EA Report CPC12

# 1981 CORBICULA ASSESSMENT FOR MIDLAND PLANT SITE

Prepared for

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May 1981

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# 1.0 INTRODUCTION

This report was prepared in response to Nuclear Regulatory Commission, Office of Inspection and Enforcement Bulletin 81-03: Flow Blockage of Cooling Water and Safety System Components by Corbicula sp. (Asiatic clam) and Mytilus sp. (mussel). As noted in the Bulletin, Corbicula poses a significant biofouling threat by colonization and subsequent blocking of fire protection systems, cooling systems or other safety related water circulation systems. Because of the lack of data and the species' propensity to extend its range, Consumers Power Company sponsored a detailed field study of the Midland Plant site on the Tittabawassee River in response to Bulletin 81-03. Objectives of the field evaluation were two-fold. The first objective was to determine the presence or absence of the Asiatic clam in the vicinity of the Midland Plant site. Secondly, the field survey was designed to evaluate potential future intrusions of Corbicula into the Tittabawassee River source waters or the Plant cooling systems.

The main text of this report is divided into four sections. Section 2.0 presents a brief review of pertinent literature on the life history of Corbicula and its biofouling potential. Section 3.0 details the field and analytical procedures employed in the study. Results of the field study conducted on 11-12 May 1981 are presented in Section 4.0. Section 5.0, Discussion, reviews the results of the study relative to available information on distribution and habitat requirements of Corbicula and provides an evaluation of potential intrusion of this nuisance species into the Tittabawassee River source waters or the cooling system of the Plant.

## 2.0 LITERATURE REVIEW

Corbicula was introduced into the west coast of the United States in the 1930's and has since spread across the southern states of this country (Sinclair 1971). It has been reported as far east as the Potomac River system (Britton 1981) and as far north as the Minnesota and St. Croix Rivers (Cummings and Jones 1978; Fuller 1978). It has recently been reported to occur in Lake Erie (Clarke 1981). This is the first record of Corbicula in the Great Lakes system.

Corbicula poses a significant biofouling problem. Power plants in Alabama, Arkansas, Illinois, Maryland and Tennessee have been forced to halt or reduce operations because of Corbicula infestations (Britton 1981). The most recent significant biofouling infestation at a nuclear power plant occurred in 1980 at Arkansas Power and Light Company's, Arkansas Nuclear One. Large densities of Corbicula in the reactor's cooling system restricted the flow of cooling water and forced a shutdown. In the electric utility industry, lost operating time and expensive repairs because of Corbicula infiltrations have been substantial. The possibility of reduced cooling water flow in safety related water circulation systems could be serious, so the concern of the NRC regarding Corbicula near nuclear power plants is warranted.

In the Midwest, Corbicula is most frequently collected in riverine habitats with continuous current; however, this species has also been found in lake environments. Corbicula is primarily found in stable silty sand substrates, but it is also inhabits sediments with large portions of clay and gravel. Rubble substrates, unstable sand or flocculent sediments are usually not inhabited by Corbicula.

## 3.0 FIELD AND ANALYTICAL PROCEDURES

On 11-12 May 1981 a detailed survey of the aquatic habitats was conducted near the Midland Plant site. Biologists employed a variety of techniques to determine the presence or absence of Corbicula in the Tittabawassee River and Plant cooling system including a Ponar grab sampler (232 sq cm), mussel raking, and hand-picking. Samples were collected in various habitats of the Tittabawassee River from approximately 1 mi upstream of the Plant's intake to approximately 0.5 mi downstream and in the Midland Plant cooling pond (Figure 1).

