

Georgia Power Company
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 877-7279

J. T. Beckham, Jr.
Vice President - Nuclear
Hatch Project



February 22, 1993

Docket Nos. 50-321
50-366

HL-3164
004811

TAC Nos. M84784
M84785

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant
Response to Request for Additional Information
NUREG-0619 Inspection Requirements

Gentlemen:

By letter dated October 19, 1992, Georgia Power Company (GPC) requested relief from the liquid penetrant (PT) examination requirement and the ultrasonic examination schedule contained in NUREG-0619, as modified by NRC Generic Letter 81-11. GPC proposed to perform automated, enhanced, ultrasonic test (UT) examinations from the reactor pressure vessel outer shell in lieu of the manual UT and in vessel PT. GPC proposed to implement the plan during the Spring 1993 refueling outage for Unit 1 and the Spring 1994 refueling outage for Unit 2.

By letter dated January 25, 1993, the NRC staff informed GPC that additional information was required to assess the acceptability of the proposed alternative inspection. The additional information concerns the automated UT system proposed for use, the method for qualification of the system, and actions to be taken pending certain inspection results. In consideration of the remaining time until the Unit 1 outage and the potentially generic application of the proposed plan, GPC's letter dated February 2, 1993 requested schedular relief for the PT examination requirement for one cycle on both Units 1 and 2.

Enclosure 1 provides GPC's response to the questions provided in the subject letter. GPC is also requesting prompt consideration of this response.

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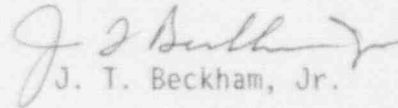
U.S. Nuclear Regulatory Commission
February 22, 1993

Page 2

Please be advised that the attached General Electric report was issued to GPC in proprietary form. Consequently, the enclosed report contains information which the General Electric Company customarily maintains in confidence and withholds from public disclosure. The information has been handled and classified as proprietary to General Electric, as identified in the enclosed affidavit (enclosure 2). GPC hereby requests General Electric Report No. GE-NE-508-023-0193 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.790.

If you have any questions in this regard, please contact this office.

Sincerely,


J. T. Beckham, Jr.

JKB/cr

Enclosures

cc: Georgia Power Company
Mr. H. L. Sumner, General Manager - Nuclear Plant
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebnetter, Regional Administrator
Mr. L. D. Wert, Senior Resident Inspector - Hatch

Enclosure 1

Edwin I. Hatch Nuclear Plant
Response to Request for Additional Information
Regarding the Inspection of the Feedwater Nozzles

NRC Question 1: Describe the automated UT system that the licensee proposes to use in lieu of the PT.

Information That Should be Provided:

- A. Description of the UT instrument, scanner, and transducer overlap planned during scanning.
- B. General discussion of the type (cracks or machined notches), dimensions, number, and distribution of flaws in the mockup(s) used to demonstrate the capability of the system. A proprietary submittal may be necessary to describe these flaws.
- C. Definition of the acceptance criteria for thermal fatigue cracks. If amplitude-based recording and reporting criteria are used, the scanning sensitivity (gain) should be conservatively correlated on cracks in the mockups.
- D. Describe the protocol used during the demonstration of the capability.

GPC Response:

GPC will use the General Electric Remote Inspection System (GERIS) for the performance of the ultrasonic (UT) examinations of the feedwater nozzle inner radius and bore areas. A description of the GERIS automated UT system and the UT techniques employed is provided in Section II of GE-NE-508-023-0193, "Ultrasonic Inspection of Feedwater Nozzles". The GE report is provided as Attachment 1 to Enclosure 1. The safe-end examinations will be performed using the GE "SMART 2000" automated UT piping inspection system.

NRC Question 2: The licensee should describe the method used to ensure that the demonstration mockup(s) accurately represent the nozzle configurations at Plant Hatch.

Information That Should be Provided:

- A. Confirmation that GPC has "as-built" dimensions of each feedwater nozzle and that the mockup demonstrations established the optimum angles to detect and size shallow cracks in the inner radius, bore, and safe-end weld at Plant Hatch.

