

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of:)
COMMONWEALTH EDISON COMPANY) Docket No. 50-249
(Dresden Station, Unit 3))

AFFIDAVITS OF VINCENT S. NOONAN

AND ROBERT G. LAGRANGE

I, Vincent S. Noonan, being first duly sworn, depose and state as follows:

I am employed by NUS Corporation as Assistant General Manager of the General Consulting Services Group, Consulting Division. I am responsible for the technical and administrative management of all consulting services, including environmental qualification (EQ) of equipment, provided by the group. Prior to working for NUS Corporation, I was Chief of the Equipment Qualification Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. In that capacity, my responsibilities included, among other things, overall management of the reviews and evaluations performed by the Environmental Qualification Section of the branch.

I, Robert G. LaGrange, being first duly sworn, depose and state as follows:

I am employed by NUS Corporation as a Senior Executive Consultant in the General Consulting Services Group, Consulting

Division. Prior to working for NUS Corporation, I was Section Leader of the Environmental Qualification Section, Equipment Qualification Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. As Section Leader, I supervised the NRC staff's EQ reviews and evaluations for most operating nuclear power plants and those under construction. I was involved with EQ for the entire six years the Equipment Qualification Branch existed.

At the request of Commonwealth Edison Company (CECo), we have reviewed the facts and circumstances having a nexus to the April 29, 1988 Notice of Violation and Proposed Imposition of Civil Penalty (Notice) for the Dresden Unit 3 facility. The Notice was issued as an enclosure to an April 29, 1988 letter from the Regional Administrator, NRC Region III.

As stated in the Modified Enforcement Policy for EQ Requirements, enclosed with NRC Generic Letter 88-07, dated April 7, 1988, enforcement action may be taken if a licensee "clearly should have known" that its equipment was not qualified in accordance with the requirements of 10CFR50.49, and the plant was operated after the November 30, 1985 deadline for such compliance. This "clearly should have known" test was developed so that it could be determined whether noncompliances with 10CFR50.49 requirements warrant the imposition of a civil penalty, to provide a defensible basis when imposing such a penalty, and to avoid the use of hindsight when determining compliance status as of November 30, 1985. It is recognized by

the staff that rarely, if ever, is the environmental qualification of equipment a black-and-white determination, and that the judgment of individuals knowledgeable in the area of environmental qualification must play a large role in these case-by-case determinations. Documenting the environmental qualification of a particular piece of equipment requires the consideration of many factors, including plant-specific environmental conditions, specific application, installed configuration, component materials, and test anomalies. For such reasons, there are no requirements or guidance that identify what specific documentation is necessary in the opinion of the NRC staff to fully establish environmental qualification. Therefore, the "clearly should have known" test has been established. In this regard, the April 29, 1988 NRC letter to Commonwealth Edison Company states:

"Commonwealth Edison clearly should have known that these splices were not qualified because (1) severe degradation of these splices had been identified in January and September 1985 in Dresden Unit 2 due to aging and a high temperature event inside containment (the licensee replaced these splices with a different type in Unit 2 but only initiated a monitoring program for Unit 3), (2) the DOR EQ guidelines mention nylon material as being suspect due to its inherently poor characteristics under postulated nuclear power plant environmental conditions, and (3) while some vendor EQ test reports used to qualify the penetration and splices existed in the qualification file, these reports were

clearly inadequate in that the tests failed to demonstrate that the installed nylon AMP splices or a suitable similar material had been tested. The test report and subsequent correspondence described a nylon-type splice, but did not specify the manufacturer nor the formulation and material properties of the nylon which was tested. These factors are considered crucial to demonstrate the similarity of the tested and installed materials. Thus, Commonwealth Edison had no reasonable bases to conclude that the AMP splices installed had similar properties to those tested."

In order to determine whether CECo clearly should have known that the subject splices were not qualified, we reviewed information available in their files as of November 30, 1985 related to the qualification of the GE electrical penetrations these splices are associated with, met with CECo personnel to discuss this issue, and talked with Bechtel personnel who had been involved with the qualification of this equipment for CECo. Based on these efforts, we then examined the specific reasons cited by the NRC that CECo clearly should have known that the splices were not qualified. Our assessment concerning the validity of each of those three reasons is presented below.

