

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 0L
) 50-455 0L
)
(Byron Nuclear Power Station,)
Units 1 & 2))

AFFIDAVIT OF WAYNE L. STIEDE

The attached questions and answers constitute my testimony in the above-captioned proceeding. The testimony is true and accurate to the best of my knowledge, information and belief.

Wayne L. Stiede
Wayne L. Stiede

Subscribed and sworn to
before me this 3rd day
of June, 1982.

Maureen Jones
Notary Public

AFFIDAVIT OF WAYNE L. STIEDE

ON CONTENTION 1

Q.1. State your name and present occupation.

A.1. My name is Wayne L. Stiede. I am currently employed at the Commonwealth Edison Company as Assistant Vice President for Nuclear Engineering, Nuclear Fuel Services and Nuclear Licensing.

Q.2. Briefly state your educational and professional qualifications.

A.2. I graduated from the University of Wisconsin in 1958 with a Bachelor of Science in Electrical Engineering. I received a Masters Degree in Management Science from Northwestern University in 1977. Upon graduating from the University of Wisconsin, I spent six years with General Electric in their Hanford Atomic Products Operation as a Reactor Physicist and Instrument Engineer. I then spent four years with General Electric at their Atomic Power Equipment Department in San Jose, California, where I worked on the design of Dresden and Quad Cities, and was involved in the licensing of those plants. In 1968, I joined Commonwealth Edison Company and have held positions in the Mechanical & Structural Engineering Department, Nuclear Licensing, Operational Analysis, Station Nuclear Engineering Departments, and my current position.

Q.3. What is the purpose of your testimony?

A.3. DAARE and SAFE have contended that Commonwealth Edison Company's record of non-compliance with Nuclear Regulatory Commission regulations in its other nuclear stations demonstrates that the Company is unable, unwilling or lacks the technical qualifications to operate the Byron Station within NRC regulations. The purpose of my testimony is to address this contention.

Q.4. Have you reviewed the specific incidents listed in Contention 1 which DAARE/SAFE claim establish that the Company is unable, unwilling or not qualified to safely operate the Byron Station?

A.4. Yes. Where the incidents are adequately identified, I am familiar with the background.

Q.5. Do the incidents listed in Contention 1 indicate to you that Commonwealth Edison Company is unable or unwilling or lacks the technical qualifications to operate the Byron Station safely and within NRC requirements?

A.5. No. Based on my knowledge of the incidents cited in this Contention and my knowledge in the nuclear area, these Contentions do not represent a lack of willingness on our part to operate our facilities safely. They represent incidents which have occurred in the past and for which aggressive

action has been taken to correct the situations cited. In addition, the Company has attempted to identify the root causes of these incidents and make generic changes in procedures when necessary or appropriate.

Q.6. Does the Company condone the type of incidents which led to the NRC assessing fines in the past or to other incidents of non-compliance with NRC regulations?

A.6. No, it does not. In fact with respect to a recent incident of over-exposure, the Company took disciplinary action against the employee involved to emphasize the need to follow station practices and procedures.

Q.7. I am sure you are familiar with more of the Company's activities than are listed in DAARE/SAFE Contention 1. Based on this broader knowledge of the Company's operation of its nuclear power stations, is it your opinion that the Company lacks the ability, willingness or technical qualifications to safely operate the Byron Station within NRC regulations?

A.7. No. Quite to the contrary. We have the willingness, the personnel and other resources to operate our plants safely. We have been operating nuclear power stations since the late 1950's and have been considered by other utilities as a leader in the industry. This

is borne out by the fact that several of our people in the past and our people today serve on standards committees, research advisory committees and policy committees which are concerned with the nuclear power field. As problems have occurred in our operation, we have addressed these problems; in most cases we have done this without urging from the NRC. Most of the incidents referred to by DAARE/SAFE occurred several years ago. People might disagree as to what they indicate about our performance at the time. In my opinion, the Company's performance has always been good, but it has continually improved and I fully expect that it will continue to improve in the future. Since the period of approximately 1978 and 1979, we have instituted a number of organizational changes at the operating stations and at the corporate level, all of which are intended to further improve our performance.

Before I discuss the specifics mentioned by DAARE and SAFE, I would like to discuss those aspects of the Company's current organization and how they will contribute to the safe operation of the Byron Station.

