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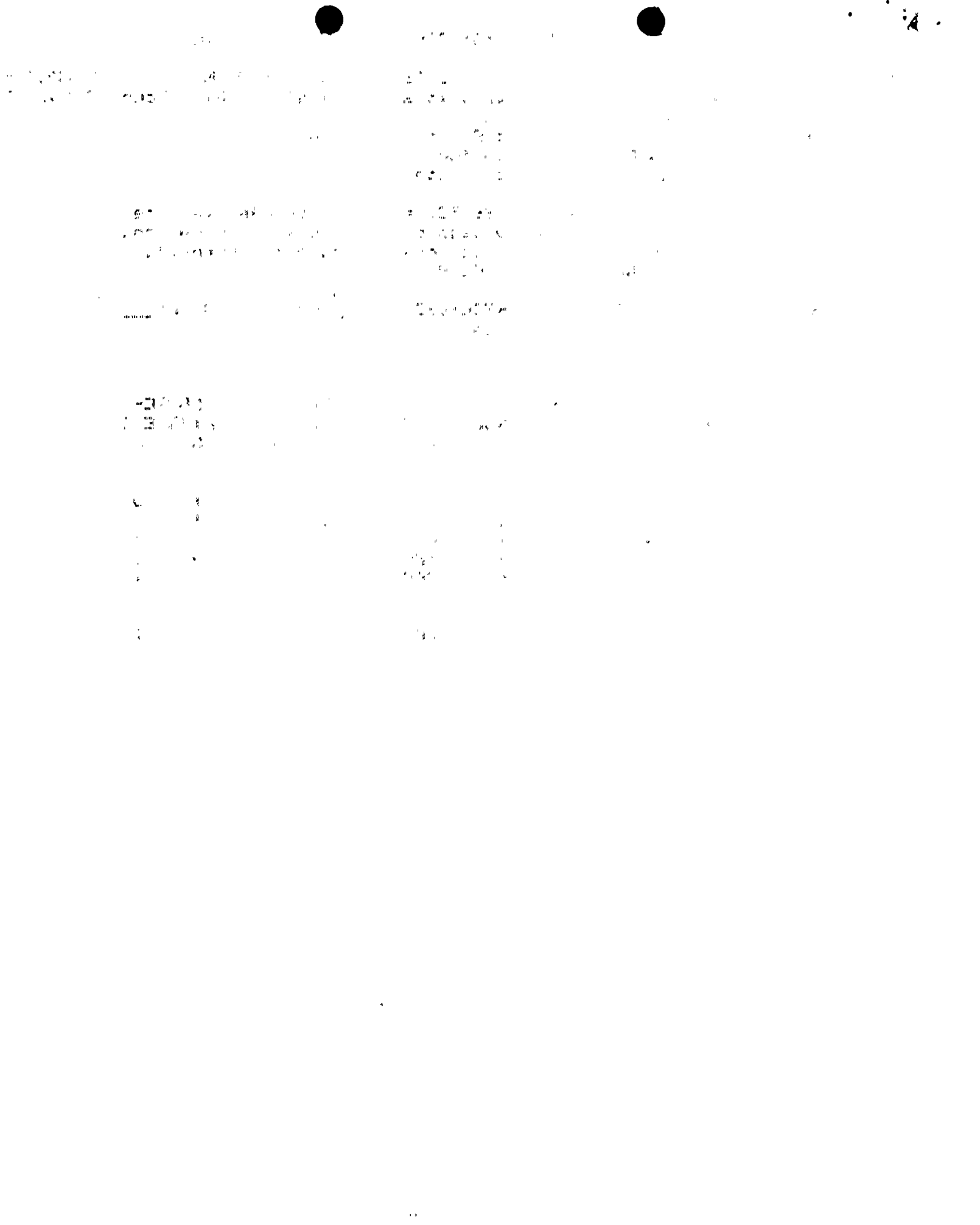
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SUBJECT: Forwards response to NRC 860523 request for addl info re
 fire protection program. Design basis fire in main control
 room can result in generating most transients currently
 analyzed in Chapter 15 of FSAR.

