

TNI Subcommittee Priority Elements of Management Plan (MP) for Field Sampling and Measurement Organizations (FSMOs)

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This document is not intended to be a substitute for reading, understanding and following the TNI Field Activities Standard. Every effort has been made to ensure the accuracy of this information, but the Standard has final authority if any discrepancies are found.

This document contains multiple requirements for an FSMO to address in its Management Plan (MP) to achieve accreditation under the TNI FSMO Standard. The FSMO Subcommittee has prepared this list of priority and secondary MP requirements to help potential FSMOs get started with their accreditation package. Although MP requirements are listed, the bolded “★” items are considered priority requirements. Note that, for convenience, the list generally follows the organization of Volume 1 of the TNI FSMO Standard. In their MP FSMOs are not required to follow this order of presentation nor to match the section headings. Sections of Volume 1 of the TNI FSMO Standard are provided (in parentheses) for reference.

MP – Management Plan (Includes management system and technical requirements)

FSM – Field Sampling and Measurement

Note: Proficiency Testing, Traceability, Measurement Uncertainty and Accreditation Symbol and Marketing Requirements are found in the AB program documents. Please review these as part of the AB selection process to ensure you understand all the requirements that will be assessed.

SECTION 1: INTRODUCTION, PURPOSE AND SCOPE

Introduction

Purpose and Scope

★ Purpose and scope of MP (1.0 and following)

- **FSMO services will address requirements of customer, ISO, TNI FSMO Standard - Vol 1, regulatory, and certifying organizations (4.1.2)**
- **MP defines management system (4.1.3; 4.1.4; 4.1.5)**
- **Scope of FSMO services documented separately (1.1)**
- FSMO personnel are independent and free of conflict of interest (4.1.4; 4.1.5)

Communication

- **Management system addresses all FSMO locations (4.1.3)**
- **Supervision and training by knowledgeable staff (4.1.5.g)**
- Communication procedure(s) within FSMO (4.1.6)
- Management Plan available and advertised to all FSMO personnel. (4.2.1)

SECTION 2: NORMATIVE REFERENCES

SECTION 3: TERMS AND DEFINITIONS

- ★ **Define special terms related to FSM services (3.0)**

SECTION 4: MANAGEMENT SYSTEM

Section 4.1: Organization

- ★ **FSMO is legally responsible entity (4.1.1)**

Section 4.2: Management System

System

- ★ **MP documents policies, systems, procedures, instructions to assure quality of field results (4.2.1; 4.2.2)**
- ★ **Quality Policy Statement defined in a Quality Manual or MP (however named) (4.2.2; 4.2.3)**
 - **Concise policy statement**
 - **Commitment to good professional practice**
 - **States FSMO standard of service**
 - **States quality purpose of management system**
 - **Requires all FSMO personnel be familiar with FSMO documents**
 - **Commits management to ISO standards and ongoing improvement**
- **Appointment of Quality Manager (4.1.5 i)**

Management Commitment

- ★ **Management to communicate importance of customer and regulatory requirements to FSMO personnel (4.2.4)**
- ★ **Provide technical management organization and responsibility to comply with ISO and TNI FSMO Standard - Vol 1 or refer to Section 4.1) (4.2.6)**
- **FSMO objectives periodically reviewed by management (4.2.2)**
- **Commitment of management to develop, implement, and improve the management system (4.2.3)**
- **Present technical support procedures (4.2.5)**
- **Maintain the program with changes to management system (4.2.7)**

Data Integrity (DI)

- ★ **Establish, document, audit, and maintain DI procedures (4.2.8)**
- ★ **Ethical approach key component to FSMO planning, training, and implementation of services (4.2.8 a)**
- ★ **DI training required for new hires and annual refresher for existing employees (4.2.8 a)**
- ★ **FSMO employees sign commitment to DI (4.2.8 b)**
- ★ **DI issues are confidentially reported to senior staff (4.2.8 c)**
- **DI procedures to ensure client confidentiality (4.1.5 c)**

