

Water Quality Certificate  
(P.L. 92-500, Section 401)

In the matter of: Central Vermont Public Service Corporation  
77 Grove Street  
Rutland, Vermont 05701

APPLICATION FOR THE GAGE  
HYDROELECTRIC PROJECT

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application filed by Central Vermont Public Service Corporation (the applicant) and dated June 21, 1993. This application has been supplemented by a copy of the Federal Energy Regulatory Commission (FERC) license application filed with the FERC on December 31, 1991; an October 1992 certification application; and subsequent submittals from the applicant, including a September 1993 FERC Additional Information Request (AIR) response to FERC. The Department held a public hearing on April 26, 1994 under the rules governing certification and received testimony during the hearing and, as written filings, until May 13, 1994; attached is a copy of the Department's responsiveness summary, which shall be incorporated into this certification as findings by reference. The Department, based on the application and record before it, makes the following findings and conclusions:

**I. Background/General Setting**

1. The applicant has applied to the FERC for relicensure of the Gage Hydroelectric Project located at river mile 7.2 on the Passumpsic River about 2.2 miles south of the village of St. Johnsbury.
2. The Passumpsic River drains 507 square miles of area, including the major portion of Caledonia County and minor portions of Essex, Orleans, and Washington Counties. The mainstem of the river begins at the confluence of the West and East branches just north of Lyndonville, and the river flows south to the Connecticut River in Barnet. The West Branch headwater is the south slope of Mt. Pisgah east of Lake Willoughby. The East Branch originates in Brighton, south of Island Pond. The topography of the basin is most rugged in the area of the eastern headwaters and less so in the western portion of the basin. The length of the mainstem is 22.6

miles with an approximate total fall of 230 feet. The average gradient is 13.8 feet per mile from Lyndonville to the river's mouth in the Town of Barnet.

3. Two of the major tributaries of the Passumpsic River, the Moose and Sleepers rivers, enter upstream of the Gage Project. The applicant operates five projects in succession on the mainstem of the Passumpsic River. Upstream of the Gage Dam are the Pierce Mills and Arnold Falls projects. Downstream of Gage Dam are the Passumpsic and the East Barnet projects, the latter having been recently reactivated. The Village of Lyndonville operates two facilities upstream of the applicant's projects; these facilities are located at Vail Dam and Great Falls Dam.
4. Half of the river length, or almost ten miles, is impounded from the head of the Vail Project to the Connecticut River. Of the 230 foot drop in the river from Vail to the Connecticut River, 81% is harnessed for electrical generation.
5. The headwaters of the Passumpsic comprise pristine streams that flow through wilderness areas that are predominantly woodlands and wetlands with only sparse settlements. The village centers of Lyndonville and St. Johnsbury are located in the central part of the basin, along the mainstem, and are the commercial and industrial centers for village residents and the surrounding rural population. The lower portion of the basin is again rural with small villages such as Passumpsic and East Barnet along the main stem.
6. The site was first developed for hydroelectric generation in 1921. Six years later the facilities were destroyed during the 1927 flood and were rebuilt and returned to service in 1929.

## II. Project and Civil Works

7. The dam is founded on rock and consists of three sections. The north section is approximately 176 feet long, and the crest, elevation 534.2 feet (msl), varies in height from 3 to 13 feet above the foundation. The center section is approximately 30 feet long and constructed on a ledge island. This section is essentially a concrete cap with a crest elevation of 542.1 feet (msl). The south dam is approximately 43 feet long, and the crest of this section is set at

elevation 538.9 feet (msl). The normal headwater elevation is 539.9 feet (msl), and the normal tailwater elevation is 524.9 feet (msl), providing 15 feet of gross head.

8. The dam is fitted with flashboards on both the north and south sections. The six foot high flashboards placed on the north section of the dam are hinged and can be dropped during flood periods to increase spillway capacity. A cable way is provided for this purpose. The flashboards on the south section of the dam are one foot high and fail during flood periods.
9. The impoundment has a surface area of 15.2 acres, a useable storage capacity of 15 acre-feet, and a backwater influence of 3,500 feet.
10. A stoplog-controlled trash/ice sluice, six feet wide and located adjacent to the face of the headgate structure, is included in the south section of the dam.
11. A headgate structure serves as the entrance to a power canal. It is approximately 51 feet wide and contains four head gates. Each head gate is approximately 10 feet wide and is manually operated. The head gate structure serves to reduce the amount of trash entering the power canal and also provides the means for dewatering the power canal for inspection and/or repair. The power canal connects the reservoir to the intake of the powerhouse. It is approximately 44 feet wide, 90 feet long, and 16 feet deep.
12. The intake structure is coupled to the powerhouse. An inclined trashrack structure is located directly upstream from the entrances to the turbine water passages. Gate slots are provided at the upstream entrances of the turbine water passages for placement of a bulkhead to close off and dewater the turbine passage.
13. The powerhouse contains two S. Morgan Smith vertical shaft, Francis-type turbines. The units are coupled to 300 kw and 400 kw generators and have adjustable wicket gates operated by headwater float control. The average annual generation for the twenty year period through 1990 was 2,766,000 kwh. (applicant's response to FERC AIR No. 9) Except for routine monitoring, inspection and maintenance, the plant is operated automatically and unattended.

14. The powerhouse substation is located adjacent to the power canal. A 12.5 kv transmission line carries output from the facility to the Bay Street Substation located in St. Johnsbury.

### III. River Hydrology and Streamflow Regulation

15. The drainage area at the dam is 413 square miles. A gaging station has been operated by the U.S. Geological Survey below Passumpsic Dam since October 1928. The drainage area at the gage is 436 square miles. Several of the flow parameters for the project have been estimated using the gage data and are shown in the following table. Some of the parameters may be influenced by the artificial flow regulation caused by upstream hydroelectric facilities.

Table 1. Hydrologic Parameters at Project.

Parameter	Value
Mean runoff	706 cfs (23.20 in/yr)
7Q10	82 cfs
95% Exceedance	123 cfs
50% Exceedance	385 cfs
10% Exceedance	1610 cfs

16. The project hydraulic capacity is 170 cfs to 700 cfs.
17. Present operation of the project is as a daily peaking plant with headpond drawdown from storage of one foot. Currently, when there is no spillage at the dam and the powerhouse is shut down, the only flow downstream of the powerhouse is leakage and local drainage.
18. The project as described in the application will operate in a true run-of-the-river mode.<sup>1</sup>

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<sup>1</sup>A true run-of-the-river project is one which does not operate out of storage and, therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project's impoundment on an instantaneous basis. The flow regime below the project is essentially the river's natural regime, except in special circumstances, such as following the reinstallation of flashboards and project shutdowns.

19. Routine monitoring, inspection and maintenance will continue as in the past. The plant will operate in a semi-automatic and unattended mode.
20. Originally, CVPSC proposed a minimum bypass flow release of 17 cfs year round. The applicant now proposes to maintain a bypass flow of 32 cfs during the brown trout spawning/incubation period of October 1 through May 1 and a continuous release of 17 cfs the remainder of the year. (applicant's response to FERC AIR No. 3) The applicant would provide the 32 cfs by adjusting the project headwater sensors to spill 4.0 inches of water over the shorter right (south) spillway (crest elevation of 538.9 feet), and spill 2.7 inches to provide the 17 cfs. The one foot of flashboards across this spillway section would be removed and no longer used. Corresponding targeted minimum headwater elevations would be 539.2 feet and 539.1 feet. (AIR No. 14)

The flow sensor will automatically and continually adjust the two generator loads so that the spillage is prerequisite to generation. When river flows diminish, the level sensors will reduce load on one unit slowly to keep the required amount of water spilling over the south spillway. As the flow continues to diminish, the flow sensors will remove a unit from the line. A similar sequencing operation will happen with the second unit to a point when all water will spill over the dam crest.

21. The project automation (SCADA) system has an accuracy of  $\pm 1.0$  inch. To provide the applicant's targeted minimum headwater elevations, the SCADA system would have to be set to a fixed level 5.0 inches to provide the 32 cfs and 3.7 to provide the 17 cfs over the south spillway. The two-inch range on the SCADA system will create a variable bypass flow condition above these minimums.
22. Periodic storm events require the lowering of the six foot flashboards to protect against upstream flooding. During the winter, ice movement causes the panels to collapse; this occurs twice on the average during this period. The flashboards are normally maintained in place during January and February. The applicant

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Under those circumstances, a change in storage contents is necessary, and outflow is reduced below inflow for a period.

breaks ice loose in February in preparation for the intentional lowering during spring runoff. According to the license application, anywhere from 8 to all 48 panels are lowered two or three times each March and April, and perhaps once in May. The applicant's response to FERC AIR No. 12 indicates that the boards are lowered for three weeks during the March - April period. Seldom are the boards manipulated from June through December.

23. Boards are typically reset when the water recedes to a 2 to 4 foot crest over the downed boards. In order to refill the impoundment, the applicant proposes to cut back the plant discharge to about half of capacity, or 350 cfs. Some water would continue to spill over the crest while the flashboards are propped. However, no provision is made for maintaining the proposed bypass flow during flashboard replacement.
24. A release of 350 cfs (0.85 csm) is well above the summer aquatic base flow of 0.5 csm prescribed by the U.S. Fish and Wildlife Service Flow Recommendation Policy for the New England Area (USF&WS Flow Policy) and the Agency of Natural Resources Interim Procedure for Determining Acceptable Minimum Stream Flows, July 1993 (Agency Flow Procedure). Brook, brown and rainbow trout may spawn in the mainstem of the Passumpsic River below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe 1.0 csm for the fall/winter period and 4.0 csm for the spring period to protect spawning and incubation.
25. The project will not be cycled for audits nor for emergency energy demands.

