QUALITY ASSURANCE PLAN

For

ARM GROUP INC.

GEOPHYSICAL SERVICES DIVISION

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August 2006

Hereby Adopted:

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ARM GROUP INC.

INTRODUCTION

It is the policy of ARM Group Inc. to provide quality consulting services and work products that meet or exceed the expectations and requirements of its clients. ARM Group Inc. is committed to continual quality improvement through involvement of all personnel in a systematic, logical process to continually improve ARM Group Inc.'s work practices and procedures. This Quality Assurance Plan (QAP) details the ten mandatory criteria of DOE Order 414.1. This QAP is intended to fulfill the requirements of 10 CFR 830.120 Subpart A for the development, submittal, and implementation of a QAP and defines ARM Group Inc.'s Geophysical Services quality management program for work at Los Alamos or other DOE facilities. ARM Group Inc. will be compliant with LANL Environmental and Remediation Support Services (ERSS) requirements.

CRITERION 1 – PROGRAM

"A written quality assurance program (QAP) shall be developed, implemented and maintained. The QAP shall describe the organizational structure, functional responsibilities, levels of authorities, and interfaces for those managing, performing, and assessing the work. The QAP shall describe management processes, including planning, scheduling, and resources considerations."
(10 CFR 830 Subpart A, Quality Assurance Criterion1, Program)

ARM Group Inc.'s QAP has been developed to ensure conformance to specified requirements, procedures, and practices. The following documents have been developed by ARM Group Inc. and will be used by Project Managers to develop project-specific procedures and practices to ensure quality on a specific project:

- Employee Handbook, latest edition;
- Standard Operating Procedures (SOPs), as applicable, for each practice area;
- Document Review Policy Memo (Attachment 1); and
- Audits of Conformance (e.g., Computations Review and Quality Assurance (QA) Review Sheets) (Attachment 2).

ARM has established an organizational structure, functional responsibilities, level of authority and interfaces for those managing, performing, and assessing the work associated with a project. ARM's project organizational chart is provided in Appendix A. The responsibility for project-specific quality is assigned to the Project Manager and it is his/her responsibility to provide a timely notice and review period for the designated QA reviewer for the specific project. At

project inception, the Corporate Quality Assurance Manager will be available to assist the Project Manager in the development of a Project-Specific Quality Assurance Plan (PSQAP).

ARM utilizes management processes, including planning, scheduling, and providing resources for the work by developing project work schedules and work breakdown structures (WBS) to identify and track tasks and costs associated with the Project. ARM will track costs weekly to ensure the accuracy of charges, and to track budget and schedule. Periodic reviews of the schedule will be conducted to track progress and to ensure the adequacy of resources assigned to the Project. Completion of monthly status reports will assist in informing LANL of funding needs well in advance. Regular communication in the form of meetings, phone calls, emails, and reports with LANL will ensure that the Project continually delivers the required product.

CRITERION 2 – PERSONNEL TRAINING AND QUALIFICATION

"Personnel shall be trained and qualified to ensure that they are capable of performing their assigned work. Personnel shall be provided continuing training to ensure that job proficiency is maintained."
(10 CFR 830 Subpart A, Quality Assurance Criterion, Training and Qualification)

The personnel requirements, roles, and responsibilities will be the same for all projects except for some slight modifications that are project dependent due to site conditions and client specific contract related requirements.

Personnel Requirements

The personnel requirements include issues related to staffing, training, experience, and proficiencies required to complete each project.

Staffing Requirements

Staffing requirements (including a conglomeration of ARM Group and all contractors/subcontractors on the project) for each job should include but are not limited to: a program manager, a project manager, a site manager, a quality control manager, a health/safety manager, data processor(s)/interpreter(s), a data manager, a Geographic Information Systems (GIS) manager, and data acquisition / field personnel. Staffing requirements (and their corresponding roles and responsibilities) may overlap in a way by which one person will fill duplicate staffing requirements. General duplicate staffing methodologies include either: (**1**) one person filling two staffing requirements on the same project (ie one person fills the staffing requirement for both GIS and data management) or (**2**) one person filling the same staffing requirement for duplicate projects (i.e. one person filling the project management for two projects). The only exception is that the Health/Safety manager(s) and Quality Control manager(s) can be the same person but they cannot be a duplicated as a project manager or another project related production oriented personnel. The exception is to avoid a conflict of interest between production, quality, and health/safety roles.

Training Requirements

General training requirements include that all personnel have completed the following (with certificates or signature verification) prior to conducting field work: a current OSHA 40-hour HAZWOPER training certificate, a current 8-hour HAZWOPER refresher training certificate, a detailed review of the geophysics (portion of the) work plan, an overview of the work plan, a review of the health/safety work plan, and a pre-project planning meeting.

Additionally, project specific staffing training and procedures will be discussed prior to mobilization to the project and conducted prior to the project start either before or after arriving on-site but prior to conducting the Geophysical Survey.

Experience and Proficiency Requirements

General experience requirements include that all personnel have at least 6 months experience at their current position or they must be guided/mentored by someone with significant experience in their position (i.e. team leader, lead processor, site manager, etc.).

