Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

MAY 16 1989

In reply refer to: RMG

Mr. Carl Vansant
Hydro Consultants, Inc.
410 Archibald Street
Kansas City, MO 64111

Dear Mr. Vansant:

As mentioned in our recent telephone conversation, the following is submitted for consideration as a short news article for Hydro Review.

An index test is a method of measuring the relative efficiency of hydraulic turbines. It differs from an absolute test in that the flow rate is measured by relative comparison to another parameter rather than in absolute terms such as cubic feet per second. Any type of hydraulic turbine can be indexed. In particular, when the procedure is applied to Kaplan turbines it allows the determination of the optimum blade-to-gate relation such that the complete turbine/generator/governor unit can operate at peak efficiency. Although generally less expensive and quicker than an absolute test, an index test still requires a significant number of man-hours in the recording of field data and in subsequent data reduction. In addition, the test operator must have local control of the unit which frequently poses conflicts with required load and discharge schedules.

To eliminate these latter two obstacles and thereby facilitate the use of index testing to optimize the performance of Kaplan turbines, Woodward Governor Copmany has developed an Index Test Box (ITB) (See Hydro Review, Vol VI, Number 3, June 1987). Used with their newer electronic 3-D governors, the ITB, utilizing new control concepts, automatically and unattended conducts an index test while the turbine and generator remain in their normal generation control mode. An additional and unique feature is that the ITB can store the performance data on an electronic chip for comparison with subsequent tests, to monitor any changes in the unit's performance over time.

With funding assistance from the Bonneville Power Administration (BPA), Portland General Electric Company (PGE) purchased and installed the first ITB at the City of Portland's Hydro Plant #2. After the ITB had been operated to

record and subsequently analyze the single unit's performance data, a separate, conventional or manual index test was conducted to verify the accuracy of the results from the ITB. The comparison of the results from these two tests showed very close agreement.

A final report on this evaluation of the ITB is available at no charge. Copies can be obtained from Lee Sheldon (Code RMGB), Bonneville Power Administration (BPA), P.O. Box 3621, Portland, Oregon 97208. The report consists of three parts--an experience in use narrative by PGE, the test report from the manual index test by BPA, and a report on the ITB results by Woodward. The cover letter from PGE transmitting this combined final report notes, "In summary, we feel the evaluation proved that the Woodward Index Test Box provides an accurate, relatively simple alternative to conventional methods of completing index tests on Kaplan turbines."

Sincerely,

Lee H. Sheldon

Lee H. Sheldon
Mechanical Engineer

cc:
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Terry Bauman, Woodward, P.O. Box 287, Stevens Point, Wisconsin 54481-0287
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