#### IV. Bypass

26. The application describes the 450 foot bypass as a one-acre plunge pool and a 200 foot run that is influenced by backwater from the tailrace during project operation.
27. Under the present operating mode of the project, only leakage flows from the dam are maintained in the bypass under low and average flow conditions. No leakage estimates have been made available.

## V. Standards Designation

28. The Passumpsic River in the project-affected reach is designated by the Water Resources Board as Class B waters. The project is entirely located within the waste management zone that receives the discharge from the Town of St. Johnsbury municipal wastewater treatment facility. The Board has also designated the entire Passumpsic River as cold water fisheries habitat.

The lengths of waste management zones are being reviewed by the Department and will be reset based on rules to be promulgated by the Water Resources Board.

29. Class B stream reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and a water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-03)
30. Waste management zones, although Class B waters, present an increased level of health risk to contact recreational users due to the discharge of treated sanitary wastewater.
31. The dissolved oxygen standards for cold water habitat streams are 6 mg/l or 70 percent saturation unless higher concentrations are imposed for areas that serve as salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. The temperature standard limits increases from background to 1.0°F. (Standards, Section 3-01(B)) The turbidity standard is 10 ntu. (Standards, Section 3-03(B))
32. Under the general water quality criteria, all waters, except mixing zones, are managed to achieve, as in-stream conditions, aquatic habitat with "[n]o change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes." (Standards, Section 3-01(B)(5))

33. Section 2-02 Hydrology of the Vermont Water Quality Standards requires that "[t]he flow of waters shall not be controlled or substantially influenced by man-made structures or devices in a manner that would result in an undue adverse effect on any existing use, beneficial value or use or result in a level of water quality that does not comply with these rules." The project dam is a man-made structure that artificially regulates streamflow.

#### VI. Water Quality - Water Chemistry

34. The application presents data from limited water quality sampling done by the applicant in 1986 and 1988. Subsequent to these sampling periods, the Town of St. Johnsbury upgraded its wastewater treatment facility from primary to secondary. The earlier data cannot, therefore, be used in assessing the project's impact on river's dissolved oxygen regime.
35. The Town of St. Johnsbury wastewater treatment facility, with a design capacity of 1.6 mgd has the largest discharge on the river and is an important influence on the river's dissolved oxygen regime. Based on 1993 records, the facility is at 68% of its design capacity.
36. The application includes a supplemental report for 1991 water quality sampling and analysis done by Aquatec, Inc. The report concludes that the project under the proposed configuration will not violate the minimum water quality standards for dissolved oxygen.

Data for the 1991 study was collected from July 16-19. Of the 15 sampling sets for the three-day study, no samples at Gage station were less than 90% saturation; 12 out of 15 of the samples collected in the impoundment just upstream of the dam were at or above saturation. The generally supersaturated conditions demonstrate substantial algal activity, which will become a very important influence on dissolved oxygen levels as the St. Johnsbury wastewater plant loading increases in the future.

37. The Aquatec study's analysis of reaeration coefficients demonstrated a significant aeration efficiency for spillage at the Gage Dam. Spillage at Gage removed 75% of the dissolved oxygen deficit from saturation. The dissolved oxygen sag for the wastewater discharge is in the Gage impoundment. (Diurnal Dissolved Oxygen and



Temperature Study, Passumpsic River from St. Johnsbury Center to East Barnet, Vermont, July 16-19, 1991, September 1991, page 5)

**VI. Water Quality - Aquatic Biota and Habitat**

38. Aquatic biota are defined in Standards Section 1-01(B) as "organisms that spend all or part of their life cycle in or on the water." Included, for example, are fish, aquatic insects, amphibians, and some reptiles, such as turtles.
39. Wild and hatchery-origin brook, brown and rainbow trout occur in the Passumpsic basin. Vermont Department of Fish and Wildlife studies conducted in the early 1970's indicate the Passumpsic River drainage basin contained a higher percentage of brook trout than any other drainage basin studied throughout the state. The Department of Fish and Wildlife currently supplements natural populations by stocking one or more of the three species in reaches of the mainstem and tributaries. Also occurring in the Passumpsic basin are sucker and minnow species, sculpins, darters, yellow perch, sunfish species, and brown bullhead. The latter three are mostly found in mainstem impoundments.

**Below Project**

40. A free-flowing reach of about one mile exists between the project tailrace and the Passumpsic Project impoundment.
41. Flows below the tailrace will essentially be unregulated. This proposed flow regime will optimize conditions for fish life downstream of the project powerhouse.
42. Artificial flow regulation below the tailrace is only anticipated to occur during impoundment refilling following flashboard reinstallation. The applicant proposes to release 350 cfs (0.85 csm) during the refill period.

**Bypass**

43. The Agency's management goal for the bypasses at the Passumpsic River projects is to establish and maintain cold water aquatic habitat, including deep aerated pools that are well circulated and

serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas (Comprehensive River Plan for the Passumpsic River Watershed, Vermont Department of Environmental Conservation, August 1992). The project bypass provides valuable habitat for juvenile Atlantic salmon, all life stages of resident salmonids (brown and rainbow trout) and a variety of non-game fishes.

44. The large plunge pool, with a depth of up to 27 feet, is important as adult fish holding habitat and was mentioned by anglers during the Agency comprehensive river planning process as a very popular fishing hole. Consultants working for the applicant found young-of-the-year brown trout in the riffle/run section downstream of the pool. This more riverine portion of the bypass has value as nursery and possibly spawning habitat.
45. During fall 1992 and summer 1993, the applicant, in consultation with the Agency and the U.S. Fish and Wildlife Service, conducted a study to determine how much habitat is available at alternate minimum bypass flows. The results of this study are presented in the applicant's response to FERC AIR No. 3 (September 1993). The study approach is patterned after the U.S. Fish and Wildlife Service Instream Flow Incremental Methodology, which quantifies physical habitat based on organism preference for certain conditions of stream depth, velocity, substrate, and cover.
46. The bypass, as described in this study, includes three separate habitat types: a large deep (up to 27 feet) pool at the base of the dam; an approximately 90-foot long and 100-foot wide, deep to moderate depth riffle, including the transition at the lower end of the deep pool; and an approximately 160 foot long and 200 foot wide shallow run that extends to the project tailrace.
47. The area to be assessed in the applicant's study under AIR No. 3 was the 250 foot long riffle/run reach. Substrate in the riffle and run sections was categorized as embedded cobble and gravel. The Agency identified the riffle portion as providing brown trout/spawning incubation habitat.
48. The scope of the AIR No. 3 study was to conduct assessments of habitat for the brown trout spawning and incubation life stage

(Transect 1 in the riffle section) and the brown trout juvenile life stage (at both Transect 1 and Transect 2, which was located in the run section) at target flows of 17 cfs, 50 cfs, 83 cfs, 144 cfs, and 207 cfs. During the study, the applicant's consultant judged that the inclusion of additional target flows under low river flow conditions would be desirable, and measurements were obtained at flows of 32 cfs and 116 cfs.

49. A hydraulic constriction downstream of the project causes a backwater influence into the bypass channel when there is a discharge from the powerhouse. This influence goes as far upstream as the large pool below the dam even with the lowest turbine wicket gate settings studied and affected depth and velocity measurements in the bypass.
50. Unfortunately, the backwater influence reduced the utility of the habitat study. The station release was varied for observations of the target bypass flows. For the smallest bypass discharge, the backwater caused the greatest increase in depth, and the effect was reversed at the high flow. Ideally, a family of habitat curves would have been generated, each curve representing the relationship for a fixed station discharge.
51. Weighted usable area (WUA) was used as the measurement unit to describe the habitat/flow relationships for brown trout spawning and incubation and juvenile life stages. WUA is expressed in units of square feet. The results are contained in the following table.

**Table 2. Results of habitat study in bypass.**

Flow (cfs)	Brown Tr. Habitat (s.f.)	
	Spawning & Inc. Transect 1	Juvenile Tr. 1 and 2
14	0	20,710
32	2,480	21,480
55	3,260	21,820
76	3,670	20,440
116	4,170	19,430
142	5,050	24,560
210	5,170	24,360

Note: Wetted area estimates are inconsistent for the range of flows. The area is about 9,000 sq. feet for the riffle section and 18,000 sq. feet for the run section. The wetted areas do not change substantially.

52. The five lowest study flows were measured under total river flow conditions of 120-200 cfs. The remaining two were under total flow conditions estimated as 470 cfs. The study report indicates that the data for 55 cfs is suspect.
53. The spawning and incubation habitat availability appears to increase substantially when bypass flows are increased over the range from 32 cfs to 142 cfs. The improvement is primarily due to enhanced quality of the habitat, as the wetted area changes only slightly. According to the computer output for the habitat model, depth and velocity conditions are generally optimized at the study flows of 142 cfs and 210 cfs; twice the habitat is available at those flows compared to 32 cfs. At the higher flows, the total WUA is about half of the total wetted area because of the low substrate suitability index (0.2).
54. Juvenile habitat does not vary substantially for the flow conditions studied. It comprises roughly 80% of the total wetted area.

