BECHTEL Gaithersburg Power Division

Specification No. 7749-E-238

Q List No. 6.20

Attachment No. 2

NOISE AND ISOLATION TEST PLAN REQUIREMENTS

FOR

SAFETY FEATURES ACTUATION SYSTEM

FOR
DAVIS-BESSE NUCLEAR POWER STATION
UNIT NO. 1
OAK HARBOR, OHIO

Consisting of:
- Instructions and Information to Bidders (ED 6022)
- General Terms and Conditions (ED 6023)
- Specific Conditions
- Toledo Edison Company Quality Assurance Program Specification for Operations Phase Suppliers/Contractors (G-2)
- Toledo Edison Company Supplier/Contractor Quality Assurance Documentation Requirements (ED 6474)
- Toledo Edison Company Quality Assurance Program Specification Quality Assurance Data Sheet (ED 6508)

BECHTEL COMPANY
GAITHERSBURG, MARY

No.	Date	Revisions	By	G.L.	C.E.	P.E.	TECo
0	2.3.78	Issued for Approval/use	BTM	SMC	CJB	[illegible]	—
1	5.31.78	Revised as Noted and Reissued for Approval/Use	BTM	SMC	—	[illegible]	—
2	9/14/78	Incorporated TECo Comments and Reissued for Approval/Use	BTM	SMC	—	[illegible]	CD

Revision 2

Individual Page Revision Index Sheet

Page No.	Latest Individual Page Rev. No.
Table of Contents	
1	2
2	2
3	2
4	2
5	2
6	2
	2
A1	0
A2	2
ED 6022	-
ED 6023	-
ED 6474	-
G-2	-
ED 6508	-

Table of Contents

Specific Conditions

Attachments

SPECIFIC CONDITIONS

1.0 GENERAL

1.1 Purpose

These test plan requirements outline the program to be implemented for a noise and isolation test of the Safety Features Actuation System (SFAS) at the Davis-Besse Nuclear Power Station, Unit No. 1.

1.2 Scope

These test plan requirements describe the general testing, documentation, and analytic requirements to be followed by the testing facility. It will be the responsibility of the testing facility to develop and implement the detailed procedures necessary to carry out these plan requirements. The test procedures shall be submitted for approval to (and approved by) the Engineer prior to test. See ED 6474 attached. | 2

2.0 TEST ARTICLES

2.1 Test Article Description-Isolation Device Testing

Test articles to be used will consist of one of each type of Isolation Device used in the SFAS IE to non-IE circuitry. | 2

2.2 Test Article Description-System Testing

Test article to be used will consist of one complete channel of the 9N16 Safety Features Actuation System as installed at the Davis-Besse Station. Test facility shall be notified when system will be available for testing. Testing will be done either at first refueling or at the first scheduled prolonged outage. It should be noted that all tests and the submittal of test reports are to be completed by June 1979. | 1

3.0 TEST PROCEDURE REQUIREMENTS

3.1 Scope

The scope of the Noise and Isolation Testing of the SFAS is to:

a. Demonstrate that the isolation capability of the digital isolation devices (relays) is not degraded to an unacceptable degree following inadvertent application of postulated electrical faults, in excess of normal operating currents, to their contacts (non-IE signal output side).

b. Demonstrate that the isolation capability of the analog isolation devices is not degraded to an unacceptable degree following inadvertent application of postulated electrical faults, in excess of normal operating currents, across the isolation device (non-IE signal output side).

c. Demonstrate that, due to the intermix of non-IE and Class IE signal wiring in the Class IE cabinet, postulated electrical faults (current and voltage) appearing in the non-IE signal wiring will not, due to mutual inductance and/or capacitive coupling, produce unacceptable effects in the Class IE system.

d. Disclose, if applicable, any areas needing improvement.

