FISH OPERATIONS PLAN IMPLEMENTATION REPORT
May 2015

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 2015 Fish Operations Plan (2015 FOP) posted to the TMT website on March 1, 2015. The 2015 FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring and summer fish migration season, generally April through August. To the extent Corps project operations are not specified in the 2015 FOP, the FCRPS operations will be consistent with the 2014 NOAA Fisheries Supplemental Biological Opinion (2014 Supplemental BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2015 Water Management Plan (WMP), WMP seasonal updates, and the 2015 Fish Passage Plan (FPP).

The Corps' May 2015 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
- Daily average Total Dissolved Gas (TDG) levels (percent of saturation) in the tailwater at each project, and in the subsequent downstream project's forebay.[1]

This report also provides information on presented issues and unanticipated or emergency situations that arose during implementation of the 2015 FOP in May 2015.

Data Reporting

I. For each project providing fish passage operations, this report contains two figures per operational week[2] in May displaying the performance of the fish passage spill program as follows:

(A) Average % TDG Values - displayed in the upper figure.
(B) Hourly Spill and Generation Flows - described in the lower figure.

[1] Averages reported are consistent with the current and applicable Oregon TDG standard modification (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG standard modification and the Washington TDG criteria adjustments have different methodologies for calculating TDG. When the standards vary or conflict, the Corps applies the more stringent standard.
[2] Operations are implemented from Monday through Sunday.

The weekly figures begin on April 27 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.

Each figure represents one week of a project's operation. The figures start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill figures) on April 27 for the lower Snake River and the lower Columbia River projects.

April 27 – May 3	Figures 1 – 8
May 4 – May 10	Figures 9 – 16
May 11 – May 17	Figures 17 – 24
May 18 – May 24	Figures 25 – 32
May 25 – May 31	Figures 33 – 40

A. Upper Figure: Displays the daily average %TDG for the Corps' lower Snake River and lower Columbia River projects. The Corps' objective is to operate each project in accordance with the spill levels in the 2015 FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the observed percent TDG in the tailwater of the dam using the Oregon 120 %TDG standard calculated with the high 12-hour average.[1] Applies only to figures which include the lower Columbia dams.
2. The blue dot-dash line represents the observed percent TDG in the tailwater of the dam using the Washington 120 %TDG standard calculated with the high 12-hour average.[1]
3. The black solid line represents the observed percent TDG in the forebay of the next dam downstream using the Washington 115 %TDG standard calculated with the high 12-hour average.[1]

B. Lower Figure: Displays the hourly flow and spill at each dam.

- The dashed blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The heavy grey line represents the average hourly total project outflow in kcfs.
- The dotted pink line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2015 FOP.
- The heavy green line represents the target spill. This is the hourly maximum spill level. The hourly target spill may vary as a function of total project outflow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2015 FOP;
    - spill caps as set daily for TDG management;
    - test spill levels for fish passage research;
    - minimum generation for power system needs;
    - minimum spill at Bonneville Dam (50 kcfs);
    - minimum spill at John Day (25% of project outflow).

II. A table is included at the end of the figures that lists the average daily %TDG for all projects. The numbers in red indicate the project exceeded the %TDG cap -- i.e.115% (forebay of the next downstream dam) or 120% (tailwater) for each project. For the lower Columbia projects, tailwater TDG values are presented by displaying the highest value %TDG (controlling limit), and the lower value is displayed with a strikethrough.

General Implementation Remarks

For all projects that spill for fish passage, the actual spill may vary from the target spill due to various conditions as described below. When spill levels briefly deviate below or above the level specified in the 2015 FOP, the dotted pink line will be below or above the heavy green line in the figures. Actual deviations from the target operation during voluntary spill hours are described below in the May 2015 Spill Variance Table.[3] The Spill Variance Table includes average hourly data; therefore, while spill may vary from target FOP spill for only a portion of an hour, the Spill Variance Table characterizes the variance as a full hour. There are instances when the hourly FOP 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 2015 FOP level of spill while also avoiding exceeding the %TDG spill cap to the extent practicable.

"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 pass the remainder of project inflow as spill and through other routes, such as fish ladders, sluiceways, and navigation locks. 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 when 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 overall project spill percentage appears to be reduced because the calculations do not account for the volume of water released during navigational lockages; however, the actual spill volume remains constant. When these variances occur, they are recorded in the monthly Spill Variance Table for Little Goose under the variance type "Navigation."

