



ORGANIZATION: ELGAR CORPORATION
SAN DIEGO, CALIFORNIA

REPORT NO.: 99900871/85-01	INSPECTION DATE(S): 09/17-19/85	INSPECTION ON-SITE HOURS: 44
CORRESPONDENCE ADDRESS: Elgar Corporation ATTN: Mr. P. A. Zecos Vice President and General Manager 9250 Brown Deer Road San Diego, California 92121		
ORGANIZATIONAL CONTACT: Mr. C. B. McVicker - QA Manager TELEPHONE NUMBER: (619) 450-0085		
PRINCIPAL PRODUCT: Uninterruptible Power Supplies NUCLEAR INDUSTRY ACTIVITY: Approximately 2% Current in house nuclear orders: Vogtle, Indian Point and WPPSS		
ASSIGNED INSPECTOR:  J. J. Petrosino, Reactive Inspection Section (RIS)		12/27/85 Date
OTHER INSPECTOR(S): E. H. Yachimiak, RIS		
APPROVED BY:  E. W. Merschoff, Chief, RIS, Vendor Program Branch		12/27/85 Date
INSPECTION BASES AND SCOPE: A. <u>BASES</u> : 10 CFR Part 21 and Appendix B to 10 CFR Part 50 B. <u>SCOPE</u> : (1) Obtain information in regard to Elgar inverters originally sold to TVA (Hartsville) which were recently purchased by Ft. Calhoun Station; (2) Review an Elgar problem evaluation concerning a recent River Bend fuse block stud problem, which was identified (continued on page 2)		
PLANT SITE APPLICABILITY: Elgar model #UPS-253-1 (fuse block stud problem): Beaver Valley #2 (50-412), Comanche Peak 1 & 2 (50-445/446), Millstone #3		

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- B. SCOPE: (continued)
on an Elgar 25 KVA inverter; and (3) Evaluate the Elgar quality assurance program for adequacy and implementation of applicable requirements.

PLANT SITE APPLICABILITY: (continued)
(50-423), Nine Mile Point #2 (50-410), River Bend #1 (50-458), Seabrook #1 (50-443), South Texas #1 & 2 (50-498/499), Vogtle #1 & 2 (50-424/425) and WPPSS #3 (50-508)

A. INSPECTION ISSUES:

- 1) Obtain information to support an NRC inspection of refueling outage modifications at the FT. Calhoun nuclear station.
- 2) Review Elgar's evaluation of a fuse block stud problem which was reported to the NRC by the River Bend station as a 10 CFR Part 50.55(e) concern.
- 3) Evaluate the adequacy of Elgar's implementation of its Quality Assurance Program.

B. INSPECTION FINDINGS:

- 1) Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 2, "Quality Assurance Program", of ANSI N45.2-1977, no quality assurance manual requirements or records were in evidence to assure that all Elgar personnel performing activities affecting safety were indoctrinated as to the QA program requirements (85-01-01).
- 2) Contrary to Criteria III and V of Appendix B, to 10 CFR Part 50, a review of the circumstances surrounding a 25 KVA inverter fuse block stud deficiency revealed the following (85-01-02):
 - a) No documents were in evidence to assure that the design basis for current carrying conductors associated with the P-266D fuse holder were correctly translated into specifications, drawings, procedures, or instructions.
 - b) No instructions, procedures, or drawings were in evidence to assure that the interconnection assembly of a 400 ampere fuse holder (858-P266D), a 400 ampere shunt resistor (857-PR4), and a bus bar (943-390-20) were satisfactorily accomplished for Elgar static inverter model 253-1 filter panel assembly.

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C. OTHER COMMENTS:

- 1) Discussions with Elgar Corporation (Elgar) personnel and a review of selected records concerning Elgar's 7.5 KVA (model #752-1) and 10 KVA (model #103-1), were performed. Areas that were discussed included; seismic testing, possible equipment requalifications, pre-operational testing, structural attachments, and storage. General Electric (GE) was TVA's agent for the original procurement of the inverters, which were purchased in 1980 for the Hartsville nuclear station.

