WATER QUALITY CERTIFICATION
(P.L. 92-500)

In the matter of: Georgia-Pacific Corporation
Gilman, Vermont 05904

Application for the Gilman Project

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed the water quality certification application filed for Georgia-Pacific Corporation (the applicant) by letter dated August 2, 1988. The Department finds:

1. The Gilman Project, an existing hydroelectric station on the Connecticut River, has entered the Federal Energy Regulatory Commission relicensing process. The present license expires December 31, 1990.

2. The project is located at the Georgia-Pacific Corporation Whitefield Division paper plant at Gilman village in the Town of Lunenburg. The dam was constructed about 1900 and is a low timber crib and concrete structure.

3. The powerhouse is integral with the dam and located on the west side of the river, partly in Vermont and partly in New Hampshire. It contains four units with a total plant capacity of 4850 kw.

4. The dam, which is about 319 feet long with a maximum height of 38 feet, is 21 miles below the breached Northumberland Dam and 11 miles above the Moore Reservoir Dam. Five feet of flashboards on Gilman Dam bring the normal pond to elevation 833.3' NGVD. The approximate tailwater elevation is 809.0' NGVD, which corresponds to the Moore Reservoir full pool elevation. Gilman Dam creates an impoundment that extends 2.9 miles upstream to a point just above the Johns River. The surface area and gross volume are 130 acres and 705 acre-feet, respectively.

5. The project is described as run-of-river with a "usable (net) storage capacity [that] is considered to be negligible" (page A-10 of the FERC application, which was filed as supporting documentation for the certification request). "Outflow [equals] inflow on an instantaneous basis" (page A-2 of the FERC application). The hydraulic capacities of the four turbines are 1250 cfs, 600 cfs, 500 cfs and 500 cfs, for a total of 2850 cfs. The total capacity is close to the mean river flow of 2915 cfs. The 1250 cfs unit was installed as a replacement for an older unit in 1985-1986. It is automatically operated while the other units are manual. A crest gate installed in

1979 is used to help maintain the pond level at the top of the boards at inflows up to project capacity and to reduce the incidence of flashboard failure, which occurs at surcharges in excess of 1.5 feet. The powerhouse can generate down to 130 cfs without cycling.

6. The average operating level of Moore Reservoir during the months of July and August is 805.2'NGVD. At this level, the reservoir extends to Cushman Brook, which is on the new Hampshire side about one mile below Gilman Dam.

7. The Connecticut River is Class B waters from Groveton to Gilman Dam and Class C from Gilman to the Lunenburg town line. A critical dissolved oxygen problem occasionally exists in the river at certain times of the year as a result of pollutant loading and reduced reaeration potential caused by impounded waters and reduced spillage at dams due to hydroelectric operation. The project is in a water quality limited segment.

The river is designated as a cold water fish habitat, which sets the dissolved oxygen standard at a minimum of 6 mg/l or 70% saturation (75% for New Hampshire) unless a higher standard is

determined to be necessary for reaches critical for spawning or nursery. Section 1-03 of the Vermont Water Quality Standards imposes a higher level of protection by outlining the public good criteria to be met in cases where a project may degrade water quality where existing water quality generally exceeds minimum standards.

8. In the project area, the river receives treated wastewater discharges from the municipalities of Groveton, Lancaster, Northumberland and Lunenburg and from the paper mills at Gilman and Groveton (James River Paper Company). According to the application, untreated sanitary wastes enters the Johns River at the Village of Whitefield, N.H.

9. Metcalf & Eddy, Inc. modeled water quality conditions in the Connecticut from the Upper Ammonoosuc to Gilman in 1983 for E.P.A. The model indicated that substandard conditions would prevail for a substantial portion of the study reach under critical low flows and design wastewater discharges.

10. The applicant contracted with Aquatec, Inc. to perform an intensive 48-hour dissolved oxygen sampling program that included stations from just

upstream of the Johns River to a point about 1 1/2 mile downstream of the dam (within the summer operating pool of Moore Reservoir). The study was conducted August 12 - 14, 1985. Flows were estimated at 800 cfs, or about twice the 7Q10 of 373 cfs. An effort was made to quantify the potential benefits of reaeration at the dam. During the first half of the study, downstream samples were collected with no water being spilled at the dam. During the last 24 hours, 100 cfs was released over the crest gate discharging at 833.3' NGVD above the sill elevation of 812.1' NGVD.