Q.8. Would you please describe the organizational changes to which you refer.

A.8. In 1979, shortly following the incident at Three Mile Island, the Company engaged a group of distinguished scientists and business leaders from the Chicago area to evaluate the effectiveness of our nuclear operations. This was a self-analysis effort. The Company hoped to get an outsider's view on any possible weaknesses in its organizational structure and outsiders' recommendations on means to remedy any weaknesses which might be uncovered.

As a result of recommendations made by this Senior Advisory Panel, the Company reassigned responsibility for the operation and maintenance of our nuclear facilities under one corporate Vice-President. Prior to this time, several corporate Vice-Presidents had responsibility for various aspects of our nuclear operations. The purpose of this change was to allow the Company to better focus its efforts on safety and on the overall quality of nuclear operations. Mr. Cordell Reed was made the Vice-President of Nuclear Operations.

The Vice-President of Nuclear Operations now has reporting to him the Division Vice-President of Nuclear Stations and an Assistant Vice-President for Nuclear Engineering, Nuclear Fuel Services and Nuclear Licensing. The Division Vice-President--Nuclear Stations has reporting to him three functional managers: one for operations, one for maintenance and one for tech-

nical services. The organization of the Operations Division tracks the organization of the nuclear stations, which is more fully described in the testimony of Mr. Robert Querio. This structure was based on a management audit performed for the Company by Booze, Allen & Hamilton, Inc., an independent management consulting firm. The structural similarity between the Operations Division and the operating nuclear stations is intended to provide corporate direction and Company-wide standardization of practices and procedures at our operating stations. This is one means whereby the Company is able to effectively utilize the experience at each of its facilities to improve its operations at all of its facilities.

In addition to the Division Vice-President, I, as Assistant Vice-President for Station Nuclear Engineering, Nuclear Fuel Services and Nuclear Licensing, report directly to the Vice-President of Nuclear Operations. Nuclear Licensing provides the primary interface between Edison and the NRC, both with NRC headquarters in Washington, D.C., and with the regional administration, which in our case is Region III located in Glen Ellyn, Illinois. Nuclear Fuel Services is responsible for the safety and economics of the fuel reloads which are done on the units about once per year. Nuclear Fuel Services is also responsible for

making recommendations to plant Operating personnel with respect to the most appropriate manner of operating the core. The Station Nuclear Engineering Department is responsible for reviewing all modifications to safety related equipment to ensure that they are in compliance with the license and existing regulations. In addition, for the major modifications, they are responsible for providing the engineering services for the design of the modification.

Q.9. In your opinion, is the corporate structure you have described effective in assuring the safe operation of the nuclear stations and can it be expected to assure the safe operation of the Byron Station?

A.9. Yes, I believe it does. Let me give you an example of how the organization would function at the corporate level in a particular situation. In the event an item of non-compliance with applicable NRC regulations at an operating station comes to the attention of the Company, it is the responsibility of the affected station to take the necessary corrective action and it is the responsibility of the Nuclear Licensing Group to communicate the corrective action to the NRC. We do not stop there. The Division Vice-President--Nuclear Stations or his staff also reviews the item of noncompliance to determine whether similar incidents could occur at our other stations. He is

responsible for advising the remaining Station Superintendents of any need to amend their procedures or change their practices. The Company does not simply assume that any given incident of non-compliance with applicable regulations is an isolated incident. In addition to the internal review in the Nuclear Operations Department, the Company's nuclear operations are also reviewed by two independent organizations within the Company.

Q.10. Could you describe the two organizations which provide independent review of nuclear operations.

A.10. The two organizations are the Quality Assurance Department and the Nuclear Safety Department. The role performed by these two organizations for Commonwealth Edison Company is, in various respects, unique in the nuclear industry.

Quality Assurance is required under the NRC regulations and the role of Quality Assurance is primarily an audit function. Quality Assurance people audit the stations to assure that the conditions of the license are being met. They do this by auditing our adherence to technical specifications and the technical specification surveillance requirements. In addition, they monitor shipments of radioactive wastes and modification work which occurs during unit outages. Beginning

in approximately 1978, the Company expanded the scope of the Company's Quality Assurance audit procedures to areas not required by Commission regulations. In this way we were able to utilize the existence of an experienced audit team to further assure the safety of our operations. To my knowledge the Edison Quality Assurance Department audits more aspects of the Company's operation than is the case for any other nuclear utility. The manager of Quality Assurance reports to the Vice-Chairman of the Company. This was done so that he is independent of the day-to-day decisions on scheduling and costs and, therefore, will not be biased in his decision by these day-to-day problems. Each operating station has several Quality Assurance people on site during normal working hours and during other hours such as during a refueling outage when required by the stations.

