# APPENDIX B

# QUALITY MANAGEMENT PLAN

# URS Corporation
# Quality Management Plan
## Version 01.01

Prepared in Support of:

## Administrative Settlement Agreement and Order on Consent for Removal Action – Zonolite Road Site, Atlanta, Georgia

Remedium Group, Inc.
6401 Poplar Avenue, Suite 301
Memphis, Tennessee 38119-4840

23 June 2011

URS Corporation
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As specified in our proposal dated May 18, 2011, this document is prepared in accordance with:

*Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4, 1994)

*EPA Requirements for Quality Management Plans* (EPA QA/R-2, Final, March 2001, as re-issued May 2006)

Plan Version

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## Plan Approval Signatures

By their signature, the undersigned certify this Quality Management Plan has been approved.

| **Name**<br>**Affiliation - Role** | **Signature** | **Date** |
|---|---|---|
| Jay White<br>URS - Nashville Office Project Director | | |
| Brent Jacobs<br>URS – Project Manager | | |
| Dustin Biddle<br>URS – Site Supervisor | | |
| Jeff Rouleau<br>URS – Atlanta Office Quality Officer | | |
| Terry Stilman<br>EPA On-Scene Coordinator | | |

## Authorized Use

Only fully approved versions of this document are authorized for use only as directed by the EPA and the URS Project Director. Only controlled copies are valid.

Table of Contents

## 1.0 Introduction

### 1.1 Company Background

URS Corporation (URS) is a leading provider of design, engineering, construction, and technical services for public agencies and private sector companies worldwide. We offer a broad range of specialized services, including planning, engineering and architectural design, environmental, construction, design/build, program and construction management, systems integration, and operations and maintenance services for Federal, State, and local government agencies, other governments, Fortune 500 companies, and other multinational corporations.

URS has an established Quality Assurance (QA) Program that provides guidelines for work activities, aimed at promoting effective management of programs and projects. This preventative program helps us avoid professional misjudgment and human error through common sense practices, setting the stage for continuing high quality service to our clients. Due to the variety of our assignments, the principles of ***work planning, independent review, and client satisfaction*** must be thoughtfully applied to each assignment.

The firm's *QA Manual* is concise and to the point; it stresses active pre-planning and independent peer reviews. The program's spirit is seen in the active voluntary exchange of ideas among our staff and the pursuit of best practices through the application of good professional judgment. There is openness to constructive criticism from clients and co-workers alike. To ensure that the program is more than just good words, however, the "letter" of the program requires an audit trail of each project's independent internal reviews.

Our QA Program requires a tangible audit trail on project assignments in order to demonstrate to clients, stockholders, and insurers that we understand our ***risks*** and ***responsibilities*** as professionals. The spirit of our program, applicable to project and non-project assignments alike, seeks to create a culture of creative openness. Each employee is asked to read, adopt, and critique the program, since each has a part in assuring that clients and the public alike are well served by our efforts.

### 1.2 Quality Management Plan

This Quality Management Plan (QMP) references and builds from the firm's Quality Management System (QMS). A cross-check of the approval date of this QMP must be compared against URS' QMS to determine the need for revision, review, and approval.

This QMP is organized to correspond to the U.S. Environmental Protection Agency (EPA) guidance provided in *EPA Requirements for Quality Management Plans* (EPA QA/R-2, Final, and March 2001, as re-issued May 2006) and *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-1994). Approval of the contents of this document by URS Corporation management is indicated by the signature page.

URS complies with the Office of Management and Budget's (OMB's) government-wide quality guidelines, issued in response to Public Law 106-554, and the EPA's associated guidelines, published in October 2002. This QMP has been reviewed for consistency with these guidelines. We also comply with the most recent OMB *Bulletin on Peer Review 2* and the recent Executive Order amendment on regulatory planning and review.

The International Organization for Standardization (ISO) has provided guidance in the development and implementation of an effective QMS by establishing ISO 9001:2000 (ISO 9001), an international quality standard. URS' QMS conforms to the requirements stated in ISO 9001.

References are provided through this QMP to applicable EPA guidance (particularly *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency.* EPA/260R-02-008, October 2002, as was developed to meet the OMB's *Final Information Quality Bulletin*, 70 FR 2665, January 14, 2005).

## 1.3 Purpose and Scope

This QMP describes the policies, organizational structure and responsibilities, procedures, and systems URS uses to manage the quality of the firm's products and services under this Consent Order. This is a Level I document that applies in general to the firm's contracts, grants, programs, and projects. Following a discussion of management and organizational issues in Chapter 2, each element of the plan is described in subsequent chapters. Level II documents– typically project-specific QA Project Plans (QAPPs) – are written as needed to further describe the QA procedures for each applicable task. The QAPPs will conform to *EPA Requirements for Quality Assurance Project Plans* (QA/R-5, March 20, 2001).

## 1.4 Control and Distribution

Controlled copies of this QMP will be distributed within the project team. Each section has an effective date of the current revision identified on the signature sheet and in the header of each page. Revisions are distributed in a controlled manner.

## 2.0 Management and Organization

This chapter documents the overall policy, scope, applicability, and management responsibilities of URS' QMS as it relates to each component of this Programmatic QMP.

### 2.1 Statement of Quality Assurance/Quality Control Policy and Organizational Commitment

The management of URS is firmly committed to:

- Promoting ethical business practices.
- Providing our clients with services that are of the highest professional quality on time or ahead of schedules while meeting financial goals and all contractual requirements.
- Fully documenting all research and analyses, chains-of-custody (where appropriate), derivations of all of our analytic results, and bases of all our analytic conclusions, findings, and recommendations to ensure that data are technically sound and legally defensible.
- Ensuring that all data collected and analyzed are verifiable, reproducible, and reliable.
- Documenting the known quality of data—ensuring that all the data developed, used, and reported are of known accuracy, precision, completeness, representativeness, and comparability to the extent that these measures of data quality are applicable.
- Ensuring that our QA procedures apply to secondary data.
- Achieving communication and teamwork within URS and our subcontractors and consultants, and with our clients.
- Taking full responsibility for the quality of all deliverables, whether prepared by staff members or primarily by subcontractor staff members or consultants.
- Continuously improving our quality systems.
- Providing all resources required for effective implementation of URS' QMS.
- Making available all necessary corporate resources to ensure effective, timely implementation of all QA/Quality Control (QA/QC) procedures.
- Empowering project personnel throughout the organizational structure to utilize their abilities for the benefit of maintaining quality standards on all components of project activities.
- Ensuring that problems detected through data assessment, audits, and other means are reported, assessed, and corrected immediately.
- Having the means to promptly recognize work of inadequate quality, or work conditions that are

substandard or unsafe, and immediately stopping these work activities to allow corrective actions to be implemented.

- Developing standard operating procedures (SOPs) to ensure that the quality and reproducibility of the procedure, product, or method meets specifications, where a new procedure, method, or product is needed.

To meet client objectives, QA/QC measures taken are appropriate to the type and complexity of the activity and the intended uses of the results of our projects.

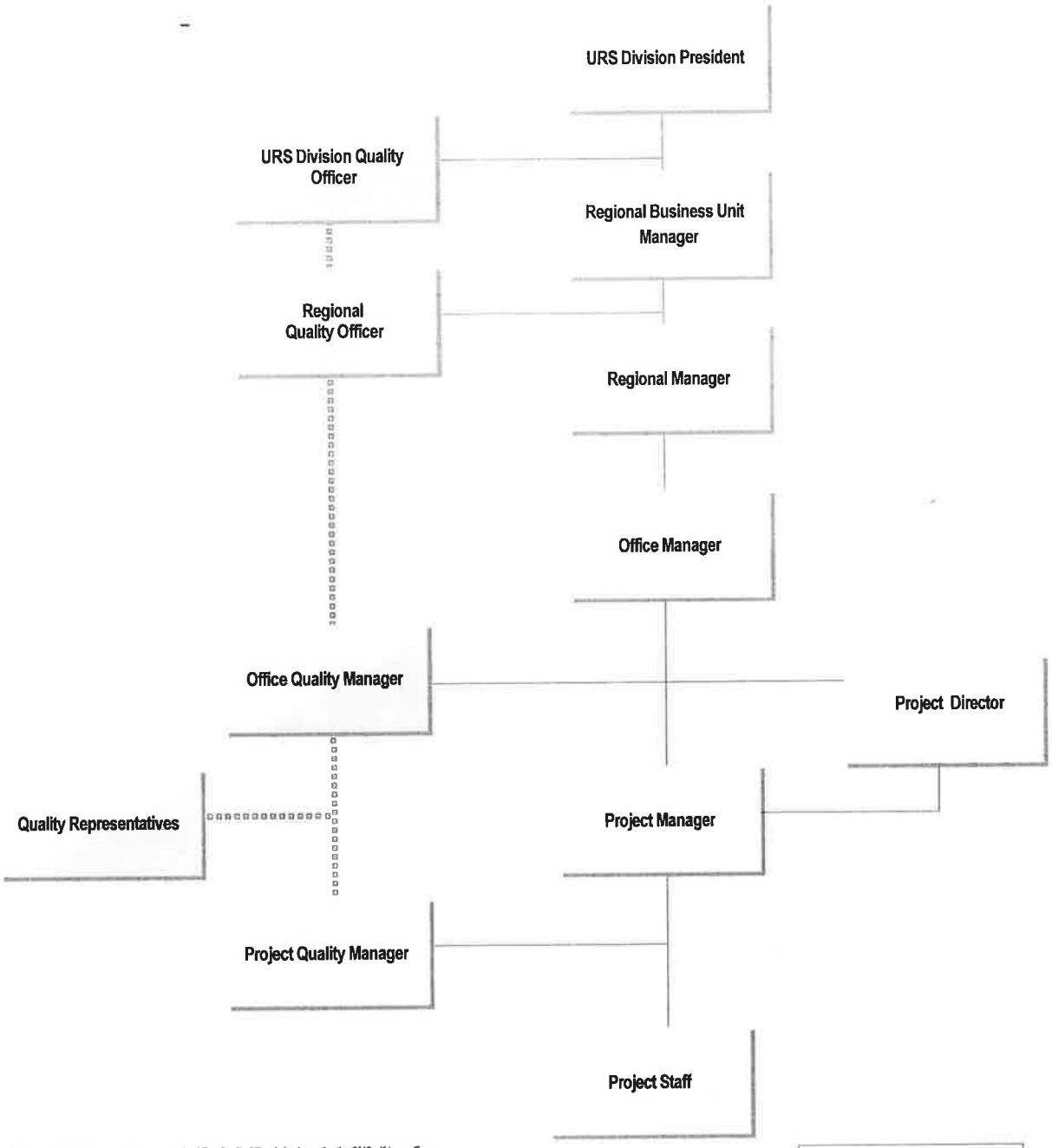
## 2.2 Program Organization and Communication

The relationship of project management and QA personnel is shown in Exhibit 2-1, which illustrates the separation between project management and QA oversight. Specifically, the QA Officer (Project Director) for each contract reports directly to senior management, independent of the contract's Project Director.