3.2 Isolation Device Testing

3.2.1 Digital Isolation Testing | 1

The digital isolation test will involve selecting one module containing each of the types of relays employed for the isolation of protection system originated digital signals for transmission to non-IE systems. This test shall be performed at the testing facility laboratory prior to the system field testing. | 1 | 2

Each module will:

a. Be connected to simulated inputs and power supplies to simulate normal operation.

b. Be checked for normal operation.

c. Be adjusted to 2.75 percent (of the full scale value of the simulated variable) above the trip set point. The test shall be repeated after adjustment to 2.75 percent (of the full scale value of the simulated variable) below the trip set point. | 2

d. Have the isolated contact output subjected to the transient that simulates the postulated electrical fault. This signal will be derived from a laboratory power supply. (Refer to Appendix A).

e. Be monitored using both a paper chart recorder and an oscilloscope. The parameters to be monitored shall include, but not be limited to, the input signals, output contacts, and the level and duration of the transient. | 1

f. Be checked for proper operation following the transient application, including the ability of the isolation relay to function. | 2

g. Be tested to assure that no unacceptable degradation of dielectric strength of the relay (contact to coil) has occurred. | 2

The digital isolation device will be considered acceptable provided that it can be fully demonstrated that the transient has not degraded the isolation device to a level which would create an adverse effect on the IE side of the isolation device. | 1

3.2.2 Analog Isolation Testing

The analog isolation test will involve testing the analog isolation device employed for the isolation of protection system originated analog signals for transmission to non-IE systems. This test shall be performed at the testing facility laboratory prior to the system field testing. | 1 | 2

Each module will:

a. Be connected to simulated inputs and power supplies to simulate normal operation.

b. Be checked for normal operation.

c. Have the isolated analog output subjected to the transient that simulates the postulated electrical fault. This signal will be derived from a laboratory power supply. (Refer to Appendix A).

d. Be attached to both a paper chart recorder and an oscilloscope. The parameters to be monitored shall include, but not be limited to, the input and output signals, and the level and duration of the transient. | 1

e. Be checked for proper operation following the transient application including the ability of the isolation device to function.

f. Be tested to assure that no unacceptable degradation of dielectric strength of the isolation device has occurred.

The analog isolation device will be considered acceptable provided that it can be fully demonstrated that the isolation device is not degraded to a level which could cause an adverse effect on the IE side of the isolation device when subjected to the transient. | 1

3.3 System Testing

3.3.1 Electromagnetic Noise Tests

The electromagnetic noise tests assume that fault induced transient currents in non-IE digital signal lines within the confines of the Class IE equipment cabinets will produce transient signals in Class IE wiring by mutual inductance. The purpose of the electromagnetic noise tests is to demonstrate that no unacceptable effects occur in the Class IE equipment.

The basic premise of the electromagnetic noise test is that electromagnetic coupling is a current density and rate of current change phenomenon.

As a minimum, one full SFAS channel will be tested. Simulated analog inputs will be adjusted to 2.75 percent (of the full scale value of the simulated variable) above the trip set point. Test shall be repeated with analog inputs adjusted to 2.75 percent (of the full scale value of the simulated variable) below the trip set point. As a minimum, one trip bistable will be tested in the case of containment high pressure and Reactor Coolant System low pressure. | 1 | 2

Internal cabinet wiring leading from the output of each isolation device to be tested (IE to non-IE circuits) will be disconnected, on a one-for-one basis, from the cabinet side of the output terminal block and connected to the noise test device. The shielded cable connected directly to the isolation device under test will be disconnected and | 1
connected to an impedance equivalent to the output impedance of the isolation device. Each IE to non-IE | 1
circuit will be subjected to both noise and fault current. (Refer to Appendix A.) During the test of each circuit the test device output, the input to the isolation device under test, and the outputs of the system will be monitored for pick-up and/or, transmission of noise, system response, and/or actuation.

3.3.2 Electrostatic Noise Tests

The electrostatic noise tests assume that fault induced transient potentials in non-IE analog signal lines within the confines of the Class IE equipment cabinets will produce transient signals in Class IE wiring by capacitive coupling. The purpose of the electrostatic noise tests is to demonstrate that no unacceptable effects occur in the Class IE equipment.

