UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Gulf States Utilities Company, *et al*.	)	Docket No. 50-458
	)	
(River Bend Station)	)	

TESTIMONY OF JOHN V. CONNER, PHILIP D. GRAHAM, AND JOANNE G. MORRIS, GULF STATES UTILITIES COMPANY, REGARDING ASIATIC CLAMS (CORBICULA)

Contention 1 as admitted by the Atomic Safety and Licensing Board states:

> Applicant has failed to provide adequate assurance that River Bend Station components and systems relying on Mississippi river water for their operation will be adequately protected against infestation of Asiatic clams (*Corbicula Leana*).

1. My name is John V. Conner. I am Supervisor-Environmental Services Group for Gulf States Utilities Company. In that capacity, I am responsible for management of all non-radiological environmental monitoring at River Bend Station. A statement of my professional qualifications is attached hereto and incorporated herein by reference for all purposes.

2. My name is Philip D. Graham. I am Assistant Plant Manager-Services for Gulf States Utilities Company. In that capacity, I am responsible for providing technical and

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administrative support for the operation and maintenance of the River Bend Station. A statement of my professional qualifications is attached hereto and incorporated herein by reference for all purposes.

3. My name is Joanne G. Morris. I am a Mechanical Engineer in the Nuclear Plant Engineering Group for Gulf States Utilities Company. In that capacity, I am responsible for the mechanical design of a number of systems including the Normal Service Water, Standby Service Water, and Circulating Water Systems at the River Bend Station. A statement of my professional qualifications is attached hereto and incorporated herein by reference for all purposes.

4. This testimony addresses the three major aspects of Contention 1. First, it describes the biology of the Asiatic clam. Next, it discusses the systems and components of River Bend Station which could be affected by the presence of Asiatic clams. Last, it describes the programs to be undertaken by Gulf States Utilities Company in order to detect and control any such clams in the River Bend Station.

5. The Asiatic clam is a type of small shellfish believed to have been introduced to the northwest corner of the United States during the late 19th century. There has been confusion about the identity of the clams, and a few biologists think that two closely-related species may be involved. However, most American experts on these clams believe that only a single highly-variable species is

present, and that its most appropriate technical name is Corbicula fluminea.

6. Corbicula is now known to inhabit 35 of the contiguous United States. By the early 1950's, Asiatic clams had spread southward throughout most of the Pacific coastal drainages and were recognized as pests in irrigation and other water supply systems of southern California. At that time, Corbicula was not reported to be east of the Rocky Mountains. In 1957, the condensers and service water systems of the Shawnee Steam Plant, located on the Ohio River near Paducah, Kentucky, were found to be infested with Corbicula. This population is considered to be the second major "epicenter," or point of inoculation, for the spread of Corbicula in the U.S. Within a few years, the Asiatic clam was noticed in the lower Mississippi River in the State of Louisiana.

7. Based on experience in other Gulf coastal rivers and other parts of the Mississippi, one would expect Corbicula to be a member of the bottom fauna of the Mississippi River near St. Francisville. While Corbicula have been found there, the densities observed so far have been somewhat lower and less stable than expected.

8. Asiatic clams are robust, thick-shelled bivalve mollusks that are roughly triangular when viewed from the side (i.e., their least outside dimension is only slightly smaller than the greatest). They are quite variable in

color; usually they appear coppery, greenish-yellow, or brownish-yellow, and tend to become darker with age.

9. Depending upon acclimation, individuals of *Corbicula fluminea* are capable of surviving in low to moderate salinities (up to 22 parts per thousand), but the young seem to be rather less tolerant. Consequently, the species is generally considered to be a freshwater form. In freshwater, Asiatic clams are able to adapt to a wide variety of natural and manmade environments, although they seem to be more successful in moving water than in quiet water.

10. *Corbicula* are typically "infaunal" or burrowing in habit. Although reported from many types of substrates, they appear to prefer sands and gravels in streams. The primary mode of feeding is by filtration.