The implementation of URS' quality management program for this contract began with the establishment of the program organization and the assignment of our most qualified professionals. Our PMO (presented in Section 4: Management Approach of our technical proposal) is structured to fit within our overall corporate structure, as it is for all other indefinite delivery/indefinite quantity (IDIQ) multi-disciplinary contracts that we manage. This approach minimizes any operational risk. We have established policies in procedures in place for managing major IDIQ contracts.

Our organizational structure also utilizes our existing architectural, environmental, and urban planning and design practices in the company, allowing URS to use relationships and communication networks already in place.

## Exhibit 2-1: URS Quality Management Organizational Structure




1. One or more Quality Representatives support the Office Quality Officer in implementing the QMS within an office.
2. In Project Offices the Project Quality Manager may also be the Office Quality Manager.
3. Project Quality Managers are typically identified only for larger projects.
4. Some RBU's may have Regional Quality Officers who may support a number of offices.
5. Operations Managers and the project team are responsible for the quality of work products and services.
6. Quality Officers, Quality Representatives and Project Quality Managers support QMS implementation.

### 2.2.1 Authorities and Responsibilities

**Project Director**

The Project Director is responsible for day-to-day management of the contract and for ensuring that all QA requirements are met at both the contract and work assignment levels. The Project Director directly coordinates with the EPA Project Officer on all contract, and contract QA, matters. The Project Director will work with the Project Manager and other technical staff in the preparation of the QAPP and other QA documents necessary for submission to EPA under this contract. The Project Director for this project is Dr. Jay White.

The Project Director also:

- Reviews and approves the QMP for the contract (which must be approved by the Project Director) and revises the document, as necessary.
- Provides guidance, as required, in the development of QAPPs for individual projects.
- Reviews and approves QAPPs and other project-specific quality documents, such as data quality objectives (DQO) documentation.
- Oversees the updating of SOPs and other quality guidance documents and ensures that the correct copies are used by the staff.
- Evaluates subcontractors', consultants', or vendors' quality systems (in accordance with applicable rights established in the subcontract agreement).
- Coordinates and performs random, scheduled, and event-driven audits of work performed under the contract to verify compliance with the QMP and QAPPs.
- Coordinates and audits the technical review of deliverable products, as required.
- Issues recommendations and orders, as required, to correct all work that does not meet QA/QC standards.
- Communicates any changes in EPA's QA/QC requirements to project staff, subcontractors, and consultants.

In reviewing individual deliverable products, the Project Director may assign Independent Technical Reviewers. These individuals are chosen by the Project Director based on the individual's field of expertise, education, and experience as they relate to the objective of the project. To preserve his or her independence and objectivity, the Independent Technical Reviewer for an assignment has no direct operational function on the project. In some cases, the Independent Technical Reviewer may be an outside expert consultant.

Although the Project Director and Independent Technical Reviewers are not directly involved in the day-to-day management of projects, they do provide advisory support to the Project Manager, as needed, to maintain and

improve the technical integrity of the work. In the course of these duties, the Project Director or Independent Technical Reviewer evaluates the:

- Collection, accuracy, precision, and validity of original data.
- Accuracy and validity of data obtained from secondary sources.
- Adherence to accepted scientific procedures and EPA standards in data collection, field and laboratory operations, chains of custody, and statistical analyses.
- Maintenance of complete and accurate computer data sheets, computer programs, and program documentation.
- Accurate presentation of information in keeping with the objectives of the work assignment or task order

When differences arise between project staff and the Independent Technical Reviewers, they are resolved by the Office Quality Officer (OQO), Project Director, and Project Manager acting in concert.

**Project Manager**

The Project Manager is responsible for the day-to-day management of the project and for the technical quality of products and services provided by the project. The Project Manager for this project is Brent Jacobs.

For each task, it is the responsibility of the Project Manager to identify client requirements and to prepare a work plan. The Project Director supports the Project Manager in interpreting requirements and developing the work plan. If there is disagreement in interpretation, the officer in charge is the final authority. This applies to projects for internal and external clients.

The Project Manager is responsible for project performance and the technical quality of products and services provided under them. The Project Manager is the primary point of contact for the client and works closely with the client during the project. The Project Manager provides technical and administrative leadership throughout a project's duration. He also directs all activities of the project team, including the development of techniques and methods to meet the project's objectives. The Project Manager contributes substantially to all phases of an assignment, from data-gathering to analysis. He is also responsible for structuring technically sound, easy-to-read products.

The Project Manager is responsible for providing access to staff, documents, and records to support the Project Director in the execution of his or her reviews and audits. The Project Manager is responsible for implementing corrective actions as specified by the Project Director. In the event of a disagreement, the Director is the final authority.

The Project Manager is responsible for reviewing, inspecting, or otherwise evaluating all items or services provided by subcontractors, consultants, or vendors, including reviewing the items or services for conformance to quality standards specified in the subcontract or purchase order. He regularly assesses the QA processes of the subcontractors or other vendors working on the relevant projects.

**Office Quality Officer**

The OQO is responsible for assuring the proper application and implementation of the URS QMS throughout the office. The OQO is charged with overseeing the proper preparation of QMPs, and with reviewing office and project procedures with respect to QMP objectives and overall URS QMS requirements. He or she is charged with developing, reviewing, and reporting to the regional level metrics associated with quality management as a means of

determining the value associated with quality improvements. The OQO for URS' Atlanta, GA office is Jeff Rouleau.

The key QA duties of this officer are to supervise the Project Director and other senior managers in the preparation of the QMP; assign officers in charge of each contract; and oversee and evaluate their performance with respect to their QA responsibilities. The OQO also supervises the Project Director's performance of the quality system improvement activities (e.g., assessment and response, and quality systems improvement) discussed later in this document. As part of this duty, the OQO allocates sufficient budgets and personnel resources to perform these functions. This officer also intervenes, as necessary, to ensure that the personnel performing these reviews have access to all necessary documentation and records, and to managers throughout the company and program team.

The OQO has additional responsibilities relating to training (see Chapter 4, "Personnel Qualifications and Training").

**URS Division Quality Officer**

The URS Division Quality Officer establishes the direction for the development and administration of the quality improvement efforts. The URS Division Quality Officer consults with peers on the attitudes and practices of quality throughout URS to develop an environment of continual improvement in every aspect of URS' products and services.

The URS Division Quality Officer acts as a champion for quality management. Responsibilities include:

- Acting as the management representative in accordance with the requirements of ISO 9001;
- Developing and administering the QMS and issuing and maintaining the Quality Policy document;
- Assuring that a program is maintained such that affected personnel are trained in the requirements of the QMS and in special skills required to perform their job duties;
- Directing the Regional Quality Officers and providing guidance regarding the implementation and maintenance of the QMS;
- Preparing and submitting to the URS Division President an annual report (at a minimum) regarding the effectiveness of the QMS; and
- Ensuring proper awareness, staffing and training of the URS Division Quality Management organization.

### 2.2.2 Communications

URS provides initial and ongoing training to all staff members to ensure that they fully understand the quality system (see chapter 4). The company's incentive and communication systems reward full participation in continuous quality improvement at all levels of the company (see chapter 11). Open and frequent communication is a cornerstone of maintaining and improving quality.

## 2.3 Technical Activities Covered by the Quality System

As noted above, the URS QMS covers all technical activities and programs. This coverage includes environmental data operations and other activities. For example, see chapter 7 for projects related to the development of information systems. In the event that a contract requires special types of program support, such as outreach support, appropriate appendices will be added to this QMP.

## 2.4 Communicating the Quality System

URS utilizes communication processes at all levels of management (i.e., office, regional and divisional) to report and discuss information regarding the effectiveness of the QMS.

URS ensures communication of its QMS through an orientation program required for all new employees. Second, it is reinforced through regular training on QA, and more general training on project management.

## 2.5 Resources

As we describe above, in Section 1.2, the Project Director has the ultimate responsibility for the successful performance of each project. He or she monitors project activities and has authority to modify project decisions, consistent with the contract or client requirements. Therefore the Project Director is responsible for providing resources to perform the assessment, verification, and testing of research and products. The Project Director is also responsible for ensuring that all necessary adjustments to QAPPs and other project quality documents are made, consistent with the policies and procedures described in URS QMS.

In a broader sense, the URS Divisional President is responsible for providing the necessary resources to ensure that the quality system is implemented, evaluated, updated, and disseminated to all employees.

## 2.6 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.1, *Management and Organization*

EPA QA/R-2, EPA Requirements for Quality Management Plans, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.2, *Management and Organization*

EPA Order 5360.1 A2, "Policy and Program Requirements for the Mandatory Agency-Wide Quality System," May 5, 2000

EPA. *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency*, EPA/260/R-02/008, October 2002

EPA QA/G-1, EPA Guidance for Developing Quality Systems for Environmental Programs, EPA/240/R-02/008, November 2002; Section 2, *Elements of a Quality System,* and Section 3, *How to Develop a Quality System*

EPA. *Overview of the EPA Quality System for Environmental Data and Technology*, EPA/240/R-02/003, November 2002; Section 4, *Requirements*

URS Quality Management System, May 12, 2010.

## 3.0 Quality System Components

### 3.1 Quality System Elements

The objective of URS' QMP is to ensure our ability to implement our QMS while meeting or exceeding EPA's quality requirements (see 1.2, above). This means, in part, that we provide our clients with products of known quality. As specified in the applicable EPA and ANSI/ASQC guidance, the URS QMS is described in this QMP. As described here, our quality system includes the management and organizational structure, policies and procedures, responsibilities, authorities, and resources for applying quality controls to our work. The QMP outlines how these quality efforts are planned, implemented, and assessed. It also describes how we assess and update the quality system.

The ultimate responsibility for preparing and updating the QMP lies with the Project Director. The process for assessing the quality system for this QMP and managing change is described in chapters 10 and 11 of this document. The frequency of implementing quality system reviews is explained in section 6.4.2 of this QMP.

As described in detail in this QMP, the URS QMP is centered on elements of:

- Planning (e.g., preparation of QAPPs and DQO documentation). See chapter 8.
- Implementation. See chapter 9.
- Assessment and improvement. See chapters 10 and 11.

These technical areas are supported by administrative functions such as:

- Training (e.g., training plans). See chapter 4.
- Procurement of items and services (e.g., assuring quality of work performed by subcontractors). See chapter 5.Documentation and records. See chapter 6.
- Use of computer hardware and software. See chapter 7.

URS QMP is described fully in this document (a Level I document) and in Level II documents (e.g., QAPPs for each applicable project, and Data Quality Objectives [DQO] documentation) that are project-specific.

The procedures defined in this QMP apply to all managers and staff working on the Order on Consent for Removal Action – Zonolite Road project. The QMP has been updated to comply with the latest (i.e., March 2001, as re-issued May 2006) version of EPA QA/R-2 and with ANSI/ASQC E4-1994.

**Responsibilities and Procedures**

All managers and staff are responsible for knowing and understanding the quality system described in this QMP and any other supplemental project documentation. The Project Director is responsible for allocating sufficient resources for training related to the quality system (see chapter 4).