The basic premise of the electrostatic noise test is that capacitive coupling is a voltage magnitude and rate of voltage change phenomenon.

As a minimum, one full SFAS channel will be tested. Simulated analog inputs will be adjusted to 2.75 percent (of the full scale value of the simulated variable) above the trip set point. Tests shall be repeated with analog inputs adjusted to 2.75 percent (of the full scale value of the simulated variable) below the trip set point. As a minimum, one trip bistable will be tested in the case of containment high pressure and Reactor Coolant System low pressure. 1 2

A test loop will be established as described in Section 3.3.1. The far end of the pair of conductors composing the loop will be terminated to an equivalent impedance in order to produce the maximum voltage across the loop. Each IE to non-IE circuit will be subjected to fault voltage (refer to Appendix A). 1

During the test of each circuit, the test device output, the input to the isolation device under test, and the outputs of the system will be monitored for pick-up and/or transmission of noise, system response, and/or actuation.

3.3.3 Acceptance Criteria

Specific test program acceptance criteria should be developed to assure that the SFAS functions as designed for the following conditions:

a. For postulated steady state electrical faults,

   i) assurance of trip function during and after fault application.

   ii) assurance that no spurious trip occurs during or after fault application. 1

b. For transient electrical faults,

   i) assurance of trip function after electrical fault transient.

   ii) assurance that no spurious trip occurs during or after electrical fault transient.

In addition, no damage will be allowed on Class IE equipment except for the non-IE side of the isolation device in the SFAS equipment.

If the channel under test fails the test, it will be considered that all channels would have failed. If the channel being tested passes, then it will be considered that all channels pass. 1

4.0 TEST REPORT REQUIREMENTS

4.1 Test Report

A Noise and Isolation Test Report shall be prepared to demonstrate that the SFAS will not be adversely affected to an unacceptable degree following inadvertent application of postulated electrical faults.

The test report shall contain but not be limited to the following:

a. A detailed description of the test procedure, acceptance criteria, prerequisites and precautions. 1

b. A list of all test equipment.

c. Copies of the original data collected during the test.

d. A conclusion of the adequacy of the isolation devices and the system to provide the necessary isolation before, during, and after an inadvertent application of postulated electrical faults.

The test report is to be submitted for review and approval to the Engineer per ED 6474.

2

Appendix A

Sense Power Supply Fault Current Analysis

1.0 PURPOSE

The purpose is to analyze the TECo plant computer and plant annunciator sensing power supplies to arrive at a value of currents to be used to perform the SFAS Noise and Isolation tests.

2.0 POWER SUPPLIES

The analysis contained in this appendix is based on the following power supplies:

a. The sensing power supply for the digital inputs to the plant computer is the Lambda LM-D-120.

b. The sensing power supplies for the analog inputs to the plant computer are the Lambda LM-E-24, LM-EE-24, and the LM-G-24.

c. The sensing power supply for the inputs to the plant annunciator is the Riley Co. Model No. 70-PSA-100.

3.0 SHORT CIRCUIT FAULT VALUES

In this section, short circuit fault values are assigned to the sensing power supplies.

3.1 Plant Annunciator

The following information is available on the plant annunciator power supplies.

E_n = unloaded power supply voltage = 172 volts

E_1 = loaded power supply voltage = 104 volts

I_1 = load current = .2 amperes

I_s = short circuit current

R = power supply internal impedance

$$I_s = \frac{E_n}{R} = \frac{172}{340} = 0.506 \text{ ampere}$$

$$R = \frac{E_n - E_1}{I_1} = \frac{172-104}{.2} = 340 \text{ ohms}$$

$$VA = E_n \times I_s = 172 \times 0.506 = 87$$

3.2 Plant Computer System

The following information is available on the plant computer Lambda power supplies:

Power Supply	LM-D-120	LM-E-24	LM-EE-24	LM-G-24
Voltage	120 VDC	24 VDC	24 VDC	24 VDC
Max. Current	1.5 amp	11.0 amp	14.0 amp	32.0 amp
Short Circuit Current*	0.6 amp	0.44 amp	0.56 amp	1.28 amp
VA	75	10.6	13.4	30.7

*In the Lambda power supplies, the short circuit current is limited by an automatic solid state current limiter. Lambda indicates that upon a short circuit, the current will rise 1.1 x I_{max} and then to 0.4 x I_{max}. This rise and drop will occur in less than one second. Therefore, the transient is assumed to be short and will be ignored in this analysis.