Actual spill levels at Corps projects with set flow targets may vary up to ±2 kcfs within the hour

[3] Involuntary spill conditions appear in the figures, but are not considered variances and are not reported in the Spill Variance Table. Involuntary spill conditions result from lack of load, high river inflows that exceed available powerhouse capacity, scheduled or unscheduled turbine unit outages or transmission outages of various durations, passing debris, or any other operational and/or maintenance activities required to manage dam facilities for safety and authorized project uses.

(except as otherwise noted in the 2015 FOP for Bonneville and The Dalles dams[4], which may range up to ±3 kcfs) as compared to those specified in the 2015 FOP and the RCC spill priority list (defining the project %TDG spill caps). A number of factors influence actual spill, including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (e.g. a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

The 2015 FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Table replaces "Rapid Load Changes," and identifies instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. "Transmission Stability" occurs because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Corporation (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be responsive to within hour changes resulting 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 primarily occur immediately preceding and following the peak load hours; however, within-hour changes in intermittent generation can occur at any hour of the day. Occasionally, 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, reporting actual spill percentages that vary by more than the ±1 percent within hour requirement (or other ranges specified in the 2015 FOP) may occur with greater frequency with "Transmission Stability" hours than other hours.

Occurrences requiring an adjustment in operations and/or regional coordination are described in greater detail in the "Operational Adjustments" section below.

May 2015 Operations

The month of May was characterized by well below average flows for both the lower Snake and the lower Columbia rivers. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the May 2015 adjusted volume runoff on the lower Snake River was below the 30 year average (1981-2010): 4.2 MAF (Million Acre Feet) or 61% of average as measured at Lower Granite Dam. For the lower Columbia, the Runoff Processor indicated the May 2015 adjusted volume runoff was below the 30 year average (1981-2010): 18.3 MAF or 72% of average as measured at The Dalles. The monthly precipitation summary for May was above average at 129% on the Snake River above Ice Harbor Dam and average on the Columbia River above The Dalles Dam at 97% due to thunderstorm activity in the southern part of the Columbia Basin during the month.

[4] As specified in the 2015 FOP (p. 14), this applies when the spill level is below 40% of total flow at The Dalles Dam.

During the May 2015 reporting period, the planned 2015 FOP spill operations were carried out as follows:

- Lower Granite Dam - The hourly target spill level was 20 kcfs, 24 hours/day.
- Little Goose Dam - The hourly target spill level was 30% of total project outflow, 24 hours/day.
- Lower Monumental Dam - The hourly target spill level was the %TDG cap, 24 hours/day.
- Ice Harbor Dam - The hourly target spill level was 45 kcfs during the day and the %TDG cap at night. Starting on April 28 at 0500 hours, the hourly target spill level alternated between 30% of total project outflow, 24 hours/day vs. 45 kcfs during the day and the% TDG cap during the nighttime.spill hours (1800-0500).[5]
- McNary Dam - The hourly target spill level was 40% of total project outflow, 24 hours/day.
- John Day Dam - The hourly target spill level alternated every two days between 40% and 30% of total project outflow, 24 hours/day. Spill level changes occurred at 2000 hours.
- The Dalles Dam - The hourly target spill level was 40% of total project outflow, 24 hours/day.
- Bonneville Dam - The hourly target spill level was 100 kcfs, 24 hours/day.

Operational Adjustments

No Operational Adjustments to report.

[5] As noted in the April report, spill operation treatments were rearranged at Ice Harbor to accommodate a post-construction evaluation of modifications made to spillbay 2 to improve juvenile fish passage survival. Due to this spill operation rearrangement, the hourly target spill level of 45 kcfs during the day and the %TDG cap at night continued up until May 8. Starting on May 8 at 0500 hours, the hourly target spill level alternated every two days between 30% of total project outflow, 24 hours/day vs. 45 kcfs during the day and the %TDG cap at night. Night spill hours are 1800-0500. This evaluation is described in FPP Appendix A, and the rearrangement of spill operation treatments was further coordinated through the FPOM on April 9.

