Appendix E

Court Reports

With Hourly Spill, Flow And TDG Graphs

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
April 2009

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 April 10, 2009 Joint Order from the U.S District Court of Oregon adopting the 2009 Spring Fish Operations Plan (2009 Spring FOP). The 2009 Spring FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring fish migration season, generally April through June. To the extent Corps project operations are not specified in the 2009 Spring FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2009 Water Management Plan (WMP), WMP updates, and the 2009 Fish Passage Plan (FPP).

The Corps' April 2009 lower Snake and Columbia River project and fish passage operations 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) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2009 Spring FOP in April.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per operational week[1] for 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.

[1] Operations are implemented from Monday through Sundays. For the month of April, this included 3 days in May.

The weekly graphs begin on April 3 and end on May 3 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 at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on March 30 for the lower Snake projects, and start the same hours on April 6 for the lower Columbia projects.

March 30 – April 5	Figures 1 – 4
April 6 – April 12	Figures 5 – 12
April 13 – April 19	Figures 13 – 20
April 20 – April 26	Figures 21 – 28
April 27 – May 3	Figures 29 – 36

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours. This is primarily a result of spill at dams. The objective is to operate each project up to the TDG limits without exceeding those limits to the extent 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% TDG is the upper operating limit.

B. Lower Graph: Shows the hourly 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 medium green line represents the average hourly total river flow through the project in 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 2009 Spring 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:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described above. When spill levels briefly deviate below or above the level specified in the 2009 Spring FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The 2009 Spring FOP Spill Report Table (Spring Spill Report Table) includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the Spring 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 2009 Spring FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. 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, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not include this volume of water. However, the actual spill volume remains constant. These variances are recorded in the Spring Spill Report Table for Little Goose under the variance type “Navigation.”

Also it is important to note that actual spill levels at Corps projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2009 Spring FOP and the RCC spill priority list, which defines the projects’ TDG 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 2009 Spring FOP describes project operations during “Rapid Load Changes” (pages 5-6). For reporting purposes, the notation “Transmission Stability” in the Spring Spill Report Table will replace “Rapid Load Changes” 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 by more than the +/- 1% requirement than other hours. On days cited in the table, the 24 hour average spill percent was within the 2009 Spring FOP level of +/- 1% of the target spill unless limited by the TDG spill cap.

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

April Operations:

The month of April was characterized by slightly below average flows for the lower Columbia River and above average flows for the lower Snake River. The high inflows for the Snake River were due to the higher atmospheric temperatures in the latter part of the month causing snowmelt with high flows in the unregulated (natural) tributaries. High river flows in the lower Snake beginning on April 22, caused instances of involuntary spill through April 25 as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. In some of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly percent TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs for the lower Snake River and McNary dams. In accordance with the 2009 Spring FOP, spring spill operations commenced on April 3 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, daily 2009 Spring FOP spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs 24 hours per day.
- Little Goose Dam - the hourly target spill was 30% of the total flow for 24 hours per day.

- Lower Monumental Dam – the hourly target spill was to the TDG spill cap for 24 hours per day.
- Ice Harbor Dam – the hourly target spill was 45 kcfs day/TDG spill cap night, except on April 30 and May 1 when the hourly target spill was 30% of total flow for 24 hours due to the two treatment spring spill test.
- McNary Dam – the hourly target spill in was 40% of total flow for 24 hours per day.
- John Day Dam – the target spill was 30% of total flow for 24 hours per day, except on May 1-3 when the hourly target spill was 40% of total flow for 24 hours due to the two treatment spring spill test.
- The Dalles Dam - the target spill was 40% of the total flow for 24 hours per day.
- Bonneville Dam - the hourly target spill was 100 kcfs for 24 hours per day.

Operational Adjustments for April:

1. Fish Transport Operations:
   - Juvenile fish collection for routine transport began at Lower Granite on May 1. The initiation of transportation was coordinated at the April 22 and April 29 TMT meetings. At the April 29 TMT meeting, salmon managers recommended that transportation start on May 5 at Little Goose and on May 8 at Lower Monumental, which will be reflected in the Spill Report for May.

2. Little Goose Dam:
   - On April 16, there was a planned powerhouse outage for required maintenance activity. As a result, the project spilled above the 2009 Spring FOP operation of 30% for two hours. TMT was not informed of this maintenance activity as there was no anticipated effect on spill.

   - Little Goose experienced a planned full powerhouse outage on April 29 and April 30 to reconnect Unit 6. This outage involved increasing spill above the 2009 Spring FOP spill level for about one hour each day. Powerhouse discharge operations consisted of one unit being operated at 5 kcfs (speed/no load) and the remaining inflow was passed as spill up to a level not to exceed 125% TDG spill cap level of 70 kcfs (set specifically for this operation). The outage was coordinated with TMT on April 22 and with Fish Passage Operations and Maintenance (FPOM) group on April 27.

3. Lower Monumental Dam:
   - A two treatment spring spill test to evaluate juvenile fish passage and survival began on April 28 and is scheduled to continue until about June 3. The test includes alternating the spill pattern between a bulk and uniform pattern. This test was developed in the Studies Review Work Group (SRWG) using the Anadromous Fish Evaluation Program (AFEP) process and coordinated with TMT on April 22.

4. Ice Harbor:
    - A two treatment spring spill test to evaluate juvenile fish passage and survival began on April 27 and will continue through June 7. The test includes alternating spill levels between 45kcfs/gas cap and 30% of total project outflow as described in the 2009 Spring FOP. The test was developed in the SRWG using the AFEP process and was coordinated with TMT on April 22.

5. John Day:
    - A two treatment spring spill test to evaluate juvenile fish passage and survival began on April 27 and will continue through June 8. The test includes alternating the spill between 30% and 40% of total project outflow as described in the 2009 Spring FOP. The test was developed in the SRWG using the AFEP process and was coordinated with TMT on April 22.

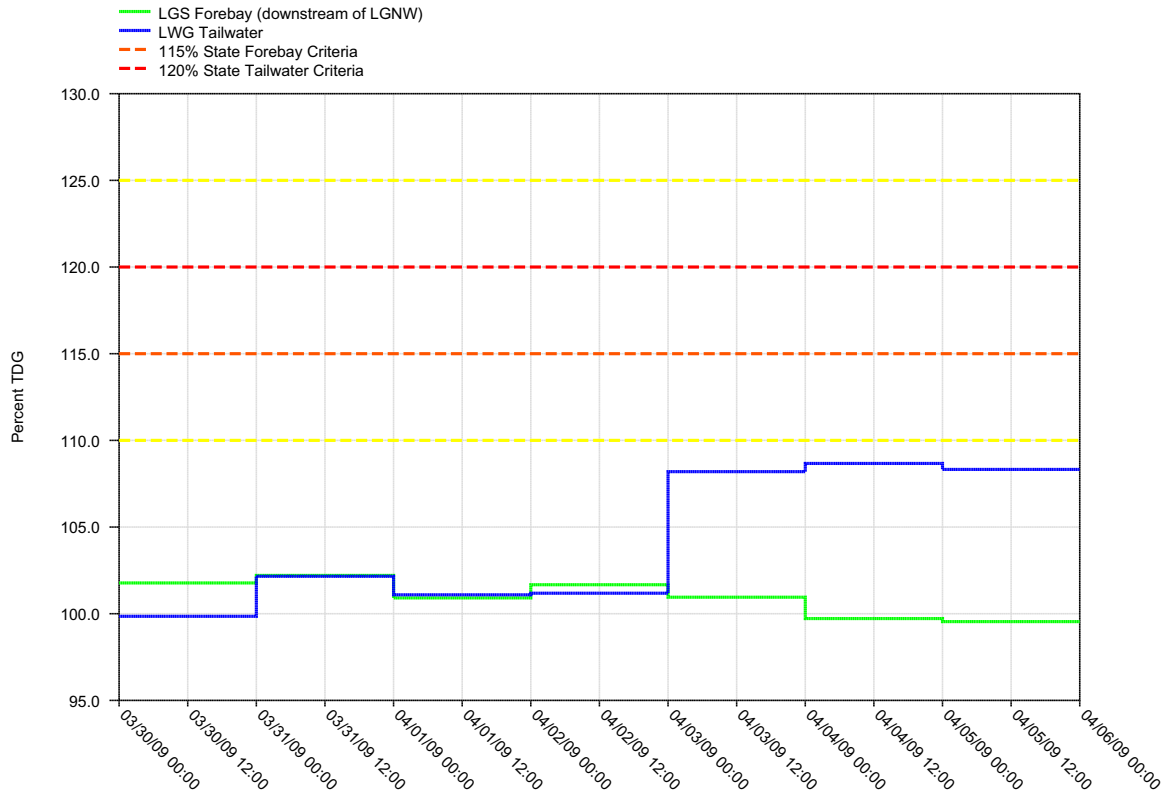
6. Bonneville:
    - On April 27 the second powerhouse tripped offline resulting in a spill level that exceeded both the 2009 Spring FOP spill level and the 120% TDG spill cap level for two hours.

Spring Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Reduced Spill %	4/8/2009	600	1	Navigation	Hourly % spill dropped to 28.5% (below 30% +/- 1% range for flows above 30 kcfs) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	4/9/2009	1300	1	Navigation	Hourly % spill dropped to 28.8% (below 30% +/- 1% range for flows above 30 kcfs) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.9%.
Little Goose	Add'l Spilll	4/16/2009	1500 - 1600	2	Maintenance	Hourly % spill increased to 41.1 and 42.5 % (above 30% +/- 1% range) due to powerhouse outage during repair of unit 5 and 6. 24 hr avg. spill was 30.9%.
Little Goose	Add'l Spilll	4/29/2009	1500 - 1600	2	Maintenance	Hourly % spill increased to 46.9 and 74.3 % (above 30% +/- 1% range) due to powerhouse outage during repair of a field ground and reconnect unit 6. This outage was coordinated with TMT on April 22. 24 hr avg. spill was 32.7%.
Little Goose	Add'l Spilll	4/30/2009	1800	1	Maintenance	Hourly % spill increased to 51.4% (above 30% +/- 1% range) due to powerhouse outage during repair of a field ground and reconnect unit 6. This outage was coordinated with TMT on April 22. 24 hr avg. spill was 30.7%.
The Dalles	Add'l Spilll	4/22/2009 - 4/23/09	2400 - 0200	3	Transmission stability	Hourly % spill increased to 41.4, 41.5 and 41.9% (above 40% +/- 1% range) due to project being on response during rapidly changing load as defined in the text on pages 3-4. 24 hr avg. spill was 38.1%.
Bonneville	Add'l Spilll	4/27/2009	1500 - 1600	2	Maintenance	Hourly spill increased to 171.7 and 143.2 kcfs (above 95 kcfs spill cap). The second powerhouse lost power when the North Bonneville substation sent a trip signal for transformers T11 and T12 at the Dam, resulting in project spilling excess outflow.

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

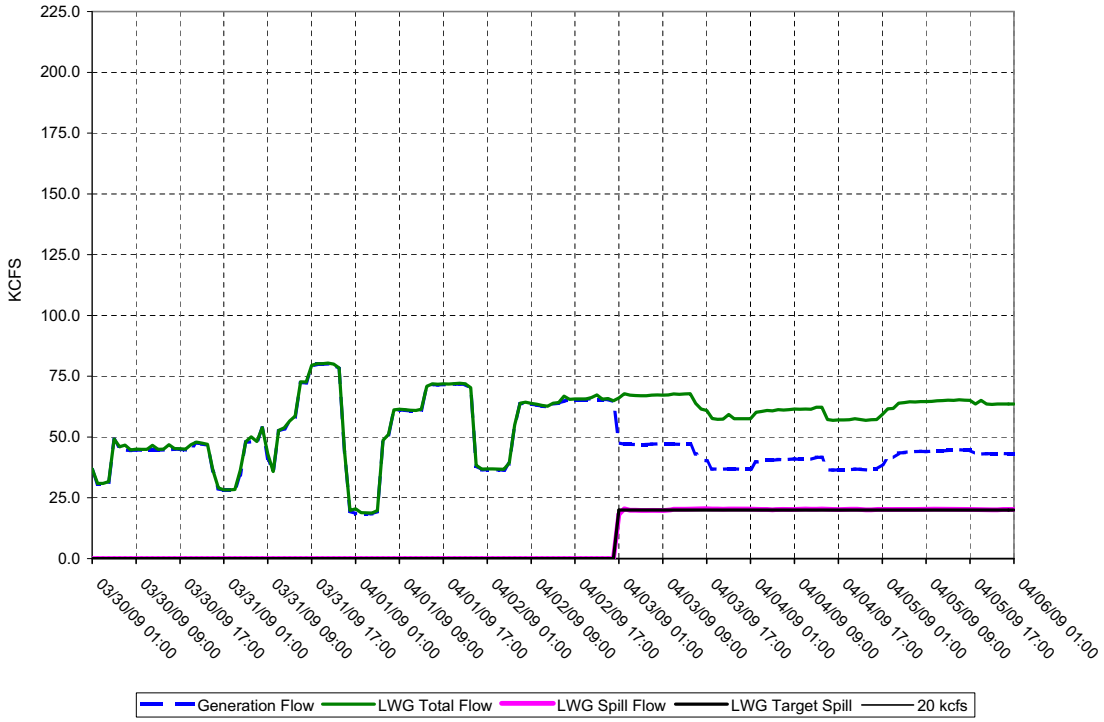
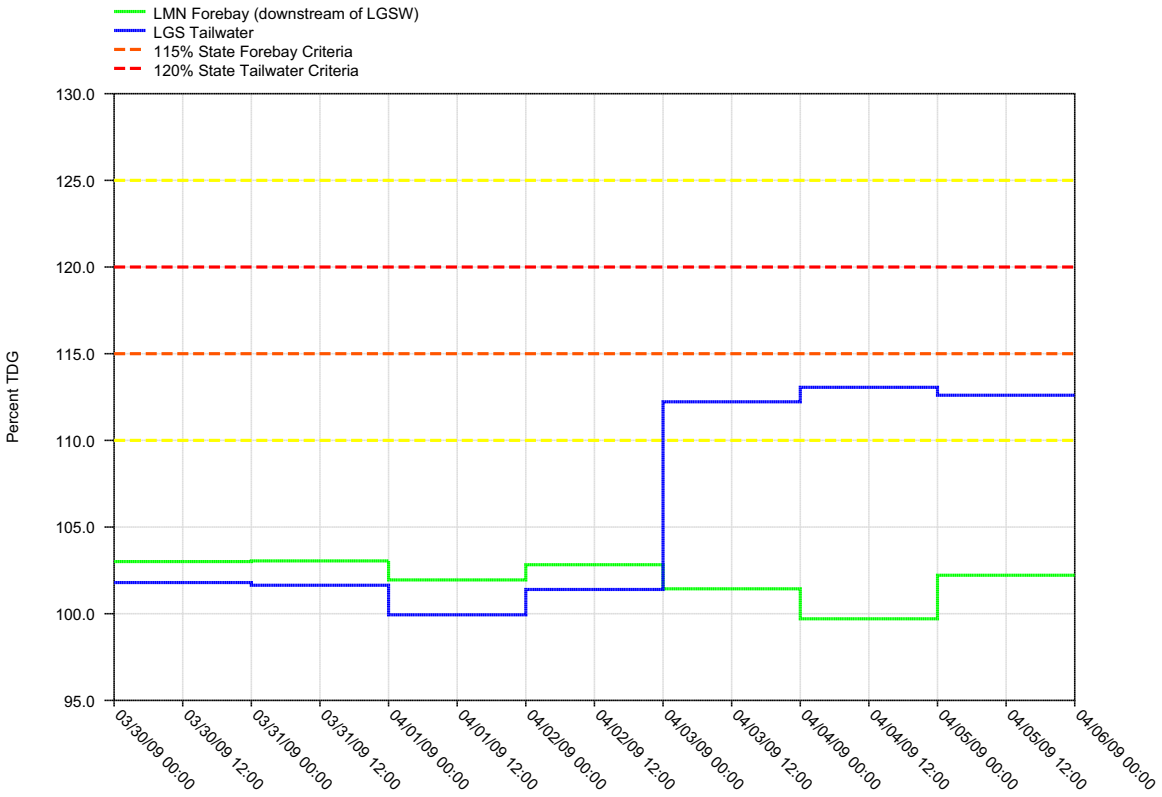


Figure 2.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

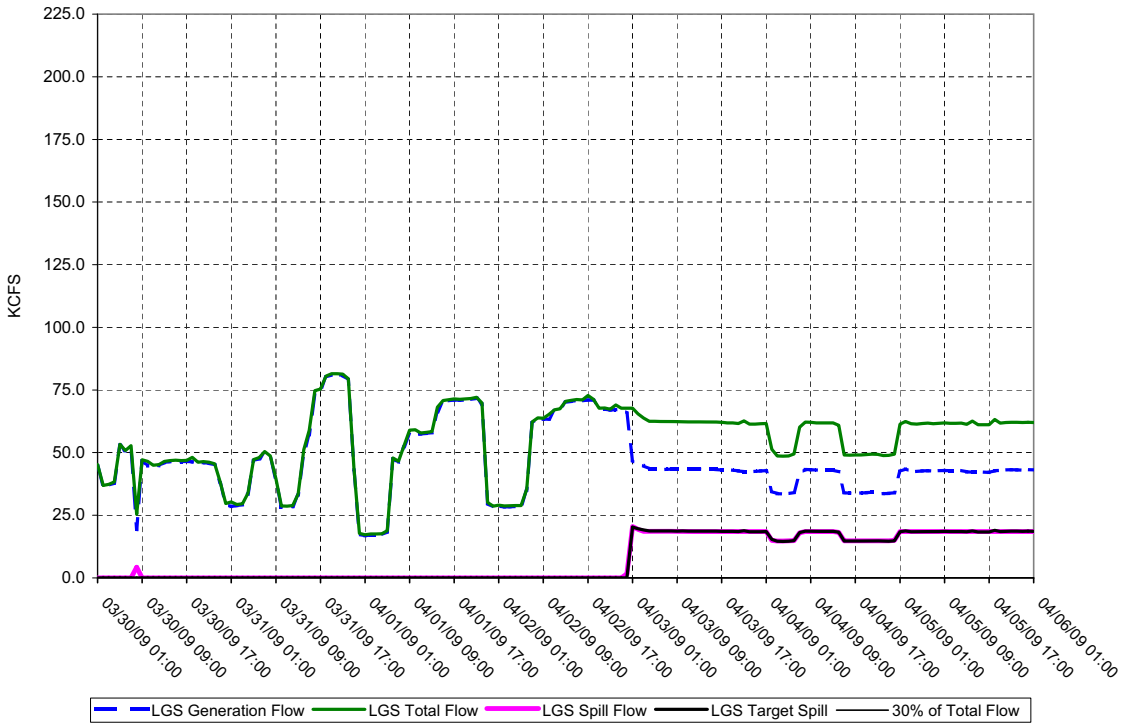
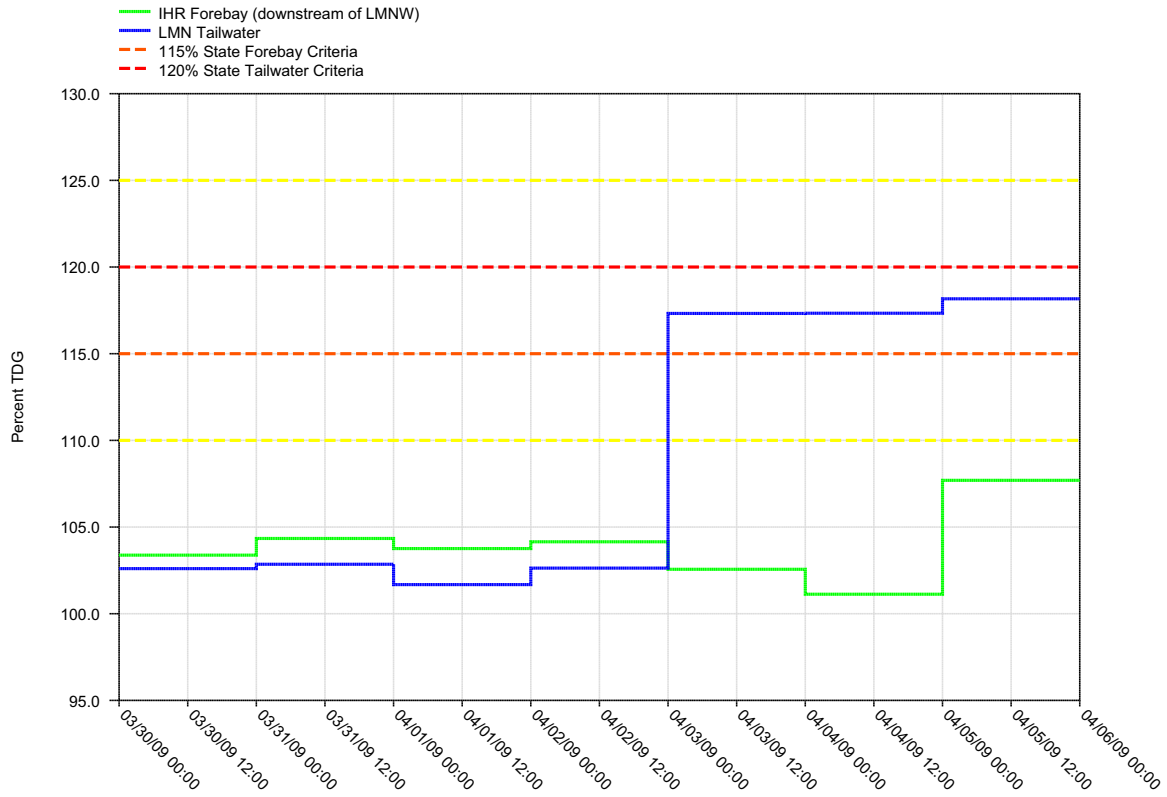


Figure 3.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

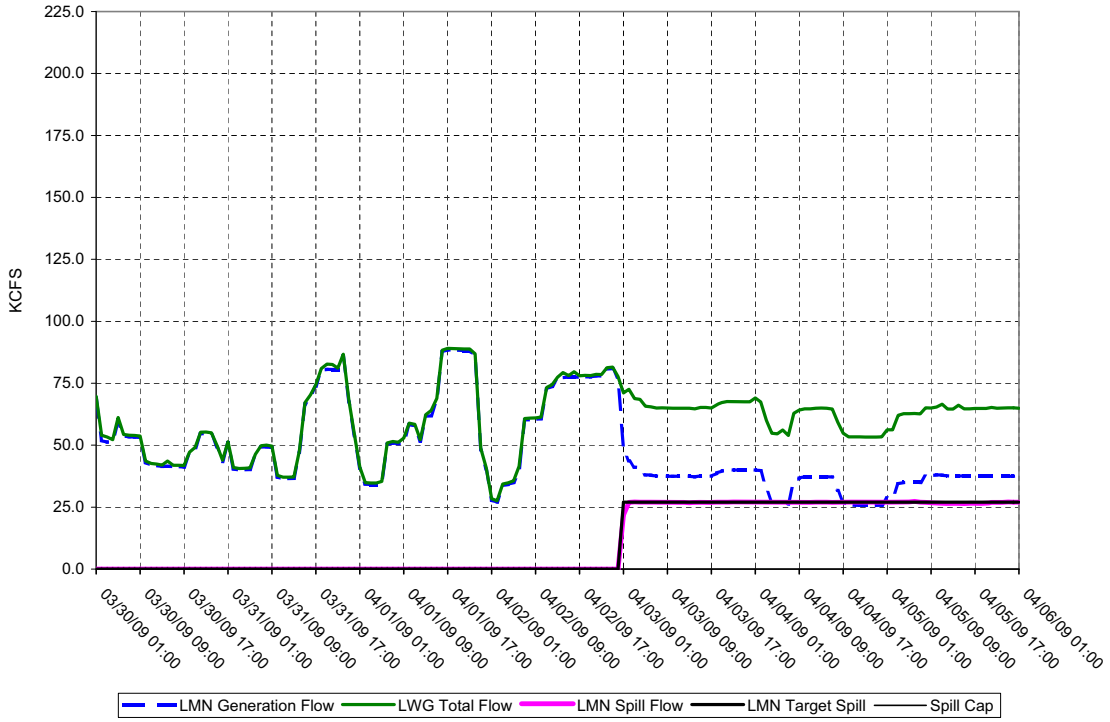
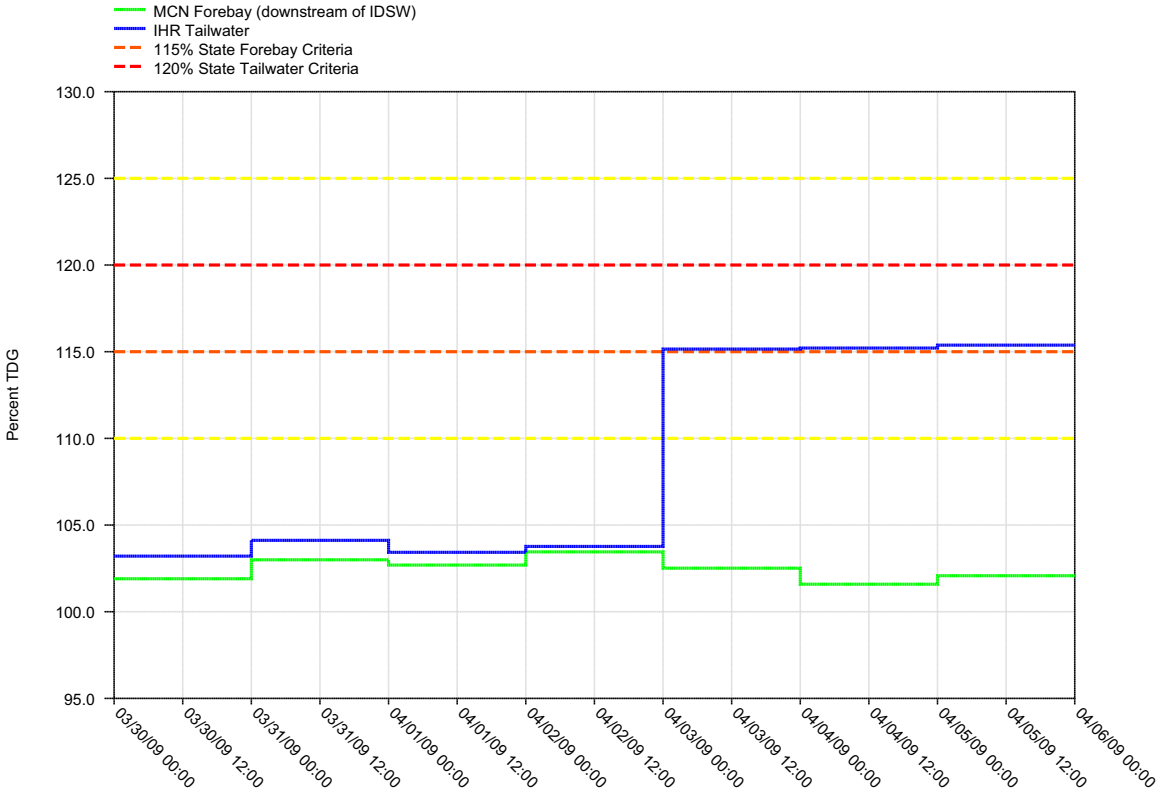


Figure 4.

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



ICE HARBOR DAM - Hourly Spill and Flow

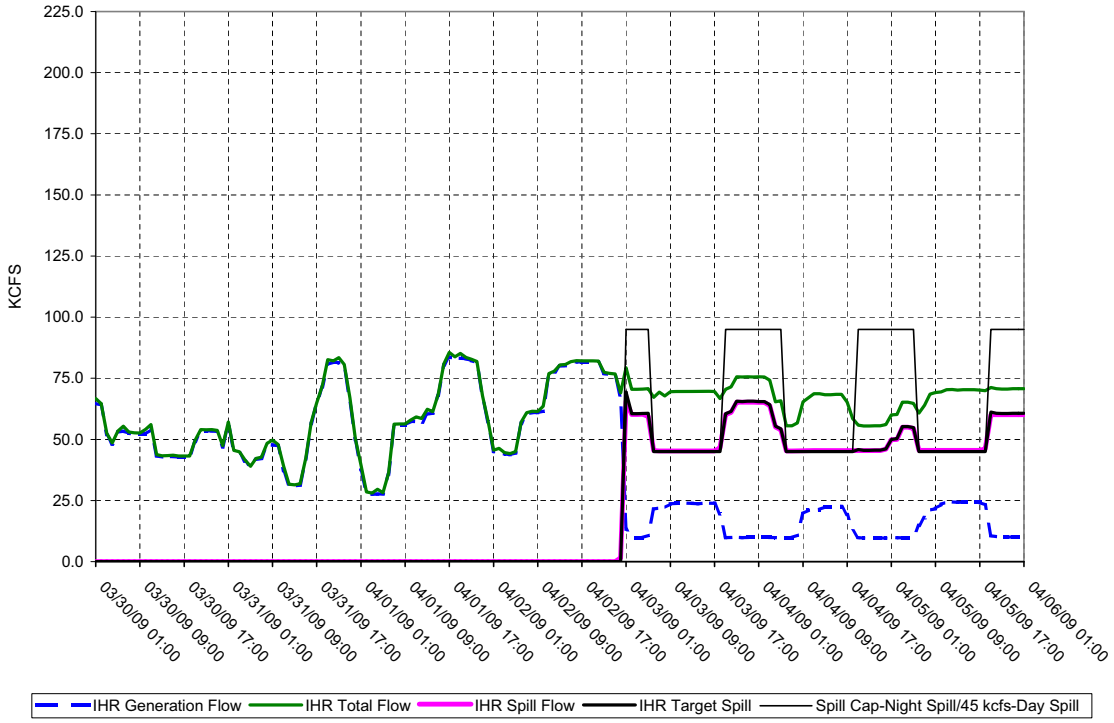
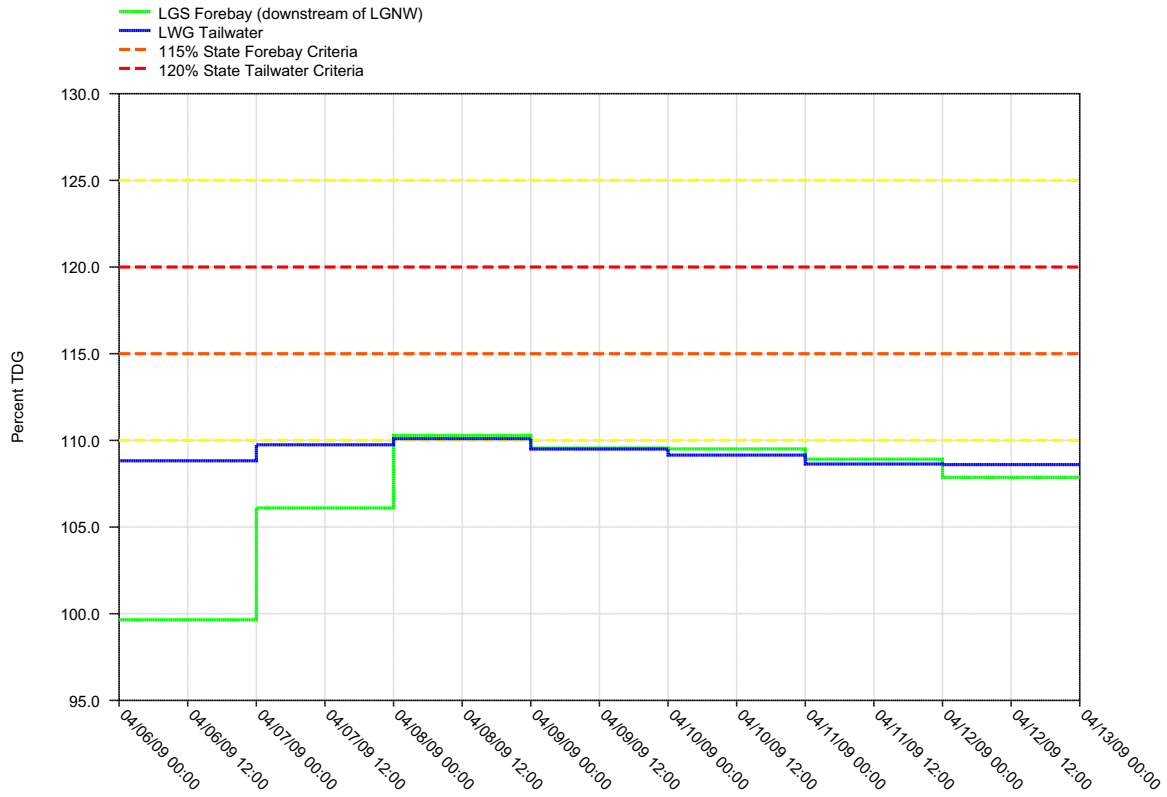


Figure 5.

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



LOWER GRANITE DAM - Hourly Spill and Flow

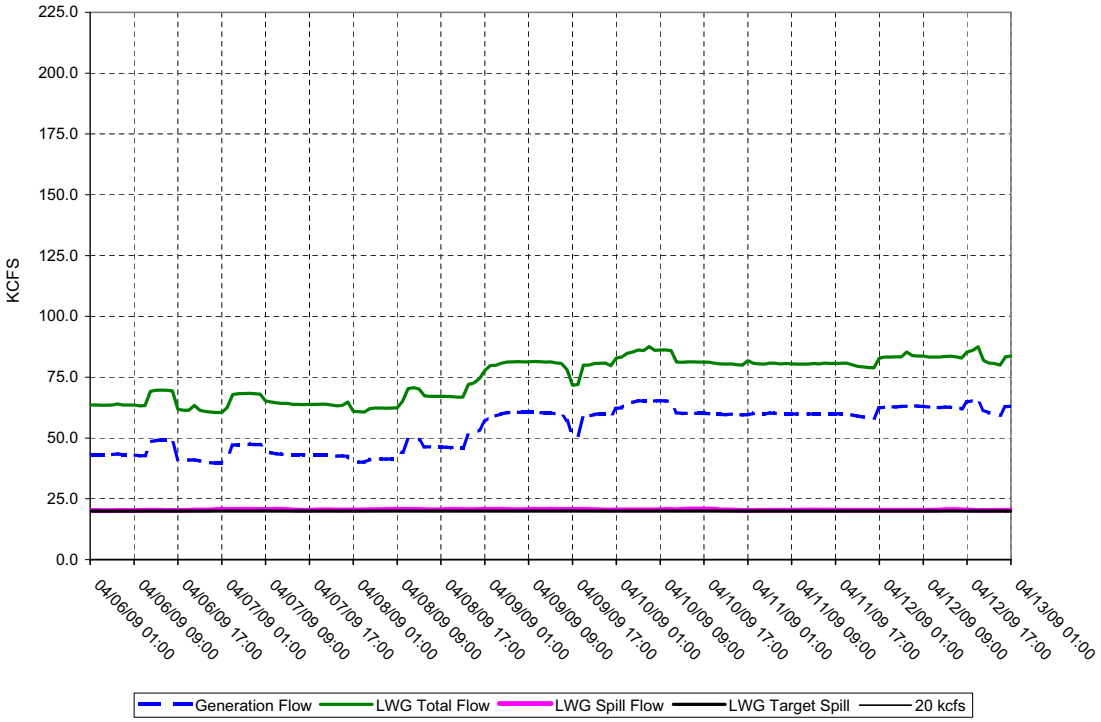
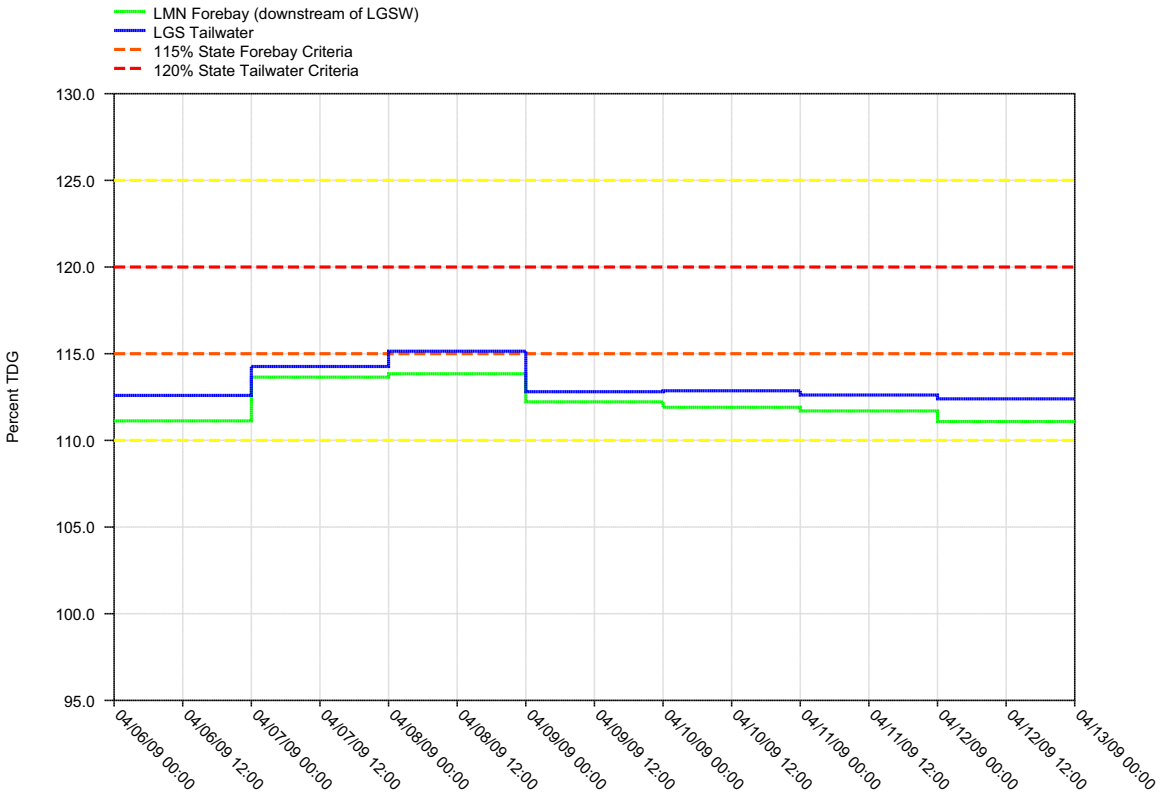


Figure 6.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

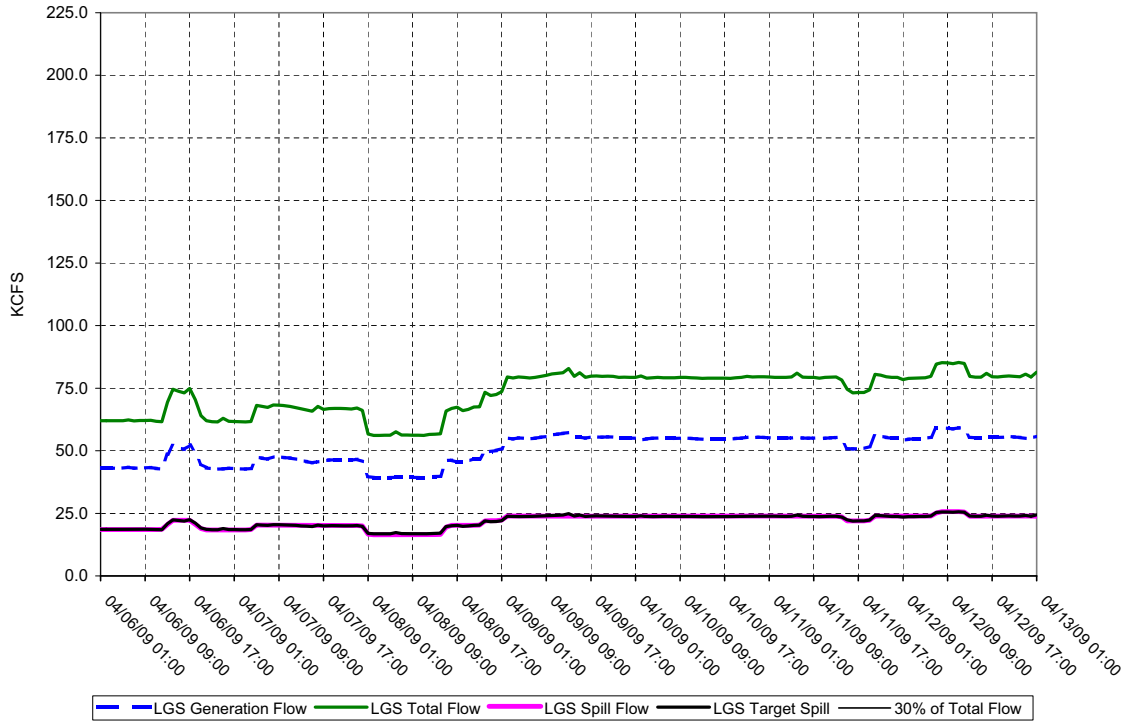
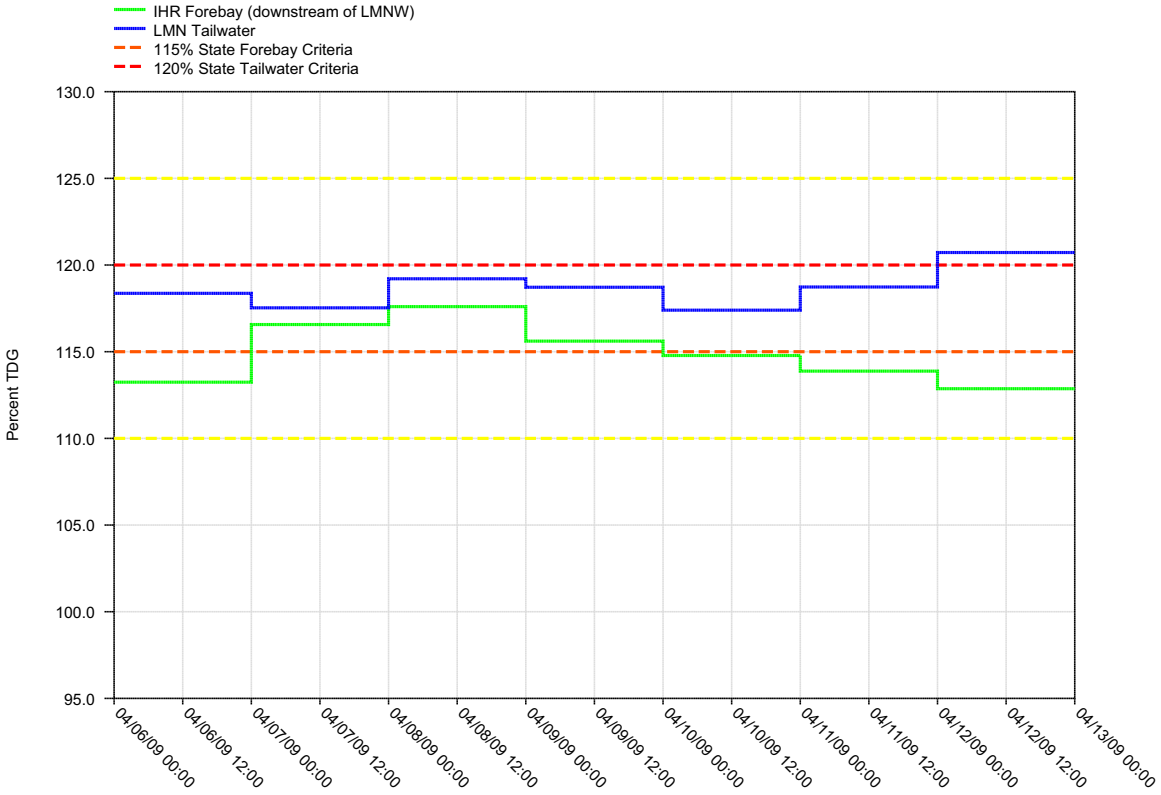


Figure 7.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

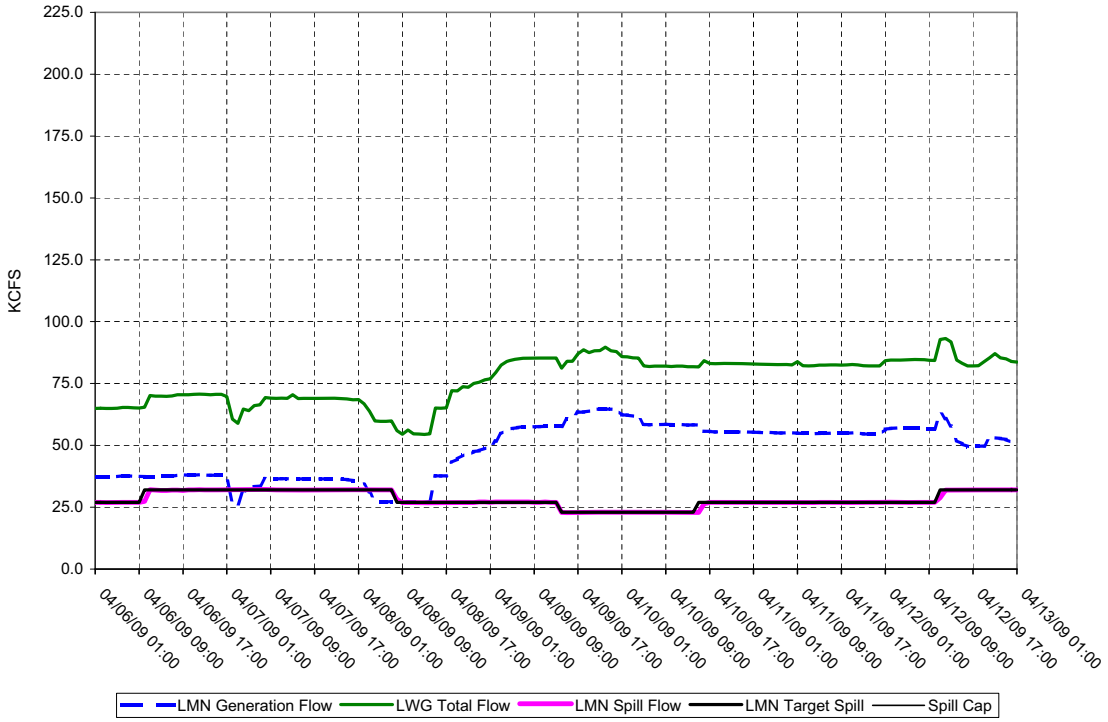
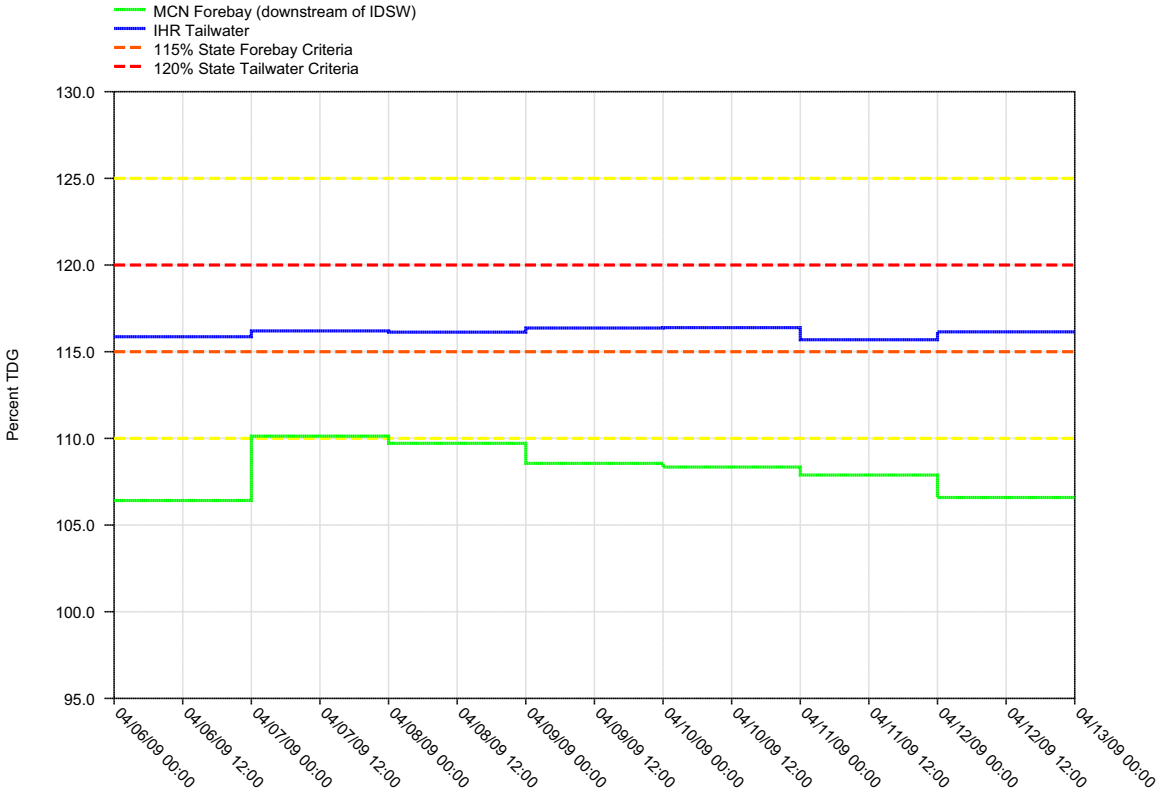


Figure 8.

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



ICE HARBOR DAM - Hourly Spill and Flow

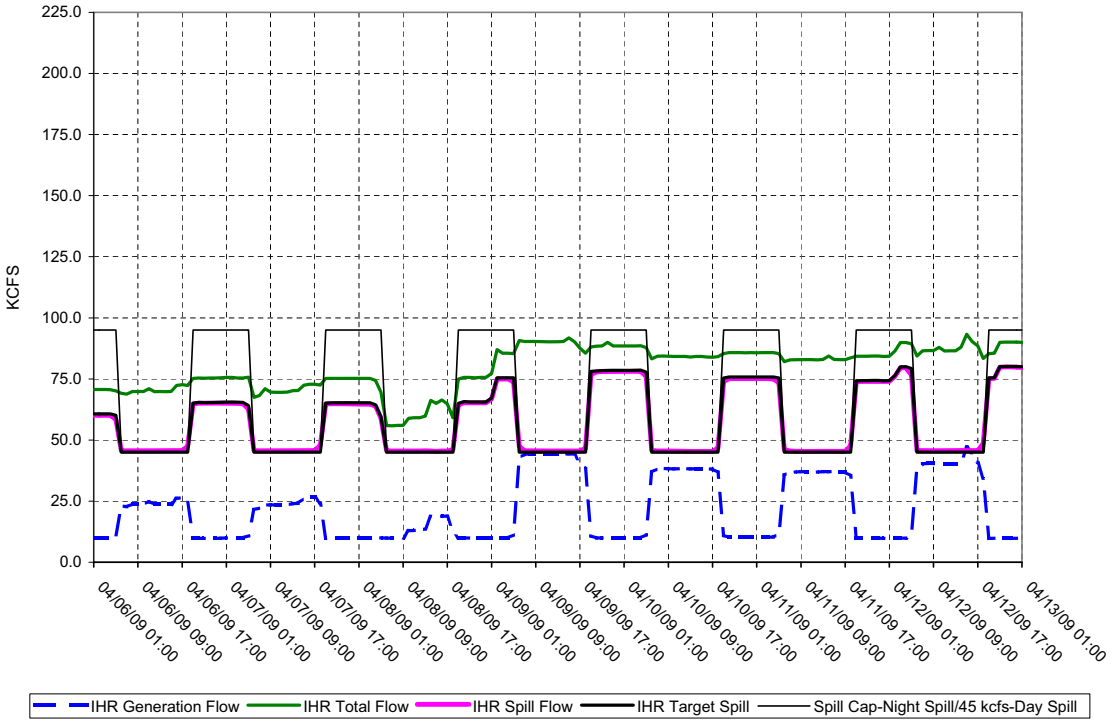
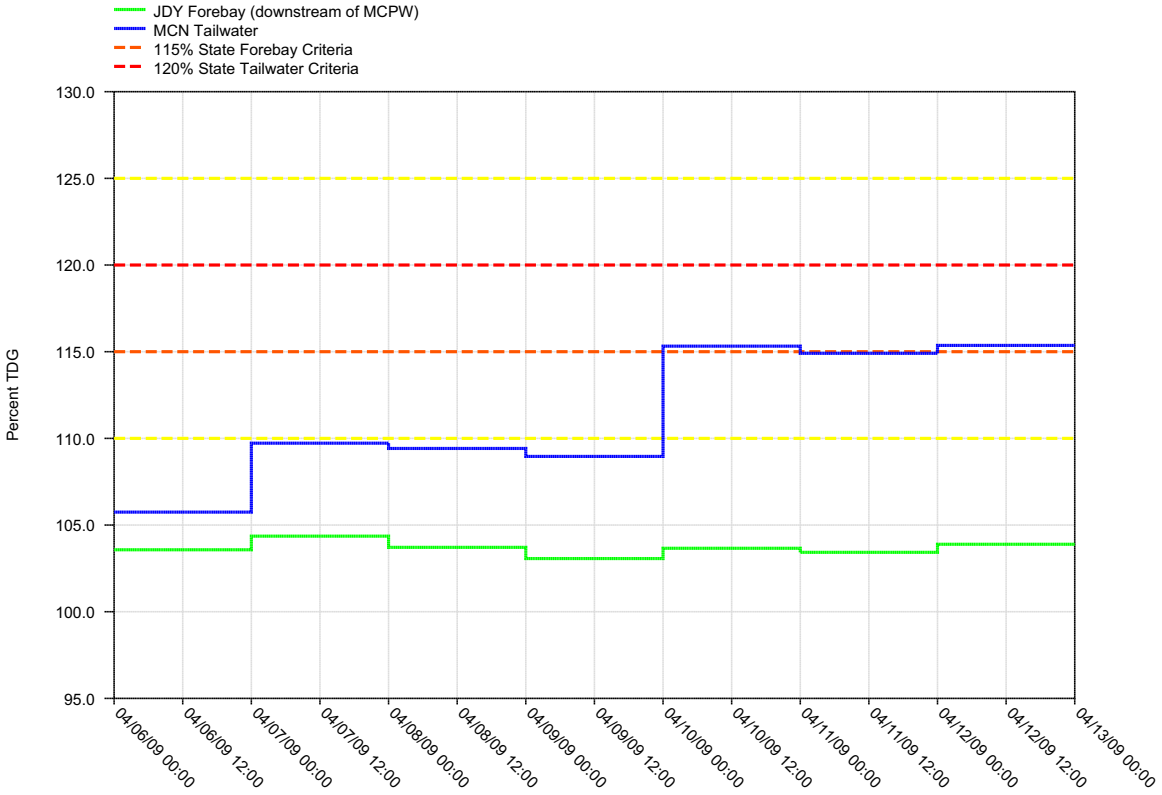


Figure 9.

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



McNARY DAM - Hourly Spill and Flow

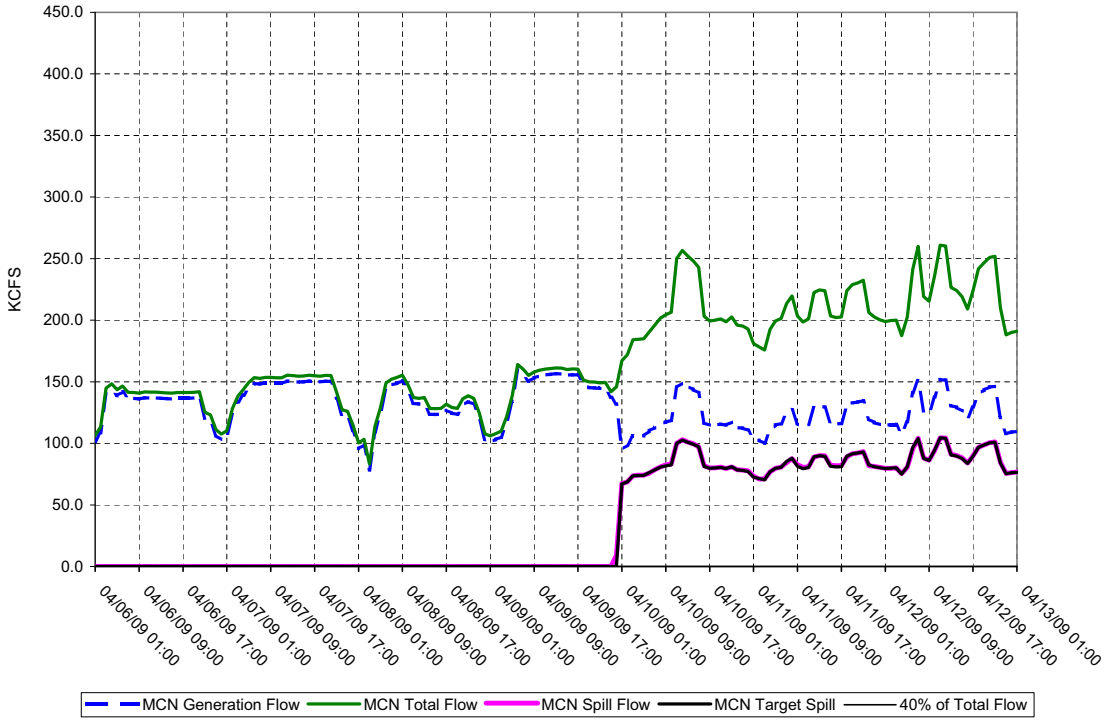
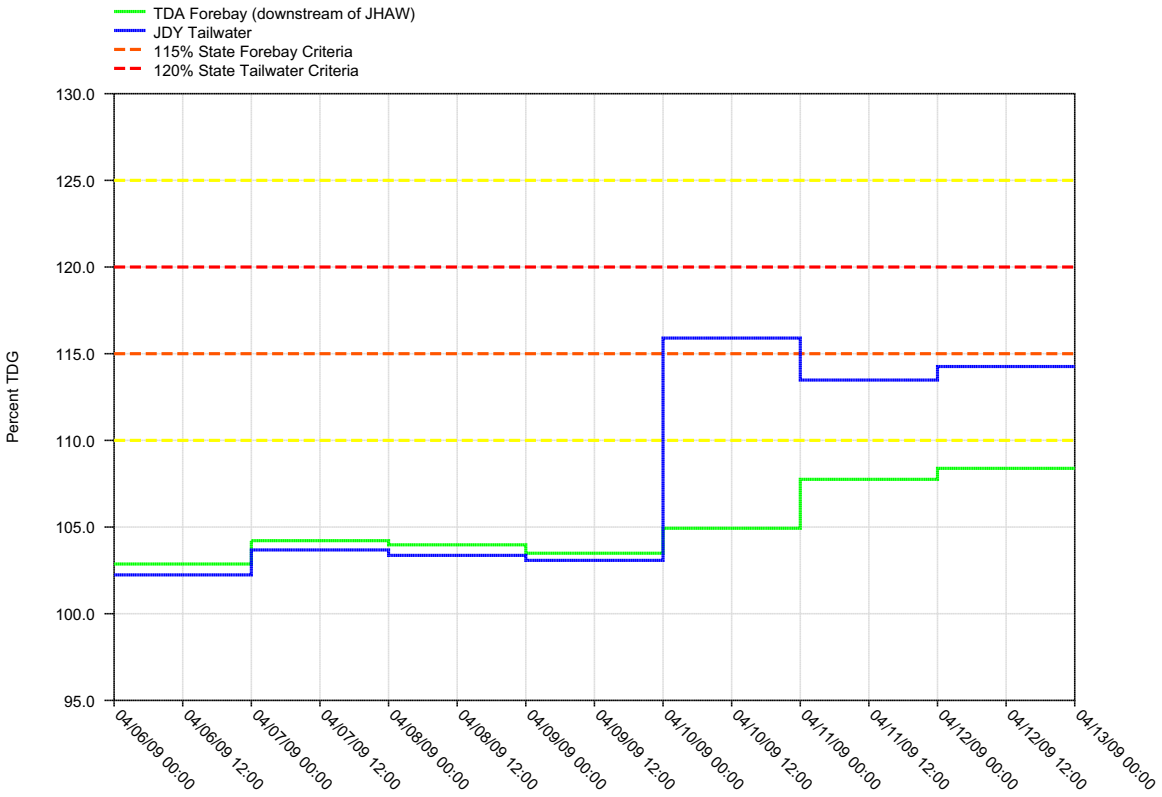


Figure 10.

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



JOHN DAY DAM - Hourly Spill and Flow

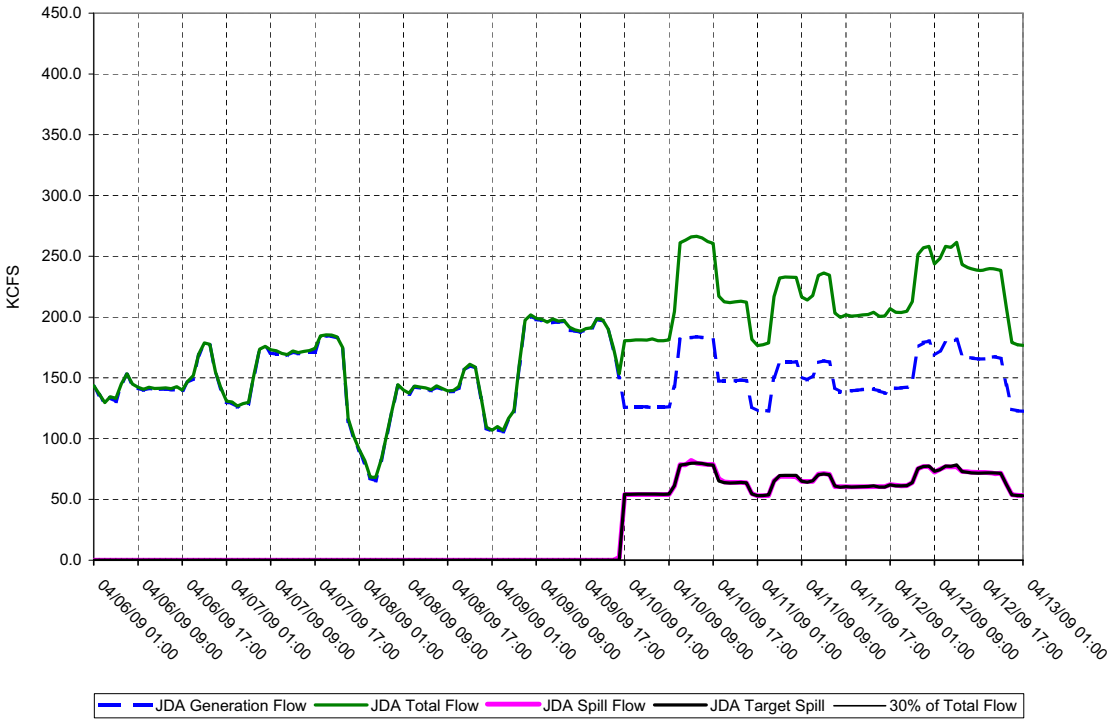
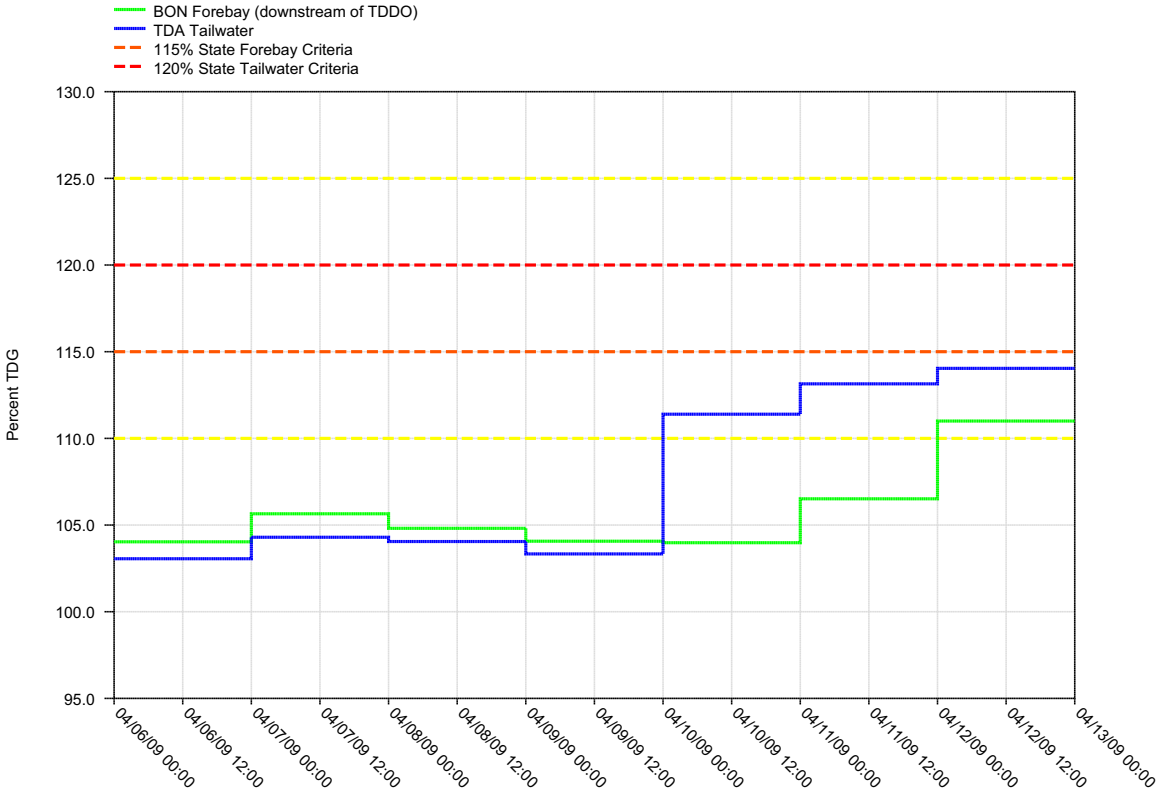


Figure 11.

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



THE DALLES DAM - Hourly Spill and Flow

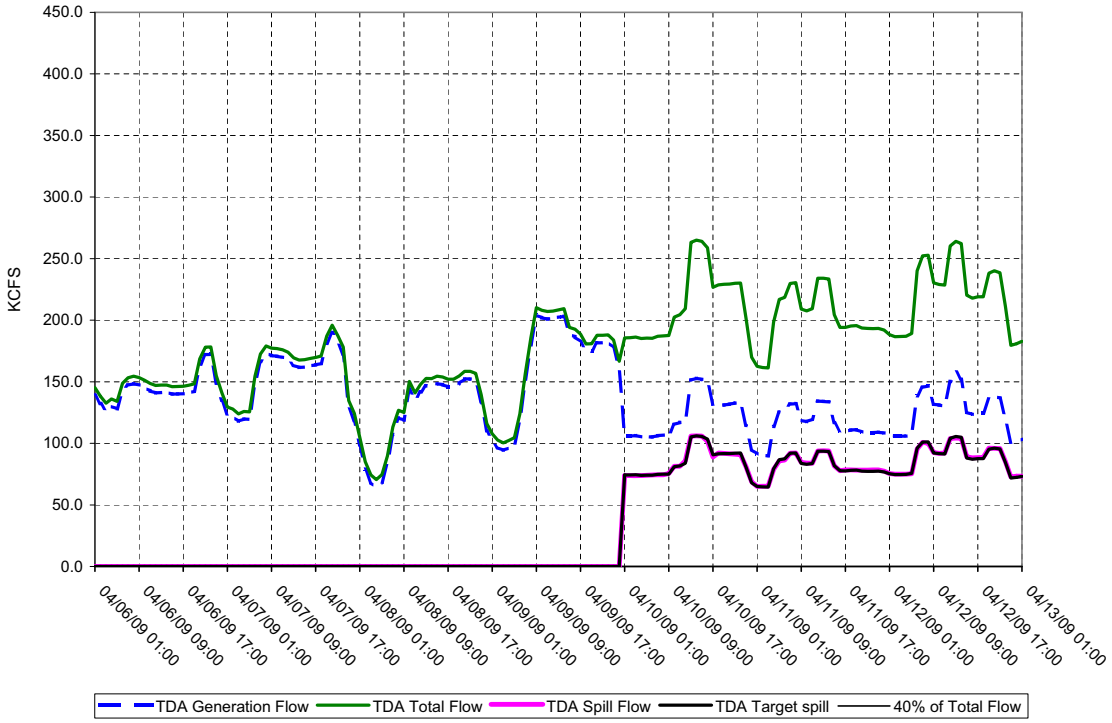
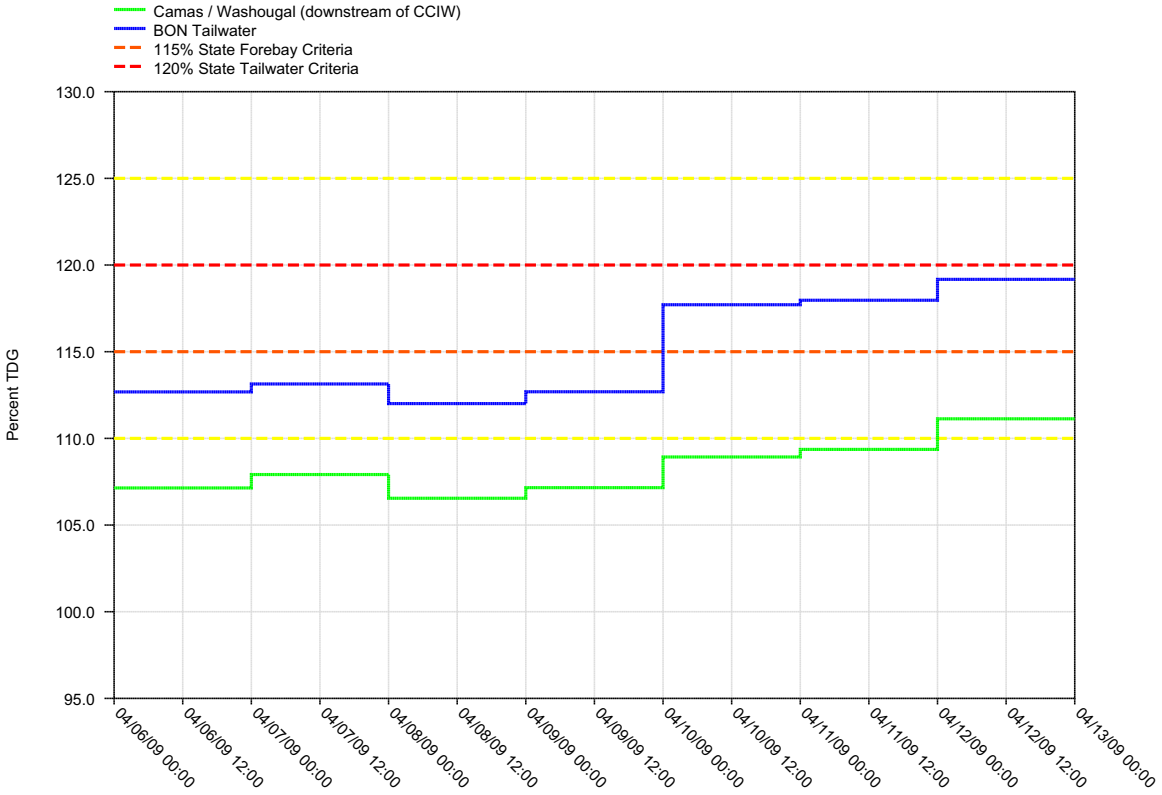


Figure 12.

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



BONNEVILLE DAM - Hourly Spill and Flow

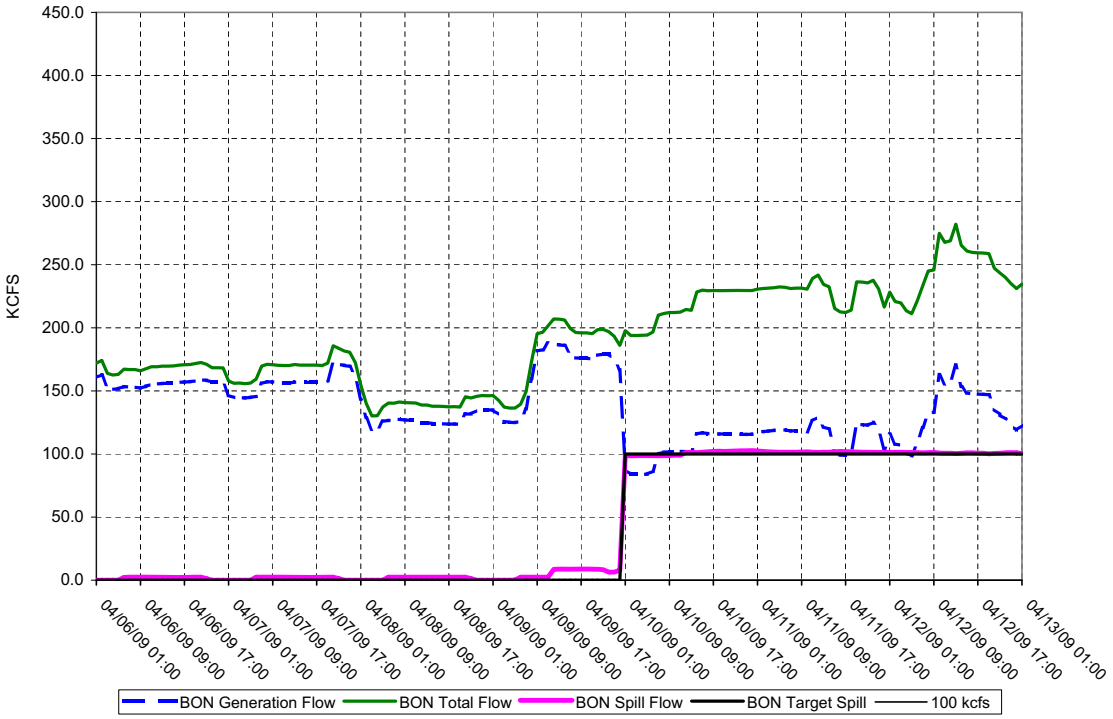
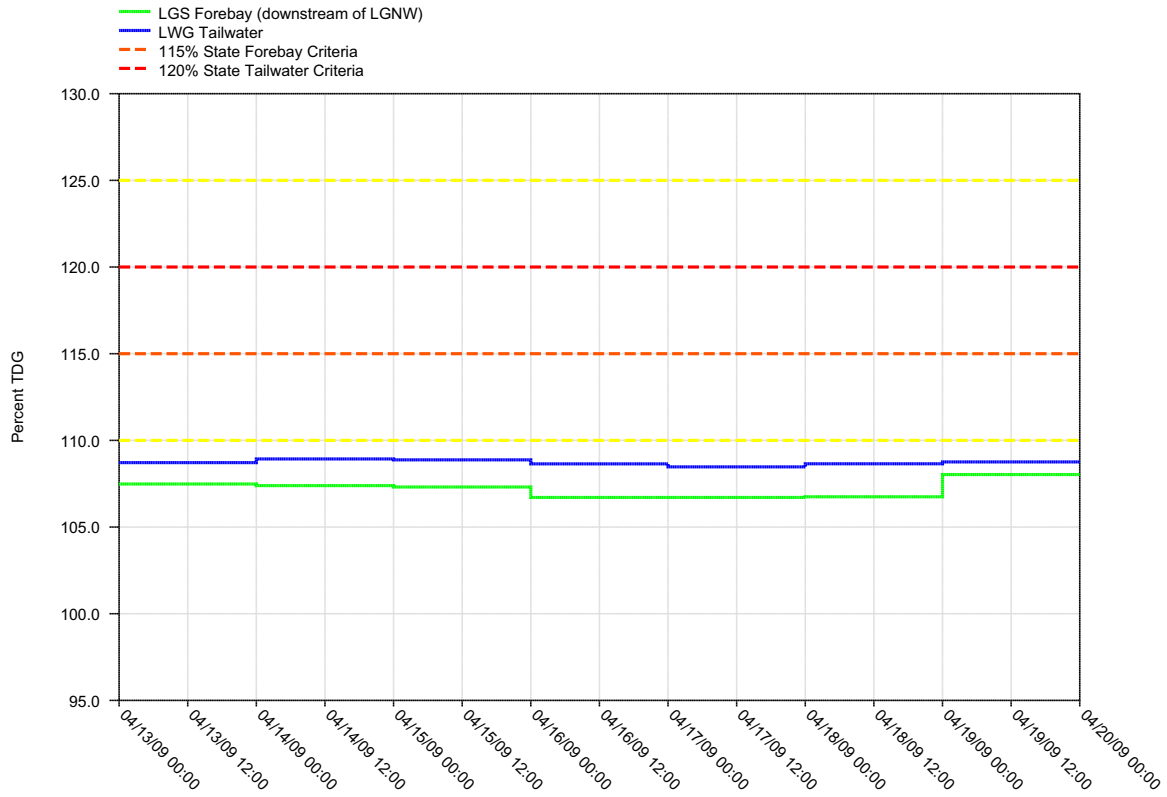


Figure 13.

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



LOWER GRANITE DAM - Hourly Spill and Flow

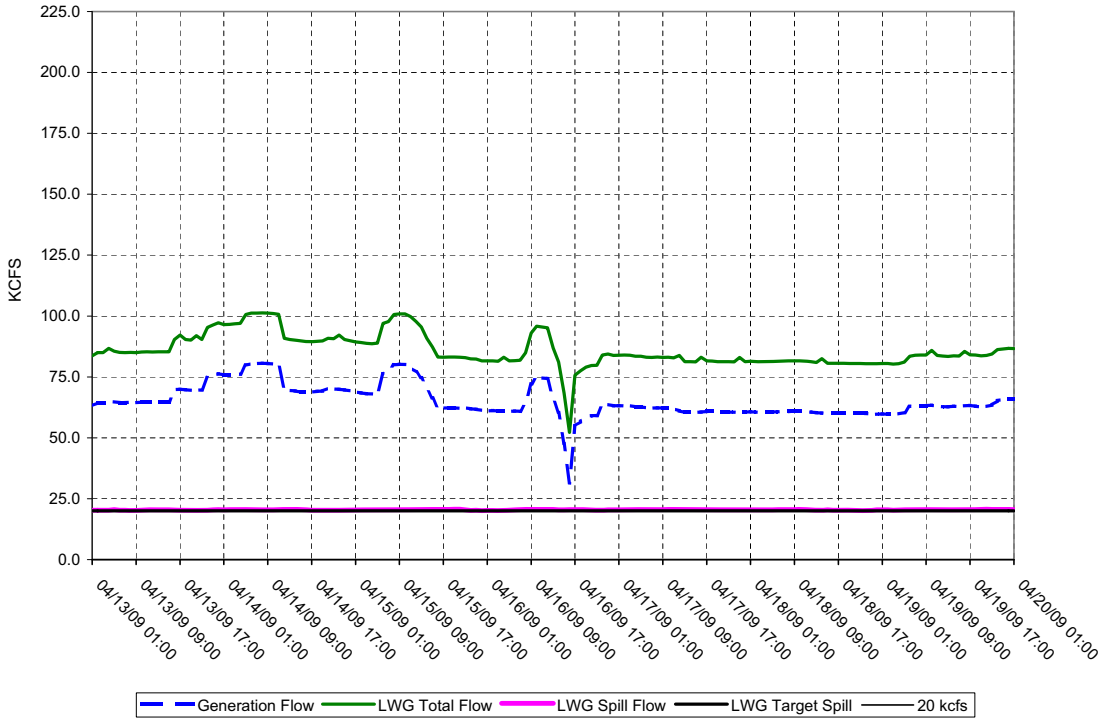
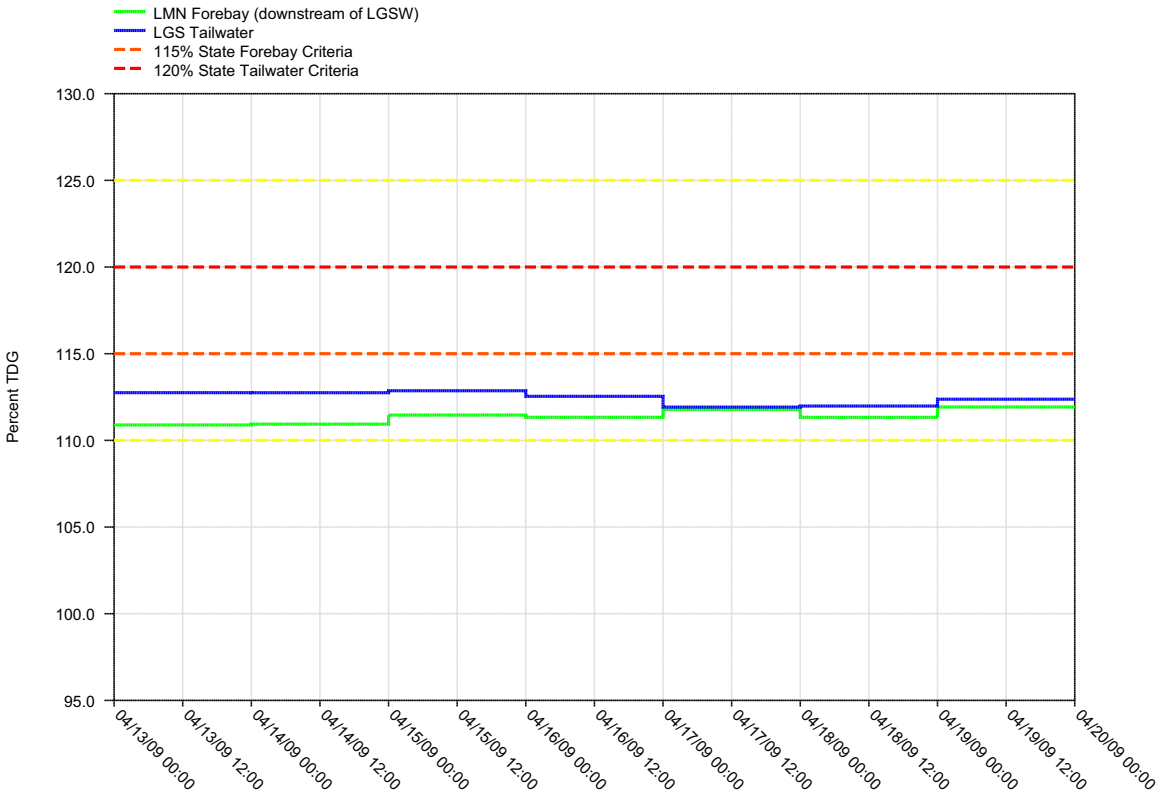


Figure 14.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

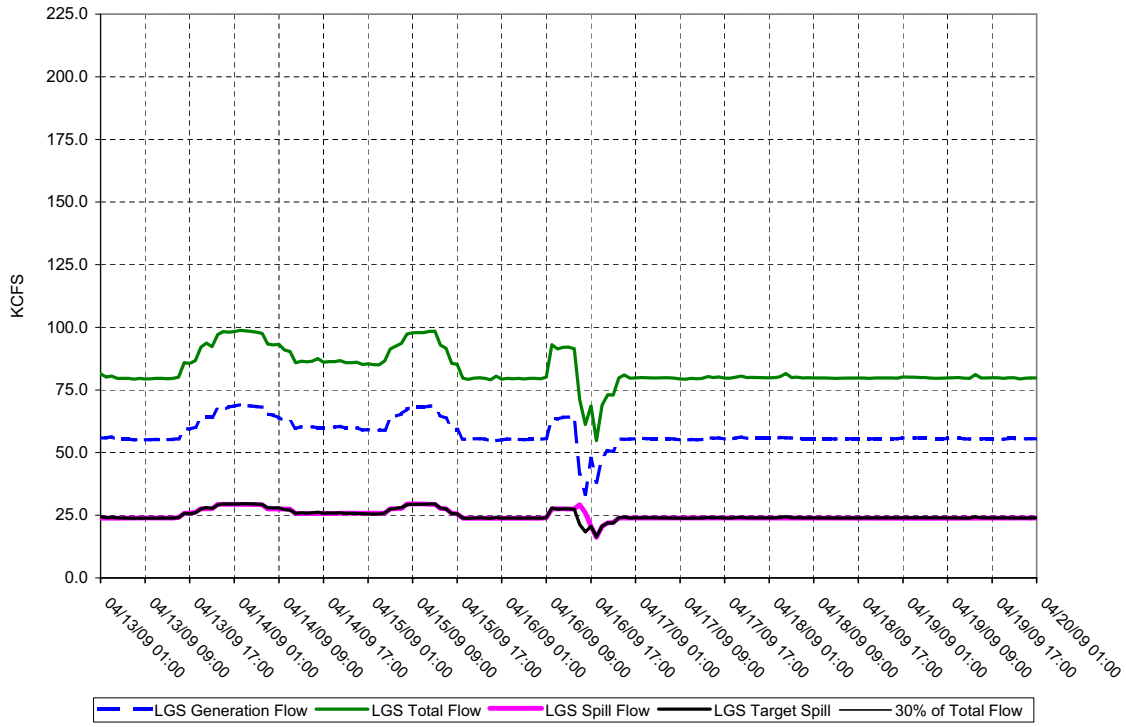
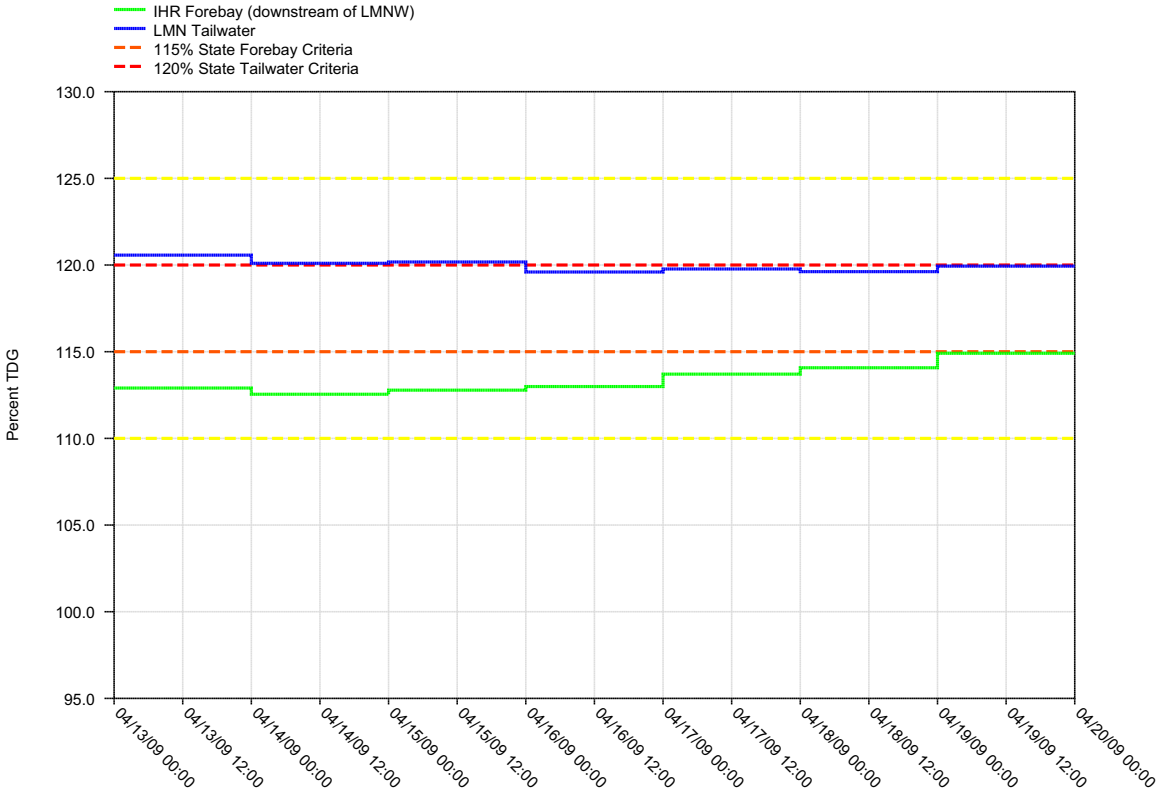


Figure 15.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

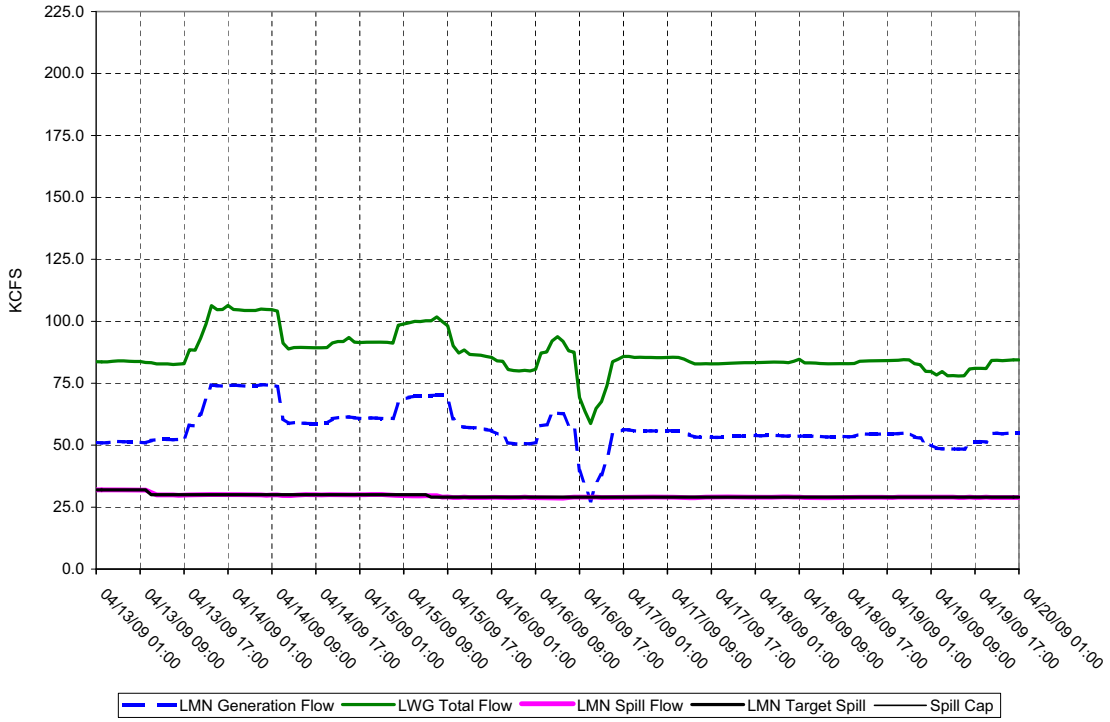
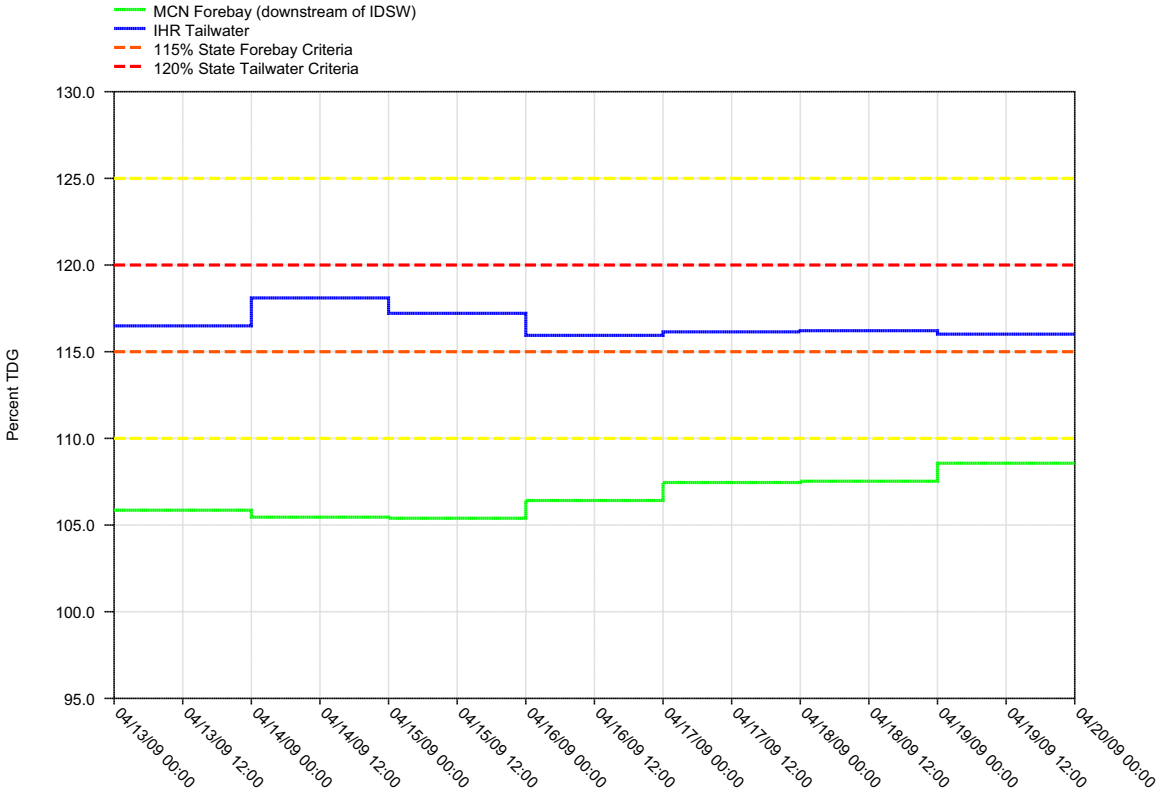


Figure 16.

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



ICE HARBOR DAM - Hourly Spill and Flow

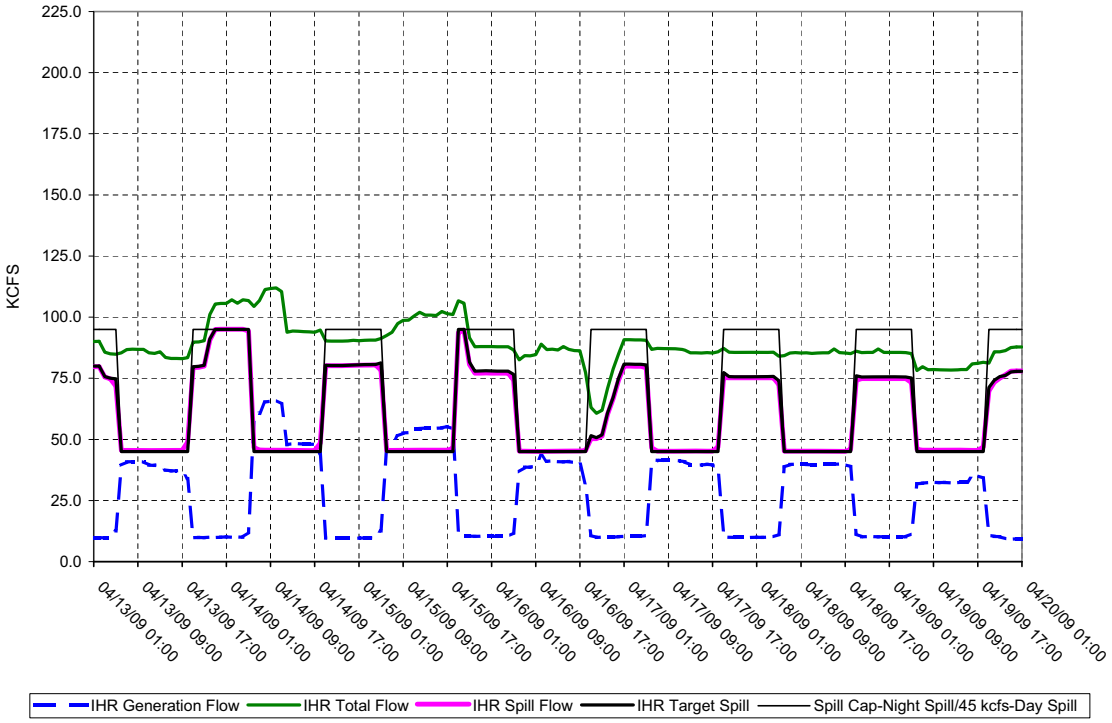
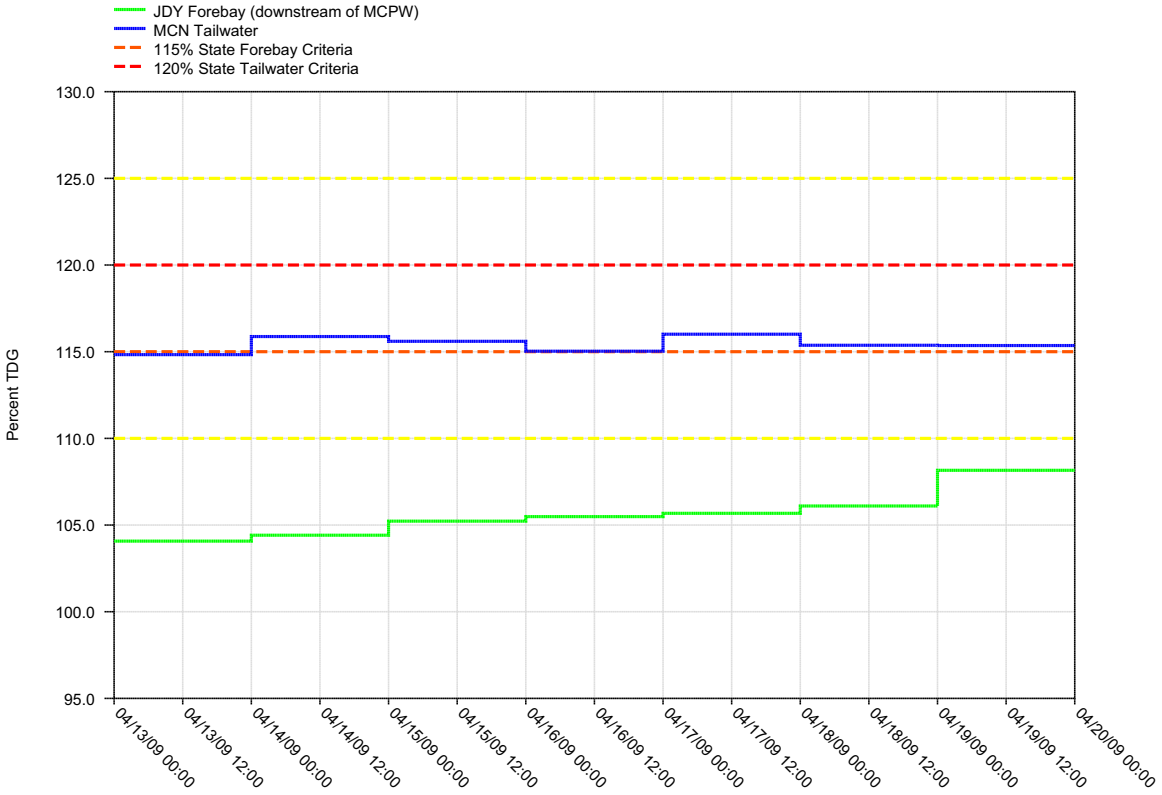


Figure 17.

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



McNARY DAM - Hourly Spill and Flow

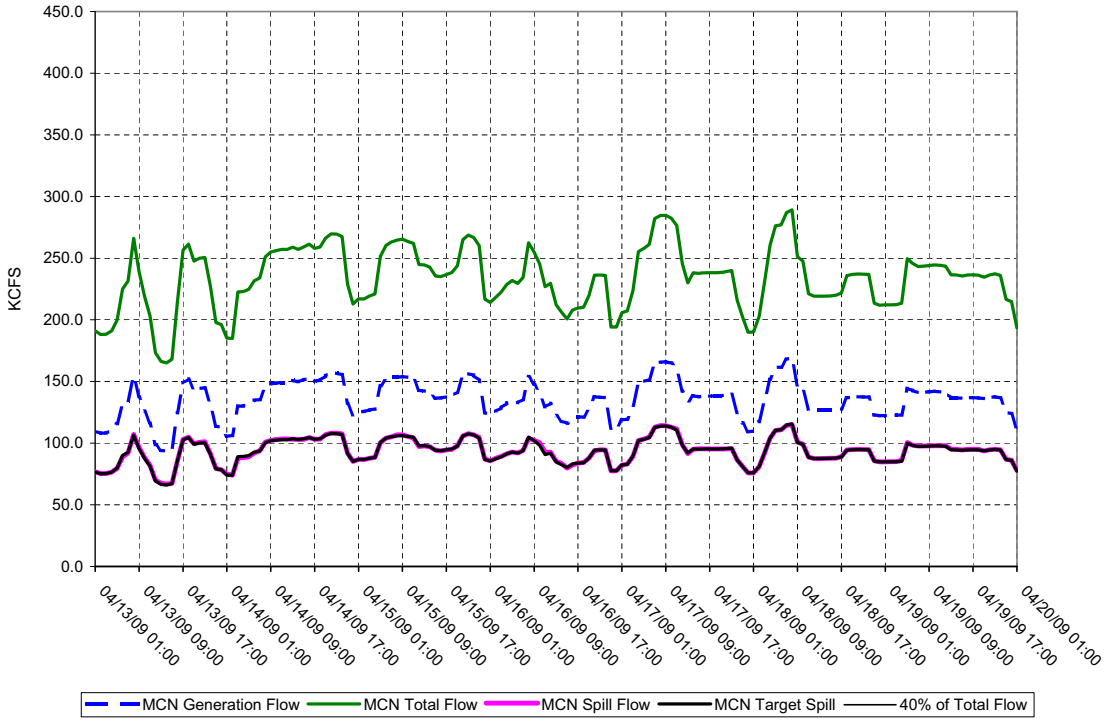
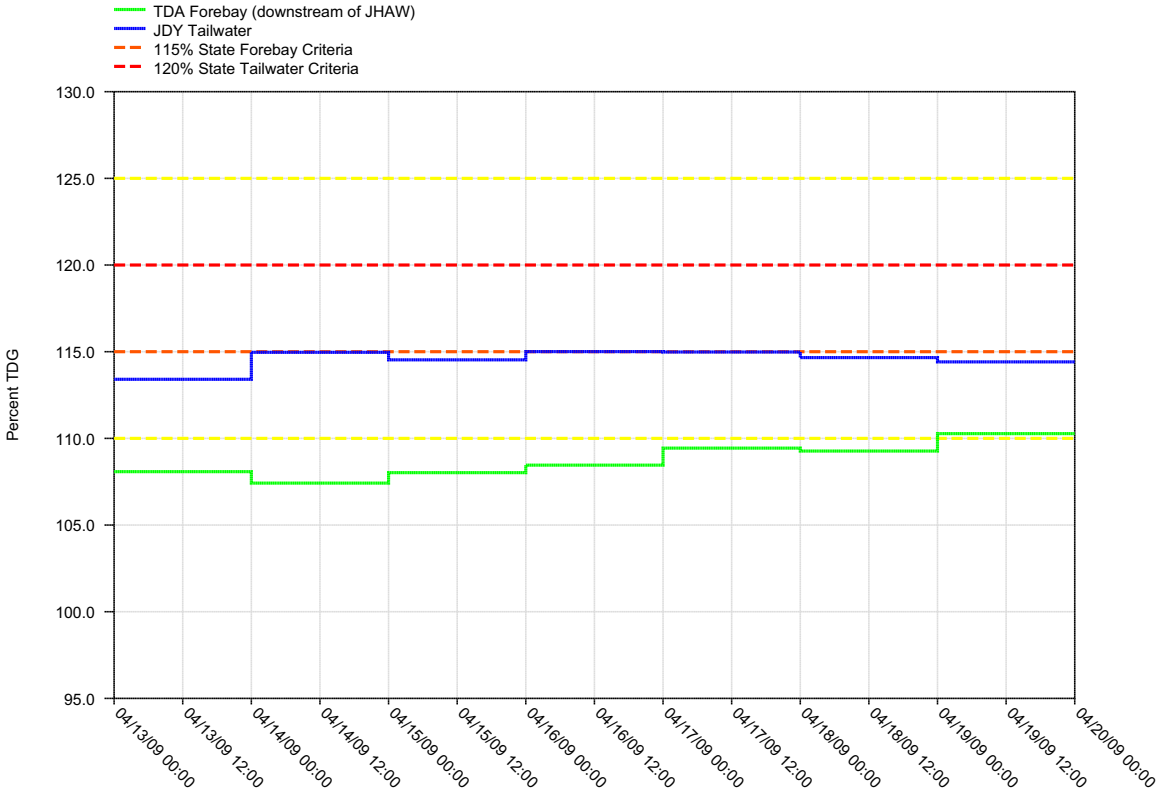


Figure 18.

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



JOHN DAY DAM - Hourly Spill and Flow

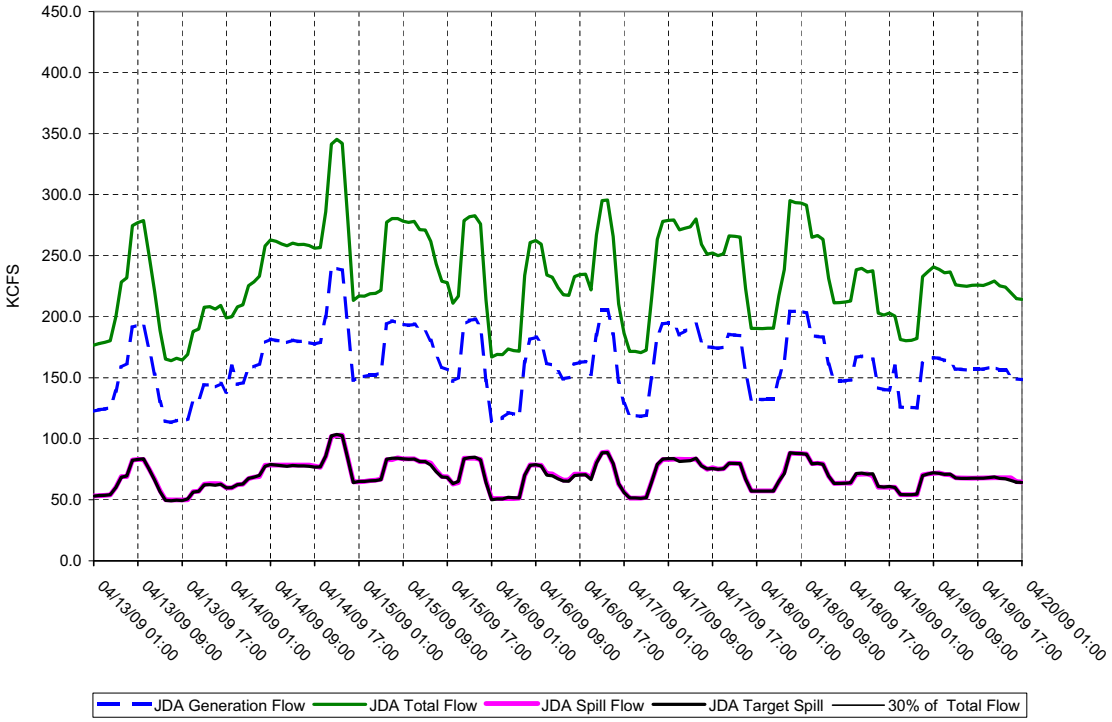
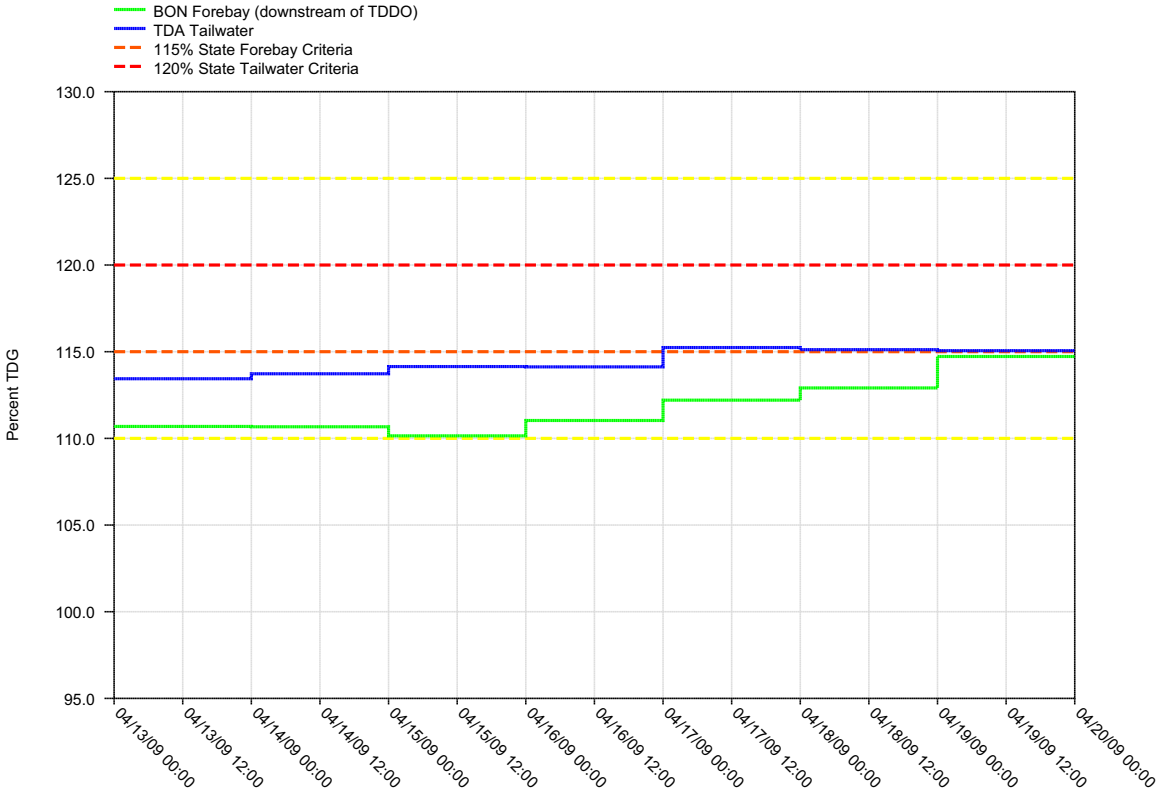


Figure 19.

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



THE DALLES DAM - Hourly Spill and Flow

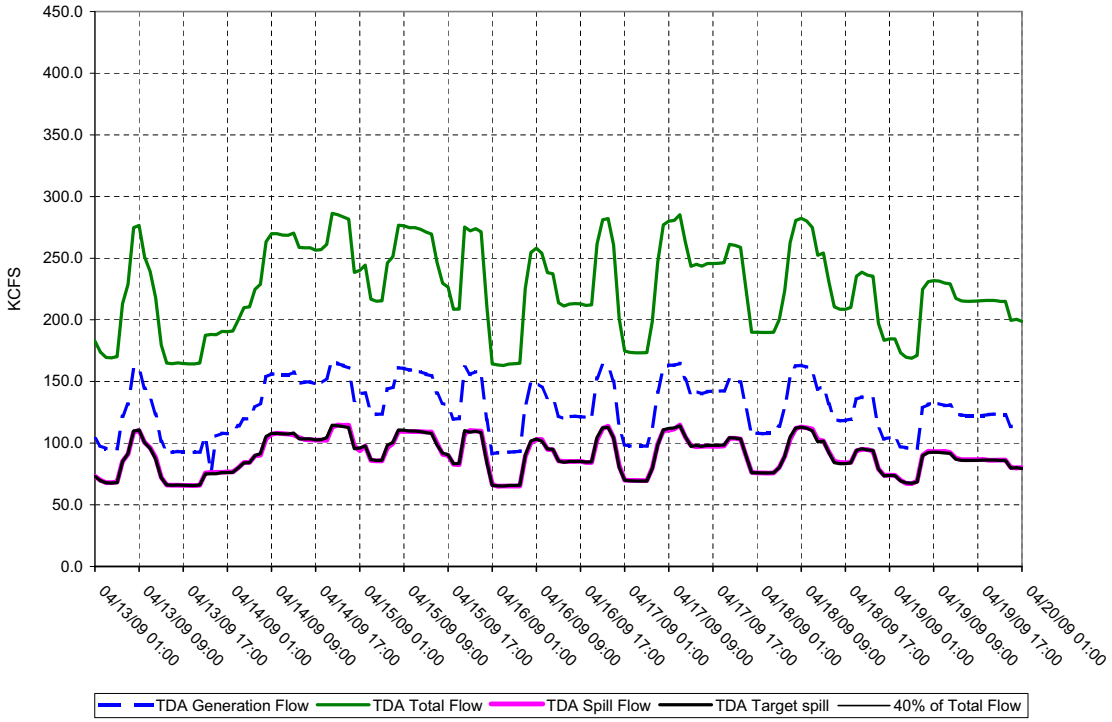
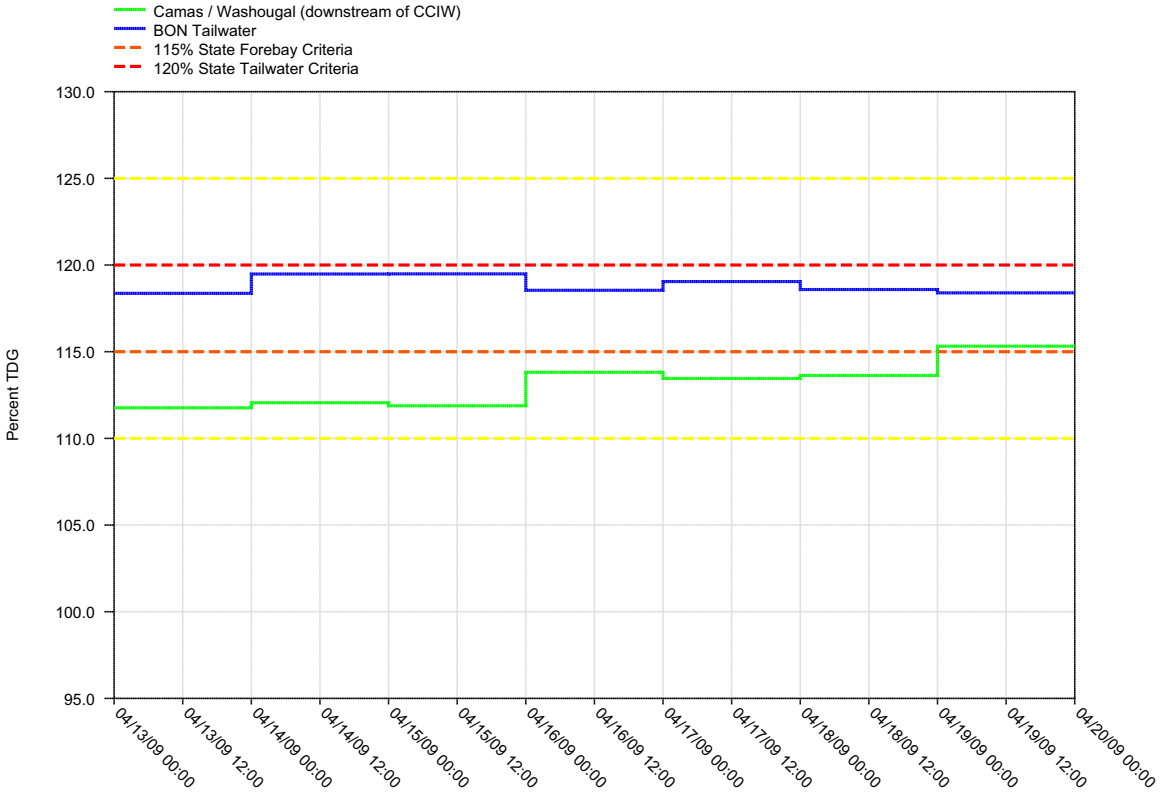


Figure 20.

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



BONNEVILLE DAM - Hourly Spill and Flow

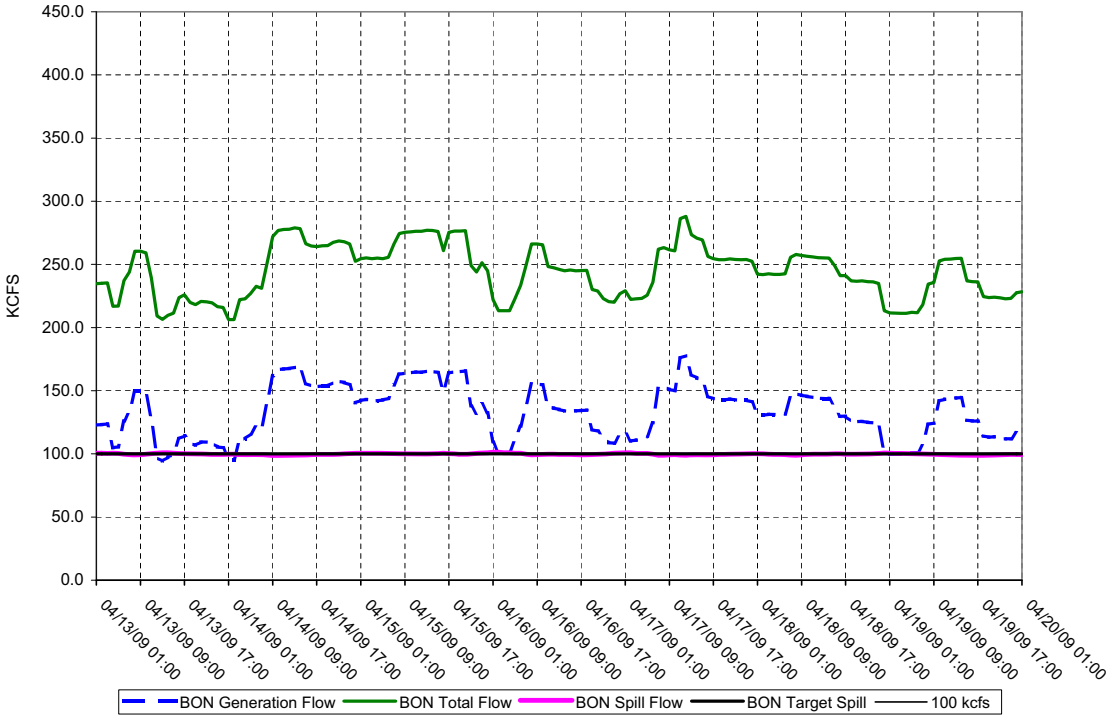
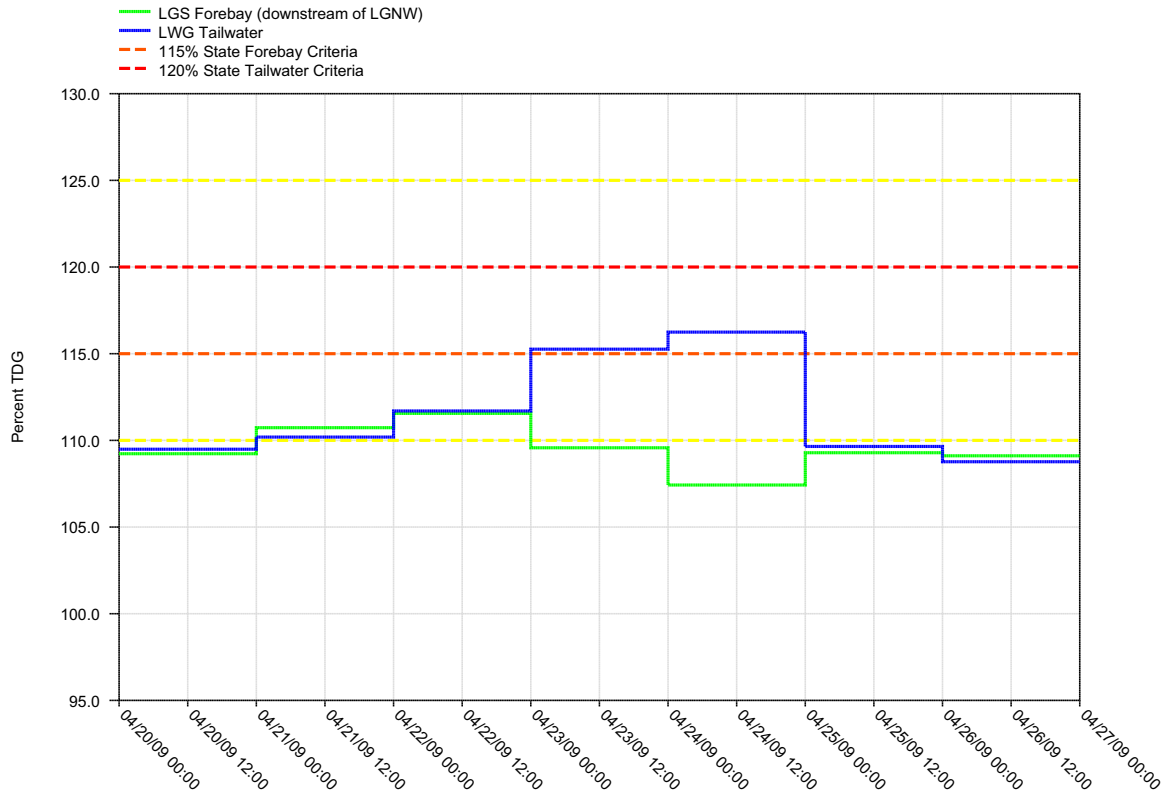


Figure 21.

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



LOWER GRANITE DAM - Hourly Spill and Flow

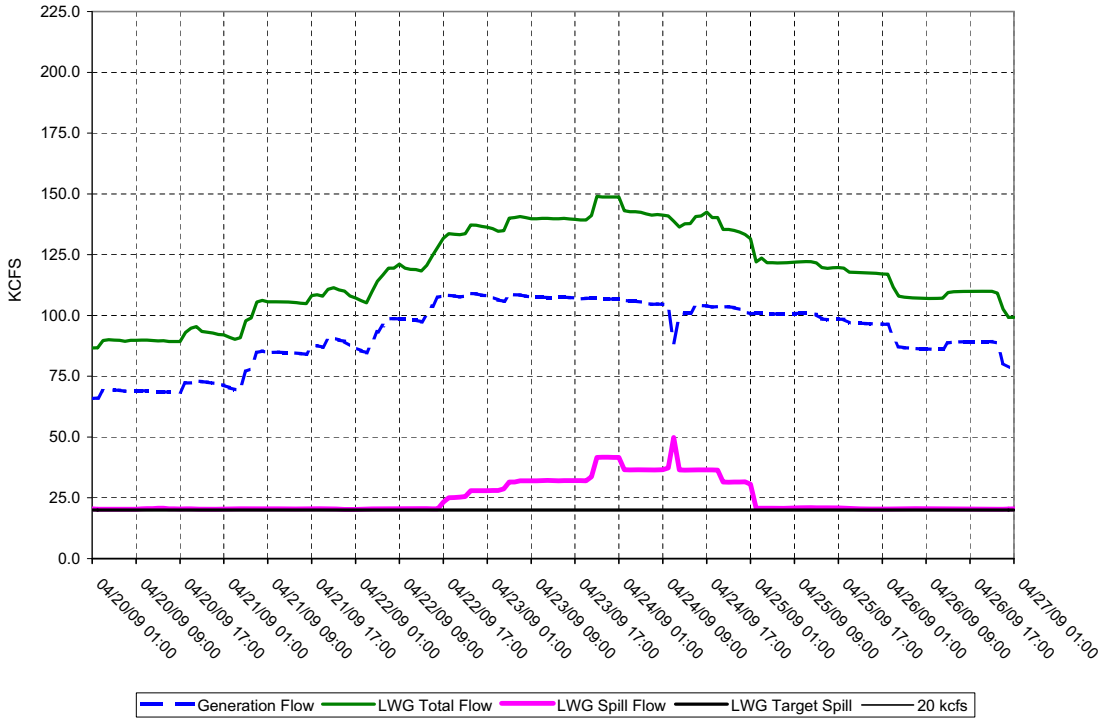
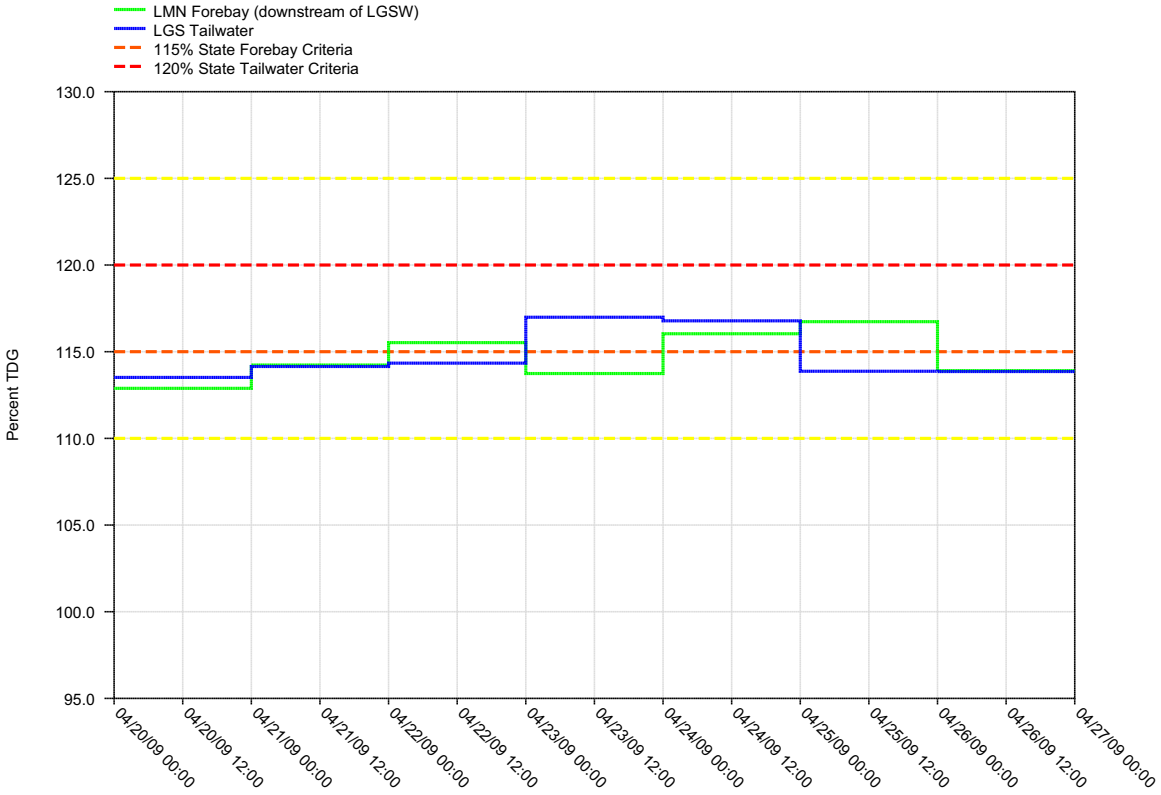


Figure 22.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

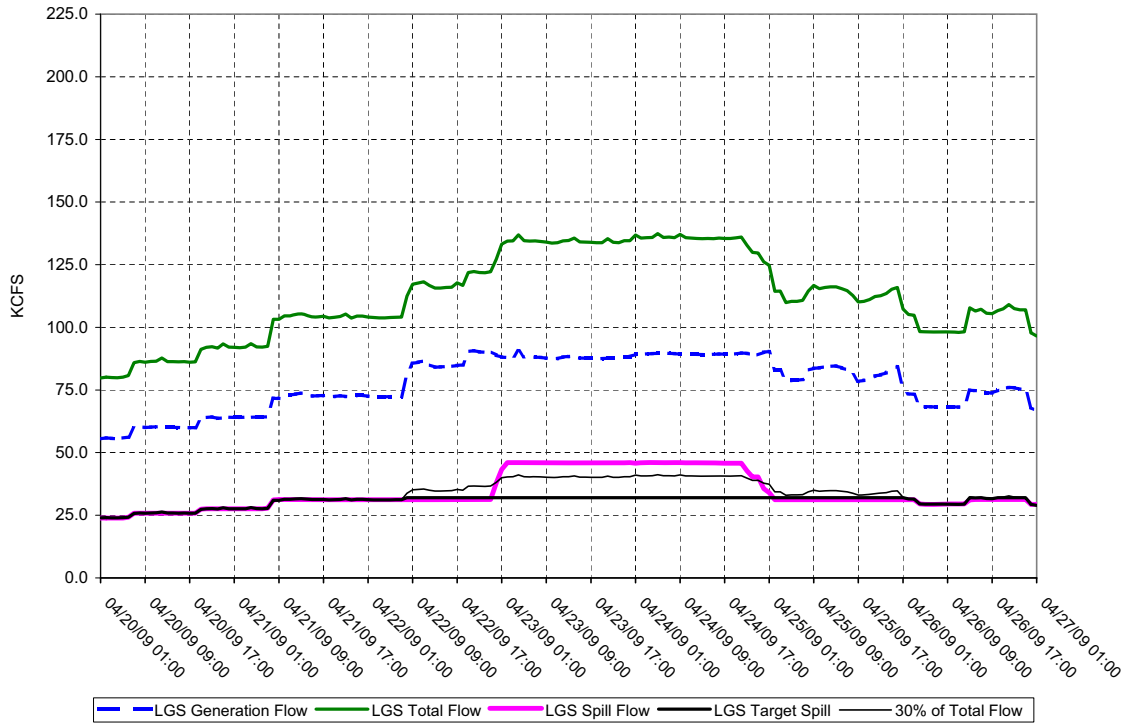
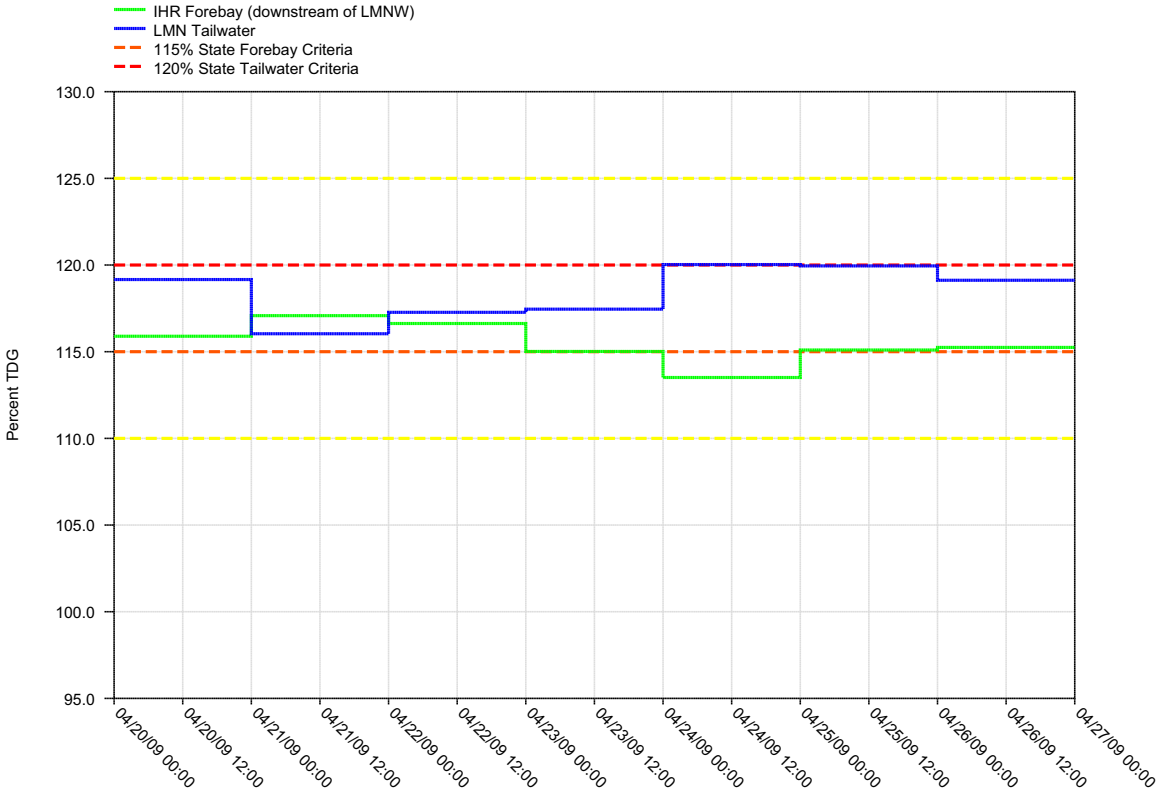


Figure 23.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

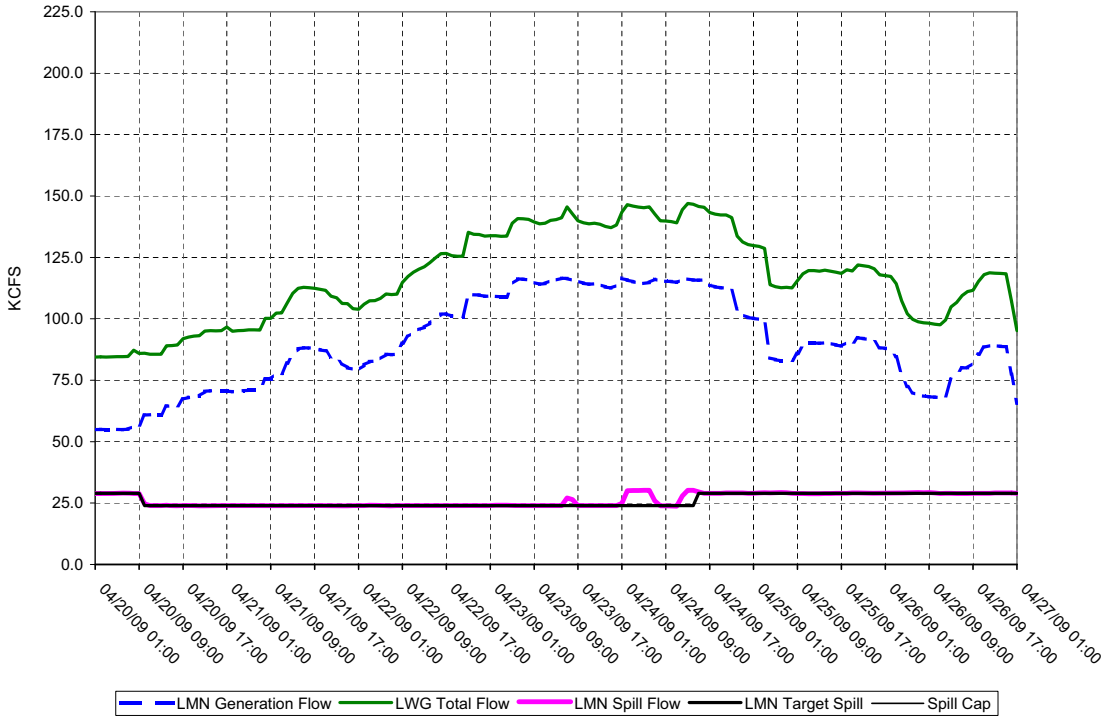
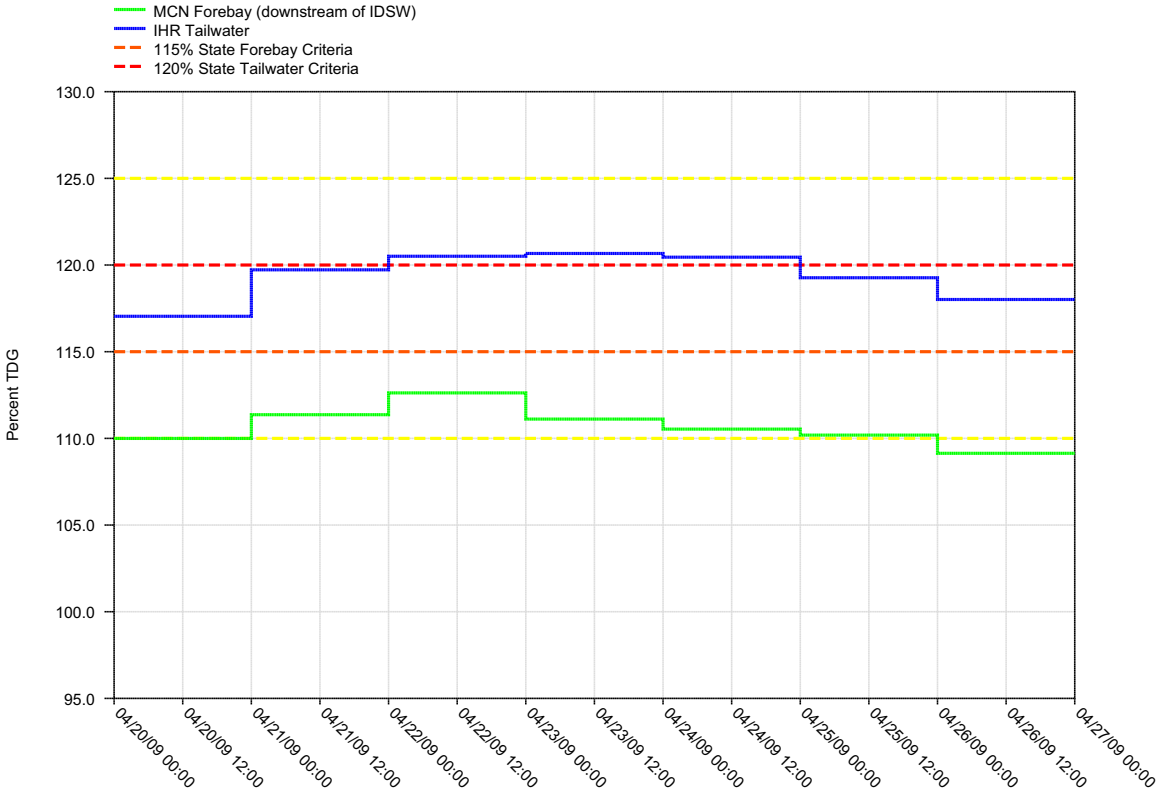


Figure 24.

