Section 3
Project Operation

3.1 River Coordination

The Yadkin Pee Dee River Project has been continuously operated since 1928. It is operated to provide peaking, load-following, and system control services. Progress Energy operates the Project in coordination with flow releases provided by the upstream Yadkin Project. Daily operation of the two power stations is managed to comply with reservoir level requirements based on inflows. In addition, Progress Energy is required by its FERC license to provide continuous releases from the Tillery and Blewett Falls Developments of no less than 40 cfs and 150 cfs, respectively.

The FERC license for the Project states that the operation of the Tillery and Blewett Falls facilities and the upstream Yadkin Project should be "coordinated to the greatest extent compatible with the several and distinct purposes for which the two projects are designed and operated." APGI's Yadkin Project consists of four developments: High Rock, Tuckertown, Narrows, and Falls. In general, High Rock Lake and Narrows are operated in a store-and-release mode, and Tuckertown and Falls are operated primarily as run-of-river developments. However, Tuckertown has the ability to fluctuate water elevations up to three feet, and Falls is operated with a maximum daily fluctuation of three to four feet. High Rock Lake serves as the principal water storage and regulation facility for the lower Yadkin Pee Dee River (APGI 2002).

The Tillery Development is designed to be operated to meet peaking, load-following, and system support needs, whereas the Blewett Falls Development, downstream of Tillery, is operated as a peaking facility with "block loading". Tillery and Blewett Falls are operated in an integrated fashion. The peaking operation at Tillery allows Progress Energy to provide electricity at periods of peak demand when its ratepayers need it most. In addition, because of its critical load-following ability, Tillery is used to adjust to rapid changes in system needs and local transfers of power between control areas. This type of operation can result in relatively rapid changes in discharge from Tillery. Blewett Falls is operated as a "block loaded" facility, meaning that the units are either operating at best efficiency or are off. Importantly, Blewett Falls acts to re-

regulate discharges from Tillery, thereby reducing the magnitude of flow fluctuations downstream of Blewett Falls. The maximum turbine hydraulic capacity is 17,700 cfs at Tillery and 9,200 cfs at Blewett Falls. This difference in hydraulic capacity is indicative of the importance of the peaking and load-following capability of Tillery, and it also underscores the need for close coordination between the two developments for flow management purposes.

