

TOLEDO EDISON COMPANY
QUALITY ASSURANCE PROGRAM SPECIFICATION
FOR OPERATIONS PHASE
SUPPLIERS/CONTRACTORS
DAVIS-BESSE NUCLEAR POWER STATION

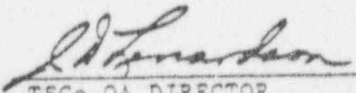
CONTENTS

SECTION

- 1.0 SCOPE
- 2.0 BIDDER'S PROPOSAL REQUIREMENTS
- 3.0 GENERAL QA PROGRAM REQUIREMENTS
- 4.0 ADDITIONAL REQUIREMENTS
- 5.0 QUALITY ASSURANCE SURVEILLANCE/STOP WORK AUTHORITY

- ATTACHMENT - A QUALITY ASSURANCE REQUIREMENTS FOR NUCLEAR
POWER PLANTS AND FUEL REPROCESSING PLANTS
- ATTACHMENT - B TECo NUCLEAR QUALITY ASSURANCE PROGRAM
COMMITMENTS

AUTHORIZED FOR USE REV. 1


TECo QA DIRECTOR

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INDIVIDUAL PAGE REVISION INDEX

| <u>PAGE NUMBER</u> | <u>LATEST PAGE REV. NO.</u> |
|--------------------|-----------------------------|
| Cover Page 1 | 1 |
| 2 | 1 |
| 3 | 1 |
| 4 | 1 |
| 5 | 1 |
| 6 | 1 |
| 7 | 1 |
| 8 | 1 |
| 9 | 1 |
| 10 | 1 |
| Attachments | |
| Attachment A | 0 |
| Attachment B | 1 |

1.0 Scope

- 1.1 This Specification provides the quality assurance requirements for the equipment, material, or services specified in the
- Toledo Edison Company (TECo) purchase contract/purchase documents.
- 1.2 This QA Program Specification does not delete or revise but is in addition to those requirements defined by the procurement documents. IF A SUPPLIER/CONTRACTOR BELIEVES THAT AN INCONSISTENCY EXISTS BETWEEN THIS TECO QA PROGRAM SPECIFICATION AND THE PROCUREMENT DOCUMENTS, OR REFERENCED INDUSTRY CODES AND STANDARDS, HE SHALL IMMEDIATELY NOTIFY THE TECO QUALITY ASSURANCE DIRECTOR FOR RESOLUTION. The TECO decision will be final and binding on the SUPPLIER/CONTRACTOR.
- 1.3 The term SUPPLIER/CONTRACTOR, as used herein, includes SELLER, VENDOR, CONTRACTOR, AND SUB-TIERS. The term TECO, used herein, includes TECO and/or its authorized representatives/agents.

2.0 Bidder's Proposal Requirements

- 2.1 The BIDDER shall submit with his proposal an outline of the BIDDER's Quality Assurance Program to be implemented in the performance of his work. This shall include the BIDDER's organizational chart showing clear paths of communication between the QA organization and top management, and the authority and responsibility of personnel performing QA functions. The outline shall also reference and briefly define the BIDDER's administrative policies and procedures to be used in carrying out the QA program.

In addition, the BIDDER shall submit a completed copy of the QA Data Sheet, Form ED 6508, signed by the BIDDER's Quality Representative. Distribution of the QA Program Outline and completed QA Data Sheet shall be in accordance with the Toledo Edison Supplier/Contractor Quality Assurance Documentation Requirements Form ED 6474, which is an attachment to the procurement documents. The copy of the QA Data Sheet to be completed by the BIDDER, is attached to the procurement documents. The QA Data Sheet shall be completed within the outlined area by listing the BIDDER's document identity numbers and applicable paragraphs which satisfy the applicable program elements imposed on him, as delineated in the left hand column of the QA Data Sheet.

- 2.2 The BIDDER shall provide an adequate statement of justification, if in his opinion, his Quality Assurance Program does not need to contain all of the elements, or portions thereof, specified on the QA Data Sheet of the procurement documents. Any modifications, agreed to by TECO, will be identified in the ensuing procurement documents released for purchase or contract. The BIDDER's QA REPRESENTATIVE SHOULD ATTEND THE

TECo BID CLARIFICATION AND/OR PRE-AWARD CONFERENCE, HELD FOR THE SPECIFIC PURPOSE OF RESOLVING QA QUESTIONS AND ANY MIS-UNDERSTANDINGS ABOUT BIDDER RESPONSIBILITY FOR PROVIDING AND EXECUTING A QA PROGRAM.

- 2.3 TECo will evaluate the BIDDER's Quality Assurance Program outline to determine its acceptability.
- 2.4 TECo reserves the right to survey/audit the BIDDER's plant(s) or facility(-ies) and those of any proposed SUB-TIER supplier(s) to determine the adequacy of his Quality Assurance Program, as proposed, prior to the award of a TECo purchase contract. 1
- 2.5 If a BIDDER is currently performing, or has recently completed a TECo purchase contract invoking these requirements, he may submit a letter with his bid, listing the circumstances and indicating that his previously TECo-approved manual(s) will be implemented in the performance of his work. 1
- 2.6 If the BIDDER's organization includes more than one plant or facility, the BIDDER shall include in his proposal a listing of plants or facilities at which work will be performed in accordance with the purchase or contract documents. A Quality Assurance Program outline, or description, shall be submitted that applies to each facility. If one Quality Assurance Program outline applies to all facilities, a statement to this effect is to be made in the proposal. 1

.0 General QA Program Requirements

- 3.1 The TECo Nuclear Quality Assurance Program is committed to the Nuclear Regulatory Commission (NRC) through a Safety Analysis Report (SAR) to the quality assurance elements contained in the documents listed in Attachment B.
- 3.2 The SUPPLIER/CONTRACTOR shall establish and implement a quality assurance program that meets, or is compatible with, the applicable 18-point criteria of 10CFR50, Appendix B (See Attachment A), 10CFR21, and ANSI Standards/Regulatory Guides/Codes specified on the QA Data Sheet, which forms a part of the procurement documents. The quality assurance requirements shall apply to all aspects of the work necessary for carrying out the TECo purchase contract, including applicable design, procurement, fabrication, installation, and testing activities. See paragraph 4.9 for SUB-TIER supplier/contractor QA program requirements. 1
- 3.3 Other industry codes and standards cited in the procurement documents must be observed and taken into account in specific, appropriate fashion. 1

IN THE EVENT OF CONFLICTS BETWEEN THE ANSI STANDARDS/REGULATORY GUIDES AND OTHER INDUSTRY CODES, THE SUPPLIER/CONTRACTOR WILL IMMEDIATELY NOTIFY THE TECo QUALITY ASSURANCE DIRECTOR FOR RESOLUTION. 1

4.0 Additional Requirements

4.1 Submittal Requirements

- Upon the award of a TECo purchase contract, and prior to starting any activities relating to said TECo purchase contract, the SUPPLIER/CONTRACTOR shall submit for TECo approval a controlled copy of his Quality Assurance Manual, which defines the program that he will follow to meet this TECo QA Program Specification. Distribution of the Quality Assurance Manual shall be in accordance with Form ED 6474, which is an attachment to the procurement documents. If additional information is required, it will be requested by TECo.

If the SUPPLIER/CONTRACTOR is a distributor who will in no way physically affect, examine, or test the supplied item, and whose function is limited to placing TECo's order with the actual manufacturer, the distributor shall provide a controlled copy of the manufacturer's QA Program Document(s) to TECo for approval. TECo approval of the QA Program Document(s) is required before the distributor may place orders with the manufacturer. In addition, if the distributor will store, repackage, or in any way handle the items beyond shipment to the buyer, he shall submit his QA Program Documents for TECo approval.

4.2 Approval Requirements

TECo will "APPROVE", "APPROVE WITH COMMENTS", or "DISAPPROVE" the SUPPLIER/CONTRACTOR Quality Assurance Program Documents. Following the TECo approval, or approval with comments, the SUPPLIER/CONTRACTOR activities may proceed. If approved with comments, the SUPPLIER/CONTRACTOR may proceed, provided that he implements and incorporates any TECo comments into the quality program documents (e.g., revision, supplements, addenda, or amendments) and resubmits them for final TECo approval within 30 days. IF THE SUPPLIER/CONTRACTOR DOES NOT RESUBMIT WITHIN 30 DAYS, THE APPROVED-WITH-COMMENTS QUALITY DOCUMENTS ARE AUTOMATICALLY CONSIDERED DISAPPROVED, and no activities shall be permitted by the SUPPLIER/CONTRACTOR on the TECo purchase contract until resubmittal, and the TECo approval is given on the documents. If DISAPPROVED, the SUPPLIER/CONTRACTOR activities affected by the disapproved documents shall not proceed and the disapproved quality document shall be resubmitted within 30 days.

4.3 Changes to QA Program

Changes to the TECo-approved program shall be submitted by the SUPPLIER/CONTRACTOR for approval in the same manner as original submittals.

NOTE: APPROVAL DOES NOT RELIEVE THE SUPPLIER/CONTRACTOR OF HIS OBLIGATION TO COMPLY WITH THE REQUIREMENTS OF THE PROCUREMENT DOCUMENTS, INCLUDING THIS TECo QA PROGRAM SPECIFICATION. IF THE SUPPLIER/CONTRACTOR

QA PROGRAM IS SUBSEQUENTLY FOUND TO BE INEFFECTIVE, OR INADEQUATE IN PROVIDING ACCEPTABLE CONTROL, TECO RESERVES THE RIGHT TO REQUIRE THAT THE NECESSARY REVISION(S) BE SUBMITTED TO TECO FOR REVIEW AND ACCEPTANCE IN ACCORDANCE WITH THE REQUIREMENTS FOR ORIGINAL SUBMITTALS.

4.4 Nonconformances (Criterion XV)

TECO shall be promptly advised, in writing, of all SUPPLIER/CONTRACTOR detected nonconformances. A nonconformance is any departure from any requirement contained in the procurement documents which the SUPPLIER/CONTRACTOR intends to incorporate in the completed item or service provided. This includes any departure from approved procedures. Nonconformances to procurement document requirements or TECO-approved procedures with a recommended disposition of USE-AS-IS, REPAIR, or MODIFY shall be submitted to TECO for approval. The submittal shall include the recommended disposition and technical justification for disposition of the Nonconformance Report. Distribution of Nonconformance Reports shall be in accordance with Form ED 6474, which is an attachment to the procurement documents. The dispositions USE-AS-IS, REPAIR, and MODIFY shall apply as follows:

Use-as-is: This disposition shall apply when it is determined that the nonconformance will result in no adverse conditions and that the nonconforming item will continue to meet all engineering functional requirements including performance, maintainability, fit, and safety.

Repair: This disposition shall apply when the nonconforming characteristic may be restored to a condition such that the capability of the item to function reliably and safely is unimpaired, even though the item still may not conform to the original requirement.

Modify: This disposition shall apply when the nonconformance is made to conform by a planned change in a drawing or specification which will be accomplished in accordance with the appropriate document control procedures.

Nonconformance Reports must be supported by technically valid information that is sufficient for TECO evaluation. When necessary, the SUPPLIER/CONTRACTOR shall attach supporting technical documents of reproducible quality to the Nonconformance Report.

A copy of the dispositioned Nonconformance Report and attachments shall be included by the SUPPLIER/CONTRACTOR in the quality verification data package for the item(s) to which it applies. The Nonconformance Report is considered complete when all entries are made, including the validation/verification signatures.

4.5 Corrective Action (Criterion XVI)

TECo shall be promptly advised, in writing, of any conditions adverse to quality including nonconformances which are considered significant. Examples of significant conditions adverse to quality are as follows:

- a. The condition indicates a declining trend in quality.
- b. The condition is repetitive indicating current controlling measures are inadequate or insufficient.
- c. Evaluation indicates that the condition is a result of a program deficiency.
- d. The condition indicates failure to obtain required approvals for changes in procedures or documents.
- e. Failure to resolve a deficiency in a timely manner.
- f. The condition indicates negligence or disregard of document or procedural requirements.
- g. QA followup review of conditions adverse to quality shows that approved corrective action has not been taken, or has been improperly or incompletely accomplished.

Significant conditions adverse to quality shall be reported to TECo and shall:

- a. Describe the significant condition adverse to quality including its cause.
- b. Stipulate the corrective action to correct the adverse condition and prevent its repetition.