4.0 RECOMMENDATION

Based upon the above data, the maximum values to be used for digital isolation testing should be based upon the LM-D-120 computer power supply and the annunciator power supply. For analog isolation testing, the LM-G-24 power supply values should be employed for fault conditions. 2

In all phases of the testing, the fault values stated above are to be considered as minimum testing values. The testing facility shall be responsible for choosing test values that will encompass both the plant parameters and the capabilities of the isolation devices.

ED 6022

THE TOLEDO EDISON COMPANY
AND
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
POST OFFICE BOX 929, TOLEDO, OHIO 43601
INSTRUCTIONS AND INFORMATION TO BIDDERS
DAVIS-BESSE UNIT NO. 1 CONSTRUCTION

1.0 LOCATION AND SCOPE OF WORK

The location and scope of the work for which quotations are requested are specified in detail in the "Request for Quotation" and delineated on the referenced drawings and/or specifications, as applicable.

2.0 DEFINITIONS

Wherever these words occur in this Specification, they shall have the following meanings:

a. "Specification" - The Request for Quotation, including all terms and conditions specified thereon, the Instructions and Information to Bidders, the General Terms and Conditions, the Specific Conditions, and any supplements, drawings, sketches and data sheets attached thereto or referenced therein, comprise the complete Specification.

b. "Buyers" - The Toledo Edison Company (52.5%) and the Cleveland Electric Illuminating Company (47.5%). Buyers will not be bound on any purchase unless and until a written purchase order has been issued by The Toledo Edison Company on behalf of Buyers.

c. "Engineer" - The Manager of Engineering, Power and Industrial Division of the Bechtel Company.

d. "Seller" - The party or parties accepting a purchase order from the Buyers for the work specified herein.

e. "Bidder" - The party or parties submitting a proposal for the work.

f. "Work" - All work specified hereunder, including the furnishing of all design, labor, plant, materials, equipment, services and all incidentals necessary and the performance of all operations required, to complete and test the work.

Where "as shown," "as detailed," "as indicated," or words of like import are used, it shall be understood that reference to the project drawings is made, unless stated otherwise. Where "as directed," "as required," "as approved," "acceptance," or words of like import are used, it shall be understood that the direction, requirements, approval or acceptance of the Buyers is intended.

3.0 INTENT OF SPECIFICATIONS

3.1 The Bidder shall make his proposal with the understanding that this Specification and attachments are intended to cover all of the work to be done; and, unless expressly excluded, any and all equipment, material and/or labor not indicated herein but which may be necessary to complete any part of the work in a proper, substantial and workmanlike manner are to be furnished by the Seller without extra charge or cost to the Buyers. Any intended omissions must be stated by the Bidder in writing in his proposal, otherwise it will be understood that all work is included.

3.2 Technical questions raised by the Bidder involving the intent of the specifications and/or drawings shall be referred for resolution to the Bechtel Company, 190 Shady Grove Road (P.O. Box 607), Gaithersburg, Maryland, Attention: Project Engineer.

4.0 DRAWINGS

4.1 Any drawings listed in the specifications are by reference made a part hereof.

4.2 Any Specification drawings furnished by Buyers are the property of the Buyers, and shall not be used for other than the instant purpose.