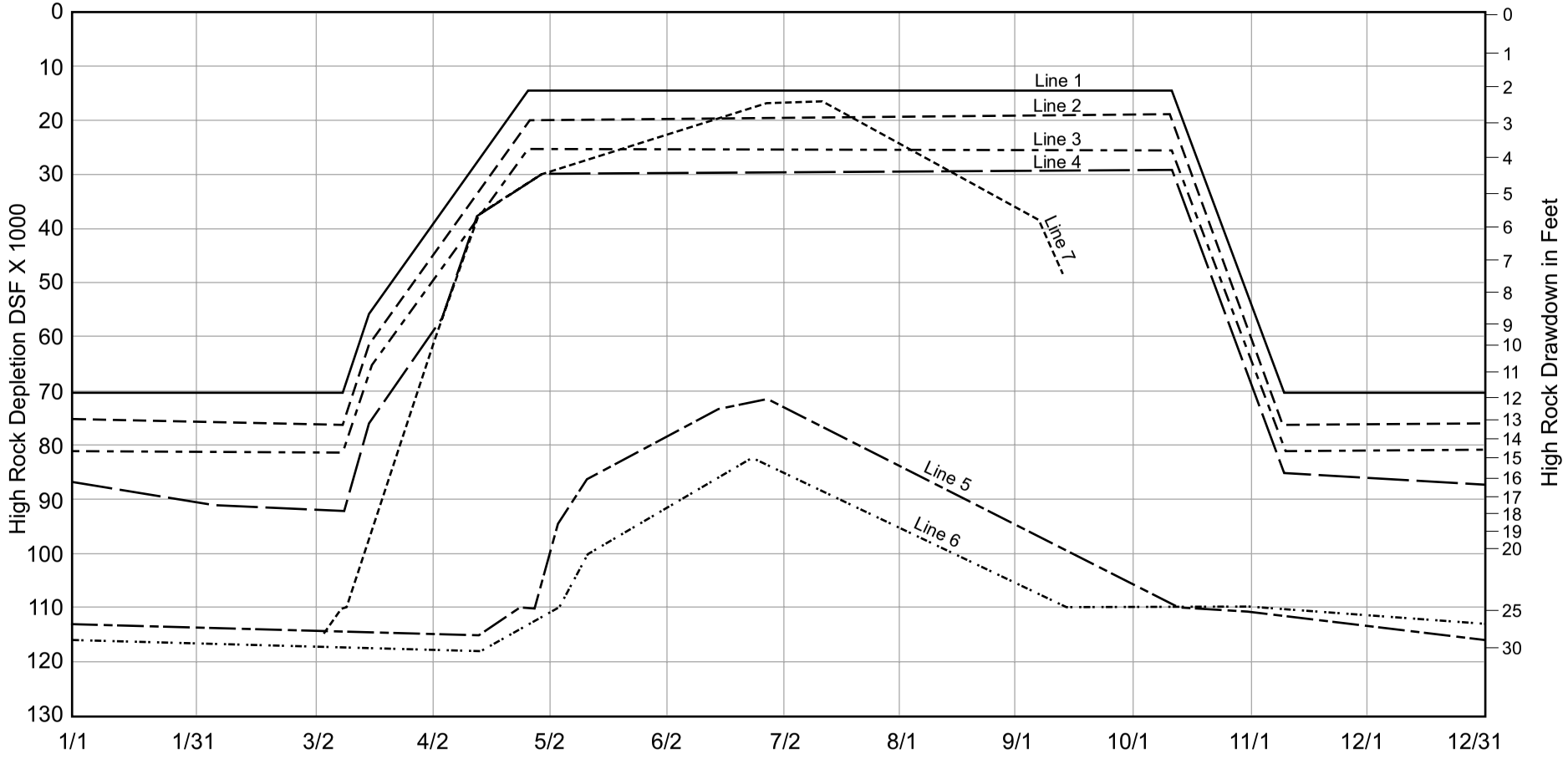
Progress Energy's operations are affected by the operation and management of the Yadkin Project. In accordance with Article 29 of the Yadkin Project's FERC license, the Yadkin Project must be operated in a manner that allows Progress Energy to meet its continuous flow requirements. Yadkin's seasonal operations are in accordance with a rule curve developed to manage water surface elevations at High Rock Lake. The rule curve, referred to as "Yadkin's Operating Guides for Operation of Badin Works", is provided in Figure 3-1. A FERC Order Amending License issued in March 1968 (39 FPC 397) also requires Yadkin to maintain a recreational pool for High Rock Lake. Under normal and dry conditions, this rule curve governs the general level of inflows into Narrows Reservoir and subsequently into Lake Tillery.

3.2 Dam and Reservoir Operation

3.2.1 Tillery Reservoir

The inflows into the Tillery Development consists primarily of the outflow from APGI's Falls Development coupled with inflow from the Uwharrie River. APGI provides information to Progress Energy on expected daily plant generation and discharge. Specific information is also provided by APGI on water levels at and inflows to High Rock Lake.