- DI procedures assure highly ethical approach to FSM activities (4.2.8)
- DI procedures signed and dated by senior management (4.2.8 e)
- DI procedures and associated implementation records maintained (4.2.8 f)
- DI procedures reviewed and updated annually (4.2.8 g)
- Conduct periodic in-depth review (audits) of DI issues to verify compliance with DI procedures (4.2.8 d)

Section 4.3: Document Control

Establish Reference Library

- ★ **Establish and maintain all FSMO reference documents (internal, external, regulations, standards, methods, drawings, software, specifications, etc.) in a library (4.3.1; 4.3.2)**
- Maintain authorized documents and a list of same (4.3.2.1)
- Make authorized documents available to all FSMO personnel (4.3.2.2)
- Establish and maintain a method to specifically identify each document (4.3.2.3)

Maintain Reference Library

- ★ **Review and revise all authorized documents periodically for compliance with program (4.3.2.2 b; 4.3.3)**
- ★ **Establish procedures and authorities for hand revision of hard-copy documents (4.3.3.3)**
- ★ **Establish document change procedures for computer-stored documents (4.3.3.4)**
- Remove obsolete and invalid documents from library (4.3.2.2 c)
- Mark retained obsolete documents as superseded (4.3.2.2 d)
- Mark specifically prepared management system documents with unique identifier (4.3.2.3)
- Make revision protocols for documents consistent with original publishing (4.3.3)
- Where practicable, identify changed text within documents or the appropriate attachments. (4.3.3.2)

Section 4.4: Review of Requests, Tenders and Contracts

Establish Procedures

- ★ **Establish and maintain FSMO procurement procedures for requests, tenders, and contracts (4.4.1)**
- Define, document, and teach procedures (4.4.1)

Request Preparation and Bidder Identification

- ★ **Establish that the subcontractors and vendors have the capabilities and resources to conduct the work (4.5.1; 4.5.3; 4.5.4)**
- ★ **Services and materials selected and requested are what the customer desires, appropriate for application, and current (4.4.1; 5.4.2)**

Review Process

- ★ **Address inconsistency of contract and tender in advance of work (4.4.1)**
- Address contractual aspects, include financial, legal, schedule, resources, capability, personnel, skills, expertise, earlier participation, proficiency, etc. (4.4.1)
- Identify whether the review process will be the same for internal and external clients (4.4.1)
- Define the acceptance of verbal terms and conditions (4.4.1)
- Maintain records of review process (4.4.2)
- Maintain customer correspondence addressing at least procurement requirements and work results (4.4.2)
- Address sub-tier contractors and vendors not directly bound to your company (4.5)

Change to Contracts

- ★ **Report contract deviations to the customer (4.4.4)**
- Contract amendments will be reviewed in similar process as the original procurement (4.4.5)
- Affected FSMO personnel will be notified of contractual changes (4.4.5)

Section 4.5: Subcontracting of Environmental Sampling and Field Measurement Activities

Note: The term “subcontractor” includes all levels of subcontracting. In some cases a subcontractor will further subcontract the work.

- ★ FSMO shall verify the competency of subcontractor(s) to perform assigned tasks, for example, by complying with the TNI FSMO Standard – Vol I (4.5.1)
- Subcontractor(s) to be selected shall be brought to the attention of advertised ~~to~~ the customer (4.5.2)
- Subcontractor(s) to be selected shall be approved in advance by the customer, if they so choose (4.5.2)
- FSMO is responsible to customer for subcontractor’s work, unless directed to use subcontractor by client or regulatory agency (4.5.3)

Section 4.6: Purchasing Services and Supplies

Procurement

- ★ **Establish a policy and procedure to select and purchase services and supplies that affect the quality of tests and calibrations (4.6.1)**
- ★ **Requisitions for services and supplies must contain specific criteria and details of required items that are approved by a technical reviewer (4.6.3)**
- Evaluate suppliers of critical services and supplies that affect quality (4.6.4)
- Maintain records of evaluation of critical services and supplies that affect quality (4.6.4)

