

# INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631  
COLUMBUS, OHIO 43216

85-13

September 13, 1985  
AEP:NRC:0692AG

Donald C. Cook Plant Unit Nos. 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
PENETRATION FIRE SEALS INSIDE CONDUITS

Mr. James G. Keppler  
U.S. Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Dear Mr. Keppler:

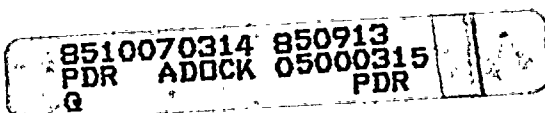
This letter is in response to Mr. C. J. Paperiello's letter dated August 26, 1985 which transmitted Inspection Report No. 50-315/85013(DRS); 50-316/85013(DRS) and to a request by Mr. J. Streeter of your staff. Specifically, we were requested to identify why we have concluded that we have complied with our licensing basis and are not required to provide additional fire seals inside electrical conduits.

It has always been our understanding that the licensing basis for the plant required silicone sealing outside of conduits penetrating fire barriers, but that additional sealant inside the conduits was not necessary. A review of the then-applicable Standard Review Plan (SRP) and Branch Technical Position (BTP) does not show that sealing both inside and outside of conduits is required. Those standards focused on maintaining the integrity of fire barriers, which are penetrated by, among other things, piping or electrical conduits. The standards required the use of a sealant which would reestablish a barrier with an equivalent fire rating by sealing around the penetrating piping or conduits at the barrier. Consistent with those standards, we do not believe that we committed to seal the inside of penetrating conduits, and have been unable to find any documentation of such a commitment.

NRC's fire protection Safety Evaluation (SE), based in part on an NRR inspection of the in-place fire protection measures, and Region III inspections of the penetration fire stops, support our understanding of the licensing basis for conduit fire barrier penetrations.

The attachment to this letter addresses the pertinent parts of the SRP, the BTP, the SE and supporting documentation, and the Region III inspection reports, all of which support our belief that we had adequately complied with the requirements for fire barrier conduit penetrations.

Our Specification DCCFP101QCN was revised in 1982 to require conduits penetrating fire barriers to be sealed both inside and outside to reflect



SEP 18 1985  
FEO/

1. *Phragmites* (common)

Figure 1 is a line graph showing the percentage of total catch versus the number of hauls for two species, *P. setiferus* and *P. setiferus* + *P. setiferus* + *P. setiferus*. The x-axis represents the number of hauls (1 to 10), and the y-axis represents the percentage of total catch (0 to 100). *P. setiferus* is represented by a solid line with open circles, and *P. setiferus* + *P. setiferus* + *P. setiferus* is represented by a dashed line with open circles. Both species show a rapid increase in catch percentage in the first few hauls, followed by a plateau.

The diagram illustrates the experimental setup. A subject is seated at a table, looking at a video screen. A video camera is positioned above the screen. A target is placed on the table. A horizontal arrow indicates the direction of movement from the starting point to the target. A vertical arrow indicates the direction of movement from the starting point to the video screen. A horizontal arrow indicates the direction of movement from the video screen to the target. A vertical arrow indicates the direction of movement from the video screen to the video camera.