The report shall be forwarded to TECo, when issued, and again when the corrective action is completed. If the corrective action is not completed within 30 days, its status shall be reported to TECo every 30 days until its completion. When corrective action has been completed, the SUPPLIER/CONTRACTOR shall perform a followup review or audit to verify the effectiveness of the corrective action and provide closeout of the corrective action report. Distribution of corrective action reports shall be in accordance with Form ED 6474, which is an attachment to the procurement documents.

4.6 NRC Reporting Deficiencies - Per 10CFR21

The SUPPLIER/CONTRACTOR shall concurrently submit to TECo copies of those notifications and reports made to the NRC in accordance with 10CFR21. Distribution of these notifications and reports shall be in accordance with the Toledo Edison SUPPLIER/CONTRACTOR Quality Assurance Documentation Requirements Form ED 6474, which is an attachment to the procurement documents.

4.7 Completed QA Records

Copies of completed SUPPLIER/CONTRACTOR and SUB-TIER quality related records shall be retained by the SUPPLIER/CONTRACTOR or SUB-TIER, in accordance with ANSI N45.2.9, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants; and other TECo-specified industry codes and/or standards. Conflicts between ANSI N45.2.9 and other industry codes will be resolved in accordance with Paragraph 3.3 of this TECo QA Program Specification.

No quality related record shall be destroyed, or otherwise disposed of, without written permission of TECo. Engineering and quality verification documents shall be submitted to TECo in accordance with Form ED 6474, which is an attachment to the procurement documents.

4.8 Inspection and Test Plan

An inspection and test plan is required when noted on ED 6474, which is an attachment to the procurement documents. When required, the inspection and test plan shall normally consist of a flow chart, diagram, or narrative description of the sequence of activities for fabrication, processing, assembly, inspection, and test. The inspection and test plan shall indicate the type of characteristics to be measured, the methods of examination, inspection or test, and the applicable acceptance criteria.

Prior to the start of work, the inspection and test plan shall be submitted to TECo in accordance with ED 6474, which is an attachment to the procurement documents. TECo, at their option, may insert hold/witness points into the inspection and test plan during any time the TECo purchase contract is valid. TECo hold and witness points are defined as follows and shall be observed by the SUPPLIER/CONTRACTOR:

Hold Point

A step in a procedure which requires witnessing or inspection by TECo and beyond which work shall not proceed without the signature of the designated individual(s).

Witness Point

A step in a procedure which TECo desires to witness or inspect. If the required notification is made and TECo is not present, the step may proceed in accordance with the procedure.

4.9 Sub-Tier Suppliers/Contractors

If the SUPPLIER/CONTRACTOR function includes placing the order with a SUB-TIER, the SUPPLIER/CONTRACTOR shall be responsible for maintaining in his file a controlled copy of the SUB-TIER's Quality Assurance Manual, bearing the SUPPLIER/CONTRACTOR's

approval. The manual must meet, or be compatible with, the applicable requirements outlined in this TECo QA Program Specification. The SUPPLIER/CONTRACTOR shall assure that the effectiveness of the control of quality by the SUB-TIER shall be assessed by the SUPPLIER/CONTRACTOR at intervals consistent with the importance and complexity of the product or service.

The SUB-TIER and SUPPLIER/CONTRACTOR Quality Assurance Program Documents must meet the requirements as outlined in this TECo QA Program Specification that pertain to the work he performs.

If the SUB-TIER is a distributor who will in no way physically affect, examine, or test the supplied item, and whose function is limited to only placing the SUPPLIER/CONTRACTOR order with the actual manufacturer, the distributor shall provide a controlled copy of the manufacturer's QA Program Document(s) to the SUPPLIER/CONTRACTOR for approval. SUPPLIER/CONTRACTOR approval of the QA Program Document(s) is required before the distributor may place orders with the manufacturer. In addition, if the distributor will store, repackage, or in any way handle the items beyond shipment to the buyer, he shall submit his QA Program Documents for SUPPLIER/CONTRACTOR approval.

4.10 ASME Code Suppliers/Contractors

For any program required by the QA Data Sheet to comply with ASME Boiler and Pressure Vessel Code in addition to other applicable program elements on the QA Data Sheet, the SUPPLIER/CONTRACTOR ASME Quality Assurance Manual containing a copy of the ASME Certificate of Authorization, shall be utilized and submitted in accordance with the requirements of this TECo QA Program Specification.

If the ASME manual does not conform to this TECo QA Program Specification, the SUPPLIER/CONTRACTOR shall establish appropriate QA Program addenda and/or controls to satisfy the requirements contained in this TECo QA Program Specification.

The SUPPLIER/CONTRACTOR shall also establish appropriate QA program addenda and/or controls to satisfy the requirements contained in this TECo QA Program Specification for safety related non-pressure boundary components in the event that his ASME Manual does not cover these components.

5.0 Quality Assurance Surveillance/Stop Work Authority

- 5.1 All design, manufacturing, processing, assembling, testing, and inspection operations performed by the SUPPLIER/CONTRACTOR and SUB-TIERS shall be in accord with their respective Quality Assurance Program and shall be subject to quality assurance surveillance by TECo. THIS SURVEILLANCE SHALL IN NO WAY RELIEVE THE SUPPLIER/CONTRACTOR OF ANY CONTRACTUAL RESPONSIBILITIES. The term "surveillance", as used herein, includes inspections, surveys, and audits.

- 5.2 TECo shall at all times have free access to the work in the SUPPLIER/CONTRACTOR and SUB-TIER work locations, for surveillance during all phases of design, manufacturing, testing, processing, assembling, and inspection. The SUPPLIER/CONTRACTOR shall provide proper facilities and arrangements for such access and inspection.
- 5.3 The SUPPLIER/CONTRACTOR shall give TECo Inspectors prior notice of all TECo hold and witness points in the manufacturing program, as specified in the SUPPLIER/CONTRACTOR inspection and test plan approved by TECo. The method of notification may be through either telephone conversation, letter, or TWX and shall be received by TECo at least five (5) working days prior to performing the operation involving the hold/witness point.
- 5.4 TECo shall have the authority to stop work, hold shipment, or hold payment if the requirements of the procurement documents covering design and quality assurance, including those for documentation requirements, are not being, or have not been complied with.
- 5.5 The SUPPLIER/CONTRACTOR shall provide written responses to audit/surveillance reports which are issued by TECo, and which contain unsatisfactory findings, or require corrective action. The nature of the unsatisfactory findings may require the SUPPLIER/CONTRACTOR to submit written responses, delineating corrective action measures implemented to prevent recurrence of similar deficiencies. The SUPPLIER/CONTRACTOR shall respond to the TECo audit/surveillance reports within the time limit and methods specified by the TECo audit/surveillance reports.

E-N-D

QUALITY ASSURANCE CRITERIA FOR NUCLEAR POWER PLANTS AND FUEL REPROCESSING PLANTS

Appendix B to 10CFR50

INTRODUCTION

Every applicant for reconstruction permit is required by the provisions of § 50.34 to include in its preliminary safety analysis report a description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Every applicant for an operating license is required to include in its final safety analysis report, information pertaining to the managerial and administrative controls to be used to assure safe operation. Nuclear power plants and fuel reprocessing plants include structures, systems, and components that present or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. This Appendix establishes quality assurance requirements for the design, construction, and operation of those structures, systems, and components. The pertinent requirements of this Appendix apply to all activities affecting the safety-related functions of those structures, systems, and components. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, replacing, and modifying.

As used in this Appendix, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which addresses those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements.

I. ORGANIZATION

The applicant¹ shall be responsible for the establishment and execution of the quality assurance program. The applicant may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part thereof, but shall retain responsibility therefor. The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components shall be clearly established and delineated in writing. These activities include both the performing functions of assuring quality objectives and the quality assurance functions. The quality assurance functions are those of (a) assuring that an appropriate quality assurance program is established and effectively executed and (b) verifying, such as by checking, auditing, and inspection, that activities affecting the safety-related functions have been correctly performed. The persons and organizations performing quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems, to initiate, recommend, or provide solutions, and to verify implementation of solutions. Such persons and organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided. Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational freedom, irrespective of the organizational structure. The individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program at any location where activities subject to this Appendix are being performed shall have direct access to such levels of management as may be necessary to perform this function.

¹ While the term "applicant" is used in these criteria, the requirements are, of course, applicable after such a person has received a license to construct and operate a nuclear power plant or fuel reprocessing plant. These criteria will also be used for guidance in evaluating the adequacy of quality assurance programs in use by holders of construction permits and operating licenses.

II. QUALITY ASSURANCE PROGRAM

The applicant shall establish at the earliest practicable time, consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of this Appendix. The program shall be documented by written policies, procedures, or instructions and shall be carried out throughout plant life in accordance with those policies, procedures, or instructions. The applicant shall identify the structures, systems, and components to be covered by the quality assurance program and the major organizations participating in the program together with the designated functions of those organizations. The quality assurance program shall provide control over activities affecting the quality of the identified structures, systems, and components, to an extent consistent with their importance to safety. Activities affecting quality shall be accomplished under actively controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, such as adequate cleanliness and assistance that all prerequisites for the given activity have been satisfied. The program shall take into account the need for special controls, processes, test equipment, tools, and skills to attain the required quality and the need for verification of quality by inspection and test. The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained. The applicant shall regularly review the status and adequacy of the quality assurance program. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing.

III. DESIGN CONTROL

Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this Appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components.

Measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations. These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces.

The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified analytical methods, or by the performance of a suitable testing program. The verifying or checking of design shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization. When a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking measures, it shall include suitable qualification testing of a prototype unit under the most adverse design conditions. Design control measures shall be applied to items such as the following: nuclear physics, stress, thermal, hydraulic, and accident analysis; compatibility of materials; accessibility for inspection, inspection, maintenance, and repair; and verification of acceptance criteria for inspection and tests.

Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design and be approved by the organization that performed the original design unless the applicant designates another responsible organization.

IV. PROCUREMENT DOCUMENT CONTROL

Measures shall be established to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are suitably included or referenced in the documents for procurement of material, equipment, and services, whether purchased by the applicant or by its contractors or subcontractors. To the extent necessary, procurement documents shall require contractors or subcontractors to provide a quality assurance program consistent with the pertinent portions of this Appendix.

V. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with those instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

VI. DOCUMENT CONTROL

Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality. These measures shall assure that documents, including changes, are reviewed for accuracy and approved for release by authorized personnel and are identified, stored, and used at the location where the prescribed activity is performed. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless the applicant designates another responsible organization.

VII. CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractor and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery. Documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear power plant or fuel reprocessing plant site prior to installation or use of such material and equipment. The documentary evidence shall be retained at the nuclear power plant or fuel reprocessing plant site and shall be sufficient to identify the specific requirements, such as codes, standards, or specifications, met by the purchased material and equipment. The effectiveness of the control of quality by contractors and subcontractors shall be examined by the applicant or licensee at intervals consistent with the importance, complexity, and quantity of the product or services.

VIII. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS AND COMPONENTS

Measures shall be established for the identification and control of materials, parts and assemblies, including partially fabricated assemblies. These measures shall assure that identification of the item is maintained by heat number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item, as required throughout fabrication, erection, installation, and use of the item. These identification and control measures shall be designed to prevent the use of incorrect or defective material, parts, and components.

IX. CONTROL OF SPECIAL PROCESSES

Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

X. INSPECTION

A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for assemblies or the activity. Such inspection shall be performed by individuals other than those who performed the activity being inspected. Examinations, measurements, or tests of materials, products, processes shall be performed for such work operation when necessary to assure quality. If inspection of produced material or products is infeasible or disadvantageous, inspect items, by measuring processing facilities, equipment, and personnel shall be provided. Both inspection and records monitoring shall be provided when control is maintained without both. If mandatory inspection does exist, which occurs, witnessing or inspecting by the approved designated representatives and beyond which work shall not proceed without the consent of its designated representatives, are required, the specific test points shall be indicated in appropriate documents.

XI. TEST CONTROL

A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. The test program shall include, as appropriate, proof tests prior to installation, operational tests during nuclear power plant or fuel reprocessing plant operation, or structural systems and components. Test procedures shall include provisions for assuring that all prerequisites for the given test have been met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. Test results shall be documented and evaluated to assure that test requirements have been satisfied.

XII. CONTROL OF MEASURING AND TEST EQUIPMENT

Measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

XIII. HANDLING, STORAGE AND SHIPPING

Measures shall be established to control the handling, storage, shipping, unloading, and preservation of material and equipment in accordance with work and inspection instructions to

prevent damage or deterioration. When necessary for particular materials, special protective environments, such as inert gas atmosphere, specific moisture content levels, and temperature levels, shall be specified and provided.

