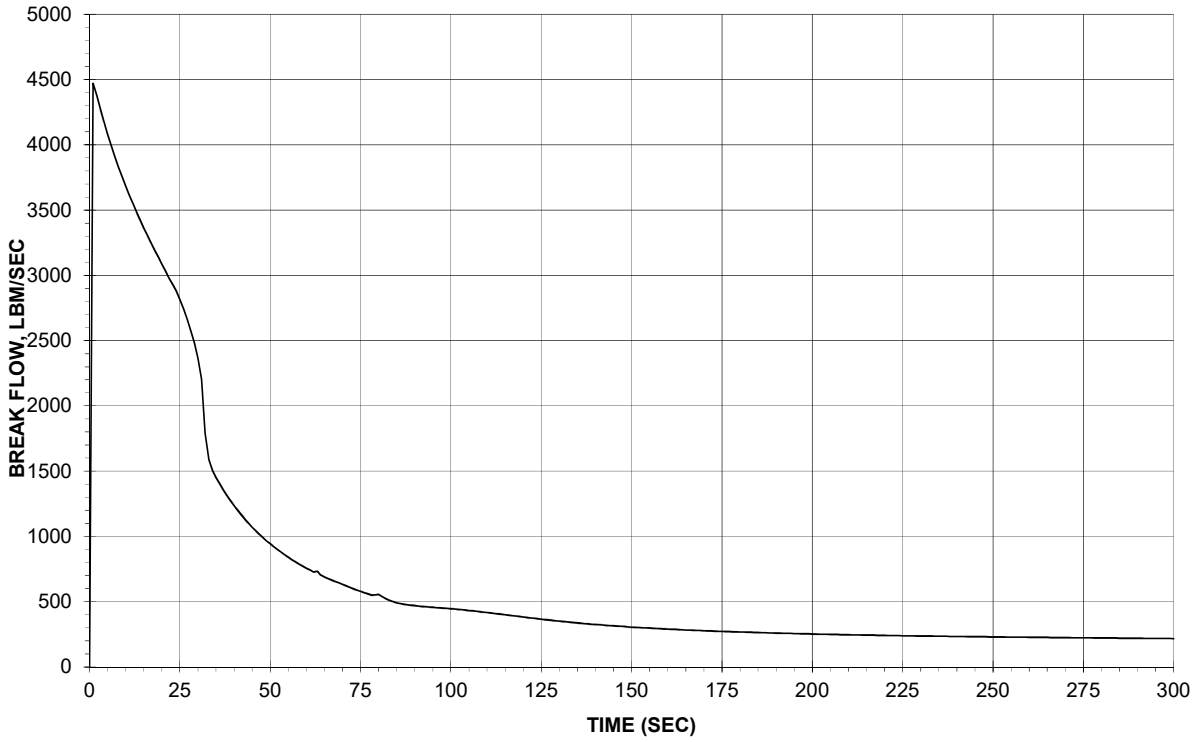


Figure 15-220. Steamline Break, Offsite Power Lost

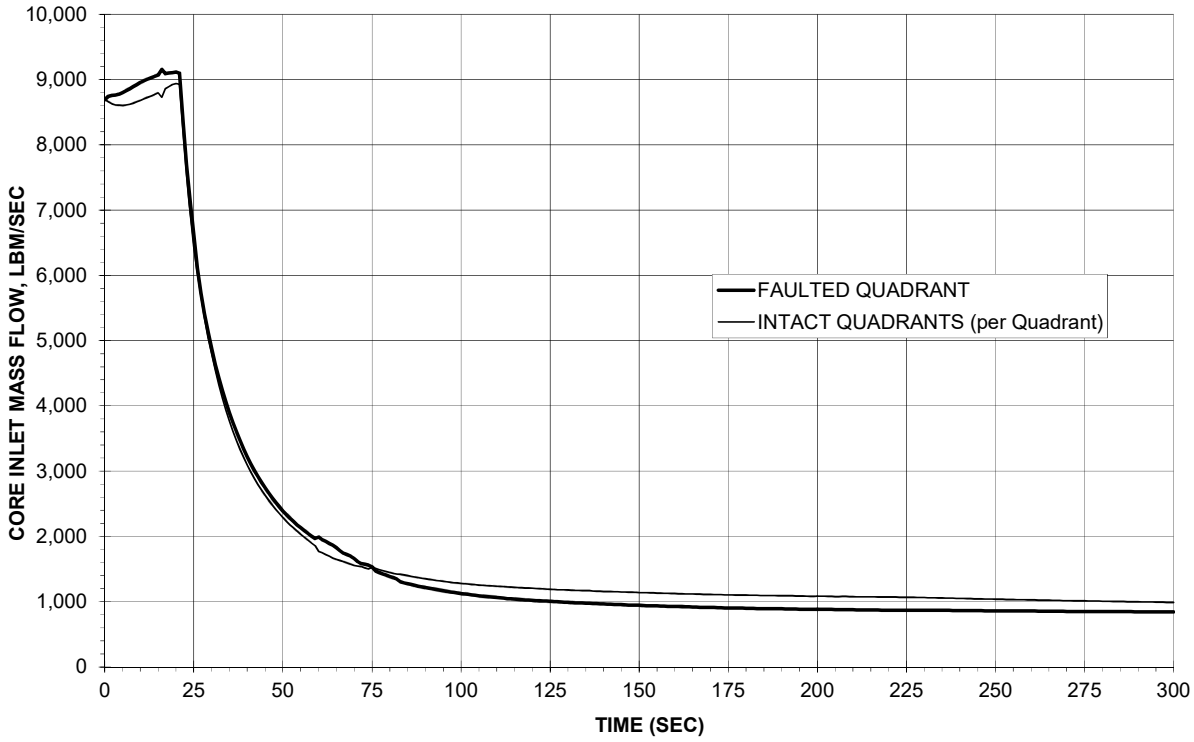


Figure 15-221. Deleted Per 1997 Update

Figure 15-222. Feedwater System Pipe Break - Unit 1

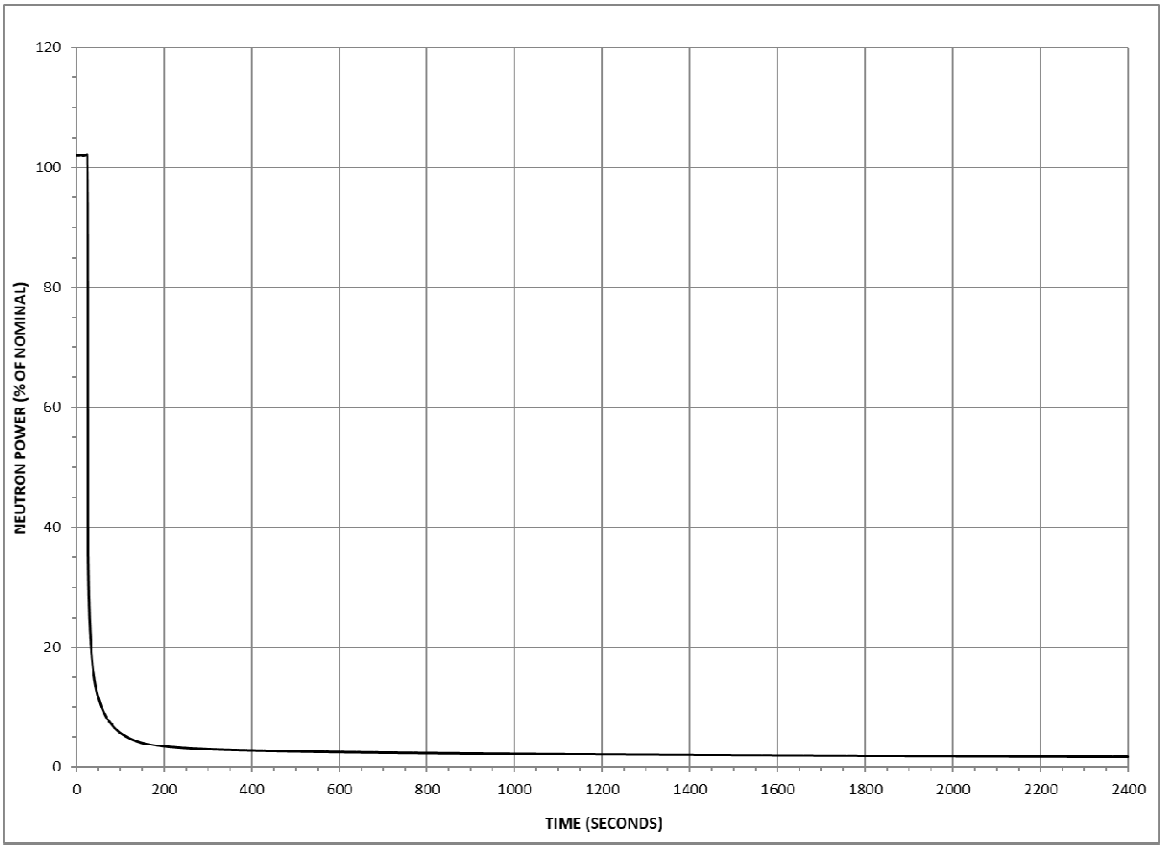


Figure 15-223. Feedwater System Pipe Break - Unit 1

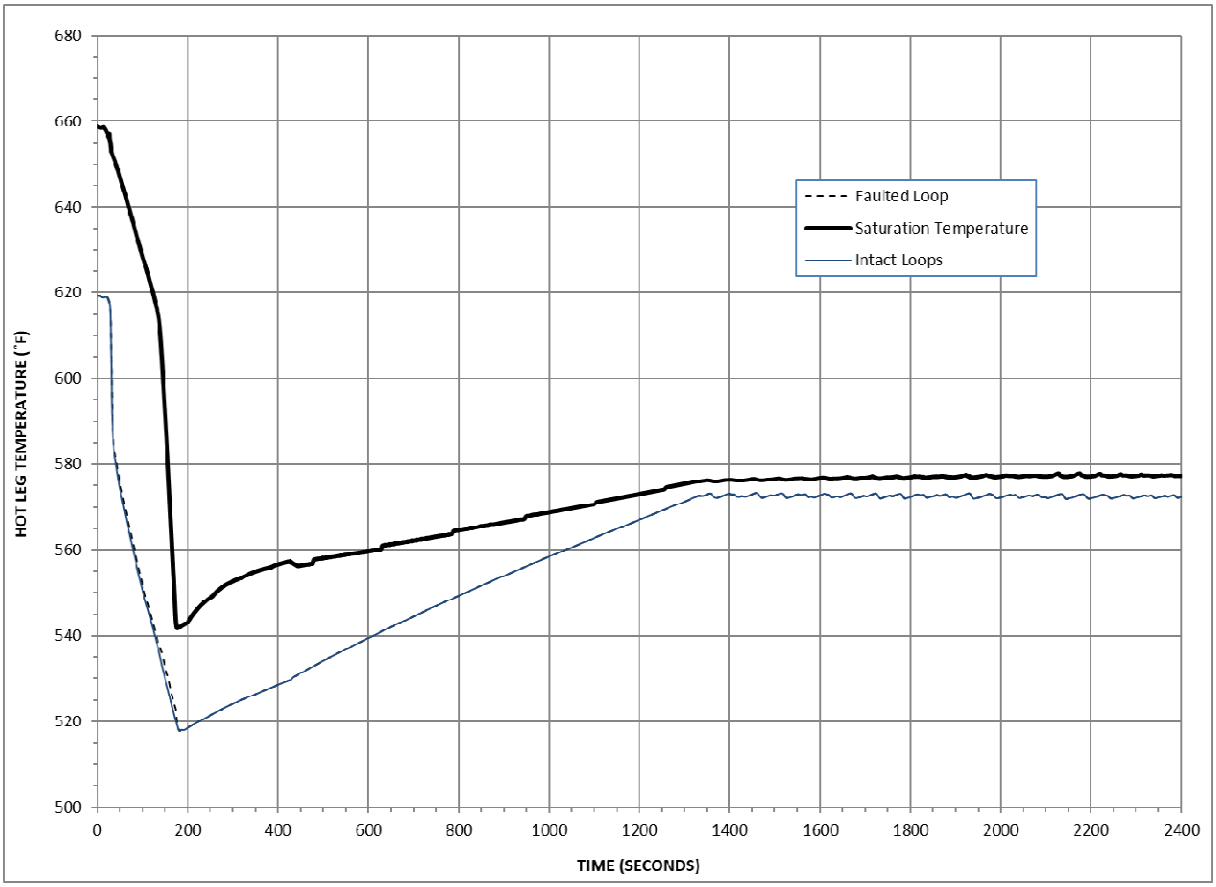


Figure 15-224. Feedwater System Pipe Break - Unit 1

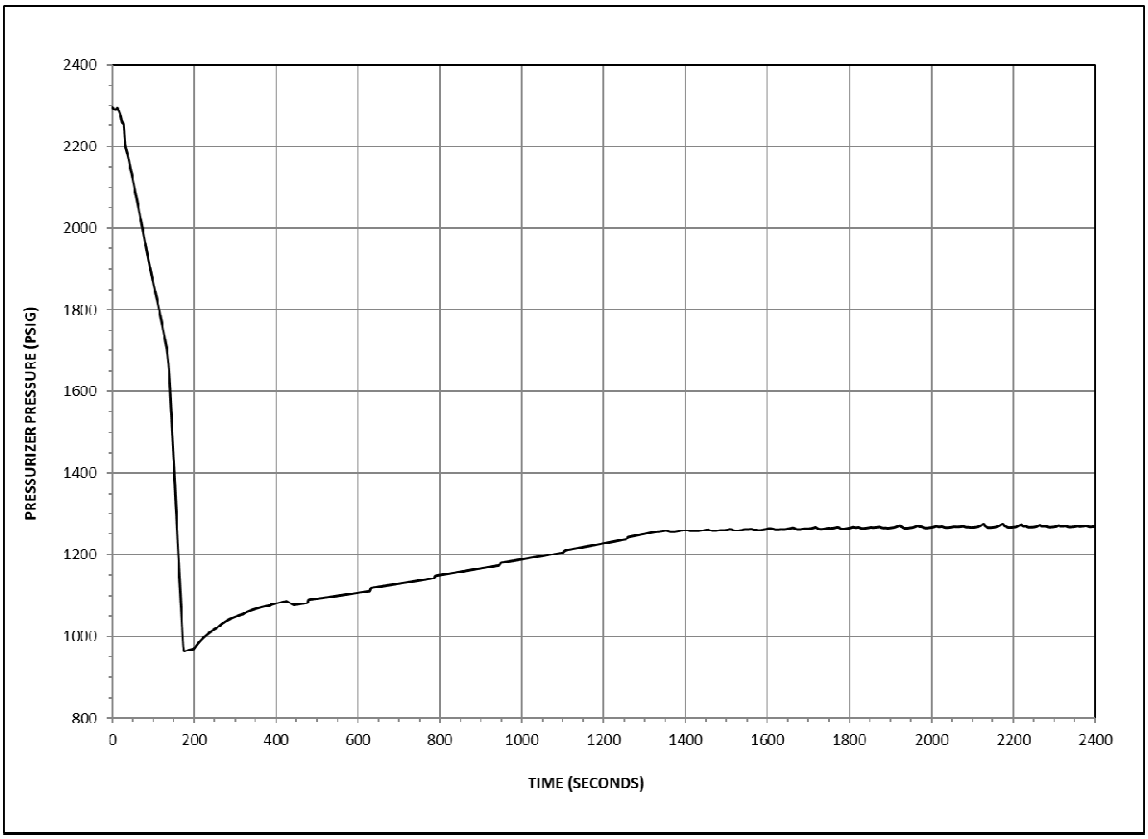


Figure 15-225. Feedwater System Pipe Break - Unit 1

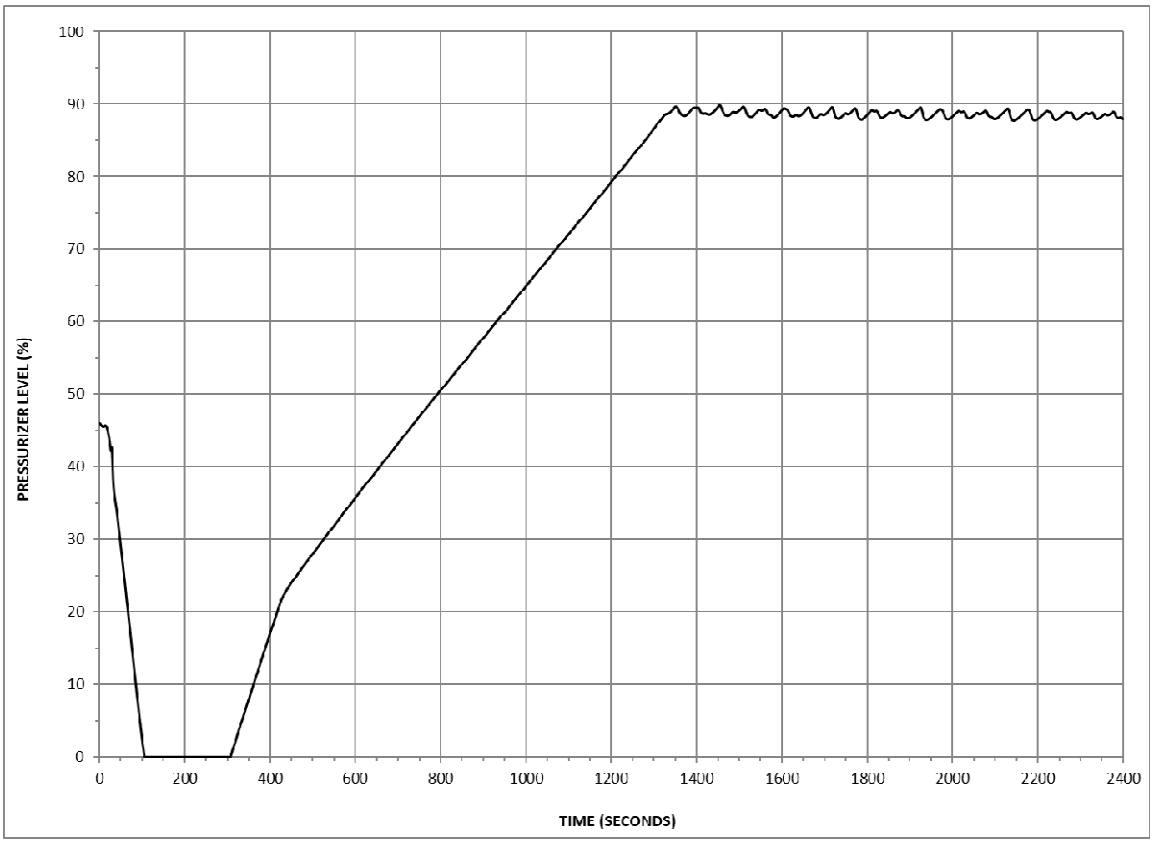


Figure 15-226. Deleted per 2020 Update.