4.3 When required by specifications, or to amplify quotation, the Bidder shall furnish typical outline, arrangement and sectional drawings with his description of equipment, and a priced recommended spare parts list. Bidder is to submit with his quotation either a statement of concurrence with the time allotted for preparation and submittal of drawings to the Buyers, or the number of calendar weeks required by the Bidder to prepare and submit the drawing requirements after receipt of a purchase order or letter of intent.

5.0 STANDARD PRODUCTS

5.1 Except for equipment and/or material which is normally manufactured only to meet a customer's specific requirements it is the intention of the Buyers that all equipment and/or material to be furnished hereunder shall be essentially the standard products of manufacturers regularly engaged in the production, and shall be of the type, sizes and capacities, and for the kinds of services specified. In case the Bidder's standard equipment does not meet the Buyer's specifications, the Bidder shall so state in his proposal, and quote prices on a suggested suitable alternative.

5.2 Quotations shall be for the exact conditions set forth in the specifications and attachments thereto. If the Bidder's equipment differs in any way he shall itemize the differences in his quotations under a separate heading titled "EXCEPTIONS TO SPECIFICATIONS". Bidders are encouraged to submit alternate proposals when they consider the alternate to be an improvement or more economical, but base proposals must meet specifications.

5.3 Consideration will be given in the selection of equipment for this project to provide maximum interchangeability of parts for units quoted where economically practical. When such consideration causes a significant increase in cost or loss of operating efficiency, others may be submitted as alternates.

5.4 Brand names and figure numbers, when specified, are illustrative of an approved type and the substitution of an equivalent type of another manufacturer may be proposed by Bidder unless specifically prohibited.

6.0 RESPONSIBILITY OF BIDDER

The Bidder may be required to furnish evidence satisfactory to the Buyers that he has sufficient means and has had sufficient experience in the class of work called for to enable him to complete the work satisfactorily, and in the time stipulated.

7.0 DELIVERY

7.1 Unless otherwise specifically stated herein, it is essential that shipment of the equipment and/or material hereunder be made as early as practicable. The Bidder should bear in mind that the shipping time quoted by him will be an important consideration in the award and should therefore quote his best shipment time based on careful review of all applicable factors. Revision of shipping times after proposals are received will not be given consideration. When determining the promised delivery date allow three (3) weeks for Buyers' approval and return of drawings as required by attachments to the quotation request.

7.2 Regular periodic detailed forecasts and progress reports may be required from Seller of long delivery fabricated materials and equipment.

8.0 SALES AND USE TAXES, DUTIES, ROYALTIES

8.1 All proposals submitted shall be exclusive of sales or use taxes or customs duties. If such taxes or duties are applicable or required to be stated by the Bidder, they shall be stated separately.

8.2 All royalties or other charges for patents shall be included in the price quoted.

8.3 The Bidder shall include in his proposal, for tax and duty purposes, a statement showing the amount included in his quotation to cover delivery charges on the equipment and/or material offered. This amount shall include cost of freight, cartage, dunnage, insurance and other transportation and/or delivery charges. The cost of erection supervision, if any, shall also be shown as a separate item.

9.0 PAYMENTS

9.1 Payments for equipment to be furnished under any purchase order which is issued shall preferably be made as follows: Fifty percent upon presentation of bill of lading, forty percent thirty days thereafter, and ten percent as a final settlement upon acceptance of the equipment by the Buyers, after passing field tests. In the absence or delay of such tests, however, the final settlement shall not be withheld more than 120 days after date of delivery of the equipment, unless otherwise stipulated herein.

9.2 The Bidder may present an alternative scheme of payment for consideration with his proposal, but the Buyers reserve the right to adhere to the methods outlined above.

10.0 PROPOSALS

10.1 Firm quotations are preferred. If escalation must be quoted, the conditions shall be clearly stated.

10.2 Quotations shall state the extra cost, if any, for witnessed performance tests. If the Seller does not have adequate facilities for performance testing (i.e., power supply, motors for pumps, steam, etc.) he shall so state in his quotation.

10.3 Bidder shall submit a list of the type and quantity of special tools required for operation and maintenance of the equipment that he proposes to furnish as a part of his quotation. Include unit costs.