XIV. INSPECTION, TEST AND OPERATING STATUS

Measures shall be established to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the nuclear power plant or fuel reprocessing plant. These measures shall provide for the identification of items which have satisfactorily passed required inspections and tests, which are necessary to produce in accordance with design of such inspections and tests. Measures shall also be established for indicating the operating status of structures, systems, and components of the nuclear power plant or fuel reprocessing plant, such as by tagging valves and switches to prevent inadvertent operation.

XV. NONCONFORMING MATERIALS, PARTS OR COMPONENTS

Measures shall be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation. These measures shall include: a) appropriate procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures.

XVI. CORRECTIVE ACTION

Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and component, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to prevent repetition. The identification of the significant condition adverse to quality, the cause of the condition and the corrective action taken shall be documented and reported to appropriate levels of management.

XVII. QUALITY ASSURANCE RECORDS

Sufficient records shall be maintained to furnish evidence of activities affecting quality. The records shall include at least the following: Understanding sign and the results of reviews, inspections, tests, audits, monitoring of work performance, and material analysis. The records shall also include identification data such as qualifications of personnel, procedures, and equipment, inspection and test records shall as a minimum identify the inspection or test number, the type of observation, the results, the acceptability and the action taken in connection with any deficiencies noted. Records shall be identifiable and retrievable. Consistent with applicable regulatory requirements, the approval shall establish requirements concerning record retention, such as duration, location, and access responsibility.

XVIII. AUDITS

A comprehensive system of planned and periodic audits shall be carried out to verify conformance with all aspects of the quality assurance program and to determine the effectiveness of the program. The audits shall be performed in accordance with the written procedures of check lists by appropriately trained personnel not having direct responsibility in the areas being audited. Audit results shall be documented and reviewed by management having responsibility in the area audited. Follow-up action, including results of deficient areas, shall be taken where indicated.

TECO NUCLEAR QUALITY ASSURANCE PROGRAM COMMITMENTS

| SOURCE | REFERENCE DOCUMENT/ EDITION | TITLE | SOURCE | REFERENCE DOCUMENT/ EDITION | TITLE |
|------------|--|---|--------|---|---|
| U. S. Gov. | 10 CFR 50, Appendix B | Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants | ANSI | N45.2.1 - 1973 | Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants |
| U. S. Gov. | 10 CFR 50.55a | Codes and Standards | ANSI | N45.2.2 - 1972 | Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase) |
| U. S. Gov. | 10 CFR 50.55(e) | Reporting Criteria for Significant Deficiencies | | | |
| U. S. Gov. | 10 CFR 21 | Reporting of Defects and Noncompliance | ANSI | N45.2.3 - 1973 | Housekeeping During the Construction Phase of Nuclear Power Plants |
| NRC | Regulatory Guide 1.8 (Safety Guide 8, 3-10-71) | Personnel Selection and Training | ANSI | N45.2.4 - 1972 | Installation, Inspection, and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations |
| NRC | Regulatory Guide 1.28 (Safety Guide 28, 6-7-72) | Quality Assurance Program Requirements for Design and Construction | ANSI | N45.2.5 | Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants |
| NRC | Regulatory Guide 1.30 (Safety Guide 30, 8-11-72) | Quality Assurance Requirements for Installation, Inspection and Testing of Instrumentation and Electric Equipment | | (Draft 1, Rev. 1, January 1974) | |
| NRC | Regulatory Guide 1.33 (Safety Guide 33, 11-3-72) | Quality Assurance Requirements (operational) | ANSI | N45.2.6 - 1973 | Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants |
| NRC | Regulatory Guide 1.37 (3-16-73) | Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants | ANSI | N45.2.8 | Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants |
| NRC | Regulatory Guide 1.38 (3-16-73) | Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants | | (Draft 1, Rev. 2, September 1973) as contained in NRC Orange Book | |
| NRC | Regulatory Guide 1.39 (3-16-73) | Housekeeping Requirements for Water-Cooled Nuclear Power Plants | ANSI | N45.2.9 | Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants |
| NRC | Regulatory Guide 1.54 (6-73) | Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants | ANSI | N45.2.10 - 1973 | Quality Assurance Terms and Definitions |
| NRC | Regulatory Guide 1.58 (8-73) | Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel | ANSI | N45.2.11 | Quality Assurance Requirements for Design of Nuclear Power Plants |
| NRC | Regulatory Guide 1.64 (10-73) | Quality Assurance Requirements for the Design of Nuclear Power Plants | | (Draft 1, Rev. 1, July 1973) | |
| NRC | Regulatory Guide 1. XX (Draft 4, 10-2-73) | Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors | ANSI | N45.2.12 | Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants |
| NRC | Regulatory Guide 1.70, XX (Draft 2, 4-25-74) | Additional Information-Quality Assurance During Design and Construction | ANSI | N45.2.13 | Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants |
| NRC | Regulatory Guide 1.74 (2-74) | Quality Assurance Terms and Definitions | | (Draft 2, Rev. 4, April 1974) | |
| ANSI | N18.1 - 1971 | Selection and Training of Nuclear Power Plant Personnel | ANSI | N101.4 - 1972 | Quality Assurance for Protective Coatings Applied to Nuclear Facilities |
| ANSI | N18.7 - 1972 | Administrative Control for Nuclear Power Plants | ASME | Section III, VIII, or XI Edition or Addenda in effect at the date of Purchase Order/Contract issuance | Boiler & Pressure Vessel Code |
| ANSI | N45.2 - 1971 | Quality Assurance Program Requirements for Nuclear Power Plants | | | |

TECO QA PROGRAM SPECIFICATION
 QUALITY ASSURANCE DATA SHEET
 DAVIS-BESSE NUCLEAR POWER STATION
 ED 6508-1

| TO BE COMPLETED BY TECO | | | TO BE COMPLETED BY THE BIDDER | |
|--|------------------------------|----------------------|--|--|
| APPLICABLE PROGRAM ELEMENTS SPEC. NO. | ANSI STANDARD | NRC REG. GUIDE | BIDDER REFERENCE DOCUMENT TITLE INCLUDING REVISION | PAR NO. |
| <input checked="" type="checkbox"/> I. ORGANIZATION | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> II. QUALITY ASSURANCE PROGRAM | N45.2 N45.2.6 | 1.33 1.58 | | |
| <input type="checkbox"/> III. DESIGN CONTROL | N45.2 N45.2.11 | 1.33 .64 | | |
| <input checked="" type="checkbox"/> IV. PROCUREMENT DOCUMENT CONTROL | N45.2 N45.2.13 | 1.33 | | |
| <input checked="" type="checkbox"/> V. INSTRUCTION, PROCEDURES AND DRAWINGS | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> VI. DOCUMENT CONTROL | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> VII. CONTROL OF PURCHASED MATL. EQUIP. AND SERVICES | N45.2 N45.2.2 N45.2.10 | 1.33 1.35 | | |
| <input checked="" type="checkbox"/> VIII. IDENT. AND CONTROL OF MATLS. PARTS COMPONENTS | N45.2 | 1.33 | | |
| <input type="checkbox"/> IX. CONTROL OF SPECIAL PROCESSES | N45.2 | 1.33 | | |
| <input type="checkbox"/> X. INSPECTION | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> XI. TEST CONTROL | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> XII. CONTROL OF MEASURING AND TEST EQUIPMENT | N45.2 | 1.33 | | |
| <input type="checkbox"/> XIII. HANDLING, STORAGE, AND SHIPPING | N45.2 N45.2.2 | *1.33 1.38 | | |
| <input checked="" type="checkbox"/> XIV. INSPECTION, TEST, AND OPERATING STATUS | N45.2 | 1.33 | | |
| <input checked="" type="checkbox"/> XV. NONCONFORMING MATLS. PARTS COMPONENTS | N45.2 N45.2.13 | 1.33 | | |
| <input checked="" type="checkbox"/> XVI. CORRECTIVE ACTION | N45.2 N45.2.13 | 1.33 | | |
| <input checked="" type="checkbox"/> XVII. QUALITY ASSURANCE RECORDS | N45.2 N45.2.9 | 1.33 | | |
| <input checked="" type="checkbox"/> XVIII. AUDITS | N45.2 N45.2.12 | 1.33 | | |
| <input type="checkbox"/> | N45.2.3 | 1.39 | | |
| <input type="checkbox"/> | N45.2.4 | 1.30 | | |
| <input type="checkbox"/> | N45.2.5 | | | |
| <input type="checkbox"/> | N45.2.8 | | | |
| <input type="checkbox"/> | N101.4 | 1.54 | | |
| <input type="checkbox"/> | N45.2.1 | 1.37 | | |
| <input checked="" type="checkbox"/> 10 CFR 21 REPORTING OF DEFECTS AND NONCONFORMANCE | | | | |
| <input type="checkbox"/> ASME CODE SECTION _____ Year Agreement _____ | | | CERTIFICATE OF AUTHORIZATION NO. _____ | EXPIRATION DATE _____ |
| SPECIFICATION NO. 7749-E-238 | | | REV. NO. 2 | Bidder Quality Representative _____ |



ER7054

Y

L

| | |
|---|---|
| BECHTEL COMPANY: | JOB NO. 7749 |
| SUPPLIER DOCUMENT REVIEW STATUS | |
| STATUS NO. | |
| 1 | <input checked="" type="checkbox"/> Approved-Mfg. may proceed. |
| 2 | <input type="checkbox"/> Approved-Submit final dwg -Mfg. may proceed |
| 3 | <input type="checkbox"/> Approved-except as noted-Make changes and submit final dwg -Mfg. may proceed as approved |
| 4 | <input type="checkbox"/> Not Approved-Correct and resubmit |
| 5 | <input type="checkbox"/> Review not required-Mfg. may proceed |
| Approval of this drawing does not relieve Supplier from his obligation to conform to contract or purchase order. (Include Remarks, Status, and Date of Approval prior to shipment of materials) | |
| BY <u>B. F. Newish</u> | DATE <u>3/17/81</u> |

7749-E-238-3-3

[illegible]

TABLE OF CONTENTS

- 1.0 Purpose
- 2.0 Test Program
- 3.0 Results
- 4.0 Conclusion

Appendum A - KAM7315 Data Pages

| | | | |
|-------|------------|---------|--------|
| SIZE | FSCM NO. | DWG NO. | |
| A | 02750 | | ER7054 |
| SCALE | REVISION - | SHEET | 2 |

1.0

PURPOSE

The purpose of the SFAS isolation device testing is to demonstrate that the isolation capability of the digital isolation devices (Reed Relays) and the analog isolation devices (I to I converters) are not degraded to an unacceptable degree following inadvertent application of postulated electrical faults in excess of normal operating currents to their output contacts (Non-IE signal output side).

| | | |
|-----------|-------------------|------------------|
| SIZE A | FSCM NO. 02750 | DWGNO. ER7054 |
| SCALE | REVISION - | SHEET 3 |

2.0 TEST PROGRAM

2.1 The test program as defined in Consolidated Controls Corporation
Test Procedure KAM7315 will test the following equipment:

2.1.1 KEL431B Relay

2.1.2 6N81 Bistable Module

2.1.3 6N83 Output Module

2.1.4 KD978 I/I Converter

2.2 Test Outline

2.2.1 KEL431B
Fault Voltage
Fault Current
Test to Failure

2.2.2 6N81 Bistable
K1 Relay

2.2.3 6N83 Output Module
K3 Relay

2.2.4 KD978 I/I
Fault Voltage
Fault Current

2.3 Required Measurements

As defined on PPS 6,7,8 of CCC Procedure KAM7315.

3.0 RESULTS3.1 Results

3.1.1 Recorded Data - See Attached Data Sheets of KAM7315

3.1.2 KEL431B Relay

The application of either fault voltage or current to the relay contacts produced no discernable effect on the IE (coil) side of the relay. The input/output dielectric strength was not degraded below the system specification due to the application of either fault mode. The relay contacts failed (welded together) at approximately 2.0 amp d.c. @ 172 VDC. Failure of the contacts produced no effect on IE circuitry or dielectric strength.

3.1.3 6N81 Bistable

The application of the postulated faults to the output contacts of the 6N81 K1 relay caused no inadvertent trips or resets of the bistable.