The second organization which monitors station activities is the Nuclear Safety Department. Edison's Nuclear Safety Department performs a role which is unique for nuclear utilities. The group was initially created by the Company following the Three Mile Accident to perform the off-site review function of changes to procedures and to licenses as required by the NRC. The Company, however, decided to expand the role of this group far beyond that required to meet NRC requirements. This is feasible for Commonwealth Edison Com-

pany only because of the number of stations we operate and the pool of experienced people from which we can draw.

The individuals making up the Nuclear Safety Department are all highly experienced senior people within the Company. When the Byron Station is placed into operation, a four person on-site team from the Nuclear Safety Department will be assigned to the Byron Station. This group will review Deviation Reports, Licensing Event Reports and Station Operations to determine if any long-term trends adverse to safety are occurring at the plant. This group also has the authority to perform an independent design review function in which it decides, quite apart from compliance with regulatory requirements, the adequacy of design of various plant structures, systems and components. In this respect, they perform a function somewhat analogous to the NRC's Advisory Committee on Reactor Safeguards.

The head of this department reports directly to the Chairman and President, and on a day-to-day basis works with the Vice-President of Nuclear Operations.

Q.11. Are there any other independent groups which monitor or evaluate the Company's nuclear operations?

Q.11. Yes. Each of our operating nuclear units has an N-Stamp granted by the American Society of Mechanical Engineers (ASME). The ASME is the primary code setting body for nuclear vessels, piping systems and concrete containment. The N-Stamp is required for Commonwealth Edison Company to perform work on items subject to the ASME code. Edison is currently in the process of obtaining an N-Stamp for the Byron Station. Edison is one of only a handful of utilities who have obtained an N-Stamp and are technically qualified to perform their own ASME code-related work.

In order to qualify for an N-Stamp, each of Edison's stations must demonstrate to the satisfaction of the ASME that its Quality Assurance Program meets the standards of the ASME. In order to retain the N-Stamp, each station is audited by the ASME every three years to ensure that the Quality Assurance Program has remained current and acceptable under ASME standards.

Q.12. Have the changes which you have described to the organization of the Edison corporate nuclear organization occurred since the occurrence of the items listed as sub-parts of Contention 1?

A.12. Yes, they have. As I indicated previously, the changes to the organization have occurred primarily since 1979. The allegations made by Intervenors in large part occurred in the time period of 1974 to 1978. Based on documents produced to Commonwealth Edison Company by DAARE and SAFE in response to discovery in this proceeding, it appears that the items listed by DAARE and SAFE were taken from an article appearing in the May, 1979 edition of Chicago Magazine. In some instances the specifics are inaccurate or, at least in the context, misleading.

Q.13. Is it true, as claimed in DAARE/SAFE Contention 1(a), that between 1974 and 1978 Edison was fined a total of \$105,500.00 by the NRC for noncompliance with NRC regulations?

A.13. The number is off by a little bit, but the Company was fined approximately that much during that period. In fact, since 1974 when Edison was first fined by the NRC, Edison has been fined a total of \$212,000.00 in connection with the operation of its seven operating reactors and construction of six additional reactors, including the two Byron units. None of the fines are related to the Byron Station. I have attached to this affidavit as Exhibit A an Appendix combining a brief description of the individual incidents and the Company's responses to the NRC.

While the Company does not condone any of the incidents which led to the fines or any other incidents of non-compliance for which it was not fined, considering the number of years involved, the number of reactors involved and the magnitude of the fines which the NRC is authorized to levy, in my opinion Edison's record is consistent with a willingness and ability to comply with NRC requirements.

