Received with letter dated 8/24/84 which references Mail Control 14007. (re: Renewal of Lic No 37-02401-04G

# QUALITY ASSURANCE

## PROCEDURE MANUAL

Nuclear Research Corporation

Warrington, PA 18976

Copy #:

Issue Date:

REVISIONS TO NRC'S QUALITY ASSURANCE PROCEDURES

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REVISIONS TO NRC'S QUALITY ASSURANCE PROCEDURES

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# REVISIONS TO NRC'S QUALITY ASSURANCE PROCEDURES

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REVISIONS TO NRC'S QUALITY ASSURANCE PROCEDURES

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# QUALITY ASSURANCE
# PROCEDURE MANUAL

Nuclear Research Corporation

Warrington, PA 18976

Copy #

Issue Date:

SECTIONS OF MIL-Q-9858A APPLICABLE TO MIL-I-45208

| ALPHA DESIG | NOMENCLATURE | SEC. OF 9858A |
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| D | Corrective Action | 1002.5-1 |
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| G | Government Furnished Material | 1006.2-1 |
| H | Government Inspection at Vendor Factory | 1006.1-1 |
| J | Inspection Status | 1005.7-1 |
| L | Measuring & Test Equipment | 1003.2-1 |
| M | Non-Conforming Material | 1005.5-1 |
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| Q | Prod. Tooling used as Inspection Media | 1003.3-1 |
| S | Purchasing Data | 1004.1-1 |
| T | Records | 1002.4-1 |
| V | Statistical Q.C. Analysis | 1005.1-1 |
| W | Use of Contractor's Inspection Equip. | 1003.4-1 |
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NUCLEAR RESEARCH CORPORATION

QUALITY ASSURANCE PROCEDURES

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| PREPARED BY: | A. W. Paffrath |
|---|---|
| DATE PREPARED: | 1 August 1977 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: AUTHORIZATION

| NUMBER: | |
|---|---|
| EFFECTIVE DATE: | 1 August 1977 |
| DATE REVISED: | 1/10/83 |
| PAGE OF | |

Nuclear Research Corporation is dedicated to providing high quality, reliable systems for the utility and process industries. The critical requirements of such systems demand continuous reliable operation. In order to provide to our customers maximum assurance that the products of NRC meet these high objectives, we have carefully considered each step in the development, manufacture, test and field use of each product and established a strict program for review and control of quality.

Reliable operation is the product of many considerations, conservative design, choice of components, workmanship, testing, program validation, field test, etc. NRC has established as a major part of its overall reliability and maintainability program a Quality Assurance Program. This manual outlines the formal elements of the program.

This Quality Assurance Manual has been designed to completely fulfill all the requirements of the Department of Defense as stated in MIL-Q-9858A, Military Specification MIL-I-45208, ASQC Standard CI-1968, 10 CFR 50, Appendix "B", ANSI N45.2, ANSI N45.2.2 and shall be modified, revised or added to as required.

The issuance of all or any part of these procedures with the indicated approval of the Quality Assurance Manager shall be taken as my concurrence with this procedure, or portions thereof, and the approval of the Quality Assurance Manager shall have the same intent and acceptance as would my own signature being applied.

It is hereby directed that the contents of these procedures shall become operating requirements for all effected departments of Nuclear Research Corporation, and the whole or part when directed, for all divisions or subsidiaries of Nuclear Research Corporation.

ISSUED:

Date: 1 September 1977 By: _____

Earl M. Pollock, President
NUCLEAR RESEARCH CORPORATION

| PREPARED BY: | A. W. P. |
|---|---|
| DATE PREPARED: | 1 August 1977 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: QUALITY ASSURANCE ORGANIZATION

| NUMBER: | 1002.1-1 |
|---|---|
| EFFECTIVE DATE: | 10 August 1977 |
| DATE REVISED: | 1/10/83 |
| PAGE 1 OF 6 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the responsibilities and authority to perform those responsibilities of the Quality Assurance Department within Nuclear Research Corporation and the assignment of responsibility and authority within the Quality Assurance organization.

2.0 Scope/Responsibilities

2.1 The responsibilities and authorities defined herein will not be interpreted as being the sole areas of responsibility and authority delegated to Quality Assurance. Additional responsibilities may be assumed without documentation, if it is necessary for the improvement of product quality.

The procedures contained in this program conform to military specification MIL-I-45208A "Inspection System Requirements" requiring the establishment of an effective system that will insure control of quality throughout all phases of contract performance. It also meets all the requirements of ASQC Standard C1-1968 "General Requirements for a Quality Program". Each procedure defines the operating instructions necessary for all departments to carry out their responsibilities under the Quality Assurance Program. The extent to which these procedures are applicable to a given contract is determined by the nature of each particular contract.

2.2 It is corporate policy that these procedures be approved by the corporate President and thereby become mandatory for the operation of each department. Responsibility for the administration and maintenance of these procedures rests with Quality Assurance (QA) Department. Deviation from the established procedures shall not be made without the express approval of the QA Manager.

2.3 Manuals will be distributed as Controlled Copy or Uncontrolled Copy. A Controlled Copy is revised and maintained in an updated condition at all times. An Uncontrolled Copy is not maintained in an updated condition and is normally supplied to customers.

2.4 Procedures will be reviewed annually with consideration for changing product and customer requirements or improvements. If changes are required, they will be accomplished by addenda or revised pages which are subject to management approval. Distribution of procedures and revisions will be made on a basis to assure that all holders of Controlled QA Manuals will receive the latest applicable documents.

1.5 Suggestions for additions to this manual and for revisions to the procedures are invited and should be directed to the Manager, QA Department.

1.6 The Manager of Quality Assurance shall be directly responsible for the following functions:

(a) Review proposal requests in order to evaluate QA provisions; transcribe requirements into a proposed QA Program Plan including manpower loading, cost estimates, and test equipment as well as policies and procedures necessary to achieve QA objectives.

(b) Develop, document, establish, and maintain a QA Program in accordance with specific contract requirements.

(c) Develop an effective program for the indoctrination, training, and certification of QA personnel.

(d) Maintain administrative and technical liaison with the customer's designated representative on matters that affect the QA aspects of the contract.

(e) Review and approve Engineering Test Specifications, as applicable.

(f) Participate in design reviews to assure that Engineering drawings, specifications, and technical documents contain adequate requirements for determining and controlling the quality of all procured or produced articles.

(g) Review and approve Engineering Change Notices after determining their effect on the QA Program Plan, function, interchangeability and other contract quality objectives.

(h) Participate in the evaluation of the facilities and the Quality Assurance systems of potential suppliers and subcontractors to determine their capabilities for supplying articles that meet all quality requirements. Document and maintain detailed records of such surveys and conduct followup surveys, as required.

(i) Conduct annual audits of QA program performance to assure that QA objectives are being attained. Document and report the results of audits to appropriate management elements and initiate the appropriate corrective action.

(j) Establish and maintain an effective data reporting system for information feedback and undertake corrective action on all troubles, failures, malfunctions, discrepancies, and any undesirable conditions found within the company or subcontractors facilities.

(k) Establish and maintain an effective returned product evaluation program.

(l) Develop QA Standards and other related QA documentation.

(m) Initiate necessary action to correct conditions or practices resulting in the fabrication of discrepant products.

## 3.0 Organizational Structure

### 3.1 Quality Assurance Manager

3.1.1 The Quality Assurance Manager will be responsible for all Quality functions of Nuclear Research Corporation.

3.1.2 The Quality Assurance Manager will report directly to the Operations Manager and/or the President.

3.1.3 The Quality Assurance Manager will be aided in the performance of the Quality Assurance functions by others in his department such as:

(a) Quality Engineering
(b) Inspection
(c) Training Supervision

3.1.4 The Quality Assurance Manager will be directly responsible for all areas of responsibility dealing with Quality Assurance assigned to the above personnel and will also be directly responsible for any and all other areas coming under the Quality Assurance jurisdiction.

3.1.5 The Quality Assurance Manager will have the authority to make final quality judgments on any and all problems at Nuclear Research Corporation that reflect on product quality.

3.2.1 Each member of the Quality Engineering Staff will report to the Quality Assurance Manager.

3.2.2 The Quality Engineering Staff will be directly responsible for:

(a) Quality Audits
Quality Audits will be conducted during the calendar year and will encompass those areas of operations and systems having an effect on product quality. These areas shall include but not be limited to:

1. Review of document availability and familiarity.
2. Review of accepted work.
3. Review of correctness and adequacy of corrective actions.
4. Review of basic inspection record documents for adequacy, completeness and accuracy.

(b) Government and customer liaison.
(c) Electronic and electrical controls.
(d) Vendor liaison.

3.2.3 The members of the Quality Engineering Staff shall have the authority to make definitive decisions concerning quality within areas of responsibility assigned, subject only to the disapproval of the Quality Assurance Manager.

3.2.4 Each member of the Quality Engineering Staff shall have the authority to delegate duties to such personnel as may be assigned to assist him in the areas of his individual responsibility and will be accountable for the performance of such personnel.

3.3 Inspection Supervision

3.3.1 Inspection supervision will consist of one or more Inspection technicians.

3.3.2 Inspection technician will report to the Quality Assurance Manager.

3.3.3 The Inspection Technician will be directly responsible for the following activities:

3.3.3.1 Inspection Technician

(a) Incoming Inspection
(b) Spare Parts Inspection
(c) Machine Shop Inspection
(d) In Process Assembly Inspection
(e) Systems Inspection

(f) Final Test
(g) Final Inspection
(h) Special Packaging
(J) Packing and Packaging

3.3.4 The Inspection Technician will have the authority to make definitive decisions concerning inspection within the respective areas of responsibility, subject only to the disapproval of the Quality Assurance Manager.

3.4 Training Supervision

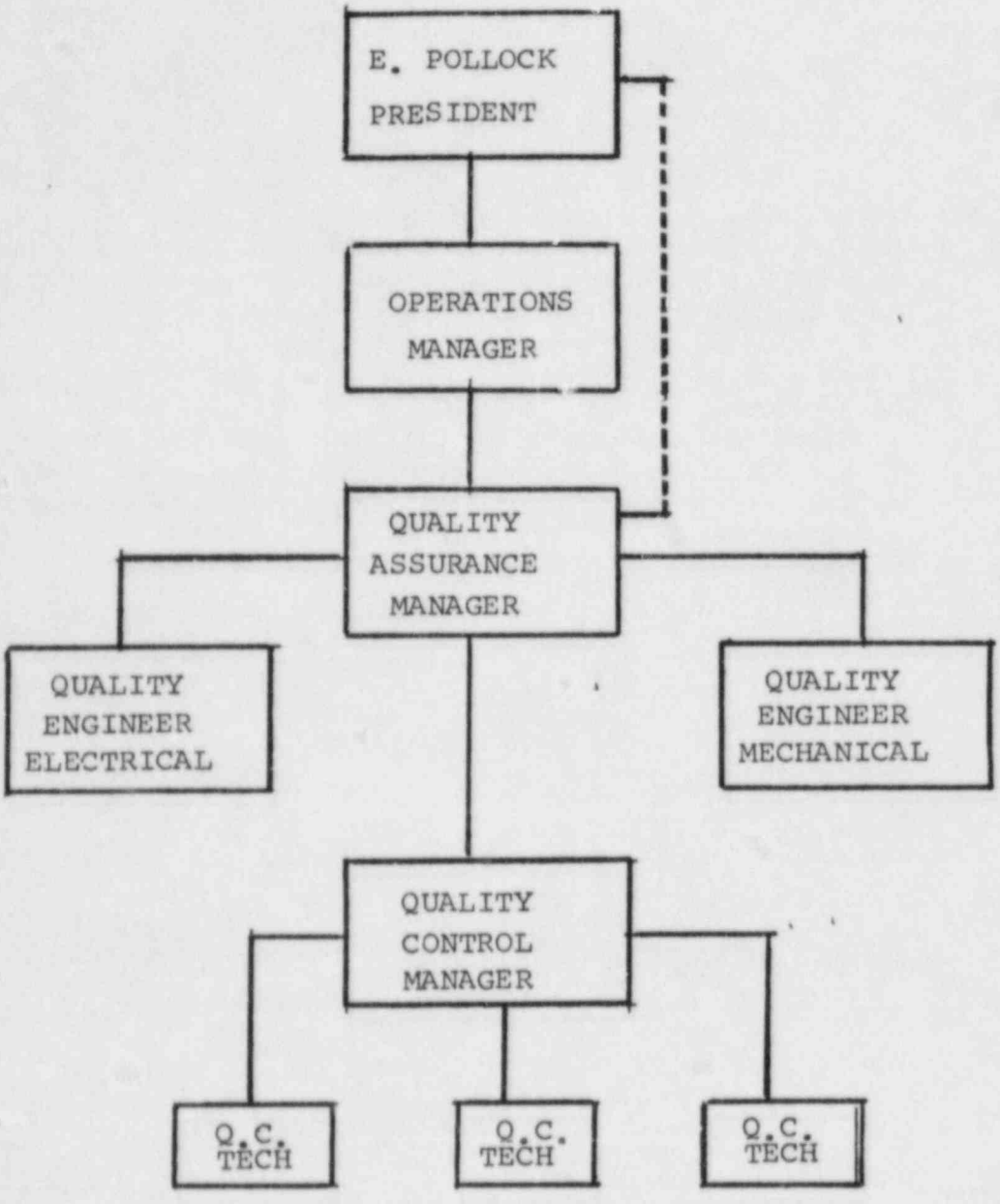
3.4.1 In line with corporate policies, the company shall develop and maintain training programs, as necessary, in order that all individuals perform their assigned tasks in a satisfactory and efficient manner. The training will be conducted, primarily, but not exclusively, at the Department Supervisor - Employee level.

Approved by Andrew J Cassell Date 1 October 1977

Quality Assurance Manager

Reviewed by A. L. Zimpa Date 3 Oct 1977

DODQAR


E. POLLOCK
PRESIDENT
OPERATIONS MANAGER
QUALITY ASSURANCE MANAGER
QUALITY ENGINEER ELECTRICAL
QUALITY ENGINEER MECHANICAL
QUALITY CONTROL MANAGER
Q.C. TECH
Q.C. TECH
Q.C. TECH

| PREPARED BY: | A. J. Cassell |
|---|---|
| DATE PREPARED: | |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: QUALITY PLANNING

| NUMBER: | 1002.2-1 |
|---|---|
| EFFECTIVE DATE: | 10 August 1977 |
| DATE REVISED: | 1 August 1977 |
| PAGE 1 OF 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to establish requirements for Quality Planning at the initiation of a contract or purchase order.

2.0 Scope

2.1 This procedure will apply to all Government contracts, all commercial purchase orders requiring Government Source Inspection, and all other commercial purchase orders where applicable by corporate policy or contractual obligations.

3.0 Procedure

3.1 Contract Review

3.1.1 Upon receipt of a contract or purchase order, Contract Administrator will initiate a Request for Contract Job Work Order for circulation to Engineering, Operations, and Quality Assurance. Receipt of the Job Work Order from Operations will serve to notify Q.A. that a contract or purchase order has been received and must be reviewed.

3.1.2 An authorized representative of Q.A. will review the contract, purchase order, job work order and other included documents.

3.1.3 The review will be for the purpose of noting:

(a) Product Type
(b) Applicable MIL Specifications
(c) Referenced customer specifications
(d) Inspection requirements
(e) Reliability requirements
(f) Quality system requirements
(g) Any other special requirements pertaining to tooling, processing, testing, etc.

3.1.4 In the event that a referenced document is not immediately available for review, the job work order may be completed and returned to Contract administrator but it will be clearly noted on the job work order that exception is being taken to those documents pending their review.

3.2 Product Design

3.2.1 As soon as practical after the contract or purchase order review, a representative of Q.A. will confer with the designated Project Manager for the item being ordered to determine the need for:

(a) Additional or unusual test equipment
(b) Inspection procedures
(c) Inspection job work orders
(d) Inspection instructions for purchase parts
(e) Controls necessary for unusual processing.

3.2.2 Q.A. will continue to coordinate with Engineering at appropriate intervals to benefit from the details which become available as the design progresses.

3.2.3 Quality Assurance will obtain test equipment and establish procedures, controls, instructions, etc., as early as possible in the performance of a contract or purchase order so as to not cause delays when the design is released for production.

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A J Turpin Date 3 Nov 1977
DODQAR

Concurred by: A Wayne Raffrath Date 1 October 1977
Contract Administrator

REVISION # 04 BY: Frank W Laino QUALITY ASSURANCE MANAGER
16 June 1980 DATE

REVIEWED BY: A Turpin DOD QAR
16 June 80 DATE

CONCURRED BY: Don Lokyn CONTRACT ADMINISTRATOR
20 June 1980 DATE

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 3 March 1976 |
| Approved By: A.J.C. | |
| | |

# NRC

QUALITY ASSURANCE PROCEDURES

Subject: REQUEST FOR QUOTE/ CONTRACT JOB WORK ORDER REVIEW

| Number | 1002.2-2 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 2 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the usage of the Request for Quote/Contract Job Work Order

2.0 Scope

2.1 This procedure will apply to all Requests for Quotes and Contracts received at Nuclear Research Corporation, as well as any amendment thereto.

3.0 Procedure

3.1 The job work order will originate with the Contract Administrator when an RFQ/Contract is received.

3.2 Contract Administrator will review the RFQ/Contract and enter on the job work order any required or pertinent information.

3.3 The job work order will be signed and dated by the Marketing Representative who has performed the review.

3.4 The job work order and a copy of the RFQ/Contract will be forwarded, successively, to Quality Assurance, Engineering and Operations for their reviews and comments.

3.5 The completed job work order and accompanying RFQ/Contract copies will be returned to Contract Administrator by Q.A.

3.6 Marketing will use the information contained on the job work order to assist them in submitting quotes or accepting contracts.

3.7 During the course of the review by the various groups, if any requirement is found to be undesirable, impractical, or impossible to comply with, this information should be clearly noted on the check list.

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A J Zimpar Date 3 Nov 1977
DODQAR

Concurred by: A. Wayne Paffrath Date 1 October 1977
Contract Administrator

| PREPARED BY: | A.J. Cassell |
|---|---|
| DATE PREPARED: | 1 March 1976 |
| APPROVED BY: | ajc |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: WORK INSTRUCTIONS

| NUMBER: | 1002.3-1 |
|---|---|
| EFFECTIVE DATE: | 1/18/79 |
| DATE REVISED: | 1/10/83 |
| PAGE 1 OF 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the methods of controlling product quality through the use of documented Work Instructions.

2.0 Scope

2.1 Work Instructions for the purposes of this procedure will be defined to include, but not be limited to Operation Sheets, Inspection Procedures, Test Instructions, Test Specifications, and Quality Assurance Procedures.

3.0 Procedure

3.1 Operation Sheet

3.1.1 All manufacturing operations will be performed in accord with the applicable Operation Sheets and/or samples. (Form QA-023)

3.1.2 Q.A. will audit the manufacturing areas during the calendar year to assure that Operations Sheets are available, current and being used, if required.

3.2 Inspection Instructions

3.2.1 Inspection instructions will include Inspection Procedures, Test Instructions, and Test Specifications. These will be used for mechanical and electrical inspection and testing.

3.2.2 Inspection Procedures and Test Instructions will be initiated and controlled by Nuclear Research Corporation Quality Assurance. Test Specifications, NRC Process Specifications, & NRC Engineering Specifications will be initiated and controlled by NRC Engineering. Specifications must be reviewed and approved by Q.A. prior to use.

3.2.3 All inspection instructions will contain, as a minimum:

(a) Part number.
(b) Part Name.
(c) Change Level of the instruction.
(d) Characteristics to be inspected or tested.
(e) Criteria for acceptance.

3.3 Quality Assurance Procedures

3.3.1 Areas and operations within Nuclear Research Corporation not covered by Operations Sheets or inspection instructions will be controlled by Quality Assurance Procedures where the functioning of that area or operation does not or could have an effect on quality.

3.3.2 Quality Assurance Procedures will be initiated and controlled by Q.A. The degree of applicability or the individual Q.A.P.'s will be as defined in the scope of those Q.A.P.'s.

3.3.3 Quality Assurance Instructions (QAI) will be issued for the purpose of defining policy to detailed operating procedures.

Prepared by Andrew J. Cassell Date 1 March 1976
Q. A. Manager

Reviewed by A. J. Turpin Date 28 May 76
DODQAR

Concurred by John R Brochon Date 5-20-76
Engineering

| PREPARED BY: | A.J.Cassell |
|---|---|
| DATE PREPARED: | 1 March 1976 |
| APPROVED BY: | ajc |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: QUALITY ASSURANCE RECORDS

| NUMBER: | 1002.4-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 1/10/83 |
| PAGE 1 OF 5 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the records system maintained by Quality Assurance to control and assure product quality.

2.0 Scope

2.1 This procedure will be limited to those records which relate to and are indicative of product quality. Records will be maintained for first article inspections, configuration inspections, production inspections, and evaluation inspections. Records concerned with departmental operation (personnel, budgeting, etc.) or allied areas will not be a part of this procedure.

3.0 Procedure

3.1 Receiving Inspection

3.1.1 The primary record of Receiving Inspection results will be the Receiving Inspection Report (Form QA-005). The inspector will record the results of every inspection of incoming purchased material. This form will indicate the vendor, purchase order number and other pertinent data.

3.1.2 A Corrective Action Request (QA-008) will be initiated by Receiving Inspection for all rejected purchased material. A copy of this form, showing quantity of rejects and cause for rejection, will be sent to the vendor for corrective action. Q.A. will maintain a file of answered and unanswered Corrective Action Requests.

3.2 In Process and Final Inspection

3.2.1 Form QA-006 is used for recording inspection results at In-Process Assembly Inspection and Final Inspection stations. All completed Inspection Records will be returned to Q.A. for analysis and storage.

3.2.2 Test data will be attached at Final Inspection to Form QA-006. For the recording of data on systems and indicators, a data sheet will be designed for that particular system or indicator.

3.2.3 Form QA-006 will be issued for all material rejected during In-Process and Final Inspection. All information on this form will be entered by the Inspector processing the material and the form will be forwarded to Q.A. for disposition. If adequate action is not taken to correct rejects, a Corrective Action Request will be issued.

3.3 Quality Assurance Audit

3.3.1 Audits of Inspection Operations and Records shall be performed during the calendar year by Q.A. Personnel. These audits shall be performed in accord with memorandum instructions of the Q.A. Manager.

3.3.2 A record of audit results will be maintained in the form of a Quality Assurance Audit Log.

3.4 Corrective Actions

3.4.1 Corrective Actions will be requested by Q.A. through the use of Corrective Action Request (Form QA-008). The person or persons responsible for initiating the corrective action will return to Q.A. a Statement of Corrective Action (Form QA-008) showing the extent of the action and date of effectivity. Detailed instructions for the use of these forms are contained in the Quality Assurance Procedure 1002.5-1.

3.4.2 Corrective Actions will be requested from vendors through the medium of the Corrective Action Request. Detailed instructions for this procedure are contained in Quality Assurance Procedure 1002.5-1.

3.4.3 A Report of Corrective Action - Customer's Returns - is initiated by Q.A. when an item is returned by a customer. If the reason for rejection is confirmed by Nuclear Research Corporation, Q.A. will be responsible for obtaining the necessary information for completion of the form and sending a copy for completed form to the customer wherever such action is contractual.

3.5 Calibration Records

3.5.1 A calibration history will be kept for each item of test equipment which is listed in the calibration schedule. These histories will be maintained by QA. Detailed instructions for calibration are contained in Quality Assurance Procedure 1003.2-1.

3.5.2 A file of calibration certificates will be maintained by QA for those items of test equipment which are calibrated by an outside facility.

