

UNITED STATES GEOLOGICAL SURVEY
PROCEDURES

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QUALITY ASSURANCE PROGRAM PLAN
FOR
NUCLEAR WASTE STORAGE INVESTIGATIONS

U.S. GEOLOGICAL SURVEY

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STATEMENT OF POLICY

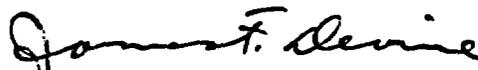
The U.S. Geological Survey (USGS) is dedicated to conducting high-quality research and investigative studies for the U.S. Department of Energy (DOE) as part of their high-level nuclear waste disposal program.

In order to meet future licensing requirements of the Nuclear Regulatory Commission for repository sites selected by DOE, the USGS has established a Quality Assurance Program for project work conducted for the DOE by the USGS at potential waste repository sites. The Assistant Director for Engineering Geology has the overall responsibility for the Quality Assurance Program of the USGS. The Quality Assurance Office of the Los Alamos National Laboratory (LANL) is developing the details of the USGS Quality Assurance Program. The authority for development of the USGS Quality Assurance Program is hereby assigned to the Quality Assurance Manager (LANL).

It is the Quality Assurance Manager's responsibility to provide program leadership, to assure compliance with program requirements, to coordinate resolution of problems, and to assure the proper implementation of the Quality Assurance Program.

To be effective this program must be understood, accepted, and fully implemented by each USGS employee holding responsibility for high-level waste repository investigations conducted for DOE.

Changes to the Quality Assurance Program will be issued as necessary to reflect revisions or additions to legal requirements and DOE or USGS standards. Suggested improvements should be submitted to the Quality Assurance Manager for evaluation.



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0.0 INTRODUCTION

This document describes the Quality Assurance Program (QAP) which will be followed by the U.S. Geological Survey (USGS) in their research and investigations for the Nuclear Waste Management Program. Results of this research will be used in the characterization and evaluation of the suitability of various geologic media and environments for the disposal of high-level nuclear waste.

This Quality Assurance Program Plan is based on the quality assurance requirements set forth in 10 CFR 50, Appendix B and meets the requirements of ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Power Plants."

The purpose of the Quality Assurance Program Plan is to assure the applicability, validity, and accuracy of research and investigations, and applies to work done by USGS personnel and, where appropriate, to those whose services are contracted for by the USGS.

The USGS quality assurance organization has been delegated the responsibility of establishment and execution of the Quality Assurance Program. They shall have the organizational freedom, authority, and support to perform these duties.

1.0 ORGANIZATION

This section defines the organization responsible for the establishment and execution of the Quality Assurance Program and the organizational framework within which the program will be carried out. It establishes that quality assurance personnel have sufficient authority and freedom to implement and operate the described Quality Assurance Program, have direct access to upper management levels, and have independence from cost and schedule restraints to allow them to carry out their designated responsibilities.

The USGS shall develop, establish, and maintain a Quality Assurance Program for its nuclear waste management projects, and has prepared this plan for the execution and implementation of that program. The USGS may perform these tasks or may delegate the work to a contractor. Responsibility for the development, establishment, and maintenance of the Quality Assurance Program, however, shall remain with the USGS.

Detailed procedures describe the USGS organization in detail and include detailed organization charts. These charts delineate the organizational structure, functional responsibilities, levels of authority, and lines of communication by position. These charts shall be up-dated as appropriate. The USGS quality assurance organization shall keep an up-to-date organization chart which includes the name of the person in each position.

The Quality Assurance Program shall be carried out by a quality assurance organization within the USGS. The organization is responsible for assuring that an appropriate Quality Assurance Program is established and for verifying that activities affecting quality have been accomplished in accordance with prescribed plans. The organization is headed by a Quality Assurance Manager. The quality assurance organization shall have sufficient authority, access to work areas, and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions to quality problems, and to verify implementation of solutions. The quality assurance organization is also responsible for assuring that further processing, delivery, installation, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.

