Appendix E

Hourly Spill and Flow and Daily Average of High 12 Hour % TDG Data

(2008 FOP Implementation Status Monthly Reports to the US District Court)

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
April 2008

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the February 25, 2008 court order adopting the 2008 Fish Operations Plan (FOP) and requiring the Corps to provide monthly reports on the implementation of the 2008 FOP. The FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. To the extent hydro-power operations are not specified in the 2008 FOP, the FCRPS operations will be consistent with the operations considered in the 2004 Biological Opinion and/or other operative documents, which include the 2008 Water Management Plan (WMP) and 2008 Fish Passage Plan (FPP).

The Corps' lower Columbia and Snake River projects and fish passage operations identified in the FOP for the month of April 2008 are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (TDG) for the tailwater at each project and for the next project's forebay downstream.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the spill program for the month of April 2008.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per week in April displaying the performance of the spill program as follows:

(A). Daily Average of the High 12 Hourly % TDG Values - described in the upper graph.
(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on April 3 and end on May 4 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start on Monday 0100 hours through Monday 0100 hours for the following dates:

April 3 – April 6	Figures 1 - 4
April 7 – April 13	Figures 5 – 12
April 14 – April 20	Figures 13 - 20
April 21 – April 27	Figures 21 – 28
April 28 – May 4	Figures 29 – 36

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours as the result of spill from the dam. The objective is to operate each project up to the TDG limits without exceeding those limits if practicable.

- The blue line on the graph represents the TDG in the tailrace of the dam. 120% TDG is the upper operating limit.
- The green line represents the TDG in the forebay of the next dam downstream. 115% is the upper operating limit.

B. Lower Graph: Represents the flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2008 FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Ice Harbor (15.2 kcfs) and Bonneville (50 kcfs) dams.

The hourly target spill may vary as a function of quantity of river flow, forebay elevation and generating units available at a project.

II. A monthly percent TDG Table is included at the end of the figures that shows the overall daily results of the average percent TDG for the 12 highest hours for all projects. The numbers in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

Please note that for all projects that spill for fish passage, the target spill may be limited to a lesser quantity (i.e. the spill cap), with the objective of staying within the TDG state waiver limits. When spill levels briefly deviated below or above the level described in the

FOP, the heavy red line will be below or above the heavy black line in the graphs. Whenever the operation varied from the target spill during voluntary spill hours, or other anomalies occurred, these instances are described below. The FOP Spill Report Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the FOP Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the FOP level of spill while also avoiding exceeding the spill cap.

"Low flow" operations on Lower Columbia and Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects operate at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour. During these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percent of the total flow than it had been during higher flows. As a result, even though the spill volume remained the same, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock. These variances are recorded in the FOP Spill Report Table below for Little Goose under the variance type “Navigation.” This spring the John Day and The Dalles projects also had “Navigation” variances due to low flows on the Lower Columbia River.

Also note that actual spill levels at Bonneville Dam may range from 1 to 3 kcfs lower or higher than specified in the 2008 FOP. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2008 FOP describes project operations during “load swing hours” (page 8). For reporting purposes, the notation “Transmission Stability” in the FOP Spill Report Table will replace “load swing hour” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly

changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours On the days cited in the Table, the 24 hour average spill was within the FOP level of +/- 1% of the target spill.

Occurrences which required an adjustment in operations and regional coordination are described in greater detail in the section below entitled "April Operational Adjustments Report."

April Operations:

The month of April was characterized by below average flows on the lower Snake River and on the lower Columbia River. Lower flows in the Lower Columbia and Snake Rivers are the result of a combination of below normal precipitation for the month of April and cooler atmospheric temperatures that have prevented significant melting of snow pack, delaying the anticipated freshet. In accordance with the FOP, spring spill operations commenced on April 3rd at 0001 hours for the Corps' lower Snake projects and on April 10 at 0001 hours for the lower Columbia projects. During the April reporting period, the daily spill operations were carried out as follows:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs for 24 hours
- Little Goose Dam - the target spill was 30% of the total flow for 24 hours
- Lower Monumental Dam - the hourly target spill was to the spill cap for 24 hours
- Ice Harbor Dam – the hourly target spill was to 45 kcfs day/spill cap night and is shown as the heavy black line on the graph
- McNary Dam – the target spill was 40% of the total flow for 24 hours
- John Day Dam – the hourly target spill was 0 kcfs day/60% night
- The Dalles Dam - the target spill was 40% of total flow for 24 hours
- Bonneville Dam - the hourly target spill was a fixed quantity of approximately 100 kcfs 24 hours per day

April Operational Adjustments Report:

1. Juvenile transportation research operations (one time/week) began at Lower Granite Dam on April 9. Fish collection for routine transport began at Lower Granite on May 1.

2. At Little Goose Dam, a three treatment (3 varying spill patterns) adult salmon passage study began on April 3, 2008 and will continue until the end of spill operations on August 31, 2008. In addition, at the request of the salmon managers, a 14 day spring spill to the spill cap operation to facilitate juvenile salmonid passage was initiated on April 25, 2008 and will continue until May 9, 2008. This operation consists of spilling to the spill cap at night (1800 to 0600 hours) and continuing with the daytime (0600-1800 hours) spill of 30% of total project outflow up to the spill cap.

3. At Lower Monumental Dam, from 4:00 p.m. April 18 to 10:00 pm on April 20 and again from 4:00 p.m. to 10:00 p.m. on April 21, the requested spill cap level of 27.0 kcfs was not achievable because the spill gate stops are fixed at either 25.3 kcfs or 28.7 kcfs. The project operator set the stops to achieve the 25.3 kcfs spill level so as not to exceed the spill cap. Therefore in the attached plots, there is a slight difference between the black line which represents the hourly FOP spill level requested and the red line representing the hourly flow through the spillway.

   Also, a two treatment (two varying spill patterns) spring spill test started at Lower Monumental on April 30, 2008 and will continue until June 1, 2008 to examine fish passage and survival at the project with the recently installed Removable Spillway Weir (RSW) in place.

4. At John Day Dam, zero daytime / 60% nighttime spill operations began on April 10, 2008. NOAA Fisheries requested and the TMT agreed to switching to 24-hour 30% spill beginning on April 21, 2008. This operation continued until April 29, 2008. On April 29, 2008 a two treatment (30% vs. 40% spill) juvenile salmonid passage and survival evaluation was initiated to evaluate two recently installed Temporary Spillway Weirs (TSWs) under two spill levels. This two-treatment evaluation will continue until July 18, 2008.

5. As a result of the Bonneville Dam preparing for a unit 3 outage (scheduled in the FOP, Appendix 2), minimum generation operations were occurring (~ 30 kcfs) during "low-flow" conditions, when the generation increased up to 39.4 kcfs for three hours while the spill stayed at about 76 kcfs, below the cap of 98 kcfs.

6. Other operations in the lower Snake and Columbia rivers that varied from those described in the FOP were discussed and agreed to in the Regional Forum process prior to commencement and are addressed below. Those operations coordinated with regional salmon managers were planned such that they would have the least impact to fish (also cited in the FOP Spill Report Table below).

   a. Lower Granite:
      - The RSW was taken out of service the morning of April 3, 2008 for less than one hour to remove a log that had become lodged in the spill bay. The project met the FOP spill objective of 20 kcfs during this hour.

b. Little Goose Dam:
   - During the two-week nighttime gas cap spill operation, a uniform spill pattern was used exclusively during nighttime hours from April 30, 2008 to the end of the operation on May 9, 2008, to provide better juvenile fish survival. This operation was requested by NOAA and discussed and agreed to by the salmon managers on the April 30, 2008 TMT conference call.

c. Ice Harbor Dam:
   - Spill decreased from 45 kcfs to 18.7 kcfs during 0500-1800 hours from April 7 to April 9 as a temporary spill operation to repair the RSW. This operation was requested by the Corps and was coordinated and agreed to by the salmon managers and TMT reps on April 2 and April 4.

d. McNary Dam:
   - Spill began at approximately 1600 hours on April 9, 2008 at McNary Dam; approximately eight hours earlier than specified in the FOP, due to the time required opening the TSWs.

e. Bonneville Dam:
   - On April 16 an outage occurred for the BII Corner Collector from 0700 to 1800 to install acoustic hydrophones used to evaluate the recently installed Behavioral Guidance Structure (BGS) in the forebay. This operation was coordinated and agreed to by the salmon managers during the April 9 TMT meeting. This work was scheduled to occur before the spill season; however due to a delay in hydrophone delivery, the work had to be completed after the initiation of spill.

FOP Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	4/3/2008	0100 - 0900	10	Operational Limitations	At start of spill season, hourly spill was up to 21.1 kcfs, above FOP level of 20 kcfs: spill fluctuates due to physical limits of spill gate settings.
Little Goose	Spill	4/3/2008	2300	1	Transmission Stability / Navigation	Hourly % spill dropped to 28.3% (below 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4, also lockage occurred. 24 hr avg. spill was 29.8%.
Little Goose	Spill	4/5/2008	600	1	Navigation	Hourly % spill dropped to 28.8% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 29.8%.

Little Goose	Spill	4/7/2008	1100	1	Navigation	Hourly % spill dropped to 28.3% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 29.3%.
Little Goose	Spill	4/7/2008	2300	1	Transmission Stability	Hourly % spill dropped to 28.5% (below 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 29.3%.
Little Goose	Spill	4/9/2008	0100, 1200	2	Navigation	Hourly % spill dropped to 28.4 and 28.9% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 4. 24 hr avg. spill was 30.0%.
Little Goose	Add'l Spill	4/9/2008	2300	1	Transmission Stability	Hourly % spill increased to 32.0% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 29.3%.
Little Goose	Spill	4/10/2008	0200	1	Navigation	Hourly % spill dropped to 28.8% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 29.8%.
Little Goose	Add'l Spill	4/11/2008	0700	1	Transmission Stability	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.0%.
Little Goose	Spill	4/11/2008	2200	1	Navigation	Hourly % spill dropped to 28.9% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 30.0%.
Little Goose	Spill	4/13/2008	1600	1	Navigation	Hourly % spill dropped to 28.6% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 29.9%.
Little Goose	Add'l Spill	4/15/2008	0100	1	Program Error	Hourly % spill increased to 31.2% (above 30% +/- 1% range): GDACS not updated, actual spill was correct. 24 hr avg. spill was 29.9%.
Little Goose	Add'l Spill	4/15/2008	0400	1	Navigation	Hourly % spill increased to 31.2% (above 30% +/- 1% range): Load dropped at top of hour but spill was not decreased due to operator dealing with a lockage previous hour, so percentage went up. 24 hr avg. spill was 29.9%.

Little Goose	Add'l Spill	4/16/2008	0200	1	Navigation	Hourly % spill increased to 31.3% (above 30% +/- 1% range): Load dropped at top of hour but spill was not decreased due to operator dealing with a lockage previous hour, so percentage went up. 24 hr avg. spill was 30.1%.
Little Goose	Spill	4/16/2008	1400	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 30.1%.
Little Goose	Add'l Spill	4/21/2008	2400	1	Navigation	Hourly % spill increased to 31.4% (above 30% +/- 1% range): Load dropped at top of hour but spill was not decreased due to operator dealing with a lockage previous hour, so percentage went up. 24 hr avg. spill was 30.0%.
Little Goose	Spill	5/3/2008	1600	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range): volume of water needed to empty the navigation lock for two lockages was more evident due to "low flow" operations as defined in text on page 3.
Ice Harbor	Spill	4/21-4/	0600 - 1700	48	Maintenance	Hourly spill was at 18.7 kcfs, below FOP 45 kcfs, due to temporary spill operation during RSW repair. See page 5 in text. Operation was coordinated with the salmon managers during the April 2 TMT conference call.
Ice Harbor	Spill	5/2/2008	0800	1	Navigation	Hourly % spill decreased to 28.2% (below 30% +/- 1% range): Load dropped at top of hour but spill was not decreased due to operator dealing with a lockage previous hour, so percentage went down. 24 hr avg. spill was 29.9%.
McNary	Spill	4/10/2008	0900	1	Transmission Stability	Hourly % spill dropped to 38.4% (below 40% +/- 1% range) due to on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.1%.
McNary	Add'l Spill	4/30/2008	2200	1	Transmission Stability	Hourly % spill increased to 41.4% (above 40% +/- 1% range) due to on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.0%.
John Day	Spill	4/12/2008	1400	1	Navigation	Hourly % spill dropped to 58.9% (below 60% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. Nighttime avg. spill was 59.3%.

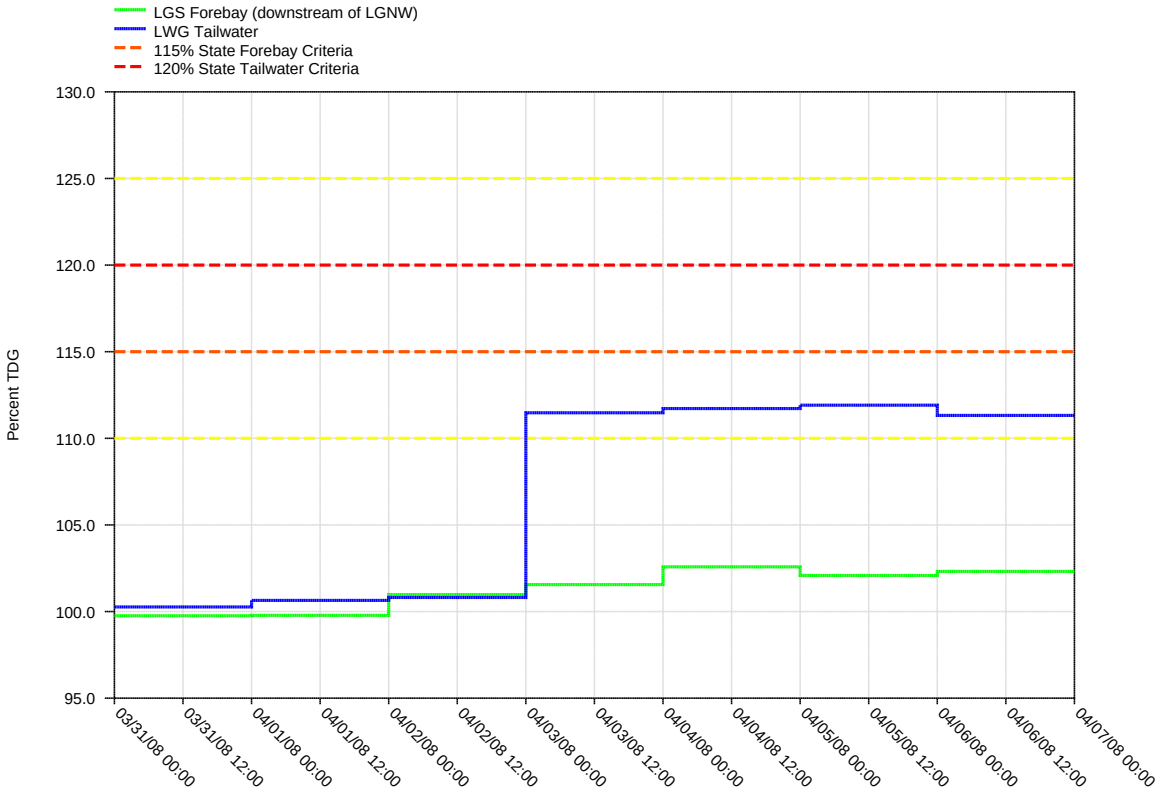
John Day	Spill	4/16/2008	0100	1	Navigation	Hourly % spill dropped to 57.8% (below 60% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. Nighttime avg. spill was 56.9%.
John Day	Spill	4/17/2008	0300	1	Navigation	Hourly % spill dropped to 55.0% (below 60% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. Nighttime avg. spill was 54.0%.
John Day	Spill	4/17/2008	0500	1	Transmission Stability	Hourly % spill decreased to 57.0% (below 60% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. Nighttime avg. spill was 54.0%.
John Day	Add'l Spill	4/22/2008	1800 - 1900	2	Transmission Stability	Hourly % spill increased to 31.1 - 35.0% (above 60% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.3%.
John Day	Spill	4/23/2008	0400	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range): volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 30.3%.
John Day	Add'l Spill	4/24/2008	0100	1	Transmission Stability	Hourly % spill increased to 31.3% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.3%
John Day	Add'l Spill	4/27/2008	1100-1200	2	Transmission Stability	Hourly % spill increased to 31.3% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.1%
John Day	Add'l Spill	4/29/2008	0500-0700	2	Transmission Stability	Hourly % spill increased to 31.3-31.8% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.5%
John Day	Add'l Spill	4/30/2008	0200	1	Transmission Stability	Hourly % spill increased to 31.5% (above 30% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 30.2%
The Dalles	Add'l Spill	4/10/2008	0200-0500	4	Operational Limitations	At start of spill season, hourly spill was up to 41.3% (above 40% +/- 1% range): spill fluctuates due to physical limits of spill gate settings. 24 hr avg. spill was 40.4%.

The Dalles	Add'l Spill	4/10/2008	0900	1	Transmission Stability	Hourly % spill increased to 41.4% (above 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.4%.
The Dalles	Spill	4/11/2008	0600	1	Transmission Stability	Hourly % spill dropped to 38.8% (below 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 39.8%.
The Dalles	Spill	4/11/2008	1300	1	Human/ Program Error	Hourly % spill dropped to 38.5% (below 40% +/- 1% range): due to improper calculation made at start of the hour. The problem was rectified when project operator realized spill was too low. 24 hr avg. spill was 39.8%.
The Dalles	Spill	4/16/2008	0200-0400	3	Operational Limitations	Hourly % spill increased to 41.2 to 41.5% (above 40% +/- 1% range): spill fluctuated due to physical limits of spill gate setting (forebay elevation increased and spill gates were not readjusted in time). 24 hr avg. spill was 40.3%.
The Dalles	Spill	4/16/2008	0700-0800	2	Transmission Stability	Hourly % spill range 38.2% to 41.5% (outside of 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.3%.
The Dalles	Add'l Spill	4/17/2008	0400, 2400	2	Transmission Stability	Hourly % spill increased to 42.7% & 41.5% (above 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.1%.
The Dalles	Add'l Spill	4/18/2008	2400	1	Transmission Stability	Hourly % spill increased to 41.2% (above 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.2%.
The Dalles	Spill	4/19/2008	2300	1	Transmission Stability	Hourly % spill dropped to 38.4% (below 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.0%.
The Dalles	Add'l Spill	4/21/2008	2000	1	Transmission Stability	Hourly % spill increased to 41.4% (above 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 40.0%.
The Dalles	Spill	4/24/2008	0100, 2200	2	Transmission Stability	Hourly % spill at 41.1 & 37.9% (outside of 40% +/- 1% range) due to the project operating on response during rapidly changing load as defined in text on page 4. 24 hr avg. spill was 39.9%.

The Dalles	Spill	4/27/2008	0900	1	Navigation	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) volume of water needed to empty the navigation lock was more evident due to "low flow" operations as defined in text on page 3. 24 hr avg. spill was 39.9%.
Bonneville	Add'l Spill	4/15/2008	1900, 2200-2400	4	Operational Limitations	Hourly spill at 98.3 - 98.9 kcfs, above 98 kcfs spill cap: spill fluctuated due to physical limits of spill gate settings.
Bonneville	Add'l Spill	4/16/2008	0100-0700	7	Operational Limitations	Hourly spill at 98.3 - 98.5 kcfs, above 98 kcfs spill cap: spill fluctuated due to physical limits of spill gate settings.
Bonneville	Spill	4/14/2008	0400-0600	3	Maintenance	Hourly spill at 75.7-76.9 kcfs (below 98 spill cap) while generation increased to 39.4 kcfs, above minimum range of 30 kcfs. Project started up Unit 3 to flush fish in preparation of scheduled outage, per FOP Appendix 2.

Figure 1.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

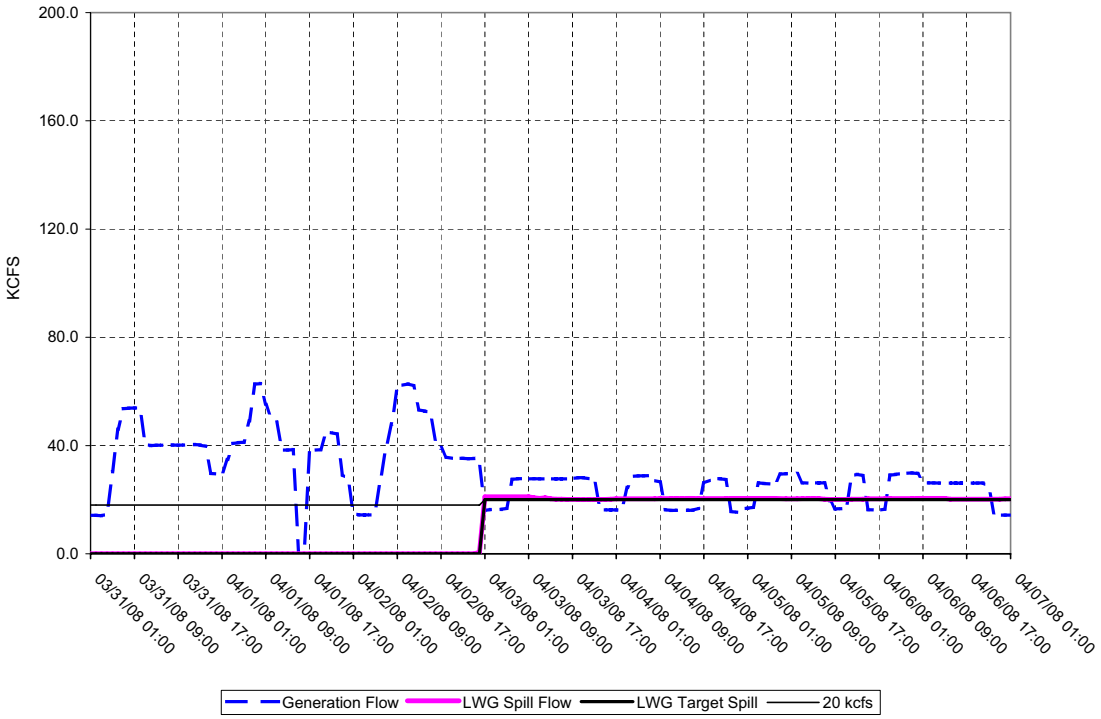
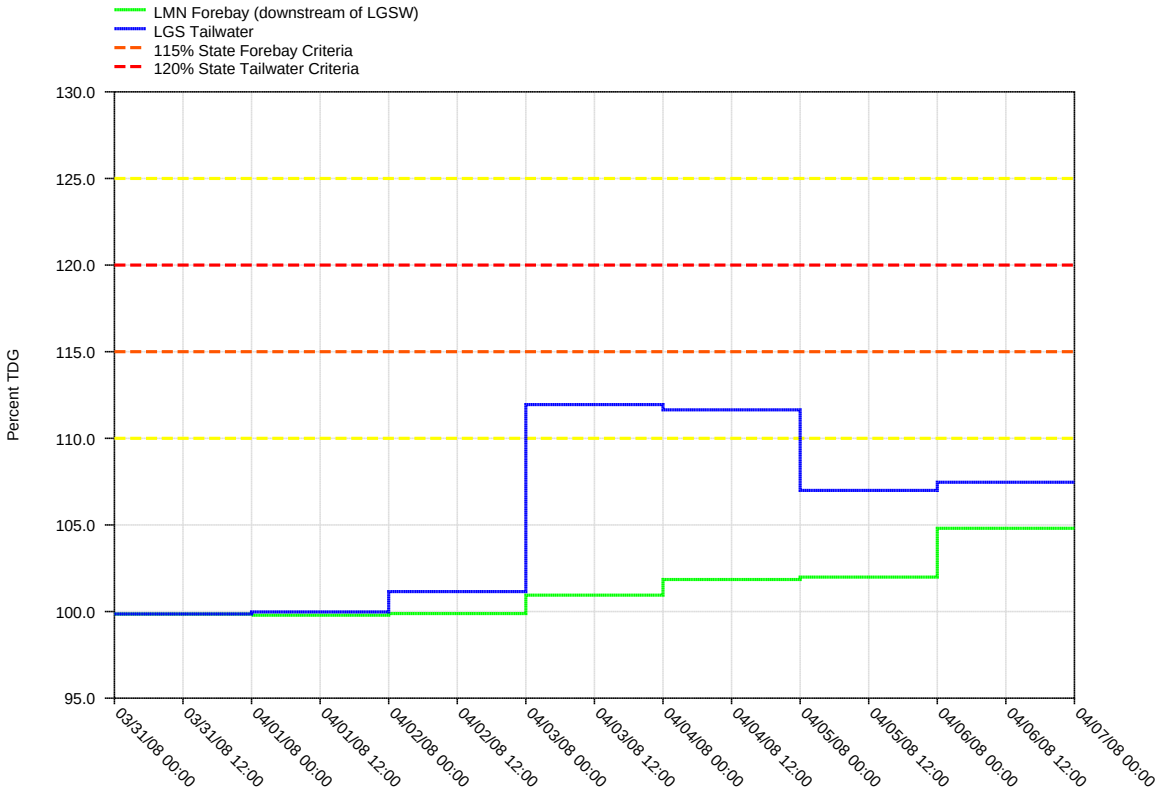


Figure 2.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

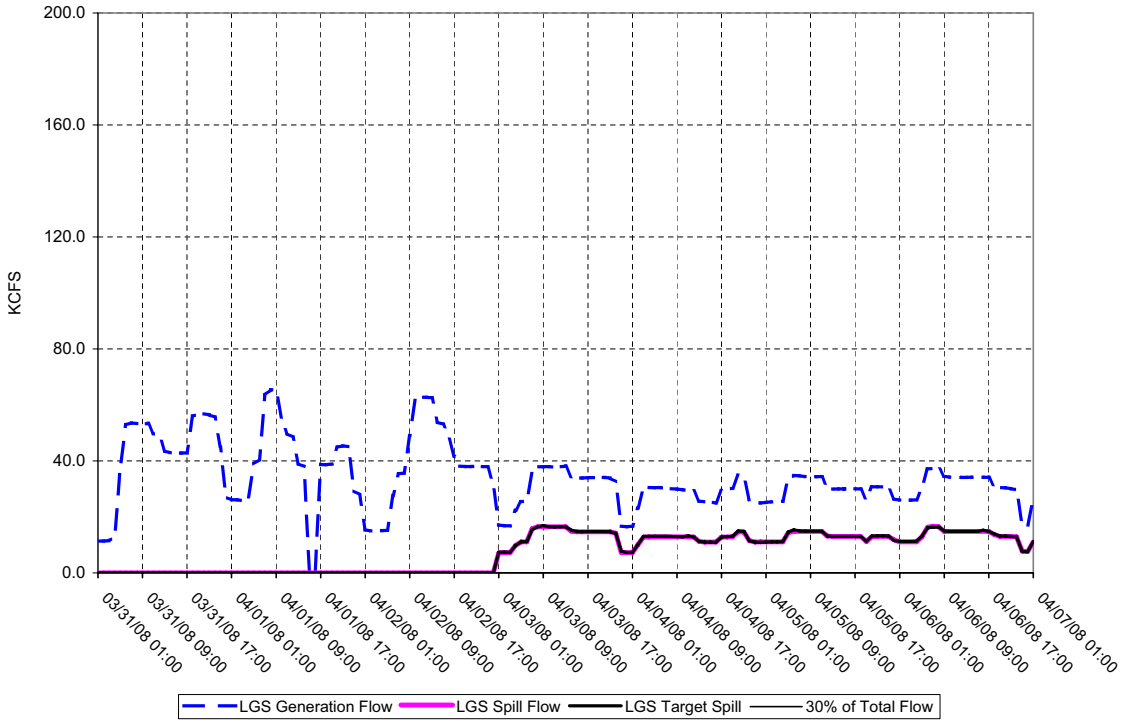
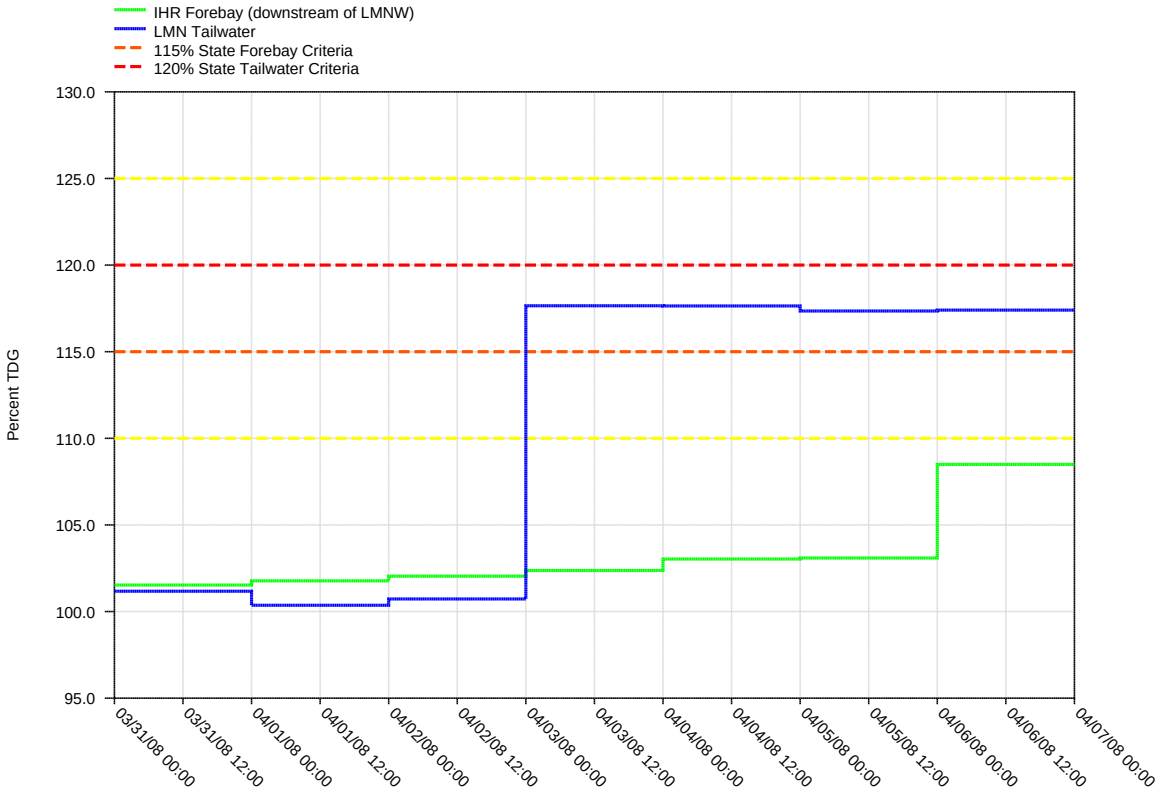


Figure 3.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

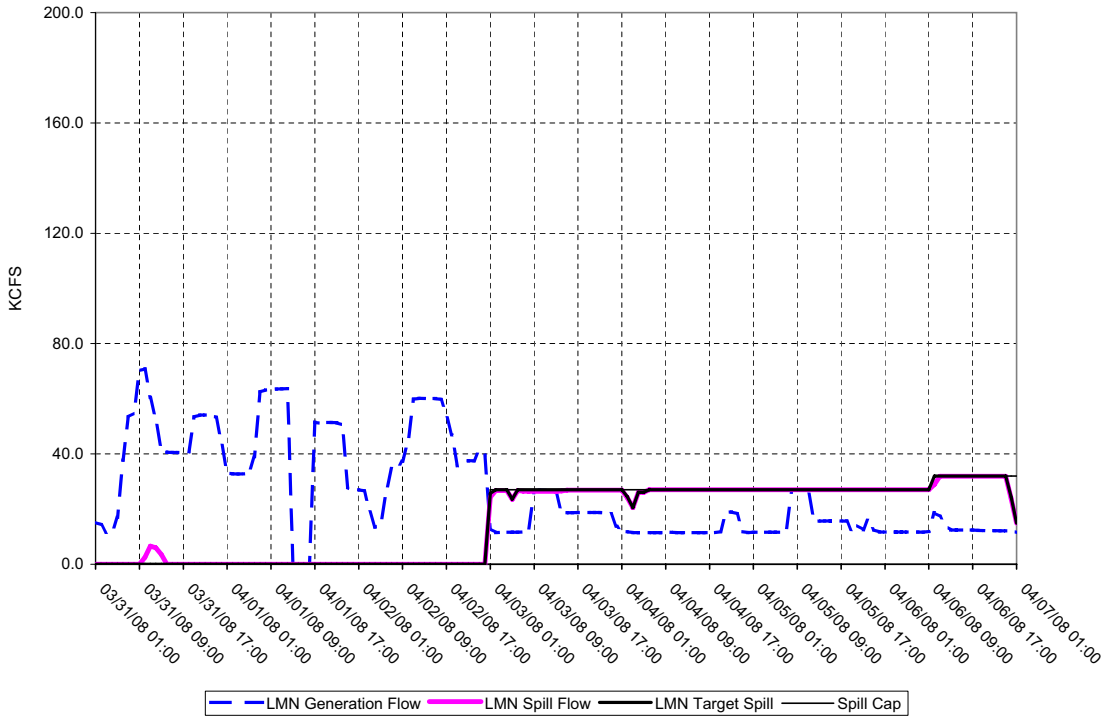
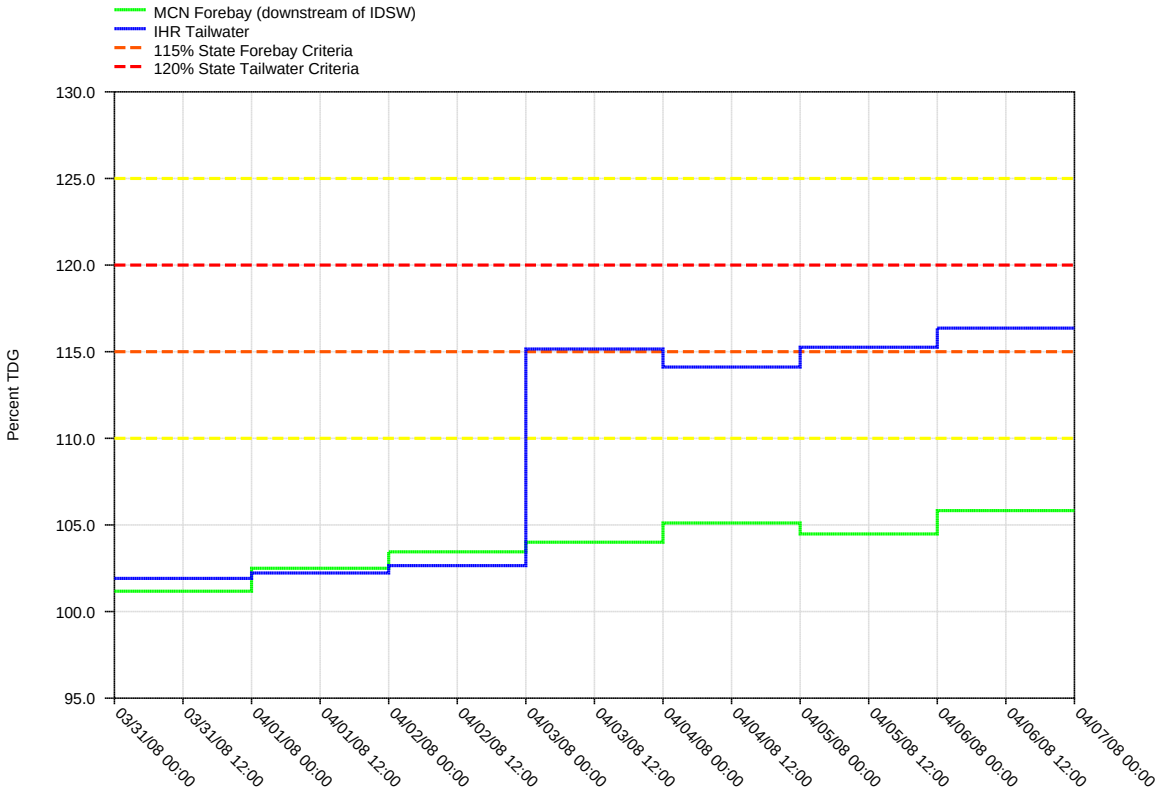


Figure 4.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

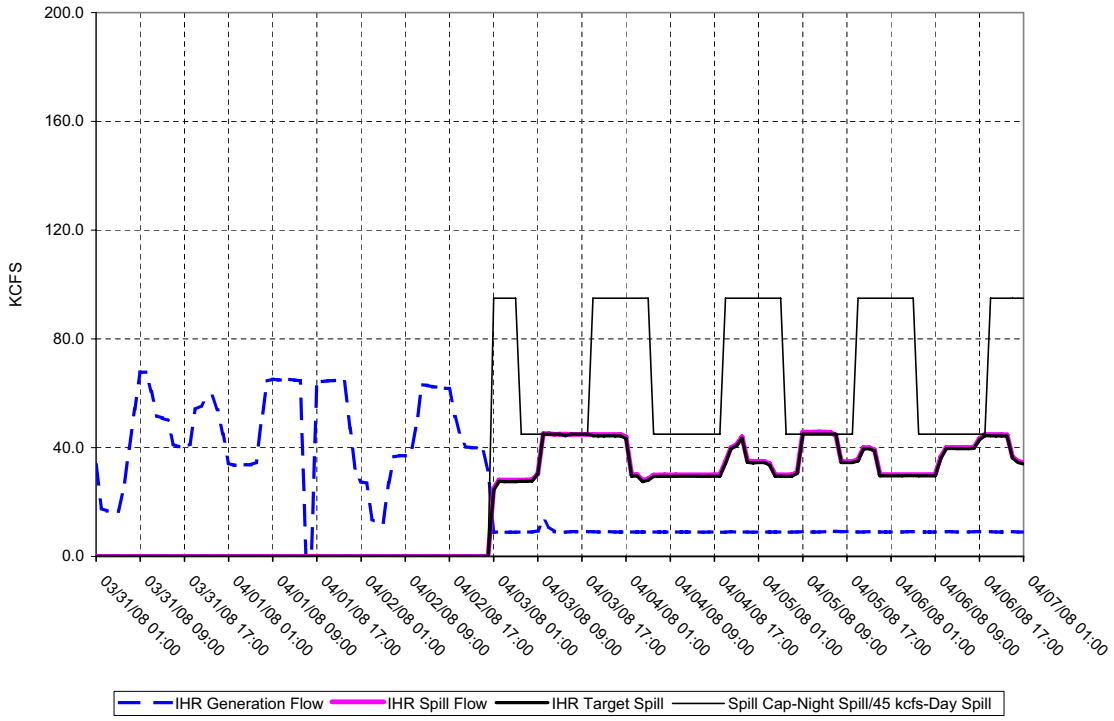
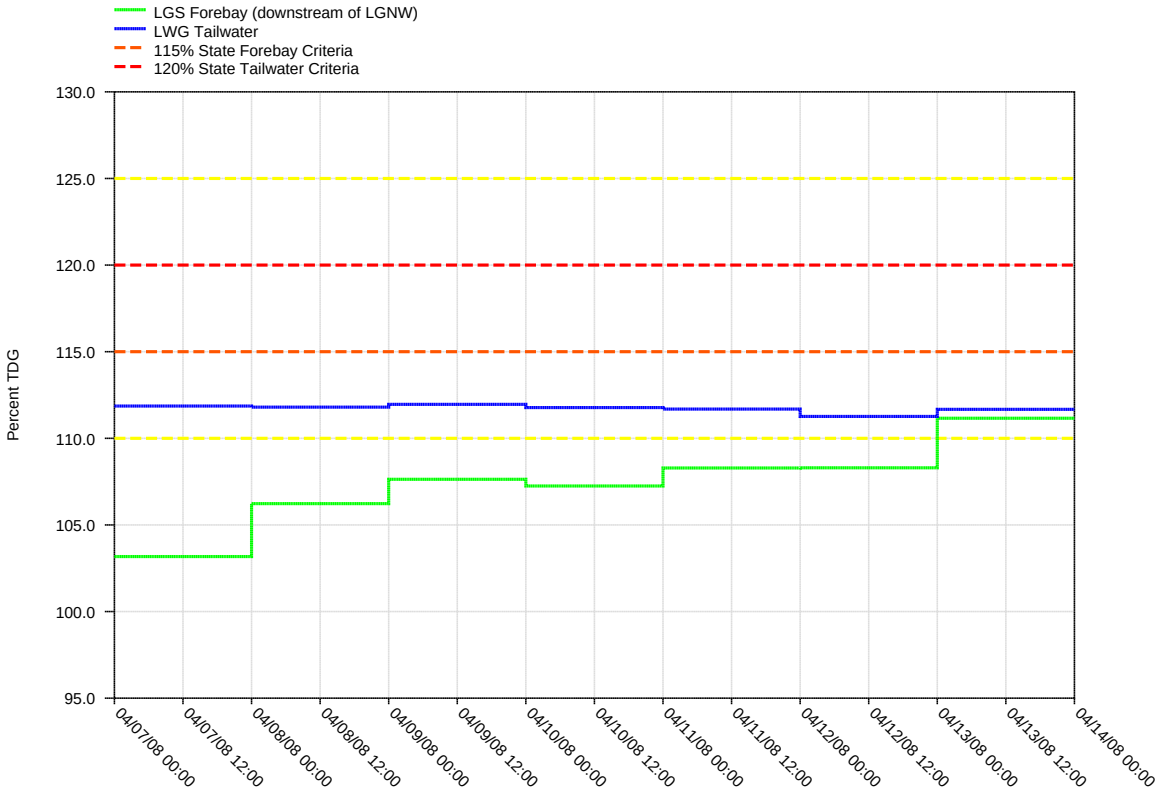


Figure 5.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

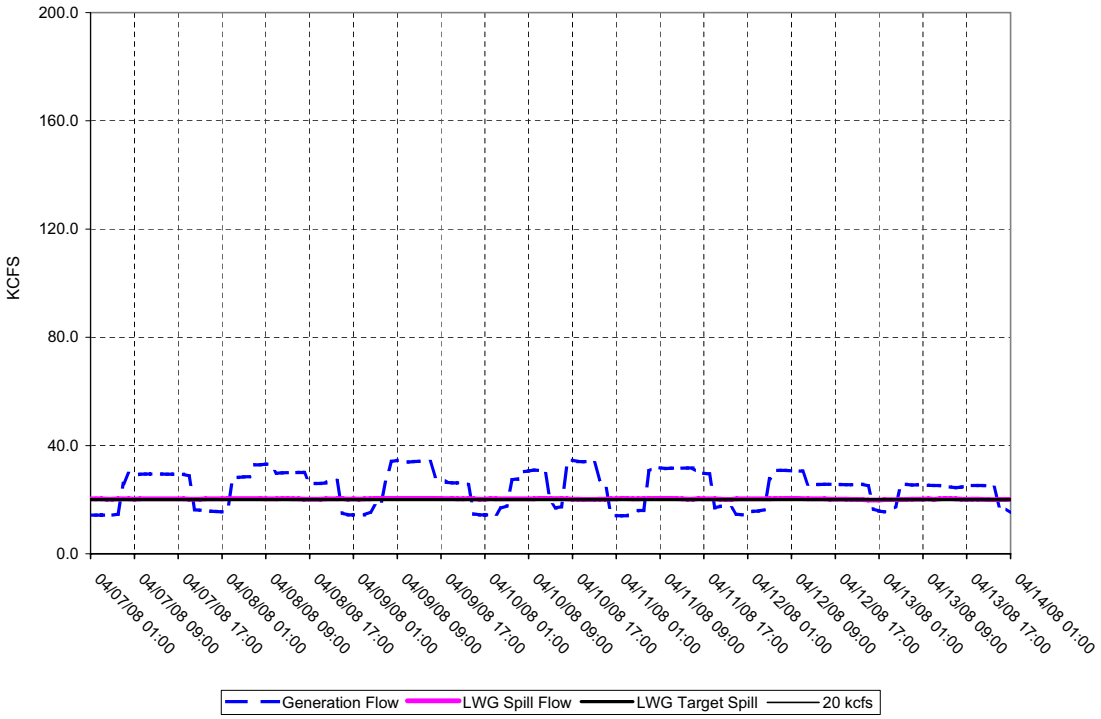
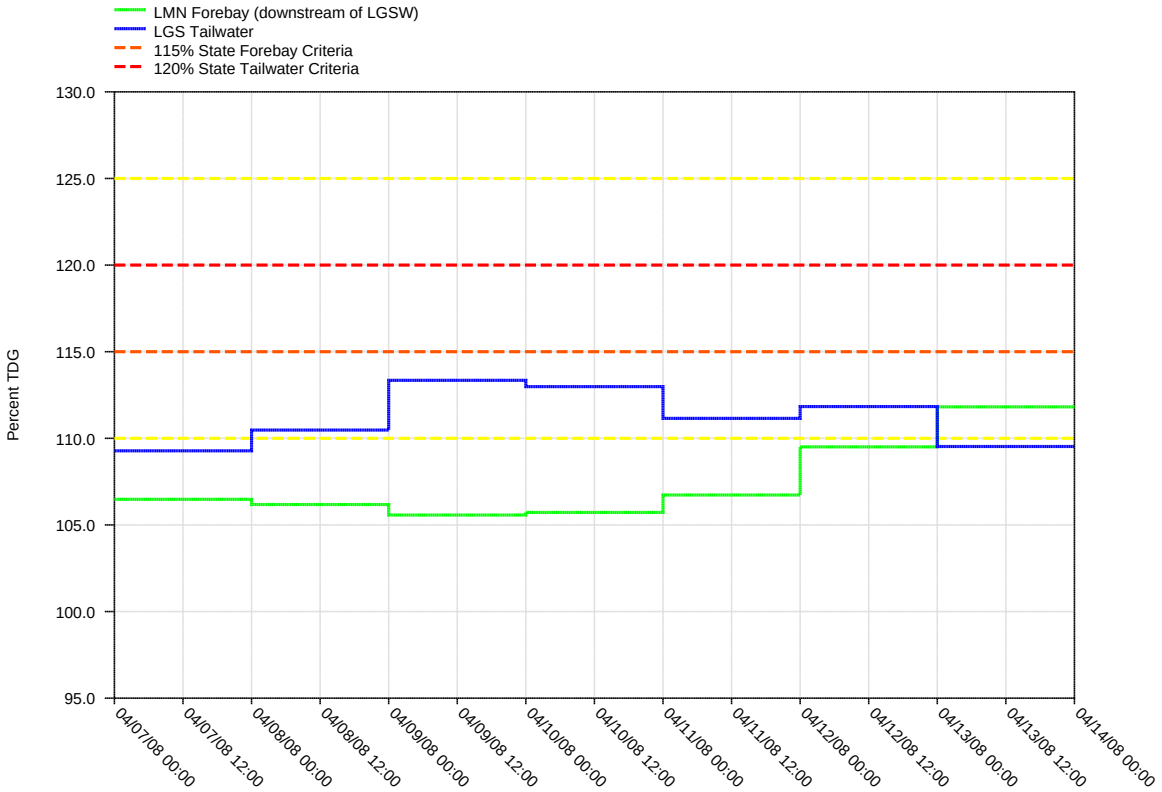


Figure 6.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

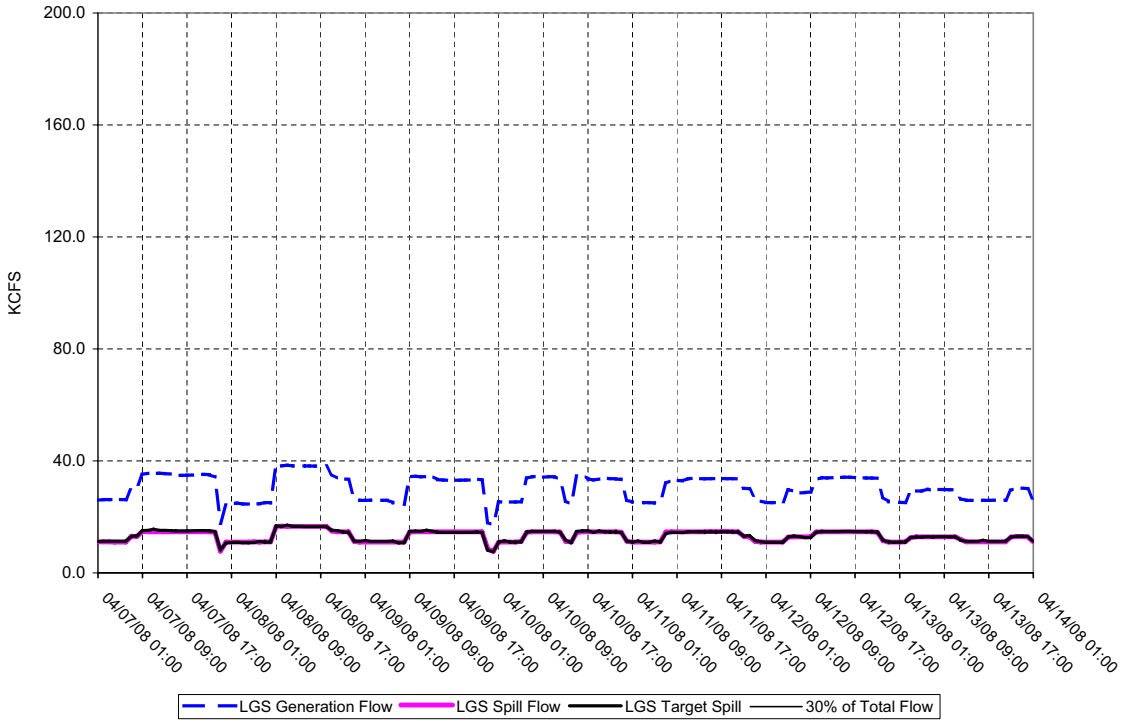
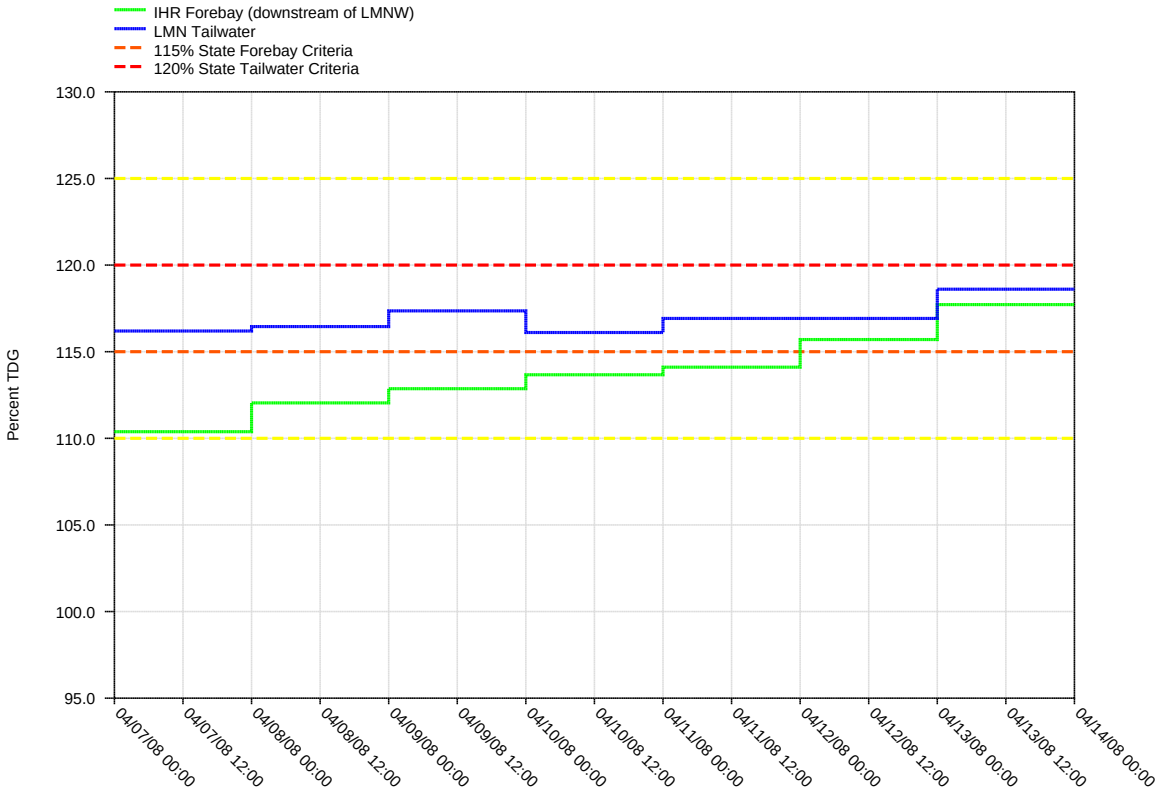


Figure 7.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

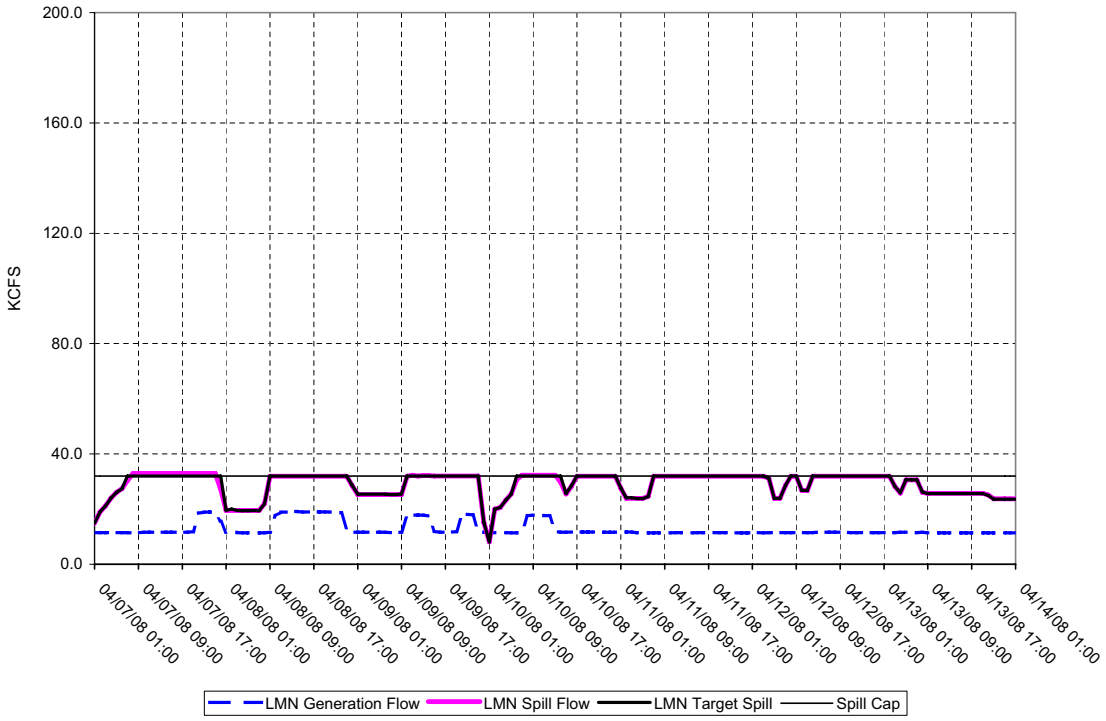
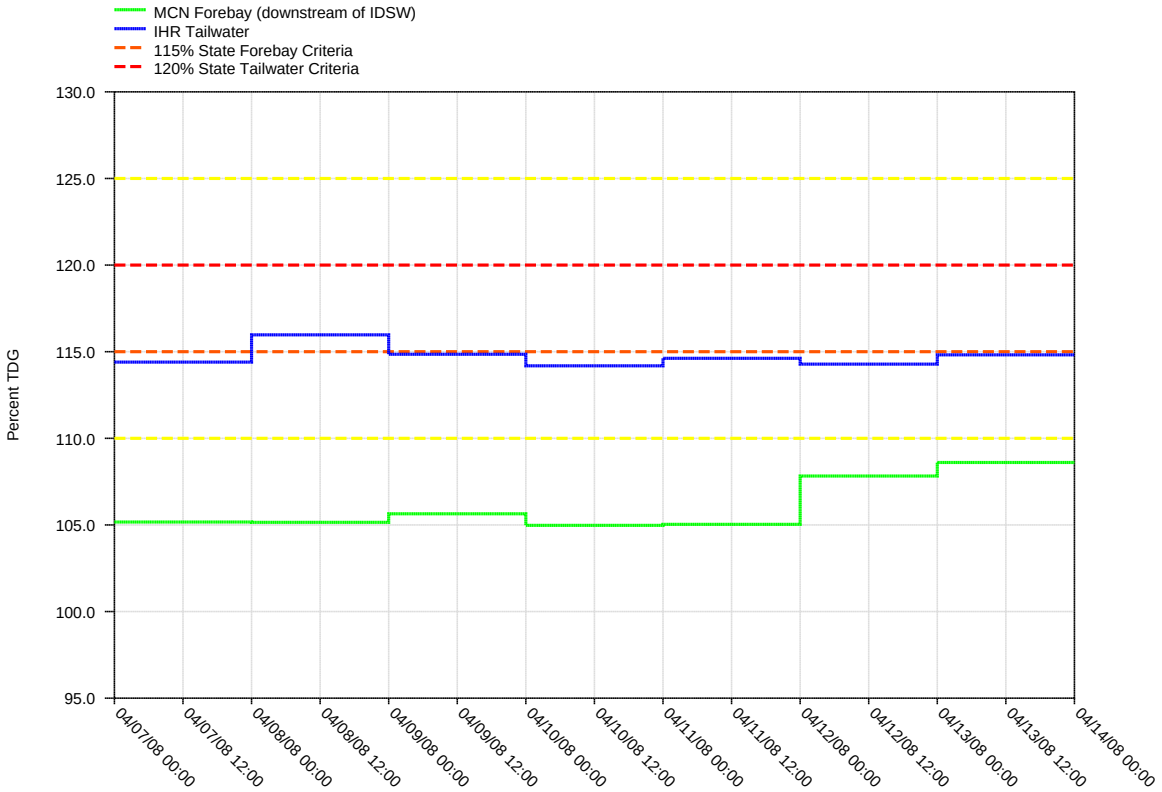


Figure 8.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

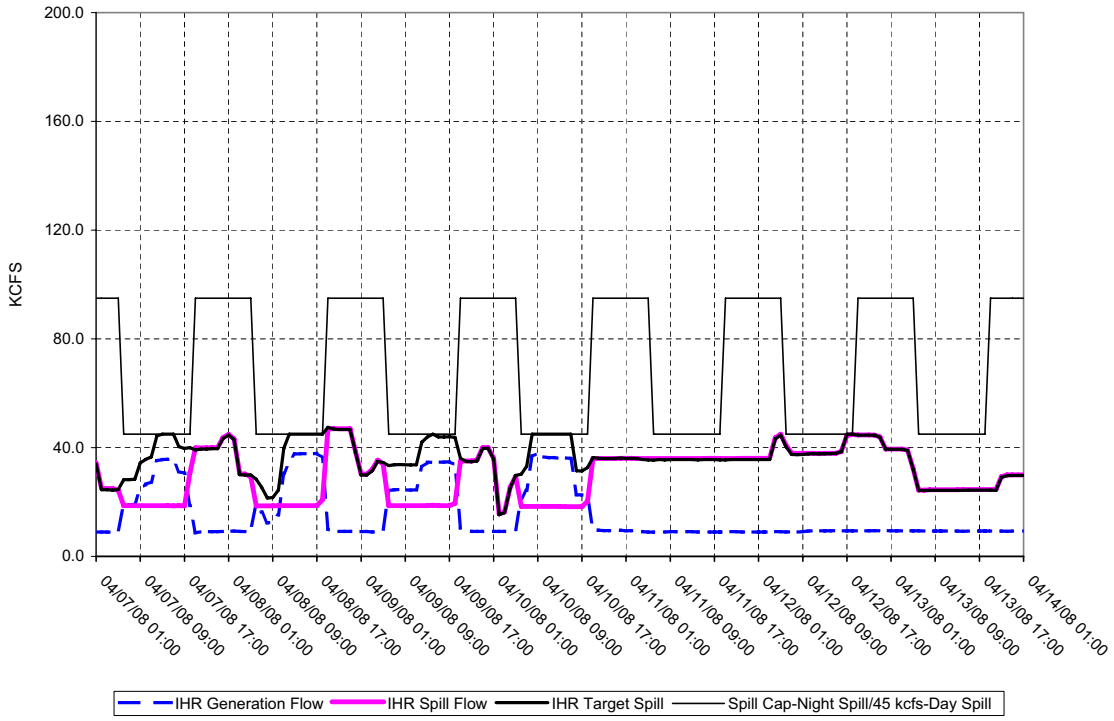
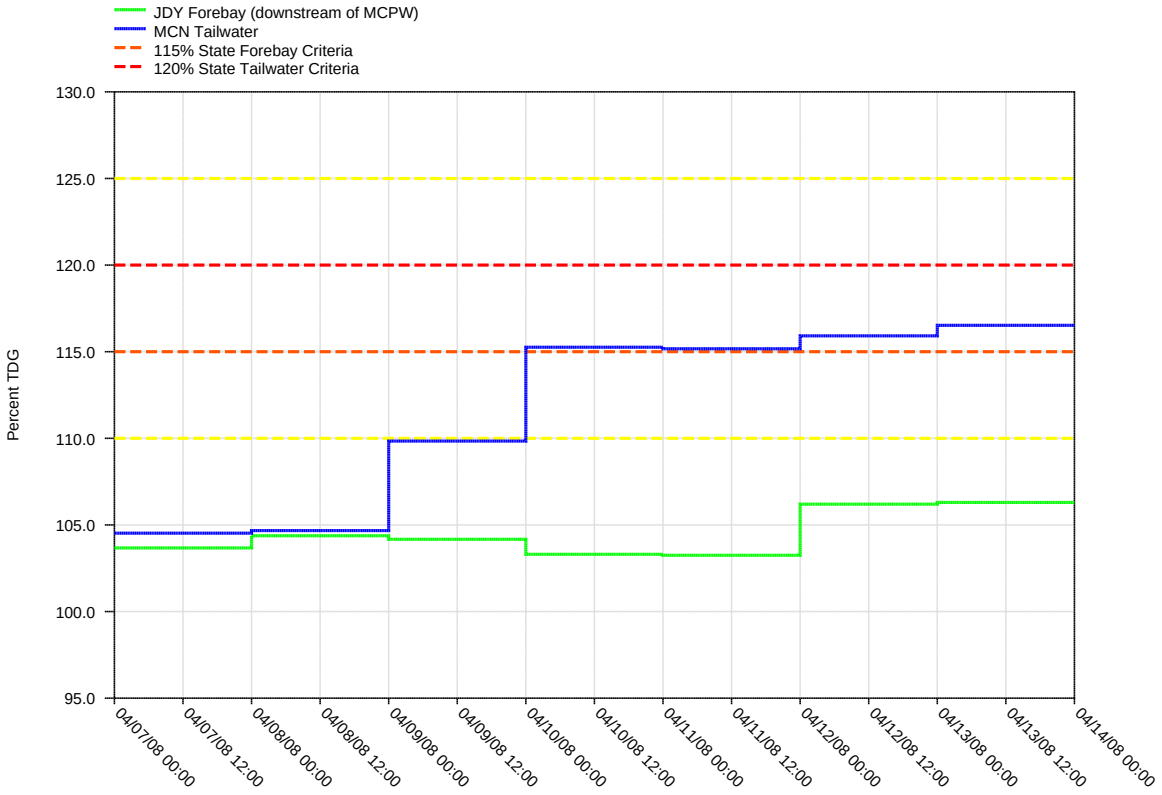


Figure 9.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

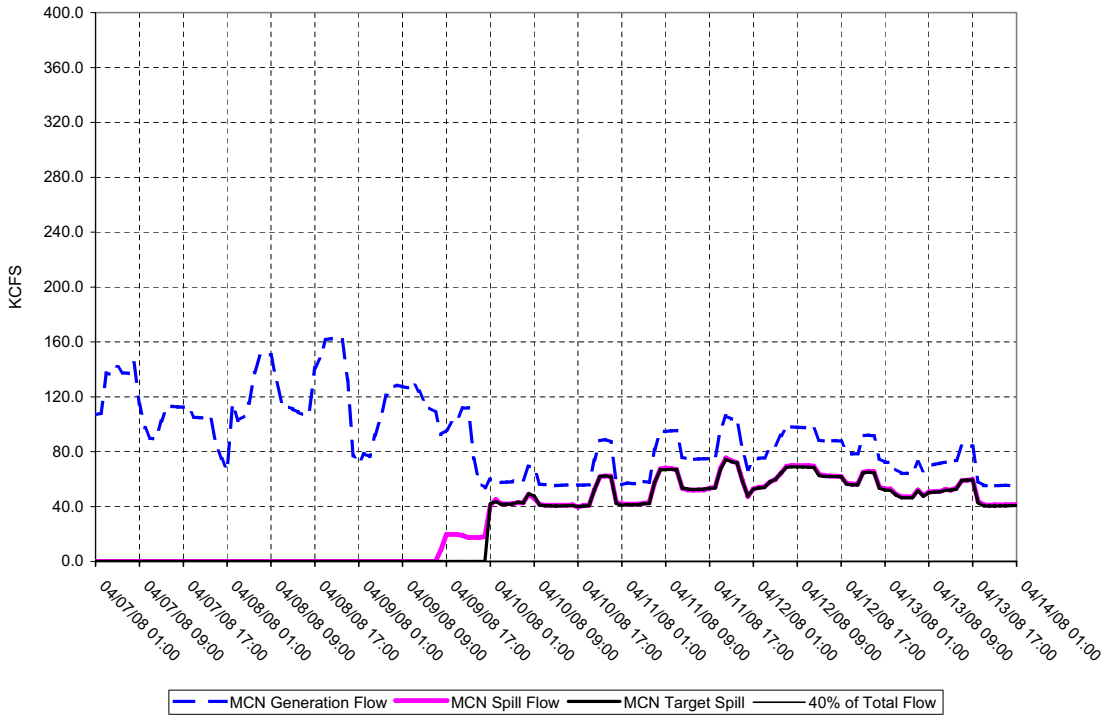
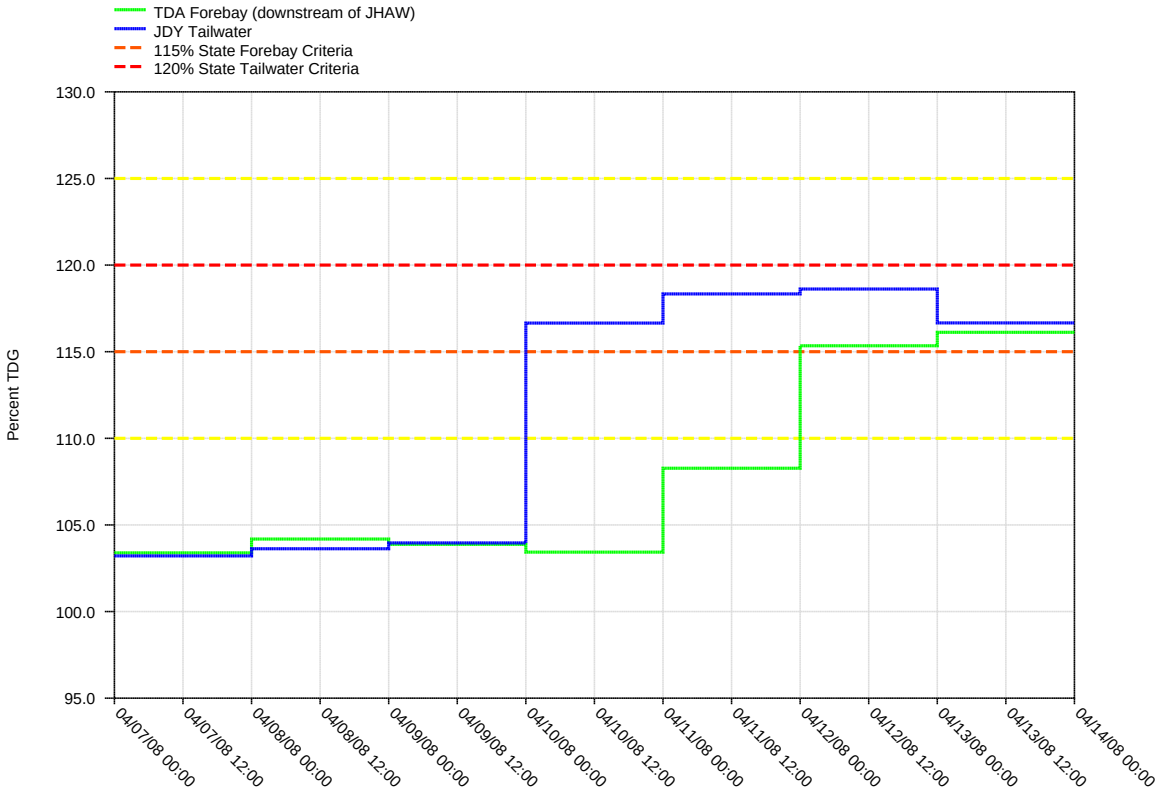


Figure 10.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

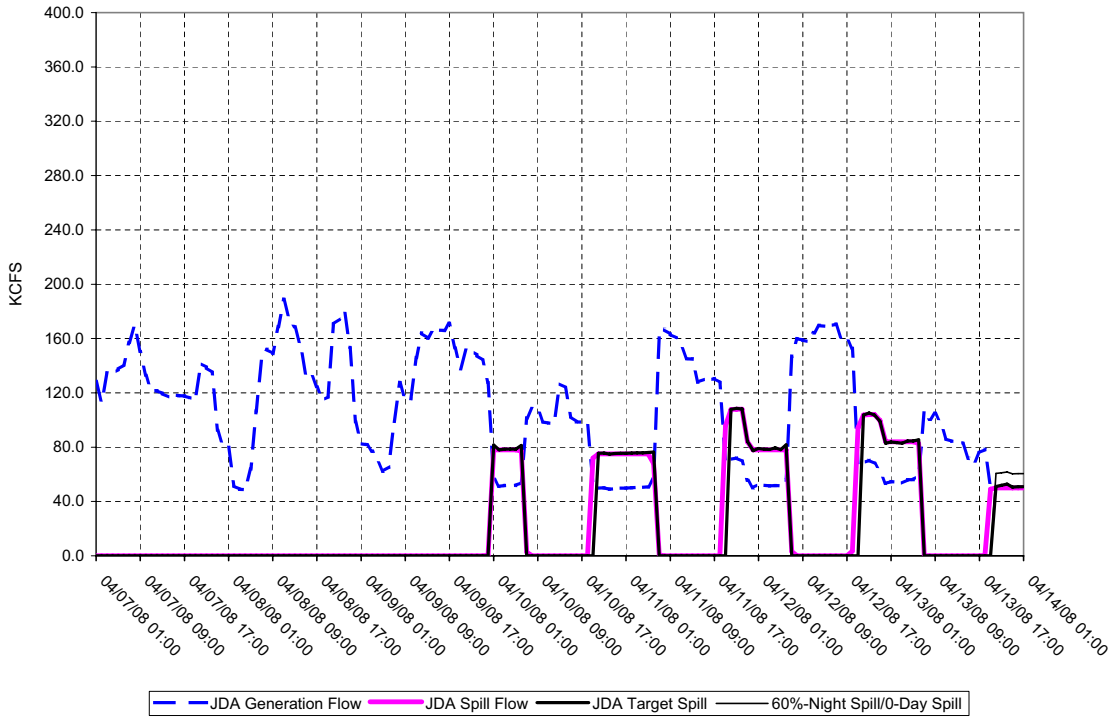
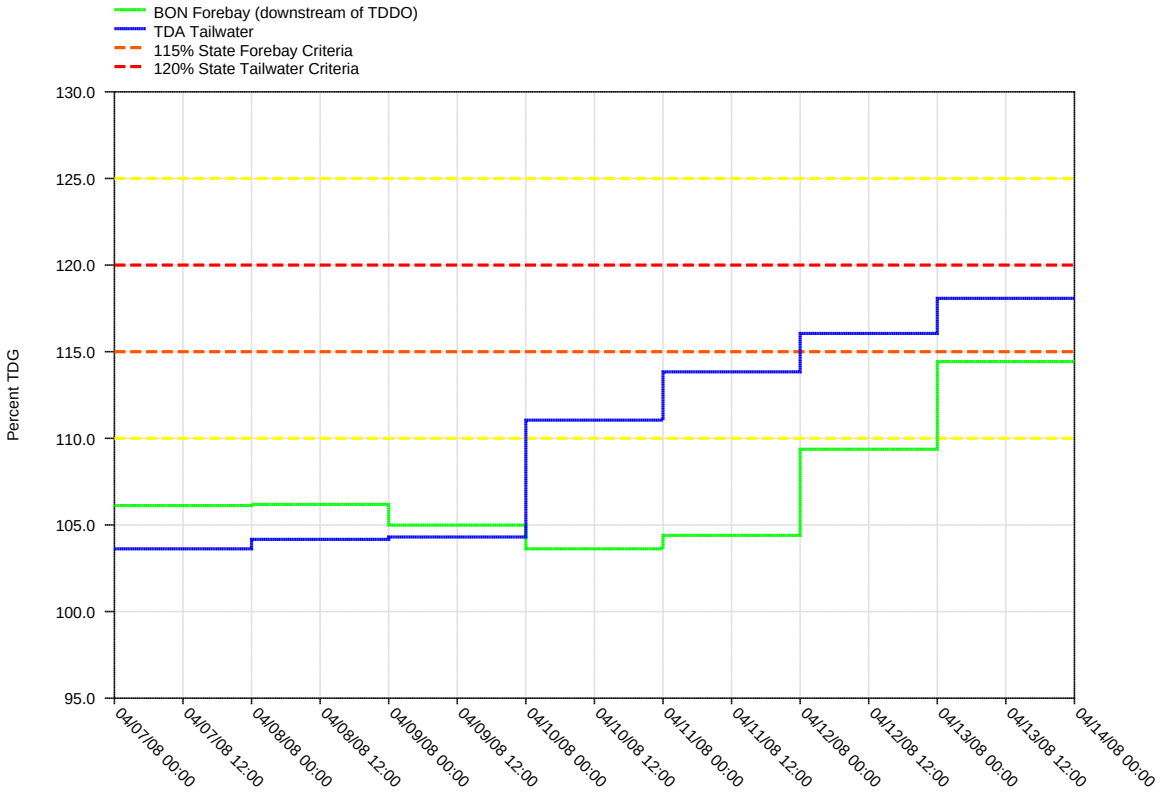


Figure 11.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

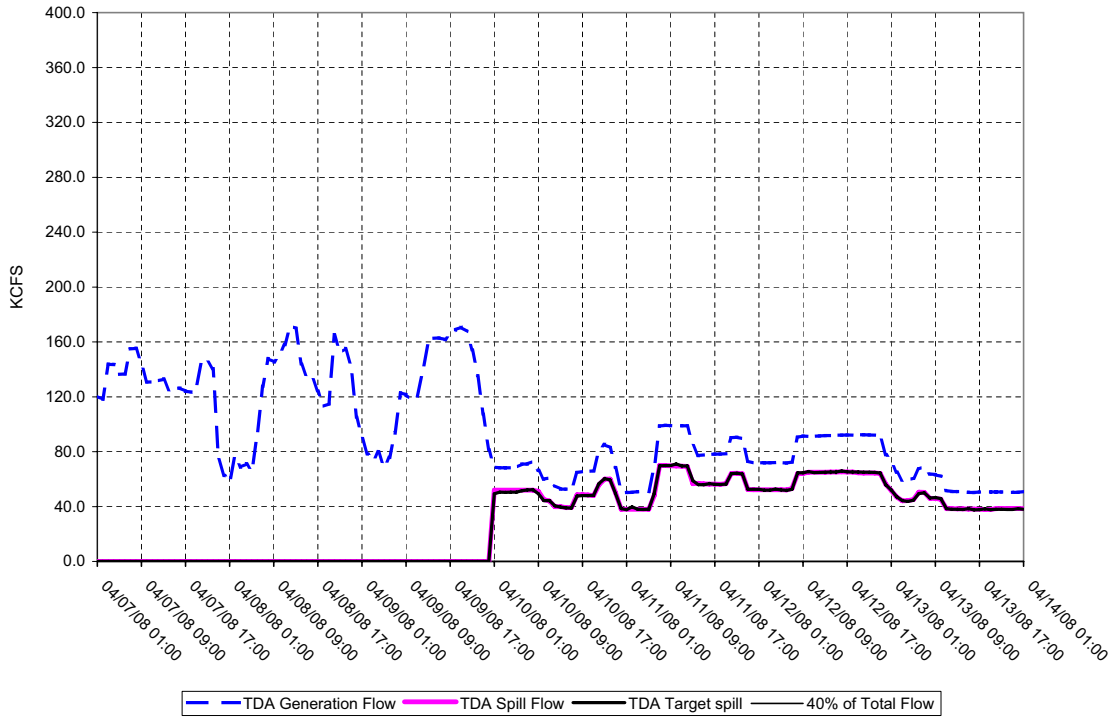
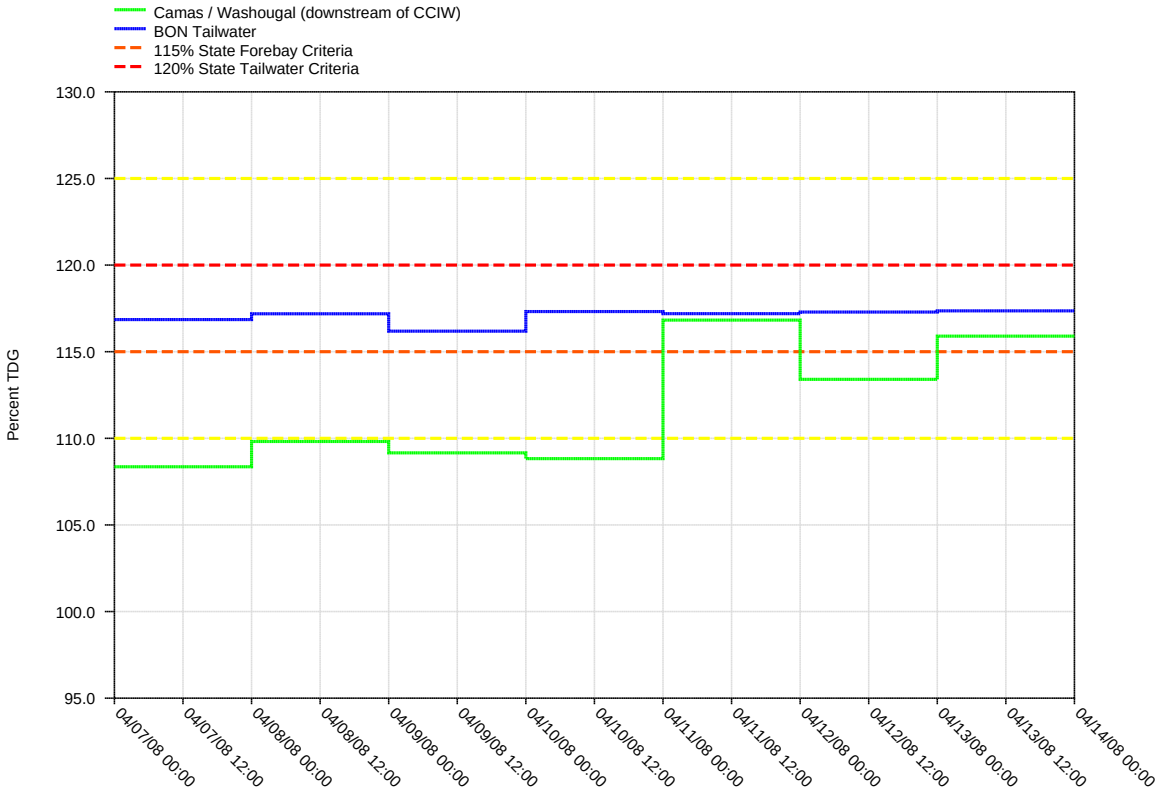


Figure 12.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

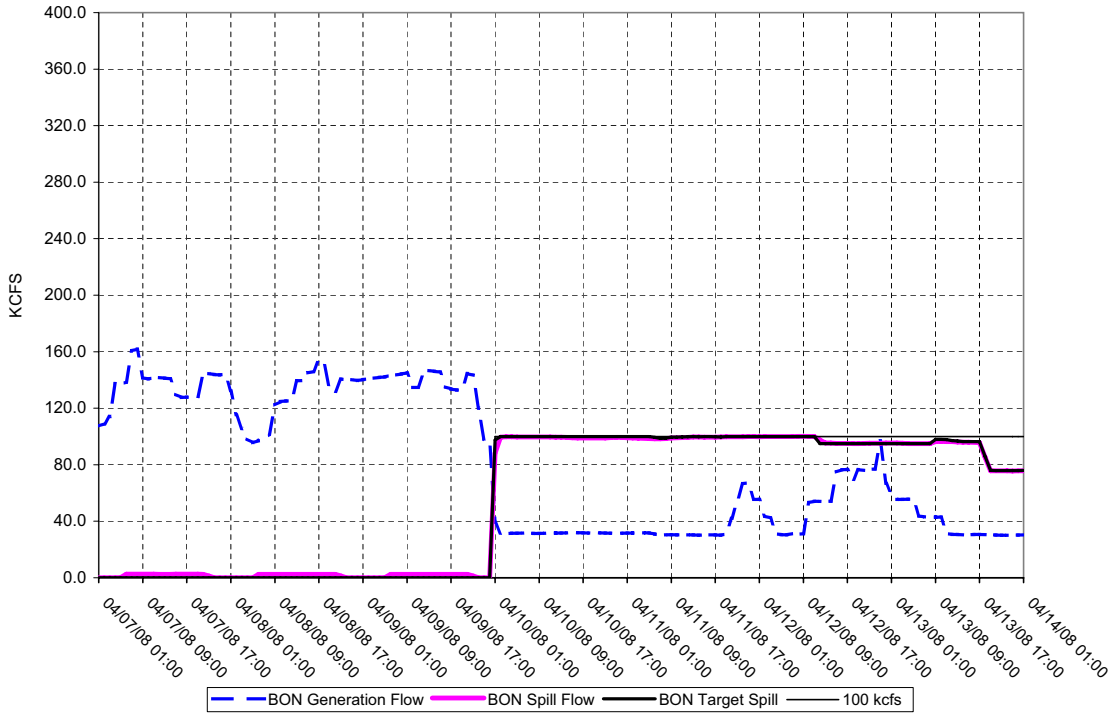
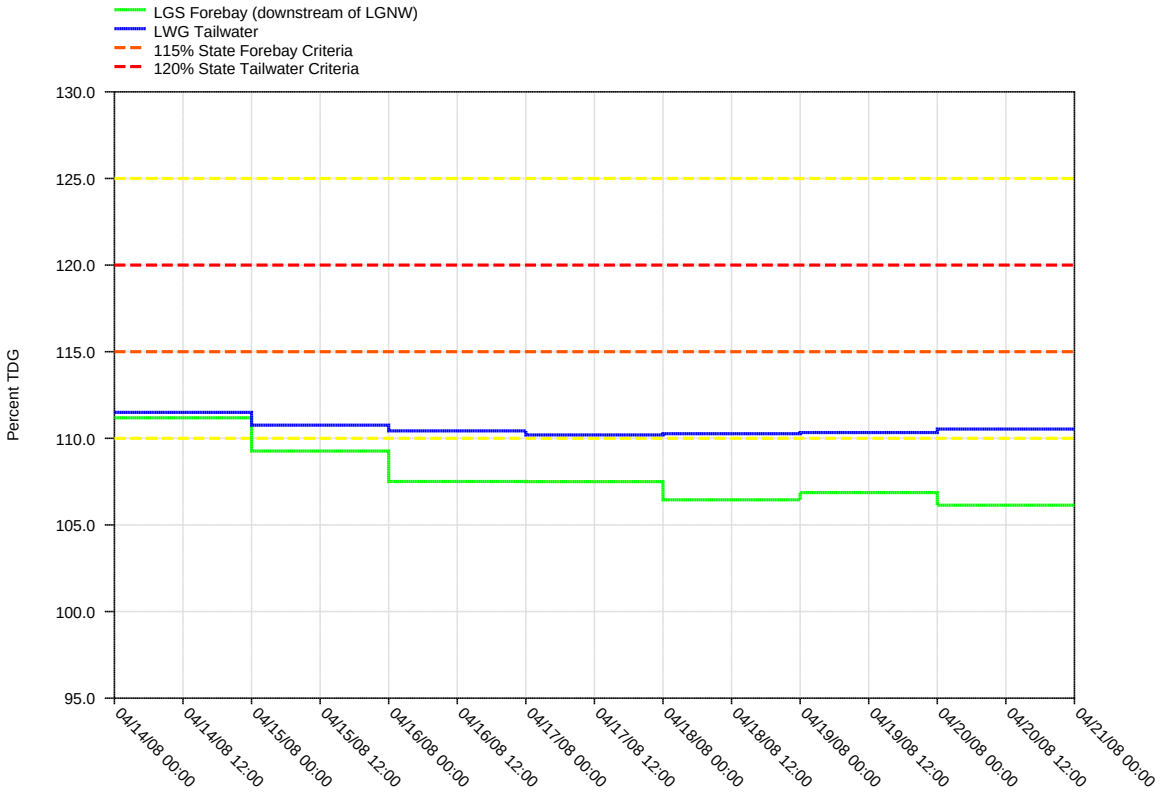


Figure 13.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

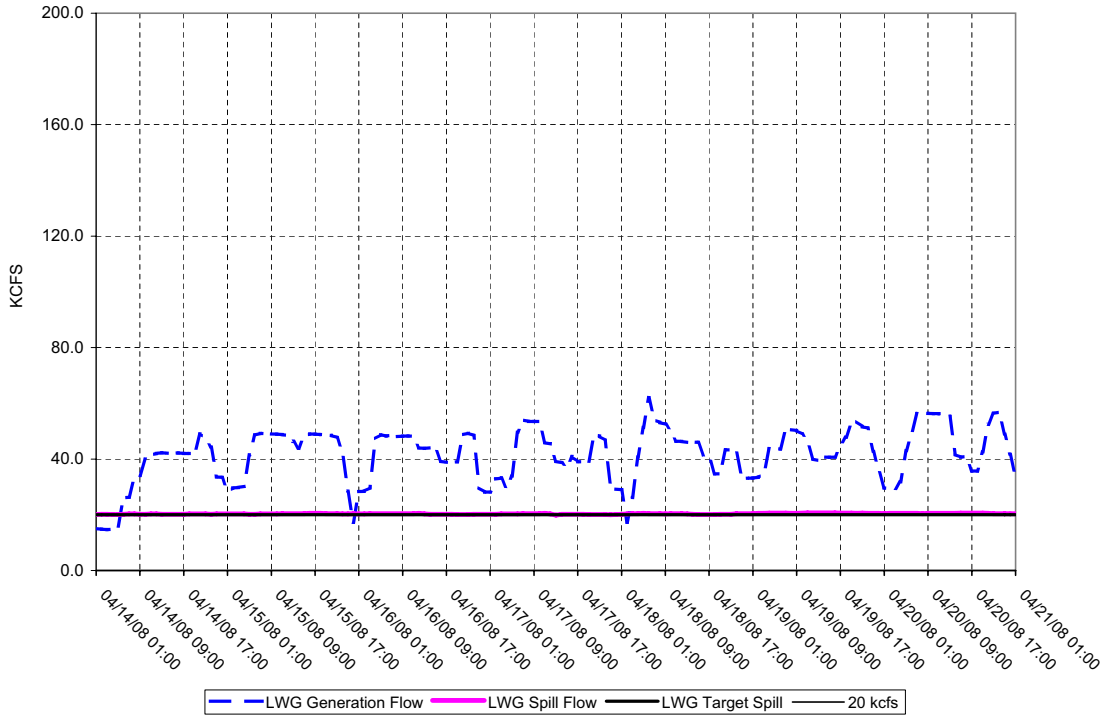
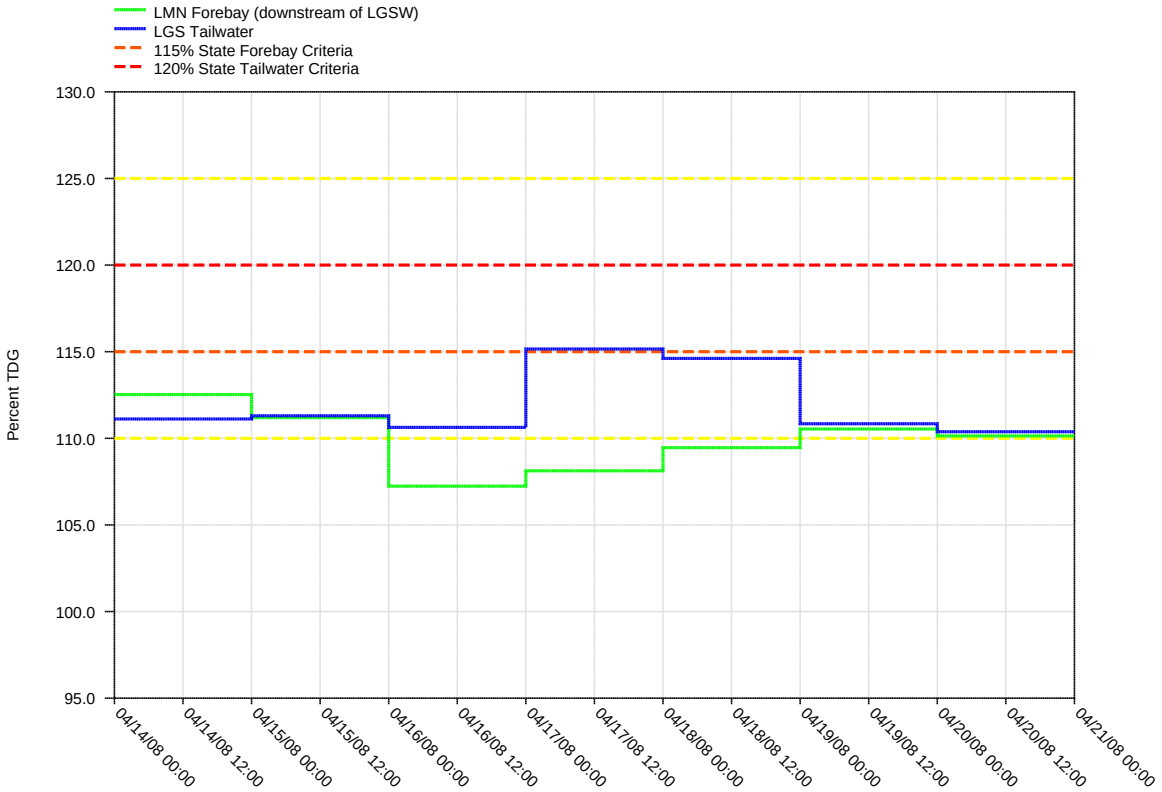


Figure 14.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

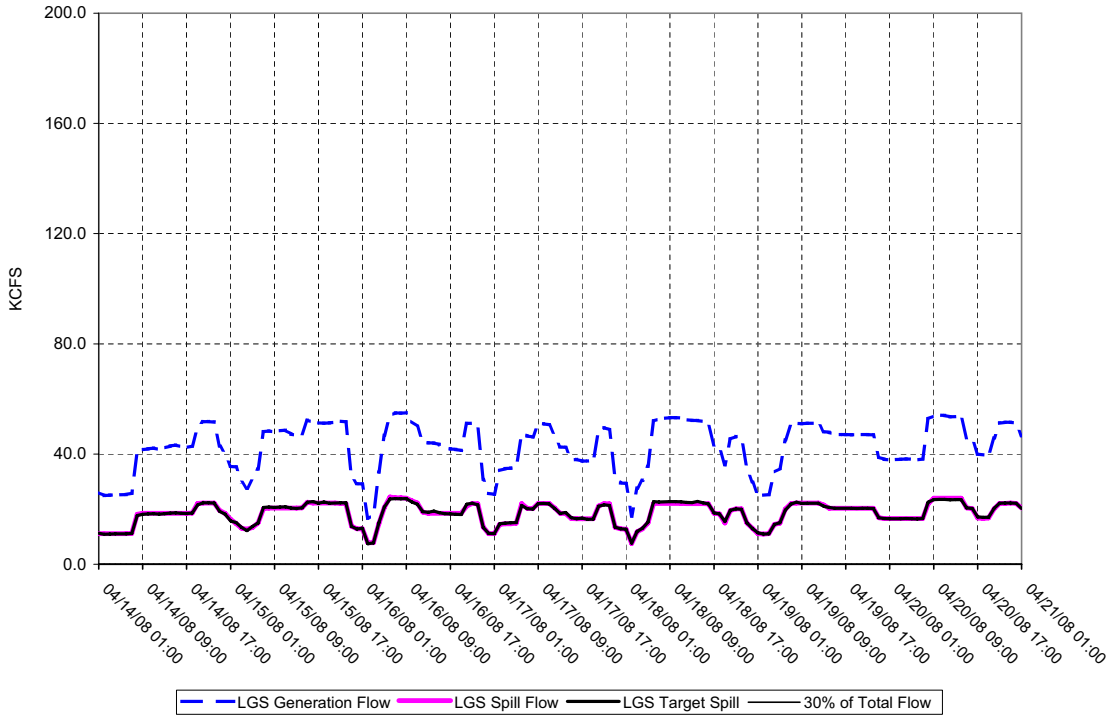
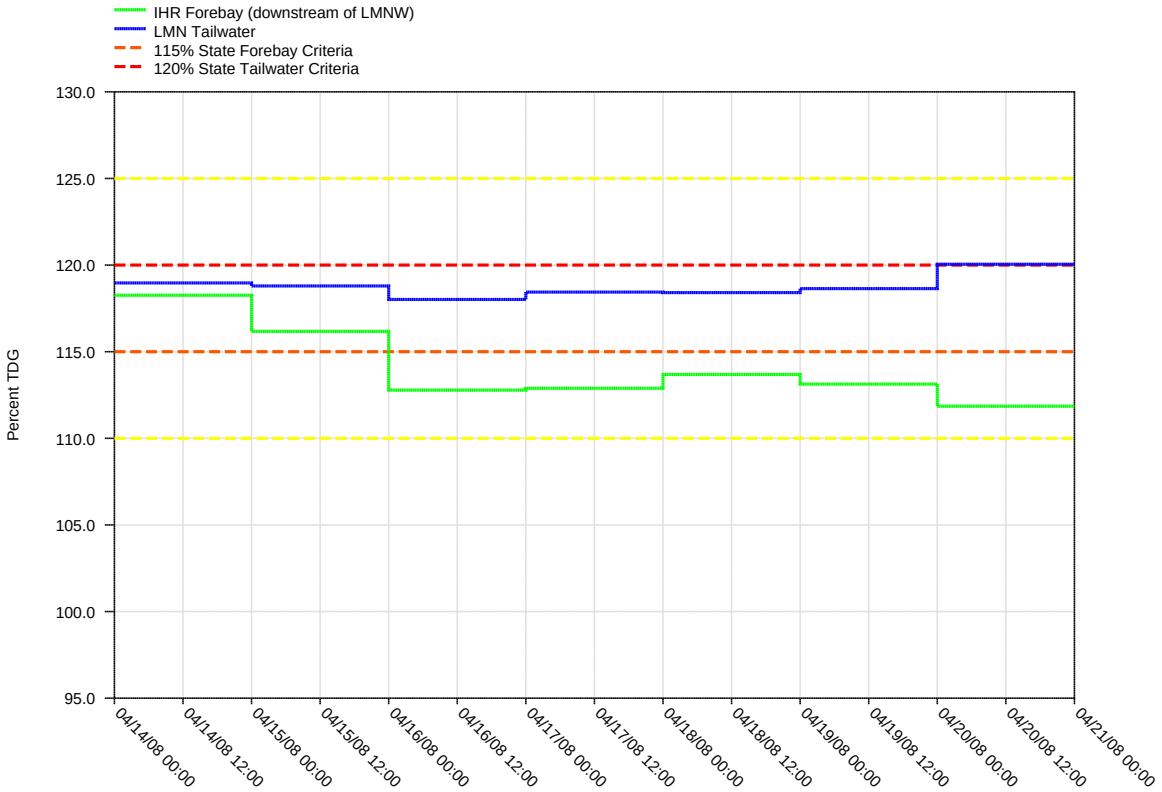


Figure 15.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

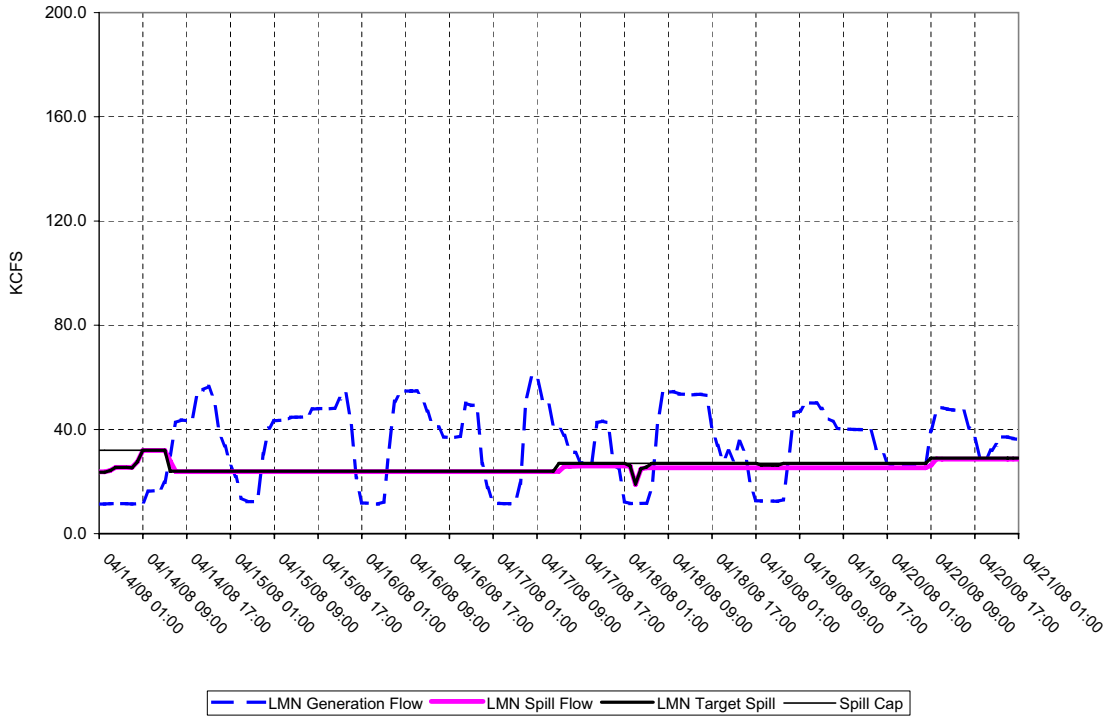
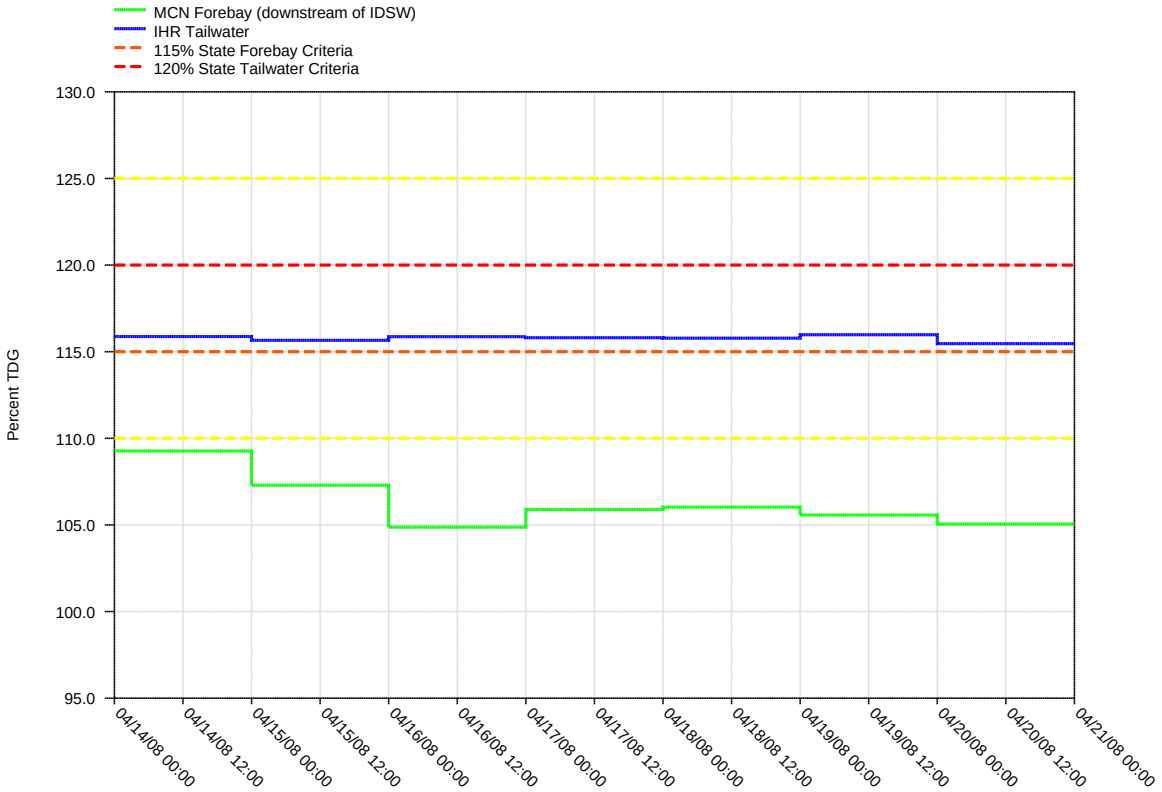


Figure 16.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

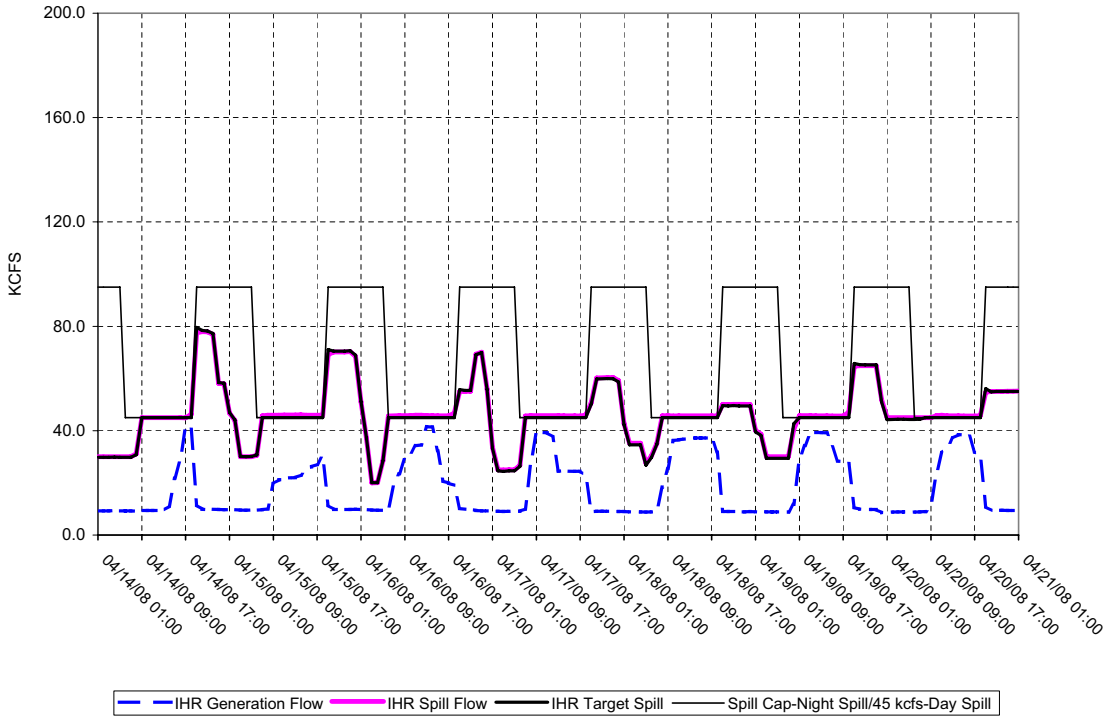
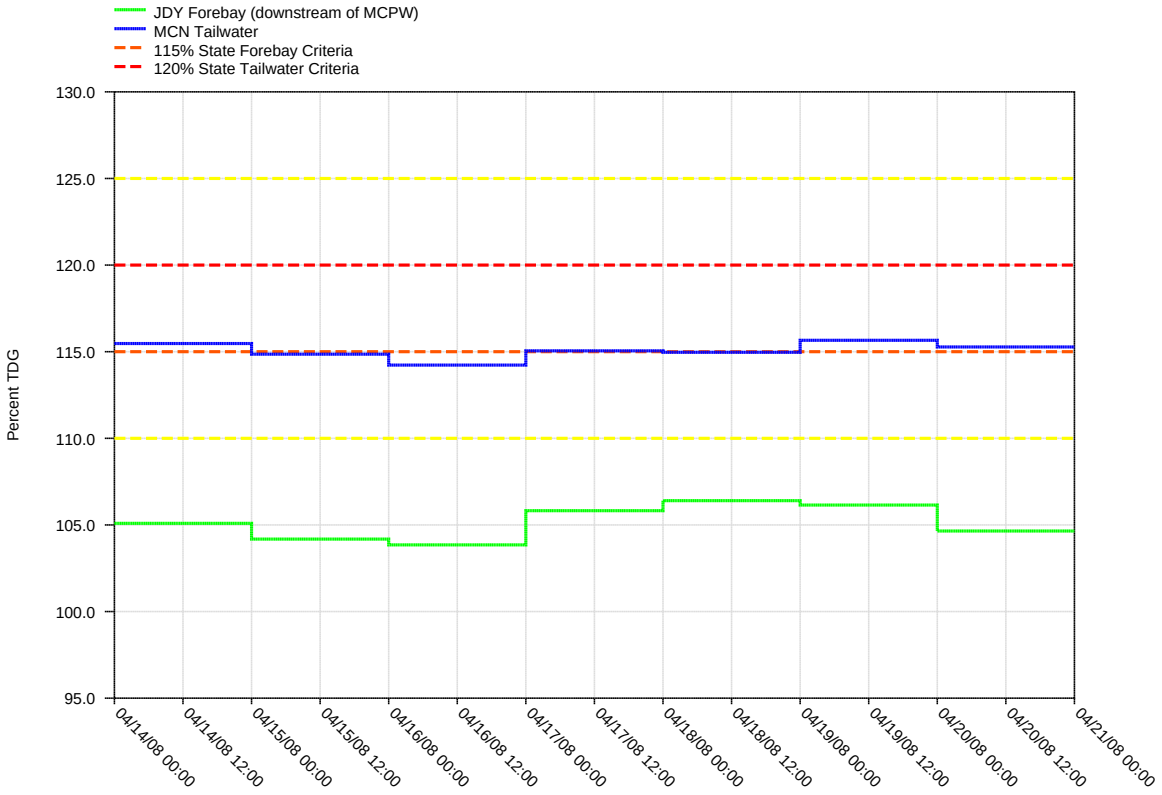


Figure 17.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

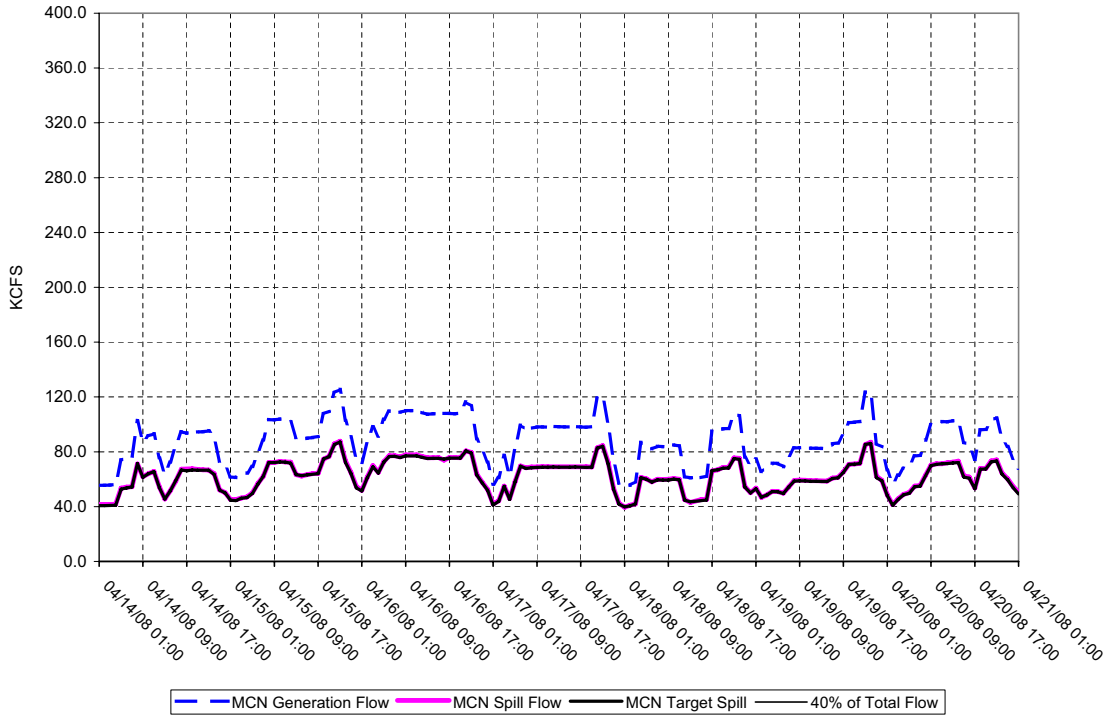
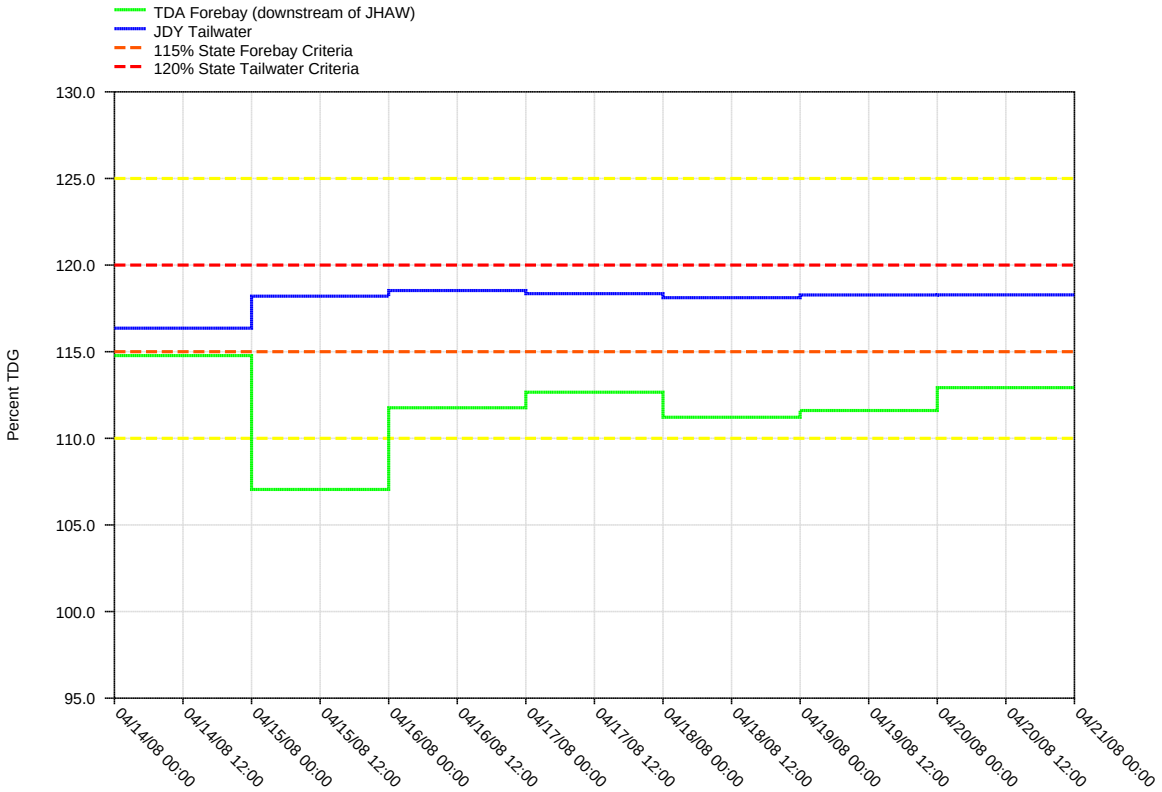


Figure 18.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

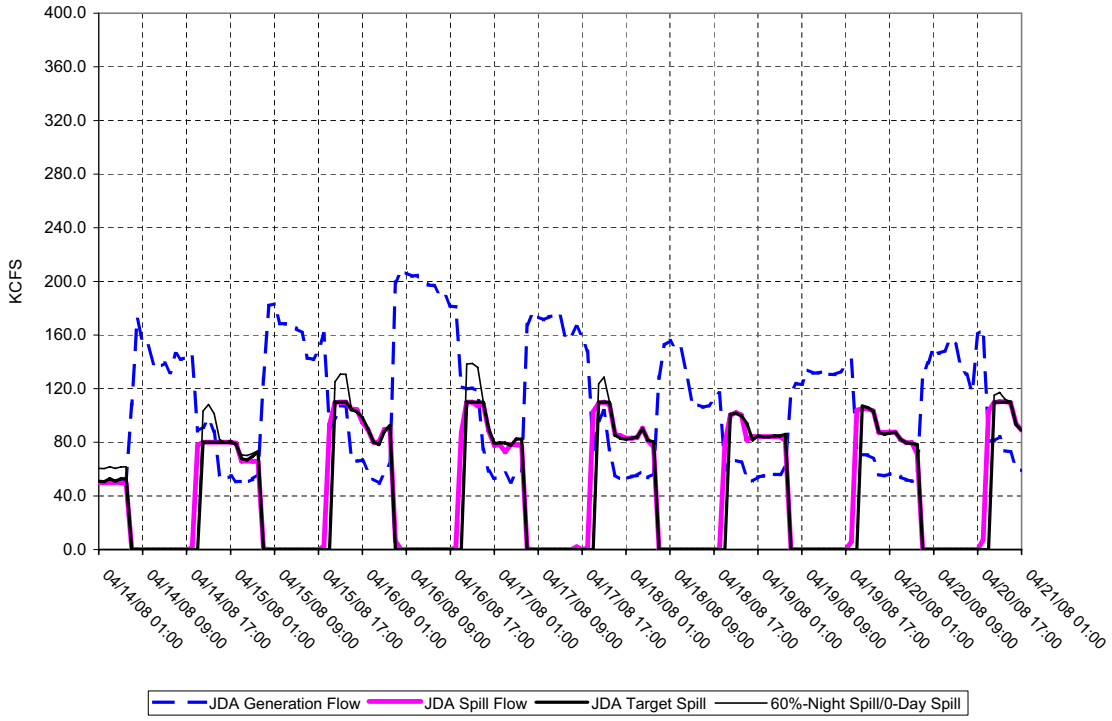
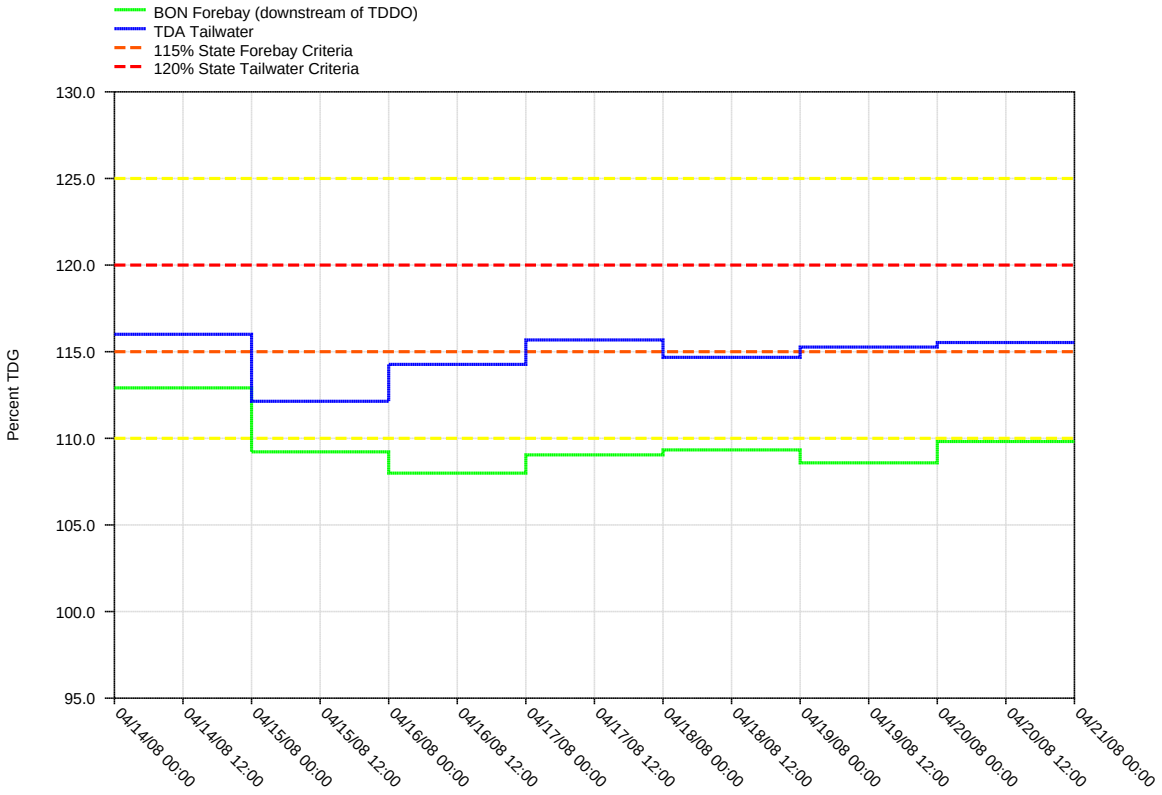


Figure 19.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

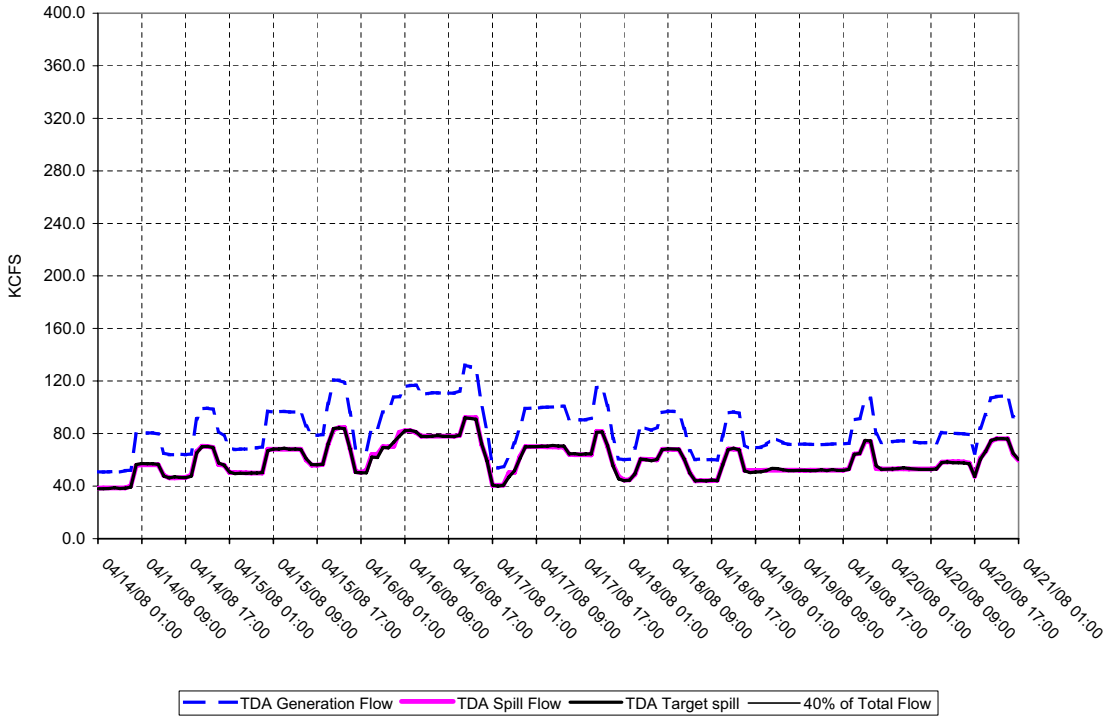
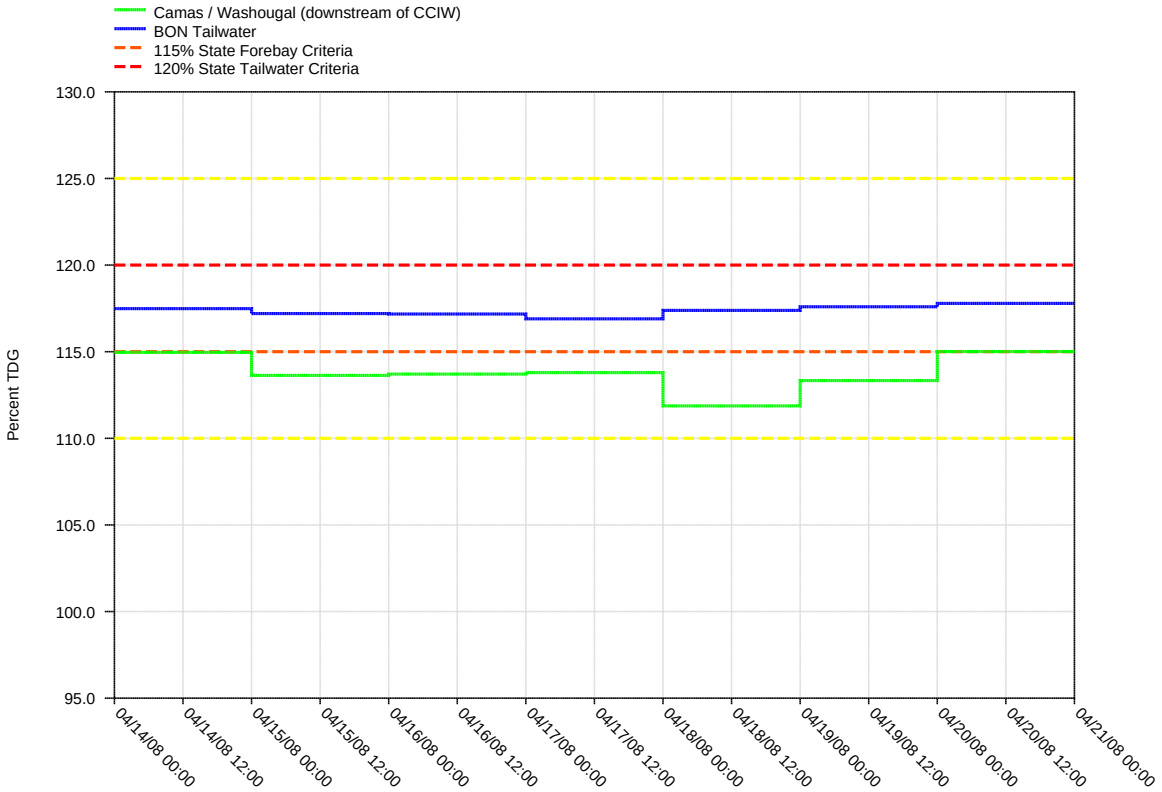


Figure 20.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

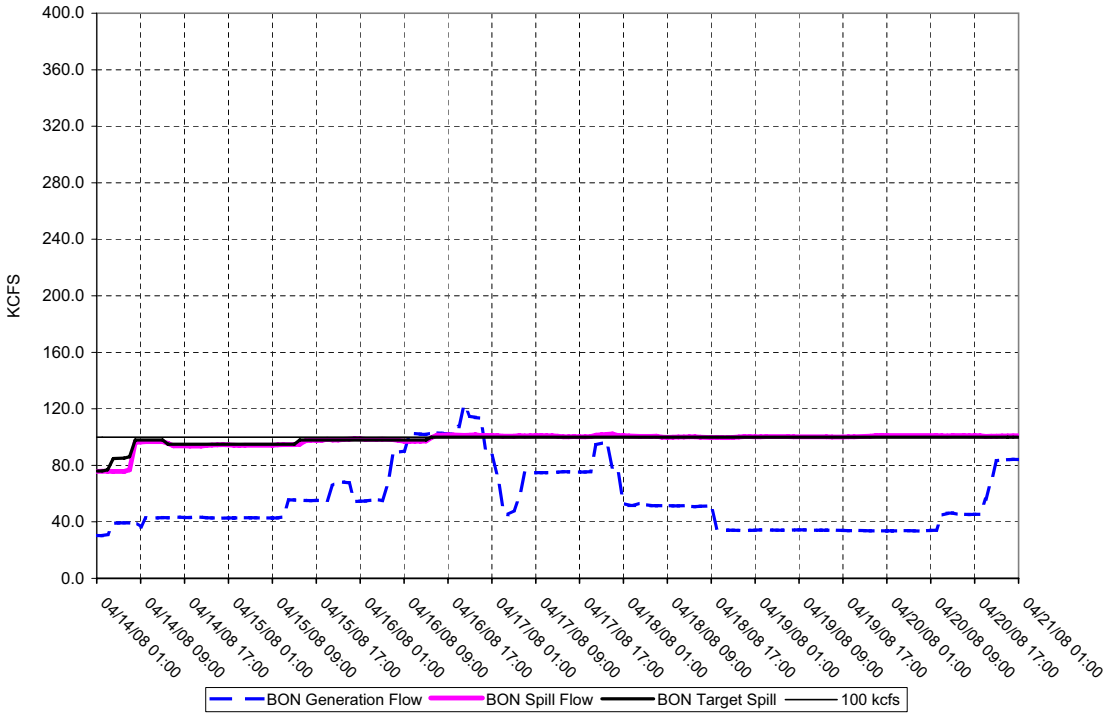
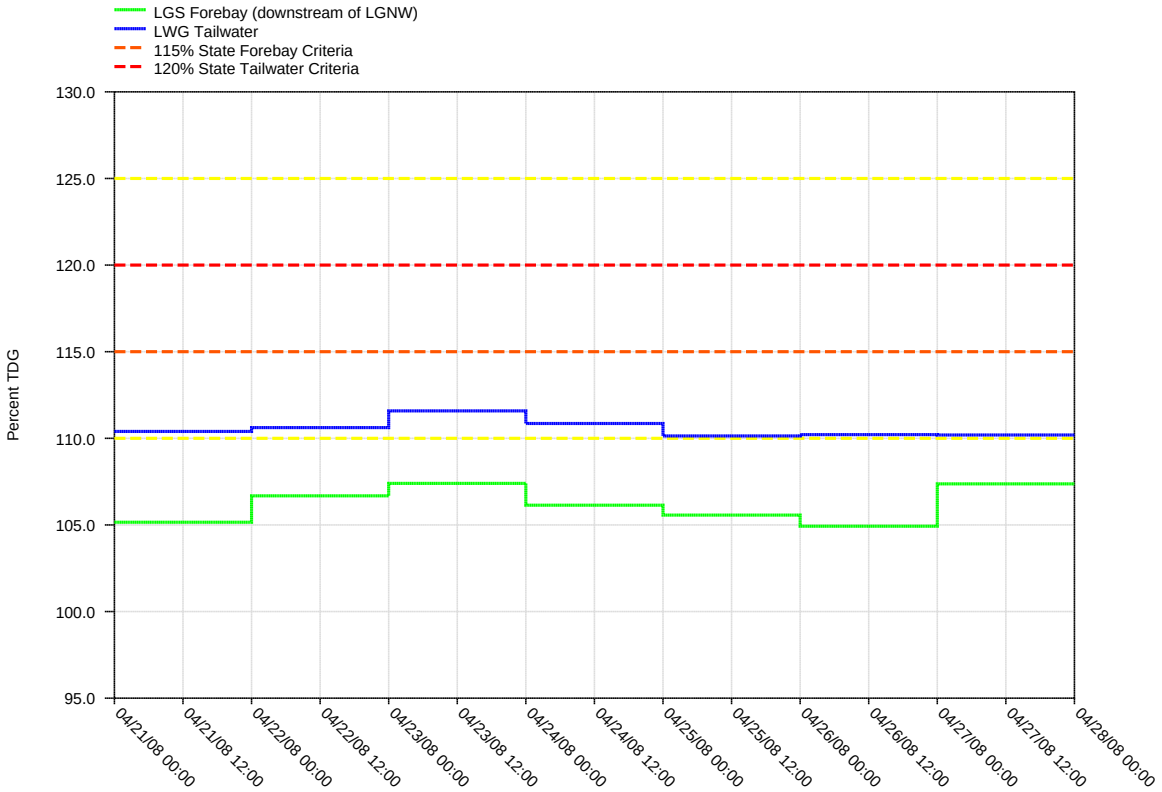


Figure 21.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

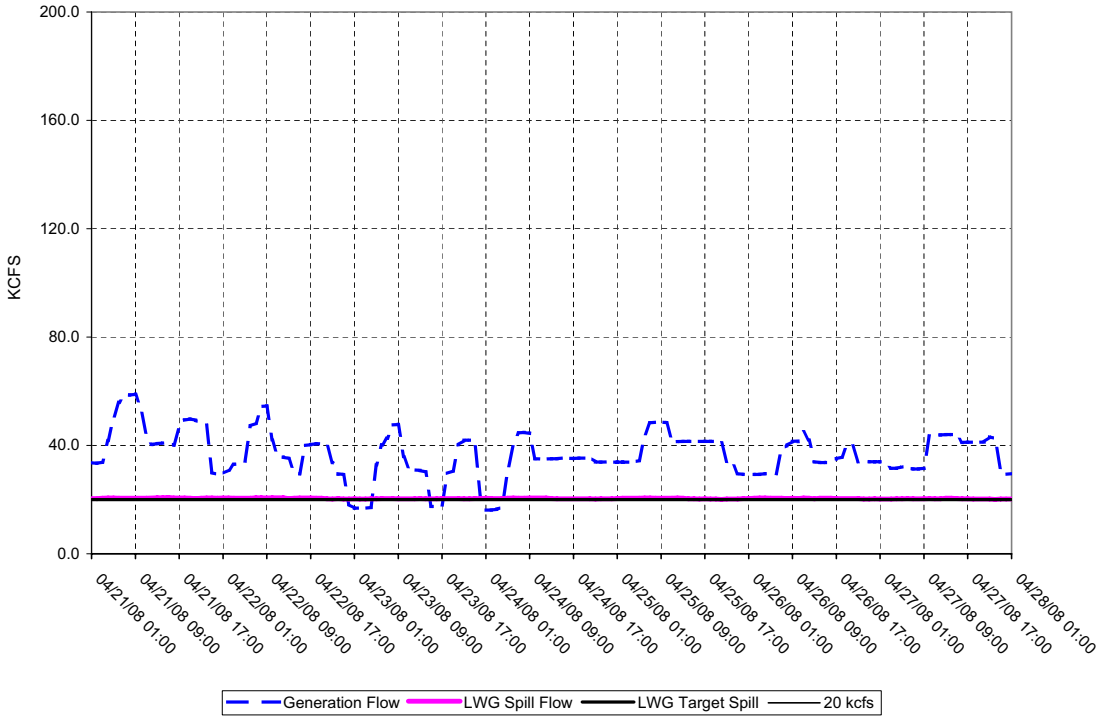
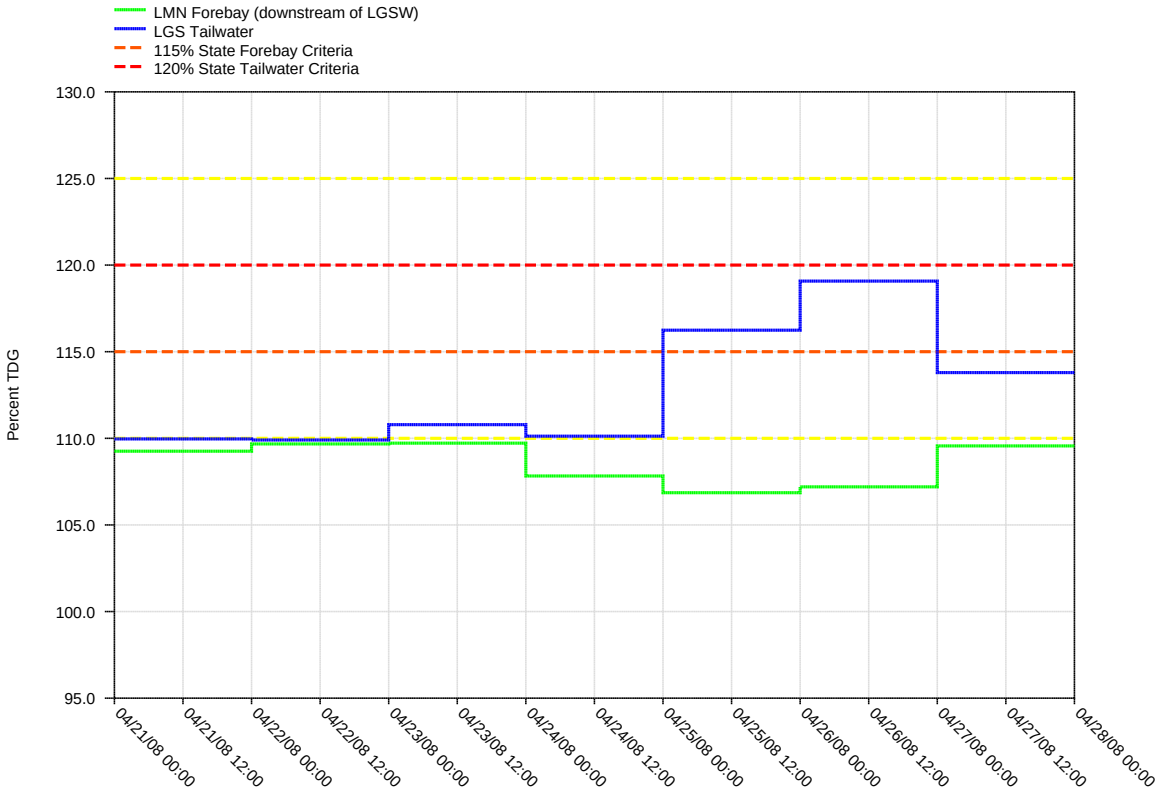