Management of Services, Supplies and Equipment

- ★ **Ensure that supplies, reagents and consumable materials that affect the quality of tests are inspected and approved for compliance with standard specifications or requirements defined in the methods before use (4.6.2; 5.5)**
- Establish procedures for the purchase and storage of supplies and equipment (4.6.1; 5.6.3.4)
- Records of inspections/verifications must be maintained (4.6.2)

Section 4.7: Service to Customer

- ★ **Cooperate with customer to clarify their requests (4.7.1)**
- ★ **Maintain communication with the client throughout the work (4.4.2; 4.7.1 - Note 2)**
- Cooperate with customer to monitor and communicate to them the performance of the work (4.7.1)
- Seek feedback from the customer on work performance (4.7.2)
- Use feedback to improve management system (4.7.2)

Section 4.8: Complaints

- ★ **Establish a policy and procedure for the resolution of complaints, customer and others (4.8)**
- Maintain records of complaints, investigations, and corrective actions (4.8)

Section 4.9: Control of Nonconforming Work

- ★ **Establish policy and procedure for when any aspect of tests, calibrations, or results do not conform to procedures or customer requirements (4.9.1)**
- ★ **Designate FSMO personnel with responsibility and authority to manage and address nonconforming work (4.9.1 a)**
- ★ **Define actions that FSMO personnel can take when nonconforming work is identified (4.9.1 a)**
- ★ **Correct nonconforming work immediately (4.9.1 c)**
- ★ **Notify customer of nonconforming work if it is recalled (4.9.1 d)**
- ★ **Identify who has authority to recommence work (4.9.1 e)**
- Evaluate significance of nonconforming work (4.9.1 b)
- Decide if nonconforming work or portion of nonconforming work is acceptable (4.9.1 c)
- If nonconforming work is due to fundamental issues, Corrective Action procedures will be implemented and completed prior to the start of new test or calibration (4.9.2)

Section 4.10: Improvement

- Improve the effectiveness of the management system through policy, quality objectives, audit results, analysis of data, corrective actions, and preventive actions (4.10)

Section 4.11: Corrective Action

- ★ **Establish a policy and procedure for implementing Corrective Actions for nonconforming work or policy and procedure departures (4.11.1)**
- ★ **Designate authorities who will implement Corrective Actions (4.11.1)**
- ★ **Implement and document required changes prescribed by the Corrective Action (4.11.3)**
- ★ **Monitor the results of the Corrective Action to ensure it is effective (4.11.4)**
- Start a Corrective Action with an investigation to determine the root cause of the problem (4.11.2)
- Identify potential Corrective Actions for problem (4.11.3)
- Select and implement the Corrective Action that will eliminate the problem, prevent recurrence, and be commensurate with the magnitude of the risk (4.11.3)
- If nonconforming work or policy departures question FSMO operations compliance to policy, procedures, and ISO standards, then an audit will be performed (4.11.4; 4.11.5)

Section 4.12: Preventive Action

- ★ **Establish a procedure for the initiation of Preventive Actions (4.12.1)**
- ★ **Apply controls to ensure Preventive Actions are effective (4.12.2)**
- Actively seek issues for Preventive Action rather than react to problems (4.12.1)
- Identify needed improvements and potential sources of nonconformities to technical issues and management system (4.12.1)
- Review operational procedures, data, trends, risks, proficiency-testing results, etc. for potential improvements and nonconformities (4.12.2 – Note 2)

Section 4.13: Control of Records

Record Procedures

- ★ **Establish and maintain procedures for identification, collection, indexing, access, filing, storage, maintenance, archiving, and disposal of records (4.13.1.1)**
- ★ **Establish procedures for the maintenance or transfer of FSMO records in accordance with clients' instructions in the event of ownership transfer or**

business termination. In cases of bankruptcy, plan must show appropriate regulatory and state legal requirements are followed (4.13.1.1.1)