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	NRR WERMEIL, JO6	1 0		<u>REG FILE</u> 04	1 1
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Docket No. 50-397

Director of Nuclear Reactor Regulation
Attn: Ms. E. G. Adensam, Project Director
BWR Project Directorate No. 3
Division of BWR Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

Subject: NUCLEAR PLANT NO. 2
OPERATING LICENSE NPF-21
WNP-2 FIRE PROTECTION PROGRAM
REQUEST FOR ADDITIONAL INFORMATION

Reference Letter, E. G. Adensam (NRC) to G. C. Sorensen (SS),
same subject, dated May 23, 1986

In the reference letter, the NRC requested that the Supply System provide the staff with certain additional information concerning the WNP-2 Fire Protection Program (12 questions contained in the attachment to the NRC request).

Due to the complexity of the issues involved, the Supply System provided a draft response for the Staff's review, and a meeting was held in Bethesda on June 11, 1986, to explain our response in detail and to provide the Staff the opportunity to comment before the final response was submitted. This was done to ensure that the final response would be acceptable to the Staff.

Enclosed are the answers to the 12 questions contained in the reference letter, into which we have incorporated the Staff's comments. Should you have any additional questions regarding this matter, please contact Mr. P. L. Powell, Manager, WNP-2 Licensing.

Very truly yours,


G. C. Sorensen, Manager
Regulatory Programs

GWB/bk
Attachment

cc: JO Bradfute, NRC
JB Martin, NRC RV
E Revell, BPA
NS Reynolds, BLCP&R
NRC Site Inspector

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1. NRC QUESTION

In the advanced copy of Appendix R Fire Protection Evaluation submitted by WPPSS on April 4, 1986 (Reference: WNP-2 FSAR Amendment No. 37 Section F.4.3.d Page F.4.6a, "General Requirements of Appendix R"), the following statement is given:

"Since the loss-of-offsite power transient is the least severe of the Chapter 15 analyzed transients, no other transients would be allowed. This is impractical to implement. Discussions with the NRC and interpretations of Generic Letter 85-01 allow consideration of a single transient bounded by the FSAR Chapter 15 transient analysis. The WNP-2 scheme of shutdown, using the Remote Shutdown System, does not result in any single unanalyzed transients. Therefore, WNP-2 complied with Appendix R Section III.L."

In the previous draft Amendment No. 37 it was stated that "The Design Basis Fire (DBF) for the main control room and the cable spreading room, even though not considered credible, can result in generating transients more severe than presently analyzed in the FSAR Chapter 15 if worst case conditions are applied. These conditions are not analyzed."

We require clarification as to which statement is correct and the basis for it.

SUPPLY SYSTEM RESPONSE

The statements in the "advance copy" of Amendment No. 37 submitted on April 4, 1986 are correct.

The basis for the statement is as follows:

A design basis fire in the Main Control Room can result in generating most of the transients currently analyzed in the WNP-2 FSAR Chapter 15 since control/instrumentation circuits for most plant equipment are terminated there.

1. SUPPLY SYSTEM RESPONSE (continued)

Appendix R Section III.L requires, for a fire in the Main Control Room, when an "Alternate Safe Shutdown System" is used (the Remote Shutdown System) to safely shutdown the plant, that reactor parameters remain within those predicted for a loss-of-offsite power (LOOP). Since a LOOP transient is one of the least severe transients, reactor parameter values for most Chapter 15 analyzed transients and those identified by the IE Bulletin 79-27 analysis exceed those for a LOOP. Therefore, by Appendix R rules, none of these analyzed transients are allowed to occur. This, of course, would require that a large amount of controls and circuits throughout much of the Control Room be protected to preclude generating a transient more severe than a LOOP. Obviously this is impractical.