Figure 22.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

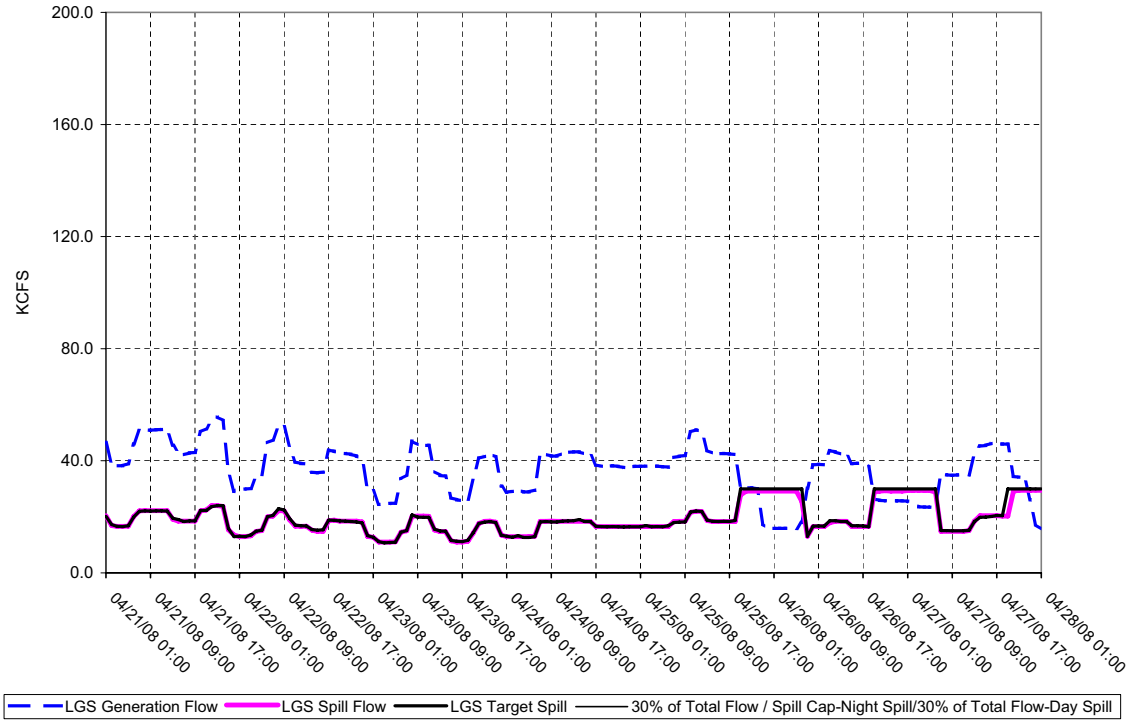
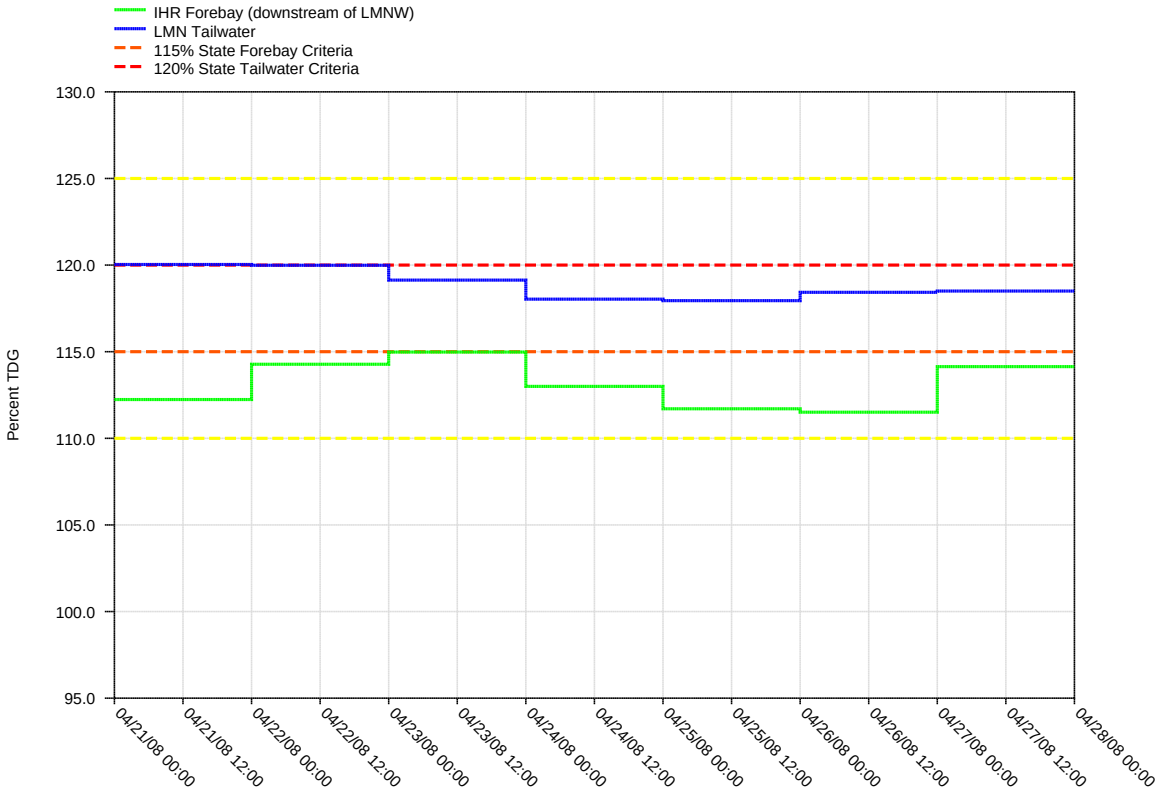


Figure 23.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

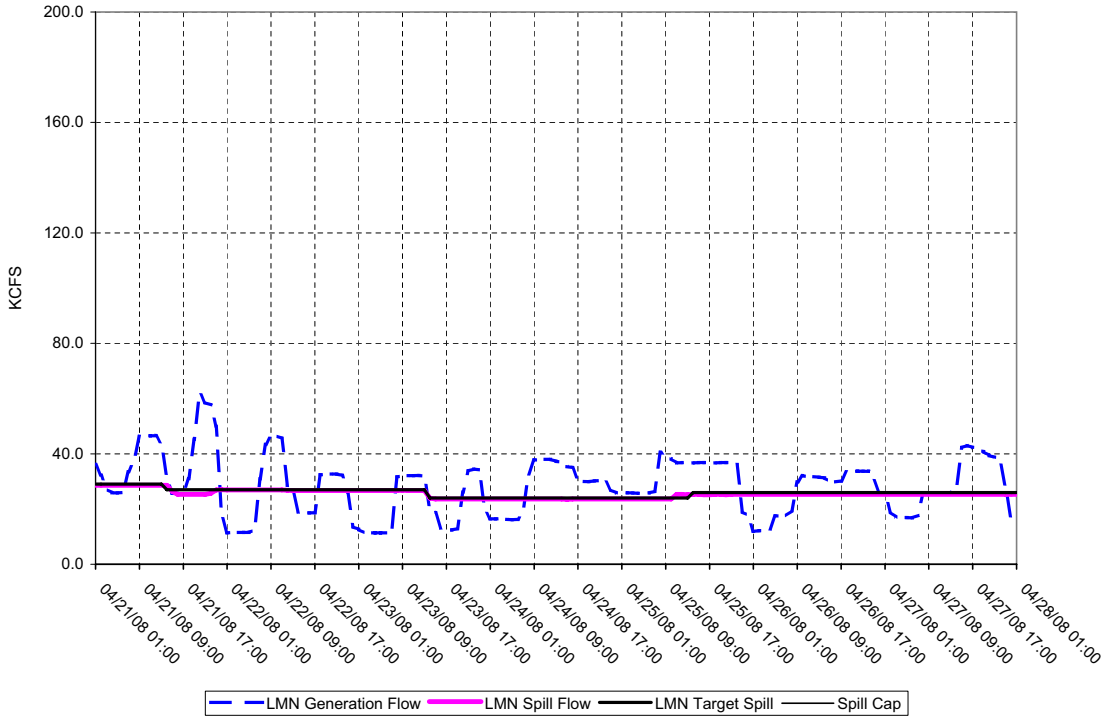
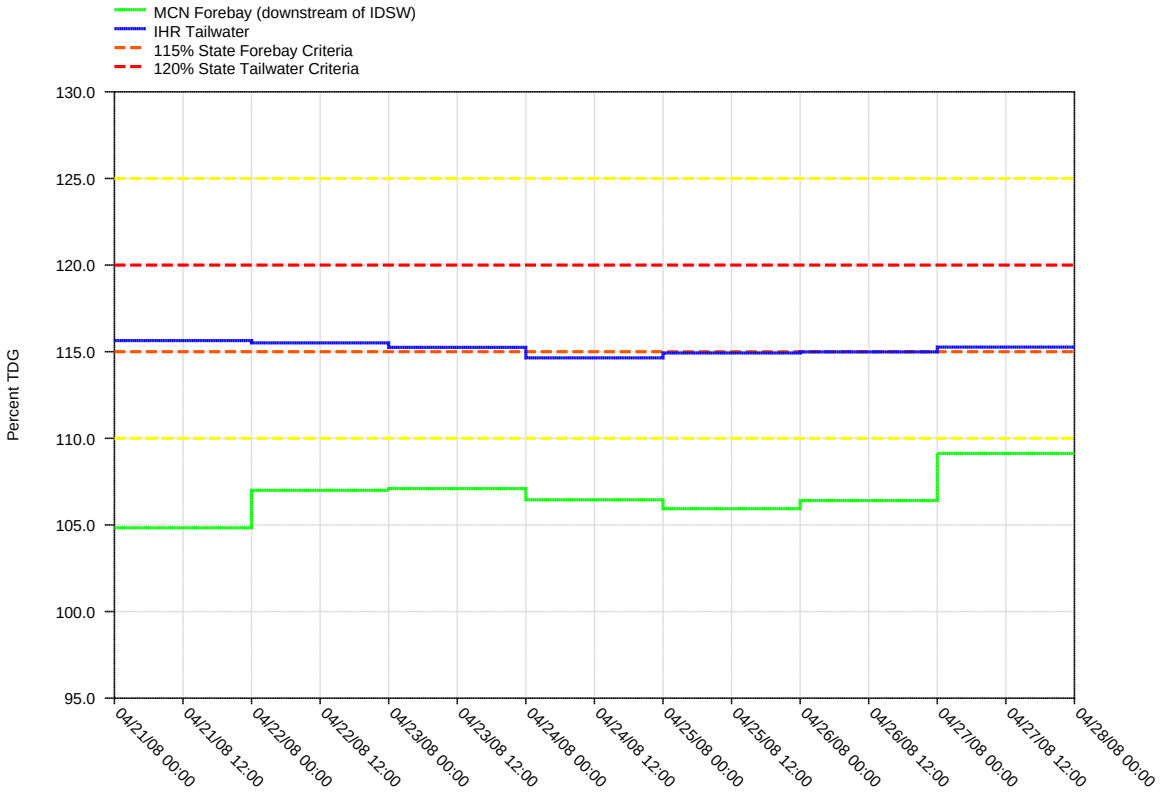


Figure 24.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

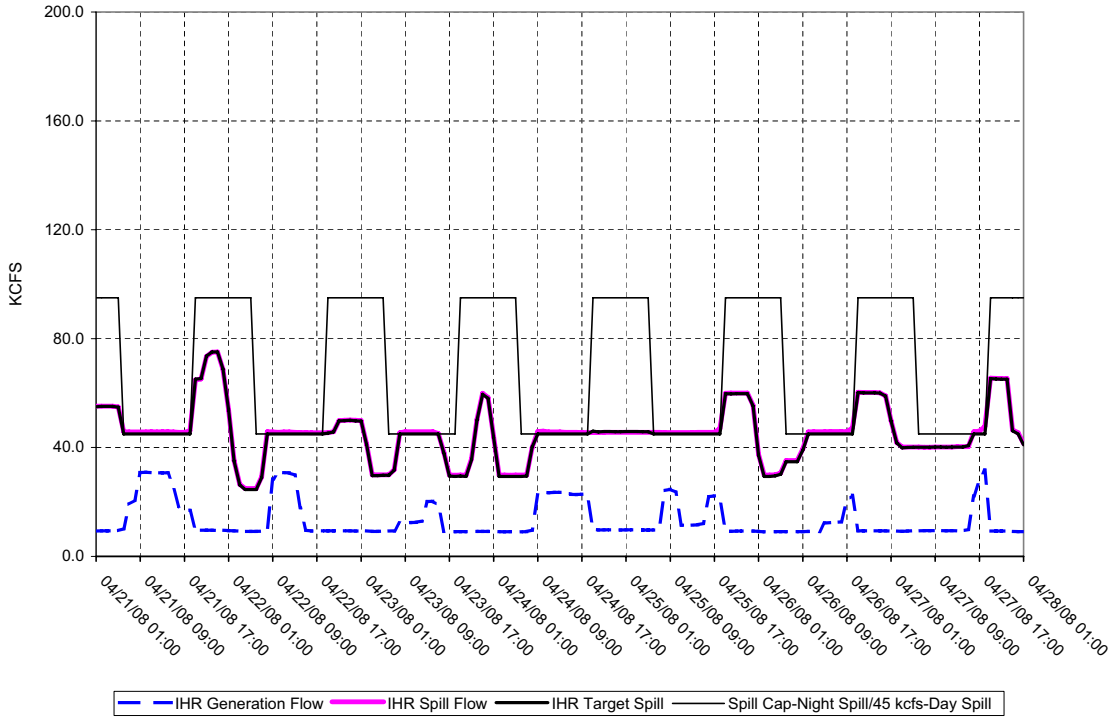
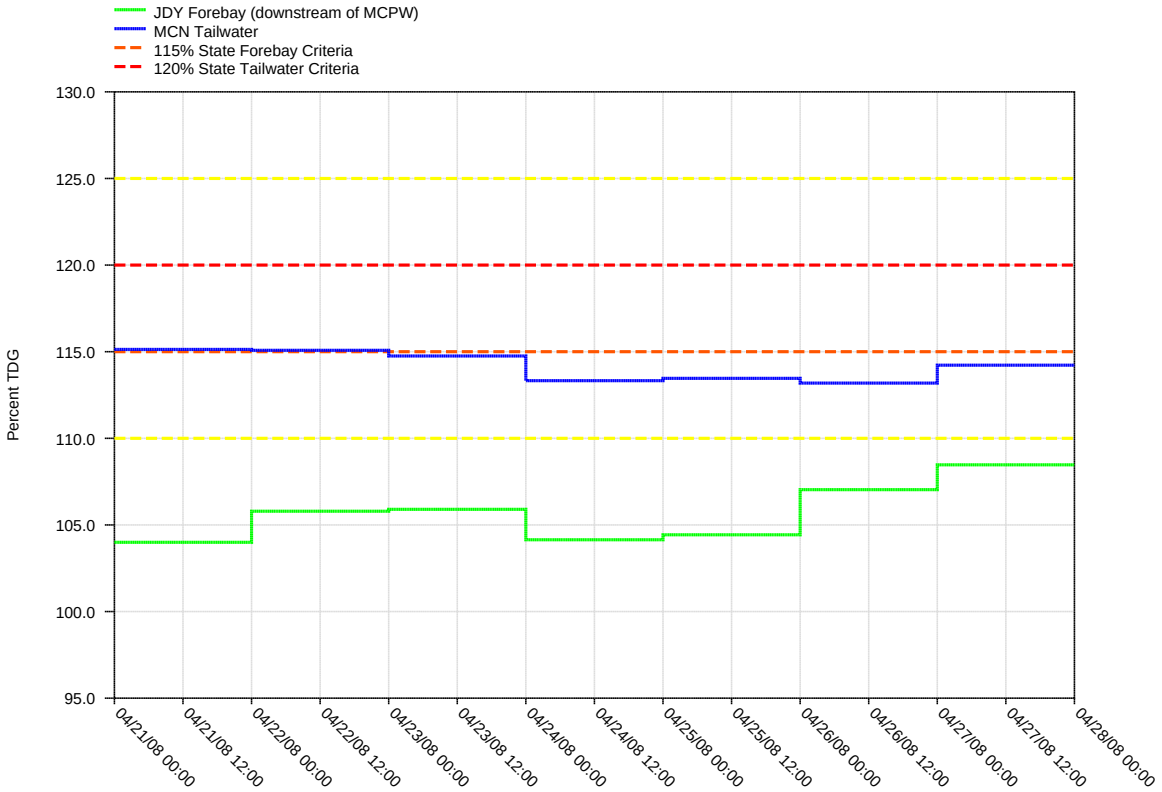


Figure 25.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

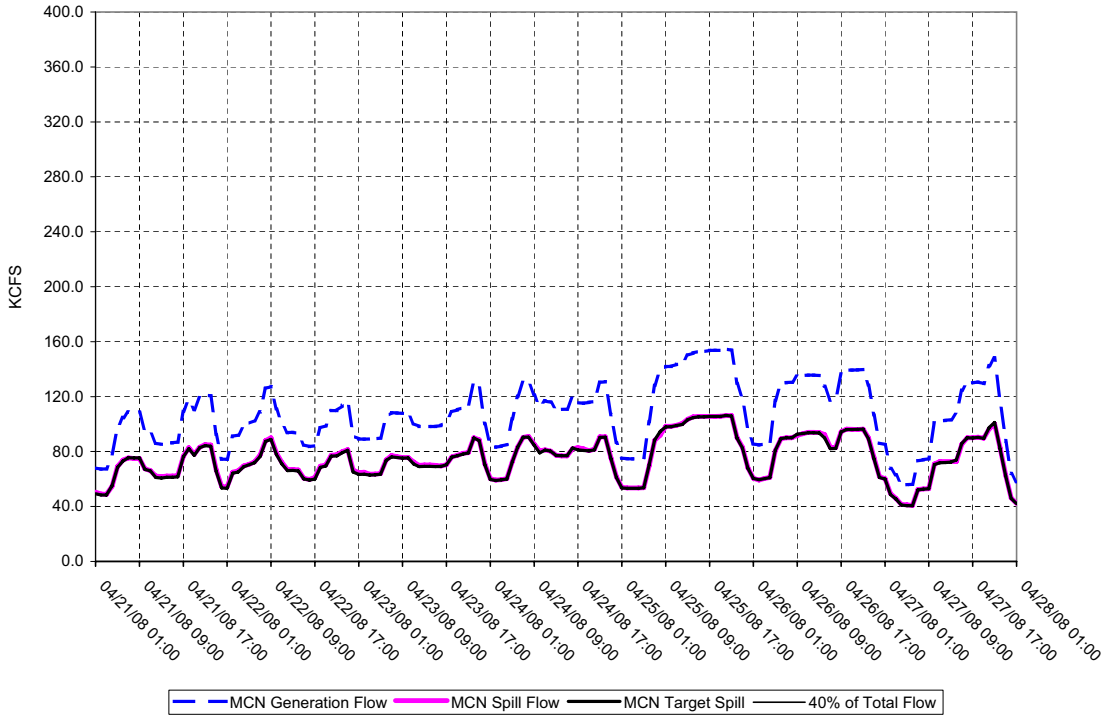
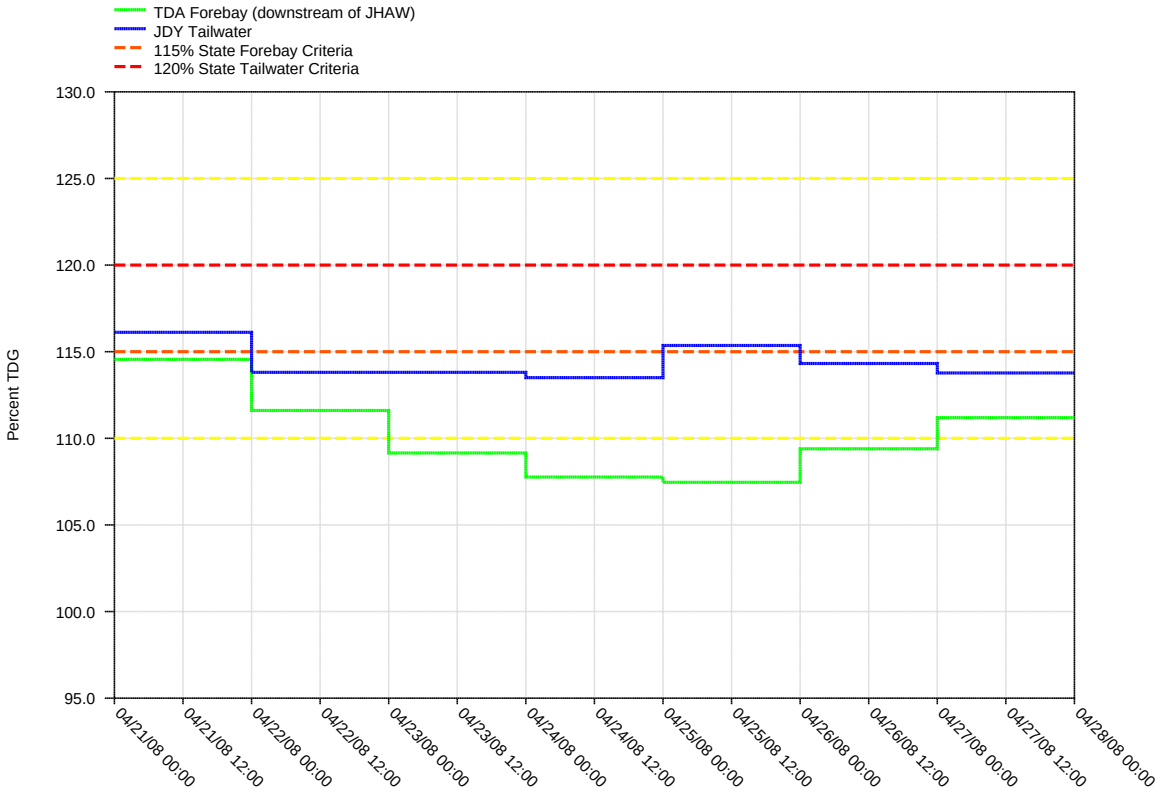


Figure 26.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

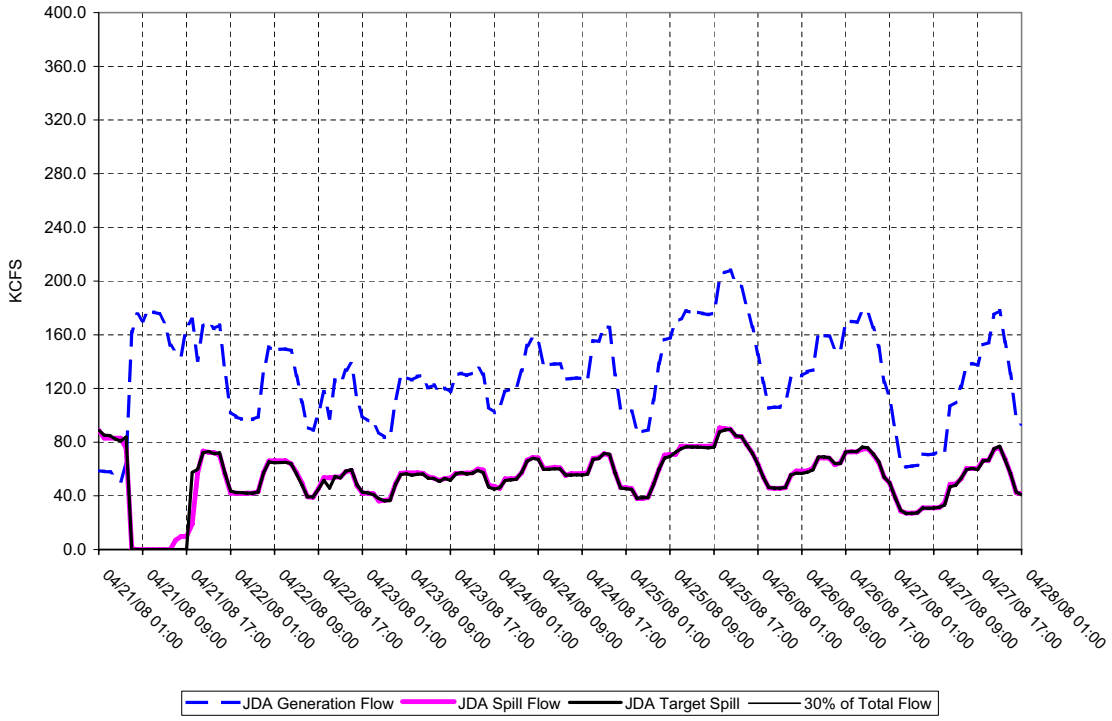
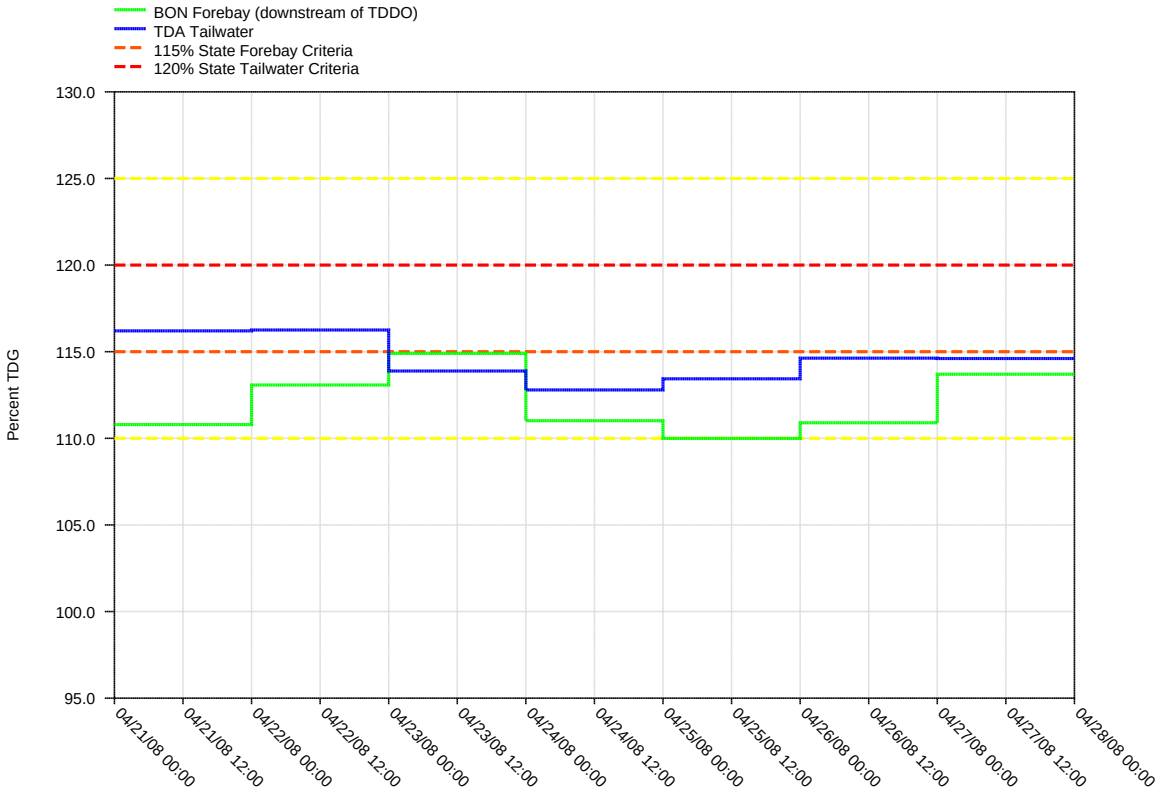


Figure 27.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

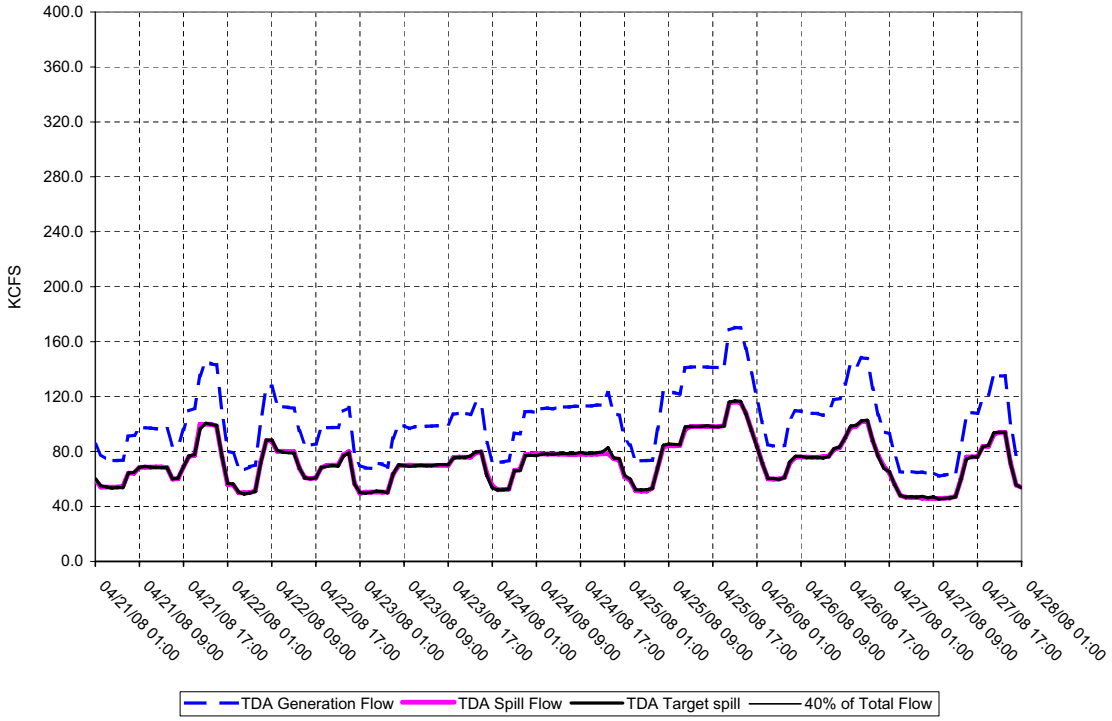
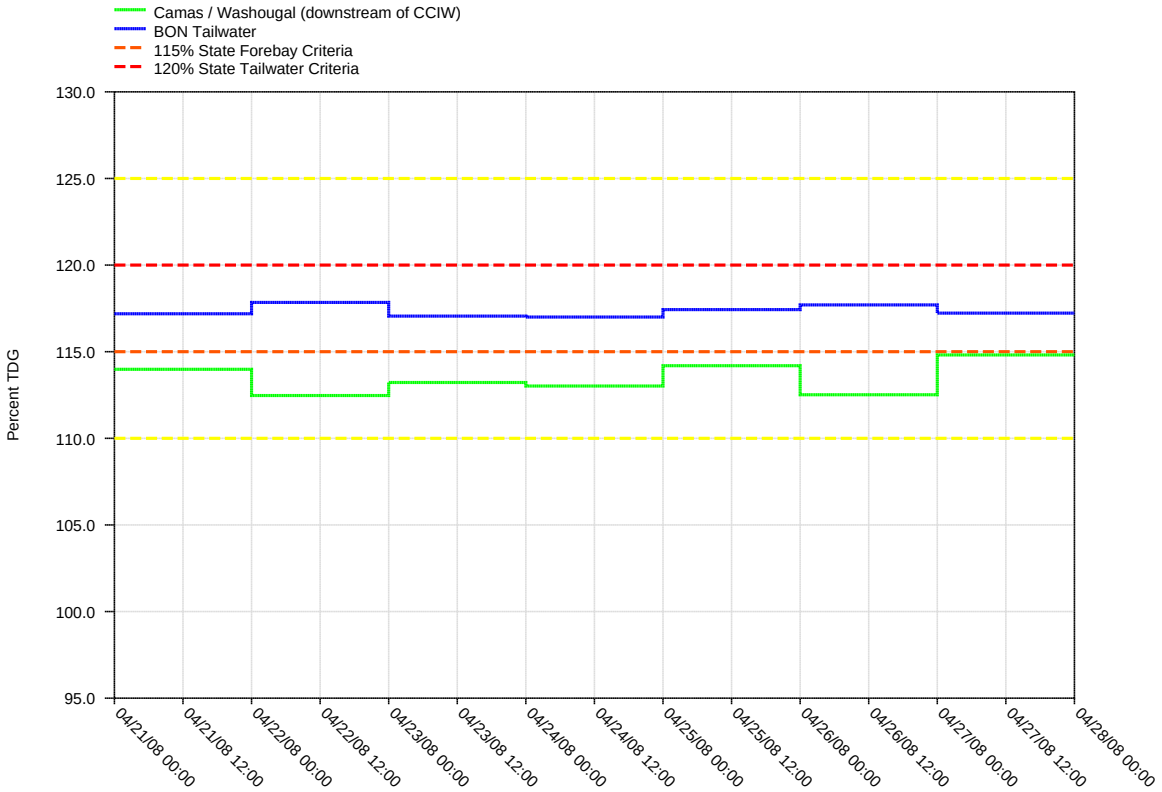


Figure 28.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

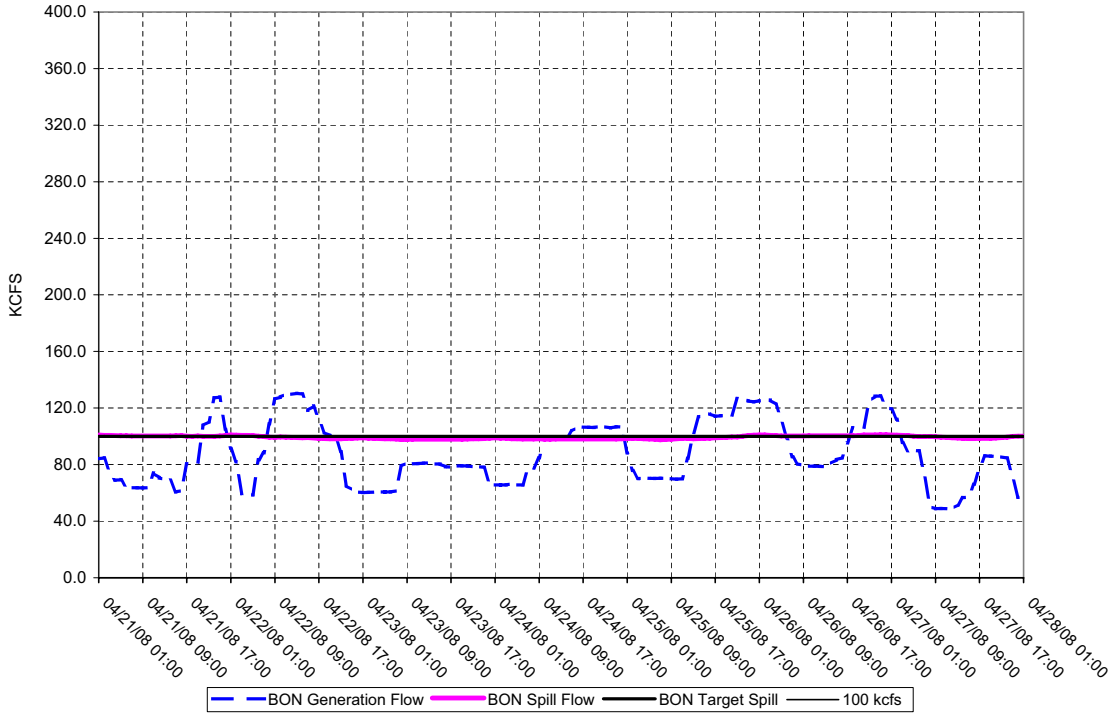
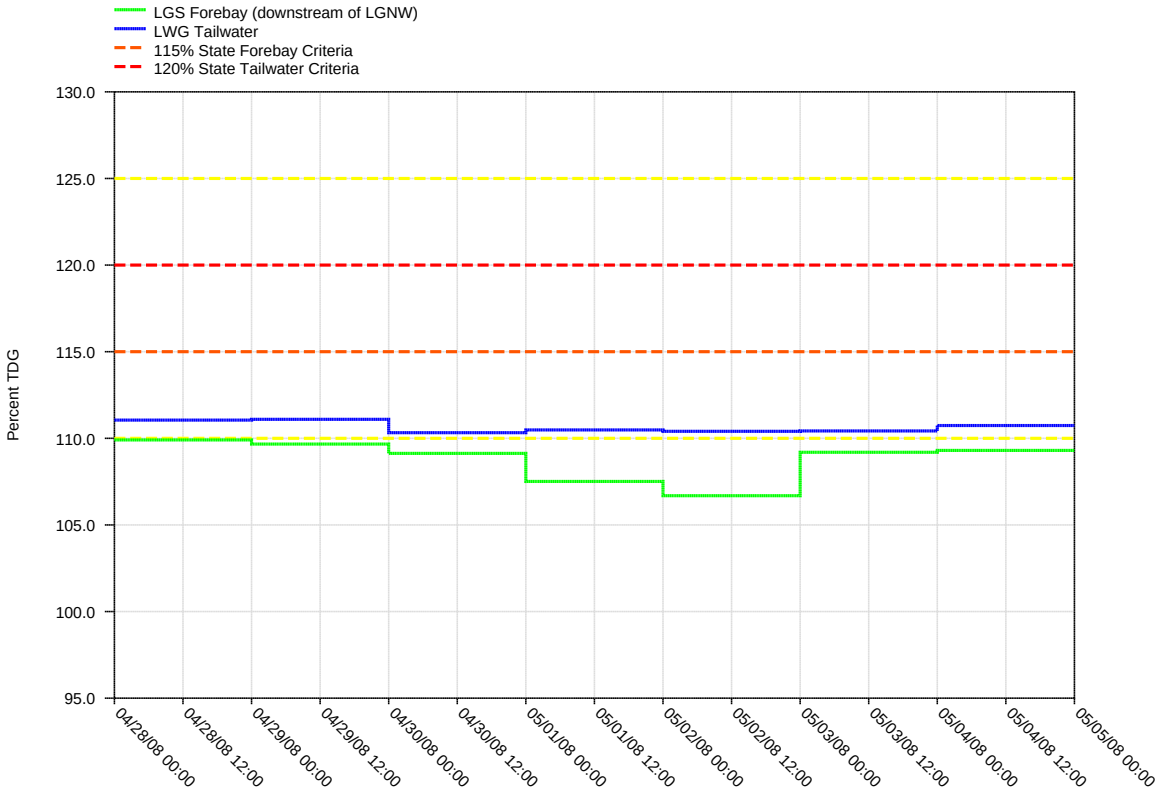


Figure 29.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

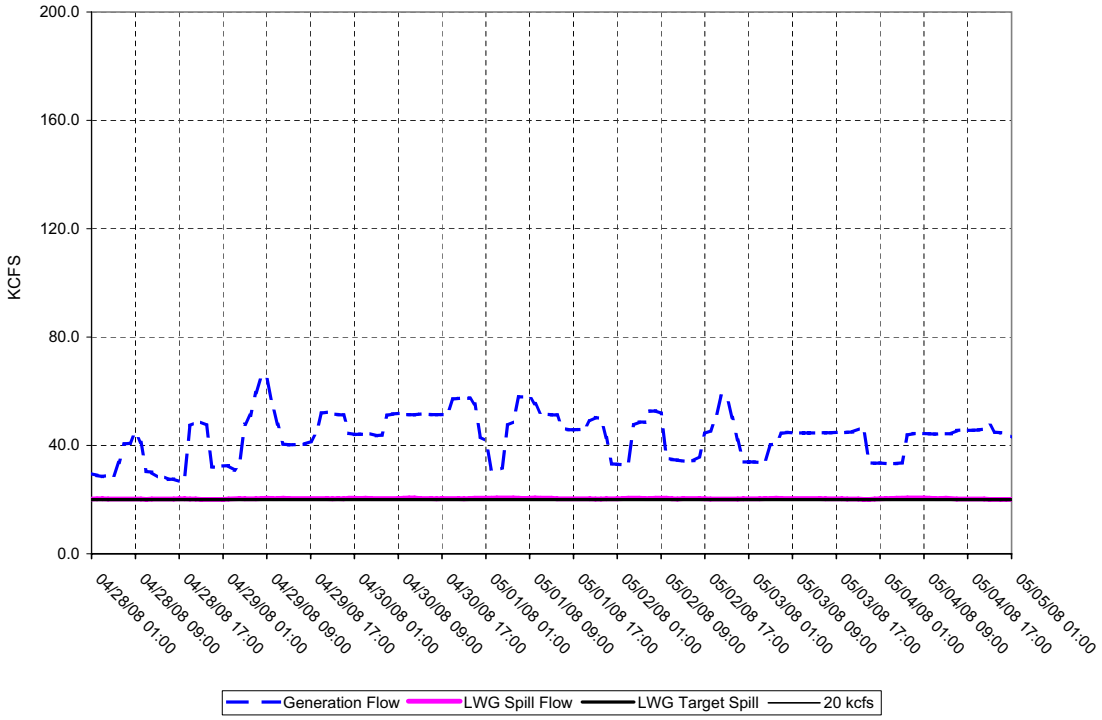
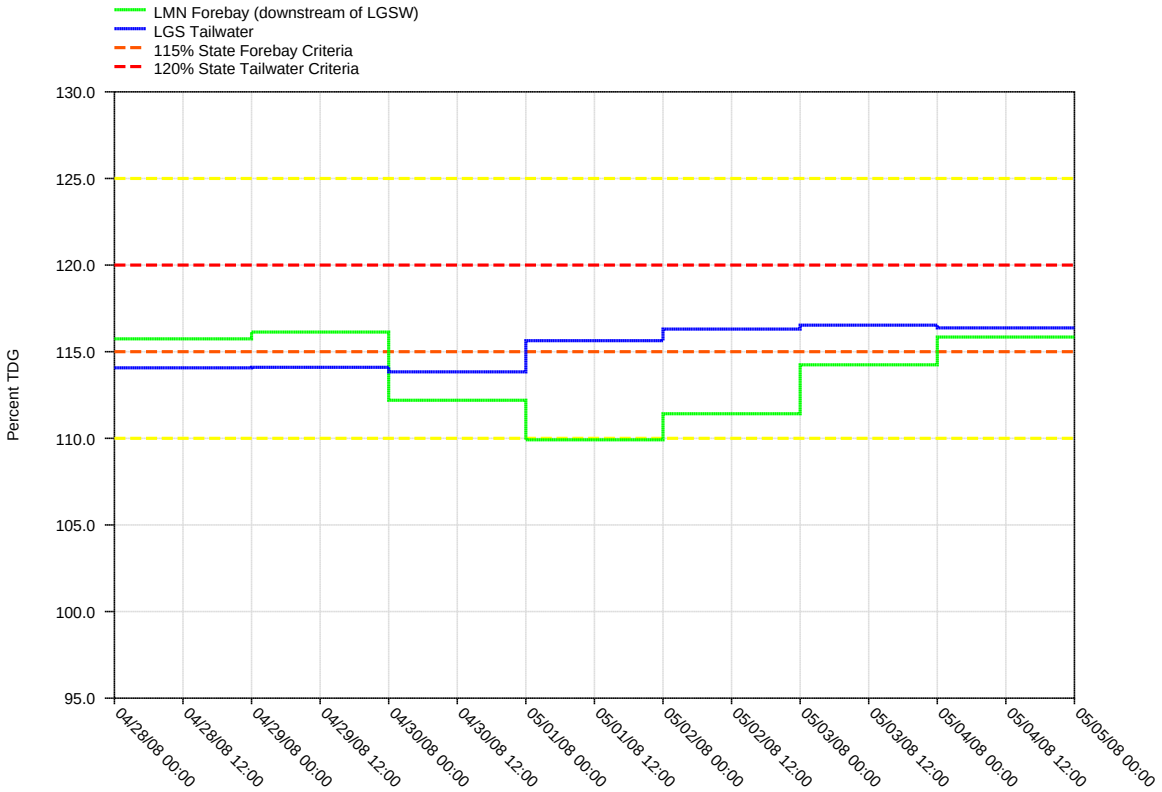


Figure 30.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

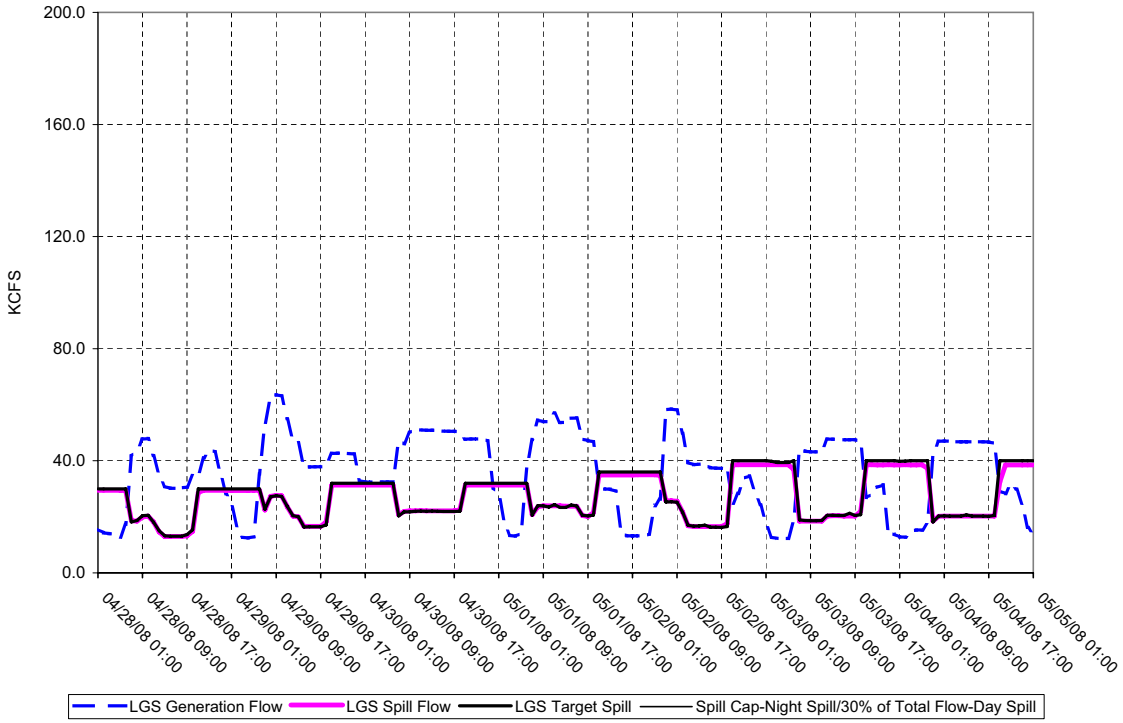
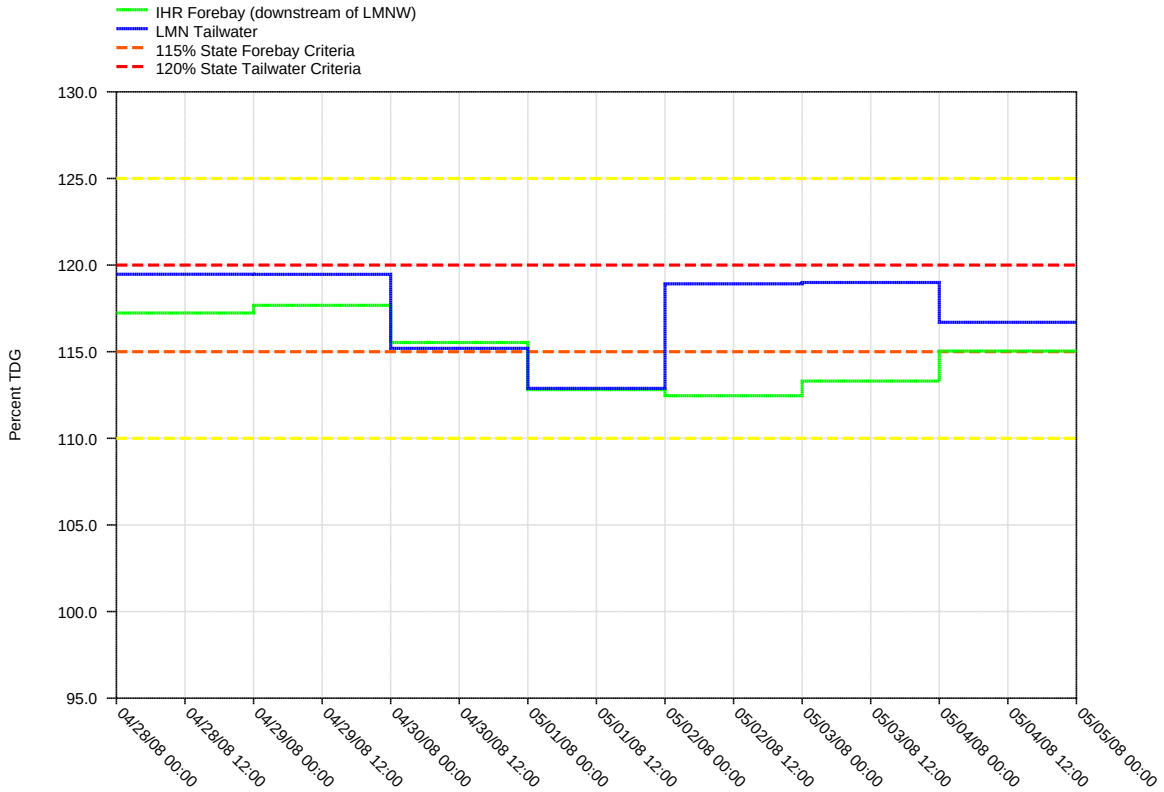


Figure 31.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

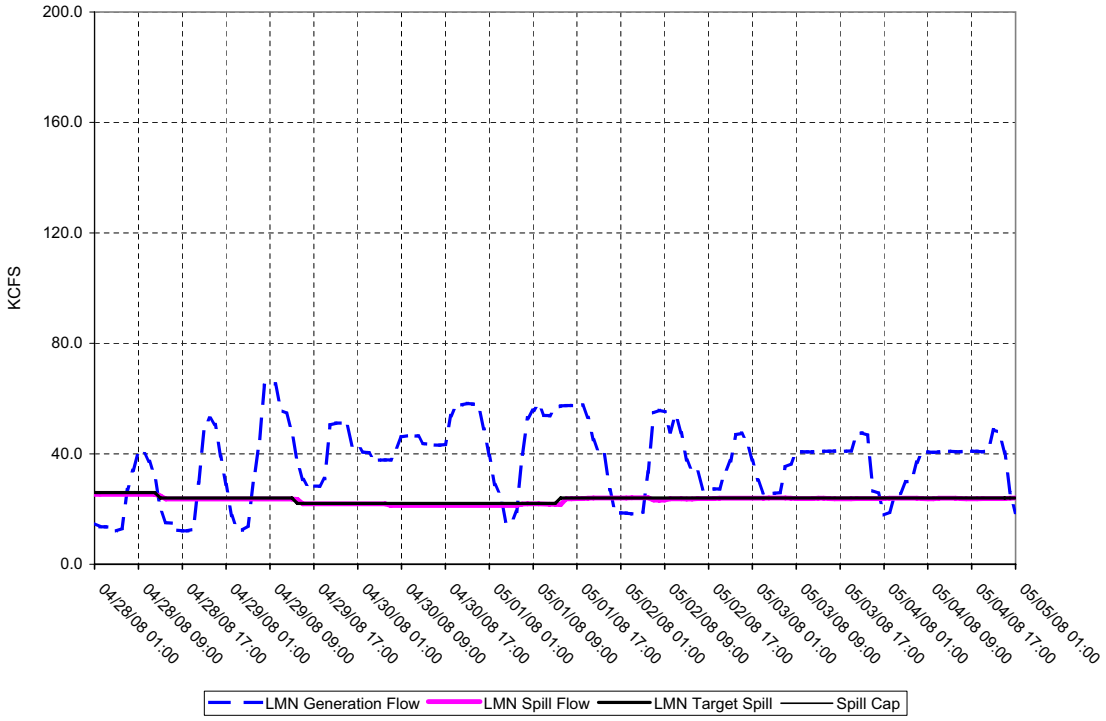
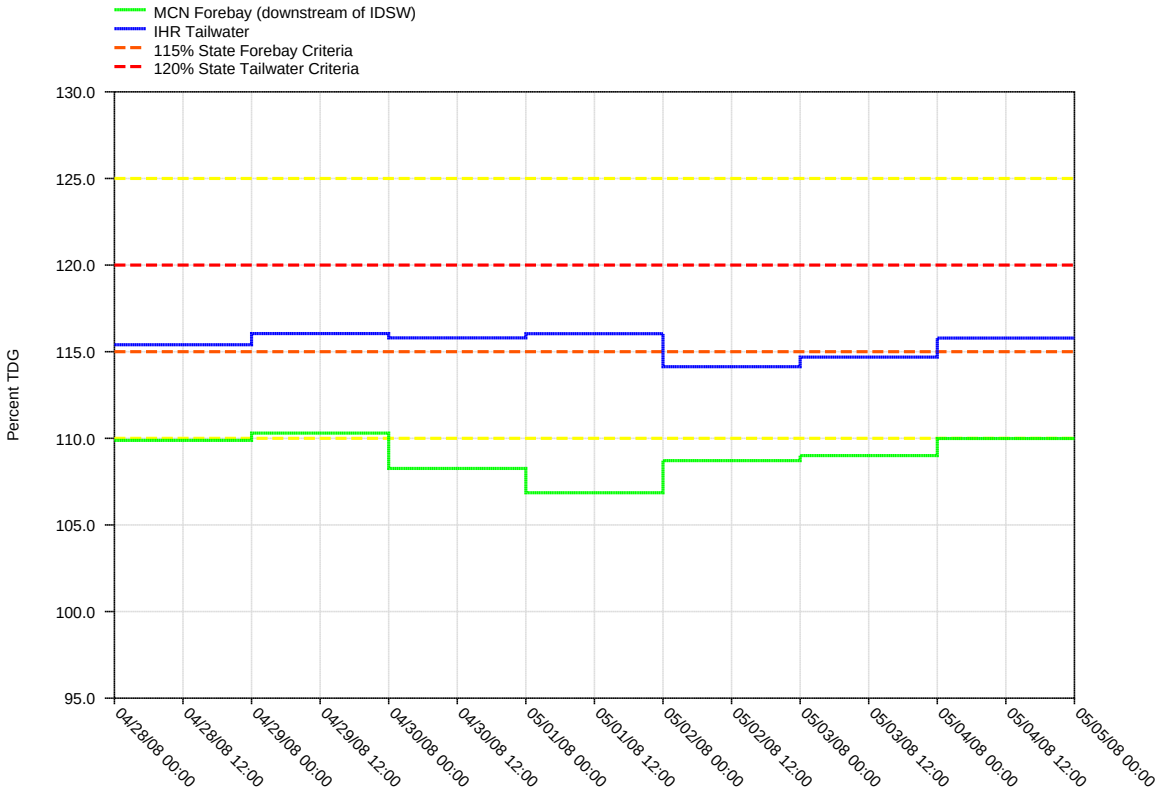


Figure 32.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

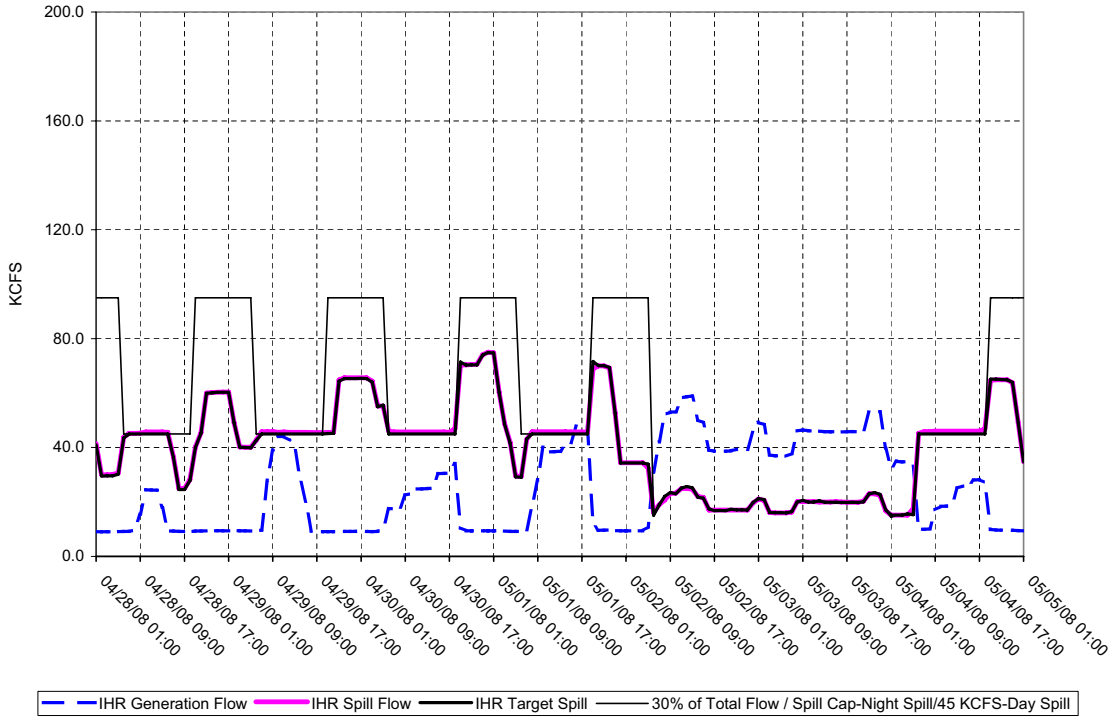
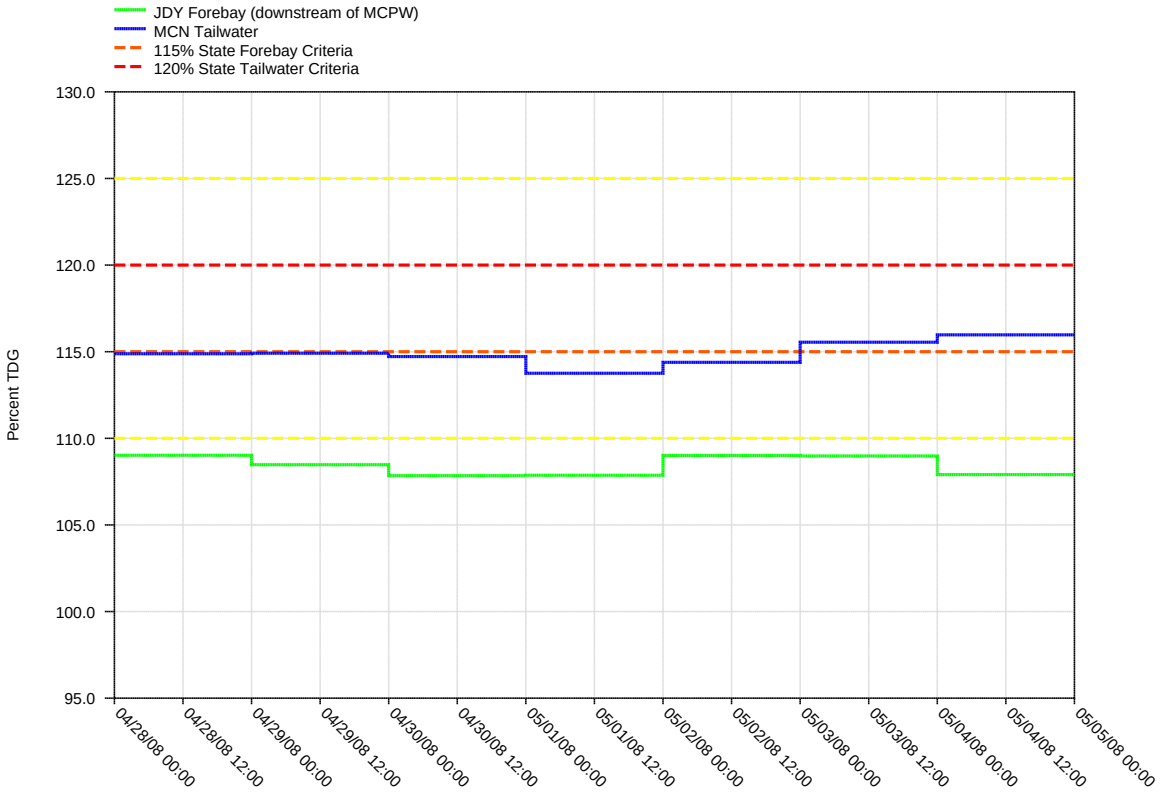


Figure 33.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

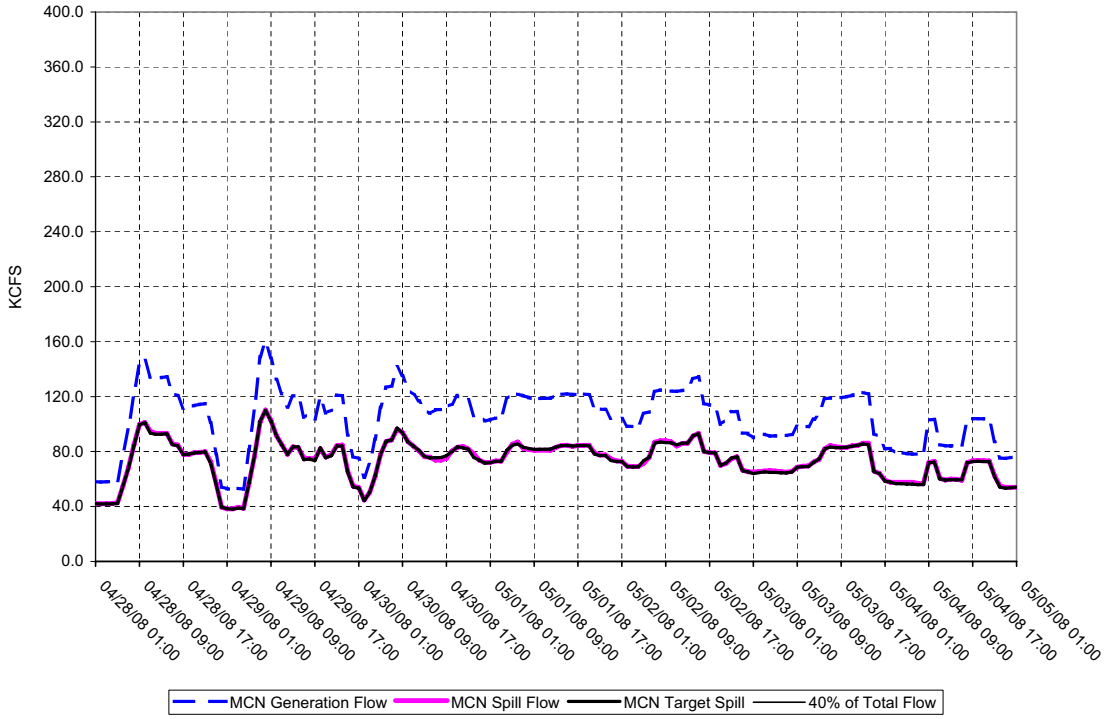
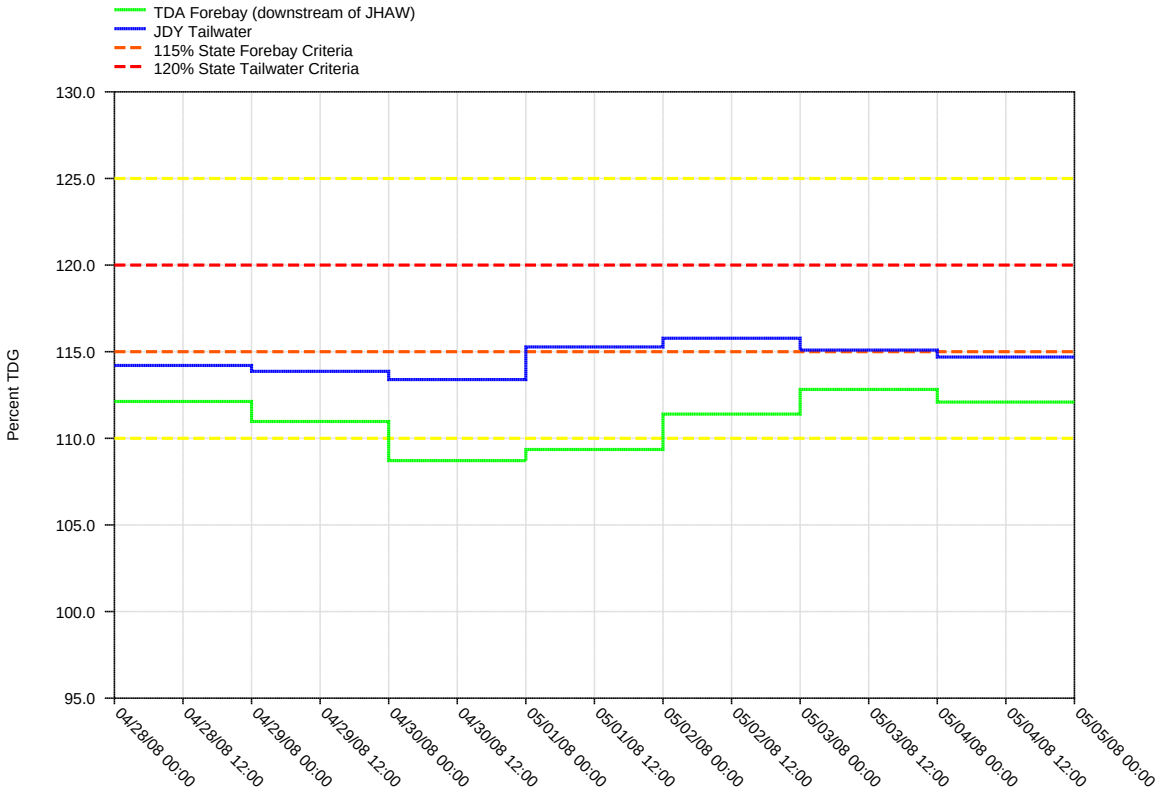


Figure 34.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

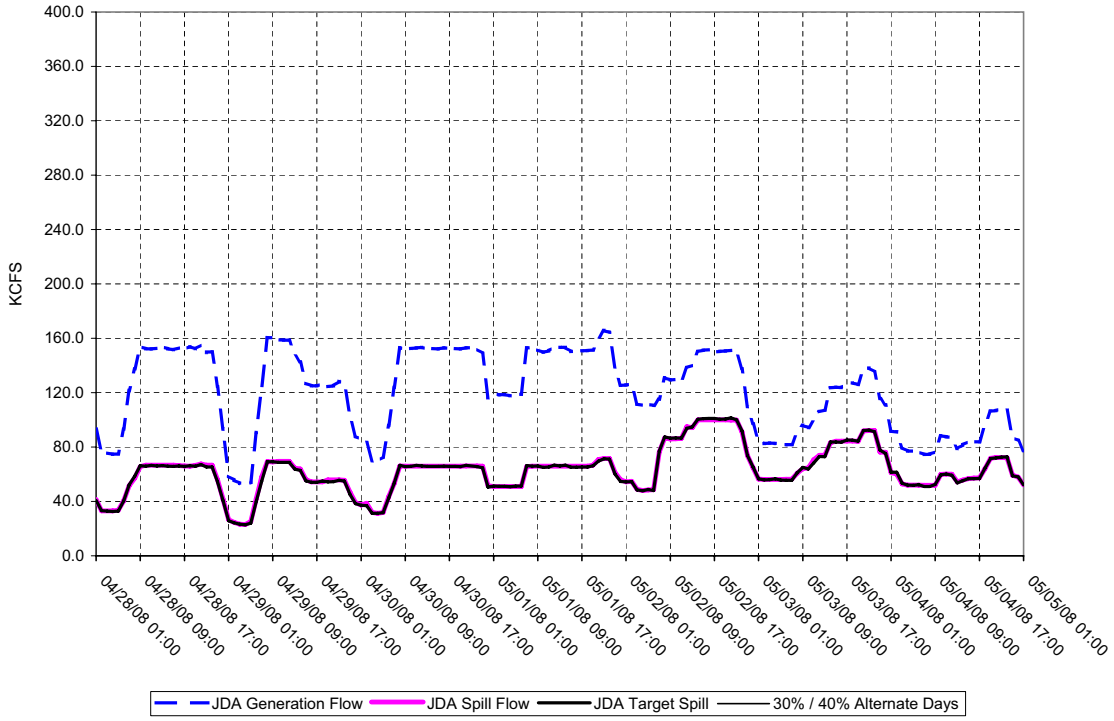
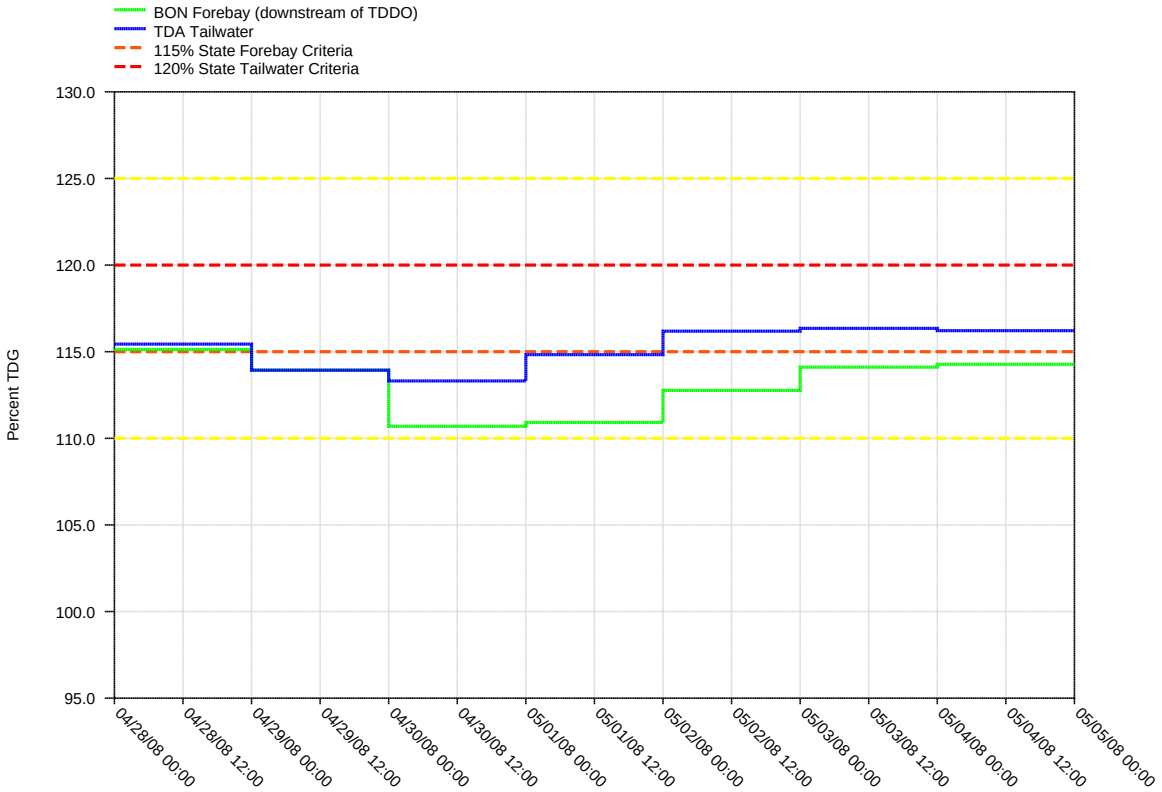


Figure 35.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

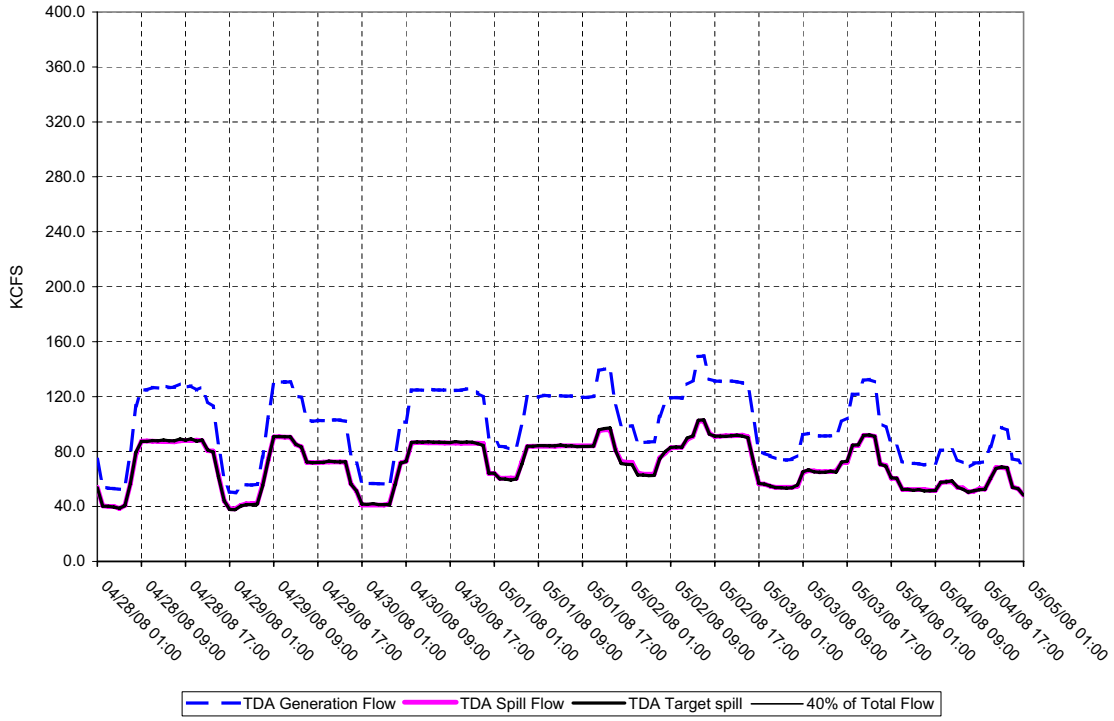
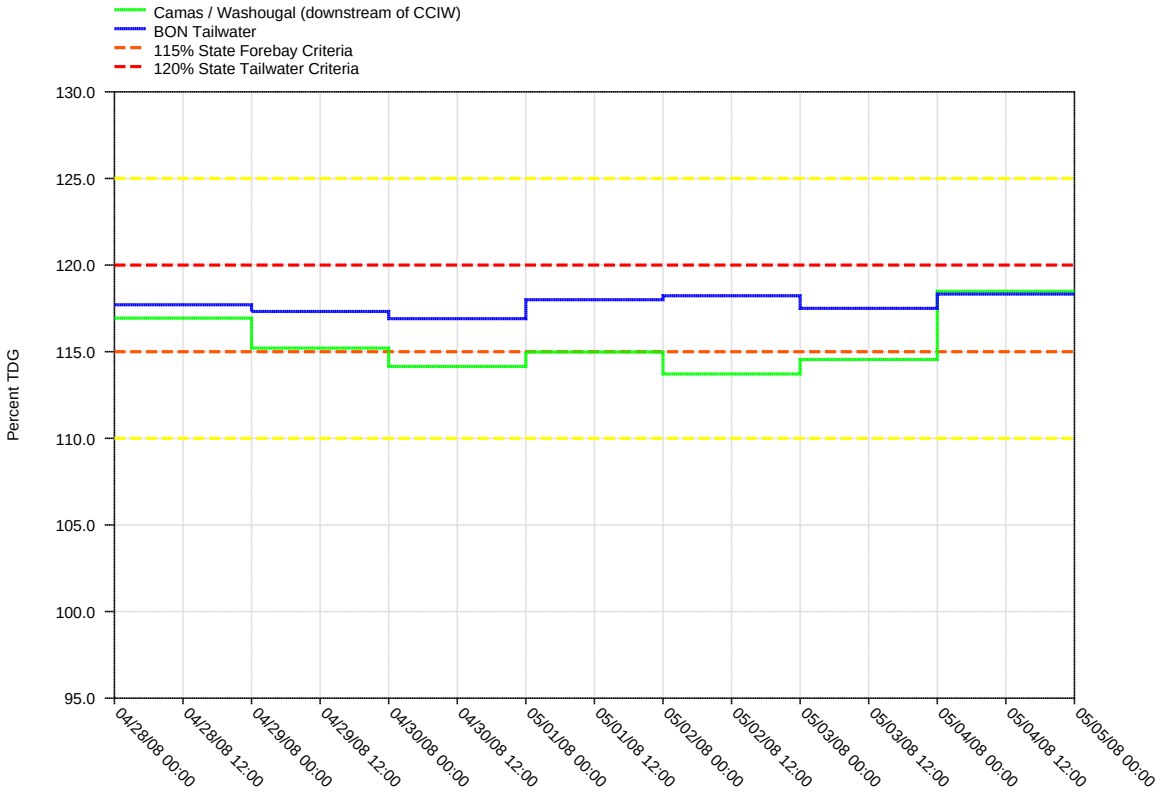


Figure 36.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

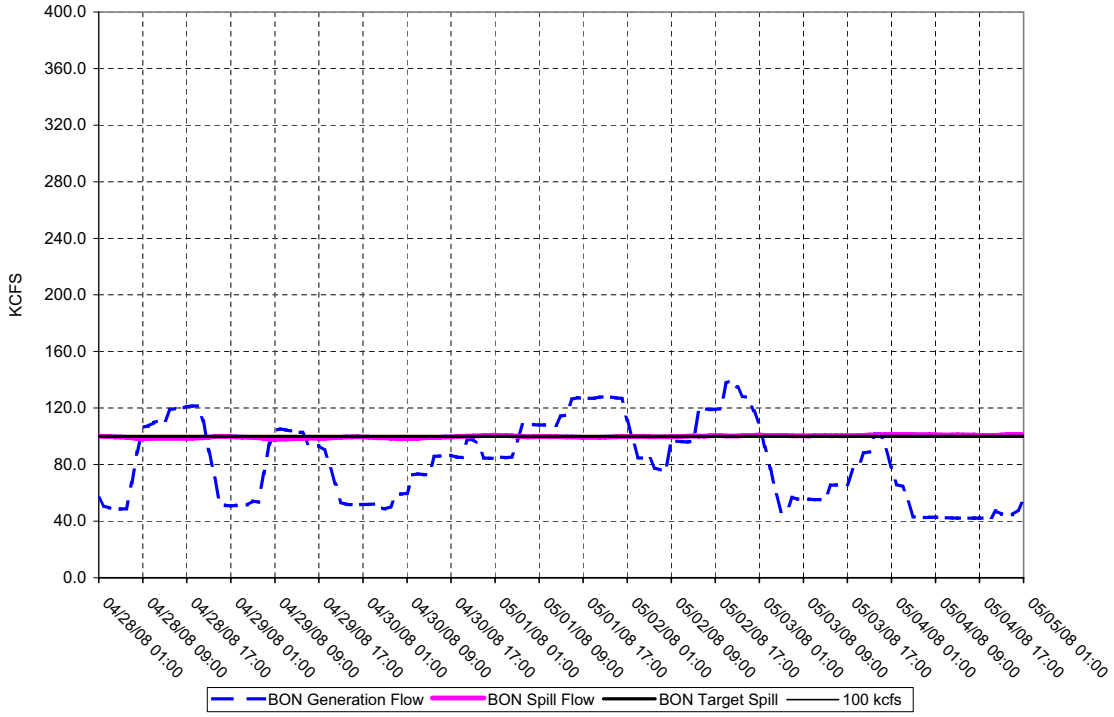


Table 1.
Average percent TDG for 12 highest hours: April 3 – May 4, 2008

Date	Monitoring Stations (full list)																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
04/03/2008	101.3	111.5	101.7	111.9	101.0	117.7	102.4	115.2	104.0	103.4	103.9	110.7	107.3	107.4	105.0	116.9	108.1
04/04/2008	102.4	111.7	102.6	111.6	101.8	117.6	103.0	114.1	105.1	104.1	103.9	109.7	106.8	106.6	106.6	116.8	107.6
04/05/2008	102.2	111.9	102.1	107.0	102.0	117.3	103.1	115.3	104.5	103.8	103.7	103.2	106.2	106.4	106.4	116.1	109.6
04/06/2008	102.4	111.3	102.3	107.5	104.8	117.4	108.5	116.4	105.8	104.8	103.8	103.8	104.4	105.5	106.6	116.9	109.4
04/07/2008	102.5	111.9	103.2	109.3	106.5	116.2	110.4	114.4	105.2	104.5	103.7	103.2	103.4	103.6	106.1	116.9	108.4
04/08/2008	102.8	111.8	106.2	110.5	106.2	116.5	112.0	116.0	105.2	104.7	104.4	103.6	104.2	104.2	106.2	117.2	109.8
04/09/2008	102.5	112.0	107.6	113.3	105.6	117.4	112.9	114.9	105.6	109.8	104.2	104.0	103.9	104.3	105.0	116.2	109.2
04/10/2008	101.9	111.8	107.2	113.0	105.7	116.1	113.7	114.2	105.0	115.3	103.3	116.7	103.4	111.0	103.6	117.3	108.8
04/11/2008	101.3	111.7	108.3	111.2	106.7	116.9	114.1	114.6	105.0	115.2	103.2	118.3	108.3	113.8	104.4	117.2	**116.8**
04/12/2008	102.9	111.3	108.3	111.8	109.5	116.9	**115.7**	114.3	107.8	115.9	106.2	118.6	**115.3**	116.1	109.4	117.3	113.4
04/13/2008	103.9	111.7	111.2	109.5	111.8	118.6	**117.7**	114.8	108.6	116.5	106.3	116.7	**116.1**	118.1	114.4	117.4	**115.9**
04/14/2008	104.1	111.5	111.2	111.1	112.5	119.0	**118.3**	115.9	109.3	115.5	105.1	116.4	114.8	116.0	112.9	117.5	115.0
04/15/2008	103.5	110.8	109.3	111.3	111.2	118.8	**116.2**	115.7	107.3	114.9	104.2	118.2	107.0	112.1	109.2	117.2	113.6
04/16/2008	101.9	110.4	107.5	110.6	107.2	118.0	112.8	115.9	104.9	114.2	103.8	118.5	111.8	114.3	108.0	117.2	113.7
04/17/2008	99.8	110.2	107.5	115.2	108.1	118.4	112.9	115.8	105.9	115.1	105.8	118.4	112.7	115.7	109.0	116.9	113.8
04/18/2008	100.7	110.3	106.4	114.6	109.5	118.4	113.7	115.8	106.0	115.0	106.4	118.1	111.2	114.7	109.3	117.4	111.9
04/19/2008	102.3	110.3	106.9	110.8	110.5	118.6	113.1	116.0	105.6	115.7	106.1	118.3	111.6	115.3	108.6	117.6	113.3
04/20/2008	102.1	110.5	106.1	110.4	110.1	**120.1**	111.9	115.5	105.1	115.3	104.6	118.3	112.9	115.5	109.8	117.8	115.0
04/21/2008	100.8	110.4	105.2	110.0	109.3	120.0	112.2	115.6	104.8	115.1	104.0	116.1	114.6	116.2	110.8	117.2	114.0
04/22/2008	100.8	110.6	106.7	109.9	109.7	120.0	114.3	115.5	107.0	115.1	105.8	113.8	111.6	116.3	113.1	117.8	112.5
04/23/2008	100.9	111.6	107.4	110.8	109.7	119.1	115.0	115.3	107.1	114.8	105.9	113.8	109.2	113.9	114.9	117.1	113.2
04/24/2008	100.4	110.9	106.1	110.1	107.8	118.0	113.0	114.6	106.5	113.3	104.1	113.5	107.8	112.8	111.0	117.0	113.0
04/25/2008	100.6	110.1	105.6	116.2	106.9	117.9	111.7	114.9	105.9	113.5	104.4	115.4	107.5	113.4	110.0	117.4	114.2
04/26/2008	100.5	110.2	104.9	119.1	107.2	118.4	111.5	115.0	106.4	113.2	107.0	114.3	109.4	114.6	110.9	117.7	112.5
04/27/2008	101.4	110.2	107.4	113.8	109.6	118.5	114.1	115.3	109.1	114.2	108.5	113.8	111.2	114.6	113.7	117.2	114.8
04/28/2008	102.6	111.1	109.9	114.1	**115.7**	119.5	**117.2**	115.4	109.9	114.9	109.0	114.2	112.1	115.4	**115.1**	117.7	**116.9**
04/29/2008	104.7	111.1	109.7	114.1	**116.1**	119.5	**117.7**	116.0	110.3	114.9	108.5	113.9	111.0	113.9	113.9	117.3	**115.2**
04/30/2008	103.7	110.3	109.1	113.8	112.2	115.2	**115.5**	115.8	108.3	114.7	107.8	113.4	108.7	113.3	110.7	116.9	114.1
05/01/2008	102.1	110.5	107.5	115.6	109.9	112.9	112.8	116.0	106.9	113.8	107.9	115.1	109.4	114.8	110.9	118.0	115.0
05/02/2008	100.8	110.4	106.7	116.3	111.4	118.9	112.5	114.1	108.7	114.4	109.0	115.8	111.4	116.2	112.8	118.2	113.7
05/03/2008	101.7	110.4	109.2	116.5	114.2	119.0	113.3	114.7	109.0	115.5	109.0	115.1	112.8	116.3	114.1	117.5	115.0
05/04/2008	103.1	110.7	109.3	116.4	**115.8**	116.7	115.0	115.8	110.0	116.0	107.9	114.7	112.1	116.2	114.3	118.3	118.5

Generated: Mon May 5 14:25:01 2008

Number of hours of data reported in a given day

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Big, bold, red text denotes exceedances.
--- indicates No Data
Dates run from hour 1 to 24 (not 0 to 23).
The gas caps shown only apply when spilling to facilitate juvenile fish passage ("voluntary spill") between April 3rd and August 31st.
At all other times, the gas cap is 110%.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
WRNO	Bonneville Tailwater (Warrendale)
CWMW	Camas / Washougal

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
May 2008

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the February 25, 2008 court order adopting the 2008 Fish Operations Plan (FOP) and requiring the Corps to provide monthly reports on the implementation of the 2008 FOP. The FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. To the extent hydro-power operations are not specified in the 2008 FOP, the FCRPS operations will be consistent with the operations considered in the 2004 Biological Opinion and/or other operative documents, which include the 2008 Water Management Plan (WMP) and 2008 Fish Passage Plan (FPP).

The Corps' lower Columbia and Snake River projects and fish passage operations identified in the FOP for the month of May 2008 are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (TDG) for the tailwater at each project and for the next project's forebay downstream.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the spill program for the month of May 2008.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per week in May displaying the performance of the spill program as follows:

(A). Daily Average of the High 12 Hourly % TDG Values - described in the upper graph.
(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on May 5 and end on June 1 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start on Monday 0100 hours through Monday 0100 hours for the following dates:

May 5 – May 11	Figures 1 - 8
May 12 – May 18	Figures 9 – 16
May 19 – May 25	Figures 17 - 24
May 26 – June 1	Figures 25 – 32

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours as the result of spill from the dam. The objective is to operate each project up to the TDG limits without exceeding those limits if practicable.

- The blue line on the graph represents the TDG in the tailrace of the dam. 120% TDG is the upper operating limit.
- The green line represents the TDG in the forebay of the next dam downstream. 115% is the upper operating limit.

B. Lower Graph: Represents the flow and spill at the dam.

- The dotted blue line shows the average flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the average hourly spill level as defined in the 2008 FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Ice Harbor (15.2 kcfs) and Bonneville (50 kcfs) dams.

The hourly target spill may vary as a function of quantity of river flow, forebay elevation and generating units available at a project.

II. A monthly percent TDG Table is included at the end of the figures that shows the overall daily results of the average percent TDG for the 12 highest hours for all projects. The numbers in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

Please note that for all projects that spill for fish passage, the target spill may be limited to a lesser quantity (i.e. the spill cap), with the objective of staying within the TDG state waiver limits. When spill levels briefly deviated below or above the level described in the FOP, the heavy red line will be below or above the heavy black line in the graphs. Whenever the operation varied from the target spill during voluntary spill hours, or other anomalies occurred, these instances are described below. The FOP Spill Report Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the FOP Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spillway gate openings to implement the regionally coordinated spill pattern. The project operator sets the spillway gate openings to most closely approximate the FOP level of spill while also avoiding exceeding the spill cap.

"Low flow" operations on Lower Columbia and Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects operate at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour. During these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percent of the total flow than it had been during higher flows. As a result, even though the spill volume remained the same, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock. When theses variances occur, they are recorded in the FOP Spill Report Table below under the variance type “Navigation.” For the month of May, the “Navigation” variance identifies instances associated with reduced spill for the safe passage of fish transportation barges at Lower Monumental Dam.

Also note that actual spill levels at the Corps projects may range from 1 to 2 kcfs lower or higher than specified in the 2008 FOP, including the set spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2008 FOP describes project operations during “load swing hours” (page 8). For reporting purposes, the notation “Transmission Stability” in the FOP Spill Report

Table will replace “load swing hour” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these “Transmission Stability” hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days cited in the Table, the 24 hour average spill was within the FOP level of +/- 1% of the target spill unless involuntary spill occurred.

Occurrences which required an adjustment in operations and regional coordination are described in greater detail in the section below entitled “May Operational Adjustments Report.”

May Operations:

The month of May was characterized by average flows the first half of the month on the Lower Columbia and Snake rivers, followed by above average flows the latter half of the month. These high inflows across the Columbia Basin were the result of high atmospheric temperatures causing rapid snowmelt with high flows in the unregulated (natural) tributaries. With these high river flows came the start of the freshet on May 17, causing frequent instances of involuntary spill through the rest of the month as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. Also, involuntary spill occurred in non-peak hours when excess spill occurred due to lack of load. A contributing factor during non-peak hours was required repair work on the Grizzly-Summer Lake No. 1 500kV transmission line, which limited the amount of generation that could be sent down the California-Oregon Intertie (COI). Because of the large amounts of involuntary spill which occurred after the onset of the freshet, these are not included in the Spill Report Table. Instead, the Hourly Spill and Flow graphs reveal the hours when the volume of spill (red line) was higher than the target spill (bold black line). In many of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly % TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs.

During the spring reporting period, the daily spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs for 24 hours
- Little Goose Dam - the target spill was 30% of the total flow for 24 hours
- Lower Monumental Dam - the hourly target spill was to the spill cap for 24 hours
- Ice Harbor Dam – the hourly target spill was to 45 kcfs day/spill cap night and is shown as the heavy black line on the graph
- McNary Dam – the target spill was 40% of the total flow for 24 hours
- John Day Dam – the hourly target spill was 0 kcfs day/60% night
- The Dalles Dam - the target spill was 40% of total flow for 24 hours
- Bonneville Dam - the hourly target spill was a fixed quantity of approximately 100 kcfs 24 hours per day

May Operational Adjustments Report:

1. Fish Transport Operations:
   - Juvenile transportation research operations (one time/week) began at Lower Granite Dam on April 9 and continued through May.
   - Fish collection for routine transport began at Lower Granite on May 1, with the first barge departing on May 2, and continued throughout the month of May. Fish collections at Little Goose started on May 9 with the first barge departing on May 10. Fish collections at Lower Monumental began on May 12 with the first barge departing on May 13. On May 20 fish transport at Lower Monumental was temporarily halted due to high flow and excessive spill that prevented transport barges from being able to safely access the fish loading facility to load fish. Fish transport resumed at Lower Monumental on May 24 after the total outflow dropped to the 150 kcfs level. This change in fish transport was discussed and agreed upon by TMT members contacted by email and phone on May 20.

2. Little Goose Dam:
   - A three treatment (3 varying spill patterns) adult salmon passage study began on April 3, 2008 and continues until the end of spill operations on August 31, 2008. At the request of the salmon managers, a 14 day spring spill to the spill cap operation to facilitate juvenile salmonid passage was initiated on April 25, 2008 and continued until May 9, 2008. This operation consisted of spilling to the spill cap at night (1800 to 0600 hours) and continued with the daytime (0600-1800 hours) spill of 30% of total project outflow up to the spill cap.
   - On May 30 there was a unit outage for the Extended-Length Submersible Bar Screens (ESBS) inspection that caused the project to reduce generation by about 20 kcfs for 7 hours and increase spill by the same amount during that period. The once per month spring ESBS inspections are included in the 2008 FPP, page LGS-9.

3. Lower Monumental Dam:
   - A two treatment (two varying spill patterns) spring spill test started on April 30, 2008 and continued until June 1, 2008 to examine fish passage and survival at the project with the recently installed Removable Spillway Weir (RSW) in place.

4. Ice Harbor Dam:
   - On May 2, 2008, a two treatment (30% vs. 45kcfs/Gas Cap) spring spill test for juvenile salmonid passage was initiated utilizing two test spill patterns from the 2008 FPP. This two-treatment evaluation will continue through July 16, 2008 and utilizes the same treatment schedule that was used in 2007 ending on the same date.

5. John Day Dam:
   - On April 29, 2008 a two treatment (30% vs. 40% spill) juvenile salmonid passage and survival evaluation was initiated to evaluate two recently installed Temporary Spillway Weirs (TSWs) under two spill levels. This two-treatment evaluation will continue until July 18, 2008.

6. Bonneville Dam:
   - On May 8 and 12, project operators increased spill above the spill cap to flush debris from the spillway forebay in order to minimize damage to research equipment. This operation is included in the 2008 FPP and was also coordinated at the May 8 FPOM meeting.

7. Other operations in the lower Snake and Columbia rivers that varied from those described in the FOP were discussed and agreed to in the Regional Forum process prior to commencement and are addressed below. Those operations coordinated with regional salmon managers were planned such that they would have the least impact to fish (also cited in the FOP Spill Report Table below).

   a. Little Goose Dam:
      - During the two-week nighttime gas cap spill operation, a uniform spill pattern was used exclusively during nighttime hours from April 30, 2008 to the end of the operation on May 9, 2008, to provide better juvenile fish survival. This operation was requested by NOAA and discussed and agreed to by the salmon managers on the April 30, 2008 TMT conference call.

   b. Bonneville Dam:
      - At Bonneville Dam on May 9, spillbays 9, 12, and 14 were shut down so that a dewatering pump could be replaced in the spillway gallery. A modified spill pattern was developed and coordinated with FPOM and TMT that allowed spill level to remain constant by shifting spill from out-of-service bays to other operating bays while the pump replacement was completed.

      - At Bonneville Dam on May 12, the BII corner collector was shut down from 1200-1800 hours so that work boats could safely access the BII forebay to conduct maintenance activities on research equipment. This action was coordinated through both TMT and FPOM groups on May 7 and May 8 with all members concurring with the outage to accommodate the research equipment maintenance activities.

- At Bonneville Dam on May 21-23, due to high river flow and corresponding high debris load, Submersible Traveling Screens (STSs) installed in turbine intakes to guide and route fish away from turbines and past the dam, were removed. Excessive amounts of debris were accumulating on the screens and causing an increased incidence of descaling of fish passing the dam. This situation was discussed at the May 21 TMT meeting with the decision that the best course of action to alleviate the elevated descaling was to remove the screens until flows and debris subside. STSs have been re-installed periodically in unit 11 but removed again due to continued high debris loads. STSs will likely not be re-installed at the Bonneville second powerhouse until river flow and debris loads subside – likely mid June.

Additional Activities

As indicated in the FOP, the Corps is proceeding with the planned maintenance action to modify gate hoists to allow closure of TSWs at McNary Dam (spillbays 19 and 20). This automatic hoist installation allows for transportation operations at McNary Dam to proceed during summer months as outlined in the 2008 FOP. Without these hoists in place, the TSWs cannot be opened and closed in a timely manner to allow transport barges to safely access the fish loading facility below McNary Dam. To accomplish this work, some spillbays will be closed intermittently starting June 12 until approximately June 14. During this period, overall 2008 FOP spill levels remain the same as spill that would normally pass through the TSW bay(s) is distributed among other open bays. Once the maintenance work is completed normal FOP spill operations will resume.

FOP Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	5/8/2008 - 5/10/2008	0300 - 0300	24	Operational Limitations / Maintenance	Hourly spill increased to a peak of 48.1 kcfs, above 20 kcfs FOP level: due to high inflows in excess of generation capacity resulting in involuntary spill. Generation Units 1 and 2 off-line for repairs.
Lower Granite	Add'l Spill	5/10/2008	0800-1900	12	Operational Limitations / Maintenance	Hourly spill increased to 25.8 kcfs, above 20 kcfs FOP level: due to high inflows in excess of generation capacity resulting in involuntary spill. Generation Units 1 and 2 off-line for repairs.
Little Goose	Add'l Spill	5/28/2008	1000-1100	2	Operational Limitations	Hourly spill increased to 46.5 kcfs, above the 37 kcfs spill cap: due to project spilling for debris removal. During this operation generation dropped from 90 kcfs range to 53 kcfs. Operation included in the 2008 FPP.

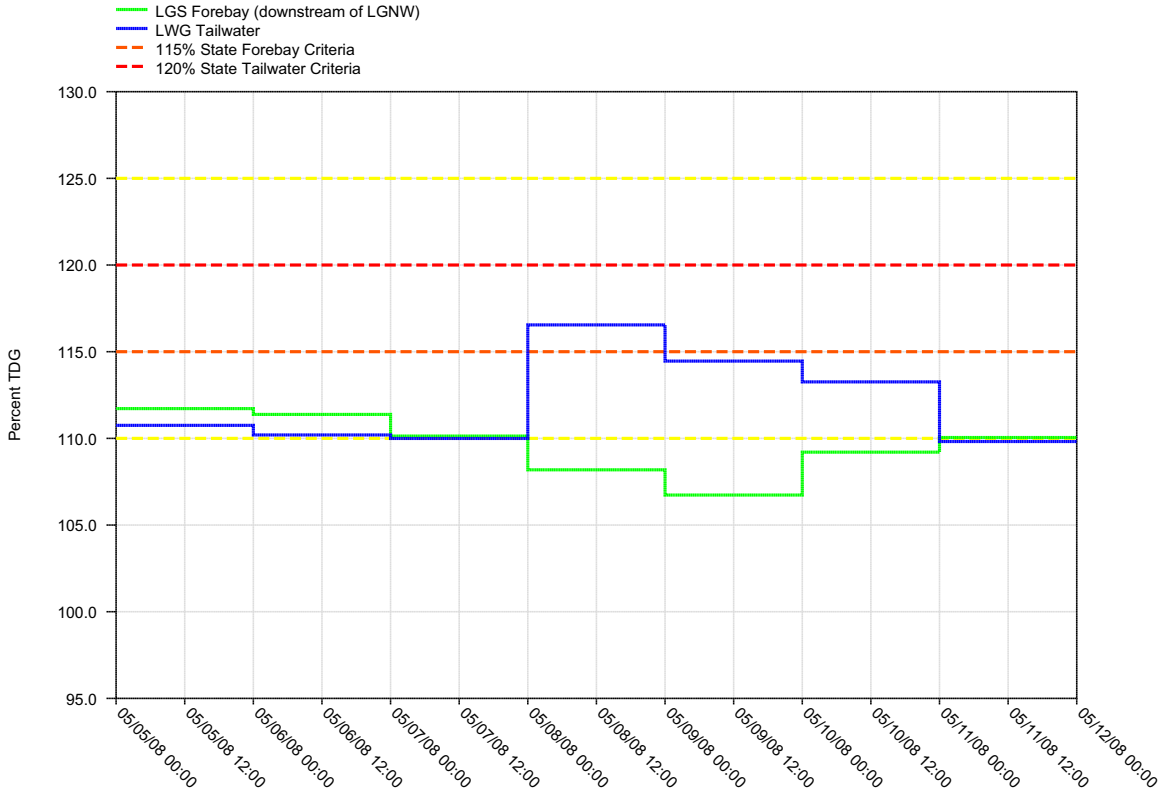
Little Goose	Add'l Spill	5/30/2008	1000-1600	7	Maintenance	Hourly spill increased to 76.2 kcfs, above the 37 kcfs spill cap. Generation dropped from 90 kcfs range to 72 kcfs due to unit outage for an ESBS inspection. Once per month spring ESBS inspections are in 2008 FPP on page LGS-9.
Lower Monumental	Spill	5/13/2008	1900-2000	2	Navigation	Hourly spill at 9.3 and 15.8 kcfs instead of the spill cap of 24 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/14/2008	2100-2200, 2400	3	Navigation	Hourly spill range from 16.3 to 24.3 kcfs instead of the spill cap of 28 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/15/2008	1800-2000	3	Navigation	Hourly spill range from 14.7 to 25.8 kcfs instead of the spill cap of 28 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/16/2008	2100-2300	3	Navigation	Hourly spill range from 22.4 to 24.5 kcfs instead of the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/17/2008	1800, 2000	2	Navigation	Hourly spill of 14.5 and 17.6 kcfs instead of the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/24/2008	1800-2000	3	Navigation	Hourly spill dropped to 21.3 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/25/2008	1800-2000	3	Navigation	Hourly spill dropped to 18.8 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/26/2008	1800, 2000	2	Navigation	Hourly spill dropped to 18.7 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/27/2008	1800-1900	2	Navigation	Hourly spill dropped to 16.2 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/28/2008	1900-2000	2	Navigation	Hourly spill dropped to 15.6 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/29/2008	1700-1800	2	Navigation	Hourly spill dropped to 12.3 kcfs, below the spill cap of 22 kcfs. Fish barge needed reduced spill for safe passage.
Lower Monumental	Spill	5/30/2008	1900	1	Navigation	Hourly spill dropped to 20.2 kcfs, below the spill cap of 22 kcfs. Fish barge needed reduced spill for safe passage.

Lower Monumental	Spill	6/1/2008	2000	1	Navigation	Hourly spill dropped to 20.3 kcfs, below the spill cap of 22 kcfs. Fish barge needed reduced spill for safe passage.
Ice Harbor	Spill	5/7/2008	100	1	Navigation	Hourly % spill decreased to 27.9% (below 30% +/- 1% range): Load increased at top of hour but spill was not increased in time due to operator dealing with a lockage previous hours, therefore percentage went down. 24 hr avg. spill was 29.7%.
Ice Harbor	Add'l Spill	5/8/2008	0900-1800	10	Operational Limitations	Hourly spill increased to 55.1 kcfs, above 45 kcfs FOP level due to project passing inflow since pool was near full resulting in involuntary spill.
Ice Harbor	Add'l Spill	5/12/2008	1700-2000	4	Maintenance	Hourly % spill increased to 37.0% (above 30% +/- 1% range): Project operator had to take unit #4 off-line and spill excess outflow due to mechanical problem.
John Day	Spill	5/10/2008	700	1	Human Error	Hourly percent spill was at 30.0% instead of 40%; due to delay in project switching to the FOP spill of 40% at 0600 hour.
John Day	Add'l Spill	5/10/2008	1900	1	Transmission Stability	Hourly percent spill was at 41.2% due to project being on response during rapidly changing load as described in the text on page 3. Spill operation split 30% vs 40%.
John Day	Add'l Spill	5/25/2008	2400	1	Operational Limitations	Hourly % spill increased to 41.7% (above 40% +/- 1% range) and generation dropped about 18 kcfs due to project being on response during rapidly changing load as described in the text on page 3. Spill cap limited spill for 21 hours.
John Day	Add'l Spill	5/30/2008	0800, 1800	2	Transmission Stability	Hourly % spill outside of 40% +/- 1% range; due to project being on response during rapidly changing load as defined in the text on page 3. 24 hr avg. spill was 31.5% (Involuntary spill during several hours).
The Dalles	Spill	5/8/2008	800	1	Transmission Stability	Hourly percent spill was at 38.6% instead of 40% FOP spill; due to project being on response during rapidly changing load as defined in the text on page 3. 24 hr avg. spill was 40.0%.
Bonneville	Add'l Spill	5/8/2008	1600-1900	4	Research Related	Hourly spill increased to 153.6 kcfs, above 100 kcfs FOP level. Project operators had to increase spill for flushing debris to minimize research equipment damage. Operation is part of the 2008 FPP.

Bonneville	Add'l Spill	5/9/2008	2200-2300, 2400	3	Operational Limitations	Hourly spill increased to 115.7 kcfs, above 100 kcfs FOP level; due to project passing inflow since pool was near full.
Bonneville	Add'l Spill	5/12/2008	1300-2100	9	Research Related	Hourly spill increased to 149.6 kcfs, above 100 kcfs FOP level. Project operators had to increase spill for flushing debris to minimize research equipment damage.

Figure 1.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

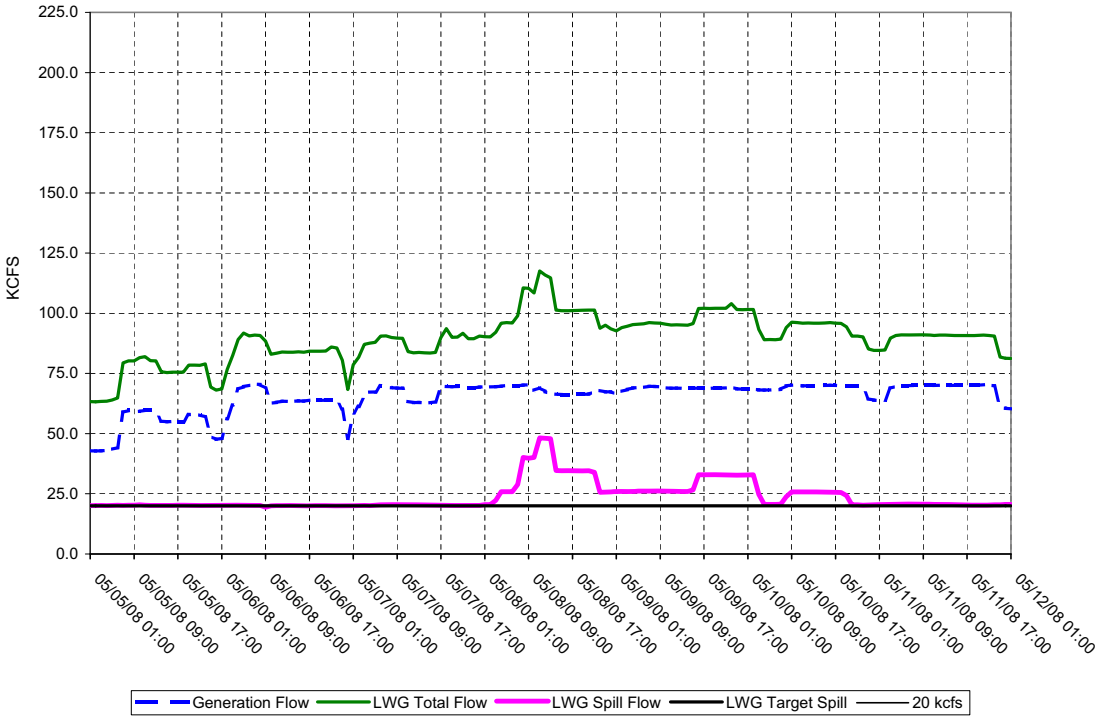
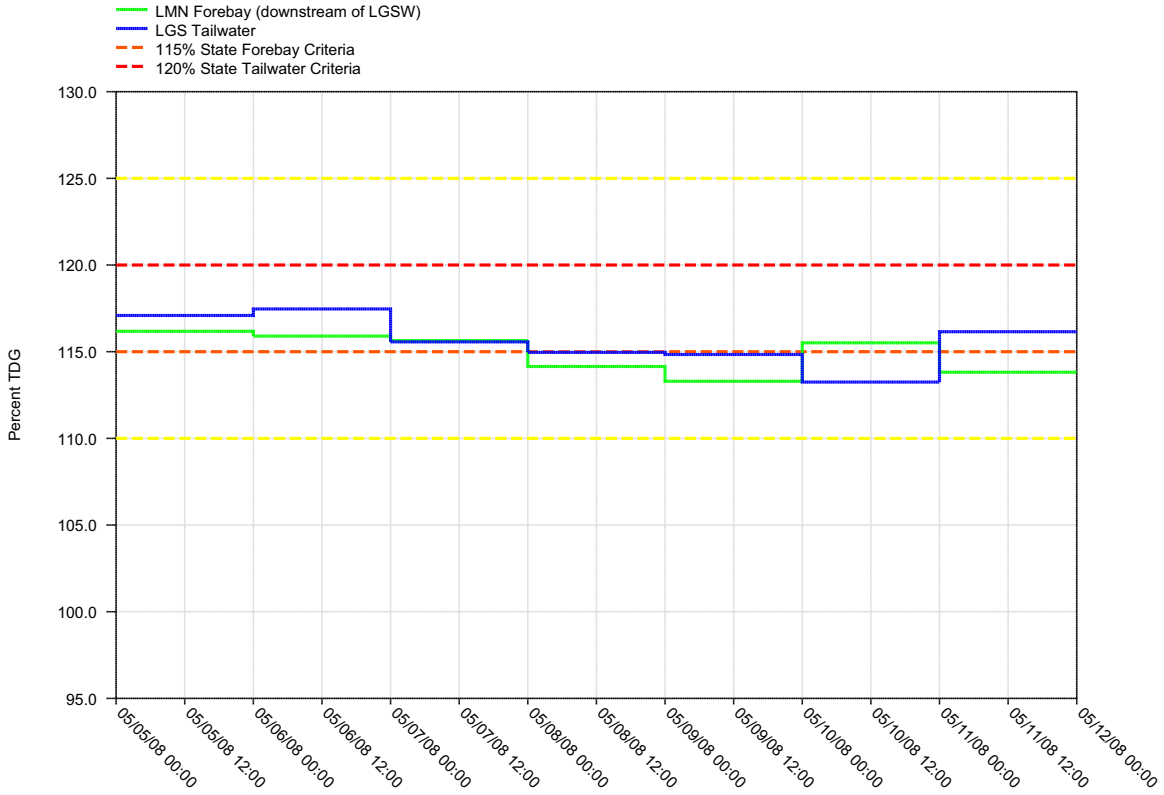


Figure 2.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

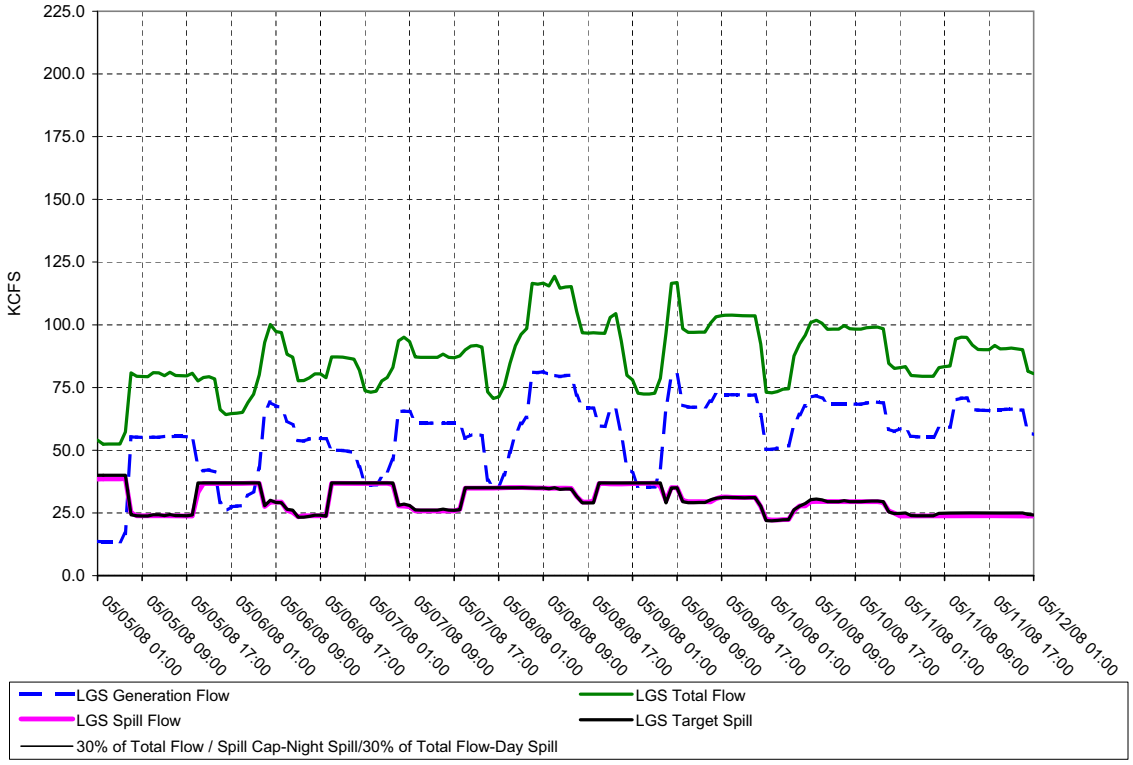
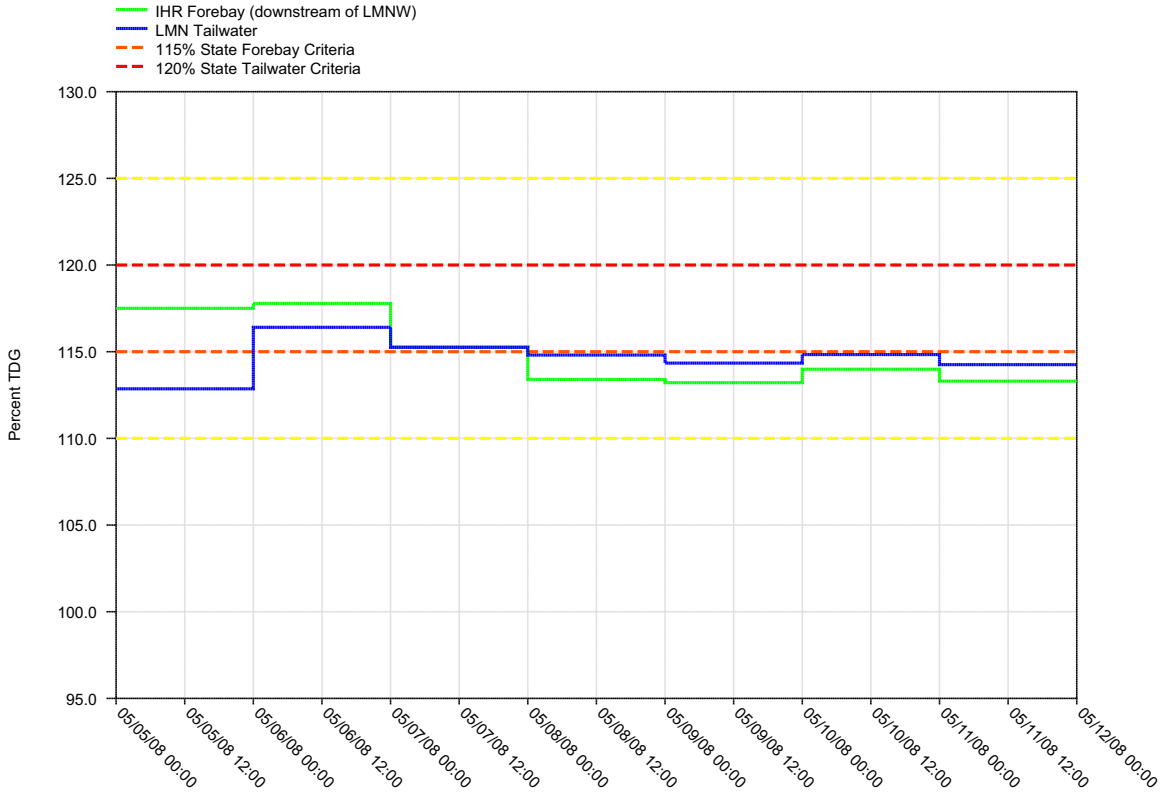


Figure 3.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

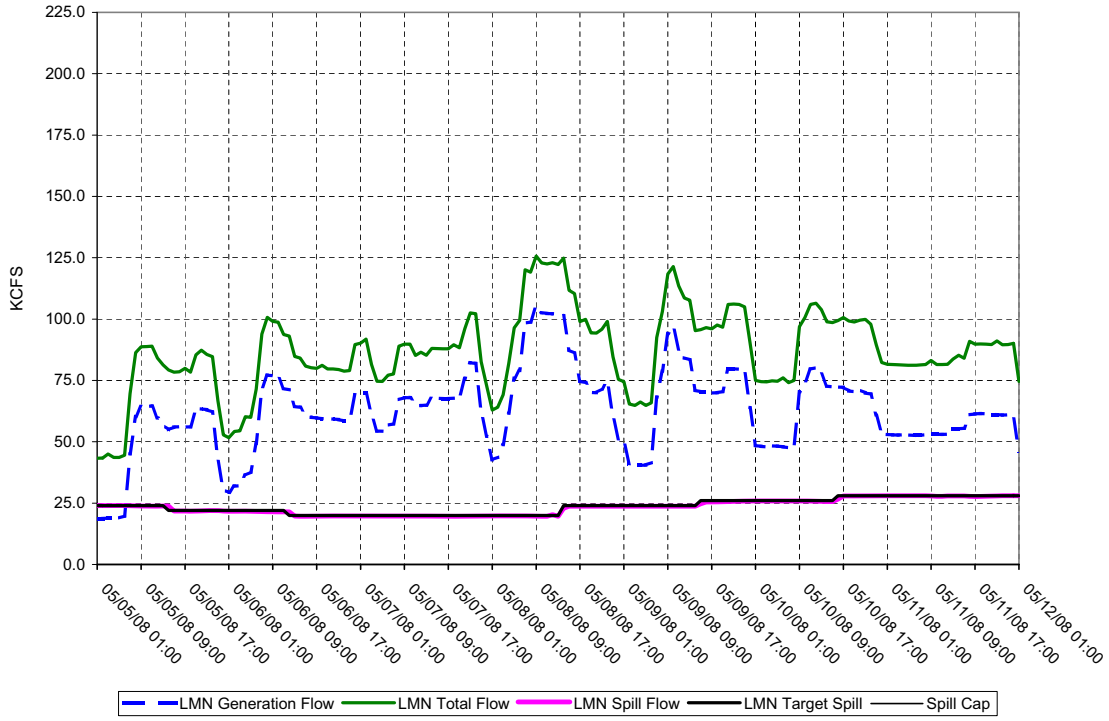
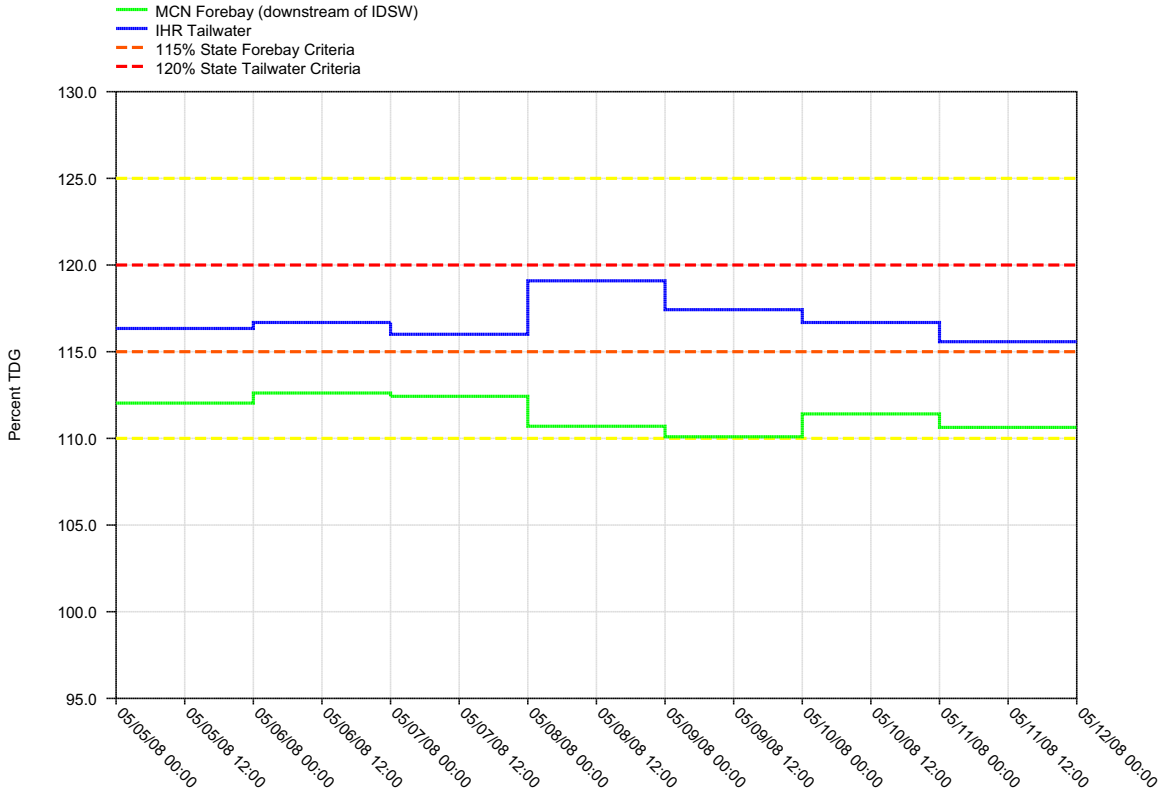


Figure 4.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

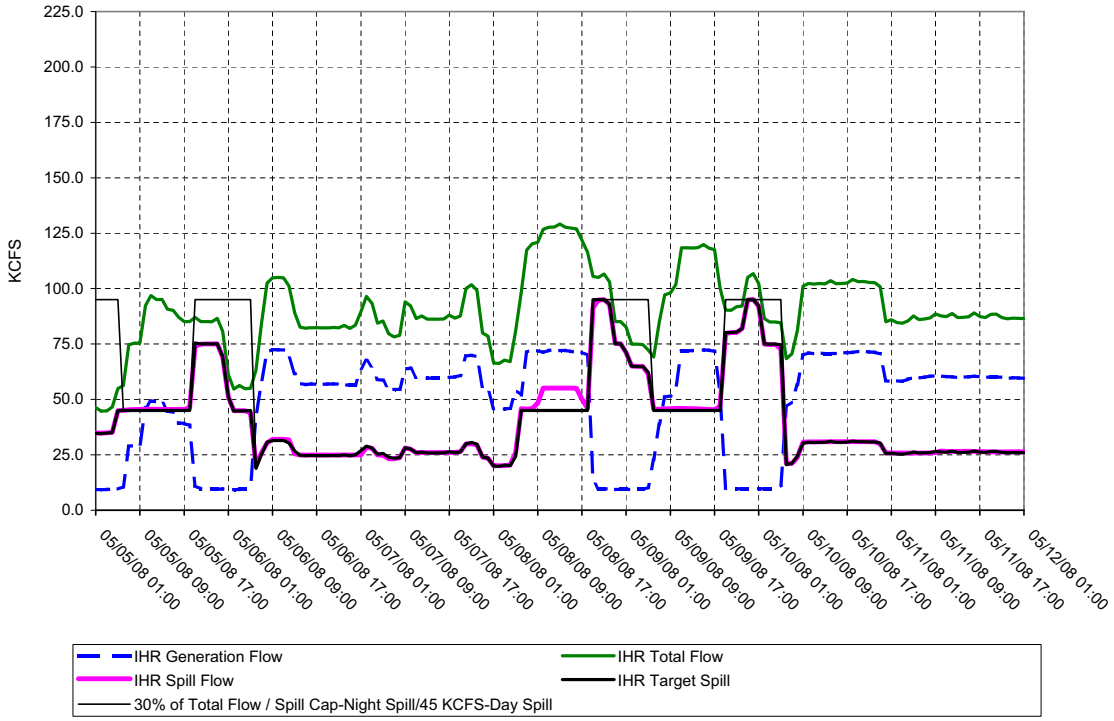
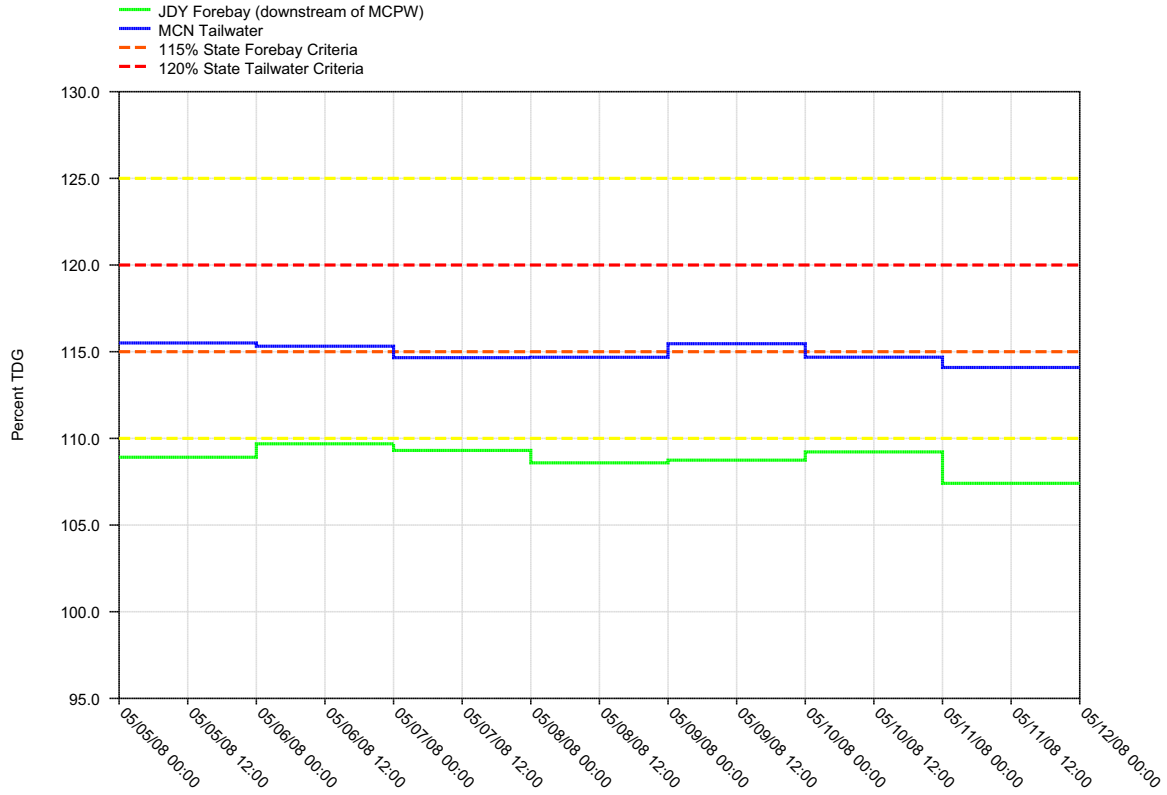


Figure 5.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

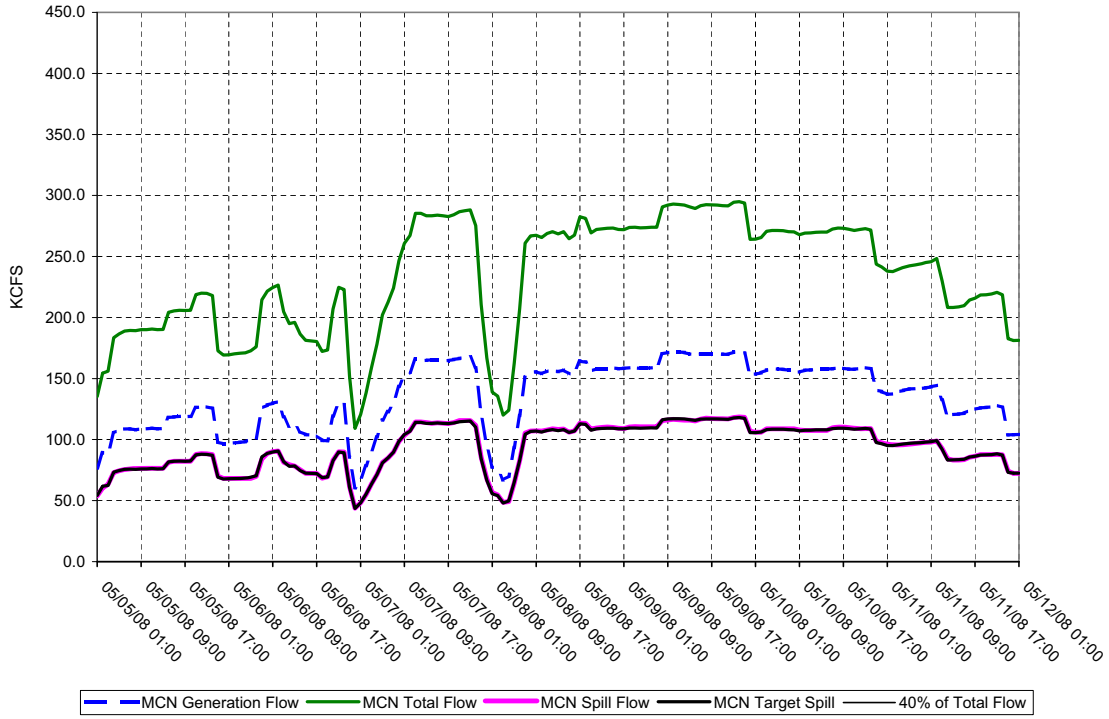
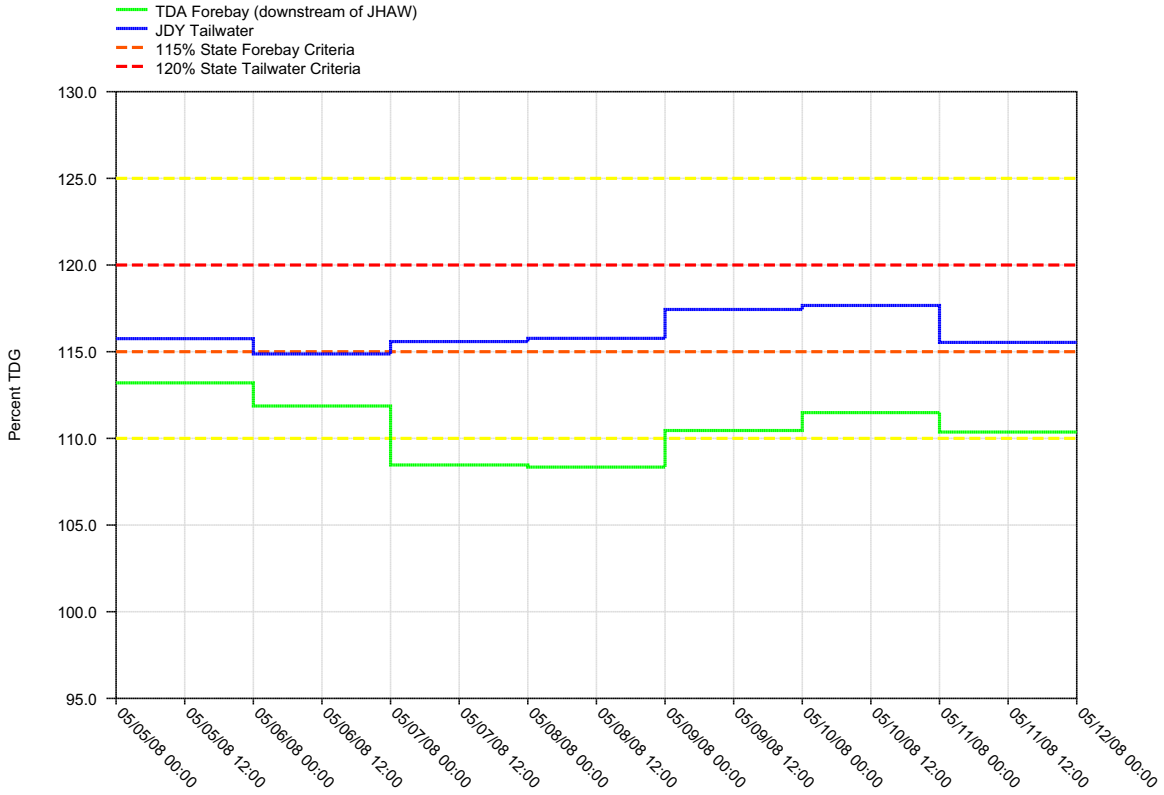