- Archived records shall be protected against degradation and loss (4.13.1.2)
- Records stored on electronic media shall be supported by hardware and software necessary for their retrieval (4.13.1.4.1)
- Records stored on computers or personal computers shall have hardcopy or secure backup copies (4.13.1.4.2)
- Establish record retention times based on either 5 years, as defined by regulations, or as required by the client. The start of retention period will be at project completion or from the last data entry (4.13.2.1.2)

Record Collection

- ★ **Records will be sufficient to enable reproduction of test conditions, if required and possible (4.13.2.1)**
- ★ **Include identity of personnel responsible for sampling, calibration, testing, and result checking (4.13.2.1)**
- ★ **Records shall include the chain of custody form of samples transferred between organizations (4.13.2.1.1)**
- ★ **Retain records of original observations, derived data, audit records, calibration records, staff records, test reports, calibration certification, and any other pertinent first generation information (4.13.2.2)**
- ★ **Require staff to document observations, data, and calculations at the time of collection (4.13.2.2)**
- ★ **All generated data, except when generated by automated collection systems or equipment, shall be recorded directly, promptly and legibly in permanent ink (4.13.2.2.1)**
- Technical records will include forms, contracts, work sheets, work books, check sheets, work notes, control graphs, external test reports, internal test reports, sample chain of custody documents, maps, sketches, calibration certificates, customer notes, papers, feedback, etc. (4.13.1.1; 4.13.2.1)
- Records can be retained in hardcopy and electronic media (4.13.1.2)
- Records will be stored so they are retrievable, will not be damaged, deteriorate, or be lost (4.13.2.1)
- Quality records will include internal audit reports, management reviews, Corrective Action records, and Preventive Action records (4.13.2.1)
- Label all documents to clearly associate the data with the activity (4.13.2.1)

Record Mistakes and Correction

- ★ **Correct data collection mistakes by marking through the incorrect value and placing the correct value to the side (4.13.2.3)**
- ★ **All corrections to hardcopy records will be initialed or signed by the correcting FSMO personnel (4.13.2.3)**
- Do not erase, make illegible, obliterate, delete, or remove mistaken entries in records (4.13.2.3)
- Similar tracking of mistake correction will be implemented for electronic data as appropriate and possible (4.13.2.3)

Record Access and Safety

★ **Records will be secure and confidential (4.13.1.3)**

- All records will be protected against fire, theft, water, loss, deterioration, vermin, electronic sources, magnetic forces, etc. (4.13.1.2)

Electronic Records

★ **Stored electronic records will be supported with retrieval software and hardware (4.13.1.4.1)**

★ **Stored electronic records shall be duplicated in hardcopy or a secure backup (4.13.1.4.2)**

- Establish procedures to protect and duplicate electronic data in field devices (4.13.1.4.2)

Section 4.14: Internal Audits

★ **Audits shall verify conformance with FSMO's management system, scope of services, and the TNI FSMO Standard - Vol 1 (4.14.1; 4.14.1.1)**

- Audit periodically in accordance with pre-determined schedule and procedures (4.14.1)
- Audits shall be carried out by trained and qualified personnel, and to extent practical, that are independent of activity being audited (4.14.1)
- FSMO shall audit its activities every year in accordance with documented procedure(s) (4.14.1; 4.14.1.1)
- When audit findings cast doubt on test/calibration results, FSMO shall take timely corrective action (4.14.2)
- FSMO shall notify customers in writing if audit results show FSM results may have been affected (4.14.2)
- Audit shall record activity(s) assessed, findings and corrective actions (4.14.3)
- Follow-up audits shall verify and record effectiveness of corrective action(s) (4.14.4)

Section 4.15: Management Reviews

★ **Management review shall assess whether management system and FSM services are suitable and effective, and recommend changes as needed (4.15.1)**

