STATE OF MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN R. McKERNAN, JR
GOVERNOR

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DEAN C. MARRIOTT
COMMISSIONER

DEBRAH RICHARD
DEPUTY COMMISSIONER

COMMENTS

April 22, 1993

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

RE: Application for New Major License
Penobscot Mills Hydro Project
FERC No. 2458-009

Dear Secretary Cashell:

This is in response to your March 25, 1993 Notice of Application Ready for Environmental Analysis in the proceeding involving the Application for New Major License filed by Great Northern Paper, Inc. for the existing Penobscot Mills Hydro Project, located on Millinocket Stream and the West Branch of the Penobscot River, Penobscot and Piscataquis Counties, Maine.

As more fully described below, the Maine Department of Environmental Protection has taken action on Great Northern's request for Water Quality Certification for the project. [discuss 2 orders--see draft order cover letter]

By Order #L-17166-32-A-N dated April 21, 1993 (copy attached), the Department has granted certification with conditions for the Millinocket Lake Storage Dam.

By Order #L-17166-33-A-N dated April 21, 1993 (copy attached), the Department has granted certification with conditions for the North Twin, Millinocket, Dolby, and East Millinocket Hydroelectric Developments, and has expressly waived its authority to certify that the section of the West Branch known as the Back Channel.

In summary, the Department has certified that the continued operation of the Penobscot Mills Project will not violate applicable water quality standards, subject to the following special conditions:

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APR 27 1993

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MILLINOCKET LAKE STORAGE DAM

1. Except as temporarily modified by operating emergencies beyond the applicant's control, a minimum flow of 60 cfs shall be maintained from the Millinocket Lake Storage Dam to Millinocket Stream from May 1 to October 15 annually, and a minimum flow of 20 cfs shall be maintained during the remainder of the year.

2. Except as temporarily modified by approved maintenance activities, inflows to the project area, or operating emergencies beyond the applicant's control, the water level in Millinocket Lake shall be maintained between elevations 470.0 feet and 480.0 feet MSL while providing water to maintain North Twin impoundment levels.

3. The applicant shall implement and monitor the results of an upgraded spring and fall brook trout stocking program as specified in Millinocket Stream. The Department reserves the right to approve a revised stocking program if deemed necessary to meet the goal of providing a seasonal fishery in Millinocket Stream.

4. The applicant shall provide enhancement of existing wetlands in the Penobscot Mills Project area, and shall submit plans for evaluating, implementing, and monitoring these enhancements.

5. The applicant shall cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury and other toxic metals on aquatic life in the project waters.

6. The applicant shall consult with the Department of Conservation regarding the need for a study to mark and remove submerged hazards to navigation in Millinocket Lake, and shall, if requested by Conservation, submit plans for investigating and for marking and/or removing hazards in the lake.

NORTH TWIN, MILLINOCKET, DOLBY & EAST MILLINOCKET HYDROELECTRIC DEVELOPMENTS

1. Except as temporarily modified by operating emergencies beyond the applicant's control, the Millinocket, Dolby, and East Millinocket Developments shall be operated as

run-of-river facilities while providing an instantaneous minimum flow of 2,000 cfs to the West Branch at Millinocket.

2. Except as temporarily modified by approved maintenance activities, infloes to the project area, or by operating emergencies beyond the applicant's control, the water level in the North Twin impoundment shall be maintained at or above the lake trout spawning/incubation level for the period on or about October 15 through May 1 annually, and shall be maintained at a relatively stable level from May 1 through mid-August annually, unless the minimum flow of 2,000 cfs cannot be maintained at Millinocket.

3. The applicant shall investigate the extent to which dissolved oxygen deficits in the Dolby impoundment are due to discharges from the Millinocket Mill, and shall susbmit the results of the investigation, along with a discussion of possible corrective actions, to the Department in conjunction with the next renewal of the Waste Discharge License for the Millinocket Mill.

4. The applicant shall cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury and other toxic metals on aquatic life in the project waters.

5. The applicant shall undertake appropriate repairs and/or modifications to the existing North Twin fishway.

6. The applicant shall conduct a study as specified to monitor togue (lake trout) reproductive success in the North Twin impoundment following licensing.

7. The applicant shall provide enhancement of existing wetlands in the Penobscot Mills Project area, and shall submit plans for evaluating, implementing, and monitoring these enhancements.

8. The applicant shall consult with the Department of Conservation regarding the need for a study to mark and remove submerged hazards to navigation in the North Twin impoundment, and shall, if requested by Conservation, submit plans for investigating and for marking and/or removing hazards in the impoundment.

9. The applicant shall improve existing recreational access facilities in the project area by: providing parking areas for four vehicles at the Route 157 Causeway site and for three vehicles and five trailered vehicles at the Dead man's Curve site; and removing boulders at the boat launch and adding gravel to expand the size of the parking area at the boat put-in site located upstream of Quakish Lake at the Green Bridge.

We recommend that the foregoing conditions be included in the Articles of any New License granted for the Penobscot Mills Project, in compliance with the provisions of Sections 401(a) and (d) of the Clean Water Act.

We note that, in order to satisfy applicable water quality standards, the section of the West Branch known as the Back Channel must be suitable for all designated uses and must meet aquatic life criteria as established for Class C waters. However, the Department has concluded that, because only leakage flows (about 2-5 cfs) and occasional spillage flows have been released since the completion of the Stone Dam in 1899, the habitat in the Back Channel has changed significantly and cannot be evaluated using traditional methods. In addition, the Department has concluded that the applicant cannot maintain the advantages to fisheries, recreation and hydroelectric power generation of the applicant's Water Use Plan if additional flows are provided to the Back Channel. Furthermore, the Department has concluded that the release of additional flows to the Back Channel is neither reasonable nor achievable because of the requirements placed on the applicant elsewhere in the watershed by state resource agencies. Finally, the Department has concluded that, due to the uniqueness of the Penobscot Mills Project, the overall advantages of the proposed project operation outweigh the disadvantages of low flows in the Back Channel.

It is on the basis of the foregoing conclusions that the Department has acted to expressly waive its authority to certify that the continued operation of the Penobscot Mills Project will meet applicable water quality standards in the section of the West Branch known as the Back Channel.

By Executive Order of the Governor of the State of Maine, the terms and conditions contained in the attached Orders represent the State's official recommendations regarding the subject Application for New License, superceding all preliminary recommendations by individual State agencies.

Please direct any questions regarding these comments to Dana Murch of the Department's staff at 207-287-2111.

Sincerely,

Dean C. Marriott, Commissioner
DEPARTMENT OF ENVIRONMENTAL PROTECTION

a\comments
Attachments
cc: Director, DPR-OHL, FERC
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STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE HOUSE STATION 17 AUGUSTA, MAINE 04333

DEPARTMENT ORDER

IN THE MATTER OF

GREAT NORTHERN PAPER, INC.	)	MAINE WATER QUALITY PROGRAM;
T1 R8 WELS, PENOBSCOT COUNTY, MAINE	)	FEDERAL CLEAN WATER ACT
PENOBSCOT MILLS PROJECT	)	
MILLINOCKET LAKE STORAGE DAM	)	
L-17166-32-A-N	)	WATER QUALITY CERTIFICATION

Pursuant to the provisions of 38 M.R.S.A. § 464, et seq., and Section 401 of the Federal Water Pollution Control Act (the "Clean Water Act"), the Department of Environmental Protection has considered the application of the GREAT NORTHERN PAPER, INC. with its supportive data, agency review comments, and other related materials on file and finds the following facts:

1. APPLICATION SUMMARY

a. Application. The applicant proposes the continued operation of the Millinocket Lake storage dam located in Township 1 Range 8 (WELS) and Township 2 Range 8 (WELS) in Penobscot County; and Township 1 Range 9 (WELS) and Township 2 Range 9 (WELS) in Piscataquis County, Maine (see Exhibit #1).

b. Existing Features. The Millinocket Lake development consists of a storage dam and impoundment, and a pumping station. There are no hydroelectric generating facilities at this development. The development is used strictly for storage, with water being either released through the Millinocket Lake storage dam and down Millinocket Stream, or pumped through the pumping station into Ambajejus Lake (North Twin impoundment). The existing Millinocket Lake storage dam was originally constructed in 1883 to provide storage for log driving. No changes to the existing structures are proposed.

i. Millinocket Lake storage dam. The Millinocket Lake storage dam, located at the outlet of Millinocket Lake in T1 R8 (WELS), is a concrete and earth-filled structure about 635 feet long. The dam consists of two spillway sections, a gated section, and earthen embankments on the east and west shores (see Exhibit #2). The dam is located about 7.8 miles upstream of the Millinocket Mill tailrace.

ii. Millinocket Lake impoundment. The impoundment created by the Millinocket Lake storage dam has a surface area of about 8,640 acres at a full pond elevation of 480.0 feet MSL.

iii. Pumping station. The pumping station consists of a concrete substructure, a brick superstructure, and a concrete outlet structure discharging to the North Twin impoundment. The pumping station is located on the west side of Millinocket Lake, about 6.2 miles from the storage dam. It is used to pump water from Millinocket Lake into the North Twin impoundment.

c. Existing Operation. Millinocket Lake is operated as a storage facility to supplement the flow of water in the West Branch of the Penobscot River. The lake has a usable storage capacity of 45,370 acre-feet. Based on availability of storage, water is pumped from Millinocket Lake to the North Twin impoundment to utilize the fall of the West Branch of the Penobscot River through the North Twin and Millinocket hydroelectric stations (see Order #L-17166-33-A-N). Millinocket Lake is normally drawn down as required to provide generation at downstream stations, and to maintain flow in Millinocket Stream and the West

Branch of the Penobscot River. The impoundment is also drawn down in anticipation of spring runoff and to provide flows throughout the winter. This drawdown has been as little as 2.86 feet and as much as 6.2 feet during the period 1972-1985. The level to which the impoundment is drawn down is usually determined by the actual and potential precipitation for the period of the year, and the water content of the snow cover. A normal or high spring runoff typically fills Millinocket Lake to its full pond level. During those years when the impoundment is filled to capacity, any excess runoff or rainfall is passed into Millinocket Stream. A minimum flow of 20 cfs is released at the dam into Millinocket Stream, as long as storage remains in the lake.

d. Summary of Proposal. The applicant proposes to operate the development in accordance with several measures for the protection or enhancement of, or mitigation of project impacts on public resources. These measures include:

i. Continuing the existing operation of the Millinocket Lake development to provide water to maintain North Twin impoundment levels;

ii. Passing a minimum flow of 60 cfs from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15. During the remainder of the year, the current minimum flow of 20 cfs will be maintained;

iii. Upgrading the existing brook trout stocking program to Millinocket Stream; and

iv. Consulting with the Department of Conservation to identify submerged hazards, if any, in Millinocket Lake.

2. JURISDICTION

The proposed continued operation of the project qualifies as an "activity ... which may result in [a] discharge into the navigable water [of the United States]" under the Clean Water Act, 33 U.S.C. 1251, et seq. Section 401 of the Clean Water Act requires that any applicant for a federal license or permit to conduct such an activity obtain a certification that the activity will comply with applicable State water quality standards. Certification is deemed to be waived if the State expressly waives its authority to act or otherwise fails to act within one year of receipt of a request for certification.

The project is licensed as a water power project under the Federal Power Act (Project No. 2458). The initial project license was issued effective April 1, 1962, and expires on December 31, 1993. The licensee has filed an Application for New License to continue to operate the Penobscot Mills Hydroelectric Project, which includes the Millinocket Lake storage dam, for another 30 years. This application is currently pending before the Federal Energy Regulatory Commission.

The Department of Environmental Protection has been designated by the Governor as the certifying agency for issuance of Section 401 Water Quality Certification for hydropower projects located in whole or in part in organized municipalities subject to the Department's regulatory jurisdiction. The Penobscot Mills Hydroelectric Project is located in part in the Town of Millinocket and the Town of East Millinocket, which are subject to the Department's jurisdiction.

GREAT NORTHERN PAPER, INC. T1 R8 WELS, PENOBSCOT COUNTY, MAINE PENOBSCOT MILLS PROJECT MILLINOCKET LAKE STORAGE DAM L-17166-32-A-N	3))))	MAINE WATER QUALITY PROGRAM; FEDERAL CLEAN WATER ACT WATER QUALITY CERTIFICATION

3. APPLICABLE WATER QUALITY STANDARDS

a. Classification. The waters of the Penobscot Mills Hydroelectric Project in the area of Millinocket Lake are currently classified as follows:

i. Millinocket Lake is classified as GPA. 38 M.R.S.A. § 465-A

ii. Millinocket Stream, from the outlet of Millinocket Lake to the railroad bridge near the Millinocket-T.3 Indian Purchase boundary, is Class A. 38 M.R.S.A. § 467(7)(C)(2)

iii. Millinocket Stream, from the railroad bridge near the Millinocket-T.3 Indian Purchase boundary to its confluence with the West Branch Canal, is Class B. 38 M.R.S.A. § 467(7)(C)(2)(c)

iv. Millinocket Stream, from its confluence with the West Branch Canal to its confluence with the West Branch of the Penobscot River, is Class C. 38 M.R.S.A. § 467(7)(C)(2)(d)

b. Designated Uses

i. Class GPA waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural. 38 M.R.S.A. § 465-A(1)(A)

ii. Class A waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. The habitat shall be characterized as natural. 38 M.R.S.A. § 465(2)(A)

iii. Class B waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. The habitat shall be characterized as unimpaired. 38 M.R.S.A. § 465(3)(A)

iv. Class C waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. 38 M.R.S.A. § 465(4)(A)

c. Numeric Standards

i. Class GPA waters do not have numeric standards for dissolved oxygen.

ii. The dissolved oxygen content of Class A waters shall be not less than 7 parts per million or 75% of saturation, whichever is higher. 38 M.R.S.A. § 465(2)(B)

iii. The dissolved oxygen content of Class B waters shall be not less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration shall not be less than 9.5 parts per million and the 1-day minimum dissolved oxygen concentration shall not be less than 8.0 parts per million in identified fish spawning areas. 38 M.R.S.A. § 465(3)(B)

iv. The dissolved oxygen content of Class C waters shall be not less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes shall be maintained. 38 M.R.S.A. § 465(4)(B)

d. Narrative Standards

i. Class GPA waters shall be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorous content and other appropriate criteria. Class GPA waters shall have a stable or decreasing trophic state, subject only to natural fluctuations and shall be free of culturally induced algal blooms which impair their use and enjoyment. 38 M.R.S.A. § 465-A(1)(B)

ii. Direct discharges to Class A waters licensed after January 1, 1986, shall be permitted only if, in addition to satisfying all the requirements of this article, the discharged effluent will be equal to or better than the existing water quality of the receiving waters. Prior to issuing a discharge license, the department shall require the applicant to objectively demonstrate to the department's satisfaction that the discharge is necessary and that there are no other reasonable alternatives available. Discharges into Class A waters which were licensed prior to January 1, 1986, shall be allowed to continue only until practical alternatives exist. There shall be no deposits of any material on the banks of Class A waters in any manner so that transfer of pollutants into the waters is likely. 38 M.R.S.A. § 465(2)(C)

iii. Discharges to Class B waters shall not cause adverse impacts to aquatic life in that the receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community. 38 M.R.S.A. § 465(3)(C)

iv. Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community. 38 M.R.S.A. § 465(4)(C)

e. Antidegradation. The Department may only approve water quality certification if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve water quality certification for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S.A. § 464(4)(F)

4. DISSOLVED OXYGEN

a. Existing Conditions. While historical water quality data exist for the Penobscot Mills Hydroelectric Project study area, two complete years of data characterizing all major impoundment/lake basins and the tailrace waters were collected to provide a comprehensive data set. A water quality sampling program approved by the Department was conducted in 1986-1987. This was supplemented with a less extensive water quality sampling program conducted in 1988 to further document yearly variations.

