BOWSER-MORNER

QUALITY MANAGEMENT SYSTEM MANUAL

QA-040

CIVIL AND GEOTECHNICAL ENGINEERING AND SUBSURFACE EXPLORATION SERVICES

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Manual No. _____

Latest Revision ____2____

BOWSER-MORNER
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QA-040

CIVIL AND GEOTECHNICAL ENGINEERING AND SUBSURFACE EXPLORATION SERVICES

CONFIDENTIAL

This Quality Management System Manual has been produced for use by Bowser-Morner to guide and demonstrate its capability and quality in the fields of engineering and technical field services. It is primarily intended for internal use, and should be used externally only where necessary for qualification purposes.

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Return this section of the page to:

Quality Assurance Department
Bowser-Morner, Inc.
4518 Taylorsville Road
Dayton, Ohio 45424

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Date _____ Revision: ____2___

No. _____

BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL

QA-040

CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES

APPROVALS

Steven M. Bowser, Company President	Date
Mark A. Bingman, Quality Assurance Manager	Date

BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL

QA-040

CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES

REVISIONS

The following is a listing of revisions made to this Quality Management System Manual.
Current revision changes are highlighted in red.

Action Taken		Date
Established		10/96
Revision No. 1	Format change to ISO 9001:2000 Addition of subsurface services	12/01
Revision No. 1(08)	Editorial changes	05-08
Revision No. 2	Remove References to Bowser-Morner Associates Add to CAR and PAR procedures Changes to Position Responsibilities Add Job Descriptions and Signatory requirements Changes to requirements for in-house SOPs	02-13

BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL

QA-040

CIVIL AND GEOTECHNICAL ENGINEERING AND SUBSURFACE EXPLORATION SERVICES

PRESIDENT'S LETTER

Subject: Quality Management System

From: Steven M. Bowser

To: Company Employees

This Quality Management System Manual has been developed for your guidance in carrying out quality civil and geotechnical engineering and field services at Bowser-Morner. We urge that you become familiar with all the sections in this manual that apply to your work and activities, and that you refer to this manual as new aspects develop.

It is our firm policy that management and senior level engineers are responsible for the quality and review of work of those reporting to them.

Thus, ultimately, the department managers and chief geotechnical engineer are responsible for the quality of our services and we assure you that we take this responsibility very seriously. On the other hand, due to the diversified nature of Bowser-Morner's services, each individual employee must accept substantial responsibility for their own work.

For this reason, this manual is accessible electronically so that you can be familiar with the procedures and practices of quality assurance in the company. As with Bowser-Morner's quality management system, this manual is a *"living"* document and will be periodically updated as existing policies and procedures are revised and as new policies are developed.

Steven M. Bowser
President

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INTRODUCTION

Bowser-Morner's Mission

Bowser-Morner's mission is to provide quality professional services that meet or exceed our customers' needs in laboratory testing, field services, subsurface exploration, and engineering/scientific expertise.

We are dedicated to professional ethics, value to our customers, and support of the public welfare. We believe that continued, measured growth is in the best interest of our customers, owners, and dedicated employees.

Description of Bowser-Morner

Bowser-Morner is comprised of two divisions that serve a wide range of individuals, commerce, industry, and agencies of the Government. These two divisions are Analytical Services and Engineering and Construction Services.

Analytical Services

The primary function of the Analytical Services Division is to provide customers with a reliable and impartial source for laboratory testing. Testing includes:

- General Chemistry (chemical testing of metals and alloys, limestone, petroleum, plastics, etc.)
- Special Chemistry (failure analysis and composition analysis of manufactured products and processes)
- Product Testing and Vibration (simulated environmental testing of commercial products and components)
- Mechanical and Metallurgical (tensile strength, hardness, impact, weld testing and evaluation, etc.)
- Calibration (dimensional, mechanical, thermodynamics, time and frequency, electrical, and radon devices)

Engineering and Construction Services

The Engineering and Construction Services Division provides a wide variety of construction-related services that include:

- Civil Engineering (engineering in the areas of grading and drainage, dams and embankments, mine reclamation, etc.)
- Geotechnical Engineering (soil studies for foundations under buildings, bridges, roadways, towers, large-span pipes, airport runways, etc.)
- Subsurface Exploration (exploration and sampling for geotechnical, environmental, mineral and aggregate reserves)
- Field Services (construction observation and QA/QC testing at construction sites)
- Laboratory Materials Testing (soil, rock, aggregate, concrete, asphalt, and other construction materials)

Brief History of Bowser-Morner

The Laboratory, founded in 1911 as the Kurz Chemical Laboratories, was purchased by R. R. Bowser and A. L. Morner in 1925. Until that time, the Laboratory offered chemical analysis exclusively. Soon after the acquisition, Bowser-Morner ventured into the field of construction materials testing.

From early in the 1930's until 1963, the main facilities and corporate offices were maintained near the downtown area of Dayton Ohio; then, due primarily to construction of an interstate highway, the offices and laboratories were relocated to the eastern sector of Dayton.

In 1937, Bowser-Morner became a charter member of the American Council of Commercial Laboratories, which later became the American Council of Independent Laboratories (ACIL).

In the 1950's, the company was organized into two divisions (Analytical and Construction) with separate departments. This permitted greater flexibility for the company's overall capabilities and allowed specialization into certain fields of services and types of materials.

In 1968, Bowser-Morner acquired Dayrad Testing Laboratories which permitted expansion into other fields of the physical sciences, specifically electronics and calibration.

The Dayton based company acquired Interstate Testing and Drilling of Toledo Ohio in February 1974 and changed the name to Bowser-Morner, Inc. - Toledo district. Also in 1974, a district office in Maysville Kentucky was opened.

In June 1982, a district office was established in Lexington Kentucky to better serve the area south of the Ohio River. The Lexington office essentially replaced the Maysville district office, which closed in March 1983. The Lexington district offered primarily engineering and field services along with a geotechnical laboratory.

In 1986, the Analytical Services and CMT laboratories and field services were ISO/IEC 17025 accredited by the American Association for Laboratory Accreditation (A2LA).

In October 1989, the main laboratory facilities and corporate offices were again relocated to a new facility in a northern suburb of Dayton Ohio. This 56,000 square foot, modern facility enabled Bowser-Morner to continually enhance its capabilities.

In 1995, the Dayton Ohio CMT field and laboratory services were accredited by AASHTO and in 1996 the Toledo Ohio CMT field and laboratory services became AASHTO accredited.

Of major significance was the purchase of Bowser-Morner's first sonic exploration rig in 1997. This relatively new technology allowed for continuous samples with close to 100 percent recovery. Three additional sonic rigs were added in 1999 and 2000.

In 1998, the Toledo office teamed up with the city to reclaim a portion of Toledo's old CSX railroad terminal site. As a result of this effort, in November of 1998, the Toledo staff moved into a new 14, 000 square foot facility located on the reclaimed Brownfields property.

In November 2000, Dayton's CMT field and laboratory services became AASHTO's first accreditation to the international standard ISO/IEC 17025 – in June 2002, Toledo became the second AASHTO ISO/IEC 17025 accredited field and CMT laboratory.

In 2003, the company's growing services in laboratory testing was expanded by opening a construction materials testing laboratory in Springfield Illinois. This laboratory was AASHTO R18 accredited in December 2009 and ISO/IEC 17025 accredited in May 2012.

In 2008, a regional office for field and laboratory services was established in Cincinnati Ohio to better serve clients along the I-75 corridor in Ohio and Kentucky and in September 2012 a regional office and CMT laboratory was established in Birmingham Alabama.

SECTION 1 – SCOPE of Manual

1.1 Objective

Bowser-Morner has an established and actively maintained quality management system appropriate to the type, range and volume of engineering, sampling, testing, observation, and research activities it undertakes. This quality management system is composed of several documented programs that individually address the various activities within Bowser-Morner's organization. The objective of this manual *(QA-040)* is to describe Bowser-Morner's quality management system for civil and geotechnical engineering and subsurface exploration services. A program that addresses the quality management system for field and laboratory testing and equipment calibration services provided by Bowser-Morner has been documented in a separate manual, QA-020.

1.2 Approach

ISO 9001:2008, *Quality Management Systems - Requirements*, has been adopted as the format and foundation for Bowser-Morner's quality management system manual QA-040.

1.3 Application of the Quality System Manual

This quality management system manual outlines and describes the procedures for establishing and maintaining quality engineering, design, and subsurface exploration services at Bowser-Morner. The control of quality is a continuing process; consequently, this manual provides not only for the formation of a quality management system, but also for its continuation through communication, standardization, documentation, and review programs. The following operational departments comply with the applicable requirements of this manual.

Engineering Services

The Engineering services provided by Bowser-Morner include geotechical and civil engineering, and hydrogeology. Many of our engineers are licensed to practice engineering in states throughout the eastern United States. Among the many types of consulting engineering services provided are shallow, deep, and special foundation designs, dam designs, solid waste landfill designs and permitting, inspections and remediations, grading-drainage plans and designs, shoreline protection designs, and pavements. Other services include hydrogeological evaluations, solid waste coal mining reclamation, slope stability studies, and mine subsidence investigations.

Geo-Environmental Consulting

Bowser-Morner provides a range of Geo-Environmental Consulting services to various types of industries, individuals, real estate firms, attorneys, government agencies, lending institutions, universities, and hospitals. Services include environmental assessments of business, commercial, and industrial properties, remedial investigations and feasibility studies, clean-up plans for hazardous waste sites, SPCC and hazardous waste management plans, monitoring of remediation and demolition, groundwater and soil studies, closure of underground storage tanks, wetland/ecological studies, and more. Our geo-environmental team works closely with our subsurface exploration, and geotechnical personnel.

Subsurface Exploration

Bowser-Morner's Subsurface Exploration department has been providing exploration services to industries and government agencies throughout the eastern United States for the past 70-plus years. Equipment includes truck-mounted, track-mounted, and ATV mounted rigs for hollow-stem auger, rotary, and sonic boring methods. Services include installation of monitoring wells, AS/SVE wells, recovery wells, and aquifer test pump wells. In addition, the subsurface exploration department performs borings for geotechnical studies, sampling studies to analyze reserves of aggregate and stone producers, and environmental sampling.

Additional Resources

The following departments and internal functions support the engineering and subsurface operations:

Drafting and AutoCad including computer graphics and software available to support engineering work such as AutoCad, SurvCad, MicroStation, foundation analyses, and hydrology programs.

Field and Laboratory Services including field observations-testing and laboratory testing for geotechnical and construction materials test methods.

Administration including mailing operations, (both incoming and distribution), telephone switchboard operations, benefits, health and safety, and human resources.

Accounting is responsible for accounts receivable, accounts payable, payroll, and the preparation of financial management reports.

Facilities and Maintenance provides building and equipment maintenance and repair and environmental controls.

Marketing provides planning, advertising, public relations, and sales effort to promote the continued growth of Bowser-Morner.

Management Information System provides hardware and software solutions and support. Systems include a central server system and a network of PC's.

Quality Assurance provides development, distribution, and support for control of internal documents, auditing, nonconformance investigations, corrective and preventive actions, measurement of customer satisfaction, management review.

1.4 Quality Management System Compliance

Bowser-Morner's quality management system is in substantial compliance with the applicable sections and requirements of international, national, and industry recognized standards including: ISO 9001:2008, 10 CFR 830-120, DOE O 414.1, ASFE Guide to Quality, ASTM D 3740, and others. Appendix C of this manual cross-references in more detail, Bowser-Morner's quality management system to several of these standards.

SECTION 2 – NORMATIVE REFERENCES

The following normative documents contain provisions, which through their specified requirements and/or reference in this text, constitute provisions of this quality management system manual. Copies of these and other quality related documents are on file and available for reference in the quality assurance department.

- ISO 9001:2008, *Quality Management Systems - Requirements*
- 10 CFR 830.120, *Quality Assurance*
- DOE O 414.1, *Quality Assurance*
- ASFE, *Guide to Establishing Quality Control Policies and Procedures for Engineering Firms Practicing in the Geosciences*
- ASTM D 3740, *Practice for Evaluation of Agencies Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction*
- ANSI Z540-1, *Calibration Laboratories and Measuring Equipment – General Requirements*

SECTION 3 – TERMS AND DEFINITIONS

For the purpose of this quality management system manual *(QA-040),* the following relevant terms and definitions relating to quality apply. Most terms and definitions have been derived from ISO 9000:2000, *Quality Management Systems – Fundamentals and Vocabulary*.

Acceptance Criteria. Specified limits, typically upper and lower, placed on characteristics of an item, process, or service.

Audit. A planned and documented activity performed to determine by investigation, examination, and evaluation of objective evidence, the adequacy and compliance with established policies and procedures.

Calibration. The set of operations, which establish under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, or values represented by a material measure, and the corresponding known value of a measurand.

Condition Adverse to Quality. An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defects, and nonconformance. A significant condition that if uncorrected, could have a serious effect on the safety and/or quality of the company operations.

External Audit. An audit of those portions of another organization's quality system not under the direct control of Bowser-Morner (also see Peer Review).

Internal Audit. An audit of those portions of Bowser-Morner's quality system requirements as documented in the quality management system manual QA-040.

Item. An all-inclusive term used to indicate any of the following: sample, specimen, equipment, material, part, unit.

Nonconformance. A deficiency in characteristic, documentation, or procedure that renders the quality of a service or activity unacceptable or indeterminate.

Observation. The act of recognizing and documenting a fact or occurrence often involving a measurement or visual comparison to a specified requirement.

Procedure. A document that specifies or describes how an activity is to be performed.

Quality Assurance (QA). Those planned and systematic actions necessary to provide adequate confidence in the accuracy of engineering designs, recommendations and opinions, subsurface investigations, or other services (i.e. documenting policies and procedures, training personnel, auditing operations, controlling purchasing, etc.).

Quality Control (QC). Those activities and functions that are integrated into routine engineering and field activities and procedures to provide adequate confidence in the accuracy of data, results, or services (report peer review, reference reviews, calculation checks, equipment calibration, etc.).

Quality Manual. A document or set of documents that describe the company's quality policy, quality system, and quality practices (quality assurance and quality control).

Quality Management System. The organizational structure, responsibilities, procedures, processes and resources for implementing quality management.

Subcontractor. A company that supplies products and/or services through direct interaction with Bowser-Morner (typically includes the use of a written contract).

Traceability. The ability to trace the history, application or location of an item with relation to time, place, personnel, and performance. For Bowser-Morner, traceability becomes an issue with sample collection and handling, and equipment calibration.

Validation. The act of confirmation through review and/or simulation that services conform to a specified method or procedure, if known.

Verification. The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items and processes conform to specified requirements.

SECTION 4 – QUALITY MANAGEMENT SYSTEM

4.1 General Requirements

Bowser-Morner's quality management system is composed of several programs that individually address the various activities within the company. Personnel are to be familiar with and implement these policies and procedures as they apply to their activities.

The purpose and function of the quality management system is to present a standard of *Good Quality Practices (GQP)* whereby an independent engineering, exploration, and testing firm can assure quality and determine its reliability in performing engineering designs, observations, explorations, sampling, testing, and consultation.

4.1.1 Quality Management System

The quality management system shall identify, establish, document, communicate, and implement quality policies and programs to:

a) Establish and maintain this document *(QA-040)* and other related standard operating procedures that define the company's quality policy and quality management system.

b) Develop, control, and distribute documents and procedures as defined in this manual.

c) Establish policies and procedures for maintaining effective and open communications with employees.

d) Develop strategic planning that clearly identifies the company's goals and communicates them at appropriate levels of responsibility.

e) Establish a formal organizational structure with defined lines of authority that identify responsibilities and reporting relationships.

f) Monitor by means of scheduled reviews and internal audits, the adherence to, and effectiveness of, the policies and procedures established within the quality management system.

g) Implement training programs and other development opportunities for personnel that emphasize the importance of professional development, on-the-job training, and evaluation of employee competency.

h) Provide appropriate work environment, equipment, and support services that promote honesty and objectivity and discourage conflict and other pressures that might adversely affect the quality of work.

i) Effectively communicate with the customer to determine their needs, contractual requirements, and feedback.

j) Establish project management policies and procedures for customer input, design and service processes, and the review and approval of designs, drawings, specifications, calculations, test data, and reports that are consistent with the company's and the customer's needs and with professional ethics.

k) Qualify suppliers and control the purchase of equipment, supplies, and services to the extent necessary to ensure a quality service to our customers.

l) Monitor, measure, plan, and implement actions for the improvement of the company's quality management system and the services provided to our customers.

m) Identify and review nonconformities (including customer complaints), determine the cause(s), evaluate the need for corrective action, and implement any action judged to be needed.

n) Determine action(s) to lessen the causes of potential nonconformities in order to help prevent their occurrence.

4.1.2 Managing the Quality Management System

The quality policies and programs are to be managed by Bowser-Morner's management team (department managers and above) in accordance with the requirements of this documented quality management system *(QA-040)*.

The quality management system manual *(Section 4.2.)* and supporting documents are to be reviewed annually by the quality assurance manager for adequacy and needed changes.

4.1.3 Subcontracting Services

Approved Subcontractors

Subcontractor sources for field support services, laboratory testing, purchased supplies, and consumables are audited on a scheduled basis for compliance with applicable quality system requirements, codes, and regulations.

The competency of the subcontractor is approved through the quality assurance department via one or more of the following methods:

- History of performance
- On-site audit
- Audit by survey questionnaire
- Independent accreditation, certification, or licensing

Audits are conducted when practicable using a questionnaire submitted to the subcontractor. This questionnaire may be supplemented by an on-site audit at the quality assurance manager's discretion.

A list of approved subcontractors detailing the services provided and the method(s) of approval is maintained by the quality assurance manager and is available in a public services folder located on the company's server *(BMI_Public – QA Services)*.

Refer to Bowser-Morner Quality Assurance SOP QA-0710 for more details concerning the selection of subcontractors.

Notification to the Customer

Notifying the customer that Bowser-Morner intends to subcontract work may typically be good practice, but it is not always a requirement. The department manager should use his or her judgement concerning notifying the customer that a portion of the scope of work is scheduled to be subcontracted. This same judgement should be applied to the identification of subcontracted test results on a Bowser-Morner report.