All samples collected on the main stem were above 6 mg/l dissolved oxygen. The Johns River exhibited lower dissolved oxygen levels down to 5.2 mg/l. Releases over the crest gate gained from this point source of reaeration from 0.4 mg/l to 0.8 mg/l of dissolved oxygen over the levels measured in the tailrace discharge. Dissolved oxygen levels also generally increased in the free-flowing river reach between the two sampling stations furthest down the study reach below the dam.

The sampling period 800 cfs does not represent

conditions under which violations of dissolved oxygen standards would be expected.

11. Under a contract with the applicant, Metcalf & Eddy, Inc. modeled reaeration of flows over Gilman Dam and the upstream dissolved oxygen conditions with the new discharge permit limits for the Groveton paper mill. Conditions were modeled at 800 cfs and 7Q10, with and without a spillage of 100 cfs. At 7Q10, upstream dissolved oxygen levels reached 5.2 mg/l (3.6 mg/l deficit from saturation at 22.5 C) at the dam and at 800 cfs, 6.05 mg/l. Spillage of 100 cfs mixed with the unaerated turbine discharge produced a mixed dissolved oxygen directly below the dam of 6.3 mg/l at 7Q10 and 6.9 mg/l at 800 cfs.

No attempt was made to determine the mixed dissolved oxygen concentrations necessary at different river discharges in order to assure that the downstream dissolved oxygen sag remains above standards. Without adequate spillage and consequent elevated dissolved oxygen levels, substandard conditions would occur in the downstream reach to Moore Reservoir. For example, at 7Q10 flows and the project operating without

spillage, the substandard condition on the upstream side of the dam (5.2 mg/l) would be released through the turbine, additional wasteload would be added at Gilman, and the dissolved oxygen levels would continue to decline.

12. The applicant's FERC application indicates no changes to their present mode of operation; however, the applicant has proposed to spill 130 cfs under circumstances during the period July 15 - September 15 where inflow is below 500 cfs and measured dissolved oxygen levels downstream fall below 6.2 mg/l.

13. The project's capability to operate at a broad range of flows from mean flow down to 130 cfs, which is below the 7Q10 value of 373 cfs, does not provide for reaeration over the dam at these flows. The dissolved oxygen deficit reduction caused by spillage reaeration is important in this water quality limited segment. Run-of-river operation does not in and of itself assure standards will be met.

14. During June, 1989 and in cooperation with Kleinschmidt Associates, the applicant's engineering consultant, the Department performed a

screening model analysis of the reach from Gilman Dam to Moore Reservoir to estimate the spillage necessary to assure maintenance of dissolved oxygen above Vermont's minimum standards. At 7Q10 flows of 373 cfs, 210 cfs must be spilled to create a mixed dissolved oxygen level of 7.4 mg/l directly below the dam (6.2 mg/l assumed upstream of dam). The resulting dissolved oxygen sag curve downstream would decline to 6.2 mg/l (70% saturation at 22 C), including the effect of the discharge of Georgia-Pacific's permitted waste load of 3150 lb./day UOD combined with a dissolved oxygen flux caused by algal respiration and photosynthesis.

The model indicates that dissolved oxygen levels would drop below minimum standards to less than 60% saturation at the sag under a no-spill operating condition, assuming 7Q10 flows and waste discharges at design. The project can operate down to 130 cfs; dissolved oxygen levels during periods of flow less than 7Q10 would be even more severely depressed. Under flow conditions higher than 7Q10, the increase in dilution of pollutant loadings combined with a spillage of 210 cfs will assure that standards are met downstream.

15. Vermont manages the Connecticut River as a cold water fish habitat. Resident species include rainbow, brook and brown trout as well as several warm water species including smallmouth bass, perch, bullhead, and pickerel. Vermont is also participating in a cooperative program with several other states and federal agencies to restore Atlantic salmon and shad to the Connecticut River Basin.

Present plans include construction of trap facilities at Ryegate Dam and transporting salmon upstream for access to spawning habitat. Between Gilman Dam and Canaan Dam, approximately 9% of the nursery habitat for the Connecticut is believed to exist. The applicant would be expected to participate in the cost of effecting the final upstream passage plan.

Safe downstream passage of the salmon is also critical to the success of the program. Reduction of both turbine and trashrack impingement mortality and provision of conveyance flows over or through the dam are important elements of downstream passage plans. An alternative of using

trap-and-truck facilities to accommodate downstream passage is also being considered.