Specific proficiency requirements include meeting project deliverable deadlines, improving proficiency as the duration of the project increases, and communicating/documenting proficiency improvement techniques for future use. The most common project related proficiencies include examples of equipment utilization techniques (ie EM61, EM31, TM5emu, cesium vapor mag, etc.) and software utilization techniques (i.e. Oasis Montaj, Surfer, Dat61, etc.).

Personnel Roles and Responsibilities

Personnel roles and responsibilities will be discussed from data acquisition through program management in their differing yet increasing levels of responsibility.

Data Acquisition / Field Geophysicist's (DA/FG's)

Roles and responsibilities for DA/FG's include but are not limited to:

- attending daily morning/afternoon safety and production meetings;
- acquiring data which meets project production and DQO standards;
- monitoring data in the field for any obscurities;
- documenting field activities hourly in a log book;
- completing QC tests as mandated by grid or by date;
- filling out and maintaining data acquisition / field sheets;
- providing data collection files to data manager or processors; and
- communicating field issues to project geophysicist(s) and site manager(s).

Data Processors/Interpreters

Roles and responsibilities for Data Processor(s)/Interpretor(s) include but are not limited to:

- attending daily morning/afternoon daily and production meetings;
- processing all data collected the previous day;
- documenting the processing steps completed on processing sheets;
- analyzing the QC tests and production data for quality;
- documenting the quality of data daily and monitoring any trends;
- discussing the quality of the data daily with DA/FG's and site manager;
- informing DA/FG's of possible methods of improving production or quality;
- interpreting data daily and providing results to the Data/GIS manager;
- organizing and formatting fully-processed files in preparation to provide as deliverables (i.e. headers, formats, naming conventions, etc.); and
- communicating field and/or processing issues to site manager.

Data / GIS Manager(s)

Roles and responsibilities for Data / GIS Manager(s) include but are not limited to:

- attending daily morning/afternoon daily and production meetings;
- receiving and documenting the chain of custody for data received each day;
- organizing the raw data into appropriate folders based on date, team, grid, etc.;
- tracking the file names and locations using a database or spreadsheet;
- gathering GIS related data (such as land surveying and geo surveying data);
- integrating GIS related data into all-encompassing site map;
- receiving/mapping anomaly selection and intrusive investigation data;
- organizing and formatting fully-processed files in preparation to provide as deliverables (i.e. headers, formats, naming conventions, etc.); and
- communicating any file formatting, positioning or other issues to the appropriate personnel and site manager.

Site Manager

Roles and responsibilities for Site Manager include but are not limited to:

- organizing and running morning/afternoon daily and production meetings;
- documenting, discussing, and solving site issues with appropriate personnel;
- planning and deciding daily activities in advance after discussions with site personnel and guidance from project/program managers;
- communicating any unresolved issues to the project/program managers for further discussion;
- communicating solutions / results of discussions with site personnel; and
- representing the company for on-site client or contractor/subcontractor communications and relations;
- communicating any unresolved issues to project/program manager(s);
- resolving personnel issues between each other and clients;
- executing project specific plans and decisions made by project/program manager(s);
- making immediate decisions to maintain project fluidity and efficiency;
- ensuring milestones are met and deliverables are provided;
- aiding site personnel with field or office work to meet goals; and
- reporting daily activities and decisions to management.

Project Manager

Roles and responsibilities for Project Manager include but are not limited to:

- Communicating with the site manager daily with regards to unresolved issues;
- Monitoring qualitatively production and quality information from site;
- Comparing daily production and quality information to project goals;
- Monitoring current project costs compared to budget for each task;

- Projecting current project costs to project completion costs for each task;
- Communicating unresolved issues with program manager after solution-oriented discussion with site manager;
- Communicating with client(s) with regards to any mutual budget concerns, planning, logistics, or other unresolved issues;
- Documenting daily discussions with site personnel and clients with regards to decision making process and client-directed project changes;
- Representing the company and clients in public meetings.

Program Manager

Roles and responsibilities for Program Manager are summarized as the personnel ultimately responsible for budgets, schedules, client interactions, and overall status at least one (usually two or more) project/task order. The program manager is responsible for project manager and site manager guidance as well as representing the company in public meetings and any unresolved issues between company and client.

ARM shall provide continuing training, including "Lessons Learned," to personnel to maintain and improve their job proficiency and will document training received as necessary. Subcontractor training and qualification records shall be submitted to ARM for review and approval. ARM retains the right of refusal of any subcontractor personnel qualification and training.

The training requirements and satisfactory completion of the requirements shall be tracked for ARM and subcontract personnel utilizing the ARM Microsoft Excel Training Database.