4.1.4 Departure from Policies and Procedures

Exceptional departure from the quality management system policies and procedures documented in this manual *(QA-040)* requires approval by upper management. A written request including an explanation of the departure should be submitted for approval by a department manager or above. A copy of the written request is to be supplied to the quality assurance manager.

4.1.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure – Engineering and Subsurface Operations*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*

4.2 Documentation Requirements

Bowser-Morner's quality management system is documented by the following:

4.2.1 General

Quality at Bowser-Morner

At Bowser-Morner we define quality as meeting or exceeding the requirements of those we serve - our customers, regulatory bodies, industry standards, and each other. A policy has been written to document and express the company's commitment to and framework for producing a quality service. This quality policy is documented in *Section 5.3* of this quality management system manual.

Key Quality Objectives

The core of Bowser-Morner's corporate mission is to provide quality professional services that meet or exceed our customer's expectations. To help in achieving our mission, Bowser-Morner has adopted the following *measurable* key quality objectives that gauge *(Section 5.4.1)* our progress in this quality journey.

The Key Quality Objectives are to:

a) Maintain a quality system manual and set of standard operating procedures that accurately define the company's quality management system.

b) Maintain a system of document control that allows for document identification, retrieval, and review to ensure that the current revision is available to employees.

c) Maintain procedures and facilities for the documenting, secure storage, retrieval, and destruction of work files and records.

d) Provide manuals, standard operating procedures, and training to management and supervisory personnel as needed to effectively communicate the requirements of the company's quality management system.

e) Complete an annual plan for marketing, sales, revenue, and resources, which provides for the orderly development and financial stability of our company.

f) Maintain an organizational chart and position descriptions that define the structure, authority, and responsibilities of management.

g) Complete and distribute to management an annual report that reviews and summarizes the effectiveness of the company's quality management system and identifies areas for improvement.

h) Select and maintain a staff of professionals and support personnel, who are technically qualified to perform the scope of services offered to our customers.

i) Establish guidelines and requirements for professional development and provide training programs and other development opportunities that meet our staffing needs.

j) Provide appropriate personnel, equipment, and facilities, which allow accurate and timely response to customer requirements.

k) Maintain software programs, report and file formats, and verify the scope of application and accuracy of drawings, standards, programs, and procedures.

l) Maintain an inventory listing of calibratable equipment and verify the equipment receives calibration and adequate maintenance on a scheduled basis.

m) Define the customer's requirements and expectations in a documented scope of work that is part of an agreed to contract.

n) Promptly address and resolve any customer complaints.

o) Establish project management policies and procedures that are consistent with both the company and the customer's needs and with professional ethics.

p) Establish and maintain a comprehensive internal quality control program including supervision of employees' work and review of technical data, calculations, drawings, specifications, and reports.

q) Maintain a list of approved sources for subcontracting and make it available to management and purchasing personnel.

r) Successfully complete regular internal audits and reviews and implement necessary corrective actions.

4.2.2 Quality System Manual

Bowser-Morner has established and maintains this quality management system manual *(QA-040)* to document the scope, policies, procedures, and interactions of its quality management system and quality related standard operating procedures. This manual is to be reviewed annually and periodically revised by the quality assurance manager, to incorporate any accumulated revisions and/or additions.

4.2.3 Control of Documents

The purpose of document control is to provide procedures for the identification, organization, maintenance, and distribution of technical and non technical documents. It is the responsibility of the quality assurance manager to see that these procedures exist throughout the company.

For identification purposes, documents are divided into two groups: *published documents* and *in-house documents*. Published documents such as technical standards are simply identified by their published identification number and title. Examples are the Ohio Building Code OBC, American Concrete Institute ACI Building Code, and ASTM standards.

In-house documents are divided into four (4) major categories. These are: *1)* quality system documents, *2)* calibration procedures, *3)* technical field and laboratory procedures, and *4)* non-technical operating procedures.

In-house developed documents are given an identification number and title. Quality system documents and calibration procedures are identified with alpha characters and numbers. Technical and non-technical engineering and field procedures are identified by a numerical system. Examples of these identifications are:

- Quality System Document — Control No. - QA-xxx
- Calibration Procedure — Control No. - BM-xxxx
- Technical Procedure — Control No. - 50-xxx
- Non-Technical Procedure — Control No. - 900-xxx

This quality management system manual represents one such document identified by the control number QA-040. The quality assurance manager maintains a listing of controlled documents. This list is also available to department managers and technical staff in a public services folder located on the company's server *(BMI_Public – QA Services).*

In-house Document Approval and Distribution

The quality assurance manager writes most quality system documents. The quality assurance manager and/or a department manager may write calibration procedures. A department manager or a knowledgeable engineer/scientist typically writes technical and non-technical procedures.

Quality system manuals (including this manual) and quality system standard operating procedures (SOPs) are approved and signed by the company president and the quality assurance manager. Other quality assurance and quality control documents must receive the approval signature of a department manager, or above, and the quality assurance manager.

Technical and non-technical procedures for engineering and design operations are approved and signed by a department manager, or above.

Technical and non-technical procedures for field operations are approved and signed by a department manager, or above, and the quality assurance manager.

For quality system documents, the quality assurance manager is responsible for distribution control. For calibration and departmental procedures *(both technical and non-technical)*, distribution control is the responsibility of the department manager who may delegate control back to the quality assurance manager.

The quality assurance manager maintains the original documents for all four categories. Signed originals are stored using suitable filing cabinets in the quality assurance department. Access to these files is restricted to the quality assurance manager and selected *approved* personnel.

In-house Document Changes

Documents are reviewed and revised on an *as-needed* basis with the exception of this quality system manual and quality system SOPs, which are reviewed/revised on an annual basis by the quality assurance manager.

When the review of a technical or non-technical document results in the need for revision, the necessary changes are submitted to the quality assurance manager who makes the changes to the electronic master copy and issues a *"draft"* revised copy back to the person making the revision for final review and corrections. When the revision is complete, the appropriate individual(s) *(see document approval section)* signs and dates the revised original copy. Distribution of the revised document, including the recovery of any obsolete documents, is made as soon as practical. Refer to Bowser-Morner's quality assurance SOP QA-0230 for more details concerning document control.

Because most in-house documents are widely distributed by electronic means, hand written revisions on printed copies are not typically allowed except as approved by the quality assurance manager. Changes may, however, be issuing as only a revised page or pages. The quality assurance manager controls the distribution of these changes.

Invalid and Obsolete Documents

Invalid and obsolete documents *(both published and in-house)* are to be removed from use as soon as practical. Published documents are typically identified with a sticker stating "*To Be Used For* ***Reference Only****"*, or some other means of identification. Copies of these documents may be maintained in designated areas such as department reference centers.

Invalid and obsolete in-house documents are removed from use per the distribution list maintained by the quality assurance manager. The original document, which is maintained by the quality assurance manager, is retained for a period of time as defined in the following section.

4.2.4 Control of Records

Bowser-Morner maintains a records system to suit the various engineering and subsurface disciplines of the company. Records are to be legible, identifiable, retrievable, and protected against damage, deterioration, or loss. Most records are identified and filed by customer name or Bowser-Morner project number, year, and revision or sheet number *(in-house drawings)*. The general classification and handling of records is divided into three main categories. These categories are: *1)* client documents, *2)* operating records, and *3)* quality system records. Company financial records are controlled separately by the accounting department.

Client documents

Client documents are signed documents submitted to the customer as official records of services performed by Bowser-Morner, including but not limited to contracts, opinions, reports, results, drawings, and designs.

Operating Records

Records relating to the conduct of an investigation, exploration, calibration, or test assignment are considered as operating records. These may include without limitation, handwritten notes, logbooks, designed work sheets, field logs and notes, equipment data printouts, certificates of calibration, test methods, and any other documents that are related to the contents of a formal report.

Quality Records

Records of training, internal and external audits, licensing, corrective and preventive actions, approved subcontractors, and any other record generated as evidence and support of the quality management system are considered quality records.

Recording of Records

Field data and notes of subsurface explorations and engineering observations carried out by Bowser-Morner are to be recorded accurately, clearly, and unambiguously to ensure that the information is meaningful to other users of the records. When mistakes occur in these records, the mistake is to be crossed out *(not erased, made illegible or deleted)* and the correction entered alongside. The person making the correction is to initial and date such alterations to a record.

Storage and Retention

Retained documents and records shall be safely stored in a manner that provides tracking and recovery, held secure, and in confidence to the customer. Records may be stored in designated locations within the department or off-site through the use of a Bowser-Morner approved subcontractor for record management. Record storage, access, and retention are the responsibility of the department manager.

Client documents more than twenty (20) years old based on January 1st of the current year are authorized to be destroyed. Exceptions are design reports, plans, specifications, etc. where Bowser-Morner is the *engineer of record*. These records are to be retained indefinitely.

Operating records more than ten (10) years old based on January 1st of the current year are authorized to be destroyed.

Quality records more than ten (10) years old based on January 1st of the current year are authorized to be destroyed. Exceptions are annual reports to management, internal audits, and corrective actions. These records are to be retained indefinitely.

Bowser-Morner may choose to indefinitely retain selected records based on anticipated future needs (i.e. subsurface boring logs, geological studies, etc.) Refer to Bowser-Morner quality assurance SOP QA-1610 for more details concerning document retention and destruction.

Electronic Media

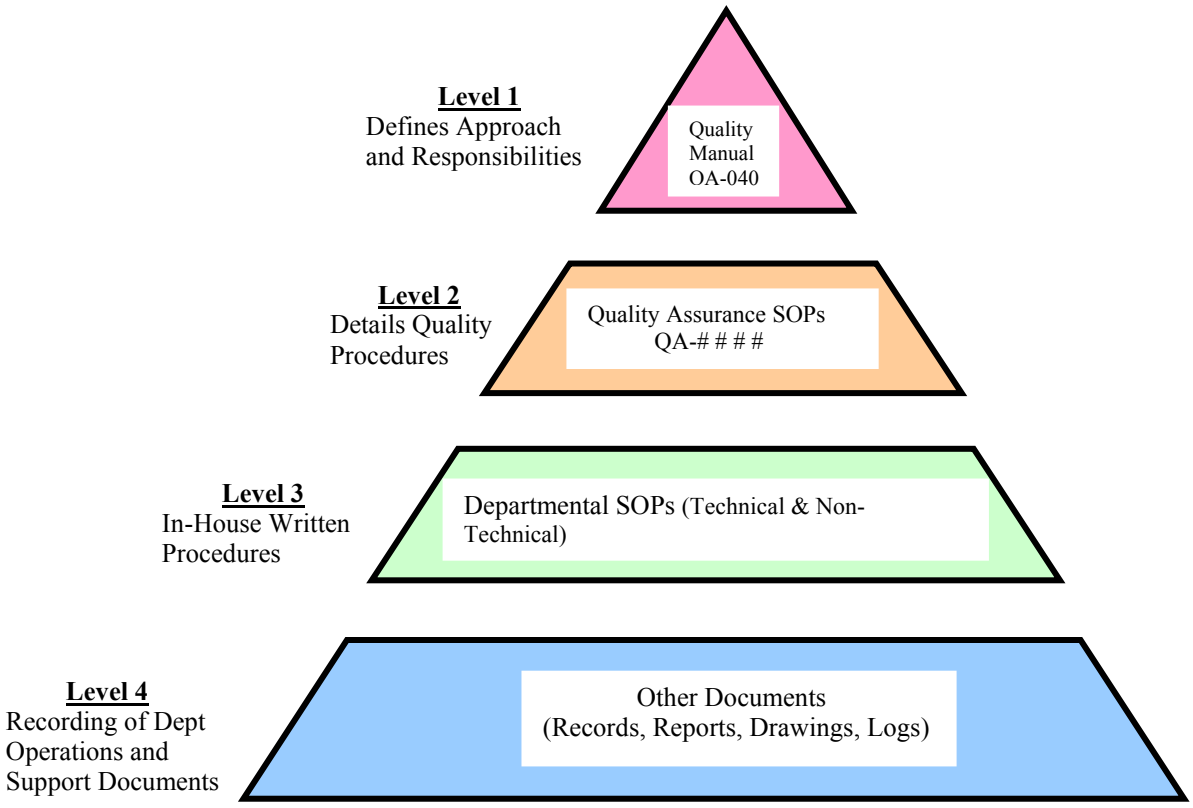
The majority of electronically stored records are engineering and subsurface reports and drawings. On a scheduled basis, these records are copied to separate removable disks. Archived computer records are placed in storage and handled in the same manner as other operating records. The handling, storage, and destruction of electronic media records are the responsibility of the information services *(IS)* department with support from the department manager. Refer to Bowser-Morner SOP 900-003 for details concerning the handling and storage of electronic media records.

4.2.5 Documentation Structure

In their *broadest* form, the policies and procedures that document Bowser-Morner's quality management system are defined in this manual *(QA-040),* authorized by the company president and quality assurance manager, and issued to management by the quality assurance manager.

In addition to the quality system manual, there are three tiers of documentation that define, in more detail, the various procedures, activities, and functions of the quality management system. Directly below the quality system manual is a set of quality assurance standard operating procedures (SOPs) that address, in specifics, the quality management system from organization through service and improvement. References to these and other SOPs are contained throughout this quality system manual.

Two other tiers complete the documentation structure. These are departmental SOPs *(field operations, subsurface exploration, and test methods)* and supporting documents *(records, reports, drawings, specifications, and many more)*. The diagram below illustrates the four-tiered documentation system.



4.2.6 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality management system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure – Engineering and Subsurface Operations*
- Bowser-Morner SOP QA-0230, *Quality Assurance Program Documentation and Records*
- Bowser-Morner SOP QA-1610, *Document Retention and Destruction Program*
- Bowser-Morner SOP 900-003, *Data Archiving and Backup Strategy*
- Bowser-Morner SOP 900-020, *Off-Site Archiving of Documents*

SECTION 5 – MANAGEMENT RESPONSIBILITY

5.1 Management Commitment

Bowser-Morner's quality management system is composed of several programs that individually address the various activities within the company. Personnel are to be familiar with and implement these policies and procedures as they apply to their activities.

The purpose and function of the quality management system is to present a standard of *Good Quality Practices (GQP)* whereby an independent engineering, exploration, and testing firm can assure quality and determine its reliability in performing engineering designs, observations, investigations, testing, and consultation.

5.1.1 Commitment To

The quality management system shall document and implement quality programs to:

a) Communicate the importance of meeting customer as well as statutory and regulatory requirements *(Section 5.2 & 5.5)*.

b) Establish a quality policy *(Section 5.3)*.

c) See that measurable key quality objectives are identified and monitored *(Section 4.2 & 5.4)*.

d) Conduct management reviews *(Section 5.6)*.

e) Ensure the availability of needed resources *(Section 6.1, 6.2, & 6.3)*.

5.1.2 Legal Identification

Bowser-Morner, Inc. is legally identifiable and registered with the Secretary of State in the state of Ohio. Bowser-Morner's corporate headquarters are located in Dayton Ohio at:

Bowser-Morner, Inc.
4518 Taylorsville Road
Dayton, Ohio 45424
(937) 236-8805

Regional offices that offer engineering and subsurface services are located at:

1419 Miami Street
Toledo, Ohio 43605
(419) 691-4800

2416-B Over Drive
Lexington, Kentucky 40511
(859) 233-0250

5.1.3 Third-Party Impartiality

Bowser-Morner provides appropriate working conditions and facilities including adequate space and furnishings for its staff in an environment that promotes honesty and objectivity while discouraging conflict and other undue pressures which might adversely affect the quality of work. If an employee feels that inadequate resources, unreasonable time constraints, customer expectations, or other issues may compromise the integrity of true and accurate results, he or she has the right and responsibility to report their concerns to a higher source, i.e. department manager, quality assurance manager, or the president.

As a commercial company, Bowser-Morner recognizes that certain sources of pressure are inherent to the types of engineering and field services that the company provides. To assist employees in dealing with these pressures, Bowser-Morner has established and documented policies and procedures that address issues such as gifts and gratuities from customers, customer complaints, internal management pressures, and other possible sources of undue pressure. Refer to Bowser-Morner's quality system SOP QA-0110 for more details concerning impartiality and integrity of results.

5.1.4 Customer Confidentiality

As an independent commercial engineering and field services company, Bowser-Morner maintains a *Confidential Information Agreement* with each of its employees. The agreement policy expressly stipulates that at no time will it be disclosed to anyone not in the employment of Bowser-Morner, any designs, specifications, data, results, observations, or associated information, unless duly authorized to make such disclosures. Protection of the customer's confidentiality and proprietary rights is covered in a new employee's orientation program. A signed copy of the policy is maintained in the employee's file. Refer to Bowser-Morner's quality system SOP QA-0110 for more details concerning impartiality and integrity of results.

Registered professional engineers shall conform to the applicable laws and regulations in the jurisdiction in which they are licensed, regarding the safety, health, and welfare of the public. If time permits, before disclosing any potential customer confidential information, the professional engineer is to consult with the company president and/or corporate risk manager.

5.1.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Quality SOP QA-0110, *Integrity of Results and Protection of Customer Confidential Information*

5.2 Customer Focus

When establishing and implementing the company's quality management system, particular emphasis was placed on the chain of traceability from customer requirements through the delivery of the services. The quality-related issues of this process are more defined in *Sections 7.2 and 7.3* of this manual.

5.2.1 Expanded Approach

At Bowser-Morner, customer focus goes beyond just seeing that the customer's requirements are defined and met by our services. Customer focus also includes:

a) Market analysis and strategic planning to identify those customers that need our services.

b) Teaching as well as listening to customers through active membership in trade associations and conducting educational seminars.

c) Keeping pace with newer technologies to meet customer needs.

d) Focusing not only on the technical and regulatory aspects of our services but also at the customer's scheduling and cost aspects.

The success of the company's approach to customer focus is continually monitored with programs directed at measuring customer satisfaction *(Section 8.2.1)* and customer retention *(Section 8.4)*.

5.2.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*

5.3 Quality Policy

5.3.1 Bowser-Morner's Quality Policy

Our goal is for Bowser-Morner's services to be recognized among the best in our industry. To accomplish this we must not sacrifice quality in any of our efforts. At Bowser-Morner we define quality as meeting or exceeding the requirements of those we serve-our customers, regulatory bodies, industry standards, and each other. This begins with a commitment by top management to select, train, and retain quality people-engineers, scientists, technicians, and support personnel. These and other resources are then applied in an atmosphere that promotes quality to provide work that accurately and effectively presents our professional judgement.