Figure 6.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

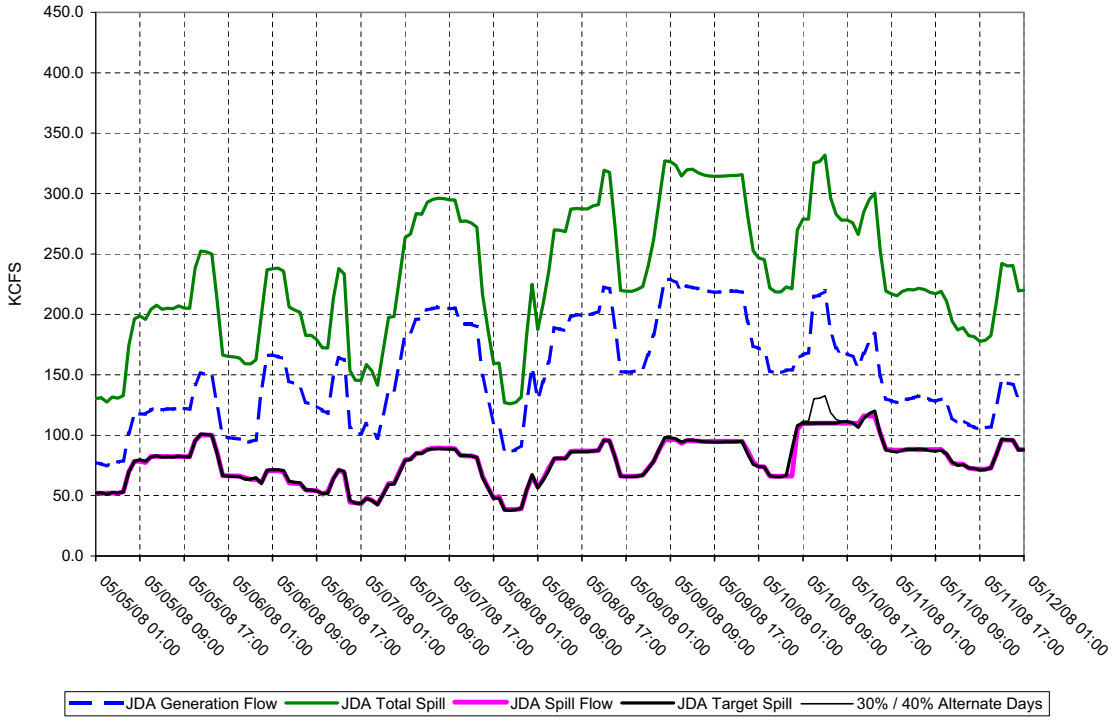
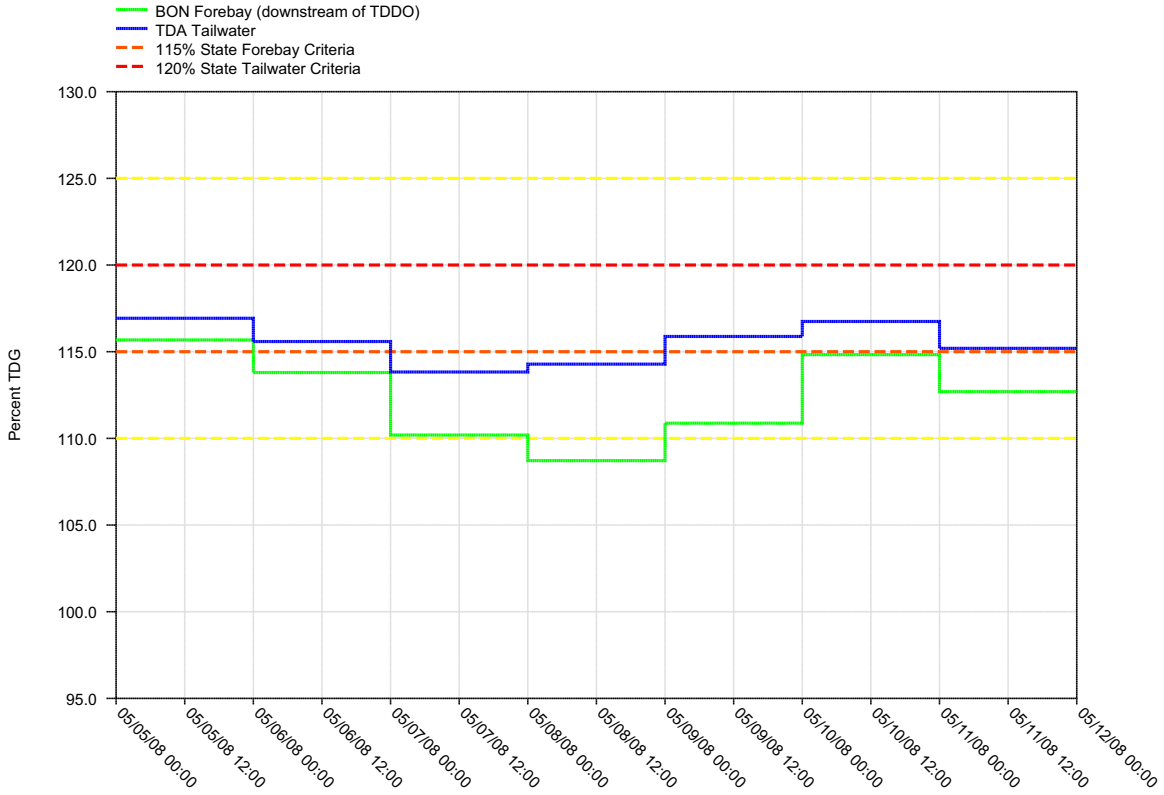


Figure 7.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

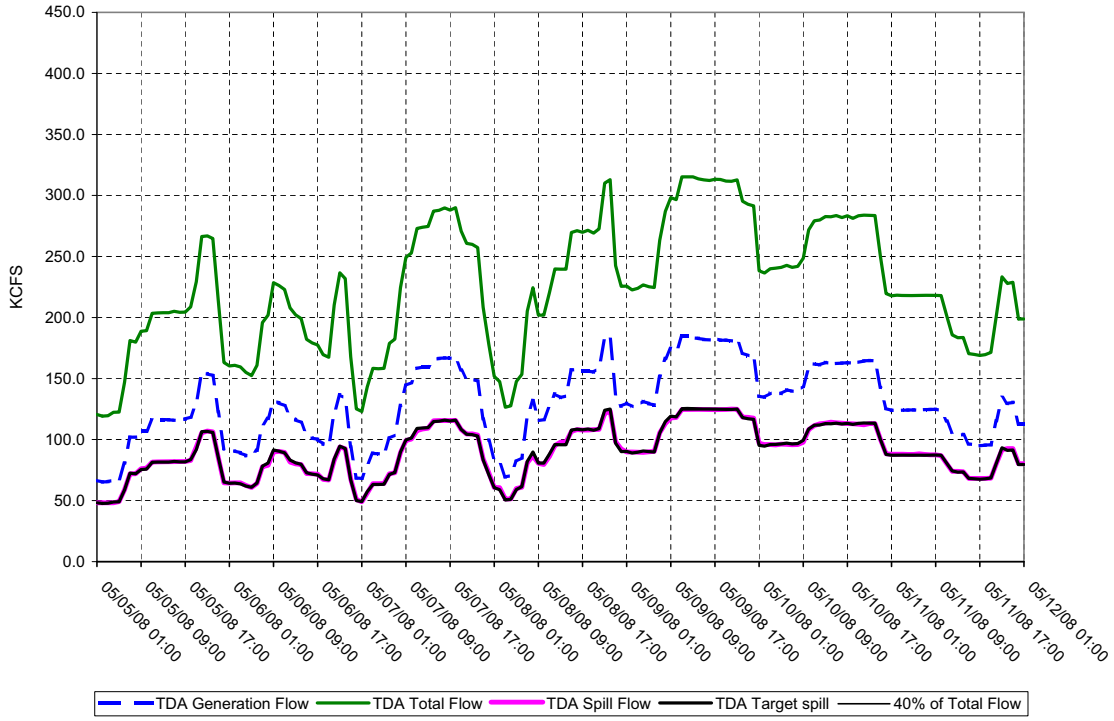
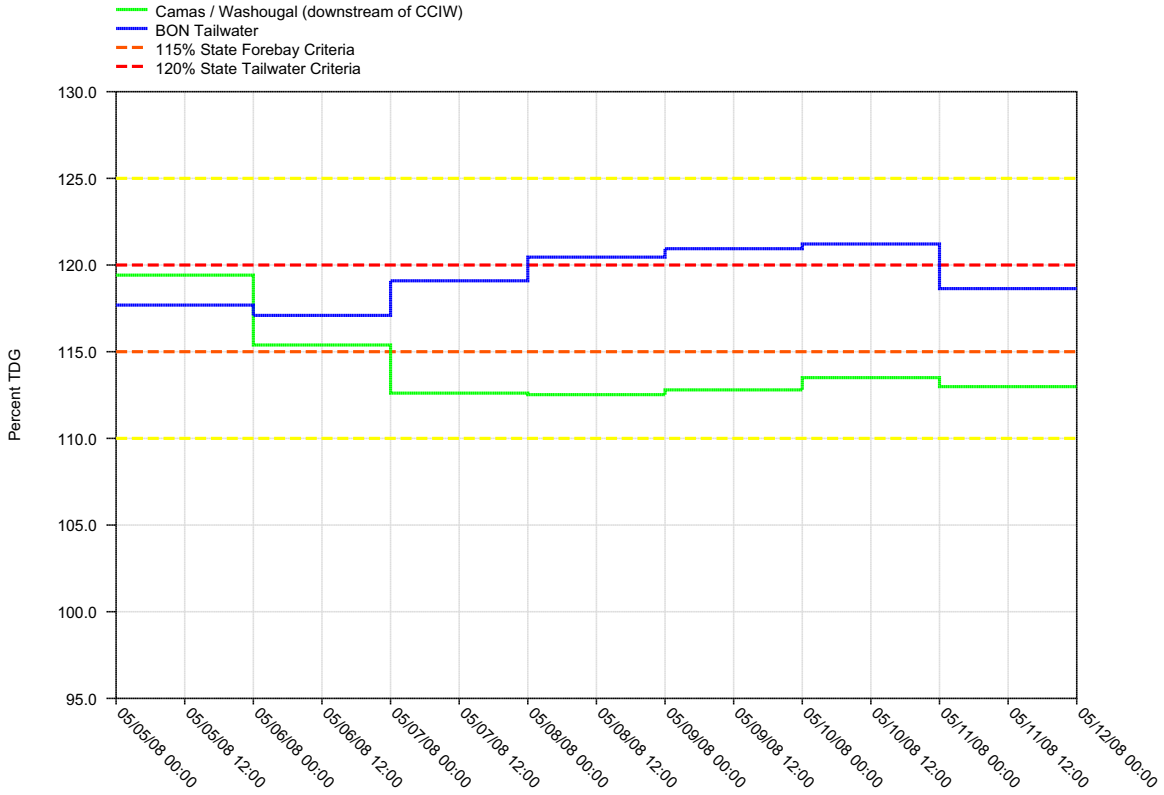


Figure 8.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

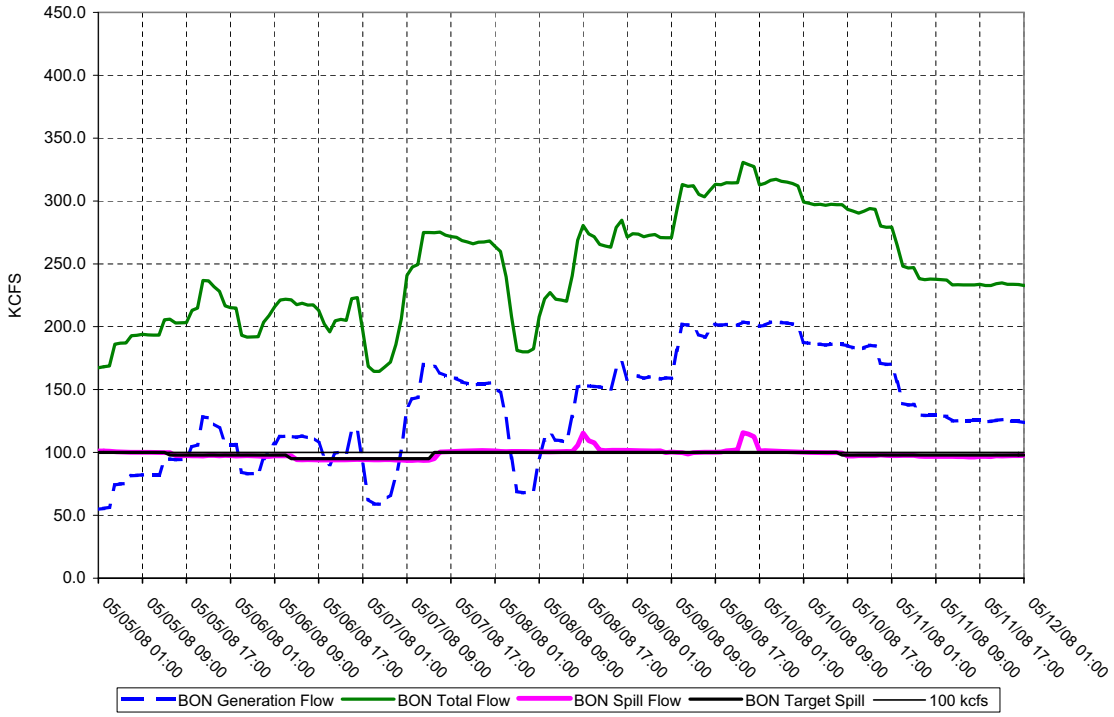
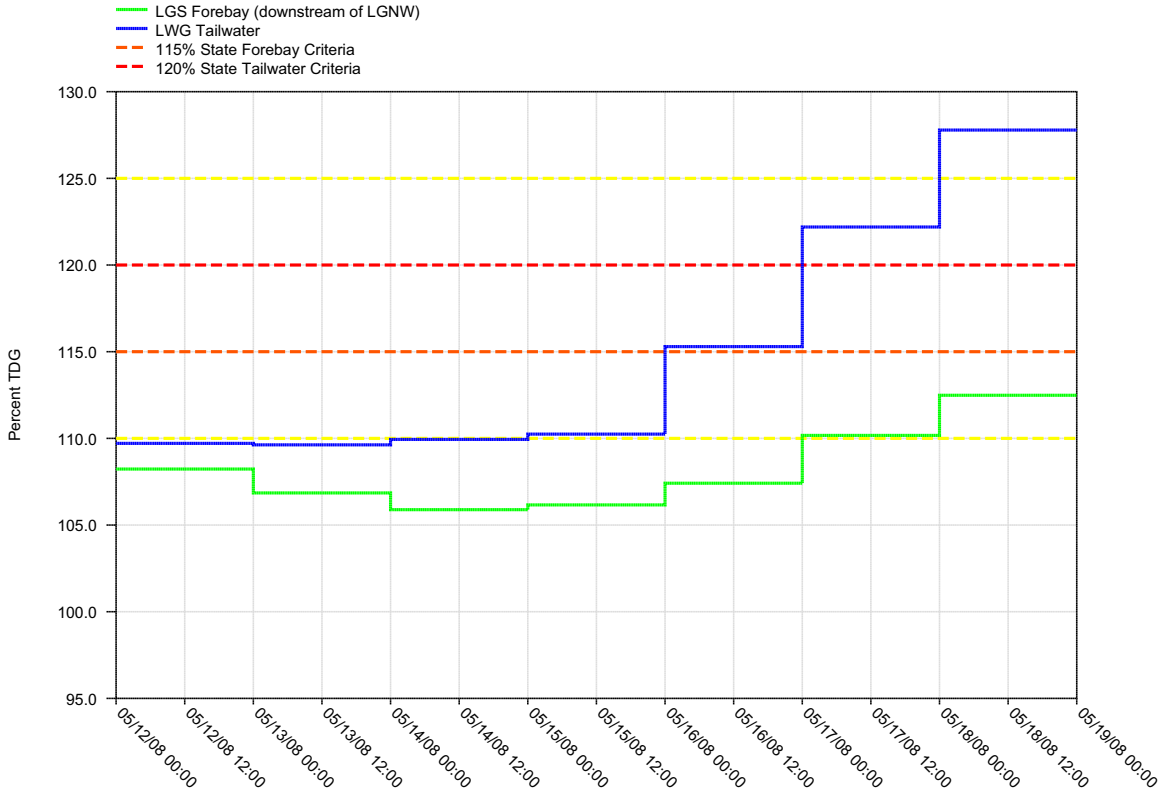


Figure 9.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

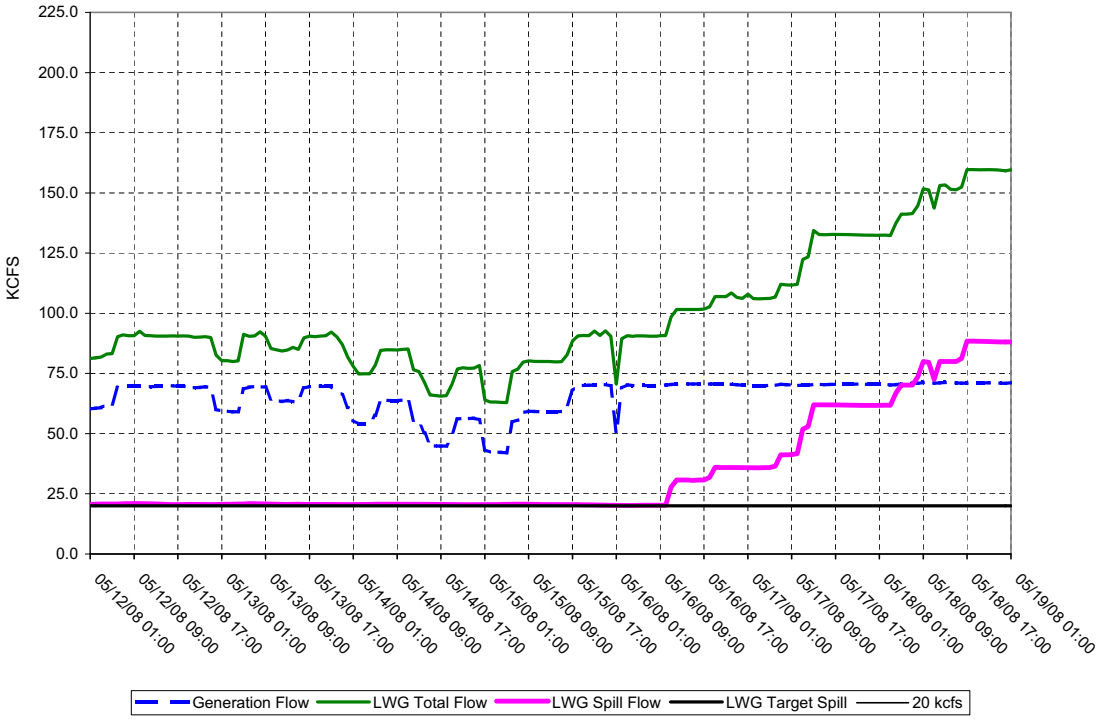
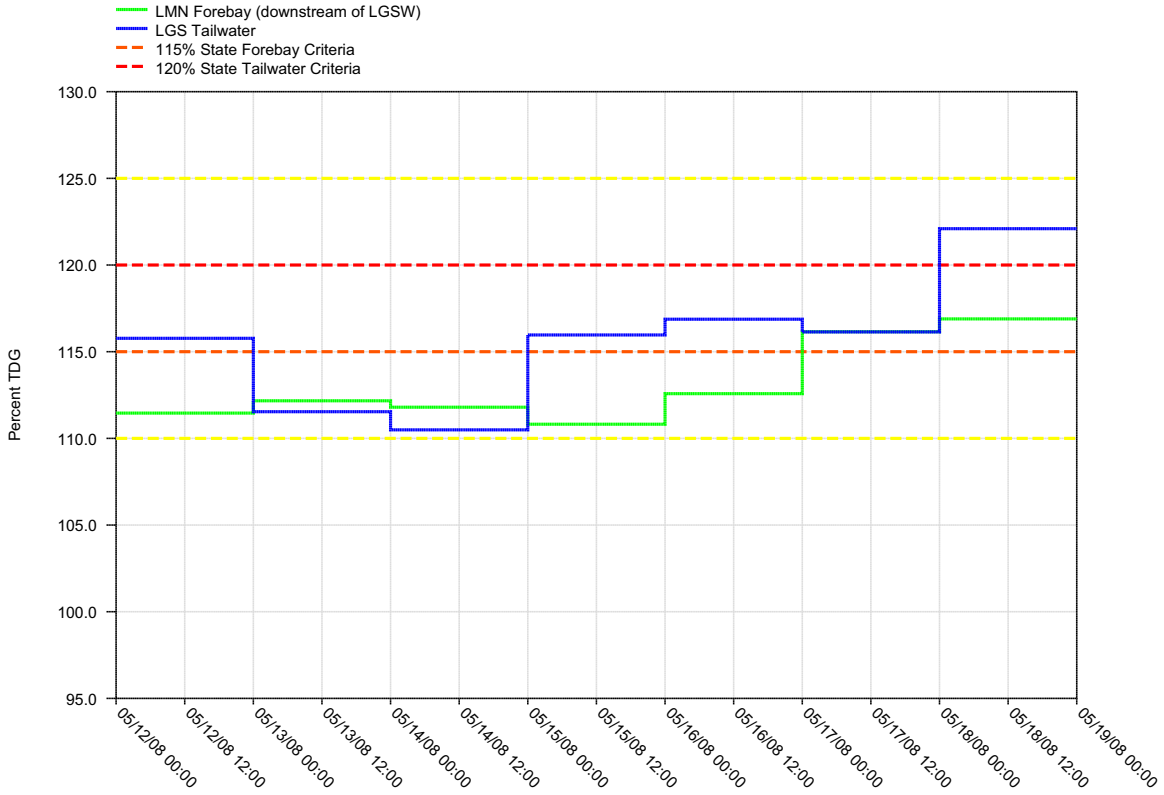


Figure 10.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

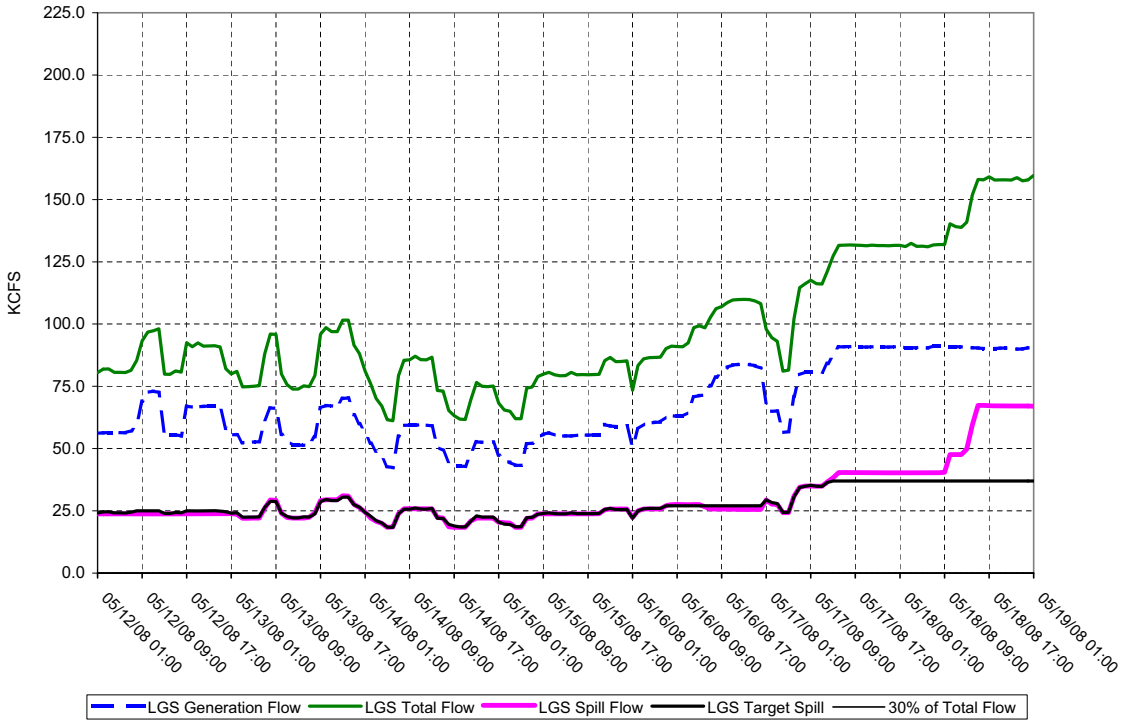
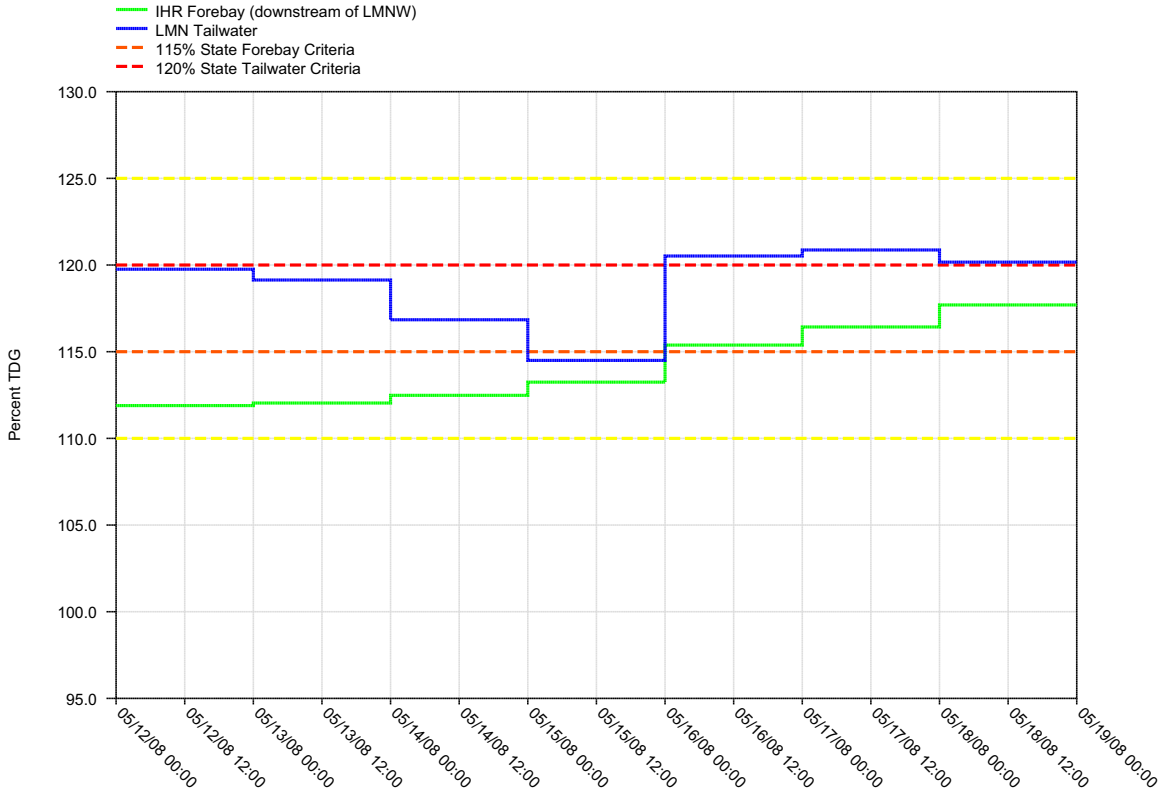


Figure 11.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

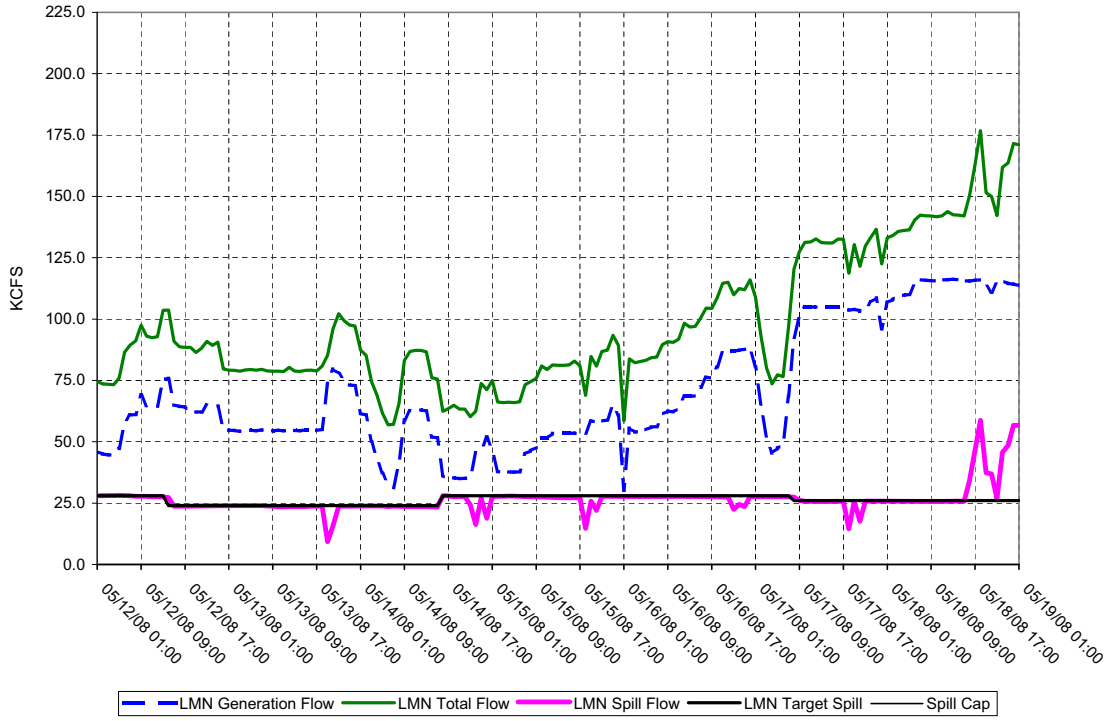
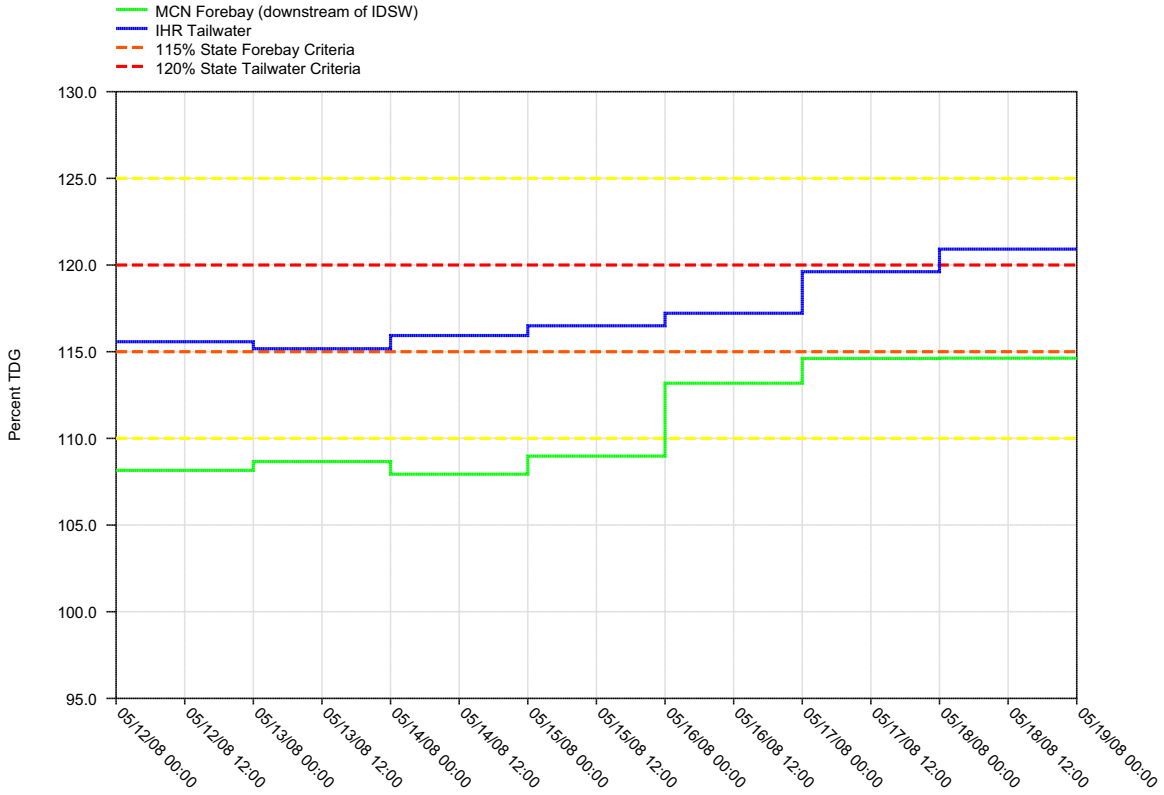


Figure 12.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

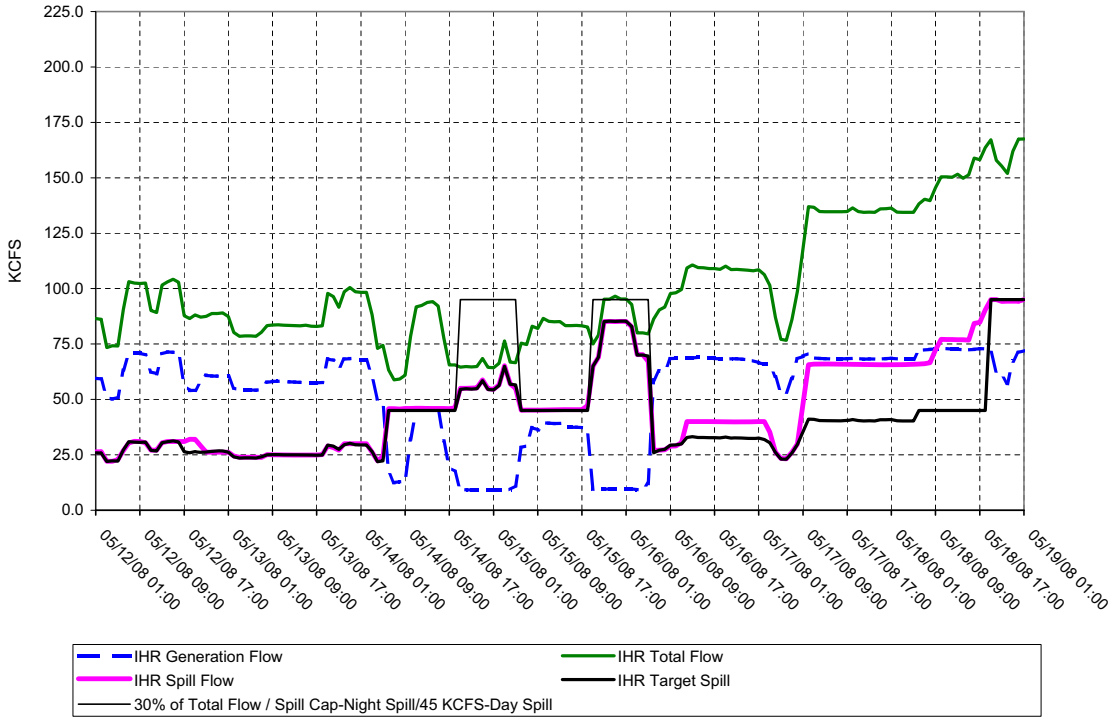
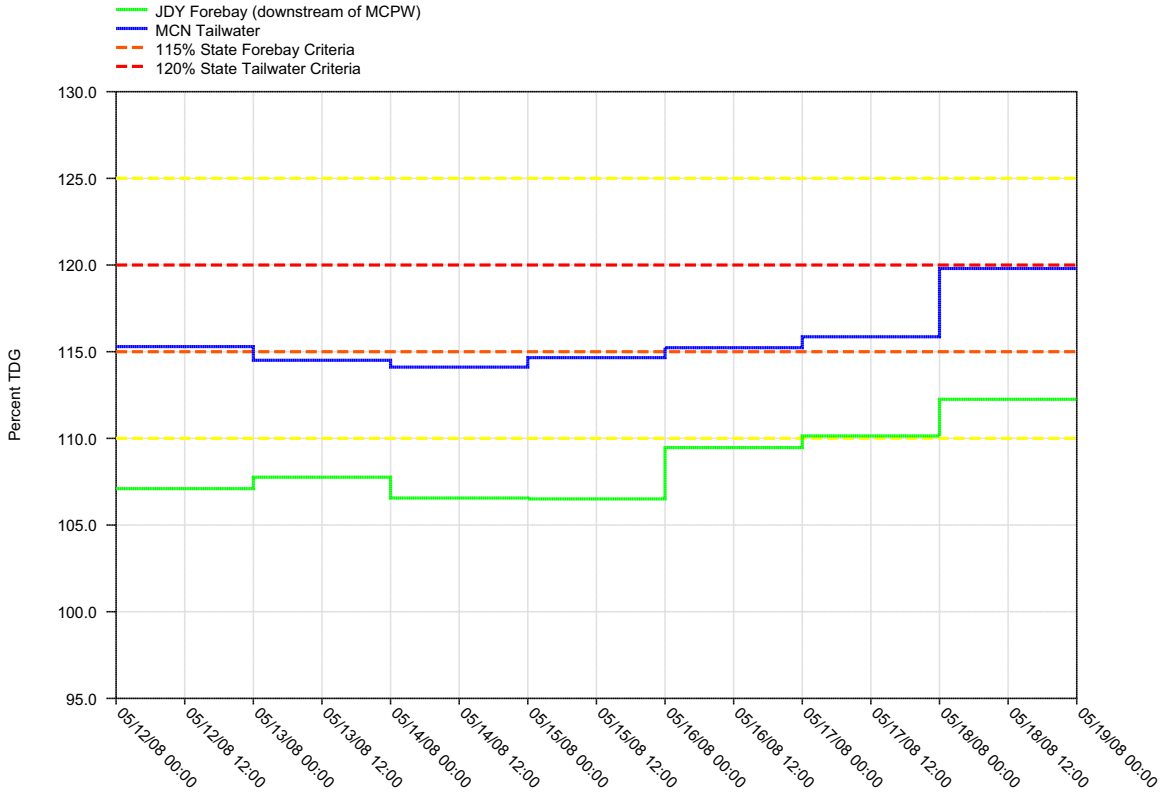


Figure 13.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

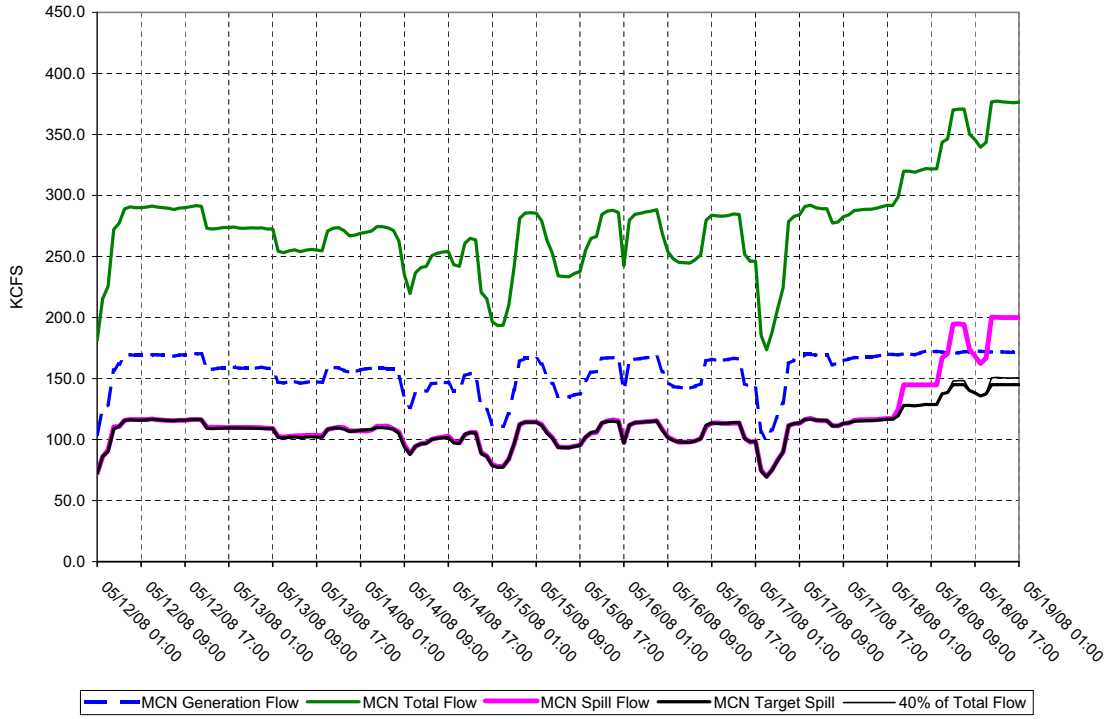
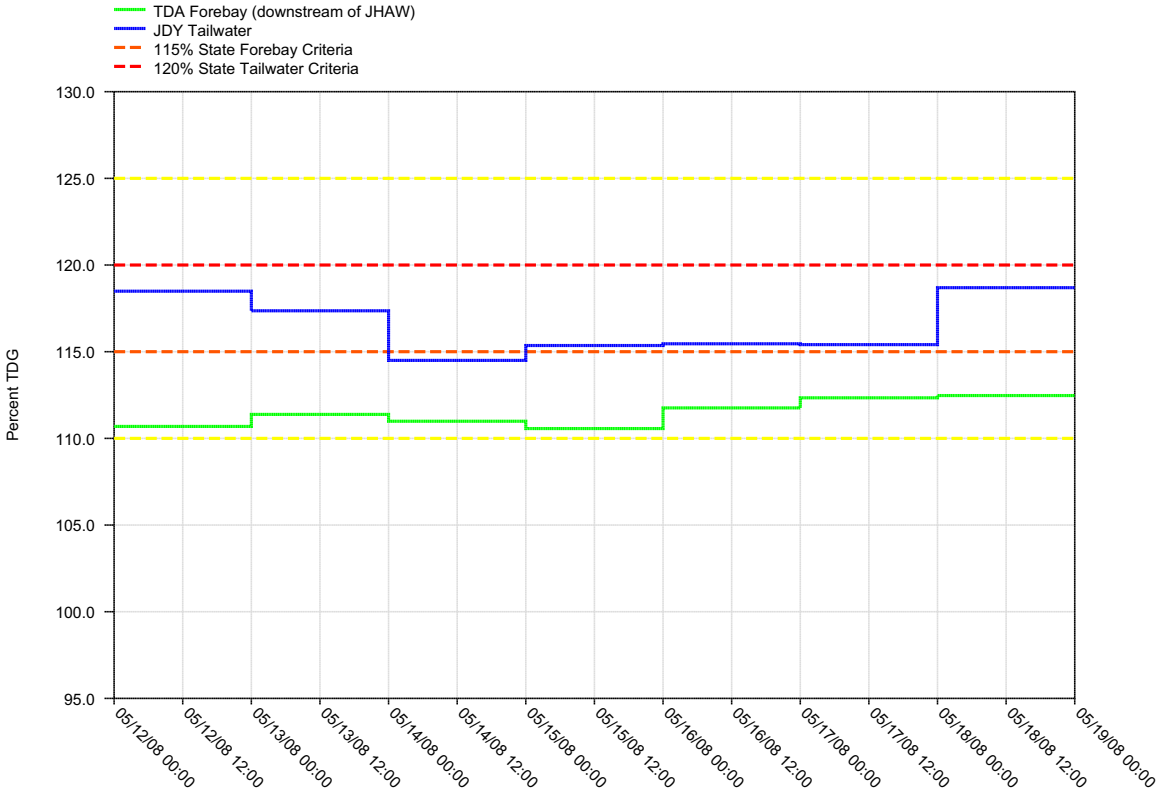


Figure 14.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

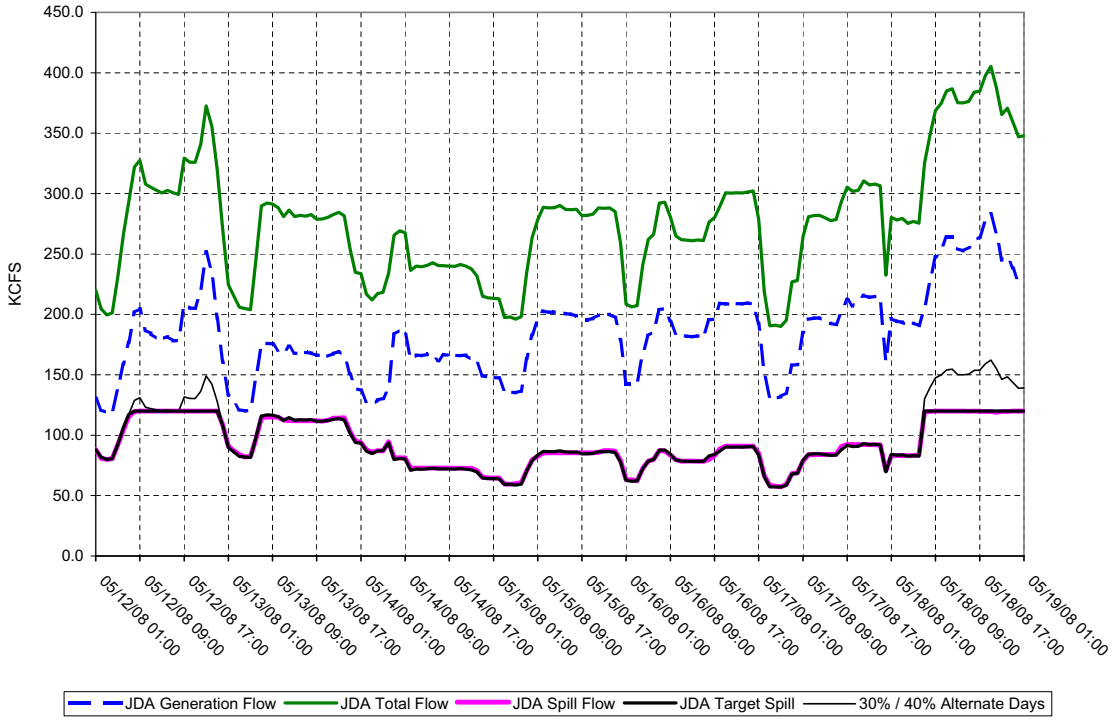
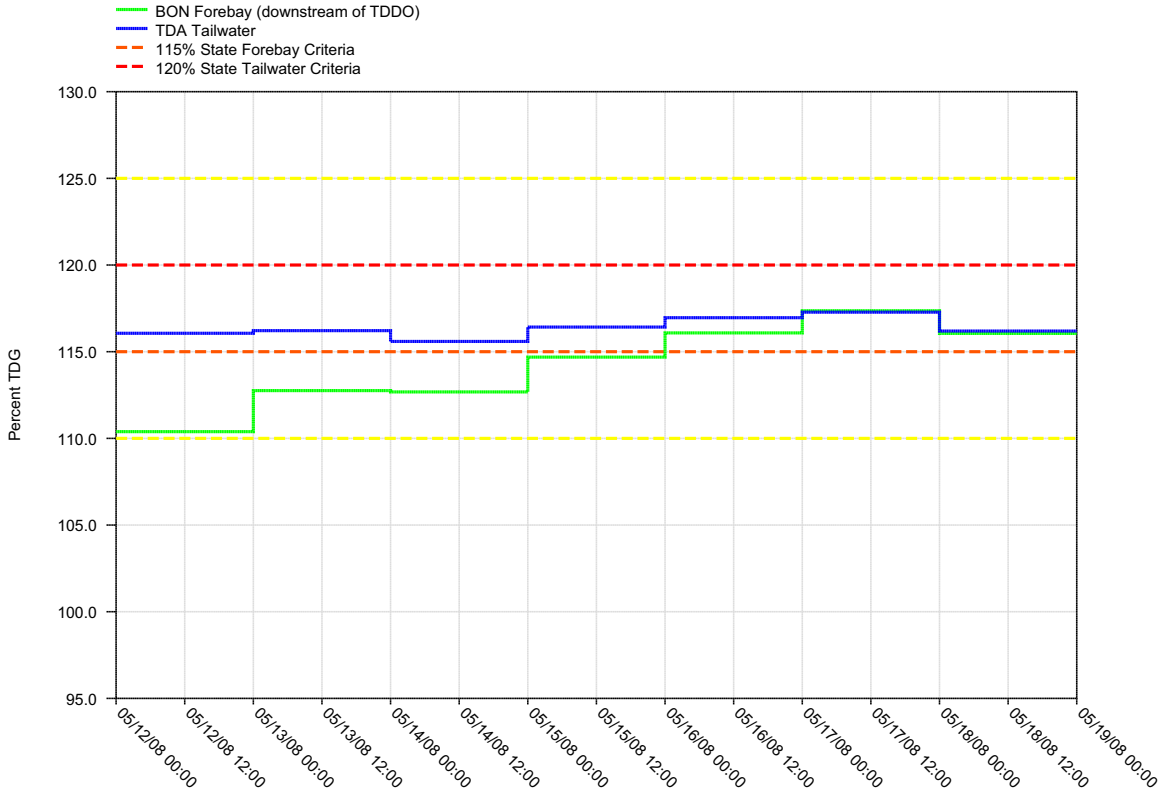


Figure 15.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

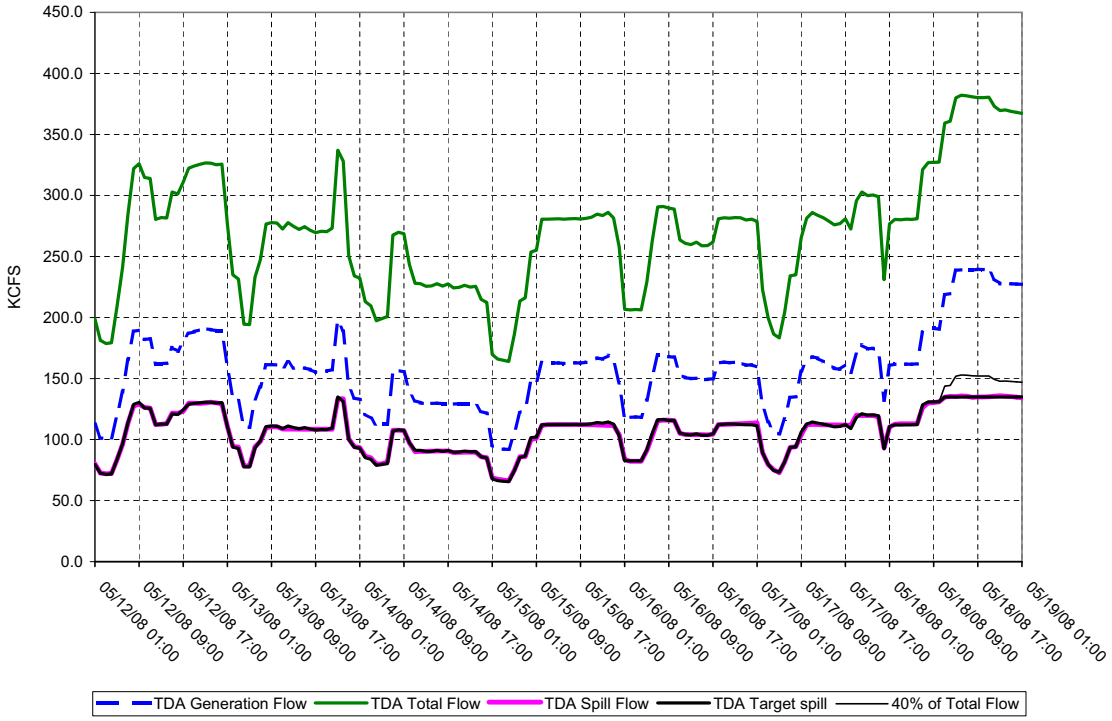
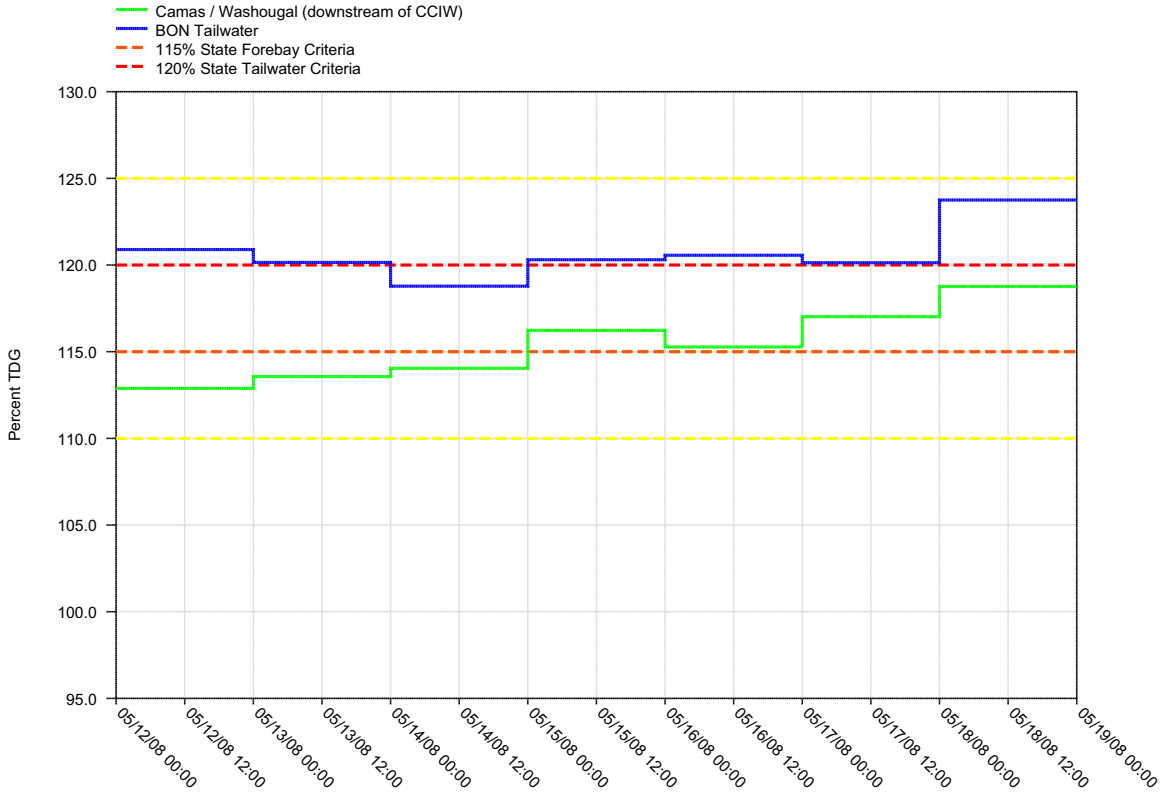


Figure 16.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

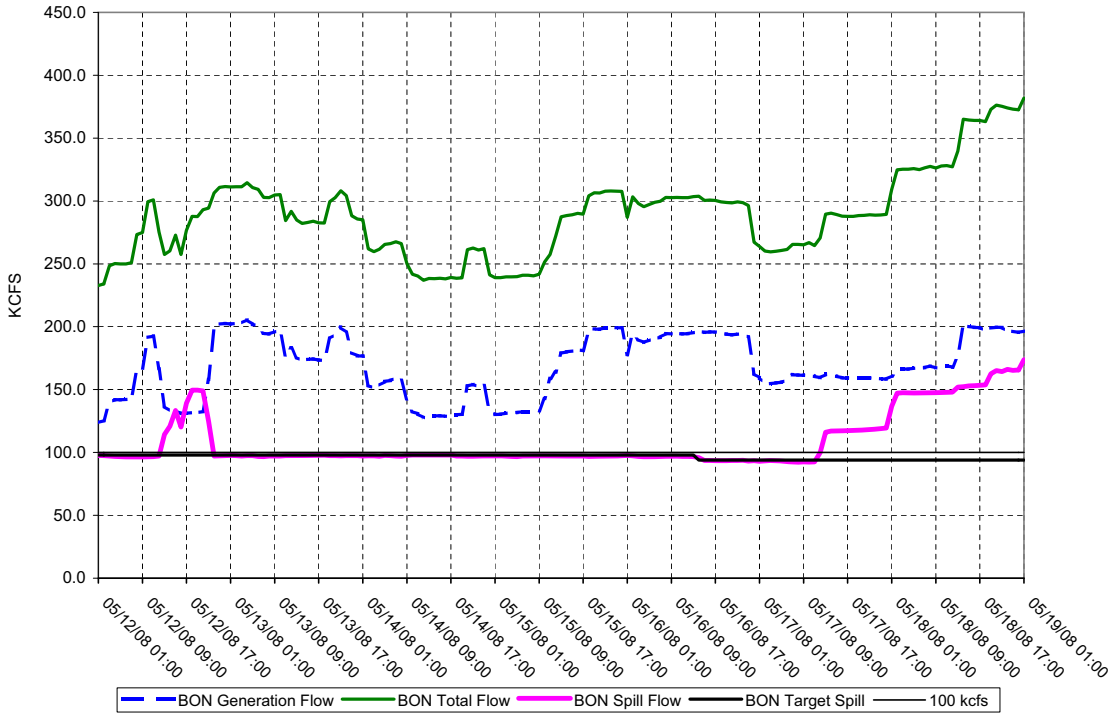
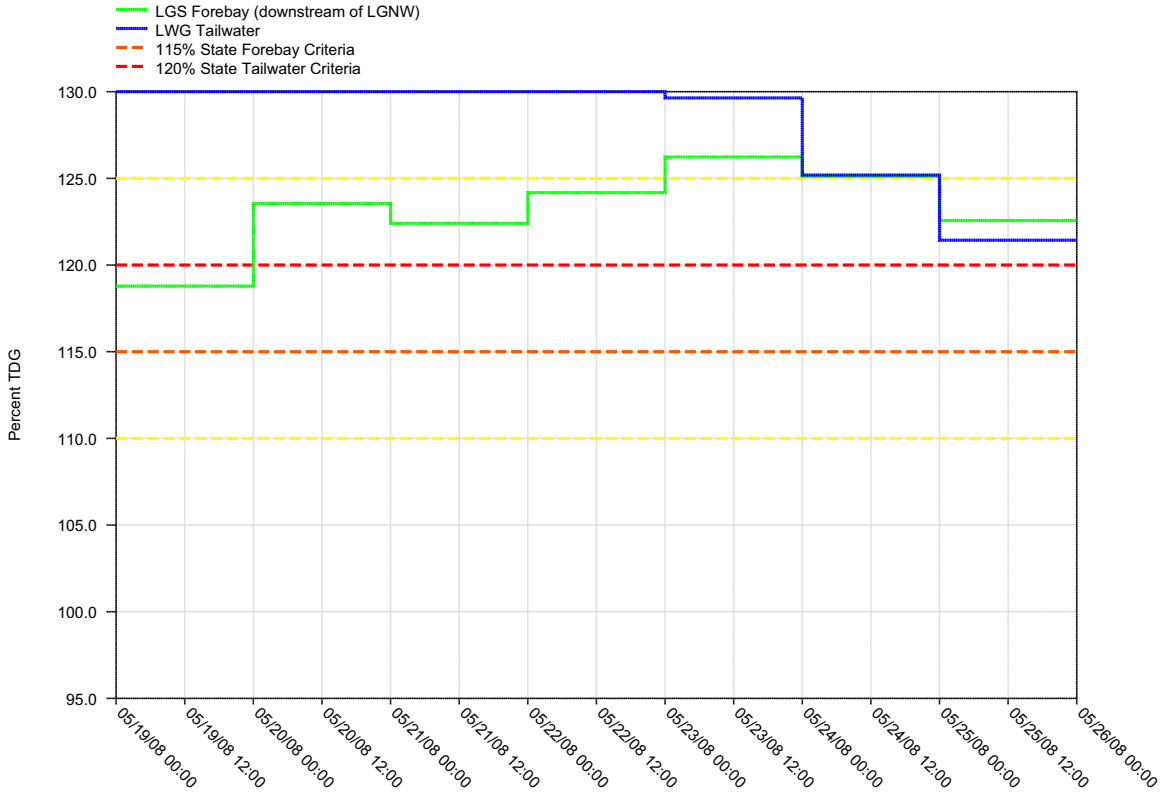


Figure 17.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

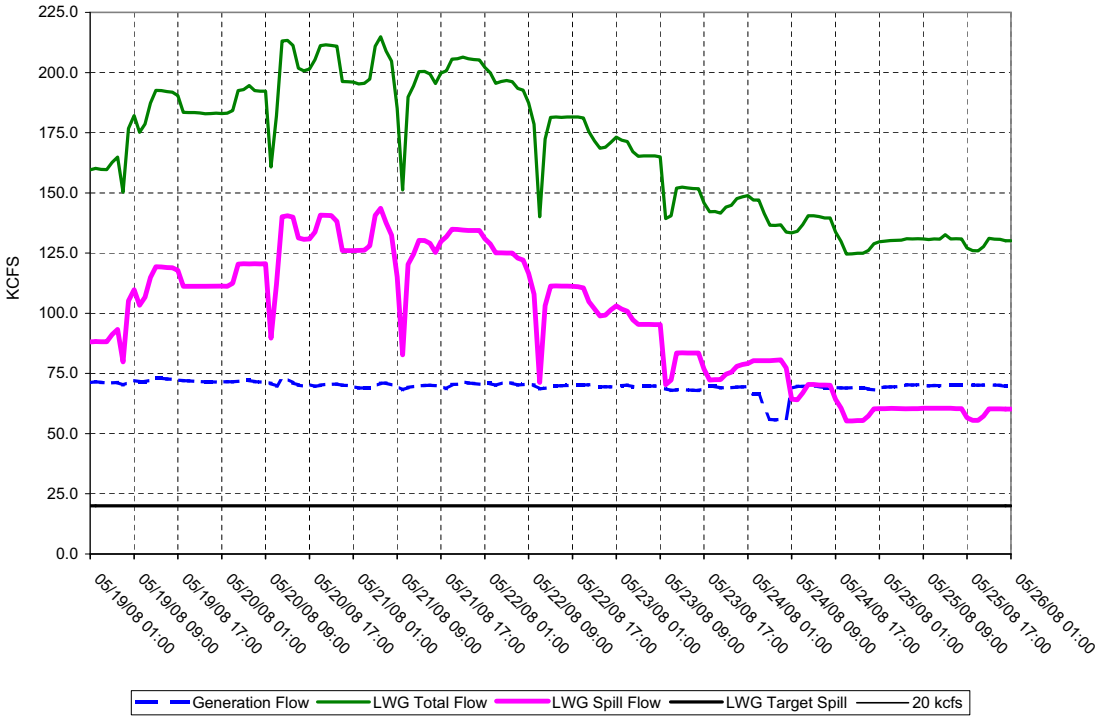
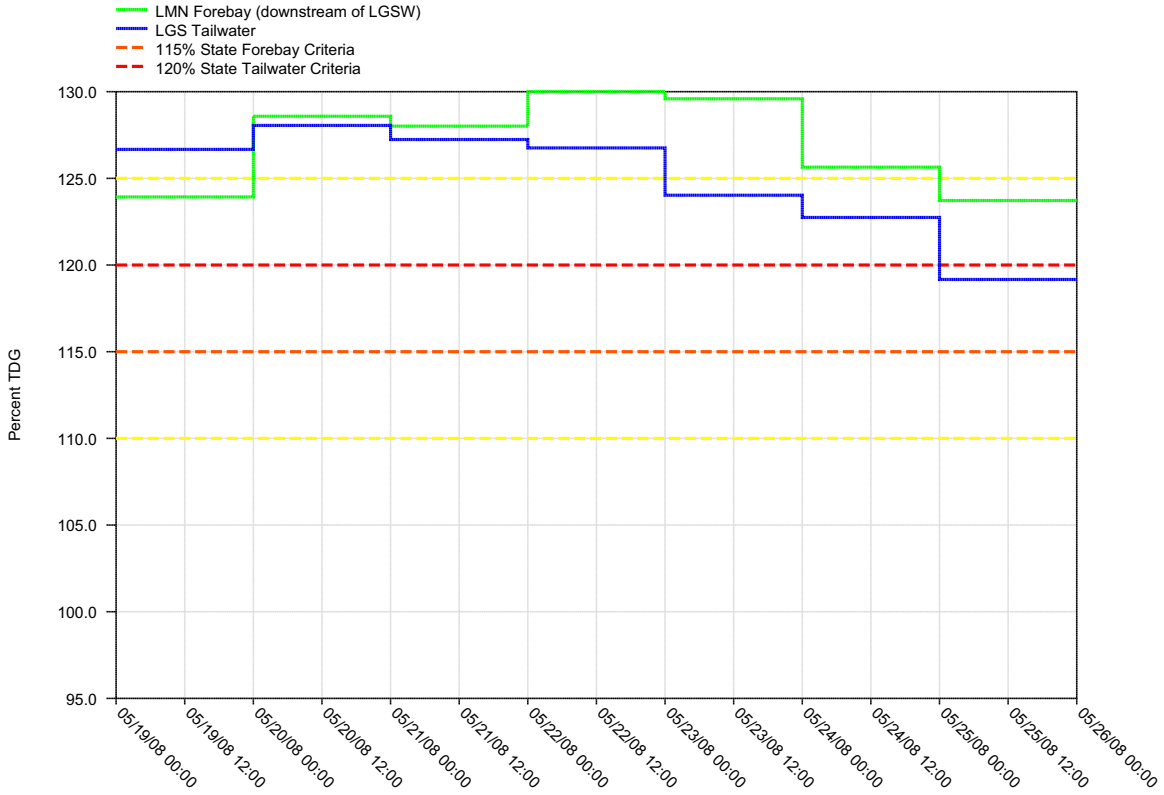


Figure 18.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

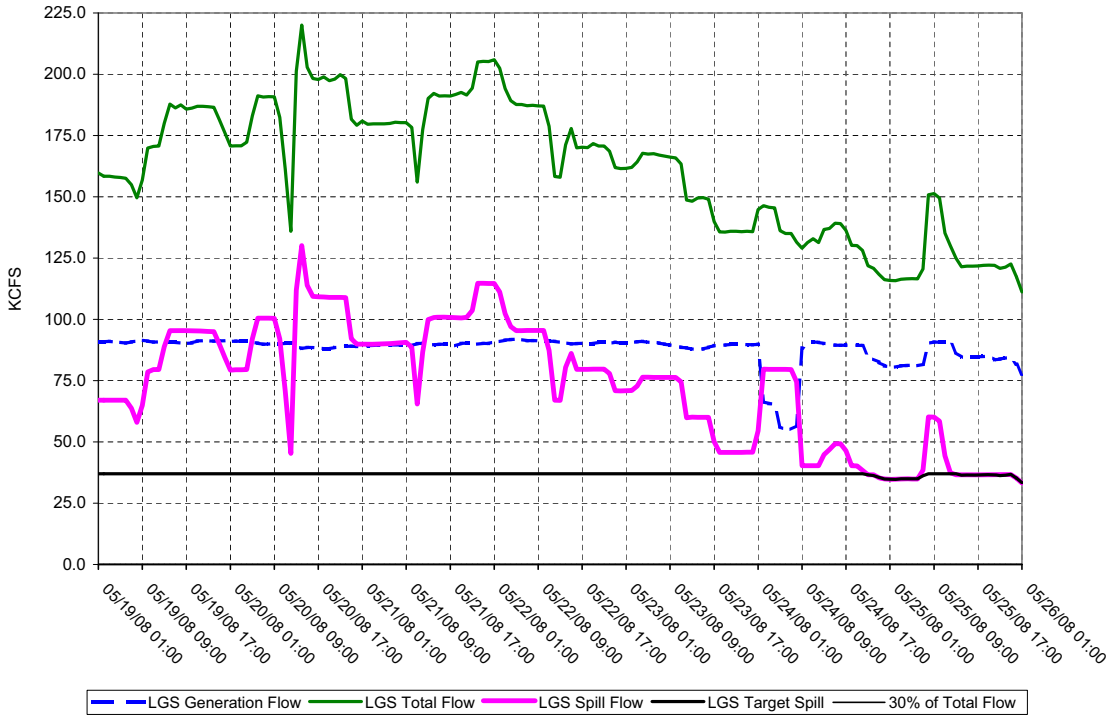
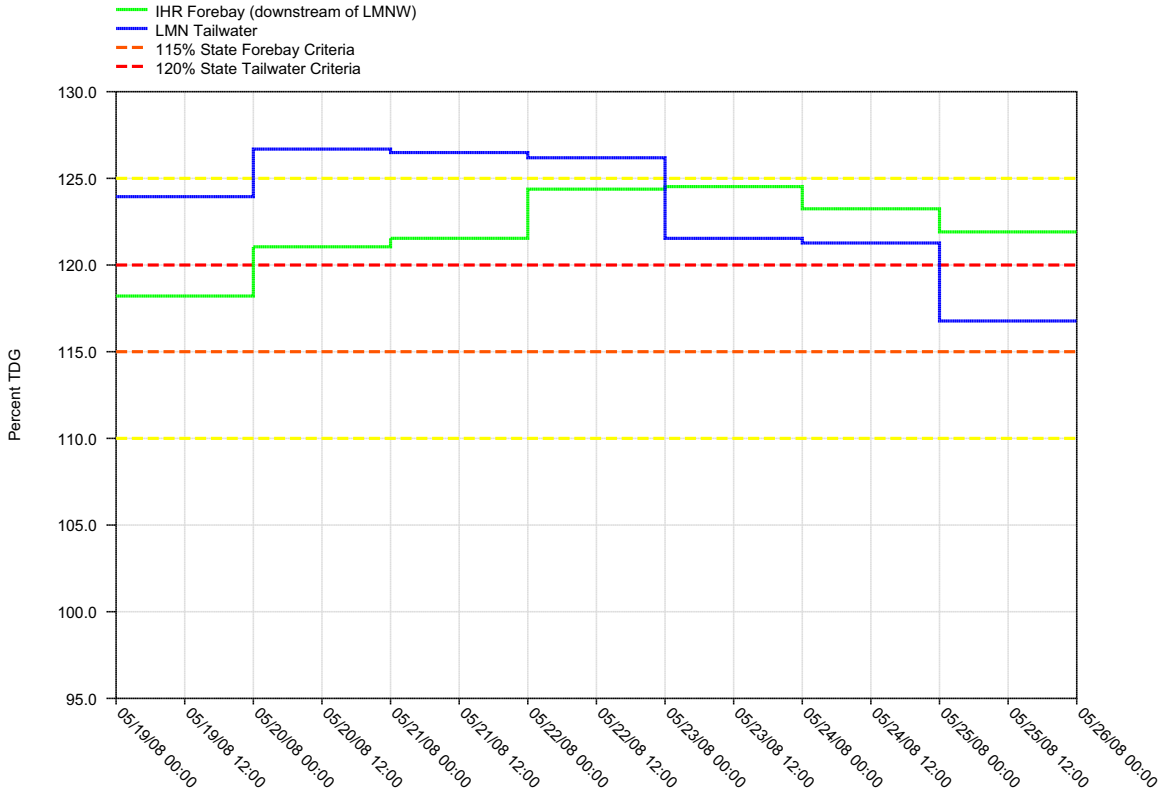


Figure 19.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

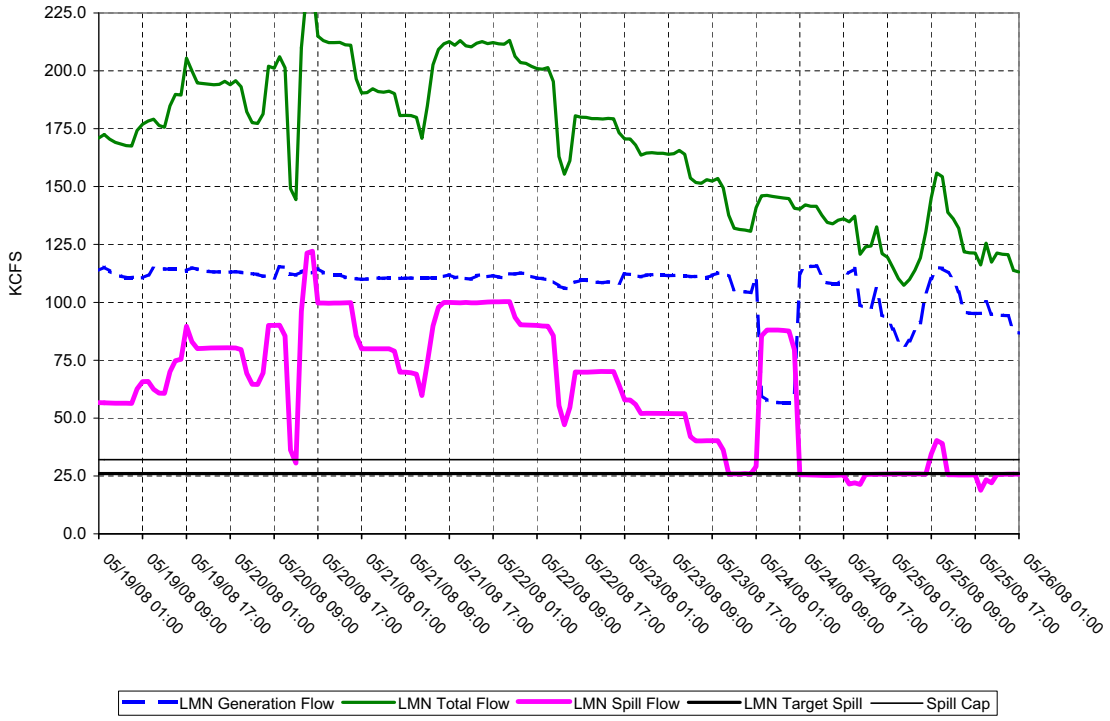
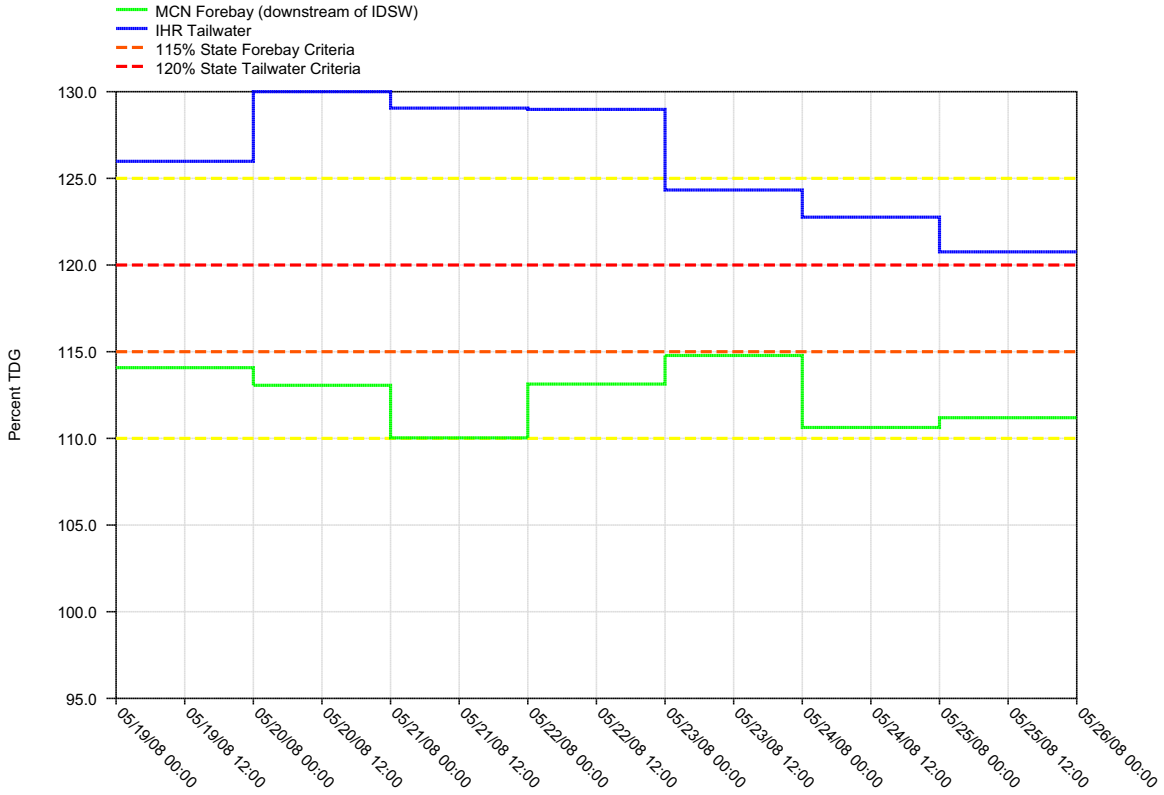


Figure 20.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

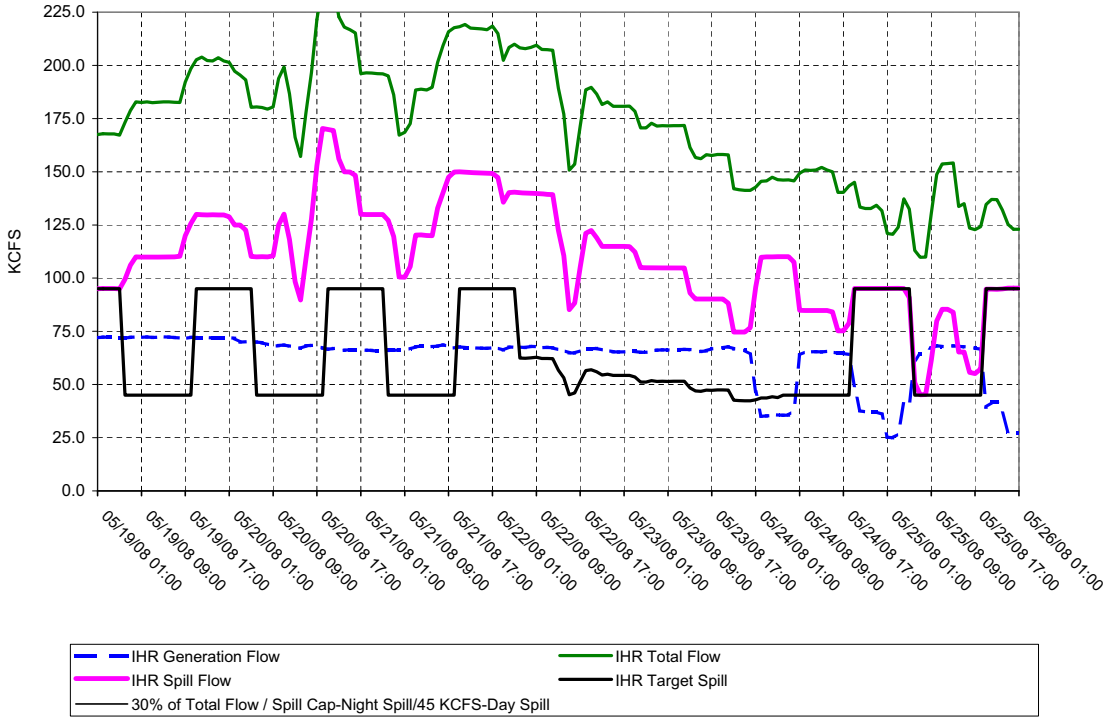
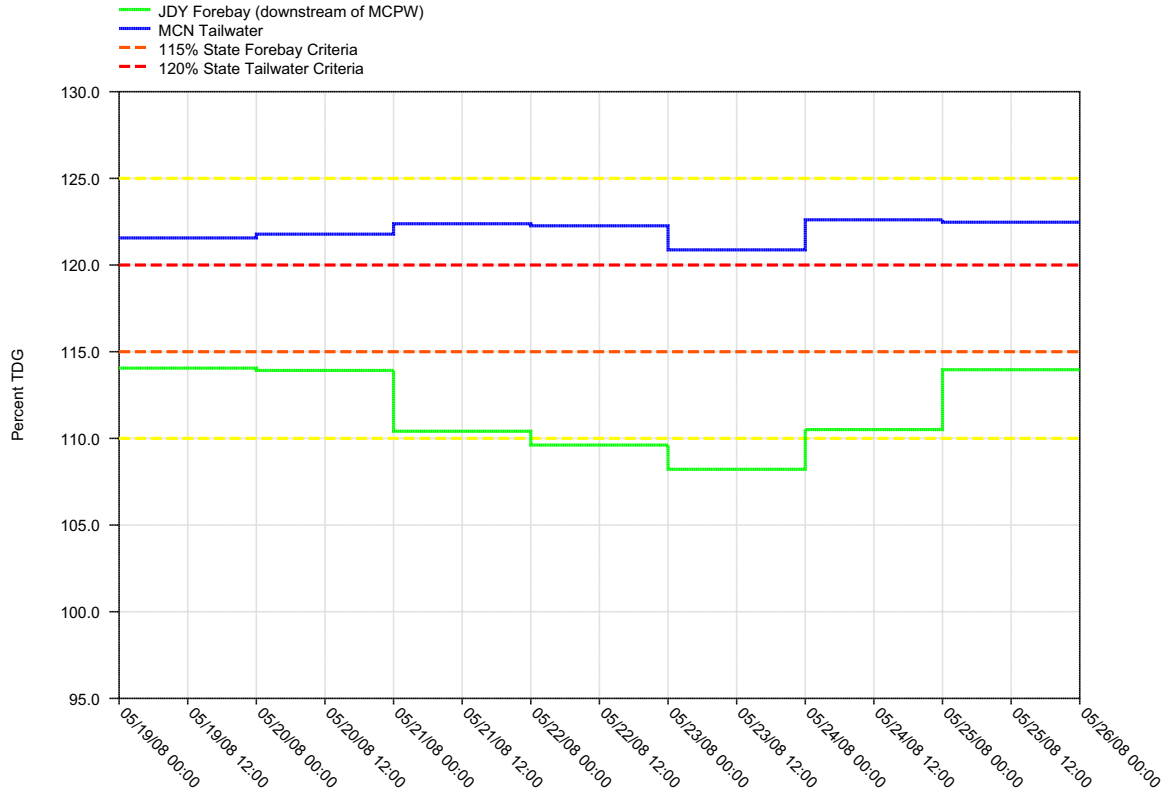


Figure 21.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

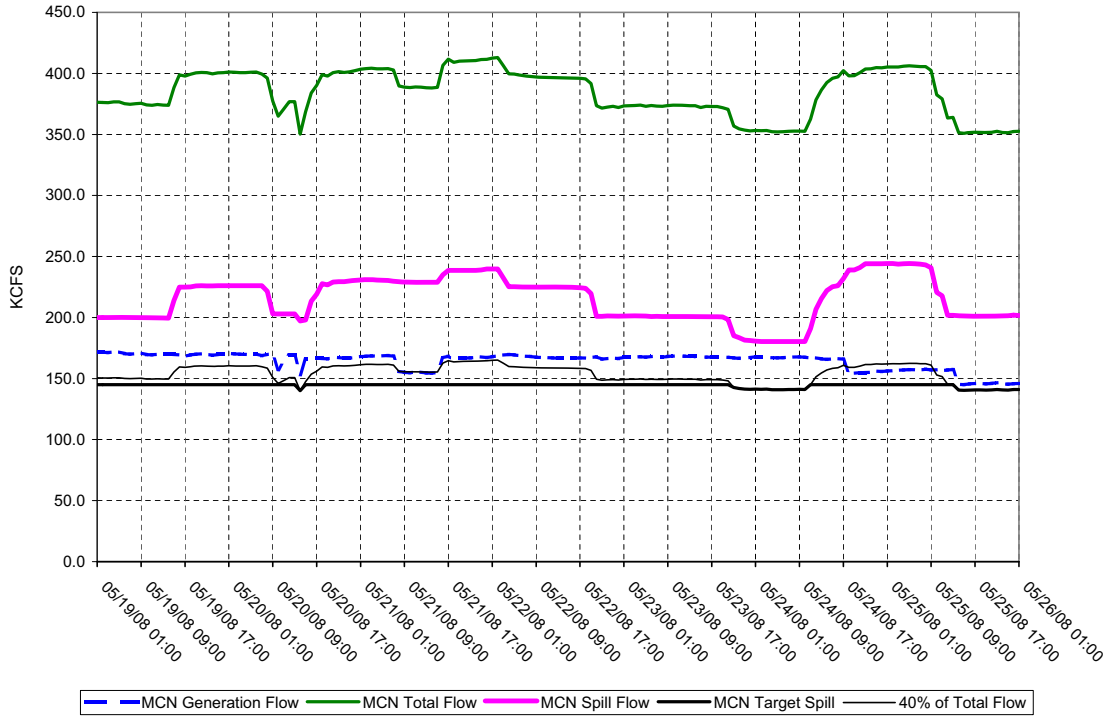
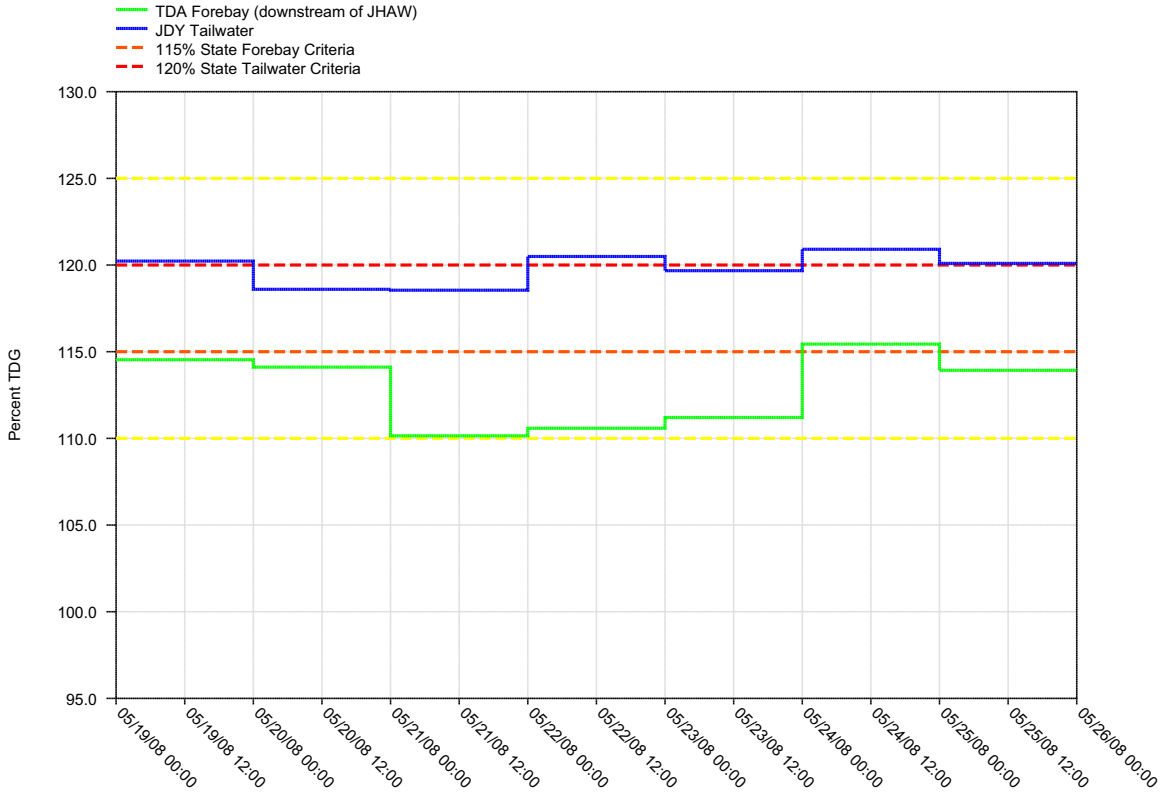


Figure 22.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

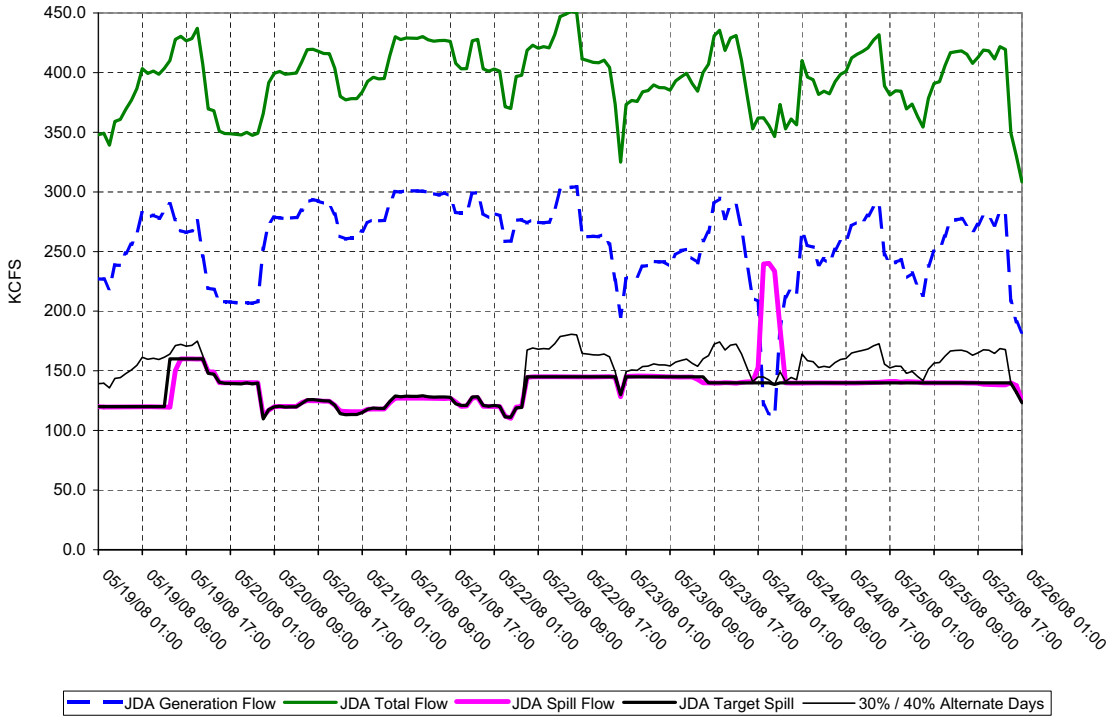
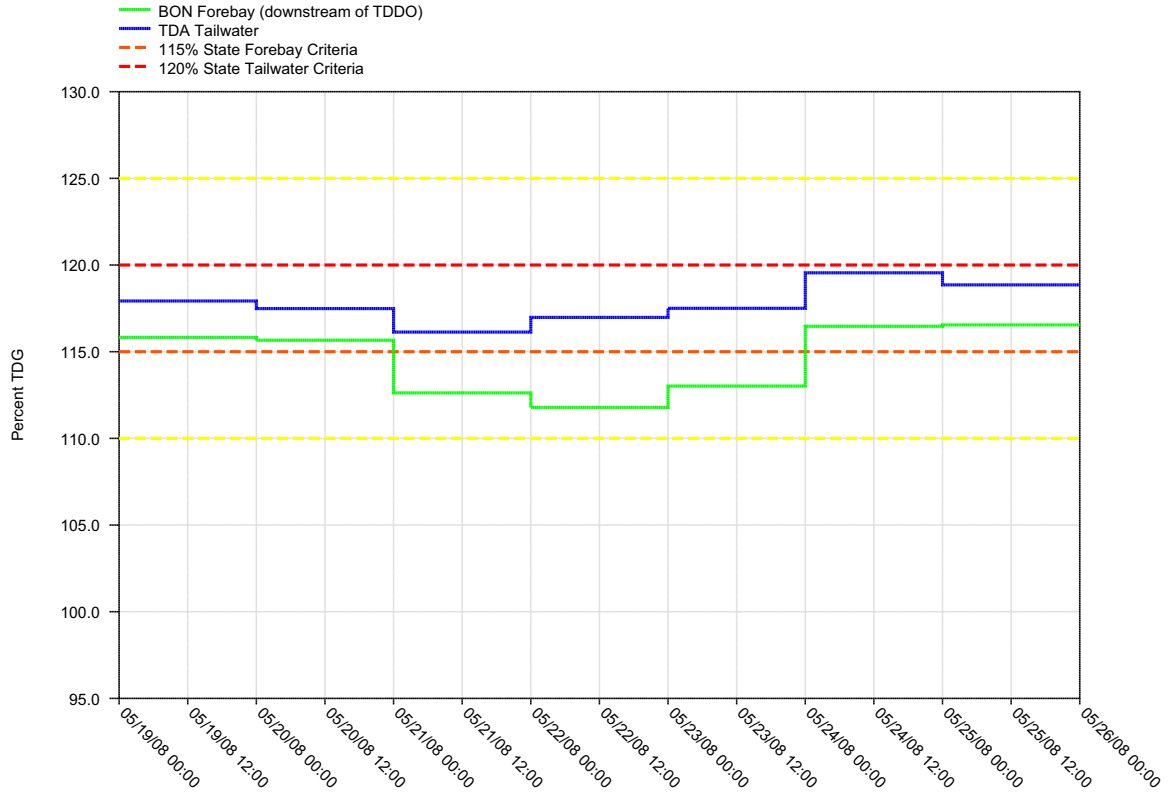


Figure 23.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

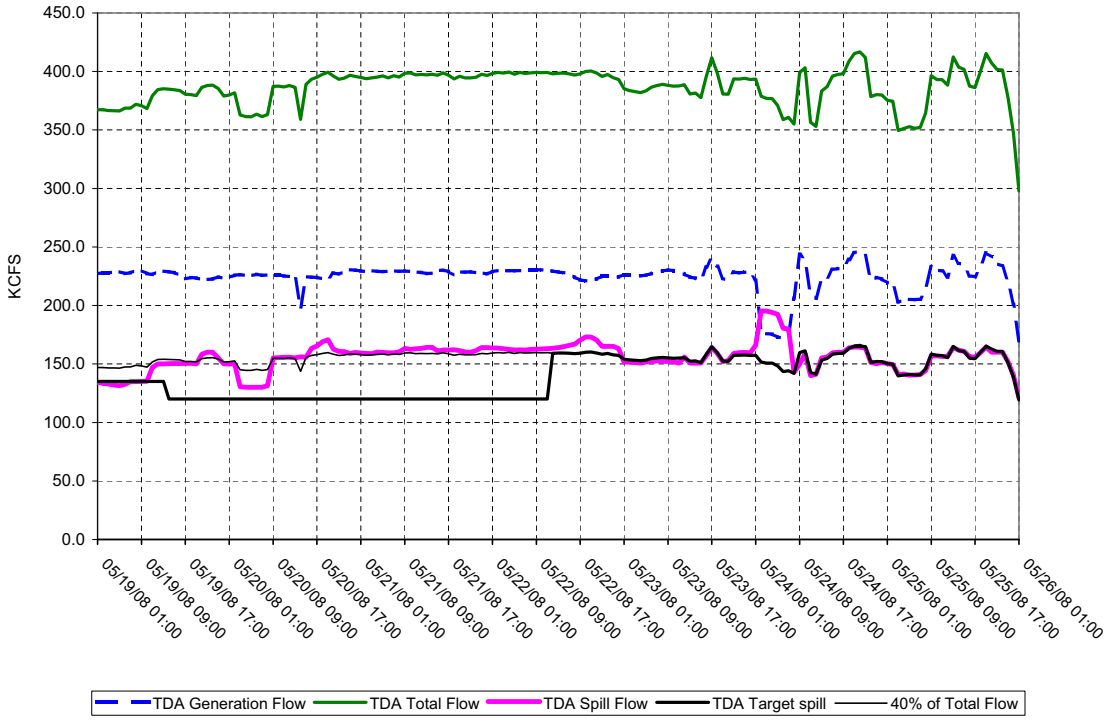
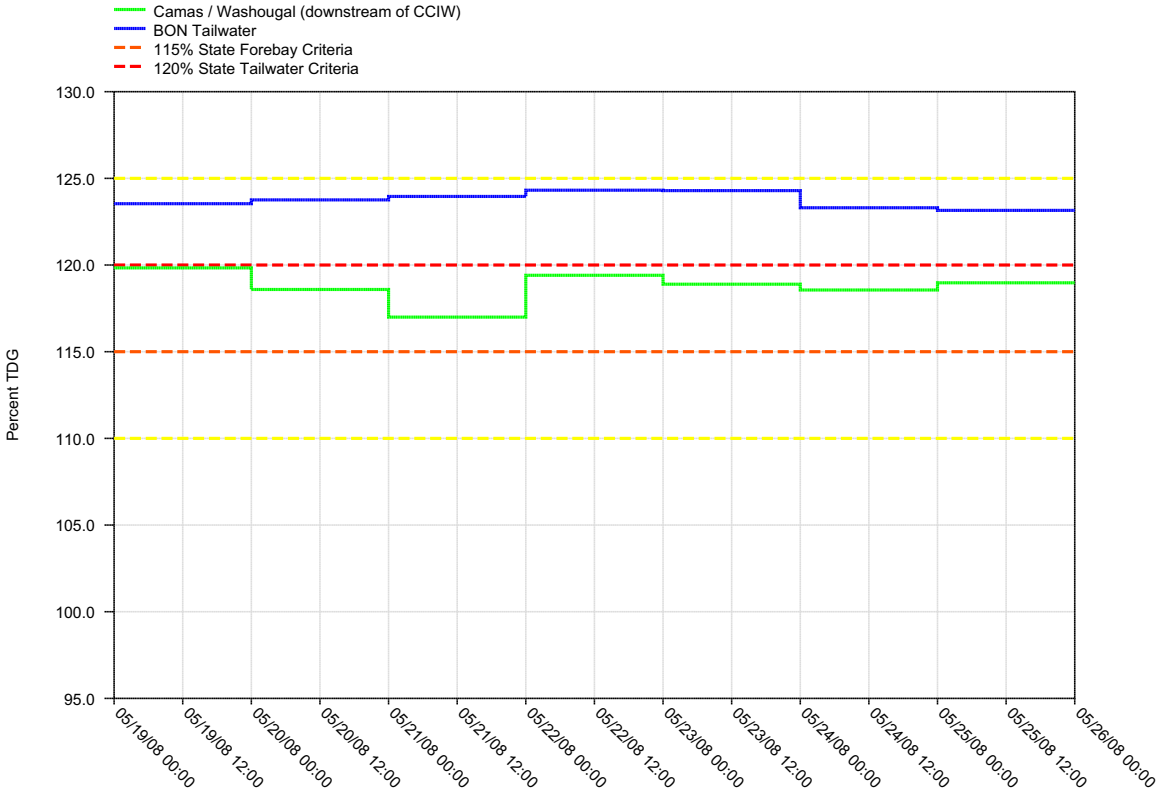


Figure 24.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

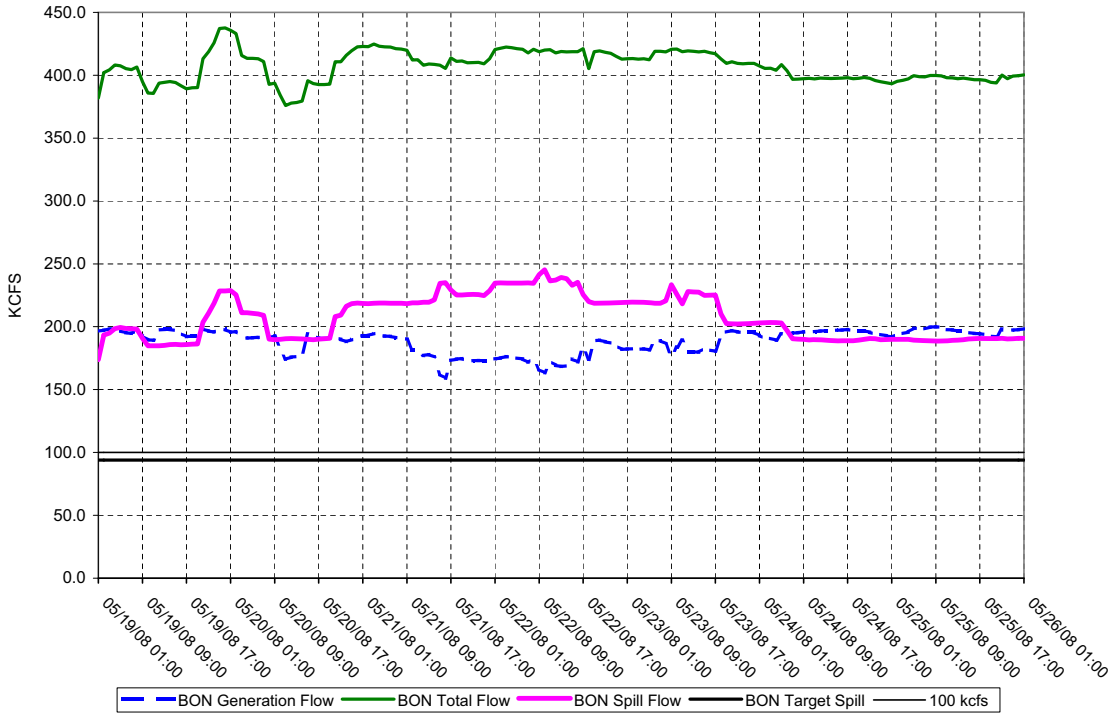
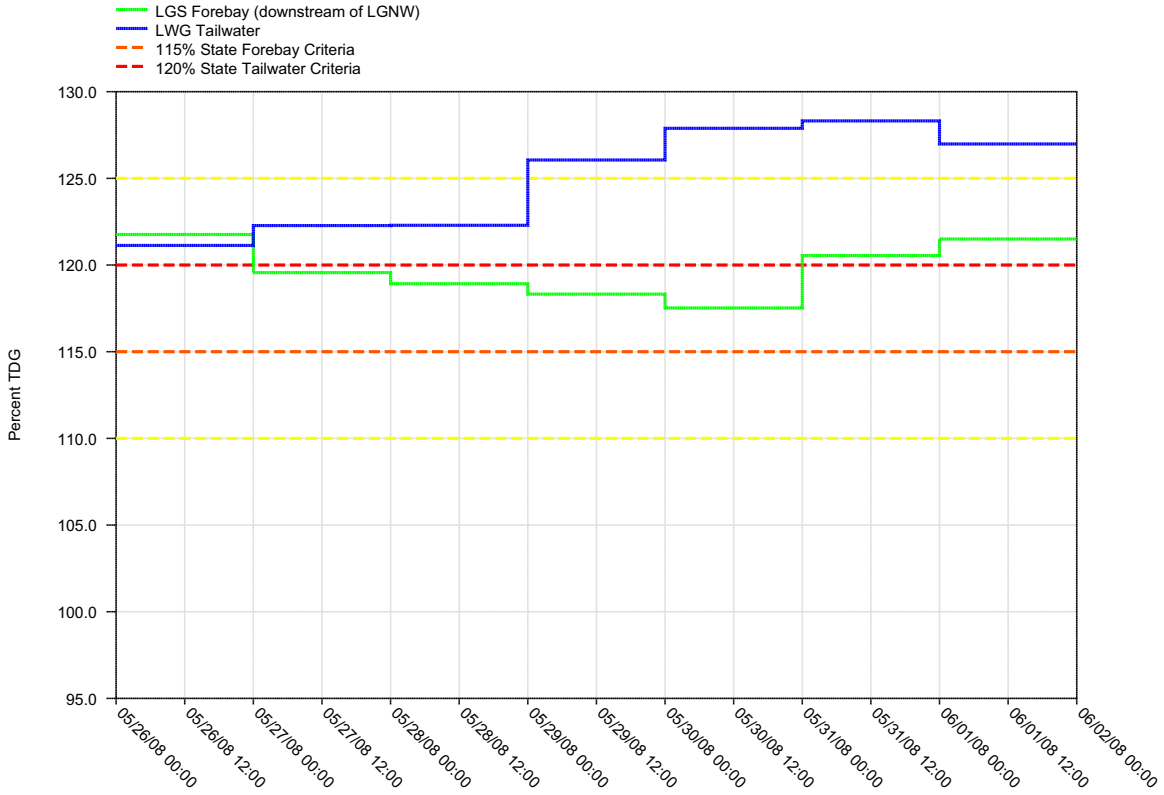


Figure 25.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

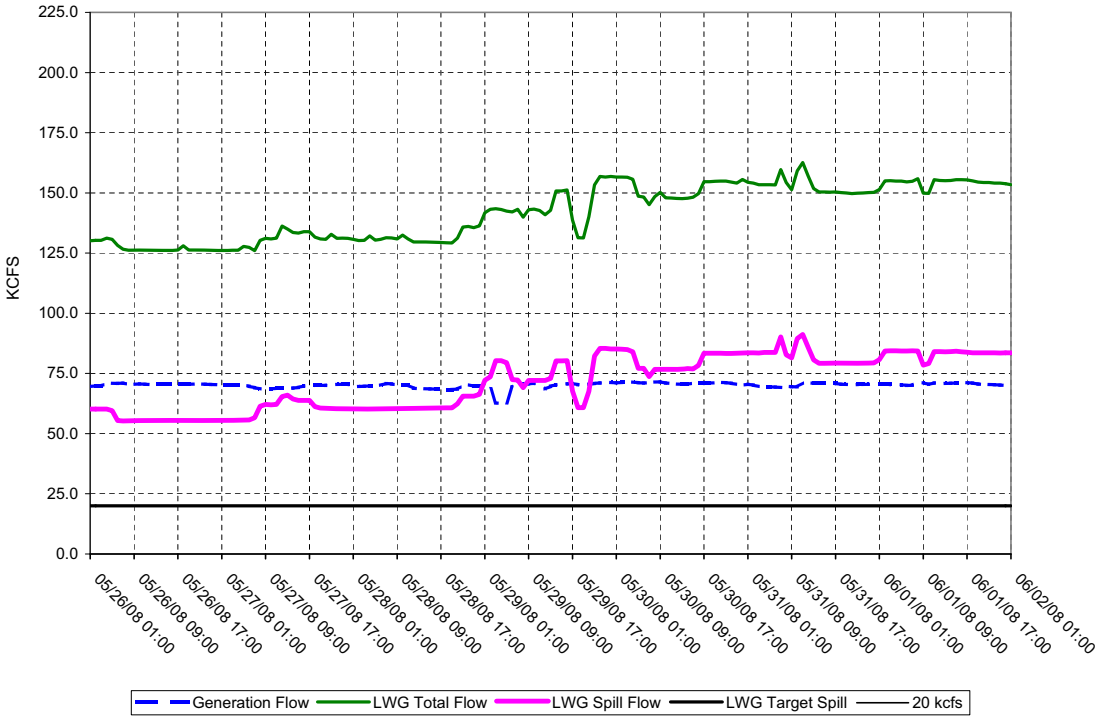
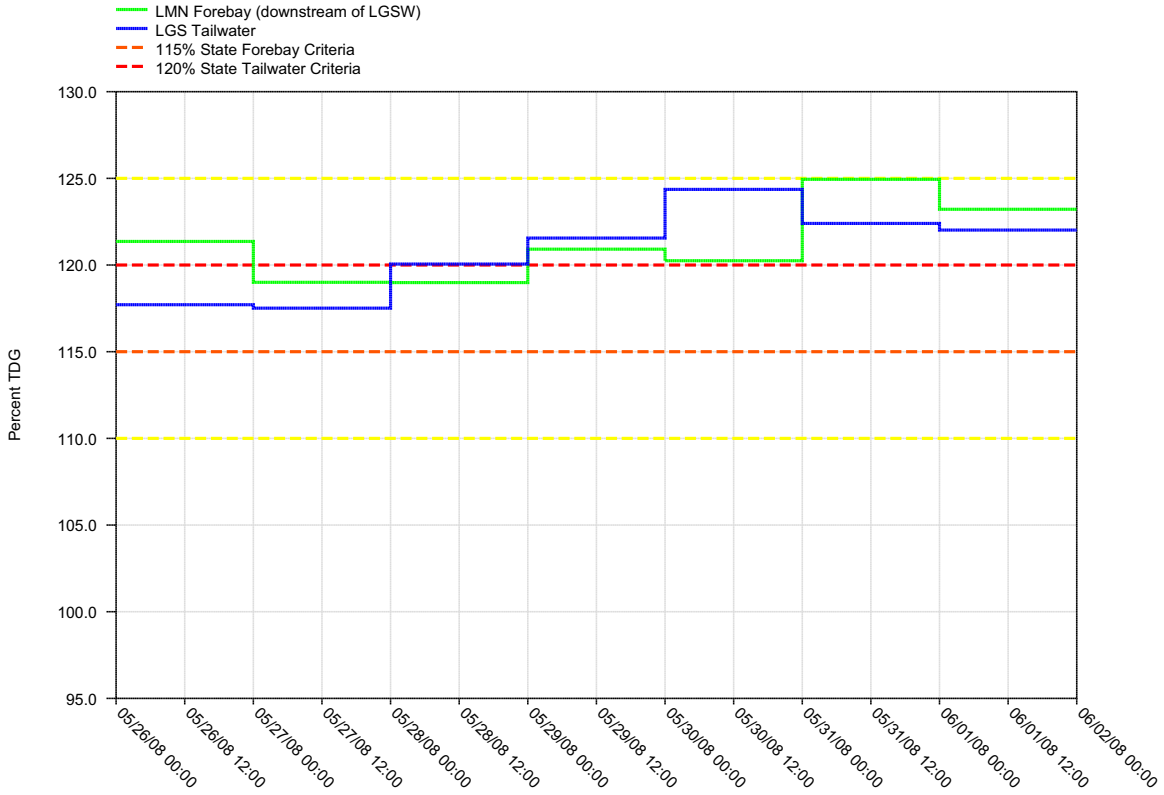


Figure 26.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

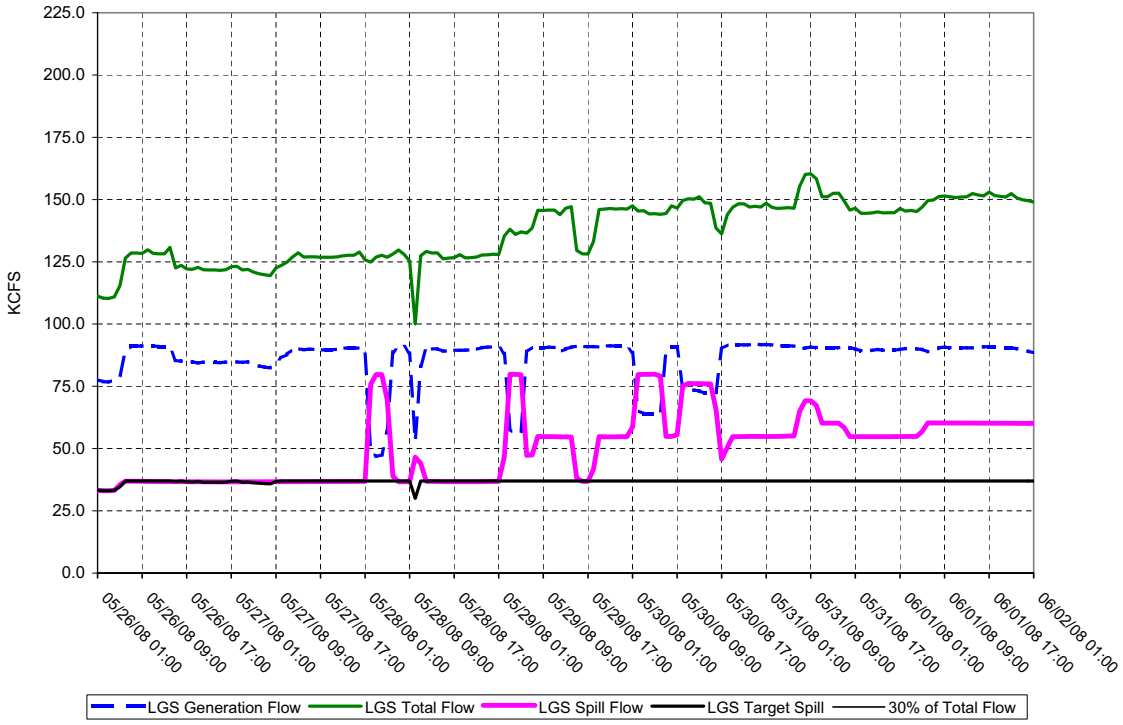
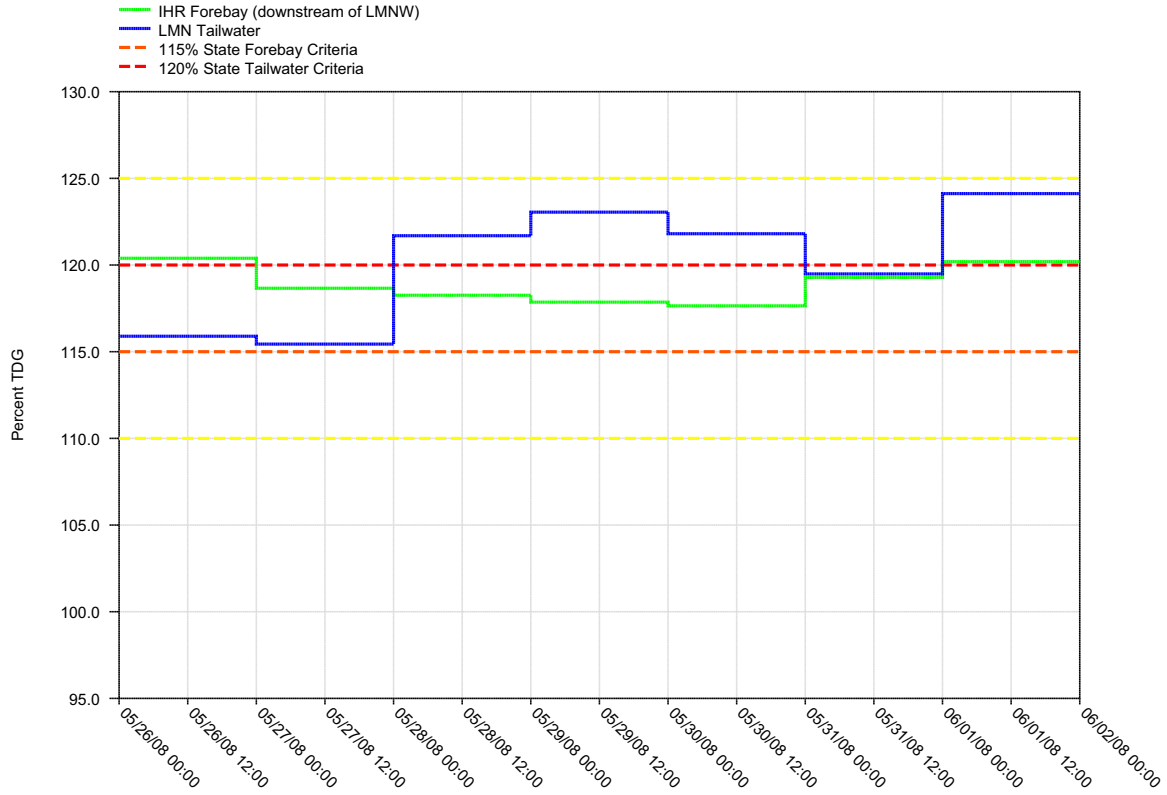


Figure 27.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

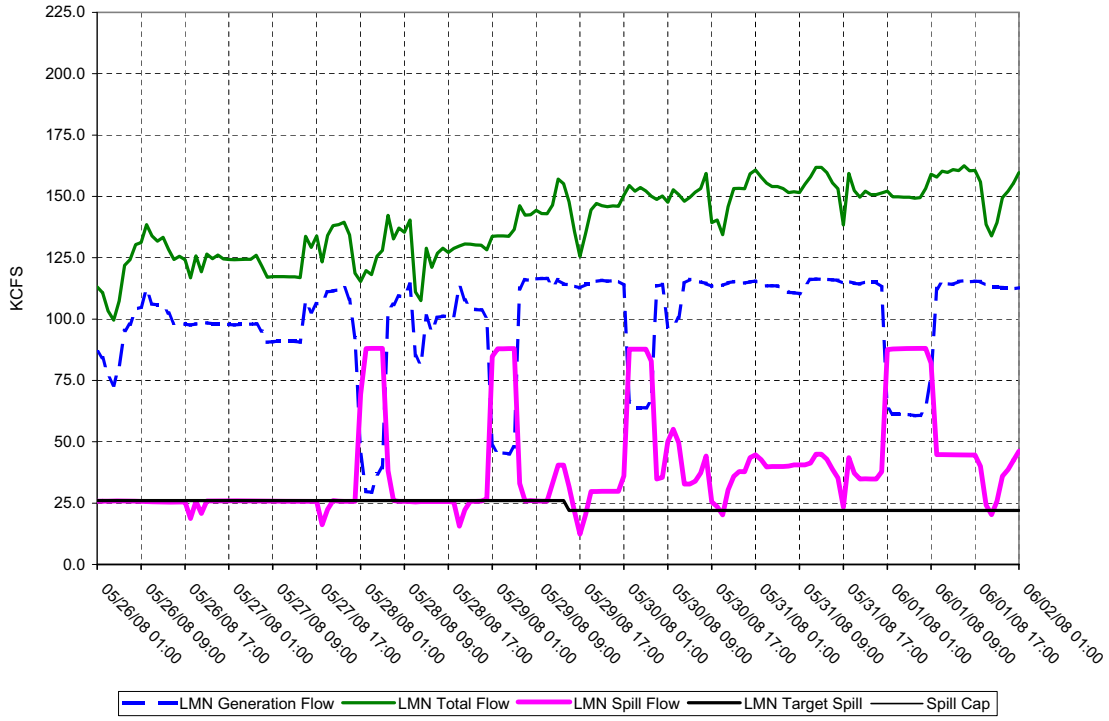
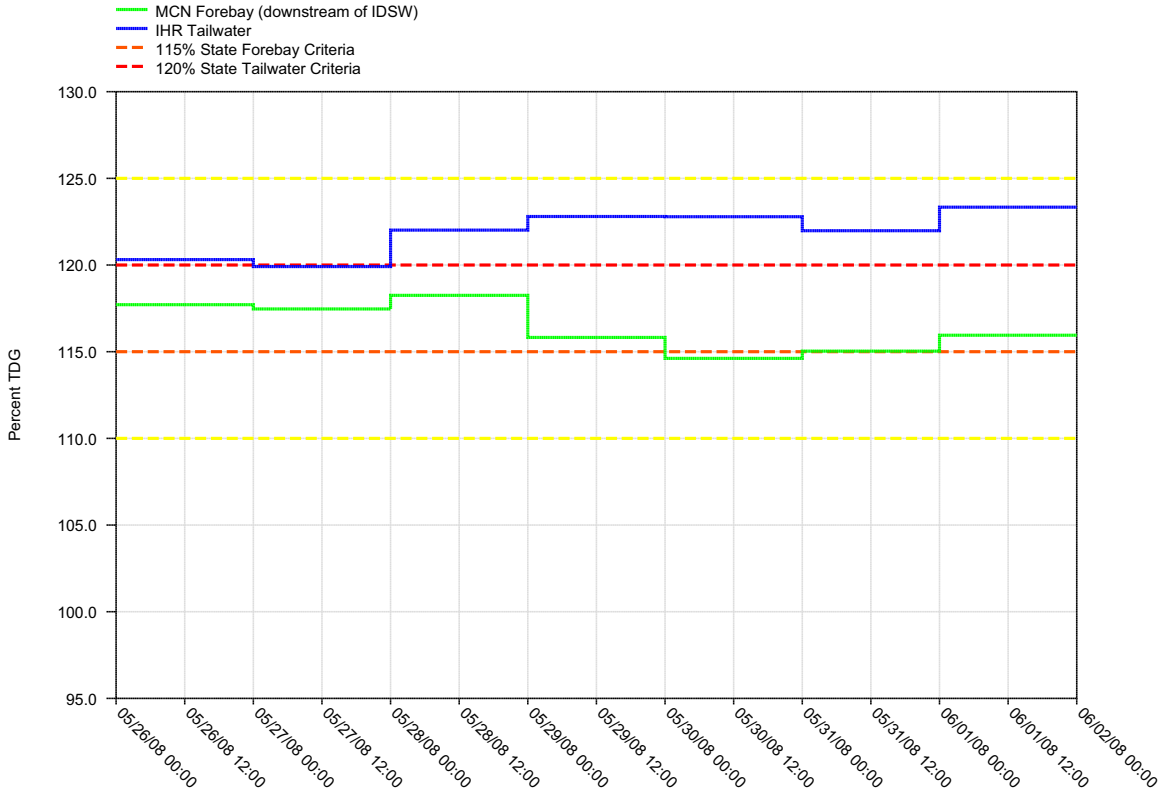


Figure 28.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

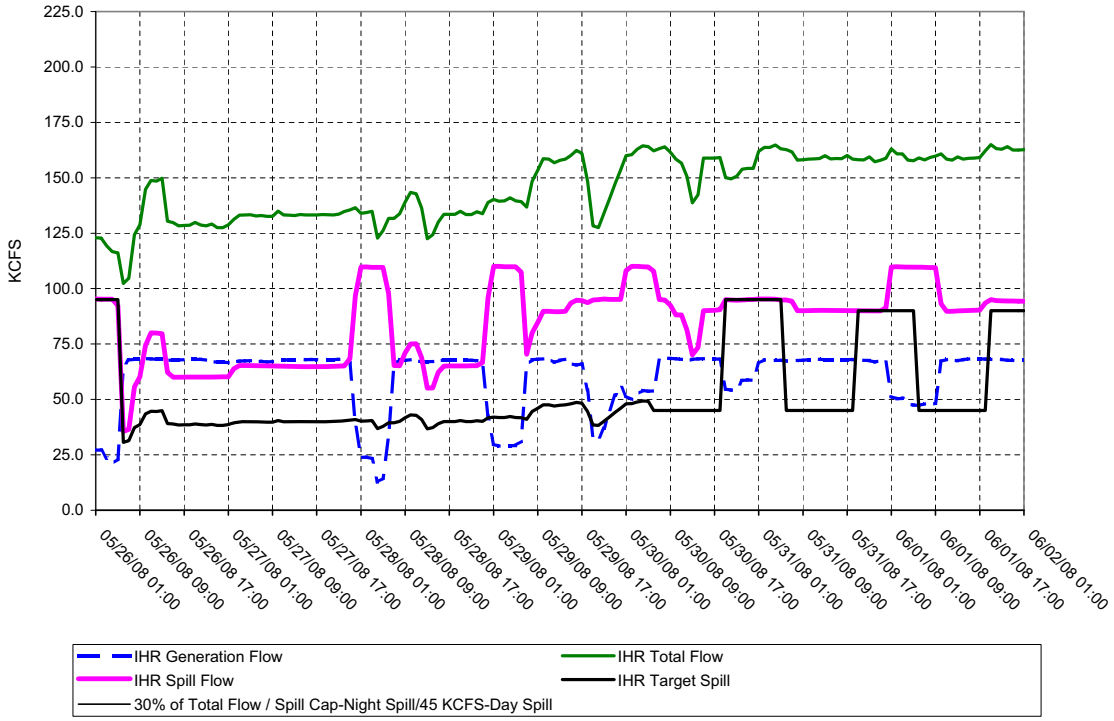
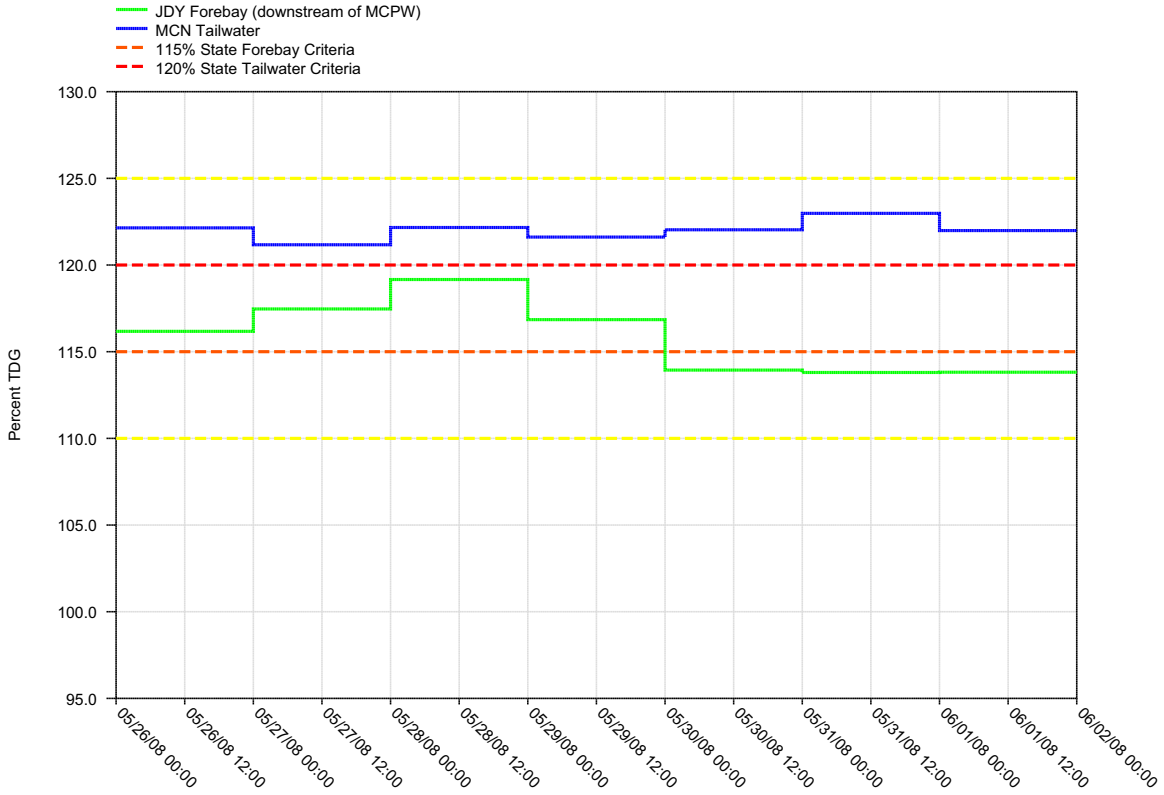


Figure 29.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

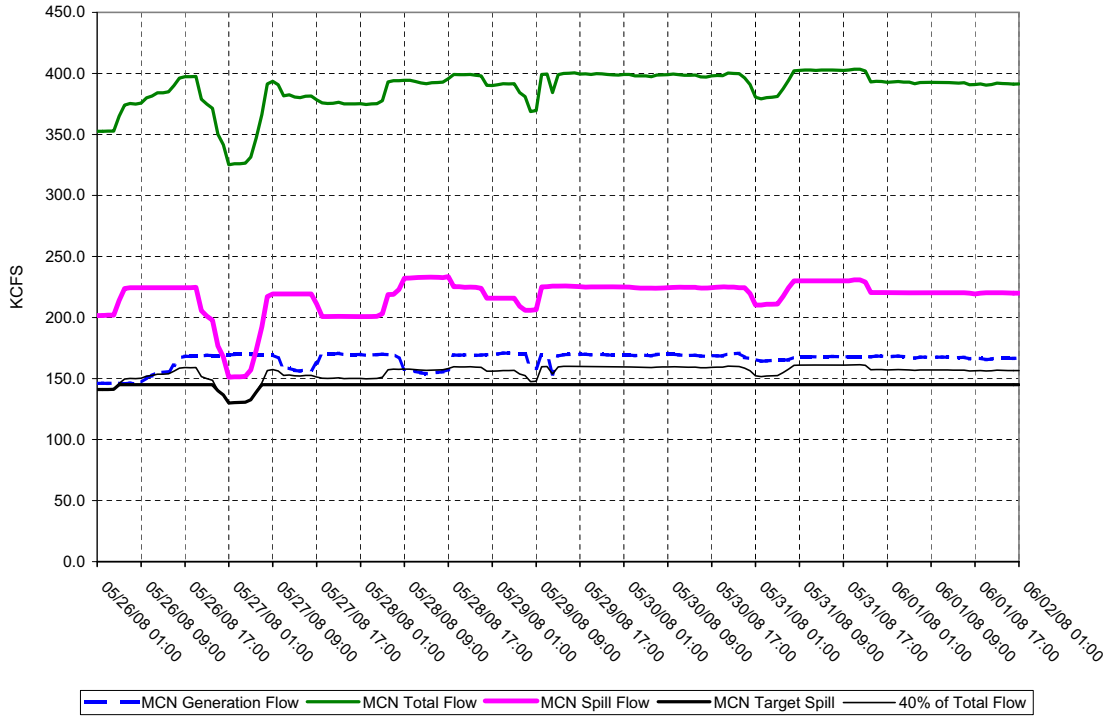
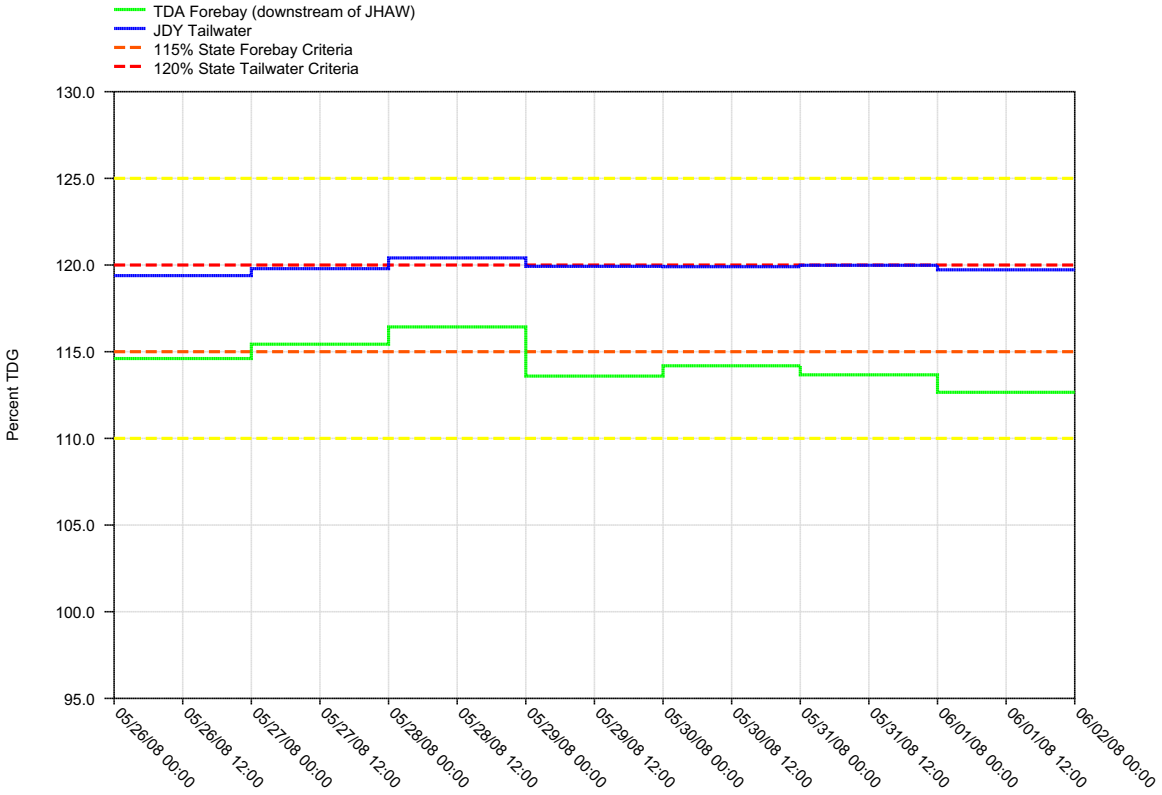


Figure 30.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

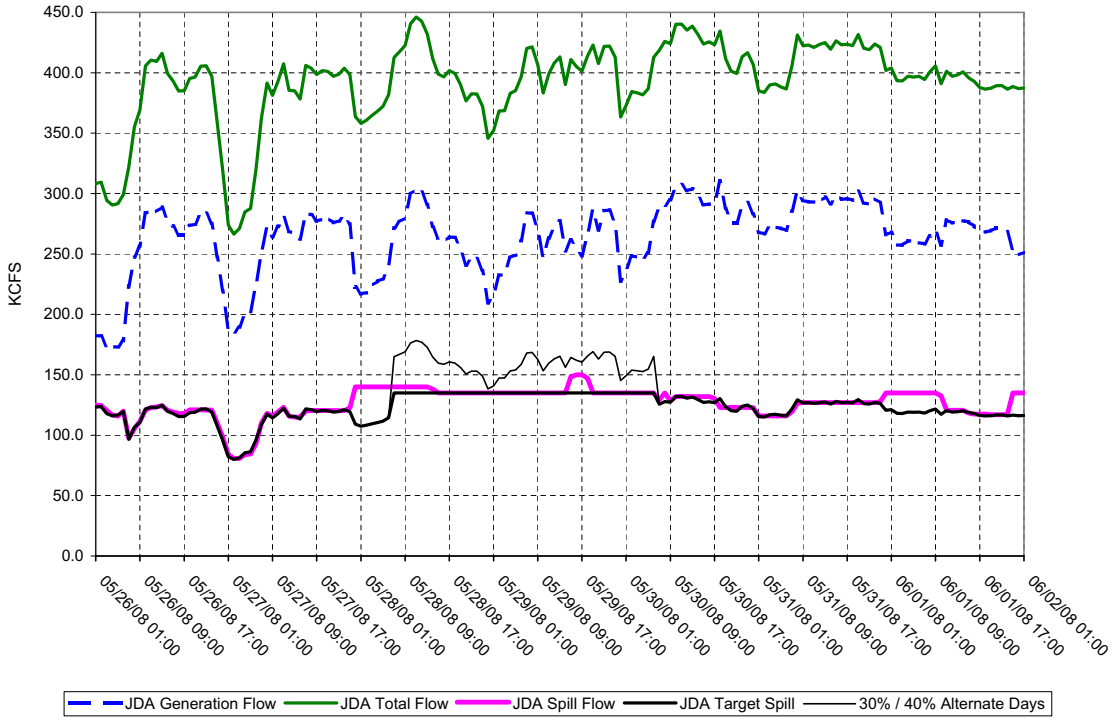
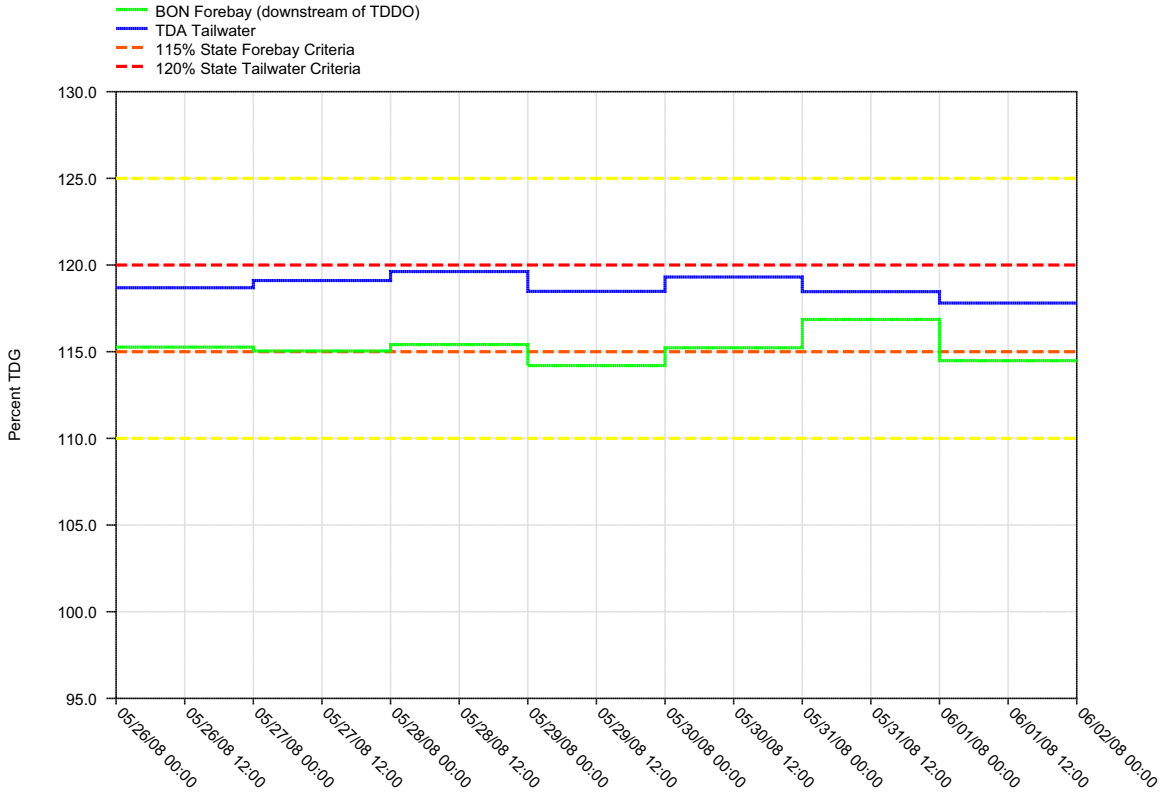


Figure 31.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

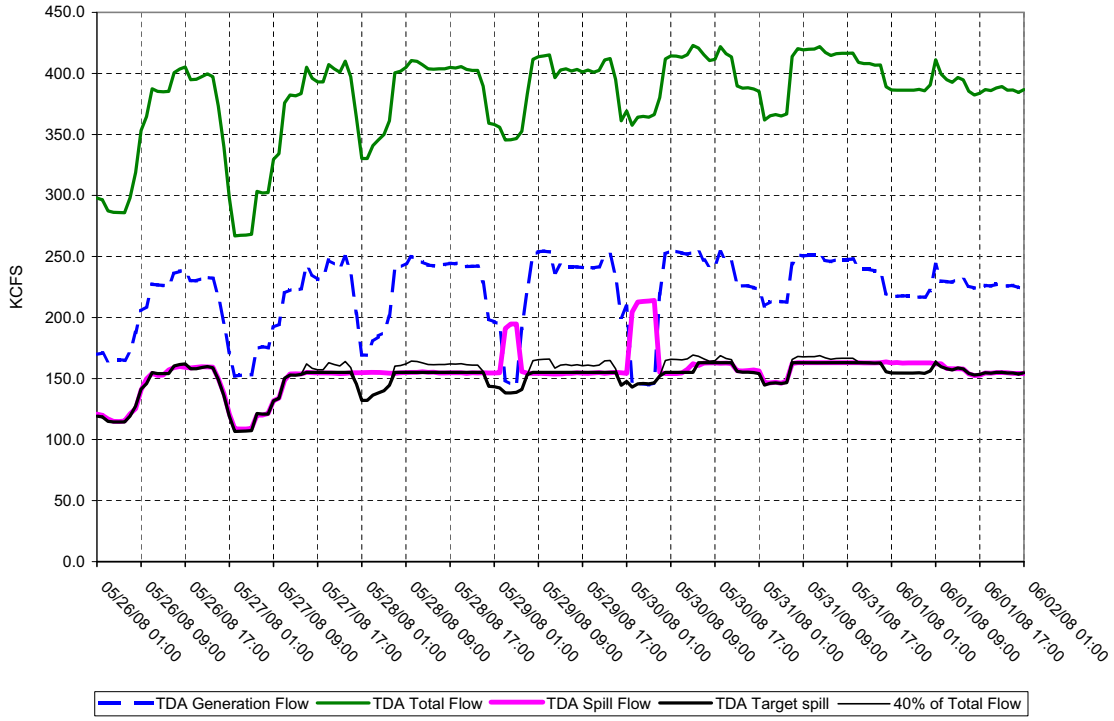
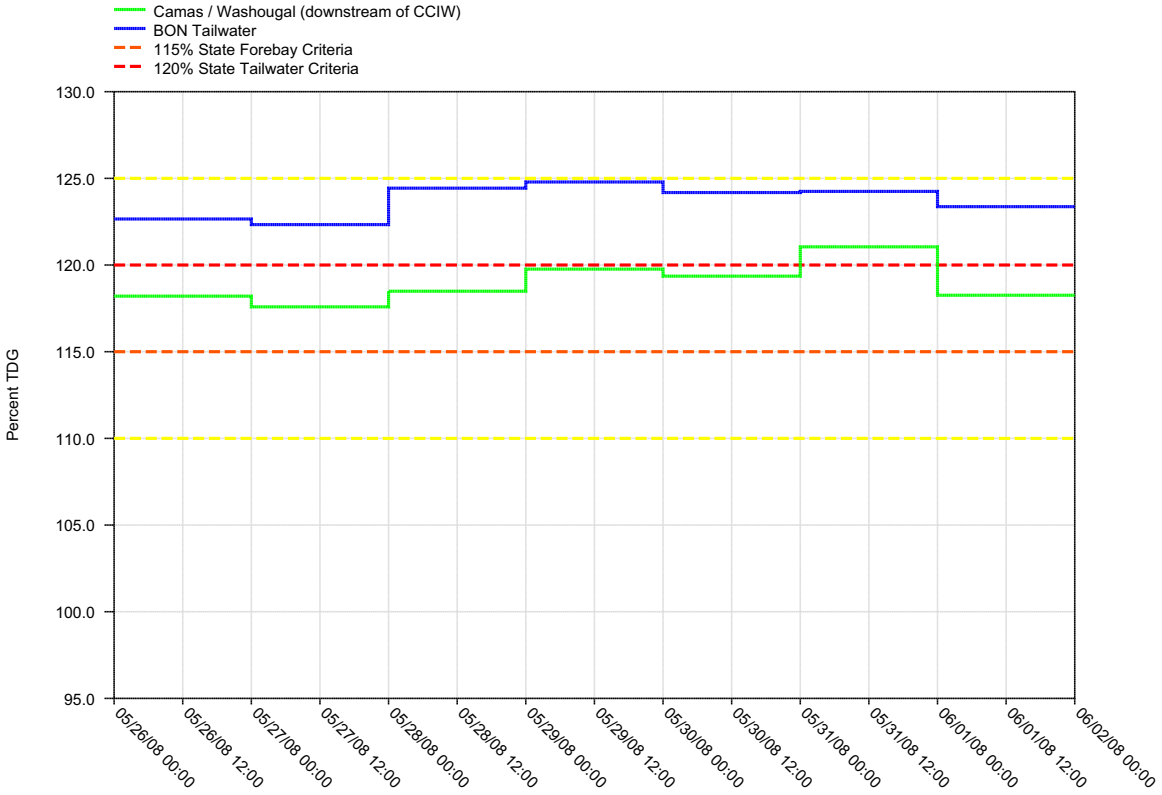
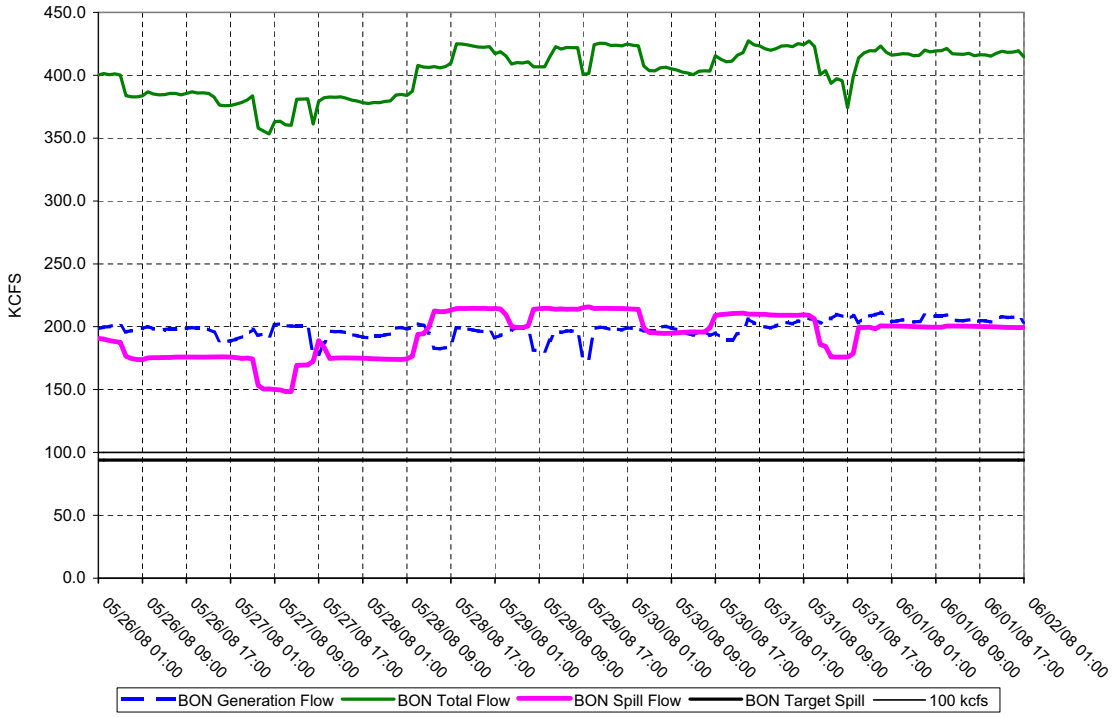


Figure 32.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow



Average percent TDG for 12 highest hours: May 5 – June 1, 2008

Date	Monitoring Stations (full list)																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
05/05/2008	104.2	110.8	111.7	117.1	116.2	112.9	117.5	116.3	112.0	115.5	108.9	115.8	113.2	116.9	115.7	117.7	119.4
05/06/2008	103.8	110.2	111.4	117.5	115.9	116.4	117.8	116.7	112.6	115.3	109.7	114.9	111.9	115.6	113.8	117.1	115.4
05/07/2008	103.1	110.0	110.1	115.6	115.6	115.2	115.3	116.0	112.4	114.7	109.3	115.6	108.5	113.8	110.2	119.1	112.6
05/08/2008	102.1	116.5	108.2	115.0	114.1	114.8	113.4	119.1	110.7	114.7	108.6	115.8	108.3	114.3	108.7	120.5	112.5
05/09/2008	101.6	114.5	106.7	114.8	113.3	114.3	113.2	117.4	110.1	115.5	108.7	117.4	110.5	115.9	110.9	120.9	112.8
05/10/2008	103.0	113.3	109.2	113.2	115.5	114.8	114.0	116.7	111.4	114.7	109.2	117.7	111.5	116.7	114.8	121.2	113.5
05/11/2008	103.1	109.8	110.1	116.2	113.8	114.3	113.3	115.6	110.6	114.1	107.4	115.5	110.4	115.2	112.7	118.6	113.0
05/12/2008	102.3	109.7	108.2	115.8	111.5	119.8	111.9	115.6	108.2	115.3	107.1	118.5	110.7	116.1	110.4	120.9	112.9
05/13/2008	102.0	109.6	106.9	111.5	112.2	119.1	112.0	115.2	108.7	114.5	107.8	117.4	111.4	116.2	112.8	120.2	113.6
05/14/2008	101.5	109.9	105.9	110.5	111.8	116.8	112.5	115.9	107.9	114.1	106.6	114.5	111.0	115.6	112.7	118.8	114.0
05/15/2008	102.2	110.2	106.2	116.0	110.8	114.5	113.2	116.5	109.0	114.7	106.5	115.4	110.6	116.4	114.7	120.3	116.2
05/16/2008	103.5	115.3	107.4	116.9	112.6	120.5	115.4	117.2	113.2	115.2	109.5	115.5	111.8	117.0	116.1	120.6	115.3
05/17/2008	105.0	122.2	110.2	116.1	116.2	120.9	116.4	119.6	114.6	115.9	110.1	115.4	112.3	117.3	117.4	120.1	117.0
05/18/2008	105.6	127.8	112.5	122.1	116.9	120.2	117.7	120.9	114.6	119.8	112.3	118.7	112.5	116.2	116.1	123.8	118.8
05/19/2008	106.0	131.0	118.8	126.7	123.9	123.9	118.2	126.0	114.1	121.6	114.1	120.2	114.5	117.9	115.8	123.5	119.8
05/20/2008	106.8	132.8	123.6	128.1	128.6	126.7	121.1	130.4	113.1	121.8	113.9	118.6	114.1	117.5	115.7	123.8	118.6
05/21/2008	106.6	133.5	122.4	127.2	128.0	126.5	121.5	129.1	110.0	122.4	110.4	118.5	110.1	116.1	112.6	124.0	117.0
05/22/2008	107.9	132.1	124.2	126.8	130.2	126.2	124.4	129.0	113.1	122.3	109.6	120.5	110.6	117.0	111.8	124.3	119.4
05/23/2008	108.5	129.6	126.2	124.0	129.6	121.5	124.5	124.3	114.8	120.9	108.2	119.7	111.2	117.5	113.0	124.3	118.9
05/24/2008	106.9	125.2	125.1	122.7	125.6	121.3	123.2	122.8	110.6	122.6	110.5	120.9	115.4	119.6	116.5	123.3	118.6
05/25/2008	105.7	121.4	122.6	119.2	123.7	116.8	122.1	120.8	111.2	122.5	114.0	120.1	113.9	118.9	116.5	123.2	119.0
05/26/2008	105.8	121.1	121.8	117.7	121.4	115.9	120.4	120.3	117.7	122.1	116.2	119.4	114.6	118.7	115.3	122.7	118.2
05/27/2008	105.2	122.3	119.6	117.5	119.0	115.4	118.7	119.9	117.5	121.2	117.5	119.8	115.4	119.1	115.0	122.3	117.6
05/28/2008	105.1	122.3	118.9	120.1	119.0	121.7	118.3	122.0	118.3	122.2	119.2	120.4	116.4	119.6	115.4	124.4	118.5
05/29/2008	104.7	126.1	118.3	121.6	120.9	123.0	117.9	122.8	115.8	121.6	116.8	119.9	113.6	118.5	114.2	124.8	119.8
05/30/2008	104.2	127.9	117.5	124.4	120.2	121.8	117.6	122.8	114.6	122.0	113.9	119.9	114.2	119.3	115.2	124.2	119.4
05/31/2008	105.8	128.3	120.5	122.4	124.9	119.5	119.3	122.0	115.0	123.0	113.8	120.0	113.7	118.5	116.9	124.2	121.0
06/01/2008	106.0	127.0	121.5	122.0	123.2	124.1	120.2	123.3	115.9	122.0	113.8	119.7	112.7	117.8	114.5	123.4	118.3

Generated: Sun Jun 1 23:25:47 2008

Number of hours of data reported in a given day

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Big, bold, red text denotes exceedances.
--- indicates No Data
Dates run from hour 1 to 24 (not 0 to 23).
The gas caps shown only apply when spilling to facilitate juvenile fish passage ("voluntary spill") between April 3rd and August 31st.
At all other times, the gas cap is 110%.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
WRNO	Bonneville Tailwater (Warrendale)
CWMW	Camas / Washougal

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
June 2008

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the February 25, 2008 court order adopting the 2008 Fish Operations Plan (FOP) and requiring the Corps to provide monthly reports on the implementation of the 2008 FOP. The FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. To the extent hydro-power operations are not specified in the 2008 FOP, the FCRPS operations will be consistent with the operations considered in the 2004 Biological Opinion and/or other operative documents, which include the 2008 Water Management Plan (WMP) and 2008 Fish Passage Plan (FPP).