CRITERION 3 – MANAGEMENT / QUALITY IMPROVEMENT

"Processes to detect and prevent quality problems shall be established and implemented. Items, services, and processes that do not meet established requirements shall be identified, controlled, and corrected according to the importance of the problem and the work affected. Correction shall include identifying the causes of problems and working to prevent recurrence. Item characteristics, process implementation, and other quality-related information shall be reviewed and the data analyzed to identify items, services, and processes needing improvement."
(10 CFR 830 Subpart A, Quality Assurance Criterion 3, Quality Improvement)

ARM Group Inc. endeavors to continually improve the quality of its procedures and work products. The continual quality improvement effort involves project management and staff level personnel meeting in quality improvement meetings or otherwise communicating in a forum that allows the synergistic expression and compilation of ideas. In these discussions, issues such as project management, project execution, design methods, field services, and the like are open for evaluation of potential process improvements. Where identified changes can improve, ARM Group Inc.'s goal of delivering a quality service, the new procedure is approved, documented, and distributed to all potentially affected employees.

Problems will be identified and documented. ARM will perform a root cause analysis and trending as required to define deficiencies and areas for improvement. The corrective action(s) necessary to fix a problem will be determined, documented, and implemented. Appropriate preventive actions to preclude the problem from recurring will also be determined, documented, and implemented.

The QA reviewer shall be responsible for verification of the processes by conducting periodic evaluations. The evaluation includes ensuring that proper corrective action is taken when required and that disposition of non-conforming work, services, and products is in accordance with this document, company policies, and the PSQAP. The Project Manager shall be responsible to ensure corrective actions are taken, if required, and that non-conforming work is handled properly. Corrective Action forms are presented in Attachment 2.

The Program Manager (PM) and the Quality Program Representative are responsible for establishing processes for, and creating an environment conducive to, taking appropriate corrective action(s) for identified problems.

ARM subscribes to the philosophy of "lessons Learned" and will implement a Lessons Learned program for this Project in accordance with Department of Energy Standard Number 7501-99, The DOE Corporate Lessons Learned Program.

CRITERION 4 – DOCUMENTS AND RECORDS

"Documents shall be prepared, reviewed, approved, issued, used, and revised to prescribe processes, specify requirements, or establish design. Records shall be specified, prepared, reviewed, approved, and maintained."
(10 CFR 830 Subpart A, Quality Assurance Criterion 4, Documents and Records)

To establish consistency in quality assurance and quality control (QA/QC), ARM Group Inc. established a list of approved reviewers for each type of work product. These reviewers are responsible for ensuring adherence to company policies for quality and monitoring quality throughout the organization and identifying required changes in company policies. All ARM documents and deliverables will be reviewed by appropriate reviewers in accordance with ARM's Document Review Policy Memo.

Project field documentation will be collected, managed, and will be kept on-site during the field portion of a geophysical investigation for inspection by client personnel.

Most geophysical procedures note that geophysical data are digitally recorded and downloaded periodically to a field computer for review in the field. In addition to the copy of data placed on the field computer's hard drive, a copy of the data will be placed on a floppy or Zip disk or disks for backup before the data are erased from the equipment.

As an additional means of ensuring data availability, all data will be transferred to the geophysical data processing center or backed up on an external hard drive or other storage medium (CDs, DVDs) on a daily basis. This backup storage of data will further reduce the likelihood that data will be lost. Transfer may be accomplished by e-mail attachment, file transfer protocol (i.e., FTP), or overnight delivery of floppy or Zip disks. If possible, copies of field data collection forms and appropriate field logbooks should be copied and/or also be faxed.

The Project Geophysicist will review all geophysical data to verify that the data represent information instead of instrument noise. This review will serve to double-check the field data review for QA/QC purposes.

All digital data stored at the geophysical data processing center will be backed up daily and weekly. All data, reports, memorandums, spreadsheets, etc. will be maintained in a designated client/site subdirectory and transferred to the central archive system.

ENV-ECR Quality Program Project Leader (QPPL) approval shall be obtained for all ARM, and ARM subcontractor, generated procedures including SOPs and internal implementing procedures.

CRITERION 5 – WORK PROCESSES

"Work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means. Items shall be identified and controlled to ensure their proper use. Items shall be maintained to prevent their damage, loss, or deterioration. Equipment used for process monitoring or data collection shall be calibrated and maintained."
(10 CFR 830 Subpart A, Quality Assurance Criterion 5, Work Processes)

At inception of the project, the Project Manager shall clearly identify the objectives, requirements, and operating procedures for the project. Project objectives, requirements, and operating procedures shall be documented in the PSQAP and/or the Project Proposal and shared with the members of the design team. Utilizing the documents identified in Section "B", the Project Manager/Team shall develop the specific QA/QC procedures to be included in the PSQAP. The PSQAP and the Project Proposal may be the same document, or the PSQAP may be an updated form of the Project Proposal that includes more specific QA/QC procedures, if the nature of the project dictates more specific protocols. These include peer reviews, independent checking, scheduled design review meetings, plan development review checking, CAD documentation, coordination with outside agencies, procedures for documenting various tasks, conformance audits, and various management tools (control sheets, ledgers, comment register, etc.). When appropriate, the Project Manager shall also develop a "Design Criteria" document. This document, which is completed and checked prior to any calculations or plan work, contains relatively detailed design information for each design element. This document will be kept in the central job file. Project task designers shall be made aware of the content and location of this document.

