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April 29, 1981

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-237-SP
COMMONWEALTH EDISON COMPANY	)	50-249-SP
	)	(Spent Fuel Pool
(Dresden Station, Units 2 & 3)	)	Modification)

Dear Administrative Judges:

Please find enclosed Applicant's Supplement to its Proposed Findings of Fact. This supplement includes introductory paragraphs 7 and 13, subsection IIH, and slight modifications to findings 41, 88, and 94 relating to the use of Exxon nuclear fuel and the fuel channel deformation matter.

These proposed findings address the potential safety concern raised by Applicant in November, 1980 that reactor induced fuel channel deformations might be great enough to affect the clearance for storage of channelled fuel assemblies in the proposed spent fuel storage racks. At the hearings held at the O'Hare Hilton in Chicago, Illinois on April 20 and 21, 1981, Applicant presented evidence establishing that the worst case combinations of largest measured channel deformations and minimum sized storage locations would result in no damage to either the affected fuel channel, fuel bundle, or the proposed rack, or otherwise present additional safety problems.

It is Applicant's understanding that Intervenor will file its supplemental proposed findings of fact within two weeks of the date of this filing, that is, by May 15, with the Staff's filing to follow one week after receipt of Intervenor's supplemental findings. (Tr. 1007-09.)

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Finally, also enclosed are Applicant's proposed Conclusions of Law and a proposed Order.

Respectfully submitted,

Robert G. Fitzgibbons, Jr.
One of the Attorneys for
Commonwealth Edison Company

RGFJr:jp
Enc.

April 29, 1981

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-237-SP
COMMONWEALTH EDISON COMPANY	)	50-249-SP
	)	(Spent Fuel Pool
(Dresden Station, Units 2 & 3)	)	Modification)

APPLICANT'S PROPOSED SUPPLEMENTAL FINDINGS OF FACT AND CONCLUSIONS OF LAW

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Applicant's Proposed Supplemental Findings of Fact

7. A second evidentiary hearing was held in Chicago, Illinois on April 20 and 21, 1981 at which time evidence was presented by Applicant and the Staff on whether fuel channel bowing might affect storage of channelled fuel assemblies in the high density neutron absorbing spent fuel storage racks, and thus have any health and safety significance.

8 - 12. Already submitted.

Delete "Board Question" on p.4.

13. At the start of the evidentiary hearing held in Morris, Illinois from November 19, 1980 through November 21, 1980, counsel for Applicant informed the Board of a potential safety issue which Applicant had identified involving the potential effect of fuel channel bowing on the fit of channelled spent fuel assemblies in the proposed racks.[a/] Applicant requested a continuance of the hearings, limited to the fuel channel bowing issue, to allow further analysis and, if necessary, the submission of testimony. The State of Illinois ("Intervenor") objected to the requested continuance.[b/] After further argument the Board granted

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a/ The fuel channel bowing matter had been previously disclosed to and discussed with the other parties. Tr. 79-80.

b/ Tr. 80-81.

Applicant's motion for a continuance.[c/]

13a. In its Memorandum and Order, dated January 26, 1981, which granted Applicant's motion to strike portions of Intervenor's cross-examination of NRC Staff witness, Millard L. Wohl, the Board propounded an additional Board Question inquiring as to the relevance and potential health and safety consequences of Unresolved Safety Issues with respect to the proposed spent fuel pool modification. At the Board's request the parties responded to this question by submitting affidavits.[d/]

14 - 40. Already submitted.

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c/ Tr. 380-384. On November 26, 1980, Intervenor moved for reconsideration of the Board's decision to grant a continuance, and in the alternative moved for certification to the Commission. Responses by the Applicant and NRC Staff, dated December 3 and 15, 1980, respectively, opposed this motion. The Board, by its Order dated December 22, 1980, affirmed its earlier ruling granting Applicant's motion for a continuance.

d/ The parties submitted two rounds of affidavits. Applicant submitted the affidavit of Robert F. Janecek, with three attachments, on January 30, 1981. The Staff followed suit with the affidavit of Paul O'Connor with certain other documents on March 13, 1981. Intervenor submitted "Intervenor's Determination of Generic Unresolved Safety Issues As Relevant to Spent Fuel Pool Modification," including the affidavit of Richard B. Hubbard, dated March 17, 1981.

The second round of affidavits were received from the NRC Staff's Karl Kniel, dated April 28, 1981; from Scott Pedigo and A. K. Singh, on behalf of Applicant, dated May __, 1981, and from _____, dated May __, 1981, on behalf of Intervenor.