Omaha Public Power District (OPPD) recently purchased the inverters from TVA for use in their uninterruptible power supply systems (UPS). The inverters will be installed at the Fort Calhoun nuclear station during the current refueling outage. The UPS system will contain two 7.5 KVA inverters and one 10 KVA inverter for each power train, for a total of six inverters.

Copies of Elgar and GE specifications, purchase orders, procedures, requirements, and other associated records were obtained from Elgar. These will be utilized by an NRC inspection team at Fort Calhoun station for a selective verification to assure the equipment conforms to all applicable requirements and is traceable back to Elgar.

- 2) The NRC was notified of a deficiency located inside class 1E uninterruptible power supplies furnished by Elgar and installed at the River Bend nuclear station. The deficiency involved a loose stud on a 450-600 Amp rated fuse block located on a "filter panel assembly", inside a 25KVA Elgar static inverter, model number OPS 253-1, which is part of the class 1E UPS system. The loose stud was identified on the side of the fuse block which was mechanically connected to a bus bar, which subsequently was connected to a shunt type resistor. This involved a straight line connection of the components, with the bus bar in between the resistor and the fuse block.

During discussions with assembly line personnel and observations of how the components were actually assembled, it was revealed that no fabrication drawings or instructions had been generated for that activity.

Subsequent discussions with engineering and quality assurance personnel revealed that engineering had not performed any design analysis to allow for the nontypical utilization of the fuse block terminal stud as a current carrying conductor.

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Normal industry practice is to have direct physical contact between the bus bar and the fuse, whereas Elgar's configuration utilizes the stud and stud hardware as a current carrying conductor.

Discussions with the fuse block manufacturer determined that the fuse block stud is a copper alloy which is tin plated, while the nuts and washers could be stainless steel or plated steel alloys. The manufacturer also indicated that the bus bar and fuse should make direct mechanical contact to reduce high heat conditions created by using the stud hardware as a current carrying conductor (see page 1 for affected plants).

The safety significance of this problem is that during a loss of offsite power, an inverter failure could result in the loss of a 120 volt ac class 1E power supply for plant control and instrumentation.

Elgar Corporation is currently evaluating all the circumstances surrounding this problem pursuant to 10 CFR Part 21. However, it was noted by the NRC inspector that Elgar's evaluation of the deficiency did not take into consideration any root cause areas other than licensee induced stud damage. Currently, Elgar is evaluating the lack of design documents and lack of in-process manufacturing controls as a potential root cause of the reported deficiency (Nonconformance 85-01-02).

- 3) A brief quality assurance (QA) program implementation review was conducted. Areas that were specifically reviewed included; measuring and test equipment, and training and indoctrination.

A sample of approximately twelve electrical crimping tools were examined for unique identification, calibration control, records of calibration, and traceability back to the National Bureau of Standards. All aspects of this area were satisfactory.

The QA manual adequately addressed the 18 criteria of Appendix B to 10 CFR 50 and ANSI N45.2. Within the individual sections, the area of indoctrination and training of personnel who perform activities affecting safety was reviewed. It was noted that an effective program of training and indoctrination was documented and appeared to be adequately implemented for the QA/QC and manufacturing personnel. However, no program was in place which would indoctrinate other personnel who performed activities affecting quality. Areas for which the program did not address indoctrination were engineering, design, procurement, customer services, and all management positions other than QA (Nonconformance 85-01-01).

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4) Plant Tour:

A plant tour was conducted which included all manufacturing aspects of Elgar's facility at San Diego. Material receipt inspection, material control, in-process quality control functions, and wave soldering processes, were some of the areas which were observed.

No deficiencies were noted during this part of the inspection.

