GULF STATES UTILITIES COMPANY
POST OFFICE BOX 2951 • BEAUMONT, TEXAS 77704
AREA CODE 713 838-6631

August 21, 1984
RBG- 18,715
File Nos. G9.5,
G9.33.1

Mr. Karl V. Seyfrit, Director
U. S. Nuclear Regulatory Commission
Region IV, Office of Inspection and Enforcement
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Dear Mr. Seyfrit:

River Bend Station Unit 1
Refer To: RIV
Docket No. 50-458/I&E Bulletin 81-03

This letter is to provide an update to previous responses to I&E Bulletin 81-03, "Flow Blockage of Cooling Water to Safety System Components by Corbicula sp. (Asiatic Clam) and Mytilus sp. (Mussel)". As was previously noted, River Bend Station (RBS) will rely on an integrated program of prevention and detection to avoid and minimize Corbicula fouling problems in systems using Mississippi River water.

Historical data for Corbicula in the river near the site exist from Louisiana State University (LSU) studies performed for Gulf States Utilities Company (GSU). Twelve years of data exist for substrate-associated juveniles and adults. Eleven years of data exist on drifting juveniles in these same areas. Review of these data indicates that:

- Benthic (substrate-associated) Asiatic clams have been encountered somewhat less frequently, and in generally lower numbers per unit area, in the late-1970's and early-1980's than during the baseline studies of the early- and mid-1970's.

- Sampling of drifting larvae and early juveniles has suggested that, in some years at least, there are two peaks of abundance (June and August). This presumably reflects a bimodal spawning pattern such as has been observed in other streams of the southern U.S.

- Adult and larger juvenile clams appear to be more abundant along the west side of the river.

IE11

Based on all observations taken since 1980, the substrate in the immediate vicinity of the proposed intake (and of the intake embayment in general) has so far been colonized by extremely low numbers of Corbicula. Routine monthly Peterson grab samples have yielded density estimates ranging from 0-5 per square meter with an overall mean of 1 per square meter at this location. Two years of samples of microzooplankton exist which include Corbicula larvae. Preliminary indications are that, relative to the river channel, densities of drifting larvae in the intake embayment are quite low.

Our program of detection includes sampling for Corbicula in the intake embayment and in the river near the site. Sampling for larger juveniles and adults will be continued monthly in the intake embayment. Sampling for planktonic early life stages using 150-micron mesh gear will be conducted semimonthly (April to October) or monthly (November to March) in the river channel near the embayment.

Sampling for planktonic early life stages will also be conducted semimonthly (April to October) or monthly (November to March) in the clarifier influent line to determine the quantities entrained in the makeup water. Although these life stages are the most likely to be entrained, the clarification equipment is expected to remove most, if not all, of these planktonic clams. Therefore, most of the sampling effort will be devoted to weekly (April to October) or monthly (November to March) samples of the clarifier discharge using 150-micron mesh nets. In addition, sampling for larger juveniles and adults will be conducted monthly in various exposed portions of the circulating water system such as the cooling tower basins.

These sampling programs described above will begin upon start-up of the cooling tower makeup water system (initial introduction of river water into the plant is estimated to be in February, 1985) and will continue through two complete clam reproductive seasons beyond commercial operation. At the end of this period there will be data reflecting: 1) ambient densities of larvae in the river; 2) numbers of larvae entrained by the plant intake water; and 3) numbers of larvae introduced into the plant service and circulating water systems (i.e. clarifier performance). If, as expected, from clarifier discharge and cooling tower basin sampling, service water component performance trending, and maintenance inspections, minimal or no Corbicula infestation of the plant is indicated, an appropriate reduction in intensity of the sampling program will be considered. Even under such a reduced program, however, monitoring of clam populations in the river, and semimonthly or monthly sampling of the clarifier discharge will be maintained.

If the in-plant sampling program mentioned above indicates that clams have been introduced into the service and circulating service water systems, emphasis in monitoring will immediately shift to address:

- the adequacy of the chlorination program and modifications, as appropriate;

- the ecology of the clams in the plant (i.e. spatio-temporal distribution, growth, and reproduction); and

- the relationship(s) between the numbers of clams observed and biofouling problems.

The exact modifications of monitoring to address these three interrelated aspects will depend on many factors, but would generally involve intensifying in-plant sampling (with corresponding reduction of effort in the river and clarifier influent line) and other considerations, as appropriate.