The Corps' lower Columbia and Snake River projects and fish passage operations identified in the FOP for the month of June 2008 are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (TDG) for the tailwater at each project and for the next project's forebay downstream.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the spill program for the month of June 2008.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per week in June displaying the performance of the spill program as follows:

(A). Daily Average of the High 12 Hourly % TDG Values - described in the upper graph.
(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on June 2 and end on June 29 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start on Monday 0100 hours through Monday 0100 hours for the following dates:

June 2 – June 8	Figures 1 - 8
June 9 – June 15	Figures 9 – 16
June 16 – June 22	Figures 17 - 24
June 23 – June 29	Figures 25 – 32

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours as the result of spill from the dam. The objective is to operate each project up to the TDG limits without exceeding those limits if practicable.

- The blue line on the graph represents the TDG in the tailrace of the dam. 120% TDG is the upper operating limit.
- The green line represents the TDG in the forebay of the next dam downstream. 115% is the upper operating limit.

B. Lower Graph: Represents the flow and spill at the dam.

- The dotted blue line shows the average flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the average hourly spill level as defined in the 2008 FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Ice Harbor (15.2 kcfs) and Bonneville (50 kcfs) dams.

The hourly target spill may vary as a function of quantity of river flow, forebay elevation and generating units available at a project.

II. A monthly percent TDG Table is included at the end of the figures that shows the overall daily results of the average percent TDG for the 12 highest hours for all projects. The numbers in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

Please note that for all projects that spill for fish passage, the target spill may be limited to a lesser quantity (i.e. the spill cap), with the objective of staying within the TDG state waiver limits. When spill levels briefly deviated below or above the level described in the FOP, the heavy red line will be below or above the heavy black line in the graphs. Whenever the operation varied from the target spill during voluntary spill hours, or other anomalies occurred, these instances are described below. The FOP Spill Report Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the FOP Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spillway gate openings to implement the regionally coordinated spill pattern. The project operator sets the spillway gate openings to most closely approximate the FOP level of spill while also avoiding exceeding the spill cap.

"Low flow" operations on Lower Columbia and Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects operate at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour. During these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percent of the total flow than it had been during higher flows. As a result, even though the spill volume remained the same, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock. When theses variances occur, they are recorded in the FOP Spill Report Table below under the variance type “Navigation.” For the month of June, the “Navigation” variance identifies instances associated with reduced spill for the safe passage of fish transportation barges at Lower Monumental Dam.

Also note that actual spill levels at the Corps projects may range from 1 to 2 kcfs lower or higher than specified in the 2008 FOP, including the set spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2008 FOP describes project operations during “load swing hours” (page 8). For reporting purposes, the notation “Transmission Stability” in the FOP Spill Report

Table will replace “load swing hour” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these “Transmission Stability” hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days cited in the Table, the 24 hour average spill was within the FOP level of +/- 1% of the target spill unless involuntary spill occurred.

Occurrences which required an adjustment in operations and regional coordination are described in greater detail in the section below entitled “June Operational Adjustments Report.”

June Operations:

The month of June was characterized by above average flows for both the Lower Columbia and Snake rivers. These continued high inflows across the Columbia Basin were the result of cooler than average atmospheric temperatures occurring earlier in the spring that shifted a significant portion of total snowmelt later into June causing high flows in the unregulated (natural) tributaries. The freshet continued through June, causing frequent instances of involuntary spill through the month as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. Also, involuntary spill occurred in non-peak hours when excess spill occurred due to lack of load. A contributing factor during non-peak hours was required repair work on the Grizzly-Summer Lake No. 1 500kV transmission line, which limited the amount of generation that could be sent down the California-Oregon Intertie (COI). Because of the large amounts of involuntary spill which occurred after the onset of the freshet, these are not included in the Spill Report Table. Instead, the Hourly Spill and Flow graphs reveal the hours when the volume of spill (red line) was higher than the target spill (bold black line). In many of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly % TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs.

During the June reporting period, the FOP spill operations switched from spring to summer levels; the daily spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs for 24 hours up to June 21, at which time the target spill changed to 18 kcfs 24 hours per day
- Little Goose Dam - the target spill throughout the month of June was 30% of the total flow for 24 hours
- Lower Monumental Dam –the hourly target spill was to the spill cap for 24 hours up to June 21, at which time the target spill changed to 17 kcfs, or up to the spill cap when under 17 kcfs.
- Ice Harbor Dam – the hourly target spill throughout the month was to 45 kcfs day/spill cap night alternating with the 30% spill test and is shown as the heavy black line on the graph
- McNary Dam – the target spill was 40% of the total flow up through June 20, and starting June 21 spill alternates between two days of 60% and two days of 40% of total flow for 24 hours arranged in a randomized two day treatment, four day block study design.
- John Day Dam – the hourly target spill throughout the month was two days of 30% and two days of 40% of total flow for 24 hours arranged in a randomized two day treatment, four day block study design.
- The Dalles Dam - the target spill throughout the month was 40% of the total flow for 24 hours
- Bonneville Dam - the hourly target spill was a fixed quantity of approximately 100 kcfs 24 hours per day up to June 21, at which time the target spill changed to 85 kcfs during daytime hours and to the spill cap during nighttime hours as defined in the 2008 FPP.

June Operational Adjustments Report:

1. Fish Transport Operations:
   - Fish collection for routine transport at Lower Granite, Little Goose, and Lower Monumental dams continued throughout the month of June. In accordance with the FOP and FPP, due to the declining number of juvenile salmonids being collected at Snake River collector projects, every other day barging began on June 5 at Lower Granite, Little Goose, and Lower Monumental dams. Daily collection continued with fish being held in raceways until the following day to be transported.

2. Little Goose Dam:
   - A three treatment (3 varying spill patterns) adult salmon passage study began on April 3, 2008 and continues until the end of spill operations on August 31, 2008.

3. Lower Monumental Dam:
   - A two treatment (two varying spill patterns) spring spill test started on April 30, 2008 and continued until June 20, 2008 to examine fish passage and survival at

the project with the recently installed Removable Spillway Weir (RSW) in place. On June 21 at 0001 hours, a single treatment (one spill pattern, one spill level) summer spill evaluation began. This operation will continue until 2400 hours on August 31, 2008.

- On June 9 there was excess spill due to a Submersible Traveling Screen (STS) inspection that prevented the project operator from bringing another unit on line to pass extra flow through the powerhouse. The once per month spring STS inspections are included in the 2008 FPP, page LMN-8.

4. Ice Harbor Dam:
   - On May 2, 2008, a two treatment (30% vs. 45kcfs/Gas Cap) spring spill test for juvenile salmonid passage was initiated utilizing two test spill patterns from the 2008 FPP. This two-treatment evaluation continued through June and will end on July 16, 2008. The test utilizes the same treatment schedule that was used in 2007 and will end on the same date.

5. McNary Dam:
   - A two treatment (40% vs 60%) summer spill test started on June 21, 2008 and will continue through July 26, 2008, to study acoustic telemetry on subyearling Chinook salmon.

6. John Day Dam:
   - On April 29, 2008 a two treatment (30% vs. 40% spill) juvenile salmonid passage and survival evaluation was initiated to evaluate two recently installed Temporary Spillway Weirs (TSWs) under two spill levels. This two-treatment evaluation will continue until July 18, 2008.
   - On June 4, there was a system wide transmission line outage that reduced generation capability resulting in excess spill for five hours.

7. The Dalles Dam:
   - On June 4, there was a system wide transmission line outage that reduced generation capability resulting in excess spill for four hours.

8. Other operations in the lower Snake and Columbia rivers that varied from those described in the FOP were discussed and agreed to in the Regional Forum process prior to commencement and are addressed below. Those operations coordinated with regional salmon managers were planned such that they would have the least impact to fish (also cited in the FOP Spill Report Table below).

   a. McNary Dam:
      - From June 10 through June 12 there were individual spillbay outages during the TSW gate hoist installation. Outages did not affect project spill since involuntary spill was already occurring. This change in operation was discussed and agreed upon by TMT members during the TMT conference call on June 11.

- On June 18, there were individual spillbay (18 - 22) outages during repairs of the hydrophones. Outages did not affect project spill since involuntary spill was already occurring. This change in operations was coordinated during the FPOM meeting on June 12, and agreed upon by TMT members via email on June 17.

b. Bonneville Dam:

- At Bonneville Dam on May 21-23, due to high river flow and corresponding high debris load, Submersible Traveling Screens (STSs) installed in turbine intakes to guide and route fish away from turbines and past the dam were removed. Large amounts of debris were accumulating on the screens, causing an increased incidence of descaling of fish passing the dam. This situation was discussed at the May 21 TMT meeting with the recommendation that the best course of action to alleviate the elevated descaling was to remove the screens until flows and debris levels subsided. In an effort to utilize the screens, they were re-installed as follows:
    - STSs were re-installed in unit 11 on June 2 to monitor debris;
    - STSs were again removed on June 5 due to excessive debris load;
    - STSs were re-installed in units 12 and 14 on June 16, units 13 and 16 on June 18, and units 17, 18, and 15 on June 19.

  Once reinstallation was complete, it was possible for STSs to operate through the remainder of June because of reduced debris loads.

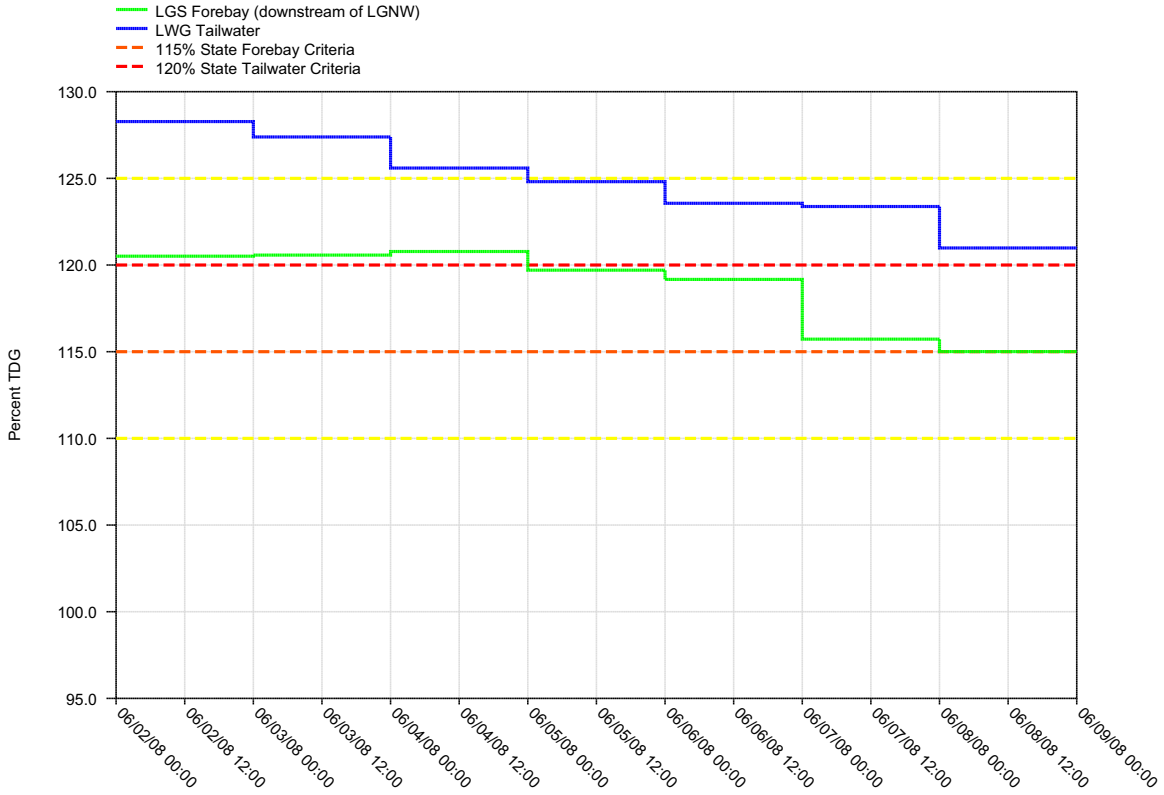
FOP Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Add'l Spill	6/8/2008	0500-0800	4	Human Error	Hourly % spill increased to 32.3% (above 30% +/- 1% range) but spilled to to the cap: inadvertent request for spill over FOP 30% while continuing to spill at cap.
Little Goose	Add'l Spill	6/12/2008	1600	1	Operational Limitations	Hourly % spill increased up to 31.7% level (above 30% +/- 1% range) while spill stayed at cap: Mid-hour request to reduce spill was not soon enough.
Lower Monumental	Spill	6/6/2008	1700-1800, 2000	3	Navigation	Hourly spill dropped to 25.1 - 32.5 kcfs range, below the spill cap of 35 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/8/2008	1700, 1900	2	Navigation	Hourly spill dropped to 23.2 - 30.7 kcfs range, below the spill cap of 35 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Add'l Spill	6/9/2008	1600-1700	2	Operational Limitations	Hourly spill increased to 27.9 - 34.8 kcfs range, above the new spill cap of 22 kcfs. Fish screen inspection at this time prevented another generating unit from being brought on line, so additional spill was necessary to pass inflow. Monthly inspections are part of the 2008 FPP.
Lower Monumental	Spill	6/10/2008	1700-1800	2	Navigation	Hourly spill dropped to 18.6 - 27.2 kcfs range, below the spill cap of 31 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/12/2008	1700-1800	2	Navigation	Hourly spill dropped to 20.8 - 24.6 kcfs range, below the spill cap of 31 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/14/2008	1700-1800	2	Navigation	Hourly spill dropped to 17.5 -18.5 kcfs range, below the spill cap of 22 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/16/2008	1800-1900	2	Navigation	Hourly spill dropped to 18.5 and 15.8 kcfs, below the spill cap of 20 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/18/2008	1700-1800	2	Navigation	Hourly spill dropped to 17.3 and 18.4 kcfs, below the spill cap of 20 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/20/2008	1700-1900	3	Navigation	Hourly spill dropped to 16.4 -17.2 kcfs, below the spill cap of 20 kcfs. Reduced spill for safe passage of fish barge.

Lower Monumental	Spill	6/22/2008	1800, 2000	2	Navigation	Hourly spill dropped to 10.7 and 16.0 kcfs, below the spill cap of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/24/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 13.9 to 14.9 kcfs, below the spill cap of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	6/28/2008	1700, 1800	2	Navigation	Hourly spill dropped to 12.2 and 15.3 kcfs, below the FOP level of 17 kcfs. Reduced spill for safe passage of fish barge.
John Day	Add'l Spill	6/4/2008	1200-1600	5	Maintenance	Hourly % spill increased to 57.9% (above 40% +/- 1% range). The project spilled excess outflow since generation capability was reduced from a transmission line going out.
John Day	Spill	6/29/2008	2400	1	Transmission Stability	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 37.9%; spill limited by cap.
The Dalles	Add'l Spill	6/4/2008	1200-1500	4	Maintenance	Hourly % spill increased to 46.3% (above 40% +/- 1% range) : due to project spilling excess outflow since generation capability was reduced from a transmission line outage.
The Dalles	Spill	6/14/2008	1100	1	Operational Limitations	Hourly % spill decreased to 38.7% (below 40% +/- 1% range) and below 165 spill cap: spill fluctuates due to physical limits of spill gate settings.
The Dalles	Spill	6/16/2008	1300 & 2000	2	Transmission Stability	Hourly % spill dropped to 38.8 and 38.6% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.0%.
The Dalles	Add'l Spill	6/21/2008	1100	1	Human Error	Hourly % spill increased to 41.5 % (above 40% +/- 1% range): Spill cap change to 150 kcfs was misinterpreted as a request to spill at the spill cap
The Dalles	Spill	6/29/2008	2400	1	Transmission Stability	Hourly % spill increased to 41.7% (above 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 39.4%.

Figure 1.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

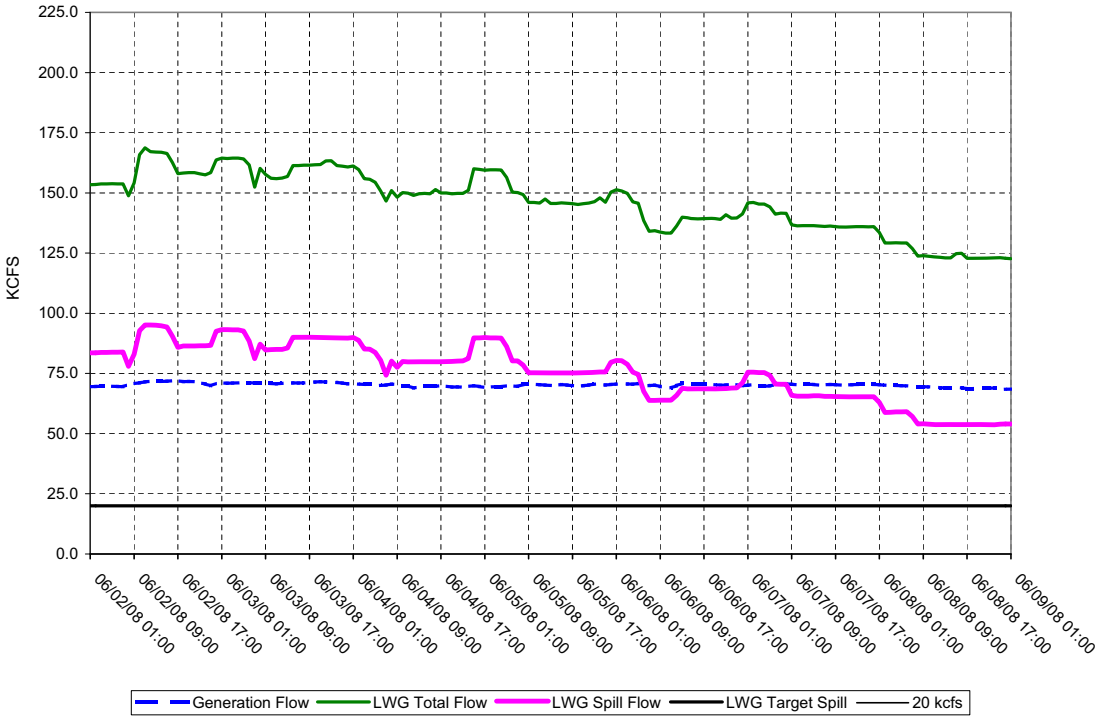
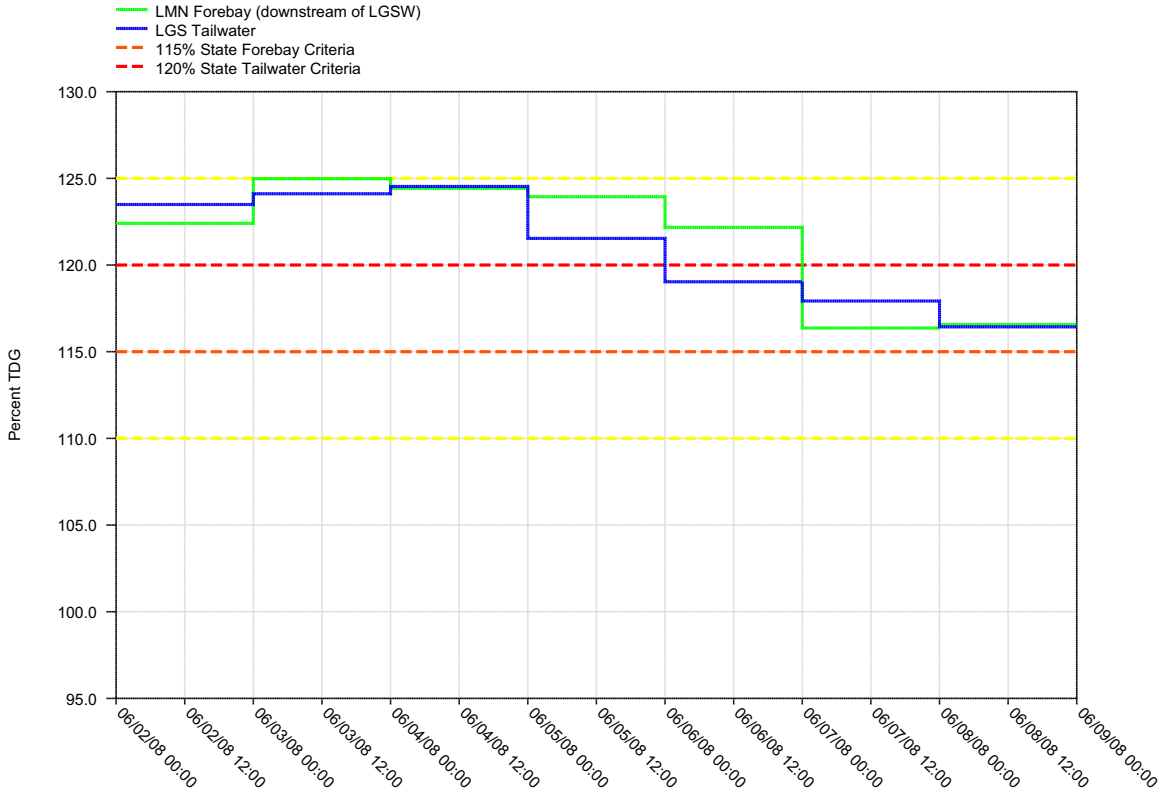


Figure 2.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

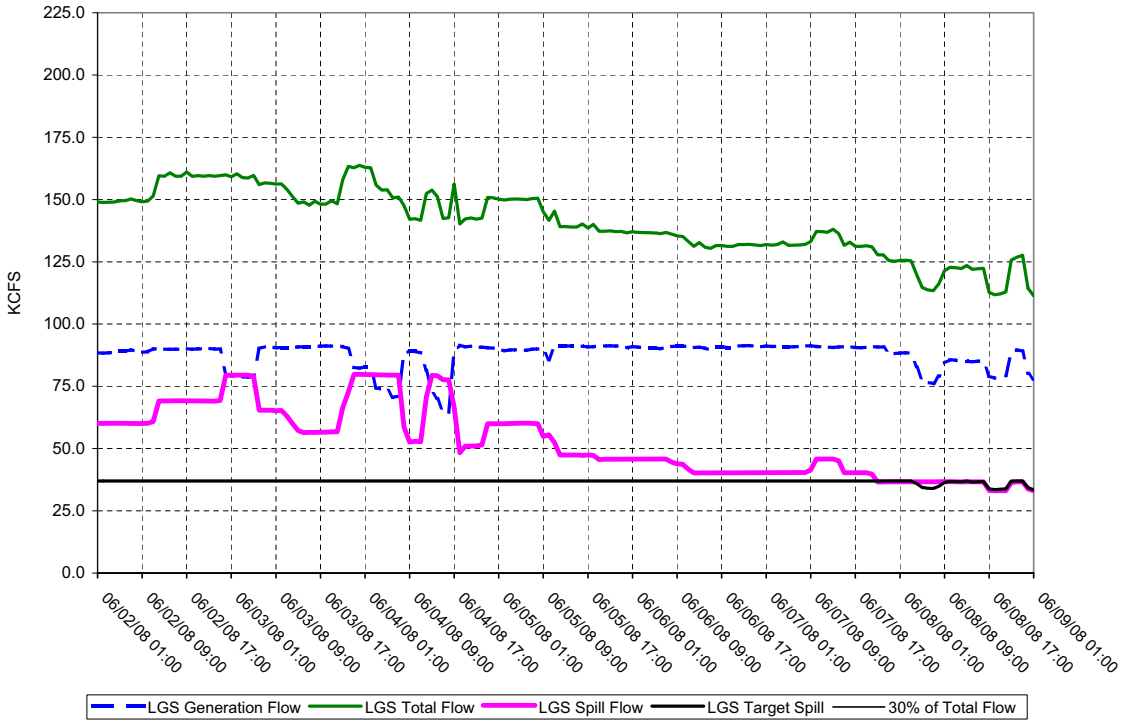
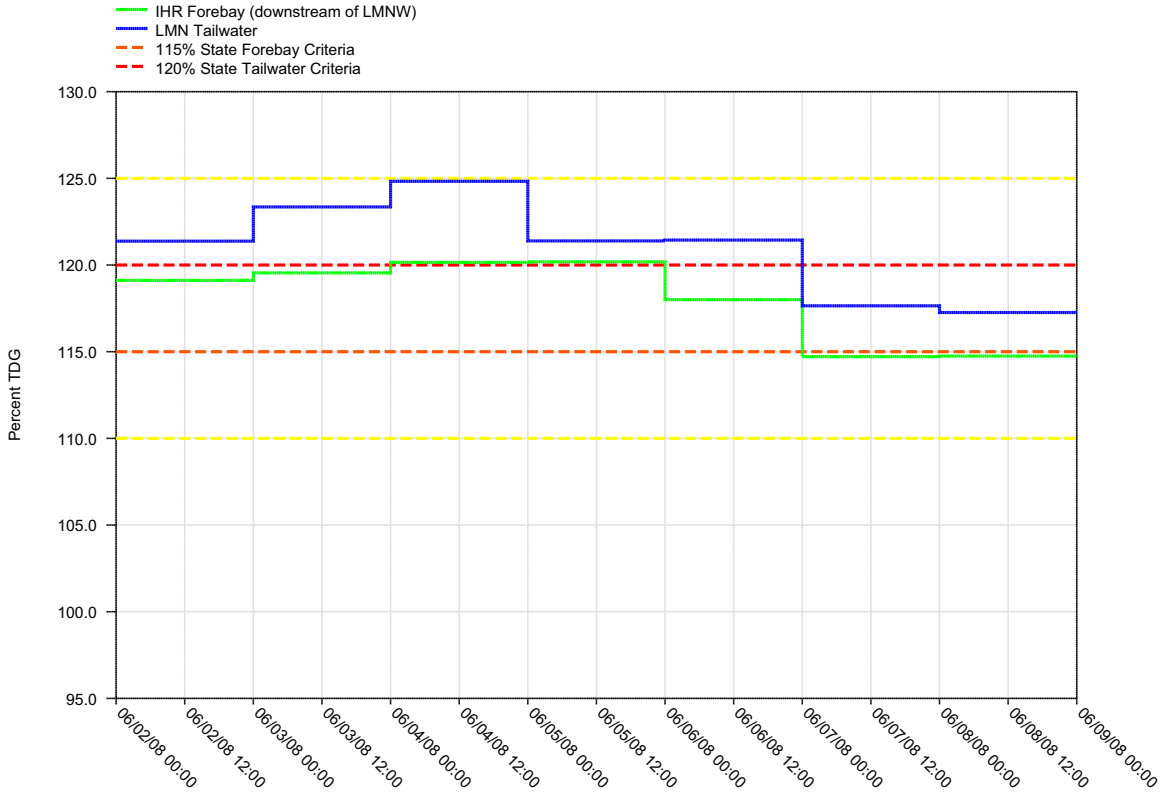


Figure 3.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

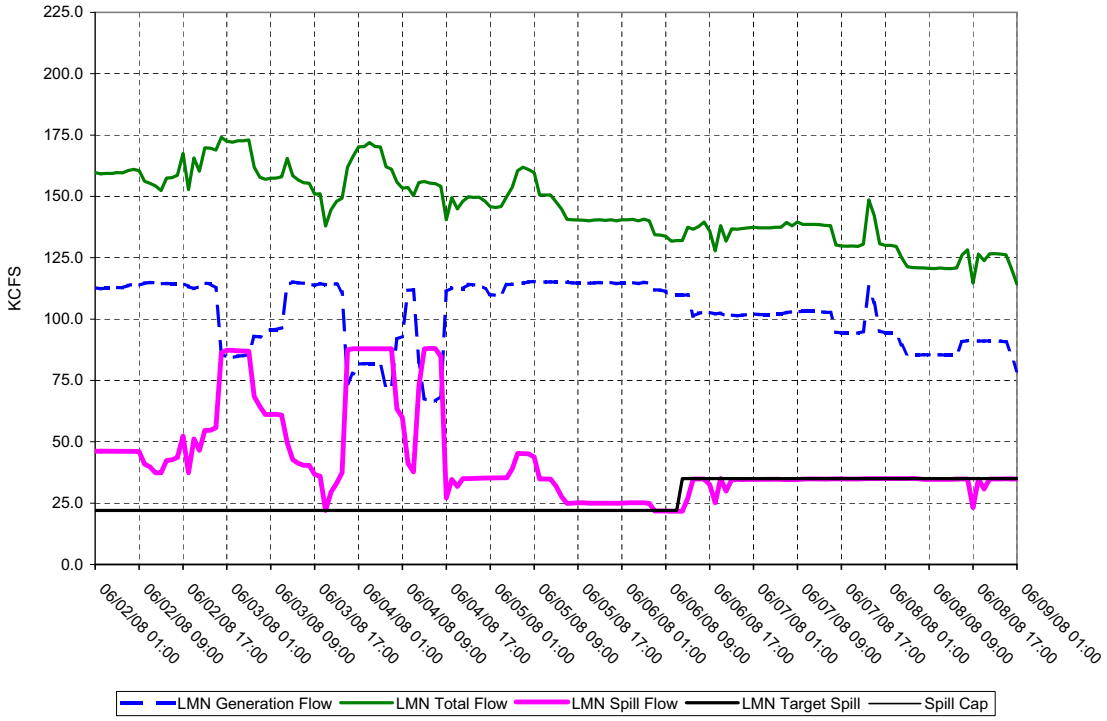
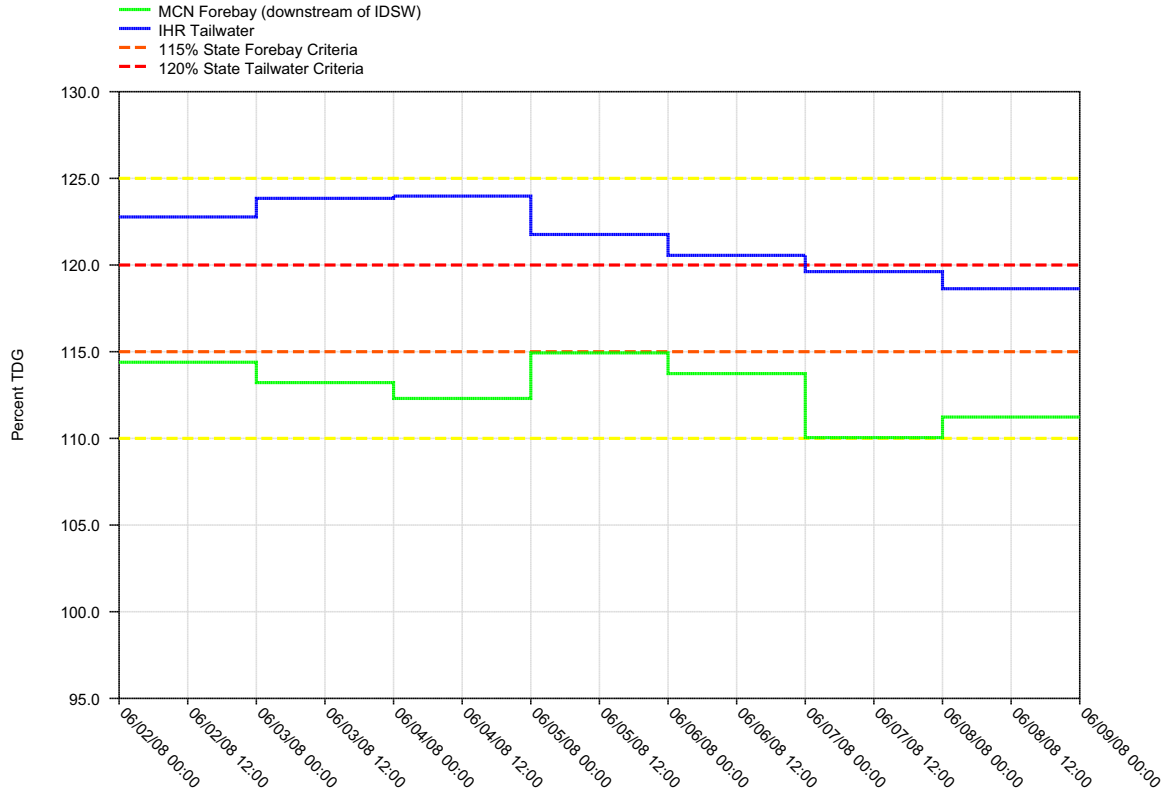


Figure 4.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

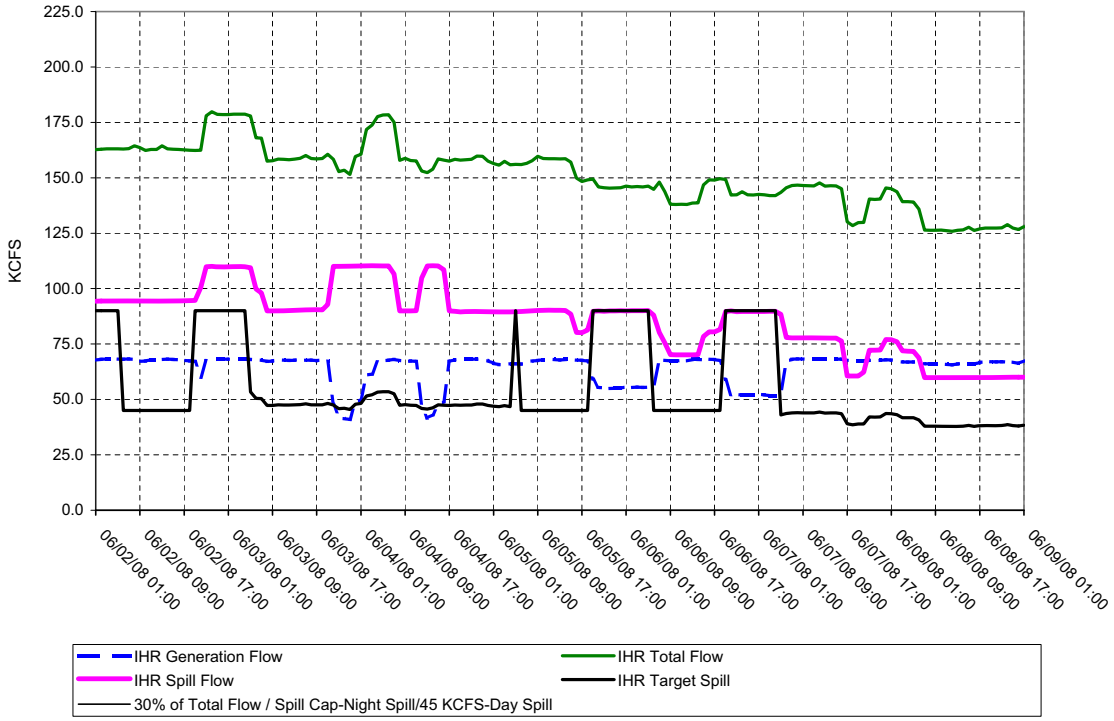
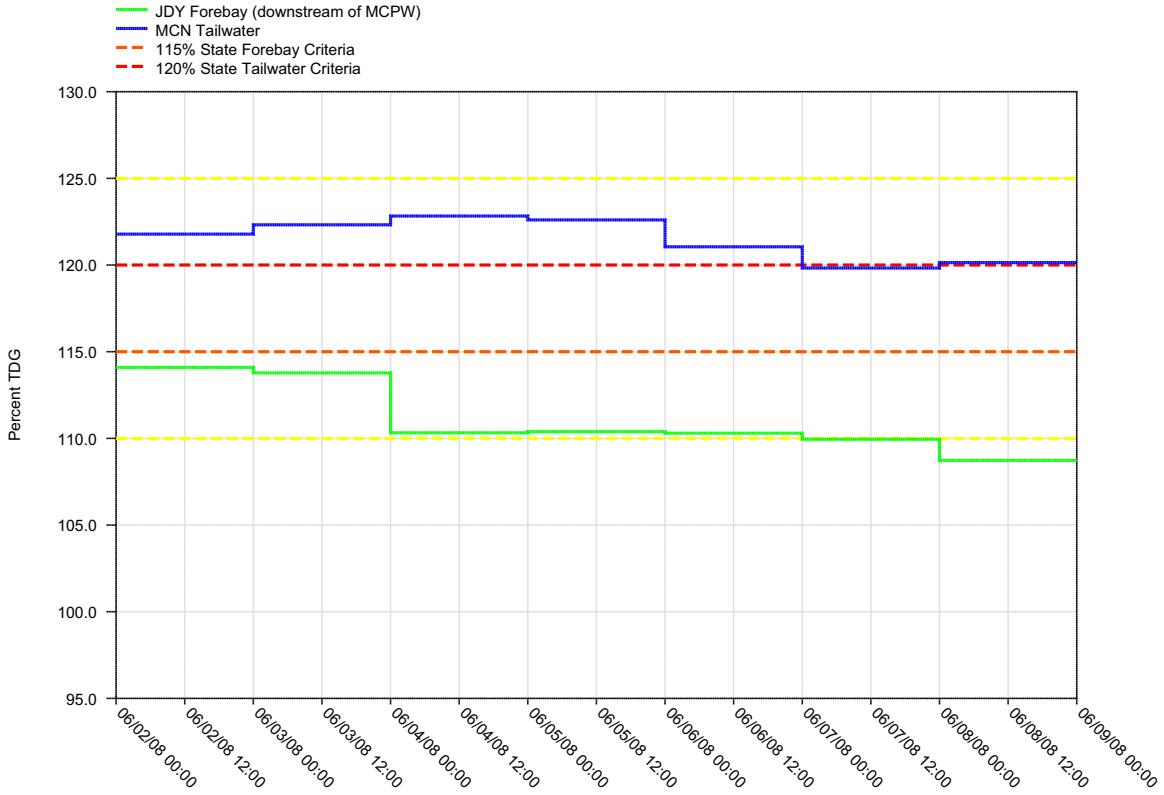


Figure 5.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

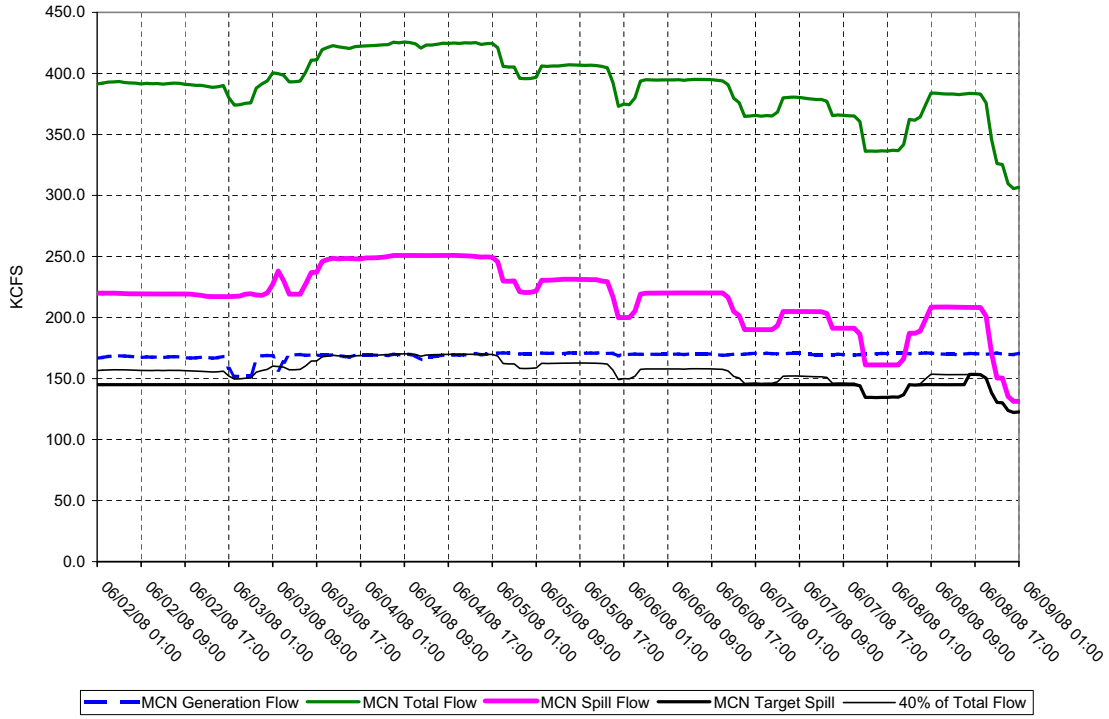
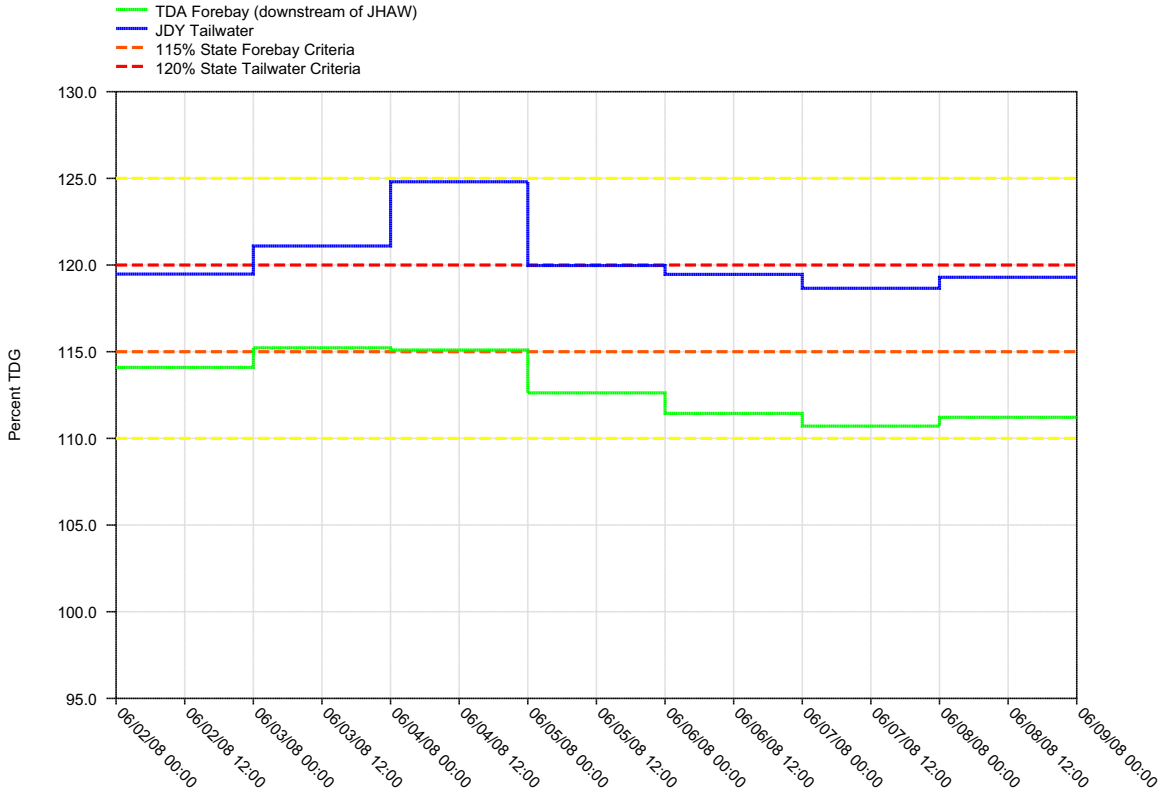


Figure 6.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

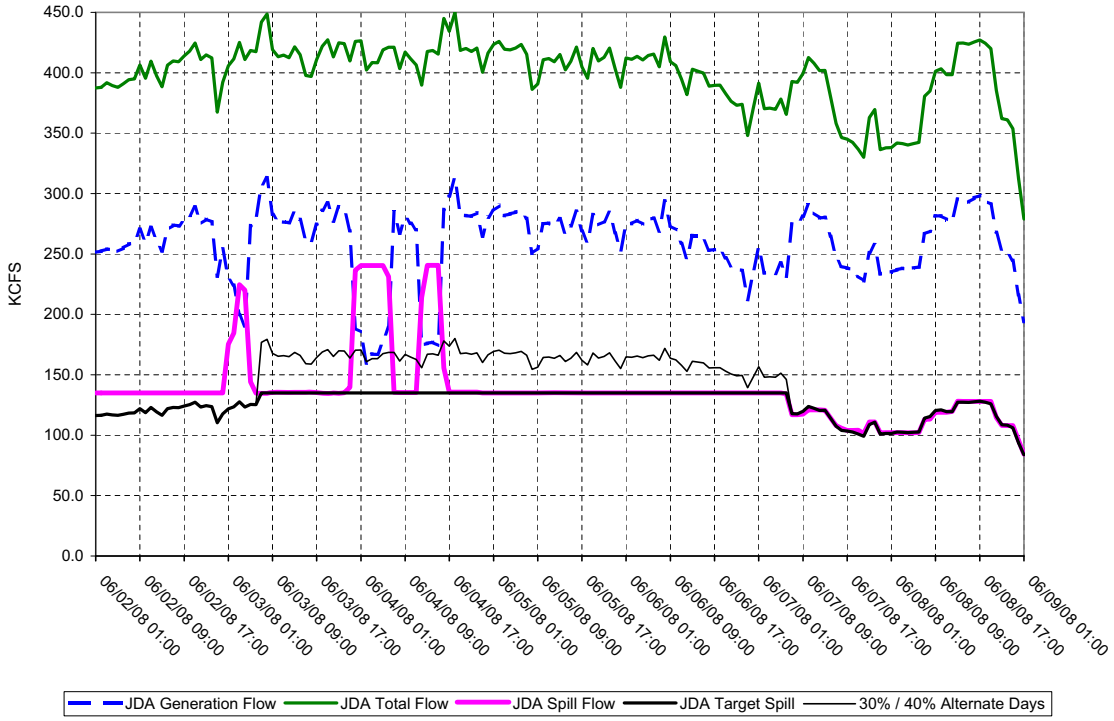
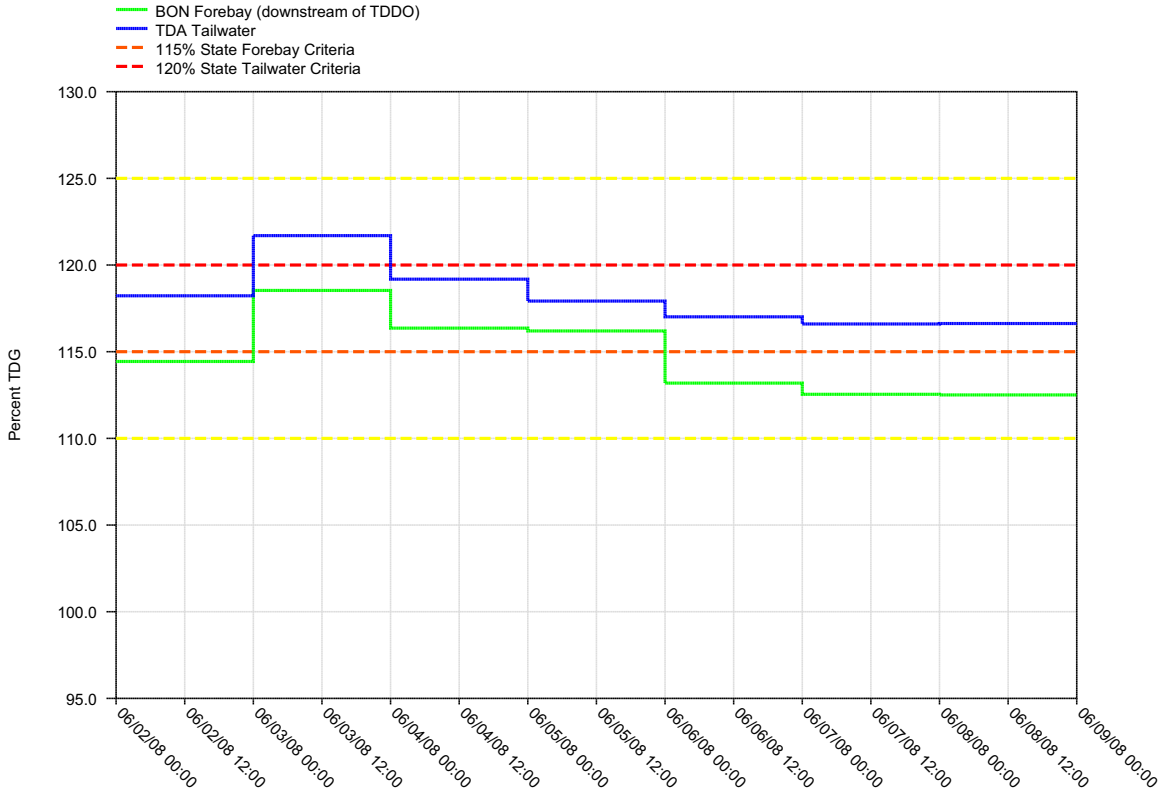


Figure 7.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

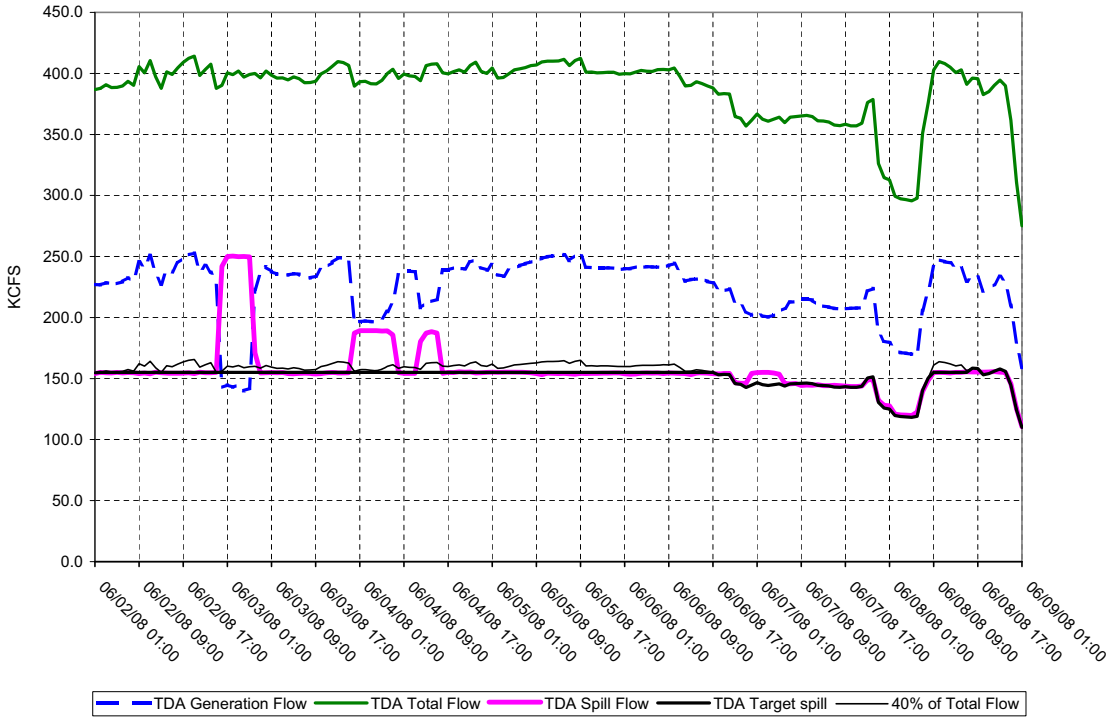
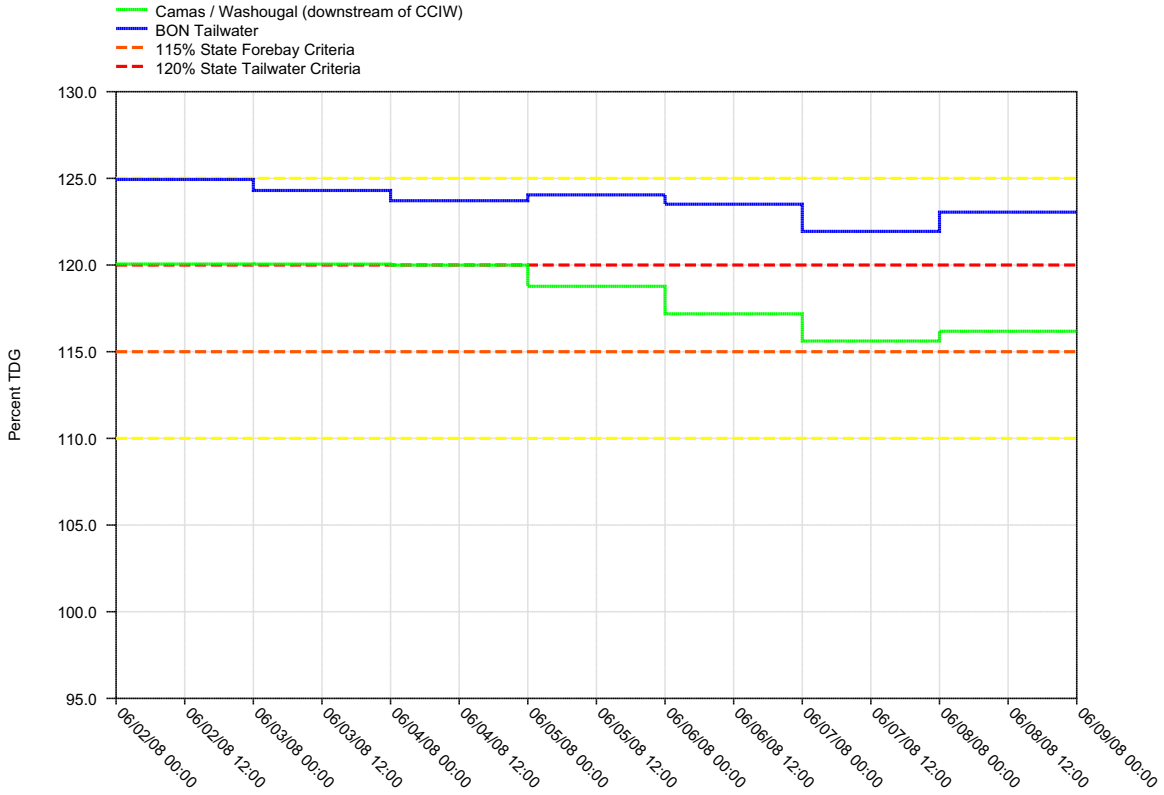


Figure 8.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

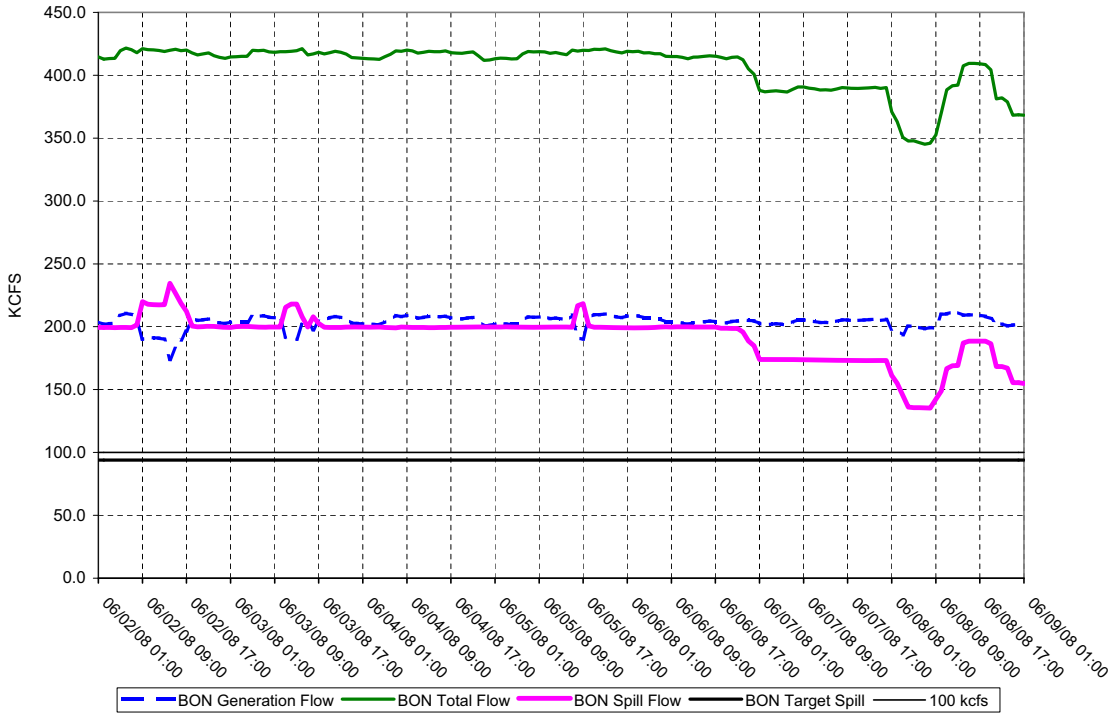
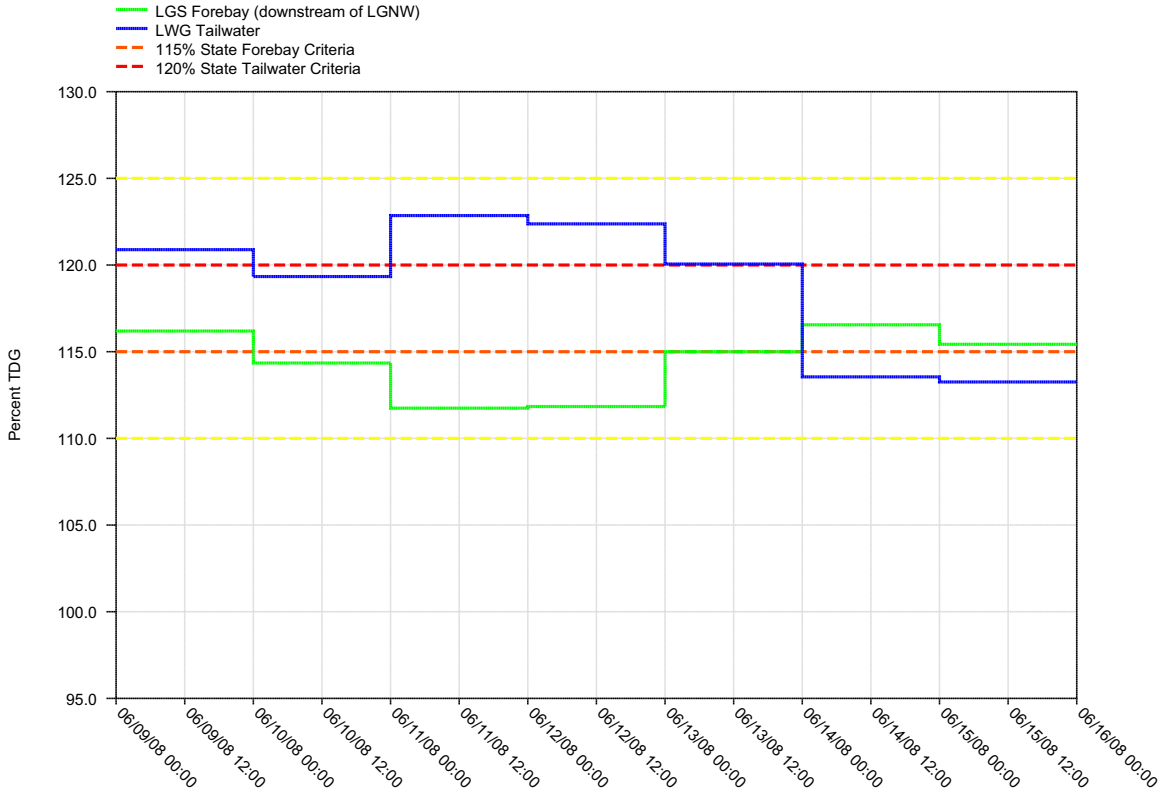


Figure 9.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

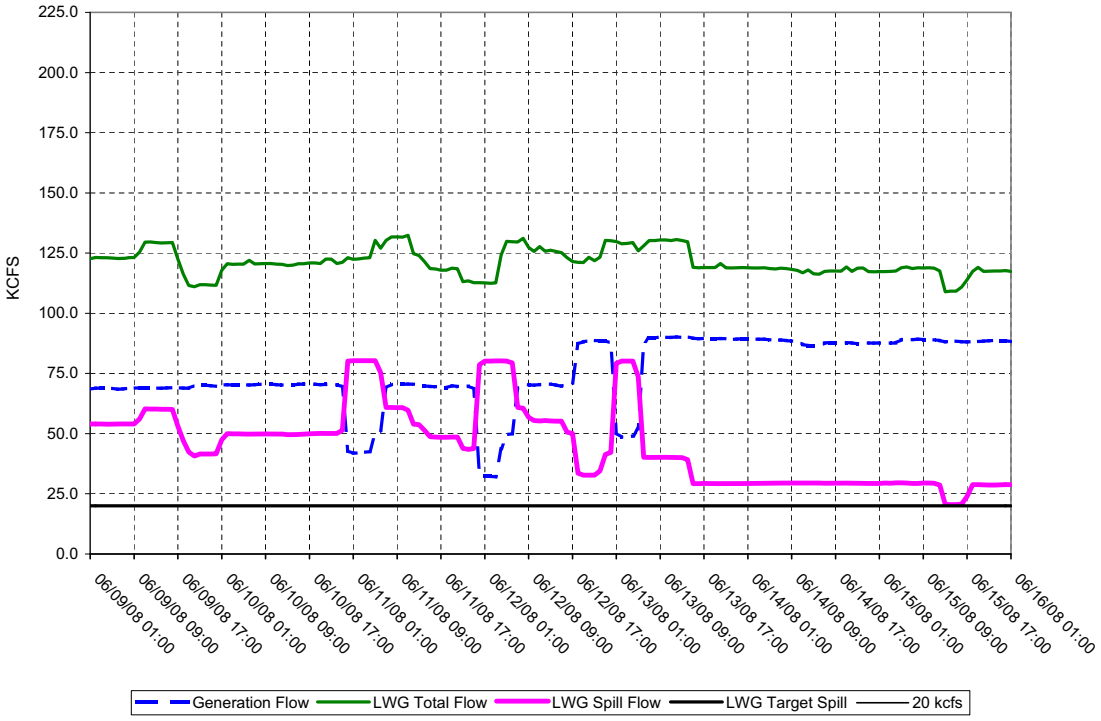
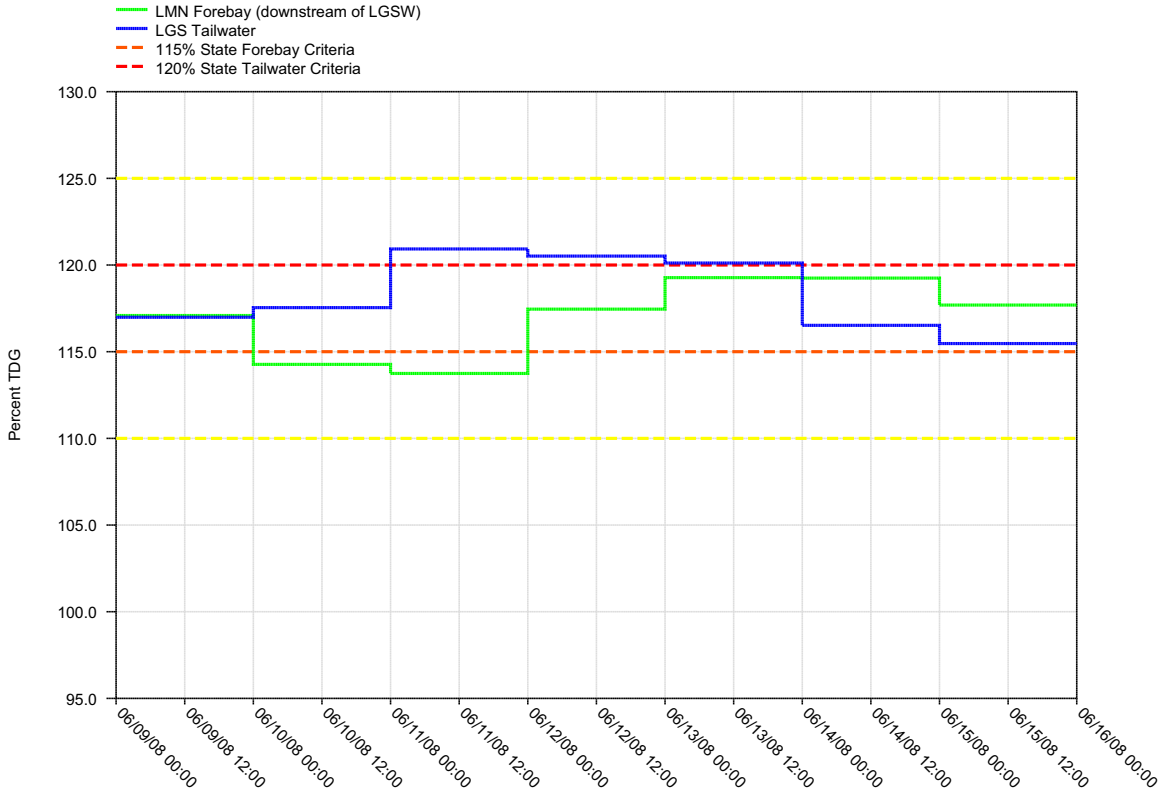


Figure 10.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

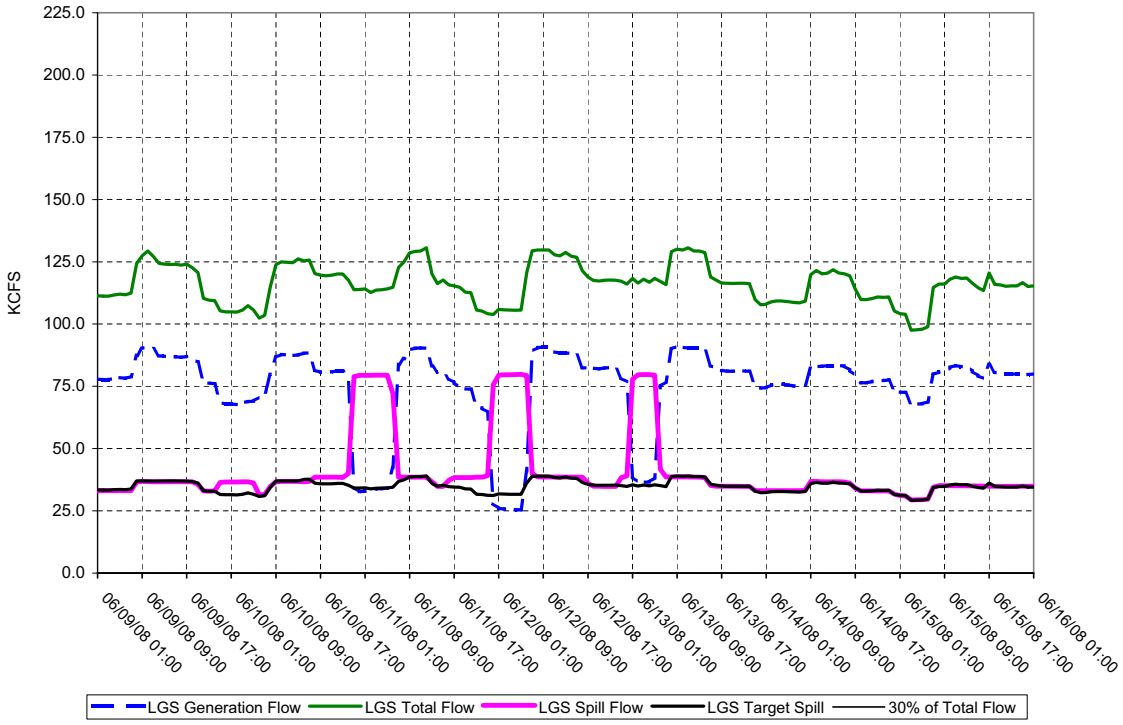
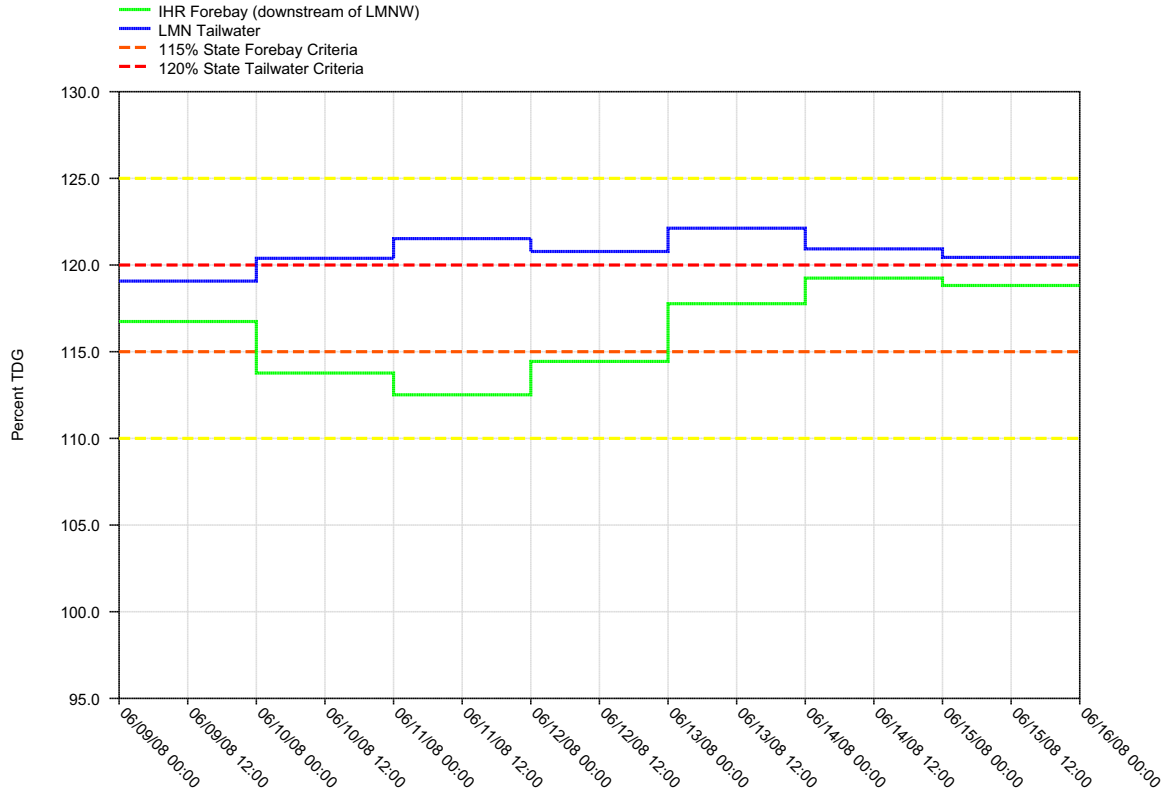


Figure 11.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

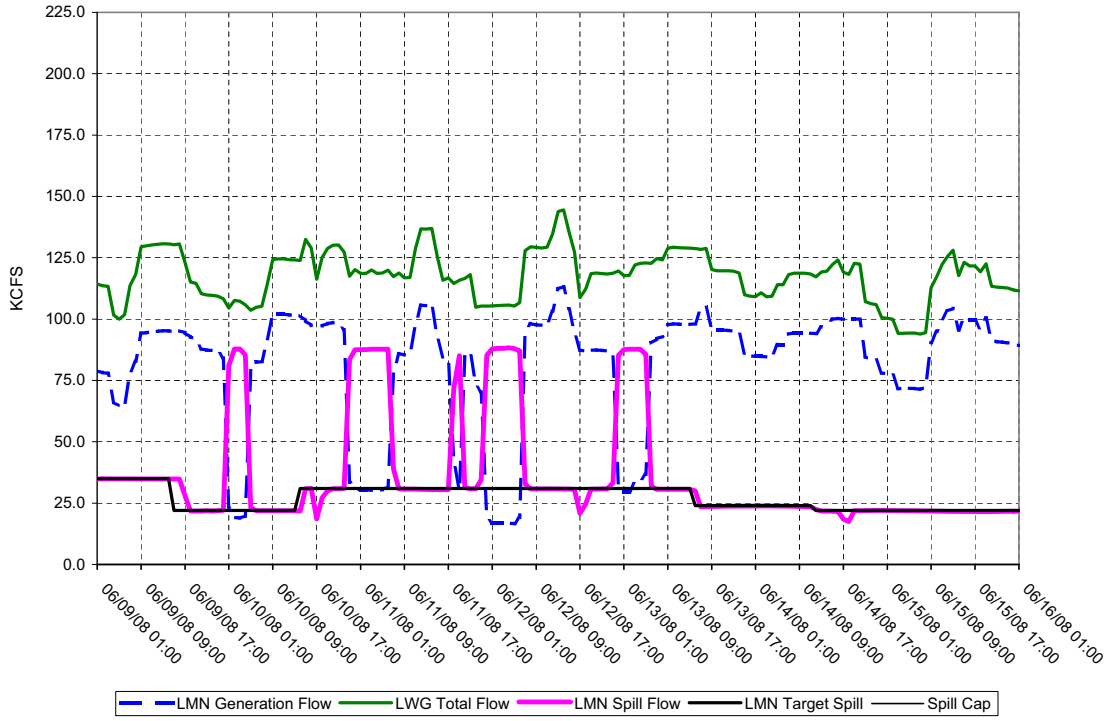
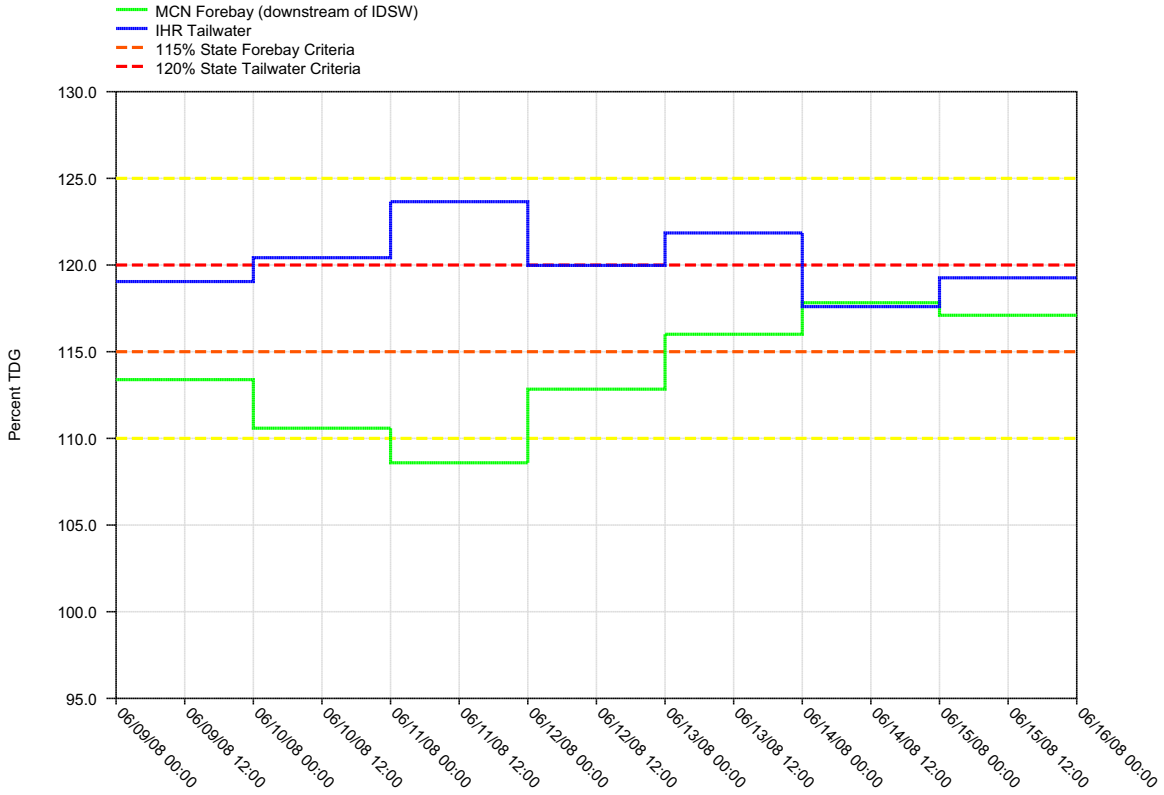


Figure 12.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

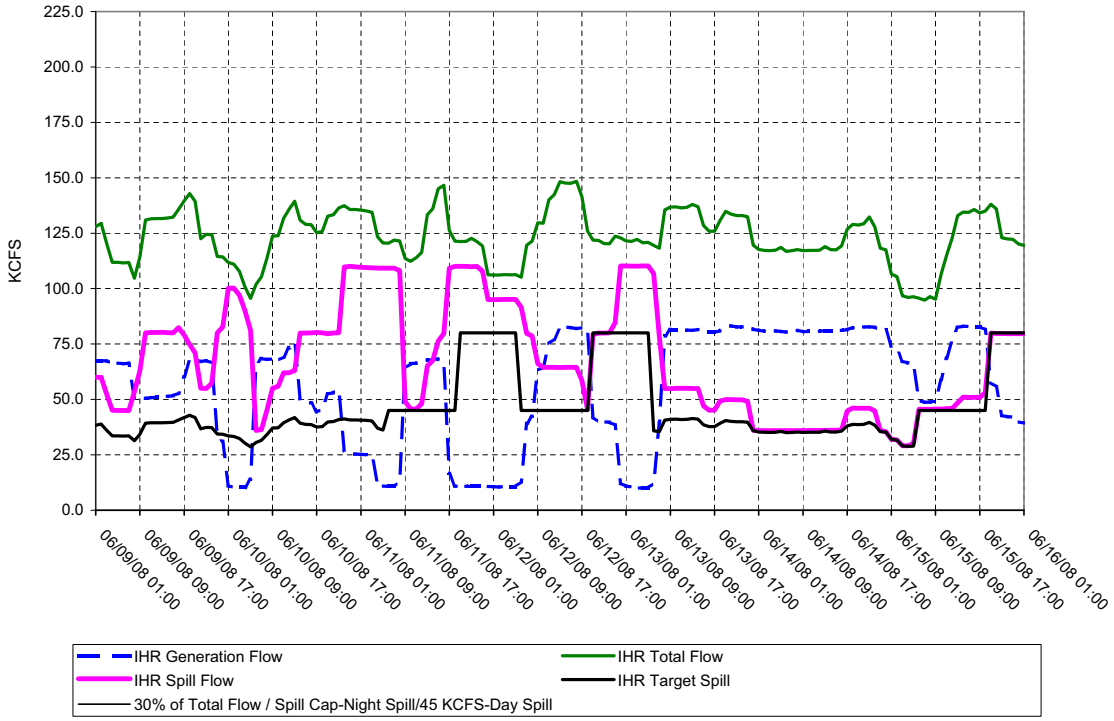
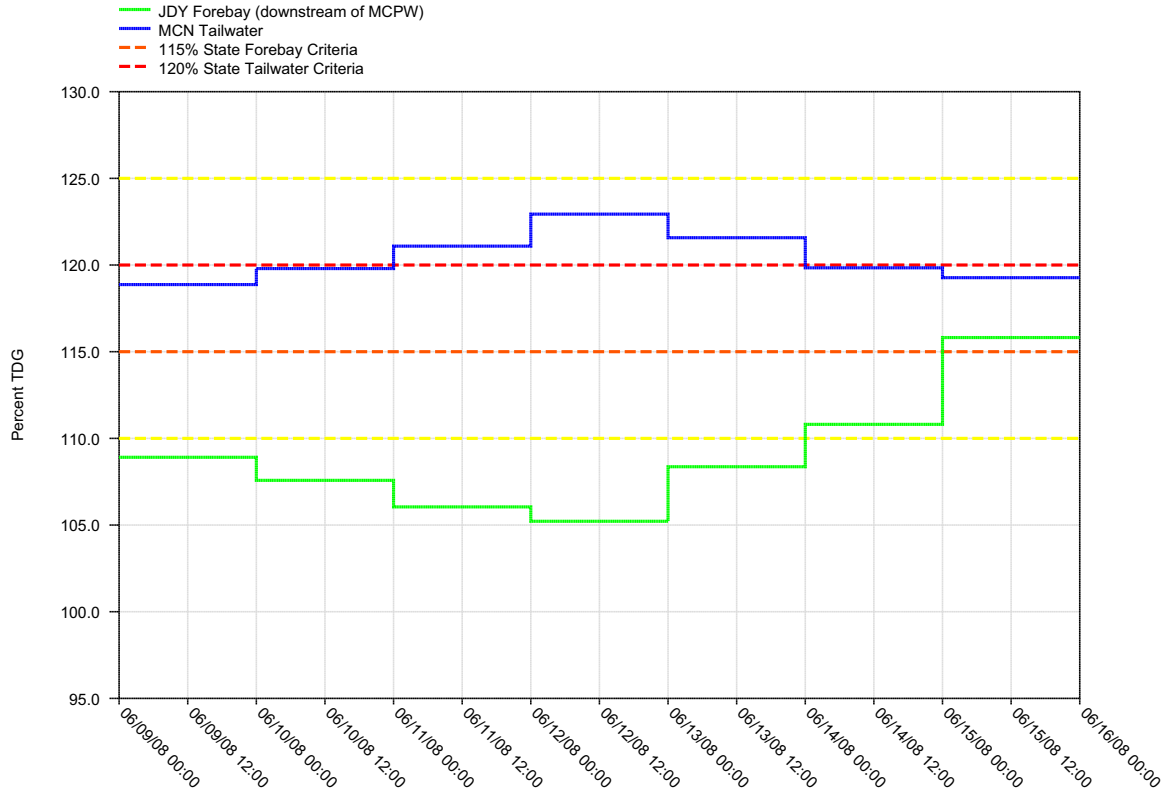


Figure 13.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

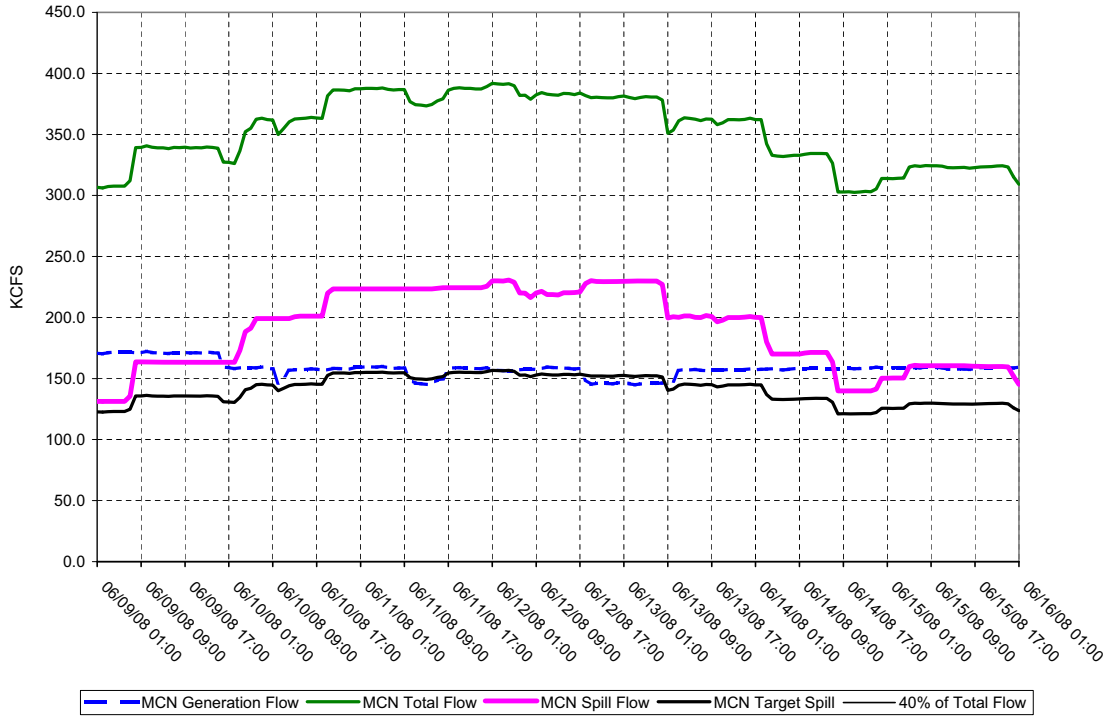
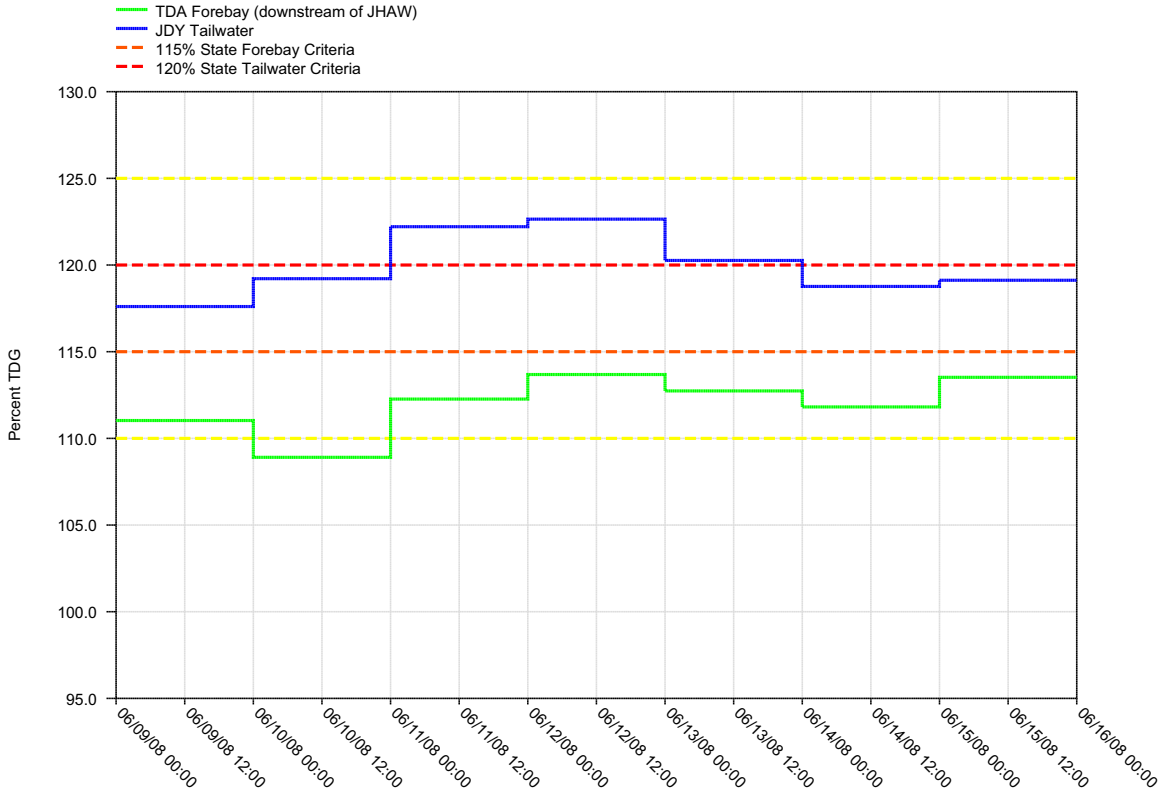


Figure 14.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

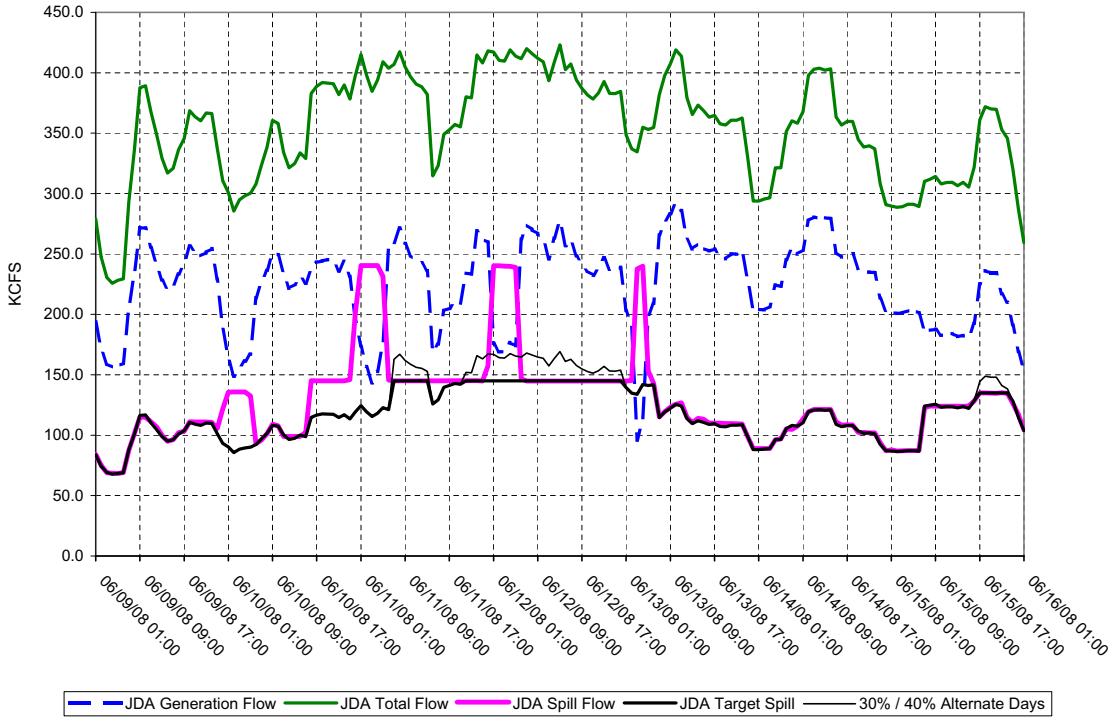
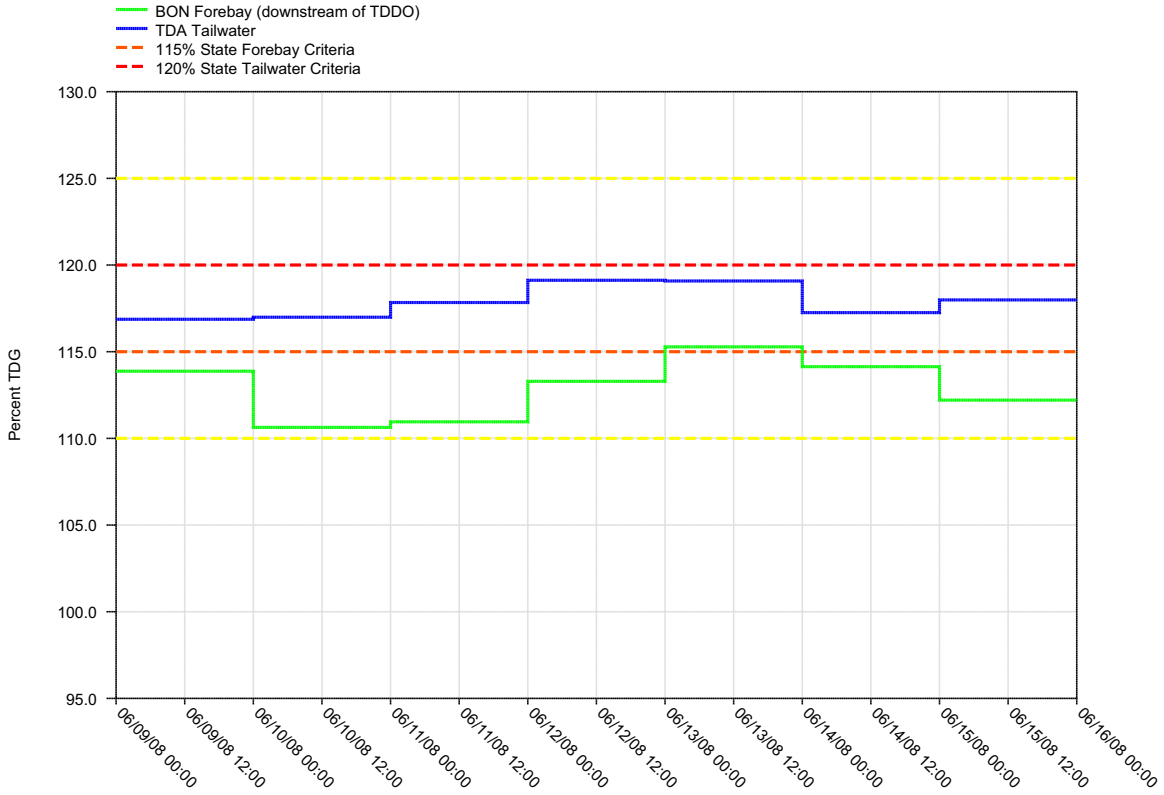


Figure 15.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

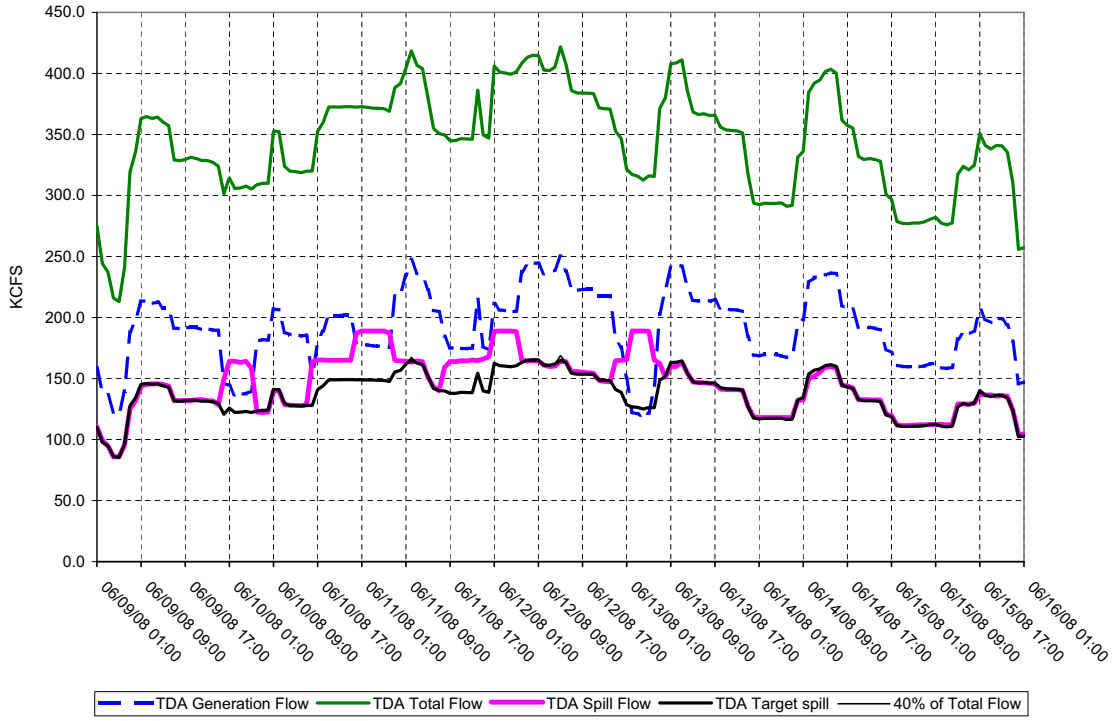
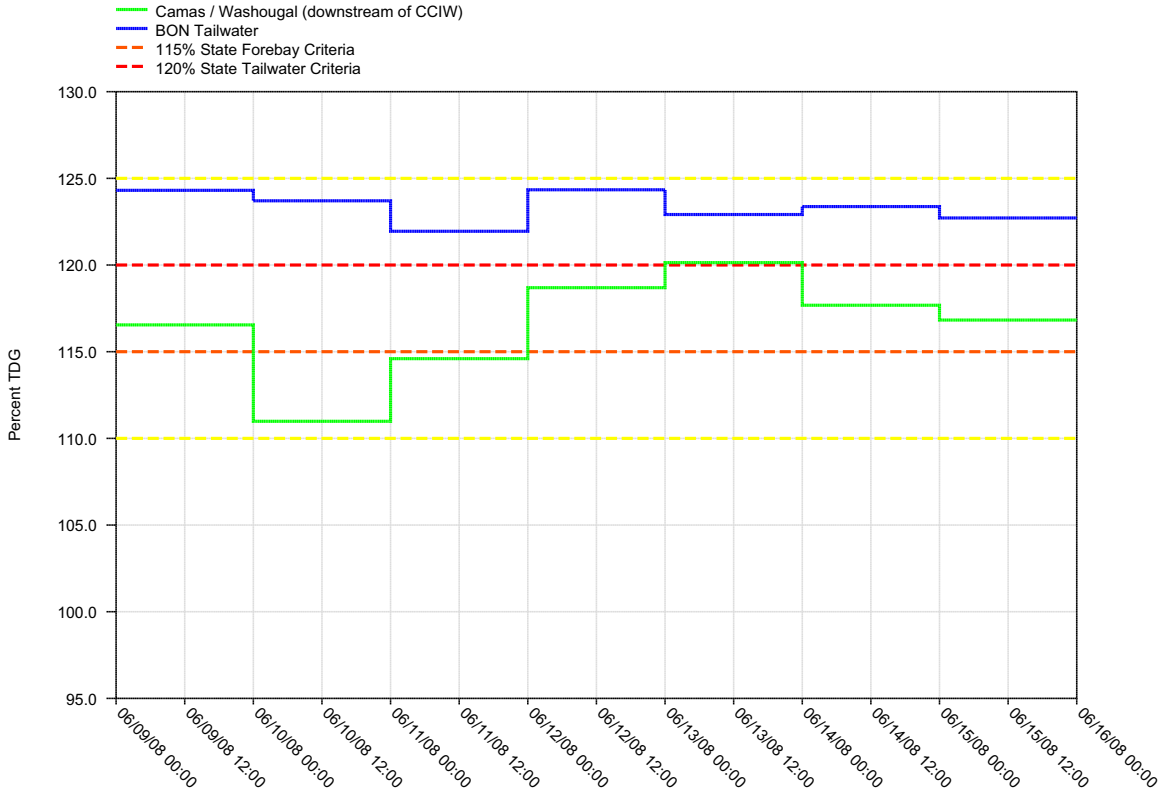


Figure 16.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

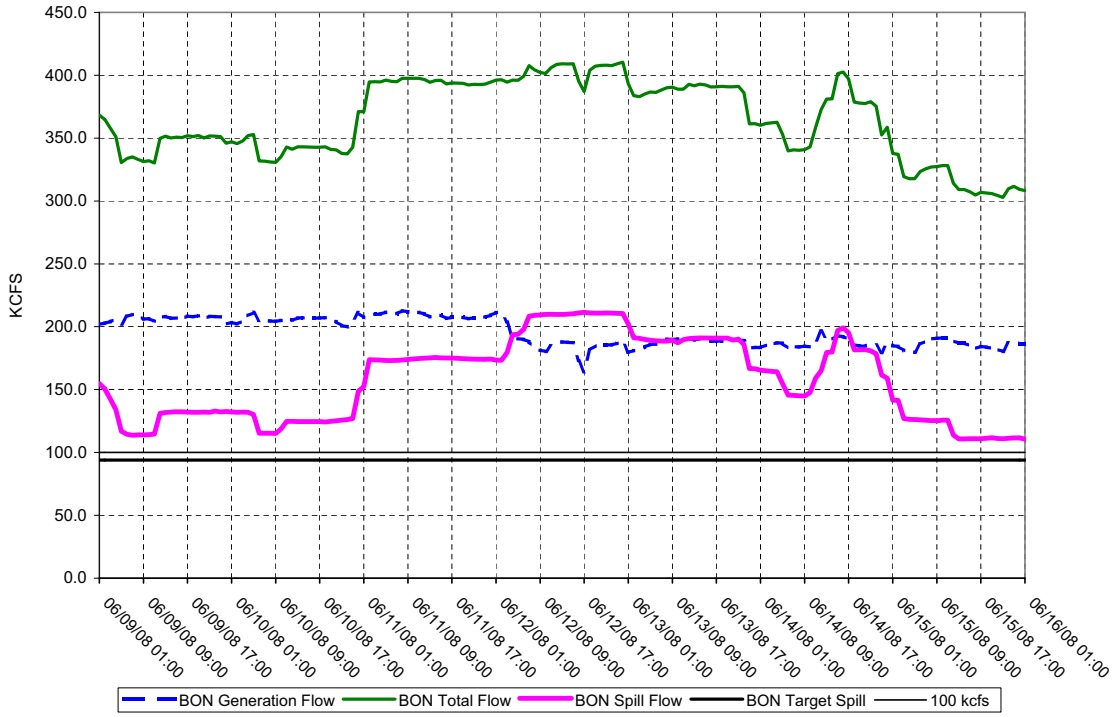
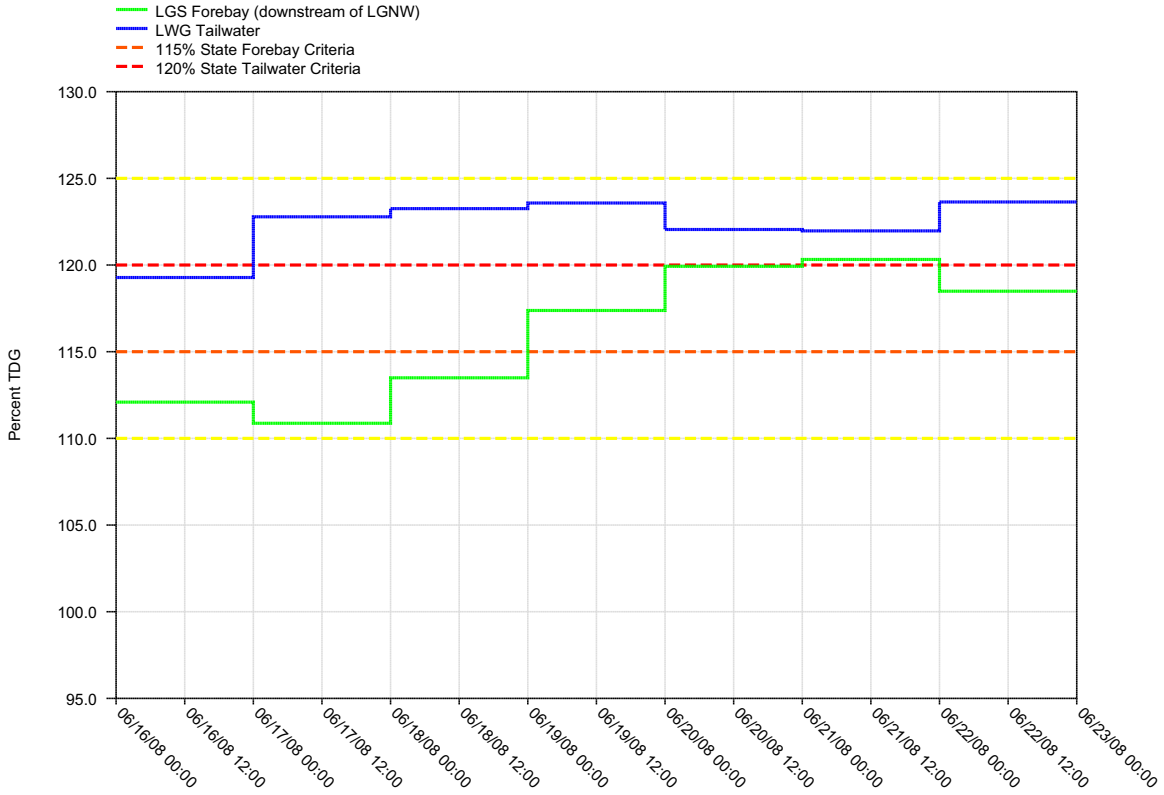


Figure 17.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

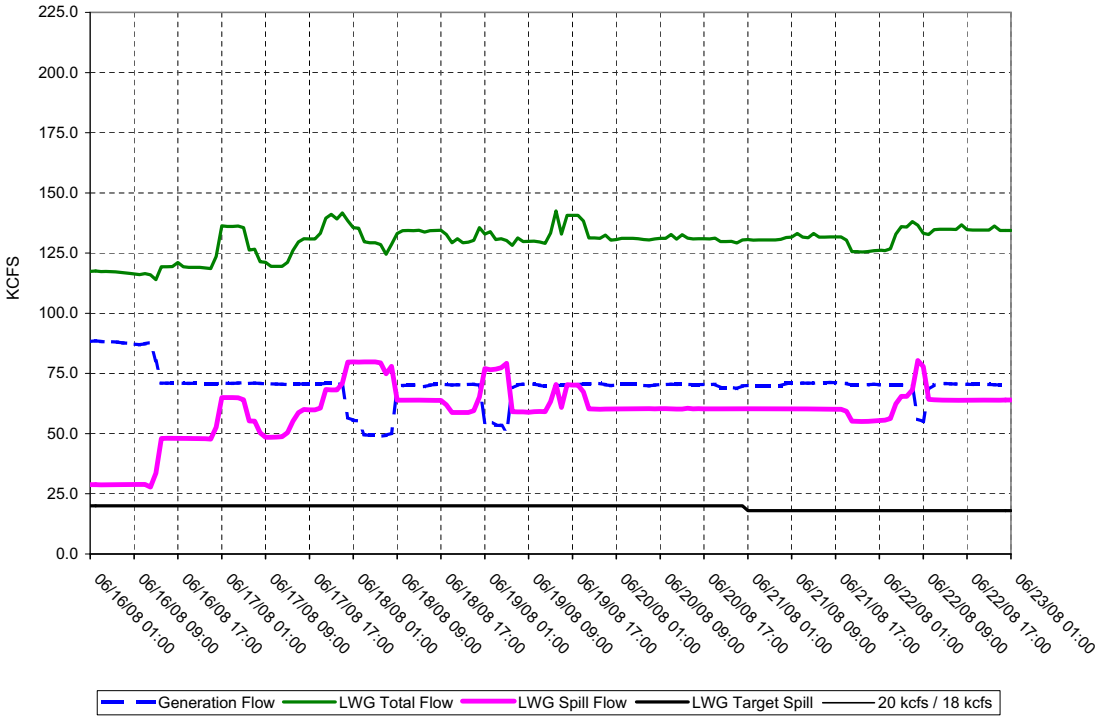
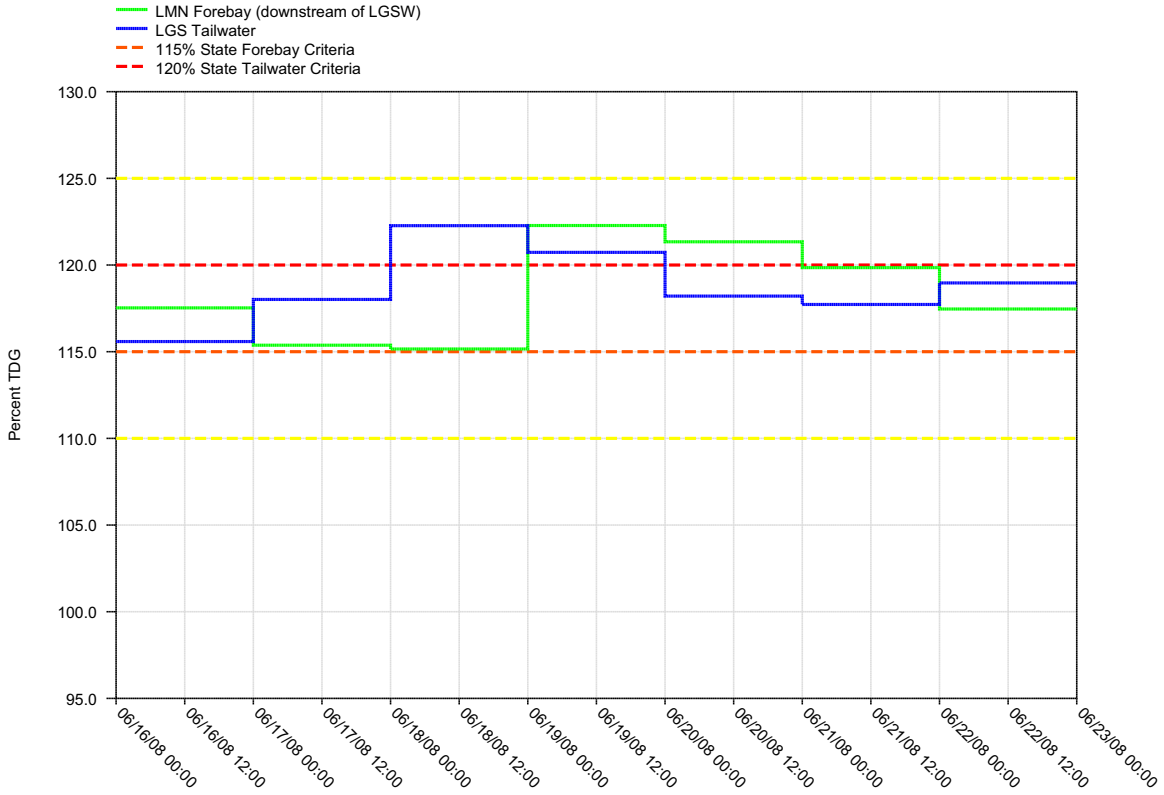


Figure 18.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

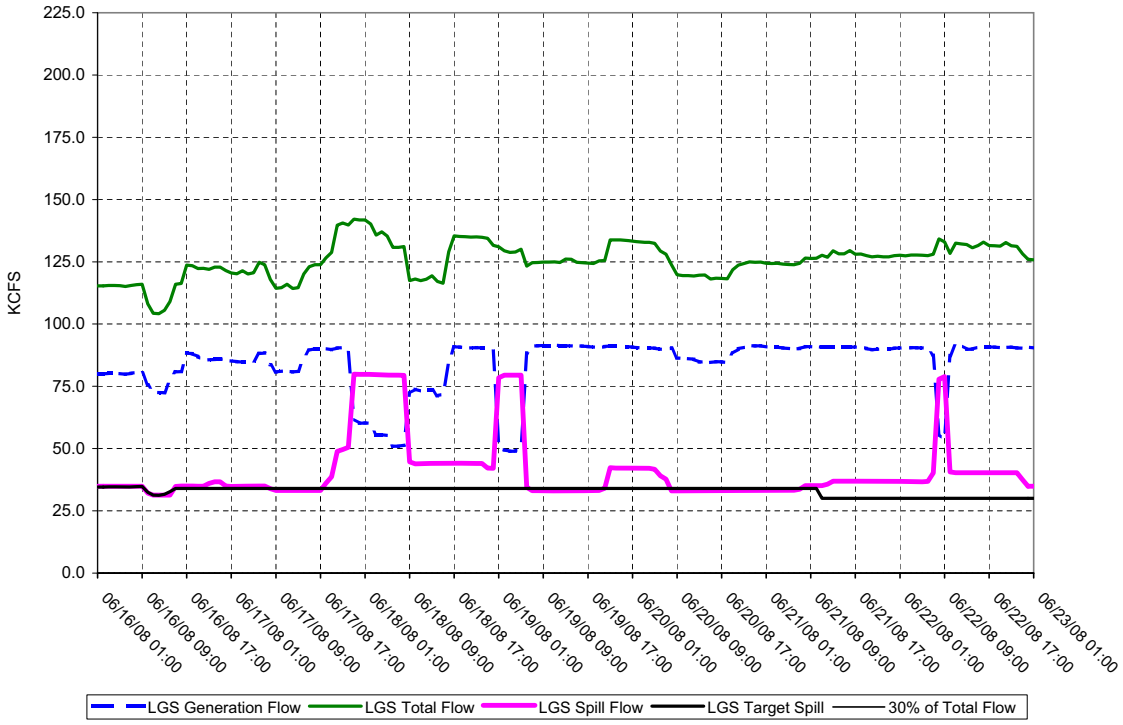
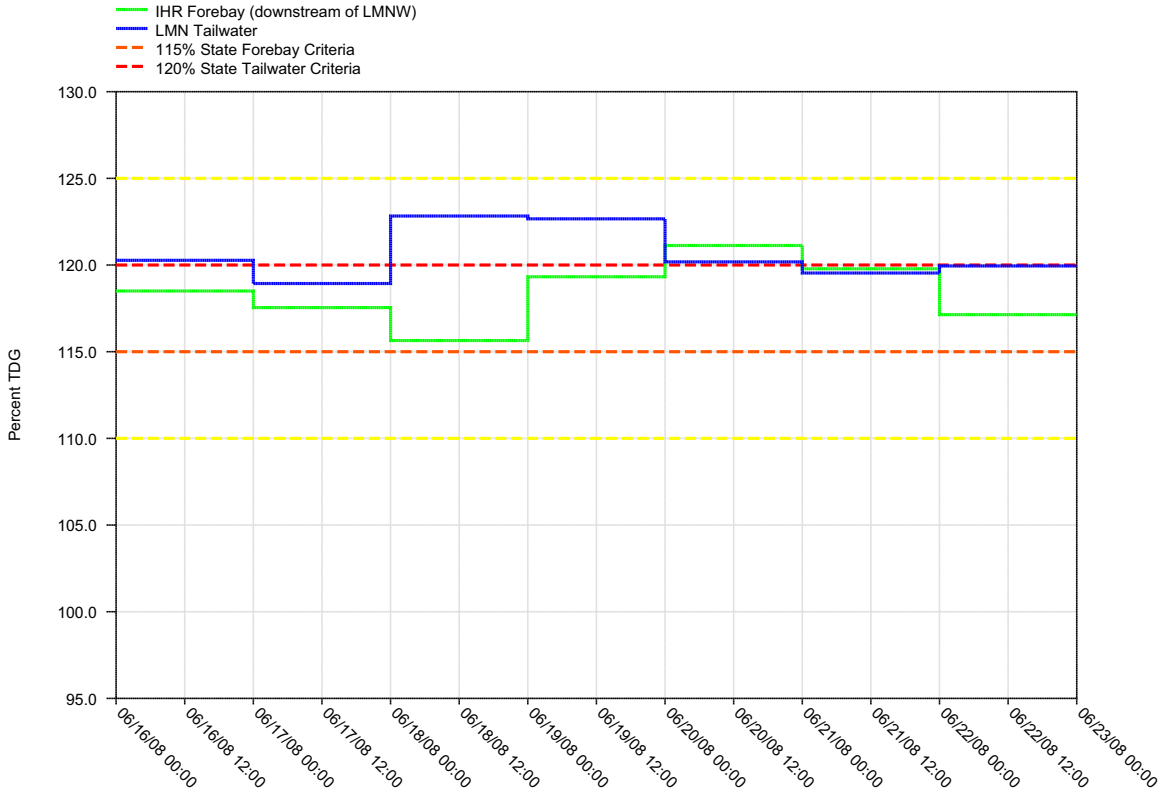


Figure 19.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

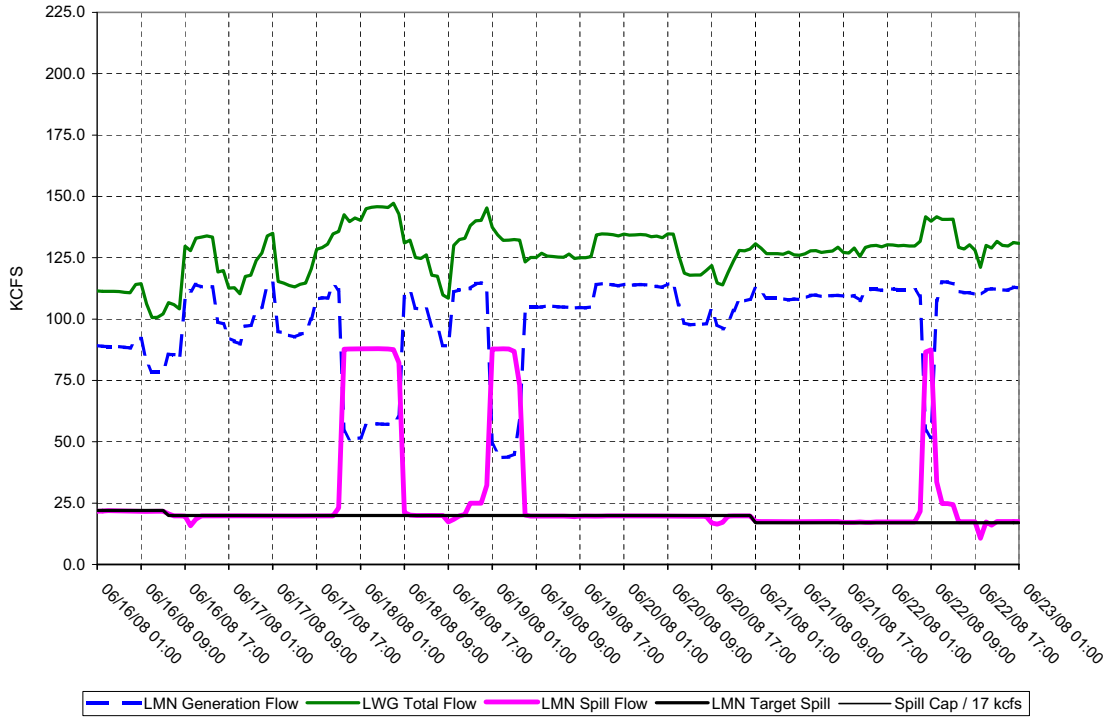
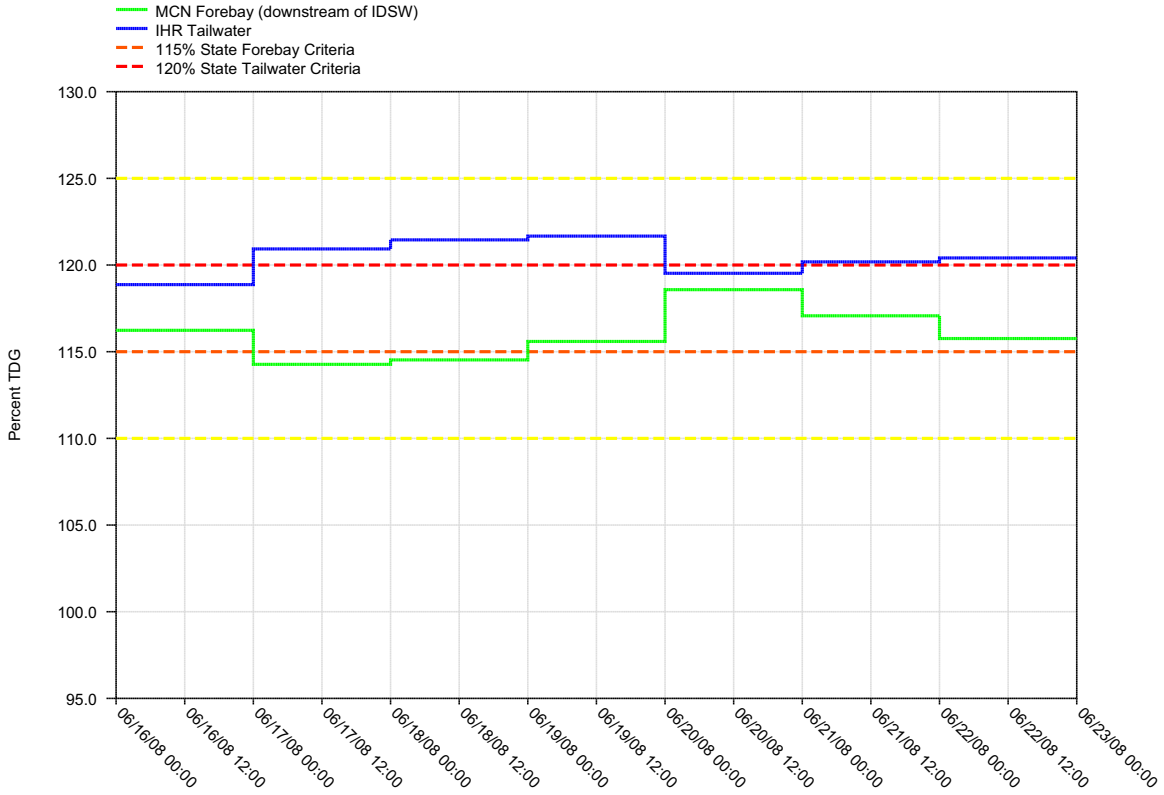