3.1.4 ~~6N83~~-1 Output Module

The application of the postulated faults to the output (non-IE) contacts of the 6N83 K3 relay caused no inadvertent trips or resets of the output modules or relays.

3.1.5 KD978 Fischer Porter I/I

The application of the postulated faults to the Isolated (non-IE) output of the FP I/I produced no increase in noise on the input 4-20 ma loop, when the loop is sourced by a constant current source similar to the loop source in the SFAS. The fault was applied in both forward and reverse polarity. Initially the fault application resulted in a 20-100 mu noise increase in the forward polarity fault mode and a 1.5 - 2V noise increase in the reverse polarity mode. This was eliminated with the substitution of a P/S for the 4-20 ma source with a constant current source. The FP I/I was finally connected in a current loop using the SFAS 6N86 analog and a 6N81 bistable loop and module filtering is sufficient to prevent any postulated fault induced noise spike from processing to the system output.

I/I = Current to Current isolator

P/S = Power Supply

| | | |
|-------|------------|---------|
| SIZE | FSCM NO. | DWG NO. |
| A | 02750 | ER7054 |
| SCALE | REVISION 3 | SHEET 5 |

4.0

CONCLUSIONS

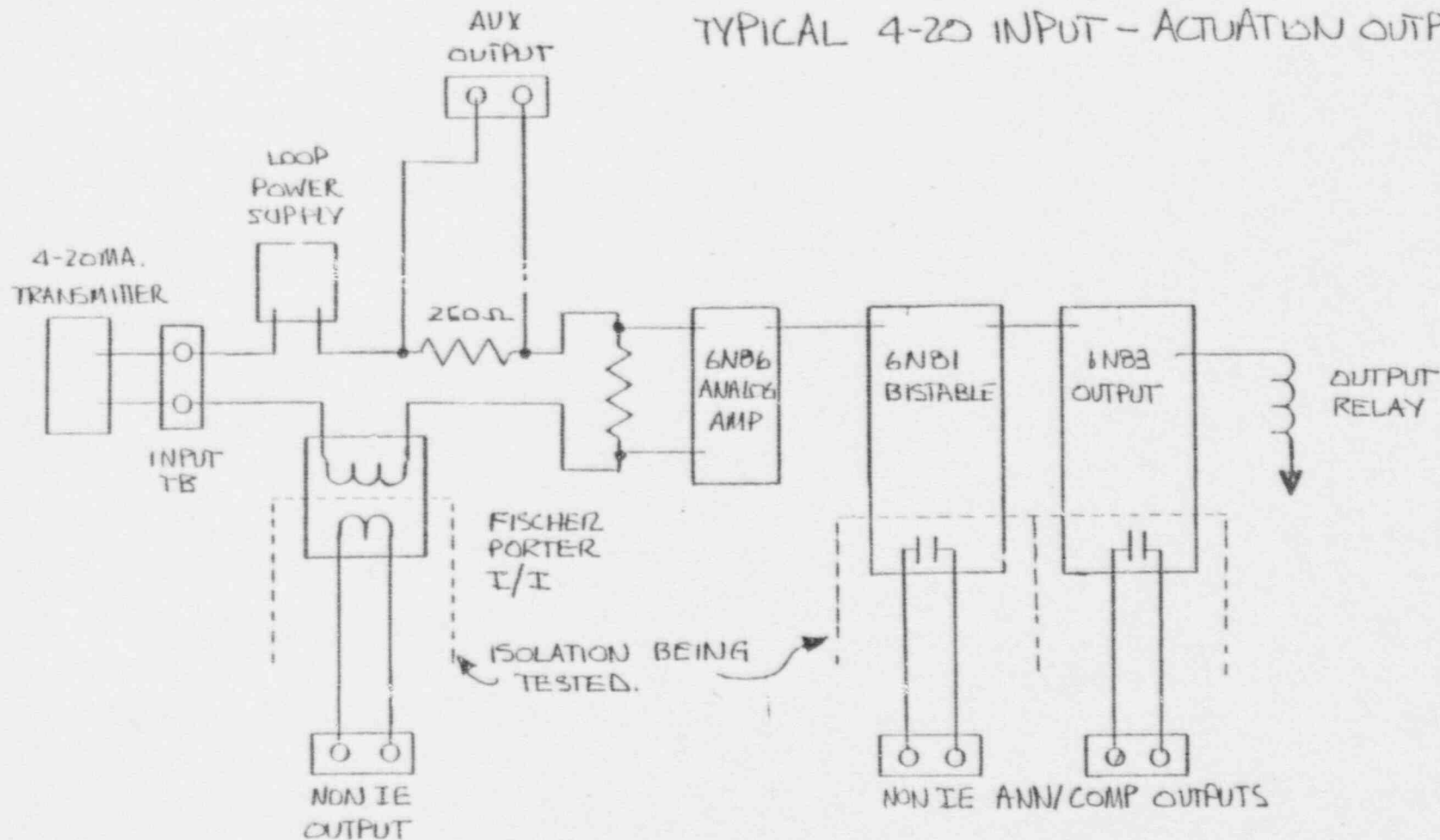
1. No significant degradation of the isolation between coil and contacts of the KEL431B relay or between the input and output of the KD978 I/I converter were observed as a result of these tests.
2. No significant output fault was induced across the isolation of either isolation device (relay or I/I).
3. Neither module (6N81 or 6N83) showed any significant response to faults applied to the non-1E relay contacts.

From the above observations it is considered that the isolation devices and modules meet the requirements of Bechtel Specification 7749-E-238.

NOTE: The 6N83-2 module used in the 9N16 SFAS is identical to the 6N83-1 with the exception of a capacitor in the output circuit. The 6N83-2 exhibits the same noise immunity characteristics as the 6N83-1.

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION A | SHEET 6 |

TYPICAL 4-20 INPUT - ACTUATION OUTPUT



| | | |
|-------|------------|----------|
| SIZE | FSCM NO. | DWG NO. |
| A | 02750 | ER7054 |
| SCALE | REVISION B | SHEET 6A |

DATA FORM 5.1, 2, 3, 4A, 4B, 5 CIRCLE APPLICABLE NO.

Ref. Para 5.1, 2, 3

Note - Attach chart recordings to Data Form.

Chart Recorder Ch. 1

Scale V/cm 500 mV.

TEST 1

Speed ~~cm~~/sec 25/125

Observations

1 PIP/PULSE IN 7 ACTUATIONS

Chart Recorder Ch. 2

Scale V/cm 5 v

Speed cm/sec 25/125

Observations

NONE

Scope

Ch. 1

Scale V/cm 2

Horiz ~~cm~~/sec 20 us

Observations

SEE ATTCH. PHOTO. 1.

Dielectric Test 1250 VAC

Observations

PRE TEST 1 MIN NO BREAKDOWN.

POST TEST 1 MIN NO BREAKDOWN.

RELAY

Addendum A
ER7054 Sh. 7

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. KAM7315 |
| SCALE | REVISION - | SHEET 6 |

②

①

RELAY
TEST



Gould Inc., Instrument Systems Division
Cleveland, Ohio
Printed in U.S.A.

172VDC

INPUT



OV

BRUSH ACCU-CHART

①

③

REFERENCE: KAM7315
SH. 6 PARA. 5.1
FORM 6.1

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION 8 | SHEET 8 |

BRUSHING 40-21

DATA FORM 6.1, (2), 3, 4A, 4B, 5 CIRCLE APPLICABLE NO.

Ref. Para. 5.1 (2), 3

Note - Attach chart recordings to Data Fo

Chart Recorder Ch. 1

Scale V/cm 500 mV

TEST 2A

Speed cm/sec 25/125

2B

Observations

NO DEVIATIONS

Chart Recorder Ch. 2

Scale V/cm 5 V

Speed cm/sec 25/125

Observations

NO DEVIATIONS

Scope

Ch. 1

Scale V/cm .5

Horiz cm/sec 50 us/div

Observations

Approx 1⁺ V P-P HIGH FREQ HASH
SEE ATT. PHOTO. 2 & 3.

Dielectric Test 1250 VAC

Observations

PRE TEST NO BREAKDOWN

POST TEST NO BREAKDOWN

RELAY

Addendum A
ER7054 Sh. 9

| SIZE | FSCM NO. | DWG NO. |
|-------|----------|---------|
| A | 02750 | KAM7315 |
| SCALE | REVISION | SHEET |

Goal

Ch

BRUSH ACCURACY

INPUT

12 VDC

OVDC

15 VDC

RELAY
TEST

REFERENCE: KAM7315

SH. 6 PARA. 5.1

FORM 6.2

SIZE

A

FSCM NO.

02750

DWG NO.

ER7054

SCALE

REVISION 0

SHEET 10

Control No.

0000

BRUSH ACCURACY

172VDC

0VDC

INDUT

REFERENCE: KAM7315
SH. 6 PARA. 5.1
FORM 6.2

↑
RELAY
TEST

0VDC

0VDC

172VDC

RELAY
TEST
↓

REVISION 40.21

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. E27054 |
| SCALE | REVISION B | SHEET 11 |

DATA FORM 6.1, 2, 3, 4A, 4B, 5 CIRCLE APPLICABLE NO.

Ref. Para 5.1 2, 3

Note - Attach chart recordings to Data Form.

Chart Recorder Ch. 1 Scale V/cm 500 mV
Speed cm/sec 25 mm/sec

TEST 3

Observations

Chart Recorder Ch. 2 Scale V/cm 5V
Speed cm/sec 2 mm/sec

Observations

CONTACT SET 1 FAIL 2 1/2 AUPS
SET 2 FAIL 2.0 AMP

Scope Ch. 1 Scale V/cm
Horiz cm/sec

Observations

REDACTED NONE TAKEN

Dielectric Test 1250 VAC

Observations PRE TEST NO BREAKDOWN.
POST TEST NO BREAKDOWN
TEST TO FAIL - 2150 VDC.

RELAY.

Addendum A
ER7054 Sh. 12

| SIZE | FSCM NO. | DWG NO. |
|-------|----------|---------|
| A | 02750 | KAM7315 |
| SCALE | REVISION | SHEET |

CONTACT
FAIL



CVDC

CONTACT
FAIL

172

ISUAC

INDOT

OFF

REFERENCE: KAM7316
SH. 6 PARA. 5.1
FORM 6.3

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. E27054 |
| SCALE | REVISION 8 | SHEET 13 |

DATA FORM 6.1, 2, 3, 4A, 4B, 5 CIRCLE APPLICABLE NO.

Ref. Para. 5.1, 2, 3 INCREASE TO TRIP

Note - Attach chart recordings to Data Form.

Chart Recorder Ch. 1 Scale V/cm 10/DIV TEST 9
Speed cm/sec 18.25 mm/sec

Observations NORMAL

Chart Recorder Ch. 2 Scale V/cm 5.0/DIV
Speed cm/sec 25 mm/sec

Observations NORMAL

Scope Ch. 1 Scale V/cm .2V/DIV
Horiz cm/sec 50 us/DIV

Observations SEE PHOTO 4

Dielectric Test N/A VAC

Observations N/A.

TRIP 3.000 50%
INPUT 2.890 47.25%

Addendum A
ER7054 Sh. 14

| SIZE | FSCM NO. | DWG NO. |
|-------|------------|---------|
| A | 02750 | KAM7315 |
| SCALE | REVISION - | SHEET 6 |

REFERENCE: KAM7316
 SH. 6 PARA. 5.2
 FORM 6.4A

| | | |
|-----------|-------------------|---------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | | REVISION R SHEET 15 |

U.S. Army, Instrument Systems Division
 Fort Belvoir, Illinois 62204-5000
 Printed in U.S.A.

WORM
→

INPUT

172

OUTPUT

TRIP
→

WORM
→

INPUT

172

0

OUTPUT

DATA FORM 6.1, 2, 3, 4A, (4B) 5 CIRCLE APPLICABLE NO.

Ref. Para. 5.1 (2) 3 DECREASE TO TRIP

Note - Attach chart recordings to Data Form.

Chart Recorder Ch. 1 Scale V/cm 1V/DIV
Speed cm/sec 25 mm/sec

Observations NORMAL

Chart Recorder Ch. 2 Scale V/cm 5V/DIV
Speed cm/sec 25 mm/sec

Observations NORMAL

Scope Ch. 1 Scale V/cm .2V/DIV
Horiz cm/sec 50 us/DIV

Observations SEE PHOTO 5

Dielectric Test N/A VAC

Observations N/A

TRIP 3.000 50%
INPUT 3.110 52.75%

Addendum A
ER7054 Sh. 16

| SIZE | FORM NO. | DWG NO. |
|-------|----------|---------|
| A | 02750 | KAM7315 |
| SCALE | REVISION | SHEET |

Gould Inc., Instrument Systems Division

Cleveland Ohio Printed in U.S.A.