Progress Energy's license allows drawdowns at Lake Tillery of up to 22 ft below full pond. Over the past several years, Progress Energy has voluntarily made its best efforts to operate Lake Tillery within a four-foot range under normal conditions, and much of the time operates within a two-foot range except during times of maintenance. During periods of maintenance, Progress



Rule 1: HW > Line 1 (or expected to be in following wk), generate 32,088 mhw/wk maximum.
Rule 2: Line 2 < HW < Line 1, generate 27,133 mhw/wk maximum.
Rule 3: Line 3 < HW < Line 2, generate 21,583 mhw/wk maximum.
Rule 4: Line 4 < HW < Line 3, generate 16,044 mhw/wk maximum.
Rule 5: Line 5 < HW < Line 4, generate 11,084 mhw/wk maximum.
Rule 6: Line 6 < HW < Line 5, generate 8,522 mhw/wk maximum.
Rule 7: 625' < HW < Line 6, generate 6000 mhw/wk (sustaining avg. min. release of 1800 cfs/wk).
Rule 8: HW < Line 7, limit disch. to 1500 cfs (Mar 6 - May 13); limit disch. to 1610 cfs (May 14 - Jul 29); limit disch. to 1400 cfs (Jul 30 - Sep 15).

Note: Rule 8 governs all other rules during applicable months.

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Figure 3-1
High Rock Development
Operating Guide

Source: APGI 2002

Energy draws Lake Tillery down approximately 12 ft. There is also an informal agreement with the NCWRC to maintain Lake Tillery levels during the period of April 15 to May 15 within approximately one foot of full pond to facilitate largemouth bass spawning. There are also two water withdrawals from the Tillery reservoir, one for the town of Norwood and one for Montgomery County. The intakes are located at least 20 ft below the normal maximum pond level, but operational problems can be experienced when lake levels drop by as little as six to eight feet.

Outflows from the Tillery Development flow into Blewett Falls Lake after passing through a 17-mile reach of the Pee Dee River. Under normal operating conditions, it takes approximately eight hours for releases from the Tillery Development to be observed at the Blewett Falls powerhouse.

3.2.2 Blewett Falls Reservoir

The Blewett Falls Development is operated in coordination with the upstream Tillery Development. The normal operation of the Blewett Falls Lake results in a daily drawdown of approximately two to three feet below the normal maximum operating level of 177.2 ft. The drawdown provides the storage capacity needed to regulate flows from the Tillery Development. The Blewett Falls turbine-generator units normally begin operation at the same time that the Tillery Plant begins generation. Due to the travel time from Tillery to Blewett Falls, Blewett Falls Lake is drawn down approximately two to three feet. Generation at Blewett Falls is usually stopped by midnight, allowing the reservoir to refill. This operating method provides power during the day when there is a higher demand for electricity, while it reduces spilling as much as possible. The difference in hydraulic capacity between Tillery and the Blewett Falls Development would result in significant spill at Blewett Falls if storage capacity was not provided.

As stated previously, there are two municipal water withdrawals from Blewett Falls Lake; Anson and Richmond Counties. Operation of Blewett Falls must consider the potential impact to these water intakes.