In addition to monitoring and sampling for Corbicula, our present plans are to utilize instrumentation to detect the deterioration of flow (possible blockage by clams) across heat exchangers in the service water system. A listing of the safety-related systems normally served by the service water system and the instrumentation to be used for each is identified in Attachment 1. Operators will monitor the permanent instrumentation daily and will record the readings on their Daily Operating Log. If it is detemined that a particular reading has exceeded its prescribed limits, that reading will be brought to the attention of the Shift Supervisor.

The Technical Staff group will review the Daily Operating Logs on a periodic basis and perform calculations to detect component fouling on a monthly basis for those components in service or having just been in service. The results of these calculations will be plotted as part of the trending program associated with the River Bend Important to Reliability Program. Using the trending program, it will be possible to predict when any particular component will exceed its desired performance capabilities. Upon an excessive instrument reading or indication from the trending program of a component's degraded heat exchange capability, the component will be removed from service, opened, and visually inspected for evidence of Corbicula fouling.

The tubesheets and water boxes of the safety-related heat exchangers within the service water system are generally not of copper-nickel material composition. The exceptions, the RHR heat exchangers and the emergency diesel generator coolers, do not rely on differential pressure across the inlet and outlet water boxes for determining fouling. The trending program utilizes a heat balance calculation to determine heat exchanger efficiency for these components. This precludes problems similar to those discussed in I&E Notice 81-21 in which it was recognized that diffential pressure could give a false indication of cooling water flow through the heat exchanger tubes upon flow blockage by Corbicula.

Attachment 1 also indicates the schedule by which visual inspections of safety related components for fouling will be conducted in accordance with our preventive maintenance program. If evidence of fouling is noted, the system will be flushed and the clams and clam debris will be removed prior to putting the component back in service. Also if any component is found to contain adult clams large enough to foul heat

exchangers, the performance testing of all other safety-related components served by the service water system will be conducted within seven days. If performance parameters exceed their prescribed limits, the component(s) will be opened for inspection. Additionally, the trending frequency will be increased in accordance with the Important to Reliability Program at River Bend.

The first level of prevention of infestation by Corbicula is the exclusion of adult clams from entrainment in the makeup water by wedge wire screens mounted on each suction pipeline. A clarifier for the removal of suspended matter from the makeup water is expected to remove a majority, if not all, of the larval Corbicula. However the primary level of prevention will be accomplished by the continuous chlorination at the normal service water pumps discharge. Although operating experience will eventually determine the appropriate dose rates, a total residual chlorine concentration of 0.6 to 0.8 ppm is initially targetted. This residual concentration will be measured by instrumentation at the outlet of the service water system prior to mixing with the condenser circulating water flow to the cooling towers.

The monthly rotation of redundant safety-related components into service will ensure that the contained water will be periodically exchanged with freshly chlorinated water. Operation of intermittent flow systems in this manner will prevent Corbicula from surviving and growing to fouling size. This will also provide the operational input for the calculations used in the component performance trending program described above.

In conclusion, the programs of detection and prevention described in this letter should be effective in controlling biofouling problems by Corbicula.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/JWC/lp

Attachment

cc: Service List (attached)

ATTACHMENT I
AFFECTED SAFETY RELATED COMPONENTS
(IN EACH CASE TUBE SIDE FLOW IS SERVICE WATER)

1. Fouling Determination Done By: Heat Balance

   Observed Parameters: Shell Side Inlet and Outlet Temperatures
   Tube Side Inlet and Outlet Temperatures
   Tube Side Flow

   Preventative Maintenance Schedule: Inspect Each One Every Refueling Outage

   Components: Emergency Diesel Generator Coolers (3)

   Residual Heat Removal Heat Exchangers (4)

2. Fouling Determination Done By: Flow Versus ΔP Constant

   Observed Parameters: ΔP Across Tube Side
   Flow Through Tubes with Temporary Instrumentation

   Preventative Maintenance Schedule: Annual Inspection, One Component Per Month

   Components: Auxiliary Building Unit Coolers (11)

   Preventative Maintenance Schedule: Annual Inspection, One Component Every Six Months

   Component: Penetration Leakage Control Compressor After Coolers (2)

3. Fouling Determination Done By: Flow Versus ΔP Constant

   Observed Parameters: ΔP Across Tube Side
   Flow Through Tubes with Permanent Instrumentation

   Preventative Maintenance Schedule: Annual Inspection, One Component Each Quarter

   Components: Control Building Water Chiller Condensers (4)

4. Fouling Determination Done By: Temperature Observation

Observed Parameters: Compressor Performance, Run Periodically to Verify Adequate Performance

Preventative Maintenance Schedule: Annual Inspection, One component Each Six Months

Components: Penetration Leakage Control Compressors (2)