41. Add to Footnote 73: "In January 1981 Applicant informed us that it had purchased new 8x8 fuel from Exxon Nuclear Corporation which it proposed to use for future reloads at Dresden Units 2 and 3. At that time it submitted an affidavit dated January 21, 1981 from Dr. Kin W. Wong (subsequently incorporated in the transcript following Tr. 1013) showing that K_{eff} of 0.95 will not be exceeded if the Exxon nuclear fuel is stored in the proposed racks. Dr. Wong testified with respect to this affidavit at evidentiary hearings held on April 20, 1981. The Exxon Nuclear fuel has not yet been approved by the NRC for use at Dresden Station. Such approval will require further licensing action by the NRC, including a criticality review by the Staff addressing the storage of Exxon Nuclear fuel in the Dresden storage racks. (Tr. 827-829.) Accordingly, the Board finds that the pending application for use of Exxon Nuclear fuel at Dresden Station does not present any impediment to the issuance of license amendments in this proceeding approving use of the proposed storage racks."

42 - 87. Already submitted.

88. Add to Footnote 155: "Commonwealth Edison Company Exhibit No. 2, Licensing Report Dresden Nuclear Power Plant Units 2 and 3 Spent Fuel Rack Modification (Rev. 5), p.3-6."

89 - 93. Already submitted.

94. Add to Footnote 178: "In response to preliminary concerns about fuel channel deformation Applicant's corrosion expert, Dr. Draley, recommended implementation of periodic mandrel testing. After further analysis, Applicant did not accept this recommendation for reasons specified in Finding No. 146 infra."

95 - 129. Already submitted.

H. Fuel Channel Deformations

130. A fuel assembly for a boiling water reactor consists of two components, a fuel bundle and a fuel channel. The fuel bundles presently used at Dresden Units 2 and 3 contain 64 rods in an 8x8 array, which are held in position by an upper tie plate, a lower tie plate, and seven grid spacers.[247/] A typical fuel channel has a square configuration with an inside diameter of 5.278 inches, a wall thickness of 0.080 inches and a length of about 13-1/2 feet. The fuel channel is placed over the fuel bundle so that it completely surrounds the array of fuel rods. The channel is attached to the fuel bundle at one corner of the upper tie plate assembly by a channel fastener bolt. The dry weight of a channelled fuel assembly is approximately 680 lbs., to which the channel

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247/ There are also fuel bundles stored in the Dresden pools with 49 rods in a 7x7 array. Mefford, prepared testimony at p.2, following Tr. 1013.

contributes approximately 64 lbs.[248/]

131. When a channelled fuel assembly is irradiated in the reactor core, normal operational pressure gradients and neutron flux gradients cause the dimensions of the fuel channel to change slightly from the original as fabricated dimensions.[249/] The potential safety concern raised by Applicant in November, 1980 was that these reactor-induced channel deformations in some cases might be great enough to affect the clearances between channelled fuel assemblies and the walls of storage locations in the proposed racks. As discussed in more detail below, subsequent analysis showed that for worst-case combinations of largest measured channel deformations and minimum sized storage locations in the proposed racks (that is, with all allowable manufacturing tolerances for the proposed racks compounded in the most adverse way), there would be a potential for a maximum interference of about 1/4 inch.[250/] If this interference were to occur, it would cause the channel to rub against the walls of the storage location during insertion, storage, and removal of the channelled fuel assembly. Applicant's testimony addressed the loads which this rubbing could impose on the channelled fuel assembly and concluded that there would be

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248/ O'Boyle, prepared testimony at pp.2-4 and figures 1-4, following Tr. 1013; O'Boyle, Tr. 738-741.

249/ O'Boyle, prepared testimony at pp.1-2, following Tr. 1013.

250/ Gilcrest, prepared supplemental testimony at p.4, following Tr. 1013.

no damage to the fuel channel, the fuel bundle, or the proposed racks even if such worst-case, 1/4 inch interference were to occur.[251/] Moreover, even for the worst-case interference the drag loads, computed conservatively, are not sufficient to cause the channelled fuel assembly to become stuck in the proposed racks.[252/] Nevertheless, Applicant's testimony also addressed the consequences of a spent fuel assembly being stuck in the proposed racks and concluded that this would not present a safety problem.[253/] The NRC Staff submitted testimony supporting Applicant's conclusions.[254/] For the reasons stated below, the Board accepts Applicant's and the Staff's conclusions.

132. The three modes of reactor-induced fuel channel deformation are twist, side-wall bulging, and longitudinal bowing. Measurements and analysis have established that the amount of channel twist is small and does not significantly affect the clearance between the fuel channel and the fuel storage rack.[255/]

133. Channel side-wall bulging occurs as a result

251/ Gilcrest, prepared supplemental testimony at p.7-8, following Tr. 1013; Mefford, prepared testimony at p.3-4, following Tr. 1013.

252/ Gilcrest, Tr. 956-959.

253/ Ragan, prepared testimony at p.3-4, following Tr. 1013.

254/ Shaw, prepared testimony at p.4, following Tr. 1013; Shaw, Tr. 989.