ARM Group Inc. will continually review equipment and software that may improve the delivery of the design product and assist us in managing the design process. ARM Group Inc. will utilize AutoCAD or Geosoft Oasis Montaj for maps, drawings and the latest editions of software used in customarily performed projects. Electronic file transfer will be utilized with clients, subconsultants, and others whenever possible to provide for timely reviews and approvals.

ARM Group Inc.'s Quality Policy includes procedures and approaches to each of the QC/QA items listed below:

- Work Plans
- Safety Plans
- Field Procedures
- Cost allocation
- Checking criteria
- Checking calculations
- Computer programs
- Deliverables
- Control Logs
- Specifications
- Cost Estimates
- Changes
- Project schedule

All geophysical instruments and equipment used to gather and generate field data are calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Calibration, repair, or replacement records will be filed and maintained by the Site Geophysicist and may be subject to audit by the QA manager.

Testing records of the field instrumentation will be filed with the Project Manager after the fieldwork is completed.

Data processing quality control is required to ensure data quality after it has been entered into the GIS system. Potential data problems include source data errors, data entry errors, data editing errors, data corruption errors, and user errors. ARM's data review is implemented to identify, and correct any of these errors should they occur.

Data Loss and File Corruption - There are several programs that manipulate the various files used by the geophysicist. Due to hard disk limitations, Random Access Memory (RAM) limitations, or human error these programs occasionally crash, and the files being manipulated by these programs may be partially or totally corrupted. To prevent data loss, these files will be backed up daily.

Data Reduction - All raw data from field measurements (including geophysical and intrusive data collection activities) will be appropriately recorded and noted in the field notebooks. If the data are to be used in the project reports, they will be reduced and summarized, and the reduction method will be documented in the report. Data reduction and analysis methodologies will be dependent upon those geophysical methods selected.

Management shall ensure that all technical standards, customer and data requirements, administrative controls, and acceptance criteria applicable to work processes are clearly identified and conveyed to workers. Management shall ensure that those under their supervision have the skills, equipment, and resources needed to accomplish their work including knowledge and understanding of the processes being used.

Systems shall be established for the identification, segregation, and control of items that are appropriate to the process, to assure the control and maintenance of items from manufacture or receipt through delivery, installation, or use. Items shall be protected and maintained in accordance with established standards and administrative controls to prevent their damage, loss, or deterioration.

Equipment used for data collection shall be calibrated and maintained in accordance with the applicable LANL and ARM SOPs and manufacturer's manuals.

When unplanned hazards or conditions adverse to quality are discovered, the activity or the work shall be stopped and corrective actions shall be promptly implemented to abate or eliminate the hazard or condition adverse to quality.

CRITERION 6 – DESIGN

"Items and process shall be designed using sound engineering and scientific principles, and appropriate standards. Design work, including changes, shall incorporate applicable requirements and design bases. Design interfaces shall be identified and controlled. The adequacy of design products shall be verified or validated by individuals or groups other than those who performed the work. Verification and validation work shall be completed before approval and implementation of the design."
(10 CFR 830 Subpart A, Quality Assurance Criterion 6, Design)

Should design documents and/or sheet drawings be required for any Project, ARM will incorporate the review procedures as outlined in Attachment 1.

CRITERION 7 – PROCUREMENT

"Procured items and services shall meet established requirements and perform as specified. Prospective suppliers shall be evaluated and selected on the basis of specified criteria. Process to ensure that approved supplier continue to provide acceptable items and services shall be established and implemented."
(10 CFR Subpart A, Quality Assurance Criterion 7, Procurement)

ARM Group Inc. will maintain records of subconsultant performance. For each project, subconsultants will be evaluated and selected on the basis of their ability to meet the project's requirements, experience with the type of work to be performed, staff resources, and dedication to schedule and budget.

The selected subconsultants will be required to either accept and implement ARM Group Inc.'s PSQAP, or prepare their own PSQAP and submit it to ARM Group Inc. for review and approval to ensure compliance with project requirements.

ARM Group Inc. will perform periodic evaluations to ensure subconsultant compliance with the PSQAP. Work prepared by subconsultants will be reviewed by ARM Group Inc. to ensure that the work, services, and products meet or exceed the expectations and requirements of our client. ARM Group Inc.'s Project Manager shall be responsible for these reviews, acceptance or rejection of material, and the preparation of reports documenting these evaluations.

ARM will ensure that quality requirements and Price Anderson Amendment Act applicability statements are rolled-down to ARM subcontractors in procurement documents. In addition, ARM shall provide objective regarding subcontractors to the ENV-ECR QPPL to support subcontractor evaluations and placement on the Qualified Suppliers List as required.

CRITERION 8 – INSPECTION AND ACCEPTANCE TESTING

"Inspection and testing of specified items, services, and processes shall be conducted using established acceptance and performance criteria. Equipment used for inspections and tests shall be calibrated and maintained."
(10 CFR 830 Subpart A, Quality Assurance Criterion 8, Inspection and Acceptance Testing)

General

ARM Group Inc.'s procedures to monitor and identify nonconforming work, services or products will include, but not be limited to:

- independent calculation and plan development checking;
- scheduled informal review/design meetings;
- scheduled peer plan review at submission milestones; and
- scheduled and unscheduled internal audits.