All quality system procedures, plans, and documents at the program, contract, and project levels are reviewed by the assigned Project Director to ensure compliance, as described in the corresponding chapter of this QMP.

The OQO is responsible for ensuring that resources are available for the quality system, the QMP, training, and necessary associated assessments.

### 3.2 Quality Management Plan Reviews and Revisions

This QMP will be revised as necessary to reflect various updates and improvements to our procedures. In keeping with the quality system review requirements of ANSI/ASQC E4-1994, section 2.1.1, and the specific review frequency criteria of EPA QA/R-2, section 2.7, the QMP will be reviewed at least annually to reconfirm the suitability and effectiveness of our documented and approved quality management practices. More frequent review will be considered based on various factors, such as changes in government or other applicable quality guidelines or policies, changes in URS policies and procedures, reorganization of functions that affect programs covered by the QMP, or the emergence of specific quality issues (e.g., assessment findings requiring corrective actions) that warrant review of specific aspects of the QMP. Updates and improvements will be specified in the QMP based on such reviews.

As part of the change management process, the Project Director will maintain the baseline copy of the QMP; the records of deliberations and decisions on all subsequent updates and revisions; and copies of change control memoranda (i.e., changes to the QMP authorized by the President). The Project Director also is responsible for overseeing the implementation of the changes; maintaining and numbering the new version; securely storing the signed copy of the new version; and distributing copies of the updated version throughout the company.

### 3.3 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.2, Quality System and Description

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.3, Quality System and Description

EPA Order 5360.1 A2, "*Policy and Program Requirements for the Mandatory Agency-Wide Quality System*," May 5, 2000

EPA QA/G-1, *EPA Guidance for Developing Quality Systems for Environmental Programs*, EPA/240/R-02/008, November 2002; Section 2, Elements of a Quality System, and Section 3, How to Develop a Quality System

EPA. *Overview of the EPA Quality System for Environmental Data and Technology*, EPA/240/R-02/003, November 2002; Section 4, Requirements

## 4.0 Personnel Qualification and Training

The purpose of this chapter is to ensure that all tasks are staffed by personnel who are qualified and adequately trained to effectively accomplish their work and to ensure that evidence of this training is documented and maintained. These procedures cover training and professional development of staff and should also be applied to any work done for URS by any subcontractor or consultant.

URS operates under a matrix management structure where the Project Manager draws on the total resource of the Team to ensure the best qualified local resources for each assignment. Group managers/supervisors are responsible for ensuring that members of their groups have the proper technical, health and safety, and managerial skills to perform the range of tasks to which they may be assigned. In addition, Group Managers/supervisors are responsible for assessing job proficiency for the duration of each project.

The Project Manager is responsible for identifying the specific skills needed on each project and for working with Group Managers/supervisors (PMO *Work Area Leaders and SME Practice Leaders on this contract*) to recruit and assign staff (including subcontractors and consultants) with appropriate training, skills, and certifications. The Project Manager is responsible for identifying special, additional training needs of individuals and, in cooperation with the appropriate Group Manager/supervisor, arranging for that training before work on the relevant task begins. The Project Manager also is responsible for assessing the outcome of the training before the individual begins work on the task.

Group managers/supervisors are responsible for annually assessing staff members' performance and identifying specific training or skills necessary for their advancement. Key inputs to this evaluation include Project Manager Reviews for all projects to which the staff member has been assigned and the staff member's own self-evaluation.

The OQO is responsible for ensuring that all staff receive initial and periodic refresher training on the company's quality system and specialized quality-related training, as appropriate. For this Program, training must be provided by the Project Director who has the appropriate technical knowledge.

The Project Director is responsible for maintaining documentation of staff health and safety, Occupational Safety and Health Administration (OSHA), and other compliance training. The human resources department is responsible for maintaining a file for each staff member that contains any relevant qualifications, certifications, accreditations, and licenses.

The qualifications of the project personnel and the senior reviewers can be found in section 4.5.

## 4.1 Personnel Training Policy and Procedures

### 4.1.1 Policy

Personnel will be trained and qualified for each client project or internal project to which they are assigned, and the firm will maintain adequate records to provide objective evidence of relevant training, skills, and certifications. Managers encourage staff to be lifetime learners and provide resources, including tuition reimbursement, to help staff stay current in their fields and to learn new skills, consistent with the firm's needs and with individuals' desires for career advancement. Managers will continuously assess staff skills and identify areas for improvement. All staff will be trained not only in technical and managerial areas, but in QA/QC, at a level of detail appropriate to the specific functions of each staff member. One of the necessary conditions for work to be assigned to subcontractors or consultants is for URS to assure that the proposed staff has all necessary training, skills, and certifications.

URS has established and maintained a focused Professional Development Program that increases our employee's performance. Our Learning Solutions program is central to providing the awareness, skills, and knowledge that increase the quality of service to clients. Innovation and technical excellence help our clients meet their program goals. The URS Learning Solutions has a curriculum of courses that bring state of the practice knowledge to project staff. In addition the courses allow a venue for sharing lessons learned on other similar projects.

URS is a Registered Education Provider for the Project Management Institute (PMI). The URS Learning Solutions meets the highest professional standards. It is certified to the International Association of Continuing Education and Training. Staff participating in the training earns CEU credits. This ensures that the training is focused on the correct subjects and has been developed to meet strict professional guidelines.

### 4.1.2 Quality Assurance and Quality Control Training

URS provides a full course of QMS training under its Professional Development Program. In addition to a one-on-one briefing to every new hire by the OQO, all new hires are automatically enrolled in the Learning Solutions course *Introduction to Quality Management.* All personnel are encouraged to complete the online quality training curriculum on the QMS, and receive professional continuing education credit for successfully passing the Quality Management Training end of course test. In addition to the introduction, the topics covered include:

- Culture of Quality
- Delivering Project Quality
- Project Planning
- Project Execution
- Continual Improvement
- Document Control
- Performing Detail Checks
- Performing Independent Technical Reviews
- Conducting Quality Audits

### 4.1.3 Identification of Other Training Needs

**Project Manager Certification**

URS sponsors its own Project Manager Certification program providing Project Managers with a broad range of skills necessary for a successful program. The URS Certification is an extensive education program that develops a project staff's teamwork, communications, planning, budgeting, and scheduling skills. The curriculum addresses URS specific systems, such as project accounting and reporting, in addition to general business and interpersonal skills. Basic courses of the Quality Training Curriculum are also part of the PM Certification.

**Performance Reviews**

As per URS' Career Performance Planning (URS Policies and Procedures Manual 030.090), performance reviews are a formalized tool to assist in measuring and documenting current performance and progress, assess training needs, provide feedback, define goals and objectives, and strategize career growth throughout the performance year. The performance of each employee is to be reviewed on an ongoing basis throughout the year by the employee's direct supervisor or manager. For the purposes of this policy, "manager" is defined as any employee who supervises other employees and is required to complete performance reviews for these individuals. Performance evaluations are formalized and summarized as scheduled below:

**Initial Performance Review:** Employees who are newly hired or transferred are to complete a brief questionnaire and discuss their progress with their manager on or before the 60th day of employment or transfer. The initial

review is to ascertain whether the employee understands the responsibilities and expectations of his/her position. Both employee and supervisor will assess the employee's level of effectiveness, establish goals for the balance of the year and identify a career path which will benefit the employee and ensure that the employee will be goal-oriented and productive.

**Annual Performance Review:** All full-time and part-time, non-temporary employees participate in this process which is electronically communicated, distributed, and completed typically in the third quarter of each year. Via an online Performance Review Tool, the Group Manager solicits input from all Project Managers for whom the staff member being evaluated has worked during the previous year. In part, through this form, each Project Manager specifies the work performed by the individual and describes (or attaches) his or her performance expectations. The Group Manager follows up with the Project Manager to clarify any issues or to obtain additional detail. In addition, the Group Manager obtains input from the staff member via the automated Self-Evaluation Form and follows up by interviewing the staff member to clarify any issues.

As a next step, the Group Manager prepares a written assessment, evaluating performance over the past year against the staff member's documented performance expectations. As part of the written assessment for each staff person, the Group Manager:

1. Evaluates the employee's qualifications, experience, and performance with respect to job description and performance expectations, including strengths and weaknesses.

2. Evaluates the employee's readiness to take on new technical or managerial responsibilities.

3. Identifies technical or managerial training needs associated with (1) and (2).

The Group Manager discusses the personnel evaluation with the person being reviewed and, as part of the discussion, makes any necessary adjustments to clarify the evaluation. The staff person has an opportunity to attach comments. The completed form, signed by all relevant parties, is forwarded to the Human Resources Department and maintained in the employee's file. It therefore serves as the basis for ongoing reviews during the year, and for assessing each employee's progress at year-end.

**Intermittent Performance Review:** Employees may request or be asked to participate in an additional performance evaluation beyond the initial and annual performance reviews. Examples of such situations may include but are not limited to: A change in job/responsibilities, a performance improvement plan, clarification of expectations, as dictated by local or department policy.

**Training needs identified by a staff member's Project Manager:** Project Managers identify specific training needs (or the need for a new certification) as part of the process of planning projects and when evaluating assigned staff qualifications, experience, and performance with respect to the requirements of a scope of work. This may include software training provided by the firm

**Health and Safety Training:** Annually, each of URS' employees is required to complete an online interactive Behavior Based Safety (BBS) Training program. The BBS training annual refresher serves as a means of focusing the responsibility of maintaining safe behavior within and beyond the office environment. It provides simple tools, such as the 4-Sight program, that reminds each individual to play a role in identifying the safest way perform common tasks and uncommon or unfamiliar tasks. As needed, the Group Managers, with the assistance of the Office Health and Safety Manager, arrange for periodic health and safety training for all staff performing specialized tasks, such as hazardous material handling/sampling or confined space entry. URS requires that every project perform a safety analysis and complete either a Safe Work Plan (typical for office tasks) or a Health and Safety Plan (for more complex or potentially more hazardous tasks).

**Contract Requirements:** Any and all training required specifically for this contract or task order herein will be obtained by URS assigned staff or our subcontractors in a timely fashion.

### 4.2 Formal Qualifications and Certifications for Specialized Activities

All employees are expected to stay current with their relevant certifications, which in some cases require types of formal training. (These renewals are formally tracked by the Human Resources Department; see section 4.3 below.)

### 4.3 Training Documentation

In consultation with Group Managers, Project Managers, the Project Director, and the Human Resources Department, the Office Manager allocates sufficient overhead budgets to provide for all training, including in-house training and tuition reimbursement. Training costs are tracked and documented by each Group Manager, with the assistance of the Accounting Department.

The Human Resources Department maintains the Personnel Information System and associated files. The system, in part, tracks all personnel with respect to pre-employment degrees and training, training received while employed, and any relevant qualifications, certifications, accreditations, and licenses. As noted previously, the Human Resources Department also maintains all appropriate hard copies (e.g., licenses) to document training received by, and qualifications and licenses of, each staff member.

### 4.4 Re-Training

Evidence and documentation of the need for re-training is obtained through the same procedures as described in section 4.3, above.