### **Impoundment**

55. Fisheries habitat that was formerly riverine (lotic) has been transformed into lacustrine habitat due to the impounding of water by the dam. The quality of the impoundment as lacustrine habitat is marginal.
56. Major drawdowns occur at the project due to the flashboard height, causing the dewatering of the riparian-zone habitat. Fish and other aquatic organisms that use the impoundment are subject to stranding or freezing when such drawdowns occur.

### **Fish Passage**

57. A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin (1982) identifies the Passumpsic River as potential non-natal smolt production habitat for stocking consideration at such time in the future that the program's hatchery fry production capacity expands to meet the needs of non-natal streams. The plan estimates that there are 6,000 units (one unit = 100 square yards) of salmon nursery habitat exist in the Passumpsic basin. Subsequent to the 1982 restoration plan, the Department of Fish and Wildlife has revised the estimate of available habitat in the Passumpsic basin. The estimated total habitat is about 20,000 units, with about 96% of the habitat above Gage.
58. The Department of Fish and Wildlife stocked 15,000 age 0+ Atlantic salmon parr in the Moose River between St. Johnsbury to Concord in fall of 1991. The Moose River is an upstream tributary of the Passumpsic River and was selected for salmon stocking because it has excellent physical habitat conditions and because its warmer than average temperature regime is likely to be very favorable for salmon development. Subsequently, parr have been stocked in both 1992 and 1993, and fry have been stocked in spring 1993 in the Moose River and in the East Branch, which is upstream of Pierce Mills. More extensive basin-wide stocking of fry is planned for spring of 1994. Passage is an existing need at the Gage Project.
59. The applicant has agreed to provide downstream passage when and if the Passumpsic River becomes an integral part of the salmon

restoration effort supported by a detailed plan documenting location of habitat units, an annual release schedule supported by hatchery capability, and a monitoring plan (license application, Page E-48). The restoration plan was last revised in September 1982 and is once again under revision.

60. Upstream fish passage for returning adult salmon is now provided up to the dam at Dodge Falls on the Connecticut River at East Ryegate (Dodge Falls Hydroelectric Project, FERC No. 8011). When a threshold number of returning adult salmon is reached at the now-operational fishway at Wilder Dam, construction of a passage facility (either a fish trap-and-truck facility or a fish ladder) at Dodge Falls will be triggered. Salmon will then have access to the Passumpsic River.
61. Upstream passage facilities are currently not needed as part of the restoration plan, as the Passumpsic River is not currently targeted for natural reproduction of salmon. However, the status of all passage needs may be reviewed as part of the revision of the Strategic Plan or annual program (USF&WS) reviews. Expansion of and/or changes in the plans for the river may necessitate upstream passage facilities in the future. (USF&WS December 23, 1993 comment letter to FERC)
62. Resident populations of trout occur both above and below Gage Dam and would benefit from fish passage facilities that would help accommodate their movements within the river system. The confluences of two large tributaries, the Sleepers River and the Moose River, are located between Arnold Falls and Gage Dam.

#### **VIII. Water Quality - Wildlife and Wetlands**

63. Vermont Water Quality Standards requires the Agency Secretary to identify and protect existing uses of state waters. Existing uses to be considered include wetland habitats and wildlife that utilize the waterbody.
64. No Class I or Class II wetlands exist within the influence of the dam backwater zone.

65. Two small Class III wetlands are associated with east side of the Passumpsic River directly upstream of the dam. The northern wetland, described by the applicant as a small backwater marsh, is a combination of forested, emergent, and open water wetland, while the southern wetland is primarily emergent and open water. These wetlands, which are on the project lands, provide significant functions.
66. The small backwater marsh is located about 900 feet upstream from the dam on the south (left) bank of the river. It is 0.8 of an acre in size with fringe cattail and overhanging woody cover. The mix of aquatic vegetation, and abundance of amphibians, crustaceans, mollusks, and other macroinvertebrates make the site a valuable feeding area for both birds and mammals. Muskrat, beaver, raccoon, mink and otter have been seen using the area. The wetland provides diversity and richness to the project area (Response to AIR No. 8, September 1993).
67. A true run-of-river operation will, in part, eliminate several environmental concerns associated with impoundment water level fluctuations, including wildlife. However, the loss of flashboards and their anticipatory lowering prior to flood events remains a serious concern, especially considering their height. Lowering the pond elevation would have a detrimental effect on fish and wildlife residing in the pond or using the upstream wetland during critical seasons of the year, such as times of fish spawning and incubation, waterfowl nesting, and periods of hibernation of reptiles and amphibians.
68. Regarding wetland vegetation, flashboard loss could result in the dewatering of root stocks. Winter drawdowns expose rootstocks of perennial plant species in the drawdown zone to freezing conditions which prevent the further establishment of certain species. Winter drawdowns can also cause "freeze-outs" of hibernating amphibians and wintering aquatic furbearers and drawdowns during the spring and early summer can cause loss of cover and increased predation of young waterfowl broods.
69. Reduction of the frequency and duration of flashboard collapse and resultant lowering of impoundment levels, particularly during the winter months of December through March, would increase the

functional value of impoundment wetlands, especially for wildlife habitat, shoreline stabilization, and food chain production.

70. A constant year round water level will protect the wetland and the wildlife that utilize the water body. Institution of a run-of-the-river operating mode will protect wetlands present in the backwater zone and any downstream wetlands that may exist.
71. Wildlife that use the riparian zone and river will be better supported by the improved operating regime. Typical wildlife would include furbearers such as otter, beaver, muskrat, mink, and deer and birds such as kingfisher, herons, ducks, and osprey.

**IX. Water Quality - Rare and Endangered Plants and Animals;  
Outstanding Natural Communities**

72. Two potentially significant habitats are found at Gage station: a floodplain community on the left (south) bank just below the railroad trestle, and a ledge and sand community to the east of the powerhouse. In both environments, non-native plants form a conspicuous part of the plant community.
73. The floodplain forest has developed under conditions created by the dam and its impoundment and should continue to be sustained without significant changes, according to the applicant. The applicant contends that existing conditions such as high spring flows will continue to be the dominant factors shaping species composition and development of the ledge and sand community and that the proposed operation should have little discernable impact.
74. No endangered or threatened plants or animals are known to inhabit the project reach.

**X. Water Quality - Shoreline Erosion and Impoundment Desilting**

75. The upper portion of the impounded reach of the Passumpsic River above the project dam and below the Sleepers River confluence forms a meander pattern in the floodplain alluvial deposits to the west of the river channel. The river then enters a more incised S-curved reach of eroding lacustrine deposits. The river cuts into a



glacial ice-contact deposit immediately upstream of the dam along where U.S. Route 5 borders the river.

76. The applicant retained a geotechnical engineer to evaluate the streambank erosion in the project area.
77. The consultant partially attributed erosion occurring below the tailrace, on the far side of the plunge pool, along the Canadian Pacific Railroad embankment to project operation. The consultant recommended riprapping to protect against further erosion. In response to FERC AIR No. 13, the consultant resurveyed this site in June 1993 and found that the reported erosion along the railroad embankment was not of concern since the exposed boulders previously observed were apparently part of a rock fill which extended well below the water surface.
78. The same consultant observed evidence of long-term erosion that was occurring along the northerly shoreline of the tailwater pool upstream of the railroad embankment. The applicant has proposed a preliminary erosion control plan for this site to include the use of conventional dumped riprap and/or gabion baskets. The problem may in part be caused by high flow releases from flashboard failure.
79. The consultant also noted severe erosion and slope failure in the ice-contact reach upstream of the dam. His opinion is that the problem is caused by toe failure; however, he does not attribute the toe failure in full or part to project operation. Toe destabilization can be exacerbated by changing pore pressures in soils as water levels are cycled. Failure of this particular bank can affect the highway.
80. Areas of significant shoreline erosion in the impoundment are the west streambank adjacent to U.S. Route 5 directly upstream of the dam and the west bank closer to the head of the impoundment upstream of the railroad trestle. Historical operation has resulted in occasional drawdowns of six feet or greater. Drawdowns of this magnitude can contribute to shoreline erosion.
81. Impoundment desilting can result in significant degradation of water quality if not executed properly. The applicant has not disclosed

any desilting problems at this project in the past and proposes to consult with the Agency prior to any future desilting activity.

#### XI. Water Quality - Recreation and Aesthetics

82. The river in the project vicinity is popular for several recreational uses, including fishing, swimming, picnicking, boating, photography and viewing. (Comprehensive River Plan for the Passumpsic River Watershed and staff observations)
83. Observations by operating personnel indicate that usage by fishermen is on the order of two visits per day during the late spring through early fall. Fishing is done almost exclusively below the dam. An occasional picnicker is seen during the summer.
84. Vermont Water Quality Standards require the protection of existing water uses, including the use of the water for recreation. The Standards also require the management of the waters of the State to improve and protect water quality in such manner that the beneficial values and uses associated with a water's classification is attained.
85. Beneficial values and uses of Class B waters include water that exhibits good aesthetic value and swimming and recreation. Section 2-02 of the Standards prohibits regulation of river flows in a manner that would result in an undue adverse effect on any existing use, beneficial value or use.
86. The river is a navigable and boatable water of the State.
87. As a result of extensive impounding by utility dams along the length of the Passumpsic River, flatwater boating opportunities are created that enable extension of the boating season well into low water periods when other rivers are not canoeable. Referencing the Appalachian Mountain Club River Guide - New Hampshire/Vermont, 2cd ed., 1989, the Passumpsic River has suffered in the past from industrial pollution and consequent bad press in earlier canoeing guides. It does have an excessive number of dams, but it is an attractive river in a rural area. The dams are easier to deal with at low water.