Sampling at a single station on Millinocket Stream just below the dam was performed once per month from May through November. The high and low dissolved oxygen readings ranged from 8.2 ppm at 88% saturation to 9.6 ppm at 109% saturation.

b. Applicant's Proposal. The applicant proposes to provide a minimum flow of 60 cfs from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15. During the remainder of the year, the current minimum flow of 20 cfs will be maintained.

c. Discussion. The Bureau of Water Quality Control states that dissolved oxygen standards are being met in Millinocket Stream.

5. TROPHIC STATE

a. Existing Conditions. As stated above, a comprehensive water quality sampling program was conducted in 1986-1987, which was supplemented with a less extensive water quality sampling program in 1988. The water quality sampling programs were conducted in accordance with the Department's "Lake Trophic State Sampling Protocol" (Maine DEP, 1986). The applicant compared the results of the 1986-1988 sampling program to the results of its 1981-1985 sampling program. The comparisons reveaied no appreciable increase in trophic state.

b. Applicant's Proposal. The applicant is not proposing any changes to the existing facilities or mode of operation at Millinocket Lake that would impact water quality in the Millinocket Lake impoundment.

c. Discussion. The Department's Bureau of Water Quality Control states Millinocket Lake is attaining a stable trophic state.

6. FISH

a. Existing Resources. Millinocket Lake and Millinocket Stream currently support both cold water and warm water fish species. The major lake fisheries are for landlocked salmon, lake trout, smelt, burbot, and white perch, while minor fisheries exist for lake whitefish and pickerel. There is a typical northern Maine population of suckers, minnows, and other non-sport species. Species in Millinocket Stream include salmon, brook trout, smallmouth bass, and white perch.

b. Studies. The applicant conducted several studies aimed at assessing existing fishery resources, and identifying impacts of project operation on those resources. The applicant also conducted studies evaluating the impact of various changes in project operation.

i. Pump station fish mortality. Prior to 1988, an electric screen at the intake of the Millinocket Lake pumping station was used to prevent fish passage through the trash rack and entrainment into the pumps. In 1987, the applicant conducted a netting operation at the pumping station outlet conduit. Species netted were white perch, pickerel, smelt, burbot, eel, common shiner, salmon, and brook trout. Salmon were taken during the October-November spawning season. As a result of the study, the applicant proposed to replace the electric screen with 1-inch clear-spaced trash racks. The fisheries resource agencies concurred, and new racks were installed in 1989. Smelt can still pass the new trash racks. Howver, the resulting smelt drift discharged into the North Twin impoundment from Millinocket Lake is beneficial since it provides forage for salmon and other species, and salmon attracted to this discharge support a popular shore fishery.

ii. Water Use Plan. The applicant developed a model of its hydropower system, referred to as the Water Use Plan. The Water Use Plan utilizes the water resources available in the applicant's entire hydropower system, as well as its condensing and cogeneration facilities which are located at the mills, in order to determine power supply capabilities to compensate for reductions (or increases) created by the requests for reallocation of water for enhancements.

It was determined from the Water Use Plan that some of the requests for water allocation by interested parties were incompatible with other requests due in part to the fact that there were many interested parties, each with their own mandate and interests, involved in the consultation process. However, of more potential significance regarding the incompatibility of requests is the fact that each dam in the watershed is part of an integrated system. A change in one portion of the system can directly impact other areas within the system.

The existing operation of the Penobscot Mills Project, in combination with other factors, may result in lower aquatic productivity than would occur with stable water levels. In addition, potential decreases in production of various fish species may result from the present mode of operation. However, the abundance and health of the existing fish populations indicate there are presently no serious project impacts on existing aquatic communities.

iii. Water level fluctuations. The applicant evaluated the effects associated with alternative operating modes, including stabilizing the water level of Millinocket Lake. Instead of using the stable water level scenario as the baseline, the applicant followed the procedure outlined in the FERC publication titled "Hydroelectric Project Relicensing Handbook" (1990). The referenced publication states that the relicensing process is unique, and that the existing resource should be used as the baseline for comparison from which alternative operating modes requested by the agencies can be compared and enhancement measures may be proposed.

iv. Operational changes in flow. With full-pond, run-of-river operation of all project impoundments, the Millinocket Lake pumping operation would probably cease. This is because there would essentially be no North Twin impoundment storage capacity to pump into, and all run-of-river flow would be discharged from Millinocket Lake into Millinocket Stream. With an increased minimum flow release for Millinocket Stream, and

impoundment water levels fluctuating as at present, the applicant could continue the pumping operation with a decrease, however, in the volume of water pumped annually.

- Run-of-river flow. The applicant reviewed the potential impacts to existing resources resulting from a change to a run-of-river (unmanaged) flow regime that would result from maintaining Millinocket Lake at its normal full pond elevation. With run-of-river operation, all discharge from the impoundment would be via the Millinocket Lake dam into Millinocket Stream. This flow regime would result in increased annual flow variability more typical of a natural outlet stream. High flows would be greater and more frequent, and would redistribute some sand and gravel from the upper reach of Millinocket Stream and deposit these sediments into the deadwaters. Low flows would be more frequent, extreme, and prolonged. Without natural inflow data, it is not clear whether low flows would be less than the present 20 cfs minimum. If natural summer low flows are below the present 20 cfs minimum flow, aquatic community habitat would be lost during the ice-free growing season. If natural low flows are higher than the present regulated minimum flow, more aquatic community habitat would become available than under the present flow regime. In either case, aquatic community composition would probably remain similar to present conditions. With run-of-river flow, there would be gradual changes from high to low flow. Present changes are made by opening or closing a gate, and these changes are gradual. There would be little, if any, negative impact compared to the gradual changes in flow resulting from run-of-river operation. Run-of-river operation would result in more spills and, if the timing of spills coincided with period of fish activity, there would be more potential for drop down of lake fish into Millinocket Stream. More downstream movement of salmon is desirable if there is sufficient flow in Millinocket Stream to support these fish and maintain a fishery.

- Aquatic base flow. The applicant reviewed the potential impacts created by increasing the minimum flow in Millinocket Stream. Aquatic base flow (ABF) is equal to the median August flow. The ABF value for Millinocket Stream is 37 cfs. This flow was evaluated under the existing regime of managed flow releases and impoundment fluctuations. With a summer ABF and existing management, there would be improvements in adult salmon habitat and more likelihood of maintaining an attractive salmon fishery. With a managed ABF, there would probably be less spillage into Millinocket Stream than with run-of-river operation, and more than with present operation. During the salmon spawning season, there will be less attraction to move from Millinocket Lake into Millinocket Stream during periods of heavy precipitation (because of storage and pumping to North Twin impoundment) than with run-of-river operation, but perhaps more than with present operation. Since Millinocket Stream has an abundance of suitable salmon spawning and nursery habitat, the October-November ABF would be applicable. This flow would provide better winter protection against dewatering and freezing of redds, as well as better overwintering habitat for any salmon kelts that do not drop down into the West Branch or Dolby Pond after spawning. Under managed conditions with either ABF or a flow determined by an instream flow study, more aquatic community habitat would be available in Millinocket Stream than is presently found, and there would be a concomitant increase in the periphyton and benthic macro invertebrate standing crop. Aquatic community composition and density per unit of substrate should remain similar to the present conditions, but more habitat will be available for colonization.

v. *Instream flow study.* The applicant studied the instream flow needs of Millinocket Stream to evaluate how well various flows, including the 20 cfs minimum flow presently required by the FERC license, maintain aquatic habitat. An instream flow study describes the relationship between flow and quantity of suitable habitat (expressed as Weighted Usable Area, WUA) for evaluation species and life stages, with the goal of determining an appropriate minimum flow.

The applicant assessed habitat suitability in Millinocket Stream for landlocked salmon, brook trout and smallmouth bass, and evaluated them in terms of existing and optimum flow releases. The applicant's instream flow study also addressed the impacts of periodically fluctuating flow releases at the Millinocket Lake Dam. Gradual changes in flow were investigated, as were higher minimum/lower maximum discharges, as a means of mitigating the impacts of fluctuating releases. The evaluation species selected in consultation with the fisheries agencies were all life stages of salmon and smallmouth bass.

The study showed that for juvenile salmon, the WUA was maximized at 20 cfs for early fry, 30 cfs for late fry (but with little gain in WUA between 20 and 30 cfs), and was still increasing for parr at 80 cfs. For smallmouth bass, the presence of the large deadwaters had a strong influence on computation of suitability of flows, but less than 20% of total stream length is dead water. With deadwaters included, the respective maximum WUA for fry, juvenile, adult, and spawning life stages were attained at flows of 50 cfs, 60 cfs, 80 cfs, and 70 cfs. On the basis of this study, the fisheries agencies requested the applicant maintain a year-round minimum flow in the stream of 60-80 cfs for salmon production.

c. Existing Management Plans. IF&W recently changed the priority management species for Millinocket Lake from lake trout to salmon. Accordingly, IF&W plans to stock Millinocket Lake to support a lake trout population rather than attempt to produce a self-sustaining population. IF&W currently stocks about 400 8-inch to 10-inch brook trout to Millinocket Stream annually each May to support a brief spring fishery, and about 3,000 yearling salmon in Millinocket Lake per year.

d. Applicant's Proposals

i. *Water levels.* The applicant proposes to continue the existing operation of the Millinocket Lake development to maintain North Twin impoundment levels.

i. Minimum flow. The applicant proposes to provide a minimum flow of 60 cfs from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15. During the remainder of the year, the current minimum flow of 20 cfs will be maintained.

ii. Fish stocking. The applicant proposes to replace the IF&W Millinocket Stream stocking program with a spring and fall stocking. Each stocking would be about 500 fish, distributed at five locations approved by IF&W. The applicant also proposes to upgrade stocking from 8-10" fish (about 3-5 fish/pound) to larger fish (about 1-3 fish/pound). The applicant proposes to monitor the results of the stocking program for five years to determine if the desired results are being achieved.

e. Discussion

i. Habitat. Neither IF&W nor the U.S. Fish and Wildlife Service (USF&WS) agreed with the applicant's conclusion that the relatively slow salmon growth rates in Millinocket Lake are due solely to too high stocking rates. IF&W concluded that, while adjusting salmon stocking rates is one management technique, the agency would review the smelt runs in the entire area to evaluate potential for closures or additional harvest restrictions as a method to increase the forage base for salmonid management. USF&WS agreed with IF&W management and conclusions.

The applicant's baseline studies performed for relicensing documented relatively slow growth of salmon in Millinocket Lake. The existing salmon population is maintained by stocking. The applicant states that managing for both good growth and the maximum number of fish in a salmon population often involves a delicate biological balance, and long experience in Maine has documented that salmon as a species are very sensitive to stocking density and frequency, i.e., stocking too many fish for the available smelt supply (or other competition factors, e.g., space) can result in a less than desirable growth rate and a reduction in harvest by anglers. In fact, a smaller population of faster growing salmon is generally considered the most desirable management scenario. The applicant continues to believe that it is appropriate to reduce current stocking rates and to monitor subsequent salmon growth. However, IF&W is correct in stating that historic annual fluctuation of impoundment level may not be optimal for salmon growth, especially as it affects the smelt population.

IF&W states the applicant's proposed stocking program is acceptable. Additional enhancement of the Millinocket Stream fishery may be required after several years of monitoring.

ii. Minimum flow. IF&W originally requested that the applicant maintain a continuous minimum flow of 60 to 80 cfs for the protection of salmonid habitat in Millinocket Stream. The applicant instead proposes to provide a minimum flow of 60 cfs from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15. During the remainder of the year, the current minimum flow of 20 cfs will be maintained. IF&W has accepted this proposal, and states that it will result in the development of a significant brook trout fishery within Millinocket Stream.

iii. Fish passage. Downstream movement of fish from Millinocket Lake is via the outlet dam into Millinocket Stream. No fish passage facilities are proposed. The Millinocket Lake dam is a barrier to bass introduction into Millinocket Lake. It is desirable to maintain this barrier so that bass do not become established in the lake and increase predation on, and competition with, the preferred cold water species. IF&W states that upstream passage at the Millinocket Lake dam is not appropriate at this time.

iv. Conclusion. The applicant's proposals to manage Millinocket Lake levels, to provide minimum flow releases in Millinocket Stream, and to upgrade the existing stocking program are adequate to achieve and maintain the designated use and narrative standards of the waters affected by the project as habitat for fish, provided the stocking program is monitored and modified as appropriate.

7. WILDLIFE AND OTHER AQUATIC LIFE

a. Existing Resources. The Millinocket Lake impoundment and surrounding shoreline support a number of mammals and waterfowl, including loons, grebes, cormorants, bitterns, herons, geese, ducks, beaver, mink, otter, and lemmings. The impoundment also supports various amphibians and reptiles. The project study area contains active nesting territories of the endangered bald eagle. In addition, the long-tailed shrew and the North American lynx, both candidates for federal endangered species status, have ranges that overlap the study area. The only Maine threatened species in the project area is the northern bog lemming.

Millinocket Lake and Millinocket Stream were sampled in the ice-free periods of 1986 and 1987 to characterize existing aquatic communities. The sampling was used to determine the impact of existing project operation, and to compare existing conditions with hypothetical changes in operation that various resource agencies requested the applicant to investigate. The results of the comparison indicate that the continued operation of the Millinocket Lake storage dam will result in a seasonal loss of habitat when compared to a lake held at a constant full pond elevation. Continued operation under current management scenario would maintain the present aquatic communities in Millinocket Stream which provide a forage base for juvenile salmon.

b. Mercury Study. A testing study for fish and invertebrates was conducted to determine whether a link exists between operation of the Penobscot Mills Project and the presence of mercury. The results of the applicant's study indicate that, while mercury levels in project waters are variable, these levels do not appear to differ significantly from lake to lake. Furthermore, other studies of mercury levels in fish found in northern Maine lakes are not inconsistent with the levels found inthe project impoundments. While higher levels of mercury were found in lake trout in North Twin impoundment and Millinocket Lake than in their respective control lakes, the other species of fish sampled (including bottom feeders) show no apparent differences in mercury concentration between lakes, indicating that drawdown is not a factor. On the other hand, mercury concentrations also appear to be elevated in predatory fish. Thus, mercury appears to be bioaccumulating.