11. Besides drainage divides and salt water, the only major barrier to the natural spread of *Corbicula* in North America appears to be an intolerance of low winter temperatures, demonstrating an absolute lower thermal limit for *Corbicula fluminea* of 2°C (36°F).

12. Although known to attain shell lengths (SL) as great as 60 mm (2.5 inches), most *Corbicula* grow to only about 25-35 mm (1.0-1.3 inches). Sexual maturity is achieved at 7.5 mm SL (3/8 inch) in some individuals, but about 10 mm (7/16 inch) appears to be the more typical size at initial maturity. In any case, growth during early life is fairly rapid, and most *Corbicula* (especially in southern

U.S. populations) seem to reach a size at which maturity is anatomically possible during their first calendar year of life. Occasional individuals may live up to four years, but the normal life-span of Asiatic clams in southern rivers is about two years.

13. Corbicula fluminea is monoecious (hermaphroditic), which means that each individual is capable of producing both eggs and sperm. The species has been described as a protandric consecutive hermaphrodite, meaning that a given clam normally functions first as a female and later changes into a male. However, some have referred to this clam as a simultaneous hermaphrodite (i.e., capable of producing eggs and sperm at the same time). Whether or not Corbicula actually engage in self-fertilization (and, if so, to what degree) has been the subject of debate, but the capability to do so has been amply demonstrated. The self-fertilization issue is important because it bears on the question of whether a single clam can initiate or sustain a colony.

14. Once fertilized, the developing embryos and early larval stages are incubated (brooded) inside special pouches in the adult clam's inner gill. Development and growth proceed inside the parent until the young clams are about 0.2 mm SL (0.008 inch) and have acquired their bivalved shell and a muscular organ known as the "foot." Due to the presence of this foot, Corbicula larvae at this stage are technically known as pediveligers. The process

simplistically referred to as "spawning" in Asiatic clams is the liberation of pediveligers from the parent. The young, which have been incubating in a specialized part of the respiratory system, are exhaled via one of the breathing tubes (siphons).

15. By virtue of its foot, a pediveliger is capable of crawling, and presumably burrowing, as are the older individuals. Although some literature on Corbicula refers to the pediveliger as a "swimming" stage, it is unlikely that this larva is capable of intrinsically-directed locomotion when not in contact with a surface. Nonetheless, when subjected to turbulence, pediveligers behave like any tiny particles in liquid and can be carried great distances by currents before settling out on substrates. The clam becomes substrate-associated in a period of a few hours to a few days of release from its parent. This drifting of pediveligers, and, indeed, of juveniles up to 5 mm SL (3/16 inch) given sufficient turbulence, is generally accepted to be the basis for the extensive and rapid downstream dispersal of Corbicula populations in rivers. It is also the primary mechanism whereby Asiatic clams gain access to industrial cooling and service water systems.

16. The young clams are considered "juveniles" from about 0.5 mm SL (0.02 inch) until attainment of sexual maturity. Juvenile Corbicula can produce "byssal threads," or holdfast organs, not unlike the threads produced by spiders. The byssal thread, muscular foot, and ability to

burrow in substrates all enable young <u>Corbicula</u> to rapidly assume a benthonic existence, even in moving water.

17. Reproduction of <u>Corbicula</u> in the U.S. appears to be closely related to temperature, with spawning essentially limited to those periods when the water is over 16°C (60°F). For most Gulf coastal streams, this affords the Asiatic clams a breeding season of 9-10 months, but in the lower Mississippi River temperatures ordinarily remain below 16°C from November through March. Although some reproduction occurs throughout the period encompassing appropriate temperatures, many U.S. populations of <u>Corbicula</u> exhibit a bimodal pattern of spawning. That is, there are two pronounced peaks of larval release (late spring/early summer and late summer/early autumn). During these spawning peaks, an individual clam may release several hundred pediveligers per day.