This issue was discussed with NRR (Messrs. D. Kubicki and W. Lafae) in February 1985. NRR agreed that "reactor parameters remaining within those values predicted for the existing FSAR Chapter 15 transient analysis" is an acceptable position. This assumes, of course, that the criteria of Generic Letters 85-01 and 86-10 Sections 5.3.10a and 5.3.10b apply, i.e., only "one worst case spurious actuation" need be considered at any one time.

2. NRC QUESTION

In the advanced copy of Appendix R Fire Protection Evaluation submitted by WPPSS on April 4, 1986 (Reference: WNP-2 Amendment No. 37 Section F.4.4.3 Page F.4.9, "Safe Shutdown System"), it is stated that six main steam safety/relief valves will result in less core uncover and lower fuel clad temperatures.

Plant specific analyses should be provided demonstrating that with credit for only those systems which are operable from the remote shutdown room, there is no (or minimal) core uncover as a result of the worst case design basis fire. Justification for analysis assumptions must be included with the analyses.

SUPPLY SYSTEM RESPONSE

Attached is the WNP-2 plant specific analysis requested. The analysis provides reactor parameter responses following depressurization utilizing six (6) main steam line safety relief valves. Note that the attached analysis has not been verified and is, therefore, preliminary. It is our intent to contract General Electric Company to perform an independent verification of the analysis results. The General Electric verification will be completed by July 15, 1986.

3. NRC QUESTION

Provide the analysis of ADS/LPCI systems for supporting a safe shutdown of the plant, and also identify the power systems, the instrumentation, the control systems, and the auxiliary systems associated with the safe shutdown methodology.

SUPPLY SYSTEM RESPONSE

The WNP-2 Remote Shutdown System was designed specifically by General Electric Company to shutdown the reactor safely following a Control Room evacuation necessitated by a fire. The Remote Shutdown System is the analyzed minimum set of systems/components acceptable for mitigation of this event as required by GDC 19 and Appendix R. The Remote Shutdown System is described in the WNP-2 FSAR Chapter 7.4.

With two exceptions, the WNP-2 Appendix R safe shutdown methodology adopted this minimum set of systems/components as those to be used generically to safely shutdown the plant following a Appendix R Design Basis Fire in any area of the plant. The first exception was the elimination of a high pressure injection system (RCIC). This resulted in the necessity to analyze the effects on reactor shutdown when utilizing immediate reactor depressurization (safety relief valve actuation) to a pressure where a low pressure system (RHR) could provide vessel water level control and long term core cooling. The second exception was to utilize the RHR system cooldown mode in its alternate shutdown cooling configuration previously analyzed in FSAR Chapter 15.2 Event No. 9. High pressure system control is still available at the Remote Shutdown panel and even though the system is not totally protected, more than one failure would be necessary to disable it.

During a telephone conversation on December 7, 1982 with Messrs. J. Ridgely and D. Kubicki of the NRC, the Supply System described its intention to revise the Appendix R analysis by eliminating the use of the high pressure injection systems in the shutdown scheme. This scheme was submitted for review to the NRC in Docket Letter G02-83-243, dated March 21, 1983, and described in subsequent revision to the FSAR Section F.4 and Question 040.075 (Amendment No. 31, dated June 1983). The analysis provided was extracted from General Electric document NEDO 24708A, Revision 1, which modified the scope of Revision 0 to include bounding analysis for other BWRs, including WNP-2, not analyzed originally.

3. SUPPLY SYSTEM RESPONSE (continued)

The analysis specifically addresses the case of shutdown with no high pressure injection systems available. Refer to Supply System Response No. 2 for further discussion.

A complete listing of all "power systems, instrumentation, the control systems, and the auxiliary systems" by equipment piece number is identified in the advance copy of WNP-2 FSAR Amendment No. 37 Section F.4 Tables 4.1, 4.2a through d, and 4.3 submitted to you on April 4, 1986.

4. NRC QUESTION

Provide the hot short to overvoltage analysis for the associated circuits in the common enclosure.