Consumption of contaminated prey may pose detrimental impacts to the federally listed bald eagle and to humans. However, available study results do not indicate an adverse impact on eagles as the result of project operation. With regard to the effect of the drawdown of project impoundments on mercury cycling, the available data does not lead to the conclusion that water level fluctuations affect mercury accumulation.

c. Wildlife Study. Wildlife resources were investigated in the field during the late summer of 1986, the early and late summer of 1987, and the late summer of 1989 at representative areas of each vegetation type throughout the project study area. The applicant investigated wildlife resources for habitats bordering the project impoundments, and assessed the impact on wildlife resources of modification of the existing impoundment draw down policy. The applicant found that insignificant impacts to wildlife occur under existing operation. While the annual drawdown of Millinocket Lake may have affected wildlife habitat relative to the amount and type that might be expected in the absence of fluctuations, the drawdowns have also provided habitat opportunities. Thus, the applicant concluded that the annual drawdown has reduced the amount of available waterfowl breeding and muskrat wintering habitat,while it has benefitted general shorebird migration and nesting by spotted sandpipers and killdeer.

As part of the FERC relicensing process, the applicant studied the possibility of enhancing wetlands within the project area. Three sites on the North Twin impoundment may have potential for wetlands enhancement. IF&W has not fully evaluated the feasibility and benefits of these or other potential enhancement measures.

d. Applicant's Proposals. The applicant proposes to continue the existing operation of the Millinocket Lake development to provide water to maintain North Twin impoundment levels. The applicant also proposes to provide a minimum flow of 60 cfs from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15. During the remainder of the year, the current minimum flow of 20 cfs will be maintained.

c. Discussion. Studies conducted by the applicant have determined impacts on wetland development as a result of annual water level fluctuations on the North Twin impoundment and Millinocket Lake. The applicant does not believe that these impacts are such as to require enhancement for purposes of §401 certification. Nevertheless, because the applicant anticipates that wetland enhancement will be part of the FERC process, the applicant has agreed, without waiving its position, that wetlands enhancement may be a condition of this certification. However, the applicant has agreed to undertake wetlands enhancement. Three sites on North Twin have been identified for possible wetlands enhancement. The sites appear to have potential, but detail is lacking as to the present wildlife habitat value of the wetlands or the likely enhancement of the values. Other enhancement measures may be identified (for example, water level control structures on River and Compass Ponds, located upriver from the Penobscot Mills project) that may provide greater wetlands enhancement for less unit cost.

Concentrations of zinc, copper, mercury and volatile solids are present in greater concentrations within the Dolby impoundment than in those above the Penobscot mills Project. Fish samples show concentrations of mercury ranging from 0.12 ppm to 1.15 ppm. The Food and Drug Administration (FDA) standard for edible fish tissue is 1.0 ppm. The concentrations of mercury in fish from non-impounded Maine lakes also exceed FDA standards. The method by which elemental mercury is made available and concentrated up the food chain is currently not known in its entirety. Therefore, the Bureau of Water Quality Control requests that the applicant cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters.

The applicant's proposals to manage water levels and to provide minimum flow releases are adequate to achieve and maintain the designated use and narrative standards of the waters affected by the project as habitat for aquatic life other than fish, provided that the applicant cooperates in a study to be conducted by the Department to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters.

8. FISHING AND RECREATION ON THE WATER

a. Existing Facilities and Use. Millinocket Lake has good public access with a public boat launch and parking lot adjacent to the State Road (Baxter Park Road) at the southwestern corner of the lake. A second parking lot adjacent to a general store on the east side of the road is available for users of both North Twin impoundment and Millinocket Lake. The most

extensive commercial development within the Penobscot Mills Project is located on the southerly shore of Millinocket Lake and offers four-season resort facilities and activities. Other commercial facilities are available. In addition, there are over 100 recreational lease lots around Millinocket Lake.

The applicant surveyed lease holders and local residents to determine recreational use of Millinocket Lake. Results of the survey indicated visitors used the Penobscot Mills Project area for fishing, swimming, boating, canoeing, water skiing, sailing, camping, hiking, hunting, ice fishing, snowmobiling, and cross-country skiing. Millinocket Lake is open without gate restriction to both summer and winter fishing and recreation.

b. Applicant's Proposals. As discussed above, the applicant proposes to maintain existing water level management at Millinocket Lake, to provide an increased minimum flow to Millinocket Stream for part of the year, and to upgrade the existing brook trout stocking program to Millinocket Lake. In addition, due to concerns about submerged hazards in Millinocket Lake, the applicant has agreed to consult with staff of the Department of Conservation (DOC) regarding the need for a study to mark or remove hazards in Millinocket Lake. An investigation of the impoundment will be conducted by the applicant after the water use plan is finalized and bench mark impoundment levels are established. Upon completion of the study, DOC will make recommendations regarding the feasibility and estimated cost of marking or removing hazardous submerged obstacles.

c. Discussion. The applicant's proposals are adequate to achieve and maintain the designated use of the waters affected by the project for fishing and recreation in and on the water.

9. HYDROELECTRIC POWER GENERATION

a. Existing Energy Generation. Although the Millinocket Lake storage dam does not generate electricity, it is credited with having produced an average of 9,322 megawatt hours (mwh) annually for the last 15 years. This generation occurs at the downstream North Twin and Millinocket developments and is the result of the volume of water pumped annually from Millinocket lake to the North Twin impoundment. This is equivalent to the energy that would be produced by burning 15,537 barrels of oil or 4,320 tons of coal each year. All project power is used by the applicant at its Millinocket and east Millinocket paper mills.

b. Existing Energy Policies/Plans. the State of Maine has adopted an Energy Resources Plan (Office of Energy Resources, October 1987) designed to "promote the present and future economic well-being of Maine residents and businesses by ensuring the availability of reliable energy at the lowest possible cost." Specifically, the Plan calls for the State to:

- Encourage cost-effective energy conservation measures in the public sector and least cost planning in the electric and gas industries;
- Promote the environmentally sound development and use of cost-effective indigenous and renewable energy resources;
- Pursue strategies designed to reduce the cost of all imported energy and to increase the availability of natural gas in the state; and
- Encourage the diversification of energy investments in Maine.

With respect to hydroelectric power, the Plan recommends that the development of hydropower be encouraged in a manner consistent with the Maine Rivers Act and that the upgrading of existing hydroelectric dams be examined during relicensing.

c. Applicant's Proposal. The applicant is not proposing any change in the facilities or the existing operating mode of the Millinocket Lake storage dam.

d. Discussion. As proposed, the operation of the Millinocket Lake development is adequate to achieve and maintain the designated use of waters affected by the project for hydroelectric power generation.

BASED on the above Findings of Fact, and the evidence contained in the application and supporting documents, and subject to the Conditions listed below, the Department makes the following CONCLUSIONS:

1. The continued operation of the development will result in the affected surface waters being suitable for all Class GPA, Class A, Class B, and Class C designated uses provided that:

   i. The development is operated to maintain water levels in Millinocket Lake between elevations 470.0 feet and 480.0 feet MSL while providing water to maintain North Twin impoundment levels;

   ii. A minimum flow of 60 cfs is maintained from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15, and a minimum flow of 20 cfs is maintained from the dam during the remainder of the year;

   iii. The applicant cooperates in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead and other toxic metals on aquatic life in project waters; and

   iv. The existing brook trout stocking program to Millinocket Stream is upgraded and monitored as proposed;

   v. The applicant consults with the Department of Conservation regarding the need for a study to mark and remove hazards to recreational navigation in Millinocket Lake.

2. The continued operation of the development will result in Class A, Class B, and Class C numeric standards for dissolved oxygen standards being met in the affected waters provided that a minimum flow of 60 cfs is maintained from the Millinocket Lake storage dam to Millinocket Stream from May 1 to October 15, and a minimum flow of 20 cfs is maintained from the dam during the remainder of the year.

3. The continued operation of the development will result in Class GPA, Class A, Class B, and Class C narrative standards for aquatic life being met in the affected waters provided that the development is modified and operated in accordance with Conclusions 1(i) through (iv) reached above.

4. The continued operation of the project will comply with the State's antidegradation policy provided the project is modified and operated in accordance with all the conclusions reached above.

5. The applicant agrees to evaluate and implement wetlands enhancement in the Penobscot Mills Project area.

THEREFORE, the Department GRANTS certification that there is a reasonable assurance that the continued operation of the MILLINOCKET LAKE STORAGE DAM DEVELOPMENT, as described above, will not violate applicable water quality standards, SUBJECT TO THE FOLLOWING CONDITIONS:

1. MINIMUM FLOWS

   A. Except as temporarily modified by operating emergencies beyond the applicant's control, as defined below, a minimum flow of 60 cfs shall be maintained from the Millinocket Lake Storage Dam to Millinocket Stream from May 1 to October 15 annually, and a minimum flow of 20 cfs shall be maintained during the remainder of the year.

   B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other temporary abnormal operating condition, generating unit operation or interruption under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

   C. The applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit plans for providing and monitoring the minimum flows required in Part A of this condition. These plans shall be reviewed by and must receive approval of the DEP Bureau of land Quality Control.

2. WATER LEVELS

   A. Except as temporarily modified by (1) approved maintenance activities (2) inflows to the project area, or (3) operating emergencies beyond the applicant's control, as defined below, the water level in Millinocket Lake shall be maintained between elevations 470.0 feet and 480.0 feet MSL while providing water to maintain North Twin impoundment levels.

   B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other temporary abnormal operating condition, generating unit operation or interruption under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

   C. The applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit plans for providing and monitoring the water levels in Millinocket Lake as required by Part A of this condition. These plans shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

3. FISH STOCKING PROGRAM

A. The applicant shall implement an upgraded spring and fall brook trout stocking program to provide a seasonal fishery in Millinocket Stream. Each stocking shall consist of about 500 fish ranging in size from 1/3 to 1 pound, and shall be distributed among 5 locations approved by the Department of Inland Fisheries & Wildlife.

B. The applicant shall, in consultation with IF&W, prepare a stocking plan with provisions to monitor the results of the stocking program for 5 years to determine if the desired results are being achieved. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

C. Based on the results of the monitoring and recommendations received from IF&W, the applicant shall prepare and submit to the DEP a revised stocking plan if deemed necessary to meet the goal of providing a seasonal brook trout fishery in Millinocket Stream. Any revised plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

4. WETLANDS ENHANCEMENT

A. The applicant shall provide enhancement of existing wetlands in the Penobscot Mills Project area.

B. The applicant shall, within 12 months of FERC relicensing or upon such a schedule as may be established by FERC, submit plans for evaluating, implementing, and monitoring wetland enhancements as required by Part A of this condition. These plans shall be developed in consultation with IF&W and the Department. These plans shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

5. TOXIC METALS STUDY

The applicant shall cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters.

6. MILLINOCKET LAKE HAZARD STUDY

A. The applicant shall consult with the Department of Conservation regarding the need for a study to mark and remove submerged hazards to recreational navigation in Millinocket Lake.

B. If a study is requested by DOC, the applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit a plan for establishing benchmark impoundment levels in Millinocket Lake and investigating the need for marking or removing submerged hazards in the lake. This plan shall be prepared in consultation with the Department of Conservation and shall be reviewed by and receive approval of the DEP Bureau of Land Quality Control.

C. The applicant shall submit the results of the hazard study to DOC and the DEP. The applicant shall then develop and submit a plan for marking and/or removing hazards in

GREAT NORTHERN PAPER, INC. T1 R8 WELS, PENOBSCOT COUNTY, MAINE PENOBSCOT MILLS PROJECT MILLINOCKET LAKE STORAGE DAM L-17166-32-A-N	16))))	MAINE WATER QUALITY PROGRAM; FEDERAL CLEAN WATER ACT WATER QUALITY CERTIFICATION

Millinocket Lake as recommended by DOC. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

7. LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to the review and approval of the Board or Department prior to implementation.

8. COMPLIANCE WITH ALL APPLICABLE LAWS

The applicant shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements and orders required for the operation of the project.

9. EFFECTIVE DATE

This water quality certification shall be effective on the date of issuance of a new hydropower project license by the Federal Energy Regulatory Commission (FERC) and shall expire with the expiration of the FERC license.

DONE AND DATED AT AUGUSTA, MAINE, THIS 22nd DAY OF April, 1993.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: Dean C Marriott
Dean C. Marriott, Commissioner

PLEASE NOTE ATTACHED SHEET FOR APPEAL PROCEDURES

Date of initial receipt of application 12/13/91.
Date application accepted for processing 12/31/91.
Date application withdrawn and refiled 12/11/92.
Date refiled application accepted for processing 12/15/92