1. 1980 2. 1981 3. 1982 4. 1983 5. 1984 6. 1985 7. 1986 8. 1987 9. 1988 10. 1989 11. 1990 12. 1991 13. 1992 14. 1993 15. 1994 16. 1995 17. 1996 18. 1997 19. 1998 20. 1999 21. 2000 22. 2001 23. 2002 24. 2003 25. 2004 26. 2005 27. 2006 28. 2007 29. 2008 30. 2009 31. 2010 32. 2011 33. 2012 34. 2013 35. 2014 36. 2015 37. 2016 38. 2017 39. 2018 40. 2019 41. 2020 42. 2021 43. 2022 44. 2023 45. 2024 46. 2025 47. 2026 48. 2027 49. 2028 50. 2029 51. 2030 52. 2031 53. 2032 54. 2033 55. 2034 56. 2035 57. 2036 58. 2037 59. 2038 60. 2039 61. 2040 62. 2041 63. 2042 64. 2043 65. 2044 66. 2045 67. 2046 68. 2047 69. 2048 70. 2049 71. 2050 72. 2051 73. 2052 74. 2053 75. 2054 76. 2055 77. 2056 78. 2057 79. 2058 80. 2059 81. 2060 82. 2061 83. 2062 84. 2063 85. 2064 86. 2065 87. 2066 88. 2067 89. 2068 90. 2069 91. 2070 92. 2071 93. 2072 94. 2073 95. 2074 96. 2075 97. 2076 98. 2077 99. 2078 100. 2079 101. 2080 102. 2081 103. 2082 104. 2083 105. 2084 106. 2085 107. 2086 108. 2087 109. 2088 110. 2089 111. 2090 112. 2091 113. 2092 114. 2093 115. 2094 116. 2095 117. 2096 118. 2097 119. 2098 120. 2099 121. 2100 122. 2101 123. 2102 124. 2103 125. 2104 126. 2105 127. 2106 128. 2107 129. 2108 130. 2109 131. 2110 132. 2111 133. 2112 134. 2113 135. 2114 136. 2115 137. 2116 138. 2117 139. 2118 140. 2119 141. 2120 142. 2121 143. 2122 144. 2123 145. 2124 146. 2125 147. 2126 148. 2127 149. 2128 150. 2129 151. 2130 152. 2131 153. 2132 154. 2133 155. 2134 156. 2135 157. 2136 158. 2137 159. 2138 160. 2139 161. 2140 162. 2141 163. 2142 164. 2143 165. 2144 166. 2145 167. 2146 168. 2147 169. 2148 170. 2149 171. 2150 172. 2151 173. 2152 174. 2153 175. 2154 176. 2155 177. 2156 178. 2157 179. 2158 180. 2159 181. 2160 182. 2161 183. 2162 184. 2163 185. 2164 186. 2165 187. 2166 188. 2167 189. 2168 190. 2169 191. 2170 192. 2171 193. 2172 194. 2173 195. 2174 196. 2175 197. 2176 198. 2177 199. 2178 200. 2179 201. 2180 202. 2181 203. 2182 204. 2183 205. 2184 206. 2185 207. 2186 208. 2187 209. 2188 210. 2189 211. 2190 212. 2191 213. 2192 214. 2193 215. 2194 216. 2195 217. 2196 218. 2197 219. 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 26

[illegible][illegible]

1. The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

2. The second part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

3. The third part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

4. The fourth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

5. The fifth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

6. The sixth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

7. The seventh part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

8. The eighth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

9. The ninth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .

10. The tenth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as  $\epsilon \rightarrow 0$ . It is shown that the solutions of the system (1) converge to the solutions of the system (2) in the sense of the weak convergence in the space  $L^2(\Omega; \mathbb{R}^n)$ .


[illegible][illegible]

newer industry practices. Since this exceeded the licensing basis requirement, our revised specification for internal conduit sealing was not made retroactive.

We continue to believe that we have fulfilled our licensing obligations for penetration fire stops and that no commitment was made to seal inside of conduits. However, we agree the safety of the plant would be further enhanced by sealing certain open ended conduits. An open ended conduit is one in which the contained cables exit the conduit into nonenclosed air space and do not directly enter into a metal enclosure such as a junction box. Therefore, we plan to initiate a plant walkdown to identify any conduits that penetrate a fire barrier, and are open at both ends. Though no commitment has previously been made to do so, we are planning to add one seal to those conduits with two open ends and no present internal seal.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

  
M. P. Alexich <sup>985</sup>  
Vice President <sub>9/13/85</sub>

cm

Attachment

cc: John E. Dolan  
W. G. Smith, Jr. - Bridgman  
R. C. Callen  
G. Bruchmann  
G. Charnoff  
NRC Resident Inspector - Bridgman



1. Safety Evaluation (SE) dated July 31, 1979

- a. The SE identified the following guidance documents which were used to establish the bases for licensing the D. C. Cook Plant in the area of penetration fire seals:

- o Standard Review Plan (SRP) NUREG-75/087, Section 9.5-1 dated May, 1976, including Branch Technical Position (BTP) APCSB 9.5-1 Appendix A, dated August 23, 1976.
- o Our response to Appendix A to the BTP 9.5-1, dated January 31, 1977.
- o Additional information requested by the NRC staff. Our response (dated October 27, 1977) to NRC questions (dated July 11, 1977).

- b. The SRP, page 9.5.1-26 paragraph (j) states in part: "Floors, walls, and ceilings enclosing separate fire areas should have minimum three-hour fire rating. Penetrations in these barriers, including conduits and piping, should be sealed or closed to provide fire resistance rating at least equal to that of the barrier itself."