88. The River Guide recommends portaging the dam on river left, although no formal portage has been provided by the applicant.
89. According to the River Guide, the river is quickwater from the dam to the Passumpsic Project two miles downstream.
90. One of the most limiting factors to boating the river is the lack of provisions for portaging the applicant's dam. The dam impairs boating on a navigable river. Recreation is a designated use for the Passumpsic River. Where designated uses have been impaired or eliminated, all reasonable steps should be taken to restore such uses.
91. Referencing the applicant's March 1991 Site Assessment concept proposal (Appendix G, License application), a portage route was proposed on the east (left) bank of the river accessible by canoe only (Site A); this portage was subsequently developed in 1992. The applicant also proposes a picnic area for an area known as the Pine Woods (Site B). As there are no provisions for formal access across the nearby railroad right of way, this site would be used by canoeists only.
92. The applicant does not plan on providing parking for recreationalists or non-canoeist day-use facilities because of project size, availability of land, and poor road access. In addition to the right-of-way crossing problem on the east side of the river, the applicant contends that access to the project from U.S. Route 5 on the west side is hazardous.
93. Access to the station is presently open to the public but not encouraged due to the hazardous intersection of the access road and U.S. Route 5. The entry road typically remains open and limited parking is available. However, should vandalism become a problem, the applicant intends to restrict access.
94. The remote project lands on the east bank are suited to the development of an overnight camping area for canoeists. The Northern Vermont Canoe Cruisers concur that this would be a good site for river-based camping. The Agency in an October 15, 1991 letter to the applicant recommended that this be included as an enhancement in the future. Providing such facilities when warranted

by recreational demand is critical if high quality recreation experiences are to continue in the state.

95. The spillage of water over the dam is a major element in the project's aesthetics. Falling water has a strong visual appeal, and without sufficient spillage over the dam the site lacks context and its attractiveness suffers. The amount of spillage needs to be in scale with the size of the project. The applicant conducted a flow demonstration to document on video-cassette tape existing spillage conditions as well as a 3-inch spillage (the applicant's original proposal) across the right spillway.
96. Spillage will only be provided over the shorter south spillway. The applicant indicates that spillage over, or the intentional leakage through, the six foot flashboards will not be provided. The Agency landscape architect has advised that the minimum flow proposal by the applicant is acceptable for aesthetics; however, that a means of providing sheet flow of water over the north spillway is needed in order to mask the unappealing appearance of the dry dam.
97. The applicant uses sheet plastic to seal the project flashboards. The plastic is unsightly in place and even more objectionable when washed downstream.

## **XII. Existing Uses**

98. No existing uses, other than those discussed above, have been identified. Existing uses, as defined in the Standards, are provided special protection under the anti-degradation provisions of the Standards (Section 1-03 (B) Protection of Existing Uses).

## **XIII. Other Applicable State Laws**

### Vermont Endangered Species Law (Title 10, Sections 5401 to 5403)

99. The Vermont Endangered Species Law (Title 10, Sections 5401 to 5403) governs activities related to the protection of endangered and threatened species. Generally, a person shall not "take, possess or transport wildlife or plants that are members of an endangered or threatened species." (Title 10, Section 5403(a)) Disturbance of a

endangered or threatened species is considered a taking. (Title 10, Section 4001)

100. No species protected by this law have been identified at the project.

#### Agency Regulatory Powers over Fish and Wildlife

101. Under 10 V.S.A. Chapter 103, "[i]t is the policy of the state that the protection, propagation control, management and conservation of fish, wildlife and fur-bearing animals in this state is in the interest of the public welfare, and that safeguarding of this valuable resource for the people of the state requires constant and continual vigilance."

102. The water use as proposed, with the conditions imposed below, will be consistent with this state policy.

#### **XIV. State Comprehensive River Plans**

The Agency, pursuant to 10 V.S.A. Chapter 49, is mandated to create plans and policies by which Vermont's water resources are managed and uses of these resources are defined. These plans implement the Agency policy. The Agency must, under Chapter 49 and general principles of administrative law, act, when possible, consistently with these plans and policies.

#### Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities

103. The Department's publication Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities is a state comprehensive river plan. The hydropower study, which was initiated in 1982, indicated that hydroelectric development has a tremendous impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flows at the sites were found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed.

At Gage Station, the plan recommends that minimum flow requirements be established for this project in order to improve the

bypass and downstream fishery, water quality, and aesthetics, and that impoundment water levels be stabilized to protect upstream fisheries resources.

### Passumpsic River Watershed Comprehensive River Plan

104. The Agency, with extensive public involvement, has completed a comprehensive river plan for the Passumpsic River Watershed. The plan, entitled Passumpsic River Watershed Comprehensive River Plan (August 1992) defines a balance of river uses and values including state hydropower management goals and actions. The state management goals and actions contained in the plan are derived from state law, written state policies, and the public interest as determined through a three-year public participation process. River basin citizens who participated in the planning process expressed as major issues of concern the restoration of the river's water quality and the fishery.

State hydropower management goals from this report include:

Goal 1 Continue to use the Passumpsic River, Sleepers River, and Joes Brook for the generation of electricity and permit other legitimate commercial uses of river water but make these uses compatible with other river uses and values.

Goal 2 Wherever possible, establish and maintain natural river flows to improve and maintain aquatic habitat, water quality, recreation, and aesthetics.

Goal 3 Establish and maintain minimum flows in the bypass segments of the hydropower facilities to maintain water quality, aesthetic and recreational values, and aquatic habitat, including: deep-aerated pools that are well circulated and serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas, all of which are limited habitat types, especially in the mostly impounded waters of the Passumpsic River mainstem.

Goal 4 Maintain riverbank stability and enhance river water clarity, aesthetics, and habitat for fish, wildlife, and other aquatic biota by minimizing river flow and pond height fluctuations.

Goal 5 Enhance the ability of fish to negotiate passage of hydro dams. Create downstream passage facilities for resident trout species and Atlantic salmon smolts (from both natal and non-natal production). Create upstream passage facilities when sufficient numbers of adult salmon have returned to the Passumpsic River.

Goal 9 Enhance the Passumpsic River's role in as recreation/tourism based economy, preserve historic and archeological resources, and restore the aesthetics and productivity of local rivers by permitting a continuous

vegetation buffer to grow on and near the banks of the river and its tributaries.

Goal 12 Enhance the desirability to live and conduct business in Lyndonville and St. Johnsbury by conserving and beautifying open spaces along the rivers as accessible recreational, cultural, scenic, and educational amenities in the urban corridor.

Goal 13 Maintain existing boating runs, for car-top boats and create a Passumpsic River boating trail where boaters can portage around dams and put-in and take-out at hydroelectric facilities on the mainstem river.

Goal 14 Increase watershed awareness and stewardship and local interest to maintain clean water, safe for swimming and compatible with other existing stream uses and values.

The project as proposed, and with the conditions imposed below, will be in compliance with the plan.

#### 1988 Vermont Recreation Plan

105. The 1988 Vermont Recreation Plan (Department of Forests, Parks and Recreation), through extensive public involvement, identified water resources and access as top priority issues. The planning process disclosed that, while Vermonters and visitors focus much of their recreational activities on surface waters, growing loss of public visual and recreational access to those waters causes substantial concern to the users. The plan projects that access is "likely to become the critical river recreational issue of the 1990s." The need for development of portage trails and canoe access sites is cited as among the major issues relative to canoe trails in Vermont.

106. The Water Resources and Access Policy is:

It is the policy of the State of Vermont to protect the quality of the rivers, streams, lakes, and ponds with scenic, recreational, and natural values and to increase efforts and programs that strive to balance competing uses. It is also the policy of the State of Vermont to provide improved public access through the acquisition and development of sites that meet the needs for a variety of water-based recreational opportunities.

107. Enhancement of access, provision of a portage, and improved flow management would be compatible with this policy and balance competing uses of the river for recreation and hydropower. Nonassurance of access or failure to provide a convenient portage trail would exacerbate a critical state recreational problem.

108. Another priority issue identified in the Recreation Plan is the loss or mismanagement of scenic resources. The plan notes "[few] recreational activities in Vermont would be the same without the visual resources of the landscape," and that protection of those resources is "necessary if the state is to remain a desirable place to live, work, and visit."

109. The Scenic Resources Protection and Enhancement Policy is:

It is the policy of the State of Vermont to initiate and support programs that identify, enhance, plan for, and protect the scenic character and charm of Vermont.

110. Provision of dam spillage, and maintenance of bypass and downstream flows will protect the scenic characteristics of project area and river.

#### Vermont Comprehensive Energy Plan

111. Pursuant to Executive Order No. 79 (1989), the Department of Public Service produced the Vermont Comprehensive Energy Plan, January 1991. This plan sets out an integrated strategy for controlling energy use and developing sources of energy. Several goals of the plan are to reduce global warming gases and acid rain precursors by 15% by the year 2000 through modified energy usage; to reduce by 20% by the year 2000 the per capita consumption of energy generated using non-renewable energy sources; and to maintain the affordability of energy.