255/ O'Boyle, prepared testimony at p.5, following Tr. 1013; O'Boyle, Tr. 757-62, 812-13, 819-20.

of the coolant pressure differential across the channel wall, which produces a slight outward displacement of the four sides of the channel. Since the outward displacement of the walls (bulging) is small, usually less than 0.060 inches, compared to the overall cross-sectional dimension of the channel, the channel remains essentially square. Side-wall bulge is largest about 4 to 6 feet from the bottom of the channel and the magnitude of the bulge decreases toward the top of the fuel channel.[256/]

134. Fuel channel bowing is a result of fast neutron flux gradients that exist across the walls of a channel when the fuel assembly is placed in specific core locations, which causes a displacement of the mid-elevation of the channel with respect to the upper and lower ends of the channel. The largest channel bowing generally occurs when channels reside for several cycles of reactor operation in locations near the periphery of the core where neutron flux gradients are highest.[257/]

135. Between July and November of 1980 Applicant measured the dimensions of 875 irradiated channels at its Quad Cities Nuclear Power Plant. The Quad Cities reactors are BWR/3 reactors like Dresden Units 2 and 3, and the fuel

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256/ O'Boyle, prepared testimony at p.5, following Tr. 1013; O'Boyle, Tr. 781.

257/ O'Boyle, prepared testimony at pp.5-6, following Tr. 1013; O'Boyle, Tr. 752; Shaw, prepared testimony at p.2, following Tr. 1013.

bundles and fuel channels used at Quad Cities and Dresden are the same. The purpose of the Quad Cities measurements was to determine whether the in-core life of fuel channels could be extended without leading to channel deformations so large as to cause interference in the reactor between channels and reactor control blades. As the results of these measurements became available, Applicant recognized that for some Quad Cities channel measurements, the combination of fuel channel bow and bulge was greater than the minimum dimensions for storage locations allowed by the engineering drawings for the proposed Dresden storage racks. After disclosing the potential problem to the Board, in December 1980 Applicant analyzed a total of 1736 channel sides measured at Quad Cities in order to evaluate the fit of the irradiated channels in the proposed Dresden storage racks. Approximately 86% of the channel sides had a total deformation (bow plus bulge) of less than 0.150 inches over the 162.2 inch length of the channel. 94.5% of the channel sides had a bow plus bulge deformation of less than 0.200 inches. Less than 1% (15) of the surfaces measured had a total bow plus bulge deformation of greater than 0.300 inches. Only two channel surfaces had a total deformation exceeding 0.350 inches. The maximum bow plus bulge, measured on only one channel side, was 0.420 inches; the next largest bow plus bulge was 0.390 inches,

again measured on only one channel.[258]

136. The minimum clearance between a straight, unirradiated fuel channel and the wall of any storage position in the proposed Dresden spent fuel storage racks is 0.346 inches total, or 0.173 inches on each side of a stored channel, assuming the channel is centered in the storage location.[259] This is the clearance existing in the inter-tube storage positions. The corresponding clearances inside a storage tube location are greater (0.496 inch total or 0.248 inch on each side).[260]

137. In the unlikely, "worst case" situation where a Dresden fuel channel with bow plus bulge equal to the maximum measured Quad Cities value of 0.420 inch were to be placed in a storage location in the Dresden racks with the minimum allowable clearance of 0.173 inch, the resulting

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258/ O'Boyle, prepared testimony at p.6-9, following Tr. 1013; O'Boyle, Tr. 747, 774-78; Shaw, prepared testimony at p.2-3, following Tr. 1013. The channel with bow plus bulge of 0.420 inch had gone through five reactor cycles, four of them on the periphery of the core, which is unusual. Tr. 752, 809-812.

259/ Gilcrest, prepared supplemental testimony at pp.3-4, following Tr. 1013; O'Boyle, Tr. 739-740.

260/ Gilcrest, prepared testimony at p.3, following Tr. 1013. The storage racks are a checkerboard pattern of stainless steel tubes containing Boral. Fuel assemblies can be stored inside the tubes and in the inter-tube locations. Commonwealth Edison Ex. 2.

interference would be approximately 0.25 inch.[261]

138. The load required to remove a fuel assembly from the proposed racks would be composed of the drag due to such interference and the dead weight of the fuel. Using standard beam formulas and a conservative coefficient of friction of 0.5, the drag force associated with worst case, 1/4" interference is calculated to be 310 pounds.[262] Therefore, the maximum load which could be necessary, under worst case conditions, to remove a fuel assembly from one of the proposed Dresden storage racks would be the weight of the fuel assembly (680 pounds) plus the drag due to channel bow interference (310 pounds), or 990 pounds.[263] The maximum lift that the Dresden fuel grapples can exert on the fuel assembly is limited to 1100 pounds by an electrical

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261/ Gilcrest, prepared supplemental testimony at p.4, following Tr. 1013. Applicant's testimony initially described another potential interference, unrelated to fuel channel deformation, which might exist at the top of the inter-tube storage positions between the channel spacer button at the top of the fuel channel and the lead-in clips which represent the minimum dimension of each storage location. Applicant has committed itself to checking each storage location in each rack with a plug gauge prior to installation in the pools to ensure that the dimension between the lead-in clips is no less than the maximum dimension of the channel at the spacer button, 5.763 inches. If necessary, Applicant will grind down the lead-in clips to achieve this dimension, thereby eliminating any interferences at the top of the storage location. Gilcrest, prepared supplemental testimony at p.3, and figures 1 and 2, following Tr. 1013; Gilcrest, Tr. 920, 923, 944-47; Ragan, Tr. 888-89; O'Boyle, Tr. 736, 796-797.