We are dedicated to the highest professional ethics, value to our customers, and support of the public welfare. We believe that continued, measured growth is in the best interest of our customers, owners, and dedicated employees.

5.3.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner's Employee Guide
- Bowser-Morner's Human Resources *Statement of Organization Philosophy*

5.4 Planning

5.4.1 Quality Objectives are Measured

Bowser-Morner's quality management system ensures that the company's quality objectives are defined and documented *(Section 4.2.1)*, are measurable, and are monitored *(Section 8)*. The relationship between each quality objective and the means of measuring compliance and improvement is defined in the following table.

Measurable Quality Objectives

Quality Objective	Section 4.2.1	Means of Measurement
Quality system manual and SOPs	a	Manual and SOPs are documented
ID, approval, and revision of documents	b, c	Documents are the current revision
Distribution of manuals and SOPs	d	Available to personnel on BMI_Public
Strategic planning	e	Annual marketing and resources plan
Define position responsibilities	f	Org. charts and position descriptions
Report to management	g	Annual report and dept. quality contracts
Recruit, train, maintain personnel	h, i	Training and competency records
Proper facilities and equipment	j, k, l	Safety audits, equipment calibration
Define customer requirements	m, n	Scope of work with each project
Project management – input, output, validation	o, p	Report format, completeness, peer review
Control of purchased items and services	q	Purchase order, approved subcontractor list
Measure and improve QM system	r	Customer surveys, audit reports, C.A.R.

5.4.2 Quality Management System Planning

Each year the quality assurance manager prepares and distributes a quality report to management. In this report the quality assurance manager defines the areas to be emphasized and the steps to be taken to correct and improve the quality management system in the upcoming year. A semi-quantitative or *graded* approach is used to evaluate each area of improvement. This graded approach takes into consideration the factors of potential benefits and losses, history of problems, safety, complexity, needed resources, and economic considerations.

Selected improvement activities may have varying degrees of impact on the different departments. The degree of impact will be reflected in a set of quality improvement goals that are established specifically for each department *(Section 5.6.3)*. Refer to Bowser-Morner SOP QA-0270 for more details concerning the annual quality report to management.

When a significant change is made to the existing quality management system, the change is documented in the quality system manual and any associated standard operating procedures. Both the revised manual and the operating procedure(s) are reviewed and approved by management.

5.4.3 Strategic Business Planning

Each year, department managers are asked to prepare and submit a strategic business plan for the up coming year. The plan addresses the areas of: *1)* marketing objectives and market opportunities, *2)* the strategy and specific tactics used to implement the plan, *3)* establishing fee strategy, *4)* time lines for accomplishing major objectives, and *5)* the resources needed to implement the plan. The department manager is responsible for communicating the plan's goals and actions to the staff.

The department manager, in conjunction with the marketing personnel, evaluate the opportunities associated with the department's market segment(s), determine the driving forces that create a demand for services, and evaluate growth trends over time. Tools used in the development are:

- Annual sales and marketing report *(Section 8.4)*
- Annual quality report to management *(Section 5.6)*
- Professional staff development *(Section 6.2)*
- Monitoring customer satisfaction and financial reports *(Section 8.2)*

5.4.4 Marketing Practices

Bowser-Morner has established policies and procedures to initiate and maintain business development practices including the handling of applicable marketing documents and materials. The company's marketing staff has primary responsibility for the preparation and updating of brochures, newsletters, qualifications, and other marketing materials, however, these activities may also be handled by department personnel with specific technical knowledge of a subject. The marketing staff also maintains up-to-date personnel profiles *(resumes)* of selected personnel.

Most marketing activities are a collaborative effort combining marketing, departmental, and management personnel. These activities may include:

- Responding to proposals *(Marketing & Departmental)*
- Personnel qualifications *(Marketing)*
- Technical qualifications *(Departmental & QA Department)*
- Quality management system compliance *(QA Department)*
- Contract review *(Departmental & Risk Management)*
- Contract negotiations *(Departmental & Risk Management)*
- Contract debriefing *(Marketing & Departmental)*

5.4.5 Additional Information

Bowser-Morner considers business and marketing as separate programs from quality assurance and as such, they are not defined in this manual. The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0270, *Quality Report to Management*

5.5 Responsibility, Authority, and Communication

5.5.1 Position Responsibilities

The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality are defined herein. A company organizational chart helps to define the company's position responsibilities. This organizational chart is available in a Public Services folder located on the Company's server *(BMI_Public – QA Services)*.

The Company

Bowser-Morner, Inc. is an independent commercial company that provides customers with reliable testing, engineering, observation, and subsurface exploration services. The company is comprised of two divisions: Analytical Services and Engineering and Construction Services.

The Board of Directors

Bowser-Morner, Inc. has a *board of directors* with the president serving as chairman of the board. These directors provide guidance on corporate issues.

The President

Bowser-Morner, Inc. is administered over by a *president*. The president has established and is responsible for maintaining the quality management system and the related policies and procedures associated with the company.

The president has delegated the authority, but not the responsibility, of the quality management system to an independent management representative; the quality assurance manager.

Chief Geotechnical Engineer

The *chief geotechnical engineer* gives technical guidance to the engineering staff and has final authority and responsibility for engineering work in the area of geosciences. The chief geotechnical engineer reports to the president of the company on matters of engineering. The chief geotechnical engineer is a registered professional engineer.

Department Manager

Due to the varied nature of Bowser-Morner's business activities, there are a variety of departments included in the company's organizational structure. Each department has a manager (however named). The department manager reports to the president as defined in the company's organizational structure.

The manager of each department is responsible for the engineering, consulting, or subsurface services *(including relevant quality requirements)* associated with their department. Each department manager reviews new work to verify that the appropriate resources are available before commencing such work.

The responsibilities of the department manager extend to include:

- Screening potential customers and projects before accepting work
- Preparing and final approval of customer quotations, contract review, and loss prevention measures
- Project tracking, establishing project schedules and budgets, customer invoicing and working with accounts receivable
- Professional development, review, and safety of department personnel
- Corrective actions and improvements
- Strategic planning, marketing, and customer relations

The department manager may delegate the authority, but not the responsibility, of these activities to a project manager or supervisor.

Responsible Delegates

Within the organizational structure, the manager typically functions as the responsible engineering and/or technical source for the department. The appointed responsible delegate for the department manager is the president of the company. The company president has the ability and authority to assume the role or name a temporary replacement in the extended absence of the manager.

The president is the assigned delegate with authority to act in the absence of the quality assurance manager, and any other adjunct position of key function such as financial officer, risk manager, safety officer, and marketing manager.

5.5.2 Management's Quality Representative

The management of Bowser-Morner has named a single *quality* management representative, the *quality assurance manager*. The quality assurance manager reports directly to the president. This direct access to the president permits the effective implementation of necessary actions.

The quality assurance manager has responsibility and authority to assure the establishment of appropriate quality system programs at the levels of the organization where it is deemed necessary by the president and the department managers.

The quality assurance manager has access to work areas and the organizational freedom to:

a) Identify quality problems and report to management.

b) Initiate, recommend, or provide solutions to quality problems through designated channels.

c) Verify implementation of solutions.

d) Monitor nonconforming processes until proper disposition of the problem, deficiency, or unsatisfactory condition has been corrected.

In the event of disputes, the president will have final authority.

5.5.3 Internal Communications

Open communications is emphasized and encouraged as part of Bowser-Morner's policies, objectives, and work culture. Within a department, individuals communicate on a routine basis and the use of formal and informal peer review is an integral part of the quality management system process.

Each department functions as its own decision-making center; however, interdepartmental communications are encouraged by management and supported by telephone, fax, and electronic media.

On a more formal basis, the company's policies and procedures are distributed to appropriate personnel and this distribution is controlled *(Section 4.2.3)*. The quality assurance manager also distributes memorandums to management on a regular basis that detail specific issues of the quality management system. These issues typically include changes and revisions to policies and procedures, personnel and training, internal audit results, equipment calibration, and corrective actions. Refer to Bowser-Morner SOP QA-0300 for more details concerning communicating the Quality Management System.

5.5.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Organizational Chart
- Bowser-Morner SOP QA-0300, *Communicating the Quality System to Management*

5.6 Management Review

5.6.1 General

The quality management system and departmental activities are to be reviewed each year by management to maintain its continuing suitability and effectiveness and to introduce changes and improvements.

5.6.2 Review Input (Audits, Surveys, Reviews, Resolutions)

The quality assurance manager presents the review in a written quality system report. As it relates to engineering and subsurface exploration services, the report contains a review of the following:

- Summary of previous year's report to management
- Results from internal audits
- In-house quality activities
- Key quality objectives
- Anticipated changes and quality support
- Customer feedback
- Personnel and training
- Corrective actions
- Equipment and facility resources
- Internal quality contracts
- Summary of current year's report

5.6.3 Review Output (Response and Improvement)

Within the company's management structure, the responsibility to improve quality *(accuracy, completeness, responsiveness)* typically rest with the department manager. To identify specific areas and goals for improvement, the quality assurance manager enters into a *written* contract agreement with each manager. Based on the findings of the annual quality system review, a contract is developed for each department that typically lists four or more *measurable* goals for improvement. The department manager and the quality assurance manager sign the contract as part of an agreement to work together towards accomplishing these improvements.

5.6.4 Distribution

Copies of the report are distributed to management including the company president, risk manager, and department managers. A copy also goes to the manager of marketing and sales. The quality assurance manager controls the distribution of the report and retains the original copy on file.

5.6.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0270, *Quality System Program Review by Management*
- Bowser-Morner SOP QA-1705, *Internal Quality System Audit – QA-040*

SECTION 6 – RESOURCE MANAGEMENT

6.1 Provision of Resources

The selection, training, and retention of good employees are all paramount to the success of Bowser-Morner. The output of our employees is the services that we provide. In order to deliver quality services to our customers, we also must have appropriate physical *(facilities and equipment)* and technical *(field and laboratory)* resources for our employees.

It is Bowser-Morner's responsibility to provide an environment that supports individual professional development through training and experience while at the same time, fosters a sense of teamwork and mutual commitment to success.

Adequate resources are to be committed to the establishment, implementation, retention, and maintenance of the company's personnel, processes, facilities, and quality management system. This commitment includes the resources needed to meet daily customer expectations and long-term efforts for continuous improvement.

When needed resources are not available in-house, Bowser-Morner's subcontractor approval process *(Section 4.1.3)* allows our employees to select a competent outside source.

6.1.1 Additional Information

Due to the varied nature of Bowser-Morner's business activities, requirements for technical support such as field services and laboratory testing may be specified in appropriate departmental or contract quality assurance documents.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner – *Statement of Organization Philosophy*
- Bowser-Morner Human Resources Policies and Procedures – *Employee Recruitment/Selection*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*

6.2 Human Resources

6.2.1 General

Many factors contribute to the correctness and reliability of Bowser-Morner's engineering and field services, however, none are more important than our people. To this end, the company makes a major commitment of time, effort, and resources to its employees.

Bowser-Morner maintains an effective human resources program to recruit, professionally develop, and retain its employees. This program is part of the company's administrative department. Human resources personnel establish and maintain employee records and control access to confidential records of personal information, employment, and salary history.

6.2.2 Training, Awareness, and Competency

Engineers, scientists, field technicians, and support personnel are to receive sufficient training and experience to perform their assigned duties. When a new employee is hired, he or she is considered to be a trainee for a probationary period of approximately three months. Departmental familiarization and indoctrination takes place early in this training period. This segment of the program is extremely flexible and varies according to the position being filled, the duration of the position, and whether the position is in the area of engineering or field operations.

The majority of training is performed as supervised on-the-job instruction. The department manager typically selects the trainer *(instructor)* based on the required education, technical knowledge, experience, and instructor skills *(organization and communication)* needed to conduct the training.

Engineers

Bowser-Morner uses several approaches to the training and promotion of professional development among our engineering staff. These include:

- On-the-job training
- Teaming
- In-house training programs
- Outside training

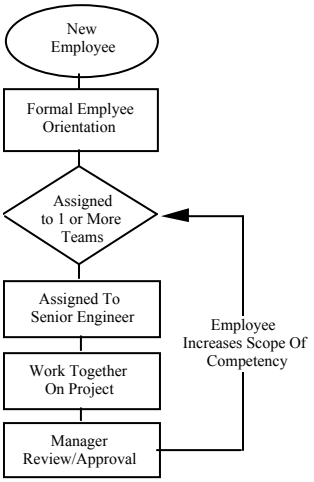
On-the–job training is the primary method used to teach a new engineer, or other trainee, how to perform a process. The trainee is assigned to a competent senior engineer who can clearly and accurately communicate how a specific task or function is to be performed. The senior engineer assumes the role of the mentor and guides the trainee through the training process.

These two will work together until such time as the senior engineer considers the trainee to be competent to perform the work on their own. At this time the trainee's skills are evaluated by the department manager, who is responsible to see that the training has been appropriate, understood, and retained by the trainee.

The completion of a project is typically a *team* effort. A team is comprised of individuals with different skills and the size and experience level of the team varies with the project or task. For instance, on a large or difficult project such as a large dam or refuse area design, a team consisting of the following may be formed:

- Project manager
- Senior engineer
- Engineer
- Engineer in training, and
- Support personnel including drafting and clerical

Although the trainee may be assigned to the senior engineer as his or her mentor, actual training may be done by the project manager, other competent engineer, or by one or more individuals of the support staff. In this way the trainee is exposed to a variety of learning opportunities, and by varying the teams and types of projects that the trainee is assigned to, an even broader scope of training and professional development can occur. It is, however, always the responsibility of the mentor to see that the training is properly conducted and the responsibility of the department manager to pass final judgement on the trainee's competency.



In-house training programs include computer software training, training on drafting and CADD systems, staff meetings on topics such as loss prevention awareness, and formal training sessions presented by Bowser-Morner such as our construction services seminars.

Examples of *outside training* include OSHA 40-hour safety, ASFE risk management skills and client relations training, seminars, and short courses. Many training opportunities are presented by manufacturers of civil and geotechnical engineering products including seminars and one-day courses such as the design of driven piles, design and construction of drilled deep foundations, bank stabilization using geo-textiles, seepage analysis, etc.

For professionals, Bowser-Morner's policy is that every individual should engage in some form of continuing education each year. Guidelines suggest that somewhere between three and ten working days per year is appropriate, depending on the individual involved.

Scientists and Field Technicians

For scientists (geologists, biologists, environmentalist) and field technicians (subsurface exploration), the department manager, or experienced designee, administers the job-training program. This is necessitated by the wide range of observation, testing, and exploration operations employed by Bowser-Morner. The trainee is typically assigned to an experienced instructor and given close supervision throughout the training process. At some point the trainee is considered to be competent to perform the assessment, test, or operation on their own. This evaluation is the responsibility of the department manager and may be done in conference with the instructor responsible for the employee's training.

Beyond the employee's initial training and determination of competency, there exists a program for the periodic review of each employee to evaluate and document *continuing* competency. The department manager will establish a method to determine job competence that typically includes frequency of performance, supervisor's observation, data review, and a one-on-one appraisal interview. Typically, each employee's performance and experience are reviewed on an annual basis.

Documentation

Documentation of training is established by the department manager and maintained by the quality assurance manager. Records are maintained for each employee that detail continuing education, approval of field procedures, dates of examinations and results, licensing and certification, and any observations of work performed, capabilities, and potentials. Training records are always available for review by the department manager and employee in a public services folder located on the company's server *(BMI_Public – QA Services).*

Education and Experience

The chart below shows the general personnel classifications and qualifications adopted by Bowser-Morner's engineering and subsurface exploration departments.

Job Title	Education	Experience
General Management	This individual, or group of individuals, may or may not be involved at the technical level. They should become familiar with the broad technical aspects of the business, so as to make policy decisions consistent with quality requirements	
Engineering Staff	Minimum of B.S. degree in civil or geotechnical engineering	Minimum of 1 year in the area(s) of engineering which they are involved
Department Manager	B.S. degree or 5 years experience, both relevant to the technology supervised	1 year with degree or 5 years w/o under qualified technical supervision pertinent to the field of work
Scientific Staff	B.S. degree pertinent to the field of work	On-the-job training by supervisor or designee
Technical Staff	High school graduate or equivalent	Sufficient on-the-job training and/or trade school.
Support Staff	Sufficient on-the-job training with oversight by the department manager so that he or she performs their job properly	

Contracted Personnel

On occasion Bowser-Morner uses the technical services *(laboratory testing, field surveying, etc.)* of someone not employed by the company and therefore have not been approved as *competent* under the company's training and evaluation programs. In such cases it is the department manager's responsibility to see that the contracted company/person is on the Bowser-Morner approved subcontractor list.

Job Descriptions

For non-engineering positions, departments maintain a set of job descriptions that outline the *general* requirements for the managerial and technical positions as they appear on the department's organizational chart. Job descriptions typically contain a position overview, list of key technical and quality-related responsibilities, education and background requirements, and the reporting relationship to other positions within the department and/or company.

Personnel Profiles

Brief personnel profiles *(biographical sketches)* of selected engineers and technical personnel in management and supervisory positions are available. The personnel profile contains information about the individual including name and title, education, work experience, and licensure/certifications. The marketing department maintains current personnel profiles.

Professional Development and Advancement

Bower-Morner's management encourages continuing education and registration of its professional and technical staff. Employees develop professionally and technically through several methods including experience, education, seminars, trade shows, professional licensure, certifications, and professional organizations.

Bowser-Morner supports and encourages graduate studies depending on the individual and the relevance of the studies to the employee's job. The types of support include paid time off for courses and thesis projects *(considered as part of training)* and reimbursement of tuition expenses. Both the department manager and the employee agree to this policy before payment for the course is approved.

As part of company's professional development policies, Bowser-Morner encourages and supports the registration, licensing and/or certification of its professional and technical staff. Many of our professionals are registered engineers or geologists in one or more states. Technical staff may be licensed or certified under government and independent programs such as the Environmental Protection Agency (EPA), Department of Natural Resources (DNR), and the National Institute for Certification in Engineering Technologies (NICET).