- (1) severe degradation of these splices had been identified in January and September 1985 in Dresden Unit 2 due to aging and a high temperature event inside containment (the licensee replaced these splices with a different

type in Unit 2 but only initiated a monitoring program for Unit 3)

While it is true that the nylon insulating sleeves were found to be discolored, embrittled, and cracked in Dresden Unit 2, the NRC states that this was due to aging and a high temperature event inside containment. However, no similar high temperature event had occurred inside the Dresden Unit 3 containment, and the results of inspections performed on the splices in Dresden Unit 3 revealed no embrittlement or cracking, and only slight discoloration.

Since the splices in Dresden Unit 3 had not been exposed to the harsh environmental conditions that the Dresden 2 splices had been exposed to as a result of the high temperature event inside the Dresden 2 containment, and since the inspection of splices in Dresden 3 revealed no degradation similar to that observed in the Dresden 2 splices, it is not reasonable to conclude that CECc clearly should have known that the Dresden Unit 3 splices were not qualified.

As discussed below, the use of a monitoring program for the Dresden 3 splices is consistent with the requirements of the DOR Guidelines.

- (2) the DOR EQ guidelines mention nylon material as being suspect due to its inherently poor characteristics under postulated nuclear power plant environmental conditions

Table C-1 of the DOR Guidelines clearly identifies nylon as a material susceptible to significant degradation due to thermal and radiation aging. This does not, however, mean that such materials cannot be used, or that equipment using such materials cannot be shown to be qualified. Under Item 4 of Section 5.2 of the DOR Guidelines, it is stated that "If the component contains such materials, a qualified life for the component must be established on a case-by-case basis." Section 7.0 of the DOR Guidelines also requires the establishment of a maintenance and surveillance program to assure that equipment which is exhibiting age-related degradation will be identified and replaced as necessary.

With regard to radiation aging, CECO had information (Reference 1) in its files prior to November 30, 1985 stating that the tested splices were qualified for 1×10^8 rads gamma total integrated dose (normal and LOCA). (Similarity of the tested splices to the installed nylon AMP splices, and therefore applicability of these test results to the Dresden 3 splices, is discussed below under our assessment of NRC reason (3)). This same document also showed that the gamma exposure was performed prior to exposure to a simulated loss-of-coolant accident. Also in the files as of November 30, 1985 was an evaluation in Reference 2 that concluded the radiation qualification was acceptable. Therefore, radiation aging (and qualification) had been determined to be adequately addressed based on test results.

With regard to thermal aging, although the tested splices were exposed to thermal cycling as stated in Reference 1, no documentation existed in CECO's files showing that the tested splices had been subjected to thermal aging. However, under an evaluation of aging and qualified life in Reference 2, it is concluded that the penetration assemblies have an installed qualified life of 40 years. The bases for that conclusion are also identified. Further, it is stated that surveillance procedures are being developed to detect any trends that may lead to common mode failure mechanisms, and if unidentified aging or degradation mechanisms become apparent, upgraded replacement or maintenance programs will be developed to address these concerns. The maintenance and surveillance procedures referred to were also in the files as of November 30, 1985 (Reference 3).

The establishment of a qualified life for equipment containing materials known to be susceptible to significant aging degradation, and of maintenance and surveillance procedures to monitor the condition of the equipment to detect age-related degradation, is consistent with the requirements of the DOR Guidelines. Since this information was contained in CECO's files as of November 30, 1985, it is not reasonable to conclude that CECO clearly should have known that the Dresden Unit 3 splices were not qualified.

- (3) while some vendor EQ test reports used to qualify the penetration and splices existed in the qualification file, these reports were clearly inadequate in that the

tests failed to demonstrate that the installed nylon AMP splices or a suitable similar material had been tested. The test report and subsequent correspondence described a nylon-type splice, but did not specify the manufacturer nor the formulation and material properties of the nylon which was tested. These factors are considered crucial to demonstrate the similarity of the tested and installed materials. Thus, Commonwealth Edison had no reasonable bases to conclude that the AMP splices installed had similar properties to those tested.

The establishment of similarity between tested and installed equipment is critical when making a determination of the environmental qualification status of any piece of equipment. The test documentation (References 1 and 4) contained in CECO's files does not establish that similarity, as stated by the NRC. However, CECO's files as of November 30, 1985 also included information (References 5, 6 and 7) that was utilized as the bases to conclude that the installed AMP splices were similar to those tested.

