



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
COMMONWEALTH EDISON COMPANY ) Docket Nos. 50-454  
(Byron Nuclear Power Station, ) 50-455 (OL)  
Units 1 and 2) )

SUPPLEMENTED  
STATEMENT OF CONTENTIONS

The following contentions are raised against the licensing of Byron Station Units by the DeKalb Area Alliance for Responsible Energy (DAARE) and the Sinnissippi Alliance for the Environment (SAFE). These groups were found to have standing to intervene by order of the Chairman of the Atomic Safety and Licensing Board on March 23, 1979.

Contention 1

Intervenors contend that the record of noncompliance with Nuclear Regulatory Commission regulations by the Applicant in its other nuclear stations demonstrates its

inability, unwillingness, or lack of technical qualifications to operate the Byron station within NRC regulations and to protect the public health and safety as required under 10 C.F.R. 50.57(a)(1) (2) (3) (4) and (6), and that therefore the Applicant should not be granted an operating license unless it demonstrates that improvements in management, operations, and procedures will ensure its willingness, ability and technical qualifications to operate within NRC rules; that these improvements will be enforced; and that the Applicant is financially capable of supporting these improvements.

As bases for this contention, intervenors cite the following facts and other facts relevant to the contention which may become apparent through the procedures authorized by 10 C.F.R. 2.740-2.744.

- a. Fines totalling \$105,500.00 have been levied upon the Applicant during the years 1974 through 1978 due to the Applicant's noncompliance with the regulations of the Commission. In imposing some of these fines, Commission officials cited the Applicant for "continuing management inadequacies" and "a history of rad-waste management problems" and stated that operating errors in the Applicant's Dresden plant caused "serious concern

about the company's [Applicant's] regulatory performance in all of their nuclear plants "

- b. An NRC Board Notification, released February 1977, reports survey and case study findings of plants nationwide, and notes continuing management and operating problems with Applicant's stations, especially Zion, which plant was also selected as the poor performer case for in-depth case analysis. In 1974, all three stations operated by Applicant were rated "C", the lowest rating given, by the NRC.
- c. Noncompliance with NRC regulations in 1977 and 1978 in the Dresden facility, including findings that both backup generators were inoperative, that there was a valve error in part of a backup system for shutting down the reactor and errors in testing or maintenance, led NRC to increase their inspection frequency to weekly inspections in the Dresden plant, and in Applicant's other two plants as well in December of 1977.
- d. The nature of the noncompliance by the Applicant with the regulations of the Commission ranges from "licensee event reports" to "violations" with "violations" constituting the most serious charge

the Commission can cite as to the operator of a nuclear generating plant.

- e. The Applicant has reported to the Commission "abnormal occurrences" at the nuclear generating plants wholly or predominantly owned by the Applicant at a rate which is proportionally in excess of the rate of "abnormal occurrences" reported by owners of other nuclear generating plants as to those plants in the rest of the United States.
- f. Former guards at the Cordova nuclear generating plant, owned predominantly by the Applicant, have stated that they were told, by employees of the Cordova nuclear generating plant, not to report certain security violations on forms intended to be reviewed by inspectors for the Commission. Applicant, despite lack of full ownership, is solely responsible for the Cordova plant's operation. A federal grand jury, convened in January, 1978, to investigate the propriety of initiating criminal charges based in part upon the aforesaid, did on information, criminally indict Applicant and certain of its employees on or about March 26, 1980. It is reported that Applicant is

charged therein with nine (9) counts of Federal criminal law violations, including fraud and conspiracy to evade NRC security regulations at the Cordova plant through Applicant's concealment of material facts from NRC and its maintaining of false records.

- g. Applicant's record of laxity in the packaging and hauling of low level wastes caused it to be banned from South Carolina's low level waste disposal site, and in Washington, all importation of low level waste was banned after an incident of waste leakage in transport by Applicant.
- h. The history at all of Applicant's plants (whether now operating) of its failure (and that of its architect-engineers and contractors) to observe on a continuing and adequate basis the applicable quality control and quality assurance criteria and plans adopted pursuant thereto.
- i. The difficult financial position of Applicant, in that its credit ratings have been lowered, it is experiencing difficulty in raising money from traditional sources, and the Illinois Commerce Commission is presently re-evaluating Applicant's entire construction program (including Byron) to determine if funds by way of rates will be allowed.

- j. Applicant does not have (nor is it likely it will have) research programs in place and resolved at the time of contemplated operation which it represented it would do (at or about time of issuance of construction permits) in connection with completion of the problems extant raised herein both by the Regulatory Staff and the Advisory Committee in Reactor Safeguards.