3.6 Miscellaneous Records

3.6.1 Quality Assurance will maintain a file of all test data and Certificates of Compliance received from vendors. These records as well as those of Receiving Inspection will be monitored to ascertain the degree of quality provided by a vendor and dated and initialed by Q.A. inspector.

3.6.2 Q.A. will control the use of inspection stamps by maintaining a file of Inspection Stamp History cards as described in Quality Assurance Procedure No. 1005.7-1.

3.6.3 Q.A. will verify the completeness and accuracy of all records by periodically, and in a random manner, auditing the use of them.

3.6.4 Q.A. will perform analysis and compilations of records in any manner deemed advisable in order to facilitate decisions on vendor selection, changing inspection levels, cost reductions, customer liaison, etc.

3.6.5 Q.A. will cooperate with the Government or Industry in providing records for review by authorized Government personnel, upon their request.

3.7 Records Retention

3.7.1 All inspection records, documents, and Q.A. correspondence applicable to a contract or purchase order will be placed in storage by Nuclear Research Corporation at the conclusion of that contract or purchase order.

3.7.2 Storage will be in an area not conducive to deterioration and in a container clearly identified with the product name and part number, contract or purchase order number, and date placed in storage.

3.7.3 Storage will be maintained for a period of time not less than that specified by the contract or purchase. When the length of storage is not specified, storage will be for a minimum of three years for non-repetitive items. Repetitive items shall be those items which are produced at no greater than yearly intervals, the interval being from the date of the last shipment on a contract or purchase order to the date of the first shipment on the next contract or purchase order for the same item. Records of non-current contracts may be permanently stored, for the required period, in an off-site storage location in such manner that they may be made available to authorized personnel within a 24 hour period.

3.7.4 A log will be maintained by Q.A. for all records removed from storage and destroyed. The log will contain the product name and part number, the contract or purchase order number, the date placed in storage, the date destroyed, and a brief description of the type of records destroyed.

3.8 Sample Forms & Record Media used for the purpose of Recording Quality Data.

3.8.1 The following sample forms may be revised from time to time. This section of the manual will be revised to incorporate significant changes only which may affect quality records.

NOTE: Sample forms will only be included in those issued manuals when specifically requested by the person or activity holding the manual. These sample forms can be found in supplement to Q.A. Manual following the final section 1007.1-1.

Prepared by Andrew J. Cassell Date 1 March 1976

Quality Assurance Manager

Reviewed by R. A. Tempsi Date 28 May 76

DODQAR

| PREPARED BY: | A.W.P. |
|---|---|
| DATE PREPARED: | 1 March 1976 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: CORRECTIVE ACTION

| NUMBER: | 1002.5-1 |
|---|---|
| EFFECTIVE DATE: | 10 August 1977 |
| DATE REVISED: | 1 August 1977 |
| PAGE 1 OF 5 | |

1.0 Purpose

This section outlines the responsibilities for taking corrective action on all troubles, malfunctions, deficiencies, nonconformance, or failures occurring during test, inspection, and usage of items produced.

2.0 Scope

This section shall apply to all NRC personnel involved in the manufacture, test, and inspection process in-plant, at subcontractor's plants, at test sites, etc., and will describe the use of the Corrective Action Request (Form QA008), the Statement of Corrective Action (Form QA 008) and the Corrective Action Report sent to supplier.

3.0 Responsibilities

3.1 The QA Manager is assigned the responsibility for the collection of data, the analyses, ensuring that proper corrective action is taken, and the reporting of all troubles, malfunctions, deficiencies, nonconformances, and failures occurring during the manufacturing process, or subsequent to delivery of end-item hardware. The QA Manager shall be responsible for seeing that the functions described in subsequent paragraphs shall be carried out.

3.2 All QA personnel shall be trained in the objectives of the corrective action program, emphasizing the need for timely and effective action to correct existing deficiencies and to minimize or eliminate future occurrences. The importance of the program to end-product quality, reliability, schedule maintenance and cost should always be stressed.

3.3 All QA personnel shall be knowledgeable in the use of the NRC Corrective Action Request Form QA008.

3.4 Reporting shall be encouraged by the most expeditious means of any troubles, malfunctions, deficiencies, nonconformances, and failures noted by NRC personnel, subcontractors, and customer representatives at any phase of manufacture, inspection, test, or subsequent delivery of end-item hardware.

3.5 All failure and malfunction reports, in whatever form received, shall be reviewed, and if warranted, Corrective Action Request Forms shall be issued as directed by the QA Manager. These forms will be serialized and maintained in a log by QA personnel.

3.6 Responsibility for the analysis, corrective action, and the effectivity date for other than QA items must be coordinated with Engineering or Manufacturing, as appropriate with a deadline date for completion indicated. Deadline dates for items designated "critical" shall be established jointly by the QA Manager and the manager of the department concerned.

3.7 Monthly status reports on all outstanding Corrective Action Requests shall be provided. This status report shall include the contract number, nature of discrepancy, deadline date, and comments on the adequacy of the corrective or preventive actions proposed or taken. Each deficiency shall be carried as a reportable item until adequate action has been taken.

3.8 Reports of critical and routine corrective action measures shall be reported in the manner and frequency determined by the QA Manager. A monthly status report should normally be all the reporting action necessary except for those failures or malfunctions of a critical or persistent nature.

3.9 Management must be advised by a separate memorandum of discrepancies that are outstanding for a period in excess of one month. This memorandum shall include a statement as to the reason that resolution has not been achieved and the target date when corrective action is anticipated.

3.10 QA must keep management advised of discrepancies of a recurrent nature in the manufacturing or inspection processes with recommendations as to the advisability of issuing an immediate ECN to halt the further manufacture or inspection of unacceptable material until suitable corrective action can be taken.

4.0 Procedure

4.1 Request for Corrective Action

4.1.1 Corrective Action **shall** be requested for any quality problems which cannot be immediately solved. A request may be initiated by any Quality Assurance personnel as authorized by the Q.A. Manager.

4.1.1.1 Quality problems will include, but not be limited to defective products, trends toward product deficiencies uncovered through analysis of inspection records, policies or practices of service groups which have or may have a deleterious effect on product quality, facilities which contribute, or may contribute to inferior quality and product deficiencies reported by customers.

4.1.2 The initiator will make all entries in the heading of the Corrective Action Request (form QA-008). The Follow-up-date will be five working days from the issuance of the Request for Corrective Action.

4.1.3 The initiator will give a complete statement of the corrective action required and a brief history of the problem along with substantiating data and/or analysis as to the need for the Corrective Action.

4.1.4 Copies of the Request for Corrective Action will be distributed as follows:

(a) 2 copies to vendor or supplier when applicable.

(b) 2 copies to Purchasing or Section Supervisor responsible for taking the corrective action.

(c) 1 copy to the President of Nuclear Research Corporation.

(d) 1 copy to the Contract Administrator.

(e) 1 copy to Q.A. Manager.

(f) 1 copy to Q.A. file for follow-up.

(g) 1 copy to Chief Engineer if Corrective Action will require an Engineering Change or investigation.

4.2 Statement of Corrective Action

4.2.1 The Q.A. Supervisor approving the Corrective Action Request will, at the same time, initiate a Statement of Corrective Action (Form QA-008).

4.2.2 Upon initiation of Corrective Action Statement, the Q.A. Supervisor shall forward to the vendor or supplier, one copy of Corrective Action Request (form QA-008) whenever applicable.

4.2.3 The Q.A. Supervisor will enter on the heading the following up-date and number shown on the accompanying Corrective Action Request.

4.2.4 Two copies will be forwarded with the Corrective Action Request to the Department Head or Section Supervisor responsible for taking the Corrective Action.

4.2.5 The person responsible for taking the Corrective Action will give a complete description of the corrective action that will be taken giving effectivity date and serial number when available, or give a date when the corrective action decision will be made.

4.2.6 After completion of the Statement of Corrective Action, one copy will be forwarded to the General Manager and one copy will be forwarded to the Q.A. Manager.

4.2.7 Q.A. will monitor its file of Corrective Action Requests to assure that follow-up-dates do not become delinquent. On the next working day following a delinquent follow-up-date, a meeting will be called by Q.A. for all interested parties to resolve the reason for the delinquency. The President will be given a report on the meeting by Q.A. if he is unable to attend.

4.3 Receiving Inspection Report

4.3.1 A statement of corrective action by the supplier is an important part of the function of the Receiving Inspection Report (form QA-005) and accompanying Corrective Action Report as described in Quality Assurance Procedure No. 1005.1-1. The supplier will be required to submit a corrective action statement to Q.A. within two weeks after receipt of the Receiving Inspection Report.

4.3.2 Q.A. will monitor its file of active RIR's and a follow-up letter will be written for any delinquent RIR replies. A copy of this letter will also be forwarded to Purchasing for their information.

4.3.3 If no corrective action is received within two weeks of the mailing of the first follow-up letter, a second request will be sent over the signatures of the Production Manager and the Q.A. Manager.

4.3.4 Q.A. will have the option of disapproving any supplier whose statements of corrective action are repeatedly delinquent and/or unsatisfactory.

4.3.5 A copy of all corrective actions by suppliers on GFE material will be given to DODQAR at Nuclear Research Corporation.

4.3.6 All corrective actions on Government-furnished material will be coordinated through the DODQAR at Nuclear Research Corporation.

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A G Zimpin Date 3 Nov 1977
DODQAR

REVISION #04 BY: Frank M. Laino QUALITY ASSURANCE MANAGER
16 June 1980 DATE

REVIEWED BY: A Zimpin DOD QAR
16 JUN 80 DATE

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 3 March 1976 |
| Approved By: | A.J.C. |
| | |

# NRC

QUALITY ASSURANCE PROCEDURES

Subject: QUALITY COSTS

| Number | 1002.6-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 1 | |

1.0 Purpose

1.1 The purpose of this procedure is to provide for the recording and use of costs relating to quality.

2.0 Scope

2.1 Quality costs for the purposes of this procedure will be defined to include, but not be limited to, the cost of correcting defects, re-inspections, and re-placing defective material under warranty.

3.0 Procedure

3.1 The accumulation and maintaining of quality costs will occur as a part of the normal functioning of the Nuclear Research Corporation Accounting Department.

3.2 It will be the responsibility of the Q.A. Manager to use any or all quality cost data available in the management of the Nuclear Research Corporation quality program.

3.3 Quality cost data will be made available to the Government Representative for "on-site" review on request. Such requests will be made through the Q.A. Manager.

3.4 Cost analysis will be used by Q.A. to determine the severity of inspection in areas where excessive rework, repair, or reinspection is required.

Prepared by: Andrew J. Cassell Date 3 March 1976
Quality Assurance Manager

Reviewed by: A. J. Zimpin Date 28 May 76
DOEQAR

Concurred by: Thelma D Berrie Date 5/27/76
Accounting

| PREPARED BY: | A. W. P. |
|---|---|
| DATE PREPARED: | 1 August 1977 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: INTERIM STANDARDS

| NUMBER: | 1002.7-1 |
|---|---|
| EFFECTIVE DATE: | 10 Aug. 1977 |
| DATE REVISED: | |
| PAGE 1 OF 1 | |

1.0 PURPOSE

This section defines the method by which the QA Manager may issue special instructions of a temporary nature to QA personnel.

2.0 SCOPE

The provisions of this standard apply to all QA personnel in their use of Interim QA Standards in lieu of established QA Standards for the inspection, test, surveillance, and control of contract material.

3.0 RESPONSIBILITIES

3.1 Interim Standards shall have a strictly limited life and shall automatically lapse with the expiration of a specific contract.

3.2 Interim Standards are issued and signed by the QA Manager or corporate President to establish special supplemental QA instructions covering special areas for a limited time because of temporary conditions or requirements.

3.3 QA Interim Standards shall not be used in lieu of Engineering Change Notice.

Prepared by: A. Wayne Paffrath Date 10 November 77
Product Manager

Reviewed by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Mgr.

Concurred by: _____ Date 1 October 1977
President

Revision #04 Frank M. Saino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: _____ DCO-QAM CONCURRED BY: _____ PRES.

_____ DATE _____ DATE

| PREPARED BY: | A. W. P. |
|---|---|
| DATE PREPARED: | 1 August 1977 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: TRAINING

| NUMBER: | 1002.8-1 |
|---|---|
| EFFECTIVE DATE: | 10 August 1977 |
| DATE REVISED: | |
| PAGE 1 OF 2 | |

1.0 Purpose

This section applies to the training of Inspection personnel and shall be used to familiarize new QA personnel with NRC policies and QA procedures, as well as broadening the knowledge of present personnel assigned to this work.

2.0 General

2.1 Before a person is assigned a job classification in the QA Department, the QA Manager shall determine whether his experience and past training meet the requirements of the job description.

2.2 The QA Manager shall be responsible for the training program. However, at his discretion, training duties may be assigned to an experienced person on his staff.

2.3 Each inspector shall receive sufficient training to have a general understanding of all inspection functions and a detailed knowledge of the inspection functions for which he is responsible (Form QA007)

2.4 Each inspector shall be assigned a QA Manual for use during the training period. Each inspector shall receive a full explanation of those QA procedures which define the functions for which he will be responsible.

3.0 Training Methods

3.1 Training shall be accomplished by any or all of the following methods:

(a) Company orientation
(b) Group instruction by QA Manager, or his delegate
(c) On-the-job training by an experienced inspector

4.0 Training Outline

(a) Company orientation
(b) Short history of NRC
(c) Description of NRC and its products
(d) Description of the QA organization, as covered by Section 2 "Quality Assurance Organization, Functions and Responsibilities"
(e) Job Orientation

(f) Description of types of inspections and their importance
(g) Definitions of common inspection terms
(h) Inspection Types
    1. 100 percent inspection
    2. Inspection by sampling per MIL-STD-105
(i) Description of Drawings, their uses, how to read them, revisions, dimensions, tolerances, etc.
(j) Specifications, their use, and how to find the portions pertinent to QA
(k) Description of Purchase Orders and their use in inspection
(l) Inspection stamps, how to use them, and the types used by NRC.

5.0 Completion of Fundamental Training

5.1 Each inspector shall receive all of the fundamental training applicable to his classification within five days after hire or assignment to a new inspection function. If, at this time, the QA Manager feels that the inspector does not thoroughly understand the inspection function to which he is assigned, he may:

(a) Continue training, as deemed necessary
(b) Reassign the inspector to another inspection function
(c) Initiate termination procedures on the grounds of the inability of the inspector to perform the requirements of his job classification.

5.2 Completion of fundamental training does not complete the training of Inspection personnel. The inspectors shall receive additional training, as required, to enforce new procedures and revisions to existing procedures.

Prepared by: A Wayne Paffrath Date 1 October 1977
Product Manager

Reviewed by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Concurred by: _____ Date 1 October 1977
President

| PREPARED BY: | A.J. Cassell |
|---|---|
| DATE PREPARED: | 3 March 1976 |
| APPROVED BY: | |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: ENGINEERING CHANGE NOTICE (FormQA4789)

| NUMBER: | 1003.1-1 |
|---|---|
| EFFECTIVE DATE: | 10 August 77 |
| DATE REVISED: | 1/10/83 |
| PAGE 1 OF 5 | |

1.0 Purpose of Form

1.1 To propose a change in Engineering design, specifications, standard manufacturing operations or standard material specified.

1.2 To act as a record and notification of a change in Engineering design, specifications, standard manufacturing operations or standard material of any part or instrument.

2.0 Contents of Instructions

2.1 Paragraph

| | Reference |
|---|---|
| 3.1 | General Instructions |
| 3.2 | Proposal of Changes |
| 3.3 | Routing of Forms and obtaining approvals |
| 3.4 | Drafting Room Procedures |
| 3.5 | Distribution of Data |

3.0 Procedure

3.1 General Instructions

(a) FormQA4789 consists of one white reproducible sheet.

(b) All requests for Engineering design, specifications, methods or material changes shall be entered on FormQA013. (A request for drawing changes originated by any department but Engineering, requires the submittal of an Engineering Change Request (FormQA013) which must receive an Engineer's approval signature before Form QA-4789 may be issued).

(c) The following priority ratings have been established for the proper action to be taken by all concerned. Either QA or Engineering can up grade a class, however, agreement by both parties is required to down grade a class.

Class "A" - Required Change - Production must stop and immediate action is to be taken to effect change.

Class "B" - Desirable Change - To be effective as quickly as possible, but not to disrupt current production.

Class "C" - Desirable Change - To be effective at any convenient time.

(d) Effectivity to be established by:

(a) Date.
(b) Number of units.
(c) Job order.
(d) Part Criticallity.

3.2 Proposal of Change

(a) All change proposals must be originated by or agreed to by Engineering.

(b) Written approval from the customer must be obtained when the proposed change affects outline, interchangeability, or functional parameters or when approval is otherwise required by contract. Request for approval of changes must be submitted to customer in manner designed by customer.

(c) Form must include:

1. Change Proposal, clearly stated.

2. All drawings and parts listed affected.

3. Advance in revision letter for each drawing affected.

4. Date of preparation.

5. Name of Proposer.

6. Reasons for Change.

7. Disposition of all parts and assemblies affected.

3.3 Routing of Form and Obtaining Approvals

(a) Upon completion of Form by draftsman, it is submitted to a

Project Engineer. If he approves proposal, he will add his signature to form and assign a priority rating (See para. 3.1-c).

(b) If Advance notice of the change is required, copies of the ECN stamped "Advance" will be distributed at this point to those persons designated by the Project Engineer. Since other signatures will still be required to make the change official, this notification is merely to alert concerened personnel that a change is being considered and activities which are in conflict with it may be placed on "Hold". No rework, inspection, etc., is permitted unless a marked-up print is issued signed by Quality Assurance, Engineering, and Manufacturing.

(c) The form is then distributed as follows for further approvals and signatures.

1. Production Control Department - All change proposals.
2. Quality Control Department - All change proposals.
3. Manufacturing Engineering - All change proposals.
4. Quality Assurance Representative of the Government shall be on distribution list for all change proposals.
5. Any other signature required in special circumstances to properly authorize an engineering change.

(d) The form is then returned to the Chief Draftsman who has printed copies distributed to each department head as an official notice.

(e) The form is then returned to the draftsman for processing of change.

NOTE: If proposal is rejected, the original is filed as a record and no distribution of copies is made.

3.4 Drafting Room Procedure

(a) When the draftsman receives the approval form, he makes all necessary revisions on the original drawings. A change letter with an explanation of the change appears in the "revisions" box in the upper right hand corner of the drawings. The draftsman's initials and date and change number also appear here as well as symbols indicating zones of drawing where revisions were made and the disposition of parts.

(b) If disposition is "use up with other old mating parts by matching up", then a new drawing is made and the old drawing is obsoleted and kept on hand for reference.

(c) Where an Engineering Change would create problems of interchangeability or control in production or assembly, the Product Engineer shall show an effective date and/or serial number at which change shall be "cut" into production. Where non-interchangeability takes place through redesign, this will constitute a Class I change and shall require PCO approval.

(d) Stockroom personnel and others who handle material shall exercise care not to mix parts which carry different "issue letters". A separate stock bin shall be established for each "issue letter".

(e) The entire change is then submitted to the Project Engineer who reviews all revised drawings, parts lists and forms. He checks accuracy of dimensions and compliance to drafting standards. When satisfied the checker initials each parts list affected by the change and signs the ECN form in the space alloted with the date of signing also indicated. Any drawings requiring approval signatures are submitted to a Project Engineer, then returned to the checker.

(f) Then, all revised original drawings and lists together with Form QA013 are sent to the engineering file room for processing. A copy of the ECN form is filed in the drafting room for ready reference. The Project Engineer retains the old file prints temporarily for his records. If the change was an insignificant one, he may destroy the old file prints at this point.

3.5 Distribution of Data

(a) In the Engineering File Room, the ECN forms are analyzed for print requirements. A "Distribution List" guides the file clerk as to whom should receive prints and how many. New Engineering File Prints are made. New or revised part numbers are entered into part number record file with latest revision letter and date entered on each card. Records are revised on drawings which were made obsolete by the change and these original drawings are filed in the "obsolete file". Various print files distributed throughout the plant are brought up to date with new prints. The departments affected and the types of drawings for each are as indicated in the "Distribution List" on page 6.

(b) Original drawings and new file prints and ECN forms are then filed.

(c) All new production orders issued after release of the ECN must conform.

(d) All new purchase orders, after release of ECN, must have a revised drawing attached.

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A J Zimpa Date 3 Nov 1977
DODQAR

Concurred by: H. Gilchrist Date 1-NOV. 1977
Chief Engineer

Revision #04 BY Frank M. Laino QUALITY ASSURANCE MANAGER
16 June 1980 DATE

Reviewed By: A Zimpa DOD QAR
16 June 80 DATE

Concurred By: Martin Fryatt CHIEF ENGINEER
20 June 80 DATE

| PREPARED BY: | A. J. Cassell |
|---|---|
| DATE PREPARED: | 3 March 1976 |
| APPROVED BY: | |

# NRC QUALITY ASSURANCE PROCEDURES

SUBJECT: ENGINEERING DRAWINGS

| NUMBER: | 1003.1-2 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 10 August 197 |
| PAGE 1 OF 7 | |

1.0 Purpose

1.1 To establish a procedure for the handling of Engineering Drawings which will:

(a) Assure satisfactory maintenance of files,

(b) Provide for proper handling and distribution, and

(c) Insure that the latest information is available at the time and place of effectivity.

2.0 Scope

2.1 These procedures are applicable to the following:

(a) Departments: Engineering, Drafting, Assembly, Machine Shop, Inspection, Sales, Purchasing, Quality Control.

(b) Personnel: All persons requiring the use of blueprints and Engineering changes.

(c) Vendors and Sub-contractors: For the purchase of materials.

3.0 Contents of Instructions

3.1

| Paragraph | Reference |
|---|---|
| 4 | General Instructions |
| 5 | Research and Development |
| 6 | Drawing Control |

4.0 General Instructions

4.1 No one will maintain an unauthorized blueprint or engineering change file.

4.2 Only the latest drawings applicable will be used for manufacturing and inspection purposes.

4.3 A copy of obsoleted and superseded drawings must be maintained and stored in the Drafting Department. All Supervisors are responsible to see that his Department always work with up-to-date drawings and that all outdated drawings are returned to the Drafting Department. Q.A. will conduct periodic checks to assure no obsolete drawings are used.

4.4 Unapproved changes on production drawings are prohibited. In emergencies, a change is authorized, provided the drawing is approved by Representatives of three departments - Engineering, Manufacturing and Quality Assurance and dated. If the drawing is accompanied by a properly authorized Variation Permit covering the variation from the drawing, the drawing need not be signed or approved as above. A copy of the variation permit must accompany material when moved to successive operations. In the event the lot is split for any reason an additional variation permit will be drawn up referencing the original variation permit. Upon completion of various operations all variation permits must satisfy the original.

4.5 When a drawing is marked up for the use in the Lab (on prototype parts), it must bear the legend "For Lab Use Only". Such a drawing will require only the Engineer's signature and the date.

4.6 In the event that a print of an unreleased or unchecked drawing is required for advance production, the print is to be stamped as follows:

Advance Engineering Information Authorized for use by

_____

Date _____

Expiration Date _____

The cognizant engineer and QC representative must sign and date the print.

5.0 Research and Development

5.1 New designs will be developed by the Project Engineers working in close association with Design Draftsmen and the Quality Assurance Department.

(a) Upon completion of a design project, all basic drawings and sketches together with changes made during development are turned over to a draftsman for execution of detail and sub-assembly drawings.

(b) Review and verification of designs shall be the responsibility of the Director of Engineering. Acceptance of new design drawings will be indicated by the Director's signature in verification space provided on drawings.

(c) Accepted drawings shall then be returned to drafting for assignment of permanent drawing number identification logged in Document Drawing Book.

(d) Copies of verified drawings shall be distributed by Drafting Department to Q.C., project engineer and Director of Engineering.