262/ Gilcrest, prepared supplemental testimony at p.5-6, following Tr. 1013; Gilcrest, Tr. 957-58; Shaw, Tr. 979.

263/ Gilcrest, prepared supplemental testimony at p.7, following Tr. 1013; Gilcrest, Tr. 946-950.

interlock.[264]

139. A lifting load of 990 pounds would not damage the fuel assembly or the proposed storage racks. The only components of the fuel assembly which would undergo significant loading changes would be the upper tie plate lifting bail and the channel corner gusset. The design load of the upper tie plate lifting bail, through which the lifting force exerted by the grapple is transmitted to the fuel assembly, is 2040 pounds. The actual load at which the lifting bail would fail is much greater.[265] Of the 990 pounds applied to the fuel assembly bail by the grapple, only the drag force (310 pounds) and the channel weight (64 pounds), a total of 374 pounds, would be transmitted to the fuel channel through the channel corner gusset.[266] General Electric has performed a test showing the deformation of the channel corner gusset was essentially elastic up to 3240 pounds and did not fail up to 4080 pounds.[267] The drag force of 310 pounds

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264/ Ragan, prepared supplemental testimony at p.2, following Tr. 1013; Ragan, Tr. 887-88, 907-09.

265/ Mefford, prepared testimony at p.3, following Tr. 1013; Mefford, Tr. 866-67.

266/ Gilcrest, prepared supplemental testimony at p.7, following Tr. 1013; Tr. 949.

267/ Mefford, prepared testimony at p.3-4, following Tr. 1013; Mefford, Tr. 867.

would also be transmitted to the affected storage rack. This would not tip the 18,000 pound rack or exceed allowable stresses as defined in U.S. N.R.C. Standard Review Plan 3.8.4.[268/]

140. Insertion of a fuel assembly under the worst case 1/4 inch interference described in Finding No. 137 would be resisted by a drag force of 310 pounds. Since the fuel assembly weight exceeds this drag force, the fuel would fully insert in the rack by its own weight.[269/] The only fuel assembly component which would be loaded during insertion is the channel fastener bolt. The load on this bolt would be the drag force (310 pounds) minus the channel weight (64 pounds), or 246 pounds, which even when added to the tensile load of 1280 pounds produced when the bolt is tightened, is far less than the certified breaking load of the channel fastener bolt (3150 pounds).[270/]

141. There are a number of conservatisms which have been identified in the foregoing analysis, the effect

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268/ Gilcrest, prepared supplemental testimony at p.8, following Tr. 1013; Gilcrest Tr. 933-34, 962; Shaw, prepared testimony at p.3, following Tr. 1013.

269/ Actually, during normal insertion of fuel assemblies in storage racks at Dresden, the additional 500 pound weight of telescoping cans, which provide rigidity to the fuel grapple hoist, rests momentarily on the upper tie plate of the fuel assembly being inserted. Ragan, Tr. 878-879, 905-909.

270/ Gilcrest, prepared supplemental testimony at p.8, following Tr. 1013; Mefford, prepared testimony at p.4, following Tr. 1013; Mefford, Tr. 867.

of which is to exaggerate potential interferences and increase calculated loads. First, Applicant's analysis assumed a maximum channel bow plus bulge of .420 inches, equal to the maximum bow plus bulge measured at Quad Cities. No channel at Dresden Units 2 and 3 is expected to exhibit that much bow plus bulge, because new fuel channels with improved heat treatment and fabrication processes are being used at Dresden,[271] because measurements of fuel channel bowing at Dresden are currently underway which will prevent reuse in the reactor of irradiated channels having bow plus bulge greater than .125 inches,[272] and because Applicant's nuclear core designers in the future will select in-core locations for fuel channels such that bowing is not compounded by multi-cycle irradiation on the core periphery.[273] A second conservatism is that all the manufacturing tolerances allowed in the engineering drawings for the proposed racks are assumed to combine in the most adverse way resulting in the minimum allowable storage location.[274] A third conservatism is the pessimistic assumption that a Dresden fuel channel with .420 inch bow

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271/ O'Boyle, prepared testimony at p.10, following Tr. 1013; O'Boyle, Tr. 781-2, in camara Tr. 790,792.

272/ O'Boyle, prepared testimony at pp.10-11; following Tr. 1013; O'Boyle, Tr. 798; Shaw, Tr. 987, 992.

273/ O'Boyle, prepared testimony at pp.10-11, following Tr. 1013; O'Boyle, Tr. 790, 798.