BRUSH ACCUCHART

BRUSH ACCUCHART

NOD
TEST

INPUT

REFERENCE: KAM7315

SH. 6 PARA. 5.2

FORM 6.4.3

SIZE

A

FSCM NO.

02750

DWG NO.

ER7054

SCALE

REVISION B

SHEET 17

DATA FORM 6.1, 2, 3, 4A, 4B, 5 CIRCLE APPLICABLE NO.

Ref. Para. 5.1, 2, 3

Note - Attach chart recordings to Data Form.

Chart Recorder Ch. 1

Scale V/cm 1/DIV

Speed cm/sec 25 mm/SEC

Observations

NORMAL

TEST 6

Chart Recorder Ch. 2

Scale V/cm 5V/DIV

Speed cm/sec 25 mm/SEC

Observations

NORMAL

Scope

Ch. 1

Scale V/cm .5/DIV

Horiz cm/sec 50 us/DIV

Observations

SEE PHOTO 6A/B

Approx 1V p-p HASH ON OUTPUT

Dielectric Test N/A. VAC

Observations

N/A.

Addendum A
ER7054 Sh. 18

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. KAM7315 |
| SCALE | REVISION — | SHEET 6 |

SH 6
KAM7315
DWG NO.
BURNING 40 21 31599

TEST 6
6W83

172VDC
TO CONTACTS

24V
MODULE
OUTPUT

BRUSH ACCUCHART

2

0

172

MODULE
TEST

24

0

172

24V MODULE
OUTPUT

Gould Inc., Instrument Systems Division

Printed in U.S.A.

Cleveland, Ohio

REFERENCE: KAM7315
SH. 6 PARA. 5.3
FORM 6.5

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER 7054 |
| SCALE | REVISION 8 | SHEET 19 |

DATA FORM 6.E A, B

Ref. Para. 5.4

DVM 1

1.00 \pm .001 VDC2.00 \pm .001 VDC3.00 \pm .001 VDC4.00 \pm .001 VDC5.00 \pm .001 VDC

DVM 2

0.996 VDC1.996 VDC2.995 VDC3.993 VDC4.994 VDC

Dielectric Test

N/A VAC

Observations

NONE

NORMAL OPERATION

4/10/80

Rmy

Addendum A
ER7054 Sh. 20

SIZE

FSCM NO.

DWGNO.

DATA FORM 6.7, 6.8

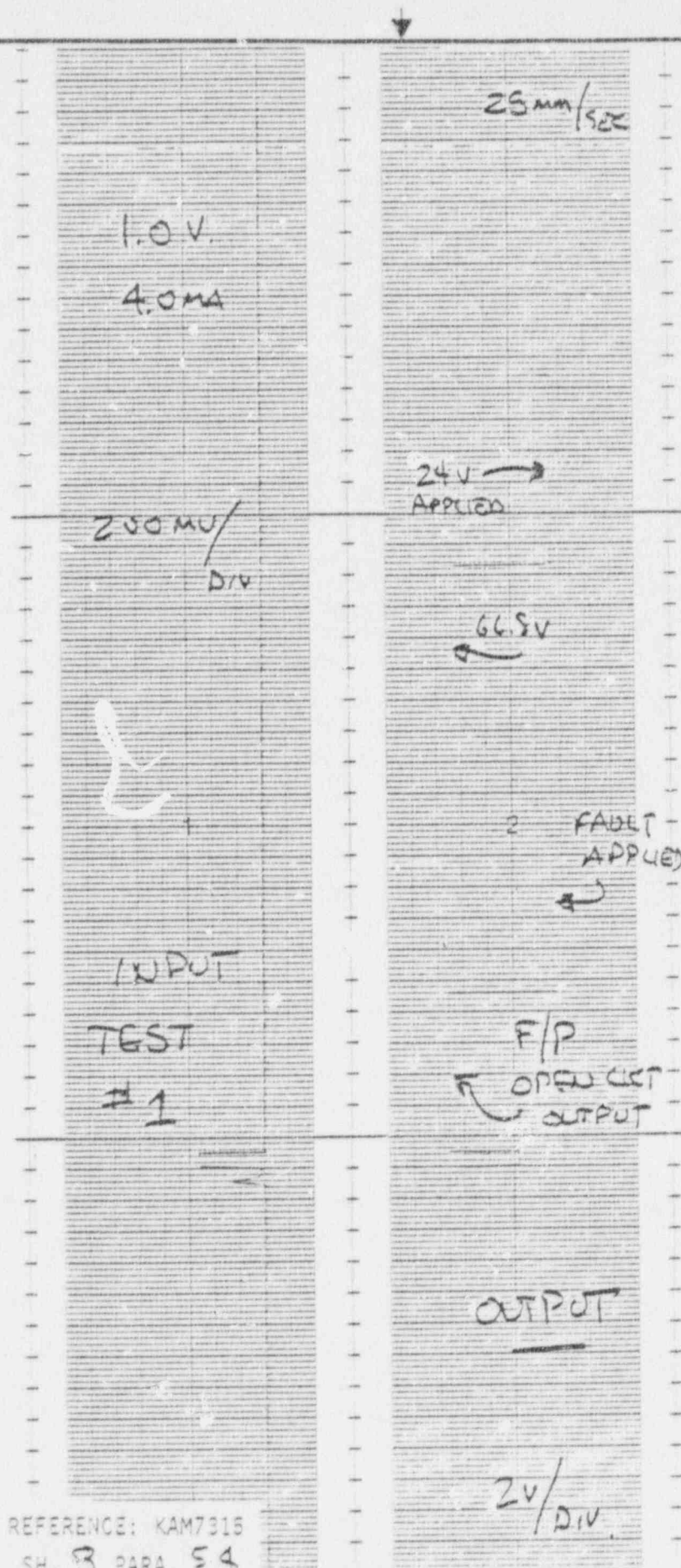
Ref. Para. 5.4

| DVM 1 | Chart Recorder Ch. 2 | Chart Recorder Ch. 2 | Scope Ch. 1 |
|-----------------|-------------------------|-------------------------|--|
| 1.00 ± .001 VDC | NO DEVIATION | 66.5 OPEN CKT. | 200mV 60HZ NOISE CONSTANT. |
| 3.00 ± .001 VDC | NO DEVIATION | 67. OPEN CKT. | 175 mV 00 NOISE CONSTANT |
| 5.00 ± .001 VDC | NOISE UNCAUSE | 68 OPEN CKT | NORMAL 150 mV 60HZ → 300mV P-P WITH FAULT APPLIED. |

Dielectric Test 1064 VAC

Observations
 NORMAL
 NO BREAKDOWN.
 Also
 dry

Addendum A
 ER7054 Sh. 21



REFERENCE: KAM7315

SH. 3 PARA. 54

FORM 67

SIZE
A

FSCMNO.

02750

DWGNO.

E127034

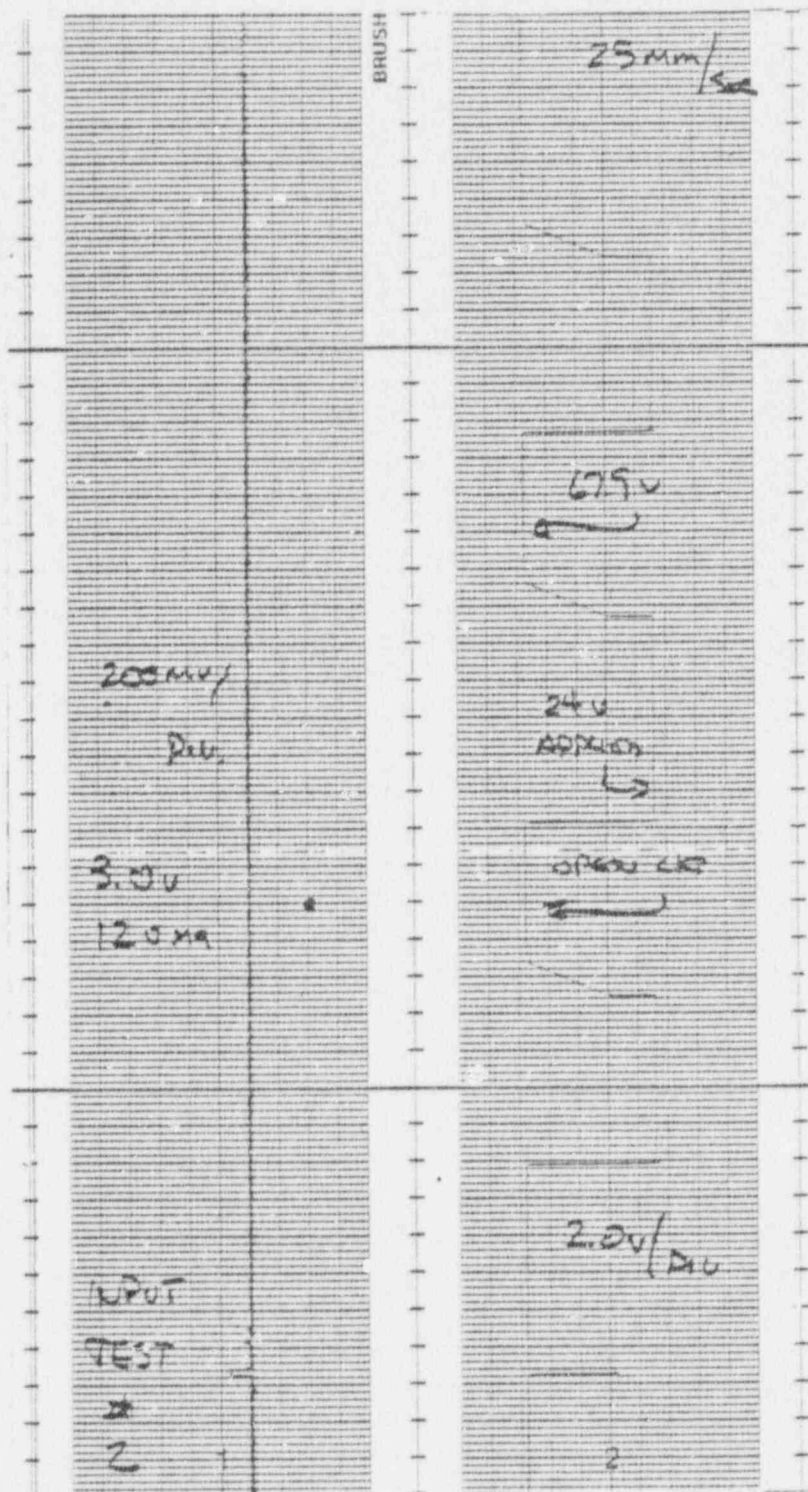
SCALE

REVISION

8-

SHEET

22



REFERENCE: KAM7315

SH. 8 PARA. 5.4

FORM 6.7

SIZE
A

FSCM NO.

02750

DWG NO.