D. PERSONS CONTACTED:

<u>Name</u>	<u>Title</u>	<u>Company</u>	
Susan Pritzl	Program Administrator	Elgar	**
Ed Noble	Supervisor QA Test/Insp.	Elgar	
Clyde B. McVicker	QA Manager	Elgar	***
Mike Murray	QA Engineer	Elgar	***
Gilbert Cota	QA Inspector	Elgar	
Vernon Lawson	Supervisor - Magnetics	Elgar	
Clydine Ford	Supervisor - Boards	Elgar	
Sue Zorich	QC Inspector - Boards	Elgar	
Steve Sedio	Engineering Manager	Elgar	
Josie Smith	Training Specialist	Elgar	
Phyllis Kelly	Supervisor - Production	Elgar	
Debbie Nason	Human Resources	Elgar	
Fred Welch	Sr. QA Technician	Elgar	
P. A. Zecos	Vice President/Gen. Manager	Elgar	**
Tom Erickson	Vice President Human Res.	Elgar	**
George Seibert	Electrical Engineering Dept.	Stone & Webster (1)	
Thomas Crouse	QA Manager - River Bend Station	Gulf States Utl. (1)	
Robert Stafford	Director - Quality Services	Gulf States Utl. (1)	
Al Wilkinson	Manager Applications Engineer	Gould Inc. (1)	

**Exit meeting only

***Entrance and exit meeting

(1) telephone contact only

REPORT NO. 9990 0871/85-01DOCUMENTS REVIEWED

<u>NO.</u>	<u>TYPE</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>COMMENTS</u>
<u>1</u>	<u>ICM</u>	<u>None</u>	<u>2/12/85</u>	<u>QA Internal Cal Frequency extension</u>
<u>2</u>	<u>QAM</u>	<u>250001-01</u>	<u>2/3/85</u>	<u>rev B - Elgar QA Manual</u>
<u>3</u>	<u>Audit Rpt</u>	<u>None</u>	<u>4/84</u>	<u>Sup Audit - Control Inc - MATE Lab</u>
<u>4</u>	<u>Audit Rpt</u>	<u>None</u>	<u>11/1978</u>	<u>GE audit of Elgar</u>
<u>5</u>	<u>Audit Rpt</u>	<u>AJ690 Audit</u>	<u>10/79</u>	<u>GE audit of Elgar</u>
<u>6</u>	<u>LTR</u>	<u>None</u>	<u>2/85</u>	<u>Elgar to OPRD "B.H.C. Summary of IND 1031"</u>
<u>7</u>	<u>PO</u>	<u>205-AJ690</u>	<u>4/5/81</u>	<u>rev 7 - Inspector, GE - ECN AJ18190</u>
<u>8</u>	<u>PO</u>	<u>205-AJ690</u>	<u>8/10/77</u>	<u>rev 0 - RPS Inquiries per PO Spec 21A3794</u>
<u>9</u>	<u>PO Spec</u>	<u>21A3120</u>	<u>2/23/79</u>	<u>GE - "External Protection Assembly"</u>
<u>10</u>	<u>PO Spec</u>	<u>21A3794</u>	<u>1/4/79</u>	<u>rev 2 "Inventory Status Report" RPS</u>
<u>11</u>	<u>PO Spec</u>	<u>383-4A745</u>	<u>2/12/73</u>	<u>rev 0 - Supplier Design - OPRD Supplied Equipment</u>
<u>12</u>	<u>PO Spec</u>	<u>22A4320</u>	<u>6/10/76</u>	<u>rev 0 - Supplier Qual Review for Class 1E Elat Equip</u>
<u>13</u>	<u>QAP</u>	<u>0460300 OHA</u>	<u>-</u>	<u>Calibration of Compressor Tools</u>
<u>14</u>	<u>APR</u>	<u>None</u>	<u>4/85</u>	<u>Complete print out of Approved Vendors w/ status</u>
<u>15</u>	<u>Rpt</u>	<u>None</u>	<u>8/85</u>	<u>Elgar Review - Reference Report Summary</u>
<u>16</u>	<u>Log</u>	<u>None</u>	<u>8/10/85</u>	<u>Elgar analysis customers w/ Equip provided</u>
<u>17</u>	<u>Red Hat</u>	<u>16425</u>	<u>4/73</u>	<u>Class Standout Log - Form 101 Type 4 A - Temp Case Blanks</u>
<u>18</u>	<u>Log</u>	<u>5431070(B)</u>	<u>8/10/82</u>	<u>Elgar UPS 253-1-101 Filter Panel Log.</u>
<u>19</u>	<u>Log</u>	<u>5431134(A)</u>	<u>8/10/84</u>	<u>Elgar UPS 253-1-102 Filter Panel Log.</u>
<u>20</u>	<u>Log</u>	<u>643-522-40(A)</u>	<u>8/10/84</u>	<u>Elgar UPS 253-1-104 Filter Panel Log (Rev 4A app)</u>
<u>21</u>	<u>Log</u>	<u>643-359-40(B)</u>	<u>8/10/84</u>	<u>Elgar UPS 253-1-101 Filter Panel Log</u>
<u>22</u>	<u>Log</u>	<u>5321074(F)</u>	<u>7/1/84</u>	<u>Elgar UPS 253-1-02/104/105/106/107/111</u>
<u>23</u>	<u>Telex</u>	<u>"12210</u>	<u>4/85</u>	<u>SW Telex to Elgar 1) Power Plant Shutdown 2) Rely on Power Plant</u>
<u>24</u>	<u>PO</u>	<u>708925</u>	<u>2/4/83</u>	<u>Supplier order work Sheet</u>