#### Contention 2

Intervenors contend that since residents of the DeKalb-Sycamore and Rockford areas, the zones of interest of DAARE and SAFE, are surrounded by 11 other nuclear generating units in operation or under construction (at Dresden, Quad-Cities, LaSalle, Zion and Braidwood) in addition to the two units at Byron, that the Applicant should re-evaluate the dose impacts of projected routine releases of radioactive materials (Chapter 11, FSAR) to determine the cumulative effects to residents from the addition of Byron releases to releases from the other 11 units. This re-evaluation is especially critical in light of Applicant's record of incidents at its other plants, since the granting of the Byron Construction License. This re-evaluation should be performed to ensure that applicable

NRC (10 C.F.R. Part 20 and 10 C.F.R. Part 50, Appendix 1) and EPA (40 C.F.R. 190) limits for radionuclide releases and exposures are not exceeded in practice for DeKalb-Sycamore and Rockford area residents due to the addition of the Byron units to other units in operation or under construction, and should focus upon both the projected and potential aggregate dose levels to these residents, and upon the known and potential effects of such projected and potential cumulative dose levels.

Contention 2a

Due to the concentration of nuclear power plants already in Northern Illinois; the Applicant's record of incidents and violations in existing plants which have emerged since the granting of a Construction License for Byron; and the credibility which must now be given to large scale accident scenarios since TMI, Intervenors contend that the addition of Byron Station operations places an undue and unfair burden of risk from exposure to radioactive materials from accidental releases on DeKalb-Sycamore and Rockford area residents. With the addition of two more nuclear power units in operation at Byron, the potential for cumulative dose effects from discrete accident events at plants in Northern Illinois under unfavorable meteorological

conditions poses an unreasonable level of risk to the health and safety of DeKalb-Sycamore and Rockford area residents.

### Contention 3

Intervenors contend that the FSAR does not adequately describe the elements set forth in 10 C.F.R. Part 50, Appendix E, IV, D as required by 10 C.F.R. Part 50, Appendix E, III, nor is the actual emergency plan presently planned to be used by Applicant in compliance with said criteria, so as to demonstrate that the Applicant's emergency plans for the Byron Station provide reasonable assurance that appropriate measures can and will be taken in the event of an emergency to protect public health and safety and prevent damage to property. Intervenors further contend that Applicant's emergency plan for Byron is inadequate in that it fails to take into account any of the following factors, each of which must be factored into emergency plans for them to be meaningful and adequate: \*

- a. that the evacuation of the affected areas would necessitate the evacuation of more than twenty-thousand students attending Northern Illinois University in DeKalb, most of whom rely upon public transportation, or those without cars at other colleges in the affected areas.

- b. that, in the event of an acute gasoline shortage coinciding with the need for evacuation, contingency plans for evacuation of those otherwise able to transport themselves by means of gasoline-powered vehicles, including public transportation, would need to be transported by other means.
- c. that in the event of an accident requiring evacuation, there is no assurance that local and state and national authorities required to interface will in fact themselves have plans in place which adequately protect the affected public both within and without the LPZ.
- d. that in the event of an accident requiring evacuation, Applicant and others have plans in place to take emergency measures other than evacuation because evacuation is or may be impractical in many affected areas.
- e. that in the event evacuation is required, Applicant has no plans to deal with weather-dependent worst case analysis or the potential consequences of a core melt with breach of containment.

#### Contention 4

Intervenors contend that the Applicant's Final Safety Analysis Report (FSAR) does not comply with 10 C.F.R. Part 50.34(b)(4) in that the FSAR and Applicant fail to take into account all "pertinent information developed since the submittal of the preliminary safety analysis report" as required by 10 C.F.R. Part 50.34(b)(4). Specifically, Intervenors contend that the FSAR does not analyze the risks to the public health and safety from the potential of accidents resulting from multiple, mutually independent failures as opposed to a "single failure," as defined in 10 C.F.R. Part 50, Appendix A. Applicant's Chapter 15 FSAR examines a set of single failure scenarios. The potential of multiple failure accidents has become more apparent since March and April of 1979 at which time the nuclear generating plant at Three Mile Island near Harrisburg, Pennsylvania, experienced an accident resulting from multiple, mutually independent failures, that is, failures which occurred in proximate time to one another without actually being caused by one another. In 10 C.F.R. Part 50, Appendix A, Introduction, it is noted that even though no specific design criteria for a problem has been defined, Applicant is not relieved from the obligation to consider new important safety matters, in this case, in its analysis of accident risk and prevention under the requirements of 10 C.F.R. 50.34(a)(4)(i) and (ii), and 10 C.F.R. 50.34(b)(4).

