Activity: **Primary and Secondary Chemistry**

1.0 Purpose: To provide a method to evaluate the conformance of primary and secondary chemistry practices to applicable commitments, standards, regulations, procedures and/or instructions.

2.0 Scope: This guideline has been developed for use in the review and evaluation of Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) chemistry activities associated with the control and monitoring of chemical variables in plant process water. This includes sampling, on-line monitoring, water quality parameters, records and corrective actions associated with parameters outside allowed limits.

3.0 References:

3.1 Regulatory Guide 1.56, "Maintenance of Water Purity in Boiling Water Reactors"

3.2 INPO Good Practice, CY-701, "Quality Control Program for Chemistry Instrumentation"

3.3 Steam Generator Owners Group Water Chemistry Guidelines Committee, "PWR Secondary Water Chemistry Guidelines"

3.4 BWR Owners Group Water Chemistry Guidelines Committee, "BWR Water Chemistry Guidelines"

3.5 Branch Technical Position, MTEB 5-3, Appendix to Standard Review Plan, Section

5.4.2.1, "Monitoring of Secondary Side Water Chemistry in PWR Plants"

4.0 Guidelines:

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

- Obtain and review implementing procedures, instructions and drawings governing this activity.
- Prepare a guide or checklist using the selected items from this guideline.
- Review past surveys, audits, surveillances and other evaluations/ assessments.
- 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.

NOTE:: Refer to Guideline A.1, "General Quality Surveillance Guidance," for specific details on the attributes listed above.

4.2 Parameters which can be routinely monitored may include:

Specific Conductivity	Hydrazine	Carbonate
Cation Conductivity	Silica	Nitrate
Suspended Solids	Copper	Purgable Organics
pH	Iron	Total Organic Carbon
Ammonia	Sodium	Electrochemical Potential
Chloride	Sulfate	Radionuclide Determination
Dissolved Oxygen	Fluoride	Radioactivity Concentration

4.3 Observe a sampling activity to verify that:

- Sampling is performed at the specified time/schedule for the plant status.
- Sample collection points are clearly identified, accessible, shielded and ventilated.
- Approved procedures are used.
- Valve line-ups are correctly performed and checked.
- Purging/Recycle times are followed and representative samples obtained.
- Sampling personnel are knowledgeable of procedures/techniques and critical variables.
- Samples are properly handled to prevent contaminating.
- Ingress of impurities to system sampled is minimized.
- Samples are clearly marked with the location of the collection point, time of collection and name of person taking sample.
- System is returned to normal operating condition and valve line-up checked.
- Proper notification has been provided to the control room prior to, during and after the sampling activities.

4.4 Walk down Reactor Water, Feedwater and Condensate, Cleanup and other systems containing on-line chemistry control and monitoring equipment to verify that the monitoring equipment is calibrated, parameters within limits and that instrumentation and demineralizers are functioning correctly. Check local and remote indicators where ALARA practices allow.

4.5 Observations and walk downs should be made when plant conditions affecting chemistry change. Such plant conditions include; heatup, cooldown, maintenance, wet layup, safety injection, chemical addition, impurity removal, demineralizer resin change, parameters outside control bounds.

4.6 Review chemistry records and logs to verify that data has been properly documented, reviewed, trended and transmitted to records.

4.7 The most common causes of chemistry problems are:

- Contamination of chemical addition
- Air contamination of feedwater
- Condensate polisher malfunctions
- Use of contaminated make-up water
- Air ingress during maintenance
- Leaking of chemicals from demineralizers

5.0 Other Guidelines for Consideration:

5.1 A.1, "General Quality Surveillance Guidance"