



Commonwealth Edison  
1400 Opus Place  
Downers Grove, Illinois 60515

March 27, 1995

U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Quad Cities Nuclear Station Units 1 and 2,  
Additional Information - Core Shroud Modification  
and Unit 2 Core Shroud Inspection Plan  
NRC Docket Nos. 50-254 and 50-265

Reference: (1) R.M. Pulsifer to D.L. Farrar letter dated March 3, 1995.  
(2) J.L. Schrage to USNRC letter dated March 3, 1995.  
(3) J.L. Schrage to USNRC letter dated March 22, 1995.

In Reference (1), the NRC staff transmitted a Request for Additional Information (RAI) to Commonwealth Edison (ComEd) related to the proposed repair and inspection plan for the Quad Cities Station, Units 1 and 2 core shrouds. ComEd provided a response to the RAI, as well as a response to additional verbal questions from the staff, in References (2) and (3).

This letter transmits additional information requested by the staff during subsequent teleconferences with ComEd. Attachment A to this letter provides a non-proprietary evaluation of the impact of shroud repair leakage for Quad Cities Units 1 and 2. Attachment B to this letter provides the Quad Cities Units 1 and 2 shroud repair computer input and output for the Design Basis Earthquake (DBE) seismic analyses.

This submittal contains information which is proprietary in nature to the General Electric Nuclear Company. This proprietary information is contained in Attachment B. ComEd has included, as Attachment C, a General Electric Nuclear Company affidavit, per the requirements of 10CFR 2.790(b), explaining the reasons and circumstances for withholding the applicable information from public disclosure.

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March 27, 1995

In addition to the information provided in Attachment B to this letter, Enclosure 1 of the Reference (3) letter also contains information which is proprietary in nature to the General Electric Nuclear Company.

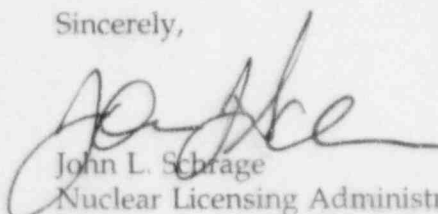
The proprietary information in Enclosure 1 of Reference (3) is identified by a vertical line in the right hand margin, and also includes Attachments A through D of the Enclosure, in their entirety.

The General Electric Nuclear Company affidavit, which is provided in Attachment C to this letter, provides the reasons and circumstances for withholding the information in Enclosure 1 of Reference (3) from public disclosure, in accordance with the requirements of 10 CFR 2.790(b).

To the best of my knowledge and belief, the analyses and evaluations contained in these documents are true and correct. In some respects these documents are not based on my personal knowledge, but on information furnished by other Commonwealth Edison employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

If there are any questions concerning this matter, or need for further clarification, please contact this office.

Sincerely,

  
John L. Schrage  
Nuclear Licensing Administrator



*Jacqueline T. Evans*  
3/27/95

- Attachment A    Performance Impact of Shroud Repair Leakage for Quad Cities Units 1&2.
- Attachment B    Quad Cities Units 1&2 Shroud Repair Computer Input and Output for Design Basis Earthquake Seismic Analyses.
- Attachment C    Quad Cities Station Unit 1 and 2 Core shroud repair documents - General Electric Nuclear Company Affidavit.

cc:    J. Martin, Regional Administrator - RIII  
      R. Pulsifer, Project Manager - NRR  
      C. Miller, Senior Resident Inspector - Quad Cities  
      Office of Nuclear Facility Safety - IDNS

Attachment C

Quad Cities Station Unit 1 and 2  
Core Shroud Repair Documents

General Electric Nuclear Company Affidavit

## General Electric Company

### AFFIDAVIT

I, **George B. Stramback**, being duly sworn, depose and state as follows:

- (1) I am Project Manager, Licensing Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in the GE proprietary letter and computer input and output analysis files, M. D. Potter (GE) to Kenneth Hutko (ComEd), *GENE/ComEd Responses to the NRC Request for Additional Information Regarding the Quad Cities Units 1 and 2 Shroud Repair Project*, (GE Company Proprietary Information), dated March 22, 1995 and attachments, *Request for Additional Information Quad Cities Core Shroud Modification*, Revision 0, dated March 21, 1995 and *Quad Cities Units 1 & 2 Shroud Repair Seismic Analysis Computer Input/Output for DBE Seismic Analysis Cases Requested by NRC*, Run I.D. Numbers 3196U, 3422U, 3369U, 3424U, 3274U, and 1838V. The proprietary information is delineated by bars marked in the margin adjacent to the specific material.
- (3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), 2.790(a)(4), and 2.790(d)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
  - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors

without license from General Electric constitutes a competitive economic advantage over other companies;

- b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
- c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
- d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
- e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in both paragraphs (4)a. and (4)b., above.