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



ICE HARBOR DAM - Hourly Spill and Flow

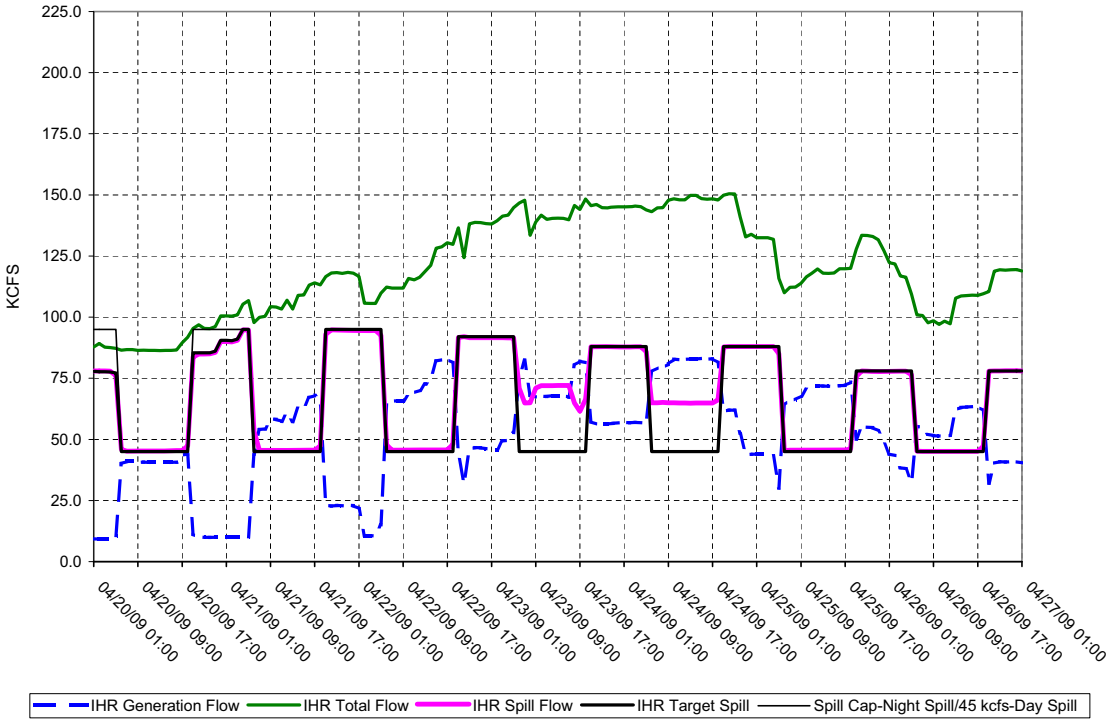
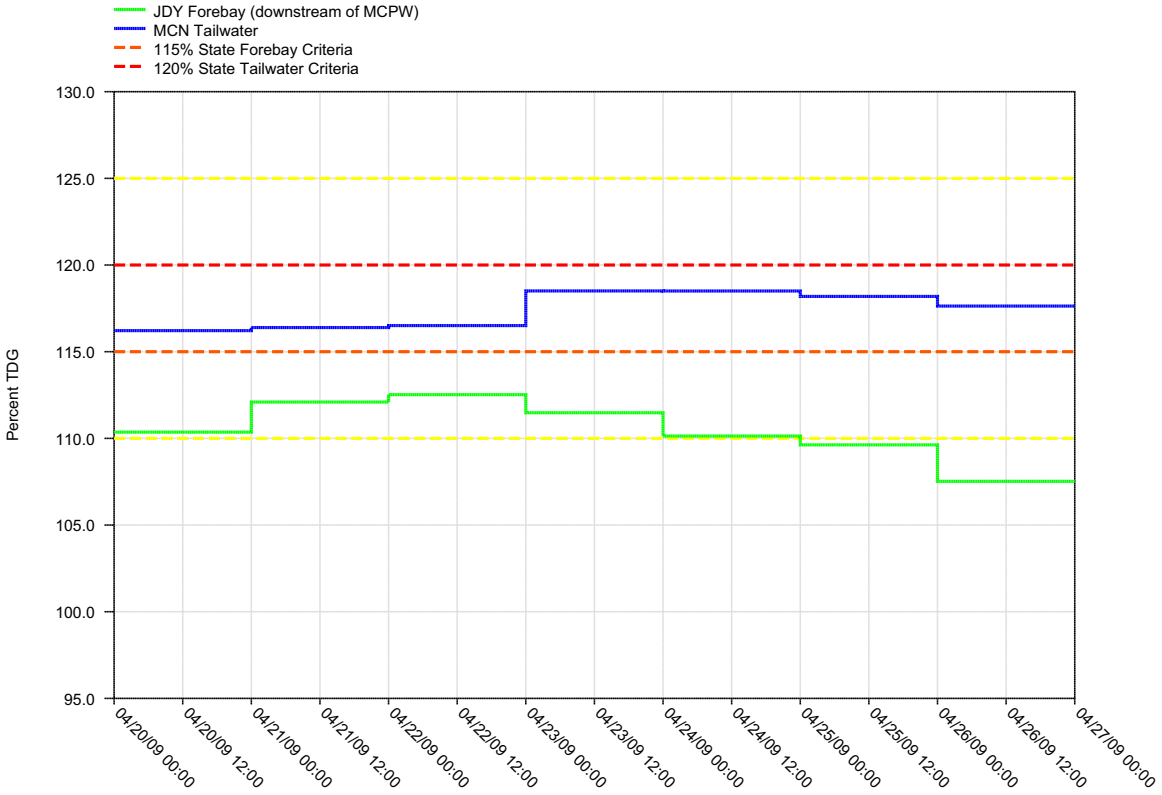


Figure 25.

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



McNARY DAM - Hourly Spill and Flow

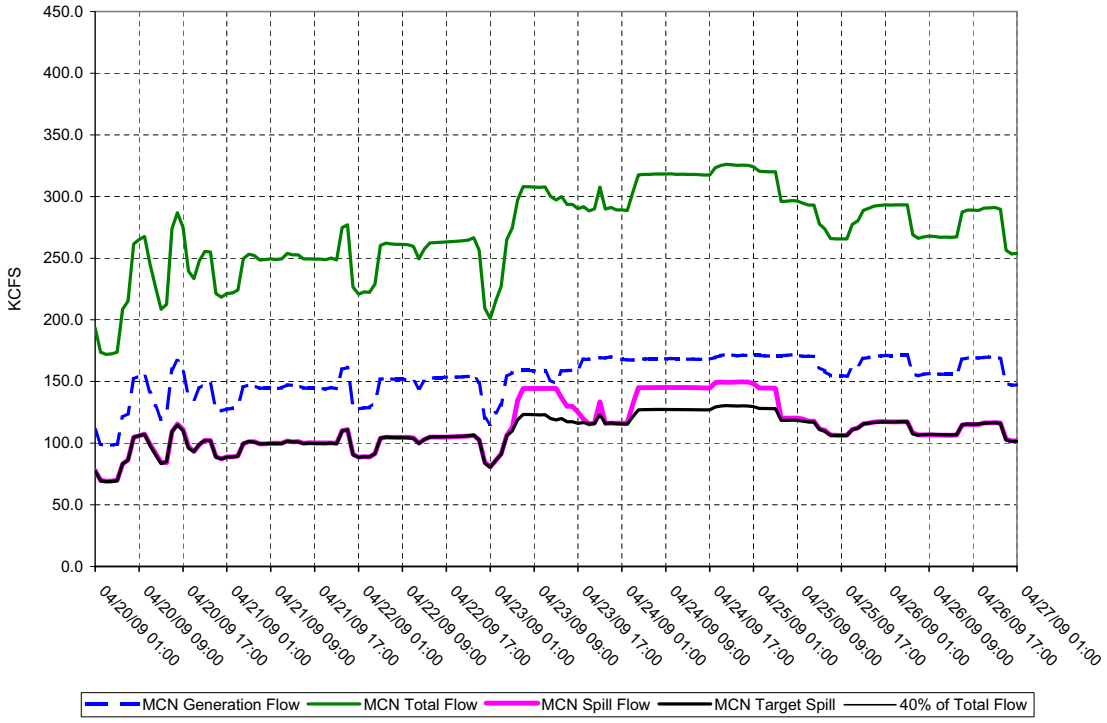
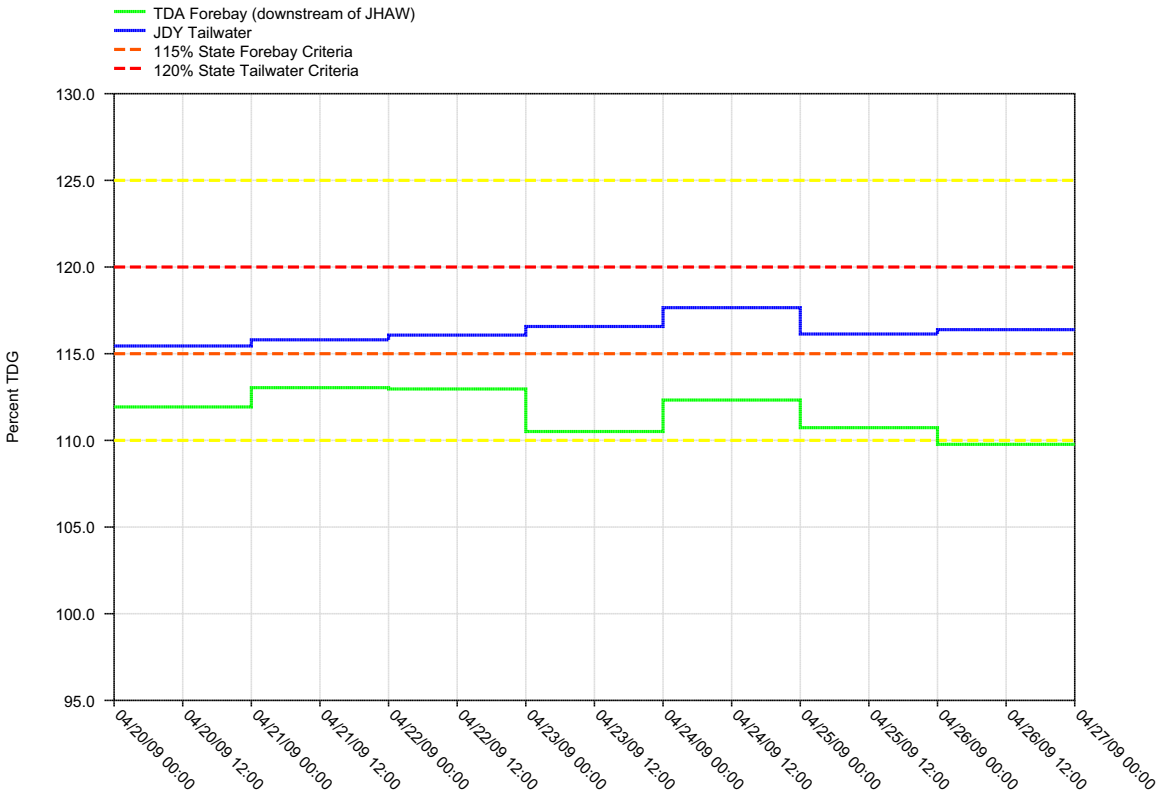


Figure 26.

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



JOHN DAY DAM - Hourly Spill and Flow

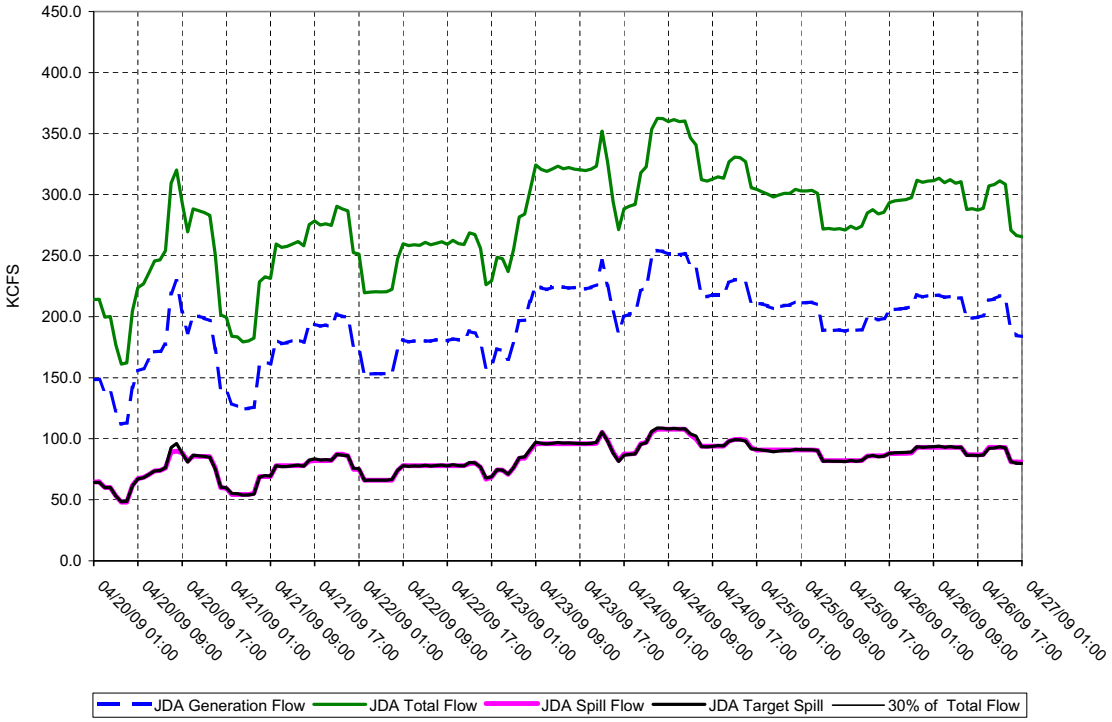
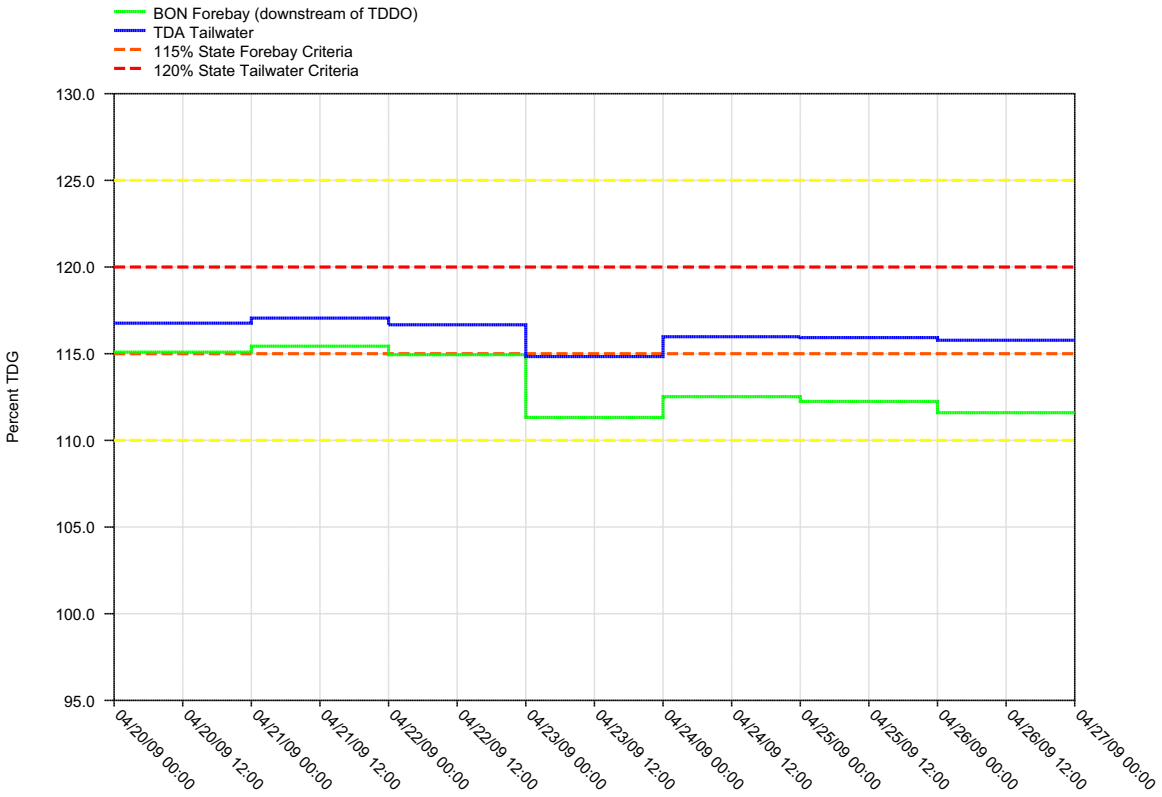


Figure 27.

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



THE DALLES DAM - Hourly Spill and Flow

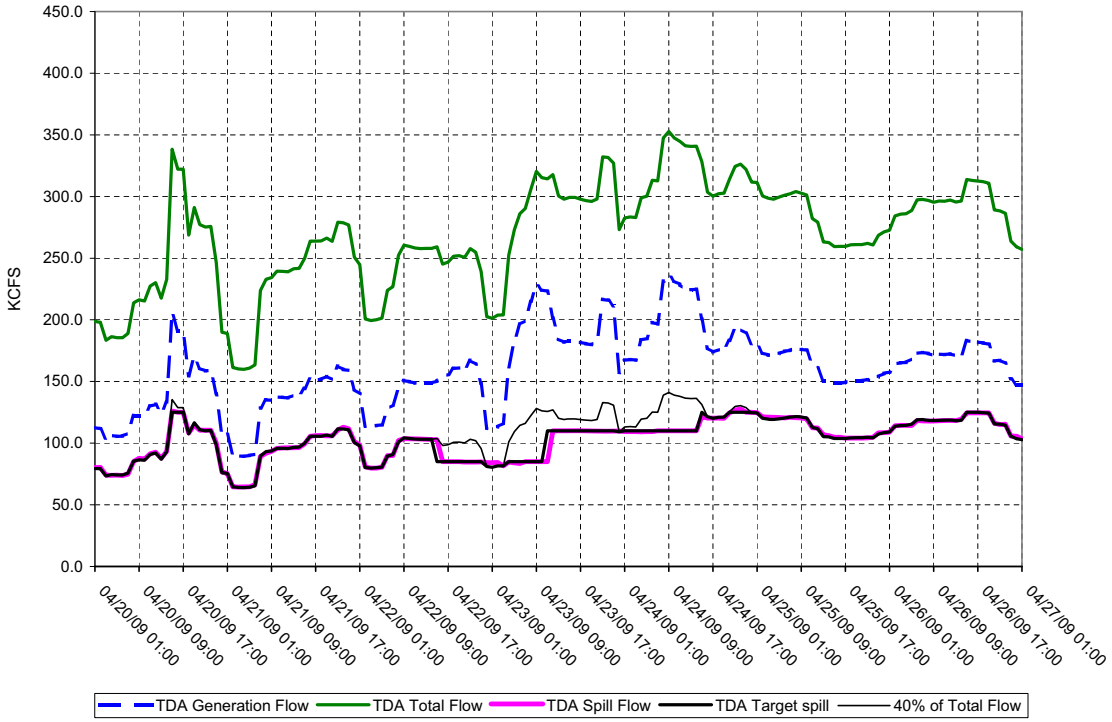
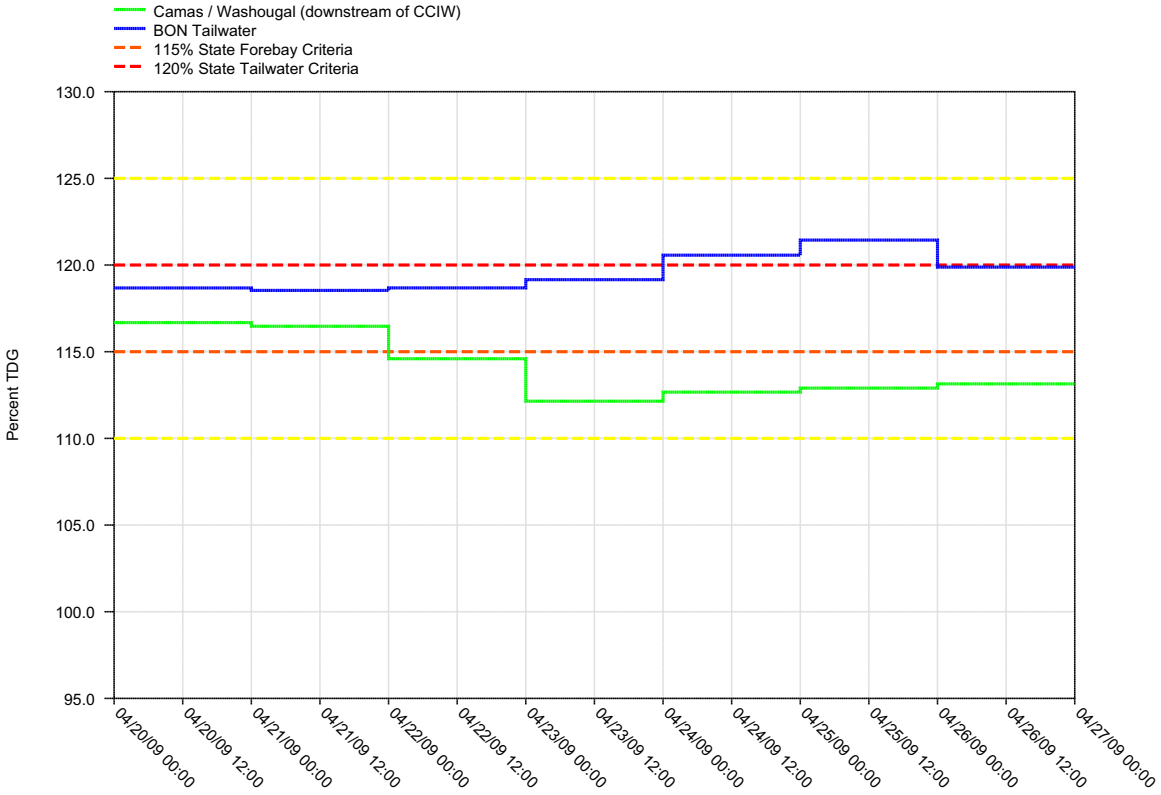


Figure 28.

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



BONNEVILLE DAM - Hourly Spill and Flow

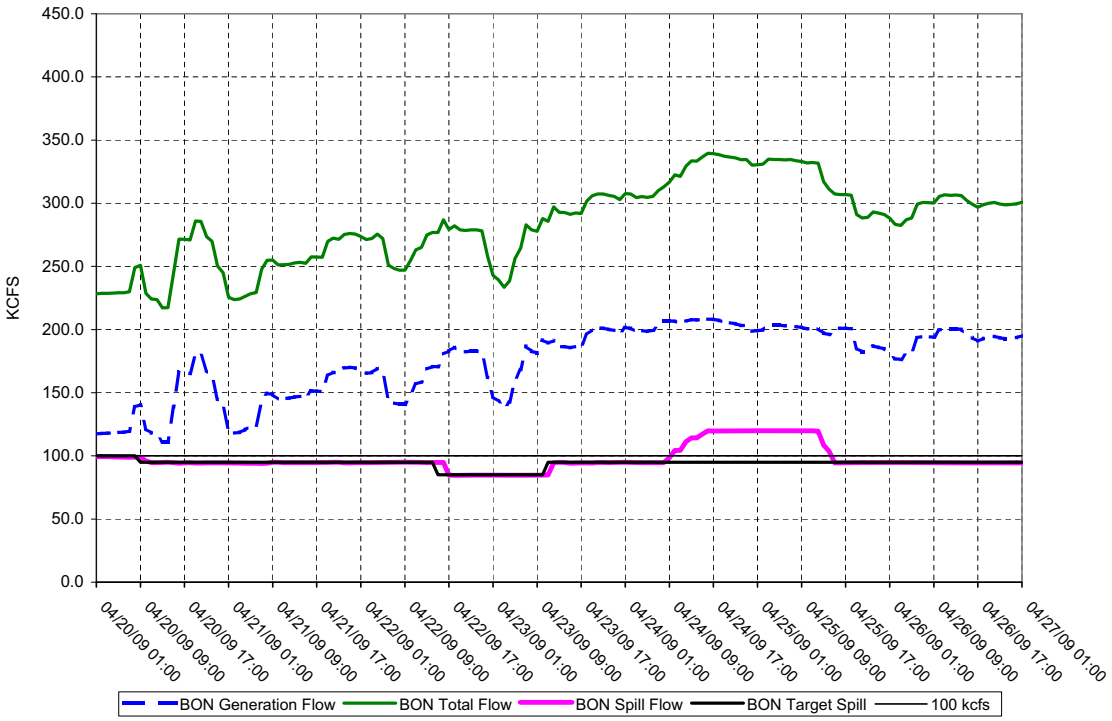
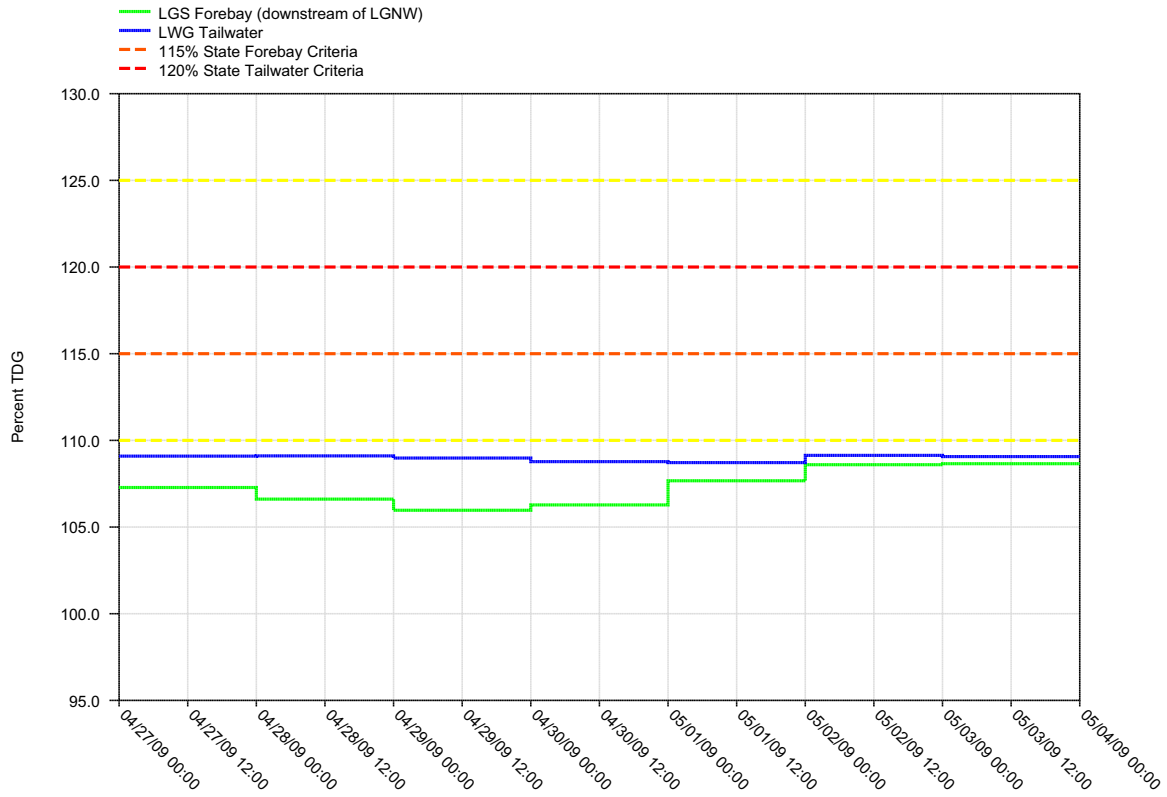


Figure 29.

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



LOWER GRANITE DAM - Hourly Spill and Flow

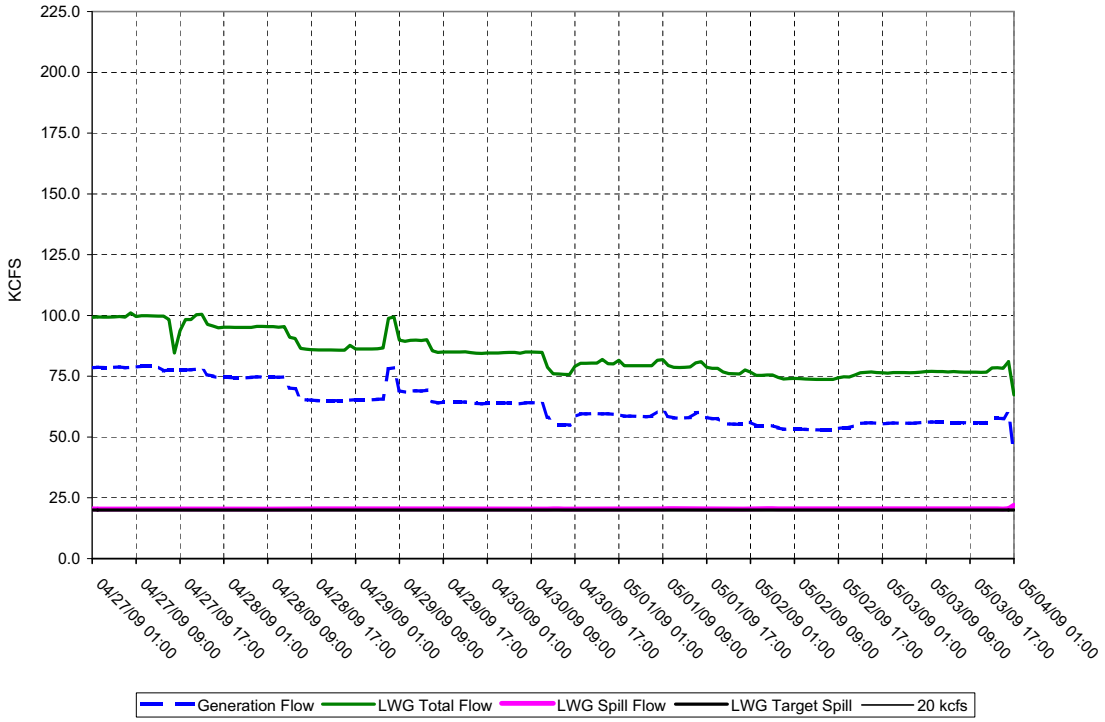
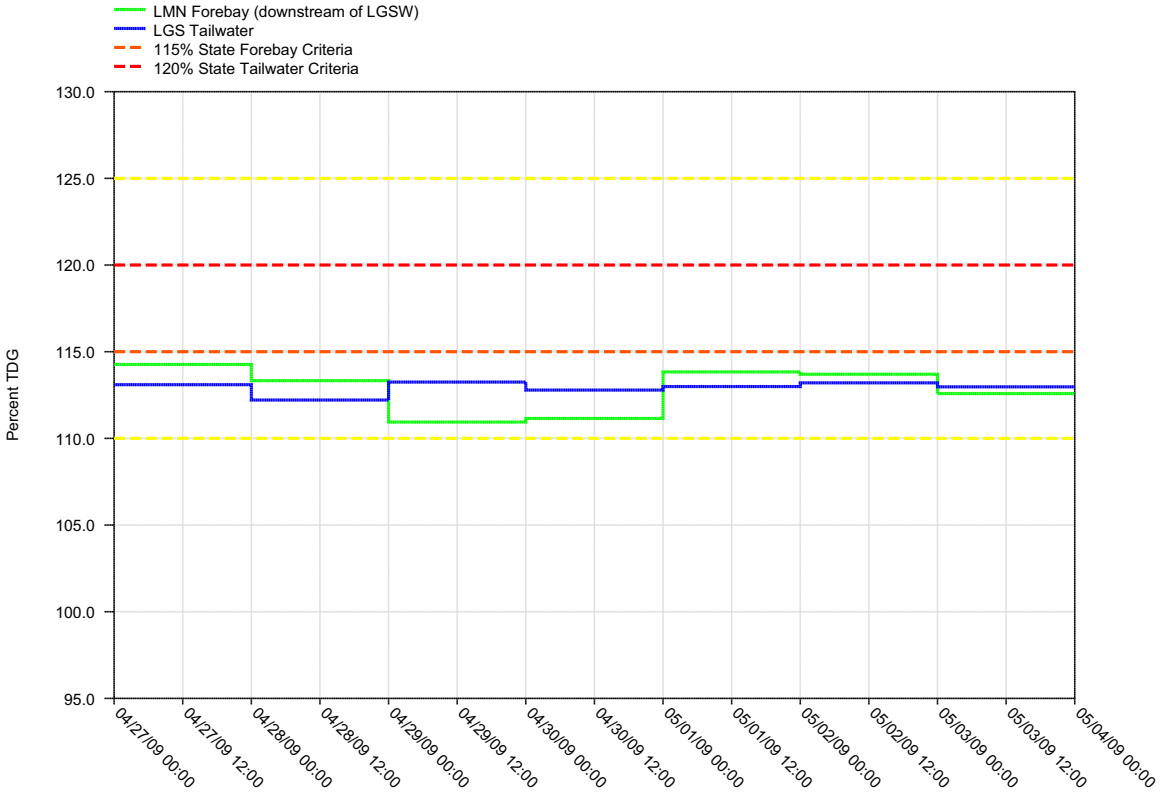


Figure 30.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

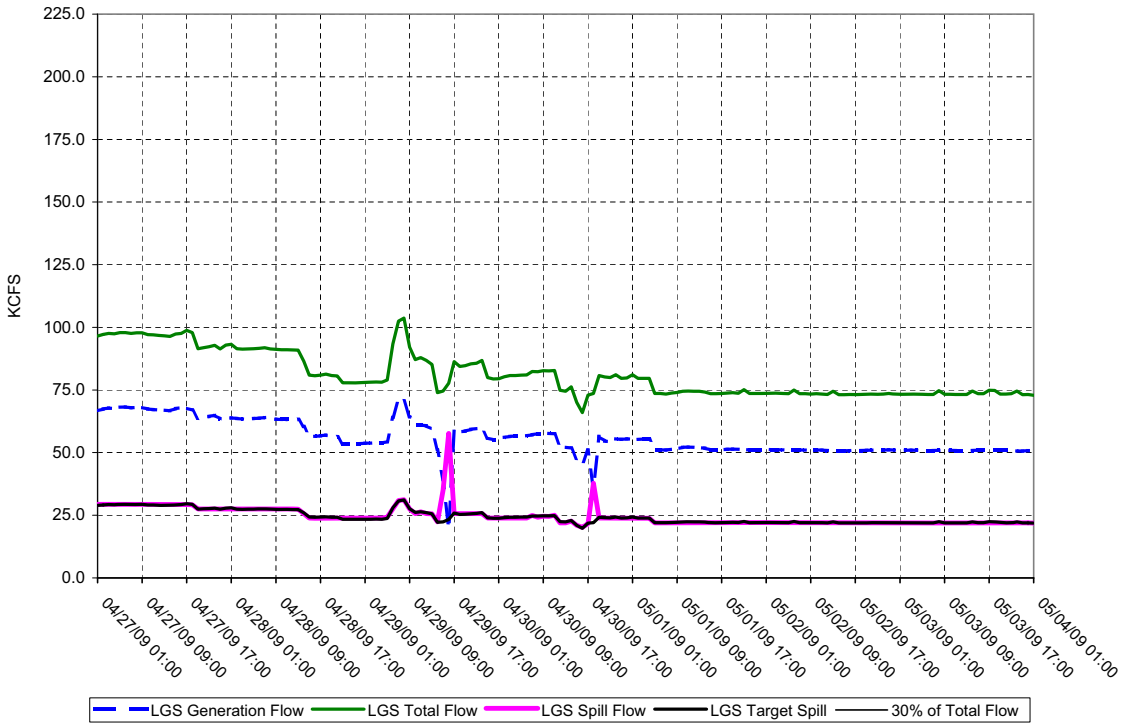
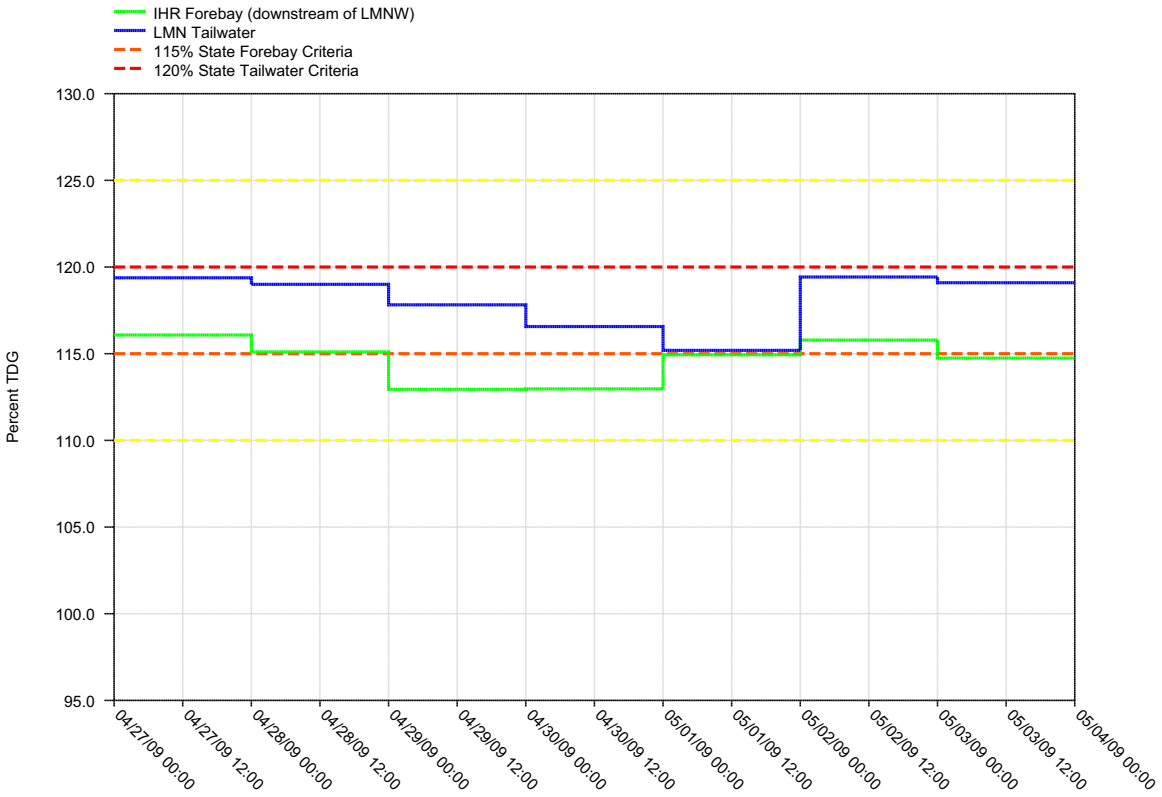


Figure 31.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

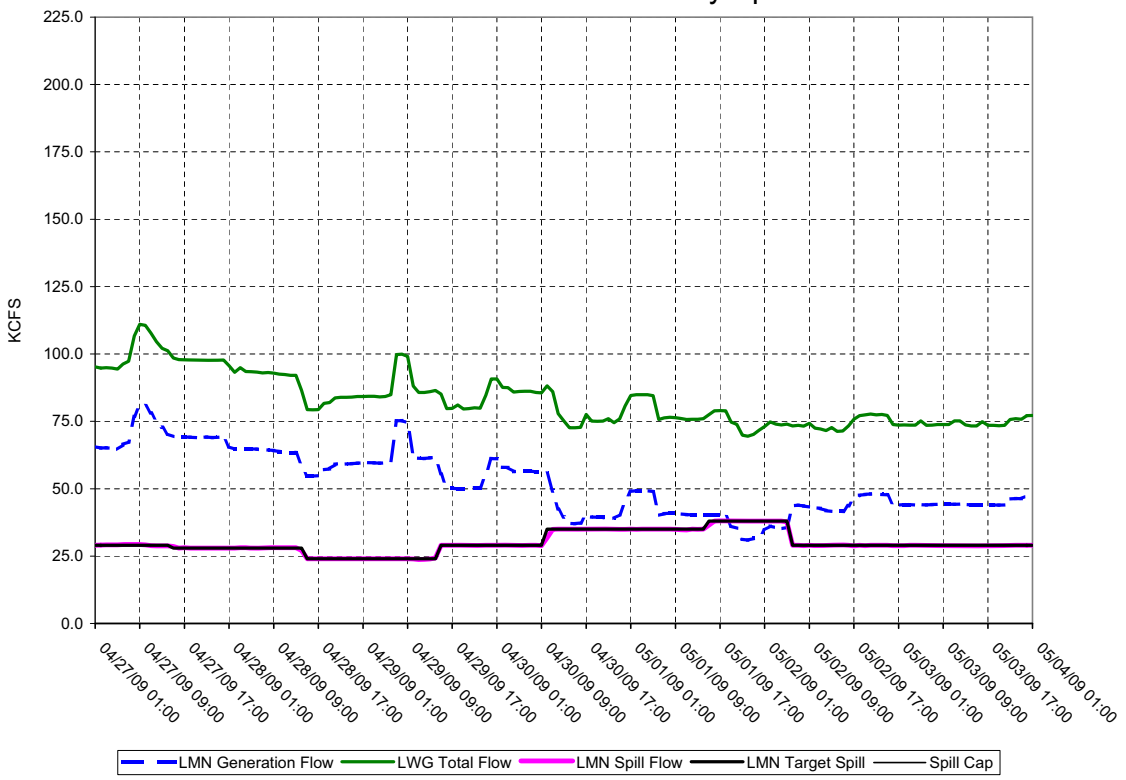
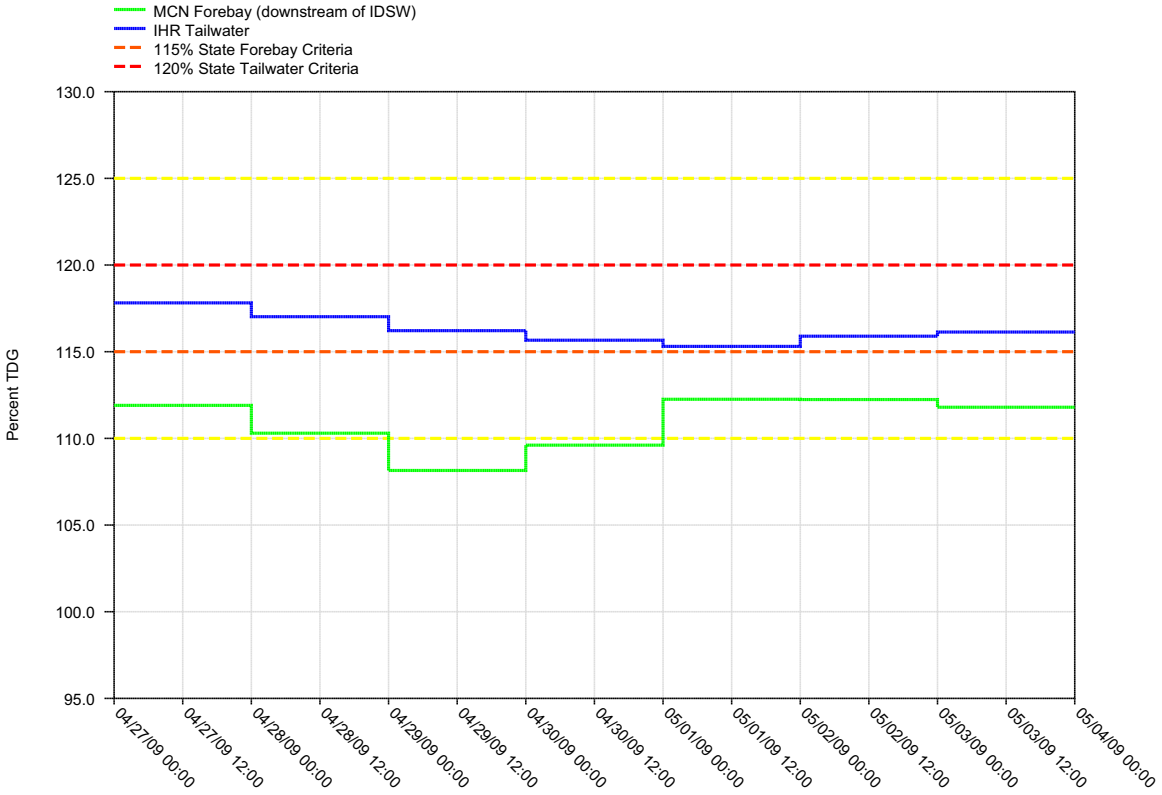


Figure 32.

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



ICE HARBOR DAM - Hourly Spill and Flow

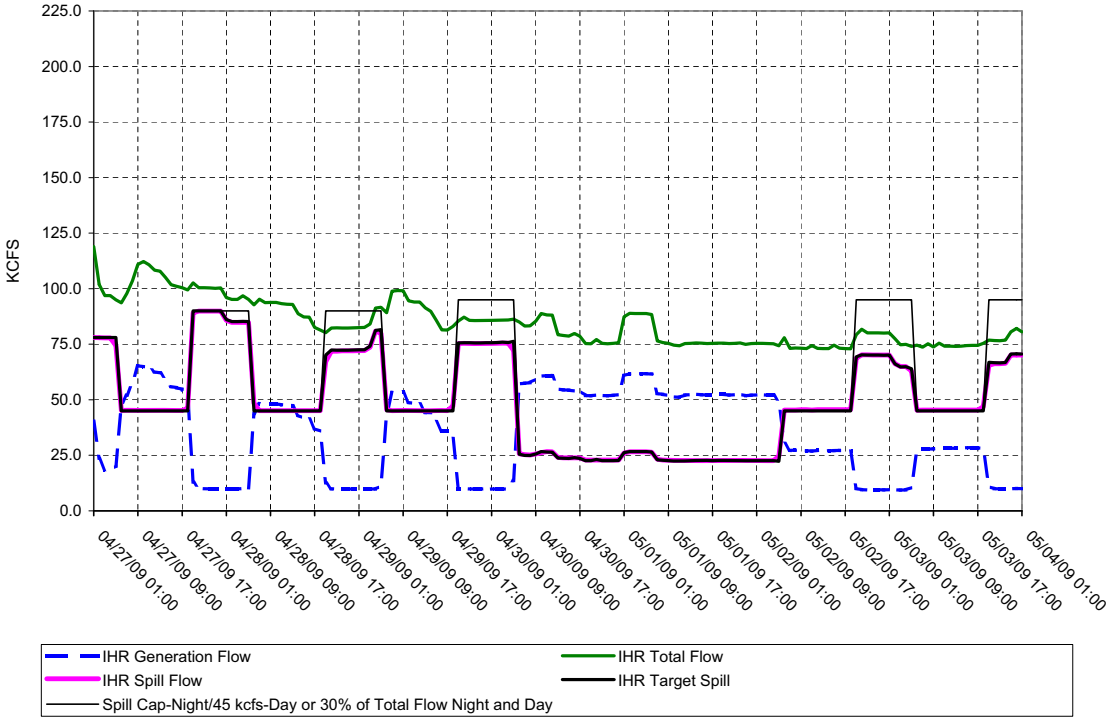
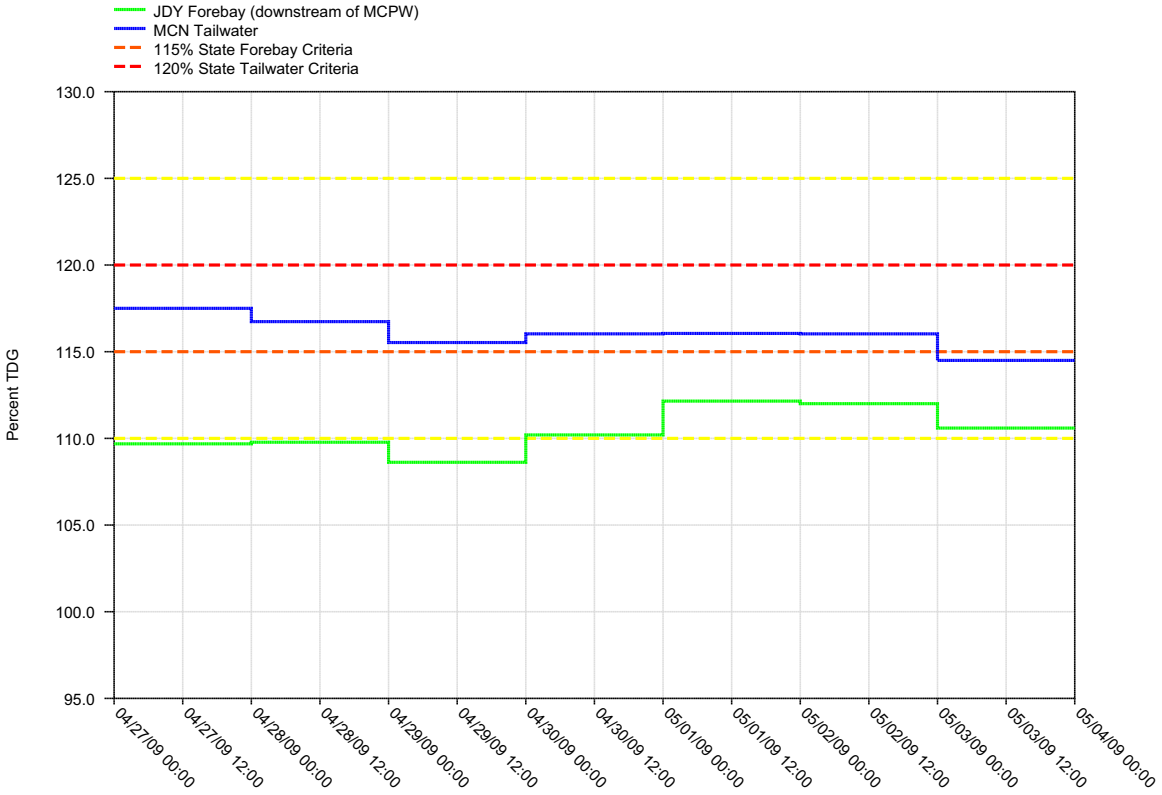


Figure 33.

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



McNARY DAM - Hourly Spill and Flow

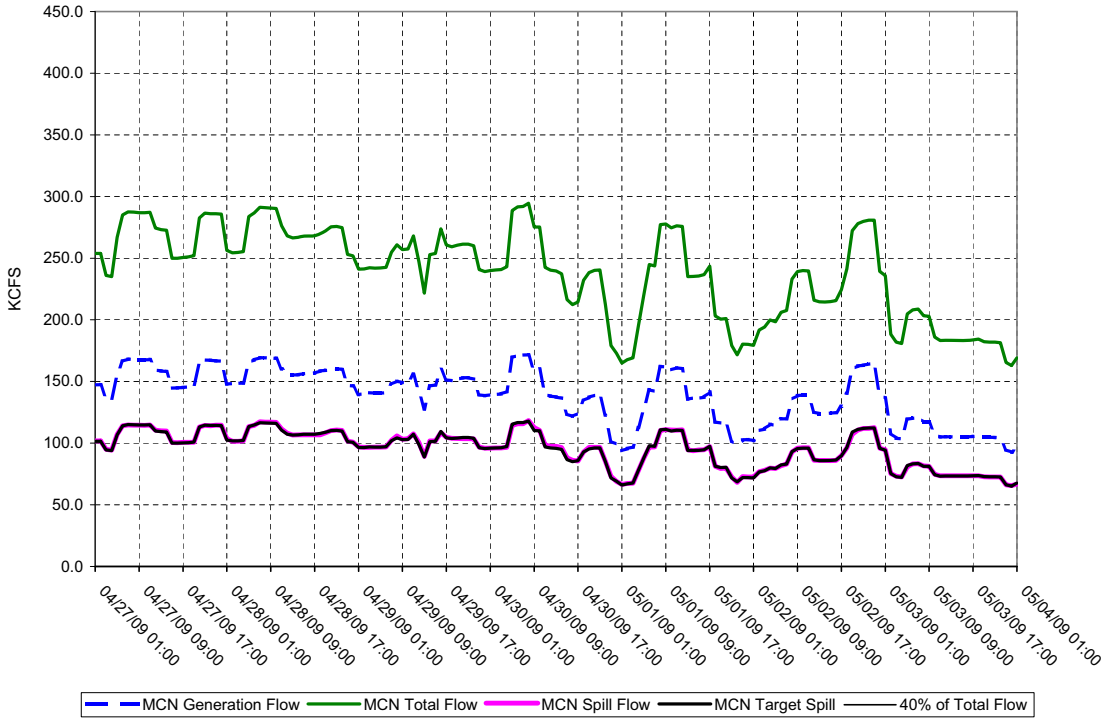
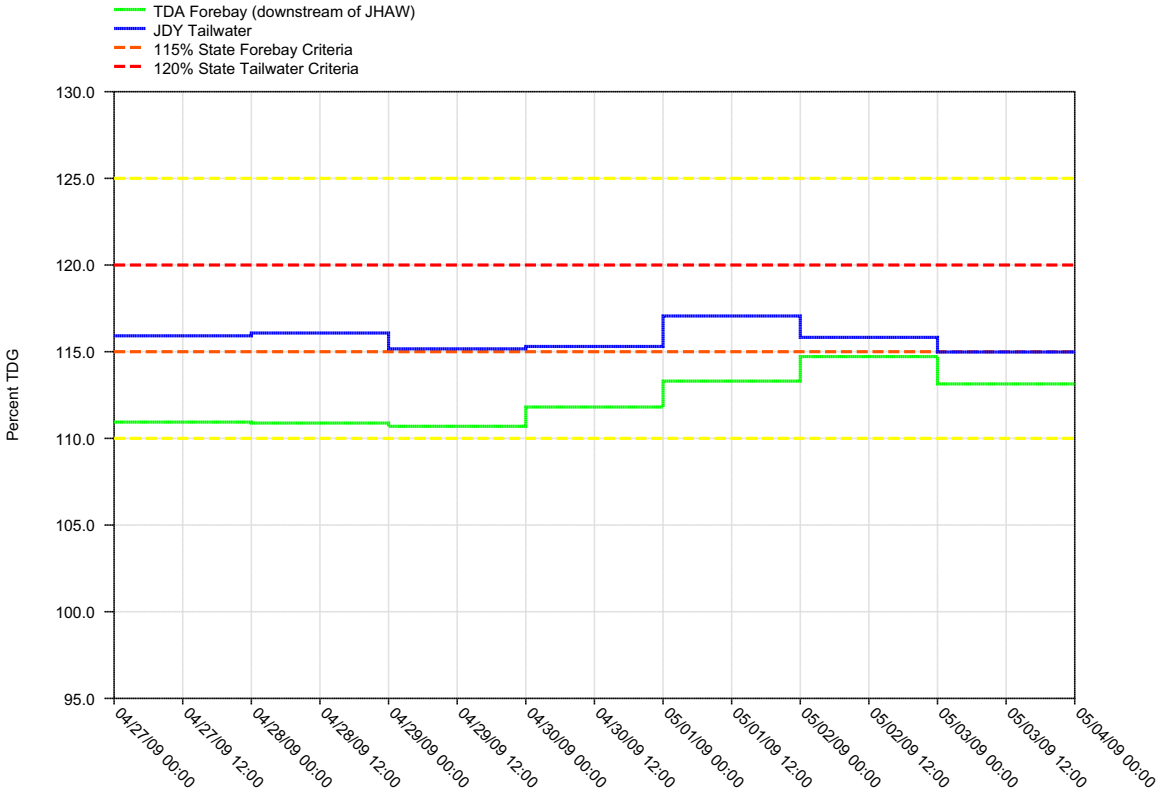


Figure 34.

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



JOHN DAY DAM - Hourly Spill and Flow

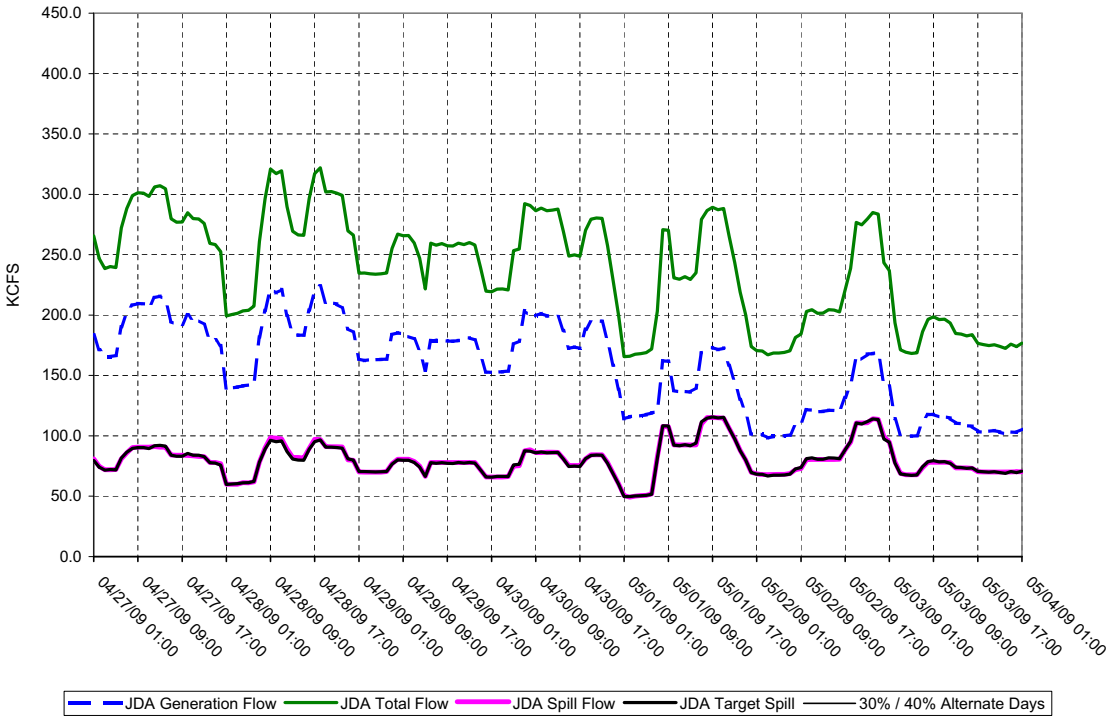
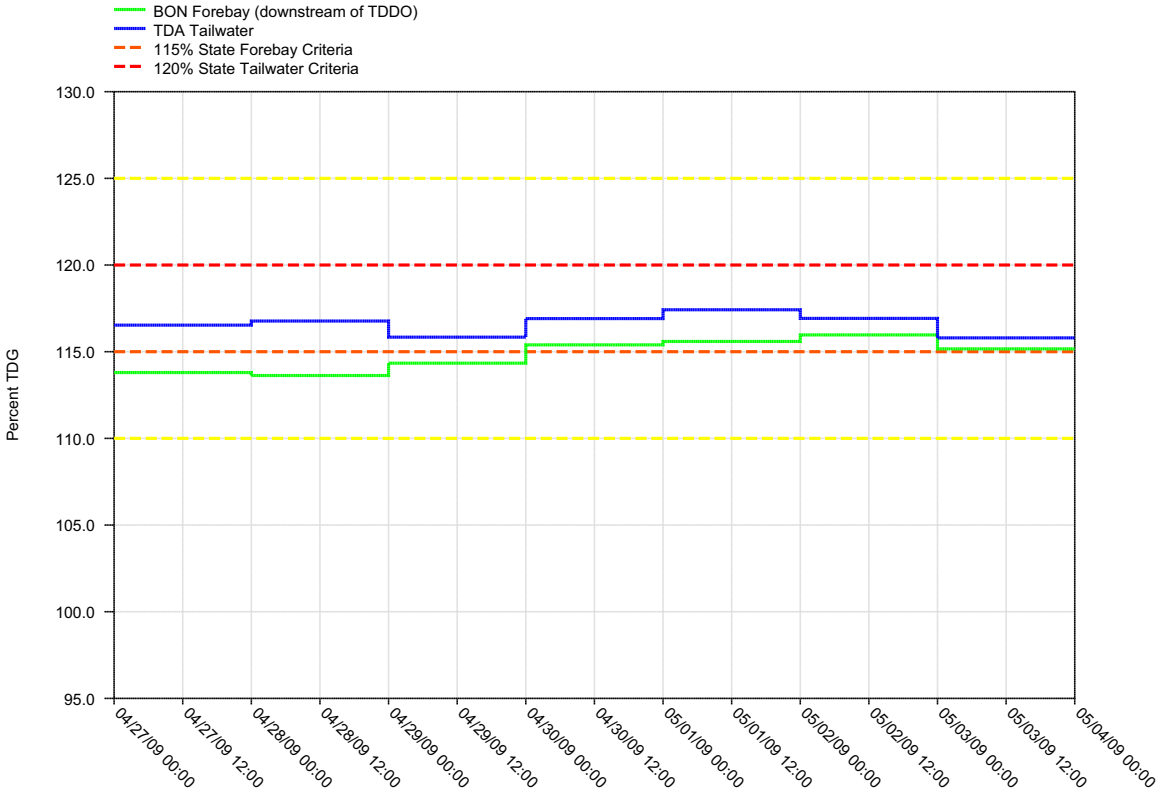


Figure 35.

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



THE DALLES DAM - Hourly Spill and Flow

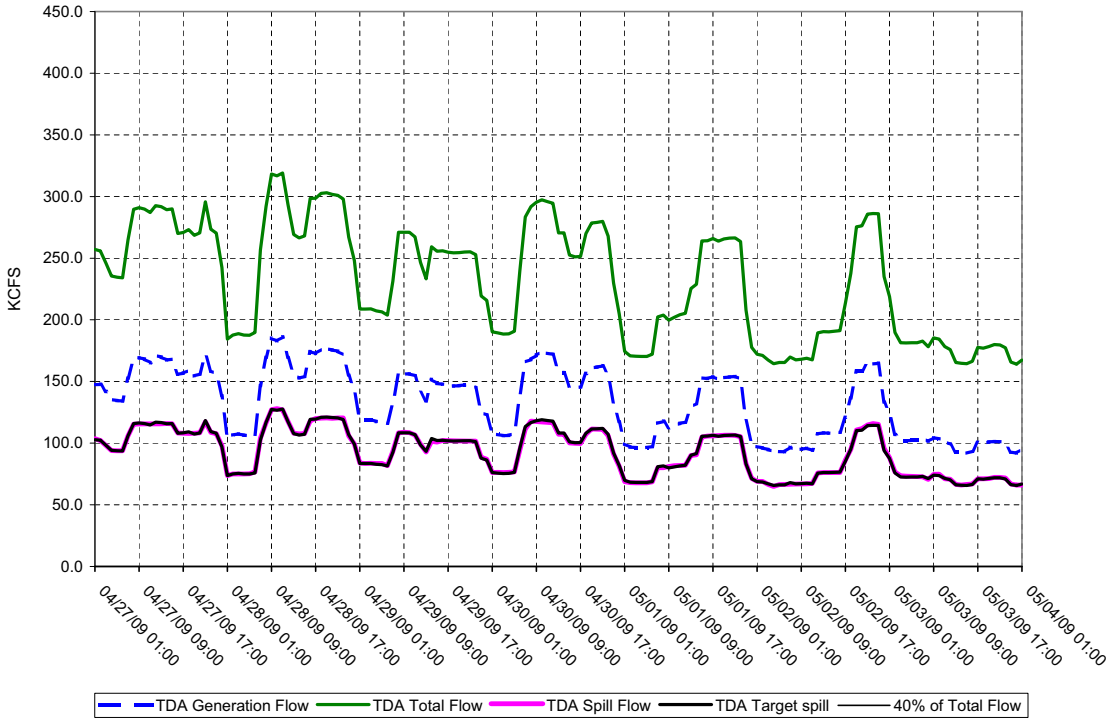
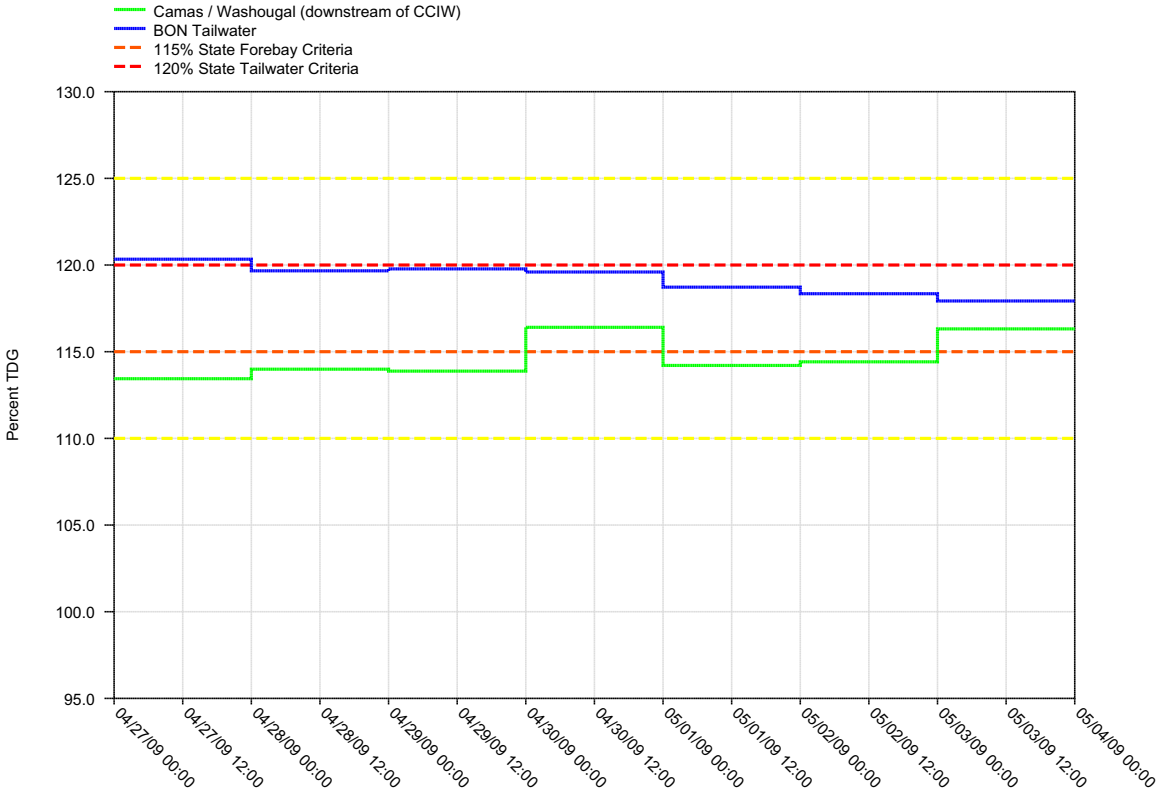
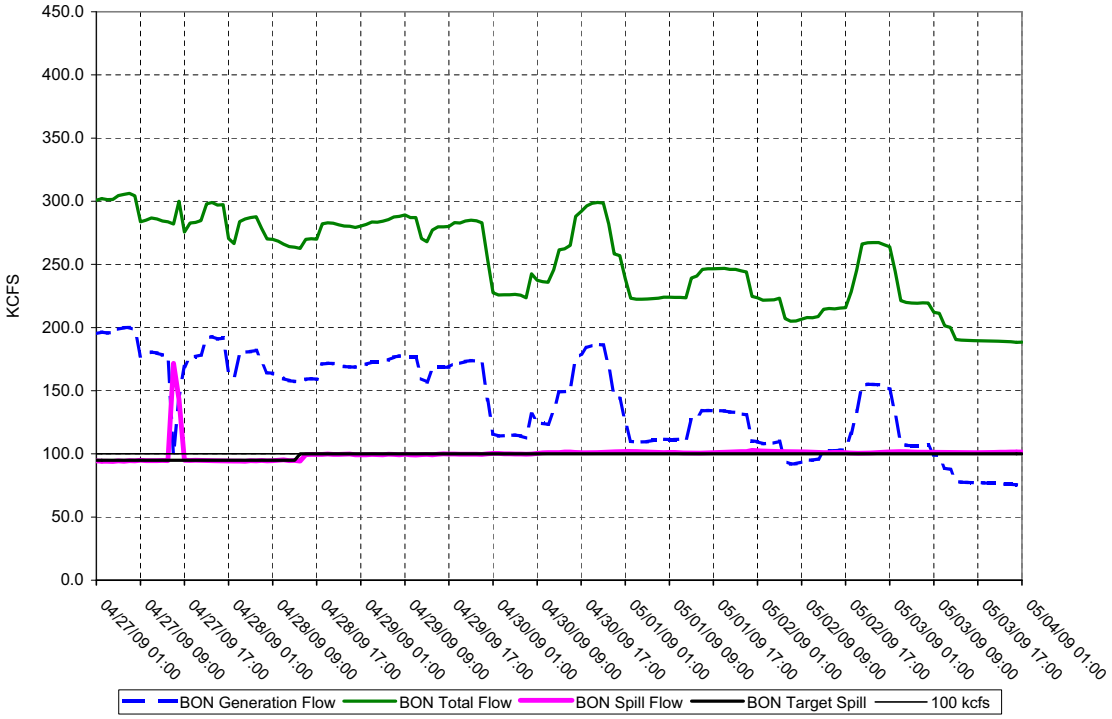


Figure 36.

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



BONNEVILLE DAM - Hourly Spill and Flow



FISH OPERATIONS PLAN IMPLEMENTATION REPORT
May 2009

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 April 10, 2009 Joint Order from the U.S District Court of Oregon adopting the 2009 Spring Fish Operations Plan (2009 Spring FOP). The 2009 Spring FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring fish migration season, generally April through June. To the extent Corps project operations are not specified in the 2009 Spring FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2009 Water Management Plan (WMP), WMP updates, and the 2009 Fish Passage Plan (FPP).

The Corps' May 2009 lower Snake and Columbia River project and fish passage operations 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) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2009 Spring FOP in May.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per operational week[1] for 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.

[1] Operations are implemented from Monday through Sundays. For the month of April, this included 3 days in May.

The weekly graphs begin on May 4 and end on May 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 at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on May 4 for the lower Snake and the lower Columbia projects.

May 4 – May 10	Figures 1 – 4
May 11 – May 17	Figures 5 – 12
May 18 – May 24	Figures 13 – 20
May 25 – May 31	Figures 21 – 28

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours. This is primarily a result of spill at dams. The objective is to operate each project up to the TDG limits without exceeding those limits to the extent 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% TDG is the upper operating limit.

B. Lower Graph: Shows the hourly 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 medium green line represents the average hourly total river flow through the project in 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 2009 Spring 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:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described above. When spill levels briefly deviate below or above the level specified in the 2009 Spring FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The 2009 Spring FOP Spill Report Table (Spring Spill Report Table) includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the Spring 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 2009 Spring FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. 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, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not include this volume of water. However, the actual spill volume remains constant. These variances are recorded in the Spring Spill Report Table for Little Goose under the variance type “Navigation.”

Also it is important to note that actual spill levels at Corps projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2009 Spring FOP and the RCC spill priority list, which defines the projects’ TDG 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 2009 Spring FOP describes project operations during “Rapid Load Changes” (pages 5-6). For reporting purposes, the notation “Transmission Stability” in the Spring Spill Report Table will replace “Rapid Load Changes” 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 by more than the +/- 1% requirement than other hours. On days cited in the table, the 24 hour average spill percent was within the 2009 Spring FOP level of +/- 1% of the target spill unless limited by the TDG spill cap.

Occurrences which required an adjustment in operations and/or regional coordination are described in greater detail in the section below entitled "Operational Adjustments for May."

May Operations:

The month of May was characterized by below average flows for the lower Columbia River and above average flows for the lower Snake River. The high inflows for the Snake River were due to the higher atmospheric temperatures in the latter part of the month causing snowmelt with high flows in the unregulated (natural) tributaries. High flows in the lower Snake and Columbia rivers, beginning on May 19, caused instances of involuntary spill which continued through the month as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. In some of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly percent TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs for the lower Columbia and Snake rivers.

During the May reporting period, daily 2009 Spring FOP spill operations were carried out as follows during voluntary spill:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs 24 hours per day.
- Little Goose Dam - the hourly target spill was 30% of the total flow for 24 hours per day.
- Lower Monumental Dam – the hourly target spill was to the TDG spill cap for 24 hours per day.

- Ice Harbor Dam – the hourly target spill was 45 kcfs day/TDG spill cap night and, 30% of total flow for 24 hours due to the two treatment spring spill test.
- McNary Dam – the hourly target spill was 40% of total flow for 24 hours per day.
- John Day Dam – the target spill was 30% of total flow for 24 hours per day and 40% of total flow for 24 hours due to the two treatment spring spill test.
- The Dalles Dam - the target spill was 40% of the total flow for 24 hours per day.
- Bonneville Dam - the hourly target spill was 100 kcfs for 24 hours per day.

Operational Adjustments for May:

1. Fish Transport Operations:

   Juvenile fish collection for routine transport began on May 1 at Lower Granite, May 5 at Little Goose, and on May 8 at Lower Monumental, consistent with dates recommended by the salmon managers at the April 29 TMT meeting. Fish collection and routine transport at Lower Granite continued until the operation was temporarily stopped on May 22 due to excessive debris entering the collection system and clogging the incline dewatering screen. These conditions caused injury and mortality to fish present in the collection system (screens, raceways and sampling tanks). NOAA Fisheries and TMT representatives were notified of the change in operations on May 22.

   Corps personnel calculate that a total of over 500,000 juvenile salmonids passed Lower Granite on May 22 with a total of 721 juvenile fish mortalities associated with the debris conditions. These mortalities included 347 clipped yearling Chinook, 104 unclipped yearling Chinook, 60 clipped subyearling Chinook, 54 unclipped subyearling Chinook, 37 clipped steelhead, 9 unclipped steelhead, 23 clipped sockeye, 6 unclipped sockeye, and 81 coho. In addition, project personnel noted that an undetermined number of impacted fish exited the bypass system increasing the overall total number of mortalities. The 721 known mortalities represent approximately 0.14% of the total number of juvenile fish estimated to have passed Lower Granite on May 22. Collection for transport operations at Lower Granite resumed on May 25 once debris levels subsided with notification to TMT representatives on May 26.

2. Lower Granite Dam:

   On May 4, an unplanned powerhouse outage occurred due to a fault in the 500KV transmission line. As a result, the project spilled 22 to 70 kcfs for three hours, exceeding the 2009 Spring FOP operation of 20 kcfs.

3. Little Goose Dam:

   On 6 May, while moving juvenile fish from the raceways to the barge, excessive flow was inadvertently discharged resulting in overflow of the flume releasing juvenile fish with approximately 200 smolts landing on the ground. Approximately 110

smolts were immediately recovered and returned alive to the river. Approximately 90 smolt mortalities resulted from this incident. TMT representatives and the Court were notified of this situation and Corps personnel were directed to review and follow proper procedures to prevent similar incidents in the future.

4. Lower Monumental Dam:

   A two treatment spring test to evaluate juvenile fish passage and survival beginning on April 28, continued throughout May and will conclude at 0500 hours on June 3.

5. Ice Harbor:
   A two treatment spring test to evaluate juvenile fish passage and survival beginning on April 27, continued throughout May and will conclude at 0500 hours on June 7.

6. John Day:
   A two treatment spring test to evaluate juvenile fish passage and survival beginning on April 27, continued throughout May and will conclude at 0600 hours on June 8.

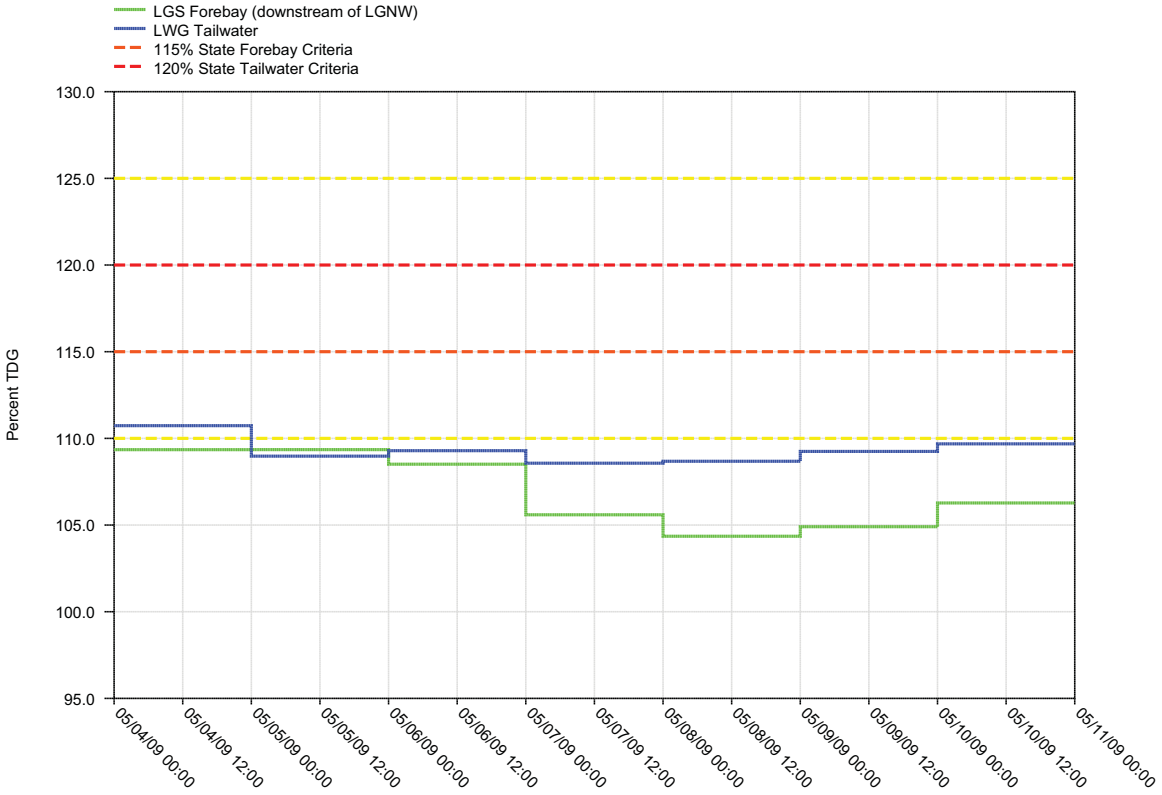
Spring Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	5/4/2009	0100 - 0300	3	Maintenance	Hourly spill was 22.2, 70.3 and 25.8 kcfs (above 20 kcfs FOP spill level). The 500 KV line lost power when ground fault failed which caused the powerhouse to go down, resulting in project spilling excess outflow.
Lower Monumental	Reduced Spill	5/9/2009	1800 - 2100	4	Navigation	Hourly spill dropped to 14.9 kcfs, below the spill cap of 38 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/10/2009	1700 - 2000	4	Navigation	Hourly spill dropped to 14.4 to 32.7 kcfs, below the spill cap of 38 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/11/2009	1800 - 2000	3	Navigation	Hourly spill dropped to 17.0 to 24.9 kcfs, below the spill cap of 35 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/12/2009	1900 - 2100	3	Navigation	Hourly spill dropped to 13.6 to 22.6 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/13/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 11.2 to15.6 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/14/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 16.3 to 22.2 kcfs, below the spill cap of 35 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/15/2009	1800 - 2000	3	Navigation	Hourly spill dropped to 12.2 to 25.3 kcfs, below the spill cap of 35 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/16/2009	1800 - 2000	3	Navigation	Hourly spill dropped to 7.6 to 25.4 kcfs, below the spill cap of 28 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/17/2009	1900 - 2100	3	Navigation	Hourly spill dropped to 10.5 to 18.3 kcfs, below the spill cap of 28 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/18/2009	1900 - 2100	3	Navigation	Hourly spill dropped to 13.7 to 22.8 kcfs, below the spill cap of 24 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/20/2009	1900 - 2000	2	Navigation	Hourly spill dropped to 14.3 - 30.6 kcfs, below the spill cap of 35 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/21/2009	2000	1	Navigation	Hourly spill dropped to 30.2 kcfs, below the spill cap of 35 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/22/2009	1900 - 2000; 2300	3	Navigation	Hourly spill dropped to 15.4 to 21.8 kcfs, below the spill cap of 24 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/23/2009	1800 - 2100	4	Navigation	Hourly spill dropped to 12.0 to 20.5 kcfs, below the spill cap of 24 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/24/2009	1700 - 1900	3	Navigation	Hourly spill dropped to 15.5 to 25.1 kcfs, below the spill cap of 20 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/25/2009	1800 - 2000	3	Navigation	Hourly spill dropped to 15.5 to 23.0 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/26/2009	1900	1	Navigation	Hourly spill dropped to 19.3 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/28/2009	1800	1	Navigation	Hourly spill dropped to 21.2 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	5/30/2009	1900	1	Navigation	Hourly spill dropped to 27.1 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Ice Harbor	Reduced Spill	5/11/2009	0800; 1000; 1200	3	Navigation	Hourly spill dropped to 28.6 to 28.9% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. See last paragraph on page 3. 24 hr avg. spill was 29.5%.
John Day	Add'l Spill	5/7/2009	1500	1	Human Error	Hourly % spill increased to 41.1% (above 40% ±1% range). Log book shows the project operator decreased the generation, but was not available to decrease spill until 20 minutes later, resulting in excess spill.
The Dalles	Add'l Spill	5/12/2009	2300	1	Transmission Stability	Hourly % spill increased to 41.5% (above 40% ±1% range) due to project being on response during rapidly changing load as defined on page 3. 24 hr avg. spill was 37.4% due to TDG spill cap limiting spill.

* Due to safety concerns at Lower Monumental Dam, towboat captains may request reduction or elimination of spill to ensure safe conditions when transiting the juvenile fish barge across the tailrace, docking, and disembarking from the fish collection facility. During juvenile fish loading operations, spill is typically reduced to 15 kcfs, but can be reduced further if needed for safety reasons. (See Spring 2009 FOP, p. 10).

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

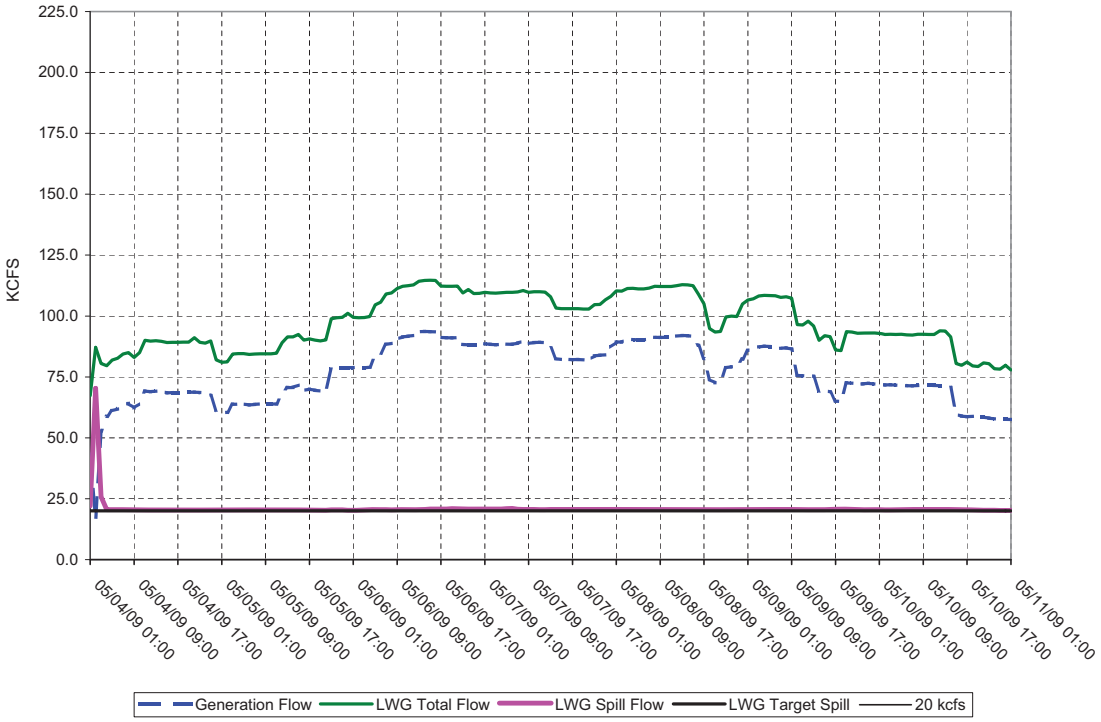
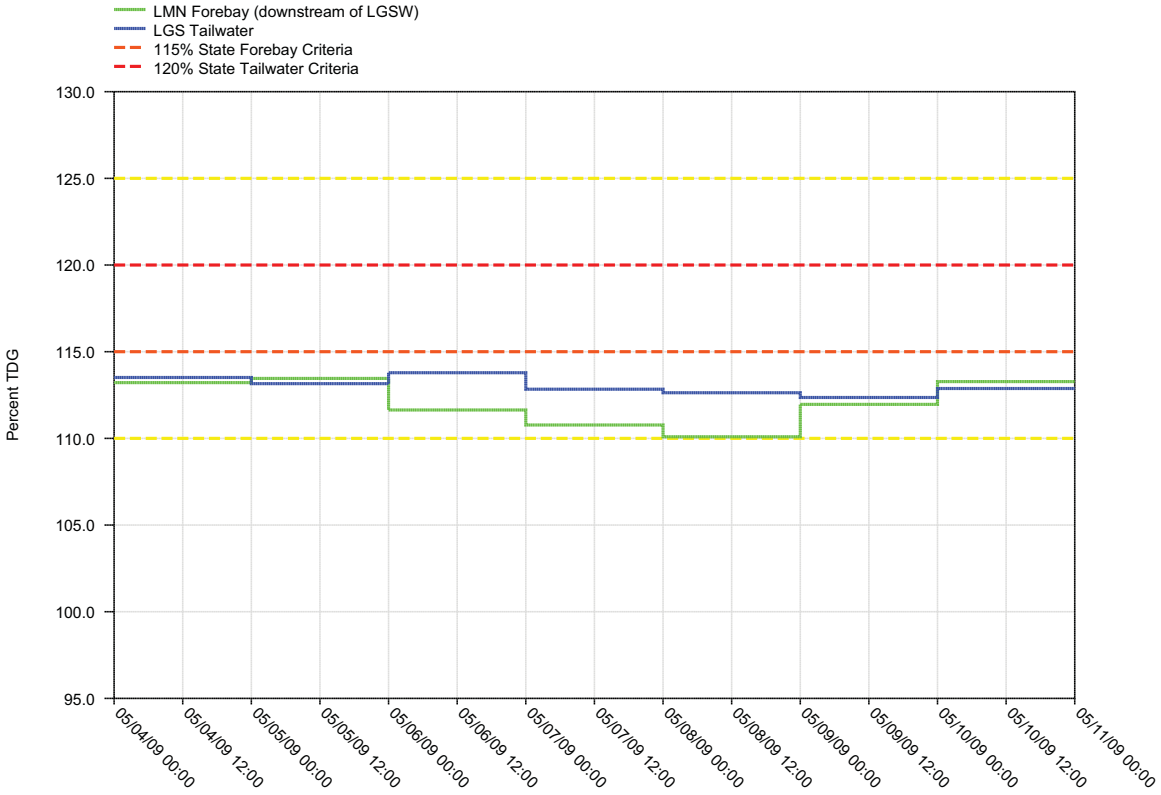


Figure 2.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

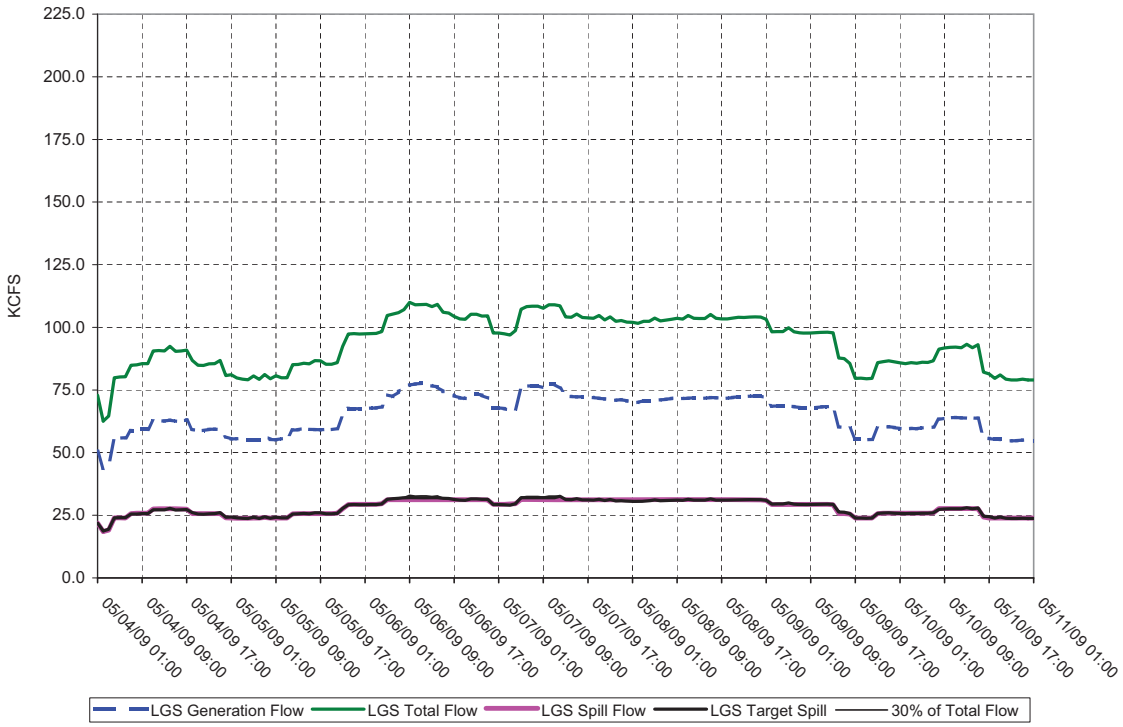
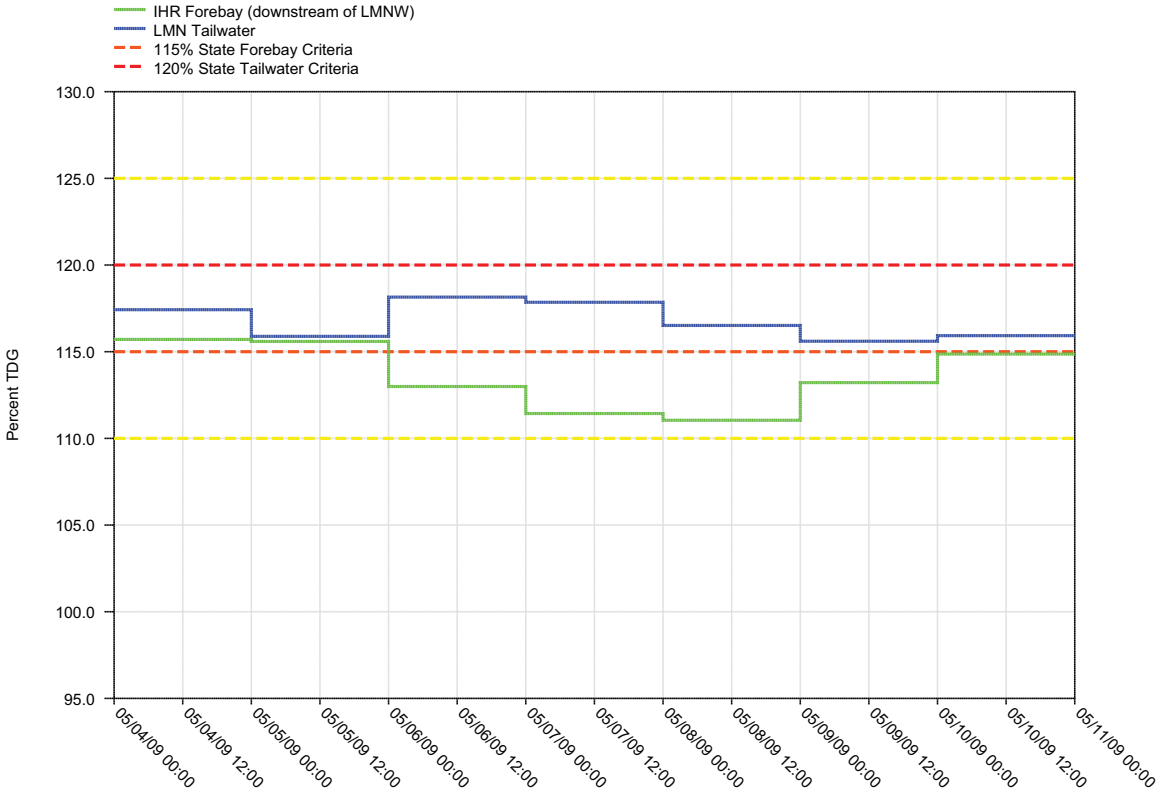


Figure 3.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

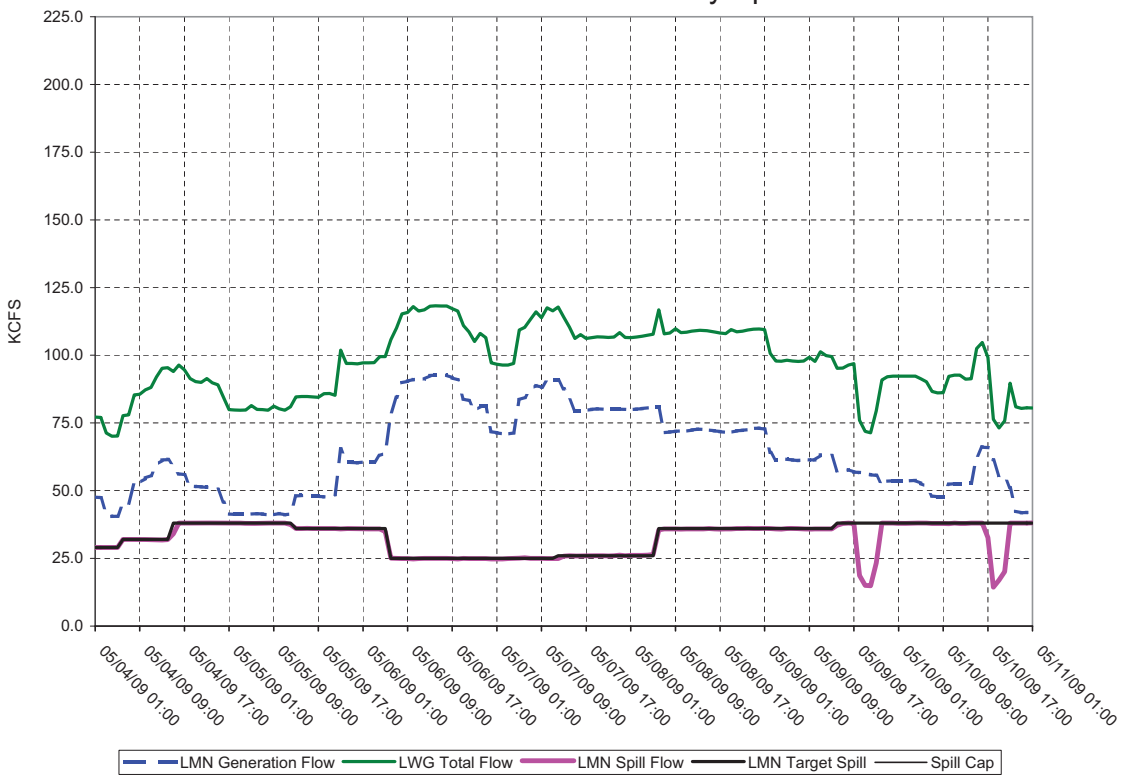
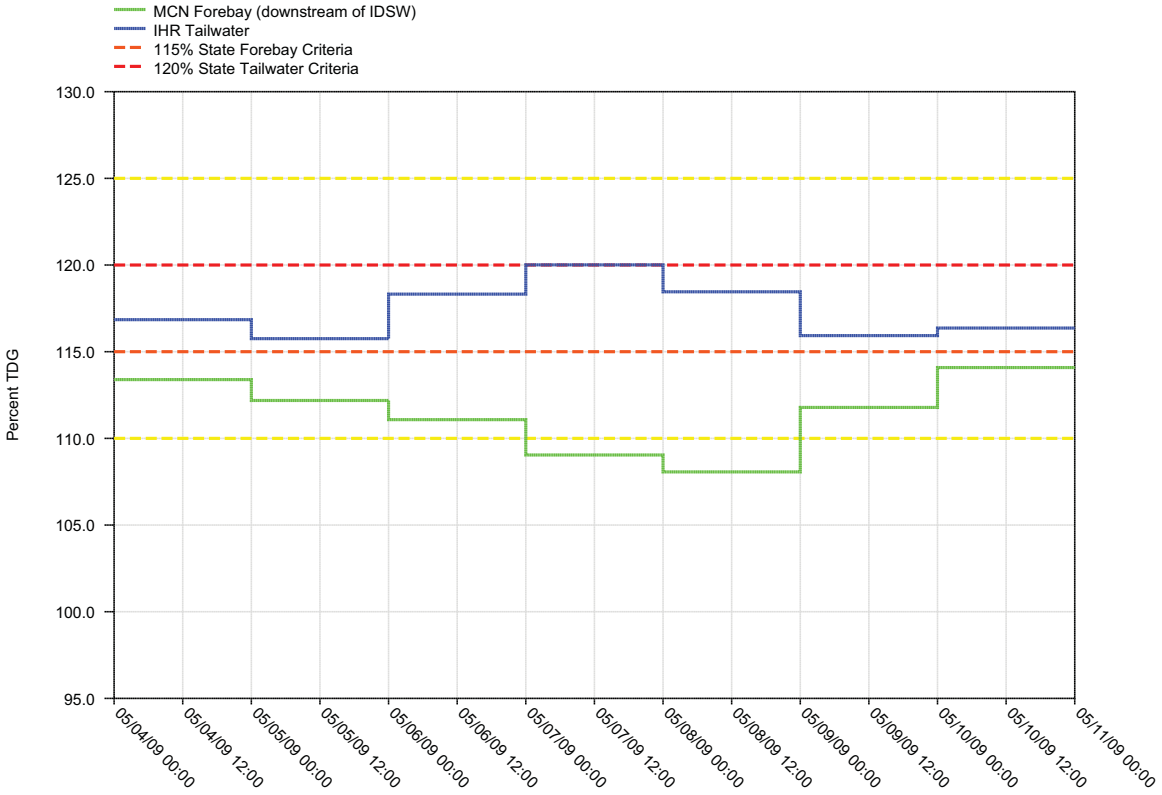


Figure 4.

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



ICE HARBOR DAM - Hourly Spill and Flow

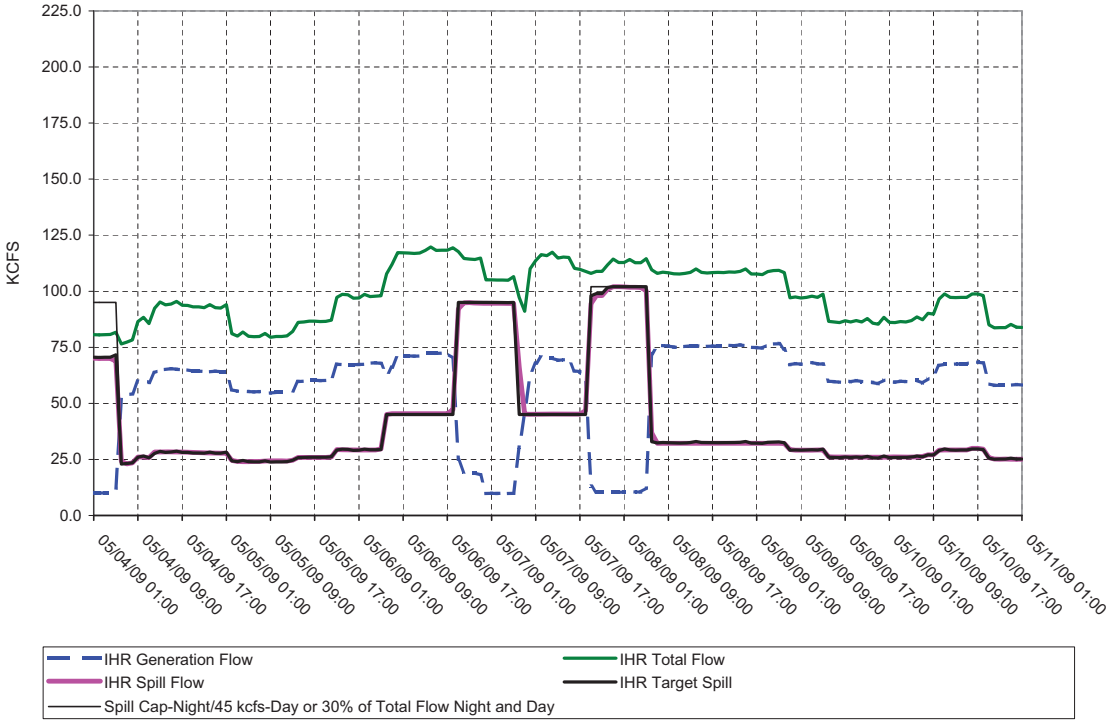
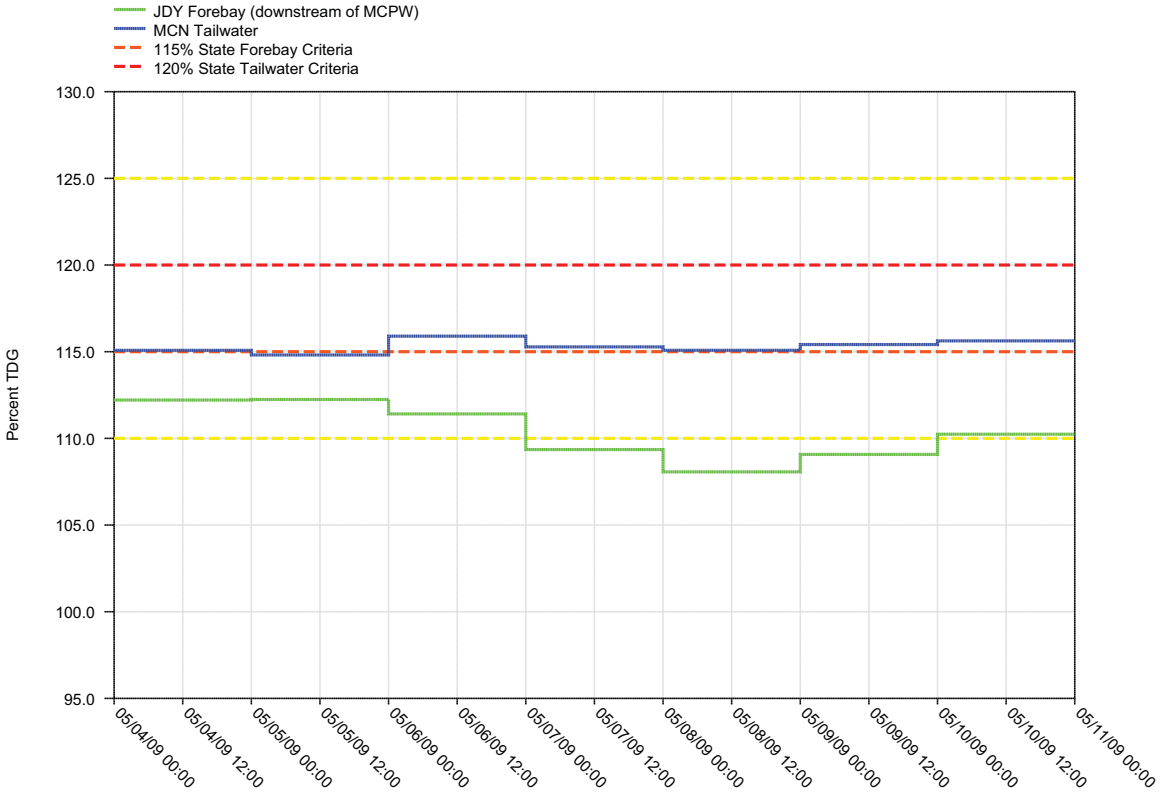


Figure 5.

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



McNARY DAM - Hourly Spill and Flow

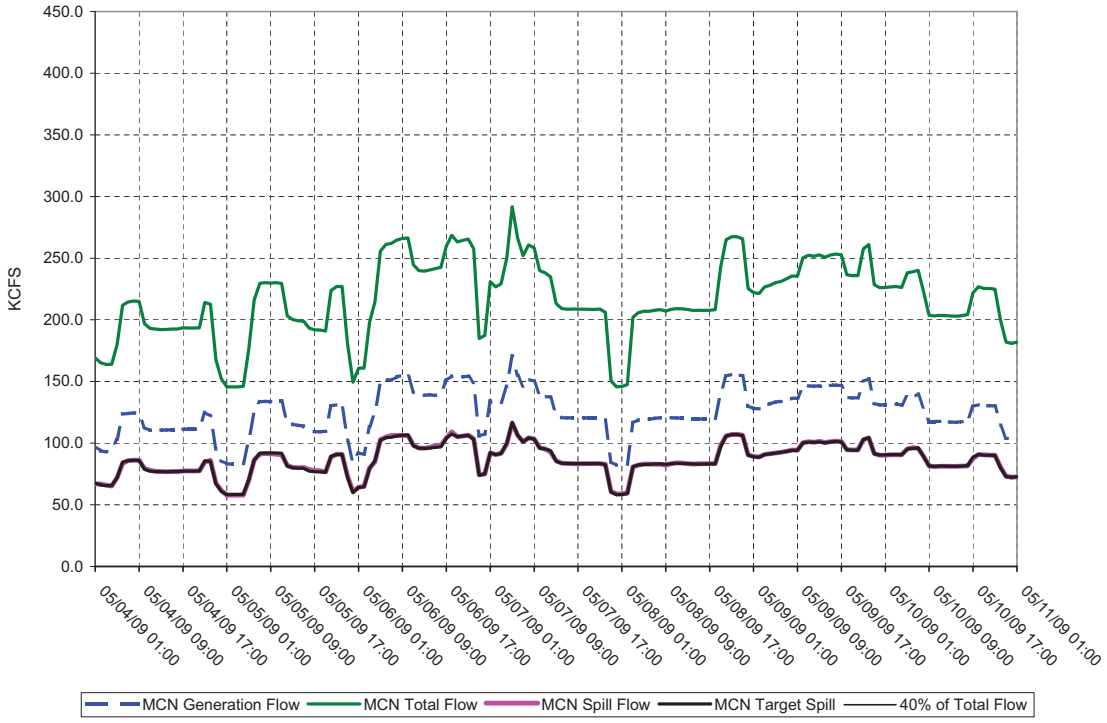
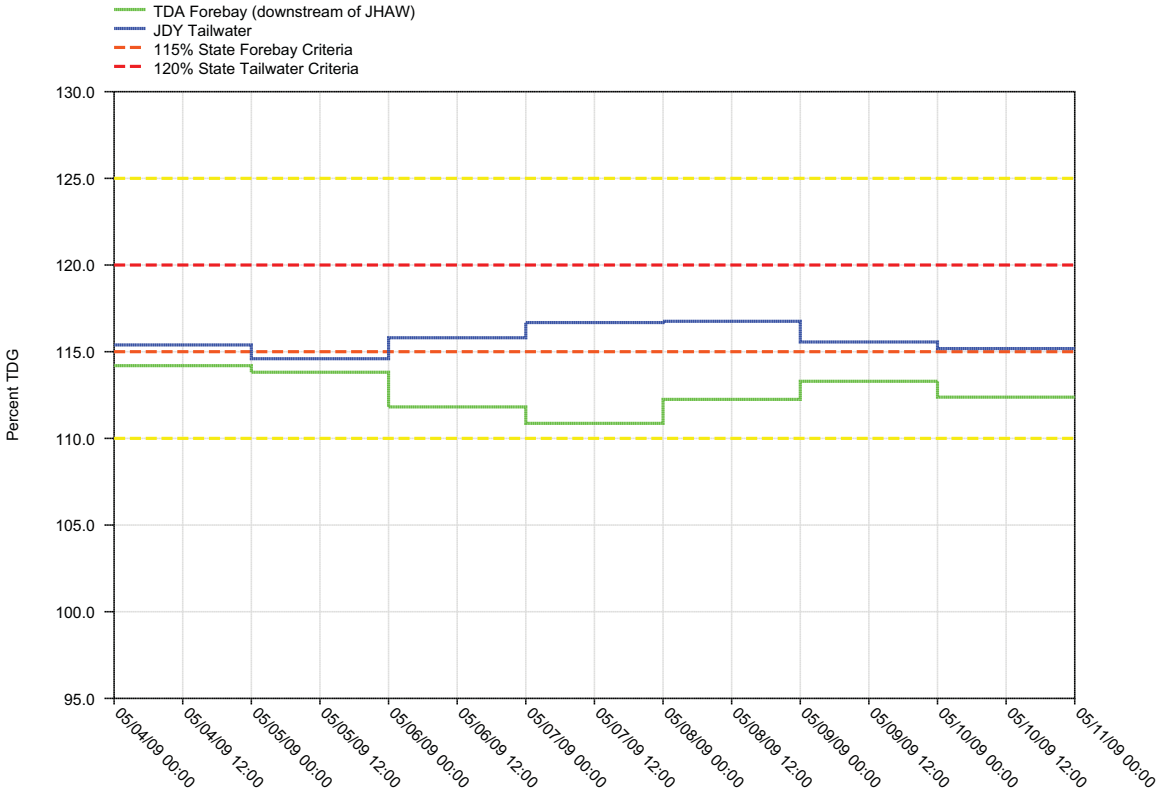


Figure 6.

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



JOHN DAY DAM - Hourly Spill and Flow

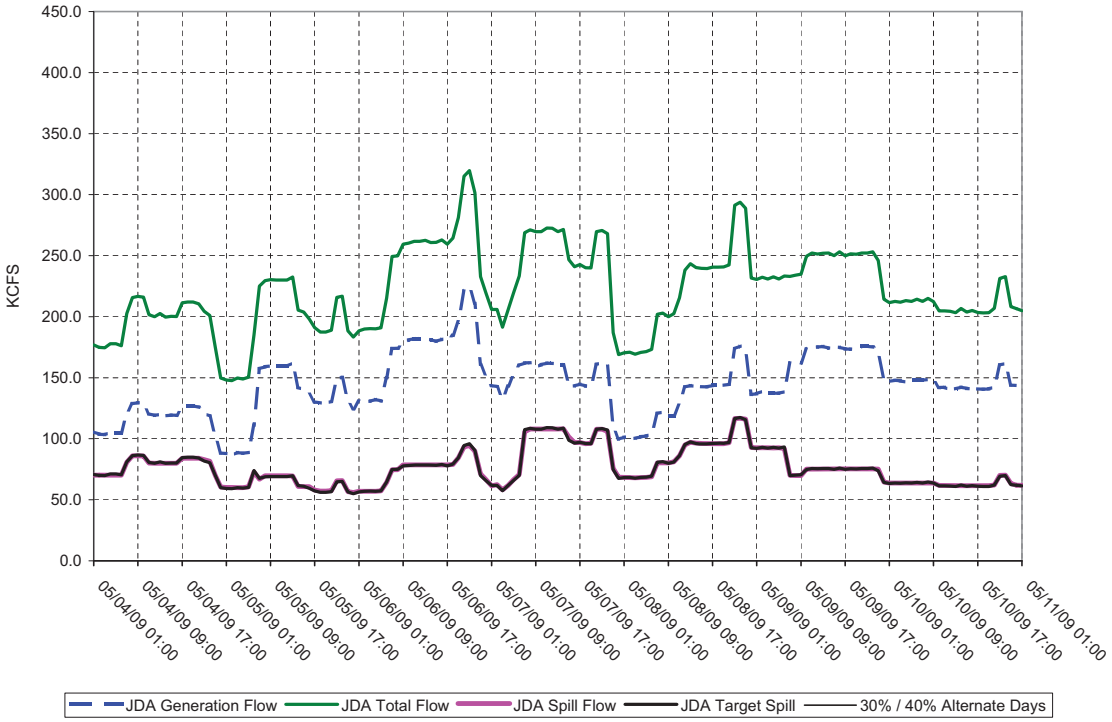
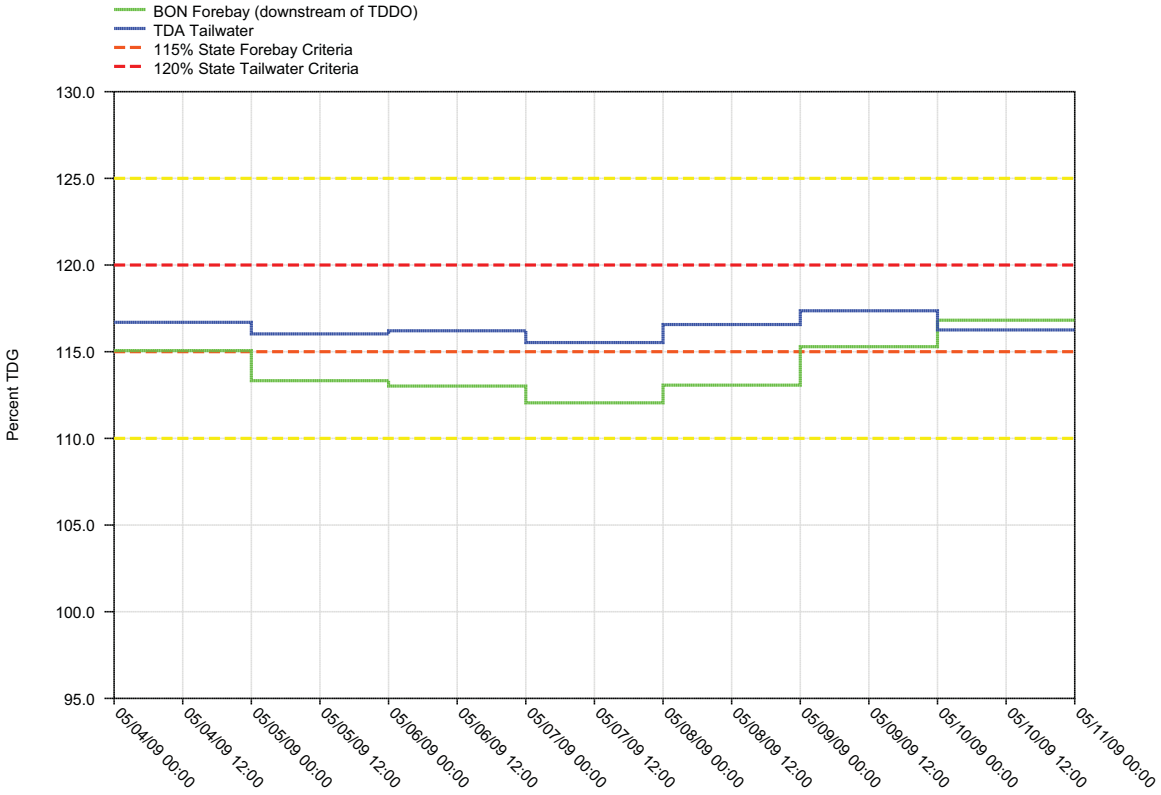


Figure 7.

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



THE DALLES DAM - Hourly Spill and Flow

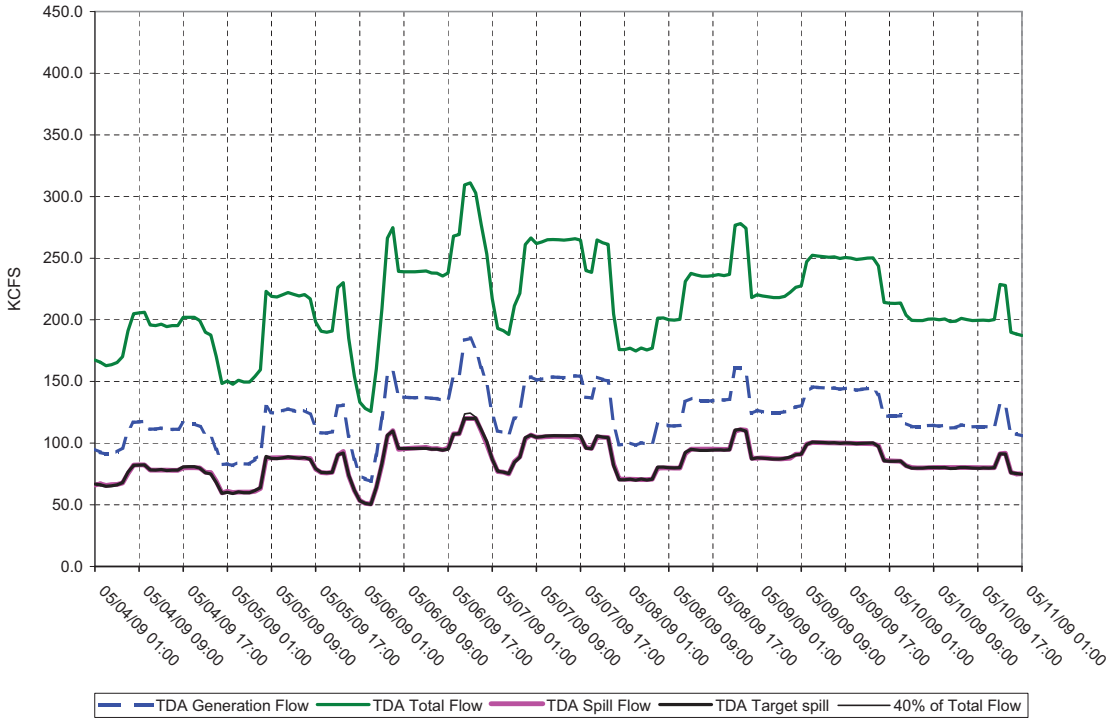
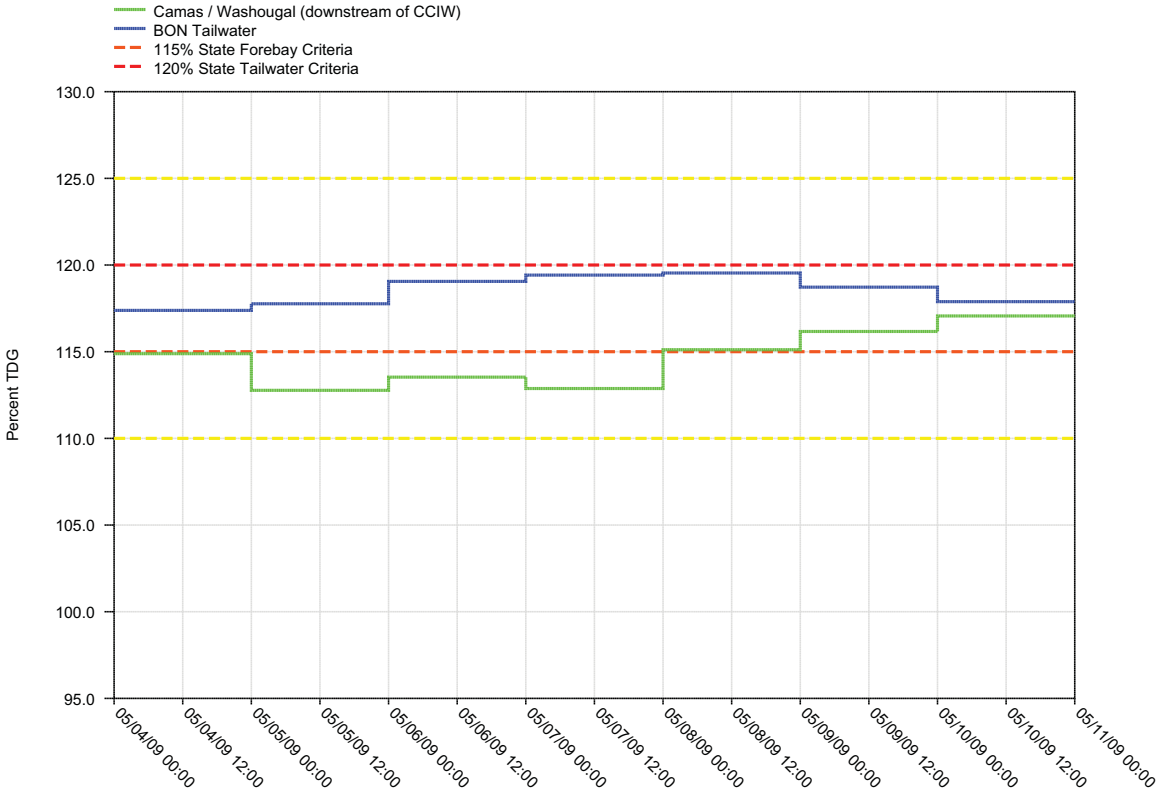


Figure 8.

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



BONNEVILLE DAM - Hourly Spill and Flow

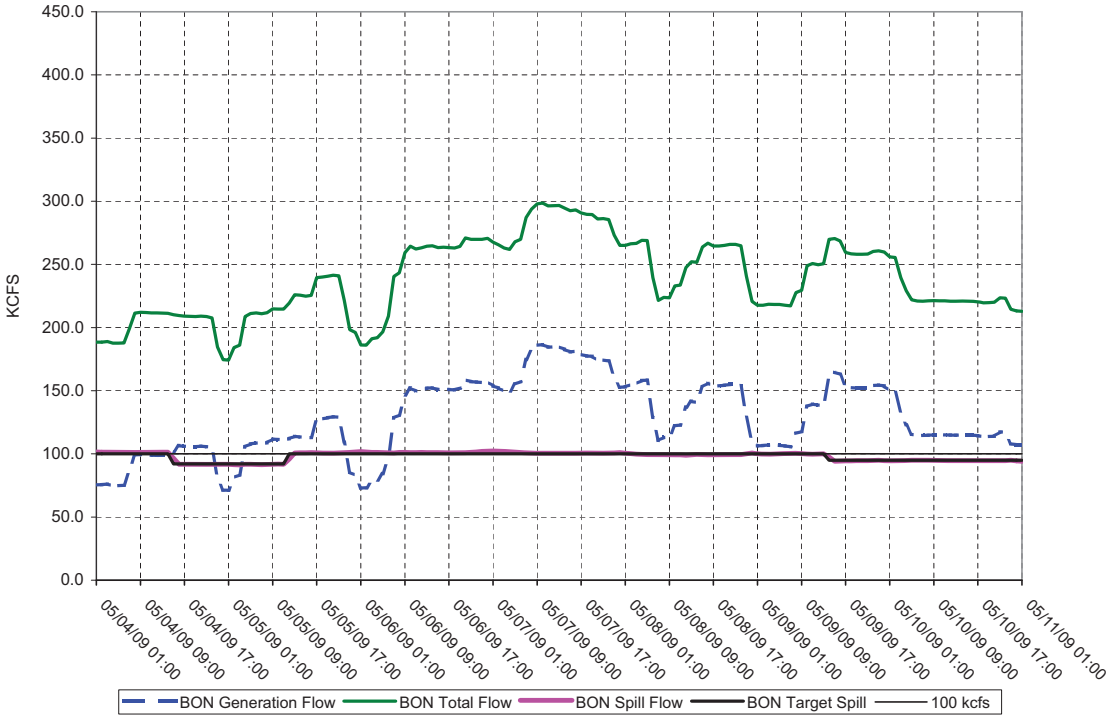
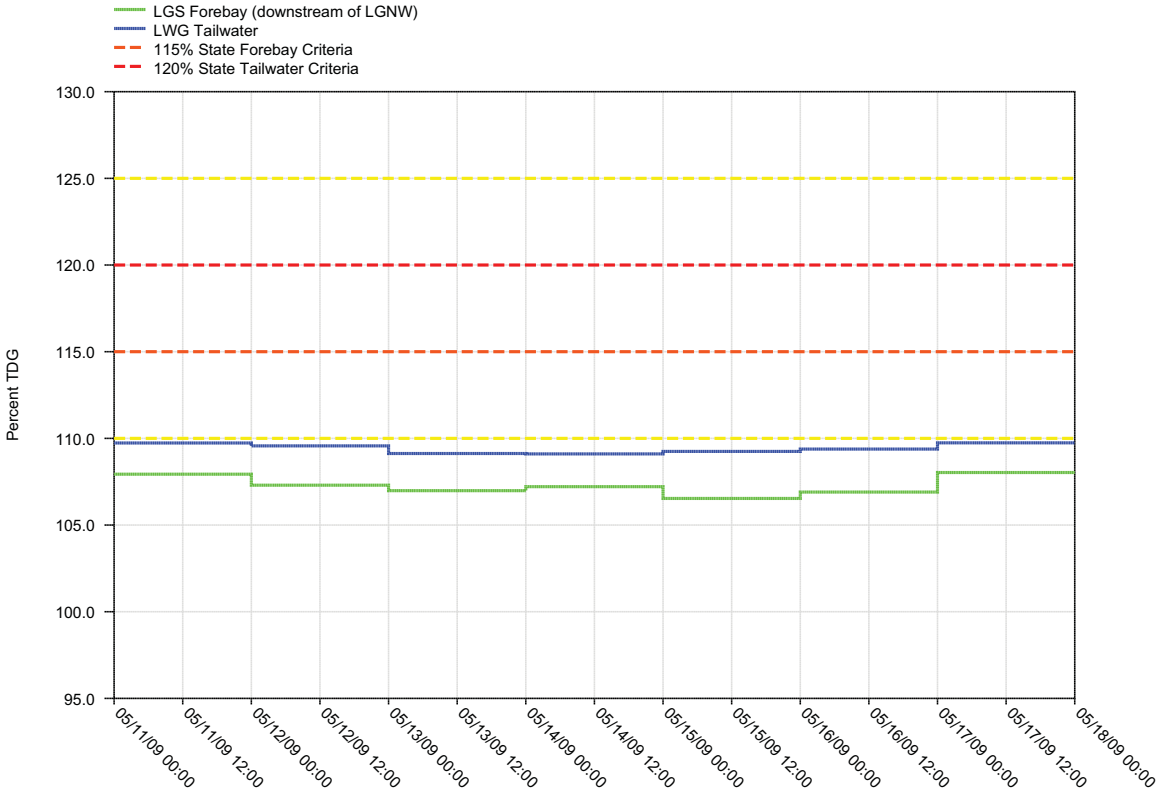


Figure 9.