18. <u>Corbicula</u> (living and/or dead shells) cause problems by their obstruction of water flow. Flow is impeded by the clogging of orifices and/or by increased friction on surfaces that would ideally be smooth. Attachment of clams to surfaces, or the passive accumulation of living <u>Corbicula</u> and/or their shell debris, can interfere with heat-transfer processes.

19. Historical data for <u>Corbicula</u> 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:

a. 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.

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

c. Adult and larger juvenile clams appear to be more abundant along the west side of the river in the area of River Bend.

20. Based on all observations taken since 1980, the substrate in the immediate vicinity of the proposed River Bend Station intake (and of the intake embayment in general) has so far been colonized by extremely low numbers of Corbicula. Routine monthly Petersen 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.

21. Several industrial users in the vicinity were contacted to determine whether they have observed clams in their systems using river water. Big Cajun No. 2, a power plant in operation since 1980 directly across the river on the west shore, has not observed evidence of the clam within their river water cooling systems and has had no fouling problems. The design of two of the Big Cajun units is similar to that of River Bend Station in that the units use clarified chlorinated river water for auxiliary and condenser cooling.

22. Also relevant is the experience of Crown-Zellerbach, a paper mill which is located on the east shore two miles downstream of the River Bend Station intake. This facility generates its own electricity. Crown-Zellerbach circulates more river water through its plant than River Bend, and takes its makeup water suction from a position in the river nearer the bottom where Corbicula would be more likely to be found. They reported to Gulf States that in 17 years they had never observed even a single clam in any internal plumbing at their facility. If, indeed, Crown-Zellerbach entrains pediveligers, then their clarifiers (very much like the clarifier at River Bend Station) and/or continuous low-level chlorination must be entirely effective.

23. Considering the River Bend intake design and clarification equipment described below, the only possible means by which Corbicula could enter River Bend Station

would be by entrainment of pediveligers. Adult clams could not pass through the intake screens or clarifiers.

24. There are three systems at River Bend Station that could potentially be affected by Asiatic clams, inasmuch as they utilize water from the river - the Cooling Tower Makeup Water System, the Circulating Water System and the Normal Service Water System. See Figure 1. The Cooling Tower Makeup Water System could potentially act as the physical pathway for the Asiatic clam to be introduced into the Circulating Water System and to the Normal Service Water System. There are safety-related components only within the Normal Service Water System. Although it is in GSU's interest to protect the Makeup Water System and the Circulating Water System from an availability standpoint, Asiatic clam infestation is a safety concern only in the Normal Service Water System.

25. The Cooling Tower Makeup Water System is designed to supply approximately 14,000 gpm of clarified water to the circulating water flume.

26. Mississippi River water enters the Cooling Tower Makeup Water System through one of two conical shaped wedgewire screen units which are constructed to screen all material greater than 1.5 x .75 inches. One 36 inch diameter intake line for each screen unit conveys water to the makeup pumphouse. In the pumphouse, the intake lines join at a common header to two makeup water pumps.

27. A makeup water pump supplies the raw river water to a clarifier which is sized to handle makeup water flow. The clarifier is a Graver solids-contact type treatment unit. Raw water is mixed with a polyelectrolyte and recirculated floc and enters the clarifier unit. The water is retained and mixed to permit the chemical and colloidal process to proceed to completion so that by the time the water passes into the outer settling zone, floc particles have formed and separated cleanly. The clear water rises and is uniformly collected over a substantial portion of the surface. The design specification for the clarifier is that average suspended solids shall not exceed 10 ppm. Any adult clams which reach the clarifier will be trapped within the clarifier along with suspended solids and transferred back to the Mississippi River. It is expected that the clarifier will also be effective in removing most, if not all, larvae. Water from the clarifier is supplied to a flume from which the circulating water and service water pumps take suction.

28. The Circulating Water System dissipates heat from the main condenser and provides the necessary heat sink for the Normal Service Water System. The system consists of four multicell cooling towers, four 25% capacity circulating water pumps and associated piping. Design flow for the Circulating Water System is approximately 510,000 gpm. The water chemistry for the Circulating Water System is controlled in order to minimize biofouling. This is accomplished by the injection of sodium hypochlorite solution

periodically into the discharge of the circulating water pumps downstream of the blowdown header to the Mississippi River. Blowdown is approximately 2200 gpm.