Date filed with Board of Environmental Protection

FILED
APR 22 1993
BOARD OF ENVIRONMENTAL PROT
STATE

a:\gnp2

Exhibit #1

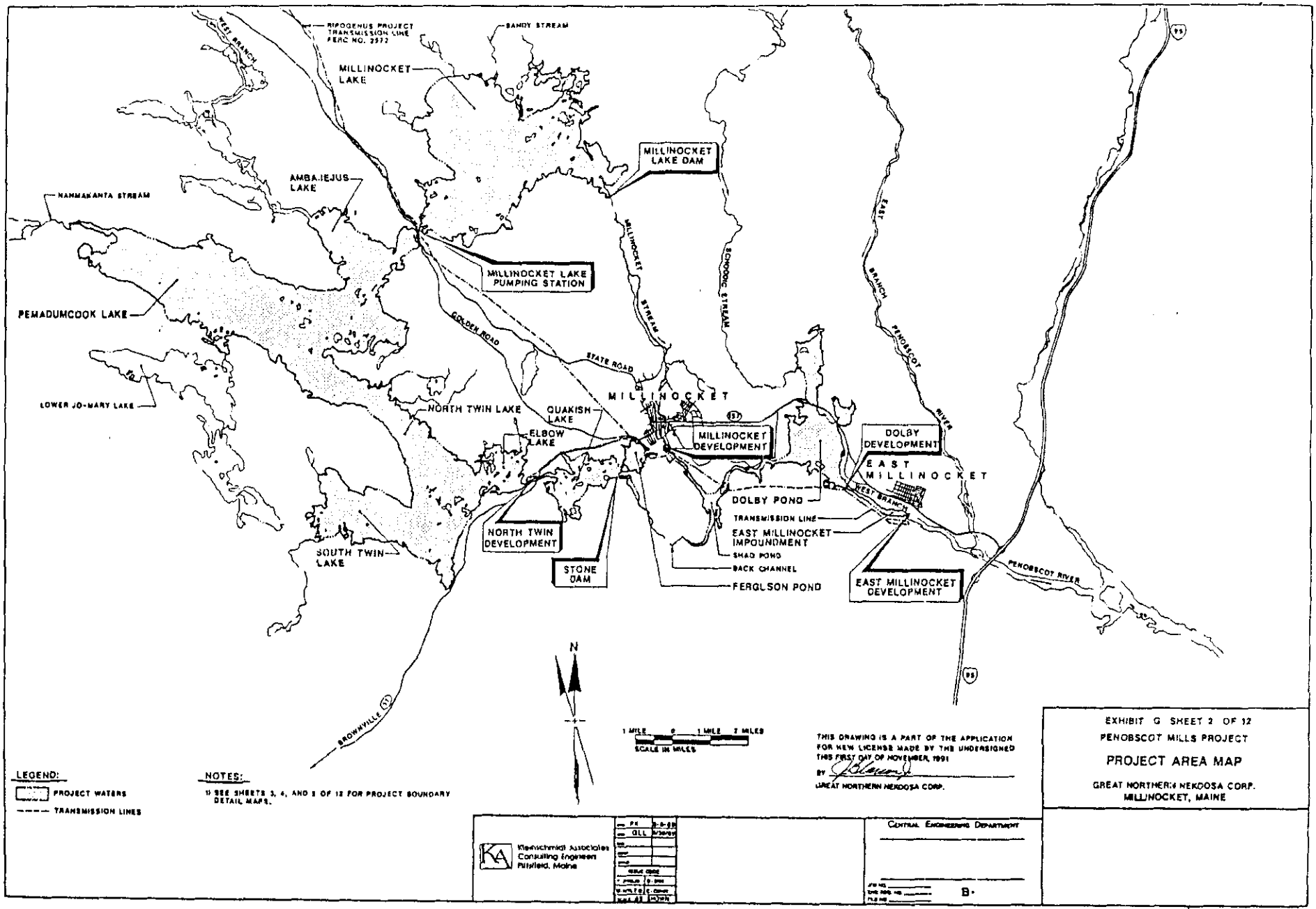
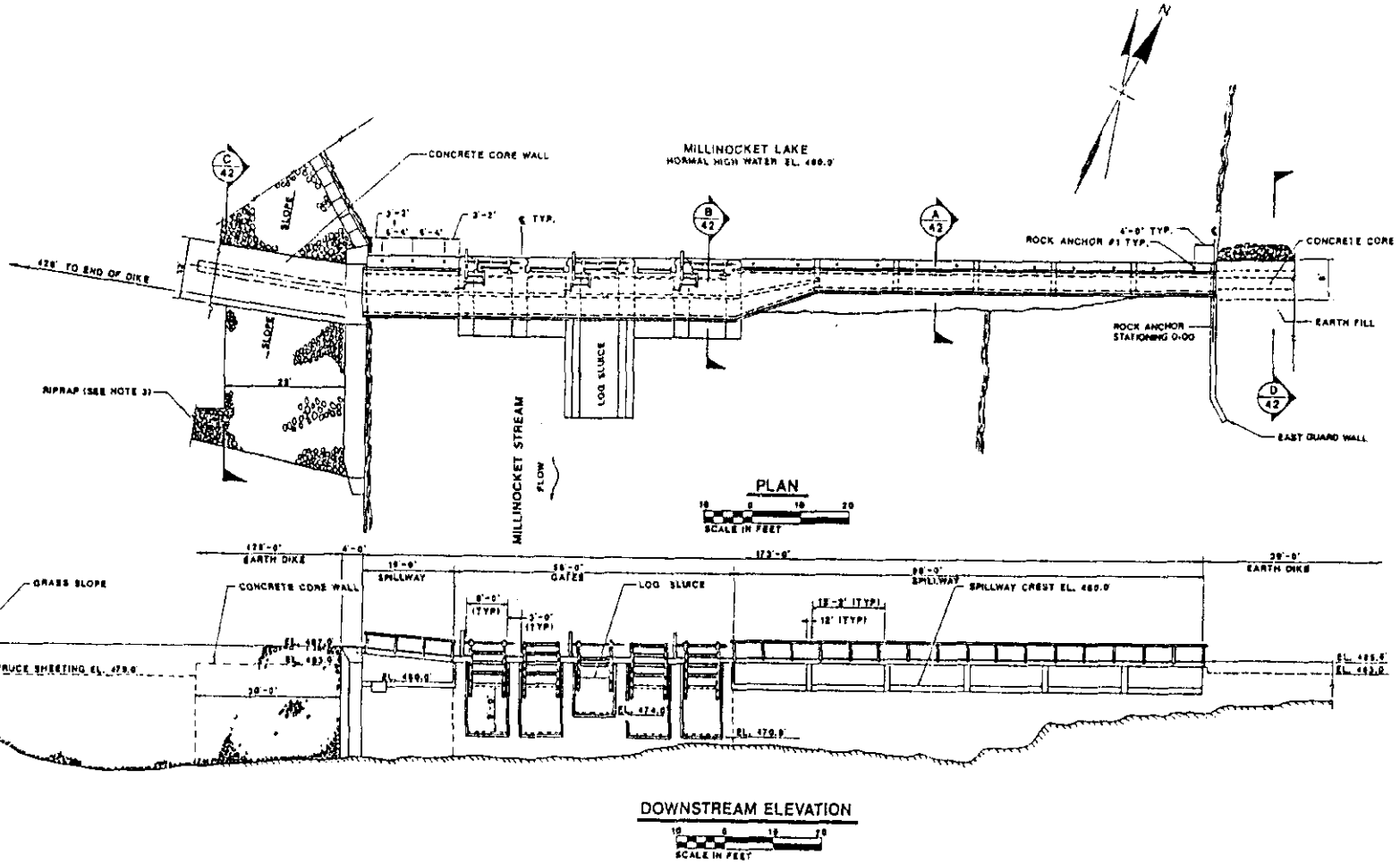


EXHIBIT G SHEET 2 OF 12
PENOBSCOT MILLS PROJECT

PROJECT AREA MAP

GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE



NOTES:

1) ALL ELEVATIONS U.S.G.S. DATUM.
2) FOR LOCATION OF DAM SEE EXHIBIT G, SHEET 1 OF 12.
3) RIPRAP ALONG DOWNSTREAM FACE OF WESTERN DIKE IS TYPICAL FOR 95'. REMAINING DISTANCE IS GRASS SLOPED WITH RIPRAP LOCATED AT TOE ONLY.

THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991
BY _____
GREAT NORTHERN NEKOOSA CORP.

EXHIBIT F SHEET 41 OF 45
PENOBSCOT MILLS PROJECT
MILLINOCKET LAKE STORAGE DEVELOPMENT
DAM - PLAN AND DOWNSTREAM ELEVATION
GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE

Kleinschmidt Associates
Consulting Engineers
Pittsfield, Maine

CENTRAL ENGINEERING DEPARTMENT

B-

EXHIBIT F SHEET 41 OF 45 | F.E.R.C. NO. 2458

Exhibit #2

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE HOUSE STATION 17 AUGUSTA, MAINE 04333

DEPARTMENT ORDER

IN THE MATTER OF

GREAT NORTHERN PAPER, INC.	)	MAINE WATER QUALITY PROGRAM;
T1 R8 WELS, PENOBSCOT COUNTY, MAINE	)	FEDERAL CLEAN WATER ACT
PENOBSCOT MILLS PROJECT	)	
HYDROELECTRIC DEVELOPMENTS	)	
L-17166-33-A-N	)	WATER QUALITY CERTIFICATION

Pursuant to the provisions of 38 M.R.S.A. § 464, et seq., and Section 401 of the Federal Water Pollution Control Act (the "Clean Water Act"), the Department of Environmental Protection has considered the application of the GREAT NORTHERN PAPER, INC. with its supportive data, agency review comments, and other related materials on file and finds the following facts:

1. APPLICATION SUMMARY

a. Application. The applicant proposes the continued operation of the following components of the Penobscot Mills Project (see Exhibit #1):

i. The North Twin hydroelectric development, located in Indian Purchase Townships 3 and 4, Penobscot County, and Township 1 Range 9 (WELS) and Township 1 Range 10 (WELS), Piscataquis County, Maine;

ii. The Millinocket hydroelectric development, located in the Town of Millinocket and Indian Purchase Township 3, Penobscot County, Maine;

iii. The Dolby hydroelectric development, located in the Town of East Millinocket and Township A Range 7 (WELS), Penobscot County, Maine; and

iv. The East Millinocket hydroelectric development, located in the Town of East Millinocket and Township A Range 7 (WELS); Penobscot County, Maine.

b. Existing Features. The project contains four hydroelectric developments on the West Branch of the Penobscot River ("the West Branch"). These developments were originally constructed around the turn of the century to meet the hydromechanical and hydroelectric demands of the Millinocket Mill, constructed in 1899, and the East Millinocket Mill, constructed in 1906. The North Twin development is located at a site that has been developed for water storage since 1846. No changes to the existing structures are proposed.

i. North Twin hydroelectric dam. The North Twin dam, located at the outlet of Elbow Lake, is a concrete and earth-filled structure about 1,051 feet long (see Exhibit #2). The dam consists of an intake structure and powerhouse; a series of six earthen dikes located upstream of the dam; a 60 Hz substation containing six transformers; and a transmission line about 4.2 miles in length that extends to the applicant's Millinocket substation. The dam has a 34 foot wide concrete section containing a pool and weir design fishway and two gated log sluice sections. The powerhouse consists of a concrete substructure and a brick superstructure measuring about 50 feet by 114 feet, and contains three generating units. These units have a combined generating capacity of 9,840 kW at a maximum head of 31.2 feet. The North Twin dam is 33.4 miles below the Ripogenus Project, and 2.6 miles above the Millinocket dam.

ii. North Twin impoundment. The impoundment created by the North Twin dam has a surface area of about 17,790 acres at a full pond elevation of 491.92 feet MSL, and extends about 11.8 miles upstream of the dam at normal river flows. The impoundment consists of Pemadumcook, Ambajejus, North Twin, South Twin, and Elbow Lakes, and is referred to as the Pemadumcook Chain of Lakes.

iii. Millinocket hydroelectric dam and powerhouse. The Millinocket dam (also called Stone dam), located at the outlet of Quakish Lake, is a concrete structure about 1,262 feet long (see Exhibit #3). The dam directs water through a series of canals and Ferguson Pond to the intake structure at the powerhouse, located about 1.5 miles from the dam. The dam consists of a gate house, containing ten gates, and a sluiceway. There are eight earthen dikes at various points around Quakish Lake and Ferguson Pond to channel water. The intake structure containing seven headgates is located at the entrance of six 10 foot diameter steel penstocks and one 112 foot diameter steel penstock, ranging in length from 1,007 feet to 1,024 feet. One hydroelectric unit and the turbines for five hydromechanical units are located at the Millinocket Mill. Two hydroelectric units are located at the powerhouse, also called the Generator Room. There are also three transformers with a rated capacity of 1,667 KVA, and a 40 Hz transmission line about 300 feet in length. The three hydroelectric generating units have a combined generating capacity of 14,880 kW at a maximum head of 111.3 feet. The Millinocket dam is 2.6 miles below the North Twin dam, and 8.1 miles above the Dolby dam.

iv. Millinocket impoundment. The impoundment created by the Millinocket dam has a surface area of 1,344 acres at a full pond elevation of 458.7 feet MSL, and extends about 8,600 feet upstream of the dam at normal river flows. The impoundment consist of Quakish Lake and Ferguson Pond.

v. Dolby hydroelectric dam. The Dolby dam, located at the outlet of Dolby Pond, is a concrete and earth-filled structure measuring about 1,395 feet long (see Exhibit #4). The dam consists of an intake structure containing eight sets of trashracks; a brick and concrete powerhouse containing seven turbine/generator units; a waste gate structure containing six gate openings; a 550 foot long earthen dike; a 60 Hz substation containing one transformer with a rated capacity of 15 MVA and a transmission line extending about 2 miles to East Millinocket; and a 40 Hz substation containing six transformers and a transmission line extending about 2 miles to East Millinocket and 4.8 miles to Millinocket. The generating units have a combined capacity of 20,988 kW at a maximum head of 49.0 feet. The Dolby dam is 8.1 miles below the Millinocket dam, and 1.9 miles above the East Millinocket dam.

vi. Dolby impoundment. The impoundment created by the Dolby dam has a surface area of 2,048 acres at a full pond elevation of 336.2 feet MSL, and extends about 2.3 miles upstream of the dam at normal river flows. The impoundment is called Dolby Pond.

vii. East Millinocket hydroelectric dam. The East Millinocket dam is a concrete and earth-filled structure about 717 feet long (see Exhibit #5). The dam contains two concrete spillway sections, and consists of a concrete intake structure with 12 gate openings with trashracks; a concrete and brick powerhouse containing six generating units; and a tailrace about 1,050 feet long. The generating units have a combined capacity of 9,600 kW at a maximum head of 25.7 feet. The East Millinocket dam is 1.9 miles below the Dolby dam, and 1.7 miles above the Medway Project.

viii. East Millinocket impoundment. The impoundment created by the East Millinocket dam has a surface area of 128 acres at a full pond elevation of 287.2 feet MSL. The impoundment extends about 1.9 miles upstream of the dam at normal river flows.

c. Existing Operation. The Penobscot Mills Project is managed in conjunction with the water flow and storage of upstream and downstream projects. The project is used to store spring runoff to provide sustained flows and to hold river flows at safe levels. Flows are released according to a hydropower system rule curve that produces a more even distribution of water flow throughout the year. The North Twin dam is operated as a storage impoundment on an annual cycle. The impoundment has a usable storage capacity of about 346,000 acre-feet, with a maximum drawdown of 22 feet. The Millinocket, Dolby, and East Millinocket dams are operated as run-of-river stations. Natural river flows are supplemented by water pumped from Millinocket Lake to the North Twin impoundment (see Order #L-17166-32-A-N). Below the Millinocket dam (Stone dam) is a 4.5 mile long bypass area referred to as the Back Channel. Only leakage flows from Stone Dam (about 2-5 cfs) and runoff provide water to the bypass, unless spillage occurs.

d. Summary of Proposal. The applicant proposes to operate the project in accordance with several measures for the protection or enhancement of, or mitigation of project impacts on, public resources. These measures, which are more fully described in the application, include in summary:

i. Continuing to Operate the Millinocket, Dolby, and East Millinocket dams as run-of-river facilities;

ii. Maintaining a minimum flow of 2,000 cfs to the West Branch at Millinocket;

iii. Maintaining relatively stable water levels in the North Twin impoundment from May 1 through mid-August, unless the minimum flow of 2,000 cfs cannot be maintained at Millinocket;

iv. Maintaining the water level in the North Twin impoundment at or above the lake trout spawning/incubation level for the period on or about October 15 through May 1, unless the minimum flow of 2,000 cfs cannot be maintained at Millinocket;

v. Maintaining existing leakage flows (2-5 cfs) to the Back Channel and implementing wildlife habitat improvements in the Back Channel area;

vi. Making repairs or modifications to the fish passage facility at North Twin as requested by the Department of Inland Fisheries and Wildlife; and

vii. Making recreational improvements, specifically:

- Providing additional parking areas for several vehicles at both the Route 157 Causeway site and the Dead Man's Curve site;

- Removing boulders from the boat put-in just upstream of Quakish Lake at the Green Bridge, and adding gravel parking to accommodate a few more vehicles; and

- Consulting with the Department of Conservation to identify submerged hazards, if any, in the North Twin impoundment.

