Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690 - 0767

April 7, 1988

Mr. T. E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Braidwood Station Unit 2
Conditional Schedular Exemption for Environmental Qualification
NRC Docket No. 50-457

Reference: (a) March 23, 1988 S.C. Hunsader letter to T.E. Murley
(b) April 7, 1988 S.C. Hunsader letter to T.E. Murley

Dear Mr. Murley:

The purpose of this letter is to summarize a series of events that apply to the environmental qualification of one (1) piece of equipment at Braidwood Unit 2 and to provide the basis to request a conditional schedular exemption from a section of 10 CFR 50.49. This exemption is considered to be conditional in that the stated concerns appear to be readily resolvable. However, it is possible that these concerns may not be resolved before the scheduled issuance of the Braidwood Unit 2 Full Power License. The concern presented by the NRC staff is not believed to warrant delay in the issuance of that license.

On March 4, 1988 the NRC staff stated its opinion that one piece of equipment, installed in Braidwood Unit 2, may not have enough supporting documentation to demonstrate environmental qualification. This piece of equipment is a Bunker-Ramo manufactured instrument penetration used to provide access through the Unit 2 containment wall in four (4) locations for circuits that carry electrical signals from instrumentation inside the containment to main control room indicators and protective circuitry. This penetration provides this function while maintaining the integrity of the containment pressure boundary. The penetration is identified at the four (4) locations in the containment wall as 2S105E, 06E, 07E and 08E. Though substantial, substative documentation exists to provide support for environmental qualification, additional documentation has been determined to be necessary by the NRC staff to make the documented basis for environmental qualification fully auditable. This documentation was deemed to be necessary based upon the the low insulation resistance (IR) values presented in the Bunker-Ramo environmental qualification test report and whether these low IR values were attributable to the penetration or to the terminal block connected to the penetration and included in the test.

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During subsequent discussions on March 9 and 16, 1988 with the NRC staff, it was established that IR values, measured at the peak LOCA temperature or corresponding analysis regarding this peak condition, must be provided for the penetration module, for it to be considered fully qualified. IEEE 323-1974, states that IR values must be measured during the course of the Design Basis Event (LOCA) test. NUREG-0588, Revision 1, dated July, 1981, states that "performance characteristics should be verified...periodically during test..." During the recent discussions, the NRC staff has indicated that these statements include the need to evaluate the IR at the peak LOCA temperature.

References (a) and (b) are evaluations of the existing documentation which supports environmental qualification. The information provided in these documents establishes the "qualifiability" if not the full qualification of the penetration. Included as Appendix "A" is an evaluation performed as a part of the review to justify continued operation of Braidwood Unit 2.

Based on the above, Commonwealth Edison Company (Edison) hereby requests a schedular exemption from the documentation requirements of 10 CFR 50.49(j). This section states:

> "A record of the qualification, including documentation in paragraph (d) of this section, must be maintained in an auditable form for the entire period during which the covered item is installed in the nuclear power plant or is stored for future use to permit verification that each item of electric equipment important to safety covered by this section:
>
> (1) Is qualified for its application; and
>
> (2) Meets its specified performance requirements when it is subjected to the conditions predicted to be present when it must perform its safety function up to the end of its qualified life."

In order to be granted an exemption from NRC regulations, the requirements of 10CFR 50.12 must be met.

10 CFR 50.12(a) states:

> "The Commission may . . . grant exemptions from the requirements of the regulations of this part, which are - (1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security."

The exemption being requested is authorized by law. It is clearly within the Commission's authority to grant an exemption to the provisions of 10 CFR 50.49(j). There will be no adverse effects on the common defense and security. Further, the granting of the schedular exemption will present no undue risk to public health and safety.

Section 50.12(a)(2) identifies six categories of special circumstances, one or more of which must be present for the Commission to consider granting an exemption. Two of these categories, (iii), and (v), apply to this request and are discussed below:

(iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated:

Edison fully intended to meet 10 CFR50.49 concerning this one penetration item. The significance of the need for additional supporting documentation does not rule out that the penetration is fully environmentally qualified. References (a) and (b) provide the basis for this. Also, Appendix "A" provides an evaluation performed that shows that Braidwood Unit 2 can operate safely while this concern exists without endangering the health and safety of the public. Restricting the issuance of the Braidwood Unit 2 full power license based on this concern would result in other costs that are significantly in excess of those incurred by others similarly situated; such as an operating unit previously licensed which identifies a similar problem; performs a justification for continued operation; and continues operating based on that justification. Many examples of this type exist in the nuclear industry. In this case, the documented justification for continued operation for Braidwood Unit 2 does provide such a basis.