Figure 20.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

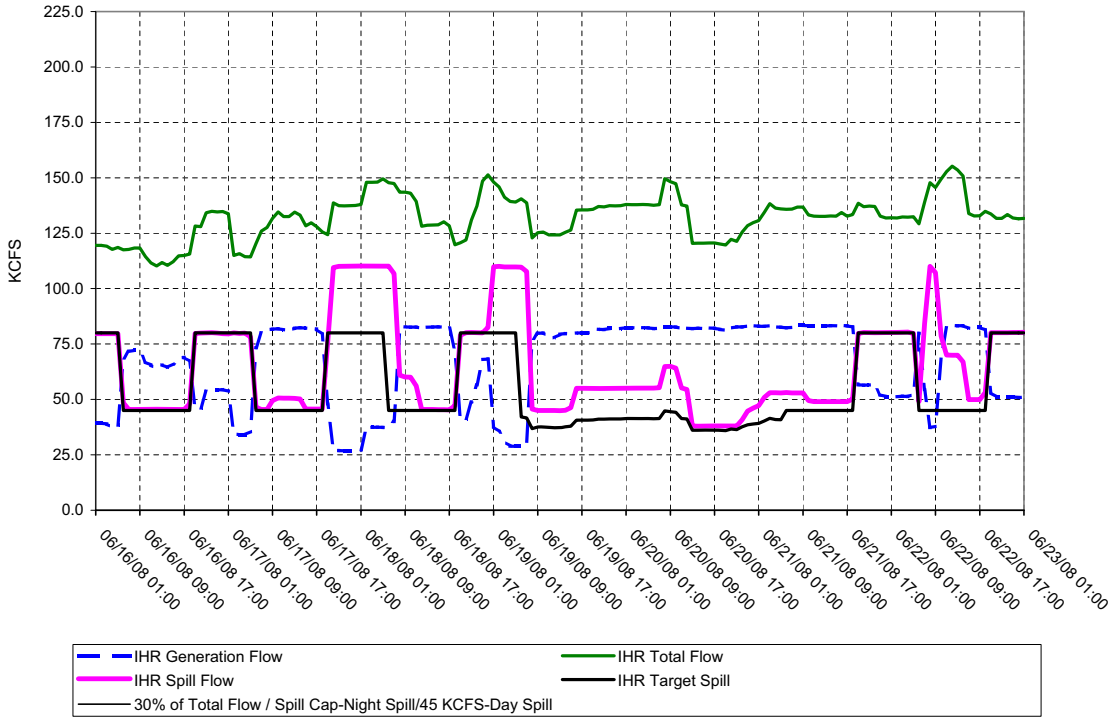
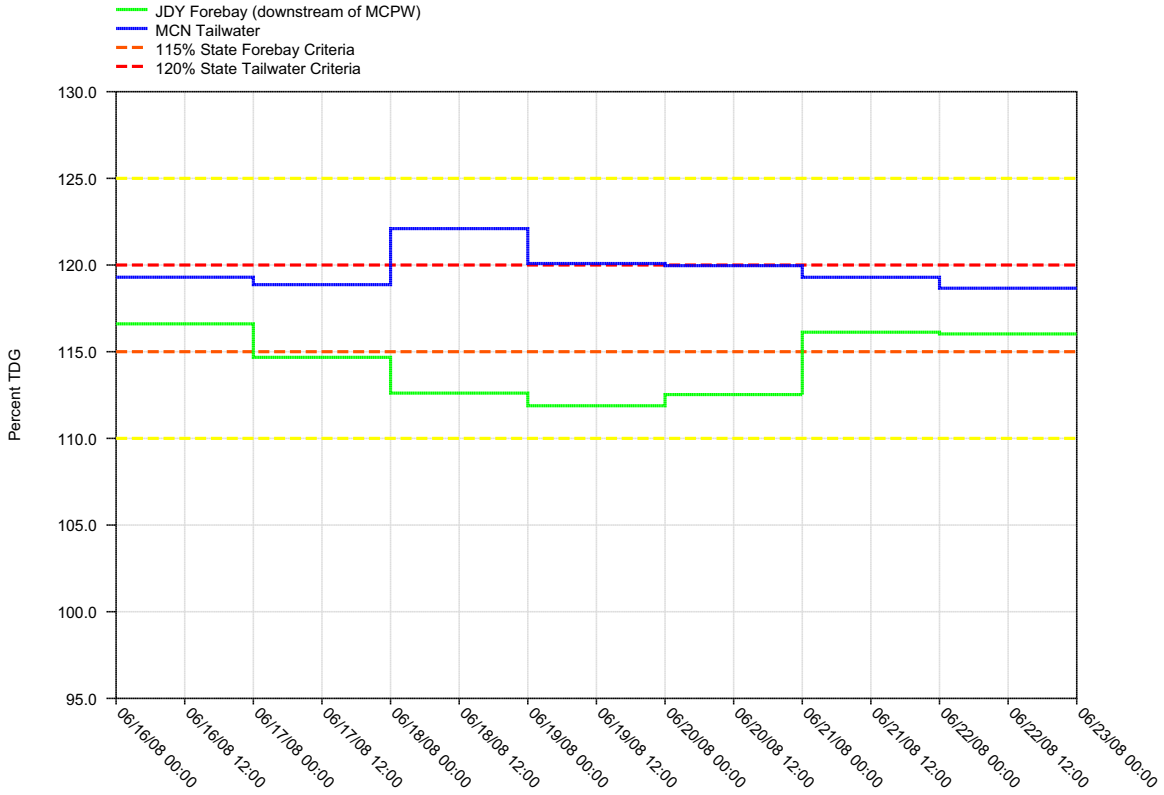


Figure 21.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

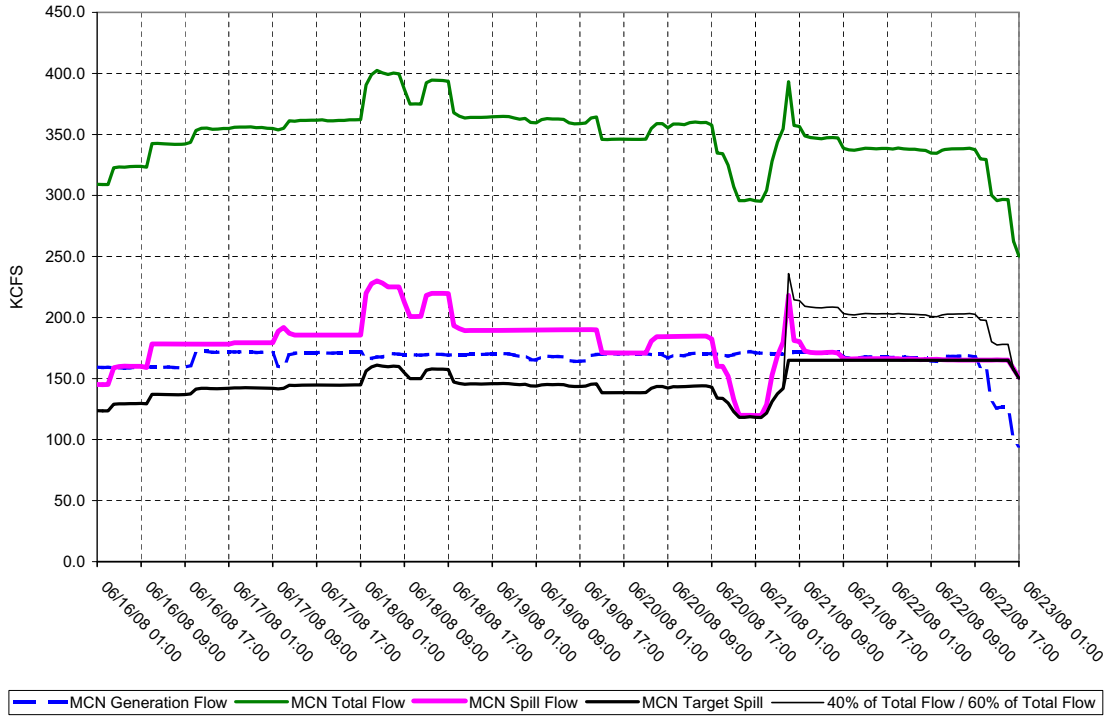
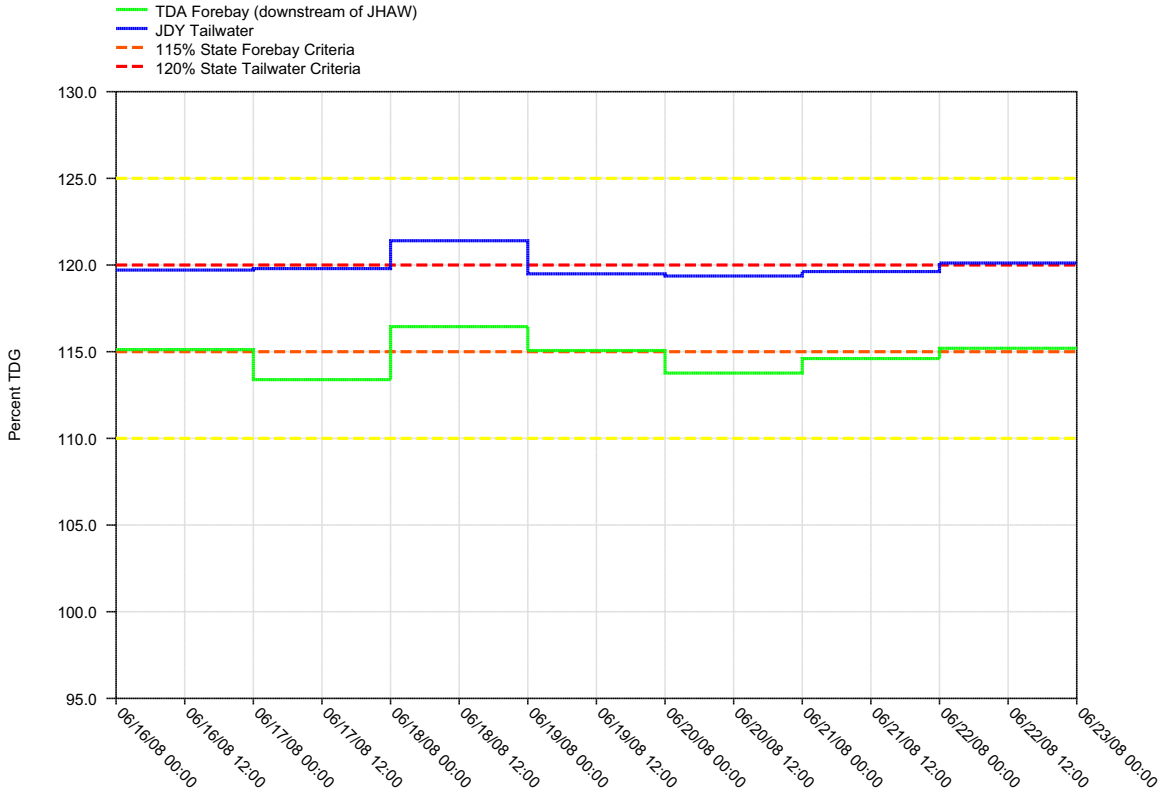


Figure 22.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

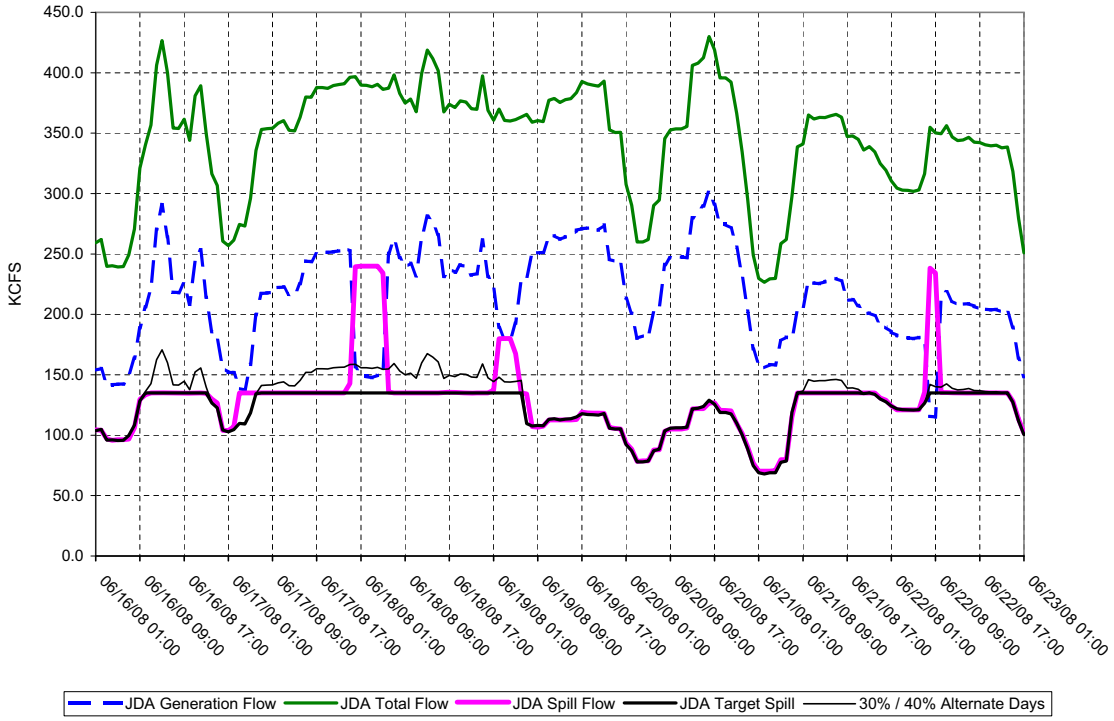
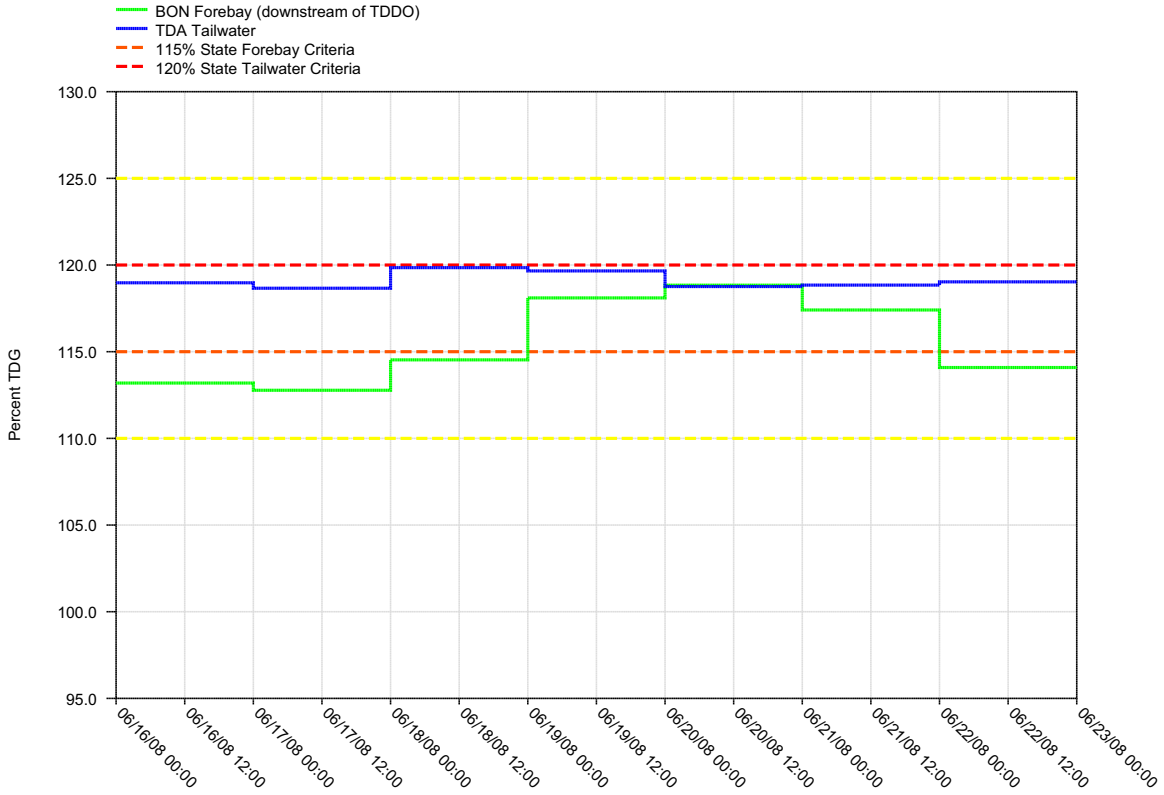


Figure 23.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

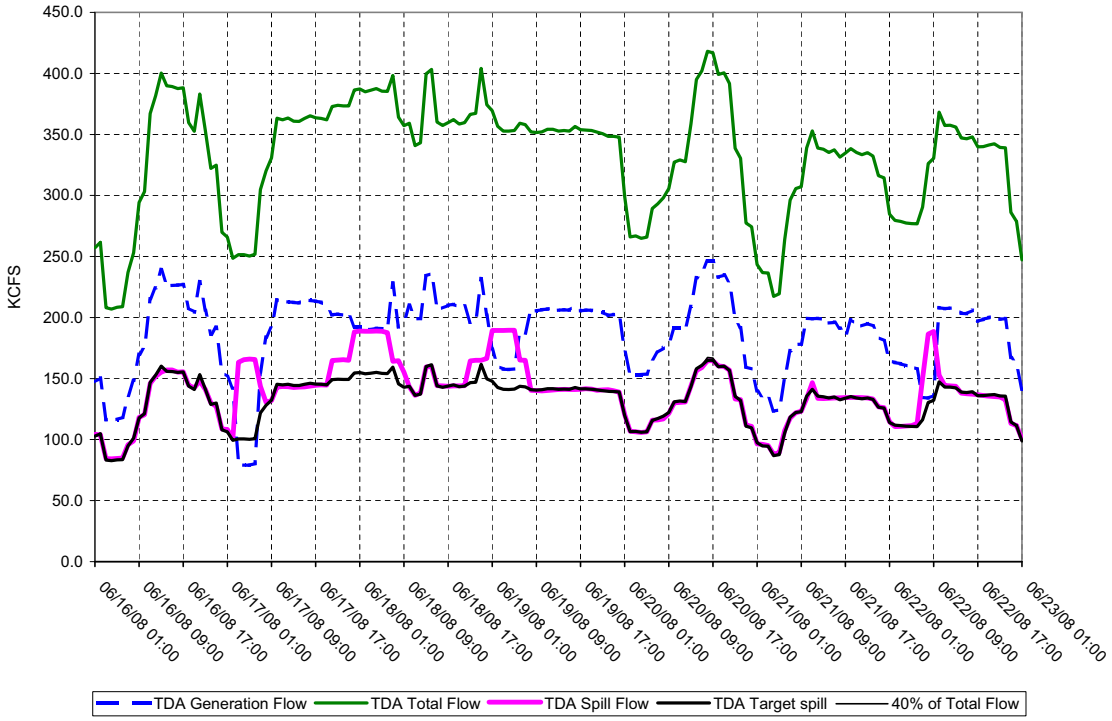
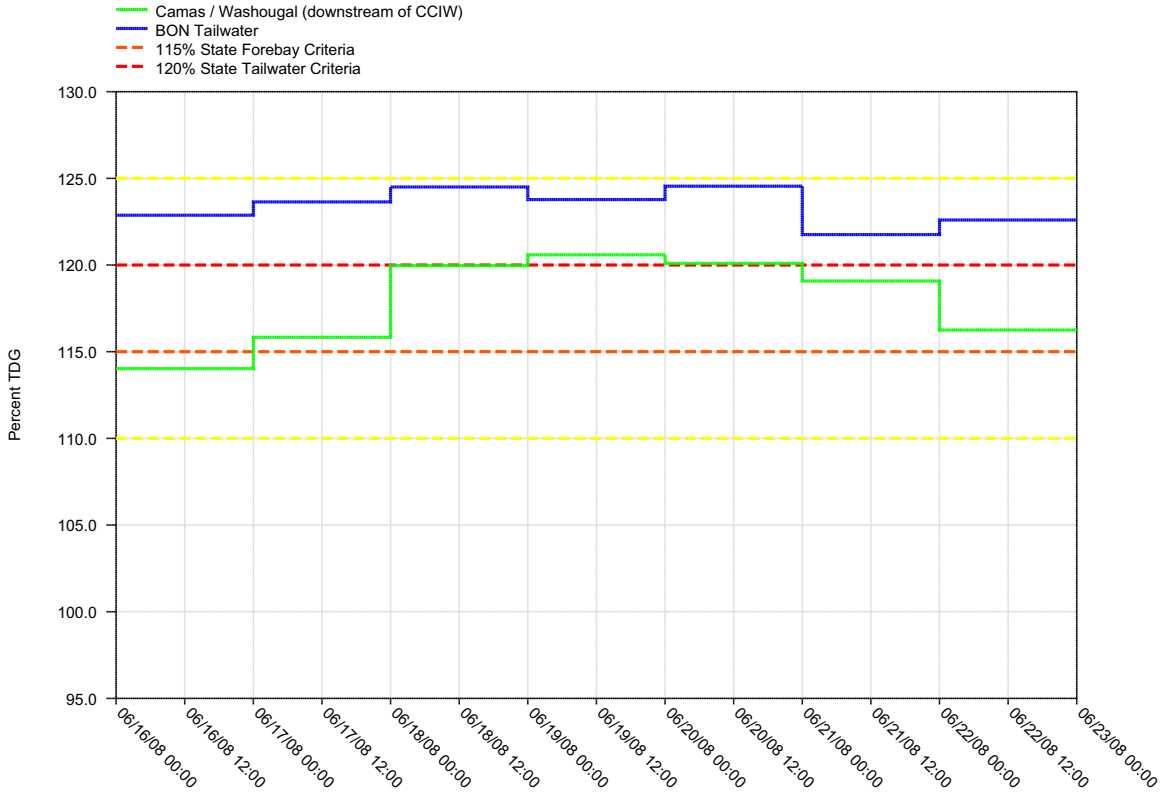


Figure 24.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

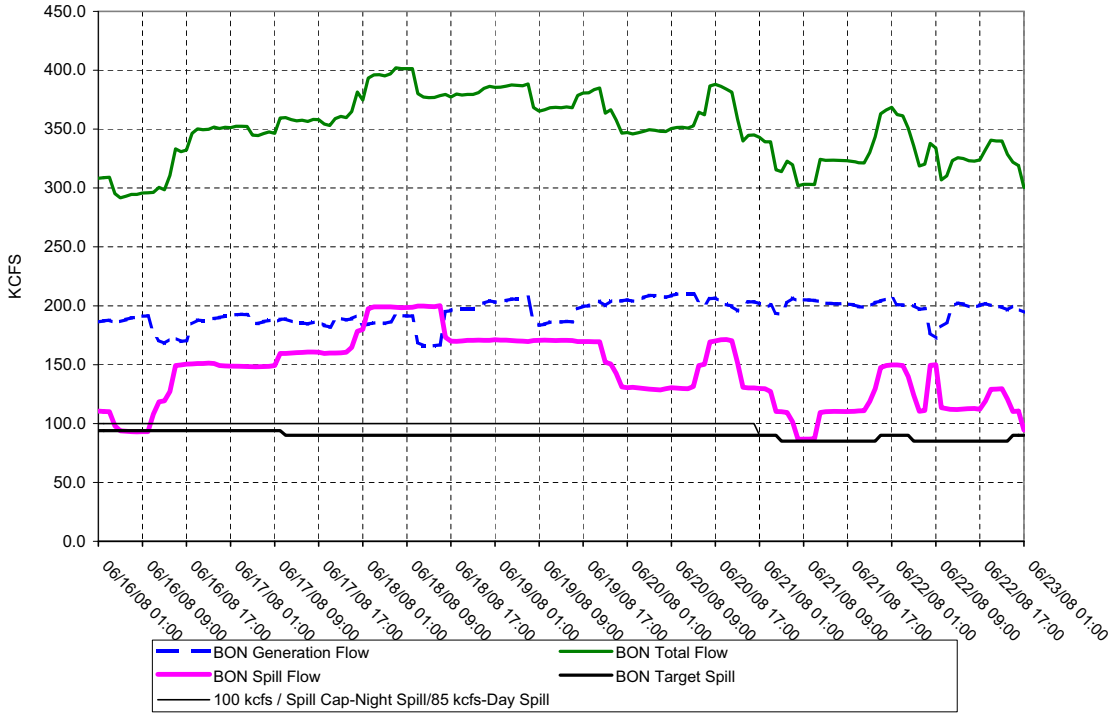
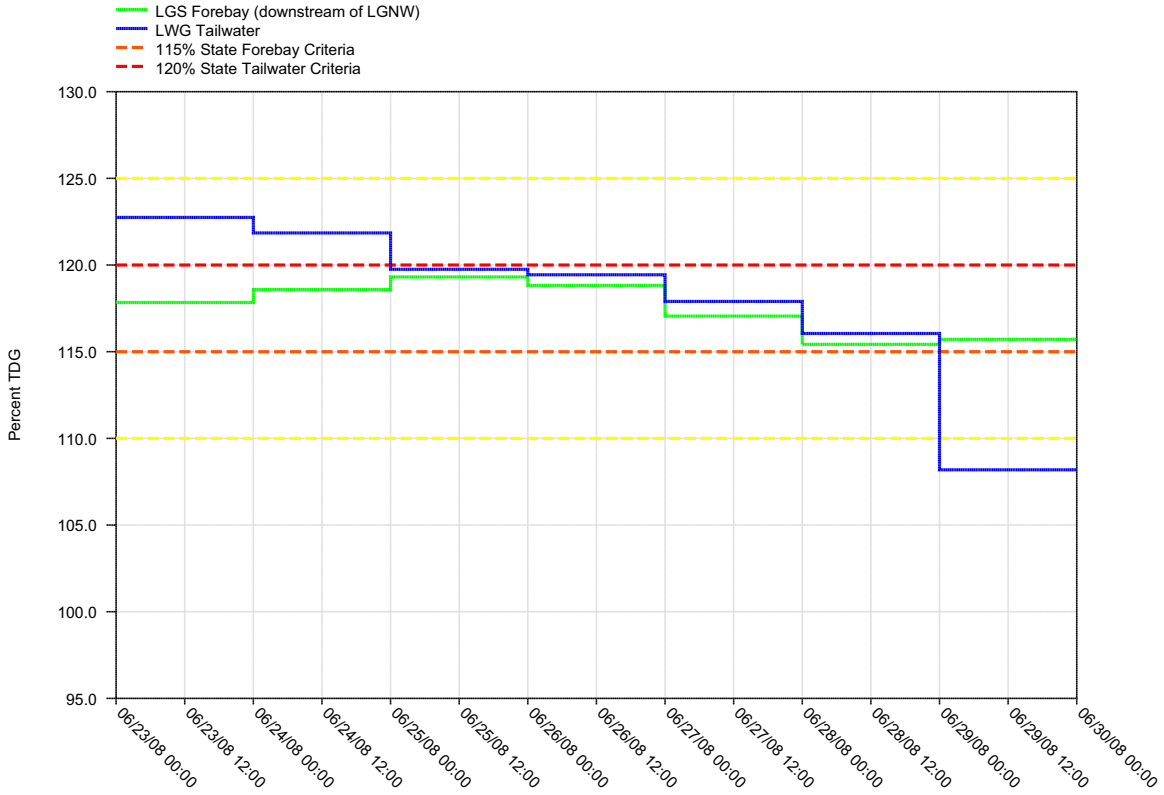


Figure 25.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

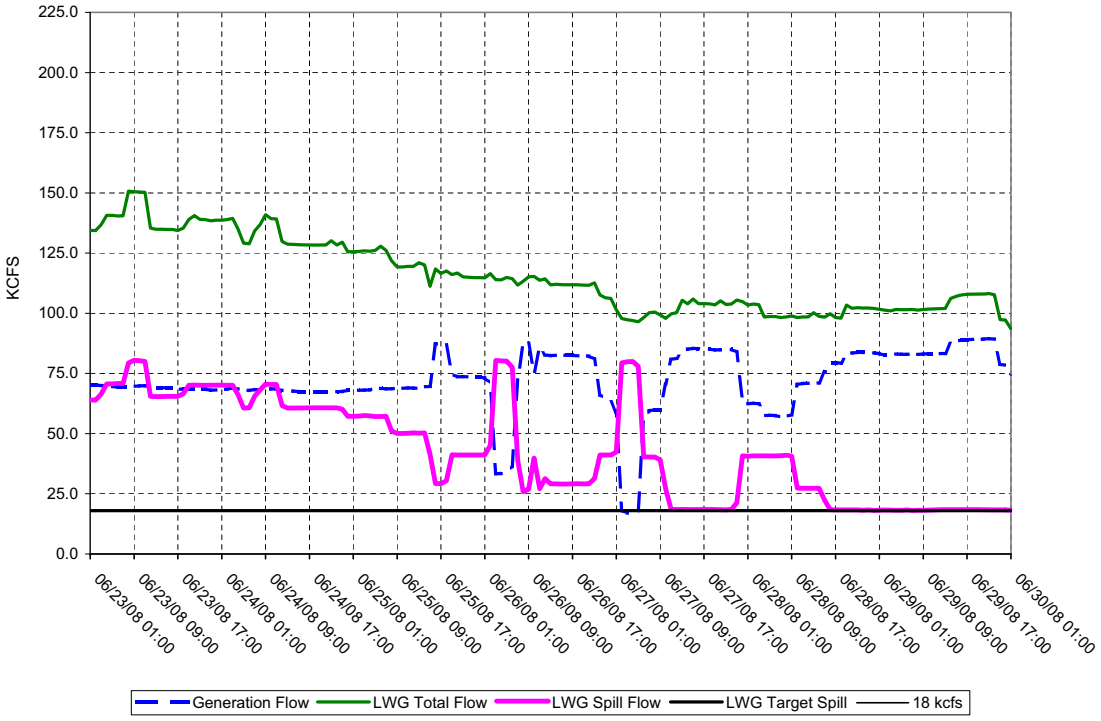
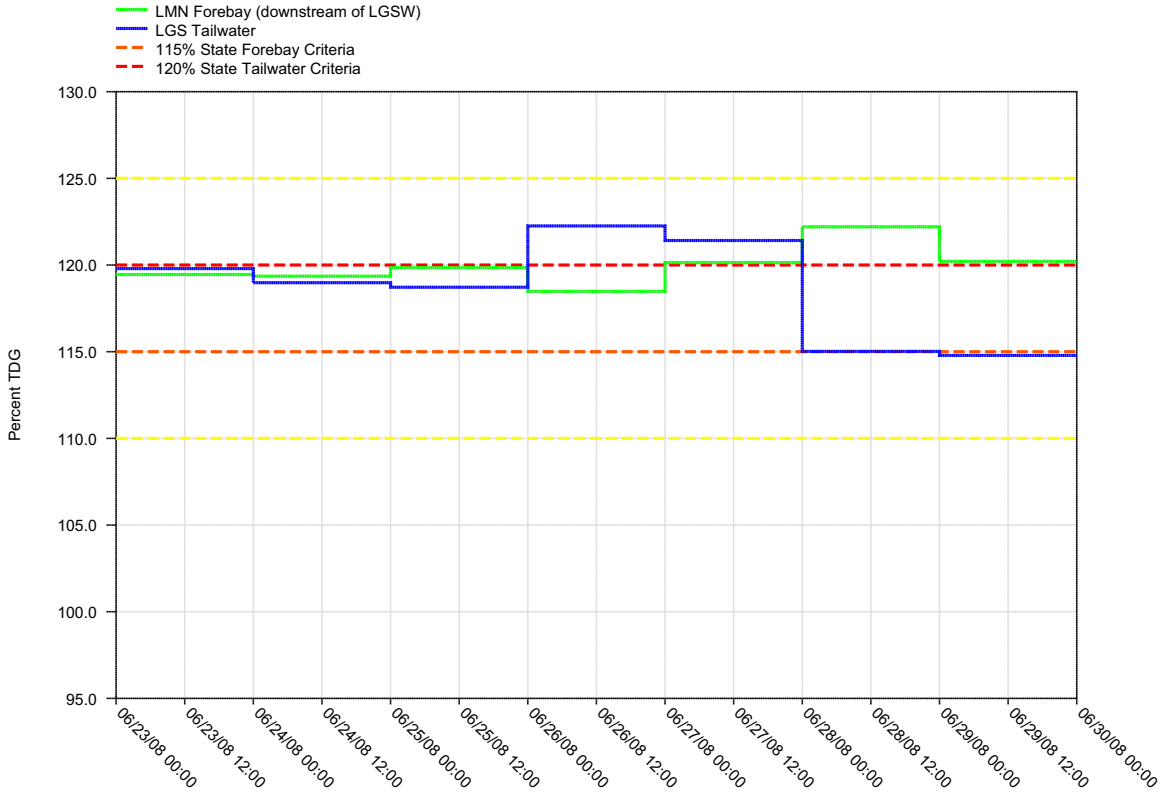


Figure 26.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

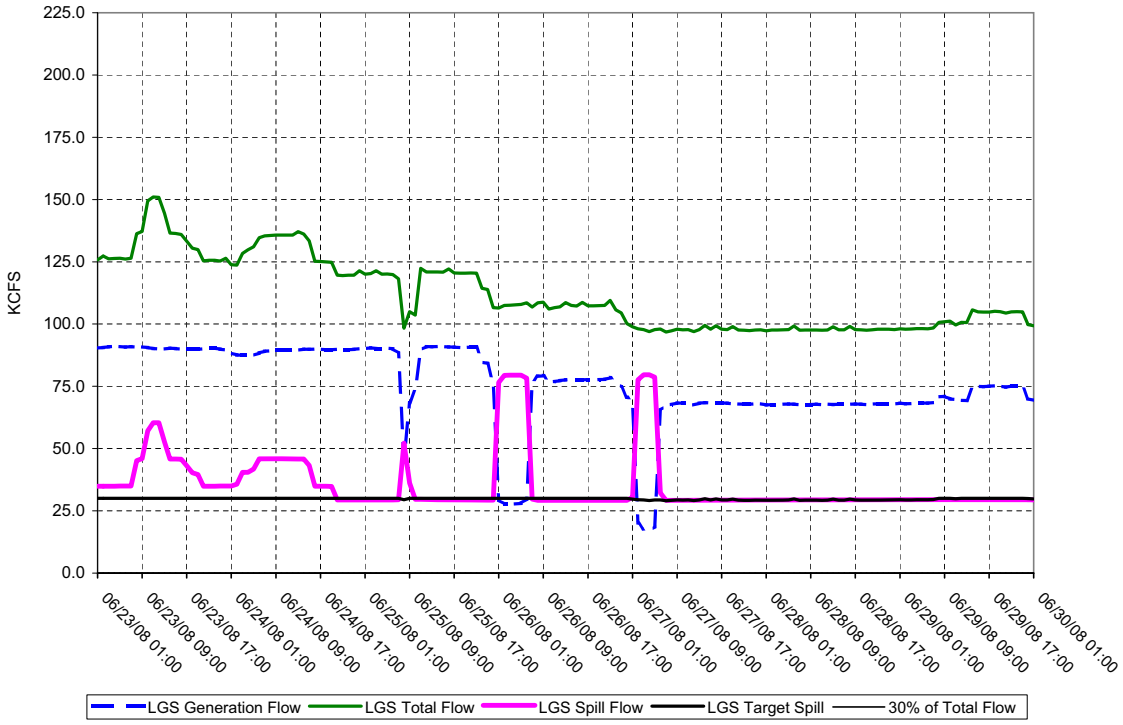
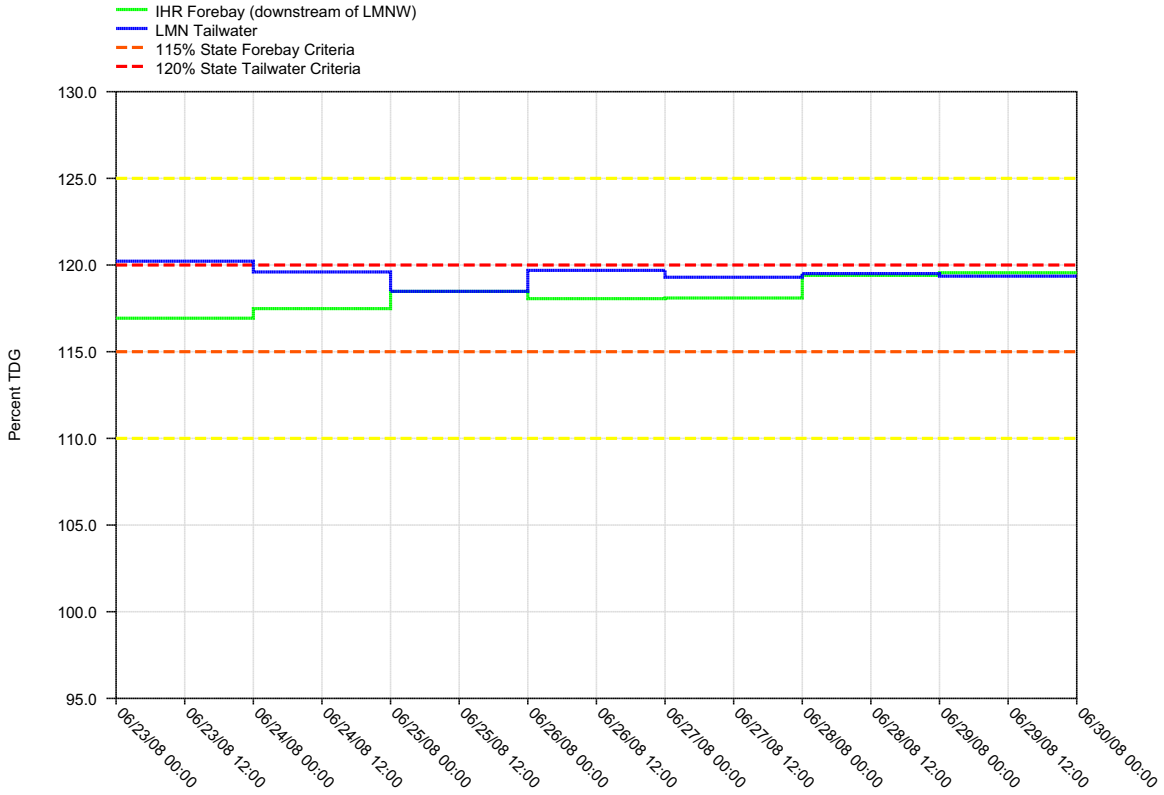


Figure 27.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

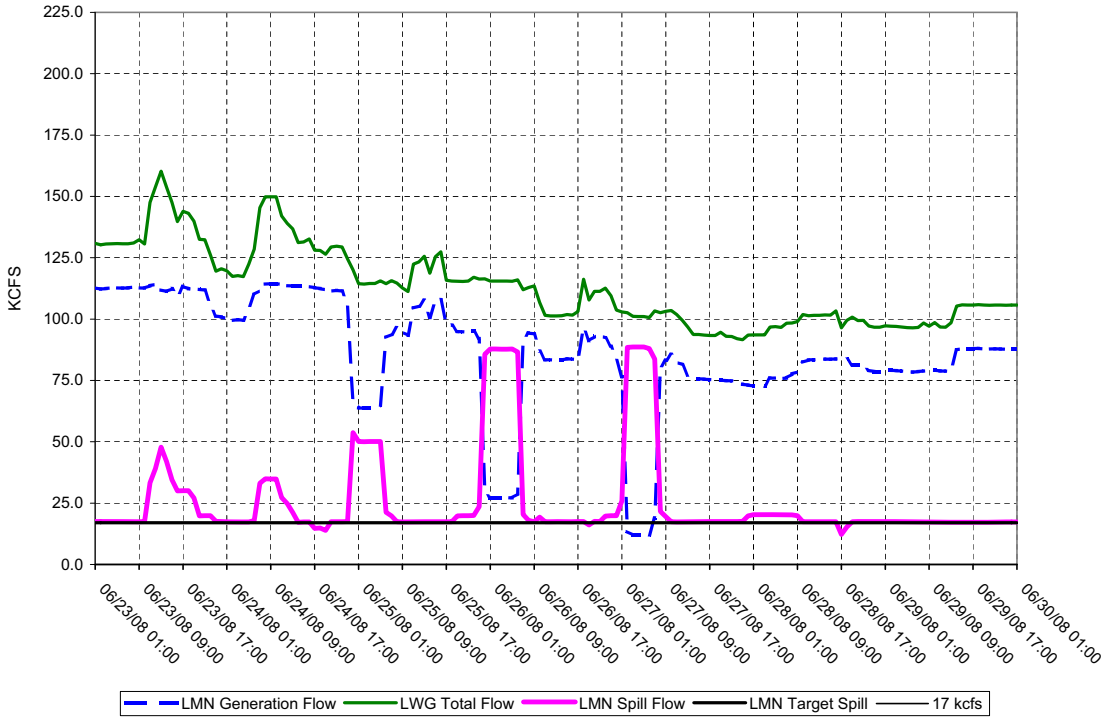
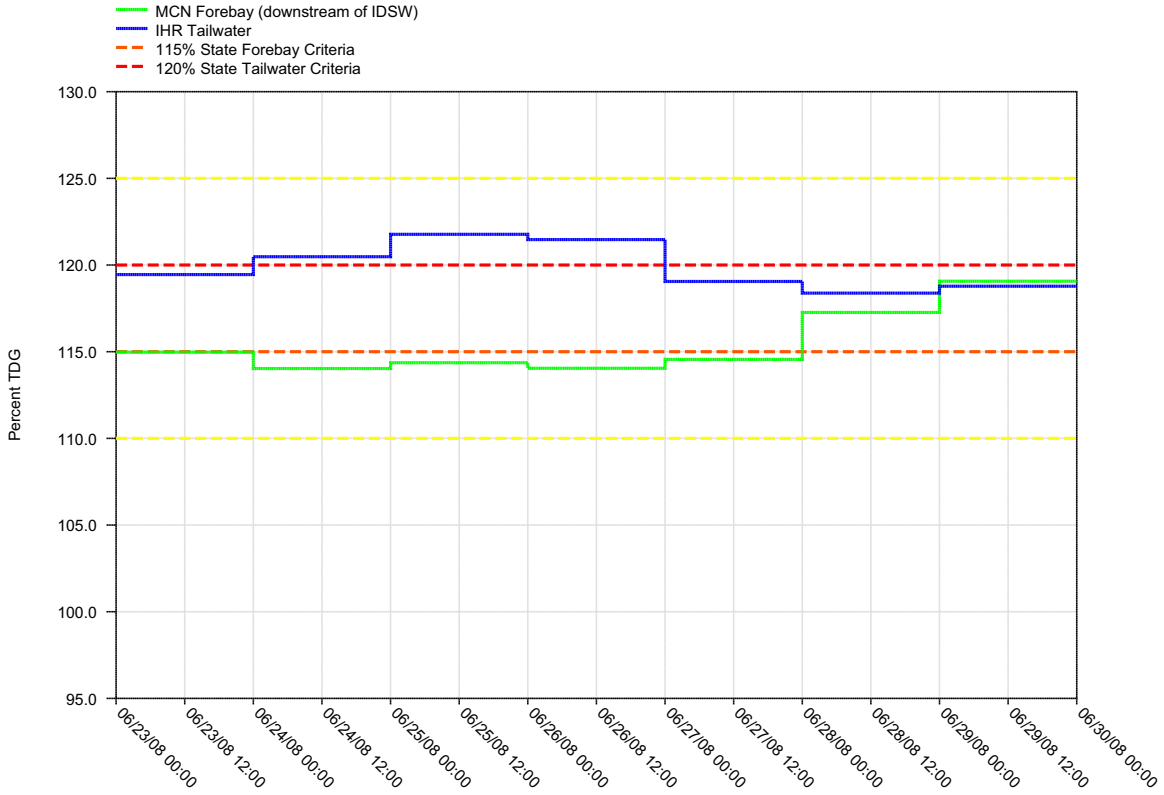


Figure 28.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

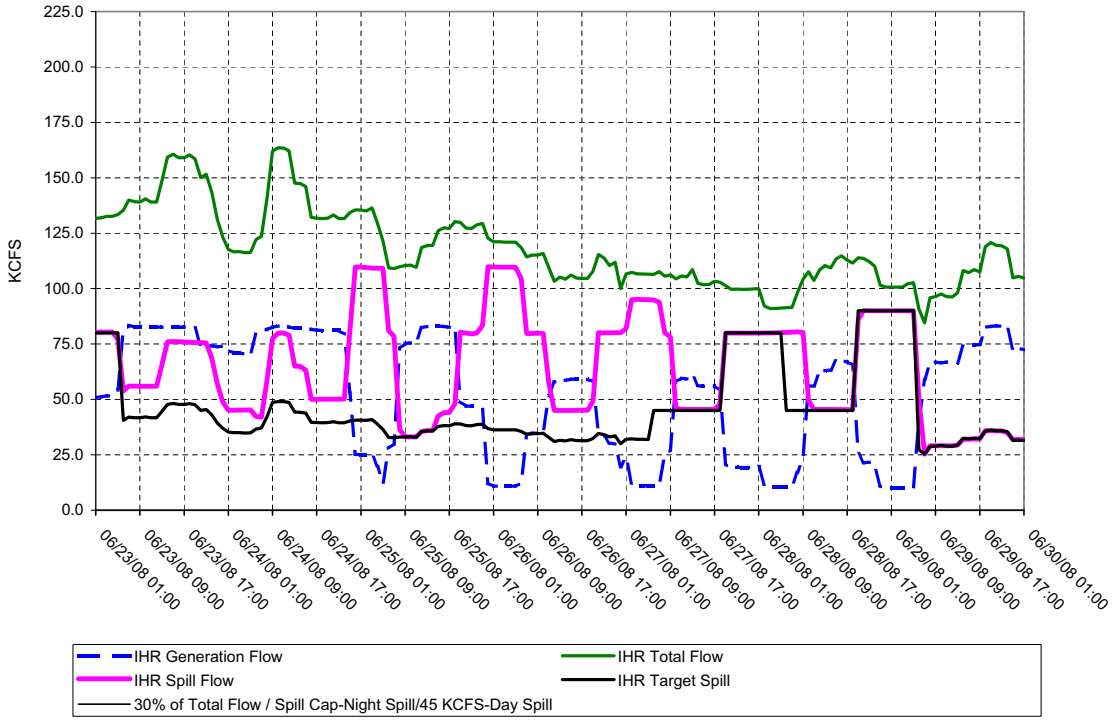
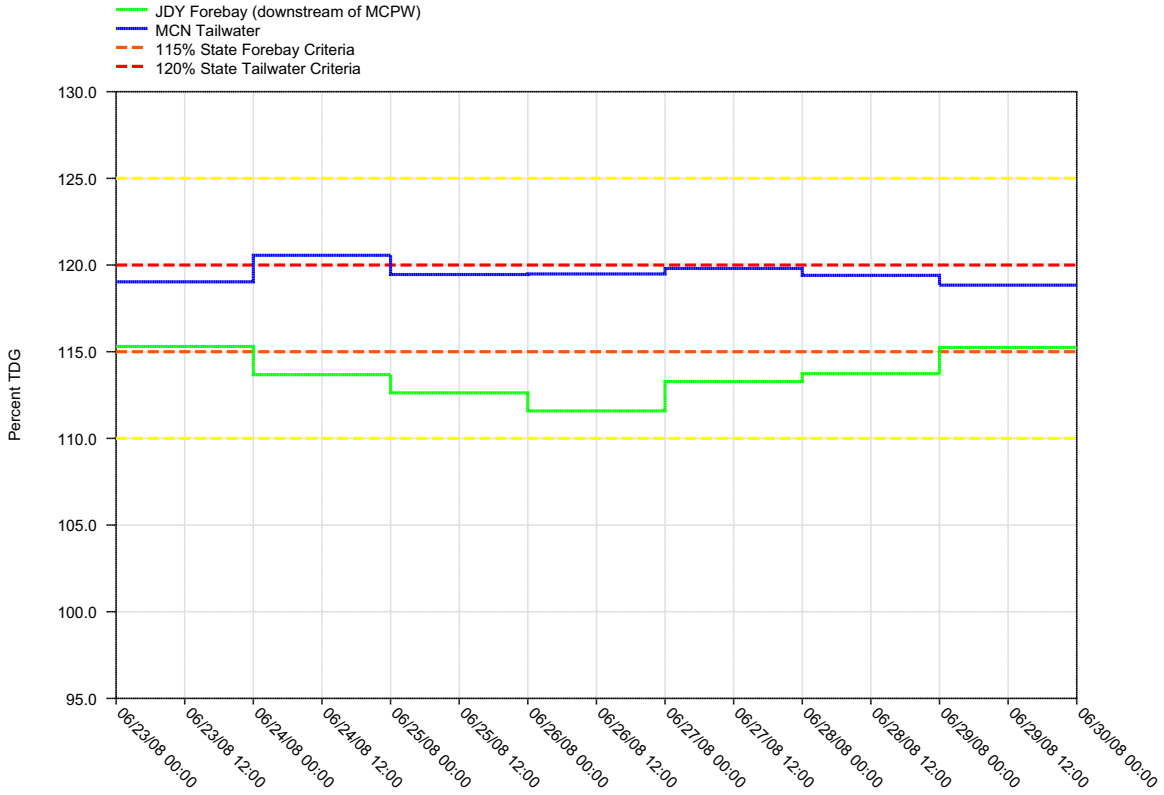


Figure 29.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

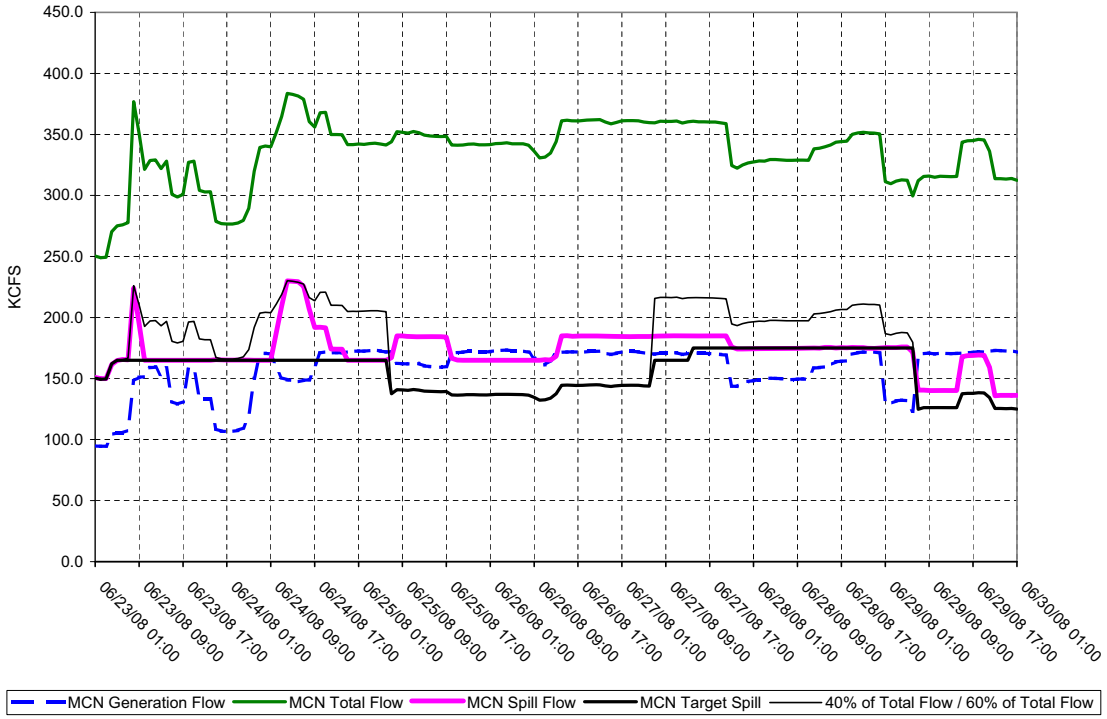
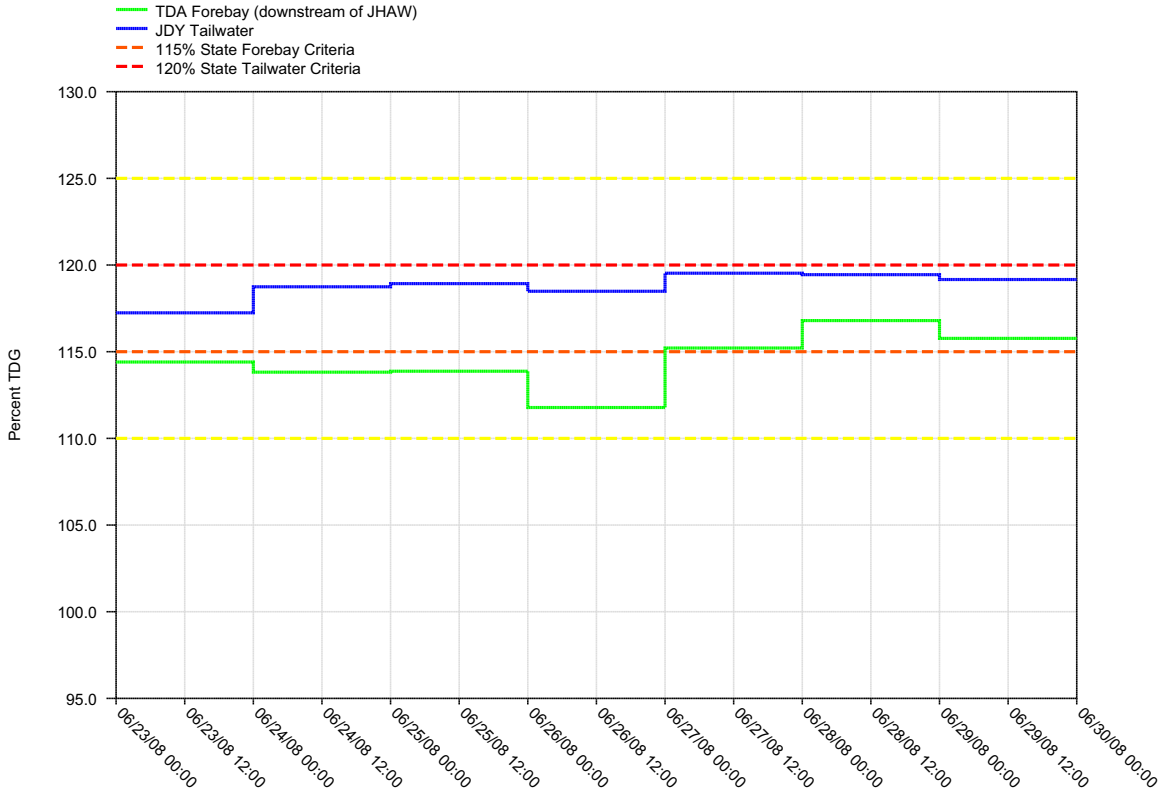


Figure 30.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

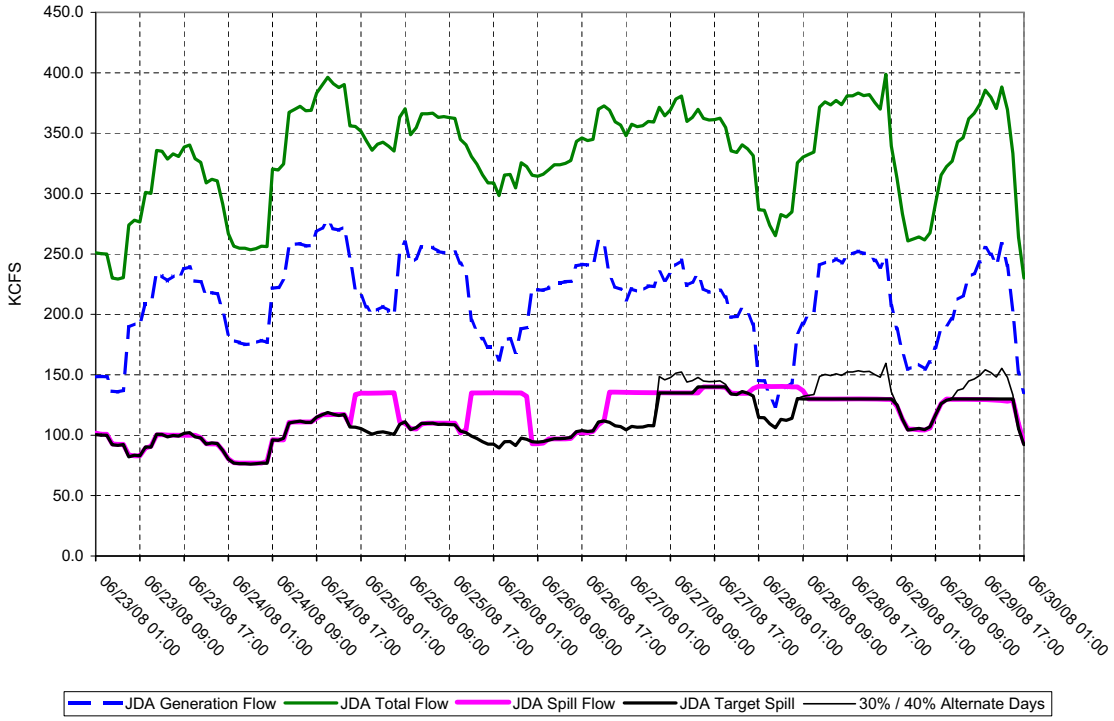
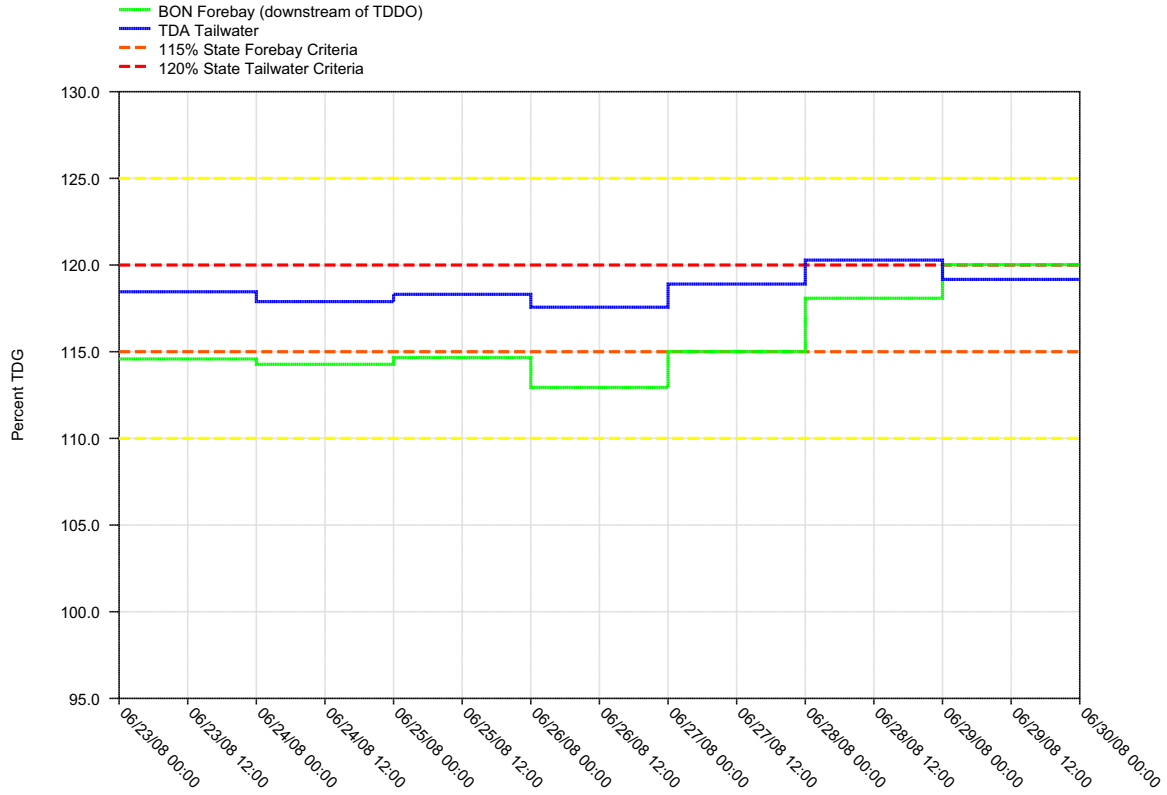


Figure 31.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

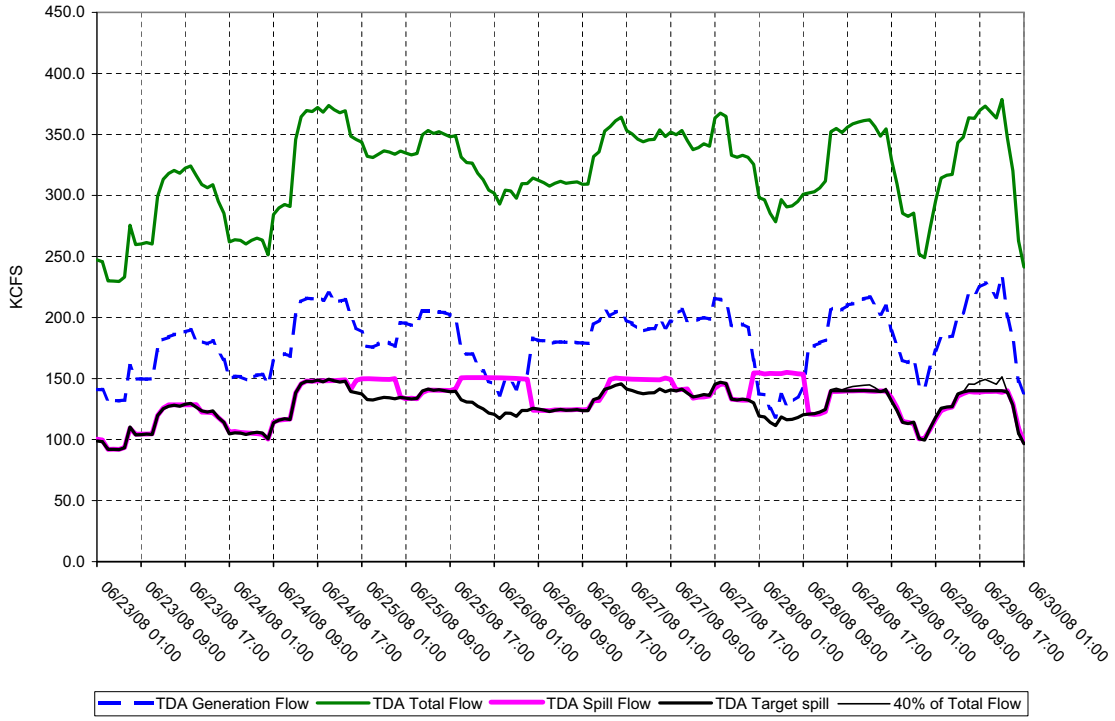
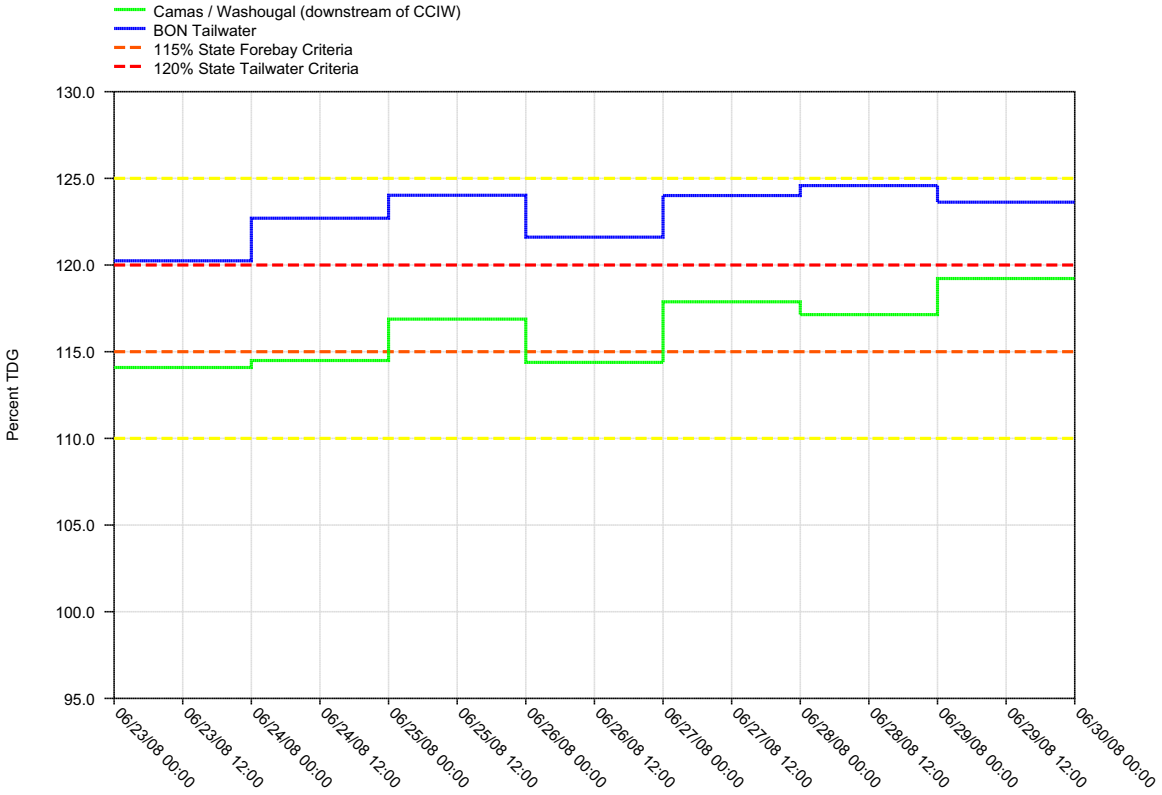
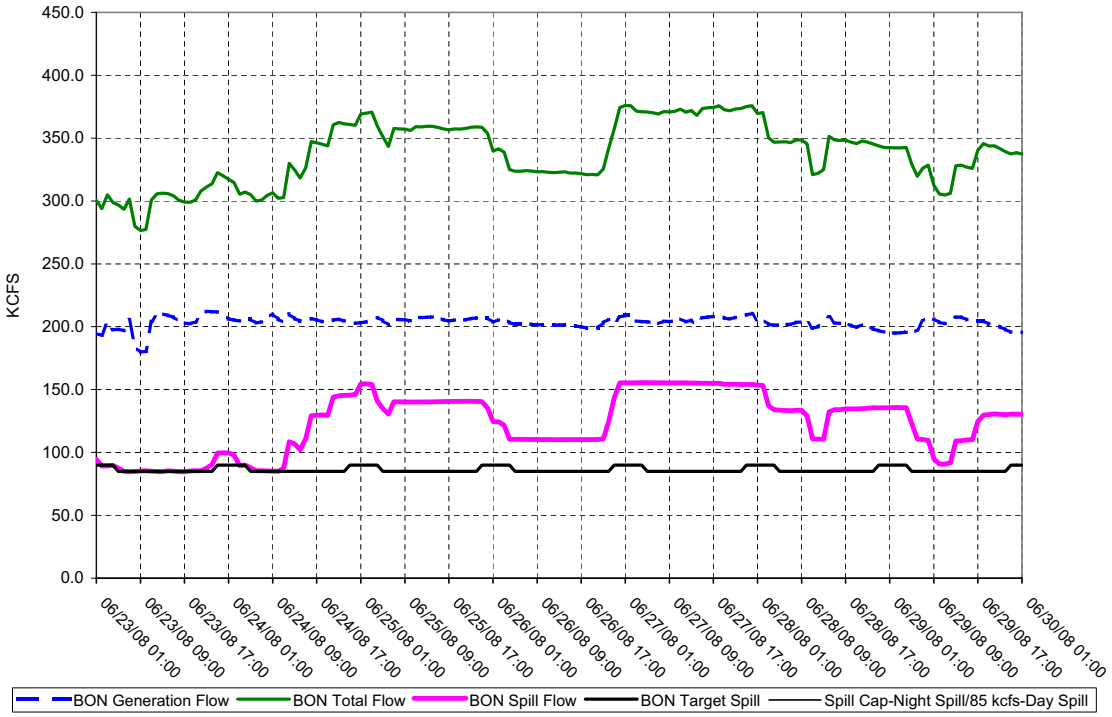


Figure 32.
Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow



Average percent TDG for 12 highest hours: June 2 – 29, 2008

Date	Monitoring Stations (full list)																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
06/02/2008	105.6	128.3	120.5	123.5	122.4	121.4	119.1	122.8	114.4	121.8	114.1	119.5	114.1	118.2	114.4	124.9	120.1
06/03/2008	106.0	127.4	120.6	124.1	125.0	123.3	119.5	123.8	113.2	122.3	113.8	121.1	115.2	121.7	118.5	124.3	120.1
06/04/2008	105.2	125.6	120.8	124.5	124.4	124.8	120.2	124.0	112.3	122.8	110.3	124.8	115.1	119.2	116.4	123.7	120.0
06/05/2008	104.9	124.8	119.7	121.5	123.9	121.4	120.2	121.8	114.9	122.6	110.4	120.0	112.6	117.9	116.2	124.0	118.8
06/06/2008	104.6	123.6	119.2	119.0	122.2	121.4	118.0	120.6	113.7	121.1	110.3	119.5	111.4	117.0	113.2	123.5	117.2
06/07/2008	104.0	123.4	115.7	117.9	116.4	117.6	114.7	119.6	110.0	119.8	110.0	118.7	110.7	116.6	112.5	121.9	115.6
06/08/2008	103.5	121.0	115.0	116.4	116.6	117.3	114.7	118.6	111.2	120.1	108.7	119.3	111.2	116.6	112.5	123.1	116.2
06/09/2008	104.7	120.9	116.2	117.0	117.1	119.1	116.7	119.0	113.4	118.9	108.9	117.6	111.0	116.9	113.9	124.3	116.5
06/10/2008	104.7	119.3	114.3	117.5	114.3	120.4	113.8	120.4	110.6	119.8	107.6	119.2	108.9	117.0	110.6	123.7	111.0
06/11/2008	103.2	122.9	111.7	120.9	113.7	121.5	112.5	123.7	108.6	121.1	106.0	122.4	112.3	117.8	111.0	121.9	114.6
06/12/2008	103.1	122.4	111.8	120.5	117.5	120.8	114.4	120.0	112.8	122.9	105.2	122.6	113.7	119.1	113.3	124.3	118.7
06/13/2008	105.0	120.1	115.0	120.1	119.3	122.1	117.8	121.9	116.0	121.6	108.4	120.3	112.7	119.1	115.3	122.9	120.1
06/14/2008	105.2	113.5	116.6	116.5	119.2	120.9	119.2	117.6	117.8	119.8	110.8	118.8	111.8	117.3	114.1	123.4	117.7
06/15/2008	105.3	113.3	115.4	115.5	117.7	120.4	118.8	119.3	117.1	119.3	115.8	119.1	113.5	118.0	112.2	122.7	116.8
06/16/2008	105.2	119.3	112.1	115.6	117.5	120.3	118.5	118.9	116.2	119.3	116.6	119.7	115.1	119.0	113.2	122.9	114.1
06/17/2008	104.9	122.8	110.9	118.0	115.4	118.9	117.5	120.9	114.3	118.9	114.7	119.8	113.4	118.7	112.8	123.6	115.8
06/18/2008	104.4	123.3	113.5	122.3	115.2	122.8	115.6	121.5	114.5	122.1	112.6	121.4	116.4	119.8	114.5	124.5	120.0
06/19/2008	105.0	123.6	117.4	120.7	122.3	122.7	119.3	121.7	115.6	120.1	111.9	119.5	115.1	119.7	118.1	123.8	120.6
06/20/2008	106.1	122.0	119.9	118.2	121.3	120.2	121.1	119.5	118.6	120.0	112.5	119.4	113.8	118.8	118.8	124.5	120.1
06/21/2008	106.1	122.0	120.3	117.7	119.8	119.5	119.8	120.2	117.1	119.3	116.1	119.6	114.6	118.8	117.4	121.8	119.1
06/22/2008	105.1	123.6	118.5	119.0	117.5	119.9	117.1	120.4	115.8	118.7	116.0	120.1	115.2	119.0	114.1	122.6	116.3
06/23/2008	105.1	122.7	117.8	119.8	119.5	120.2	116.9	119.4	115.0	119.0	115.3	117.2	114.4	118.5	114.6	120.2	114.1
06/24/2008	105.4	121.9	118.6	119.0	119.4	119.6	117.5	120.5	114.0	120.6	113.7	118.7	113.8	117.9	114.3	122.7	114.5
06/25/2008	105.9	119.8	119.3	118.7	119.8	118.5	118.5	121.8	114.4	119.5	112.6	118.9	113.9	118.3	114.7	124.0	116.9
06/26/2008	105.8	119.4	118.8	122.3	118.5	119.7	118.1	121.5	114.0	119.5	111.6	118.5	111.8	117.6	112.9	121.6	114.4
06/27/2008	104.9	117.9	117.1	121.4	120.1	119.3	118.1	119.1	114.6	119.8	113.3	119.5	115.2	118.9	115.0	124.0	117.9
06/28/2008	104.8	116.1	115.4	115.0	122.2	119.5	119.4	118.4	117.3	119.4	113.7	119.4	116.8	120.3	118.1	124.6	117.1
06/29/2008	105.4	108.2	115.7	114.8	120.2	119.4	119.6	118.8	119.1	118.8	115.2	119.2	115.8	119.2	120.0	123.6	119.2

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Number of hours of data reported in a given day

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Big, bold, red text denotes exceedances.
--- indicates No Data
Dates run from hour 1 to 24 (not 0 to 23).
The gas caps shown only apply when spilling to facilitate juvenile fish passage ("voluntary spill") between April 3rd and August 31st.
At all other times, the gas cap is 110%.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
WRNO	Bonneville Tailwater (Warrendale)
CWMW	Camas / Washougal

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
July 2008

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the February 25, 2008 court order adopting the 2008 Fish Operations Plan (FOP) and requiring the Corps to provide monthly reports on the implementation of the 2008 FOP. The FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. To the extent hydro-power operations are not specified in the 2008 FOP, the FCRPS operations will be consistent with the operations considered in the 2004 Biological Opinion and/or other operative documents, which include the 2008 Water Management Plan (WMP) and 2008 Fish Passage Plan (FPP).

The Corps' lower Columbia and Snake River projects and fish passage operations identified in the FOP for the month of July 2008 are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (TDG) for the tailwater at each project and for the next project's forebay downstream.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the spill program for the month of July 2008.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per week in July displaying the performance of the spill program as follows:

(A). Daily Average of the High 12 Hourly % TDG Values - described in the upper graph.
(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on June 30 and end on July 27 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start on Monday 0100 hours through Monday 0100 hours for the following dates:

June 30 – July 6	Figures 1 - 8
July 7 – July 13	Figures 9 – 16
July 14– July 20	Figures 17 - 24
July 21 – July 27	Figures 25 – 32

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours as the result of spill from the dam. The objective is to operate each project up to the TDG limits without exceeding those limits if practicable.

- The blue line on the graph represents the TDG in the tailrace of the dam. 120% TDG is the upper operating limit.
- The green line represents the TDG in the forebay of the next dam downstream. 115% is the upper operating limit.

B. Lower Graph: Represents the flow and spill at the dam.

- The dotted blue line shows the average flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the average hourly spill level as defined in the 2008 FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Ice Harbor (15.2 kcfs) and Bonneville (50 kcfs) dams.

The hourly target spill may vary as a function of quantity of river flow, forebay elevation and generating units available at a project.

II. A monthly percent TDG Table is included at the end of the figures that shows the overall daily results of the average percent TDG for the 12 highest hours for all projects. The numbers in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

Please note that for all projects that spill for fish passage, the target spill may be limited to a lesser quantity (i.e. the spill cap), with the objective of staying within the TDG state waiver limits. When spill levels briefly deviated below or above the level described in the FOP, the heavy red line will be below or above the heavy black line in the graphs. Whenever the operation varied from the target spill during voluntary spill hours, or other anomalies occurred, these instances are described below. The FOP Spill Report Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the FOP Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spillway gate openings to implement the regionally coordinated spill pattern. The project operator sets the spillway gate openings to most closely approximate the FOP level of spill while also avoiding exceeding the spill cap.

"Low flow" operations on Lower Columbia and Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects operate at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour. During these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percent of the total flow than it had been during higher flows. As a result, even though the spill volume remained the same, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock. When theses variances occur, they are recorded in the FOP Spill Report Table below under the variance type “Navigation.” For the month of July, the “Navigation” variance also identifies instances associated with reduced spill for the safe passage of fish transportation barges at Lower Monumental and McNary Dams.

Also note that actual spill levels at the Corps projects may range from 1 to 2 kcfs lower or higher than specified in the 2008 FOP, including the set spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2008 FOP describes project operations during “load swing hours” (page 8). For reporting purposes, the notation “Transmission Stability” in the FOP Spill Report

Table will replace “load swing hour” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these “Transmission Stability” hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days cited in the Table, the 24 hour average spill was within the FOP level of +/- 1% of the target spill unless limited by the spill cap or involuntary spill occurred.

Occurrences which required an adjustment in operations and regional coordination are described in greater detail in the section below entitled “July Operational Adjustments Report.”

July Operations:

The month of July was characterized by above average flows for both the Lower Columbia and Snake rivers. These continued high inflows across the Columbia Basin were the result of cooler than average atmospheric temperatures occurring earlier in the spring that shifted a significant portion of total snowmelt later into June causing high flows in the unregulated (natural) tributaries. The freshet continued through the first week of July, and into the second week for McNary Dam, causing frequent instances of involuntary spill as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. Also, involuntary spill occurred in early July during non-peak hours when excess spill occurred due to lack of load. The large amounts of involuntary spill, which began to occur after the onset of the freshet, are not included in the Spill Report Table. Instead, the Hourly Spill and Flow graphs reveal the hours when the volume of spill (red line) was higher than the target spill (bold black line). In many of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly % TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs.

Also, on July 12 through July 15, 2008, there were three instances where spill was curtailed at Lower Monumental (LMN), and one instance where spill was curtailed at Ice Harbor (IHR). These spill reductions were the result of a combination of operational conditions and human error while attempting to meet the dual objectives in the biological

opinion of reservoir refill and spill along with variability of flow in the Lower Snake River. Spill was curtailed to maintain Minimum Operating Pool (MOP) and minimum generation at the projects. At the July 16 TMT meeting, the Lower Monumental issue was discussed and the BPA representative acknowledged that the conditions that led to the weekend variances were not acceptable to BPA. He also stated that BPA had already taken steps to decrease the possibility of deviating from MOP and the required FOP spill. These spill reduction instances were reported to the court on July 23, 2008.

During the summer reporting period, the daily FOP spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill through the month of July was a fixed quantity of 18 kcfs 24 hours per day
- Little Goose Dam - the hourly target spill through the month of July was 30% of the total flow for 24 hours
- Lower Monumental Dam –the hourly target spill through the month of July was to 17 kcfs, or up to the spill cap when under 17 kcfs
- Ice Harbor Dam – the hourly target spill up to July 16 was to 45 kcfs day/spill cap night alternating with the 30% spill test, at which time the target spill changed to 45 kcfs day/spill cap night.
- McNary Dam – the target spill through the month of July was spill alternates between two days of 60% and two days of 40% of total flow for 24 hours arranged in a randomized two day treatment, four day block study design
- John Day Dam – the target spill up to July 20 was two days of 30% and two days of 40% of total flow for 24 hours arranged in a randomized two day treatment, four day block study design. On July 21 the hourly target spill switched to 30% of total flow for 24 hours.
- The Dalles Dam - the target spill throughout the month was 40% of the total flow for 24 hours
- Bonneville Dam - the hourly target spill was a fixed quantity of approximately 85 kcfs 24 hours per day up to July 21, at which time the target spill changed to 75 kcfs during daytime hours and to the spill cap during nighttime hours as defined in the 2008 Fish Passage Plan (FPP).

Operational Adjustments for July:

1. Fish Transport Operations:

    - Fish collection for routine transport at Lower Granite, Little Goose, and Lower Monumental continued throughout the month of July. In accordance with the FPP, due to the declining number of juvenile salmonids being collected at Snake River collector projects, every other day barging began on June 5 at Lower Granite, Little Goose, and Lower Monumental dams and continued throughout July. Daily collection continued with fish being held in raceways until the following day to be transported.

- Following the recommendation of the Corps, TMT agreed unanimously to begin transportation from McNary Dam at the July 16 TMT meeting. River flows had dropped below 220 kcfs and river temperature at McNary Dam had exceeded 62º F by this time, indicating that conditions were no longer "spring-like" as defined in the 2008 Fish Passage Plan. Fish collection began on July 16, and every other day barging of juvenile salmonids began on July 17 and continued through the month of July. Brief spill outages occurred at the project during arrival and departure of the transportation barges to provide safe navigating conditions in accordance with the FOP (p 18). Spill resumed at FOP specified levels during barge loading.

2. Little Goose Dam:
   - A three treatment (3 varying spill patterns) adult salmon passage study began on April 3, 2008 and continues until the end of spill operations on August 31, 2008.

3. Lower Monumental Dam:
   - The single treatment (one spill pattern, one spill level) summer spill evaluation that began on June 21 continued throughout July. This operation will continue until 2400 hours on August 31, 2008.

4. Ice Harbor Dam:
   - The two-treatment evaluation(30% vs. 45kcfs/Gas Cap) spring spill test for juvenile salmonid passage utilizing two test spill patterns from the 2008 FPP beginning on May 2, 2008 ended on July 16, 2008, at which time the spill operation switched to 45 kcfs day/spill cap night for the remainder of the spill season through August 31, 2008. The test utilized the same treatment schedule that was used in 2007 and ended on the same date.

5. McNary Dam:
   - The two treatment (40% vs. 60%) summer spill test that started on June 21, 2008 ended on July 21, 2008, to study acoustic telemetry on subyearling Chinook salmon. The alternating pattern for spill (40% and 60%) will continue through August 31, 2008.

6. John Day Dam:
   - The two treatment (30% vs. 40% spill) juvenile salmonid passage and survival evaluation that began on April 29, 2008 was initiated to evaluate two recently installed Temporary Spillway Weirs (TSWs) under two spill levels. This two-treatment evaluation ended on July 18, 2008, at which time the project switched to spilling 30% for 24 hours through August 31, 2008.

Operational Adjustments for July through August:

1. At the July 2, 2008 TMT meeting, the State of Montana submitted a System Operations Request (SOR Number 2008 MT-2). At the July 10 Regional Forum Implementation Team (IT) meeting, the operations for Libby and Hungry Horse dams

through the end of August were addressed. The proposed operation, with updated information, was reviewed again at the TMT meeting on July 16. TMT representatives concurred that the proposed Libby Dam operation as described below should proceed. The Oregon TMT representative clarified that if the forecast changed such that the end of August elevation would be above 2439', the Action Agencies should consider seeing if a comparable volume of water was available elsewhere. The Corps stated that further analysis was needed, however, because the forecasted inflows actually dropped, this condition did not materialize.

- Libby Dam: Flows will ramp down from 17 kcfs to 15.0 kcfs on July 11, and then to 13 kcfs on July 12 and not adjusted unless a reduction in flows is required to avoid drafting the reservoir below 2439 feet on August 31. In order to avoid a "double peak," if actual runoff exceeds forecasted inflows, the end of August elevation at Libby could exceed elevation 2439'. However, if actual runoff is less than forecasted, flows will be adjusted downward in late August to be at elevation 2439' on August 31.

- Hungry Horse: Hungry Horse is expected to refill into the top foot of the reservoir by about July 14 at which time an outflow will be set, based on a forecasted flow that is expected to achieve the full 20 foot draft (elevation 3540 feet by August 31. Releases of 6.45 kcfs are forecasted to draft the reservoir to elevation 3540 feet by August 31. If inflows are greater than forecasted through August 31, in order to avoid a double peak, outflows will not be adjusted upward and the reservoir will not be drafted to the full 20 feet. If inflows are less than forecasted through August 31, outflows will be reduced so as to not draft the reservoir below 3540 feet.

2. At the August 1, 2008 TMT conference call, a proposal from BPA and BC Hydro concerning an operation that would result in increased outflows from a Canadian project – Arrow Dam, with a reduction in Libby Dam outflows was presented by BPA. Final agreement was reached on the "Libby - Arrow Swap" by TMT members through the end of August as described below as long as it was a flow neutral operation. The Corps will provide accounting of the operation plan that demonstrates it was flow neutral.

   Libby Dam: The Libby-Arrow Swap between the United States and Canada has changed the August 31 target elevation from 2439 ft to 2441.8 ft. The swap allows Arrow reservoir, to release up to 60 ksfd through the end of August while allowing Libby to then store an equal amount of water above the 2439 ft target. The resulting exchange should put Libby at 2441.8 ft at the end of August. In response, Libby Dam operations will ramp down to the minimum bull trout flow of 8 kcfs on August 13th and will maintain the flow through the end of August. This operation will be flow neutral concerning Grand Coulee releases and flows in the lower Columbia River. Adjustments to flow may be required to maintain flow neutrality in the lower Columbia River after the operations are reviewed during weekly TMT meetings. A

report on the final accounting of the water exchange will be provided in the September report to the Court.

Incidents Impacting Fish:

McNary Dam:

- On August 4, 2008, Corps personnel discovered a number of fish mortalities in raceway 7 at McNary Dam. Nearly all of these fish were sub-yearling fall Chinook, but it is estimated that less then 1% of them, or 2 individual fish, were fall Chinook listed pursuant to the Endangered Species Act (ESA). As set forth in the memorandum submitted to the court on August 6, 2008, 175 fish were trapped in a 4" perforated PVC pipe located in the north upstream corner of the raceway. The perforated PVC pipe was in the raceway for the purpose of covering a 2" diameter metal pipe that was periodically used as a siphon to provide water to researchers. Fish in raceway 7 were apparently jumping at the incoming water from the flume and became trapped inside the uncovered PVC pipe. Corps personnel believe the cover was missing at the start of collection on July 16. The Corps quickly acted to rectify the problem. Both the PVC pipe and metal pipe have been removed from raceway 7. In addition, the other raceways at McNary have been surveyed to ensure that no other raceways have a similar configuration that could lead to a repeat of the problem. Additionally, there is no similar siphon at any other FCRPS project.

- On August 8, 2008, a number of subyearling Chinook mortalities occurred during smolt monitoring activities conducted under the Smolt Monitoring Program at McNary Dam. The mortalities occurred after Washington Department of Fish and Wildlife (WDFW) personnel inadvertently applied too much anesthetic to a fish anesthetic tank resulting in the 180 subyearling Chinook deaths. Smolt monitoring activities are conducted every other day at McNary Dam by WDFW to monitor the condition of juvenile salmonids passing the project. In addition, 41 fish mortalities occurred as a result of the collection and holding of 6,690 fish in holding raceways as part of normal fish transport operations. The Juvenile Fish Transport Permit (JFTP) provides for incidental take of a limited number of listed fish. The 41 mortalities noted above were contemplated in the JFTP. The total number of fish mortalities occurring on August 8 at McNary Dam was 221.

FOP Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Add'l Spill	7/8/2008	0800	1	Operational Limitations	Hourly % spill increased to 47.5% (above 30% +/- 1% range) due to project spilling to pass debris coordinated through FPOM on July 3, 2008.
Little Goose	Spill	7/9/2008	2000 & 2300	2	Operational Limitations	Hourly % spill decreased to 28.8 and 28.5% (below 30% +/- 1% range). Project operator was handling a lockage and was not available to change spill level on the hour. 24 hr avg. spill was 29.7%.
Little Goose	Spill	7/10/2008	2400	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%.
Little Goose	Add'l Spill	7/11/2008	0100-0200	2	Navigation	Hourly % spill increased to 31.1% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	7/11/2008	0500	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	7/12/2008	600	1	Operational Limitations	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/13/2008	2000	1	Operational Limitations	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	7/15/2008	1500	1	Operational Limitations	Hourly % spill decreased to 28.4% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/16/2008	0300	1	Navigation	Hourly % spill decreased to 27.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Add'l Spill	7/18/2008	0600	1	Navigation	Hourly % spill increased to 31.3% (below 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.6%

Little Goose	Add'l Spill	7/18/2008	2000 - 2100	2	Navigation	Hourly % spill increased to 31.1 and 31.2% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.6%
Little Goose	Add'l Spill	7/19/2008	1600	1	Navigation	Hourly % spill increased to 31.2% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.2%
Little Goose	Spill	7/21/2008	1500	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/21/2008	2400	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/22/2008	0900	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	7/22/2008	2400	1	Navigation	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) because the operator was handling a lockage and was not available to change spill level on the hour. 24 hr avg. spill was 30.0%
Little Goose	Spill	7/23/2008	0200	1	Navigation	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	7/23/2008	1300	1	Navigation	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	7/23/2008	2300	1	Navigation	Hourly % spill decreased to 28.3% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	7/25/2008	300	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	7/26/2008	900	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%

Little Goose	Spill	7/27/2008	1300	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Lower Monumental	Spill	6/30/2008	1700	1	Navigation	Hourly spill dropped to 11.8 kcfs, below the spill cap of 15 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/2/2008	1800	1	Navigation	Hourly spill dropped to 10.3 kcfs, below the spill cap of 15 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/4/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 13.1 kcfs and 15.8 kcfs, below the FOP level of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/6/2008	1800	1	Navigation	Hourly spill dropped to 15.5 kcfs, below the FOP level of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/8/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 14.4 kcfs - 15.5 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/10/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 13.1 kcfs - 15.8 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/12/2008	0100 - 0200	2	Operational Limitations and Human Error	Hourly spill dropped to 6.6 kcfs - 9.5 kcfs, below the FOP spill of 17 kcfs to maintain MOP and minimum generation.
Lower Monumental	Spill	7/12/2008	1700 - 1800	2	Navigation	Hourly spill dropped to 10.3 kcfs - 14.8 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/13/2008	0100 - 0600	6	Operational Limitations and Human Error	Hourly spill dropped to 6.6 kcfs - 16.3 kcfs, below the FOP spill of 17 kcfs to maintain MOP and minimum generation.
Lower Monumental	Spill	7/14/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 11.0 kcfs - 15.2 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/15/2008	0400 - 0800	5	Operational Limitations and Human Error	Hourly spill dropped to 10.0 kcfs - 15.3 kcfs, below the FOP spill of 17 kcfs to maintain MOP and minimum generation.
Lower Monumental	Spill	7/16/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 10.0 kcfs - 14.8 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.

Lower Monumental	Spill	7/18/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 13.5 kcfs - 15.0 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/20/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 10.8 kcfs - 14.3 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/22/2008	1700 - 1800	2	Navigation	Hourly spill dropped to 13.6 kcfs - 15.0 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/24/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 12.0 kcfs - 14.6 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/26/2008	1700 - 1900	3	Navigation	Hourly spill dropped to 11.4 kcfs - 16.8 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Ice Harbor	Spill	7/13/2008	0500 - 0600	2	Operational Limitations and Human Error	Hourly spill dropped to 0 kcfs - 8.8 kcfs, below the FOP spill of minimum spill of 15 kcfs to maintain MOP and minimum generation.
McNary	Spill	7/7/2008	1700-1900	3	Operational Limitations	Hourly % spill ranged from 54.2 to 61.1% (outside 60% +/- 1% range): which was 3 kcfs below spill cap. Spill fluctuated due to physical limits of spill gate settings.
McNary	Spill	7/8/2008	0800-1700	10	Operational Limitations	Hourly % spill ranged from 56.8 to 58.7% (below 60% +/- 1% range) which was 2.5 kcfs below spill cap. Spill fluctuated due to physical limits of spill gate settings. 24 hr avg. spill was 59.4%
McNary	Spill	7/14/2008	1300	1	Transmission Stability	Hourly % spill dropped to 58.8% (below 60% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 60.1%
McNary	Add'l Spill	7/15/2008	1400	1	Maintenance	Hourly % spill increased to 41.4% (above 40% +/- 1% range) due to project switching units off and on for maintenance.
McNary	Add'l Spill	7/16/2008	1100 - 1200	2	Maintenance	Hourly % spill increased to 41.1 and 41.2% (above 40% +/- 1% range) due to project switching units off and on for maintenance. 24 hr avg. spill was 40.4%
McNary	Spill	7/17/2008	0700 - 1000	2	Navigation	Hourly % spill decreased to 15% and 33.3 then increased to 43.3% (below and above 40% +/- 1% range). Reduced spill for safe passage of fish barge. There were also clogged fish screens. 24 hr avg. spill was 39.4 %

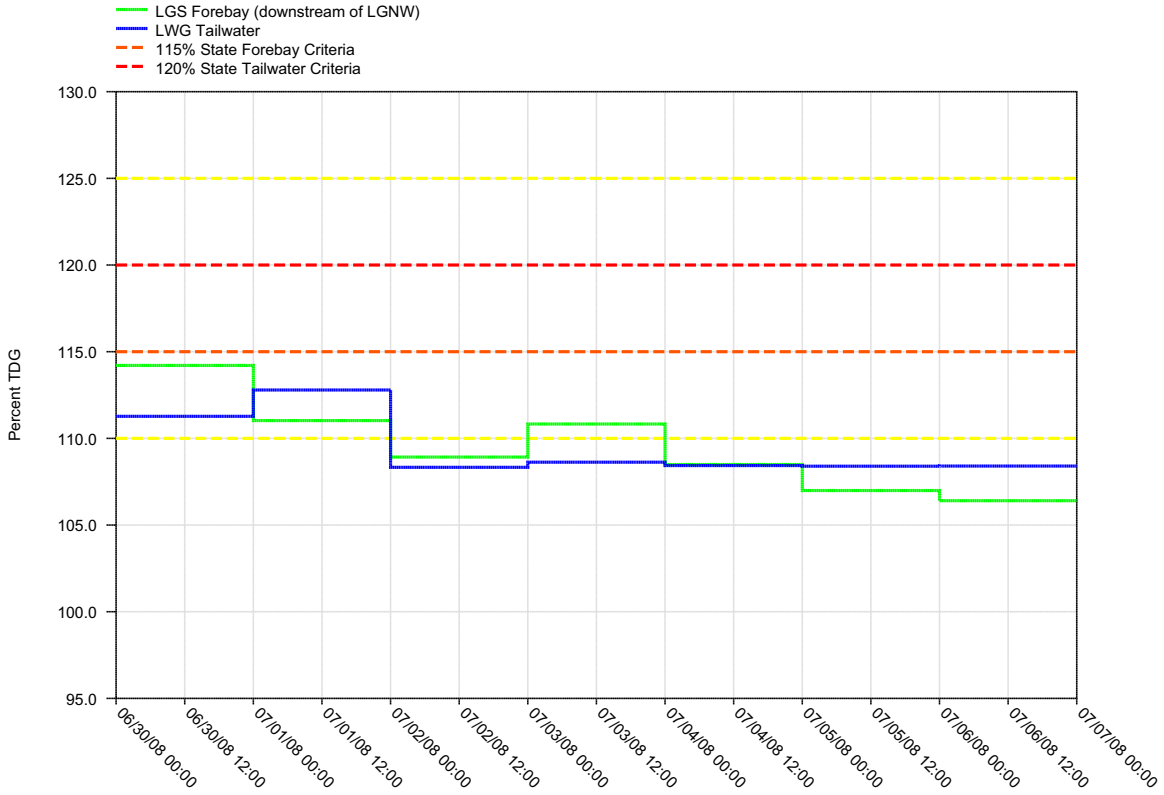
McNary	Add'l Spill	7/17/2008	1300	1	Operational Limitations	Hourly % spill increased to 41.2% (above 40% +/- 1% range) due to project forebay elevation restriction, fish screens clogged, and units derated.
McNary	Spill	7/19/2008	1100 - 1200	2	Maintenance	Hourly % spill decreased to 48% (below 60% +/- 1% range) and then increased to 61.6% (above 60% +/- 1% range) due to mechanical difficulties returning TSW to service.
McNary	Add'l Spill	7/19/2008	2300	1	Transmission Stability	Hourly % spill increased to 61.1% (above 60% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4.
McNary	Spill	7/21/2008	700, 1000-1100	3	Navigation	Hourly % spill decreased to 28.4%, 28.5 and 38.9% (below 40% +/- 1% range). Reduced spill for safe passage of fish barge.
McNary	Add'l Spill	7/22/2008	0100	1	Human or Program Error	Hourly % spill increased to 43.3% (above 40% +/- 1% range) due to GDAC automatic spill adjustment program malfunctioning. 24 hr avg. spill was 40.2%
McNary	Spill	7/23/2008	700, 1100	2	Navigation	Hourly % spill decreased to 38.9% and 43.7% (below 60% +/- 1% range). Reduced spill for safe passage of fish barge.
McNary	Spill	7/25/2008	700 & 1000	2	Navigation	Hourly % spill decreased to 47.5% and 51.4% (below 60% +/- 1% range). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 59.4%
McNary	Add'l Spill	7/25/2008	1400	1	Transmission Stability	Hourly % spill increased to 61.1% and 51.4% (above 60% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 59.4%
McNary	Spill	7/26/2008	500	1	Human or Program Error	Hourly % spill decreased to 58.9% (above 60% +/- 1% range) due to GDAC automatic spill adjustment program malfunctioning. 24 hr avg. spill was 60.1%
McNary	Spill	7/27/2008	700 & 1000	2	Navigation	Hourly % spill decreased to 33.1% and 34.5% (below 40% +/- 1% range). Reduced spill for safe passage of fish barge.
John Day	Spill	6/30/2008	0300	1	Transmission Stability	Hourly % spill decreased to 38.9% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 36.0%, spill limited by cap.

John Day	Spill	7/6/2008	0900	1	Transmission Stability	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 29.9%
John Day	Add'l Spill	7/7/2008	1200	1	Transmission Stability	Hourly % spill increased to 32.8% (below 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.1%
John Day	Add'l Spill	7/7/2008	1700	1	Transmission Stability	Hourly % spill increased to32.5% (above 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.1%
John Day	Add'l Spill	7/8/2008	1200	1	Transmission Stability	Hourly % spill increased to 32.2% (above 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.2%
John Day	Add'l Spill	7/9/08 - 7/10/2008	2400 - 0100, 0300	3	Transmission Stability	Hourly % spill increased to 41.2% 41.1% and 41.5% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.2% on 7/10.
John Day	Spill	7/14/2008	1200	1	Transmission Stability	Hourly % spill dropped to 38.9% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 39.8%
John Day	Spill	7/16/2008	1400	1	Transmission Stability	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.2%
John Day	Add'l Spill	7/16/2008	2300	1	Transmission Stability	Hourly % spill increased to 41.6% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.2%
John Day	Spill	7/18/2008	0800	1	Transmission Stability	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.2%
John Day	Add'l Spill	7/23/2008	1600 - 1700	2	Transmission Stability	Hourly % spill increased to 31.6% and 32.0 (above 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.2%

John Day	Add'l Spill	7/23/2008	2200	1	Transmission Stability	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.2%
John Day	Spill	7/24/2008	700 - 800	2	Transmission Stability	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.0%
John Day	Add'l Spill	7/25/2008	1700	1	Transmission Stability	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 30.1%
The Dalles	Add'l Spill	7/5/2008	2300 - 2400	2	Transmission Stability	Hourly % spill increased to 41.1 and 41.7% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.2%
The Dalles	Add'l Spill	7/7/2008	1200	1	Transmission Stability	Hourly % spill increased to 43.5% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.0%
The Dalles	Spill	7/7/2008	1400, 1600	2	Transmission Stability	Hourly % spill dropped to 38.5% and 38.7% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.0%
The Dalles	Spill	7/16/2008	0200, 0600	2	Transmission Stability	Hourly % spill decreased to 38.9 and 38.5% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 39.3%
The Dalles	Add'l Spill	7/16/2008	1900 - 2100, 2300	4	Transmission Stability	Hourly % spill increased to 41.7, 41.4 and 41.2% (above 40% +/- 1% range) and dropped to 38.9% due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 39.3%
The Dalles	Add'l Spill	7/17/2008	2300	1	Transmission Stability	Hourly % spill increased to 42.1% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.0%
The Dalles	Spill	7/20/2008	1600	1	Transmission Stability	Hourly % spill decreased to 38.5% (below 40% +/- 1% range) due to project being on response during rapidly changing load as defined on page 4. 24 hr avg. spill was 40.0%
Bonneville	Add'l Spill	7/8/2008	1900 - 2200	4	Operational Limitations	Hourly spill increased to 99 kcfs (above 85 kcfs) due to forebay restrictions associated with Treaty Gill Net fishing per July 3 teletype.

Figure 1.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

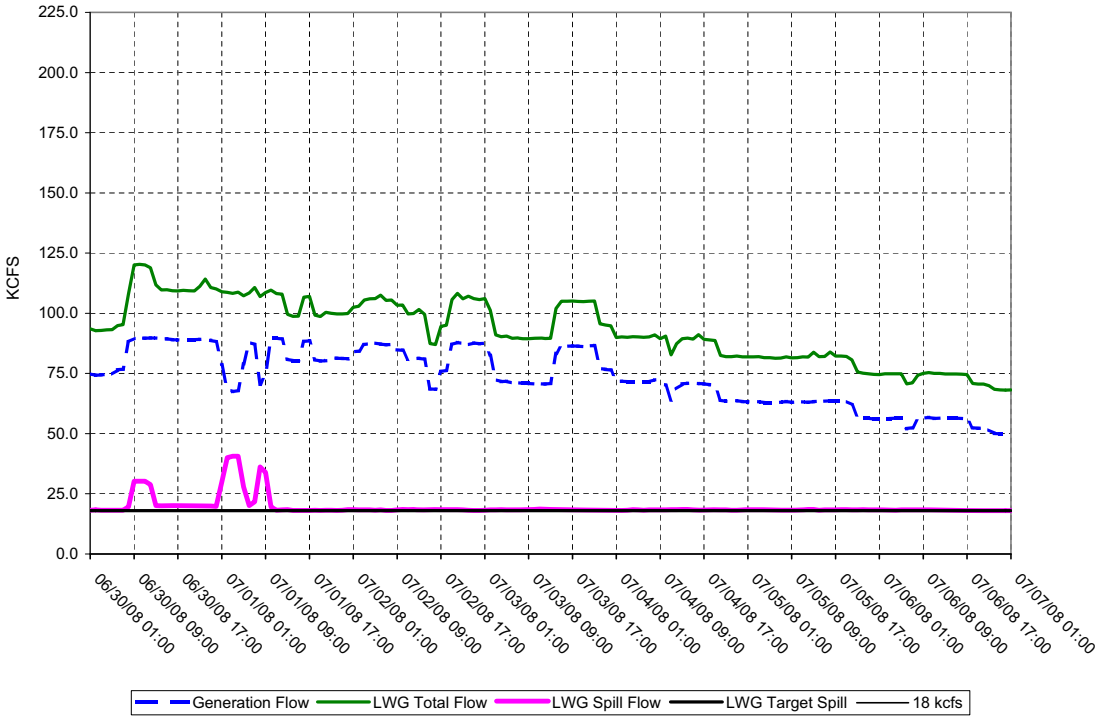
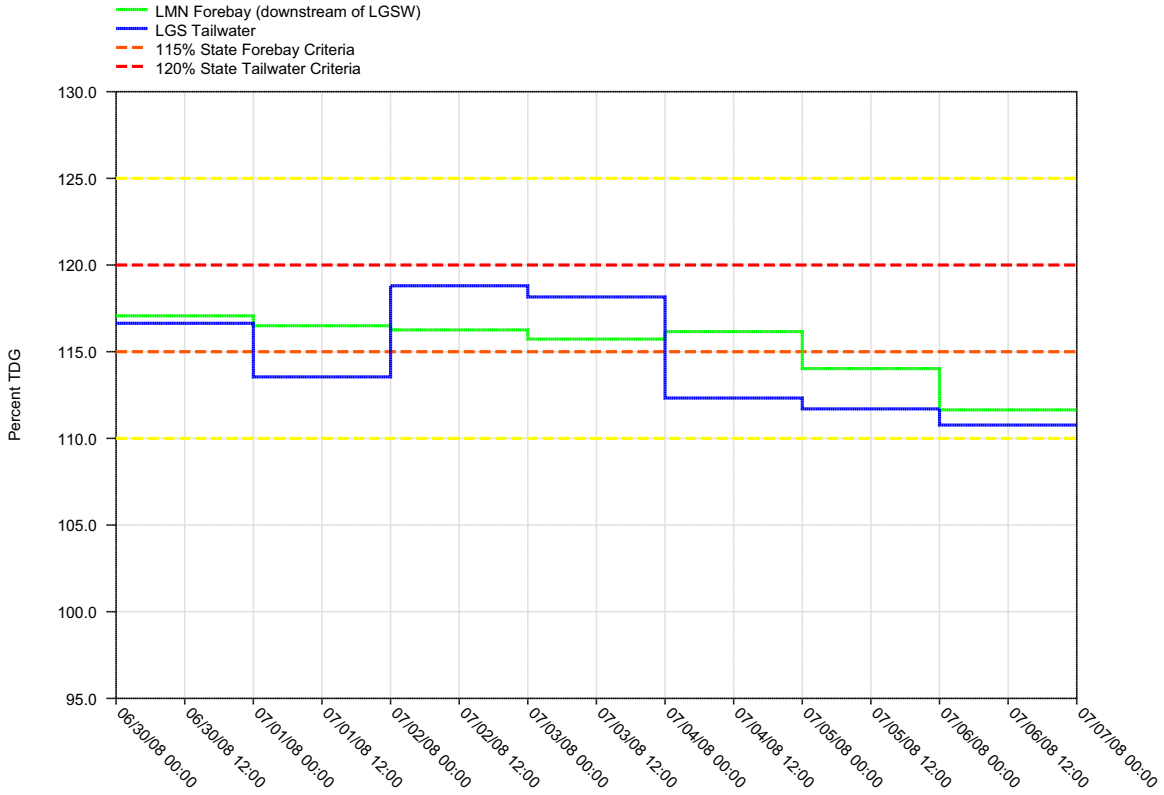


Figure 2.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

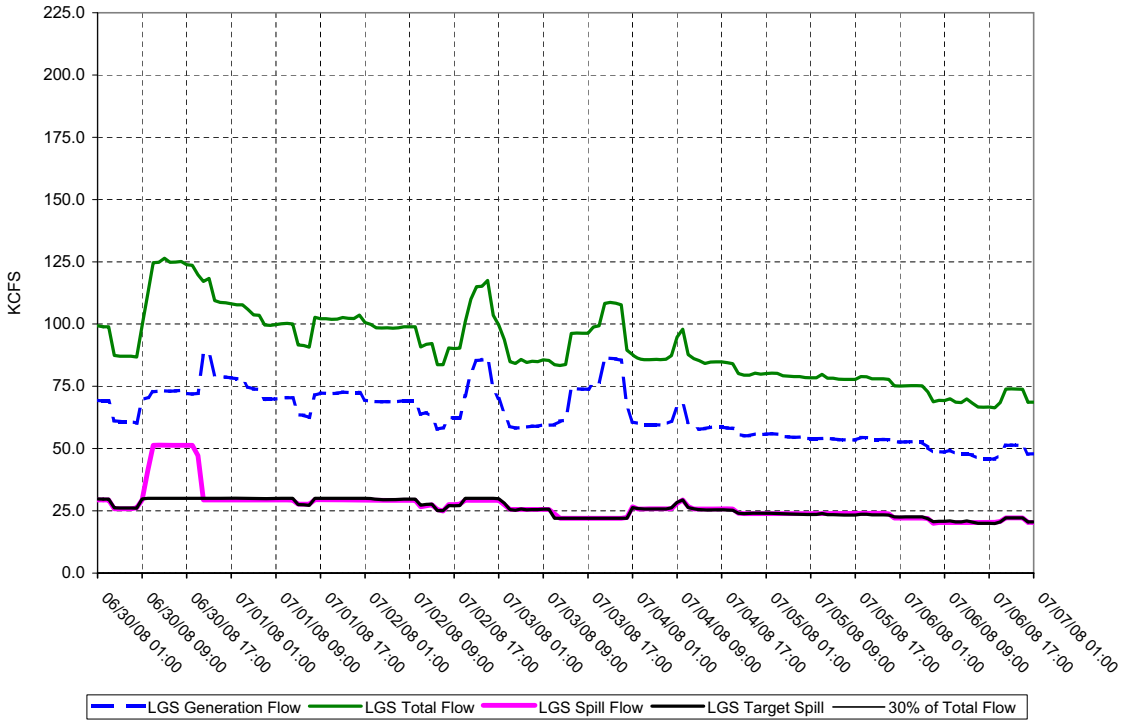
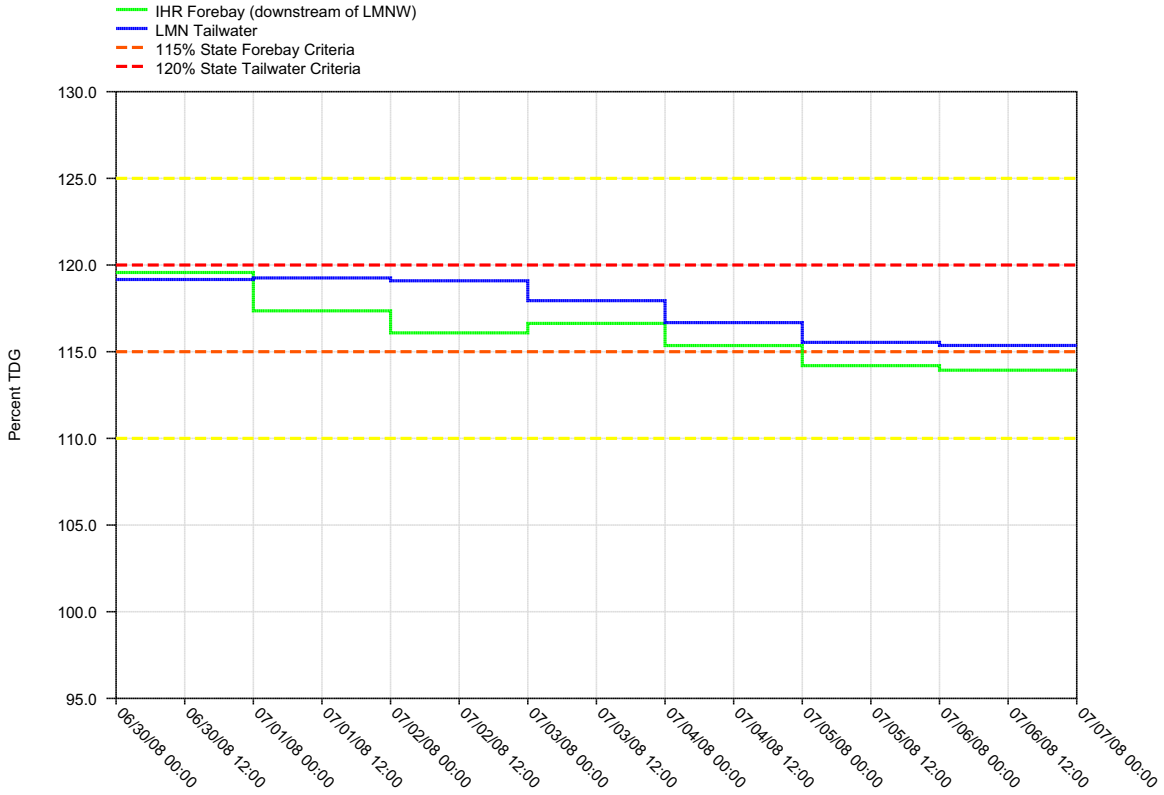


Figure 3.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

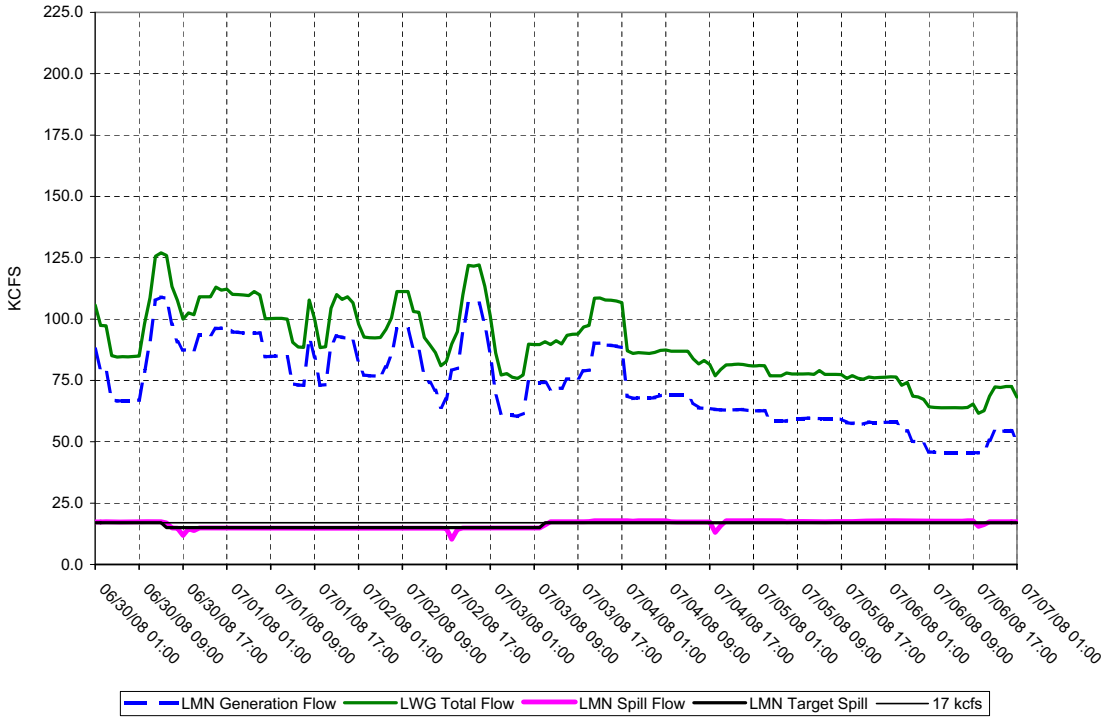
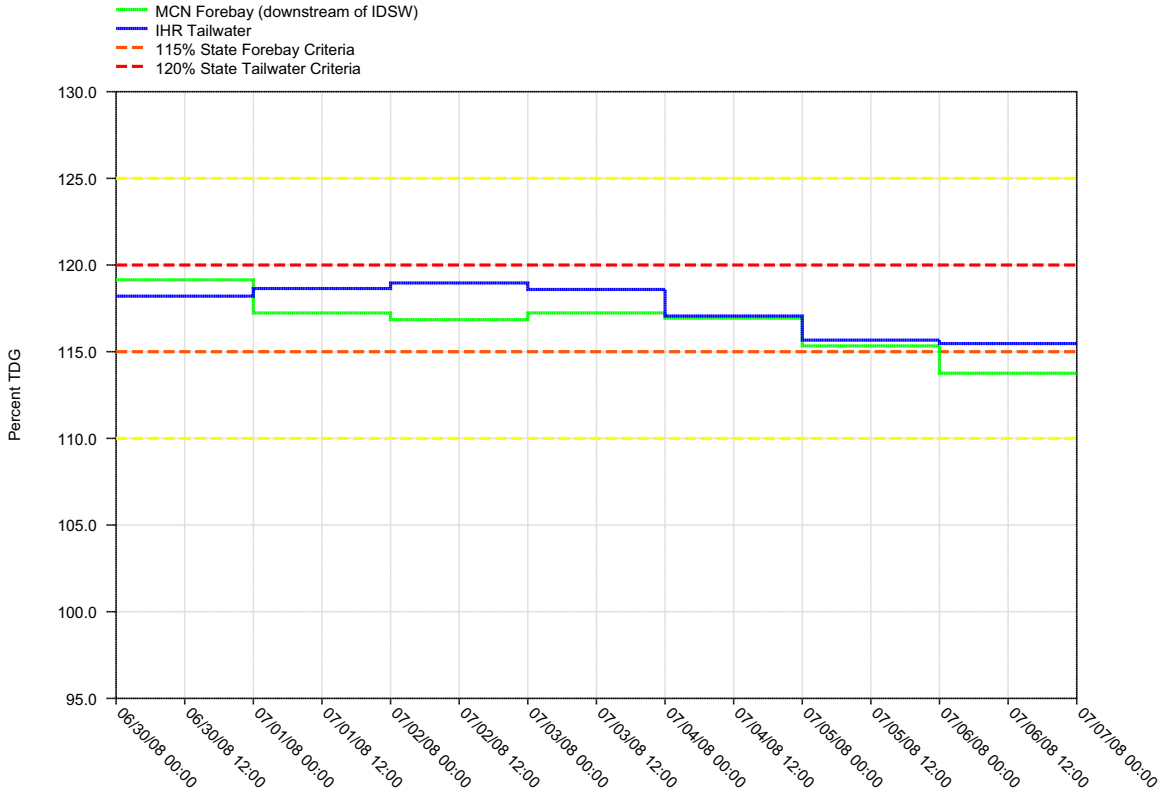


Figure 4.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

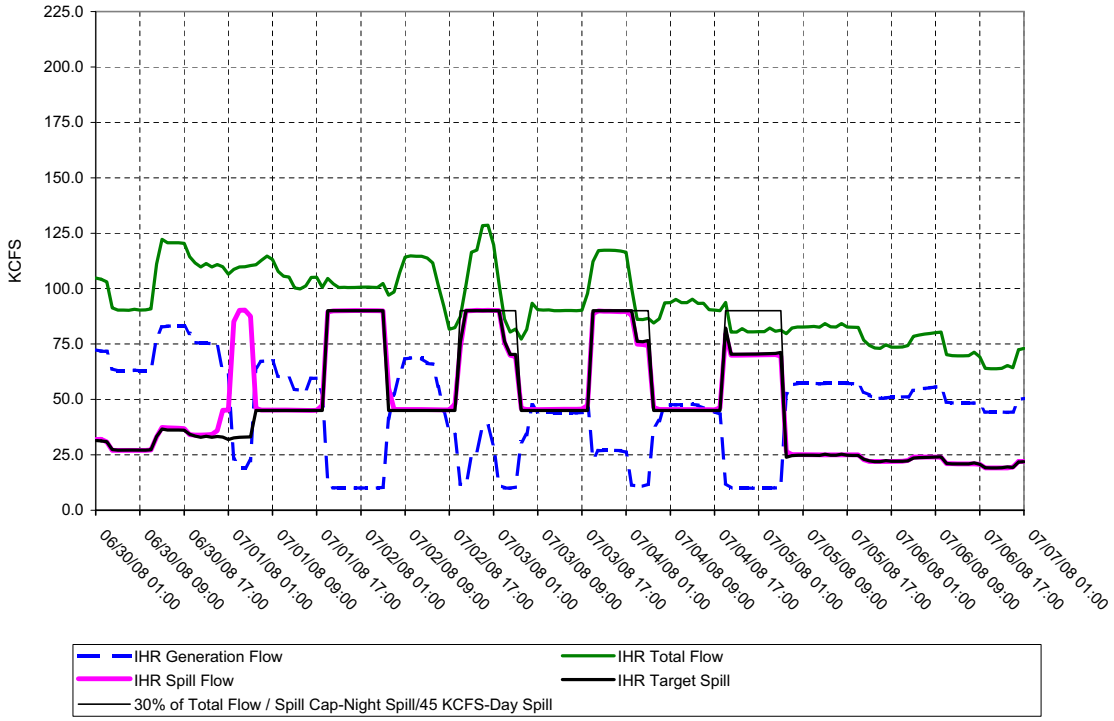
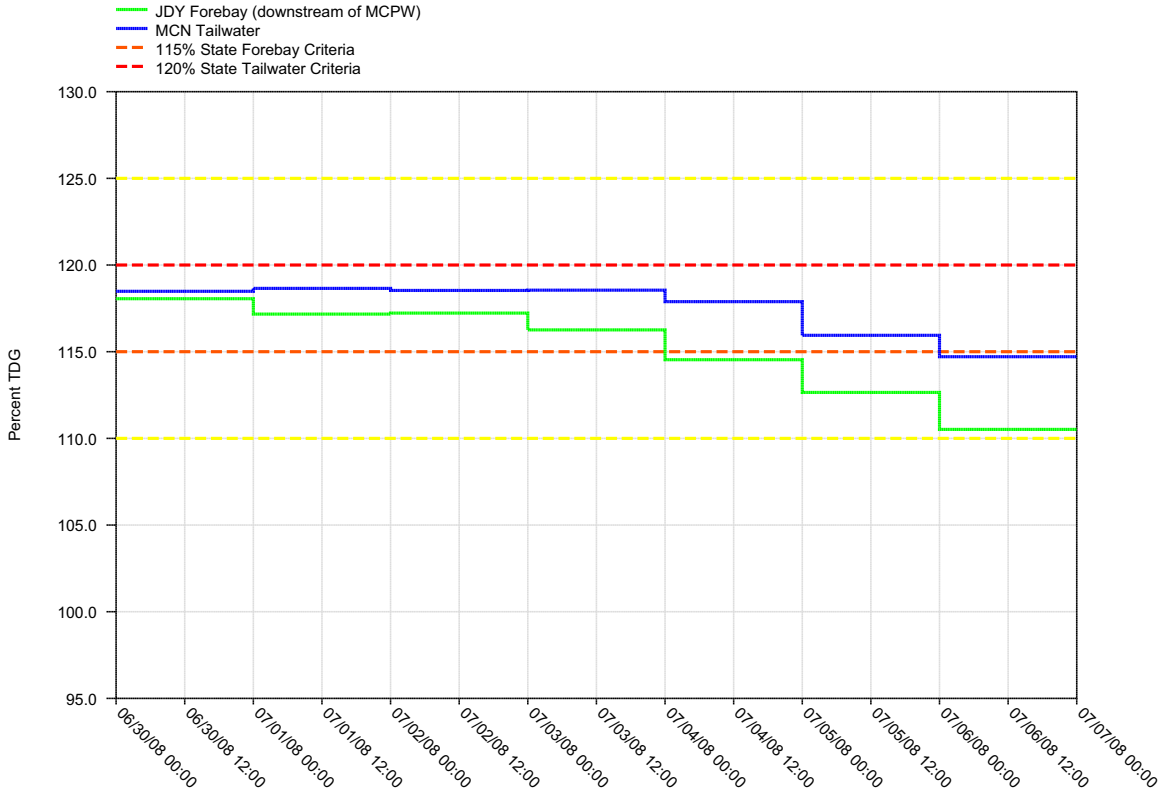


Figure 5.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

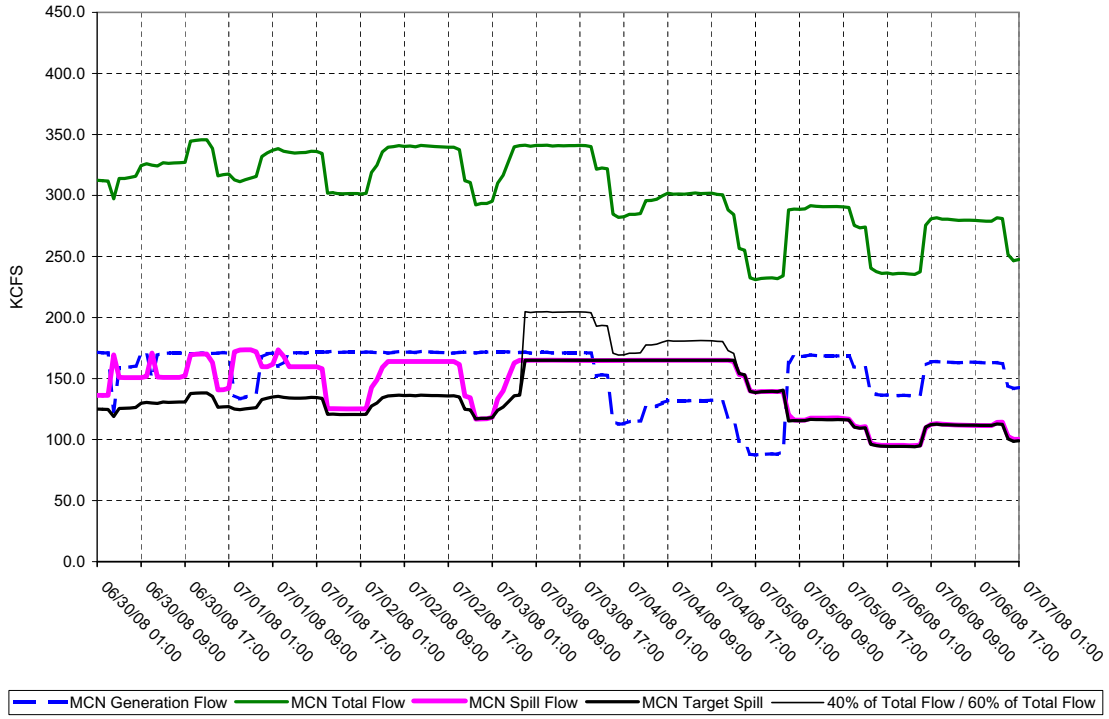
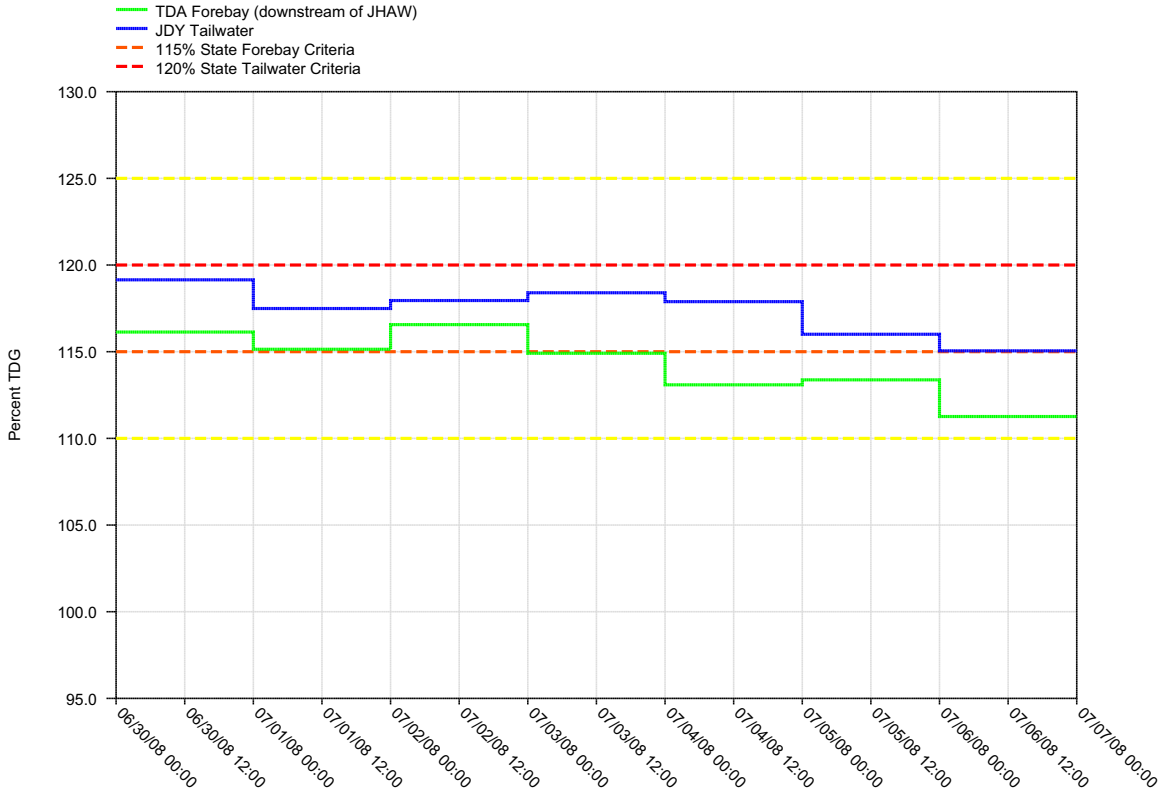


Figure 6.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

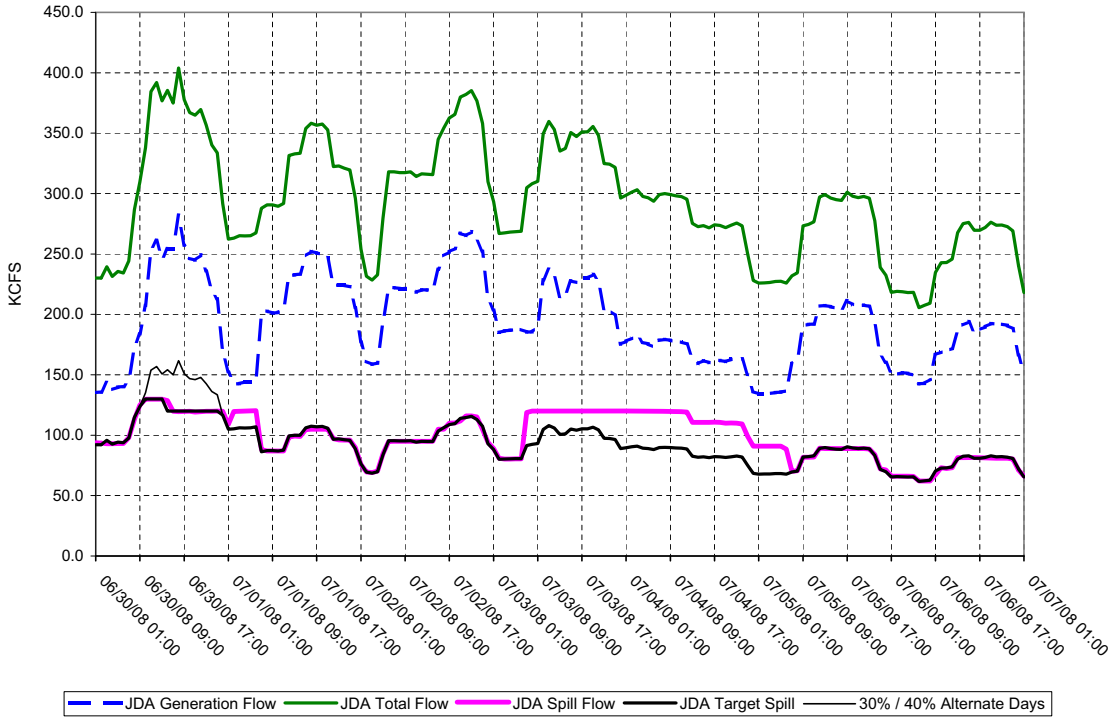
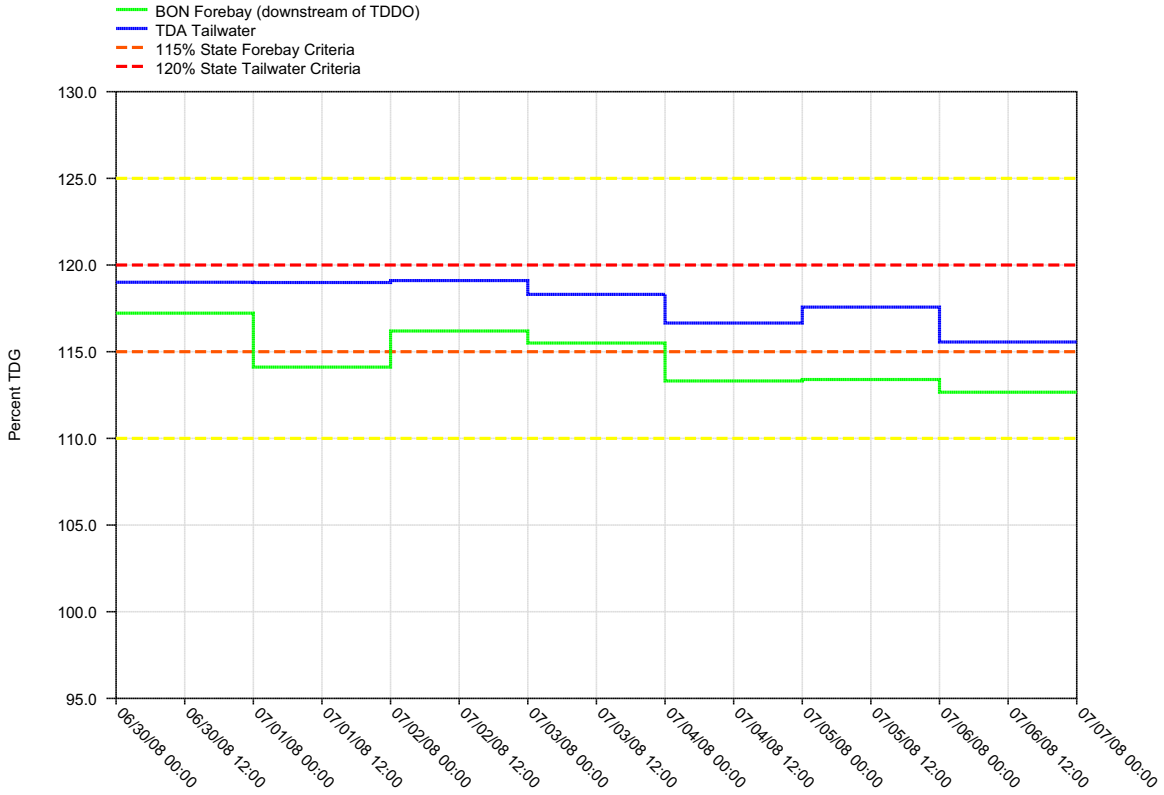


