NATIVE FRESHWATER MUSSELS (UNIONACEA) AS FOULING AGENTS IN ELECTRICAL GENERATING PLANTS

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ABSTRACT

The occurrence of native freshwater mussels (Unionacea) as fouling agents in the water supply system of an electrical-generating plant is reported. Details of the reported problem and discussion of the likelihood of similar occurrences in additional generating plants are presented.

While the Asiatic clam, *Corbicula fluminea*, is well-known as a fouling agent in electrical generating plants (Mattice, 1977; Smithson, 1981), native unionids have not been implicated in similar situations. Absence of unionids in water distribution systems has been attributed to lack of byssus attachment (see Ingram 1953). Herein I record an example of both *Corbicula* and native unionids as fouling agents in a cooling water supply main for a lignite-fired electrical generating plant. The purposes of this study were (1) to understand factors significant in this fouling example and (2) to determine if this was an isolated incident or a forerunner of future problems at other power plants.

Alcoa Lake is a 5972-hectare reservoir located 11 km southwest of Rockdale, Milam Co., Texas. The impoundment was created in 1953 on Sandy Creek, a tributary of East Yegua Creek in the Brazos River drainage. The limited surface runoff water is supplemented by an aqueduct which transports water approximately 20.5 kilometers from the Little River, also in the Brazos drainage. The unionids reported below probably originated from the Little River, although some stocking of fish has occurred in Alcoa Lake.

Jule Frankeny of International Generating Corporation, operator of the Sandow Power Plant at Alcoa Lake, informed me that a number of clams had been forced under pressure in August 1983 from a service line (off the supply main) which had been partially blocked. Inspection of recovered clams revealed *Anodonta grandis, Cyrtonaias berlandieri* and *Corbicula fluminea;* all three species have been reported from the Brazos drainage (Strecker 1931; Fontanier 1982). These clams were recovered from a 14-inch diameter pipe located four feet below ground surface. To reach this pipe, the individuals recovered had passed through an initial traveling screen (12.8 mm mesh), large pump, booster pump (19.5 mm bore), and another strainer (4.8 mm mesh).

Two water supply mains transport water from Alcoa Lake to the Sandow plants. Both mains are of equal size (initially 78" diameter), but one main supplies two plants while the second only supplies one plant (a planned fourth plant was

never built). Unionids were found only in a service line off the second main where decreased water velocities apparently allowed sediment and clams to accumulate to a degree that water flow was eventually restricted.

A typical recovered *A. grandis* shell was 127 mm in length and 72.2 mm in height. This "long, low" phenotype corresponds to the nominate variety. The shell is highly polished, especially on the older part of the shell. Dark rings may represent annual growth rings which are generally faint to absent on most Texas shells. Ring production could be due to differences in growth rate due to variations in water temperature and/or food supply. Total number of rings is ten.

Cyrtonaias berlandieri from this supply main were small and rather thick-shelled but appeared similar to examples from surface water populations from central Texas. Nacre color was light pinkish purple; typical shell height and length was 73.0 mm and 51.0 mm, respectively.

Corbicula fluminea shells were small with the largest measuring 28.45 mm in length; all shells were of the "white morph."

The only similar example recorded in the literature was by Button (1900). Two examples of *Margaritifera margaritifera* var. *falcata* which were collected in a water tunnel near Santa Cruz, California. The shells were found 700 feet from the mouth of the tunnel at a depth of 300 feet. Button (1900) did not state that the examples were alive, but he described the shells as "unusually large and thin, the nacre being richly colored."

Occurrence of unionids in water lines of an electrical generating plant raises questions concerning the likelihood of these clams becoming major problems in such plants. The existence of this problem at the Sandow complex could be significant because these plants were the first lignite-fueled electric generating units in Texas (Espey, Huston and Associates 1983: 60). Sandow #1 and #2 went on line in 1953 with Sandow #3 becoming operational in 1954. Existence of clams only in the line servicing #3 indicates that the occurrence of unionids as a fouling agent in electric generating plants probably will be a minor problem. The passage of young unionids through the screening mechanisms is likely to be a low probability event, especially in contrast to passage of minute larval forms of *Corbicula fluminea*. Survival of young unionids which do pass through these screens is unlikely except in those pipes with low velocity flows which do not exceed appropriate entrainment velocities.

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