The Project Manager shall be responsible for enactment of these procedures for both internal and subconsultant work products.

Written documentation of nonconformance to this QAP shall be retained in the Project QA file. This documentation shall contain relevant discussions, data, findings and resolution of the nonconformity. When appropriate, the client shall be notified of the nonconforming product and be advised of the resolution.

In accordance with client criteria, nonconforming products shall be reviewed with respect to:

- correction to meet client requirements;
- acceptance by concession;
- use as an alternative scheme; and
- rejection of product or portion thereof.

Documentation of nonconforming product disposition shall be by entry into the Review Comment Register, QA Review Sheet, minutes of meeting, phone conversation memo and/or letter of record. When nonconforming work is corrected to meet requirements, quality shall be assured by repeating the design process for checking, peer plan review, etc., as discussed above.

General

ARM Group Inc. will sustain a preventive and corrective action process that addresses nonconforming conditions.

Preventive

Critical and detailed reviews/analyses by the assigned Project QA Reviewer and/or Project

Manager shall be performed to ensure that the project adheres to the specified criteria. This review/analysis shall be made prior to each submission and recorded on the Review Comment Register. These reviews shall be scheduled prior to the submission date to allow sufficient time to make any required modification to the product prior to the submission to the client.

The Project QA Reviewer shall review the minutes of meetings and periodically attend meetings unannounced. This shall include internal meetings and team coordination meetings. Emphasis of these reviews shall be on the management of the project. The Project QA Reviewer shall determine if:

- problems raised are being addressed;
- appropriate action is being taken in a timely manner; and
- discipline interfaces have been addressed and are effective.

The Project Manager and appropriate staff shall perform a technical review of the drawings and reports selected for submission to the client. Submittals shall be checked for compliance with codes, design criteria, and standards.

Corrective

When review comments on a submittal are received from the client, the post-submittal review process shall begin. The purpose of the post-submittal review is to analyze comments, formulate responses, and identify corrective actions to satisfy comments made on the submittal by the client. ARM Group Inc.'s response to the comments and proposed corrective action will be reviewed with the client prior to the action being implemented. Written comments from the client, comments marked on documents such as plans and reports, and comments recorded in meeting minutes shall be documented in the project file.

ARM Group Inc. will prepare a detailed schedule and budget for each project at inception. At intervals appropriate for the specific project, the Project Manager shall monitor work completed to date against the schedule and utilize a budget report to check expenditures against the project budget.

When requested or appropriate, Project Managers shall also prepare a schedule status report to be submitted to the client with the monthly or milestone invoices. When slippages in schedule or budget occur requiring corrective action, the Project Manager shall meet with key project staff to determine appropriate corrective actions, develop a corrective plan, implement the plan, and monitor the work until the project is complete or back on course.

ARMs inspection process shall contain as appropriate, provisions for identification of when, how, and what types of inspections are required; administrative control and status indicators necessary to preclude inadvertent bypassing of required inspections; administrative controls to prevent inadvertent operation of the item or process; qualification requirements for inspection personnel; and, provisions for inspection planning.

ARMs inspection process shall contain, as appropriate, provisions for when, how, and what types

of inspections of calibration and equipment maintenance. Inspection reports will be prepared and submitted for each Project as required.

CRITERION 9 – MANAGEMENT ASSESSMENT

"Managers shall assess their management processes. Problems that hinder the organization from achieving its objectives shall be identified and corrected."
(10 CFR 830 Subpart A, Quality Assurance Criterion 9, Management Assessment)

The Project Manager shall be responsible to monitor the project progress to ensure that the scope of work is completed within the budget and time of completion stipulated in the Agreement. When appropriate, an amendment/supplement request to revise the scope of work, cost, or time of completion shall be initiated by the Project Manager. The documentation and justification will be reviewed and approved by the President/Vice President prior to submission to the client. The approved amendment/supplement to the Agreement will be maintained in the project file.

ARM Group Inc. has a centralized billing function that prepares all invoices. The Project Manager or his designated Estimator shall be responsible for developing percent completion and related invoice amounts. Documented procedures have been established for processing of invoices. Progress reports and budget summaries shall be submitted with the invoices when dictated by the project requirements

ARM Group Inc. will prepare a project specific quality assurance plan (PSQAP) for all projects. The PSQAP may vary from a standard checklist for small projects, to a detailed customized document for a complex project. Typically, the Project Proposal is, or forms a basis for, the PSQAP.