Figure 7.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

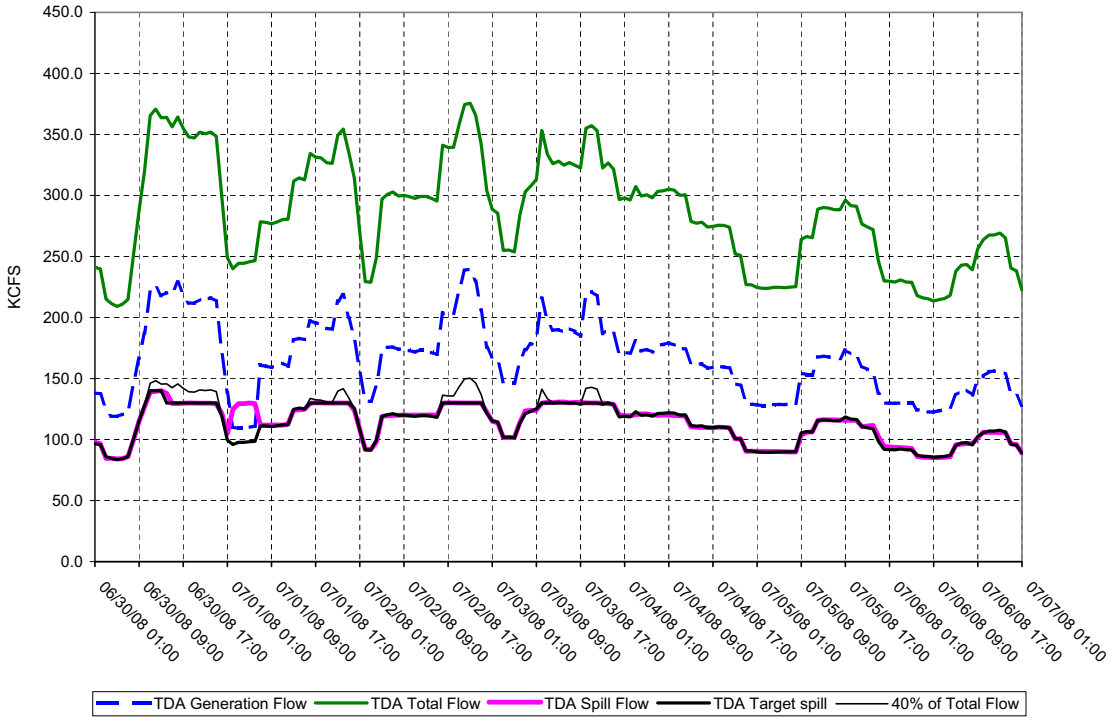
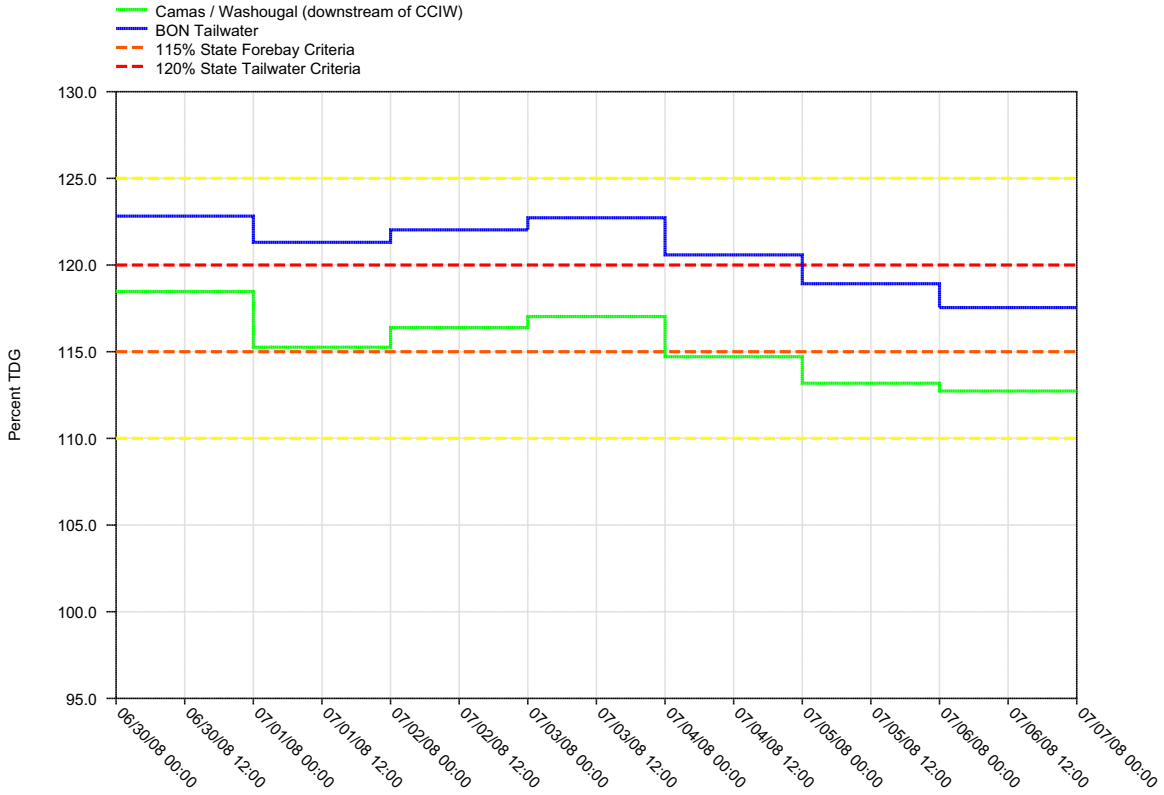


Figure 8.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

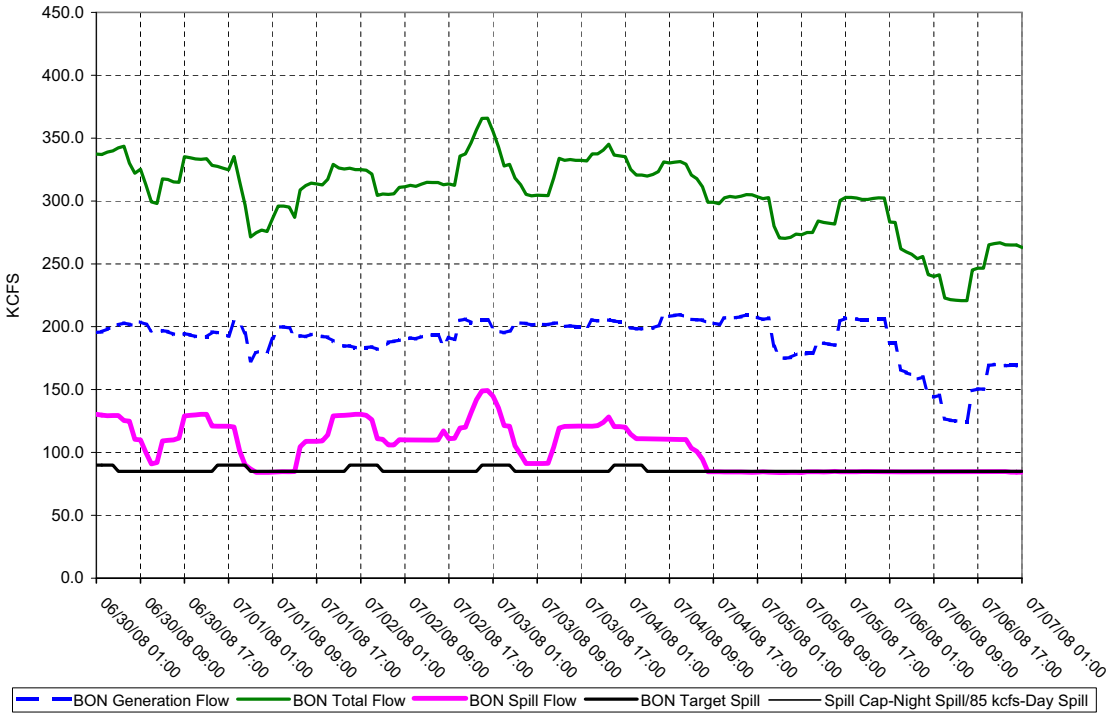
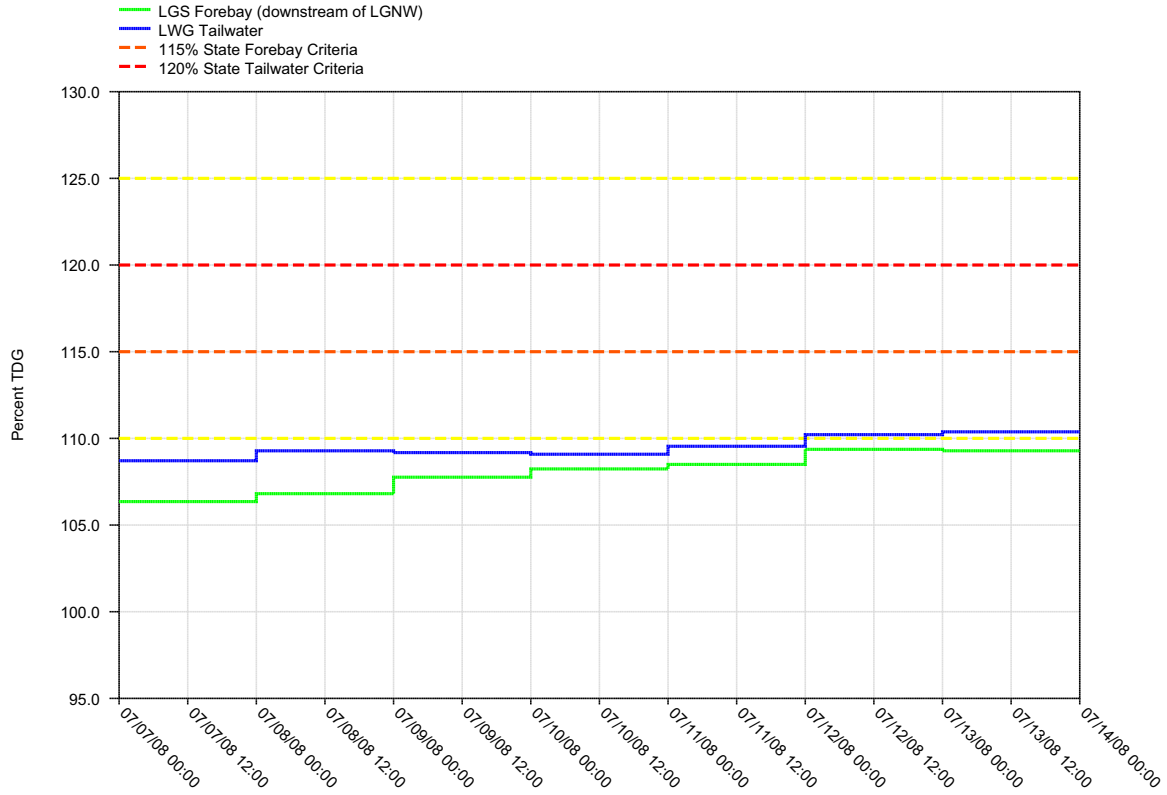


Figure 9.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

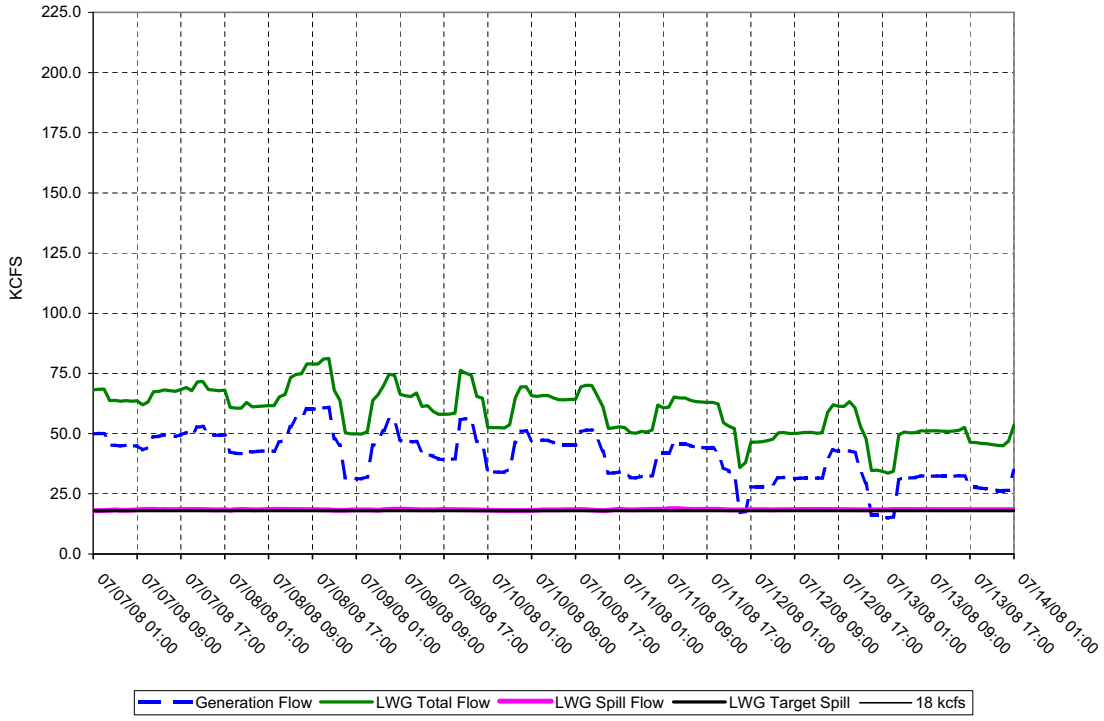
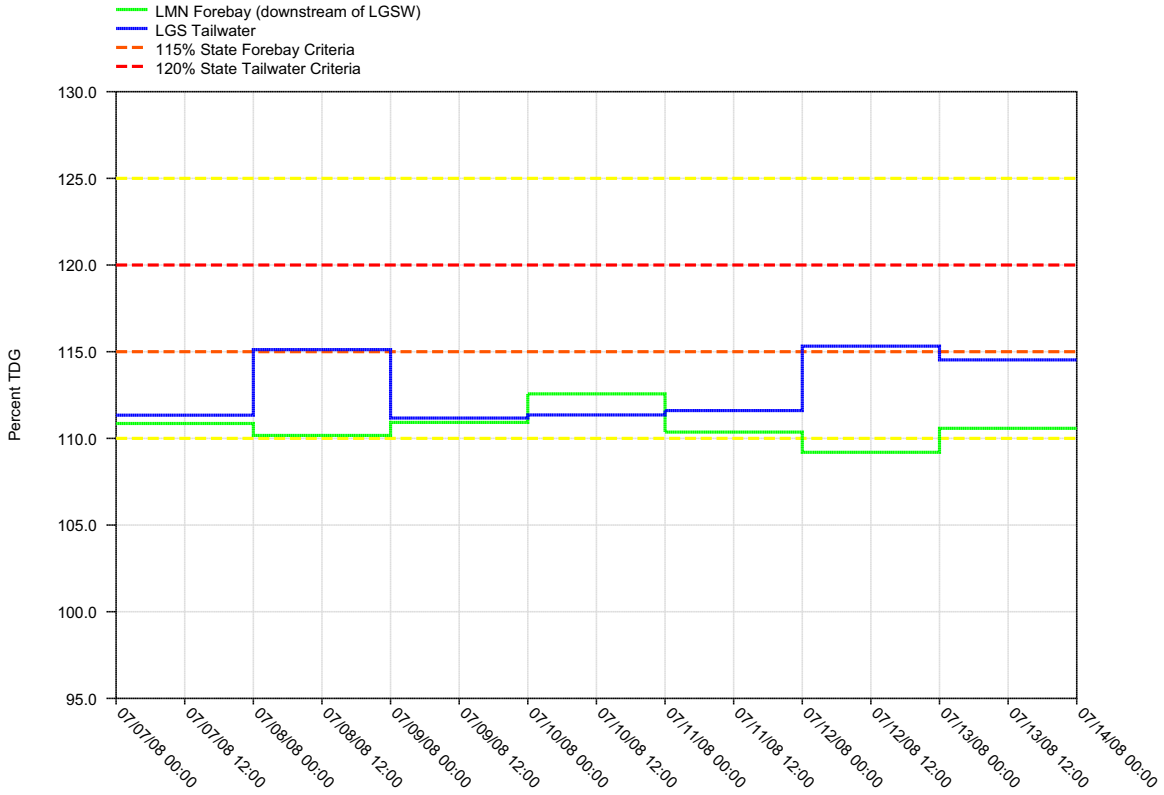


Figure 10.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

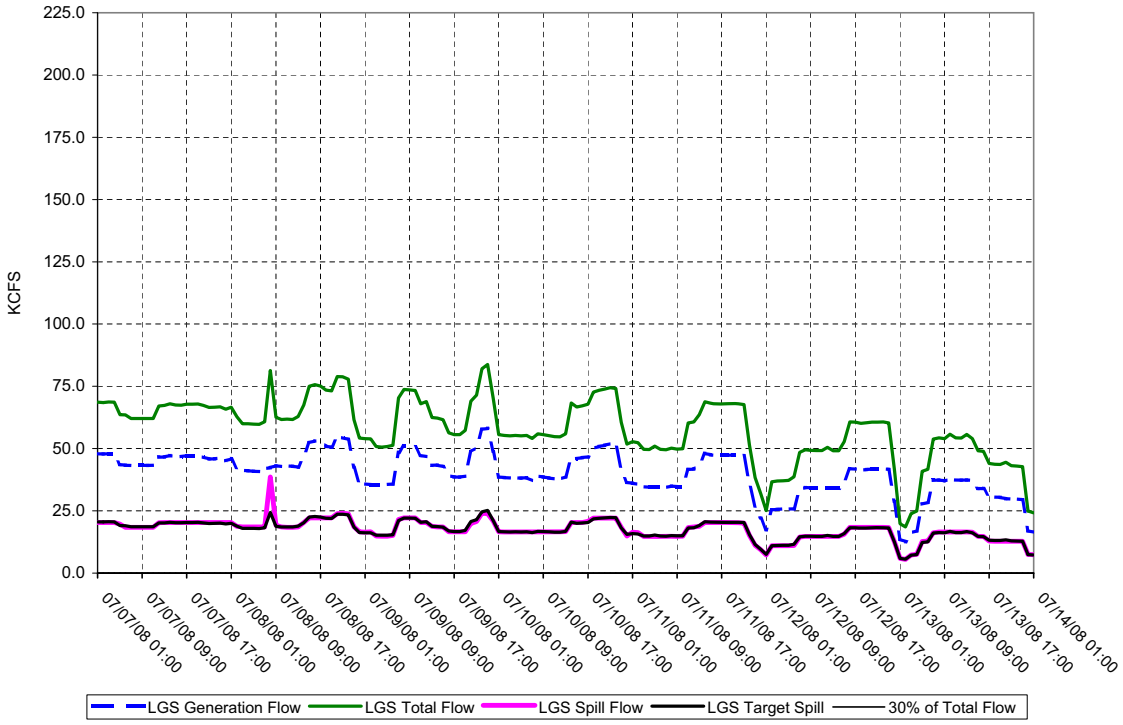
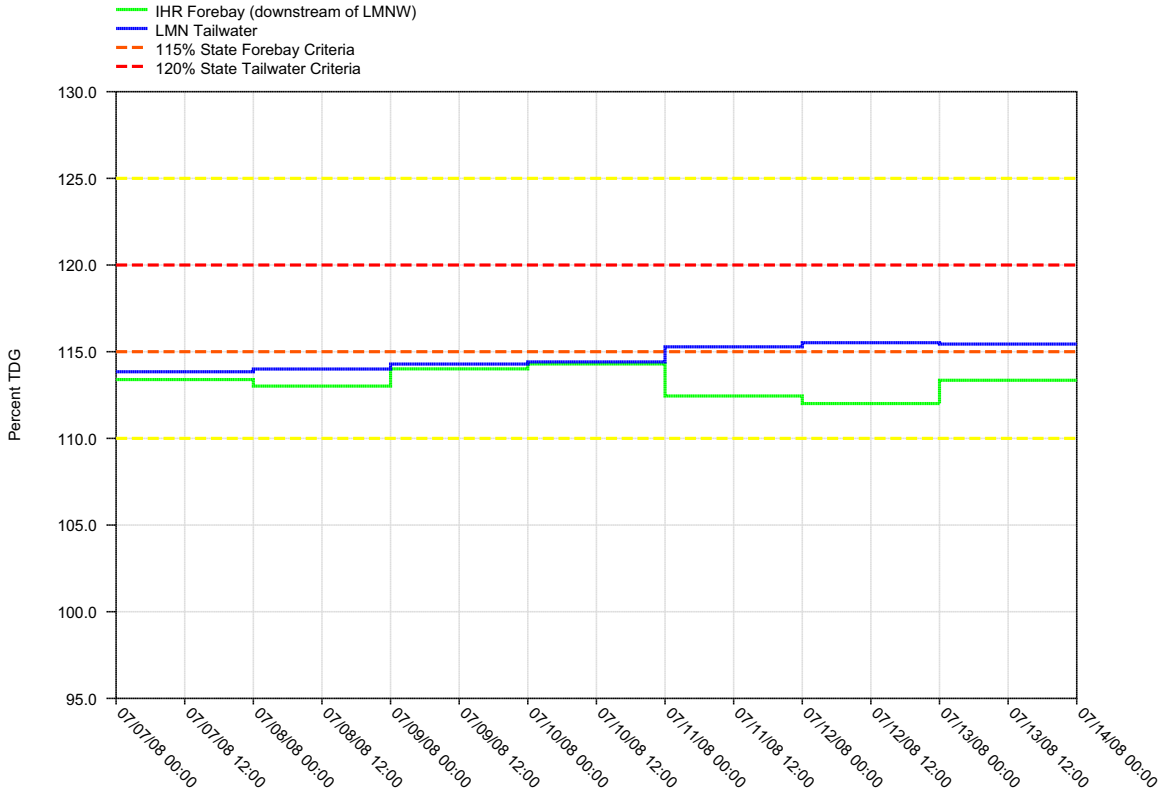


Figure 11.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

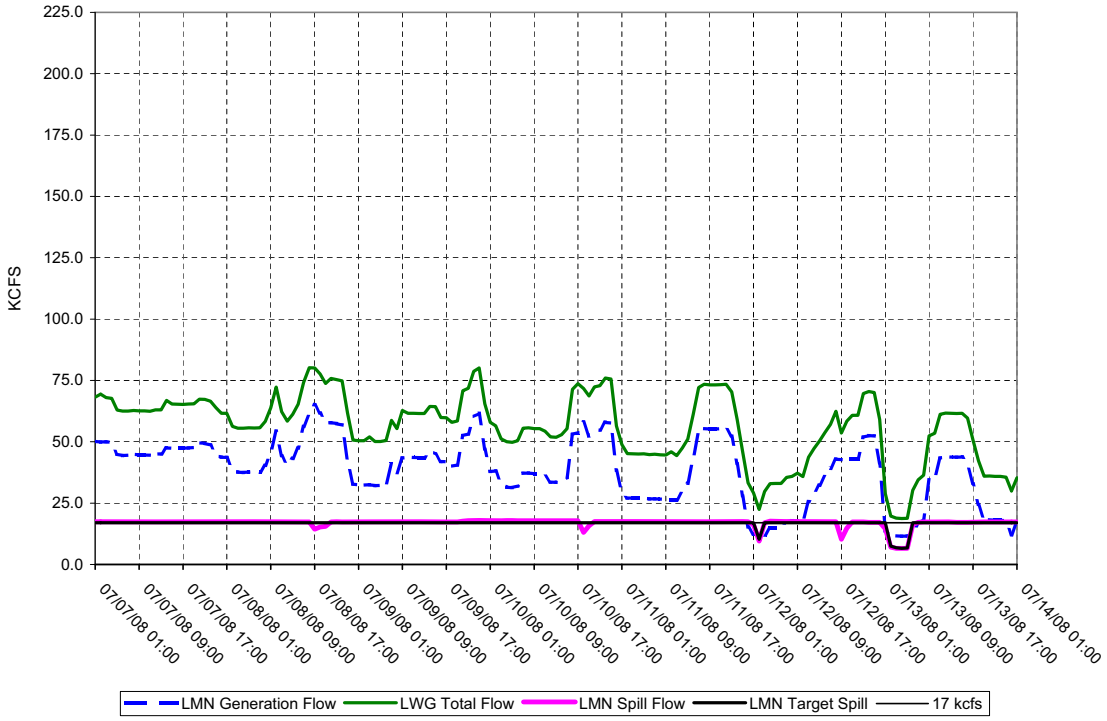
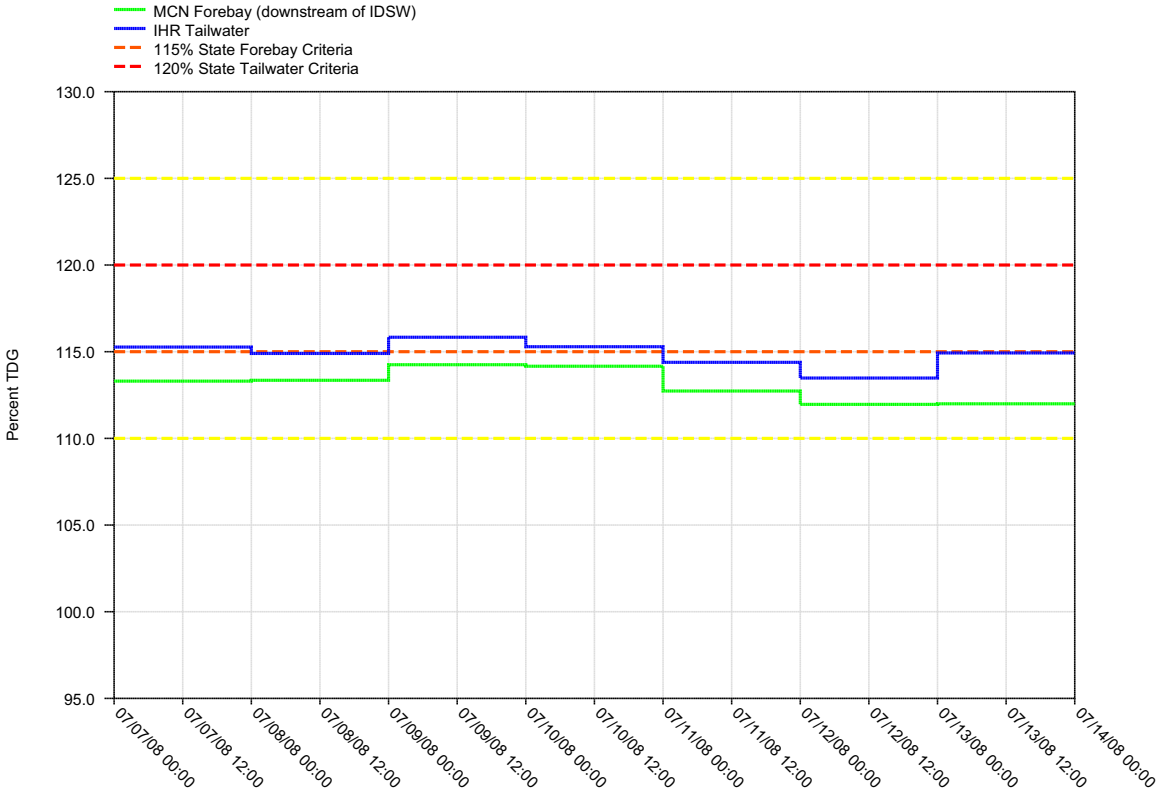


Figure 12.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

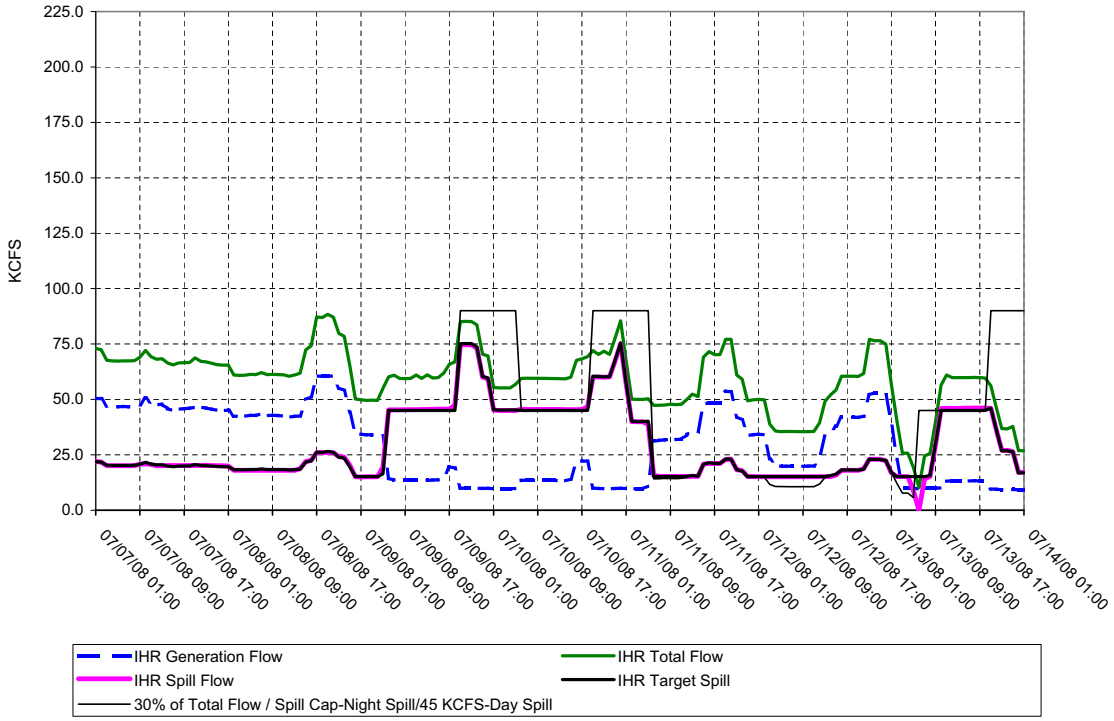
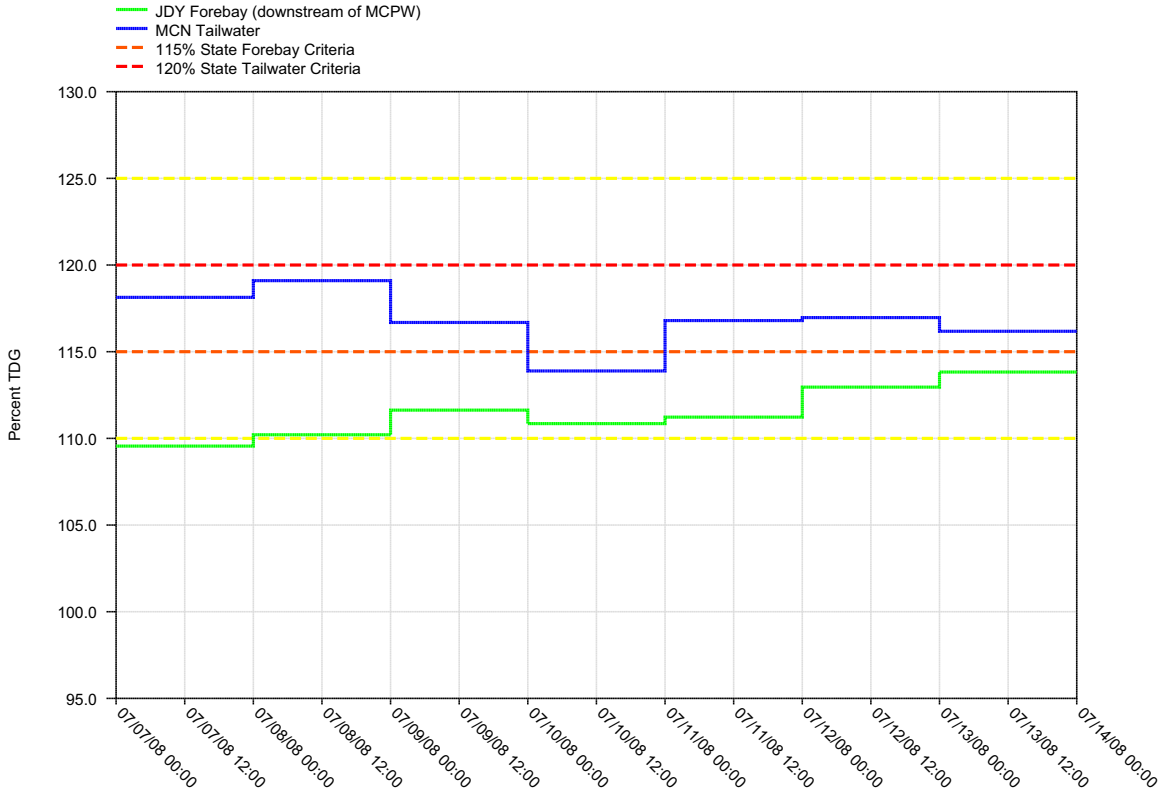


Figure 13.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

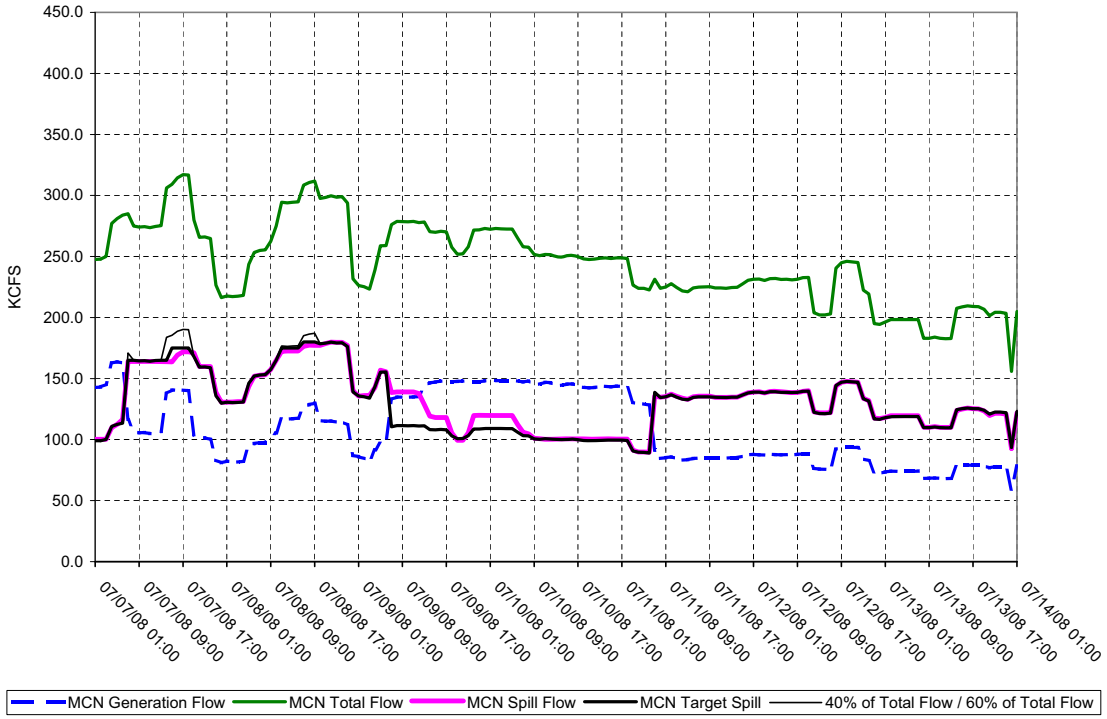
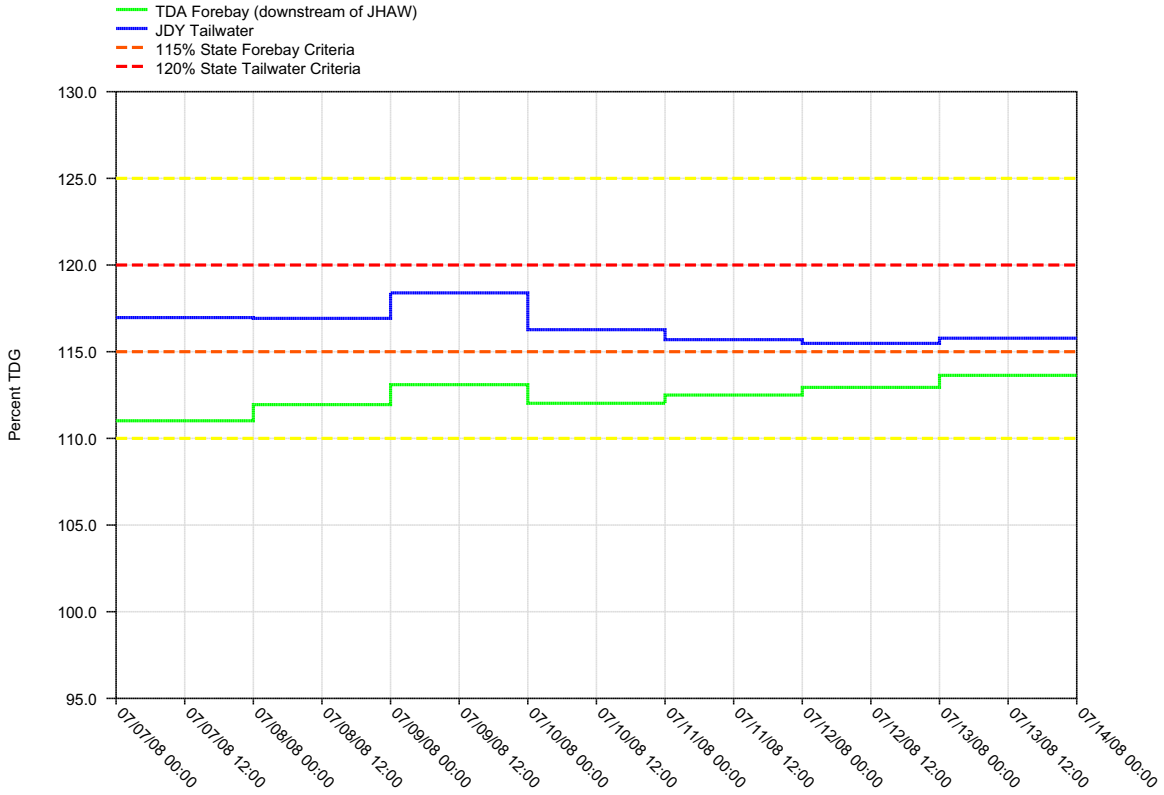


Figure 14.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

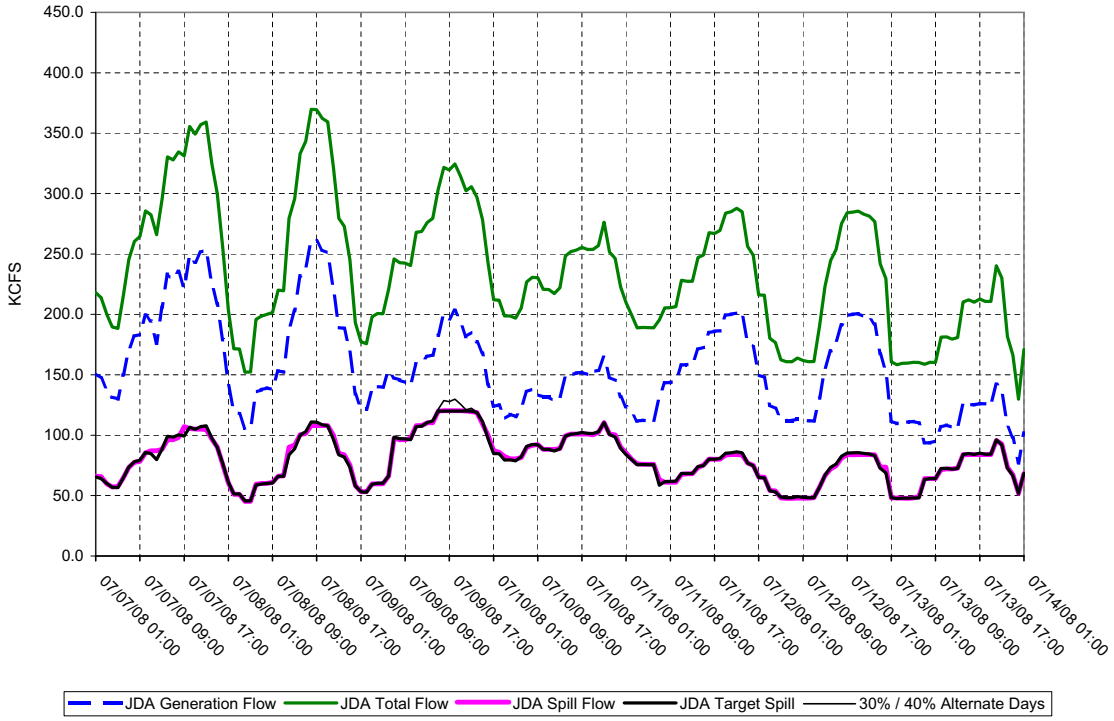
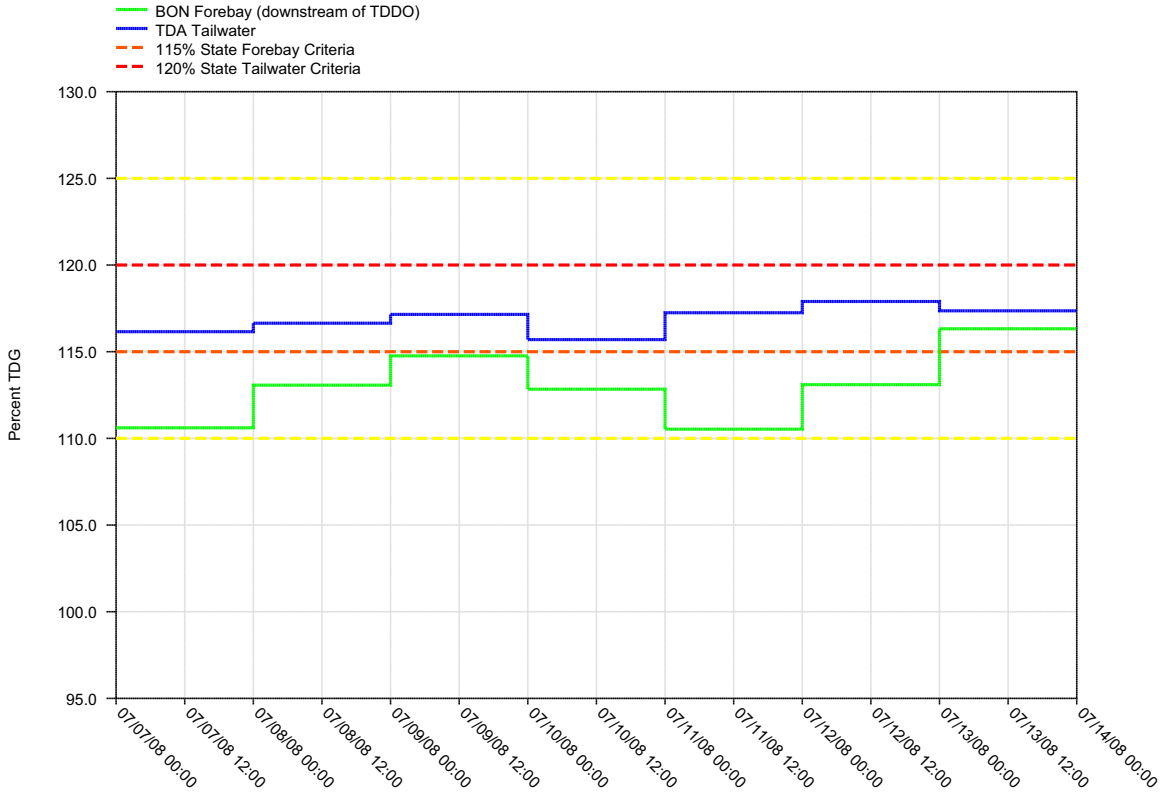


Figure 15.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

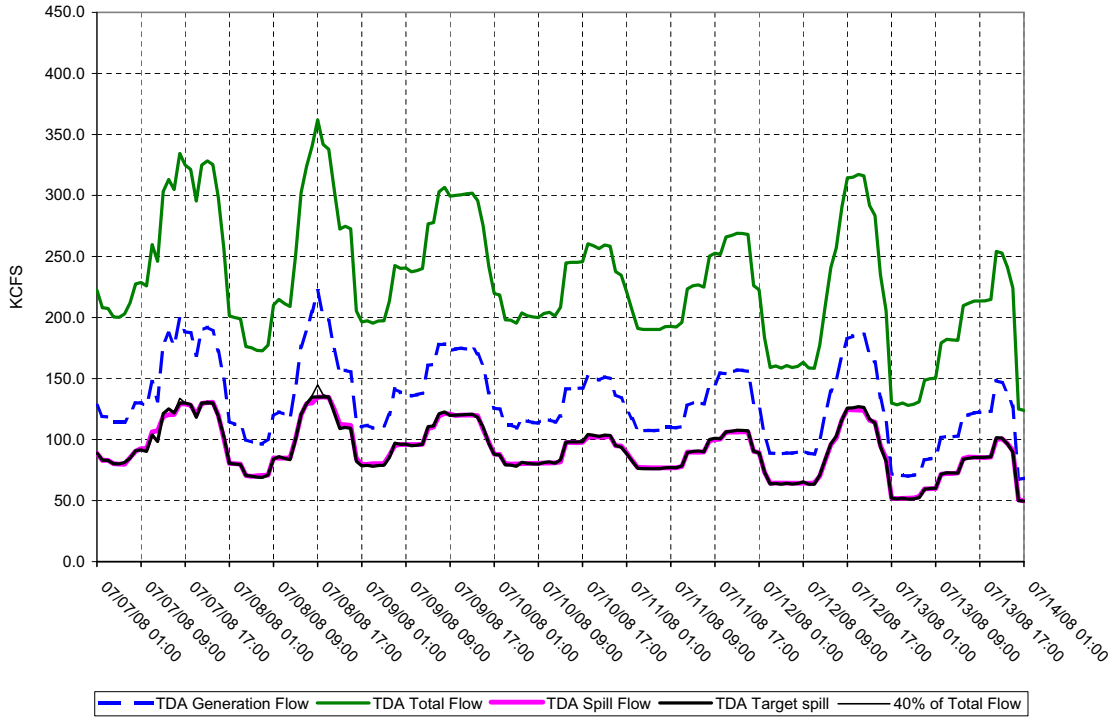
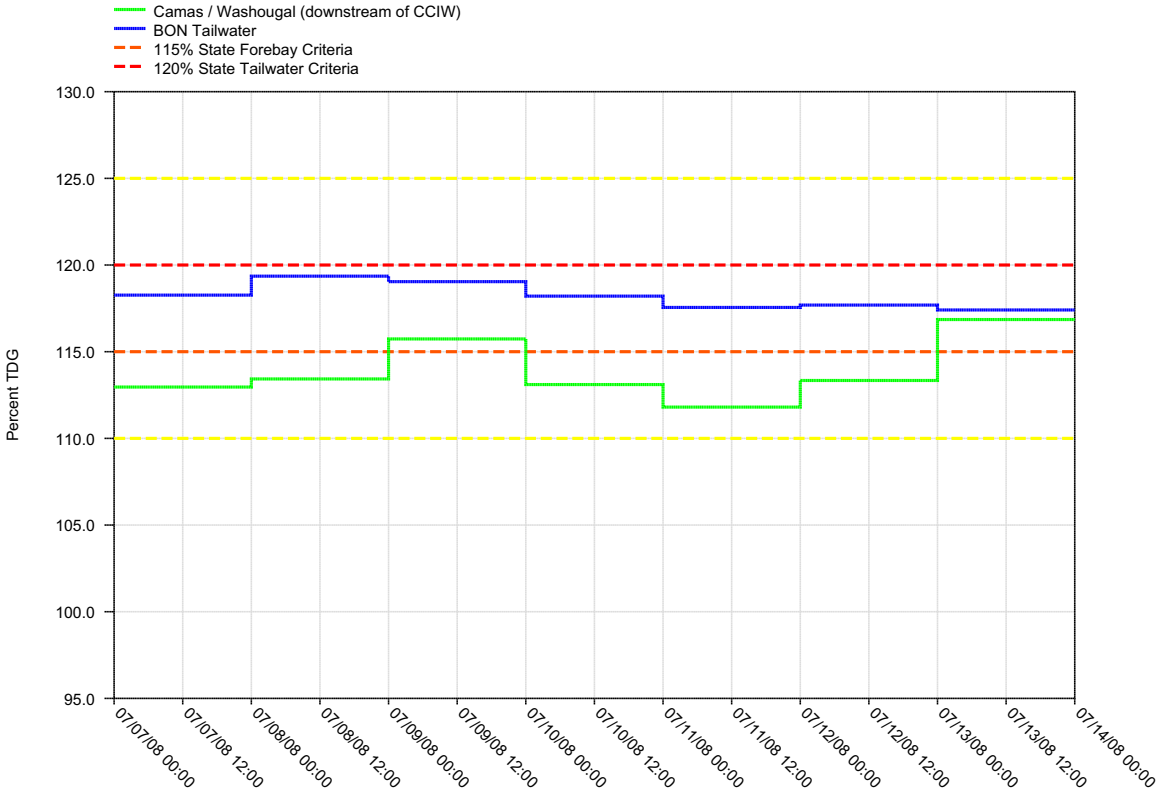


Figure 16.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

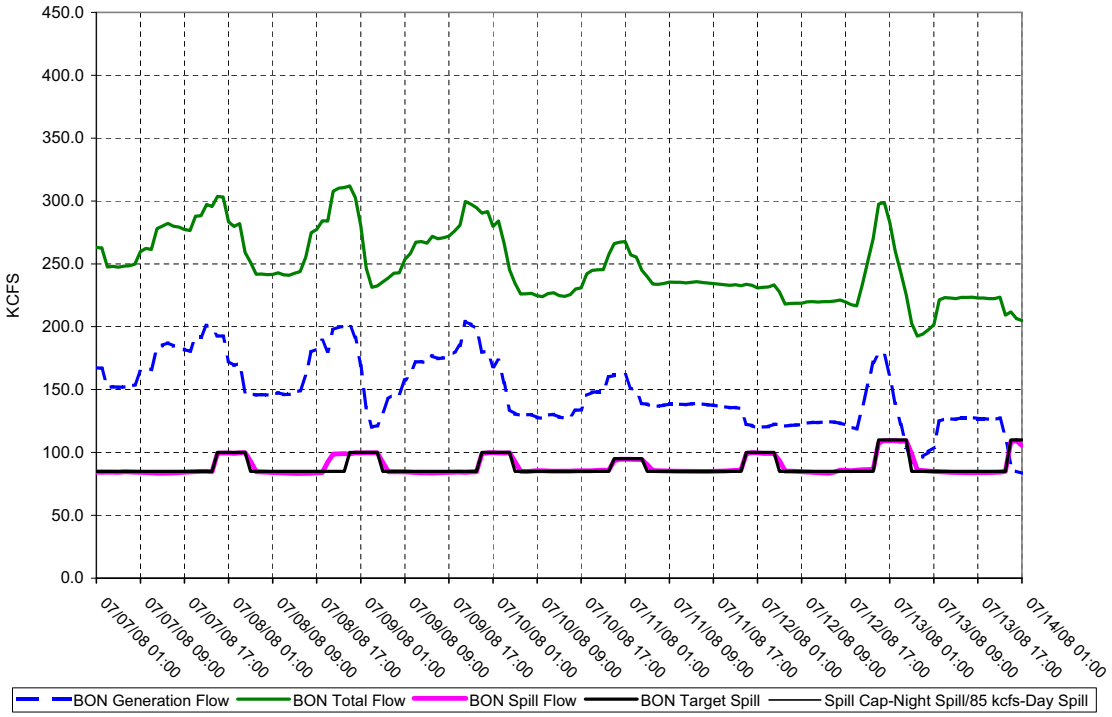
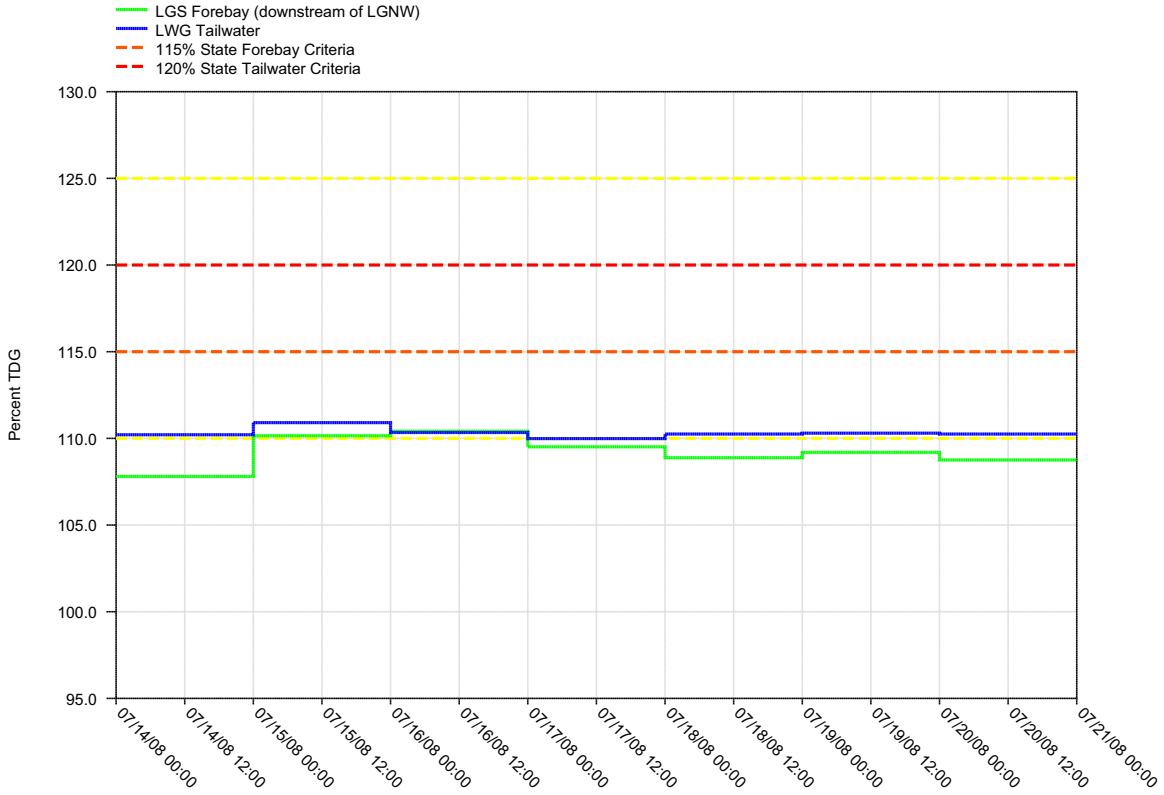


Figure 17.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

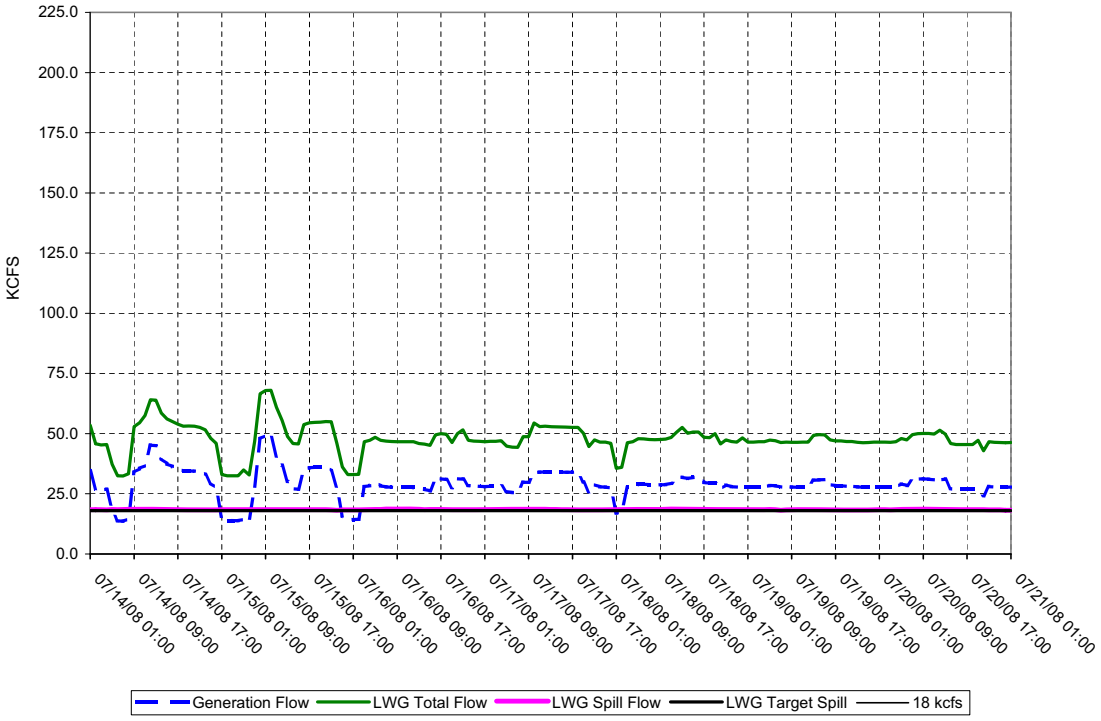
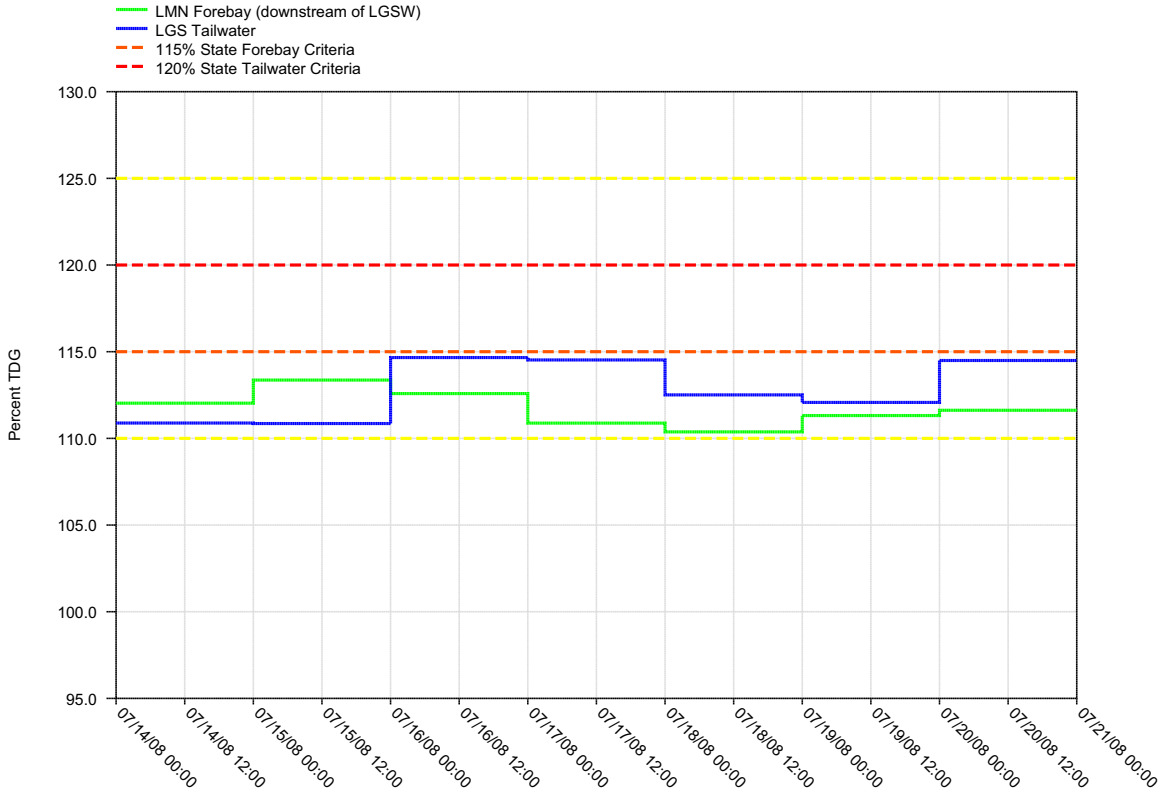


Figure 18.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

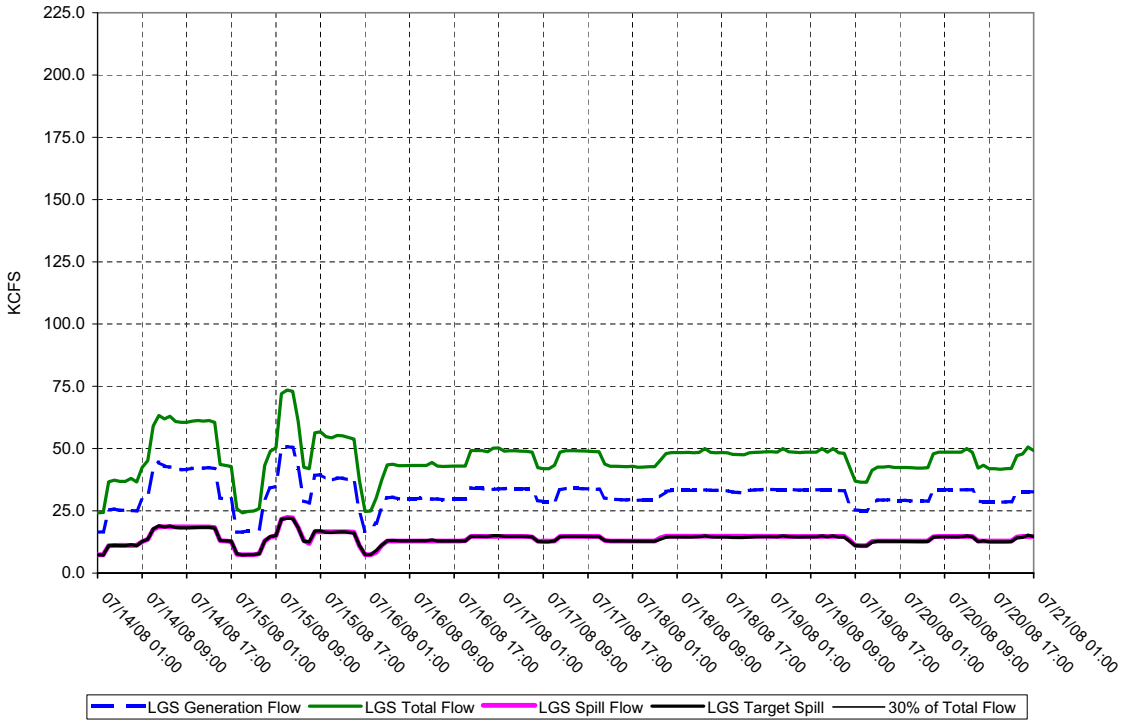
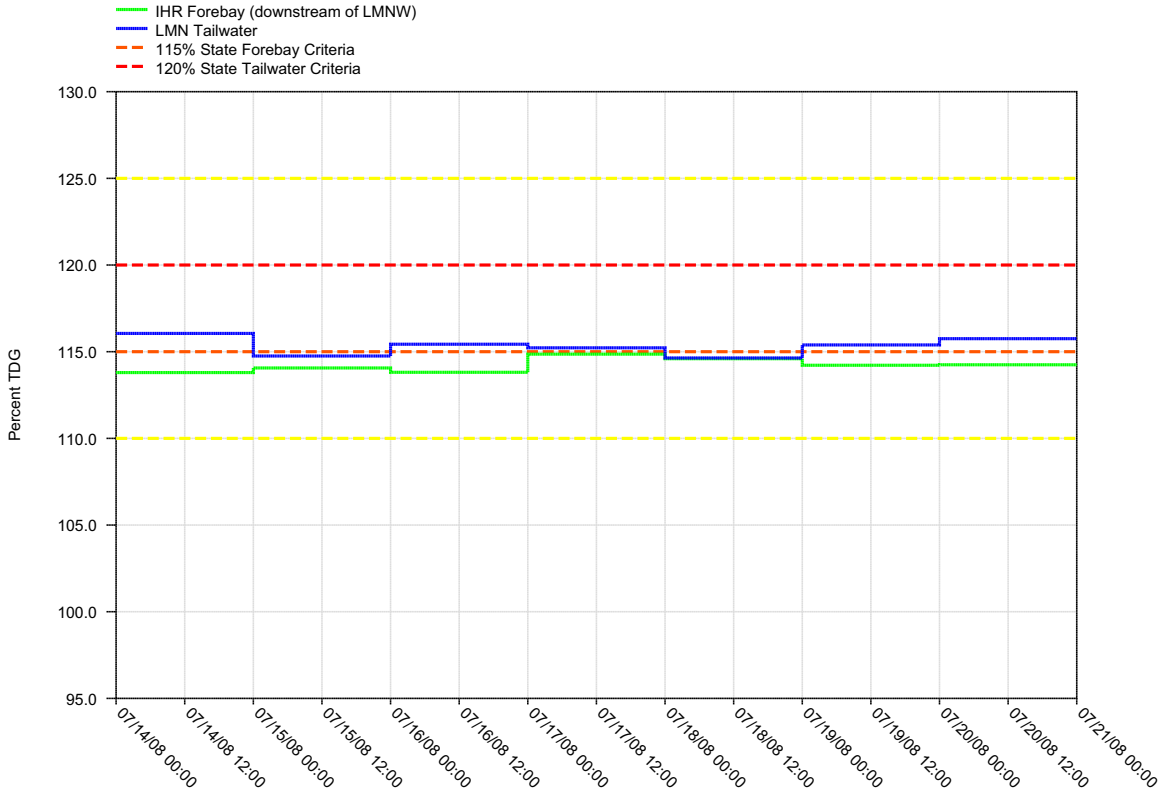


Figure 19.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

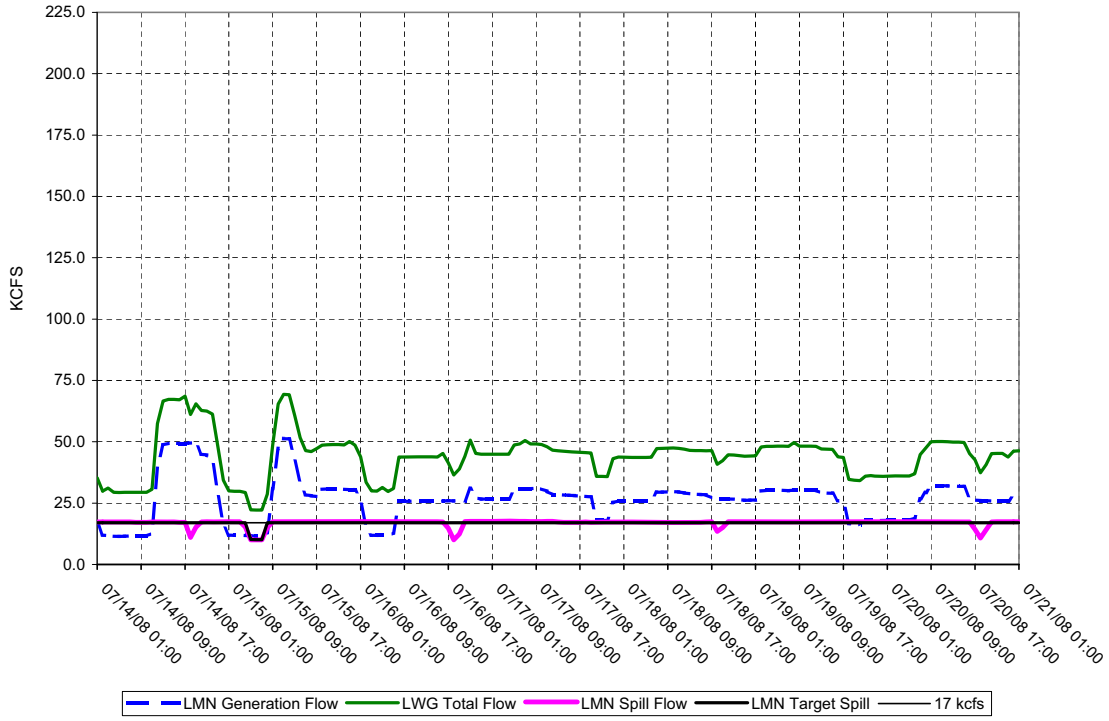
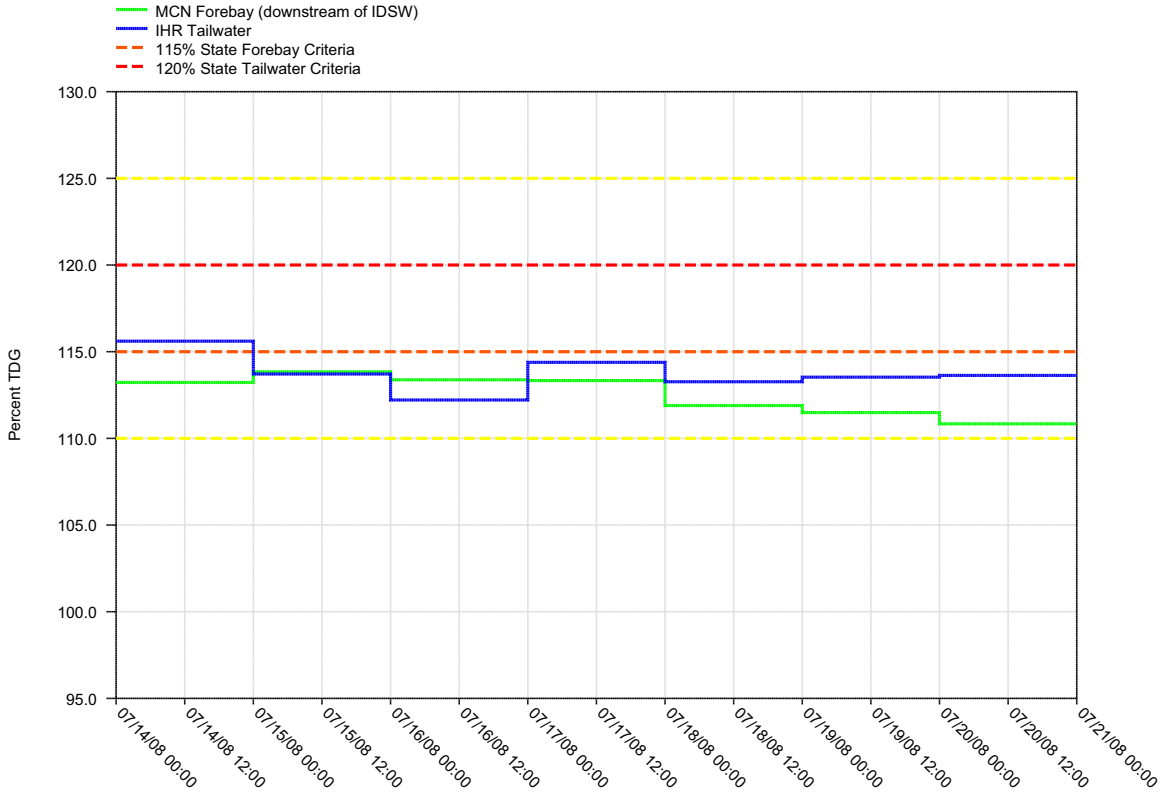


Figure 20.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

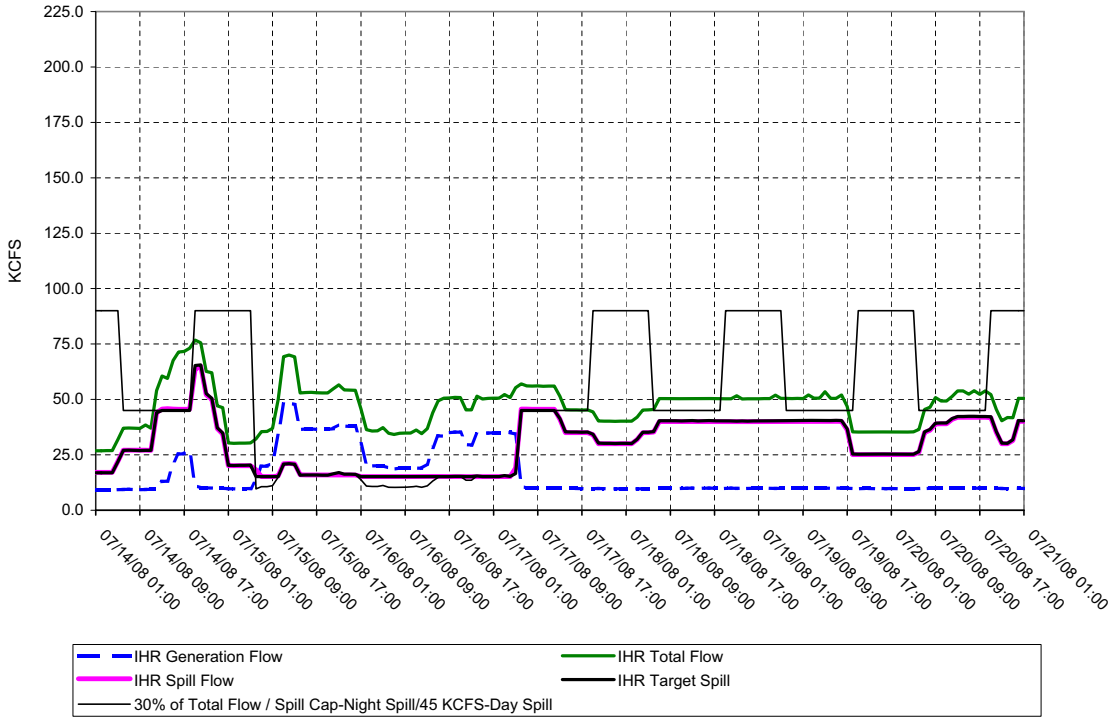
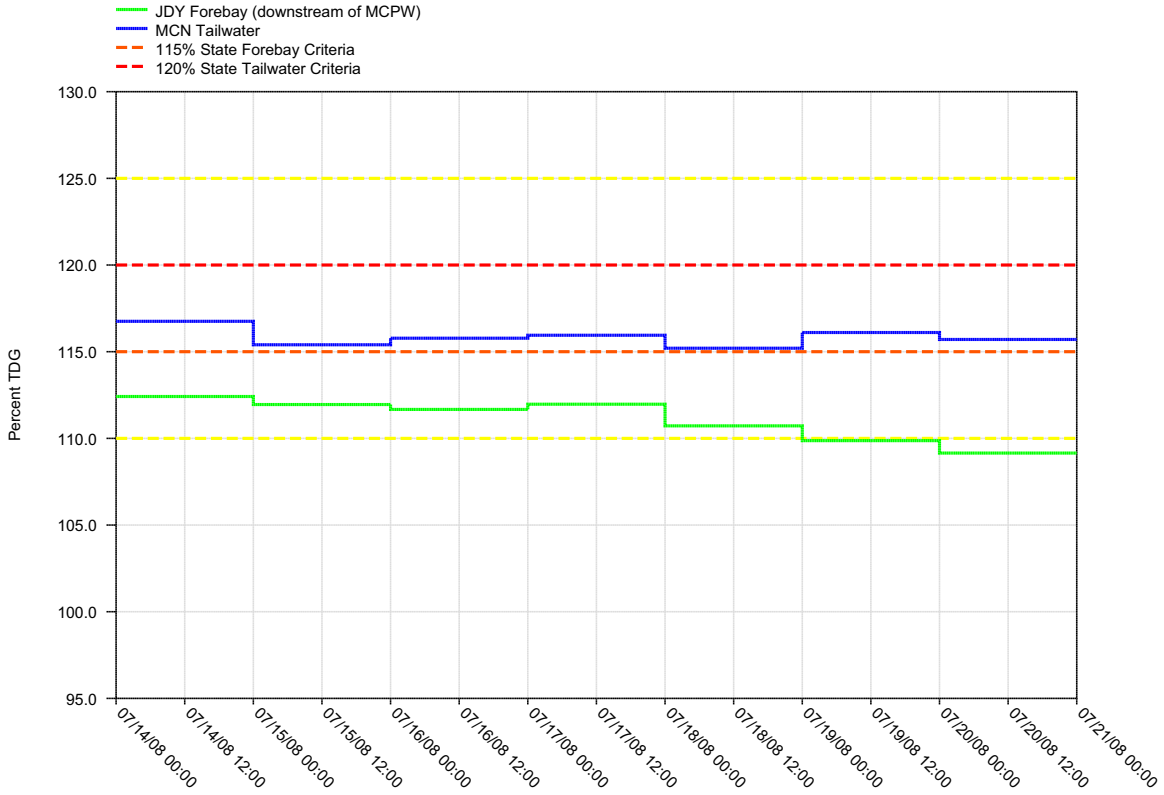


Figure 21.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

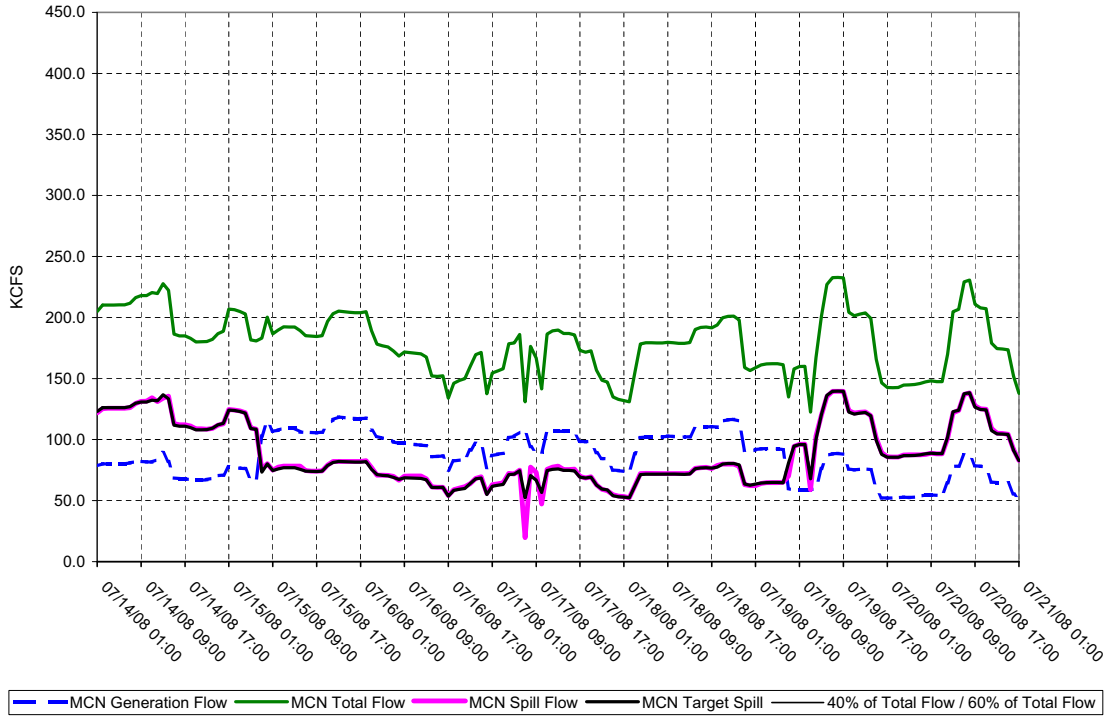
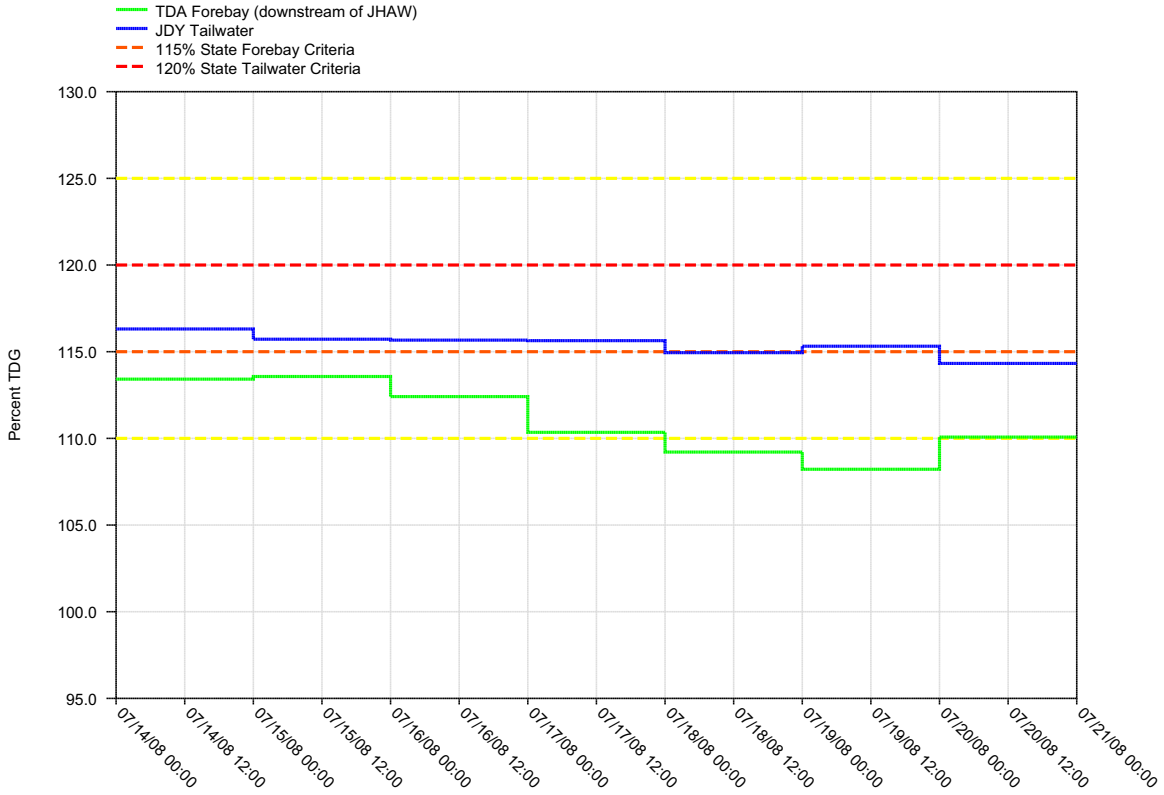


Figure 22.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

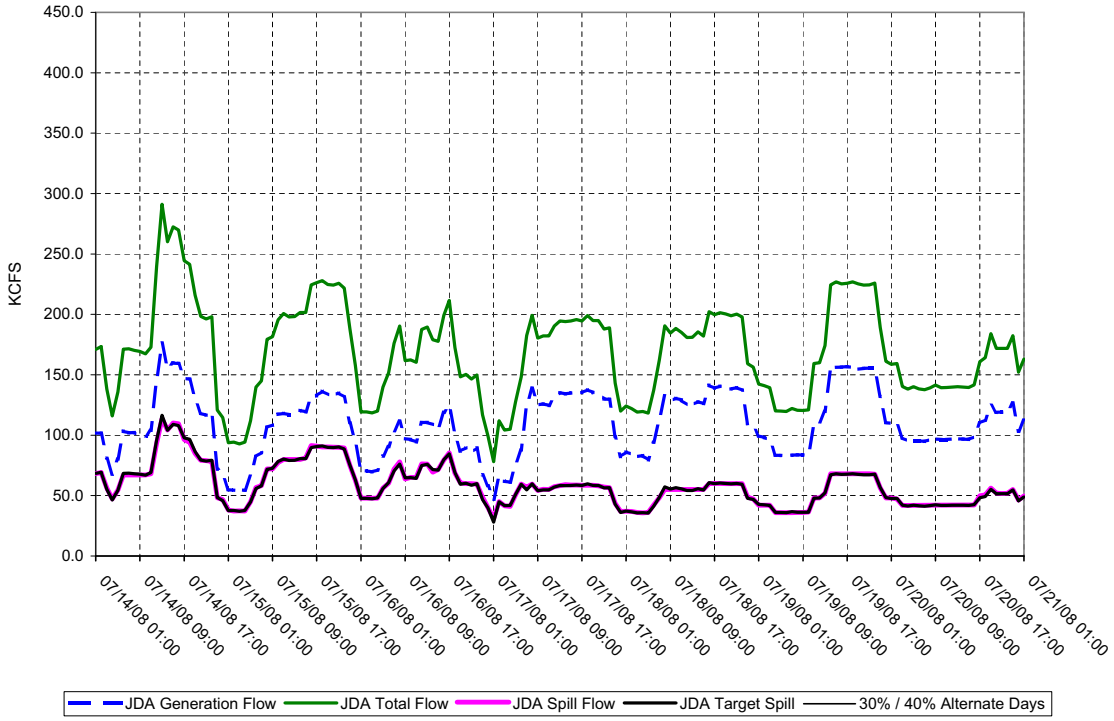
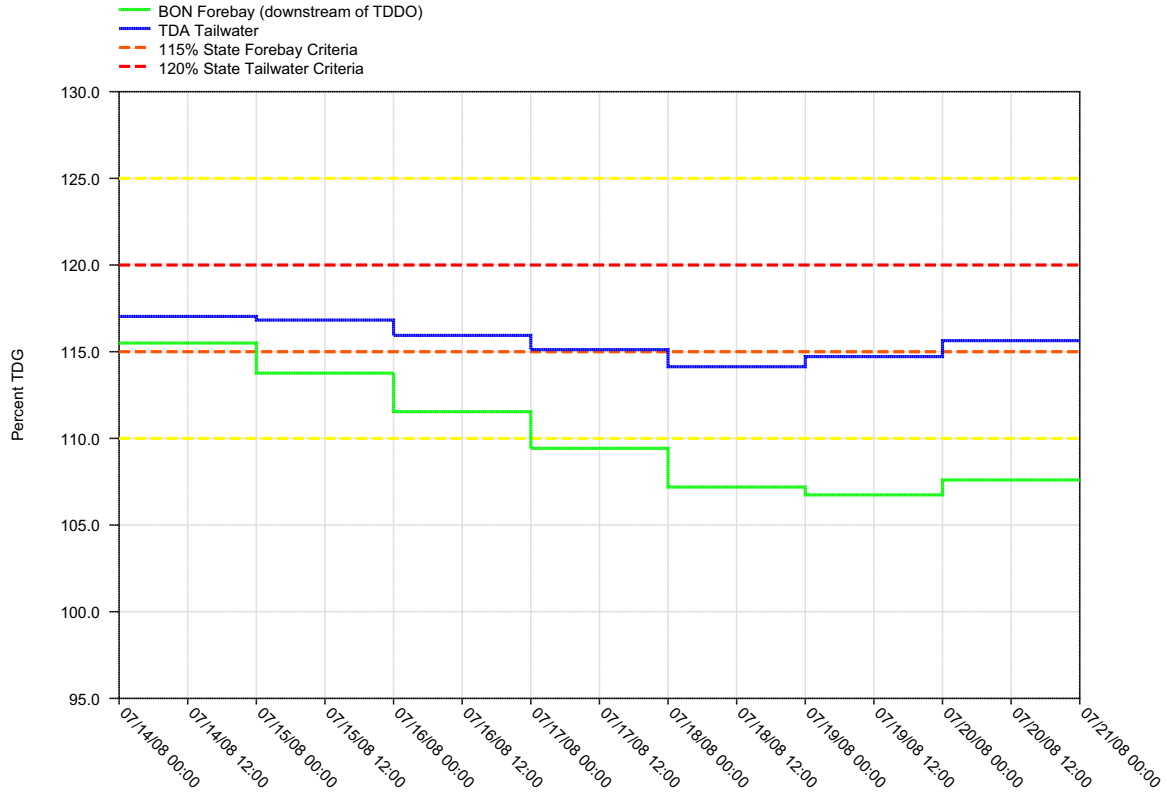


Figure 23.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

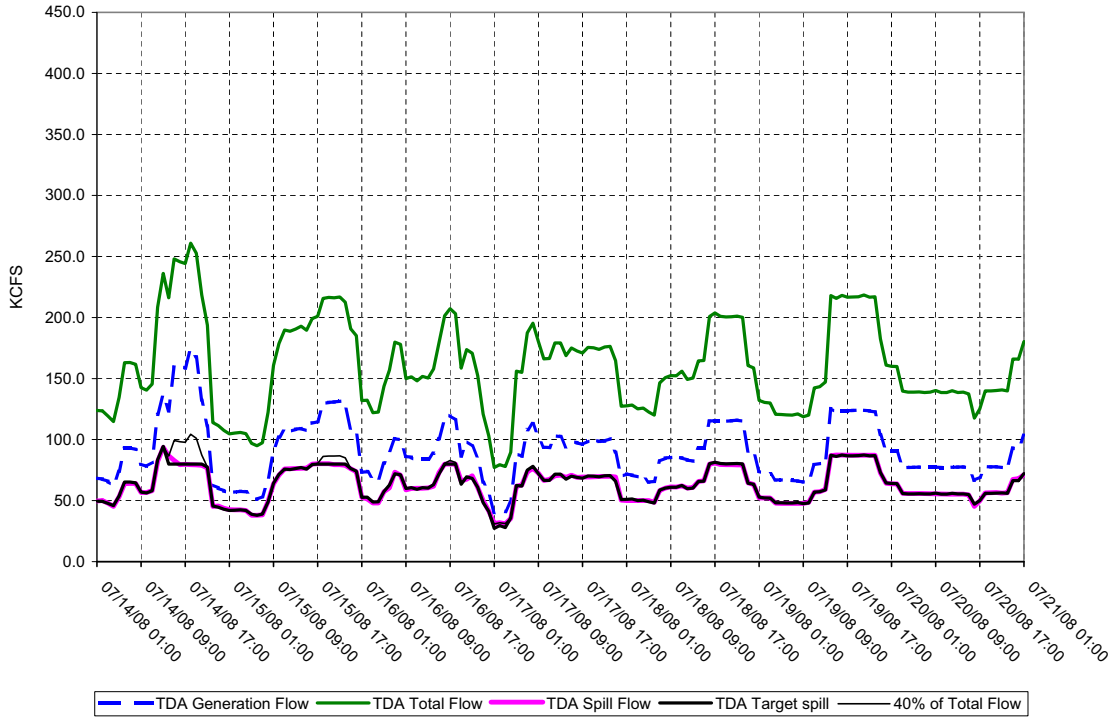
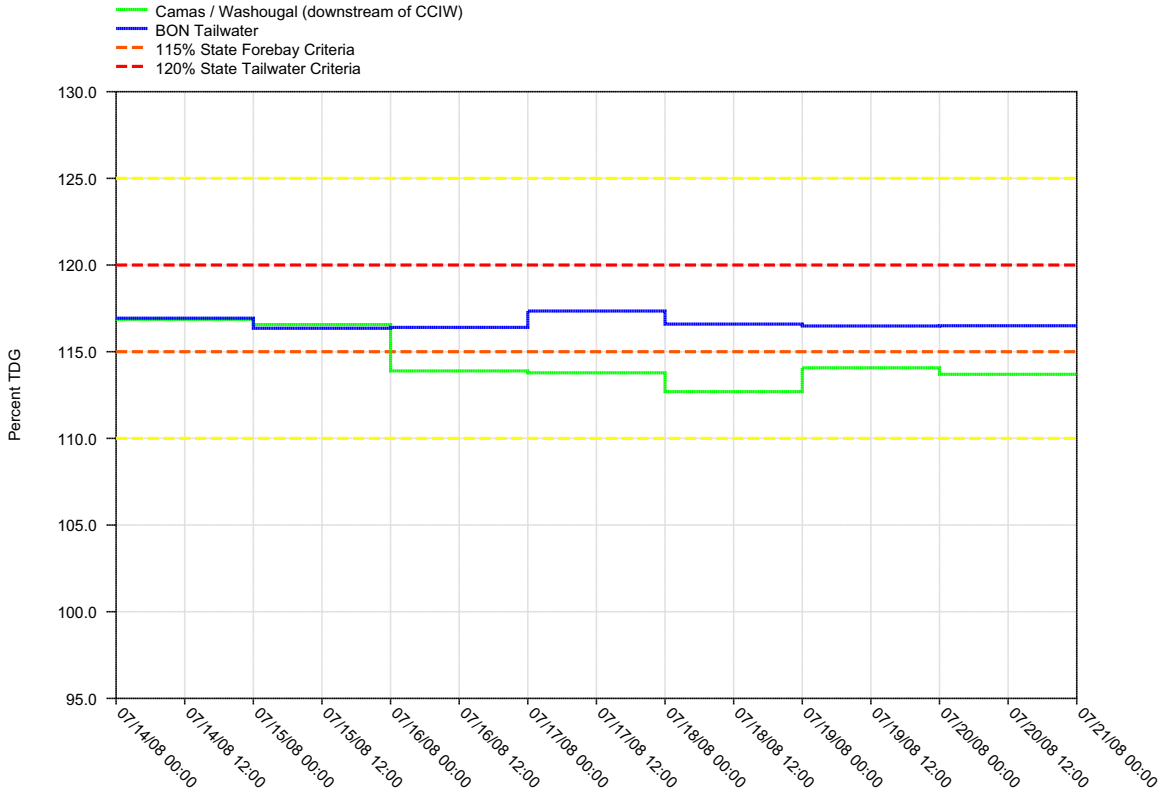


Figure 24.
Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

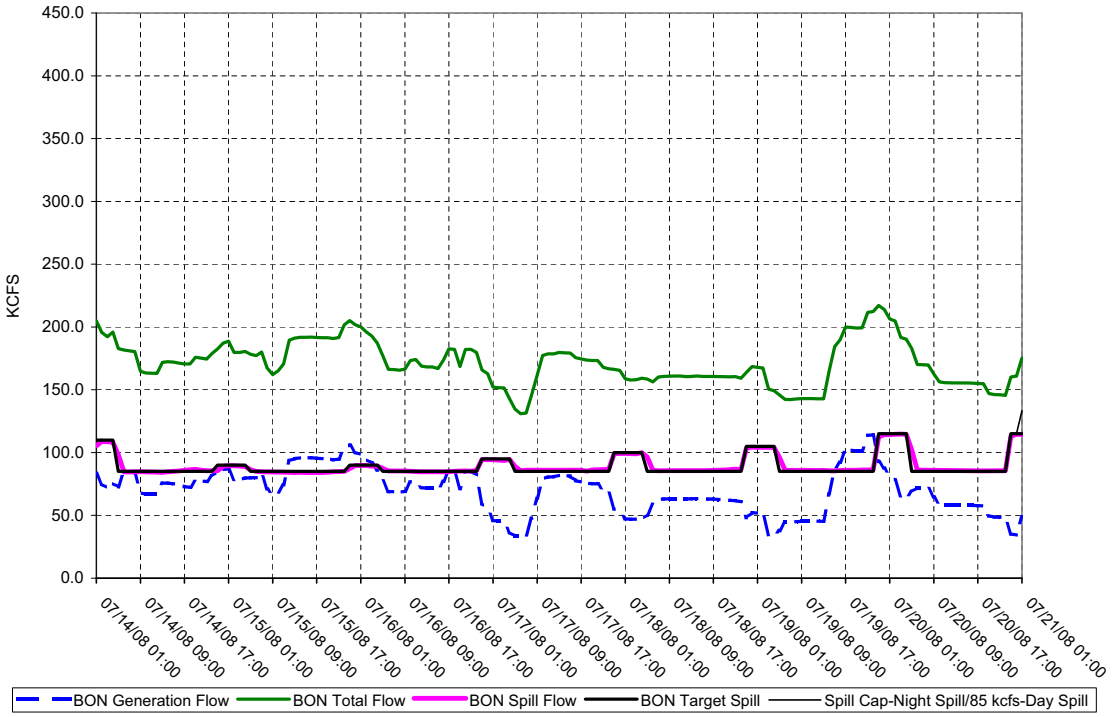
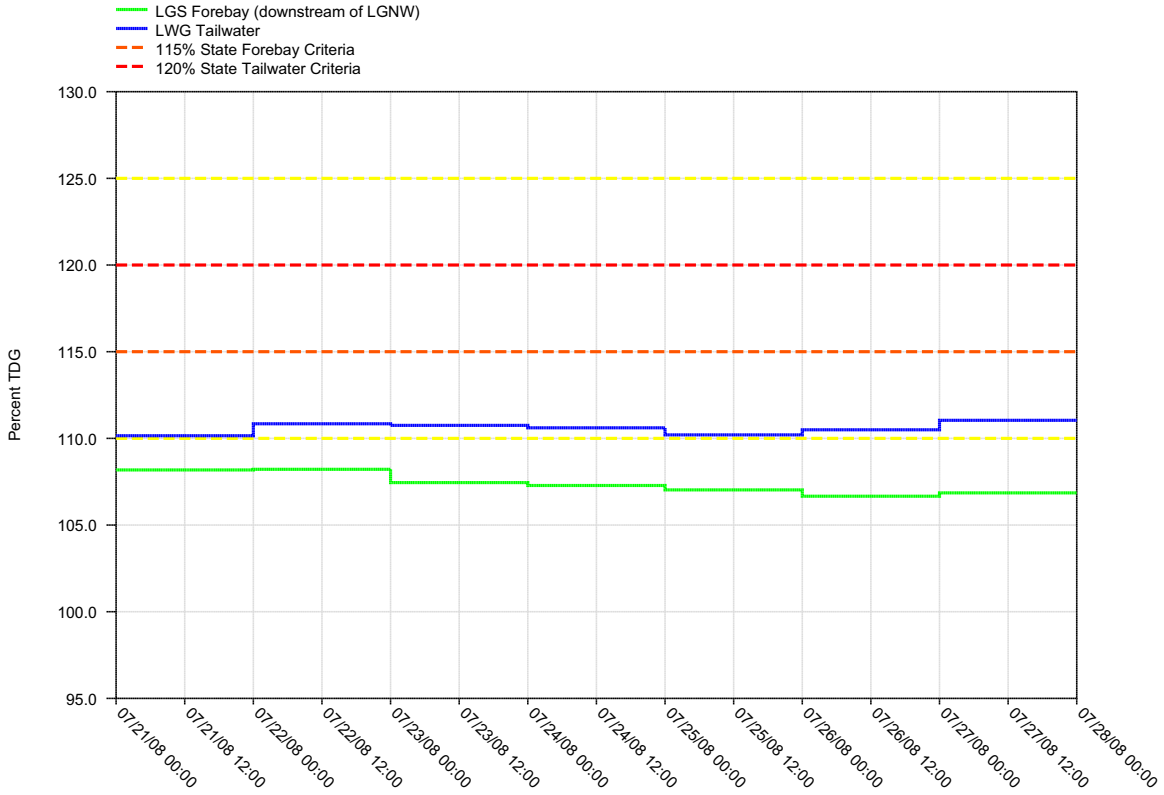


Figure 25.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

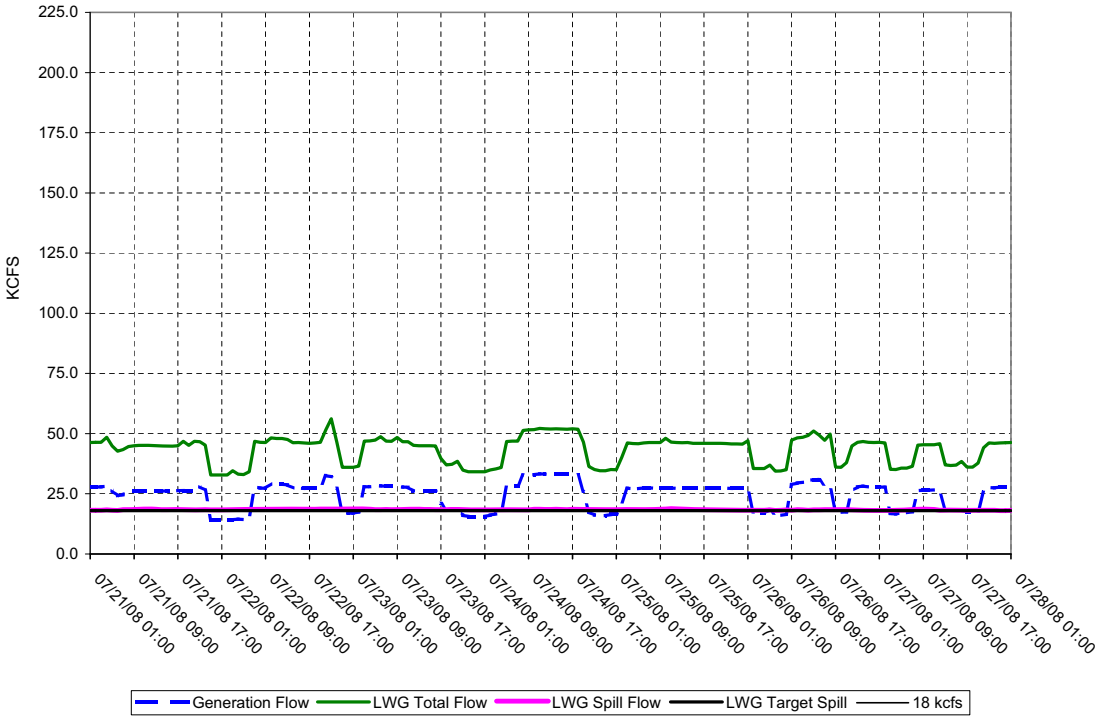
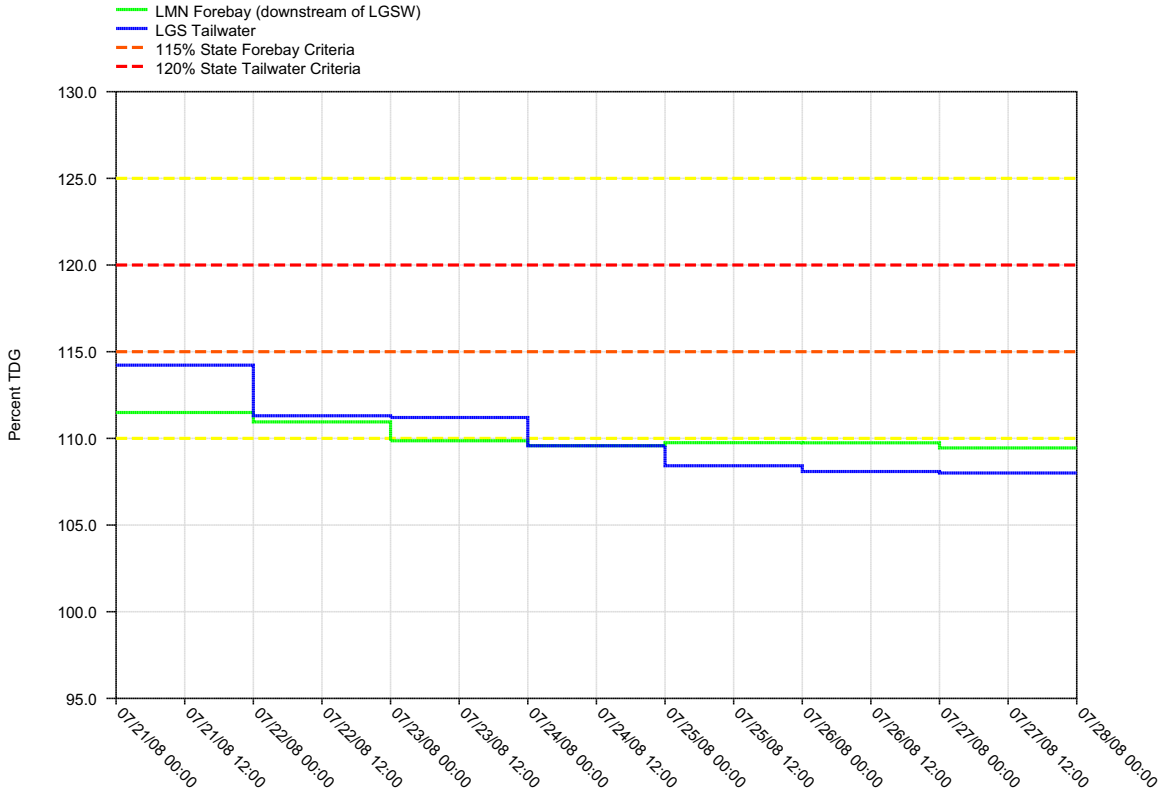


Figure 26.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

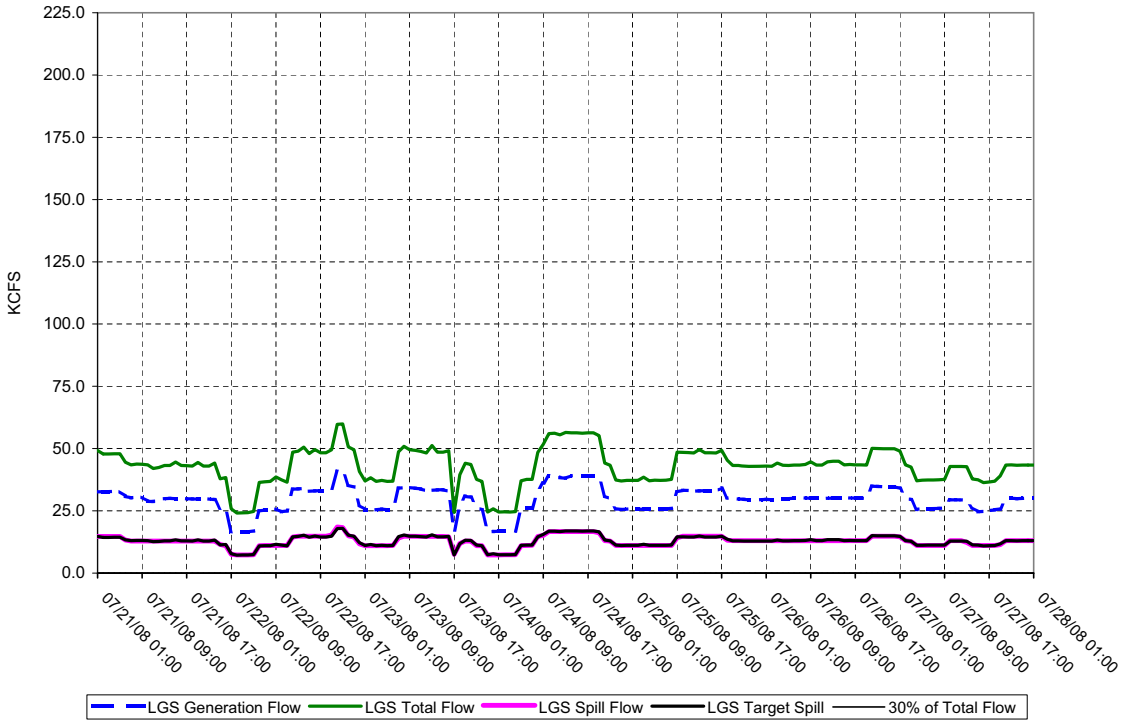
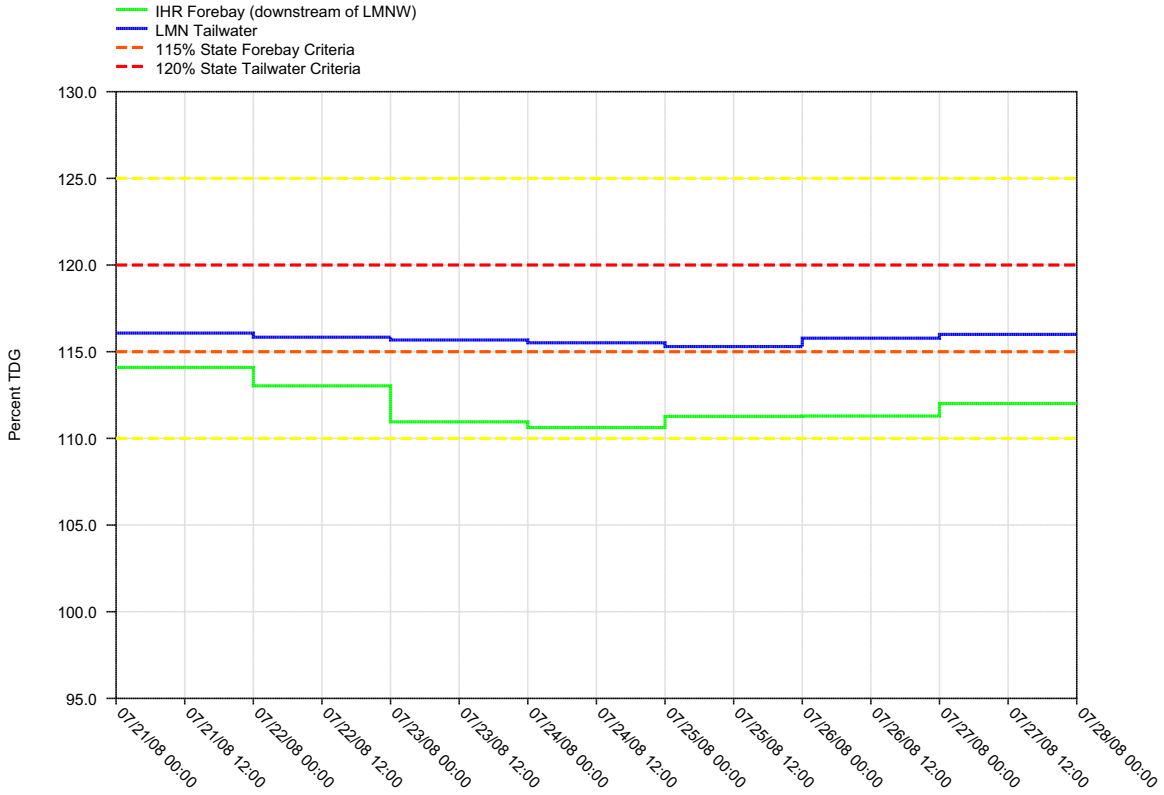


Figure 27.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

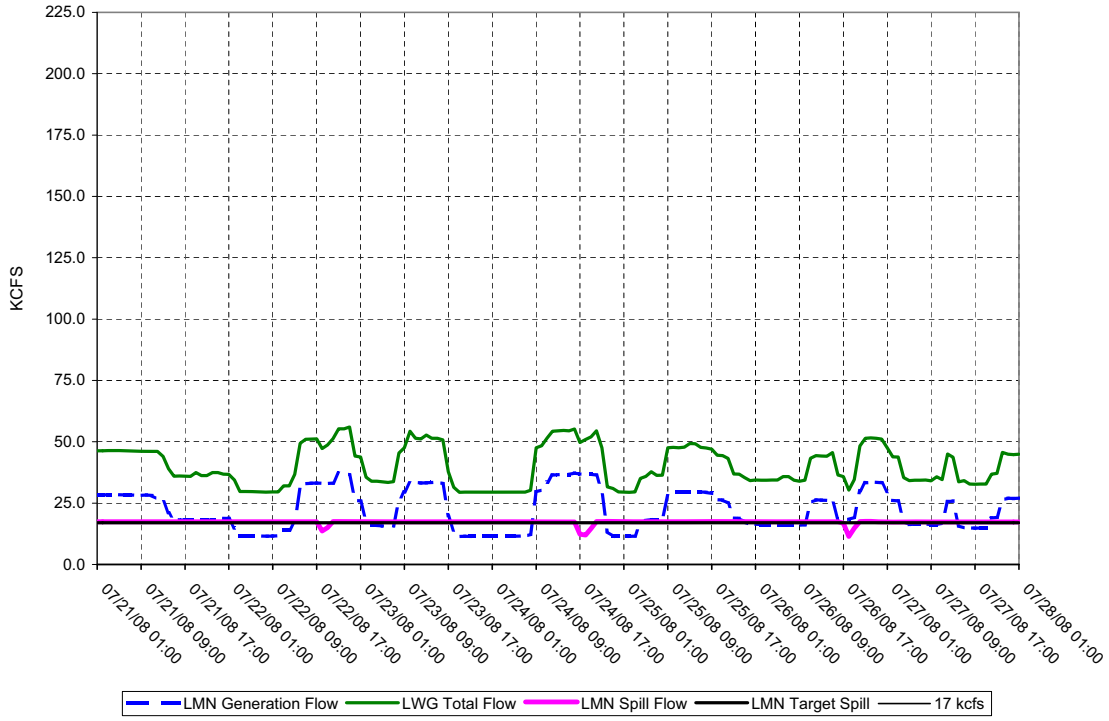
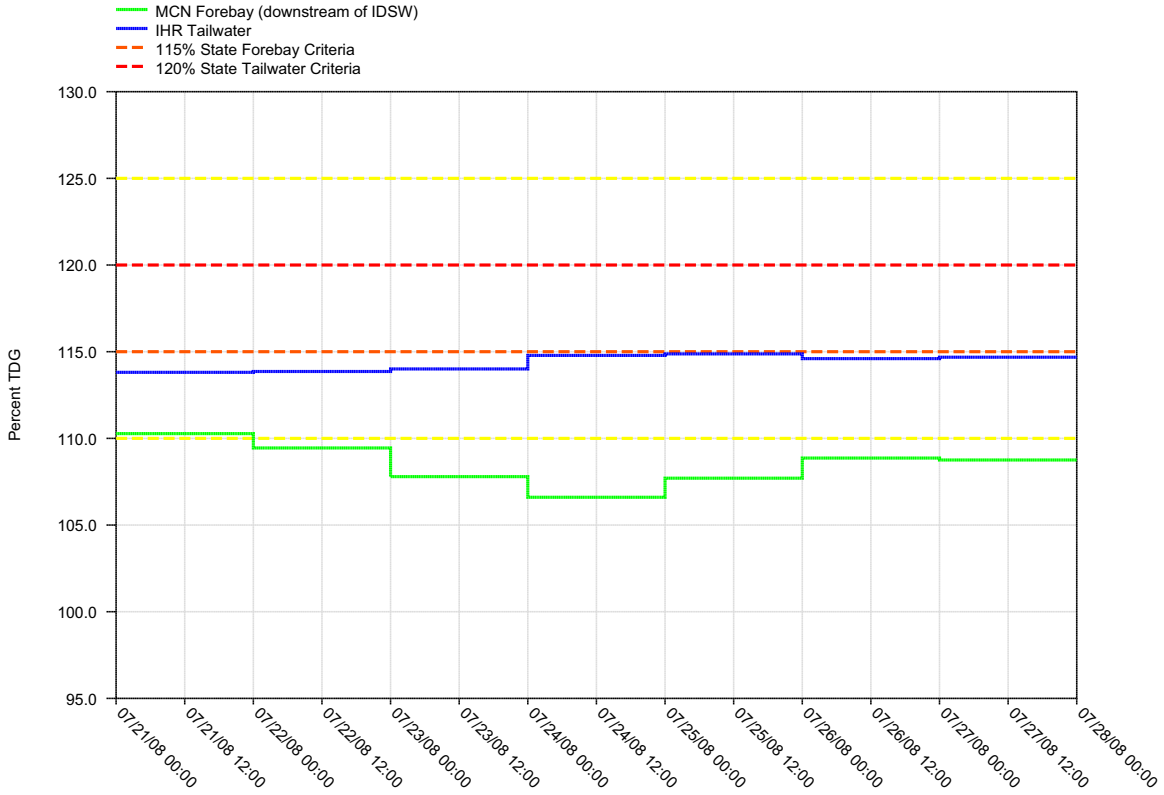


Figure 28.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

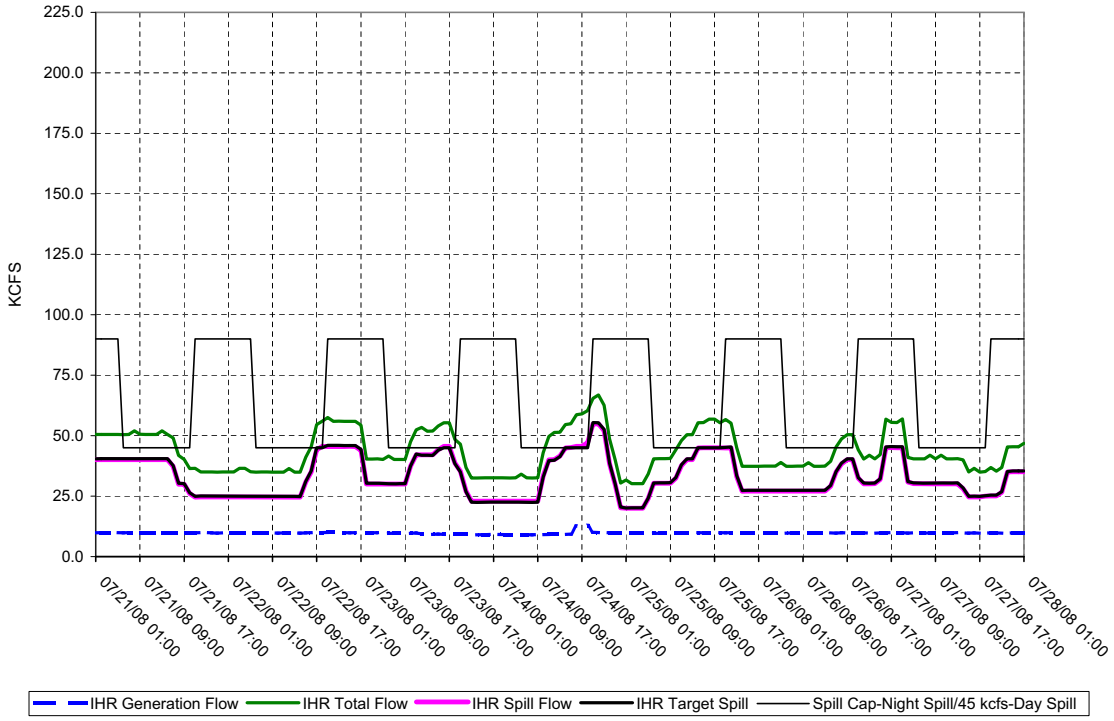
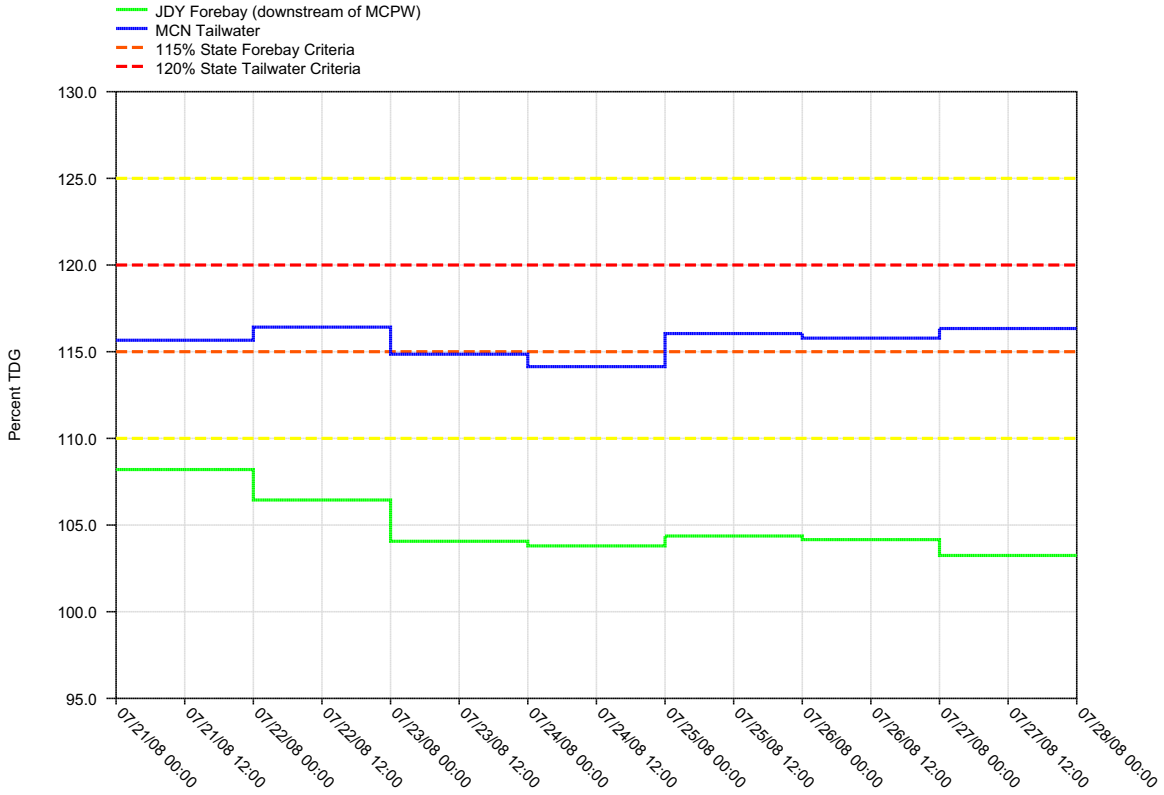


Figure 29.

Daily Average of High 12 Hourly % TDG Values for McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

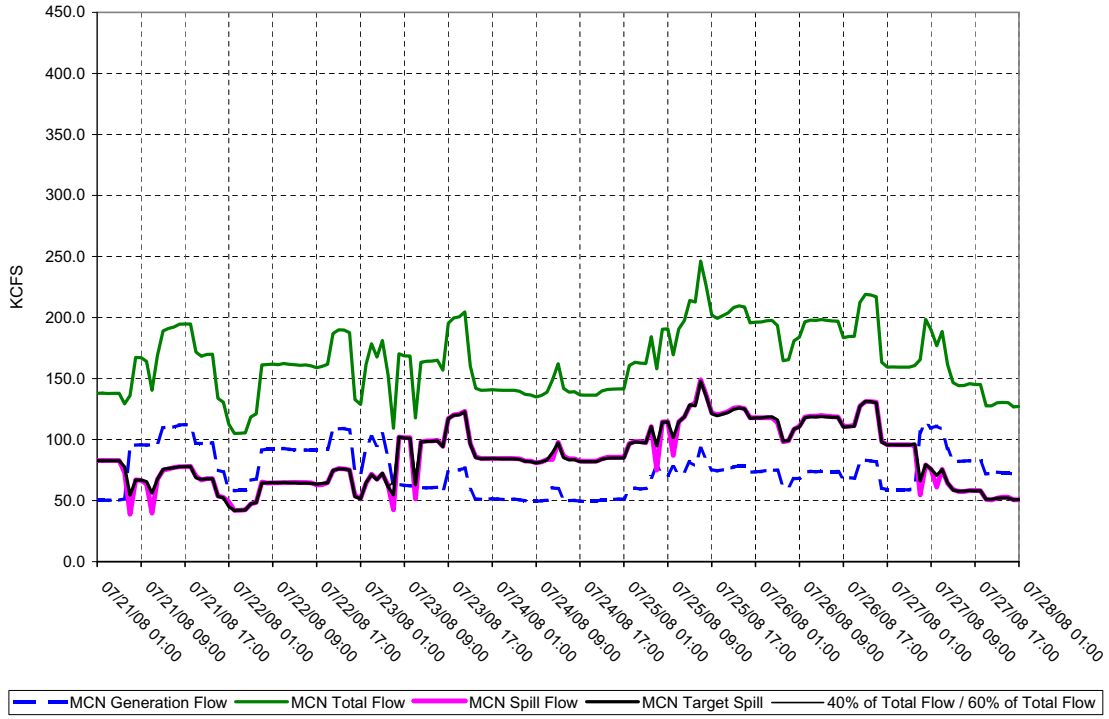
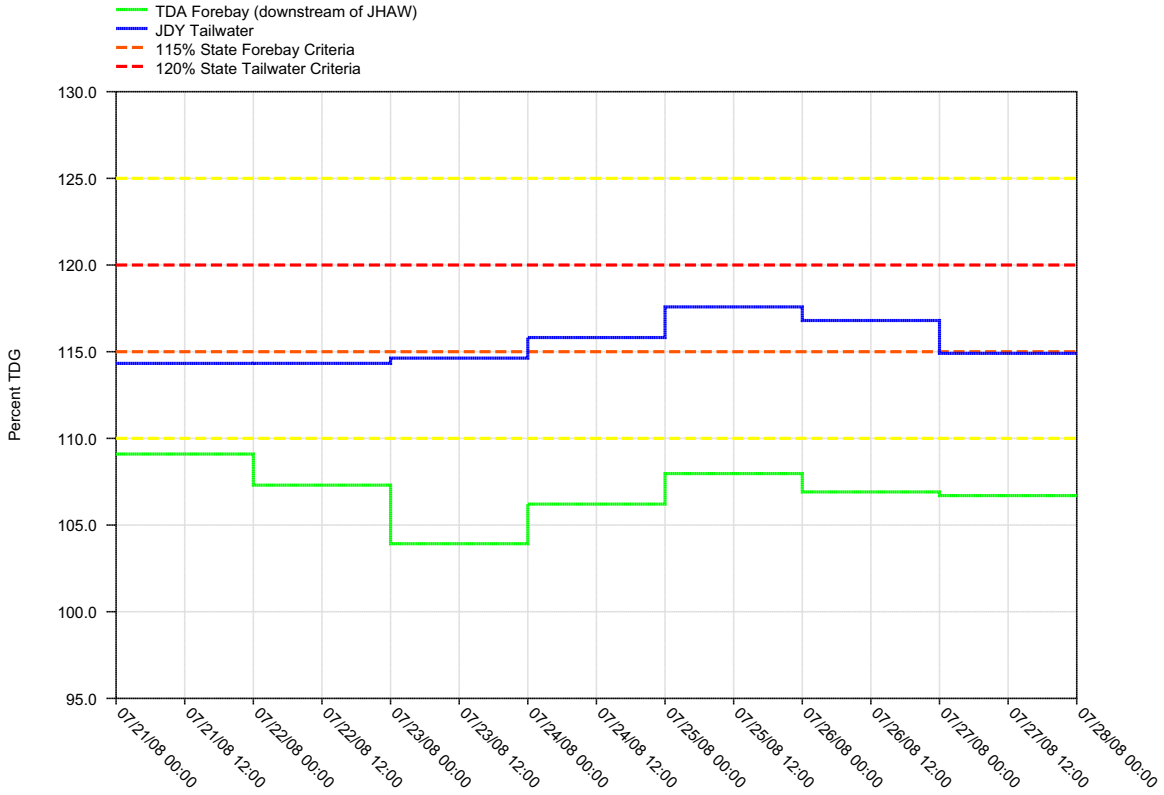


Figure 30.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

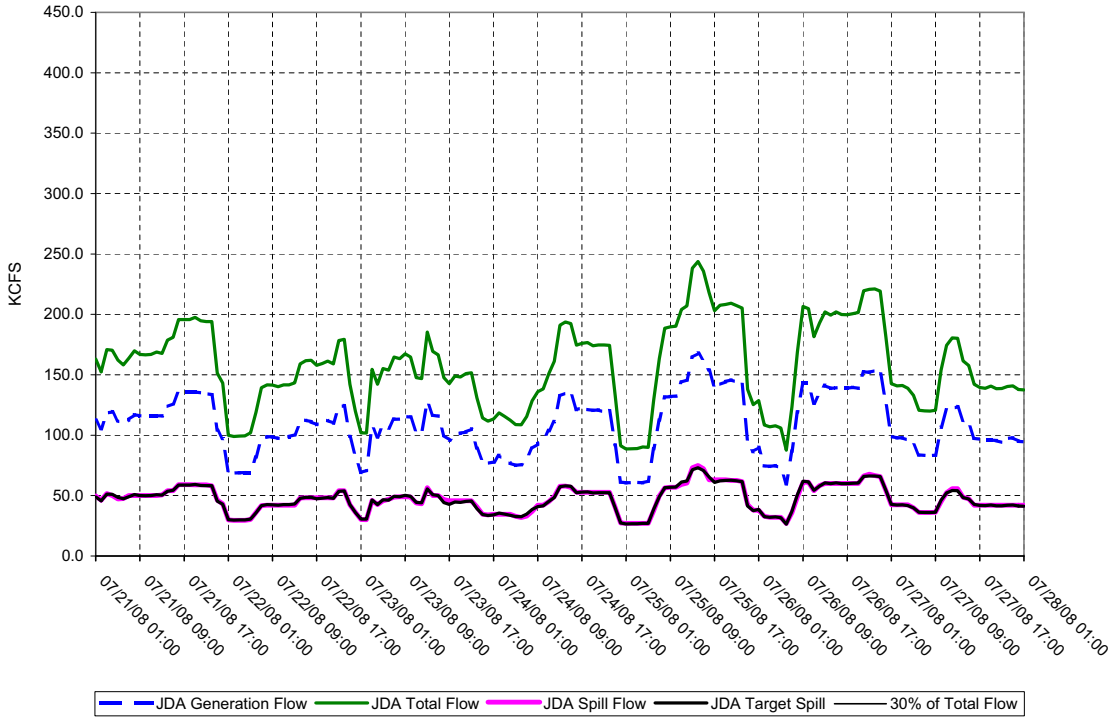
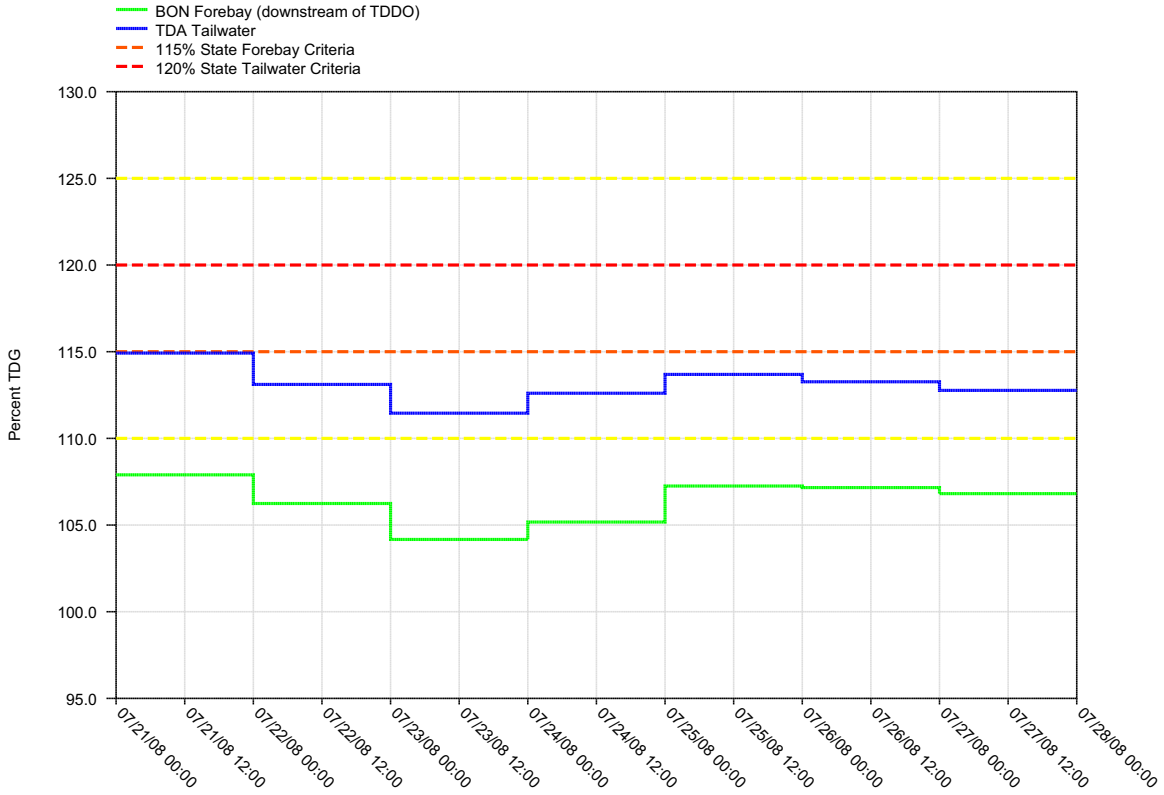


Figure 31.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

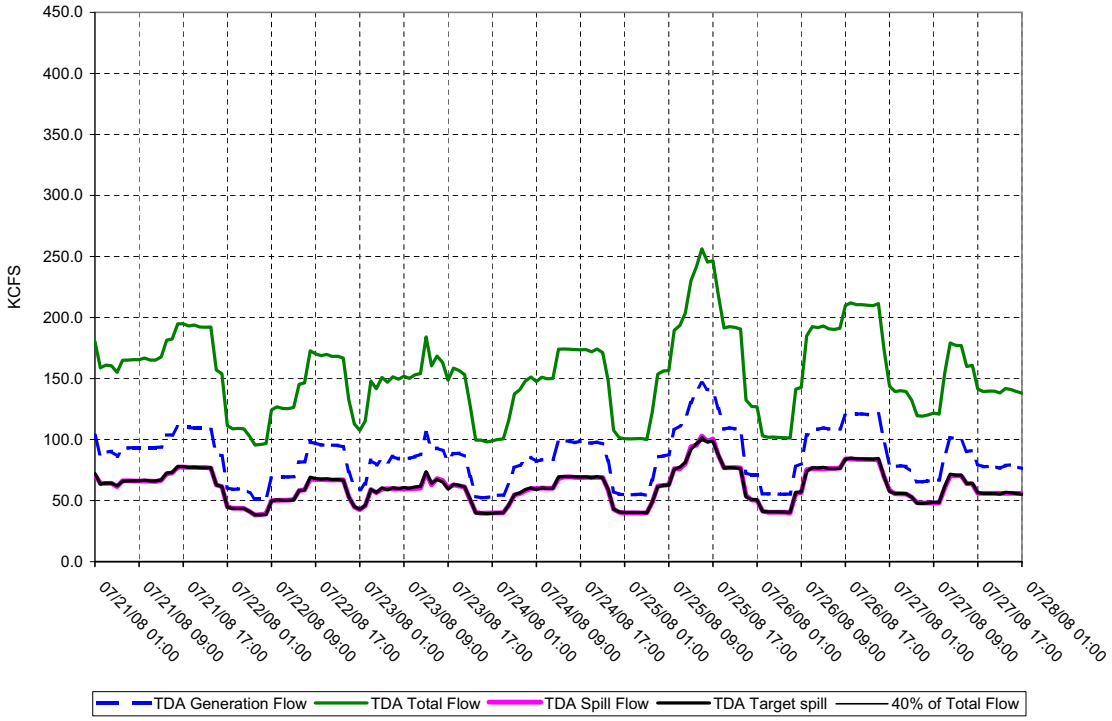
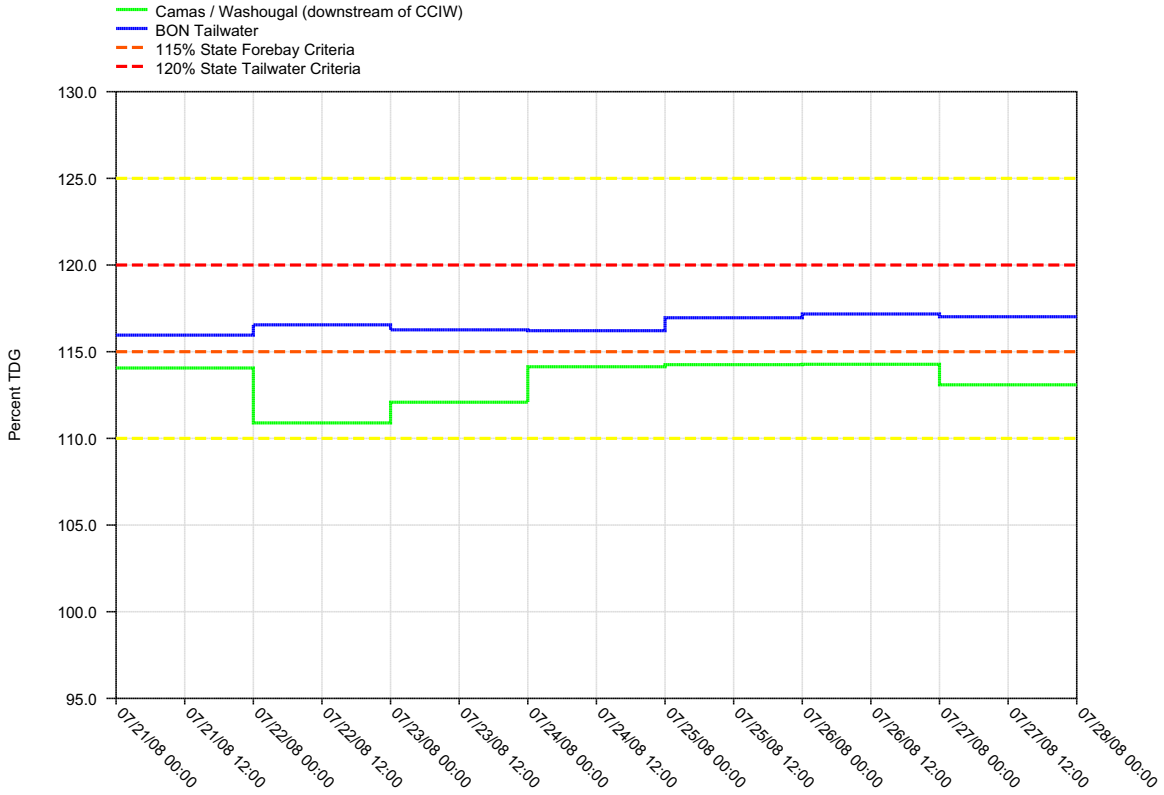


Figure 32.
Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

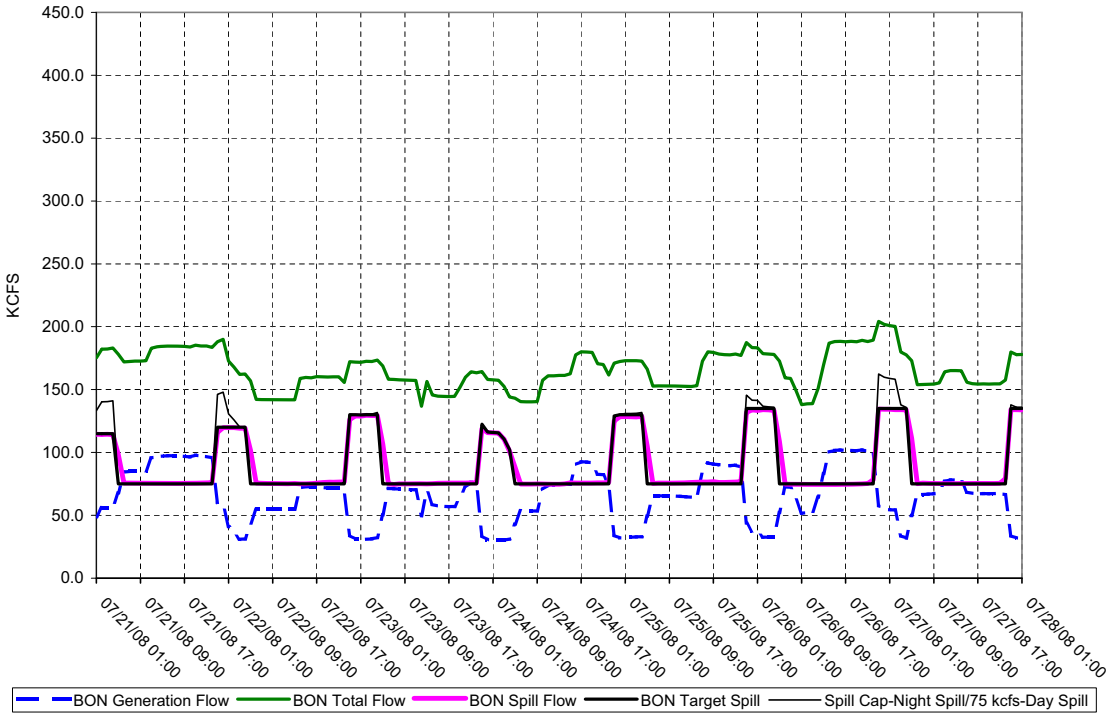


Table 1.