Enclosure 1

Response to Request for Additional Information

Regarding the Inspection of the Feedwater Nozzles (Continued)

- B. Confirmation that the licensee's proposal includes the automated examination of the entire nozzle and safe-end weld of all nozzles at both Hatch units.

GPC Response:

The mockup used by GE was evaluated for suitability by comparison with the actual dimensions and materials of the Hatch feedwater nozzles. Also, guidance from Appendix VIII of the ASME Section XI, 1991 Addenda was used.

Appendix VIII of Section XI gives guidelines for the mockups that can be used for performance demonstrations. These guidelines are: 1) at least one nozzle in the specimen set shall be at least 90 percent of the maximum thickness to be examined, and 2) the ratio of the nozzle thickness to shell thickness shall be within ± 30 percent of that ratio for the vessel nozzles to be examined. The mockup met these criteria for both Units 1 and 2.

Additionally, the Hatch Unit 1 feedwater nozzle and the mockup were: 1) manufactured with ID clad surfaces and later had the clad removed, and 2) are barrel-type nozzles with the outside diameter (OD) blend radius made of weld material. The Unit 1 and Unit 2 nozzles and the mockup are A-508 Class 2 forging material.

Descriptions of the qualification mockups and information on the flaw sizes, flaw types, and nozzle mockups used are described in Section III of GE-NE-508-023-0193 which is provided as Attachment 1 to this enclosure.

NRC Question 3: What is the licensee's estimate of the largest flaw that could exist in a nozzle based on the NDE to date?

Information That Should be Provided:

- A. The method, extent of examination, acceptance criteria (dimensions), and date of all liquid penetrant and UT examinations should be submitted in tabular form starting with the 1977 examination. The UT information should indicate whether manual, automated, or a combination of techniques were used during the outage. The table should explain if the UT results can be correlated with the licensee's proposed automated UT in the Spring of 1993.
- B. The above table or supporting notes should also address the required visual examination. Cracking of the sparger or orifice holes should be identified.

Enclosure 1

Response to Request for Additional Information

Regarding the Inspection of the Feedwater Nozzles (Continued)

- C. Describe any leakage detection methods in Hatch Unit 2 that would indicate cracking of the thermal sleeve or sparger that could result in bypass leakage onto the nozzle or vessel wall.
- D. Define the number of startup/shutdown cycles since the last PT. Discuss plans and actions regarding monitoring the startup-shutdown cycles in the future.

GPC Response:

Based on a review of the current manual inspection technique and the development process of the manual UT procedure, which included the use of an EPRI mockup with flaw depths of 0.15 inches, GPC is confident that a flaw of 0.250 inches would have been detected for the area of UT coverage. The new technique is automated and no efforts to correlate with the previous manual data are planned.

As requested in sub-paragraphs A and B of question 3, Attachment 2 to this enclosure provides the examination history for the welds and regions addressed by NUREG-0619 for Units 1 and 2. An exception is the three welds on each of the Unit 2 safe-ends. These particular weldments are dissimilar welds and are included in the NUREG-0313, Generic Letter 88-01 inspection scope that has more stringent examination requirements. Individual data sheets for each examination are available for review at Plant Hatch or the Birmingham office.

Sub-paragraph C requested that any Unit 2 bypass leakage detection methods be described. There are no bypass leakage detection provisions on either unit and it is GPC's position that none is required since the UT described above is capable of detecting any flaws in advance of the flaw exceeding analyzed limits.

Sub-paragraph D requested the number of startup/shutdown cycles since the last liquid penetrant (PT) examination and actions regarding monitoring the startup/shutdown cycles in the future. As of February 1, 1993, Unit 1 has experienced 123 startup/shutdown cycles. Unit 2 has experienced 40 cycles since the last PT. GPC currently maintains a cumulative account of the number of startup/shutdown cycles for both units. GPC will continue to maintain a cumulative account of startup/shutdown cycles.

Enclosure 1

Response to Request for Additional Information

Regarding the Inspection of the Feedwater Nozzles (Continued)

NRC Question 4: What action will be taken if a region of the nozzle, subject to PT, is missed during the proposed automated UT?

