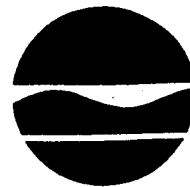


New York State Department of Environmental Conservation
Region 7, Division of Environmental Permits
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John P. Cahill
Commissioner

January 7, 1998

Lanny Joyce
Cornell University
Facilities & Business Operations-Utilities
Humphreys Service Building
Ithaca, NY 14853-3701

RE: DEC #7-5099-00009/00001, Cornell University, Lake Source Cooling Project, Findings Statement

Dear Mr. Joyce:

Enclosed is the Department's "Findings Statement" for the above-referenced project.

The Department is in the process of finalizing the Stream Protection and State Pollutant Discharge Elimination System (SPDES) permits and will be issuing them in the next two weeks.

If you have any questions, please feel free to call me.

Sincerely,

Michael Barylski
Deputy Regional Permit Administrator

cc: Distribution List

State Environmental Quality Review
FINDINGS STATEMENT
Project No.: 7-5099-00009/00001
January 7, 1998

Pursuant to Article 8 (State Environmental Quality Review Act - SEQRA) of the Environmental Conservation Law and 6NYCRR Part 617, the New York State Department of Environmental Conservation makes the following findings.

Name of Action: Cornell University's proposed Lake Source Cooling Project

Description of Action: Construct and operate a cooling system for the Cornell University campus. The system will draw a maximum of 46 mgd per day (32,000 gpm) of cold water from Cayuga Lake at a depth of approximately 250 feet through a 63-inch intake pipeline extending two miles from the shoreline heat exchange facility. The cold water will circulate through heat exchangers where it will absorb heat from water in the 42-inch closed-loop pipeline extending 2.4 miles from Cornell's central cooling system to the heat exchange facility. The chilled water will circulate back to the university through the closed-loop pipeline. The warmed lake water will be returned to the lake through a 48-inch diameter 500 foot long outfall pipe that terminates with a 75 foot long diffuser. The system is designed so that the Cayuga Lake water will never mix with the campus chilled water in the 42-inch closed-loop pipeline.

Location: Heat exchanger building and pumping facilities will be located at 983 East Shore Drive, Ithaca, New York on approximately 13 acres. The project is located in both the Town and City of Ithaca, and the Village of Cayuga Heights, Tompkins County. The project will also be located in Cayuga Lake as described in the "Description of Action" above.

Agency Jurisdiction: State Pollutant Discharge Elimination System (SPDES) (Major), Protection of Water; 6NYCRR Subchapter D, and Parts 608, 621 and 617.

Date Final EIS Filed: December 3, 1997

Facts and Conclusions in the EIS Relied Upon to Support the Decision:

General

The record of the hearing, including the Draft (DEIS) and Final EIS (FEIS) provide an adequate basis to make the findings required by SEQRA.

Discussion

The record also shows that the concerns related to Cayuga Lake can be divided into several main categories: direct impacts to aquatic resources (organisms) from the operation of the project, changes to the ecological balance of the lake from increased phosphorus loadings and warmer water temperature from the return water, and impacts related from the excavation (dredging of the bottom of Cayuga Lake during the construction phase of the project).

The issue related to the entrainment of aquatic organisms generated a great deal of concern. Typically, the Department requires that an intake be screened, to prevent aquatic organisms from being drawn (entrained) into a facility and killed by mechanical and thermal stresses. Every project is unique, however, and the individual characteristics of each project are taken into consideration. The cold water intake will be approximately 250' below the surface elevation of Cayuga Lake. The Department has accepted that the costs of maintaining a screened intake will be high and that the actual maintenance of it may be difficult due to the depth at which it will be located. Zebra mussels are expected to be a problem and provisions for maintaining the screen and pipeline are practical realities that needed to be addressed. There are several species of concern and the mitigation for them varies. A tiny shrimp-like organism, *Mysis relicta*, is known to be sensitive to light and the project has incorporated a continually operated lighted device. This lighted device has been demonstrated to be effective in discouraging *Mysis relicta* from its vicinity. Since *Mysis relicta* avoid the light, impacts to them are not expected. During the period June through November, the stratified period for the lake, there are expected to be few fish present at the depth of the proposed intake. During the period December through May (unstratified), there may be certain fish, most likely alewife and rainbow smelt. To discourage fish from the vicinity of the intake, the intake has been designed to incorporate high frequency sound (ultrasound). The use of ultrasound has been demonstrated to be effective in reducing entrainment of alewife and other clupeids in both Lake Ontario and the New York Harbor at power plants. Ultrasound will not, however, be effective in keeping lake trout and other fish species from the intake if they are at that depth. The unstratified period is also the time when Cornell's cooling demand will be lowest and consequently when the velocity at the intake will be at its slowest, providing a higher probability that fish swimming near the intake will be able to avoid entrainment. Lake trout and other fish species are not expected to be present at this depth. While this is the expectation, the actual experience cannot be predicted with one hundred percent accuracy. Accordingly, the project proposal and record provides that the SPDES permit to be issued by the Department includes a monitoring component that will enable the Department the ability to assess actual fish entrainment and mortality. If the result is different than expected, that is that fish entrainment and mortality does surface as a problem, changes and/or additions can be made. From the DEIS adequacy comments July 1, 1997 p. 59 "Cornell University acknowledges that there are other species that may be negatively impacted. If biomonitoring indicates unacceptable impacts to alewife, smelt, *Mysis relicta*, and/or other species using the proposed mitigation measures, Cornell University will commit the funds necessary to modify the intake to achieve the required system effectiveness. Cornell University will submit a plan that describes proposed alternate mitigation methods for NYSDEC approval within six months of a determination that additional measures are necessary".

In addition, two design elements will be incorporated into the structure that is constructed. First, a "tee connection" will be incorporated into a shallow section of pipeline to allow for the use of an alternate intake location during the unstratified (December through May) period, in the event that monitoring reveals unacceptable levels of entrainment. This alternate intake would have a fine screen design (2.0 mm openings) to prevent/minimize entrainment. Winter operation of a shallow screened intake will allow for the withdrawal of sufficiently cold water without the maintenance problems associated with the operation of a fine screened deep water intake.

Secondly, the open intake at 250' below the lake surface will be constructed in such a manner that it could accept a screen if it is determined that it is warranted. While it is not anticipated that these measures will be necessary, they are available should unforeseen circumstances arise.

The cold water drawn from the bottom of Cayuga Lake will be returned to the lake at higher temperatures. The discharged water will be on average 10° - 15°F warmer than its 41°F temperature when removed from ~250 feet deep in the lake. This water will be discharged to the southern lake basin where the ambient water temperature ranges between 32° in the winter to greater than 75° in the summer. This warmer water will be returned to the lake via a diffuser that will expedite the mixing of the returned water with the water in the area of the outfall. Cormix modeling, which is the standard system used for the analysis, prediction, and design of pollutant discharges (including heat), predicts that in most months, temperature of the water around the discharge will return to within 1 degree F of ambient, within a distance of only 100 meters. Milliken Station, which has been in operation since 1955, discharges from 5 to 13 times more heat into Cayuga Lake than will the LSC project. No adverse impacts from the Milliken Station thermal discharge have been documented.

While the water returned to the lake will be the same water drawn from the lake bottom, the characteristics of the water at each location can vary. This is true for both location and time of year. The potential environmental impacts of the transfer of phosphorus to Cayuga Lake's upper waters were examined closely. Phosphorus is the limiting nutrient for plant and algal growth in Cayuga Lake. Lake Source Cooling, while not a new source of phosphorus to Cayuga Lake, will transfer phosphorus from the lake's lower waters to the upper waters when the two water layers are naturally separated (the stratified period, from June through November). The additional transfer of phosphorus to the upper waters has the potential to increase the growth of plants and algae. This is a potential aesthetic impact in the region of the outfall. There are no public health risks associated with phosphorus transfer of this small a magnitude.

The total increase in the phosphorus inputs to southern Cayuga Lake with implementation of LSC varies monthly during the stratified period. Maximum transfer of phosphorus is projected to occur in August and September, and could contribute an additional 6 percent to the existing loading. The potential magnitude of additional algal growth associated with the incremental loading was calculated to be very small. The Department looked at the alternative locations to the proposed outfall and determined that they were not justified on the basis of cost and benefit. The possibility of algae blooms is real. However, the duration of the period of time that they might occur would be limited to the July, August and September period and would not be a significant problem due to the small amount of phosphorus involved. The most significant impact of the algae blooms would be expected to be aesthetics. On this basis alone, there was insufficient justification to warrant requiring the extension of the outfall at a cost of over two million dollars.

Dredging the lake during construction will put suspended sediments into the lake. The preventive measures proposed, a silt curtain and/or water dam will prevent sediments from becoming a problem. The intake and outfall lines are proposed, such that after construction, the depth of water overlying the intake and outfall pipelines at actual mean summer lake level will be

a minimum of 9 feet. Excavated material that is removed from the lake will be disposed of at a location that will be acceptable to the DEC.

During the construction phase of the project, there will be traffic detours and delays since the proposed location of the pipeline will affect several road segments and intersections along East Shore Drive, Lake Street, University Avenue and on the Cornell campus. These delays and detours will be short-term and are not considered a significant long-term issue. A traffic plan has been prepared in conjunction with other local agencies and as a result, these impacts are believed to be minimized to the greatest extent possible.

There are other issues that have been raised including, concerns for bicycle and pedestrian traffic, suspended sediments caused by the piggging operation and aesthetic consideration for the Heat Exchanger building. The first two; bicycle and pedestrian issues are minor and short-term in nature. And, since a portion of the roadway corridor is to be rebuilt, there is the opportunity for the local government to incorporate bicycle considerations into the reconstruction plan. There was no evidence to suggest that the proposed piggging operation, at the frequency anticipated, would place enough sediments into the lake to cause any problems with on-shore drinking wells or lake based drinking water intakes. And finally, while the aesthetics of the Heat Exchanger building are of concern, it is anticipated that design changes can be made to make it more aesthetically compatible.

The FEIS examined the merits and drawbacks of alternatives to the proposed Lake Source Cooling (LSC) system as a means of cooling the Cornell University campus.

The "no action" alternative would entail Cornell's continued use of its existing conventional chiller equipment using CFC refrigerants. This option would require the stockpiling of CFC refrigerants. Because of regulatory constraints on the availability of CFCs, however, the continued operation of existing chillers with CFCs is not a viable long-term option.

The FEIS has considered using new chillers that utilize refrigerants with low or no ozone depletion potential, including hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs). HCFCs are significantly less damaging to stratospheric ozone than CFCs, and HFCs pose no threat to the ozone layer. Only one of Cornell's seven existing chillers can economically be converted to use an ozone-friendly refrigerant. Although the capital cost of replacing conventional chillers is less than the capital cost of LSC, the chiller alternative would consume approximately five times more electrical energy. At expected utility and construction and renewal rates, the extra initial cost of LSC will be recovered over the long term, and LSC will benefit the environment by reducing the combustion of fossil fuels used to produce electricity equal to that used to heat approximately 2,000 homes. In addition, the design of LSC has been modified through public comments to include significant Ithaca taxpayer benefits including cooling of the high school and road, sidewalk, and utility improvements for the City and Town of Ithaca.

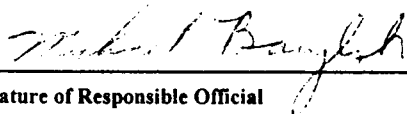
CERTIFICATION OF FINDINGS TO APPROVE

Having considered the DEIS and FEIS, and the Hearing Record, and having considered the preceding written facts and conclusions relied upon to meet the requirements of 6NYCRR 617.9, this Statement of Findings certifies that:

1. The requirements of 6NYCRR Part 617 have been met;
2. Consistent with the social, economic and other essential considerations from among the reasonable alternatives thereto, the action approved is one which minimizes or avoids adverse environmental effects to the maximum extent practicable; including the effects disclosed in the environmental impact statement, and
3. Consistent with social, economic and other essential considerations, to the maximum extent practicable, adverse environmental effects revealed in the environmental impact statement process will be minimized or avoided by incorporating as conditions to the decision those mitigative measures which were identified as practicable.

New York State Department of Environmental Conservation

Agency



Signature of Responsible Official

Michael Barylski

Name of Responsible Official

Deputy Regional Permit Administrator

Title

January 7, 1998

Date