Initially, the Project Manager will typically prepare a "conceptual PSQAP", which will address the following at a project overview level:

- Key Considerations
  - Key deliverables and their milestones dates
  - Key project personnel and their accountability
  - Communication Plan for stakeholders, public involvement, and team communication
  - Decision making steps and issue resolution
- Quality Assurance
  - Identify person or agency responsible for independent assurance
  - Determine the number of status meetings to review schedules, scope, budget, team organization, approvals, and coordination
- Quality Control
  - Identify appropriate design criteria and specifications
  - Identify person(s) responsible for checking assumptions, verifying calculations, and reviewing documentations
  - Indicate process for submission preparation and checking
  - Indicate how design and/or construction costs will be estimated and checked

When ARM Group Inc. is awarded the project, depending on its size and complexity, the Vice President and/or Project Manager shall refine the "Conceptual PSQAP" to include further project

requirements as deemed necessary by the client. Generally, the refined plan will include a comprehensive schedule with milestone dates, a Communication Plan, specific QC/QA procedures for deliverables, and a project team protocol.

The Project Manager shall be responsible for implementation of the Team Communication Plan contained in the PSQAP.

Internal and project meetings shall be conducted on a regular basis to ensure a coordinated effort between the various organizations and technical units, including subconsultants.

ARM Group Inc. will conduct regularly scheduled meetings with the client and other involved parties to meet project needs. ARM Group Inc. will prepare and distribute minutes of these meetings to attendees and other affected parties.

Prior to contractual milestones, the Project Manager shall review a draft of the deliverables for comments and discussion with the client. Upon receipt of feedback after submission of the deliverables, this information shall be logged, reviewed, and appropriate changes are implemented and documented in the file.

In addition, it is ARM Group Inc.'s policy that the Project Manager shall maintain contact with the client on a regular basis to discuss the project and obtain feedback. ARM Group Inc. has established a Client Satisfaction Evaluation (Attachment 3) process as part of its continuous quality improvement plan to obtain client feedback at the substantial completion of the project. Information received on these client surveys will be used for improvement on future projects.

ARM shall conduct management assessments to determine how well a project manager provides the leadership to enable an organization to continuously meet institution and client requirements and expectations. Strengths and weaknesses affecting the achievement of organization objectives shall be identified so that meaningful action is taken to improve quality. Responsibilities and the assessment process will be defined as needed for individual projects and shall be documented on the Readiness Planning and Review Checklist.

CRITERION 10 – INDEPENDENT ASSESSMENT

"Independent assessments shall be planned and conducted to measure item and service quality to measure the adequacy of work performance, and to promote improvement. The group performing independent assessments shall have sufficient authority and freedom from line management to carry out its responsibilities. Persons conducting independent assessments shall be technically qualified and knowledgeable in the areas assessed."
(10 CFR 830 Subpart A, Quality Assurance Criterion 10, Independent Assessment)

Quality audits will be performed on projects, depending on size and complexity, at appropriate intervals. These audits will be used to verify whether quality activities comply with planned arrangements and to determine effectiveness of the quality process. The exact number and frequency of quality audits will vary with the project and will be established, with concurrence by the client, in the PSQAP at commencement of the project.

The Project QA Reviewer or a member of the Company Management Team, both of whom are independent of those performing the work, will conduct audits. A copy of the completed Audit Form shall be placed in project QA file. Audit forms are presented in Attachment 2. Where non-conformity is found, the Project QA Reviewer shall recommend changes to be implemented by the Project Manager and notify the organization or technical unit performing the work. A follow-up audit shall be conducted to determine if a corrective action plan is undertaken. The audit form report shall be noted to indicate findings of action taken and placed in QA files and the project file.

Independent assessment shall be used to evaluate the performance of work processes and shall be conducted periodically. Project quality personnel that conduct assessments shall not be directly responsible for the work processes and systems assessed.
Personnel who conduct surveillances shall have sufficient authority and freedom from line organizations to carry out their responsibilities.

Personnel who conduct surveillances shall be qualified and knowledgeable in the subject matter they are evaluating.