May 2015 Spill Variance Table

Table 1: May 2015 (4/27 – 5/31) – FOP Implementation Report Table

Project	Parameter	Date	Time [6]	Hours	Type	Reason
Little Goose	Reduced Spill	5/2/15	1500	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 29.7%.
Little Goose	Reduced Spill	5/4/15	0500	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 29.7%.
Lower Monumental	Reduced Spill	5/2/15	2000-2100	2	Navigation	Hourly spill decreased to 15.2 and 19.5 kcfs (below 26 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/3/15	1900-2000	2	Navigation	Hourly spill decreased to 20.1 and 21.2 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/4/15	1800-2000	3	Navigation	Hourly spill decreased to 17.5, 17.6 and 18.0 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/5/15	1900-2000	2	Navigation	Hourly spill decreased to 12.8 and 20.0 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/6/15	1700-1900	3	Navigation	Hourly spill decreased to 11.5, 21.3 and 23.1 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/8/15	1400	1	Human/Program Error	Hourly spill decreased to 21.4 kcfs (below 24 kcfs ±2 kcfs range) due to spill control software program losing contact with the spillway.
Lower Monumental	Reduced Spill	5/8/15	1800-2000	3	Navigation	Hourly spill decreased to 18.1, 18.4 and 21.5 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/9/15	1800	1	Navigation	Hourly spill decreased to 9.7 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

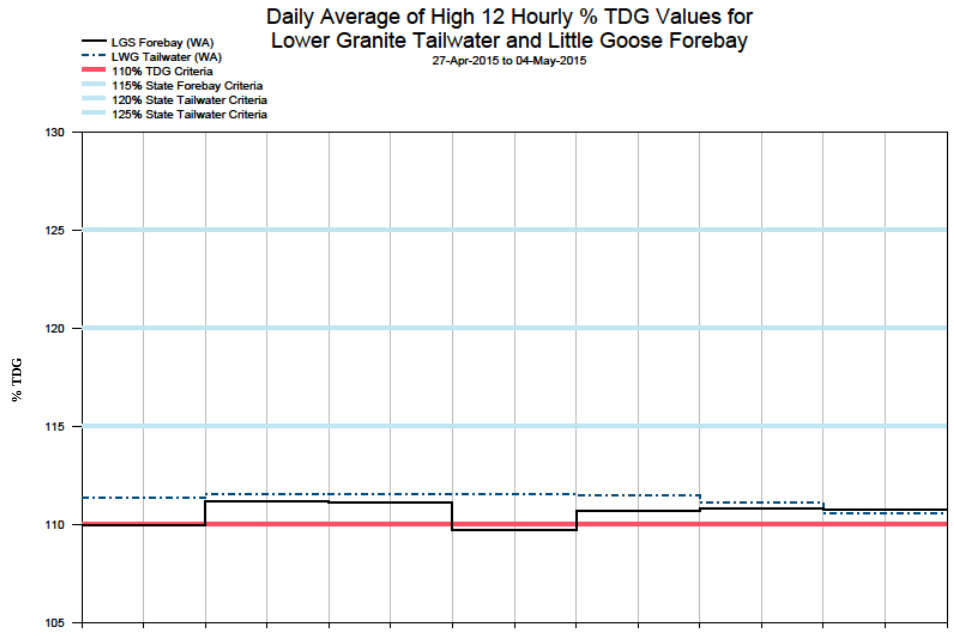
[6] Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Spill Variance Table as an hour.

