

Activity: **Chemistry Laboratory Practices**

1.0 Purpose: To provide a method to evaluate the conformance of Chemistry Laboratory analytical practices to applicable standards, regulations, procedures and/or instructions.

2.0 Scope: This guideline has been developed for use in the review and evaluation of analytical performance in the chemistry laboratory covering the use of standards, spiked samples, reagents and precision measuring equipment.

3.0 References:

3.1 Regulatory Guide 4.15, Revision 1, February 1979, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) Effluent Streams and the Environment"

3.2 ASTM D3856-80, "Standard Guide for Evaluating Laboratories Engaged in Sampling and Analysis of Water and Waste Water"

3.3 INPO Good Practice CY-702, "Verification of Analytical Performance"

3.4 ASTM C1009 - 1983, "Establishing a Quality Assurance Program for Analytical Chemistry Laboratories Within the Nuclear Industry"

3.5 NRC Inspection Module 83722, "Radiation Protection Plant Chemistry and Radwaste:

Organization and Management Controls"

4.0 Guidelines:

4.1 In preparation for and during the conduct of this surveillance:

- E Obtain and review implementing procedures, instructions and drawings governing this activity.
- E Prepare a guide or checklist using the selected items from this guideline.
- E Review past surveys, audits, surveillances and other evaluations/ assessments.
- E Ensure that checklists include, where applicable, actual observations of performance; general plant conditions, radiological work practices, housekeeping, work document controls and use, and safety practices.

4.2 Observe performance of analytical activities on a schedule designed to include all techniques and instruments and verify use of:

- Approved procedures based on well-established practices.
- Properly prepared reagents.
- Calibrated instruments.
- Qualified analysts.
- QC program.
- Appropriate data recording industry control charts.
- Controlled environments.

4.3 Check the availability of currently approved procedures or instruction addressing the following activities:

- Preparation of solutions/reagents and chemicals.
- Conduct of analyses and tests.
- Calibration and maintenance of equipment.
- Qualification of personnel.
- Documentation and trending of results.
- Quality Control

4.4 Observe the preparation of reagents to check that:

- Current procedures are used.
- Chemicals used to prepare standards have a received date, open date, and obvious expiration date.
- Chemicals used to prepare standards are traceable to EPA, NIST, or other acceptable and reliable source.
- Chemical standards traceability is achievable via documentation from its source.
- Chemicals use for prepare standards have not exceeded their designated shelf life.
- Shelf life assigned to reagent does not exceed the shelf life of any of the constituents
- Measuring apparatus is properly calibrated
- Reagent is stored in a container at a location which will not adversely affect purity or shelf life

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- Demineralized water of the requisite quality is used
- Prepared reagent is properly labeled with name of chemical, concentration, expiration date, preparation date and name of preparer

4.5 Observe the apparatus used in the laboratory analyses and review documentation associated with the apparatus to check that:

E Apparatus used is within calibration date

E Records confirm that apparatus has been maintained in accordance with manufacturer's recommendations or other approved procedures

4.6 Review records to check that personnel performing laboratory analyses have the qualifications appropriate to the activities assigned to perform.

4.7 Observe the implementation of the quality control program. This program may include the use, as appropriate, of the following techniques:

E Reviews of approved laboratory procedures for analysis, calibration, preventive maintenance and operation

E Reviews of records of maintenance and calibration of analytical apparatus

E Reviews of the results of blind, spike and split samples

E Reviews of the use of control charts and functional checks

E Reviews of the results of laboratory cross-checks

E Reviews of chemicals and reagents shelf lives

E Tracking the corrective actions taken when a quality control analysis produces

results outside the allowable control range

4.8 Analytical records should contain the following information:

- E Sample data such as: source of sample, time of collection, name of person collecting, analysts' name, calculations, results of analysis and reviewer's name
- E Calibration data - graphs that are used to determine a value for an instrument reading including instrument identity, date, standards, name of analyst, and results of calibration
- E Quality control charts used to evaluate the performance of laboratory and counting equipment
- E Responses to out of acceptable limit conditions
- E Methods to document out of tolerance equipment

5.0 Other Guidelines for Consideration:

- 5.1 A.1, "General Quality Surveillance Guidance"
- 5.2 B.1, "Calibration of Chemistry Instruments - Process and Laboratory Analysis"
- 5.3 C.2, "Chemistry - Control of Reagents and Solutions"