GPC Response:

GPC is confident that all inspection areas within zones 1, 2, and 3, shown in Figure 1 of the GE report, will be examined from at least one direction. This provides more coverage than the PT currently required in the NUREG.

The obstructions at Plant Hatch that somewhat limit automated scanning are: 1) instrumentation and CRD nozzles adjacent to the feedwater nozzle, and 2) thermocouple pads welded on the OD cylindrical surfaces and the vessel wall. Where coverage is limited, supplemental manual UT will be considered.

NRC Question 5: What techniques and scanning sensitivity will be used for the examination of the reactor vessel to nozzle welds?

GPC Response:

The examination of the RPV vessel-to-nozzle welds are not part of this relief action. As a minimum, GPC will continue to examine these welds in accordance with ASME Section XI as documented in the Unit 1 and Unit 2 ISI Program, regardless of the technique used.

NRC Question 6: Describe the methods that will be used to modify the fracture mechanics analysis if the examination results, after the proposed Spring 1993 automated UT, show that the acceptance standard crack could not be reliably detected and sized in the nozzle inner radii, bore, and safe-end.

GPC Response:

As described previously, GPC is confident of the capability to be able to detect flaws of 0.250 inches or greater in depth. If such a flaw is found, then the existing NRC approved fracture mechanics analysis and other appropriate evaluation tools will be used. No modification of the existing fracture mechanics analysis is anticipated.

ATTACHMENT 1 TO ENCLOSURE 1

EDWIN I. HATCH NUCLEAR PLANT
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

GENERAL ELECTRIC PROPRIETARY INFORMATION
REPORT NO. GE-NE-508-023-0193
ULTRASONIC INSPECTION OF FEEDWATER NOZZLES

ATTACHMENT 2 TO ENCLOSURE 1

EDWIN I. HATCH NUCLEAR PLANT
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

NUREG-0619 EXAMINATION SUMMARY

ATTACHMENT 2

Hatch Unit 1 and 2

NUREG-0619 Examination Summary

The following pages are a summary of the examinations performed at Plant Hatch, Units 1 and 2 in accordance with the requirements of NUREG-0619. All of this information has previously been provided to the NRC either in separate submittals or as part of the NIS-1 report.

It should be noted that Unit 2 welds 2B21-1FW-12AA-8, -9, -10, and 2B21-1FW-12AB-11, -12, -13, and 2B21-1FW-12BC-11, -12, -13, and 2B21-1FW-12BD-8, -9, and -10, were initially included in the scope of NUREG-0619. However, these are dissimilar metal welds and were therefore moved under the scope of NUREG-0313 as part of the GPC response to GL88-01. For that reason, their inspection history is not included in this summary.

A list of the outages for each unit is included so GPC compliance with examination frequency requirements is documented.

Except as noted below, there have been no significant indications reported at Plant Hatch for the welds under the scope of NUREG-0619.

List of Significant Indications

1. The 1979 UT examination of weld 1B21-1FW-12AB-10 revealed one Code acceptable indication.
2. The 1982 UT examination of weld 1B21-1FW-12BC-10 revealed one Code allowable weld inclusion.
3. The 1992 visual examination of the 2N4A Sparger revealed a cracked fillet weld. Dispositioned "use-as-is".
4. The 1984 UT examination of weld 2B21-1FW-12AA-12 revealed a linear indication. The indication was evaluated and determined not to be service induced. The NRC was notified. Subsequently, the weld was examined during four successive outages (1985, 1986, 1988, and 1989) and the indication exhibited no growth. The latest examination in 1992 confirmed the continued acceptability of the weld.
5. The 1989 MT examination of weld 2B21-1FW-12AB-15 revealed a Code acceptable indication.
6. The 1991 UT examination of weld 2B21-1FW-12AA-9, as part of the GL88-01 scope, revealed indications. GPC conservatively evaluated the indications as possible IGSCC and added a weld overlay. Information is included here for completeness.

ATTACHMENT 2

Hatch Unit 1 and 2

NUREG-0619 Examination Summary

The following pages are a summary of the examinations performed at Plant Hatch, Units 1 and 2 in accordance with the requirements of NUREG-0619. All of this information has previously been provided to the NRC either in separate submittals or as part of the NIS-1 report.