2. JURISDICTION

The proposed continued operation of the project qualifies as an "activity ... which may result in [a] discharge into the navigable water [of the United States]" under the Clean Water Act, 33 U.S.C. 1251, et seq. Section 401 of the Clean Water Act requires that any applicant for a federal license or permit to conduct such an activity obtain a certification that the activity will comply with applicable State water quality standards. Certification is deemed to be waived if the State expressly waives its authority to act or otherwise fails to act within one year of receipt of a request for certification.

The project is licensed as a water power project under the Federal Power Act (Project No. 2458). The initial project license was issued effective April 1, 1962, and expires on December 31, 1993. The licensee has filed an Application for New License to continue to operate the Penobscot Mills Hydroelectric Project, which includes the North Twin, Millinocket, Dolby, and East Millinocket developments, for another 30 years. This application is currently pending before the Federal Energy Regulatory Commission.

The Department of Environmental Protection has been designated by the Governor as the certifying agency for issuance of Section 401 Water Quality Certification for hydropower projects located in whole or in part in organized municipalities subject to the Department's regulatory jurisdiction. The Penobscot Mills Hydroelectric Project is located in part in the Town of Millinocket and the Town of East Millinocket, which are subject to the Department's jurisdiction.

3. APPLICABLE WATER QUALITY STANDARDS

a. Classification. The waters of the Penobscot Mills Hydroelectric Project in the project area are currently classified as follows:

i. The North Twin impoundment, which consists of Pemadumcook, Ambajejus, North Twin, South Twin, and Elbow Lakes, is classified as GPA. 38 M.R.S.A. § 465-A

ii. The West Branch of the Penobscot River, from the outlet of Elbow Lake to the outlet of Ferguson and Quakish Lakes, is Class B. 38 M.R.S.A. § 467(7)(C)(1)(e)

iii. The West Branch of the Penobscot River, from the outlet of Ferguson and Quakish Lakes to its confluence with the East Branch of the Penobscot River, including all impoundments, is Class C. 38 M.R.S.A. § 467(7)(C)(1)(f)

b. Designated Uses

i. Class GPA waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural. 38 M.R.S.A. § 465-A(1)(A)

ii. Class B waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. The habitat shall be characterized as unimpaired. 38 M.R.S.A. § 465(3)(A)

The habitat characteristics and aquatic life criteria of Class B are deemed to be met in an existing impoundment classified B if the impounded waters achieve the aquatic life criteria of Class C, provided that any reasonable changes are implemented that do not significantly affect existing energy generation capability and would result in improvement in the habitat and aquatic life of the impounded waters, and further provided that, where the actual quality of the impounded waters attains any more stringent habitat characteristic or aquatic life criteria than required under the assigned classification, the existing water quality must be maintained and protected. 38 M.R.S.A. § 464(10)

iii. Class C waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. 38 M.R.S.A. § 465(4)(A)

The habitat characteristics and aquatic life criteria of Class C are deemed to be met in an existing impoundment classified C, if reasonable changes can be implemented that do not significantly affect existing energy generation capability. If those changes would result in improvement in habitat and aquatic life of the impounded waters, then those changes must be implemented. Where the actual water quality of the impounded waters attains any more stringent habitat characteristic or aquatic life criteria than that required under the assigned classification, the existing water quality must be maintained and protected. 38 M.R.S.A. § 464(10)

c. Numeric Standards

i. Class GPA waters do not have numeric standards for dissolved oxygen.

ii. The dissolved oxygen content of Class B waters shall be not less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration shall not be less than 9.5 parts per million and the 1-day minimum dissolved oxygen concentration shall not be less than 8.0 parts per million in identified fish spawning areas. 38 M.R.S.A. § 465(3)(B)

iii. The dissolved oxygen content of Class C waters shall be not less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes shall be maintained. 38 M.R.S.A. § 465(4)(B)

d. Narrative Standards

i. Class GPA waters shall be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorous content and other appropriate criteria. Class GPA waters shall have a stable or decreasing trophic state, subject only to natural fluctuations and shall be free of culturally induced algal blooms which impair their use and enjoyment. 38 M.R.S.A. § 465-A(1)(B)

ii. Discharges to Class B waters shall not cause adverse impacts to aquatic life in that the receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community. 38 M.R.S.A. § 465(3)(C)

iii. Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community. 38 M.R.S.A. § 465(4)(C)

e. Antidegradation. The Department may only approve water quality certification if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve water quality certification for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S.A. § 464(4)(F)

4. DISSOLVED OXYGEN

a. Existing Conditions. While historical water quality data exist for the Penobscot Mills Hydroelectric Project study area, two complete years of data characterizing all major impoundment/lake basins and the tailrace waters were collected to provide a comprehensive data set. A water quality sampling program approved by the Department was conducted in 1986-1987. This was supplemented with a less extensive water quality sampling program conducted in 1988 to further document yearly variations.

Ten stations were established as sample stations. Stations 8, 16 and 17 were in Class B designated waters, and Stations 9, 10, 11, 12, 13, 14 and 15 were in Class C designated waters. The station locations and high and low dissolved oxygen (DO) readings for each of the stations are as follows:

Station No.	Location	Low DO (ppm)/ % of Saturation	High DO (ppm)/ % of Saturation
8	Tailrace of North Twin dam	7.9/93.1	13.8/97.2
9	Back channel, below Stone dam	6.7/75.9	13.6/95.6
10	Tailrace at Millinocket Mill	7.8/92.0	13.6/95.3

11	Upper Dolby Pond	0.4/4.4	14.2/100
12	Lower Dolby Pond, deep hole	0.1/1.0	13.8/96.4
13	Lower Dolby Pond, above dam	3.8/41.0	13.3/93.2
14	East Millinocket impoundment, above dam	6.5/77.2	13.7/95.8
15	Tailrace of East Millinocket dam	5.7/68.5	13.7/95.9
16	Outlet of Ferguson Pond	7.2/84.2	13.8/92.8
17	Quakish Lake	2.5/27.0	11.6/98.3

b. Applicant's Proposal. The applicant proposes to maintain a minimum flow of 2,000 cfs at Millinocket unless storage is depleted, and to continue run-of-river operations at the Millinocket, Dolby, and East Millinocket developments. The applicant also proposes to maintain existing leakage flows to the Back Channel.

c. Discussion. The Bureau of Water Quality Control states that data provided by the applicant indicates dissolved oxygen standards are being met in all riverine segments of the West Branch. However, low DO levels have been recorded in the bottom of the Dolby impoundment. There is no evidence in the record that the operation of the project is causing or contributing to these low DO levels. The Bureau of Water Quality Control requests that the applicant investigate and report on the extent to which dissolved oxygen deficits in the Dolby impoundment are due to discharges from the Millinocket Mill.

5. TROPHIC STATE

a. Existing Conditions. As stated above, a comprehensive water quality sampling program was conducted in 1986-1987, which was supplemented with a less extensive water quality sampling program in 1988. The water quality sampling programs were conducted in accordance with the Department's "Lake Trophic State Sampling Protocol" (Maine DEP, 1986). The applicant compared the results of the 1986-1988 sampling program to the results of its 1981-1985 sampling program. The comparisons revealed no appreciable increase in trophic state.

b. Applicant's Proposal. The applicant is not proposing any changes to the existing facilities or mode of operation at the North Twin development that would impact water quality in the impoundment.

c. Discussion. The Bureau of Water Quality Control states that the North Twin impoundment is attaining a stable trophic state.

6. FISH

a. Existing Resources. The West Branch currently supports both cold water and warm water fish species. The major fisheries are for salmon, lake trout, smelt, burbot, and white perch, while minor fisheries exist for lake whitefish, pickerel, brook trout, and smallmouth bass. There is a typical northern Maine population of suckers, minnows, and other non-sport species. The priority management species of the Department of Inland Fisheries and Wildlife (IF&W) for the North Twin impoundment is lake trout.

b. Studies. The applicant conducted several studies aimed at assessing existing fishery resources, and identifying impacts of project operation on those resources. The applicant also conducted studies evaluating the impact of various changes in project operation.

i. North Twin dam fishway study. In response to requests by the fisheries agencies, the applicant conducted a study of the configuration and hydraulics of the North Twin dam fishway. The study determined the fishway exit was dewatered at low impoundment elevations, that there was excessive turbulence within the pools, and that attraction water volume was quite low. The fisheries agencies determined the fishway must be kept operational with modifications.

ii. Water Use Plan. The applicant developed a model of its hydropower system, referred to as the Water Use Plan. The Water Use Plan utilizes the water resources available in the applicant's entire hydropower system, as well as its condensing and cogeneration facilities which are located at the mills, in order to determine power supply capabilities to compensate for reductions (or increases) created by the requests for reallocation of water for enhancements.

It was determined from the Water Use Plan that some of the requests for water allocation by interested parties were incompatible with other requests due in part to the fact that there were many interested parties, each with their own mandate and interests, involved in the consultation process. However, of more potential significance regarding the incompatibility of requests is the fact that each dam in the watershed is part of an integrated system. A change in one portion of the system can directly impact other areas within the system.

The existing operation of the Penobscot Mills Project, in combination with other factors, may result in lower aquatic productivity than would occur with stable water levels. In addition, potential decreases in production of various fish species may result from the present mode of operation. However, the abundance and health of the existing fish populations indicate there are presently no serious project impacts on existing aquatic communities.

iii. Impoundment fluctuations. The applicant evaluated the effects associated with alternative operating modes, including stabilizing the water level of the North Twin impoundment. Instead of using the stable water level scenario as the baseline, the applicant followed the procedure outlined in the FERC publication titled "Hydroelectric Project Relicensing Handbook" (1990). The referenced publication states that the relicensing process is unique, and that the existing resource should be used as the baseline for comparison from which alternative operating modes requested by the agencies can be compared and enhancement measures may be proposed.

iv. Operational changes in flow. The applicant reviewed the potential impacts to existing resources resulting from a change to a run-of-river (unmanaged) flow regime that would result from maintaining all impoundments at their normal full pond elevation with instantaneous discharge of all inflow. A run-of-river flow regime would result in increased annual flow variability. High flows would be greater and more frequent, and low flows would be more frequent, extreme, and prolonged with run-of-river operation. Run-of-river operation would result in more spills and, if the timing of spills coincided with period of fish activity, there would be more potential for drop down of lake fish into the West Branch. Run-of-river conditions might favor brook trout, but not salmon.

v. Instream flow study. The applicant studied the instream flow needs of the Back Channel to evaluate how well various flows maintain aquatic habitat. The USF&WS recommended that any instream flow studies address the impacts of periodically fluctuating flow releases at the project. An instream flow study describes the relationship between flow and quantity of suitable habitat (expressed as Weighted Usable Area, WUA) for evaluation species and life stages, with the goal of determining an appropriate minimum flow. The evaluation species selected in consultation with the agencies was landlocked salmon, in all life stages.

The study found that WUA was maximized at 170 to 300 cfs for fry, 300 to 400 cfs for parr, 500 to 700 cfs for spawning, and that adult habitat increased through a flow of 2,000 cfs. Therefore, salmon habitat could be provided in the Back Channel, with optimum conditions achieved at releases in the range of 350 cfs to 400 cfs. However, it is not certain whether suitable spawning habitat would be available at these flows, or whether stocking could support a salmon population here. The applicant has demonstrated that increased flows to the back Channel would have an adverse impact on its ability to maintain relatively stable lake levels at the North Twin impoundment, and that any additional flows would seriously affect the viability of the proposed Water Use Plan.

c. Existing Management Plans. The primary goal of IF&W is to establish a self-sustaining lake trout population in the North Twin impoundment. This requires regulation of water levels to protect eggs during the over wintering incubation period. In addition, IF&W has a goal to provide for a landlocked salmon fishery in the North Twin impoundment through a continued stocking program.

d. Applicant's Proposals

i. Minimum flows. The applicant proposes to provide a minimum flow of at least 2,000 cfs to the West Branch at Millinocket, and to maintain existing leakage flows to the Back Channel.

ii. Water levels. Unless it is unable to maintain the 2,000 cfs minimum flow at Millinocket, the applicant proposes to maintain the water level of the North Twin impoundment at or above the lake trout spawning/incubation level for the period on or about October 15 to May 1.

d. Discussion

i. Minimum flow

- Existing flow to the Back Channel is leakage from Stone dam (2-5 cfs). Because only leakage flows and occasional spillage flows have been released since the completion of Stone dam in 1899, the habitat of the Back Channel has changed significantly and cannot be evaluated using traditional methods. In addition, the applicant cannot maintain the advantages to fisheries, recreation and hydroelectric power generation of the Water Use Plan if additional flows are provided to the Back Channel. Furthermore, the release of additional flows to the Back Channel is neither reasonable nor achievable because of the requirements placed on the applicant elsewhere in the watershed by state agencies. Therefore, due to the uniqueness of this project, the overall advantages of the proposed project operation outweigh the disadvantages of low flow in the Back Channel.

- The Department of Inland Fisheries and Wildlife (IF&W) states that significant fisheries enhancement in the Back Channel is not reasonable because of the requirements placed on the applicant upstream of the Penobscot Mills Project by state agencies. IF&W also states that it is satisfied and convinced that the existing fishing and angling opportunity currently being provided in the Back Channel do meet the prevailing classification of this section of the Penobscot River. Adjustments to the applicant's Water Use Plan to accommodate significant fisheries enhancement for landlocked salmon in the upper West Branch and lake trout in the North Twin impoundment preclude the diversion of meaningful flows to the Back Channel. However, the project, when taken as a whole, provides a number of fisheries, recreation and other environmental benefits as well as benefits for hydroelectric power generation.

- The fishery resource agencies recommend that a minimum flow of 2,000 cfs be maintained in the West Branch at Millinocket in order to protect downstream aquatic habitat.

- The fishery resource agencies recommend that the Millinocket, Dolby, and East Millinocket developments continue to be operated as run-of-river facilities.

ii. Impoundment fluctuations. The applicant's studies at North Twin delineating suitable togue spawning substrate, and the Water Use Plan as proposed, appear satisfactory to achieve reasonable conditions to enhance togue reproductive success in the North Twin impoundment. IF&W requests monitoring studies following licensing, both for documenting spawning success and for correlating any water level management or other aberrations which may be factors if success is not achieved.

iii. Fish passage. Both IF&W and the USF&WS state that no additional project fish passage facilities beyond the North Twin fishway are necessary. However, improvements should be made to the fishway to improve its effectiveness. The exact repairs or modifications necessary to the improve efficiency of the fishway have not been determined. Additional consultation between the applicant and IF&W is needed to evaluate the necessary repairs.

iv. Conclusion. Operation of the project is adequate to achieve and maintain the designated use and narrative standards of the waters affected by the project as habitat for fish, provided that: run-of-river operation is continued at the Millinocket, Dolby, and East Millinocket developments; a minimum flow of 2,000 cfs is maintained at Millinocket; the water level of North Twin impoundment is maintained at or above the lake trout spawning/incubation level during the period on or about October 15 to May 1; the applicant monitors togue spawning success in the North Twin impoundment following licensing; and the applicant makes appropriate modifications to the existing North Twin fishway. The Back Channel presents a unique situation which makes it difficult to evaluate for certification using traditional methods.