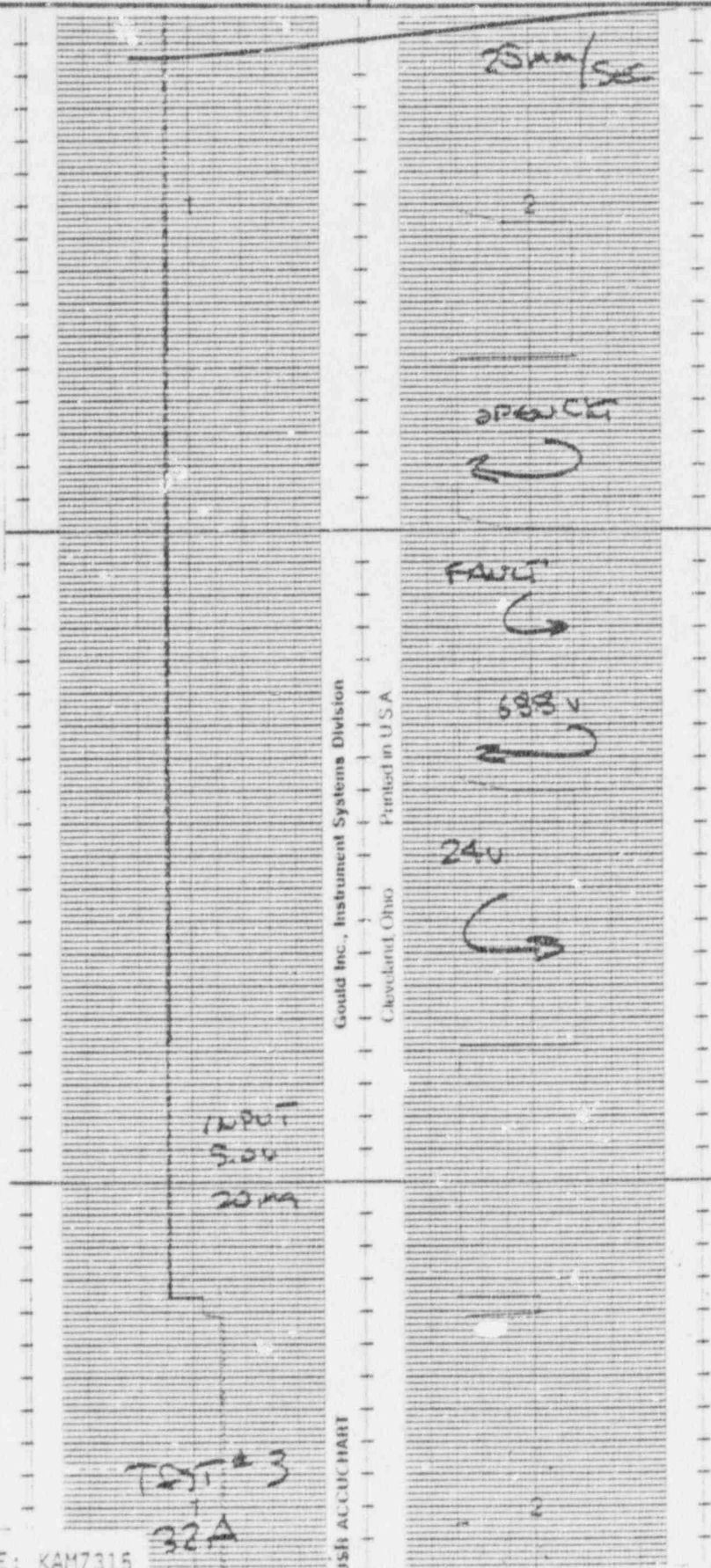
ER7054

SCALE

REVISION 8-

SHEET

23



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Cleveland, Ohio Printed in U.S.A.

REFERENCE: KAM7315
SH. 8 PARA. 5.4
FORM 6.7

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION 8 | SHEET 24 |

DWGNO. KAM7315

DATA FORM 6.7, 6.8

Ref. Para. 5.4

| DVM 1 | Chart Recorder Ch. 1 | Chart Recorder Ch. 2 | Scope Ch. 1 |
|-----------------|--------------------------|-------------------------|---|
| 1.00 ± .001 VDC | 120 mV 60 Hz CONSTANT | 66 | 120 mV 60 Hz NORMAL + TR. |
| 3.00 ± .001 VDC | 240 mV 60 Hz 260 mV | 67.8 OPEN CRT | 240 mV 60 Hz NORMAL 260 mV 60 Hz FAULT |
| 5.00 ± .001 VDC | 160 mV 300 mV | 68.8 OPEN CRT | 160 mV 60 Hz 300 mV 60 Hz FAULT |

Dielectric Test 1064 VAC

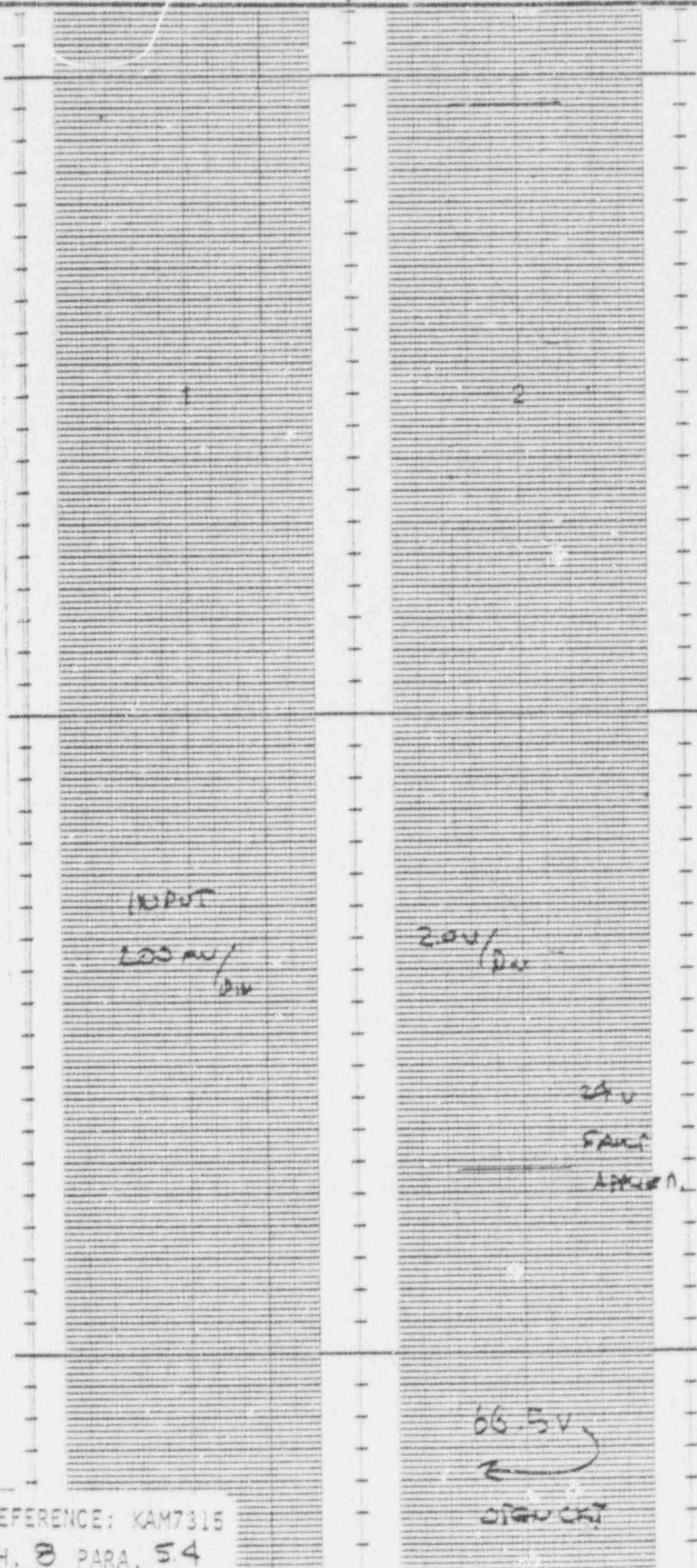
Observations NORMAL
NO BREAKDOWN

Also
my

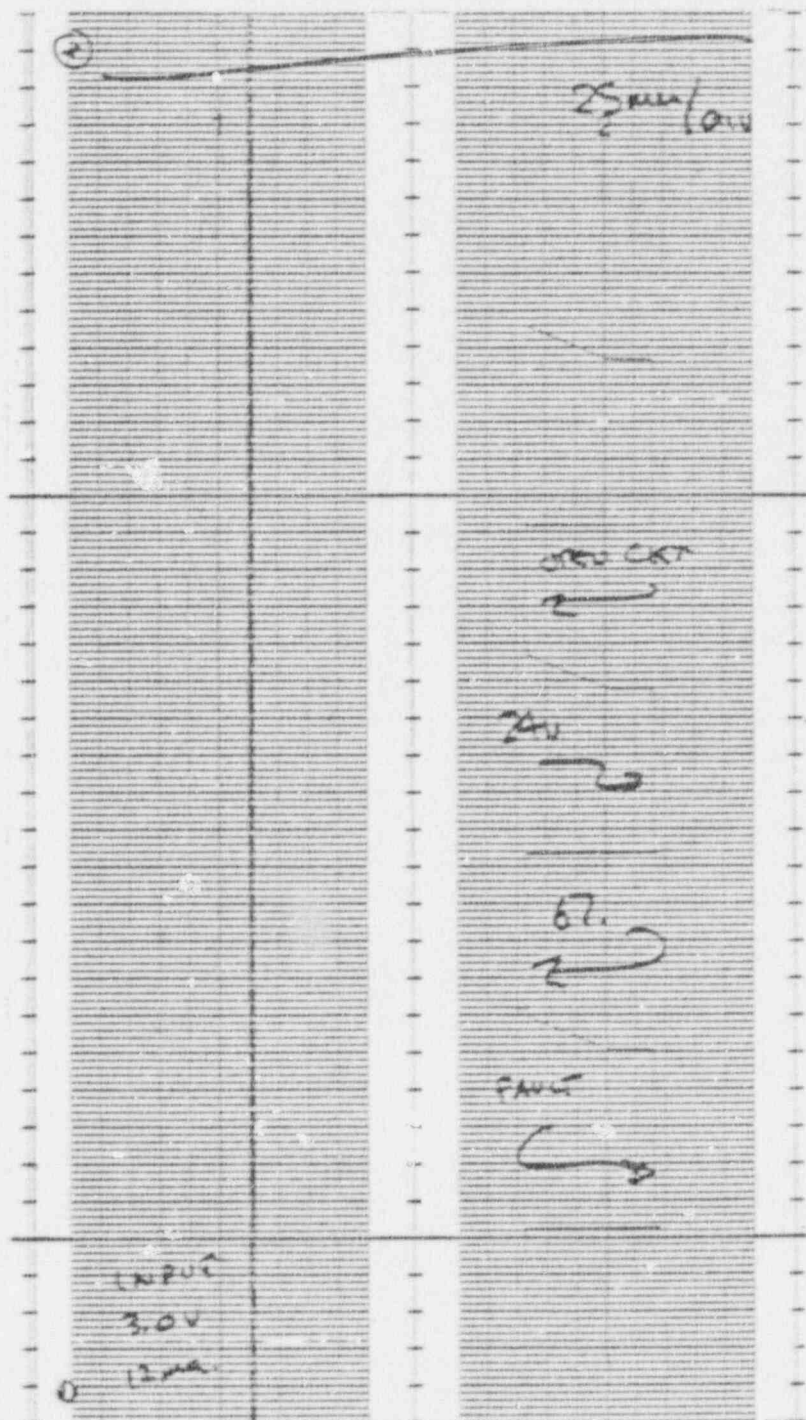
Addendum A
ER7054 Sh. 25

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. KAM7315 |
| SCALE | REVISION | SHEET |

BRUNING 40 21 31599



| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION B | SHEET 26 |

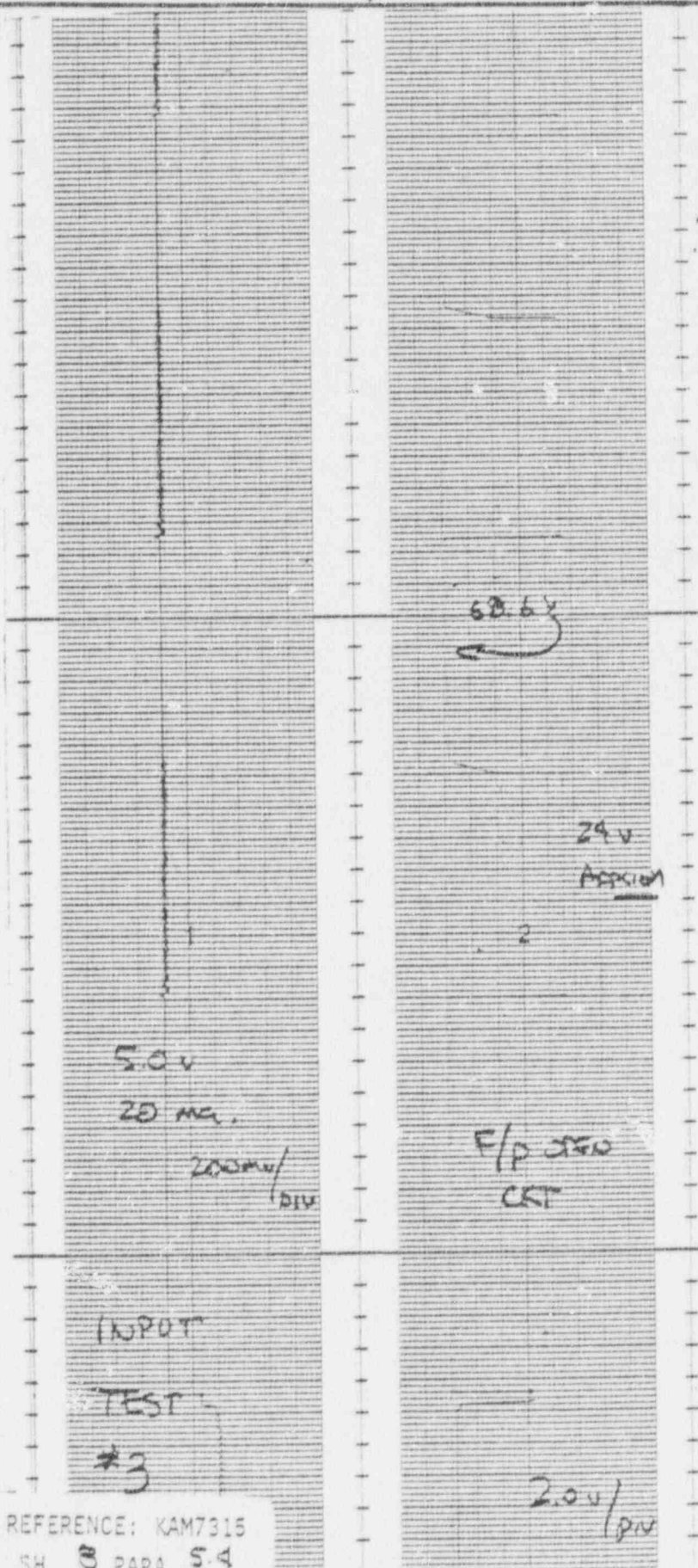


REFERENCE: KAM7315

SH. 8 PARA. 5.4

FORM 6.8

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ERT054 |
| SCALE | REVISION 8 | SHEET 27 |