Policies for development and specific criteria for advancement are communicated to affected personnel through regularly scheduled meetings conducted by the department manager.

Signatories

The company has a policy that addresses the signing of engineering and field services reports. The signature on a Bowser-Morner report identifies the person accepting responsibility for the adequacy of the report's contents. Signatories are chosen based on their involvement, understanding, experience, and licensing. It is the responsibility of the department manager to define the scope of each employee's approval to sign reports and other technical documents.

6.2.3 Safety

Safety is part of each new employee's orientation and probationary period of training. Safety training typically includes: proper operation of equipment, proper handling of chemicals and toxic waste, safety aspects of working on a construction site, and a review of the "Right to Know" law and materials safety data sheets (MSDS). Additional safety training is provided by monthly safety meetings and is documented through Bowser-Morner's corporate safety and facilities department.

As applicable to the type of work that the employee is performing, Bower-Morner administers a medical monitoring program through an occupational health care organization.

The company's safety performance is measured regularly and employees earn quarterly and annual incentives and awards based on their performance. Employee safety and health is considered as a separate program and only *touched on* in this quality management system manual.

6.2.4 Additional Information

Due to the varied nature of Bowser-Morner's business activities, additional requirements for instructions, procedures, and training may be specified in appropriate departmental or contract quality assurance documents.

To promote job advancement and professional growth, the department manager may request that human resources post staff openings and permit current employees to apply.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Human Resources, *Policies and Procedures Manual*
- Bowser-Morner SOP QA-1800, *A Program for Training In Field and Laboratory Operations*
- Bowser-Morner SOP QA-1810, *A Program for Periodic Review of Employee Competency in Field and Laboratory Operations*
- Bowser-Morner Safety Manual
- Bowser-Morner Chemical Hygiene Plan

6.3 Infrastructure

6.3.1 Infrastructure

Appropriate facilities, equipment, and support services are to be provided for Bowser-Morner's staff of engineers, scientists, and technical personnel. As applicable these include:

a) Adequate space, and furnishings.

b) Process equipment including computers and automated drafting.

c) Support services *(communications, technical writing, shipping and receiving, computer hardware & software, etc.).*

Attention to proper facilities, equipment, and support services applies to *on-site* sampling, testing, and observation activities as well as the department's permanent facilities.

6.3.2 Additional Information

Due to the varied nature of Bowser-Morner's business activities, the requirements for facilities, equipment, and support may vary significantly between departments and between activities performed within the facility or on-site in the field *(particularly subsurface exploration work which is essentially all on-site).* It is the responsibility of the department manager to see that the facilities, equipment, and support services appropriate to the type of work being done are established and maintained.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Employee Guide

6.4 Work Environment

6.4.1 Work Environment

Appropriate working conditions are to be provided that consider both physical and mental aspects. These workplace factors include:

a) Physical conditions such as temperature and humidity control, proper lighting, and sound protection.

b) A mental environment of support and teamwork that promotes honesty and objectivity and discourage conflict and other pressures.

At Bowser-Morner we take the safety of our employees *very* seriously. We strongly believe the following:

- Accidents and injuries are preventable
- Management is responsible for providing a safe work place
- Compliance with federal, state, and local regulations
- Employees receive safety training
- Safety makes good business sense

- Bowser-Morner employees must take safety seriously. In conjunction with employee safety training and the OSHA Hazard Communication Standard, the company has developed a hazard communication policy. This policy is designed to implement the following primary objectives:

a) Identify potentially hazardous substances in the work place.

b) Obtain material safety data sheets and appropriate labels.

c) Provide employee information and training.

Attention to environmental work conditions applies to *on-site* activities as well as the department's permanent facilities.

6.4.2 Additional Information

Due to the varied nature of Bowser-Morner's business activities, the requirements for an appropriate work environment may vary significantly between departments and between work performed within the facility or on-site in the field *(particularly subsurface exploration work which is essentially all on-site).* It is the responsibility of the department manager to see that a physical and mental environment appropriate to the type of work being done is established and maintained.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Employee Guide
- Bowser-Morner Hazard Communication Policies and Procedures Manual

SECTION 7 – SERVICES

7.1 Planning of Process Realization

A *process* is a sequence of related activities that has both input and output. Bowser-Morner's management is committed to ensuring the effective and efficient operation of its processes. As a provider of services in the areas of civil and geotechnical engineering and subsurface exploration, our process input *(customer requirements)* is typically defined in a scope of work and our output *(deliverable product)* is most often a report.

7.1.1 Issues to be Considered

The degree to which a process can be defined and documented varies greatly with the types of services that Bowser-Morner provides. At one end is the engineering design of a *unique* structure like an earthen dam, and at the other end is the relatively *routine* installation of a monitoring well. However, throughout all associated processes, certain key issues need to be considered. These issues include:

a) Identification and communication of the customer's requirements.

b) A defined and documented scope of services to be provided.

c) Ensuring the health and safety of our people.

d) Identification, assessment, and mitigation of risk.

e) Needed resources - trained personnel.

f) Sharing knowledge and experience in teams and work groups.

g) Time and cost constraints.

h) Verification of processes and validation of the final services.

i) Records needed to provide evidence that the services meet requirements.

j) Analysis and review of the processes.

As applicable, consideration to improvement is part of the planning for both input and output. Improvement efforts are generally focused on means of achieving a higher level of customer satisfaction, better use of company resources, personnel safety, and profitability.

7.1.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure – Engineering and Subsurface Operations*

7.2 Customer-Related Processes

7.2.1 Determination of Requirements Related to Services

Whenever possible, the customer's request for engineering design, consultation, assessment, or subsurface exploration services should be documented in a written request or tender. For most departments, this documentation is a customer-supplied request for proposal. At a minimum, the documentation should include the following information:

a) The customer's name, address, telephone number, and contact person.

b) The services requested including the specific methods to be used.

c) Any specifications or acceptance criteria that the services must comply with.

Whether or not the customer provides a written statement of requirements, the customer requirements are to be documented in the scope of work *(SOW)* section of Bowser-Morner's quotation to the customer. Refer to Section 7.3.2 for more on documenting work services.

7.2.2 Review of Requirements Related to Services

The department manager, or a designee, is to review the customer's request to confirm that the required services are appropriate and that the department possesses the necessary resources *(personnel, procedures and skills, equipment, etc.)* to provide the services. This review is to be conducted prior to any commitment to the customer to take on the work. The review is to ensure that:

a) Service requirements are well defined.

b) Any applicable statutory or regulatory requirements are identified.

c) Any potential safety hazards are identified.

d) Any differences between the customer's request and Bowser-Morner's proposed services are resolved before work commences.

A review of the requested SOW may include the identification of any work that will be subcontracted to an outside source. Refer to Section 4.1.3 for more on subcontracting services.

7.2.3 Customer Communication

Contracts

A contract is Bowser-Morner's agreement to provide the customer with engineering, consultation, and/or field services. The contract shall include a *SOW* that documents the services to be provided and any specific requirements or acceptance criteria that must be met.

A Bowser-Morner *agreement for services* shall be presented to the customer before work commences. As part of the agreement, a set of *terms and conditions* shall be included.

For consistency and efficiency, Bowser-Morner's risk manager has standardized the wording of the agreement. The wording of this standardized agreement shall not be changed without the approval of the risk manager, chief financial officer, company president, or other authorized personnel. Refer to Section 7.3.*2* for more details concerning contracts.

Customer Feedback and Approval

The department manager, or a designee, with technical knowledge of the required services, is to review the contract's SOW to confirm that it matches the customer's request. Any difference between the customer's request and the requirements of the contract's SOW are to be brought to the customer's attention and needs to be resolved between the customer and Bowser-Morner before the work commences.

If the SOW needs to be changed after work has started, the department manager is responsible to see that the changes are properly communicated to, and approved by, the customer.

Whenever practical, a written record of any changes to the SOW and any relevant discussions with the customer should be documented and maintained as part of the client/project records.

Customer Complaints

The customer, and other parties having dealings with Bowser-Morner, may communicate *(voice)* a complaint. The effective handling of a complaint is necessary to maintain quality operations *(stability and effectiveness of the quality management system)*, introduction of any necessary changes *(corrections and improvements)*, and goodwill *(both the customer and employee)*.

Any company employee may receive or become aware of a compliant from a customer or some other party. While final responsibility for handling the complaint lies with management, whoever receives the complaint should gather as much information about the problem as possible and see that the appropriate manager, or above, is notified.

For most complaints, the department manager will review the information and determine if the complaint warrants a formal investigation and corrective action response. Guidance on determining when a problem becomes a *formal documented* complaint can be found in Bowser-Morner quality assurance SOPs QA-1900 addressing technical issues and QA-1910 that addresses non-technical concerns.

Documented complaints are handled by integration into the company's corrective action process *(Bowser-Morner SOP QA-1400)*. The investigation, apparent *root* cause, and appropriate corrective action(s) are documented using a corrective action response *(C.A.R.)* form controlled by the quality assurance manager.

As applicable, the department manager is responsible to see that the customer or other party is informed of the results of the investigation. When necessary, the quality assurance manager is to audit the area in question as part of the formal corrective action process *(Section 8.5.2)*.

Invoicing and Accounts Receivables

Timely and consistent invoicing to the customer is the responsibility of the department manager who may delegate this activity to the project manager. Most short-term projects (4–6 weeks) are invoiced at completion by the project manager *(Section 7.3.3)* while longer-term projects are invoiced, whenever possible, on a monthly basis. Quite often, monthly invoices accompany project status reports that are issued to the customer. The project manager reviews short-term project invoices while the department manager reviews most long-term invoices for accuracy before being sent to the customer.

Periodically, the company's financial officer issues account receivable and work-in-process reports to the department managers. Efforts are made to communicate with customers of over due accounts and the department manager may send out over due notices. At some point (typically past 120 days) the delinquent customer may be notified that their account is being turned over for collection. A selected group that includes the department manager, chief financial officer, corporate risk manager, and company president controls the authorization of this last effort, including possible legal actions.

Invoices are considered operating records and a copy is to be placed in the customer's project files *(Section 4.2.4)*.

7.2.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1400, *Corrective Action Response*
- Bowser-Morner SOP QA-1900, *Handling Technical Complaints from Customers and Other Parties*
- Bowser-Morner SOP QA-1910, *Handling Non-Technical Complaints from Customers and Other Parties*

7.3 Design and Development

7.3.1 Design and Development Planning

The department manager is responsible for seeing that the design and development of each project is properly planned. During the planning stages of each project, the following components should be considered.

- Project manager
- Approach
- Team
- Resources
- Risk management
- Health and safety
- Reviews and verifications

The *project manager* is the individual assigned to direct the project from the planning stages to final closure. The project manager (however named, i.e. department manager, supervisor, etc.) determines how the work is to be performed and who actually performs the work. The project manager's responsibilities include but are not limited to the following:

a) Determine the appropriate approach to the work including the selection of a technically competent team (including possible consultants and subcontractors) with the necessary education, skills, expertise, and special requirements *(regulatory and contractual)*.

b) Identify the proper design criteria, codes, and standards to which the work must conform.

c) Communicate, as needed, with the customer throughout the project including times of decision before any budget overruns, before the invoice is sent, and after the report has been submitted.

d) Supervise the work progress including associated quality functions, the budget, time schedule, reviews, reports, and invoicing for accuracy and completeness.

e) Coordinate any inter departmental and subcontracted work.

f) Practice Bowser-Morner's loss prevention and safety policies.

The *approach*, how the work will be performed and reported, is to be identified in a scope-of work (SOW). As applicable, the SOW needs to clearly define the specific services to be provided by Bowser-Morner in terms of design requirements, exploration, sample collection, materials, and contents of the final report.

The project manager plans for the *team's* skills, experience, and credentials that will be needed to complete the project and evaluates these needs in relation to the company's qualified and available personnel. Developing the team may include the selection of one or more subcontractors *(Section 4.1.3 for subcontracted services)*. Opportunities for in-house training of professional and technical staff and interfacing between different departments and work groups *(consultation and collaboration)* is encouraged and should also be identified as part of the planning process.

The project manager plans for the *resources* that will be needed including as applicable, the capabilities, capacity, and availability of: subsurface exploration rigs and test equipment, computer aided design and engineering (CAD/CAE) systems, and financial (time and cost) information systems.

In the early stages of planning, some consideration should be given to assessing any *risks* associated with the customer's request for services. The anticipated risks may be minimal when performing routine work or more substantial when performing one-of-a-kind designs or when work site conditions require special consideration.

Within the limitations of initial knowledge about the project's design, scope of work, and on-site work conditions, the project manager should consider any foreseeable *health and safety* issues. These issues may include work conditions, the handling of hazardous materials, and compliance with any customer specified health and safety requirements.

Periodic *reviews (Section 7.3.4)* should be scheduled throughout the work process and a final *verification (Section 7.3.5)* should be conducted before the final report is issued to the customer.

7.3.2 Design and Development Inputs

Design Input

The design of a process whether it's an engineered system or structure, consultation, testing and observation, or the process of subsurface exploration, is to be performed in accordance with planned and defined input criteria. These input criteria may be provided by the customer or may be prepared by Bowser-Morner as part of the service to the customer.

Input criteria should include pertinent functional, engineering, and quality related requirements such as:

- Applicable standard practices
- Applicable statutory and regulation codes
- Client specified criteria (i.e. budget and time schedule)
- Design and functional (performance-based) criteria
- Safety related issues
- Quality assurance and quality control requirements

Contractual Agreement

A complete and accurate understanding of each customer's project is one of the *most important* aspects of the engineering and subsurface services that Bowser-Morner offers. The achievement of quality, defined as meeting or exceeding our customer's expectations, is based upon the understanding that the services provided must conform to the expressed requirements. Good practice dictates that these requirements be clearly defined and agreed to by both the customer and Bowser-Morner. A documented agreement containing a comprehensive and clearly identified SOW and term and conditions serve as the basis for this understanding.

Bowser-Morner has developed a specific format and standardized wording for contractual agreements between the customer and Bowser-Morner. The agreement contains information about the customer and Bowser-Morner (i.e. name, address, telephone number, etc.), identification of the document as relating to a specific technical and cost proposal, and the date of the agreement.

The contract typically contains essential sections of information that include:

- Detailed scope of work (SOW)
- Budget
- Time schedule
- Terms and Conditions
- Authorization

The SOW clearly identifies the services to be provided by defining specifics in terms of engineering and technical services, designs and drawings, labor, sample collection, materials, and contents of the final report. If any limitations exist, these should also be clearly stated *(what is not to be covered by the project's scope of work).*

The *budgeted* cost associated with the defined SOW may be expressed as a lump sum or a range.

Based on the SOW and information supplied by the customer, the proposal will typically include a statement addressing the anticipated amount of *time* required to complete the project.

Each *contractual agreement* shall include a standardized document containing information about Bowser-Morner and the customer (i.e. name, address, telephone and fax numbers, etc.), identification of the document as relating to a specific technical and cost proposal (i.e. proposal number and project name), and the date of the agreement.

Included is Bowser-Morner's *terms and conditions agreement*. The contents and wording of the terms and conditions has been standardized for the various types of services provided (engineering design, environmental, geotechnical, subsurface exploration, etc.) Based on the proposed services, the standard terms and conditions may be a single or multi page attachment.

The designated project manager has the *authority* to prepare and sign a written proposal including attaching the appropriate contract agreement and to send them to a potential customer. However, only certain individuals within the company have the authority to negotiate and agree to changes in the standard terms and conditions or client-provided agreement. Throughout Bowser-Morner's office locations, these individuals are:

Name	Title	Office Location
Steven M. Bowser	President	Dayton, OH
Timothy M. Staley	Manager, Corporate Risk	Dayton, OH
Scott D. Kinney	Chief Financial Officer	Dayton, OH
J. Richard Hoppenjans	Vice President	Toledo, OH

Final decision and acceptance on all negotiated matters shall be approved by one of the individuals listed above.

For more information on approval of agreements and contracts, refer to Bowser-Morner SOP QA-0400.

7.3.3 Design and Development Outputs

Our written report normally represents the primary product of our service to the customer. As such it must be presented in an organized and comprehensive format. The report writer, typically the project manager, is responsible for assembling the technical data and then preparing the report. To be effective, a report should be:

- Prepared in a readable format that conforms to contractual obligations
- Concise
- Technically correct
- Supportive of professional liability and loss prevention objectives
- Complete in meeting the customers expectations, to the extent, professionally and ethically, possible

A Word to Report Writers

Report reviewers spend considerable time and effort to help you prepare better reports; reports that better meet customer expectations and adhere to technical and risk management standards. Reviewers are reading your material for the first time, as a customer would. Review comments depend in large measure on the text, supportive data, and graphics you have prepared.

Reviewers should discuss their comments with you. These comments may relate to matters such as changes in text, topics for additional study, suggestions for improvement, structure, presentation, or grammar. Accept these comments and suggestions graciously and professionally. Learn from them and if you have questions, speak with the reviewer to discuss their comments. - *ASFE Guide To In-House Review of Reports.*

Scope of Work

The report writer must consider the agreed to SOW between Bowser-Morner and the customer when preparing the final report. The contents of the report should address these services and contain comments relating to the extent to which the report fulfills the SOW.

Report Preparation and Format

Standard engineering reports such as soil investigation reports are written based upon a template. The template *standardizes* the report format while prompting the writer to include essential engineering data and recommendations. The template is available in both a short and long form, the selection criteria being based on the SOW to be covered in the report. Both short and long formats include the following sections:

- Cover page identifying the project, the customer, the Bowser-Morner report number and the date
- A header section
- Demographic information
- Introduction
- Technical data
- Findings, designs, and recommendations
- Footer
- Signature Block

At a minimum, the *cover page* should reference the project name, the customer, the Bowser-Morner assigned report number, and the date of report preparation.

The *header* identifies the report as Bowser-Morner's along with the street address, mailing address and telephone number of the office producing the report.

Demographic information includes the customer's name and address, name of contact person, customer authorization number, and brief description or identification of the project.

The *introduction* discusses the purpose of the work as it relates to the project's SOW including any limitations or areas that are not addressed in the report.

Technical data includes, but is not limited to, field and laboratory test data, boring logs, descriptions of observation, and drawings and sketches. Test data and observations may be expressed in descriptive form or as tables of data and may be included as part of the body of the report or as appendices to the report.