(e) An Engineering Change Request before production drawings are released is made directly on original print. However, all changes made after drawings are released require an Engineering Change Notice (FormQA4789) and the appropriate revision marking.

6.0 Drawing Control

(a) The release of a drawing shall require the approval signatures of the cognizant engineer and the Director of Engineering in the designated part of the title block.

(b) Following a controlled release, all changed to assemblies beyond the prototype stage will be made by an ECN, in accordance with the established Design-Drafting Procedures. It is the responsibility of the cognizant engineer to obtain approval on all ECN's.

(c) An ECN is primarily an instrument of formal communication. ECN's will be required for all changes involving equipment in the field, or which have been given final approval prior to shipment to a customer. Also ECN's may be required to direct rework on items in stock or process affected by changes to released drawings. This is primarily to facilitate and formalize communications.

6.1 Definitions

(a) Controlled Engineering Drawings - Reproducible masters of drawings, schematics, specifications, Test Inspection Procedures, artwork, wire lists, tooling drawings, and Engineering Change Notices which are prepared, released, and controlled according to the requirements set forth in this procedure.

(b) Uncontrolled Drawings - Reproducibles with or without an assigned drawing number that have not been released.

(c) Released Print - A print of any document that is as defined in subparagraph (a).

(d) Nonreleased Print - A print of any document that is not controlled and is used for pricing, bidding, or reference purposes. A nonreleased print is recognized by the absence of authorized approval.

(e) Engineering ChangeNotice (ECN) - A document that authorizes a change to information covered on released drawings and showing which documents are changed, and the changes made. It also authorizes and delineates physical changes to be made to equipment, according to the requirements set forth in this procedure.

6.2 Types of Releases

(a) Prototype Release - A prototype release is for the purpose of building one or more prototype units for evaluation. All prints issued for the purpose of building of prototype units shall bear the following stamp:

PROTOTYPE ONLY

These prints shall be marked with corrections and suggestions by those responsible for building the prototype units and returned to Engineering. Engineering shall then evaluate all corrections and suggestions for incorporation into the drawings prior to making the controlled release. Prints bearing the "Prototype Only" stamp must never be used to fabricate, assemble or inspect production parts or units.

(b) Controlled Release - A controlled release is for the purpose of fabrication, assembling, inspecting and testing productions, parts, and/or assemblies for delivery to outside customers.

(c) Reference Only - Prints requested by individuals not on the controlled release distribution list for their own information for proposals or general information distribution. These drawings are recognized by the ISO drawing prefex.

(d) Preliminary - These drawings are issued for limited purposes before the design has been finalized. Examples of such purposes are for buying of raw stock and long-lead items (purchasing and/or stores) or for determining mounting hole pattern in mating chassis (issued to customer). These prints will not have authorized approvals.

These prints must never be used to fabricate, assemble, inspect or test any equipment, production or prototype.

6.3 Engineering Change Notice Procedure

This procedure defines the requirements for originating and processing Engineering Change Notice (ECN's) for all controlled release drawings.

(a) Responsibility - An ECN may be requested by Engineering, Quality Assurance, Production, the customer or his Inspector. All ECN's must be reviewed and approved by authorized engineering supervision. The Drafting Manager shall distribute all Engineering ChangeNotices and issue ECN numbers. The Drafting Manager shall be responsible for maintaining a file for the original copies of ECN's.

(b) Originating an ECN - ECN's will be originated by Engineering and/or Drafting/Design. The information to be provided is as follows:

1. Drawing number
2. Title
3. Title of change or reason for change
4. Description of change
5. Other drawings affected
6. Other equipment or assemblies affected
7. Specific disposition required (if necessary)

Approvals will be obtained by drafting after documentation is complete and prior to starting any rework.

(c) Drafting Manager - Should follow the steps below:

1. Enter the ECN status in the log book and assign an ECN number, if it hasn't already been assigned.

2. Pull the affected vellums from the file, attach the ECN, and schedule the package for rework.

3. All valid ECN's should be distributed in the following manner to alert other departments:

Production Control
Quality Assurance
Director of Engineering
Originator
All other departments having that print

(d) Incorporating the Change - Drafting shall incorporate the changes specified on the ECN to all affected drawing originals.

The number of the ECN shall be entered in the revision block of the title block.
After obtaining the necessary "Drawn By", checked by and approval signatures in the change description block of each drawing, the draftsman shall sign and date the "Changed by" block on the ECN form and return the complete package to Data Control.

(e) Releasing the Change - Data Control will do the following:

1. Enter the release date in the ECN log.

2. Note new data on drawing control cards, e.g. new revision number and the release date.

3. Run blueline copies of the drawings and the ECN staple the ECN to the prints and distribute in the normal procedure.

4. Return the originals to the file

6.4 File prints are removed by Engineering personnel only. Originals may be removed only by Draftsmen for purposes of revision or running extra prints.

6.5 The Engineering File Room is a completely closed room. Admittance is by key only to personnel authorized by the Chief Draftsman. All files containing original drawings are to be locked except during working hours.

6.6 If an extra print is required for any purpose, (quotations, etc), it may be ordered by filling out a reproduction requisition and submitting to chief draftsman.

6.7 Engineering Changes are to be effected through the use of Form QA013 as specified in accompanying Quality Assurance Procedure 1003.1-1.

6.8 Quality Assurance will maintain a cross-referenced file showing customer's part number and applicable Nuclear Research Corporation part number.

Prepared by: Andrew J. Carroll Date 18 October 1977
Quality Assurance Mgr.

Reviewed by: [signature] Date 3 Nov. 1977
DODQAR

Concurred by: [signature] Date 1-NOV. 1977
Director of Engineering

| PREPARED BY: | A. J. Cassell |
|---|---|
| DATE PREPARED: | 1 March 1976 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

**SUBJECT:** CONTROL OF ENGINEERING RELEASE/DERELEASE
FORM # QA5942

| NUMBER: | 1003.1-3 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 10 August 1977 |
| PAGE 1 OF 4 | |

1.0 Purpose

1.1 To define a procedure for the release of new designs or redesigns by Engineering to operating groups; i.e., Manufacturing, Engineering, and Materials Control and to Quality Control.

1.2 To define a procedure for the derelease of a design, whether new or old, from the production groups to Engineering for redesign, correction of design, etc.

1.3 To assign responsibility for release of new designs or redesigns by Engineering.

1.4 To assign responsibility for derelease of a new design or derelease of design for redesign or correction of design.

2.0 Scope

2.1 These procedures cover release in whole or in part, by Engineering of all newly designed units to the operating groups & Quality Assurance for the purpose of design review, tooling, parts procurement and parts fabrication.

2.2 These procedures cover the derelease, in whole or in part, by Engineering, Operations or Quality Assurance of any previously released design requiring redesign, or to be obsoleted.

3.0 Contents

4.0 Procedures

4.1 Release of New Design

4.1.1 When Engineering has determined that the design of a unit is ready for release to the production groups, for review, methodizing, tooling, procurement of raw material and assemblies, a formal release of the design shall be made. This release may be of the design in whole or may be a partial release if such release will expedite the functions of the operating groups.

4.1.2 The authorizing Engineer, upon determination to release, will prepare the Engineering Release/ Derelease form. This form shall be completed using six (6) copies. These copies shall be distributed as listed below:

| | |
|---|---|
| Quality Assurance | - 1 Copy |
| Quality Control | - 1 Copy |
| Manufacturing Engineering | - 1 Copy |
| Production Planning | - 1 Copy |
| Sales | - 1 Copy |
| Engineering | - 1 Copy |

In the preparation of the form the authorizing Engineer will sign the form, signifying the release of the design and indicate whether each of the items listed are complete or partial releases. If the release is a partial release the authorizing Engineer shall indicate in the remarks section of the form the documents released or, if more convenient, the documents remaining unreleased. Any other information that would be necessary to the performance of the functions of the operating group should also be included by the Authorizing Engineer, in the remarks section.

4.1.3 No release is considered final until file copy is signed by a Quality Assurance representative.

4.2 Derelease of Design

4.2.1 The determination to derelease a design may be made by the heads of the following groups:

Quality Control
Operations
Engineering
President's Office

A derelease of a design will be made, when it is necessary for any of the above groups to return to Engineering any of the documents formally released, for redesign, change, or correction.

4.2.2 When such redesign, change or correction cannot immediately be effected, an Engineering Release/ Derelease form shall be prepared by the group determining the need for making notification to the cognizant activity. The appropriate block or blocks, shall be initialed by the person preparing the form. If the derelease is not whole, the extent of the derelease shall be entered in the remarks section of the form.

4.2.3 The issuance of a Derelease shall cause all copies of the affected drawing(s) to be removed from work areas.

4.2.4 If a design has been dereleased by the QA Manager it may not be released (full or partial) until his approval on file copy is obtained.

4.3 General

4.3.1 The Engineering release authorizes the operation group to proceed with the review of design for manufacturing purposes, procurement of raw materials, design and procurement or fabrication of tooling and procurement and/or fabrication of parts, sub-assemblies, and assemblies within the economic limitations as approved at the time the design was authorized.

The Engineering release, plus notification by Manufacturing Engineering that Design Review is completed, authorizes Quality Control to proceed with the design and procurement of gaging and test equipment necessary for the fabrication of the parts, sub-assemblies, assemblies and end product. The expenditures necessary for the accomplishment of this purpose shall be within the economic limitations as approved at the time the design was authorized. Design review can be indicated as complete on a part or all of the various components of an end product.

4.3.2 Any derelease, partial or in whole, will void the Engineering release and will require that when the derelease design is re-released, the Engineering release must again be made by Engineering.

4.3.3 Any submission of a derelease may be questioned, and should be questioned, if the cause for derelease is not considered a valid cause.

4.3.4 The work "design" herein refers to a piece part, sub-assembly, assembly, or end product. It also refers to a "redesign" as well as the "initial design".

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A.C. Zuspan Date 3 Nov 1977
DODQAR

Concurred by: J. Julia Schiller Date 1 NOV 1977
Engineering Manager

Revision #04 BY: Frank M. Laino QUALITY ASSURANCE MANAGER
16 June 1980 DATE

REVIEWED BY: A. Zuspan DOD QAR
30 Sep 80 DATE

CONCURRED BY: Martin Fryl CHIEF ENGINEER
21 Jun 1980 DATE

| PREPARED BY: | A. J. Cassell |
|---|---|
| DATE PREPARED: | 3 March 1976 |
| APPROVED BY: | ajc. |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: CONTROL OF MEASURING AND TEST EQUIPMENT

| NUMBER: | 1003.2-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 8 December78 |
| PAGE 1 OF 9 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the methods for identifying, maintaining, calibrating and otherwise controlling the use and accuracy of measuring and test equipment.

2.0 Scope

2.1 This procedure will apply to all mechanical and electrical measuring and testing equipment used at Nuclear Research Corporation to assure that purchased supplies and manufactured products conform to technical requirements.

3.0 Procedure

3.1 Responsibility

3.1.1 The Quality Assurance Department will be responsible for the calibration of all test equipment. Q.A. will also be responsible for the preparation and control of procedures for performing such calibrations and maintaining records of the calibrations.

3.1.2 Q.A. will control the calibration of all measuring and test equipment by monitoring the records, certifications, and equipment to assure adherence to the calibration procedures. Any item of equipment past-due for calibration, damaged, inaccurate or otherwise unsuitable for use will be tagged accordingly and segregated until correction has taken place.

3.2 Adequacy of Standards

3.2.1 All calibration will be performed using equipment which, because of its inherent accuracy, stability, and range, has been qualified by Q.A. as Transfer Standards or Reference Standards.

3.2.1.1 A Reference Standard is a standard which has been calibrated by a qualified laboratory and has certification traceable to the National Bureau of Standards.

3.2.1.2 A Transfer Standard is a standard which has been calibrated by direct comparison with a Reference Standard.

3.3 Environmental Controls

3.3.1 Measuring and test equipment will be calibrated and used in an environment controlled to the extent necessary to assure continued measurements of required accuracy. When applicable, compensating corrections will be applied to calibration results obtained in an environment which departs from standard conditions. Applicability and degree of compensation will be subject to the approval of Q.A.

3.4 Calibration Intervals

3.4.1 The frequency of calibration for electrical and mechanical measuring and test equipment will be established on the basis of stability, purpose, and degree of usage. The prescribed calibration interval for each item is listed in Quality Assurance Procedures 1003.2-2 (Electrical Measuring Equipment) and 1003.2-3 (Mechanical Measuring Equipment). These procedures and the calibration intervals defined there-in, are subject to the approval of Quality Assurance.

3.4.2 Calibration Records will be reviewed quarterly Q.A. to determine if the interval should be changed because of a change in accuracy, stability, or usage.

3.5 Calibration Procedures

3.5.1 Calibration Procedures will be prepared & issued by Q.A. or prepared and issued by Engineering subject to approval of Q.A. which will describe, in detail, the method to be followed in calibrating equipment. The procedures may be a compilation of published standard practices; manufacturers written instructions, or Nuclear Research Corporation prepared procedures.

3.5.2 The procedures shall define, whenever possible, the standard to be used for the calibration, to insure that comparison is performed with higher accuracy level standards.

3.6 Calibration Source

3.6.1 Reference Standards

3.6.1.1 Reference Standards will be calibrated by a commercial facility capable of providing the service (with the approval of Q.A.) a Government Laboratory, or the National Bureau of Standards.

3.6.1.2 The interval of calibration for a Reference Standard will be that interval specified in Quality Assurance Procedure 1003.2-2 or 1003.2-3.

3.6.1.3 The calibrating facility will be required to furnish the following data in the certificate of calibration.

(a) Date of calibration.

(b) Serial Number of Reference Standard calibrated.

(c) Nomencalture of Reference Standard calibrated.

(d) Nomenclature and Serial Number of equipment used to calibrate the Reference Standard.

(e) Date of calibration of equipment used to calibrate the Reference Standard.

(f) Traceability of calibrating equipment to NBS.

(g) Environmental conditions under which calibration was performed.

(h) Accuracy of Reference Standard.

(i) Corrections which must be applied to cover any variations from standard conditions of temperature, humidity, etc., that are not met or differ from those at the place of calibration.

3.6.1.4 A calibration record will be maintained by Q.A. for each Reference Standard. (Form QA0200).

This record will contain:

(a) Equipment nomenclature.

(b) Equipment Serial Number.

(c) Scheduled calibration interval.

(d) Calibration Certification Number.

(e) Date of last calibration.

(f) Due Date of next calibration.

3.6.2 Transfer Standards

3.6.2.1 Transfer Standards will be calibrated at those intervals specified in Quality Assurance Procedures 1003.2-2 and 1003.2-3.

3.6.2.2 The calibration will be performed using the appropriate Calibration Procedure.

3.6.2.3 A calibration record will be maintained by Q.A. for each Transfer Standard. This record will contain: (Form QA0200).

(a) Equipment nomenclature.

(b) Equipment Serial Number.

(c) Date of Calibration.

(d) Serial Number of the Equipment with which the Transfer Standard was calibrated.

(e) Due date of next calibration.

(f) Correction factors to be applied to Transfer Standard.

(g) Initials or stamp of person performing calibration.

(h) Calibration Procedure Number.

3.7 Calibration Records

3.7.1 A calibration record will be maintained for each item of working equipment by Q.A. This record will contain: (Form QA0200).

(a) Equipment nomenclature

(b) Equipment Serial Number

(c) Calibration Interval

(d) Date of calibration

(e) Initial or stamp of person performing the calibration.

(f) Due date of next calibration.

(g) Any other information pertinent to the calibration of the equipment.

(h) Calibration Procedure Number.

3.7.2 All calibration records (working equipment and standards) will be maintained in a manner which will provide for calibration or recall on or before the calibration due date.

3.8 Equipment Labeling

3.8.1 Each item of measuring and test equipment (working equipment and standards) will bear, if size and usage permits, a label which will contain the following data:

(a) Date of calibration.

(b) Initials or stamp of person performing the calibration.

(c) Due date of next calibration.

(d) Serial Number of equipment (may be omitted if S/N is permanently etched, stamped, or affixed to the equipment.)

3.8.2 In the event the equipment cannot be labeled, due to size or usage, the calibration record will be so noted and it will be initialed or stamped in lieu of the equipment label.

3.9 Subcontractor Calibration

3.9.1 All subcontractors are required to have a calibration system which essentially satisfies the intent and requirements of MIL-C-45662. Any subcontractor may be required to furnish objective evidence of his conformance to these requirements to Nuclear Research Corporation Q.A. Quality Assurance will have the responsibility of determining that a subcontractor has a satisfactory calibration system.

3.9.2 When applicable, each Purchase Order to a subcontractor must bear a statement that:

"The subcontractor is required to establish or adopt and maintain a calibration system for measuring and test equipment which will substantially satisfy the requirements and intent of MIL-C-45662.

3.9.3 Applicability of paragraph 3.9.2 and/or request for evidence of conformance will be determined by Nuclear Research Corporation Quality Assurance based on:

(a) Type of purchased item.

(b) Use of purchased item.

(c) Complexity and required accuracy of purchased item.

(d) Economic and delivery considerations.

3.10 Equipment Found To Be Out Of Calibration

3.10.1 In the event that equipment is found to be out of calibration or defective and has been used in that condition, the following procedure must be followed:

(a) Notify Q.C. Foreman or Manager

(b) Remove a sample lot of the last two items checked with the suspect equipment.

(c) Re-inspect the sample lots with equipment known to be within calibration.

(1) If the sample lots are acceptable, it must be assumed that the equipment defect occurred after the last time that it was used. Further inspection of past lots will not be required.

(2) If the sample lots are found to be defective, it will be necessary to inspect previous lots in a reverse chronological order until no more defective lots are found.

(d) If materials are in further stages of production, follow paragraph (c).

(e) If materials have been delivered to customers, the customer shall be notified. The customer may have their Q. C. Department check the items or may return them for NRC to inspect.

Prepared by: Andrew J. Cassell — QUALITY ASSURANCE MANAGER — Date 8 Dec. 78

Reviewed by: A. Lampi — DODQAR — Date 21 FEB. 79

Concurred by: A. Wayne Raffetto — ENGINEERING MANAGER — Date 21 FEB 79

REVISION #04 by: Frank M Laino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: [illegible] DOD QAR

[illegible] DATE

CONCURRED BY: [illegible] CHIEF ENGINEER

22 June 1980 DATE

| Prepared By | A. J. Cassell |
|---|---|
| Date Prepared | 3 March 1976 |
| Approved By | A J C |
| | |

NRC

QUALITY ASSURANCE PROCEDURES

Subject: CALIBRATION OF ELECTRICAL MEASURING EQUIPMENT

| Number | 1003.2-2 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the intervals of calibration for all electrical measuring equipment.

2.0 Scope

2.1 Electrical measuring equipment as defined by this procedure will include all electrical test and measuring equipment used to determine and/or control product quality.

3.0 Procedure

3.1 Calibration Intervals of Reference Standards.

| | | |
|---|---|---|
| (a) | Standard Resistors | 2 years |
| (b) | Standard Capacitors | 2 years |
| (c) | Standard Cell | 2 years |

3.2 Calibration Intervals of Transfer Standards.

| | | |
|---|---|---|
| (a) | Differential | 1 year |
| (b) | AC Milliammeters | 1 year |
| (c) | Wattmeters | 1 year |

3.3 Equipment to be calibrated at biennial intervals.

(a) Chart Recorders

(b) Frequency Meter

(c) Harmonic Distortion Meter

(d) Pulse Generator

(e) H. V. Power Supply

(f) Multimeter

(g) D. C. Microammeter

(h) Precision Milliammeter

(i) Counter-timer

(j) Regulated D. C. Power Supply

(k) Regulated H. V. Power Supply

(l) Sq. Wave Generator

(m) Unit Pulser

(n) Vacuum Tube Voltmeter

(o) Hygrometers

3.4 Equipment to be Calibrated on yearly Interval:

(a) Audio Oscillator

(b) Digital Multimeter

(c) Dual Trace Oscilloscope

(d) Electrostatic Voltmeter

(e) Environmental Chamber

(f) Kilovoltmeter

(g) Pulse Generator

3.5 Equipment to be calibrated at Semi-yearly Intervals:

(a) Nuclear Research Corporation Survey Meter

(b) Victoreen Survey Meter

4.0 Partial Calibration

4.1 It shall be standard practice for Quality Control Inspectors, when measuring equipment is used on a daily or weekly basis, a partial recalibration on these equipments shall be carried out.

4.2 Partial calibration shall consist of calibration of equipment with primary or secondary standards to a degree which shall satisfy inspector that equipment calibration remains within acceptable tolerance. Record keeping of partial calibration is not required.

Prepared by Andrew J. Cassell Date 3 March 1976

Quality Assurance Manager

Approved by Andrew J. Cassell Date 5 May 1976

Quality Assurance Manager

Reviewed by A. J. Zimpri Date 28 May 76

DODQAR

REVISION #04 BY: Frank M. Lasio QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: A. Zimpri DOD QAR

DATE

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 3 March 1976 |
| Approved By | AJC |

NRC

QUALITY ASSURANCE PROCEDURES

Subject: CALIBRATION OF MECHANICAL MEASURING EQUIPMENT

| Number | 1003.2-3 |
|---|---|
| Effective Date | |
| Date Revised | 1/10/83 |
| Page 1 of 2 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the calibration intervals for all mechanical measuring equipment.

2.0 Scope

2.1 For the purposes of this procedure, mechanical measuring equipment will be defined to mean all gauges and measuring equipment used at Nuclear Research Corporation for dimensional inspection and verification.

3.0 Procedure

3.1 Calibration schedule for Master Gauges.

(a) Master set gauge blocks 2 years

(b) Diameter Plug Gauges 2 years

3.2 Equipment on Biennial calibration

(a) Dial Calipers

(b) Dial Indicators

(c) Height Gauge

(d) Micro-balance

3.3 Equipment on yearly calibration

(a) Micrometers

(b) Depth Gauge

(c) Mercury Thermometers

(d) Stem Thermometers

(e) Thread Gauges

(f) Dial Bores

4.0 Partial Calibration

4.1 It shall be standard practice for Quality Control Inspectors, when measuring equipment used on a daily or weekly basis, partial recalibration on these equipments shall be carried out.

4.2 Partial calibration shall consist of calibration of equipment with primary or secondary standards to a degree which shall satisfy inspector that equipment calibration remains within acceptable tolerance. Record keeping of partial calibration is not required.

5.0 NRC Calibration

5.1 As defined in 1003.2-3, calibration of selected mechanical measuring equipment shall be carried out by Q. C. personnel authorized by Q.A. Manager

5.2 Certificate of Calibration (QA024) shall be issued for such of those mechanical measuring equipment calibrated.

5.3 Calibration inspection shall be carried out in accordance with NRC Procedure 200304.

Prepared by: Andrew J. Cassell Date: 3 March 1976

Quality Assurance Manager

Reviewed by: A J Turpin Date: 28 May 76

DODQAR

| Prepared By | A. J. Cassell |
|---|---|
| Date Prepared | 8 March 1976 |
| Approved By | AJC |
| | |

**NRC**

QUALITY ASSURANCE PROCEDURES

Subject: CONTROL OF PRODUCTION TOOLING USED AS MEDIA OF INSPECTION

| Number | 1003.3-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 2 | |

1.0 Purpose

1.1 The purpose of this procedure is to provide for control and monitoring by Nuclear Research Corporation Quality Assurance of all production tooling used as media of inspection.

2.0 Scope

2.1 "Production tooling" for the purposes of this procedure shall mean production jigs, fixtures, tooling masters, templates, patterns and such other devices which may be used for inspection and gaging.

3.0 Procedure

3.1 All production tooling used for inspection or gaging purposes will be approved by Nuclear Research Corporation Q.A. prior to such usage.

3.2 Q.A. will initially inspect each production tool for accuracy and condition and the information recorded on a calibration record.