Figure 15-227. Feedwater System Pipe Break - Unit 1

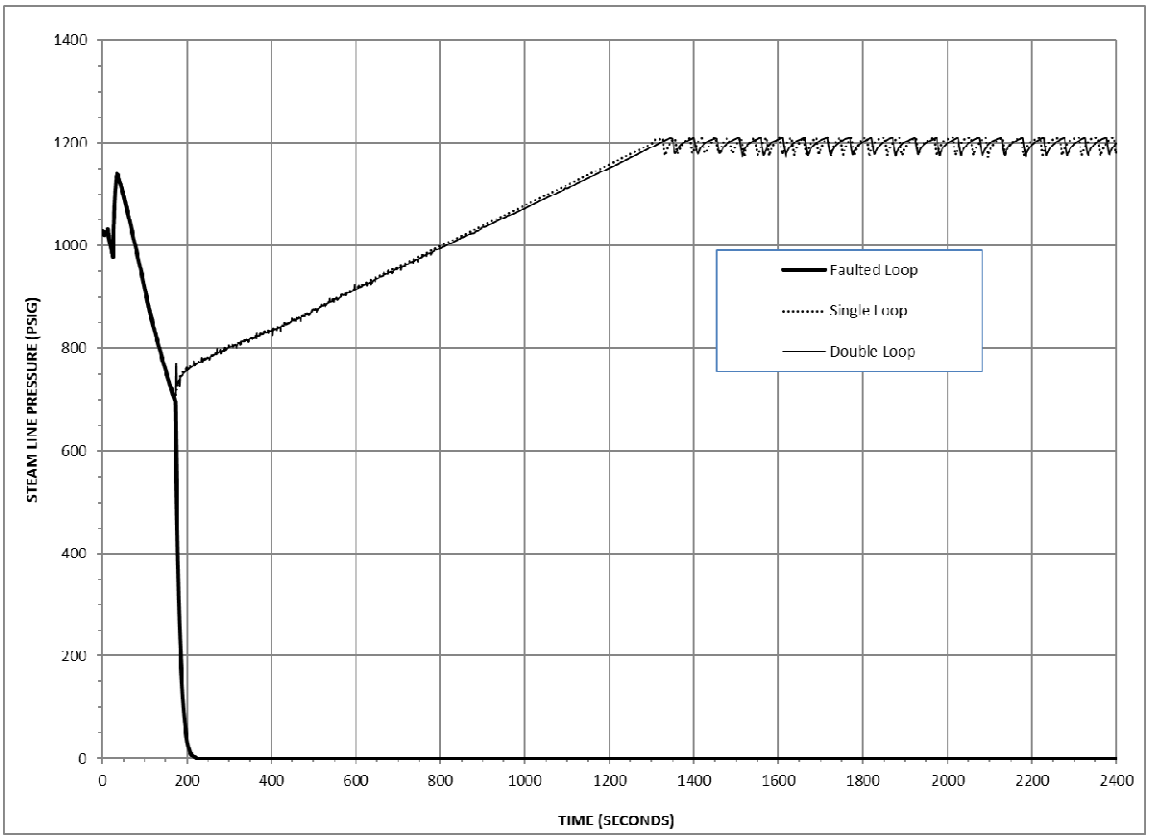


Figure 15-228. Feedwater System Pipe Break - Unit 1

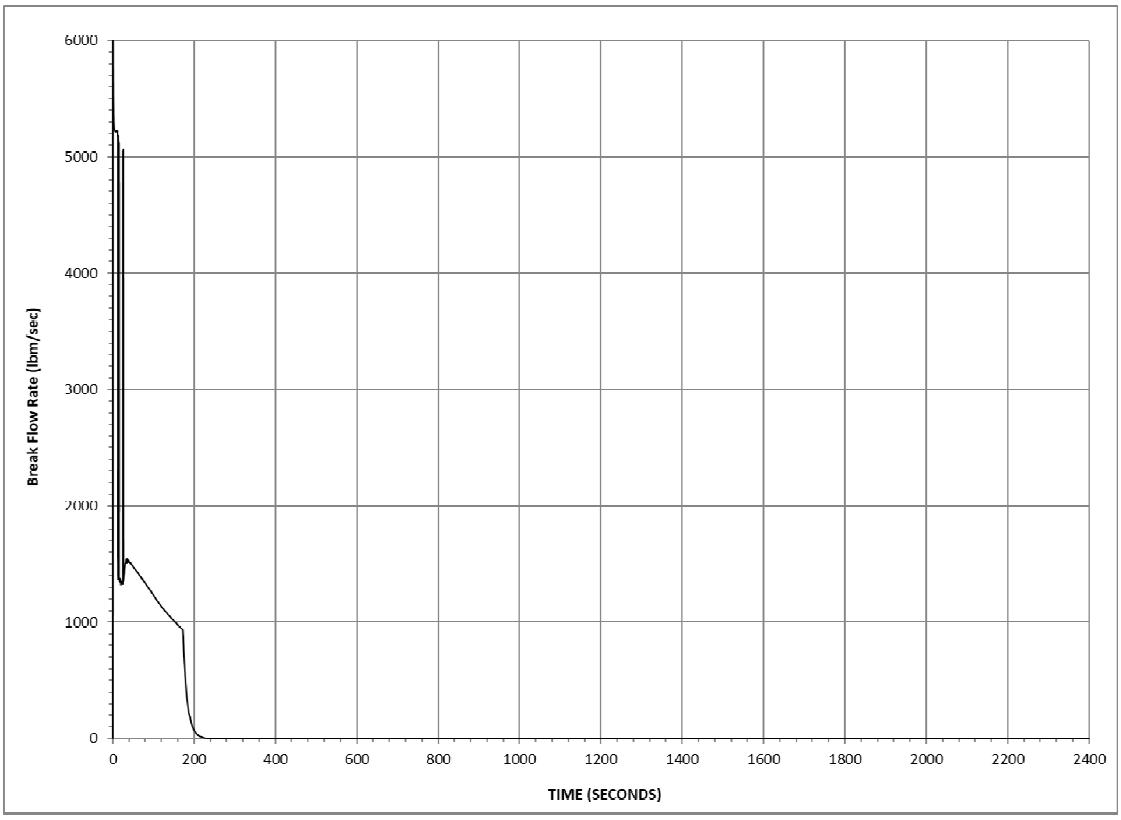


Figure 15-229. Steam Generator Tube Rupture

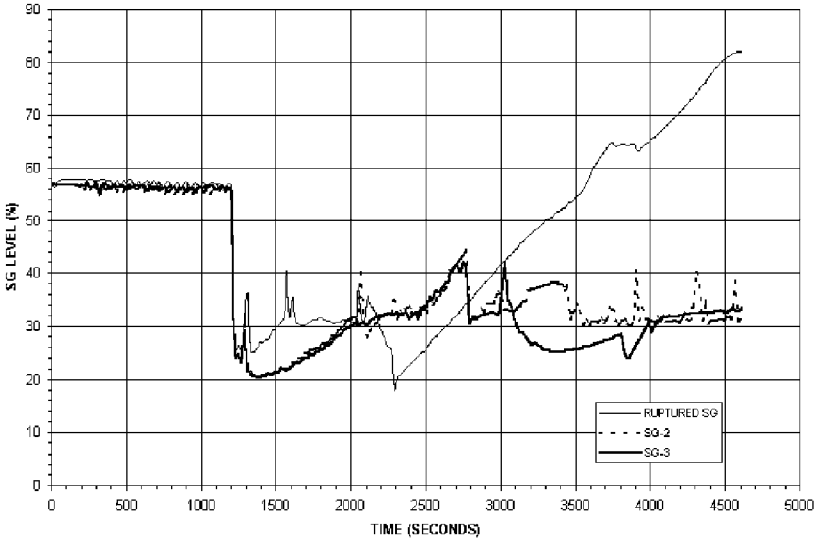


Figure 15-230. Deleted Per 2001 Update

Figure 15-231. Deleted Per 2001 Update

Figure 15-232. Deleted Per 2001 Update

Figure 15-233. Deleted Per 2001 Update

Figure 15-234. Deleted Per 2001 Update

Figure 15-235. Deleted Per 2001 Update

Figure 15-236. Deleted Per 2001 Update

Figure 15-237. Deleted Per 2001 Update

Figure 15-238. Deleted Per 2001 Update

Figure 15-239. Deleted Per 2001 Update

Figure 15-240. Deleted Per 2001 Update

Figure 15-241. Deleted Per 2001 Update

Figure 15-242. Deleted Per 2001 Update

Figure 15-242. Deleted Per 2001 Update

Figure 15-243. Deleted Per 2001 Update

Figure 15-244. Deleted Per 2001 Update

Figure 15-245. Deleted Per 2001 Update

Figure 15-246. Deleted Per 2001 Update

Figure 15-247. Deleted Per 2001 Update

Figure 15-248. Deleted Per 2001 Update

Figure 15-249. Deleted Per 2001 Update

Figure 15-250. Deleted Per 2001 Update

Figure 15-251. Deleted Per 2000 Update

Figure 15-252. Deleted Per 2000 Update

Figure 15-252. Deleted Per 2000 Update

Figure 15-253. Deleted Per 2000 Update

Figure 15-254. RCCA Position Versus Time to Dashpot

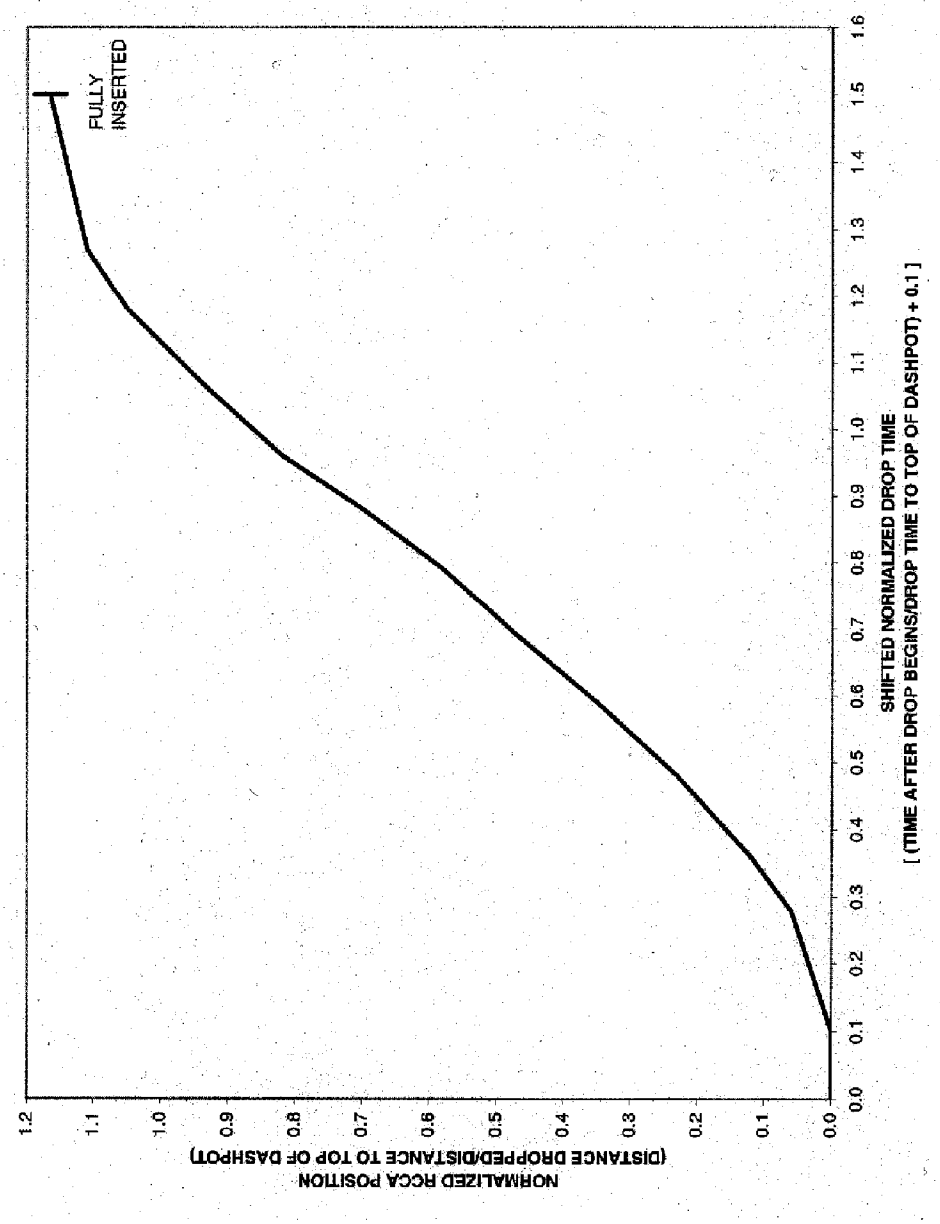


Figure 15-255. Normalized Rod Worth Versus Percent Inserted

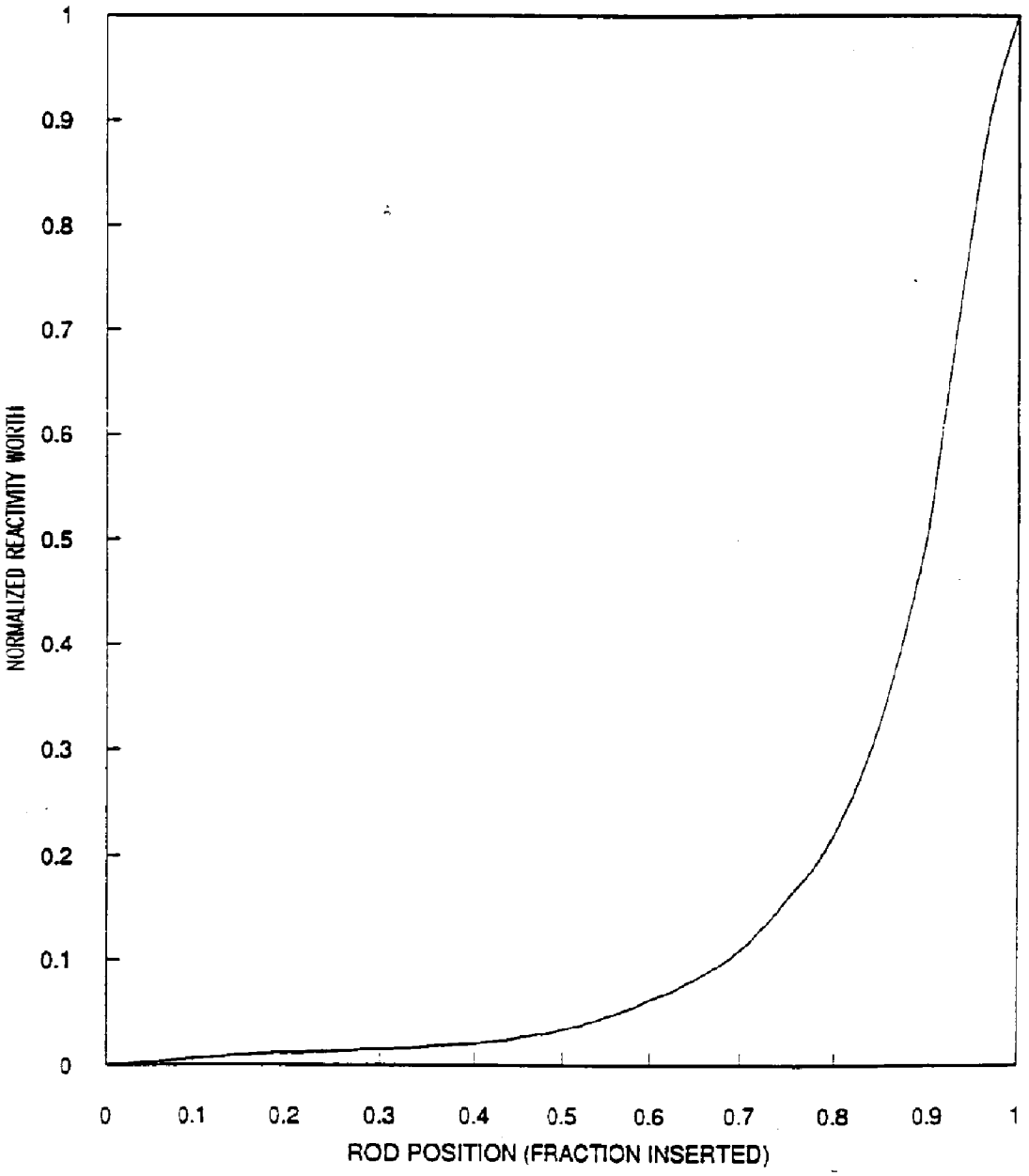


Figure 15-256. Normalized RCCA Bank Reactivity Worth Versus Normalized Drop Time

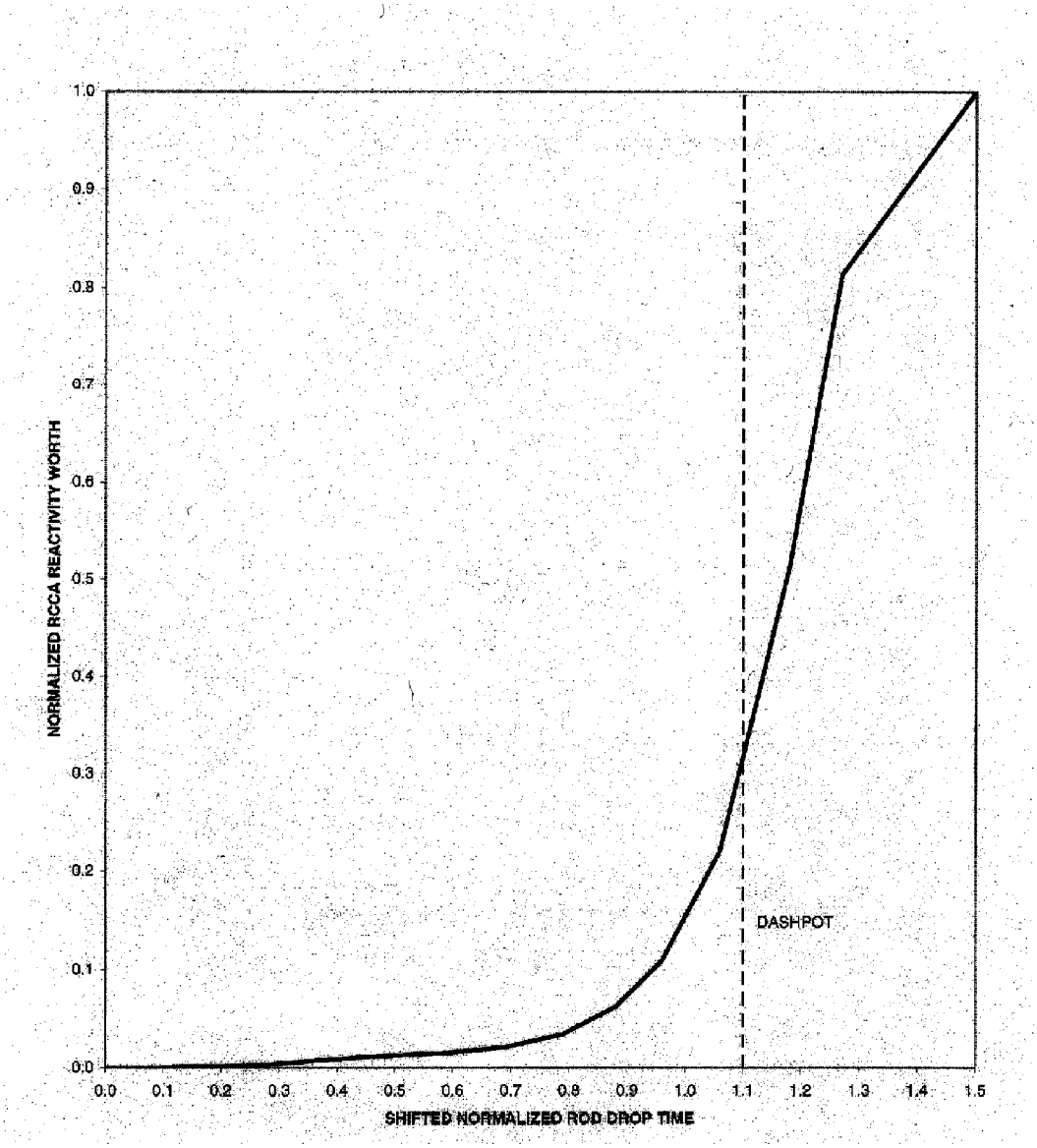


Figure 15-257. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

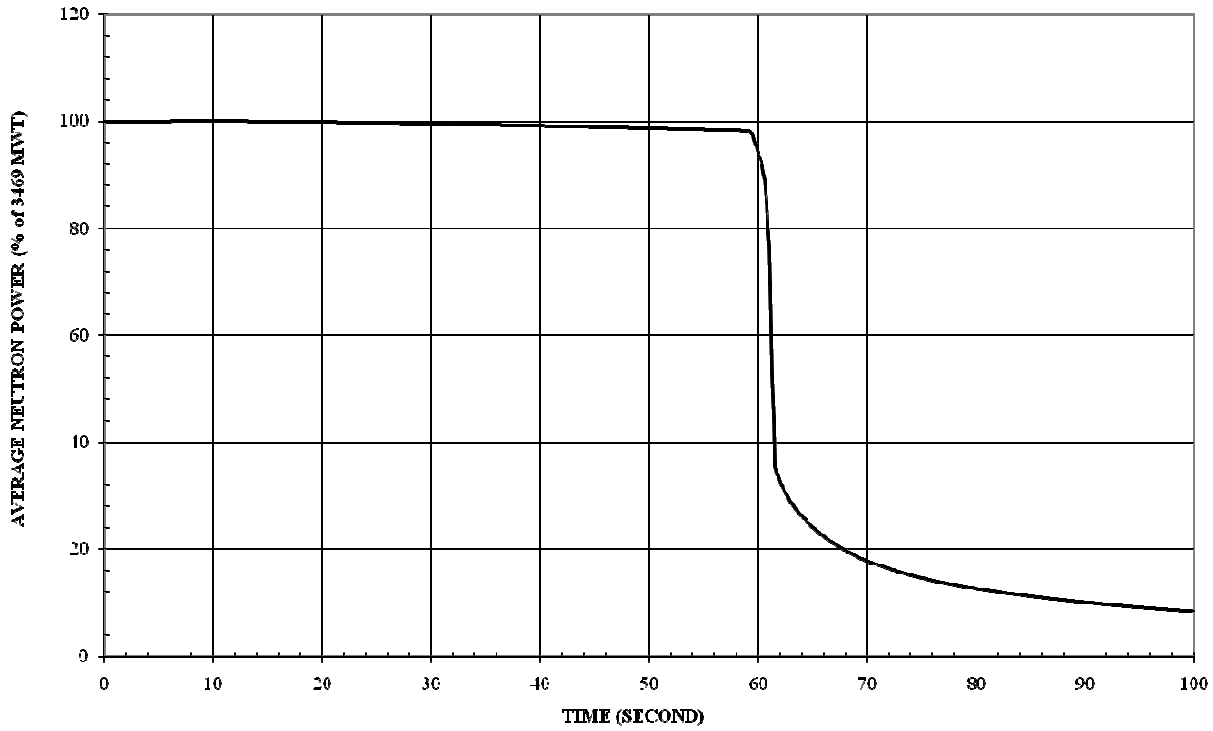


Figure 15-258. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

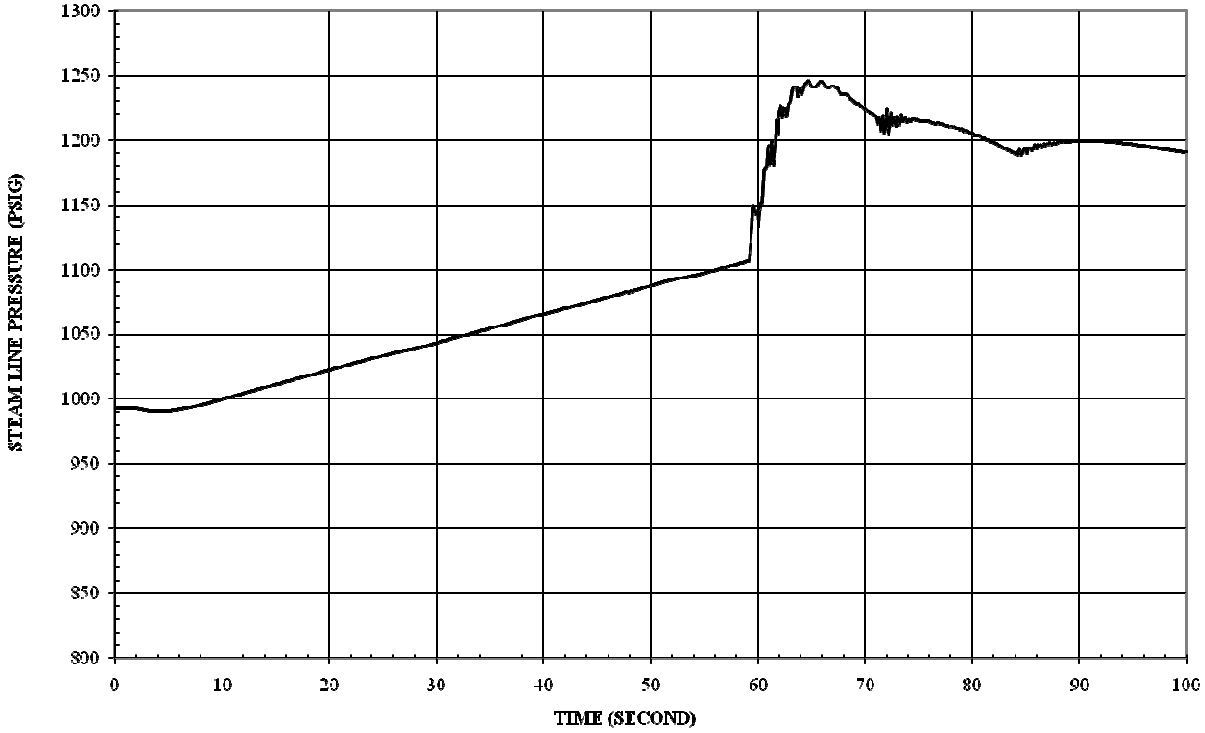


Figure 15-259. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

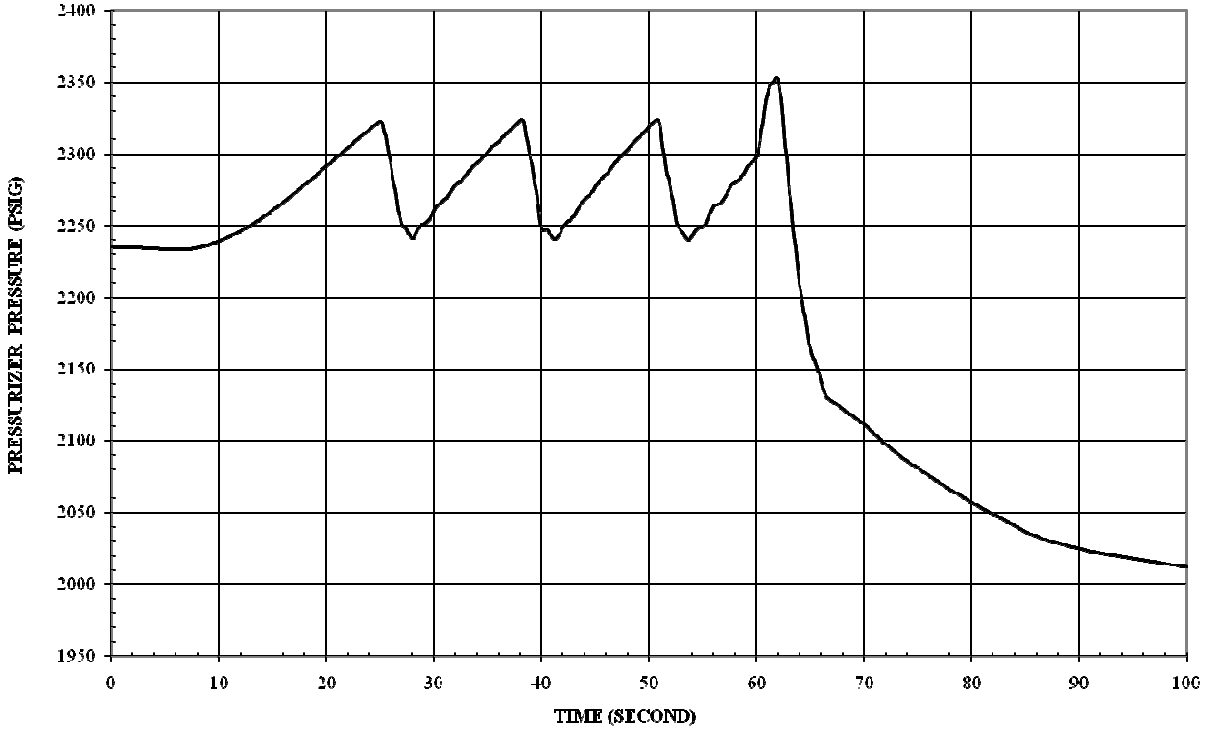


Figure 15-260. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

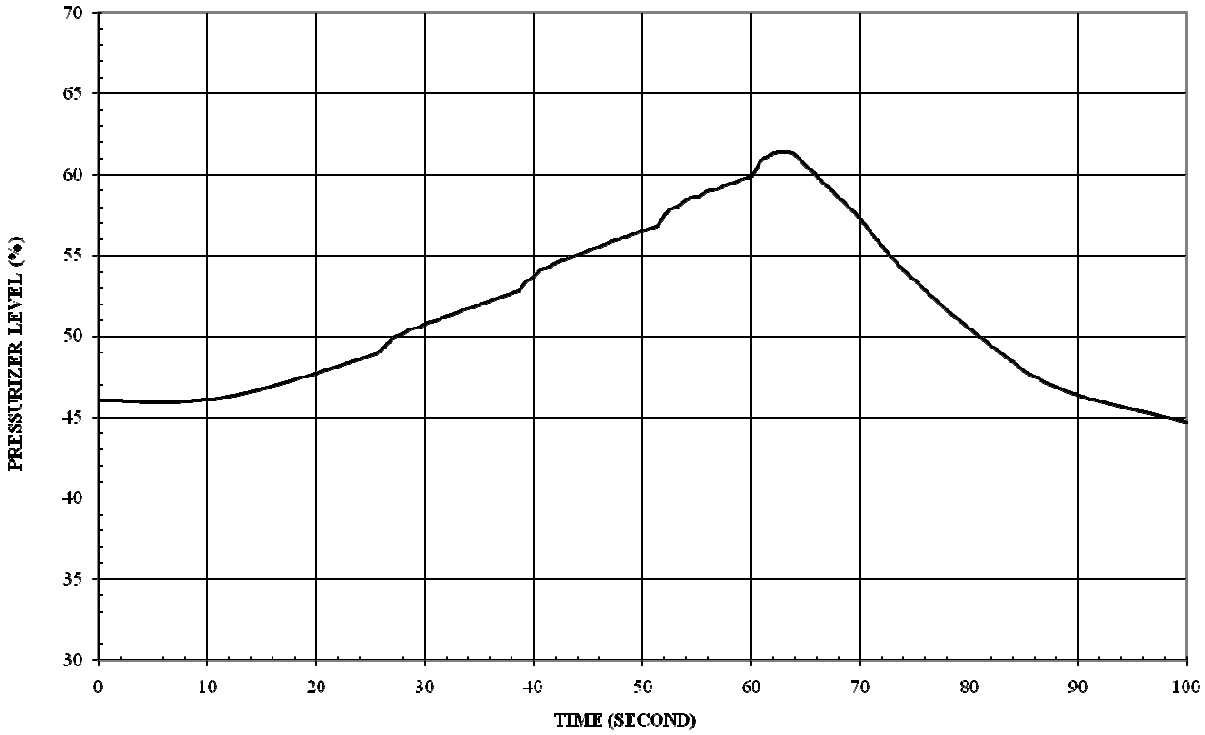


Figure 15-261. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

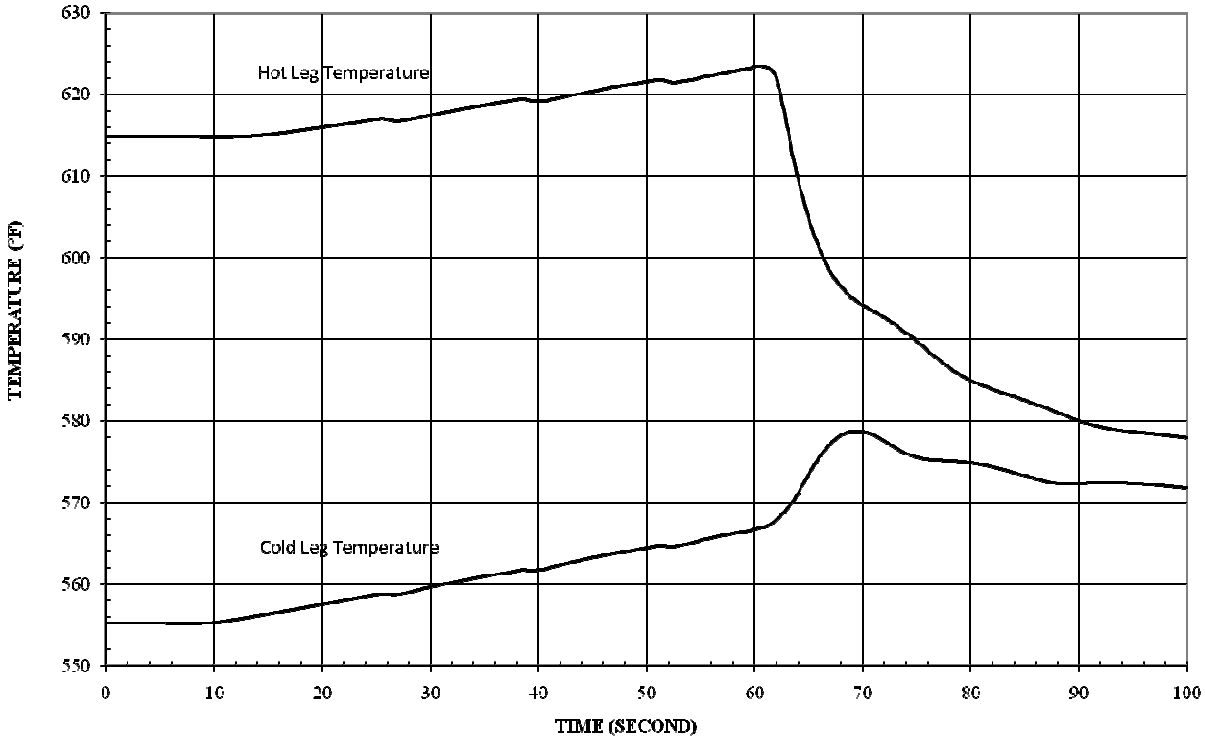


Figure 15-262. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

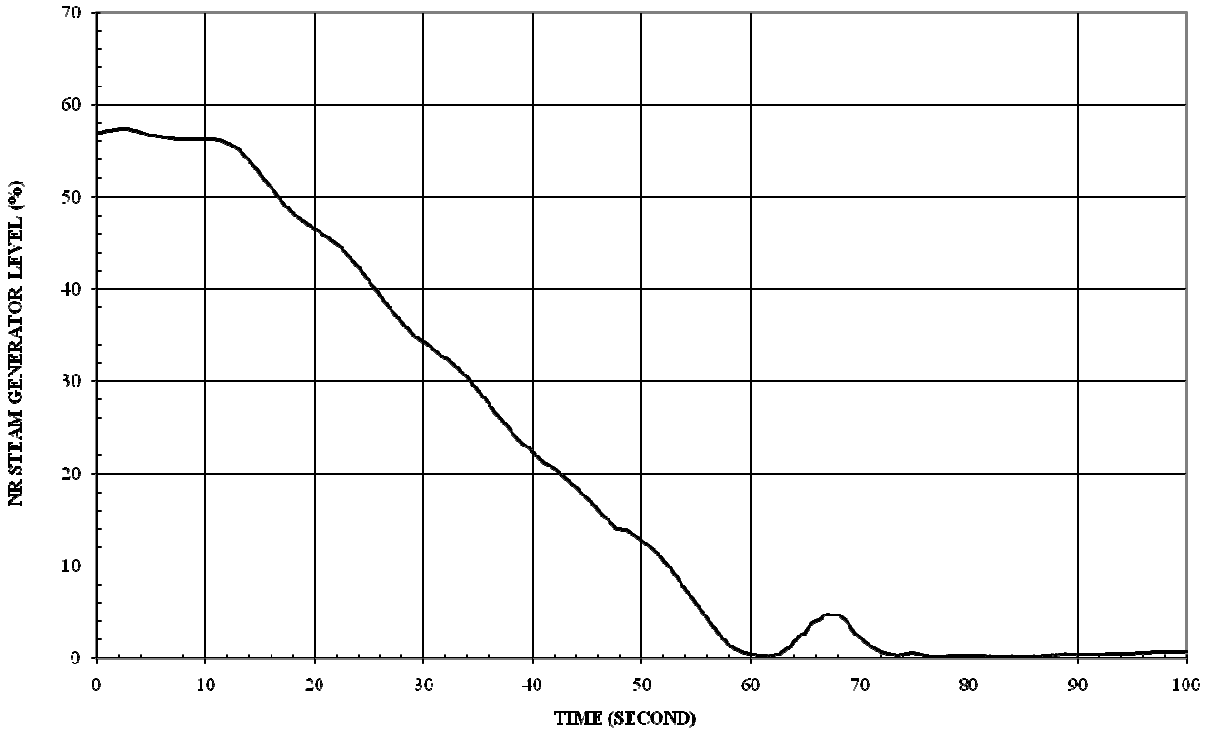


Figure 15-263. Unit 1 Loss of Normal Feedwater Short-Term Core Cooling Analysis

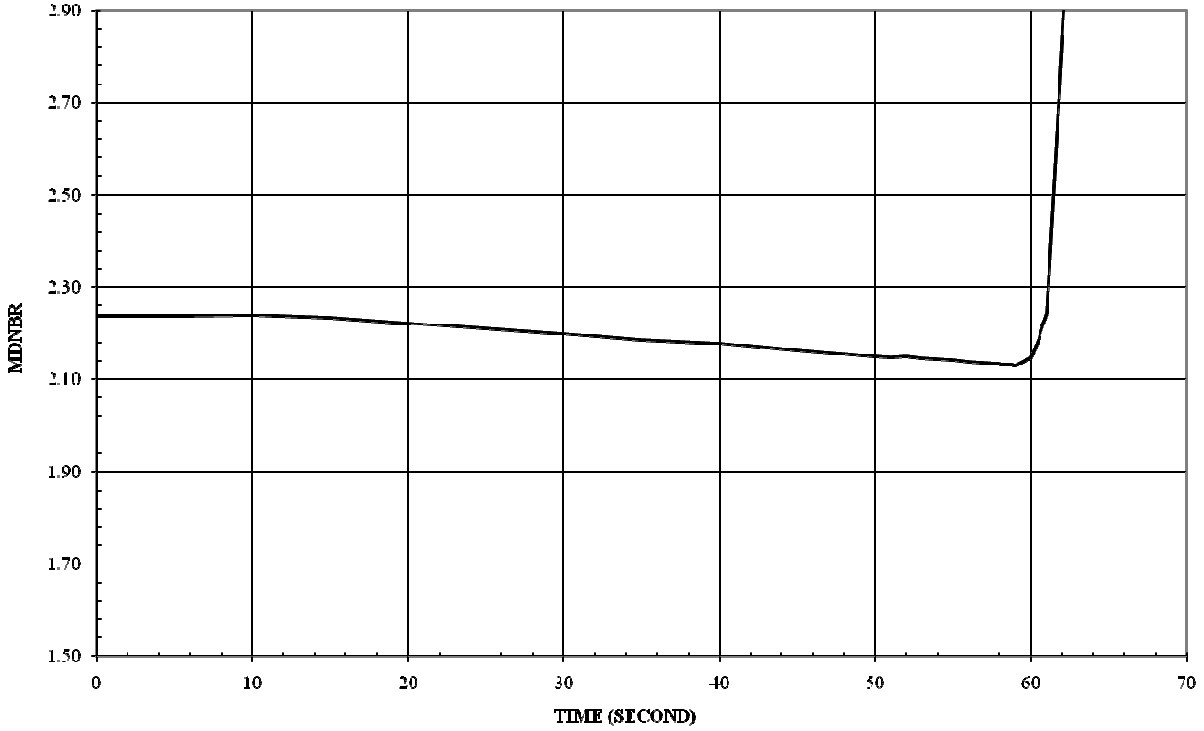