The applicant has developed conceptual designs for downstream passage facilities with the U.S. Fish & Wildlife Service. The plan consists of an angled intake guidance system, a bell-mouthed intake and a bypass conduit. A flow of 30 cfs would be used to operate the system. The applicant proposes in the license application to institute these measures when warranted by planned stocking of salmon upstream of Gilman. No use of the Upper Connecticut River is being made at this time. It should be noted that hatchery produced salmon may be placed upstream of Gilman Dam to use the available spawning and nursery habitat before upstream passage facilities are constructed.

16. Operation as a strictly run-of-the-river project with no artificial flow regulation and no impoundment fluctuations will prevent the aquatic habitat degradation associated with a cycling type of operation. By letter dated October 3, 1988, the N.H. Fish and Game Department recommended a license article requiring an instantaneous minimum stream flow of 757 cfs. The operation as proposed

should assure that this standard is met.

17. The applicant proposes to improve the canoe portage route and the existing boat launch near the Johns River. Both of these facilities are on the New Hampshire side. The Agency of Natural Resources finds that recreational use demands on the Connecticut are continuing to increase and that additional amenities to further enhance recreational use will be sought in the future.

18. Spillage of 210 cfs for protection of downstream water quality during the period June 1 through October 15 will also serve to restore to a degree the aesthetics of this river reach. This is particularly important during the high public recreational use period.

19. The State of New Hampshire certified this project under Section 401 on October 27, 1988, conditional on submittal of erosion control plans (although no construction is proposed at this time).

20. By letter dated July 24, 1989, the applicant filed a report with the Department through John R. Ponsetto, Esq. The report defines the water quality modeling runs performed to date, including recent Qual-2e modeling done using basically the same parameter values used before. No additional field data has been collected to refine the modeling attempts.

CONDITIONS

In certifying that there is a reasonable assurance that project activities will be conducted in a manner that will not violate applicable water quality standards, the Department of Environmental Conservation imposes the following conditions:

A. The project shall be operated in a strict run-of-the-river mode where instantaneous flows below the tailrace are maintained equivalent to instantaneous inflows to the impoundment. The pond level shall be maintained at or within six inches of the top of the flashboards at all times except where circumstances beyond the control of the applicant occur, such as the loss of flashboards. Under such unusual circumstances, a minimum instantaneous flow of 757 cfs, or instantaneous project inflow, if less, shall be maintained below the tailrace until normal operations are restored. There shall be no impoundment cycling for generation.

A minimum instantaneous flow of 210 cfs shall be spilled at the dam during the period June 1 through October 15 to protect downstream water quality. When the project is not operating, all inflows shall be spilled at the dam.

The applicant shall submit a complete description, hydraulic ~~design calculations~~, and specifications for the operational procedures and measures to be used to meet this condition. The filing shall be made within six months of the date of this certification and shall be subject to Departmental approval. All necessary modifications shall be instituted within one year of the date of this certification.

B. The impoundment shall not be drawn down for maintenance purposes without prior written approval of the Department.

C. Downstream fish passage facilities, as approved by the Vermont Department of Fish and Wildlife and the U.S. Fish and Wildlife Service, shall be constructed within one year of a request made by those agencies and operated following a schedule determined by the agencies. Flows needed to operate the bypass facility shall be in addition to those spillage flows required in Condition A for water quality. The final plans and approval letters shall be filed with the Department for the record prior to construction of these facilities.

Erosion and sediment control and water management plans for the construction of these facilities shall be filed with the Department for approval. Construction shall not proceed without approval of these plans.

D. Provision of upstream passage facilities, which may consist of participation in the construction and operation of a trap-and-truck facility at a downstream site, shall follow a schedule determined appropriate by the Vermont Department of Fish and Wildlife. Erosion and sediment control and water management plans for the construction of these facilities, if located at Gilman Dam, shall be filed with the Department for approval. Construction shall not proceed without approval of these plans. Plans for a facility at Gilman Dam are subject to the approval of the Vermont Department of Fish and Wildlife, and, in such case, the approval letter and design drawings must be filed with the Department for the record.

E. Debris associated with project operation, including trashrack debris, shall be disposed of properly.

F. Any desilting of the dam impoundment shall be done in accordance with the Agency of Natural Resources Desilting Policy, a copy of which is attached. The Department shall be contacted prior to any desilting activity.

G. Any significant changes, including project operation, shall be submitted to the Department for prior review and written approval.

Dated at Waterbury, Vermont this 28th day of July, 1989.

Timothy Burke, Commissioner
Department of
Environmental Conservation

TB:JRC/vld