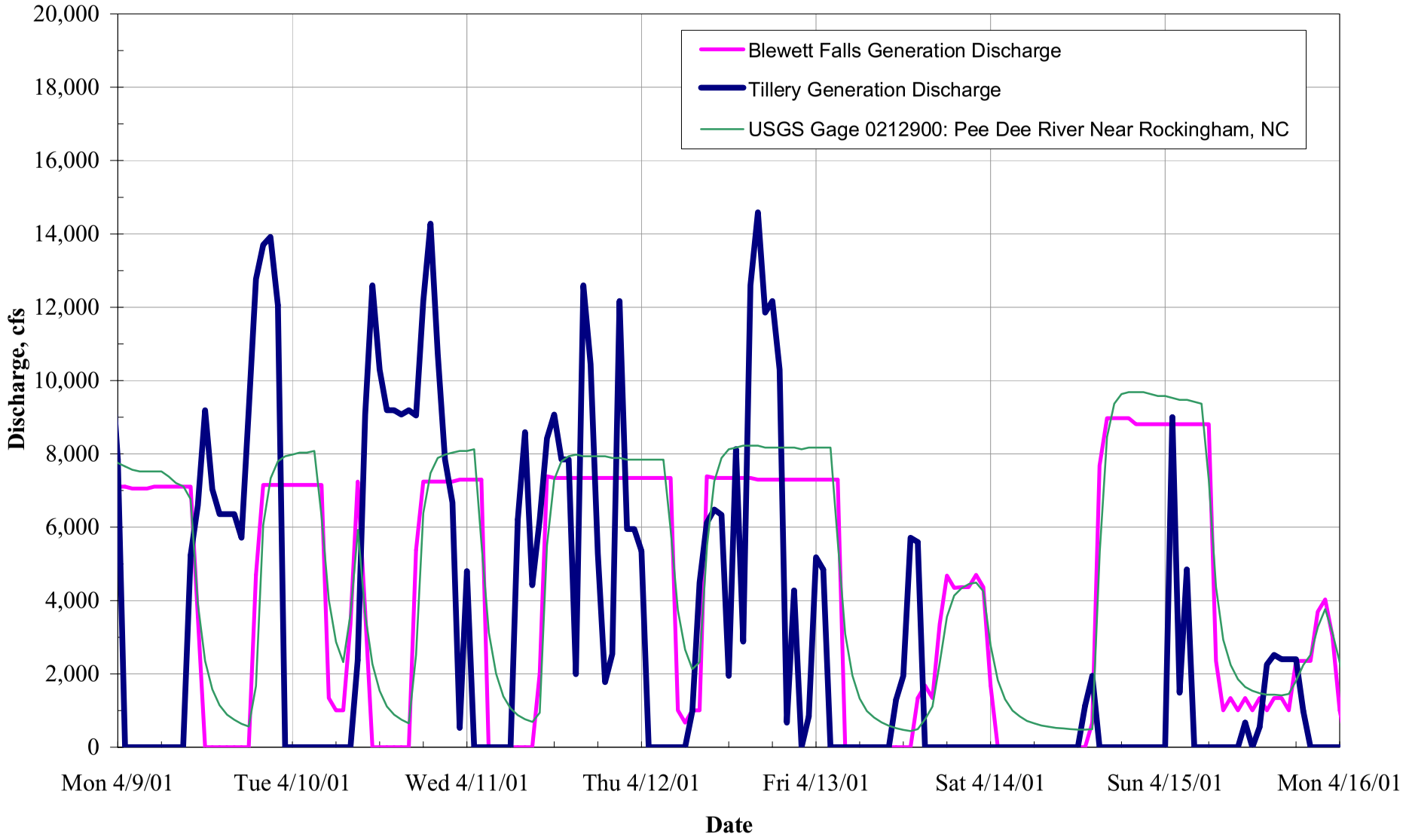
3.2.3 Description of Power Operations

The Tillery Development is operated as a peaking and load-following resource. Typical operation includes daily (weekday) generation and load-following during hours of peak demand with scheduling and output varying seasonally, based on peak electrical demand and water availability.

The Blewett Falls Development is operated as a "block-loaded" facility, meaning the units are either operated at best efficiency or are off. The hydraulic capacity of Blewett Falls is significantly less than Tillery; therefore, the Blewett Falls Development must anticipate flows from Tillery generation and begin generating in advance of flows reaching the lake. This can result in a daily reservoir fluctuation of up to three feet. This also serves as a means to re-regulate peaking flows from Tillery using the Blewett Falls Lake storage to reduce discharge fluctuations and minimize spill at the dam. This operation is consistent year-round and varies only with seasonal availability of water. An example of the discharge cycle from the Tillery and Blewett Falls Developments for a one-week period during April 2001 is presented in Figure 3-2.

3.2.4 Description of Non-Power Operations

Periodic maintenance may require the lowering of the reservoir levels at both developments. At Tillery, the drawdowns are associated with the maintenance of the steel spillway gates, repairs to the powerhouse intake trash rack filter system or repairs to the upstream slope of the earthen embankment. Drawdowns required at the Blewett Falls Development are similar to Tillery except the most frequent maintenance requirement is to service the wooden flashboards atop the spillway. During periods of high inflow, damage to these flashboards may occur and repairs require that the lake be drawn down about four to five feet to safely perform the necessary maintenance.