274/ Gilcrest, prepared supplemental testimony at p.4, following Tr. 1013; Mefford, prepared testimony at p.1, following Tr. 1013.

plus bulge (a bow plus bulge which occurred in only one out of 875 channels at Quad Cities) is placed in a minimum sized storage location.[275/] A fourth conservatism is the assumption that the fuel assembly is centered in the storage location. Although at the bottom of the proposed racks the fuel assembly would be centered by fitting into a round, bevelled hole in the fuel assembly support plate, the stored assembly would not be restrained at the top of the proposed racks except by the rack lead-in clips. Therefore the top of the fuel assembly would tend to tip away from the direction of the bow, reducing interference between the fuel channel and the walls of the storage position.[276/] A fifth conservatism is Applicant's use of a coefficient of friction of 0.5. A more reasonable coefficient of friction for zircaloy channels rubbing on steel would be 0.15, especially when the lubricating effects of water are taken into account.[277/] Finally, Applicant increased calculated lifting loads by using the dry weight of a fuel assembly, 680 pounds, rather than the buoyant weight of a submerged fuel assembly, which is about 600

275/ Gilcrest, prepared supplemental testimony at p.4,8, following Tr. 1013.

276/ O'Boyle, Tr. 740, 810; Shaw, Tr. 979.

277/ Gilcrest, prepared supplemental testimony at p.5, following Tr. 1013; Gilcrest, Tr. 957-60; Shaw, Tr. 978-79.

pounds.[278/]

142. Findings 135-140 are based on fuel bundles and channels supplied to Applicant by General Electric Company. Applicant represents that it has recently purchased fuel bundles for future reloads from Exxon Nuclear Company ("Exxon Nuclear") and fuel channels from Carpenter Technology Corporation ("CarTech"). Applicant expects the new CarTech channels to exhibit smaller deformations during irradiation than the General Electric channels measured at Quad Cities, which were purchased in 1970.[279/]

143. The materials used in the upper tie plates of the General Electric and Exxon fuel bundles are nearly identical and the designs are similar. The materials and dimensions of the General Electric and CarTech channels are nearly identical. The loads that these fuel components can withstand are not significantly different than similar fuel components supplied by General Electric Company.[280/]

144. The effect of manufacturing tolerances in the CarTech and General Electric fuel channels was addressed at the hearings, including the brief in camara session addressing

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278/ Gilcrest, prepared supplemental testimony at p.8, following Tr. 1013; Gilcrest, Tr. 958; Ragan, prepared supplemental testimony at p.1, following Tr. 1013; Mefford, Tr. 864.

279/ O'Boyle, prepared testimony at p.10, following Tr. 1013; O'Boyle, Tr. 781, 790, 792.

280/ O'Boyle, prepared testimony at p.13, following Tr. 1013; in camara Tr. 784-787; Gilcrest, Tr. 950-954.

certain proprietary information held on Monday, April 20, 1981. Any increase in potential interference between the fuel channels and the storage racks, and therefore any increase in the loads imposed on the fuel assemblies and racks, due to these tolerances will be negligible.[281/]

145. In the evidentiary hearings in November 1980, Applicant's expert witness Dr. Draley testified that he expects galvanic corrosion between the neutron absorbing Boral and the stainless steel walls of the storage racks which enclose the Boral to be limited by the limited conductivity of the pool water and by naturally occurring oxide films on the Boral and on the stainless steel. If through some unpostulated mechanism galvanic corrosion were not so limited, so that the entire thickness of the Boral were converted to aluminum corrosion product, this would lead to a maximum swelling of .180 inch.[282/] Dr. Draley stated that this swelling, if it occurred, would affect only the storage tube locations within the proposed storage racks, rather than the inter-tube storage locations. This is because the inner stainless steel walls of the storage tubes are thinner than the outer walls, and thus the inner walls would tend to bulge out more readily under the pressure of the corrosion product.[283/] He also stated that any such

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281/ O'Boyle, Tr. 735-36, In camara Tr. 784-91, Tr. 800-01, 803-05, 807-09; Gilcrest, Supplemental testimony at p.9, following Tr. 1013; Gilcrest Tr. 929-930, 950-954, 957.

282/ Draley, prepared testimony at pp.7-8, following Tr. 341; Tr. 353-357.

283/ Draley, Tr. 372-373, 377-378.

swelling would be localized and highly improbable.[284/] Nevertheless, because this swelling, in combination with channel bow and bulge, might present a possible impediment to insertion or withdrawal of a fuel assembly, he recommended periodic mandrel testing of unfilled storage tubes in the proposed racks.[285/]

146. In the hearings in April 1981 Applicant informed the Board that it had determined not to accept the recommendation for mandrel testing.[286/] The Staff supported Applicant's position.[287/] Assuming the highly unlikely occurrence of .180 inch localized swelling in a storage tube containing a channel with maximum bow plus bulge of .420 inch, at a point on the storage tube wall opposite the maximum bow plus bulge of the channel, the interference would be .352 inches, leading to a calculated drag force of 436 pounds and a total fuel assembly bail load of 1116 pounds, well within the capability of the affected fuel components.[288/] Again, these calculated loads are conservative for the reasons stated in Finding No. 141. In light of the high improbability of such swelling, the corrosion surveillance program committed to by Applicant, Applicant's efforts to reduce channel

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284/ Draley, prepared testimony at p.7-8, Tr. 354-355, 357.