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



LOWER GRANITE DAM - Hourly Spill and Flow

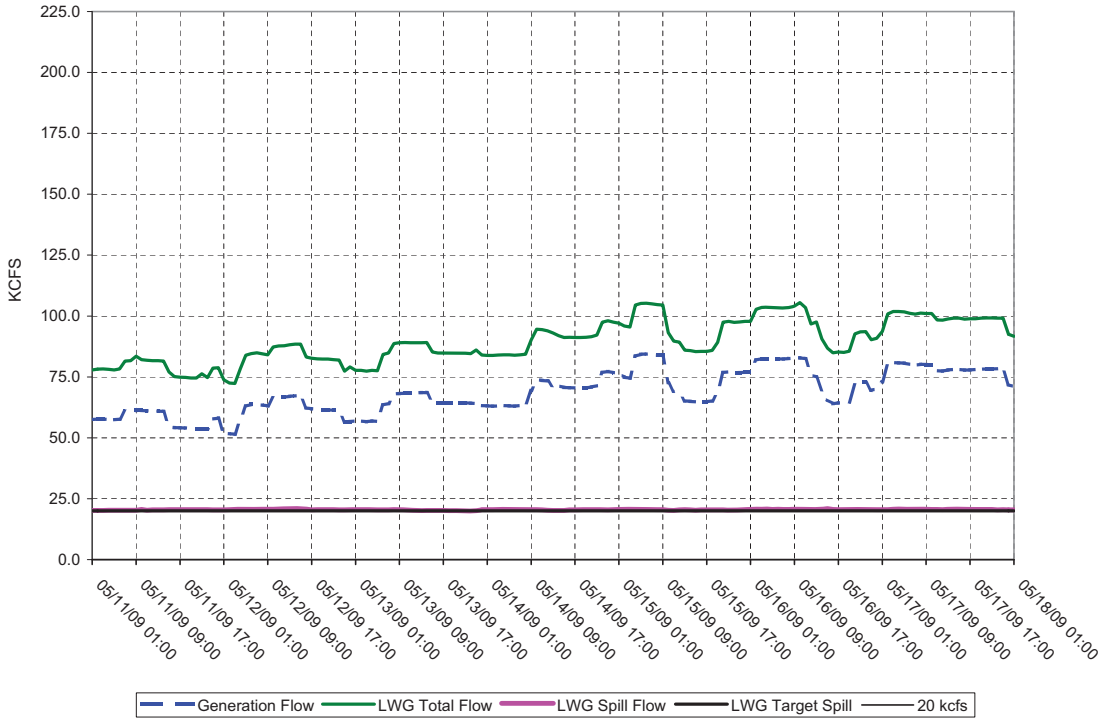
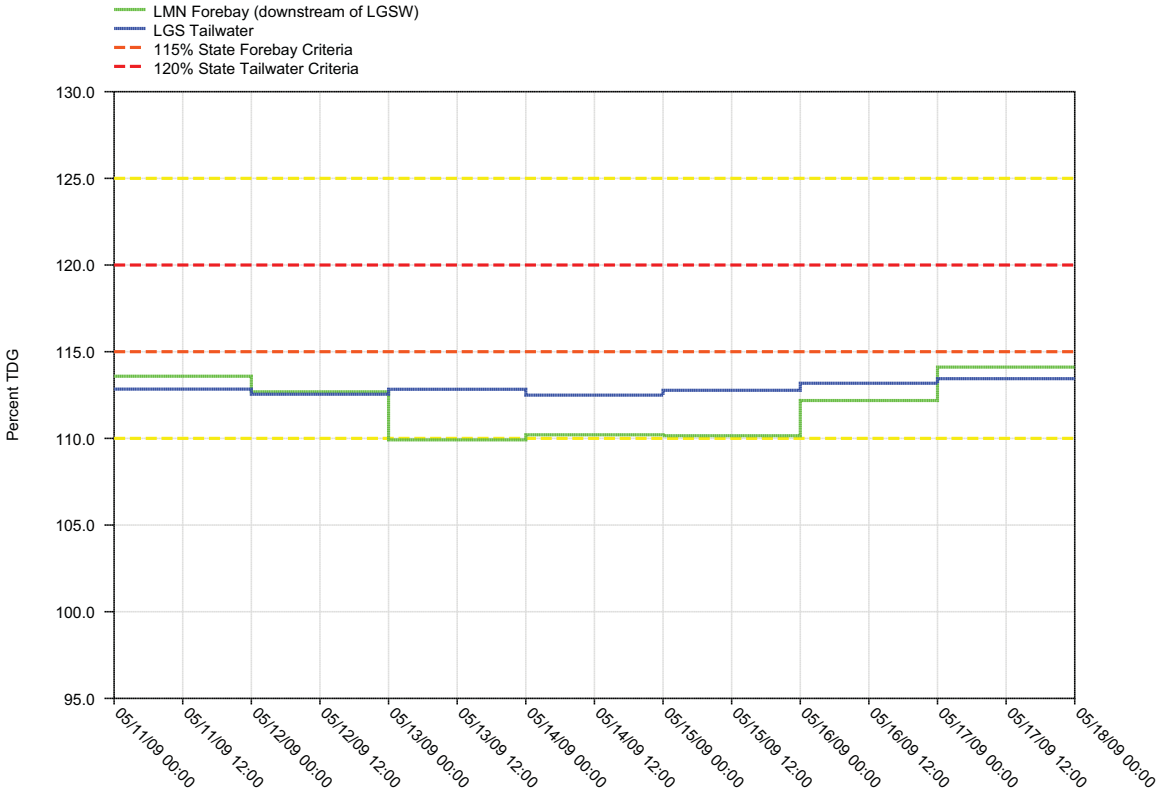


Figure 10.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

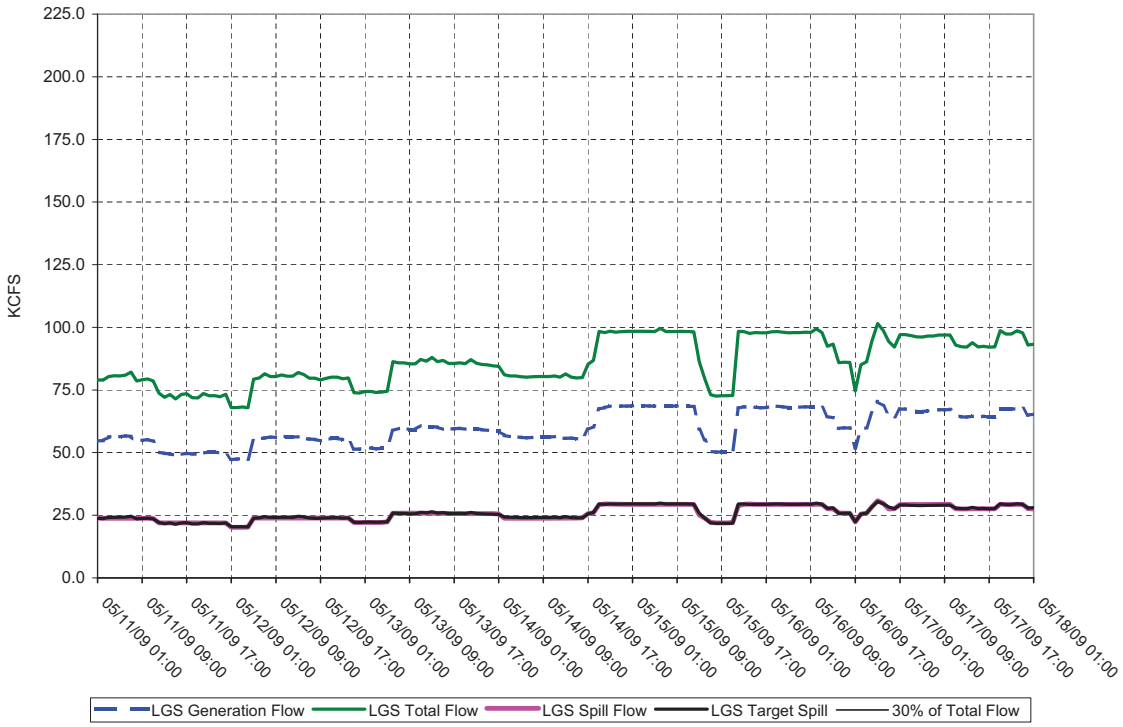
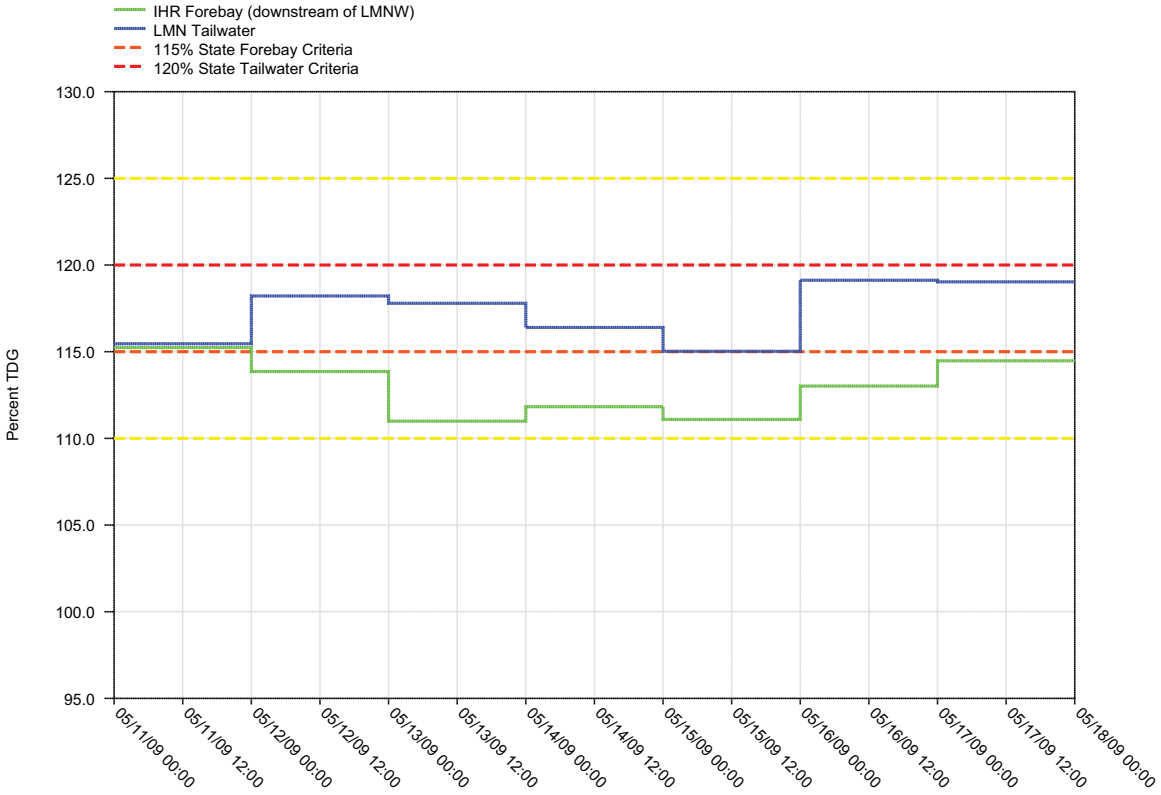


Figure 11.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

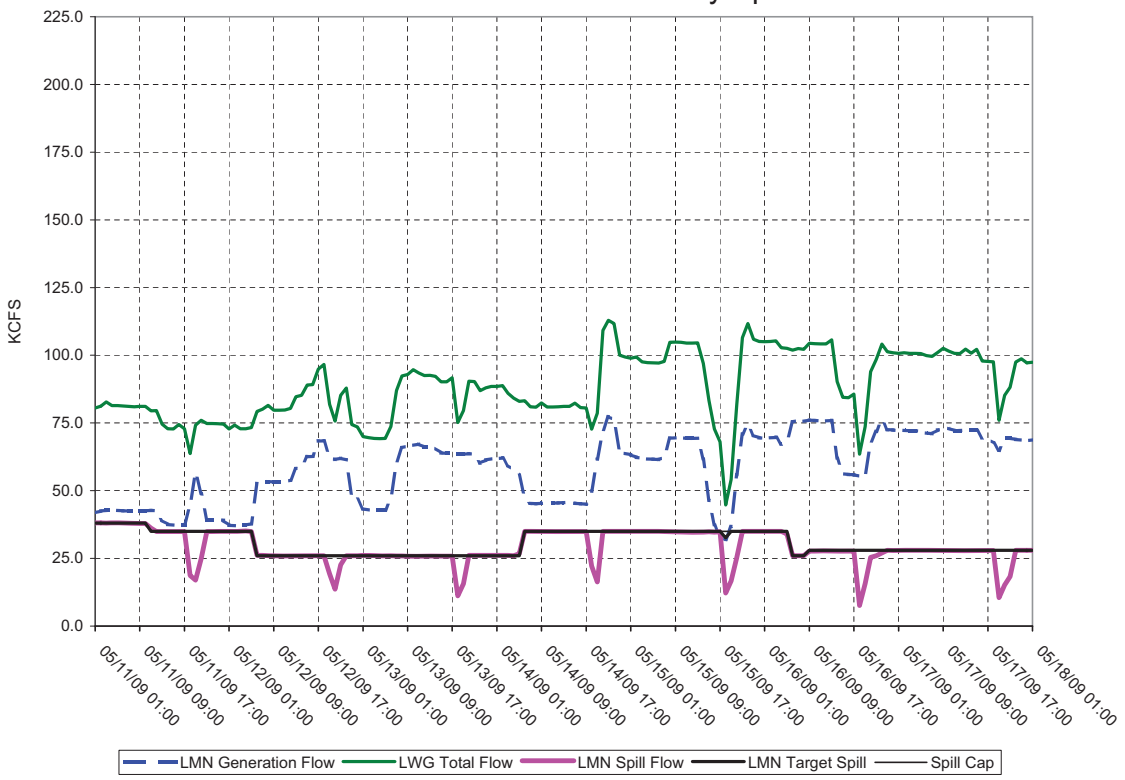
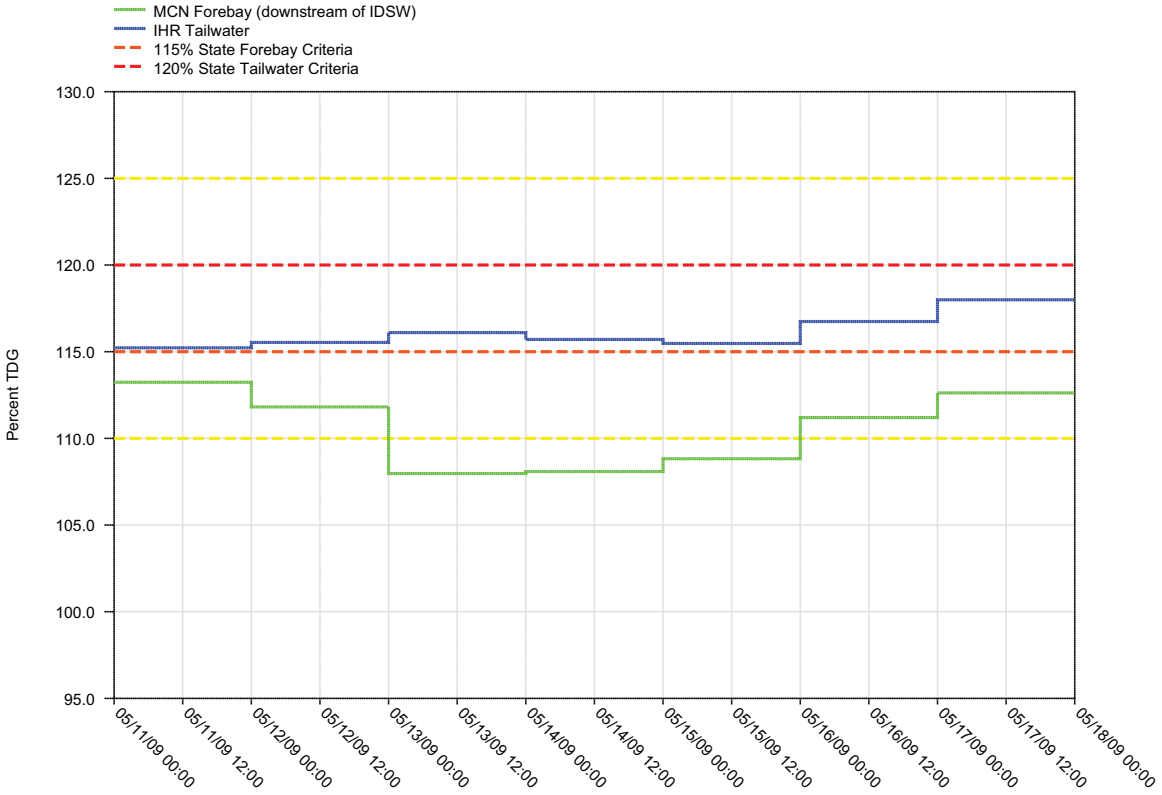


Figure 12.

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



ICE HARBOR DAM - Hourly Spill and Flow

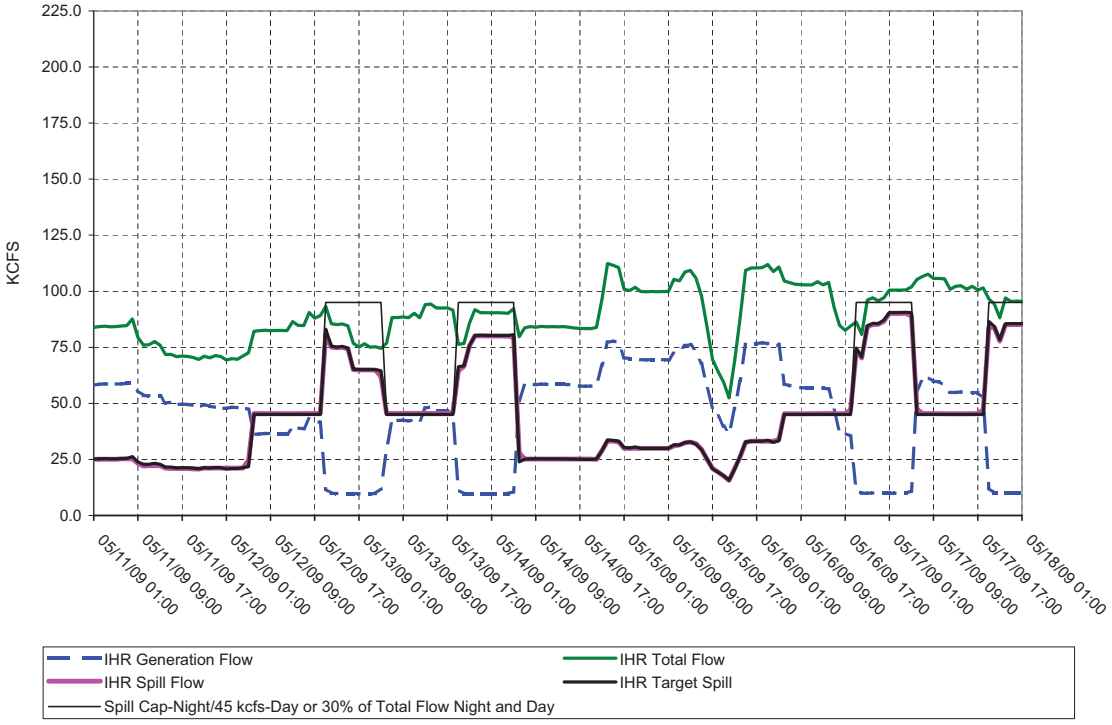
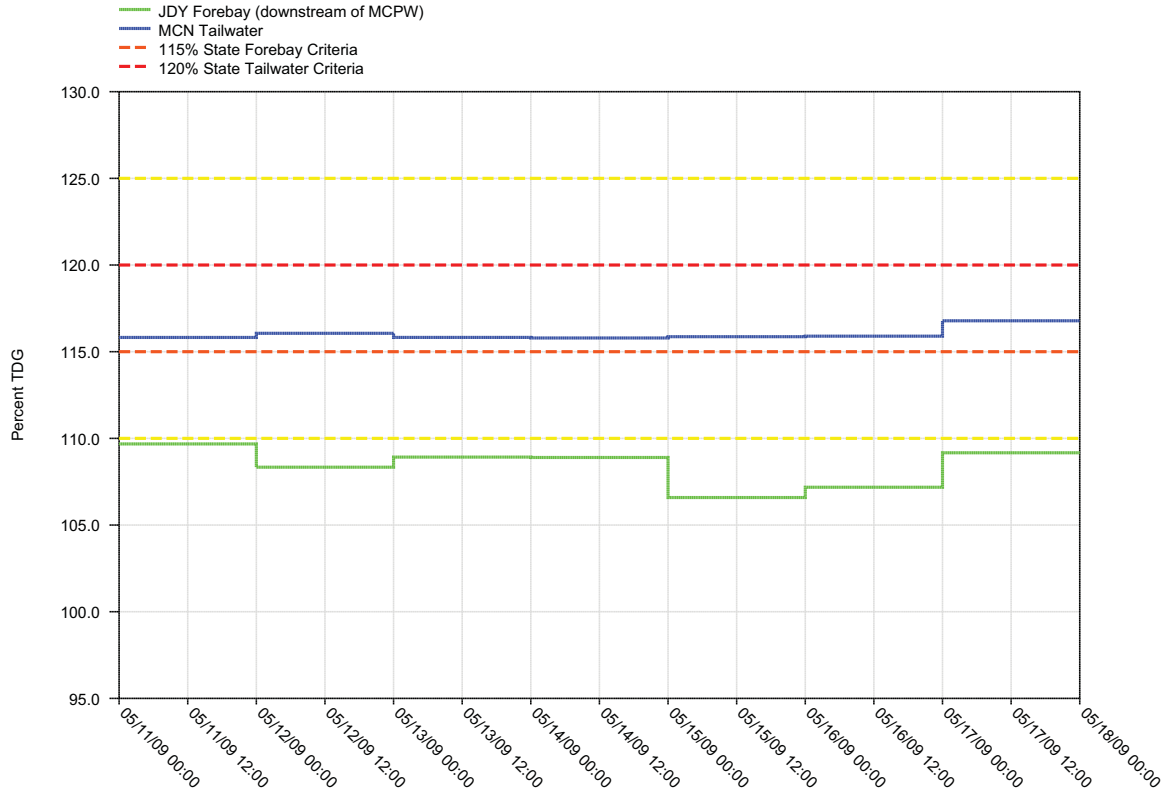


Figure 13.

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



McNARY DAM - Hourly Spill and Flow

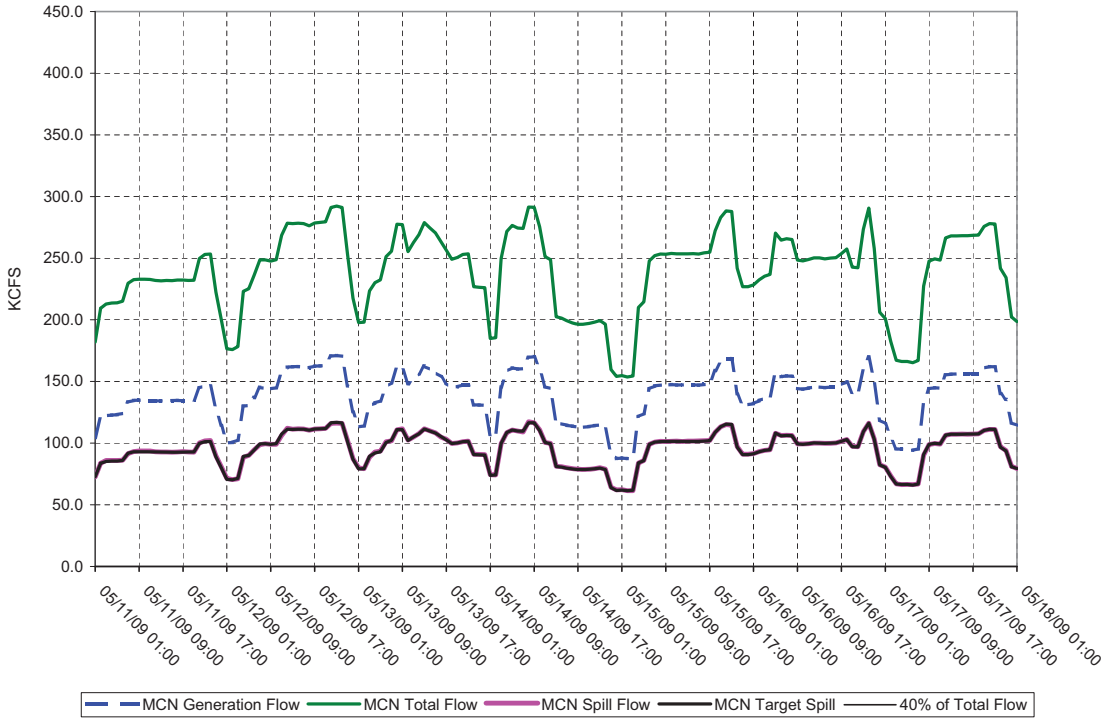
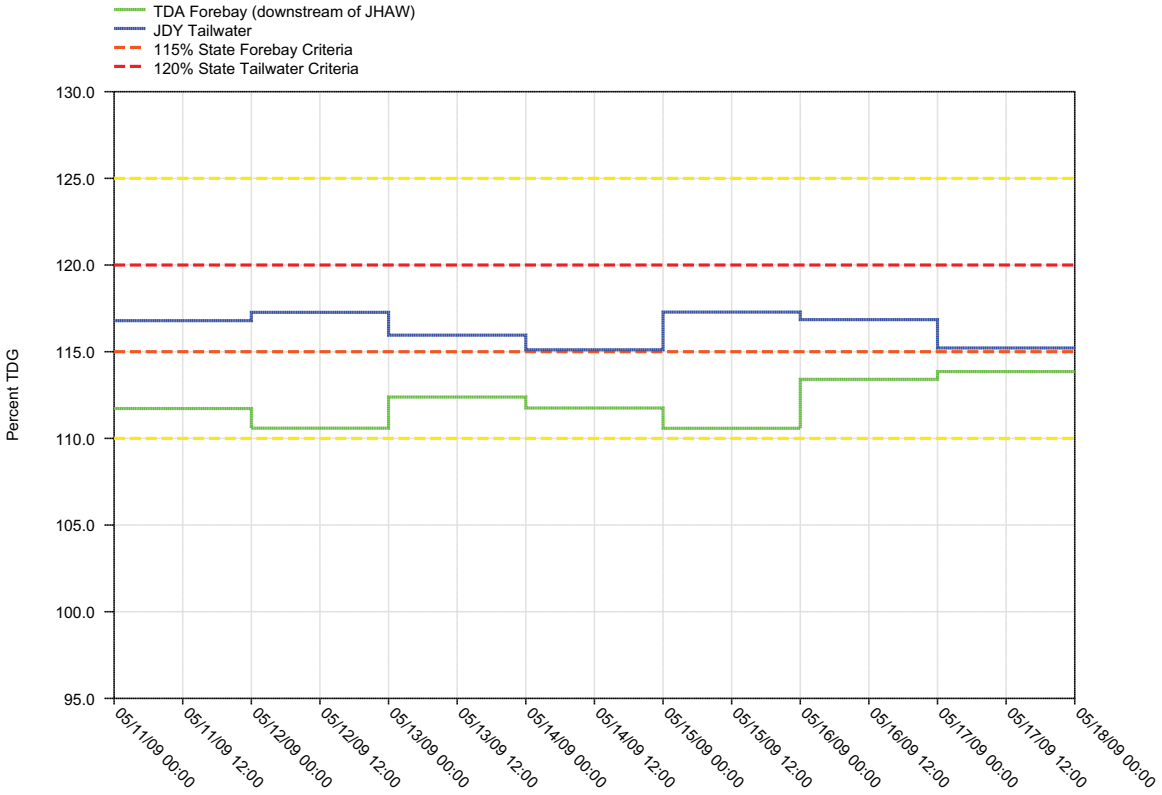


Figure 14.

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



JOHN DAY DAM - Hourly Spill and Flow

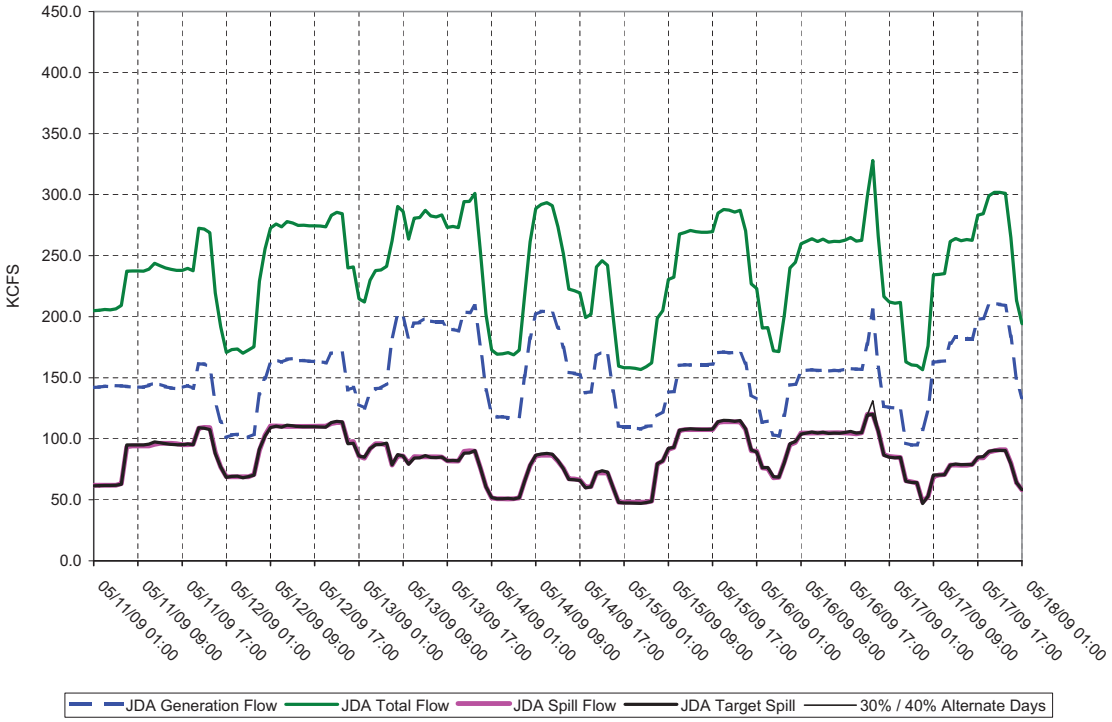
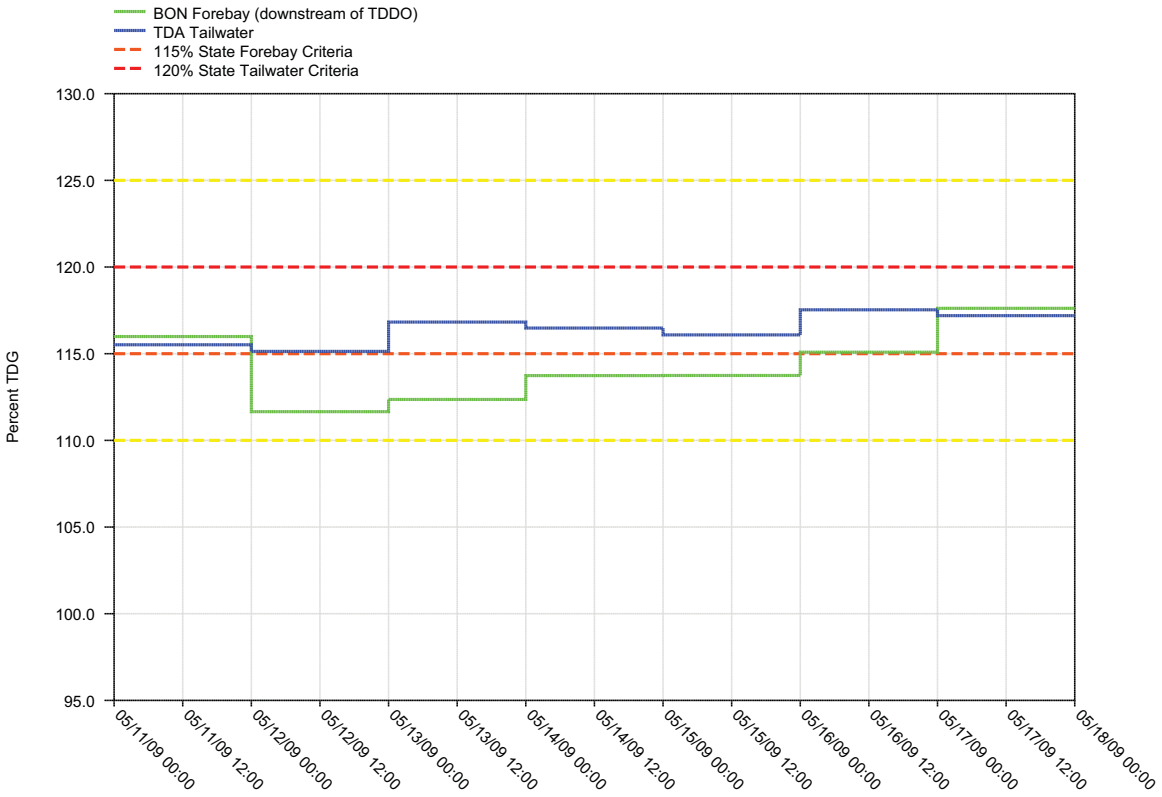


Figure 15.

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



THE DALLES DAM - Hourly Spill and Flow

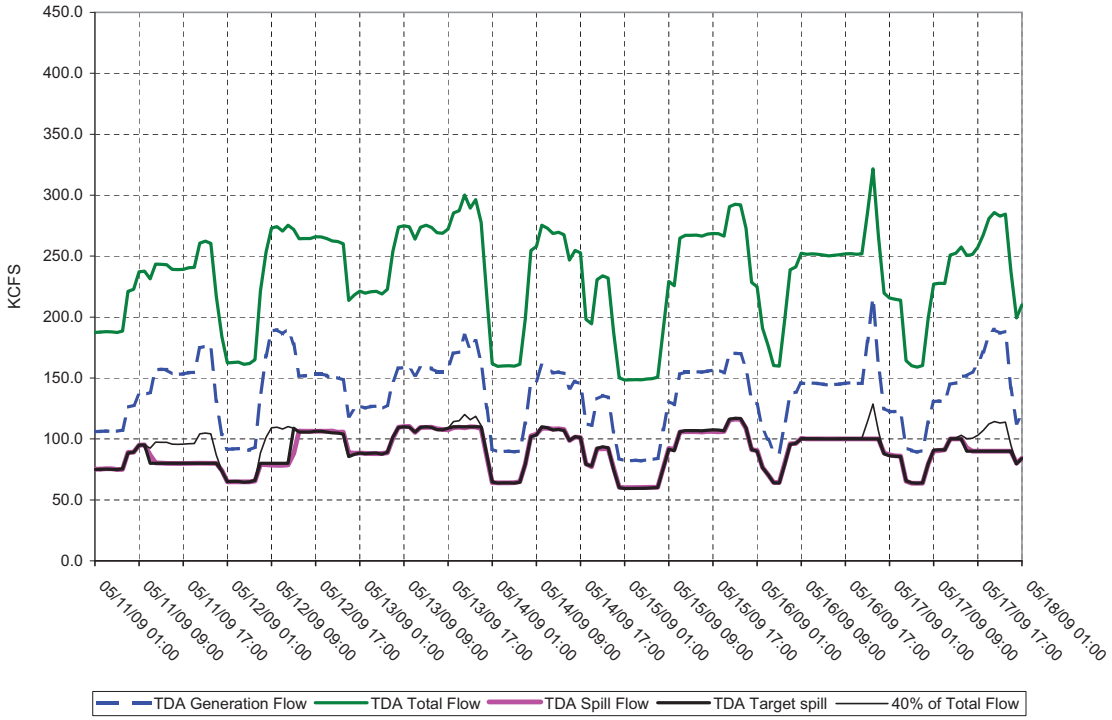
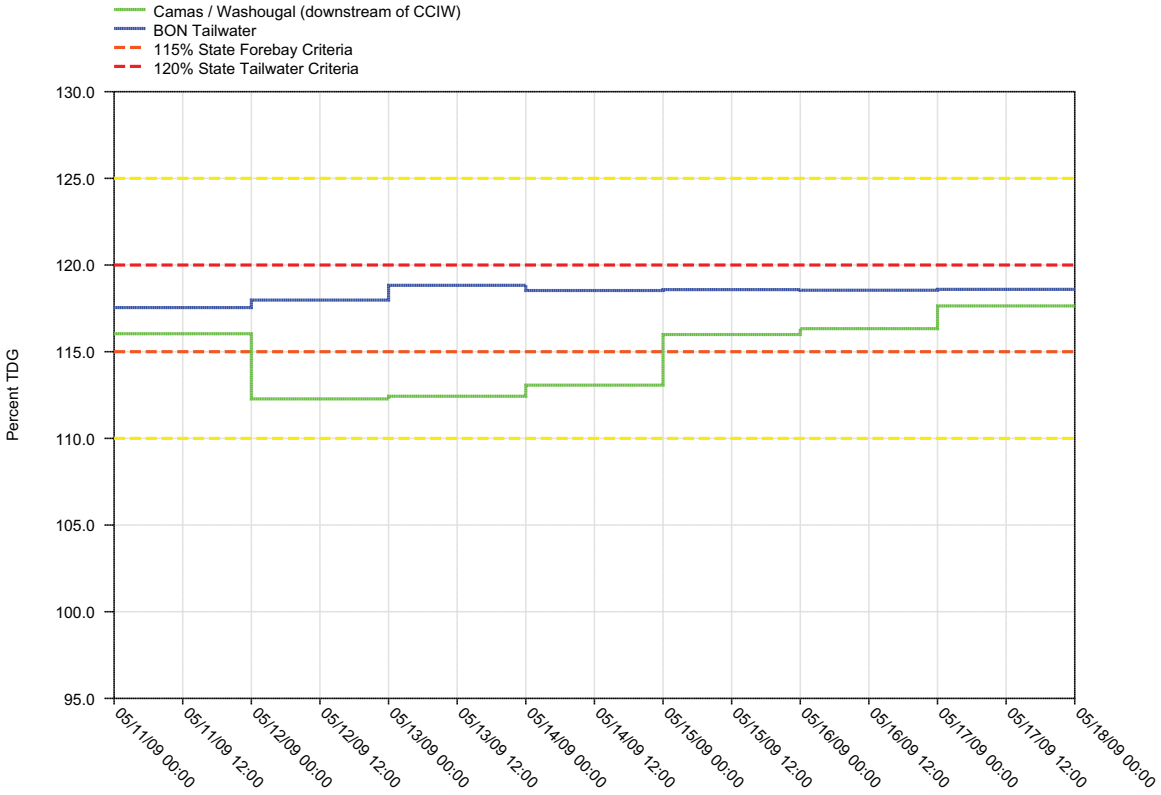


Figure 16.

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



BONNEVILLE DAM - Hourly Spill and Flow

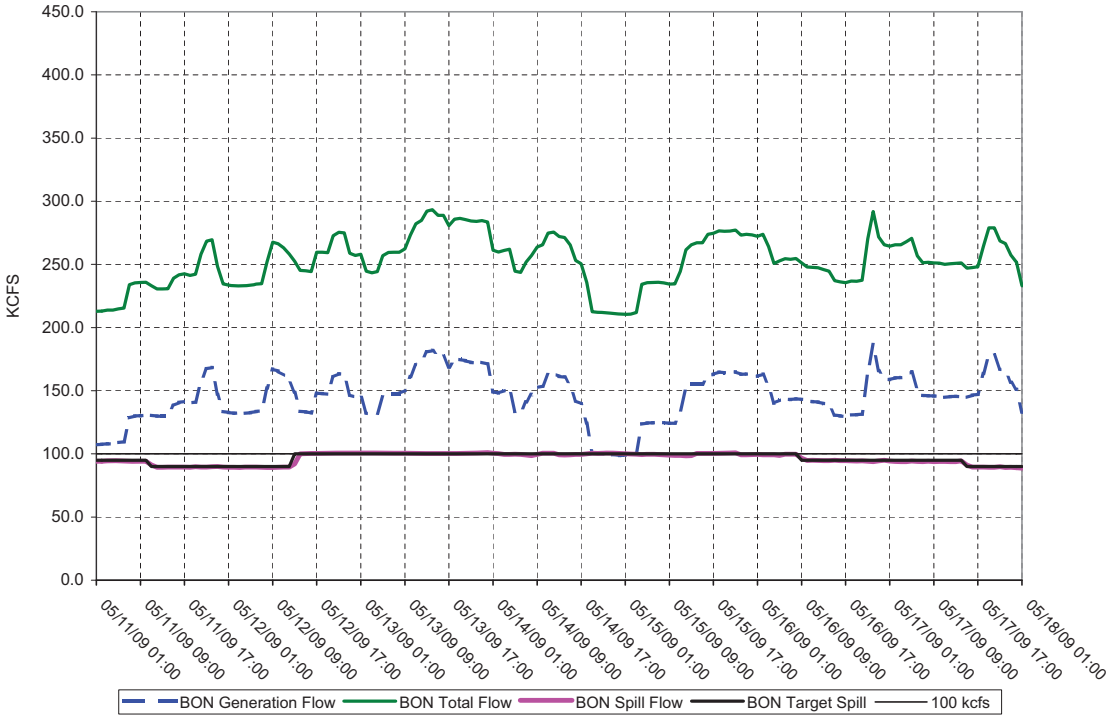
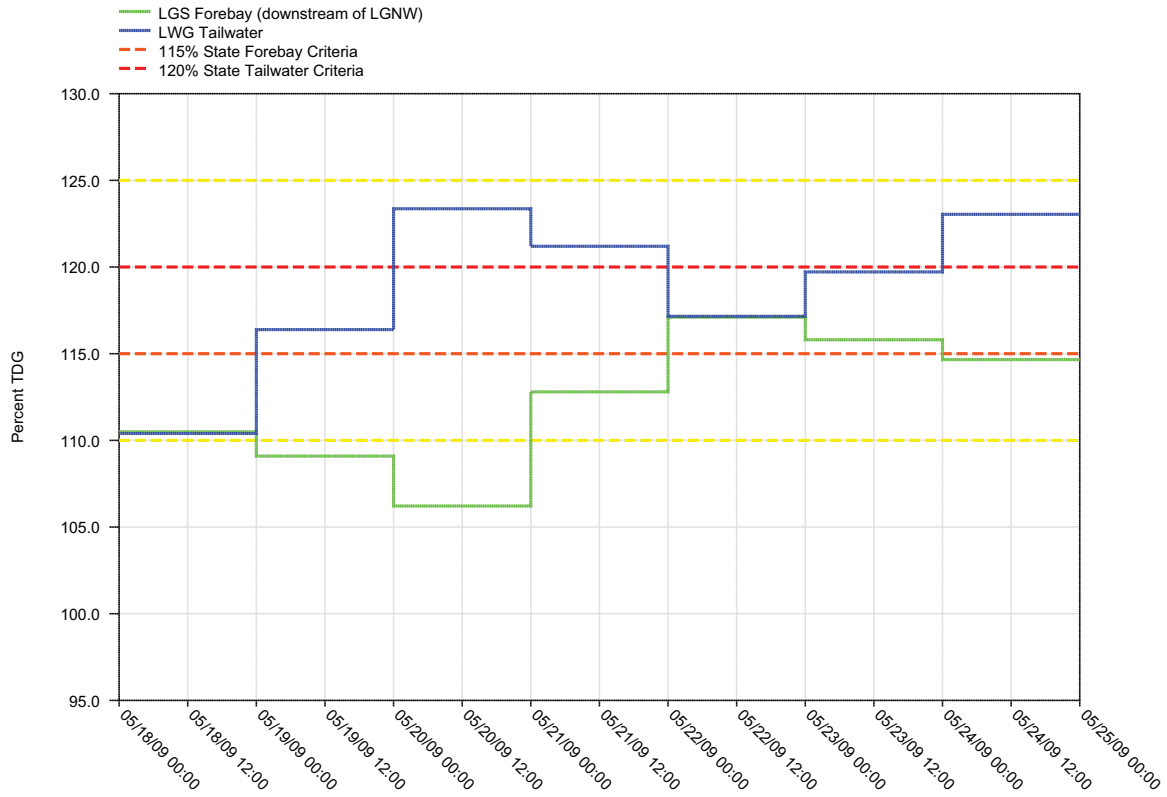


Figure 17.

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



LOWER GRANITE DAM - Hourly Spill and Flow

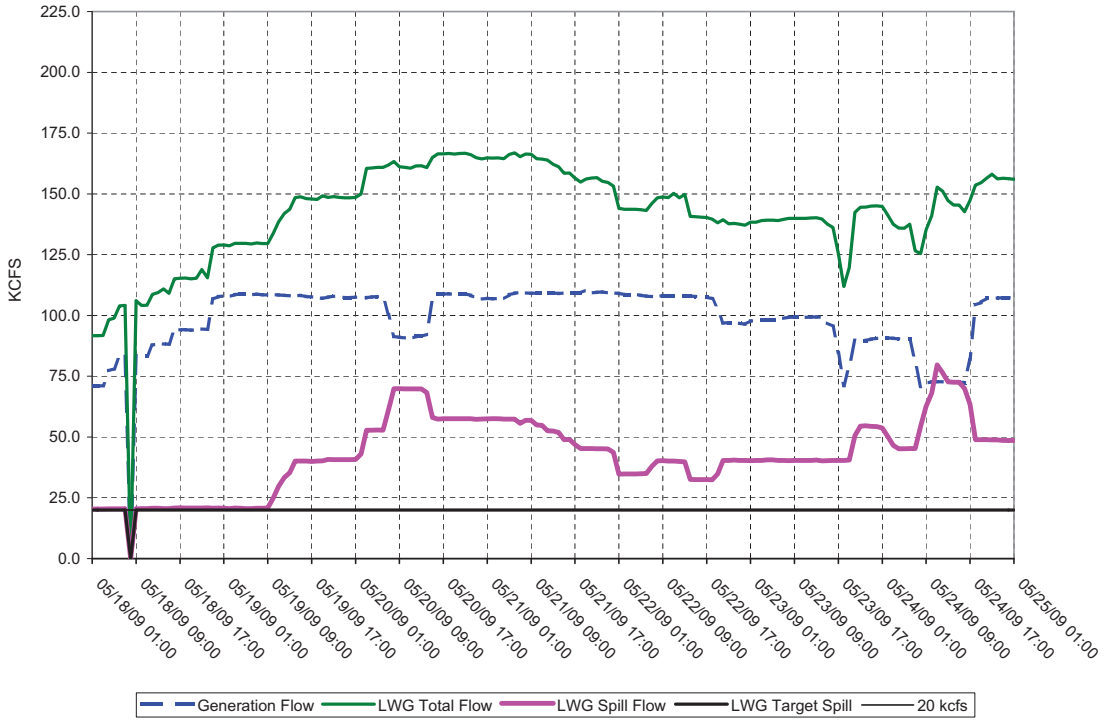
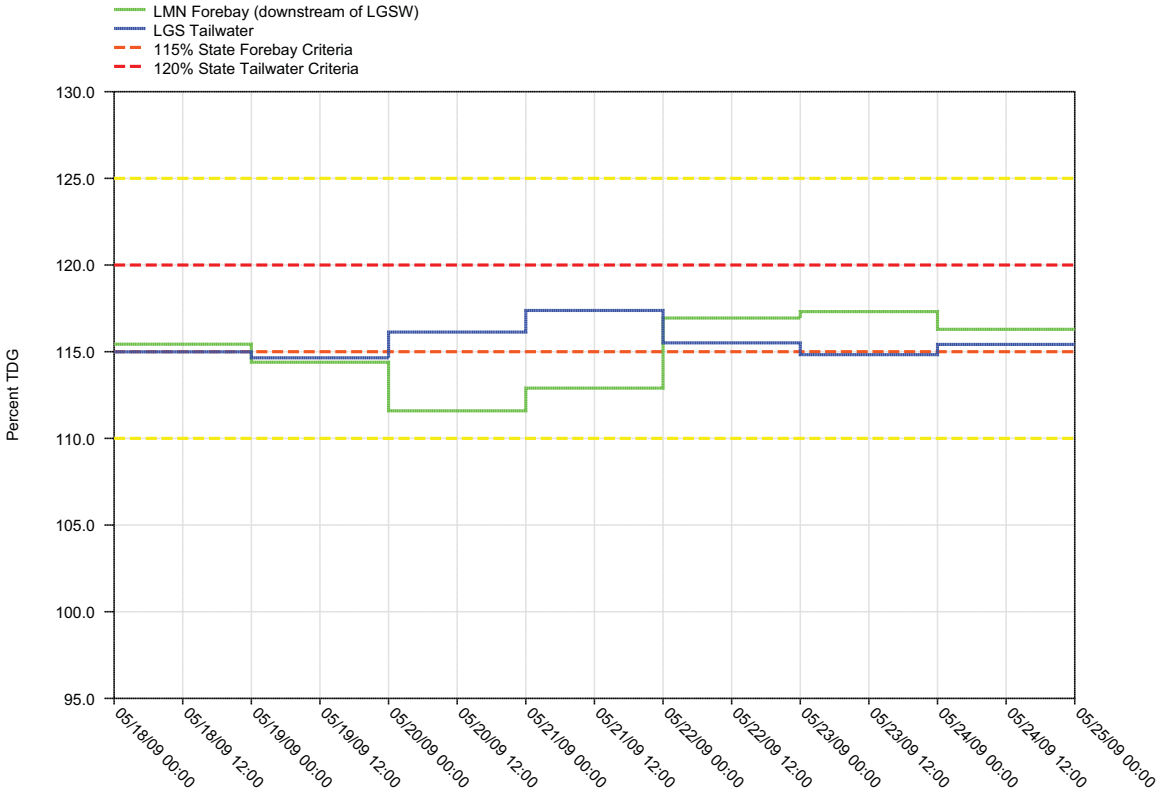


Figure 18.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

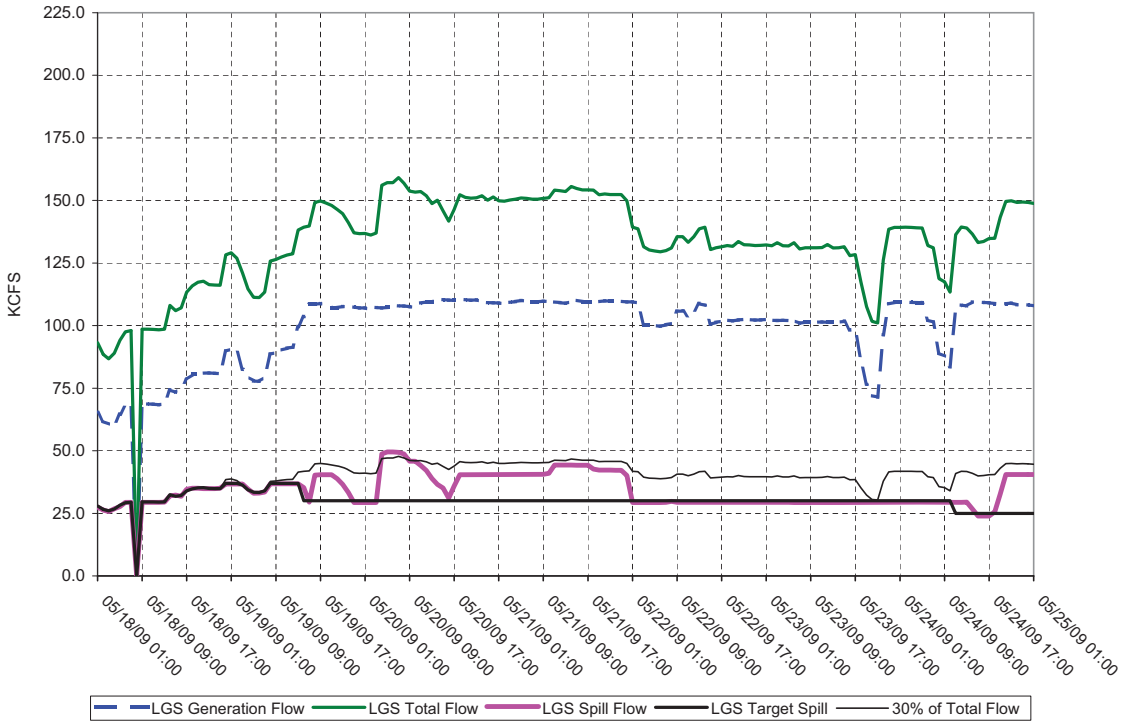
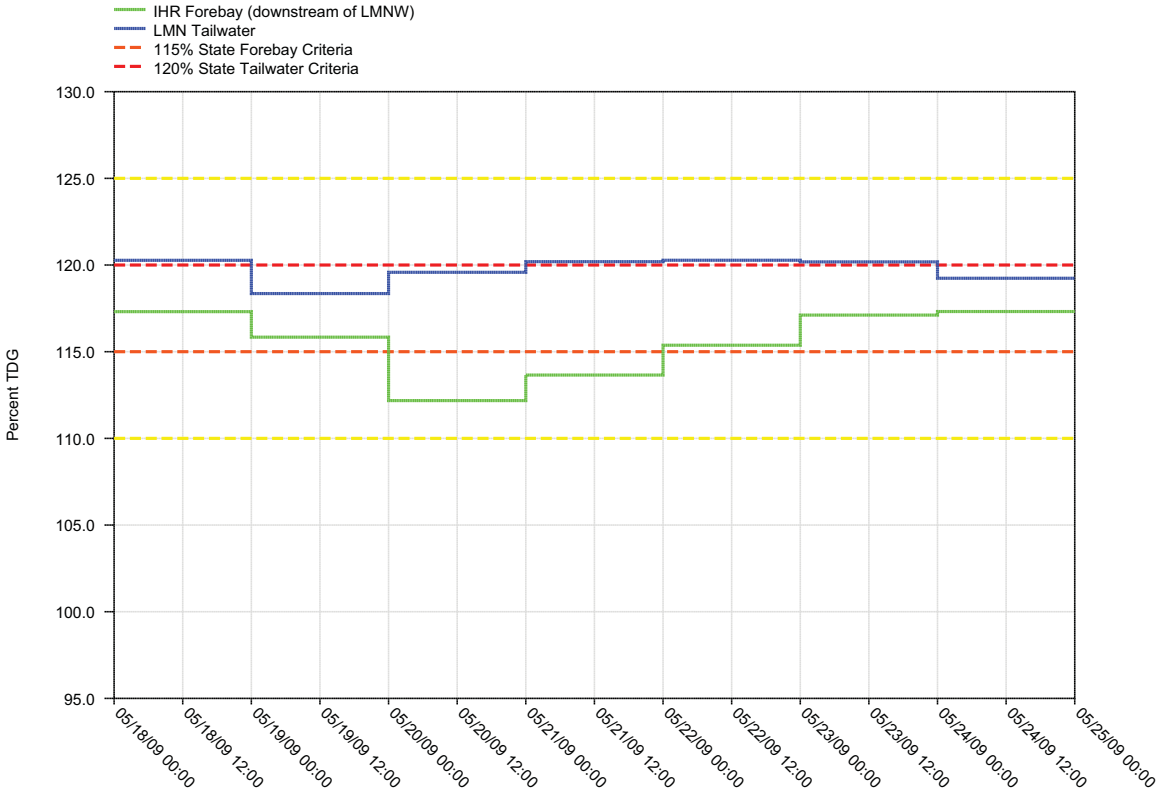


Figure 19.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

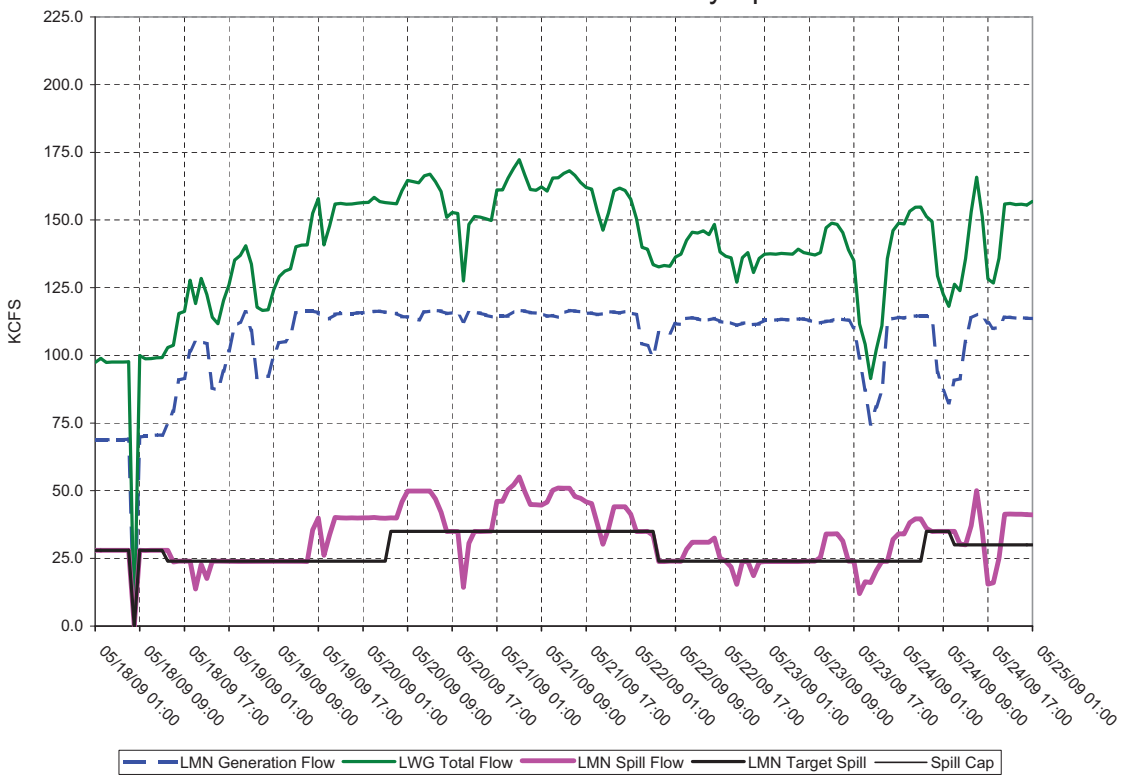
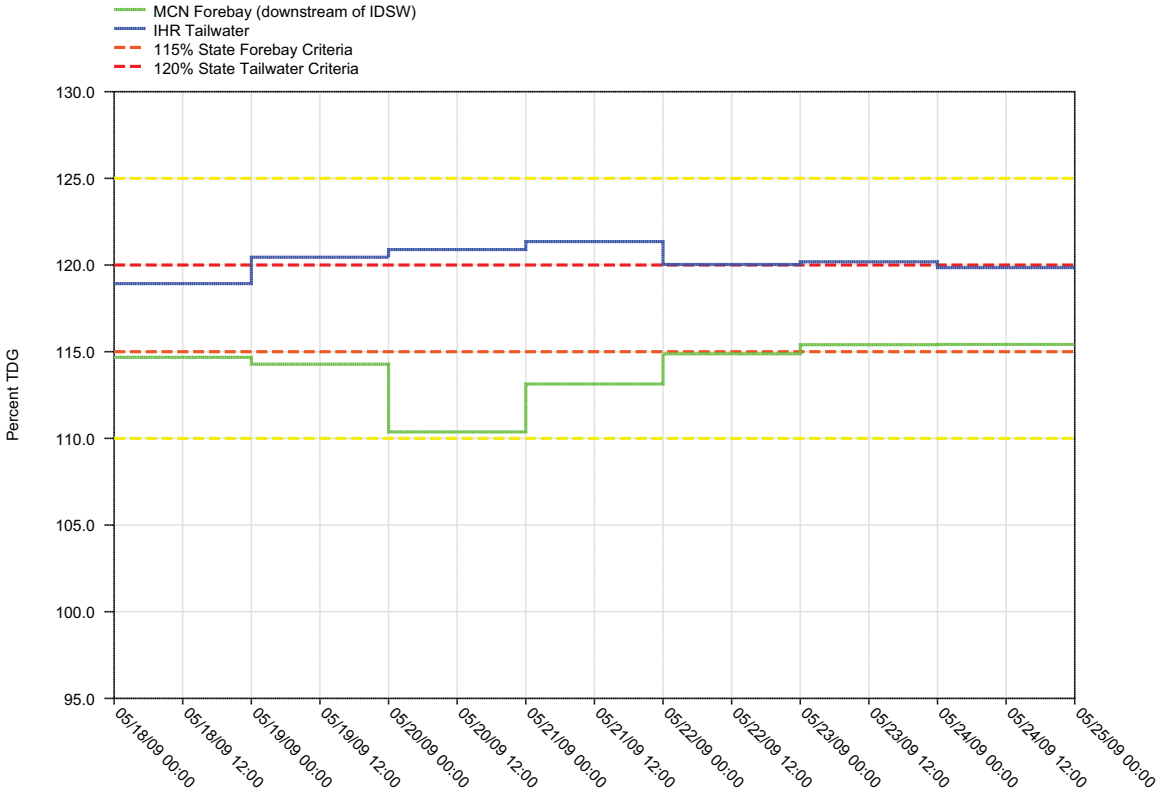


Figure 20.

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



ICE HARBOR DAM - Hourly Spill and Flow

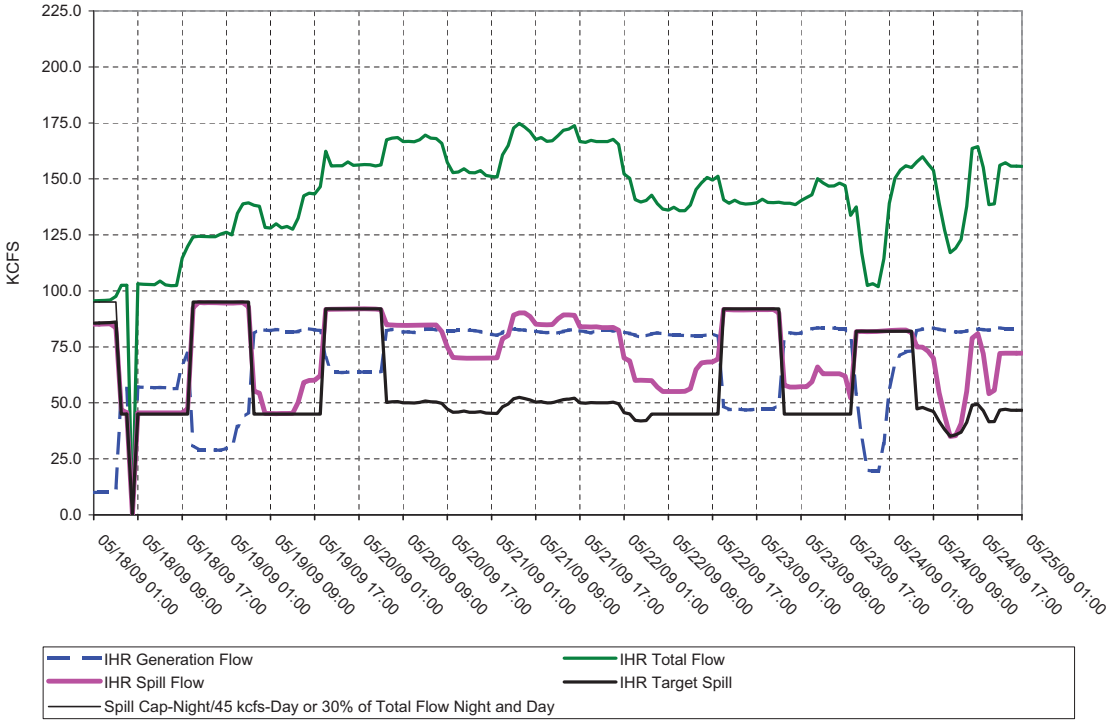
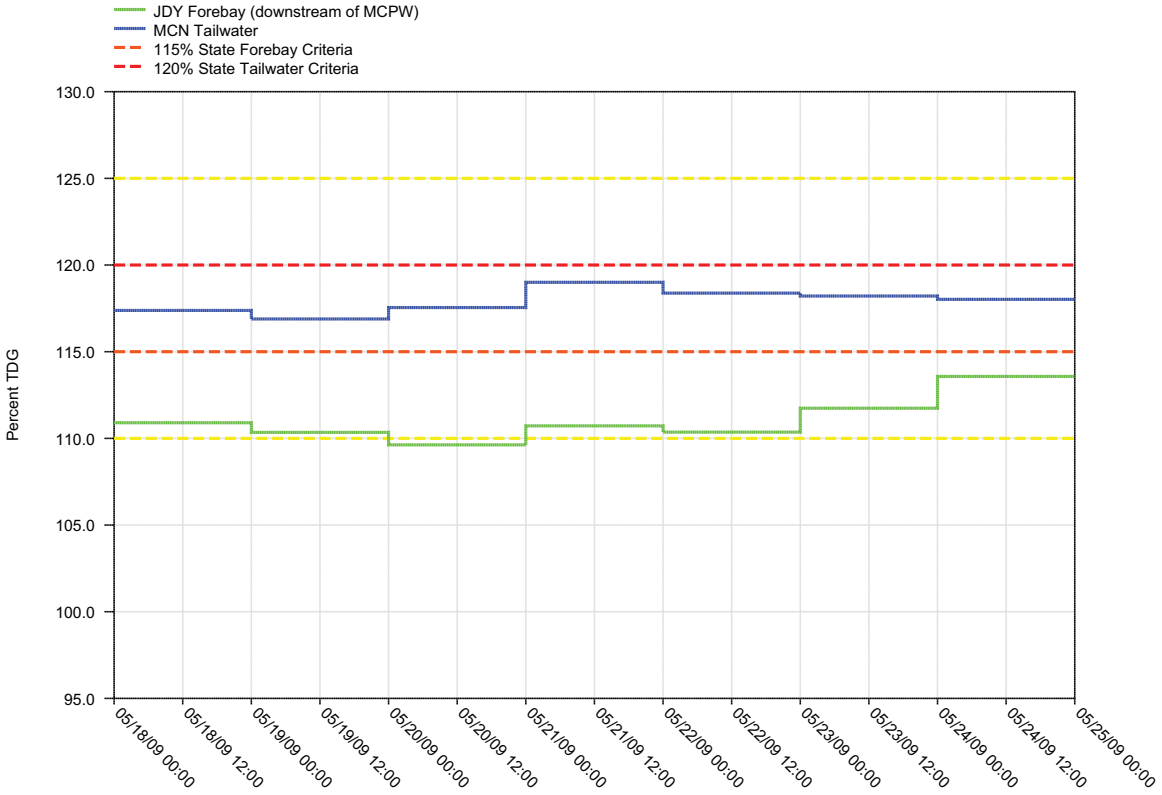


Figure 21.

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



McNARY DAM - Hourly Spill and Flow

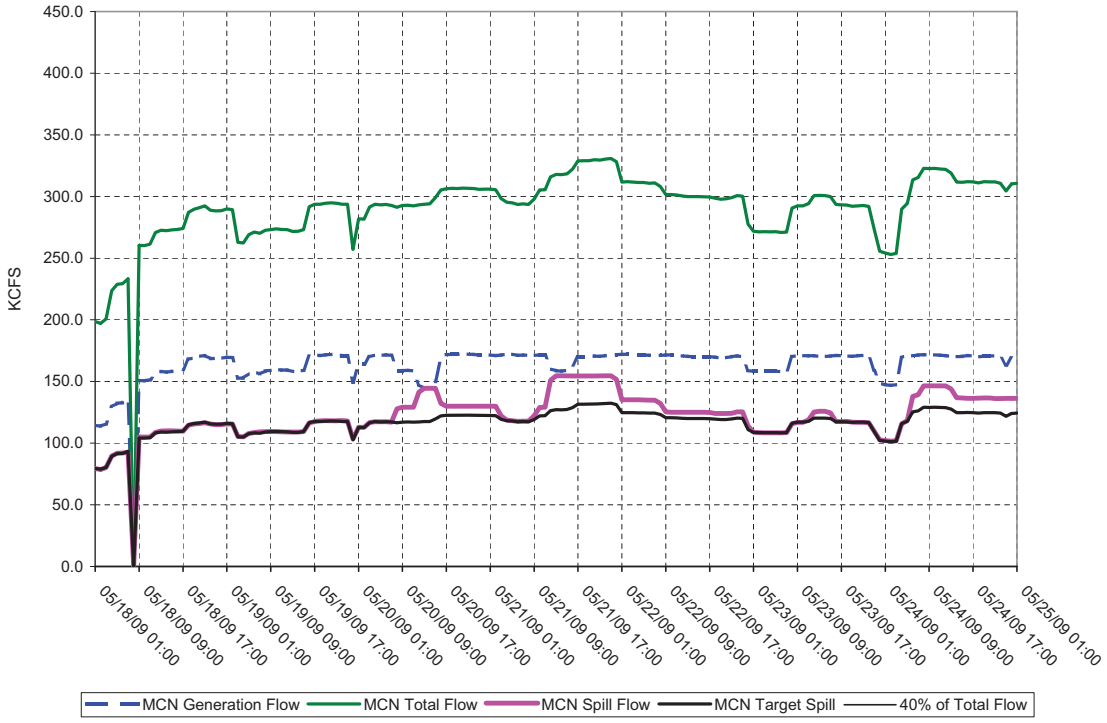
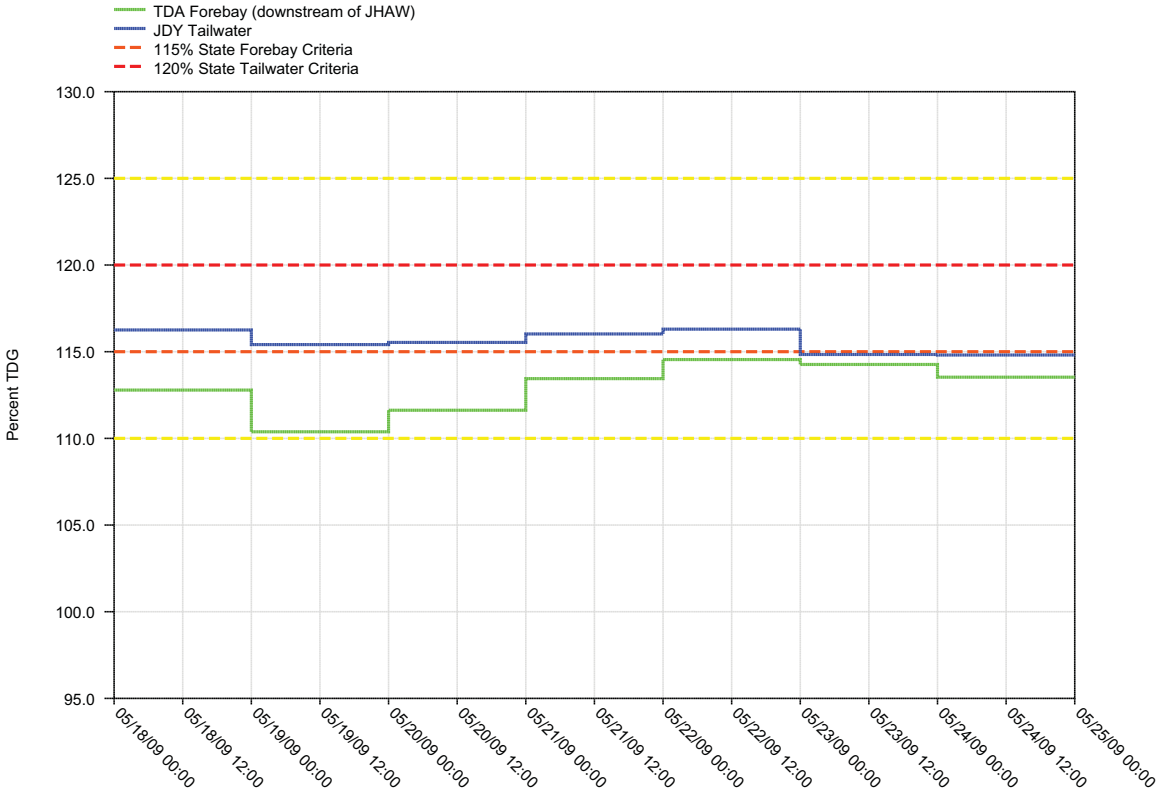


Figure 22.

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



JOHN DAY DAM - Hourly Spill and Flow

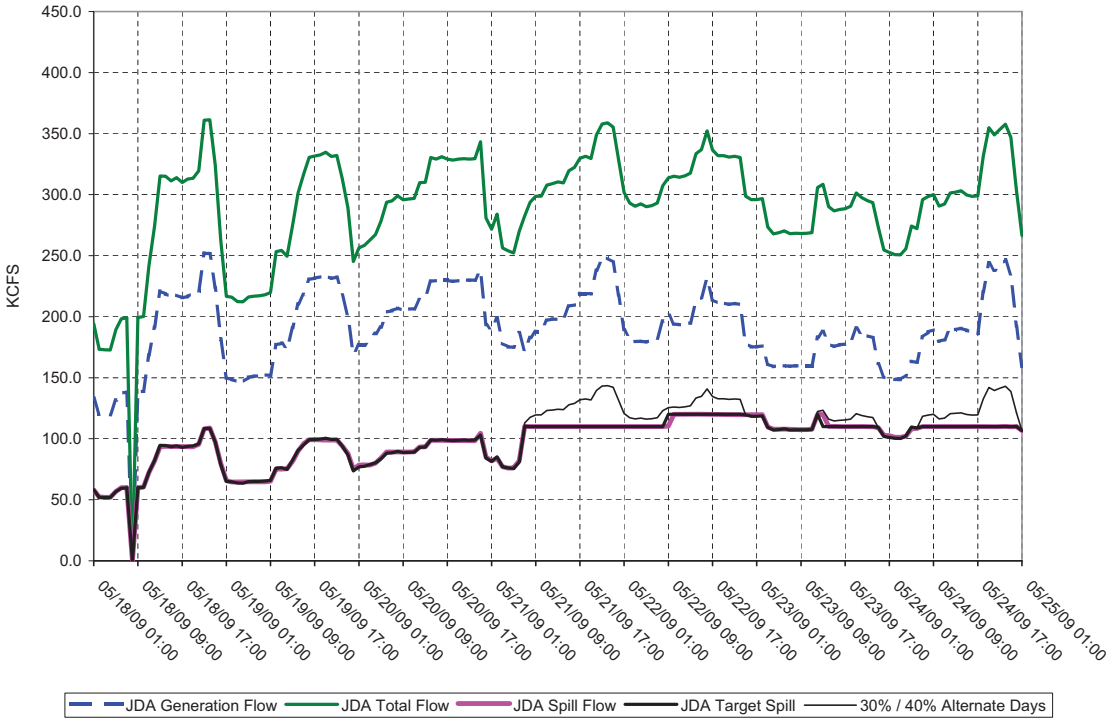
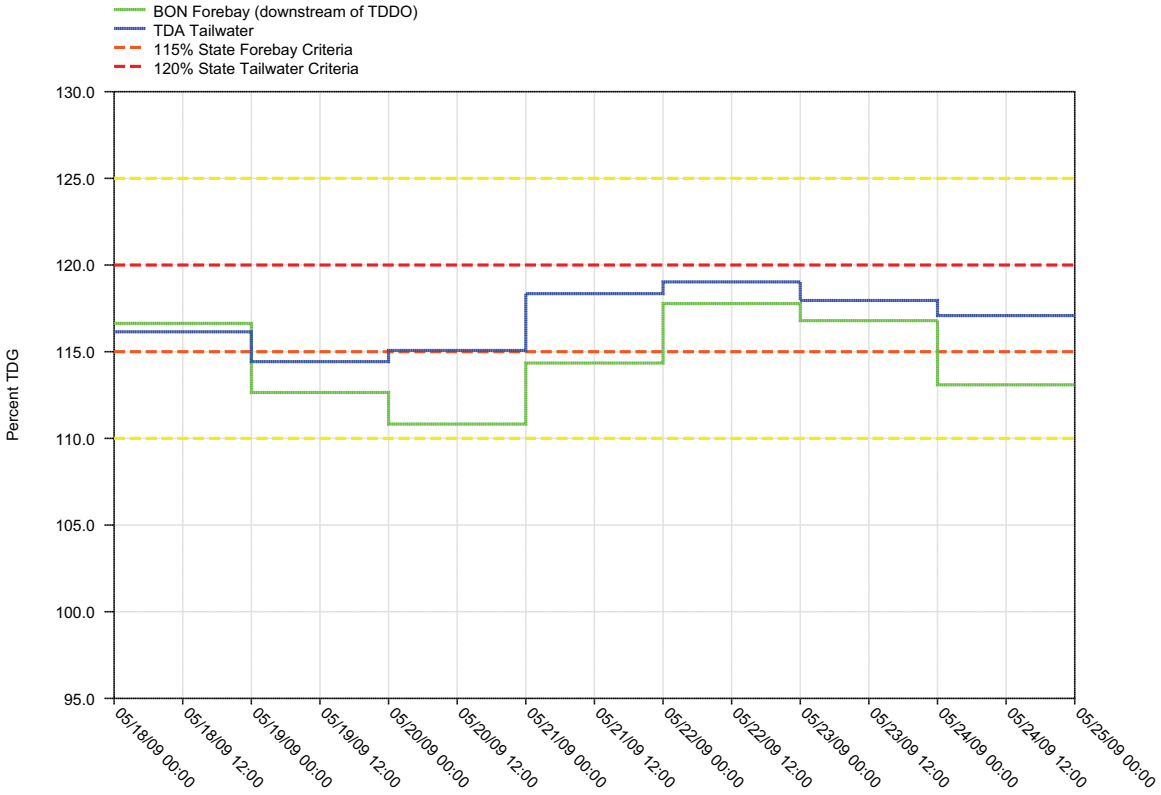


Figure 23.

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



THE DALLES DAM - Hourly Spill and Flow

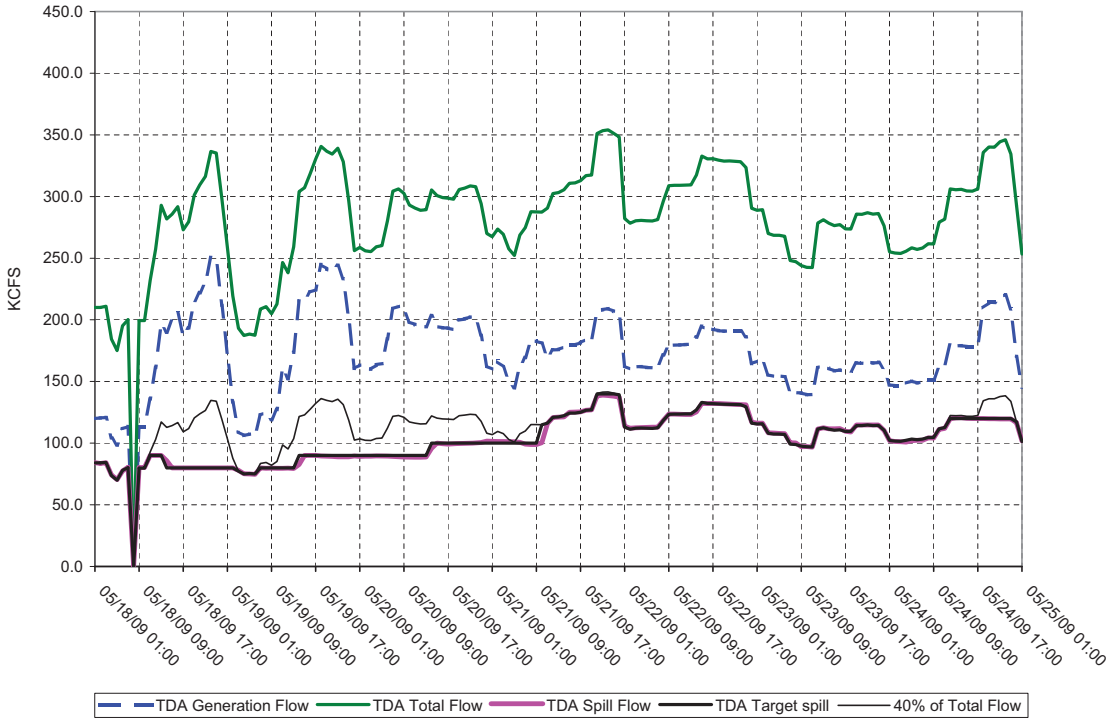
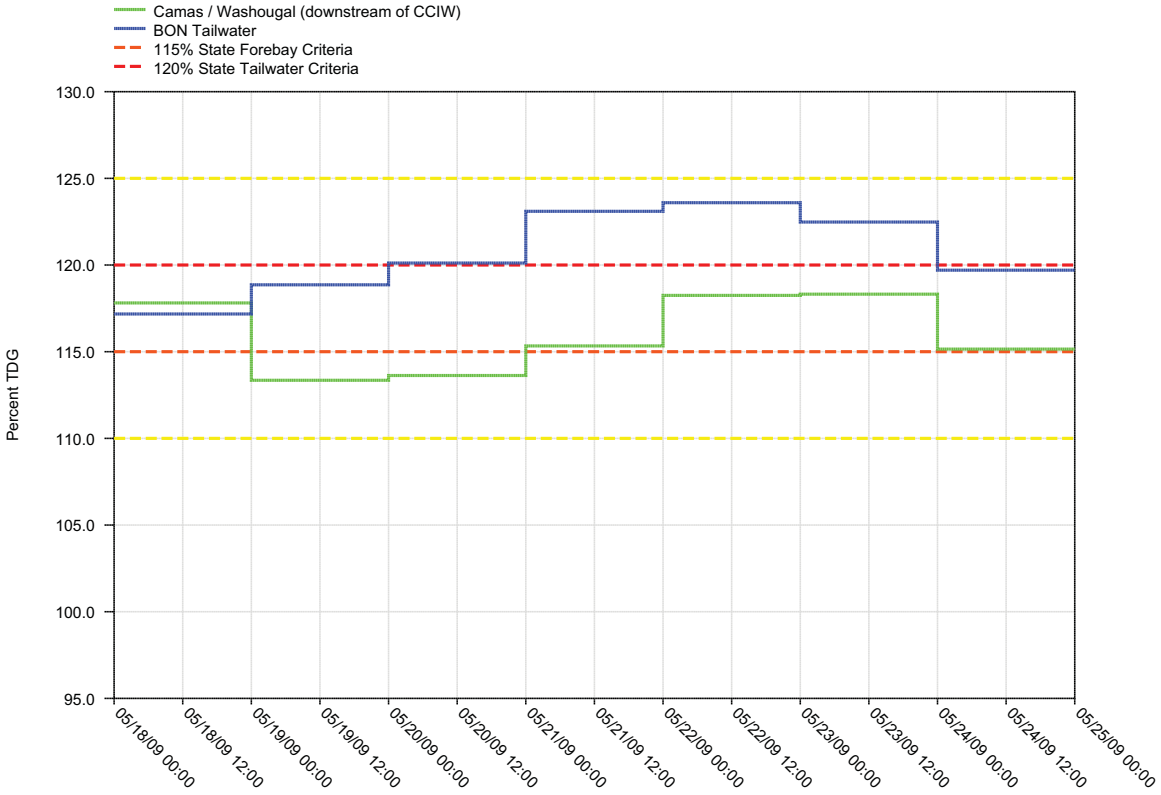


Figure 24.

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



BONNEVILLE DAM - Hourly Spill and Flow

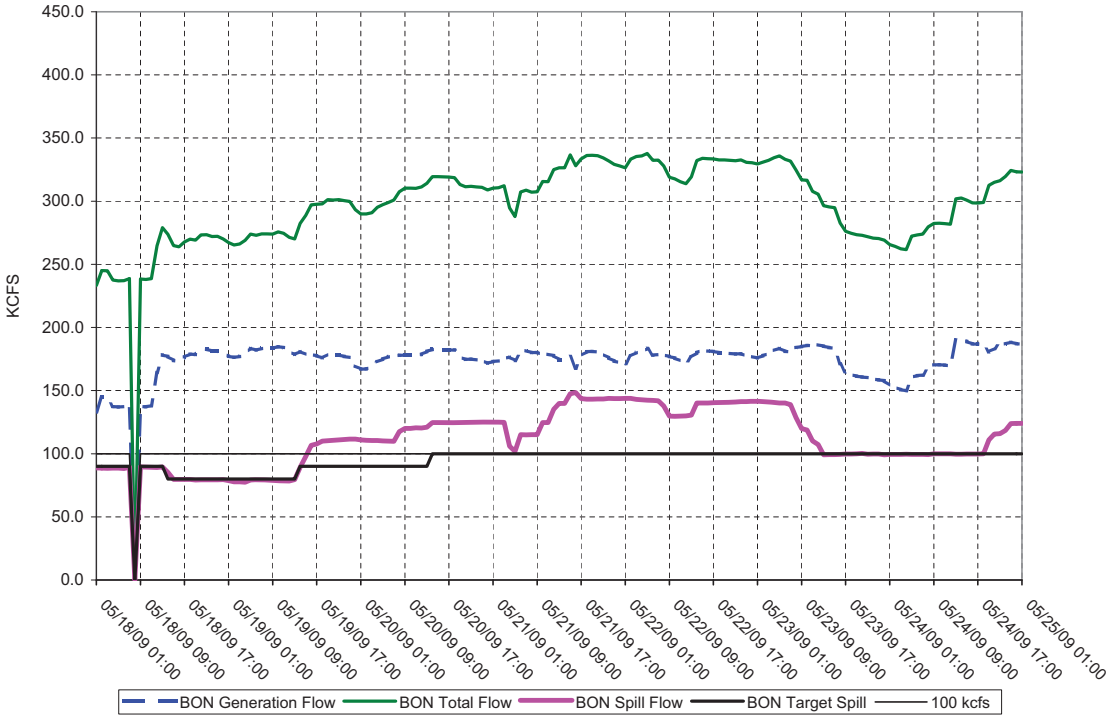
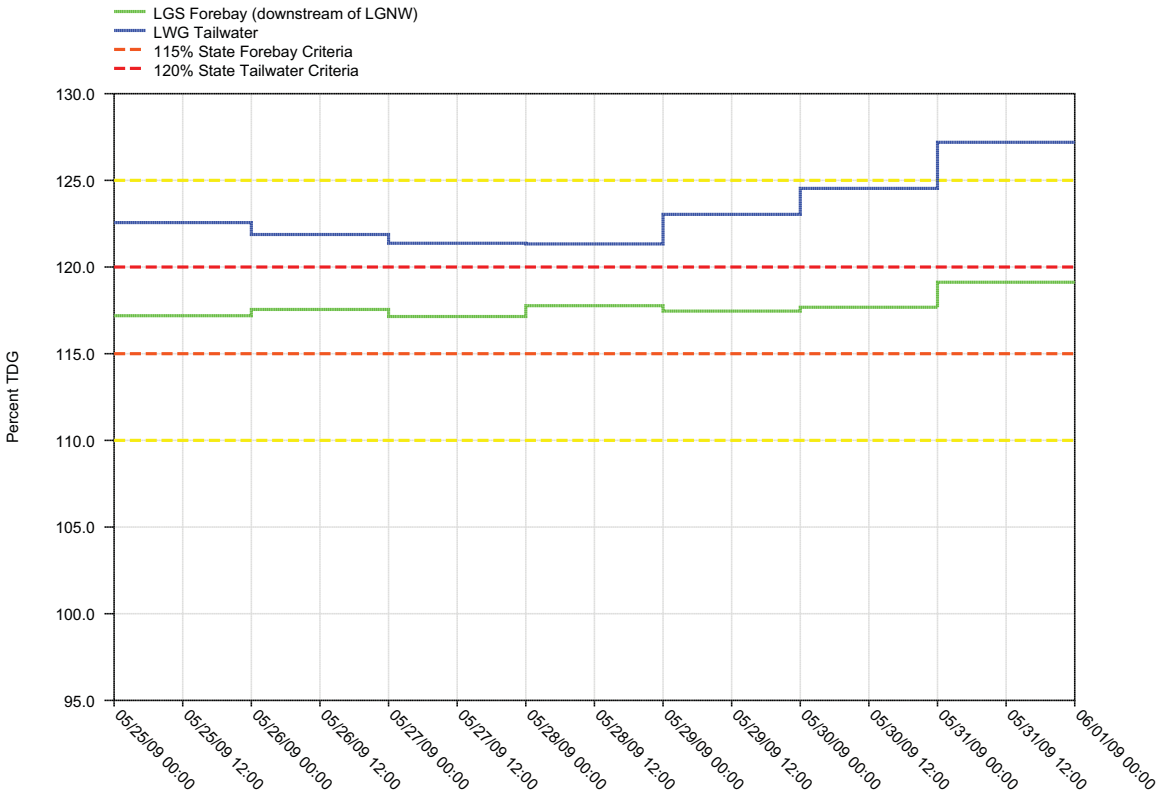


Figure 25.

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



LOWER GRANITE DAM - Hourly Spill and Flow

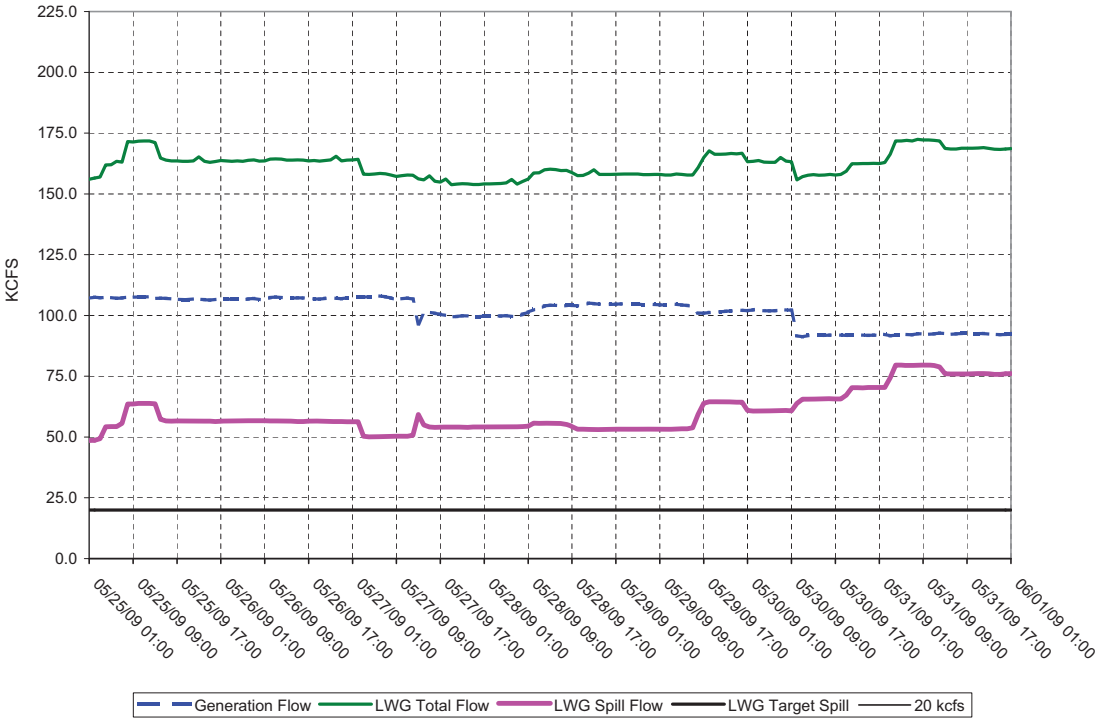
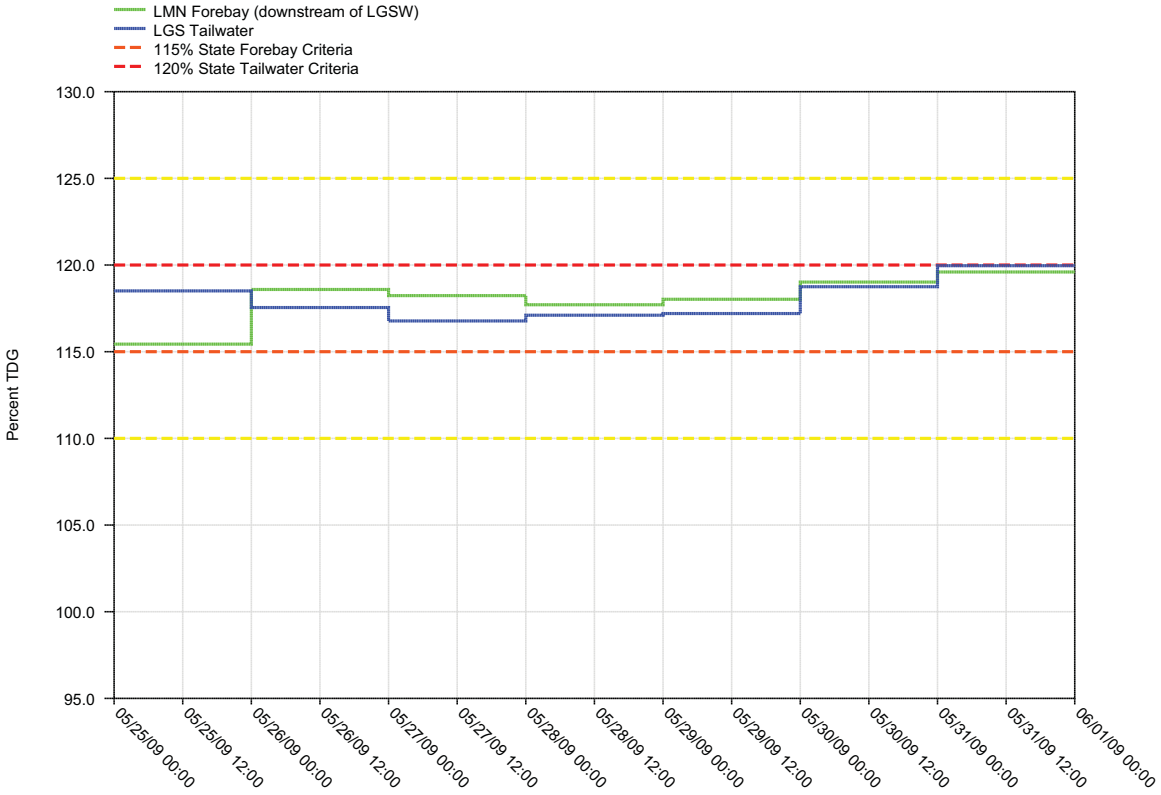


Figure 26.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

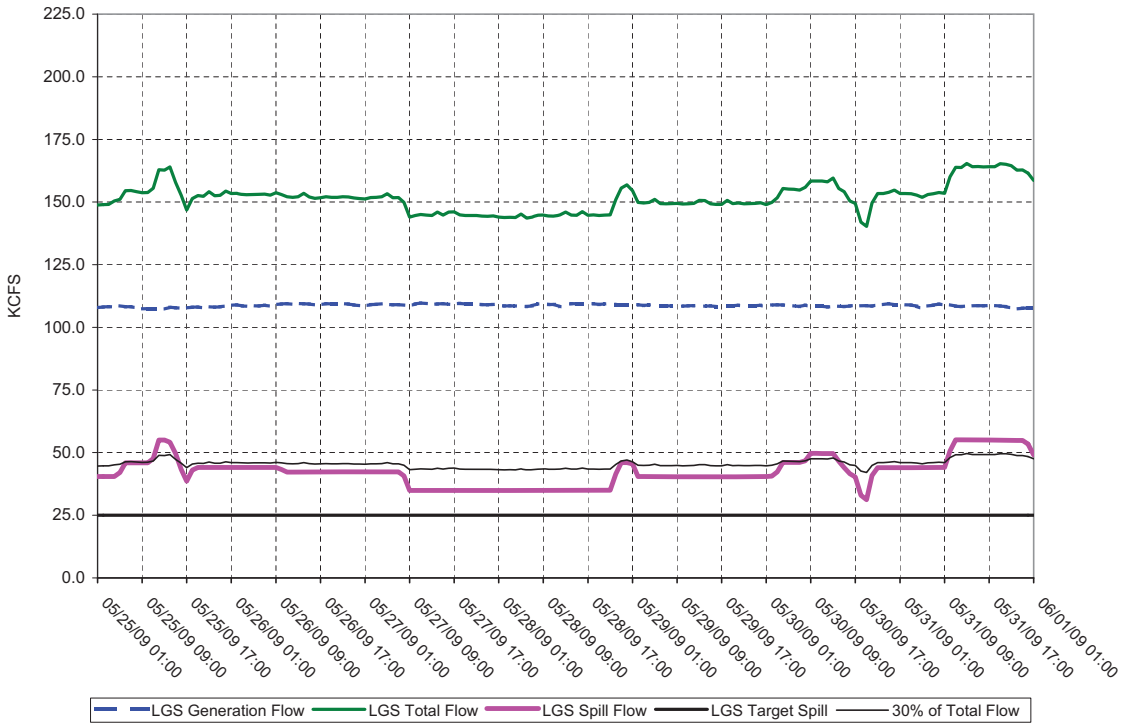
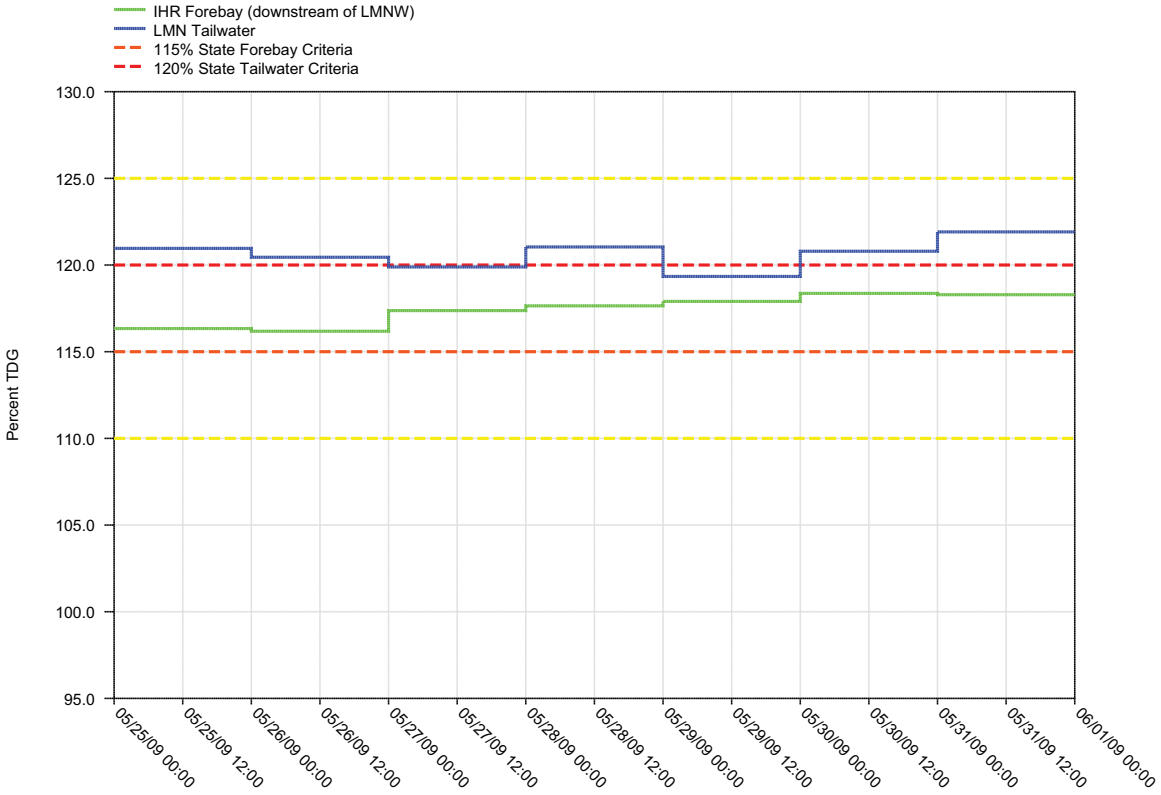


Figure 27.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

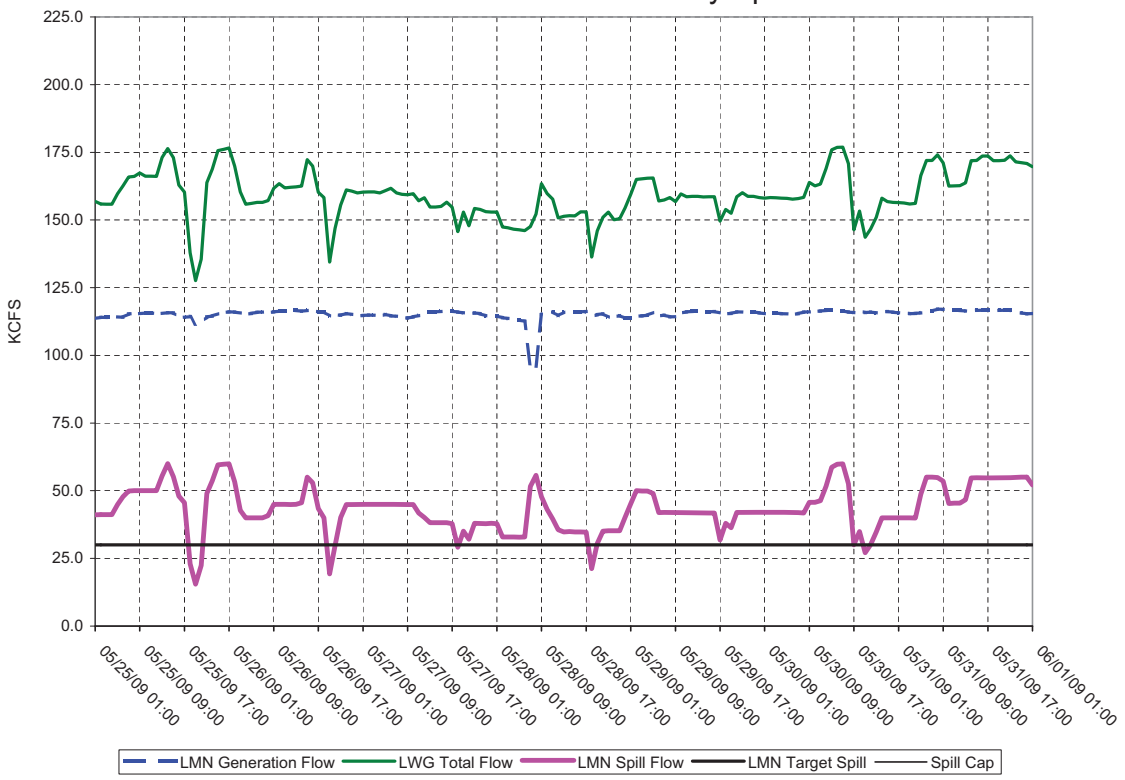
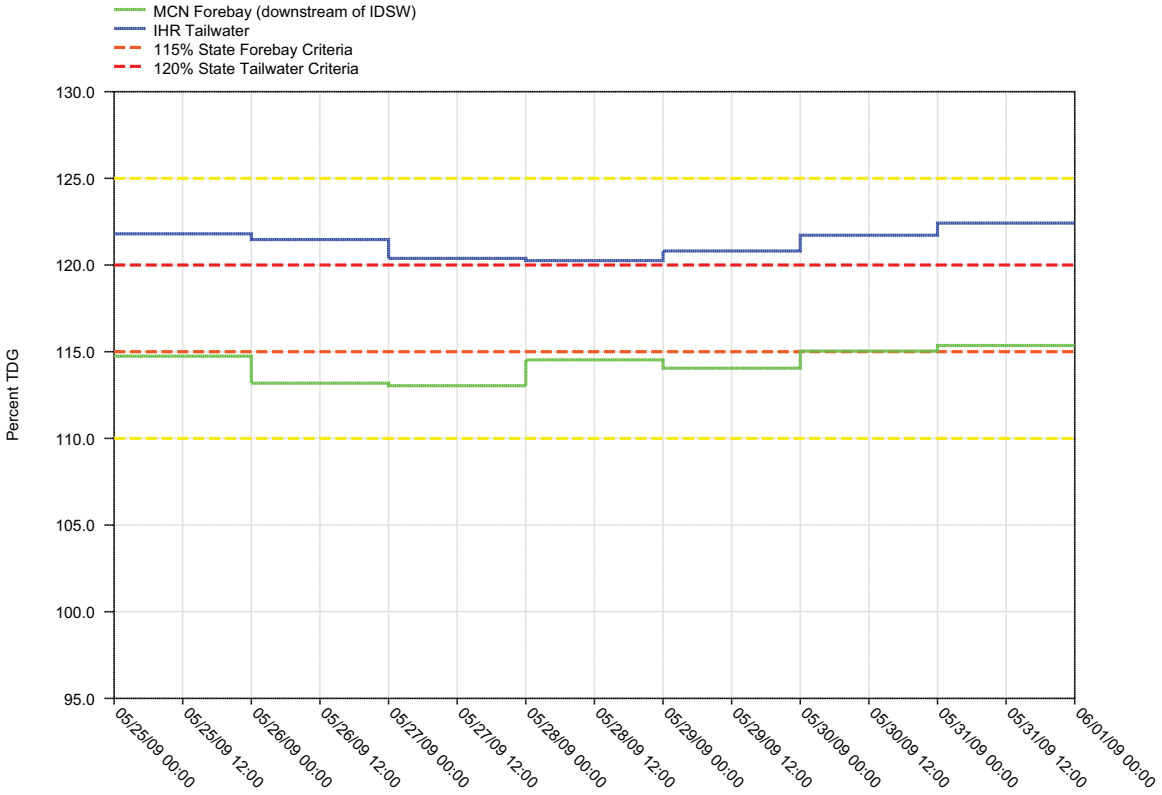


Figure 28.

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



ICE HARBOR DAM - Hourly Spill and Flow

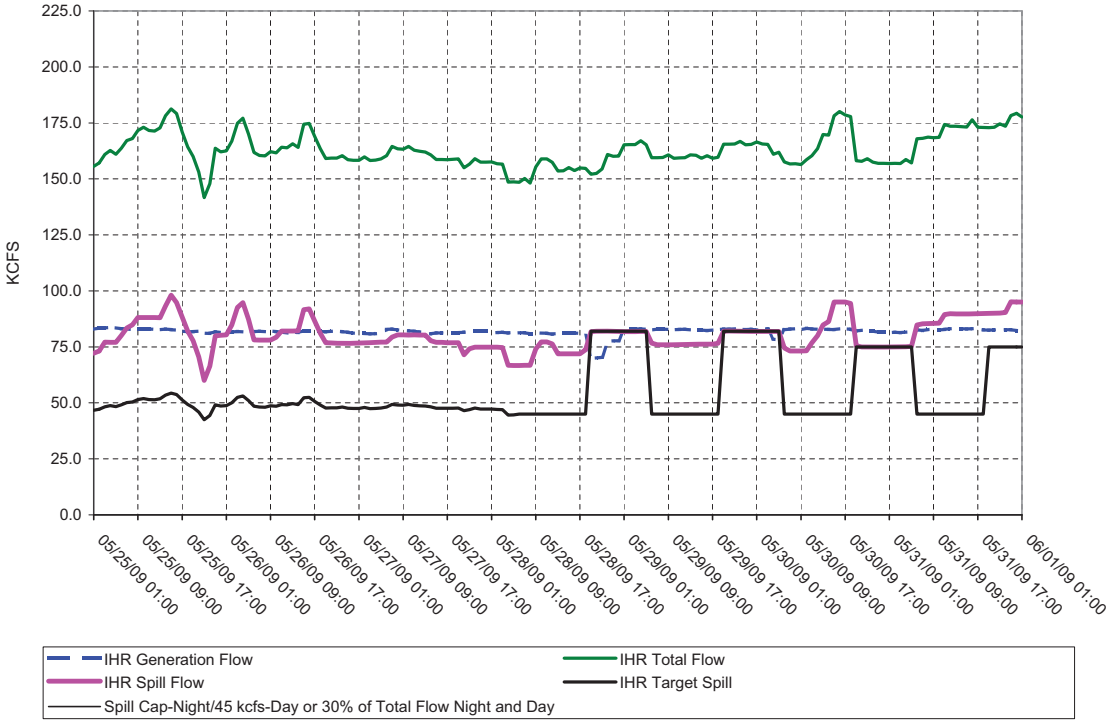
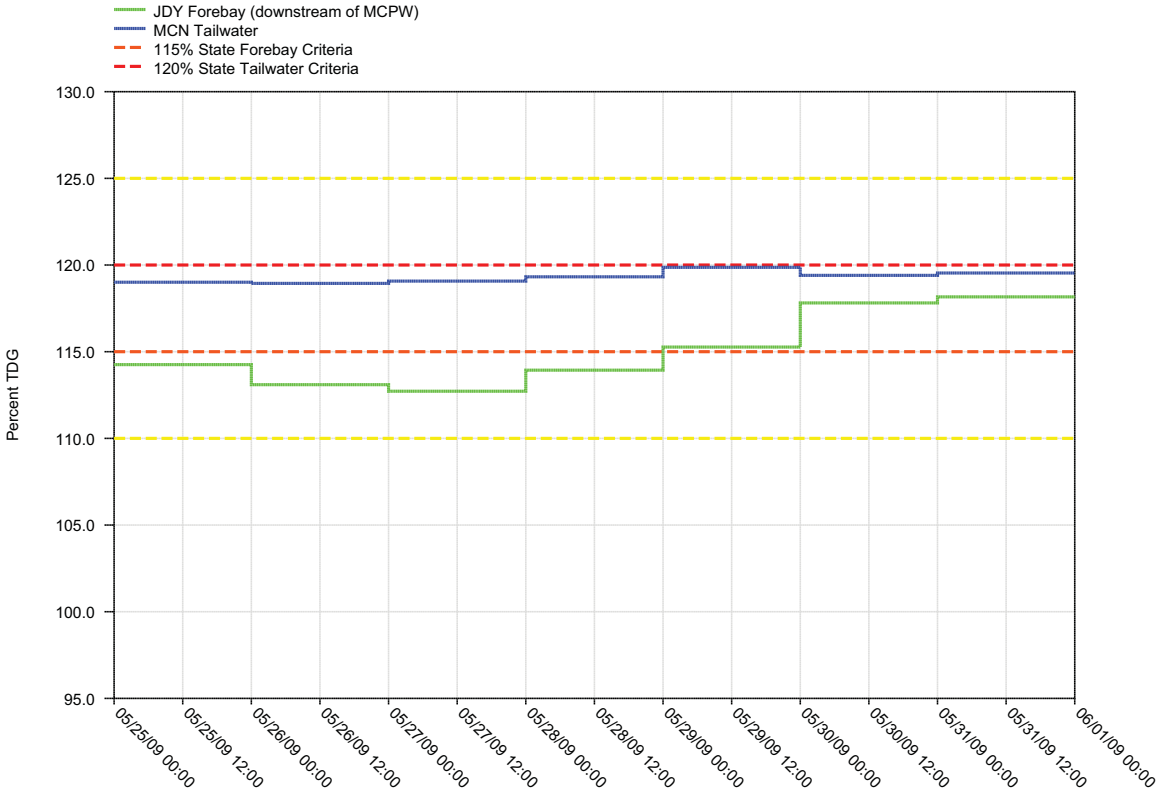


Figure 29.

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



McNARY DAM - Hourly Spill and Flow

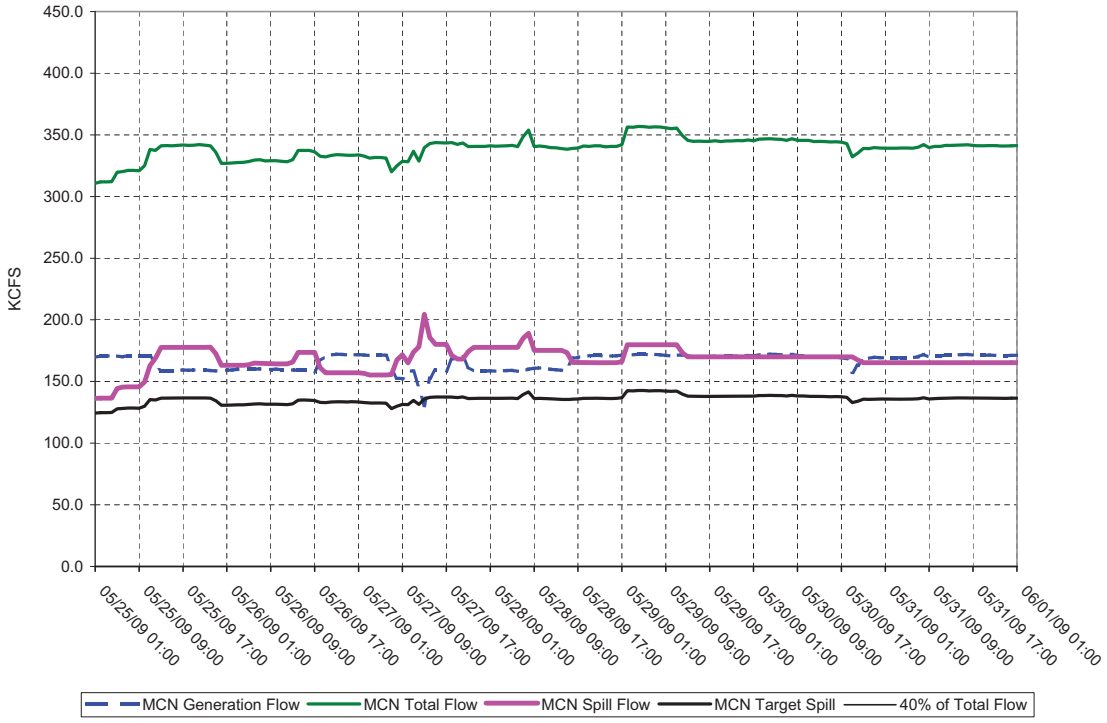
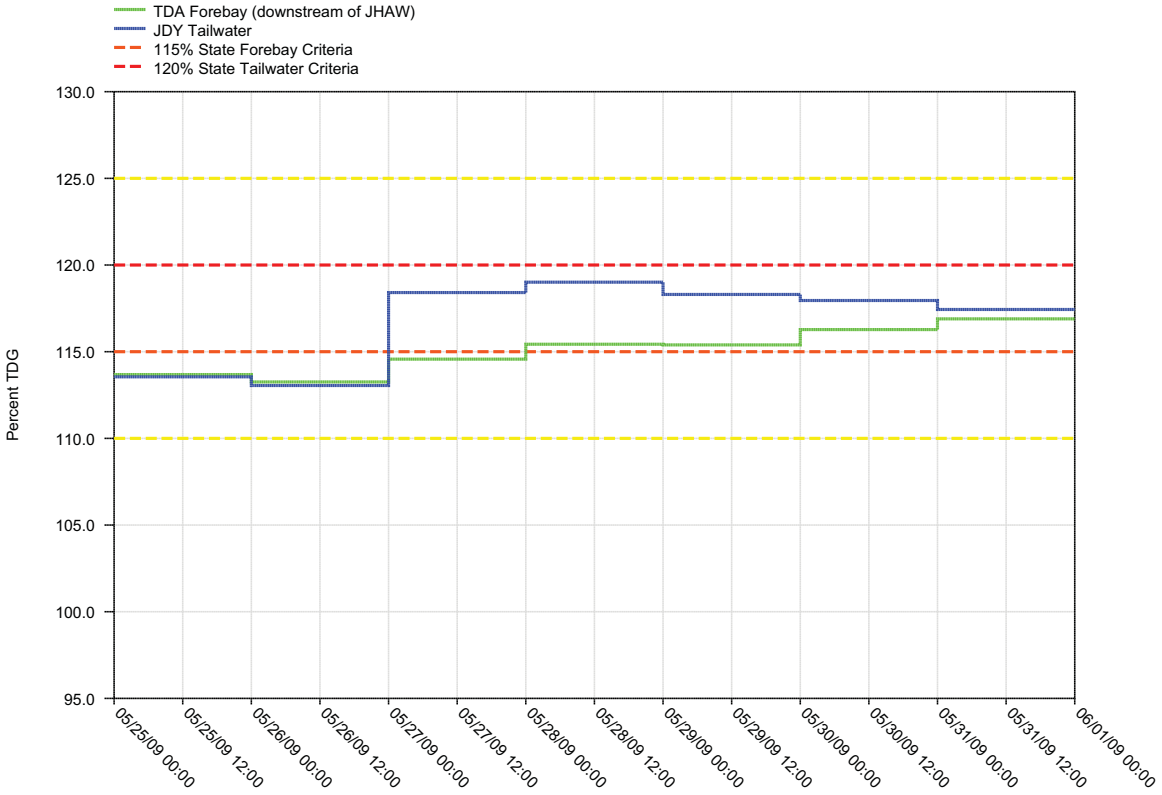


Figure 30.

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



JOHN DAY DAM - Hourly Spill and Flow

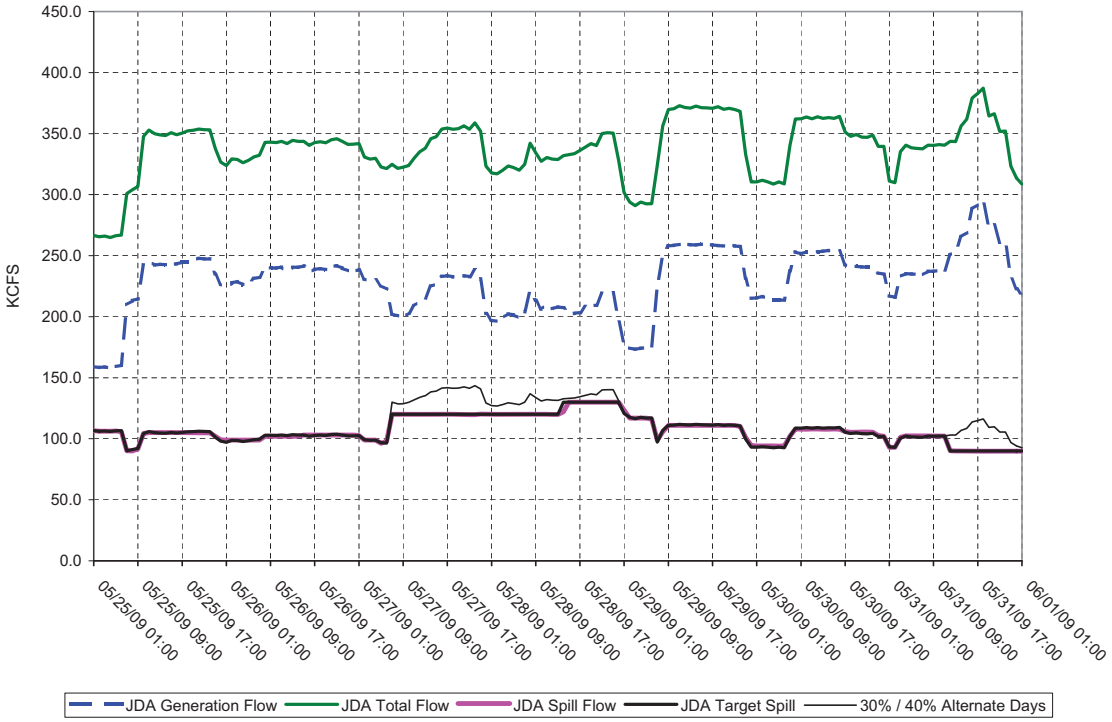
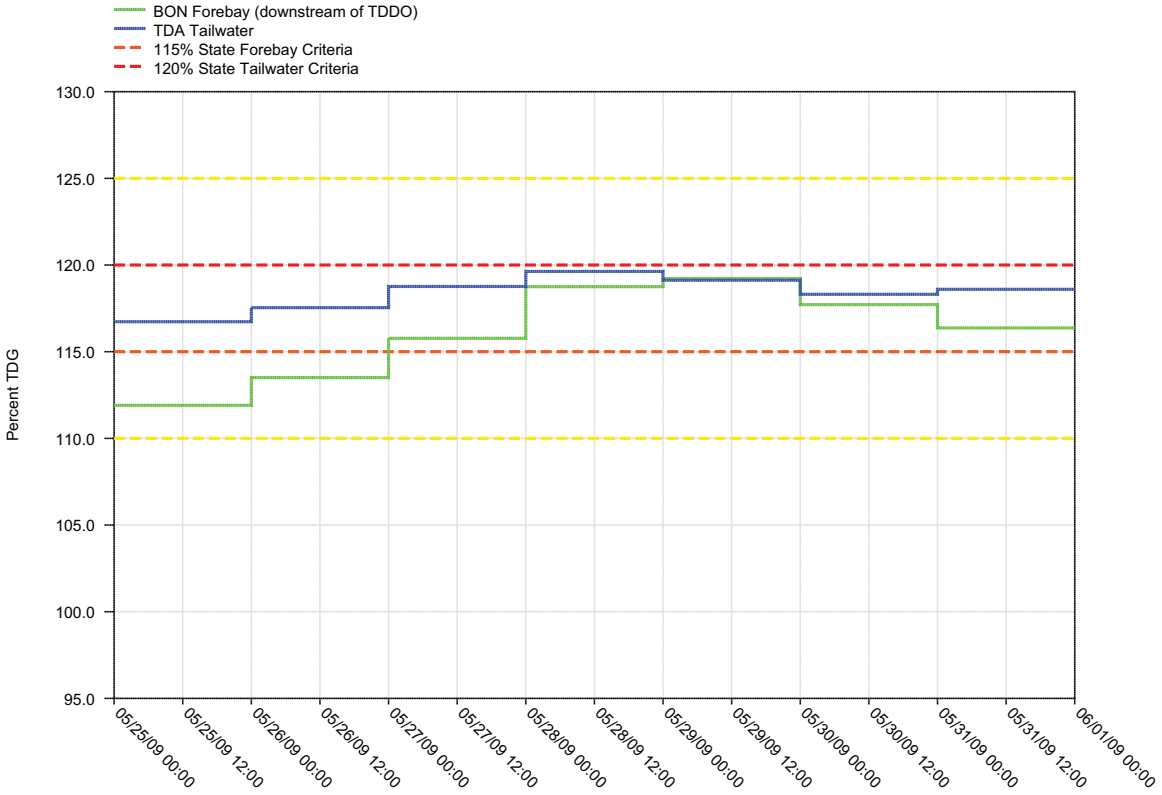


Figure 31.

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



THE DALLES DAM - Hourly Spill and Flow

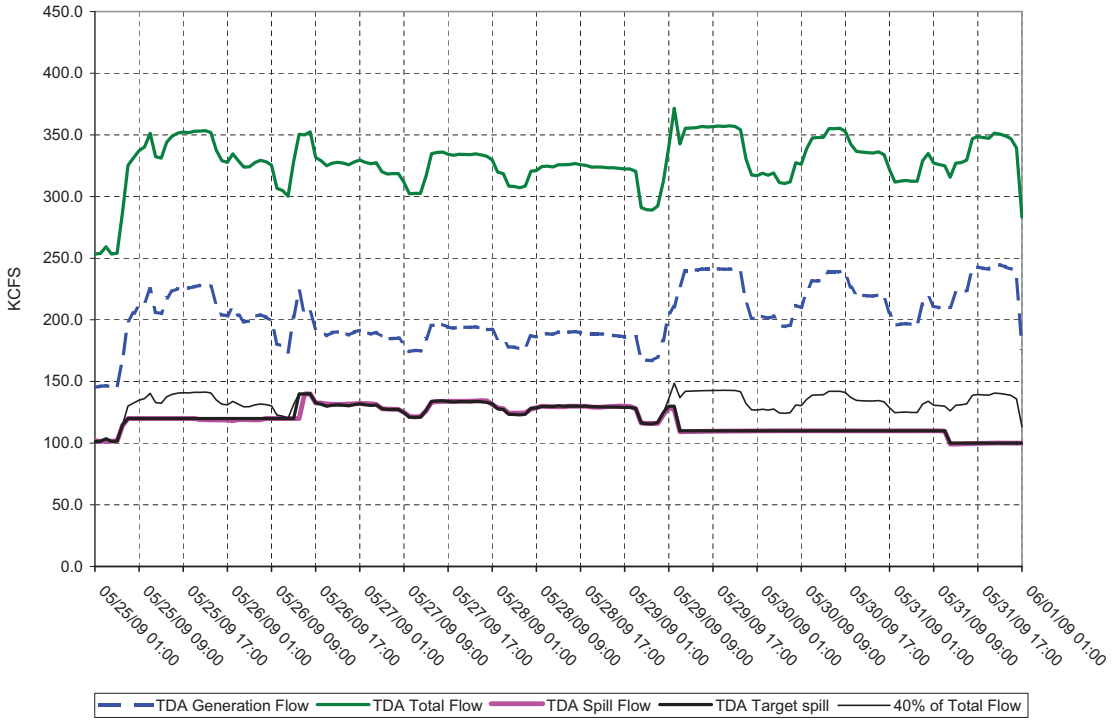
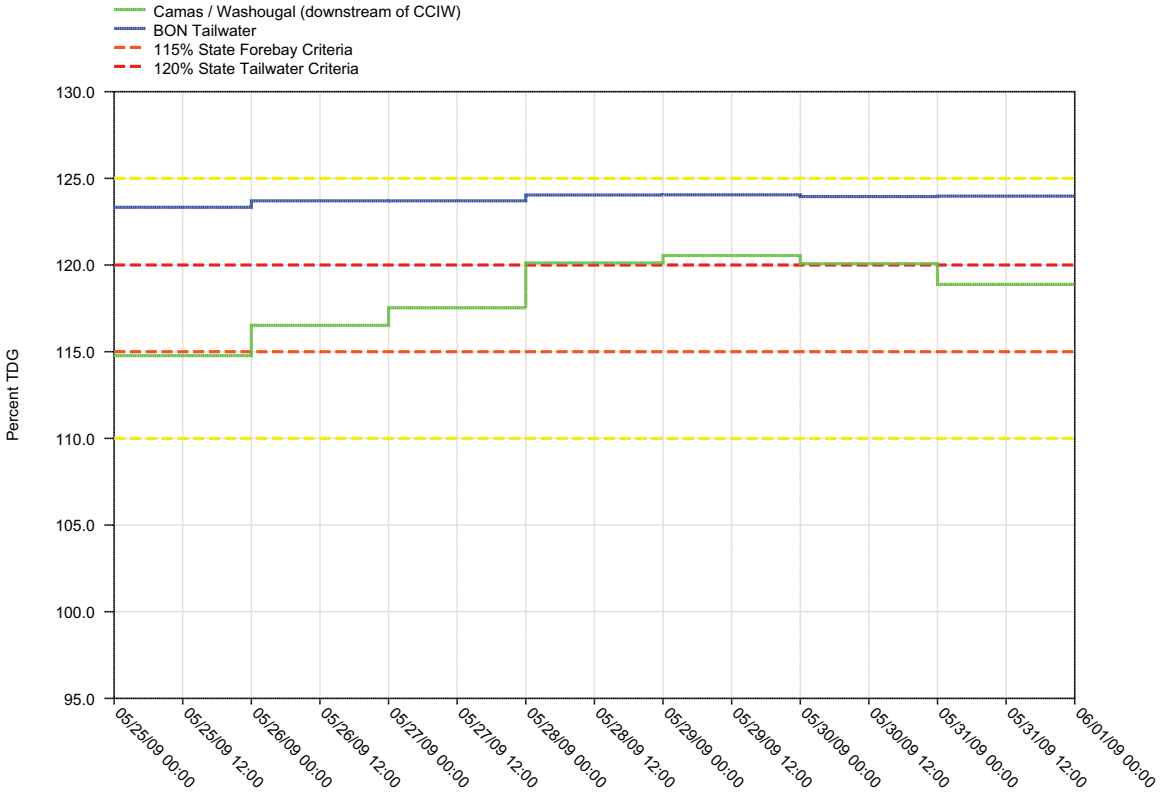
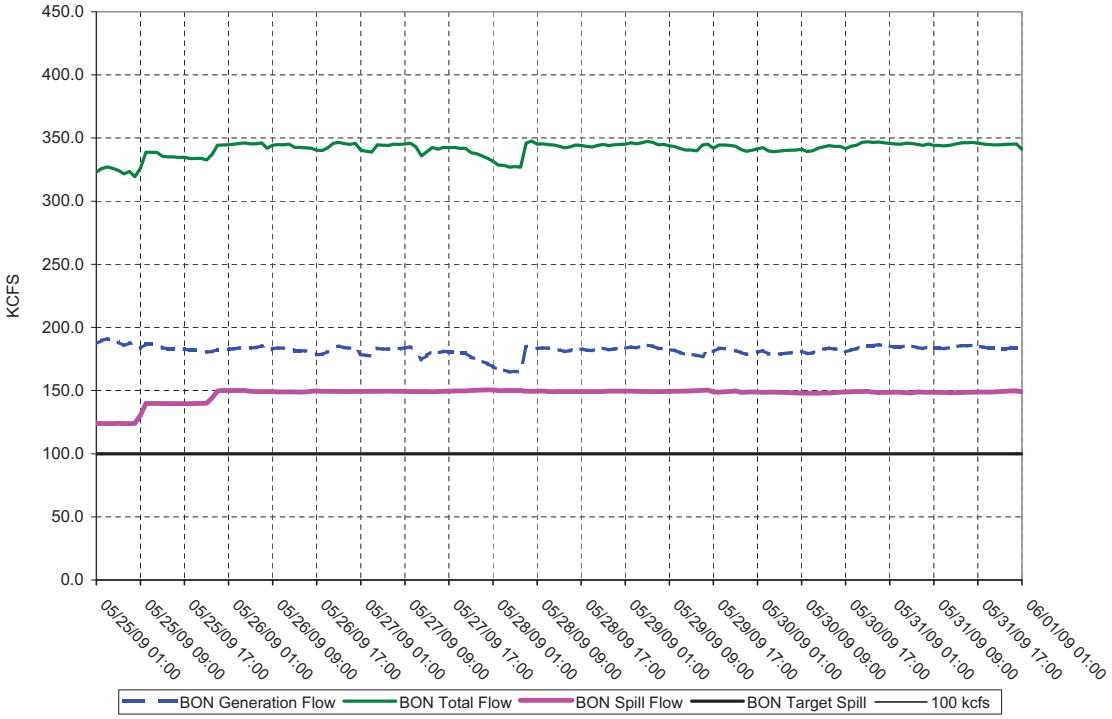


Figure 32.

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



BONNEVILLE DAM - Hourly Spill and Flow

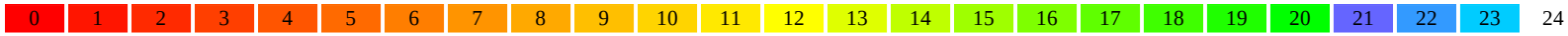


Average percent TDG for 12 highest hours: May 04 – May 31, 2009

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
05/04/2009	103.1	110.7	109.3	113.5	113.2	117.4	**115.7**	116.8	113.4	115.1	112.2	115.4	114.2	116.7	**115.1**	117.4	114.9
05/05/2009	102.3	109.0	109.4	113.2	113.5	115.9	**115.6**	115.8	112.2	114.8	112.2	114.6	113.8	116.0	113.3	117.8	112.8
05/06/2009	102.0	109.3	108.5	113.8	111.6	118.1	113.0	118.3	111.1	115.9	111.4	115.8	111.8	116.2	113.0	119.1	113.5
05/07/2009	100.7	108.6	105.6	112.8	110.8	117.9	111.4	120.0	109.0	115.3	109.4	116.7	110.9	115.5	112.1	119.4	112.9
05/08/2009	101.1	108.7	104.4	112.6	110.1	116.5	111.0	118.5	108.1	115.1	108.1	116.8	112.2	116.6	113.1	119.5	**115.1**
05/09/2009	102.2	109.2	104.9	112.4	112.0	115.6	113.2	115.9	111.8	115.4	109.1	115.6	113.3	117.4	**115.3**	118.7	**116.2**
05/10/2009	104.2	109.7	106.3	112.9	113.3	115.9	114.9	116.4	114.1	115.6	110.2	115.2	112.4	116.3	**116.8**	117.9	**117.1**
05/11/2009	104.6	109.7	107.9	112.8	113.6	115.5	**115.2**	115.2	113.2	115.8	109.7	116.8	111.7	115.5	**116.0**	117.5	**116.0**
05/12/2009	104.4	109.6	107.3	112.5	112.7	118.2	113.9	115.5	111.8	116.1	108.3	117.3	110.6	115.1	111.7	118.0	112.3
05/13/2009	103.2	109.1	107.0	112.8	109.9	117.8	111.0	116.1	108.0	115.8	108.9	116.0	112.4	116.8	112.4	118.8	112.4
05/14/2009	102.9	109.1	107.2	112.5	110.2	116.4	111.8	115.7	108.1	115.8	108.9	115.1	111.8	116.5	113.7	118.5	113.1
05/15/2009	102.8	109.2	106.5	112.8	110.2	115.0	111.1	115.5	108.8	115.9	106.6	117.3	110.6	116.1	113.7	118.6	**116.0**
05/16/2009	102.8	109.4	106.9	113.2	112.2	119.1	113.0	116.7	111.2	115.9	107.2	116.8	113.4	117.5	**115.1**	118.5	**116.3**
05/17/2009	104.4	109.7	108.0	113.4	114.1	119.0	114.5	118.0	112.6	116.8	109.2	115.2	113.9	117.2	**117.6**	118.6	**117.6**
05/18/2009	105.6	110.4	110.5	115.0	**115.4**	**120.3**	**117.3**	118.9	114.7	117.4	110.9	116.3	112.8	116.1	**116.6**	117.2	**117.8**
05/19/2009	105.3	116.4	109.1	114.6	114.4	118.4	**115.8**	**120.4**	114.3	116.9	110.3	115.4	110.4	114.4	112.6	118.9	113.4
05/20/2009	102.8	**123.4**	106.2	116.1	111.6	119.6	112.2	**120.9**	110.4	117.5	109.6	115.5	111.6	115.1	110.8	**120.1**	113.6
05/21/2009	106.2	**121.2**	112.8	117.4	112.9	**120.2**	113.7	**121.4**	113.1	119.0	110.7	116.0	113.4	118.3	114.3	**123.1**	**115.3**
05/22/2009	107.9	117.2	**117.1**	115.5	**116.9**	**120.3**	**115.4**	120.0	114.9	118.4	110.4	116.3	114.5	119.0	**117.8**	**123.6**	**118.2**
05/23/2009	107.7	119.7	**115.8**	114.8	**117.3**	**120.2**	**117.1**	**120.2**	**115.4**	118.2	111.7	114.8	114.3	118.0	**116.8**	**122.5**	**118.3**
05/24/2009	106.9	**123.0**	114.7	115.4	**116.3**	119.2	**117.3**	119.8	**115.4**	118.0	113.6	114.8	113.5	117.1	113.1	119.7	**115.1**
05/25/2009	106.1	**122.6**	**117.2**	118.5	**115.4**	**121.0**	**116.3**	**121.8**	114.7	119.0	114.3	113.5	113.7	116.7	111.9	**123.3**	114.8
05/26/2009	107.2	**121.9**	**117.6**	117.5	**118.6**	**120.4**	**116.2**	**121.5**	113.2	118.9	113.1	113.0	113.3	117.5	113.5	**123.7**	**116.5**
05/27/2009	107.2	**121.4**	**117.1**	116.8	**118.2**	119.9	**117.4**	**120.4**	113.0	119.1	112.7	118.4	114.6	118.8	**115.8**	**123.7**	**117.5**
05/28/2009	107.3	**121.3**	**117.8**	117.1	**117.7**	**121.0**	**117.6**	**120.3**	114.5	119.3	113.9	119.0	**115.4**	119.6	**118.8**	**124.0**	**120.1**
05/29/2009	107.2	**123.0**	**117.5**	117.2	**118.0**	119.3	**117.9**	**120.8**	114.0	119.9	**115.3**	118.3	**115.4**	119.1	**119.2**	**124.0**	**120.5**
05/30/2009	107.3	**124.5**	**117.7**	118.7	**119.0**	**120.8**	**118.4**	**121.7**	115.0	119.4	**117.8**	118.0	**116.3**	118.3	**117.8**	**124.0**	**120.1**
05/31/2009	107.6	**127.2**	**119.1**	120.0	**119.6**	**121.9**	**118.3**	**122.4**	**115.4**	119.5	**118.2**	117.4	**116.9**	118.6	**116.4**	**124.0**	**118.9**

Generated: Wed Jun 10 12:58:09 2009

Number of hours of data reported in a given day



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 2009

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 U.S. District Court of Oregon April 10, 2009 Joint Order adopting the 2009 Spring Fish Operations Plan (2009 Spring FOP) and the June 10, 2009 Order adopting the Summer Fish Operations Plan (2009 Summer FOP). The 2009 Spring FOP and Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring and summer fish migration seasons, generally April through August[1]. To the extent Corps project operations are not specified in the 2009 Spring FOP or the 2009 Summer FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2009 Water Management Plan (WMP), WMP seasonal updates, and the 2009 Fish Passage Plan (FPP).

The Corps' June 2009 lower Snake and Columbia River project and fish passage operations 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) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2009 Spring or Summer FOP in June.

Data Reporting:

[1] The 2009 Summer FOP identified various projects in which spill operations transitioned from a spring operation to a summer operation during the month of June. Other projects are scheduled to transition to summer operations beginning on or about July 1.

I. For each project providing fish passage operations, this report contains two graphs per operational week[2] for 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 1 and end on June 28 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 at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on June 1 for the lower Snake and the lower Columbia projects.

June 1 – June 7	Figures 1 – 8
June 8 – June 14	Figures 9 – 16
June 15 – June 21	Figures 17 – 24
June 22 – June 28	Figures 25 – 32

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours. This is primarily a result of spill at dams. The objective is to operate each project up to the TDG limits without exceeding those limits to the extent 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% TDG is the upper operating limit.

B. Lower Graph: Shows the hourly 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 medium green line represents the average hourly total river flow through the project in 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 2009 Spring FOP or the 2009 Summer 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:

[2] Operations are implemented from Monday through Sundays.

- 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:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described above. When spill levels briefly deviate below or above the level specified in the applicable 2009 Spring or Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The June 2009 Spring and Summer FOP Spill Report Table (June 2009 Spring/Summer Spill Report Table) includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the June 2009 Spring/Summer 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 applicable 2009 FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. 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, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage

reduction because the calculations do not include this volume of water. However, the actual spill volume remains constant. When these variances occur, they are recorded in the monthly Spill Report Table for Little Goose under the variance Type "Navigation." There were no events of this type for the month of June.

Also it is important to note that actual spill levels at Corps projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the applicable 2009 Spring FOP or Summer FOP and the RCC spill priority list, which defines the projects' TDG 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 2009 Spring FOP and the 2009 Summer FOP describe project operations during "Rapid Load Changes" (pages 5-6). For reporting purposes, the notation "Transmission Stability" in the June 2009 Spring/Summer Spill Report Table will replace "Rapid Load Changes" 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 by more than the +/- 1% requirement than other hours. On days cited in the table, the 24 hour average spill percent was within the applicable 2009 Spring or Summer FOP level of +/- 1% of the target spill unless limited by the TDG spill cap.

Occurrences which required an adjustment in operations and/or regional coordination are described in greater detail in the section below entitled "Operational Adjustments for June."

June Operations

The month of June was characterized by below average flows for the lower Columbia River and above average flows for the lower Snake River. The high inflows for the Snake River were due to the higher atmospheric temperatures in the latter part of May causing snowmelt with high flows in the unregulated (natural) tributaries. High flows in the lower Snake and Columbia rivers that began on May 19, continued through the second week of June, causing instances of involuntary spill as flows exceeded powerhouse capacity and project operators had to spill the remaining amount of outflow. In some of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly percent TDG values exceeded the 115%/120% limits as shown in the corresponding TDG graphs for the lower Columbia and Snake rivers.

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

- Lower Granite Dam - the hourly target spill was a fixed quantity of 20 kcfs 24 hours per day up to June 21, at which time the target spill changed to 18 kcfs 24 hours per day.
- Little Goose Dam - the hourly target spill was 30% of the total flow for 24 hours per day, for both spring and summer spill seasons.
- Lower Monumental Dam – the hourly target spill was to the TDG spill cap for 24 hours per day up to June 21, at which time the target spill changed to 17 kcfs 24 hours per day.
- Ice Harbor Dam – the hourly target spill was 45 kcfs day/TDG spill cap night and, 30% of total flow for 24 hours due to the two treatment spring and summer spill tests.
- McNary Dam – the hourly target spill was 40% of total flow for 24 hours per day up to June 20, at which time the target spill changed to 50% of total flow for 24 hours per day.
- John Day Dam – the target spill was 30% of total flow for 24 hours per day and 40% of total flow for 24 hours due to the two treatment spring and summer spill tests.
- The Dalles Dam - the target spill was 40% of the total flow for 24 hours per day.
- Bonneville Dam - the hourly target spill was 100 kcfs for 24 hours per day up to June 21, at which time the target spill changed to 85 kcfs day/TDG spill cap night.

Operational Adjustments for June:

1. Lower Granite Dam:

On June 14, the project had to increase spill to pass excessive debris through the spillway bay. As a result, the project spilled 22.3 kcfs for one hour, exceeding the 2009 Spring FOP operations of 20 kcfs spill cap.

2. Little Goose Dam:

   On June 10, an unplanned powerhouse outage occurred due to excessive debris that required units to be cleaned and inspected for damage. As a result, the project spilled 38.4 and 34.8 kcfs for two hours, exceeding the 2009 Spring FOP operations of 30 kcfs spill cap.

3. Lower Monumental Dam:

   A two treatment spring test (bulk vs. uniform spill pattern) to evaluate juvenile fish passage and survival began on April 28 and concluded at 0500 hours on June 3, at which time the project began to use only the bulk spill pattern.