Figure 15-264. Unit 2 Loss of Normal Feedwater Long-Term Core Cooling Analysis

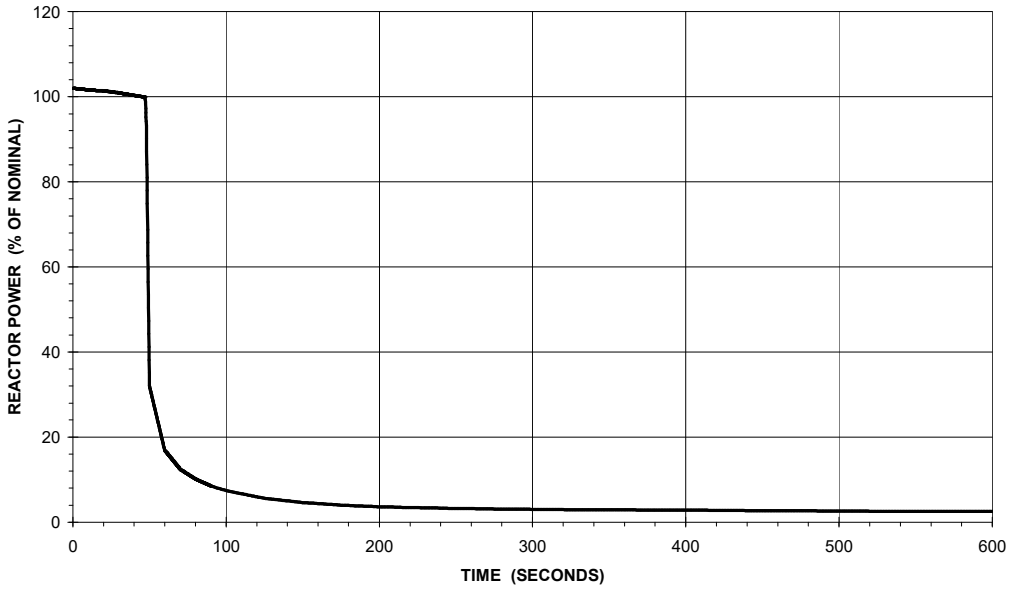


Figure 15-265. Unit 2 Loss of Normal Feedwater Long-Term Core Cooling Analysis

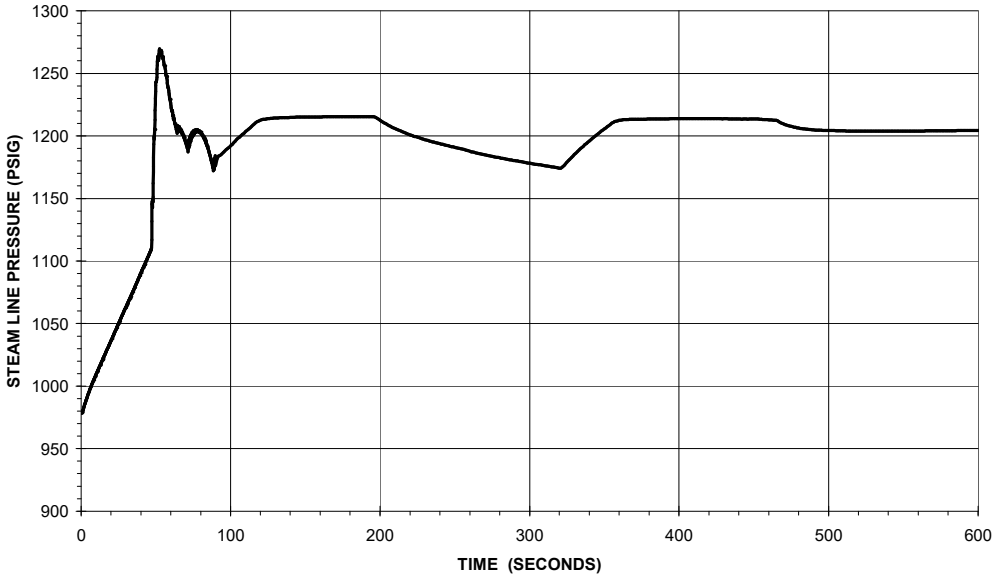


Figure 15-266. Unit 2 Loss of Normal Feedwater Long-Term Core Cooling Analysis

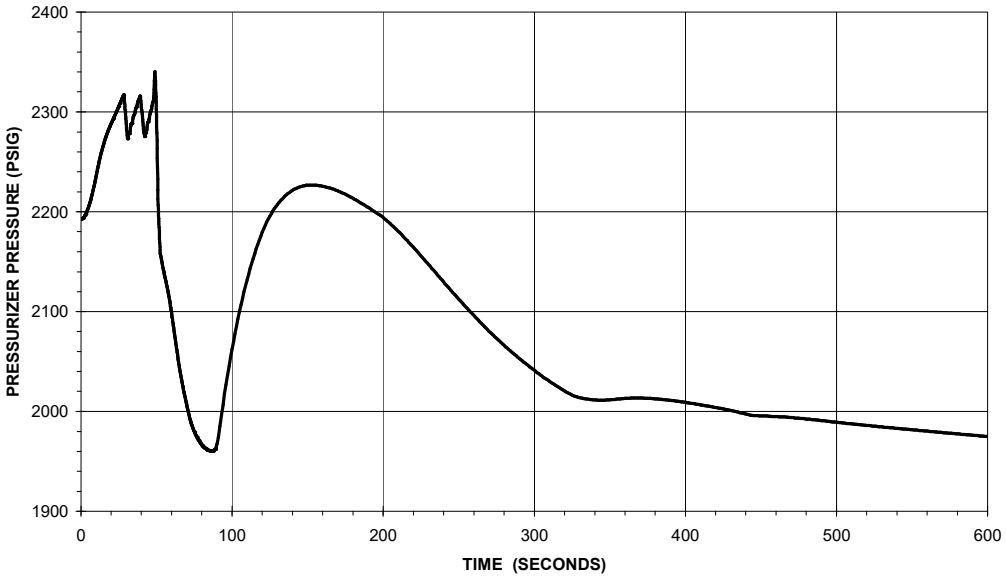


Figure 15-267. Unit 2 Loss of Normal Feedwater Long-Term Core Cooling Analysis

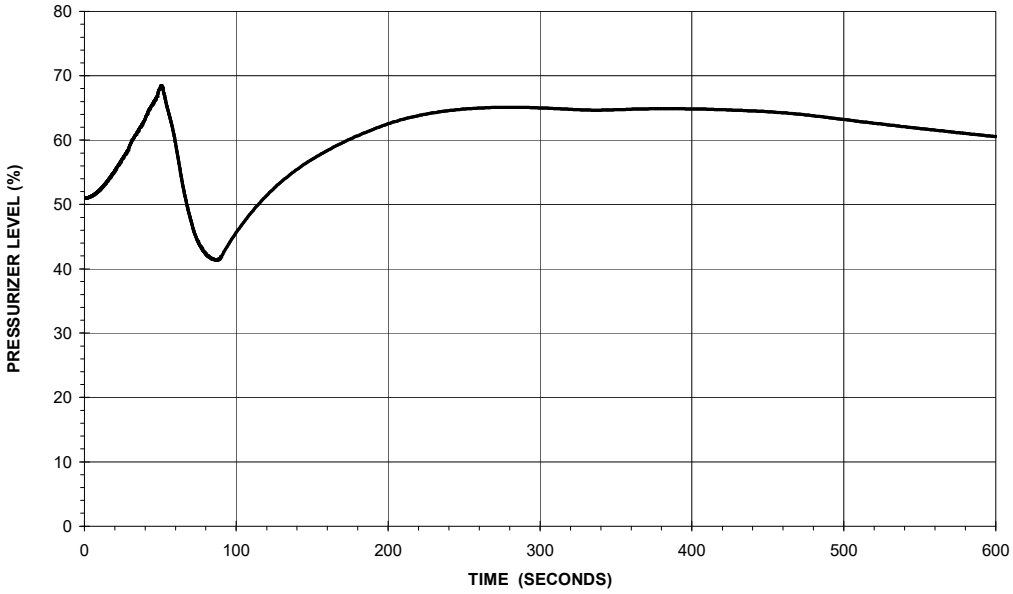


Figure 15-268. Unit 2 Loss of Normal Feedwater Long-Term Core Cooling Analysis

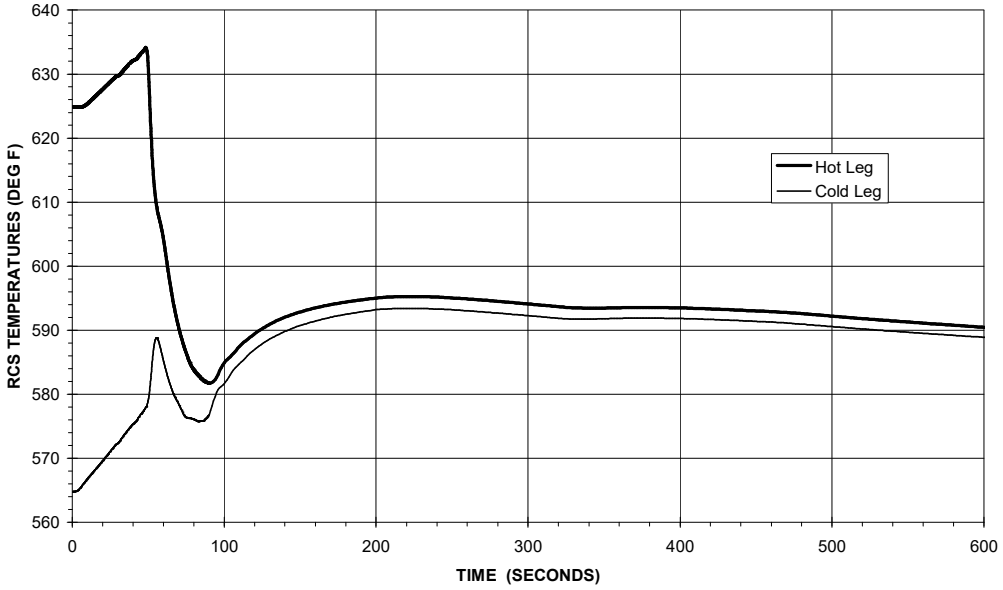


Figure 15-269. Partial Loss of Forced Reactor Coolant Flow

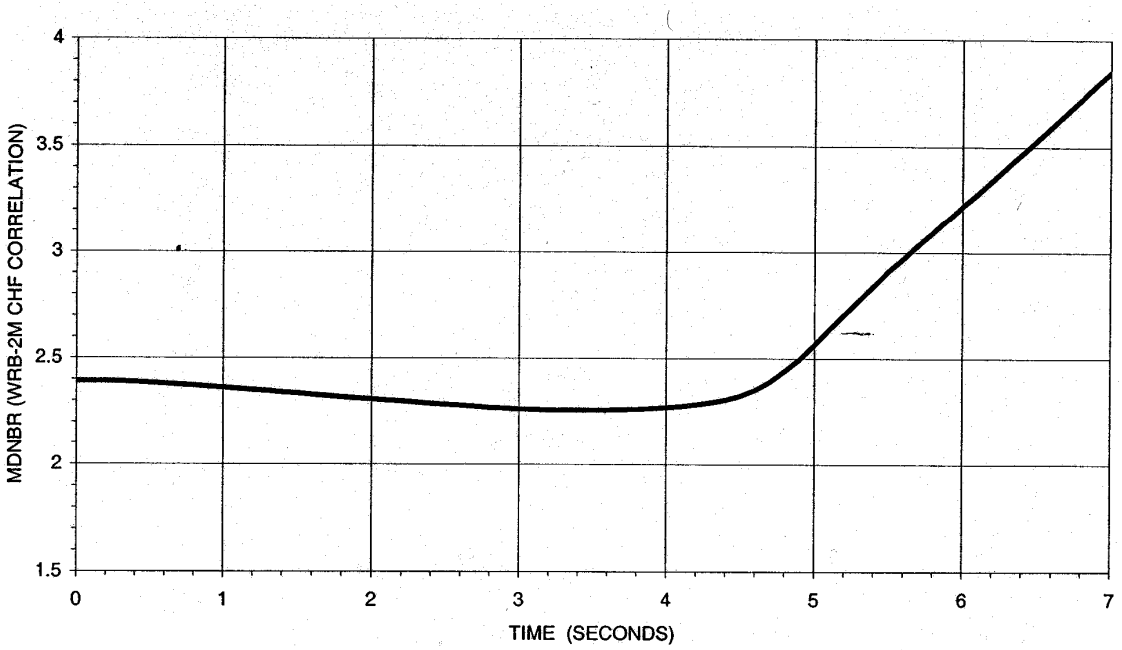


Figure 15-270. Complete Loss of Forced Reactor Coolant Flow

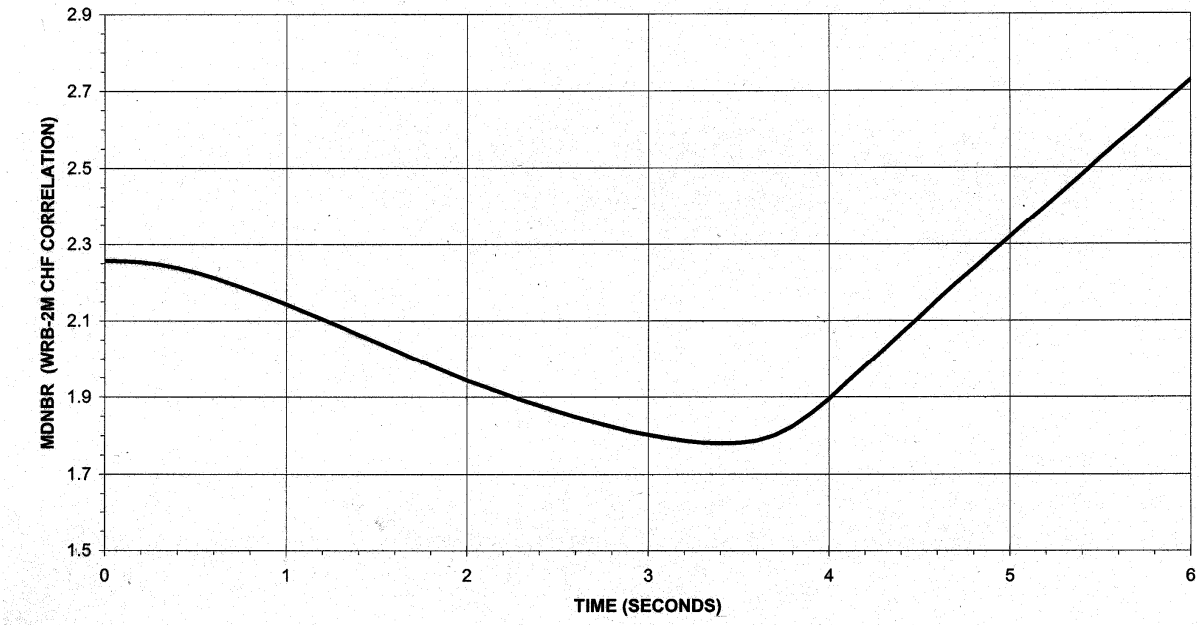


Figure 15-271. Locked Rotor - Offsite Power Maintained

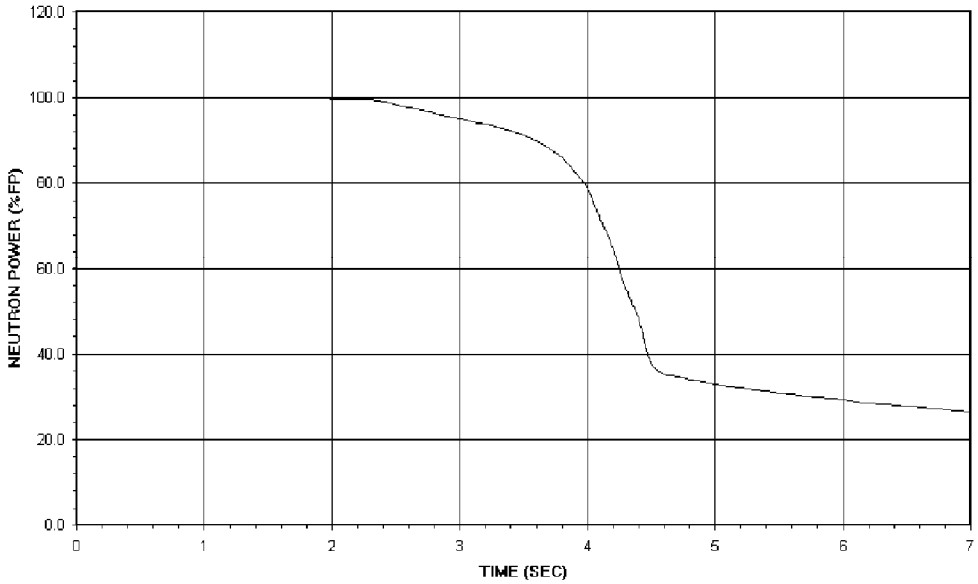


Figure 15-272. Locked Rotor - Offsite Power Maintained

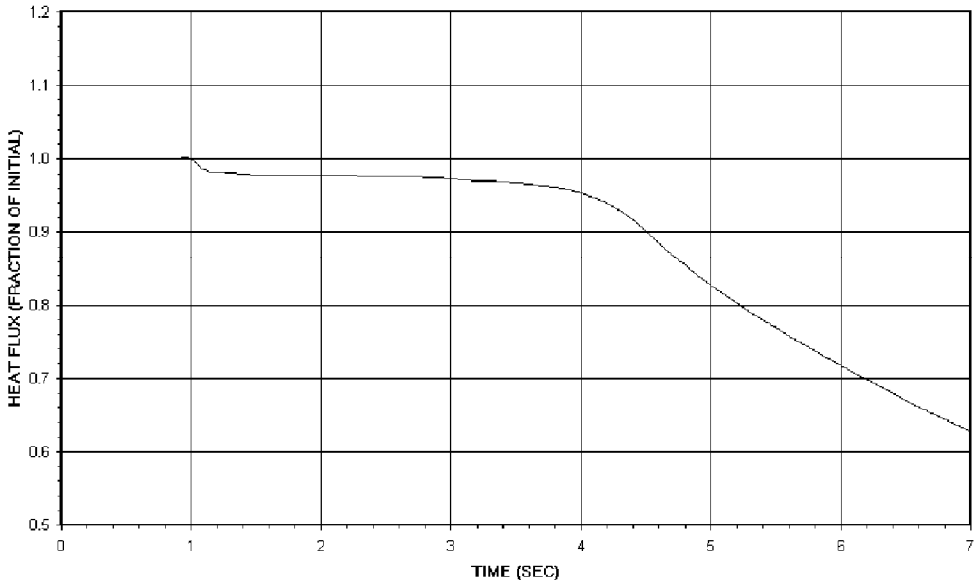


Figure 15-273. Locked Rotor - Offsite Power Maintained

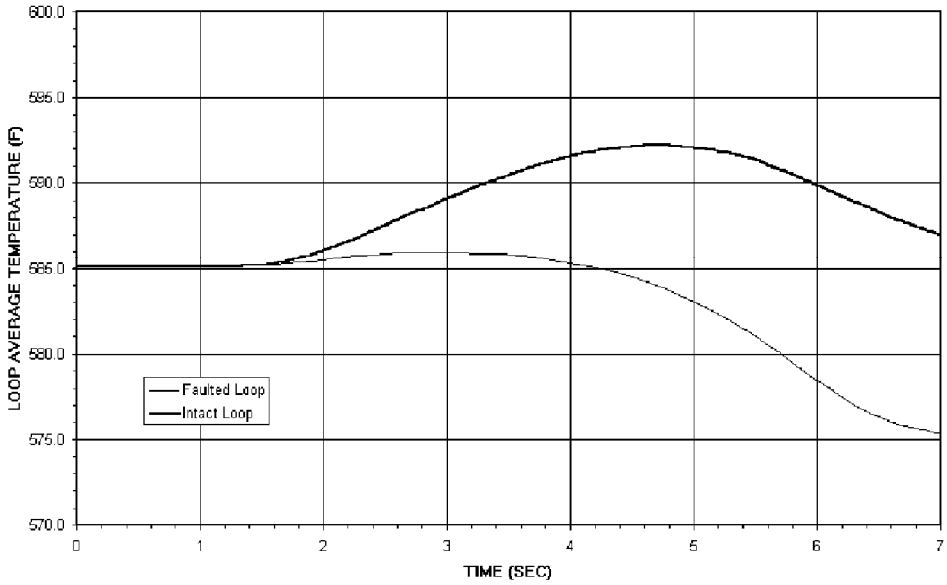


Figure 15-274. Locked Rotor - Offsite Power Maintained

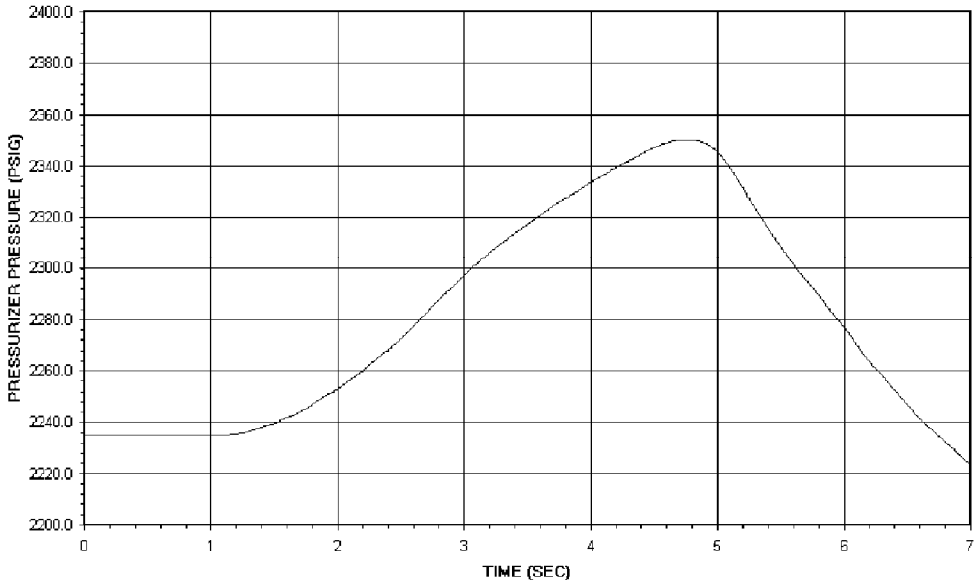


Figure 15-275. Locked Rotor - Peak RCS Pressure

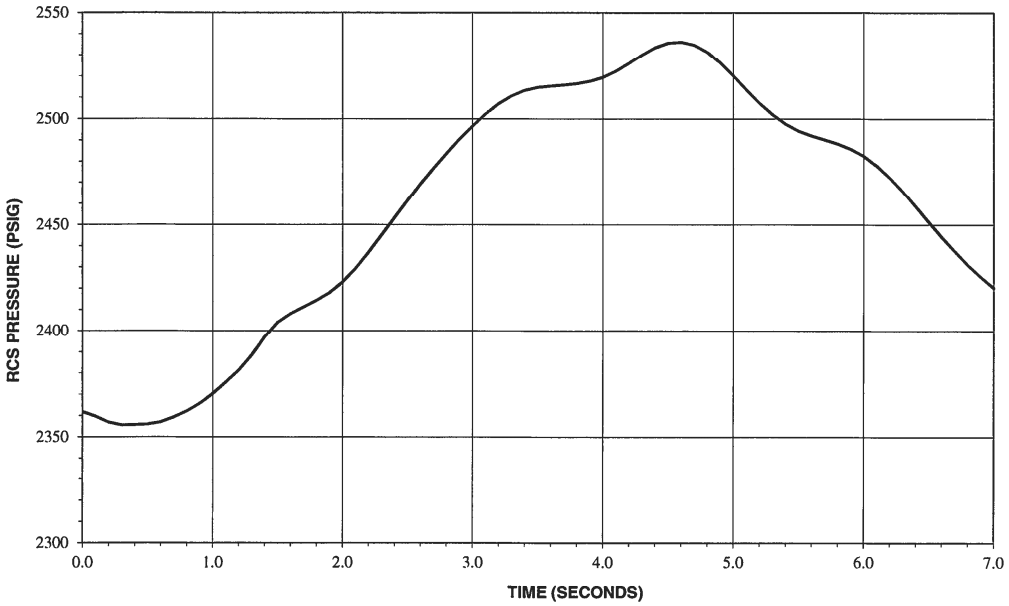


Figure 15-276. Deleted Per 2006 Update

Figure 15-277. Uncontrolled RCCA Bank Withdrawal from 10% Power - Westinghouse Fuel

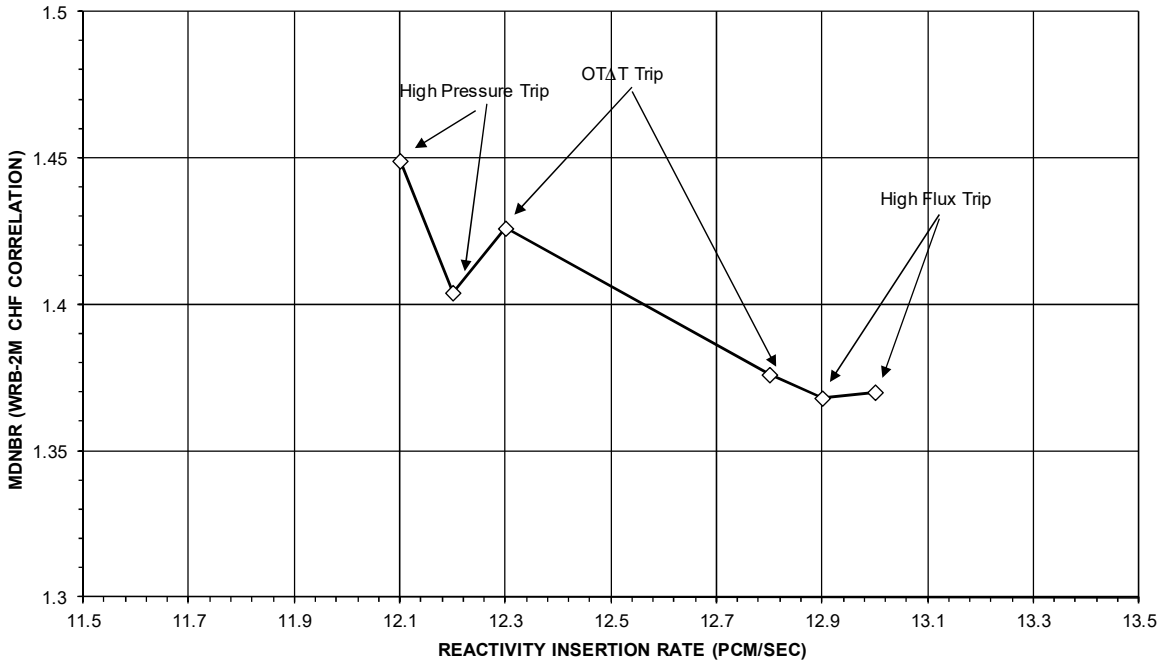


Figure 15-278. Uncontrolled RCCA Bank Withdrawal from 50% Power - Westinghouse Fuel

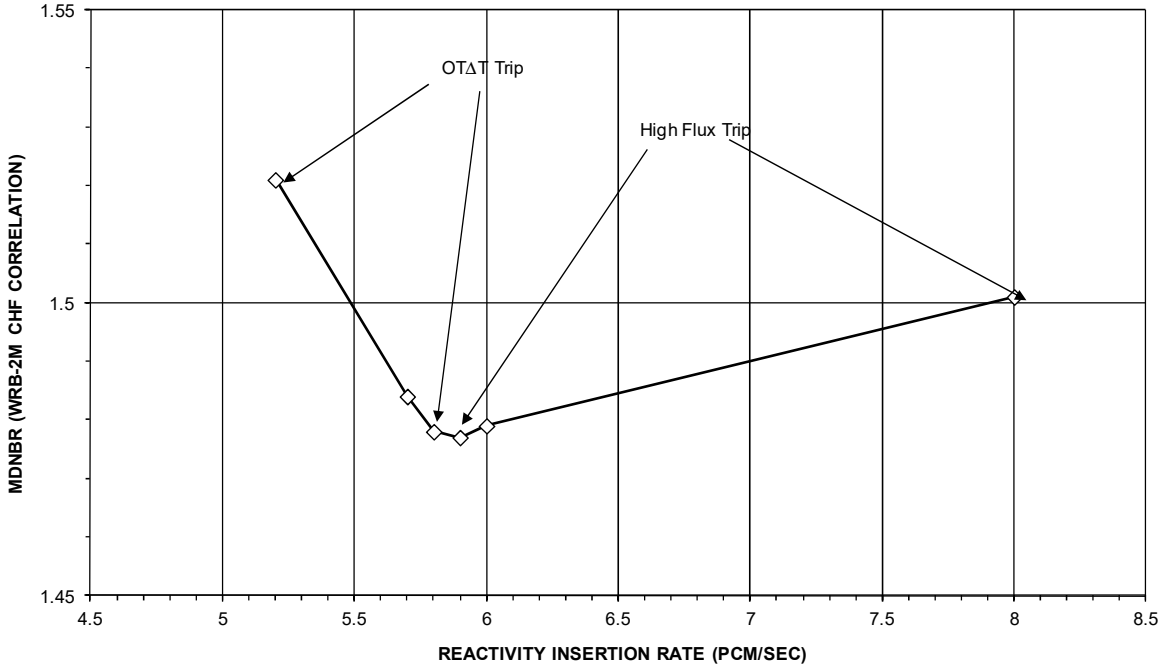


Figure 15-279. Uncontrolled RCCA Bank Withdrawal from 100% Power

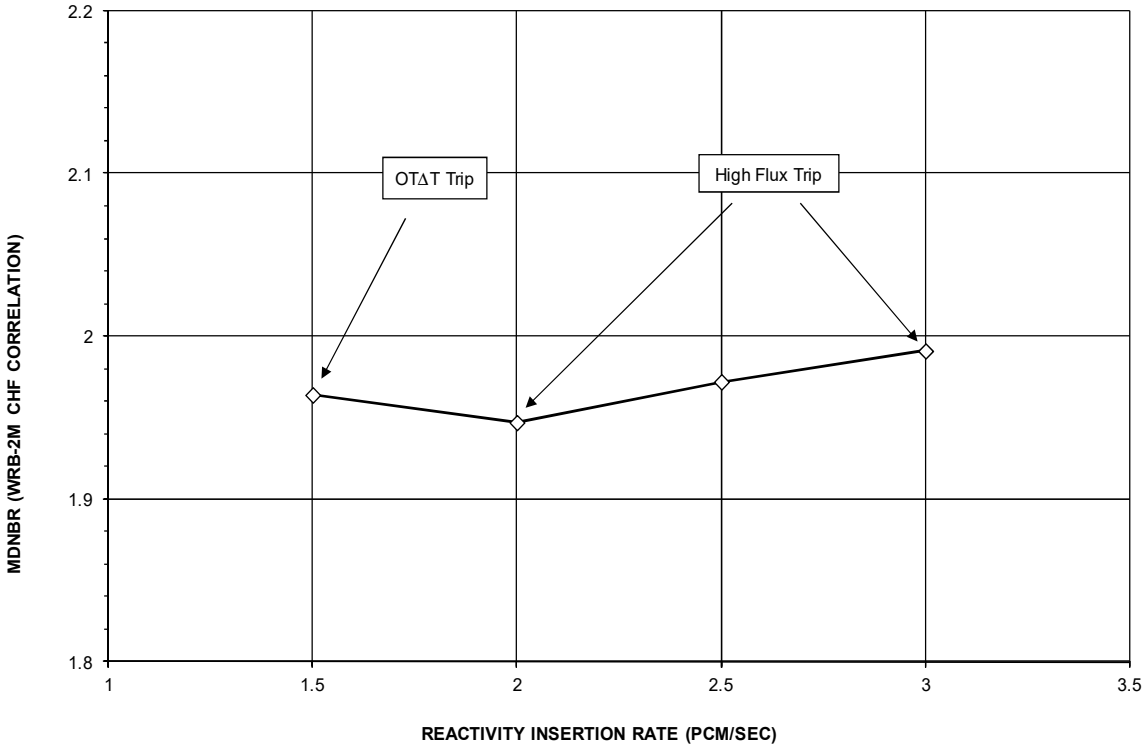


Figure 15-280. Deleted Per 2004 Update

Figure 15-281. Uncontrolled RCCA Bank Withdrawal from 98% Power

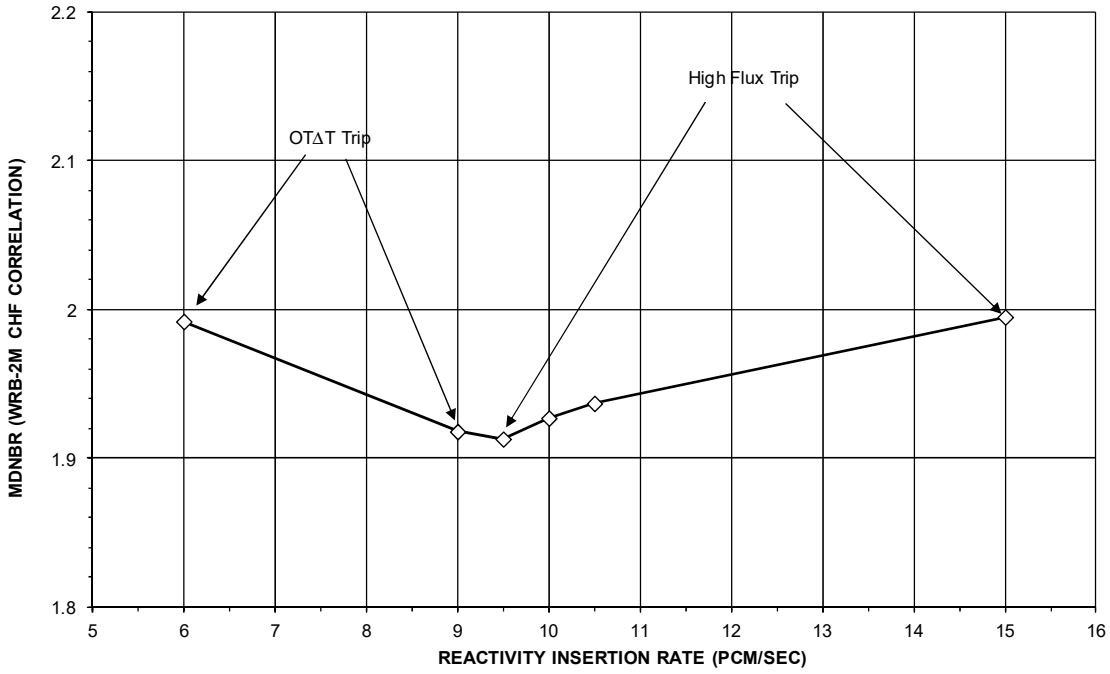


Figure 15-282. Power Distribution Assumed for Small Break LOCA Analyses

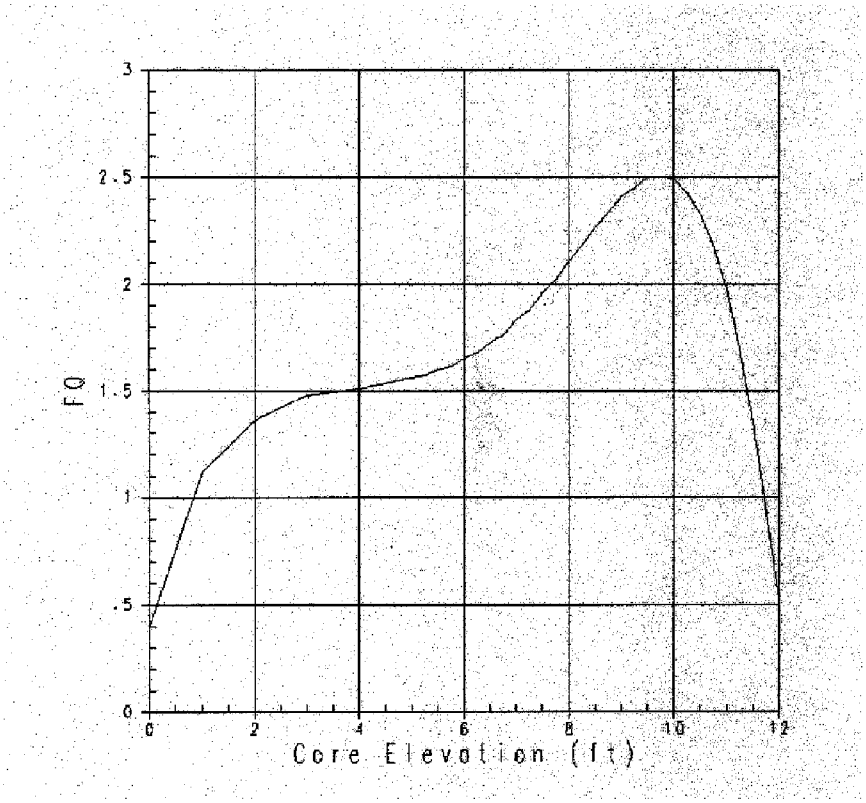


Figure 15-283. Catawba - 2 SBLOCA 4-Inch Pressurizer Pressure

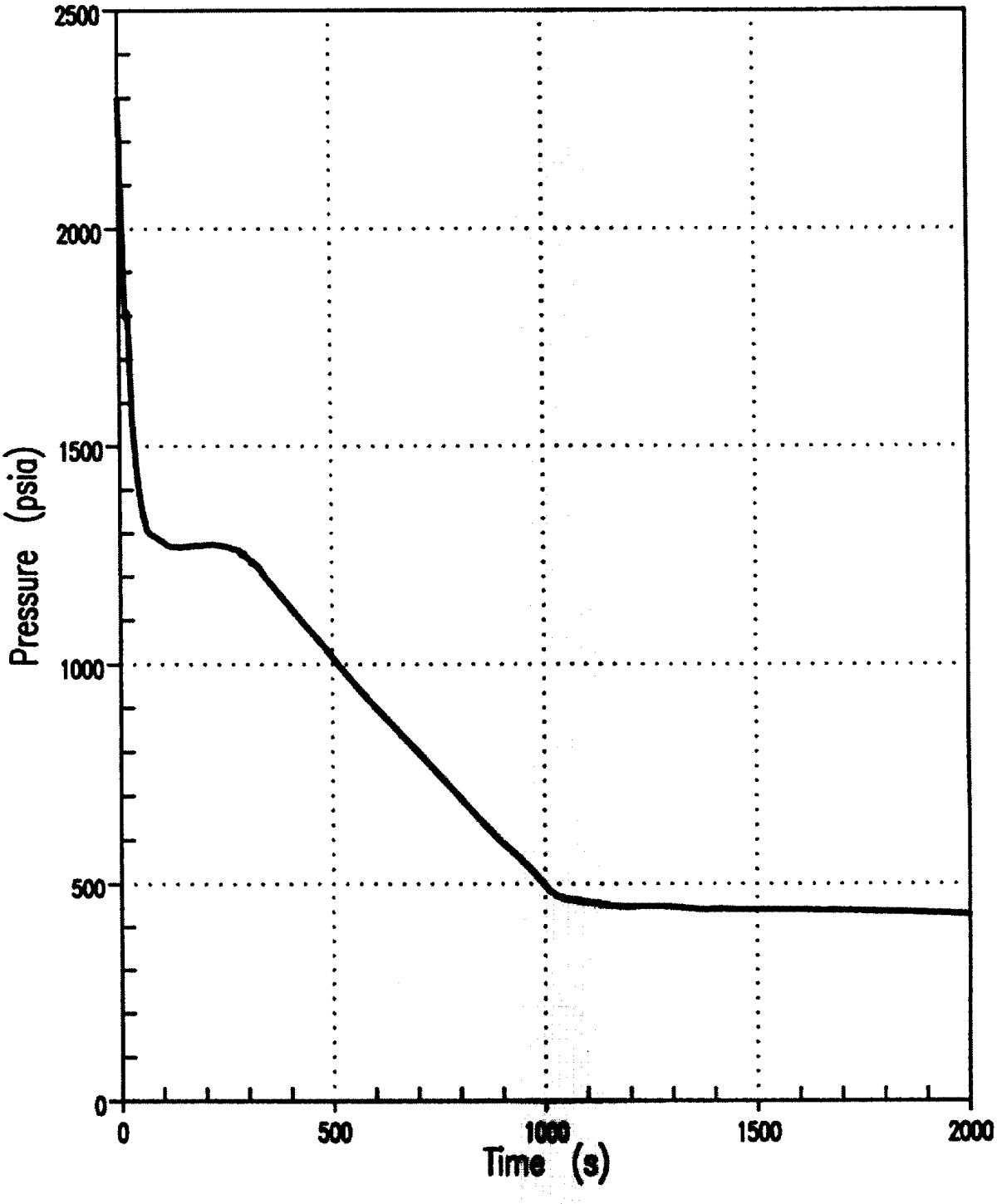


Figure 15-284. Catawba - 2 SBLOCA 4-Inch Core Mixture Level

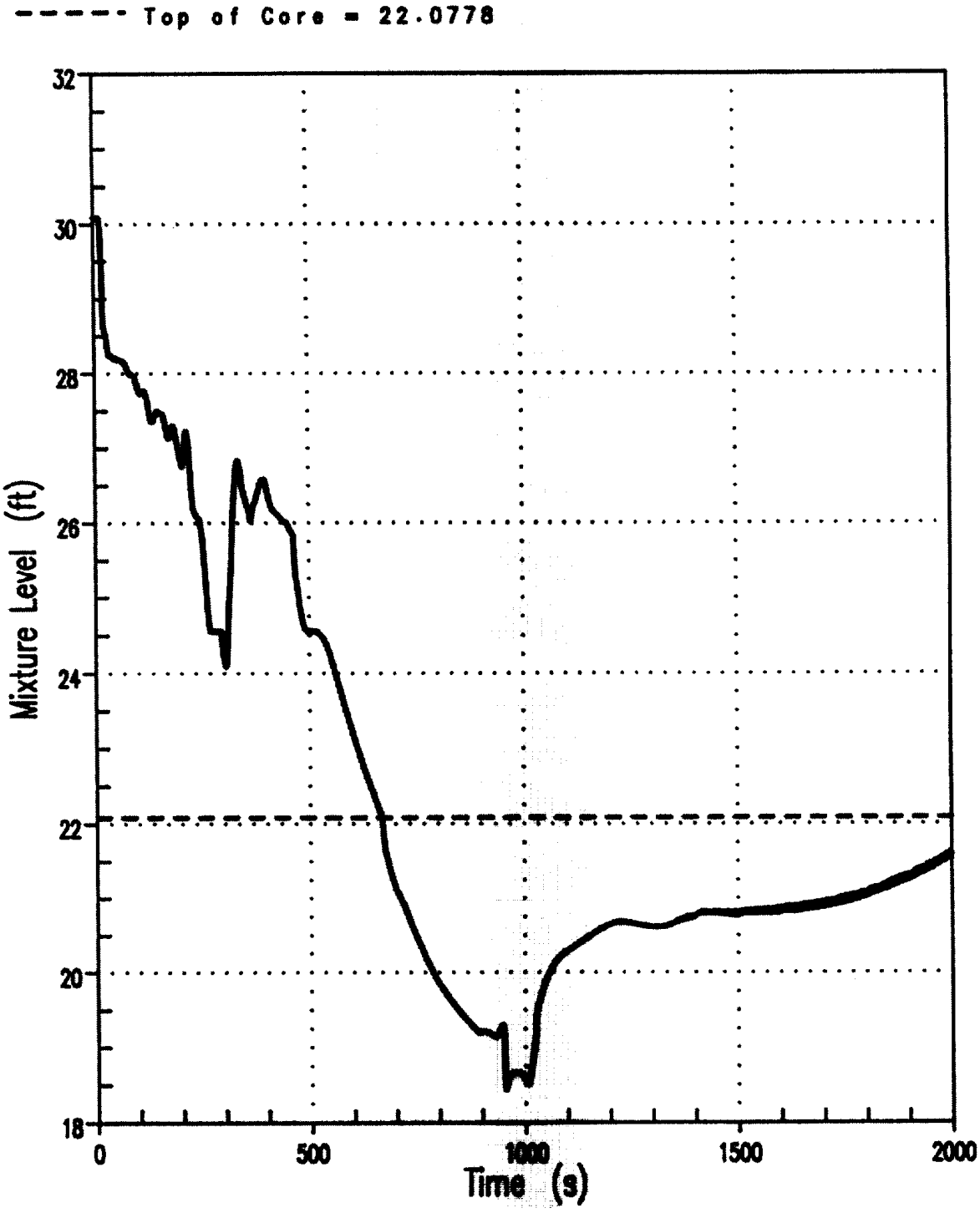


Figure 15-285. Catawba - 2 SBLOCA 4-Inch Core Exit Vapor Temperature

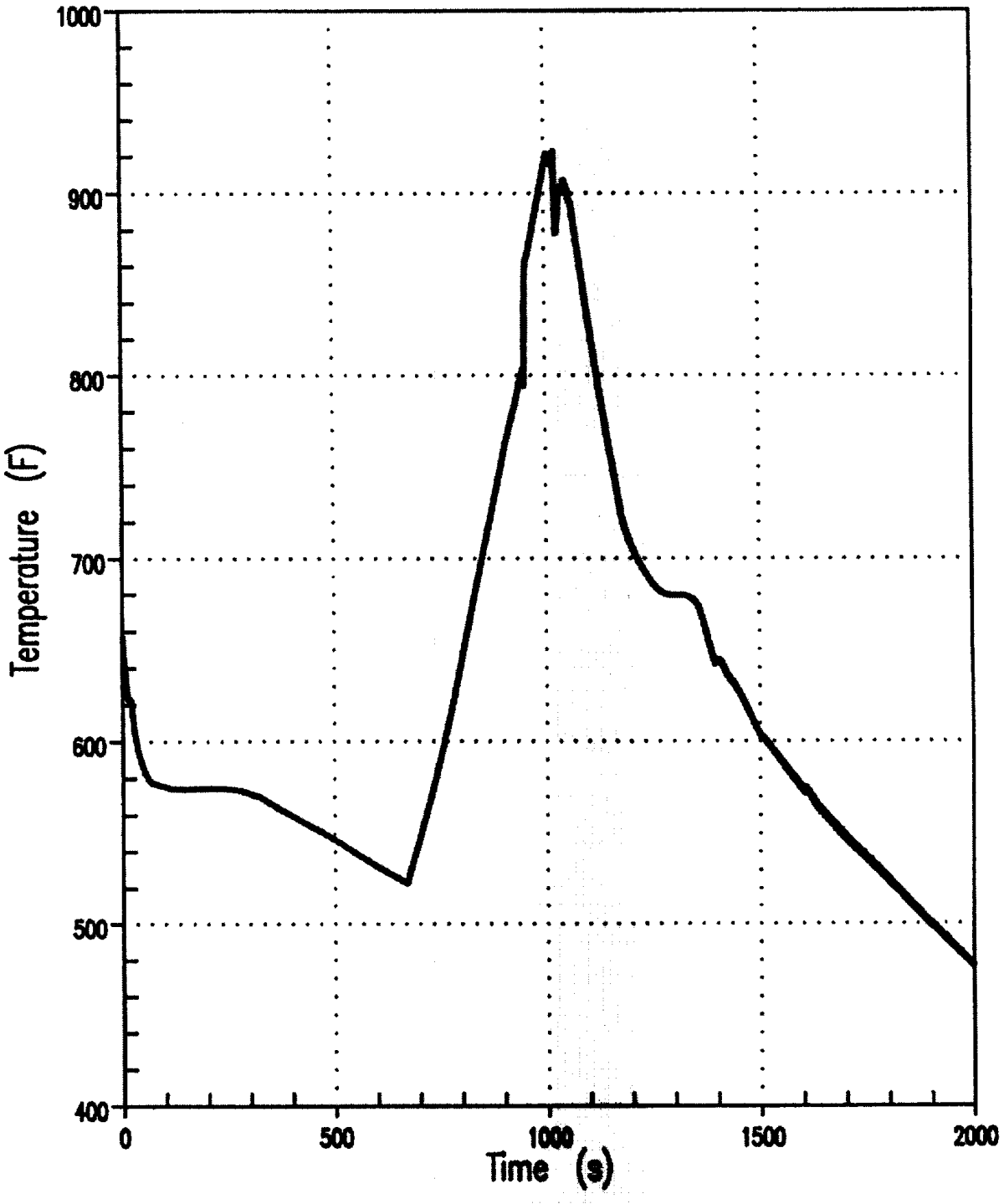


Figure 15-286. Deleted Per 2007 Update

Figure 15-287. Catawba - 2 SBLOCA 4-Inch Break Liquid Flow and Total Safety Injection Flow