29. The Normal Service Water System provides cooling water to remove heat from turbine and reactor plant auxiliary systems and components during all modes of normal plant operation. During a loss of the Normal Service Water System, the Standby Service Water System goes into operation supplying safety-related components which normally use normal service water. The Normal Service Water System consists of three 50% pumps which take suction from the circulating water flume. Design flow for the Normal Service Water System is approximately 51,000 gallons per minute. The pumps discharge into a common header where the system is continuously chlorinated to prevent biofouling. Outside of the turbine building, the common header branches into two headers, one to the turbine and radwaste buildings, the other to the auxiliary, diesel generator, control and reactor buildings. The second branch supplies all safety-related components of the system as well as certain non-safety systems which would be isolated during Standby Service Water System operation if required. Automatic isolation of the Normal Service Water System supply and return headers allows standby service water to supply the auxiliary, control, diesel generator and reactor buildings.

30. The Standby Service Water System consists of the standby service water cooling tower and four 50% capacity

pumps. The pumps take suction from the standby cooling tower and supply well water from the basin to all safety-related service water components as well as some non-safety related components which are isolated if required. During functional testing of the Standby Service Water System, there may be a potential for water from the Normal Service Water System to enter the Standby Service Water System. Chlorination of the Standby Service Water System would be used to prevent the survival of any Corbicula which may be present.

31. GSU's 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 plankton nets will be conducted semimonthly (April through October) or monthly (November through March) in the river channel near the embayment.

32. Sampling for planktonic early life stages will also be conducted semimonthly (April through October) or monthly (November through 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

through October) or monthly (November through March) samples of the clarifier discharge using plankton nets.

33. 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.

34. The 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).

35. 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 detection program will be made.

36. Even under a reduced program, however, monitoring of clam populations in the river, and semimonthly or monthly sampling of the clarifier discharge will be maintained.

37. If the sampling program described above indicates that clams have been introduced into the Service and

Circulating Service Water Systems, emphasis in monitoring will immediately shift to address:

a. The adequacy of the chlorination program and modifications to it, as appropriate;

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

c. 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 sampling downstream of the clarifier (with corresponding reduction of effort in the river and clarifier influent line).

38. In addition to monitoring and sampling for Corbicula, GSU will utilize instrumentation to detect the deterioration of flow (possible blockage by clams) across heat exchangers in the Normal Service Water System. A listing of the safety-related systems normally served by the Normal 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 the Daily Operating Log. If it is determined that a particular reading has exceeded its prescribed limits, that reading will be brought to the attention of the Shift Supervisor.

39. The Technical Staff group will review the Daily Operating Logs on a periodic basis and perform trending to

detect component fouling on a monthly basis for those components listed in Attachment 1. Using the trending program, it will be possible to predict when any particular component will exceed its desired performance capabilities. Upon receipt of 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.

40. The tubesheets and water box dividers 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.

41. Attachment 1 provides the schedule by which visual inspections of safety related components for fouling will be conducted in accordance with GSU's preventive maintenance program.

42. 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 components served by the service water system and listed in Attachment 1 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.

43. Most adult clams will be excluded from entrainment in the makeup water by wedge wire screens mounted on each suction pipeline. The clarifier for the removal of suspended matter from the makeup water is expected to remove a majority, if not all, of the Corbicula. The continuous chlorination at the normal service water pump discharge header will serve as yet another level of prevention of infestation by Corbicula. Although operating experience will eventually determine the appropriate chlorine feed rates, a total residual chlorine concentration of 0.6 to 0.8 ppm is initially targeted. 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.

44. The monthly rotation of normally-operating 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.

45. To avoid fouling problems following initial introduction of river water or following outages, the Normal Service Water System will be operated such that adequate chlorine levels are maintained continuously during these periods. The monthly rotation of normally-operating redundant safety-related components into service will further assure that the plant will not be started (or restarted) with existing fouling unknown to the operators.