- (5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.



- (8) The information identified in paragraph (2), above, is classified as proprietary because it contains responses to NRC questions which provide detailed results of analytical models, methods and processes, including computer codes, used to evaluate a hardware design modification (stabilizer for the shroud horizontal welds) intended to be installed in a reactor to resolve the reactor pressure vessel core shroud weld cracking concern. The development and approval of this design modification utilized systems, components, and models and computer codes that were developed at a significant cost to GE, on the order of several hundred thousand dollars.

The development of the supporting processes, as shown in this detailed information, was at a significant additional cost to GE, in excess of a million dollars, over and above the large cost of developing the underlying individual proprietary report information.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

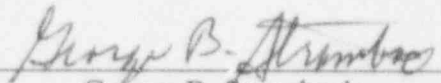
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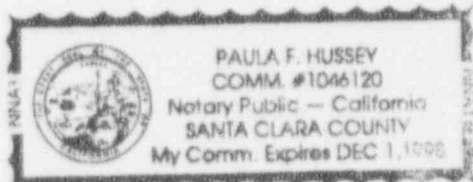
George B. Stramback, being duly sworn, deposes and says:

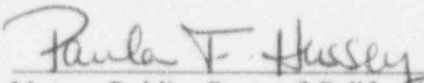
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

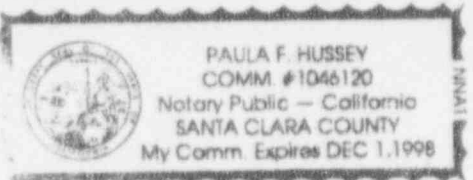
Executed at San Jose, California, this 22nd day of March 1995.

  
George B. Stramback  
General Electric Company

Subscribed and sworn before me this 22nd day of March 1995.



  
Notary Public, State of California



Attachment A

Performance Impact of Shroud Repair  
Leakage for Quad Cities Units 1 & 2





March 20, 1995

Electric Company  
5 Currier Avenue, San Jose, CA 95125

cc: R. Svarney  
E. R. Mohtashemi  
B13-01740  
MDP-9518

To: Kenneth Hutko  
ComEd Shroud Project Engineer

From: M. D. Potter *M. D. Potter*  
GE Shroud Project Engineer

SUBJECT: PERFORMANCE IMPACT OF SHROUD REPAIR LEAKAGE FOR QUAD CITIES  
UNITS 1 AND 2

Reference: DRF No. B13-01740.

## 1. Introduction

The hardware designed to repair the shroud with identified cracks for Quad Cities Units 1 and 2 requires the machining of eight holes through the shroud support plate. Each of these holes will have some clearance, which will allow leakage flow to bypass the steam separation system. In addition, potential leakage through the weld cracks (H1 through H8) and the replacement access hole cover is also considered. This letter reports the leakage flow for 100% rated power and 87 to 108% rated core flow.

## 2. Evaluation

### 2.1 Leakage Flow Evaluation

The most restrictive flow area for leakage through the holes in the shroud support plate is based on a conservative gap between the adjacent surfaces of the shroud support plate and the lower support bracket. In addition, there are a total of eight circumferential shroud welds (H1 - H8) that are considered as potential leakage paths - two above the top guide support ring, three on the upper shroud between the core support ring and the top guide support ring, and three on the lower shroud below the core support ring. It is conservatively assumed that each of these welds develops a complete circumferential crack that opens to 0.001 inches.