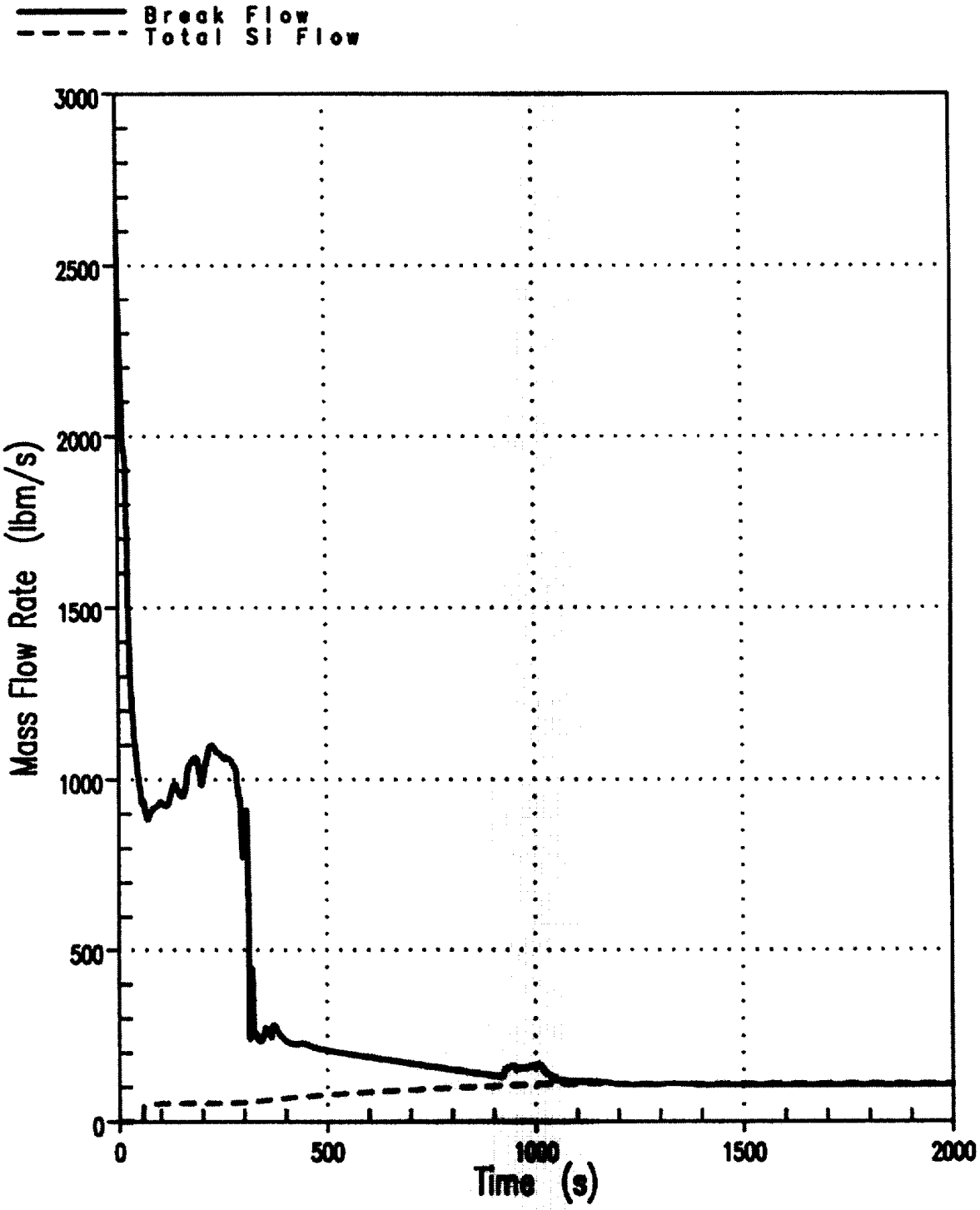


Figure 15-288. Catawba - 2 SBLOCA 4-Inch Peak Clad Temperature and Maximum Transient Oxidation

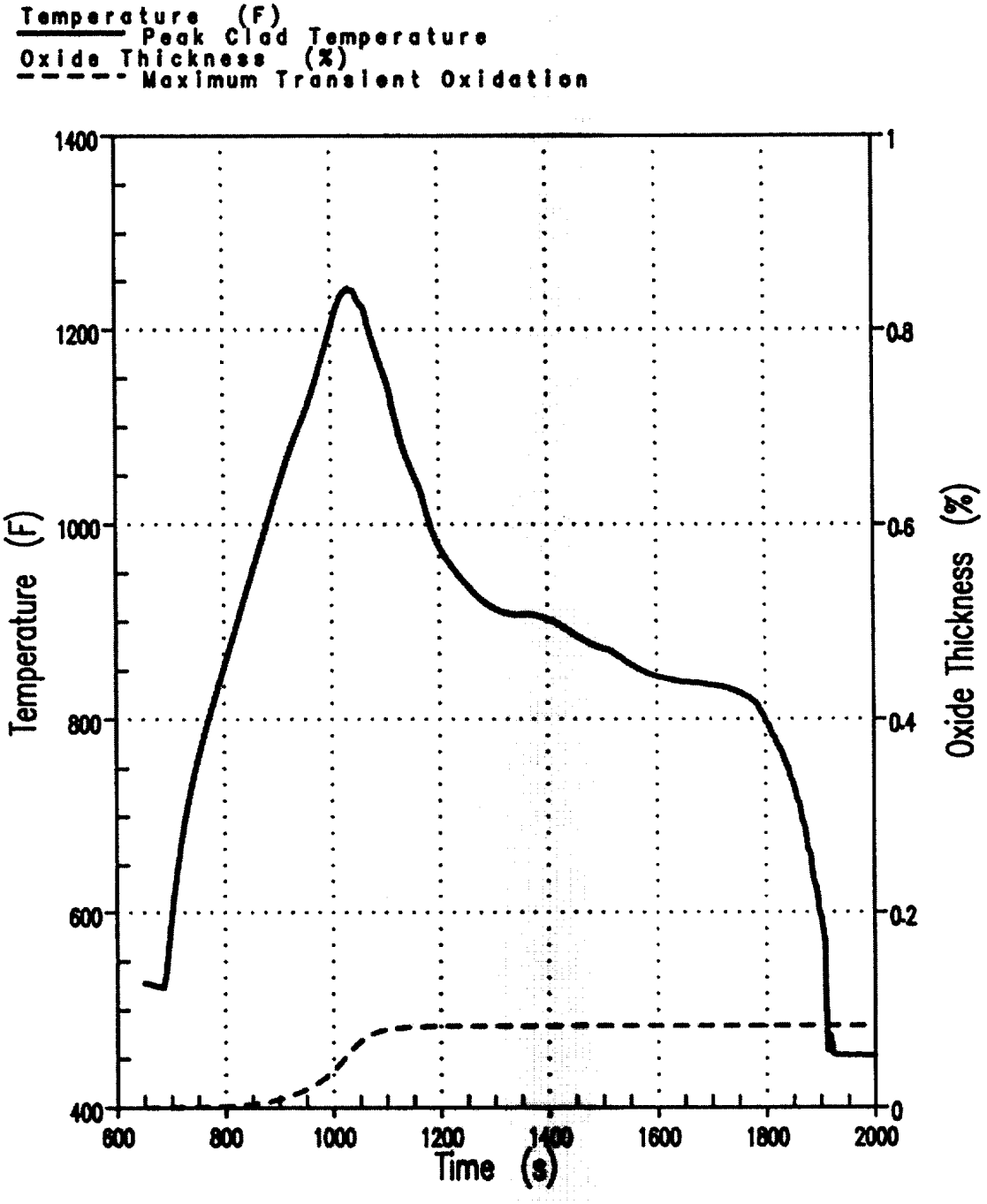


Figure 15-289. Catawba - 2 SBLOCA 4-Inch RCS Mass

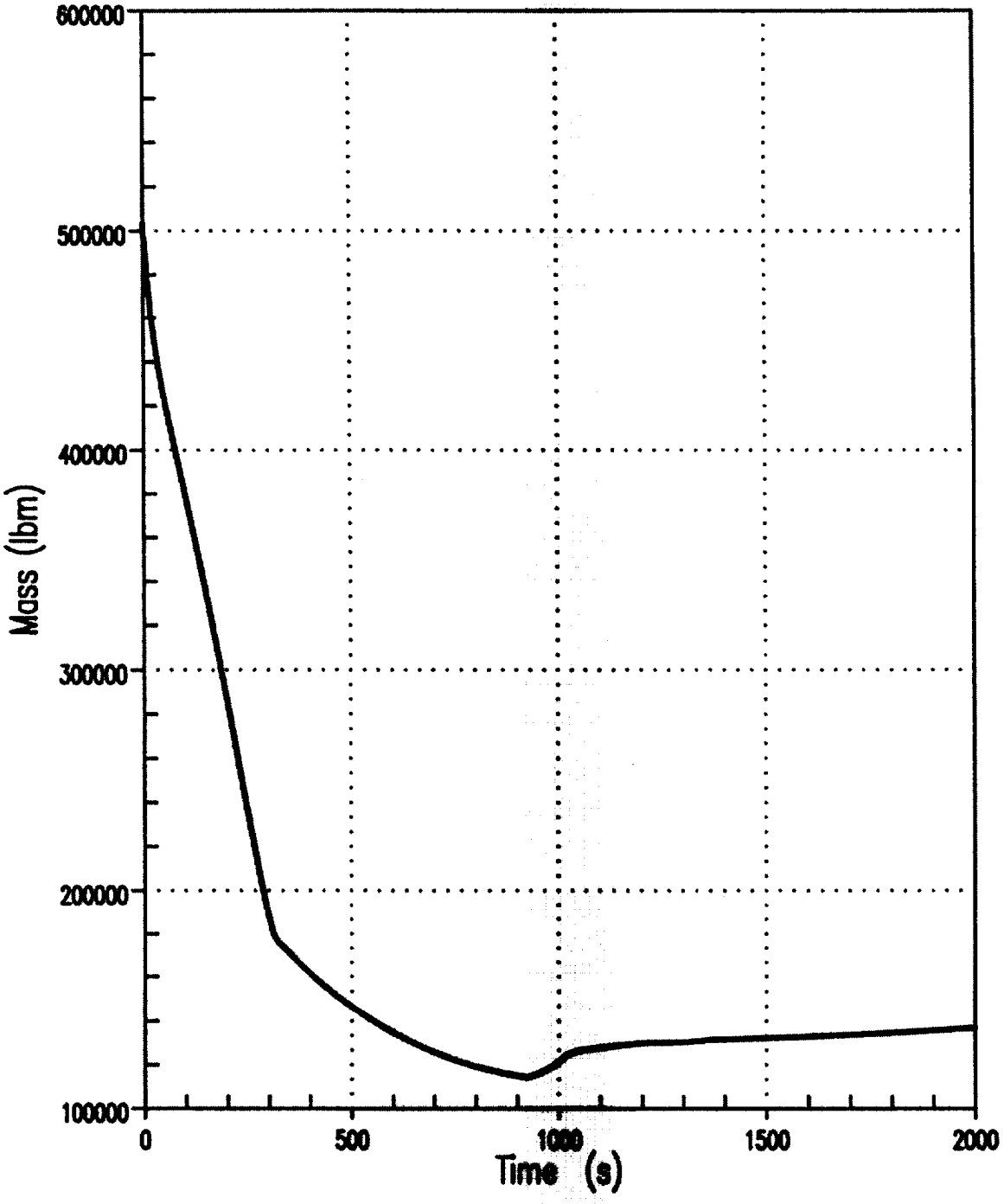


Figure 15-290. Catawba - 2 SBLOCA 2-Inch Pressurizer Pressure

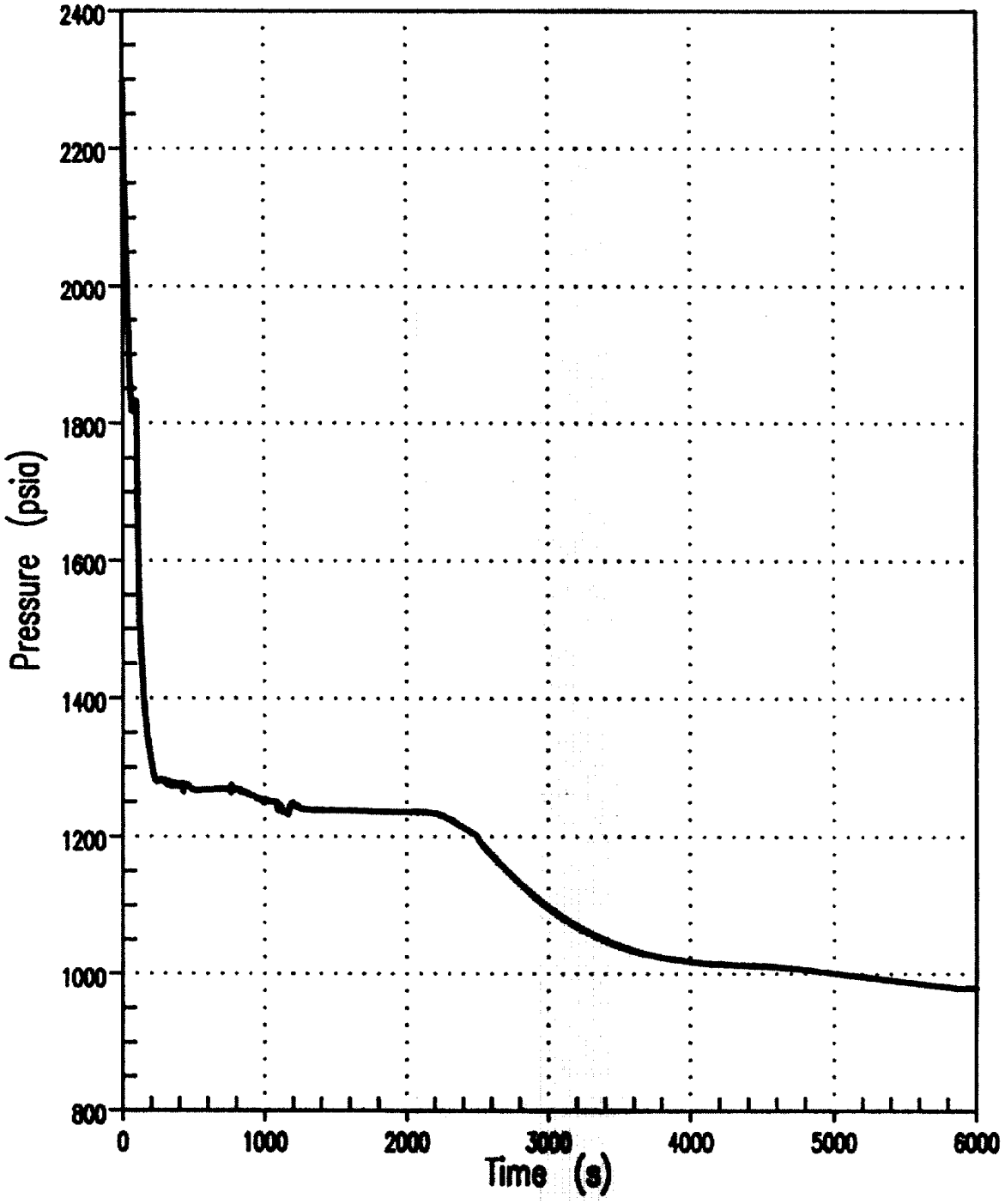


Figure 15-291. Catawba - 2 SBLOCA 2-Inch Core Mixture Level

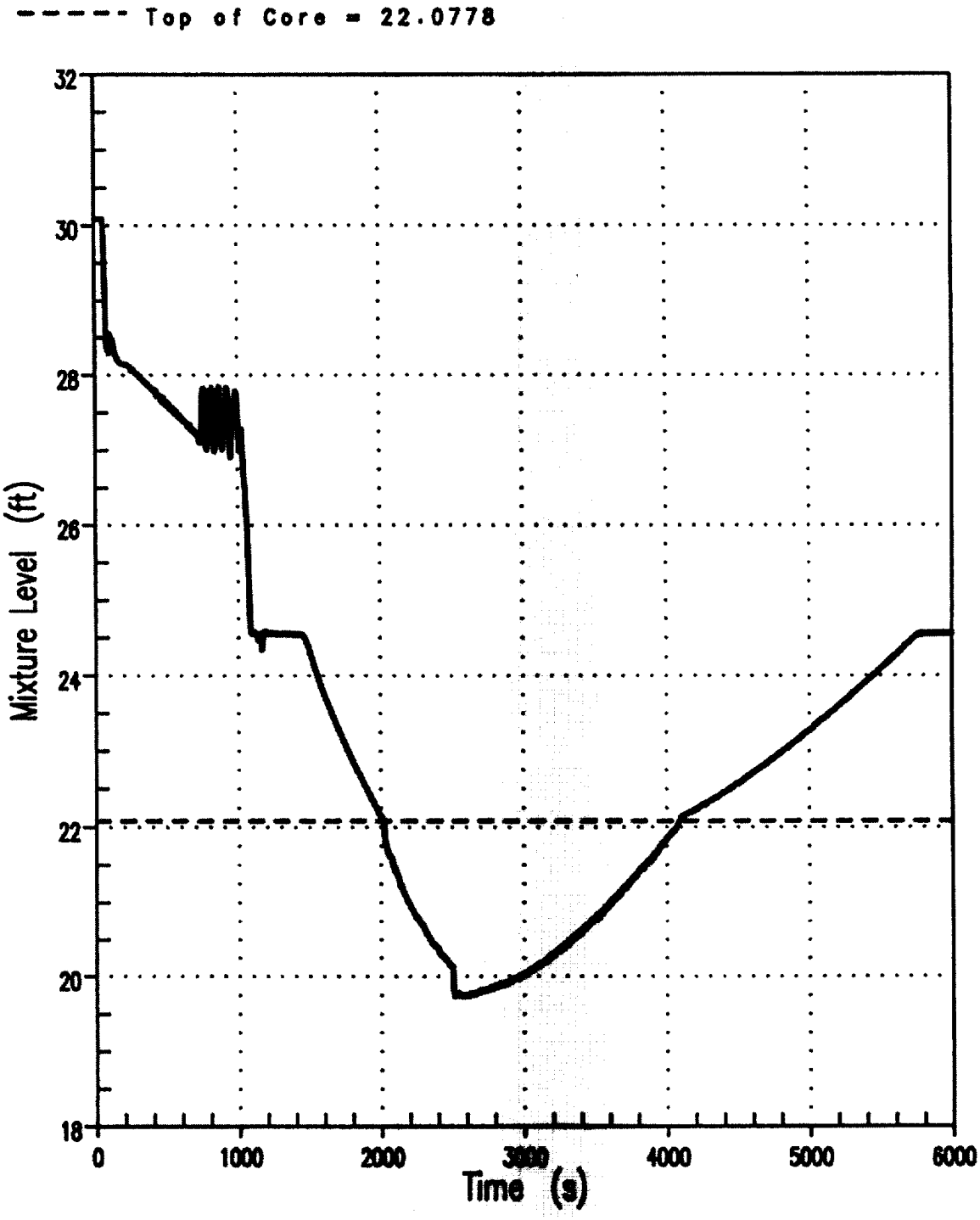


Figure 15-292. Catawba - 2 SBLOCA 2-Inch Core Exit Vapor Temperature

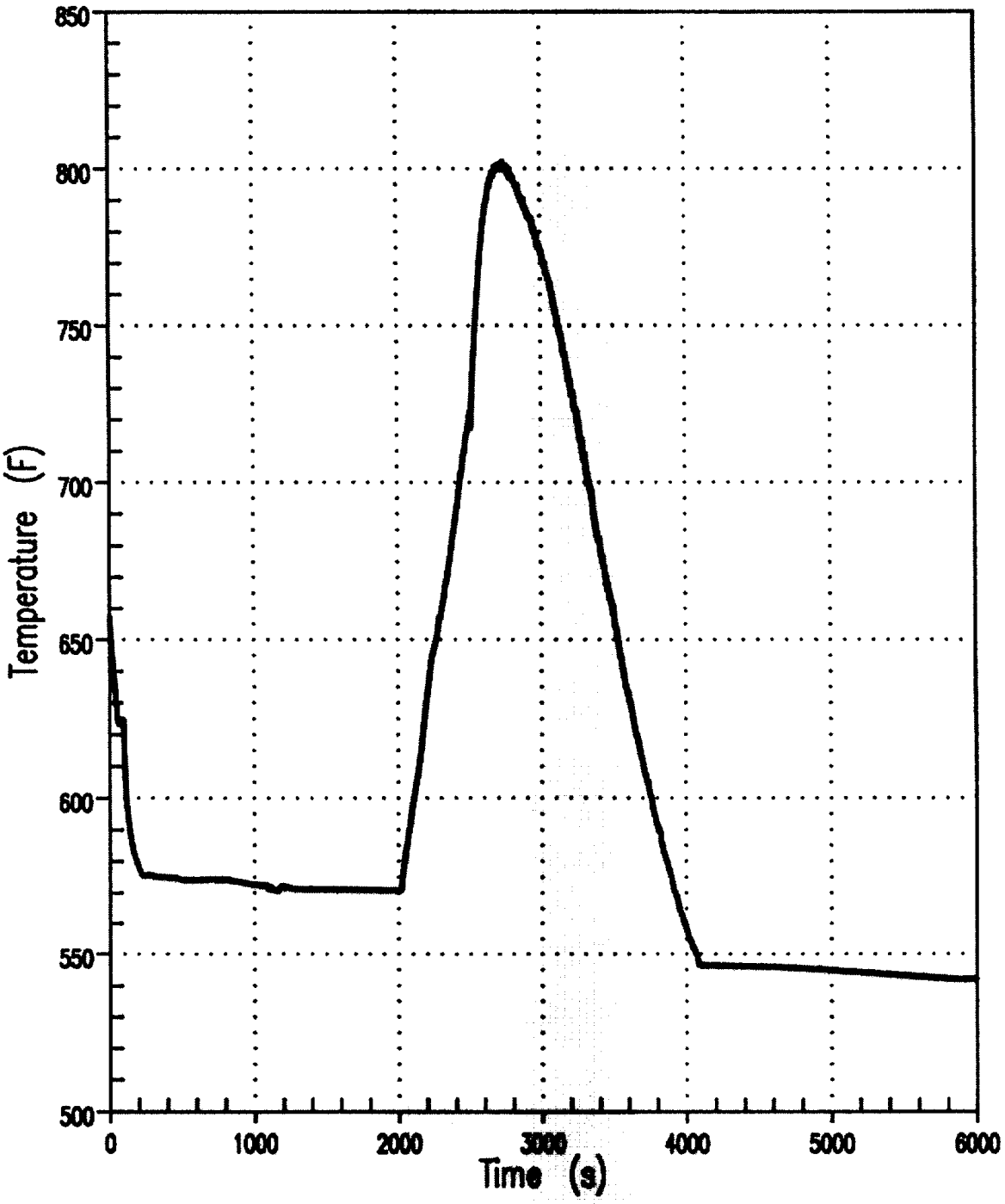


Figure 15-293. Catawba - 2 SBLOCA 2-Inch Peak Clad Temperature and Maximum Transient Oxidation

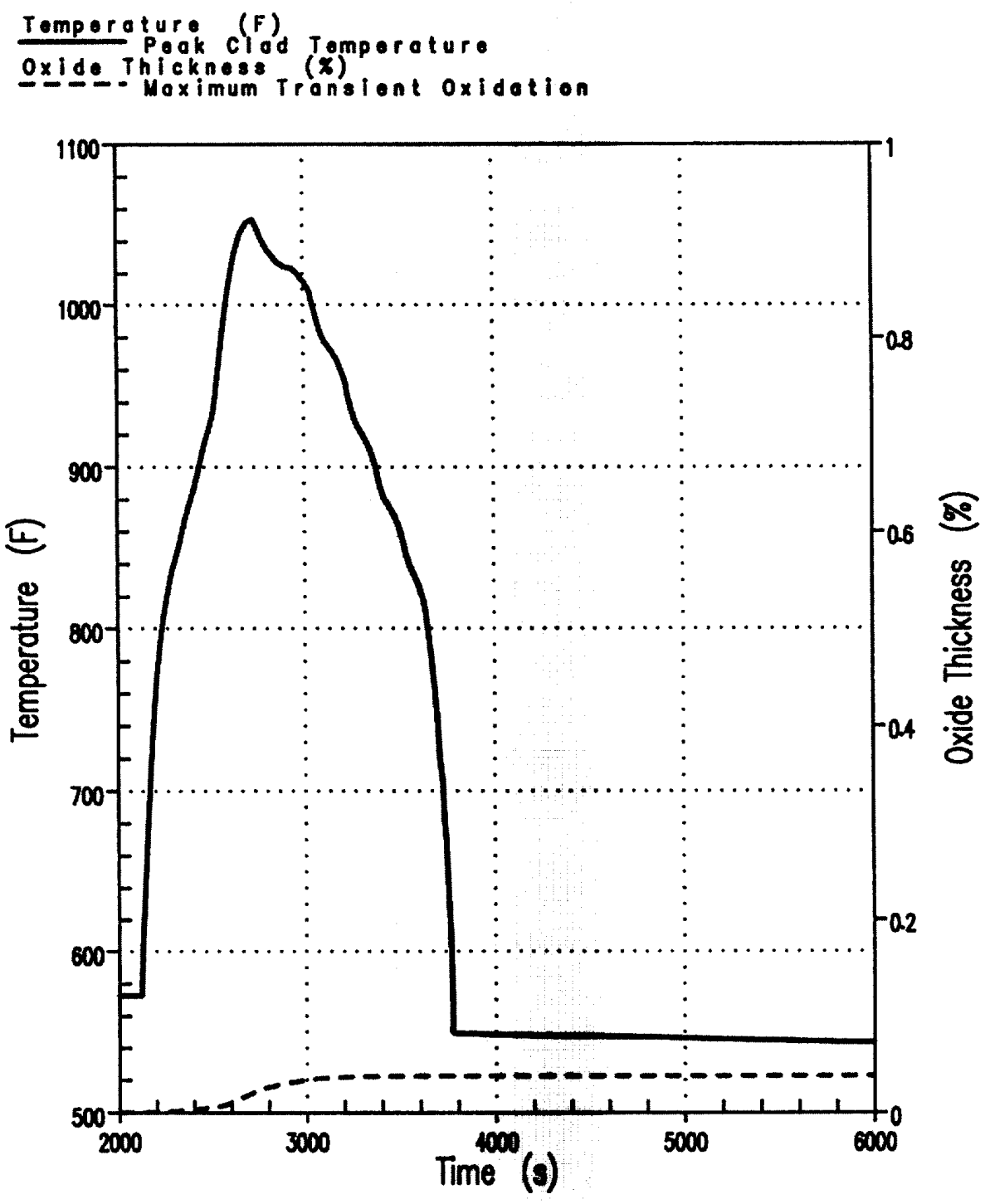


Figure 15-294. Catawba 2 - SBLOCA 3-Inch Pressurizer Pressure

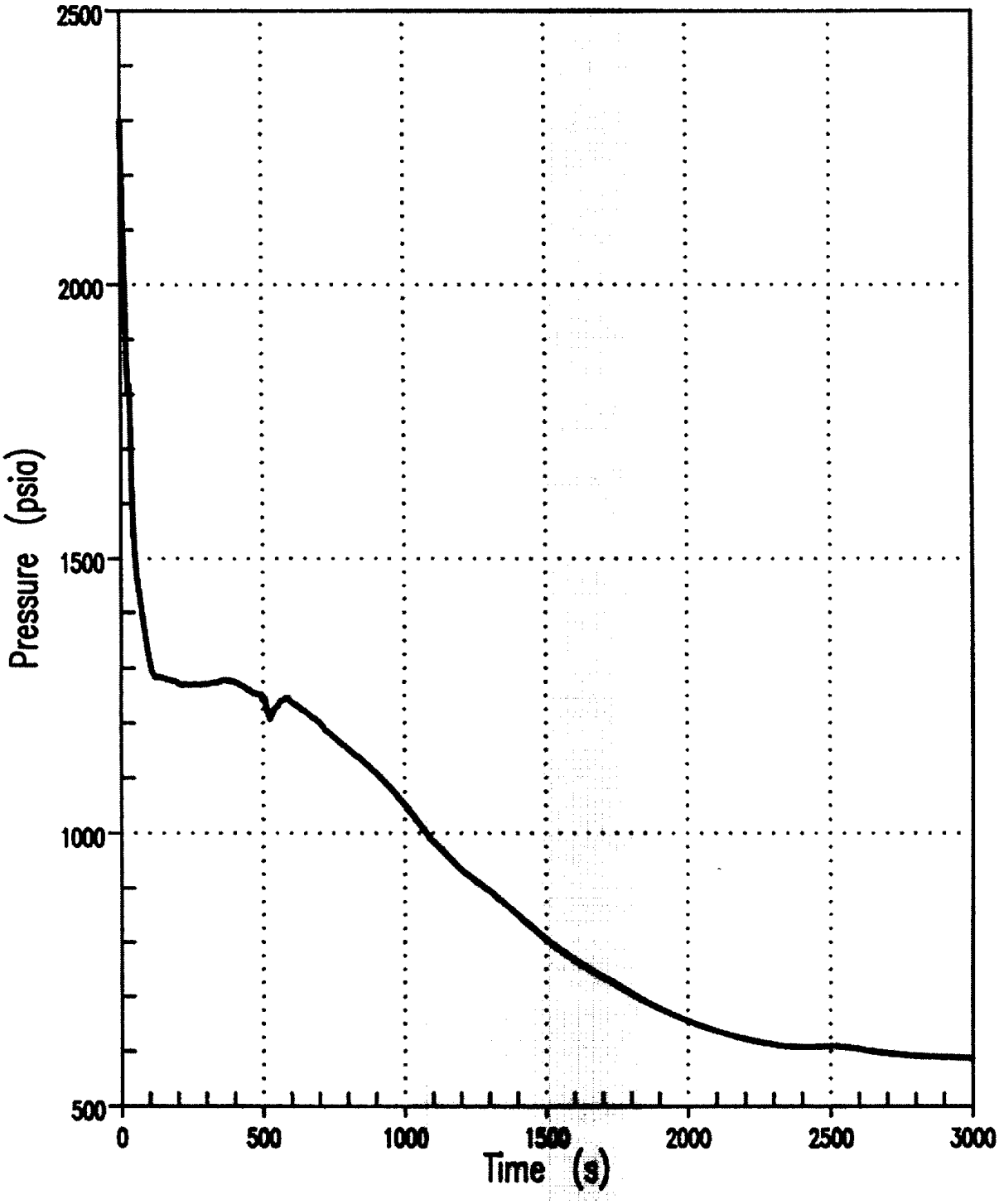


Figure 15-295. Catawba - 2 SBLOCA 3-Inch Core Mixture Level

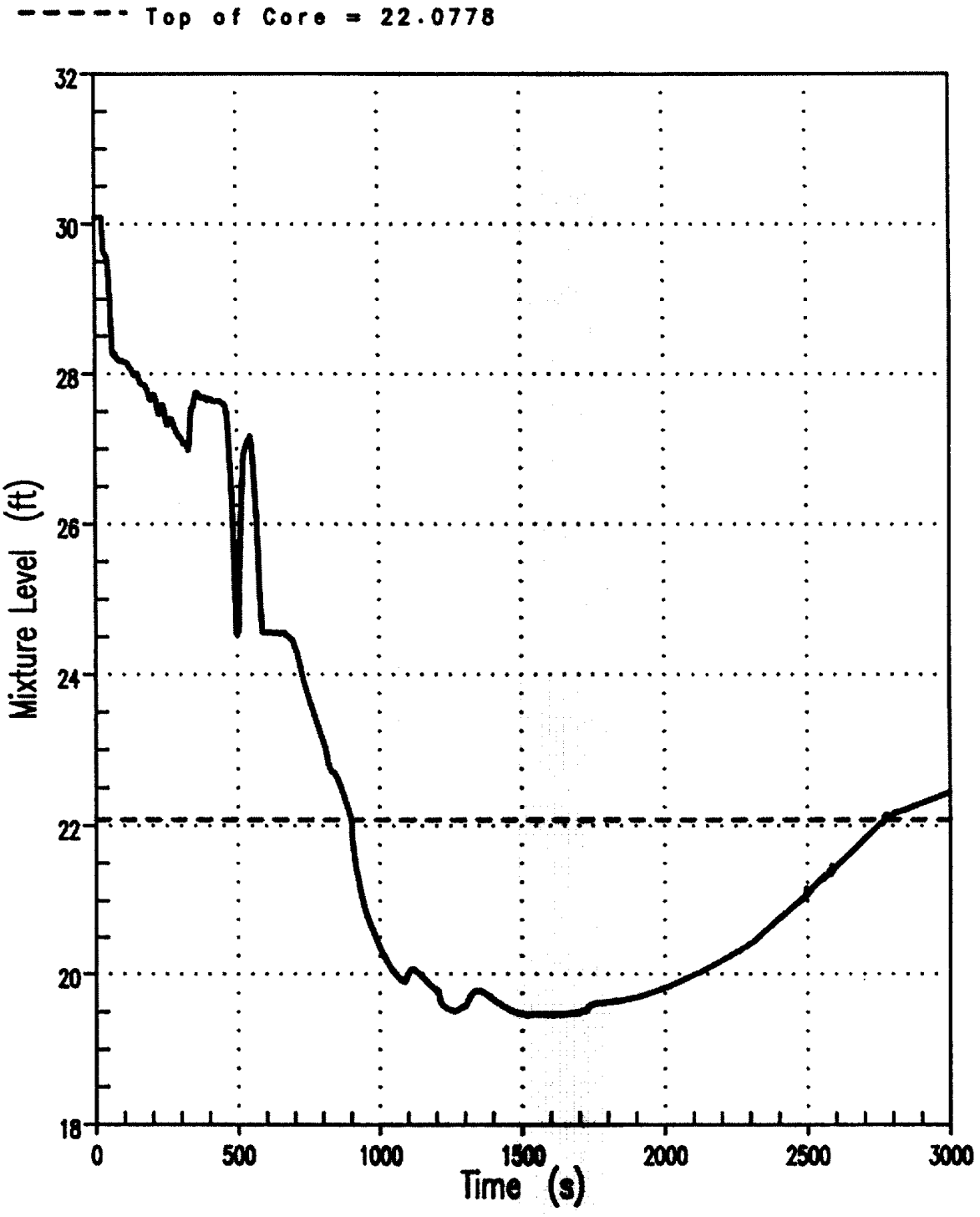


Figure 15-296. Catawba - 2 SBLOCA 3-Inch Core Exit Vapor Temperature

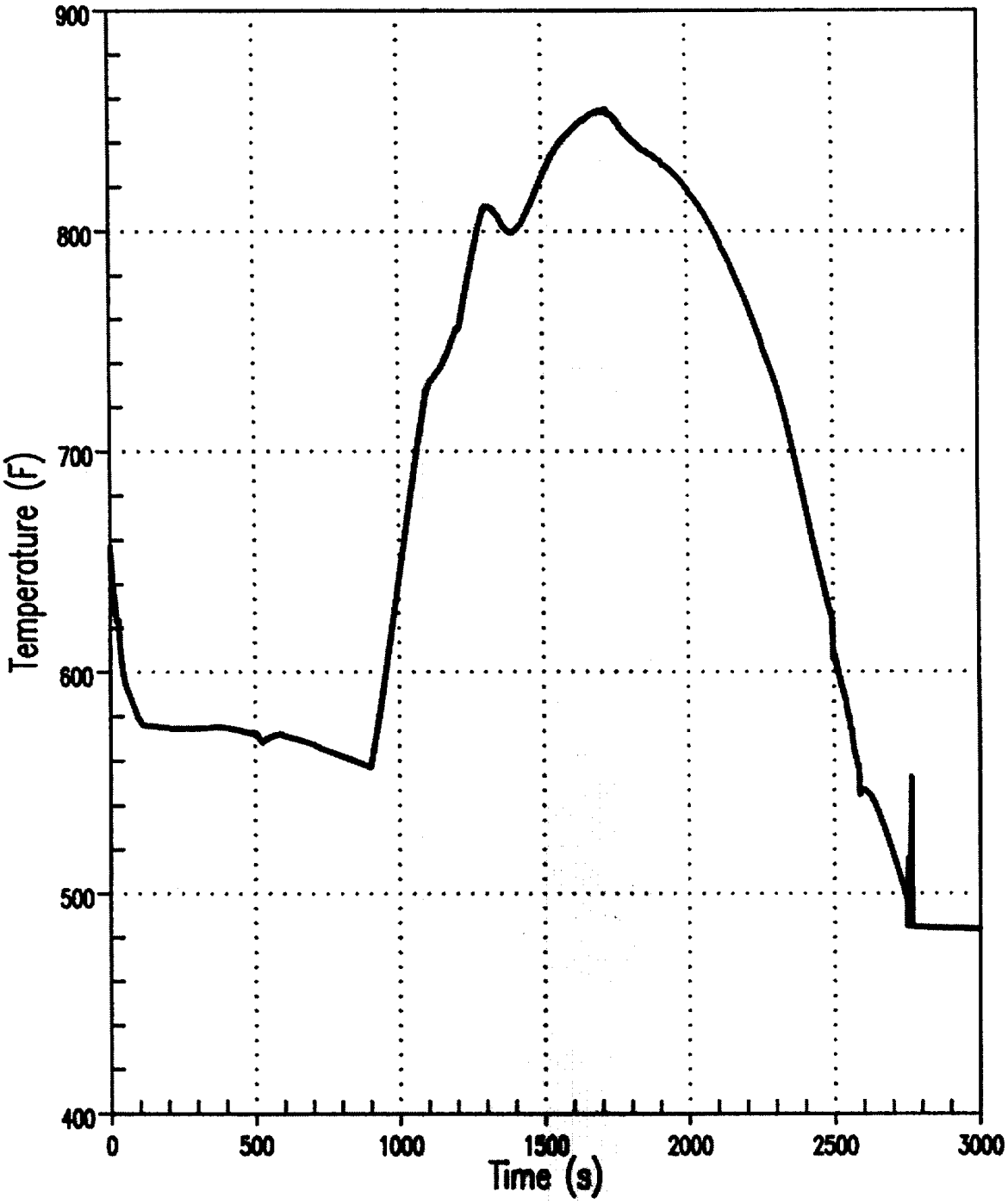


Figure 15-297. Catawba - 2 SBLOCA 3-Inch Peak Clad Temperature and Maximum Transient Oxidation