46. These detection and prevention programs and the facility's design provide reasonable assurance that GSU will be effective in controlling biofouling problems by Corbicula.

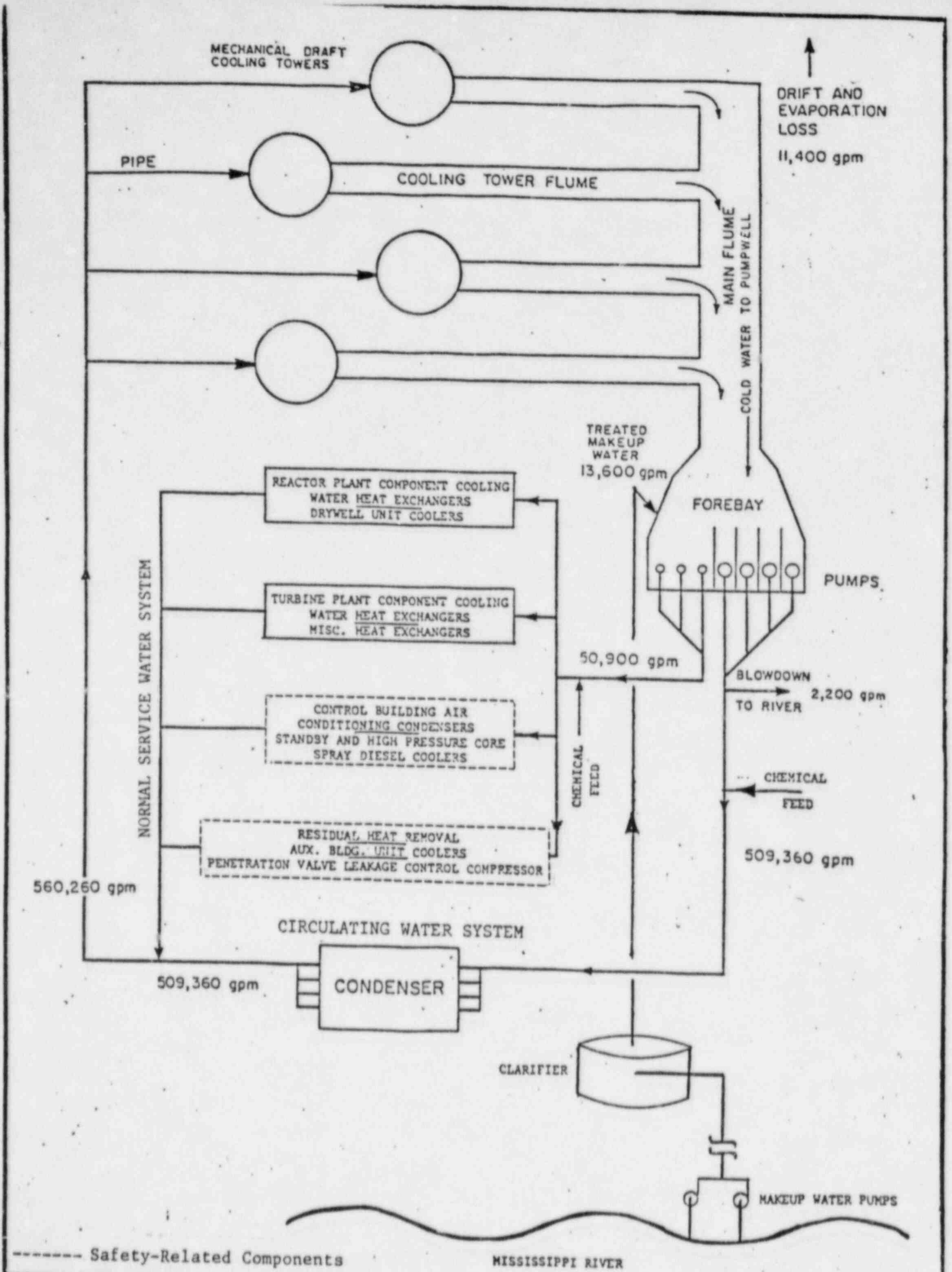

Figure 1. RBS SYSTEMS SUPPLIED WITH MISSISSIPPI RIVER WATER

RESPONSIBILITIES OF WITNESSES FOR TESTIMONY CONCERNING CONTENTION 1 (ASIATIC CLAMS)