- FSMO top management shall review management system on a predetermined schedule and in accordance with documented procedure (4.15.1)
- Reviews shall include among other items: suitability of policies and procedures of the management system reports from supervisors; outcomes of internal audits; CAPA activities; assessments by external bodies; results of proficiency tests; changes in volume or type of FSM services; customer feedback; complaints; staff recommendations for improvement; other relevant

- factors, including QA/QC activities, available resources and tools, and staff training (4.15.1)
- Reviews and management actions thereof shall be recorded, and management shall ensure that actions are carried out in appropriate timely manner (4.15.2)

SECTION 5: TECHNICAL REQUIREMENTS

Section 5.1: General

- ★ **Describe methods and procedures for tests and calibration, for staff training, and for selection of equipment to allow assessment of uncertainty of results (5.1.2)**
 - Recognize that multiple factors can contribute to the total uncertainty of FSM results (5.1.1)
 - Recognize that collection of representative samples is integral to providing useable FSM results (5.1.3)
 - Provide methods that address representativeness including subject (matrix), type of test, test location, and test time; and that assure sufficient documentation to demonstrate that results are representative of the subject (matrix) (5.1.3)

Section 5.2: Personnel

- ★ **Management must ensure competence of FSMO staff and reviewers. Competence is assessed by combination of education, training, experience, and demonstrated skills. Certain interpretive and reporting tasks may require individual certification (PE/PG) (5.2.1)**
- ★ **Management responsible for documenting up-to-date status of staff training that includes: training on equipment, techniques, and procedures; training on DI procedures (4.2.8 b); employee signed attestation having read, understood, and will follow latest FSM SOPs and accepted methods (copies of project WP/SAP signature pages) (5.2.2.2)**
- ★ **Management must maintain current job descriptions for managerial, tech and key support functions. Descriptions must include (as appropriate) responsibilities and duties (5.2.4)**
 - Management must establish training goals for staff and evaluate effectiveness of training actions (5.2.2)
 - Management must assure sufficient personnel with necessary qualifications for their assigned functions (5.2.2.1)
 - Subcontractor personnel must be supervised and be competent to perform FSM tasks assigned. Subcontractors performing FSM services must work in accordance with this MP (duplicate of Item 4.5) (5.2.3; 4.5.1)

Section 5.3: Accommodation and Environmental Conditions

- ★ **Procedure to assure that test methods are conducted under environmental conditions that do not invalidate results. For example instrument calibrations should be conducted under conditions similar to field tests. Sampling methods should preserve sample properties to assure representative results (5.3.1)**
- ★ **Field staff must have training to recognize adverse environmental conditions and have authority to stop work in adverse conditions. Responsibility and authority to select different test methods that are compatible with field conditions must be assigned (5.2.1; 5.3.2)**
- Field teams must separate tasks (perform in different areas or different times) that are incompatible and may adversely affect results (5.3.3)
- Access to test areas must be regulated to assure test results are not compromised (5.3.4)
- Procedures to assure good housekeeping in work areas must be employed (5.3.5)

Section 5.4: Methods and Method Validation

- ★ **Procedure to assure methods (sampling, handling, transport, preparation/preservation) are appropriate and will provide suitable data (5.4.1)**
- ★ **Instructions for operation of equipment including calibration are up to date and readily accessible (4.3.1; 5.4.1)**
- ★ **Procedures to evaluate, justify, authorize (include by client) and document all deviations from work plans/ sampling plans (5.4.1). Regulations, established sampling protocols, client DQOs, reference methods shall be followed as applicable (5.4.2.1)**
- ★ **Procedure to assure range and accuracy of method are relevant to client needs/requirements (5.4.5.2; 5.4.5.3)**
- ★ **Procedure to assure e-data software is validated, data are protected (both integrity and confidentiality), and electronic equipment is maintained and operated in proper environmental conditions (5.4.7.2)**
- Procedure to assure that methods and equipment will meet needs of client and are appropriate for the tests/measurements planned. Use standard methods to extent practical (5.4.2)
- Procedure to inform client when non-standard methods employed (5.4.2)
- Statement that FSMO ensures it is using the latest edition of a method unless it is not appropriate to do so (5.4.2)
- Procedures for FSMO to select method when client does not specify the method to be used (4.4.1; 5.4.4)
- Procedure for assigning FSMO-developed methods to qualified personnel with adequate resources (5.4.1; 5.4.3)