4. Ice Harbor:

- A two treatment spring test to evaluate juvenile fish passage and survival began on April 28 and continued through June 7. The same two treatment spill test (45kcfs/gas cap vs. 30% of total flow) continued from June 7 as the summer spill test described in the Summer FOP, and will conclude on July 13.
- On June 23, the project had to shut a generation unit off for annual maintenance. As a result, the project spilled 35.1 – 43.8% for 15 hours, exceeding the 2009 Summer FOP operating range for 30% of total project flow.

5. McNary:

   A single treatment spring test to evaluate juvenile fish passage and survival under a continuous 40% spill level, with spillway weirs located in spill bays 4 and 20, began on April 18 and continued through June 19. A single treatment summer test under a continuous 50% spill level, with spillway weirs located in adjacent spill bays 19 and 20, began on June 20. The summer test will conclude about August 3, while 50% spill operations with spillway weirs in spill bays 19 and 20 will continue through August 31. The spillway weir in spill bay 4 was moved to spill bay 19 for the summer test. Spillway weir locations and spill level for the McNary summer test were coordinated through the Studies Review Work Group and TMT, and had the unanimous support of the state, federal, and tribal fishery managers. The Court was notified of this operation by letter on June 19, as the summer test was a change from the operations described in the 2009 Summer FOP.

6. John Day:

   A two treatment spring test to evaluate juvenile fish passage and survival began on April 27 and concluded on June 4 due to early closure of the spillway weirs. This early closure was a consequence of observed heavy gull predation in the tailrace

below the spillway weirs and on June 5, the Court was notified. The two treatment summer test (30% vs. 40%) began on June 25 and will conclude on July 20. This operation was coordinated with TMT at the June 24 meeting.

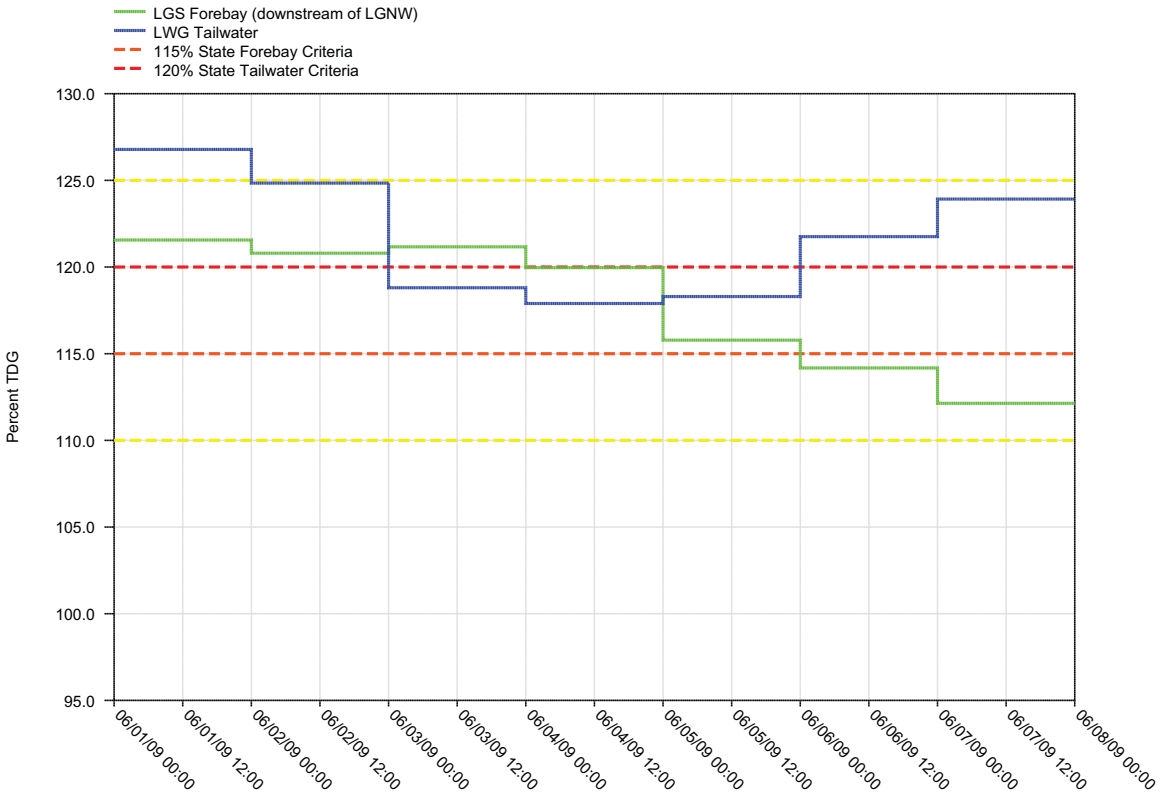
June 2009 Spring/Summer Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	6/14/2009	1200	1	Operational Limitations	Hourly spill increased to 22.3 kcfs (Above 20 kcfs spill cap) due to project spilling to pass debris.
Little Goose	Add'l Spill	6/10/2009	0900 - 1000	2	Maintenance	Hourly spill increased to 38.4 and 34.8 kcfs (Above 30 kcfs spill cap) due to project switching units 1 & 2 off and on during forced outages.
Lower Monumental	Reduced Spill	6/3/2009	1800	1	Navigation	Hourly spill dropped to 16.8 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/5/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 17.3 and 16.2 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/7/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 18.7 and 21.4 kcfs, below the spill cap of 30 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/11/2009	1700 - 1800	2	Navigation	Hourly spill dropped to 15.1 and 16.5 kcfs, below the spill cap of 20 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/13/2009	1800 & 2000	2	Navigation	Hourly spill dropped to 14.4 and 15.3 kcfs, below the spill cap of 20 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/15/2009	1800 & 2000	2	Navigation	Hourly spill dropped to 14.3 and 15.6 kcfs, below the spill cap of 22 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/17/2009	1800	1	Navigation	Hourly spill dropped to 11.0 kcfs, below the spill cap of 22 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/19/2009	1700 - 1900	3	Navigation	Hourly spill dropped to 18.4, 23.8, and 18.8 kcfs, below the spill cap of 26 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/20/2009	0100	1	Human/Program Error	Hourly spill dropped to 23.1 kcfs, below the spill cap of 26 kcfs. Operator implemented summer operations a day earlier than scheduled by mistake.
Lower Monumental	Reduced Spill	6/21/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 12.4 and 14.8 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/23/2009	1700 - 1800	2	Navigation	Hourly spill dropped to 11.3 and 14.6 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/25/2009	1800	1	Navigation	Hourly spill dropped to 15.4 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	6/27/2009	1800 - 1900	2	Navigation	Hourly spill dropped to 14.2 and 14.7 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Ice Harbor	Add'l Spill	6/16/2009	0600	1	Human/Program Error	Continued to spill 88.9 kcfs as part of the spill to cap operation instead of swtiching to the 45 kcfs spill operation, due to operator delay in changing spill operation.
Ice Harbor	Add'l Spill	6/23/2009	0800 - 2200	15	Maintenance	Hourly % spill increased to 35.1-43.8% (38.6 to 54.9 kcfs) (above the 30% +/-1%) due to project switching units off for annual maintenacne. 24 hr avg. spill was 35.8%.
John Day	Spill	6/26/2009	0700 - 0800	2	Human/Program Error	Hourly % spill was between 37.5% and 41.3 (outside of 40% +/- 1% range) due to BPA requested an increase in generation but not spill. At 6:48 am, BPA realized the project was spilling too little so BPA requested project to spill 90 kcfs which resulted in too high % spill. 24 hr avg. spill was 39.4%.
The Dalles	Reduced Spill	6/15/2009	1000	1	Human/Program Error	Hourly % spill decreased to 37.8% (below 40% +/- 1% range). BPA real time scheduler requested to spill 80 kcfs, then one hour later, BPA realized the project was spilling too little because of an error in their calculations. 24 hr avg. spill was 40.0%.

* Due to safety concerns at Lower Monumental Dam, towboat captains may request reduction or elimination of spill to ensure safe conditions when transiting the juvenile fish barge across the tailrace, docking, and disembarking from the fish collection facility. During juvenile fish loading operations, spill is typically reduced to 15 kcfs, but can be reduced further if needed for safety reasons. (See Spring/Summer 2009 FOP, p. 10).

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

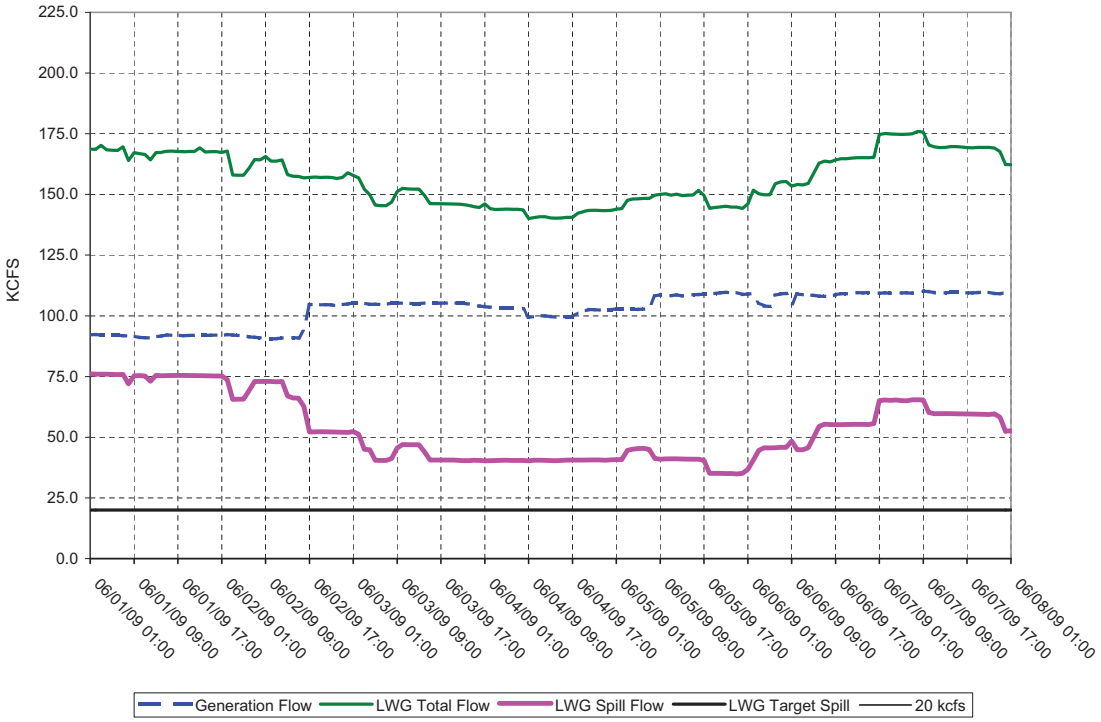
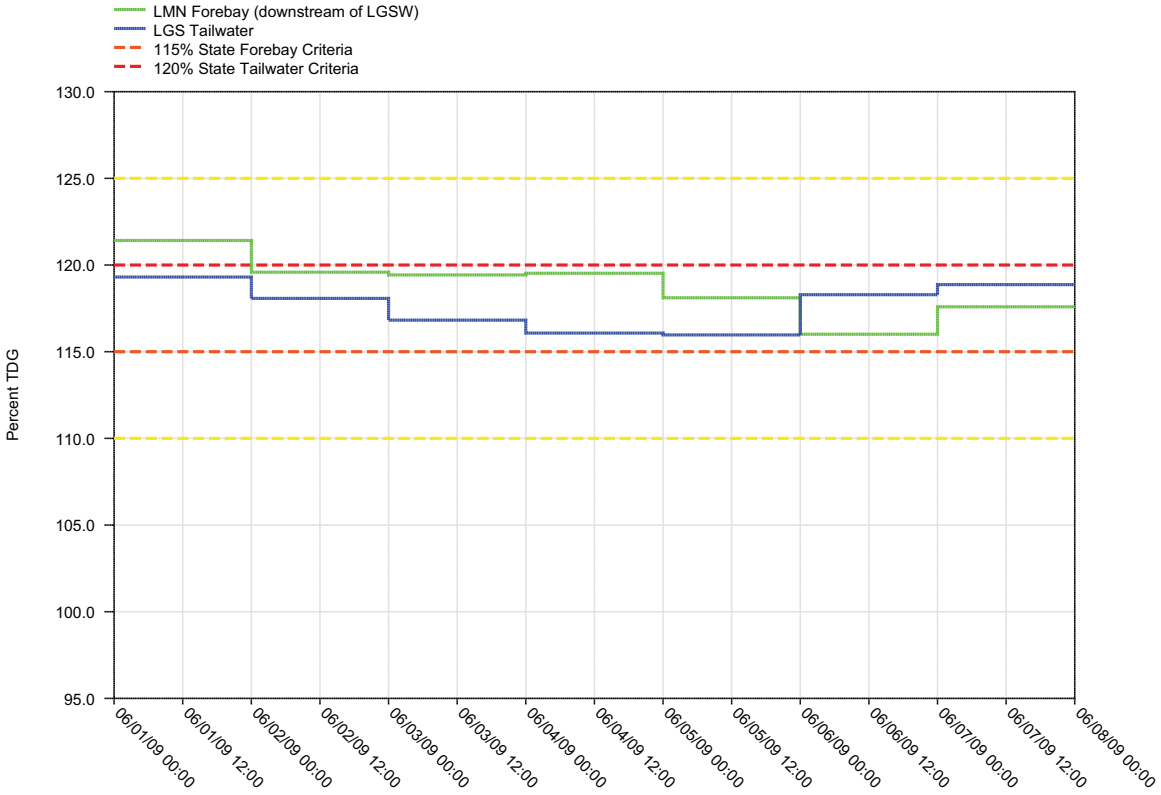


Figure 2.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

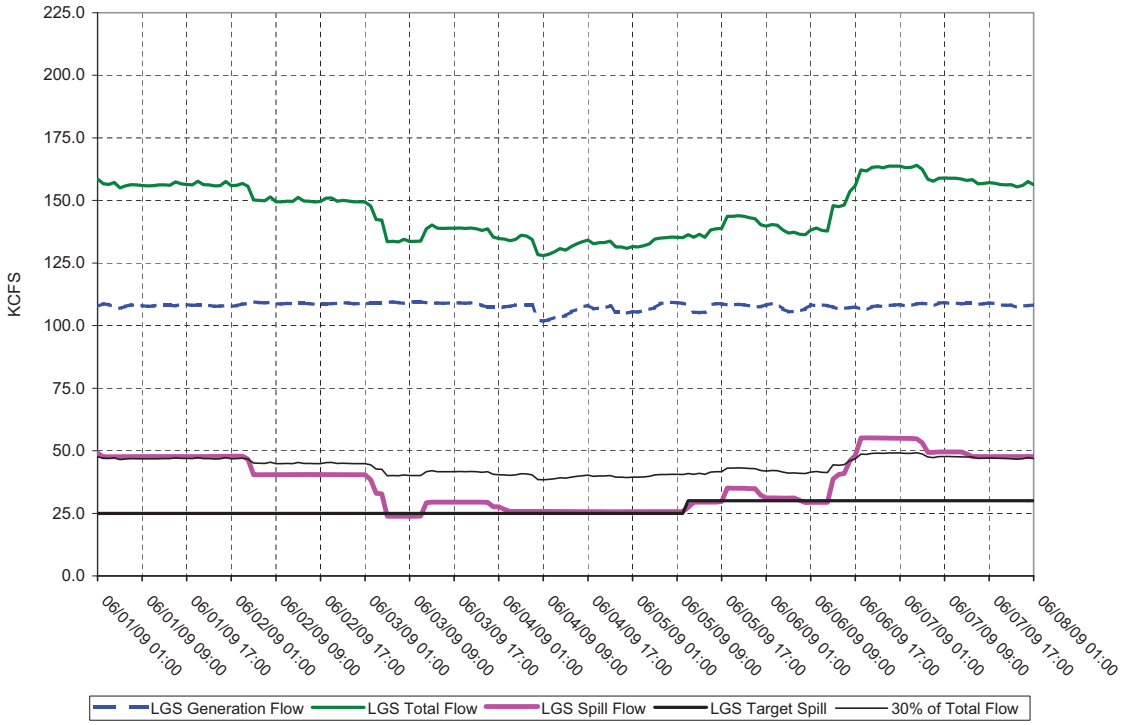
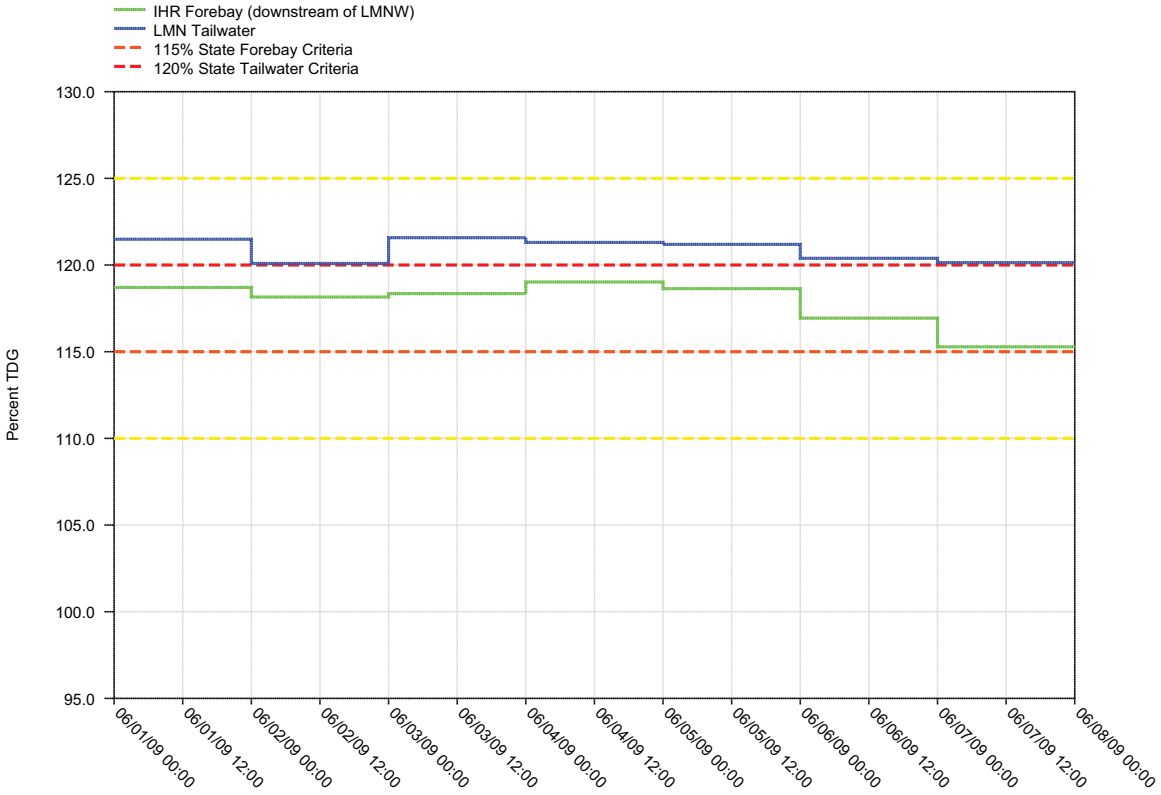


Figure 3.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

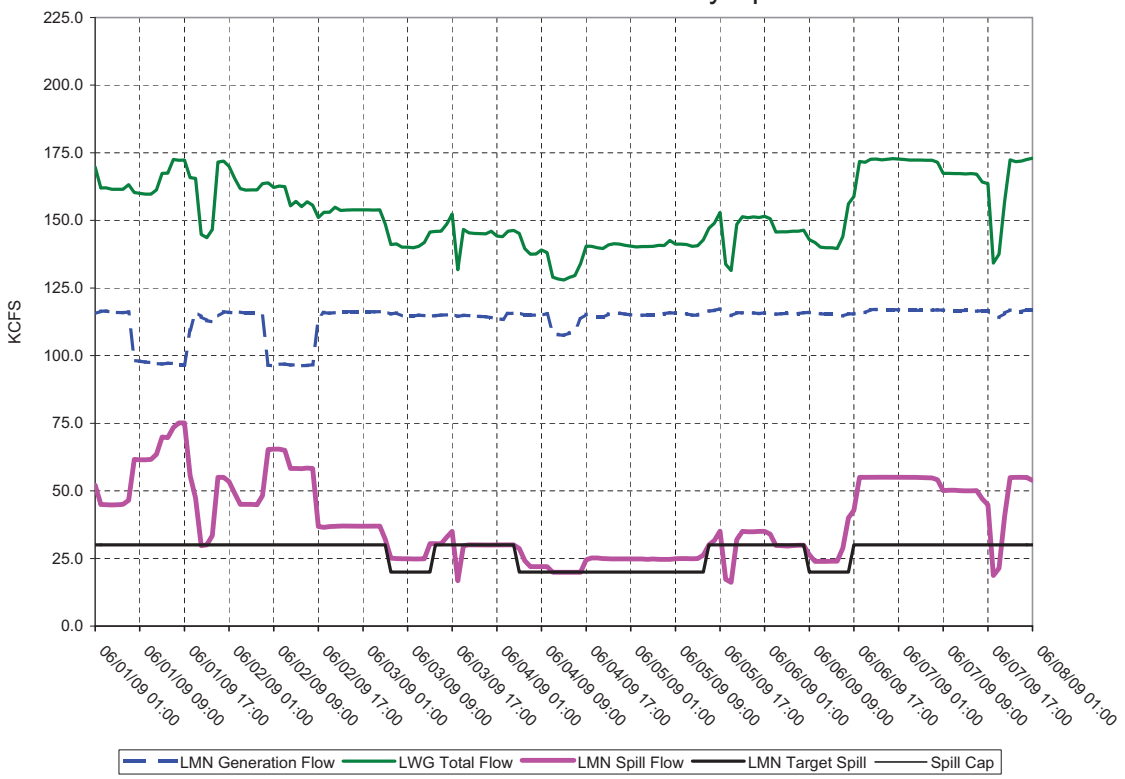
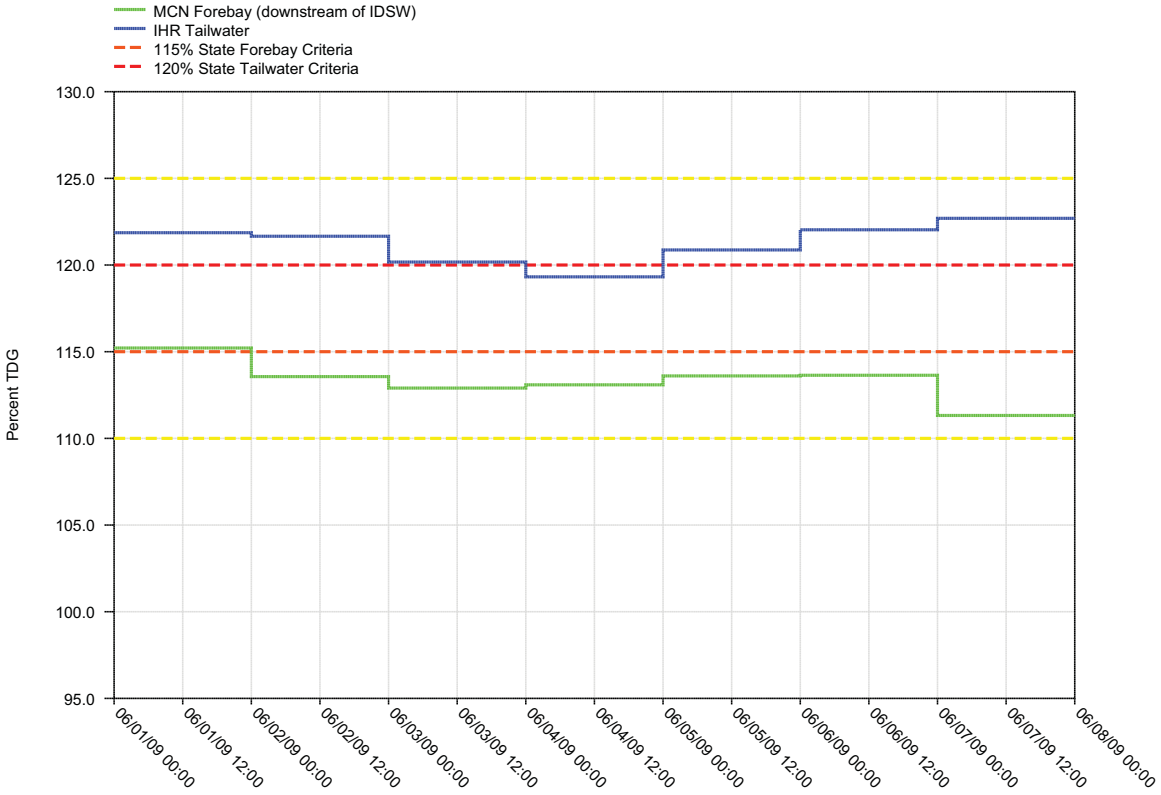


Figure 4.

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



ICE HARBOR DAM - Hourly Spill and Flow

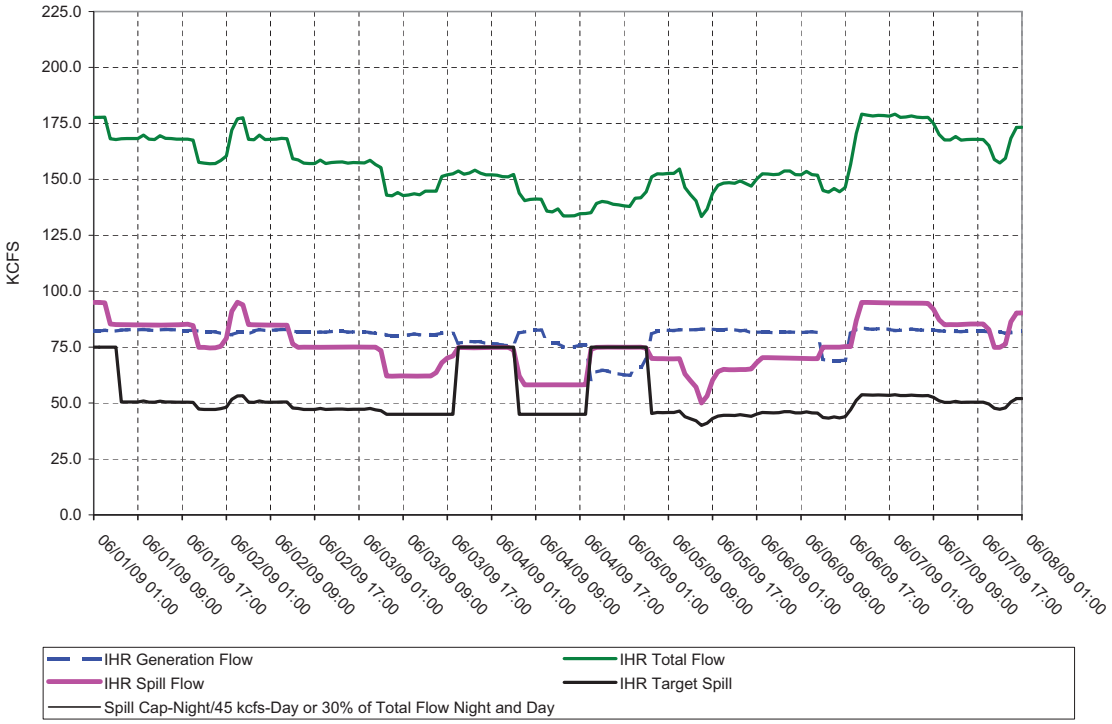
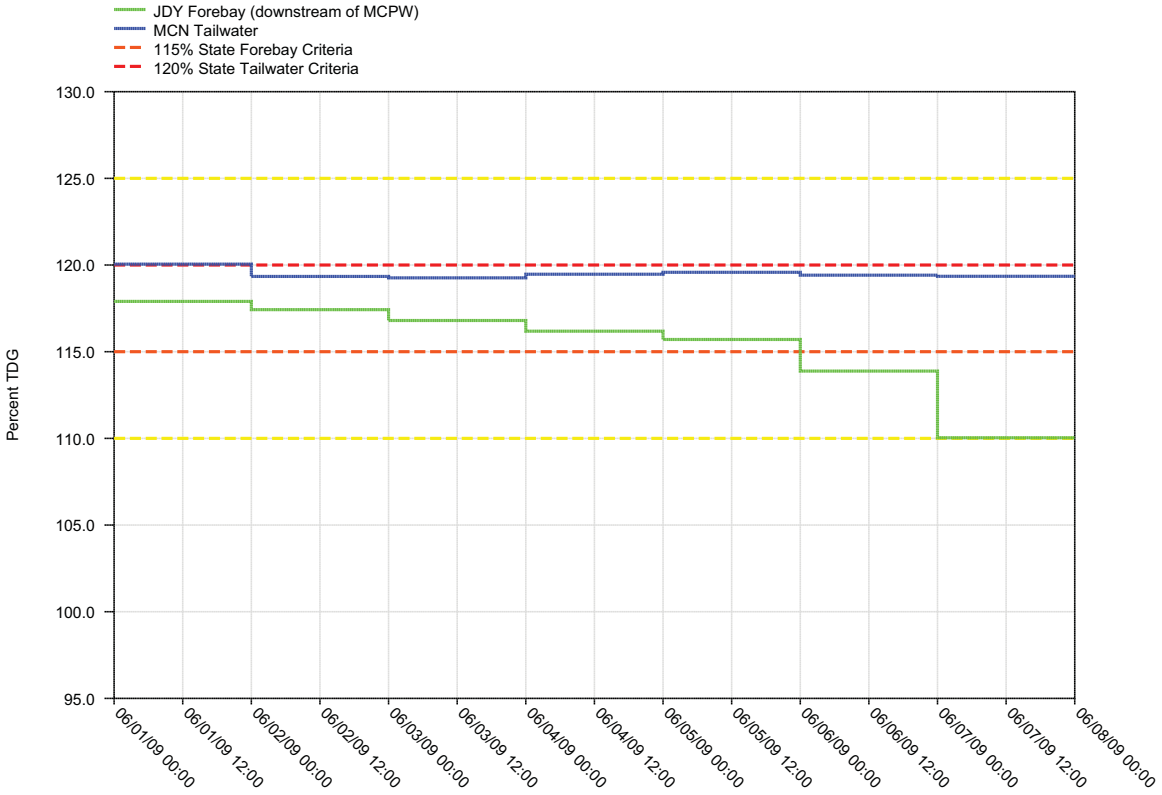


Figure 5.

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



McNARY DAM - Hourly Spill and Flow

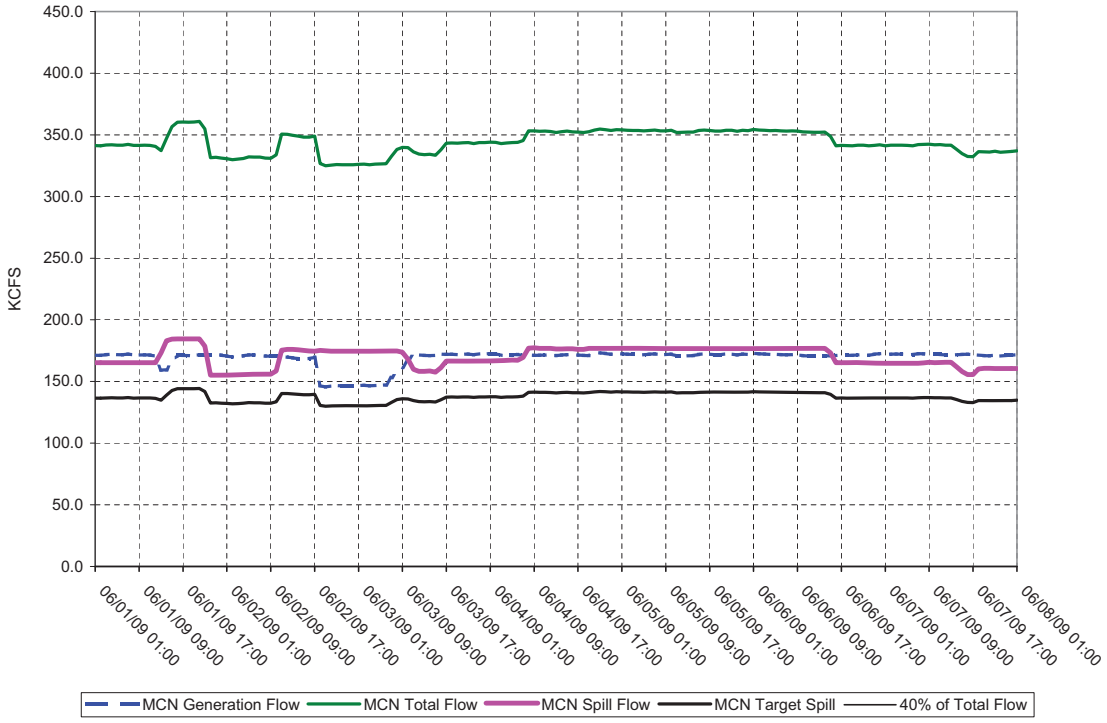
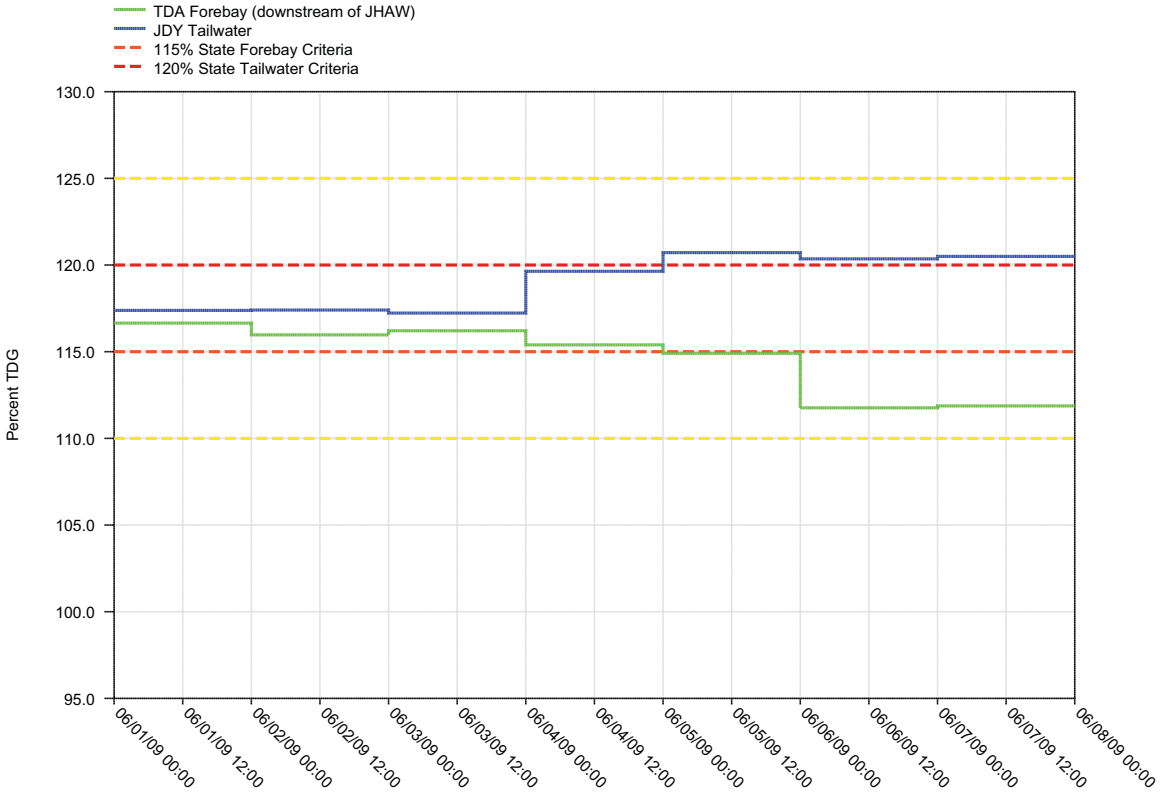


Figure 6.

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



JOHN DAY DAM - Hourly Spill and Flow

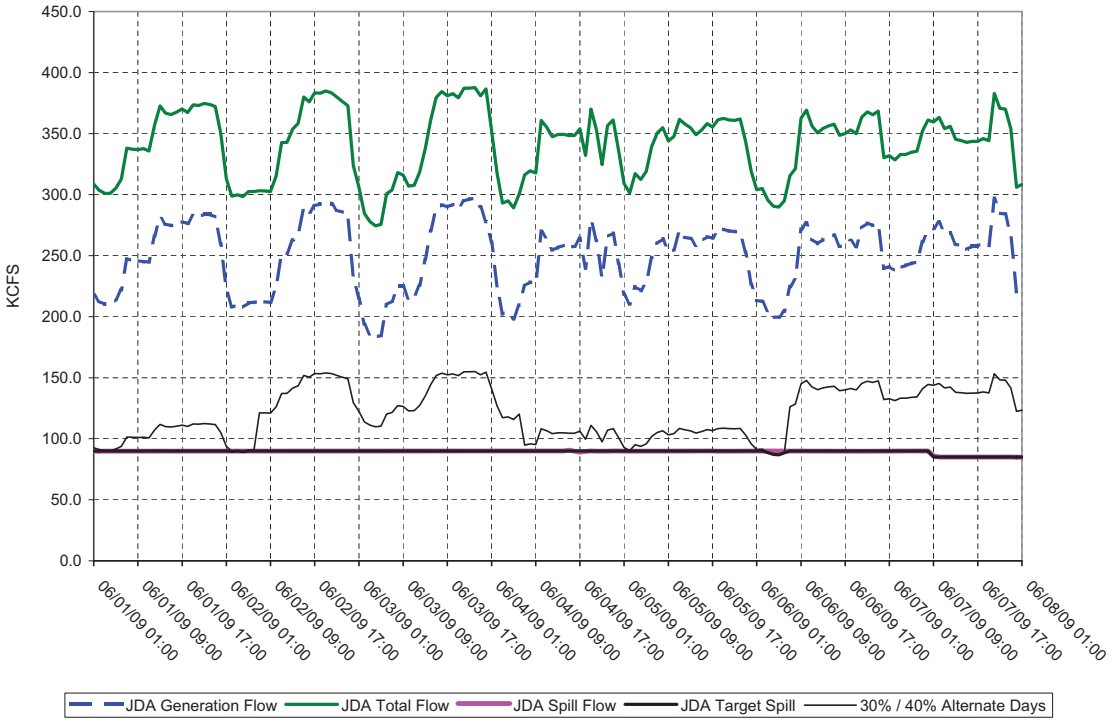
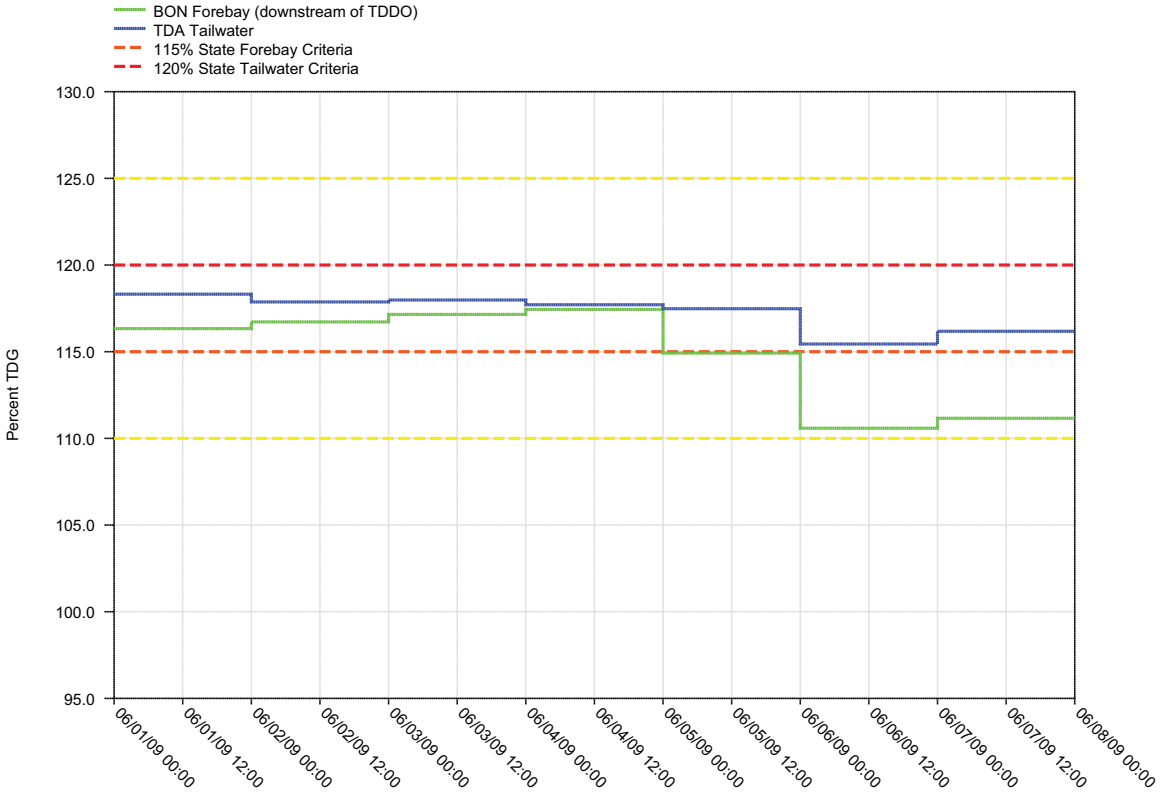


Figure 7.

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



THE DALLES DAM - Hourly Spill and Flow

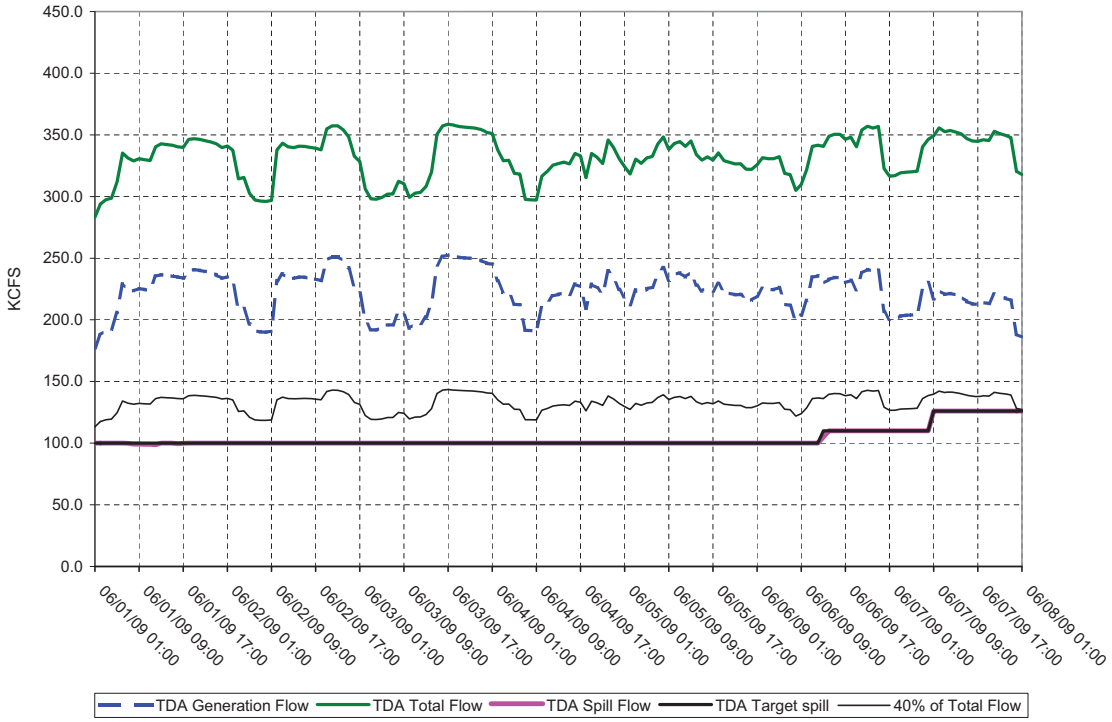
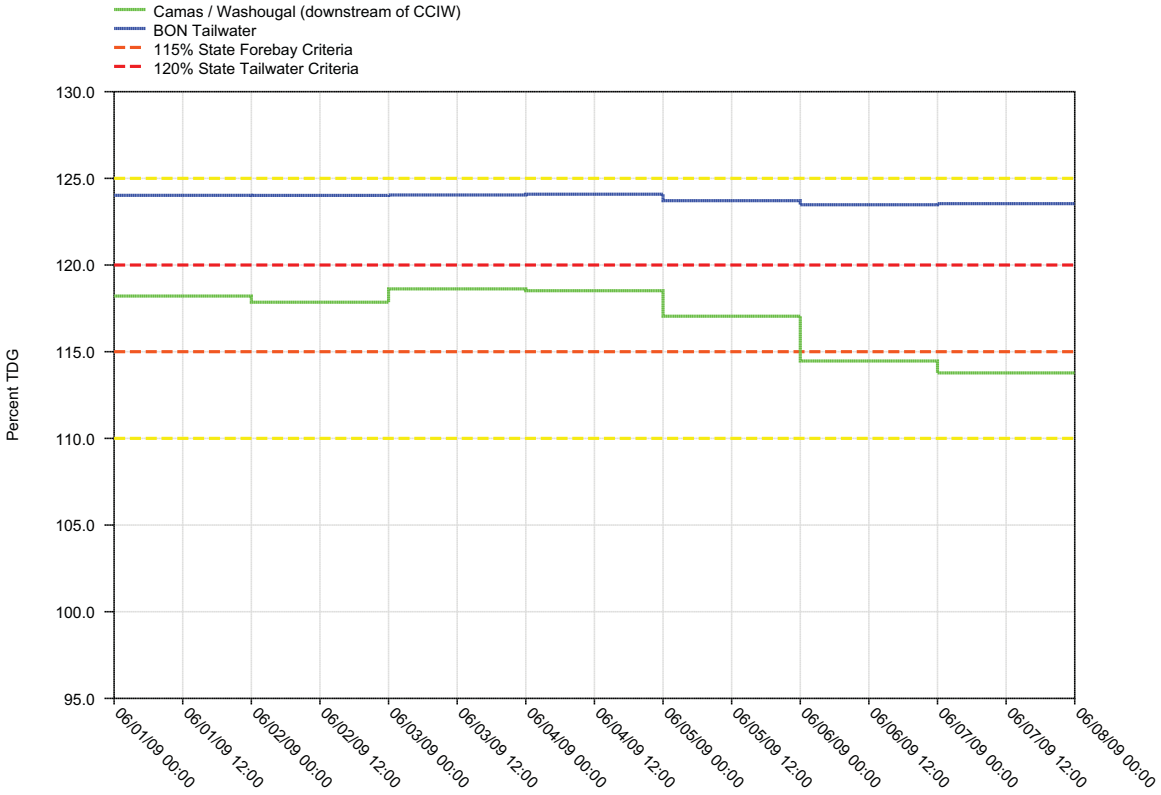


Figure 8.

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



BONNEVILLE DAM - Hourly Spill and Flow

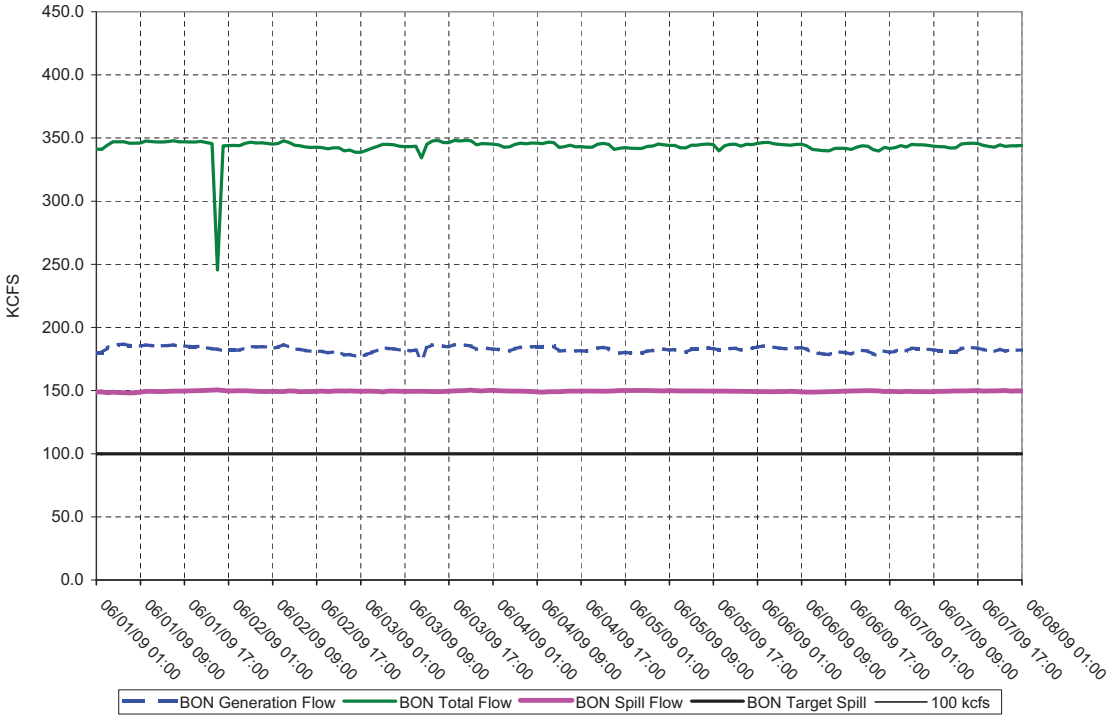
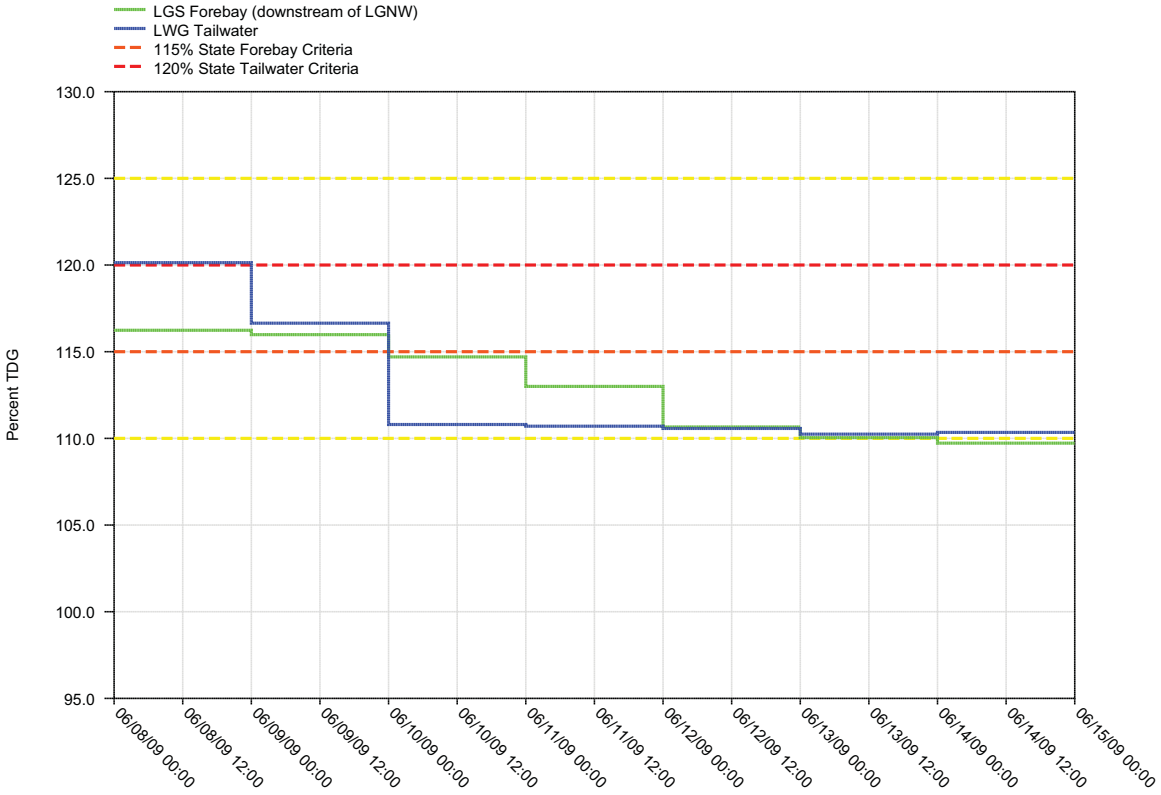


Figure 9.

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



LOWER GRANITE DAM - Hourly Spill and Flow

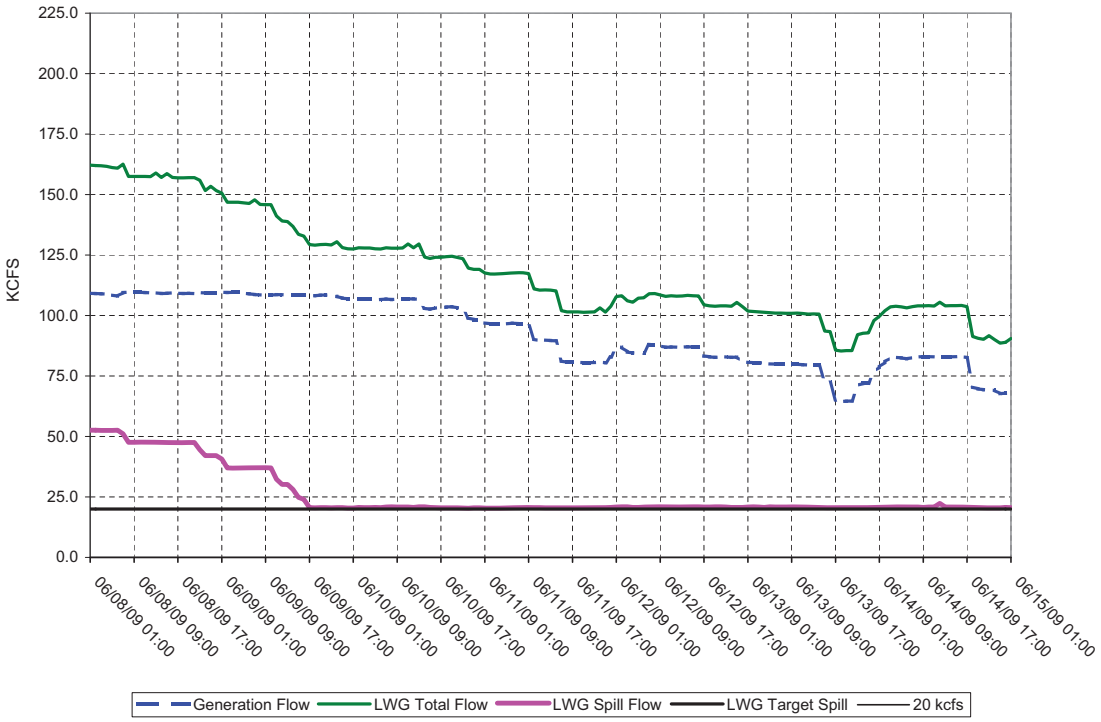
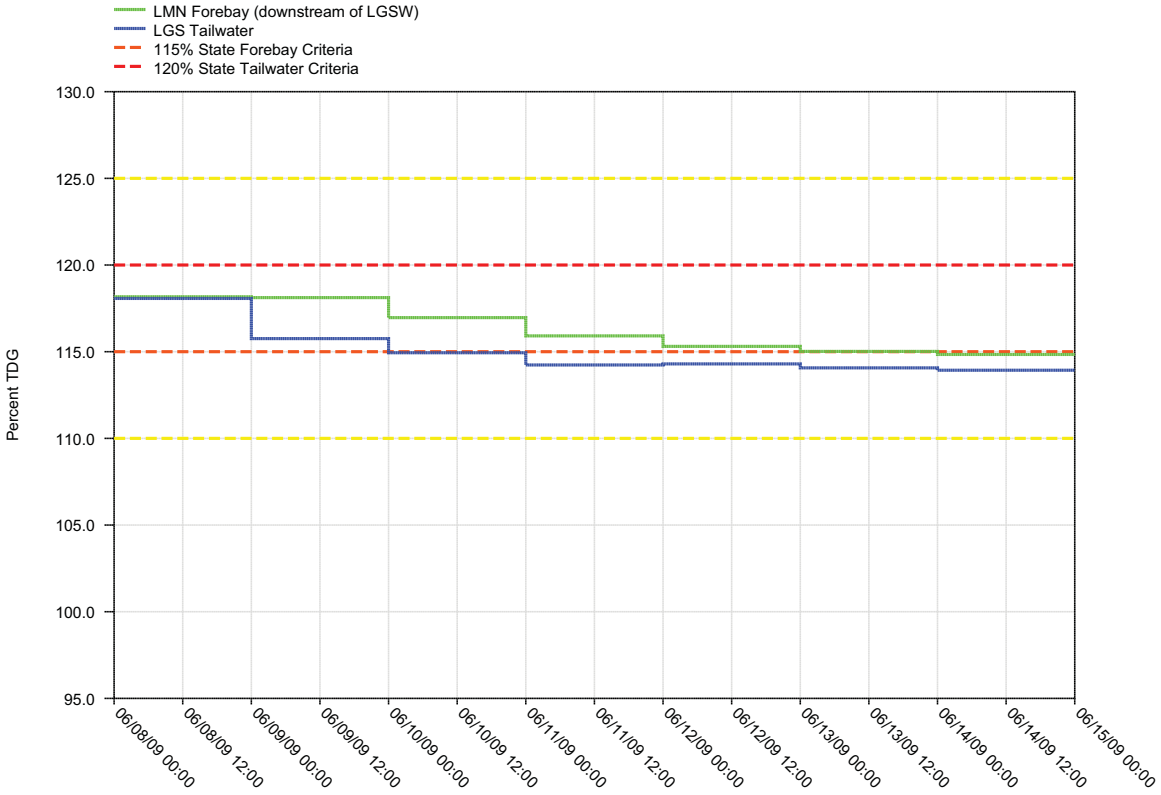


Figure 10.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

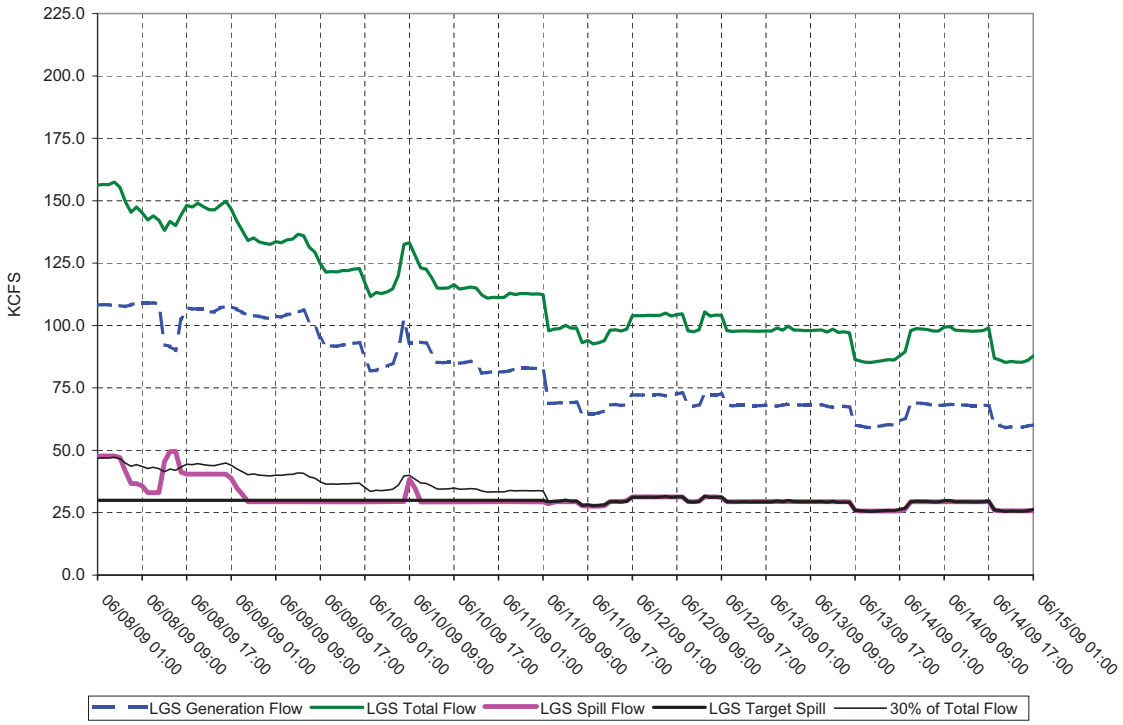
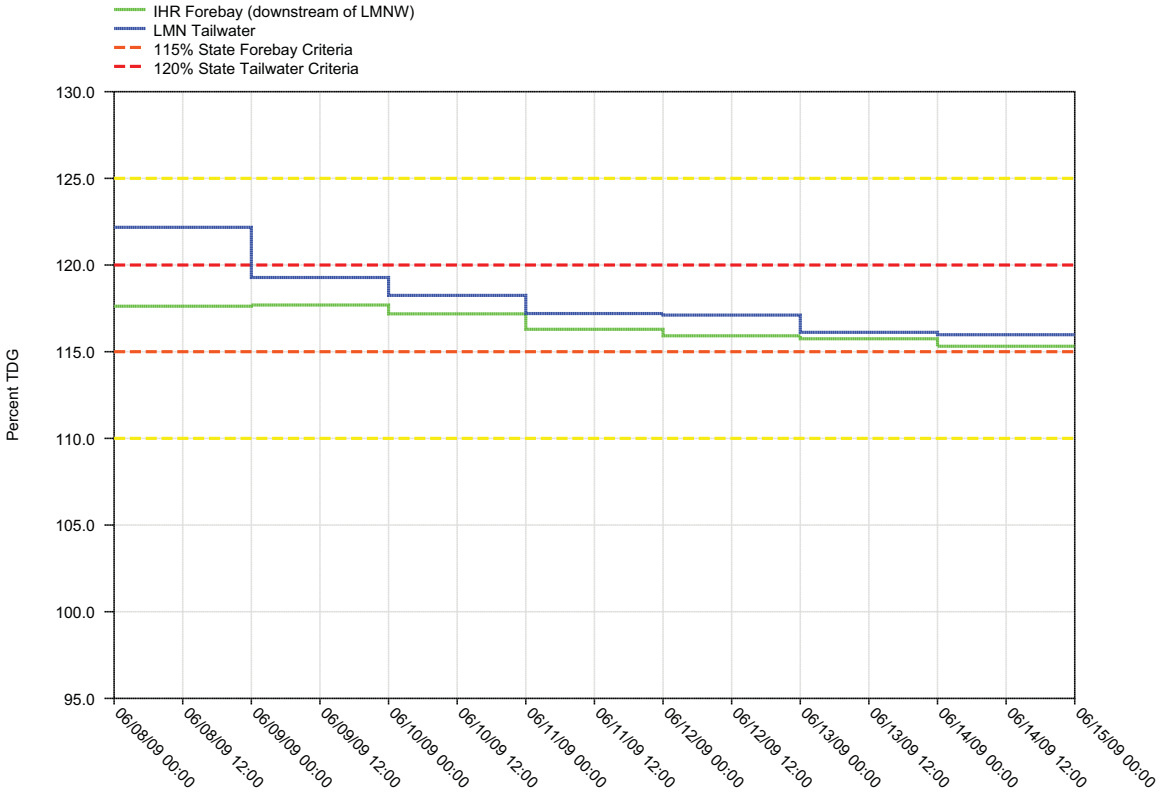


Figure 11.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

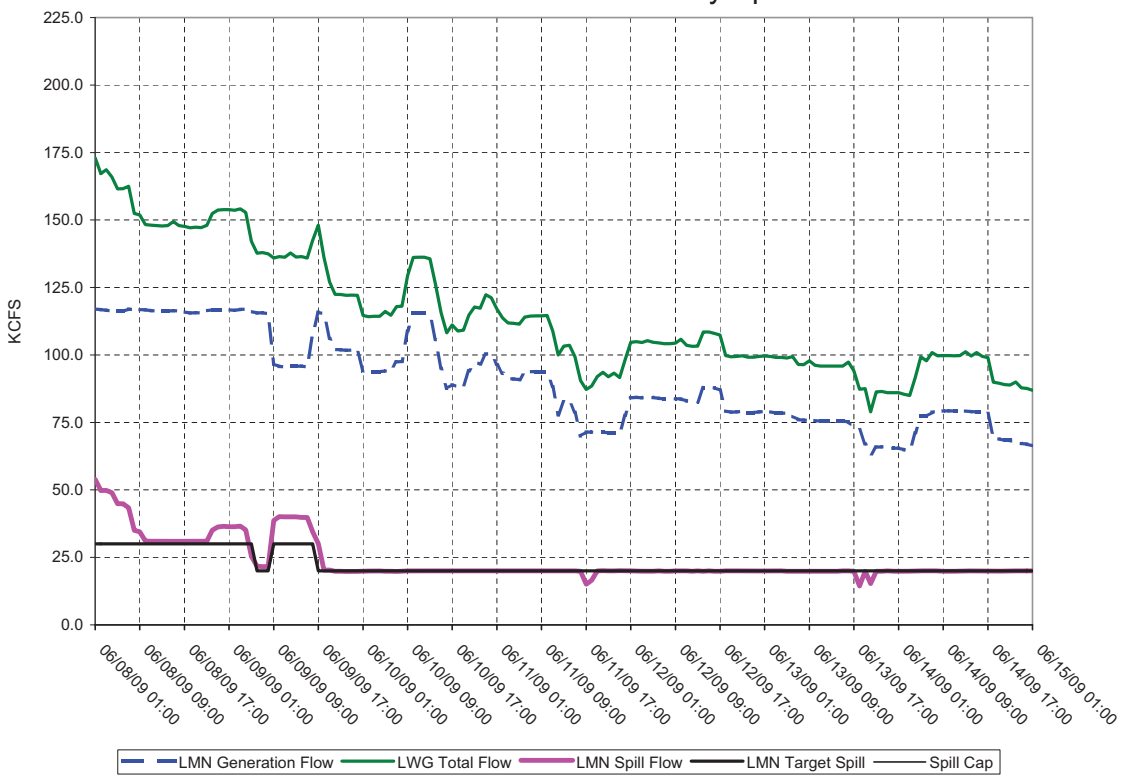
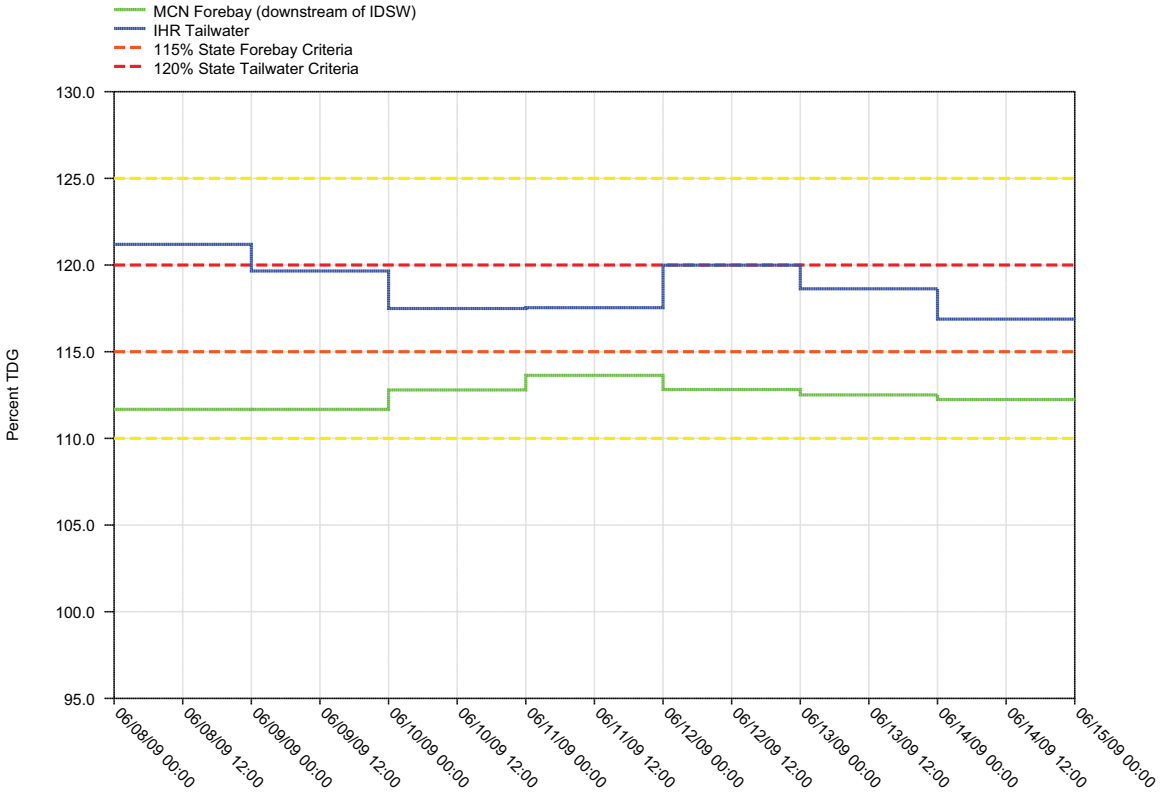


Figure 12.

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



ICE HARBOR DAM - Hourly Spill and Flow

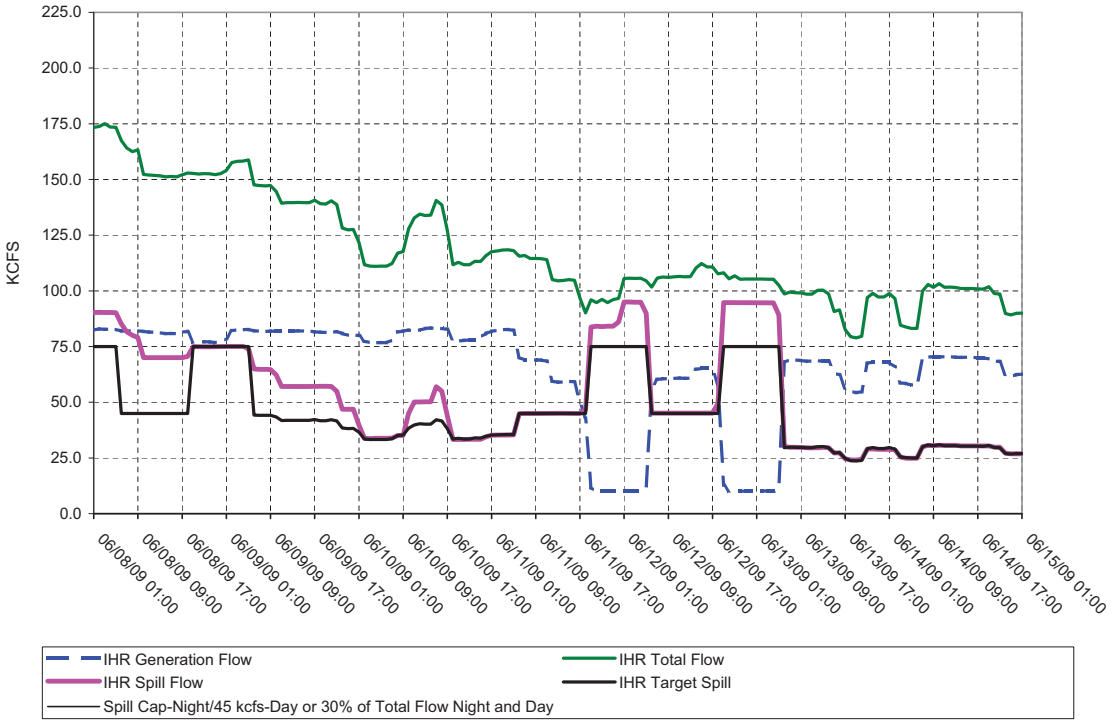
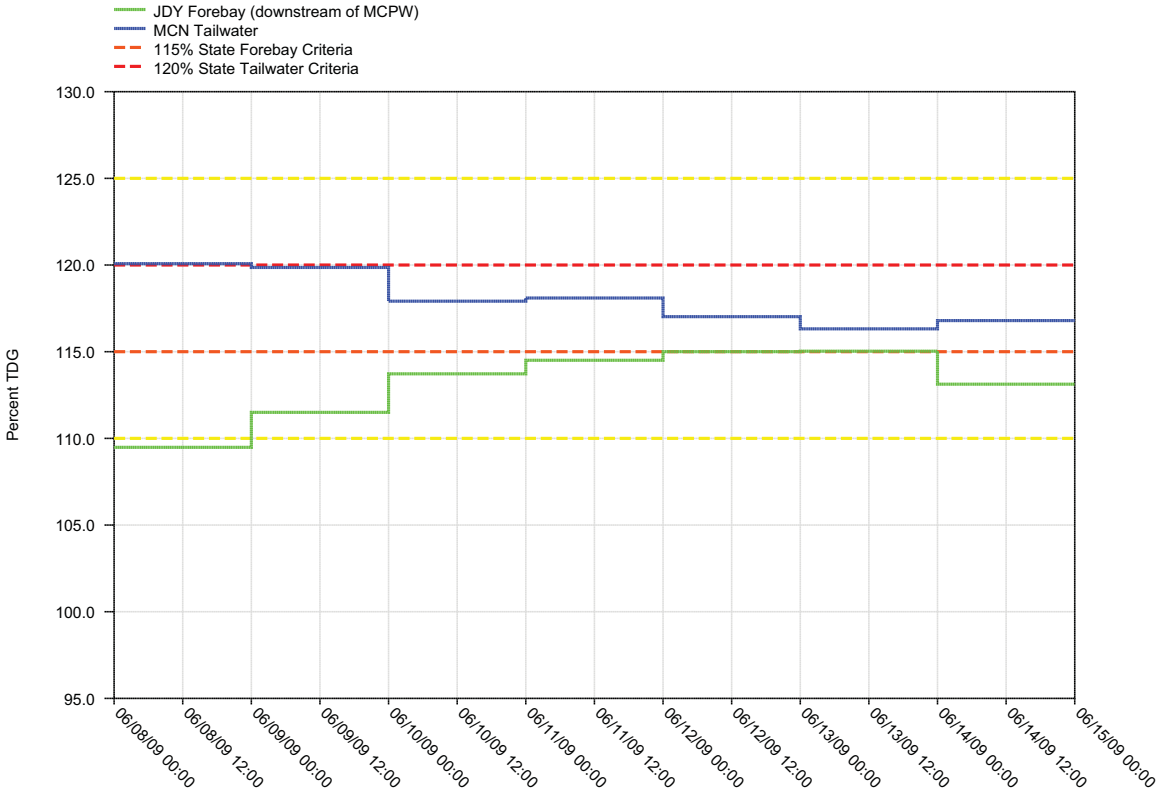


Figure 13.

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



McNARY DAM - Hourly Spill and Flow

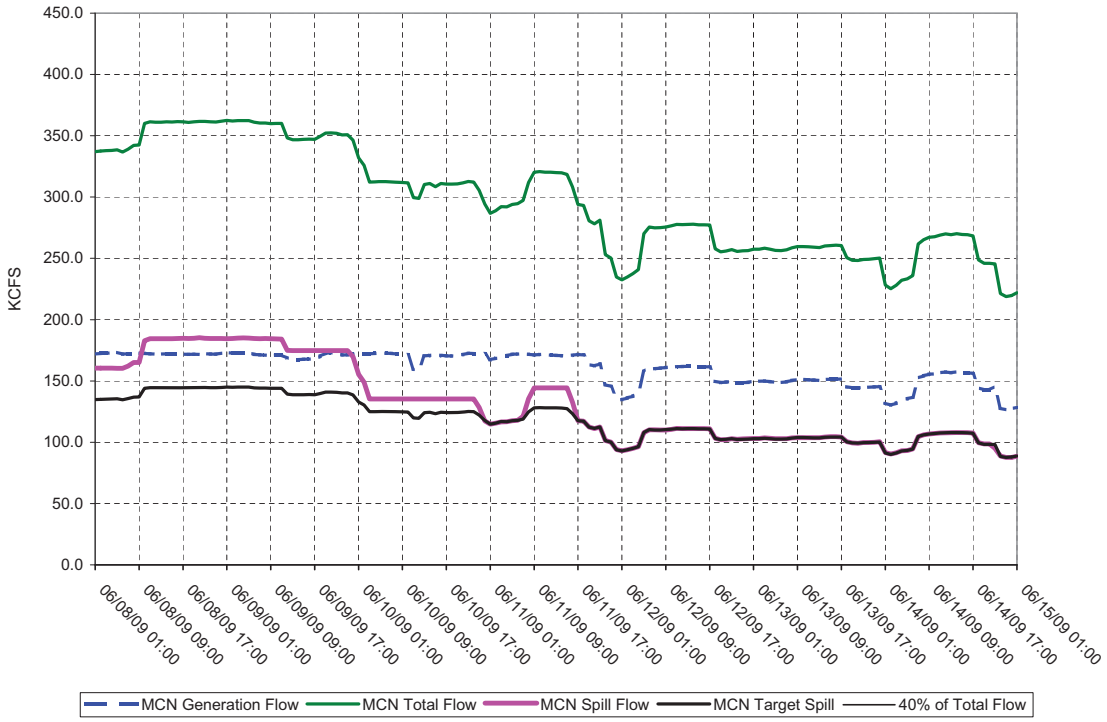
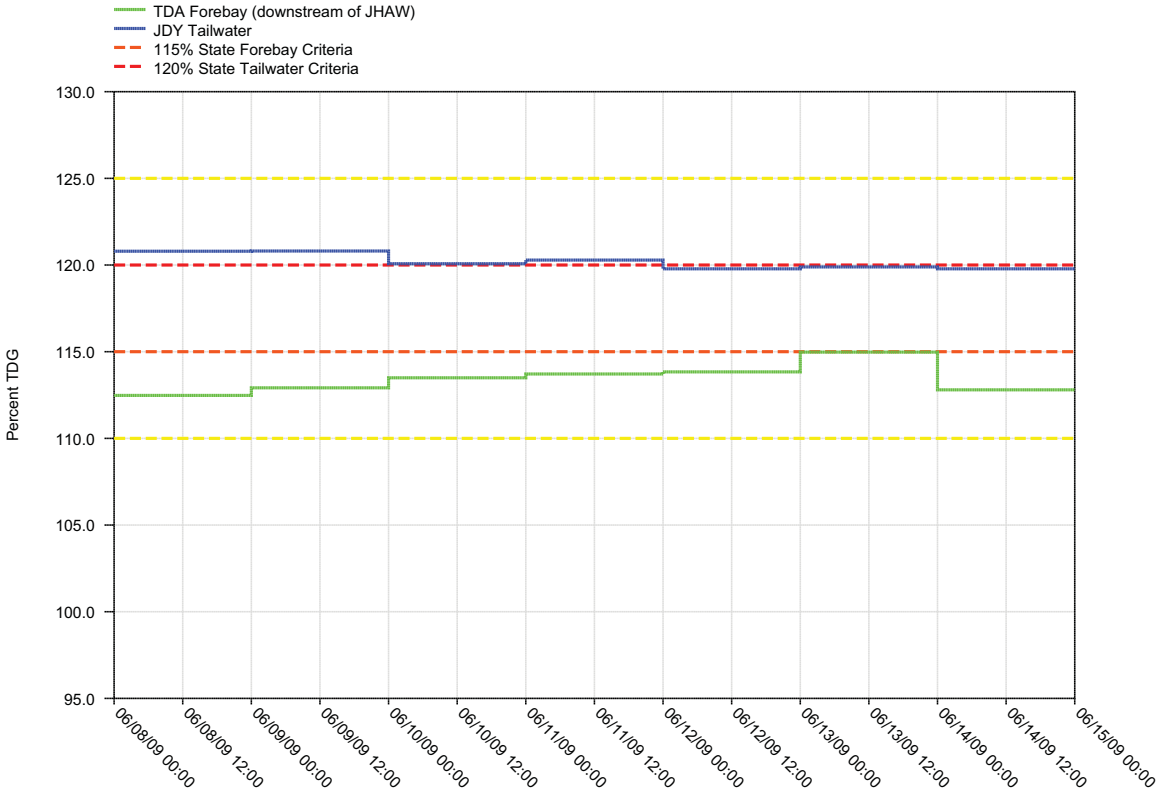


Figure 14.

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



JOHN DAY DAM - Hourly Spill and Flow

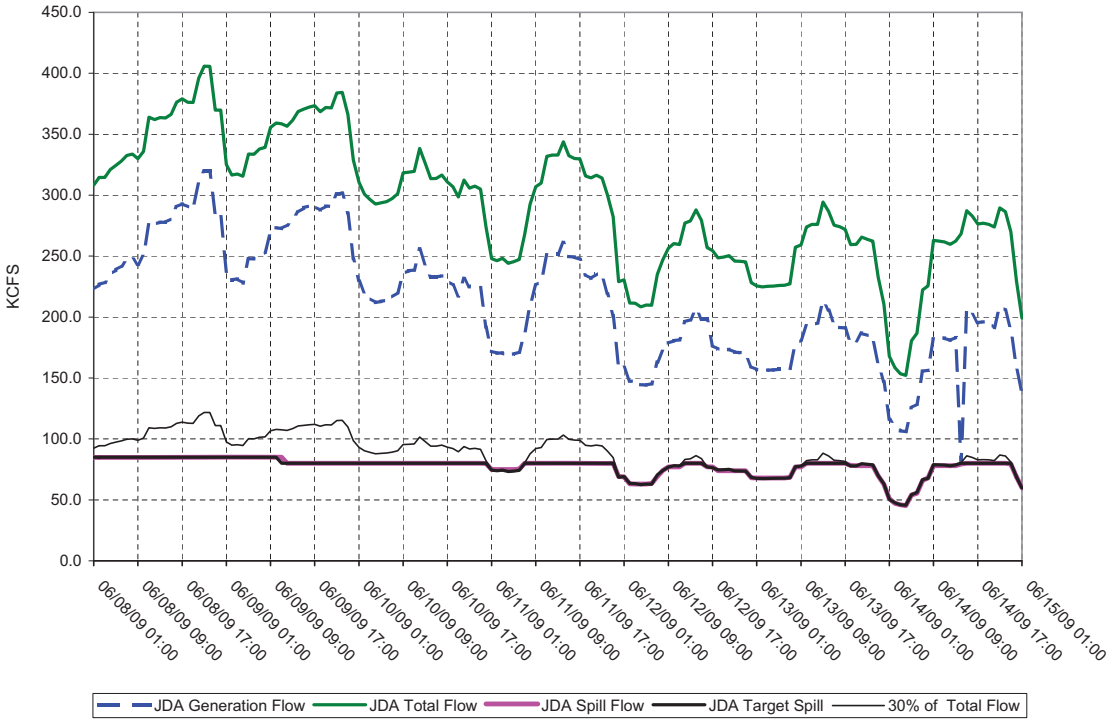
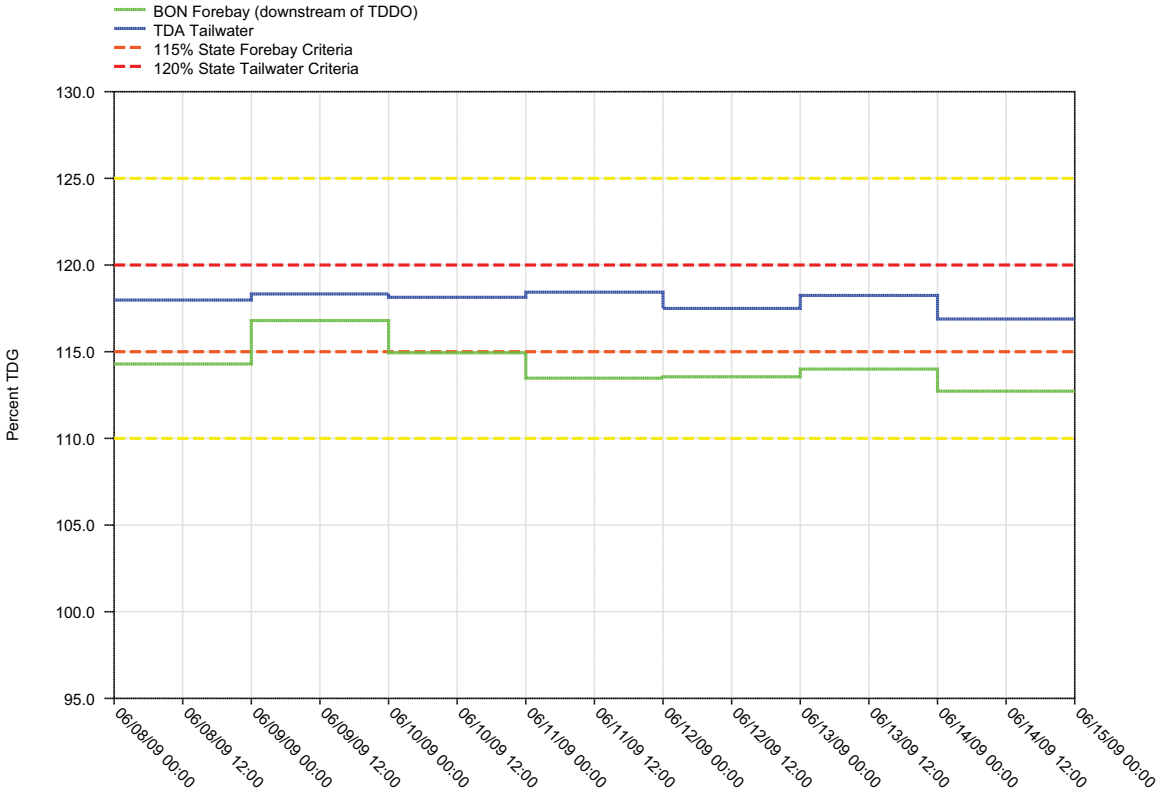


Figure 15.

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



THE DALLES DAM - Hourly Spill and Flow

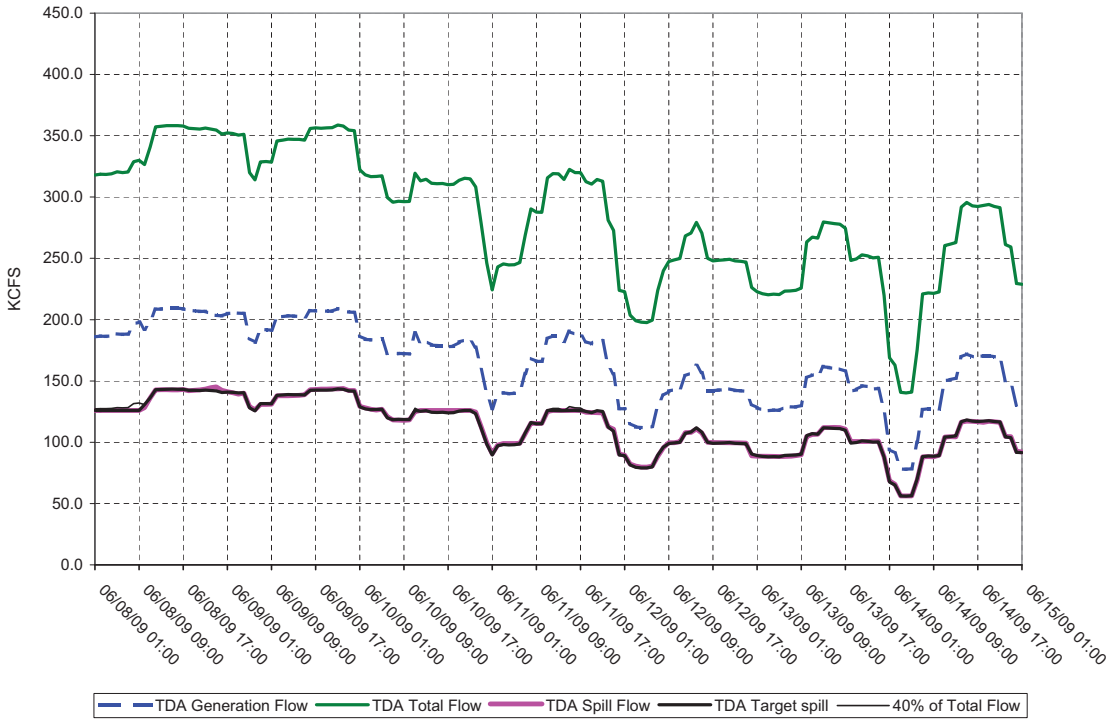
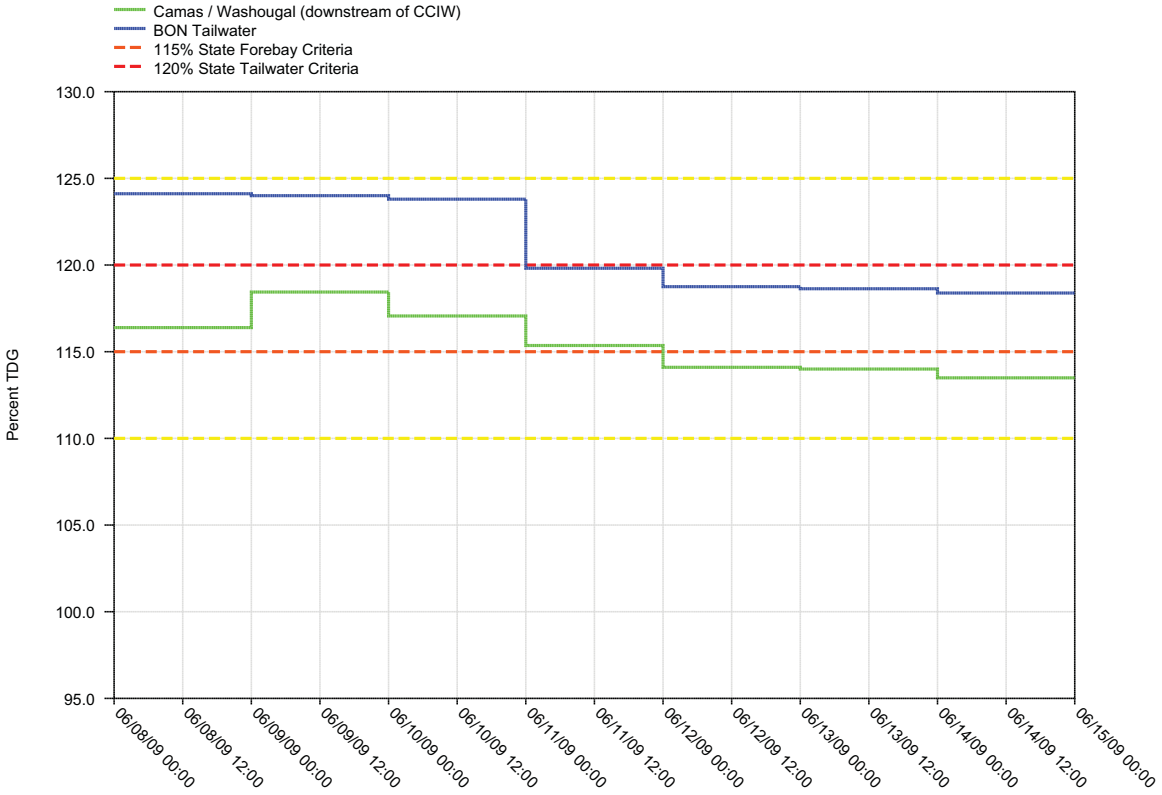


Figure 16.

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



BONNEVILLE DAM - Hourly Spill and Flow

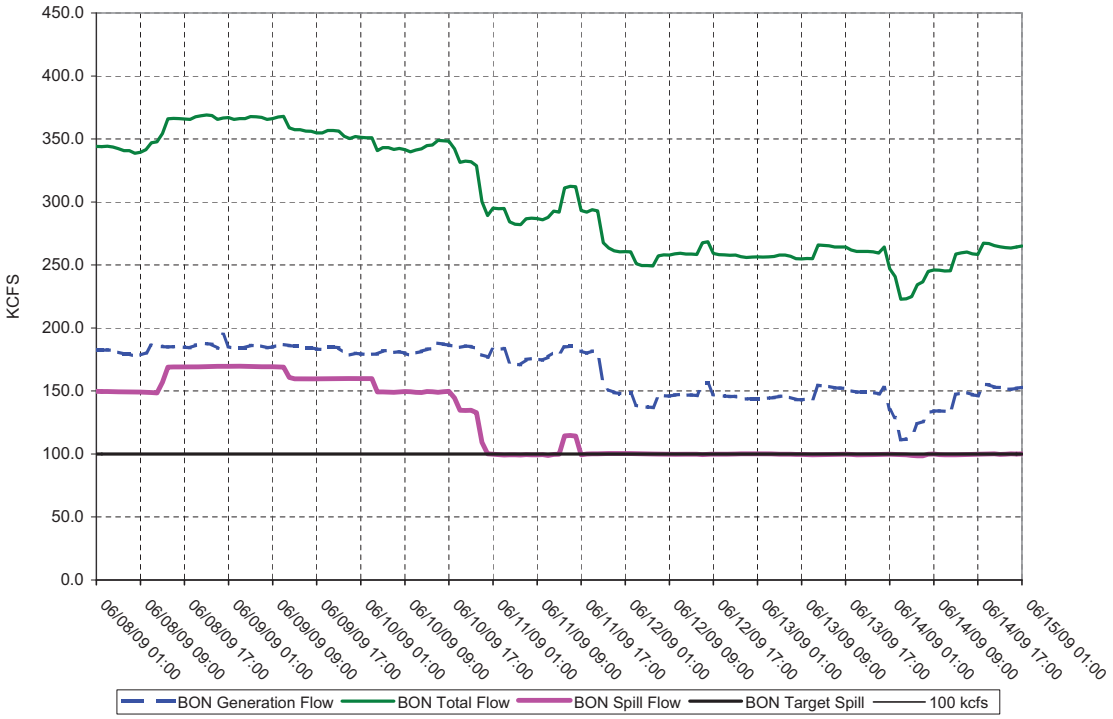
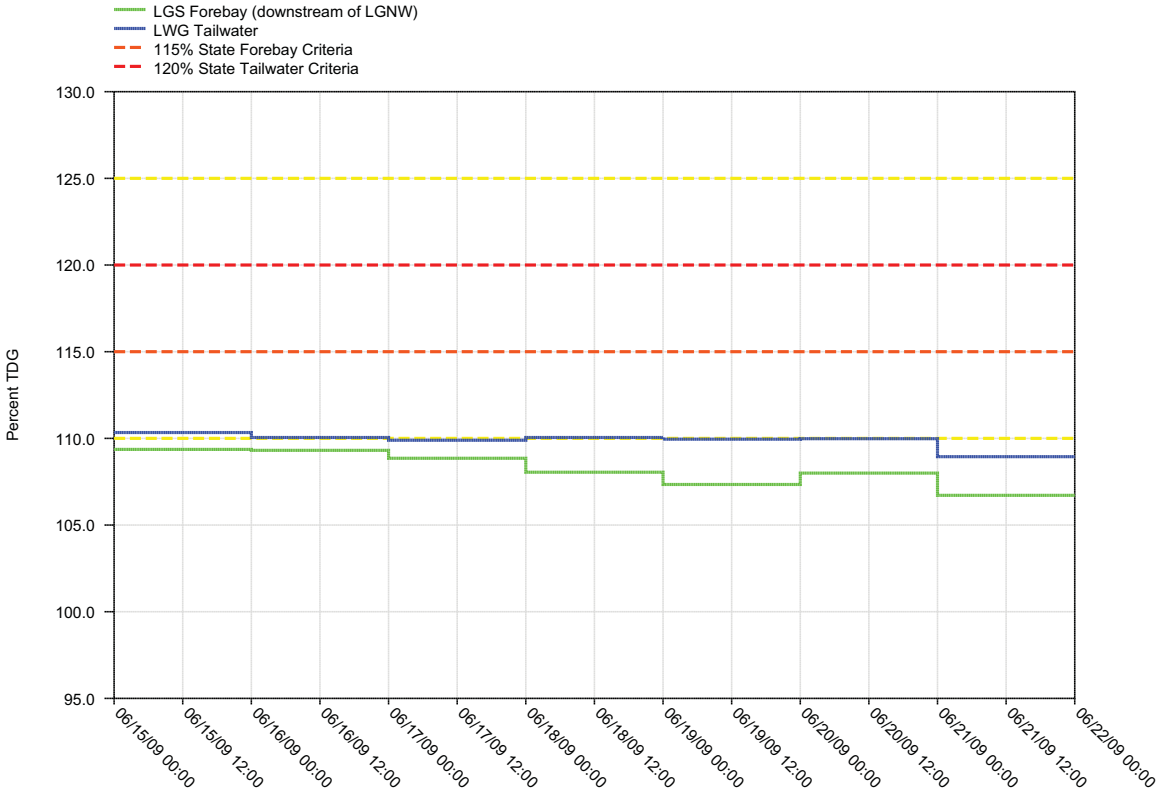


Figure 17.

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



LOWER GRANITE DAM - Hourly Spill and Flow

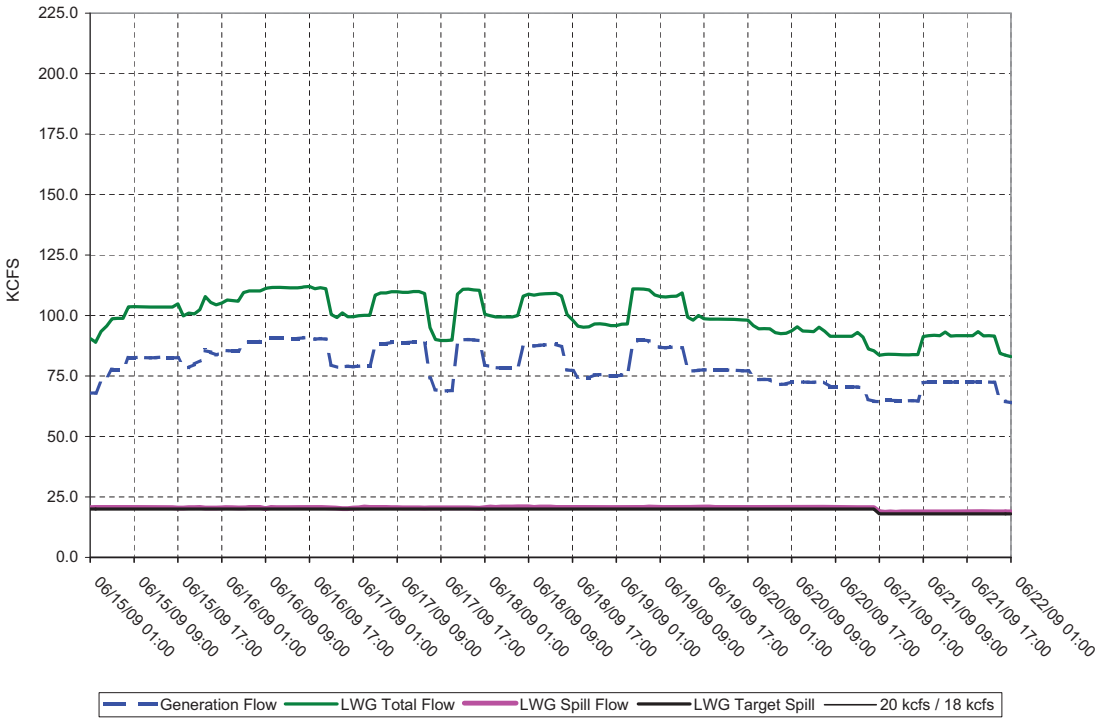
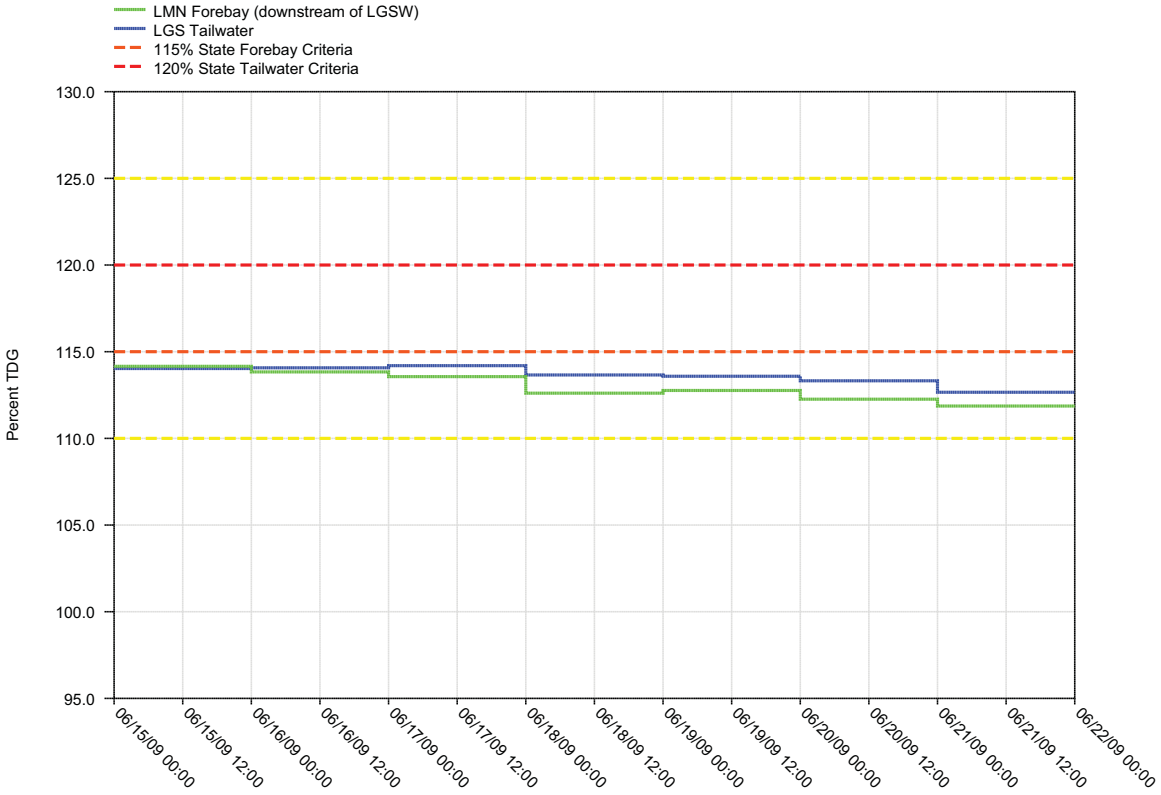


Figure 18.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

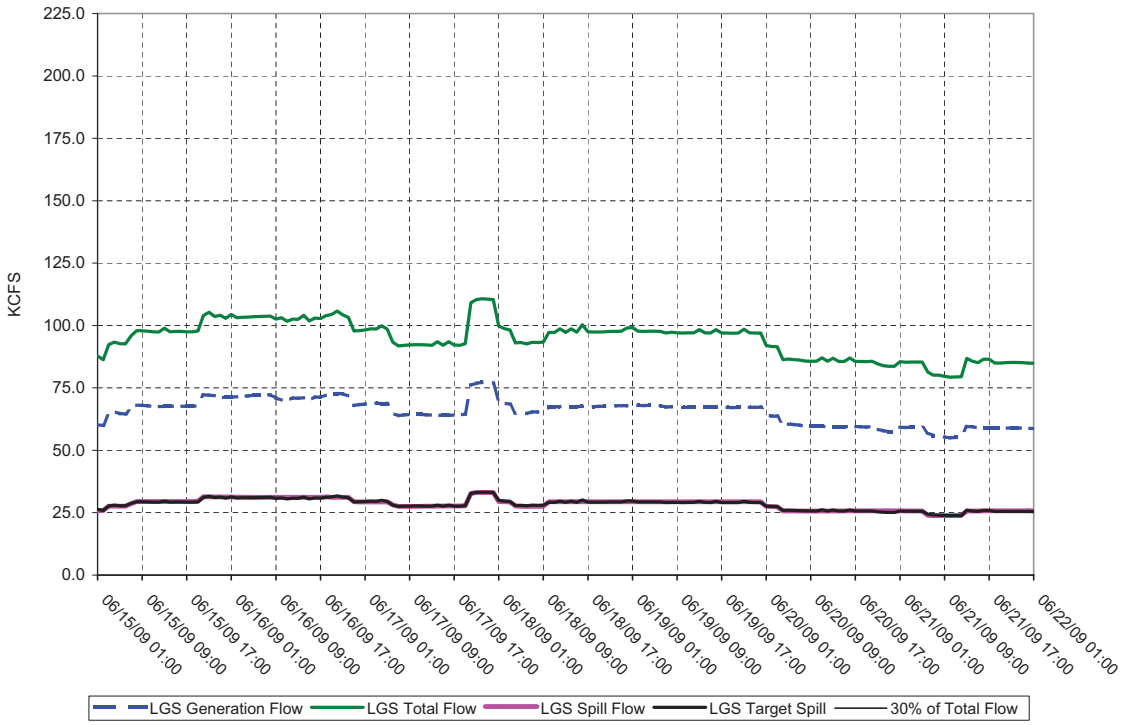
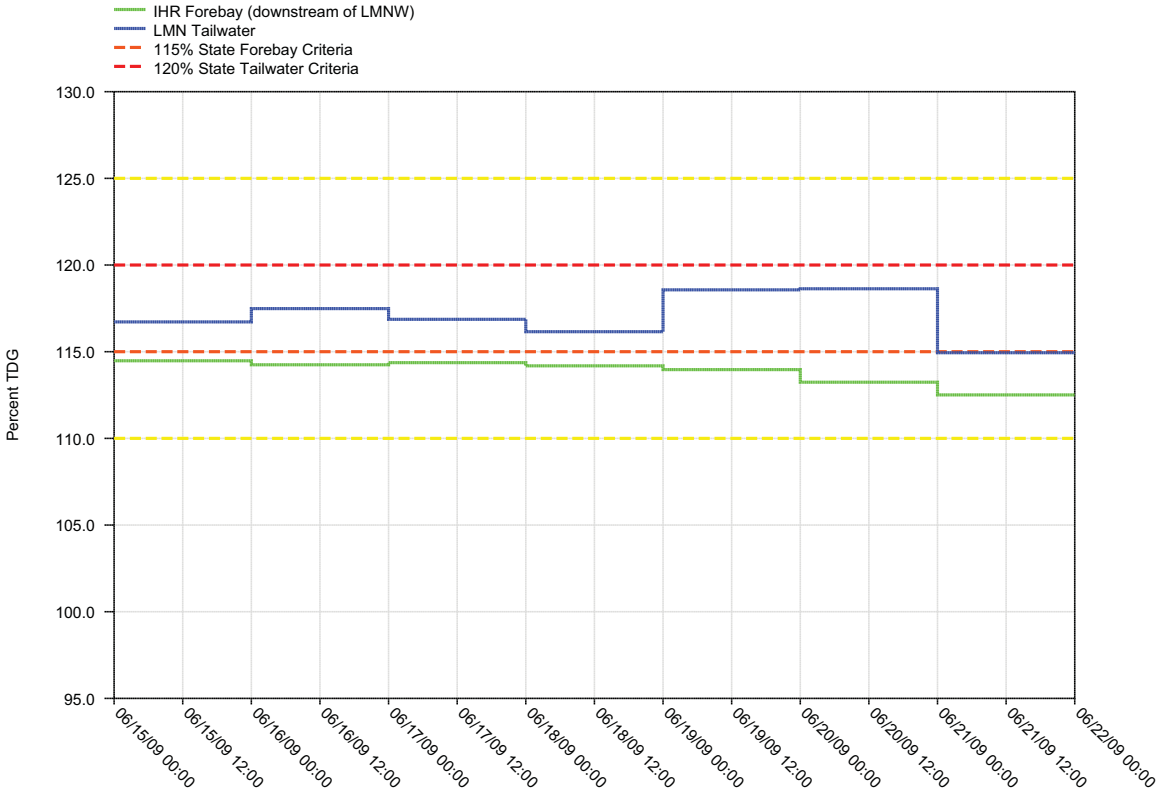


Figure 19.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

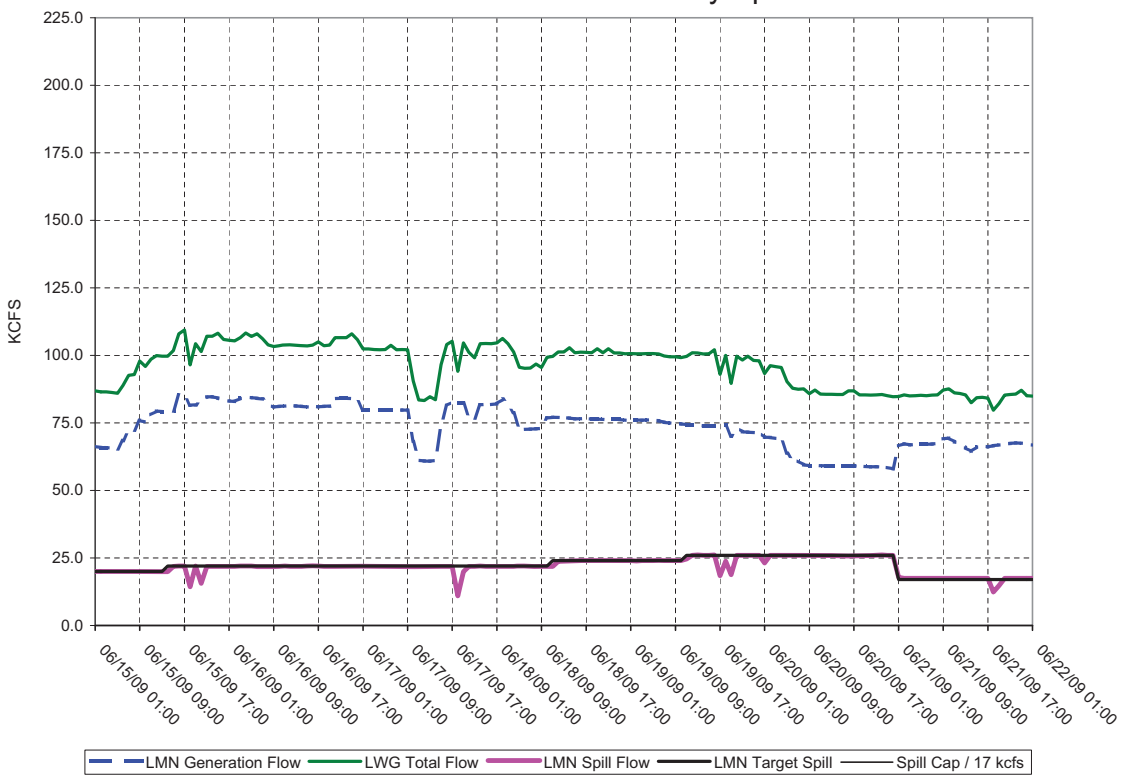
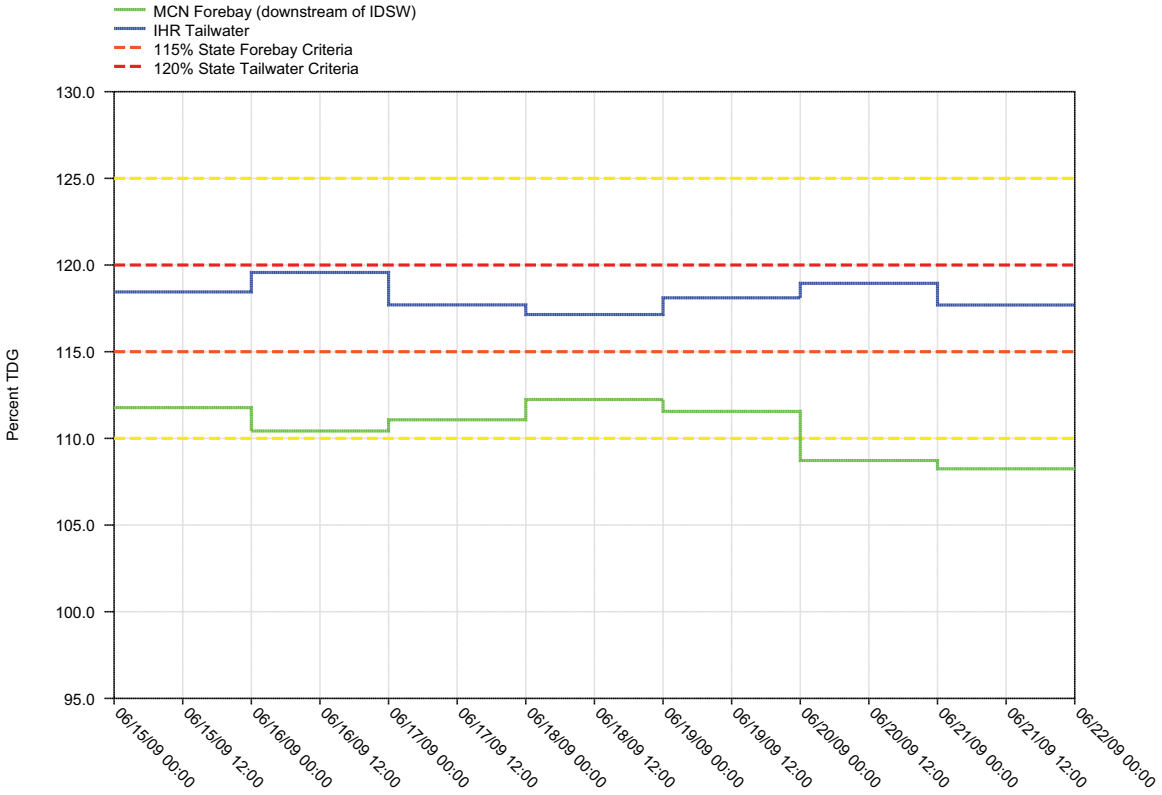


Figure 20.

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



ICE HARBOR DAM - Hourly Spill and Flow

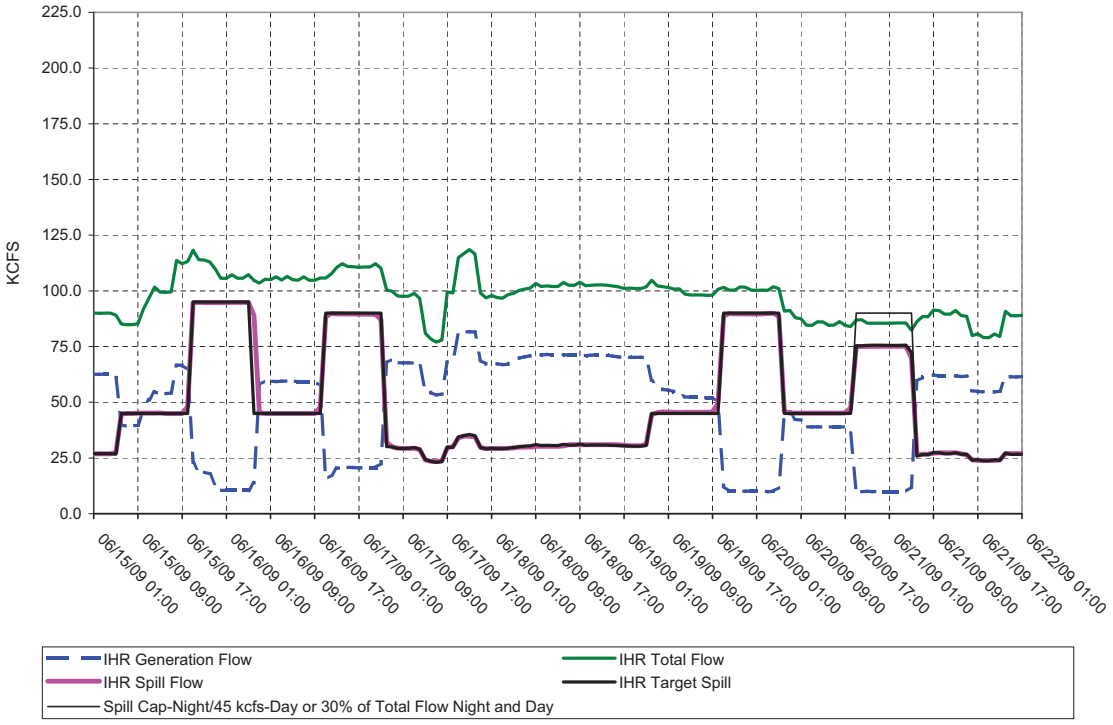
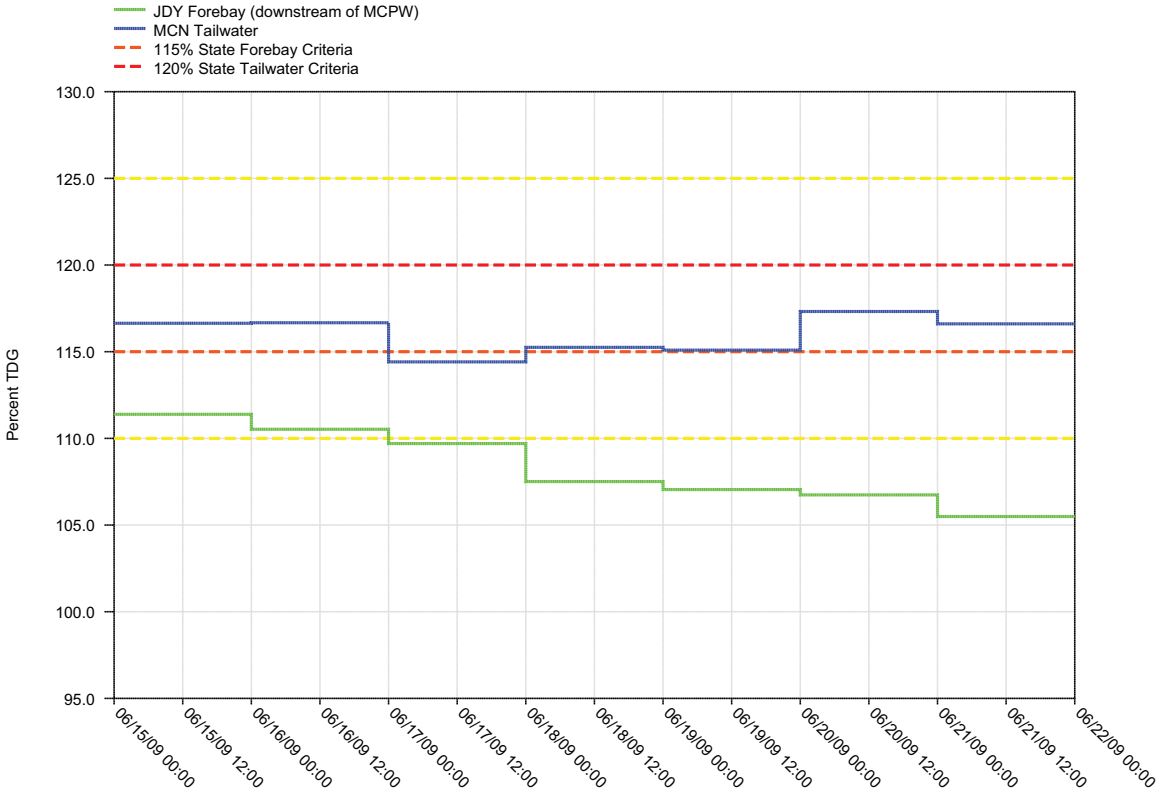


Figure 21.

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



McNARY DAM - Hourly Spill and Flow

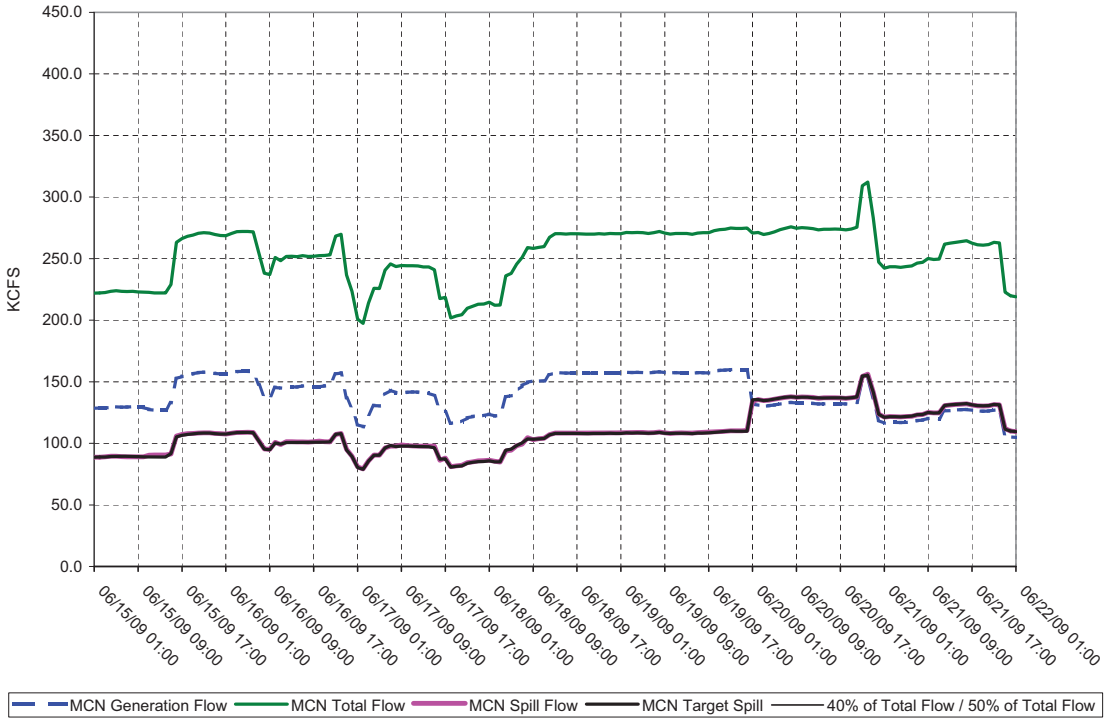
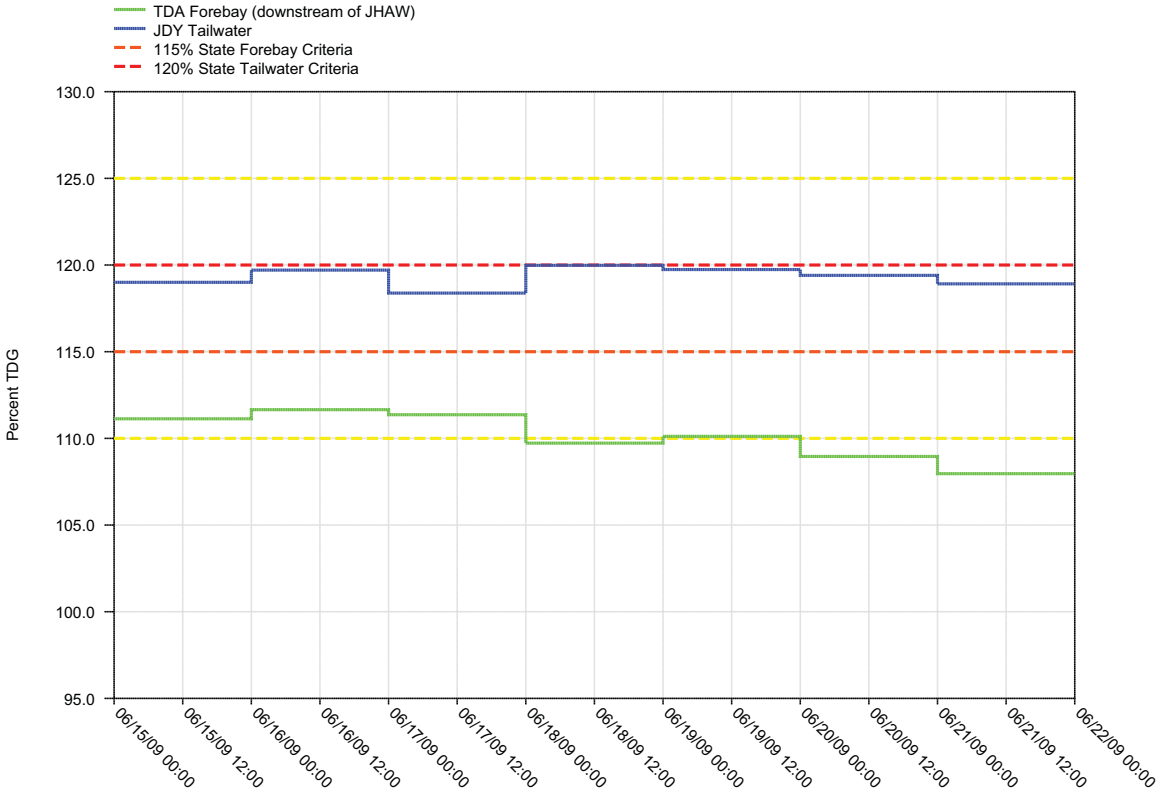


Figure 22.

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



JOHN DAY DAM - Hourly Spill and Flow

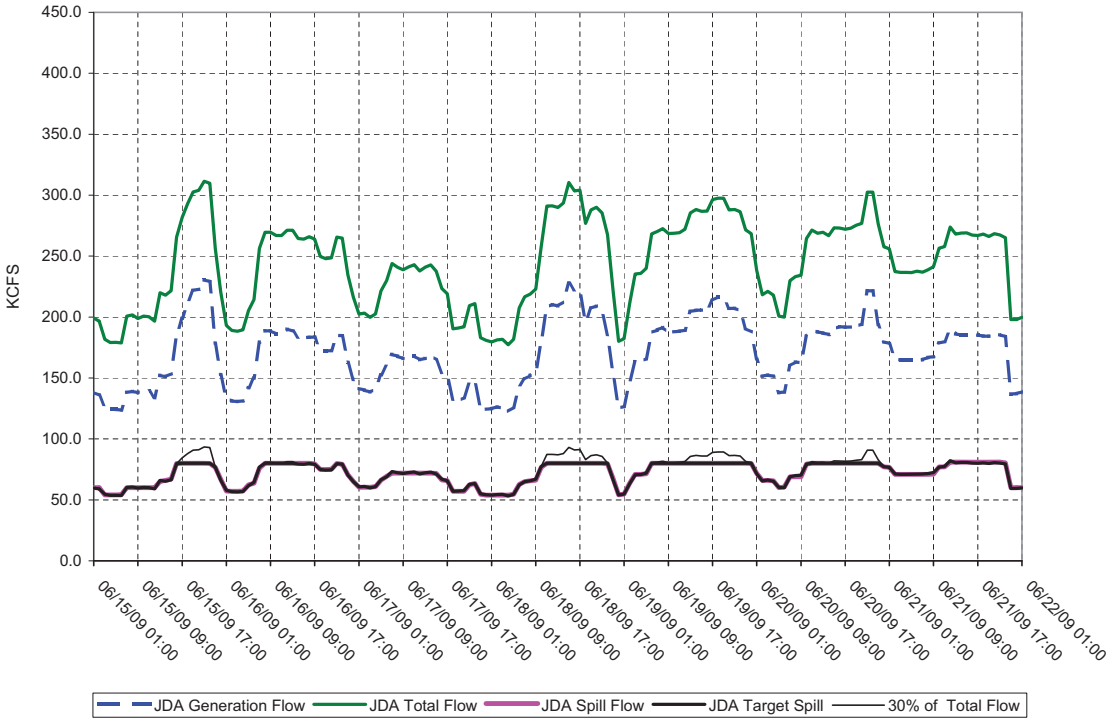
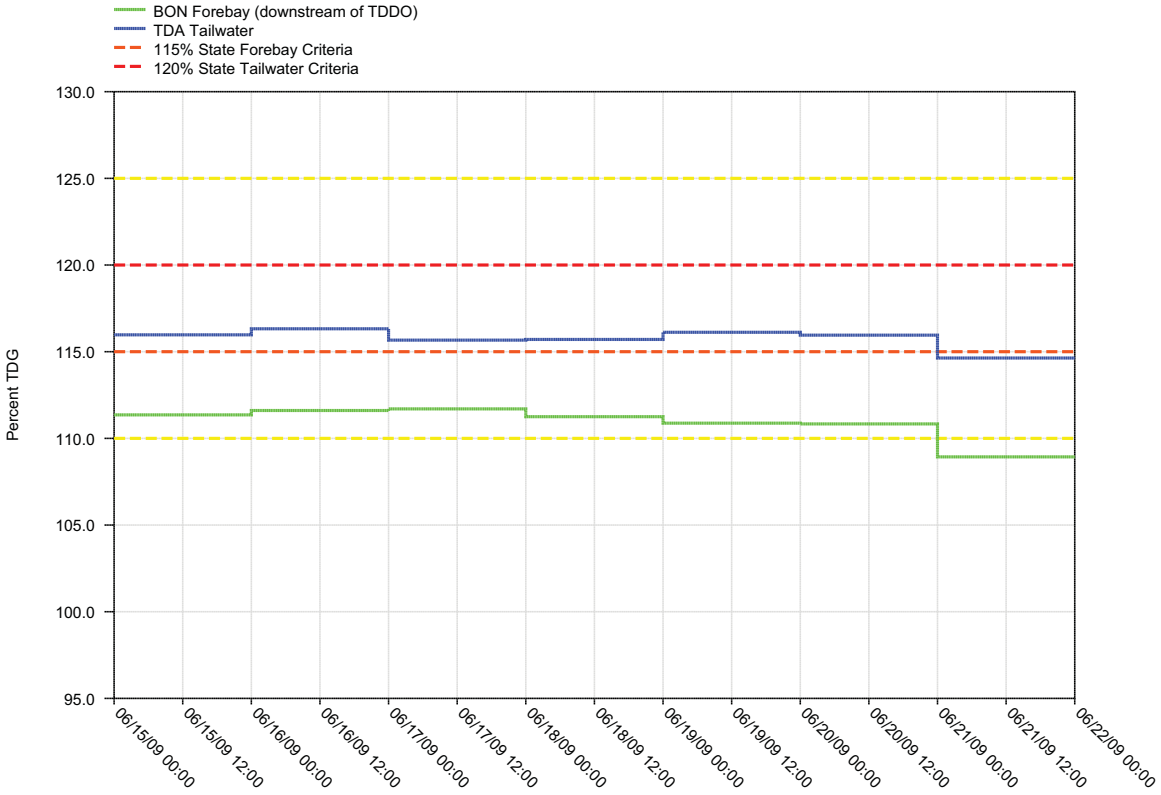


Figure 23.

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



THE DALLES DAM - Hourly Spill and Flow

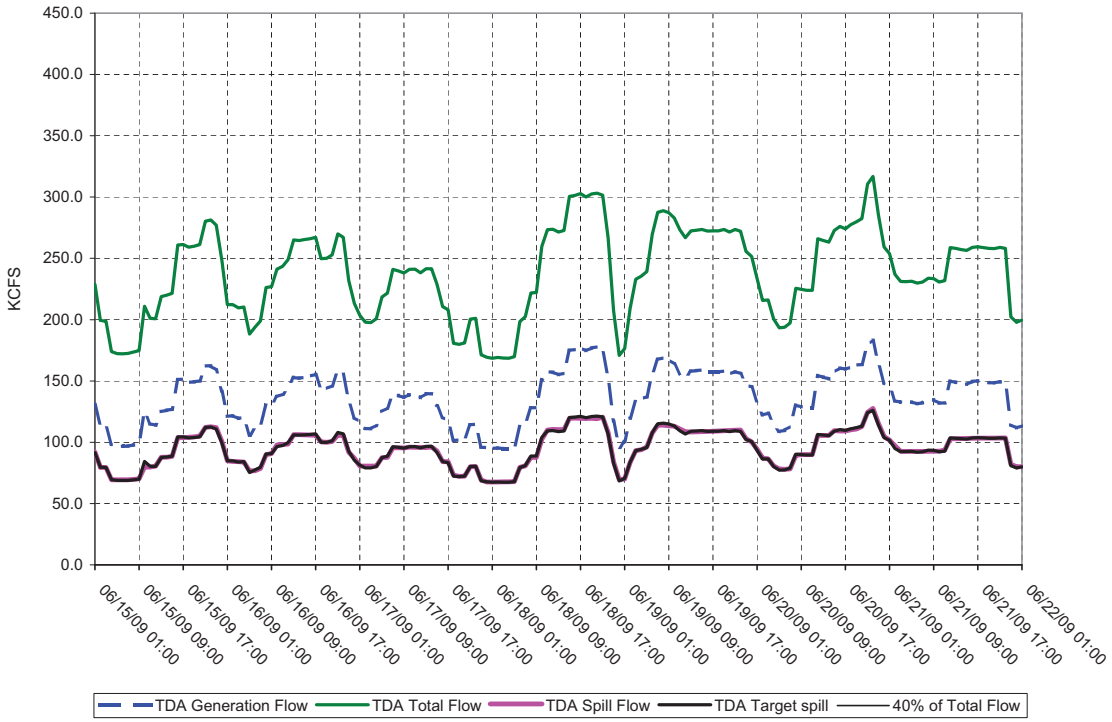
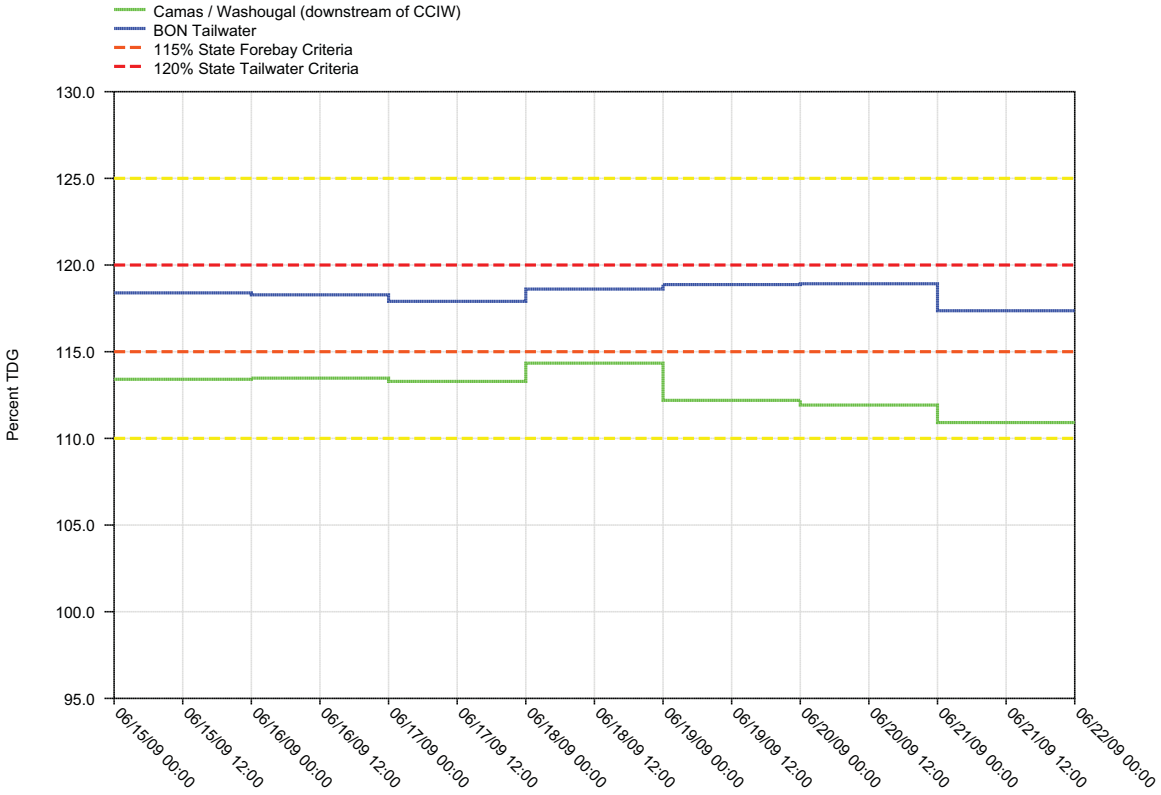


Figure 24.