3.2.1 Each production tool must be identified by a number which will identify it for subsequent inspections.

3.2.2 Q.A. will authorize the use of the production tool following inspection based on its accuracy, condition, and intended usage.

3.2.3 Q.A. will establish a calibration frequency based on the tools accuracy, condition, and intended usage, and will record the frequency on the calibration record.

3.2.4 The calibration record will be maintained by Q.A. in such a manner as to insure that there is adequate control of reinspections.

3.2.5 If periodic reinspection of any production tooling is not economically practical, control of such tooling will be maintained by "first-piece" inspection of parts produced by the tooling.

3.3 When inspection of a production tool by Q.A. reveals that the accuracy or condition of the tool has rendered it unfit for continued usage as an inspection or gauging device, Q.A. will notify the supervisor of the department where the tool was used and disapproved the tool for continued usage.

3.4 Frequency of calibration of jigs, tooling masters, templates, patterns, etc., shall depend upon frequency of usage. It shall be a standard practice of Nuclear Research Corporation that any production tooling used as an inspection media shall be calibrated prior to inspection use.

3.5 First piece inspection must be recorded even if fixture is used for inspection and must be documented on Inprocess Inspection records.

Prepared by Andrew J. Cassell Date 8 March 1976

Quality Assurance Manager

Reviewed by A C Lampen Date 28 May 76

DODQAR

Concurred by Ralf S. Halmen Date May 20, 1976

Manager of Manufacturing

| Prepared By | A. J. Cassell |
|---|---|
| Date Prepared | 8 March 1976 |
| Approved By: | AJC |
| | |

# NRC

## QUALITY ASSURANCE PROCEDURES

**Subject:** USE OF NUCLEAR RESEARCH CORPORATION INSPECTION EQUIPMENT BY GOVERNMENT REPRESENTATIVES.

| Number | 1003.4-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page | 1 of 1 |

1.0 Purpose

1.1 The purpose of this procedure is to define the conditions whereby Nuclear Research Corporation equipment may be used for Government Inspections.

2.0 Scope

2.1 This procedure will cover all gages, measuring, and testing devices which may be used in the conducting of a Government inspection.

3.0 Procedure

3.1 If the Nuclear Research Corporation DODQAR or any other qualified Government representative desires to use Nuclear Research Corporation equipment to verify conformance to contract requirements, this request will be initialed through Nuclear Research Corporation Quality Assurance.

3.2 Q.A. will coordinate with the Government inspector to establish the time, place, and type of inspection desired. Q.A. will have the option of suggesting times and places which will not interfere with production operations.

3.3 Q.A. will provide personnel to perform this inspection when the equipment is of sufficient complexity as to require operational training or if it is desirable to both Q.A. and the Government inspector.

Prepared by: Andrew J. Cassell Date 8 March 1976
Quality Assurance Manager

Reviewed by: A. J. Tompkins Date 28 May 76
DODQAR

60

| Prepared By | A. J. Cassell |
|---|---|
| Date Prepared | 8 March 1976 |
| Approved By: | AJC |
| | |

**NRC**

QUALITY ASSURANCE PROCEDURES

Subject: ADVANCED METROLOGY REQUIREMENTS.

| Number | 1003.5-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 1 | |

1.0 Purpose

1.1 This procedure will be used when any contractual measurement requirement is metrologically beyond the state-of-the-art.

2.0 Scope

2.1 This procedure will apply to any measurement requirement which cannot be met by commercially available measuring instruments.

3.0 Procedure

3.1 In the event that an Engineering or Quality Assurance review of request for proposal or contract reveals a contractual measurement requirement which is felt to be unrealistic or of such precision as to be impossible to measure with commercially available equipment, the Sales Department will be notified immediately.

3.2 Upon notification of such a requirement, Sales will contact the Contracting officer and request a waiver or a change of the measurement requirement.

3.3 If a contractual measurement requirement is of such a character as to not be available with commercial equipment, yet is not beyond the state-of-the-art, Engineering will notify Sales of this requirement.

3.4 Upon notification of such a requirement, Sales will contact the Contracting Officer and request a waiver or request funds for Engineering design and construction of equipment to perform the measurement.

Prepared by Andrew J. Cassell Date 8 March 1976
Quality Assurance Manager

Approved by [illegible] Date 20 May 1976
Company President

Reviewed by A. J. Lyssi Date 28 May 76

1.0 Scope

This section describes the basic requirements for qualifying Class IE equipment and interfaces that are to be used in nuclear power generating stations. These requirements, when met, will confirm the adequacy of the equipment design under normal, abnormal, design basis event, post design basis event, and containment test conditions for the performance of Class IE functions.

2.0 Purpose

The purpose of this document is to provide the qualification of Class IE equipment including components or equipment of any interface whose failure could adversely affect the performance of Class IE systems and electric equipment. Qualification required in IEEE Std 279-1971 (ANSI N42.7-1972), Criteria for Protection Systems for Nuclear Power Generating Stations can be demonstrated by using this document.

3.0 Definitions

These definitions establish the meanings of words in the context of their use in this section.

Analysis. A process of mathematical or other logical reasoning that leads from stated premises to the conclusion concerning specific capabilities of equipment and its adequacy for a particular application..

Auditable data. Technical information which is documented and organized in a readily understandable and traceable manner that permits independent auditing of the inferences or conclusions based on the information.

Class IE. The safety classification of the electric equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or otherwise are essential in precenting significant release of radioactive material to the environment.

Components. Items from which the system is assembled (for example, resistors, capacitors, wires, connectors, transistors, tubes, switches, springs, etc.).

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Containment. That portion of the engineered safety features designed to act as the principal barrier, after the reactor system pressure boundary, to prevent the release, even under conditions of a reactor accident, of unacceptable quantities of radioactive material beyond a controlled zone.

Demonstration. A course of reasoning showing that a certain result is a consequence of assumed premises; an explanation or illustration, as in teaching by use of examples.

Design basis events. Postulated events, specified by the safety analysis of the station, used in the design to establish the acceptable performance requirements of the structures and systems.

Design life. The time during which satisfactory performance can be expected for a specific set of service conditions.

Equipment qualification. The generation and maintenance of evidence to assure that the equipment will operate on demand, to meet the system performance requirements.

Installed life. The interval from installation to removal, during which the equipment or component thereof may be subject to design service conditions and system demands.

NOTE: Equipment may have an installed life of 40 years with certain components changed periodically; thus, the installed life of the components would be less than 40 years.

Interface. A junction or junctions between a Class IE equipment and another equipment or device. (Examples: connection boxes, splices, terminal boards, electrical connections, grommets, gaskets, cables, conduits, enclosures, etc.).

Nuclear generating station. A plant wherein electric energy is produced from nuclear energy by means of suitable apparatus. The station may consist of one or more units which may or may not share common auxiliaries.

Operating experience. Accumulation of verifiable service data for conditions equivalent to those for which particular equipment is to be qualified.

Qualified life. The period of time for which satisfactory performance can be demonstrated for a specific set of service conditions.

NOTE: The qualified life of a particular equipment item may be changed during its installed life where justified.

Sample equipment. Production equipment tested to obtain data that are valid over a range of ratings and for specific services.

Service conditions. Environmental, power, and signal conditions expected extremes in operating requirements, and postulated conditions appropriate for the design basis events of the station.

Type tests. Tests made on one or more sample equipments to verify adequacy of design and the manufacturing processes.

4.0 Introduction

It is the primary role of qualification to assure that for each type of Class IE equipment the design and the manufacturing processes are such that there is a high degree of confidence that future equipment of the same type will perform as required. The other steps in the quality assurance program require strict control to assure that subsequent equipment of the same type matches that which was qualified and is suitably applied, installed, maintained, and periodically tested. Margins used during type testing provide additional assurance that the equipment will perform as required.

Qualification may be accomplished in one of three ways: type testing, operating experience, or analysis. These may be used individually or in any combination depending upon the particular situation. In the first, the equipment will be subjected to the simulated environments and operating conditions for which it was designed and its performance measured in a test program. The limitations in such simulations, the abbreviation of exposures permitted by increasing the severity of the environment, and the validity of data extrapolations will be taken into account in the design of the test.

Operating experience is a limited, but useful method of qualification but of great use for the supplementation of testing in that it provides an insight into the change in behavior of materials and equipment with time under actual service and maintenance conditions. Operating experience is of particular use in qualification of equipment outside of the containment.

Qualification by analysis will include justification of methods, theories, and assumptions used. In general, electric equipment is too complex to be qualified by analysis alone, although it may be effective in the extrapolation of test data and determination of the effects of minor design changes to equipment that was previously tested.

With all qualification methods, the end result will be the documentation that demonstrates the equipment's adequacy to perform its required function.

5.0 Qualification Procedures and Method

The qualification of Class IE equipment shall include the following:

5.1 Identification of the Class IE Equipment Being Qualified.

5.2 Equipment Performance Specifications.

Electric equipment specifications shall define the equipment's Class IE requirements and shall include as applicable:

(1) Performance characteristics under defined normal, abnormal, containment test, design basis event, and post design basis event conditions,

(2) The range of voltage, frequency, load, electromagnetic interference, and other electrical characteristics,

(3) The installation requirements including mounting method and configuration(s),

(4) Preventive maintenance schedule for the installed life of the equipment, (including lubricants and seals),

(5) The design life of the equipment and the design life of any components which may have a life shorter than that of the complete equipment,

(6) Control, indicating, and other auxiliary devices contained in the equipment or external to the equipment and required for proper operation,

(7) The range, type, and duration of environmental conditions including temperature, pressure, humidity, radiation, chemicals, and seismic forces,

(8) Complete description and number of operating cycles including periodic testing,

(9) Qualified life. (This specification may be established during the qualification testing).

5.3 Type Test Procedures

5.3.1 General. The type test, as required by the QA Manager, shall be designed to demonstrate that the equipment performance meets or exceeds the requirements of the equipment specifications for the plant. The type test

shall consist of a planned sequence of test conditions that meet or exceed the expected or specified service conditions, including performance margin, and shall take account of both normal and abnormal operation.

5.3.1.1 Test Plan. The first step in the test procedure is the preparation of the test plan. The plan will be compatible with the equipment specification and will contain sufficient detail to describe the required tests and provide an auditable link between the specifications and test results.

The test plan will contain the following information:

(1) Equipment description
(2) Number (quantity) of units to be tested
(3) Mounting and connection requirements
(4) Aging simulation procedure
(5) The service conditions to be simulated
(6) Performance and environmental variables to be measured
(7) Test equipment requirements including accuracies
(8) Environmental, operating, and measurement sequence in step-by-step detail
(9) Performance limits or failure definition
(10) A description of any conditions peculiar to the equipment which are not covered above, but which would probably affect said equipment during testing.

5.3.1.2 Mounting. Equipment shall be mounted in a manner and a position that simulates its expected installation when in actual use unless an analysis can be performed and justified to show that the equipment's performance would not be altered by other means of mounting. By manner is meant the means to be used such as bolts, rivets, welds, clamps, etc. By position is meant the spatial orientation with respect to the gravitational field of the earth. The effect of any interposing structures which are required for installation, such as control boards, stands, legs, pedestals, etc, shall be taken into account in specifying the test mounting.

5.3.1.3 Connections. Equipment shall be connected in a manner that simulates its expected installation when in actual use unless an analysis can be performed and justified to show that the equipment's performance would not be altered by other means of connection. By manner is meant the means to be used in connection to equipment such as wiring, connectors, cables, conduit, terminal blocks, service loops, tubing, etc.

5.3.1.4 Monitoring. The test shall be monitored using equipment that provides resolution for detecting meaningful changes in the variables. The test equipment shall be calibrated against auditable calibration standards and shall have documentation to support such calibration. The time interval between measurements shall be such as to obtain the time dependence of each variable. In describing test sequences, the measured variables may be classified into general categories as follows:

5.3.1.4.1 Category I - Environment. Temperature, pressure, moisture content, gas composition, vibration, and time.

5.3.1.4.2 Category II - Input Electrical Characteristics. Frequency, current, voltage, power to the equipment, and time duration of the input.

5.3.1.4.3 Category III - Fluid Characteristics. Concentration of chemical constituents in fluid injected into the test chamber plus the flow rate and spray disposition and temperature of such fluids.

5.3.1.4.4 Category IV - Radiological Features. Nuclear radiation data including energy type, energy level, exposure rate, and integrated dose.

5.3.1.4.5 Category V - Electrical Characteristics. Insulation resistance of electrical components; voltage, current and power output; response time; frequency characteristics and simulated load.

5.3.1.4.6 Category VI - Mechanical Characteristics. Thrust, torque, time, and load profile.

5.3.1.4.7 Category VII - Auxiliary Function Measurements. Function measurements related to Class IE equipments which are included in the equipment but not necessarily for its own operation; that is items which are required to provide a signal to control other Class IE equipment. Included under this heading would be auxiliary switches and position feedback potentiometers. Measurements shall be taken which confirm the capability of the equipment to handle rated or specified load and to provide rated or specified accuracy. Relevant measurements would include: current carrying and current interrupting capability of switches; contact resistance of limit switches with contacts closed; and potentiometer resistance and linearity.

5.3.1.5 Margin. Margin is the difference between the most severe specified service conditions of the plant and the conditions used in type testing to account for normal variations in commercial production of equipment and reasonable errors in defining satisfactory performance. The qualification type testing shall include provisions to verify that adequate margin exists. In defining the type test, increasing levels of testing, number of test cycles, and test duration shall be considered as methods of assuring adequate margin does exist.

Factors to be applied to service conditions for type testing are as follows:

(1) Temperature: + 15°F(8°C). When qualification testing is conducted under saturated steam conditions, the temperature margin shall be such that test pressure will not exceed saturated steam pressure corresponding to peak service temperature by more than 10 $lb/in^2$.

(2) Pressure: + 10 percent of gauge, but not more than 10 $lb/in^2$ ($7.03(10^{-1})kg/cm^2$)

(3) Radiation: + 10 percent (on accident dose)

(4) Voltage: ± 10 percent of rated value unless otherwise specified

(5) Frequency: ± 5 percent of rated value unless otherwise specified.

(6) Time: + 10 percent of the period of time the equipment is required to be operational following the design basis event

(7) Environmental Transients: The initial transient and the dwell at peak temperature shall be applied at least twice.

(8) Vibration: + 10 percent added to the acceleration of the response spectrum at the mounting point of the equipment

5.3.2 Test Sequence. The type tests shall be run on the equipment in a specified order. For most equipment and applications, the following constitutes the most severe sequence; however, the sequence used shall be justified as the most severe for the item being tested.

(1) Inspection will be performed to assure that a test unit has not been damaged due to handling since manufacture and to determine basic dimensions. This inspection shall not be directed to select a specific unit for type testing.

(2) The equipment shall be operated under normal conditions to provide a data base for comparison with performance under more highly stressed conditions. Certain measurements such as drift (rate of change with time) of a parameter may be made at this time.

(3) The equipment shall be operated to the extremes of all performance and electrical characteristics given in the equipment specifications excluding design basis event and post design basis event conditions unless these data are available from other tests on identical or essentially similar equipment.

(4) Equipment shall be aged in accordance with Section to put it in a condition which simulates its expected end-of-qualified-life condition including the effect of radiation (design basis event radiation may be included). If the required radiation level can be shown to produce less effect than that which would cause loss of the equipment's Class IE function, radiation need not be included as part of aging. Certain key measurements should be made following aging to determine if the equipment is performing satisfactorily prior to subsequent testing.

(5) The aged equipment shall be subjected to such mechanical vibration as will be seen in service. This should include simulated seismic vibration and self-induced vibration.

(6) The aged equipment shall next be operated while exposed to the simulated design basis event (radiation will be excluded if previously incorporated). Those functions which must be performed during the simulated design basis event shall be monitored.

(7) The equipment shall then be operated while exposed to the simulated post accident conditions (following exposure to accident conditions). Those functions which must be performed following the simulated design basis event shall be monitored during this simulation.

(8) Disassemble, to the extent necessary for the inspection of the status and condition of the equipment and record the findings.

5.3.3 Aging. The objective of aging is to put samples in a condition equivalent to the end-of-life condition. If previous aging of various devices exists, it can be utilized provided these data are applicable and justifiable in regard to the service conditions that are required by the performance specifications of the device to be type tested.

A short period of accelerated thermal aging merely simulates service life; however, it produces some deterioration and, when followed by vibration may produce realistic failure modes. Radiation shall be added to other known degrading influences where appropriate. Margins over that expected in the qualified life shall be provided in the application of each influence. Electromechanical equipment (motors,

relays, etc) shall be operated to simulate the expected mechanical wear and electrical contact degradation (for example, contact pitting) of the device to be type tested.

An accelerated rate for the number of cycles equal to the required number during the design life may be utilized provided the rate shall not be accelerated to any value which results in effects that would not be present at normal rates.

Sample aging times of less than 100 hours shall not be permitted.

5.3.4 Radiation. All materials or components which may be degraded to a degree which would adversely affect performance of Class IE functions by the radiation exposure expected to occur during normal service and postulated accidents shall be irradiated to simulate this exposure. Radiation shall be applied as a part of the sequence of environments representative of service conditions. The equipment shall be subjected to the significant type of radiation equivalent to that expected in service. However, if more than one type of radiation is significant, each type can be applied separately. In determining the total required test radiation equivalent to that of service life, consideration shall be given to oxidation gasdiffusion effects. To facilitate the use of a reasonable test time, an accelerated exposure rate may be necessary. Thus, to allow margin for these effects, a greater total dose than the service lifetime dose should be applied. Formulas for approximating the test dose equivalent to service are given in IEEE Std 278-1967 (ANSI N4.1-1967), Guide for Classifying Electrical Insulating Materials Exposed to Neutron and Gamma Radiation and ASTM D 2953-71, Classification System for Polymeric Materials for Service in Ionizing Radiation.

5.3.5 Vibration. The aged equipment shall be qualified for expected seismic events in accordance with IEEE Std 344-1971. In addition, equipment subject to nonseismic vibration during normal and abnormal use shall be subjected to such typical vibration following the aging and seismic procedures. Vibration to be simulated shall include self-induced vibration (such as the starting and running of a motor, vibration from nearby equipment, or vibration from equipment) which produces the mounting support for the Class IE equipment being qualified (such as pipes, generators, motors, etc).

5.3.6 Operation Under Normal and Accident Conditions. Means shall be provided during the type test for electrically energizing the equipment, applying simulated loads, applying input signals, and exposing it to simulated environmental conditions (for example, temperature, pressure, moisture, vibration, nuclear radiations, chemical solutions, jet forces, and chemical composition of the ambient environment).

5.3.7 Inspection. Upon completion of type testing, the equipment shall be dismantled to permit all parts to be appropriately tested and visually inspected. The condition of electrical insulation, mechanical parts, bearings, lubricants, electrical contacts, wiring, gear drive trains, linkages, and other related components shall be recorded.

5.4 Operating Experience

5.4.1 General. Qualification of electric equipment by operating experience shall consist of determining the past history of performance and service conditions of the equipment type to be qualified, correlating operating service conditions with design service conditions, and proving that the Class IE performance characteristics of the equipment will meet or exceed the equipment specification under design service conditions.

5.4.2 Operating History

5.4.2.1 The operating environment of the electric equipment to be qualified shall be determined and shall be justified by analysis of the effects of non-continuous measurements. The documentation of the operating environment shall include physical locations and mounting arrangements of the equipments in the operating facilities.

5.4.2.2 The performance of the electric equipment type to be qualified shall be determined from measured data or analysis of failures that may have occurred or both. Documentation of all Class IE performance shall include measurement or determination of all performance characteristics in the equipment specifications, recording and analysis of all failures and trends that occurred during the operating period, and a log of all periodic maintenance (including adjustments and calibrations) and inspections.

5.4.3 Determination of Qualification. It shall be documented that the equipment whose operational history becomes a basis for qualification is typical of equipment bearing the same designation.

The electric equipment type shall be considered to be qualified by demonstrating that the recorded operating environment equals or exceeds the design environment in severity, and that the performance of the in service equipment equaled or exceeded the specified user requirements. The period of time for which the above requirements can be shown to be met with reasonable margin shall be the qualified life.

It should be noted that if the design environment includes seismic accelerations followed by a design basis event environment that is more severe than the recorded in service environment, then the installed equipment must, in general, be removed from service and subjected to a partial type test to include the seismic and design basis event effects before the equipment can be considered fully qualified.

5.5 Analysis. Qualification by analysis shall consist of a mathematical or logical proof that the Class IE performance of the equipment to be qualified meets or exceeds its specified performance when subjected to its specified normal and design basis event environments. In general, this proof must be based on established principles, operating experience data, partial type test data, or combinations of these. All assumptions, including extrapolations that are made in proof, shall be justified by establishing principles or verifiable test data; and the analysis shall be of a form that can be readily understood and verified by people qualified in the pertinent discipline of engineering or science.

The electric equipment type shall be considered to be qualified by demonstrating that the equipment performance will meet or exceed its specified values for the most severe environment or sequence of environments in the equipment specification during its qualified life. The severity of the environmental parameters shall be based upon knowledge of the failure modes and failure mechanisms of the equipment which may be based upon the known limits of extrapolation of the time dependent environmental effects if an accelerated aging test was used to determine the mathematical model.

5.6 Modifications. Modifications will not be made to the equipment, or test specifications, after the start of the type test or beginning of the operating experience reporting period since such modification will normally render the test and experience results inconclusive. Modifications may be made only if full justification is documented on the basis that such modifications have no bearing on the validity of the test.

Each modification to the equipment or to the equipment specification made after the type test or beginning of the operating experience reporting period shall be evaluated to determine its effect on the equipment qualification. This evaluation shall indicate whether or not complete requalification is required. If not, the analysis or data and evaluation that demonstrates the effect of the modification on equipment performance shall be added to the original qualification documentation.

Components of the equipment which can be shown to be unaffected by the change need not by type tested again, as previous operating experience and type test data along with complete qualifications for portions affected by the modification shall constitute qualification of the entire equipment.

Any changes in qualification basis, materials of construction, lubricant, mechanical stresses, clearances, manufacturing process, dielectric stress levels, etc, shall be identified and the equipment requalified if necessary. Necessity shall be based on effect of the change on the equipment's Class IE functions.

5.7 Documentation. Files which provide documentation of the qualification procedures, methods, and results shall be maintained by the QA Manager, to provide a current basis for qualification and permit conparisons if future tests are conducted.

Prepared by: A Wayne Polfratt Date 1 October 1977
Product Manager

Reviewed by: Andrew J Cassell Date 1 October 1977
Quality Assurance Manager

Concurred by: _____ Date 1 October 1977
President

REVISION #04 BY Frank M Laino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: A. Lupi DOD QAR

16 JUN 80 DATE

CONCURRED BY: [signature] PRESIDENT

20 June 80 DATE

| PREPARED BY: | A. J. Cassell |
|---|---|
| DATE PREPARED: | |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

**SUBJECT:** Purchasing Control

| NUMBER: | 1004.1-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 1/10/80 |
| PAGE 1 OF 6 | |

1.0 Purpose

1.1 The purpose of this procedure is to control purchasing procedures as a means towards assurance of quality of purchased materials and processes.

2.0 Scope

2.1 This procedure applies to all sub-contracts and/or purchase orders issued to cover the procurement of any material or any special process performed on such material used in items for delivery to a customer. "Material" shall mean any raw material, part, or assembly. "Special Process" shall mean heat treat, anodize, plating, x-ray, testing, etc.

3.0 Procedures

3.1 As soon as practicable after the receipt of a contract, Engineering and/or Production Control will review the contract, drawings, and/or specifications to determine the purchased material or process requirements for the contract. Purchasing will be advised of these requirements by receipt of a requisition from Production Control.