- Procedure to assure client agrees with use of any non-standard methods (4.4.1; 5.4.4)
- Procedure for validation of non-standard methods (5.4.5.2)
- Procedure to estimate measurement uncertainty. Procedure shall attempt to make reasonable estimation based on knowledge of method, previous experience, and available validation data (5.4.6.2)
- Procedure for measurement uncertainty should include all components (reference standards, methods and equipment, environmental conditions, matrix properties, and operator) (5.4.6.3)
- Procedure for assuring appropriate systematic checks on all data transfers and calculations (5.4.7.1)

Section 5.5: Equipment

- ★ **Procedure for specifying appropriate equipment in project WP/SAP to perform the required FSM services (5.5.1)**
- ★ **Procedure to assure equipment complies with specifications and is calibrated/checked for functionality and accuracy (5.5.2)**
 - **For company equipment, procedure for identifying current status, include calibration (5.5.2; 5.5.8)**
 - **Procedure for assuring rental equipment complies with specifications (5.5.1)**
- ★ **Procedure to maintain records of equipment maintenance and calibrations. Records should provide name/model (include software as applicable), ID number, current location, checks against specification(s), calibrations, routine maintenance, manufacturer's instructions, damage/malfunctions and repairs (5.5.5)**
- ★ **Procedure for taking defective equipment out of service (5.5.7)**
 - Procedure for assuring appropriate equipment is available to perform the required FSM services (5.5.1)
 - Procedure for assuring attended or unattended equipment will maintain calibration throughout the range of environmental conditions occurring during the period of measurements (5.5.2.1)
 - Procedure to assure that attended or unattended equipment is operated only by authorized (trained) personnel, and that up-to-date instructions are available (5.5.3)
 - Procedure to document, when necessary and practical, uniquely tagged/labeled field equipment (5.5.4)
 - Procedure for equipment handling (storage, transport, preparation, use, planned maintenance) (5.5.6)
 - Procedure for intermediate calibration checks (5.5.6.1; 5.5.10)
 - Procedure to assure proper use of "correction factors" following calibration (5.5.11)
 - Procedure to assure equipment safeguarded from invalid adjustments (5.5.12)

Section 5.6: Measurement Traceability

- ★ **Procedure for documenting internal and external calibrations, standards used, date & time, source of standard(s) (5.6.1; 5.6.2.1.1)**
- ★ **Procedure for equipment calibrations must provide for traceability of standards and records of standards must be retained (5.6.2.1; 5.6.2.1.4 g)**
- ★ **Procedure for calibration of unattended equipment, include procedures for periodic service and methods to quantify instrument drift (5.6.2.1.3)**
- ★ **Procedure for documenting initial calibrations; criteria for acceptance of initial calibration; corrective actions for equipment malfunctioning; description of continuing calibrations (if used) (5.6.2.1.4)**
- Procedure for tracing calibrations to certified reference materials, or to methods or consensus standards that are clearly described and accepted by stakeholders (5.6.2.1)
- Procedure for evaluating data from automated equipment that indicate fouling or drift before reporting to client (5.6.2.1.3)
- Procedure for calibration of FSMO-prepared reference standards, if used (5.6.3.1)
- Procedure to trace FSMO reference standards to SI measurements or to certified reference materials (5.6.3.2)
- Procedure including schedule to check all reference, primary, transfer, or working standards (5.6.3.3)
- Procedure for safe handling, transport, storage and use of reference materials, especially to prevent contamination and deterioration (5.6.3.4)

Section 5.7: Sampling

- ★ **Procedure for assuring a sampling plan, including assuring plan is at the job site. Plan should address factors that can be controlled to ensure validity of the test and calibration results (5.7.1)**
- ★ **Procedure to document sampling activities, including sampling method(s), personnel, environmental conditions, location, date and time, and statistical basis of sampling procedure if used (5.7.1; 5.7.3)**
- Procedure to document client requirements that deviate from documented sampling procedures (5.7.2)
- Procedure to document sample subject, location and time to allow determination of representativeness (5.7.4; 4.13.2.1; 4.13.2.2).
- Procedure to document sampling methods and equipment used (5.7.1; 5.5.1).