I would like to point out that the quotations contained in Contention 1(a) were not directed at Edison's corporate attitude. At the time the items of non-compliance were found the NRC's findings were directed to the operations at a particular station. The comment with respect to "continuous management inadequacies" is a reference made to the management of the Zion Station. As I pointed out in my attachment, there has since been a reorganization of the management of the operating stations, including Zion. The statement to the effect that Edison had "a history of rad-waste management problems" and that operating errors at the Dresden plant caused "serious concern about the Company's regulatory performance in all of their nuclear plants" appeared in a Notice of Violation in connection with an incident at Dresden in 1974. Substantial changes have been implemented in the handling of rad-waste throughout Edison's system since that time, and the quoted language has no relevance today.

Q.14. Can you explain the following allegation contained in DAARE/SAFE Contention 1(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."

A.14. I believe that DAARE/SAFE have somewhat inaccurately described an early version of what is now known as the NRC's Systematic Assessment of Licensing Performance (SALP) Program. The purpose of this Program is to look at the licensee's performance on a yearly basis and to draw conclusions and make recommendations as to where more emphasis could be placed by the licensee in the several categories of performance evaluated. The Program was also designed to help the NRC effectively allocate its own inspection efforts. If one looks at the SALP reviews for an individual nuclear unit over time, some conclusions can be drawn as to whether necessary corrective action has been taken, or whether performance in a given area is consistently in need of corrective action. To the best of my knowledge, the NRC has not identified any areas

of any of the Company's operating units' activities as requiring additional attention by the Company or the NRC Staff in the two consecutive years in which the SALP Program has been operating on an industry-wide basis. These are the reviews for 1980 and 1981. I conclude we are responding appropriately to the reviews.

When first made public by the NRC, the results of the station reviews were used by some to compare the performance of one utility against that of another. At our most recent SALP review meeting, the NRC indicated that it is not the purpose or intent of the SALP Program to be used for comparing utilities. Due to its misuse by, among others, the media, the particular rating system referred to in Contention 1(b) has since been abandoned by the NRC. In passing, I note that the results of the first overall station reviews were made public in 1977, not 1974 as indicated in the last sentence of sub-part (b) of Contention 1, and that one of our stations was rated "B" at the time and two were rated "C". These ratings do not reflect that the performance of Edison at the time was not adequate to assure public safety; the NRC prohibits continued operations when it believes they are not carried out safely.

Q.15. Are you familiar with item (c) in Contention 1 which read as follows: "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 reactors 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."

A.15. Yes, I am familiar with this incident. The NRC did increase its inspection frequency in 1977, at least at the Dresden Station, after the referenced violation report long enough to assure themselves that other areas of our operation were in compliance with the regulations. After several weeks of intensive inspection effort, the NRC so concluded and, as a result, the inspection frequency was decreased to normal levels. This sub-part of the Contention refers to one of the incidents for which the Company was fined in March, 1978, and is discussed in the Appendix to this testimony.

Q.16. In your opinion, does the following statement in Contention 1(d) reflect in any way on the Company's ability to operate the Byron Station: "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."

A.16. No. The statement is a somewhat confused characterization of the levels of severity which the NRC attaches to items of non-compliance. A "Licensee Event Report" is simply the name of a report prepared by the Company and forwarded to the NRC when the Company believes some of its activities may have been out of compliance. The NRC no longer uses the terms "violation", "infraction", "deviation" to differentiate between items of non-compliance. While that terminology was in use, I am sure that there was no station of any utility which was wholly free of items of non-compliance, including items classified as "violations" by the NRC. No conclusions can be drawn from that fact alone.

Q.17. Are you familiar with Contention 1(e) which reads as follows: "The Applicant has reported to the Commission 'abnormal occurrence' 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."

A.17. Yes, I am familiar with the allegation but I am not sure what it means. We have been provided with no information from Intervenors to be more specific as to the thrust of this allegation. I am not familiar with any compilation of any "abnormal occurrences" available from which we could determine whether in fact we report abnormal occurrences at a rate which is disproportional to the number of generating stations we have in operation. I would point out that abnormal occurrence is not necessarily a safety-related incident, and there may be significant differences between the type of incidents different utilities might characterize as "abnormal occurrences."

Q.18. Are you familiar iwth the incident referred to in Contention 1(f), which reads as follows: "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 ini-

tiating 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."

A.18. Yes. In April of 1977, former employees of Pinkerton made allegations concerning the security system and plant operations in Quad Cities Station. Pinkerton supplied guard services for Commonwealth Edison Company at Quad Cities at that time. The NRC immediately investigated these allegations. As a result of their inspection and investigations, they found certain of our activities to be in non-compliance with NRC's requirements.