John V. Conner	Paragraphs 1, 4-23, 31-37, 43 and 45-46
Philip D. Graham	Paragraphs 2, 4, 24, 30, and 38-46
Joanne G. Morris	Paragraphs 3, 4, 24-30, 38, 40, 43 and 46

PROFESSIONAL QUALIFICATIONS

John V. Conner
Supervisor
Environmental Services Group
River Bend Station
Gulf States Utilities Company

My name is John V. Conner. My business address is P.O. Box 220, St. Francisville, LA 70775. I am the Supervisor - Environmental Services at Gulf States Utilities Company's (GSU) River Bend Station. As such, I supervise a group of scientists and technicians responsible for onsite management of programs related to interactions of the power plant with its natural surroundings. Such programs include activities related to regulatory compliance; fulfillment of licensing commitments; and support of construction, start-up and testing, and operations.

I attended Texas A&M University from 1959 to 1964 and received a Bachelor's Degree in Wildlife Management (Fisheries Option) in 1964. I continued my studies at Texas A&M and received a Master's Degree in Wildlife Science in 1966. I attended Tulane University from 1970 to 1977 and received a Doctor of Philosophy Degree in Biology in 1977. Additionally, I have taken courses or received specialized training in environmental chemistry, radiochemistry, remote sensing, industrial water treatment, dispersion meteorology, environmental regulations, and hazardous waste management.

While a graduate student at Texas A&M, I was appointed in 1965 to a junior faculty position with various teaching, research, and extension duties. My primary responsibilities were to teach ichthyology and fisheries management courses and to supervise field and lab work for two major research projects on reservoirs and estuaries. In 1969, I was sent to East Pakistan as a fisheries advisor under a contract between the U.S. Agency for International Development (USAID) and Texas A&M. While in East Pakistan, I assisted in the development of courses and curricula in fisheries science and technology at the provincial agricultural university; helped with the design and implementation of small-scale fisheries research projects; and temporarily served as liaison between USAID and Pakistani government fisheries agencies. I returned from Asia in 1970 and, after one and a half years as a fulltime graduate student, I became an assistant professor of fisheries at Louisiana State University (LSU) in 1972. At LSU my main responsibility was to direct the baseline and interim phases of aquatic ecological monitoring for River Bend Station under a contract with GSU. These studies involved sampling and analyses of water quality, plankton, drifting macroinvertebrates, benthic macroinvertebrates, and fishes in a 10-mile reach of the Mississippi River, floodplain swamps, and upland streams. In 1975, I studied the distribution and abundance of larval fishes in lower Toledo Bend Reservoir as a private consultant and took a leave of absence from LSU to participate in a USAID-sponsored nutrition improvement project in west Africa. In 1981, I was employed part-time as a fisheries research biologist by the U.S. Army Corps of Engineers Waterways Experiment Station to analyze and interpret data from various studies of the Mississippi River. In 1982, I was employed by GSU as a non-radiological environmental specialist and in 1983 I was appointed to my present position.

I am a member of the American Fisheries Society (AFS), the American Society of Ichthyologists and Herpetologists, the Association of Southeastern Biologists, and the Southeastern Fishes Council. I am a Certified Fisheries Scientist (AFS No. 1426) and have authored or co-authored more than 40 publications dealing with fishes and aquatic ecology.