Section 5.8: Handling of Test and Calibration Items

- ★ Procedure for transportation, receipt, handling, protection, storage, retention and disposal of samples and test/calibration items. Procedure must protect interests of client (5.8.1)
- ★ Procedure for unique identification of FSM items both in field and in laboratory. Note that in this context “items” includes calibration standards, test specimens, and environmental samples (5.8.2)
 - Procedure to record abnormalities or departure from normal or specified conditions in FSM items (5.8.3)
 - Procedure for contacting customer re: handling of non-conforming FSM items, before proceeding with test/measurement (5.8.3)
 - Procedure for storage of FSM items to avoid deterioration, loss or damage, including special security procedures if warranted (5.8.4)

Section 5.9: Assuring the Quality of Test and Calibration Results

- ★ Establish QC procedures for monitoring validity of results, including regular testing/use of reference materials, personnel proficiency tests, replicate tests, correlation of results for different characteristics of sample/test item (5.9.1; 5.9.2)
 - Procedure for analysis of QC results, including CAPA to correct problem and to prevent reporting incorrect results (5.9.3; 4.9.1; 4.11.1)

Section 5.10: Reporting the Results

- ★ Procedure for reporting findings that are complete, clear/unambiguous, and in accordance with client requirements. A report may contain multiple test results from one site or multiple test results at multiple sites for the same client, as long as test subjects are clearly identified (5.10.1)
- ★ Reports should contain: report title, name and address of FSMO and other testing facility(s), report ID number or date, customer name and address, name/title/address/telephone number of person authorizing the report, list of methods used, description of items tested (including date/time received and tested), discussion of sampling/testing representativeness, all test results w/ appropriate units, and appropriate opinions and interpretations of the results (5.10.2)
- ★ Report should explain deviations from planned test method(s), specific test/environmental conditions, statement of compliance with specifications, estimated uncertainty, information on usability of test results (estimate of completeness, comparability, precision and accuracy) (5.10.3.1)
- ★ Report should contain complete sampling information, description of environmental conditions affecting samples, deviations from sampling

plan (including estimate of representativeness), information on usability of results (estimate of sampling completeness and comparability) (5.10.3.2)

- ★ Records of all calibrations including conditions during calibrations, uncertainty of calibration/compliance with specifications, traceability of standards employed, all calibration results (w/date & time), and corrections to test results due to instrument drift (5.10.4)**
- ★ Report should explain basis of interpretations and opinions; opinions and interpretations should be clearly labeled (5.10.5)**
- ★ Report shall provide, for samples transferred to subcontractor, unique identification and information on handling/testing that might affect quality of results (5.10.6; 5.10.10; 4.13.2.1.1)**
- ★ Report should provide (to extent practical) raw data from unattended monitoring instruments. Report should clearly indicate basis for and amount of any adjustments made to the raw data (5.10.11)**
- Report should provide complete information of sample items, including sample ID, date & time collected and analyzed, sampling methods, sample handling and preservation, proof of chain of custody (if required), analyses performed, and appropriately qualified (flagged) results ((5.10.3.2)
- Report should clearly identify work/ results of subcontractors, including their calibration results (5.10.6)
- Report must conform to these requirements regardless of presentation medium (paper, electronic, facsimile, other) (5.10.7)
- Report should be organized (formatted) to minimize possibility of misunderstanding or misuse (5.10.8)
- Report addenda or amendments must clearly reference the original report, or be provided a unique ID if replacing an original report (5.10.9)