Examples of multiple failure accidents can be found in a report written by Dr. Richard E. Webb entitled "An Analysis of Three Mile Island Accident," 1979. Quoting from Chapter 12 of that report:

- (1) Rupture of a defective control rod drive mechanism (CRDM) housing which causes adjacent, similarly defective CRDM housings to rupture in a cascade manner. Such ruptures could cause the affected control rods to be ejected from the core by the reactor pressure, thereby causing a potentially catastrophic power excursion.
- (2) Failure of the main feedwater system followed by a scram system failure, which results in a high level of heat generation in the core of the reactor but low heat removal from the reactor system.
- (3) Seizure of a main coolant pump followed by a scram failure.
- (4) Continuous withdrawal of control rods with a scram failure.
- (5) Loss of electric power to the coolant pump followed by a scram failure.
- (6) Loss of turbine steam condenser vacuum with scram failure.
- (7) Small coolant pipe rupture with a scram failure.

- (8) Large coolant pipe rupture followed by failure of the emergency coolant system to function.
- (9) Spontaneous reactor vessel explosion due to failure of defective closure bolts.
- (10) Errors in regulating the boron chemical concentration in the reactor coolant causing excessive over-power transients or power excursions.
- (11) A large pipe rupture followed by failures of additional pipes and components due to the reaction forces that occur as a result of the pipe rupture.
- (12) Coolant pipe rupture due to a strong pressure surge caused by a core power or under-cooling incident; or a simultaneous rupture of a set of defective control rod drive mechanism housings due to a strong coolant pressure surge, water hammer, or a coolant explosion caused by a molten fuel-water interaction in an accident in which the fuel melts.
- (13) Steam generator vessel rupture.
- (14) Improper operator actions in response to a particular accident situation which tends to worsen the accident.
- (15) Accidents caused by faulty gauges and instruments.

Contention 5

Intervenors contend that Applicant's power demand models in the Environmental Report-Operating License (EROL) no longer demonstrates that there exists, or will exist in the reasonably foreseeable future, a need for the level of generating capacity which the addition of the Byron units would provide. Such a need must be shown in order to establish that the units produce a level of benefit which will balance the costs of the project under 10 C.F.R. Part 51.21 and 51.20(b). Intervenors further contend that new conditions and trends have emerged, some of which are described below, and that in consequence the Applicant should reassess its demand projections taking these new facts into account, to determine when and if the generating capacity of the Byron units would be needed to obtain their 14% reserve generating target. Intervenors contend that such a reassessment is necessary in order to fulfill the NRC's obligation under NEPA to determine if there exists an alternative, environmentally superior means to meet the real need for power. Such alternatives may include no action.

- a. The addition of the Byron station units contributes to a generating reserve of 38 percent, substantially above the 14 percent level of reserve deemed adequate by Applicant. The excess reserve

capacity projected by Applicant does not take into account decreasing rates of growth in projected demand due to price and other factors set out below, so that real overcapacity for generating electricity may be, and has been projected by other sources to be, substantially above 33 percent. Even though the value of electricity to fulfill basic needs is "priceless," the value of an excess reserve capacity for generating electricity does not constitute a similarly high level of benefit.

- b. Applicant purports to show in EROL, Chapter 1, that demand for power responds to several conditions, including price. New price increases initiated by Applicant, including those in response to rapid increases in factor costs of operations and maintenance, such as fuel costs; storage and disposal costs on and off site of low, intermediate and high level waste; and in wages, and including costs from Applicant's construction program, will all ensure continued price increases and, therefore, according to Applicant's models, a drop in the rate of growth in demand.
- c. There is considerable discrepancy between the projections of average annual rate of growth in

peak load Applicant has made in the EROL and those it has recently made in testimony before other state regulatory bodies, such that the growth rate now being projected may be only one-third (.329) the size stated in the EROL.

- d. Applicant corrected its original demand projections made for construction licensing downward in the EROL to account for the effects of the 1973-4 round of oil price increases. The effects of current and expected oil price increases should, if Applicant's EROL models are correct, further reduce demand. The effects of rapid inflation and the tightened loan market on construction and investments in high energy use appliances should also be considered by Applicant in recalculating saturation indices used in making projections.

All of these facts have emerged since the construction hearings and are significant enough to require re-evaluation at the operating stage hearings.