The SRP, page 9.5.1-28, paragraph 3(d) states in part: "Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to the fire barrier."

- c. Appendix A to BTP 9.5-1, page 15 for Plants Under Construction and Operating Plants, paragraph (j) states in part: "Floors, walls and ceilings enclosing separate fire areas should have minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself.... The fire hazard in each should be evaluated to determine barrier requirements. If barrier fire resistance cannot be made adequate, fire detection and suppression should be provided...."

Our response to Appendix A to BTP 9.5-1, page 33, states in part: "All openings for cable, pipe, and ductwork in these walls, floors, and ceilings have been sealed with foamed in place silicone...."

- d. NRC Question 9, dated July 11, 1977 states in part: "Substantiate the fire resistance capability of the following items by verifying that their construction is in accordance with a particular design



that has been fire tested, and identify the design and test method used and acceptance criteria....

c. fire barrier penetration seals....

(3) Other pipe or conduit openings - justify the lack of seals where they are not provided in fire rated barriers."

Our response dated October 27, 1977 to Question 9.c(3) states: "There are no openings in what we consider fire rated barriers which have not been sealed."

- e. The SE, page 2, states in part: "All licensees were requested to: (1) compare their fire protection programs with the new guidelines; and (2) analyze the consequences of a postulated fire in each plant area. The results of these actions as applied to D. C. Cook, Units 1 & 2, are discussed below.

"We have, with the assistance of our fire protection consultants,\* reviewed the licensees' analysis and visited both Units 1 and 2 to examine the relationship of safety related components, systems, and structures to combustible materials and associated fire detection and suppression systems....

The SE, page 13, states in part: "The penetration fire stops are provided to prevent the movement of fire from one area to another along the electrical cables which run through these fire areas. Silicone foam poured in and around the cable trays and conduits where they penetrate fire barriers make up the penetration fire stops.

"The licensees have cited applicable generic test data for the penetration fire stops which show that the silicone foam material in this application provides a three-hour fire resistance to an ASTM E-119 type fire exposure.

"During our site visit we saw many of the penetration fire stops which had been installed in Unit 1. Subsequently, we learned that some penetration fire stops being installed for Unit 2 were [identical] to those designs that had been tested....

The SE, page 14, states in part: "We conclude that the penetration fire stops which are in place provide sufficient protection from the unbounded spread of fire along electrical cables. We base this conclusion on our knowledge of ASTM E-119 fire tests including those cited by the licensees which substantiate the fire resistive ability of penetration fire stops constructed with silicone foam."

## 2. NRC Region III Inspections of Penetration Fire Stops

- a. Report 050-315/75-01 for inspections dated January 7-9, 1975. Section 2 states in part: "The licensee stated that all silicone





seals were installed in the Donald C. Cook Plant by Brand Industrial Services, Incorporated (BISCO).... During his tour of the plant, the [NRC] inspector did not observe any missing or damaged fire barriers...."

- b. Report 050-316/77-17 dated September 21, 1977. Section III, paragraph 3.e. states in part: "The Region III inspector observed BISCO personnel working on penetrations identified as trace numbers 302-003-1, -2, and -3 in the cable spreading room...."
- c. Report No. 050-315/77-25; 050-316/77-35 for inspections dated December 6-8 and 19-22, 1977. Pages 3 and 4 paragraph g states in part: "In the company of Operations Quality Control Coordinator, the [NRC] inspector made a tour of the following areas examining.... penetration areas requiring special sealing materials....
  - (1) Control room (including all cabinet interiors)
  - (2) Control room cable spreading room
  - (3) Switchgear rooms
  - (4) Switchgear room cable spreading areas
  - (5) Cable tunnels
  - (6) Diesel generator rooms
  - (7) Various areas of the Auxiliary Building and Turbine Building

All penetration areas inspected were adequately sealed with approved and accepted sealant materials...."

- d. Report 050-315/78-08; 050-316/78-03 for inspections dated February 14-16 and March 8, 1978.

Page 4 states in part: "(Closed) Item D.5, Attachment to License DPR-74, Fire barriers in cable spreading area below control room... All areas requiring the installation of fire barriers appeared to be completed. The inspector did not observe any area which required the installation of a fire barrier...."