10.4 When Bidder considers erection supervision, specialists or a startup personnel to be necessary, the cost shall be quoted as separate items.

10.5 Quotations which include components which are not manufactured in the United States may be considered. However, Bidders must specifically list in their quotation all such components and state their source. All imported materials must meet the requirements of the applicable codes and specifications.

10.6 Proposals shall be submitted in septuplicate with the original plus three copies sent to:

Purchasing Department-For Davis-Besse
Unit No. 1 Construction
The Toledo Edison Company and Cleveland
Electric Illuminating Company
Post Office Box 929 Toledo, Ohio 43601

Three copies sent simultaneously to:

Bechtel Company
190 Shady Grove Road
Gaithersburg, Maryland 20760
Attention: Project Engineer

And enclosed in a sealed envelope distinctly marked "Proposal" with the title of work as given, and delivered per instructions contained in Request for Quotation.

10.7 The proposal shall be signed with the full name and local address of the Bidder; if a co-partnership, by a member of the firm with the name and address of each member; if a corporation, by an officer, in the corporate name, and with the corporate seal.

10.8 The following information shall be included with each copy of the proposal:

a. Preliminary outline drawings with dimensions, typical cross-section drawing, and whenever applicable, anticipated performance curves of the equipment offered.

b. Prints of completely filled-in Bechtel data sheets, when enclosed with the bid request.

c. Complete descriptive information relating to the equipment including materials of construction.

10.9 Unless otherwise stipulated herein, the Buyers reserve the right to reject any and all proposals, to accept other than the lowest proposal, to accept one part of a proposal and reject the other, to effect a combination of proposals and to waive any technical informalities in any proposal.

10.10 A Bidder may without prejudice to himself withdraw his proposal before the bid due date, provided request is made to the Buyers; however, submission of a revised proposal within the twenty-four hour period prior to the bid due date will not be permitted.

10.11 The Specification, the accepted proposal, and supporting data submitted therewith and such modifications as may be mutually agreed to, shall become a part of the purchase order if Bidder's proposal is accepted and such order is issued to Bidder for the work hereunder.

11.0 PROPRIETARY INFORMATION

This request and all drawings, designs, specifications and other data appended or related to it are the property of Buyers and are delivered only for the purpose of enabling each potential Bidder to prepare and submit a proposal in response thereto. The information contained or referred to in the request or appended to it is not disclosed or released for any other use or purpose and must be returned to Buyers when requested.

ED 6023

THE TOLEDO EDISON COMPANY
AND
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
TOLEDO, OHIO
GENERAL TERMS AND CONDITIONS
DAVIS-BESSE UNIT NO. 1 CONSTRUCTION

1.0 MATERIALS AND SHIPMENT

The materials and equipment shall be as set forth in the Specification and no substitutions shall be made after a purchase order is issued, without the consent of Buyers.

2.0 CHANGES IN SPECIFICATIONS OR DRAWINGS

Buyers reserve the right before or after the issuance of a purchase order, by written notice to the Seller, to correct any errors in, to issue supplements to, or to make any changes in the specifications or drawings. If such revisions cause a material increase or decrease in price, the Seller shall submit, within ten days, a quotation stating the change in price. Unless otherwise directed, the Seller shall withhold action on any revisions until notified in writing, by the Buyers, to proceed.

3.0 DRAWINGS AND DATA

3.1 The Seller shall submit, within the time limit indicated, the number of complete sets of drawings and data as stipulated on Form ED 6021 attached hereto. These drawings and data shall include all information required by the engineer to complete the design of foundations, power supply and control, connections to other equipment and related auxiliaries, and shall be in sufficient detail for the final installation of the equipment by Buyers and to demonstrate that the Seller's equipment and materials conform to the intent of the specifications. The engineer will examine all drawings furnished and will return one print with comments or approval. Such approval will apply only to general arrangements and shall not relieve the Seller from responsibility for adherence to specifications, correctness of design, details and dimensions.