#### Contention 6

The Intervenors contend that the FSAR provides insufficient assurance of containment of radioactive materials in light of, among other factors, the risks of use

of zirconium cladding alloys resulting in a breach of the integrity of both internal and external systems.

Our evidence for the unacceptability of zirconium cladding includes the matter contained in a letter to the Bulletin of Atomic Scientists by former Westinghouse nuclear engineer, Earl A. Gulbransen, published on page 5 of the June, 1975 issue of that journal. Quoting Dr. Gulbransen from that letter: "At the operating temperature of nuclear power reactors zirconium cladding alloys react with oxygen in water to form an oxide layer which partially dissolves in the metal, embrittling and weakening the metal tubing. Part of the hydrogen formed in the zirconium-water reaction dissolves in the metal and may precipitate as a hydride phase also embrittling and weakening the metal tubing." Further evidence of risk of using zirconium alloys occurs a bit later in the same letter: "At temperatures above 1100° Celsius zirconium reacts rapidly with steam with a large evolution of heat and the formation of free hydrogen, with most metals to form intermetallic compounds and with other metallic oxides to form its own oxide. Once zirconium is heated to 1100° Celsius, which could occur in loss of coolant accidents, it is difficult to prevent further reaction, failure of the tubing and of the reactor."

Thus the conclusion is reached by Dr. Gulbransen that:  
"The use of zirconium alloys as a cladding material for the hot uranium oxide fuel pellets is a very hazardous design concept since zirconium is one of our most reactive metals chemically."

Additionally, Applicant has not demonstrated the adequacy of its internal and external safety systems as impacted by a zirconium cladding failure. In the event of a loss of integrity of zirconium cladding, radiation levels exceeding those of the design environment of the internal and external safety equipment and systems would occur. As the design basis for these systems and equipment does not include an integrity assurance in the event of a zirconium cladding failure by failing to consider such potential radiation levels in the design environment of the internal and external safety systems, Intervenor contends that the proposed use of zirconium cladding, and the impact on the internal and external safety systems and equipment in the event of a zirconium cladding failure, require further examination.

#### Contention 7

The Intervenor contends that the FSAR and Applicant offer insufficient safeguards against hydrogen explosions,

such as are alleged to have occurred at Three Mile Island Reactor 2. There is no evidence that the recombiners for taking up hydrogen would be adequate if circumstances similar to those at TMI 2 should occur at Byron.

Contention 8

Intervenors contend that Applicant does not meet the requirements of 10 C.F.R. Part 51.21 and 51.20(a), (1 and 2); (b), (c) because no consideration is given the environmental impact of primary coolant system chemical decontamination and steam generator chemical cleaning which the Department of Energy has determined will occur twice during the lifetime of a nuclear power plant. Recent data raise the possibility of serious adverse consequences of the decontamination process. Chelating agents, intended for the removal of highly radioactive corrosion products adherent to the coolant system surfaces, sharply increase the rate of migration of these same radioactive products through the environment and into the food chain. No analysis or discussion is given possible biological consequences to the accidental spillage during decontamination, waste storage, transportation or disposal (on or off-site).

Contention 9

Intervenors contend that there are many unresolved safety problems with clear health and safety implications and which are demonstrably applicable to the Byron Station design, but are not dealt with adequately in the FSAR.

These issues include but are not limited to:

- a. Serious water hammer problems. We understand that a water hammer caused by rapid condensation of steam in feedwater lines of a PWR constitutes the most serious of this sort of event. Damage to pipes and valves are some potential hazards. Ultimately, under the most serious circumstances successive water hammer incidents might lead to a loss of coolant accident. Applicant has already had water hammer problems in its Zion plant in 1977, and a plant shutdown was required to repair the damage. The similarity of plant equipment, management, and operator training programs between the Zion and Byron stations raises serious questions about the Applicant's ability to operate the Byron plant safely, with respect to water hammer phenomenon. Evidence with respect to demonstrated efficacy of new nozzle designs to be used at Byron to mitigate water hammers is not presented at FSAR 10.4.7.3.

- b. Asymmetric blowdown loads on reactor primary coolant system. This problem may develop from a reactor coolant pipe rupture at the vessel nozzle. The result, after a LOCA incident, could be to place a significant load on the reactor vessel supports, which, in the extreme, could cause their failure. This, in turn, might damage the ECCS lines and/or prevent proper functioning of the control rods. This problem is particularly severe in PWRs. Applicant's response to this problem, a computer model of stresses at FSAR 3.9.1.4.6, is insufficient, and a full scale mechanical test is necessary, especially given the complexity of the reactor vessel geometry.
- c. Steam generator tube integrity. In PWRs steam generator tube integrity is subject to diminution by corrosion, cracking, denting and fatigue cracks. This constitutes a hazard both during normal operation and under accident conditions. Primary loop stress corrosion cracks will, of course, lead to radioactivity leaks into the secondary loop and thereby out of the containment. A possible solution to this problem could involve redesign of the steam generator, but at FSAR,

Section 10.3.5.3 the Applicant notes its intent to deal with this as a maintenance problem, which may not be an adequate response given the instances noted in Contention 1, above.