### 4.5 Project Management Personnel Qualifications

**Project Director Dr. Jay White,** has more than 35 years of project and program management experience. Dr. White's professional experience includes project management activities involving hazardous waste site investigations, soil and groundwater remediation facility planning, design, construction and operation, regulatory compliance programs, and property transfer site assessments. He has managed the permitting and closure of RCRA hazardous waste treatment/storage facilities, and prepared and directed RFI Work Plans and Investigations. He is currently Operations Manager for URS TN Operations.

**Project Manager Brent B. Jacobs, P.G.,** is a licensed professional geologist with over 20 years of experience in geology, site investigations, site remediation, preparation of corrective action plans, and design documents with specific background in site remediation and corrective action planning. Mr. Jacobs has completed numerous remediation projects involving soil and/or groundwater involving various contaminants like fuel related constituents, solvents, pesticides, and metals.

### 4.6 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.3, Personnel Qualifications and Training

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.4, Personnel Qualifications and Training

URS Policies and Procedures Manual 030.090 *Career Performance Planning*

## 5.0 Procurement of Items and Services

This chapter documents the procedures for purchasing items and services that directly affect the quality of support that URS provides to its clients and their programs. URS procures all required items (goods and services), whether for use on client projects or for our own activities, using sound business practices and in accordance with applicable government regulations. The Company is committed to procuring items on a competitive basis to the fullest extent possible and to providing the "best overall value" for our clients and for URS. All procurement of items, including subcontracts and consulting agreements, must be performed by designated procurement personnel in consultation with the appropriate URS personnel. URS procurement procedures are addressed in *URS Policies and Procedures Manual 090.040.*

The following addresses key aspects of these processes associated with quality issues.

### 5.1 Procurement Planning and Control

The Project Director and Project Manager are responsible for identifying requirements to procure items or services in support of a project, including:

- Describing and quantifying the items or services to be procured.
- Specifying applicable technical quality standards and associated performance requirements.
- Translating these requirements into acceptance standards or other means by which the items or services will be evaluated (e.g., for purposes of acceptance or rejection; for purposes of determining award fee).

The Office Manager will designate the procurement staff person who has the responsibility for implementation and compliance of procurement activities related to this program and adjust those assignments as appropriate.

The Project Manager provides a detailed description of goods or services to the assigned procurement staff person attached to a "Purchase Requisition (AC-22)." All requests are subject to review and approval by the Project Director, depending on project-specific policies established by that officer (for instance, a dollar threshold may be established).

### 5.2 Procurement Technical and Quality Requirements

The procurement staff person or designee assigned to the project is responsible for advising the Project Manager on the most appropriate procurement strategy taking into account quality issues—i.e., the type of contract and the type of selection process that is most likely to motivate subcontractors, consultants, or other vendors to prepare the most advantageous offers and to perform at optimal quality levels. There is a range of procurement strategies for different types of purchases, with respect to:

- Type of statement of work (e.g., performance-based specifications; detailed methodological specifications).
- Type of contract vehicle (e.g., cost plus fixed or award fee; time and materials; fixed price).
- Scope of competition (e.g., identifying a wide range of potential offerors via a market survey and sending the solicitation to all offerors as well as announcing it publicly; or holding a restricted competition, for example for small, disadvantaged businesses).

- Use of a pre-established schedule (e.g., asking for bids from a pre-approved team subcontractor with unique skills, in cases where a competition is unlikely to yield benefits or where quick response requirements of the client necessitate a rapid purchase; holding a restricted competition among pre-approved subcontractors).
- Selection criteria and evaluation plan.

If the procurement staff and the Project Manager cannot agree on the appropriate procurement strategy, the Office Manager is responsible for the final decision.

### 5.3 Procurement Document Specification of Verifying Supplier's Conformance

The Office Manager or designated procurement specialist is responsible for preparing procurement documents with the support of the Project Manager to ensure timely incorporation of pertinent technical requirements (e.g., statement of work) and pertinent quality requirements, such as:

- Requiring the offerors to include quality systems documentation (QMP or QAPP) at the company or project level with their offers.
- Specifying performance requirements and acceptance standards.
- Specifying URS inspection rights (e.g., on-site reviews of the vendor's quality systems, or audits).
- Procedures for settling disputes, including disputes over quality or acceptability of product or service

### 5.4 Procurement Document Review

The Project Director is responsible for reviewing procurement documents prior to their release to confirm the proper incorporation of quality-related information (e.g., performance standards).

**Technical evaluation:** The Office Manager is responsible for deciding on the appropriate evaluation process to be used for each procurement. (Note: This can range from designating the Project Manager to perform the evaluation through designating a formal evaluation panel including, as necessary, independent technical experts to review and rank proposals.) This evaluation should include a review of the QAPP or QMP submitted by each offeror.

**Cost/price evaluation:** Supported by the Project Manager, as needed, the Office Manager or designated procurement staff is responsible for making cost/price evaluations of offers.

**Final purchase decision:** The Office Manager is responsible for the final purchase decision. The Project Manager can appeal the decision to the Project Director, who in these cases is responsible for the final decision.

Procurement staff is responsible for negotiating the final contract or purchase order, with input from the Project Manager or Project Director as needed.

## 5.5 Review of Changed Procurement Documents

If changes are needed, due either to changing requirements associated with the project or to deficiencies in performance by the subcontractor, consultant, or vendor, the Project Manager determines what changes are required and notifies the Project Director. The Project Director has the independent authority to inform the Project Director and Office Manager of required changes in the event of quality-related issues.

## 5.6 Review of Procured Items and Services

The Project Manager is responsible for reviewing, inspecting, or otherwise evaluating all items or services provided by the subcontractor, consultant, or vendor, including reviewing the items or services for conformance to quality standards specified in the subcontract or purchase order.

The Project Director has the independent authority to perform such reviews. The Project Director is responsible for evaluating the subcontractor's, consultant's, or vendor's quality systems (in accordance with applicable rights established in the subcontract agreement). The contracting officer is responsible for issuing the appropriate contractual documents (e.g., amendments) and ensuring that they are properly received and acted on by the subcontractor, consultant, or vendor. The Office Manager can issue stop-work orders as necessary

The Project Manager is responsible for acceptance reviews and decisions at the culmination of the review process. The Office Manager is responsible for formally documenting the acceptance decision and, as may be required contractually, transmitting that documentation to the subcontractor, consultant, or vendor. The Office Manager is responsible for maintaining documentation on performance as part of the "past performance" file that URS maintains on the subcontractor, consultant, or vendor, using information provided by the Project Manager and Project Director. This information is maintained for use in future procurement.

## 5.7 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.4, Procurement of Items and Services

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.5, Procurement of Items and Services

URS Policies and Procedures Manual 090.040 *Procurement*

## 6.0 Documents and Records

This chapter specifies standards and procedures for the review, approval, indexing, distribution, security, storage, retrieval, and disposition of records and documents on a project. URS' documents and records procedures (*URS Policies and Procedures Manual 070.040JDE: Records Management and Retention*) comply with the Federal Records Act of 1950 and the Paperwork Reduction Act of 1995, which makes records management a part of federal information resources management.

For this program, URS will create, manage, store and dispose of documents at a minimum in accordance with the requirements of EPA Directive 2100, "Information Resources Management Policy Manual," Chapter 10 (July 19, 1996), and will manage record lifecycle and trustworthiness (reliability, authenticity, integrity and usability) in accordance with the requirements of EPA Order 2160, "Records Management Manual," (1984, last updated May 11, 2007) by maintaining record content, context and structure. Where URS' policies are more stringent, they will supersede these requirements.

These procedures are applicable to all forms of pertinent project documents and records, including print and electronic media, records and documents related to QA/QC, and other records and documents.

A document is any written or digital record of information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results. A record is a document that furnishes objective evidence of items or activities and that has been verified and authenticated as technically complete and correct. Records may include photographs, drawings, digital media, and other data-recording material.

- The Project Manager responsible for ensuring that all project-related documents and records are managed in accordance with this procedure.
- The Project Manager is responsible for ensuring that records are maintained for all documents prepared by URS.
- The OQO and Project Director are responsible for ensuring that this QMP is managed in accordance with this procedure.

## 6.1 Records Management Procedures

### 6.1.1 Project-specific Records and Documents

All project-specific documents or records are to be clearly identified by:

- Title.
- Author, Project Manager or Project Manager
- Date.
- Report or document number, and version number.
- Project-related information (i.e., contract number, work assignment number, task or sub-task number, if

applicable, and project code).

This requirement pertains to all relevant documents and records including, but not limited to:

**Documents**

- Project Execution Plans (PXPs)
- Work plans
- Project quality plans (PQPs)
- QA documentation (e.g., Detail Checks, Independent Technical Review
- Technical project plans
- Draft reports (if specified by EPA)
- Final reports

**Records**

- Interview notes or other site-generated information (e.g., survey data)
- Working notes and calculations
- Assessment results and findings
- Calibration data
- Data usability results
- Field logbooks
- Inspection results
- Instrument test data
- Materials testing results
- Personnel qualifications
- Sampling and analytical QC data
- Sampling and analytical data

- Technical and readiness review results
- Other records required for statutory or contract-specific compliance

All documents are subject to peer review and Independent Technical Review as specified in the QMP or QAPP to ensure their conformance with technical requirements and quality system requirements. Documents are released to clients only after authorization by the Project Manager and, when required, the Project Director. The Project Manager will ensure that records are developed, authenticated, and maintained to reflect the achievement of quality goals. Through adoption of these document-specific quality control procedures, URS ensures that records and documents reflect completed work, in keeping with specifications of section 3.6 of EPA QA/R-2. Conformance with these specifications is also maintained through application of URS' quality audit procedures, as documented elsewhere in this QMP.

For each document or record, the Project Manager will maintain a project-specific indexing and filing system during the course of the project. Depending on the complexity of the project and the volume of documents and records, the Project Manager may use an automated records management system to supplement the physical filing of records and documents.

Throughout the course of the project, the project-specific indexing and filing system must meet the following minimum performance specifications:

- All documents and records must be physically or electronically retrievable within 120 minutes.
- Primary copies of all physical documents and records must be stored in filing cabinets or other appropriate storage space in the Central Files on premises. Back-up copies of physical documents and records must be stored separately (e.g., off-site physical storage of photocopies; electronic copies of physical documents).
- All documents subject to confidentiality restrictions must be stored in strict accordance with.

All documents and records must be marked or cross-referenced with respect to retention schedules. All documents in the first list above are subject to an automatic disposition schedule that requires their retention for 10 years, unless a longer time is required by the particular contract under which they were created or is required for other purposes. Within 1 month of their creation, all other documents and records must be classified for retention/disposition.

Within 1 month of the close of a project, a complete set of all the documents and records must be appropriately filed for long-term storage.

### 6.1.2 Company-Wide Document/Record Indexing System and Long-Term Storage

The Project Manager will ensure the efficient, reliable filing, storage, and retrieval of deliverables and significant internal documents and records. This person maintains a process that provides for appropriate staff to obtain access to documents and records. Following the completion of a contract or project, all significant documents and records, as noted above, are stored in long-term physical or electronic storage in accordance with their records retention schedules.