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



BONNEVILLE DAM - Hourly Spill and Flow

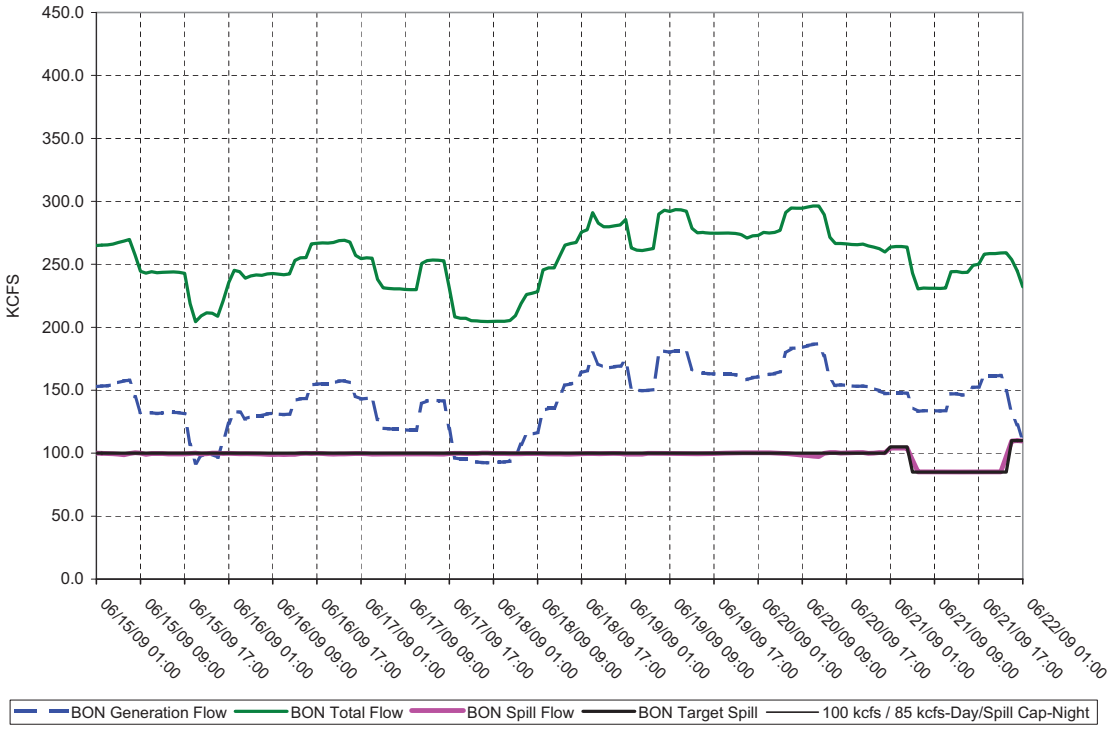
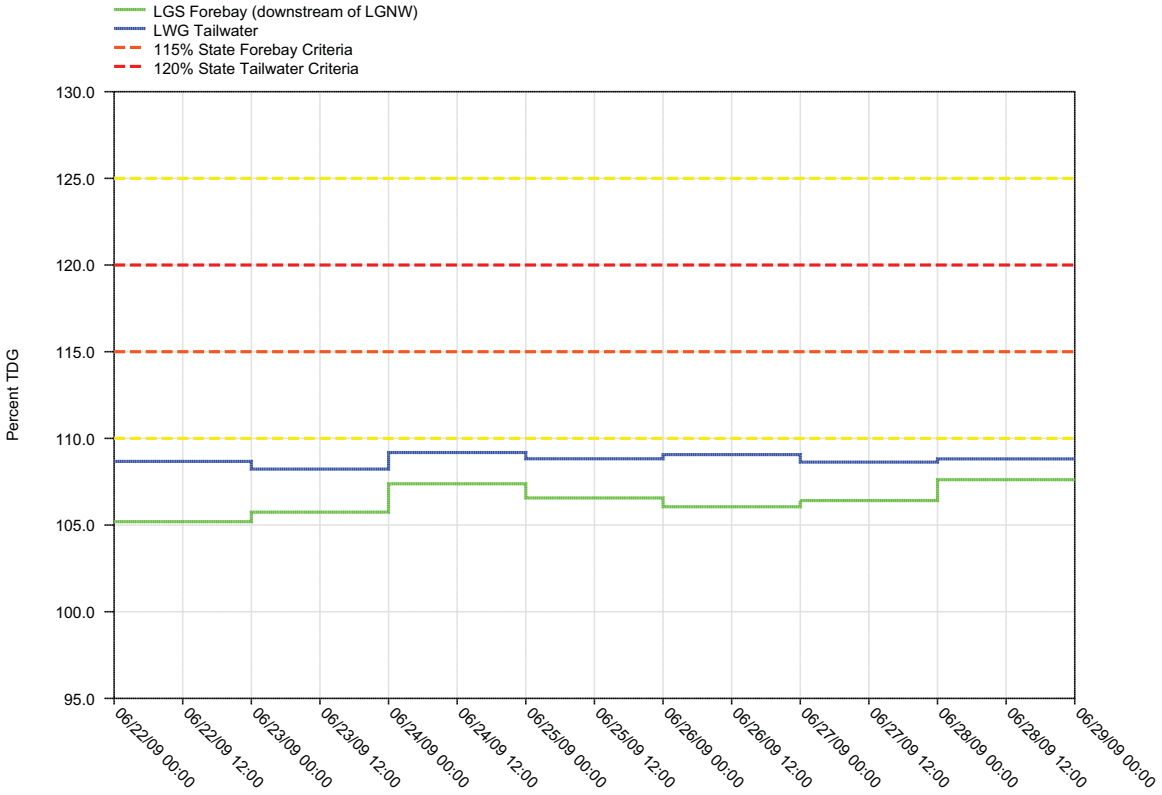


Figure 25.

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



LOWER GRANITE DAM - Hourly Spill and Flow

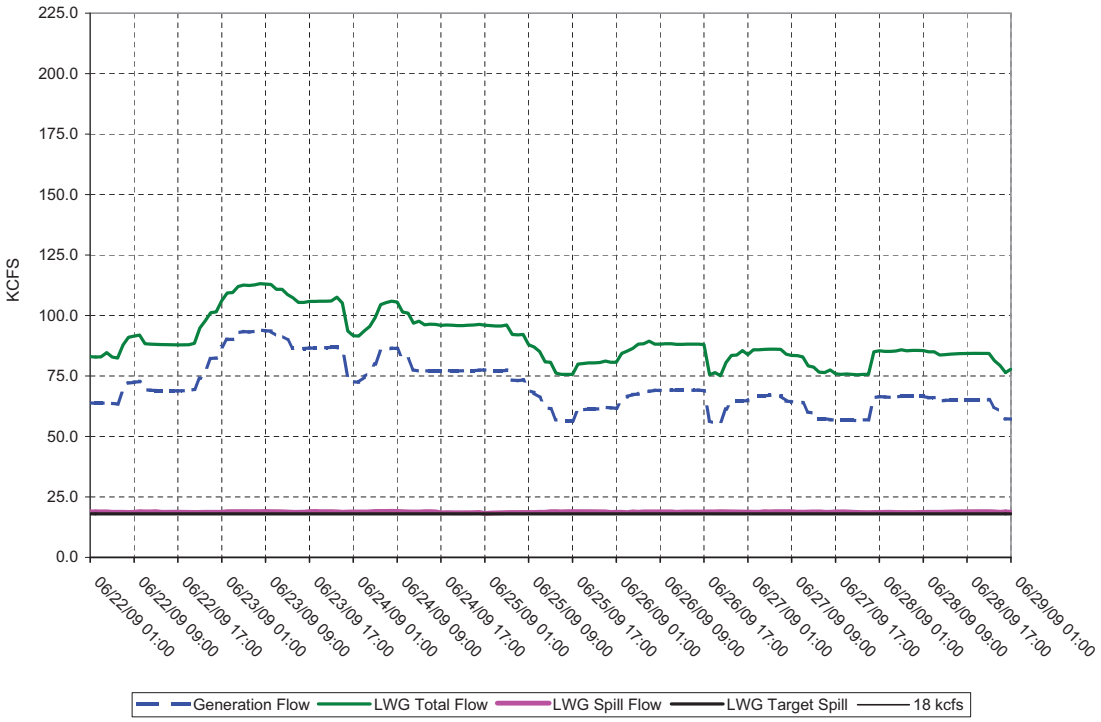
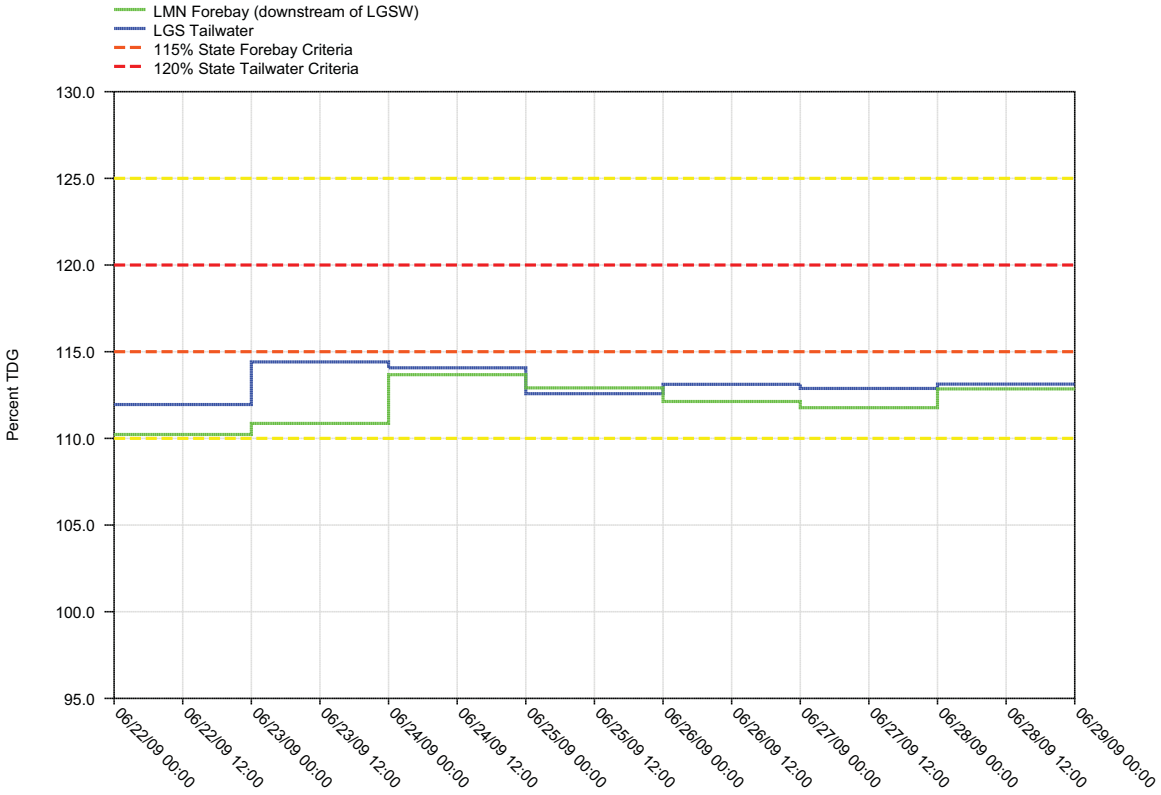


Figure 26.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

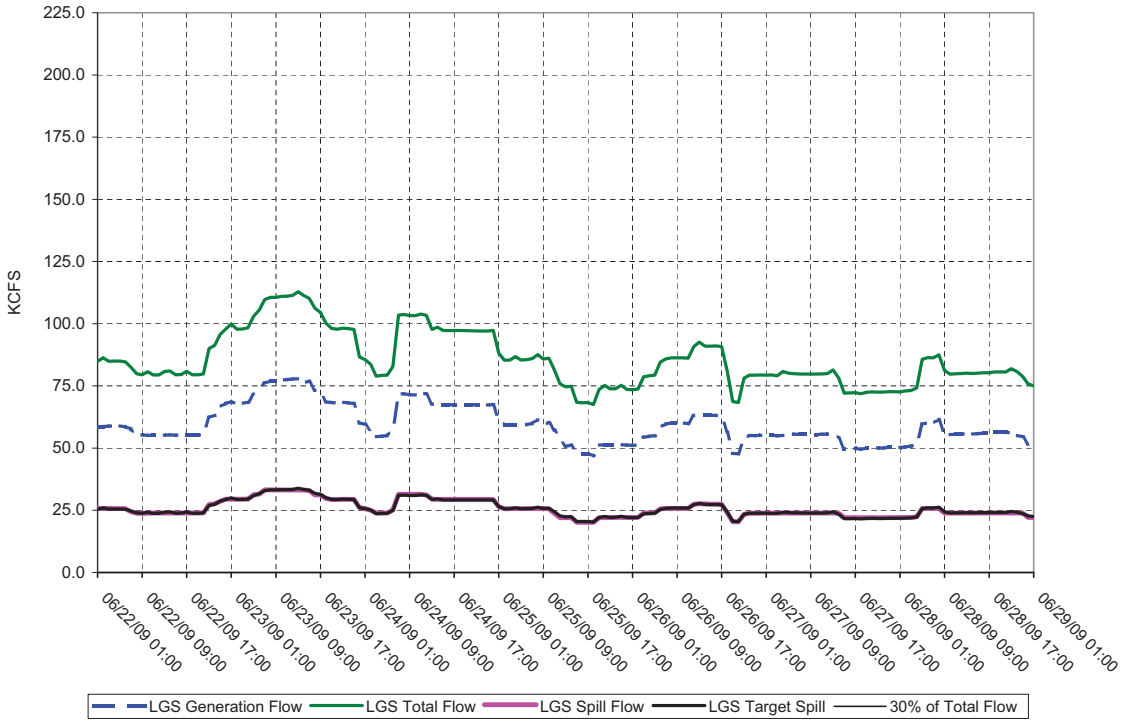
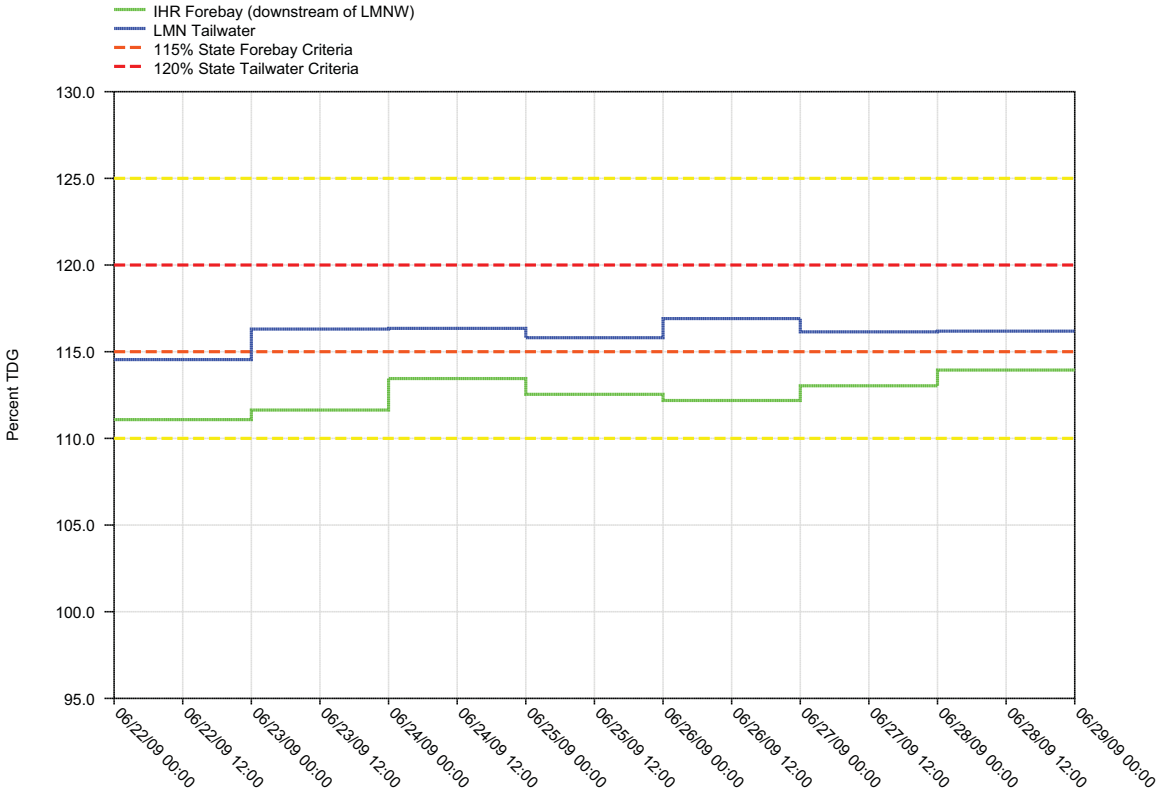


Figure 27.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

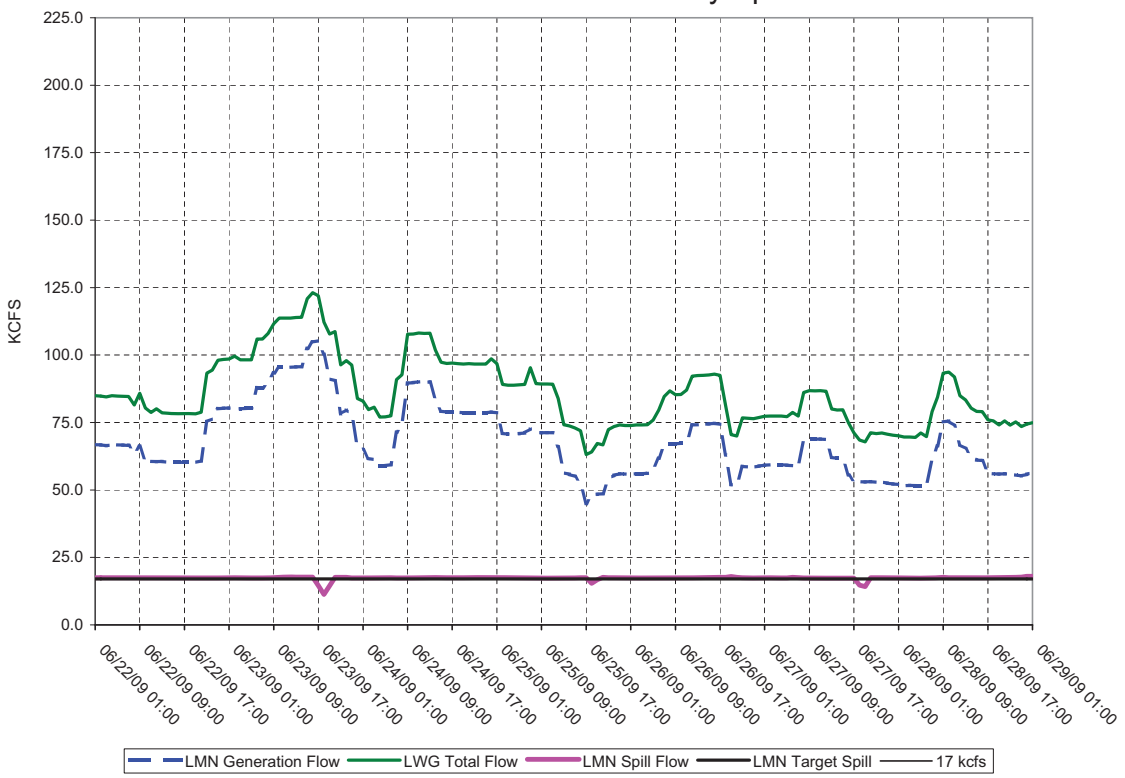
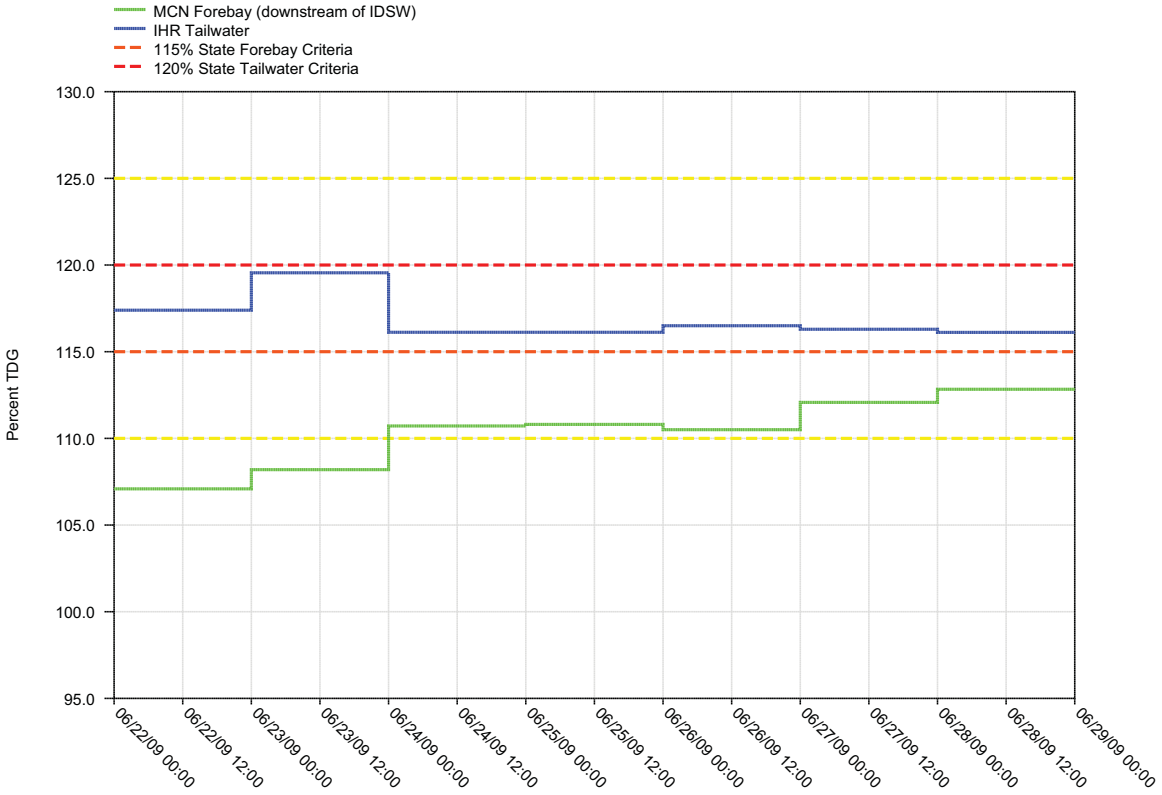


Figure 28.

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



ICE HARBOR DAM - Hourly Spill and Flow

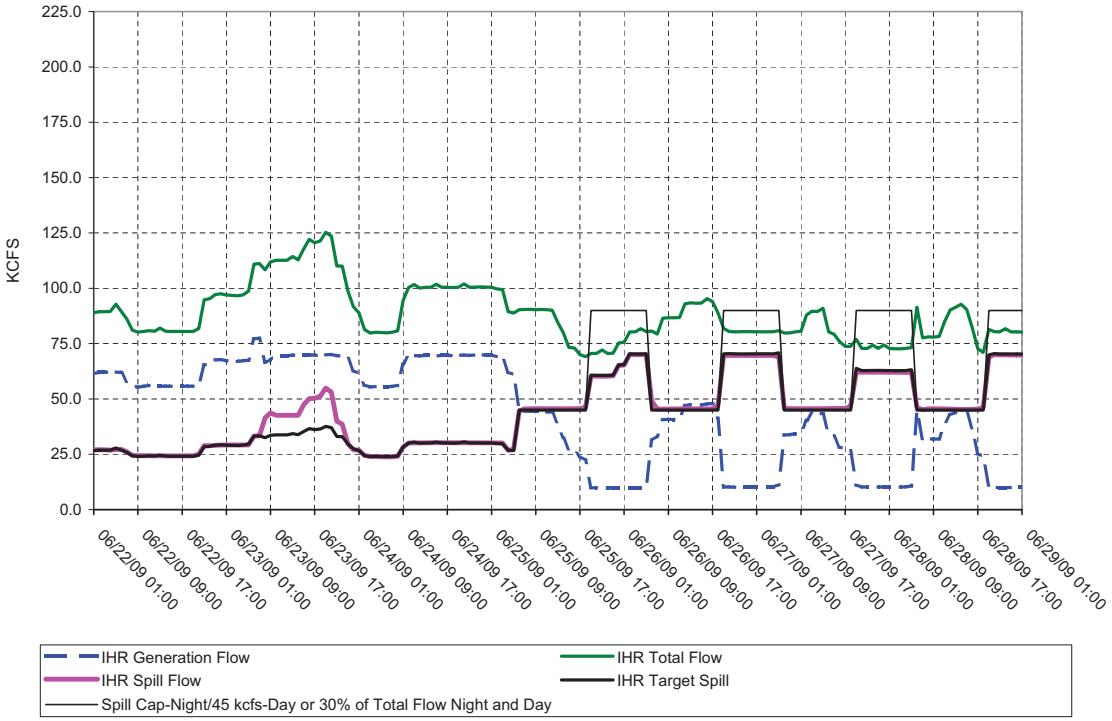
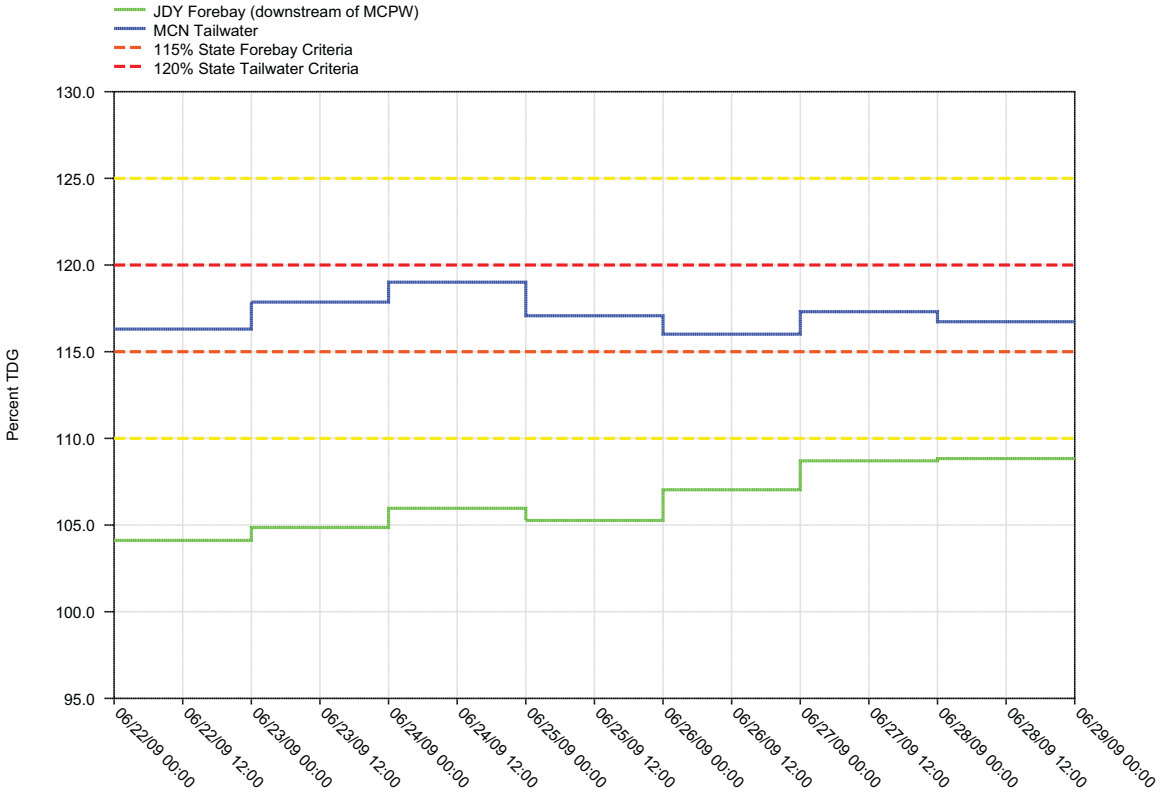


Figure 29.

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



McNARY DAM - Hourly Spill and Flow

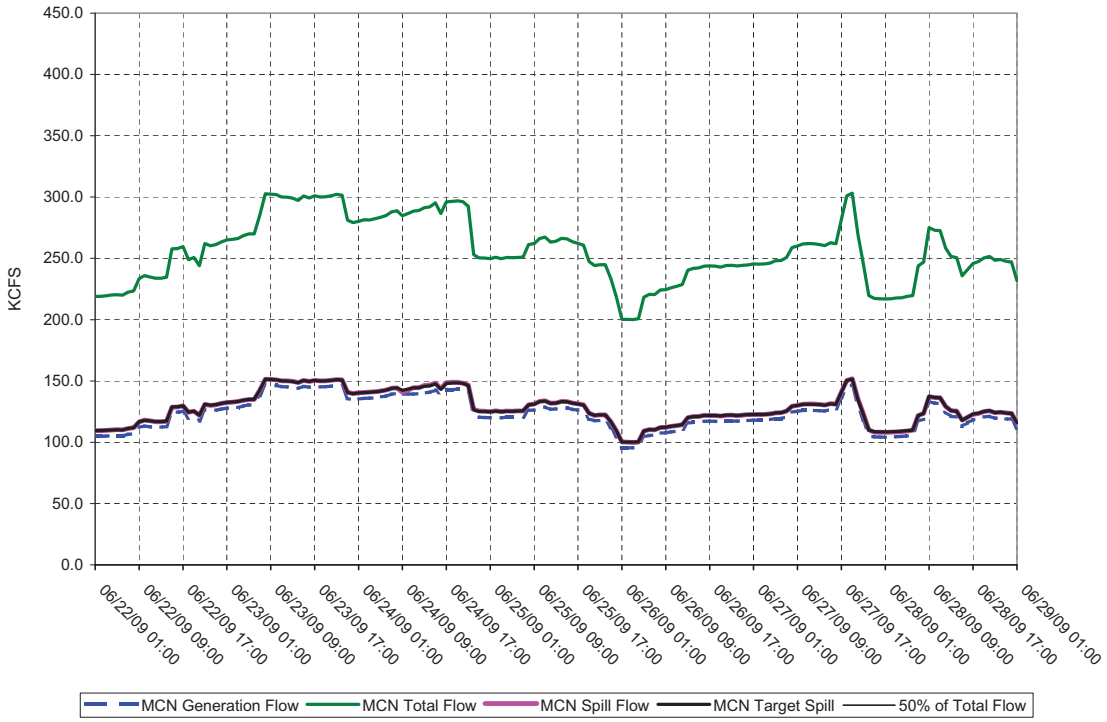
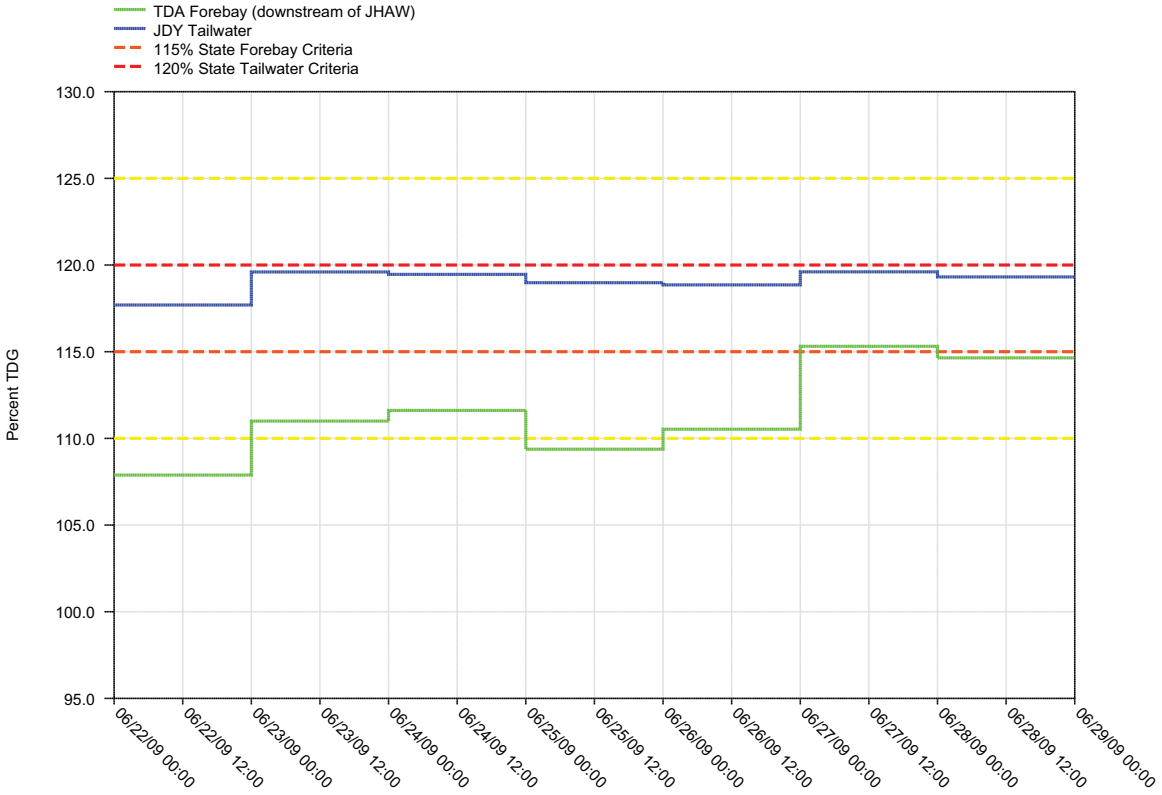


Figure 30.

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



JOHN DAY DAM - Hourly Spill and Flow

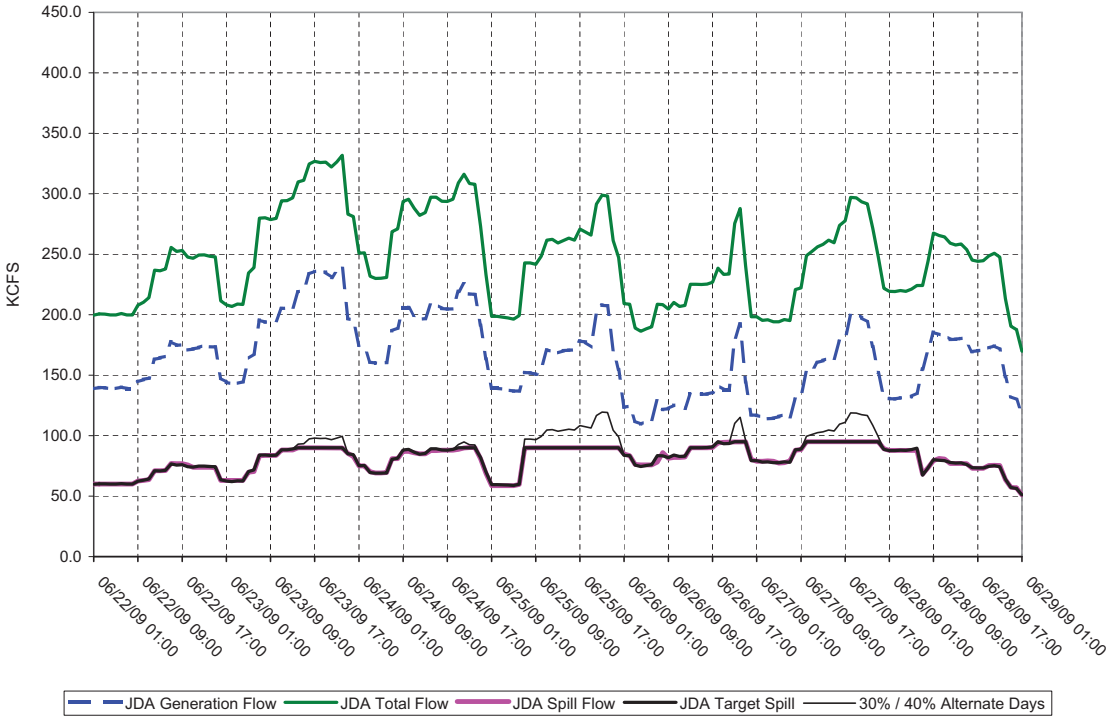
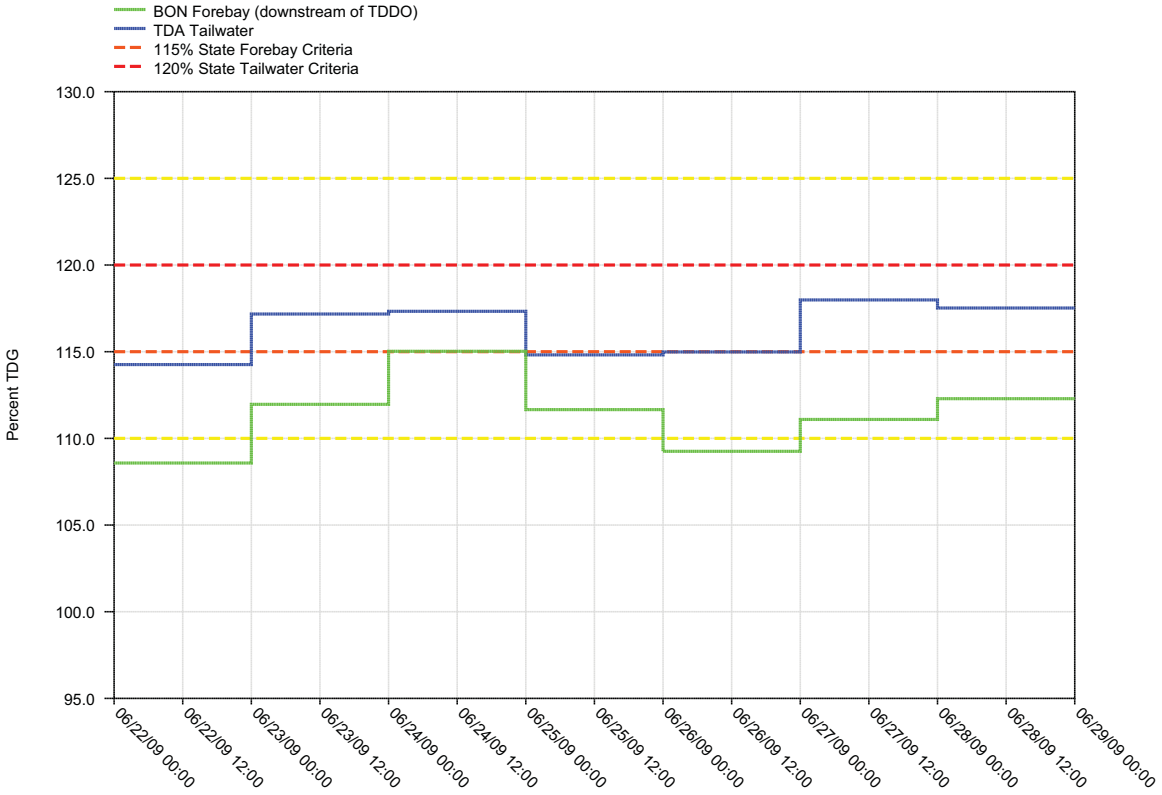


Figure 31.

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



THE DALLES DAM - Hourly Spill and Flow

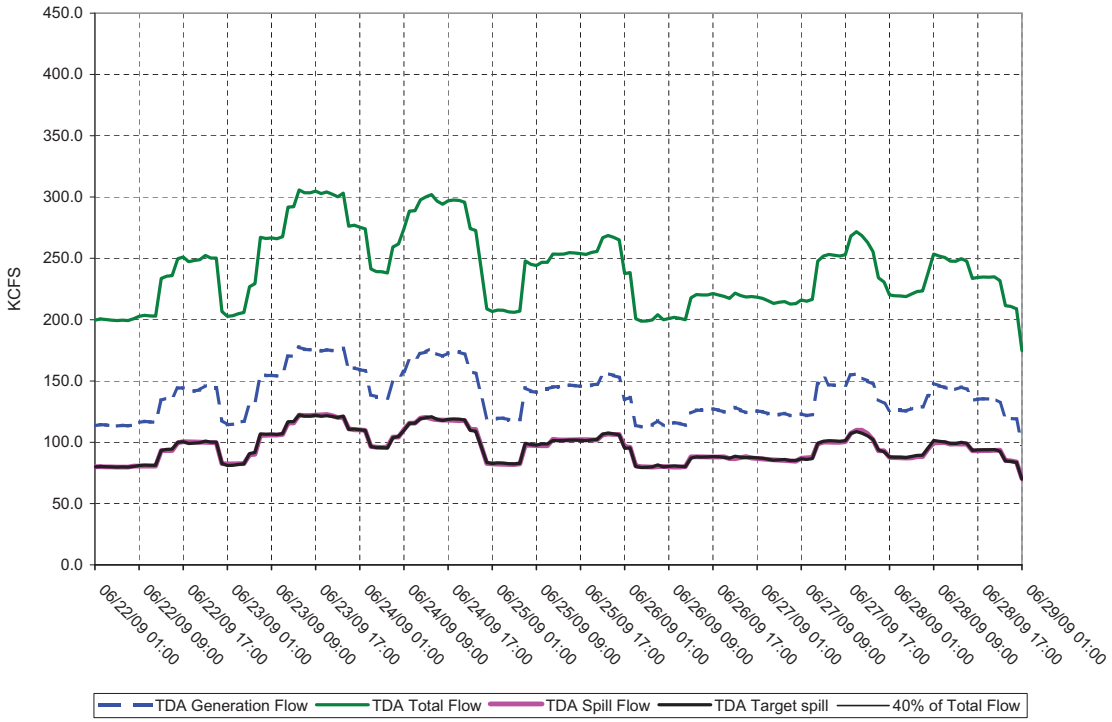
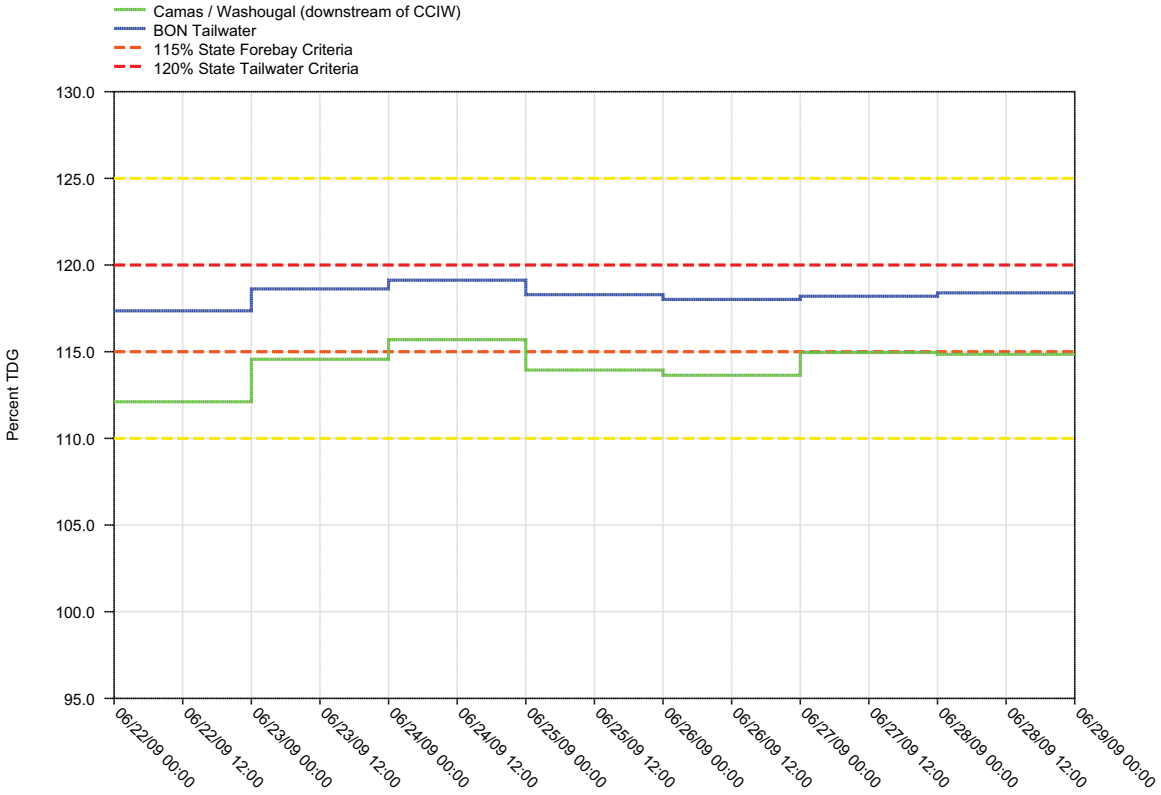
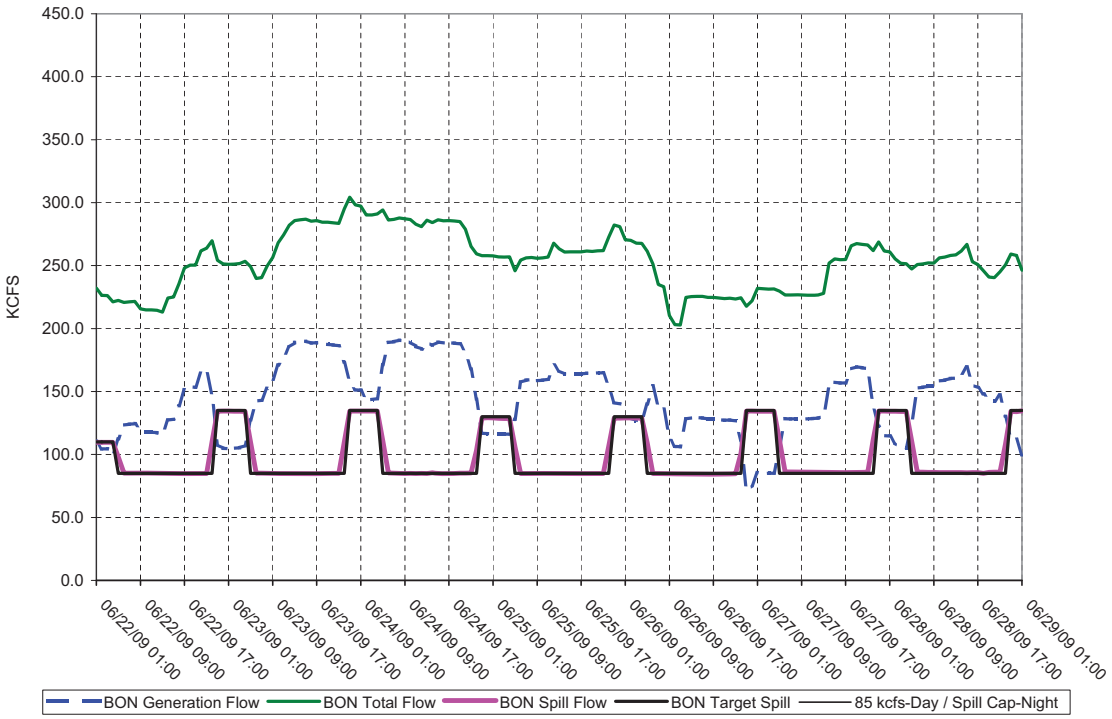


Figure 32.

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



BONNEVILLE DAM - Hourly Spill and Flow

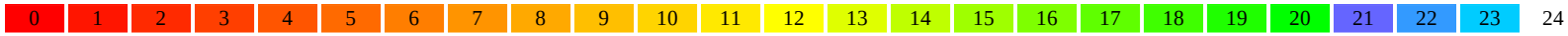


Average percent TDG for 12 highest hours: June 01 – June 28, 2009

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
06/01/2009	107.2	126.8	121.6	119.3	121.4	121.5	118.7	121.9	115.2	120.1	117.9	117.4	116.7	118.3	116.3	124.0	118.2
06/02/2009	106.9	124.8	120.8	118.1	119.6	120.1	118.2	121.7	113.6	119.3	117.4	117.4	116.0	117.9	116.7	124.0	117.9
06/03/2009	107.4	118.8	121.2	116.8	119.4	121.6	118.4	120.2	112.9	119.3	116.8	117.2	116.2	118.0	117.2	124.0	118.6
06/04/2009	107.5	117.9	120.0	116.1	119.5	121.3	119.0	119.3	113.1	119.5	116.2	119.6	115.4	117.7	117.4	124.1	118.5
06/05/2009	107.7	118.3	115.8	116.0	118.1	121.2	118.6	120.9	113.6	119.6	115.7	120.7	114.9	117.5	114.9	123.7	117.0
06/06/2009	106.9	121.8	114.2	118.3	116.0	120.4	116.9	122.0	113.6	119.4	113.9	120.4	111.8	115.4	110.6	123.5	114.5
06/07/2009	105.4	123.9	112.1	118.9	117.6	120.1	115.3	122.7	111.3	119.3	110.0	120.5	111.9	116.2	111.2	123.5	113.8
06/08/2009	106.8	120.1	116.2	118.1	118.2	122.2	117.6	121.2	111.7	120.1	109.5	120.8	112.5	118.0	114.3	124.1	116.4
06/09/2009	107.1	116.6	116.0	115.8	118.1	119.3	117.7	119.7	111.7	119.9	111.5	120.8	112.9	118.3	116.8	124.0	118.4
06/10/2009	107.0	110.8	114.7	114.9	117.0	118.2	117.2	117.5	112.8	117.9	113.7	120.1	113.5	118.1	114.9	123.8	117.1
06/11/2009	106.7	110.7	113.0	114.2	115.9	117.2	116.3	117.5	113.6	118.1	114.5	120.3	113.7	118.4	113.5	119.8	115.4
06/12/2009	106.1	110.6	110.7	114.3	115.3	117.1	115.9	120.0	112.8	117.0	115.0	119.8	113.8	117.5	113.6	118.8	114.1
06/13/2009	105.9	110.2	110.0	114.1	115.0	116.1	115.7	118.6	112.5	116.3	115.0	119.9	115.0	118.2	114.0	118.6	114.0
06/14/2009	104.9	110.3	109.7	113.9	114.8	116.0	115.3	116.9	112.2	116.8	113.1	119.8	112.8	116.9	112.7	118.4	113.5
06/15/2009	104.7	110.3	109.4	114.0	114.2	116.7	114.5	118.4	111.8	116.6	111.4	119.0	111.1	116.0	111.4	118.4	113.4
06/16/2009	104.6	110.1	109.3	114.1	113.8	117.5	114.2	119.6	110.4	116.7	110.5	119.7	111.7	116.3	111.6	118.3	113.5
06/17/2009	104.5	109.9	108.9	114.2	113.6	116.9	114.4	117.7	111.1	114.4	109.7	118.4	111.4	115.7	111.7	117.9	113.3
06/18/2009	104.7	110.1	108.0	113.7	112.6	116.2	114.2	117.1	112.2	115.3	107.5	120.0	109.7	115.7	111.3	118.6	114.3
06/19/2009	104.6	110.0	107.3	113.6	112.8	118.6	114.0	118.1	111.6	115.1	107.0	119.7	110.1	116.1	110.9	118.9	112.2
06/20/2009	104.5	110.0	108.0	113.3	112.3	118.6	113.2	118.9	108.7	117.3	106.7	119.4	109.0	116.0	110.8	118.9	111.9
06/21/2009	103.7	108.9	106.7	112.7	111.9	114.9	112.5	117.7	108.2	116.6	105.5	118.9	108.0	114.6	108.9	117.4	110.9
06/22/2009	102.1	108.7	105.2	112.0	110.2	114.5	111.1	117.4	107.1	116.3	104.1	117.7	107.9	114.3	108.6	117.4	112.1
06/23/2009	102.5	108.2	105.7	114.4	110.9	116.3	111.6	119.6	108.2	117.9	104.9	119.6	111.0	117.2	112.0	118.6	114.6
06/24/2009	104.5	109.2	107.4	114.1	113.7	116.3	113.5	---	110.7	119.0	106.0	119.5	111.6	117.3	115.0	119.1	115.7
06/25/2009	104.8	108.8	106.6	112.6	112.9	115.8	112.5	116.1	110.8	117.1	105.3	119.0	109.4	114.8	111.7	118.3	113.9
06/26/2009	104.3	109.1	106.1	113.1	112.1	116.9	112.2	116.5	110.5	116.0	107.0	118.9	110.5	115.0	109.3	118.0	113.6
06/27/2009	103.3	108.6	106.4	112.9	111.8	116.1	113.0	116.3	112.1	117.3	108.7	119.6	115.3	118.0	111.1	118.2	115.0
06/28/2009	103.4	108.8	107.6	113.1	112.9	116.2	113.9	116.1	112.8	116.7	108.8	119.3	114.6	117.5	112.3	118.4	114.8

Generated: Wed Jul 1 23:26:11 2009

Number of hours of data reported in a given day



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 2009

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 U.S. District Court of Oregon April 10, 2009 Joint Order adopting the 2009 Spring Fish Operations Plan (2009 Spring FOP) and the June 10, 2009 Order adopting the Summer Fish Operations Plan (2009 Summer FOP). The 2009 Spring FOP and Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring and summer fish migration seasons, generally April through August[1]. To the extent Corps project operations are not specified in the 2009 Spring FOP or the 2009 Summer FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2009 Water Management Plan (WMP), WMP seasonal updates, and the 2009 Fish Passage Plan (FPP).

The Corps' July 2009 lower Snake and Columbia River project and fish passage operations 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) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2009 Spring or Summer FOP in July.

Data Reporting:

[1] The 2009 Summer FOP identified various projects in which spill operations transitioned from a spring operation to a summer operation during the month of June. The reporting period for the Fish Operation Plan Implementation Report for July begins on June 29, therefore some projects were still operating in accordance with the 2009 Spring FOP. These projects transitioned to summer operations beginning on or about July 1.

I. For each project providing fish passage operations, this report contains two graphs per operational week[2] for 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 29 and end on August 2 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 at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on June 29 for the lower Snake and the lower Columbia projects.

June 29 – July 5	Figures 1 – 8
July 6 – July 12	Figures 9 – 16
July 13 – July 19	Figures 17 – 24
July 20 – July 26	Figures 25 – 32
July 27 – August 2	Figures 33 – 40

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours. This is primarily a result of spill at dams. The objective is to operate each project up to the TDG limits without exceeding those limits to the extent 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% TDG is the upper operating limit.

B. Lower Graph: Shows the hourly 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 medium green line represents the average hourly total river flow through the project in 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 2009 Spring FOP or the 2009 Summer FOP.

[2] Operations are implemented from Monday through Sundays.

- 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:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described above. When spill levels briefly deviate below or above the level specified in the applicable 2009 Spring or Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The July 2009 Spring and Summer FOP Spill Report Table (July 2009 Spring/Summer Spill Report Table) includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the July 2009 Spring/Summer 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 applicable 2009 FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. 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, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not include this volume of water. However, the actual spill volume remains constant. When these variances occur, they are recorded in the monthly Spill Report Table for Little Goose under the variance Type "Navigation."

Also it is important to note that actual spill levels at Corps projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the applicable 2009 Spring FOP or Summer FOP and the RCC spill priority list, which defines the projects' TDG 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 2009 Spring FOP and the 2009 Summer FOP describe project operations during "Rapid Load Changes" (pages 5-6). For reporting purposes, the notation "Transmission Stability" in the July 2009 Spring/Summer Spill Report Table will replace "Rapid Load Changes" 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 by more than the +/- 1% requirement than other hours. On days cited in the table, the 24 hour average spill percent was within the applicable 2009 Spring or Summer FOP level of +/- 1% of the target spill unless limited by the TDG spill cap.

Occurrences which required an adjustment in operations and/or regional coordination are described in greater detail in the section below entitled "Operational Adjustments for July."

July Operations

The month of July was characterized by below average flows for the lower Columbia River and average flows for the lower Snake River.

During the July reporting period, the daily FOP spill operations were carried out as follows:

- Lower Granite Dam - the hourly target spill was a fixed quantity of 18 kcfs 24 hours per day.
- Little Goose Dam - the hourly target spill was 30% of the total flow for 24 hours per day.
- Lower Monumental Dam – the hourly target spill was a fixed quantity of 17 kcfs 24 hours per day.
- Ice Harbor Dam – the hourly target spill was 45 kcfs day/TDG spill cap night and 30% of total flow for 24 hours due to the two treatment summer spill tests up to July 12, at which time the target spill was changed to 45 kcfs day/TDG spill cap night.
- McNary Dam – the hourly target spill was 50% of total flow for 24 hours per day.
- John Day Dam – the target spill was 30% of total flow for 24 hours per day and 40% of total flow for 24 hours due to the two treatment summer spill tests up to July 20, at which time the target spill was changed to 30% of total flow for 24 hours per day.
- The Dalles Dam - the target spill was 40% of the total flow for 24 hours per day.
- Bonneville Dam - the hourly target spill was 85 kcfs day/TDG spill cap night up to July 21, at which time the target spill changed to 75 kcfs day/TDG spill cap night.

Operational Adjustments for July:

1. Little Goose Dam:

   On July 29, a fish screen inspection occurred at the project as scheduled in the FPP which required operators to switch to a larger generation unit. As a result, generation increased slightly by 1.4 kcfs, however spill level did not change.

2. Lower Monumental Dam:

   On July 20, a full powerhouse outage occurred as scheduled in the FPP to conduct Doble testing. As a result, the project spilled 39.4 kcfs for one hour, exceeding the 2009 Summer FOP spill level. This testing was originally scheduled to occur in June, as stated in the FPP. Through coordination with FPOM, the testing was rescheduled for July 20.

3. Ice Harbor:

- A two treatment summer test (45kcfs/gas cap vs. 30% of total flow) to evaluate juvenile fish passage and survival continued from June 7 as the summer spill test described in the Summer FOP, and concluded on July 11.
- On July 31 and August 2, BPA declared a transmission system emergency requiring the Corps to increase generation above minimum generation for a total of 64 minutes on July 31 and 176 minutes on August 2. A detailed description of these transmission emergencies was provided to the Court on August 6, 2009.

4. McNary:

- The single treatment summer test with continuous 50% spill that began on June 20 continued throughout the month of July. The spillway weir in spill bay 4 was moved to spill bay 19 for the summer test, next to the spillway weir in spill bay 20. The summer test will conclude about August 3, while 50% spill operations will continue through August 31.
- On July 22, the project began spilling to the TDG spill cap instead of the 50% target spill operation. A System Operational Request (SOR) 2009-03 was discussed and coordinated with TMT on July 22. Project operations were adjusted in response to elevated water temperatures and resulting increased mortality of juvenile salmonids passing through the juvenile bypass system. This operation was in place until July 24 at 1200 hours when the temperature ranges that fish experienced was reduced. A detailed description was provided to the Court on July 24, 2009.

5. John Day:

   The two treatment summer test (30% vs. 40%) that began on June 25, concluded on July 20. Beginning on July 20 at 0600 hours, the spill level changed to a constant 30% 24 hours per day. This operation will continue through August 31.

6. Bonneville:

   On July 29, elevated air and water temperatures were driving TDG levels above 115% at the Camas Washougal monitoring site, and spill was reduced to 70 kcfs at the project. Because fish survival through the spillway is reduced at spill levels below 75 kcfs, an agreement was reached at TMT to set the spill cap at no lower than 75 kcfs, as long as TDG levels do not exceed 120% at the Camas Washougal monitoring site. This operational interim measure will continue through August to maintain high fish survival through the spillway.

July 2009 Spring/Summer Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Reduced Spill %	6/29/2009	1800	1	Navigation	Hourly % spill decreased to 28.9% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.7%.
Little Goose	Reduced Spill %	7/1/2009	1300	1	Navigation	Hourly % spill decreased to 28.8% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill %	7/6/2009	0600, 2400	2	Navigation	Hourly % spill decreased to 28.7 and 28.9% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill %	7/15/2009	0900-1000, 1300	3	Navigation	Hourly % spill decreased to 28.9 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.6%.

Little Goose	Reduced Spill %	7/20/2009	0100	1	Navigation	Hourly % spill decreased to 28.9 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 47.0 kcfs. 24 hr avg. spill was 30.1%.
Little Goose	Reduced Spill %	7/21/2009	0100	1	Navigation	Hourly % spill decreased to 28.2 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 43.2 kcfs. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill %	7/22/2009	0300	1	Navigation	Hourly % spill decreased to 28.7 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 40.8 kcfs. 24 hr avg. spill was 29.8%.

Little Goose	Reduced Spill %	7/22/2009	2400	1	Navigation	Hourly % spill decreased to 28.8 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 47.3 kcfs. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill %	7/23/2009	1300	1	Navigation	Hourly % spill decreased to 28.0 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 35.3 kcfs. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill %	7/23/2009	1500	1	Navigation	Hourly % spill decreased to 28.9 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 34.2 kcfs. 24 hr avg. spill was 29.8%.

Little Goose	Reduced Spill %	7/25/2009	1300	1	Navigation	Hourly % spill decreased to 28.3 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 35.0 kcfs. 24 hr avg. spill was 29.4%.
Little Goose	Reduced Spill %	7/27/2009	0100	1	Navigation	Hourly % spill decreased to 28.4 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 34.9 kcfs. 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	7/27/2009	1300	1	Human/Program Error	Hourly % spill decreased to 28.0 % (below 30% ±1% range) Log book shows the project was requested to change spill to 11.7 kcfs at 1225 hour, but change did not occur until 1318. 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	7/28/2009	0100	1	Navigation	Hourly % spill decreased to 28.5 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 34.7 kcfs. 24 hr avg. spill was 29.7%.

Little Goose	Reduced Spill %	7/29/2009	0600	1	Navigation	Hourly % spill decreased to 28.4 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 34.8 kcfs. 24 hr avg. spill was 29.5%.
Little Goose	Reduced Spill %	7/29/2009	1100	1	Maintenance	Hourly % spill decreased to 28.1 % (below 30% ±1% range) as generation increased by 1.4 kcfs. It was necessary to take off line a small unit and bring on a large unit in order to perform the fish screen inspection. The large units generate more than a small unit. The fish screen inspections are documented in the 2009 FPP. Actual spill volume remained constant. 24 hr avg. spill was 29.5%.
Little Goose	Reduced Spill %	7/29/2009	1300	1	Navigation	Hourly % spill decreased to 28.0 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 35.3 kcfs. 24 hr avg. spill was 29.5%.
Little Goose	Reduced Spill %	8/1/2009	1400	1	Navigation	Hourly % spill decreased to 28.1 % (below 30% ±1% range) due to volume

						of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 35.2 kcfs. 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	8/3/2009	0100	1	Navigation	Hourly % spill decreased to 28.4 % (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). Total flow was 34.9 kcfs. 24 hr avg. spill was 29.4%.
Lower Monumental	Reduced Spill	6/29/2009	1700 - 1800	2	Navigation	Hourly spill dropped to 11.3 and 14.9 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/1/2009	1700 - 1800	2	Navigation	Hourly spill dropped to 12.3 and 14.0 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/3/2009	1700, 1900	2	Navigation	Hourly spill dropped to 13.7 and 14.7 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/5/2009	1800	1	Navigation	Hourly spill dropped to 13.3 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/7/2009	1800-1900	2	Navigation	Hourly spill dropped to 13.6 kcfs, below

						the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/9/2009	1700-1800	2	Navigation	Hourly spill dropped to 11.1 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/11/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.2 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/13/2009	1700-1900	3	Navigation	Hourly spill dropped to 12.7 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/15/2009	1700-1800	2	Navigation	Hourly spill dropped to 10.9 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/17/2009	1700-1800	2	Navigation	Hourly spill dropped to 11.6 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/19/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.1 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Increased Spill	7/20/2009	1000-1300	4	Maintenance	Hourly spill increased to 39.4 kcfs, above the FOP spill volume of 17 kcfs and spill cap of 35 kcfs due to a scheduled powerhouse line outage during doble testing. Outage is scheduled in the Fish

						Passage Plan, Table LMN-1.
Lower Monumental	Reduced Spill	7/21/2009	1700-1800	2	Navigation	Hourly spill dropped to 10.3 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/23/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.6 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/25/2009	1700-1900	3	Navigation	Hourly spill dropped to 11.6 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/27/2009	1700-1800	2	Navigation	Hourly spill dropped to 13.1 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/29/2009	1700-1800	2	Navigation	Hourly spill dropped to 9.2 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	7/31/2009	1700-1800	2	Navigation	Hourly spill dropped to 10.7 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	8/2/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.1 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Ice Harbor	Increased Spill %	7/4/2009	0600 - 0700	2	Operational Limitation	Hourly % spill increased to 75.7% (above 30% ±1% range) Project was on

						spill priority due to lack of load while managing GCL refill. 24 hr avg. spill was 32.3%.
Ice Harbor	Reduced Spill %	7/7/2009	1200-1300	2	Navigation	Hourly % spill decreased to 28.9 and 28.7% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume did not change.
Ice Harbor	Reduced Spill	7/20/2009	1600	1	Human/Program Error	Hourly spill was 40.7 kcfs (below FOP spill of 45 kcfs). Log book shows the project operator was requested to change to 45 kcfs at 1525 hour, but change did not occur until later in the hour. 24 hr avg. spill was 40.7 kcfs.
Ice Harbor	Reduced Spill	7/29/2009	0900 & 1100	2	Maintenance	Project generated between 13.4-13.8 kcfs which is outside of minimum generation range 8.5-11.5 kcfs for units 1-3. Project was returning unit 2 back to service after an overhaul maintenance resulting in generating above the 11.5 kcfs minimum generation. Actual spill volume did not change for 0900 hour but it dropped 5.1 kcfs for 1100 hour. See page 3 under "Low flow".

Ice Harbor	Reduced Spill	7/31/2009	1700	1	Transmission Stability	Project generated 17.3 kcfs which is above of minimum generation range 8.5 - 11.5 kcfs for units 1-3. Project added unit 1 after BPA declared a transmission emergency at 1554 hour. See page 6 under "Ice Harbor" bullet.
Ice Harbor	Reduced Spill	8/2/2009	1800 - 1900	2	Transmission Stability	Project generated up to 13.6 kcfs which is above of minimum generation range 8.5-11.5 kcfs for units 1-3. Project increased generation after BPA declared a transmission emergency at 1720 hour. See page 6 under "Ice Harbor" bullet.
McNary	Increased Spill %	7/4/2009	0700	1	Operational Limitation	Hourly % spill increased to 60.4% (above 50% ±1% range) Project was on spill priority due to lack of load while managing GCL refill. 24 hr avg. spill was 50.4%.
McNary	Reduced Spill %	7/16/2009	1000 - 1100	2	Navigation	Hourly % spill decreased to 32.2% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.0%.
McNary	Reduced Spill %	7/18/2009	0700; 1100 - 1200	3	Navigation	Hourly % spill decreased to 18.2% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.0%.

McNary	Reduced Spill %	7/20/2009	0700 & 1100	2	Navigation	Hourly % spill decreased to 21.2% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.2%.
McNary	Reduced Spill %	7/22/2009	0600-0700 & 1100	3	Navigation	Hourly % spill decreased to 21.8% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 55.7%.
McNary	Reduced Spill %	7/25/2009	0800 & 1000	2	Navigation	Hourly % spill decreased to 35.7% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.9%.
McNary	Reduced Spill %	7/26/2009	0600-0700 & 1000	3	Navigation	Hourly % spill decreased to 23.6% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.0%.
McNary	Reduced Spill %	7/27/2009	0700-0800 & 1000	3	Navigation	Hourly % spill decreased to 34.4% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.4%.
McNary	Reduced Spill %	7/28/2009	0800-1000	3	Navigation	Hourly % spill decreased to 28.1% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.4%.
McNary	Reduced Spill %	7/29/2009	0700-1000	4	Navigation	Hourly % spill decreased to 37.3% (below 50% ±1%

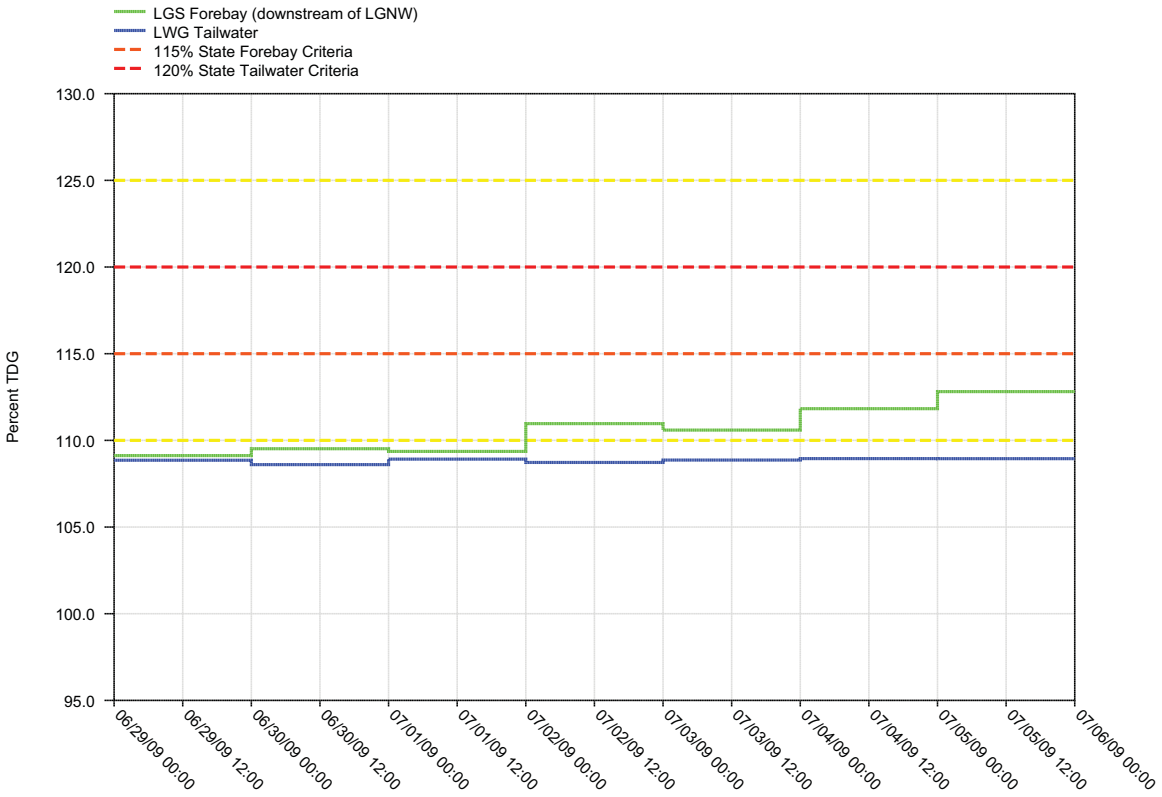
						range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.9%.
McNary	Reduced Spill %	7/30/2009	0700-0800; 1000	3	Navigation	Hourly % spill decreased to 40.5% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.4%.
McNary	Reduced Spill %	7/31/2009	0800-1000	3	Navigation	Hourly % spill decreased to 36.4% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.1%.
McNary	Reduced Spill %	8/1/2009	0700-1000	4	Navigation	Hourly % spill decreased to 41.3% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.2%.
McNary	Reduced Spill %	8/2/2009	0700-0800; 1000	3	Navigation	Hourly % spill decreased to 38.1% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.1%.
McNary	Reduced Spill %	8/3/2009	0700-0800	2	Navigation	Hourly % spill decreased to 40.1% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.7%.

John Day	Increased Spill %	7/4/2009	0700	1	Operational Limitation	Hourly % spill increased to 48.9% (above 30% ±1% range). Project was on spill priority due to lack of load while managing GCL refill. 24 hr avg. spill was 30.8%.
The Dalles	Reduced Spill %	6/30/2009	0700	1	Human/Program Error	Hourly % spill decreased to 38.4% (below 40% ±1% range). BPA requested an increase in spill three times within the hour; however, the project operator was not available to implement the last request (0647) until 25 minutes later. Actual spill volume increased, while percentage decreased. 24 hr avg. spill was 40.0%.

* Due to safety concerns at Lower Monumental Dam, towboat captains may request reduction or elimination of spill to ensure safe conditions when transiting the juvenile fish barge across the tailrace, docking, and disembarking from the fish collection facility. During juvenile fish loading operations, spill is typically reduced to 15 kcfs, but can be reduced further if needed for safety reasons. (See Spring/Summer 2009 FOP, p. 10).

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

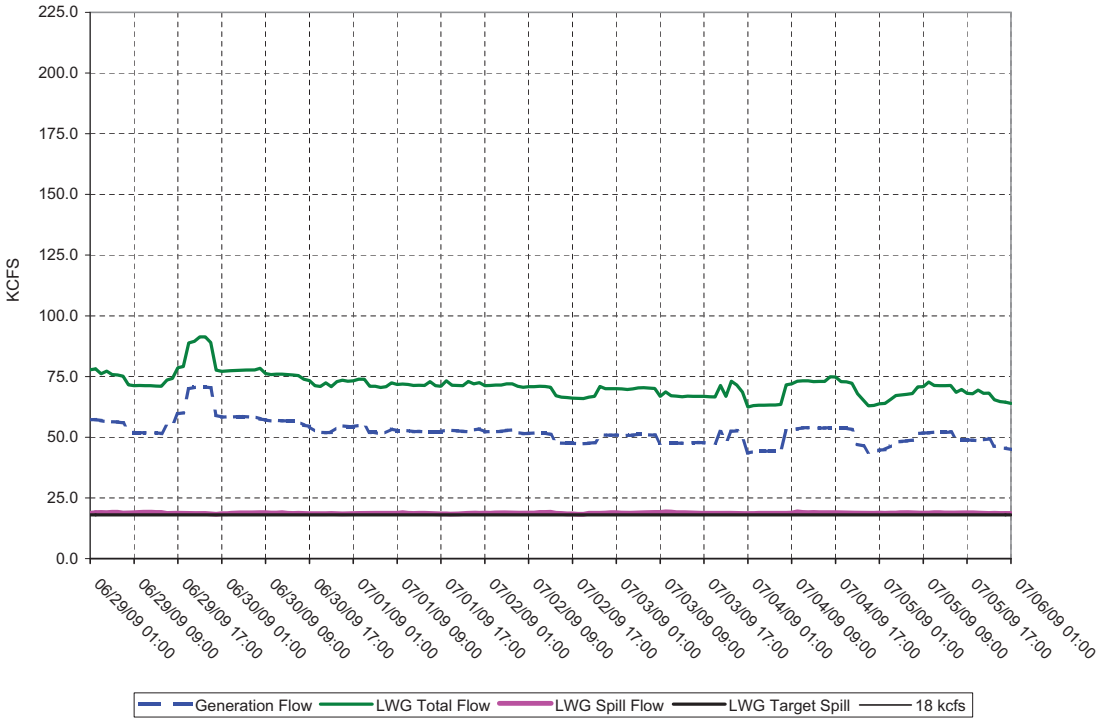
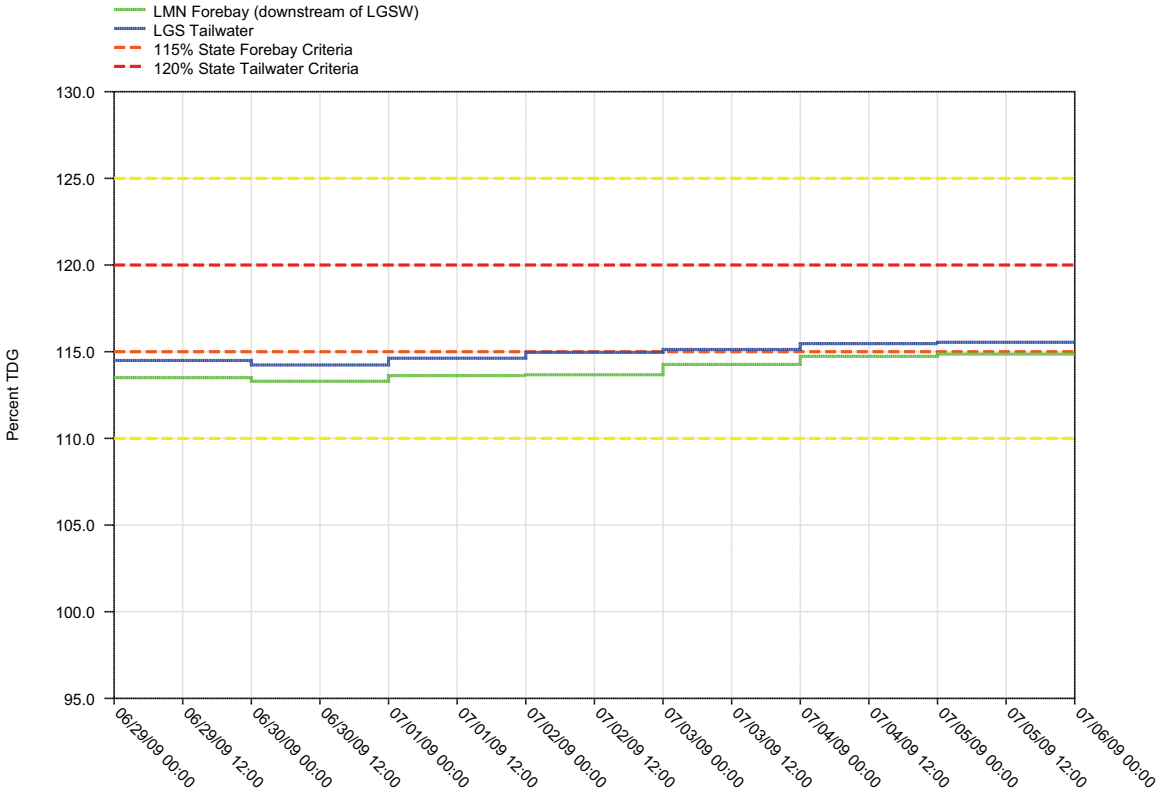


Figure 2.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

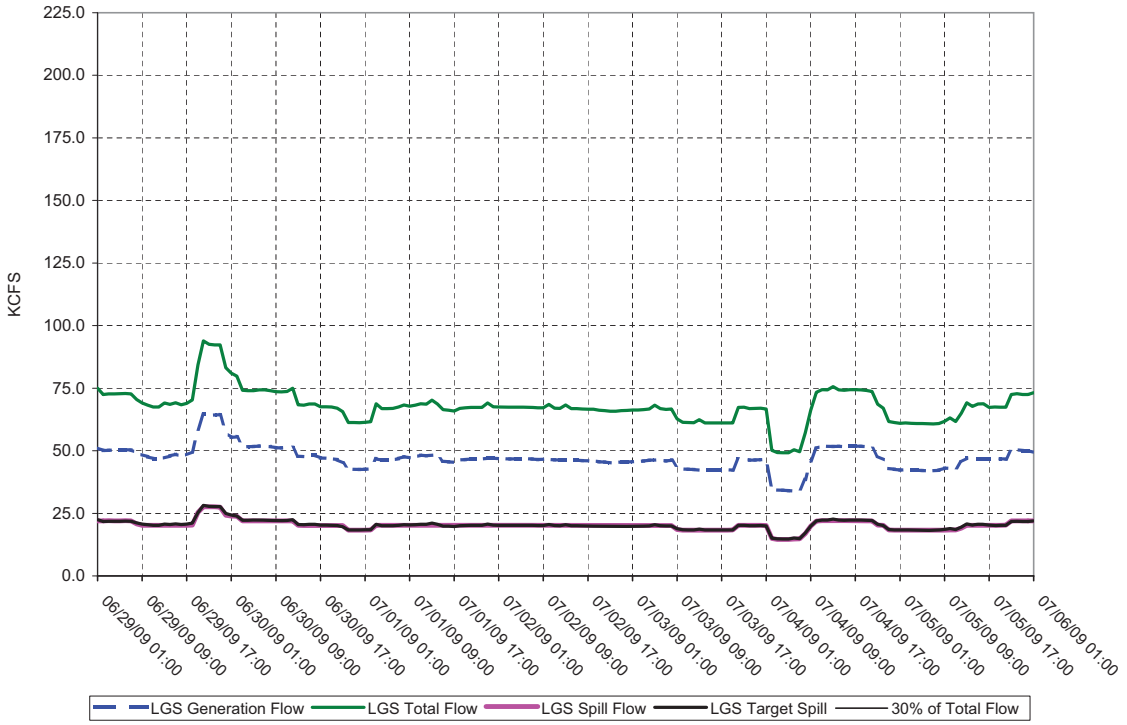
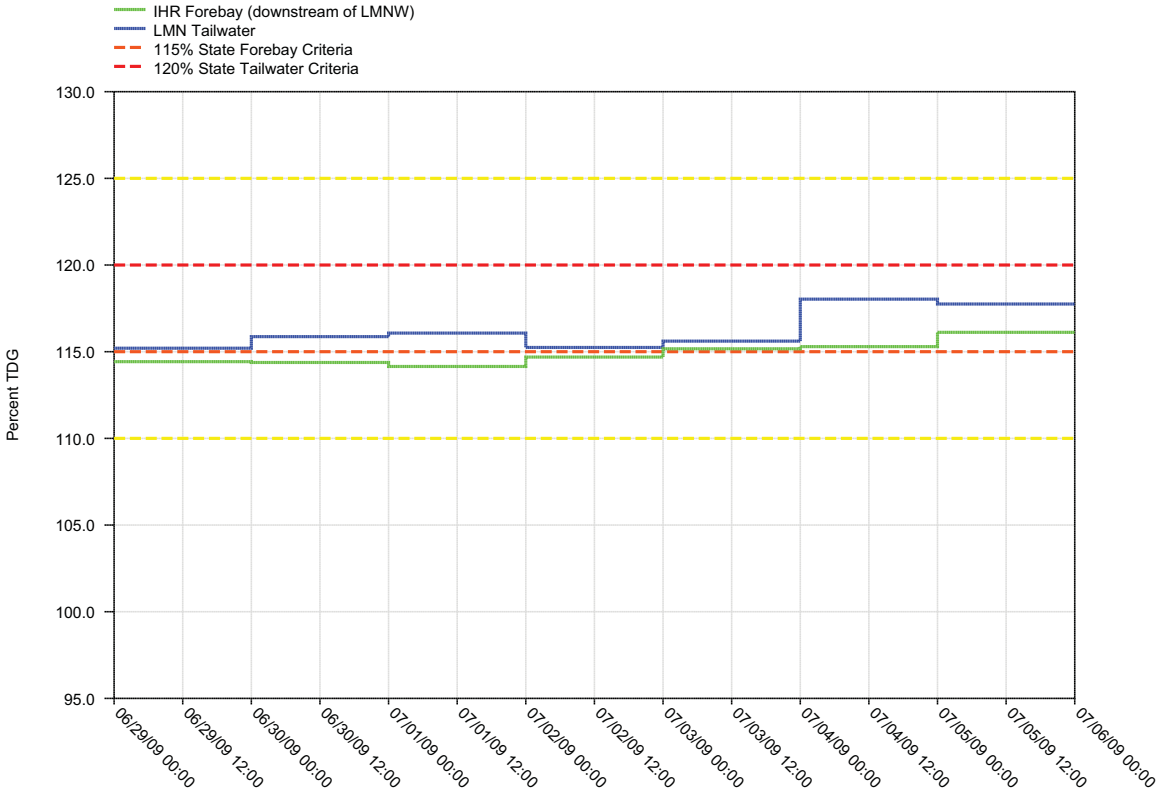


Figure 3.

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



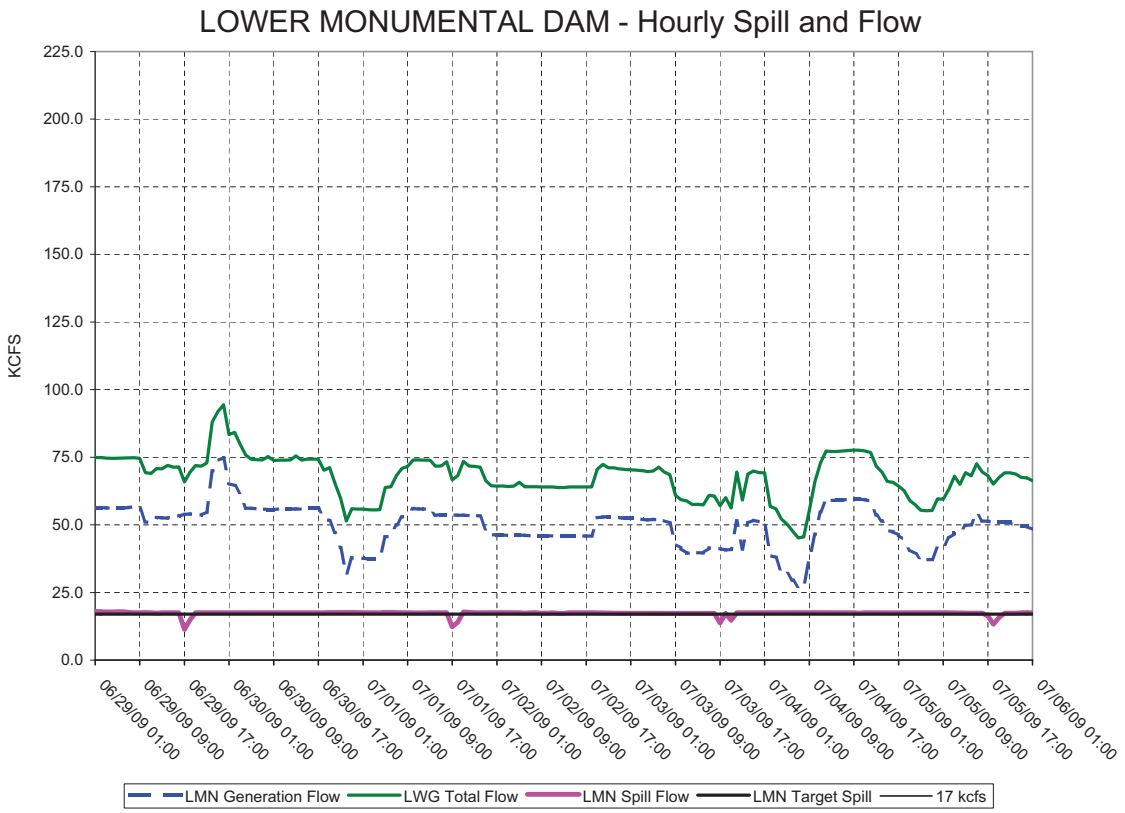
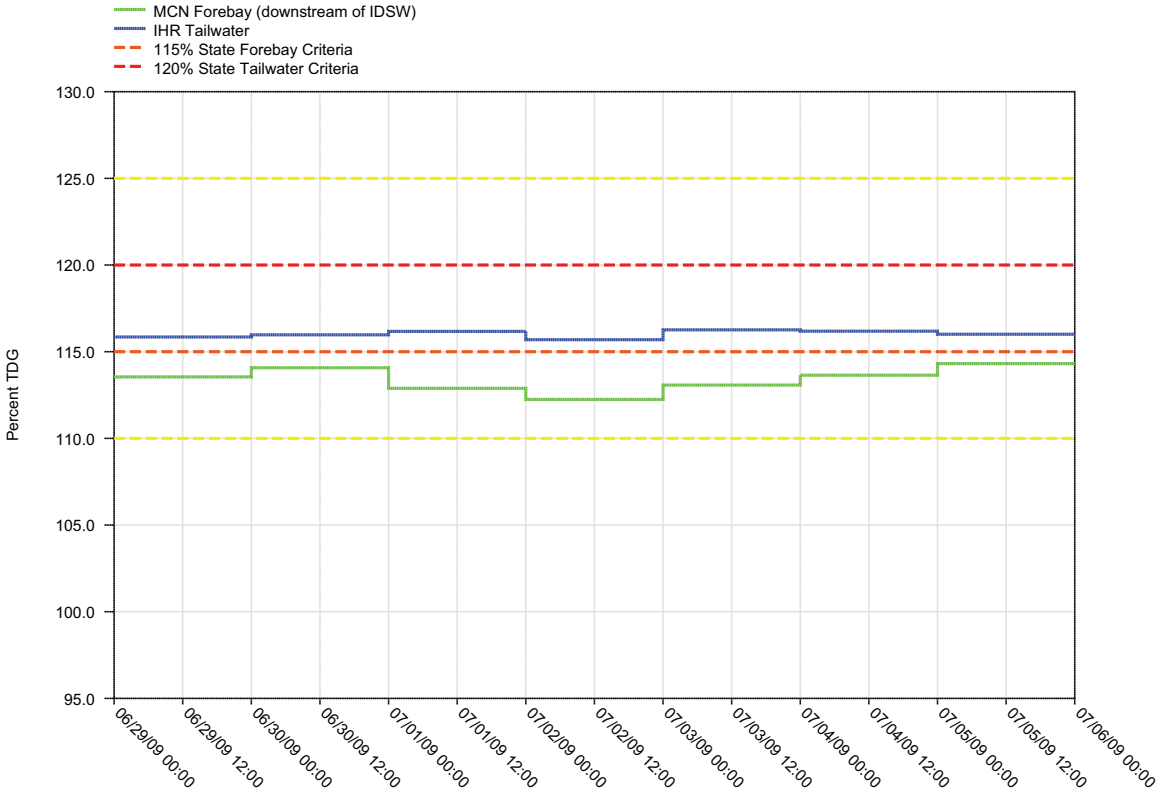


Figure 4.

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



ICE HARBOR DAM - Hourly Spill and Flow

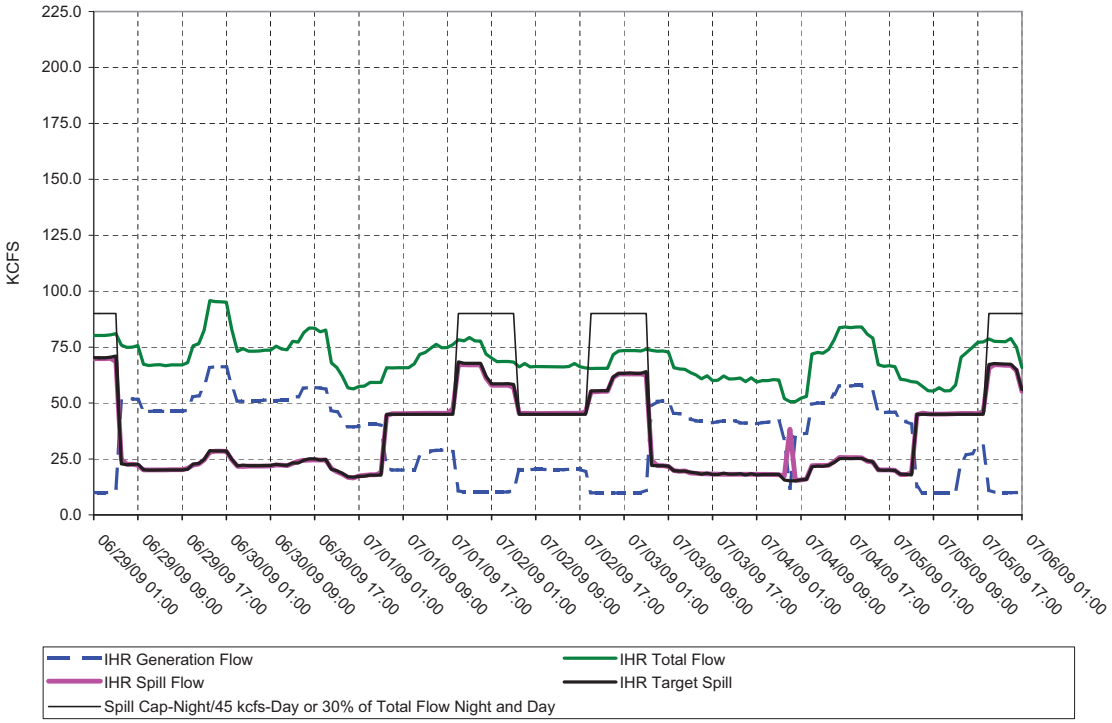
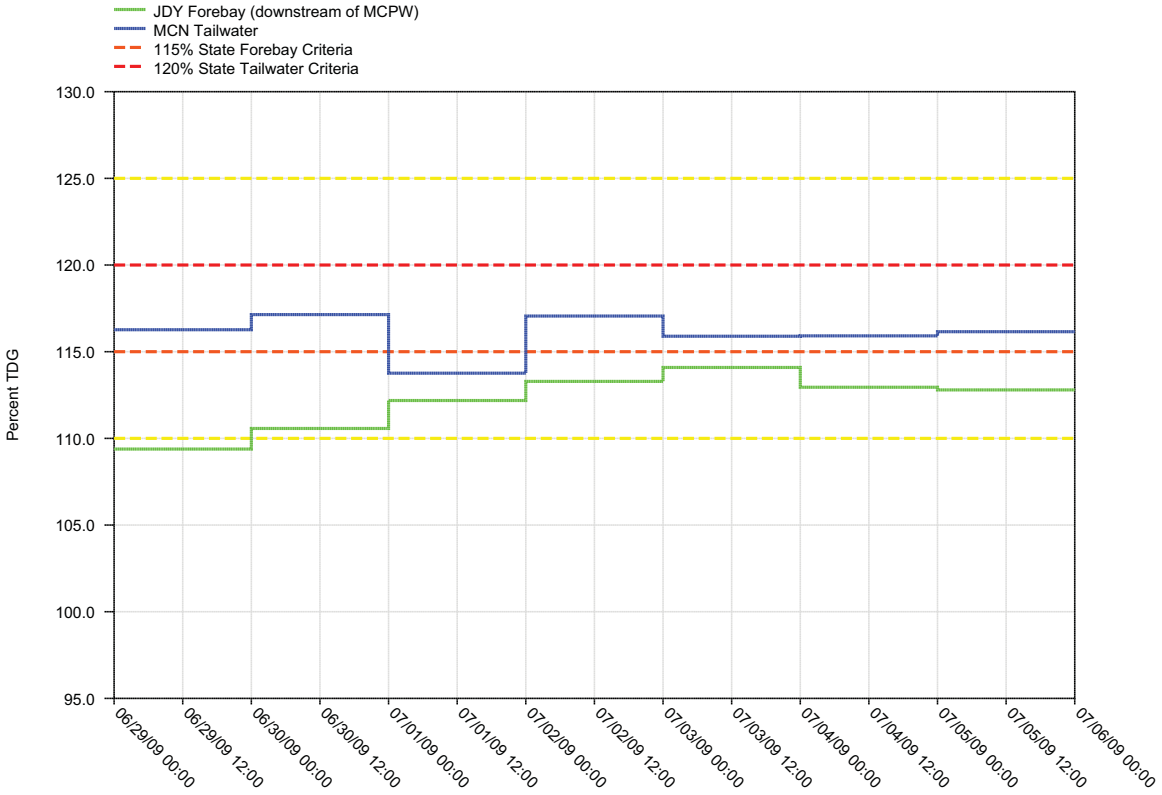


Figure 5.

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



McNARY DAM - Hourly Spill and Flow

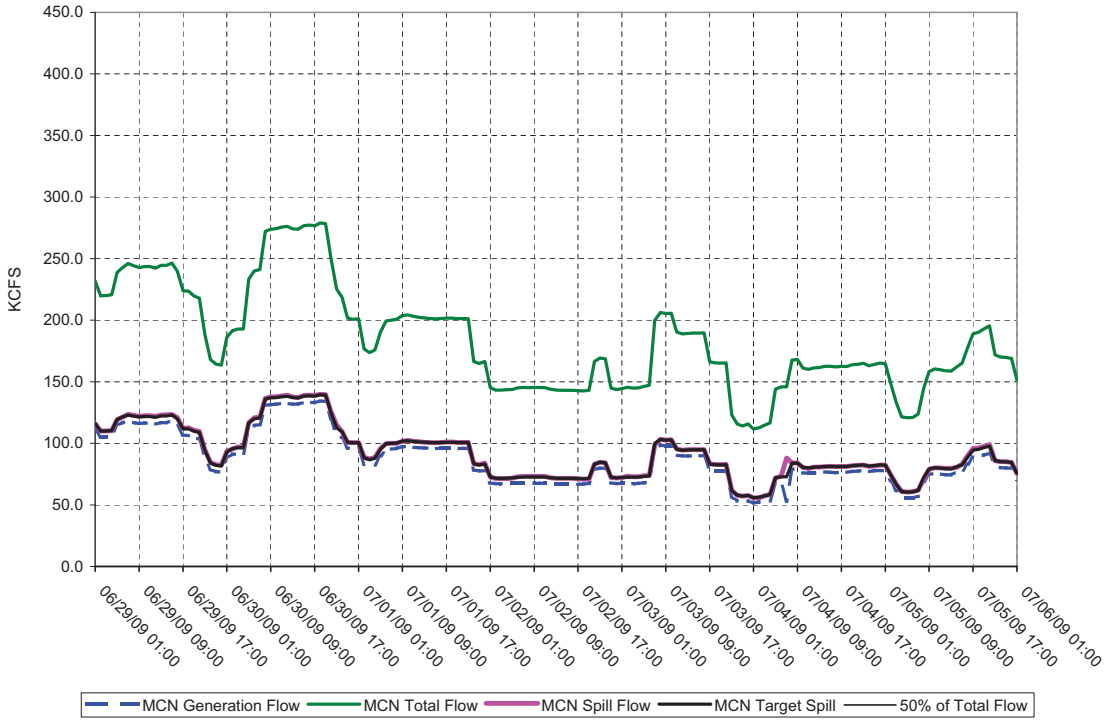
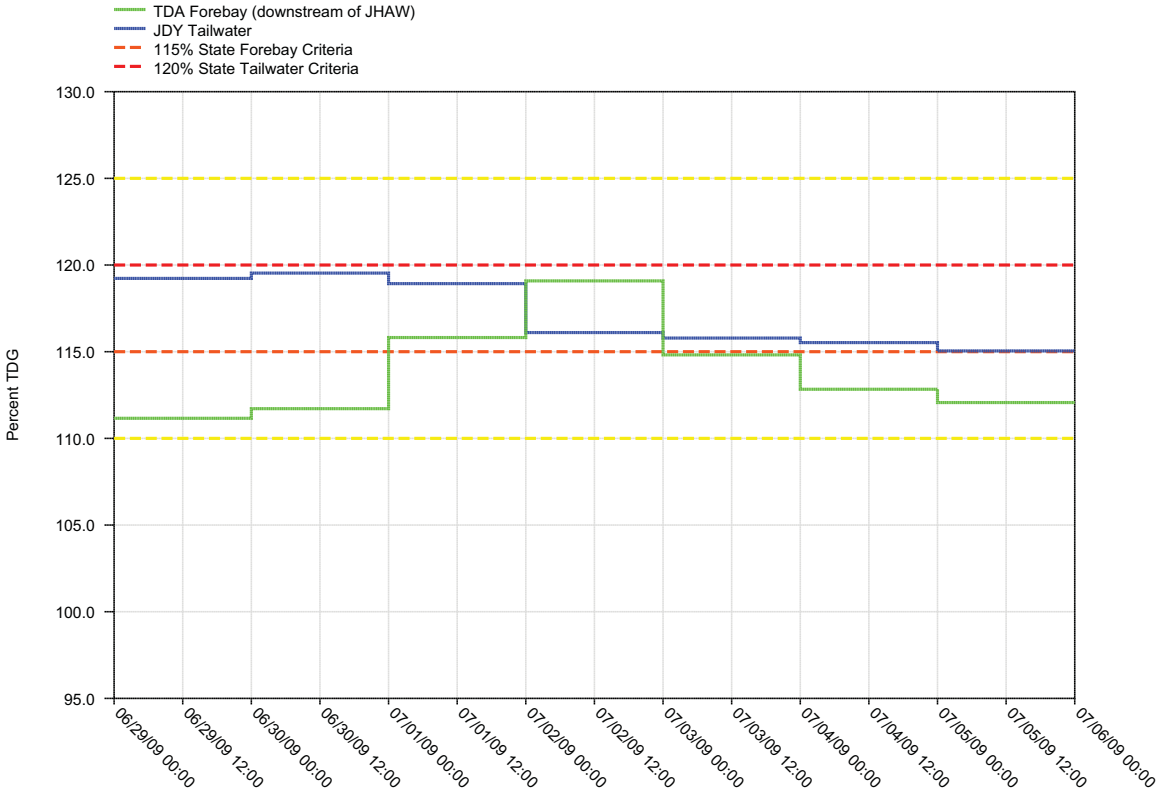


Figure 6.

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



JOHN DAY DAM - Hourly Spill and Flow

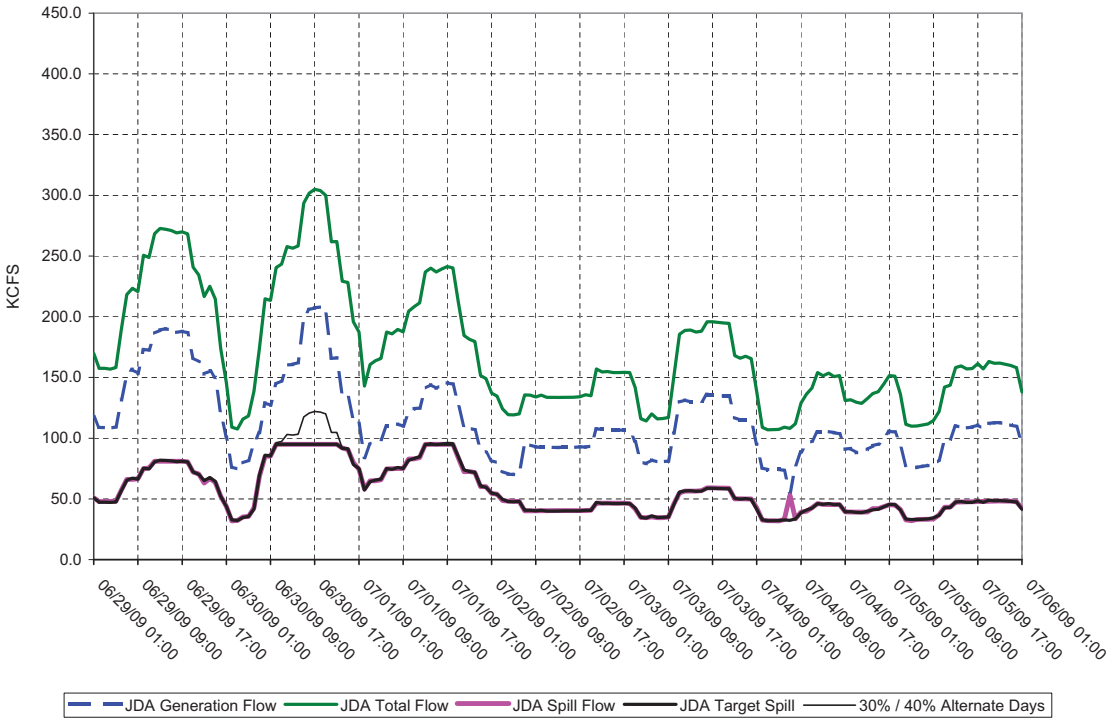
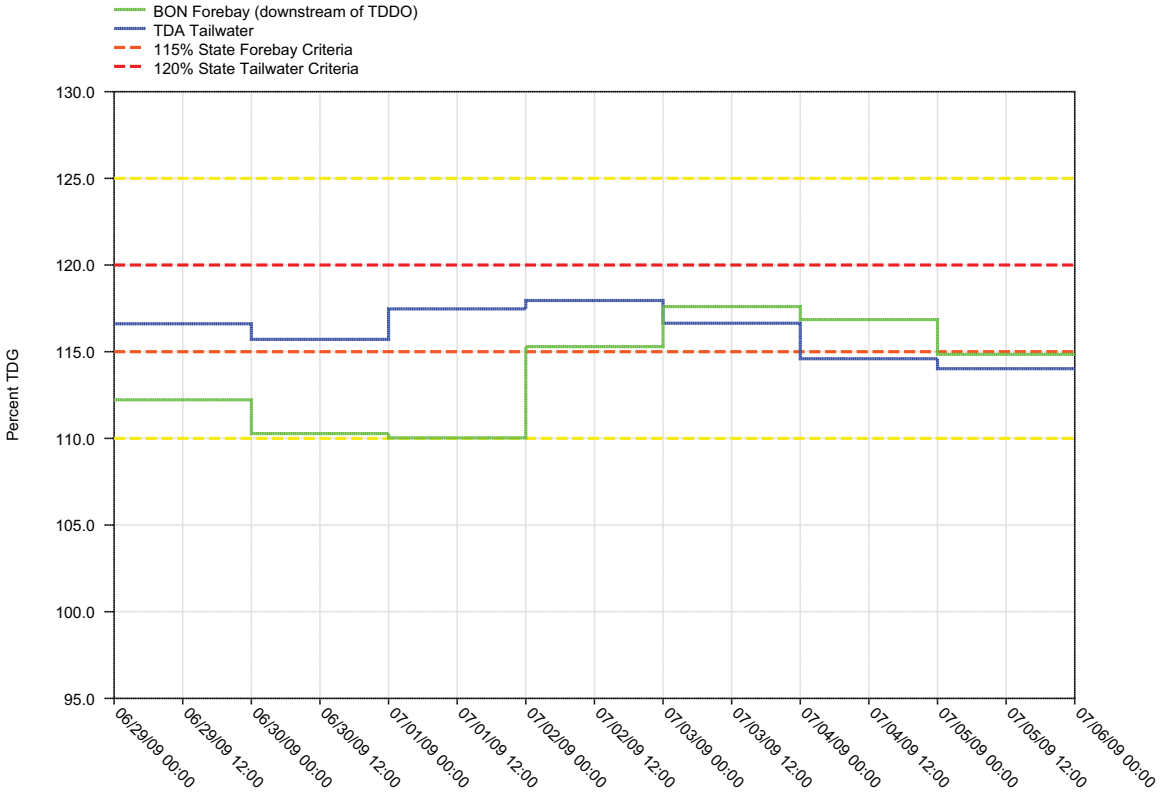


Figure 7.

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



THE DALLES DAM - Hourly Spill and Flow

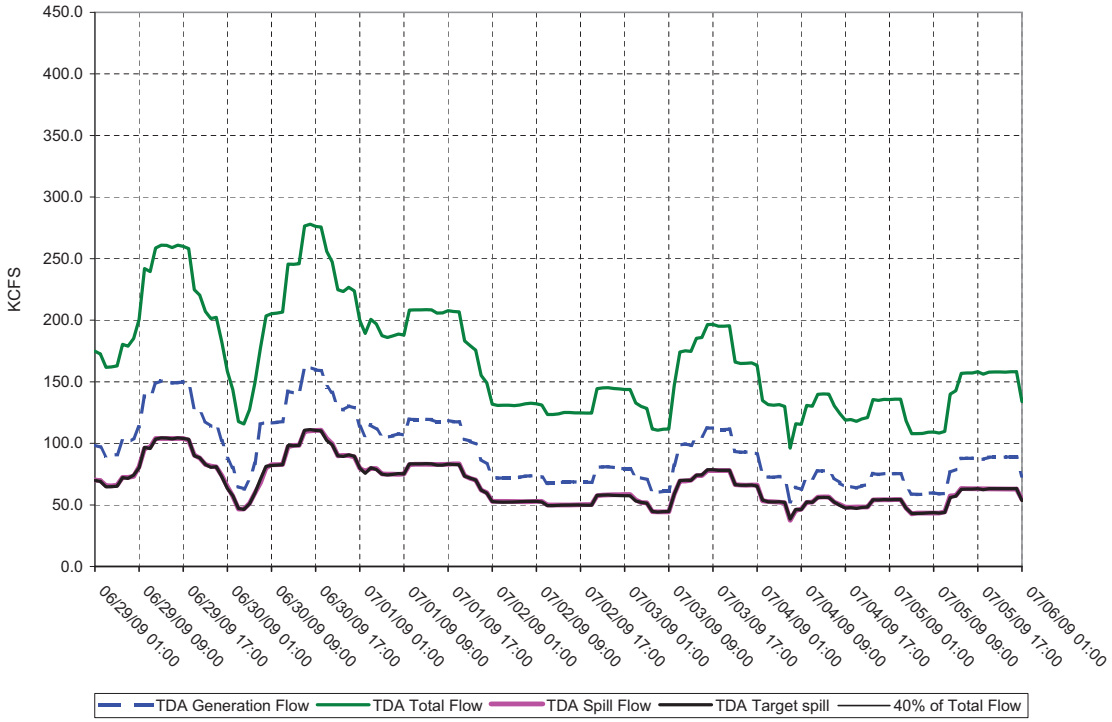
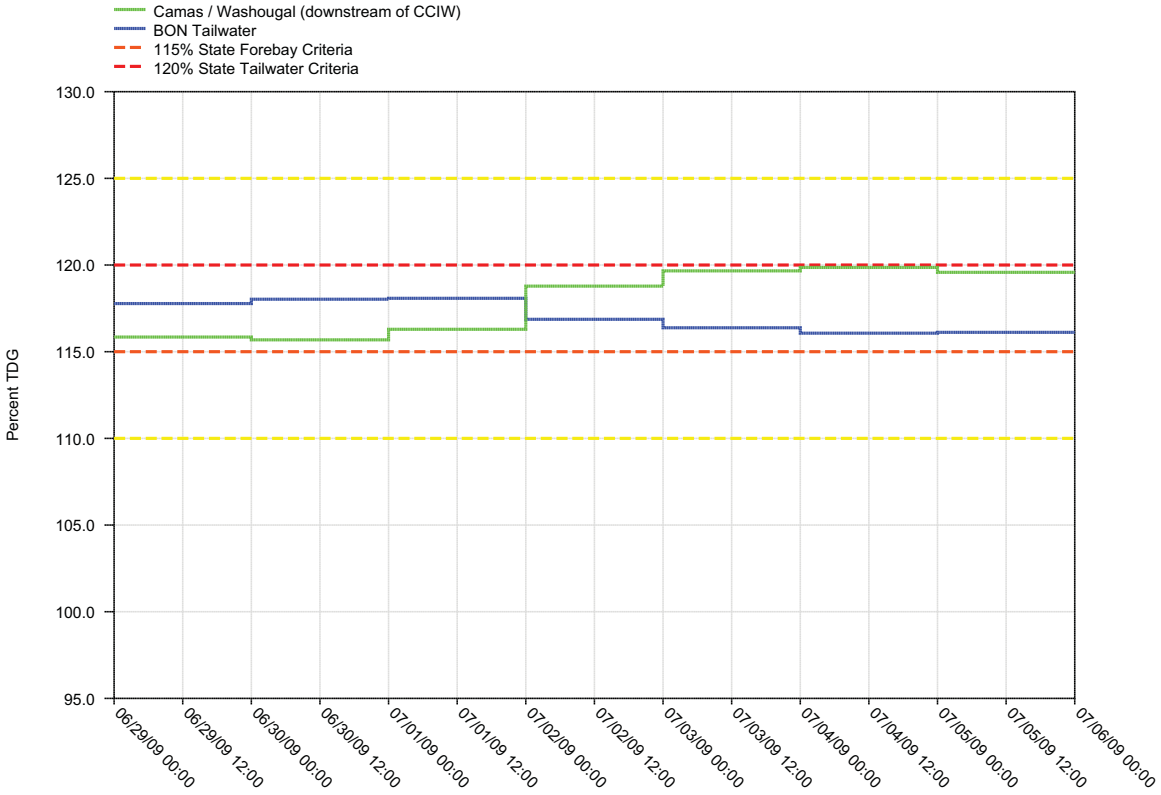


Figure 8.

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



BONNEVILLE DAM - Hourly Spill and Flow

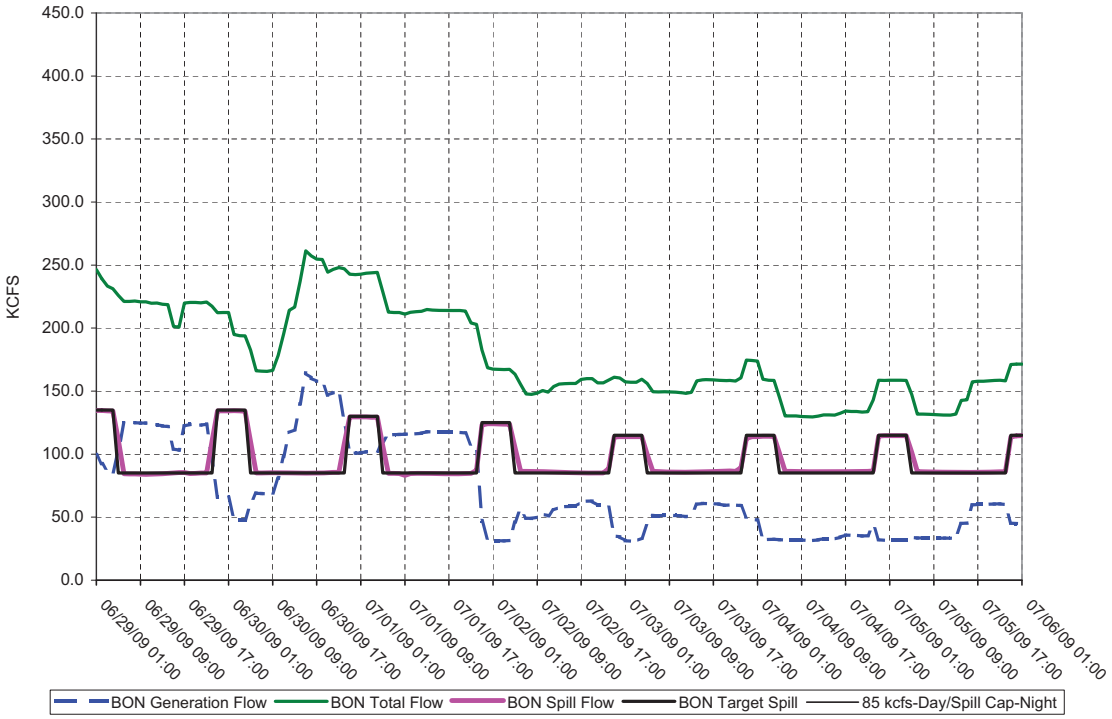
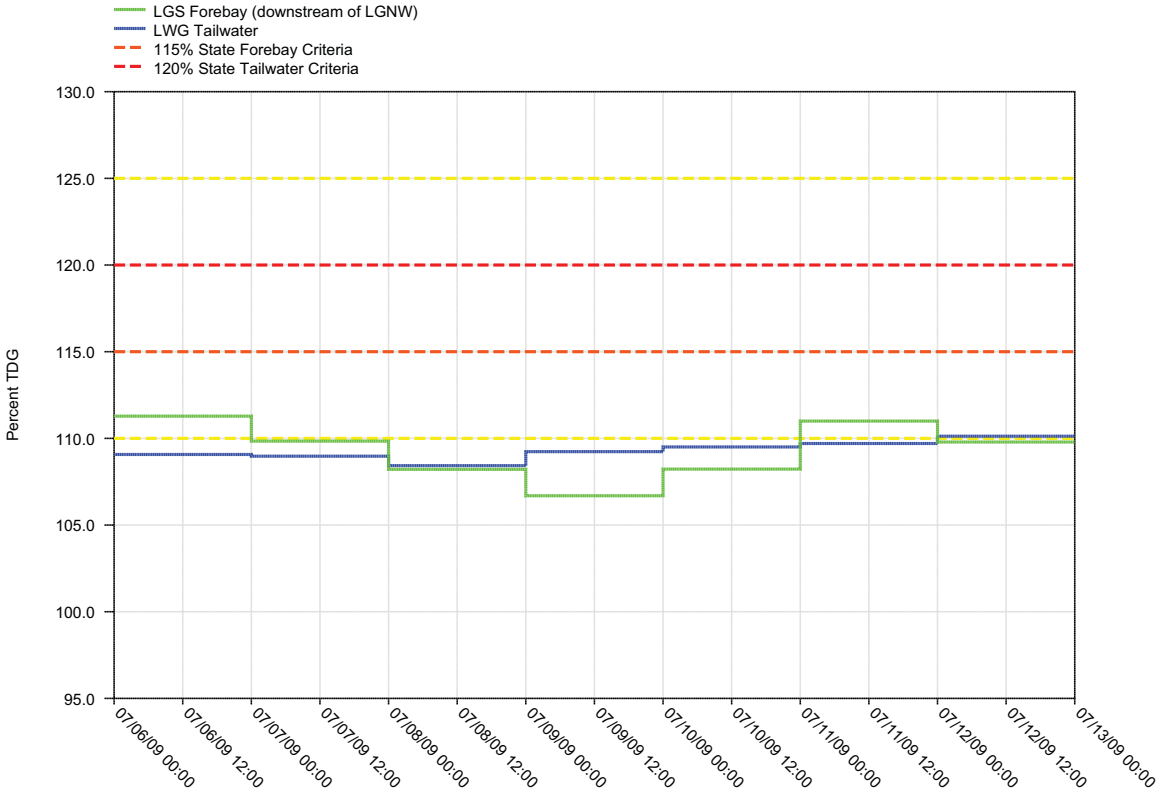


Figure 9.

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



LOWER GRANITE DAM - Hourly Spill and Flow

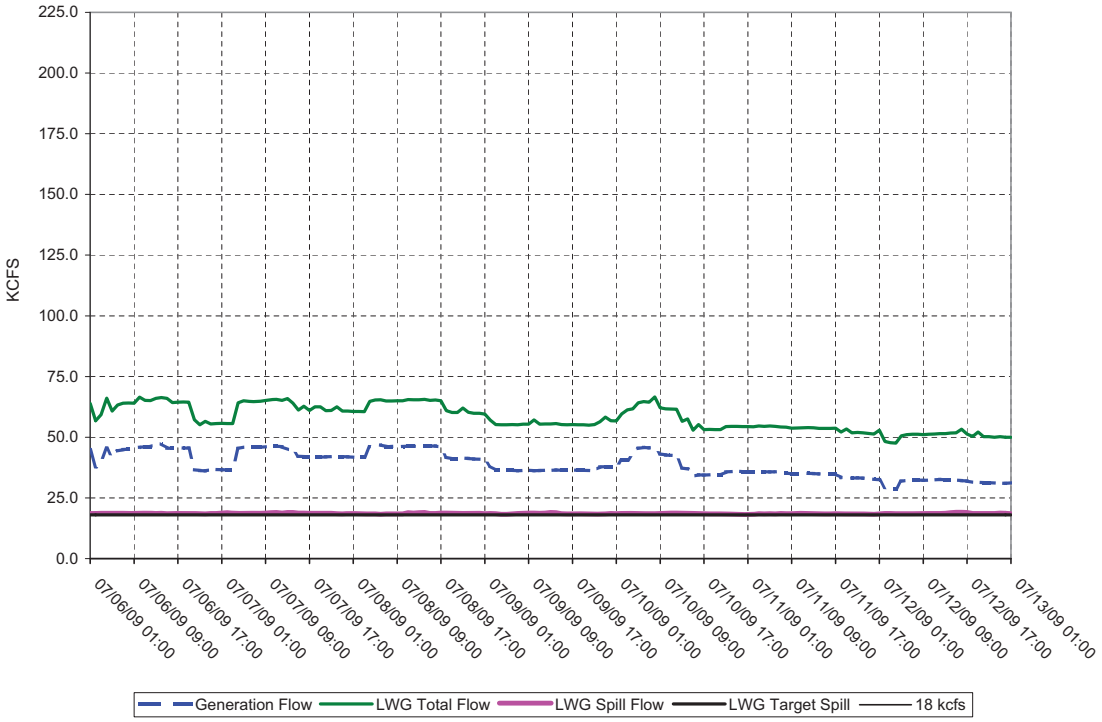
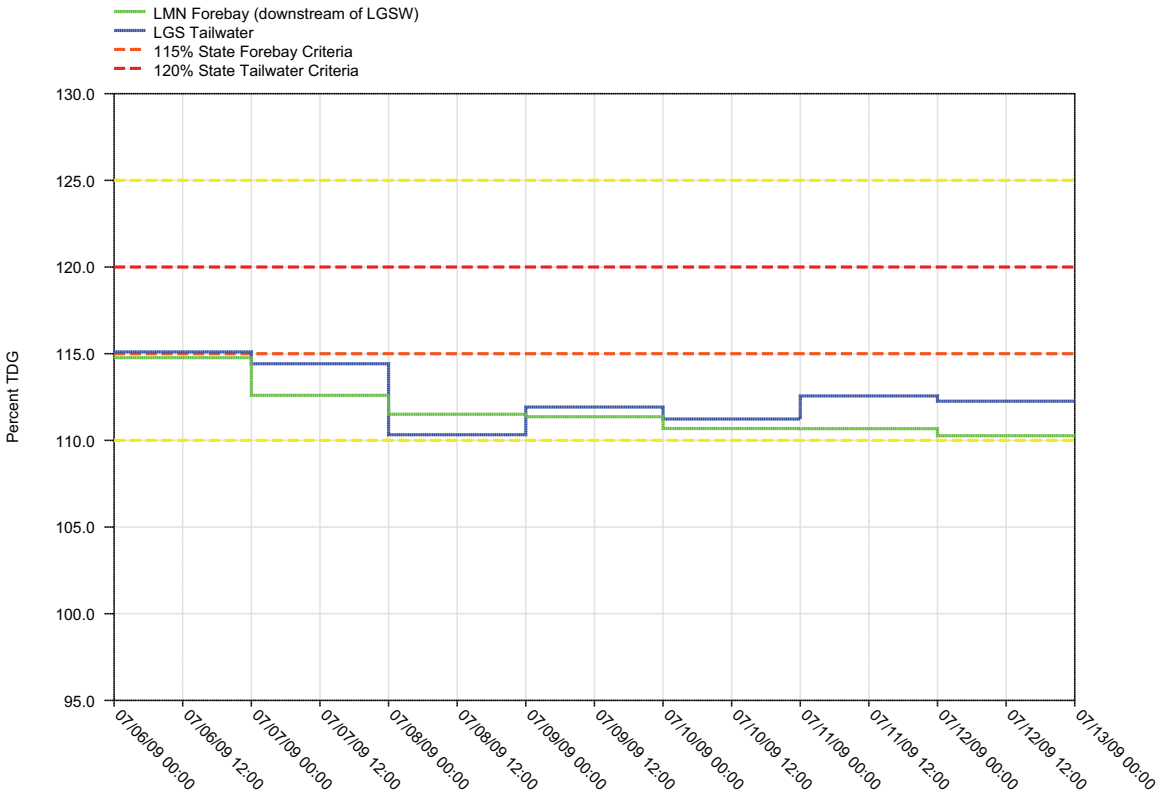


Figure 10.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

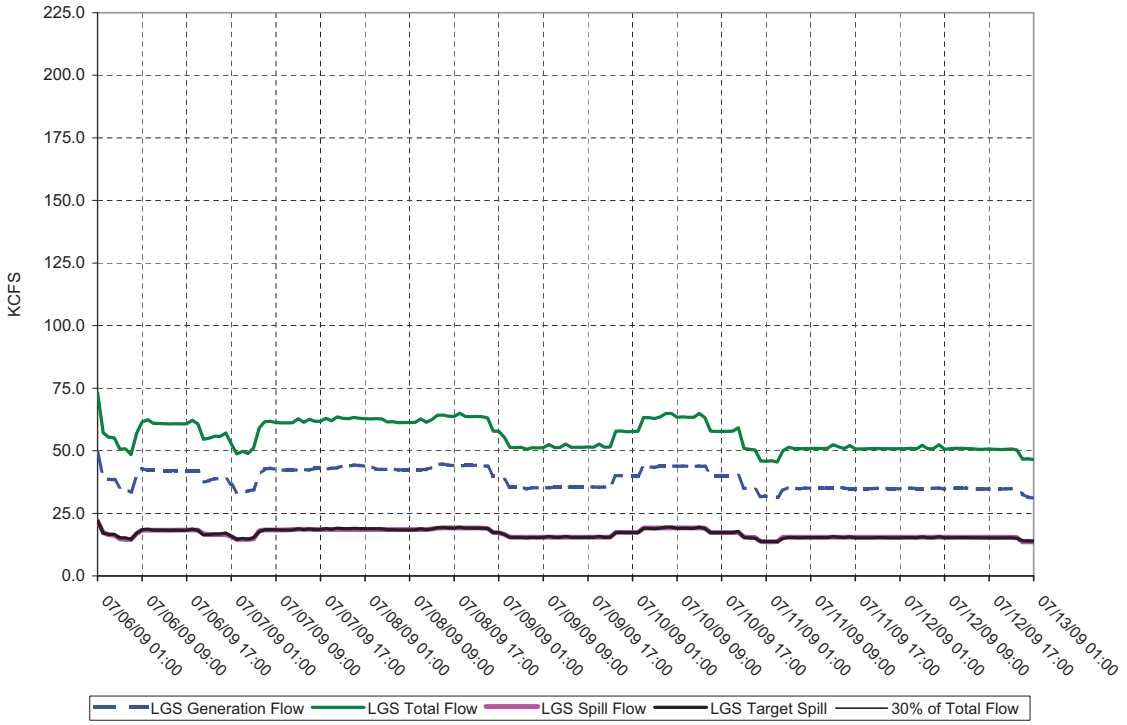
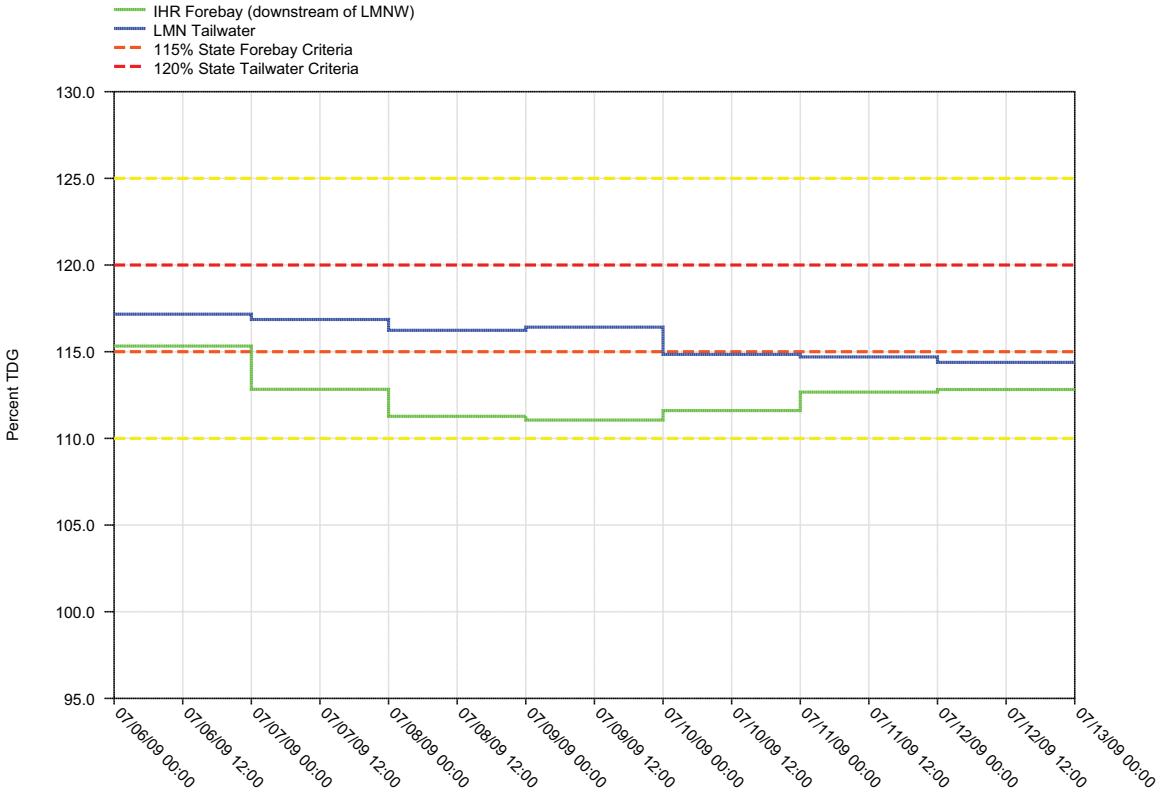


Figure 11.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

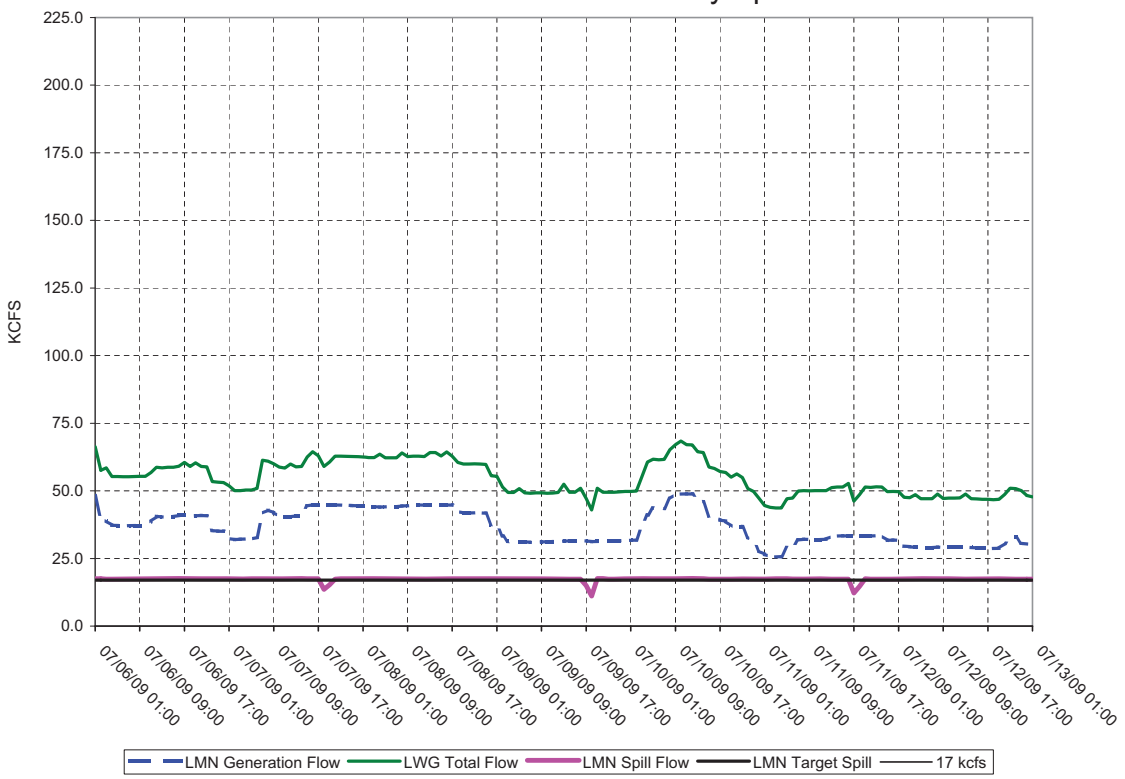
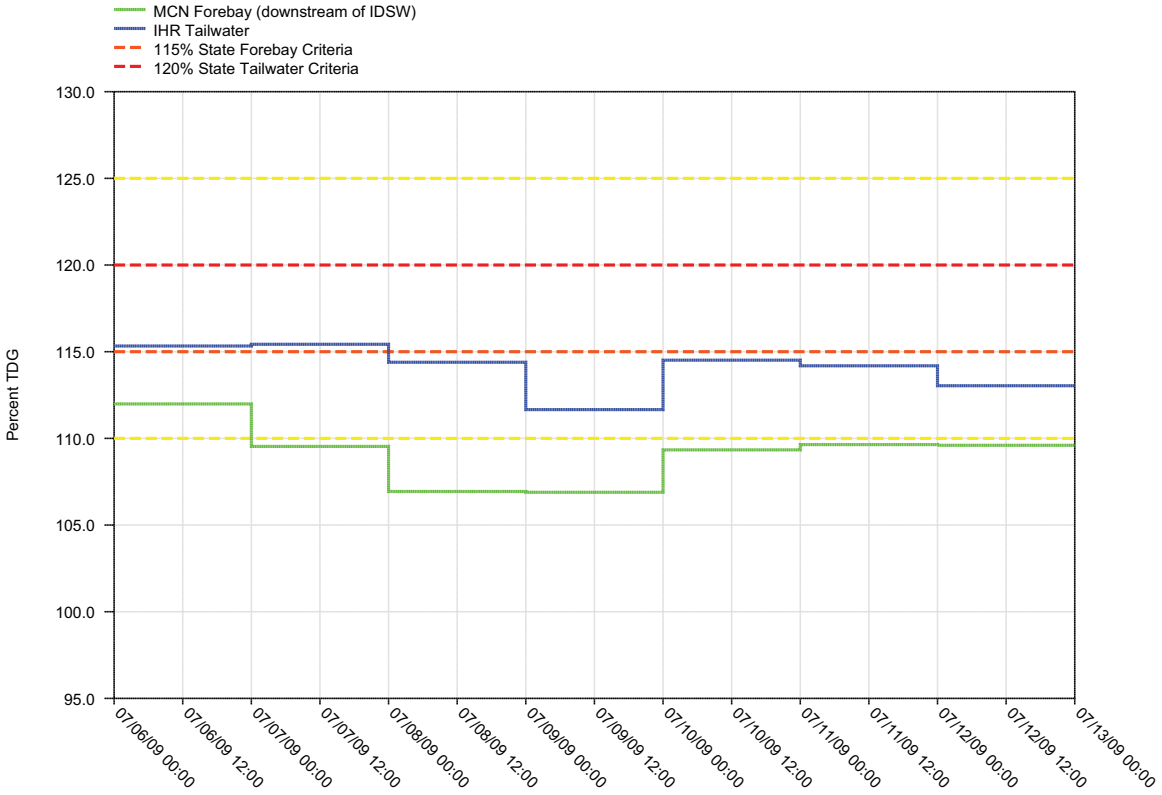


Figure 12.