112. Prescription of an appropriate minimum flow for the bypass is important to project economics. The applicant's response to AIR No. 9 (September 1993) provides the energy output losses for a range of minimum bypass flows from 17 to 207 cfs. The special releases proposed by the applicant would reduce project output by about 113 mwh, or 4% of the average annual energy output, for the 30-year term of the federal license; the special releases recommended by the Agency would result in roughly a 600 mwh, or 22%, reduction in output.

113. The loss of electrical power production associated with mitigation needed to meet water quality standards will have a negligible effect on overall power availability and rates.



The expected regional power surplus from the New England and New York power pools is 13,389 megawatts for Winter 2002-2003. Because the facility would be operated in a base-load fashion (run-of-the-river), no operating reserve (storage function) is available. The applicant has large amounts of base-load power at its disposal. (testimony of Robert Howland, Central Vermont Power's Manager of Power Supply, before the State Public Service Board in Docket No. 5171)

114. Continued availability of electricity generated by this renewable source, with proper environmental constraints in place, is consistent with the State energy plan.

## XV. Analysis

### Operations

#### *Impoundment*

115. The conversion of Gage to a run-of-the-river station will result in a more stable impoundment. However, occasional lowering of the flashboards will cause a lowering of the impoundment by up to six feet. To protect the wetland ecology, wildlife, and the aquatic habitat in the reach influenced by the project backwater, impoundment levels should be managed such that deviations in excess of minus two feet from the normal operating level are eliminated. Reasonable alternatives for controlling or preventing major drawdowns, such as the installation of a crest gate, should be investigated. Without such controls, extensive aquatic habitat would be dewatered causing an undue adverse effect.
116. Major drawdowns for construction or repair would have to be reviewed case specifically to insure protection of the upstream resource.

#### *Bypassed reach*

117. The Agency Procedure for Determining Acceptable Minimum Stream Flows (July 14, 1993) provides guidance to the Department

in setting minimum stream flows at hydroelectric projects. With regard to project bypasses, the procedure states:

Bypasses shall be analysed case-by-case. Generally, the Agency shall recommend bypass flows of at least 7Q10 in order to protect aquatic habitat and maintain dissolved oxygen concentration in the bypass and below the project. In assessing values, consideration shall be given to the length of the bypass; wildlife and fish habitat potential; the aesthetic and recreational values; the relative supply of the bypass resource values in the project area; the public demand for these resources; and any additional impacts of such flows upon citizens of the State of Vermont. Bypass flows shall be at least sufficient to maintain dissolved oxygen standards and wastewater assimilative capacity. Where there are exceptional values in need of restoration or protection, the general procedure shall be followed. In most cases, a portion or all of the bypass flows must be spilled over the crest of the dam to reoxygenate water, provide aquatic habitat at the base of the dam and assure aesthetics are maintained.

118. The applicant proposes to maintain a 17 cfs bypass release during the summer period; 17 cfs is only 21% of the 7Q10 drought flow condition (82 cfs, or 0.20 csm) at the project. This will have limited value for reaeration as it represents only a small fraction of the total flow of the river during operation. However, the project will be spilling all inflows during the period of greatest concern, providing full reaeration potential. The project's low-end capacity is 170 cfs, which with the applicant's proposed operating mode would require about 0.45 csm in order to operate.
119. There is no present need for a special bypass-flow release to meet dissolved oxygen standards downstream. However, algal respiration will become an important influence on dissolved oxygen levels as the St. Johnsbury wastewater plant loading increases in the future. Use of the dam spillage as a point source of reaeration may become necessary at some point in the future to maintain dissolved oxygen standards as wastewater loadings become more significant. However, the spillage required to serve aquatic habitat needs in the bypass, as discussed below, will preclude the need to monitor water quality to assure that dissolved oxygen standards are met.
120. The Passumpsic River is heavily dammed and the large majority of its length is under impounded conditions. The bypasses represent a disproportionate amount of the high quality habitat for salmonids on the river mainstem. The Department considers the maintenance of

habitat values within the bypasses as very important. The applicant's proposed bypass flow regime would cause an undue adverse effect on the composition of the aquatic biota and the species composition and propagation of fish, and would not support Agency management goals for this reach.

121. A spillage flow in the bypass reach of 82 cfs (7Q10) would be sufficient to maintain adequate water quality and circulation within the large bypass pool, which serves as an important refuge for numerous fish. When flows recede below 252 cfs, or 0.61 cfs (82 cfs plus 170 cfs, the minimum station hydraulic capacity), all flows would flow through the bypass.
122. A minimum flow of 142 cfs during the fall/winter spawning and incubation period for brown trout (October 1 - May 31) would provide high quality habitat for this species/life stage.
123. Based on the video assessment completed by the applicant, the proposed spillage regime would be adequate to support good aesthetic value, a Class B management objective. Higher flows as required for habitat support would further enhance conditions.

*Below Project*

124. The conversion of the project to a true run-of-river facility is expected to improve water quality below the project, as downstream flows will no longer be subject to artificial drought conditions and concomitant poor water quality. The project as proposed and with Department conditions below related to bypass flows and impoundment refilling will meet dissolved oxygen and temperature standards and the anti-degradation provisions of the water quality regulations.
125. Because natural river flows will be continuously available downstream, the impact of the project on concentrations or levels of the following parameters will not be significant:

Phosphorus  
Nitrates  
Settleable, floating or suspended solids  
Oil, grease, and scum

Alkalinity  
pH  
Toxics  
Turbidity  
Escherichia coli  
Color  
Taste and odor

*Flashboard Replacement*

126. During special events when water must be placed in storage, the applicant proposes to release 350 cfs (0.85 csm) below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe certain minimum flows for the perpetuation of indigenous fish species. The base flows are 4.0 csm for spring spawning and incubation, 1.0 for fall/winter spawning and incubation, and 0.5 csm for the remaining period and for cases where there is no use for spawning and incubation. When instantaneous inflows are less than these values, the inflow must be passed on an instantaneous basis. At the Gage Project, these aquatic base flows are 1652 cfs (4.0 csm), 413 cfs (1.0 csm), and 206 cfs (0.5 csm). Reduction of flows substantially below these minimums for the purpose of refilling the impoundment may imperil fish below the project. Mainstem spawning in the spring and fall is believed to occur downstream.
127. A continuous release of the U.S. Fish and Wildlife Service aquatic base flows or 90% of inflows, depending on inflow circumstances, will adequately protect downstream fish and other aquatic organisms during the occasional refill periods. During the spring period, the aquatic base flow is substantially higher than project capacity; flashboard replacement will only be possible during lower inflows. The 90% requirement would apply during this period. For the summer and fall/winter periods, the 90% requirement would apply to inflow conditions less than the 206 cfs and 413 cfs standards, respectively.

**Fish Passage**

128. Because of past stocking, operational passage facilities for outmigration is a present need at Gage. Passage facilities should include structures or devices to safely convey fish downstream of the

dam and may include screening to minimize entrainment and impingement and a conveyance conduit.

129. Adequate flows to operate these facilities will also be required. Passage facilities will also benefit resident trout species. Standard design for downstream passage facilities utilize operating flows equivalent to 2% of the plant hydraulic capacity, or the flow through a 3x2 foot rectangular weir, whichever is greater. For this project, the flow need would equate to about 20 to 25 cfs. It will be necessary to operate these facilities continuously during the periods April 1 through June 15 and September 15 through November 15. These periods are subject to adjustment based on knowledge gained about migration periods for salmon in the Connecticut River basin.
130. Changes to the salmon restoration plan may require the provision of upstream passage facilities within the term of the new license, although such facilities are not envisioned in the existing plan. The U.S. Fish and Wildlife Service has reserved a general passage prescription right under Section 18 of the Federal Power Act. (U.S. Department of Interior letter to FERC, December 23, 1993)
131. Any passage facilities at Gage Dam must be provided and operated consistent with the most current restoration plan.

#### **Streambank erosion**

132. The applicant's proposed operating mode will reduce the potential for new erosion problems to develop in the future. Installation of a crest gate or rubber dam system may reduce problems caused by flashboard failure.
133. Uncorrected erosion problems that are attributable to historic project operation will likely remain unstable. The applicant should develop a specific mitigation plan for the erosion areas identified by its geotechnical engineer and perform the necessary corrective measures. Otherwise, continued erosion may cause soil loss that would violate turbidity standards and contribute sediment to the river that may have an undue adverse effect on aquatic habitat.

### Recreation

134. The portage and access, with the improvements proposed by the applicant will provide support of the recreation management objectives for Class B waters, as well as the use of the river at the project for fishing, boating, and other existing uses.
135. Although the applicant proposes to develop and maintain its proposed recreational facilities, it states that it may restrict open access if vandalism becomes a problem. Arbitrary restriction of public access to the river would impair recreational use and enjoyment of the resource.
136. The applicant's spillage proposal of 20 cfs is satisfactory for aesthetics. The greater spillage proposed for the period of October 1 - May 1 would provide additional enhancement. If feasible, a portion of the flow should be spilled over the main spillway to provide a veil of water.
137. The applicant should cease using plastic for sealing flashboard leakage. The plastic degrades river aesthetics and recreational use and, when lost downstream, violates standards for settleable or floating solids.