Note: Figure only depicts flows used for generation, it does not incldue continuous releases or leakage.

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Figure 3-2
Tillery and Blewett Falls Developments
Example of Hourly Generation Discharges

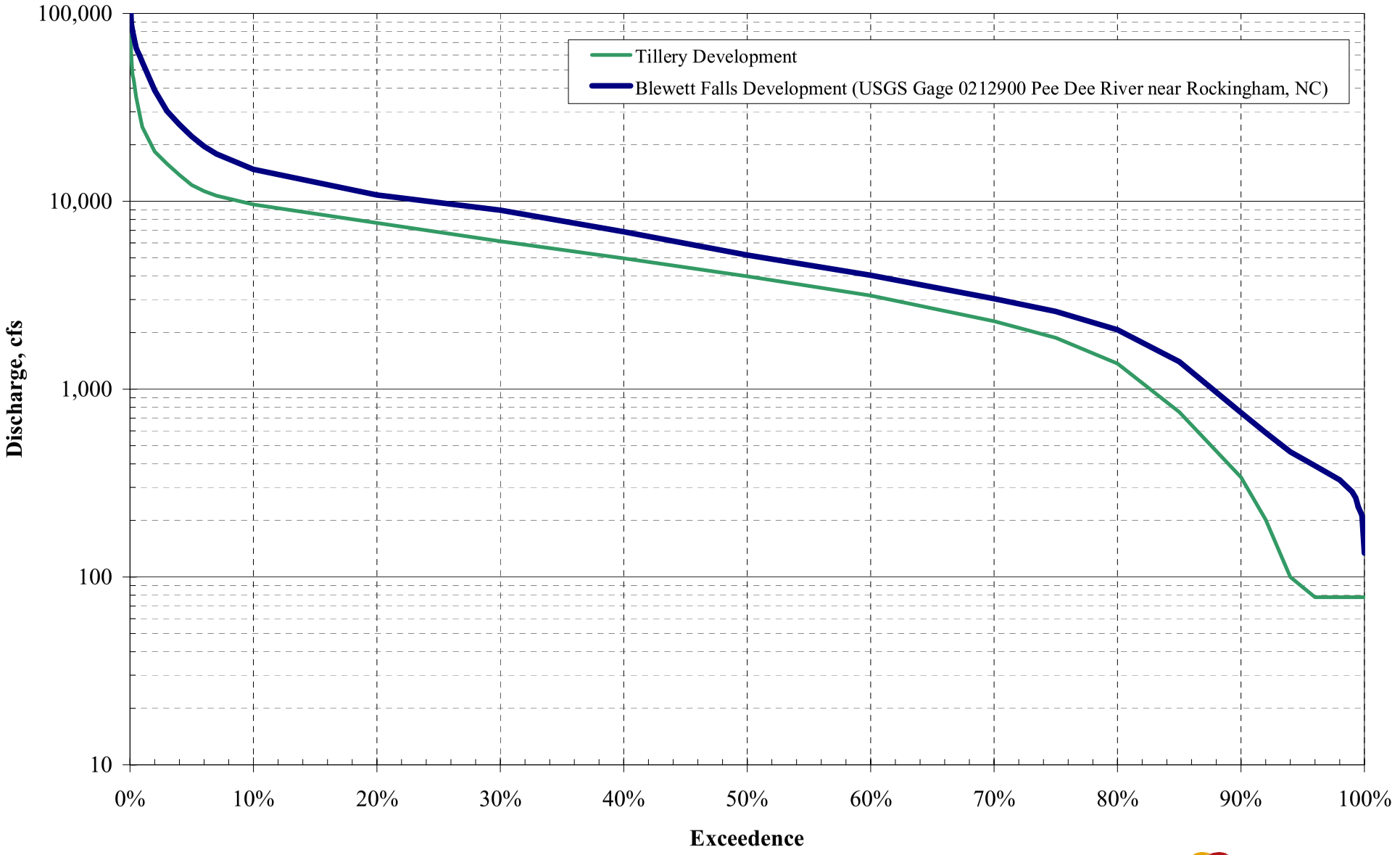
A continuous release of at least 40 cfs is maintained at Tillery, and a continuous release of at least 150 cfs is maintained at Blewett Falls[4].