Average percent TDG for 12 highest hours: June 30 – July 27, 2008

Date	Monitoring Stations (full list)																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
06/30/2008	105.5	111.3	114.2	116.6	117.1	119.2	119.6	118.2	119.1	118.5	118.1	119.1	116.1	119.0	117.2	122.8	118.5
07/01/2008	104.9	112.8	111.0	113.5	116.5	119.3	117.4	118.6	117.2	118.7	117.2	117.5	115.1	119.0	114.1	121.3	115.3
07/02/2008	104.8	108.3	108.9	118.8	116.3	119.1	116.1	119.0	116.8	118.5	117.2	118.0	116.6	119.1	116.2	122.0	116.4
07/03/2008	105.4	108.6	110.8	118.2	115.7	117.9	116.6	118.6	117.2	118.5	116.3	118.4	114.9	118.3	115.5	122.7	117.0
07/04/2008	105.5	108.4	108.5	112.3	116.2	116.7	115.4	117.1	116.9	117.9	114.5	117.9	113.1	116.7	113.3	120.6	114.7
07/05/2008	104.0	108.4	107.0	111.7	114.0	115.5	114.2	115.7	115.3	115.9	112.7	116.0	113.4	117.6	113.4	118.9	113.2
07/06/2008	102.9	108.4	106.4	110.8	111.6	115.4	113.9	115.5	113.8	114.7	110.5	115.1	111.3	115.6	112.7	117.5	112.7
07/07/2008	101.8	108.7	106.4	111.3	110.9	113.8	113.4	115.3	113.3	118.1	109.6	117.0	111.0	116.2	110.6	118.3	113.0
07/08/2008	102.6	109.3	106.8	115.1	110.2	114.0	113.0	114.9	113.4	119.1	110.2	116.9	111.9	116.6	113.1	119.4	113.4
07/09/2008	103.1	109.2	107.8	111.2	110.9	114.3	114.0	115.8	114.2	116.7	111.6	118.4	113.1	117.2	114.8	119.0	115.7
07/10/2008	102.8	109.1	108.2	111.4	112.6	114.4	114.3	115.3	114.2	113.9	110.9	116.3	112.0	115.7	112.8	118.2	113.1
07/11/2008	100.8	109.5	108.5	111.6	110.4	115.3	112.4	114.4	112.7	116.8	111.2	115.7	112.5	117.2	110.5	117.6	111.8
07/12/2008	101.5	110.2	109.4	115.3	109.2	115.5	112.0	113.5	112.0	117.0	113.0	115.5	112.9	117.9	113.1	117.7	113.3
07/13/2008	100.5	110.4	109.3	114.5	110.6	115.4	113.4	114.9	112.0	116.2	113.8	115.8	113.6	117.4	116.3	117.4	116.9
07/14/2008	100.1	110.2	107.8	110.9	112.0	116.1	113.8	115.6	113.2	116.8	112.4	116.3	113.4	117.0	115.5	116.9	116.9
07/15/2008	100.9	110.9	110.2	110.9	113.4	114.8	114.1	113.7	113.8	115.4	112.0	115.7	113.6	116.8	113.8	116.4	116.6
07/16/2008	101.1	110.3	110.4	114.7	112.6	115.4	113.8	112.2	113.4	115.8	111.7	115.7	112.4	115.9	111.5	116.4	113.9
07/17/2008	101.4	110.0	109.5	114.5	110.9	115.2	114.9	114.4	113.3	115.9	112.0	115.6	110.3	115.1	109.4	117.3	113.8
07/18/2008	100.8	110.3	108.9	112.5	110.4	114.6	114.6	113.3	111.9	115.2	110.7	114.9	109.2	114.1	107.2	116.6	112.7
07/19/2008	100.8	110.3	109.2	112.1	111.3	115.4	114.2	113.5	111.5	116.1	109.9	115.3	108.2	114.7	106.7	116.5	114.1
07/20/2008	100.9	110.2	108.8	114.5	111.6	115.8	114.2	113.6	110.8	115.7	109.2	114.3	110.1	115.6	107.6	116.5	113.7
07/21/2008	100.9	110.2	108.2	114.2	111.5	116.1	114.1	113.8	110.3	115.7	108.2	114.3	109.1	114.9	107.9	116.0	114.1
07/22/2008	100.7	110.8	108.2	111.3	110.9	115.8	113.0	113.9	109.4	116.4	106.4	114.3	107.3	113.1	106.2	116.5	110.9
07/23/2008	101.7	110.8	107.4	111.2	109.9	115.7	111.0	114.0	107.8	114.9	104.1	114.6	103.9	111.5	104.2	116.3	112.1
07/24/2008	101.8	110.6	107.3	109.6	109.6	115.5	110.6	114.8	106.6	114.1	103.8	115.8	106.2	112.6	105.2	116.2	114.1
07/25/2008	101.3	110.2	107.0	108.4	109.8	115.3	111.3	114.9	107.7	116.0	104.4	117.6	108.0	113.7	107.3	117.0	114.3
07/26/2008	101.5	110.5	106.7	108.1	109.7	115.8	111.3	114.6	108.9	115.8	104.2	116.8	106.9	113.3	107.2	117.2	114.3
07/27/2008	102.8	111.0	106.9	108.0	109.4	116.0	112.0	114.7	108.8	116.3	103.2	114.9	106.7	112.8	106.8	117.0	113.1

Generated: Fri Aug 1 23:25:49 2008

Number of hours of data reported in a given day

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Big, bold, red text denotes exceedances.
--- indicates No Data
Dates run from hour 1 to 24 (not 0 to 23).
The gas caps shown only apply when spilling to facilitate juvenile fish passage ("voluntary spill") between April 3rd and August 31st.
At all other times, the gas cap is 110%.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
WRNO	Bonneville Tailwater (Warrendale)
CWMW	Camas / Washougal

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
August 2008

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the February 25, 2008 court order adopting the 2008 Fish Operations Plan (FOP) and requiring the Corps to provide monthly reports on the implementation of the 2008 FOP. The FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. To the extent hydro-power operations are not specified in the 2008 FOP, the FCRPS operations will be consistent with the operations considered in the 2004 Biological Opinion and/or other operative documents, which include the 2008 Water Management Plan (WMP) and 2008 Fish Passage Plan (FPP).

The Corps' lower Columbia and Snake River projects and fish passage operations identified in the FOP for the month of August 2008 are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (TDG) for the tailwater at each project and for the next project's forebay downstream.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the spill program for the month of August 2008.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per week in August displaying the performance of the spill program as follows:

(A). Daily Average of the High 12 Hourly % TDG Values - described in the upper graph.
(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on July 28 and end on August 31 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start on Monday 0100 hours through Monday 0100 hours for the following dates:

July 28 – August 3	Figures 1 - 8
August 4 – August 10	Figures 9 – 16
August 11– August 17	Figures 17 - 24
August 18 – August 24	Figures 25 – 32
August 25 – August 31	Figures 33 – 40

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours as the result of spill from the dam. The objective is to operate each project up to the TDG limits without exceeding those limits if practicable.

- The blue line on the graph represents the TDG in the tailrace of the dam. 120% TDG is the upper operating limit.
- The green line represents the TDG in the forebay of the next dam downstream. 115% is the upper operating limit.

B. Lower Graph: Represents the flow and spill at the dam.

- The dotted blue line shows the average flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the average hourly spill level as defined in the 2008 FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Ice Harbor (15.2 kcfs) and Bonneville (50 kcfs) dams.

The hourly target spill may vary as a function of quantity of river flow, forebay elevation and generating units available at a project.

II. A monthly percent TDG Table is included at the end of the figures that shows the overall daily results of the average percent TDG for the 12 highest hours for all projects. The numbers in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

Please note that for all projects that spill for fish passage, the target spill may be limited to a lesser quantity (i.e. the spill cap), with the objective of staying within the TDG state waiver limits. When spill levels briefly deviated below or above the level described in the FOP, the heavy red line will be below or above the heavy black line in the graphs. Whenever the operation varied from the target spill during voluntary spill hours, or other anomalies occurred, these instances are described below. The FOP Spill Report Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the FOP Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spillway gate openings to implement the regionally coordinated spill pattern. The project operator sets the spillway gate openings to most closely approximate the FOP level of spill while also avoiding exceeding the spill cap.

"Low flow" operations on Lower Columbia and Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects operate at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour. During these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percent of the total flow than it had been during higher flows. As a result, even though the spill volume remained the same, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock. When theses variances occur, they are recorded in the FOP Spill Report Table below under the variance type “Navigation.” For the month of August, the “Navigation” variance also identifies instances associated with reduced spill for the safe passage of fish transportation barges at Lower Monumental and McNary Dams.

Also note that actual spill levels at the Corps projects may range from 1 to 2 kcfs lower or higher than specified in the 2008 FOP, including the set spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2008 FOP describes project operations during “load swing hours” (page 8). For reporting purposes, the notation “Transmission Stability” in the FOP Spill Report

Table will replace “load swing hour” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these “Transmission Stability” hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days cited in the Table, the 24 hour average spill was within the FOP level of +/- 1% of the target spill unless limited by the spill cap.

Occurrences which required an adjustment in operations and regional coordination are described in greater detail in the section below entitled “Operational Adjustments for August.”

August Operations:

The month of August was characterized by average flows for the Lower Columbia River and slightly above average flows for the Lower Snake River. At all the projects, the summer spill season ended on September 1 at 0001 hours in accordance with the FOP.

During the August reporting period, the daily FOP spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill through the month of August was a fixed quantity of 18 kcfs 24 hours per day
- Little Goose Dam - the hourly target spill throughout the month was 30% of the total flow for 24 hours
- Lower Monumental Dam –the hourly target spill throughout the month was 17 kcfs, or up to the spill cap when under 17 kcfs
- Ice Harbor Dam – the hourly target spill through the month of August was 45 kcfs day/spill cap night
- McNary Dam – the hourly target spill through the month of August alternated between two days of 60% and two days of 40% of total flow for 24 hours
- John Day Dam – the target spill through the month of August was 30% of total flow for 24 hours
- The Dalles Dam - the target spill throughout the month was 40% of the total flow for 24 hours

- Bonneville Dam - the hourly target spill through the month of August was 75 kcfs during daytime hours and to the spill cap during nighttime hours as defined in the FPP.

Operational Adjustments for August:

1. Fish Transport Operations:
   - Fish collection for routine transport at Lower Granite, Little Goose, and Lower Monumental continued throughout the month of August. In accordance with the FOP, every other day barging that began on June 5 at Lower Granite, Little Goose, and Lower Monumental dams continued through August 15, after which time transportation shifted to trucking every other day. Daily collection continued with fish being held in raceways until the following day to be transported. Transportation of fish via truck will continue through September 30, 2008 at Lower Monumental Dam and through October 31, 2008 at Lower Granite and Little Goose dams.

   - Fish collection continued at McNary Dam with every other day barging of juvenile salmonids through August 16, after which time transportation shifted to trucking every other day, per the FOP. Transportation of fish via truck at McNary Dam will continue through September 30, 2008. Brief spill outages occurred at the project during arrival and departure of the transportation barges to provide safe navigating conditions in accordance with the FOP (p. 18). Spill resumed at FOP specified levels during barge loading.

2. Little Goose Dam:
   - A three treatment (3 varying spill patterns) adult salmon passage study began on April 3, 2008 and continued until the end of spill operations on August 31, 2008.

   - At the August 26, 2008 TMT conference call, the Salmon Managers submitted a System Operations Request (SOR Number 2008-06) to alter spill at Little Goose Dam from 30% of total flow to a continuous flow of 11 kcfs taking effect at 1500 hour on August 26. This followed TMT conference calls on August 22 and 25 where low flow operational issues on the lower Snake River were described by the Corps and BPA, and alternatives were discussed. The purpose of the SOR was to stabilize spill, minimum powerhouse operations, and MOP operations at Lower Monumental and Ice Harbor dams in a manner that would protect fish. The Salmon Managers and Tribes stated they would monitor adult passage at Little Goose Dam to ensure this operation would not negatively impact migrating adult salmonids. The daily average percent spill range for the six day duration of this operation was above the 30 % FOP level from 34.2 to 36.1% and is noted in the Spill Report table below.

3. Lower Monumental Dam:
   The single treatment (one spill pattern, one spill level) summer spill evaluation that began on June 21 continued throughout August. This operation will continue until 2400 hours on August 31, 2008.

4. McNary Dam:
   At the August 6 TMT meeting, the Corps requested that the 60% spill day scheduled for August 7 and the 40% spill day scheduled for August 8 be swapped, spilling 40% on August 7 and 60% on August 8. The purpose of this swap was to achieve a lower tailwater elevation at McNary Dam on August 7 to allow workers to safely inspect fish unit #3 for oil leaks. At this time of year, with low river flow conditions, the necessary tailwater elevation could only be achieved during a 40% spill operation. Salmon managers concurred with this spill operation schedule change.

5. As reported in the July Fish Operations Plan Implementation Report, at the August 1, 2008 TMT conference call, BPA and BC Hydro introduced a proposal referred to as the "Libby-Arrow Swap." The proposed operation would result in increased outflows from Columbia River Treaty storage projects in Canada - Arrow and Duncan dams, with a similar reduction in Libby Dam outflows during the month of August. Consensus was reached at TMT with some representatives supporting the operation as long as flow neutrality in the lower Columbia River was maintained, and a detailed accounting is provided after completion of the operation.

   The planned swap consisted of the Canadian storage projects releasing up to 60 ksfd through the end of August, with Libby Dam storing an equal amount of water. As a result of this operation, the August 31, 2008 target elevation at Libby Dam moved from 2439 ft to 2441.8 ft. (60 ksfd). Releases from Grand Coulee Dam and flows in the lower Columbia River would be flow neutral.

   With implementation of the swap, Libby outflows in the first week of August were 10 kcfs. Based on forecast changes, they were adjusted throughout the rest of the month to between 8 and 12 kcfs. On August 31, Libby Dam elevation was 2441.7 ft. Likewise, 60 ksfd of water was delivered from Canadian Storage by August 31.

   At the September 10, 2008 TMT meeting, the BPA representative presented the accounting of the swap and reported that storage activities were carried out in a manner that was flow neutral. While the full amount of the swap was exchanged, Treaty storage in Canada ended August higher than the target. This is attributed to forecast error - higher than forecast basin inflows in the Columbia and Kootenay basins, and operations at Canadian projects needed to avoid exceeding maximum downstream flow requirements. Such occurrences are normally expected in real-time operations and are in accordance with the applicable operating documents.

6. At Hungry Horse Dam, the operations identified at the July 2, 2008 TMT meeting were implemented with releases set between 6.4 kcfs and 6.5 kcfs starting on July 14

with the intent of reaching elevation 3540 feet by August 31. Releases were set based on the River Forecast Center's July 8 inflow forecast for Hungry Horse Reservoir. Inflows between July 8 and August 31were slightly greater than were forecasted on July 8 and as a result Hungry Horse Reservoir drafted to elevation 3541.02 feet on August 31. Average Hungry Horse outflow from July 15 through August 31 was 6.42 kcfs.

FOP Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	8/10/2008	1700	1	Program Error	Hourly spill increased to 20.6 kcfs, above FOP spill of 18 kcfs due to GDACSS program error problem at project.
Little Goose	Spill	7/28/2008	0300	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/28/2008	0800	1	Navigation	Hourly % spill decreased to 28.4% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.9%
Little Goose	Spill	7/29/2008	1500 & 1700	2	Navigation	Hourly % spill decreased to 28.5% and 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	7/30/2008	0800 - 0900	2	Maintenance	Hourly % spill decreased to 28.3% and 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock for gate repair. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	7/30/2008	2400	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	7/31/2008	0300	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%

Little Goose	Spill	8/2/2008	0600	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/2/2008	1800	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/4/2008	2000	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.1%
Little Goose	Spill	8/5/2008	2400	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/6/2008	0400 & 0600	2	Navigation	Hourly % spill decreased to 28.7% and 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	8/7/2008	0400	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	8/8/2008	1000	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.5%
Little Goose	Spill	8/9/2008	0400	1	Navigation	Hourly % spill decreased to 28.5% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/9/2008	1400	1	Navigation	Hourly % spill decreased to 28.7% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%

Little Goose	Spill	8/10/2008	1300	1	Navigation	Hourly % spill decreased to 28.5% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	8/10/2008	1800	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Spill	8/12/2008	0100 - 0200	2	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.4%
Little Goose	Spill	8/12/2008	1000	1	Navigation	Hourly % spill decreased to 28.0% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.4%
Little Goose	Spill	8/12/2008	1300	1	Navigation	Hourly % spill decreased to 28.4% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.4%
Little Goose	Spill	8/12/2008	1600 & 1800	1	Navigation	Hourly % spill decreased to 27.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.4%
Little Goose	Spill	8/13/2008	0100 & 0600	2	Navigation	Hourly % spill decreased to 28.8% and 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/13/2008	1300	1	Navigation	Hourly % spill decreased to 28.5% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/13/2008	2400	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%

Little Goose	Add'l Spill	8/14/2008	0200	1	Human Error	Hourly % spill increased to 31.3% (above 30% +/- 1% range) due to operator handling a lockage and was not available to make the change until 0130. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/14/2008	0400	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/14/2008	1400	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/14/2008	1600	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/15/2008	0900	1	Navigation	Hourly % spill decreased to 28.4% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.8%
Little Goose	Spill	8/16/2008	1000	1	Navigation	Hourly % spill decreased to 28.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	8/16/2008	1300	1	Navigation	Hourly % spill decreased to 27.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	8/16/2008	2200 - 2300	2	Navigation	Hourly % spill decreased to 28.9% and 28.5% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.6%
Little Goose	Spill	8/17/2008	0200	1	Navigation	Hourly % spill decreased to 28.3% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.5%

Little Goose	Spill	8/17/2008	1300 - 1400	2	Operations Limitations	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to low flow conditions, a slight change of 1 kcfs in total flow will cause the % spill to go outside of the +/- 1% range. 24 hr avg. spill was 29.5%
Little Goose	Spill	8/18/2008	0900	1	Navigation	Hourly % spill decreased to 28.6% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.7%
Little Goose	Add'l Spill	8/19/2008	1400	1	Operations Limitations	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to low flow conditions, a slight change of 1 kcfs in total flow will cause the % spill to go outside of the +/- 1% range. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/22/2008	0700	1	Navigation	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/23/2008	2300	1	Navigation	Hourly % spill decreased to 28.2% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Add'l Spill	8/24/2008	2000	1	Navigation	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 30.0%
Little Goose	Spill	8/25/2008	1600	1	Navigation	Hourly % spill decreased to 27.8% (below 30% +/- 1% range) due to volume of water needed to empty the navigation lock. See page 3. 24 hr avg. spill was 29.5%
Little Goose	Add'l Spill	8/26/2008	1500 - 2400	10	Operations Limitations	Hourly % spill increased between 37.5% and 42.4% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 34.2%

Little Goose	Add'l Spill	8/27/2008	0100; 0300 - 2300	22	Operations Limitations	Hourly % spill increased between 31.7% and 39.2% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 36.1%
Little Goose	Add'l Spill	8/28/2008	0100 - 2400	24	Operations Limitations	Hourly % spill increased between 35.7% and 39.4% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 38.9%
Little Goose	Add'l Spill	8/29/2008	0100 - 1900	20	Operations Limitations	Hourly % spill increased between 31.9% and 39.4% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 32.5%
Little Goose	Add'l Spill	8/30/2008	0300 - 0900; 1100 - 2400	21	Operations Limitations	Hourly % spill increased between 31.3% and 39.9% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 33.1%
Little Goose	Add'l Spill	8/31/2008	0100 - 1500; 1700 - 2400	23	Operations Limitations	Hourly % spill increased between 31.8% and 47.2% (above 30% +/- 1% range) due to project spilling a flat 11 kcfs, per SOR 2008-06 and TMT conference calls on 8/22, 8/25, and 8/26. 24 hr avg. spill was 38.8%
Lower Monumental	Spill	7/28/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 9.9 kcfs - 12.7 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	7/30/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 10.2 kcfs - 14.5 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/1/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 13.3 kcfs - 13.5 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.

Lower Monumental	Spill	8/3/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 11.7 kcfs - 13.9 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/5/2008	1900 - 2000	2	Navigation	Hourly spill dropped to 13.2 kcfs - 15.6 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/7/2008	1800 - 2000	3	Navigation	Hourly spill dropped to 11.3 kcfs - 15.4 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/9/2008	1800 - 1900	2	Navigation	Hourly spill dropped to 10.5 kcfs - 13.2 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/11/2008	1900 - 2000	2	Navigation	Hourly spill dropped to 12.4 kcfs - 13.9 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/13/2008	1800	1	Navigation	Hourly spill dropped to 14.1 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Lower Monumental	Spill	8/15/2008	1800	1	Navigation	Hourly spill dropped to 0.0 kcfs, below the FOP spill of 17 kcfs. Reduced spill for safe passage of fish barge.
Ice Harbor	Spill	8/5/2008	1300 & 1500	2	Operations Limitations/maintenance	Hourly spill remained at 20 kcfs (below 45 kcfs FOP spill) while project generation increased to 11.4 and 10.6 kcfs which is outside of minimum generation range of 9-10 kcfs for units 1-3. Project was switching between units during a fish screen inspection.
Ice Harbor	Spill	8/20/2008	0900 & 1100	2	Operations Limitations/maintenance	Hourly spill was 31.8 and 25.0 kcfs (below 45 kcfs FOP spill) while project generation increased to 12.3 and 11.3 kcfs which is outside of minimum generation range of 9-10 kcfs for units 1-3. Project was switching between units during a fish screen inspection.

Ice Harbor	Spill	8/25/2008	1000 - 1700	8	Operations Limitations	Hourly spill decreased to 8.8 - 11.4 kcfs, below the minimum spill of 15.2 kcfs, while at minimum generation. During low flow conditions it is not possible to concurrently maintain MOP, minimum generation, and minimum spill as described on pg 3.
Ice Harbor	Spill	8/27/2008	1400 - 1900	6	Operations Limitations	Hourly spill decreased to 11.0 kcfs, below the minimum spill of 15.2 kcfs, while at minimum generation. During low flow conditions it is not possible to concurrently maintain MOP, minimum generation, and minimum spill as described on pg 3.
McNary	Spill	7/29/2008	0700 & 1100	2	Navigation	Hourly % spill decreased to 47.9% and 55.9% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Add'l Spill	7/31/2008	0100	1	Transmission Stability	Hourly % spill increased to 61.1% (above 60% +/- 1% range) due to project being on response during rapidly changing load as described on page 4.
McNary	Spill	7/31/2008	0700 and 1000	2	Navigation	Hourly % spill decreased to 34.5% and 31.1% (below 40% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/2/2008	0700	1	Navigation	Hourly % spill decreased to 52.8% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/4/2008	0700 and 1000	2	Navigation	Hourly % spill decreased to 35.0% and 35.6% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/6/2008	0800 and 1100	2	Navigation	Hourly % spill decreased to 53.6% and 58.5% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/7/2008 - 8/8/2008	0700 - 0600	24	Maintenance	Hourly % spill decreased to 40% instead of the scheduled 60%; in order to have a low forebay elevation for fish pump repairs on August 8, the spill percents for 8/7 and 8/8 were swapped. Salmon managers agreed to this operation at the 8/6 TMT meeting.

McNary	Add'l Spill	8/8/2008 - 8/9/2008	0700 - 0600	24	Maintenance	Hourly % spill increased to 60% instead of the scheduled 40% in order to have a lower forebay elevation needed to perform repairs to fish pump # 3 which was leaking oil. Salmon managers agreed to this operation at the 8/6 TMT meeting.
McNary	Spill	8/8/2008	0700 & 1100	2	Navigation	Hourly % spill decreased to 50.6% and 57.6% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/10/2008	0700 and 1000	2	Navigation	Hourly % spill decreased to 45.4% and 52.4% (below 60% +/- 1% range) Reduced spill for safe passage of fish barge.
McNary	Spill	8/12/2008	0700 and 1000	2	Navigation	Hourly % spill decreased to 26.2% and 29.1% (below 40% +/- 1% range). Reduced spill for safe passage of fish barge.
McNary	Add'l Spill	8/13/2008	1900	1	Program Error	Hourly % spill increased to 41.7% (above 40% +/- 1% range) due to GDACS program error problem at project. 24 hr avg. spill was 40.2%. Error was corrected on 8/14/2008 at 1900 hrs.
McNary	Spill	8/14/2008	0100 - 0200	2	Program Error	Hourly % spill decreased to 38.6 and 38.8% (below 40% +/- 1% range) due to GDACS program error problem at project. Error was corrected on 8/14/2008 at 1900 hrs.
McNary	Spill	8/14/2008	0400 - 0500	2	Program Error	Hourly % spill decreased to 38.4 % (below 40% +/- 1% range) due to GDACS program error problem at project. Error was corrected on 8/14/2008 at 1900 hrs.
McNary	Spill	8/16/2008	0700 and 1000	2	Navigation	Hourly % spill decreased to 25.9% and 29.5% (below 40% +/- 1% range) Reduced spill for safe passage of fish barge.
John Day	Add'l Spill	8/1/2008	0200	1	Maintenance	Hourly % spill increased to 32.3% (above 30% +/- 1% range) due to a unit was taken out of service for repairs. 24 hr avg. spill was 30.1%

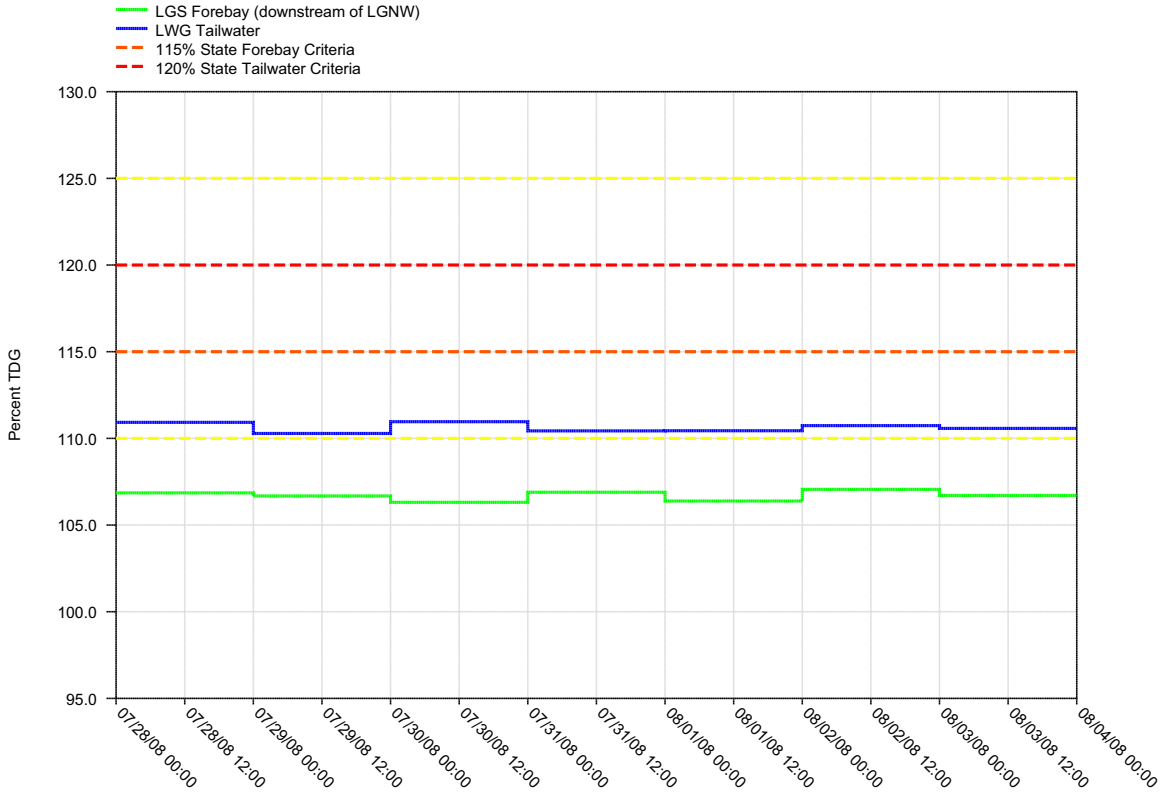
John Day	Add'l Spill	8/2/2008	0600	1	Transmission Stability	Hourly % spill increased to 31.5% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.1%
John Day	Add'l Spill	8/4/2008	1600	1	Transmission Stability	Hourly % spill increased to 31.2% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.1%
John Day	Add'l Spill	8/7/2008	1400	1	Transmission Stability	Hourly % spill increased to 31.2% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 29.9%
John Day	Spill	8/8/2008	0400	1	Transmission Stability	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 29.9%
John Day	Spill	8/10/2008	0000	1	Transmission Stability	Hourly % spill decreased to 28.4% (below 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 29.9%
John Day	Add'l Spill	8/11/2008	2000	1	Transmission Stability	Hourly % spill increased to 31.3% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.0%
John Day	Add'l Spill	8/15/2008	0400	1	Transmission Stability	Hourly % spill increased to 31.1% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.1%

John Day	Add'l Spill	8/16/2008	0100	1	Transmission Stability	Hourly % spill increased to 31.2% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.0%
John Day	Spill	8/16/2008	0800	1	Transmission Stability	Hourly % spill decreased to 28.9% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.0%
John Day	Spill	8/27/2008	1300	1	Transmission Stability	Hourly % spill decreased to 28.9% (below 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 29.9%
John Day	Add'l Spill	8/29/2008	1600	1	Transmission Stability	Hourly % spill increased to 31.6% (above 30% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 30.1%
The Dalles	Spill	7/28/2008	1400	1	Transmission Stability	Hourly % spill decreased to 38.9% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.0%
The Dalles	Spill	7/30/2008	0700	1	Transmission Stability	Hourly % spill decreased to 38.2% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 39.9%
The Dalles	Add'l Spill	7/30/2008	1200 - 1300	2	Transmission Stability	Hourly % spill increased to 41.3% and 41.6% (above 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 39.9%

The Dalles	Add'l Spill	8/6/2008	0500	1	Operations Limitations	Hourly % spill increased to 41.5% (above 40% +/- 1% range) due to low flow conditions, a slight change in spill or generation will cause the % spill to go outside of the +/- 1% range. 24 hr avg. spill was 40.2%
The Dalles	Add'l Spill	8/6/2008	0700-0800	2	Transmission Stability	Hourly % spill increased to 41.5% and then decreased to 38.9% (above 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.2%
The Dalles	Spill	8/8/2008	0400	1	Transmission Stability	Hourly % spill decreased to 38.7% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 39.9%
The Dalles	Add'l Spill	8/11/2008	2000 & 2200	2	Transmission Stability	Hourly % spill increased to 41.2% and 41.1% (above 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.0%
The Dalles	Add'l Spill	8/17/2008	0300	1	Transmission Stability	Hourly % spill increased to 41.1% (above 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.0%
The Dalles	Spill	8/21/2008	1100	1	Transmission Stability	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 40.1%
The Dalles	Spill	8/23/2008	1000	1	Transmission Stability	Hourly % spill decreased to 38.8% (below 40% +/- 1% range) due to project being on response during rapidly changing load as described on page 4. 24 hr avg. spill was 39.7%

Figure 1.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

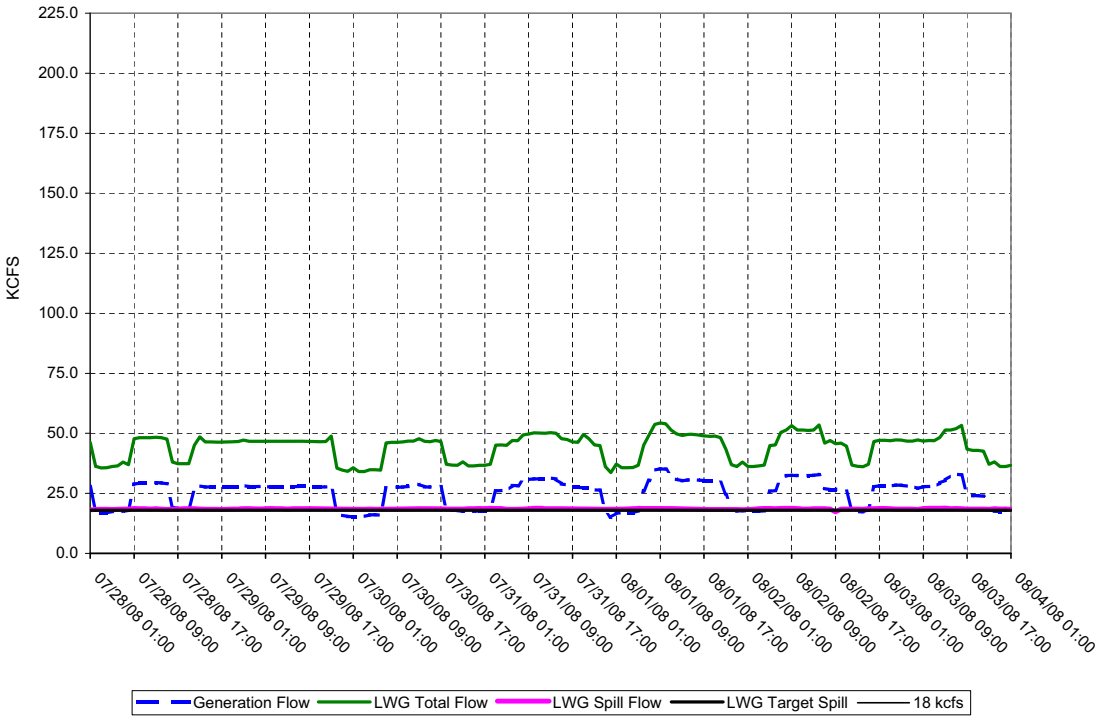
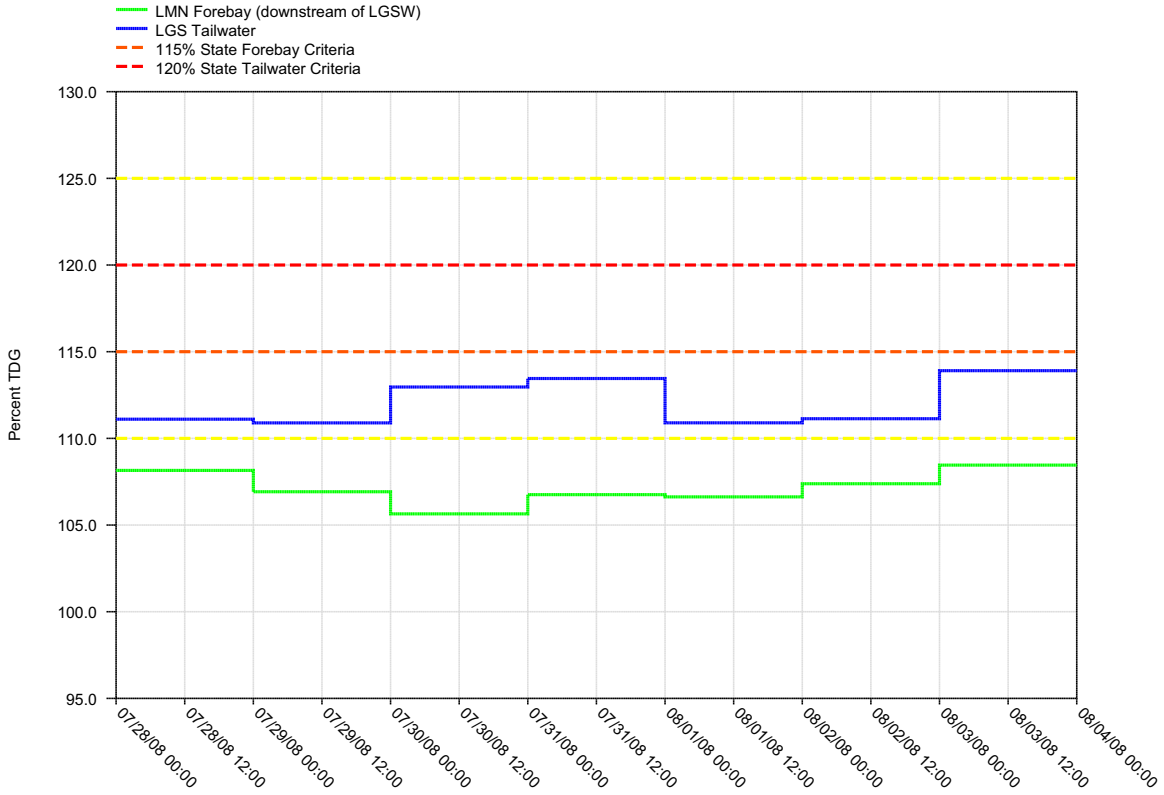


Figure 2.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

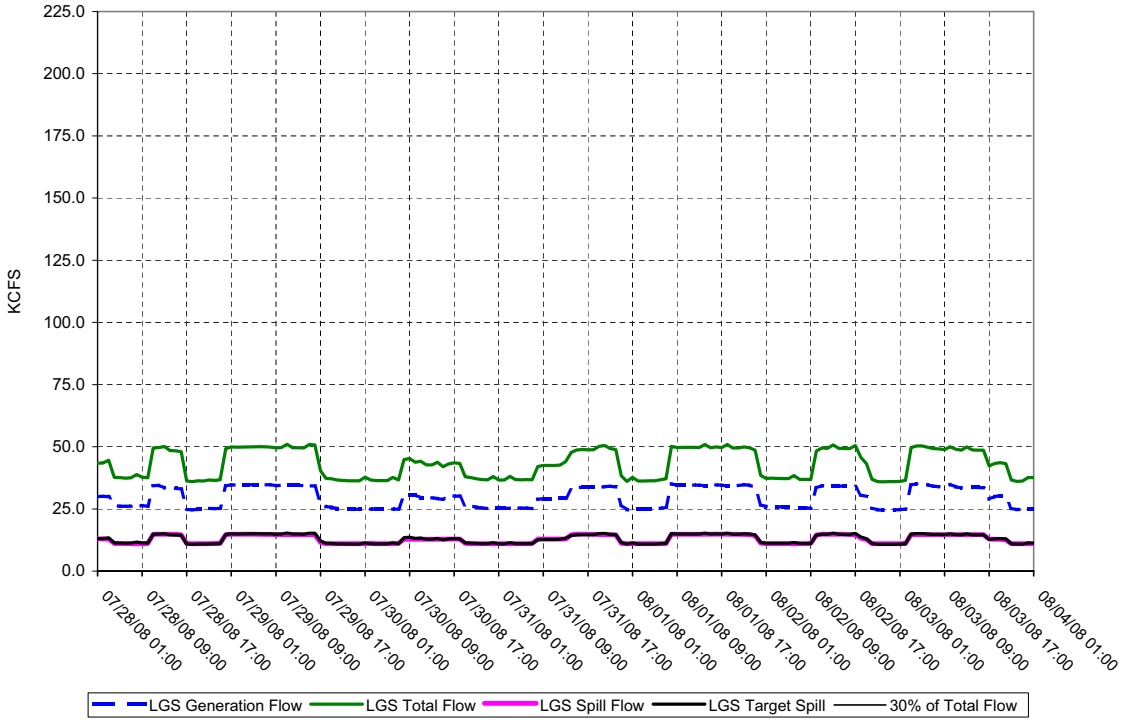
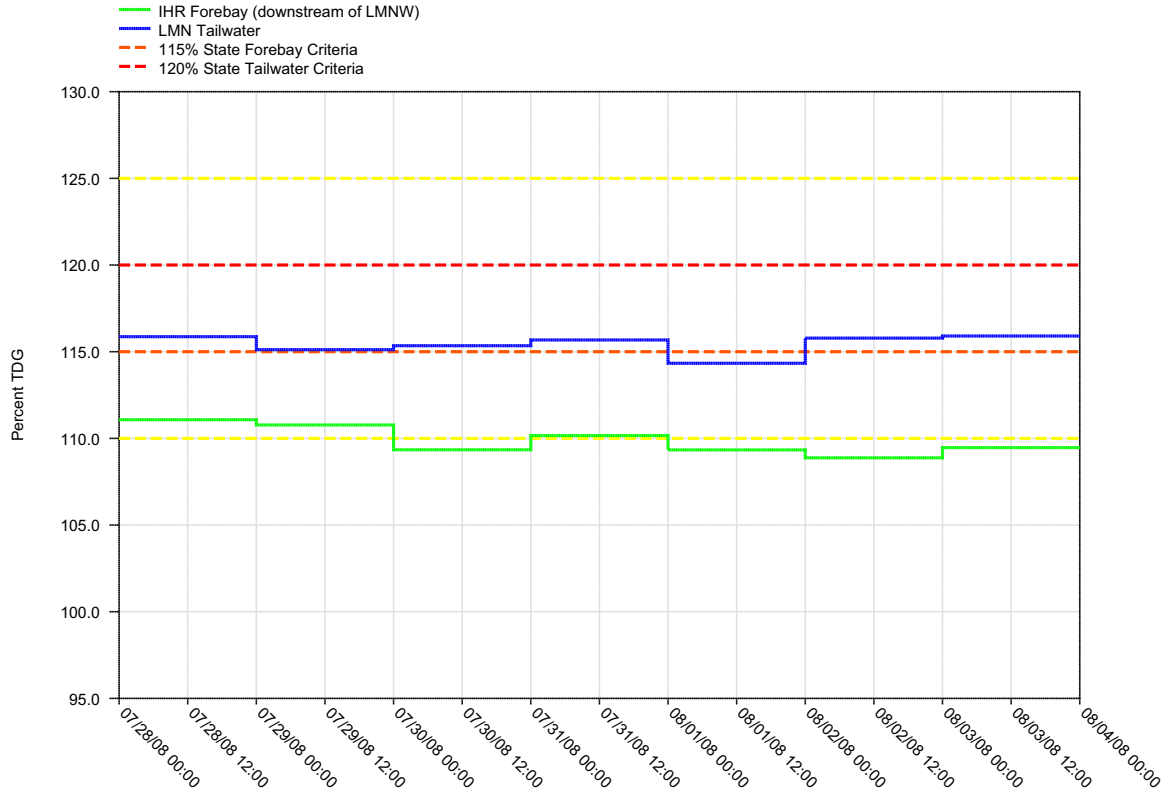


Figure 3.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

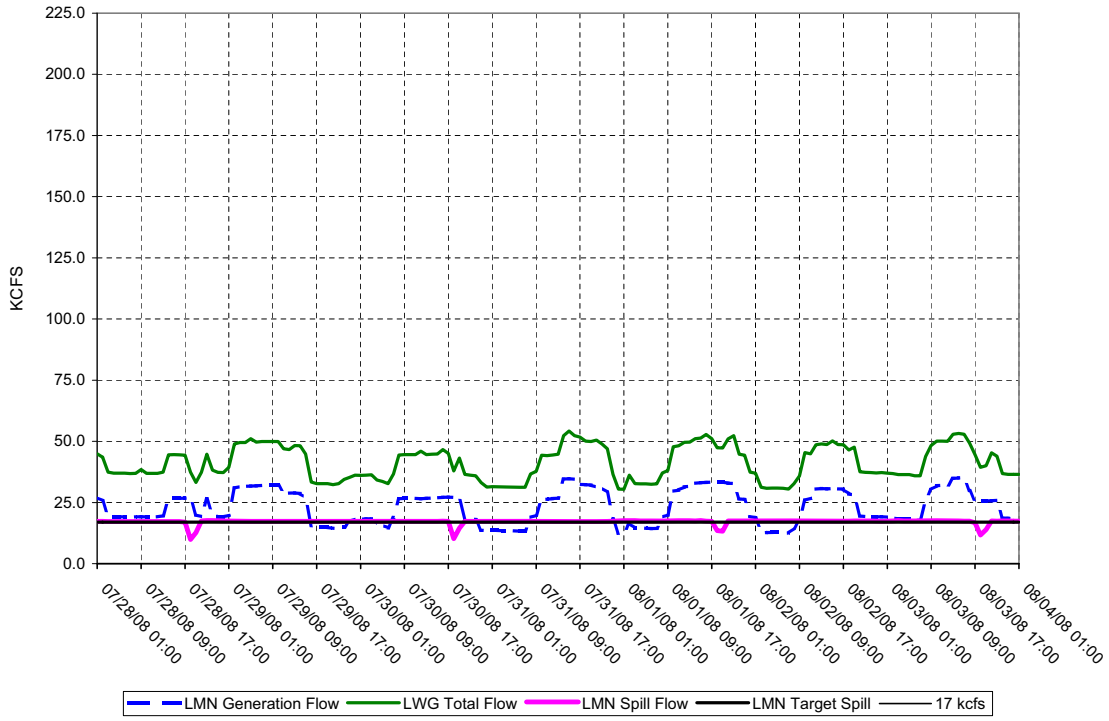
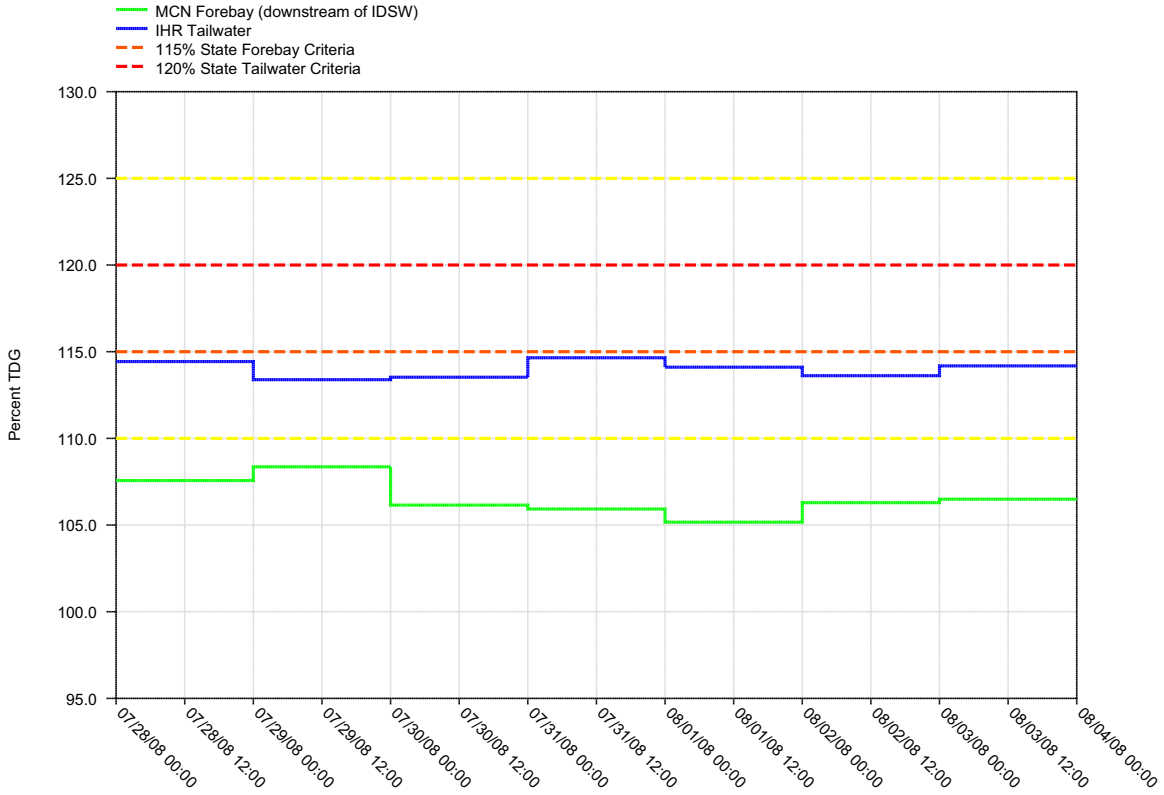


Figure 4.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

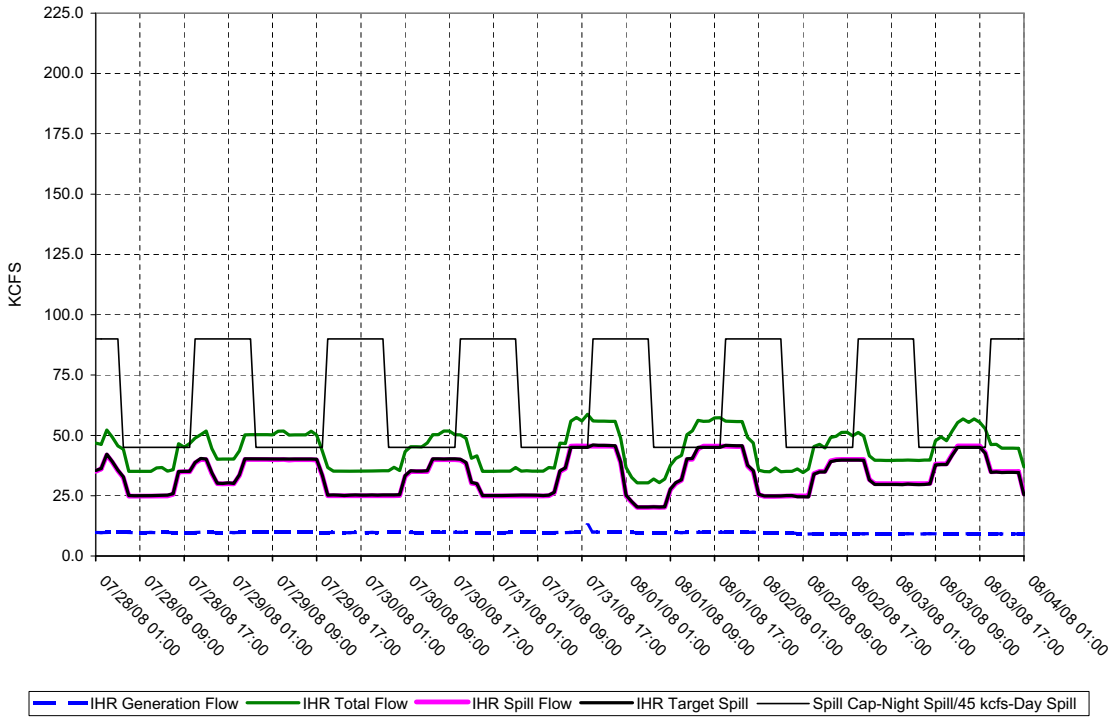
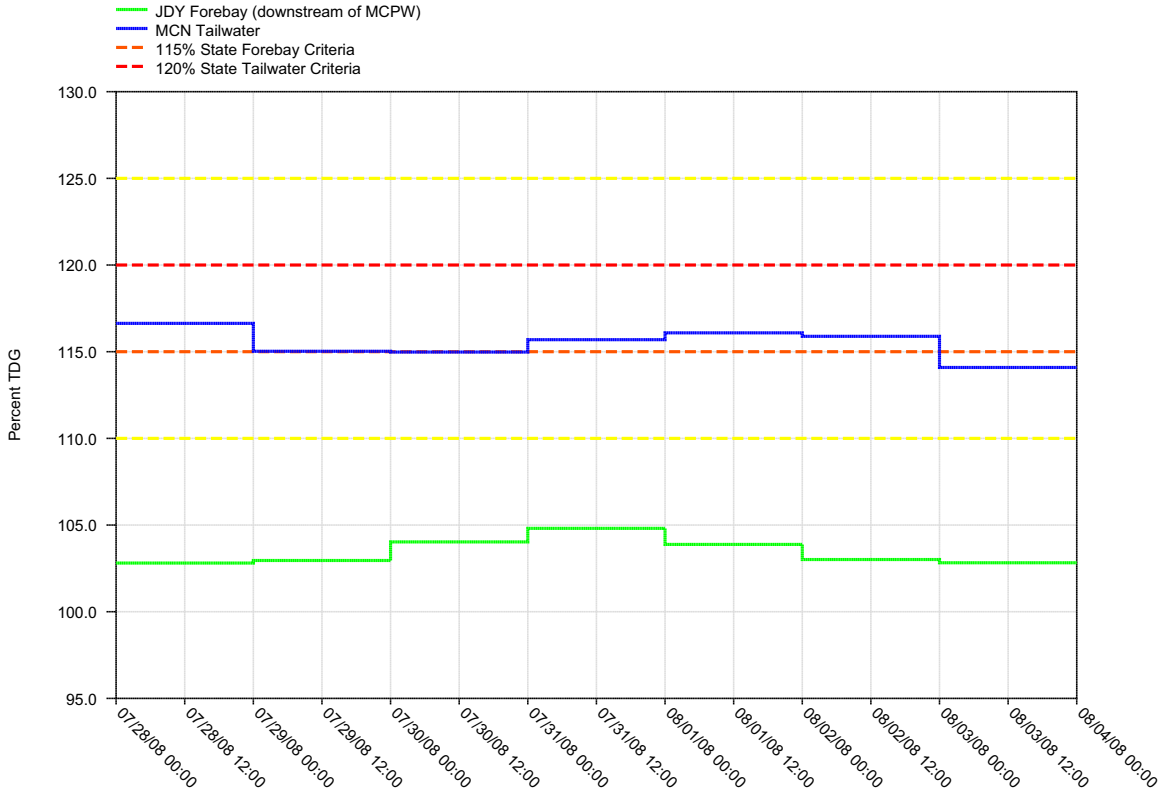


Figure 5.

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

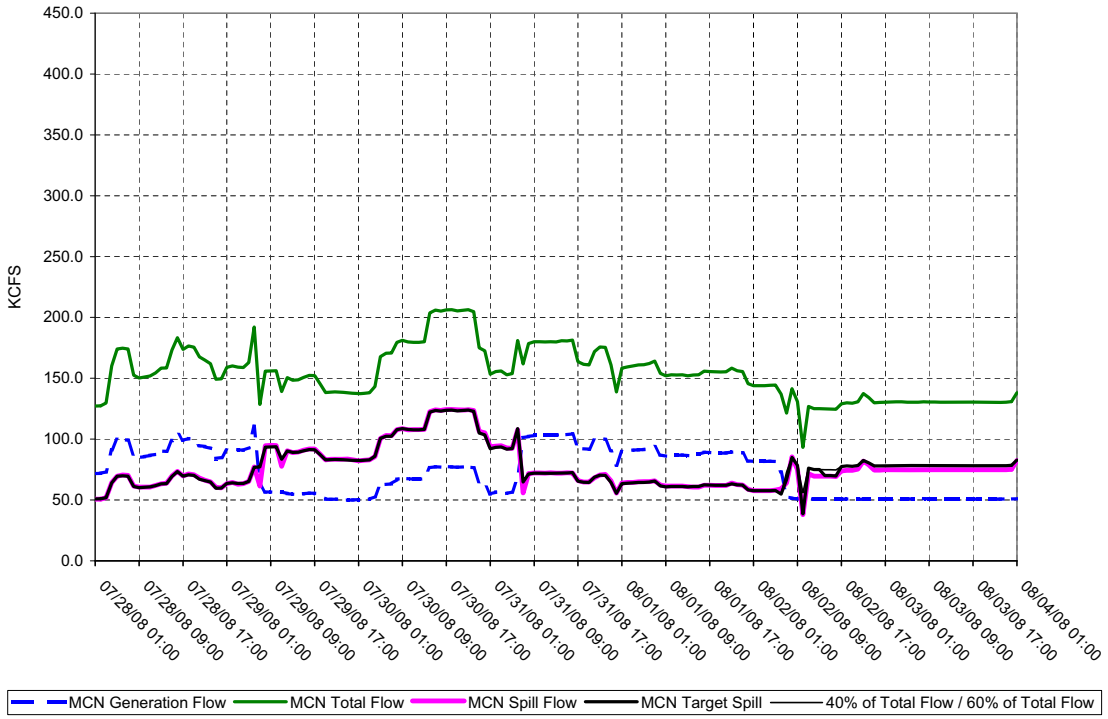
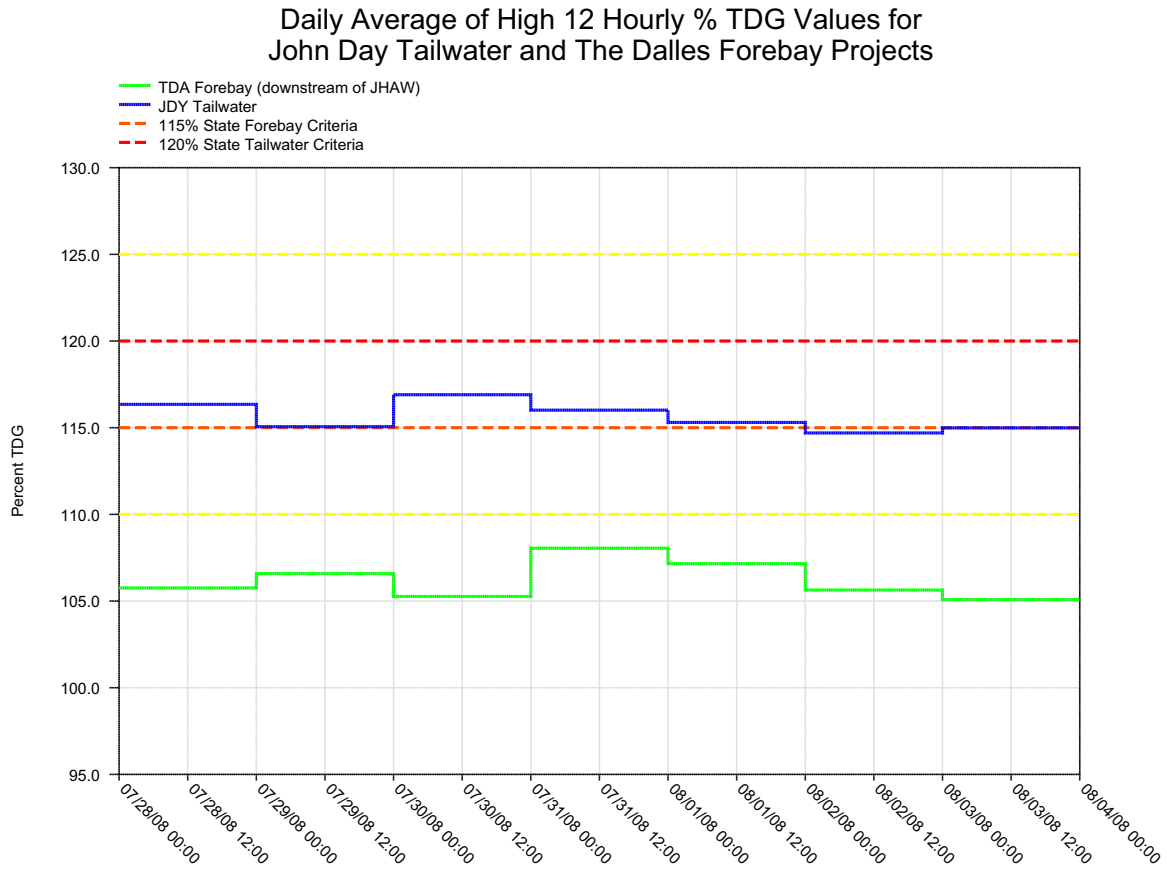


Figure 6.


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/28/08 00:00
07/28/08 12:00
07/29/08 00:00
07/29/08 12:00
07/30/08 00:00
07/30/08 12:00
07/31/08 00:00
07/31/08 12:00
08/01/08 00:00
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08/03/08 12:00
08/04/08 00:00

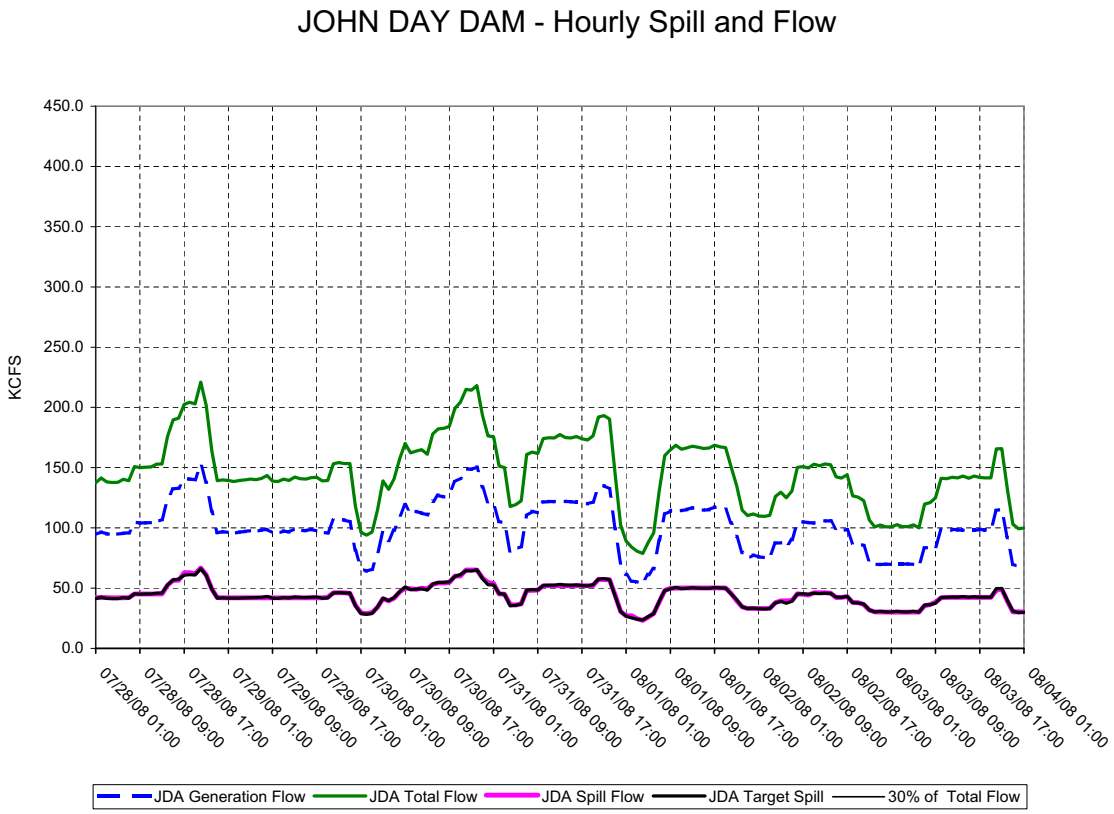
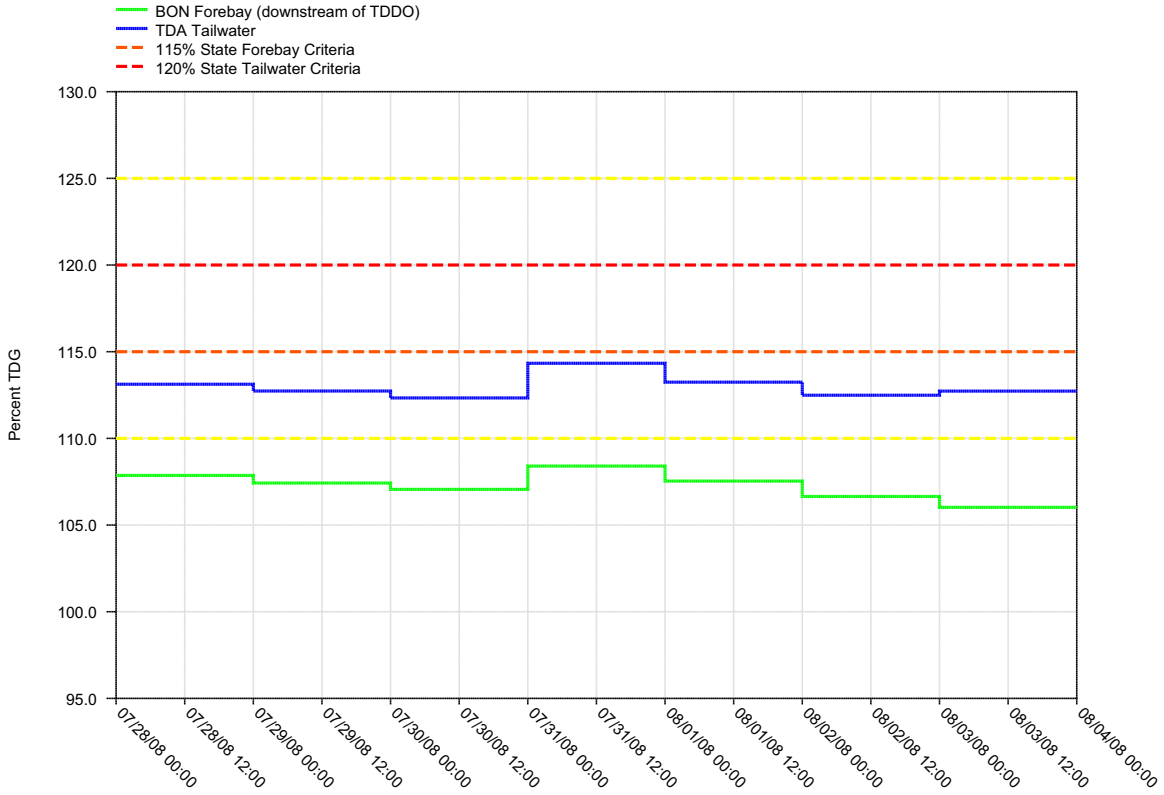

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/28/08 01:00
07/28/08 09:00
07/28/08 17:00
07/29/08 01:00
07/29/08 09:00
07/29/08 17:00
07/30/08 01:00
07/30/08 09:00
07/30/08 17:00
07/31/08 01:00
07/31/08 09:00
07/31/08 17:00
08/01/08 01:00
08/01/08 09:00
08/01/08 17:00
08/02/08 01:00
08/02/08 09:00
08/02/08 17:00
08/03/08 01:00
08/03/08 09:00
08/03/08 17:00
08/04/08 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 7.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

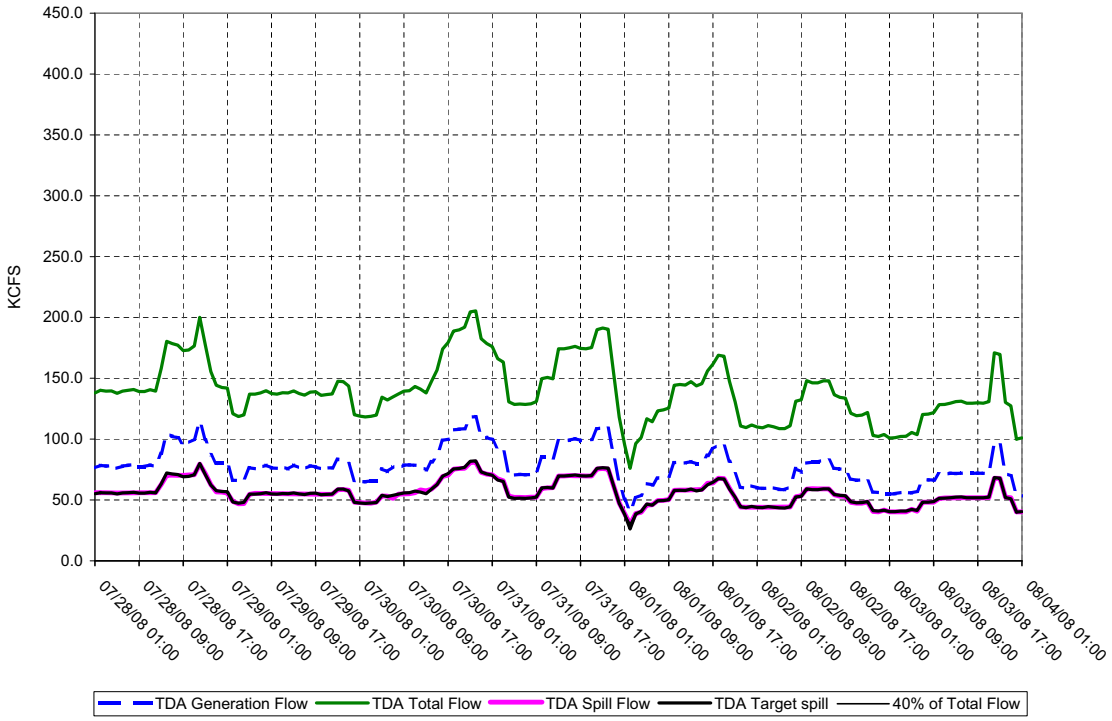
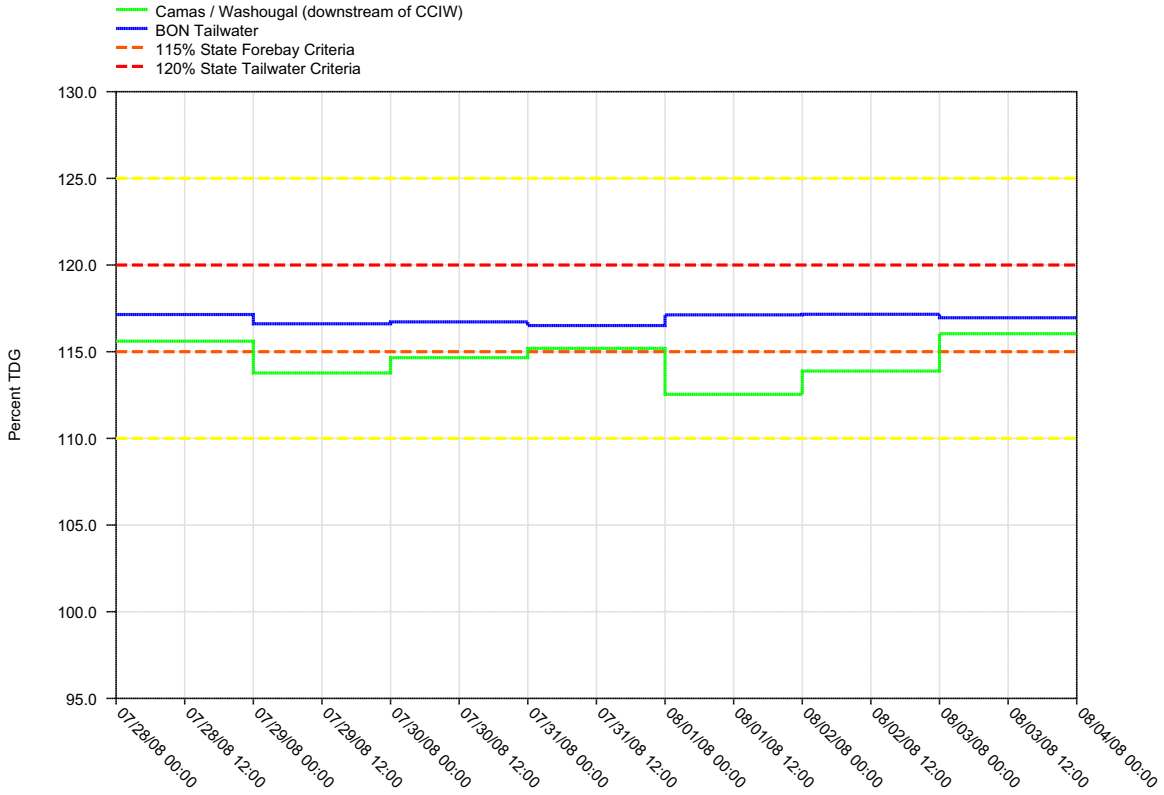


Figure 8.

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

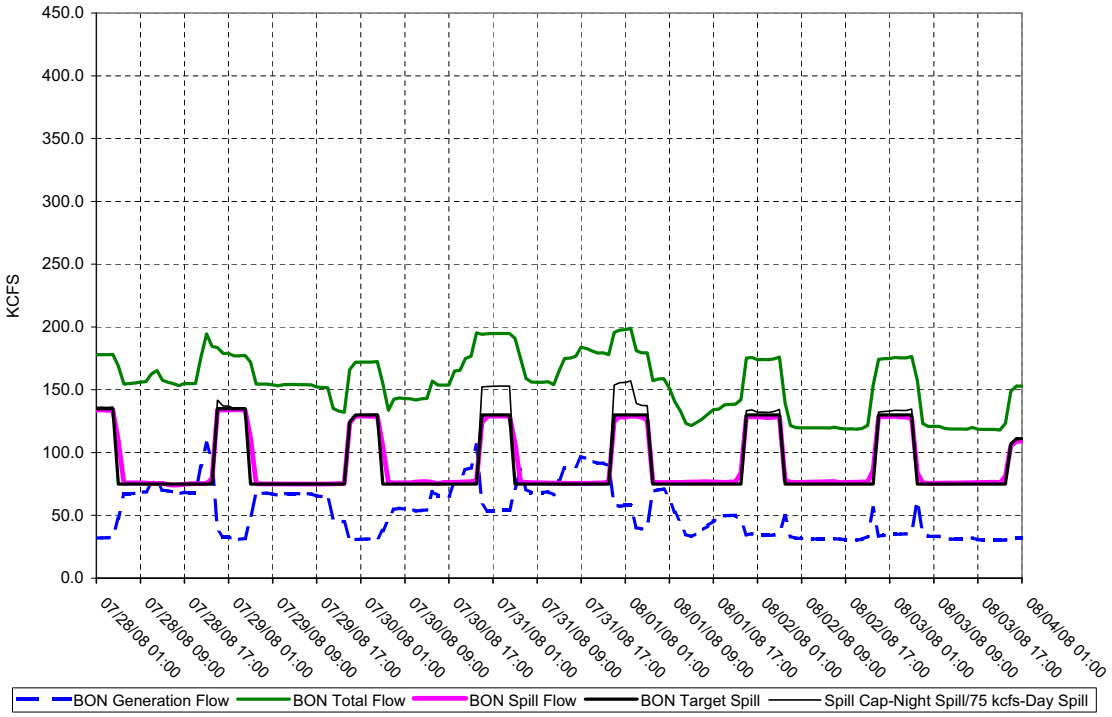
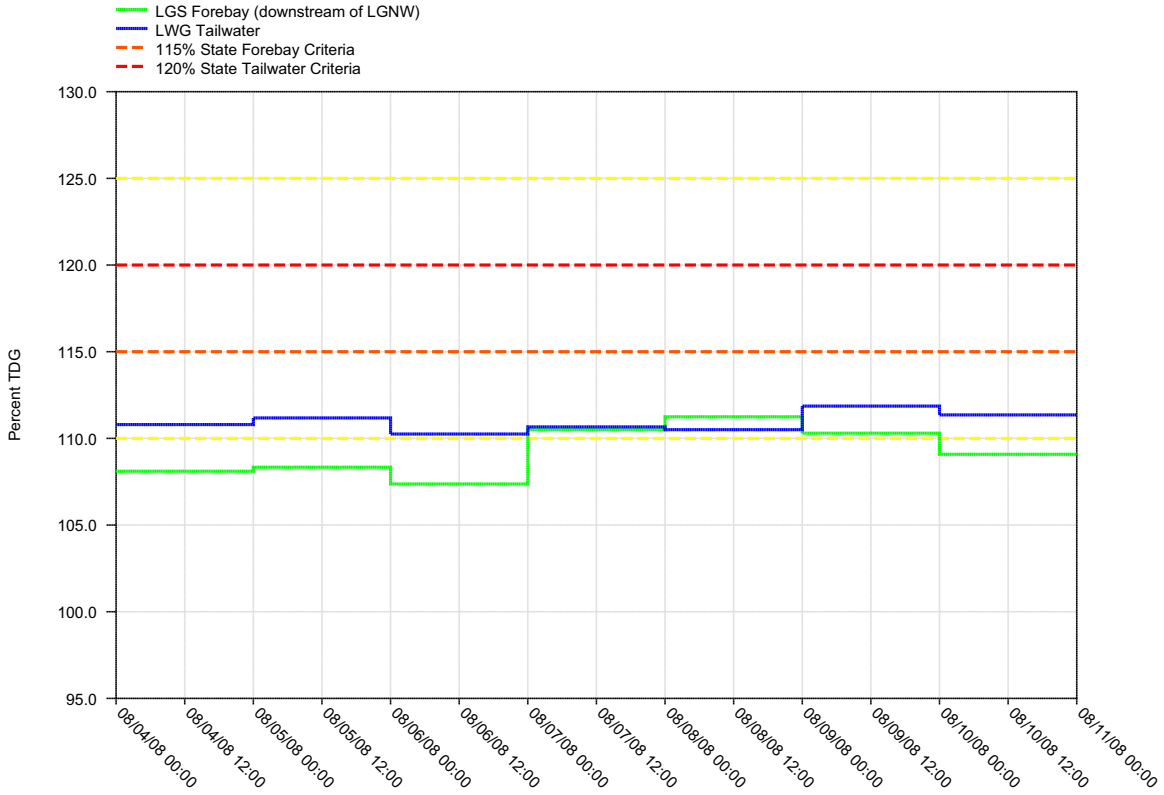


Figure 9.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

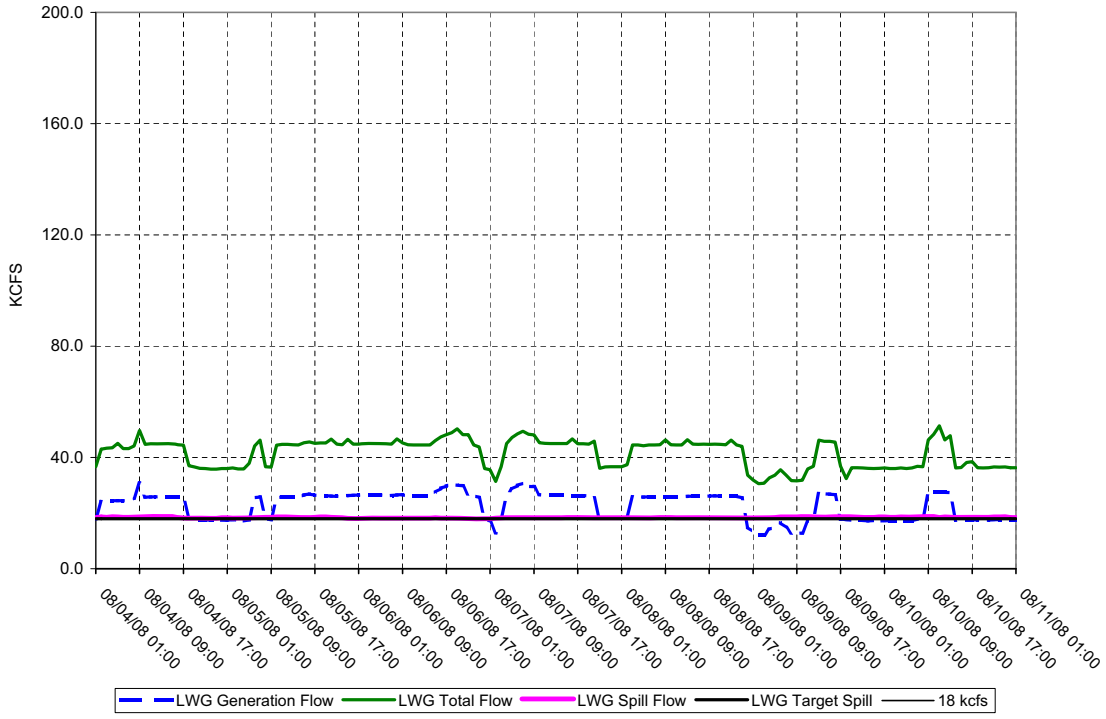
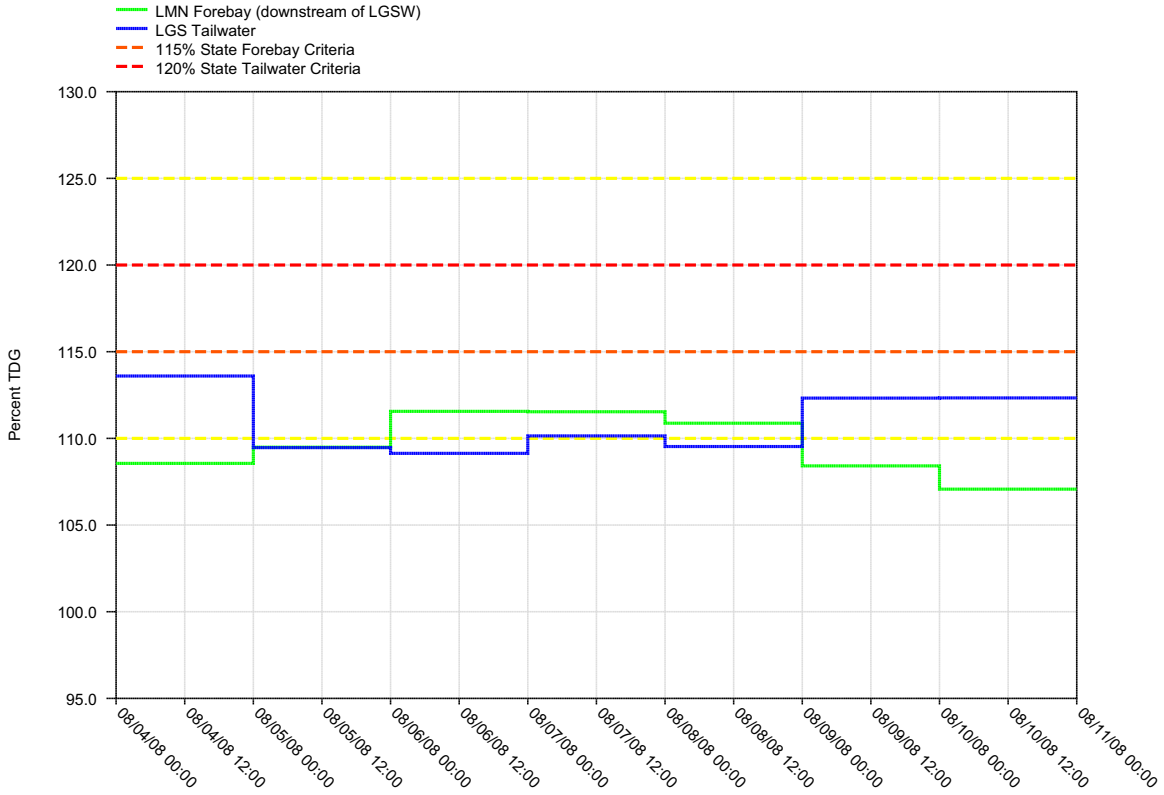


Figure 10.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

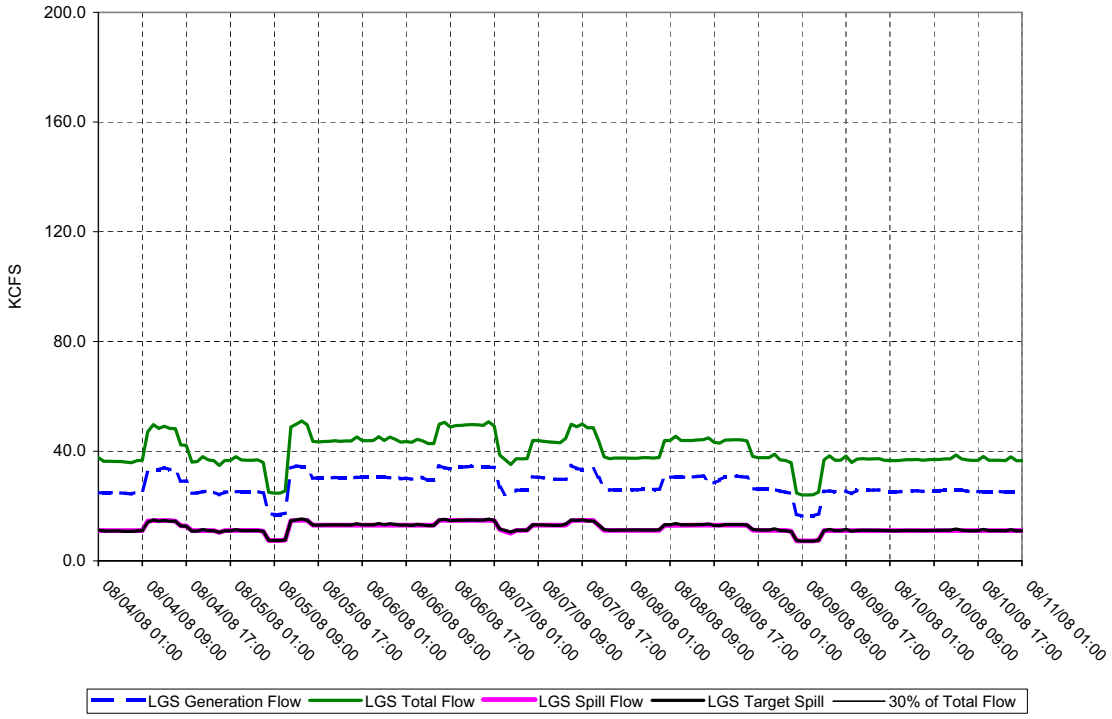
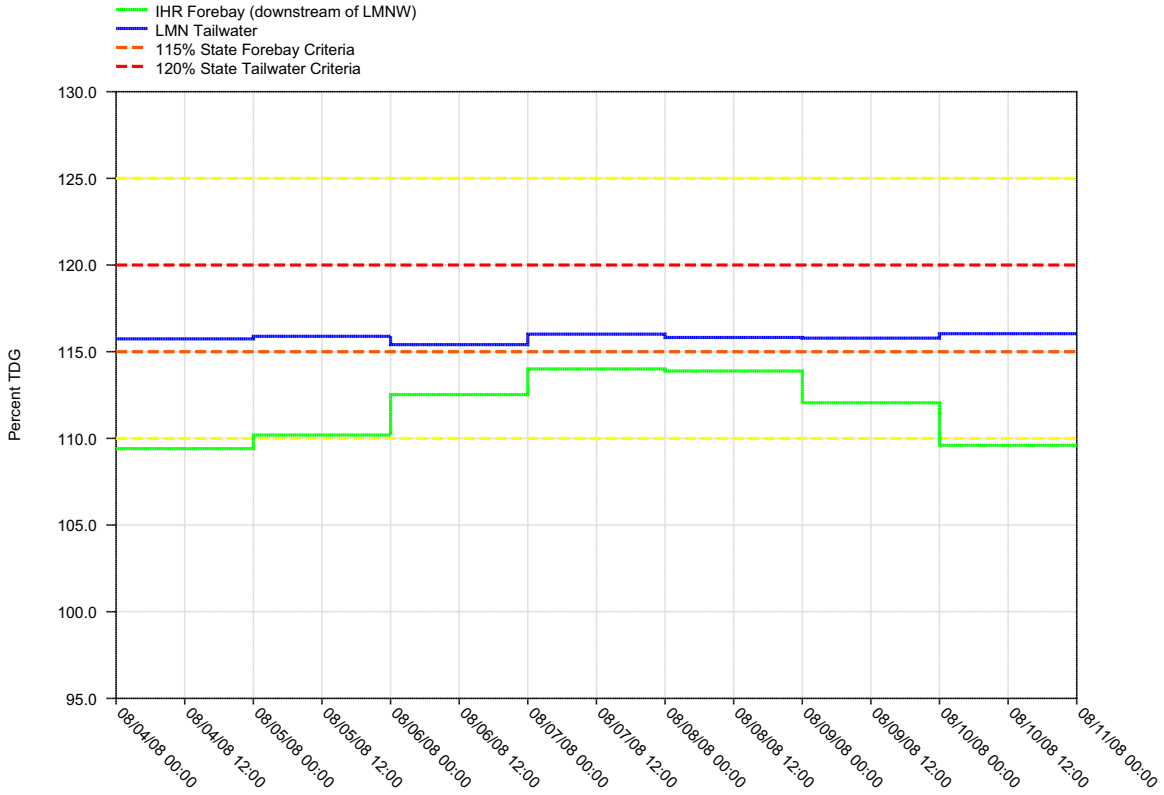


Figure 11.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

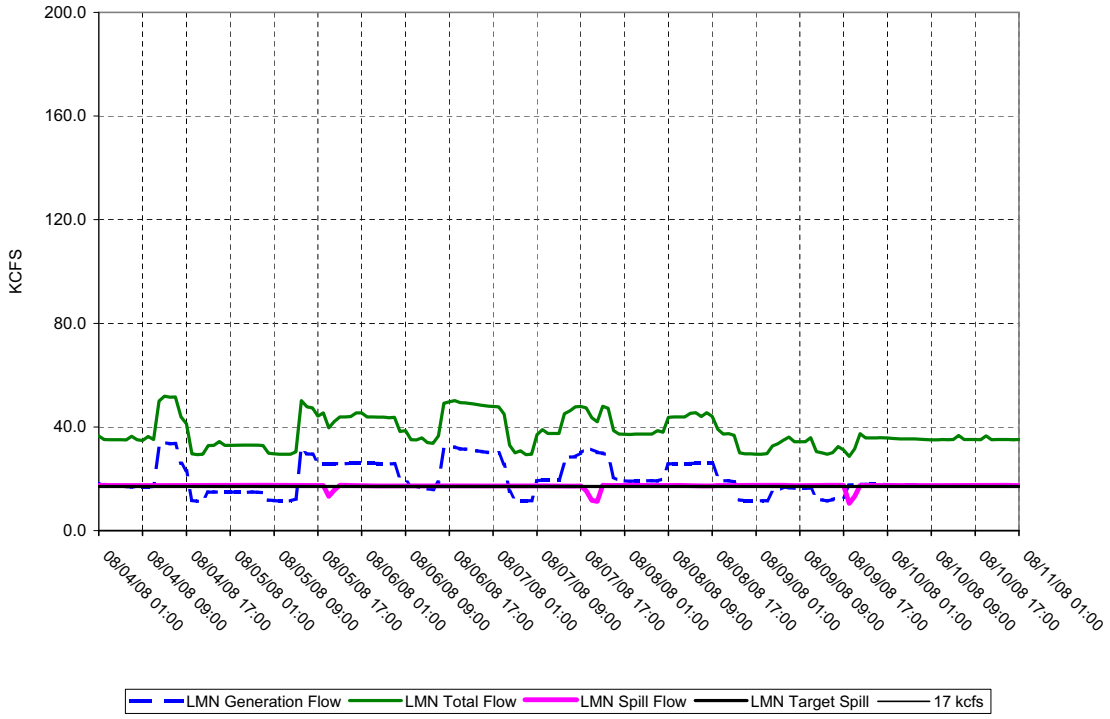
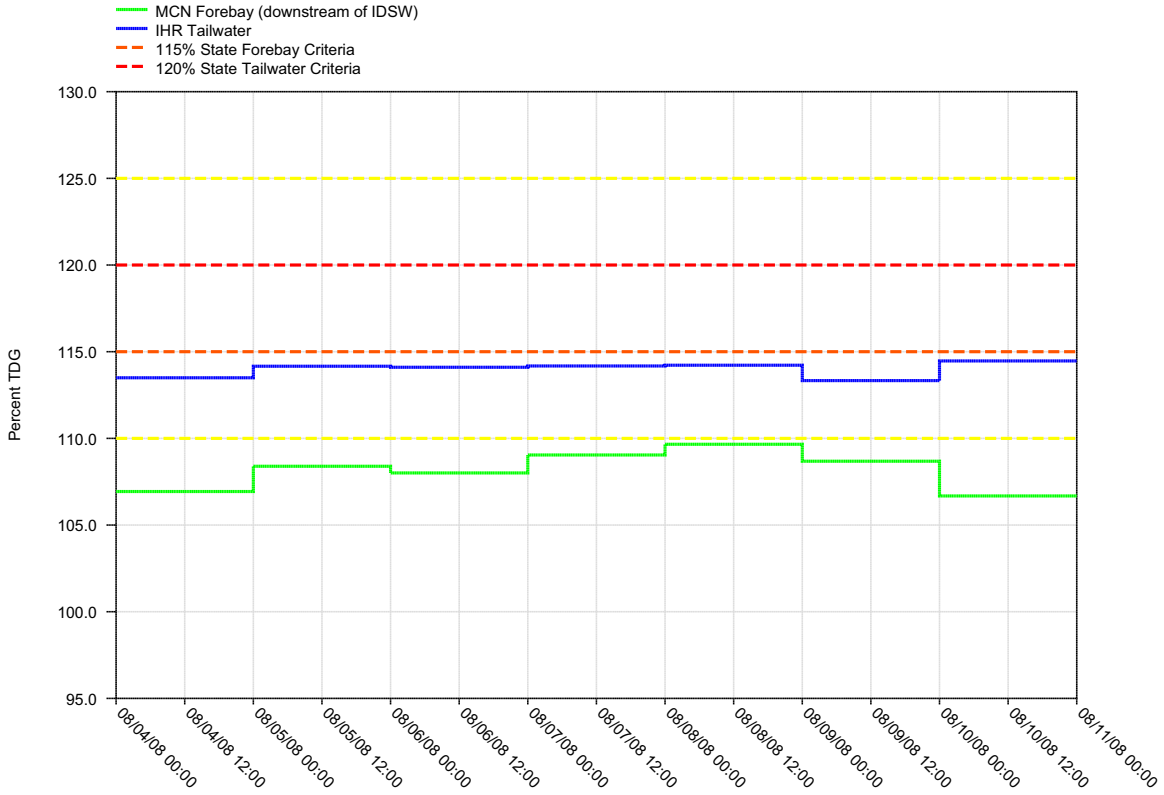


Figure 12.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

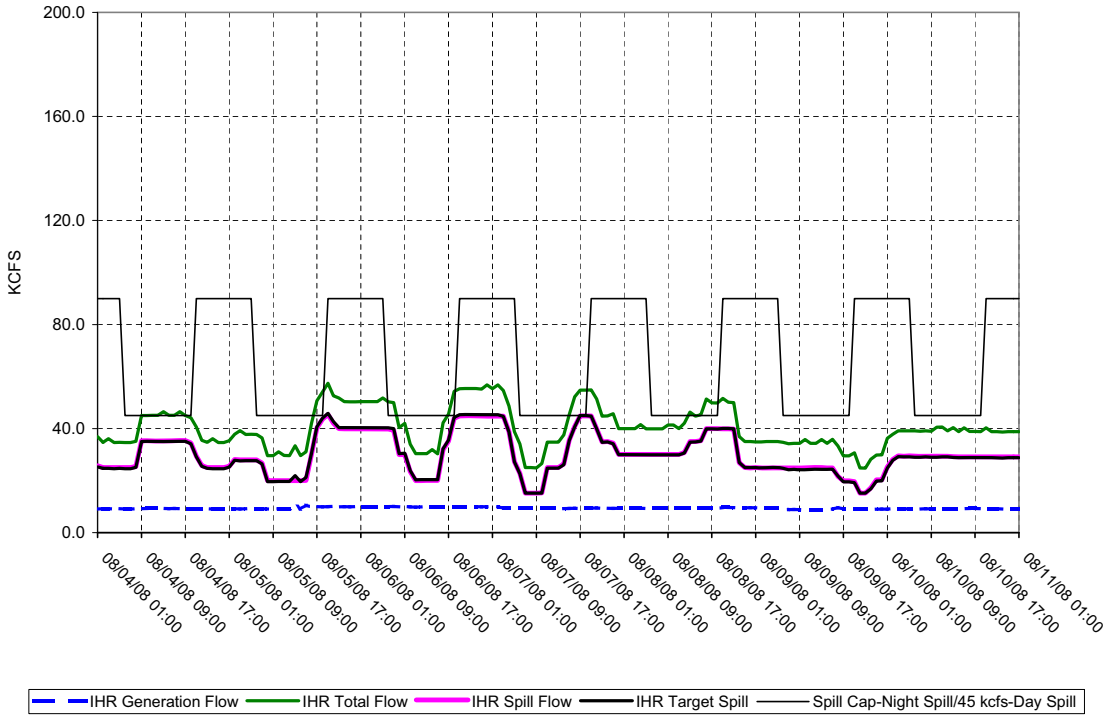
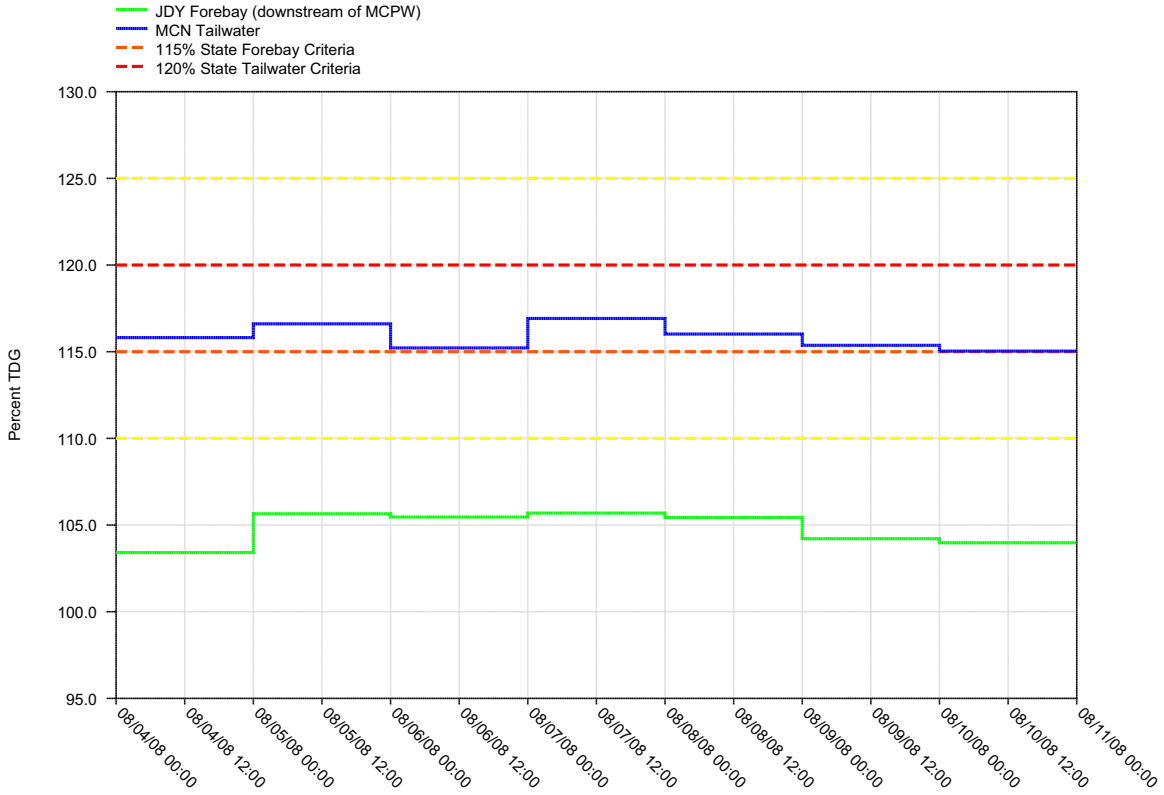


Figure 13.

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

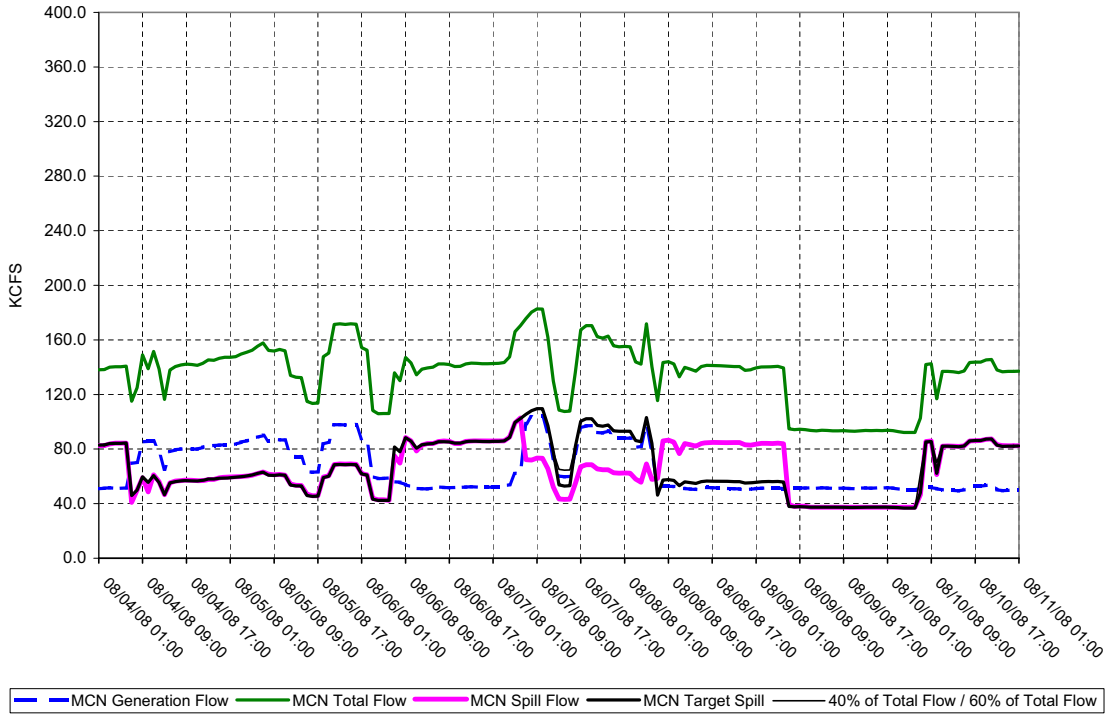
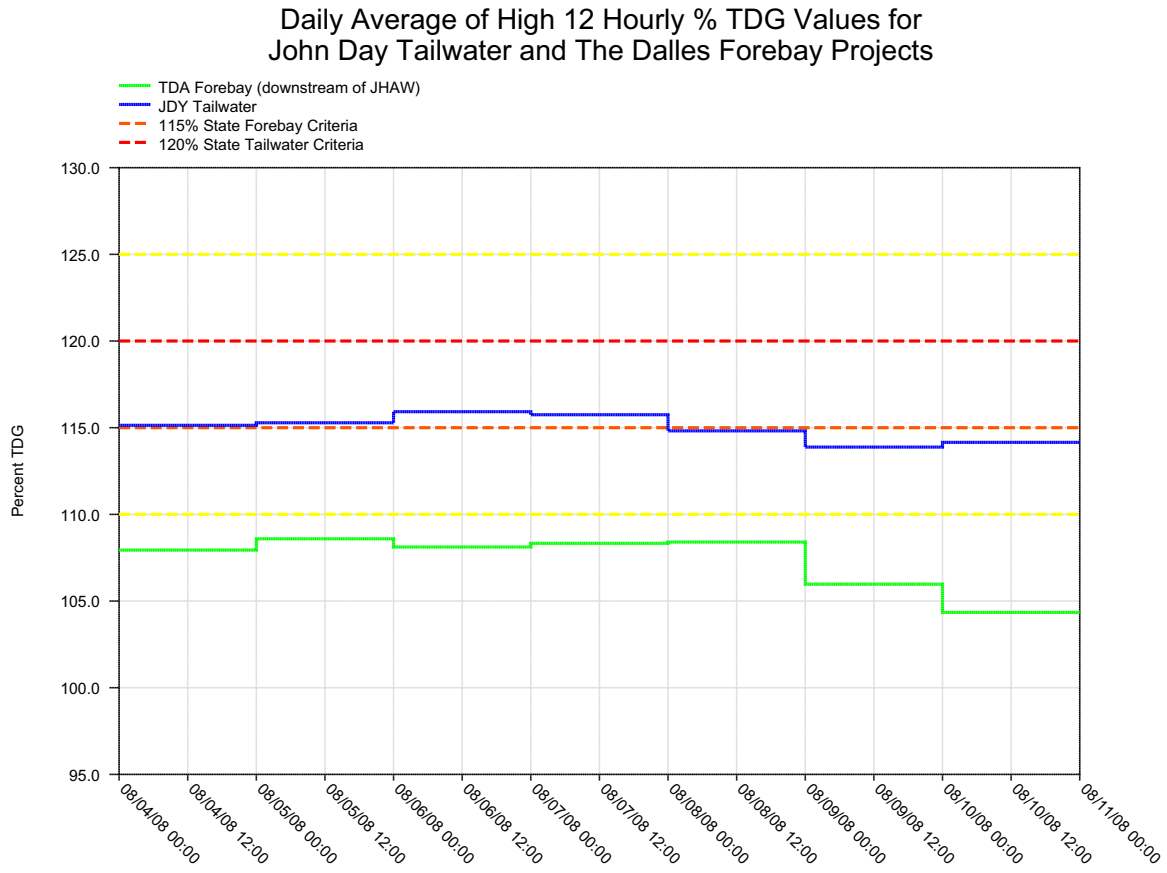


Figure 14.


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/04/08 00:00
08/04/08 12:00
08/05/08 00:00
08/05/08 12:00
08/06/08 00:00
08/06/08 12:00
08/07/08 00:00
08/07/08 12:00
08/08/08 00:00
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08/10/08 12:00
08/11/08 00:00

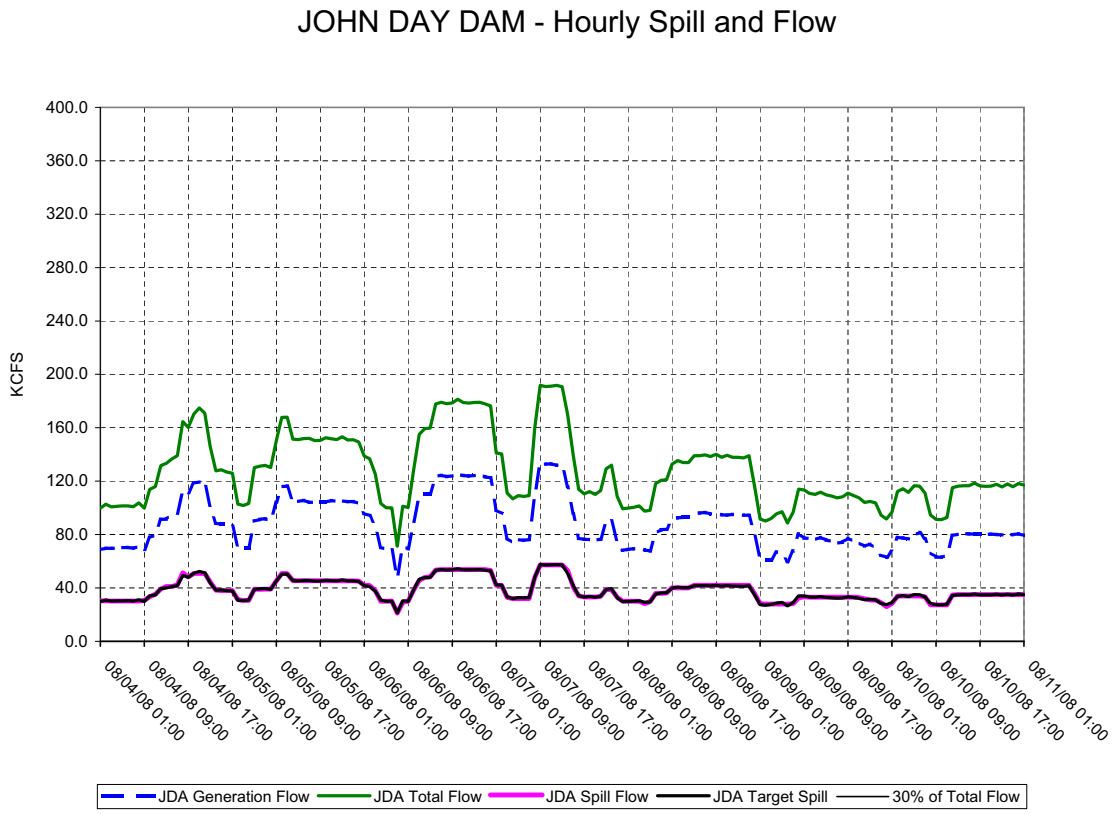
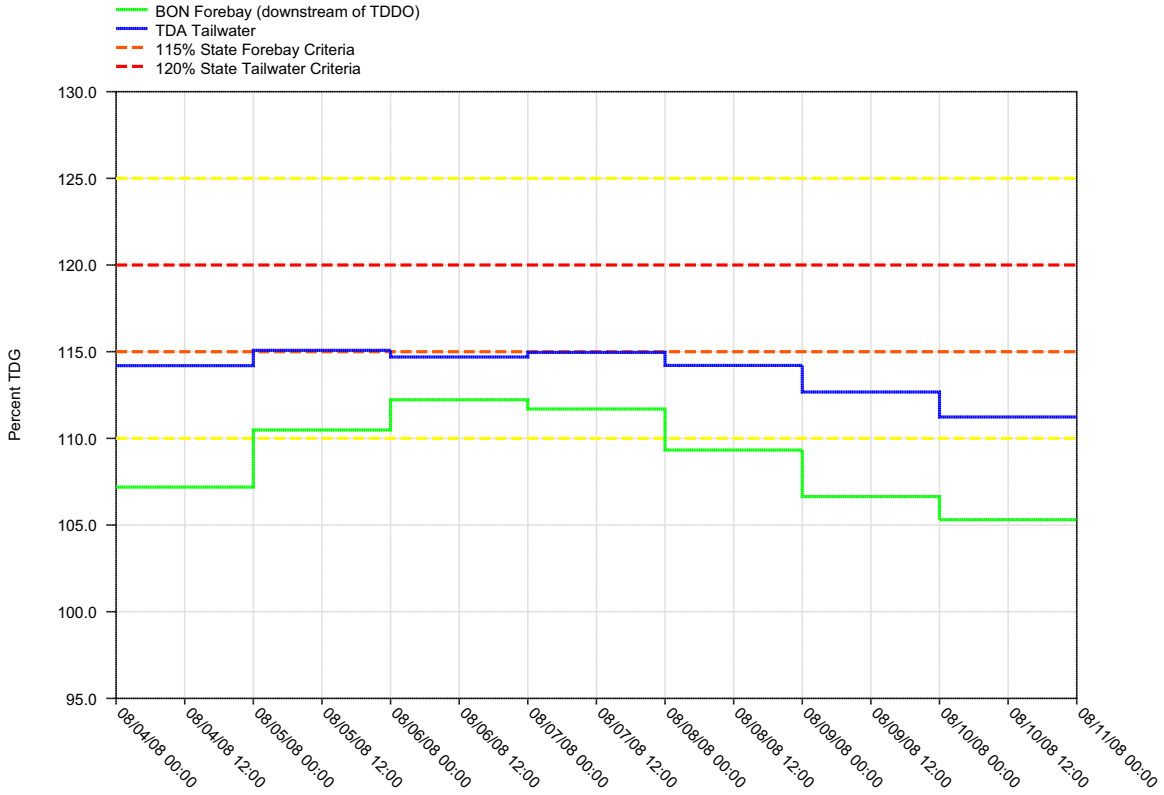

JOHN DAY DAM - Hourly Spill and Flow
KCFS
400.0
360.0
320.0
280.0
240.0
200.0
160.0
120.0
80.0
40.0
0.0
08/04/08 01:00
08/04/08 09:00
08/04/08 17:00
08/05/08 01:00
08/05/08 09:00
08/05/08 17:00
08/06/08 01:00
08/06/08 09:00
08/06/08 17:00
08/07/08 01:00
08/07/08 09:00
08/07/08 17:00
08/08/08 01:00
08/08/08 09:00
08/08/08 17:00
08/09/08 01:00
08/09/08 09:00
08/09/08 17:00
08/10/08 01:00
08/10/08 09:00
08/10/08 17:00
08/11/08 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 15.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

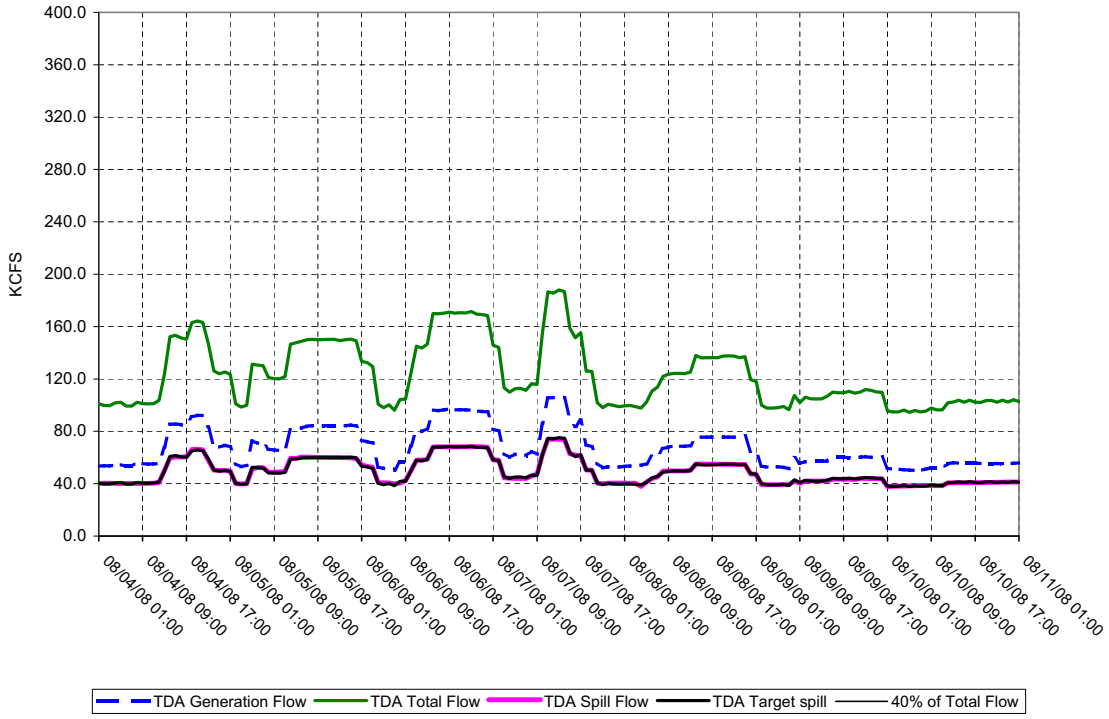
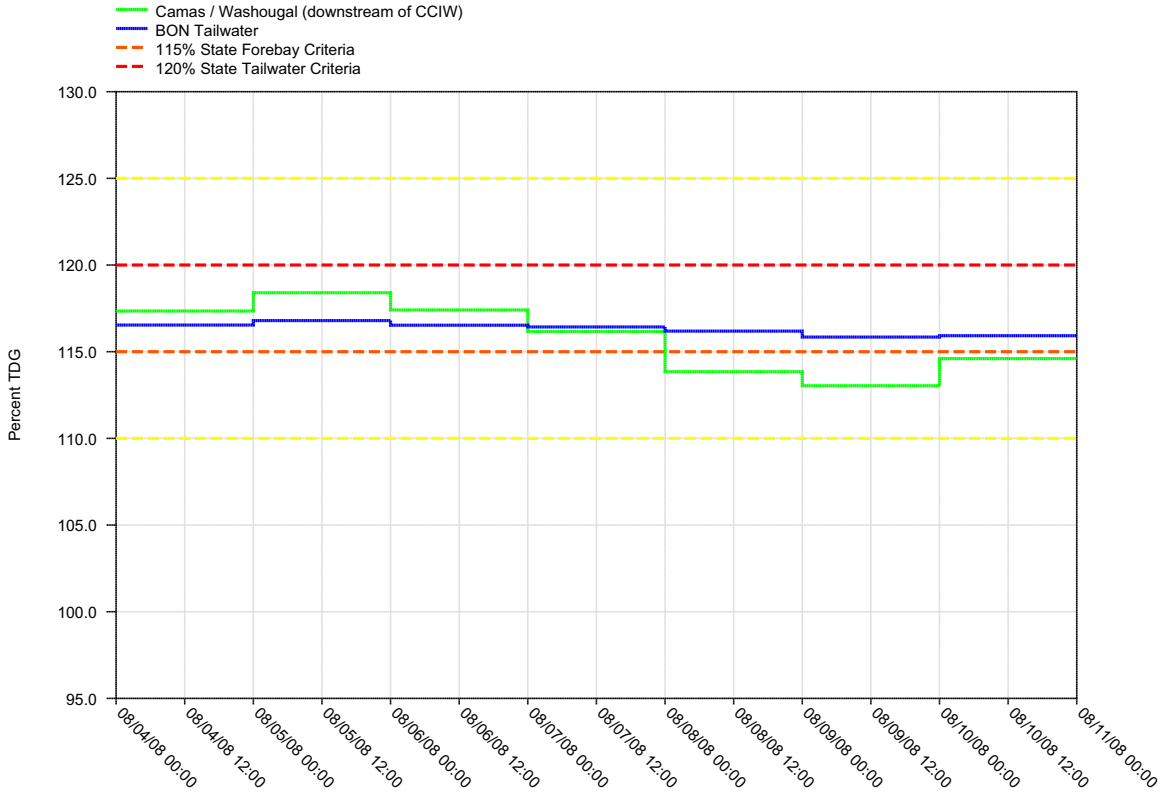


Figure 16.