### ACTION OF THE DEPARTMENT

Based on its review of the applicant's proposal and the above findings, the Department concludes that there is reasonable assurance that operation of this project as proposed by the applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, P.L. 92-500, as amended, and other appropriate requirements of state law:

A. The applicant shall operate and maintain this project as set forth in the findings of fact and conclusions above and these conditions.

B. Except as allowed in Condition E below, the facility shall be operated in a true run-of-the-river mode where instantaneous flows below the tailrace shall equal instantaneous inflow to the impoundment at all times. When the facility is not operating, all flows shall be spilled at the dam.

The applicant shall, within 90 days of issuance of this certification, furnish a description, hydraulic design calculations, and plans for the measure to be used to maintain true run-of-river flows below the project tailrace.

C. When available from inflow, a minimum instantaneous flow of 142 cfs from October 1 through May 31 and 82 cfs from June 1 through September 30 shall be released at the dam at all times. If the instantaneous inflow falls below the hydraulic capacity of the turbine unit plus this spillage requirement, all flows shall be spilled at the dam.

Within 90 days of the issuance of this certification, the applicant shall furnish a description, hydraulic design calculations, and plans for the measure to be used to pass these minimum flows. The filing shall address conditions during flashboard replacement and impoundment refilling. If technically feasible, the measure shall include spillage of a portion of the flow over the main spillway.

D. The applicant shall fully investigate alternatives that would enable it to manage impoundment levels such that drawdowns in excess of 2.0 feet, as caused by flashboard management, from the normal

operating level are eliminated or significantly reduced. An investigation report shall be filed with the Department within six months of issuance of this certification and shall include an implementation schedule for construction of a feasible alternative, subject to Department review and approval.

- E. Following the reinstallation of flashboards or an approved special maintenance operation necessitating a drawdown, the impoundment shall be refilled by reducing downstream flows, but to no less than 206 cfs from June 1 to September 30 and 413 from October 1 to May 31. During the period April 1 to May 31 or under circumstances during the summer and fall/winter periods when the natural inflow to the project is insufficient to permit both passage of these minimum flows and refilling of the impoundment, the impoundment shall be refilled while releasing 90% of instantaneous inflow downstream at all times.
- F. The applicant shall file for review and approval, within 90 days of the issuance of this certificate, a plan for monitoring instantaneous flow releases at the project, both in the bypass and below the tailrace. Following approval of the monitoring plan, the applicant shall then measure instantaneous flows and provide records of discharges at the project on a regular basis as per specifications of the Department. Upon receiving a written request from the applicant, the Department may waive the requirement for flow monitoring at this project provided the applicant satisfactorily demonstrates that the required flow will be discharged at all times.
- G. The applicant shall file for review and approval, within 180 days of the issuance of this certification, a remediation plan and schedule for correcting erosion that has been attributed to past project operation (ref. Finding 78). The Department may waive this requirement if the applicant files an updated geotechnical analysis of the reach showing that such remediation is unnecessary due to the existence of bedrock.
- H. Unless a means of controlling major drawdowns is implemented, the applicant shall monitor shoreline erosion during the life of the project. The applicant shall report to the Department the results of a survey of erosion every three years during the life of the project. If problems arise measures shall be taken by the applicant, subject



to Department approval, to stabilize shorelines so as to prevent discharge of sediment to State waters.

I. Within six months of the issuance date of the license, the applicant shall submit a plan for downstream fish passage to the Department of Fish and Wildlife for review and written approval. Downstream passage shall be provided April 1 - June 15 and September 15 - November 15 and shall be functional with and without flashboards in place, with the period subject to adjustment by the Department based on knowledge gained about migration periods for migratory salmonids. The approved plan shall be fully implemented within two years of license issuance and shall include provisions to:

1. minimize passage of fish into the generating unit(s);
2. minimize impingement of fish on trashracks or on devices or structures used to prevent entrainment; and
3. convey fish safely and effectively downstream of the project, including flows as necessary to operate conveyance facilities.

The plan shall include an implementation/construction schedule and a proposal for an interim fish bypass method for use until permanent facilities are completed; the interim method shall be utilized no later than six months from license issuance. The U.S. Fish and Wildlife Service and the Department of Fish and Wildlife shall be consulted during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction.

J. Within two years of a written request by the Agency, the applicant shall provide for upstream fish passage, subject to plan approval by the Department of Fish and Wildlife. The U.S. Fish and Wildlife Service and the Department of Fish and Wildlife shall be consulted during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction.

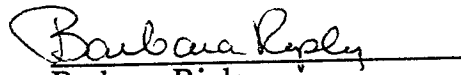
K. The applicant shall provide the Department with a copy of the turbine rating curves, accurately depicting the flow/production

relationship, for the record within one year of the issuance of this certificate.

- L. Within 90 days of the issuance of this certification, the applicant shall submit a plan for proper disposal of debris associated with project operation, including trashrack debris, for written approval by the Department. The plan shall include the method used for flashboard construction, including materials used and means of sealing to prevent leakage. The plan shall be designed to prevent or minimize the discharge of debris or trash downstream. The applicant shall cease using plastic sheeting for control of flashboard leakage and utilize an alternative that meets standards.
- M. Any proposals for project maintenance or repair work involving the river, including desilting of the dam impoundment, impoundment drawdowns to facilitate repair/maintenance work, and tailrace dredging, shall be filed with the Department for prior review and approval.
- N. By October 1, 1994, the applicant shall file maintenance plans for the existing portage with the Department of Environmental Conservation and the Department of Forests, Parks and Recreation for review and approval. The Department may require reasonable modifications to the portage at any time and as necessary to facilitate use or protect wildlife use of nearby wetlands.
- O. The applicant shall allow public access to the project area for utilization of public resources, subject to reasonable safety and liability limitations. Any proposed limitations of access to State waters to be imposed by the applicant shall first be subject to written approval by the Department.
- P. The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.
- Q. A copy of this certification shall be prominently posted within the facility.
- R. Any change to the project that would have a significant or material effect on the findings, conclusions, or conditions of this certification,

including project operation, must be submitted to the Department for prior review and written approval.

- S. The Department may request, at any time, that FERC reopen the license to consider modifications to the license necessary to assure compliance with Vermont Water Quality Standards.

  
Barbara Ripley  
Secretary  
Agency of Natural Resources

Dated at Waterbury, Vermont  
this 16 day of June, 1994.

cc: distribution list

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**Gage Hydroelectric Project  
Water Quality Certification**

**Public Responsiveness Summary**

The Department of Environmental Conservation conducted a public hearing on April 26, 1994 at 7:00 pm at the St. Johnsbury Middle School library in St. Johnsbury for the purpose of receiving oral testimony or written statements and data bearing on the issuance of water quality certifications to Central Vermont Public Service Corporation for the continued operation of the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric projects located on the Passumpsic River in the towns of St. Johnsbury and Barnet. In addition to the hearing, written comments were accepted through the end of business on May 13, 1994.

Area residents and representatives from Central Vermont Public Service Corporation (the applicant) and Passumpsic River Watch attended the hearing and provided oral testimony. Central Vermont provided written comments by letter dated May 11, 1994. The Vermont Natural Resources Council (VNRC) filed comments by letter dated May 13, 1994. Written comments were also received from two interested citizens.

Following is a summary response to the substantive comments received for the Gage Hydroelectric Project.

**CENTRAL VERMONT PUBLIC SERVICE**

The applicant commented on the content and specific wording of a number of certification findings in addition to making general comments on the scope of the certifications and the appropriateness of certain certification conditions. Agency responses are not provided for comments pertaining to issues that have been in litigation concerning the scope of jurisdiction under Section 401 of the Federal Clean Water Act. The applicant's objections are noted.

**Findings 36-37. Need for future water quality related increases in spillage**

Comment: The applicant comments that, based on the results of its 1991 water quality sampling, which included sampling under drought flow conditions, there seems little likelihood for a need for future water-quality-related increases in dam spillage.

Response: Reference Finding 119 for the Agency's explanation of the potential need for future increases in dam spillage for water quality purposes.

**Findings 49-50. Backwater influence in bypass**

Comment: The applicant comments that the backwater influence in the bypass reach obviates the need for dam spillage recommended by the Department.

Response: The habitat in the bypass reach needs to be more than simply wetted by backwater. The flow study completed by the applicant took into consideration the need for both depth and current through the reach and those needs formed the basis for the proposed flow requirements, along with the need to maintain flows through the large plunge pool.

**Findings 57-62, 128-131. Downstream passage**

Comment: The applicant feels that mandating fish passage facilities for 1995 is unwarranted at this point in time considering the sporadic stocking up to this date and the fact that the salmon restoration plan is under revision.

Response: The Connecticut River salmon restoration program now focuses on fry as the primary life stage stocked for non-natal production. The increased availability of eggs and fry and the expansion of stocking within the basin indicates that stocking is likely to be sustained annually and expand in the Passumpsic basin. There is an immediate need for downstream fish passage facilities to accommodate outmigrating smolts from prior stockings.

The restoration plan is currently being revised, and will be consistent with the 401.

**Finding 58. Stocking of salmon parr**

Comment: The applicant comments that stocking of salmon parr does not justify the need for fish passage facilities at the projects.