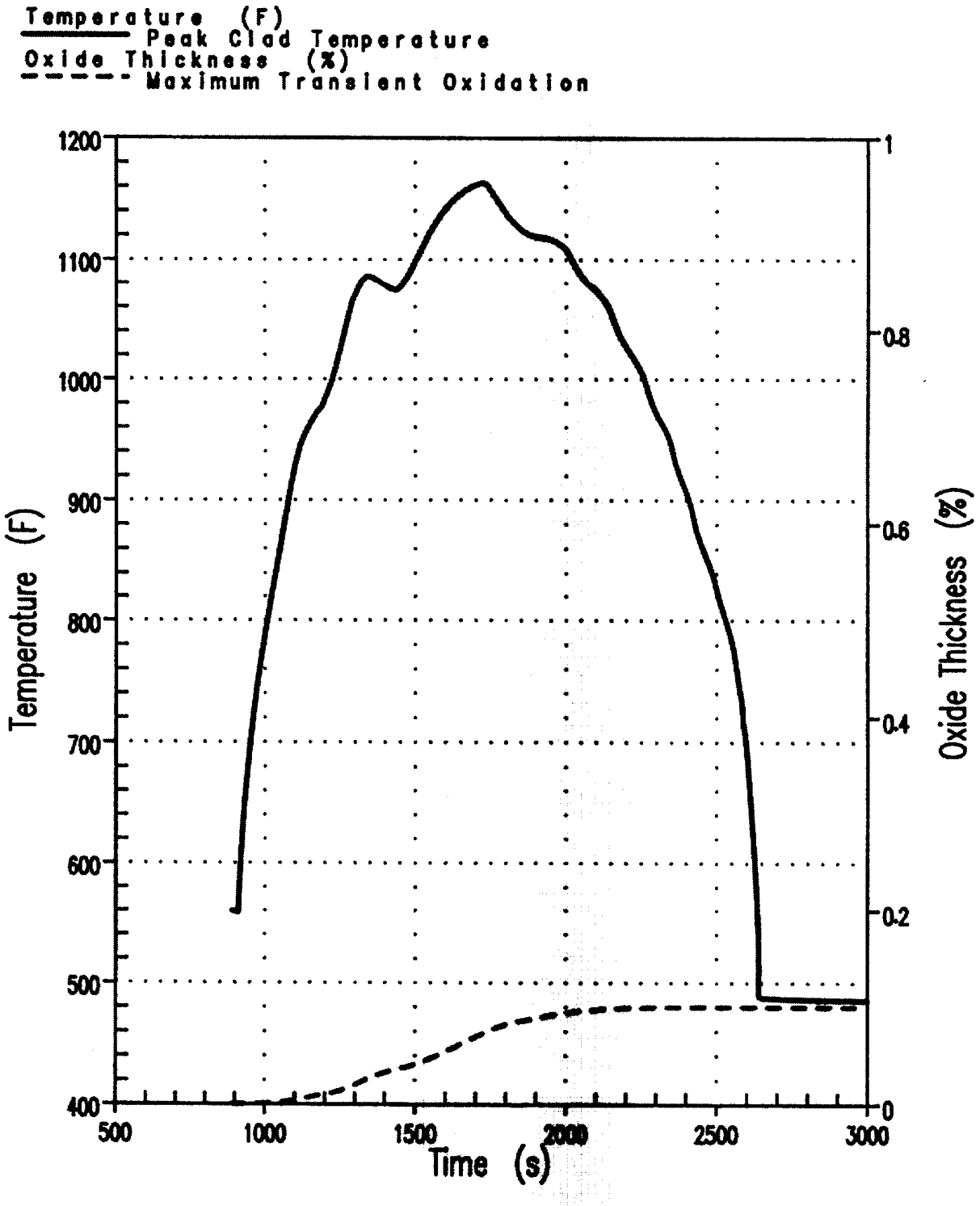


Figure 15-298. Catawba - 2 SBLOCA 1.5-Inch Pressurizer Pressure

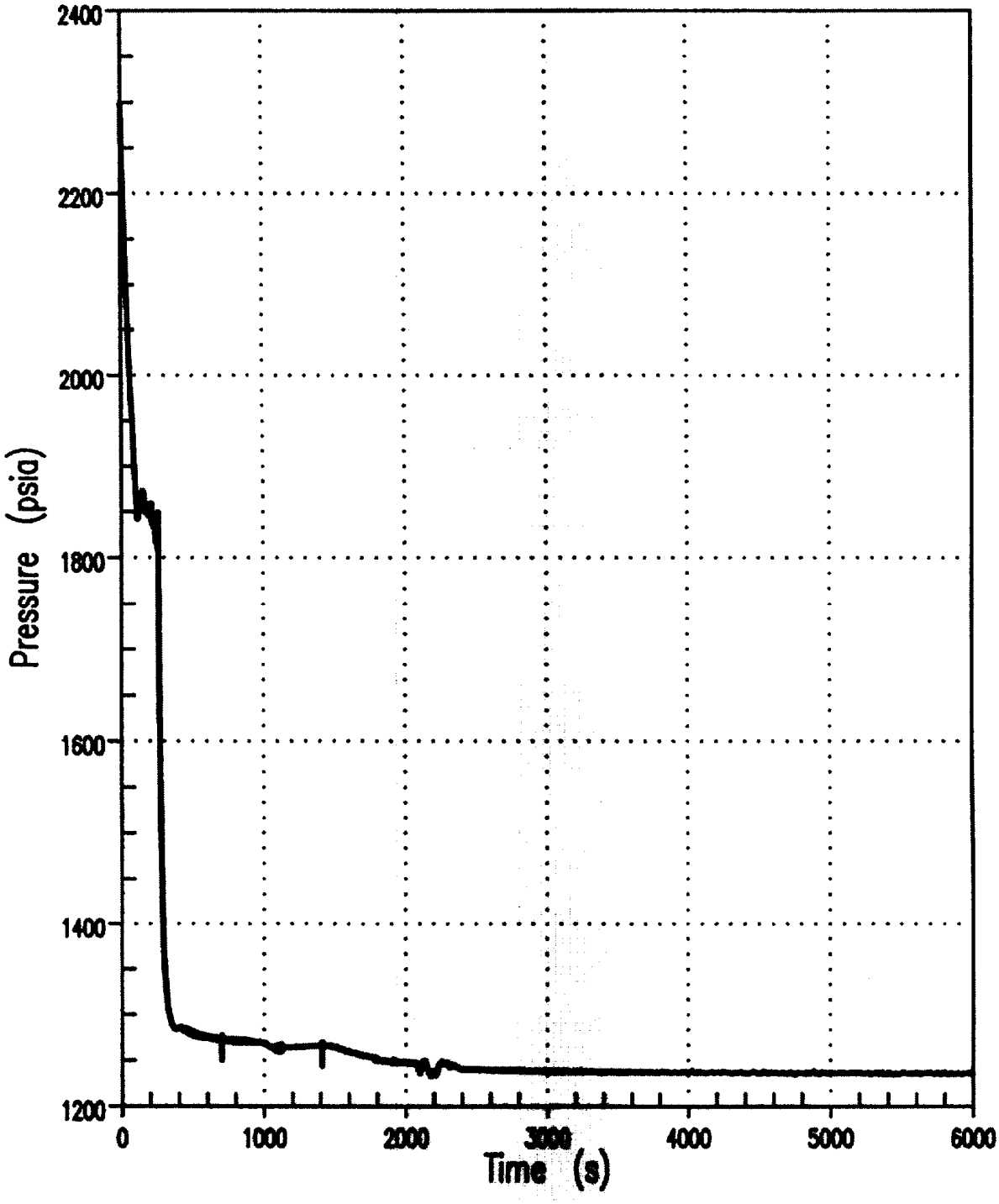


Figure 15-299. Catawba - 2 SBLOCA 1.5-Inch Core Mixture Level

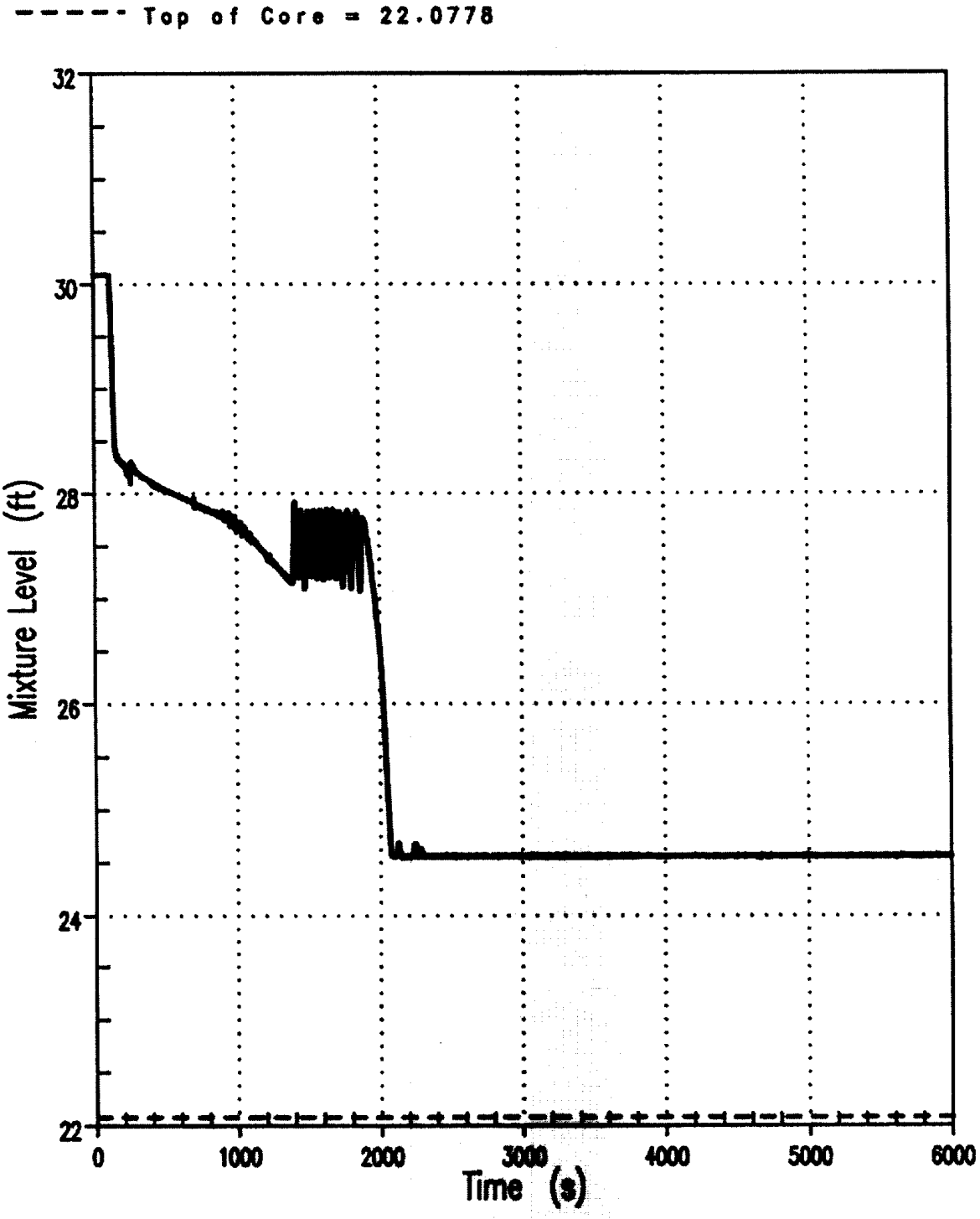


Figure 15-300. Catawba - 2 SBLOCA 1.5-Inch Core Exit Vapor Temperatue

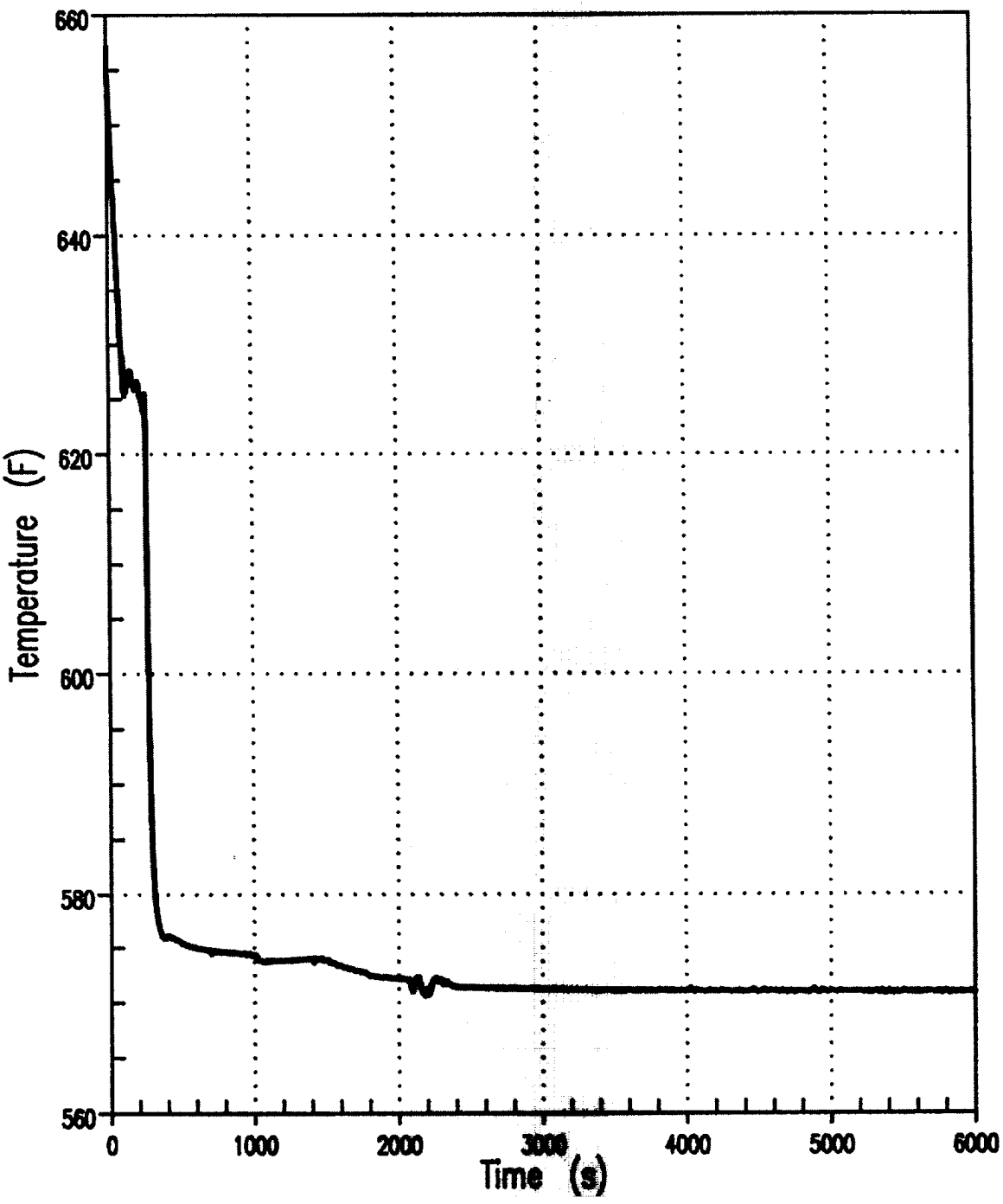


Figure 15-301. Deleted Per 2007 Update

Figure 15-302. Lower Bound Containment Pressure Used for Best-Estimate Large Break LOCA

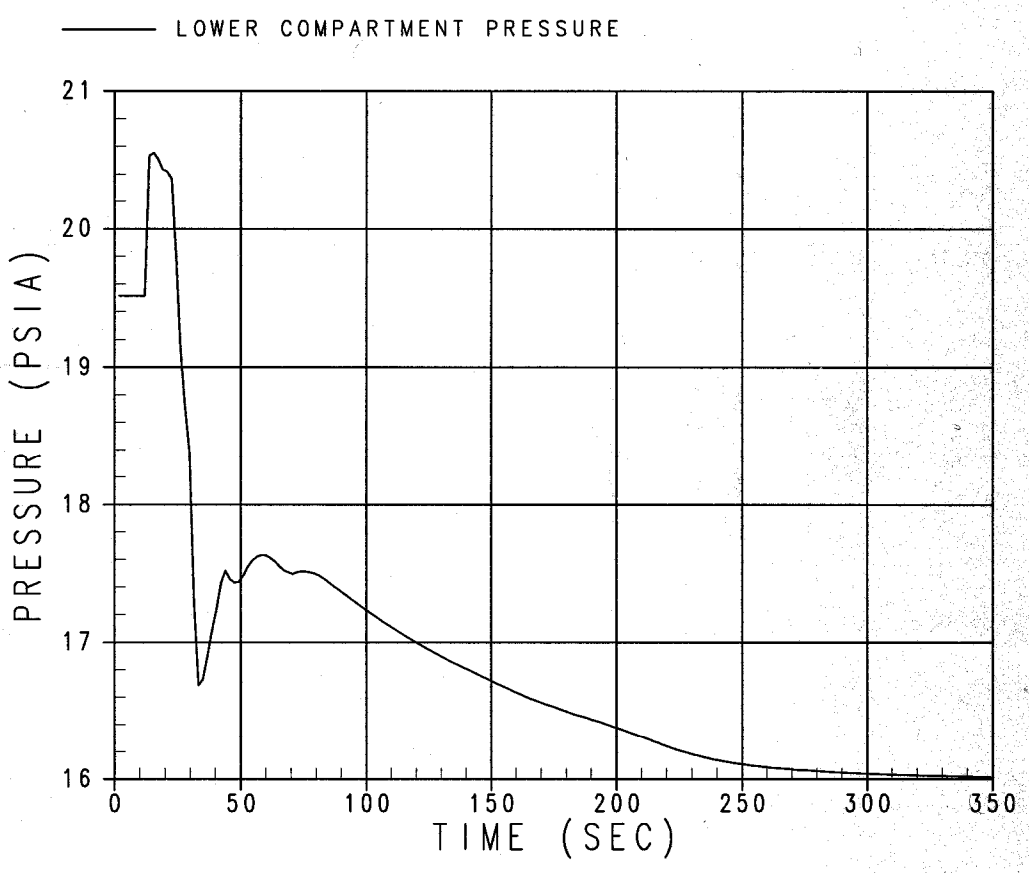


Figure 15-303. LBLOCA Peak Cladding Temperature (Reference Transient)