SUPPLY SYSTEM RESPONSE

During the March 1986 NRC audit, the NRC reviewers indicated that the Supply System's Appendix R safe shutdown analysis was deficient in that cross connection in common enclosures of higher voltage circuits with lower voltage circuits was not considered.

The NRC reviewers postulated that, with high voltage impressed on low voltage circuits, the lower voltage circuit loads would fail resulting in high currents traveling the lower voltage circuits within the fire area and also leaving the fire area and routing into other fire areas. Because the higher voltage circuit protective device may not clear the fault, the high currents are postulated to produce cable insulation failures resulting in localized electrically generated fires and subsequent hot shorts along the lower voltage circuit route involving additional circuits (some may be safe shutdown) in the fault. These additional circuits may fail and further propagate localized fires finally involving many fire areas simultaneously. The Supply System believes that this postulated event is not credible, and that due to the plant's vintage, such an analysis is impractical and results in failures that would be without practical design solution. It should be noted that such an analysis involves not only "common enclosures" but requires analysis of all circuits within and leaving a given fire area.

This issue was discussed with NRR (Messrs. D. Kubicki and J. Ridgely) in April 1984. The Supply System identified this potential circuit failure condition but could find no practical design solution, and therefore, asked NRR if fuses/breakers could be relied upon to clear any faults resulting from the fire even if the fuses/breakers are located in the fire area. NRR agreed that taking credit for the actuation of circuit protective devices is consistent with the generally expected conditions resulting from exposure fires. When cables routed

4. SUPPLY SYSTEM RESPONSE (continued)

in grounded steel raceways or enclosures are exposed to fire, the jackets on those cables lying directly on the steel fail first, resulting in shorts to ground opening the circuit protective device which clears the fault. These cables then become the ground grid to which the next cables will short, and so on. Additionally, the Supply System believes that since only IEEE 383 qualified cable is used throughout WNP-2 (both 1E and Non-1E circuits), localized fires will not occur, even if high currents were to exist in some circuits.

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UNITED STATES
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5. NRC QUESTION

Paragraph F.4.4.29 states that "Following a Main Control Room evacuation (because of a fire), before operation of the remote shutdown transfer switches, it is assumed that the results of spurious failures, for analysis purposes, are limited to loss of power supplies and blown fuses."

Our position is that this assumption is insufficient. Provide a revised analysis which assumes that any circuit can spuriously operate to energize or to de-energize valves, pumps, or other equipment in such a manner as to operate in the worst direction for achieving safe shutdown. These spurious signals need only be considered one at a time and should be assumed to initiate immediately upon scrambling the reactor. They are not to be assumed terminated, if possible, prior to regaining control of the plant at the remote locations away from the control room. Similarly, Paragraph F.4.4.3 states that "Spurious signal cables are those cables which... could cause an Appendix R safe shutdown circuit to malfunction." It is our position that this is inadequate. All circuits are to be reviewed for spurious signals to determine if any spurious signal could result in inhibiting the safe shutdown of the plant.

SUPPLY SYSTEM RESPONSE

The WNP-2 Appendix R methodology assumes that spurious signals occur only one at a time and are of two basic types: 1) those that directly affect a safe shutdown component(s) by causing it to "malfunction"; and 2) those that indirectly affect a safe shutdown system by creating plant responses which reduce the effectiveness of the selected systems to achieve safe shutdown.

For a Main Control Room fire, each circuit in the room is not individually analyzed. Instead, the WNP-2 methodology utilizes the following assumptions:

- 1) A single spurious signal which can indirectly affect safe shutdown by inadvertently energizing or de-energizing pumps, valves, etc. cannot result in any transient not currently analyzed in the FSAR Chapter 15.0 event analysis or as analyzed by the IE Bulletin 79-27 analysis. Therefore, the selected Appendix R safe shutdown systems can mitigate the effects of any transient which might be generated by a fire.