Findings, designs, and recommendations take the technical data and observations and state conclusions and where appropriate, make recommendations. Findings and recommendations express the engineering facts, designs, applications, and opinions as they relate to the SOW. It is important that the wording used be clear and concise and that the reader is able to distinguish fact from opinion. Standard language is included which recommends to the customer the use of Bowser-Morner's construction-phase (monitoring and testing) services to provide a continuity of service to the customer, and to confirm that actual field conditions are consistent with those anticipated.

The bottom of the first page of each report (not including the cover page) is to contain a *footer* with the following: *All Reports Remain The Confidential Property of BOWSER-MORNER And No Publication Or Distribution Of Reports May Be Made Without Our Express Written Consent, Except As Authorized By Contract.*

The s*ignature block* contains the typed name, signature ,and title of the person, or persons, accepting responsibility for the contents of the report. An authorized professional engineer signs all Bowser-Morner engineering design reports.

Just as efforts have been made to standardize report formatting, so have efforts been made to standardize the language used in the report. Obviously each report is different in its SOW, findings, designs, and recommendations, however the language used within the context of practicing risk management, can be standardized into those words and expressions that are *"acceptable"* and *"not acceptable"*. Engineers and geologists are trained to rely heavily on standardized language to reduce liability and increase efficiency in report preparation.

Lists of inappropriate words, phrases, etc. are routinely circulated and discussed. Risks and limitations in our reports are the responsibility of the project manager and the peer reviewer *(Section 7.3.5)*.

Drawings and Details

Engineering drawings fall into one of two categories:

- Sketches
- Drawings

Engineering *sketches* are typically used for preliminary designs, layouts, and conceptual studies. Field sketches are most often used to document the location of an observation, sample collection, and/or test. Sketches may be included in the final report provided they have been titled, reviewed, and identified as part of the project *(i.e. project name, number, date)*.

Drawings are used to illustrate engineering designs, components, systems, and structures. Drawings are controlled documents in the same manner as the report. A drawing produced by Bowser-Morner as part of the design output process is identified by project name, date, and revision number. A drawing supplied by the customer, as part of the design input process is given in-house identification by labeling with the customer name and date.

Refer to Bowser-Morner SOP QA-0230 for more details concerning document control.

Bowser-Morner approved methods for illustrating typical drawing details *(i.e. structure footers, culverts, standpipe piezometer installation, etc.)* have been computerized and are to be used, as applicable, for final presentation of drawings.

Closing a Project

On large projects, billing is done periodically throughout the project. Many projects, however, are relatively small and even though they last more than a month, are normally billed at completion. The goal is to bill all active jobs at least once a month.

A separate file is maintained for each active project. Instructions, procedures, memorandums, including change orders, reports, and billing information are kept in this file until the specific work has been billed. Originals of *important* information relating to the project are not to be retained outside this file, however, copies of information may be retained by the project manager for future reference. Preliminary report drafts which are not signed are to be destroyed.

Subsequent to project completion and billing, the files are placed in long-term storage. Each file is identified by project number and customer name. Bowser-Morner keeps a cross-reference file on all projects, which are available by computer search of the project number. Copies of drawings are normally stored in the long-term file with the other records. Mylars and reference drawings are kept separately in designated flat-file drawers. Bowser-Morner's SOP QA-1610 addresses in more detail the retention and destruction of documents.

7.3.4 Design and Development Review

Periodically throughout the development and design process, a critical review of the design should be conducted. The frequency of these reviews is part of the project's design and development planning *(Section 7.3.1)*. At least one review should be conducted for each phase of the design and development process.

These in-process reviews should be separate from any scheduled project progress meetings that primarily address concerns of time and cost. The design reviews are conducted to: *1)* assure that the design output meets the input requirements, *2)* identify and anticipate problem areas and inadequacies, and *3)* initiate necessary corrective actions.

Project process reviews may be conducted by using one or more of the following control measures:

- Design review conducted by a peer or a supervisor
- Review by a selected consultant
- Use of qualification testing and demonstration
- Carrying out repeat and/or alternative calculations
- Comparing the new design with a similar proven design

As applicable, records of these in-process reviews should be maintained and added to the project file.

7.3.5 Design and Development Verification

The design of a component, system, structure, or installation process and any work that requires an engineering and/or scientific judgment, expression of an opinion, mathematical calculation is subject, as applicable, to a verification process that may include one or both of:

A *peer review* by an individual equivalent to the engineer or project manager in work related experience.

A *supervisor review* by a senior engineer and/or scientist who has supervisory responsibility - quite often this will be the department manager.

This verification process is repeated until the design output meets the design input criteria developed at the beginning of the project. Only when the peer/supervisor have determined that the acceptance criteria have been met, can the design be submitted for final reporting to the customer.

The verification process should be documented on a Bowser-Morner report review form or some similar checklist format and the form placed in the project file.

Qualification Testing and Demonstrations

For certain types of designs, it may be possible to support the verification of a design by use of a model or prototype. If this method of verification is used, the test programs and procedures should be clearly defined and the results documented and placed in the project file.

Report Contents

Studies, engineering reports, and technical memorandums are subject to verification by peer review before being issued to the customer. The peer review process should use some form of a review checklist that is to be completed by the reviewer.

A Word to Report Reviewers

Studies have found that report reviewers are most effective when presented in a positive, constructive tone. Harsh criticism serves no beneficial purpose. If you have questions, speak with the report writer; doing so can be most beneficial. Then, once you have completed your review, meet with the writer and go through your suggestions together. This is a part of the learning process that helps develop insight and confidence. - *ASFE Guide to In-House Review of Reports.*

Guidelines for the review of a report are separated into four subject areas:

- Contractual obligations
- Technical content
- Risk management
- Clarity of presentation

The review should evaluate the report's ability to fulfill Bowser-Morner's *contractual obligations* relating to the purpose of the report, the agreed to SOW, any work performed outside the original SOW, and any conclusions drawn and/or recommendations made.

Technical contents include a review of field observations and measurements and laboratory test results, interpretation of the field and laboratory data, engineering designs, and calculations including any computer software used.

Good communications between Bowser-Morner and the customer is good *risk management*. The report should be clearly worded, avoiding the use of engineering jargon and superlatives. As applicable, the report should convey that civil and geotechnical engineering relies heavily on interpretive skills and judgement, and that the materials and conditions being analyzed are variable. Whenever possible, the degree of uncertainty and representativeness of field and laboratory findings should be stated in the report.

The report should present the findings and recommendations in a way that clearly and readily conveys to the customer, Bowser-Morner's understanding of the project and the relevance of evaluations and recommendations. In evaluating *clarity*, the report should effectively convey the understandings, findings, recommendations, limitations, and risk to the customer.

Example -Design and Report Review Checklist and Documentation Form

REPORT REVIEW FORM - GEOTECHNICAL/SUBSURFACE JOBS
(To be completed when report goes to typing)

Report Title & No.:		
Today's Date:	Date Report Prepared:	Date Report to Typing:
Author:	Peer Review Name:	Peer Review Date:
Date First Draft Required:	Date Report to Go Out:	Date Report Went out:
Author Edit Date:		

REPORT REVIEW TASKS (to check off by peer reviewer. Author to make sure report file is organized and complete before giving to reviewer.)

[ ]	1	Scan boring location plan and boring logs to develop conceptual understanding of the project and soil profile.
[ ]	2	Read report to determine that: A. Technical data is presented clearly • Authorization (P.O., Quote, verbal (?), change order, etc.) • Work performed (field and lab) • Soil profile (topsoil, fill, stratification, soil strength and groundwater levels) • Project description (type construction and loads) • Evaluations and conclusions (summary, site preparation, structural fill, foundations, construction concerns, groundwater, slabs, retaining walls, pavements. • Qualifications B. Review quote and RFP to make sure that scope of work has been completed. If scope has changed, do we have a change order?, and is reason explained in the report?
[ ]	3	Check calculations/analysis methods (initial calculation sheet)
[ ]	4	Check to see that elevation data was verified.
[ ]	5	Check boring location plan.
[ ]	6	Briefly review soil lab data.
[ ]	7	Correct typos.
[ ]	8	Mark-up draft report with all corrections.
[ ]	9	Discuss any major changes/problems/questions with author or report.
[ ]	10	Sign and date review form.
[ ]	11	Return report to typing if changes are not major. Otherwise, give to author for corrections.

Comments:

Calculations - Manual

When applicable, calculations and other manipulations of numerical data are to be checked by an individual not responsible for performing the calculation. This checking may include verification of formulas used and verification of actual computations.

Calculations - Computerized

Computer generated data is an extension of the paper records of a project. Just as manual calculations are to be checked, systematic checking of computerized manipulations of data and calculations should be a part of the review process. Even though the software has been validated, it should always be evaluated for consistency of output.

As applicable, both manual and computerized design calculations may also be verified by using alternate formulas to the original computations. Verifications should be documented and placed in the project file.

Comparison to Proven Design

In the verification of engineering designs, work experience is an important factor. In part, this is why Bowser-Morner uses a verification process with the review typically conducted by a senior engineer or scientist. Through the reviewer's experience, it may be possible to compare the design under verification, with one or more similar designs that have proven to be successful in their applications. Use of this type of comparison should be noted by the reviewer and placed in the project file.

7.3.6 Design and Development Validation

The process of validation comes from the actual construction of a structure or installation of the system for which design and development were performed. Whenever applicable, Bowser-Morner includes observation, testing, and subsequent monitoring services as part of the original proposal to the customer. If the customer chooses to retain Bowser-Morner for these construction phase services, the validation is concluded as the structure or system of design is completed and placed into use. In cases where the client chooses not to retain Bowser-Morner, such validation may not be possible. This possibility is to be addressed through standard language in the engineering report, and depending upon the circumstances, through follow-up communication with the client.

For subsurface exploration services, final validation occurs when *acceptable* samples of soil and/or aggregate have been collected for subsequent evaluation and laboratory testing or when an installed monitoring well is placed into service.

7.3.7 Control of Design and Development Changes

Design and development changes are to be identified and records of the changes are to be maintained. Typically a revision number identifies changes to design records such as plans, drawings, and specifications. Changes are to be reviewed, verified, and approved by the project manager before implementation.

7.3.8 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0230, *Quality System Documentation and Records*
- Bowser-Morner SOP QA-0400, *Review of Requests, Tenders, and Contracts*
- Bowser-Morner SOP QA-1610, *Document Retention and Destruction*

7.4 Purchasing

7.4.1 Purchasing Process

Bowser-Morner controls purchased items and services by the use of a purchase order/service agreement form. The purchase is to be approved and the form signed by the department manager or their designee, to verify that appropriate quality related information is included with each document. After approval, any changes to the purchase order are subject to the same degree of control as utilized in the preparation of the original document.

For subcontracted field services, laboratory testing, and the purchase of supplies that can affect the *quality* of work, a Bowser-Morner approved subcontractor is to be used. The quality assurance department maintains a list of approved subcontractors whose competency has been verified as described in Section 4.1.3. This list of approved subcontractors is available in a public services folder located on the company's server *(BMI_Public – QA Services).*

The purchaser should ask two questions to determine if an approved subcontractor is needed. First, is the quality of the purchased item or service of *critical importance* to the success of the work being performed? Secondly, are there in-house *checks* in place to verify quality before the purchased item or service is released for use? If the answer to the first question is *"yes"* and the answer to the second question is *"no",* then an approved subcontractor needs to be used.

Refer to Bowser-Morner's quality assurance SOP QA-0710 for more details concerning the selection of approved subcontractors.

7.4.2 Purchasing Information

Space for most of the required purchasing information is formatted in the purchase order form. This information includes a unique purchase order number, ship to address, quantity, price, signature of person requesting the purchase, and approval signature.

The department manager is responsible to see that any needed *quality* requirements are included on the purchase order form. Typical information may include:

a) Requirements for approval of the service or item *(i.e. specific test methods, equipment capability and calibration, etc.)*.

b) Any applicable statutory or regulatory requirements.

c) Any licensing and/or certification requirements.

Refer to Bowser-Morner's quality assurance SOP QA-0700 for more details concerning the purchasing of services and supplies.

7.4.3 Verification of Purchased Products and Services

When procured items such as chemicals and test equipment are received, the packing slip or receiving slip is to be checked against the original purchase order and the items received. If the check proves to be satisfactory, the receiving or packing slip is to be initialed and dated by the person verifying the match. If they do not match, the appropriate department manager is to be contacted to resolve the problem.

Field services such as survey reports and laboratory services such as test results are to be reviewed for the appropriate use of test method, data accuracy, and completeness. The department manager, or a designee, should review the subcontractor's report, including any associated quality control data, and determine whether, in their opinion, the results are accurate. If the subcontracted service involves the design and/or the manufacturing of a product, the manager or designee should physically review the work or product to verify that any quality related requirements have been met. In cases where the accuracy of the test results or quality of the design or manufactured product is in doubt, the manager or designee is to promptly contact the subcontractor to resolve the issue.

The department manager is to understand that he or she is responsible for selecting a qualified subcontractor *(Section 4.1.3)*, except in the case where the customer or a regulatory authority specifies which subcontractor is to be used. Within Bowser-Morner's technical scope of knowledge, the department manager should see that subcontracted results are reviewed and validated before being released to the customer.

Any nonconformance in the condition or verification of a purchased item or service is to be brought to the attention of the quality assurance manager. It is the responsibility of the quality assurance manager to maintain records and monitor the performance of subcontractors. Refer to Bowser-Morner's quality assurance SOP QA-0810 for more details concerning nonconformance of purchased services and supplies.

7.4.4 Additional Information

Due to the varied nature of Bowser-Morner's services, additional requirements for procurement of services and supplies may be specified in appropriate departmental or contract quality assurance documents.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0700, *Purchasing and Control of Services and Supplies*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*
- Bowser-Morner SOP QA-0810, *Subcontractor Nonconformance*

7.5 Service Provisions

7.5.1 Control of Service Provisions

The civil and geotechnical engineering services provided by Bowser-Morner have *related* applications to service provisions. As defined in the project's scope of work (SOW), Bowser-Morner's services are quite often used in the construction of a structure *(i.e. a dam, landfill, building, etc)*. Service provisions are supplied as part of Bowser-Morner's report in the form of construction specifications and performance criteria. Control of these specifications and demonstrable performance criteria is part of the design and development process *(Section 7.3)* and is subject to the same forms of review and verification.

7.5.2 Validation of Process for Service Provisions

As described in Section 7.3.6, when the customer retains Bowser-Morner for validation services such as field and laboratory testing, these services are *"in-a-form"* validated by the laboratory's accreditation. The American Association of State Highway and Transportation Officials (AASHTO) accredits Bowser-Morner's construction materials field and testing services. Refer to Bowser-Morner's quality system manual QA-020 for details concerning field and laboratory testing.

7.5.3 Identification and Traceability

As stated in Section 7.1, most often, Bowser-Morner's product is a report. When a project (engineering and subsurface) is initiated, a unique project number is assigned. This number is used to identify and track the work and associated documents of the project.

Any samples that are collected as part of the project are also assigned individual identification numbers. As applicable, chain-of-custody practices are used to ensure traceability from sampling to receipt at the laboratory.

After the testing is complete, the samples are retained by the laboratory for a specified period of time and then disposed of unless the submitting department *(engineering or subsurface)* requests otherwise. Samples are disposed of in accordance with the company's waste management and reduction program.

7.5.4 Customer Property

For engineering and subsurface work, customer property typically relates to the job-site. Reasonable care is to be exercised to protect the property when work is being performed on the customer's job-site. The general conditions and expectations for both Bowser-Morner personnel and the customer are defined in the *"Job-Site"* section of Bowser-Morner's standard terms and conditions. Site specific conditions will be defined in the project's SOW.

7.5.5 Preservation of Items

With respect to preservation, the word "item" is equivalent to "sample". Samples may be collected as part of a civil or geotechnical engineering project, as part of an environmental study, or for quality-related laboratory testing. In each case, the proper means of identifying, handling, preserving, and storing the samples is to be decided in the project's SOW.

7.5.6 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Document QA-020, *Quality System Manual for Field and Laboratory Services*
- Bowser-Morner Document, *Waste Management and Reduction Manual*

7.6 Control of Monitoring and Measuring Devices

7.6.1 General

For Bowser-Morner's engineering and subsurface work, monitoring and measuring devices are typically associated with the collection of samples and/or the determination of test results *(refer to Bowser-Morner's quality system manual QA-020 for details concerning the control of laboratory test equipment)*. The department manager or technical designee is responsible for the proper selection and use of sampling and measuring and testing equipment. Each department is to provide evidence of adequacy for the equipment assigned to them. Typically the quality assurance department assists the department manager in establishing the method(s) used to verify that equipment has the accuracy, stability, and suitability to achieve the desired results with respect to given specifications. The proper selection of equipment goes hand-in-hand with the selection of the proper field sampling and/or testing methods.

The quality assurance department maintains *(through the calibration laboratory)* an inventory of calibratable equipment and measurement standards. This inventory is a listing of sampling, measurement, and test equipment and includes information concerning the manufacture, model, type, and equipment capability. A chronological history of repairs or modifications is maintained either in the equipment's calibration folder or as separate records *(a logbook or maintenance form)*.

As applicable, the department manager is responsible to see that the equipment in his or her department is properly calibrated before being *initially* placed into or *returned* to use. If the department manager chooses to use equipment that is outside the ownership or control of the company, he or she is required to see that the equipment is calibrated and functioning properly.

Refer to Bowser-Morner quality assurance SOPs QA-1200 and QA-1210 for more details concerning the control and calibration of sampling, measurement, and test equipment.

7.6.1 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1200, *Inventory Control of Measurement and Test Equipment*
- Bowser-Morner SOP QA-1210, *Measuring and Test Equipment (M&TE) Calibration*

SECTION 8 – MEASURE, ANALYZE, IMPROVE

8.1 General

Bowser-Morner has established and maintains several programs for the monitoring, measurement, analysis, and improvement of the company's services. These programs include, as applicable, the use of statistical techniques in the measurement and analysis processes. The following are key programs for measurement, analysis, and improvement:

Program	Reference	Measurement
Policies & Procedures	4.2.5	Bar charts measure documents completed vs. goals (%)
Customer Complaints	7.2.3	Bar charts measure number & areas of complaints
Customer Satisfaction	8.2.1	Customer satisfaction index (%) & six sigma rating
Internal Audits	8.2.2	Bar charts measure number & areas of deficiencies
Nonconformance	8.3	Bar charts measure number & areas of nonconformance
Improvement Goals	5.6.3	Completion of annual improvement goals (%)
Safety	6.2.3	Charts & stats. monitor accidents vs. hours worked
Productivity/Profitability	5.4.3	Charts & stats. monitor ANF, profit, hours worked, etc.