The quality assurance organization is assigned the following duties in meeting the responsibilities described above:

- 1.1 Responsibility for quality assurance activities for nuclear waste management programs.
 - 1.1.1 Identify quality assurance procedures and other documents needed to support the Quality Assurance Program.
 - 1.1.2 Develop, maintain, and implement quality assurance procedures and other documents.
 - 1.1.3 Determine the need and scope of quality assurance surveillance and audits.
 - 1.1.4 Assist in the selection of quality assurance requirements.
 - 1.1.5 Review all procedures, instructions, and policies which make up the Quality Assurance Program.
 - 1.1.6 Approve quality assurance plans, procedures, and other documents. Specific approval requirements are further delineated in a document control procedure.
 - 1.1.7 Participate in decisions concerning qualifications of suppliers and contractors to the USGS.
 - 1.1.8 Establish requirements for quality assurance training and indoctrination.
 - 1.1.9 Plan, schedule, and conduct audits of the USGS nuclear waste management program.
 - 1.1.10 Report periodically to USGS management on the status of the Quality Assurance Program, its accomplishments, and its problems.
 - 1.1.11 Approve the disposition of USGS nonconformances and corrective actions.
 - 1.1.12 Provide a permanent member of the Quality Assurance Review Board.

Additional personnel shall be assigned to the quality assurance organization as required to perform appropriate surveillance and to provide the necessary support to the Quality Assurance Manager

to enable him to carry out his duties and responsibilities.

A Quality Assurance Review Board shall be established to perform the review functions identified in other sections of this Quality Assurance Program Plan. The board shall always include a representative from quality assurance and technical management. Additional members shall be assigned when their expertise is deemed necessary to the review process.

2.0 QUALITY ASSURANCE PROGRAM

The USGS has the responsibility for planning, implementing, and maintaining a Quality Assurance Program. The Quality Assurance Program applies to activities performed and the facilities and equipment used, as well as documentation for the nuclear waste management program. This Quality Assurance Program Plan delineates the manner in which the Quality Assurance Program will be administered. The Quality Assurance Program Plan is based on 10 CFR 50, Appendix B and meets the requirements of ANSI/ASME NQA-1, and can be revised when and as appropriate. Personnel who perform quality assurance activities shall have appropriate training or experience; their training or experience shall be documented. The USGS administration will review the Quality Assurance Program regularly.

The USGS is responsible for the planning, implementation, and maintenance of a Quality Assurance Program designed to assure the quality of its research and investigations undertaken in support of the Nuclear Waste Management Program. This Quality Assurance Program Plan delineates the manner in which the quality assurance organization will administer the Quality Assurance Program.

This Quality Assurance Program Plan is effective until such time as revised quality assurance standards are provided by the Nuclear Regulatory Commission for nuclear waste repositories. At that time the Quality Assurance Program Plan shall be revised to incorporate such changes. In addition, revisions shall be made on an as needed basis.

The total Quality Assurance Program includes this Quality Assurance Program Plan, Unit Task Procedure, and detailed procedure.

Scientific and technical personnel who perform quality related activities shall be given training in quality assurance. The extent and status of this training shall be documented.

Personnel performing tasks that require skill, experience, or training shall be qualified. Certification of qualification shall be documented for each individual by means of a USGS Professional/Personnel Record (USGS Standard Form No. 171) or on a form made up for this purpose. This document shall be retrievable.

The Professional/Personnel Record or other certification form for each person shall be updated and reviewed annually. This review shall constitute recertification.

Documented management reviews of the Quality Assurance Program shall be conducted yearly, or more often if deemed necessary by the Project Coordinator(s).

3.0 DESIGN CONTROL

This section in ANSI/ASME NQA-1 was originally written to control the design of a nuclear power plant. For USGS use, design control shall apply to the acquisition, reduction, and interpretation of geoscientific data and to the interfaces made in the integrated interpretation of the data. This section of the Quality Assurance Program Plan then states that geological, geophysical, hydrological, and other designated nuclear waste management activities will be prescribed, controlled, and verified. Written procedures, instructions, specifications, etc. shall be prepared in advance, identifying each designated activity and the method used to accomplish and document the activity. Since nuclear power plant verification systems do not apply here, independent peer review will be the principal means of verification. Independent peer review will be by a technically qualified person not directly involved in the conduct of the work.