3.2 Supplier Selection

3.2.1 The selection of a supplier by Purchasing to provide a particular material or process will be based on the supplier's quality history with Nuclear Research Corp., (maintained by NRC Quality Assurance) as well as economic and delivery considerations. Q.A. shall annually issue a qualified vendor's list to implement this selection Form QA 026

3.2.2 Supplier selection is subject to the approval of qualified representatives of Nuclear Research Corp. Quality Assurance and Engineering.

3.2.3 Vendor performance shall be noted on quality history cards maintained by QA.* The vendor shall be notified regarding unacceptable quality ratings. Any corrective action proposed by the vendor shall be reviewed by QA to determine if it is acceptable to NRC. * Form QA 025

3.2.4 Vendor ratings shall be coded and divided into four classes: 1 is excellent; 2 is good; 3 is fair; and 4 is unacceptable. Vendor ratings shall be indicated on the Vendor Performance History Card.

3.2.5 When it becomes necessary to procure material and/or services from a vendor with a 3 or 4 rating, QA will be notified of such action by Purchasing prior to the placement of the Purchase Order.

3.2.6 When the Quality Assurance Department has no supplier records for a particular material, suppliers appearing on the Qualified Products List will be given prime consideration.

3.2.7 Review of previous suppliers history shall be a basis of rating vendors based on:

1. QPL availability
2. Delivery scheduling
3. Past problem areas
4. Accept/reject history
5. Conformance of required paperwork, C of C, analytical analysis, etc.

3.3 Purchase Orders

3.3.1 A copy of all Purchase Orders (Form #8747) for Quality Related Materials & Services will be forwarded to QA for review as part of the normal distribution of the P.O.

3.3.2 Each Purchase Order will include:

(a) NRC Part Number, NRC specification number, MIL drawing or specification number, or adequate commercial identification. Revision levels for all drawings and specifications will be included.

(b) Reference to all MIL specifications applicable to the order as determined by QA and requisitioner.

(c) Request for supporting test data, if required by QA and/or requisitioner.

(d) Certificate of Conformance (if required) must accompany shipment of material.

(e) Requirement for NRC approval by QA and/or Engineering before making significant design changes.

(f) Any other special instructions or requirements necessary for the supplier to furnish the desired material or process.

(g) DOD rating

(h) Prime Contract Number
(i) See Page 79

3.3.3 It will be the responsibility of Production Control to determine the applicability of the requirements of Paragraph 3.3.2 and to forward this information to Purchasing.

3.3.4 When Government Source Inspection is required and designated by DCAS-QAR, Quality Assurance Procedure No. 1006.1-1 (Government Inspection at Supplier Facilities) will be observed.

3.3.5 Quality Assurance will review a copy of the Purchase Order for the adequacy of the information.

3.3.5.1 If it is approved, it will be forwarded to Receiving Inspection.

3.3.5.2 If it is disapproved, Production Control, Purchasing, and the requisitioner will be notified so that the Purchase Order may be amended or cancelled if necessary. Such notification will be made no more than two working days after receipt of the P.O.

3.4 Vendor Control

3.4.1 Responsibilities - Quality Assurance shall:

(a) Insure that procurement documents are in accordance with the applicable QA contractual provisions and to the project inspection plan.

(b) Determine the appropriate QA inspection requirements for each procurement action to assure adequate and economical coverage without unnecessary duplication of inspection and test effort.

(c) Maintain liaison between QA personnel responsible for receiving inspection and the Customer QA Representative to coordinate special inspection and test requirements and to provide source inspection, where required.

(d) Maintain liaison with the Customer QA Representative as required. Screen emergency procurement requisitions covering materials or services to assure that adequate inspections, tests, and certifications can be performed as required by contractual documents. Initiate waiver action, as applicable, wherever deviations from the contract are necessary.

3.4.2 Receiving Inspection personnel shall:

Review, validate, inspect, and accept materials, reports, and certifications in accordance with QA provisions specified by applicable procurement documents. Detailed instructions for receiving inspection are contained in Section

3.5 Procedures - Quality Assurance shall:

(a) Screen engineering drawings, Engineering Change Notices, specifications and other related documents to assure compliance with QA provisions of the contract.

(b) Determine the capability of inspection and test at the destination and the need for certifications, chemical or physical test reports, or Source Inspection.

(c) Approve and stamp Purchase Requisitions and procurement documents, such as Purchase Order Changes which have been audited and found to be in compliance with Section 1004.3.3.2 In the event of any omissions or errors of documentation supporting the procurement action, they shall be returned to Purchasing for correction and/or resubmission. QA shall reaudit as per Section 1004.3.3.2.

NOTE: The Program Inspection Plan, approved by the Customer QA Representative, will indicate the requirements for source inspection. However, additional requirements may be indicated in certain areas, following approval. These cases will be discussed with the Customer QA Representative and concurrence obtained prior to approval of any Purchase Order Change by QA.

3.5.1 Receiving Inspection will verify the acceptability of incoming purchased materials by Quality Assurance Procedure No. 1005.1-1 (Receiving Inspection). Results of these inspections will be reflected in the suppliers quality history.

3.5.2 Should any purchase order be required to be changed, the necessary change shall be submitted by Project Mgr. to Q.A. for review and/or approval then to Purchasing Dept. Purchasing shall issue a change order reflecting additions, deletions, revisions, etc. Copies of these change orders shall be distributed as described in 1003.1-1 (3.5.C).

3.5.3 Prior to release of Purchase Orders, "Bill of Material" shall be forwarded to Q C Department and QAR for specific requirements and if necessary, Government Source Inspection by QAR.

NOTE: Paragraph 3.3.2

(i) When customer purchase order requirements include source inspection, Nuclear Research Corp. shall incorporate a statement on purchase order instructing vendor of source inspection requirements.

(j) Where audit of vendor is required as if no audit has been conducted and Nuclear Research Corp. selects to audit vendor, notification shall be made in writing to vendor instructing them of forthcoming audit.

(k) Audit shall be conducted to ascertain reliability of vendor. All purchase orders shall reflect proposed audit when required. Vendors shall be instructed of all specific documentation requirements including record retention and disposition when deemed necessary by Q.A. Manager.

Prepared by: Andrew J. Cassell Date 1 October 1977

Quality Assurance Manager

Reviewed by: A. Lupis Date 3 Nov 1977

DODQAR

Concurred by: Anthony F. Galli Date 3 October 1977

Purchasing

REVISION #04 by: Frank M. Laino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: [illegible] DOD QAR

[illegible] DATE

CONCURRED BY: C Hamilton PURCHASING

6-23-80 DATE

| PREPARED BY: | W. Paffrath |
|---|---|
| DATE PREPARED: | |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: SOURCE INSPECTION

| NUMBER: | 1004.2-1 |
|---|---|
| EFFECTIVE DATE: | 10AUGUST1977 |
| DATE REVISED: | |
| PAGE 1 OF 3 | |

1.0 Purpose

The purpose of this section is to establish the procedures to be followed by Nuclear Research Corporation Quality Assurance personnel when performing source inspection.

2.0 Scope

This section is applicable to all source inspection performed by QA personnel, as modified by the special requirements of each individual contract.

3.0 Applicability

The requirement for source inspection is applicable under the following conditions but not necessarily limited to these conditions:

(a) When specified by NRC customer.

(b) On equipment or materials which require inspection but will be drop-shipped directly to the customer's facility.

(c) When special instruments, gages, test equipment or environmental facilities required for inspection are available only at the source.

(d) When inspection at any other point would necessitate uneconomical disassembly or destruction.

(e) When inspection during the production process is necessary to determine product quality.

(f) When special and/or expensive packing or packaging would be destroyed if the inspection were performed at any other point.

(g) If an appreciable loss would result to NRC due to unacceptable supplies being shipped, then having to be returned for correction.

(h) When it is necessary to witness special tests, processes, or to examine records, certifications and other evidence of quality.

(i) When inspection at the source results in a substantial net cost saving with no compromise in product quality. (Any source inspection trips must be approved by the appropriate Program Manager, in advance.)

4.0 Procedures

The procedures indicated below will be followed by QA personnel when making source inspections:

(a) Schedule the inspection at a time and date mutually agreeable with NRC Purchasing, the vendor and QA. The vendor should be advised that source inspection is required when the Purchase Order is placed.

(b) Prepare a Source Inspection Package which contains the following documents and materials, as applicable:

Purchase Order or Subcontract
Procurement Specifications
Statement of Work
Applicable Workmanship Standards
Correspondence relating to the procurement
Manufacturer's Specifications

NOTE: The Source Inspector will inspect the materials to the controlled print, or negative, which NRC furnished to the vendor. If no additional items are remaining to be manufactured on this order, he should pick up the controlled print and return them to NRC.

(c) Coordinate with our Customer's Source Inspection Group in case they desire to be present.

(d) Upon arrival at the vendor's facility, contact their Quality Assurance organization and conduct the scheduled inspection in company with their QA Representative.

(e) Compare the supplier's written QA Procedures (if any) with the procedures being followed to ensure compliance.

(f) Perform sufficient inspections of the product during its manufacturing process to determine that their inspection system is adequate and insures good quality.

(g) Witness any end-item tests as required by documents in the Source Inspection Package.

(h) Initiate a Reject Notice if the product is discrepant and deliver to the Supplier's Quality Assurance Department. Retain a copy of the RN until rework or substitution has been satisfactorily completed, inspected and accepted. Keep a copy of the RN for the NRC QA files.

(i) If the product is acceptable, signify by stamping with the round stamp, as follows:

1. As close to the nameplate or part number as possible.

2. On the container, tag, or label for small parts, or on materials which will not accept a stamp.

3. On "Inspection By" stickers on chassis, where additional work on the chassis will break the sticker.

4. On the vendor's shipper and all copies. This stamp should be accompanied by a date and the Inspector's signature. Obtain one copy for the QA file.

(j) Monitor the vendor's packaging and shipping facility procedures for practices which might invalidate the inspection just concluded.

(k) Ascertain the means of shipping and date of expected arrival at NRC.

5.0 Records

The QA Department will maintain complete files on all materials which have had source inspection. Those files shall be set up by vendor name and shall contain the following:

(a) The source inspection package

(b) Copies of all RN's written

(c) Any reports written which pertain to the vendor's product quality.

Prepared by: Andrew J. Cassell Date 10 AUGUST 1977

Quality Assurance Manager

Reviewed by: A. Lempi Date 3 Nov. 1977

DODQAR

Concurred by: Anthony E Galli Date 3 OCTOBER 1977

Purchasing

| PREPARED BY: | A.J. Cassell |
|---|---|
| DATE PREPARED: | 8MARCH1976 |
| APPROVED BY: | ajc |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: RECEIVING INSPECTION

| NUMBER: | 1005.1-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 20FEB1979 |
| PAGE 1 OF 9 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the methods for verifying quality and conformance by inspection of materials and processes purchased by Nuclear Research Corporation and for providing data for the maintenance of supplier quality histories.

2.0 Scope

2.1 This procedure covers the inspection of any material or any special process performed on material which has been purchased for use in items for delivery to a customer.

3.0 Procedure

3.1 Receiving Inspection will receive from the Quality Assurance Manager a copy of the Purchase Order (Form 8747) that required approval.

3.2 A qualified representative of Receiving Inspection will review the copy of the Purchase Order to ascertain if any additional test equipment or instructions will be required to properly inspect the material.

3.3 The copy of the Purchase Order will be placed in file to await receipt of the material.

3.4 The purchased material or material which a supplier has processed, is received at Receiving Inspection accompanied by a copy of P.O. and packing slip, which is prepared by Receiving, together with any test reports included in the shipments.

3.4.1 If a Certificate of Conformance is required by the Purchase Order, it must accompany the material. Following inspection, the C of C will be retained in the QA office.

3.5 Receiving Inspection of Purchased Parts - The standard described in the following paragraphs is applicable to normal procurements of all material and services required for end user items, office furniture, office supplies and such items not requiring receiving inspection, should be indicated on the Purchase Order.

(a) The inspector shall inspect the received items following predetermined requirements set forth on the Purchase Order. Acceptance documentation utilized during this inspection shall be readily available, complete, accurate, and up-to-date. He shall record the details in the Receiving Inspection Log and check the material visually to assure that the material and description of the receiving documents are in agreement and the Receiving paperwork has evidence of required customer or NRC source inspection, if applicable.

(b) All tests and inspections shall be performed utilizing currently calibrated equipment as required by specifications or by standard practice. All electronic tests for purchased devices shall be accomplished according to purchase order instruction, utilizing Specification Control Drawings, Applicable-Test/Inspection Standards, Acceptance Test Procedures, Acceptance Test Specifications, and applicable Receiving Inspection Requirements.

(c) Results of inspections shall be stamped on receiving copy and appropriate QA forms.

(d) All items that pass Receiving Inspection Requirements shall be stamped by the QA Inspector or tagged with an "Accepted" tag, bagged, or packaged, as required, to prevent damage, and routed as directed by the Purchase Order instructions.

(e) A "Hold" tag shall be initiated whenever required certifications are not included with the shipment or when QA requires additional information to enable the performance of an inspection.

(f) Nonconforming items shall be tagged with a red Reject Tag (QA010) and a material discrepancy notice initiated. The rejected parts shall be routed immediately through QA to the MRB area for disposition (Refer to Section 1005.5-1).

(g) NRC Source-accepted items, unless otherwise specified, shall be reinspected by QA only to the extent necessary to verify that they are the materials specified on the Purchase Order and that they are identified, tagged, and have received no damage during handling and shipment.

3.6 Receiving Inspection of Raw Materials

3.6.1 Metallic raw materials that are not identified by the manufacturer with continuous grade stamping shall be identified by Receiving,

(a) Raw materials are accompanied by the required test reports or certificate. Materials not accompanied by certificates shall be held pending acquisition of same.

(b) Chemical analysis and physical test results are in conformance with applicable specification requirements.

(c) Accepted material is identified by the Inspector before being moved into the raw material storage area.

(d) Procured materials subject to age deterioration are marked with an indication of the date on which the critical life was initiated and the date on which the useful life will be expended. This material shall be audited during storage to prevent, reduce, and recognize deterioration during storage.

3.7 Receiving Inspection of Castings

3.7.1 Castings shall be checked for objective evidence of acceptance and for damage during transit. They shall then be processed as follows:

(a) Castings shall be checked for required test reports, physical analysis certificates, heat-treat records, X-ray reports, evidence of X-ray, casting serialization, and lot identification, as required.

(b) Unless specific instructions are issued by QA, the remaining castings shall be visually checked for physical damage, warping, shrinking, voids, porosity, core shift, etc.

(c) Acceptance or rejection of castings shall be accomplished in accordance with the procedures set forth in Section 1005.1-3.5a.

(d) Test reports and certificates shall be attached to the applicable receiving document and filed by the QA Department, as indicated in this procedure.

3.8 Receiving Inspection of Tools, Gages, and Mechanical Measuring and Physical Test Equipment

3.8.1 Tools, gages, and mechanical measuring and physical test equipment shall be checked by Receiving Inspection for proper description, certification, and shipping damage and then forwarded to QA for detailed inspection, test and calibration in accordance with Section 1003.2-3 "Calibration". Receiving documents and certifications shall accompany the material forwarded to Q.A.

3.9 Receiving Inspection of Electronic Test Equipment

3.9.1 General purpose electronic test equipment shall be checked against the receiving document for proper description, certification, and test documentation manuals and inspected for possible damage during transit. The receiving documents, together with the certifications, etc., shall then be delivered to the QA Department for the required inspection test and calibration, in accordance with Section 1003.2-2 "Calibration".

3.9.2 Incoming contractually deliverable electronic test equipment shall be handled per previous paragraph. Following inspection, calibration, and tagging, the equipment shall undergo system compatibility tests and be delivered in accordance with instructions contained in the applicable equipment contract.

3.10 If the received material is found to be defective, the following procedure will be observed:

3.10.1 The requisitioner will be notified to decide if screening of the material is desired.

3.10.1.1 If screening of the material is desired because of time considerations, the material will be inspected 100%.

3.10.1.2 All defective material will be returned to the supplier accompanied by a Debit Memo (Form QA012) showing cause of rejection on Form QA012A.

3.10.1.3 Any material found to be acceptable will be released to stock accompanied by the Material Receiving Report. A copy of the MRR and Form (QA005) is forwarded to Purchasing.

3.10-1.4 A Receiving Inspection Report (Form QA005) and/or Corrective Action Request (QA 008) for the rejected material will be initiated and forwarded to Q.A. for Review and Distribution.

3.10.2 If screening is not desired, the material will be returned to the supplier for reinspection and/or replacement.

3.10.2.1 The Material Receiving Report will be completed by the inspector showing shipment, rejection and reason. Copy 1 of this report will be forwarded to Purchasing and a Debit Memo (Form QA012) will be attached to the material.

3.11 If the received material is found to be acceptable, the following procedure will be observed:

3.11.1 The Material Receiving Report will be completed showing acceptance by the inspector and the material will be released to stock accompanied by Copy 1 of the report. Copy 1 of this report will be forwarded to Purchasing.

3.12 When material is in urgent need, a partial delivery of a rejected shipment can be released by Receiving Inspection by:

(a) Screening (100% inspection) the shipment until the desired number of acceptable units are found.

(b) Initiating a Partial Delivery Request. A copy of the M.R.B. (QA004) shall accompany material, when released, and forwarded to Purchasing.

4.0 Sampling Inspection

4.1 Purpose

This procedure establishes a basis for the preparation of sampling plans to provide an economic tool for control of quality by objective means through the use of statistics.

4.2 References

The following authorized documents shall be referenced for acceptance:

(a) Engineering Specifications
(b) Engineering Drawings
(c) Purchase Order Requirements
(d) Purchase Specifications
(e) Customer Drawings
(f) Customer Purchase Orders or Contract Documents
(g) Quality Assurance Plans
(h) MIL-STD-105D

4.3 Definitions

Inspection Lot - The inspection lot shall be defined as the number of identical items or the number of items of similar characteristics of an individual item which is submitted to QA for acceptance or rejection as a group.

4.4 Classifications of Defects

The classification of defects is the description of possible defects of a unit of product according to their seriousness. A defect is any nonconformance of the unit of product from specified requirements. Normally, defects will be classified into one of the following categories:

Class 1 Critical Defects - A critical defect is a defect that judgment and experience indicate is likely to result in hazardous or unsafe conditions in the equipment or for individuals using or maintaining the equipment. One-hundred percent inspection of these attributes are required.

Class 2 Major Defects - A major defect is a defect other than critical that is likely to result in failure or materially reduce the usability of the item for its intended purpose. An Acceptable Quality Level (AQL) of 1.0 percent will be used for the inspection of these attributes.

Class 3 Minor Defects - A minor defect is neither major or critical but is a departure from requirements that is not likely to reduce the usability of the item for its intended purpose. An AQL of 1.5 percent shall be used for the inspection of these attributes.

Class 4 Incidental Defect - A Class 4 Incidental Defect is less serious than a minor defect and will be used when the characteristics of defect, in Engineering judgment, cannot possibly affect the safety, performance, function, or usability of the product.

4.5 Limitations

The provisions of this procedure shall apply as required by Engineering specifications and instructions from QA. Only the sampling tables included in this procedure are authorized for use by the inspector. In the event Engineering specifications require an AQL sampling table that is not a part of this procedure, QA shall be contacted for further instructions.

4.6 Responsibilities

The QA Manager, or his designated alternate, shall be responsible for the formulation and application of sampling plans in accordance with applicable requirements.

4.7 Procedure

(a) A representative sample shall be selected and segregated from the inspection lot according to the applicable AQL.

(b) The characteristics to be inspected shall be segregated into the various classifications of defects and inspected in the following order: Class 4 characteristics first, then Class 3, Class 2 and Class 1. This method assures the randomness of the representative sample.

(c) Discrepancies found during the sampling operation are to be recorded on a Material Discrepancy Notice according to their classification, and tagged with a "Reject Tag". If, in accordance with the instructions in the applicable sampling table, the lot is rejectable, QA supervision shall be contacted to determine if the lot is to be 100 percent screened or submitted to the MRB for disposition in accordance with Section 7, "Non-conforming Material Control, Material Review Board". Accepted lots shall be passed on in accordance with the procedure used on other accepted materials.

4.8 Tables

The following tables are provided for use in the inspection by attributes. Data in the tables have been extracted from the applicable tables of the MIL-STD-105, latest issue. No other tables are to be used without the concurrence of QA.

4.8.1

| | LOT SIZE | SAMPLE SIZE | ACCEPTABLE NO. OF REJECTS | MIN. NO. OF REJECTS FOR REJECTION OF ENTIRE LOT |
|---|---|---|---|---|
| AQL = 0.65 percent | 2-8 | 100% | 0 | |
| | 9-15 | 100% | 0 | |
| | 16-25 | 100% | 0 | |
| | 26-50 | 20 | 0 | 1 |
| | 51-90 | 20 | 0 | 1 |
| | 91-150 | 20 | 0 | 1 |
| | 151-280 | 20 | 0 | 1 |
| | 281-500 | 80 | 1 | 2 |
| | 501-1200 | 80 | 1 | 2 |

4.8.1

| AQL = 1.0 percent | LOT SIZE | SAMPLE SIZE | ACCEPTABLE NO. OF REJECTS | MIN. NO. OF REJECTS FOR REJECTION OF ENTIRE LOT |
|---|---|---|---|---|
| | 2-8 | 100% | 0 | |
| | 9-15 | 100% | 0 | |
| | 16-25 | 13 | 0 | 1 |
| | 26-50 | 13 | 0 | 1 |
| | 51-90 | 13 | 0 | 1 |
| | 91-150 | 13 | 0 | 1 |
| | 151-280 | 50 | 1 | 2 |
| | 281-500 | 50 | 1 | 2 |
| | 501-1200 | 80 | 2 | 3 |
| 4.8.2 AQL = 1.5 percent | 2-8 | 100% | 0 | 1 |
| | 9-15 | 8 | 0 | 1 |
| | 16-25 | 8 | 0 | 1 |
| | 26-50 | 8 | 0 | 1 |
| | 51-90 | 8 | 0 | 1 |
| | 91-150 | 32 | 1 | 2 |
| | 151-280 | 32 | 1 | 2 |
| | 281-500 | 50 | 2 | 3 |
| | 501-1200 | 80 | 3 | 4 |

Prepared by: Andrew J. Cassell Date 1 October 1977
Quality Assurance Manager

Reviewed by: A Lampin Date 11/4/77
DODQAR

Concurred by: A Wayne Paffrath Date 10 October 1977
Contract Administrator

REVISION #04 BY: Frank M. Lains Q.A. MANAGER

16 June 1980 DATE

REVIEWED BY: A Turpin DOD QAR

80 Jul 03 DATE

CONCURRED BY: [illegible] CONTRACT ADMINISTRATOR

20 June 1980 DATE

| PREPARED BY: | A.J.Cassell |
|---|---|
| DATE PREPARED: | 8 March 1976 |
| APPROVED BY: | AJC |

# NRC
## QUALITY ASSURANCE PROCEDURES

**SUBJECT:** IN-PROCESS & BENCH INSPECTION - MACHINE SHOP

| NUMBER: | 1005.2-1 |
|---|---|
| EFFECTIVE DATE: | 1/19/79 |
| DATE REVISED: | 1/19/79 |
| PAGE 1 OF 4 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the methods used at Nuclear Research Corporation for inspection and quality control of parts and material in-process in the machine shop and their acceptance or rejection before stocking.

2.0 Scope

2.1 For the purposes of this procedure In-Process and Bench Inspection is defined to include In-Process Inspection for preventive purposes and Bench Inspection for acceptance purposes.

3.0 Procedure

3.1 Machine Shop In-Process Inspection

3.1.1 Machine shop operations will be the responsibility of the Production Manager. It will be his responsibility to assure that first piece inspection is performed by Q.C. on each job run and for the continuing quality of material produced in the shop.