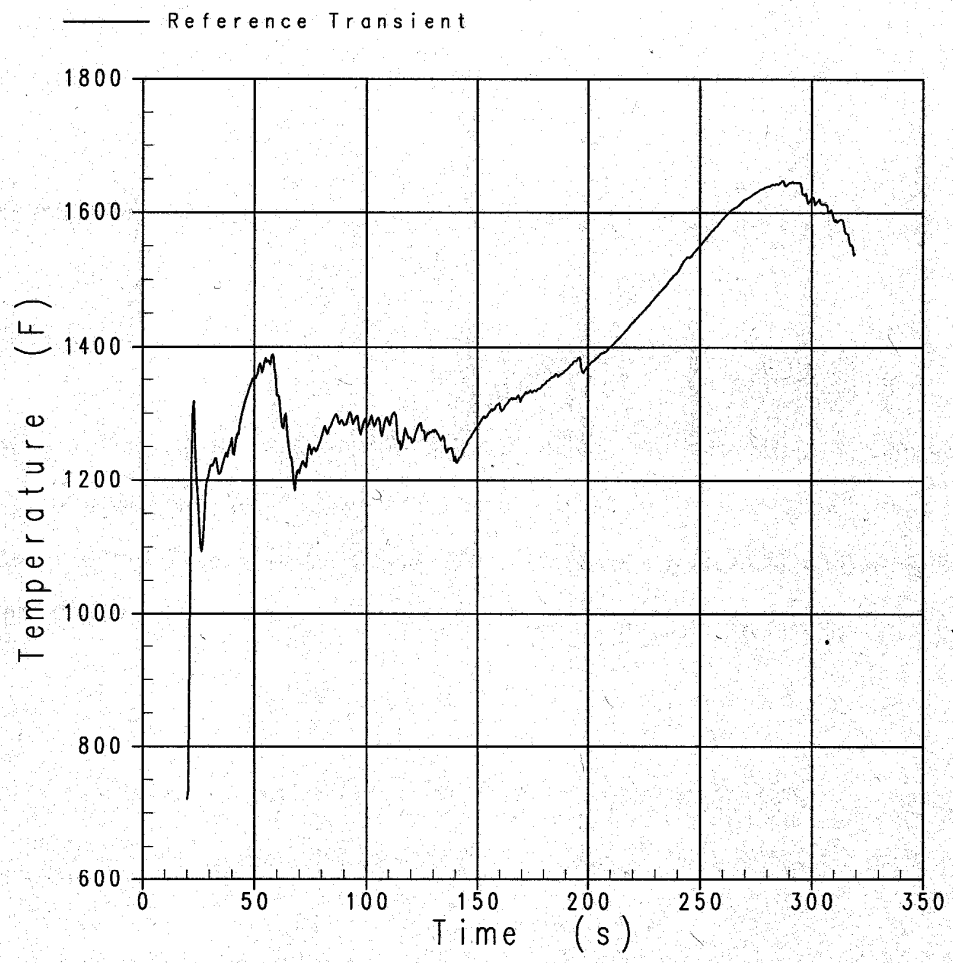


Figure 15-304. LBLOCA Liquid Mass Flowrate at Inlet to Hot Assembly

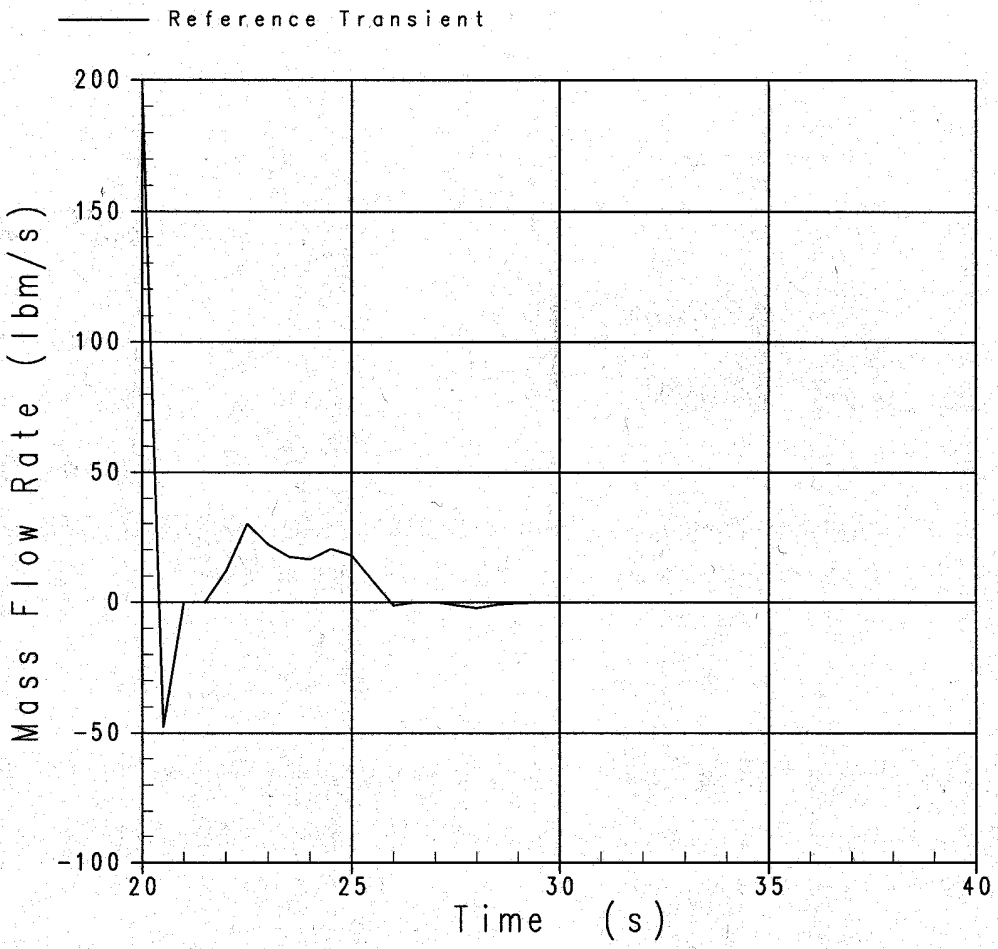


Figure 15-305. LBLOCA Vapor Mass Flowrate at Blowdown PCT Location

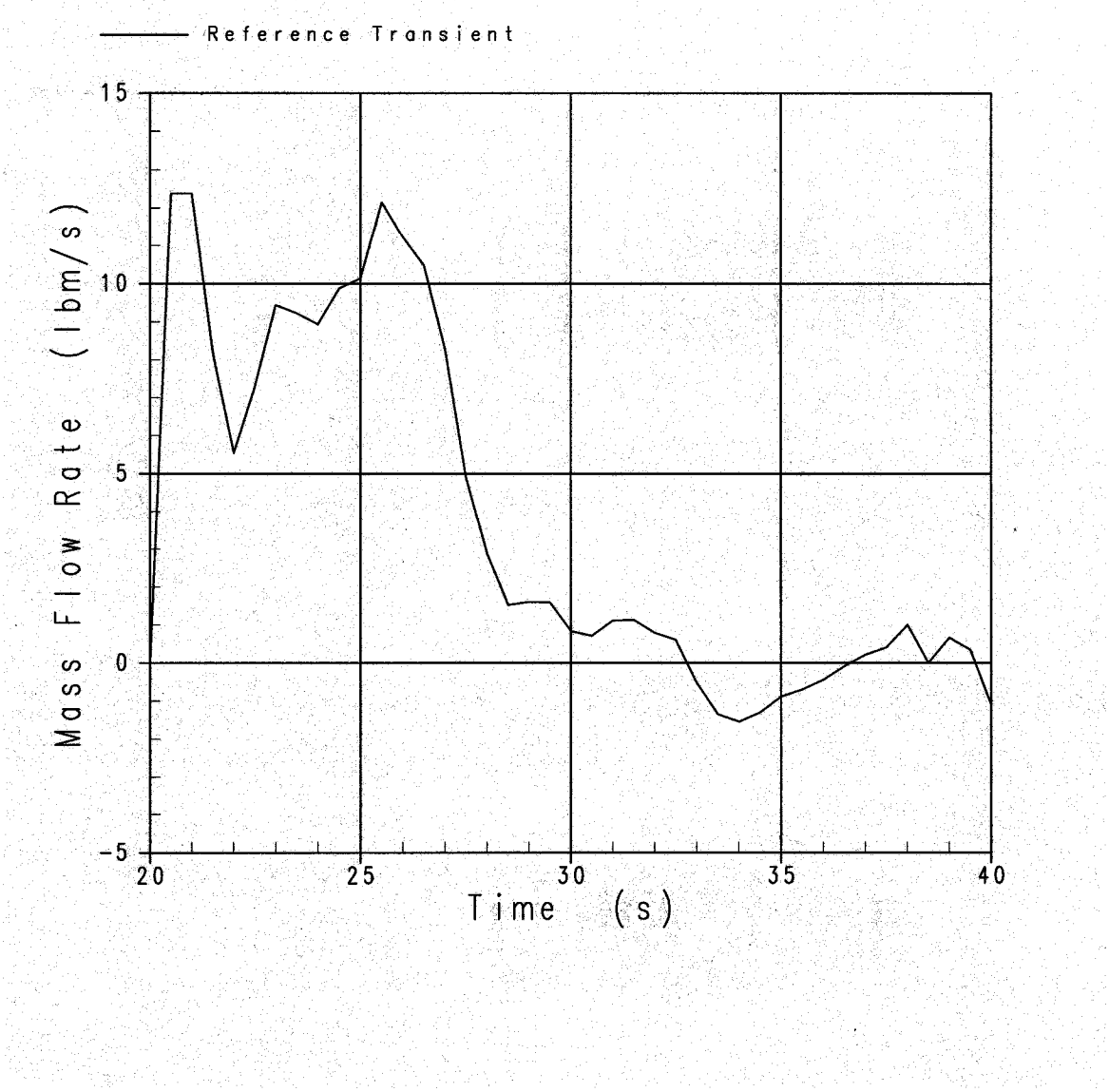


Figure 15-306. LBLOCA Entrained Liquid Mass Flowrate at Blowdown PCT Location

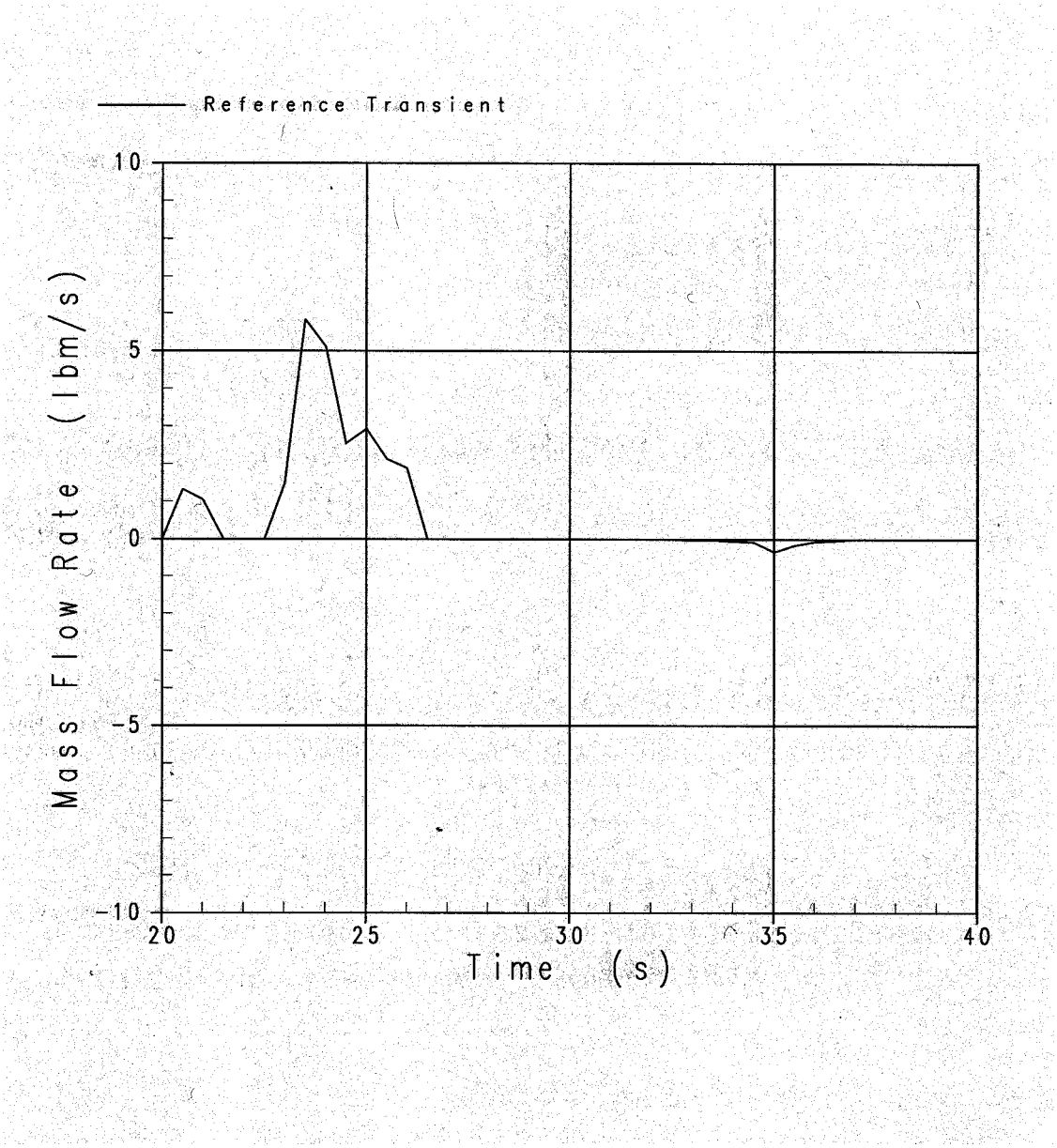


Figure 15-307. LBLOCA Accumulator Discharge Flowrate

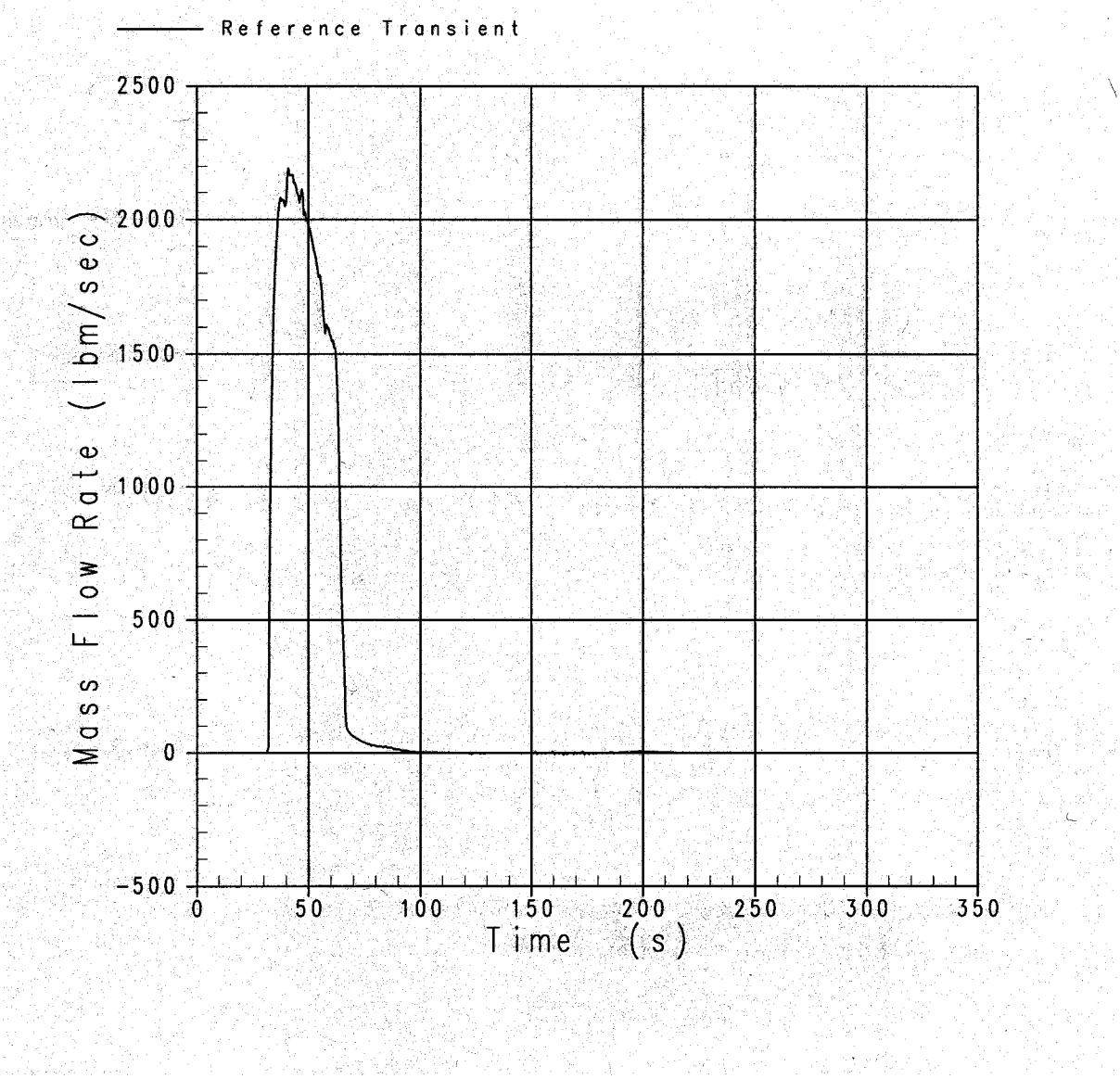


Figure 15-308. LBLOCA Pumped Safety Injection

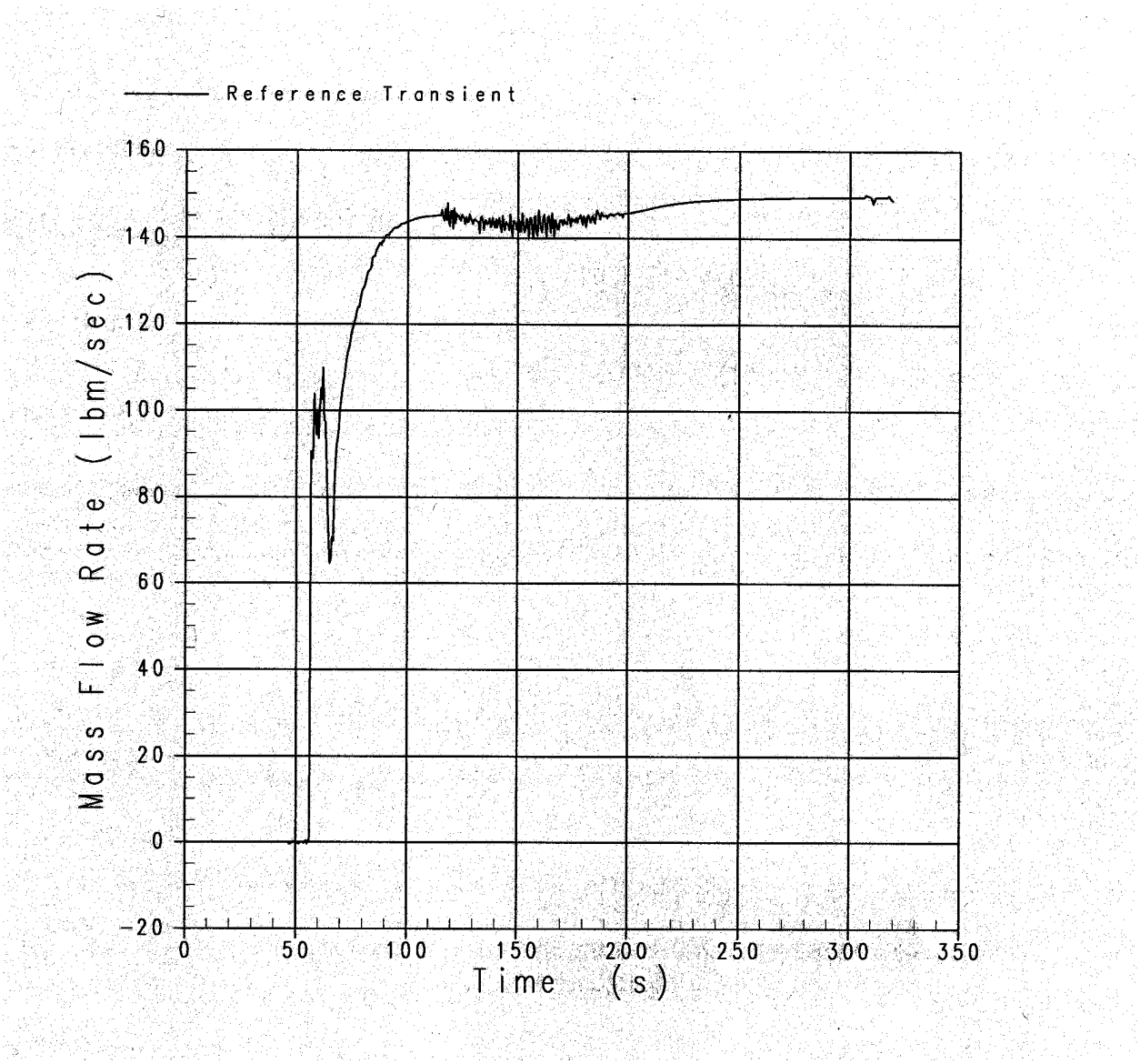


Figure 15-309. LBLOCA Collapsed Liquid Level in the Lower Plenum

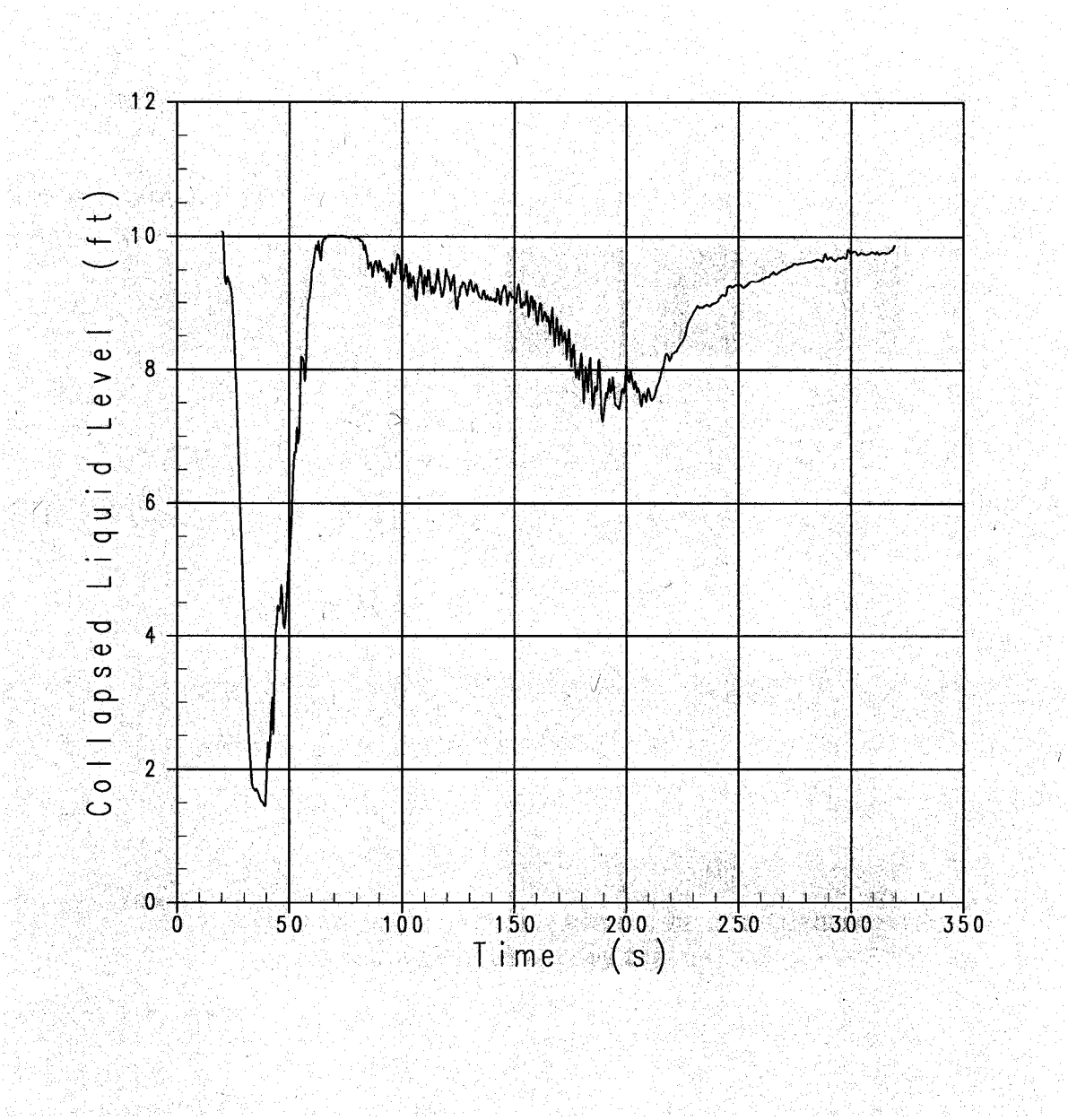


Figure 15-310. LBLOCA Collapsed Liquid Level in Hot Assembly

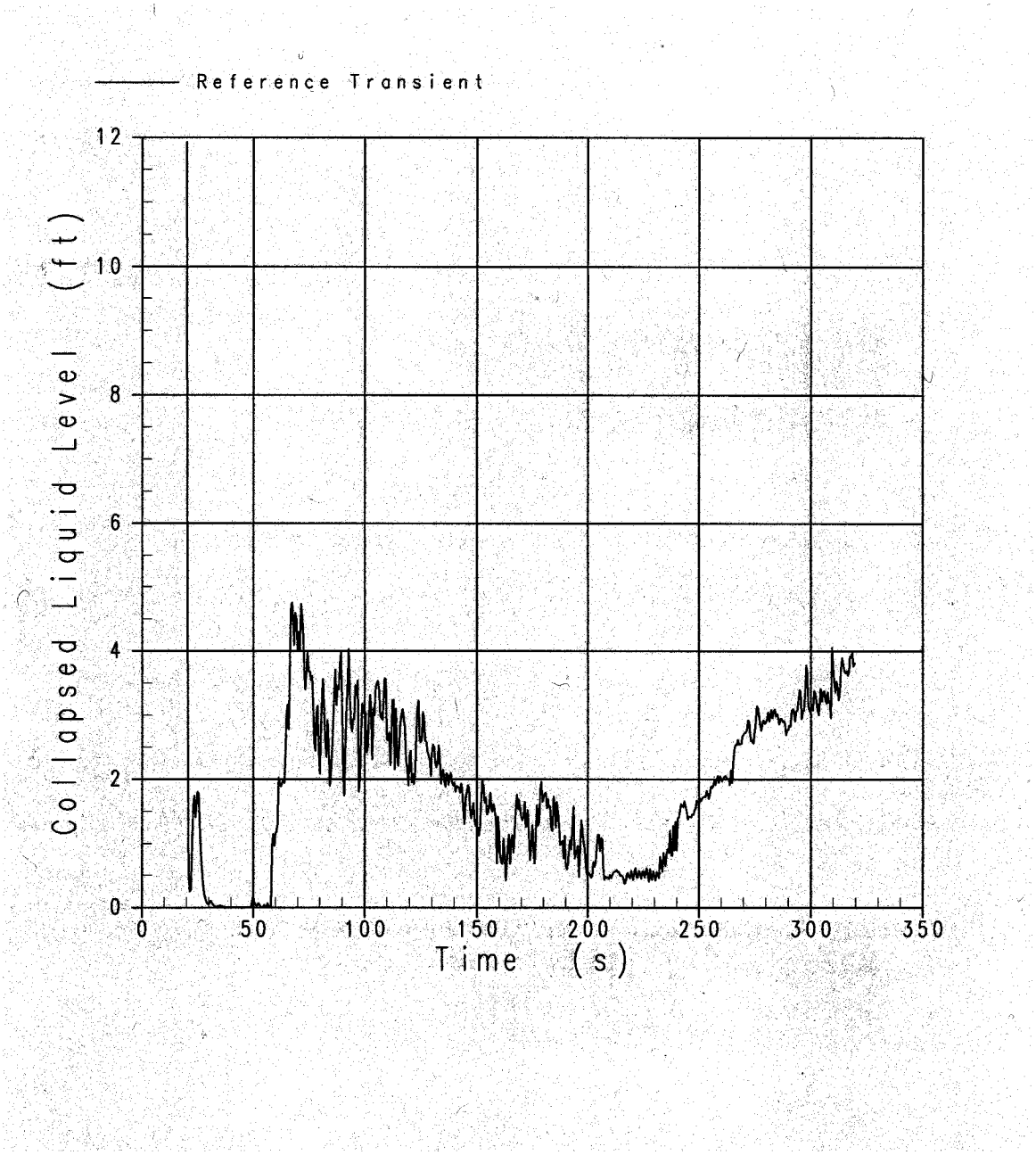


Figure 15-311. LBLOCA Collapsed Liquid Level in Downcomer

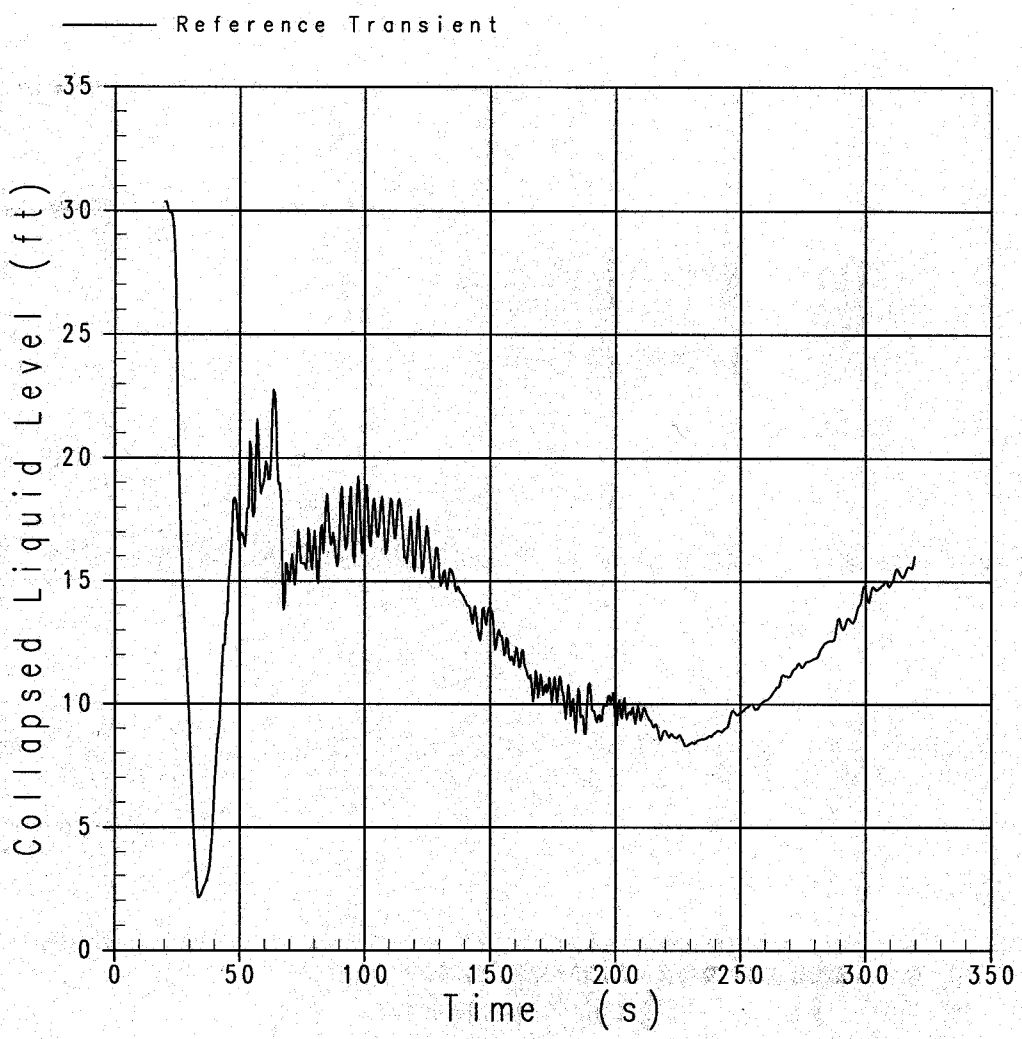


Figure 15-312. Best-Estimate LBLOCA PBOT/PMID Operating Limits

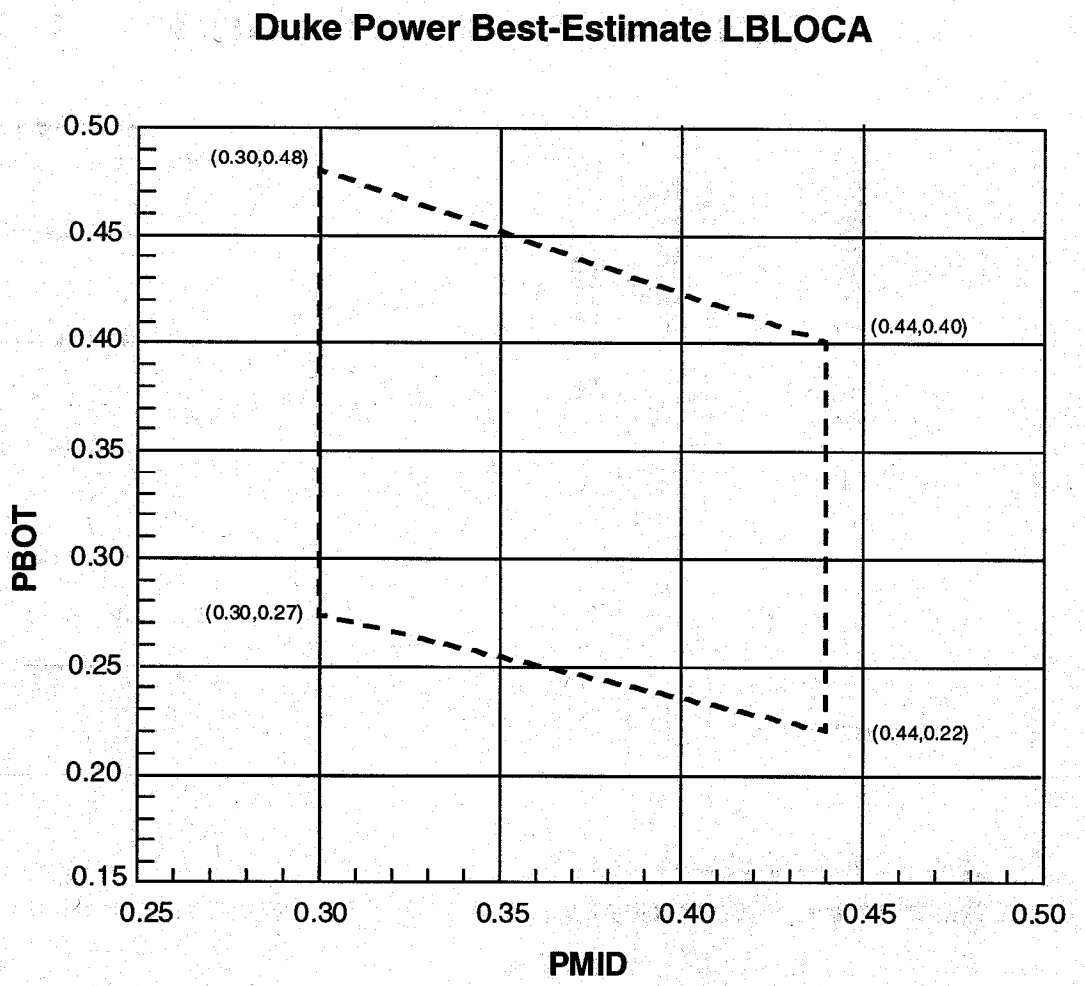


Figure 15-313. LBLOCA Axial Power Distribution for Reference Transient

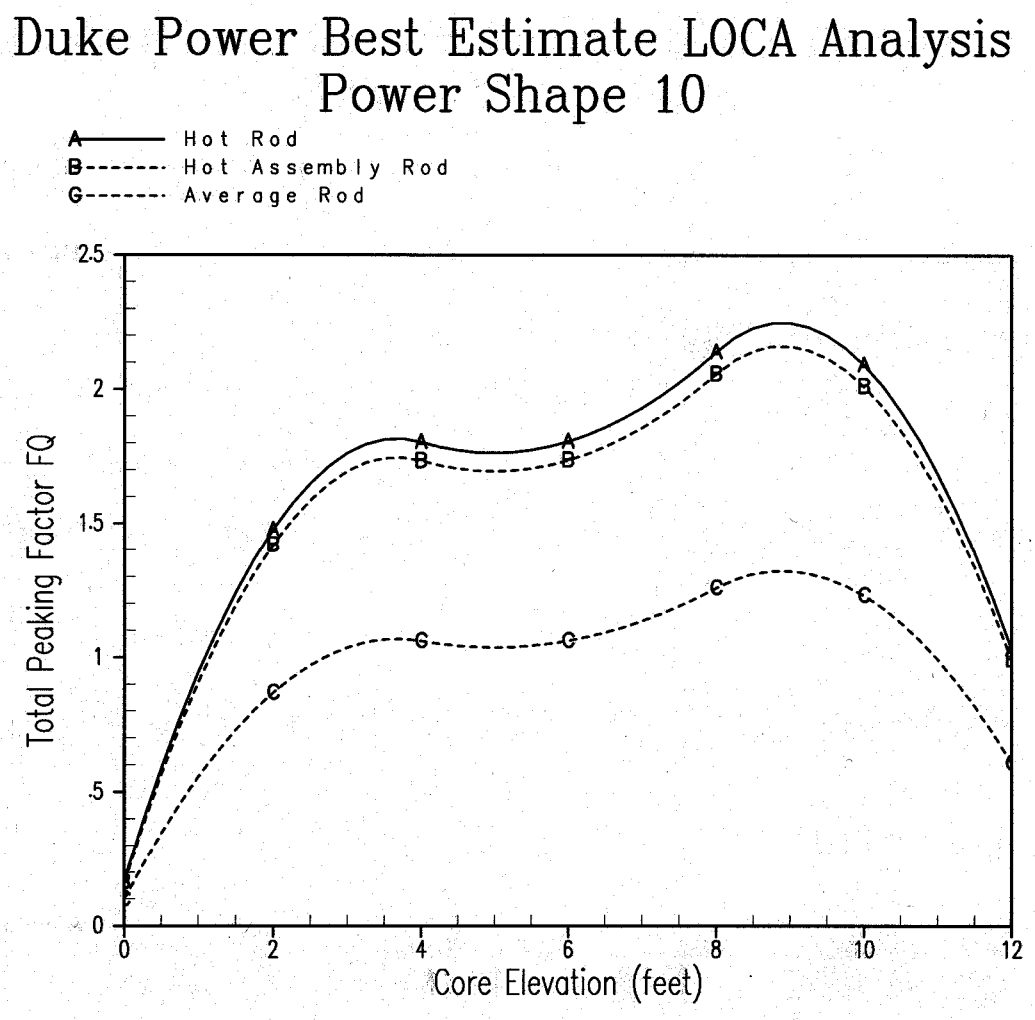


Figure 15-314. Catawba Unit 1 2-Inch Pressurizer Pressure

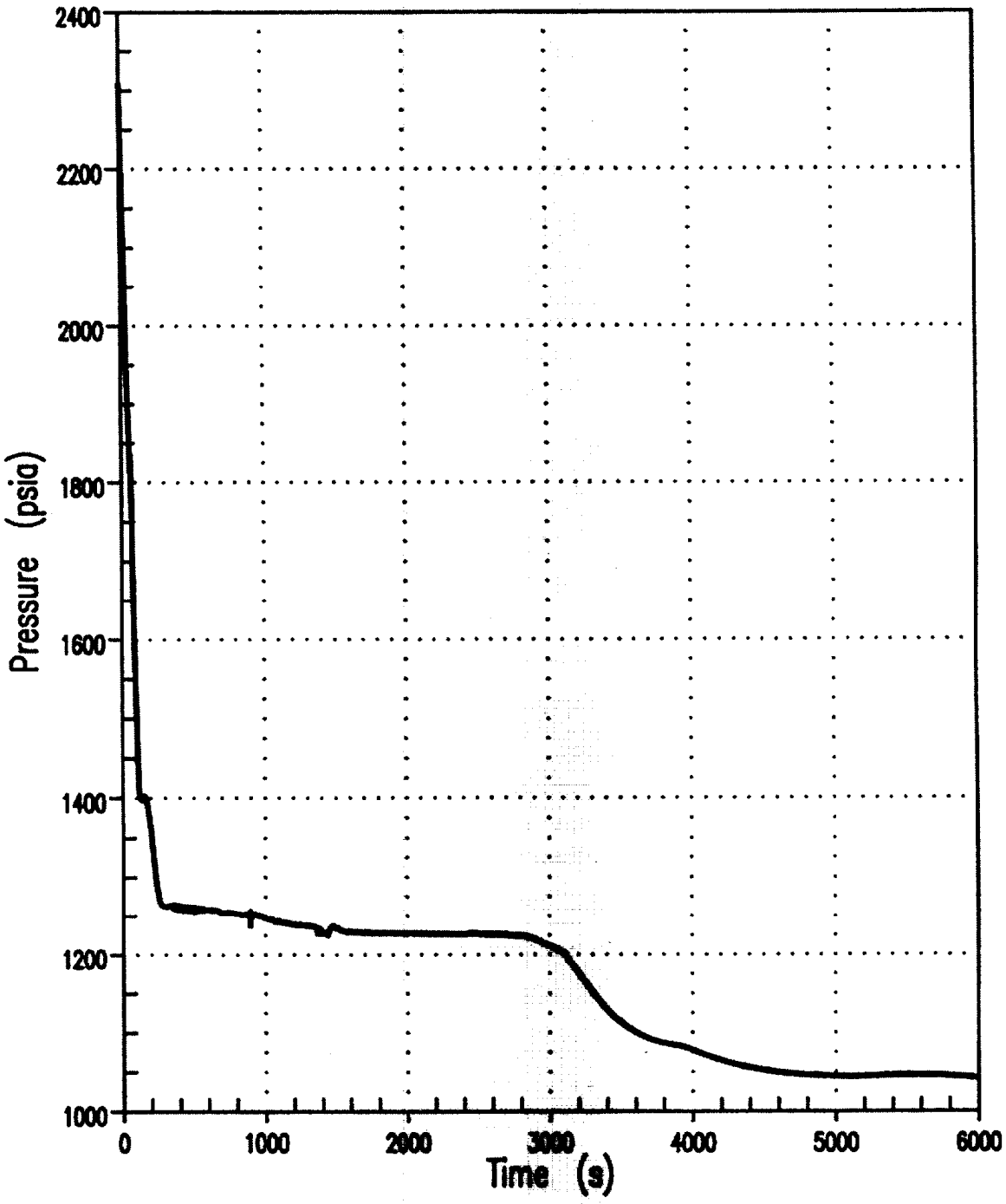


Figure 15-315. Catawba Unit 1 2-inch Core Mixture Level

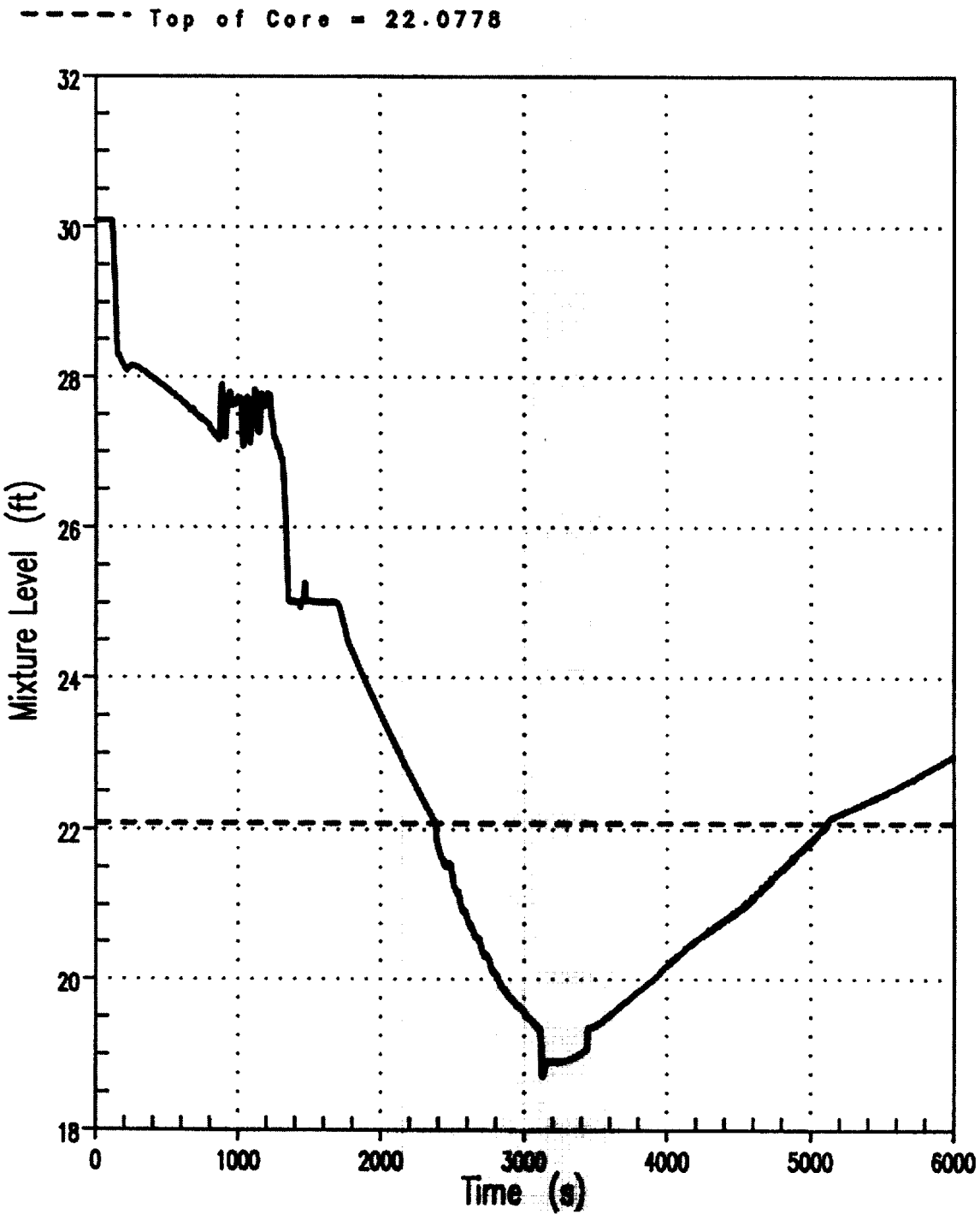


Figure 15-316. Catawba Unit 1 2-inch Core Exit Vapor Temperature

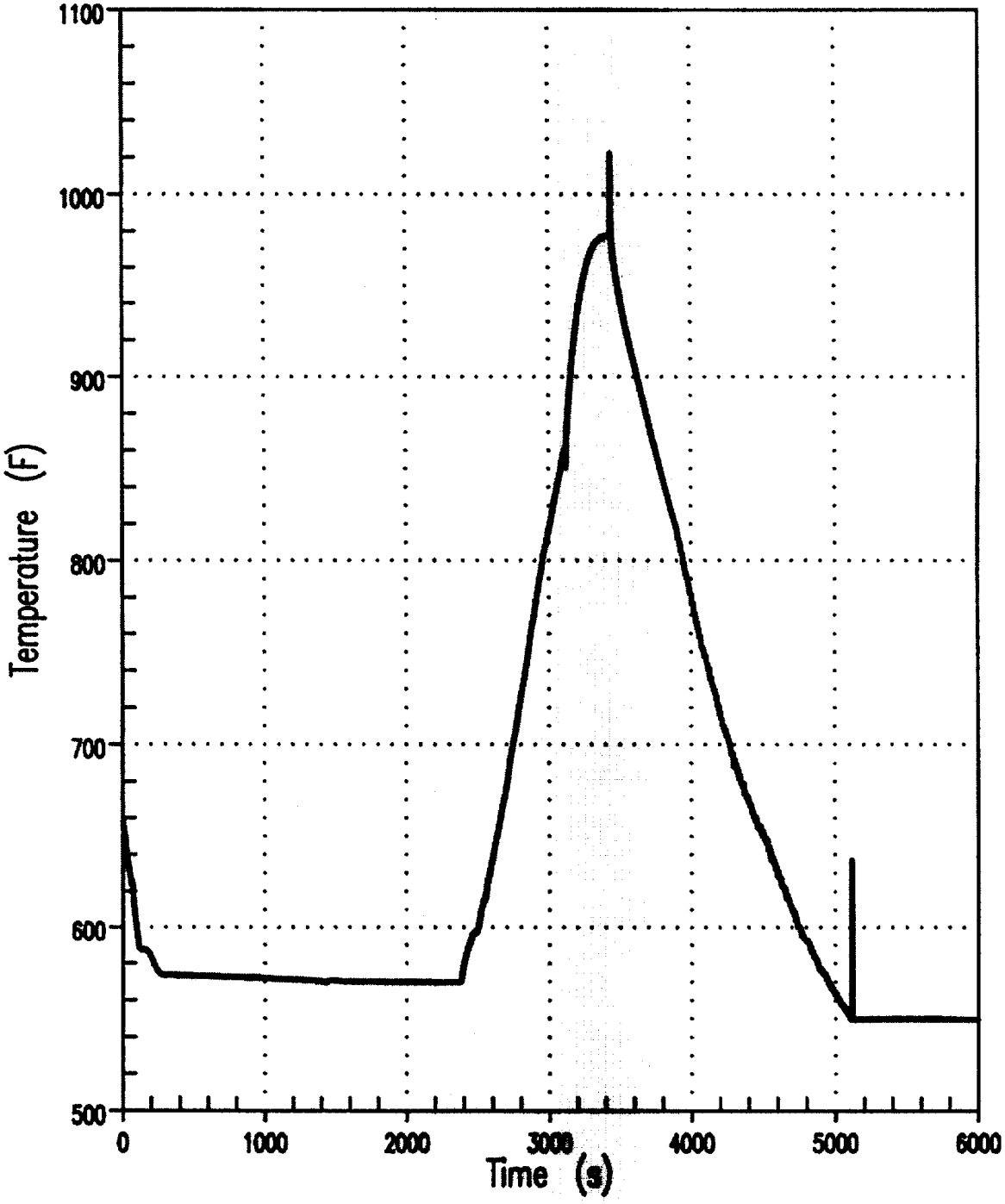


Figure 15-317. Catawba Unit 1 2-inch Break Vapor Flow and Upper Head Spray Nozzle Vapor Flow