## 6.2 Document Control

Documents requiring control follow the specified procedures for review and approval, distribution, and ensuring that obsolete documents are no longer used. These issues are particularly important for SOPs, QAPPs, and final reports.

As suggested above, the overall records management procedures outlined in section 6.1 define most of these issues and establish the requirements for storage and retention of documents.

### 6.2.1 Operating Procedures and Manuals

The Project Manager will communicate with project personnel to ensure they understand which version of any project-specific operating procedures is valid. The Project Director is responsible for identifying obsolete or superseded documents for taking measures to prevent their use, including removal from the work place and from the possession of users when practical.

### 6.2.2 Changes in QMPs and QAPPs

As part of the records management process, the Project Director will maintain the baseline copy of the QMP; the records of deliberations and decisions on all subsequent updates and revisions; and copies of change control memoranda (i.e., changes to the QMP authorized by the Project Director). The Project Director also is responsible for overseeing the implementation of the changes; maintaining and numbering the new version; securely storing the signed copy of the new version; and distributing copies of the updated version throughout the project team. The Project Director is responsible for managing baseline and updated versions of contract-specific QMPs relative to the corporate QMS.

### 6.2.3 Chain of Custody for Evidentiary Records

To maintain the integrity, control, and security of the samples that we collect, URS uses rigorous methods for sample identification, chain of custody (in field, in transit, in laboratory), sample receiving, and sample tracking. The methods specified depend on the nature of the samples, the maximum allowable sample holding times before extraction or analysis, required temperature ranges during shipment, and available shipping options.

For each project involving sampling, the proposed methods for sample handling and chain of custody will be specified in the QA Project Plan by:

- Specifying the appropriate use of forms, notebooks, and procedures to record the exact location and ambient conditions associated with sample collection, possession, and analysis.
- Specifying the use of sample custody logs by URS and any subcontractor or subcontracted service (e.g., laboratory).
- Providing examples of sample documentation forms, such as sample labels, custody seals, and chain-of-custody forms.
- Specifying labeling procedures and information to be entered on the forms, including sample preservation, if any, and dates and times of sample transfer and analysis.

- Describing procedures for transferring and maintaining custody of samples.

## 6.3 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.5, Documents and Records

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.6, Documents and Records

EPA. *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency*, EPA/260/R-02/008, October 2002

EPA. *Records Management Manual*, EPA Directive 2160, July 1984 (last updated May 11, 2007)

EPA. *Information Resources Management Policy Manual*, EPA Directive 2100, Chapter 10, July 19, 1996

URS Policies and Procedures Manual 070.040JDE *Records Management and Retention*

## 7.0 Computer Hardware and Software

The purpose of this chapter is to document how URS will ensure that computer hardware and software satisfies the quality requirements of end users and of EPA. This procedure is applicable to all software and hardware used to meet our clients' needs, such as modeling; environmental databases; program management support, such as software for comment-response and peer-review tracking; and process control of environmental technology.

## 7.1 Conformance to User and EPA Requirements

### Responsibilities

URS software and hardware management is handled by Corporate Information Technology Officer, Tom Lynch. The Corporate Information Technology Officer QA/QC responsibilities include the following:

- Establishing procedures for software and hardware installation and licensing agreements.
- Ensuring that all URS networks are secure and working properly.
- Maintaining our Internet connections and associated licensing agreements and maintaining and updating our corporate intranet (The Sourse)
- Ensuring that our corporate e-mail system and Web site are meeting performance requirements.
- Helping review all QAPPs that involve the development or purchase of software or hardware or that involve database and model development.
- Overseeing training to ensure that all staff members are familiar with URS' information technology resources and our QA/QC approaches regarding these resources.
- Maintaining and promulgating information on the latest developments in our clients' information resources management policies (e.g., EPA's IRM Manual).

QA/QC responsibilities of URS' Project Managers include those listed below. (Note: The Project Manager often will confer with others in performing these responsibilities. For example, he or she often will confer with the client, project staff, URS' Corporate Information Technology Officer, or other senior URS managers.) The following responsibilities are subject to review and approval by the Project Director for the relevant contract:

- Developing a complete understanding of information technology requirements associated with each project during the project planning phase, including requirements specified in the task order (e.g., the development of a software system or Web site as a project deliverable), and indirect requirements of the task order (e.g., to perform an analytic task properly, the Project Manager may determine that URS needs to develop software to support the analysis, even if the software is not a deliverable item per se).
- Understanding the business information requirements (e.g., the end-user's essential technical needs and information objectives, the user-friendliness of the product, the scalability of the product, and possible current and future regulatory and policy implications of the work) supported by applicable or selected information systems, such as databases, database applications, software development, modeling, hotlines, or construction of Web sites; translating such requirements internally to project staff to ensure efficient development of information technologies that fully support the needs of end-users as simply as possible.

- Defining performance-based quality requirements associated with each information technology requirement; documenting these requirements as appropriate (e.g., in the work plan or in a formal QAPP, if one is appropriate for the project); obtaining client review and feedback, as appropriate; and revising the documentation of requirements, as appropriate.
- Defining quality control metrics associated with the requirements and obtaining appropriate approvals of those metrics and the proposed testing methods (e.g., from the Project Director).
- Managing the development or maintenance of software or hardware during the performance of the project and adhering to all change-control procedures.
- Monitoring all such performance against these appropriate quality control metrics and assisting independent reviewers that may be assigned by the Project Director.

The Project Manager is also responsible for maintaining instrumentation operated by computers and ensuring that equipment calibrations are performed. Calibration procedures are established and specified in QA Project Plans.

### EPA Requirements

All IT-related work will adhere to the following EPA requirements:

- **EPAAR 1552.211-79**, "Compliance with EPA Policies for Information Resources Management," which requires adherence to all Agency directives for performance of any IRM work.
- **The Information Technology Architecture Road Map (ITARM)**, which describes specifications for development and enhancement of information resources.
- **The Environmental Information Management System (EIMS)**, which allows contractors to search existing information resources to ensure that planned development and enhancement efforts do not duplicate existing resources.
- **OMB Circular A-130**, which provides for the management of Federal information resources as required by the Paperwork Reduction Act of 1980 as amended, and requires that the Director of OMB to implement consistent information resources management policies and promote the use of information management standards and guidelines.
- **The Clinger-Cohen Act of 1996** requires federal agencies to analyze, revise, and improve their mission-related processes before making significant investment in IT. It also requires them to improve interoperability and standardization, and mandates the use of open-source architecture.
- **EPA IRM Policies, Standards, and Procedures**, which describe steps for ensuring that systems planning, design, development, and maintenance proceed consistent with EPA's information technology investment, information security and enterprise architecture requirements. It contains principles for modernization of systems according to the interim EPA enterprise architecture policy.
- **The EPA Office of Water (OW) Information Strategy Plan (ISP)** organizes OW's data into eight data classes. Each data class is a like set of information, such as facility or financial related information, and serves as an organizing principle for data integration efforts.
- **Section 508 of the Rehabilitation Act Amendment of 1998** governs the accessibility of web-based content for people with disabilities.

### User requirements definition

Quality problems in software systems—whether the systems consist of a few dozen or a few million lines of code—often can be traced to a failure to properly define user requirements. This problem, for example, has plagued many systems at EPA. URS defines and documents user requirements in detail. Depending on the system development methodology being used (see above), this might be accomplished through user interviews, prototyping, joint applications development (JAD), or other approaches. For all projects, the results of our user requirements analysis are documented and shared with the client for review and comment. The specific format of the documentation varies by project.

### Evaluating Purchased Hardware and Software

URS employs structured methods to evaluate all purchased hardware and software to ensure that they meet user requirements and comply with applicable information management requirements and standards. URS has learned from experience that a rigorous process is required even when buying from the best known vendors.

Our process for evaluating purchased hardware and software has these following steps:

- Establish quality requirements along all relevant dimensions, such as functionality, ease of use, security, portability, reliability, ability to interface with the installed base of software and hardware or existing instruments, ease of installation and maintenance, ease of use, ease of learning.
- Identify direct metrics associated with each requirement.
- Perform screening-level reviews of the candidate products (e.g., by examining documentation or evaluating user reviews) and take into account any applicable information management requirements or standards (e.g., contract-specific requirements or standards).
- Test against the identified quality metrics for each candidate that survives the screening-level review (e.g., by performing tests of the hardware or software against a test database).
- Analyze the results of the testing.
- Make a purchase decision based on an assessment of each item's relative quality and cost.

The quality metrics chosen and the testing methods vary widely depending on the specifics of each purchase decision.

## 7.2 Configuration Testing

URS' policy is to test thoroughly all software the firm develops. The Project Manager is responsible for developing and implementing a thorough plan for testing all software, including verification and validation. The Project Director, with the assistance of an Independent Technical Reviewer (independent of the project team) is responsible for approving the testing plan.

This plan must address verification and validation activities. Verification activities (as informed by ANSI standards) take place during each successive phase of the software development process. Verification can be defined as "the process of determining whether or not the products of a given phase of the software development cycle fulfill the requirements established during the previous phase." Verification activities include inspection, measurement,

testing, and configuration management. Validation is "the process of evaluating software at the end of the software development process to ensure compliance with software requirements."

Depending on the complexity, scope, and size of the software development process, the software testing plan must address the following at varying levels of detail:

- Standards, practices, conventions, and metrics. This part of the plan identifies the standards, practices, conventions, and metrics to be used and describes how compliance with these items is to be monitored and ensured by URS.
- Reviews and audits. The plan must define the technical and managerial reviews and audits to be conducted, how they are to be performed, and how follow-up actions will be implemented and verified.
- Testing. The plan must describe the details of what types of testing will be performed and the associated acceptance criteria.

Typical verification testing elements will include:

- Requirements analysis inspection.
- Design inspection.
- Code inspection and testing.
- Test procedures inspection.
- Unit testing (to find bugs in individual modules).
- Integration testing (to find problems associated with interfaces among modules).

Formal validation testing includes:

- Test script development.
- Test script execution and reviews (which often involves the development of a test database and a review by a team independent of the software development team).
- Problem reporting and resolution.
- Code inspections for modules changed as a result of problem reports.
- Release procedures.

The verification and validation test plans must address how the software will be tested in the target environment (i.e., in contrast to the system development hardware environment), taking into account factors such as hardware limitations, connection speeds, and monitor resolutions.

## 7.3 Configuration Management and Change Assessment

Procedures for using, maintaining, and controlling hardware and software will be established for each project. While the procedures will vary widely by system, the elements that are most germane to quality control include:

- Definitions of any necessary access controls (e.g., at the system, database, or file level).
- Explanations of how these controls will be implemented (e.g., physical restrictions on distribution of software; password protection for elements of a system or Web site).
- Identification of security objectives and precautions (e.g., encryption and firewall deployment).
- Designations of what types of data must not be maintained on the software.
- Identification of routine and non-routine maintenance procedures.
- Procedures for reporting problems.