None of the items found represented a direct threat to the health, safety or interest of the public. Eleven items were categorized as infractions and five were categorized as deficiencies with no threat to the public. These items were referred to the NRC in Washington, D.C., for consideration of escalated enforcement action, that is, a monetary fine.

In addition to the investigation conducted by NRC, the FBI conducted an investigation. The FBI performed this investigation because the allegations concerned

the security of a nuclear power station. The FBI investigation led to a grand jury hearing on this matter and they returned an indictment against the Company and two of its employees. A trial was held and the Company and its employees were found not guilty of the charges.

The NRC had been asked to defer any administrative action until the Department of Justice had concluded its work. Following the trial, the NRC again considered the sixteen items of non-compliance. In its letter to the Company closing out this matter, the NRC stated "Recognizing that Commonwealth Edison took prompt corrective action on the specific items of non-compliance which were identified, and recognizing the impact of the Department's course of action in focusing Commonwealth's attention on security requirements, we conclude that the assessment of a civil penalty at this time is inappropriate and unnecessary to assure lasting corrective action." The particular incident referred to by DAARE/SAFE is obviously closed, and the NRC has stated that it does not believe steps are necessary to insure any further corrective action at Quad Cities.

I would also like to point out that, unlike the Quad Cities Station, the Byron Station has been designed with the need for industrial security as one of the design criteria. This will eliminate many of the difficulties the Company experienced developing

effective security programs for its operating stations. In addition, the NRC requirements regarding industrial security were undergoing rapid evolution back in 1977. Security requirements are much more defined today, and therefore, there will be far less possibility of misinterpretation of specific requirements. We also have a corporate level Security Administrator now who will aid in the development of the Byron Station security program.

Q.19. Are you familiar with Contention 1(g), which reads as follows: "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."

A.19. Yes. Since 1980, Commonwealth Edison has been denied access to low level waste burial sites three times. On each of these occasions, the NRC also assessed a fine. It should be made clear that the NRC fine was for the incident which caused us to be excluded from a burial site and was not for separate violations of our license.

In February, 1980, we were excluded from the Richland low level burial site because of high radiation readings on the underside of the trailer which was used to transport the waste to the site. This violation was due to our misinterpretation of the requirements on radiation readings and on accessible areas of transportation vehicles. Following this violation, our procedures were changed such that Quality Assurance and Quality Control would assure that all vehicles would be inspected prior to their release from the site. In addition, all packages would be surveyed before loading them on the truck to provide further assurance that high radiation readings at the accessible areas of the vehicles would not occur. We have not had a violation of this nature since.

In May, 1980, we were again denied access to the Richland low level waste burial site. This was brought about by a defective closure on a rad-waste shipping container. Our records indicate that these closures were in proper condition at the time of shipment and we believe they became defective in route to the burial site. We have improved our closure devices and since this incident have not had a repeated violation.

In August, 1981, we were denied access to the Richland burial site because of a leaking metal bin. The leaking material was very slightly radioactive.

As a result of this incident, the administrative control of the contents of the metal bins is more clearly monitored. Since this action was taken no other similar events have occurred.

In addition to instituting the independent review of all rad-waste shipments by Quality Control and Quality Assurance, we have established the position of Radioactive Waste Management Administrator in our Technical Services Department. The Administrator maintains detailed records of radioactive waste shipments, and works closely with station personnel as well as appropriate officials of the states to which we ship wastes as as to minimize future problems. On several occasions the states have indicated where improvements could be made to the Company's procedures. We have changed our procedures and have sent these to the states for their comments. We believe this has improved our rad-waste shipment performance.

Mr. Robert Querio describes in some detail the procedures which will be used at the Byron Station to assure the proper packaging and shipment of low level waste from the station.

Q.20. Are you familiar with Contention 1(h), which states as follows: "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."

A.20. This particular allegation does not seem to address itself to any facts or particular incidents at all. Mr. Walter J. Shewski, the Company's Manager of Quality Assurance, has prepared a detailed affidavit describing the Company's quality assurance program.

Q.21. Are you familiar with Contention 1(j), which states as follows: "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."