5. SUPPLY SYSTEM RESPONSE (continued)

- 2) A single spurious signal which directly affects safe shutdown by inadvertently energizing or de-energizing safe shutdown system(s) equipment will result in no safe shutdown equipment or system failures. The Remote Shutdown System controls located on the Remote Shutdown panels are aligned, by procedure, such that proper pump/valve lineup will occur when the remote transfer switches are operated. Additionally, WNP-2 has evaluated the effects of inadvertent actuation of safe shutdown system pumps and valves which might occur before transfer switch operation and has determined that no failure of the safe shutdown system(s) will result.

The Supply System believes that this methodology envelopes all possible spurious signals effects. The draft FSAR Sections F.4.4.2.9 and F.4.4.4.3 will be revised to reflect the above clarifications.

6. NRC QUESTION

Paragraph F.4.4.3 states that "For any postulated fire in the plant a single set of undamaged systems including power and control and instrumentation must be available to bring the plant to a cold shutdown condition." This is acceptable. However, it should be noted that there is no requirement that safe cold shutdown must be achieved with only undamaged systems. Only hot shutdown must be achieved with undamaged systems. If repairs are necessary to achieve cold shutdown, then they are acceptable provided that the following conditions are met: 1) the materials that are necessary to make the repairs are available onsite and dedicated for those repairs; 2) the operators are trained to make the repairs; 3) the appropriate procedures are in place to instruct personnel in making the repairs; and 4) that the repairs can be made in sufficient time such that the plant can be in cold shutdown within 72 hours from the initiation of the fire without offsite power. In view of the above, verify that no credit is being taken for repairs in going to cold shutdown, or provide a discussion of the repairs that are necessary which addresses the above four points.

SUPPLY SYSTEM RESPONSE

The Supply System has chosen to protect all equipment required to achieve safe shutdown. Therefore, required equipment is always available and no repairs are necessary.

7. NRC QUESTION

On Page F.4-9, the licensee states that "With the inclusion of the Alternate Remote Shutdown System in the WNP-2 design the number of ADS valves available will be increased to six." Paragraph F.4.4.3.3 states that "The equipment required to provide cold shutdown capability, in the event of a Main Control Room fire, consists of an isolated portion of the Appendix R Division 2 safe shutdown equipment, three Division I SRVs along with auxiliary components...". The above statements appear to be contradictory. Verify that control of six ADS/SR valves will be provided at a remote location from the control room. If only three ADS/SR valves will be controlled from outside the control room, provide the results of a water inventory analysis which demonstrates that the effects of a fire in the control room, with the worst spurious signal and only controlling three ADS/SR valves, will result in no reactor coolant system (RCS) parameters exceeding those values which would exist during a loss-of-offsite power event. Verify that there will be no uncover of the core, or alternatively identify the amount of fuel uncovered, length of time fuel is uncovered, and the maximum fuel and cladding temperatures in the core.

SUPPLY SYSTEM RESPONSE

The FSAR will be revised to describe the availability of six SRVs. Reference to three valves will be eliminated.

The existing WNP-2 design provides two redundant Remote Shutdown panels. Each panel is provided with transfer switches and controls for three SRVs (total of six). These panels are located in adjacent rooms. The control of these valves is not dependent on the diesel generator availability since the power source is 125VDC from Division 1 or 2 station batteries.

8. NRC QUESTION

On Page F.4-11, the licensee states that Appendix R Remote Shutdown System consists, in part, of the "Reactor Vessel Instrumentation (Non-1E)". Since all Appendix R fire events include the concurrent loss-of-offsite power, it is not clear how Non-1E instrumentation can be relied on to be available for safely shutting down the plant in the event of a fire in the control room. Verify that all instrumentation in the Remote Shutdown System is powered by Class 1E systems (i.e., the diesel generators).