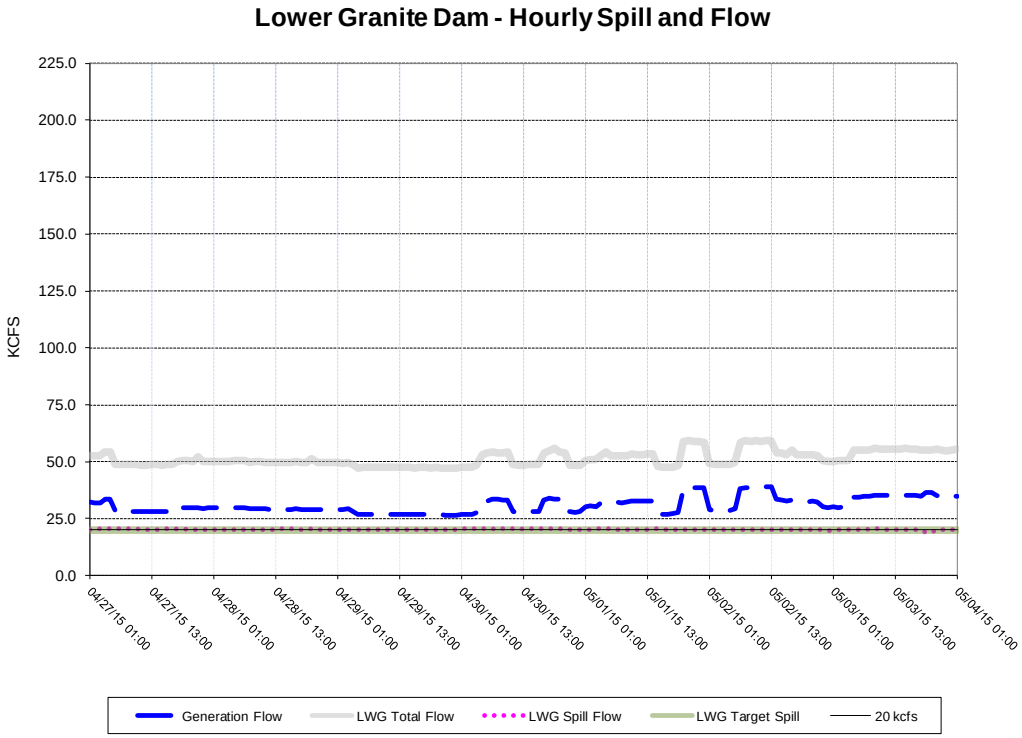
Project	Parameter	Date	Time [6]	Hours	Type	Reason
Lower Monumental	Reduced Spill	5/10/15	1800-2000	3	Navigation	Hourly spill decreased to 17.9, 18.2 and 21.0 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/11/15	1700-1900	3	Navigation	Hourly spill decreased to 16.1, 17.4 and 21.0 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/12/15	1900-2000	2	Navigation	Hourly spill decreased to 14.8 and 20.8 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/13/15	1800-1900	2	Navigation	Hourly spill decreased to 15.4 and 21.4 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/14/15	1900-2000	2	Navigation	Hourly spill decreased to 14.3 and 19.1 kcfs (below 25 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/15/15	1800-1900	2	Navigation	Hourly spill decreased to 13.8 kcfs for both hours (below 27 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/16/15	1900	1	Navigation	Hourly spill decreased to 18.4 kcfs (below 27 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/17/15	1800-1900	2	Navigation	Hourly spill decreased to 20.0 and 22.6 kcfs (below 27 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/18/15	1800-2000	3	Navigation	Hourly spill decreased to 18.6, 22.2 and 24.2 kcfs (below 27 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/19/15	1800-1900	2	Navigation	Hourly spill decreased to 19.5 and 23.1 kcfs (below 27 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/20/15	1800-1900	2	Navigation	Hourly spill decreased to 12.6 and 19.9 kcfs (below 25 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/21/15	1900-2000	2	Navigation	Hourly spill decreased to 13.1 and 20.2 kcfs (below 25 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

Project	Parameter	Date	Time [6]	Hours	Type	Reason
Lower Monumental	Reduced Spill	5/22/15	1800-1900	2	Navigation	Hourly spill decreased to 13.8 and 17.7 kcfs (below 23 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/24/15	1700-1800	2	Navigation	Hourly spill decreased to 21.4 and 14.1 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/26/15	1700-1800	2	Navigation	Hourly spill decreased to 12.5 and 19.7 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/28/15	1800-1900	2	Navigation	Hourly spill decreased to 12.5 and 16.6 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/30/15	1800-1900	2	Navigation	Hourly spill decreased to 15.0 and 18.4 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Ice Harbor	Reduced Spill	4/29/15	0200	1	Operational Limitation	Hourly spill of 37.4 kcfs was 2.5 kcfs below FOP minimum generation spill, while generation levels drifted above minimum range for Unit 1 (8.2-10.0 kcfs) to 10.1 kcfs. See FOP p. 3.
Ice Harbor	Reduced Spill	5/11/15	0400	1	Navigation	Hourly spill decreased to 28.8% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 29.7%.
Ice Harbor	Reduced Spill	5/11/15	0900-1000	2	Navigation	Hourly spill decreased to 28.8 and 28.9 % (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 29.7%.
Ice Harbor	Reduced Spill	5/12/15	0900	1	Operational Limitation	Hourly spill remained at 40.0 kcfs (below FOP 45 kcfs ±2 kcfs) while generation levels drifted above minimum range for Unit 1 (8.2-10.0 kcfs) to 10.1 kcfs. See FOP p. 3.
Ice Harbor	Reduced Spill	5/20/15	2200	1	Navigation	Hourly spill decreased to 28.7 % (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 40.7%.