The design phase for nuclear waste repository site characterization activities by the USGS includes various aspects, such as preparation of specifications, mapping, scientific research, layout analysis, drafting, review, and publication of reports. Scientific research includes geological, hydrological, geophysical, and geochemical research and investigations. The research and investigative work by the USGS is part of the total planning effort and precedes the actual design, construction, and operational phases of an installation.

The effort of the USGS shall be defined and described (planned), performed, and reviewed in accordance with the requirements of this Quality Assurance Program Plan. The various tasks shall be translated into procedures, instructions, drawings, and specifications that will constitute planning documents. When appropriate these documents will specify, describe, or make reference to, existing standards to assure quality.

The planning documents shall describe a planned effort for each designated activity. The procedures shall describe the work in terms of methods and techniques to be employed, and characterize accuracy or level of detail to be achieved. Specifics for the development and control of procedures,

will be further delineated in Section 5.0 of this Quality Assurance Program Plan. Changes and modifications shall be approved in the same manner as the original document.

The adequacy of the research and investigations planned by the USGS shall receive independent peer review by qualified individuals who may, or may not, be USGS employees. The peer review process is described in detailed procedures. The detailed procedure for a task shall indicate progress points where independent review is scheduled when appropriate. Evaluators assigned to peer review status shall be capable of performing the task being reviewed. The reviewers thus are qualified to make judgements as to the quality of the research or investigations performed. The peer review process shall be documented in accordance with provisions described in detailed procedures.

In the quality assurance review process each published report shall be examined to ascertain that the work was performed in an appropriate manner and that records, documents, and reports attest to the adequacy of the effort. Appropriate corrective action shall be taken where inadequacies are determined. The review shall assure that the research and investigative effort will satisfy both the technical and quality needs of the various scientific and technological interests. The signature of approving technical and quality assurance review personnel shall constitute the documented assurance that the work carried out meets the requirements of the Quality Assurance Program.

4.0 PROCUREMENT DOCUMENT CONTROL

Procurement of instruments, services, equipment, and material that may have a significant impact on the characterization and evaluation of the suitability of the geologic media or environment shall be accomplished under the Quality Assurance Program. Such procurement shall be in accordance with the Geological Survey Manual with the addition of quality assurance requirements. The USGS will be responsible for compliance with quality assurance requirements by the USGS contractors and subcontractors.

Procurement of instruments, services, equipment, and materials by the USGS shall be in accordance with procedures described in the Geological Survey Manual and the detailed procedure, "Procurement". These procedures describe the procurement process and delineate the documents generated.

Procurement documents including requisitions and purchase orders initiated for the Nuclear Waste Management Program shall be identified by marking: "USGS Nuclear Waste Management Program." Current versions of applicable basic technical requirements such as drawings, specifications, codes, and standards shall be made part of the procurement documents.

Quality assurance personnel shall be responsible for verifying that regulatory requirements, quality requirements, and technical requirements have been included or referenced in the purchase documents. Contractors and subcontractors to the USGS shall provide a quality assurance program consistent with the applicable portions of ANSI/ASME NQA-1. If the contractor or subcontractor cannot provide such a quality assurance program, the USGS shall assume the quality assurance responsibility. Documentation of quality assurance review of a procurement document will be the signing and dating of the Purchase Requisition by quality assurance personnel.

Revisions to procurement documents shall require the same level of approval as the original document including review by quality assurance personnel.

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

This section states that prescribed documents shall exist for all activities affecting quality and that the documents must contain criteria for satisfactory accomplishment of each activity. It also defines the hierarchy of the documents to be used, first this Quality Assurance Program Plan, then the Unit Task Procedures, then the detailed procedures, and the contents of each.

Activities affecting quality shall be prescribed and accomplished in accordance with instructions, procedures, or drawings which have been appropriately prepared, reviewed, and approved.

A document control procedure as described in Section 6.0, has been prepared which clearly delineates the requirements and responsibilities for preparation, review, and approval of documents including instructions, procedures, and drawings. The method of distribution and control has been clearly delineated in the document control procedure to assure that the latest approved revision of the document will be distributed to the people responsible for the work.