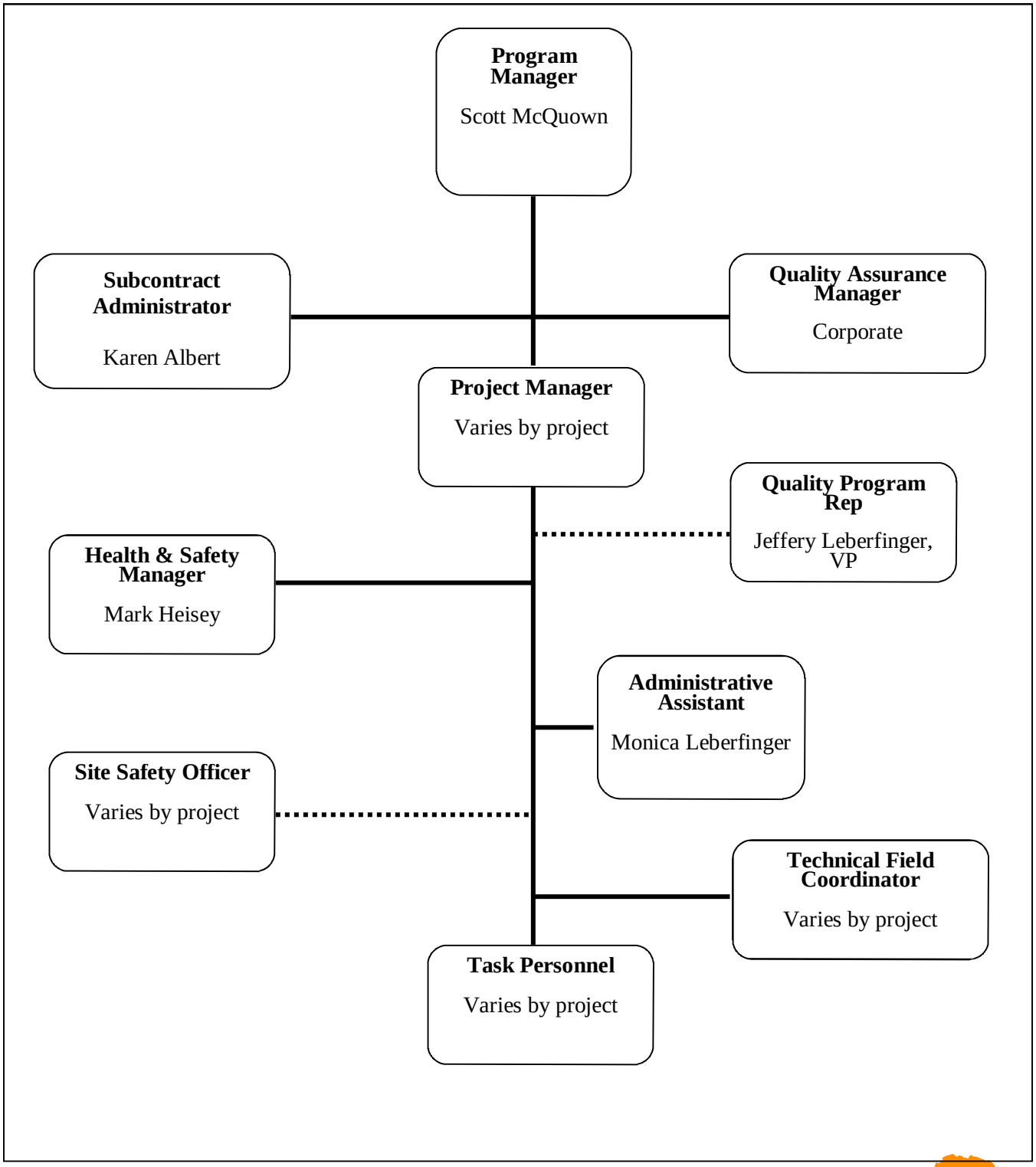
NOTES / DEFINITIONS

Usage Note: *Assure, ensure,* and *insure* all mean "to make secure or certain." Only *assure* is used with reference to a person in the sense of "to set the mind at rest": *assured the leader of his loyalty*. Although *ensure* and *insure* are generally interchangeable, only *insure* is now widely used in American English in the commercial sense of "to guarantee persons or property against risk."

Usage of Shall/Will/Should/May: When used in a procedure / instruction, the word *"shall"* is used to denote a requirement, the word *"will"* documents intention, the word *"should"* signifies a recommendation, and the word *"may"* denotes permission, which is neither a requirement, intention, nor a recommendation.

Usage of Continual and Continuous: *Continual* denotes that an action is conducted intermittently, but frequently repeated, while *continuous* denotes that an action is conducted without interruption.

APPENDIX A
ARM Project Organization Chart



APPENDIX B

LIST OF STANDARD OPERATING PROCEDURES

SOP	IMPLEMENTING PROCEDURE
SOP-EM31-1	Terrain Conductivity (EM31) Surveying
SOP-EM61-1	High-Sensitivity Metal Detector (EM61) Surveying
SOP-GPR-1	Ground Penetrating Radar (GPR) Surveying
SOP-RFL-1	Radio Frequency Pipe Locator Surveying
SOP-MASW	Multi-Analysis Surface Wave Surveying
SOP-DGM-QC	UXO DGM Quality Control

ATTACHMENT 1

Document Review Policy

ARM Group Inc.

Earth Resource Engineers and Consultants

Memo

To: Project Managers

From: William S. Tafuto, P.E.

Date: July 1, 2005

Re: Document Quality Assurance (QA) Review Procedure

This is a follow-up to the 11-20-02 Memo that discusses QA protocols for documents delivered to our clients. That document and this update are part of ARM's Quality Assurance Plan (QAP). Please review this information with those who report to you.

The purpose of this update is to account for personnel changes relative to document review responsibilities. Every contractual deliverable or other interim document that provides advice or guidance to a client must be reviewed. In general, as guidance, the following personnel shall be responsible for document review according to the category of work:

Water Supply:	Ecol./Wetland/ESA:	Remediation:	Geotechnical:	Landfills:	Geophysics:
Bill Seaton	Ami Gulden	Steve Fulton	John Masland	Bill Tafuto	Jeff Leberfinger
Ned Wehler	Phil McClain	Neil Peters	Bill Tafuto	Michael Guy	Beth Williams
Greg Burgdorf	Mark Heisey	Ned Wehler	Jim Warnick	Brian Martz	Scott McQuown

Note: All work products produced in the Maryland Office must be reviewed by either Neil Peters or Bren Huggins before submission.