In the river, samples were collected immediately upstream from the intake; along a transect extending from the intake structure to the opposite shore of the river; downstream along the outside of the intake structure bar racks; and in the middle bay inside of the intake structure in front of the traveling screens. Sampling was intensified near warm water discharges from Dow Chemical Co. and a municipal sewage treatment plant because of the proclivity of Corbicula to inhabit thermal discharges in northern latitudes (Cummings and Jones 1978, Lewis 1981). Approximately 40 grab samples were collected, screened on a U.S. Standard No. 30 mesh sieve and examined in the field for Corbicula. A composite sample of the sediments from 10 of the grabs was retained for examination in the laboratory under a dissection microscope (10 to 70X magnifications). In addition to the quantitative collections, qualitative mussel raking (Lewis 1981) was conducted along the shoreline at various locations in the sampling area. Field notes were maintained detailing habitat types and biota observed. Depths sampled by both quantitative and qualitative techniques ranged from less than 1 ft to 10 ft.

The Midland Plant cooling pond was sampled with a Ponar grab sampler along transects through the discharge and intake areas (four grab samples at each), and on a north-south transect across the cooling pond (10 grab samples). Additional grab samples and mussel rake samples were collected in select areas of the cooling pond. A composite sample of sediment material from 10 grab samples was retained for examination in the laboratory. The depth varied from 3 to 20 ft in the areas sampled.