To accomplish the above the USGS shall prepare procedures which include:

5.1 Unit Task Procedures

Unit Task Procedures shall be prepared for each work task and are considered to be primary planning documents. The following topics shall be considered when preparing a Unit Task Procedure. These and other additional topics shall be included as applicable.

- 5.1.1 Purpose and Scope
- 5.1.2 Description of Work
- 5.1.3 Specific Requirements
- 5.1.4 Work Personnel, Qualifications, and Training
- 5.1.5 Interfaces
- 5.1.6 Equipment and Facilities
- 5.1.7 Item Identification and Traceability
- 5.1.8 Documentation
- 5.1.9 Listing of Detailed Procedures

- 5.1.10 Milestones
- 5.1.11 Calibration
- 5.1.12 References
- 5.1.13 Attachments

5.2 Detailed Procedures

Detailed procedures shall be prepared for each activity listed in the Unit Task Procedures. One detailed procedure may apply to several Unit Task Procedures. Detailed procedures shall provide sufficient description of work activities such that a qualified person performing the task at a later date under the same conditions could produce the required results. The following topics shall be considered when preparing a detailed procedure. These and other additional topics shall be included as applicable.

- 5.2.1 Purpose
- 5.2.2 Instruction on How to Perform Work
- 5.2.3 Description of Equipment to be Used
- 5.2.4 Instructions on How to Operate Equipment
- 5.2.5 Instructions on How to Calibrate Equipment
- 5.2.6 Quantitative or Qualitative Acceptance Criteria
- 5.2.7 Description or Example of Documentation
- 5.2.8 Identification and Control of Samples
- 5.2.9 References
- 5.2.10 Attachments

Written approved procedures with a defined format shall be prepared and used unless the activity is a research effort. Research efforts shall be identified in the Unit Task Procedures and will be documented in USGS logs, notebooks, or other documents, with independent technical review at defined intervals. The documents shall contain sufficient information to describe the activity such that a detailed procedure may be prepared when the research effort is concluded.

5.3 Quality assurance personnel shall be responsible for reviewing instructions, procedures, and drawings and assuring that:

- 5.3.1 Activities affecting quality have been sufficiently prescribed.
- 5.3.2 Quality requirements have been specified or referenced.

5.3.3 Quantitative or qualitative acceptance criteria have been included when applicable.

5.3.4 Documentation requirements are sufficient.

The quality assurance review shall be documented in accordance with the document control procedure.

6.0 DOCUMENT CONTROL

This section requires that measures in the form of written procedures be established to control procedures and other documents used for activities affecting quality.

Procedural documents shall be controlled in accordance with the detailed procedure for document control that will govern their preparation, independent review, approval, distribution, storage, and revision.

The document control procedure shall:

- 6.1 Identify and describe the documents required.
- 6.2 Identify individuals or groups responsible for document:
 - 6.2.1 Preparation
 - 6.2.2 Review
 - 6.2.3 Approval
 - 6.2.4 Distribution
 - 6.2.5 Storage
 - 6.2.6 Retrieval
- 6.3 Provide a system for document identification.
- 6.4 Require that revisions to documents are controlled by the same requirements as apply to the original document, with review and approval by the same individuals or their designated alternates.
- 6.5 Require that documents which require revision are revised and distributed before the change is implemented.
- 6.6 Provide controls to assure that superseded documents cannot be inadvertently used.
- 6.7 Provide controls such that all necessary documents are current and are available at locations where quality activities are performed.

7.0 CONTROL OF PURCHASED ITEMS, AND SERVICES

Quality assurance requirements shall be included in purchase documents for selected instruments, parts, services, or equipment. This section requires procedures to assure that selected instruments, parts, services and equipment conform to technical and quality assurance requirements.

Control of the quality of instruments, equipment, parts, materials and services purchased for use in the USGS Nuclear Waste Management projects shall be accomplished through technical and quality assurance reviews of the purchase documents that are prepared in accordance with Section 4.0 of this Quality Assurance Program Plan. Those items which are determined to have a significant impact on the technical data acquired shall be subject to the quality assurance controls below and the Purchase Requisition shall be so marked.