285/ Draley, prepared testimony at p.8, following Tr. 341.

286/ Ragan, prepared supplemental testimony at pp.4-5, following Tr. 1013.

287/ Shaw, Tr. 990-992.

288/ Gilcrest, Tr. 954-957.

deformation in the future as described in Finding No. 141, and the existence of the grapple interlock and the development of Dresden Station procedures which will prevent excessive forces being applied to any channelled fuel assembly if it should become stuck in the proposed racks, such mandrel testing is not necessary.[289/] Moreover, to do such testing each year would involve three men working about 20 hours above the pools, where exposures are about 3 to 5 millirem per hour. This occupational exposure, while small, is not ALARA.[290/]

147. Even though no channelled fuel assemblies are expected to become stuck in the proposed storage racks, occurrence of such an event has been reviewed. A stuck fuel assembly in itself would not be a safety problem, unless efforts to free the assembly led to perforation of the fuel rods and a release of radioactivity.[291/] To ensure that excessive loads are not imposed on a stuck assembly, Applicant's Dresden Fuel Handling Procedures are being revised to provide that if the 1100 pound fuel grapple interlock trips as a fuel handler is attempting to lift an assembly out of the racks, he will call for the assistance of the licensed fuel handling foreman, who would notify station management and receive any technical support needed. The grapple interlock can be raised to 1500 pounds by a station

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289/ Ragan, supplemental testimony at pp.4-5, following Tr. 1013.

290/ Ragan, Tr. 901-903, 911-913; Tr. 990-992.

291/ Shaw, Tr. 989; Mefford, Tr. 868 There would be adequate water shielding above the stuck assembly to protect workers at the pool surface from its radioactive shine. Ragan, Tr. 1004-06.

electrician if additional lifting force is required.[292/] There is no way to force a partially inserted fuel assembly down into the storage location.[293/] Once the affected fuel assembly is removed, it could be inserted in another, larger storage location in the proposed racks, or the fuel assembly could be dechannelled and the fuel bundle stored separately from its channel in the racks.[294/] Any fuel channel which would not fit in any storage location could be stored separately from the fuel bundle in the pool beside the racks, with no effect on criticality.[295/]

148. The Board finds that there is reasonable assurance that even worst credible interferences between fuel channels with large reactor-induced deformations (twist, bulge and bow) and minimum sized storage locations in the proposed Dresden racks will not lead to damage of the fuel channels, the fuel bundles, or the proposed racks. Accordingly, the Board concludes that the possibility of reactor-induced channel deformations does not pose any health and safety problems in connection with the proposed spent fuel pool modifications.

292/ Ragan, prepared supplemental testimony at p.2, following Tr. 1013; Ragan, Tr. 907-09.

293/ Ragan, prepared supplemental testimony at p.1, following Tr. 1013; Ragan, Tr. 890.

294/ Ragan, Tr. 886.

295/ Wong, Tr. 842-43.

III. CONCLUSIONS OF LAW

The Board has reviewed the evidence submitted by all parties in regard to Intervenor's contentions, and in response to the Board's own questions. The Board has also considered the proposed findings of fact and conclusions of law submitted by the parties. Those proposed findings of fact and conclusions of law not adopted herein by the Board are rejected. The Board makes the following conclusions of law:

(1) The issuance of the license amendment requested in this proceeding is not a major Commission action significantly affecting the quality of the human environment and therefore it does not require the preparation of an environmental impact statement under the National Environmental Policy Act of 1969, 42 U.S.C. Section 4321, et seq., and Part 51 of the Commissions' regulations, 10 CFR Part 51.

(2) The Licensing Board in this case is not required to consider the five factors set forth in the Commission's "Notice of Intent to Prepare Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," 40 Fed. Reg. 42801 (September 16, 1975). See "Notice of Finality of Commission Action with Regard to Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG 0575),"

46 Fed. Reg. 14506 (February 27, 1981).

(3) There has been no showing by Intervenor through filing a timely contention meeting the requirements of the Commission's Rules of Practice or otherwise, that there is a reasonable nexus between "systems interaction" or any other "unresolved safety issue" and the subject matter of this proceeding. In the absence of any such nexus, a licensing board in a license amendment case is not required to make findings on such generic issues by the Appeal Board's rulings in Gulf States Utilities Company (River Bend Station, Units 1 and 2), ALAB-444, 6 NRC 760 (1977), and Virginia Electric and Power Company (North Anna Nuclear Station, Units 1 and 2) ALAB-491, 8 NRC 245 (1978). Similarly, in a license amendment case the Staff's Safety Evaluation is not inadequate because it fails to address each "Unresolved Safety Issue" and explain why each is not relevant or has no significant safety implications for the proposed modification. Nevertheless, on its own motion this Board has examined the relevance and potential health and safety implications of the Unresolved Safety Issues identified in NUREG 0606 and we have concluded that these issues do not present any safety problem with respect to the license amendments authorized by this Order.