Project	Parameter	Date	Time [6]	Hours	Type	Reason
Ice Harbor	Reduced Spill	5/26/15	0100	1	Navigation	Hourly spill decreased to 28.9 % (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. 24 hr avg. spill was 29.8%.
McNary	Additional Spill	4/28/15	0700	1	Transmission Stability	Hourly spill increased to 43.6% (above 40.0% ±1% range) due to an unexpected transmission line outage. 24 hr avg. spill was 40.1%.
John Day	Additional Spill	5/11/15	1700	1	Transmission Stability	Hourly spill increased to 31.1% (above 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see FOP p. 3-4).
John Day	Reduced Spill	5/12/15	1100-1200	2	Transmission Stability	Hourly spill decreased to 38.6 and 36.4% (below 40.0% ±1% range). FCRPS response to loss of regional generation. John Day and The Dalles were allocated more load for part of the hour to assure system reliability. 24 hr avg. spill was 39.7%.
John Day	Reduced Spill	5/16/15	0600	1	Human/Program Error	Hourly spill decreased to 38.5% (below 40.0% ±1% range). Delay in changing spill to requested 80 kcfs. 24 hr avg. spill was 39.8%.
The Dalles	Reduced Spill	5/12/15	1100	1	Transmission Stability	Hourly spill decreased to 38.5% (below 40.0% ±1% range). FCRPS response to loss of regional generation. John Day and The Dalles were allocated more load for part of the hour to assure system reliability. 24 hr avg. spill was 40.1%.
The Dalles	Additional Spill	5/14/15	2300	1	Transmission stability	Hourly spill increased to 41.2% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24 hr avg. spill was 40.0%.
The Dalles	Additional Spill	5/22/15	2100	1	Transmission stability	Hourly spill increased to 41.1% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24 hr avg. spill was 39.9%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
27-Apr-2015 to 04-May-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105


Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/27/15 01:00
04/27/15 13:00
04/28/15 01:00
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04/30/15 01:00
04/30/15 13:00
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05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
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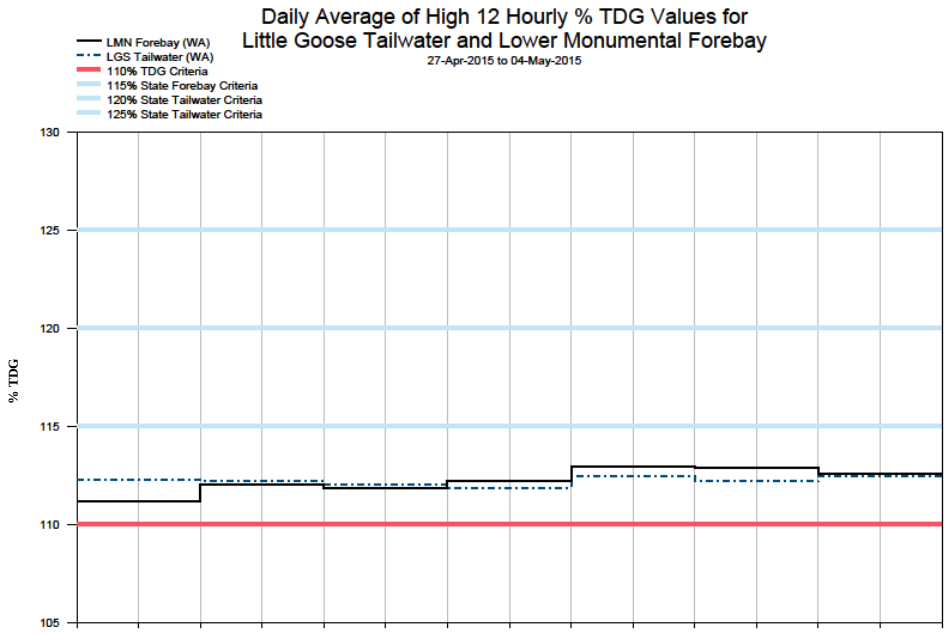
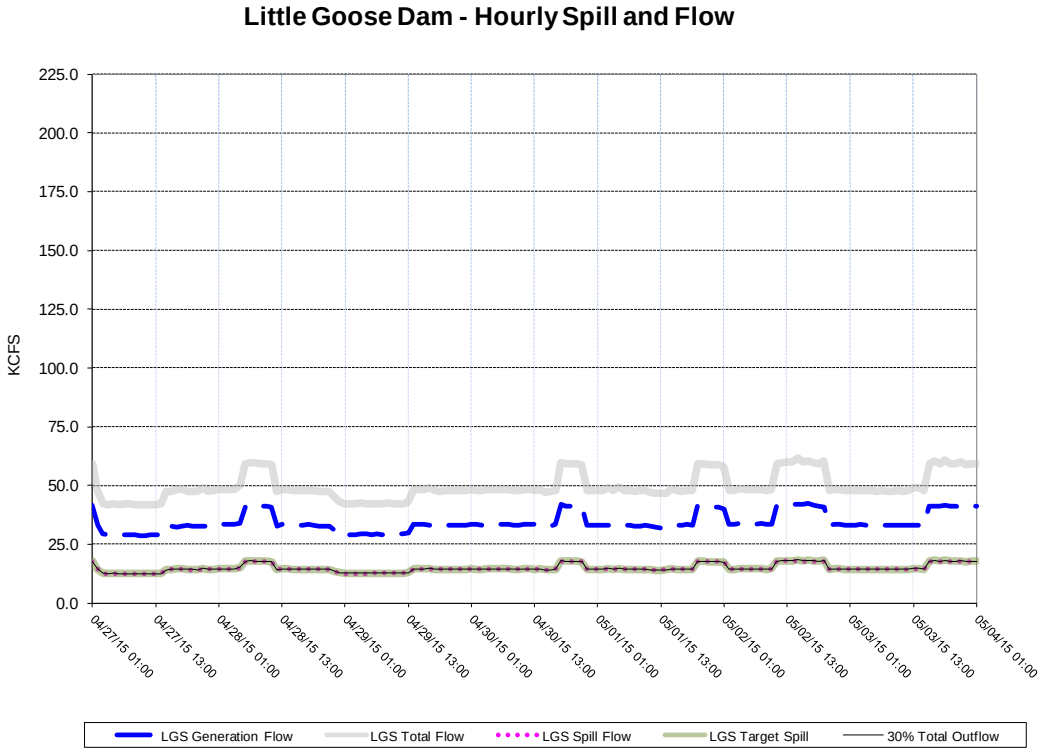
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 2