Reference 5 states that the insulated splices referred to in Reference 4 were Thomas & Betts (T&B) or equivalent splices with nylon covers, and that the GE supplied butt splices for the wire gauges 10 through 22 for Dresden 2 & 3 were typical of those tested. The letter further states that if other than the GE supplied butt splices were used, the insulation has to be a

continuous piece of clear nylon tubing or nylon tubing with a sighting strip which overlaps the cable insulation in order to be considered equivalent to those qualified by GE.

Reference 6 documents that the 100 series penetration design and qualification program (as summarized in Reference 1) can be used as the basis for qualification of the Type FO1 penetration because, among other reasons cited, the materials that would be exposed to the LOCA environment are the same in both configurations. The 100 series penetrations were irradiated prior to LOCA testing.

Reference 7 transmitted an environmental information study performed by GE. The study identified age-sensitive materials used in the FO1 penetration design. Three splice vendors are identified, namely Hollingsworth, AMP, and T&B. The age-sensitive material in each is identified as nylon. The T&B splice is noted as being tested under the 100 series penetration seal program for radiation.

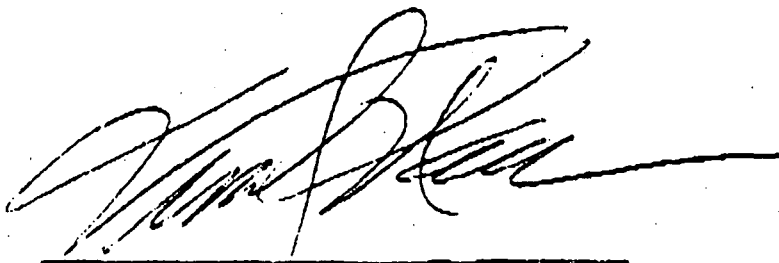
Given the information described above that existed in CECo's files as of November 30, 1985, it is not reasonable to conclude that CECo clearly should have known that the Dresden Unit 3 splices were not qualified.

Summary

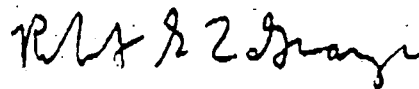
Based on our assessment described above, and considering the information contained in the files of Commonwealth Edison as of November 30, 1985, it is our opinion that it is not reasonable

to conclude that for the reasons cited by NRC Commonwealth Edison clearly should have known on November 30, 1985 that the Dresden Unit 3 splices were not qualified. Therefore, CECO does not meet the "clearly should have known" test, and no enforcement action should be taken.

Our conclusions are based solely on information that was contained in CECO's files as of November 30, 1985. We did not rely on the benefit of hindsight or take into consideration additional documentation that was subsequently developed, the results of testing performed after that date, or information that subsequently became available, such as NRC Information Notice 86-104 that was widely disseminated by the NRC in December of 1986.



Vincent S. Noonan
Assistant General Manager
General Consulting Services



Robert G. LaGrange
Senior Executive Consultant
General Consulting Services

State of Maryland, County of Montgomery
Subscribed and sworn before me this

23rd day of June 1988

Joyce Conway
Notary Public

References

1. GE Qualification Test Summary, 100 Series Electric Penetration, Report 994-7501-011, dated February 28, 1975
2. Bechtel Qualification Package for the GE FO1 Electrical Penetrations, Package 07.G080.01D, Revision 1, dated October 30, 1985
3. WESTEC Engineering Procedure, Maintenance and Surveillance Plan for Dresden Units 2 & 3 GE Electric Penetration Assembly Model F-01, Revision 2, dated July 15, 1985
4. GE Qualification Test for FO1 Electrical Penetration Assembly, dated April 30, 1971
5. GE Letter G-EBO-8-121, dated April 28, 1978, Subject: Dresden 2 & 3 Butt Splice Wire Connection
6. GE Letter G-EBO-2-031, dated February 9, 1982, Subject: Penetration Information
7. GE Letter G-EBO-2-192, dated September 7, 1982, Subject: Dresden Units 2 & 3 and Quad Cities Units 1 & 2 Electrical Penetration Environmental Information Study