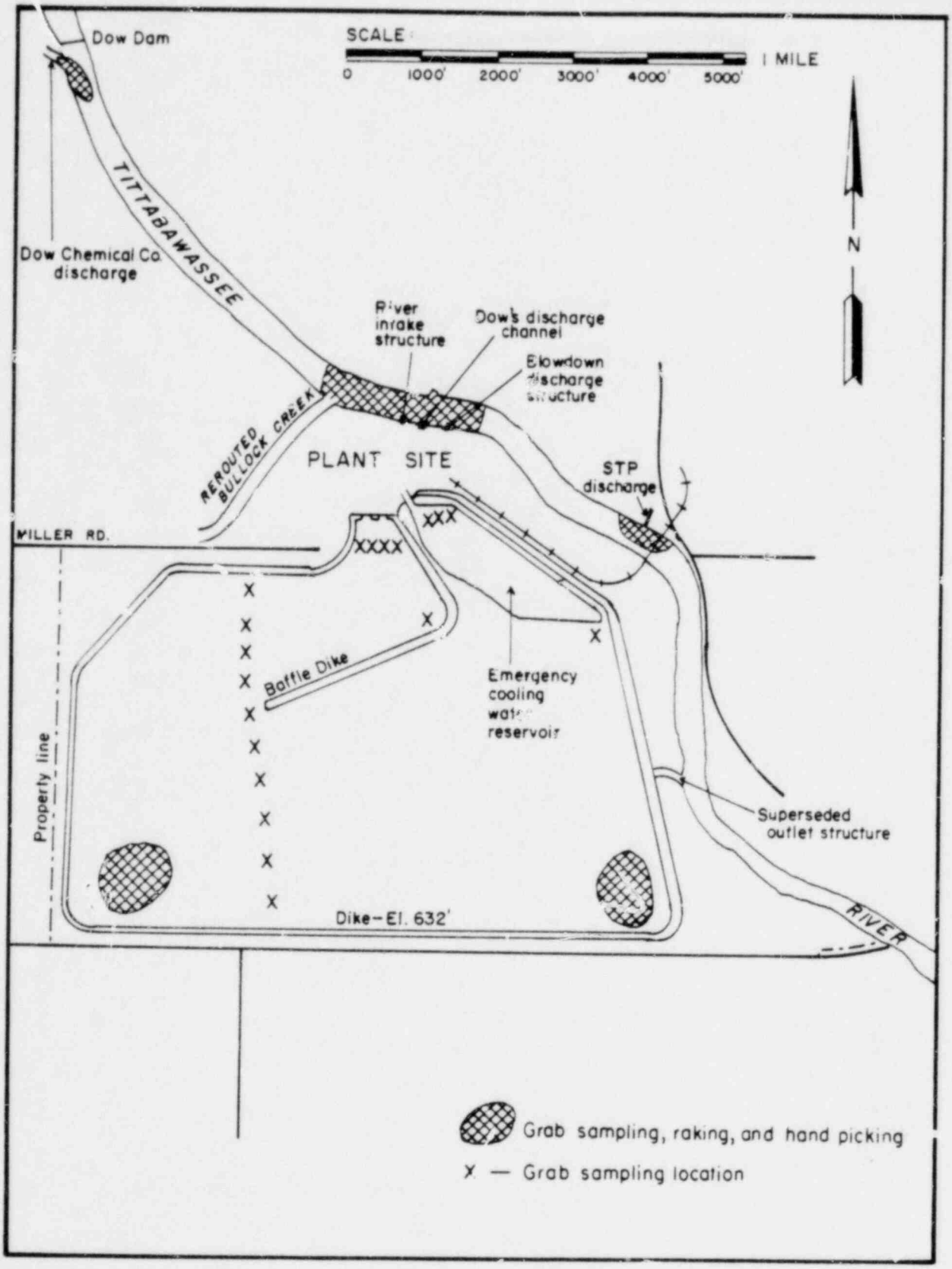


Figure 1. Sampling locations for the Corbicula assessment conducted at the Midland Plant Site, 11-12 May 1981.

# 4.0 RESULTS

Quantitative Ponar grab samples collected in the Tittabawassee River of the Midland Plant site contained sparse numbers of benthic invertebrates. No Corbicula were observed in 40 grab samples from this area. The only zoobenthos observed were sporadic collections of aquatic worms (Oligochaeta), midge-fly larvae (Chironomidae), caddisflies (Hydropsychidae) and side-swimmers (Amphipoda). Grab samples collected in the Tittabawassee River during 1979 were also dominated by oligochaetes and chironomids, and indicated the benthic community was not well established (Lawler, Matusky and Skelly Engineers 1980a). Dead valves of sphaeriid clams, which possess habitat requirements and preferences similar to Corbicula, were abundant in the grab samples of the present survey. A dead valve of the freshwater mussel Lasmigona complanata was also collected in this investigation. Habitats sampled included rubble in the area immediately downstream from the Dow Chemical Co. Dam, predominantly sand in the remainder of the river, and silty sand in the middle intake bay.

Quantitative grab sampling, and qualitative hand-picking and mussel raking revealed a relatively abundant but non-diverse macroinvertebrate community inhabiting the Midland Plant cooling pond in May 1981. Midge-fly larvae (Chironomidae) and aquatic worms (Oligochaeta) were commonly collected. These taxa were also the most abundant organisms collected during a 1979 assessment of the cooling pond (Lawler, Matusky and Skelly Engineers 1980b). Single representatives of the mayflies Caenis sp. and Hexagenia sp. were found in May 1981. No evidence of any molluscs, including Corbicula, was found. Pelecypods were also absent in the 1979 collections from the cooling pond. The few taxa collected in the present survey can probably be attributed to the young age of the cooling pond, which was filled during 1978. A more diverse benthic fauna will likely appear as the pond ages. A uniform sandy clay substrate was found throughout the cooling pond. The alga Chara sp. was present near the shoreline of the pond.

## 5.0 DISCUSSION

Sampling of the Tittabawassee River and the Midland Plant cooling pond yielded no evidence that Corbicula has or does presently occur near the Midland Plant site. In addition, macroinvertebrate investigations during 1979 near the Plant site revealed no Corbicula.

It is not likely that Corbicula will occur in the Tittabawassee River in the near future. The apparent poor water quality of the river, which has eliminated most molluscs, would be unfavorable for this species. In addition, the extended 32 degrees Fahrenheit water temperature during the winter (Consumers Power Company 1978) is lower than Corbicula's ultimate incipient lethal temperature of 36 degrees Fahrenheit (Mattice and Dye 1976). Also, the proposed discharge of the Midland Plant into the Tittabawassee River will be intermittent, thus a continuous heated effluent favorable for this introduced species would not be present. A factor that may limit the occurrence of Corbicula in the cooling pond will be the water temperature during Plant operation. Temperatures are predicted to reach ~~110~~ 100.1 * degrees Fahrenheit which would be greater than the upper ultimate incipient lethal temperature of 93 degrees Fahrenheit observed by Mattice and Dye (1976).

* This is the average surface temperature as stated in Midland Plant Units 1 and 2 Environmental Report, OL Stage.

WJHall
6/29/81

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