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

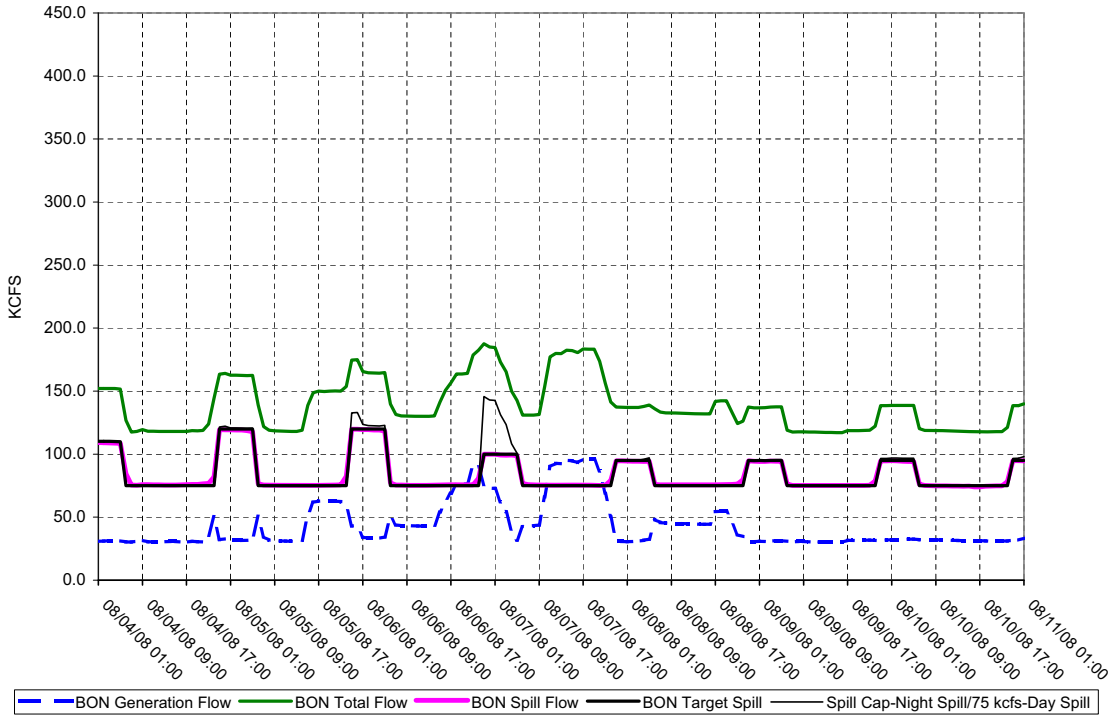
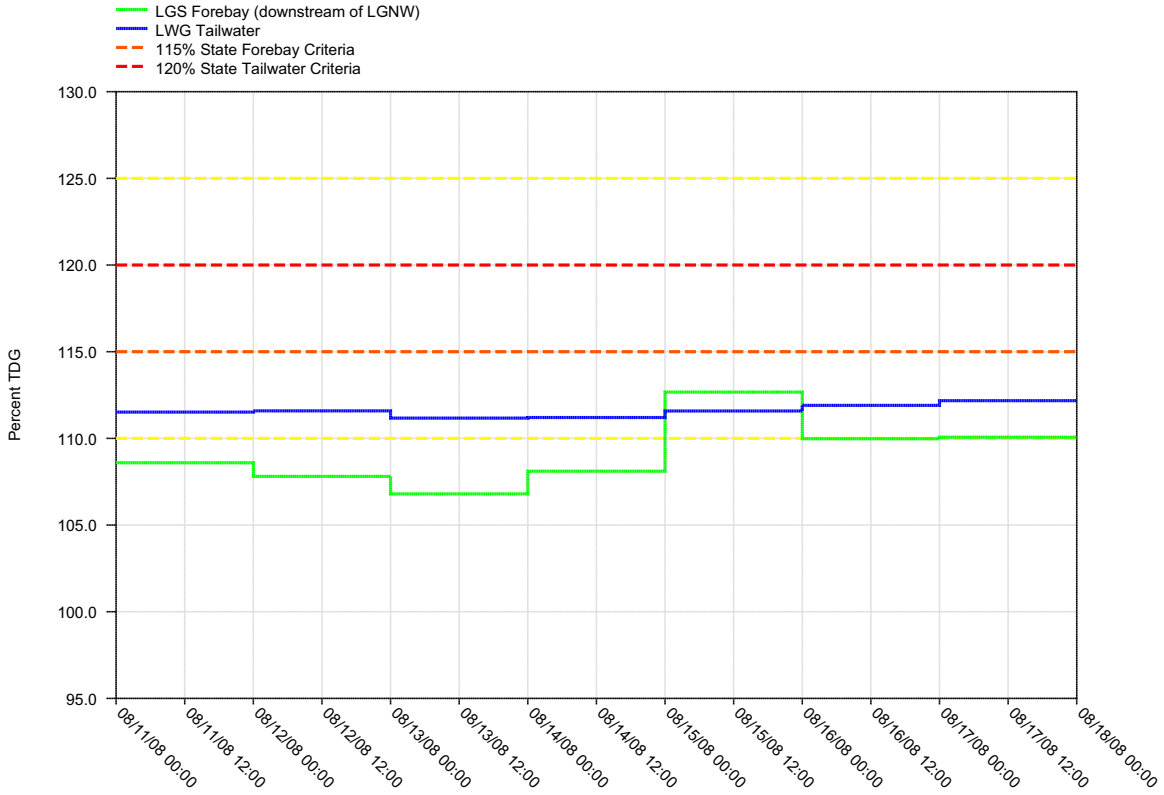


Figure 17.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

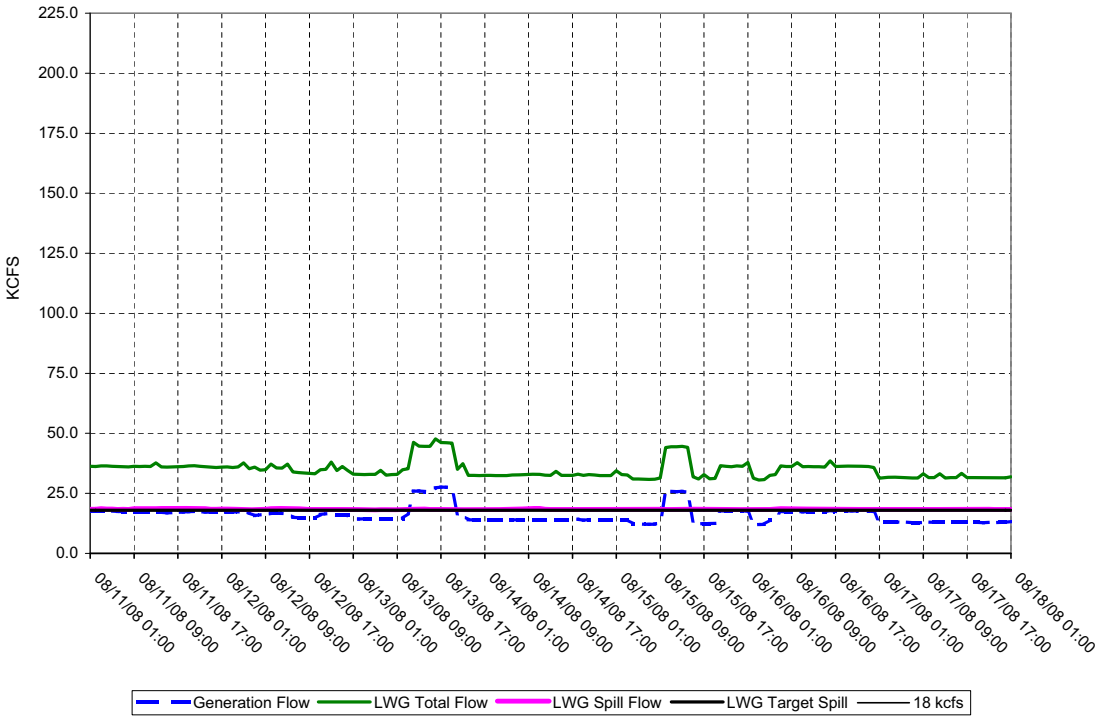
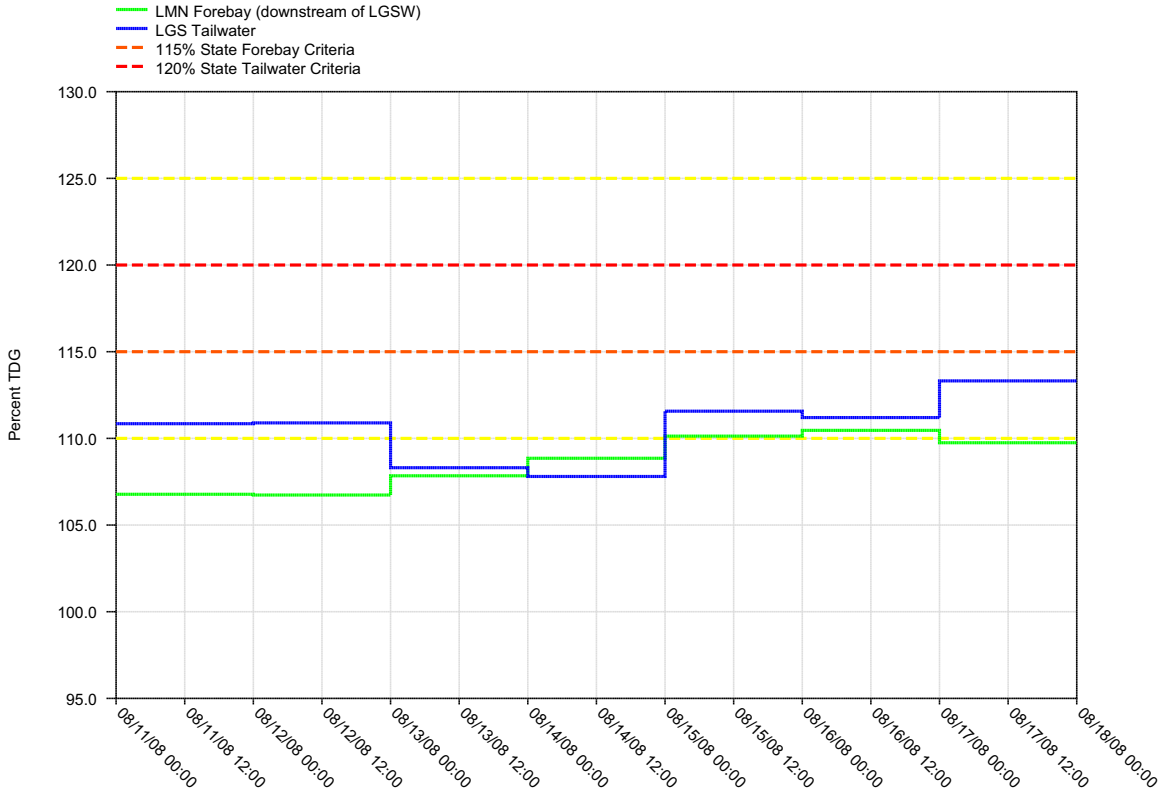


Figure 18.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

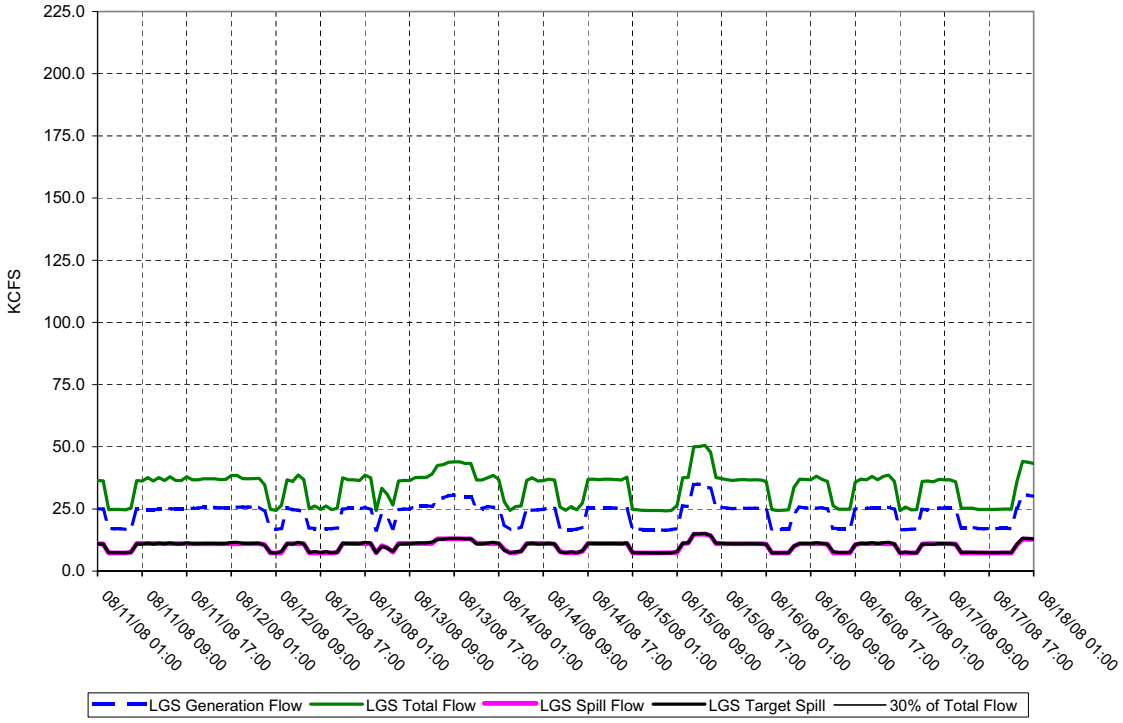
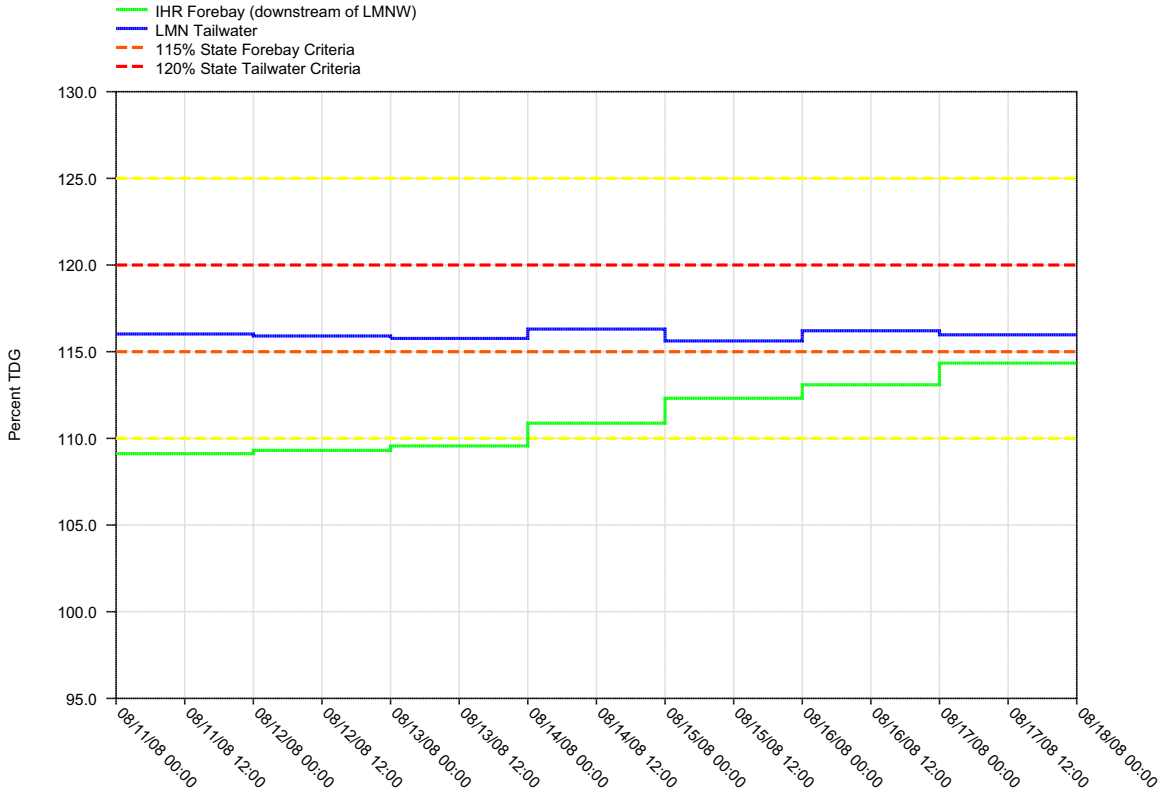


Figure 19.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

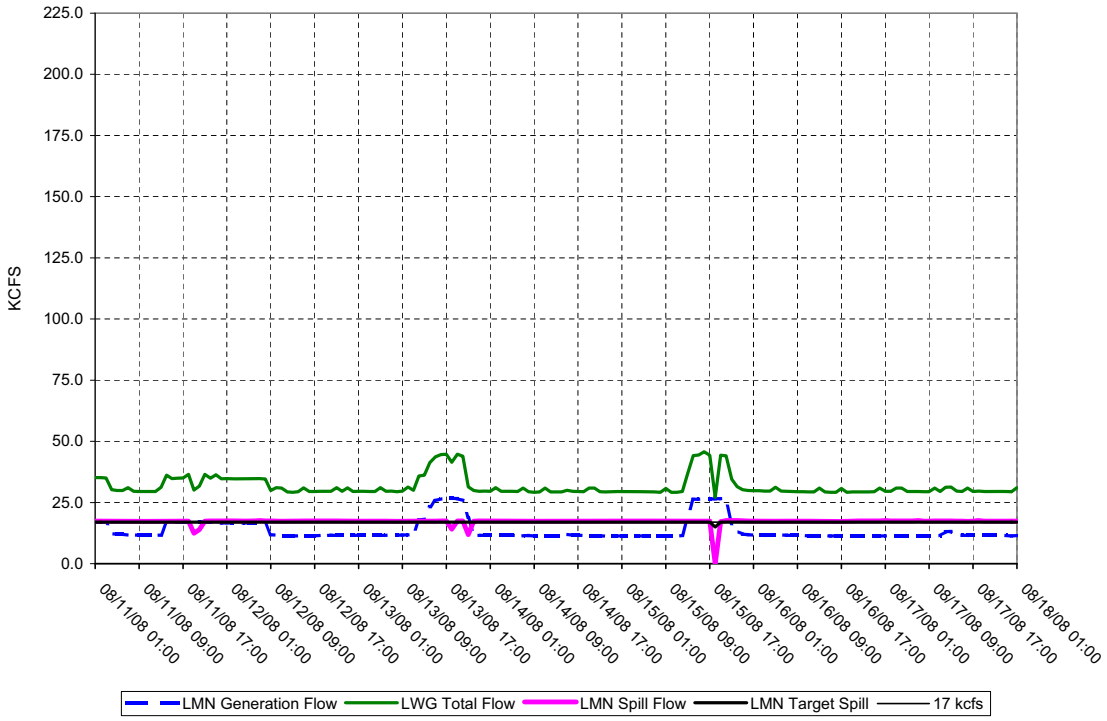
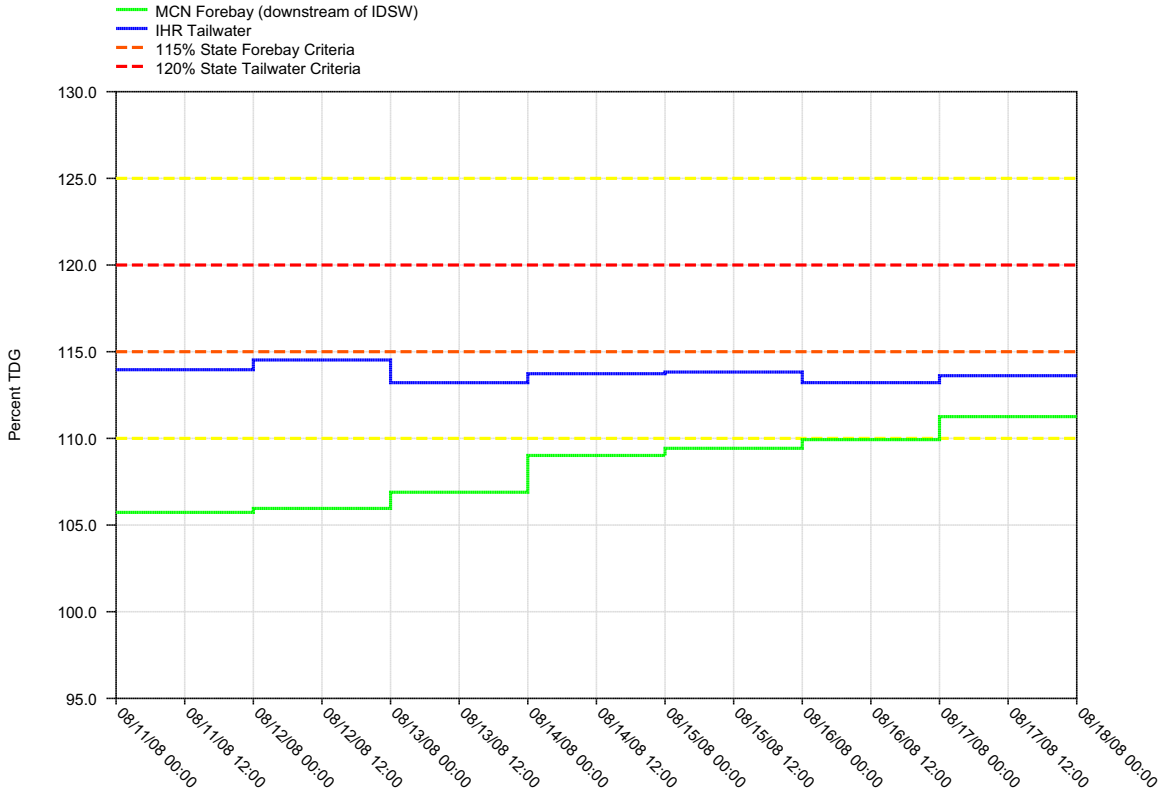


Figure 20.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

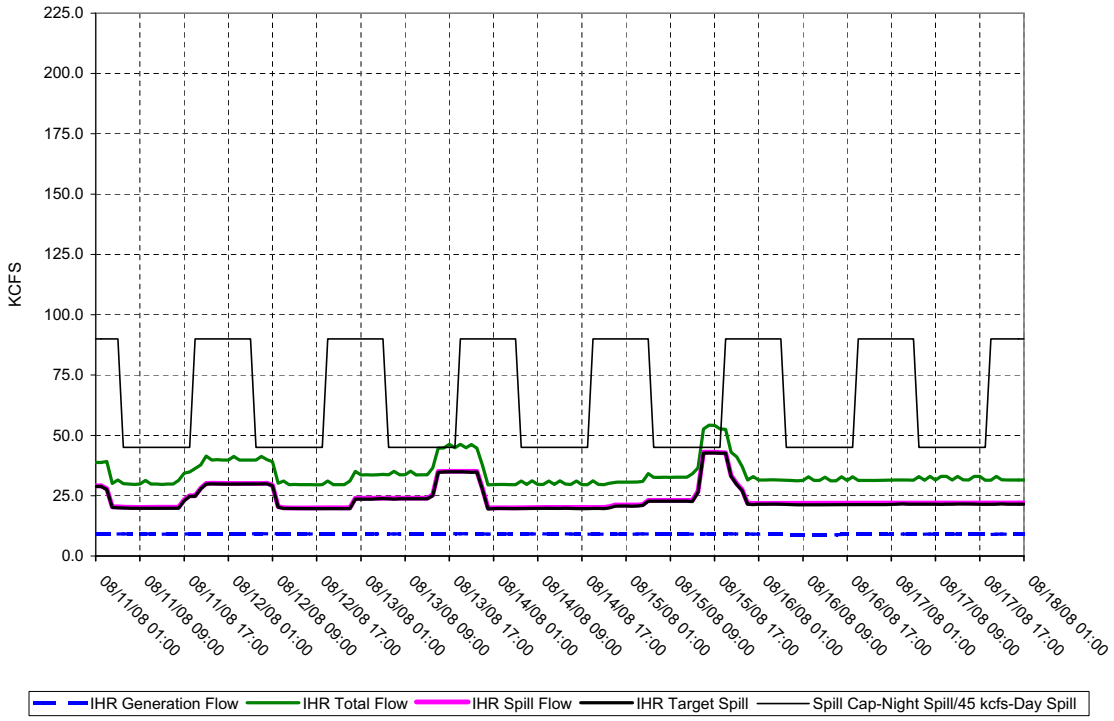
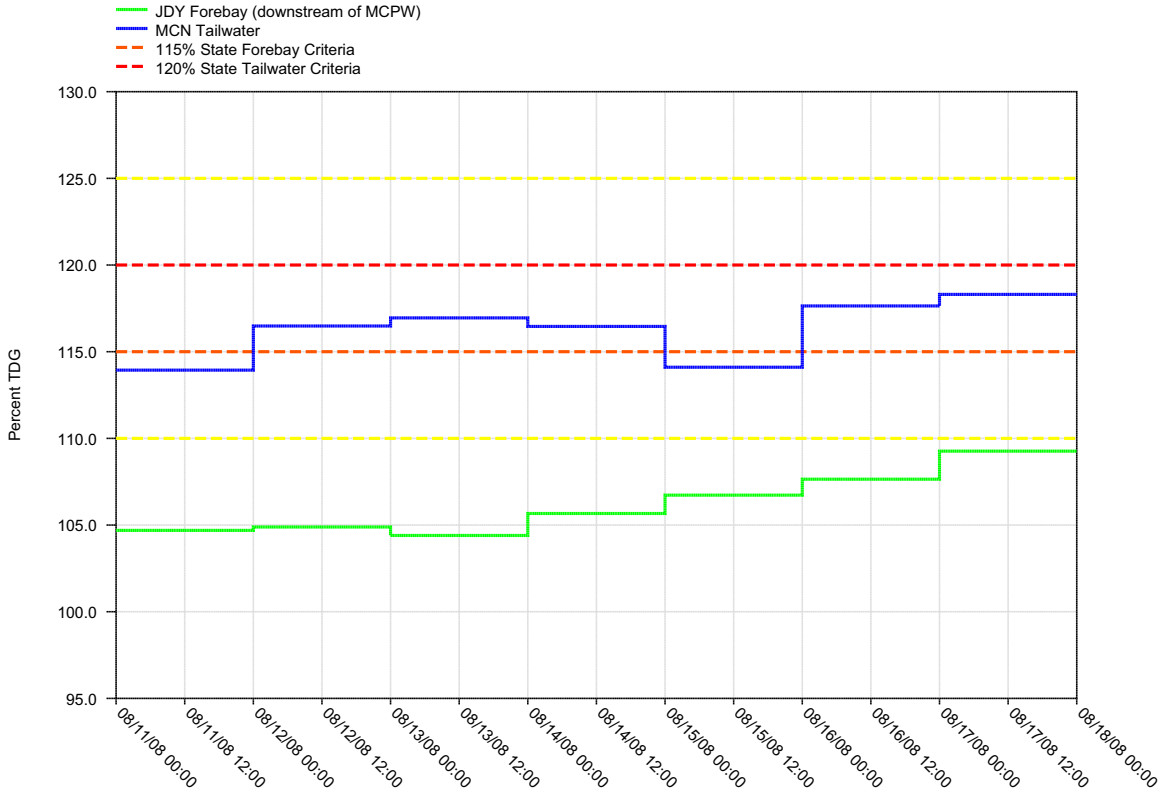


Figure 21.

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

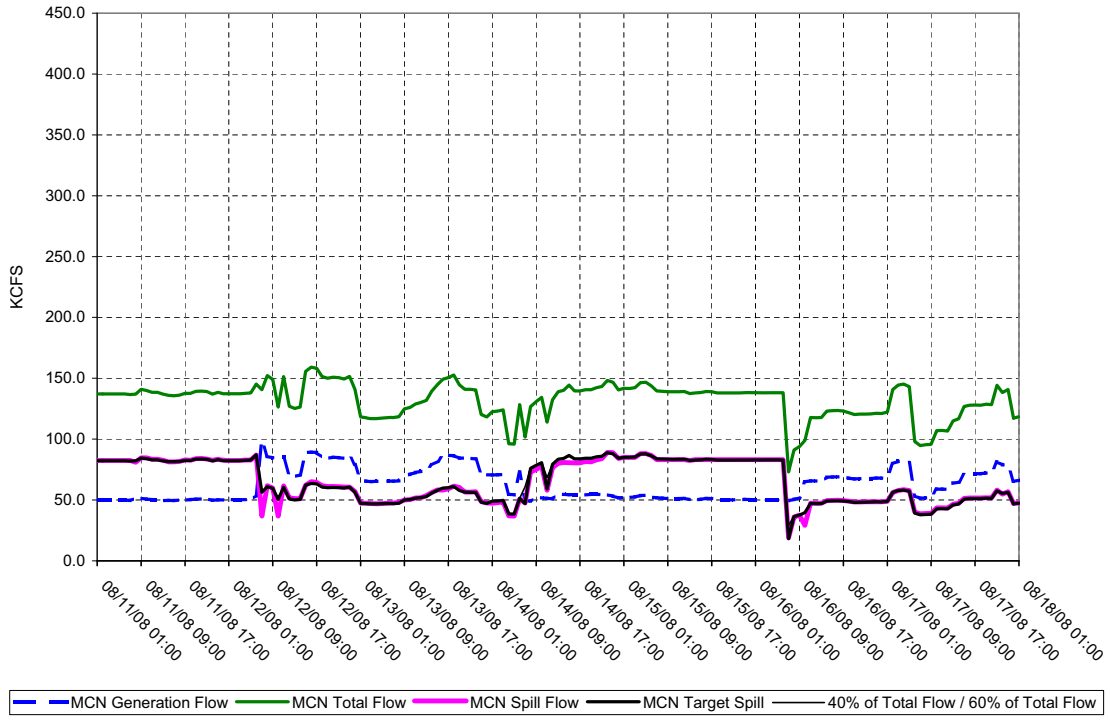
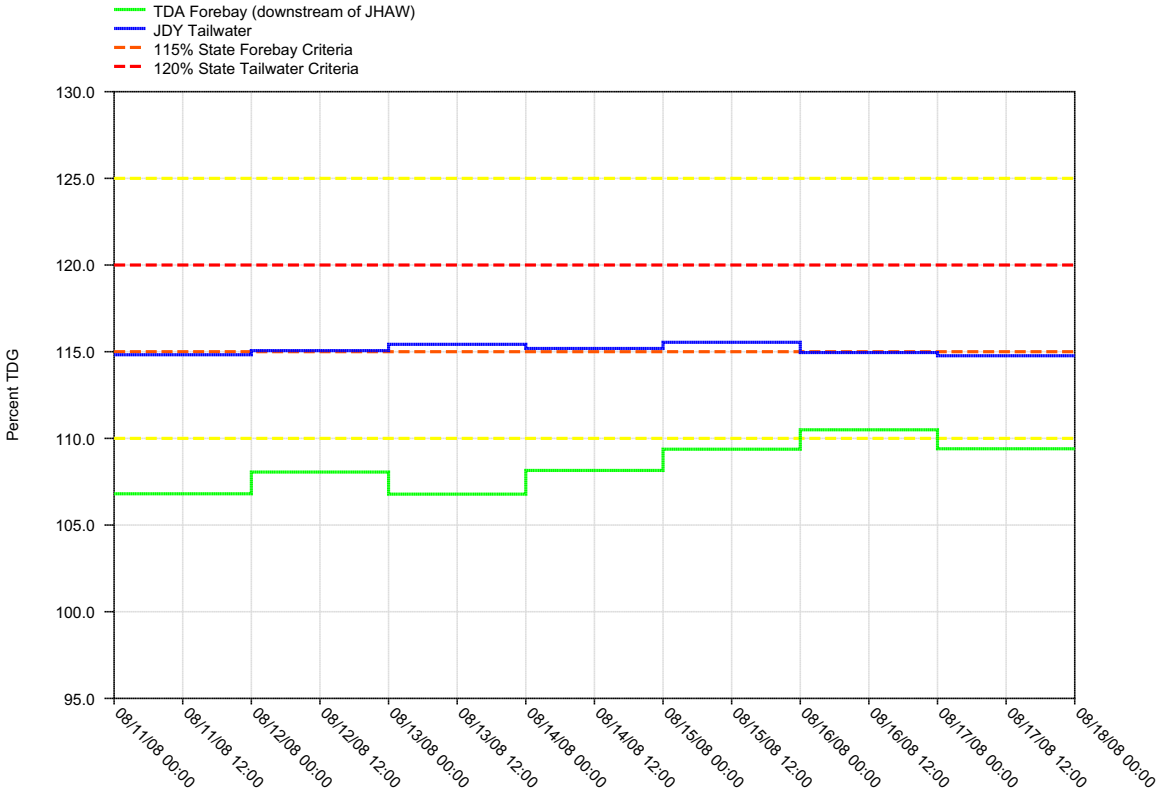


Figure 22.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

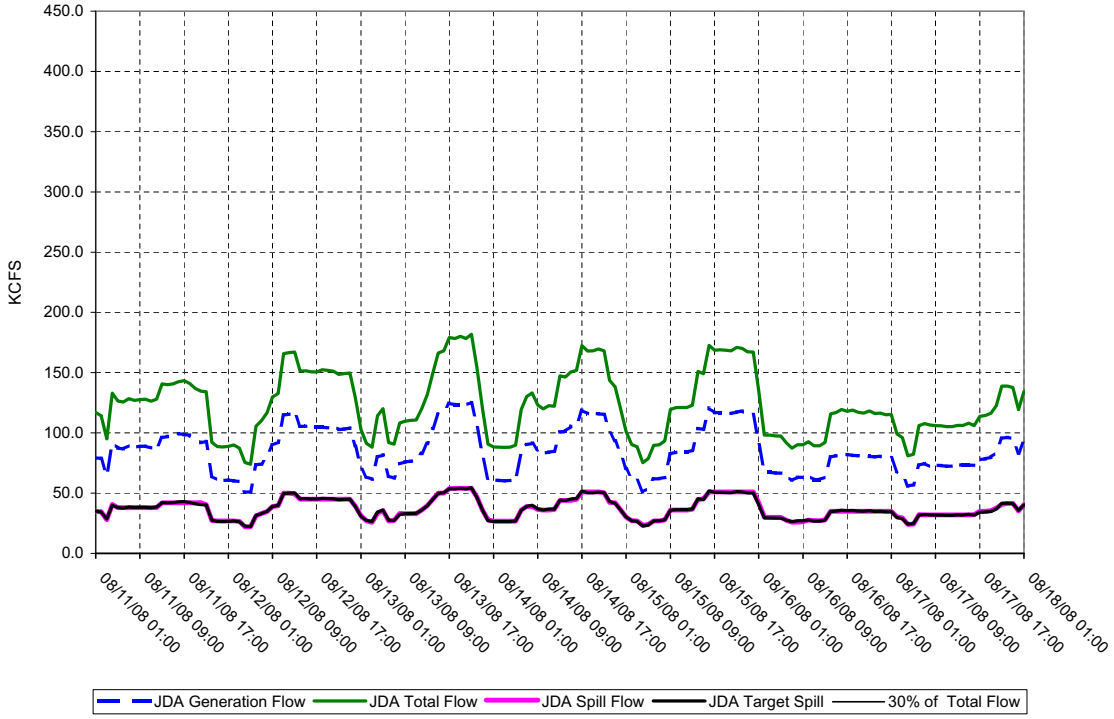
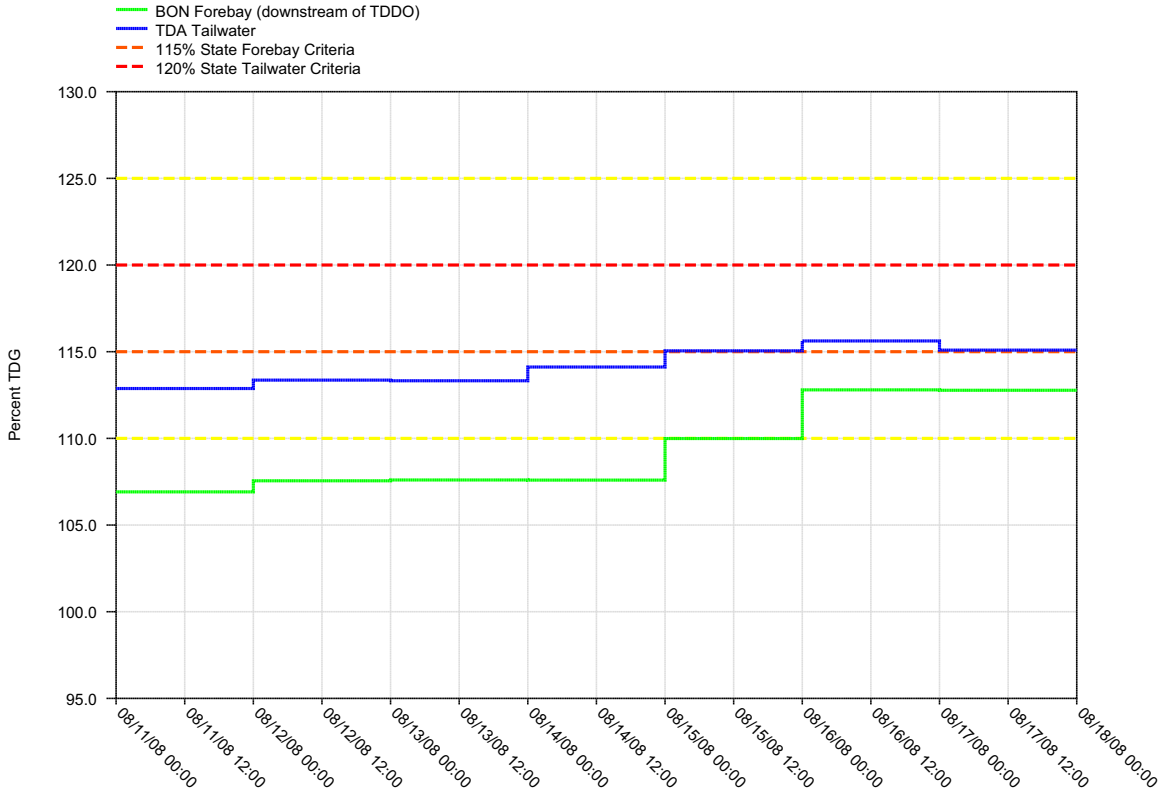


Figure 23.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

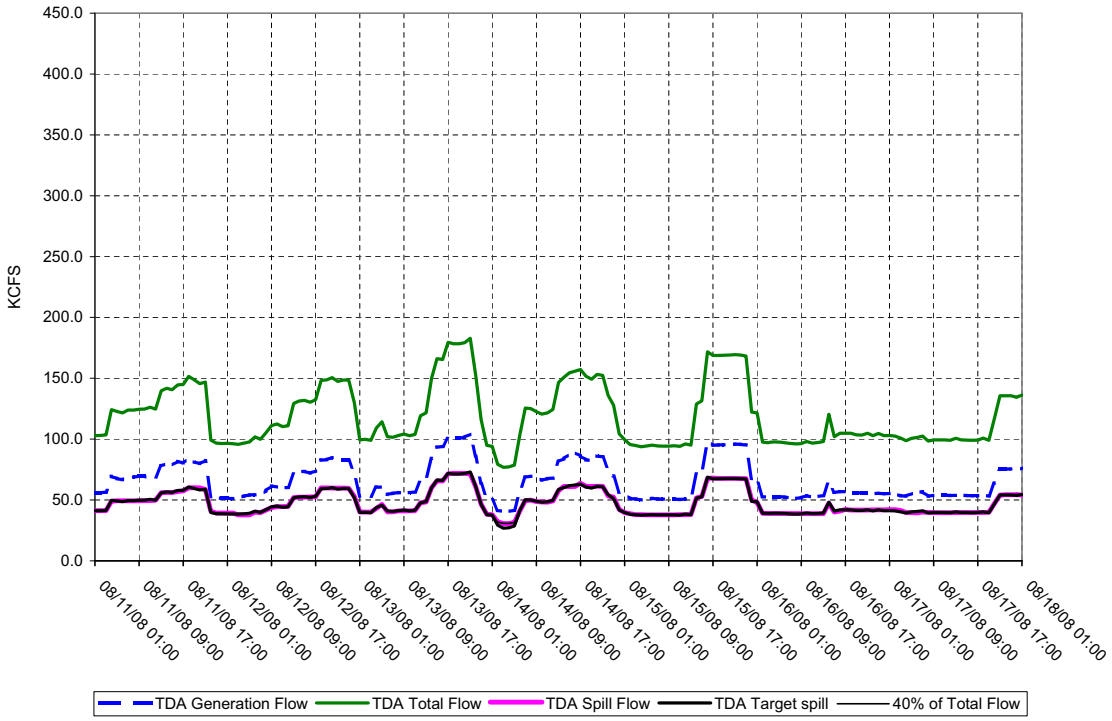
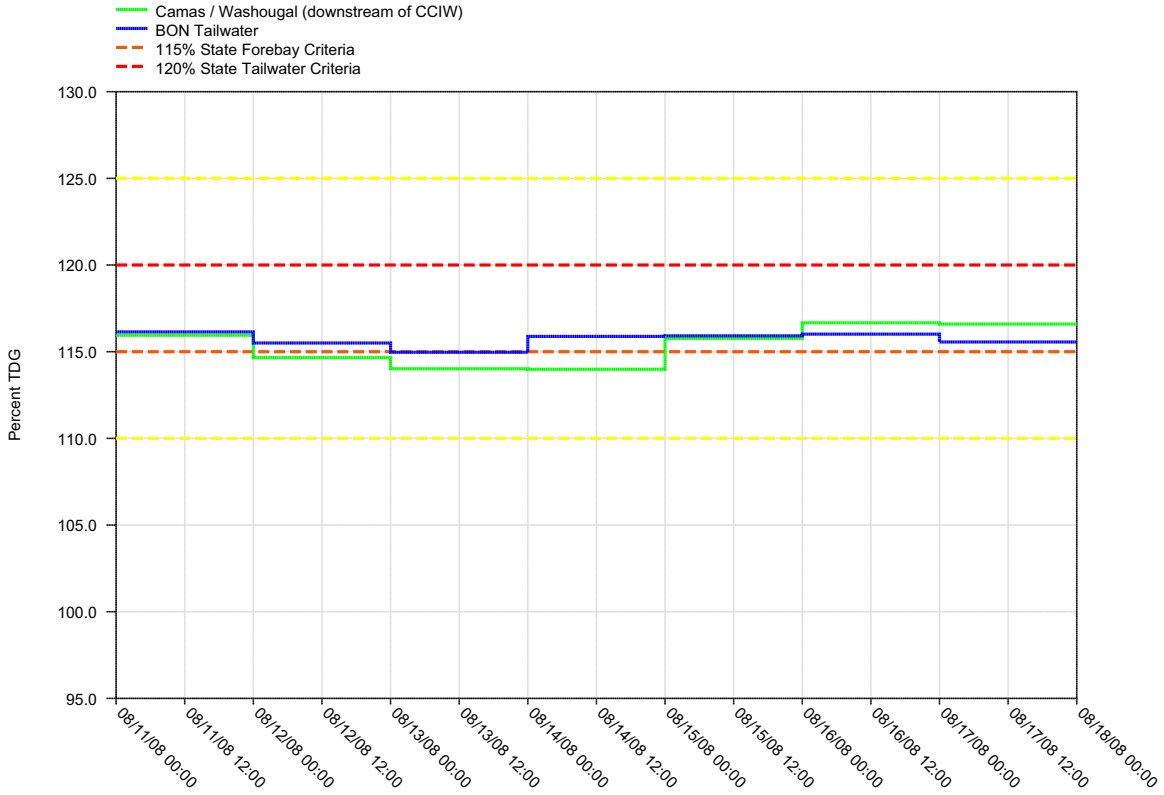


Figure 24.

Daily Average of High 12 Hourly % TDG Values for Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

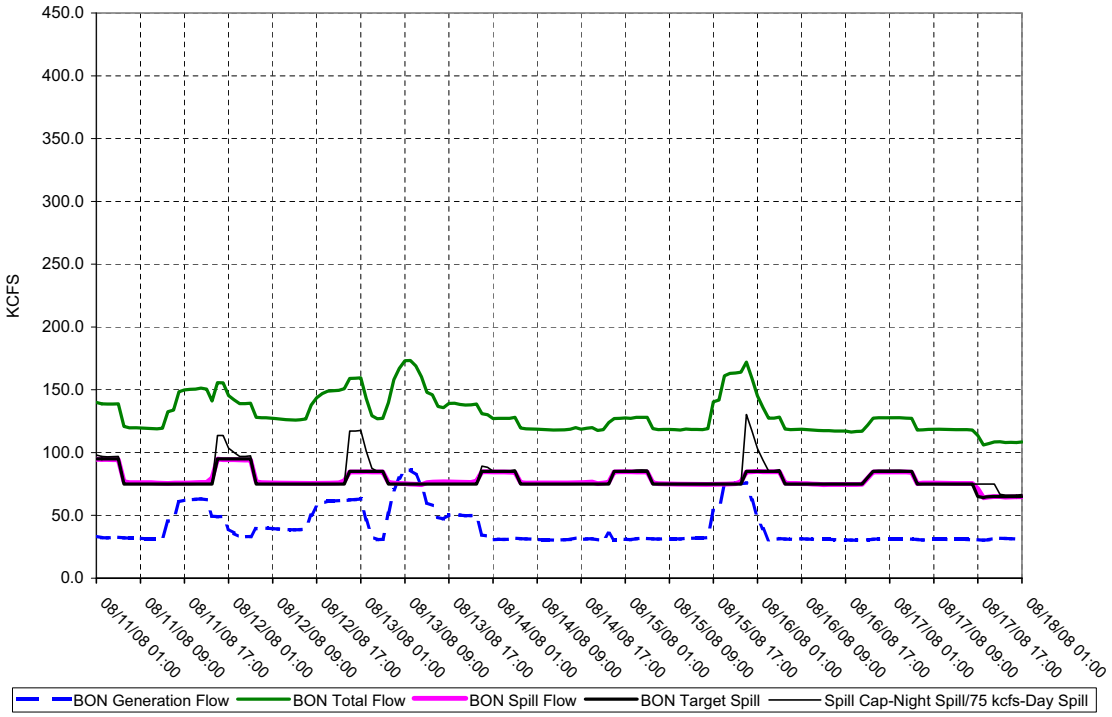
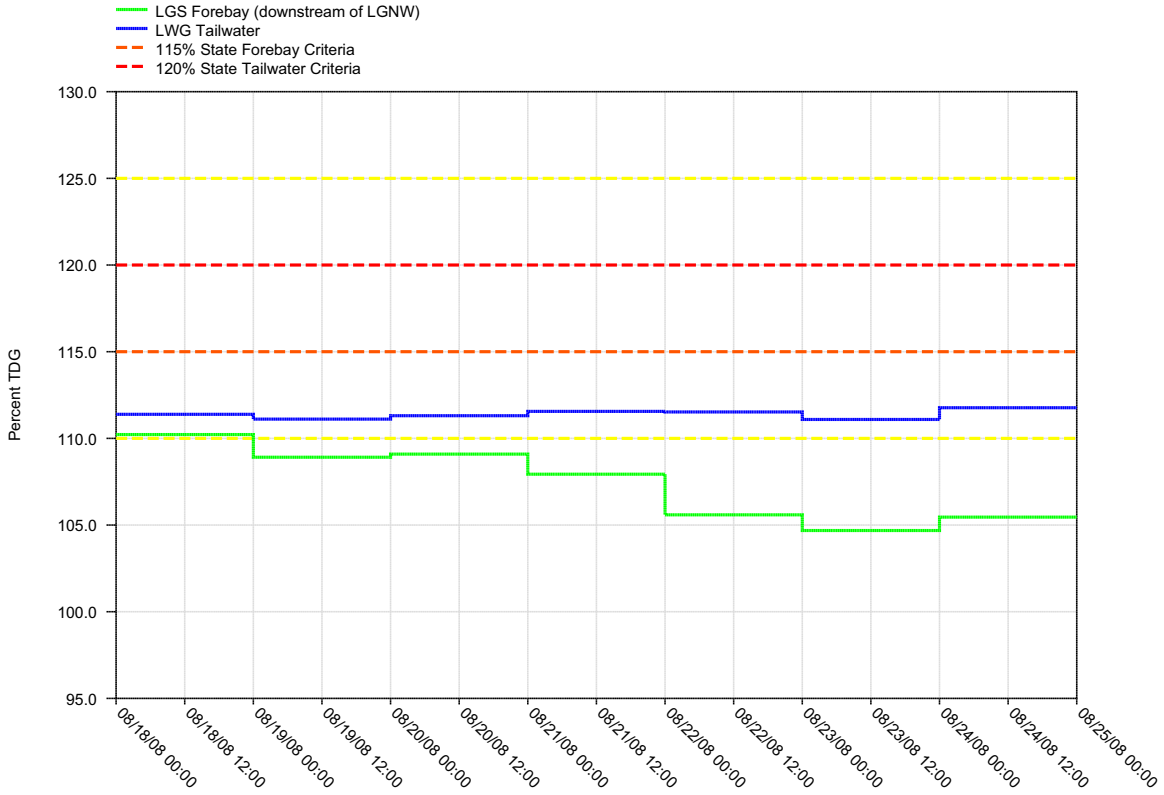


Figure 25.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

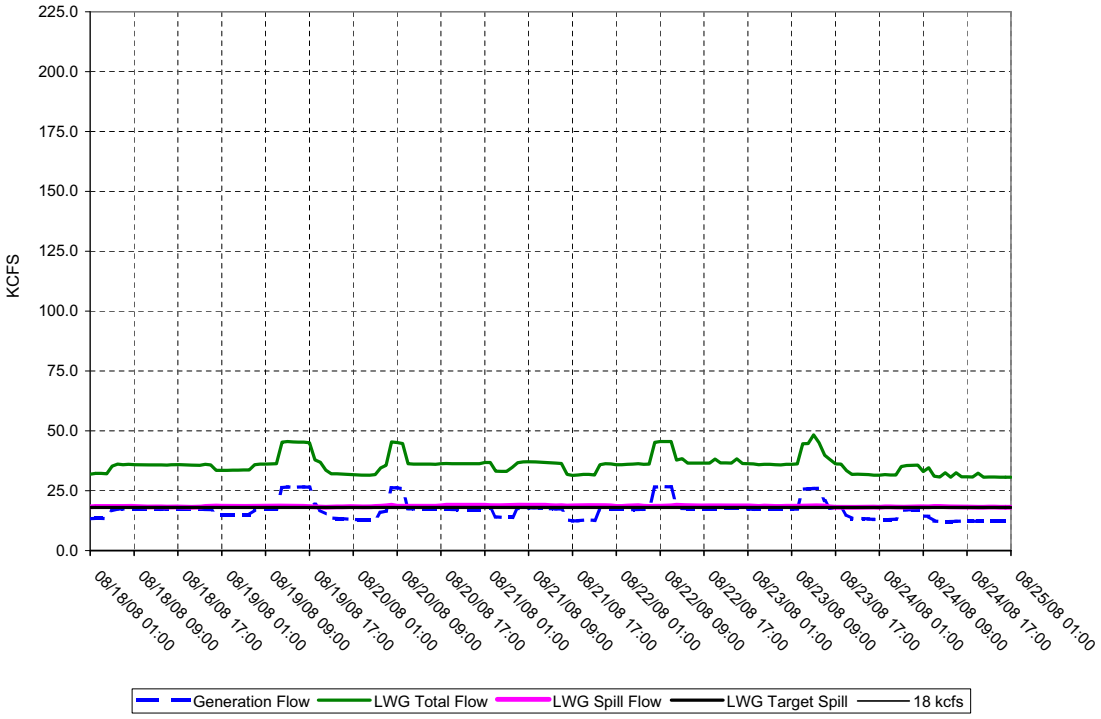
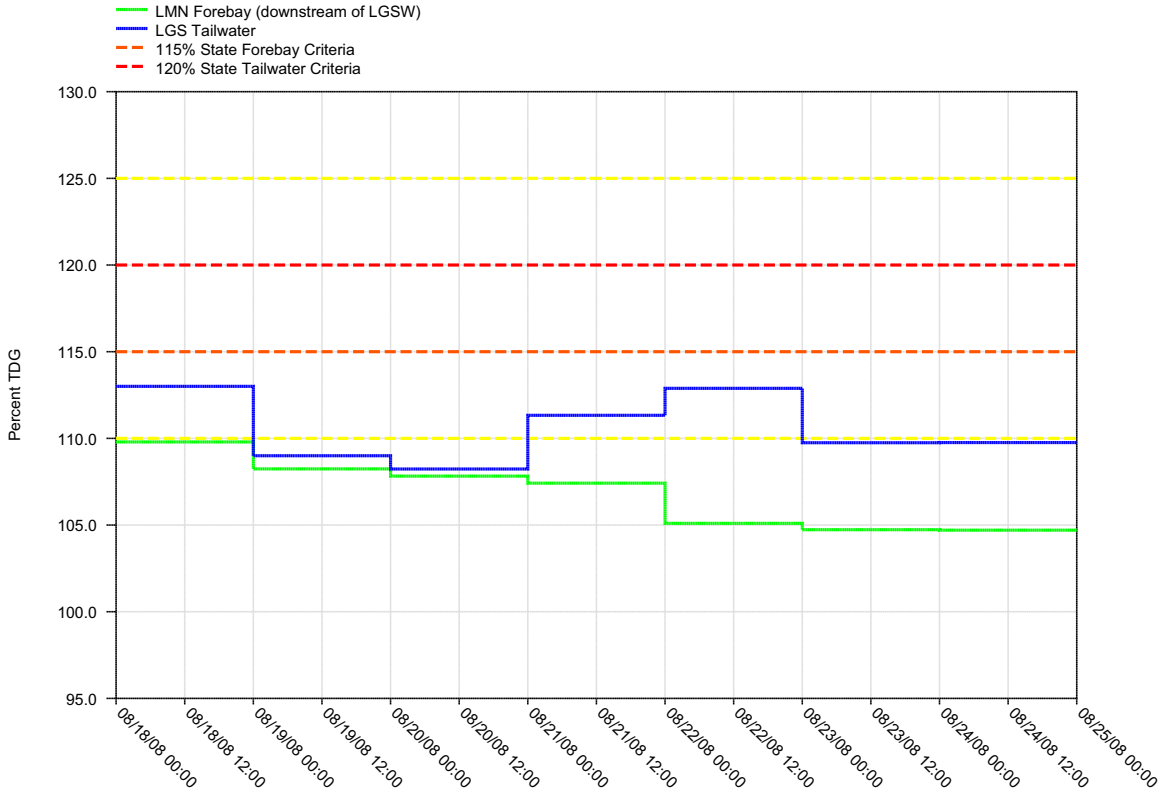


Figure 26.

Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects



LITTLE GOOSE DAM - Hourly Spill and Flow

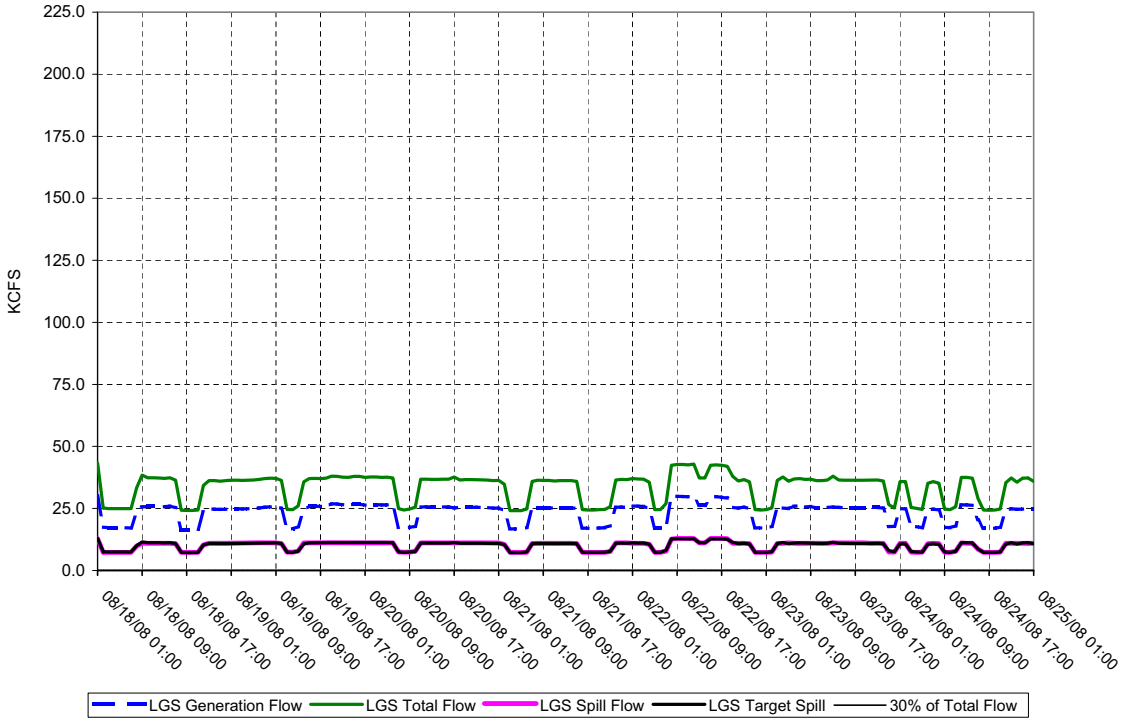
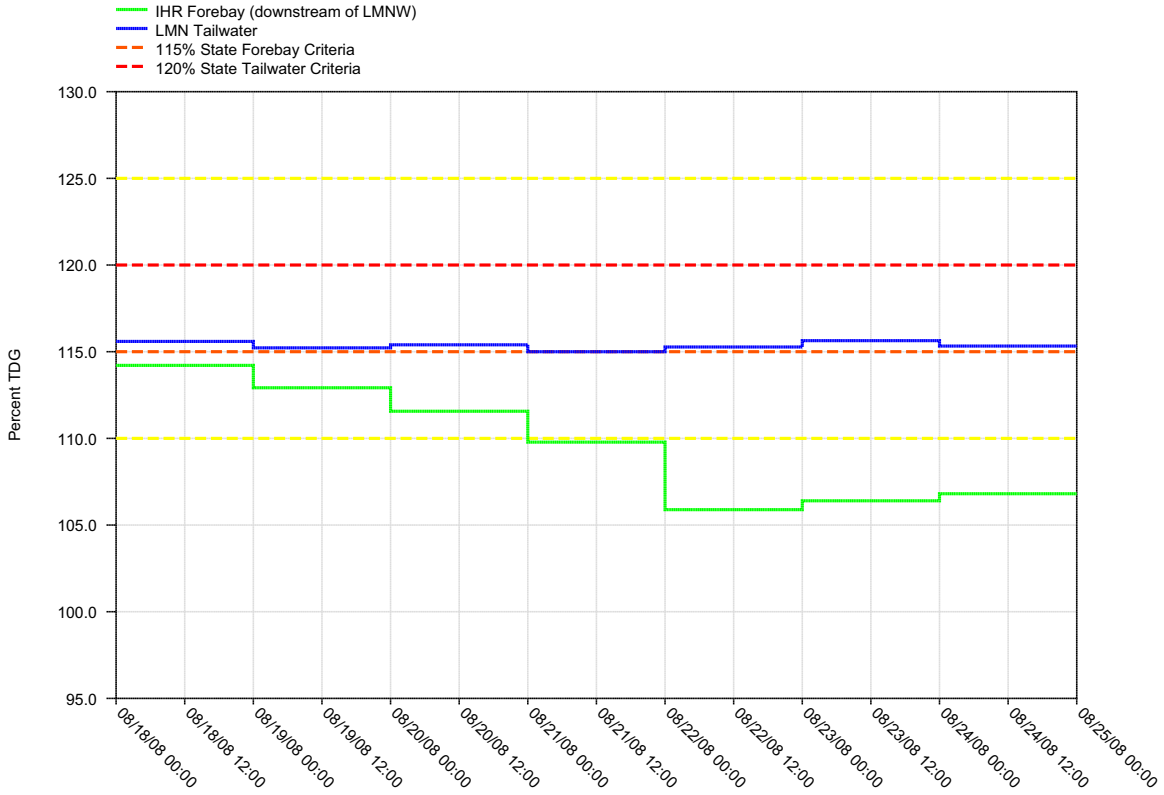


Figure 27.

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects



LOWER MONUMENTAL DAM - Hourly Spill and Flow

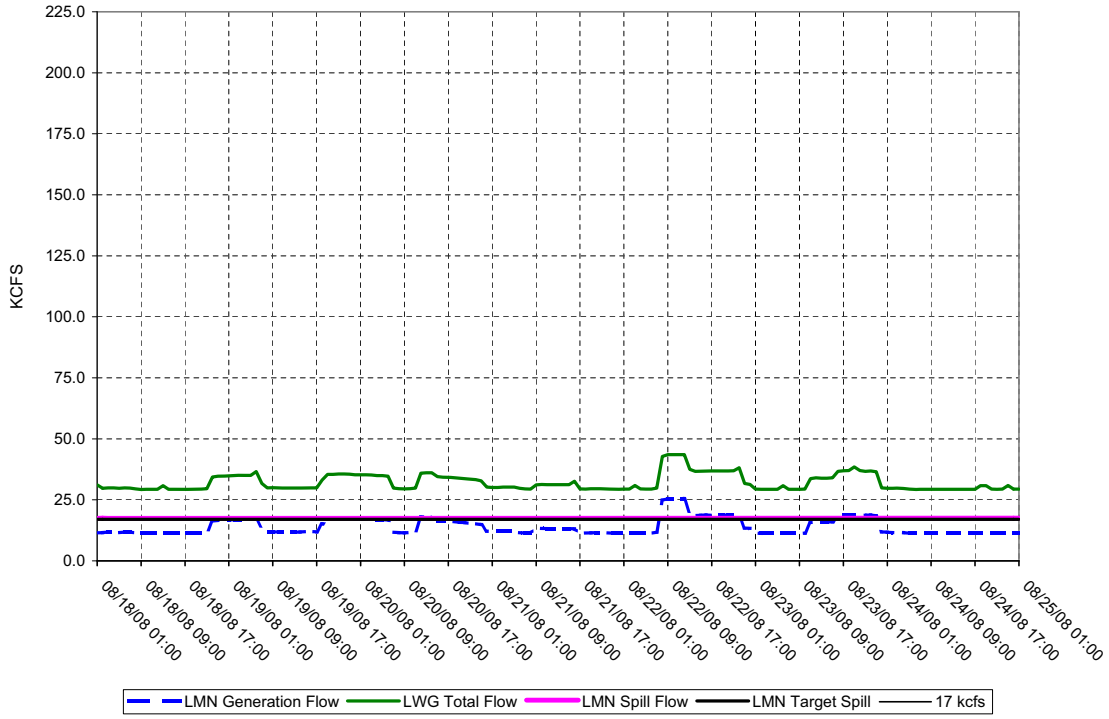
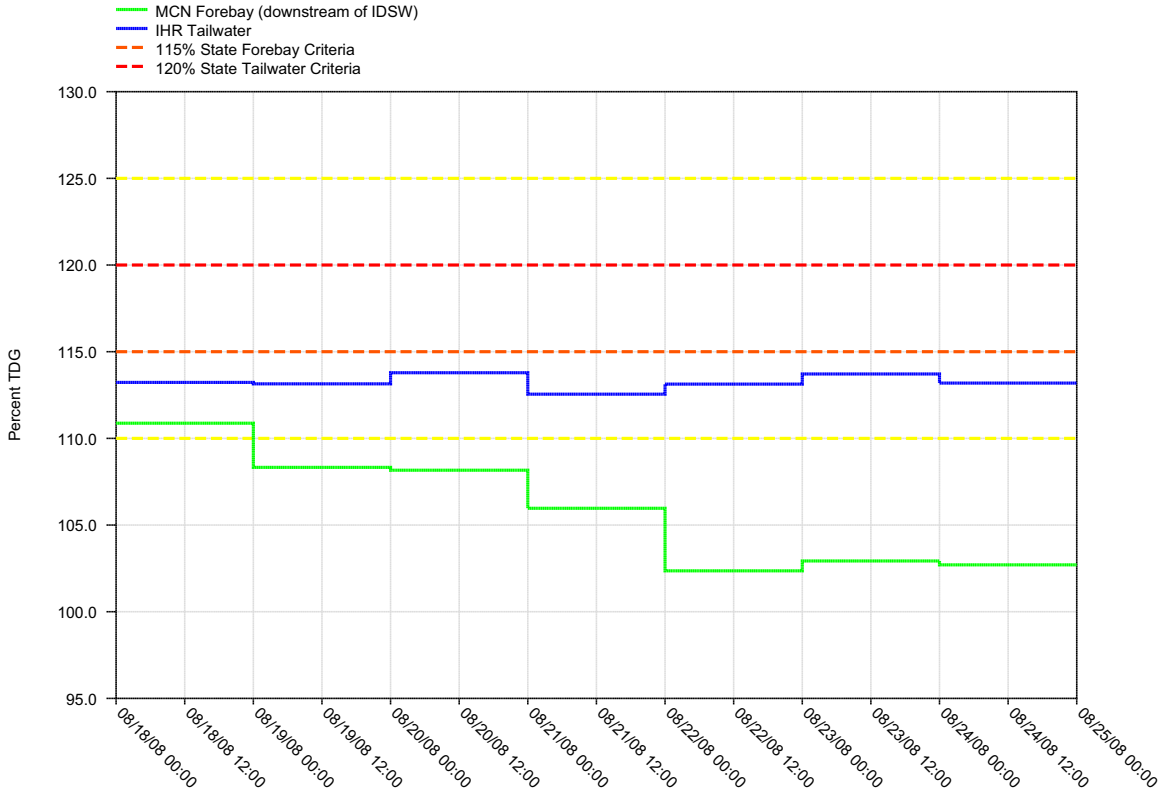


Figure 28.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

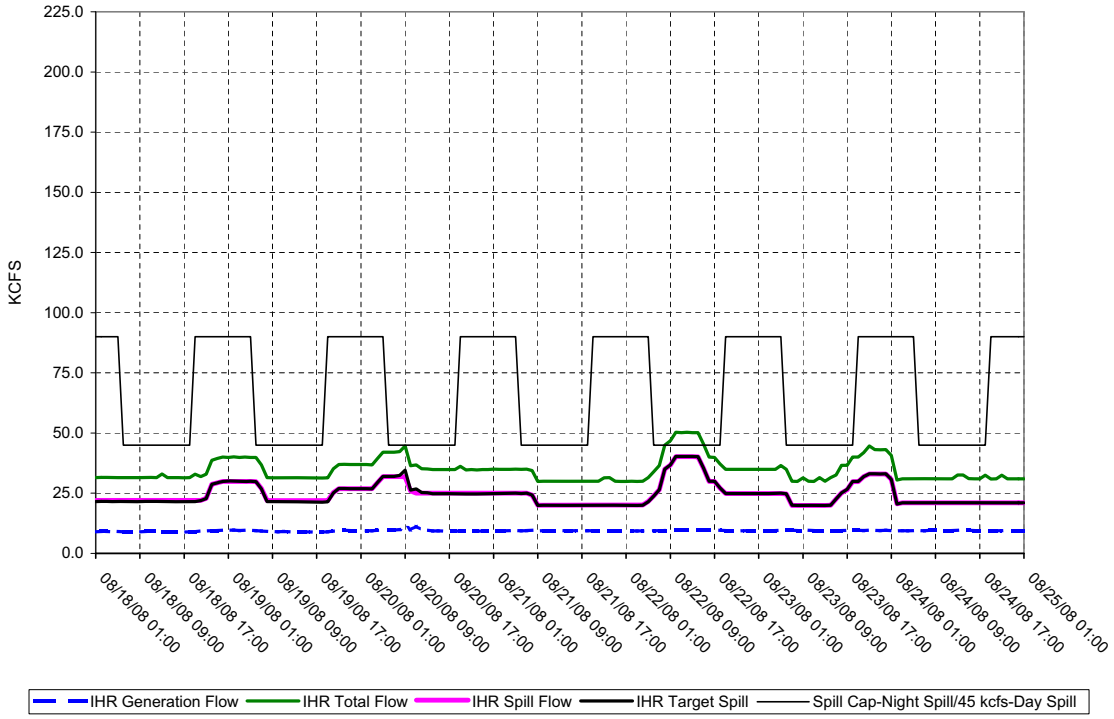
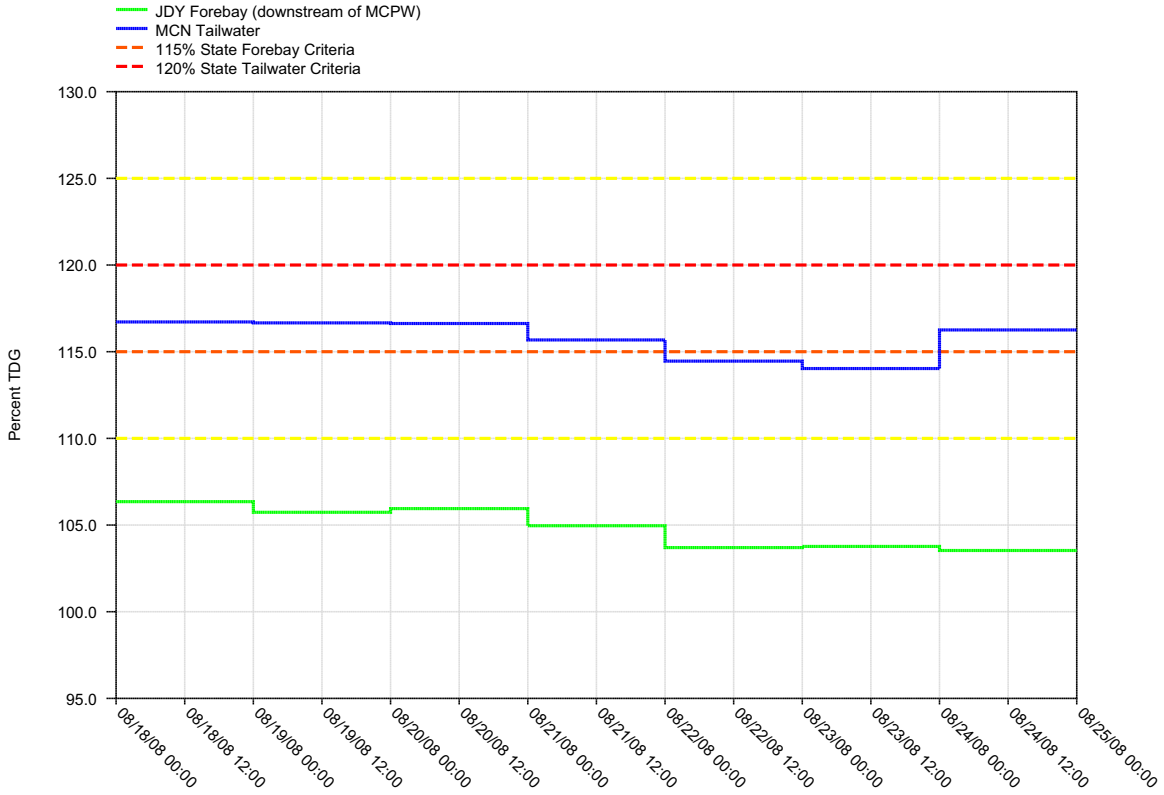


Figure 29.

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

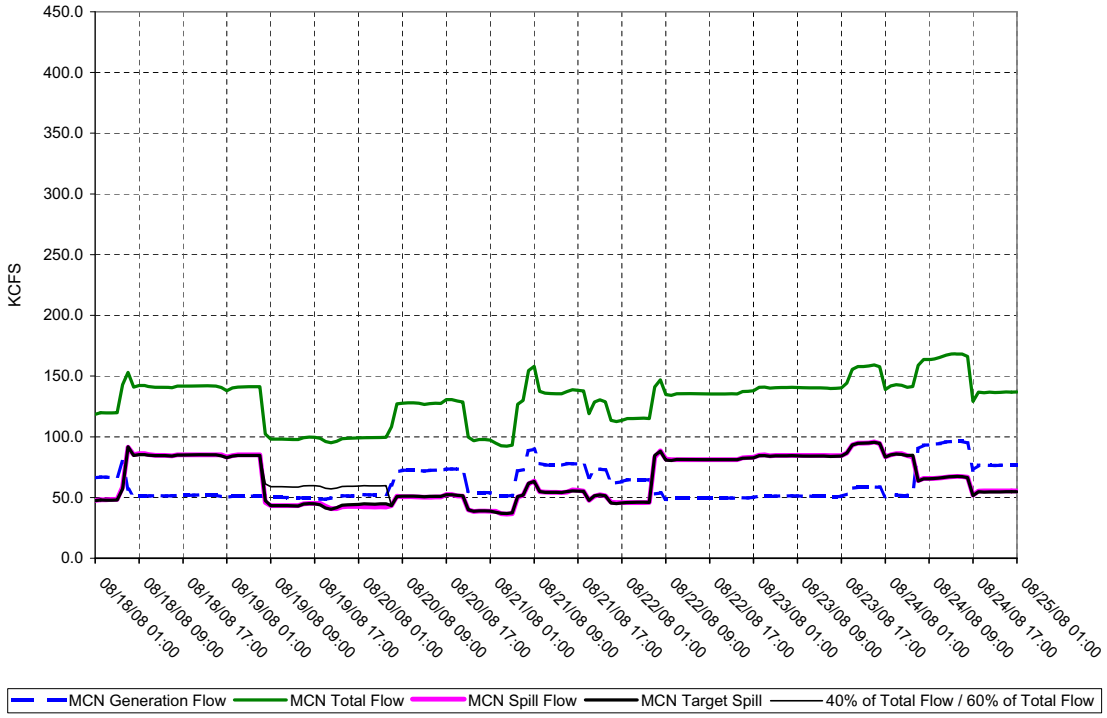
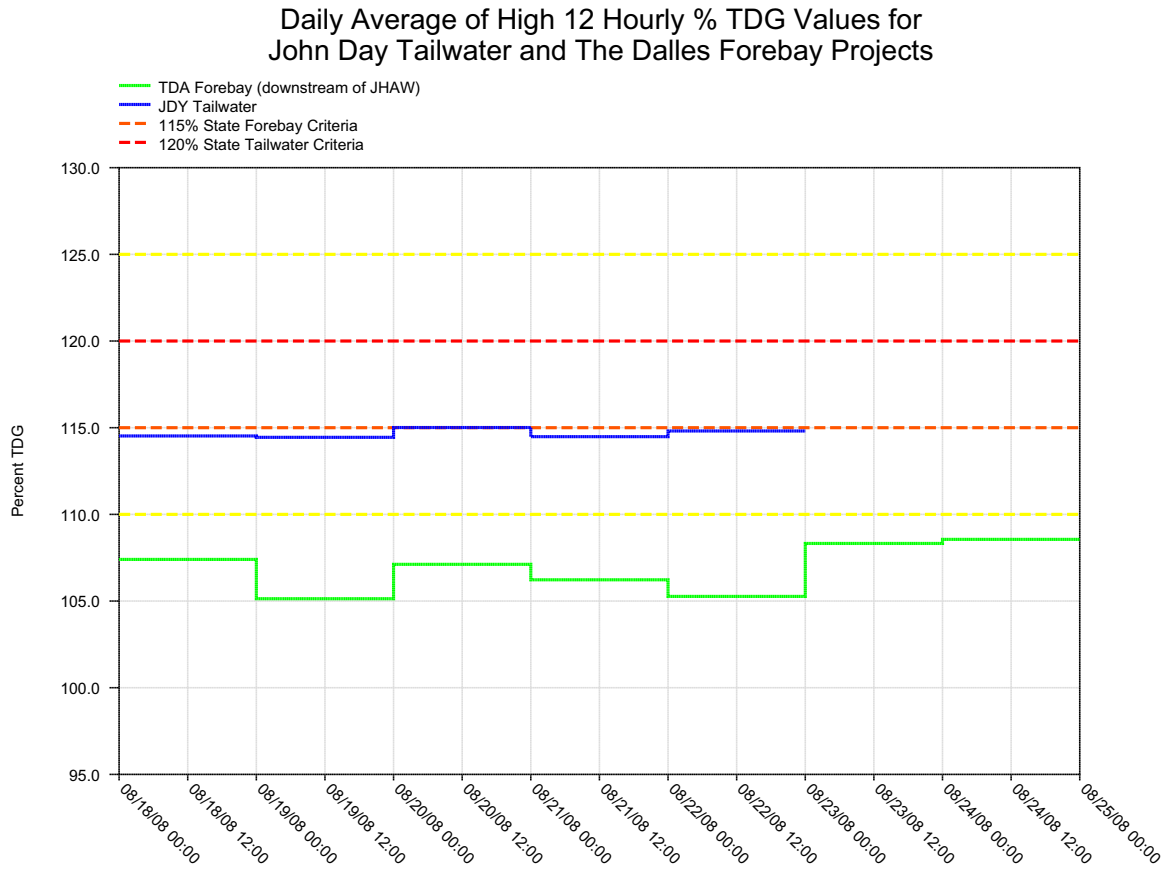


Figure 30.


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/18/08 00:00
08/18/08 12:00
08/19/08 00:00
08/19/08 12:00
08/20/08 00:00
08/20/08 12:00
08/21/08 00:00
08/21/08 12:00
08/22/08 00:00
08/22/08 12:00
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08/23/08 12:00
08/24/08 00:00
08/24/08 12:00
08/25/08 00:00

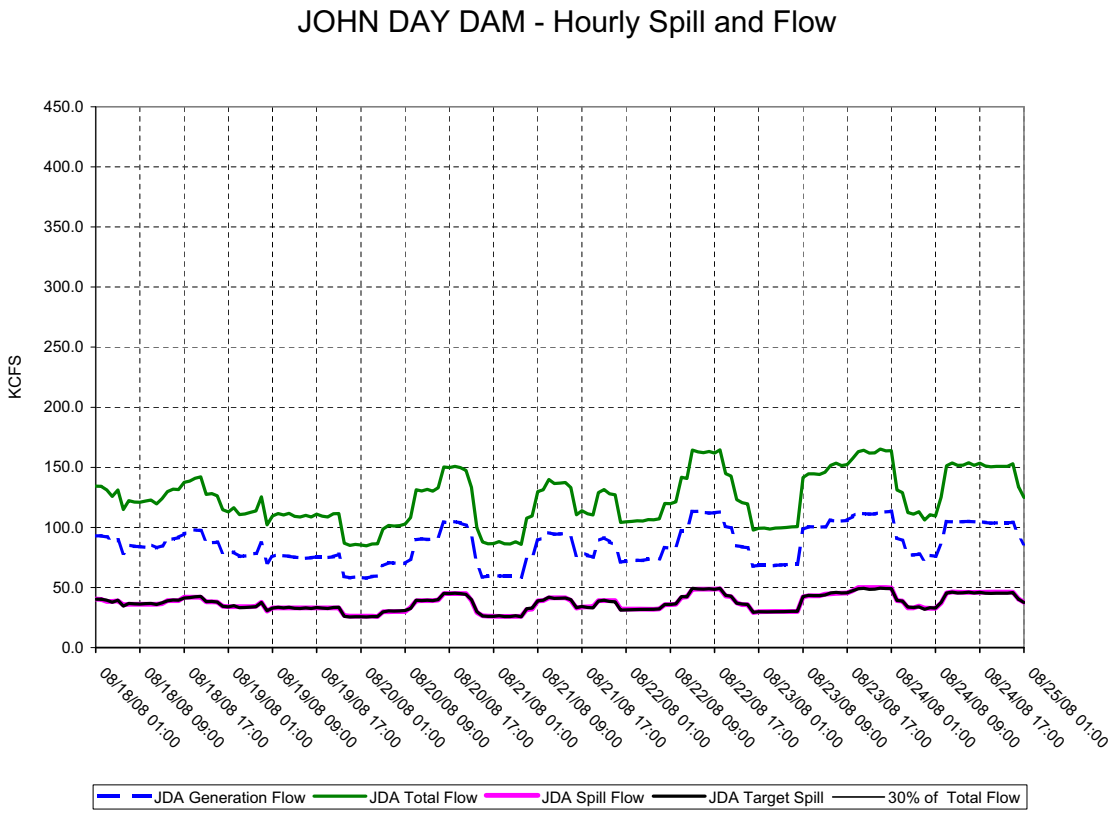
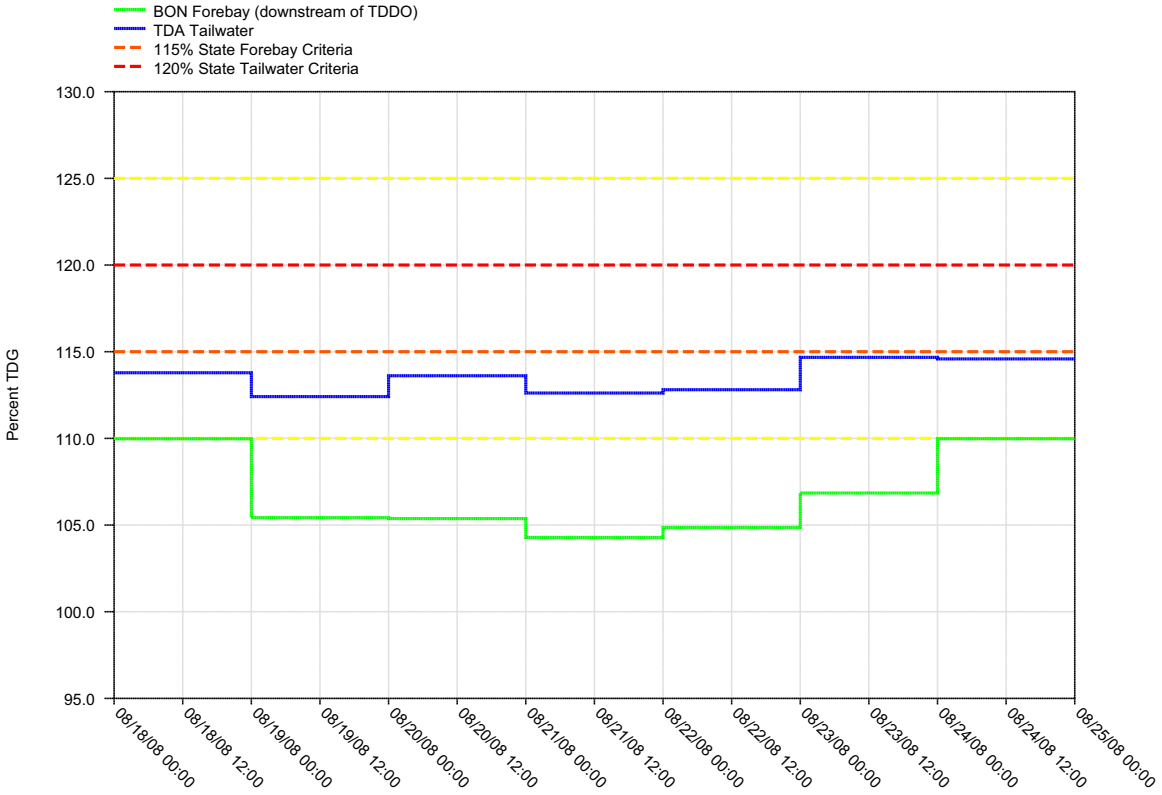

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/18/08 01:00
08/18/08 09:00
08/18/08 17:00
08/19/08 01:00
08/19/08 09:00
08/19/08 17:00
08/20/08 01:00
08/20/08 09:00
08/20/08 17:00
08/21/08 01:00
08/21/08 09:00
08/21/08 17:00
08/22/08 01:00
08/22/08 09:00
08/22/08 17:00
08/23/08 01:00
08/23/08 09:00
08/23/08 17:00
08/24/08 01:00
08/24/08 09:00
08/24/08 17:00
08/25/08 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 31.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

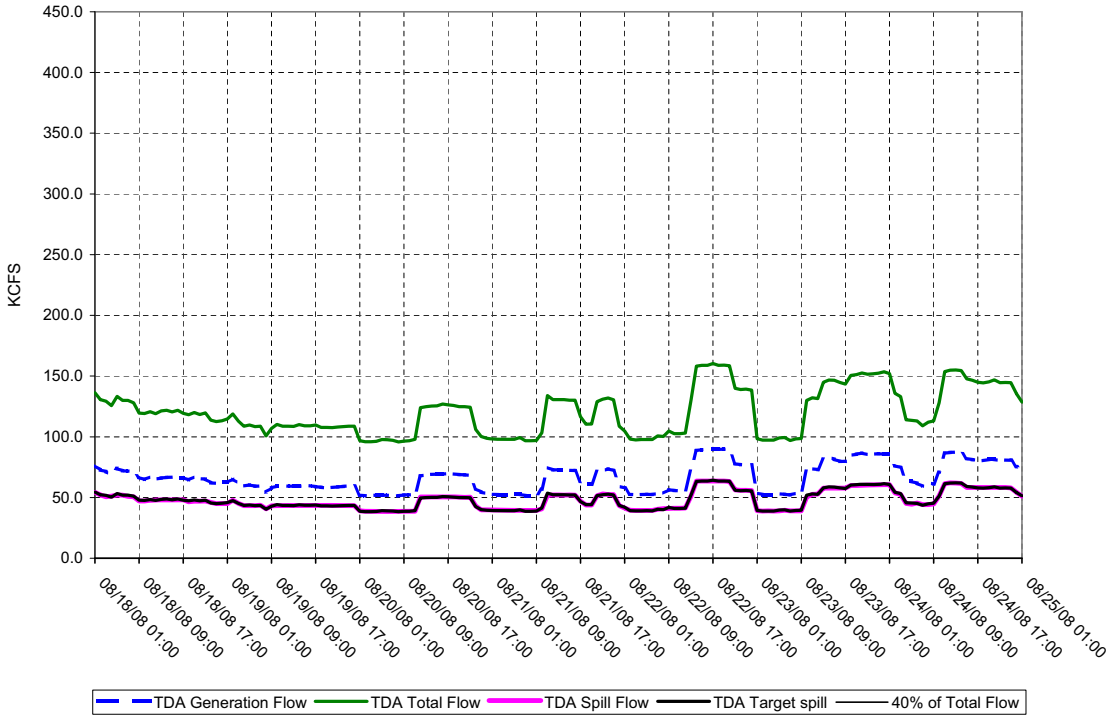
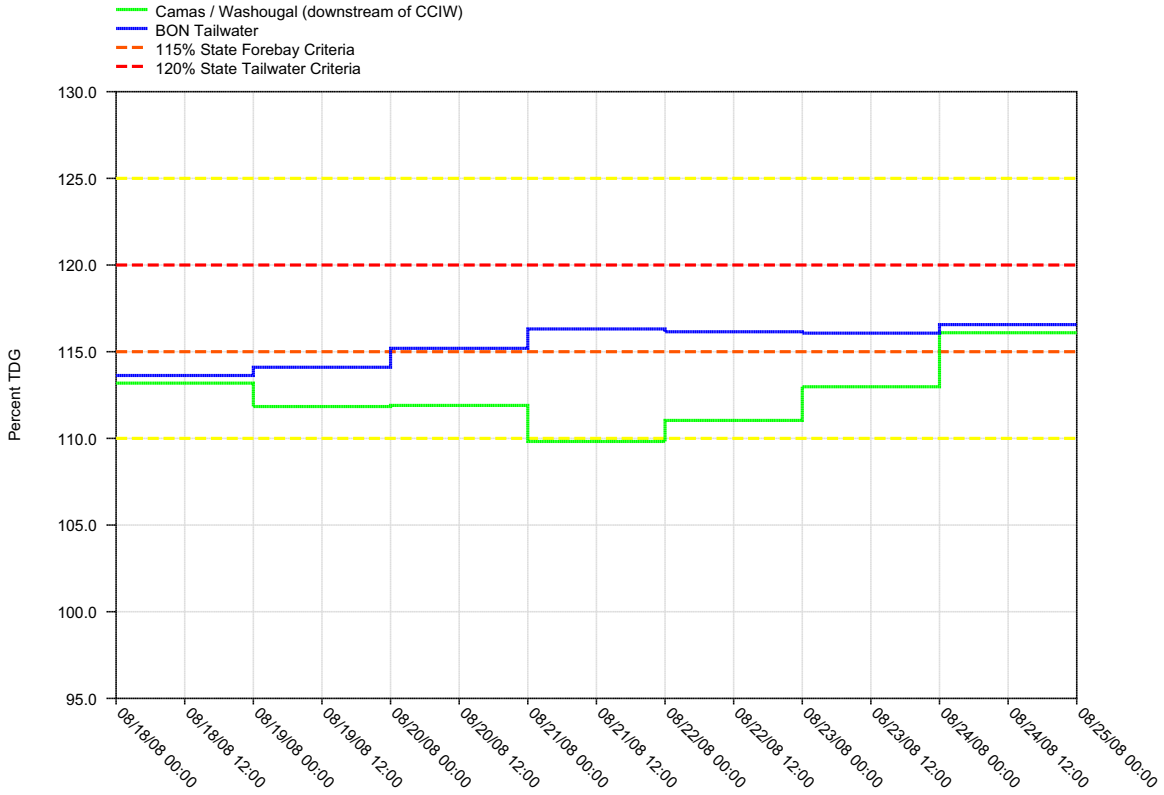


Figure 32.

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow

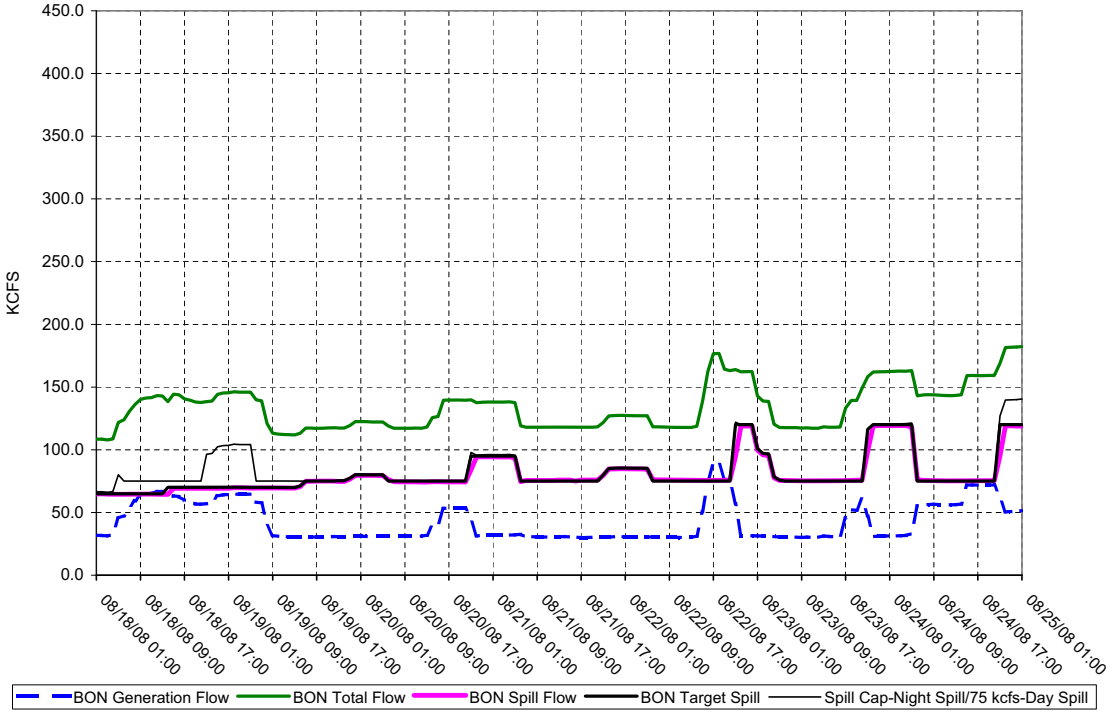
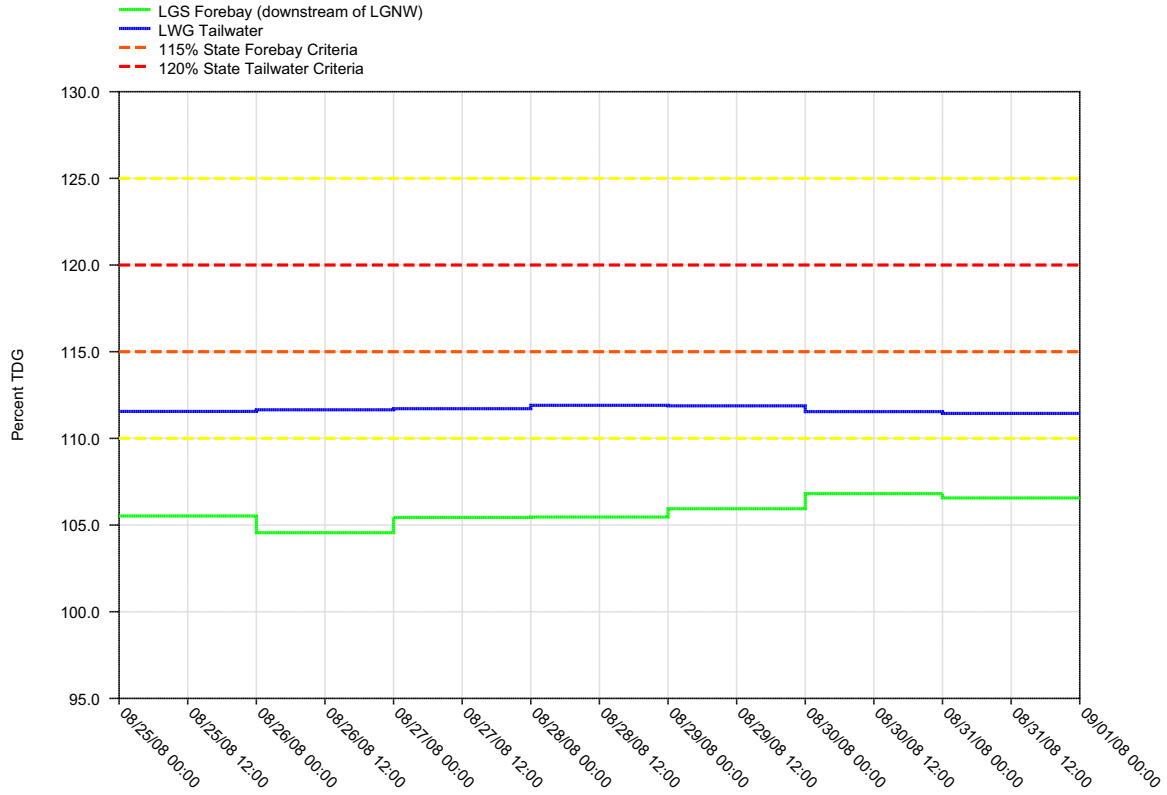


Figure 33.

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects



LOWER GRANITE DAM - Hourly Spill and Flow

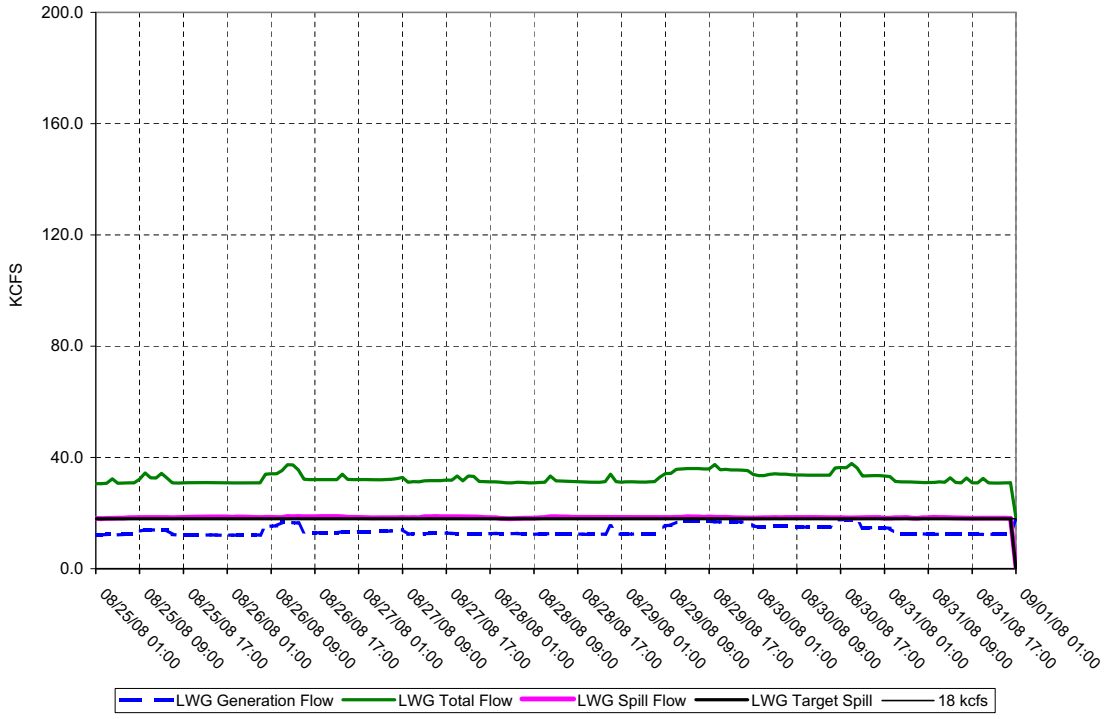
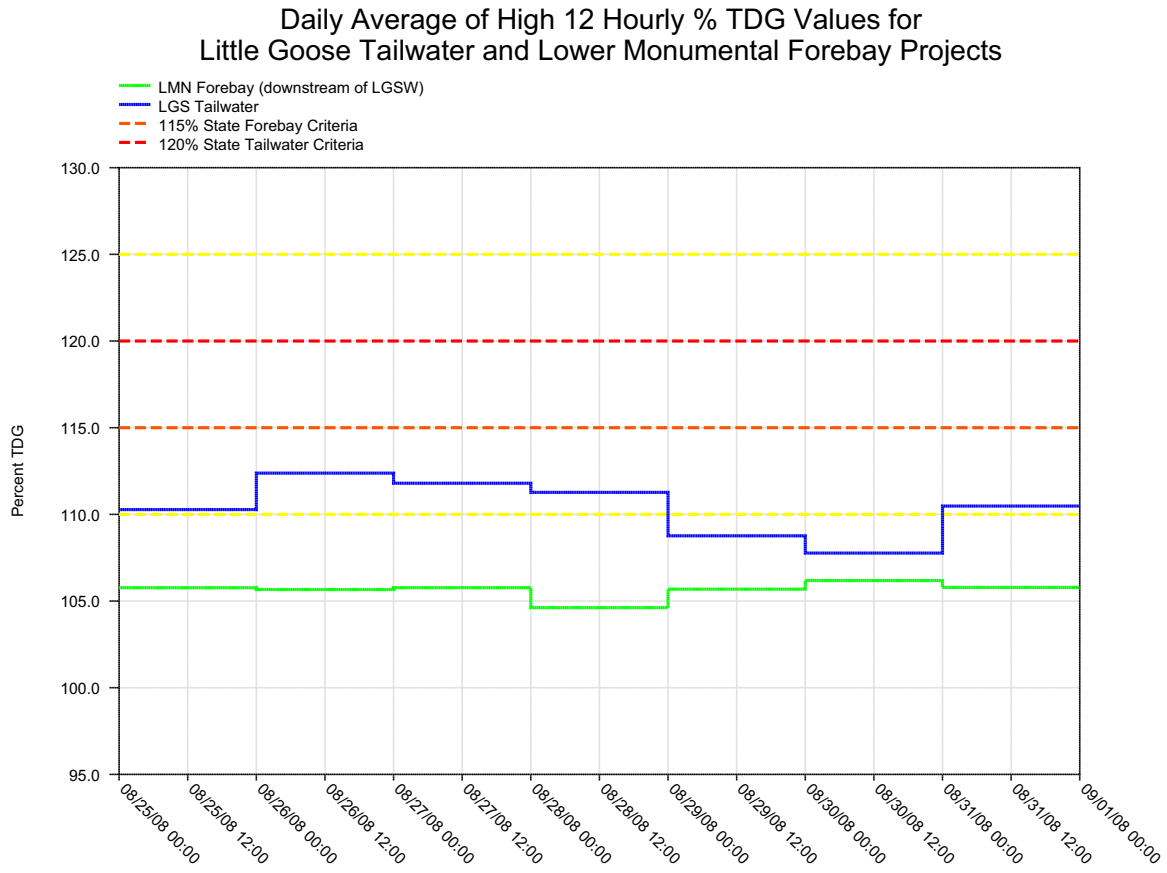


Figure 34.


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/25/08 00:00
08/25/08 12:00
08/26/08 00:00
08/26/08 12:00
08/27/08 00:00
08/27/08 12:00
08/28/08 00:00
08/28/08 12:00
08/29/08 00:00
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08/31/08 12:00
09/01/08 00:00

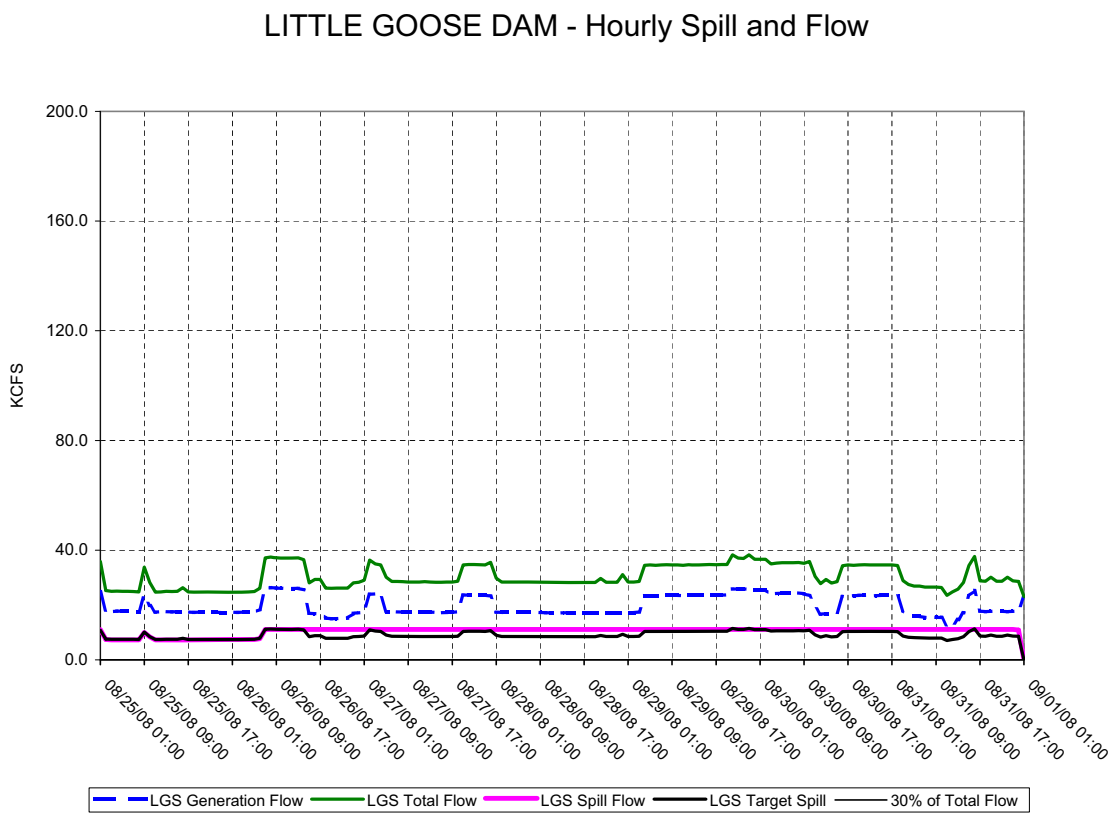
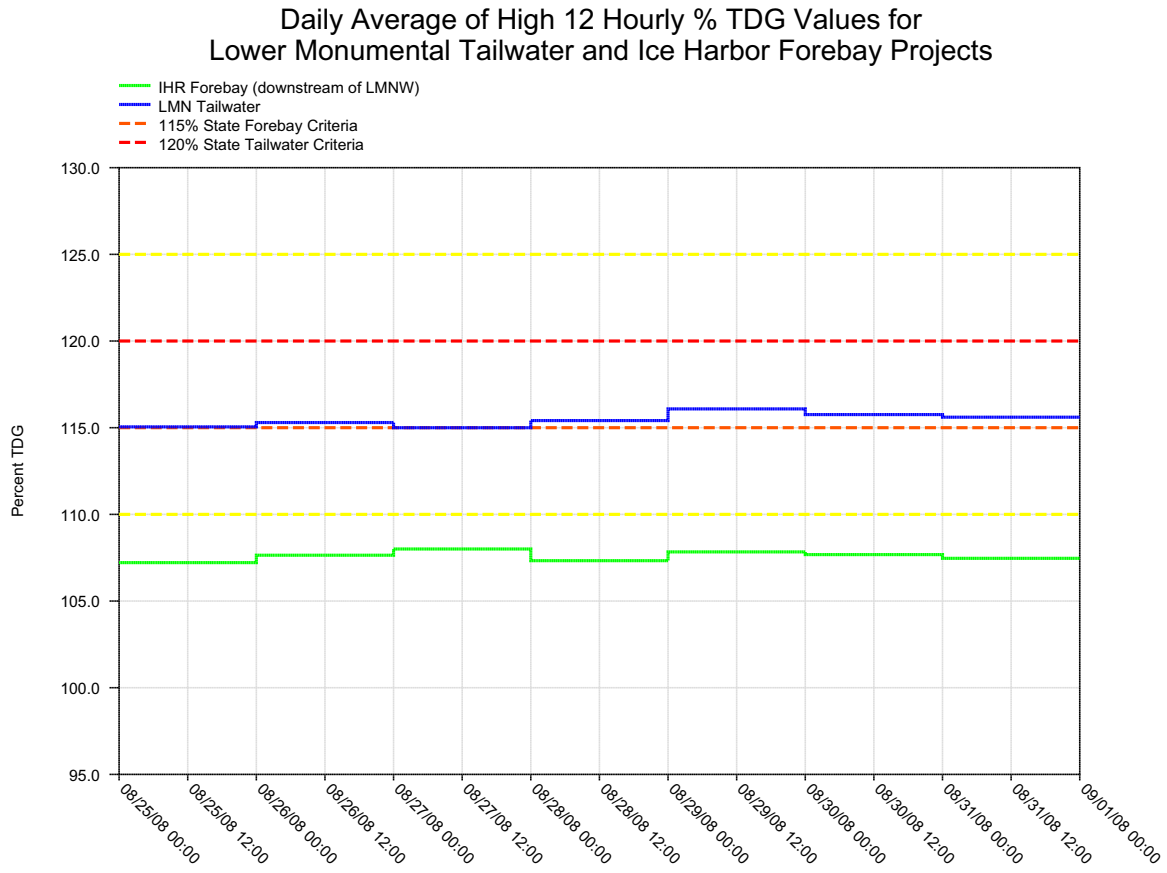

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
200.0
160.0
120.0
80.0
40.0
0.0
08/25/08 01:00
08/25/08 09:00
08/25/08 17:00
08/26/08 01:00
08/26/08 09:00
08/26/08 17:00
08/27/08 01:00
08/27/08 09:00
08/27/08 17:00
08/28/08 01:00
08/28/08 09:00
08/28/08 17:00
08/29/08 01:00
08/29/08 09:00
08/29/08 17:00
08/30/08 01:00
08/30/08 09:00
08/30/08 17:00
08/31/08 01:00
08/31/08 09:00
08/31/08 17:00
09/01/08 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 35.


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/25/08 00:00
08/25/08 12:00
08/26/08 00:00
08/26/08 12:00
08/27/08 00:00
08/27/08 12:00
08/28/08 00:00
08/28/08 12:00
08/29/08 00:00
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08/30/08 00:00
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08/31/08 12:00
09/01/08 00:00

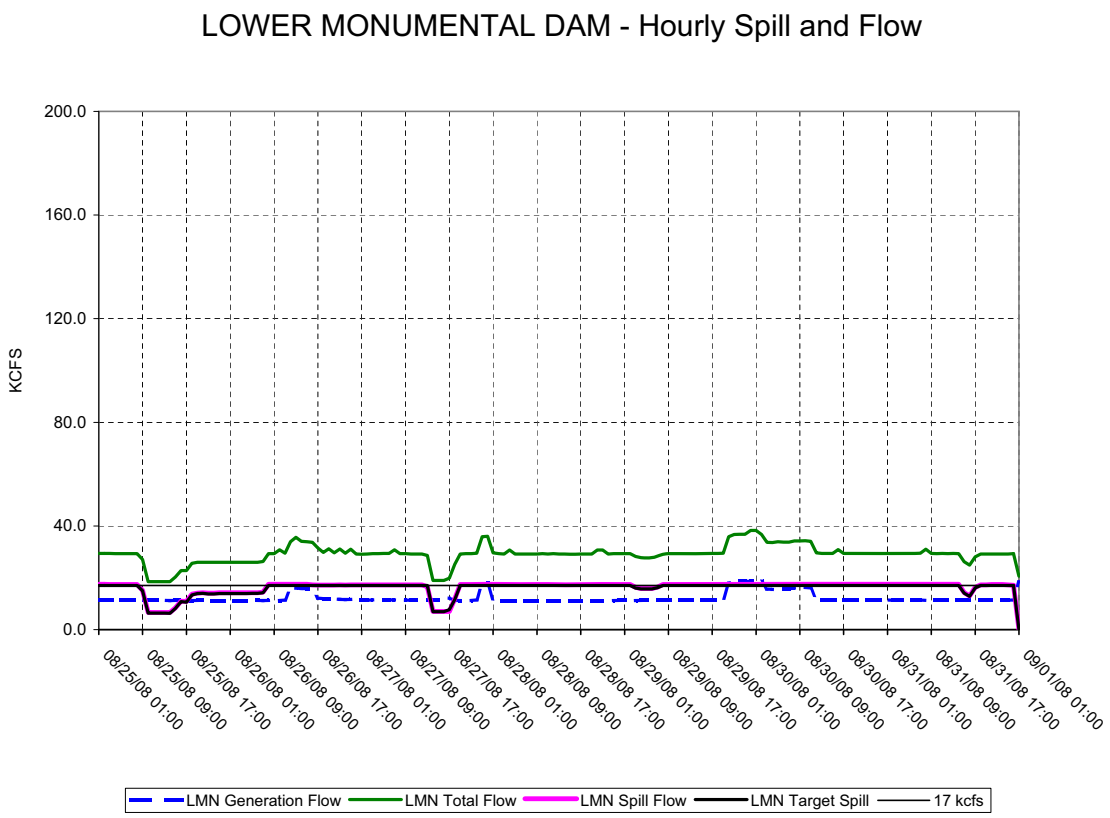
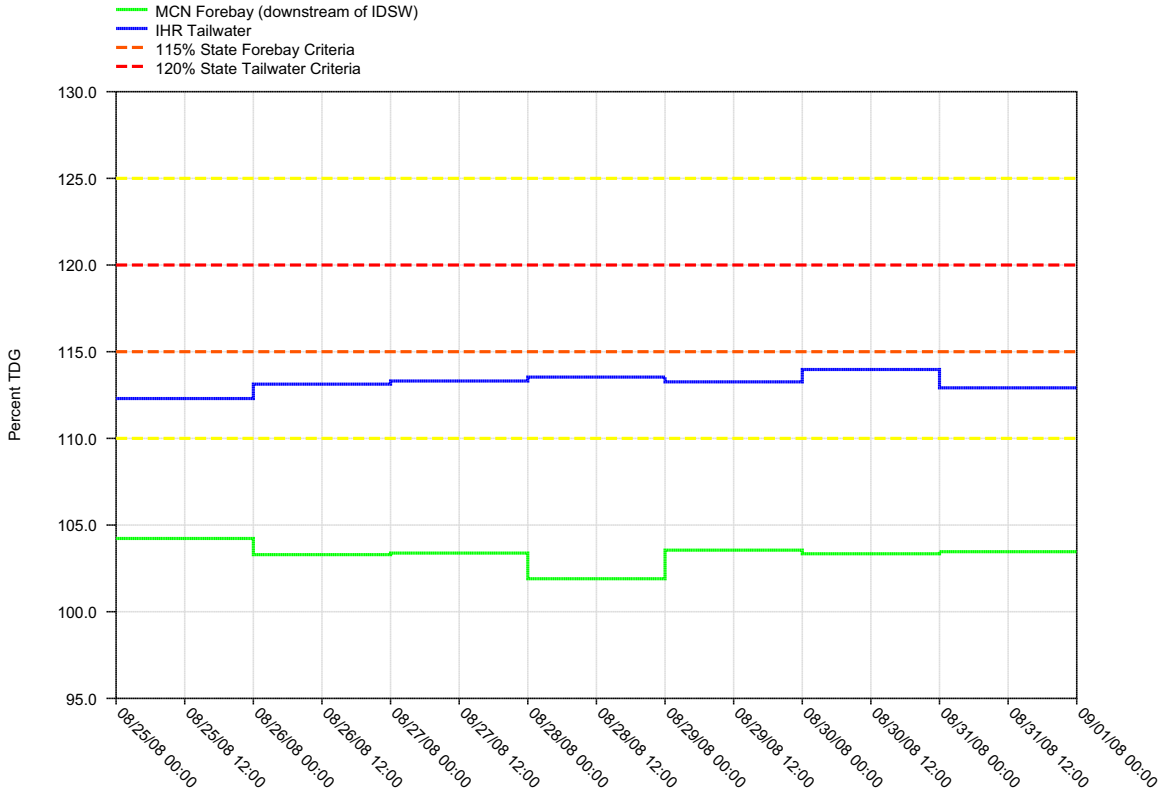

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
200.0
160.0
120.0
80.0
40.0
0.0
08/25/08 01:00
08/25/08 09:00
08/25/08 17:00
08/26/08 01:00
08/26/08 09:00
08/26/08 17:00
08/27/08 01:00
08/27/08 09:00
08/27/08 17:00
08/28/08 01:00
08/28/08 09:00
08/28/08 17:00
08/29/08 01:00
08/29/08 09:00
08/29/08 17:00
08/30/08 01:00
08/30/08 09:00
08/30/08 17:00
08/31/08 01:00
08/31/08 09:00
08/31/08 17:00
09/01/08 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 36.

Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects



ICE HARBOR DAM - Hourly Spill and Flow

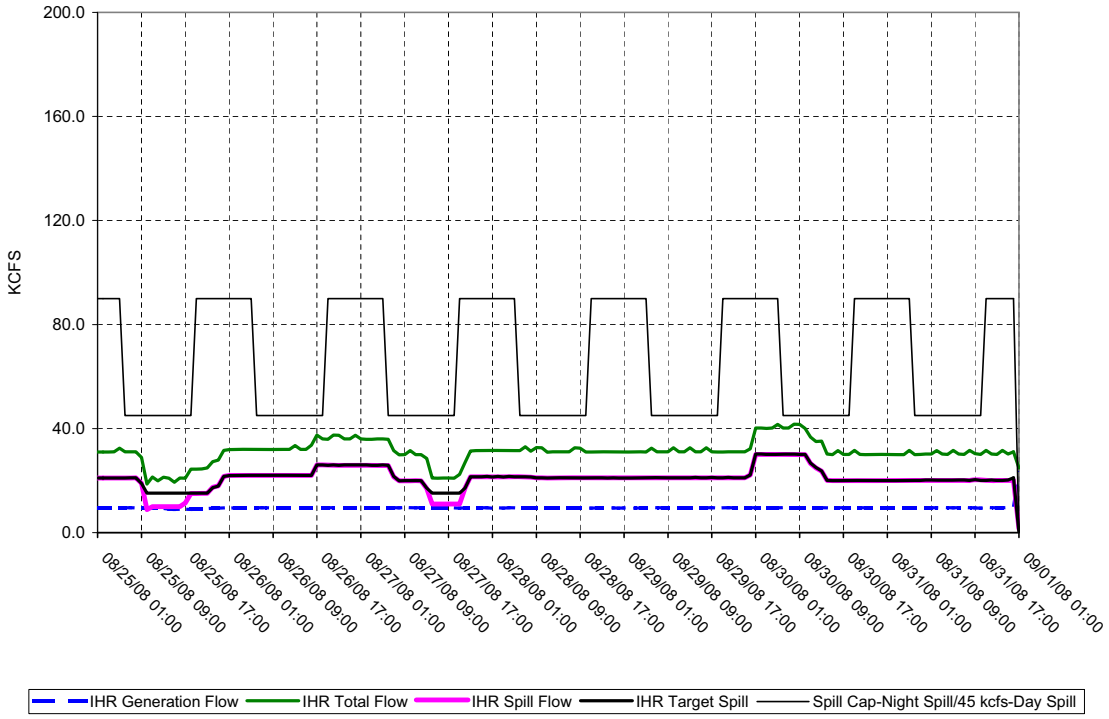
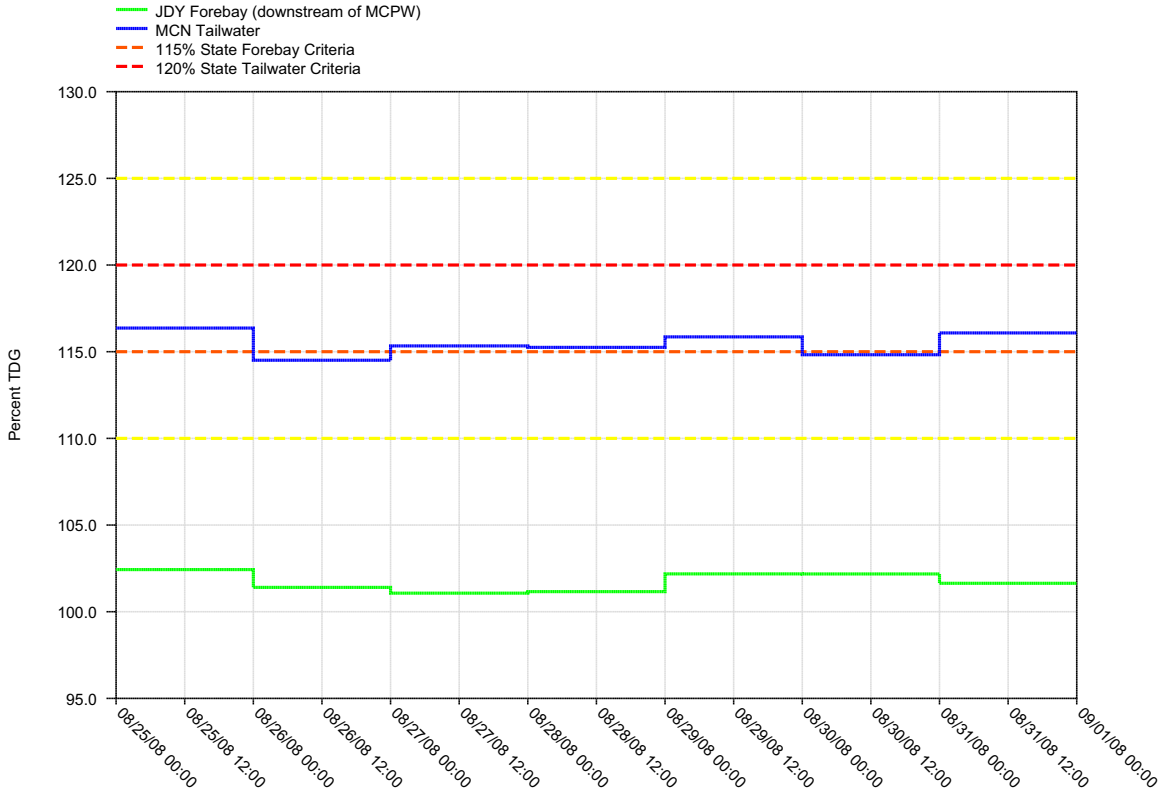


Figure 37.

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects



McNARY DAM - Hourly Spill and Flow

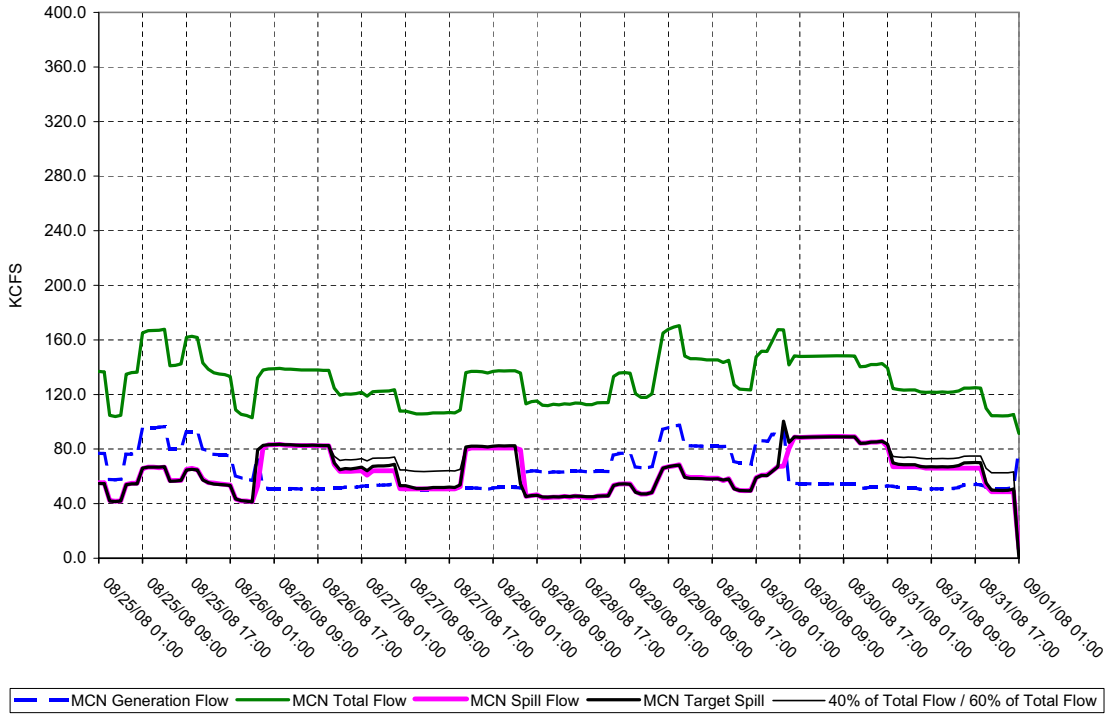
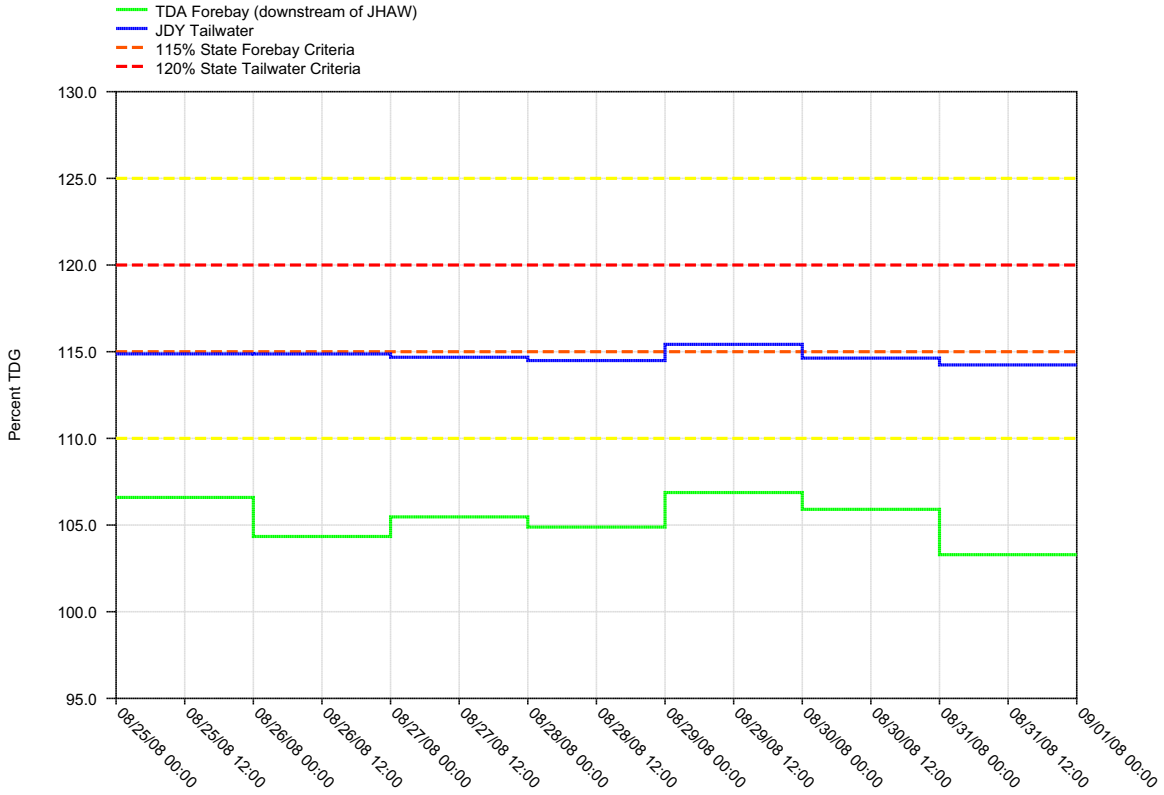


Figure 38.

Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects



JOHN DAY DAM - Hourly Spill and Flow

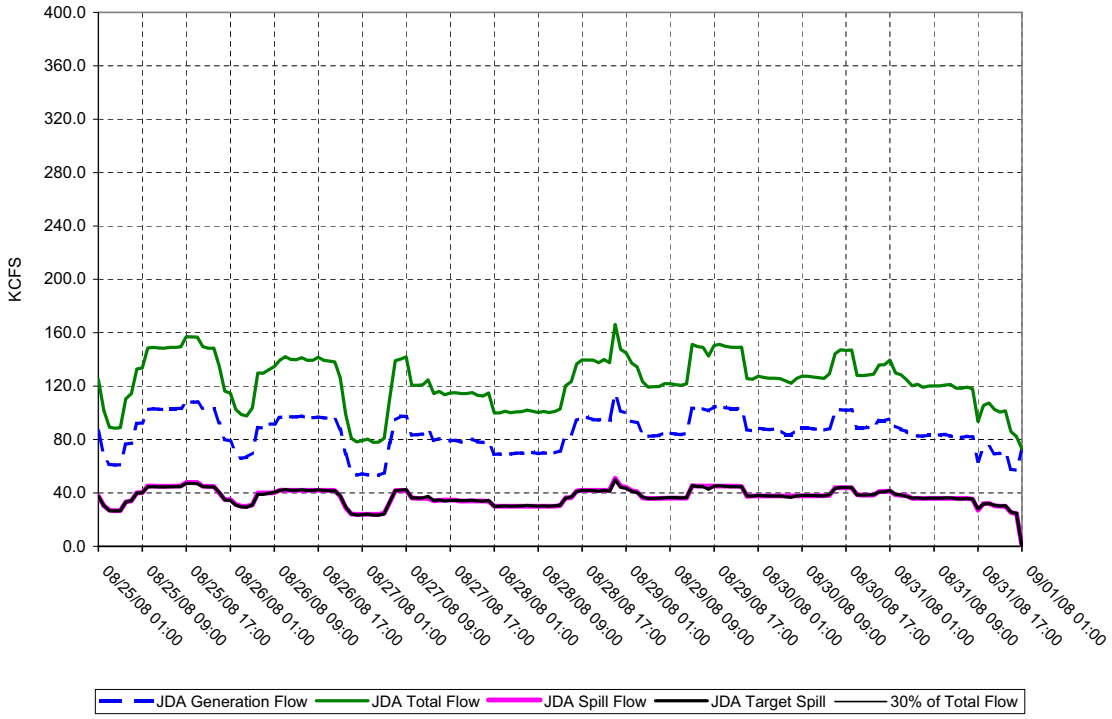
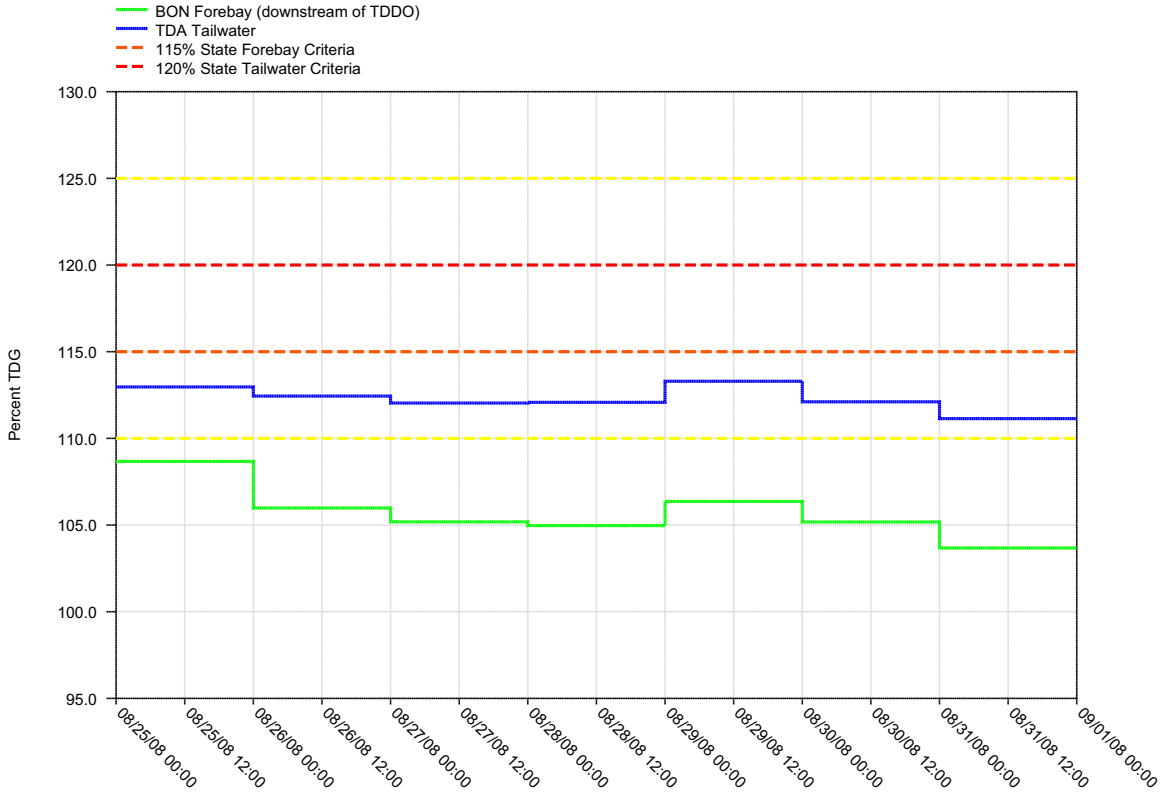


Figure 39.

Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects



THE DALLES DAM - Hourly Spill and Flow

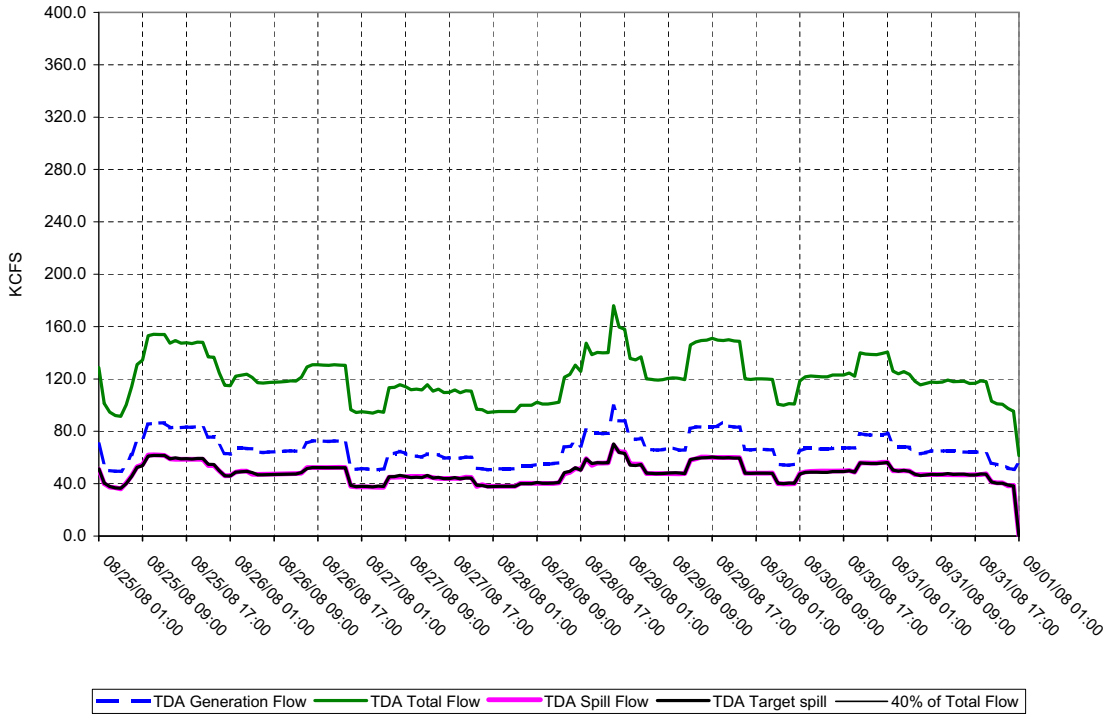
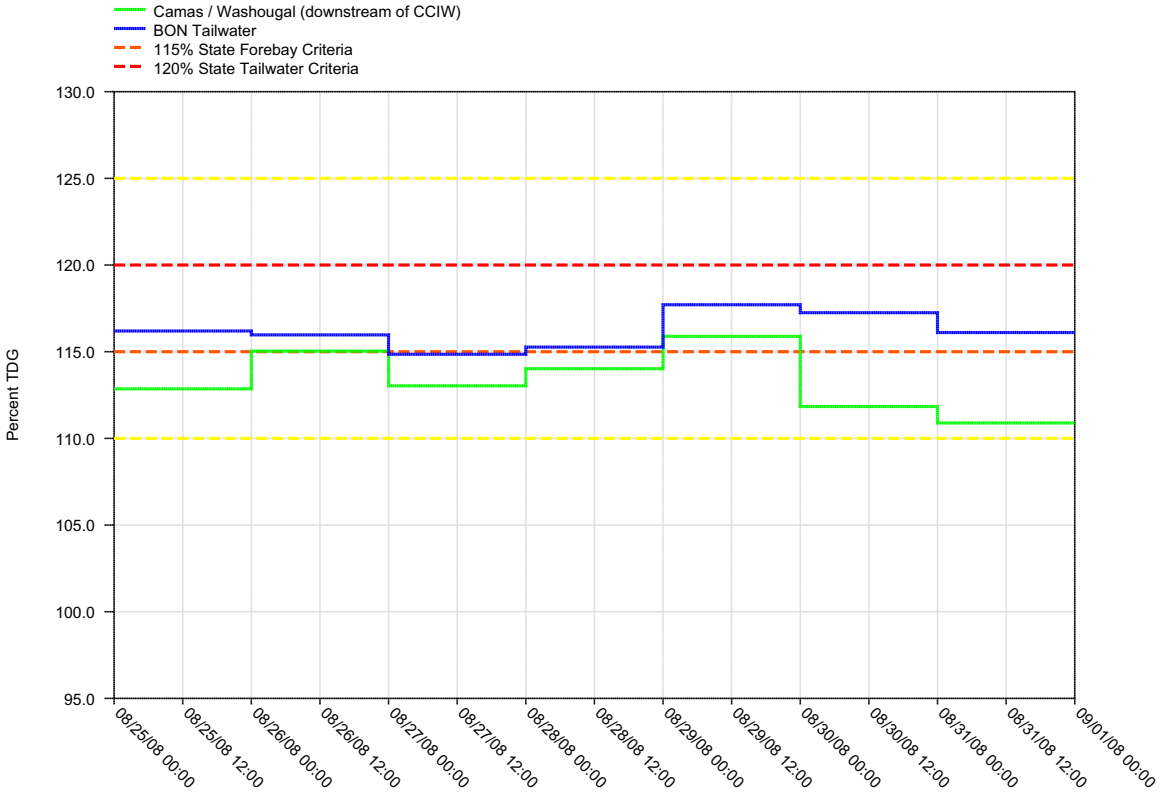
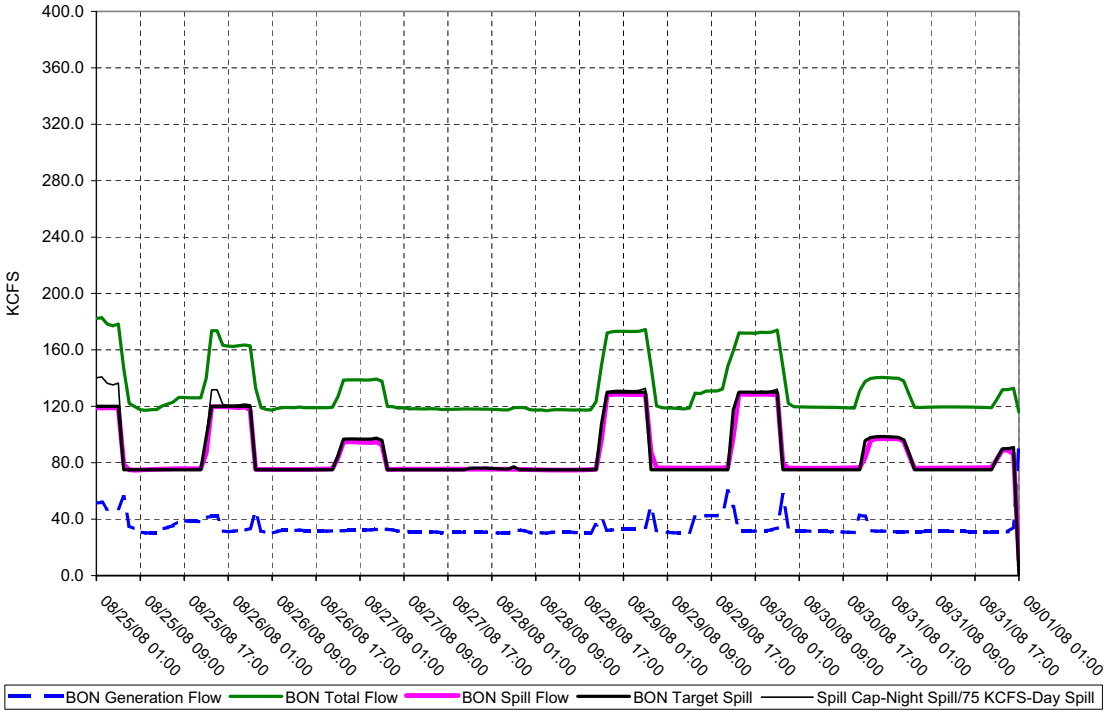


Figure 40.

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal



BONNEVILLE DAM - Hourly Spill and Flow



Average percent TDG for 12 highest hours: July 28 – August 31, 2008

Date	Monitoring Stations (full list)																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
07/28/2008	103.9	110.9	106.9	111.1	108.2	115.9	111.1	114.4	107.6	116.6	102.8	116.3	105.8	113.1	107.9	117.1	**115.6**
07/29/2008	103.3	110.3	106.7	110.9	106.9	115.1	110.8	113.4	108.4	115.0	103.0	115.1	106.6	112.7	107.4	116.6	113.8
07/30/2008	101.4	111.0	106.3	113.0	105.6	115.3	109.3	113.5	106.1	115.0	104.0	116.9	105.3	112.3	107.1	116.7	114.7
07/31/2008	102.7	110.4	106.9	113.5	106.8	115.7	110.2	114.6	105.9	115.7	104.8	116.1	108.0	114.3	108.4	116.5	**115.2**
08/01/2008	101.4	110.4	106.4	110.9	106.6	114.3	109.3	114.1	105.2	116.1	103.9	115.3	107.2	113.2	107.5	117.1	112.5
08/02/2008	101.0	110.7	107.1	111.1	107.4	115.8	108.9	113.6	106.3	115.9	103.0	114.7	105.6	112.5	106.6	117.2	113.9
08/03/2008	101.4	110.6	106.7	113.9	108.5	115.9	109.5	114.2	106.5	114.1	102.8	115.0	105.1	112.7	106.0	117.0	**116.0**
08/04/2008	101.3	110.8	108.1	113.6	108.6	115.7	109.4	113.5	106.9	115.8	103.4	115.1	107.9	114.2	107.2	116.5	**117.3**
08/05/2008	101.7	111.2	108.3	109.5	109.5	115.9	110.2	114.2	108.4	116.6	105.6	115.3	108.6	115.1	110.5	116.8	**118.4**
08/06/2008	101.6	110.3	107.4	109.1	111.6	115.4	112.5	114.1	108.0	115.2	105.5	115.9	108.1	114.7	112.2	116.5	**117.4**
08/07/2008	101.9	110.7	110.5	110.1	111.5	116.0	114.0	114.2	109.0	116.9	105.7	115.7	108.3	115.0	111.7	116.4	**116.2**
08/08/2008	103.6	110.5	111.2	109.5	110.9	115.8	113.9	114.2	109.7	116.0	105.4	114.8	108.4	114.2	109.3	116.2	113.8
08/09/2008	103.6	111.9	110.3	112.3	108.4	115.8	112.1	113.3	108.7	115.4	104.2	113.9	106.0	112.7	106.6	115.8	113.0
08/10/2008	101.1	111.4	109.1	112.3	107.1	116.0	109.6	114.5	106.7	115.0	104.0	114.2	104.3	111.2	105.3	115.9	114.6
08/11/2008	100.8	111.5	108.6	110.8	106.8	116.0	109.1	114.0	105.7	113.9	104.7	114.8	106.8	112.9	106.9	116.1	**116.0**
08/12/2008	100.8	111.6	107.8	110.9	106.7	115.9	109.3	114.5	106.0	116.5	104.9	115.1	108.1	113.4	107.6	115.5	114.7
08/13/2008	100.5	111.2	106.8	108.3	107.8	115.8	109.6	113.2	106.9	116.9	104.4	115.4	106.8	113.3	107.6	115.0	114.0
08/14/2008	99.7	111.2	108.1	107.8	108.9	116.3	110.9	113.7	109.0	116.5	105.7	115.2	108.2	114.1	107.6	115.9	114.0
08/15/2008	101.0	111.6	112.7	111.6	110.1	115.6	112.3	113.8	109.4	114.1	106.7	115.5	109.4	115.1	110.0	115.9	**115.8**
08/16/2008	102.4	111.9	110.0	111.2	110.5	116.2	113.1	113.2	109.9	117.6	107.6	115.0	110.5	115.6	112.8	116.0	**116.7**
08/17/2008	103.7	112.2	110.1	113.3	109.7	116.0	114.3	113.6	111.3	118.3	109.3	114.8	109.4	115.1	112.8	115.6	**116.6**
08/18/2008	103.9	111.4	110.2	113.0	109.8	115.6	114.2	113.2	110.9	116.7	106.3	114.5	107.4	113.8	110.0	113.6	113.2
08/19/2008	101.8	111.1	108.9	109.0	108.2	115.2	112.9	113.1	108.3	116.7	105.7	114.4	105.1	112.4	105.4	114.1	111.8
08/20/2008	102.2	111.3	109.1	108.2	107.8	115.4	111.6	113.8	108.2	116.6	105.9	115.0	107.1	113.6	105.4	115.2	111.9
08/21/2008	102.1	111.6	107.9	111.3	107.4	115.0	109.8	112.5	106.0	115.7	105.0	114.5	106.2	112.6	104.3	116.3	109.8
08/22/2008	100.3	111.5	105.6	112.9	105.1	115.3	105.9	113.1	102.4	114.5	103.7	114.8	105.3	112.8	104.9	116.1	111.0
08/23/2008	99.7	111.1	104.7	109.7	104.7	115.6	106.4	113.7	102.9	114.0	103.8	---	108.3	114.7	106.9	116.1	113.0
08/24/2008	100.5	111.8	105.5	109.8	104.7	115.3	106.8	113.2	102.7	116.3	103.5	---	108.6	114.6	110.0	116.6	**116.1**
08/25/2008	100.5	111.6	105.5	110.3	105.8	115.0	107.2	112.3	104.2	116.4	102.4	114.9	106.6	113.0	108.7	116.2	112.9
08/26/2008	99.8	111.6	104.6	112.4	105.7	115.3	107.6	113.1	103.3	114.5	101.4	114.9	104.3	112.4	106.0	116.0	115.0
08/27/2008	101.1	111.7	105.4	111.8	105.8	115.0	108.0	113.3	103.4	115.3	101.1	114.7	105.5	112.0	105.2	114.9	113.0
08/28/2008	101.6	111.9	105.5	111.3	104.6	115.4	107.3	113.5	101.9	115.2	101.2	114.5	104.9	112.1	105.0	115.3	114.0
08/29/2008	102.0	111.9	105.9	108.8	105.7	116.1	107.8	---	103.6	115.9	102.2	115.4	106.9	113.3	106.4	117.7	**115.9**
08/30/2008	101.7	111.5	106.8	107.8	106.2	115.8	107.7	114.0	103.3	114.8	102.2	114.6	105.9	112.1	105.2	117.2	111.8
08/31/2008	101.0	111.4	106.6	110.5	105.8	115.6	107.5	112.9	103.5	116.1	101.6	114.2	103.3	111.1	103.7	116.1	110.9

Generated: Mon Sep 1 23:25:33 2008

Number of hours of data reported in a given day

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Big, bold, red text denotes exceedances.
--- indicates No Data
Dates run from hour 1 to 24 (not 0 to 23).
The gas caps shown only apply when spilling to facilitate juvenile fish passage ("voluntary spill") between April 3rd and August 31st.
At all other times, the gas cap is 110%.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
WRNO	Bonneville Tailwater (Warrendale)
CWMW	Camas / Washougal

Effective April, 2006