3.2.5 Project Flow Rates and Flow Duration Data

The long-term (1928 to 2001) average annual flow at the USGS Rockingham, North Carolina, gage located just downstream of the Blewett Falls Development is 7,943 cfs. The mean daily flow over the period 1984 to 2001 from the Tillery Development is 5,029 cfs and 7,078 cfs at Blewett Falls[4]. Annual flow duration curves for each development are provided in Figure 3-3; monthly flow duration curves for each development are provided in Appendix B, and mean daily discharge data by month are presented in Figure 3-4.

In 2002, large portions of North Carolina and South Carolina continued to experience extreme drought conditions that have been occurring since 1998. The Yadkin-Pee Dee River Basin reached "exceptional drought" classification, the most serious category, in the summer of 2002. These extreme drought conditions jeopardized the traditional uses of the river including public and private water supplies, power generation, and recreation. To respond to the public health and safety concerns that had arisen as a result of the drought, Progress Energy worked proactively with water resource authorities from both states, as well as APGI, to collaboratively develop a water release protocol for the coordinated operation of both Progress Energy's and APGI's hydroelectric projects. Progress Energy agreed to release a daily average flow of 900 cfs as measured at the USGS Rockingham gage. This release was sufficient to meet the needs of downstream users located on the lower Pee Dee River in South Carolina during this extreme period of drought. These users had been effected not only by the drought conditions in the mainstem Pee Dee River but also by the reduction in tributary flows into the Pee Dee River, which had been severely reduced or eliminated due to the drought conditions. Progress Energy also agreed, as described in the "Emergency Drought Management Protocol", to continue release of the 900 cfs until the parties agree that the drought has passed or March 6, 2003, whichever comes first (Refer to Appendix C).

[4] As recorded at USGS gage 02129000 near Rockingham, North Carolina.



Period of Analysis: 1984-2001

Tillery Development flow based on daily "Net Discharge" data plus the average leakage flow, 78 cfs. Average leakage flow is based on 10 USGS measurements from 1978 to 2001, taken below Tillery Dam with the gates closed and all units off line. Blewett Falls Development flows are based on daily flows from the USGS Gage 0212900 Pee Dee River near Rockingham, NC. USGS gage mean daily flows less than 150 cfs were recorded on 5 days from 1984 to 2001.