Some flexibility is in order when one of the above persons is not a customary reviewer for a work category but is the client manager for the work product, or if none of the other listed persons are available. Use good judgment. Also, please plan ahead and provide adequate review time. Ask Rhonda, Karen, or Cathy to proofread your document when appropriate.

Documentation

Use the Review Forms attached to the QAP to document the QA process for deliverables, calculations, and all other relevant work products or components of work products. Flexibility is appropriate when using the Computation Review Sheet relative to the size and different engineering/scientific disciplines represented in the calculation package. These forms shall be placed in the project file and supplemented if necessary.

ATTACHMENT 2

Audits of Conformance

ARM GROUP INC.

COMPUTATION REVIEW SHEET

Client:_____ **Project:**_____ **Project No.:**_____

Title of Computations:_____

Computations by: Signature _____ Date: _____

Printed Name _____ Title: _____

Assumptions and Procedures Checked by: Signature _____ Date: _____

Printed Name _____ Title: _____

Calculations Checked by:

Signature _____ Date: _____

Printed Name _____ Title: _____

QA Review by: Signature _____ Date: _____

Printed Name _____ Title: _____

Revisions (Number revisions. Revisions must be backchecked.):

No.	Page no.	By	Date	Checked By	Date

Notes:

_____

_____

_____

_____

_____

ARM GROUP INC.

QUALITY ASSURANCE REVIEW SHEET

Client:_____ **Project:**_____ **Project No.:**_____

Title of Document/Section:_____

Prepared by: Signature _____ Date: _____

Printed Name _____ Title: _____

Reviewed by: Signature _____ Date: _____

Printed Name _____ Title: _____

Notes:

Internal Audit Form

Client:_____ **Project:**_____ **Project No.:**_____

Project Phase:_____

Prepared by: Signature _____ Date: _____

Printed Name _____ Title: _____

Reviewed by: Signature _____ Date: _____

Printed Name _____ Title: _____

Process Reviewed: _____

Deficiencies Found: Yes (see attached form) ☐ No ☐

Notes[1]:

[1] ATTACH ADDITIONAL PAGES IF NEEDED

Internal Audit – Preventative/Corrective Actions

Client:_____ **Project:**_____ **Project No.:**_____

Project Phase:_____

Prepared by: Signature _____ Date: _____

Printed Name _____ Title: _____

Reviewed by: Signature _____ Date: _____

Printed Name _____ Title: _____

Process Reviewed: _____

Severity of Deficiency: ☐ Severe ☐ Moderate ☐ Minor

Description of Deficiency[2]:

Recommended Action*:

[2] ATTACH ADDITIONAL PAGES IF NEEDED

ATTACHMENT 3

Customer Assessment of Performance

Customer Assessment of ARM's Performance

Project No.:	_____	Date:	_____
Project Name:	_____	Willing to act as a customer reference?	___Yes ___No
ARM Project Manager:	_____	Completed by:	_____
_____		Signature:	_____

Performance Item	*Rating	Comments
1. Technical Quality of Work		
2. Quality of ARM Staff		
3. Communication and Responsiveness to Needs		
4. Innovative Approach -Regulatory -Technical		
5. Timeliness of Performance		
6. Cost Effectiveness/Value		
7. Budget Control and Invoicing		
8. Overall Performance/ Customer Satisfaction		
9. What has ARM accomplished for you that is particularly noteworthy?		
10. What changes should ARM make to improve its service to you?		
11. Other comments or suggestions.		
* D = Does Not Meet Expectations M = Meets Expectations E = Exceeds Expectations		

Performance Item – Rating Guidelines

Performance Item	Ratings Guidelines
1. Technical Quality of Work	Quality of work plans; compliance with contract scope and project specifications; quality of deliverable – reports, specifications, drawings, conclusions and recommendations.
2. Quality of ARM Staff	Appropriateness of assigned professional, technical and administrative personnel; appropriate levels of academic training, skills, and experience. Adequate staffing levels.
3. Communication and Responsiveness to Needs	Communication frequency and method – in-person meetings; telephone; e-mail, correspondence (letters and memos); adequacy of documentation; organizational and speaking skills, quantity of design drawings, illustrations and other graphics.
4. Innovative Approach -Regulatory -Technical	Demonstrated unique or innovative approach to regulatory compliance, or technical design or problem remedy. Cost-benefits and time-benefits of project approach and project execution.
5. Timeliness of Performance	Project scheduling with milestones and meetings planned; compliance with project schedule. Delay responsibility.
6. Cost Effectiveness/Value	Effective and efficient use of resources. Costs in compliance with contract; superior value; consistent with market pricing; return on investment/payback value.
7. Budget Control and Invoicing	Honors contract pricing and budget estimates; change order procedures; invoicing procedures; accounts receivable management and collections procedures.
8. Overall Performance/ Customer Satisfaction	Overall performance rating. Willingness to use ARM again for future services and contracts.