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6. The 1991 UT examination of weld 2B21-1FW-12AA-9, as part of the GL88-01 scope, revealed indications. GPC conservatively evaluated the indications as possible IGSCC and added a weld overlay. Information is included here for completeness.

Hatch Outage Summary

<u>Unit One</u>	<u>Unit Two</u>
1975	1980 (spring)
1977	1980 (1st RO)
1978	1982
1979	1983
1981	1984
1982	1985
1984	1986
1985/86	1988
1987	1989
1988	1991
1990	1992
1991	
1993 (Scheduled)	

UNIT 1 Examination History

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
N4A Bore	77	UT
	78	UT
	79	UT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4A Inner Radius	77	UT
	78	UT
	79	UT & PT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4A Sparger	79	VT
	85/86	VT
	91	VT
N4B Bore	77	UT
	78	UT
	79	UT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4B Inner Radius	77	UT
	78	UT
	79	UT & PT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4B Sparger	79	VT
	85/86	VT
	91	VT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
N4C Bore	77	UT
	78	UT
	79	UT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4C Inner Radius	77	UT
	78	UT
	79	UT & PT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4C Sparger	79	VT
	85/86	VT
	91	VT
N4D Bore	77	UT
	78	UT
	79	UT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4D Inner Radius	77	UT
	78	UT
	79	UT & PT
	82	UT
	85/86	UT
	88	UT
	91	UT
N4D Sparger	79	VT
	85/86	VT
	91	VT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
1B21-1FW-12AA-15	77	VT & UT
Pipe to Transition Piece	78	VT & UT
	79	VT & UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12AA-16	77	VT & UT
Transition Piece to Nozzle	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12AB-9	77	VT & UT
Pipe to Transition Piece	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12AB-10	77	VT & UT
Transition Piece to Nozzle	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
1B21-1FW-12BC-9	77	VT & UT
Pipe to Transition Piece	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12BC-10	77	VT & UT
Transition Piece to Nozzle	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12BD-15	77	VT & UT
Pipe to Transition Piece	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT
1B21-1FW-12BD-16	77	VT & UT
Transition Piece to Nozzle	78	VT & UT
	79	UT
	82	UT
	85/86	MT & UT
	88	MT & UT
	91	MT & UT

UNIT 2 Examination History

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
2N4A Bore	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4A Inner Radius	PSI	UT
	80	UT
	82	UT
	84	UT
	85	PT
	86	UT
	89	UT
	92	UT
2N4A Sparger	84	VT
	86	VT
	92	VT
2N4B Bore	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4B Inner Radius	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4B Sparger	84	VT
	86	VT
	92	VT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
2N4C Bore	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4C Inner Radius	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4C Sparger	84	VT
	86	VT
	92	VT
2N4D Bore	PSI	UT
	80	UT
	82	UT
	84	UT
	86	UT
	89	UT
	92	UT
2N4D Inner Radius	PSI	UT
	80	UT
	82	UT
	84	UT
	85	PT
	86	UT
	89	UT
	92	UT
2N4D Sparger	84	VT
	86	VT
	92	VT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
2B21-1FW-12AA-7	PSI	UT
Pipe to Transition Piece	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12AA-11	PSI	UT
Transition Piece to	80	UT
Transition Piece	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12AA-12	PSI	UT
Transition Piece to Nozzle	80	UT
	82	UT
	84	MT & UT
	85	MT & UT
	86	MT & UT
	88	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12AB-10	PSI	UT
Pipe to Transition Piece	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12AB-14	PSI	UT
Transition Piece to	80	UT
Transition Piece	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
2B21-1FW-12AB-15 Transition Piece to Nozzle	PSI	UT
	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12BC-10 Pipe to Transition Piece	PSI	UT
	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12BC-14 Transition Piece to Transition Piece	PSI	UT
	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12BC-15 Transition Piece to Nozzle	PSI	UT
	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12BD-7 Pipe to Transition Piece	PSI	UT
	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT

<u>Weld/Item I.D.</u>	<u>Inspection Year</u>	<u>Inspection Technique</u>
2B21-1FW-12BD-11	PSI	UT
Transition Piece to	80	UT
Transition Piece	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT
2B21-1FW-12BD-12	PSI	UT
Transition Piece to Nozzle	80	UT
	82	UT
	84	MT & UT
	86	MT & UT
	89	MT & UT
	92	MT & UT

ENCLOSURE 2

EDWIN I. HATCH NUCLEAR PLANT
AFFIDAVIT FOR GENERAL ELECTRIC COMPANY
PROPRIETARY REPORT NO. GE-NE-508-023-0193

General Electric Company

AFFIDAVIT

I, Robert C. Mitchell, being duly sworn, depose and state as follows:

1. I am Manager, Safety, Environmental & Quality Assurance, General Electric Company, and have been delegated the function of reviewing the information described in paragraph 2 which is sought to be withheld from public disclosure and have been authorized to apply for its withholding.
2. The information sought to be withheld is the report "Ultrasonic Inspection Of Feedwater Nozzles", GE-NE-508-023-0193, January 29, 1993.
3. In designating material as proprietary, General Electric utilizes the definition of proprietary information and trade secrets set forth in the American Law Institute's Restatement of Torts, Section 757. This definition provides:

"A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.... A substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring information.... Some factors to be considered in determining whether given information is one's trade secret are: (1) the extent to which the information is known outside of his business; (2) the extent to which it is known by employees and others involved in his business; (3) the extent of measures taken by him to guard the secrecy of the information; (4) the value of the information to him and to his competitors; (5) the amount of effort or money expended by him in developing the information; (6) the ease or difficulty with which the information could be properly acquired or duplicated by others."

4. Some examples of categories of information which fit into the definition of proprietary information are:
 - a. Information that disclosed a process, method or apparatus 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 consisting of supporting data and analyses, including test data, relative to a process, method or apparatus, the application of which provide a competitive economic advantage, e.g., by optimization or improved marketability;
 - c. 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;
- d. Information which reveals cost or price information, production capacities, budget levels or commercial strategies of General Electric, its customers or suppliers;
 - e. Information which reveals aspects of past, present or future General Electric customer-funded development plans and programs of potential commercial value to General Electric;
 - f. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection;
 - g. Information which General Electric must treat as proprietary according to agreements with other parties.
5. Initial approval of proprietary treatment of a document is typically made by the Subsection manager of the originating component, who is most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within the Company is limited on a "need to know" basis and such documents are clearly identified as proprietary.
6. The procedure for approval of external release of such a document typically requires review by the Subsection Manager, Project manager, Principal Scientist or other equivalent authority, by the Subsection Manager of the cognizant Marketing function (or delegate) and by the Legal Operation for technical content, competitive effect and determination of the accuracy of the proprietary designation in accordance with the standards enumerated above. Disclosures outside General Electric are generally limited to regulatory bodies, customers and potential customers and their agents, suppliers and licensees, and then only with appropriate protection by applicable regulatory provisions or proprietary agreements.
7. The document mentioned in paragraph 2 above has been evaluated in accordance with the above criteria and procedures and has been found to contain information which is proprietary and which is customarily held in confidence by General Electric.
8. The information to the best of my knowledge and belief has consistently been held in confidence by the General Electric Company, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties have been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.
9. Public disclosure of the information sought to be withheld is likely to cause substantial harm to the competitive position of the General Electric Company and deprive or reduce the availability of profit making opportunities because it would provide other parties, including competitors, with valuable information.

Affidavit

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) ss:

Robert C. Mitchell, being duly sworn, deposes and says:

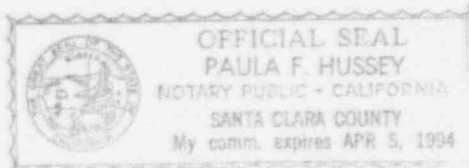
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at San Jose, California, this 4th day of FEBRUARY 1993

Robert C. Mitchell

Robert C. Mitchell
General Electric Company

Subscribed and sworn before me this 4th day of February 1993



Paula F. Hussey

Notary Public - California
Santa Clara County