Response: The stocking of hatchery "grade-out" parr is a legitimate and beneficial use of these fish and will contribute to the overall restoration program. Salmon stocking includes fry stocking, now the primary life stage stocked as part of the restoration program. The restoration program is expanding since more eggs and fry have become available. This stocking will continue in the long term and does justify passage. Passage will also benefit resident trout and other fish species, which are known to migrate within river systems.

**Finding 60. Upstream fish passage**

Comment: No mention is made of upstream passage facilities at McIndoes Dam, a Connecticut River dam upstream of Dodge Falls but downstream of the Passumpsic River confluence.

Response: A trap-and-transport facility is planned as the upstream fish passage facility at Dodge Falls and would obviate the need for special facilities at McIndoes. However,

there are a number of disadvantages to this type of facility compared to a fish ladder or lift. For example, a salmon trapped at the Dodge Falls upstream passage facility could be from the Passumpsic River or any other part of the upstream basin previously involved in production of either natal or non-natal juveniles. This fact could result in the trucking and release of fish into the Passumpsic River that were in fact reared in and seeking to return to other rivers. This type of incident tends to cause fish to move downstream, disrupting behavior and spawning success and subjecting fish to turbine mortality where they must pass dams (this movement would occur outside of the currently specified period of operation for downstream fish passage facilities). To maximize the ability of fish to choose their own course, trucking is typically kept to a functional minimum.

The return and restoration of adult salmon to the upper Connecticut River is still in its early stages, such that the need for upstream passage at a number of dams has yet to be determined. However, it is likely that at least a portion of the salmon trapped at Dodge Falls will be released directly upstream of McIndoes, so that they would have access to the Connecticut River mainstem, the Stevens River, and the Passumpsic River.

#### **Finding 78. Bypass shoreline erosion**

Comment: The applicant comments that streambank protection measures of this area may not enhance water quality as the exposed soil is underlain by bedrock, and the soil is river-deposited material.

Response: The Department has modified Condition G, which requires remediation, to allow for a waiver of the stabilization work if an updated geotechnical analysis is provided and shows that such work is unnecessary.

#### **Findings 79-80. Impoundment shoreline erosion**

Comment: The applicant comments to the effect that erosion at the site would be even greater than what exists presently if project flashboards were not operated since impoundment fluctuations would be even greater than those that exist with the boards in place.

Response: In the reach directly upstream of the dam, the dam has significantly raised the normal river water surface elevation, exposing soils to erosion from ice action, river flow, and impoundment fluctuations.

**Findings 88, 90. Portage**

Comment: The applicant states that a canoe portage was developed at the site in 1992.

Response: The Agency has amended the certification to incorporate this development.

**Finding 94. Overnight camping**

Comment: The applicant has expressed concern that unsupervised camping areas will tend to become party spots.

Response: The certification notes the potential benefit of providing a canoe camping site at the project, but one is not mandated. FERC is evaluating the need for and feasibility of such a facility in its process. Recreation plans evolve; if a primitive campsite becomes a problem, the recreation plan can be modified. The site recommended is located on river left in an area which would not be accessible by vehicle.

**Finding 104. Comprehensive River Plan for the Passumpsic River**

Comment: The applicant disputes the Agency's statement that the development of the plan involved extensive public involvement.

Response: The Passumpsic River Watershed Preliminary Comprehensive River Plan (August 1991) identifies the extensive public involvement in the development of the plan. While there may not have been many individuals at the public hearings, many participated in the development of the documents presented at each of the hearings. One indication of the level of public involvement during the development of the comprehensive river plan, was the creation of a group known as Passumpsic River Watch. Passumpsic River Watch is a broad based educational and environmental monitoring organization with a core group of 30-50 members. The group's primary activity is the monitoring of E. coli concentrations in the Passumpsic watershed. However, it has been involved in a number of Passumpsic River related activities including streambank stabilization projects, recreational use surveys, and educational outreach programs in area schools. The group has also been involved in relicensing activities related to the applicant's projects on the Passumpsic River.

**Finding 111. Vermont Comprehensive Energy Plan**

Comment: The applicant states that the Agency proposed bypass flows are inconsistent with this plan because they result in the loss of renewable resource generation equivalent

to approximately 3,840 barrels of oil, or 882 tons of coal annually in a steam-electric plant, resulting in an increase in global warming gases and acid rain.

Response: Emissions can be expected to increase if hydrogeneration is reduced. CVPSC has not provided any evidence that loss of a portion of the hydropower production at each of the facilities will contribute in any significant way to non-attainment of the goals of the Energy Plan.

**Finding 113. Effect of mitigation on overall power availability and rates**

Comment: The applicant comments that the regional power reserve for winter 2002-2003 is more accurately categorized as adequate rather than as a surplus and that the Agency is being shortsighted to dismiss the value of the lost energy at these stations because of a short term base-load power surplus. The energy produced by the four stations accounts for 10-12 percent of the electrical needs of the St. Johnsbury and Barnet area.

Response: The information in this finding is drawn directly from testimony presented to the Public Service Board by the applicant in opposition to the development of a new run-of-the-river hydroelectric station on the Missisquoi River in Swanton. That station would have an annual output approximately equivalent to Pierce Mills and Arnold Falls stations combined.

The lack of storage and dispatchability reduces the value of the four stations for operating reserve. The characteristic of high production in the low-energy demand periods of fall and spring further reduces their value. The conclusions relative to impacts of minimum flows on power availability and rates appear to be sound.

**Finding 115. Flashboards/impoundment**

Comment: The applicant states that the flashboards are never removed for flood control, rather they are lowered, and that historic operation of the station has not been shown to result in an undue adverse effect on impoundment wetlands, wildlife, and aquatic habitat.

Response: Regardless of whether the boards are removed or lowered, the same effects caused by large fluctuations in impoundment levels result. The applicant has not provided the Agency with any data to substantiate its claim that historic operation has not shown an undue adverse effect on wetland ecology, wildlife, and aquatic habitat; the Agency is unaware of any special studies undertaken to identify and quantify the impacts



of historical impoundment fluctuations. The Agency has modified this finding to incorporate the applicant's comment on flashboard operation during flood control.

#### **Finding 120. Bypassed reaches**

Comment: The applicant questions the value of the four project bypasses due to the limited number of habitat units they contain and the projections of limited returns of Passumpsic River sea-return salmon to the Connecticut River based on high marine mortality.

Response: The project bypasses contain unique, high quality habitat whose value is under represented by a simple percent area analysis. They have value to many more species and life stages of aquatic life than just juvenile salmon.

#### **Condition C. Bypass flows**

Comment: The applicant believes that the Agency flow requirements are not fully supported by the findings and that lessor flows may satisfy water quality criteria while permitting economically viable operation of the four plants. CVPSC would like to reach a compromise with the Agency on these flows.

Response: The flow requirements set in the Gage certification are well supported by the findings and conclusions made with respect to restoration and protection of aquatic habitat. The Department has again reviewed the issue of minimum flows in the four bypasses, including a review of the FERC multiple-project draft environmental assessment (May 23, 1994), and has determined that a reduction in the minimum flow requirement is only appropriate at Passumpsic Station.

#### **Condition I. Fish passage**

Comment: The applicant claims that studies have shown fish mortality rate may be higher through a downstream fish passage device than through a low head, low speed propeller turbine similar to those in place at Gage and Arnold Falls.

Response: Turbine mortality is very site-specific and can vary over a wide range. Properly installed downstream fish passage devices at these low-head facilities are not expected to cause any fish mortality. In order for the Agency to consider allowing passage through the units, the applicant would have to demonstrate that negligible mortality would occur to the species and life stages of interest. That has not been done.

### **Condition L. Debris disposal**

Comment: The applicant contends that debris disposal is outside the jurisdiction of the Department for certification purposes.

Response: The intention of this condition, which is a standard condition placed in certificates for hydropower facilities, is that any debris foreign or natural be properly disposed of after removal from the river. This condition requires the applicant to properly dispose of debris that is physically removed from a project intake or any other material removed as part of project operations. The discharge of this removed material back into the river system would constitute a violation of Vermont Water Quality Standards, Section 3-01 Water Quality Criteria - General, which states there shall be no discharge of settleable solids, floating solids, oil, grease, scum, or total suspended solids in concentrations or combinations that would have an undue adverse effect on any beneficial values or uses; and that there shall be no discharge of solid refuse. Improper disposal of debris is also a technical violation of the state solid waste laws and V.S.A. Title 24, Section 2201, which deals with throwing, depositing, or dumping of refuse into or on the banks of a river; the Department considers these laws to apply under Section 401(d). Proper disposal methods would include the deposition of this material in a disposal facility that qualifies under the state solid waste law; composting of appropriate materials; and recycling. Please refer to Section 6-309 of the State Solid Waste Management Rules for guidance on the disposal of subsection (b)(1) materials (stumps, brush, and untreated wood) under a categorical certification.

Removal of this material also reduces hazards to boating and the potential for increased flood damage due to debris blockages at bridges or instream channels. At most hydroelectric facilities, debris removal also precludes the need for a downstream facility to handle the material.

### **Condition M. Project maintenance or repair work**

Comment: The applicant asks whether inclusion of this condition in the Gage certification infers that desilting activities can take place without Department approval at those projects which do not contain this special condition in their licenses?

Response: No.

### **Condition N. Canoe portage**

Comment: Since a canoe portage has been constructed at the site already, consultation prior to construction is impossible.

Response: As referenced previously, the certification has been amended to reflect that a portage already exists at the site.