Detailed procedures shall be prepared to control purchased items that are considered to have a significant impact on technical data acquired. This control shall include requirements for source evaluation and selection, objective evidence of quality furnished by the contractor, inspections and audits at the procurement source, and examination of items upon delivery.

Items and services which are determined to have significant impact shall be evaluated before the purchase order is placed to determine what action is necessary to assure that purchased items or services conform to the purchase requirements stated in Section 4.0 of this Quality Assurance Program Plan.

8.0 IDENTIFICATION AND CONTROL OF ITEMS

This was originally a hardware oriented criterion used to control the materials, parts, and components used to construct a nuclear power plant. Its application to USGS activities is primarily to provide identification and control of geologic and hydrologic samples. The intent is to prevent the use of incorrect or inappropriate samples.

Identification and control of materials, equipment, samples, etc. shall be described in detailed procedures. Identification shall be on the item or on records traceable to the item and shall not affect the overall function or performance of the material, part, component, or sample. Identification shall be legible and shall be designed to provide traceability throughout the lifetime of the item.

Although this section may possibly apply to any material, equipment, and items which have a significant impact on decisions leading to site or media qualification for Nuclear Waste Management projects, its primary usage is for the identification and control of USGS geologic and hydrologic samples.

The correct identification of geologic and hydrologic samples shall be verified by the quality assurance staff on an audit basis in accordance with Section 18 of this Quality Assurance Program Plan.

9.0 CONTROL OF PROCESSES

This requirement was originally written to cover control of special processes such as welding and nondestructive testing which are dependent on operator skill and where quality cannot be determined by product inspection or test. Most USGS activities are considered to be special processes but controls will be limited because the results can be evaluated by independent peer review.

Most activities performed by USGS personnel are considered to be special processes because of their high degree of dependency on "operator skill". Detailed procedures shall be developed for activities which have a significant impact on decisions leading to site or media qualification or disqualification. These procedures include controls for processes for which the results are highly dependent on the control of the process, the skill of the operators, or both.

Detailed procedures shall provide the following controls for special processes as applicable:

- 9.1 Special process work is to be performed by personnel whose qualifications are documented by the method described in Section 2.0 of this Quality Assurance Program Plan.
- 9.2 When applicable, special process procedures will be qualified before use. In most cases "procedure qualification" will be after work is performed in the form of documented independent peer review.
- 9.3 Special process work is to be in accordance with applicable codes, standards, specifications, criteria, or other special requirements.

10.0 INSPECTION

USGS activities shall be conducted in accordance with requirements as delineated in the Quality Assurance Program and shall be verified by means of an inspection program. The inspections may be performed by quality assurance staff personnel or by independent technical personnel as designated by technical management and the Quality Assurance Manager.

An inspection program shall be established and carried out which verifies that activities affecting quality are conducted in accordance with this Quality Assurance Program Plan and its associated Unit Task Procedures and detailed procedures. The inspection program shall include an inspection plan which may be in the form of a detailed procedure when appropriate. The inspection program shall be used in coordination with project drawings, specifications, procedures, and instructions and shall provide for the following where applicable:

- 10.1 The identification of characteristics and activities to be inspected.
- 10.2 The identification of individuals responsible for the inspection operation.
- 10.3 The acceptance and rejection criteria.
- 10.4 A description of the inspection method.
- 10.5 A listing of mandatory hold points.
- 10.6 A method for the documentation of the results of the inspection, including the signature of the inspector and the date of the inspection.

Individuals who perform the inspection operations shall not have been responsible for the work being examined and shall be qualified, and their qualifications shall be documented. Inspector qualifications shall be documented by use of the standard USGS personnel form for USGS technical personnel or by a Personnel Certification Form.

As a minimum, inspections shall be in the form of surveillance by quality assurance personnel in accordance with the above stated requirements. Surveillance shall include a periodic monitoring of activities to provide documentation to show that work was performed as planned.

11.0 TEST CONTROL

Tests and analyses which result in data that may have a significant impact on decisions leading to site or media qualification or disqualification shall be identified and controlled by written procedures. Such procedures shall provide for the qualification of technical personnel and equipment, the recording of data, and criteria for acceptance or rejection of results.