3.2 Within the specified number of days after approval of preliminary drawings, the required transparencies and/or number of sets of final prints of all drawings, revised as required by the Buyers and properly certified, shall be furnished by the Seller.

3.3 The Seller shall maintain one complete current set of drawings at his shop, for reference at all reasonable times.

4.0 INSPECTION AND SHOP TESTS

4.1 Authorized representatives of the Buyers shall be allowed free access at all times during working hours, throughout the period of manufacture, to the Seller's shops and those of his sub-suppliers, to enable said representatives to inspect and expedite the equipment or any of its parts, to witness tests on the same, and to obtain information on the progress of the work. The Seller shall notify the Buyers and Engineer well in advance of the starting of the work.

4.2 Any work or material found to be defective or which does not meet the requirements of the specifications may be rejected, and Buyers shall have the option, in addition to any other remedies, to require that same shall be replaced by the Seller at his own expense. Such inspection, however, shall not relieve the Seller from full responsibility for the quality and correctness of his materials and work.

4.3 Shop tests, as specified, shall be performed by the Seller prior to shipment. The Seller shall give due prior notice to the Buyers and Engineer and Seller shall furnish all facilities necessary to, and shall perform the tests, which shall be subject to witnessing by the Buyers or their authorized representative unless waived. The Seller shall furnish to the Buyers certified copies of all test reports, whether or not the tests were witnessed by the Buyers' representative. Certified copies of code certificates shall also be furnished by the Seller, as called for on Form ED 6021 attached.

4.4 Should material tests be desired by Buyers, Seller will be advised in ample time to permit the preparation of test specimens during the shop manufacture. Unless otherwise provided, such test shall be in accordance with the requirements of the American Society for Testing Materials and shall be at Buyer's expense.

4.5 Not withstanding any inspection during manufacture or witnessed test at the plant of Seller, final inspection and acceptance of the equipment and/or material furnished hereunder shall be at Buyer's station.

4.6 In lieu of shop testing, or where complete shop assembly is impracticable, Seller shall assume full responsibility for the fit of the disassembled parts, and where trouble arises Seller shall furnish upon request and without cost to Buyers, a qualified field representative authorized to take corrective measures as required.

5.0 FIELD TESTS AND WARRANTIES

5.1 All warranties made by Seller other than those contained in this Specification are in addition to the warranties contained in this Specification and not in lieu thereof.

5.2 The conditions of field tests, if any, shall be as agreed upon by Buyers and Engineer with Sellers, and the Sellers shall be notified of, and may be represented at, all field tests that may be made. Such field tests will be made at the expense of the Buyers, except that the expense of Seller's representatives, if any, shall be borne by the Seller.

5.3 If for any reason whatever, the material or equipment does not meet the stipulated requirements or warranties, Buyers, in addition to any other remedies, shall have the option with

one year after use or acceptance thereof to require Seller to dismantle, repair or replace at his own expense, F.O.B. jobsite, such defect or non-conformance, provided Buyers give Seller prompt written notice of such defect or non-conformance. When the Seller furnishes an erection superintendent, however, said one-year period shall commence from the date that the equipment is ready for use or placed in normal service. Any additional tests required to show the effects of such repairs or replacement shall be performed at Seller's expense.

5.4 Any such work performed at the jobsite in connection with repairs to or replacement of defective material or equipment shall be done under the supervision of the Seller's representative, by a party or parties mutually acceptable to the Buyers and the Seller, and shall be paid for by the Seller.

6.0 SHIPMENT

6.1 The Seller shall prepare all articles for shipment in such a manner as to protect flanges, nozzles, machined surfaces, and other finished parts from any damage to which they might be subject both in transit and handling prior to final Buyers' delivery point. The Seller shall be responsible for, and shall repair or replace at his own expense, any and all damaged equipment where damage was due to improper preparation for shipment. Seller will be held responsible for all loss or damage during transportation to Buyers' delivery point where carrier declines payment to Buyers.

