

Activity: **Clam (Asiatic) and Slime Control**

1.0 Purpose: This guideline provides a method to evaluate the clam and slime control exercised at nuclear plants.

2.0 Scope: This guideline has been developed for the quality surveillance of clam and slime control in the following areas.

- E Detection
- E Treatment
- E Sampling
- E Reports and Records

3.0 References:

3.1 NRC IE Bulletin 81-03, "Flow Blockage of Cooling Water to Safety System Components by Corbicula SP (Asiatic Clam) and Mytilus SP (Mussel)"

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.

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- 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.

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

4.2 Clam and Slime Detection During Construction

- A. Determine if methods for the detection of clam and slime biofouling have been, or are being, implemented during the construction and startup phases of the raw water systems.
- B. Verify that if a system has been filled with raw water prior to operation, the affected components have been cleaned and all lines back-flushed to rid the system of clams and debris.

NOTE: Preoperational tests should be run with chlorinated water where possible and a sampling plan set up to ensure that the total residual chlorine is maintained per acceptance criteria.

- C. Verify that where construction plant piping is used to supply raw water to permanent plant piping systems, the raw water is chlorinated at the point where it enters the permanent system.

4.3 Clam and Slime Detection During Operations

- A. Verify that the equipment/systems and components using raw * water are being inspected periodically in accordance with the specific plant procedures and that the results are documented.

NOTE: Some of the most prevalent systems include the raw cooling, raw service, essential service, emergency equipment cooling, essential raw cooling, fire protection, etc.

- B. Verify that the following requirements are being met at all plants:

- 1) Continuous flow self-cleaning strainers for clam control should be inspected periodically for damage and proper operation. (This should be done when the intake vertical traveling screens are inspected.)
- 2) Heat exchangers (condensers and equipment cooling units) should be removed from service and cleaned out at the first opportunity (consistent with equipment operability requirements) when indications of impaired flow are noted.
- 3) The condenser circulating water system must be inspected on a regular basis to assess the level of Asiatic clam infestation.

4.4 Treatment Systems

- A. Observe whether the raw water systems are being controlled by chlorination during periods of larval clam dissemination (usually May through October).

NOTE: Both clams and slime are controlled mainly by chlorination; however, the methods and dosages differ. Also, clams are primarily in the raw water systems, where slime is in the condenser cooling systems.

B. Observe several raw water treatment (chlorination) locations for clam control and verify the following (see paragraph 4.7 for typical systems to survey):

- 1) The chlorination addition and/or injection points have been established.
- 2) One thirty-second inch automatic backwash type strainers have been installed and are functional. (Chlorination for clam control is not effective without these strainers.)
- 3) Continuous chlorination is being applied during the required periods.
- 4) Safe handling use and control practices of chlorine at the injection locations are evident.

C. Observe the treatment stations that are in place for slime control in the condenser cooling water systems and ensure the following is being done:

- 1) Injection of chlorine is added at the stipulated points.
- 2) The recommended dosages of chlorine are adhered to.
- 3) The schedule of injections is followed, e.g., each day for one hour.

D. Determine if dredging for clam removal is or has been employed and if so dredging is not used as a substitute for chlorination.

4.5 Sampling

- A. Determine from samples taken if the total residual chlorine is being maintained at the specified levels for clam control (0.6 to 0.8 ppm).

NOTE: Total residual chlorine (TRC) should be measured at the effluent of the system. In many systems, it will not be possible to identify a single or limited number of effluent points. In those instances, total residual chlorine should be measured at remote points in the system located such that it could be reasonably concluded that the proper residual had been established throughout the system.

- B. Observe the sampling process and determine whether the following is being done:
- 1) An acceptable device or method for measuring TRC is being used. (Use of an amperometric titrator for determining chlorine residual is recommended.)
 - 2) Verify that, where required, equipment/devices used in the chlorination process have current calibration dates and the personnel involved are knowledgeable of the equipment being used and how to interpret readings.
 - 3) Observe that in the event the TRC has dropped below specified levels at any point in the system, chlorinated water is added until the residual is reestablished.

NOTE: For stagnant systems, under certain conditions it may not be necessary to reestablish a chlorine residual which has decayed below the specified level.

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If a system has been filled with raw water which has been chlorinated and if the system is then maintained in a stagnant condition with no raw water makeup, additional chlorination is not required provided the specified residual has been maintained per the acceptance criteria.

- 4) Samples are taken periodically as appropriate.

4.6 Reports and Records

Verify that the inspection reports and systems records are being maintained as follows:

- A. Heat exchanger inspection reports should be retained by the responsible plant section for equipment history files.
- B. Containment cooling water conduit inspection reports should be retained by the responsible plant section for equipment history files.
- C. Records of systems silt accumulation and clam infestation should be retained by responsible plant sections.

5.0 Other Guidelines for Consideration:

5.1 A.1, "General Quality Surveillance Guidance"