Detailed procedures shall include provisions such that significant testing is identified and performed in accordance with a test plan. The detailed procedures may describe the test plan or make reference to written testing procedures found elsewhere. Test procedures shall include or reference:

- 11.1 Applicable test requirements
- 11.2 Provisions to insure that prerequisites have been met before testing.
- 11.3 The use of adequate, calibrated measuring and test equipment.
- 11.4 The use of qualified and certified personnel (See section 2.0).
- 11.5 Suitable and controlled environmental conditions when appropriate.
- 11.6 Written instructions for test performance.
- 11.7 Hold points to be witnessed by a qualified inspector.
- 11.8 Methods for collecting and recording test data and for storing the data.
- 11.9 Acceptance and rejection criteria for test data obtained.
- 11.10 A sequence of operations, when appropriate.

The test results shall be evaluated by a qualified individual (independent peer review) and the evaluation documented. An inspection plan and test plan may be combined into a single document when appropriate.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

Test instruments and other equipment used for data gathering shall be set, adjusted, or calibrated either periodically or before use if failure to do so might have a significant effect on the quality of the data. The setting, adjusting, or calibration shall be documented.

Designated tools, gages, instruments, and other measuring and test equipment (M&TE) used in the measurement, inspection, or evaluation of activities affecting quality shall be included in a maintenance and calibration program.

Detailed procedures shall describe or make reference to measuring and test equipment calibration instructions and shall provide requirements for documentation, control, maintenance, and adjustment of instruments and equipment. The calibration program shall provide a system for the identification and labeling of measuring and test equipment which shows that the item has been calibrated, provides traceability to the calibration test data, and indicates the date recalibration is due.

Reference standards used to calibrate the measuring and test equipment shall be traceable to the National Bureau of Standards. Where other standards must be used the basis for calibration shall be documented.

Measuring and test equipment which is included in the program shall be identified in the detailed procedures.

13.0 HANDLING, STORAGE, AND SHIPPING

Originally these requirements were written to provide procedures to control the handling, storing, and shipping of materials, parts, and components for the design, construction, and operation of nuclear power plants. For USGS Nuclear Waste Management projects, this section requires that procedures be written and implemented to control handling, processing, shipping, and storing of geologic and hydrologic samples, as well as other material, parts, and equipment that are significant to public health and safety.

Cleaning, handling, processing, packaging, shipping, and storage of geologic and hydrologic samples collected in the field shall be controlled in accordance with detailed procedures. These procedures shall include provisions for the identification of samples and for the proper packing, handling, shipping, and storage of the samples in order that they retain the properties for which they are to be tested. If a special environment is necessary to maintain the sample during shipping or storage, the methods for maintaining that environment shall be described in detailed procedures. Inspection of the packages shall be made at the shipping destination to assure that packaging and labeling are secure and that no shipping damage has occurred.

The same requirements as above apply to materials, parts, and equipment shipped for use in the field or laboratory for which the loss of identification or damage could result in significant risk to the usefulness of data.

14.0 INSPECTION, TEST, AND OPERATING STATUS

The requirements of this section were originally established to preclude the inadvertent bypassing of significant tests and inspections. Here this section applies to test-hole drilling, trenching, and laboratory efforts where multiple organizations or individuals are involved in performing tests wherein the sequence and timeliness of the tests are significant.

Test, inspection, and data gathering efforts shall be planned and controlled by detailed procedures. The procedures shall provide for the proper sequence for the test, inspection, or data gathering efforts and for the timely completion of them. If the efforts involve multiple organizations or persons, the procedures shall provide for the timely and effective interfacing of those involved. Test controls are described in Section 11.0. Quality assurance involvement in the planning and test operations shall be documented.

15.0 CONTROL OF NONCONFORMING ITEMS

Materials, equipment, items, and processes that do not meet established requirements for quality or performance are described as nonconforming. They shall be controlled by detailed procedures in order to provide a record of their identification, disposition, and close out. A system for marking, segregating, or otherwise identifying the nonconforming item or process shall be developed.