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



ICE HARBOR DAM - Hourly Spill and Flow

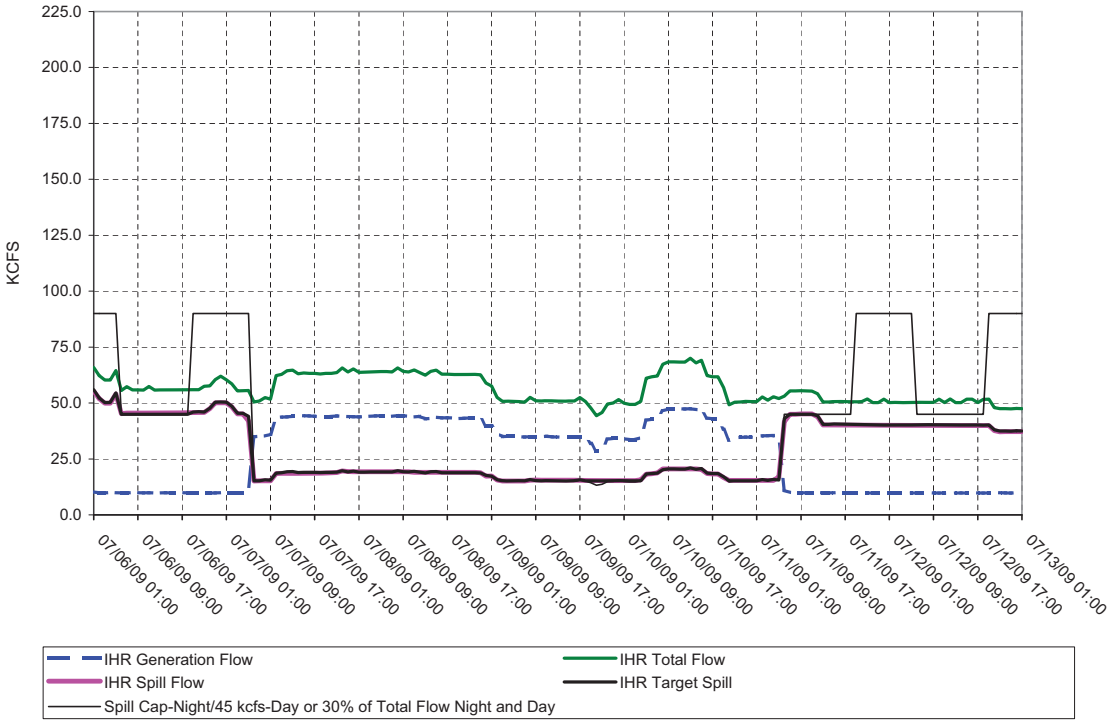
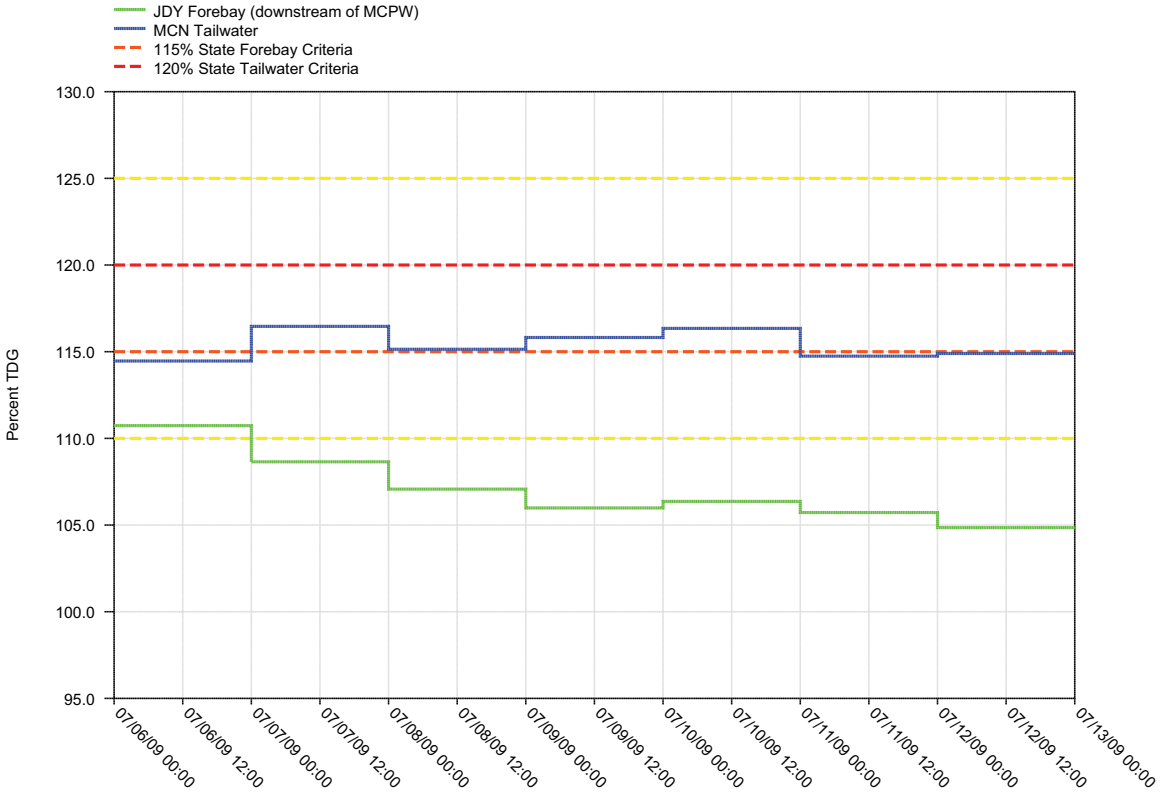


Figure 13.

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



McNARY DAM - Hourly Spill and Flow

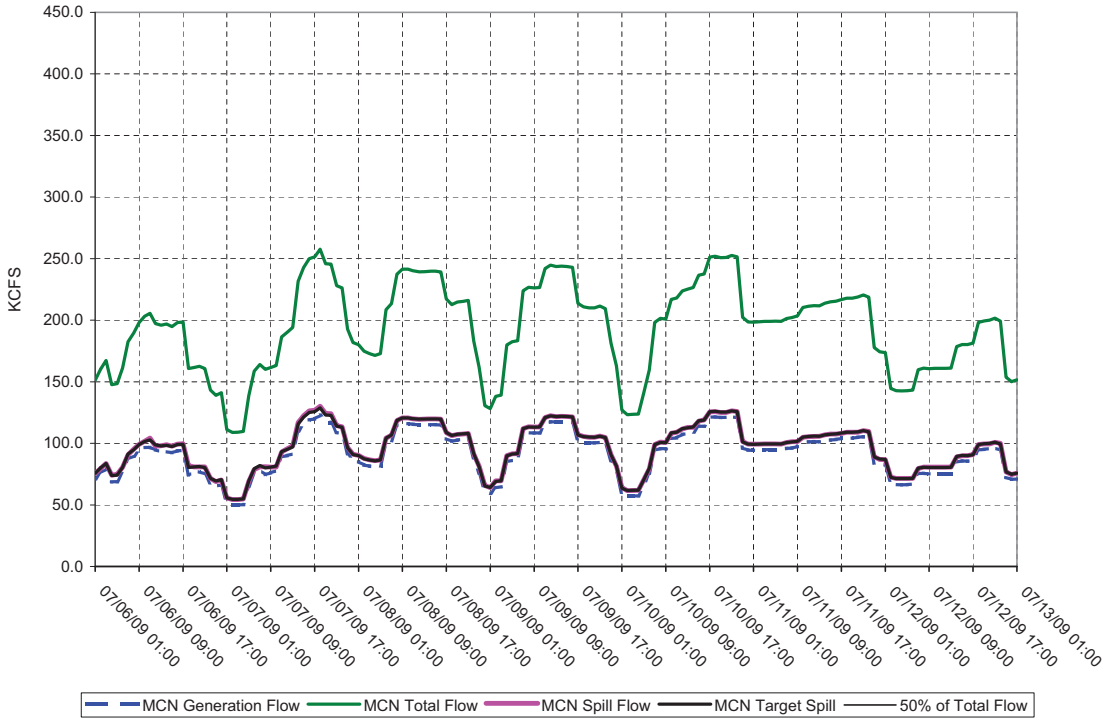
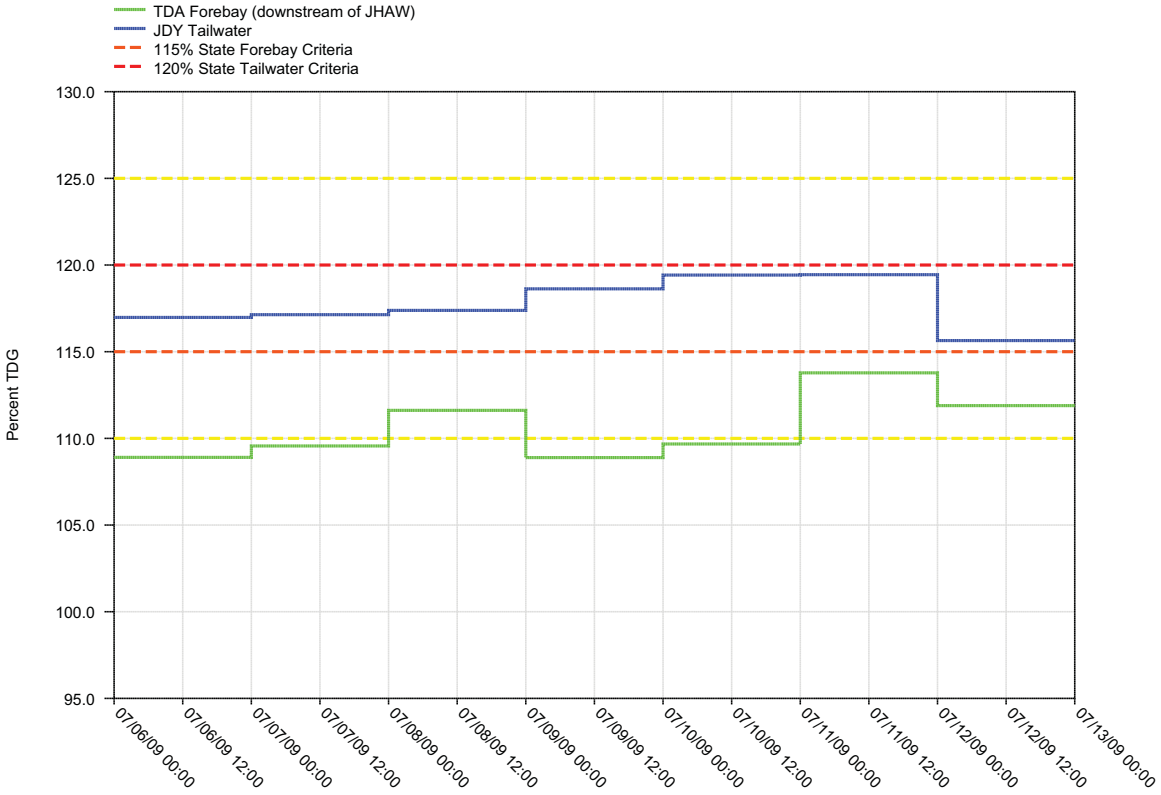


Figure 14.

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



JOHN DAY DAM - Hourly Spill and Flow

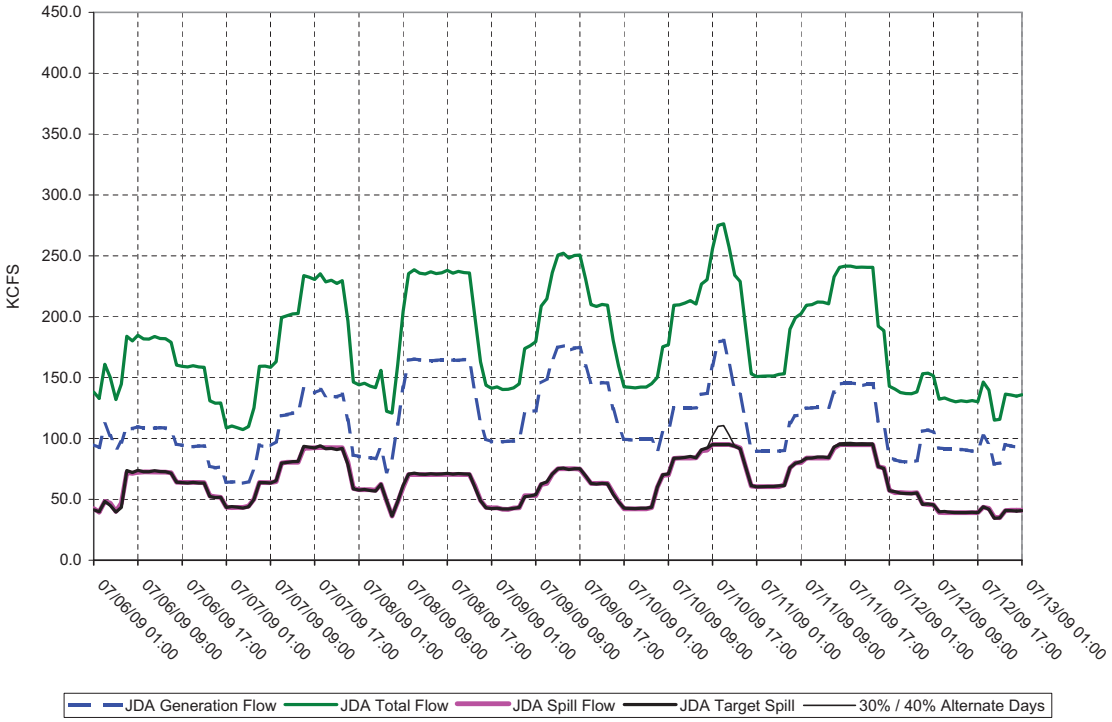
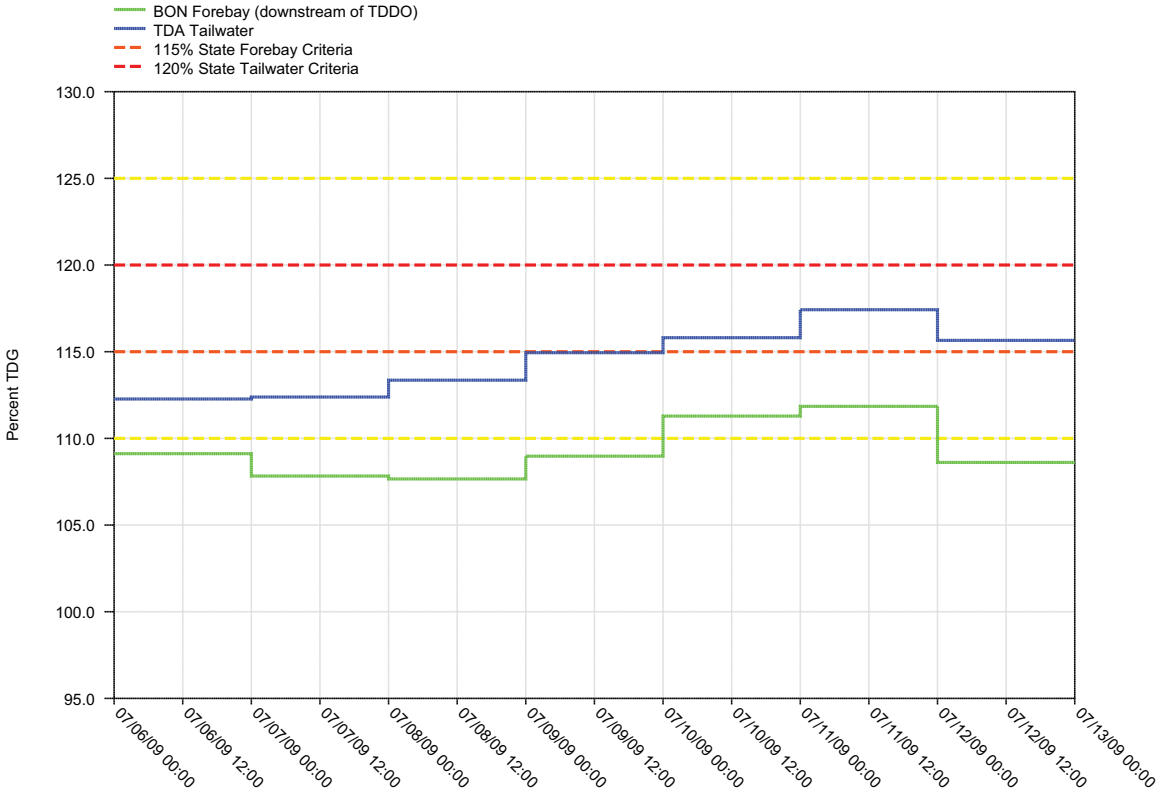


Figure 15.

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



THE DALLES DAM - Hourly Spill and Flow

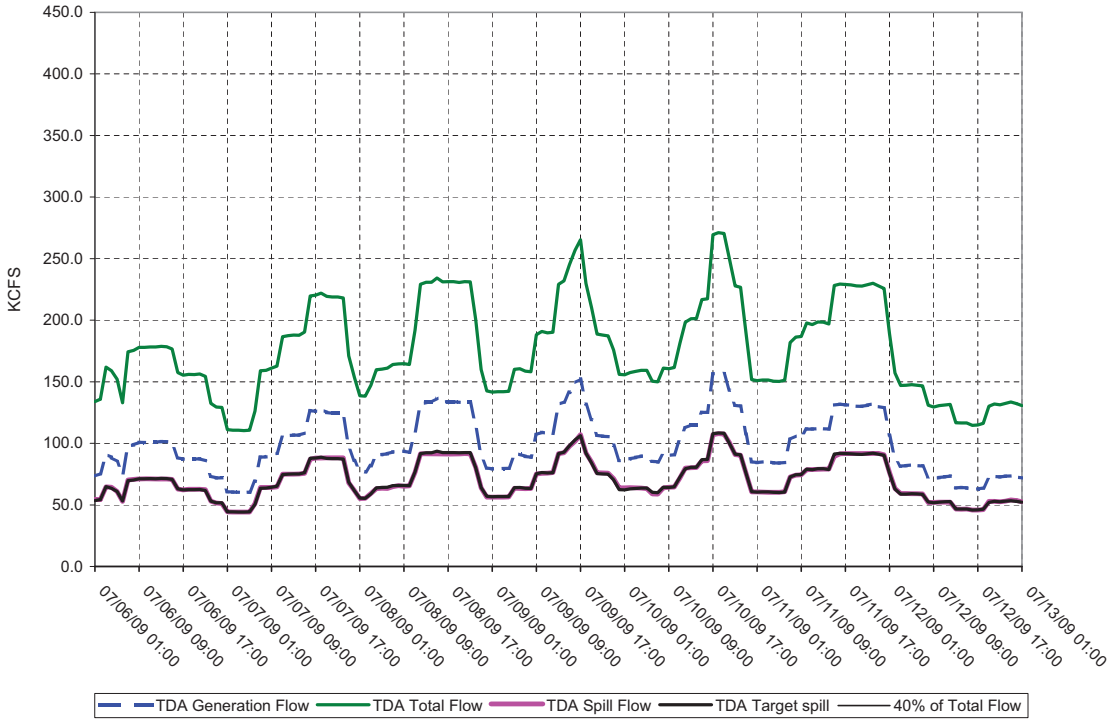
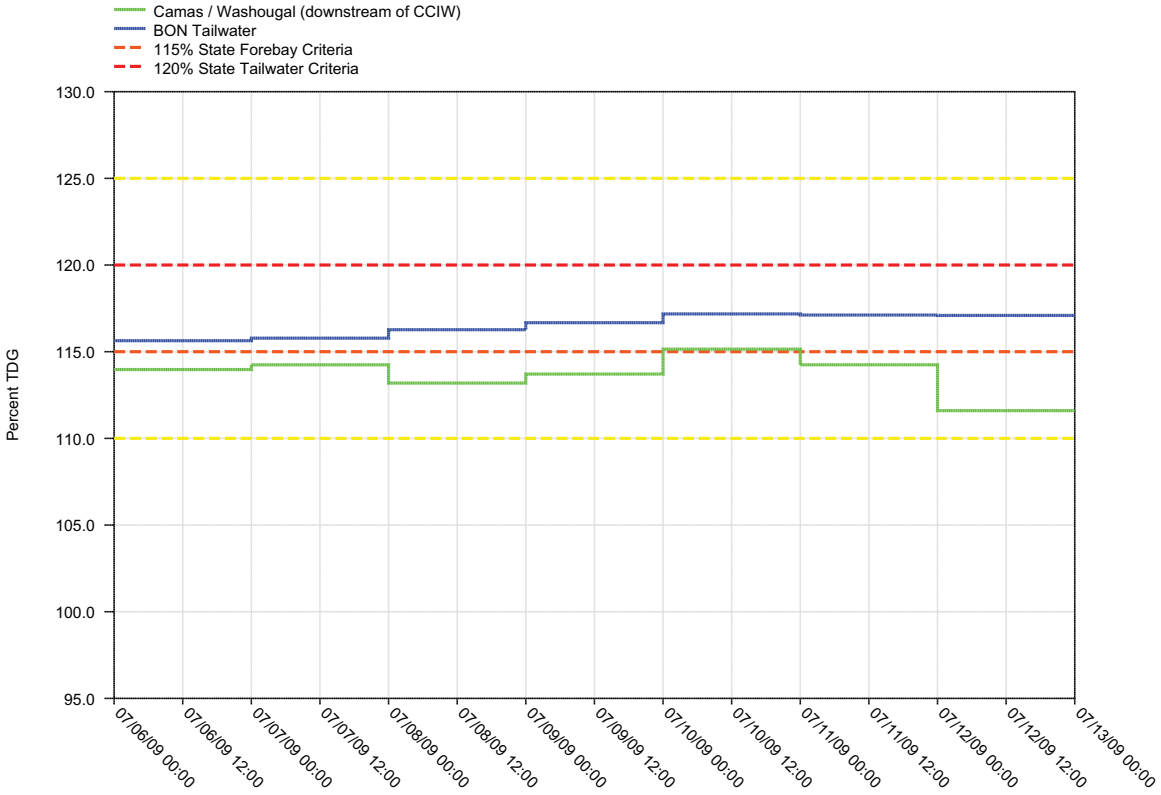


Figure 16.

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



BONNEVILLE DAM - Hourly Spill and Flow

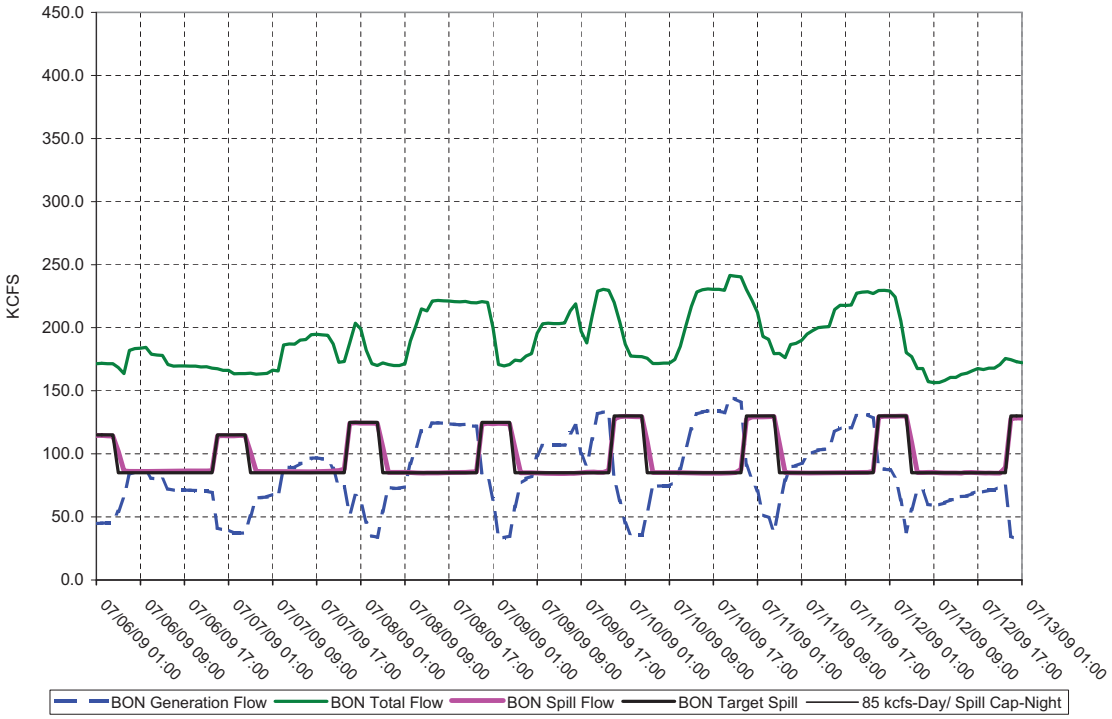
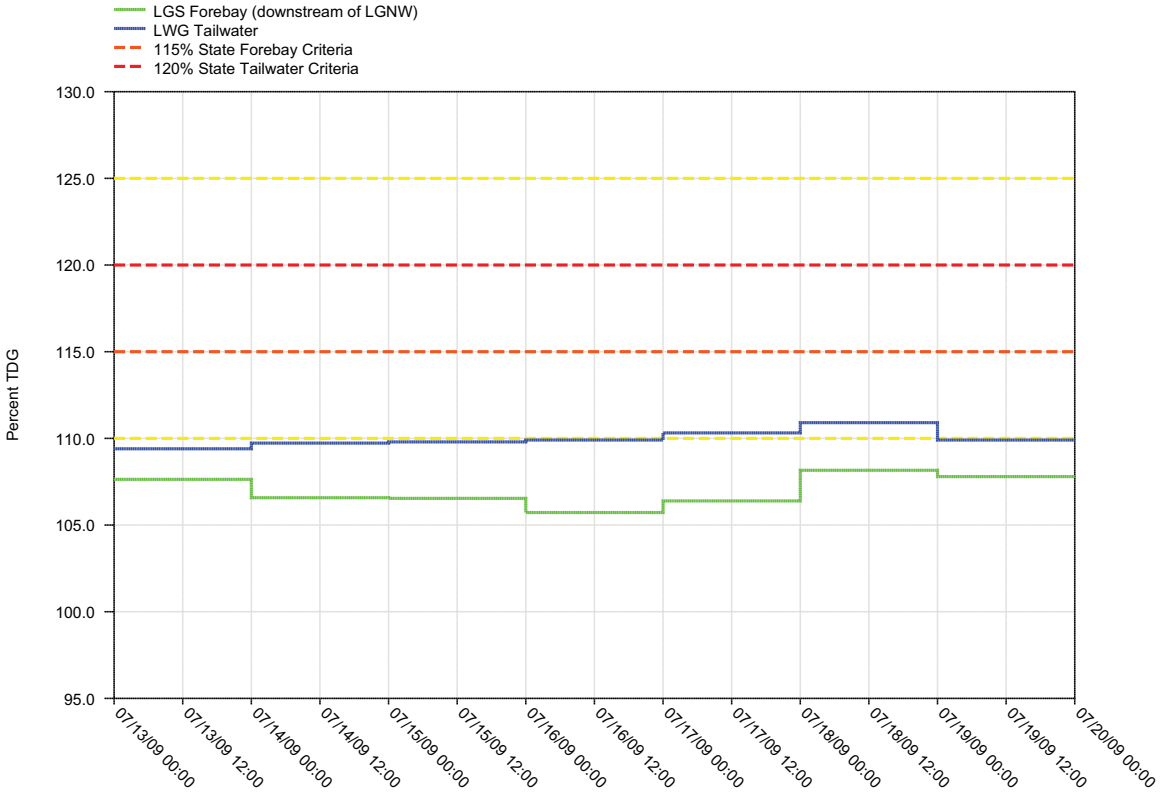


Figure 17.

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



LOWER GRANITE DAM - Hourly Spill and Flow

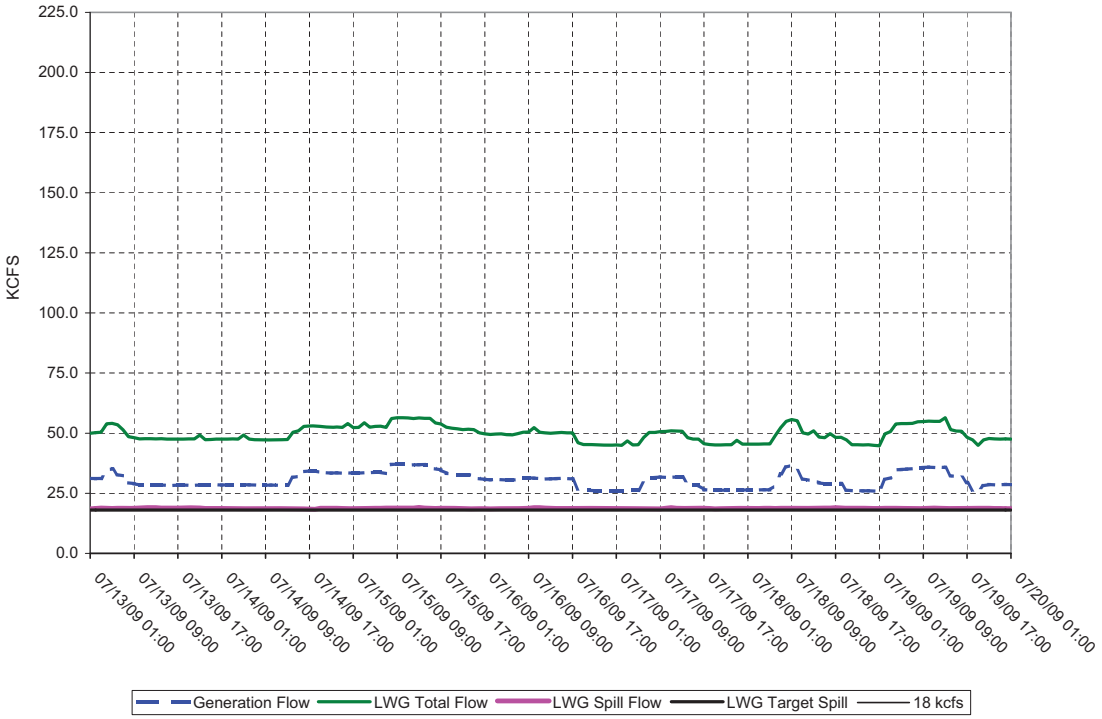
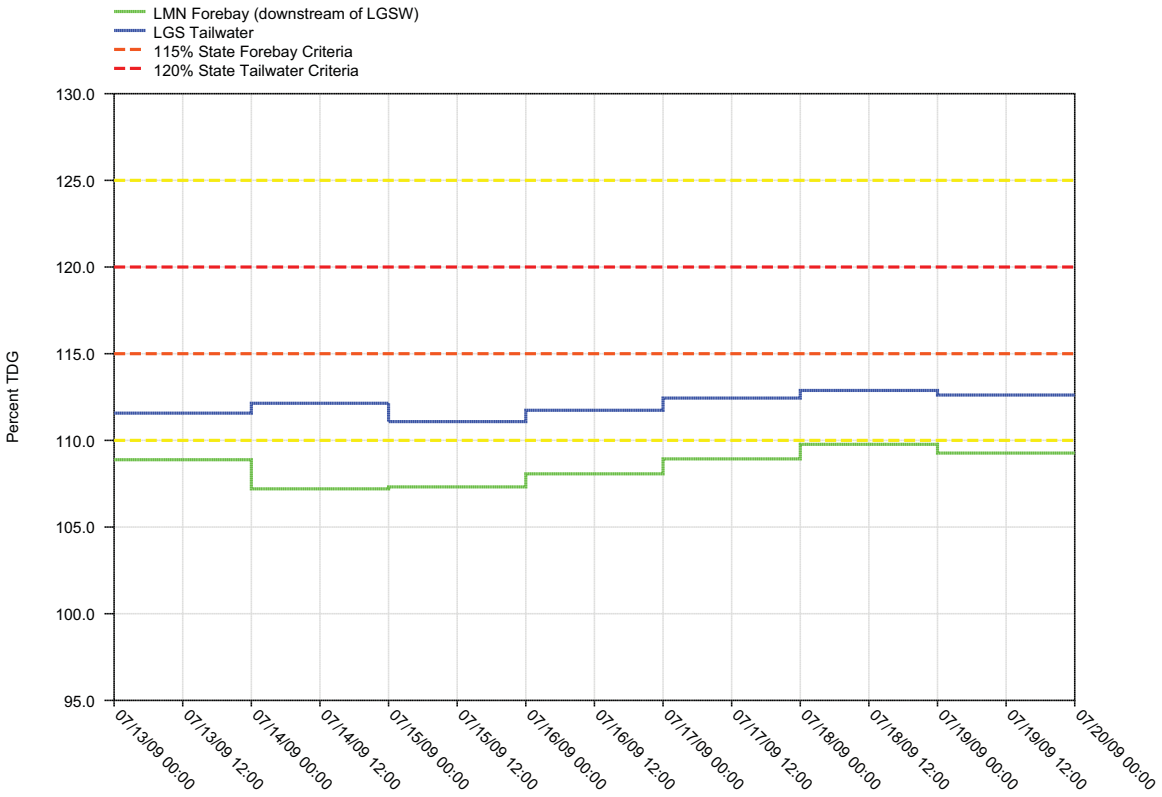


Figure 18.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

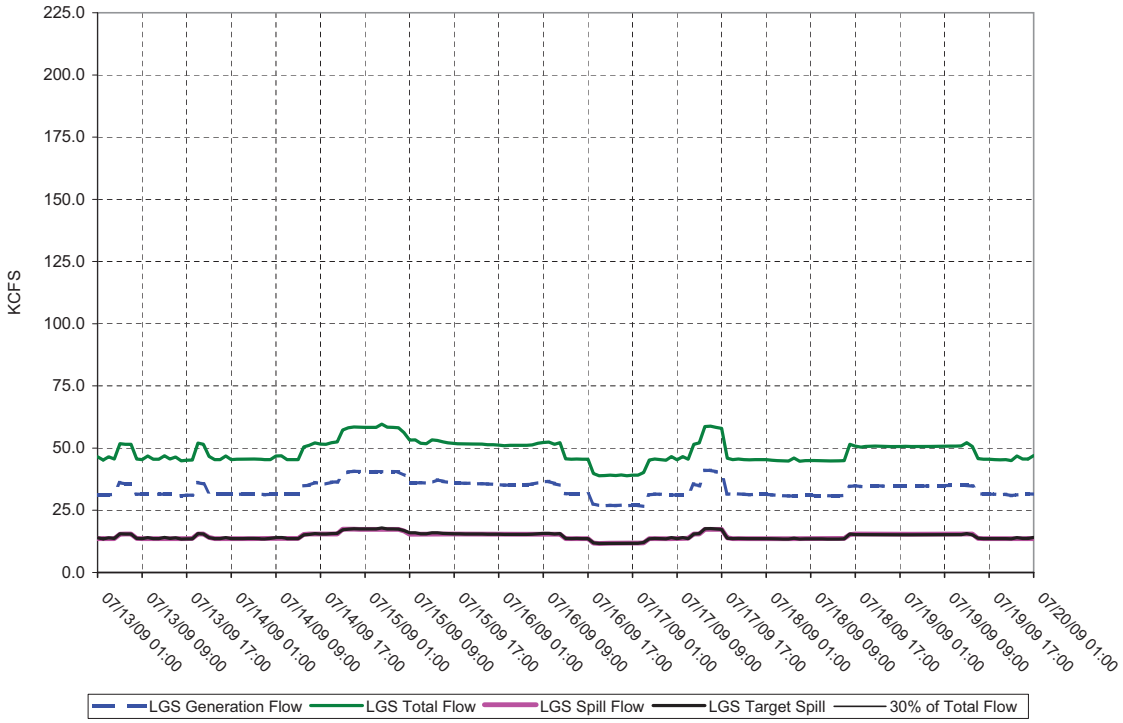
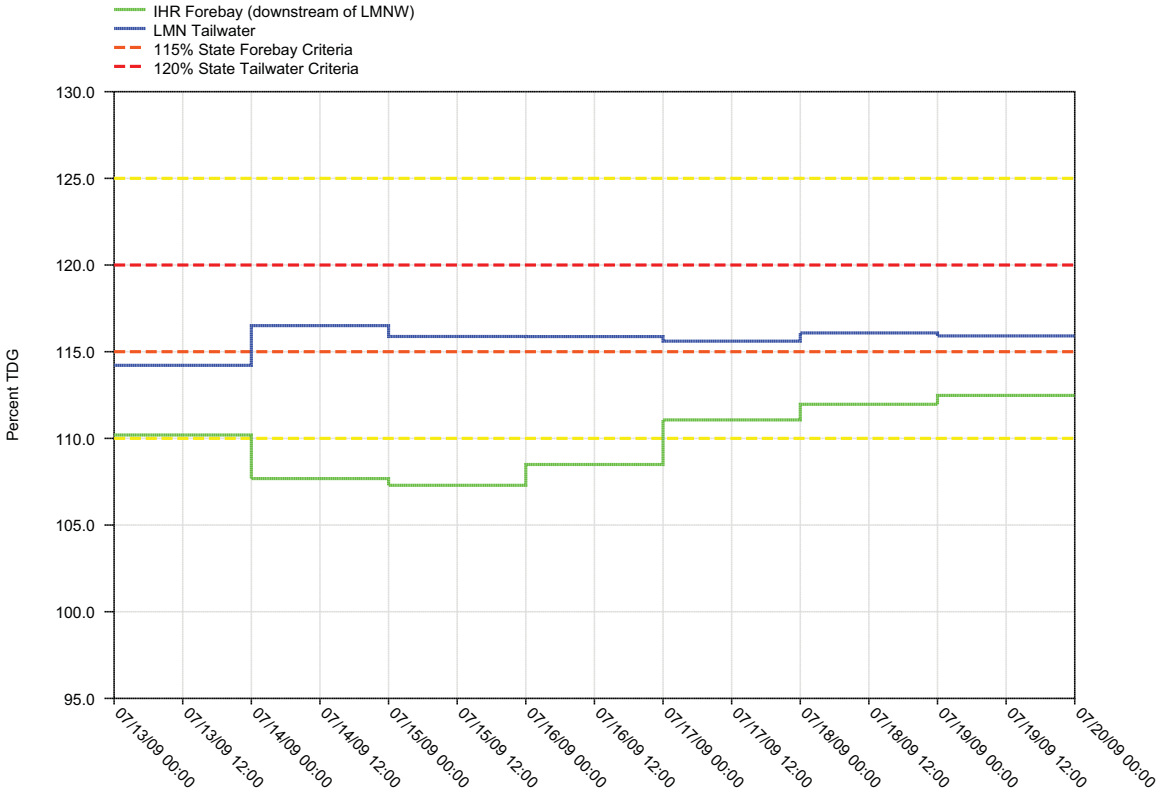


Figure 19.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

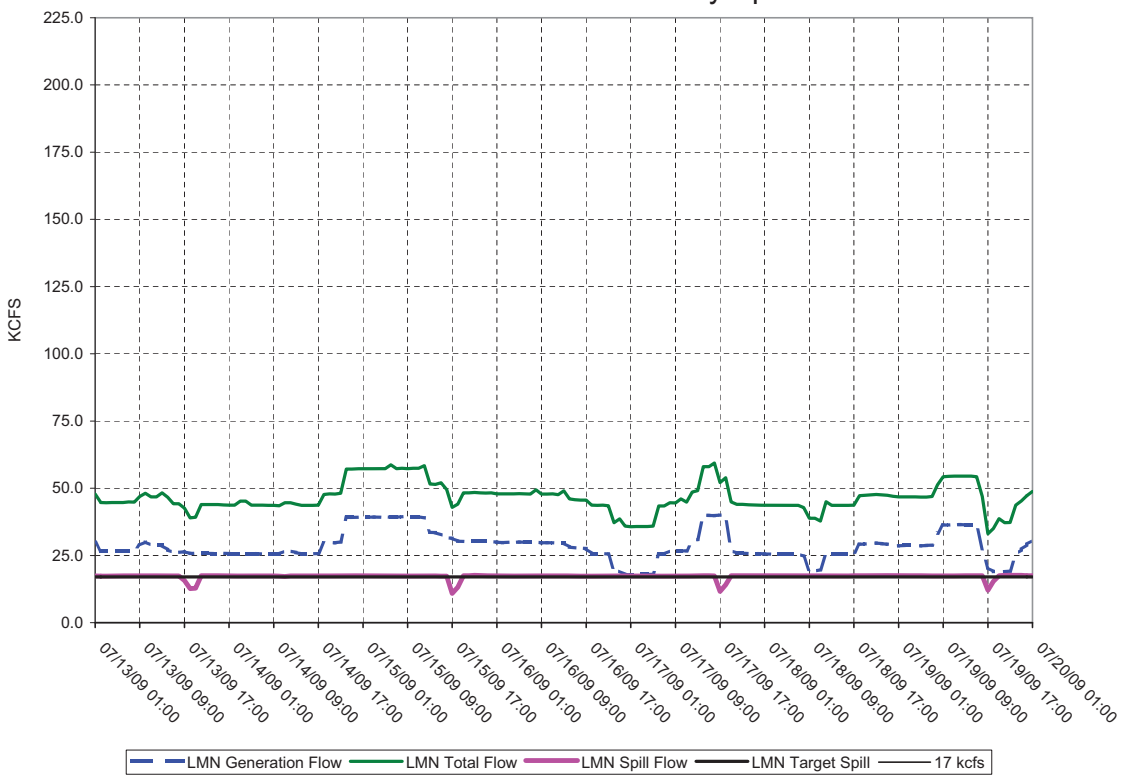
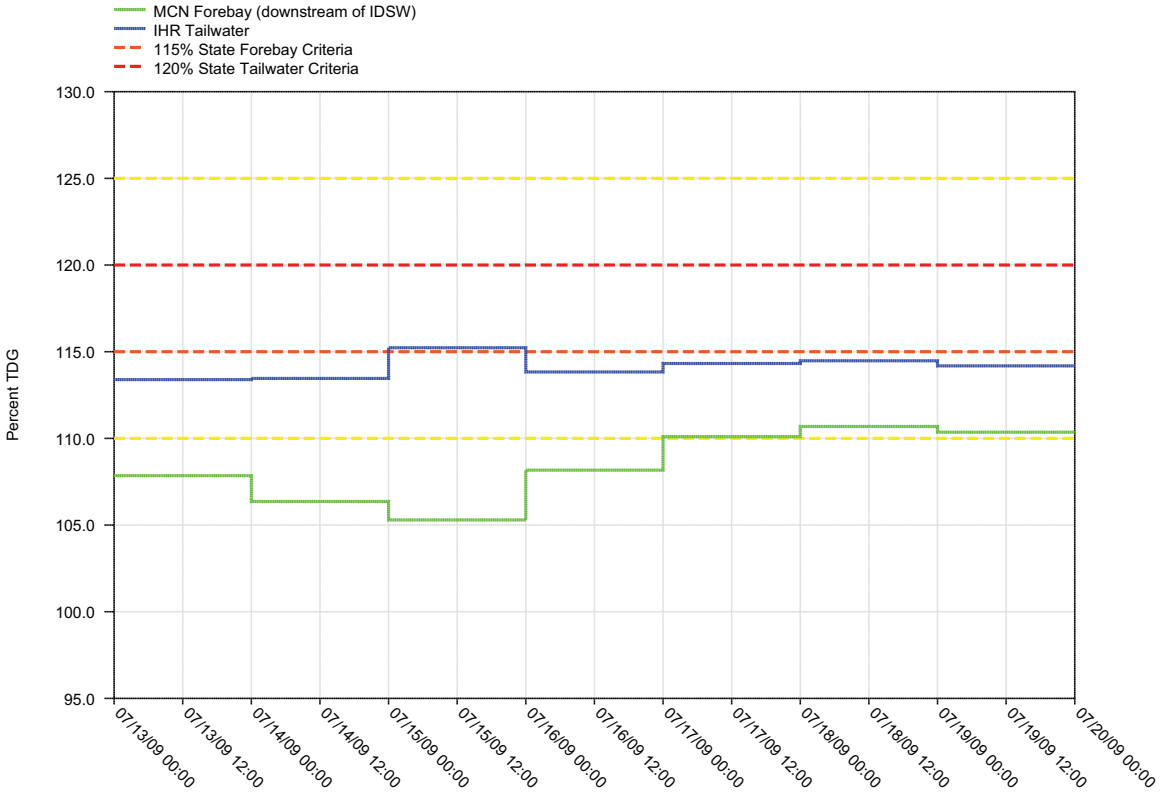


Figure 20.

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



ICE HARBOR DAM - Hourly Spill and Flow

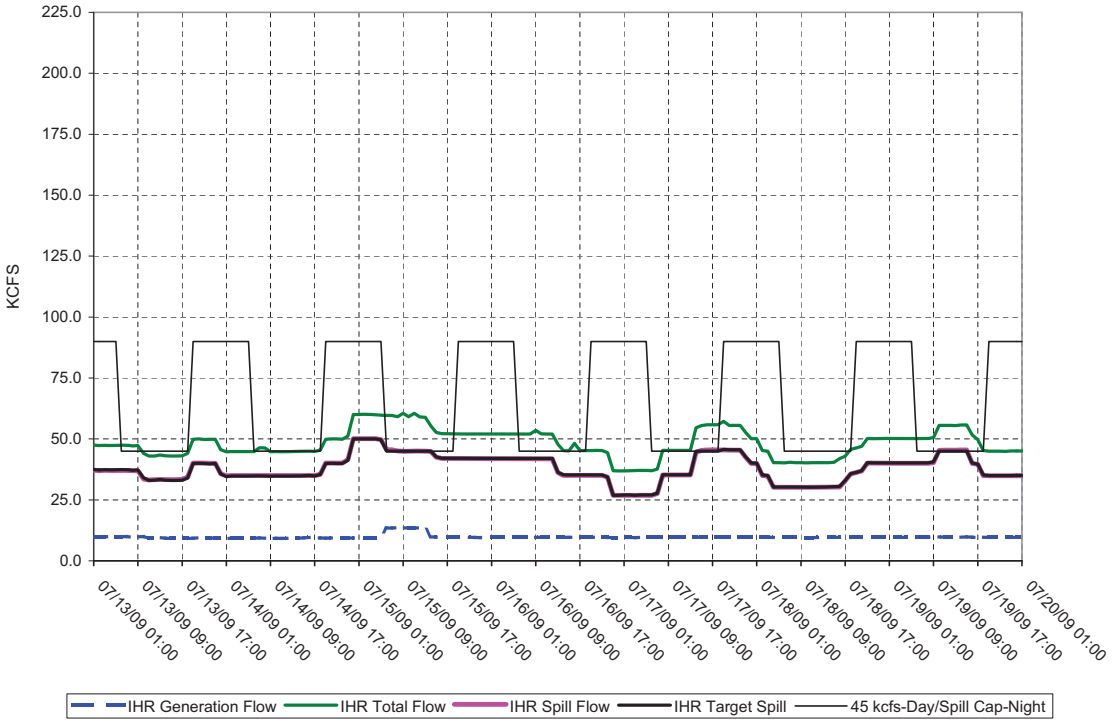
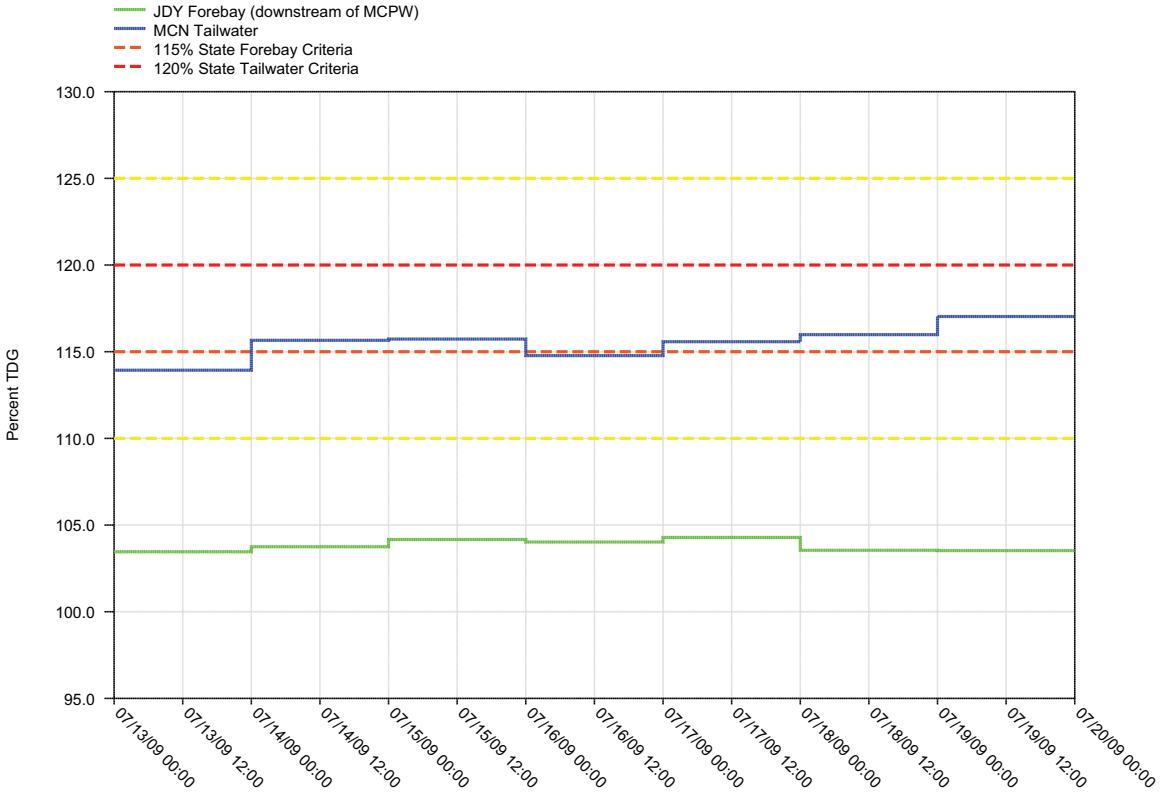


Figure 21.

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



McNARY DAM - Hourly Spill and Flow

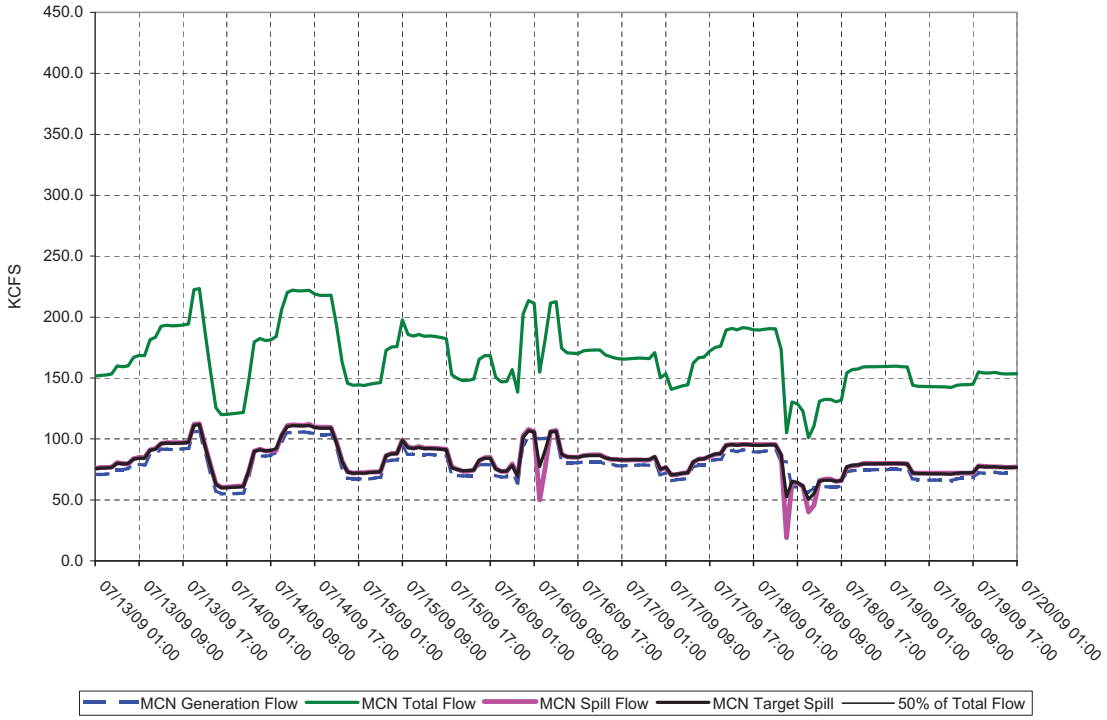
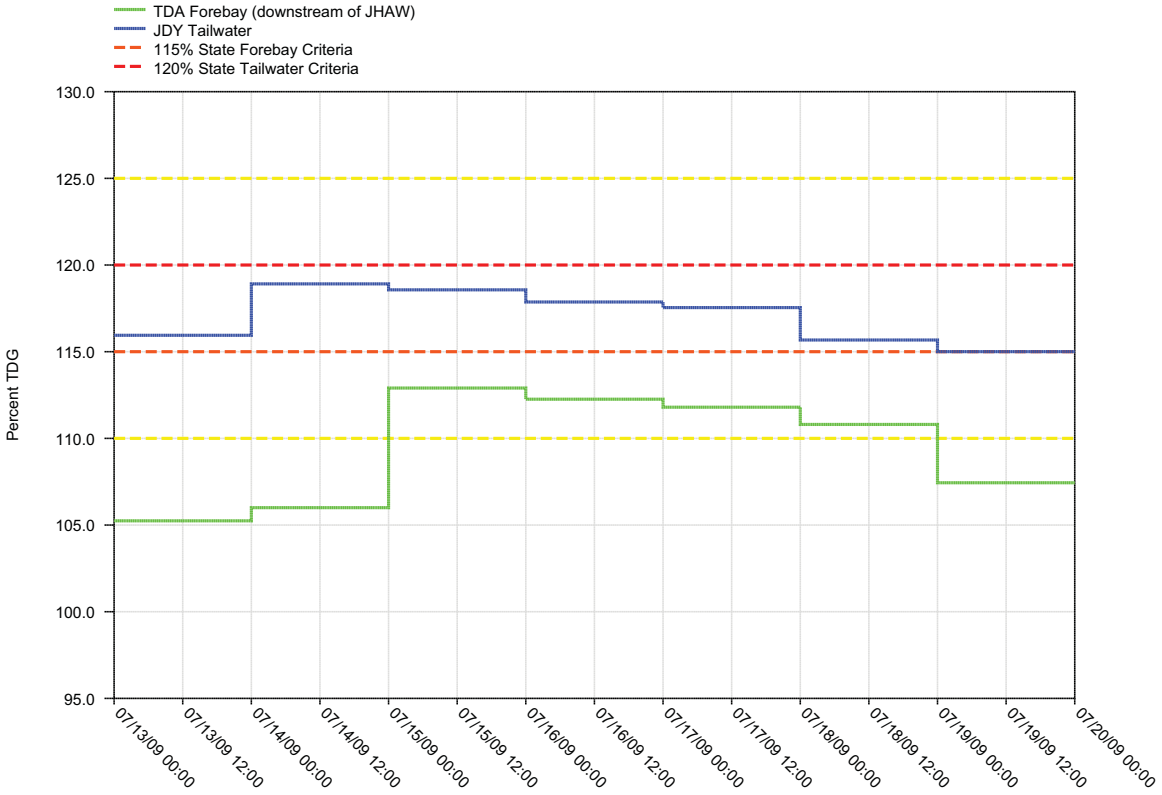


Figure 22.

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



JOHN DAY DAM - Hourly Spill and Flow

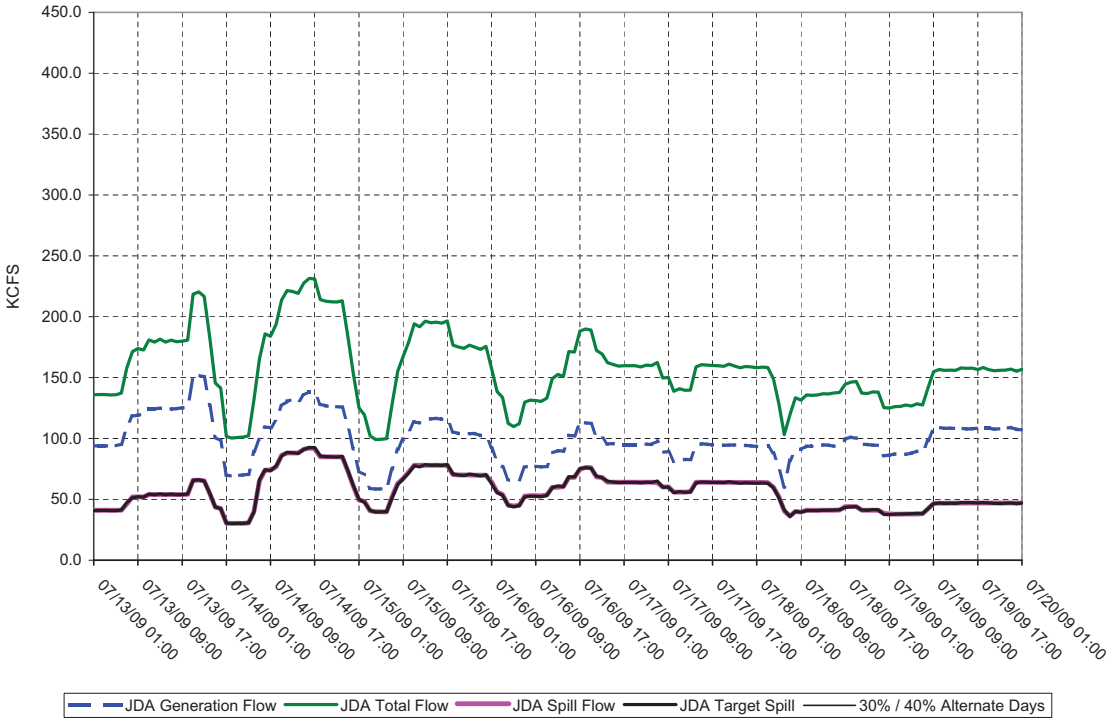
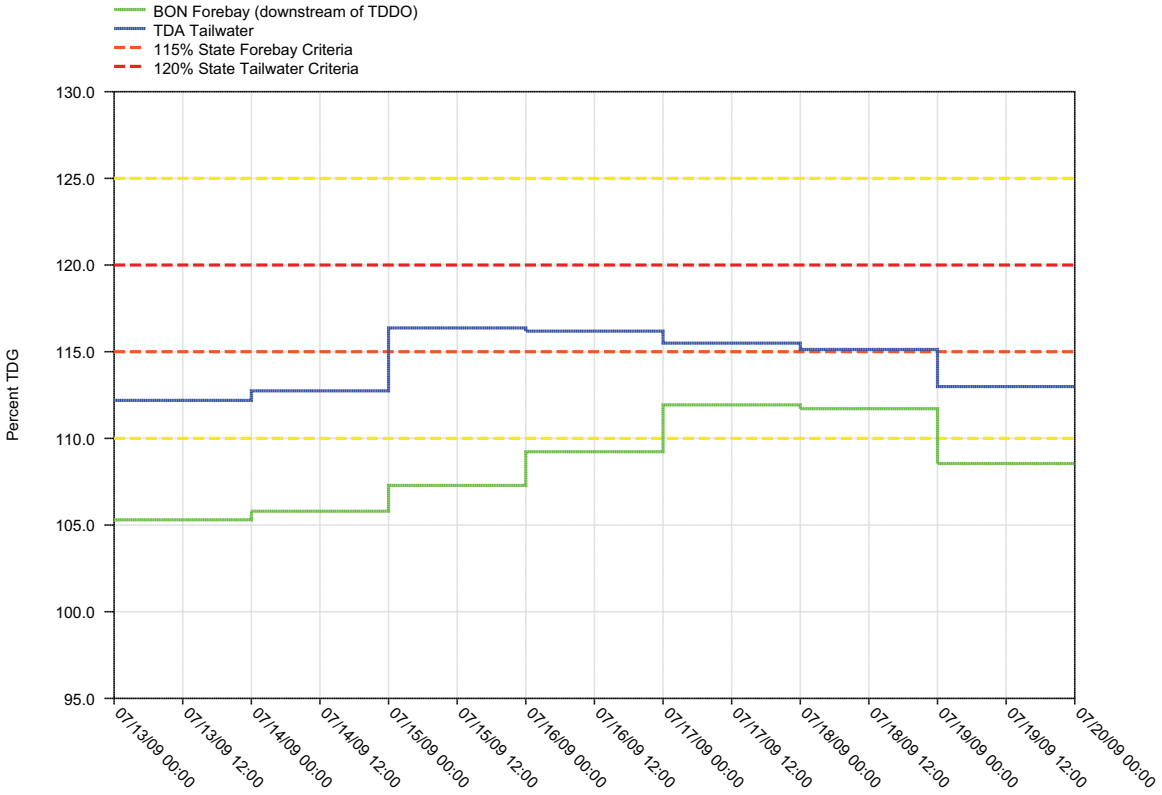


Figure 23.

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



THE DALLES DAM - Hourly Spill and Flow

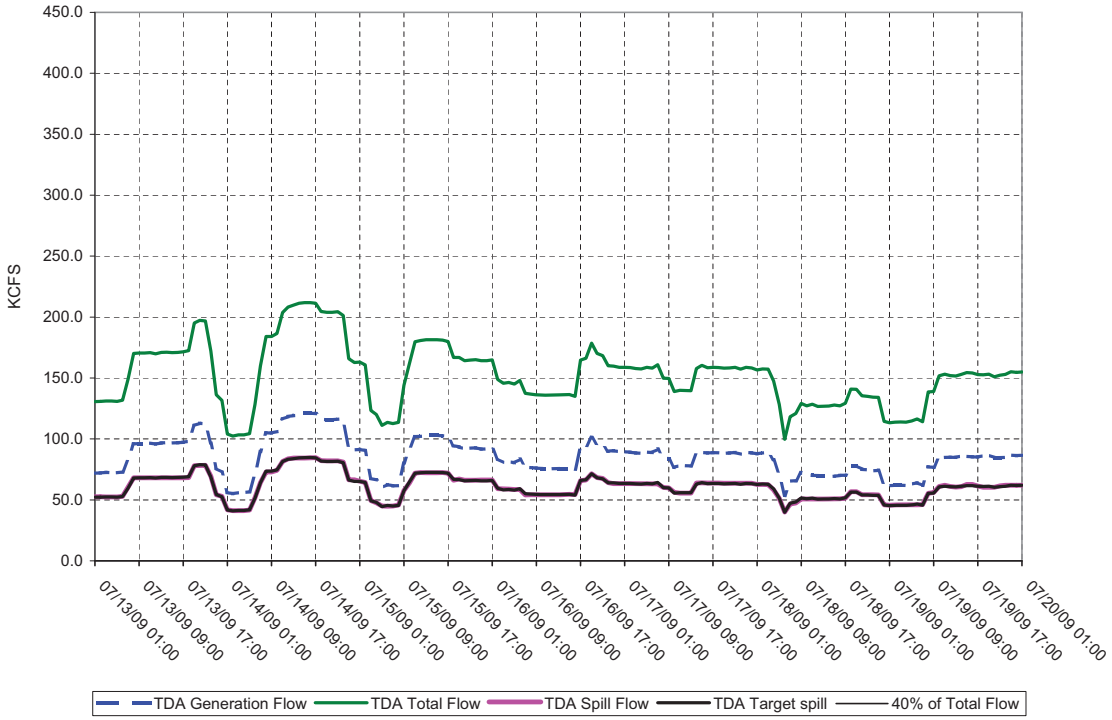
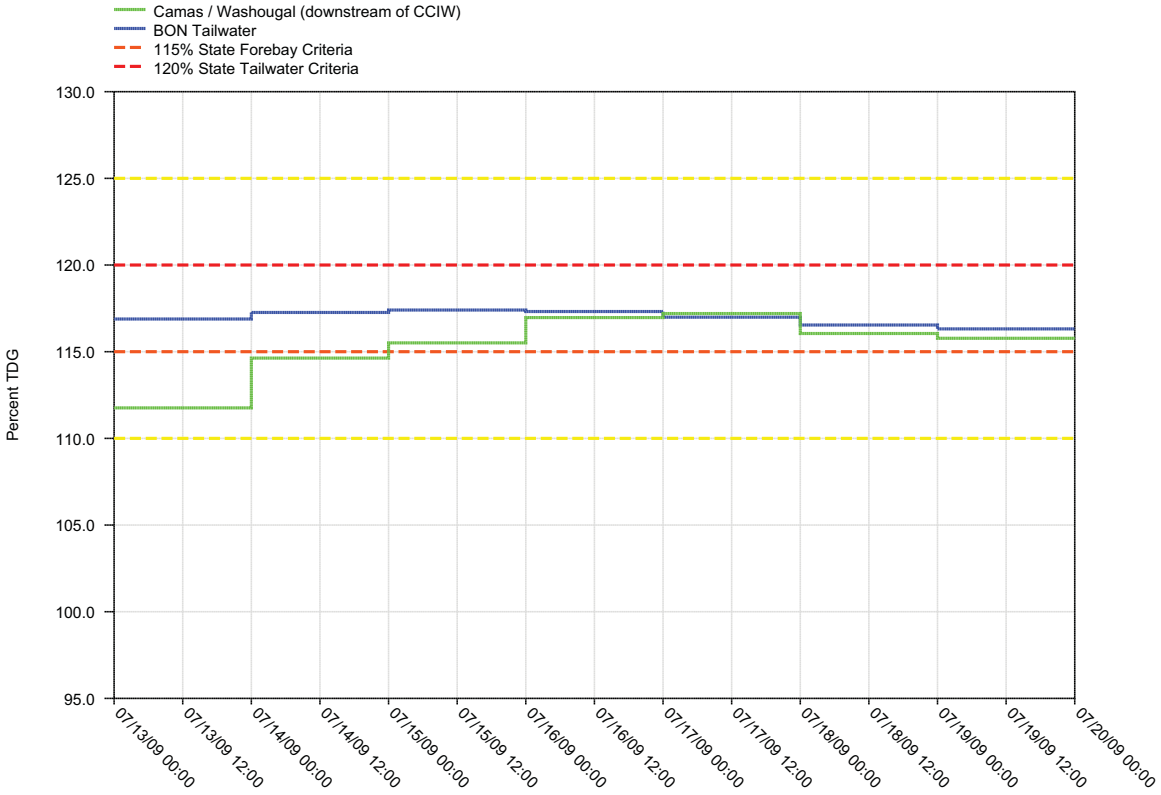


Figure 24.

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



BONNEVILLE DAM - Hourly Spill and Flow

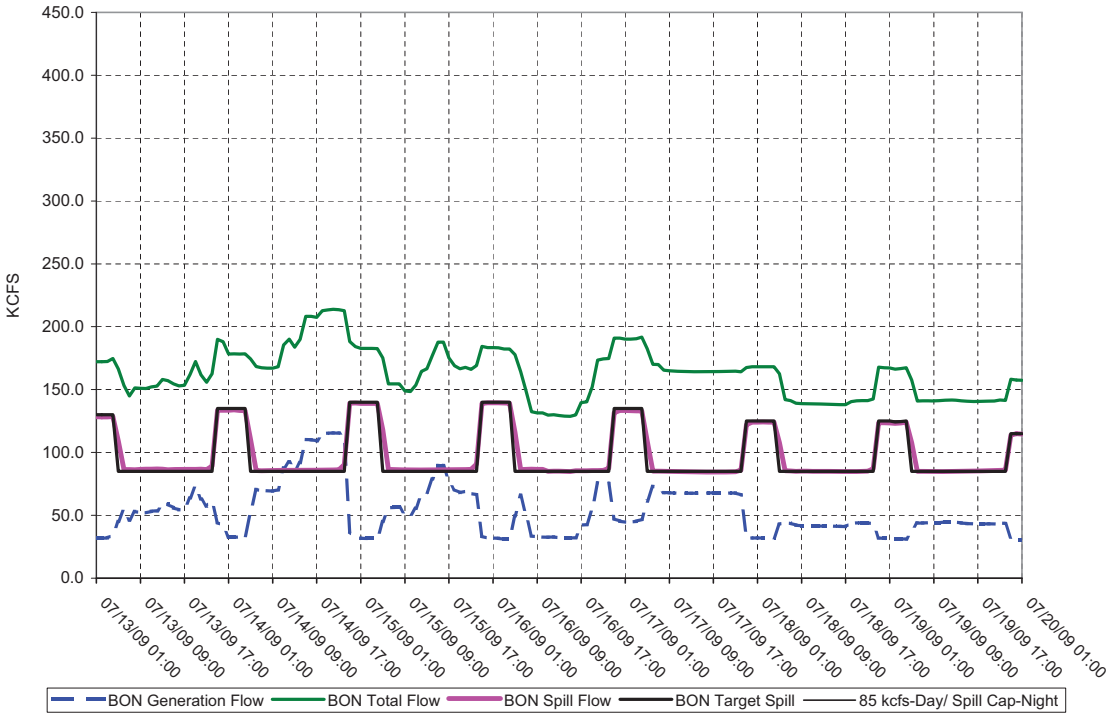
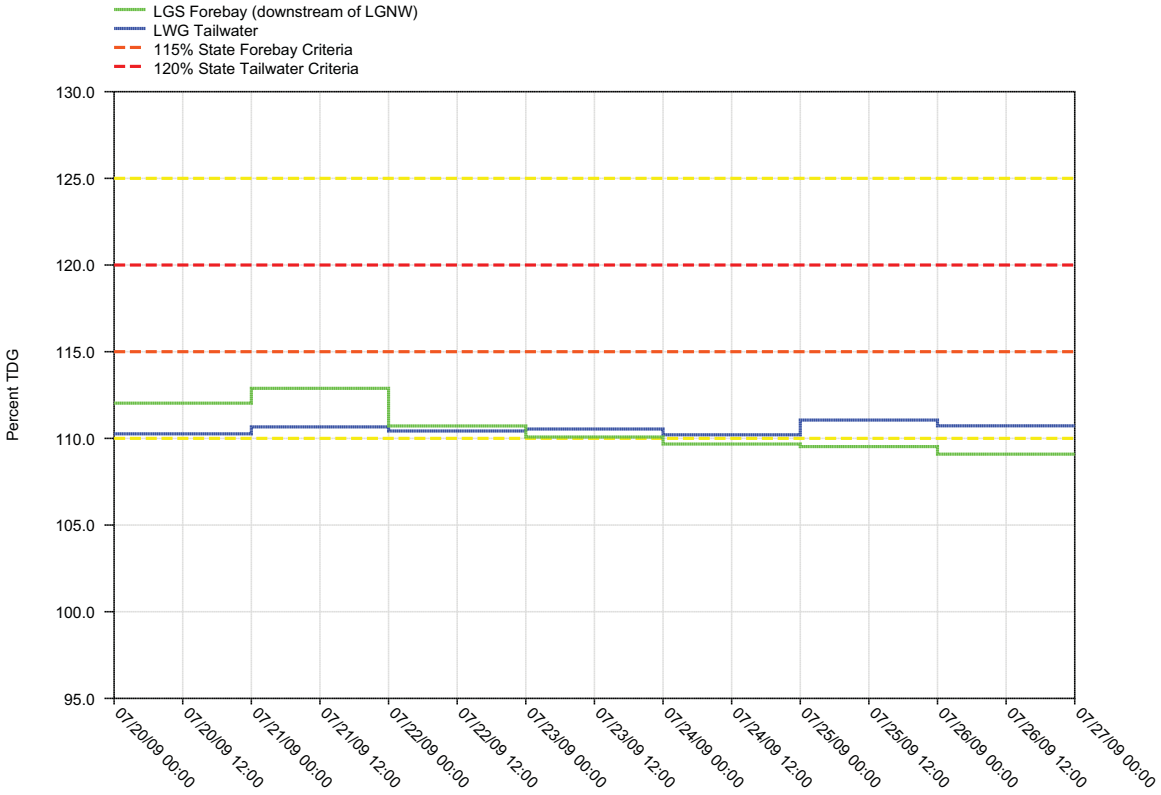


Figure 25.

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



LOWER GRANITE DAM - Hourly Spill and Flow

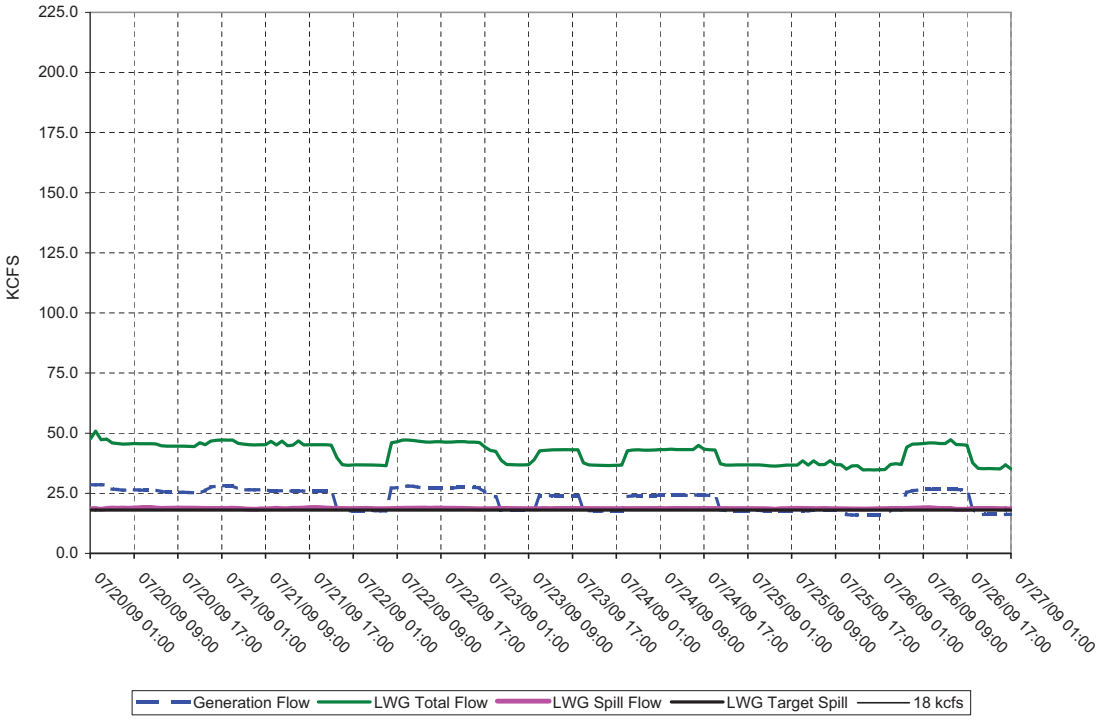
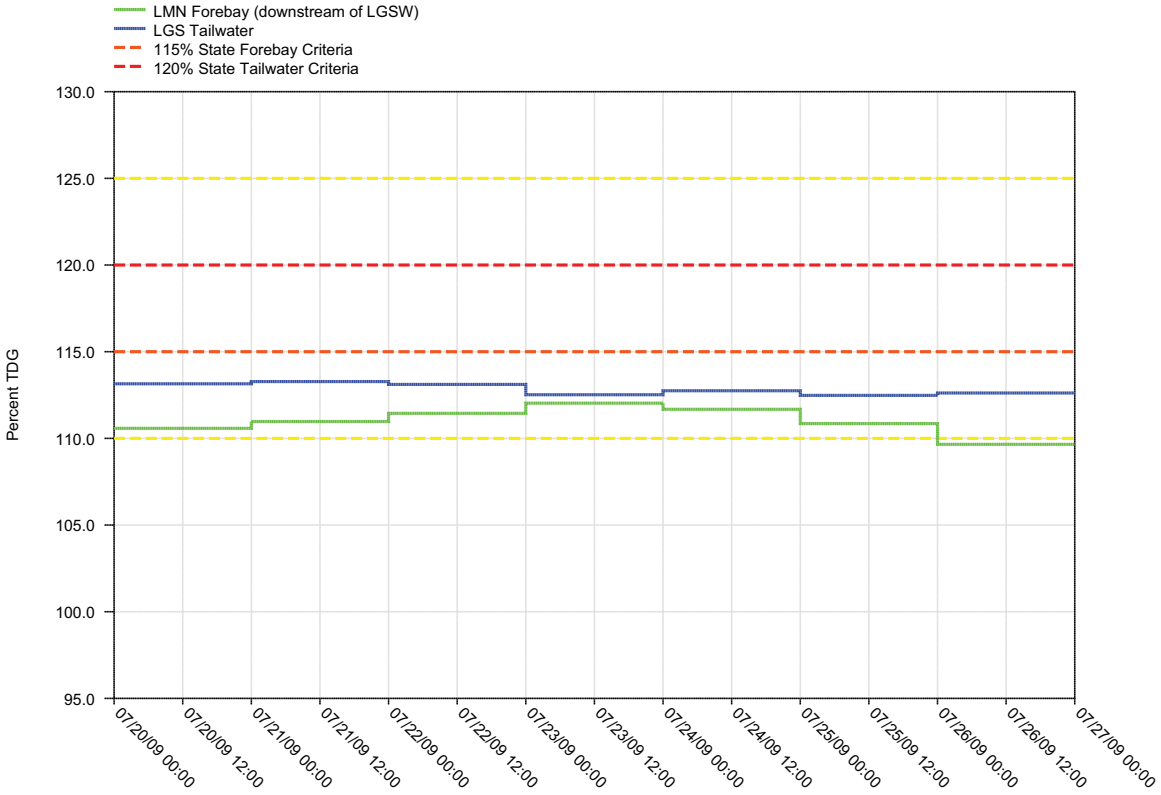


Figure 26.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

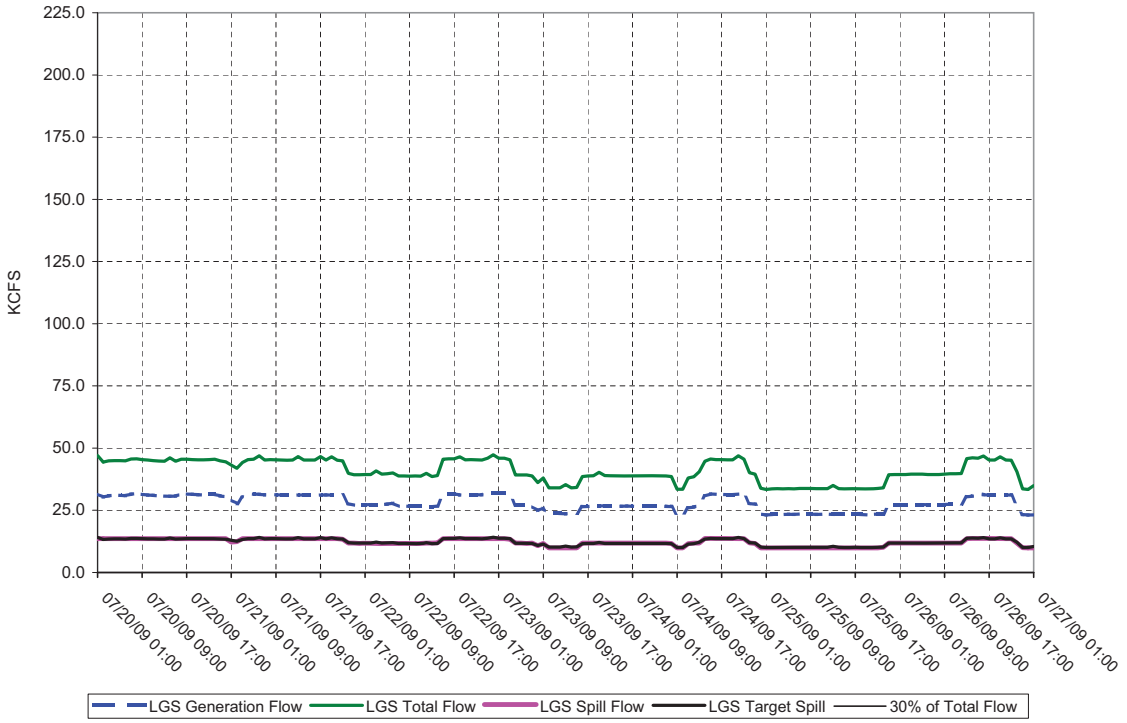
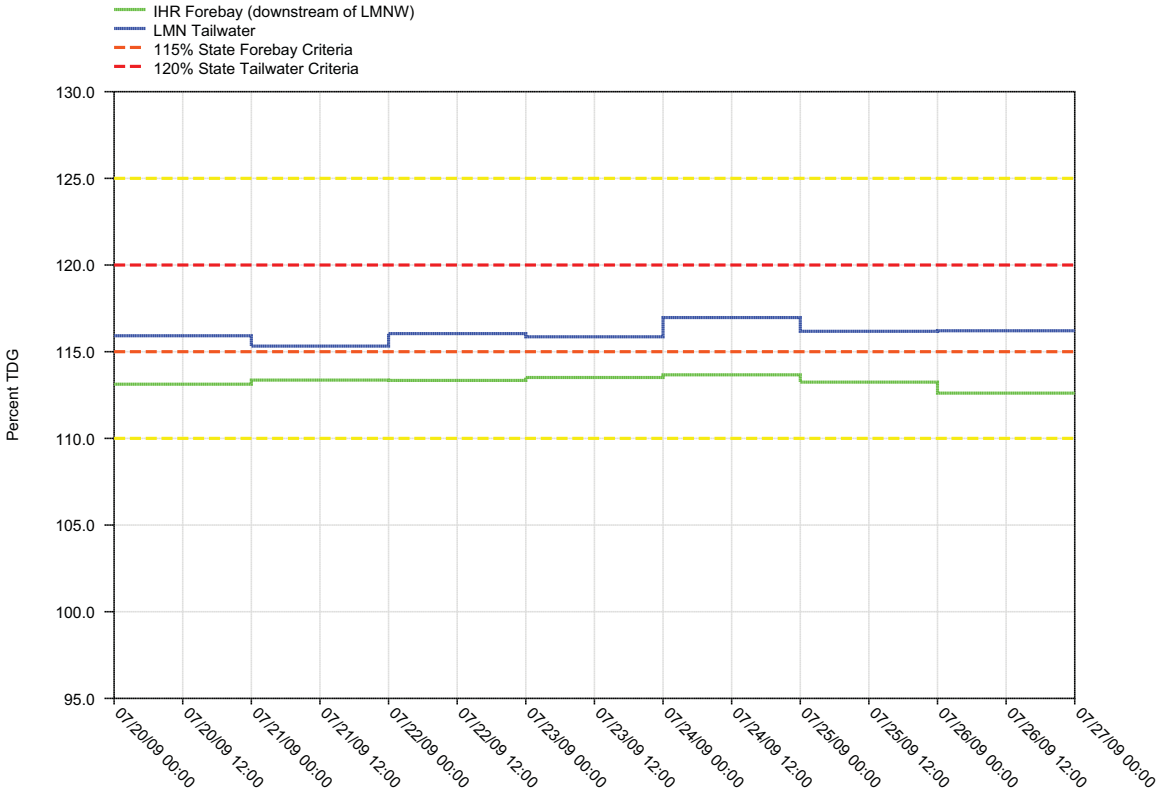


Figure 27.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

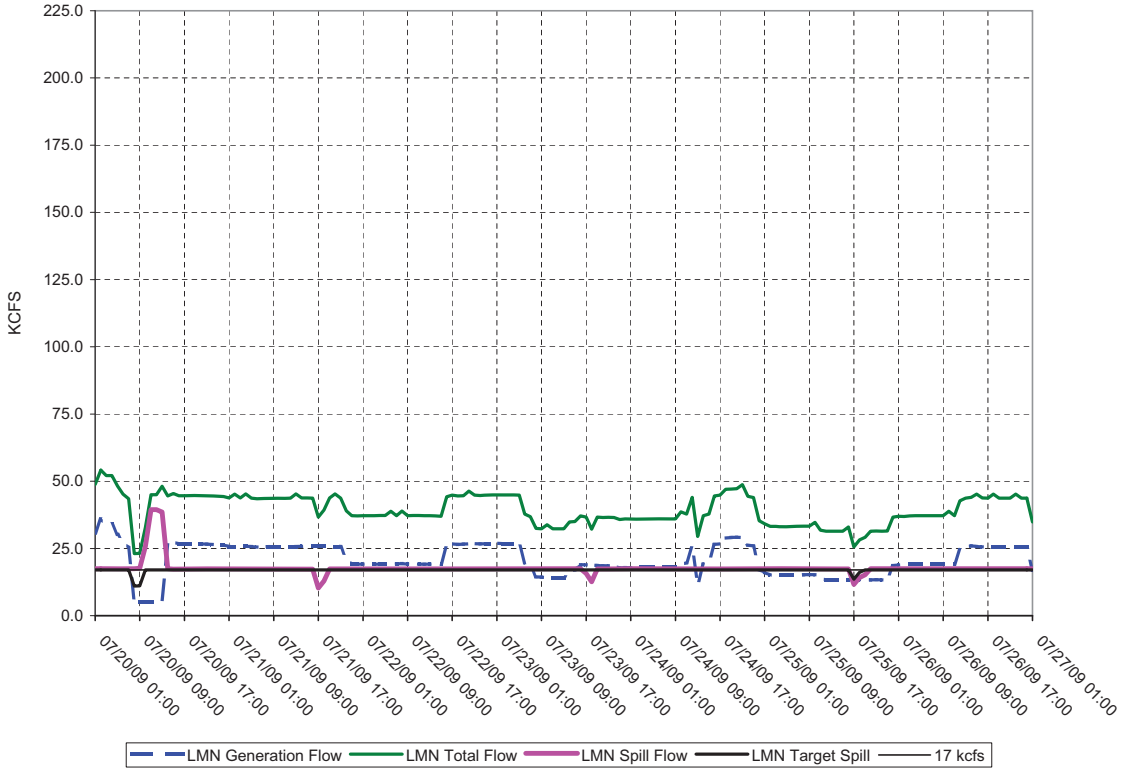
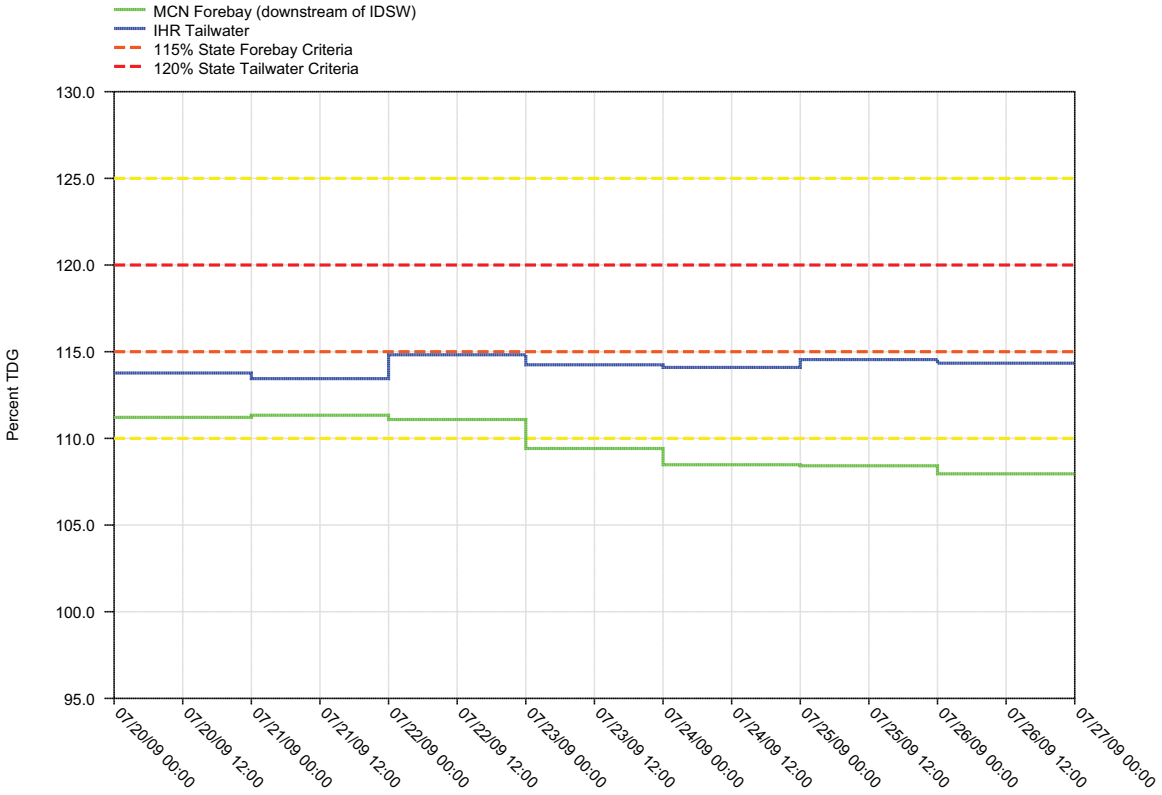


Figure 28.

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



ICE HARBOR DAM - Hourly Spill and Flow

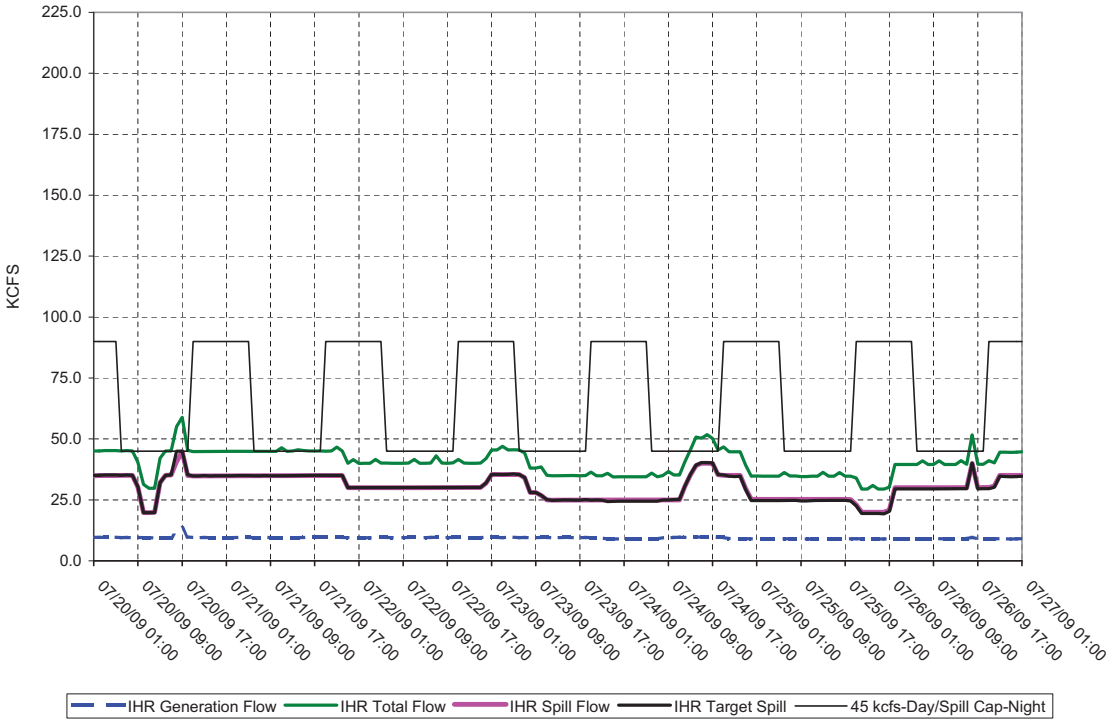
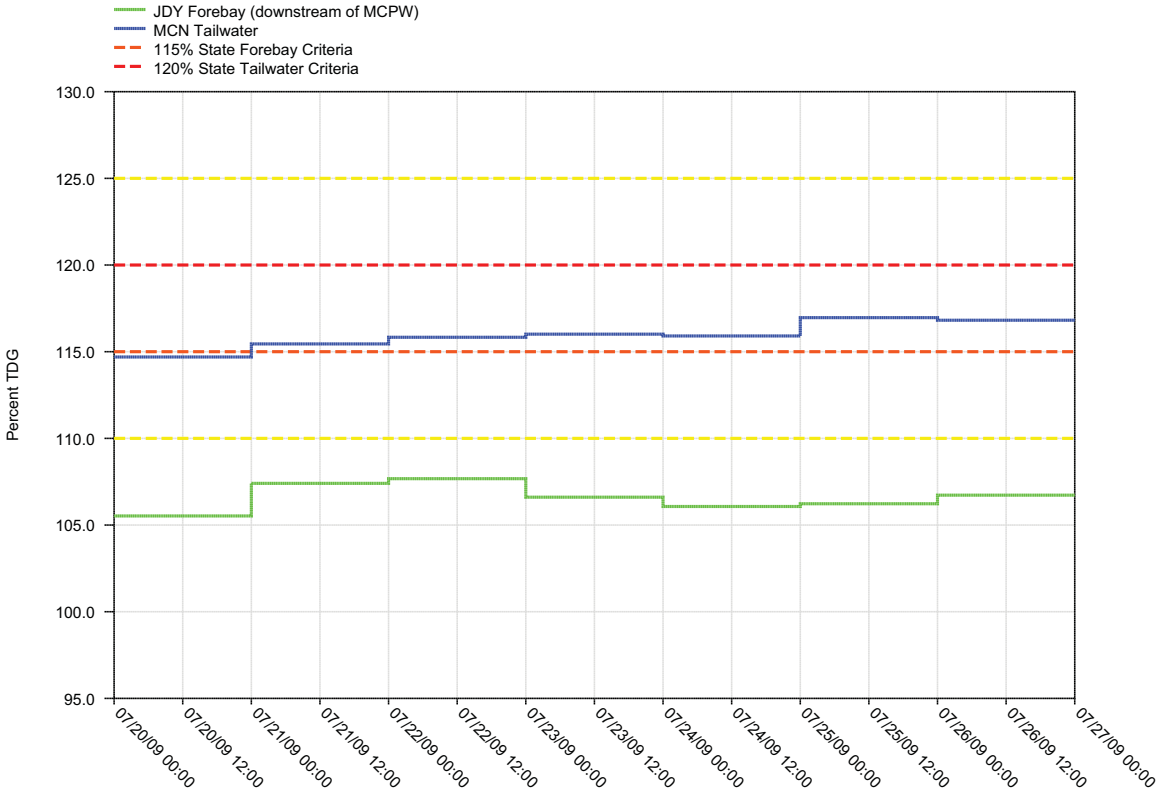


Figure 29.

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



McNARY DAM - Hourly Spill and Flow

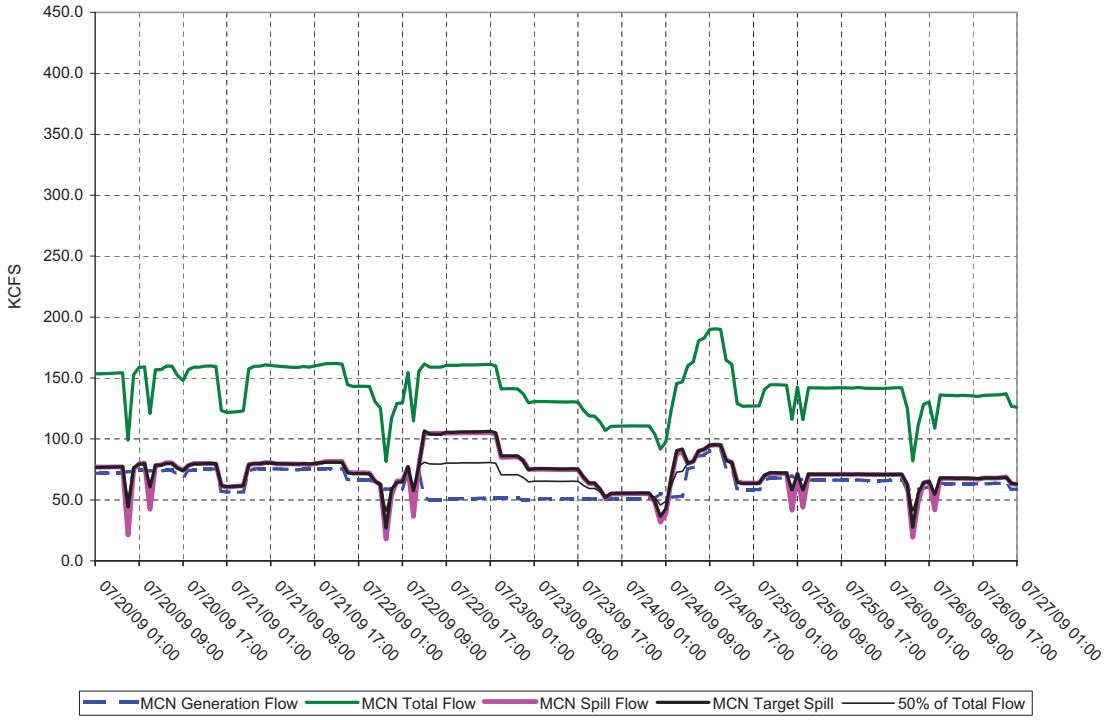
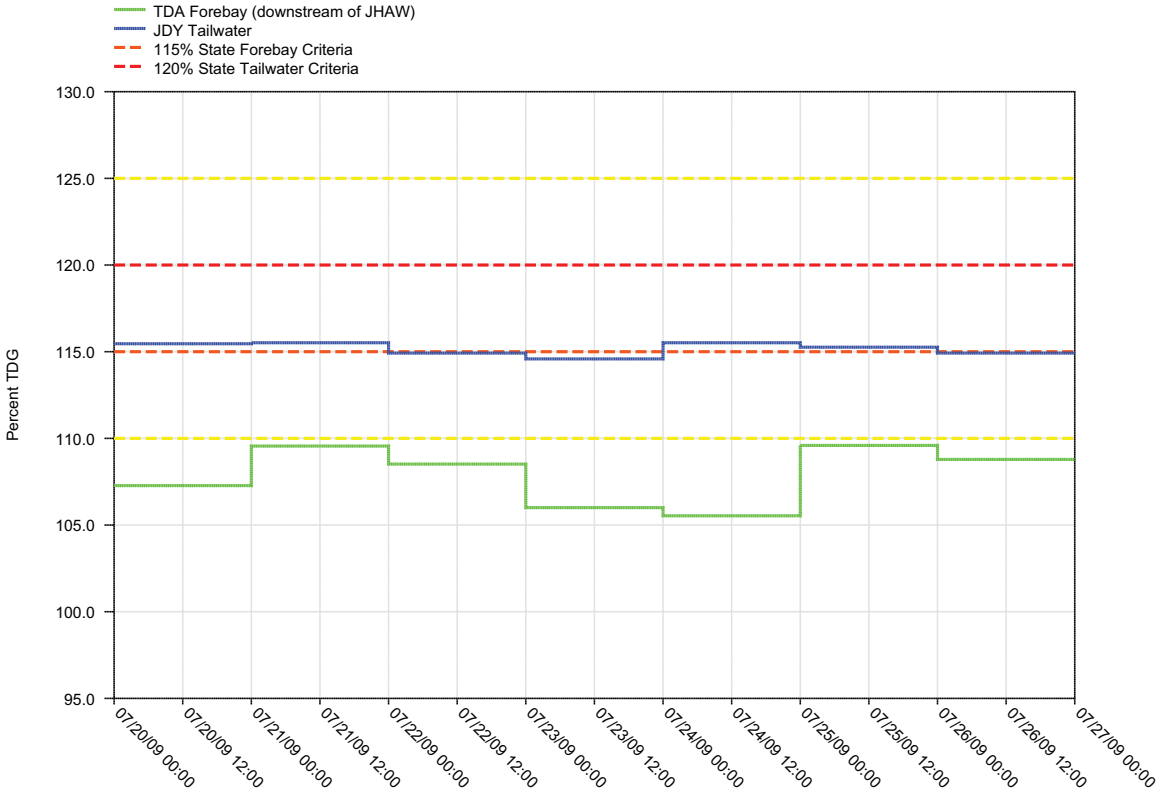


Figure 30.

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



JOHN DAY DAM - Hourly Spill and Flow

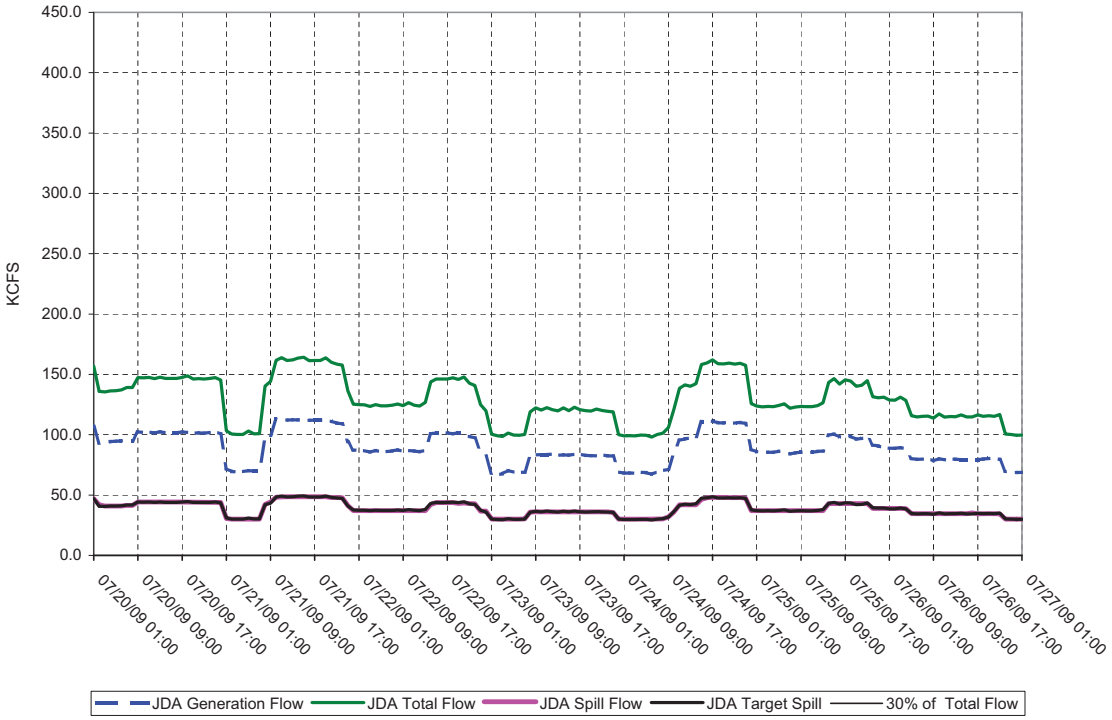
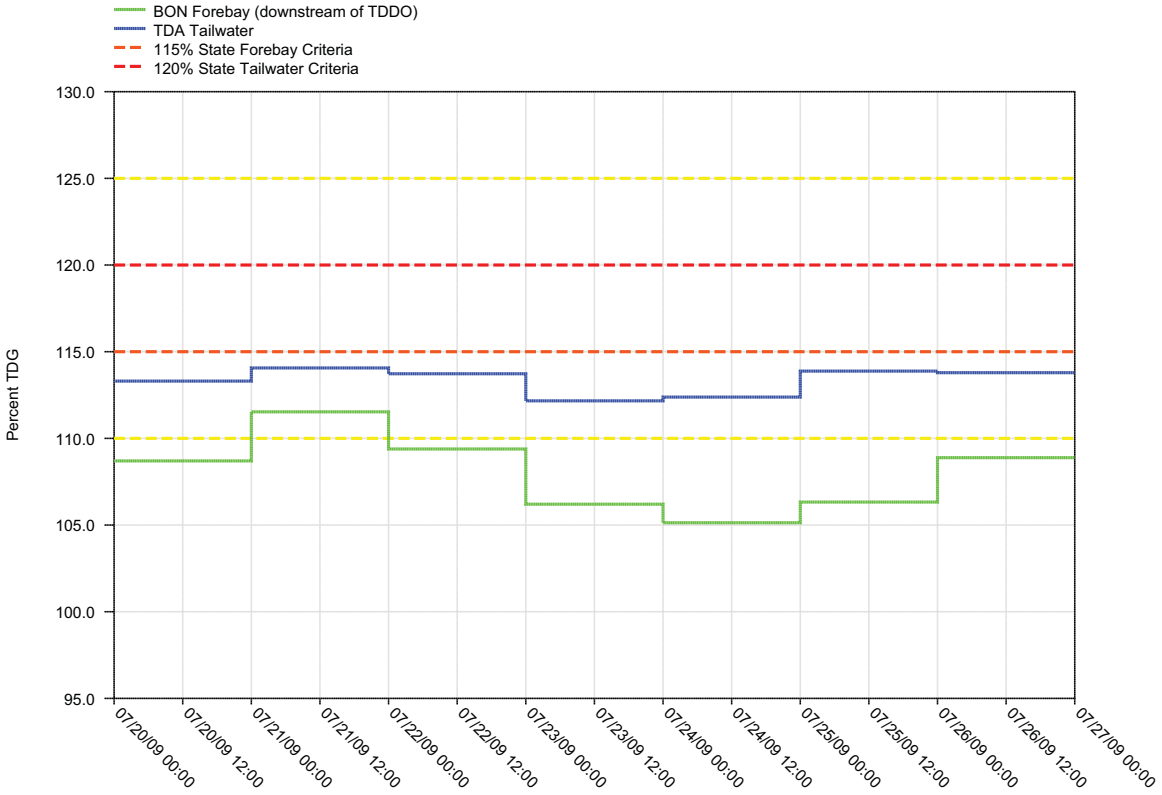


Figure 31.

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



THE DALLES DAM - Hourly Spill and Flow

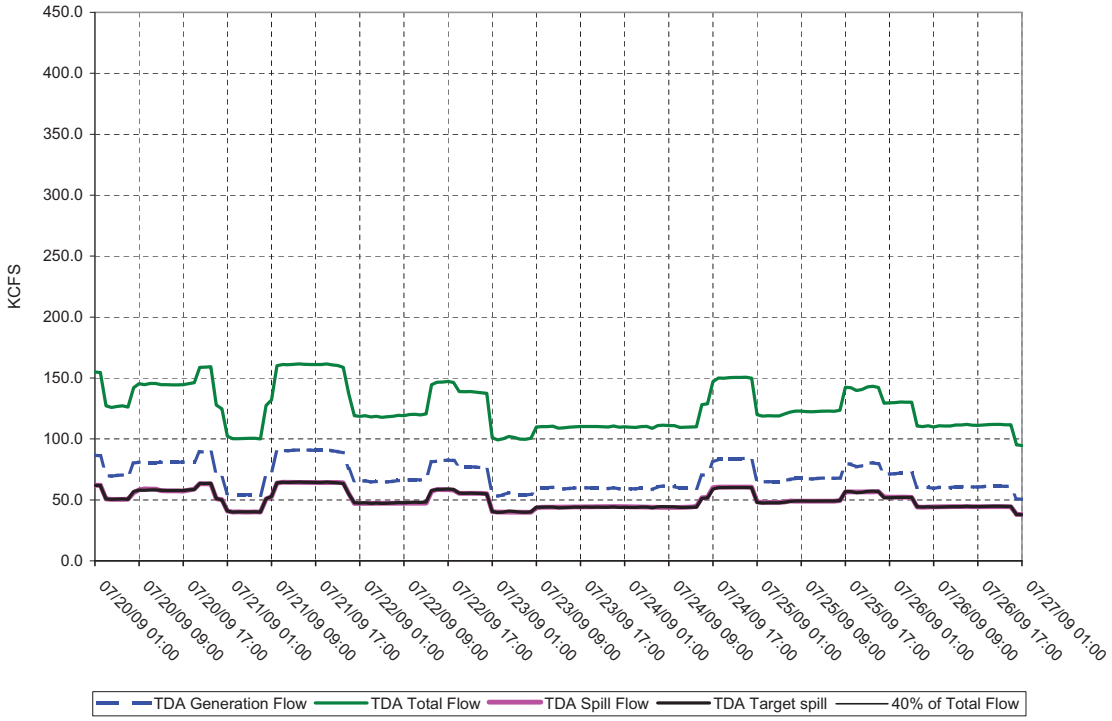
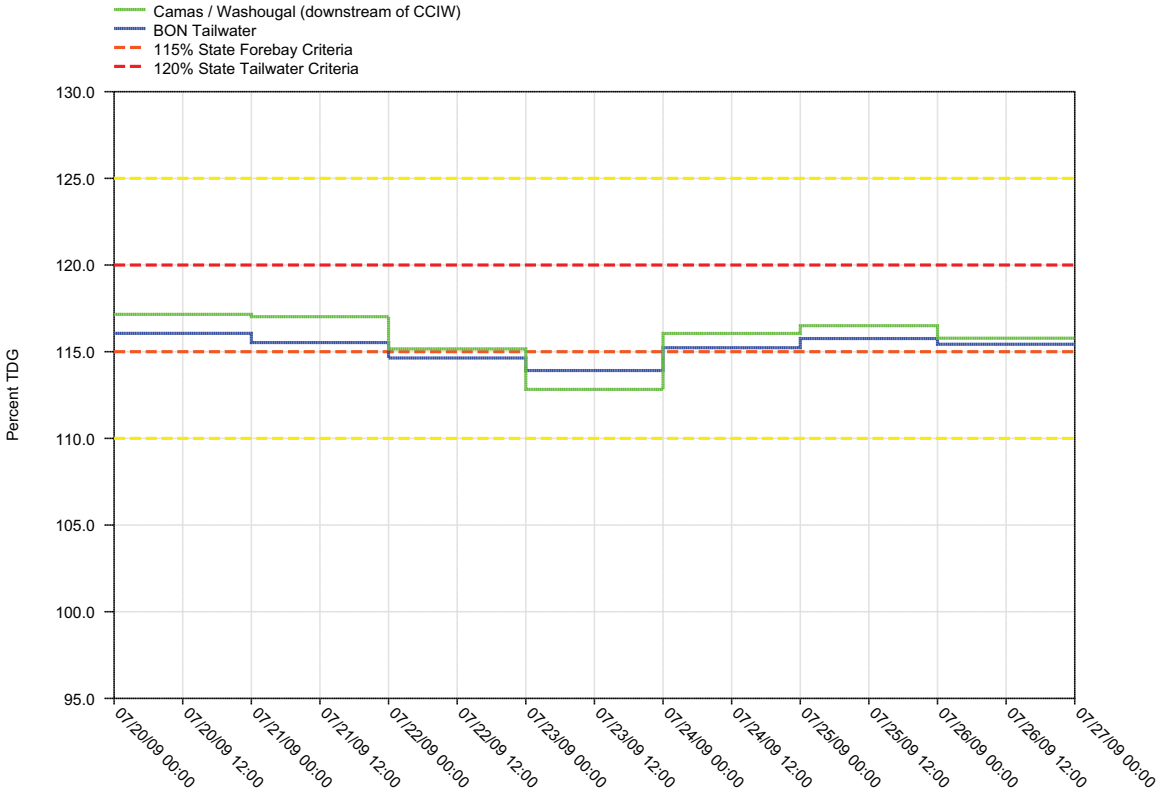


Figure 32.

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



BONNEVILLE DAM - Hourly Spill and Flow

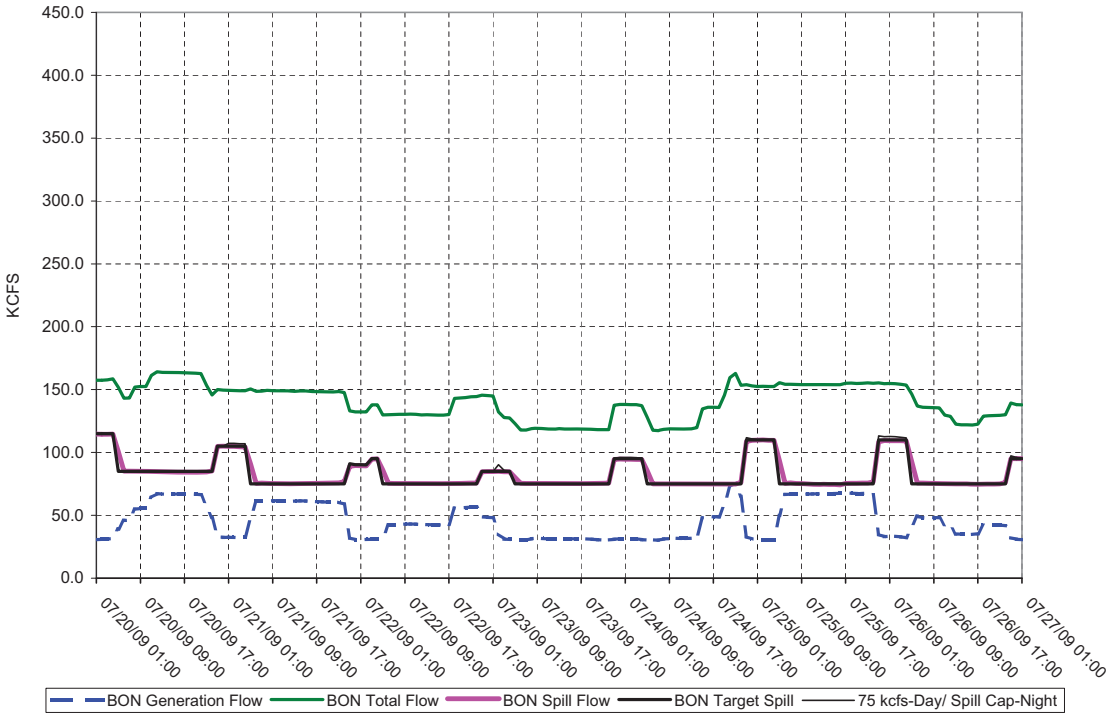
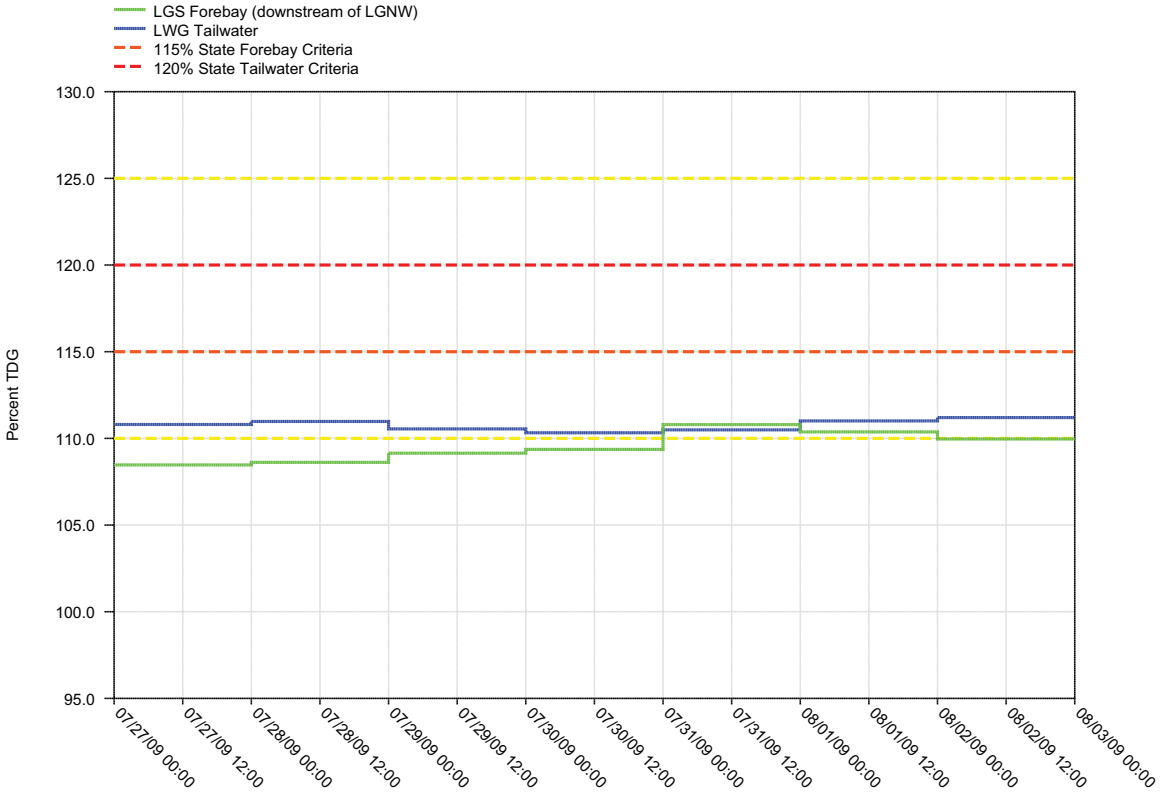


Figure 33.

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



LOWER GRANITE DAM - Hourly Spill and Flow

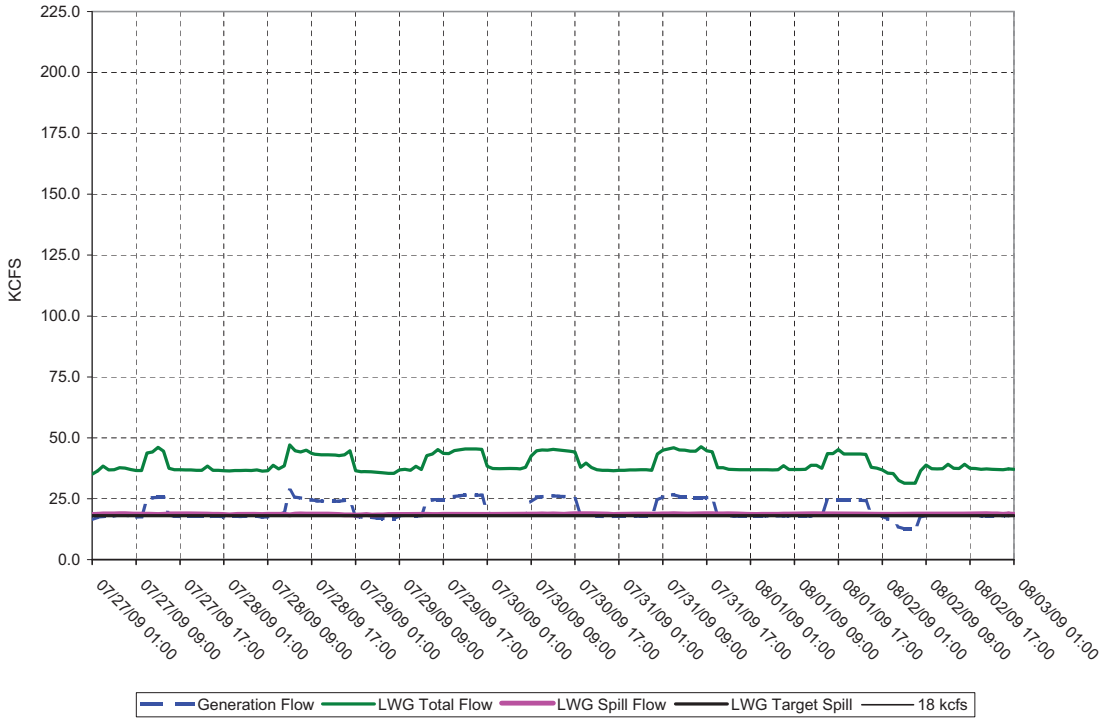
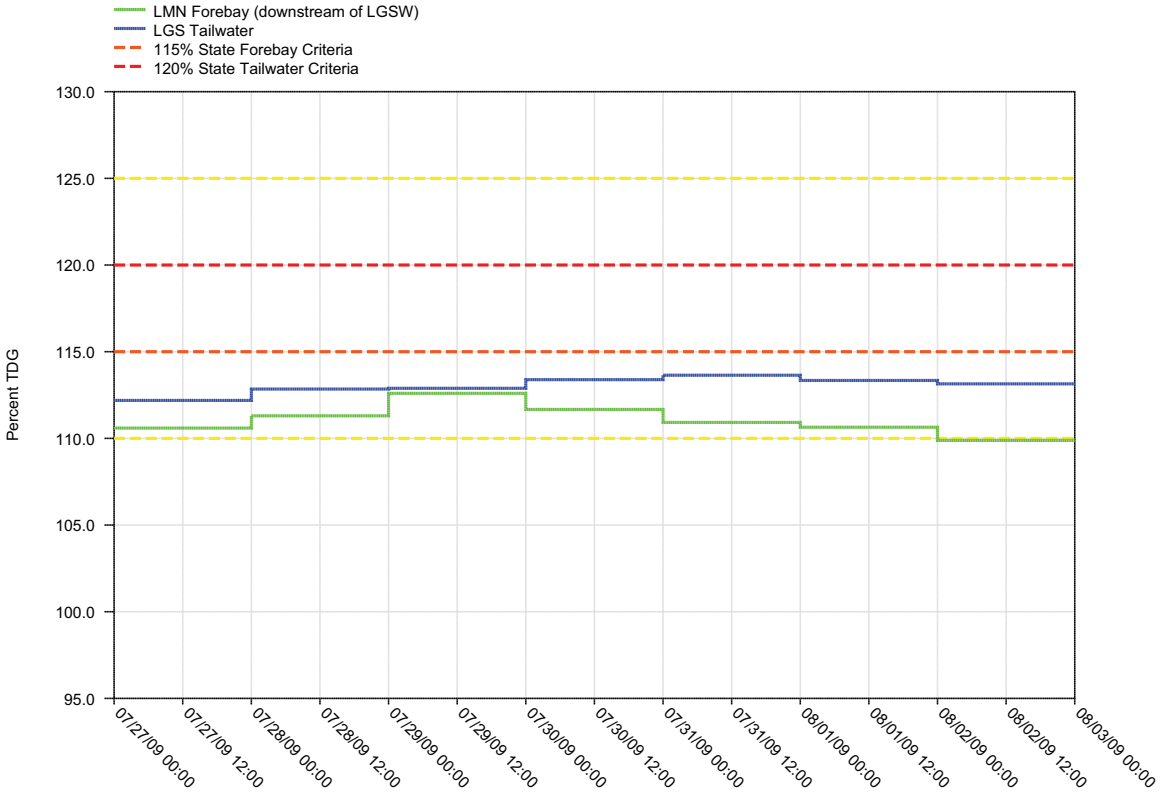


Figure 34.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

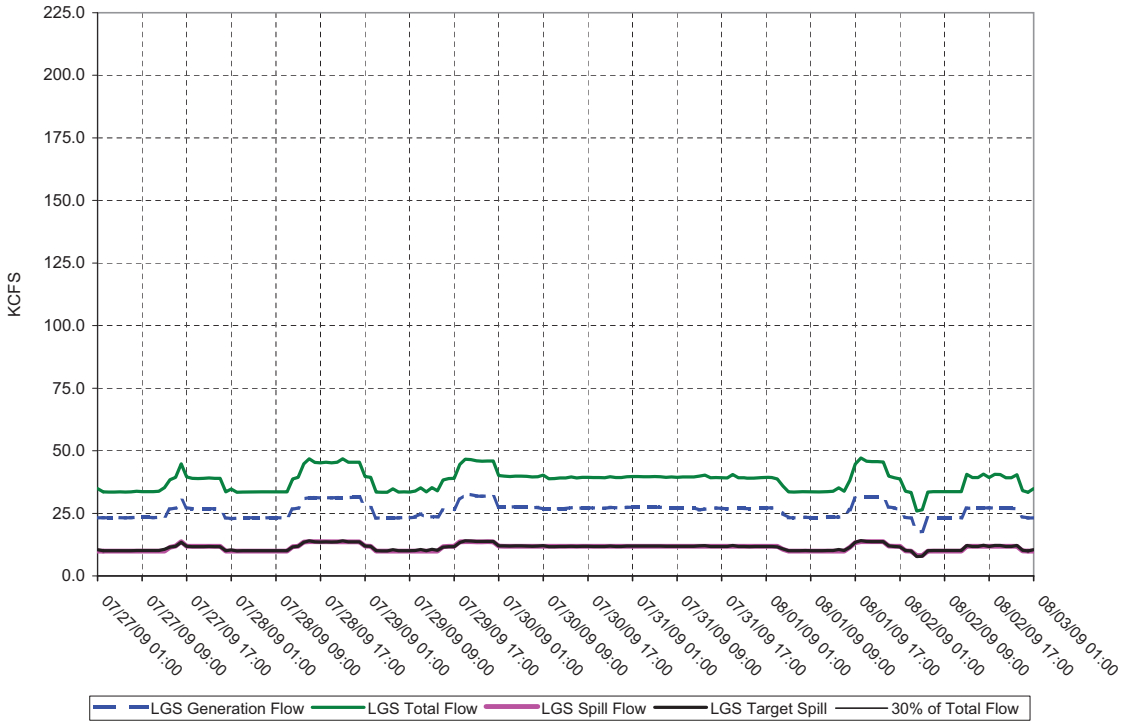
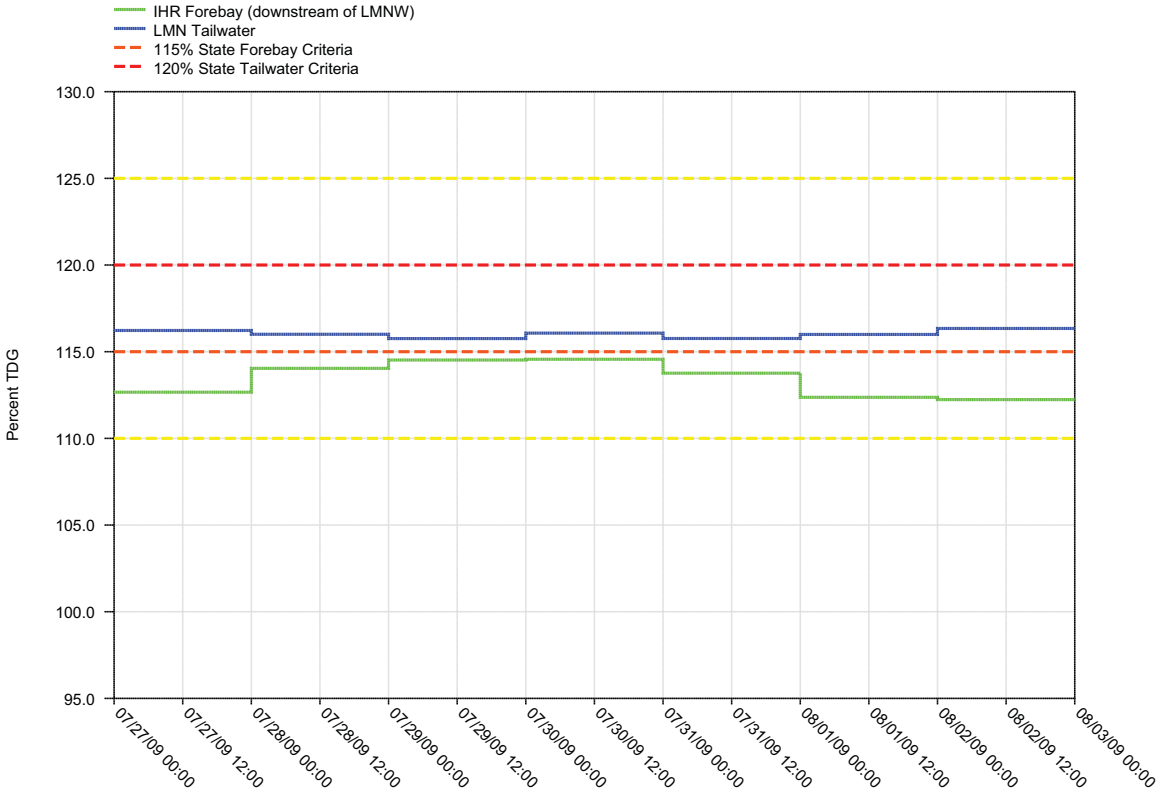


Figure 35.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

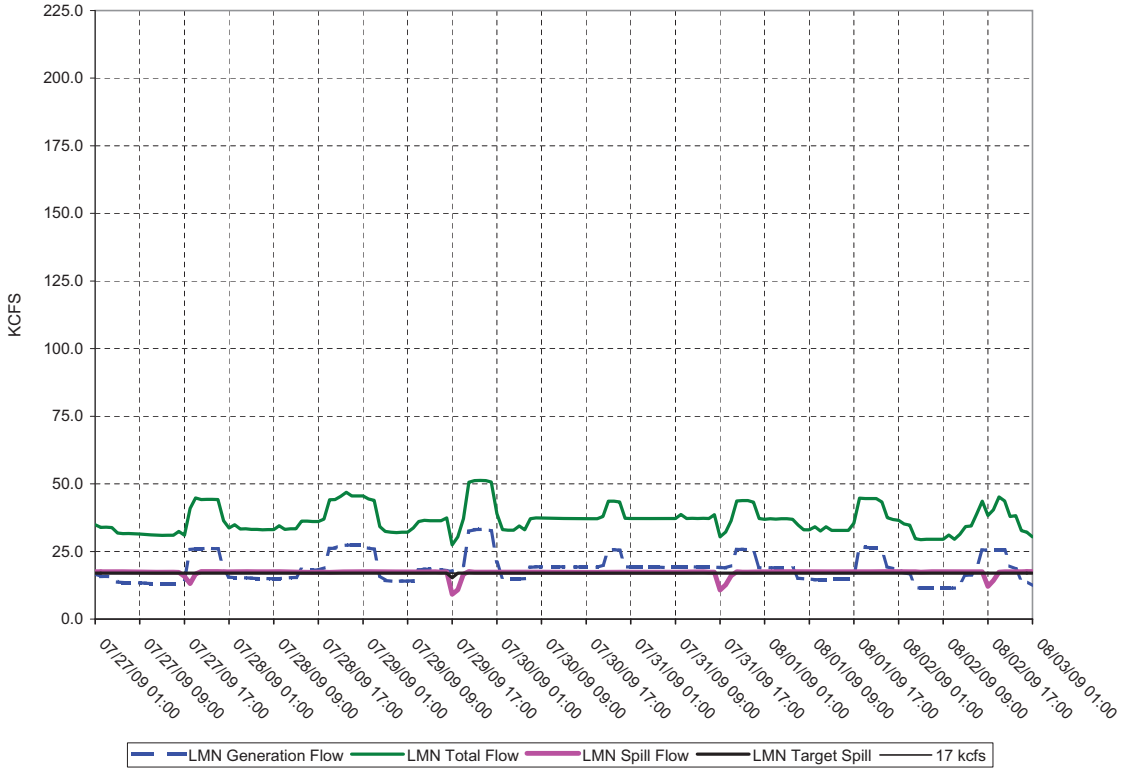
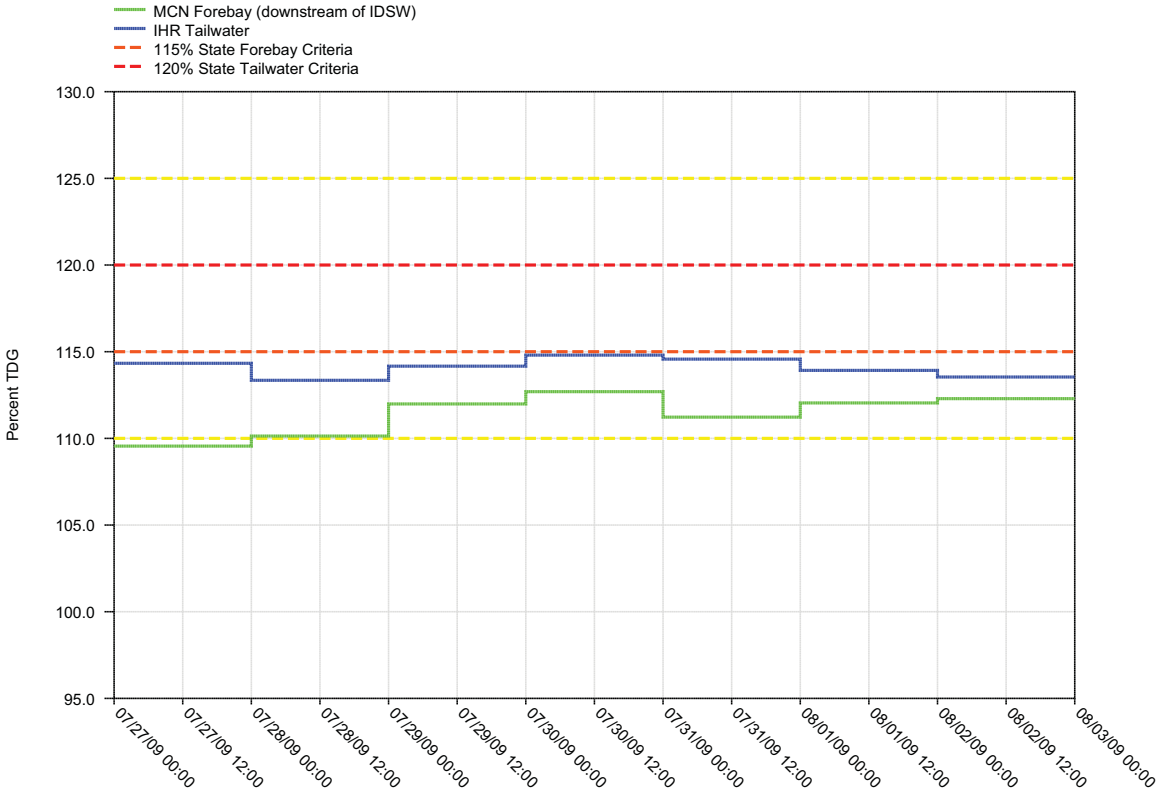


Figure 36.

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



ICE HARBOR DAM - Hourly Spill and Flow

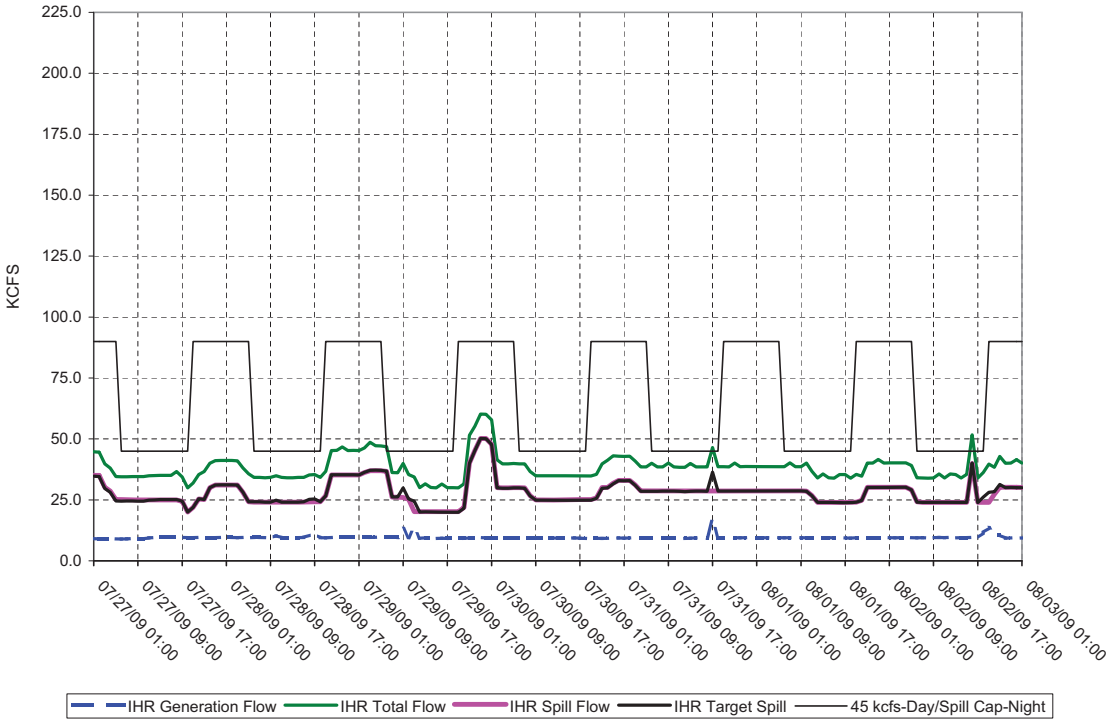
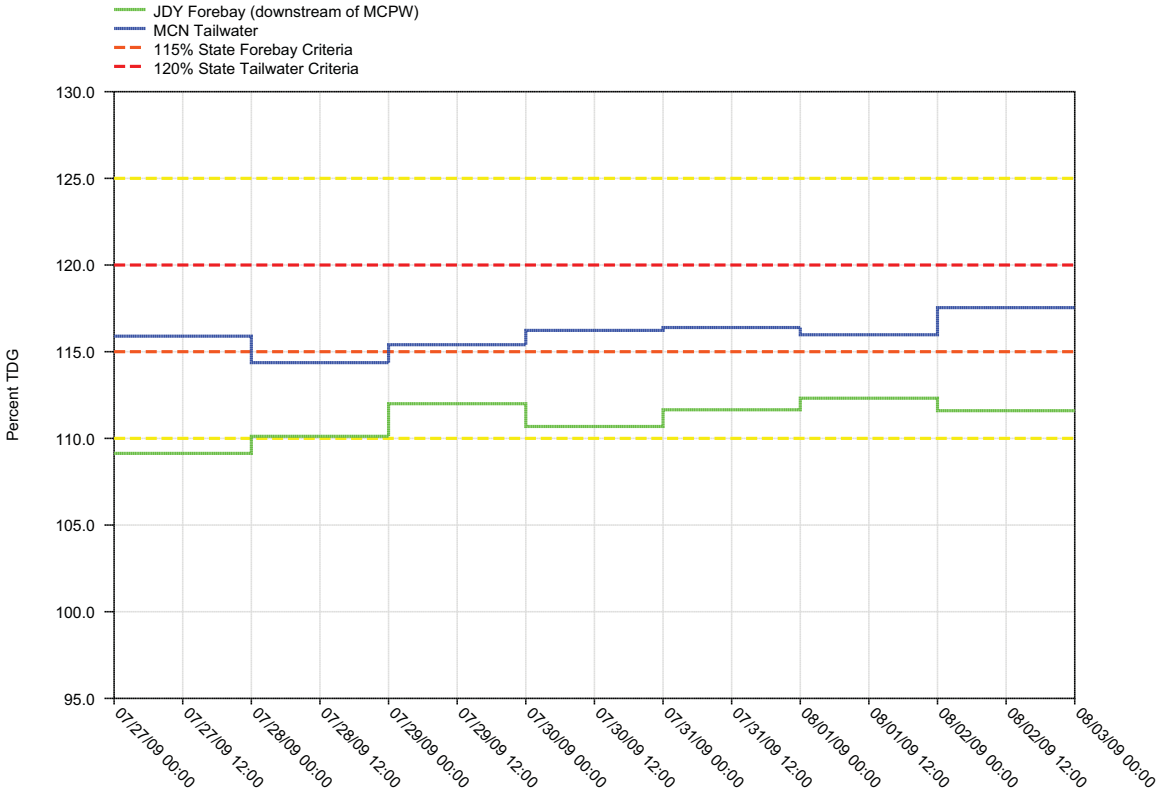


Figure 37.