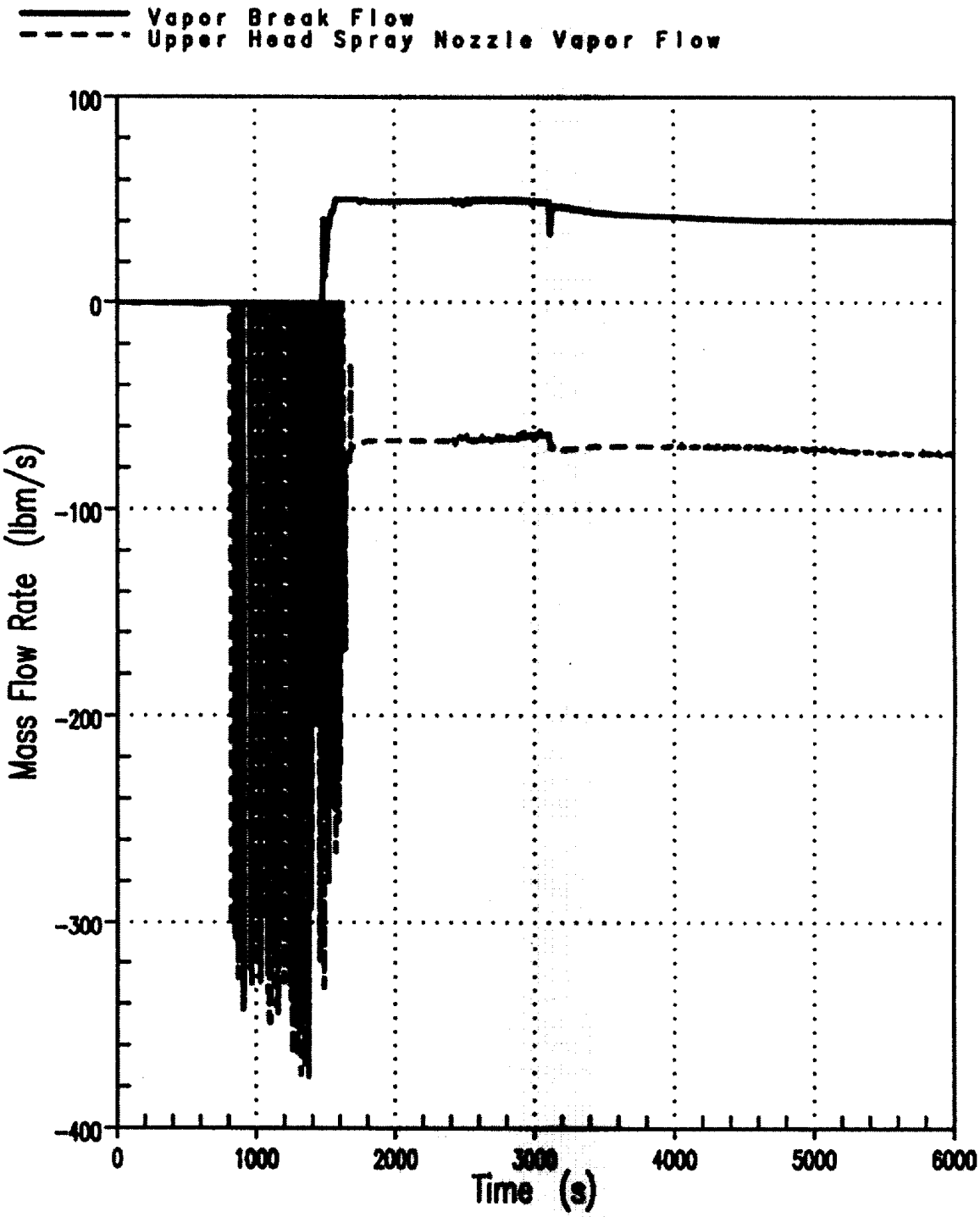


Figure 15-318. Catawba Unit 1 2-inch Break Liquid Flow and Total Safety Injection Flow

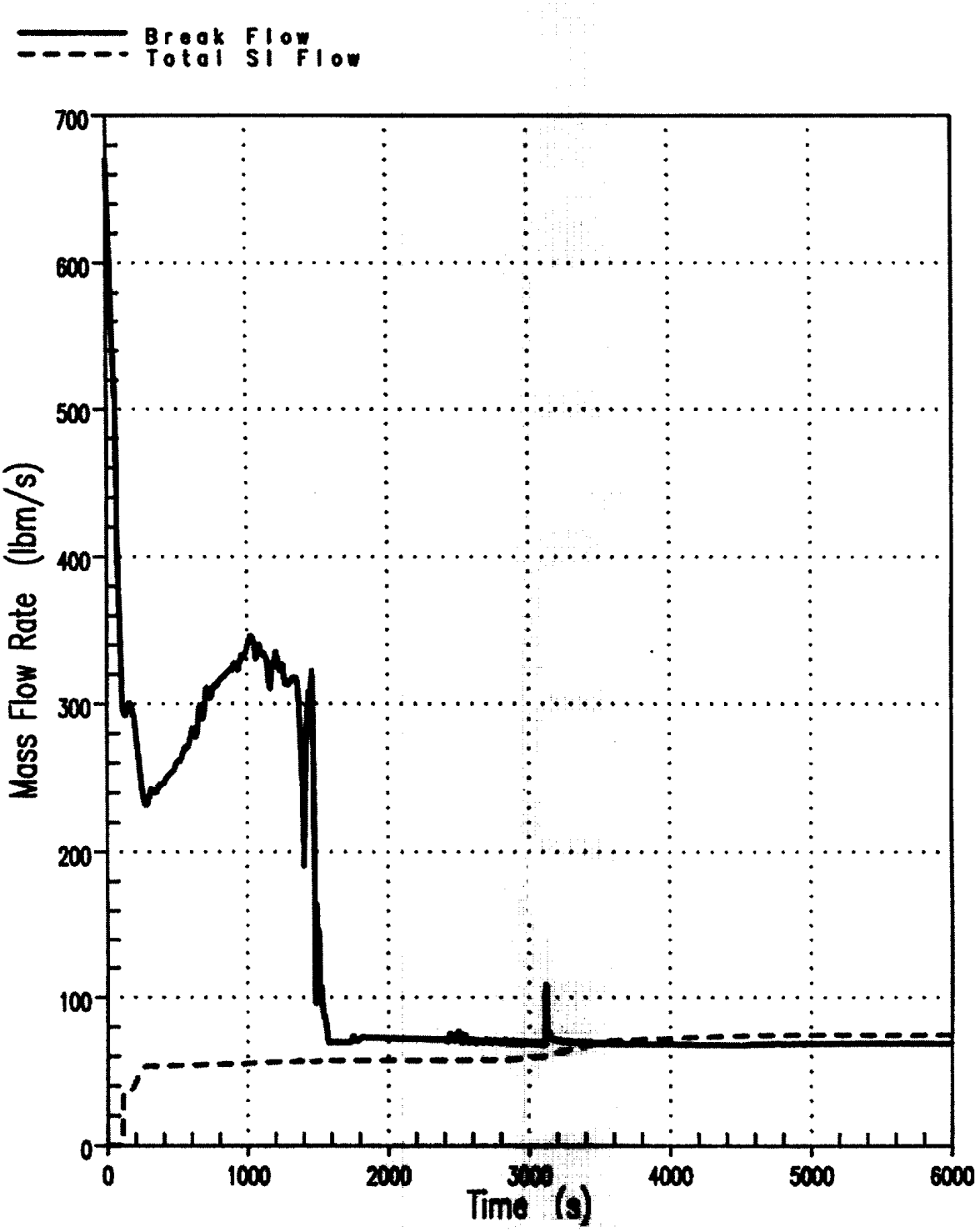


Figure 15-319. Catawba Unit 1 2-inch Peak Clad Temperature and Maximum Transient Oxidation

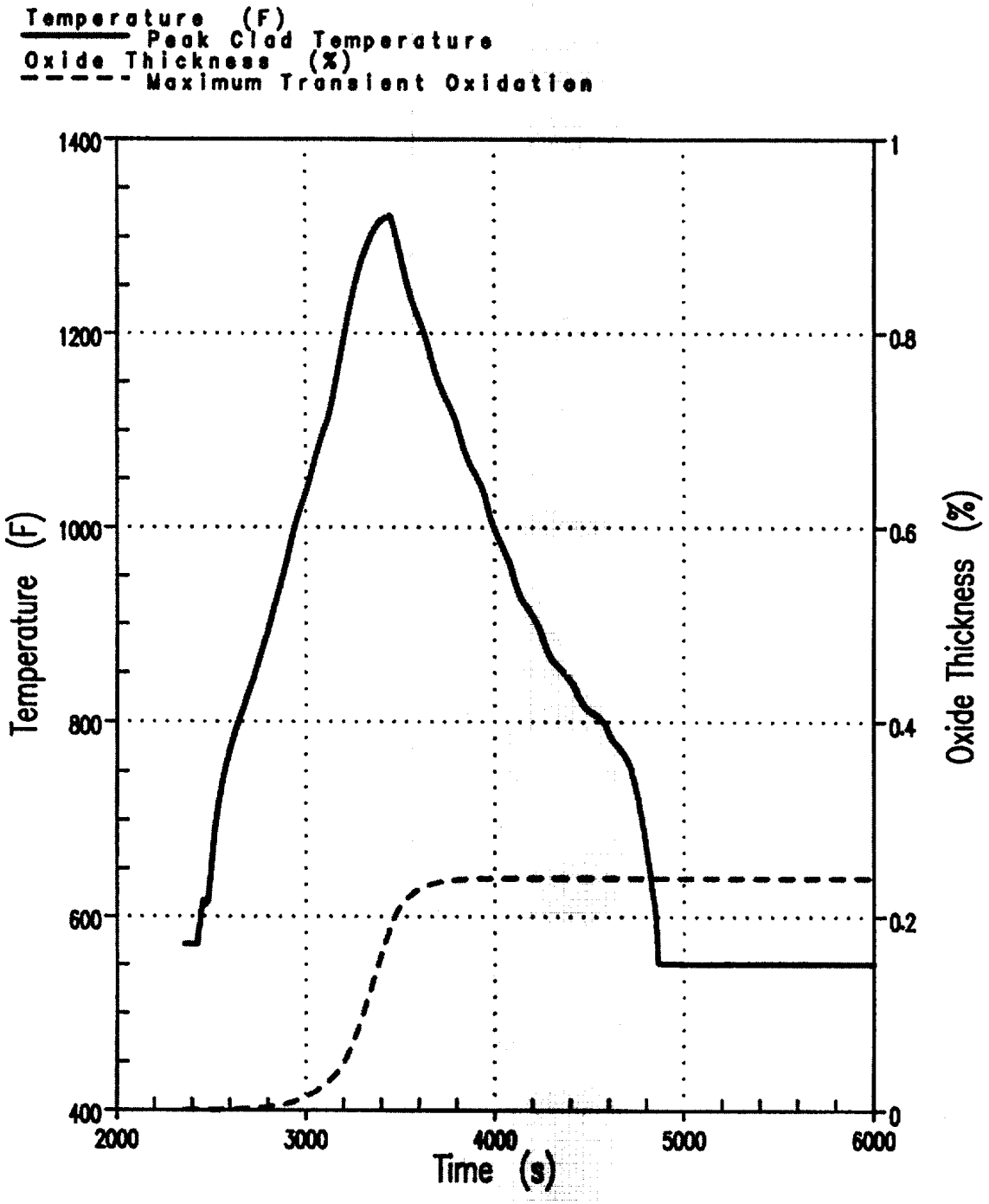


Figure 15-320. Catawba Unit 1 2-Inch RCS Mass

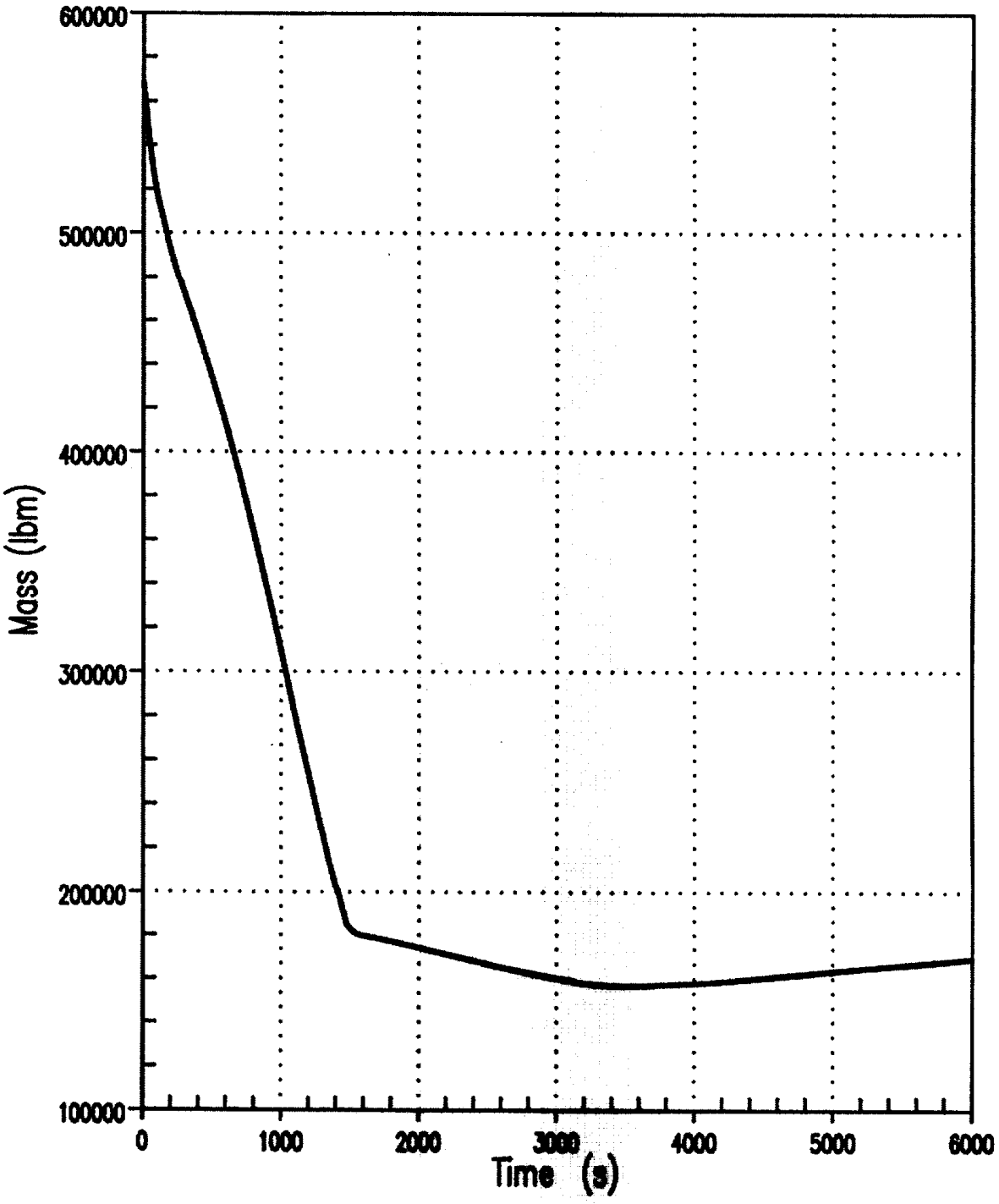


Figure 15-321. Catawba Unit 1 3-Inch Pressurizer Pressure

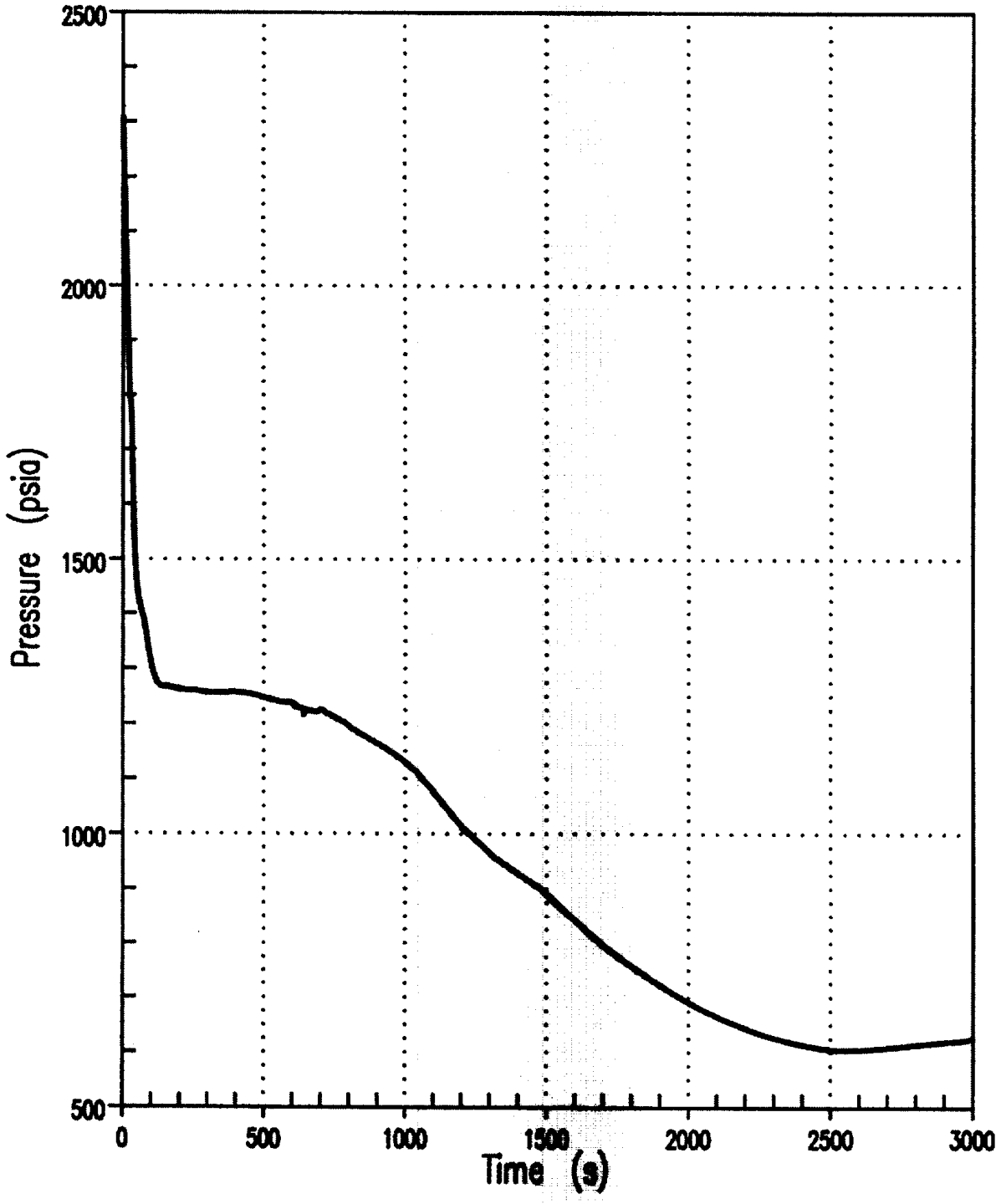


Figure 15-323. Catawba Unit 1 3-Inch Peak Clad Temperature and Maximum Transient Oxidation

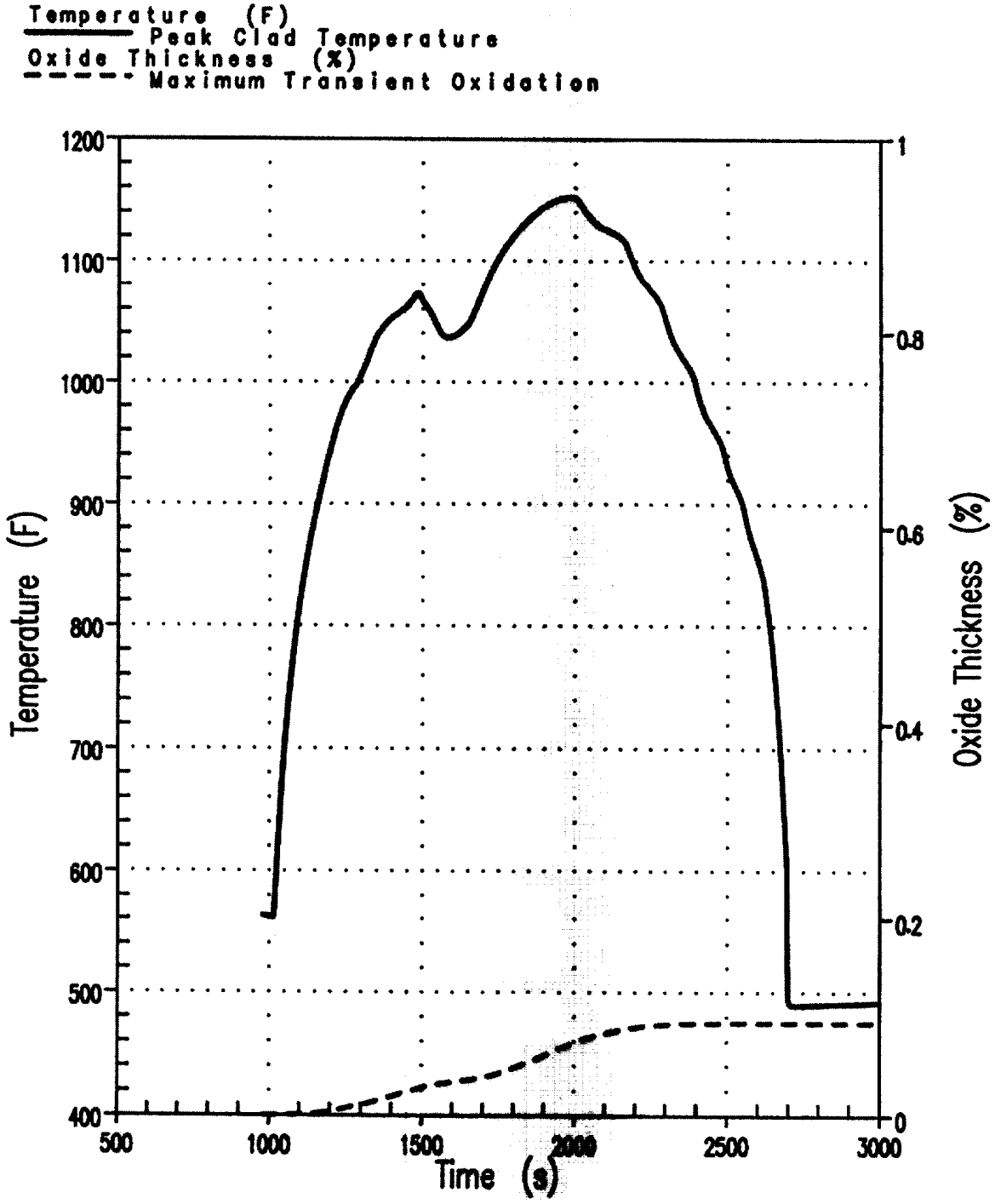


Figure 15-324. Catawba Unit 1 1.5-Inch Pressurizer Pressure

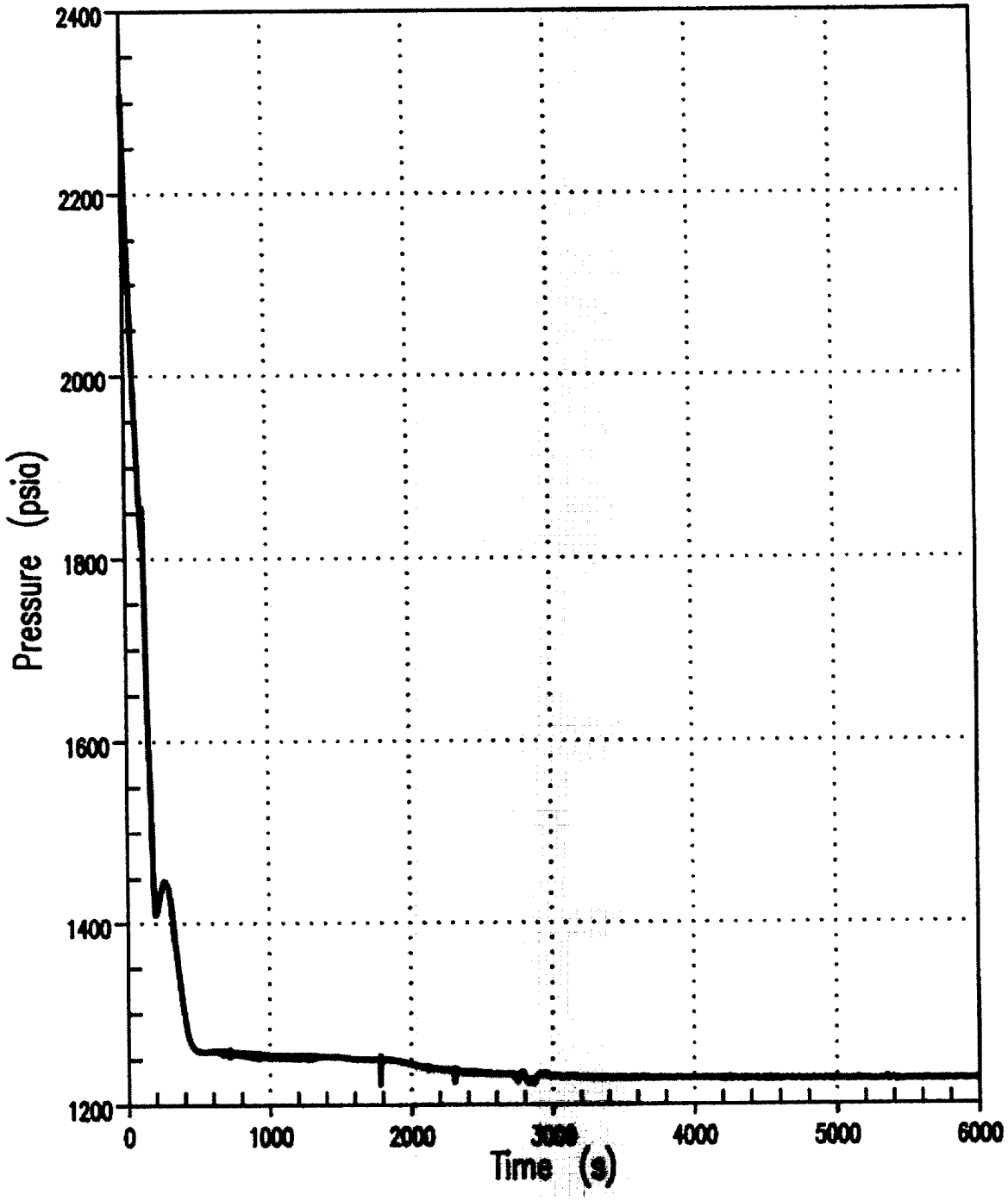


Figure 15-325. Catawba Unit 1 1.5-Inch Core Mixture Level

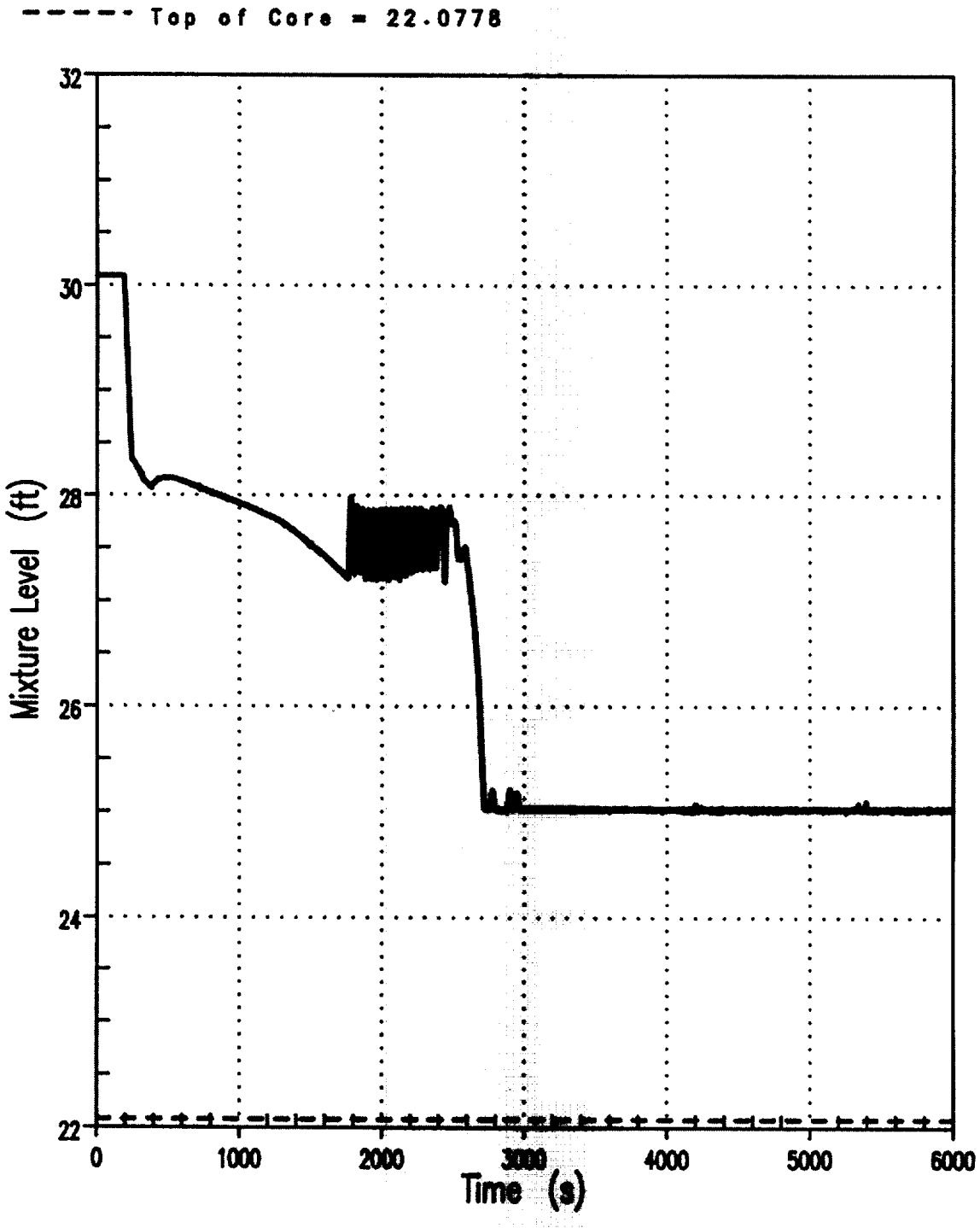


Figure 15-326. Deleted Per 2007 Update

Figure 15-327. Catawba Unit 1 4-Inch Pressurizer Pressure

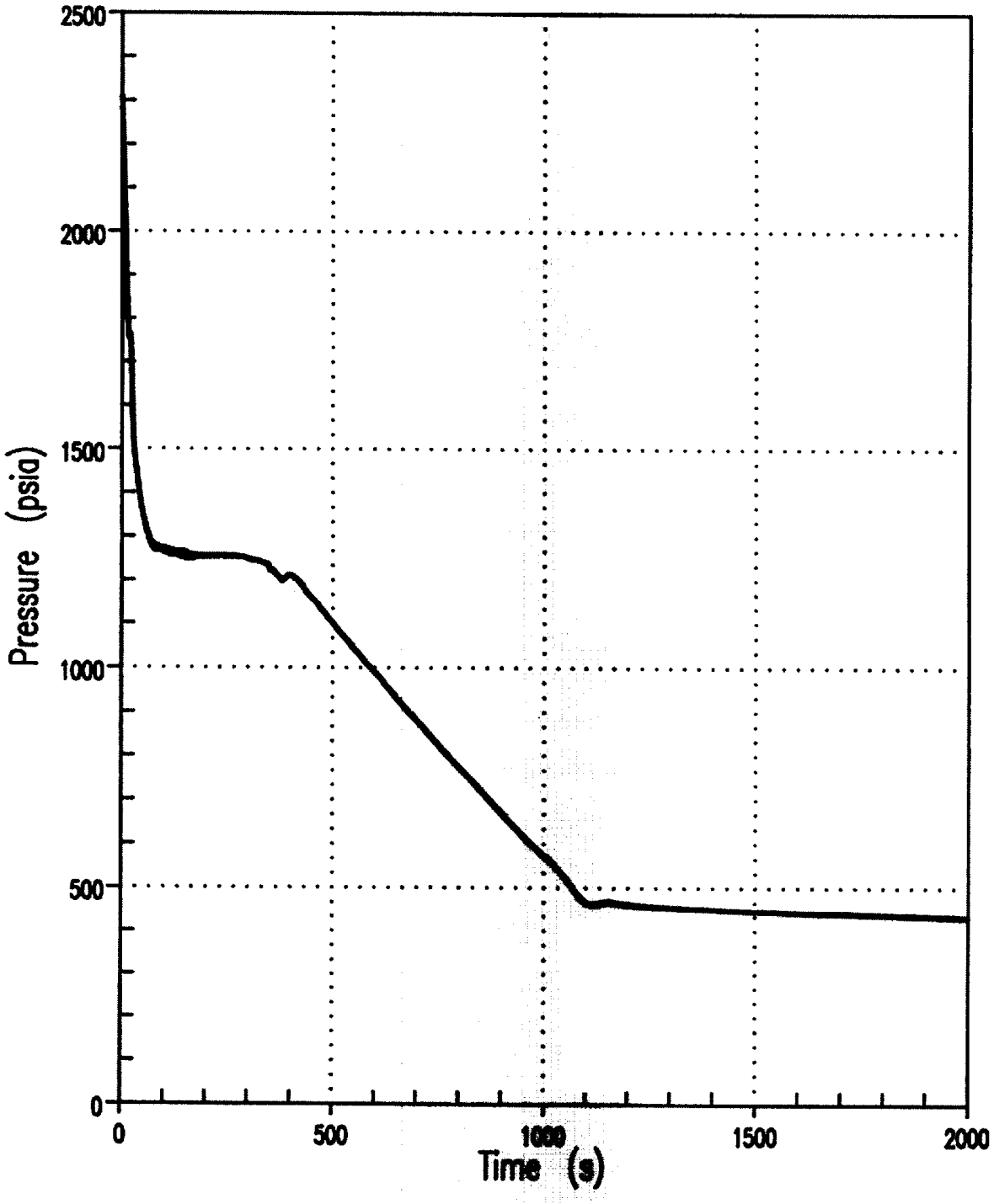


Figure 15-328. Catawba Unit 1 4-Inch Core Mixture Level

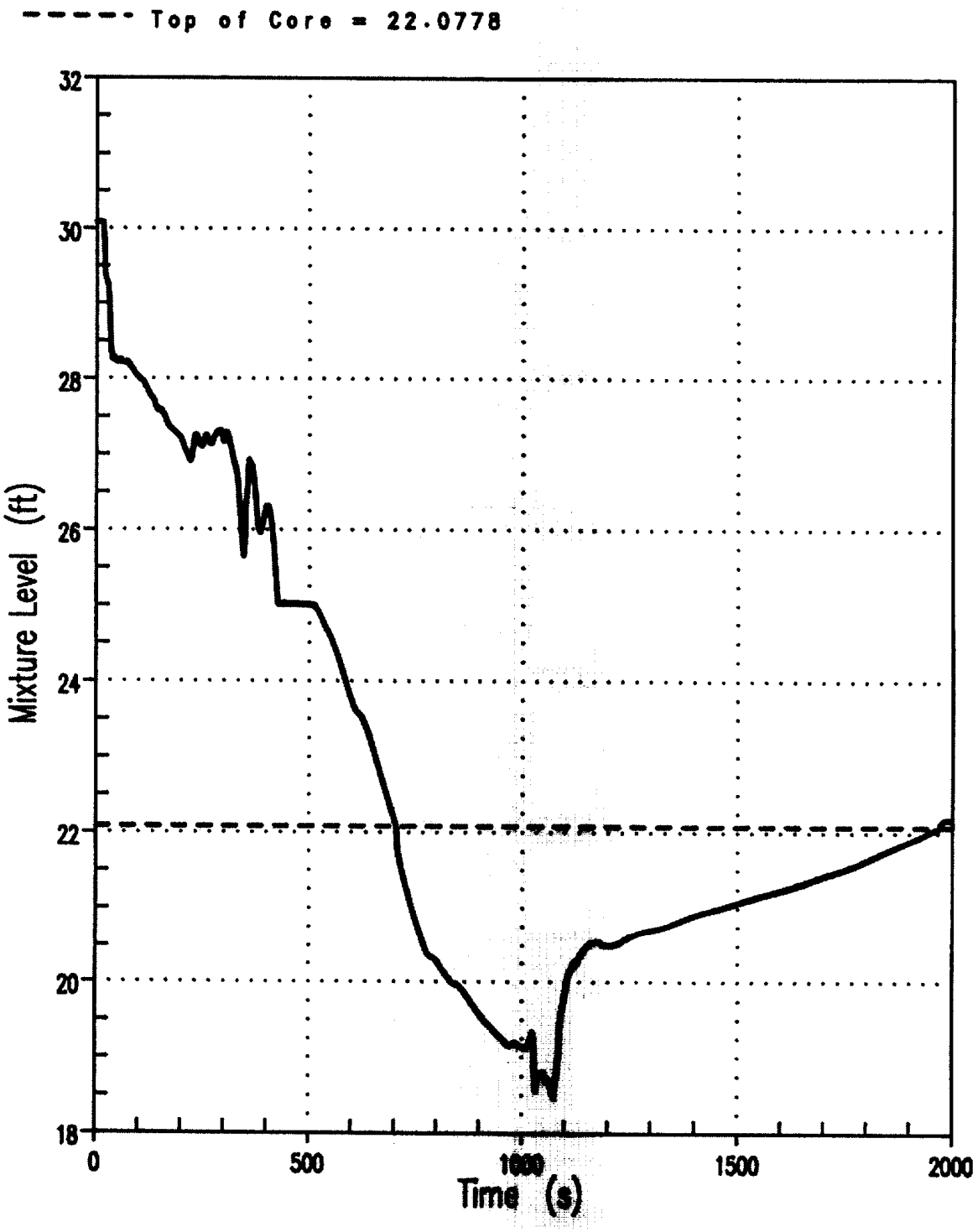


Figure 15-329. Catawba Unit 1 4-Inch Peak Clad Temperature and Maximum Transient Oxidation