Each system or Web site maintained by URS (whether developed by URS or another organization) will be subject to rigorous change-management procedures. Such procedures, even for relatively simple software, are central to quality control. While the specific change-management procedures will vary by software system or Web site, key elements will include:

- Specifying responsibilities for maintaining and physically controlling baseline documentation for each system and the required content of that documentation.
- Defining roles and responsibilities for identifying potential change requirements. (For complex systems, this will include the designation of a formal change control board [CCB].
- Defining criteria for assigning priorities to change requests.
- Specifying criteria and procedures for communicating changes (e.g., who at URS and among client staff should be notified of minor to major changes?).
- Specifying processes for implementing, testing, and documenting approved changes, and for changing printed or on-line user documentation (e.g., FAQs on Web sites).
- Specifying processes for delivering changes to the user community (whether internal to URS or also involving clients or third parties) and verifying their proper delivery or installation.
- Specifying methods for updating systems baselines and documentation baselines to reflect the changes.
- Methods for preventing unauthorized changes to source code and for detecting and correcting them if they do occur.

## 7.4 Re-Testing and Re-Documentation

Configuration changes may come about as a result of error correction, functionality improvement, changes in EPA requirements, or changes in user needs. The procedures for re-testing and re-documenting configurations will depend on the source of the changes.

Error correction and functionality improvement are the easiest to accommodate, as the basic structure of the hardware or software remain the same. In such cases, the Project Manager will identify the components that are being revised, and submit them to those procedures outlined in sections 7.3 and 7.4 above that are appropriate. Testing will be done at two levels: The altered components will first be tested in isolation, then as integrated into the overall system.

Changes in EPA requirements or user needs may call for more complex revisions. In such cases, the change process may be subject to the procedures outlined above, whereby the fundamental design parameters of the hardware or software system are re-evaluated and revised if necessary. Modification, re-testing, and re-documentation of the system would not proceed until the client and a representative group of users approve of the design changes.

## 7.5 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.6, *Computer Hardware and Software*

EPA QA/R-2, EPA Requirements for Quality Management Plans, EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.7, *Computer Hardware and Software*

## 8.0 Planning

This chapter documents the procedures for planning and documenting all work associated with the generation, acquisition, and use of environmental data. Planning for acquisition or development of quantitative measurements, or models is essential to assuring the quality of these task components.

We will also address the planning process for the use of secondary data, and the development or modification of mathematical models, and data that is collected in support of technical assistance, and communications under this contract. This project planning is critical to ensure that data or information collected meets the needs and expected quality for their intended use.

### 8.1 Planning and Documenting the Generation, Acquisition, and Use of Environmental Data

For any project that involves environmental data measurements, URS will prepare a QAPP. The objective is to ensure that URS consistently understands the client's needs and expectations with respect to issues such as the required levels of precision and accuracy of the underlying data. Each QAPP will provide enough detail to demonstrate that:

- Intended measurements are appropriate for achieving project objectives, whether the project involves the application of known methods or the development of new methods.
- Quality control procedures are sufficient for obtaining data of known and adequate quality.
- Data will be defensible if challenged technically or legally.

The QAPP will be submitted with the work plan. The preparation of QAPP will be performed in accordance with the most up-to-date guidance, such as EPA *Requirements for Quality Assurance Project Plans* (QA/R-5) (EPA 2001).

We will develop the QAPP in sufficient detail to demonstrate that:

- The project's technical and quality objectives as specified by the client are achievable. In many cases, this may involve the development of formal DQOs, which are discussed in more detail below.
- The measurement or data acquisition methods proposed (and its subcontractors) are appropriate for achieving project objectives.
- Sufficient planning and budget for assessment procedures to confirm that data of the type and quality needed and expected by the client will be obtained.
- Any limits on the use of the data can be identified and documented.

The QAPP developed under this program will be clear and concisely state what is to be accomplished, how, and by whom. The QAPP will provide understandable instructions to those who must implement it, including, as appropriate, the data development team and data reviewers.

#### 8.1.1 Contents of Quality Assurance Project Plans

The general contents of a QAPP are established by EPA guidance (*EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5, 2001) regardless of whether they are prepared for the generation, acquisition, and use of

environmental data, or for the design, construction, and operation of environmental technologies. According to EPA guidance, the QAPP can include up to 25 separate elements as needed, grouped into 4 categories, as listed below. To the extent that these can be conveyed to a task with quantitative data development objectives, these will be included as described below.

***Group:***

***Group A: Project Management***
***This group of elements will ensure that the project has defined and documented goals and that all contractor and client participants understand the goals and the approach to be used***

***Group B: Measurement and Data Acquisition***
***This group of QAPP elements addresses the design and implementation of measurement systems to ensure that URS and its subcontractors employ and document appropriate methods for data collection, measurement, and data management.***

***Group C: Assessment and Oversight***
***This group of QAPP elements addresses the activities to be taken by URS to assess the effectiveness of the implementation of the project and associated QA/QC. The objective is to ensure that the QAPP is implemented as prescribed.***

***Group D: Data Validation and Usability***
***This group of QAPP elements establishes the validation steps for data review prior to application to project objectives.***

**Version and Revision Control of QA Project Plans**

Each page of a QAPP must contain the following information:

- Page number.
- Total number of pages in the document.
- Date of issuance (or effective date of revision).
- Document number ("QA" followed by project number).
- Revision number.

Revisions to QAPPs will be processed through, and approved by, the Project Director. Each plan will be a revision-controlled document. The purpose of revision control is to ensure that:

- The revised document remains consistent with project objectives and quality goals.

- All members of the project team are notified of revisions.

A QAPP can be revised directly by changing and reissuing the plan itself or by issuing an addendum. For extensive revisions, it is usually better to revise the text directly and reissue the plan under a new revision number. A list of revisions, by section, should be added to the beginning of the plan, immediately after the cover page.

When a plan is revised by addendum:

- The addendum must be addressed to all of the QAPP holders listed in the plan who are still involved in the project at the time of the revision.
- The addendum must identify itself as an addendum to the specific plan, citing the plan by document number, revision number, date, and title.
- Each revision given in the addendum must be accompanied by a reference to the text in the original QA Plan that is being revised or replaced. The reference must cite the section number and page number, unless there is no text in the original plan pertaining to matters addressed by the revision.

Each QAPP revision must be accepted by the Project Manager, all affected managers and the Project Director prior to issuance. The revision also must be accepted by the client.

When the revisions have been approved, the revision number is incremented by one and the date is changed to reflect the effective date of the revisions. The revised plan and a brief summary of the changes will be distributed to all project participants listed in the plan.

## 8.2 Identifying and Documenting the Type and Quality of Environmental Data Needed

This section will apply to all environmental data, including secondary data.

### 8.2.1 Process for Data Quality Objectives

As part of the QA planning for a project, URS will work with the client to develop a statement of the project's quality objectives and measurement performance criteria. The results of this process will be documented in the QAPP.

In some cases, the client will require only relatively straightforward definitions of the project's quality objectives and performance criteria. In these cases, we will describe these objectives and criteria in terms such as acceptable detection levels and acceptable Type I and Type II errors.

In other cases, the client will require the development of formal DQOs. They are qualitative and quantitative statements that clarify the objectives of the study or project, define the appropriate type of data, and specify the tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. Depending on the specific requirements of the project, the QAPP will state DQO goals in terms of parameters such as:

- The desired degree of **precision**, defined as the measure of agreement among repeated measurements of the same property under identical, or substantially similar conditions.
- The required **accuracy**, defined as the measure of overall agreement of a measurement to a known value.
- The degree of **completeness**, which indicates the amount of data obtained in comparison to the amount

expected to be collected under normal conditions.

- The **representativeness** of the data, which expresses the degree to which the data accurately represent the population from which they are drawn.
- The **comparability** of the data, indicating the confidence with which one data set can be compared to another.

In accordance with EPA guidance, URS will use the following approach in developing DQOs for projects involving environmental data operations. These sequential steps require mutual agreement with EPA and other team participants.

- **Step 1: Define the Problem.** The DQO development team will develop a detailed understanding of the problem to be studied. The DQO development team will review prior studies and existing information to gain sufficient understanding to define the problem.
- **Step 2: Identify the Decision.** The DQO development team will ensure that it understands the questions that the data operation will attempt to resolve.
- **Step 3: Identify the Inputs to the Decision.** The purpose of this step is to identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.
- **Step 4: Define the Study Boundaries.** The purpose of this step is to specify the time periods and spatial area to which the decisions will apply and to determine when and where data should be collected.
- **Step 5: Develop a Decision Rule.** The purpose of this step is to define the statistical parameter of interest, to specify the action level, and to integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions.
- **Step 6: Specify Tolerable Limits on Decision Errors.** This step will define the decision maker's tolerable decision error rates (the probability of making an incorrect decision based on data that inaccurately estimate the true state of nature) based on the consequences of making an incorrect decision.

### 8.2.2 Sampling Process Design (Experimental Design)

The objective of the sampling process design is to identify the most resource-effective approach to collecting data that will satisfy the project's quality objectives (the latter sometimes will be expressed as DQOs). The QA approach for this step is to develop statistically sound study designs and to document them fully in the QAPP, addressing issues such as:

- Types and numbers of samples or survey data values required
- Analytical requirements that the sampling will support

- Design of the sampling or survey network
- Sample population
- Measurement parameters of interest
- Rationale for the design

The sampling process design or experimental design for each project will be documented in section B.1 of the QAPP.

URS will use appropriate statistical techniques to develop alternative data collection designs and to evaluate their efficiency in meeting the project's DQOs. Within this broad topic, however, there are several QA issues, as addressed below.

**To ensure that the sample process design or experimental design meets the data quality objectives**, URS will identify and evaluate alternative designs. In broad terms, the objective of sample process design or experimental design is to find a cost-effective method to balance sample size and measurement performance, given the feasible choices for sample collection techniques and analytic methods. Typically there can be several feasible, cost-effective alternative designs. Unless the client has already specified one approach, URS will identify these alternatives based on outputs of the DQO planning process and other relevant information, such as historical patterns, estimates of variance, and technical characteristics.

**Wherever possible, URS will use statistical and mathematical analyses to rigorously define optimal sample sizes to ensure that the sample design meets the project's DQOs.** This is to identify the optimal sample size that will satisfy the project's DQOs, taking into account the client's limits on decision errors. Statisticians will develop and apply appropriate tests, which in many cases will incorporate power functions.

**URS will document the sample process design or experimental design to provide a foundation for QA and QC.** After URS and the client agree on the sample process design or experimental design, we will carefully document the selected design's key features, with particular emphasis on those features that must be implemented properly to allow for valid statistical interpretation of the resulting data.

### 8.2.3 Sampling Methods (Standard Operating Procedures)

To help ensure high-quality and cost-effective sampling programs, URS will use standard methods wherever possible. If standard methods are used, the plan will identify the method by number, date, and regulatory citation (as appropriate). Where SOPs allow for optional equipment or procedures, the QAPP will state precisely which options URS has selected.

If the project calls for non-standard methods or method development, the plan will specify the method validation information needed to confirm the performance of the method for the particular matrix. If the published method allows the choice of several options, the plan's citation of the method will specify the selected option.

URS will document the information related to sampling methods and SOPs for each project primarily in section B.2 of each QA Project Plan.