#### **Condition R. Posting of certification**

Comment: The applicant comments that this condition should be deleted as it has nothing to do with compliance with water quality standards. Nevertheless, the applicant agrees to post a copy of the final certifications in each of the powerhouses.

Response: This is included as a standard condition in certifications. Prominently posting such a document within the facility simply helps to ensure that those responsible for compliance with the certificate are aware of its requirements.

#### **Supplemental Comment, Various conditions of all certifications**

Comment: The applicant comments that the timing of commencement of compliance with the conditions of the certification should be triggered by the issuance of the new license and not the issuance of the certification itself.

Response: Primarily, the filings required by these conditions are designed to enable the project to be in compliance upon relicensing by FERC.

#### **VERMONT NATURAL RESOURCES COUNCIL (VNRC)**

##### **Hydroelectric projects as an existing use**

Comment: VNRC comments that the applicant's dam on the Passumpsic River should not be considered an existing use under Vermont Water Quality Standards, Section 1-03(B).

Response: The Agency agrees and has not considered the applicant's project an existing use under the Standards.

##### **Consideration of economic costs and benefits of projects**

Comment: Consideration of the economic costs and benefits of the projects being considered for certification is beyond the scope of the Agency's authority and is substantially incomplete.

Response: The Agency gives a certain level of consideration of economics in its decision making under Section 401, especially with regard to the setting of minimum flows in bypassed reaches. The minimum flow restrictions are commensurate with the values of

the reach. Consistent with the Agency flow procedure (July 14, 1993), the requirements for the Passumpsic projects have been set at no less than 7Q10 and are site specifically assigned based on habitat value. None of the bypass flow requirements in the certifications, as drafted, would result in a violation of the narrative and numeric water quality standards.

**Upstream fish passage; bypass flow requirements for protection of fish habitat**

Comment: VNRC supports the specific requirements of the draft certifications. VNRC believes that the certifications should include conditions to assure that upstream fish passage for resident and anadromous fish will be provided in the near term with a definite schedule for implementation. VNRC also recommends that the Agency include fall/winter spawning and incubation flow requirements in the bypassed reaches at each of the projects as follows.

PROJECT	SUMMER PERIOD (CFS)	FALL/WINTER SPAWNING AND INCUBATION (CFS)
Pierce Mills	90, or inflow	237, or inflow
Arnold Falls	106, or inflow	254, or inflow
Gage	206, or inflow	413, or inflow
Passumpsic	214, or inflow	428, or inflow

Response: Each of the certifications include a condition requiring that the applicant provide upstream fish passage within two years of a written request by the Agency, subject to plan approval by the Department of Fish and Wildlife. Reference also Section VII. Water Quality - Aquatic Biota and Habitat, fish passage of the findings for each certification that explain the Agency's basis for its handling of upstream fish passage needs at each facility.

Regarding VNRC's comments on bypass flows, with the exception of the Gage project, salmonid spawning habitat within the bypasses is limited. The primary habitat value of the bypasses is as macroinvertebrate habitat and habitat for juvenile and adult fishes, as reflected in the selection of target species and life stages for the bypass habitat studies. The recommended bypass minimum flows are based on these studies. The Gage bypass flow recommendation is also based on the site-specific habitat study and does include a fall/winter flow to protect spawning and incubation.

## **OTHER PUBLIC COMMENTS**

### **Erosion**

Comment: Bank erosion is a significant problem in the Connecticut River watershed which includes the Passumpsic River, and the Agency should be sensitive to this issue as it seeks to improve water quality here and elsewhere. Also, its not clear what is meant by the statement "Unless a mean(s) of controlling major drawdowns is implemented..." in Finding H of Gage.

Response: The Agency is sensitive to erosion issues at the various projects and by condition of the certifications, has required monitoring and stabilization measures as necessary at the various projects. Erosion and stream sedimentation were identified as watershed issues during the development of the comprehensive river plan for the Passumpsic. The plan identified various goals and recommends actions directly related to these issues. The Passumpsic River Watch has been involved in various streambank stabilization projects as well.

Referencing Condition H of the draft certification for the Gage Project, major drawdowns can occur at the project when the flashboards fail. These large fluctuations can contribute to streambank destabilization, among other impacts. Recognizing this problem, the Agency points out in Finding 132 of the draft that the installation of a crest gate or rubber dam system may reduce problems caused by flashboard failure and also includes Condition D which requires the applicant to investigate alternatives to minimize drawdowns caused by flashboard management. Unless a means of controlling major drawdowns is implemented, shoreline monitoring will be necessary as conditions contributing to bank destabilization will persist.

### **Hydrologic connection between projects**

Comment: Did you assess the hydrologic connection between operating modes of the projects? If not, why not?

Response: The Agency did not assess this connection as the projects are proposed as true run-of-river facilities. Had they been proposed as peaking facilities on the other hand, the hydrologic connection between each of the facilities would have warranted studying.

### **State's responsibility - pollution vs. hydro**

Comment: Rather than spending its time regulating these hydro projects, the state should be working on cleaning up the river. The State should be dealing with water

quality problems resulting from activities/sources such as agricultural runoff, industrial pollution, and bank dumping for example. These problems pose a greater threat to aquatic life than hydro dams. The Passumpsic River is not as clean as some people may think it is. Why should these projects have to walk such a straight line when there are all these other problems that need to be dealt with and which are within the State's authority to regulate?

Response: Under Section 401 of the Federal Clean Water Act (P.L. 92-500), the Agency is responsible for regulating hydroelectric projects so that these projects do not violate Vermont Water Quality Standards. The certifications for these projects have been drafted accordingly. In addition to hydro regulation, the State is involved in a number of other water pollution control activities dealing with problems such as agricultural run-off, streambank protection, and illegal dumping which, like hydro dams, can threaten the aquatic life in a stream. While these various programs have resulted in significant improvements to the water quality of our streams over the years, including the Passumpsic River, the pollution problems have by no means been eliminated. This will take continued State regulation and public education and involvement in pollution causes and prevention. The work of the Passumpsic River Watch group is an important step in the direction of public education and involvement.

#### **Dams and project bypasses as source of reaeration**

Comment: There was some dispute over the importance of project dams and bypasses in providing an important source of reaeration in the Passumpsic River. While a representative of the Passumpsic River Watch group commented on the importance of the dams and bypasses as important sources of reaeration, others who provided comment questioned this statement, claiming that there are many other areas of the river where reaeration is going on.

Response: Reaeration occurs throughout the length of a river; however, the rates of reaeration are substantially greater in unimpounded reaches, where the river depths are shallower and the current more turbulent. Riffle reaches and falls and cascades are particularly efficient in reoxygenating rivers. Dams act as a point source of aeration, similar to a waterfall; work done by the applicant demonstrated the value of spillage over dams in driving the river's dissolved-oxygen concentrations towards saturation.

#### **Portages**

Comment: If canoeists want portages at these dams, they should be contributing to the cost of putting them in rather than requiring the utility to put them in which will cost the ratepayer in the end.

Response: Vermont Water Quality Standards require the protection of existing water uses, including the use of the water for recreation. The river is a navigable and boatable water of the State. One of the most limiting factors to boating the Passumpsic River is the lack of provisions for portaging the applicant's dams. Dams without portages impair boating. Recreation and recreational boating are designated uses for the Passumpsic River. Where these uses have been impaired or eliminated, all reasonable steps should be taken to restore such uses. Developing portages around the dams where none exist presently is one such step. Canoe portage development at hydroelectric projects is generally not an expensive enhancement for dam owners to undertake. The applicant has developed portages at many of its projects around the state without formally being required to do so.

#### **Hydro regulation vs. future economic viability of projects**

Comment: The State is far too involved in many matters and power dams is one. CVPSC has made some important concessions under this relicensing process such as converting the projects to run-of-river. These concessions are going to cost the company a lot of money which will in turn cause our electric rates to go up. The State should back off on some of its more onerous positions otherwise the projects may lose their economic viability. These projects should be relicensed without having an undue burden placed on them so that they maintain their economic viability now and in the future. Long range energy planning should not exclude hydro.

Response: River restoration has a cost, whether it is construction and operation of wastewater treatment facilities or reduction in electrical output at hydroelectric projects. The mitigation contained in the certifications is the minimum necessary to meet standards and will not render the projects in-viable. As noted in the certifications, a fairly large proportion of the resource will continue to be utilized for electrical production at each of the projects.

#### **Benefits of hydroelectric projects**

Comment: We need to recognize some of the benefits of these hydroelectric facilities in addition to the energy production. When a project is developed on a river, the river environment is going to change but these changes are not always detrimental. The impoundments created by a dam can provide boating opportunities and important wildlife habitat, for example.

Response: The Agency recognizes these benefits.

**Changing public perception of Passumpsic River; support of certification conditions**

Comment: The river has been viewed as an industrial river more so in the past than it is today. Recreational use of the river has increased considerably in recent years and that increase is tied directly to the public's perception of the river's water quality which has been improving over the years. The river should be viewed more as a natural resource in need of protection rather than as an industrial river which we can use and abuse. With that in mind, there should be improved bypass flows in the project bypasses to improve water quality and promote healthy conditions for aquatic life, including fish; upstream and downstream fish passage facilities; established canoe portages at every project; and improved public access.

Response: The Agency concurs with this comment.

**Flooding**

Comment: If the dams were to be decommissioned, would this impact spring flooding conditions?

Response: No.