8.1.1 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction*
- Bowser-Morner SOP QA-0270, *Review by Management*
- Bowser-Morner SOP QA-1000, *Developing Bowser-Morner Technical Standard Operating Procedures (SOPs)*
- Bowser-Morner SOP QA-1300, *Nonconformance Requiring Corrective Action*
- Bowser-Morner SOP QA-1705, *Internal Quality Audit to the Requirements of QA-040 (Engineering and Subsurface Exploration)*

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

Bowser-Morner has established and actively maintains a system for measuring, evaluating, and acting in response to quality-related customer opinions concerning the services provided by Bowser-Morner. A mailed survey card, faxed survey sheet, or emailed survey form allows the customer to rate the department on responsiveness, helpfulness and courtesy, quality and accuracy of report, and overall value of service.

Copies of the returned cards and surveys are distributed to the company president and the appropriate department manager with the original going to the quality assurance manager. A customer rating of *fair* or *poor* triggers a corrective action response from the quality assurance manager to the department manager whom in turn contacts the customer to discuss their concerns. The quality assurance department maintains and distributes to management a quarterly customer satisfaction index report. Refer to Bowser-Morner Quality Assurance SOP QA-0240 for more details concerning customer satisfaction.

8.2.2 Audits and Assessments

An audit of each department is to be conducted at least yearly, on a scheduled basis, to verify compliance with the company's quality management system. In addition, audits may be conducted as part of a corrective action response to confirm that measures have been taken to preclude the recurrence of a problem.

One or more auditors, who do not have direct responsibility in the department being audited, conduct the audit. For engineering services, an audit team may consist of a senior level engineer from another department and the quality assurance manager. For the subsurface exploration department, the quality assurance manager will conduct the audit.

Audit results are recorded and noted per distribution to management personnel for review and response to any found deficiencies. A vital part of the internal audit includes a review of corrective action reports and verification that corrective actions are being properly implemented and maintained.

Bowser-Morner's quality assurance SOP QA-1705 details the internal audit process.

Response to Deficiencies

Addressing audit deficiencies is the responsibility of the department manager with results documented and retained by the quality assurance manager. The response is typically in the form of a Bowser-Morner Deficiency Response form and/or an interoffice memo from the department manager to the quality assurance manager that outlines the implemented corrective action plan.

Review and Approval

The last page of the audit report includes lines for the signature of the following individuals: auditor(s), department manager, and company president. The signature of each individual indicates a review of the audit findings and their agreement to any corrective actions that have been implemented to preclude recurrence of identified deficiencies.

If deemed necessary by any one of the signatories, a follow-up audit can be scheduled and conducted. The quality assurance manager typically conducts follow-up audits.

Any deficiencies found as a result of the follow-up, either from incomplete implementation of corrective actions or as the result of ineffective corrective actions, are handled by integration into the company's regular corrective action process. The findings and actions of a follow-up audit should be documented and included as part of the original audit report.

8.2.3 Safety

The company's safety committee, which is chaired by the safety and facilities manager, monitors *recordable* incidents related to on-the-job employee safety. This information is measured and recorded in a number of ways including recordable incident rate, incidents per department/type of service, and type of incident. Employee safety and health is considered as a separate program and only *touched on* in this quality management system manual.

8.2.4 Productivity/Profitability

The company's chief financial officer prepares a monthly financial operation report for each department and distributes this report to appropriate management personnel. This report contains current time period and year-to-date financial results and compares the current information with the past year's financial performance. Department managers use tables and charts to compare their department's financial performance to departmental budgets. The planning, monitoring, and control of the company's productivity and profitability is considered as a separate program and only *touched on* in this quality management system manual.

8.2.5 Monitoring and Measurement Processes

Bowser-Morner applies suitable methods for monitoring and, where applicable, measurement of the quality management system processes. These methods demonstrate the ability of the processes to achieve planned results and document the company's progress through internal quality system audits *(Section 8.2.2)* and annual reports to management *(Section 5.6.3)*.

8.2.6 Monitoring and Measurement of Services

As the provider of a service, Bowser-Morner's deliverables is typically in the form of:

Engineering Services
- Reports
- Drawings
- Specifications
- Work Plans
- Expert Opinions
- Technical Oversight
- Project Management

Subsurface Exploration Services
- Boring logs
- Monitoring Well Installation
- Sample Collection

The closest that Bowser-Morner gets to producing a tangible product would be the installation of a monitoring well or the recovery of a subsurface sample such as soil or aggregate.

In relation to the company's quality policy *(Meeting or exceeding the requirements of our customers)*, the monitoring of customer satisfaction *(Section 8.2.1)*, customer complaints *(Section 7.2.3)*, *and customer retention (Section 8.4.3)* are the principle sources of external measurement for evaluating a *quality* service.

Internally, close monitoring of the project's scope of work, project changes during work, and final verification of designs, reports, drawings, etc. are the most effective means of producing a *quality* service. Design and development verification *(Section 7.3.5)* by an experienced senior staff member is one of the most significant activities contributing to quality control and quality improvement.

8.2.7 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*
- Bowser-Morner SOP QA-1705, *Internal Quality Audit to the Requirements of QA-040 (Engineering and Subsurface Exploration)*

8.3 Control of Nonconforming Service

8.3.1 Identification of Nonconformance

The identification of nonconformance may involve procured items and services, laboratory and field work, the results of such work, and audit findings. Possible sources of nonconformance include: purchased chemicals and test equipment, samples collected and submitted for testing, field logs, reports that do not meet the customer's needs, and audits conducted to evaluate a department's compliance with the quality management system and technical operations. In each case the possibility arises for the identification of nonconformance.

Refer to Bowser-Morner quality assurance SOP QA-1300 for more details concerning the identification of nonconformance.

8.3.2 Handling of Nonconformance

Any employee identifying a possible problem involving company work is to report the finding to a department manager or the quality assurance manager. If the finding is determined to be a nonconformance to the company's quality management system or technical operations, the responsibility for promptly handling the nonconformance lies with the department manager and the quality assurance manager. Both individuals have the authority to investigate the problem and implement corrective actions. The documenting of a nonconformance is to be integrated into the corrective action process *(Section 8.5.3)*.

8.3.3 Customer Notification

If one or more organizations *(typically customers)* have been affected by the nonconformance, they are to be notified as soon as possible. The affected organization(s) is to be listed on the C.A.R. form along with how they were notified and the date of notification.

8.3.4 Additional Information

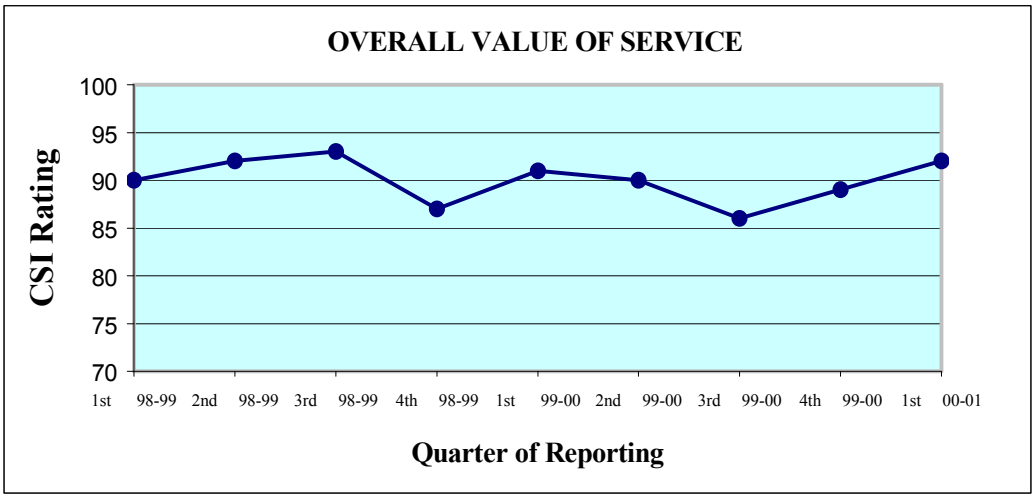
The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0810, *Purchased Products and Services – Supplier Nonconformance*
- Bowser-Morner SOP QA-1300, *Nonconformance Requiring Corrective Action*
- Bowser-Morner SOP QA-1400, *Corrective Action Response (C.A.R.)*

8.4 Analysis of Data

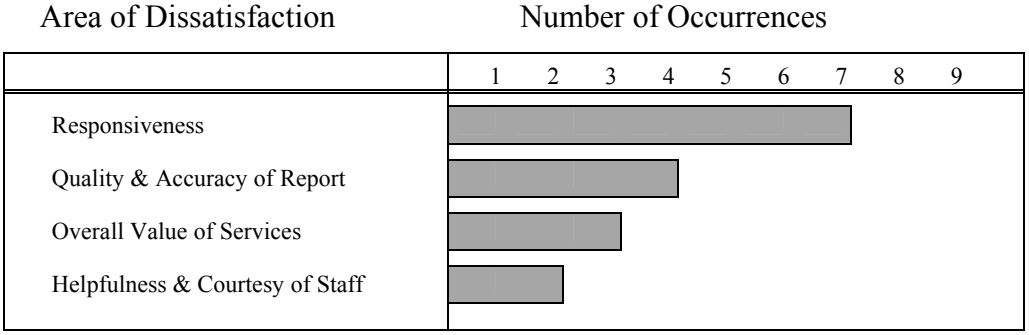
8.4.1 Customer Satisfaction

Information from customer satisfaction surveys *(Section 8.2.1)* is reviewed as soon as it is received. Any *less-than-acceptable* ratings are to be acted upon by contacting the customer. Every three months, the data generated by this ongoing survey program is complied and analyzed. The survey results are expressed as both a customer satisfaction index and as a six-sigma rating. By department, the data for each of the four categories *(responsiveness, helpfulness, quality of report, and overall service value)* are displayed as *p*-charts that help identify possible trends.



8.4.2 Customer Complaints

Customer complaints are analyzed by category and number of occurrences per year. The results are displayed as a bar chart and reported as part of the company's annual Quality Report to Management. Customer complaints are also handled by integration into the company's corrective action response program.



8.4.3 Customer Retention

The company's success at retaining customers over an extended period of time *(i.e. repeat work)* is monitored, measured and reported to management in an annual Sales & Marketing Report. For a five year window, customers are listed as Top Twenty and Clients Representing 80% of annual fees. This allows each department manager to analyze which customers consistently send work to Bowser-Morner. This information is fundamental to the company's annual strategic planning.

8.4.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*
- Bowser-Morner SOP QA-1900, *Handling Technical Complaints from Customers and Other Parties*
- Bowser-Morner SOP QA-1910, *Handling Non-Technical Complaints from Customers and Other Parties*

8.5 Improvement

8.5.1 Continual Improvement

Bowser-Morner works to continually improve on the effectiveness of its quality management system and the services we provide to our customers. Key components of this continual improvement process are:

a) Measurement and analysis of quality objectives *(Section 4.2.1)*

b) Strategic planning and management review practices *(Section 5.4.3)*

c) Customer focus *(Section 5.2.1)*

c) Professional development *(Section 6.2.2)*

d) Root cause analysis of nonconformance and effective implementation of corrective actions *(Section 8.5.2)*

e) Preventative actions *(Section 8.5.3)*

8.5.2 Corrective Action

Bowser-Morner's corrective action response *(C.A.R.)* program covers processes and operations, equipment, report errors and invalid results, audit findings, and customer complaints. This corrective action system is used to track and document the investigations and corrective actions dealing with nonconformance.

A corrective action response can be initiated by a department manager or above. A standardized form, controlled by the quality assurance manager, is used to document the investigation, corrective action, and subsequent monitoring.

When conditions that are adverse to quality are identified, the problem is to be corrected as soon as practical. In the case of conditions *significantly* adverse to quality, the problem is to be identified as a nonconformance *(Section 8.3)*, the root cause(s) determined, and corrective action taken to preclude recurrence. If the condition is found to have affected Bowser-Morner's service to the customer, the department manager is to notify the affected customer of the situation, so that the customer may take appropriate action.

When the investigation and corrective action is complete, the original C.A.R. form is signed and dated by the responsible department manager and forwarded to the quality assurance department. The quality assurance manager then monitors and verifies the implementation of any corrective action. When the quality assurance manager is satisfied of the corrective action's effectiveness, he or she signs and dates the C.A.R. form to close the corrective action process.

Refer to Bowser-Morner quality assurance SOP QA-1400 for more details concerning the corrective action process.

Cause Analysis

When a nonconformance has been identified and a C.A.R. has been issued, an investigation is to be conducted to gather data and information that can be used in the development of a corrective action plan. The investigation into the root cause(s) of the nonconformance is typically the responsibility of the department manager or a designee with knowledge of the problem and any technical issues. Consider the following sources of information when investigating a nonconformance:

a) Review the agreed upon scope of work and any subsequent changes after work had begun.

b) Interview staff members who were involved in the work process.

c) Review the processes, procedures, and equipment used.

d) Check reference documents containing technical data and calculations.

Based on the findings of the investigation, the investigating person should be able to identify the cause for the nonconformance. There may be many possible causes but among these causes there is typically one dominant *root cause*. An accurate identification of the root cause will allow for a more complete and functional corrective action. For assistance in conducting a root cause analysis, refer to Bowser-Morner SOP QA-1400.

8.5.3 Preventive Action

One form of preventative action is to stay current with the standards and regulations of the industries that we serve. Bowser-Morner works to stay current with changes to engineering practices and subsurface exploration procedures by participation on professional societies, subscriptions to relevant publications, and through our professional development programs.

For company policies and standard operations, Bowser-Morner develops its own procedures. These include human resources policies and procedures, a chemical hygiene plan, project safety plans, and various other policies addressing professional development, project management, and customer relationships.

When the absence of a published procedure and/or a consensus standard could jeopardize the quality of a department's technical work, the department manager may choose to develop an in-house standard operating procedure (SOP). These documented SOPs are reviewed and revised on an "as-needed" basis to remain current with the industry practices that they are typically derived from, changes in equipment, and in-house developed improvements. Refer to Bowser-Morner quality assurance SOP QA-1000 for more details concerning the development of in-house technical procedures and specifications.

External Peer Review

At times, Bowser-Morner finds it beneficial to participate in an audit/review process conducted by a government agency or other independent organization. One such organization that has been used by Bowser-Morner is ASFE, the Association for Engineering Firms Practicing in the Geosciences. Participation in ASFE's Peer Review Program is handled in the same manner as other audits including addressing peer review findings through the company's corrective action process.

8.5.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1000, *Developing Bowser-Morner Technical Procedures and Specifications*
- Bowser-Morner SOP QA-1400, *Corrective Action Response (C.A.R.)*

Appendix A

Organization Chart

Organizational charts for the company and the various departments are available in a public services folder located on the company's server at:

Dayton sv1

BMI_Public

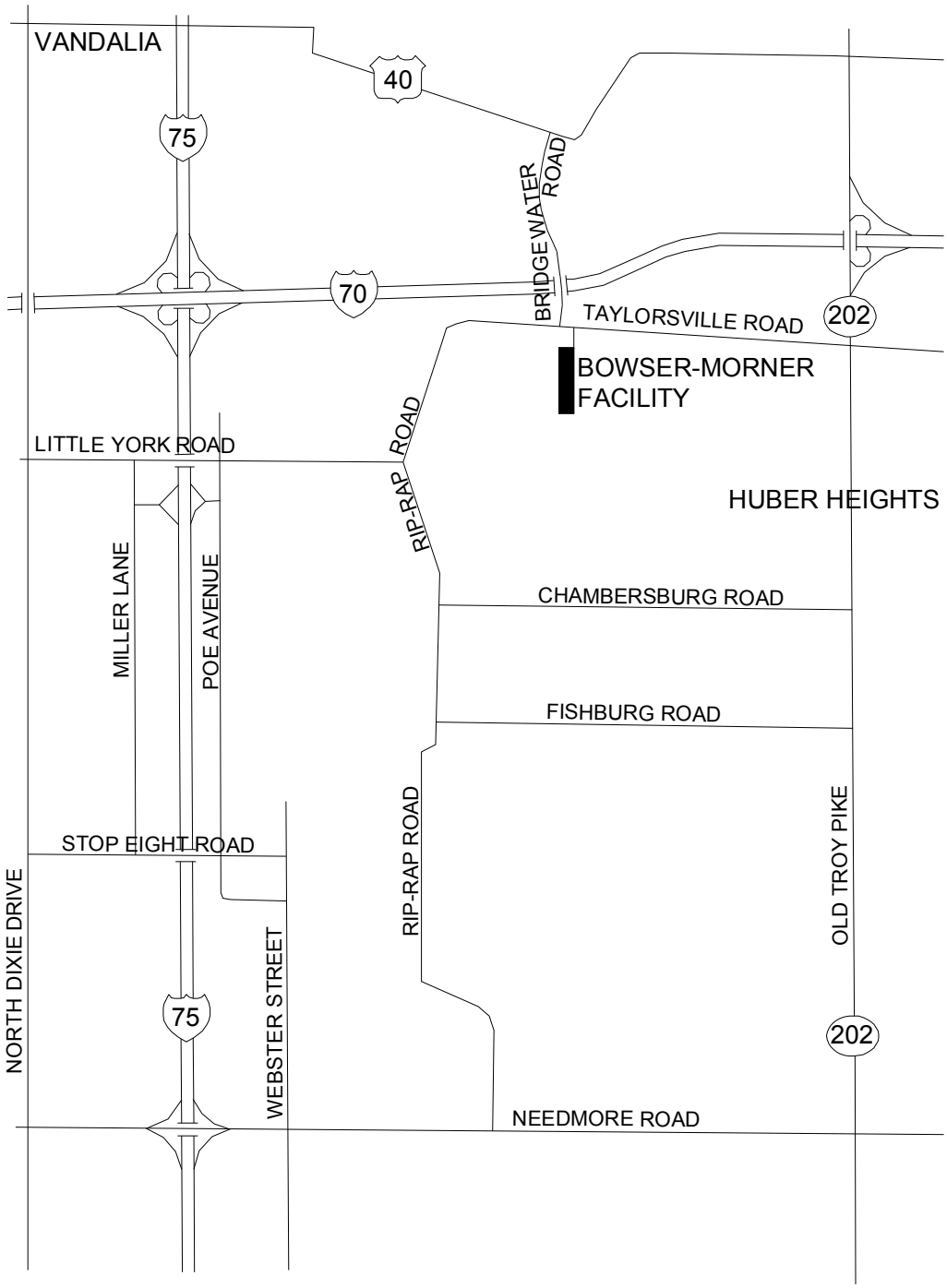
QA Services

Organization & Description

Organizational Charts

Appendix B

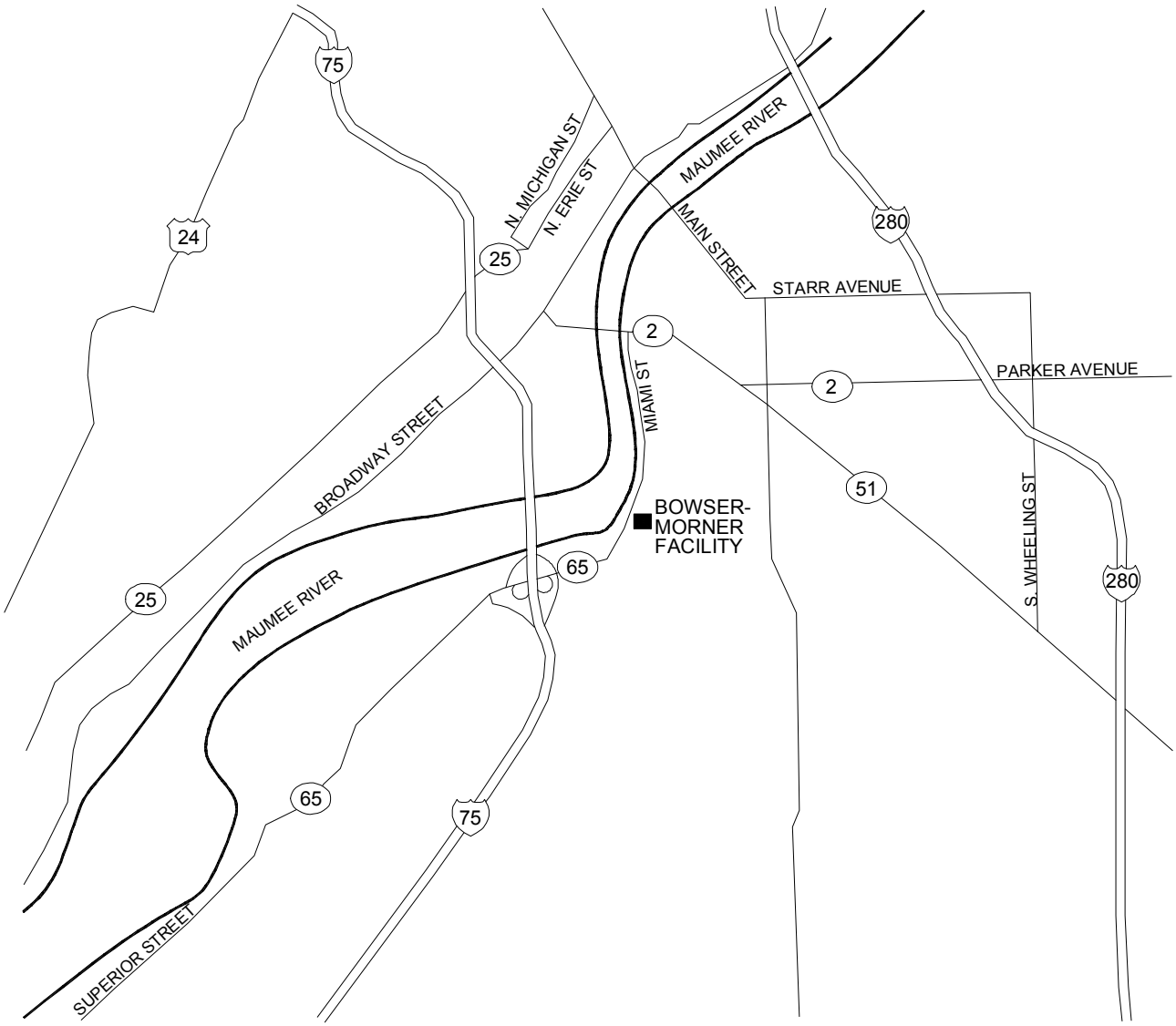
Location Maps



DAYTON, OHIO LOCATION AREA MAP

Appendix B

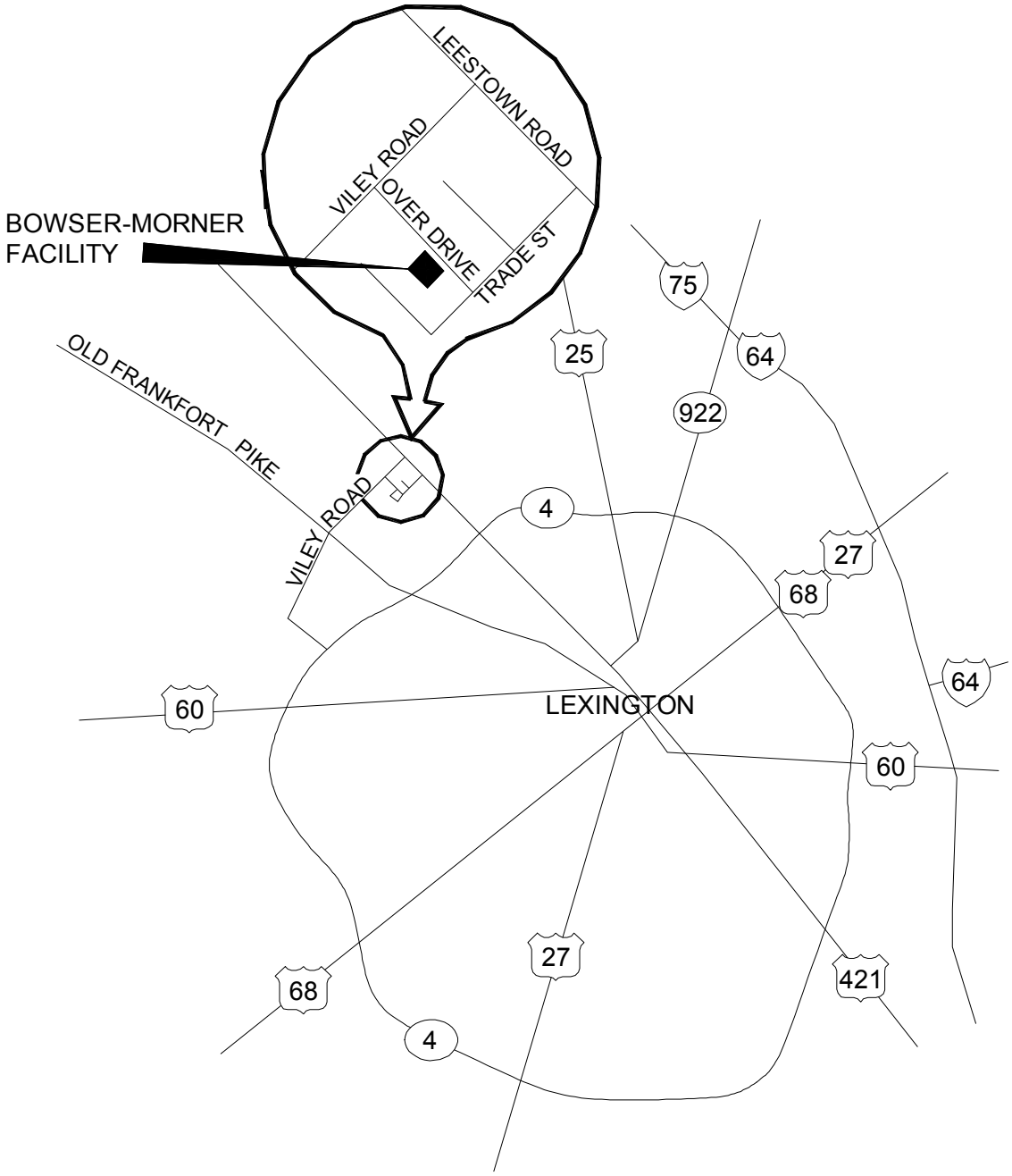
Location Maps



TOLEDO, OHIO LOCATION AREA MAP

Appendix B

Location Maps



LEXINGTON, KENUTCKY LOCATION AREA MAP

Appendix C

Comparison of Quality Management System QA-040 To:

ISO 9001:2008

ISO 9001:2008	QA-040	Support Documents
4. Quality Management Requirements *(title only)*		
4.1 General Requirements	4.1	QA-0210, QA-0710
a) Identify the processes needed for the QM system	4.1.1, 4.1.2	
b) Determine the sequence of these processes	4.1.1	
c) Determine criteria and methods needed	4.1.1	
d) Ensure availability of resources and information	4.1.1, 4.1.3	
e) Monitor, measure and analyze these processes	4.1.1	
a) Implement actions to achieve planned results	4.1.1	
4.2 Document Requirements	4.2	QA-0210
4.2.1 General	4.2.1, 4.2.5	
a) Quality policy and quality objectives	4.2.1	
b) A quality manual	4.2.1	
c) Documented procedures	4.2.1	
d) Documents needed to ensure effective processes	4.2.1	
e) Records required by this standard	4.2.1	
4.2.2 Quality Manual	4.2.2	
a) Scope of the QM system	4.2.2	
b) Documented QM system procedures *(or refer to)*	4.2.2	
c) Description of interaction between QM processes	4.2.2	
4.2.3 Control of Documents	4.2.3	QA-0230
a) Approve documents prior to issue	4.2.3	
b) Review and update documents	4.2.3	
c) Ensure that current revisions are identified	4.2.3	
d) Ensure that relevant revisions are available	4.2.3	
e) Ensure that documents are legal and identifiable	4.2.3	
f) Ensure that external documents are identified	4.2.3	
g) Prevent the unintended use of obsolete documents	4.2.3	
4.2.4 Control of Records	4.2.4	QA-1610, 900-003, 900-020
5. Management Responsibility *(title only)*		
5.1 Management Commitment	5.1	HR P&P, QA-0110
a) Communicate importance of quality & improvement	5.1.1	
b) Establish quality policy	5.1.1	
c) Ensure quality objectives	5.1.1	
d) Conduct management review	5.1.1	
e) Ensure availability of resources	5.1.1	
5.2 Customer Focus	5.2	HR P&P, QA-0240
5.3 Quality Policy	5.3	HR P&P
a) Appropriate to the purpose of the organization	5.3.1	
b) Commitment to quality & improvement	5.3.1	
c) Provide framework for quality objectives	5.3.1	
d) Communicate quality policy to organization	5.3.1	
e) Review for continuing stability	5.3.1	
5.4 Planning	5.4	QA-0270
5.4.1 Quality Objectives	5.4.1	
5.4.2 Quality Management System Planning	5.4.2	
a) Planning is carried out to meet requirements	5.4.2	
b) Integrity of QM system is maintained	5.4.2	

ISO 9001:2008 *(continued)*

ISO 9001:2008	QA-040	Support Documents
5.5 Responsibility, Authority, and Communications	5.5	QA-0300, Org. Chart
5.5.1 Responsibility and Authority	5.5.1	
5.5.2 Management Representative	5.5.2	
a) Ensure processes needed for QM system	5.5.2	
b) Report to top management on performance	5.5.2	
c) Promote awareness of customer requirements	5.5.2	
5.5.3 Internal Communication	5.5.3	
5.6 Management Review	5.6	QA-0270, QA-1705
5.6.1 General	5.6.1	
5.6.2 Review Input	5.6.2	
a) Results of Audits	5.6.2	
b) Customer feedback	5.6.2	
c) Process performance & product conformity	5.6.2	
d) Status of preventive & corrective actions	5.6.2	
e) Follow-up action from management reviews	5.6.2	
f) Information about changes that could affect quality	5.6.2	
g) Recommendations for improvement	5.6.2	
5.6.3 Review Output	5.6.3	
a) Improvement of QM system & processes	5.6.3	
b) Improvement of product	5.6.3	
c) Decisions and actions related to resources needed	5.6.3	
6. Resource Management *(title only)*		
6.1 Provision of Resources	6.1	HR P&P, QA-0710
a) Resources for QM system & improvement	6.1	
b) Resources needed for customer satisfaction	6.1	
6.2 Human Resources	6.2	QA-1800, QA-1810
6.2.1 General	6.2.1	
6.2.2 Competence, Awareness, and Training	6.2.2	
a) Necessary competency for personnel	6.2.2	
b) Provide training	6.2.2	
c) Evaluate effectiveness of training	6.2.2	
d) Personnel aware of the importance of their actions	6.2.2	
e) Appropriate records of education, training, skills	6.2.2	
6.3 Infrastructure	6.3	BM Employee Guide
a) Buildings, workspace, utilities	6.3.1	
b) Process equipment	6.3.1	
c) Supporting services	6.3.1	
6.4 Work Environment	6.4	Safety Policies & Procedures
7. Product Realization *(title only)*		
7.1 Planning of Product Realization	7.1	QA-0210
a) Quality objectives for products	7.1.1	
b) Establish processes, documents, resources	7.1.1	
c) Require verification, validation, monitoring	7.1.1	
d) Records of that product meets requirements	7.1.1	
7.2 Customer-Related Processes	7.2	QA-1400, QA-1900, QA1910
7.2.1 Determination of Requirements Related to Product	7.2.1	
a) Determine requirements of customer	7.2.1	
b) Requirements not stated but necessary	7.2.1	
c) Statutory & regulatory requirements	7.2.1	
d) Any additional requirements	7.2.1	
7.2.2 Review of Requirements Related to Product	7.2.2	
a) Product requirements are defined	7.2.2	
b) Requirement differences are resolved	7.2.2	
c) Organization has ability to meet requirements	7.2.2	

ISO 9001:2008 *(continued)*

ISO 9001:2008	QA-040	Support Documents
7.2.3 Customer Communication	7.2.3	QA-1900, QA-1910
a) Product information	7.2.3	
b) Inquiries, contracts or order handling	7.2.3	
c) Customer feedback, including complaints	7.2.3	
7.3 Design and Development	7.3	QA-0230, QA -1610
7.3.1 Design and Development Planning	7.3.1	
a) Determine the design and development stages	7.3.1	
b) Review, verification, validation needed	7.3.1	
c) Responsibility/authority for design & development	7.3.1	
7.3.2 Design and Development Inputs	7.3.2	QA-0400
a) Function and performance requirements	7.3.2	
b) Applicable statutory and regulatory requirements	7.3.2	
c) Information derived from previous designs	7.3.2	
d) Other requirements essential to design	7.3.2	
7.3.3 Design and Development Outputs	7.3.3	QSM Manual QA-020
a) Meet the input requirements	7.3.3	
b) Information for purchasing, production, service	7.3.3	
c) Contains product acceptance criteria	7.3.3	
d) Characteristics that are essential for safety	7.3.3	
7.3.4 Design and Development Review	7.3.4	
a) Evaluate results to meet requirements	7.3.4	
b) Identify any problems & propose actions	7.3.4	
7.3.5 Design and Development Verification	7.3.5	
7.3.6 Design and Development Validation	7.3.6	
7.3.7 Control of Design and Development Changes	7.3.7	
7.4 Purchasing	7.4	QA-0700, QA-0710, QA-0810
7.4.1 Purchasing Process	7.4.1	
7.4.2 Purchasing Information	7.4.2	
a) Requirements for approval	7.4.2	
b) Requirements for qualification of personnel	7.4.2	
c) QM system requirements	7.4.2	
7.4.3 Verification of Purchased Product	7.4.3	
7.5 Production and Service Provision	7.5	QSM Manual QA-020
7.5.1 Control of Production and Service Provision	7.5.1	
a) Information on characteristics of the product	7.5.1	
b) Work instructions	7.5.1	
c) Use of suitable equipment	7.5.1	
d) Use of monitoring & measuring devices	7.5.1	
e) Implementation of M & M devices	7.5.1	
f) Release, delivery & post-delivery activities	7.5.1	
7.5.2 Validation of Processes	7.5.2	
a) Defined criteria for review & approval	7.5.2	
b) Approval equipment & personnel	7.5.2	
c) Use of specific methods & procedures	7.5.2	
d) Requirements for records	7.5.2	
e) Revalidation	7.5.2	
7.5.3 Identification and Traceability	7.5.3	
7.5.4 Customer Property	7.5.4	
7.5.5 Preservation of Product	7.5.5	
7.6 Control of Monitoring and Measurement Devices	7.6	QA-1200, QA-1210
a) Equipment shall be calibrated	7.6	
b) Equipment shall be identified	7.6	
c) Equipment shall be safeguarded from adjustment	7.6	
d) Equipment shall be protected from damage	7.6	

ISO 9001:2008 *(continued)*

ISO 9001:2008	QA-040	Support Documents
8. Measure, Analysis, and Improve ***(title only)***		
8.1 Monitoring and Measurement	8.1	QA-0240, QA-0270, QA-1000
a) Demonstrate conformity of the product	8.1	
b) Ensure conformity of QM system	8.1	
c) Continually improve QM system	8.1	
8.2 Customer-Related Processes	8.2	QA-0240, QA-1705
8.2.1 Customer Satisfaction	8.2.1	
8.2.2 Internal Audits	8.2.2	
8.2.3 Monitoring and Measurement of Processes	8.2.3	
8.2.4 Monitoring and Measurement of Product	8.2.4	
8.3 Control of Nonconforming Product	8.3	QA-0810, QA-1300, QA-1400
a) Take action to eliminate nonconformance	8.3.1	
b) Authorize use, release, acceptance	8.3.1	
c) Taking action to preclude use or application	8.3.`	
8.4 Analysis of Data	8.4	QA-0240, QA-1900, QA-1910
a) Customer satisfaction	8.4	
b) Conformity to product requirements	8.4	
c) Trends of process & preventative actions	8.4	
d) Suppliers	8.4	
8.5 Improvement	8.5	
8.5.1 Continual Improvement	8.5.1	
8.5.2 Corrective Action	8.5.2	QA-1000, QA-1400
a) Review nonconformance	8.5.2	
b) Determine cause	8.5.2	
c) Evaluate the need for action	8.5.2	
d) Determine & implement action	8.5.2	
e) Record results of action taken	8.5.2	
f) Review corrective action taken	8.5.2	
8.5.3 Preventive Action	8.5.3	
a) Determine potential nonconformance	8.5.3	
b) Evaluate need for action	8.5.3	
c) Determine & implement action	8.5.3	
d) Record results of action taken	8.5.3	
e) Review corrective action taken	8.5.3	