TYPE CODE:

DWG - DRAWING

SPEC - SPECIFICATION

PRO - PROCEDURE

QAM - QA MANUAL

P.O. - PURCHASE ORDER

I.M. - INTERNAL MEMO

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DOCUMENTS REVIEWED

NO.	TYPE	DOC. NO.	DATE	COMMENTS
25	PO	5/0 8925	2/9/83	Acknowledgment of Order
26	Pro	0010005-01(A)	7/4/85	PT21 Qualifying procedure
27	Dwg	542-206-46	4/2/79	INV 752-1-101 "Top Assy" (SA 1)
28	Dwg	542-206-46	4/2/79	INV 752-1-101 "Top Assy" (SA 2)
29	Dwg	531-227-45	7/3/79	INV 103-1-102 "Top Assy" (SA 1) TVA X17-X22
30	Dwg	531-227-45	7/3/79	INV 103-1-102 "Top Assy" (SA 2) TVA X17-X22
31	Dwg	942-209-21	6/6/79	INV 752-1-101 "Chassis weldment" (SA 1)
32	Dwg	942-209-21	6/6/79	INV 752-1-101 "Chassis weldment Top" (SA 2)
33	Dwg	942-209-21	6/6/79	INV 752-1-101 "Chassis weldment Top" (SA 3)
34	Dwg	531-227-75	6/9/79	INV 103-1-102 "Static Exciter Installation Dwg" (SA 1)
35	Dwg	531-227-75	6/9/79	INV 103-1-102 "Static Exciter Installation Dwg" (SA 2)
36	Dwg	531-227-75	8/5/80	INV 103-1-102 "Installation Dwg Static Exciter" (SA 3)
37	Dwg	542-000-42	1/9/77	INV 752-1-101 "Installation Drawing" (SA 1)
38	Dwg	542-000-42	1/9/77	"Installation Drawing - INV 752-1-101" (SA 2)
39	Ref List	INVING 8/106	7/23/80	For INVING 1-101 Chassis weldment is 942-209-21 pg 42 "Multilevel exploded" IMS 62
40	PRO	12.01	9/9/80	* "After generated for Part"
41	PRO	12.02	9/10/80	* "Long Term Storage & Shipping Instructions"
42	PRO	12.0	1/27/82	* "On-site Storage/Installation of INV 103-1-102"
43	Pro	2479-1342	1/21/81	* "Packaging & Shipping of INV 103-1-102"
44	Warranty	9-2000	7/23/80	20 YRS for spare parts kit 7.5 YRS warranty - start up service etc
45	Test Rpt	80123	7/23/80	Chassis weldment inspection - requires heat treatment & inspection
46	PRO	12.04	2/19/80	INV 752-1-101 40,000 SSB to Power Source Equipment Class 1E Qualifier
47	PRO	12.01	2/19/80	INV 752-1-101 "Long Term Storage & Installation of Inventory"
48				Static Exciter Installation
49				INV 752-1-101 "Packaging & Transportation of Inventory"