WATER INTAKE RECOMMENDATIONS

The following is a list of various intake specifications for both lake and stream environments. Different options are available that could be implemented to protect trust fish and wildlife resources depending on the size and type of stream/river. (Note: these recommendations were developed for large water withdrawals such as those associated with power plants; however, recommendations for agriculture and fracking [see Intake Requirements and Maintaining Adequate Water Flows/Depths] withdrawals are also included.)

General

Once-through circulation systems should not be employed.

If feasible, dry cooling systems, or a combination of dry and wet cooling systems should be used to reduce the amount of water withdrawn for cooling purposes. It should be noted that dry cooling systems require a larger land area that could lead to greater wetland or other habitat impacts.

Variable speed intake pumps should be utilized to reduce water intakes during low demand periods.

Any repairs to the cooling system that would require the heated discharge to be discontinued should be conducted during summer months. Cessation of heated discharge during cold weather can result in the death of fishes due to the sudden change in water temperature (U.S. Fish and Wildlife Service 1978, Environmental Protection Agency 1976).

Water intakes shall not be located in identified primary spawning and/or nursery areas or mussel beds.

Reduced water intake during cooler water periods is recommended to avoid any unnecessary impacts to aquatic species by entrainment or impingement (Environmental Protection Agency 1976).

An inspection/monitoring and maintenance plan for intakes is required to ensure proper operation (National Marine Fisheries Service 1996).

Intake screens should be equipped with a reliable automatic cleaning system that utilizes proven technology (National Marine Fisheries Service 1996).

Intake Requirements

Intake velocities at the screen should not exceed ½ ft/sec (US Fish and Wildlife Service 1993).

Mesh size at intake screens should have a maximum mesh opening of ¼ inch to reduce the size of aquatic organisms that can be entrained (Environmental Protection Agency 1976, US Fish and Wildlife Service 1993).

A Johnson (or Johnson-type) screen/intake, with ⅛-inch mesh or less, should be used if feasible.

Existing Intakes

If a vertical opening intake is used, a velocity cap should be installed to substantially reduce the number of organisms drawn into pumps and cooling systems (Richards 1977).

Moveable screens should be used to minimize impacts to impinged organisms (U.S. Fish and Wildlife Service 1978, Environmental Protection Agency 1976).

Use of continuous rotating screens is recommended, when feasible; otherwise, the time duration between screen rotations should not exceed two hours (King et al. 1978, Tatham 1978).

Use of a low-pressure wash system (maximum spray pressure of 50 pounds per square inch) prior to a high-pressure wash should be utilized to increases the survival of fish removed from screens (Environmental Protection Agency 1976, King et al. 1978).

A minimum of 2 inches of water should be maintained in discharge troughs to prevent fish escape and re-impingement from occurring (Environmental Protection Agency 1976).

Fish removed from the discharge troughs should be quickly returned a sufficient distance (downstream, if applicable) from the intake to prevent re-impingement (Environmental Protection Agency 1976).

Discharge conduits should be designed to minimize undue stress and physical injury (e.g., no closure valves, smooth joint design, smooth interior surface, and bends should have large radius of curvature (> 5)) while returning fish to the water body from which they were removed (National Marine Fisheries Service 1995).

Discharge conduits shall not have water pumps and fish shall not be allowed to free fall at any time (National Marine Fisheries Service 1995).

If side walls protrude into the stream (or other flowing water body), openings that provide for fish passage should be constructed.

Intake Location

The Service recommends that cooling water discharges be located downstream of the cooling water intakes to avoid impacting fish that may be attracted to the cooling water discharge during the colder months.

Streams and Rivers

Avoid locating intakes in known locations of eddies.

Placing the intake on the cut or higher velocity bank has been shown to reduce the amount of organisms impinged or entrained (Environmental Protection Agency 1976).

Intakes that are within streams should be placed away from the shoreline and no closer than 2 feet from the bottom (U.S. Fish and Wildlife Service 1978, Environmental Protection Agency 1976).

Intakes that are not located within stream should be as flush to the bank as possible, with the intake screens at the bank line (Environmental Protection Agency 1976).

Lakes and Reservoirs (note the above three recommendations have also been applied to lake environments)

Intakes should not be placed within the littoral (or photic) zone.

Intakes should not be placed within 50 meters of the littoral (or photic) zone.

Placement of intakes in canals or small coves should be avoided.

If intakes are placed in canals or small coves, a porous rock dike or conventional open-channel screen should isolate the intake area from the main water body.

Agricultural Recommendations

If Johnson (or Johnson-type) screens are utilized then maximum mesh openings should be ⅛ inch.

Pumping plant sound levels shall not exceed 75DB at 50 feet.

Water intake structures shall be elevated 2 to 4 feet off the bottom and placed at least twenty vertical feet below the water level existing on June 1st of that irrigation season. If twenty feet is not attainable, the intake shall be placed at the maximum attainable depth and the intake velocity shall not exceed ¼ ft/sec.
A floating intake system may be used and should be located over deep water (20 feet or greater, if attainable). If water depths at the irrigation intake site fall below 10 feet during the irrigation season, the intake shall be moved to deeper water or shut down.

Maintaining Adequate Water Flows/Depths

Based upon previously conducted flow studies, an appropriate monthly minimum instantaneous flow rate for the survival of aquatic species is 40 percent of the annual average flow for October through March and 60 percent of the annual average flow for April through September (Stalnaker 1976).

Intake flow must be no more than either the lower 5 percent of the source water body mean annual flow or 25 percent of the source water 7Q10.

Existing monthly 7Q10 must be maintained.