REFERENCE: KAM7315
SH. 8 PARA. 5.4
FORM 6 8

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION 8 | SHEET 23 |

DATA FORM 6.7, 6.8

REVERSE

FAULT APPLIED REVERSE
POLARITY TO OUTPUT.

Ref. Para. 5.4

DVM 1

Chart Recorder
Ch. 2

Chart Recorder
Ch. 2

Scope
Ch. 1

1.00 ± .001 VDC

120 mV
60 Hz

FAULT. . . .
OPPOSITE SWING.

120 mV 60 Hz
NORMAL & FAULT

3.00 ± .001 VDC

220 mV
60 Hz

OPPOSITE SWING

220 mV 60 Hz
NORMAL & FAULT

5. ± .001 VDC

40 mV
260 mV
60 Hz

2.1 V P.P.
3 cycles

40 mV
260 mV Fault

Dielectric Test

1064 VAC

Observations

Addendum A
ER7054 Sh. 29

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. KAM7315 |
| SCALE | REVISION | SHEET 8 |

DWG NO. ER7054

SF 30

Gould Inc., Instr
Cleveland Ohio

BRUSH ACCU-CHART

TEST

FAULT

200mV/DIV

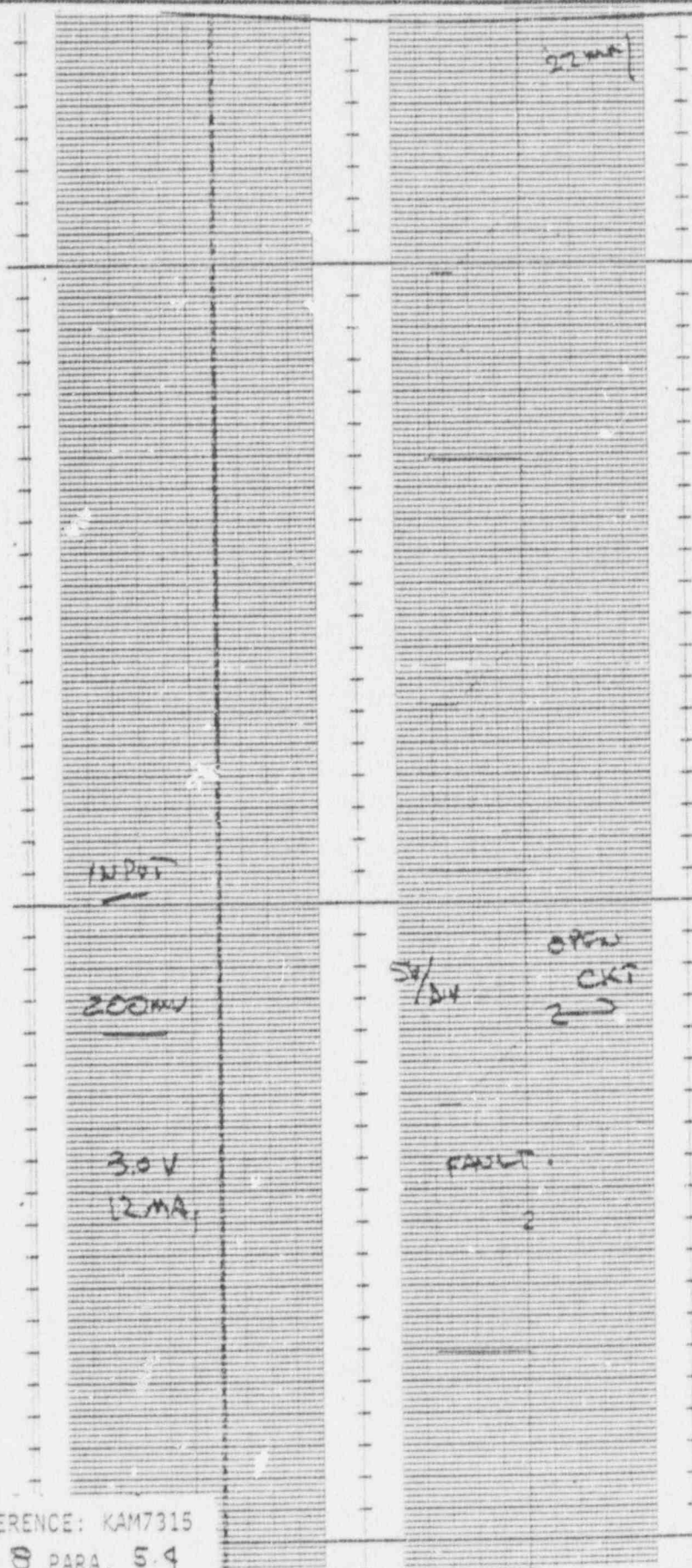
5V/DIV

1.0μs
4.0μs

TESTER

REFERENCE: KAM7315
SH. 8 PARA. 5.4
FORM 6.7R

| | | |
|-----------|-------------------|-------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. ER7054 |
| SCALE | REVISION B | SHEET 30 |



REFERENCE: KAM7315
 SH. 8 PARA. 5.4
 FORM 6.7 R

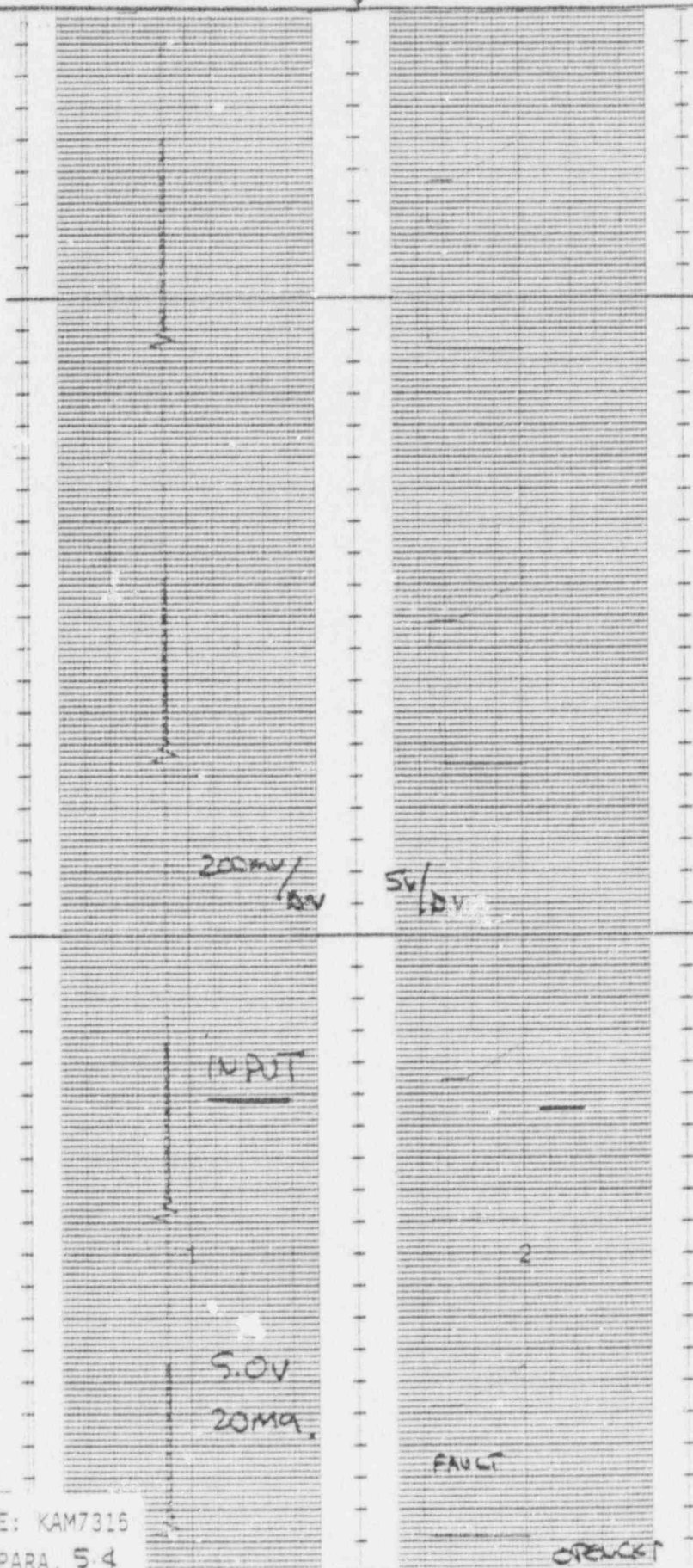
| | | |
|-----------|-------------------|------------------|
| SIZE A | FSCM NO. 02750 | DWG NO ER7054 |
| SCALE | REVISION 8 | SHEET 31 |

SI 82

DWG NO ER7054



REVISION 30 21 31599



REFERENCE: KAM7316

SH. 8 PARA. 5.4

FORM 6.7R

SIZE
A

FSCM NO.
02750

DWG NO
ER7054

SCALE

REVISION D SHEET 22

SH 7
KAM7315
DWG NO.
BRUNING 40 21 31599

DATA FORM 5.6 A,B

Ref. Para. 5.4

DVM 1

DVM 2

1.00 ± .001 VDC

1.003 VDC

2.00 ± .001 VDC

2.005 VDC

3.00 ± .001 VDC

3.004 VDC

4.00 ± .001 VDC

4.005 VDC

5.00 ± .001 VDC

5.004 VDC

Dielectric Test

1064 VAC

Observations

NORMAL

NO BREAKDOWN

40 21 31599

5/12

Addendum A
ER7054 Sh. 33

| | | |
|-----------|-------------------|--------------------|
| SIZE A | FSCM NO. 02750 | DWG NO. KAM7315 |
| SCALE | REVISION - | SHEET 7 |