6.2 Each piece of equipment shall be identified with a securely-fastened metal tag, bearing the purchase order number and the appropriate equipment number as specified. Packing slips showing all equipment and/or material shipped shall accompany all shipments.

6.3 Unless otherwise provided, Buyers shall have the option of designating the method of shipment and routing of carload shipments.

6.4 The Seller shall notify the Buyers and Engineer of all shipments, giving all pertinent data for the tracing of the shipment enroute to destination. The names and addresses of the personnel to whom such shipping memoranda and/or bills of lading are to be forwarded will be supplied when the purchase order is issued.

7.0 OPERATING INSTRUCTIONS AND PARTS LISTS

7.1 The Seller shall furnish to the Buyers the number of copies of all manufacturer's complete instructions for the installation, operation and maintenance of each item of equipment furnished as specified on Form ED 6021. All information shall be furnished suitable for binding in 8-½ inch by 11 inch binders. Lubrication charts and guides shall be furnished for posting adjacent to equipment.

7.2 The Seller shall also furnish to the Buyers the number of copies of all parts-identification lists with prices for all equipment, including component parts, as specified on Form ED 6021. All parts lists shall be 8-½ inches by 11 inches, suitable for binding

7.3 In addition to the required parts - identification lists, the Seller shall furnish to the Buyers lists with prices of all parts recommended by the manufacturer for a spare parts reserve suitable to provide for one year of operation, and, where applicable, a priced list of expendable parts.

8.0 INVOICING

8.1 Invoices shall be submitted immediately following shipment in the number of copies and to the addressee stipulated in the purchase order.

8.2 All invoices shall indicate delivery charges and the cost of erection supervision, if any, as separate items apart from the cost F.O.B. factory. Invoices shall also show Sales or Use Taxes, duties, and escalation charges, if any, as separate items. A direct pay Ohio sales tax permit has been issued by the State of Ohio and is listed on the order.

8.3 The Buyers' purchase order number shall appear on all invoices.

9.0 TERMINATION

In the event that a bid is accepted and purchase order is issued, same is canceled by the Buyers, for any reason other than the fault of the Seller, the Seller shall be entitled to reasonable cancellation charges.

TOLEDO EDISON COMPANY
SUPPLIER/CONTRACTOR QUALITY ASSURANCE
DOCUMENTATION REQUIREMENTS
ED 6474-3

Data Package copies shall be furnished either upon or prior to the arrival of the material at the job site.

SPECIFICATION NO 7749-E-238 | EQUIPMENT ITEM NO.

TYPE OF QUALITY ASSURANCE DOCUMENTATION	REFER TO SPECIFICATION PARAGRAPH	COPIES FOR APPROVAL TO		INFORMATION COPIES TO			COPIES INCLUDED IN DATA PACKAGE (Send to C)
		B	C	A	B	C	
1 Quality Assurance Program Outline and QA Data Sheet	Q-2 Para. 2.1		1				
2 Quality Assurance Manual (Detailed)	Q-2 Para. 4.1		1				
3 Nonconformance Reports	Q-2 Para. 4.4	1		1		1	
4 Corrective Action Reports	Q-2 Para. 4.5			1	1	1	
5 10 CFR 21 Reports	Q-2 Para. 4-6			1	1	1	
6 Inspection and Test Plan to Aid in Establishing TECo Hold/Witness Points	Q-2 Para. 4.8		1				
7 Certificate of Conformance	Purchase Order						1
8 10 CFR 21 Reports	Purchase Order						
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ADDRESSES

A T. D. Murray
Station Superintendent
Davis-Besse Station
5501 N. State Rt. 2
Oak Harbor, Ohio 43449

B E. C. Novak
General Superintendent
Power Engineering and Construction
Toledo Edison Company
300 Madison Avenue
Toledo, Ohio 43652

C J. D. Lenardson
Quality Assurance Director
Toledo Edison Company
300 Madison Avenue
Toledo, Ohio 43652