PROFESSIONAL QUALIFICATIONS

Philip D. Graham
Assistant Plant Manager-Service
River Bend Station
Gulf States Utilities Company

My name is Philip D. Graham. My business address is P.O. Box 220, St. Francisville, LA 70775. I am the Assistant Plant Manager-Services of the Plant Staff at River Bend Station. As Assistant Plant Manager-Services, I supervise a groups of engineers and administrative personnel responsible for providing technical and administrative support activities for River Bend Station.

I attended Old Dominion University, Norfolk, VA, from 1967 to 1973 and received a Bachelor's Degree in Electrical Engineering in 1973. Additionally, I have taken various courses in nuclear engineering, reactor operations, codes, nondestructive examinations, and Quality Assurance.

After graduating from Old Dominion University in 1973, I joined the Navy's Nuclear Power Program. After receiving a commission, I attended Naval Nuclear Power School and the S5G prototype where I qualified as an Engineering Officer of the Watch (EOOW). Following training, I was transferred to the USS Shark (SSN 591) where I remained for three and one-half years. While on the Shark, I qualified as an EOOW and Officer of the Deck, participated in a refueling overhaul, and made two deployments. I served in the capacity of Electrical Division Officer, Auxiliary Division Officer, Communicator and Electronics Officer. I left the Navy in November 1978 and joined the U.S. Nuclear Regulatory Commission as an Operations Reactor Inspector. I attended the NRC's training programs for BWR's and performed inspections at operating nuclear power plants in the areas of operation, maintenance, refueling, start-up, and quality assurance. I remained with the NRC until February 1980, and then joined Gulf States Utilities (GSU) at the River Bend Station. While with GSU, I have held positions as the Supervisor, Operations QA; Technical Assistant to the Senior Vice President; Director-QA; and Assistant Plant Manager-Services. Quality Assurance responsibilities included developing the Operations QA Program description; and directing audits, inspections, and reviews of construction, design, procurement, and operation activities. As a member of Plant Staff, my groups are responsible for developing the technical and administrative programs required to support operation and maintenance of River Bend Station.

I am a member of the American Nuclear Society and the American Society for Quality Control.

PROFESSIONAL QUALIFICATIONS

Joanne G. Morris
Mechanical Engineer
Nuclear Plant Engineering Group
Gulf States Utilities

My name is Joanne G. Morris. My business address is Edison Plaza, Beaumont, Texas 77704. I am a Mechanical Engineer in the Nuclear Plant Engineering Group at the corporate offices of Gulf States Utilities Company. The Nuclear Plant Engineering Group is responsible for the design and design control of the River Bend Nuclear Power Station.

I attended Millersville State College from 1977 to 1980 and received a Bachelors Degree in Physics in 1980. I also received a Masters Degree in Mechanical Engineering, specifically Energy Engineering, from Catholic University of America in 1982.

While attending Millersville State College, I spent summers working in engineering groups of the U.S. Department of Transportation, the U.S. Department of Defense and General Electric's North Carolina Fuel Fabrication Plant. While working toward my Masters degree, I was employed as a Research Assistant in the Civil Engineering Department at Catholic University of America.

After graduating in 1982, I worked for Gulf States Utilities Company in the Project Engineering Group for the

River Bend Nuclear Group. My responsibilities included review and evaluation of system Problem Reports from the River Bend Start-Up and Test Group and evaluation of any design change or non-conformance on any system within my responsibility area. In 1983 I began work with the Nuclear Plant Engineering Group. This group was newly formed to have ultimate responsibility for design and design control of the River Bend Power Station. My assignments as a Mechanical Engineer within Nuclear Plant Engineering include responsibility for the mechanical design of the Normal Service Water, Standby Service Water, and the Circulating Water Systems at River Bend Station. I am also responsible for Licensing support on I&E Information Notices, Bulletins and Generic Letters as they apply to my system responsibilities. These include generic issues such as Intergranular Stress Corrosion Cracking and Flow Blockages of Cooling Water by Corbicula.

I am qualified as an Auditor in accordance with GSU Quality Assurance Procedure - 1.3. I am a member of the American Society of Mechanical Engineers and I have held offices in the National Society of Physics Students.