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



McNARY DAM - Hourly Spill and Flow

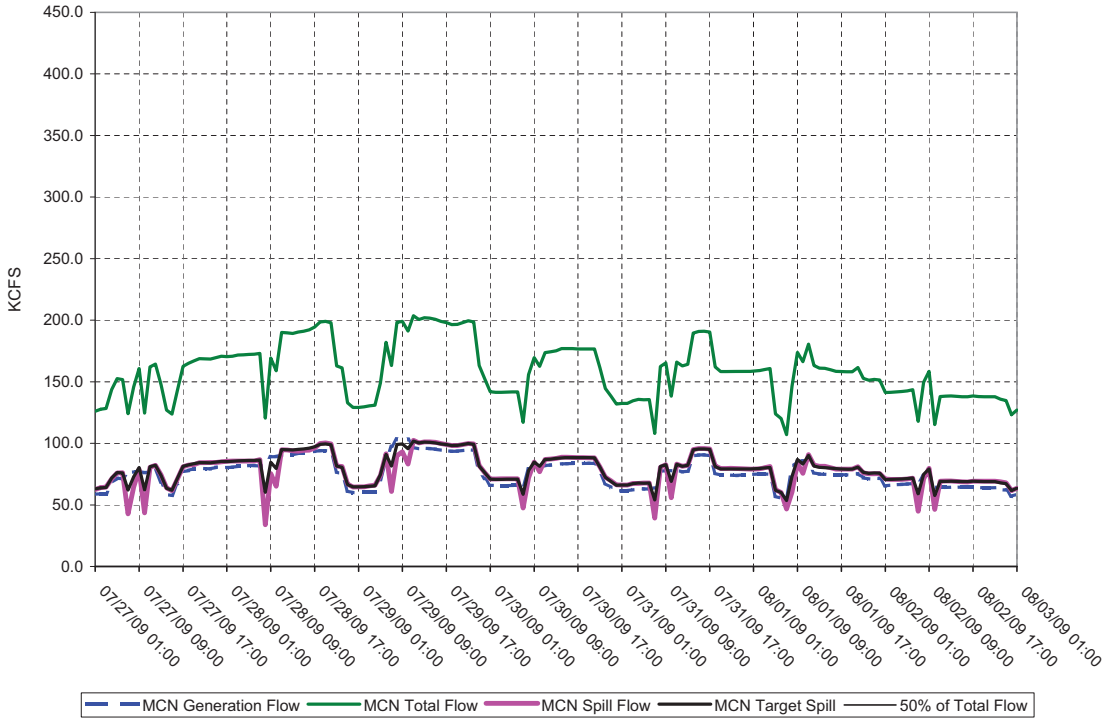
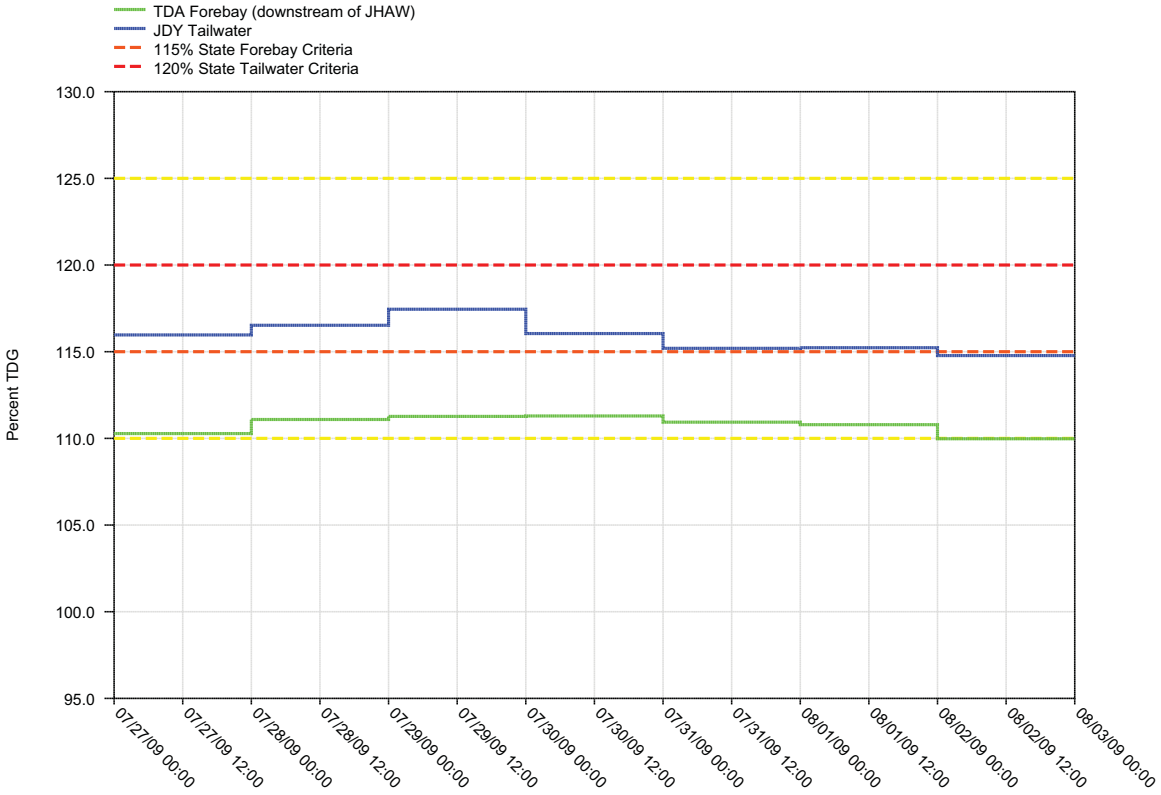


Figure 38.

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



JOHN DAY DAM - Hourly Spill and Flow

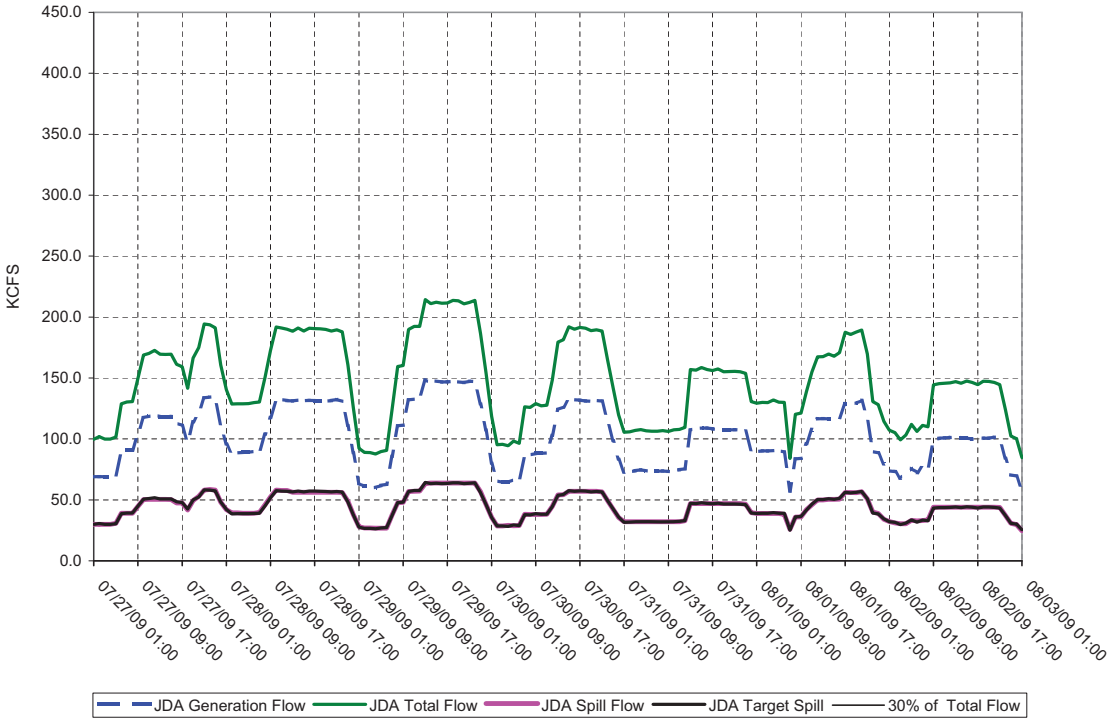
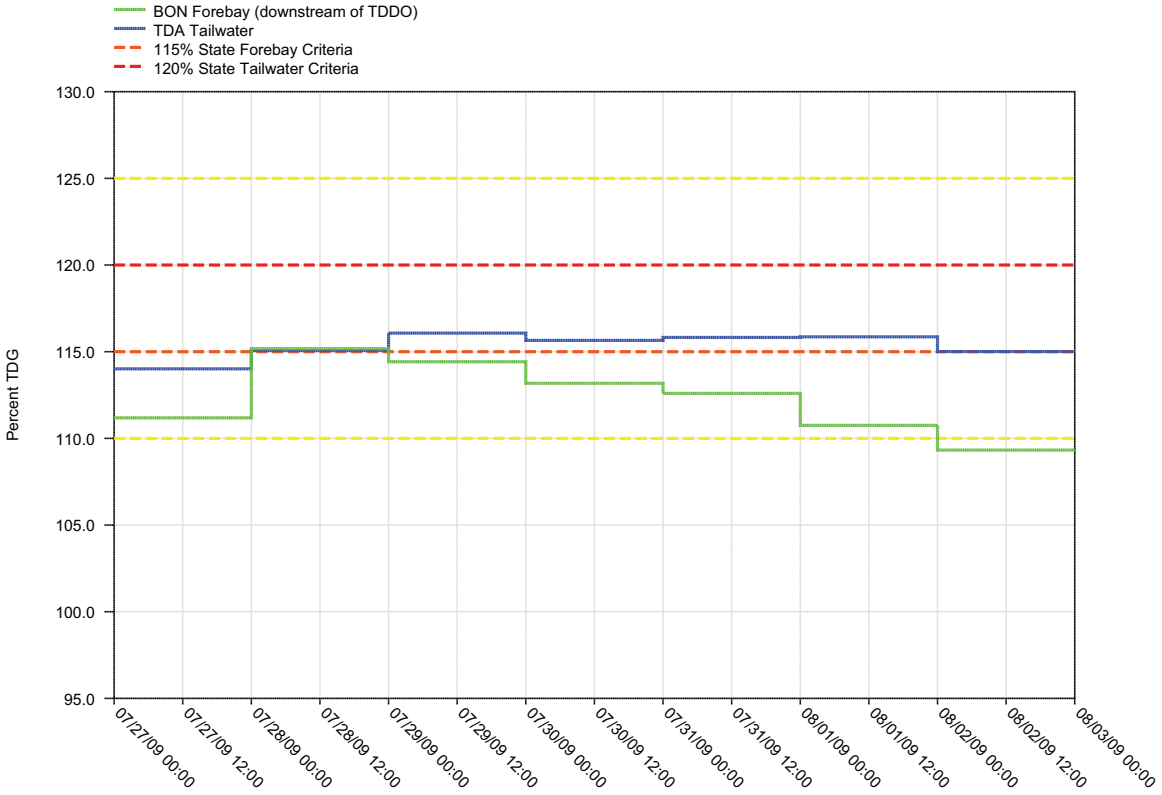


Figure 39.

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



THE DALLES DAM - Hourly Spill and Flow

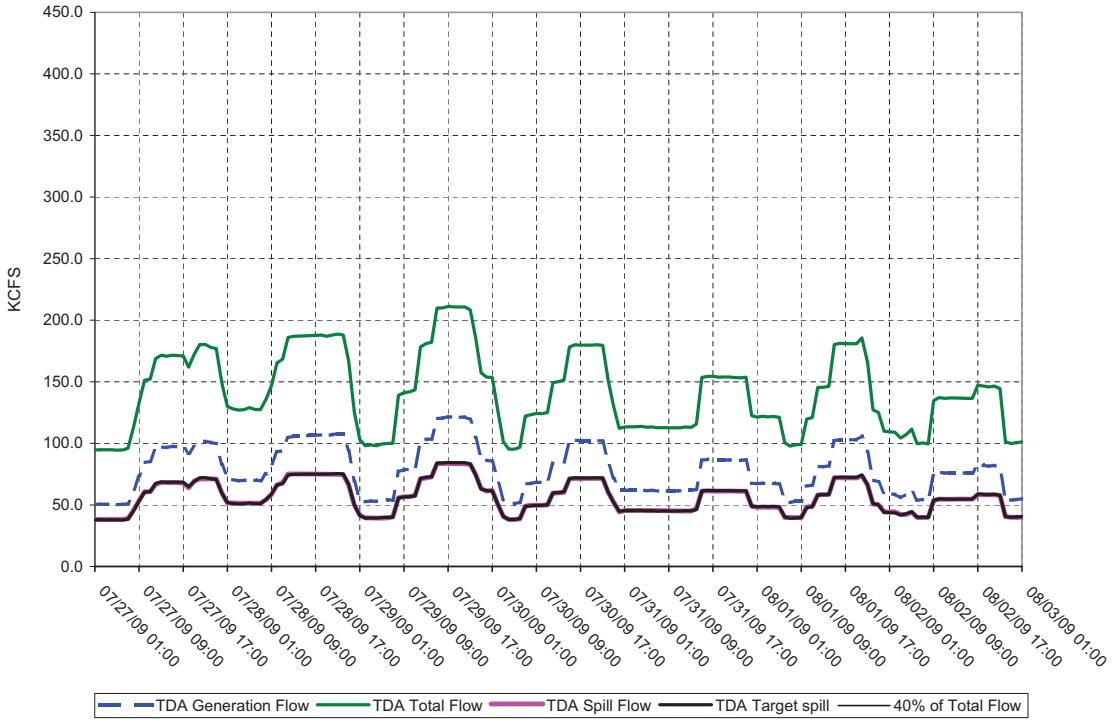
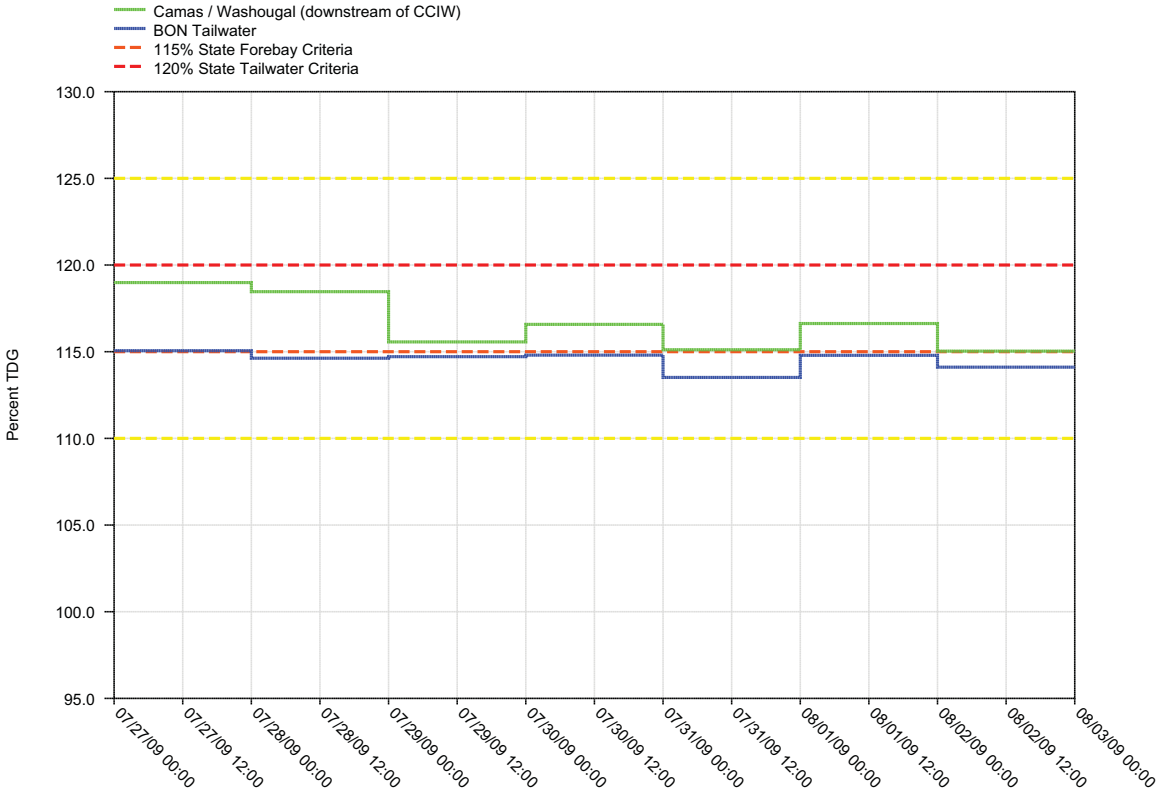
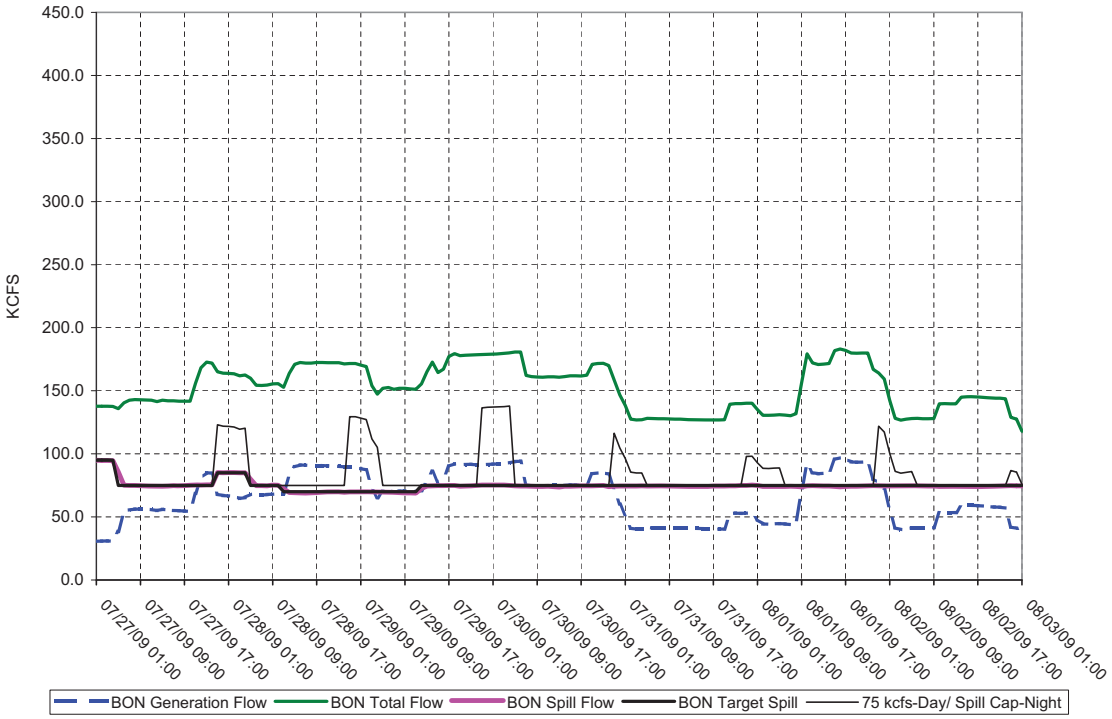


Figure 40.

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: June 29 – Aug 02, 2009

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
06/29/2009	103.9	108.9	109.1	114.5	113.5	115.2	114.4	115.8	113.5	116.3	109.4	119.2	111.2	116.6	112.2	117.8	**115.8**
06/30/2009	103.8	108.6	109.5	114.2	113.3	115.9	114.4	116.0	114.1	117.1	110.6	119.5	111.7	115.7	110.3	118.0	**115.7**
07/01/2009	103.8	108.9	109.4	114.6	113.6	116.1	114.1	116.2	112.9	113.8	112.2	118.9	**115.8**	117.5	110.0	118.1	**116.3**
07/02/2009	103.6	108.7	111.0	115.0	113.7	115.2	114.7	115.7	112.2	117.1	113.3	116.1	**119.1**	118.0	**115.3**	116.9	**118.8**
07/03/2009	103.2	108.9	110.6	115.1	114.3	115.6	**115.2**	116.3	113.1	115.9	114.1	115.8	114.8	116.6	**117.6**	116.4	**119.7**
07/04/2009	103.1	108.9	111.8	115.5	114.7	118.0	**115.3**	116.2	113.6	115.9	112.9	115.5	112.8	114.6	**116.9**	116.1	**119.9**
07/05/2009	103.7	108.9	112.8	115.5	114.9	117.8	**116.1**	116.0	114.3	116.2	112.8	115.0	112.1	114.0	114.8	116.1	**119.6**
07/06/2009	102.7	109.1	111.3	115.1	114.8	117.2	**115.3**	115.3	112.0	114.5	110.7	117.0	108.9	112.3	109.1	115.6	114.0
07/07/2009	101.8	109.0	109.8	114.4	112.6	116.9	112.8	115.4	109.5	116.5	108.6	117.1	109.6	112.4	107.8	115.8	114.2
07/08/2009	101.2	108.4	108.2	110.3	111.5	116.2	111.3	114.4	106.9	115.1	107.1	117.4	111.6	113.4	107.7	116.3	113.2
07/09/2009	100.6	109.2	106.7	111.9	111.4	116.4	111.1	111.7	106.9	115.8	106.0	118.6	108.9	114.9	109.0	116.7	113.7
07/10/2009	101.0	109.5	108.2	111.2	110.7	114.8	111.6	114.5	109.3	116.3	106.4	119.4	109.7	115.8	111.3	117.2	**115.1**
07/11/2009	102.7	109.7	111.0	112.6	110.7	114.7	112.7	114.2	109.6	114.7	105.7	119.4	113.8	117.4	111.8	117.1	114.2
07/12/2009	103.0	110.1	109.8	112.3	110.3	114.4	112.8	113.0	109.6	114.9	104.9	115.6	111.9	115.7	108.6	117.1	111.6
07/13/2009	101.2	109.4	107.6	111.6	108.9	114.2	110.2	113.4	107.8	113.9	103.5	115.9	105.2	112.2	105.3	116.9	111.8
07/14/2009	102.3	109.7	106.6	112.1	107.2	116.5	107.7	113.5	106.4	115.7	103.7	118.9	106.0	112.7	105.8	117.3	114.6
07/15/2009	102.1	109.8	106.5	111.1	107.3	115.9	107.3	115.2	105.3	115.7	104.2	118.6	112.9	116.4	107.3	117.4	**115.5**
07/16/2009	101.2	109.9	105.7	111.7	108.1	115.9	108.5	113.8	108.2	114.8	104.0	117.9	112.3	116.2	109.2	117.3	**117.0**
07/17/2009	102.8	110.3	106.4	112.4	108.9	115.6	111.1	114.3	110.1	115.6	104.3	117.5	111.8	115.5	111.9	117.0	**117.2**
07/18/2009	103.7	110.9	108.2	112.9	109.8	116.1	112.0	114.5	110.7	116.0	103.5	115.7	110.8	115.1	111.7	116.5	**116.0**
07/19/2009	102.6	109.9	107.8	112.6	109.3	115.9	112.5	114.2	110.4	117.0	103.5	115.0	107.4	113.0	108.5	116.3	**115.8**
07/20/2009	102.4	110.3	112.0	113.1	110.6	115.9	113.1	113.8	111.2	114.7	105.5	115.5	107.3	113.3	108.7	116.1	**117.2**
07/21/2009	102.9	110.7	112.9	113.3	111.0	115.3	113.4	113.4	111.3	115.4	107.4	115.5	109.6	114.1	111.5	115.5	**117.0**
07/22/2009	102.5	110.4	110.7	113.1	111.4	116.0	113.3	114.8	111.1	115.8	107.7	114.9	108.5	113.7	109.4	114.6	**115.2**
07/23/2009	102.7	110.5	110.1	112.5	112.0	115.9	113.5	114.2	109.4	116.0	106.6	114.6	106.0	112.2	106.2	113.9	112.8
07/24/2009	102.2	110.2	109.7	112.7	111.7	117.0	113.7	114.1	108.5	115.9	106.1	115.5	105.5	112.4	105.1	115.2	**116.1**
07/25/2009	102.3	111.1	109.5	112.5	110.9	116.2	113.2	114.5	108.4	117.0	106.2	115.3	109.6	113.9	106.3	115.8	**116.5**
07/26/2009	102.2	110.7	109.1	112.6	109.7	116.2	112.6	114.3	108.0	116.8	106.7	114.9	108.8	113.8	108.9	115.4	**115.8**
07/27/2009	101.8	110.8	108.5	112.2	110.6	116.2	112.7	114.3	109.6	115.9	109.1	116.0	110.3	114.0	111.2	115.1	**119.0**
07/28/2009	102.8	111.0	108.6	112.8	111.3	116.0	114.0	113.3	110.1	114.4	110.1	116.5	111.1	115.1	**115.2**	114.6	**118.5**
07/29/2009	103.1	110.5	109.1	112.9	112.6	115.8	114.5	114.2	112.0	115.4	112.0	117.4	111.3	116.1	114.4	114.7	**115.6**
07/30/2009	103.2	110.3	109.4	113.4	111.7	116.1	114.6	114.8	112.7	116.2	110.7	116.0	111.3	115.7	113.2	114.8	**116.6**
07/31/2009	103.7	110.5	110.8	113.6	110.9	115.8	113.8	114.6	111.2	116.4	111.6	115.2	110.9	115.8	112.6	113.5	**115.1**
08/01/2009	103.4	111.0	110.4	113.3	110.6	116.0	112.4	113.9	112.0	116.0	112.3	115.2	110.8	115.9	110.8	114.8	**116.6**
08/02/2009	103.1	111.2	110.0	113.1	109.9	116.3	112.2	113.5	112.3	117.5	111.6	114.8	110.0	115.0	109.3	114.1	**115.0**

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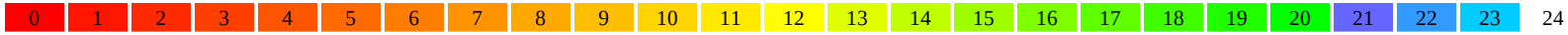
Number of hours of data reported in a given day



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 2009

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 U.S. District Court of Oregon June 10, 2009 Order adopting the Summer Fish Operations Plan (2009 Summer FOP). The 2009 Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the summer fish migration season, generally July through August. To the extent Corps project operations are not specified in the 2009 Summer FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2009 Water Management Plan (WMP), WMP seasonal updates, and the 2009 Fish Passage Plan (FPP).

The Corps' August 2009 lower Snake and Columbia River project and fish passage operations 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) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2009 Summer FOP in August.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per operational week[1] for 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.

[1] Operations are implemented from Monday through Sundays.

(B). Hourly Spill and Generation Flows – described in the lower graph.

The weekly graphs begin on August 3 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 at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on August 3 for the lower Snake and the lower Columbia projects.

August 3 – August 9	Figures 1 – 8
August 10 – August 16	Figures 9 – 16
August 17 – August 23	Figures 17 – 24
August 24 – August 30	Figures 25 – 32
August 31 – September 6	Figures 33 – 40

A. Upper Graph: Shows the resultant daily average percent TDG for the 12 highest hours. This is primarily a result of spill at dams. The objective is to operate each project up to the TDG limits without exceeding those limits to the extent 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% TDG is the upper operating limit.

B. Lower Graph: Shows the hourly 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 medium green line represents the average hourly total river flow through the project in 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 2009 Summer 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:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described above. When spill levels briefly deviate below or above the level specified in the applicable 2009 Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The August 2009 Summer FOP Spill Report Table (August 2009 Summer Spill Report Table) includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the August 2009 Summer 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 applicable 2009 FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. 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, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not include this volume of water. However, the actual spill volume remains constant. When these variances occur, they are recorded in the monthly Spill Report Table for Little Goose under the variance Type “Navigation.”

Also it is important to note that actual spill levels at Corps projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the applicable Summer FOP and the RCC spill priority list, which defines the projects' TDG 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 2009 Summer FOP describes project operations during "Rapid Load Changes" (pages 5-6). For reporting purposes, the notation "Transmission Stability" in the August 2009 Summer Spill Report Table will replace "Rapid Load Changes" 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 by more than the +/- 1% requirement than other hours. On days cited in the table, the 24 hour average spill percent was within the applicable 2009 Summer FOP level of +/- 1% of the target spill unless limited by the TDG spill cap.

Occurrences which required an adjustment in operations and/or 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 below 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 2009 Summer FOP.

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

- Lower Granite Dam - the hourly target spill was a fixed quantity of 18 kcfs 24 hours per day.
- Little Goose Dam - the hourly target spill was 30% of the total flow for 24 hours per day up to August 18, at which time the target spill changed to a flat spill of 11.6 kcfs through August 26, 9.9 kcfs through August 29, and 7.9 kcfs through August 31 for 24 hours per day.
- Lower Monumental Dam – the hourly target spill was a fixed quantity of 17 kcfs 24 hours per day.
- Ice Harbor Dam – the hourly target spill was 45 kcfs day/TDG spill cap night.
- McNary Dam – the hourly target spill was 50% of total flow for 24 hours per day.
- John Day Dam – the target spill was 30% of total flow for 24 hours per day.
- The Dalles Dam - the target spill was 40% of the total flow for 24 hours per day.
- Bonneville Dam - the hourly target spill was 75 kcfs day/TDG spill cap night.

Operational Adjustments for August:

1. Little Goose Dam:

   On August 18, the project began a flat spill of 11.6 kcfs for 24 hours per day through August 26, at which time the flat spill changed to 9.9 kcfs and continued through August 29, when it changed to 7.9 kcfs through August 31, 2009. This change in operation was due to the reopening of the spillway weir on August 18. This low flow contingency operation is included in the 2009 Summer FOP and was coordinated with TMT via email on August 18, 2009.

2. Ice Harbor:

- On August 15, as a result of the Sacajawea substation transformer coming back in service, it became unnecessary to have a unit operating at Ice Harbor during nighttime hours to maintain system stability. The project began a zero generation nighttime operation from 2200-0600 hours through August 31. During this operation, the project was able to provide 9 kcfs (approximate) spill that would otherwise have been used for minimum generation. This operation was coordinated with TMT on August 19, 2009. An exception to this zero generation operation occurred for scheduled maintenance between August 25-27 as described in the FPP, Appendix A. During this maintenance period, nighttime generation was required for station service.

- On August 25 due to low flow conditions, maintaining both the minimum generation requirement for system stability and the minimum spill level (15.2 kcfs) was not possible. Consequently, the spill level was reduced as described in the 2009 FPP (Section 6, Table IHR-11). The project spilled all available water (approximately

11.9 kcfs) above the minimum generation level for 14 hours between 1800 hours on August 25 and 0700 hours on August 26. The project operated at the minimum generation requirement at all times during this low flow period, while spilling all remaining flow.

3. McNary:

- The single treatment summer test with continuous 50% spill that began on June 20 continued throughout the month of August. The spillway weir in spill bay 4 was moved to spill bay 19 for the summer test, next to the spillway weir in spill bay 20. The summer test concluded on August 10, while 50% spill operations continued through August 31, except during the low flow operation (*see* p. 3).

- On August 14-17, day average flows were low enough to require implementation of the 2009 Summer FOP "low flow" provisions, which forced the project to operate for the minimum generation requirement instead of the 50% target spill operation. In early August, studies forecasted regulated flows at McNary that were 104 kcfs through the remainder of August, indicating that at some point flows would drop below the level necessary to meet the 50% spill target. To manage the remaining volume of flow augmentation water through August, between August 10-16, Grand Coulee was operated with the objective of achieving a weekly average regulated flow at McNary of 105 to 110 kcfs. Midway through that week, updated forecasts indicated that Grand Coulee outflows should be reduced to remain consistent with the weekly average flow at McNary. Concurrent with this operation was an increase in inflow, due to additional releases from BC Hydro in order to facilitate barge operations. While these water supply forecasts and resulting operational recommendations were coordinated through TMT, the Action Agencies acknowledge the need for better coordination on “low flow” operations for future years and will do so through the TMT. After August 16, the regulated flow forecasts at McNary improved so that implementing "low flow" provisions was not necessary for the remainder of the month.

4. Bonneville:

On July 29, elevated air and water temperatures were driving TDG levels above 115% at the Camas Washougal monitoring site, and spill was reduced to 70 kcfs at the project. Because fish survival through the spillway is reduced at spill levels below 75 kcfs, an agreement was reached at TMT to set the spill cap at no lower than 75 kcfs, as long as TDG levels do not exceed 120% at the Camas Washougal monitoring site. This operational interim measure continued through August 31 to maintain high fish survival through the spillway.

August 2009 Summer Spill Report Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Add'l Spill	8/10/2009	0700-1800	12	Maintenance	Hourly spill increased to 29.2 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Add'l Spill	8/11/2009	0700-1800	12	Maintenance	Hourly spill increased to 29.1 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Add'l Spill	8/12/2009	0600-1900	14	Maintenance	Hourly spill increased to 29.0 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Add'l Spill	8/13/2009	0700-1800	12	Maintenance	Hourly spill increased to 30.7 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Add'l Spill	8/14/2009	0800-1800	11	Maintenance	Hourly spill increased to 25.6 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Add'l Spill	8/25/2009	0800-1400	7	Maintenance	Hourly spill increased to 21.4 (above 18 kcfs FOP spill) due to units being out of service during Doble testing as scheduled in the FPP.
Lower Granite	Reduced Spill	8/26/2009	0800	1	Operational Limitations	Hourly spill remained at 13.5 kcfs (below 18 kcfs FOP spill) while project generated increased to 14.7 kcfs which is outside of minimum generation range 11.3 -13.1 kcfs for units 1-3. Project was conducting dewatering activities to

						prepare for annual maintenance outage.
Little Goose	Reduced Spill %	8/3/2009	0900-1000, 1600	3	Navigation	Hourly % spill decreased to 28.4% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.4%.
Little Goose	Reduced Spill %	8/5/2009	900	1	Maintenance	Hourly % spill decreased to 28.9% (below 30% ±1% range) due switching of units on and off during a VBS inspection. 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	8/5/2009	0400, 1100, 1600	3	Navigation	Hourly % spill decreased to 28.4% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant or increased. (See page 3). 24 hr avg. spill was 29.6%.
Little Goose	Reduced Spill %	8/6/2009	1000, 1300, 1800	3	Navigation	Hourly % spill decreased to 28.4% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill %	8/7/2009	1200, 1900	2	Navigation	Hourly % spill decreased to 28.4% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.9%.

Little Goose	Reduced Spill %	8/8/2009	1600, 1900	2	Navigation	Hourly % spill decreased to 28.2% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume increased. (See page 3). 24 hr avg. spill was 30.0%.
Little Goose	Reduced Spill %	8/9/2009	0200, 1100, 1300, 1800, 2400	5	Navigation	Hourly % spill decreased to 28.3% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant, however, spill percent was reduced by 0.5% (below 1% range) over the 5 hours. (See page 3). 24 hr avg. spill was 29.3.
Little Goose	Reduced Spill %	8/10/2009	0100, 1300, & 1500	3	Navigation	Hourly % spill decreased to 28.3% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.4%.
Little Goose	Reduced Spill %	8/11/2009	0100 & 1300	2	Navigation	Hourly % spill decreased to 28.3% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.4%.
Little Goose	Reduced Spill %	8/12/2009	0700 & 1300 & 1700	3	Navigation	Hourly % spill decreased to 28.2% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume

						remained constant. (See page 3). 24 hr avg. spill was 29.4%.
Little Goose	Reduced Spill %	8/13/2009	0800-1000 & 1600 & 2100	5	Navigation	Hourly % spill decreased to 28.0% (below 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant; however, spill percent was reduced by 0.6% (below 1% range) over the 5 hours. (See page 3). 24 hr avg. spill was 29.4.
Little Goose	Reduced Spill %	8/16/2009	1000; 1300-1400; & 2200	4	Navigation	Hourly % spill decreased to 27.7% (above 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 29.4%.
Little Goose	Add'l Spill	8/17/2009	0700-0800	2	Maintenance	Hourly % spill increased to 51.4% (above 30% ±1% range) due to units being out of service during Doble testing as scheduled in the FPP. 24 hr avg. spill was 31.2%.
Little Goose	Reduced Spill %	8/17/2009	1600	1	Navigation	Hourly % spill decreased to 28.6% (above 30% ±1% range) due to volume of water needed to operate the navigation lock. Actual spill volume remained constant. (See page 3). 24 hr avg. spill was 31.2%.
Lower Monumental	Reduced Spill	8/4/2009	1700-1800	2	Navigation	Hourly spill dropped to 10.0 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *

Lower Monumental	Reduced Spill	8/6/2009	1700-1800	2	Navigation	Hourly spill dropped to 11.3 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	8/8/2009	1800	1	Navigation	Hourly spill dropped to 14.0 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	8/10/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.8 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Lower Monumental	Reduced Spill	8/12/2009	1700-1800	2	Navigation	Hourly spill dropped to 12.3 kcfs, below the FOP spill volume of 17 kcfs. Fish barge needed reduced spill for safe passage. *
Ice Harbor	Reduced Spill	8/14/2009	0800; 1000 & 1500	3	Maintenance	Hourly spill remained at 15.2 to 19.9 kcfs while project generation increased to 10.6 to 14.9 kcfs which is outside of minimum generation range 8.5 - 10.3 kcfs for units 1-3. Project was returning units 5 and 6 back to service after an annual maintenance outage.
Ice Harbor	Reduced Spill	8/28/2009	1800-1900	2	Maintenance	Hourly spill remained at 20.0 kcfs while project generation increased to 10.5 and 11.4 kcfs which is outside of minimum generation range 8.5 -10.3 kcfs for units 1-3. Project was returning unit 4 back to service after an annual maintenance outage.
McNary	Reduced Spill %	8/3/2009	0800, 1000	2	Navigation	Hourly % spill decreased to 33.1% (below 50% ±1% range). Fish barge

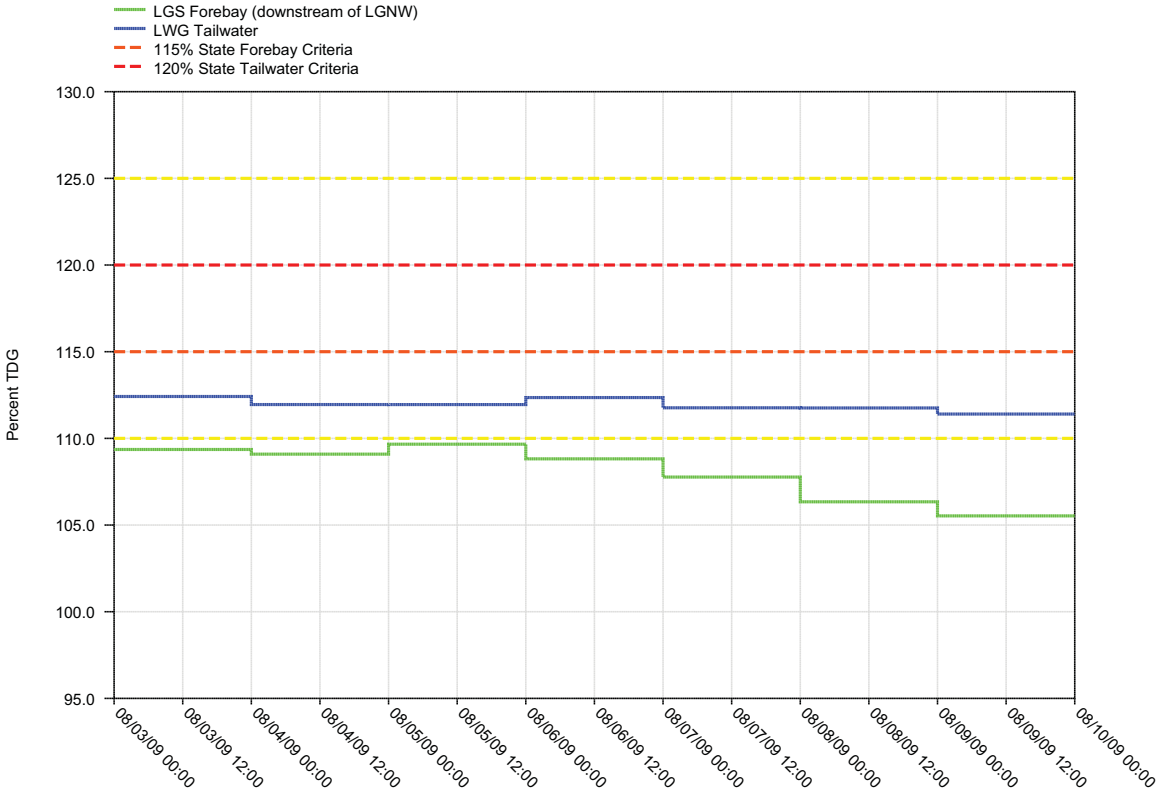
						needed reduced spill for safe passage. * 24 hr avg. spill was 48.7%.
McNary	Reduced Spill %	8/4/2009	0700-0800, 1000	3	Navigation	Hourly % spill decreased to 24.5% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 47.7%.
McNary	Reduced Spill %	8/5/2009	0700-0800, 1000-1100	4	Navigation	Hourly % spill decreased to 28.3% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 47.8%.
McNary	Reduced Spill %	8/6/2009	0700-0800, 1100	3	Navigation	Hourly % spill decreased to 34.5% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.6%.
McNary	Reduced Spill %	8/7/2009	0700-0800, 1000	3	Navigation	Hourly % spill decreased to 35.1% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.8%.
McNary	Reduced Spill %	8/8/2009	0700-1000	4	Navigation	Hourly % spill decreased to 34.5% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.9%.
McNary	Reduced Spill %	8/9/2009	0700, 0900	2	Navigation	Hourly % spill decreased to 44.3% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 49.6%.
McNary	Reduced Spill %	8/10/2009	0700-1000	4	Navigation	Hourly % spill decreased to 22.3% (below 50% ±1% range). Fish barge needed reduced spill for

						safe passage. * 24 hr avg. spill was 47.5%.
McNary	Reduced Spill %	8/11/2009	0700-1000	4	Navigation	Hourly % spill decreased to 27.3% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.3%.
McNary	Reduced Spill %	8/12/2009	0700-0800 & 1000-1100	4	Navigation	Hourly % spill decreased to 26.0% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 47.9%.
McNary	Reduced Spill %	8/13/2009	0700-0800 & 1000	3	Navigation	Hourly % spill decreased to 34.4% (below 50% ±1% range). Fish barge needed reduced spill for safe passage. * 24 hr avg. spill was 48.6%.

* Due to safety concerns at Lower Monumental Dam (Summer 2009 FOP, p. 10) and McNary Dam (Summer 2009 FOP, p. 13), towboat captains may request spill curtailment to ensure safe conditions when transiting across the tailrace with the juvenile fish barge, docking, loading, and disembarking from the fish collection facility.

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

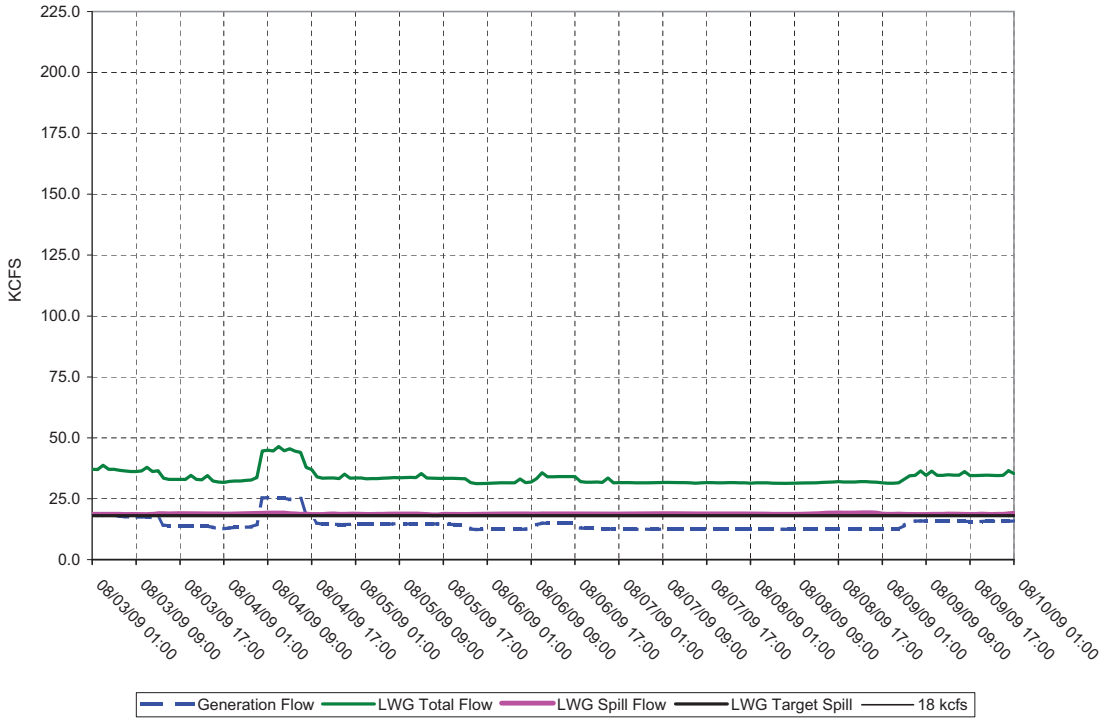
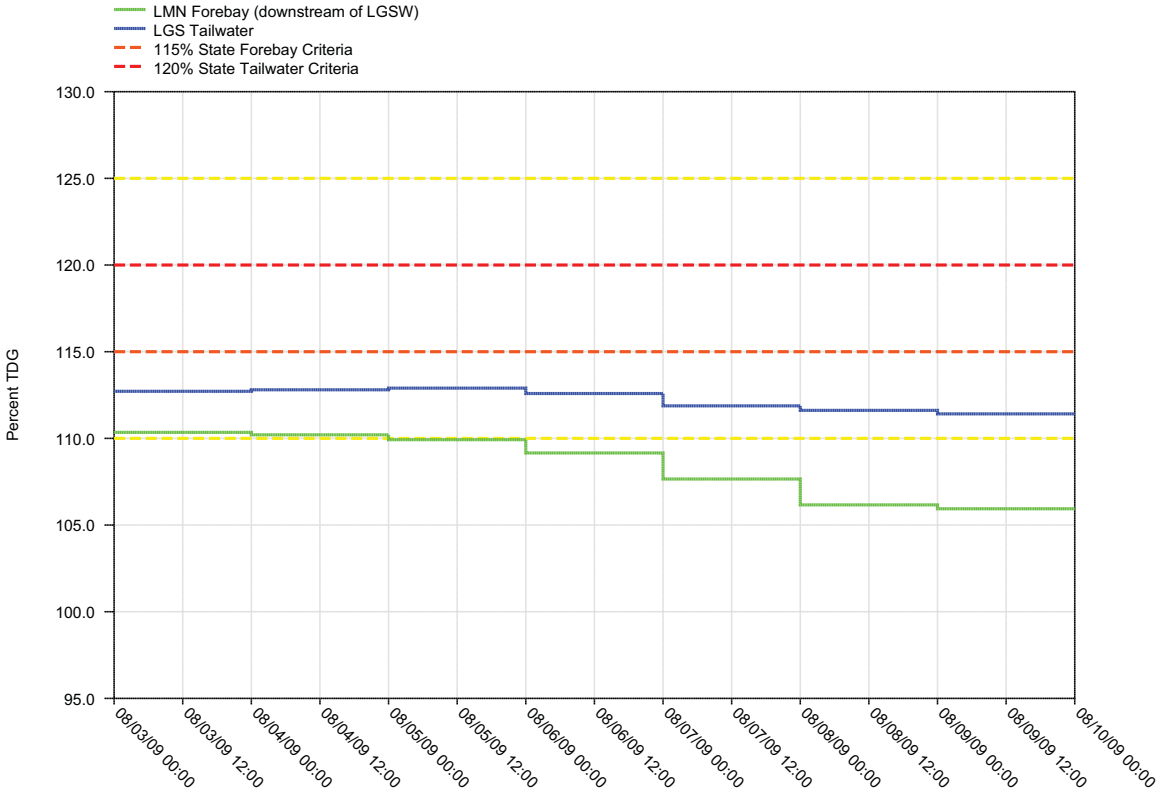


Figure 2.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

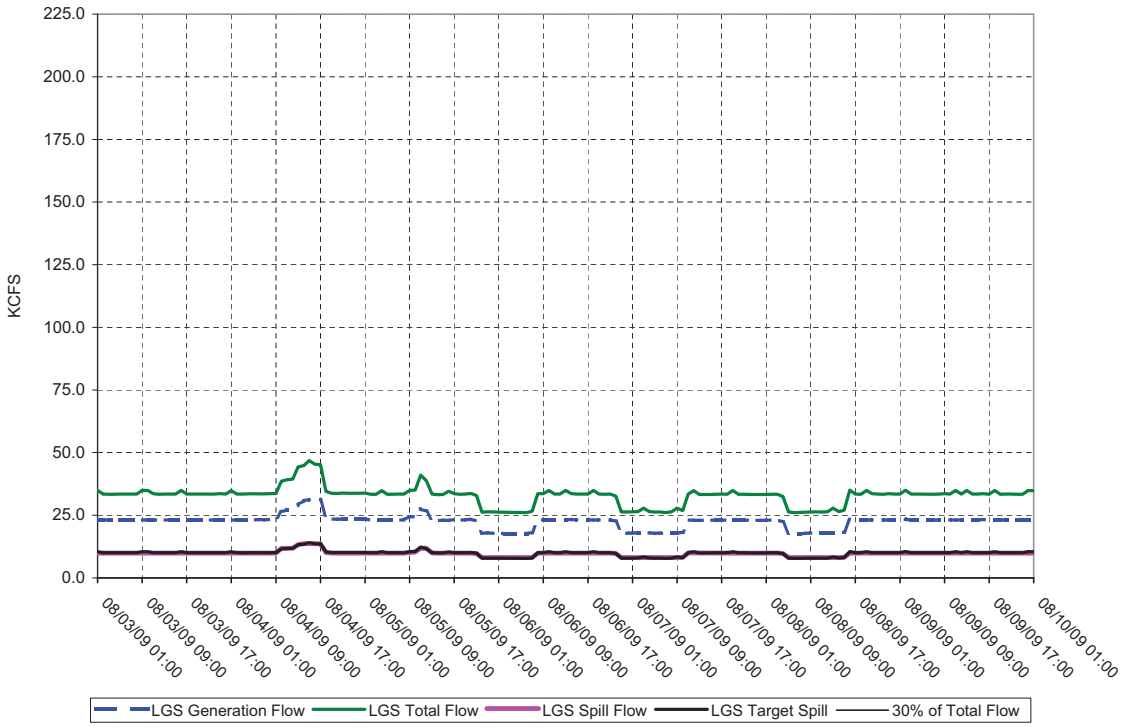
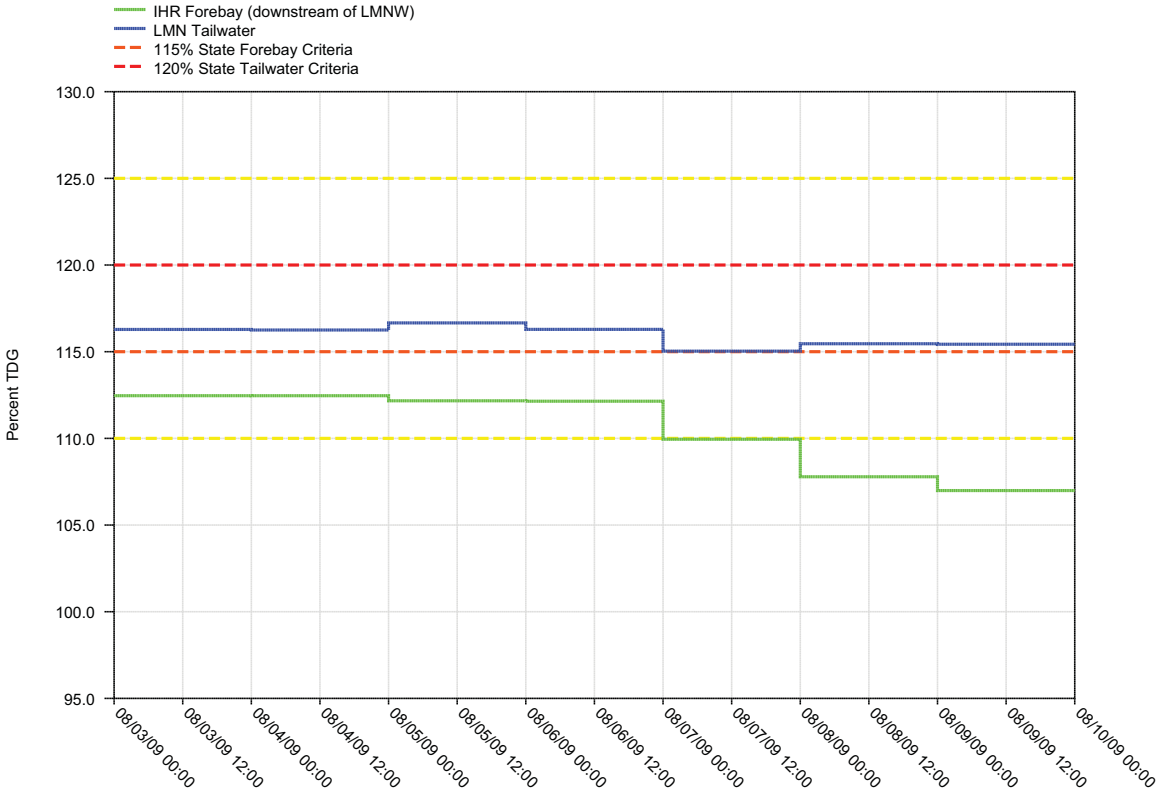


Figure 3.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

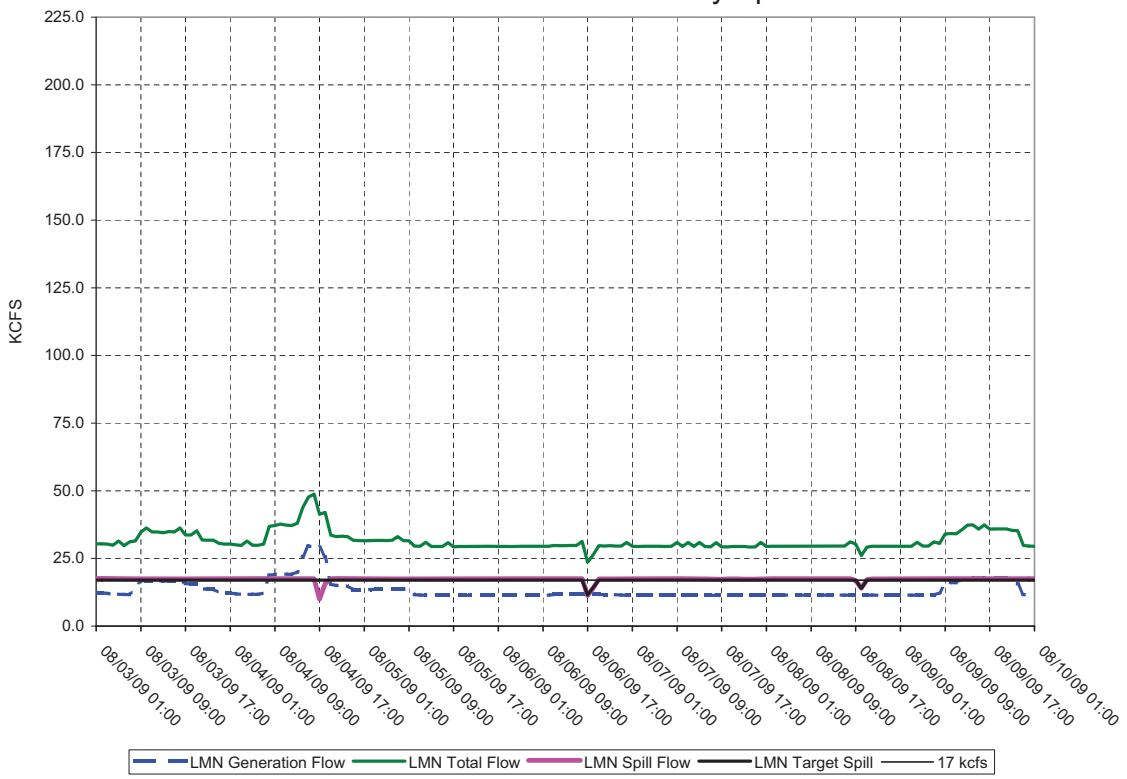
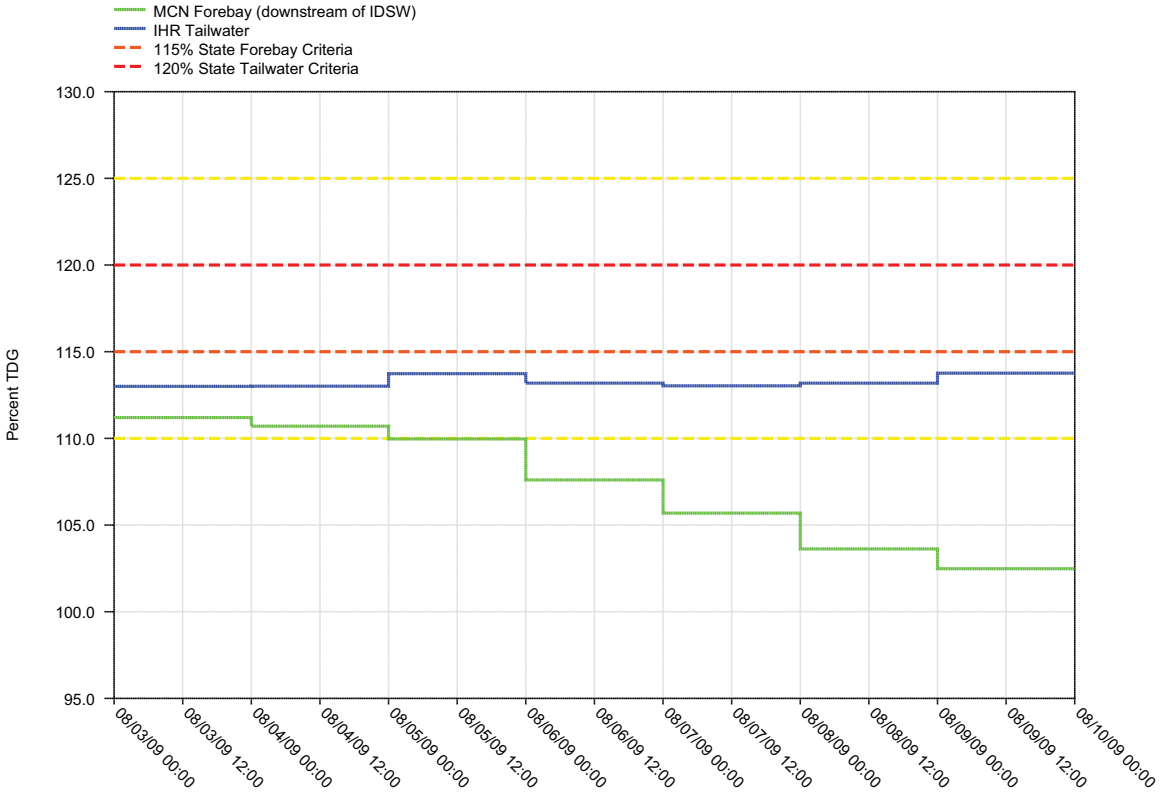


Figure 4.

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



ICE HARBOR DAM - Hourly Spill and Flow

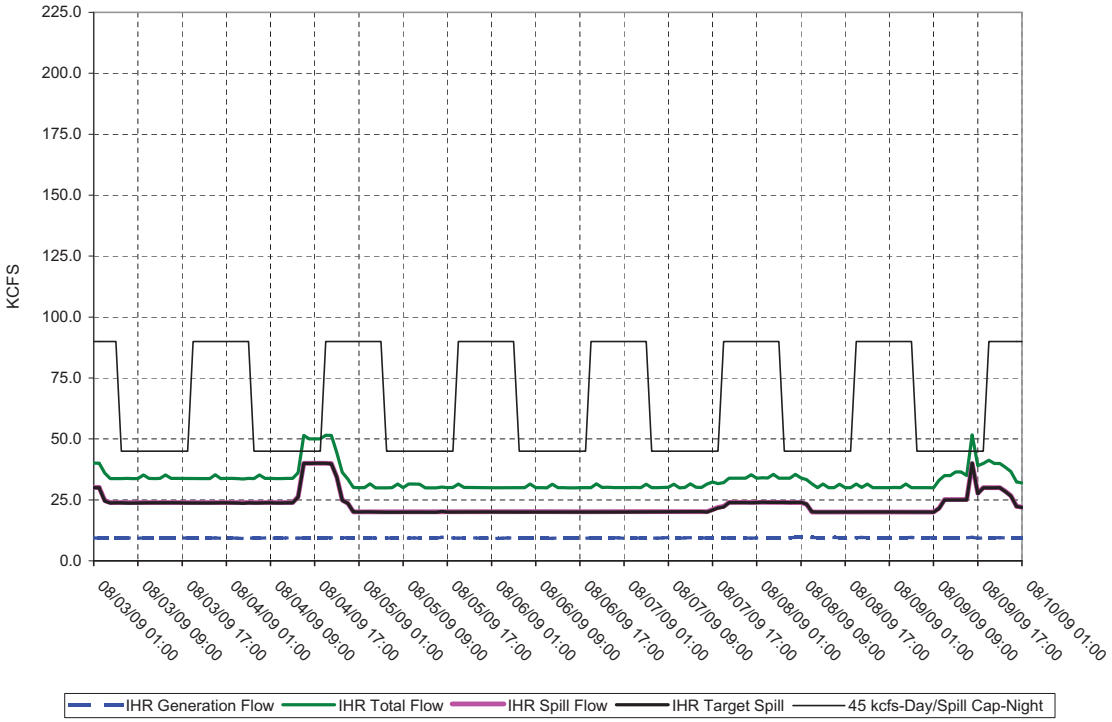
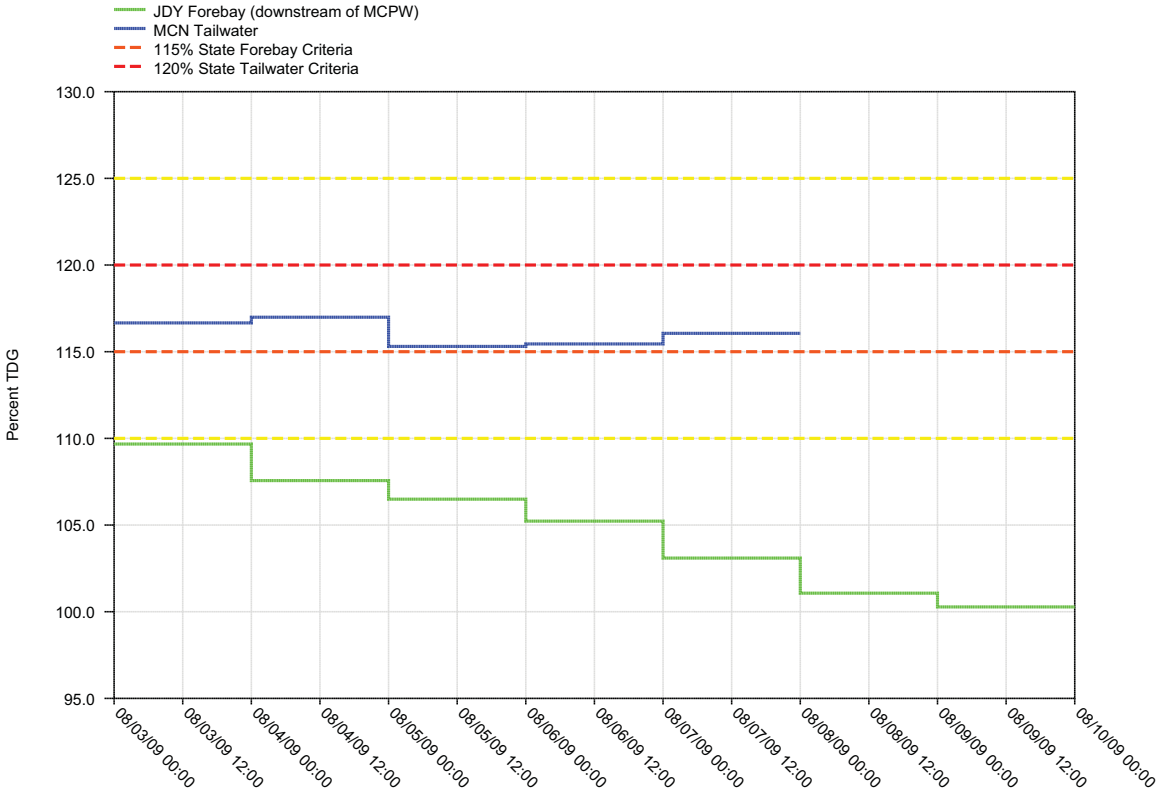


Figure 5.

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



McNARY DAM - Hourly Spill and Flow

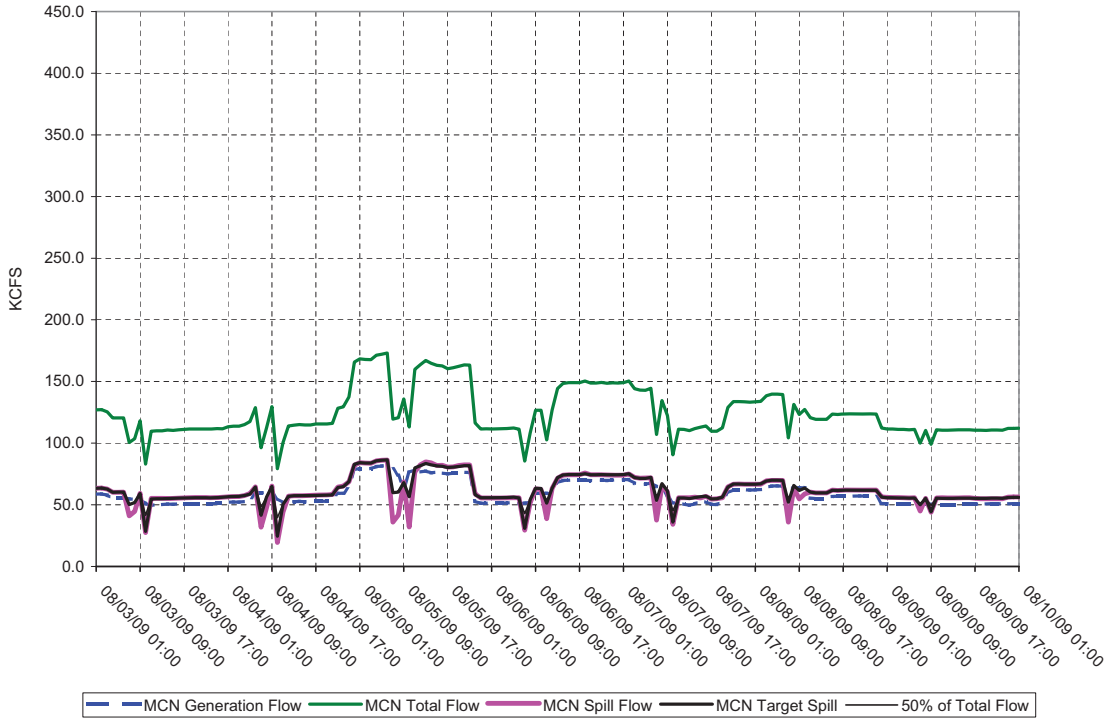
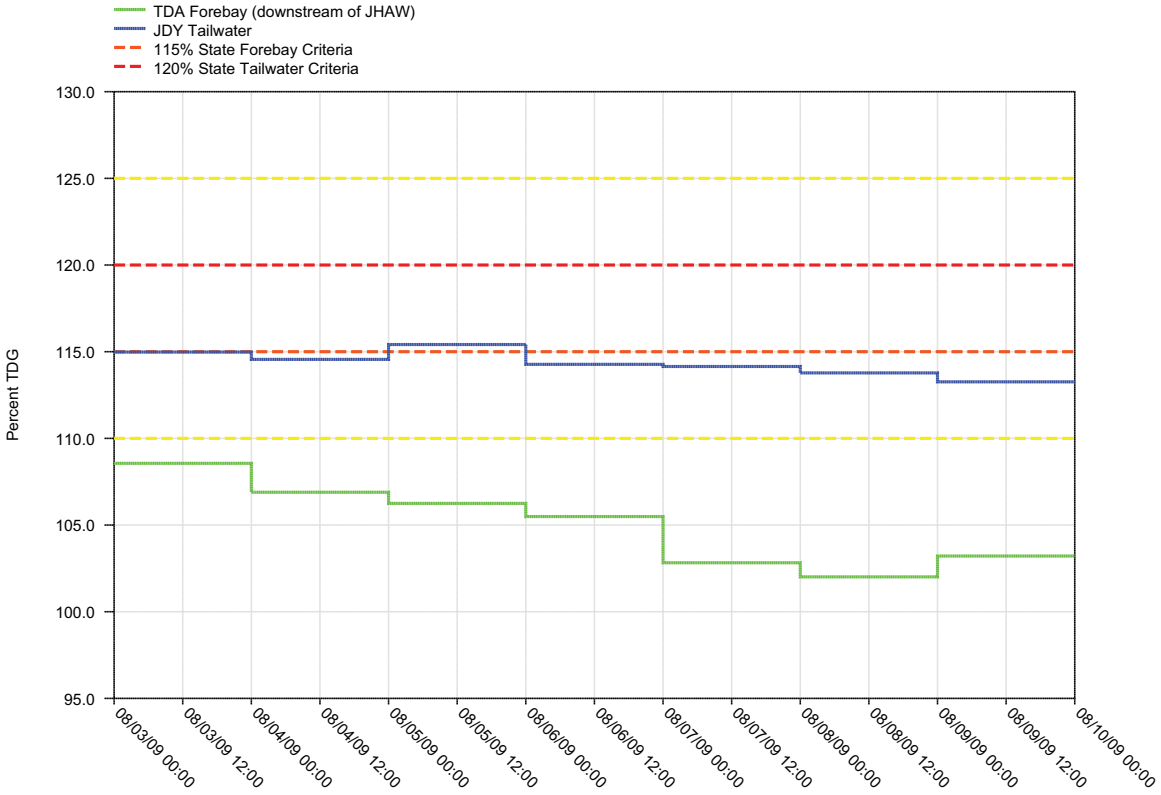


Figure 6.

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



JOHN DAY DAM - Hourly Spill and Flow

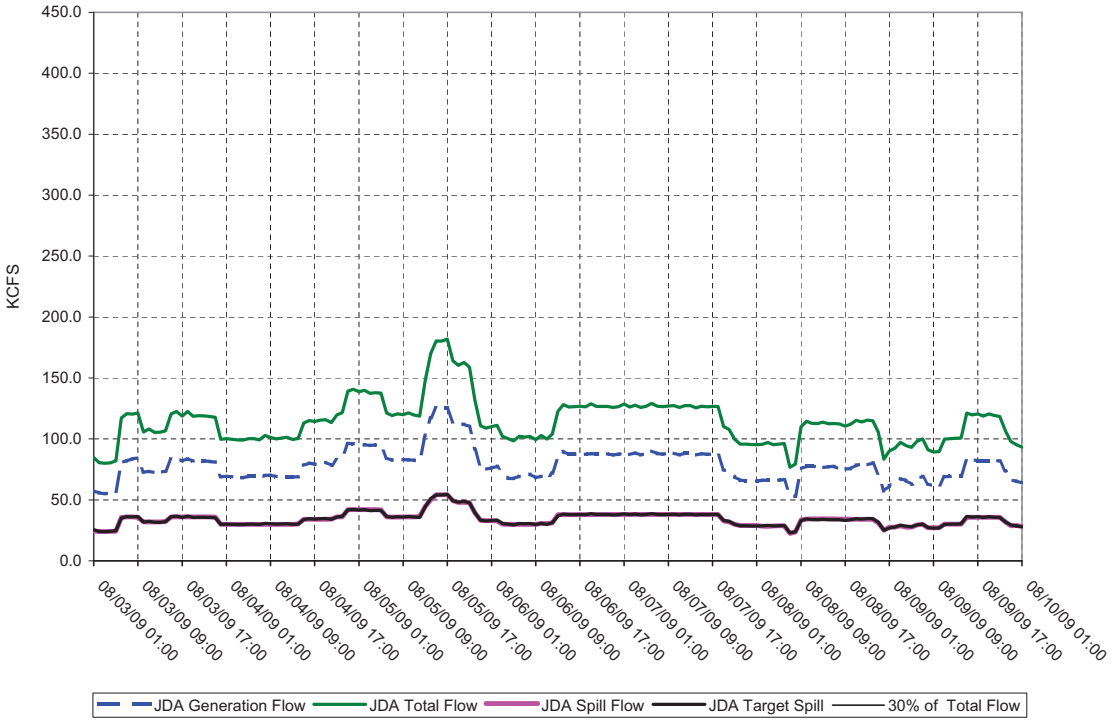
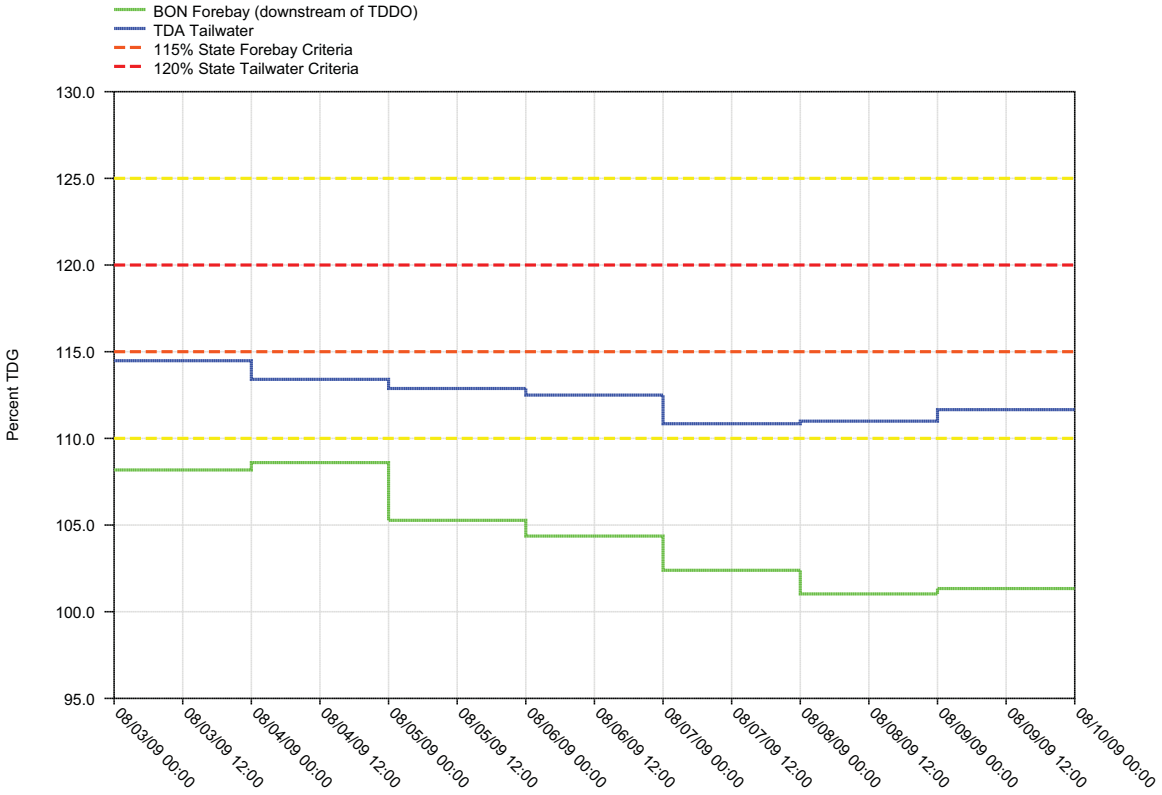


Figure 7.

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



THE DALLES DAM - Hourly Spill and Flow

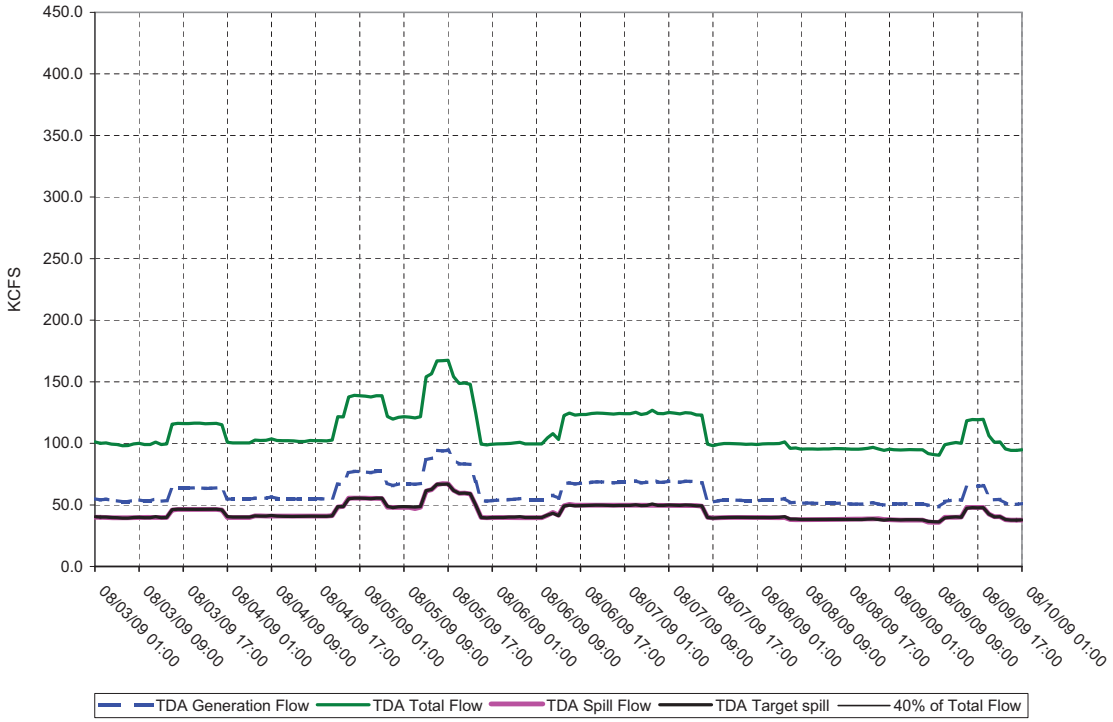
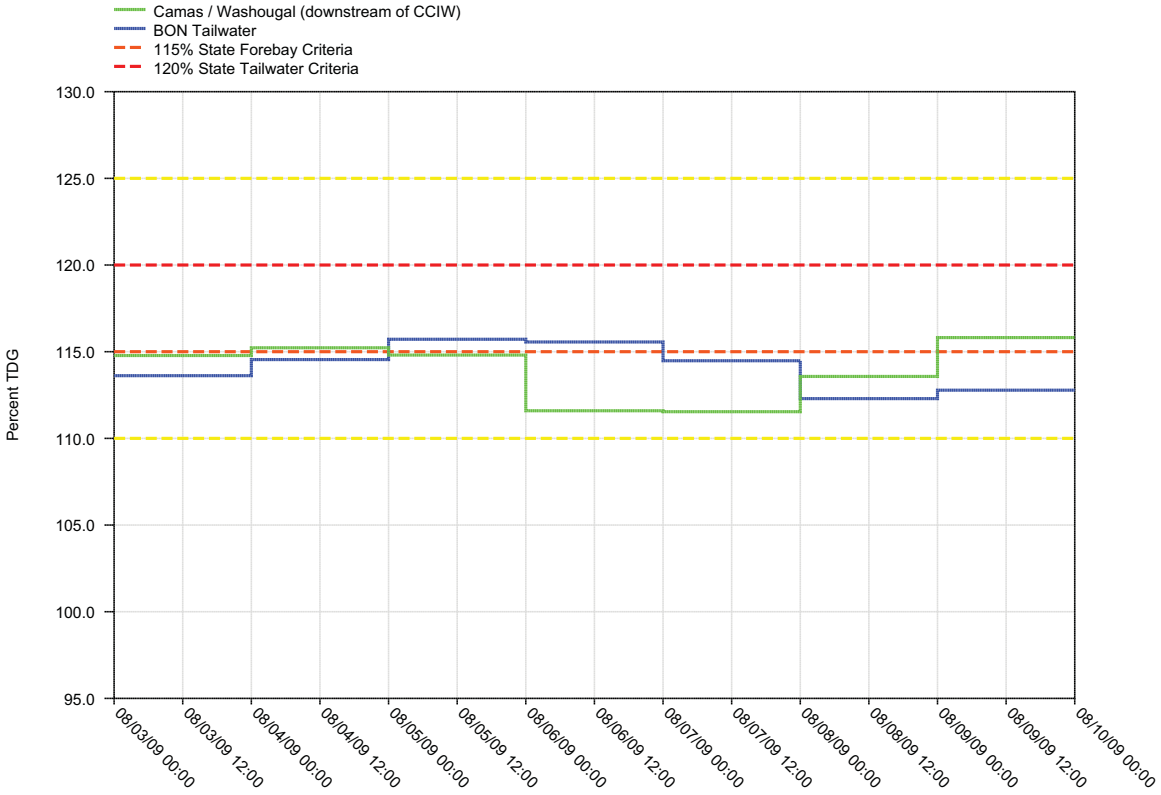


Figure 8.

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



BONNEVILLE DAM - Hourly Spill and Flow

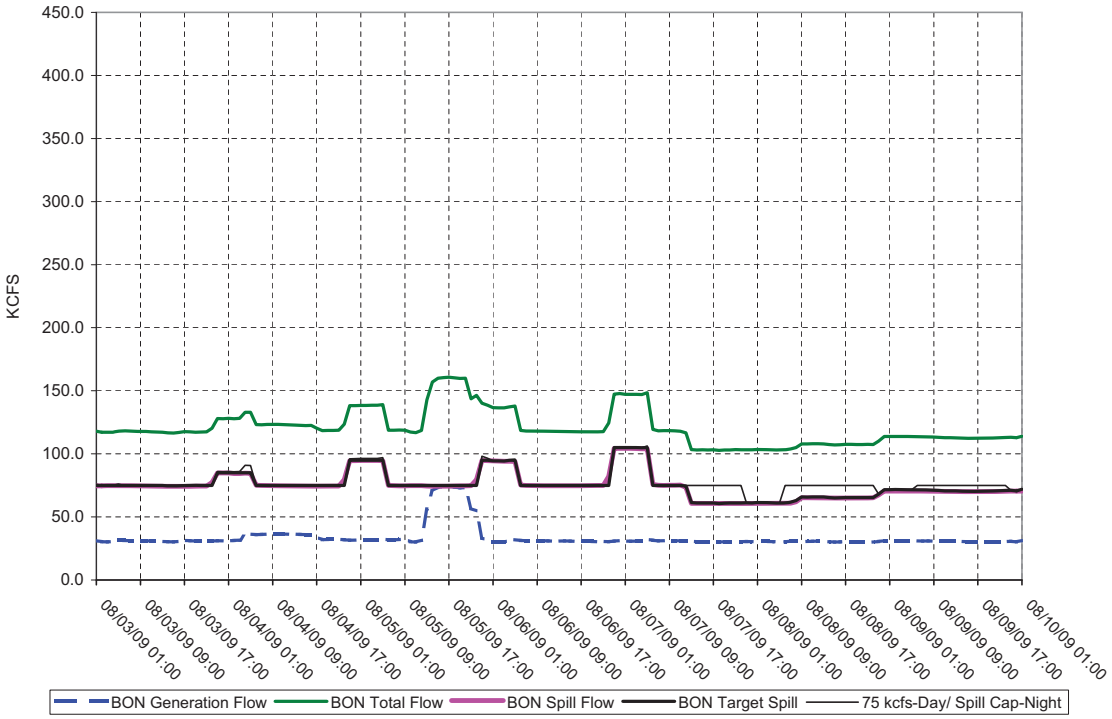
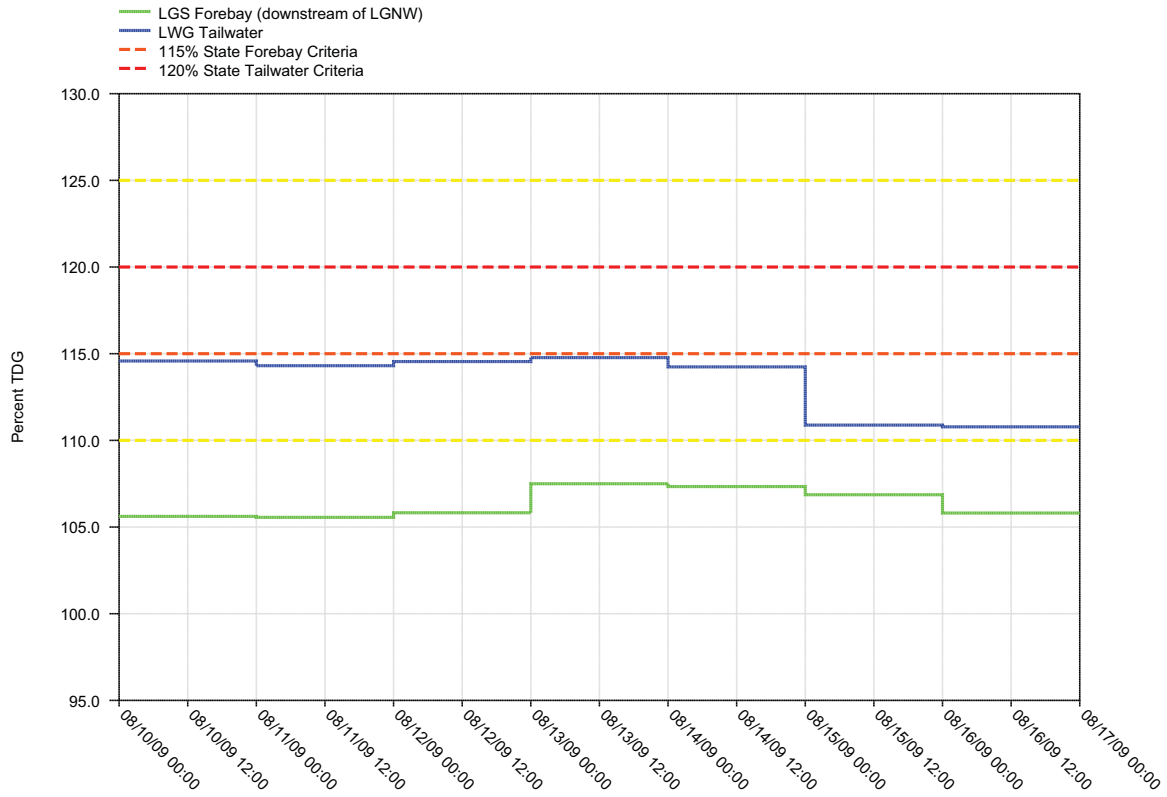


Figure 9.

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



LOWER GRANITE DAM - Hourly Spill and Flow

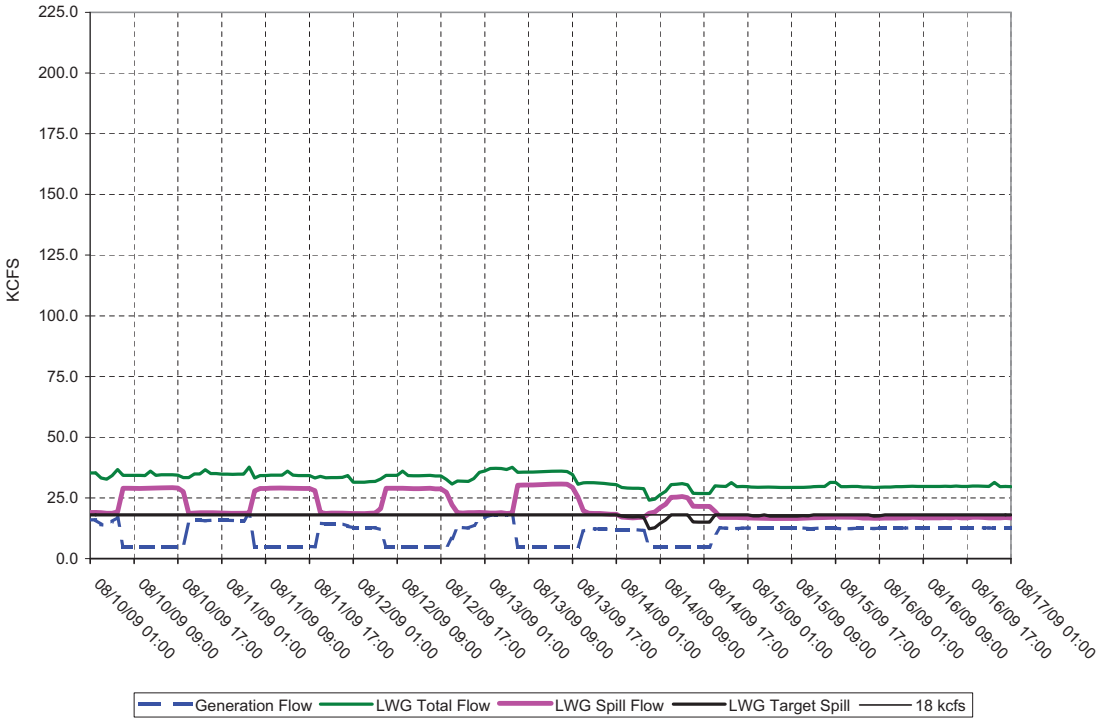
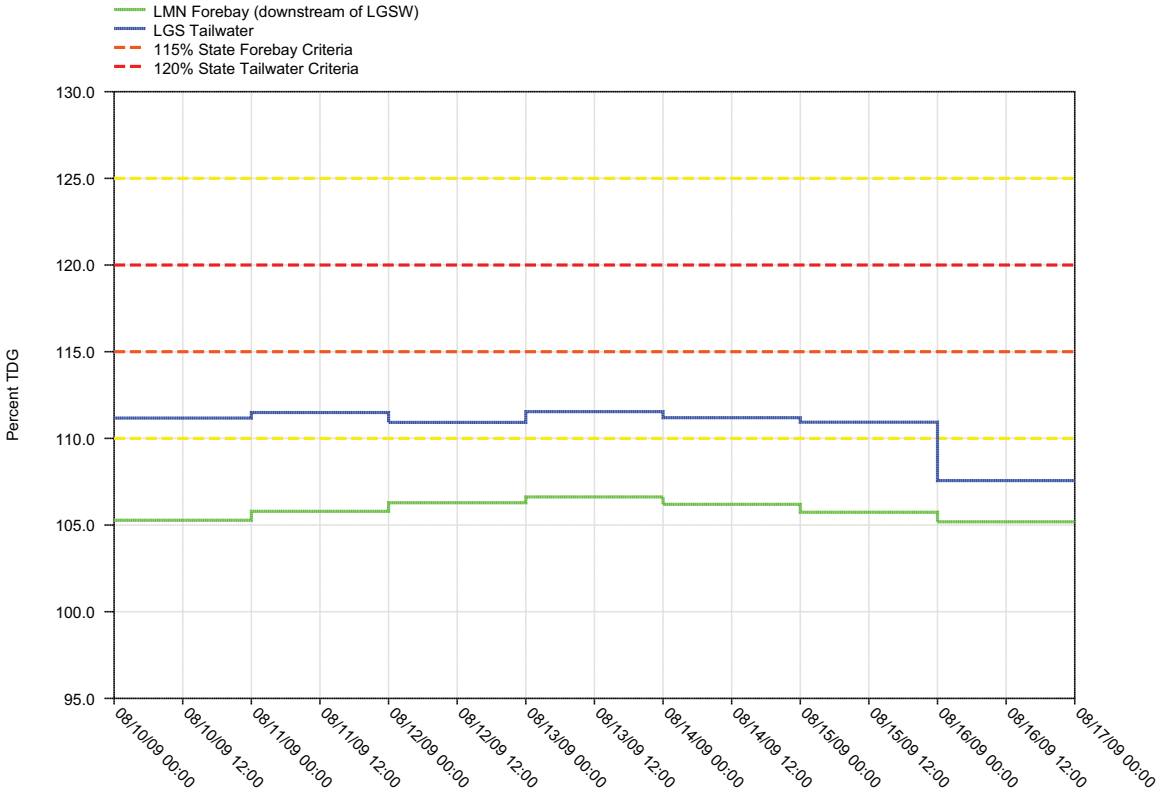


Figure 10.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

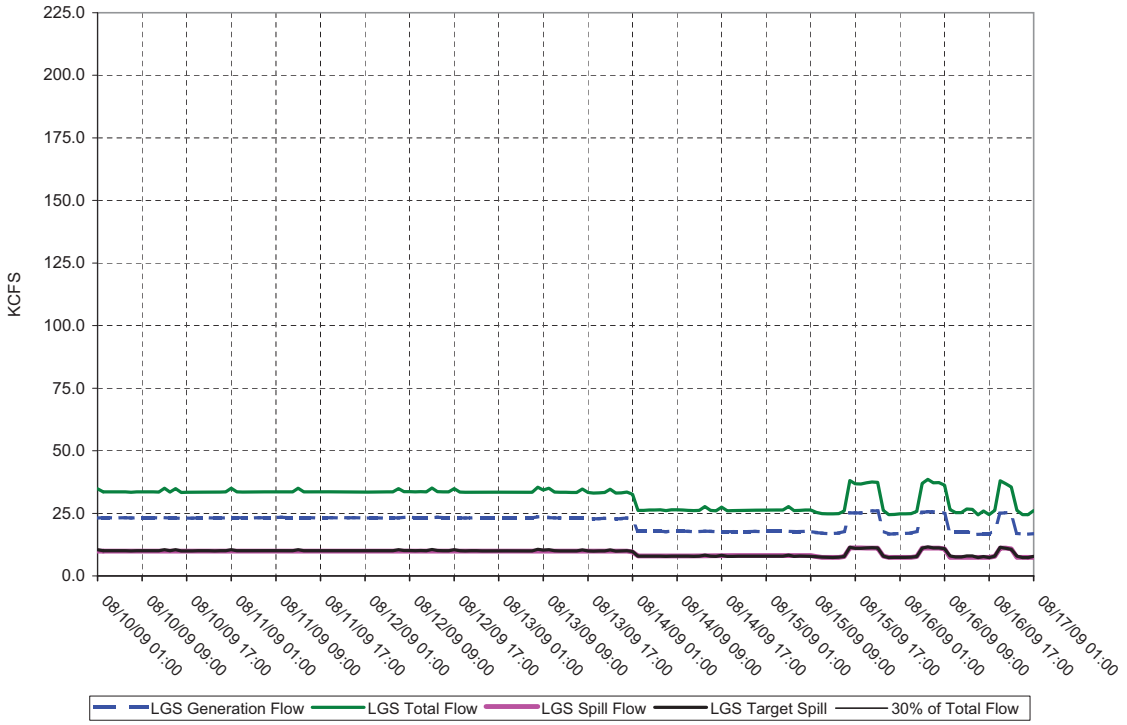
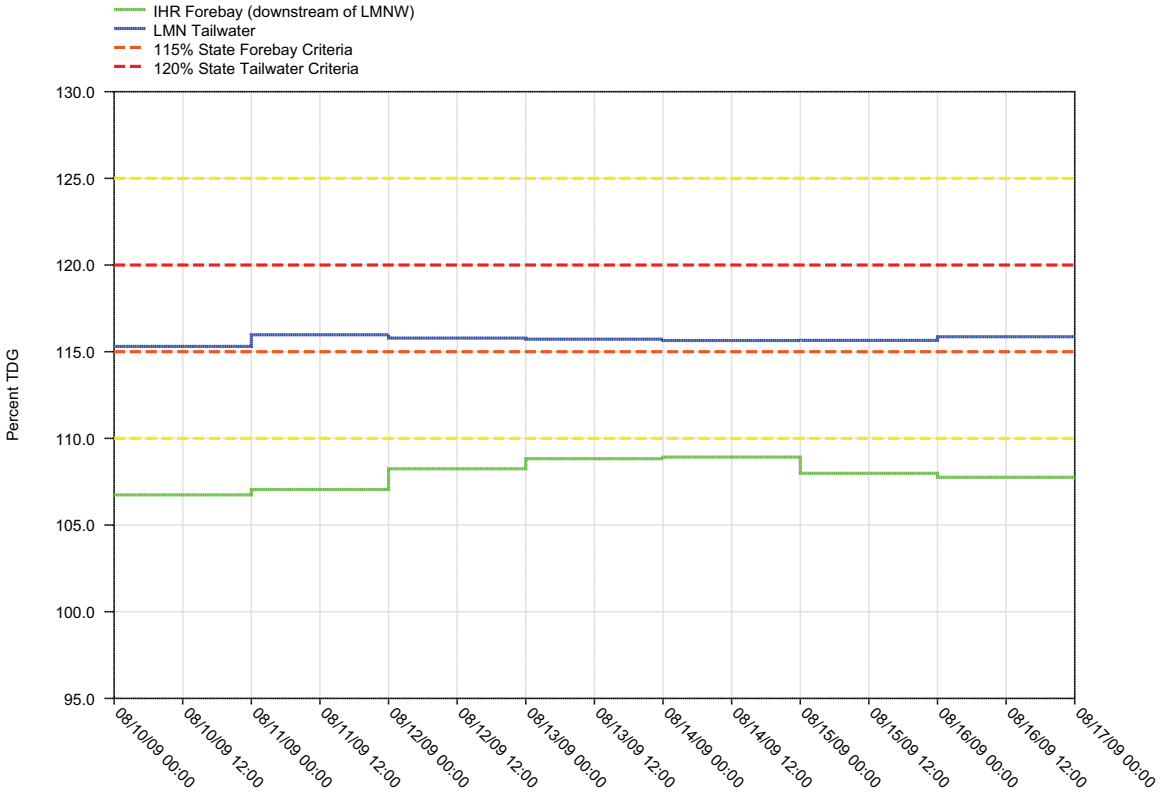


Figure 11.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

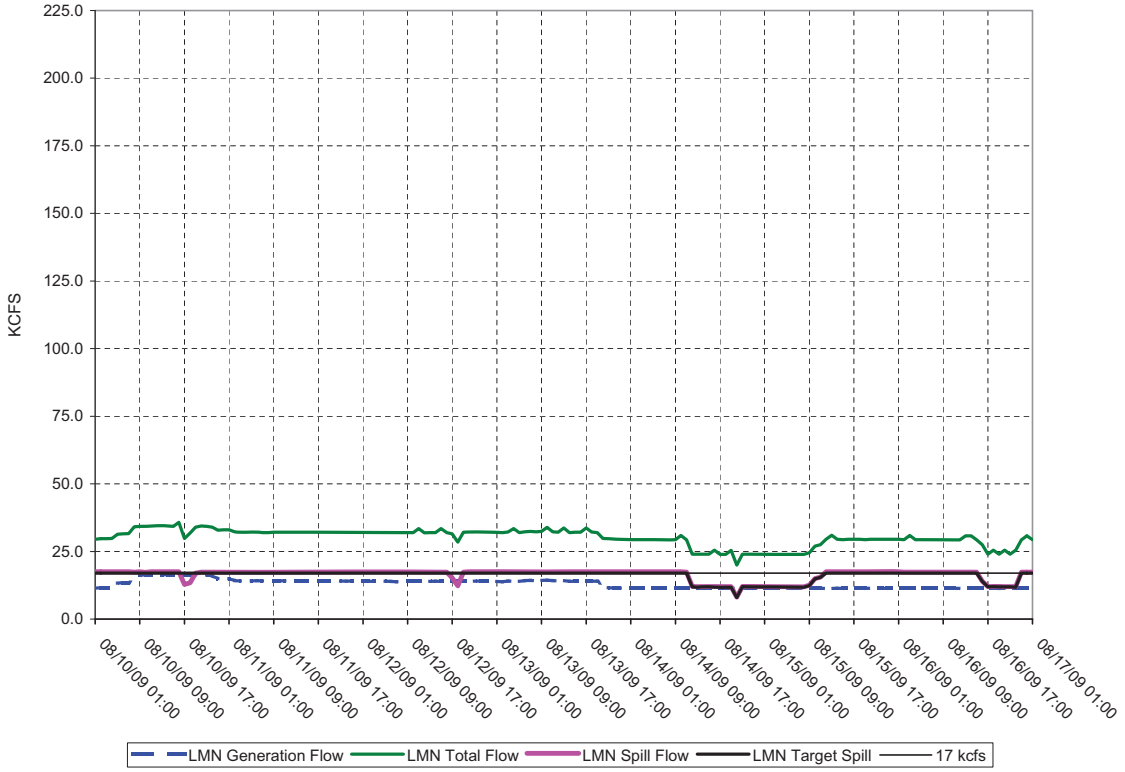
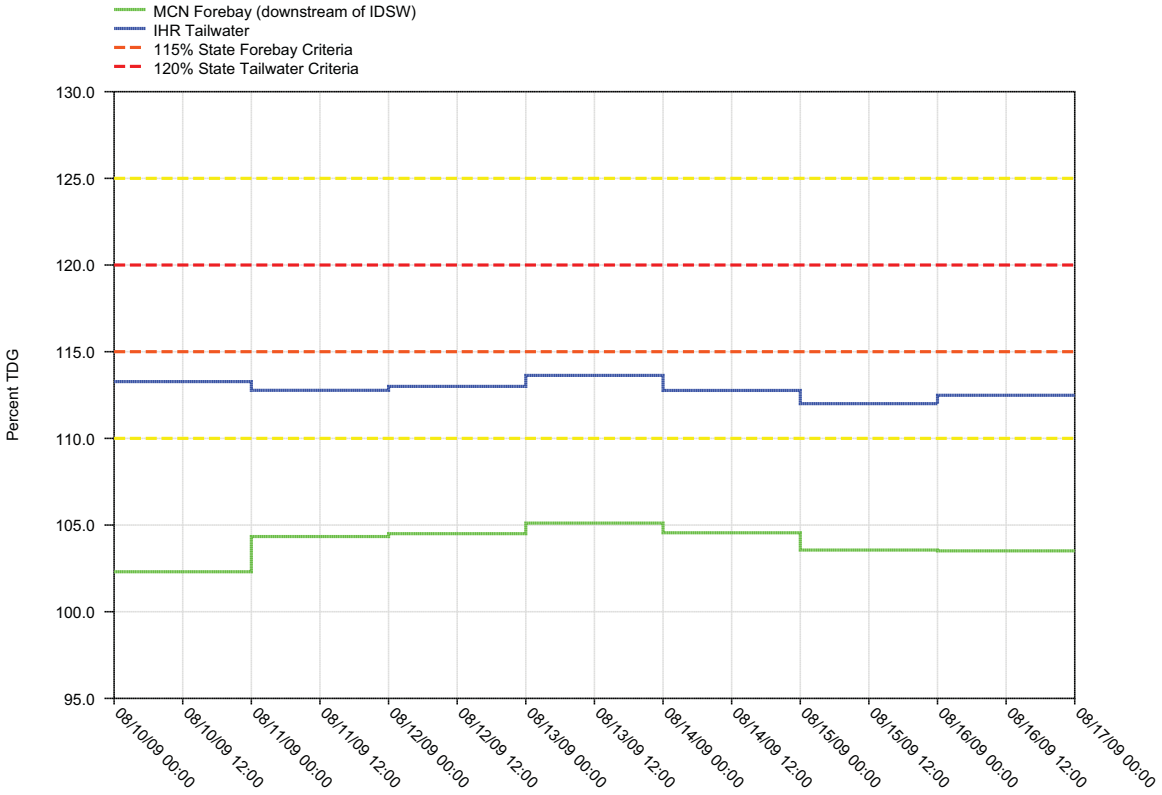


Figure 12.

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



ICE HARBOR DAM - Hourly Spill and Flow

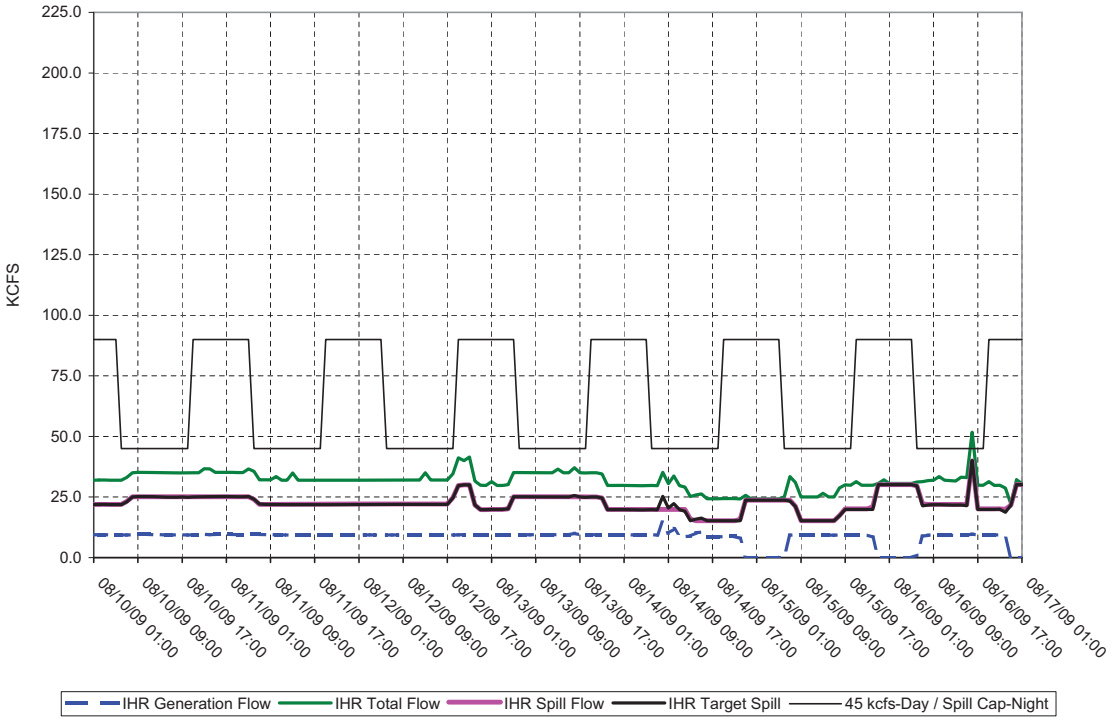
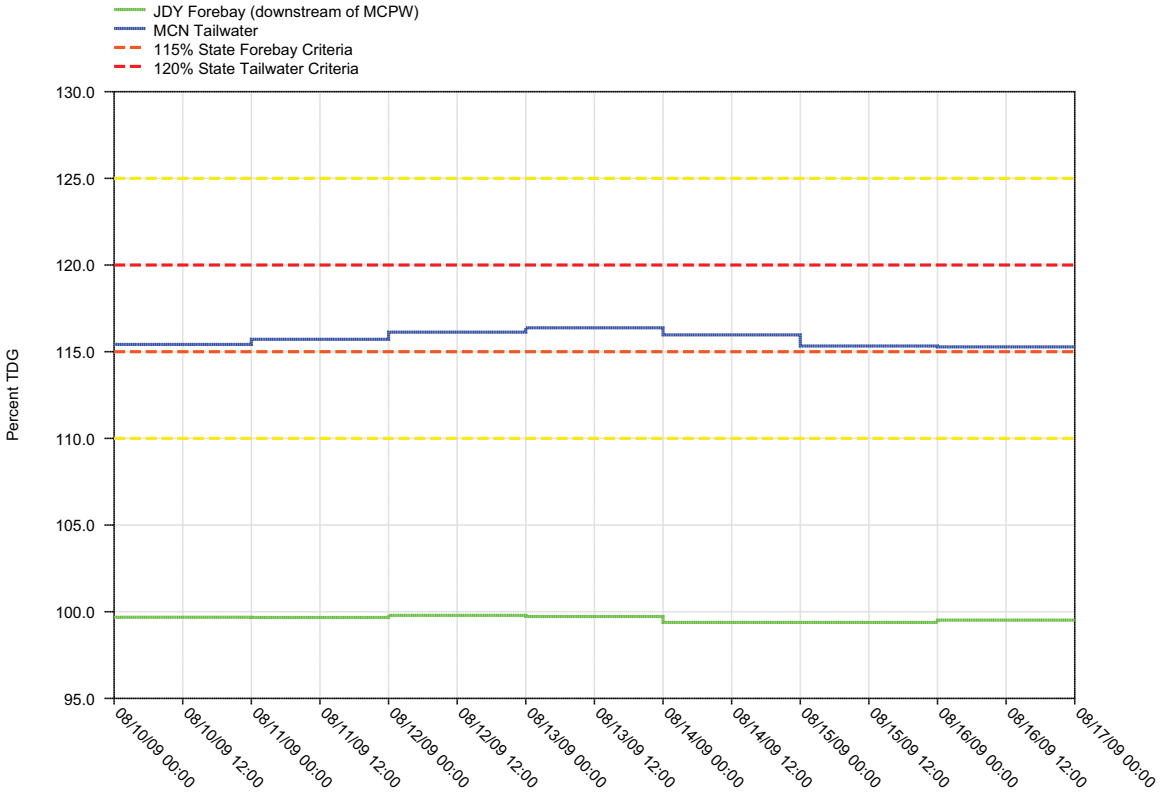


Figure 13.

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



McNARY DAM - Hourly Spill and Flow

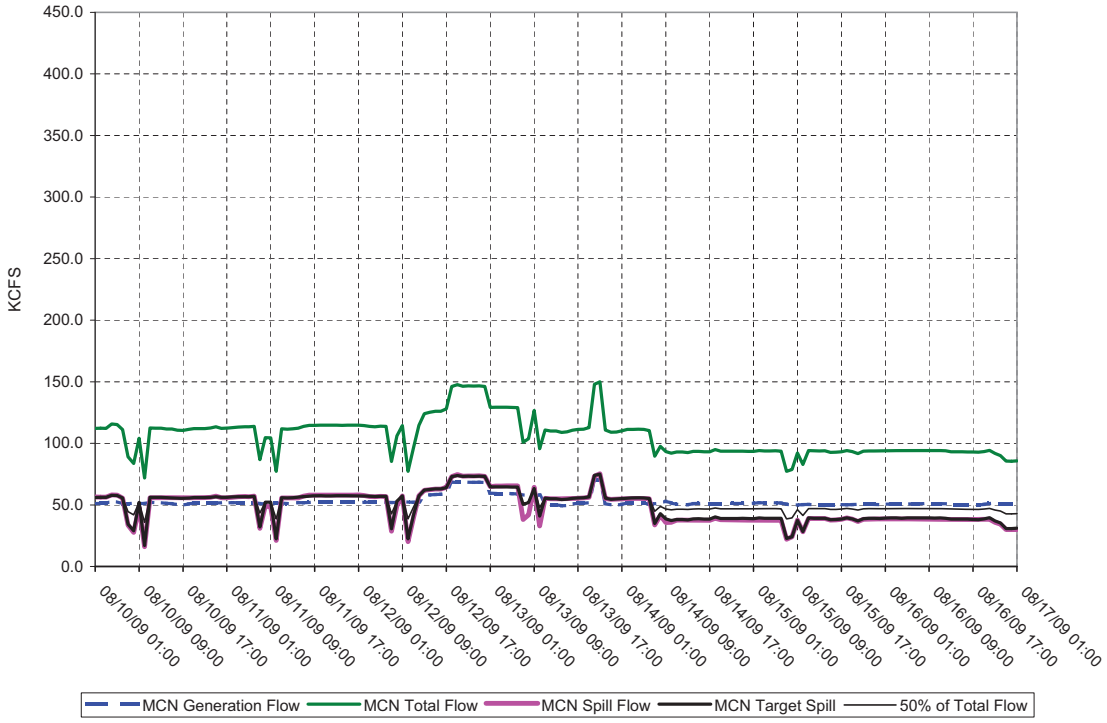
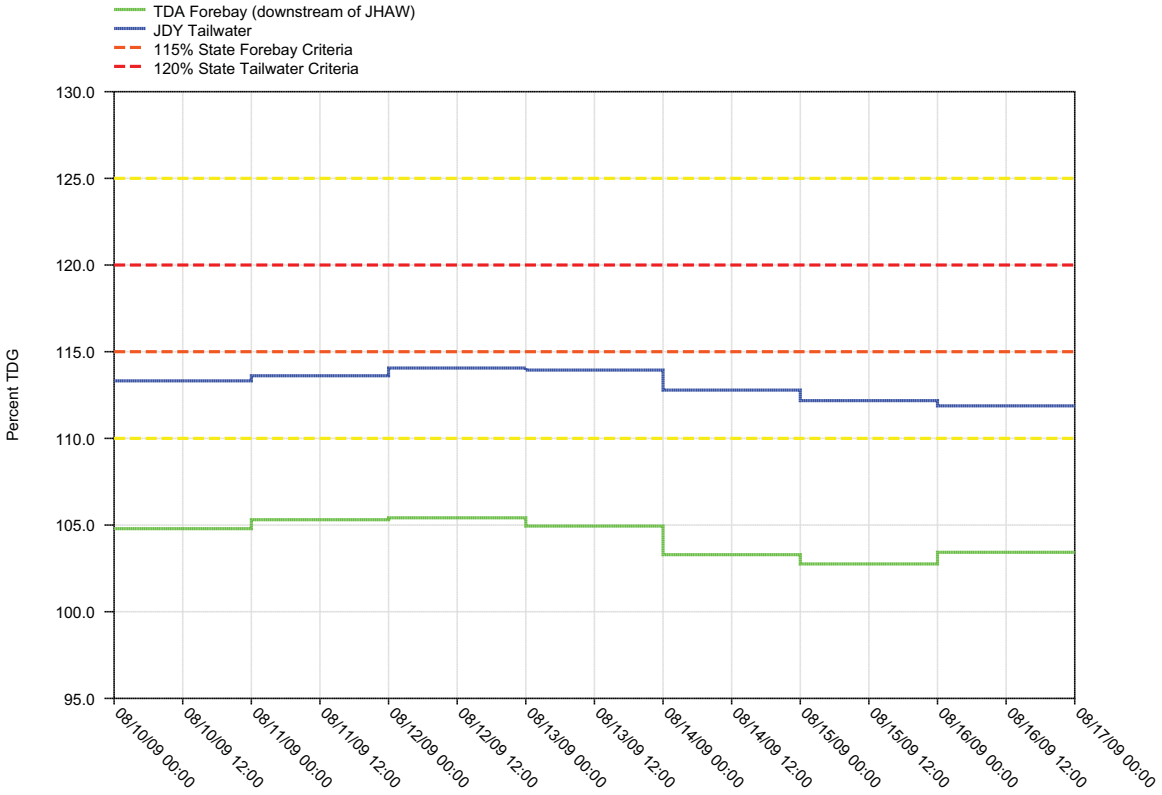


Figure 14.

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



JOHN DAY DAM - Hourly Spill and Flow

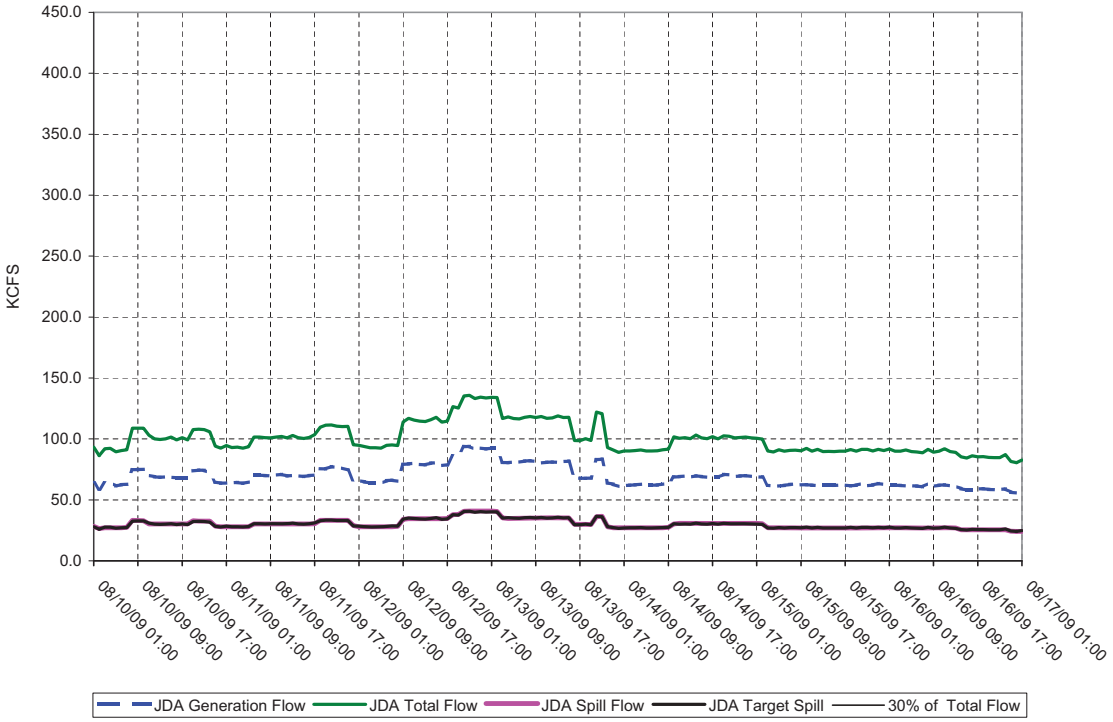
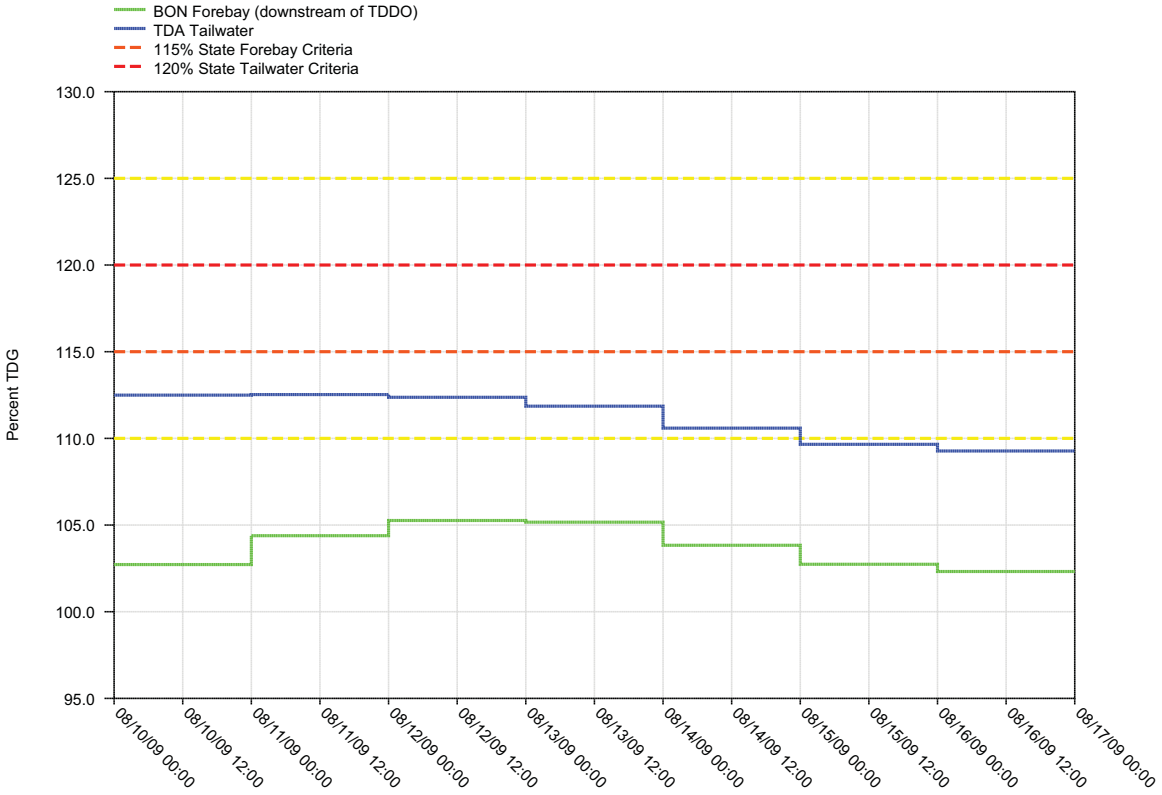


Figure 15.

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



THE DALLES DAM - Hourly Spill and Flow

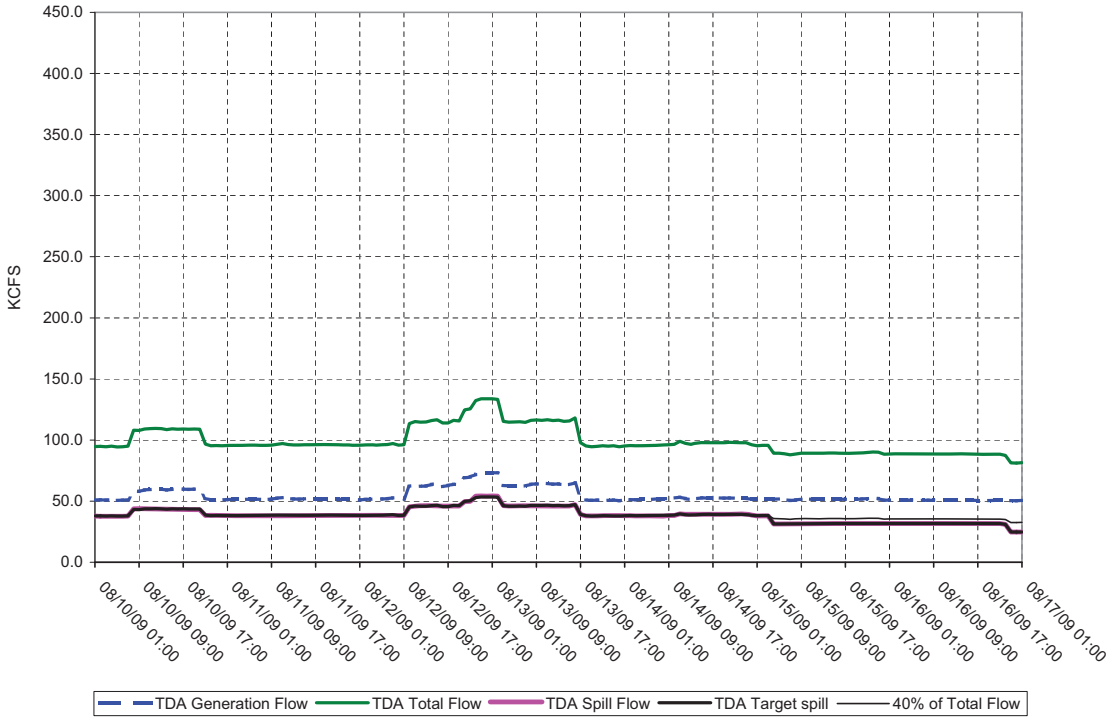
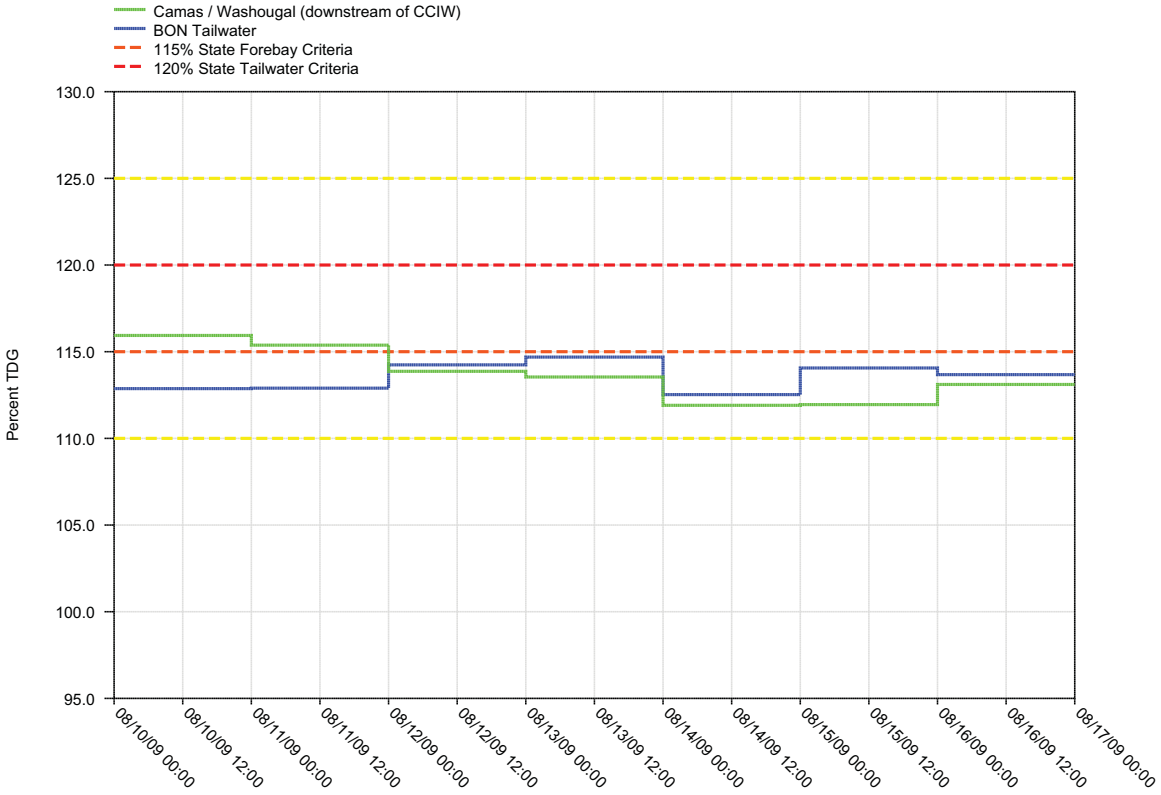


Figure 16.

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



BONNEVILLE DAM - Hourly Spill and Flow

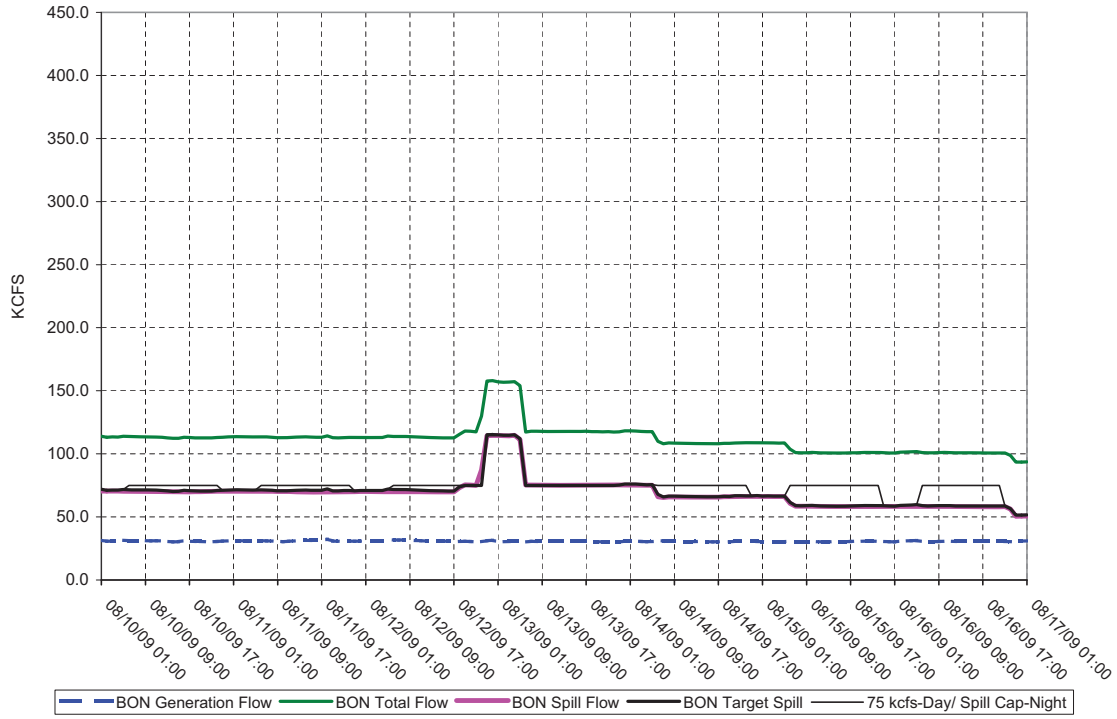
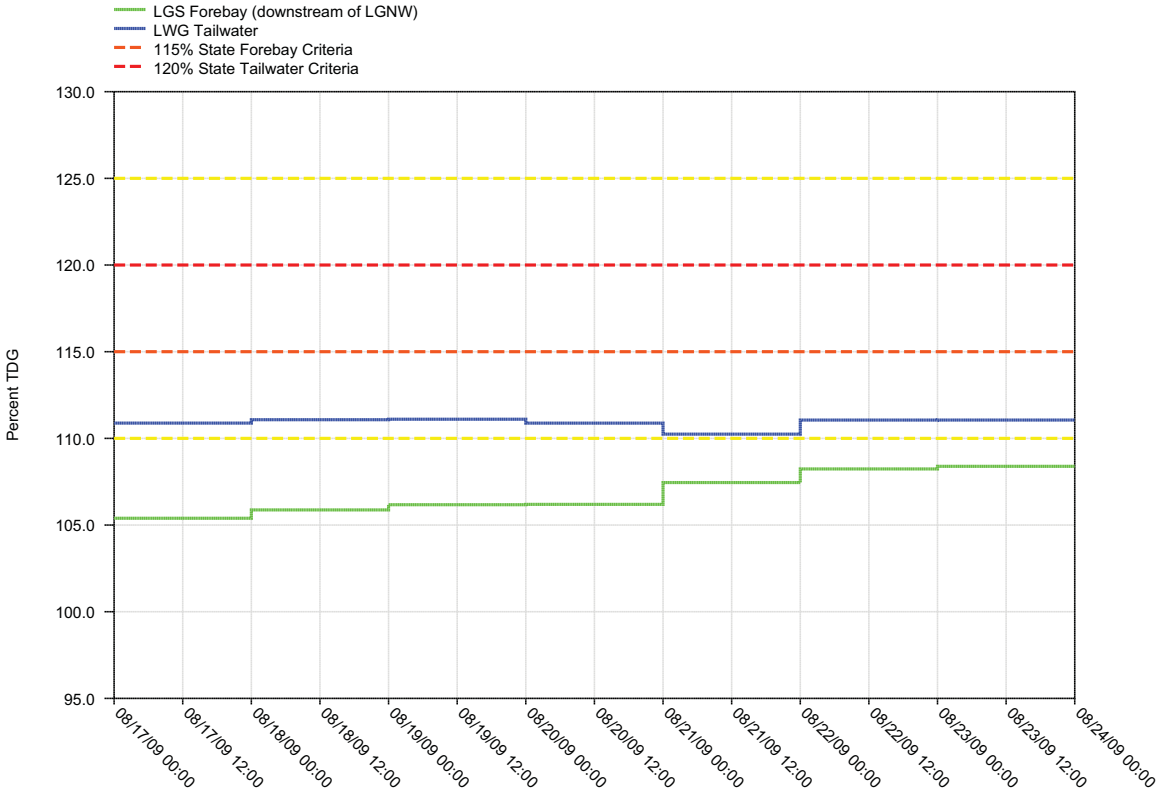


Figure 17.