(4) There is reasonable assurance that the activities authorized by the requested operating license

amendments can be conducted without endangering the health and safety of the public provided that the conditions set forth in the Order, below, are incorporated into the license, and provided that the commitments set forth below are followed.

(5) The activities authorized by the requested operating license amendments will be subject to compliance with the Commission's regulations.

(6) The issuance of the requested operating license amendments will not be inimicable to the common defense and security or to the health and safety of the public provided there is compliance with the conditions and commitments set forth in the order below.

IV. ORDER

WHEREFORE, it is ORDERED, in accordance with the Atomic Energy Act, as amended and the regulations of the Nuclear Regulatory Commission, and based on the findings and conclusions set forth herein, that the Director of Nuclear Reactor Regulation is authorized to make appropriate findings in accordance with the Commission's regulations and to issue the appropriate license amendment authorizing the requested replacement of spent fuel storage racks at Dresden Station.

The aforementioned license amendments shall contain the following conditions:

(1) Fuel stored in the spent fuel pool shall have a U-235 loading less than or equal to 14.8 grams per axial centimeter.[1/]

(2) No loads heavier than the weight of a single spent fuel assembly plus the tool for handling that assembly shall be carried over fuel stored in the spent fuel pool.[2/]

In deciding to grant the aforementioned license amendments, the Board has relied upon the following commitments by the Applicant:

(1) A corrosion surveillance program for the racks to insure that any loss of neutron absorber material and/or swelling of the storage tubes is detected.[3/]

(2) In situ neutron attenuation tests to verify that tubes and racks contain a sufficient number of Boral plates such that K-effective will not be greater than 0.95 when the spent fuel is in place.[4/]

(3) If one Boral plate is detected missing, the associated tube will be blocked to prohibit insertion of a fuel assembly. If more than one missing

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1/ NRC Staff Exhibit 1, Safety Evaluation at p. 3.

2/ NRC Staff Exhibit 1, Safety Evaluation at p. 10.

3/ Draley, prepared testimony attachment 6, following Tr. 341; Weeks, supplemental testimony at p.3, following Tr. 434.

4/ Tr. 595-596.

Boral plate is detected per pool, Applicant will remove the storage rack or racks containing any additional missing Boral plates from the pool. Such storage racks will not be replaced in the pool until a specific criticality analysis covering the proposed corrective action has been submitted to and approved by the NRC.[5/]

(4) Before any storage rack is placed in the Dresden pools, Applicant will check each storage location with a mandrel to confirm that the minimum dimension between the lead-in clips at the top of each storage location is at least 5.758 inches. If necessary, Applicant will grind down the storage clips to ensure this dimension is achieved.[6/]

The Board finds that these commitments by the Applicant add to the assurance of safe operation of the Spent Fuel Pools, and therefore they contribute to the Board's conclusion that the application to modify the Dresden spent fuel pools should be granted. Accordingly, the Board hereby orders the Applicant to keep these commitments until it is released from them by the NRC, and further, Applicant is ordered to include these commitments in the Dresden FSAR when it is updated.[7/] Failure to implement

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5/ Tr. 595-596.

6/ Gilcrest, Tr. 920.

7/ See 10 CFR §50.71(e), as amended, effective July 22, 1980, 45 Fed. Reg. 30614 (May 9, 1980).

these commitments is subject to any appropriate sanctions found in the Commission's regulations.

It is further ORDERED in accordance with 10 CFR 2.760, 2.762, 2.764, 2.785 and 2.786, that this Initial Decision shall be effective immediately[8/] and shall constitute the final action of the Commission forty-five (45) days after the issuance thereof, subject to any review pursuant to the above-cited Rules of Practice.

Exceptions to this Initial Decision may be filed within ten (10) days after service of this Initial Decision. A brief in support of the exceptions shall be filed within thirty (30) days thereafter [forty (40) days in the case of Staff]. Within thirty (30) days of the filing and service of the brief of the Appellant [forty (40) days in the case of the Staff], any other party may file a brief in support of, or in opposition to, the exception.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND LICENSING BOARD

Linda W. Little, Administrative Judge
Forrest J. Remick, Administrative Judge
John F. Wolf, Chief Administrative Judge

Dated at Bethesda, Maryland
this ____ day of _____,
1981.

8/ This proceeding is not covered by the Commission's partial suspension of the immediate effectiveness rule (10 CFR 2.764). 44 Fed. Reg. 65049 (November 9, 1979).