For either SOPs or custom-designed methods, URS will specify the performance requirements for the method; what to do when a failure in the sampling or measurement system occurs; and who is responsible for corrective action.

### 8.2.4 Sample Handling and Chain of Custody

URS understands the key issues relating to maintaining the integrity, control, and security of samples collected, and these must be addressed in the QAPP.URS will document the proposed sampling methods in section B.3 of the QAPP.

### 8.2.5 Instrument/Equipment Testing, Inspection, and Maintenance

To help ensure consistently high data quality and integrity for each project that requires environmental data measurements, URS will specify procedures for inspections and acceptance testing of environmental sampling and measurement systems. The objective will be to ensure that these systems can meet the experimental design's intended use. These procedures will be specified in the QAPP.

In some cases, the plan will reference standard preventive maintenance activities performed by the relevant laboratory. In other cases, it will identify additional inspections and acceptance testing procedures specific to the needs of the individual project. The plan will describe how deficiencies will be resolved and how and when re-inspection will be performed. It also will describe (or reference) how preventive and corrective maintenance of measurement or test equipment will be performed and how the availability of critical spare parts will be ensured.

This information will be presented in section B.5 of the QAPP.

Information on testing, inspection, and maintenance will be presented in section B.6 of the QAPP.

### 8.2.6 Instrument Calibration

URS will ensure that all tools, gauges, instruments, and other sampling, measurement, and test equipment that can affect data quality will be controlled and periodically calibrated to maintain performance within specified limits. In many cases, the calibration will be performed in conformance with nationally recognized performance standards or methods. The QAPP will describe or reference these standards. When no such standards exist, the plan will document the basis for the specified calibration. The plan will describe how records of calibration will be maintained and how they will be traceable to each instrument.

Information on instrument calibration and testing will be presented in section B.7 of the QAPP.

### 8.2.7 Evaluating and Qualifying Secondary Data

EPA's guidance on QAPPs acknowledges that there may be occasions when one may rely on secondary data (also referred to as "existing data"). If there are secondary data that are directly relevant to one's research needs, or if time and budget constraints preclude the collection of new data, one may need to rely on such data. The decision to use existing data should be made early in the project planning process since it will affect budget, design, schedule, and choice of personnel.

The steps involved in evaluation of existing data are similar to those of any other data source.

- First, determine data needs and requirements.
- Second, identify existing data sources that may meet the requirements of the project.
- Third, evaluate the existing data on the basis of the project's data quality requirements.
- Fourth, document the quality of the existing data.

Under this contract data will be collected through multiple sources to support research and studies aimed at the evaluation of innovative approaches to sustainable community development. URS will categorize and manage this data similar to how we handle secondary environmental data. Data quality objectives and the QA/QC process for collecting such data will be designed to ensure sufficient documentation to support the any recommendations that would be derived from the analyses and studies performed using such data and information collected.

When evaluating existing data, it is particularly useful if one can find data that includes documentation of the QA/QC processes applied during its collection. Without such information, it is difficult to assess data quality, uncertainty, and so forth. If documentation exists, then one can apply the data quality attributes already identified in EPA's *Guidance on Data Quality Indicators* (EPA QA G-5i). The process of evaluation should enable one to arrive at an overall rating of the confidence one has in each data source.

The QAPP should include the required level of confidence you should have in existing data, including the acceptance criteria associated with these data sources. At the end of the project, one should document the process used to evaluate the potential existing data sources. The documentation should provide enough detail that the reader can understand the process that one used and the criteria that were applied.

### 8.3 Including Key Users, Customers, and Technical Staff in Planning

In preparing a QAPP for a project, URS will interact with the client and, as specified by the client, with staff from other parts of the client organization or other agencies or organizations. The primary purposes will be to ensure that the QAPP is responsive to the client's needs and to avoid unnecessary and potentially expensive rounds of revisions. Through discussions and working sessions, URS will seek to ensure that we fully understand the following before preparing the QAPP:

- The purpose of the data collection and analysis
- The type of work to be done
- The intended use of the results

A major responsibility of Project Manager is communication – communications in understanding the clients requirements, in developing a strategy and scope of work in meeting those requirements and the direction, control and reporting of task progress to the client so that corrective action can be taken to meet the objectives of the task and to keep the task on schedule and on budget.

The Project Manager will work closely with the EPA and their client representatives to ensure clear understanding of the schedule, budget, and scope, and work for the project. Our Project Manager will be assisted with the use of standard management tools for communication and discussion, including the use of standing meetings and their documentation. While URS Corporation has established agendas and formats for the leadership of standing meetings and documentation, we have also worked with and adapted to agendas and formats defined by a broad range of governmental agencies.

- The team must adhere to corporate Q/C standards that include regular meetings and standard Q/C checklists.
- The Q/C Team monitors this performance and a project's progress by conducting detailed reviews of all drawings and correspondence. Their efforts in no way relieve the quality-control responsibilities of the project team itself. The Q/C Team does not contribute directly to actual project production.

Key to the implementation of the work will be facilitated team-based communication through regular meetings. URS Corporation has established the following regular meeting approach:

- **Project Reviews every 4 weeks:** All tasks are reviewed monthly by the Project Director and DPM Decisions pertaining to any management or technical issues will be frequently brought to this meeting for discussion. Additionally, firm-wide resources will be available for discussion.
- **Client Meeting every 2-Weeks (typical):** URS Corporation will meet with client representatives on a regular basis (2 to 4 weeks) to review progress and discuss any issues.

- **Team Meetings:** The Project Manager will work with the project team in weekly meetings to establish project parameters and monitor progress.

## 8.4 Reviewing and Approving Planning Documents

The Project Manager is responsible for ensuring that data operations are planned and properly documented in accordance with this section and other applicable portions of this manual. The Project Manager is responsible for developing QAPPs with assistance from appropriate staff who consider the technical requirements of the project. As noted in QMP Section 2.4, the Project Director provides guidance in developing QAPPs and reviews and approves such plans developed by the Project Manager. Subcontractors are expected to use the same approach in preparing QAPPs. Subcontractors are to notify the Project Manager or the Project Director directly if significantly different approaches are planned for use.

The Project Manager is responsible for ensuring that work plans provide for adequate budget to implement these planning procedures. The PM is ultimately responsible for the review and approval of these work plans and for ensuring the adequacy of budgeted resources for QA/QC purposes.

The Project Director is responsible for providing input to the Project Manager during planning activities and for reviewing QA plans, DQO documents, and other documentation prepared in accordance with this section.

Our subcontractors are integrated into our common program management structure and will therefore also utilize URS policies and procedures in support of task activities.


## 8.5 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.7, *Planning*
EPA QA/R-2, *EPA Requirements for Quality Management Plans,* EPA/240/B-01/002, March 2001, as re-issued May 2006; Section 3.8, *Planning*
EPA QA/G-5, *EPA Guidance for Quality Assurance Project Plans,* EPA/240/R-02/009, December 2002
EPA QA/R-5, *EPA Requirements for Quality Assurance Project Plans*, EPA/240/B-01/003, March 2001, as re-issued May 2006
EPA, QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process,* EPA/240/B-01/004, February 2006
EPA, QA/G-6, *Guidance for Preparing Standards Operating Procedures (SOPs)*, EPA/600/B-07/001, April 2007
EPA QA/G-8, *Guidance on Environmental Data Verification and Data Validation*, EPA/240/R-02/004, November 2002
EPA QA/G-5i, *Guidance on Data Quality Indicators*, September 28, 2001 (peer review draft)
EPA QA/G-5M, *Guidance for Quality Assurance Project Plans for Modeling*, EPA/240/R-02/007, December 2002

## 9.0 Implementation of Work Processes

### 9.1 Implementation of Work According to Planning Documents

After the project QAPP has been developed, the next task is implementation of that plan. The processes developed for implementation will ensure that all work is performed according to the approved planning document. The primary avenue for communicating the plans and the requirements they impose upon the project is through the written QAPP itself. This is submitted at the same time as the work plan, and all staff working on the project will be familiar with both documents. For additional assurance of successful implementation, it is the responsibility of the Project Manager to explain and reinforce the approved planning document. This can be done through a kick-off meeting where the entire project is explained, and it should be repeated periodically to ensure full implementation.

The role of the Project Director is to review the implementation activities of the Project Manager to ensure that they are achieving their intended purpose. The Project Director may use a variety of audit techniques to assess implementation. These audit techniques are described in greater detail in Section 10, below.

### 9.2 Standard Operating Procedures Documentation

Another important implementation task is the identification of activities or tasks that require standard operating procedures (SOPs). An SOP is a set of written instructions that document a routine or repetitive activity followed by an organization. The development and use of SOPs provide individuals with the guidance that will enable them to perform a job properly. This is critical to the entire quality process. SOPs are most-often developed as part of the QAPP because they are project-specific; however, program-wide SOPs may be attached to this QMP at the EPA Contract Officer's request. SOPs detail the work processes that are to be conducted or followed within an organization. They document the way activities are to be performed to facilitate consistent conformance to technical and quality system requirements and to support data quality. SOPs are intended to be specific to the organization, facility, or project.

SOPs are needed even in conjunction with published methods. SOPs generally provide greater detail than the published methods and therefore are critical to the QA function.

URS SOPs will be developed according to the following guidelines.

- They must be clear enough that they can be understood by all personnel (employees, subcontractors, and consultants).
- Current copies of SOPs, and revisions to SOPs, must be available to all staff working on a project.
- Implementation of SOPs must include a system of oversight by the Project Manager (and by the Project Director as needed) to ensure that they are being used as intended.
- SOPs must be validated by individuals with appropriate training and experience with the process for which the SOP is developed.
- The procedure for approval of the SOPs should be the same type of process—including the same roles and responsibilities—as that used for the QMP. Indeed, the finalized SOPs should be included in the QMP or QAPP, as appropriate.

- To stay current, SOPs must be changed whenever procedures are materially changed. This requires both an update and re-approval. In addition to these revisions based on events (e.g., changes in procedure), all SOPs will be reviewed annually to ensure that they are properly updated. The Project Director or his designee is responsible for ensuring that SOPs are updated in the QMP. The Project Director or his or her designee is also responsible for document tracking and archiving of documents associated with SOPs.

### 9.3 References

ANSI/ASQC E4-1994 (*Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.8, *Implementation of Work Processes*

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, March 2001, as re-issued May 2006; Section 3.9, *Implementation of Work Processes*

EPA QA/G-6, *Guidance for Preparing Standard Operating Procedures (SOPs)*, EPA/600/B-07/001, April 2007

## 10.0 Assessment and Response

### 10.1 Purpose

The purpose of this chapter is to define a process for assessing the suitability and effectiveness of the implemented quality system.

### 10.2 Scope

These procedures cover the following types of assessments:

**Management self-assessment**: The qualitative evaluation of a particular program operation or organization(s) by those immediately responsible for overseeing or performing the work to establish whether the prevailing management structure, policies, practices, and procedures are adequate for ensuring that the type and quality of results needed are obtained.