3.1.2 DELETED

3.1.3 Should the Production Manager or Q.C. determine that a machine or operator is producing unacceptable material, Production Manager shall stop the operation, or when that is not feasible, reject not for Material Review Board consideration.

(a) Advise the operator and request correction. If the operator does not make the correction, he shall.

(b) Notify the shop Supervisor, who shall be responsible for assuring correction of the unacceptable characteristic if possible.

(c) If correction cannot be taken the Supervisor shall immediately notify Production Manager & Quality Assurance of the problem.

(d) Quality Assurance will review the defective characteristic, with Shop supervision. The following actions may be taken thru PMRB:

1. Submit defective parts for MRB action.

2. Obtain an Engineering Change when authorized by contract.

3. Obtain a Route & Tool Change.

4. Correct the deficiency thru rework.

(e) The "stop order" may be rescinded only by Quality Assurance, once it has been imposed.

3.1.4 Upon completion of the machine shop operation the finished parts shall be progressed, with the route & tool sheet and machining print to the Bench Inspection area.

3.2 Machine Shop - Bench Acceptance Inspection

3.2.1 The Q.A. representative shall select a random sample from the lot of parts submitted. The sample size shall be in accord with MIL-STD-105D, Level II, normal, unless otherwise indicated on the Inspection Record Sheet (Form QA-006).

3.2.2 The sample shall be examined to determine its conformance with the print, and any other documents specified by the print. If the lot is found acceptable, the Q.A. representative will note his findings on the Inspection Record Sheet (Form QA-006), and fill out the Inspection Record. The original copy shall be filed by the Q.A. representative at the end of each day for his records. The carbon copy shall be retained by Inspection for his records. The. Q.A. representative shall prepare a move ticket for the acceptable material and stamp the move ticket to indicate acceptance.

3.2.3 The acceptable material and copy of Travel Ticket shall be progressed to stock.

3.2.4 If the sample indicates the lot to be unacceptable, the inspector shall prepare an Inspection Record (Form QA-005). The original disposition, Return to Department, shall be made by the inspector. When the defective material has been reworked or screened, the Inspection Record and parts shall be returned to the Q.A. inspector. The Q.A. inspector shall re-inspect the parts as in paragraphs 3.2.1 and 3.2.2, except that he shall only inspect for the class of defect originally found defective and visually for damage to other characteristics.

3.2.5 If the reworked characteristics can no longer be reworked, the disposition shall be changed to MATERIAL REVIEW.

3.2.6 The defective lot, inspection and print shall be progressed to the MRB area for further action.

3.3 Quality Assurance

3.3.1 Continued surveillance will be maintained by Quality Assurance on the Operation Sheets used by the Machine Shop. These will be periodically audited for completeness and accuracy of information.

3.3.2 Q.A. will ascertain the need for process control when direct inspection of processed material is not advisable, and will establish controls & procedures for such process control when it becomes applicable, or is required by a contract.

3.3.3 Q.A. will annually audit the records and inspection samples to assure compliance with procedures and effectiveness of inspections.

Prepared by Andrew J. Carroll Date 8 March 1976

Quality Assurance Manager

Reviewed by A J Lupi Date 28 May 76

DODQAR

REVISION #04 BY: Frank M. Laino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: A Tapia DOD QAR

DEC 4, 80 DATE

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 9 March 1976 |
| Approved By: | AJC |
| | |

# NRC

QUALITY ASSURANCE PROCEDURES

Subject: IN PROCESS INSPECTION ASSEMBLY

| Number | 1005-2.2 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

## 1.0 Purpose

1.1 The purpose of this procedure is to describe the methods used at Nuclear Research Corporation for inspection and quality control of subassemblies in the Assembly area.

## 2.0 Scope

2.1 For the purposes of this procedure, In Process Inspection is defined to mean all Assembly Area inspections up to but not including Final Inspection and Testing. Inspections may be performed by Inspectors or by operators with Q.C. auditing.

## 3.0 Procedure

3.1 Printed Circuit Board Assembly

3.1.1 At the completion of printed circuit board assembly or subassembly, all parts will be inspected by a member of the Inspection Department.

3.1.2 The inspection will be conducted using the drawing for the item, the Inspection Record (form QA-006) for the item and statistical sampling method per MIL-STD-105D.

3.1.3 The lot will be sample inspected for all electrical and mechanical characteristics shown on the drawing and the results recorded on the Inspection Record.

3.1.4 If there are any rejects found during the sample inspection all of the lot will be screened by the Inspector. All defectives resulting from the inspections will be recorded on an Inspection Record (Form QA-006) and held for disposition by the Inspection Foreman. All the lots offered for screening or rework shall be placed on Government Inspection table for subassembly inspection if required.

3.1.5 If the inspection yields no defectives, the lot will be forwarded to stock or next assembly operation by use of a Production Notification Sheet.

3.1.6 Paragraph 3.1.2 will be applicable for this inspection, except that all accepted material will be released for stock by a Production Notification Sheet.

3.2 Systems Inspection:

3.2.1 Each system will move through the various assembly operations accompanied by an NRC TRAVEL TAG. As each operation is complete, the Travel Tag is initialed and dated by the person performing the operation. As each inspection is completed, the inspector will stamp the appropriate block on the Travel Tag, signifying acceptance or rejection of the unit, and date the entry.

3.2.2 If the unit is accepted, the NRC Travel Tag will so indicate and the unit is free to move to the next assembly operation.

3.2.3 If the unit is rejected, the Inspector will initiate a C.A.R. which will detail the discrepant characteristics and the serial number of the unit. This C.A.R. will accompany the NRC Travel Tag and the unit to a rework operation. At the conclusion of rework, the unit and all data will be returned to the inspection station for determination of rework effectiveness. The Travel Tag and Inspection Report will again be stamped as accepted or rejected at the conclusion of this inspection.

3.3 Quality Control:

3.3.1 Surveillance will be maintained by Quality Assurance on all Operation Sheets, drawings, assembly instructions, etc. used by the Assembly Department. These will be periodically audited for completeness and accuracy of information.

3.3.2 Q.A. will prepare all Inspection Procedures necessary for adequate control of the Inspection operations and monitor all NRC Instruction Sheets written for the use of Inspection personnel.

3.3.3 Q.A. will periodically audit the Inspection Records and inspected samples to assure compliance with procedures and effectiveness of inspections.

Prepared by Andrew J. Cassell Date 9 March 1976

Quality Assurance Manager

Reviewed by A.J. Turpin Date 28 May 76

DODQAR

| PREPARED BY: | W. Paffrath |
|---|---|
| DATE PREPARED: | 1AUGUST1977 |
| APPROVED BY: | |

# NRC
# QUALITY ASSURANCE PROCEDURES

SUBJECT: IN PROCESS INSPECTION-ELECTRICIAL

| NUMBER: | 1005.2-3 |
|---|---|
| EFFECTIVE DATE: | 10AUGUST1977 |
| DATE REVISED: | |
| PAGE 1 OF 3 | |

## 1.0 Purpose

This standard sets forth QA controls and responsibilities for the electrical inspection of in-process electrical fabrication operations to assure compliance with applicable specifications.

## 2.0 Scope

2.1 This standard shall apply to the inspection of all in-process electrical fabrication of parts, assemblies, and components including forming, potting, encapsulation, cleaning, soldering and wiring.

2.2 This procedure does not apply to the receiving inspection of subcontractor or supplier items which are covered by Section "Receiving Inspection".

## 3.0 Responsibilities

3.1 In-Process Electrical Fabrication Inspection (EFI) shall:

(a) Inspect and monitor all in-process electrical fabrication and associated processing operations in accordance with applicable drawings, specifications, and QA Interim Standards, etc., to assure that manufacturing operations are accomplished in accordance with the established Manufacturing Standards.

(b) Monitor electrical fabrication and processing areas to insure that the tools, processing equipment, and test equipment in use are currently calibrated and used as specified.

(c) Require that special handling and packaging requirements are accomplished and maintained as specified.

(d) Constantly monitor special processes such as cleaning, soldering, encapsulation, and coating to insure that they are controlled, and are used as specified.

(e) Maintain control over parts, subassemblies, components, and materials to be sure they are correctly handled, stored, and protected from damage and loss of identity.

(f) Handle the items inspected in a manner that will prevent damage, contamination, or loss of identity.

(g) Record the results of all inspection operations at the required inspection points on the fabrication documents that accompany materials during all manufacturing operations.

3.2 Quality Assurance shall provide administrative support by:

(a) Reviewing processes and specifications to anticipate the need for inspection tools and test equipment.

(b) Coordinate specific program QA problems with the personnel concerned.

(c) Monitoring processes, fabrication, and the test of electrical fabrication to insure that manufacturing methods and inspection operations are conducted in a manner that does not compromise the quality and reliability of the end product.

4.0 Inspection Standards

4.1 When materials, parts, subassemblies, or components are issued to manufacturing for processing, fabrication, or assembling, EFI shall:

(a) Check materials to assure that they are properly identified with the correct part number and revision as specified by the applicable fabrication documents, and that they bear evidence of previous inspection acceptance.

(b) Check materials for damage or contamination that may have occurred during storage, transportation, or handling.

(c) Check materials for limited life, shelf life, or cure dates to assure that they are within specified end dates.

(d) Reject all unidentified, discrepant, or damaged materials.

(e) Indicate acceptance or rejection of materials by an appropriate inspection stamp at each material issue operation of the fabrication document and release for fabrication. (Form QA006)

(f) Assure that discrepant materials are properly identified, tagged, and promptly remoced from the Production area, in accordance with Section 7 "Nonconf rming Material Control, Material Review Board".

4.2 During the manufacturing process, EFI shall inspect all parts, components, assemblies, and subassemblies at the points designated on the applicable fabrication flow charts or flow cards, or in accordance with specific inspection instruction for the material, in the following manner:

(a) Inspect all manufacturing operations accomplished since the last indicated inspection.

(b) Inspect in accordance with the requirements of applicable drawings and related engineering specifications and to other applicable engineering data or first article inspection requirements.

(c) Indicate the inspection status of all material by inspection stamping the item, where practical, to indicate the material has been processed according to applicable engineering and fabrication documentation. When inspection stamping of the material is impractical, the stamp shall be applied to an identification tag attached to the individual item or container.

(d) Assure that discrepant material is properly identified, tagged, and removed promptly from the Manufacturing or Test area in accordance with Section 7 "Nonconforming Material, MRB".

Prepared by: Andrew J. Cassell Date 1 August 1977
Quality Assurance Manager

Reviewed by: A Zimpri Date 11-4-77
DODQAR

Concurred by: A Wayne Paffrath Date 1 September 1977
Contract Administrator

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 9 March 1976 |
| Approved By | AJC |
| | |

# NRC

QUALITY ASSURANCE PROCEDURES

Subject: FINAL INSPECTION AND TESTING

| Number | 1005.3-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to define the method and requirements of performing the final inspection and testing of a product.

2.0 Scope

2.1 This procedure will apply only to those inspections and tests which are performed on assemblies, components or systems just prior to packing for shipment or just prior to installation into higher assemblies. Final Inspection will be defined to include such testing as is required to assure conformance of the finished item.

3.0 Procedure

3.1 Individual Tests:

3.1.1 All end assemblies, such as detectors, meters, cables, P.C. boards, panels, cases, etc., will be subjected to individual electrical and/or mechanical inspection and testing, before being accepted as a finished assembly. Such completed assemblies may be packed for delivery as end items or may be incorporated into higher assemblies such as systems and indicators. These higher assemblies will, in turn, each be given Final Inspection before being approved for shipment.

3.1.2 All inspection and testing will be performed by an inspector or by such other individuals as have been approved by Q.A. for Final Inspection. All personnel, while performing inspection functions, shall be under Q.A. control.

3.1.3 Final Inspection will be for those characteristics which are indicative of the product's quality and conformance to specification and/or simulate the actual operation of the product. The characteristics to be inspected, the criteria for acceptance, the

3.1.3 (Continued)

equipment to be used, and any other pertinent information will be provided by an Inspection Procedure. The applicable Inspection Procedure will be identified by the same part number as th item being inspected. Where an instrument is ordere to a customer's print, the unit must meet the requirements of that document. A copy of the customer's print shall be made available to the DODQAR at the point of his inspection if required.

3.1.4 Test data will be recorded on an Electrical Test Data Sheet (form QA-1-1), or, when testing systems, a data sheet designed for that system or indicator. When completed, all data sheets will be forwarded to Q.A. for analysis and filing.

3.1.5 The results of each inspection will be shown on the Final Inspection Data Sheets for that part number being inspected. All completed Inspection Records will be forwarded to Q.A. for analysis and filing.

3.1.6 When an inspection or test results in items being rejected, a Corrective Action Request (Form QA-008) shall be initiated This form will indicate the part name and number, work order number, quantity inspected, accepted, and rejected, reason for rejection, etc. This form will be forwarded to an authorized representative of Q.A. who will provide disposition for the defective items and initiate corrective action, if necessary.

3.1.7 Any item which has been reworked, repaired or modified as a result of rejection during Final Inspection will again be submitted for Final Inspection.

3.1.8 Quality Assurance will have the option of questioning the inclusion or exclusion of any inspection or test procedures initiated by Engineering. All inspection and test procedures must be reviewed and approved by Q.A. prior to use.

3.1.9 Q.A. will have the responsibility of assuring that the Inspection Records for an item accurately reflects the requirements of the purchase specification. Q.A. will advise Sales concerning the advisability or feasibility of any non-standard test required by the customer.

3.2 Sampling Tests:

3.2.1 All testing on sampled items shall be tested in accordance with contract or specification requirements. Any end item sampling shall be approved by Procuring Contracting Officer (PCO).

3.2.2 Sampling tests may be required by a customer (e.g. Qualification tests, Reliability tests) or may be a continuing Quality Assurance function (e.g. Type Tests).

3.2.3 Change in sampling, increase or reduction, shall occur only upon concurrence of DODQAR.

3.2.4 Q.A. will have the option of performing sample testing in lieu of individual testing of specific characteristics only when:

a. Individual testing on that characteristic is not required by the customer.

b. The characteristic is not critical to the functioning of the end item.

c. The inspection history of that characteristic indicates a high rate of acceptance, and

d. The reduction in inspection has the concurrence of DODQAR.

Prepared by: Andrew J. Cassell Date: 9 March 1976

A.J. Cassell

Reviewed by: A.J. Lupsi Date: 28 May 76

DODQAR

| Prepared By | A. J. Cassell |
|---|---|
| Date Prepared | 8 March 1976 |
| Approved By: | AJC |

**NRC**

**QUALITY ASSURANCE PROCEDURES**

**Subject:** HANDLING, STORAGE AND DELIVERY

| Number | 1005.4-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the methods for control of the handling, storage, and delivery operations at Nuclear Research Corporation.

2.0 Scope

2.1 For the purposes of this procedure, storage and delivery will be defined to mean stockroom operations and packing and shipping respectively.

3.0 Procedure

3.1 Handling

3.1.1 All materials will be handled in a way which will minimize the possibility of occurrence of contamination, corrosion, or any other damage.

3.1.2 In-process parts which have not been cleaned will be handled in steel, plastic, or metal-edge fibreboard containers, with or without covers.

3.1.3 In-process parts which have been cleaned, or higher assemblies utilizing cleaned parts will be handled in steel, plastic, or metal-edged fibreboard containers with covers.

3.1.4 Peg-boards or dividers will be used in the containers whenever possible for protection of the material. Peg-boards will not be used by themselves.

3.1.5 Stacking of handling containers will be permitted only if the containers rest on the lower containers and not on the material within those containers.

3.1.6 All material being handled will be adequately and accurately identified by Move Tickets or similar devices designed for the purpose.

3.1.7 Quality Assurance will annually audit the containers used for materials handling and the manner in which they are being used to assure compliance with this procedure.

3.2 Stock Room Operations

3.2.1 Purchased, in-process, or finished materials will not be accepted for stock unless such material is accompanied by a Move Ticket (or similar device) which identifies the material and shows Inspection acceptance.

3.2.2 The Move Ticket will be removed from the material when the material is placed in stock and will be filed by the person(s) in charge of the stock room(s) for inventory control and reference.

3.2.3 When a drawing change is made with other than a "use up existing stock" disposition, it will be the responsibilityof Production Control, upon being notified of such a change disposition, to initiate the removal of all affected material from stock for reworking or scrapping.

3.2.4 Any and all material which is or may be affected by aging will be dated when it is placed in stock and the stock of such materials will be rotated so as to use the oldest material first. If any material has a limited shelf life, a "DO NOT USE AFTER" date will also be conspicuously placed on the material.

3.2.5 All material in stock will be maintained in a manner which will minimize the possibility of contamination, corrosion, or any other damage.

3.2.6 Q.A. will annually audit the stockroon operations to assure that all material is being properly stored per the requirements of this procedure.

3.3 Packing and Shipping

3.3.1 A copy of all customers' contracts will be delivered to the Sales Department who will review the contract and applicable specifications for packing and shipping requirements.

3.3.2 The Sales Department will detail the requirements on a form designed for the purpose and a copy of that form will be forwarded to the individual in charge of the Shipping Dept.

3.3.3 The Shipping Foreman will perform the packing and shipping operations for the contracted material in accordance with the detailed requirements, thus assuring conformance to contractual requirements.

3.3.4 The Shipping Foreman will not allow to be packed and shipped any contracted material for which he has not received a copy of the packing and shipping requirements, and which does not indicate Inspection acceptance.

3.3.5 Q.A. will annually audit the operations of the Shipping Dept. to insure compliance with this Quality Assurance Procedure.

Prepared by: Andrew J. Cassell — Date 8 March 1976
Quality Assurance Manager

Reviewed by: A.J. Lumpini — Date 28 May 76
DODQAR

Concurred by: Ralph S. Halvorsen — Date May 20, 1976
Manager of Production

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 8 March 1976 |
| Approved By | AJC |
| | |

# NRC

QUALITY ASSURANCE PROCEDURES

Subject: PACKING AND PACKAGING

| Number | 1005.4-2 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 2 | |

1.0 Purpose

1.1 The purpose of this procedure is to identify and describe the method and procedures to follow for Packing and Packaging all material, commercial or Government oriented.

2.0 Scope

2.1 The procedures used shall apply to all Government purchased material and normally is applicable to final shipment of completed items, assemblies, or subassemblies.

3.0 Procedures

3.1 Responsibility:

3.1.1 The Q.A. Department shall have the responsibility of reviewing contractual requirements as referenced under "Packing and Packaging" for all contracts or Purchase Orders.

3.1.2 It shall be the responsibility of the Quality Assurance Manager to issue a Government DSA Form 528 describing the method of Packing and Packaging. Reference shall be made to MIL-STD-726 for specific requirements and to MIL-P-116 for specific methods.

3.1.3 Markings for all shipments shall be in accordance with MIL-STD-129F, unless otherwise stated and shall be included as part of standard procedure, informing packers exactly what markings are required.

3.2 When required by contract, submission for inspection shall be made to DCAS-QAR on Form QA0600. Contractual requirements will be made available to DCAS-QAR should the necessity arise.

4.0 Documentation:

4.1 Required Documents:

4.1.1 As part of Packing and Packaging Procedures, each item packaged shall have the following documents:

1) DD Form 250
2) TCN, #1, 2, or 3, (when required)
3) GBL (when required)
4) Check-off List.

4.1.2 Check-off lists shall be initiated by packer to denote presence of all required items. The check-off list shall be retained with documentation of a specific contract and shall be available for review by DCAS-QAR or customer.

Prepared by Andrew J. Cassell Date 8 March 1976

Quality Assurance Manager

Reviewed by A J Turpin Date 28 May 76

DODQAR

| PREPARED BY: | A.J. Cassell |
|---|---|
| DATE PREPARED: | 9MARCH1976 |
| APPROVED BY: | ajc |
| | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: NON-CONFORMING MATERIAL

| NUMBER: | 1005.5-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 21FEB1979 |
| PAGE 1 OF 8 | |

1.0 Purpose

1.1 The purpose of this procedure is to define methods for controlling the identification, segregation, and disposition of non-conforming material.

2.0 Scope

2.1 Non-conforming material will be defined to mean purchased or manufactured items which are not in conformance with the applicable contract requirements, drawings and/or specifications.

3.0 Procedures

3.1 Class of non-conforming material will be as follows:

(a) Class I non-conforming material is that which contains deviations which affect system or end item specification, reliability, safety, maintainability, performance, interchangeability, weight, and appearance when they are significant factors.

(b) Class II non-conforming material is that which contains deviations not included in the category of Class I.

3.1.1 The class of a non-conforming item will be subject to the approval of the Material Review Board (MRB).

3.2 Non-Conforming Purchased and/or Sub-Contracted Material:

3.2.1 When Purchased material is found to deviate from the applicable drawing and/or specification, a Receiving Inspection Report, (Form QA-005) will be prepared as described in Quality Assurance Procedure 1005.1-1.

3.2.2 If it is the opinion of the Receiving Inspection Dept. that return of the material is not practical because of time limitations, economics, and/or the nature of the deviation, the material may be submitted for Material Review by so indicating on the Receiving Inspection Report (Form QA-005).

3.2.3 All copies of the Receiving Inspection Report, the applicable drawings, and/or specifications and a representative sample of the discrepant material will be forwarded to the Q.A. Manager or an authorized representative for Q.A. for preliminary review and/or MRB processing.

3.2.4 The remainder of the discrepant material which is held by Receiving Inspection will be identified by a Reject Tag which is appropriately marked "Hold for Material Review". (Form 010) The material will be segregated from all other incoming material and held for a disposition decision.

3.2.5 A preliminary review may be conducted by the Q.A. Manager or his authorized alternate, for the purpose of making a "return to Vendor", "rework", or "Scrap" decision. If none of these decisions are desirable, the material will be submitted to the Material Review Board. A "Use-As-Is" decision cannot be made as a result of a Preliminary Review but only as a MRB decision, except as noted below.

3.2.5.1 If a particular discrepancy on a particular part or assembly has previously been granted, a "Use-As-Is" decision by the MRB, the same discrepancy on the same part may be given as automatic "Use-As-Is" decision on no more than two additional inspection lots without MRB action. Such MRB action shall be based on the investigation results and corrective action performed. Such automatic decisions must have supporting documentation and must be approved by the Q.A. manager. The third submission would require action by the full Material Review Board.

3.2.5.2 All rework or repair of purchased material affecting Government procurement must be fully documented and repair procedures must be approved by Government representative.

3.2.6 The disposition of the material as a result of Preliminary Review or MRB decision will be noted on the Receiving Inspection Report under "MRB Disposition".

3.2.7 The Receiving Inspection Report will be retained and filed by Job & Purchase Order Number to be available upon request.

3.3 Non-Conforming Manufactured Material

3.3.1 All instances of non-conformance of manufactured parts or assemblies will be recorded on the Inspection Record (Form QA-006) by the Inspectors at the various inspection stations at Nuclear Research Corporation.

3.3.2 All IR's will be reviewed by the Inspection Foreman of the area within which the rejection occurred.

3.3.3 The Foreman will forward the IR, engineering prints, and/or specifications and a representative sample of the discrepant material to Q.A. A red reject tag will be placed with the remaining discrepant material and the material segregated from further processing until a material review decision has been made.

3.3.4 When part or all of the material in an inspection lot is found to be non-conforming, the work group may proceed on the balance of the order. This material will continue to be identified by a "HOLD FOR MATERIAL REVIEW" card and, upon completion of the operation(s), must not be moved from the work group unless authorized by MRB decision.

3.3.5 Preliminary Material Review - the QA Member of the MRB shall review all rejected material and associated documentation to determine that clear and valid statements have been made describing the nonconforming material. He shall then review the nonconforming material to determine whether the material shall be:

(a) Scrapped - If the material is obviously unfit for use and not repairable, it may be disposed of, as appropriate.

(b) Returned to Vendor (Rejected) - If a purchased or furnished item is non-conformant, it should be returned as a reject if there are no extenuating circumstances which affect the disposition.