7. WILDLIFE AND OTHER AQUATIC LIFE

a. Existing Resources. The North Twin impoundment and surrounding shoreline support a number of mammals and waterfowl, including loons, grebes, cormorants, bitterns, herons, geese, ducks, beaver, mink, otter, and lemmings. The impoundment also supports various amphibians and reptiles. The project study area contains active nesting territories of the endangered bald eagle. In addition, the long-tailed shrew and the North American lynx, both candidates for federal endangered species status, have ranges that overlap the study area. The only Maine threatened species in the project area is the northern bog lemming.

b. Mercury Study. A testing study for fish and invertebrates was conducted to determine whether a link exists between operation of the Penobscot Mills Project and the presence of mercury. The results of the applicant's study indicate that, while mercury levels in project waters are variable, these levels do not appear to differ significantly from lake to lake. Furthermore, other studies of mercury levels in fish found in northern Maine lakes are not inconsistent with the levels found in the project impoundments. While higher levels of mercury were found in lake trout in North Twin impoundment and Millinocket Lake than in their respective control lakes, the other species of fish sampled (including bottom feeders) show no apparent differences in mercury concentration between lakes, indicating that drawdown is not a factor. On the other hand, mercury concentrations also appear to be elevated in predatory fish. Thus, mercury appears to be bioaccumulating.

Consumption of contaminated prey may pose detrimental impacts to the federally listed bald eagle and to humans. However, available study results do not indicate an adverse impact on eagles as the result of project operation. With regard to the effect of the drawdown of the project impoundments on mercury cycling, the available data does not lead to the conclusion that water level fluctuations affect mercury accumulation.

c. Wildlife Study. Wildlife resources were investigated in the field during the late summer of 1986, the early and late summer of 1987, and the late summer of 1989 at representative areas of each vegetation type throughout the project study area. The applicant investigated wildlife resources for habitats bordering the project impoundments, and assessed the impact on wildlife resources of modification of the existing impoundment drawdown policy. The applicant found that insignificant impacts to wildlife occur under existing operation. While the annual drawdown of the North Twin impoundment may have affected wildlife habitat relative to the amount and type that might be expected in the absence of fluctuations, the drawdowns have also provided habitat opportunities, such as nesting by spotted sandpipers and killdeer, and shorebird migration, that would be lacking under a stable water level regime.

As part of the FERC relicensing process, the applicant studied the possibility of enhancing wetlands within the project area. Three sites on the North Twin impoundment may have potential for wetlands enhancement. IF&W has not fully evaluated the feasibility and benefits of these or other potential enhancement measures. The applicant has developed a Wildlife Habitat Management Plan for the Back Channel area in consultation with IF&W.

d. Applicant's Proposals

i. Minimum flows. The applicant proposes to provide a minimum flow of at least 2,000 cfs to the West Branch at Millinocket, and to maintain existing leakage flows to the Back Channel.

ii. Water levels. Unless it is unable to maintain the 2,000 cfs minimum flow at Millinocket, the applicant proposes to maintain the water level of the North Twin impoundment at or above the lake trout spawning/incubation level for the period on or about October 15 to May 1.

e. Discussion.

i. Wetlands. Studies conducted by the applicant have determined impacts on wetland development as a result of annual water level fluctuations of the North Twin impoundment and Millinocket Lake. The applicant does not believe that these impacts are such as to require enhancement for purposes of §401 certification. Nevertheless, because the applicant anticipates that wetlands enhancements will be a part of the FERC process, the applicant has agreed, without waiving its position, that wetlands enhancement may be a condition of this certification. However, the applicant has agreed to undertake wetlands enhancement. Three sites on North Twin have been identified for possible wetlands enhancement. The sites appear to have potential, but detail is lacking as to the present wildlife habitat value of the wetlands or the likely enhancement of the values. Other enhancement measures may be identified (for example, water level control structures on River and Compass Ponds, located upriver from the Penobscot Mills Project) that may provide greater wetlands enhancement for less unit cost.

ii. Minimum flow. Existing flow to the Back Channel is leakage from Stone dam (2-5 cfs). Because only leakage flows (about 2-5 cfs) and occasional spillage flows have been released since the completion of Stone dam in 1899, the habitat of the Back Channel has changed significantly and cannot be evaluated using traditional methods. In addition, the applicant cannot maintain the advantages to fisheries, recreation and hydroelectric power generation of the Water Use Plan if additional flows are provided to the Back Channel. Furthermore, the release of additional flows to the Back Channel is neither reasonable nor achievable because of the requirements placed on the applicant elsewhere in the watershed by state agencies. Therefore, due to the uniqueness of this project, the overall advantages of the proposed project operation outweigh the disadvantages of low flow in the Back Channel.

iii. Mercury. Concentrations of zinc, copper, mercury and volatile solids are present in greater concentrations within the Dolby impoundment than in those above the Penobscot Mills Project. Fish samples show concentrations of mercury ranging from 0.12 ppm to 1.15 ppm. The Food and Drug Administration (FDA) standard for edible

fish tissue is 1.0 ppm. The concentration of mercury in fish from non-impounded Maine lakes also exceed FDA standards. The method by which elemental mercury is made available and concentrated up the food chain is currently not known in its entirety. Therefore, the Bureau of Water Quality Control requests that the applicant cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters.

iv. Conclusion. Operation of the project is adequate to achieve and maintain the designated use and narrative standards of the waters affected by the project, as habitat for aquatic life other than fish, provided that: run-of-river operation is continued at the Millinocket, Dolby, and East Millinocket developments; a minimum flow of 2,000 cfs is maintained at the Millinocket development; relatively stable water levels are maintained in the North Twin impoundment from May 1 through mid-August; the water level of North Twin impoundment is maintained at or above the lake trout spawning/incubation level for the period on or about October 15 to May 1; and the applicant cooperates in a study to be conducted by the the Department to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters. The Back Channel presents a unique situation which makes it difficult to evaluate for certification using traditional methods.

8. FISHING AND RECREATION ON THE WATER

a. Existing Facilities and Use. The applicant surveyed lease holders and local residents to determine recreational use of the Penobscot Mills Project area. Results of the survey indicated visitors used the area for fishing, swimming, boating, canoeing, water skiing, sailing, camping, hiking, hunting, ice fishing, snowmobiling, and cross-country skiing. Access to the project area is either over State Route 11, the State Road, or the Golden Road. Access to specific project sites are as follows:

i. North Twin impoundment. Pemadumcook Lake is the most remote of the lakes within the project area and has been developed to a lesser degree than the other lakes. Access is primarily by boat via public boat launches at the Ambajejus Lake dike and at South Twin Lake. There are primitive campsites on Pemadumcook Lake and Ambajejus Lake. Ambajejus Lake is adjacent to Millinocket Lake and is accessible from the State Road. There is a public boat launch, a very popular public beach, and a commercial flying service located near the dike that separates Ambajejus Lake from Millinocket Lake. South Twin Lake, North Twin Lake, and Elbow Lake are accessible from Route 11. There is a picnic area, commercially operated marina with boat launch, and a general store adjacent to the public boat launch, at South Twin Lake. A smaller boat launch on Elbow Lake is at Norcross.

ii. Quakish Lake and Ferguson Pond. Quakish Lake and Ferguson Pond are relatively small bodies of water with limited recreational value, located adjacent to Route 11. They can be reached from Route 11. In addition, Quakish Lake can be reached from a dirt road off Route 11. The municipal water supply for the Town of Millinocket is drawn from Ferguson Pond.

iii. Dolby Pond. Dolby Pond is a large flowage along the West Branch, and is one of the most visible impoundments found within the Penobscot Mills Project. Route 157 crosses the pond on a causeway between Millinocket and East Millinocket. A picnic area is located on the north side of the road.

iv. East Millinocket impoundment. This impoundment is fairly small. Recreational use of the impoundment is limited by the need to restrict access through the East Millinocket mill yard, which is adjacent to the northeastern side of the impoundment.

b. Applicant's Proposals. As discussed above, the applicant proposes to maintain existing minimum flows from Millinocket and to maintain relatively stable water levels in the North Twin impoundment during critical periods of the year. In addition, due to concerns about submerged hazards in the North Twin impoundment, the applicant has agreed to consult with staff of the DOC regarding the need for a study to mark or remove hazards in the North Twin impoundment. After consultation, DOC will make recommendations regarding the feasibility and estimated cost of marking or removing hazardous submerged obstacles.

Based on recommendations of the Department of Conservation (DOC), the applicant has also agreed to make several improvements to existing recreational access facilities. These improvements include providing parking areas for several vehicles at both the Route 157 Causeway site and the Dead Man's Curve site, two privately owned access sites in the project area, and removing some boulders and expanding the existing gravel parking area at the boat put-in site located just upstream of Quakish Lake at Green Bridge.

c. Discussion. The applicant's proposals are adequate to achieve and maintain the designated use of the waters affected by the project for fishing and recreation in and on the water.. The Back Channel presents a unique situation which makes it difficult to evaluate for certification using traditional methods.

9. HYDROELECTRIC POWER GENERATION

a. Existing Energy Generation. All project power is used by the applicant at its Millinocket and East Millinocket paper mills.

i. The North Twin hydroelectric development generates an average of 47,300 megawatt hours of electricity annually. This is equivalent to the energy that would be produced by burning 78,833 barrels of oil or 21,918 tons of coal each year.

ii. The Millinocket hydroelectric and hydromechanical developments generate an average of 203,300 megawatt hours of electricity annually. This is equivalent to the energy that would be produced by burning 338,833 barrels of oil or 94,208 tons of coal each year.

iii. The Dolby hydroelectric development generates an average of 98,100 megawatt hours of electricity annually. This is equivalent to the energy that would be produced by burning 163,500 barrels of oil or 45,459 tons of coal each year.

iv. The East Millinocket hydroelectric development generates an average of 37,700 megawatt hours of electricity annually. This is equivalent to the energy that would be produced by burning 62,833 barrels of oil or 17,470 tons of coal each year.

b. Existing Energy Policies/Plans. the State of Maine has adopted an Energy Resources Plan (Office of Energy Resources, October 1987) designed to "promote the present and future economic well-being of Maine residents and businesses by ensuring the availability of reliable energy at the lowest possible cost." Specifically, the Plan calls for the State to:

- Encourage cost-effective energy conservation measures in the public sector and least cost planning in the electric and gas industries;
- Promote the environmentally sound development and use of cost-effective indigenous and renewable energy resources;
- Pursue strategies designed to reduce the cost of all imported energy and to increase the availability of natural gas in the state; and
- Encourage the diversification of energy investments in Maine.

With respect to hydroelectric power, the Plan recommends that the development of hydropower be encouraged in a manner consistent with the Maine Rivers Act and that the upgrading of existing hydroelectric dams be examined during relicensing.

c. Applicant's Proposal. The applicant is not proposing any change in the facilities or the existing operating mode of the project dams.

d. Discussion. As proposed, the operation of the Penobscot Mills Hydroelectric Project is adequate to achieve and maintain the designated use of waters affected by the project for hydroelectric power generation.

BASED on the above Findings of Fact, and the evidence contained in the application and supporting documents, and subject to the Conditions listed below, the Department makes the following CONCLUSIONS with respect to the effects of the continued operation of the Penobscot Mills Hydroelectric Developments on all affected waters except for the Back Channel:

1. The continued operation of the project will result in the affected surface waters being suitable for all Class GPA, Class B, and Class C designated uses provided that:

   i. The Millinocket, Dolby, and East Millinocket developments are operated as run-of-river facilities;

   ii. A minimum flow of 2,000 cfs is maintained to the West Branch at Millinocket;

   iii. Relatively stable water levels are maintained in the North Twin impoundment from May 1 through mid-August, unless the 2,000 cfs minimum flow cannnot be maintained at Millinocket;

   iv. The water level in the North Twin impoundment is maintained at or above the lake trout spawning/incubation level for the period on or about October 15 through May 1, unless the minimum flow of 2,000 cfs cannot be maintained at Millinocket;

   v. Appropriate repairs and/or modifications are made to the existing North Twin fishway;

vi. The applicant cooperates in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water levels fluctuations on concentrations of mercury, cadmium, lead and other toxic metals on aquatic life in the project waters;

vii. A study is performed to monitor togue reproductive success in the North Twin impoundment following licensing;

viii. The applicant consults with the Department of Cocnservation regarding the need for a study to mark and remove hazards to recreational navigation in the North Twin impoundment; and

ix. All proposed improvements to existing recreational facilities in the project area are undertaken.

2. The continued operation of the project will result in Class B and Class C numeric standards for dissolved oxygen standards being met in the affected waters provided that the Millinocket, Dolby, and East Millinocket developments continue to be operated as run-of-river facilities and a minimum flow of 2,000 cfs is maintained to the West Branch at Millinocket. The applicant agrees to investigate and report on the extent to which dissolved oxygen deficits in the Dolby impoundment are due to discharges from the Millinocket mill.

3. The continued operation of the project will result in Class GPA, Class B, and Class C narrative standards for aquatic life being met in the affected waters provided that the project is modified and operated in accordance with Conclusions 1(i) through (viii) reached above.

4. The continued operation of the project will comply with the State's antidegradation policy provided the project is modified and operated in accordance with all the conclusions reached above.

5. The applicant agrees to evaluate and implement wetlands enhancement in the Penobscot Mills Project area.

BASED on the above Findings of Fact, and the evidence contained in the application and supporting documents, the Department concludes that the Back Channel must be suitable for all designated uses and must meet applicable aquatic life criteria. Because only leakage flows (about 2-5 cfs) and occasional spillage flows have been released since the completion of the Stone Dam in 1899, the habitat in the Back Channel has changed significantly and cannot be evaluated using traditional methods. In addition, the applicant cannot maintain the advantages to fisheries, recreation and hydroelectric power generation of the Water Use Plan if additional flows are provided to the Back Channel. Furthermore, the release of additional flows to the Back Channel is neither reasonable nor achievable because of the requirements placed on the applicant elsewhere in the watershed by state agencies. Therefore, due to the uniqueness of this project, the overall advantages of the proposed project operation outweigh the disadvantages of low flows in the Back Channel.

GREAT NORTHERN PAPER, INC. T1 R8 WELS, PENOBSCOT COUNTY, MAINE PENOBSCOT MILLS PROJECT HYDROELECTRIC DEVELOPMENTS L-17166-33-A-N	17))))	MAINE WATER QUALITY PROGRAM; FEDERAL CLEAN WATER ACT WATER QUALITY CERTIFICATION

THEREFORE, the Department GRANTS certification that there is a reasonable assurance the continued operation of the NORTH TWIN, MILLINOCKET, DOLBY, AND EAST MILLINOCKET HYDROELECTRIC DEVELOPMENTS, as described above, will not violate applicable water quality standards, and EXPRESSLY WAIVES its authority to certify that the continued operation of the Penobscot Mills Hydroelectric Developments, as described above, will meet applicable water quality standards in the section of the West Branch known as the Back Channel, SUBJECT TO THE FOLLOWING CONDITIONS:

1. MINIMUM FLOWS

   A. Except as temporarily modified by operating emergencies beyond the applicant's control, as defined below, the Millinocket, Dolby, and East Millinocket developments shall be operated as run-of-river facilities while providing an instantaneous minimum flow of 2,000 cfs to the West Branch at Millinocket.

   B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other temporary abnormal operating condition, generating unit operation or interruption under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

   C. The applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit plans for providing and monitoring the minimum flows required in Part A of this condition. These plans shall be reviewed by and must receive approval of the DEP Bureau of land Quality Control.

2. WATER LEVELS

   A. Except as temporarily modified by approved maintenance activities, inflows to the project area, or by operating emergencies beyond the applicant's control, as defined below, the water level in the North Twin impoundment shall be maintained at or above the lake trout spawning/incubation level for the period on or about October 15 through May 1 annually, and shall be maintained at a relatively stable level from May 1 through mid-August annually, unless the minimum flow of 2,000 cfs cannot be maintained at Millinocket.

   B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other temporary abnormal operating condition, generating unit operation or interruption under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

3. DOLBY DISSOLVED OXYGEN STUDY

   The applicant shall investigate the extent to which dissolved oxygen deficits in the Dolby impoundment are due to discharges from the Millinocket Mill. The applicant shall submit the results of the dissolved oxygen investigation, and a discussion of possible corrective actions, to the DEP in conjunction with the next renewal of the Waste Discharge License for the Millinocket Mill.

4. TOXIC METALS STUDY

The applicant shall cooperate in a study to be conducted by the Department and the Environmental Protection Agency to determine the interrelationship and impacts of atmospheric deposition and water level fluctuations on concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in the project waters.

5. NORTH TWIN FISHWAY

A. The applicant shall undertake appropriate repairs and/or modifications to the existing North Twin fishway.

B. The applicant shall, within 12 months of FERC relicensing or upon such a schedule as may be established by FERC, submit a plan for repairing and/or modifying the North Twin fishway, prepared in consultation with the Department of Inland Fisheries & Wildlife. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

6. NORTH TWIN TOGUE MONITORING

A. The applicant shall conduct a study to monitor togue reproductive success in the North Twin impoundment following licensing.

B. The applicant shall, within 12 months of FERC relicensing or upon such a schedule as may be established by FERC, submit a plan for monitoring togue reproductive success in the North Twin impoundment, prepared in consultation with the Department of Inland Fisheries & Wildlife. This plan shall include provisions for documenting togue spawning success and for correlating water level management or other aberrations which may be factors if success is not achieved. The plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

C. The applicant shall submit the results of the study and any recommendations to improve togue reproductive success in the North Twin impoundment to the consulting agencies and to the DEP.

7. WETLANDS ENHANCEMENT

A. The applicant shall provide enhancement of existing wetlands in the Penobscot Mills Project area.

B. The applicant shall, within 12 months of FERC relicensing or upon such a schedule as may be established by FERC, submit plans for evaluating, implementing, and monitoring wetland enhancements as required by Part A of this condition. These plans shall be developed in consultation with IF&W and the Department. These plans shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

8. NORTH TWIN HAZARD STUDY

A. The applicant shall consult with the Department of Conservation regarding the need for a study to mark and remove submerged hazards to recreational navigation in the North Twin impoundment.

B. If a study is requested by DOC, the applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit a plan for establishing benchmark impoundment levels in the North Twin impoundment and investigating the need for marking or removing submerged hazards in the lake. This plan shall be prepared in consultation with the Department of Conservation and shall be reviewed by and receive approval of the DEP Bureau of Land Quality Control.

C. The applicant shall submit the results of a hazard study, if required, to DOC and the DEP. The applicant shall then develop and submit a plan for marking and/or removing hazards in the North Twin impoundment as recommended by DOC. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

9. RECREATIONAL ACCESS

A. The applicant shall improve existing recreational access facilities in the project area by: providing parking areas for four vehicles at the Route 157 Causeway site and for three vehicles and five trailered vehicles at the Dead Man's Curve site; and removing boulders at the boat lanch and adding gravel to expand the size of the parking area at the boat put-in site located upstream of Quakish Lake at the Green Bridge.

B. The applicant shall, within 6 months of FERC relicensing or upon such a schedule as may be established by FERC, submit a plan for implementing Part A of this condition. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land Quality Control.

10. LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to the review and approval of the Board or Department prior to implementation.

11. COMPLIANCE WITH ALL APPLICABLE LAWS

The applicant shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements and orders required for the operation of the project.

GREAT NORTHERN PAPER, INC. T1 R8 WELS, PENOBSCOT COUNTY, MAINE PENOBSCOT MILLS PROJECT HYDROELECTRIC DEVELOPMENTS L-17166-33-A-N	20))))	MAINE WATER QUALITY PROGRAM; FEDERAL CLEAN WATER ACT WATER QUALITY CERTIFICATION

12. EFFECTIVE DATE

This water quality certification shall be effective on the date of issuance of a new hydropower project license by the Federal Energy Regulatory Commission (FERC) and shall expire with the expiration of the FERC license.

DONE AND DATED AT AUGUSTA, MAINE, THIS 22ND DAY OF April, 1993.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: Dean C Marriott
Dean C. Marriott, Commissioner

PLEASE NOTE ATTACHED SHEET FOR APPEAL PROCEDURES

Date of initial receipt of application 12/13/91.
Date application accepted for processing 12/31/91.
Date application withdrawn and refiled 12/11/92.
Date refiled application accepted for processing 12/15/92.

Date filed with Board of Environmental Protection
a:\gnp1

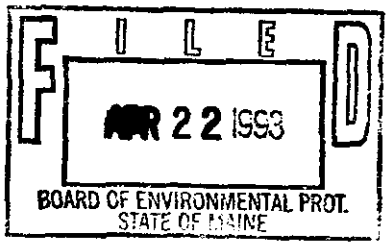


Exhibit #1

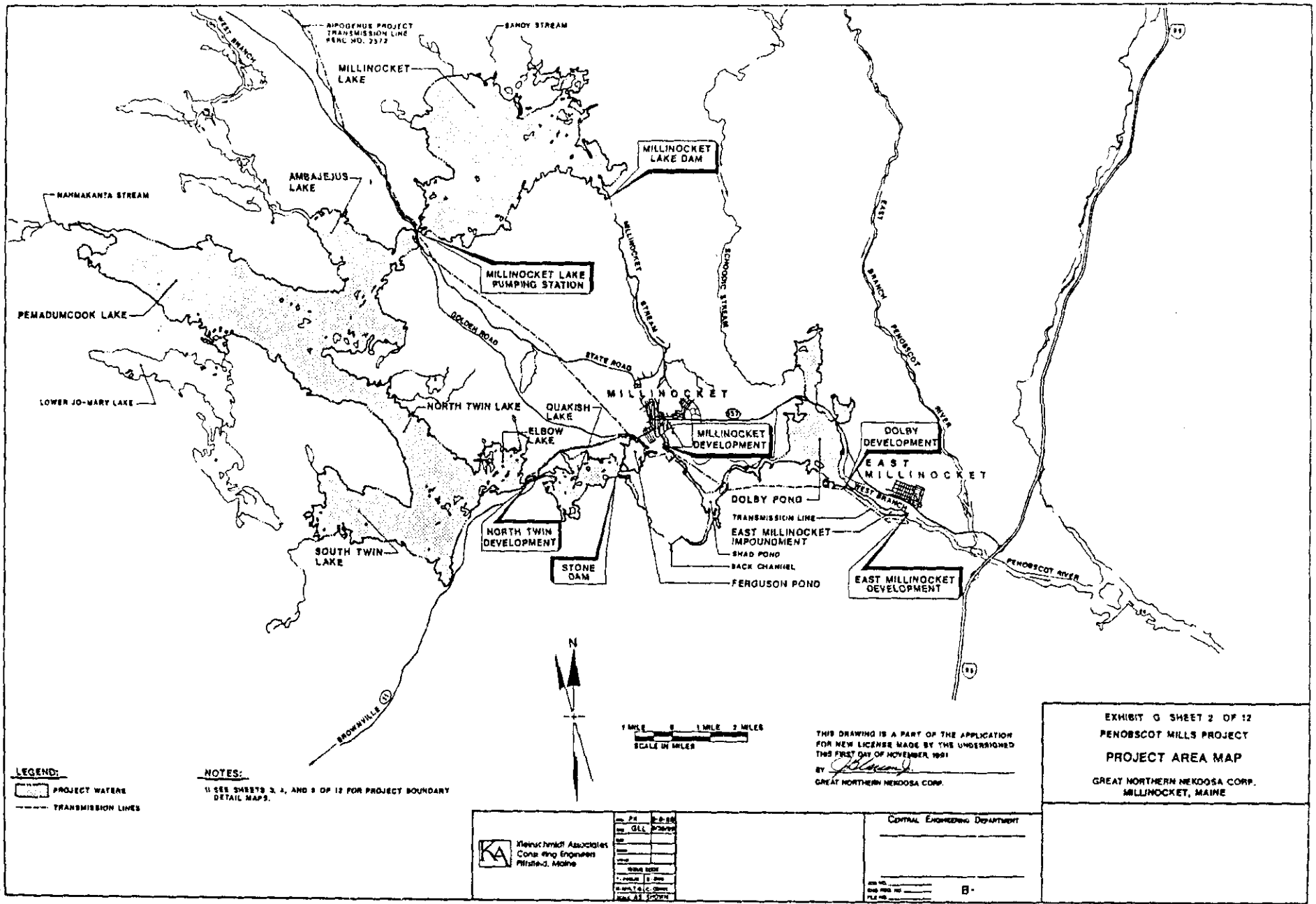
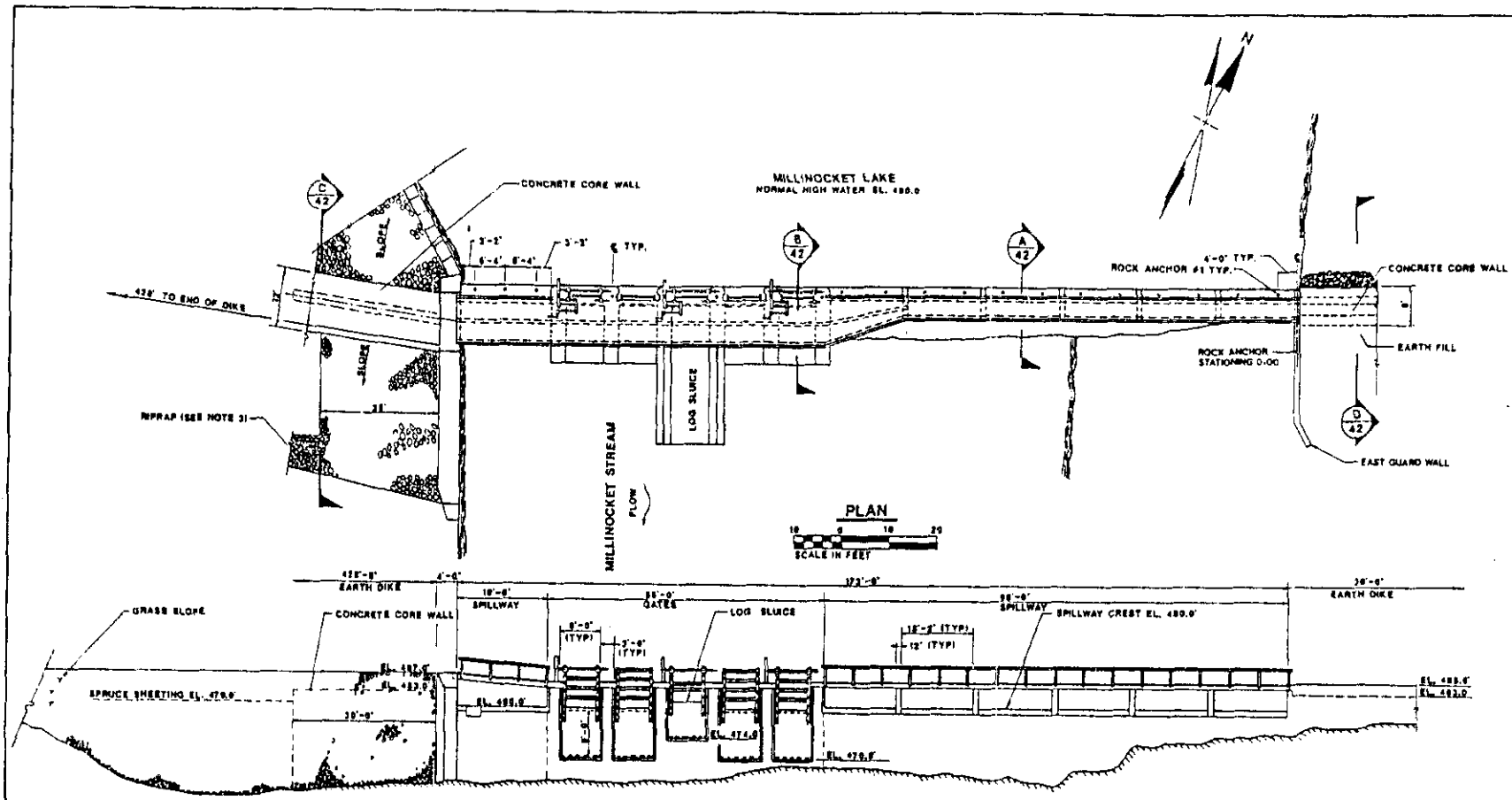

MILLINOCKET LAKE
AMBAJEJUS LAKE
NAHMAKANTA STREAM
PEMADUMCOOK LAKE
LOWER JO-MARY LAKE
NORTH TWIN LAKE
QUAKISH LAKE
ELBOW LAKE
SOUTH TWIN LAKE
BROWNVILLE
MILLINOCKET LAKE DAM
MILLINOCKET LAKE PUMPING STATION
MILLINOCKET
MILLINOCKET DEVELOPMENT
NORTH TWIN DEVELOPMENT
STONE DAM
DOLBY DEVELOPMENT
EAST MILLINOCKET
DOLBY POND
TRANSMISSION LINE
EAST MILLINOCKET IMPOUNDMENT
SHAD POND
BACK CHANNEL
FERGUSON POND
EAST MILLINOCKET DEVELOPMENT
PENOBSCOT RIVER
EAST BRANCH PENOBSCOT RIVER
WEST BRANCH
SANDY STREAM
MILLINOCKET STREAM
SCHOODIC STREAM
DOLPEN ROAD
STATE ROAD
N
1 MILE 0 1 MILE 2 MILES
SCALE IN MILES
LEGEND:
PROJECT WATERS
TRANSMISSION LINES
NOTES:
1/ SEE SHEETS 3, 4, AND 5 OF 12 FOR PROJECT BOUNDARY DETAIL MAPS.
THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991
BY
GREAT NORTHERN NEKOOSA CORP.
EXHIBIT G SHEET 2 OF 12
PENOBSCOT MILLS PROJECT
PROJECT AREA MAP
GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE
Kleinschmidt Associates
Consulting Engineers
Pittsfield, Maine
CENTRAL ENGINEERING DEPARTMENT
B-

Exhibit #2



NOTES:

1) ALL ELEVATIONS U.S.G.S. DATUM.
2) FOR LOCATION OF DAM SEE EXHIBIT G, SHEET 2 OF 12.
3) RIPRAP ALONG DOWNSTREAM FACE OF WESTERN DIKE IS TYPICAL FOR 25'. REMAINING DISTANCE IS GRASS SLOPED WITH RIPRAP LOCATED AT TOE ONLY.

THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991

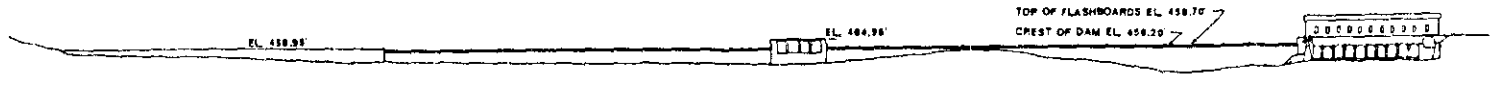
BY _____
GREAT NORTHERN NEKOOSA CORP.

EXHIBIT F SHEET 41 OF 45
PENOBSCOT MILLS PROJECT
MILLINOCKET LAKE STORAGE DEVELOPMENT
DAM - PLAN AND DOWNSTREAM ELEVATION
GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE

Kleinschmidt Associates
Consulting Engineers
Pittsfield, Maine

CENTRAL ENGINEERING DEPARTMENT

B-



ELEVATION LOOKING UPSTREAM

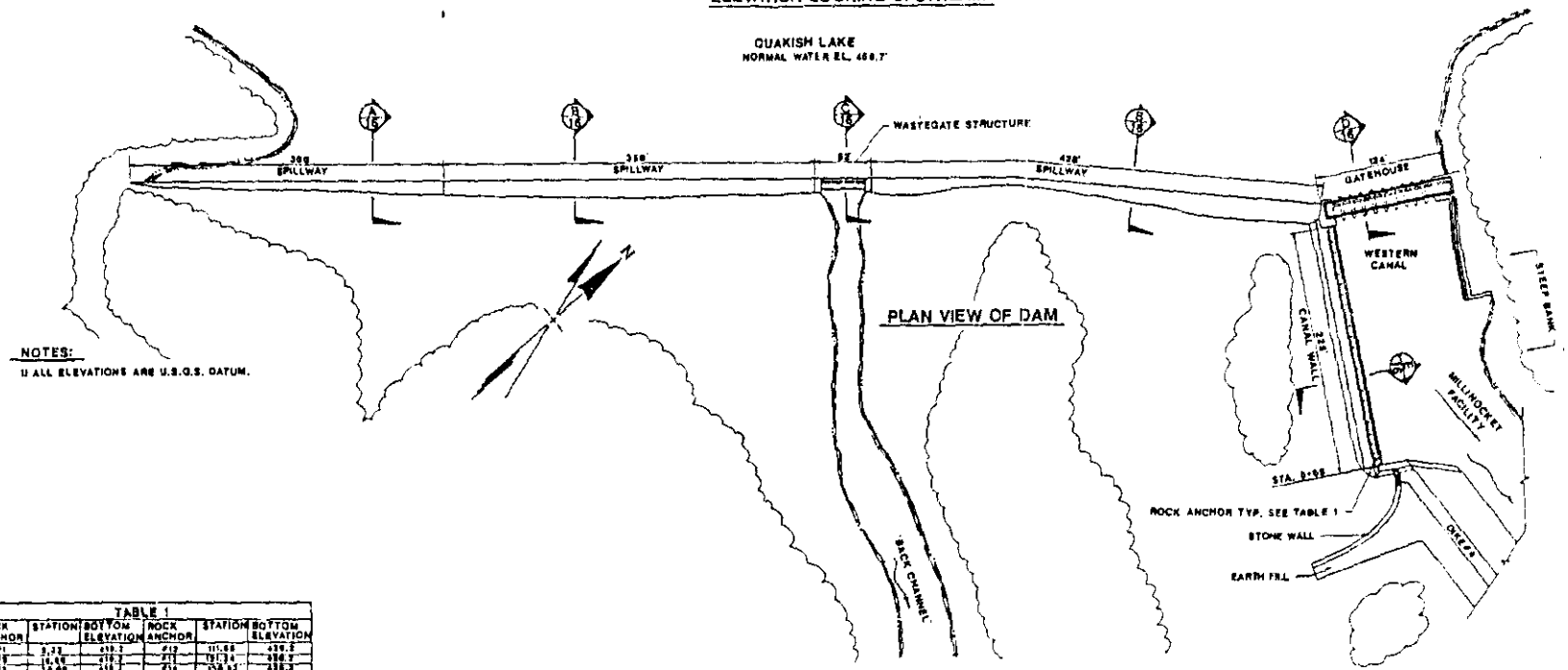


TABLE 1

ROCK ANCHOR	STATION	BOTTOM ELEVATION	ROCK ANCHOR	STATION	BOTTOM ELEVATION
#1	3+33	410.3	#12	111.66	439.8
#2	14.66	410.3	#13	121.34	436.7
#3	25.66	410.3	#14	130.62	433.3
#4	35.33	410.3	#15	140.31	429.7
#5	44.99	410.3	#16	149.73	426.7
#6	54.30	410.4	#17	159.38	423.7
#7	64.24	410.3	#18	169.24	423.7
#8	74.15	410.3	#19	179.26	423.7
#9	83.89	410.3	#20	189.33	423.7
#10A	93.64	410.3	#21	199.39	423.7
#10B	98.30	414.8	#22	209.72	423.7
#11	102.18	418.3	#23	219.16	423.7

THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991

BY _____
GREAT NORTHERN NEKOOSA CORP.

EXHIBIT F SHEET 15 OF 45
PENOBSCOT MILLS PROJECT
MILLINOCKET DEVELOPMENT

DAM PLAN AND ELEVATION

GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE

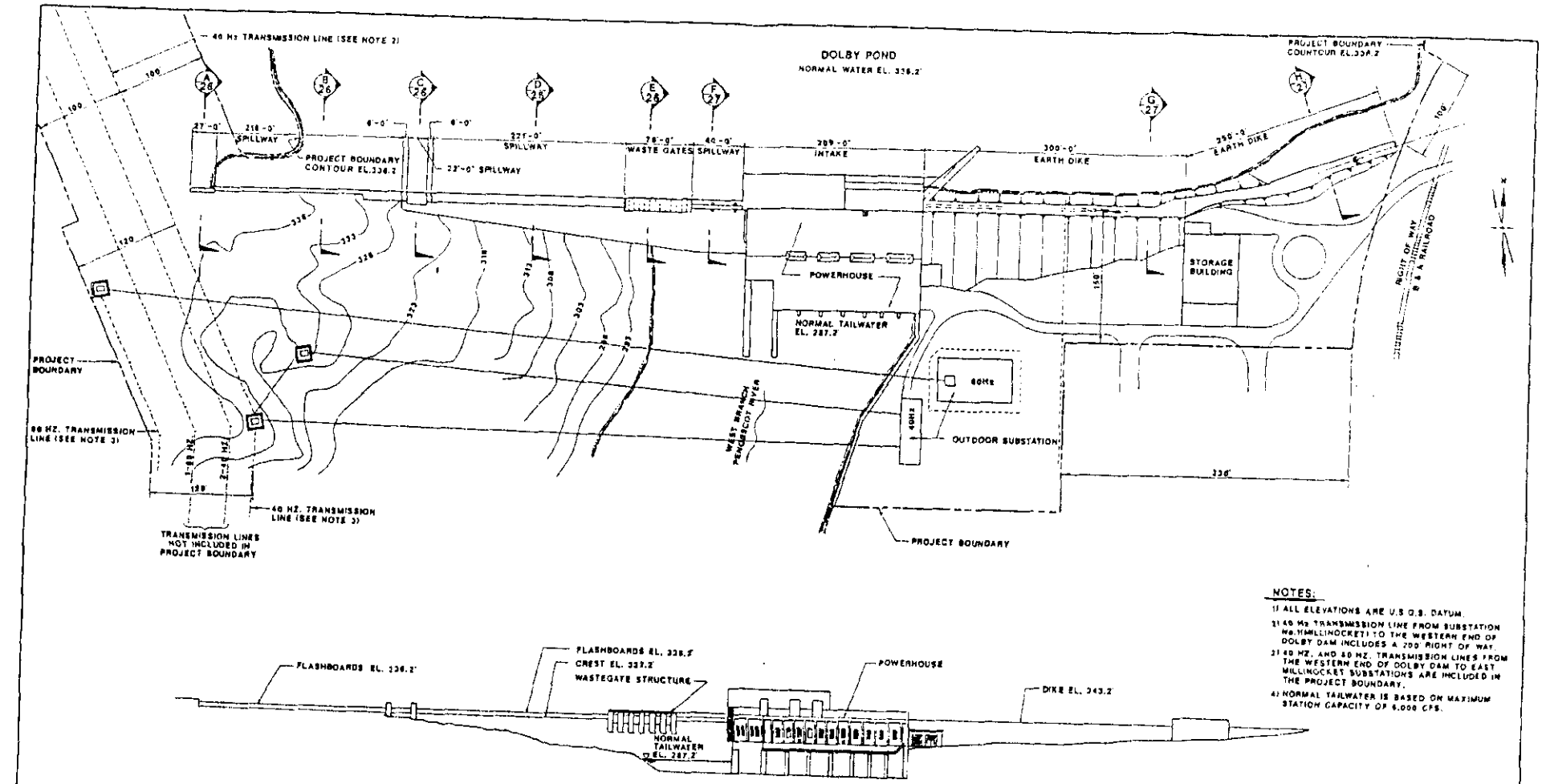
Kleinschmidt Associates
Consulting Engineers
Pittsfield, Maine

CENTRAL ENGINEERING DEPARTMENT

B-

Exhibit #3

Exhibit #4



NOTES:

1) ALL ELEVATIONS ARE U.S.G.S. DATUM.
2) 40 Hz TRANSMISSION LINE FROM SUBSTATION No.1(MILLINOCKET) TO THE WESTERN END OF DOLBY DAM INCLUDES A 200' RIGHT OF WAY.
3) 40 HZ. AND 60 HZ. TRANSMISSION LINES FROM THE WESTERN END OF DOLBY DAM TO EAST MILLINOCKET SUBSTATIONS ARE INCLUDED IN THE PROJECT BOUNDARY.
4) NORMAL TAILWATER IS BASED ON MAXIMUM STATION CAPACITY OF 6,000 CFS.

THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991

BY _____
GREAT NORTHERN NEKOOSA CORP.

EXHIBIT F SHEET 25 OF 45
PENOBSCOT MILLS PROJECT
DOLBY DEVELOPMENT

DAM PLAN & ELEVATION

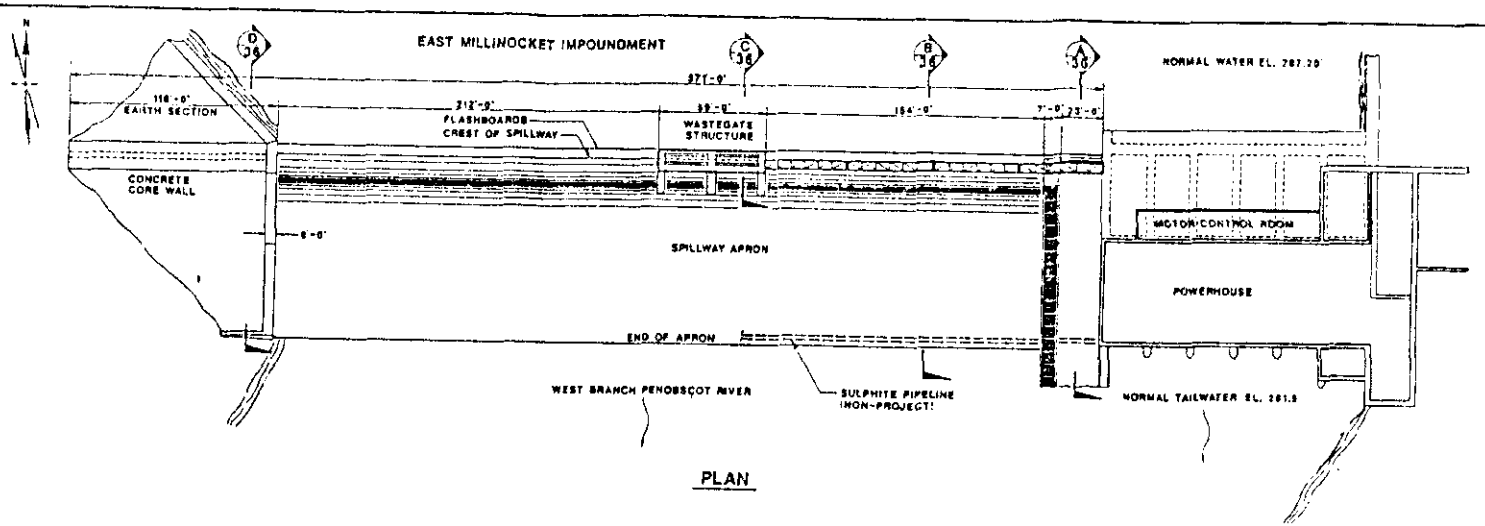
GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE

Klemschmidt Associates
Consulting Engineers
Pittsfield, Maine

CENTRAL ENGINEERING DEPARTMENT

B-

Exhibit #5



NOTES:

1) ALL ELEVATIONS ARE U.S.G.S. DATUM.

SCALE IN FEET

THIS DRAWING IS A PART OF THE APPLICATION FOR NEW LICENSE MADE BY THE UNDERSIGNED THIS FIRST DAY OF NOVEMBER, 1991

BY _____
GREAT NORTHERN NEKOOSA CORP.

Kleinschmidt Associates
Consulting Engineers
Pittsfield, Maine

CENTRAL ENGINEERING DEPARTMENT

B-

EXHIBIT F SHEET 35 OF 45
PENOBSCOT MILLS PROJECT
EAST MILLINOCKET DEVELOPMENT

DAM PLAN & ELEVATION

GREAT NORTHERN NEKOOSA CORP.
MILLINOCKET, MAINE