**Management independent assessment:** The qualitative evaluation of a particular program operation by someone other than the group performing the work (either internal or external to the organization) to establish whether the prevailing management structure, policies, practices, and procedures are adequate for ensuring that the type and quality of results needed are obtained.

**Nonconformance:** A deficiency, discrepancy, or noncompliance in characteristics, documentation, or procedures that render the quality of an item or activity unacceptable or indeterminate.

**Technical self-assessment:** The evaluation process used by those immediately responsible for overseeing or performing the work to measure the performance or effectiveness of an operation or system and its elements with respect to documented specifications and objectives. Such assessments could be qualitative or quantitative evaluations.

**Independent technical assessment:** The evaluation process used by someone other than the group performing the work to measure the performance or effectiveness of a technical system could be qualitative or quantitative evaluations.

**Project Progress Review:** Process for ensuring that the project team is providing the best service possible. It is a brief summary to management of important aspects of a project.

**Corrective action:** The response taken to eliminate or mitigate the causes of an existing nonconformance, deficiency, or unsatisfactory situation.

Management Independent Assessments and Technical Independent Assessments will be performed at least once a year. Other assessments will be performed as needed in the opinion of corporate management or the Project Director.

### 10.3 Responsibilities

The Project Director, OQO and Project Manager are responsible for performing a regular assessment of the quality system's effectiveness for their programs and projects and for arranging for independent reviews and assessments as appropriate, and reporting the results to the President.

Group managers are responsible for conducting project progress reviews with each Project Manager. The Project Director are responsible for conducting independent reviews of projects and reporting the results to the Project Manager and the President.

The Project Manager is responsible for providing regular assessments of subcontractor and consultant work processes under their authority.

## 10.4 Processes

### 10.4.1 Quality System Reviews

The Project Director confers with other senior managers on a regular basis to identify strengths and weaknesses of the quality system, to schedule reviews of the effectiveness of the system to individual programs and projects, and as a whole, and to select the tools and approach to be used for each review.

The Project Director designates the senior technical personnel responsible for implementing the review for each program or the system as a whole. In consultation with other senior management, the Project Director will make the choice based on the level of competence, experience, and training necessary to ensure the capability of the personnel who will be leading and performing the review. In some events, the Project Director will oversee the review. In other cases, the Project Director might appoint another senior manager (who also has no operational responsibility for the program for which the quality system effectiveness is being reviewed). The designated Project Director is responsible for implementation, including arranging for assistance from outside, independent reviewers, as appropriate.

Group managers hold progress reviews of each project which include an assessment of how well client objectives are being met, status of project plans, budgets, and schedules, status of change orders, and status of quality and professional reviews. Group Managers report the results of these reviews to senior management and to the Project Director and OQO for the relevant contracts. The Project Manager performs routine assessments of project progress and reports the results to the Group Manager and the Project Director.

The Project Director is responsible for performing assessments or arranging for independent assessments. The Project Director is responsible for determining the tools to be used and the frequency of such reviews, depending on the complexity, scope, and criticality of the project. The Project Director reports these results directly to senior management, with copies to the Group Managers and the Project Manager.

### 10.4.2 Ensuring Independence, Authority, and Access

The Project Director is responsible for appointing independent technical reviewers who have the appropriate technical and programmatic knowledge, but who will have no role in the day-to-day operations of the contract. In selecting the reviewers, the Project Director also explicitly takes into consideration the need to avoid any real or perceived conflict of interest.

The Project Manager is required to provide the independent technical reviewers designated by the Project Director with all necessary working notes, lab notes, or other documents and records to support comprehensive, detailed quality reviews.

### 10.4.3 Management Review, Response and Dispute Resolution

When Project Director prepares findings and recommendations, he or she sends them directly to senior management, with copies to the relevant Group Manager and the Project Manager. In the event that the Group Manager disputes the findings or recommendations, he or she has the right to provide senior management with an alternative finding or recommendation, in which case the Project Director will make a final determination. The President or person he designates is responsible for deciding which recommended corrective actions should be taken.

In the event that the corrective action requires a change to standard procedures, staffing, or operations at the project or program level, the relevant Group Manager is responsible for implementation of the change. In the event that the corrective action suggests the need for a change to the quality system, the appropriate Quality Assurance Officer will oversee the process for amending the appropriate project quality plan or other documentation, in accordance with the company's change procedures. In the event that the root problem has generic implications for the company's quality system, the Project Director will meet with the company's Project

Directors to determine the types of changes required to the quality system, in which case the change control procedures for the QMP will govern the change process.

## 10.5 References

ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*; Section 2.9, Assessment and Response

EPA QA/R-2, *EPA Requirements for Quality Management Plans*, March 2001, as re-issued May 2006; Section 3.10, Assessment and Response

EPA QA/G-7, *Guidance on Technical Audits and Related Assessments for Environmental Data Operations*, EPA/600/R-99/080, January 2000, reissued May 2006

## 11.0 Quality Improvement

Continuous improvement leads to the development of a better and more responsive quality system. Even a fully implemented system can be enhanced by improving the rate and ease with which quality problems are identified, resolved, and documented. The URS QMS improvement program includes formal mechanisms for encouraging staff at all levels to identify problems and suggest improvements as well as timely management evaluation and feedback or implementation.

URS is committed to continually improving the effectiveness of the QMS through the use of this Quality Policy document, the identification of quality objectives, audit results, analysis of data, performance metrics, Corrective and Preventive Actions, and management review.

The URS Division Vice President is ultimately responsible for continuous improvement of the quality system. He delegates that responsibility to the URS Division Quality Officer. Other senior managers of the firm, including all Project Directors and other officers of the firm, are responsible for participating in system improvement and for empowering staff members to identify areas where improvement is necessary.

### 11.1 Quality Improvement Process

The OQO or projects personnel verifying, inspecting, reviewing or designing work are authorized and responsible for the following:

- Obtaining immediate correction in cases of minor deficiencies;
- Initiating Nonconformance Reports (NCRs) where required
- Initiating the Corrective Action process where required.

The project personnel who identify any nonconformance should notify the Project Director or OQO, who will evaluate the discrepant condition(s) and initiate the Corrective Action process. The PM, with the concurrence of the OQO, is responsible for evaluating the reported nonconformance, determining the root cause(s) and defining and implementing the Corrective Action required to eliminate the root cause(s). The PM, with the concurrence of the OQO, is also responsible for reviewing and approving recommended Corrective Actions.

When necessary, the OQO acts to resolve differences between personnel performing QA and QC activities and PM and project personnel regarding Corrective Action requirements relative to a nonconformance.

Corrective and Preventive Action activities must be documented including investigation, root cause analysis, Corrective and Preventive Action plans, verification and reporting. The Corrective Action process is described below.

#### 11.1.1 Corrective Action Identification

Every staff member is empowered to identify areas for continuous quality improvement, including identifying any nonconformance. URS' philosophy is that this empowerment, which mirrors a larger community approach to safety, enhances opportunities to improve systems and avoid system failures before they result in a loss.

Corrective Actions must be initiated in response to one or more of the following conditions:

- A complaint is received from a client, government or regulatory agency
- A single nonconformance representing significant loss or negative impact on a project is identified
- Repeat nonconformances occur

- Process data show a negative trend toward poor quality
- Internal quality audit findings are documented
- Any other discrepant condition occurs as deemed appropriate by the Project Director, OQO, or Project Director

All personnel are responsible for notifying the OQO or Project Director when nonconforming conditions are suspected and for immediately reporting the situation to the Project Director. The Project Director, together with the Project Director and OQO, will evaluate the situation and determine whether a nonconformance exists and a Corrective Action is warranted based on the criteria above. At the discretion of the OQO or Project Director, Office Management or higher can be called upon for involvement or to decide if work must be stopped pending Corrective Action.

When possible or practical, the Corrective Action should be completed within 30 calendar days from initiation.

### 11.1.2 Corrective Action Reports

Corrective Action activities must be documented on the Internal Quality Audit Report form or a Corrective Action Report (CAR) form. URS' QMS offers such a form as one option for a CAR and as guidance for what should be included in a CAR. Alternatively, meeting minutes can be used as a CAR. The meeting minutes must include the following information, at a minimum:

- Reference to the NCR (if any);
- Affected project number and name;
- Name of individual initiating the CAR;
- CAR date;
- Statement of the problem;
- Containment action;
- Root cause;
- Listing of Corrective Action(s);
- Date by which Corrective Action(s) must be performed and the responsible individual;
- Verification process;
- Name of individual to verify Corrective Action(s) performed; and
- Approval by the Project Director and OQO.

On a case-by-case basis, the Project Director and OQO may delegate all or portions of the review process to other technically qualified staff. The Project Director will provide copies of the NCR and CAR, where required, to the project Project Director for review and/or comment.

When all required Corrective Actions are completed and verified as implemented and effective, the CAR will be signed as closed by the OQO or designee. The Corrective Action completion date will be noted on the NCR

## 11.2 Preventing, Detecting, and Correcting Quality System Problems

URS will determine the necessary actions to eliminate the causes of potential non-conformances in order to prevent their occurrence. Preventive Actions will be appropriate relative to the effects of the potential problems.

URS QMS defines the requirements for response to a nonconformance as:

- Determining potential non conformances and their causes;
- Evaluating the action(s) needed to prevent recurrence of non-conformances;
- Determining and implementing action(s) needed;
- Recording the results of actions taken; and
- Reviewing the effectiveness of the Preventive Actions taken

Preventive Action measures will be selected to prevent or reduce the likelihood of potential occurrences. Selected measures will be appropriate to the seriousness of the nonconformance and will be realistic in terms of the resources required to implement them. Preventive Action instructions will be communicated in appropriate detail to project staff by the Project Director and Project Manager by the means most appropriate to the situation. This may be by special Preventive Action group meetings, training sessions, project-specific instructions, internal memoranda, or such other means as may be required to implement the required action. All Preventive Action activities must be documented and maintained by the OQO or Project Director, if so designated.

### 11.3 Responsibilities

URS approach to QA training is designed to encourage staff to participate in the prevention and correction of nonconformance. All personnel have been told that the best means for providing the highest quality products and services stems from their ability to establish communications between customers and suppliers, identify process improvement opportunities, and identify and propose solutions for problems.

The bottom-up and top-down components of our quality system assessment process combine to produce a matrix capable of targeting problem areas that need improvement. In addition, periodic, targeted audits undertaken at management initiative generate recommendations relating to specific aspects of the quality system. The products of both of these efforts are combined into an action list that identifies the items that need to be addressed and a recommended set of actions. Each item is assigned a priority, a responsible manager, and a schedule. This list forms the Quality System Improvement Plan. It is updated more or less continually as new areas of improvement are identified.

The Project Director is responsible for monitoring the status of the items on the Quality System Improvement Plan. He checks with the responsible manager to ensure that response actions are completed. He also monitors work processes and products by direct observation, to ensure that their quality reflects the improvements in the system. The Project Director annotates the Quality System Improvement Plan to describe the disposition of each item on it, as well as the observed effects on the quality of project outputs.

### 11.4 References

EPA QA/G-3, *Guidance on Assessing Quality Systems*, EPA/240/R-03/002, March 2003