A.21. Yes. The Company will be filing shortly an amendment to the FSAR which reflects appropriate completion of all research programs which were identified as required for plant design and operation in the PSAR. A copy of this amendment and the letter providing notice of the proposed amendment to the NRC Staff are attached to this testimony as Exhibit B.

APPENDIX TO THE TESTIMONY

OF WAYNE L. STIEDE

The following is a brief summary of the fines paid by Commonwealth Edison Company to the Nuclear Regulatory Commission.

In December, 1974, Commonwealth Edison Company was fined a total of \$25,000 for 18 apparent violations of A.E.C. (now the NRC) regulations at Dresden in three broad areas: (1) the release of approximately 1,100 gallons of laundry water, (2) deficiencies in the following rad-waste procedures, and (3) deficiencies in implementing the new security procedures. None of the violations posed a threat to the health and safety of the public.

In response to these violations Commonwealth Edison implemented new procedures and training for operators to further reduce operating errors such as the laundry water discharge. A special review of the design, operation and management of rad-waste systems at Dresden resulted in change in a number of areas. Security guard training was increased and physical security equipment was improved.

In October, 1975, the NRC fined Edison \$25,000 for violations at its Quad Cities Station. \$8,000 was for an error in control rod withdrawal which caused fuel damage but

did not threaten the health and safety of the public. The remainder of the fine was for deficiencies in implementation of the new station security plan. None of the violations posed a threat to the health and safety of the public.

In response to these violations, changes to procedures and training were made which improved the control and use of control rod withdrawal sequences through the increased participation of Nuclear Engineers in the guidance of licensed operators. Specific changes were made to address each of the security violations. Additionally, Thomas G. Ayers, then President and Chairman of Commonwealth Edison Company, visited each of our nuclear stations to review with station personnel the importance of compliance with NRC regulations. Improvements were made in the analysis and trending of abnormal occurrences and equipment failures. A new program was also instituted at this point to give personnel errors the same degree of investigation and analysis which is given to serious accidents.

In May, 1976, Edison was fined \$13,000 for an occurrence in which an employee received excessive radiation exposure when he entered a high radiation area without taking proper precautions. There was no threat to the health and safety of anyone except the employee involved and no apparent effect on his health.

In response to these violations, specific changes were made to administrative controls to prevent recurrence

of this overexposure. These included special locks and special training for all station personnel. Outage planning and coordination practices were also reviewed to emphasize the special need for proper planning of maintenance activities where radiation hazards are involved. A special review of radiation protection practices resulted in a number of changes which increased the staffing and improved the organization of the Radiation Protection Department.

In September, 1977, a fine of \$21,000 was levied against Commonwealth Edison Company for the inadvertent draining of the pressurizer at the Zion Station. The reactor was shutdown at the time of the occurrence, and no threat was posed to the public health and safety.

Extensive changes were made in response to this violation. In addition to specific changes made to prevent recurrence of the event, the operating organization reporting chain was streamlined to minimize conflicting assignments of work. The responsibilities and authorities of shift personnel at all levels were clarified. An extensive procedure review was undertaken and the program of error investigation was formalized. Audits of station operations by the Quality Assurance Department were initiated.

In March, 1978, a fine of \$21,000 was imposed for seven items of noncompliance at Dresden Station which occurred between October, 1977 and January, 1978.

In response to these violations, administrative controls were improved, special training was conducted, and

shift starting times were adjusted to prevent recurrence of the noncompliances. In addition, a special study of management organization and controls was conducted by Booze, Allen & Hamilton, Inc. Changes to station organization were instituted as a result of this study. Additional operating personnel were assigned to strengthen management control, and changes to operating systems and procedures have been made to improve overall reliability. As a result, our performance in meeting NRC requirements improved significantly in 1978 and thereafter in all operating stations and non-compliances were reduced.

In June, 1980, December, 1980, and February, 1982, fines were levied for rad-waste shipping noncompliances. The fines paid totalled \$9,000 and are discussed elsewhere in this testimony.

In October, 1980, the NRC proposed a fine of \$40,000 for alleged inattentive operators at Dresden Station. We protested this fine and the associated noncompliance on the basis of our investigations which determined the operators in question were present at their prescribed stations and able to perform all functions required of them. The actual fine paid was \$18,000 as a compromise with the NRC. The event posed no threat to public health and safety. Revised procedures regarding control room personnel conduct were implemented following this incident.