- d. Fracture toughness of steam generators and reactor coolant pump supports. The steel used as steam generator and reactor coolant pump support materials may be subject to cracks in the material near a weld under lower-than-normal temperature conditions. For this reason, under certain circumstances, auxiliary electric heating should, according to NRC generic problem analyses, be provided to keep the temperatures of these structural elements high enough to avoid brittle fracture. The problem may become severe under a LOCA condition. Auxiliary heating is not provided for in the Byron design, as indicated at FSAR 5.2.3.3 or 3.9.3.4.
- e. The process of chemical decontamination may exacerbate safety problems through a degradation of the integrity of the primary coolant system boundary. Such degradation may occur during the process of decontamination or during subsequent operation of the reactor. Also, chemical solution

decontamination may add to the deposition of radioactive corrosive products, according to an NRC official. Decontamination is not discussed in Applicant's FSAR or EROL.

For a fuller statement of the unresolved problems applicable to Byron see the ACRS letters issued herein; the ACRS generic letters, including the letter dated November 15, 1977, NUREG 0410; Testimony, Aycock, Crocker and Thomas, presented in Public Serv. Co. of Okla. (Black Fox Station, Units 1 and 2); the Regulatory Staff's "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations" NUREG 0578; and ACRS' Reports to Congress, January, 1978 and 1979, all of which are incorporated herein by reference as if specifically set forth.

#### Conclusion

For the reasons described in the above contentions, DAARE and SAFE, intervention parties, urge that the Atomic Safety and Licensing Board not approve the Applicant's request for an Operating License for Byron Station Units.

Respectfully submitted,

DAARE and SAFE, intervention parties

By: \_\_\_\_\_  
One of their attorneys

Certificate of Service

The undersigned, Kenneth F. Levin, attorney for the DeKalb Area Alliance for Responsible Energy and the Sinnissippi Alliance for the Environment, certifies that on this date he sent twenty copies of the attached Statement of Contentions to the Secretary of the Nuclear Regulatory Commission and one copy to each of the persons at the addresses shown on the attached service list, by U.S. Mail, postage paid.

Dated: May 9, 1980

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Kenneth F. Levin  
Beatty, Levin, Holland,  
Basofin & Sarsany  
11 South LaSalle Street  
Suite 2200  
Chicago, Illinois 60603  
(312) 263-1281

SERVICE LIST

Marshall E. Miller, Esq.  
Chairman - Atomic Safety and  
Licensing Board Panel  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dr. Richard F. Cole  
Atomic Safety and Licensing Board  
Panel  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Richard J. Goddard, Esq.  
Office of the Executive  
Legal Director  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Atomic Safety and Licensing Board  
Panel  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Chief Hearing Counsel  
Office of the Executive  
Legal Director  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dr. A. Dixon Callihan  
Union Carbide Corporation  
P.O. Box Y  
Oak Ridge, Tennessee 37830

Myron Karman, Esq.  
Office of the Executive  
Legal Director  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Secretary  
Attn: Chief, Docketing &  
Service Section  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Ms. Betty Johnson  
1907 Stratford Lane  
Rockford, Illinois 61107

Dr. Bruce von Zellen  
Department of Biological  
Sciences  
Northern Illinois University  
DeKalb, Illinois 60115

Paul M. Murphy, Esq.  
Isham, Lincoln & Beale  
One First National Plaza  
Suite 4200  
Chicago, Illinois 60603

Mr. Cordell Reed  
Commonwealth Edison Company  
P.O. Box 767  
Chicago, Illinois 60690

Dr. Julianne Mahler  
Center for Governmental Studies  
Northern Illinois University  
DeKalb, Illinois 60115

Ms. Beth L. Galbreath  
734 Parkview  
Rockford, Illinois 61107

Michael I. Miller, Esq.  
Isham, Lincoln & Beale  
One First National Plaza  
Suite 4200  
Chicago, Illinois 60603

Myron M. Cherry, Esq.  
Cherry, Flynn & Kanter  
One IBM Plaza  
Room 4501  
Chicago, Illinois 60611