(v) The exemption would provide only temporary relief from the applicable regulation and the licensee or applicant has made good faith efforts to comply with the regulation;

Edison believes that a good faith effort has been made to provide documentation that supports full environmental qualification of the penetration to 10 CFR 50.49. Upon identification of this concern, a significant effort has been made by Edison and its consultants to resolve this issue. Key members of the NRC staff are aware of these actions and the efforts that have been made. Edison is providing this exemption request to 10 CFR 50 49(j) so that Edison may pursue the resolution of this issue in an orderly and timely manner, and not delay the issuance of the Braidwood Unit 2 Full Power License.

Giving us assurance that this matter can be corrected is that which is presented in the NRC Staff's Safety Evaluation Report (SER) dated July 23, 1983, and subsequently reiterated in Byron SER Supplement (SSER) #5, dated October, 1984. Included in Appendix "C" to both documents is a listing of equipment that was found to be acceptable following completion of reviews by the NRC staff during or following the NRC Environmental Qualification Audit performed in June, 1983 at Byron Station. Included in that list is this Bunker Ramo penetration.

Section 3.11.4.1.3 of the SSER states that, "items identified in Appendix C have been determined to be acceptable, pending implementation of the maintenance/surveillance program." The Bunker Ramo penetration is listed in Appendix C. In addition, on page 3-36 of the SSER, the Staff discussed Marathon 1600 terminal blocks, noting that IR values were probably too high for instrument application. The SSER acknowledges that Edison's solution was to replace all terminal blocks used in instrumentation applications with splices. This includes the Bunker Ramo penetrations now of concern. The SSER is being read as establishing a NRC Staff position that resolution of the Bunker Ramo IR problem by use of splices was acceptable. The SSER does not make any mention of a perceived need for additional testing or analysis concerning the environmental qualification of the Bunker Ramo penetration.

If the above efforts presented do not prove to be successful, Edison will replace this penetration assembly at the four locations indicated above with a penetration assembly fully qualified to 10 CFR 50.49. Edison will schedule this work so that it can be completed prior to start-up following the first refueling outage of Braidwood Unit 2. The first refueling outage is scheduled for the third quarter of 1990.

In conclusion, Commonwealth Edison Company requests a schedular exemption from the requirements of 10CFR 50.49(j) so that the NRC staff's concerns with the environmental qualification of the Bunker-Ramo penetration do not delay the granting the Braidwood Unit 2 Full Power License. Edison is continuing to work with the NRC staff concerning this issue. If, prior to Fuel Power Licensing, environmental qualification acceptance of the Bunker Ramo penetration assembly is obtained from the NRC staff, this request for exemption will no longer be necessary.

Please address any questions concerning this matter to this office.

Very truly yours,

S. C. Hunsader

S. C. Hunsader
Nuclear Licensing Administrator

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SAFETY EVALUATION

SAFETY FUNCTION OF INSTRUMENTATION PENETRATION ASSEMBLIES

The instrumentation penetration assemblies are designed to carry the electrical signals from instrumentation inside the containment to main control room indicators and protective circuitry, while maintaining the integrity of the containment pressure boundary. The potential deficiency in the environmental qualification of the electrical penetration assemblies has no effect on the pressure-retaining capabilities of the assemblies, but could potentially affect the electrical signals transmitted. The specific instruments involved, Attachment A, provide certain inputs to the reactor protection system and engineered safety features actuation system. They also provide certain post-accident monitoring functions. Some of these functions are required to mitigate a LOCA, main feedwater line break, and a main steam line break. These are the accidents that produce the harsh environment the penetrations must withstand.

ACCOMPLISHMENT OF SAFETY FUNCTION BY OTHER EQUIPMENT

A review was conducted of the FSAR accident analyses for LOCA, Main Steam line break, and Feedwater line break, to determine the instrument channels relied upon to initiate the necessary projective actions in the reactor protection and engineered safety features systems. The results of this review indicated that in all cases the containment pressure and/or steam line pressure instrument channels were available to accomplish the required safety function. These instruments are located outside containment and would not be affected by the accidents which produce the harsh environment at the electrical penetration in question. The results of the review are summarized in Attachment B.

For the design bases accidents, one or more instruments, for which environmental qualification is unquestioned, will provide backup ESF actuations in approximately the same time frame as assumed in the accident analyses for the primary actuations. Therefore, even if the primary actuation does not occur as a result of the potential EQ deficiency, there would be no significant increase in the consequences of those accidents as previously determined in the FSAR.

Smaller pipe breaks will produce a less severe environment than the generic pressure-temperature profile used to environmentally qualify equipment which is based on design basis accidents. For smaller pipe breaks, the necessary protective functions will not be required as rapidly as assumed in the FSAR analyses. The smaller the pipe break, the longer the time reactor trip can be delayed with acceptable core consequences.