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
27-Apr-2015 to 04-May-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105


Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
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04/27/15 01:00
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05/01/15 13:00
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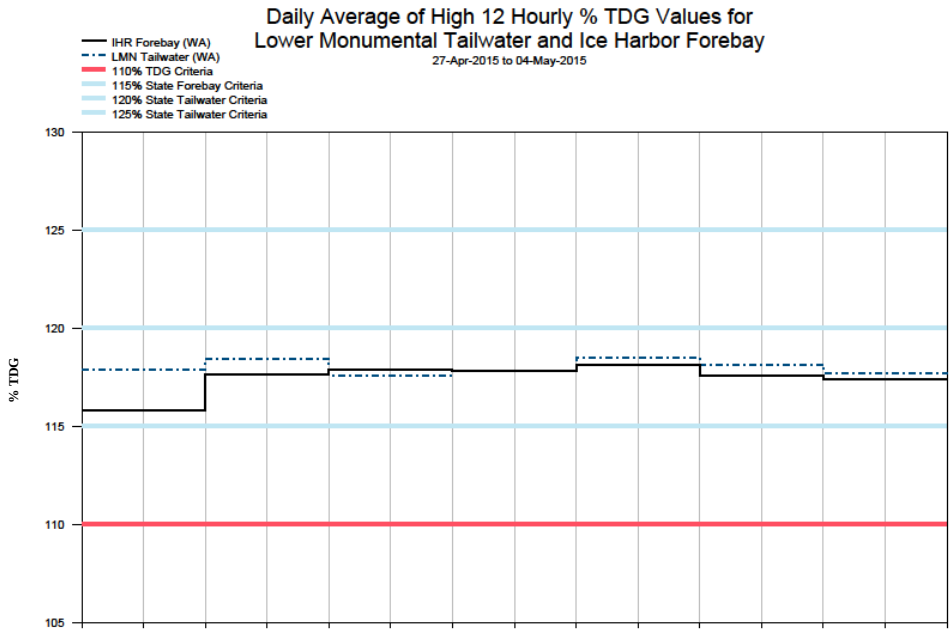
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
27-Apr-2015 to 04-May-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
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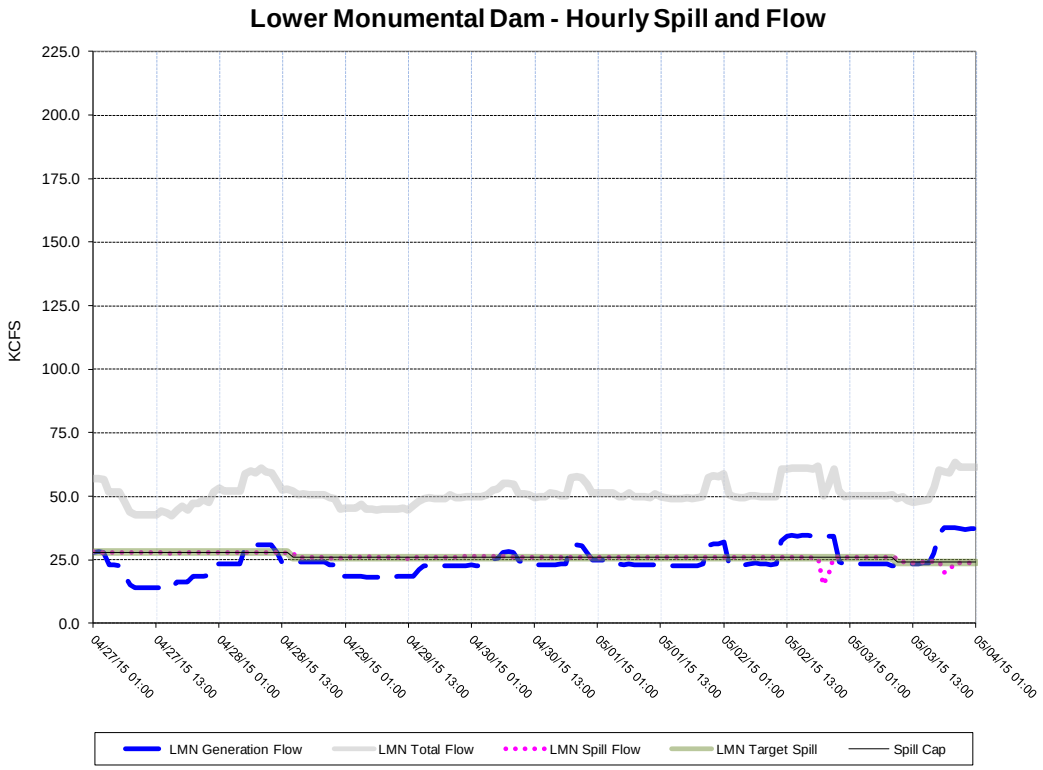
125
120
115
110
105


Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
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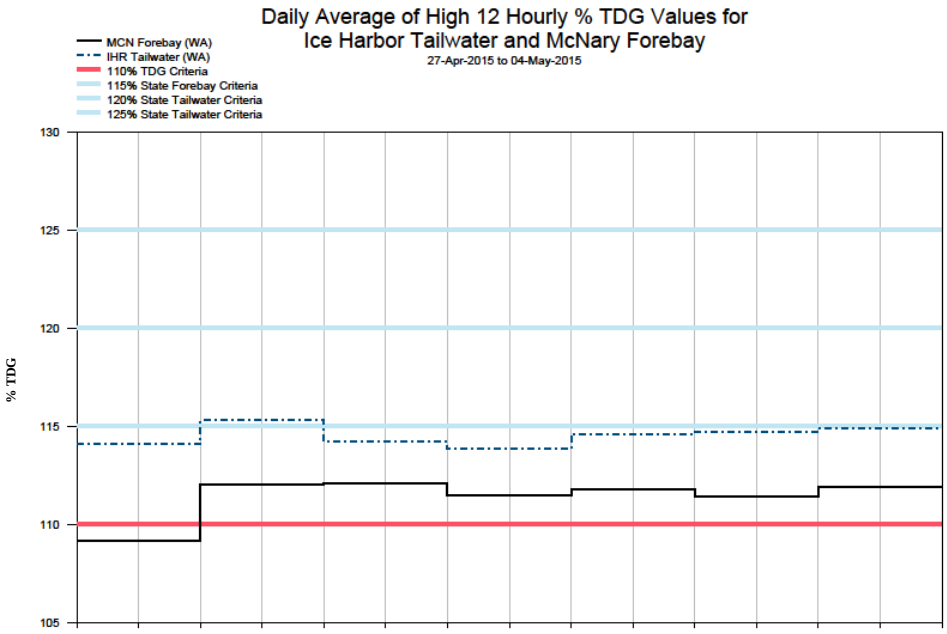
05/01/15 13:00
05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 4


Daily Average of High 12 Hourly % TDG Values for
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MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