SUPPLY SYSTEM RESPONSE

The WNP-2 electrical separation criteria allows Non-1E loads to be powered from a 1E source if adequate isolation is provided to protect the 1E source from Non-1E load failures. The Non-1E, as well as 1E, Appendix R instrumentation provided are supplied power from the Class 1E diesel generators and, therefore, are available following a loss of offsite power.

9. NRC QUESTION

Paragraphs F.4.4.4.3.1.4 and F.4.4.4.3.2.4 state that "Spurious signals are isolated by manually operated transfer switches if available." Verify that there are no spurious signals which could result in a worse transient than a loss-of-offsite power event in the event of a fire in the control room. For each spurious signal which does not result in a worse transient than a loss-of-offsite power in the event of a fire in the control room: 1) describe the available parameters and procedures which will be used to verify the presence of a spurious signal, of its absence, and the frequency at which this determination will be made during the 72 hours of the transient (or until cold shutdown is achieved); 2) identify the specific location and the identification number of the breaker which will be used to isolate the spurious signal; 3) identify the person or persons who will make these determinations and will take the appropriate corrective actions; 4) verify that these people will either be in addition to the currently identified number of personnel needed for safe shutdown and the fire brigade, or that there will be adequate time for the personnel to perform their previously identified functions and to determine all spurious signals and take the appropriate corrective actions in a timely manner; 5) for each spurious signal which requires operator action, identify the amount of time available for operator action in order to prevent the spurious signal from inhibiting the safe shutdown of the plant; 6) for each spurious signal which does not have a means of isolation (Part 2 above), assume that it occurs simultaneously with any other non-isolatable spurious signal and remains in the condition which produces the maximum hinderance to safely shutting down the plant. For this scenario, verify that safe shutdown can be achieved and that no RCS parameter will exceed the value of the parameter for a loss-of-offsite power event.

SUPPLY SYSTEM RESPONSE

Our response assumes that the NRC meant "which does result in a worse transient..." rather than "does not."

As discussed in the response to Question No. 1 above, the WNP-2 methodology assumes that for a Control Room fire, no single spurious signal can result in a transient with associated reactor parameters more severe than presently analyzed.

9. SUPPLY SYSTEM RESPONSE (continued)

by FSAR Chapter 15.0 or as modified by the transients identified by IE Bulletin 79-27 analysis rather than more severe than a LOOP. The safe shutdown systems selected have been shown to be sufficient to mitigate each event and attain safe cold shutdown.

The statements in Paragraphs F.4.4.4.3.1.4 and F.4.4.4.3.2.4 mean that credit will be taken for the actuation of manually operated transfer switch contacts existing within the electrical circuits to terminate spurious signals which may be generated by the fire. The Remote Shutdown transfer switches are examples. If no transfer switch is available, either one is added or other means (protection, reroute, etc.) are chosen to mitigate the spurious signal.

10. NRC QUESTION

Paragraph F.4.4.4.3.2.7 states that "Appendix R Division 1 Safe Shutdown System cables that contain potentially spurious signals to other Division 1 circuits do not require analysis." This is not clear. Any fire event can cause spurious signals. Every spurious signal should be reviewed to verify that it will not adversely affect the safe shutdown of the plant and every spurious signal which will potentially have an adverse effect on the safe shutdown of the plant should be provided with protection and isolation capability. Verify for every fire area that all non-3-phase power cables and control cables have been considered as potentially spuriously operating the related equipment and that every cable either:

1) will not adversely affect the ability to achieve safe shutdown of the plant and will not result in any RCS parameter exceeding the value which would be observed during a loss-of-offsite power event, or

2) the spuriously actuated device will either be:

a) normally isolated from the control room during normal power operation;

b) isolated immediately upon leaving the control room in the event of a fire in the control room; or

c) there has been an analysis performed which demonstrates that there is adequate time for the operator to identify the spurious signal and to isolate it from the control room. For this case, provide a list of the spurious signals, the time available for operator action before any parameter exceeds the value associated with a loss-of-offsite power event, and a description of the actual operations and movements of the operator necessary to isolate the spurious signal in the event of a fire in the control room.