In March, 1981, Commonwealth Edison Company was fined \$80,000 for an occurrence in which two contractor employees at Dresden Station received excessive radiation exposure due to the failure of station personnel to survey the working environment. There was no threat to the health and safety of anyone except the employees involved and no apparent effect on their health.

We are implementing new procedures and a new timekeeping policy regarding the monitoring of radiation exposure by contractor personnel. Self reader radiation detectors were purchased and will be worn by all contractors in high radiation areas to confirm daily timekeeping results. During the recent Dresden 3 outage the same work was performed which resulted in the over exposure at Dresden 2. New procedures were implemented and no over exposure occurred.



Commonwealth Edison

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Address Reply to: Post Office Box 767

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May 26, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Status of Research Programs
NRC Docket Nos. 50-454, 50-455,
50-456 and 50-457

Dear Mr. Denton:

This is to provide advance copies of Byron/Braidwood FSAR information regarding the status of research and development programs discussed in the PSAR.

Enclosed are fifteen copies of pages 1.5-1 through 1.5-5 of the Byron/Braidwood FSAR. These will be included in the next amendment. One signed original and fifteen copies of this letter are also provided.

Please address questions regarding this matter to this office.

Very truly yours,

T. R. Tramm
Nuclear Licensing Administrator

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1.5 REQUIREMENTS FOR FURTHER TECHNICAL INFORMATION

The design of the Byron/Braidwood units is based upon proven concepts which have been developed and successfully applied to the design of pressurized water reactor systems. There are currently no areas of research and development which are required for operation of this plant.

At the time of issuance of construction permits for the Byron/Braidwood units, the Preliminary Safety Analysis Report (PSAR) and the standard design report which it referenced, RESAR-3, identified certain research and development programs which were incomplete. These programs, which have been successfully completed, have provided technical information which has been used either to demonstrate the safety of design, more sharply define margins of conservatism, or lead to design improvements. Reference 1 presents descriptions of those safety-related research and development programs which have been carried out for, or by, or in conjunction with, Westinghouse Nuclear Energy Systems, and which are applicable to Westinghouse Pressurized Water Reactors. The discussion which follows in section 1.5 documents the completion of the Construction Permit stage research programs.

1.5.1 Programs Required for Plant Operation

Two programs were identified as required for plant design and operation in the PSAR:

- a. Core Stability Evaluation and,
- b. Fuel Rod Burst Program.

Both programs are complete. The Fuel Rod Burst Program was completed at the time of the PSAR. The core Stability Evaluation Program was not. A discussion of the Core Stability Evaluation Program follows.

1.5.1.1 Core Stability Evaluation

The program to establish means for the detection and control of potential xenon oscillation and for the shaping of the axial power distribution for improved core performance has been satisfactorily completed. See item 1, reference 2, for a further discussion of the tests and results.

1.5.2 Other Programs Not Required for Plant Operation

The following programs were not complete at the time of the PSAR but are now satisfactorily complete.

1.5.2.1 Fuel Development Program for Operation at High Power Densities

The program to demonstrate the satisfactory operation of fuel at high burnup and power densities has been satisfactorily completed. See item 8, reference 2, for a further discussion of the program and its results.

1.5.2.2 Blowdown Forces Program

Westinghouse has completed BLODWN-2, an improved digital computer program for the calculation of local fluid pressures, flows and density transient in the primary coolant systems during a LOCA.

BLODWN-2 is used to evaluate the effects of blowdown forces in this application. Refer to item 15 in reference 4 for a further discussion of the tests and results.

1.5.2.3 Blowdown Heat Transfer Testing (Formerly Titled Delayed Departure From Nucleate Boiling)

The NRC Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Power Reactors was issued in section 50.46 of 10CFR50 on December 28, 1973. It defines the basis and conservative assumptions to be used in the evaluation of the performance of Emergency Core Cooling Systems (ECCS). Westinghouse believes that some of the conservatism of the criteria is associated with the manner in which transient DNB phenomena are treated in the evaluation models. Transient critical heat flux data presented at the 1972 specialists meeting of the Committee on Reactor Safety Technology (CREST) indicated that the time to DNB can be delayed under transient conditions. To demonstrate the conservatism of the ECCS evaluation models, Westinghouse initiated a program to experimentally simulate the blowdown phase of a LOCA. This testing is part of the Electric Power Research Institute (EPRI) sponsored Blowdown Heat Transfer Program, which was started early in 1976. Testing was completed in 1979. A DNB correlation developed by Westinghouse from these test results is used in the ECCS analyses for Byron/Braidwood.