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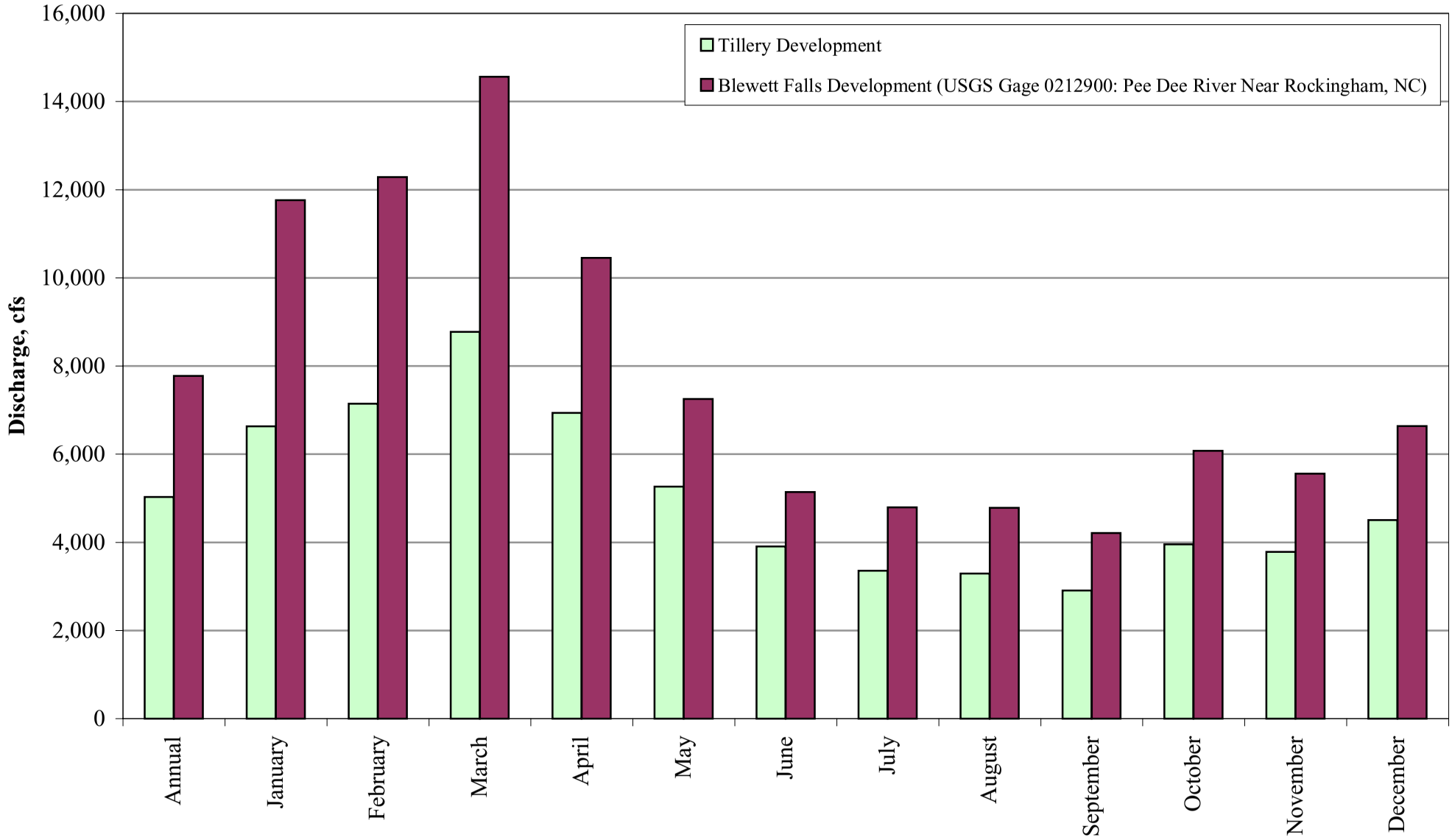
Figure 3-3
Tillery and Blewett Falls Developments
Annual Flow Duration Curve



Period of Analysis: 1984-2001

Tillery Development flow based on daily "Net Discharge" data plus the average leakage flow, 78 cfs. Average leakage flow is based on 10 USGS measurements from 1978 to 2001, taken below Tillery Dam with the gates closed and all units off line. Blewett Falls Development flows are based on daily flows from the USGS Gage 0212900 Pee Dee River near Rockingham, NC. USGS gage mean daily flows less than 150 cfs were recorded on 5 days from 1984 to 2001.

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Figure 3-4

Tillery and Blewett Falls Developments

Mean Daily Discharges by Month, 1984-2001

3.2.6 Project Operations Model

Progress Energy has developed an operations model to evaluate various equipment upgrade alternatives for the Project. CHEOPS^{tm} is a computer-based simulation model, which allows for evaluation of operational changes and physical modifications at individual and multiple-development hydroelectric projects. Progress Energy has developed the model using historic data from both the Tillery and Blewett Falls Developments. Progress Energy intends to utilize this model throughout the licensing process as needed to assess options for project operations that arise during consultation.