SH 8
KAM7315
DWG NO
RUNING 40 21 31599

DATA FORM ~~57.5~~ ~~5.4~~ ~~5.8~~ ~~5.9~~ ~~6.0~~ ~~6.1~~ ~~6.2~~ ~~6.3~~ ~~6.4~~ ~~6.5~~ ~~6.6~~ ~~6.7~~ ~~6.8~~ ~~6.9~~ ~~7.0~~ ~~7.1~~ ~~7.2~~ ~~7.3~~ ~~7.4~~ ~~7.5~~ ~~7.6~~ ~~7.7~~ ~~7.8~~ ~~7.9~~ ~~8.0~~ ~~8.1~~ ~~8.2~~ ~~8.3~~ ~~8.4~~ ~~8.5~~ ~~8.6~~ ~~8.7~~ ~~8.8~~ ~~8.9~~ ~~9.0~~ ~~9.1~~ ~~9.2~~ ~~9.3~~ ~~9.4~~ ~~9.5~~ ~~9.6~~ ~~9.7~~ ~~9.8~~ ~~9.9~~ ~~10.0~~ ~~10.1~~ ~~10.2~~ ~~10.3~~ ~~10.4~~ ~~10.5~~ ~~10.6~~ ~~10.7~~ ~~10.8~~ ~~10.9~~ ~~11.0~~ ~~11.1~~ ~~11.2~~ ~~11.3~~ ~~11.4~~ ~~11.5~~ ~~11.6~~ ~~11.7~~ ~~11.8~~ ~~11.9~~ ~~12.0~~ ~~12.1~~ ~~12.2~~ ~~12.3~~ ~~12.4~~ ~~12.5~~ ~~12.6~~ ~~12.7~~ ~~12.8~~ ~~12.9~~ ~~13.0~~ ~~13.1~~ ~~13.2~~ ~~13.3~~ ~~13.4~~ ~~13.5~~ ~~13.6~~ ~~13.7~~ ~~13.8~~ ~~13.9~~ ~~14.0~~ ~~14.1~~ ~~14.2~~ ~~14.3~~ ~~14.4~~ ~~14.5~~ ~~14.6~~ ~~14.7~~ ~~14.8~~ ~~14.9~~ ~~15.0~~ ~~15.1~~ ~~15.2~~ ~~15.3~~ ~~15.4~~ ~~15.5~~ ~~15.6~~ ~~15.7~~ ~~15.8~~ ~~15.9~~ ~~16.0~~ ~~16.1~~ ~~16.2~~ ~~16.3~~ ~~16.4~~ ~~16.5~~ ~~16.6~~ ~~16.7~~ ~~16.8~~ ~~16.9~~ 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SH. 8 PARA. 5.4
FORM 6.7 R2

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| SCALE | REVISION 5 | SHEET 35 |

DWG NO. ER3054



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SHEET 36

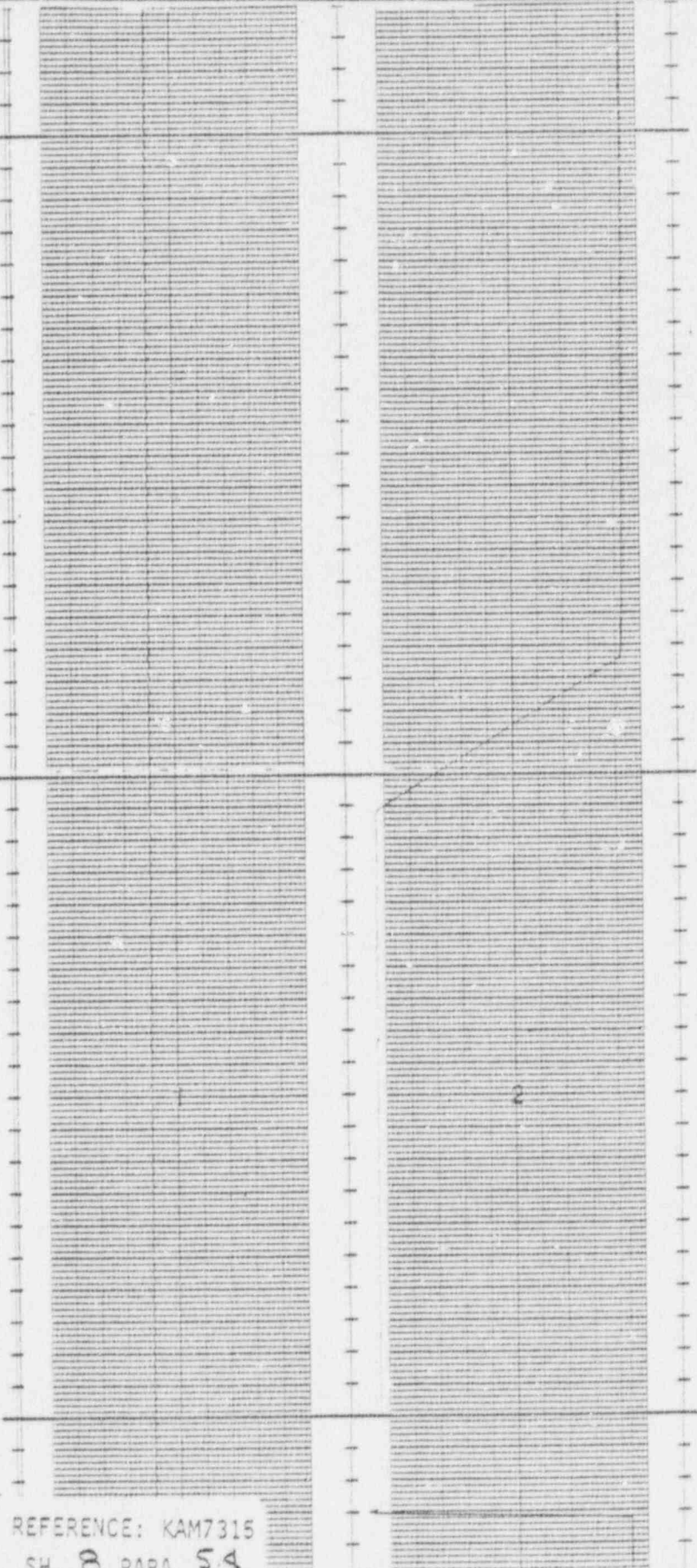
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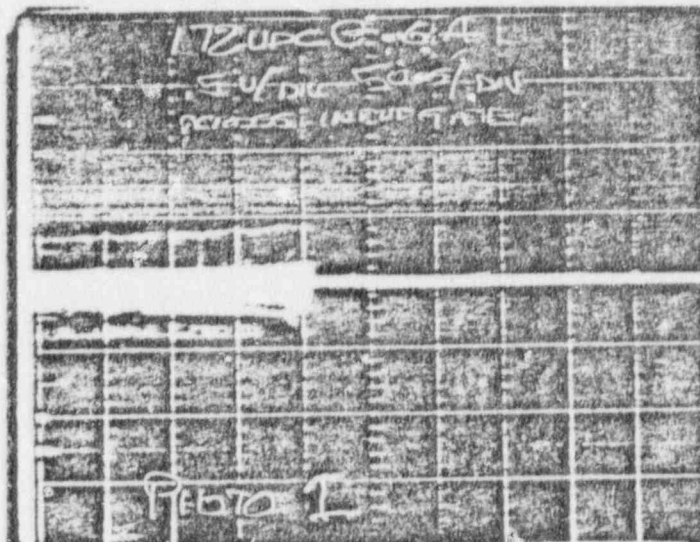
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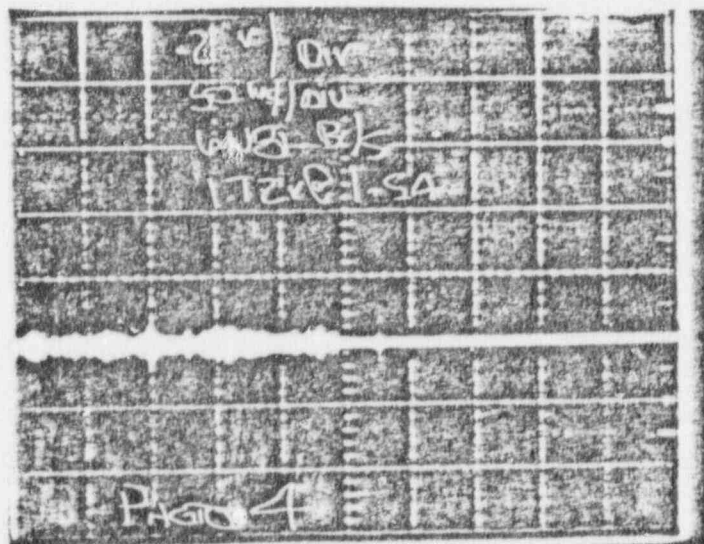
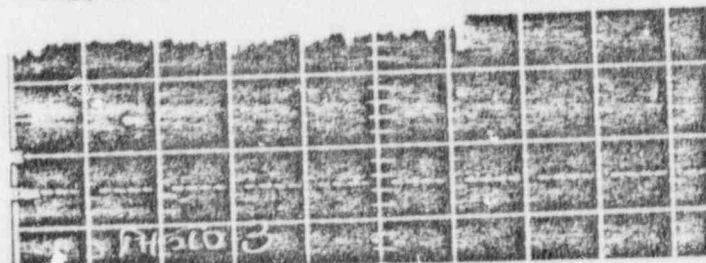
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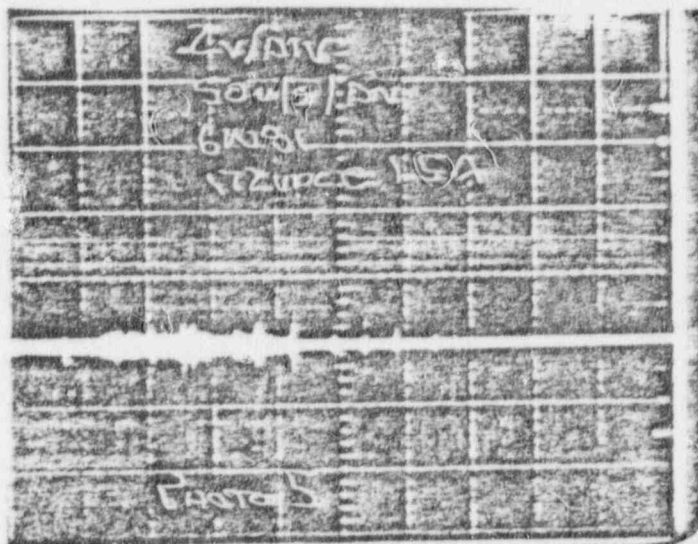
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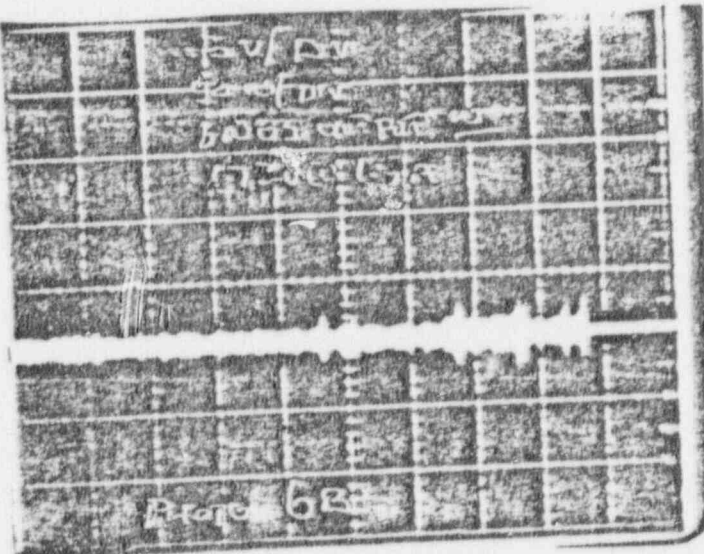
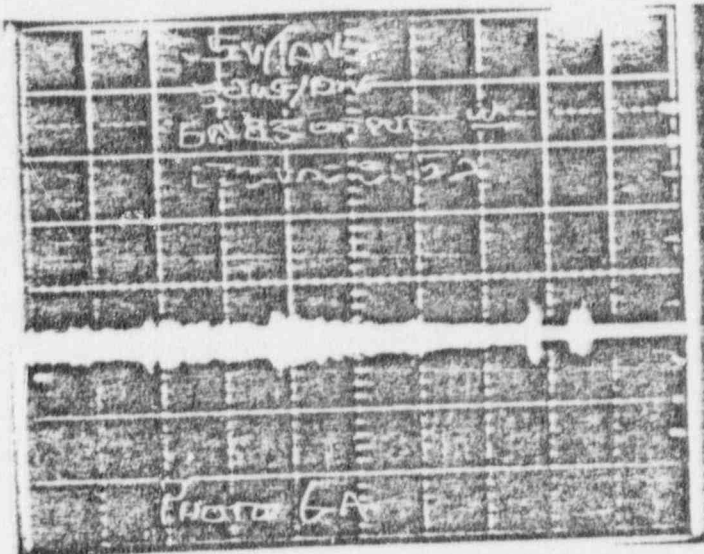
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Addendum A
ER7054 Sh. 40

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| SCALE | REVISION | SHEET 40 |



Addendum A
ER7054 Sh. 41

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|-----------|-------------------|-------------------|
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| SCALE | REVISION | SHEET 41 |