Objective

The objective of the Blowdown Heat Transfer Test was to determine the time that DNB occurs under LOCA conditions. This information was used to confirm a new Westinghouse transient DNB correlation. The steady-state DNB data obtained from 15 x 15 and 17 x 17 test programs was used to assure that the geometrical differences between the two fuel arrays is correctly treated in the transient correlations.

Program

The program was divided into two phases. The Phase I tests started from steady state conditions, with sufficient power to maintain nucleate boiling throughout the bundle, and progressed through controlled ramps of decreasing test section pressure or flow initiated DNB. By applying a series of controlled conditions, investigation of the DNB was studied over a range of qualities and flows, and at pressures relevant to a PWR blow-down.

Phase I provided separate-effects data for heat transfer correlation development.

Typical parameters used for Phase I testing are shown below.

ParametersNominal ValueInitial Steady State Conditions

Pressure	1250 to 2250 psia
Test section mass velocity	1.12 to 2.5×10^6 lb/hr-ft ²
Core inlet temperature	550 to 600°F
Maximum heat flux	306,000 to 531,000 Btu/hr-ft ²

Transient Ramp Conditions

Pressure decrease	0 to 350 psi/sec and subcooled depressurization from 2250 psia
Flow decrease	0 to 100 percent/sec
Inlet enthalpy	Constant

Phase II simulated PWR behavior during a LOCA to permit definition of the time delay associated with onset of DNB. Tests in this phase covered the large double-ended guillotine cold leg break. All tests in Phase II were also started after establishment of typical steady state operating conditions. The fluid transient was then initiated, and the rod power decay was programmed in such a manner as to simulate the actual heat input of fuel rods. The test was terminated when the heater rod temperatures reached a predetermined limit.

Typical parameters used for Phase II testing are shown below.

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<u>Parameter</u>	<u>Nominal Value</u>
<u>Initial Steady State Conditions</u>	
Pressure	2250 psia
Test section mass velocity	2.5×10^6 lb/hr-ft ²
Inlet coolant temperature	545°F
Maximum heat flux	531,000 Btu/hr-ft ²
<u>Transient Conditions</u>	
Simulated break	Double-ended cold leg guillotine breaks

Test Description

The experimental program was conducted in the J-Loop at the Westinghouse Forest Hills Facility with a full length 5 x 5 rod bundle simulating a section of a 15 x 15 fuel assembly to determine DNB occurrence under LOCA conditions.

The heater rod bundles used in this program were internally-heated rods, capable of a maximum power of 18.8 kW/ft, with a total power of 135 kW (for extended periods) over the 12-foot heated length of the rod. Heat was generated internally by means of a varying cross-sectional resistor which approximates a chopped cosine power distribution. Each rod was adequately instrumented with a total of 12 clad thermocouples.

Results

The experiments in the DNB Facility resulted in cladding temperature and fluid properties measured as a function of time throughout the blowdown range from 0 to 20 seconds.

Facility modifications and installation of the initial test bundle were completed. A series of shakedown tests in the J-Loop were performed. These tests provided data for instrumentation calibration and check-out, and provided information regarding facility control and performance. Initial program tests were performed during the first half of 1975. Under the sponsorship of EPRI, testing was reinitiated during 1976 on the same test bundle. The testing was terminated in November and plans were made for a new test bundle and further testing during 1978-1979. These tests were completed in December of 1979.

1.5.3 References

1. F. T. Eggleston, "Safety-Related Research and Development for Westinghouse Pressurized Water Reactors, Program Summaries," WCAP-8768, October 1978.

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2. F. T. Eggleston, "Safety-Related Research and Development for Westinghouse PWR's Program Summaries," WCAP-8768. Spring 1976 Edition.
3. "Safety-Related Research and Development for Westinghouse PWR's Program Summaries, WCAP-8458. Fall 1977 Edition.
4. "Safety-Related Research and Development for Westinghouse PWR's Program Summaries, WCAP-8004. Fall 1972 Edition.