(c) Complete or Rework to Specification - If the material does not meet requirements because of incomplete fabrication, additional work by Manufacturing or the vendor, as applicable, may be authorized to bring it within specified requirements. This must be an MRB action.

(d) Designated for MRB Action - All material for which a clearcut decision cannot be reached as to scrap, return to vendor, or complete shall be designated for MRB action.

3.3.6 The disposition of the material as a result of Preliminary Review or MRB decision will be noted on the IR.

3.3.7 Copies of the completed Inspection Report (IR) QA005 shall be returned to QA/QC files and when applicable, to the Foreman holding the discrepant material, with the sample parts, engineering print(s) and other documents.

3.3.7.1 In the event that the discrepant material is an end item, the MRB decision is to ship "As-Is", and the customer has agreed to accept the variation, a "Variation Permit" is prepared and the blue copy of the Variation Permit accompanies the shipped material.

3.3.7.2 All material either in-plant produced or vendor supplied shall be stored in holding area. This area shall be separated from bonded area to prevent commingling. Each lot of material shall be properly identified and await decision of either Q.A. Manager or MRB for further disposition.

3.3.7.3 On Government contracts, Variation Permits will not be shipped with any material. If the variant material is accepted by the DODQAR, it will be shipped as conforming material.

3.4 Material Review Board

3.4.1 Delegation of MRB authority must be in writing from prime contractors procuring materials for the Government or specified in prime contracts assigned to Nuclear Research Corp.

3.4.2 The Material Review Board will be composed of:

a) Quality Assurance Manager or an alternate approved by the Q.A. Manager and the DODQAR. *

b) Chief Engineer or an alternate approved by the Chief Engineer and the DODQAR. *

c) Manufacturing Manager. *

d) DODQAR or Customer's representative, whenever required.*

e) Contract Administrator or Product Manager.*

* When Applicable

3.4.3 A "Use-As-Is" decision by the MRB on discrepant material must be:

a) A Class II non-conformance (or Class I if permitted by Government contract) and

b) The unanimous decision of all members of the MRB.

3.4.4 All members of the MRB will sign the Variation Permit or RIR (whichever is applicable) when a decision has been agreed upon.

3.4.5 When MRB action is not permitted by Government contract, all Class I deviations will be submitted to ACO through the DODQAR.

3.4.6 Any one member can reject non-conformance on MRB. On Government procurement or authorization for MRB the Government Representative is the final authority to accept or reject non-conformance.

3.5 Quality Assurance Member Responsibilities

(a) Assuring that materials designated for MRB action are properly identified as "nonconforming" and moved promptly to the MRB area. (The only exceptions to this would be when material must be maintained in a Clean Room atmosphere; when a major setup would have to be torn down; or when the material is too large to be easily moved).

(b) Administrating MRB activities to assure the completeness of reviews and analyses of materials and records submitted to the Board.

(c) Rendering decision on the disposition of material submitted for review, in accordance with this procedure.

(d) Monitoring MRB activities to assure that adequate records of all Board actions are maintained and available for review.

(e) Initiating follow-up action to assure that nonconforming material is disposed of in an expeditious manner according to proper procedures.

(f) Initiating necessary follow-up measures to insure that prompt action is taken to remedy causes of recurring defects. The measures to be taken to prevent such recurrent defects are covered by Section 1002.5-1.

(g) Adequately controlling the MRB area to ensure the admittance of authorized personnel only.

(h) Proper control and final disposition of nonconforming material.

3.6 Engineering Member - The Engineering Member of the MRB shall:

(a) Recommend disposition of nonconforming materials based on engineering facts.

(b) Recommend satisfactory methods of rework or repair.

(c) Process changes to drawings and/or specifications that will improve the product manufacturability, when applicable.

3.7 Manufacturing Member - The Manufacturing Member shall be charged with the following responsibilities:

(a) Coordinate with Procurement for allocation of charges to suppliers covering rework, as applicable.

(b) Recommend satisfactory methods of rework or repairs to the Board, as may be appropriate.

(c) Initiate prompt corrective action to prevent recurrence of conditions under manufacturing control that might contribute toward the production of discrepant material.

(d) Accomplish necessary rework or repair in accordance with MRB disposition instructions.

3.8 Inspection Personnel - The responsibilities of the Inspection Personnel, with respect to this procedure, shall be as follows:

(a) Provide MRB with clear and valid statements covering the causes for rejections.

(b) Ensure that nonconforming materials are properly tagged, identified, and delivered to the MRB area, except as noted in Paragraph 3.5. (a).

(c) Ensure that action on MRB disposition is accomplished in accordance with the instructions of the Board. They must ensure that reworked materials are reinspected and accepted prior to release for further processing or use.

3.9 Rework and Scrap Dispositions

3.9.1 When a disposition of Rework is made on either purchased or manufactured material as a result of a Preliminary Review, the material will be adequately identified to insure that the material will be re-inspected following rework.

3.9.2 When a disposition of Scrap is made on either purchased or manufactured material, Quality Assurance Procedure No. 1005.5-2 will be observed.

Prepared by Andrew J. Cassell Date 10 August [illegible]

Quality Assurance Manager

Reviewed by A. Zimpri Date 11-4-77

DODQAR

Concurred by Ralph S. Holmen Date 11-3-77

Manager of Manufacturing

REVISION #04 BY: Frank M. Lauro Date 16 June 1980

Quality Assurance Manager

REVIEWED BY: A. Zimpri Date 20 Jun 03

DOD QAR

CONCURRED BY: Anthony E. Falbi Date 20 June 1980

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 9 March 1976 |
| Approved By: | AJC |

**NRC**

QUALITY ASSURANCE PROCEDURES

Subject: SCRAP MATERIAL: HANDLING AND CONTROL

| Number | 1005.5-2 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

To define procedures for control, authorization and disposition of scrap material.

1.1 Scrap, as used in this procedure, refers to material not recoverable for equipment use obtained by Nuclear Research Corporation shop production or vendor supplied.

2.0 Scope

2.1 These instructions apply to:

2.2.1 Rejected material which cannot be reworked, supplied by Nuclear Research Corporation shop production.

2.2.2 Rejected material which cannot be reworked, supplied by subcontractor or vendors who have been issued purchase orders to cover materials supplied.

3.0 Scrap Causes

3.1 As referenced to paragraph 2.2.1, materials which have been machined according to customer or Government drawings, may not fit subassemblies due to non-updating of drawings supplied to Nuclear Research Corporation.

3.1.1 All materials classified as "Scrap" shall be identified with red reject tag, explaining on reverse side of tag, cause and suggested disposition of rejected material.

3.1.2 Tooling: Scrap caused by defective, worn, or inadequate tooling used in the parts manufacturing may be a source for "Scrap".

3.1.3 Destructive Testing: In cases where testing requires destruction of parts, assemblies or final equipment stage can produce non-recoverable scrap.

4.0 Vendor Cause

4.1 As per paragraph 2.2.2, materials received from vendors, which although discrepant, have been accepted by Nuclear Research Corporation Q.C. incoming inspection and the discrepancy not detected until after the completion of one or several operations.

4.1.1 Vendor Error: Vendor supplied material not within lower tolerance values, according to supplied prints, and not reworkable shall constitute "Scrap" material only when it is not economically feasible to return rejected material.

4.1.2 Vendor Misinterpretation: Vendor supplied material rejected because of insufficient information supplied by parts drawings where vendor may interpret certain drawing dimensions, can be a potential cause of rejected "Scrap".

5.0 Handling of "Scrap Material"

5.1 Lot Identification: For each lot classified as "Scrap Material" an entry shall be made in "Scrap Log Book" identifying; 1) manufacturer, 2) date received, 3) material I.D., 4) rejection cause, 5) disposition.

5.2 Scrap material shall then be moved to holding area or bonded area for future possible use on other jobs.

5.3 Materials Review Board:

5.3.1 Nuclear Research Corporation's MRB shall be notified in writing of any accumulated scrap material. The purpose, to allow the MRB to act on disposing of scrap as well as review possibility of reworking scrap to be reinspected and possibly used on manufactured equipment.

5.4 Storage: In order not to allow commingling of scrapped material and accepted material of similar identity, no scrap material is to be placed in Government Bonded area.

5.4.1 Storage Review: Periodically, every six months, Q.A. Manager shall have the responsibility of reviewing Scrap Log Book, to determine where scrapped material may be utilized.

Prepared by: Andrew J. Caosell Date: 9 March 1976
Quality Assurance Manager

Reviewed by: A J Gaspar Date: 28 May 76
DODQAR

Approved by: [signature] Date: 11 March 76

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 9 March 1976 |
| Approved By: | AJC |
| | |

# NRC

## QUALITY ASSURANCE PROCEDURES

**Subject:** STATISTICAL QUALITY CONTROL

| Number | 1005.6-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the use of statistical methods and analysis for controlling quality.

2.0 Scope

2.1 The details of this procedure apply only to those inspections which are within the requirements and limitations of this procedure.

3.0 Procedure

3.1 Sampling Inspection:

3.1.1 Inspection of a characteristic by sampling will be performed only when:

a. It is approved by the Q.A. Manager.

b. It will provide adequate quality control

c. It is not prohibited by the customer's purchase order, contract, or referenced specifications for the item being inspected, and

d. It is approved by the DODQAR when the item being inspected comes within DOD cognizance.

3.1.2 Each characteristic to be inspected by sampling will be classified by Q.A. as to its seriousness and an A.Q.L. percentage assigned to that characteristic.

3.1.2.1 When the characteristic applies to an item which is within DOD cognizance, the assigned A.Q.L. will be approved by the DODQAR.

3.1.2.2 Where desirable, classification of Defect Code Numbers may be assigned as follows:

| Code No. | Class | AQL |
|---|---|---|
| 1 through 99 | Critical | 0% (100% inspection) |
| 100 through 199 | Major | 1.5% |
| 200 through 299 | Minor A | 2.5% |
| 300 through 399 | Minor B | 6.5% |

3.1.3 Sampling inspections will be performed using Normal, Tightened, or Reduced Sampling Inspection Tables. These tables are in accordance with MIL-STD-105D, Inspection Level II.

3.1.4 The severity of inspection of a characteristic may be changed at the discretion of the Q.A. Manager, if the history of inspection of that characteristic indicates that a change is desirable. The criteria for such change will be the Process Quality Level history for that characteristic or examination of the Inspection Records. Paragraph 8.3 and sub-paragraph of MIL-STD-105D will be used as a guide for making a change decision.

3.1.4.1 Reduction of inspection will require the approval of the DODQAR when the inspected item comes within the cognizance of the DODQAR.

3.1.4.2 When the level of inspection is prescribed by a customer's purchase order, contract, or referenced specifications, such inspection will be reduced only with the permission of the customer.

3.2 Statistical Analysis:

3.2.1 Process Quality Levels will be computed and recorded for those characteristics where it is practical to do so. The P.Q.L. will be obtained from Inspection Records.

3.2.2 Nuclear Research Corporation Quality Assurance will endeavor to use any and all other statistical techniques which are adjudged to be practical for evaluating and controlling quality.

3.2.3 Nuclear Research Corporation Quality Assurance will utilize all feed back data from in-house inspection groups, customer furnished information and product returns, scrap and rework reports, etc. for the purpose of trend analysis, cause determination, and preventative actions.

3.3 Storage of Records

3.3.1 All records associated with Statistical Quality Control shall be on file in Quality Control Room and shall be available for review by Government Representatives or customer upon written request.

Prepared by: Andrew J. Cassell Date: 9 March 1976

Q.A. Manager

Reviewed by: A J Zimpri Date: 28 May 76

DODQAR

| PREPARED BY: | A.J. Cassell |
|---|---|
| DATE PREPARED: | 12 March 1976 |
| APPROVED BY: | |

# NRC
## QUALITY ASSURANCE PROCEDURES

SUBJECT: INDICATION OF INSPECTION STATUS

| NUMBER: | 1005.7-1 |
|---|---|
| EFFECTIVE DATE: | |
| DATE REVISED: | 10 Aug. 1977 |
| PAGE 1 OF 4 | |

1.0 Purpose

This section outlines the controls and responsibilities in the management of QA stamps used to indicate the inspection status of materials, processes, parts, components, assemblies, and systems.

2.0 Scope

2.1 The procedures in this section apply to all QA personnel.

2.2 The stamps described herein are the only designs authorized for use by QA personnel for identification of the inspection status or suitability of materials, parts, assemblies, or documents.

3.0 Responsibilities

3.1 The QA Manager, or his designated assistant, shall perform the following duties in accordance with this procedure:

(a) Issue and impound stamps.

(b) Requisition new and replacement stamps.

(c) Maintain records of stamps issued, on hand, lost, or impounded.

(d) Review stamp assignments periodically to verify inventory and condition.

(e) Provide for the return and impounding of worn stamps or those assigned to employees scheduled for extended leaves of absence.

(f) Provide for the return and impounding of sets of stamps assigned to employees when one or more of a set is missing.

(g) Instruct QA personnel in the responsibilities of safe-keeping and correct usage of the stamps in accordance with this procedure.

4.0 Control and Use of Stamps

4.1 Stamps shall be issued in sets to authorized QA personnel by the QA Manager, or his delegated assistant.

4.2 The record log will indicate the stamp number, the recipient, the date of return, signature of recipient, and any other pertinent remarks such as those regarding loss, theft, etc.

4.3 Stamps shall be considered as the assigned individual's signature. Stamps shall not be lent to or used by anyone other than the person to whom they are assigned. When not in use, stamps must be protected from loss or use by unauthorized persons. Lack of adequate control and protection by the person to whom stamps are assigned will be cause for disciplinary action.

4.4 The loss of a stamp shall be reported immediately to the individual's supervisor who will impound the remaining stamps of the inspector's set and issue a memo to the QA Manager reporting the circumstances of the loss.

4.5 Proper care must be exercised to insure that stamp impressions will not damage, contaminate, mutilate, or set up stresses in the material to which they are applied.

4.6 Surrendered stamps from transferring or terminating employees shall be impounded and not reissued for at least six months.

5.0 Stamp Design

5.1 The QA stamps and their usages are listed below. There are six basic Quality Control Stamps: Acceptance Stamp, In-Process Stamp, Material Review Board Stamp, Rejection Stamp, Scrap Stamp, Final Acceptance Stamp.

6.0 Quality Assurance Stamp Control

6.1 Acceptance Stamp - This stamp shall indicate conformity to specifications and shall also be used to supersede the "Defect" stamp when the correction of the defect has been completed and approved. When used to supersede a defect, the acceptance stamp shall be applied over one corner of the defect stamp so that the identification of the two stamps is in no way destroyed. The final acceptance stamp will be applied when applicable to equipment adjacent to or under the nameplate.

6.2 The In-Process Stamp shall be used to indicate that semi-final products conform to all contractual requirements and specifications. The in-process stamp must be superseded by either the Acceptance Stamp, the "Material Review Board"Stamp, or the "Reject" Stamp.

6.3 Material Review Board Stamp - The MRB stamp shall be used only by the QA Manager, or his representative on material determined to be acceptable by MRB action. The MRB stamp shall be applied over one corner of the reject stamp so that the identification of each of the stamps is retained.

6.4 Rejection Stamp - This stamp shall be used on the forms, tags, records, and materials to show rejection for nonconformity with specifications.

6.5 Scrap Stamp - This stamp shall be used by the QA member of the MRB on items that are beyond further contract use. Close coordination will be necessary with the operations support manager and manufacturing manager before scrapping.

6.6 Final Product Acceptance - The final product acceptance stamp shall be used to indicate that the final product conforms to all contractual requirements and specifications.

7.0 Stamp Types

7.1 The following types of stamps will be issued by the Q.C. Manager:

a) Incoming inspection acceptance stamp. ---------- 


b) In-process stamp. ---------- 


c) Final inspection approval stamp. ---------- 


d) Rejected parts withheld for review. ---------- 


e) Parts accepted with deviation by the Material Review Board. ---------- 


f) Scrap Stamp. ---------- 


Prepared by: Andrew J. Cassell Date 10 August 1977
Quality Assurance Manager

Reviewed by: A. Lupis Date 11-4-77
DODQAR

Concurred by: A Wayne Paffrath Date 1 September 1977
Contract Administrator

REVISION #04 BY: Frank M Lawso DATE: 16 June 1980

QUALITY ASSURANCE MANAGER

REVIEWED BY: [illegible] DATE: 26 JUN 80

DODQAR

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 12 March 1976 |
| Approved By: | A JC |
| | |

# NRC

## QUALITY ASSURANCE PROCEDURES

**Subject:** GOVERNMENT INSPECTION AT SUPPLIER FACILITIES

| Number | 1006.1-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page | 1 of 2 |

1.0 Purpose

1.1 The purpose of this procedure is to define the conditions under which Government Source Inspection may be requested for a purchased material or process and to describe the procedure for implementing this inspection.

2.0 Scope

2.1 This procedure applies to all sub-contracts and/or purchase orders on which the DOD has authorized Government Source Inspection at the supplier's facility.

3.0 Procedure

3.1 Government Source Inspection at a supplier's facility will be requested only for those purchases classified as Group I by the DOD. Group I subcontracts consist of purchases involving complex supplies or having critical applications and where conformance to subcontract requirements cannot be fully determined upon receipt.

3.2 For any purchase satisfying the requirements of para. 3.1 and on which GSI is desired by NRC Quality Assurance:

3.2.1 Purchasing will initiate a Purchase Order per Quality Assurance Procedure #1004.1-1, (Purchasing Control).

3.2.2 In addition to the requirements of para. 3.3.2 QAP 1004.1-1, the Purchase Order will include the statement: "Government inspection is required prior to shipment from your plant. Upon receipt of this order, promptly notify the Government Representative who normally services your plant so that appropriate planning for Government inspection can be accomplished."

3.2.3 Before release of the Purchase Order to the supplier, Purchasing will forward the Purchase Order and all referenced documents to Quality Assurance for review.

3.2.4 After the review by Q.A. for accuracy and adequacy of information, the Purchase Order and documents will be transmitted to the DODQAR at Nuclear Research Corporation for review and approval.

3.2.5 When the Purchase Order has been approved by the DODQAR, it will be returned to Purchasing for normal distribution. As part of the normal distribution Purchasing will supply 2 copies of the Purchase Order and all referenced documents to the DODQAR at Nuclear Research Corporation for transmittal to the cognizant inspection agency.

3.3 Quality Assurance will forward to Nuclear Research Corporation a copy of all Receiving Inspection Reports written as a result of receiving non-conforming GSI Material.

Prepared by: Andrew J. Cassell Date: 12 March 1976

Q.A. Manager

Reviewed by: A J Lupsi Date: 27 May 76

DODQAR

| Prepared By | A.J. Cassell |
|---|---|
| Date Prepared | 12 March 1976 |
| Approved By: | AJC |
| | |

**NRC**

**QUALITY ASSURANCE PROCEDURES**

**Subject:** CONTROL OF GOVERNMENT PROPERTY

| Number | 1006.2-1 |
|---|---|
| Effective Date | |
| Date Revised | |
| Page 1 of 3 | |

1.0 Purpose

1.1 The purpose of this procedure is to describe the methods for controlling the inspection, identification, maintenance, and storage of Government property.

2.0 Scope

2.1 This procedure covers all Government-furnished material and bailed property. "Government-Furnished Material" shall mean material owned by the Government and furnished directly to Nuclear Research Corporation for use in products to be delivered to the Government. "Bailed Property" shall mean Government-furnished equipment not for incorporation into a product.

3.0 Procedure

3.1 Government - Furnished Material

3.1.1 Material furnished by the Government will be inspected upon receipt at Nuclear Research Corporation to verify the quantity and condition of the material and that it is of the proper type. The inspection will usually be visual, however, electrical and/or mechanical inspection may be desired. The decision for such inspection will be made by a qualified representative of Q.A., based on the accuracy and adequacy of accompanying documentation.

3.1.2 GFM which is noted as damaged or otherwise unacceptable upon receipt at Nuclear Research Corporation will be held and the DODQAR will be immediately notified. Disposition of such material will be the joint responsibility of the DODQAR and Q.A.

3.1.3 Upon acceptance by Receiving Inspection, the Material will be identified as Government-Furnished Material and the applicable contract number noted, before it is released to stock.

3.1.4 GFM will be stored so that minimal deterioration is possible and damage is prevented. Stock records for GFM will indicate the applicable contract number, the date placed in stock, and the results of quarterly inspections of such material to detect deterioration or damage.

3.1.5 Functional testing of GFM before or after installation, or both, will be as required by the contract and applicable specifications or if it is judged advisable by Q.A. and/or Engineering. If unsuitability is found before, during, or after installation, the probable cause and disposition information will be forwarded to the DODQAR.

3.2 Bailed Property

3.2.1 Bailed property will be inspected upon receipt at Nuclear Research Corporation to detect any shipping or other damage and to determine that the equipment is complete and of the proper type.

3.2.2 All accompanying documents, manuals, certifications, etc. will be forwarded to Q.A. for review and filing. It will be the option of Q.A. to determine the amount and type of receiving inspection based on the adequacy of the documentation and precision requirements of the equipment.

3.2.3 In the event that the bailed property is unacceptable as received, the DODQAR will be immediately notified. The disposition of such material will be the joint responsibilities of the DODQAR and Q.A.

3.2.4 Before being released for storage or use, the bailed property will be adequately identified as Government property and a serial number attached by some appropriate means will be assigned for identification until a Government property number is issued.

3.2.5 A log will be maintained for bailed property in use or storage by the supervisor in charge of such usage or storage. The log will identify the bailed property by serial number, type, size, or any other appropriate information and will show all periodic inspections, maintenance, and/or repairs performed on the equipment. It will be the responsibility of the supervisors to schedule sufficient inspections, maintenance and/or repairs to keep the equipment in good condition. Such records will be subject to review by Q.A. and/or the DODQAR at any time. In the event of malfunction of the equipment through normal wear, the DODQAR will be notified and he will provide disposition for repair, or replacement of the equipment or any portion of it.

Prepared by: Andrew J. Cassell Date: 12 March 1976

Q.A. Manager

Reviewed by: A J Tempri Date: 28 May 76

DODQAR

| PREPARED BY: | A.J.CASSELL |
|---|---|
| DATE PREPARED: | 20 JUNE 1979 |
| APPROVED BY: | ajc |

NRC
QUALITY ASSURANCE PROCEDURES

SUBJECT: AUDITS

| NUMBER: | 1007.1-1 |
|---|---|
| EFFECTIVE DATE: | 6/20/79 |
| DATE REVISED: | 7/9/79 |
| PAGE 1 OF 2 | |

1.0 Purpose

This section describes Audits to be conducted by Nuclear Research Corp. based on two specific coverages:

(a) Vendor Audit
(b) In-House Q.A. Audit (QA021)

2.0 Scope

Each specific coverage of the two phases of Audit shall be addressed in the following steps:

(a) Vendor's name
(b) Location
(c) Cardex history of past product performance
(d) Physical inspection of vendor's facilities
(e) Form QA 020 , "Audit Check List Form" shall be completed during audit.
(f) Audits shall be identified by Audit No. and Check Sheets shall be retained with vendor history.

3.0 Procedure

3.1 Upon written request and returned answer from vendor, Nuclear Research Corporation shall make a thorough audit of vendor's facilities to determine whether vendor is adequately equipped to supply to Nuclear Research Corporation materials required under given specifications.

3.2 On sight audit shall be conducted by a member of Nuclear Research Q.C. Department or Project Engineer on a specific job.

3.3 Questions on Audit Check Sheet shall be completed for those specific applications which are applicable. Where specific points are not applicable, the letters "N/A" shall be entered.

3.4 On a rotational basis, auditing of vendors should not be required more frequent than once every two years. Should a vendor exhibit poor workmanship or poor documentation, as reflected by vendor history cards, it may be necessary to audit more frequently.