In addition, operator actions to manually actuate reactor trip and safety injection would be taken on the basis of multiple available indications (e.g., containment temperature, containment humidity, and containment sump levels). These operator actions would help mitigate the consequences of smaller size breaks.

A review was conducted of the Emergency Operating Procedures (EOP's) that are utilized for a primary or secondary line break to determine the instrument channels relied upon for operator actions. The results of this review indicated that one or more of the following conditions was met for all cases:

1) The preferred indication is qualified and is not affected by the potential qualification deficiency, or

2) A designated, qualified backup instrument is available to provide the information, or

3) The procedures provide alternative actions in the event that the item of information cannot be obtained. These actions are conservative with respect to maintaining critical safety functions (e.g., maintaining ECCS flow if termination conditions cannot be satisfied)

The results of this review are summarized in Attachment C.

The EOPs are constructed in such a way as to utilize multiple, diverse indications whenever possible. Operators are trained not to rely on a single indicator as a basis for decision making. It can be seen from Attachments A and C that all trains of a given type of display will be either affected or unaffected by the potential EQ deficiency; therefore, the operator will not be presented with conflicting information. For example, in checking SI re-initiation criteria, all PZR level instruments could be affected by the potential EQ deficiency, but, at the same time, all subcooling instruments would not be affected. The EOP instructs the operator to re-initiate SI if <u>either</u> PZR level <u>or</u> subcooling reaches the specified value.

ATTACHMENT A
LIST OF INSTRUMENTS CONNECTED THROUGH
THE INSTRUMENTATION ELECTRICAL PENETRATION ASSEMBLIES

PENETRATION 2SI05E

Instrument No.	Parameter Measured
2TE-410A	Spare
2TE-410B	Spare
2TE-411A	Loop 2A Hot Leg Temperature
2TE-411B	Loop 2A Cold Leg Temperature
2TE-RC022A	Reactor Coolant Loop 2A Hot Leg Wide Range Temperature
2TE-RC023A	Reactor Coolant Loop 2B Hot Leg Wide Range Temperature
2TE-RC024A	Reactor Coolant Loop 2C Hot Leg Wide Range Temperature
2TE-RC025A	Reactor Coolant Loop 2D Hot Leg Wide Range Temperature
2FT-414	Reactor Coolant Loop 2A Flow
2FT-424	Reactor Coolant Loop 2B Flow
2FT-434	Reactor Coolant Loop 2C Flow
2FT-444	Reactor Coolant Loop 2D Flow
2FT-512	Steam Generator Loop 2A Steam Flow
2FT-522	Steam Generator Loop 2B Steam Flow
2FT-532	Steam Generator Loop 2C Steam Flow
2FT-542	Steam Generator Loop 2D Steam Flow
2LT-556	Steam Generator 2A Level
2LT-529	Steam Generator 2B Level
2LT-539	Steam Generator 2C Level
2LT-559	Steam Generator 2D Level
2PT-455	Pressurizer Pressure
2LT-459	Pressurizer Level
2LT-501	Steam Generator 2A Wide Range Level
2PT-407	Loop 2C Hot Leg Wide Range Pressure
2FT-651	Reactor Coolant Pump 2A Bearing Water Flow
2NR07E	Source and Intermediate Range Neutron Detection
2NR08E	Power Range Neutron Detection

ATTACHMENT A
LIST OF INSTRUMENTS CONNECTED THROUGH
THE INSTRUMENTATION ELECTRICAL PENETRATION ASSEMBLIES (Cont)

PENETRATION 2SI06E

Instrument No.	Parameter Measured
2TE-420A	Spare
2TE-420B	Spare
2TE-421A	Loop 2B Hot Leg Temperature
2TE-421B	Loop 2B Cold Leg Temperature
2TE-RC022B	Reactor Coolant Loop 2A Cold Leg Wide Range Temperature
2TE-RC023B	Reactor Coolant Loop 2B Cold Leg Wide Range Temperature
2TE-RC024B	Reactor Coolant Loop 2C Cold Leg Wide Range Temperature
2TE-RC025B	Reactor Coolant Loop 2D Cold Leg Wide Range Temperature
2FT-415	Reactor Coolant Loop 2A Flow
2FT-425	Reactor Coolant Loop 2B Flow
2FT-435	Reactor Coolant Loop 2C Flow
2FT-445	Reactor Coolant Loop 2D Flow
2FT-513	Steam Generator 2A Steam Flow
2FT-523	Steam Generator 2B Steam Flow
2FT-533	Steam Generator 2C Steam Flow
2FT-543	Steam Generator 2D Steam Flow
2LT-519	Steam Generator 2A Level
2LT-557	Steam Generator 2B Level
2LT-558	Steam Generator 2C Level
2LT-549	Steam Generator 2D Level
2PT-456	Pressurizer Pressure
2LT-460	Pressurizer Level
2LT-502	Steam Generator 2B Wide Range Level
2FT-654	Reactor Coolant Pump 2B Bearing Water Flow
2NR09E	Source and Intermediate Range Neutron Detection
2NR10E	Power Range Neutron Detection