Appendix C

Comparison of Quality Management System QA-040 To:

DOE O 414.1 (10 CFR 830.120)

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.1 Program ***(title only)***		
4.1.1 Introduction	4.1	
a) Documented quality goals & objectives	4.1.1, 4.2.1	QA-0210
b) Documented mission statement	5.3	BM Employee Guide
c) Compliance with consensus standards	1.4	
4.1.2 Responsibilities	4.2	
Quality directive from management	Page IV	
Key quality objectives include:	4.2.1	
a) Establishing task assignments	4.2.1	
b) Identifying lines of communication	4.2.1	Company Org Chart
c) Determining & providing resources & environment	4.2.1	
d) Ensuring employees are trained & capable	4.2.1	
e) Feedback on the effectiveness of planning & work	4.2.1	
f) Improvements are identified & implemented	4.2.1	
4.1.3 Grade Approach	5.4	
Includes planning, scheduling, & resource consideration	5.4.2	QA-0270
Assess application of specific activities *(graded approach)*	5.4.2	
4.2 Personnel Training and Qualification ***(title only)***		
4.2.1 Introduction	6.2	
Documented training & competency program	6.2.2	QA-1800, QA-1810
4.2.2 Responsibilities	5.1	
Management's commitment of resources for training	5.1.1, 6.1	HR P&P
4.2.3 Qualification of Personnel	6.2	
Documented job descriptions	6.2.2	
Methods for determining competency	6.2.2	
4.2.4 Training	6.2	QA-1800, QA-1810
Training materials	6.2.2	
Instructor requirements	6.2.2	
Training monitored	6.2.2	
Training includes:	6.2.2	
a) Project/task specific training	6.2.2	
b) site/facility specific training	6.2.2	
c) Institutional training	6.2.2	
4.2.5 Training Plans	6.2	
Prepared training plans for managing work	6.2.2	
Continuing training to improve job performance	6.2.2	
Training records are maintained	6.2.2	
4.3 Quality Improvement ***(title only)***		
4.3.1 Introduction	8.5	
Effective QM system:	8.5.1	QA-0270
a) Uses feedback information to improve	8.5.1	
b) Prevents quality problems *(preventative actions)*	8.5.1	QA-1410
c) Corrects problems as necessary *(corrective action)*	8.5.1	QA-1400
4.3.2 Identification of Quality Problems	8.5.2	QA-1300
Identifying problem types *(root cause analysis)*	8.5.2	
Gauging the significance of a problem	8.5.2	
Handling a problem *(on-site vs. long-term.)*	8.5.2	
Issuance & removal of Stop-Work orders	8.5.2	

DOE O 414.1 (10 CFR 830.120) *(continued)*

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.3.3 Resolution of Quality Problems	8.5.2	
Quality problem resolution *(C.A.R.)*	8.5.2	
Management's involvement	8.5.2	
Tracking of resolution process	8.5.2	
4.3.4 Quality Improvement	8.5	
Planned management process	8.5.3	
Encourage & empower workers *(identify problems)*	8.5.3	
Sources of quality related information	8.5.3	
4.4 Documents and Records *(title only)*		
4.4.1 Introduction	4.2	
Documents to develop & control review	4.2.3	QA-0230
4.4.2 Documents	4.2	
Document control *(develop, approve, review, change)*	4.2.3	QA-0230
4.4.3 Records	4.2	
Record types & forms *(paper, electronic, photo, etc.)*	4.2.4	
Record management system (retain*, protect, retrieve, etc.)*	4.2.4	QA-1610
4.5 Work Process *(title only)*		
4.5.1 Introduction	7.1	
Work as a process	7.1.1	
4.5.2 Work Performance	7.2	
Management ensures:	7.2.1	
a) Customer & data requirements for the work	7.2.1	
b) Acceptance criteria applicable to work	7.2.1	
c) Hazards associated with work	7.2.2	
d) Technical standards applicable to work	7.2.2	
e) Safety, technical, & environmental controls	7.2.2	
Documented work instructions	7.2.1	
Quality of the work is evaluated	7.2.1	
Worker feedback for improvement	7.2.1	
4.5.3 Item Identification and Use Control	7.5	
Identification & control of items	7.5.3	
4.5.4 Item Protection	7.5	
Items protected from damage, loss, deterioration	7.5.5	
4.5.5 Equipment Control	7.6	QA-1200, QA-1210
Proper equipment	7.6	
As applicable, equipment is calibrated	7.6	
4.6 Design *(title only)*		
4.6.1 Introduction	7.3	
Formal designs are sound engineering/science practices	7.3.2	QA-0400
Design review & verification	7.3.4, 7.3.5	900-035
Safety issues considered	7.3.1, 7.3.2	
4.6.2 Design Input	7.3	
Contractual requirements, design basics, customer needs	7.3.2	QA-0400
4.6.3 Design Process	7.3	
Design input & interfaces	7.3.2	
Computer software validation	7.3.5	900-040
Design analysis	7.3.5	
4.6.4 Design Output	7.3	
Design output documents *(drawings, specs, plans, reports)*	7.3.3	
Output documents are controlled	7.3.3	
4.6.5 Design Verification	7.3	
Design verification *(tech review, peer review, etc.)*	7.3.5	900-035
Qualifications for review personnel	7.3.5	

DOE O 414.1 (10 CFR 830.120) *(continued)*

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.6.6 Design Changes	7.3	
Control & recording of design changes	7.3.7	
4.6.7 Suspect/Counterfeit Items	7.4	
Inspection of received items	7.4.3	QA-0700
Use of approved suppliers	7.4.1	QA-0710
4.7 Procurement *(title only)*		
4.7.1 Introduction	7.4	
Procurement process *(purchase order requirements)*	7.4.1	QA-0700
Documentation	7.4.1	
Approved suppliers	7.4.1	QA-0710
4.7.2 Procurement Documents	7.4	
Use of purchase order	7.4.2	QA-0700
Requirements & critical parameters	7.4.2	
4.7.3 Supplier Qualifications	7.4	
Approval process for suppliers	4.1.3	QA-0710
4.7.4 Supplier Performance Monitoring	7.4	
Periodic monitoring	7.4.3	
4.7.5 Inspection	7.4	
Inspection for received supplies and services	7.4.3	
4.7.6 Supplier Documents	7.3	
Control of supplier documents *(reports, drawings, etc.)*	7.3.3	
4.7.7 Suspect/Counterfeit Items	NA	
Avoidance & detection procedures	NA	
4.7.8 Procurement of Safety Grade Items	NA	
Special purchasing practices	NA	
4.8 Inspection and Acceptance Testing *(title only)*		
4.8.1 Introduction	7.3	
Inspections & tests	7.3.5	
4.8.2 Process	7.3	
Inspection & testing should provide for:	7.3.5	
a) Defined processes *(review procedures & tests)*	7.3.5	
b) Acceptance criteria	7.3.5	
c) Safety issues	7.3.5	Separate Program
d) Qualified personnel	7.3.5	
e) Records of inspections & test results	7.3.5	
f) Control of failed items	7.3.5	
4.8.3 Control of Measurement & Test Equipment	7.6	QA-1200, QA-1210
Calibration & traceability	7.6	
4.9 Management Assessment *(title only)*		
4.9.1 Introduction	5.6	
Management review *(assess goals & performance)*	5.6.2	QA-0270
Safety review	8.2.3	Separate Program
4.9.2 Responsibility	5.6	
Responsibilities for reviews	5.6.2	
4.9.3 Process	5.6	
Report to management	5.6.2	
Report on safety	8.2.3	Separate Program
On-site assessments	5.6.2	
4.9.4 Results	5.6	
Documented reports	5.6.3	QA-0270
Problems identified & corrected	5.6.3	

DOE O 414.1 (10 CFR 830.120) *(continued)*

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.10 Independent Assessment ***(title only)***		
4.10.1 Introduction	8.2	
Process for independent assessment	8.2.2	QA-1705
4.10.2 Performing Organization	8.3	
Independent individuals, agencies, organizations	8.3.3	QA-1705
4.10.3 Process	8.2	
Type & frequency	8.2.2	
Criteria for assessment	8.2.2	
4.10.4 Results	8.2	QA-0270
Report to management	8.2.2	
Improvement/corrective actions	8.2.2	
Follow-up	8.2.2	

Appendix C

Comparison of Quality Management System QA-040 To:

ASFE QUALITY CONTROL

ASFE	QA-040	Support Documents
Business Management *(title only)*		
A. Documented Goals & Objectives	4.2, 5.3	
1) State the mission of the firm	5.3.1	BM Employee Guide
2) Communicate mission & objectives to personnel	4.2.1	
3) Firm's responsibilities to clients, employees, public	4.2.1, 5.3.1	
4) Identify profit goals	4.2.1, 5.3.1	
B. Organizational Structure & Position Responsibilities	4.1, 5.5, 6.2	
1) Inform personnel of the firm's org. structure	4.1.1, 5.5.1	Company Org Chart
2) Job descriptions	6.2.2	
3) As applicable, establish adjunct positions	5.5.1	
4) Periodically review & update	4.1.2	
C. Policies & Procedures	4.2	
1) Readily assessable	4.2.3	QA-0230
2) Persons responsible to develop, review, update	4.2.3	QA-0230
D. Ownership Transition	NA	Separate program
1) Determine the firm's market value	NA	
2) Strategies for the firm's continuation	NA	
E. Strategic Plan for the Firm's Future Direction	5.4	
1) Identify strengths, weaknesses, opportunities	5.4.3	
2) Monitor the firm's performance	5.4.3	
3) Review & revise the strategic plan annually	5.4.3	
4) Communicate the plan's goals & responsibilities	5.4.3	
Facilities and Technical Resources *(title only)*		
A. Satisfactory Work Conditions	6.3, 6.4	HR P&P
1) Standards for space & furniture allocations	6.3.1, 6.4.1	
B. Technical Resources	4.2, 6.1	
1) Identify field and laboratory support needs	6.1	QA-0710
2) System for retrieval of current & prior project records	4.2.4	QA-1610
3) Responsibility for collection, storage, retrieval	4.2.4	
C. Business, Personnel, & Technical Records	4.2, 5.1	
1) Responsibility for protecting important records	4.2.4	
2) Protecting client confidentiality & proprietary data	5.1.4	HR P&P
3) System for retention & purging records	4.2.4	QA-1610
D. Employee Health & Safety Procedures	6.2, 7.5	
1) Medical monitoring program	6.2.3	Corp. Health & Safety
2) Handling, storage, disposal of hazardous materials	7.5.3	Corp. Health & Safety
3) Personnel protection equipment & instruments	6.2.3	Corp. Health & Safety
Human Resources *(title only)*		
A. Recruiting & Orientation	6.2	Separate program
1) Responsibility for recruiting	6.2.1	HR P&P
2) Identify sources & qualifications	6.2.1	HR P&P
3) Handling resumes & applications	6.2.1	HR P&P
4) Orientation program	6.2.1	
B. Employment Processes & Records	6.2	Separate program
1) Responsibility for human resources functions	6.2.1	
2) Confidential records system	6.2.1	HR P&P, QA-0110
3) Document training received by staff members	6.2.2	QA-1800

ASFE QUALITY CONTROL *(continued)*

ASFE	QA-040	Support Documents
4) Equal employment opportunity officer	6.2.1	HR P&P
5) Health & safety manager & programs	6.2.3	HR P&P
6) Substance abuse policies & procedures	6.2.3	HR P&P
C. Training & Career Path Development	6.2	
1) Internal & external training opportunities	6.2.2	QA-1800
2) Assign individuals to appropriate types of work	6.2.2	
3) Announce staff openings to employees	6.2.4	
D. Personnel Positions & Compensations	6.2	
1) Review position descriptions, salary, & benefits	6.2.2	Separate program
E. Personnel's Performance	6.2	
1) Responsibility for performance reviews	6.2.2	QA-1800
2) Review evaluations with the person evaluated	6.2.2	
3) Provide review records to managers	6.2.2	
4) Maintain records of advancements *(personnel files)*	6.2.2	HR P&P
F. Communications	6.1, 6.2	
1) Performance discussions with personnel	6.2.2	
2) Evaluate & improve HR management	6.2.1	HR P&P
Professional Development *(title only)*		
A. Professional Development	6.2	
1) Responsibility for professional development	6.2.2	QA-1800
2) Professional training standards *(in-house & outside)*	6.2.2	
3) Review & update training & development program	6.2.2	
B. Communications	5.5, 6.2	
1) Distribute the firm's policies & procedures manual(s)	5.5.3	
2) Support activities in professional organizations	6.2.2	
3) Registration of professional staff	6.2.2	
C. Training Programs & Development Opportunities	6.2	
1) Training in specialized areas	6.2.2	
2) Training in supervisory/management practices	6.2.2	
3) Upgrade training activities	6.2.2	
D. On-The-Job Training	6.2	
1) Emphasis & Importance	6.2.2	QA-1800
2) Documented records of experience	6.2.2	
3) Supervision	6.2.2	
E. Risk Awareness	6.2	
1) External training seminars *(risk management)*	6.2.2	
2) Internal training *(loss prevention)*	6.2.2	
F. Advancement	6.2	
1) Professional levels & qualifications	6.2.2	
2) Performance criteria	6.2.2	
3) Advancement decisions	6.2.2	
Project Management *(title only)*		
Contracting and Client Relationships *(title only)*		
A. Client Contracts	7.2, 7.3	
1) Contract provisions	7.2.3, 7.3.2	QA-0400
2) Contract review	7.3.2	QA-0400
B. Budgets & Schedules	7.3	
1) Monitoring progress of projects & corrective actions	7.3.1	
2) Departures from the plan	7.3.7	
C. Client Communications	7.1, 7.2, 7.3	
1) Procedures for regular communications with client	7.2.3, 7.3.2	
2) Assessing & managing risk	7.1.1	QA-1400

ASFE QUALITY CONTROL *(continued)*

ASFE	QA-040	Support Documents
D. Confidentiality of Client Information	5.1	
1) Policy for releasing information	5.1.4	HR P&P
2) Release by client permission	5.1.4	
3) Reporting to public agencies *(required by law)*	5.1.4	
E. Billing & Collection of Fees	7.3	
1) Billing & payment procedures	7.2.3, 7.3.3	Separate program
F. Closure *(sample disposal, document return, final invoice)*	7.3	
Project Planning and Assigning Personnel *(title only)*		
G. Project Scheduling	7.1	
H. Assigning Personnel	7.3	
1) Responsibility for selection of personnel	7.3.1	
2) Identify staffing requirements	7.3.1	
3) Supervision	7.3.1	
4) Selection of personnel *(quals, training, performance)*	7.3.1	
5) Trainees *(opportunities for training & experience)*	7.3.1	
I. Contract Requirements	7.3	
1) Proposal commitments *(specific personnel)*	7.3.2	
2) Continuity of work	7.3.1, 7.3.3	
J Site-Specific Health & Safety Plans	7.3	
K. Supervision	7.3	
L. Review Process	7.3	
1) Checklists	7.3.5	
2) Independent quality review	7.3.5	
3) Work performance	7.3.5	
4) Loss prevention	7.3.5	
5) Project reporting systems *(schedule & budget)*	7.3.5	
M. Consultation	7.3	
1) Sources *(internal & external)*	7.3.1	
2) Consultation policy	7.3.1	
N. Reporting Risk & Uncertainty Issues	7.3	
1) Limit report's scope & purpose	7.3.2, 7.3.5	QA-1605
2) Fact or opinion	7.3.3, 7.3.5	
3) Identify risks & limitations	7.3.5	
Documentation of Work Activity *(title only)*		
O. Pre-engagement Activities	7.3	
P. Project Performance & Review Activities	7.3	
1) Project files *(chronological records of activities)*	7.3.3	
2) Record identification	7.3.3	
Q. Project File Closure	4.2, 7.3	
1) Responsibility for closure	7.3.3	
2) Form & contents	7.3.3	
3) Storage *(safekeeping)*	4.2.4, 7.3.3	QA-0230
4) Purging & retiring files	4.2.4	QA-1610
Construction-Phase Services *(title only)*		
R. Project Continuity *(project continuation - field services)*	7.3	
S. Field Service Procedures	7.3	QSM Manual QA-020
Financial Management *(title only)*		
A. Financial Performance *(evaluation)*	8.4	
B. Budget	5.4	
1) Overhead accounts	5.4.3	
2) Monitoring *(financial statements)*	5.4.3, 8.2.4	
3) Profitability	5.4.3, 8.2.4	
4) Future workload	5.4.3	
C. Information Systems	7.3	

ASFE QUALITY CONTROL *(continued)*

ASFE	QA-040	Support Documents
D. Invoicing to Clients	7.2	Separate program
E. Accounts Receivable	7.2	Separate program
F. Collection	7.2	
1) Procedures for collection *(overdue accounts)*	7.2.3	
G. Financial Records *(storage & retrieval)*	4.2.4	Separate program
Marketing Practices *(title only)*		
A. Responsibility for Marketing	5.4	Separate program
1) Documents *(types, content, language, etc.)*	5.4.4	
2) Qualifications *(resumes, experience, etc.)*	5.4.4	
B. Selection of Clients	5.5, 7.3	
C. Requests & Proposals	5.5, 7.3	
D. Proposal Follow-up *(debriefing on lost work)*	5.4.4	
E. Additional Practices *(awards, professional societies, etc.)*	5.4.4	