3.5 Copies of the Audit Check sheet should be made available to any vendor, upon their request.

3.6 For in-house, Quality Assurance and Quality Control Procedures, audit should be conducted by dis-interested party. Engineering Dept. of Nuclear Research shall select one of it's members to conduct such an audit annually. Reports of this audit shall be circulated to Q.A. Manager, Company President and Director of Engineering.

3.7 Records of any audit shall be maintained for at least five (5) years in Company Documentation Files.

Prepared by: Andrew J. Cassell Date 2 July 1979

Quality Assurance Manager

Reviewed by: A. J. Zuppi Date 9 July 79

DOD QAR

Concurred by: [illegible] Date 7-9-79

Purchasing

SUPPLEMENT

TO Q.A. MANUAL PER MIL-Q-9858

ILLUSTRATION OF ALL FORMS USED

IN THIS MANUAL

DATE: 10 APRIL 1976
REVISION 01: 7-9-79
REVISION 02: 4-23-80

REVISION #02 BY: Frank M. Saino QUALITY ASSURANCE MANAGER

16 June 1980 DATE

REVIEWED BY: _____ DOD QAR

_____ DATE

SUPPLEMENT

TABLE OF CONTENTS

( QA FORMS)

NUCLEAR
RESEARCH
CORPORATION
NRC
128 TITUS AVENUE
WASHINGTON, PA 15301
215-343-5900

# RECEIVING INSPECTION REPORT

Purchase Order # _____

Date Received: _____ Date Inspected: _____

VENDOR _____ P.O.# _____

Contract #: _____ JOB# _____

C. of C.: RECD/NOT RECD/NOT REQD. TEST DATA: RECD/NOT RECD/NOT REQD.

SAMPLE PLAN PER MIL-STD-105 INSPECTION LEVEL [ ] AQL [ ] 100% [ ]

| SNO | ARTICLE | Part # / DWG # REV | Qty. | Sample | Test # | Accept | Reject | CAR # | ACCEPTED AFTER RE-WORK |
|---|---|---|---|---|---|---|---|---|---|
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**Disposition of Material:**

1. Lot to be Screened ( )
2. Release to Stock ( )
3. Return Defective Lot to Vendor ( )
4. To be Reviewed By M.R.B. ( )
5. Additional Work Required ( )
6. Rework ( )

TEST CRITERIA:

A- PHYSICAL DAMAGE
B- PROPER PART #
C- PAINTING
D- PLATING
E- PHYSICAL DIMENSIONS
F- WORKMANSHIP
G- SILK SCREENING

REMARKS: _____

INSPECTED BY: _____

NUCLEAR RESEARCH CORPORATION

PHYSICAL & ELECTRICAL CHARACTERISTICS

JOB NO. _____ DATE: _____

CONTRACT NO. _____

PART NO. _____ NOMENCLATURE _____

LOT QUANTITY _____ INSPECTOR _____

SAMPLE SIZE _____

| PHYSICAL CHARACTERISTICS REQUIRED | MEASURED CHARACTERISTICS | ACCEPT | REJECT |
|---|---|---|---|
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| ELECTRICAL CHARACTERISTICS REQUIRED | MEASURED CHARACTERISTICS | | |
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S/N: _____

# CORRECTIVE ACTION REQUEST

DATE: _____

JOB # _____ P.O.# _____ DWG.# _____ QTY. _____

ITEM: _____ VENDOR: _____

NATURE OF NON-CONFORMANCE

1. NO. GOV'T. SOURCE INSPECTION AS REQUIRED [ ]
2. WRONG PART NUMBER FURNISHED [ ]
3. PARTS SUPPLIED NOT TO DRAWING [ ]
4. PARTS RECEIVED DEFECTIVE [ ]
5. OTHER [ ]

DESCRIPTION:

_____

_____

_____

_____

_____

FORM QA 008A

Signature: _____
QUALITY CONTROL

---

# MATERIAL REVIEW BOARD FINDING

DISPOSITION OF REJECTED ITEMS:

DATE: _____

RETURN TO VENDOR [ ]
SCRAP [ ]
USE AS IS, NOT CRITICAL [ ]
TO BE CORRECTED BY N.R.C. [ ]
OTHER _____

TYPE - CLASS I [ ]
CLASS II [ ]

_____

_____

_____

_____

MFG. MGR: _____ CONTRACT ADM.: _____

ENGINEERING: _____ QUALITY ASSURANCE MGR.: _____

DOD QAR: _____ VERIFICATION OF CORRECTED ACTION BY Q.A. _____

ACCEPTANCE BY ABOVE AS REQUIRED

FORM QA 004A

NUCLEAR RESEARCH CORPORATION
1105 INDUSTRIAL HIGHWAY, SOUTHAMPTON, PA. 18966

ENG. RELEASE / DERELEASE NOTICE NO: _____

PAGE _____ OF _____

JOB NO.: _____

PROJECT: _____

FINAL ASS'Y: _____

SUB-ASS'Y: _____

# ENGINEERING RELEASE/DERELEASE NOTICE

PARTIAL [ ] FINAL [ ]

THE FOLLOWING ITEM(S) ARE RELEASED / DERELEASED FOR MANUFACTURING OR PROCUREMENT:

| DESCRIPTION | ACTION |
|---|---|
| | |
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| | |
| SPECIAL INSTRUCTIONS: | |

ISSUED BY: _____

DATE: _____

APPROVED BY: _____

DATE: _____

DISTRIBUTION:

Original ENGINEERING FILE

_____ PURCHASING

_____ MANUFACTURING

_____ Q.A.

_____ Q.C.

_____ PRODUCTION CONTROL

FORM QA-5942

TOLEDO TAG

# NRC INSPECTION TAG

INCOMING [ ] IN PROCESS [ ] FINAL [ ]

PART NO._____ QUANTITY_____

DESCRIPTION_____

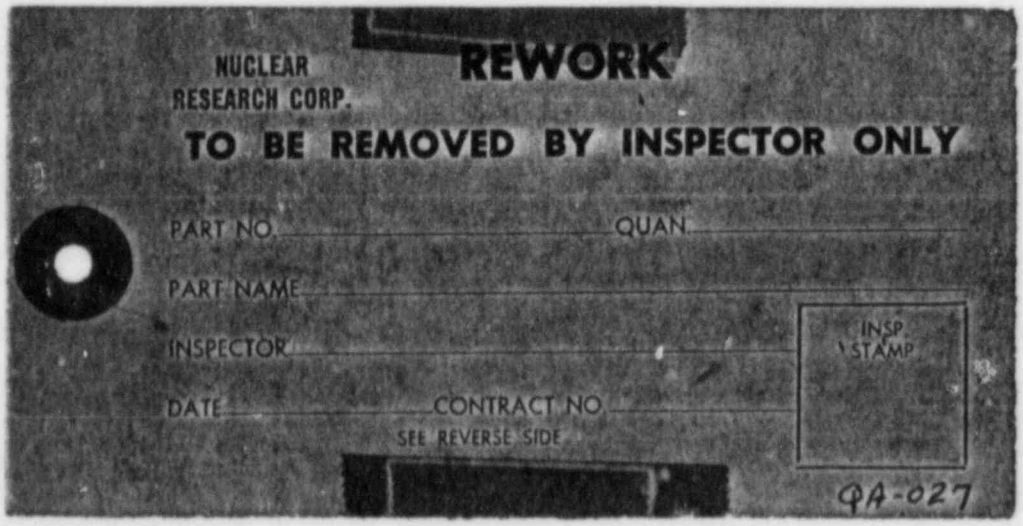
VENDOR_____

P.O. / T.T._____ JOB NO._____

DATE_____ INSPECTOR_____

FORM QA-0098

WHITE




GREEN

QA-009
QA-027

TO BE REMOVED BY INSPECTOR ONLY

REJECT TAG

PART NO.

NOMENCLATURE & TYPE

SHOW REASON FOR REJ. ON REVERSE SIDE

| NUCLEAR RESEARCH CORP. | QTY | UNIT OF MEASURE | INSP. STAMP |
|---|---|---|---|
| JOB NO. | ORDER OR CONTR. NO. | | |
| DATE | INSPECTOR SIGNATURE | | |

QA-010

RED

TOLEDO TAG

## NRC - ADDITIONAL WORK TAG

JOB NO. _____ QTY. _____

PART NO. / DWG. NO _____

DESCRIPTION _____

NATURE OF WORK _____

DATE _____ INSPECTOR _____

FORM QA-011

BLUE

RAPIDFORMS® NO. 14304

DEBIT MEMO



# DEBIT MEMO

**NEUCLEAR RESEARCH CORP.**
WARRINGTON INDUSTRIAL PARK • P O BOX H
WARRINGTON, PA 18976
(215) 343-5900

**No.** 003

SHIPPED TO

| DEBIT MEMO DATE | OUR ORDER NO. | INVOICE DATE | YOUR INVOICE NO. | TERMS | F.O.B. | DATE RETURNED | RETURNED VIA |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

| QUANTITY | DESCRIPTION | PRICE | AMOUNT |
|---|---|---|---|
| | | | |

| REASON FOR DEBIT | AUTHORIZED SIGNATURE |
|---|---|
| | |



WE DEBIT YOUR
ACCOUNT AS SHOWN

AREA CODE (215) 357-5015
(215) 464-4434

No. 3405

# NRC INDUSTRIES DIV.
## NUCLEAR RESEARCH CORP.

SOUTHAMPTON INDUSTRIAL PARK P. O. BOX 68
SOUTHAMPTON, PENNSYLVANIA 18966

SOLD TO

SHIP TO

SAME AS SOLD TO UNLESS OTHERWISE INDICATED

| INVOICE DATE | OUR ORDER NO. | YOUR ORDER NO. | TERMS | SALESMAN |
|---|---|---|---|---|
| | | | | |

| DATE SHIPPED | VIA | F.O.B. | Ppd. or Coll. |
|---|---|---|---|
| | | | |

| QUANTITY ORDERED | QUANTITY SHIPPED | DESCRIPTION | PRICE | AMOUNT |
|---|---|---|---|---|
| | | DEBIT MEMO FOR RETURNED MATERIAL | | |

"Seller represents that with respect to the production of the articles and/or the services covered by this invoice, it has fully complied with the provisions of the Fair Labor Standards Act of 1938, as amended."

OA-012

N R C TRAINING CERTIFICATION

THIS IS TO CERTIFY THAT _____

HAS SHOWN PROFICIENCY IN THE FOLLOWING AREAS OF INSPECTION

ON THE DATES SHOWN.

| AREA OF PROFICIENCY | DATE | MANAGER APPROVAL |
|---|---|---|
| ELECTRICAL INSPECTION | _____ | _____ |
| MECHANICAL DETAIL INSPECTION | _____ | _____ |
| BLUEPRINT READING | _____ | _____ |
| MIL SPEC SOLDERING | _____ | _____ |
| ASSEMBLY INSPECTION | _____ | _____ |
| INTERPRETATION OF TEST DATA | _____ | _____ |
| QUALITY ASSURANCE FORMS & PROCEDURES | _____ | _____ |
| CALIBRATION | _____ | _____ |
| ELECTRO-MECHANICAL | _____ | _____ |
| VENDOR EVALUATION | _____ | _____ |



QA - 007

## ENGINEERING CHANGE REQUEST

Date _____ Change Request By _____

Job. # _____ Contract # _____

Part No. _____ Part Name _____

Drawing No. _____ Rev. _____ Model No. _____

Requested By _____ Change Required by Date _____

_____

_____

DESCRIPTION OF CHANGE REQUESTED: _____

_____

_____

_____

REASON FOR CHANGE: _____

_____

_____

_____

### CHANGE APPROVAL

Effective Date _____

Approved By _____

Change Notice _____

Issue Date _____

### CHANGE REJECTED

Reason for Rejection _____

_____

Rejected By _____

Date Rejected _____

### DEPARTMENT APPROVAL

Engineering _____

Quality Control _____

President _____

Production _____

# ENGINEERING CHANGE NOTICE

ECN No. _____ Date _____

Job. # _____ Contract # _____

Part No. _____ Part Name _____

Drawing No. _____ New Rev. _____ Model No. _____

Requested By _____

_____

_____

DESCRIPTION OF CHANGE: _____

_____

_____

_____

_____

_____

REASON FOR CHANGE: _____

_____

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_____

| CHANGE APPROVAL | | DISTRIBUTION LIST | NO. COPIES |
|---|---|---|---|
| Effective Date | _____ | President | _____ |
| Approved By | _____ | DCAS-CAL | _____ |
| Issue Date | _____ | Quality Control | _____ |
| | | Purchasing | _____ |
| | | Production | _____ |
| | | Contract Admin. | _____ |

# DISCREPANCY REPORT (DR)

DR # _____ DATE _____

DWG. NO.: _____ PART NAME: _____

REV.: _____ MODEL NO.: _____

PARTS LIST NO.: _____

ITEM(S): _____ _____

_____ _____

_____ _____

DISCREPANCY: _____

_____

_____

_____

_____

_____

CORRECTED ACTION
REQUESTED

PRECISION SQUARE BROWN & SHARPE NRC042

CALIBRATION INTERVAL: 1 YR.

| DATE CALIBRATED | BY | DATE DUE |
|---|---|---|
| | | |

SAMPLE

COUNTER FLUKE 1900A NRC015

CALIBRATION INTERVAL - 1 YR.

| DATE CALIBRATED | BY | DATE DUE |
|---|---|---|
| | | |

SAMPLE

QA-0600

| REQUEST FOR GOVERNMENT INSPECTION | | | | | | |
|---|---|---|---|---|---|---|
| ITEM | PART NO. | CONTRACT NO. | | | | DATE |
| REQUESTED BY: | ELEC. TEST | ☐ | VISUAL MECH. | ☐ | INSPECT. STATION | |
| | | | | | | |
| ☐ ACCEPTED | ☐ REJECTED | ☐ RESUBMITTED | GOVT. QAR | | | DATE |

Form PO–8747
PURCHASE ORDER

AREA CODE (215) 357-5015

ORIGINAL PURCHASE ORDER

No.

# NUCLEAR RESEARCH CORP.

STREET ROAD AT 2ND STREET PIKE
SOUTHAMPTON, PENNSYLVANIA 18966

TO

SHIP TO

| DATE OF ORDER | DATE REQUIRED | SHIP VIA | F.O.B. |
|---|---|---|---|
| | | | |

| TERMS | ☐ FOR RESALE ☐ FOR OWN USE | DEPT. OR REQ. NO. | ACCOUNT NO. | QUOTATION NO. |
|---|---|---|---|---|
| | | | | – |

| QUANTITY ORDERED | QUANTITY RECEIVED | PLEASE SUPPLY ITEMS LISTED BELOW | PRICE | AMOUNT |
|---|---|---|---|---|
| | | | | |

IMPORTANT

ABOVE ORDER NUMBER MUST APPEAR ON ALL CORRESPONDENCE, INVOICES, PACKAGES AND SHIPPING PAPERS. NOTIFY US IMMEDIATELY IF YOU ARE UNABLE TO SHIP COMPLETE ORDER BY DATE SPECIFIED. YOUR ACCEPTANCE OF THIS ORDER IS YOUR WARRANTY TO US THAT YOU ARE COMPLYING WITH THE U. S. FAIR LABOR STANDARDS ACT OF 1938, AS AMENDED, AND WE RESERVE THE RIGHT TO CANCEL DELIVERIES NOT IN STRICT ACCORD WITH THIS ORDER.

By_____

NUCLEAR RESEARCH CORPORATION

TYPE OF INSPECTION: (Check 1) IN PROCESS [ ] FINAL [ ] DATE: _____

JOB NO: _____ CONTRACT NO: _____

ARTICLE(S) UNDER TEST: _____ DWG. NO: _____ MODEL NO: _____

LOT QTY: _____ AQL PER MIL 105 _____ SAMPLE SIZE: _____

ACCEPT LEVEL _____ REJECT LEVEL _____ 100% INSPECTION [ ]

| INSPECTION REQUIREMENTS: | INSPECTION RESULTS: ACCEPTED | REJECTED | ACCEPTED AFTER CORRECTIVE ACTION | N/A |
|---|---|---|---|---|
| CALIBRATION | [ ] | [ ] | [ ] | [ ] |
| TEST DATA | [ ] | [ ] | [ ] | [ ] |
| SOLDERING | [ ] | [ ] | [ ] | [ ] |
| WORKMANSHIP | [ ] | [ ] | [ ] | [ ] |
| ASSY. PER PRINT | [ ] | [ ] | [ ] | [ ] |
| FINISH | [ ] | [ ] | [ ] | [ ] |
| CLEANLINESS | [ ] | [ ] | [ ] | [ ] |
| SERIALIZED | [ ] | [ ] | [ ] | [ ] |
| _____ | [ ] | [ ] | [ ] | [ ] |
| _____ | [ ] | [ ] | [ ] | [ ] |

NOTE: CHECK IF INSPECTION RESULTS COMPLY & ACCEPTED [ ]

QUANTITY ACCEPTED _____ QUANTITY REJECTED _____

REJECTS ACCEPTED AFTER CORRECTIVE ACTION _____ QUANTITY RELEASED FOR FINAL ASSY _____

CORRECTIVE ACTION NEEDED FOR ACCEPTANCE _____

_____

_____

SOLDERED BY _____ ASSEMBLED BY _____ TESTED BY _____

INSPECTOR: _____

DATE SUBMITTED TO GOVERNMENT: _____ ACCEPT/REJ. DATE: _____

QA-006

NRC STANDARD TRAVEL TICKET

DEPT.

PART/ASSY. NO. REV.

PART/ASSY. NAME

WORK ORDER #

TOTAL QTY.

LOT OF QTY.

RATE STD.

SCHED.HRS.

COMPLETION DATE

| STEP | DEPT. | QTY. | DESCRIPTION/REMARKS | START DATE | FINISH DATE |
|---|---|---|---|---|---|
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| JOB TIME | HRS. |
|---|---|
| START | |
| FINISH | |
| INSP. | HRS. |
| START | |
| FINISH | |
| REWORK | |

QA-015

# HOLD FOR CERT

P.O.# _____ JOB # _____

P/N _____ NOMEN. _____

DATE _____ PROD. _____

QA-017

# HOLD FOR SPEC

P/N _____ DATE _____

QA-018

# HOLD FOR ECN

P/N _____ DATE _____

QA-019

# EVALUATION SUMMARY

| N R C QUALITY ASSURANCE AUDIT | | VENDOR: |
|---|---|---|
| | | AUDIT NO: NO. |

| NO. | REQUIREMENTS REFERENCE 10 CFR 50 APPENDIX "B" | ACCEPT | REJECT | N/A | * | COMMENTS |
|---|---|---|---|---|---|---|
| | GENERAL INFORMATION | | | | | |
| 1 | ORGANIZATION | | | | | |
| 2 | QUALITY ASSURANCE PROGRAM | | | | | |
| 3 | DESIGN CONTROL | | | | | |
| 4 | PROCUREMENT DOCUMENT CONTROL | | | | | |
| 5 | CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES | | | | | |
| 6 | CONTROL OF SPECIAL SERVICES | | | | | |
| 7 | INSPECTION | | | | | |
| 8 | TEST CONTROL | | | | | |
| 9 | CONTROL OF MEASUREMENT AND TEST EQUIPMENT | | | | | |
| 10 | HANDLING, STORAGE, SHIPPING AND PRESERVATION | | | | | |
| 11 | NONCONFORMING MATERIAL, PARTS AND COMPONENTS | | | | | |
| 12 | CORRECTIVE ACTION | | | | | |
| 13 | QUALITY ASSURANCE RECORDS | | | | | |
| 14 | AUDITS | | | | | |
| | OTHER | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

* RECOMMENDED CORRECTIVE ACTION

RESPONSE DATE:

CORRECTIVE ACTION TAKEN

CORRECTIVE ACTION RESPONSE SUBMITTED BY (NAME & TITLE) DATE:

Q A VERIFICATION BY DATE:

## OPERATION SHEET

ALL MANUFACTURING OPERATIONS WILL BE PERFORMED IN ACCORD WITH THIS OPERATION CHECK SHEET. CHECK THE APPROPRIATE BLOCK WHERE APPLICABLE.

MODEL NO.: _____ JOB NO.: _____

ASSEMBLY NO.: _____ QTY.: _____

(A) TRAVEL TAG (QA015) ☐

(B) PARTS LIST ☐

(C) DRAWING(S) ☐

(D) WIRING INSTRUCTIONS ☐

(E) TEST PROCEDURES ☐

(F) MANUALS ☐

(G) SERIAL NUMBERS (When applicable) ☐

(H) SPECIAL INSTRUCTIONS ☐

(I) PACKAGING ☐

OPERATIONS SHEET PROCEDURE APPROVAL

MFG. MANAGER _____ DATE _____

Q.A. _____ DATE _____

FORM: QA 023

## NUCLEAR RESEARCH CORPORATION

☐ WARRINGTON, PA., U.S.A.

NRC INDUSTRIES

☐ DOVER, N.J., U.S.A.

# Certificate of Calibration

CUSTOMER

TYPE OF INSTRUMENT _____

MANUFACTURER _____

MODEL NO. _____

SERIAL NO. _____

DATE CALIBRATED _____

This Instrument has been calibrated with Nuclear Research Corp. reference standard No. _____

Calibration was performed in accordance with Nuclear Research Corp. Procedure No. _____

All reference standards used by Nuclear Research Corp. are NBS certified or NBS traceable.

ACCURACY:

| Calibration Point | Actual Reading | Calibration Point | Actual Reading |
|---|---|---|---|
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CALIBRATED BY _____

RECALIBRATION DUE DATE _____ REVIEWED BY _____

| S/N | PO # | JOB # | DWG/PART # | QUANTITY | | | | DELIVERY DATE | | COMPLIANCE OF P.O. REQUIREMENTS | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ORDERED | RECD. | ACCEPTED | ACCEPTED BY MRB | SCHEDULED | RECIEVED | | |
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NUCLEAR RESEARCH CORPORATION
125 TITUS AVENUE
WARRINGTON, PA 18976
PHONE 215.343.9000

# VENDOR HISTORY CARD

QA-025

VENDOR

TRADE/FACILITY:

# QUALIFIED VENDORS LIST

COMPANY NAME: _____

ADDRESS: _____

_____ ZIP: _____

TELEPHONE: _____

RATING: 1 = IS EXCELLENT, 2 = IS GOOD, 3 = IS FAIR, 4 = IS NOT ACCEPTABLE

| | RATING |
|---|---|
| QUALIFIED PRODUCTS LIST (QPL) AVAILABILITIES | |
| DELIVERY SCHEDULING | |
| PREFERENCE RATING (PAST PROBLEM AREAS) | |
| ACCEPT/REJECT HISTORY | |
| CONFORMANCE OF REQUIRED PAPERWORK,C OF C,ANALYTICAL ANALYSIS,ETC. | |
| FACILITIES | |
| PAST ORDERS/SERVICES | |

COMMENTS: _____

_____

RATED BY: _____

# QUALIFIED VENDORS LIST

COMPANY NAME: _____

ADDRESS: _____

_____ ZIP: _____

TELEPHONE: _____

RATING: 1 = IS EXCELLENT, 2 = IS GOOD, 3 = IS FAIR, 4 = IS NOT ACCEPTABLE

| | RATING |
|---|---|
| QUALIFIED PRODUCTS LIST (QPL) AVAILABILITIES | |
| DELIVERY SCHEDULING | |
| PREFERENCE RATING (PAST PROBLEM AREAS) | |
| ACCEPT/REJECT HISTORY | |
| CONFORMANCE OF REQUIRED PAPERWORK,C OF C,ANALYTICAL ANALYSIS,ETC. | |
| FACILITIES | |
| PAST ORDERS/SERVICES | |

COMMENTS: _____

_____

RATED BY: _____