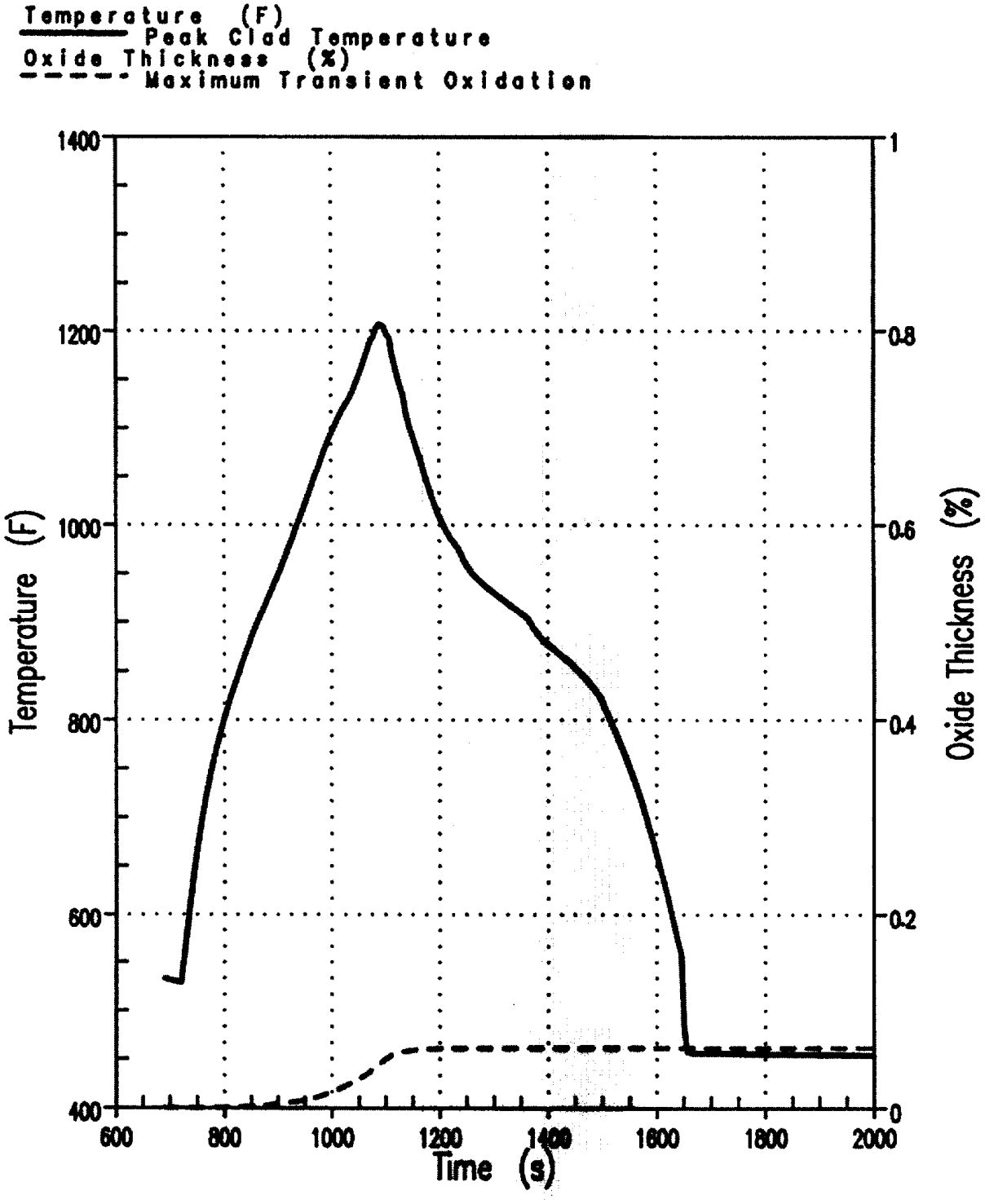


Figure 15-330. Steamline Break at Power

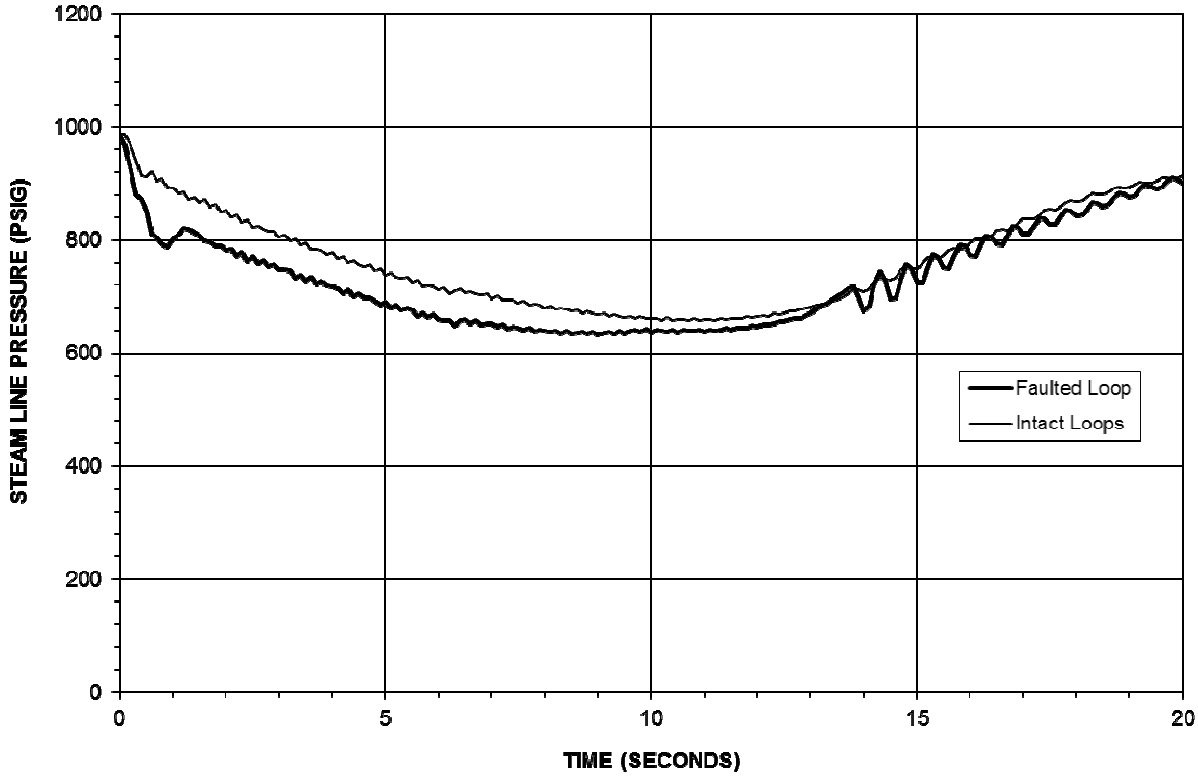


Figure 15-331. Steamline Break at Power

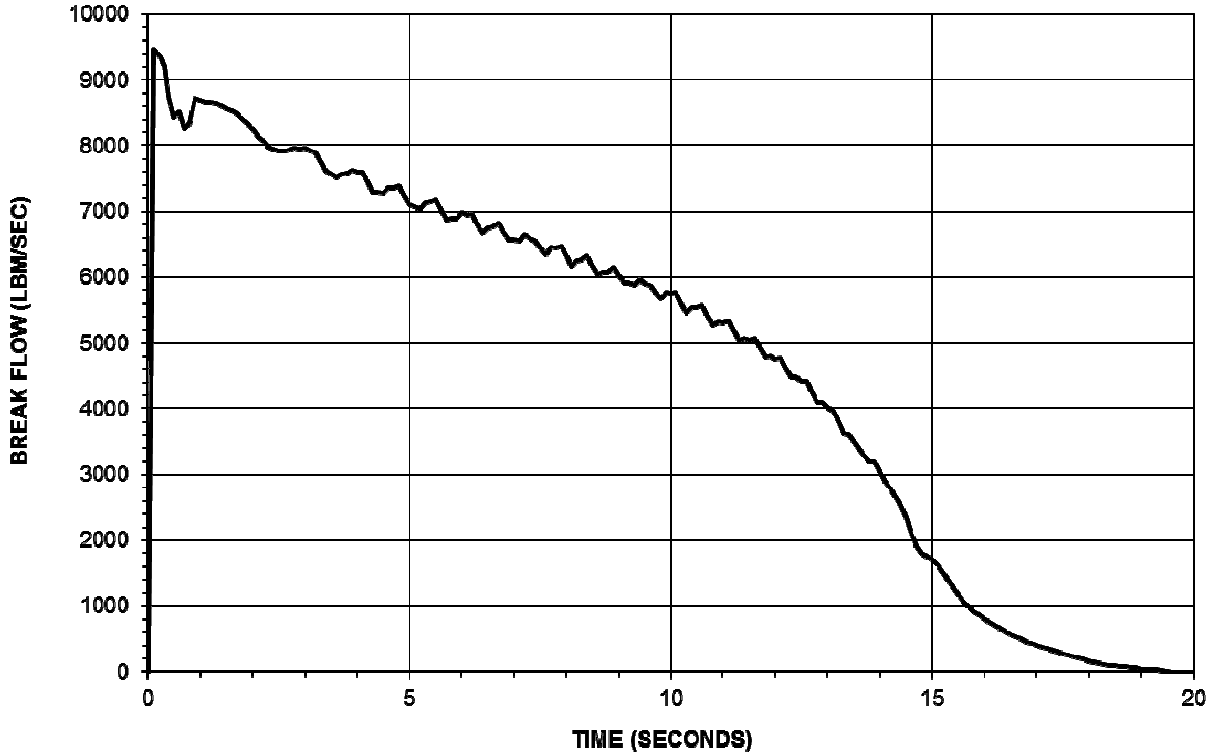


Figure 15-332. Steamline Break at Power

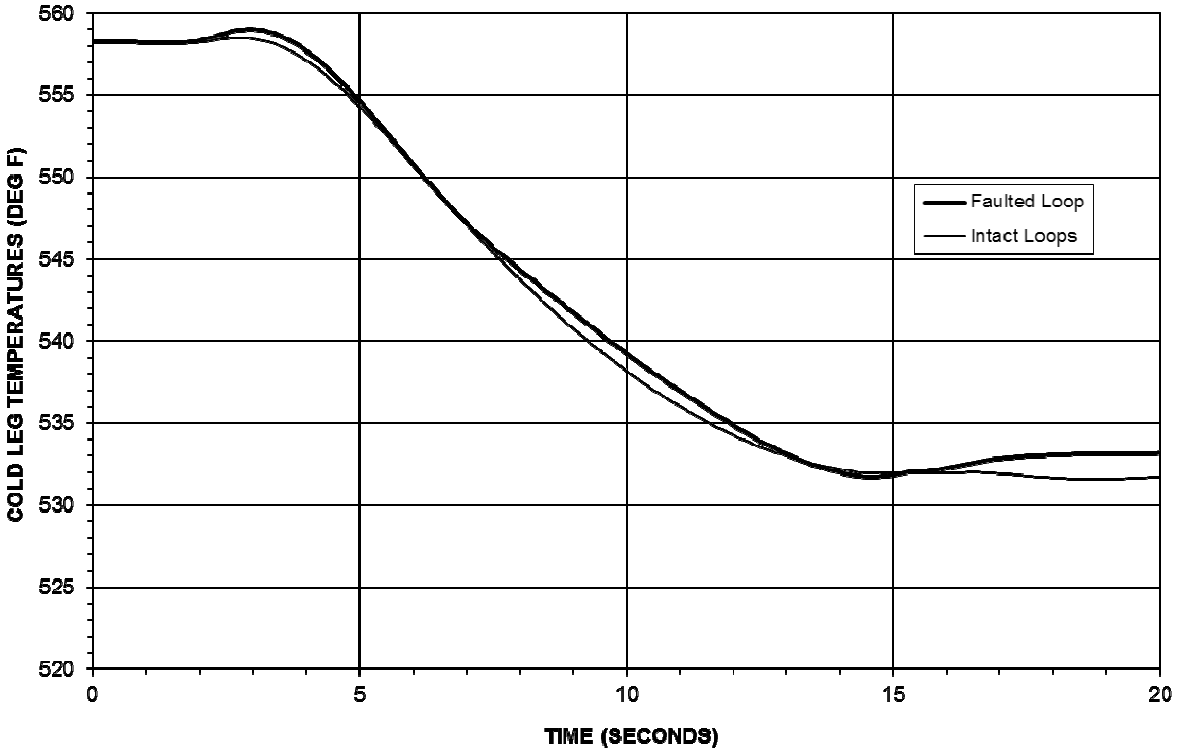


Figure 15-333. Steamline Break at Power

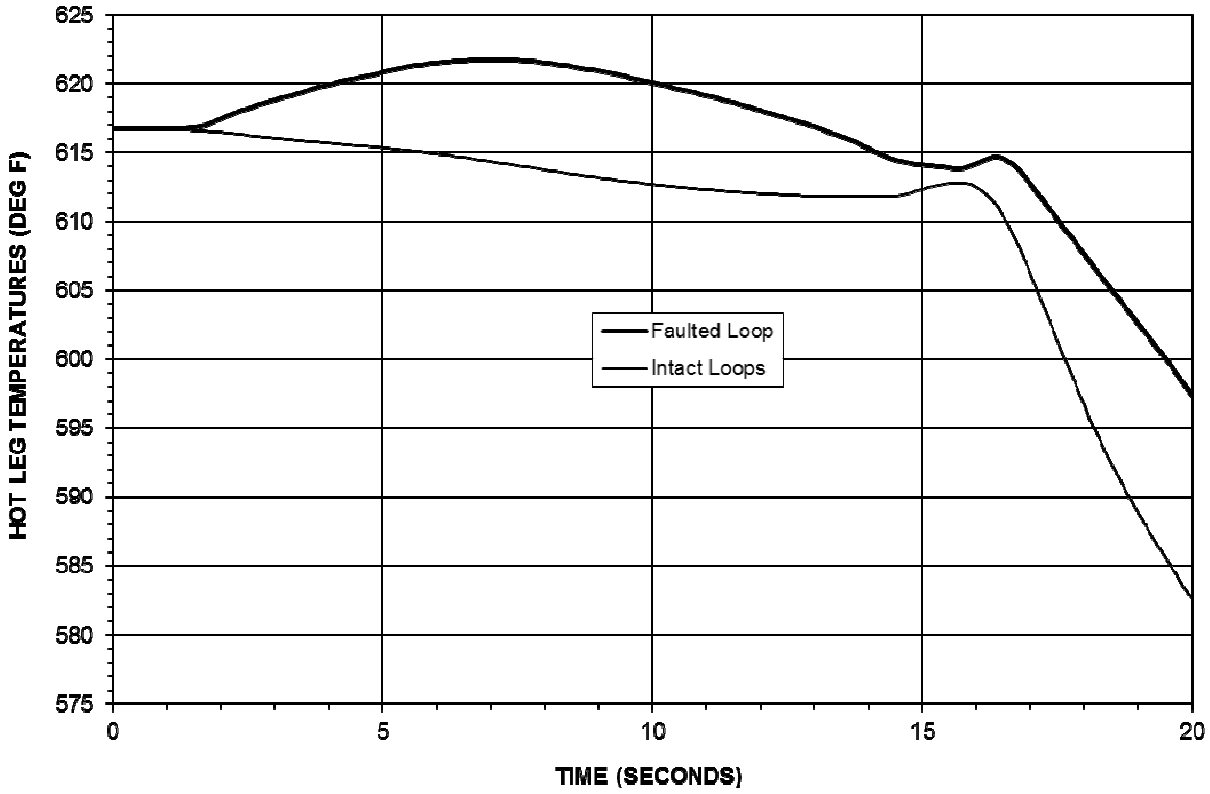


Figure 15-334. Steamline Break at Power

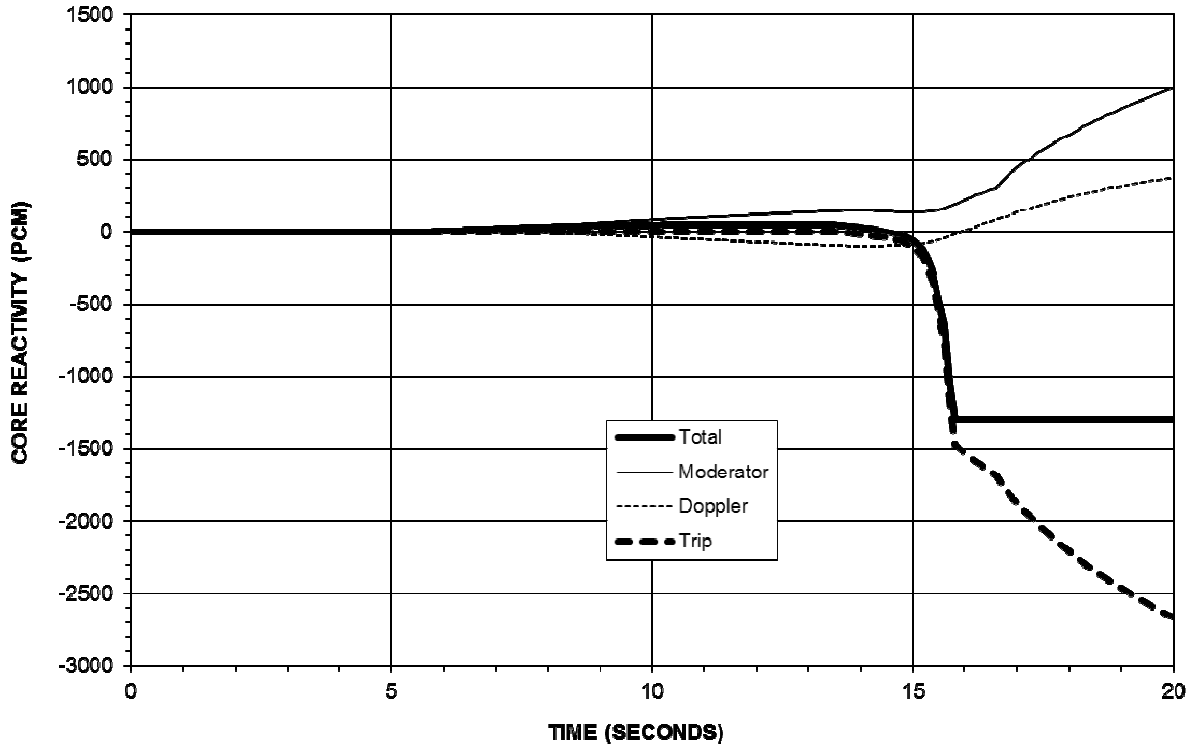


Figure 15-335. Steamline Break at Power

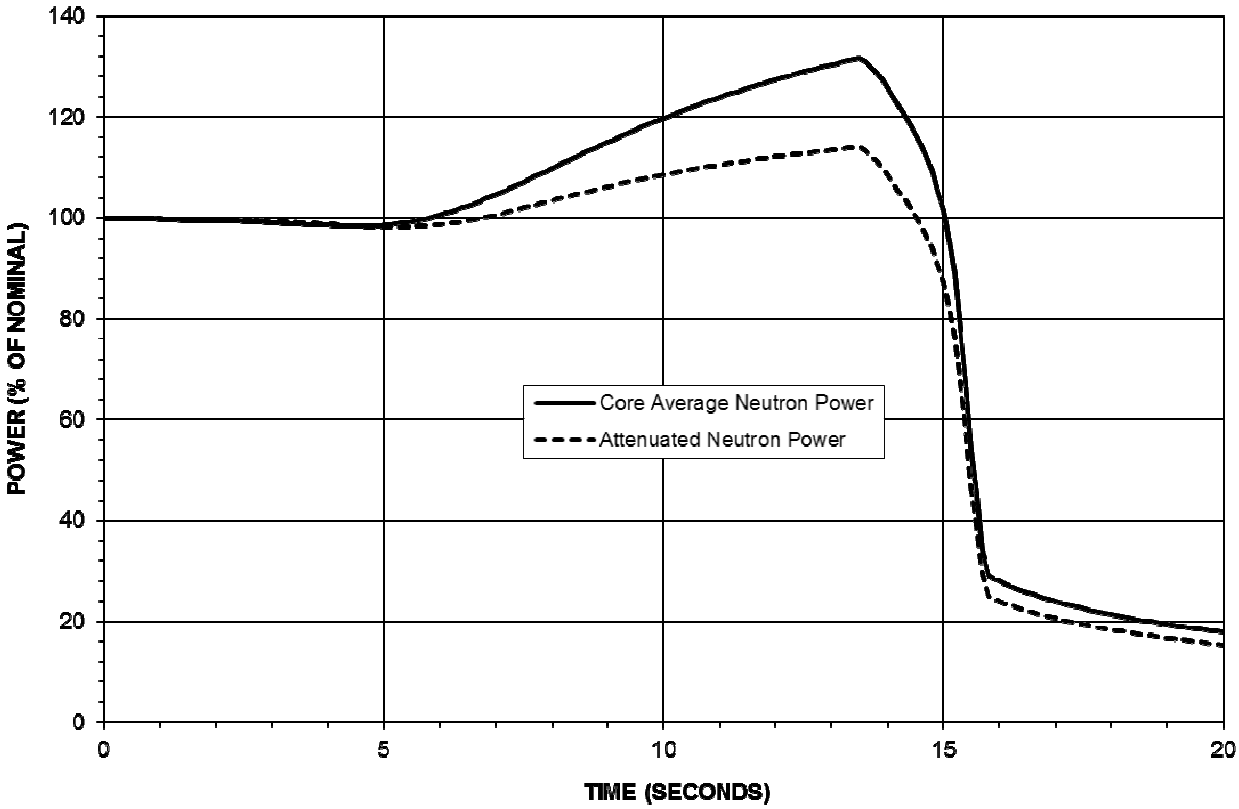


Figure 15-336. Steamline Break at Power

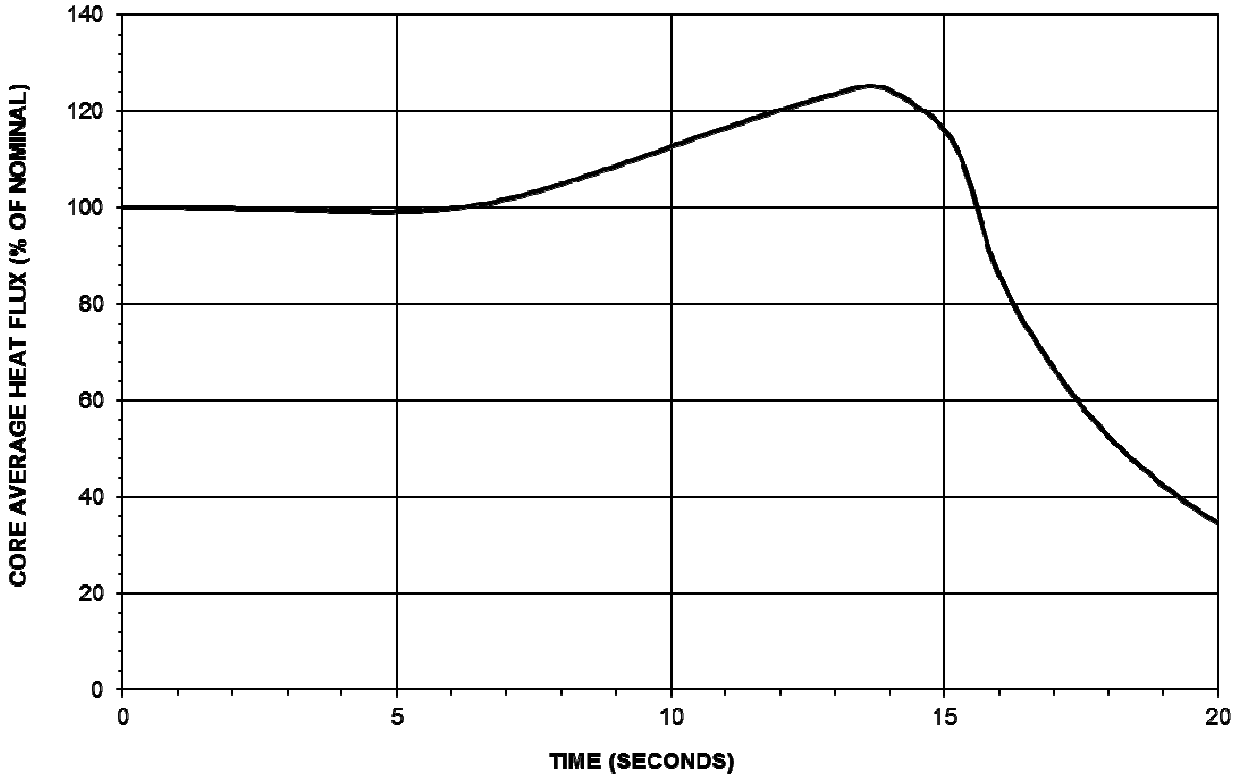


Figure 15-337. Steamline Break at Power

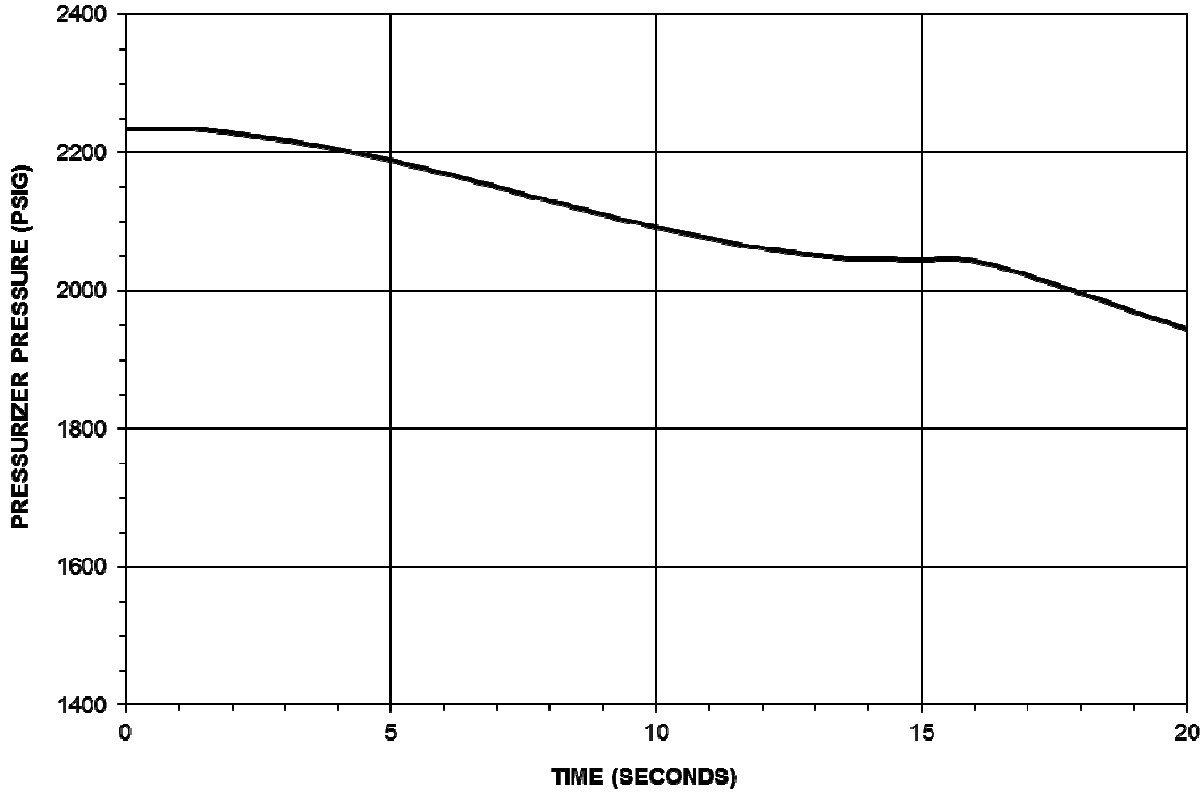


Figure 15-338. Steamline Break at Power

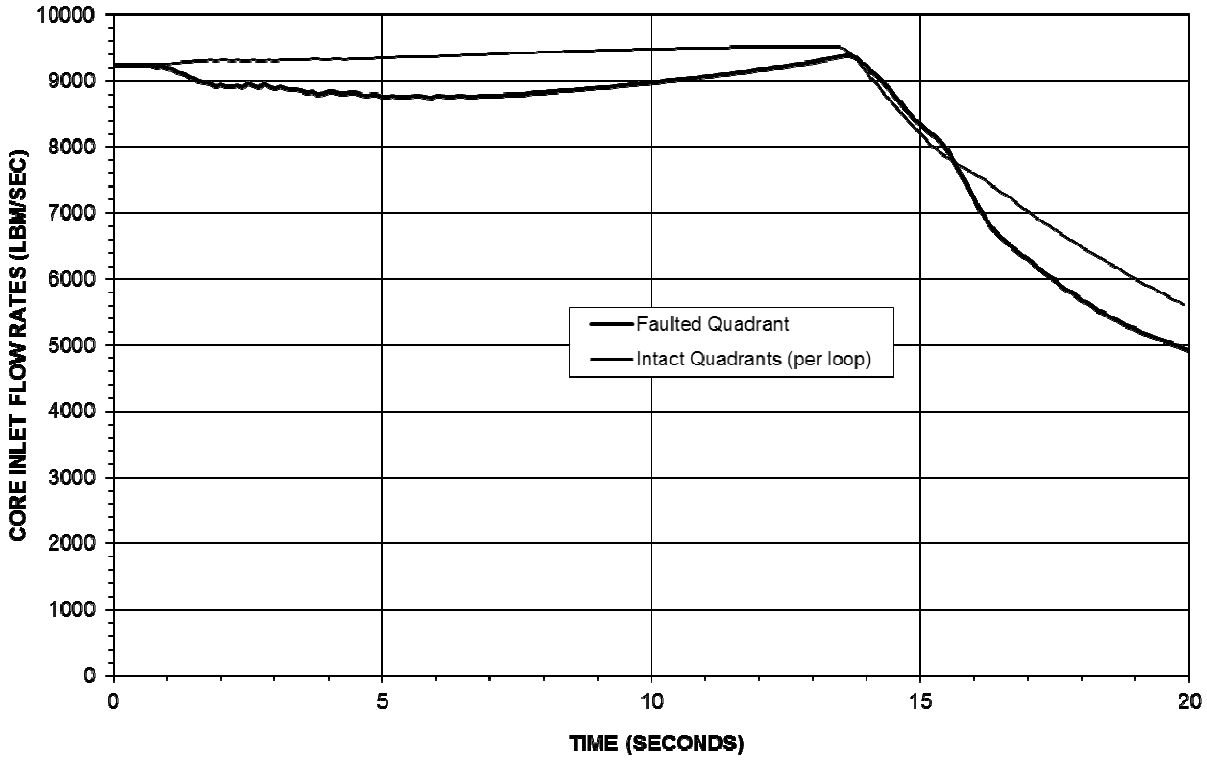


Figure 15-339. Steamline Break at Power