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



LOWER GRANITE DAM - Hourly Spill and Flow

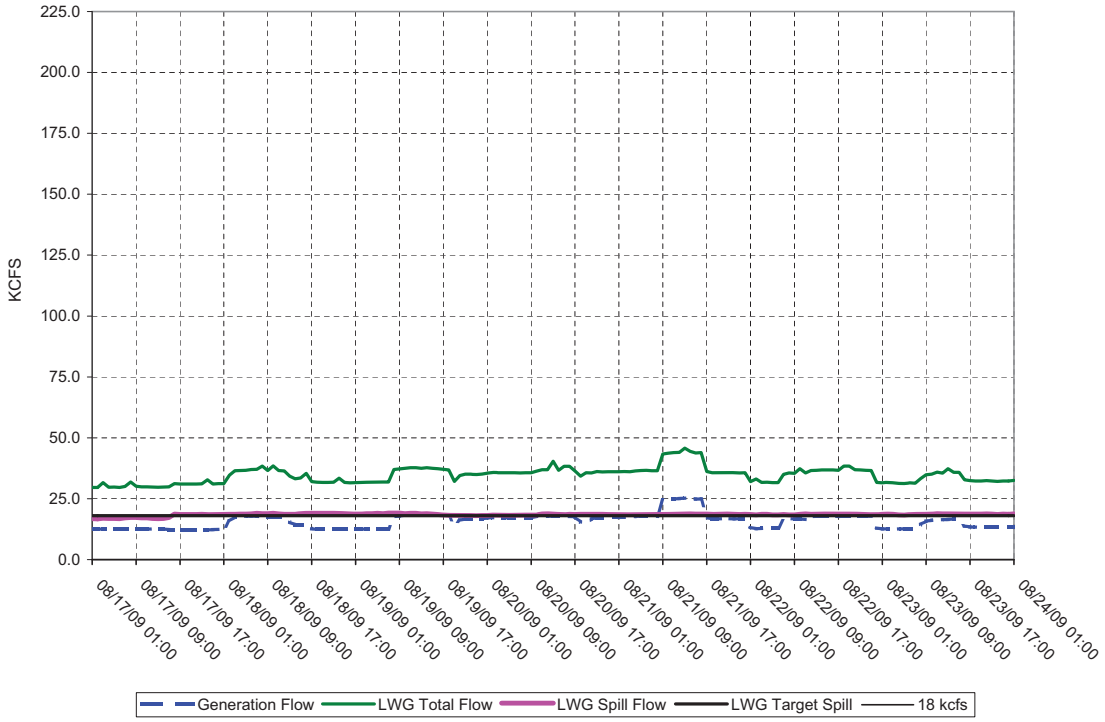
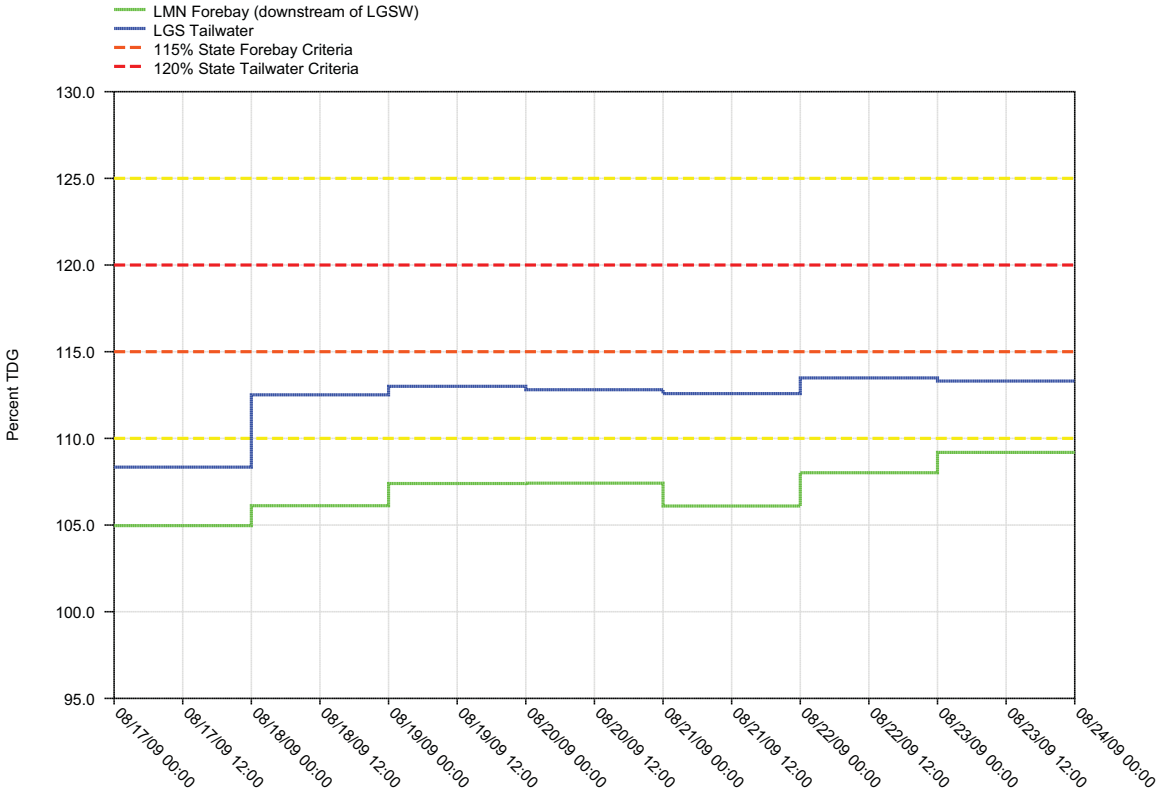


Figure 18.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

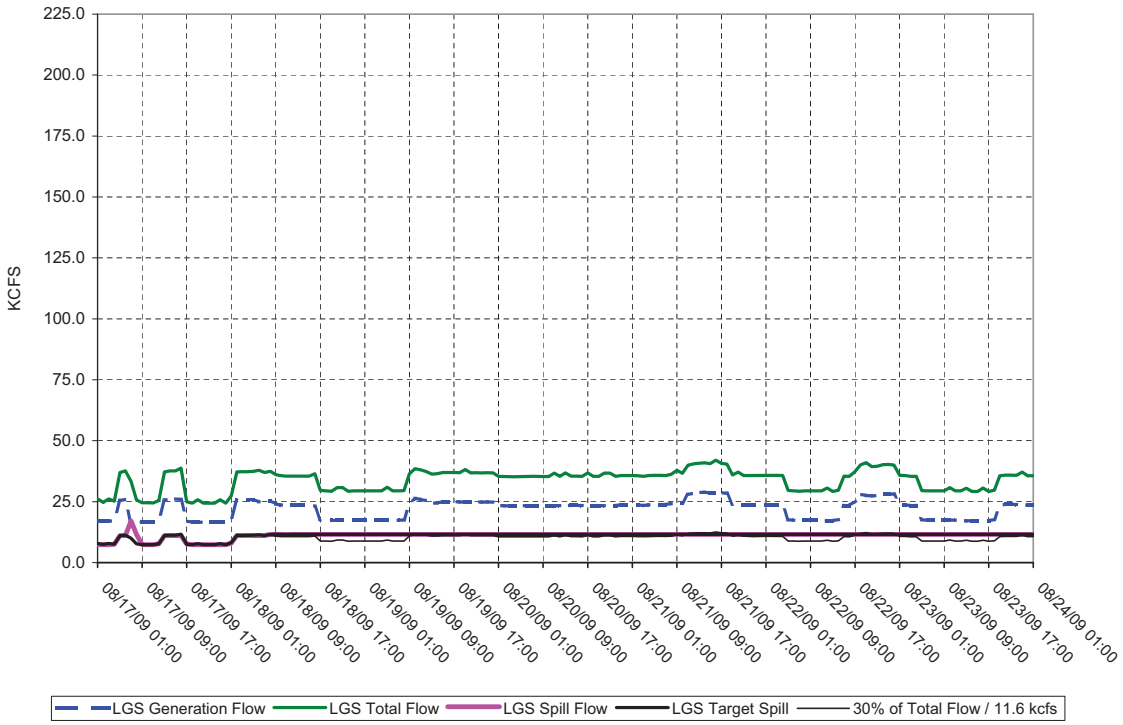
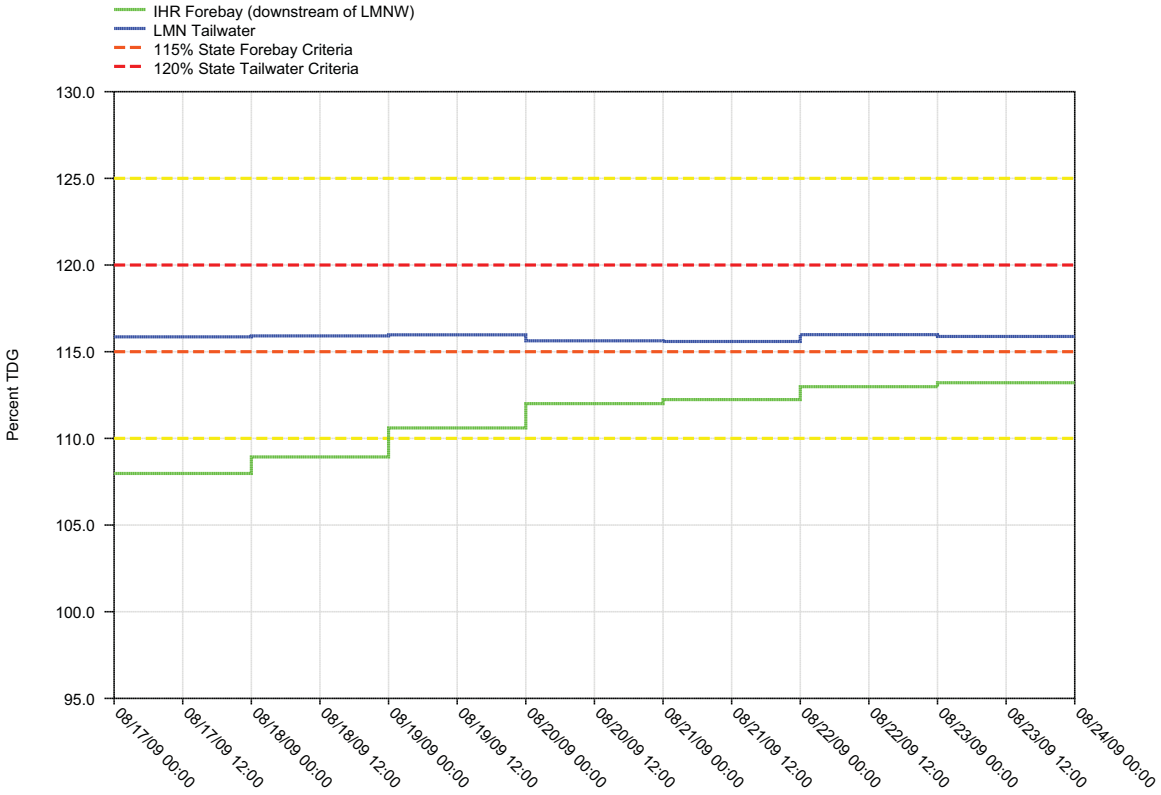


Figure 19.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

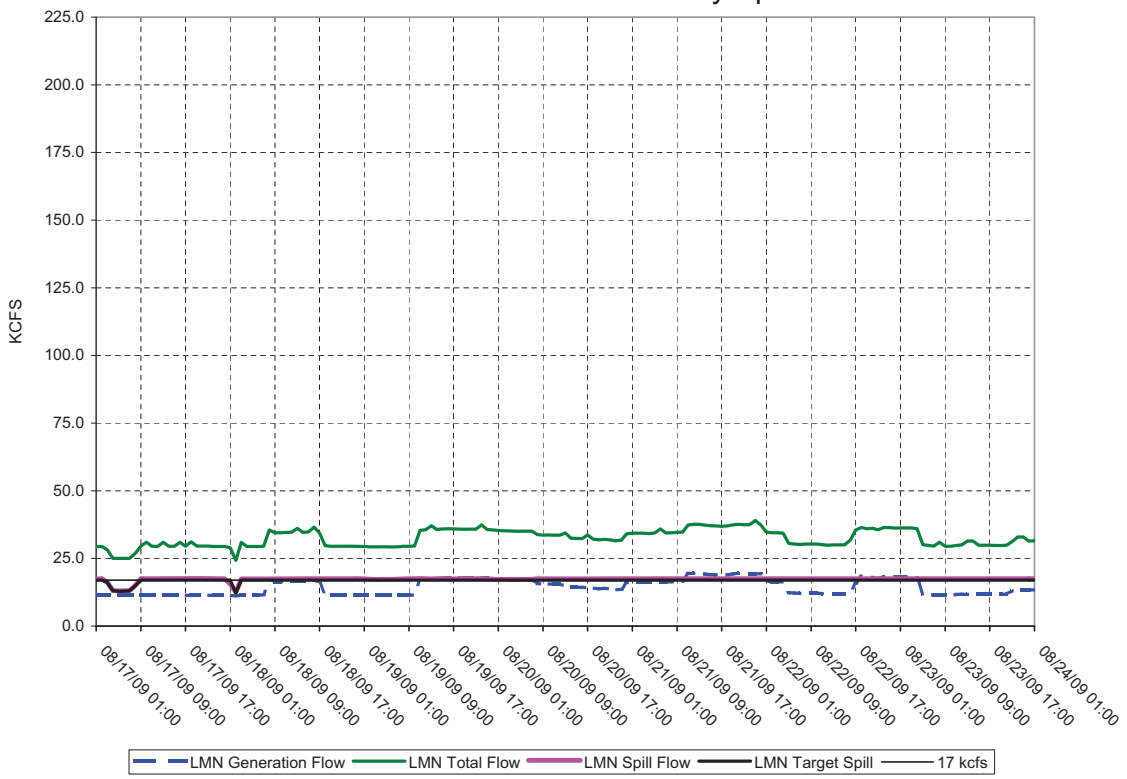
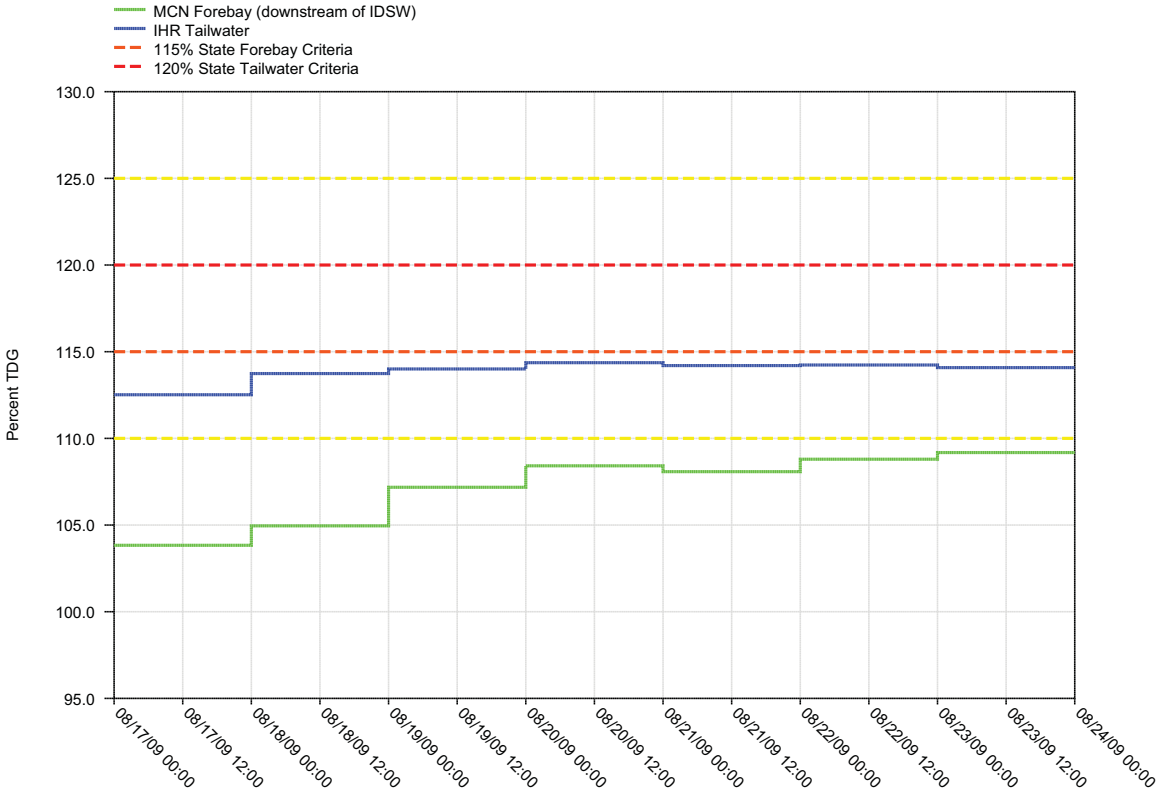


Figure 20.

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



ICE HARBOR DAM - Hourly Spill and Flow

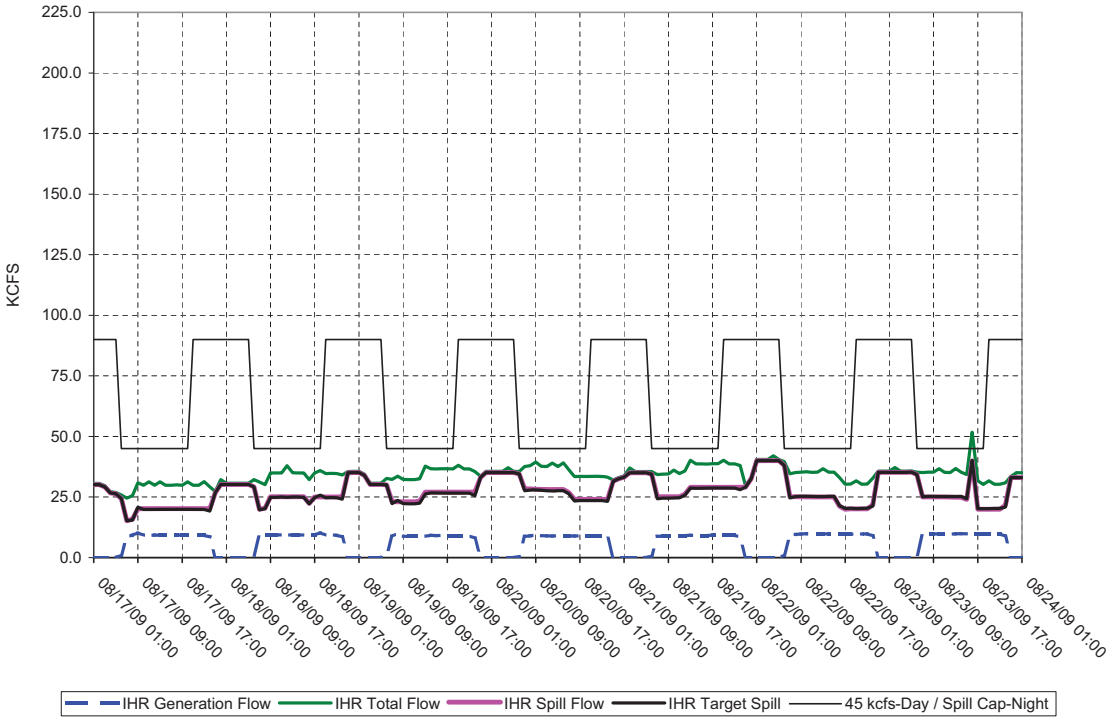
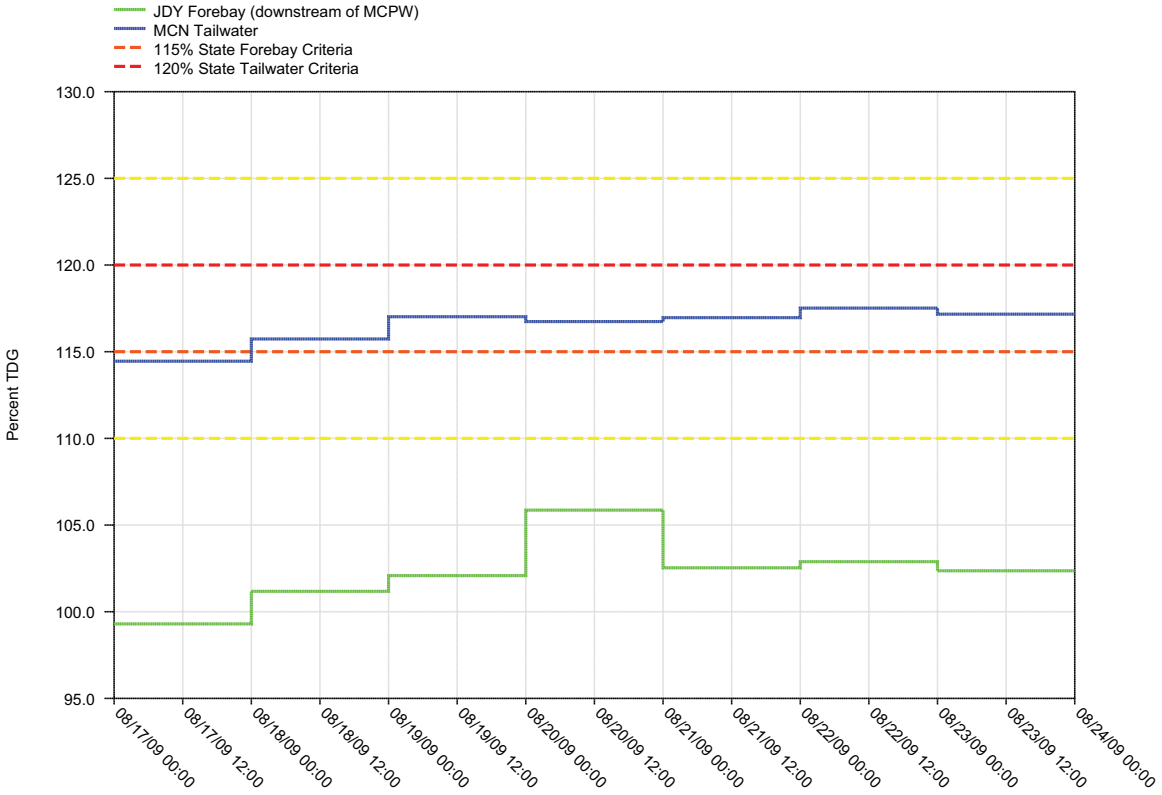


Figure 21.

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



McNARY DAM - Hourly Spill and Flow

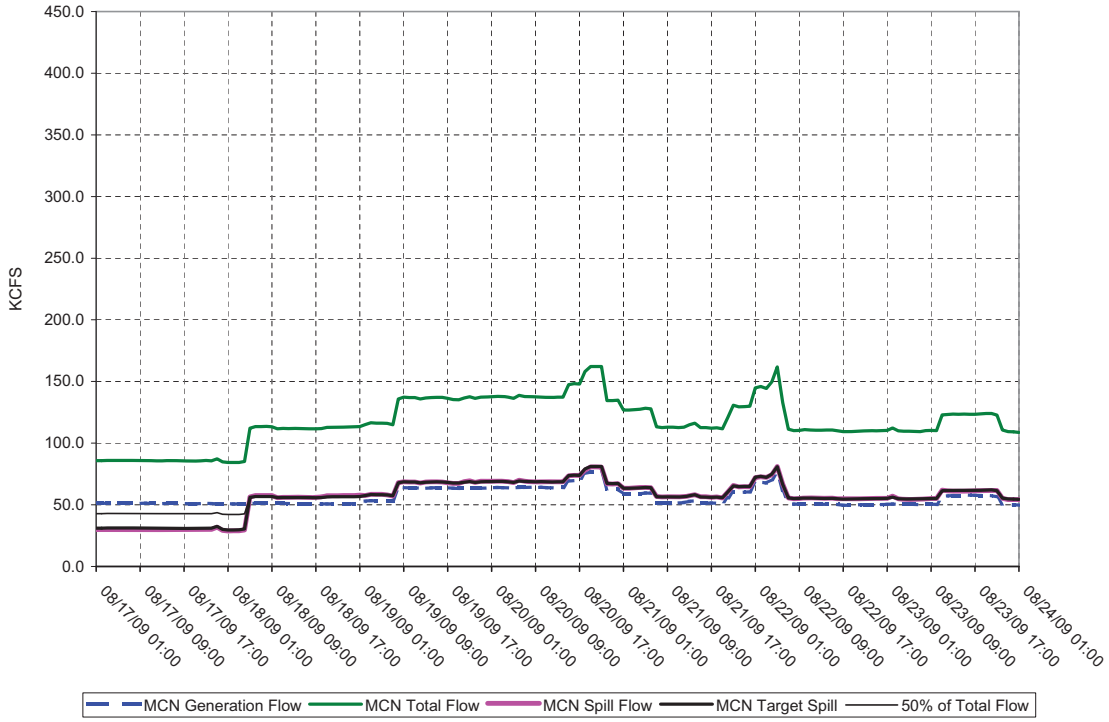
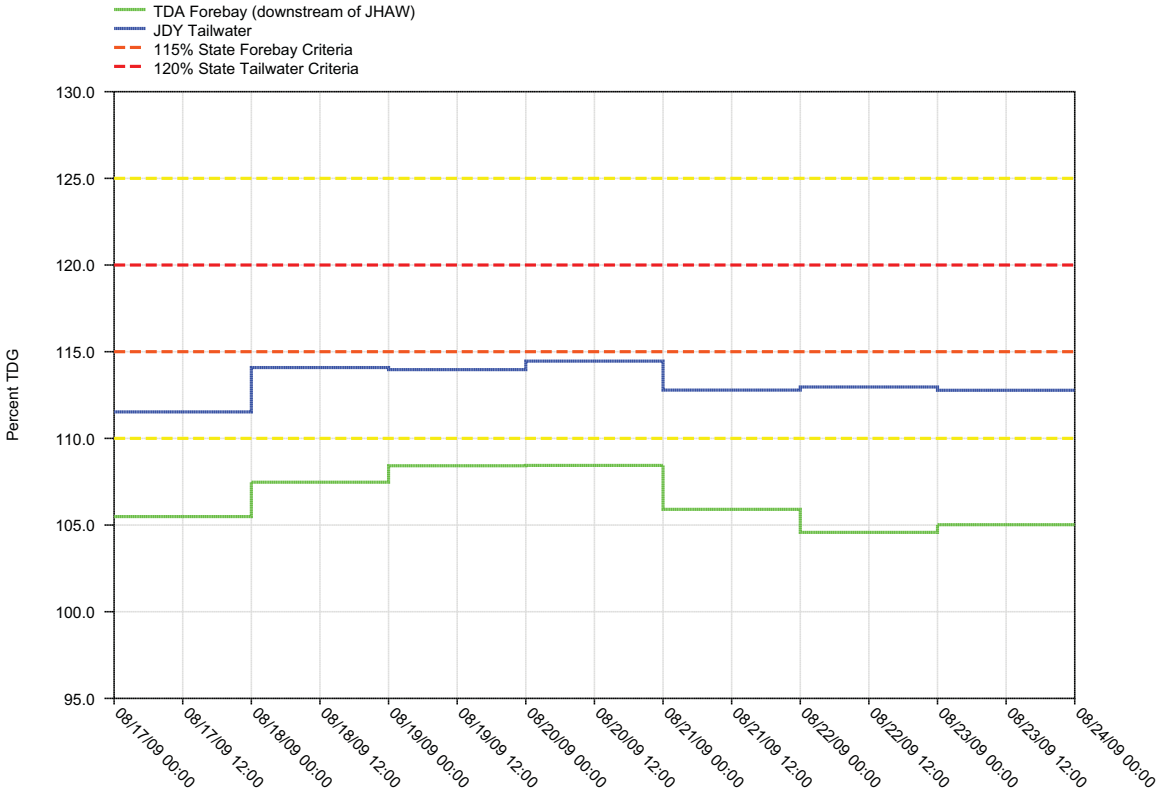


Figure 22.

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



JOHN DAY DAM - Hourly Spill and Flow

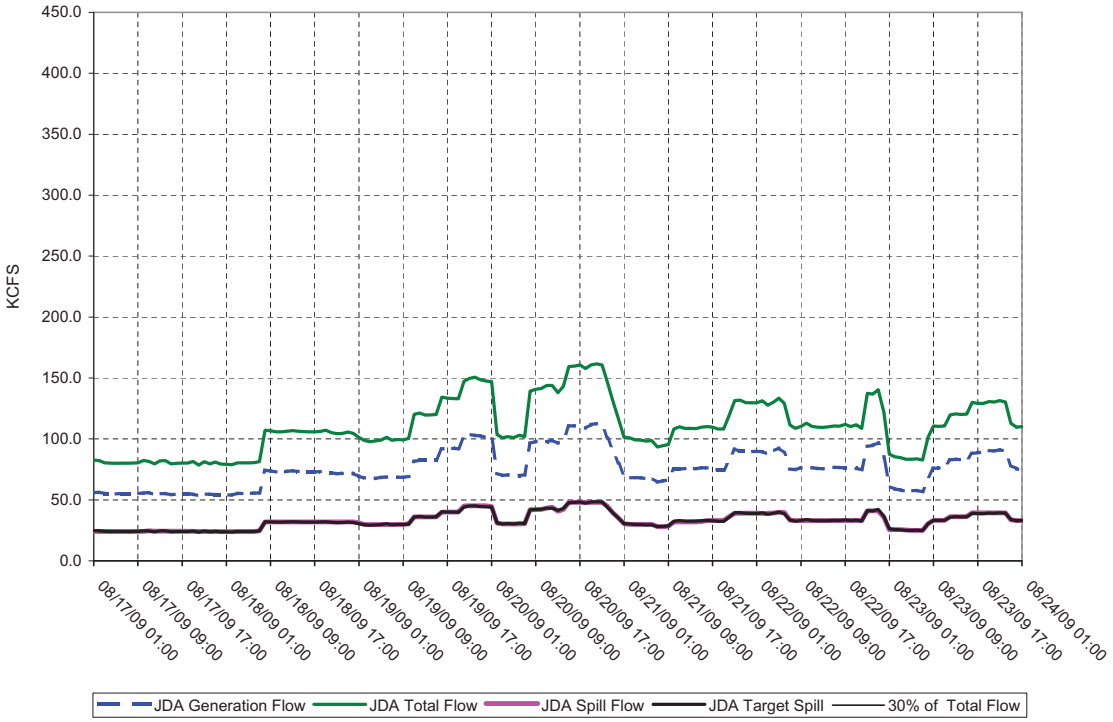
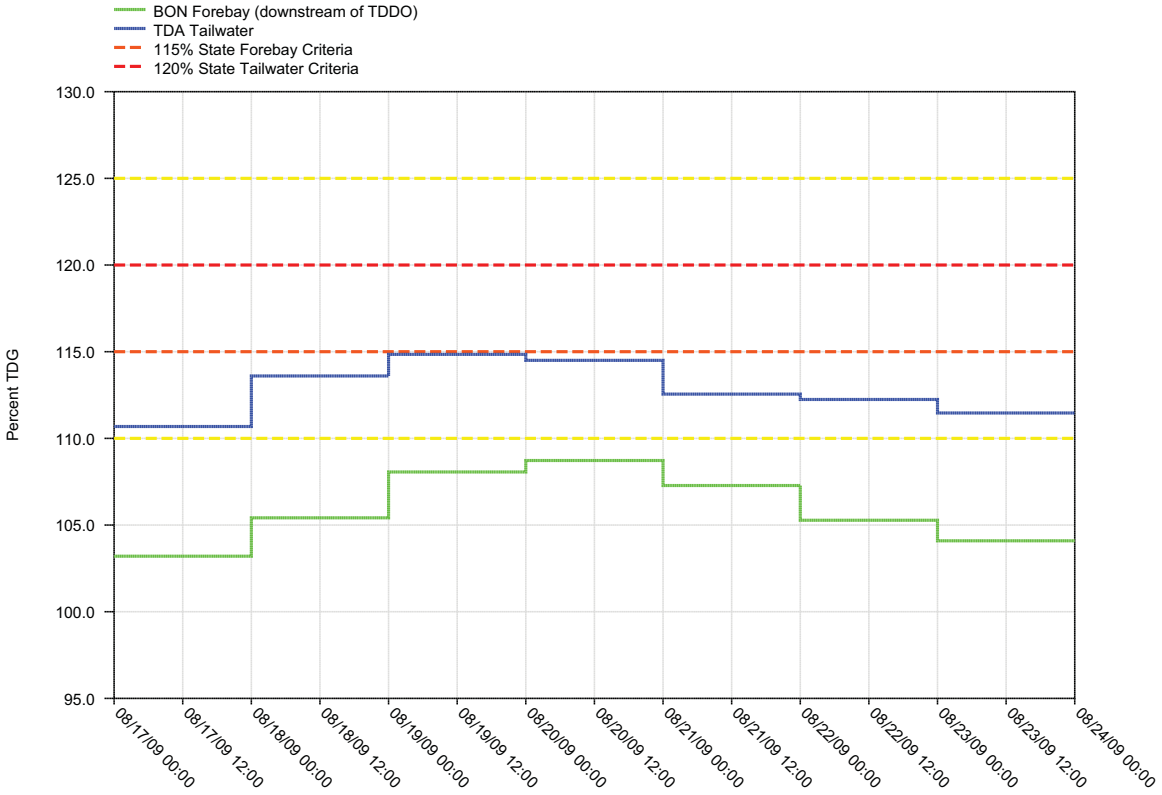


Figure 23.

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



THE DALLES DAM - Hourly Spill and Flow

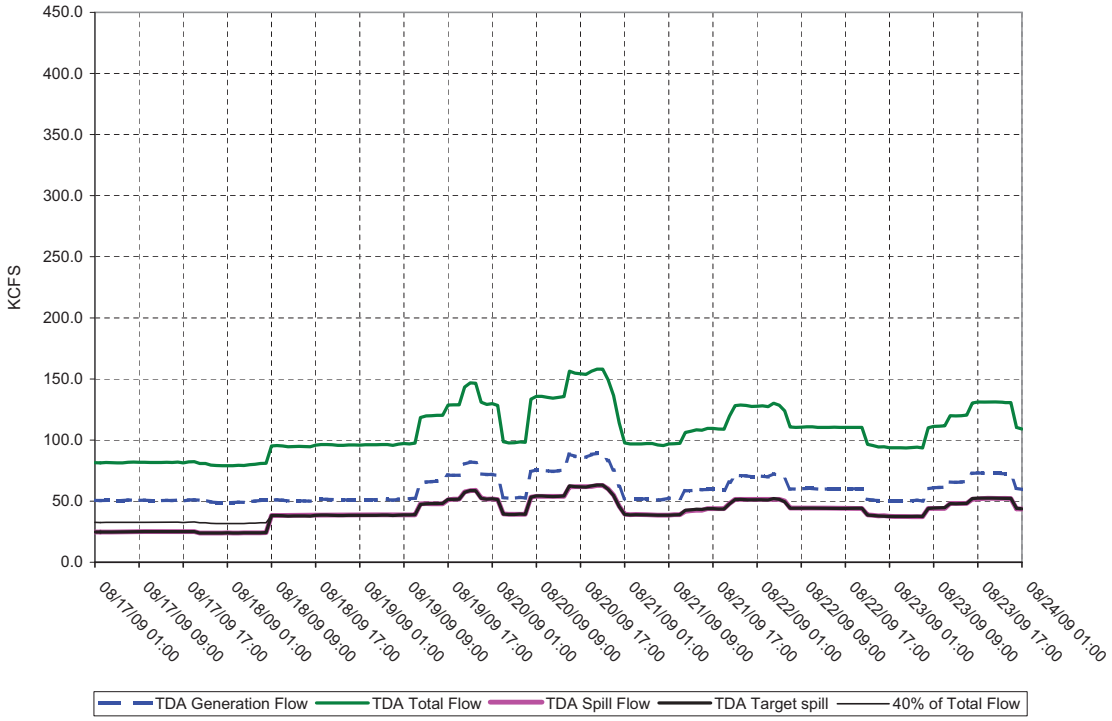
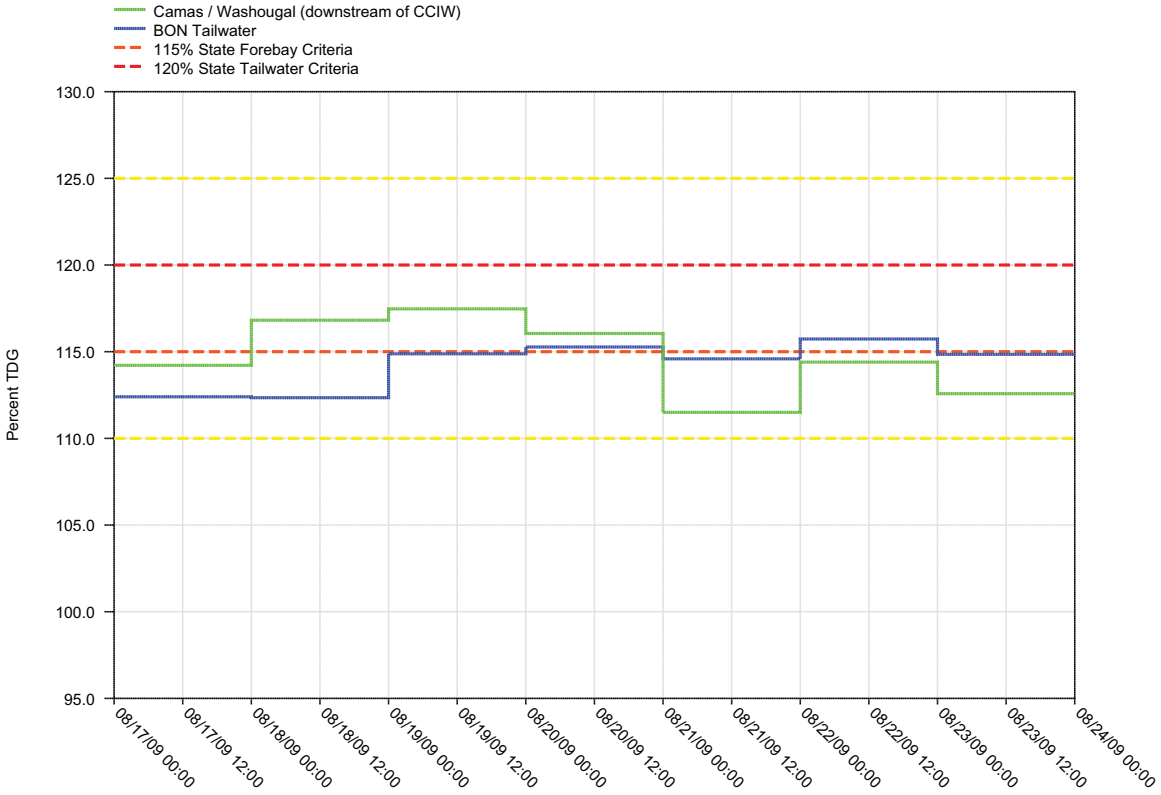


Figure 24.

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



BONNEVILLE DAM - Hourly Spill and Flow

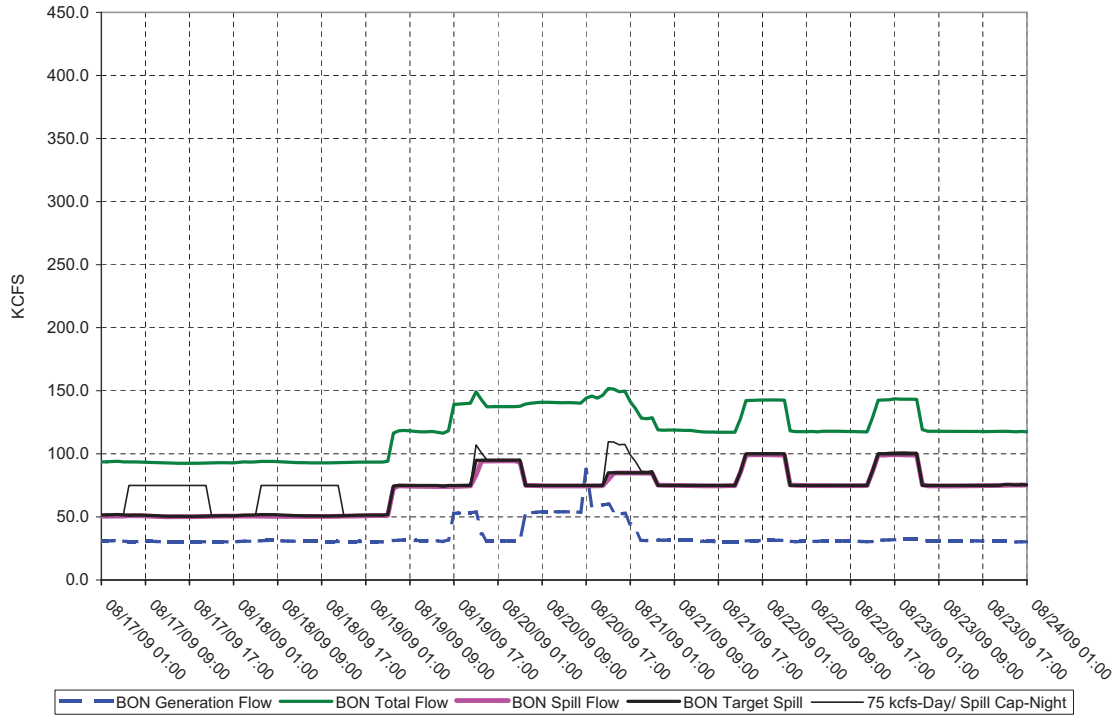
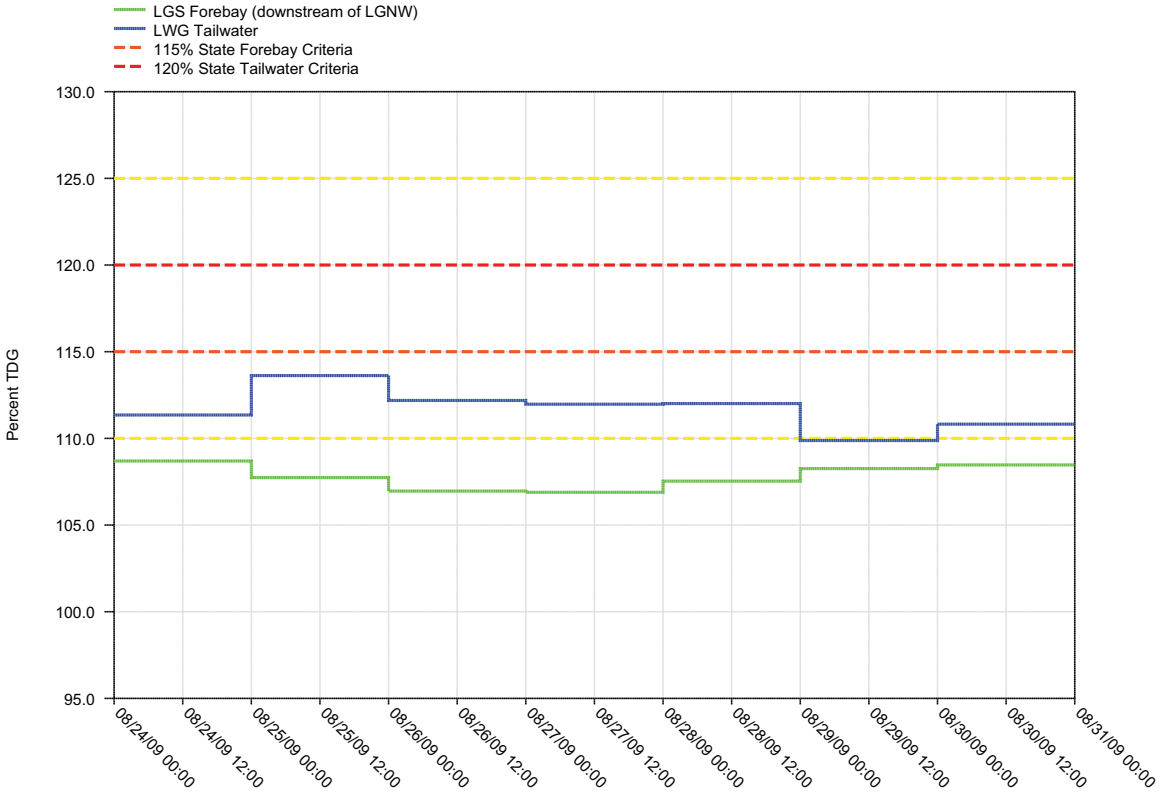


Figure 25.

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



LOWER GRANITE DAM - Hourly Spill and Flow

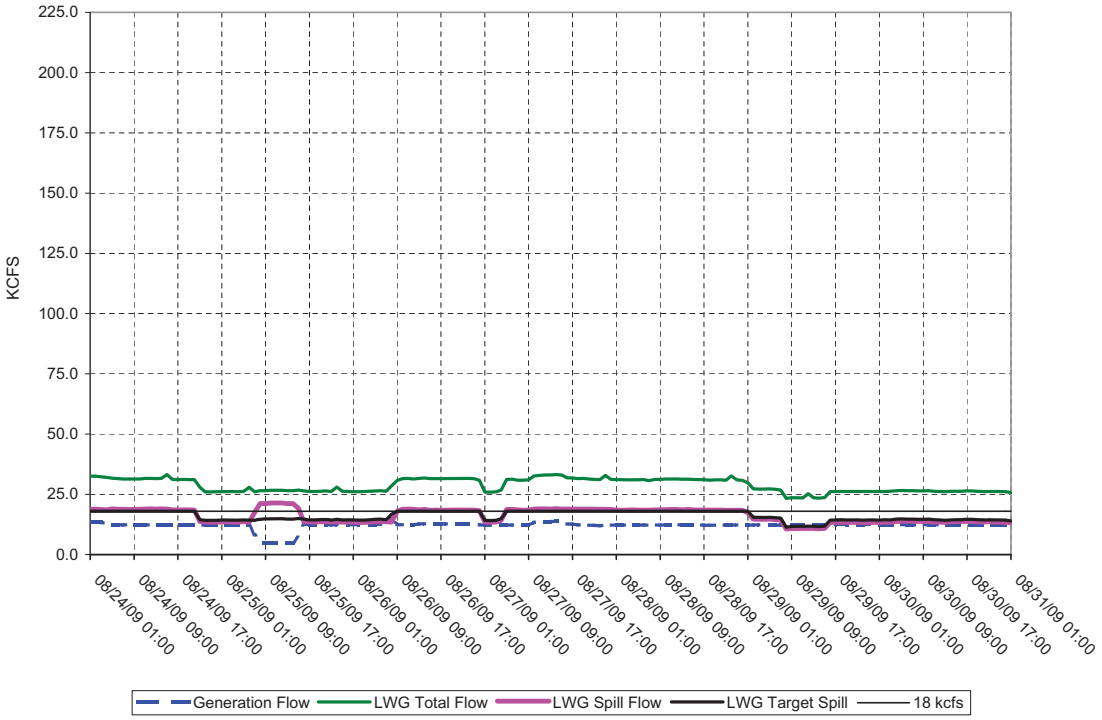
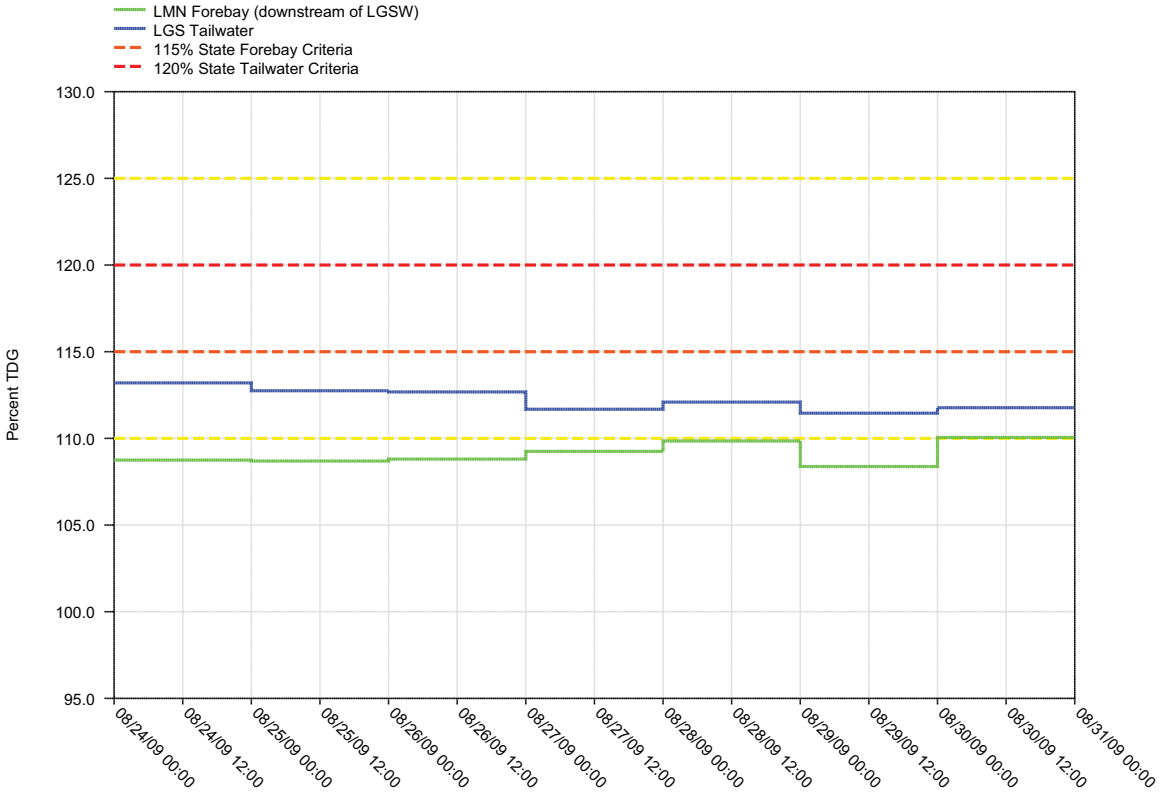


Figure 26.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

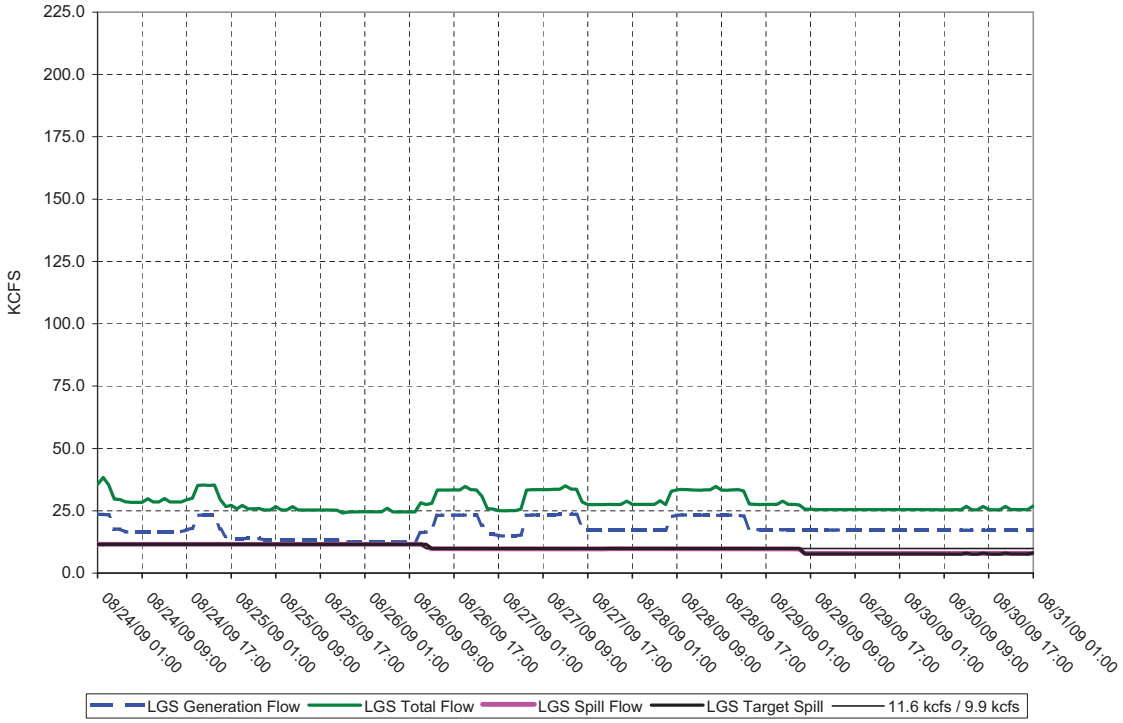
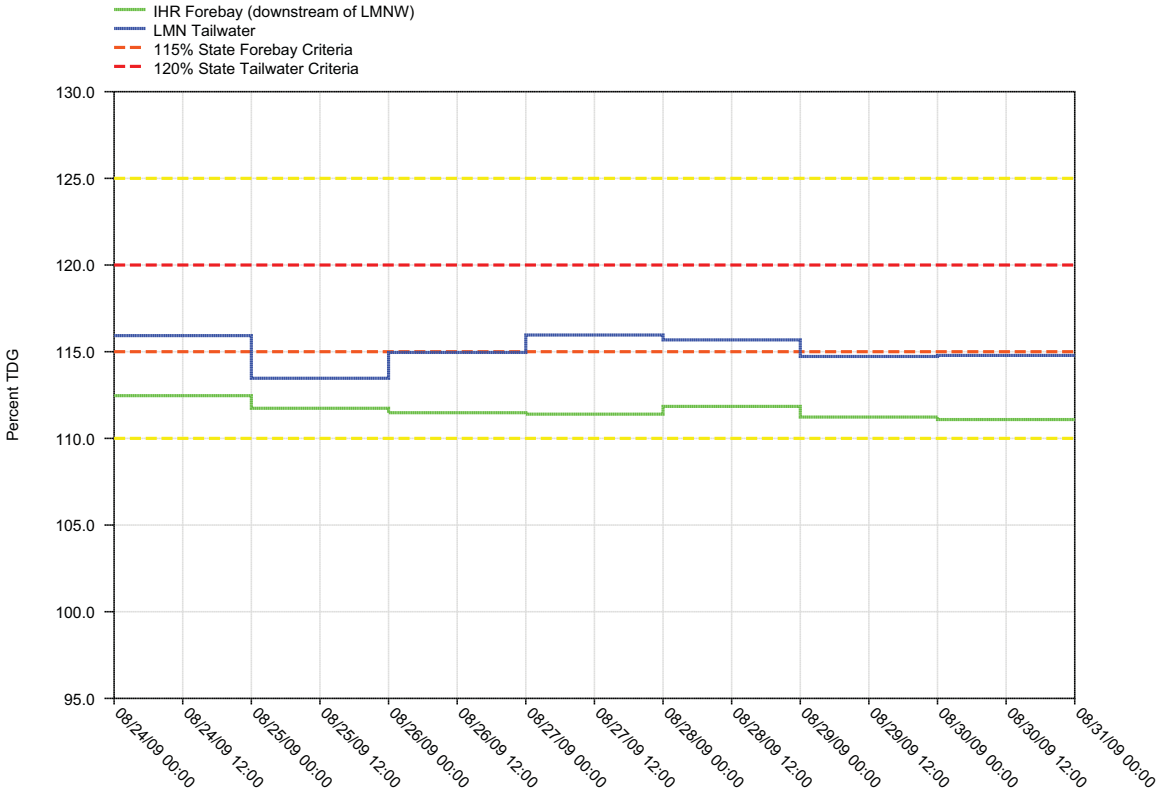


Figure 27.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

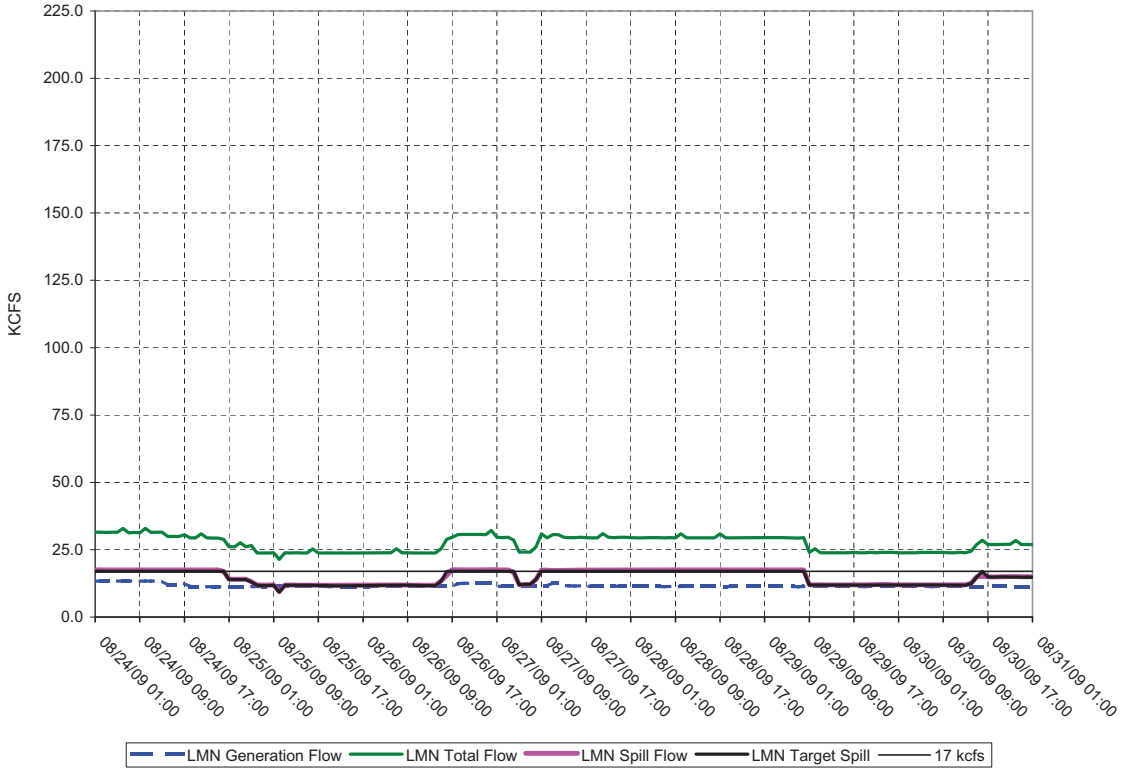
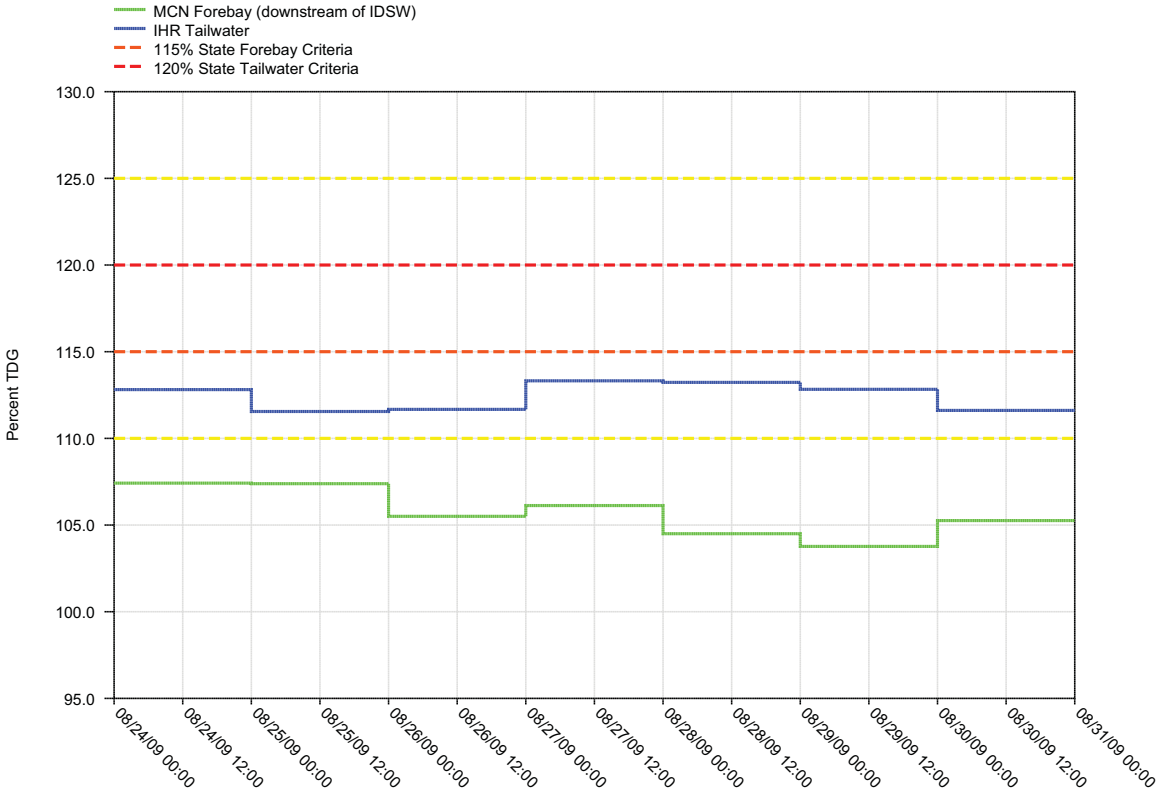


Figure 28.

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



ICE HARBOR DAM - Hourly Spill and Flow

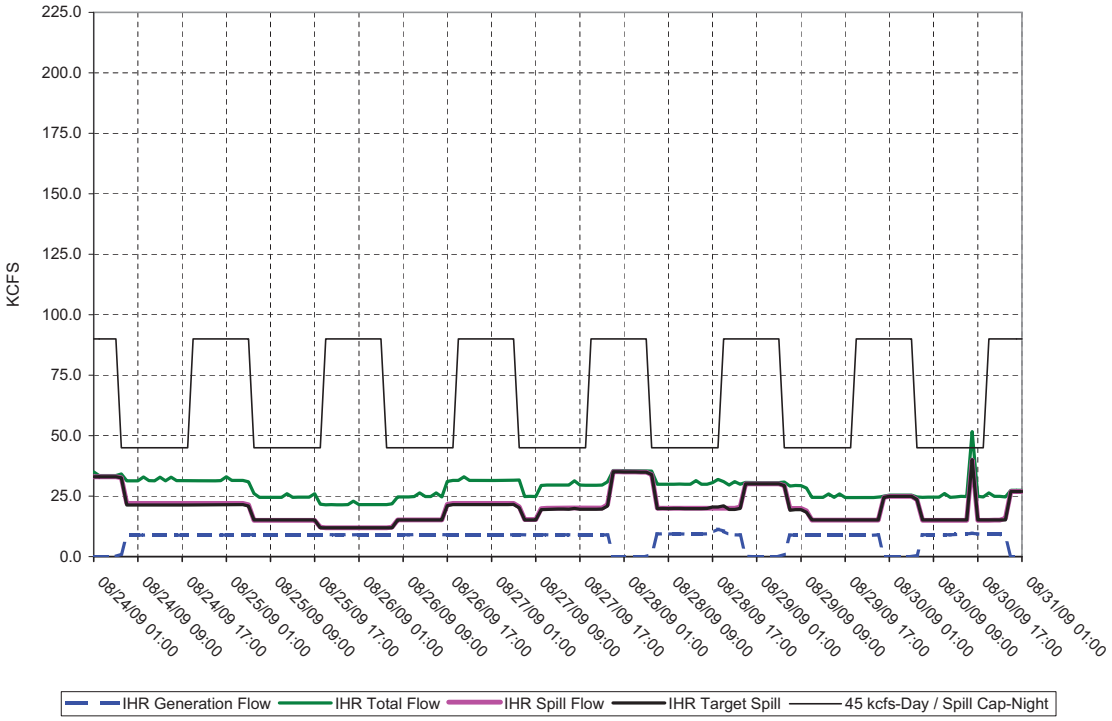
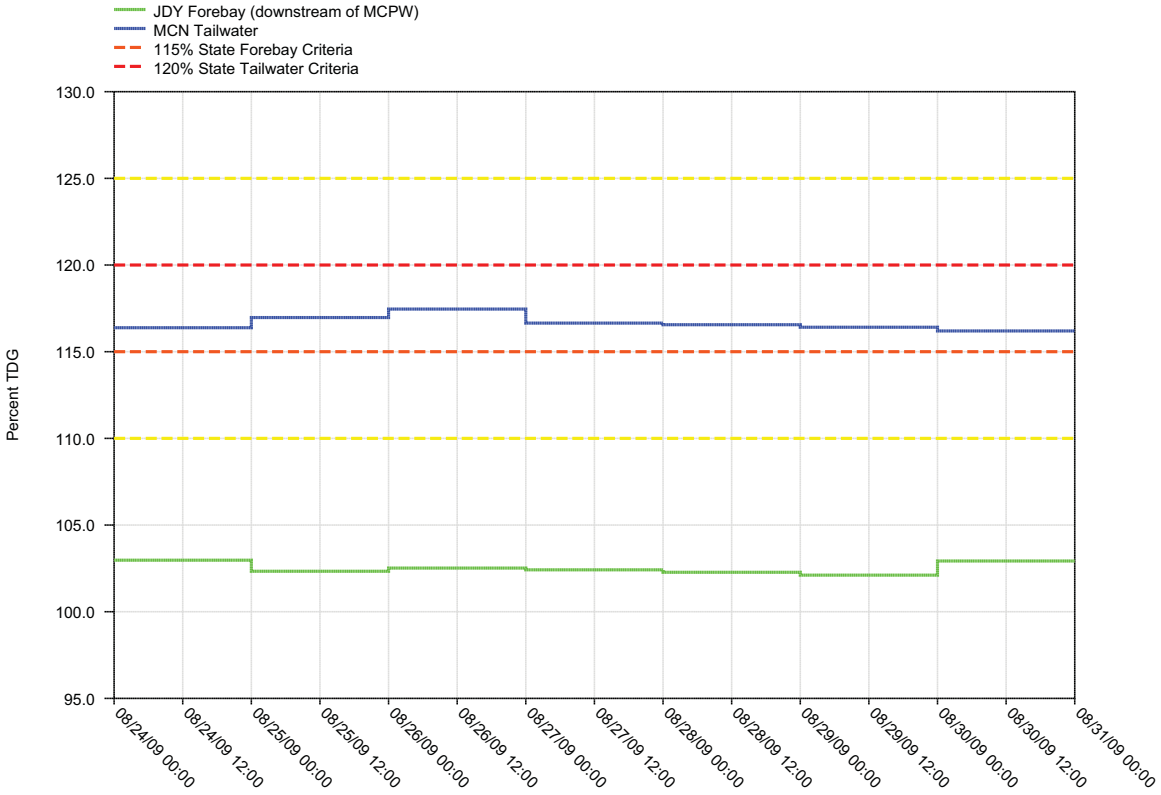


Figure 29.

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



McNARY DAM - Hourly Spill and Flow

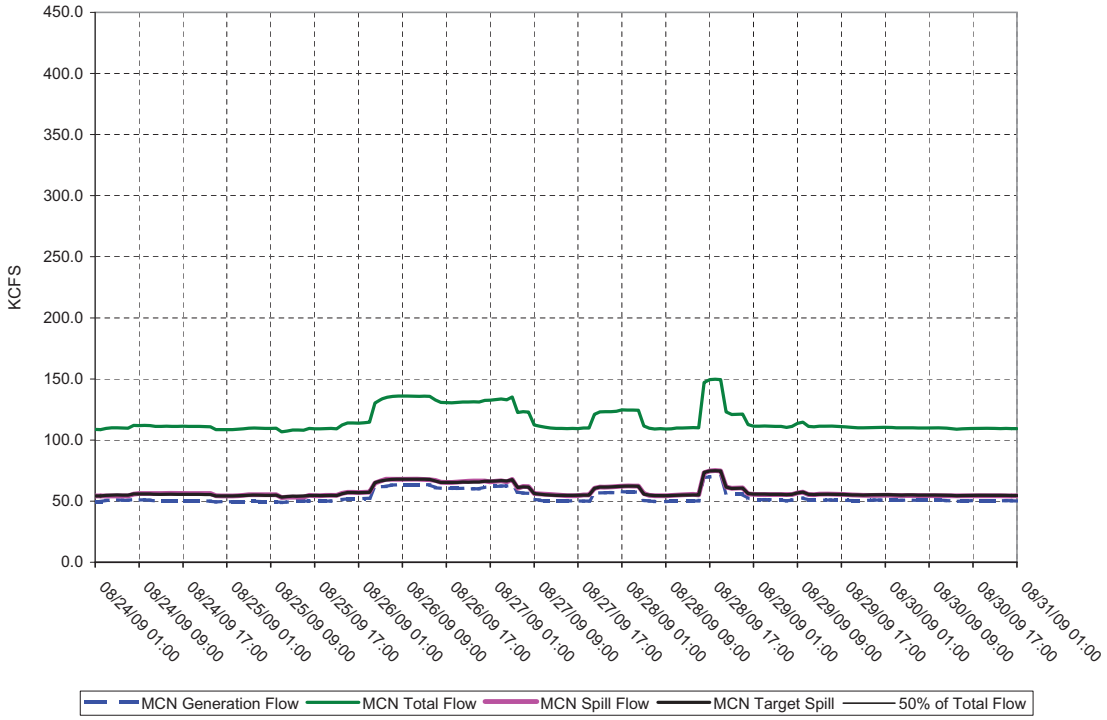
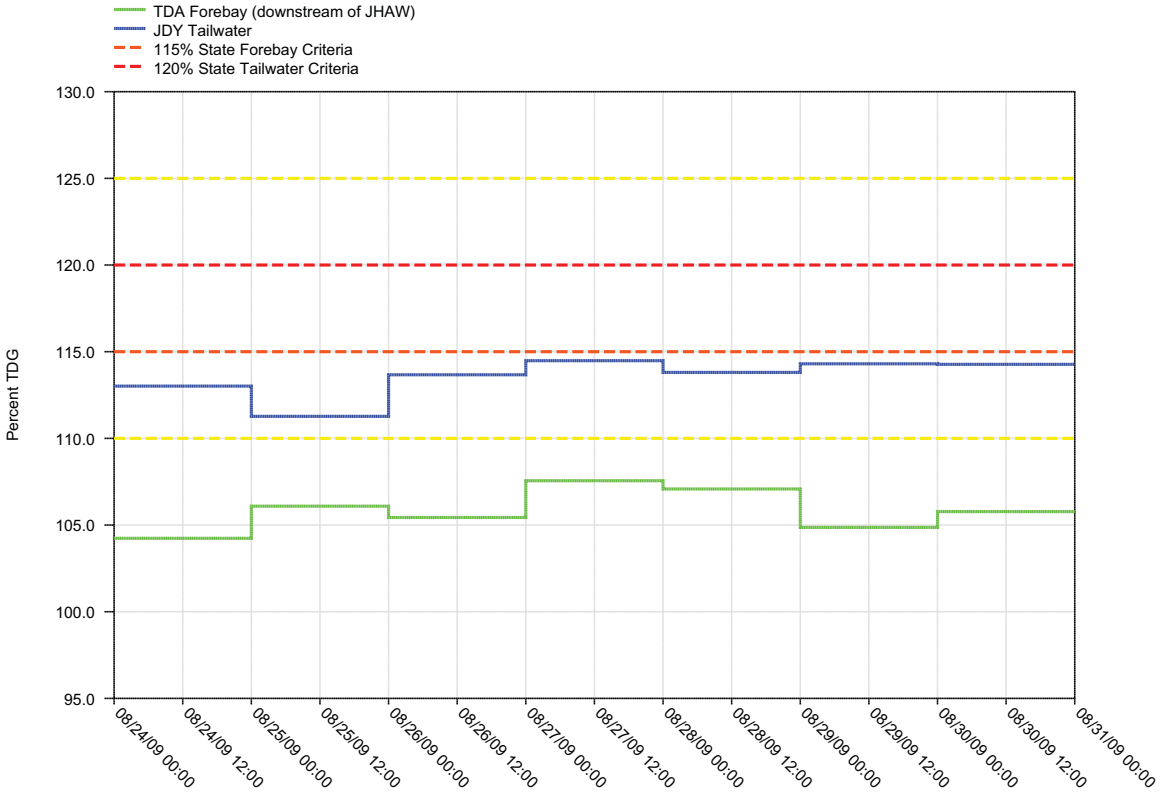


Figure 30.

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



JOHN DAY DAM - Hourly Spill and Flow

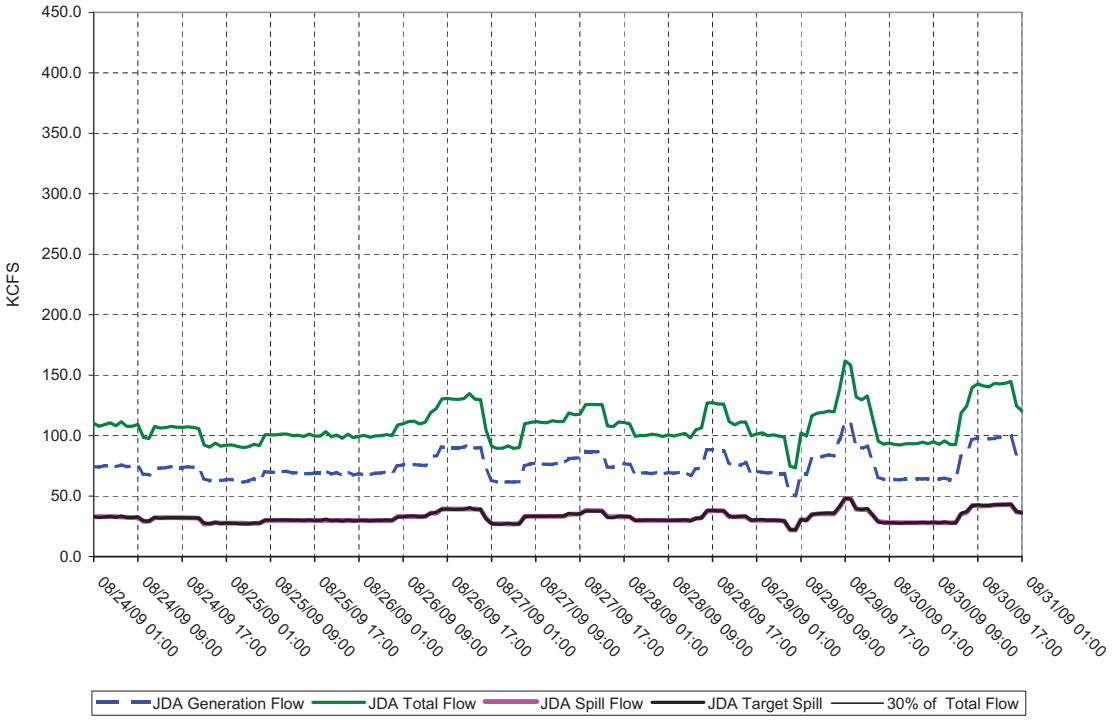
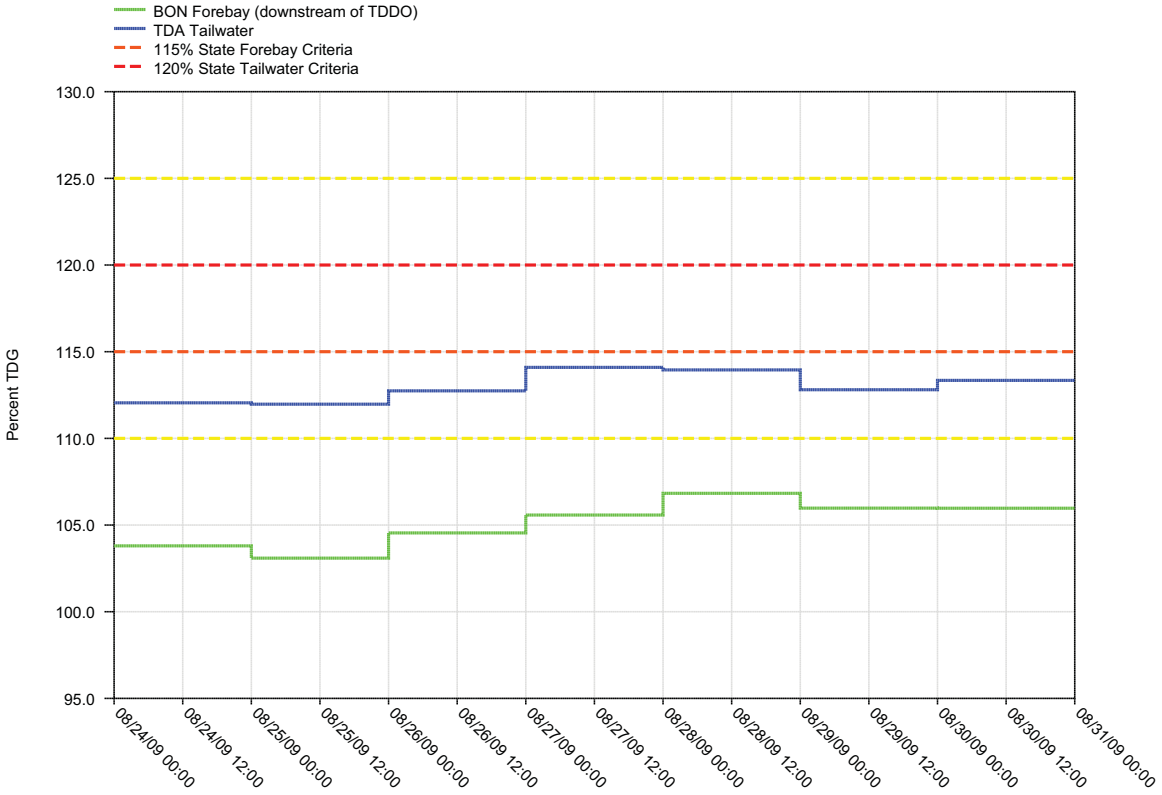


Figure 31.

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



THE DALLES DAM - Hourly Spill and Flow

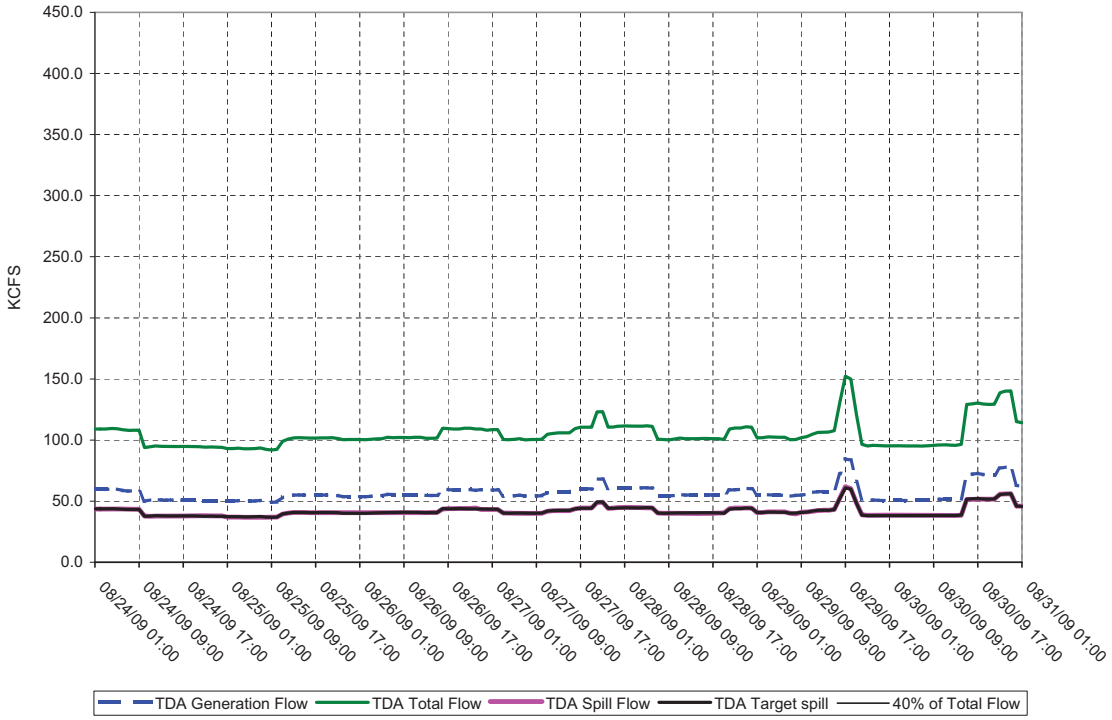
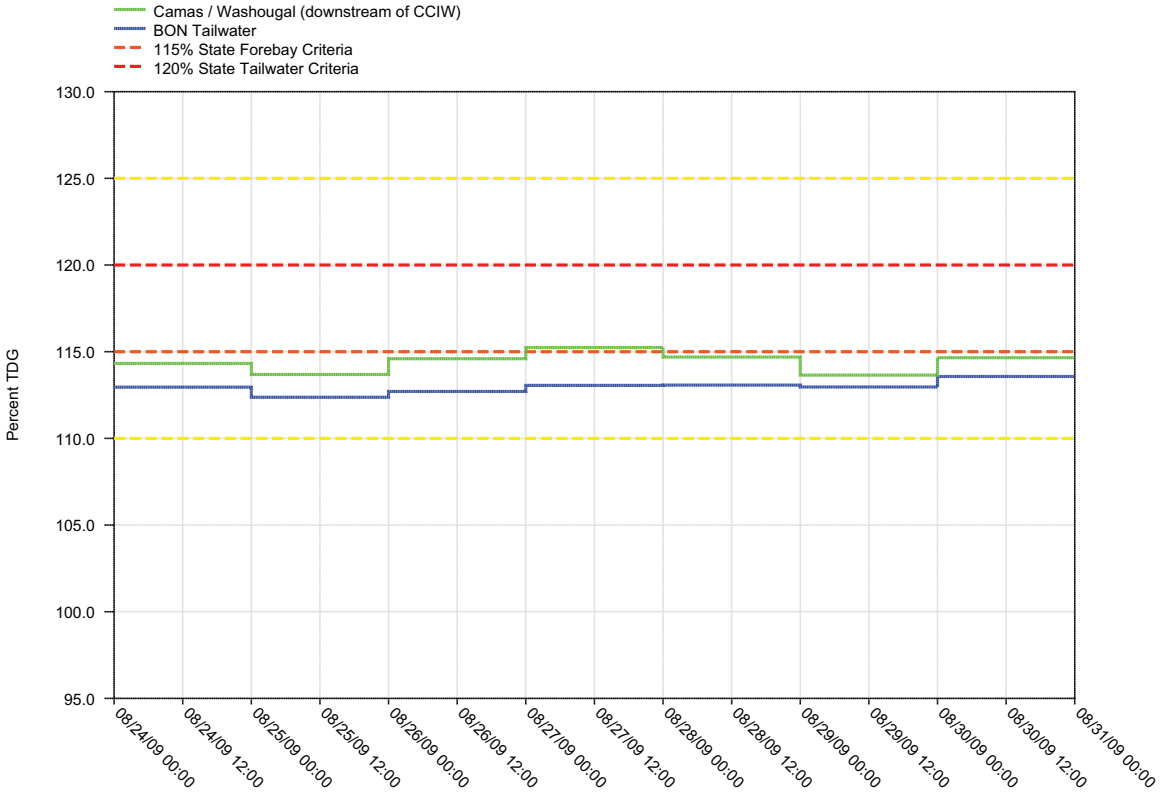


Figure 32.

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



BONNEVILLE DAM - Hourly Spill and Flow

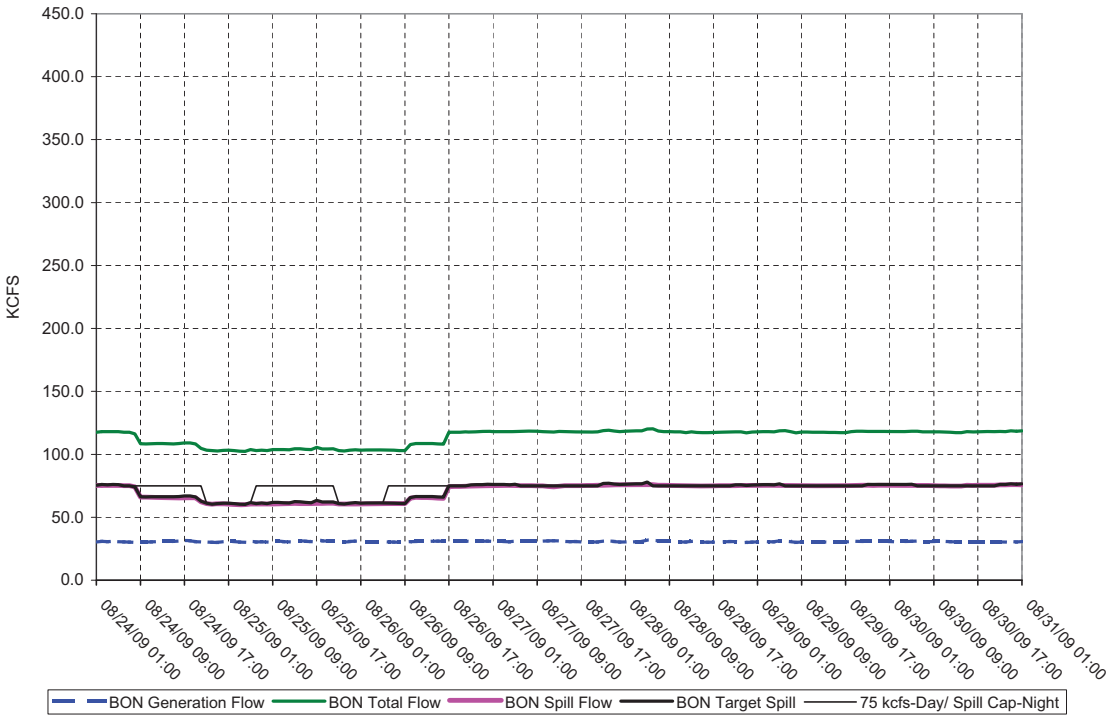
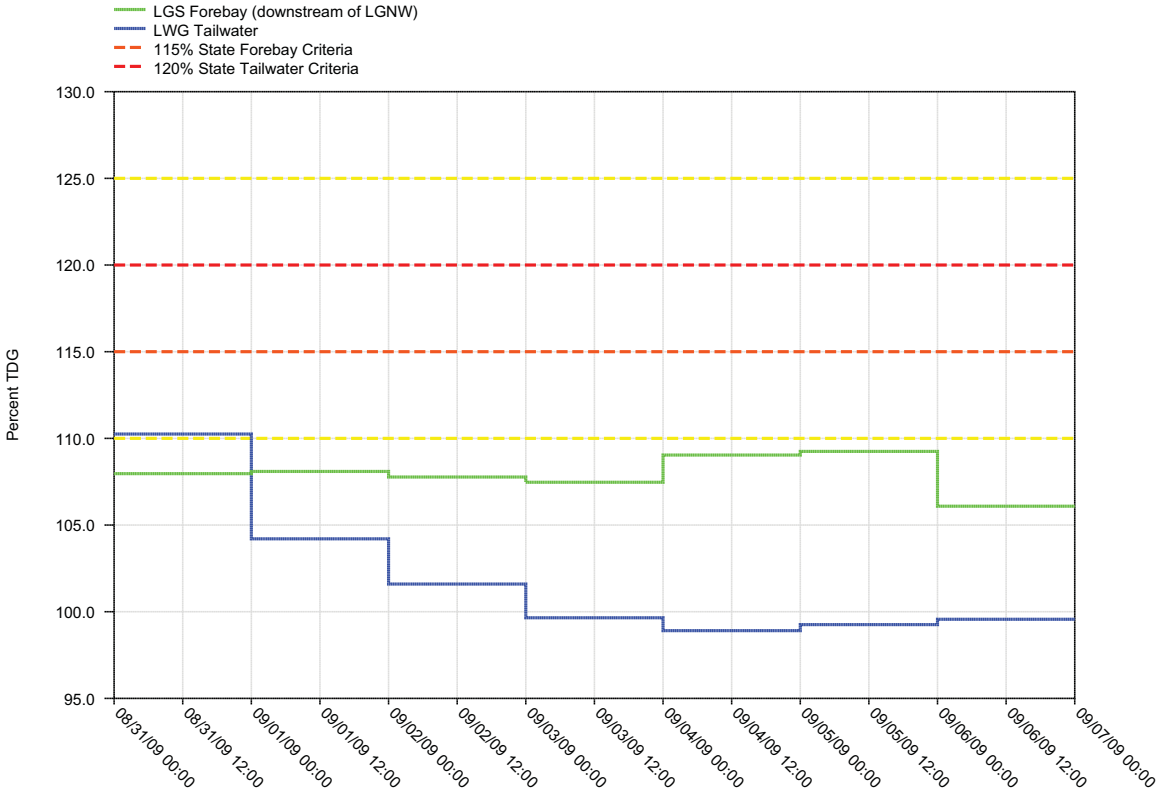


Figure 33.

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



LOWER GRANITE DAM - Hourly Spill and Flow

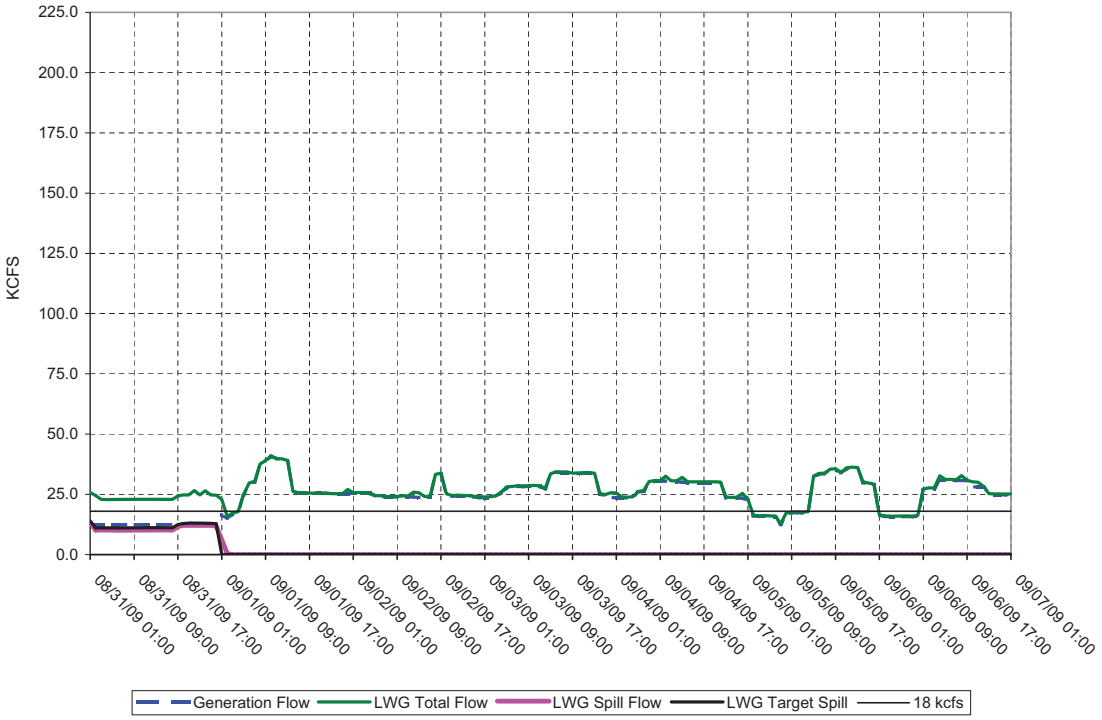
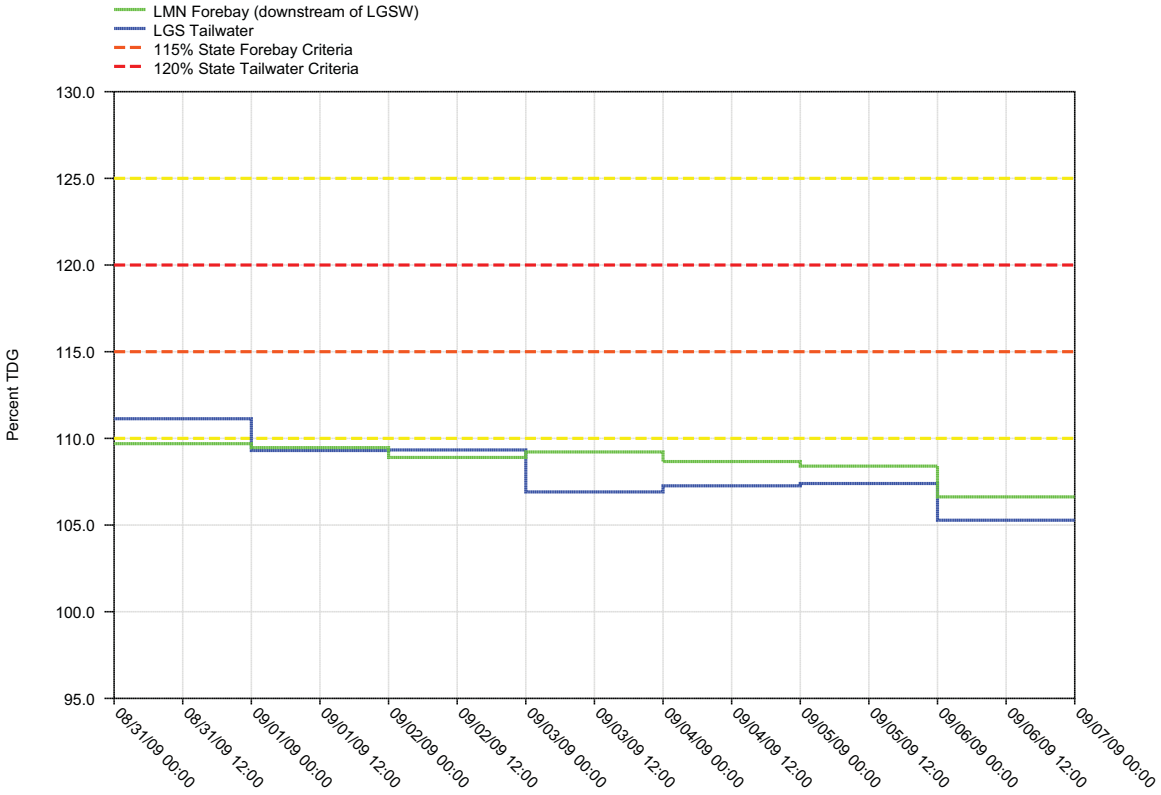


Figure 34.

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



LITTLE GOOSE DAM - Hourly Spill and Flow

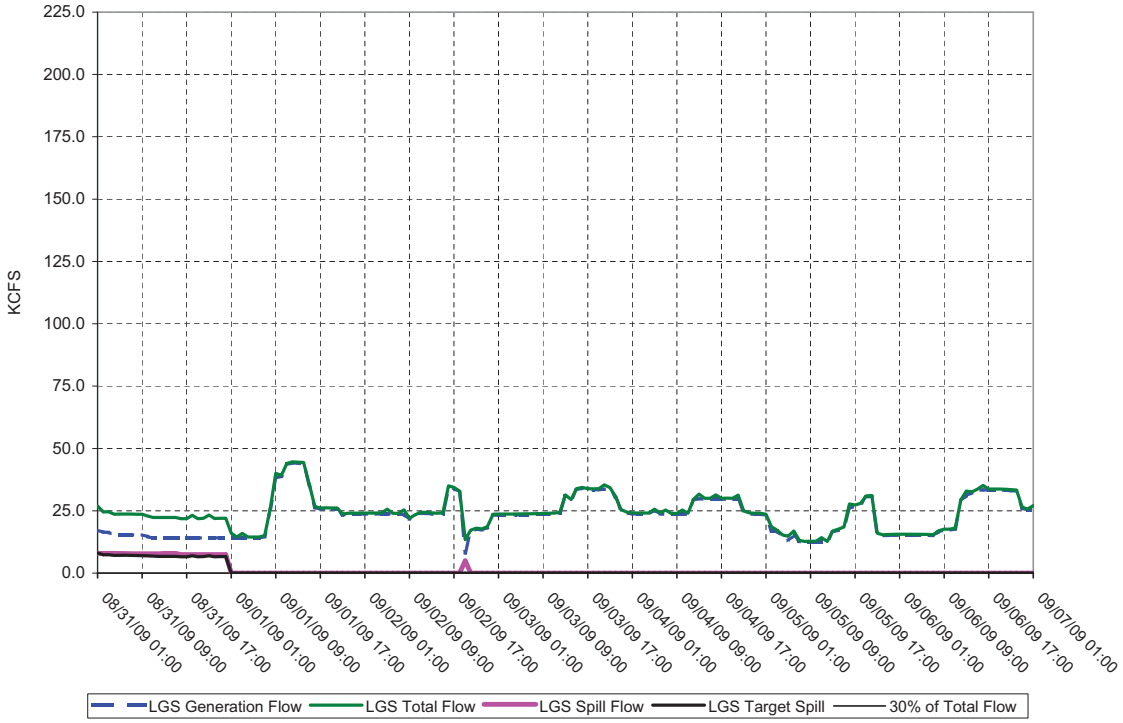
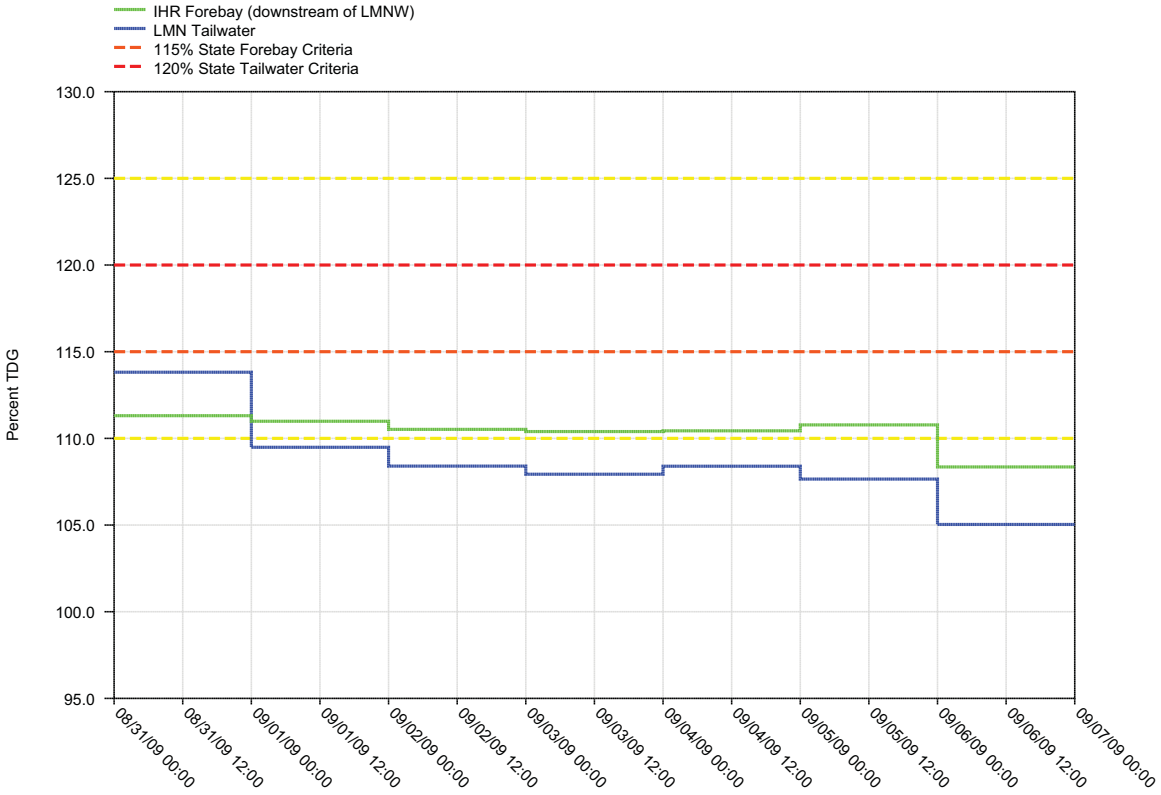


Figure 35.

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



LOWER MONUMENTAL DAM - Hourly Spill and Flow

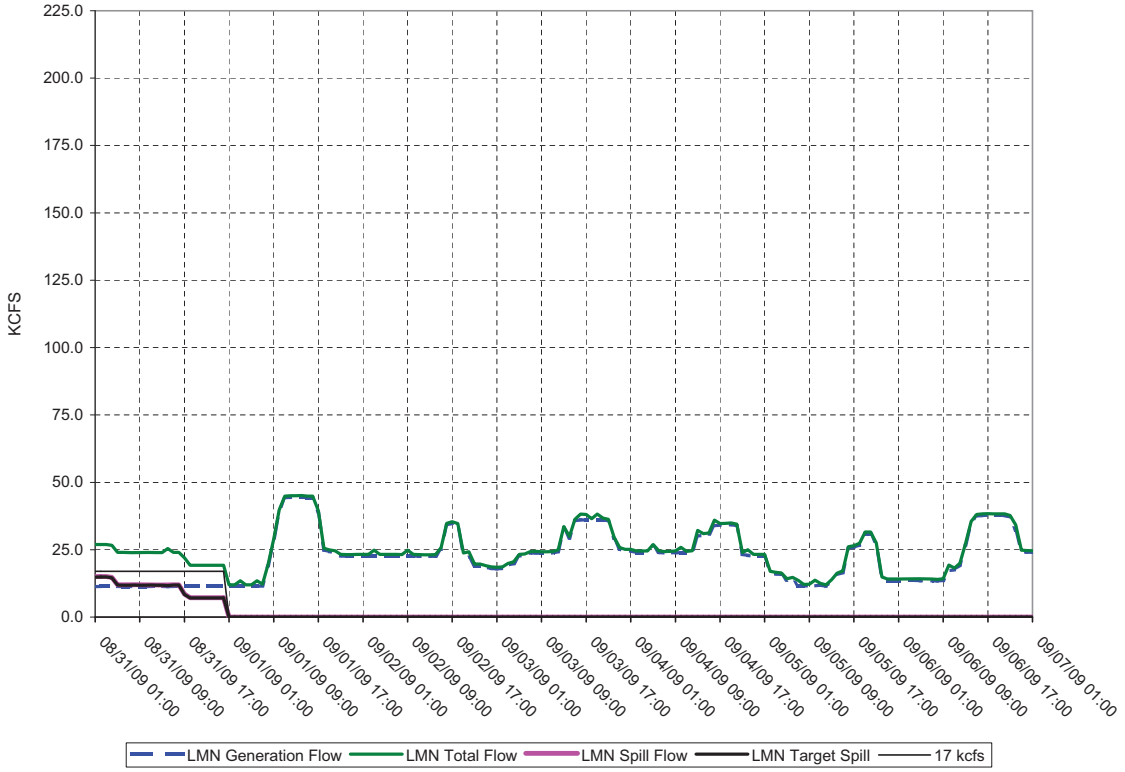
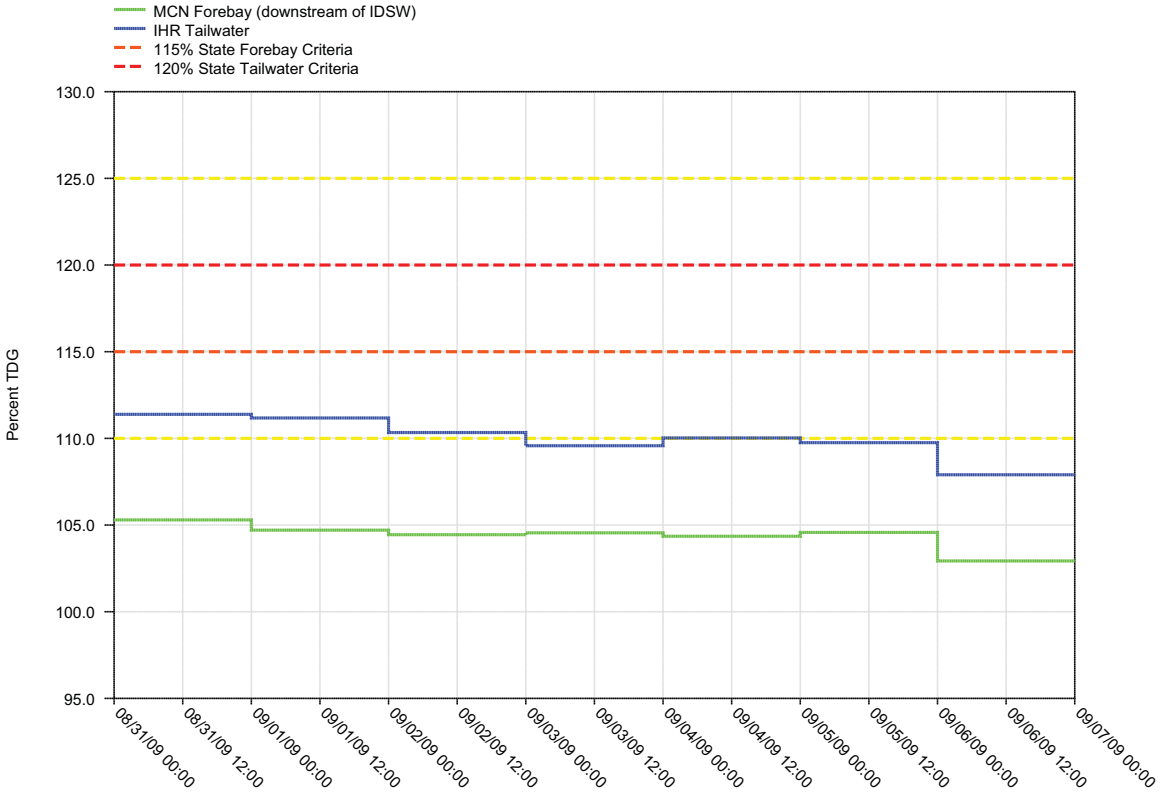


Figure 36.

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



ICE HARBOR DAM - Hourly Spill and Flow

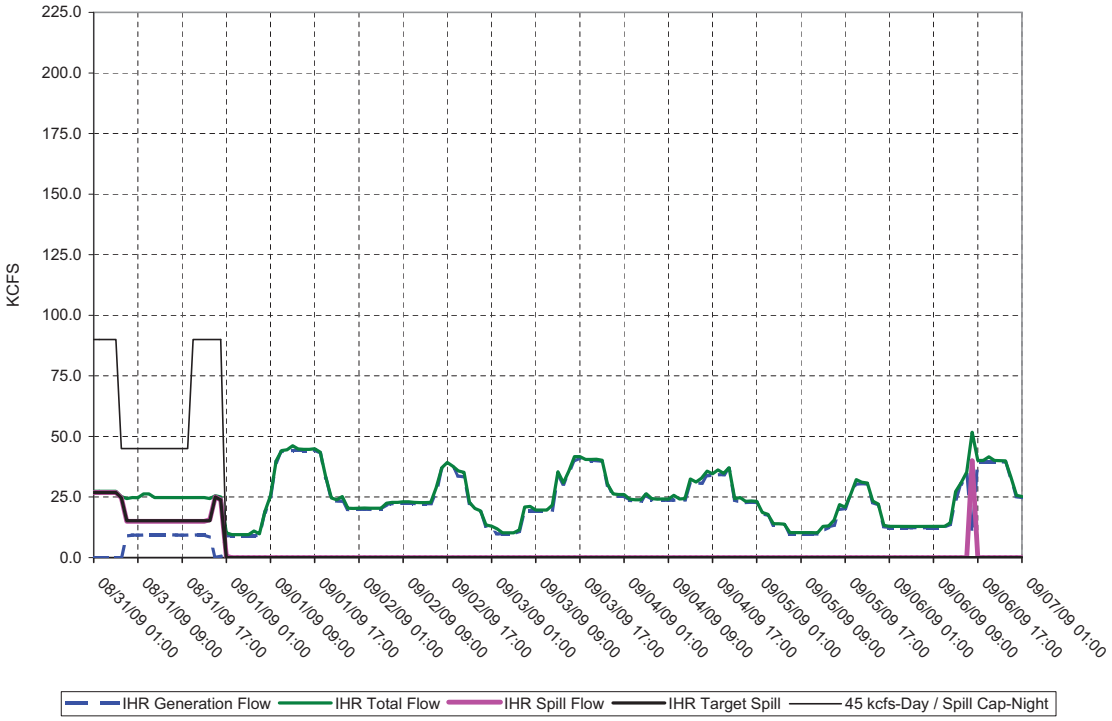
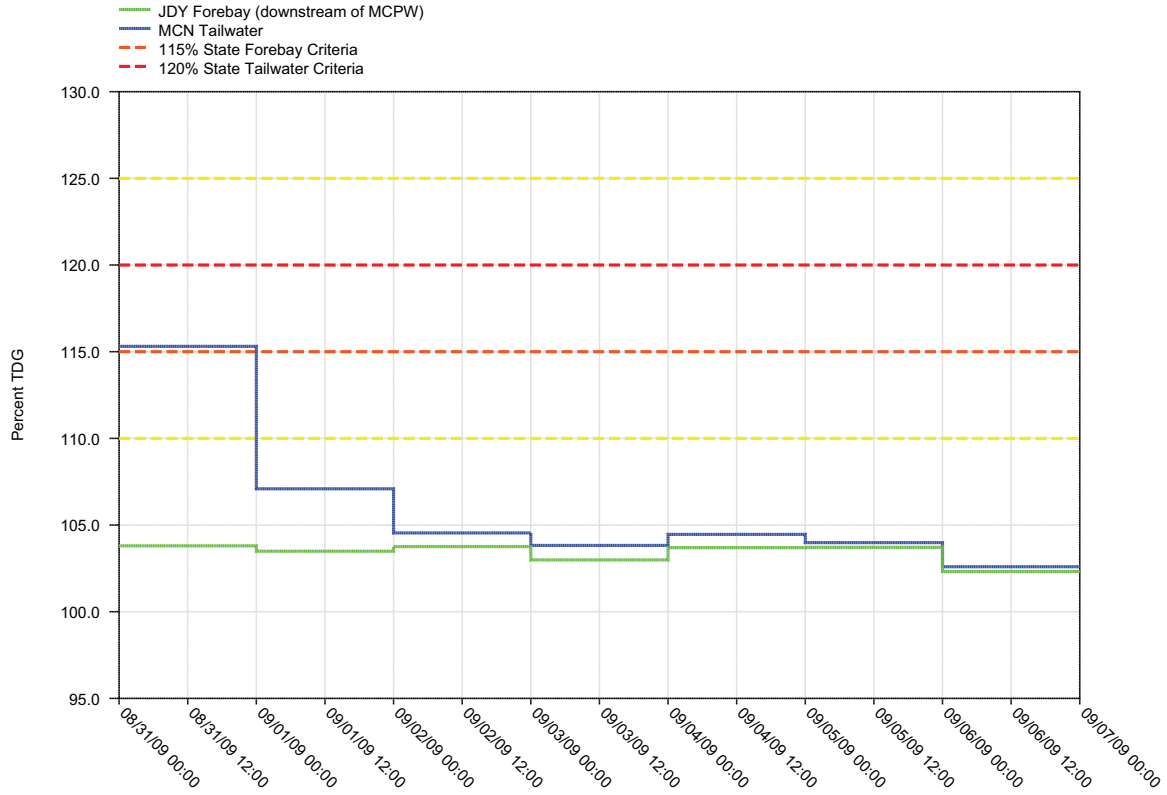


Figure 37.

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



McNARY DAM - Hourly Spill and Flow

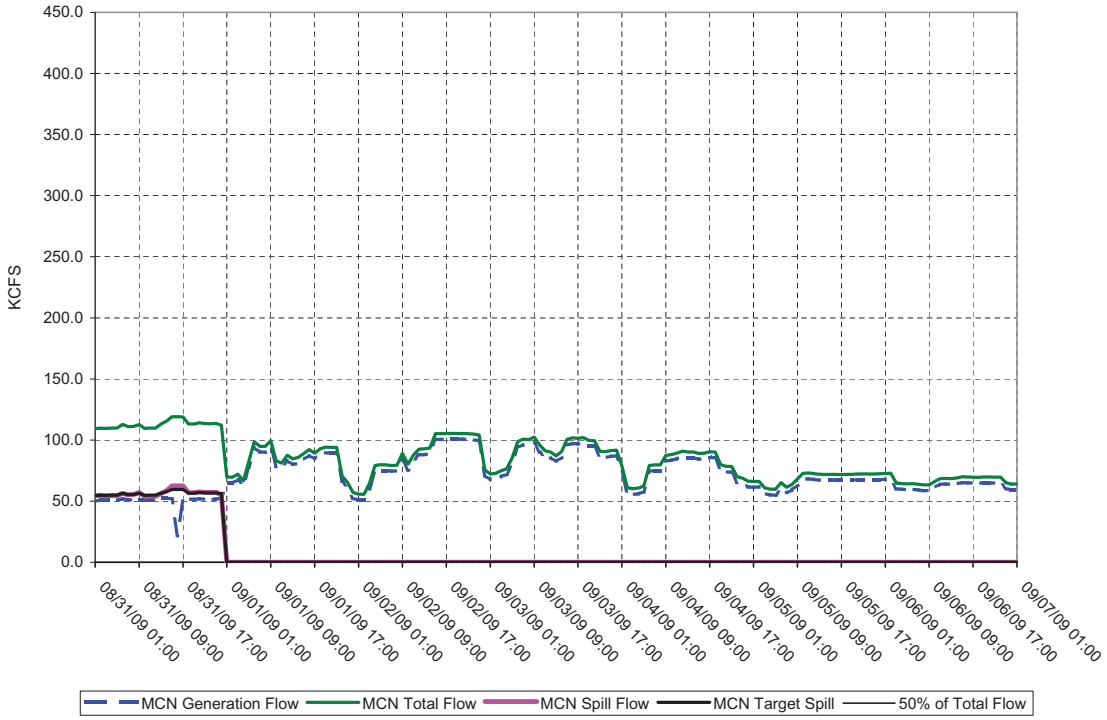
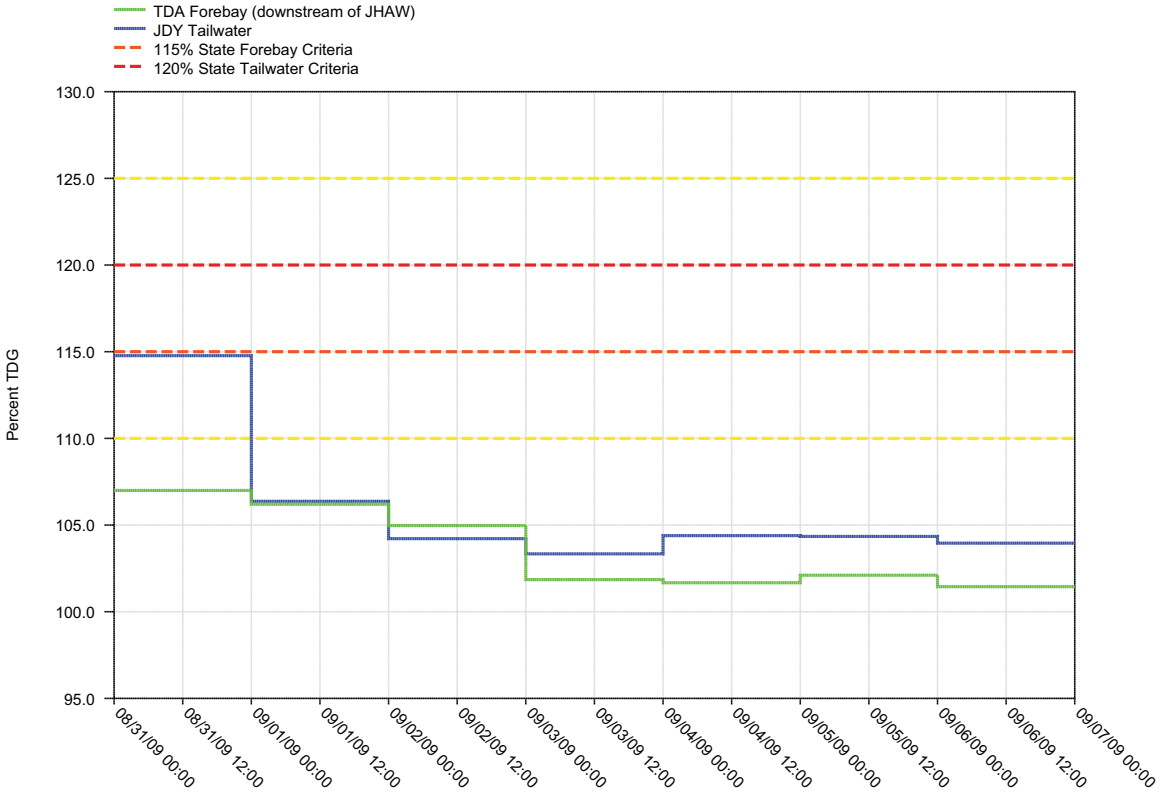


Figure 38.

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



JOHN DAY DAM - Hourly Spill and Flow

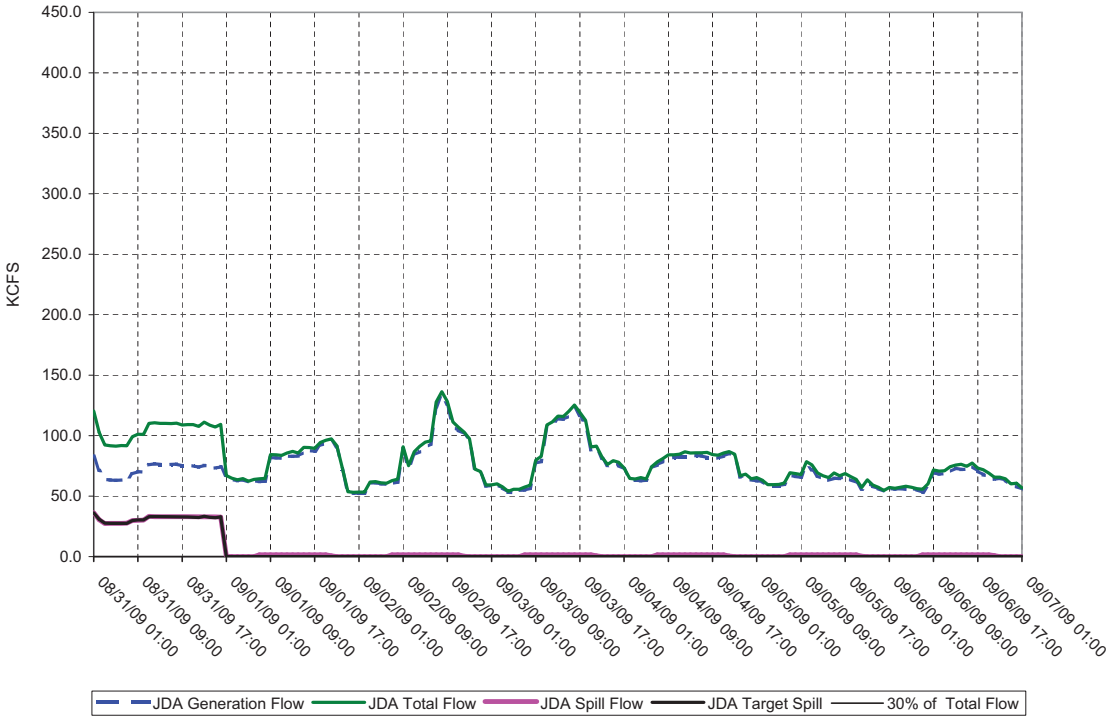
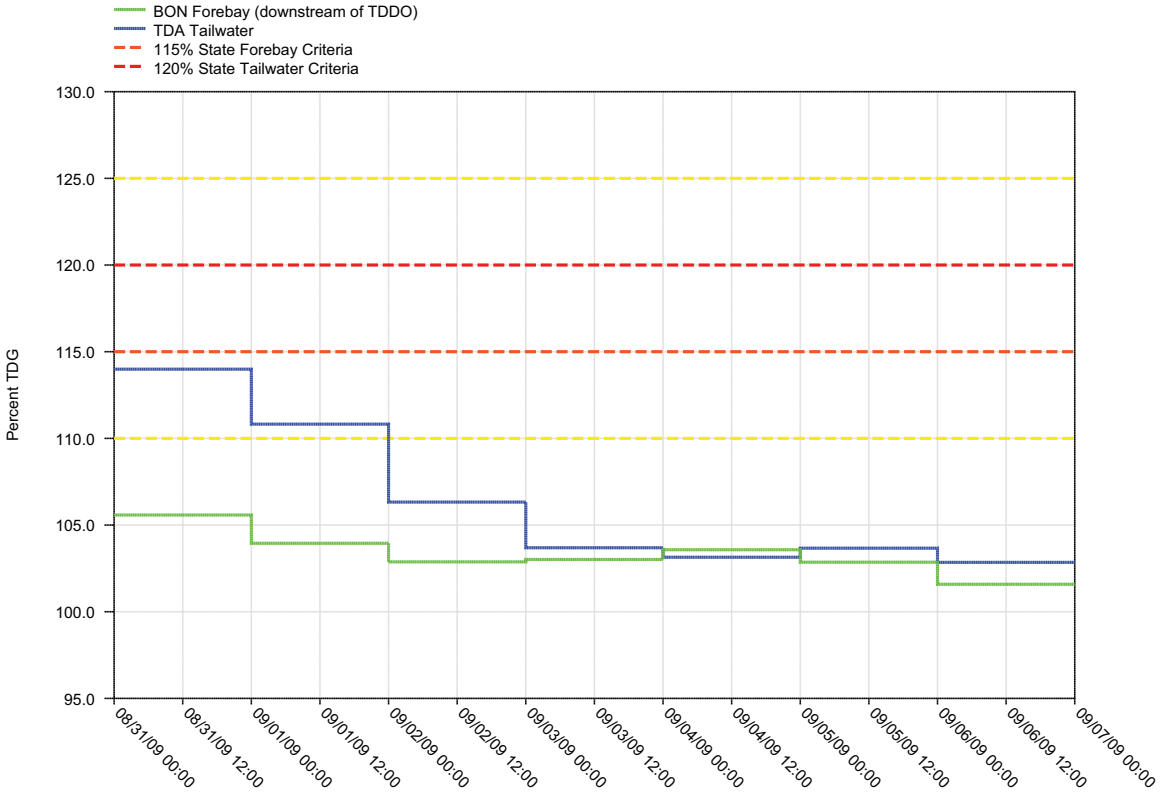


Figure 39.

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



THE DALLES DAM - Hourly Spill and Flow

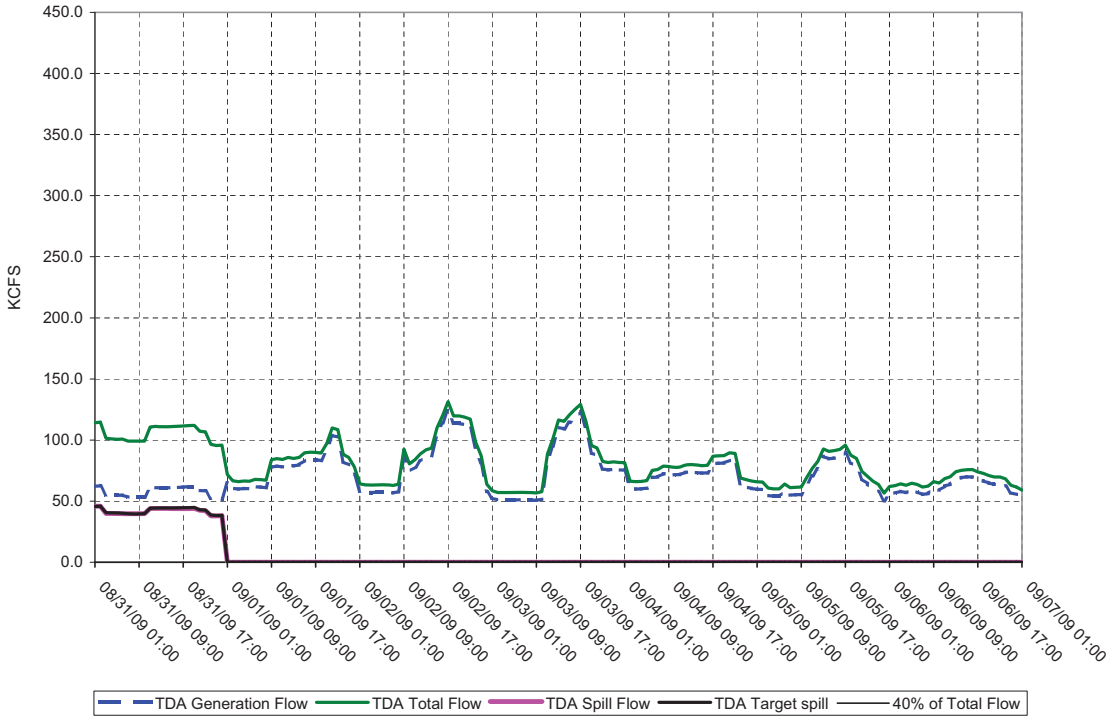
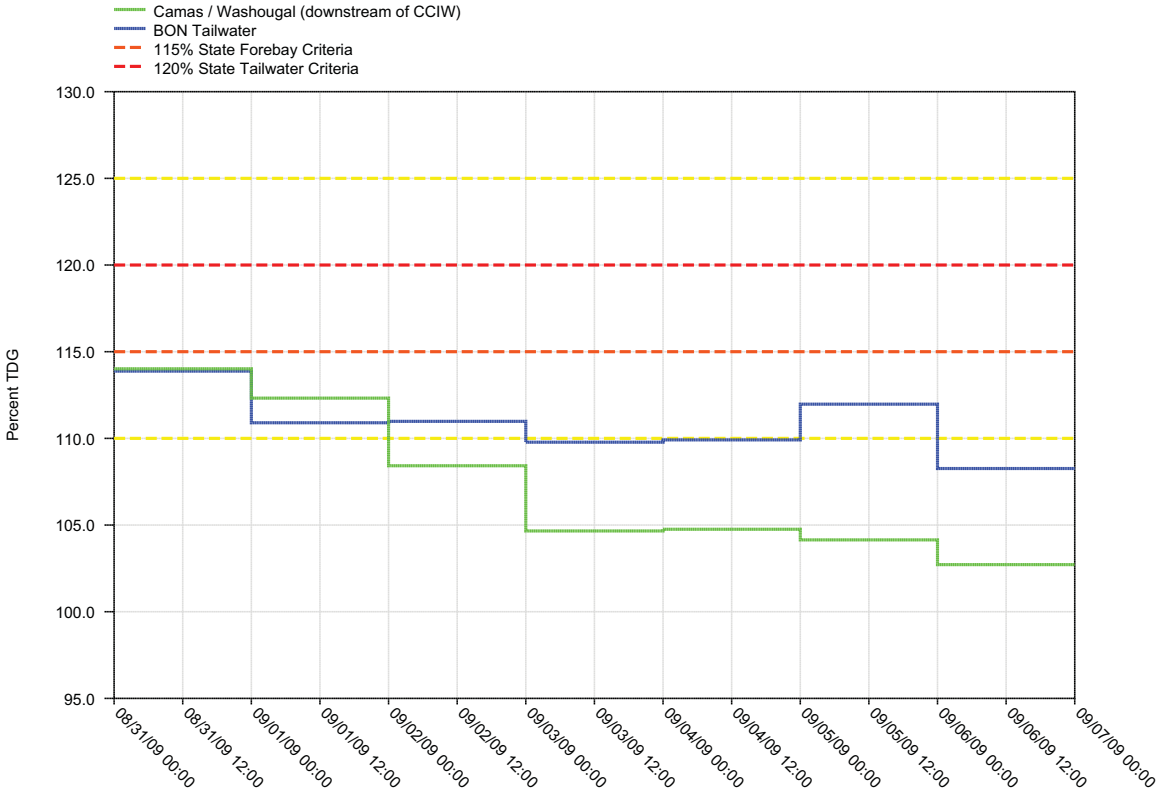
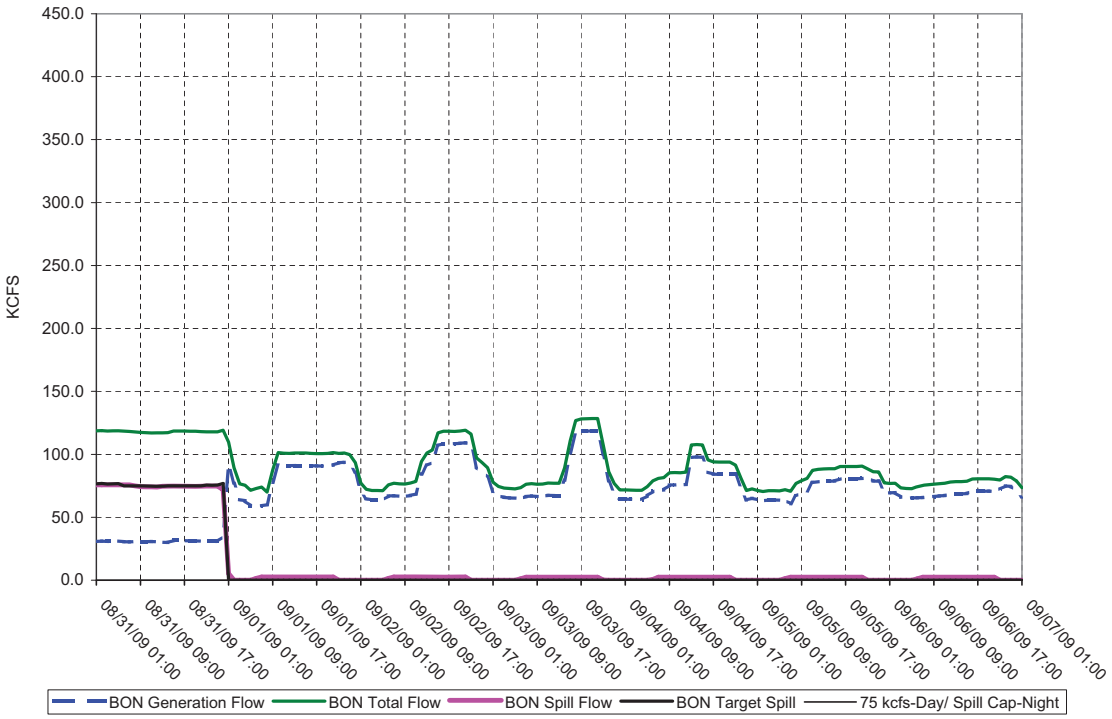


Figure 40.

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



BONNEVILLE DAM - Hourly Spill and Flow

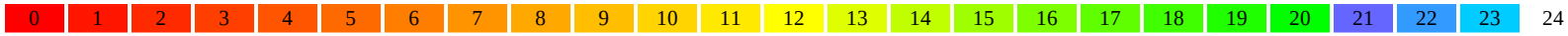


Average percent TDG for 12 highest hours: Aug 03 – Aug 31, 2009

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
08/03/2009	105.2	112.4	109.4	112.7	110.3	116.3	112.5	113.0	111.2	116.7	109.7	115.0	108.6	114.5	108.2	113.6	114.8
08/04/2009	104.9	112.0	109.1	112.8	110.2	116.3	112.5	113.0	110.7	117.0	107.6	114.6	106.9	113.4	108.6	114.5	115.2
08/05/2009	104.8	111.9	109.7	112.9	109.9	116.7	112.2	113.7	110.0	115.3	106.5	115.4	106.2	112.9	124.3	115.7	114.8
08/06/2009	104.9	112.4	108.8	112.6	109.2	116.3	112.1	113.2	107.6	115.4	105.2	114.3	105.5	112.5	104.4	115.6	111.6
08/07/2009	103.8	111.8	107.8	111.9	107.7	115.0	109.9	113.0	105.7	120.8	103.1	114.1	102.8	110.8	102.4	114.5	111.5
08/08/2009	103.0	111.8	106.3	111.6	106.2	115.5	107.8	113.2	103.6	132.0	101.1	113.8	102.0	111.0	101.0	112.3	113.6
08/09/2009	102.6	111.4	105.5	111.4	105.9	115.4	107.0	113.8	102.5	131.7	100.4	113.3	103.2	111.7	101.3	112.8	115.8
08/10/2009	101.5	114.6	105.6	111.2	105.3	115.3	106.7	113.3	102.3	138.0	99.9	113.3	104.8	112.5	102.7	112.9	115.9
08/11/2009	100.6	114.3	105.6	111.5	105.8	116.0	107.1	112.8	104.3	115.7	99.8	113.6	105.3	112.5	104.4	112.9	115.4
08/12/2009	100.7	114.5	105.8	110.9	106.3	115.8	108.2	113.0	104.5	116.1	99.8	114.1	105.4	112.4	105.3	114.2	113.9
08/13/2009	102.2	114.8	107.5	111.5	106.6	115.7	108.8	113.6	105.1	116.4	99.9	113.9	104.9	111.9	105.2	114.7	113.5
08/14/2009	101.0	114.2	107.3	111.2	106.2	115.6	108.9	112.8	104.6	116.0	99.4	112.8	103.3	110.6	103.8	112.5	111.9
08/15/2009	100.5	110.9	106.9	110.9	105.7	115.7	108.0	112.0	103.6	115.3	99.4	112.2	102.8	109.7	102.7	114.1	111.9
08/16/2009	100.2	110.8	105.8	107.6	105.2	115.9	107.8	112.5	103.5	115.3	99.6	111.9	103.4	109.3	102.3	113.7	113.1
08/17/2009	99.5	110.9	105.4	108.3	105.0	115.9	108.0	112.5	103.8	114.5	100.1	111.5	105.5	110.7	103.2	112.4	114.2
08/18/2009	99.6	111.1	105.9	112.5	106.1	115.9	108.9	113.7	105.0	115.7	101.3	114.1	107.5	113.6	105.4	112.3	116.8
08/19/2009	100.3	111.1	106.2	113.0	107.4	116.0	110.6	114.0	107.2	117.0	102.1	114.0	108.4	114.8	108.1	114.9	117.5
08/20/2009	101.1	110.9	106.2	112.8	107.4	115.6	112.0	114.4	108.4	116.7	105.9	114.5	108.4	114.5	108.7	115.3	116.1
08/21/2009	101.9	110.2	107.5	112.6	106.1	115.6	112.2	114.2	108.1	117.0	102.5	112.8	105.9	112.6	107.3	114.6	111.5
08/22/2009	102.8	111.1	108.2	113.5	108.0	116.0	113.0	114.2	108.8	117.5	102.9	113.0	104.6	112.2	105.3	115.7	114.4
08/23/2009	103.2	111.1	108.4	113.3	109.2	115.9	113.2	114.1	109.2	117.2	102.4	112.8	105.0	111.5	104.1	114.8	112.6
08/24/2009	103.0	111.3	108.7	113.2	108.7	115.9	112.5	112.8	107.4	116.4	103.0	113.0	104.2	112.1	103.8	113.0	114.3
08/25/2009	103.2	113.6	107.7	112.7	108.7	113.5	111.7	111.6	107.4	117.0	102.3	111.3	106.1	112.0	103.1	112.4	113.7
08/26/2009	101.7	112.2	107.0	112.7	108.8	115.0	111.5	111.7	105.5	117.5	102.5	113.7	105.4	112.7	104.5	112.7	114.6
08/27/2009	101.0	112.0	106.9	111.7	109.3	116.0	111.4	113.3	106.1	116.6	102.4	114.5	107.6	114.1	105.6	113.1	115.2
08/28/2009	101.6	112.0	107.5	112.1	109.8	115.7	111.8	113.2	104.5	116.6	102.3	113.8	107.1	113.9	106.8	113.1	114.7
08/29/2009	100.7	109.9	108.3	111.5	108.4	114.7	111.2	112.8	103.8	116.4	102.1	114.3	104.9	112.8	106.0	113.0	113.6
08/30/2009	101.6	110.8	108.5	111.8	110.1	114.8	111.1	111.6	105.3	116.2	102.9	114.3	105.8	113.3	106.0	113.6	114.7
08/31/2009	102.9	110.3	108.0	111.1	109.7	113.8	111.3	111.4	105.3	115.3	103.8	114.8	107.0	114.0	105.6	113.9	114.0

Generated: Tue Sep 1 23:25:23 2009

Number of hours of data reported in a given day



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