APPENDIX A

LISTS OF EXHIBITS

EXHIBIT	ADMITTED IN EVIDENCE
A. Applicant's Exhibit Number:	
1. Licensing Report Dresden Nuclear Power Plant Units 2 and 3 Spent Fuel Rack Modification (Rev. 4)	Tr. 451
2. Licensing Report Dresden Nuclear Power Plant Units 2 and 3 Spent Fuel Rack Modification (Rev. 5)	Tr. 965
B. Staff's Exhibit Number:	
1. Safety Evaluation Report and Environmental Impact Appraisal Relating to the Modification of the Spent Fuel Storage Pool Provisional License No. DPR-19 and Facility Operating License No. DPR-25	Tr. 118
C. Intervenor's Exhibit Number:	
1. Memorandum from Henry E. Bliss to D. J. Scott and W. L. Stiede re Clearances on Dresden's High Density Spent Fuel Storage Racks, dated October 31, 1980	Not Admitted
2. NSC "Trip Report," dated September 2, 1980.	Tr. 511
3. NSC Report and associated close-out documents of NSC Audit of Brooks & Perkins, dated December 26, 1979.	Tr. 512
4. Commonwealth Edison Company Audit Report of Commonwealth Edison Company's audit of Brooks & Perkins dated September 13, 1980.	Tr. 285

EXHIBIT		ADMITTED IN EVIDENCE
5.	Commonwealth Edison Company Audit Report of Commonwealth Edison Company's audit of NSC, dated September 25, 1980.	Tr. 268
6.	Commonwealth Edison Company Audit Report and associated close-out documents of Commonwealth Edison Company's audit of Leckenby Company, dated September 29, 1980.	Tr. 287
7.	Commonwealth Edison Company Audit Report and associated close-out documents of Commonwealth Edison Company's audit of Leckenby Company, dated March 13, 1980.	Tr. 290
8.	Internal Audit Summary Report from T. L. Sumter to P. D. Moore, dated June 19, 1979.	Not Admitted
9.	Internal Audit conducted by Brooks & Perkins, Inc., dated June 11, 1980.	Not Admitted
10.	Nuclear Regulatory Commission Audit Report of Leckenby Company, dated April 14, 1980.	Tr. 334
11.	NSC "Trip Report," dated May 5, 1980.	Tr. 511
12.	INPO Report No. EA 80-01, "Evaluation of Dresden Nuclear Power Station, dated September 12, 1980.	Tr. 607
13.	Nuclear Regulatory Commission's Health Physics Appraisal, dated September 12, 1980 and Commonwealth Edison Company's Response, dated October 6, 1980.	Tr. 627
14.	One page sketch entitled "Deformation of Edison's BWR-3 80 Mil Channels," undated.	Not Admitted

EXHIBIT		ADMITTED IN EVIDENCE
15.	General Electric Company Specification 22A5866, Revision 0 "Fuel Storage Requirements," dated November 3, 1978.	Not Admitted
16.	Commonwealth Edison Company Handwritten Notes, undated.	Not Admitted
17.	Commonwealth Edison Company Handwritten Notes, dated November 14, 1980.	Tr. 803
18.	General Electric Company Document entitled "Recommendations for Mitigation of the Effects of Fuel Channel Bowing," dated December 1979.	Tr. 862
19.	NSC Memorandum to Q. Hossain from J. Gilcrest entitled "Dresden Fuel Racks (COM-0219) - Fuel Channel Bowing," dated December 9, 1980.	Not Admitted
D.	Board Exhibit Number:	
1.	NSC Purchase Order	Tr. 713
2.	Brooks & Perkins, Inc. Purchase Order	Tr. 713
3.	Leckenby Co. Purchase Order	Tr. 713

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-237-SP
COMMONWEALTH EDISON COMPANY	)	50-249-SP
	)	(Spent Fuel Pool
(Dresden Station, Units 2 & 3))		Modification)

CERTIFICATE OF SERVICE

I, Robert G. Fitzgibbons, Jr., one of the attorneys for Commonwealth Edison Company, certify that copies of "Applicant's Proposed Supplemental Findings of Fact," "Conclusions of Law" and a proposed "Order" have been served in the above-captioned matter on the following by depositing the same in the United States mail, first class postage prepaid, this 29th day of April, 1981:

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TO: Document Control Desk, 016 Phillips

FROM: Docketing & Service Branch, Office of the Secretary

SUBJECT: REQUEST FOR DISTRIBUTION SERVICE THROUGH REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

NOTE: The attached document, which relates to a specific licensing docket, is the DOCUMENT CONTROL ACTION COPY. It is certified by the Office of the Secretary as the best available copy.

RIDS CODES AND TITLES

Rids Code	Description
DS01	Antitrust Issuances
DS02	Non-Antitrust Issuances
DS03	Filings (Not Originated by NRC)
DS04	Antitrust Filings (Originated by Non-Parties)
DS05	Non-Antitrust Filings (Originated by Non-Parties)
DS06	ELD Filings (Antitrust)
DS07	ELD Filings (Non-Antitrust)
DS08	Antitrust Filings (Not Originated by NRC)

Add: