
INTERNATIONAL RAINY LAKE BOARD OF CONTROL

NEWSLETTER

REVIEW OF THE IJC ORDER FOR RAINY AND NAMAKAN LAKES

Number 3, November 1997

Introduction

The final plan of study for the review of the IJC Order was approved by the International Joint Commission (IJC) on January 17, 1996. The International Rainy Lake Board of Control has the delegated responsibility for the review.

As part of the study plan the Board developed a list of specific study components to be carried out, and a schedule for the completion of the work. These study components will be used in this newsletter as a framework for reporting purposes.

Fisheries Review & Environmental Data Summary

Reports on these components have been prepared and were summarized previously in Newsletters 1 and 2 respectively.

Hydrologic Modelling

The "REGUSE" computer model, developed by Environment Canada and used previously in other IJC transboundary basin studies, has been used to simulate the regulation of Rainy and Namakan lakes when operated in accordance with either the existing IJC rule curves or the proposed International Steering Committee (SC) rule curves. The model determines the levels and outflows that are likely to result from either mode of operation, which can then be used as a basis for assessing the benefits and disbenefits associated with each. First a number of "runs" (a day by day simulation of lake regulation for a specified period with set operating rules) were done to test model performance and select appropriate modelling parameters, and then a set of 8 runs were done with both the existing and proposed rule curves to obtain the required basis of comparison. These runs, using historic daily inflows for the 1958-1996 period, assessed a range of operating practices within the rule curves, the sensitivity to higher and lower inflows, and the effect of reducing the existing minimum outflow requirements. Based on these model runs the key findings are as follows:

- The maximum flood level in the 1958-1996 period is somewhat higher with the SC curves than with the IJC curves - about 5 cm on Namakan Lake and 10 cm on Rainy Lake. During some lesser flood events the difference is larger - for example, about 17 cm on Namakan Lake and 22 cm on Rainy Lake with 1974 inflows.
- The choice of operating practice (within the rule curves) has little or no effect on flood levels, but

does affect the severity and extent of drought events and the number of rule curve violations.

- The minimum drought level on Namakan Lake is 20 to 100 cm lower with the IJC curves than with the SC curves, but on Rainy Lake is 7 to 38 cm higher with the IJC curves than with the SC curves.
- Based on the number of rule curve violations, the SC curves appear to be nominally more viable than the IJC curves on Namakan Lake, but less viable on Rainy Lake.
- While some of the differences between IJC and SC level results appear large, they occur quite infrequently. For example, on Rainy Lake, the number of days above the IJC "all gates open" level with the SC curves is double that with the IJC curves, but this only occurs about 1% of time.
- Average annual energy generation is 6.6 to 7.7% less with the SC curves than with the IJC curves, with up to 15% less in the winter and 20% less in the spring.
- Reducing the minimum outflow from Namakan Lake can significantly reduce the number of lower rule curve violations, but doing likewise on Rainy Lake is less effective if the Namakan Lake minimum outflow is reduced at the same time.
- Because of the earlier refill of the SC curves, there is a significant shift in timing of outflow, with less in winter and more in summer, especially June. For example, Rainy Lake outflow is 140 cubic metres per second greater 50% of the time for the month of June.
- The model results have been provided to the experts preparing the flood risk and economics components, and will be summarized in the Status Report.

State-of-Nature Modelling has also been completed, independent of the REGUSE modelling. This work simulates the natural levels and outflows as if the dams had never been built, so that the assumptions regarding the timing of the spring refill can be checked. The model uses the same 1958-1996 historical inflows as used by REGUSE. The key findings are as follows:

- On Namakan Lake the actual refill under past regulation has typically occurred about the same time as the natural refill would have occurred (it was often permitted to rise ahead of the IJC curves). Despite the wide variation in timing of natural refill, the earlier refill proposed by the SC appears to better fit the natural timing in a majority of years.
- On Rainy Lake the actual refill under past regulation has typically occurred earlier than the natural refill would have. The timing of the IJC rule curve band appears to better fit the natural refill timing than does the SC rule curve band.
- On both lakes both the IJC and SC rule curves provide a much narrower time slot for refill than occurred naturally. Both for refill timing and overall range of lake levels the IJC and SC curves are much more similar to each other than either is to the state of nature.

Inflow Forecasting

The Plan of Study included an inflow forecasting component, with part one being an assessment of whether or not improved inflow forecasting could realistically mitigate flood risk and, if this appeared to be the case, part two being the attempted development of forecasting. A report summarizing the results

of Part One has recently been distributed to an advisory group for comment.

Flood Risk & Economics

Based upon the results of the hydrologic modelling, work has been initiated to develop incremental comparisons of damages for each of the REGUSE Model runs. Elevation-frequency, elevation-duration and flow-duration curves have been developed for each of the model runs and will be used by economics experts to produce incremental damage comparisons between the IJC and SC rule curves.

Work has continued on filling of information gaps and a section prepared on background socio-economic data for the portion of the basin located in the United States. Information on population, housing, employment, labour force, income, social resources and other parameters have been included. Similar data is being assembled for the Canadian portion of the basin.

The final report will include a comparison of effects under existing and proposed rule curves, assessment of significance of effects and recommendations for any additional data collection and analysis found to be warranted.

Status Report

As noted in the first Newsletter, the Board intends to prepare and release a Status Report when the initial study components have been completed. Based on progress to date, and a forecast of work remaining in the various sectors, the Board anticipates that the Status Report will be available near the end of December, 1997. Any technical reports that the Board has received for the specific study components will be made available at the same time.

Other Activities

The Board appeared before the International Joint Commission on October 9, 1997. This was an opportunity to provide a overview of progress to date and discuss future activities, including the public consultation process.

The Board will be using the Newsletter as one of the mechanisms to keep agencies and the public informed on study progress. If you wish to be added to the mailing list, or have comments or questions, please contact the Board's Engineering Advisors:

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