Materials, equipment, items, processes, or data shall be considered to be nonconforming when they do not meet established requirements or their quality has been rendered indeterminate. Such nonconforming conditions shall be controlled by the detailed procedure "Control of Nonconforming Materials", which shall provide measures to prevent the use of nonconforming items and processes through identification, segregation and disposition.

The system of control established shall document the methods, requirements, and procedures for:

- 15.1 Identifying the nonconformance and its cause.
- 15.2 Reporting of nonconformances by technical or quality assurance personnel.
- 15.3 Processing a nonconformance report.
- 15.4 Establishing an appropriate disposition; possibilities include use-as-is, repair, rework, or reject.
- 15.5 Review and acceptance of the disposition by both technical and quality assurance personnel.
- 15.6 Documented verification of the nonconformance disposition.

16.0 CORRECTIVE ACTION

Discrepant conditions, actions, and methods may be reported using one of several methods as described in detailed procedures. In addition, significant discrepant conditions require the issuance of a Corrective Action Report (CAR) to preclude recurrence.

Conditions adverse to quality are promptly identified and dispositioned as documented in nonconformance reports, audit reports, surveillance reports, etc., which are described elsewhere in this Quality Assurance Program Plan. Significant conditions adverse to quality identified in these documents by technical or quality assurance personnel shall be identified promptly on a Corrective Action Report as described in detailed procedure "Control for Corrective Action", and corrected as soon as practical. Corrective Action Reports shall document the identification of the significant condition, the cause, and the corrective action to preclude repetition.

Corrective Action Reports and Corrective Action Status Logs shall be sent to appropriate levels of management as decided by quality assurance management.

17.0 QUALITY ASSURANCE RECORDS

Quality assurance records that may be maintained are listed generically; details as to what records shall be maintained, their location, and the duration of their retention are delineated in detailed procedures. Records must be sufficient to demonstrate in a court of law what was done during technical activities, and that the records meet requirements of the USGS Quality Assurance Program.

Quality assurance records shall be controlled by the detailed procedure "Control of Quality Assurance Records". This procedure identifies specific records to be maintained, the duration of retention, location, and conditions for maintenance responsibilities. Records may be designated for permanent or nonpermanent storage and shall be so marked. Records to be maintained in permanent storage shall be identified and retrievable and shall be adequate to supply traceable evidence of the quality of research activities.

Quality assurance records that may be maintained include, but are not limited to, those listed below.

- 17.1 Operating logs
- 17.2 Results of technical reviews
- 17.3 Results of quality assurance reviews
- 17.4 Technical data records
- 17.5 Inspection reports
- 17.6 Test reports
- 17.7 Equipment certifications
- 17.8 Material certifications
- 17.9 Material analysis reports
- 17.10 Work performance records
- 17.11 Audit reports
- 17.12 Unit Task Procedures
- 17.13 Detailed procedures
- 17.14 Personnel qualification records
- 17.15 Maps, photographs, drawings, cross sections, diagrams, graphs
- 17.16 Calibration records
- 17.17 Open file reports
- 17.18 Technical papers and reports

18.0 AUDITS

A formal auditing system shall be established. Compliance with codes and standards, established procedures, and the Quality Assurance Program shall be evaluated periodically, and the results shall be reported to technical and quality assurance management.

Audits shall be performed and controlled in accordance with the detailed procedure "Control of Auditing". Audits shall be performed by qualified personnel who have the independence to perform an objective evaluation of the area being audited. Audits of each activity shall be scheduled in a timely manner to evaluate quality performance and compliance to the Quality Assurance Program requirements. An audit schedule shall be documented, distributed by the USGS quality assurance organization to appropriate management levels, and updated at regular intervals. The scheduled audits shall cover facilities, field and laboratory activities, implementation of procedures, recording of data, data reduction, data processing, preparation of reports, records systems, and identification and storage of samples. Subcontractors' performance shall be audited.

Checklists shall be used in the performance of audits. The completed checklists may be used in the preparation of the audit report. The audit report shall be submitted to appropriate levels of management for review. Audit findings described in the audit report shall include provisions for corrective actions. Decision to reaudit shall be made by quality assurance or technical management.