The leakage flows for 100% rated power and 108% rated core flow [corresponding to maximum Increased Core Flow (ICF)] are summarized in Table 1. These leakage flows are based on applicable loss coefficients and reactor internal pressure differences (RIPD's) across the applicable shroud components. The replacement access hole cover leakage is based on information in the referenced DRF. Leakage from the weld cracks above the top guide support ring is assumed to be two-phase fluid at the core exit quality. Leakage from the remaining paths below the top guide support ring is considered single-phase liquid. All of the leakage flows bypass the steam separators and dryers. The leakage flows below the shroud support ring also bypass the core. The results show that the leakage flows from the repair holes, weld cracks and the access hole cover result in a combined leakage of about 0.24% of core flow at 100% rated power and 87 to 108% rated core flow.

Table 1. Summary of Leakage Flows at Rated Power and ICF

Leakage flow (gpm)	
Weld cracks	150
Repair holes in support plate	350
Access hole covers	190
Leakage-to-core Mass flow (%)	
Weld cracks	0.04
Repair holes in support plate	0.12
Access hole covers	0.07

The steam portion of the leakage flows will contribute to increasing the total carryunder from the steam separators. The impacts of the total leakage on the steam separation system performance, jet pump performance, core monitoring, fuel thermal margin, emergency core cooling system (ECCS) performance and fuel cycle length are evaluated as summarized in the following subsections.

## 2.2 Steam Separation System

The leakage flow above the top guide support ring includes steam flow, which effectively increases the total carryunder in the downcomer by a maximum of about 0.001% at 100% rated power and 87 to 108% rated core flow. The carryunder from the separators is based on the applicable separator test data at the lower limit of the operating water level range. The combined effective carryunder from the separators and the shroud head leakage is about 0.16% and is bounded by the design value.

## 2.3 Jet Pumps

The increased total carryunder will decrease the subcooling of the flow in the downcomer. This in turn reduces the margin to jet pump cavitation. However, because the total carryunder meets the design-condition carryunder value, there is no impact on jet pump performance compared with the design condition.

## 2.4 Core Monitoring

The impact of the leakage results in an overprediction of core flow by about 0.22% of core flow. This overprediction is small compared with the core flow measurement uncertainty of 2.5% for jet pump plants used in the MCPR Safety Limit evaluations. Additionally, the decrease in core flow resulting from the overprediction results in only a 0.1% decrease in calculated MCPR. Therefore, it is concluded that the impact is not significant.

## 2.5 Anticipated Abnormal Transients

The code used to evaluate performance under anticipated abnormal transients and determine fuel thermal margin includes carryunder as one of the inputs. The effect of the increased carryunder due to leakage results in greater compressibility of the downcomer region and, hence, a reduced maximum vessel pressure. Since this is a favorable effect, the thermal limits are not impacted.

## 2.6 Emergency Core Cooling System

Shroud head leakage results in slightly increased carryunder that causes the initial core inlet enthalpy to increase slightly, with a corresponding decrease in the core inlet subcooling. However, because the total downcomer carryunder still meets the design value, there is no impact on the emergency core cooling system (ECCS) performance from this effect compared with the design conditions. Another effect of the leakage flows from the repair holes and the weld cracks is to decrease the time to core uncover slightly and, also to increase the time that the core is uncovered. The combined effect has been assessed to increase the peak cladding temperature (PCT) for the limiting LOCA event by less than 15°F. This impact is sufficiently small to be judged insignificant, and hence, the licensing basis PCT for the normal condition with no shroud leakage is applicable. The sequence of events remains essentially unchanged for the LOCA events with the shroud head leakage.

## 2.7 Fuel Cycle Length

The increased carryunder due to leakage flow above the top guide support ring results in a slight increase in the core inlet enthalpy, compared with the no-leakage condition. The combined impact of the reduced core inlet subcooling and the reduced core flow due to the leakage results in a minor effect (~0.4 days) on fuel cycle length and is considered negligible.

## 3. Conclusions

The impact of the leakage flows through the shroud repair holes and the potential weld cracks in the shroud have been evaluated. The results show that at rated power and 87 to 108% core flow, the leakage flows from the repair holes and the weld cracks are predicted equal to a combined leakage of about 0.24% of core flow (including potential replacement access hole cover leakage). These leakage flows are sufficiently small so that the steam separation system performance, jet pump performance, core monitoring, fuel thermal margin and fuel cycle length remain adequate. Also, the impact on ECCS performance is sufficiently small to be judged insignificant, and hence, the licensing basis PCT for the normal condition with no shroud leakage is applicable.

M. D. Potter