For Case 2 above, verify that the appropriate procedures include the instructions for the operator to identify and isolate the spurious signals and that all operators will be trained to identify and to isolate spurious signals in the event of a fire.

10. SUPPLY SYSTEM RESPONSE

There are two methods which may be used to identify spurious signals which either directly cause safe shutdown circuit malfunction or indirectly inhibit safe shutdown by providing inappropriate reactor responses which cannot be mitigated by the selected safe shutdown systems.

The first method uses no previous analyses results but verifies the effect of failure of each individual circuit which is exposed to the fire (within the fire area) to show that safe shutdown is still available.

The second method utilizes the existing plant transient and accident analysis which has previously documented all potential spuriously generated plant responses that could inhibit a normal safe shutdown. These are identified in the FSAR Chapter 15.0 and by the IE Bulletin 79-27 analysis. The majority of those identified could result from an Appendix R fire but with properly selected safe shutdown systems mitigation is attained. Therefore, the only remaining threat to safe shutdown is provided by spurious signals which directly cause malfunction of the safe shutdown circuits. To identify these spurious signals, each safe shutdown circuit is analyzed for connecting circuits (series or parallel) whose failure due to fire may result in failure of the safe shutdown circuit. This tabulation of spurious signal circuits is then consulted for each fire area to determine if any circuit exists there which requires protection.

The statement in FSAR Paragraph F.4.4.4.3.2.7 requires the following clarification. The statement should read "A single Appendix R Division 1 safe shutdown system multiconductor cable that contains circuits to safe shutdown equipment as well as spurious signal circuits affecting other Division 1 circuits does not require additional analysis as a spurious signal cable." The reason for this is that since the cable contains a safe shutdown circuit, any protection required for this cable will be provided on this basis; consideration of protection for this cable because it is a spurious signal cable would be redundant.

Refer also to the response to Questions 5, 6, and 9.

11. NRC QUESTION

Paragraph F.4.4.4.3.3.2. states that "All Appendix R Remote Shutdown Components located fire area other than the Main Control Room will perform their designated function and do not require additional protection." For each of the following areas, verify that the remote shutdown system will perform its designated functions in the event of a fire in that area and the spurious signals generated by the fire.

- 1) The area containing the transfer switches;
- 2) The area containing the RHR pumps;
- 3) The area containing the remote shutdown panel(s);
- 4) The area containing the motor control centers for the remote shutdown systems;
- 5) The areas containing the cables (signal and power) for all of the remote shutdown systems; and
- 6) The areas for the remote shutdown systems where cables (power and signal) pass through areas where other cables are present.

SUPPLY SYSTEM RESPONSE

The statement in Paragraph F.4.4.4.3.3.2 means that since the "Remote Shutdown Components" are used for shutdown from a Control Room fire only, and no fires exist in other areas, it is assumed that circuit damage is limited to fuses and power sources (refer to response to Question No. 5). Therefore, protection for Remote Shutdown circuits is not necessary in other fire areas listed in the Question. All spurious signals generated in the Control Room which could cause malfunction of a Remote Shutdown circuit were eliminated by the addition of isolating transfer switches. Additionally, each spurious signal circuit was analyzed to assure that no detrimental effects to the Remote Shutdown system(s) occurred before the Operator could actuate the transfer switch (assuming one spurious signal at a time).

12. NRC QUESTION

Paragraph F.4.4.4.3.3.4 states that "Spurious signals are isolated by normally open circuit devices that are located outside the Main Control Room." Describe how the operators will identify which signals are spurious and how they determine which circuit devices to open.

SUPPLY SYSTEM RESPONSE

"Normally open" means that, during normal plant operation, the devices will isolate any potential spurious signals that might affect the safe shutdown circuits and no fire related failures can cause these circuit devices (such as manual transfer switches) to change state. Therefore, no Operator action is required to change the normal state of these isolation devices.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84