ATTACHMENT A
LIST OF INSTRUMENTS CONNECTED THROUGH
THE INSTRUMENTATION ELECTRICAL PENETRATION ASSEMBLIES (Cont)

PENETRATION 2SI07E

Instrument No.	Parameter Measured
2TE-430A	Spare
2TE-430B	Spare
2TE-431A	Loop 2C Hot Leg Temperature
2TE-431B	Loop 2C Cold Leg Temperature
2FT-416	Reactor Coolant Loop 2A Flow
2FT-426	Reactor Coolant Loop 2B Flow
2FT-436	Reactor Coolant Loop 2C Flow
2FT-446	Reactor Coolant Loop 2D Flow
2LT-518	Steam Generator 2A Level
2LT-528	Steam Generator 2B Level
2LT-538	Steam Generator 2C Level
2LT-548	Steam Generator 2D Level
2PT-457	Pressurizer Pressure
2LT-461	Pressurizer Level
2LT-504	Steam Generator 2D Wide Range Level
2FT-657	Reactor Coolant Pump 2C Bearing Water Flow
2NR12E	Power Range Neutron Detection

ATTACHMENT A
LIST OF INSTRUMENTS CONNECTED THROUGH
THE INSTRUMENTATION ELECTRICAL PENETRATION ASSEMBLIES (Cont)

PENETRATION 2SI08E

Instrument No.	Parameter Measured
2TE-440A	Spare
2TE-440B	Spare
2TE-441A	Loop 2D Hot Leg Temperature
2TE-441B	Loop 2D Cold Leg Temperature
2LT-517	Steam Generator 2A Level
2LT-527	Steam Generator 2B Level
2LT-537	Steam Generator 2C Level
2LT-547	Steam Generator 2D Level
2PT-458	Pressurizer Pressure
2LT-503	Steam Generator 2C Wide Range Level
2PT-406	Loop 2A Hot Leg Wide Range Pressure
2FT-660	Reactor Coolant Pump 2D Bearing Water Flow
2NR14E	Power Range Neutron Detection

ATTACHMENT B

Accident Analysis Protective Functions

LOCA	MSLB	FWLB
SI and Rx trip on the following signals:	SI and Rx trip on the following signals:	Rx trip on the following signals:
Low pzr. pressure*	Low steamline pressure	Low SG level *
Containment Hi-1 pressure	Containment Hi-1 pressure	OTAT *
	Low Pzr. pressure*	HI pzr. pressure* (NOTE 1)
		SI and Rx trip on the following signals:
		Containment Hi-1 pressure
		Low steam line pressure

* Instruments that could be affected by potential EQ deficiency.

NOTE 1 Potential EQ deficiency would cause instrument to read erroneously high. This is conservative for high pzr pressure Rx trip.

ATTACHMENT C

Instruments Relied Upon for Operator Actions in the EOP's for Primary and Secondary Line Break

Operator Actions	Instrument	Assessment
Verify Rx trip and ESF actuations	Various	1,3
Check RCP trip criteria	RCS wide range press. (Note a.)	1,3
Check SI re-initiation criteria	RCS subcooling or PZR level *	2,3
Check SI termination criteria	RCS subcooling and (FW flow or S/G level*) and RCS wide range press. and PZR level *	3
Check CS termination criteria	Containment pressure	1,3
Check RHR trip criteria	RCS wide range press.	1,3
Check S/G pressures	Main steam press	1,3
Check recirc sump level	Recirc sump level	1,3
Refill PZR	PZR level *	3
Check ECCS pump trip criteria	PZR level* and subcooling	3
Main S/G heat sink	S/G level* or AFW flow	2,3

* Instruments that could be affected by potential EQ deficiency.

Note a) The RCS wide range pressure channels that provide control board indication (403 and 405) are not affected by the potential EQ deficiency.

Assessment

1) The preferred indication is qualified and is not affected by the potential deficiency.

2) A designated, qualified backup instrument is available to provide the information.

3) The procedure provides alternate actions in the event that the item of information cannot be obtained. These actions are conservative with respect to maintaining critical safety functions (e.g., maintaining ECCS flow if criteria to shutoff pumps cannot be confirmed).

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