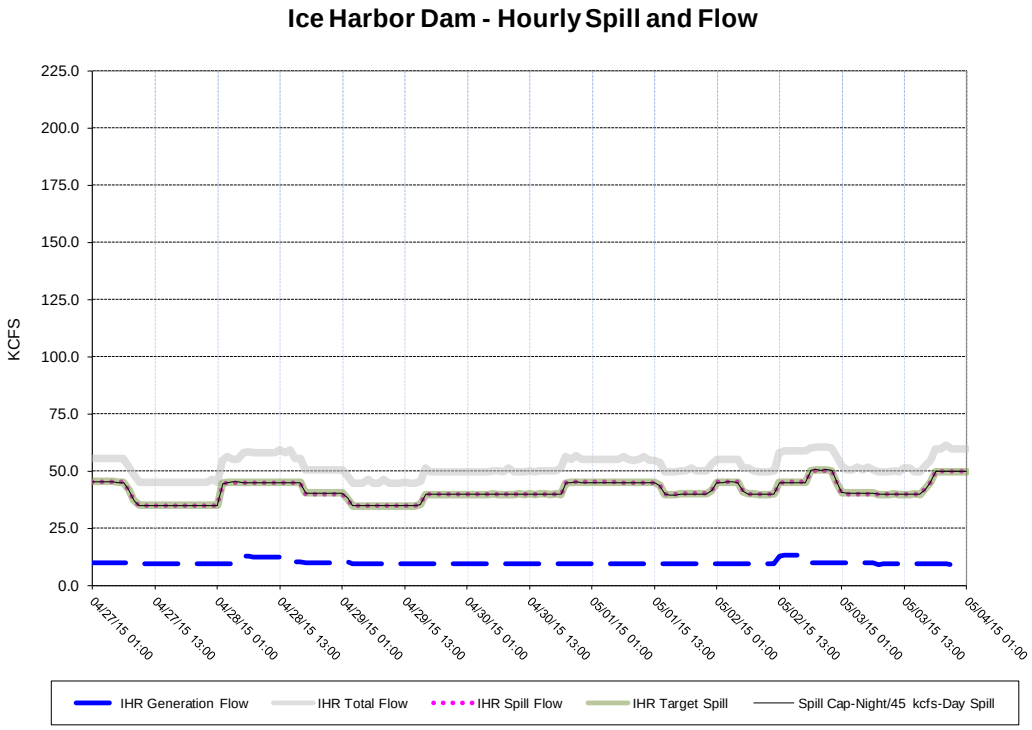
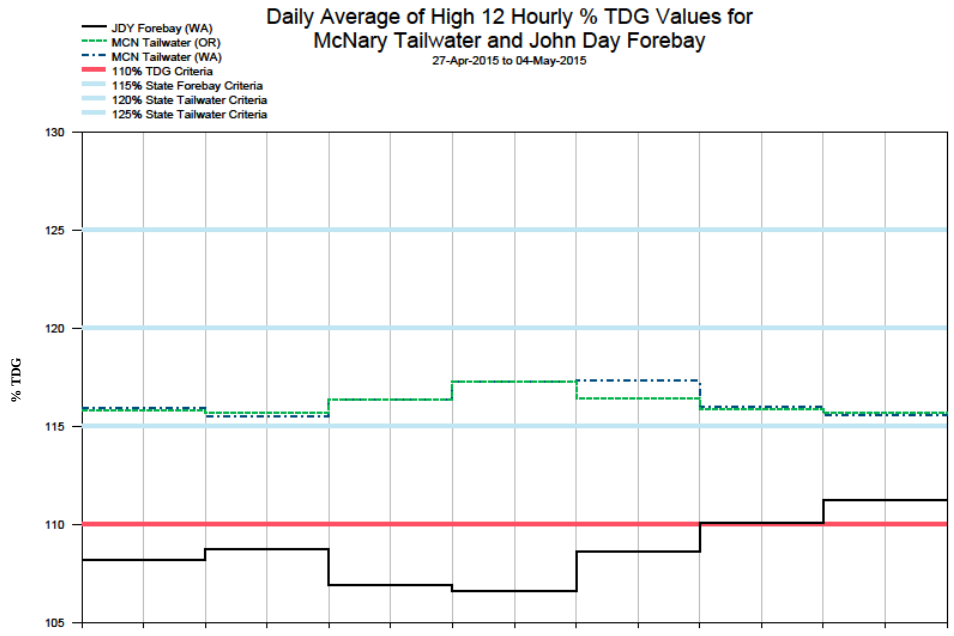

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/27/15 01:00
04/27/15 13:00
04/28/15 01:00
04/28/15 13:00
04/29/15 01:00
04/29/15 13:00
04/30/15 01:00
04/30/15 13:00
05/01/15 01:00
05/01/15 13:00
05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
27-Apr-2015 to 04-May-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

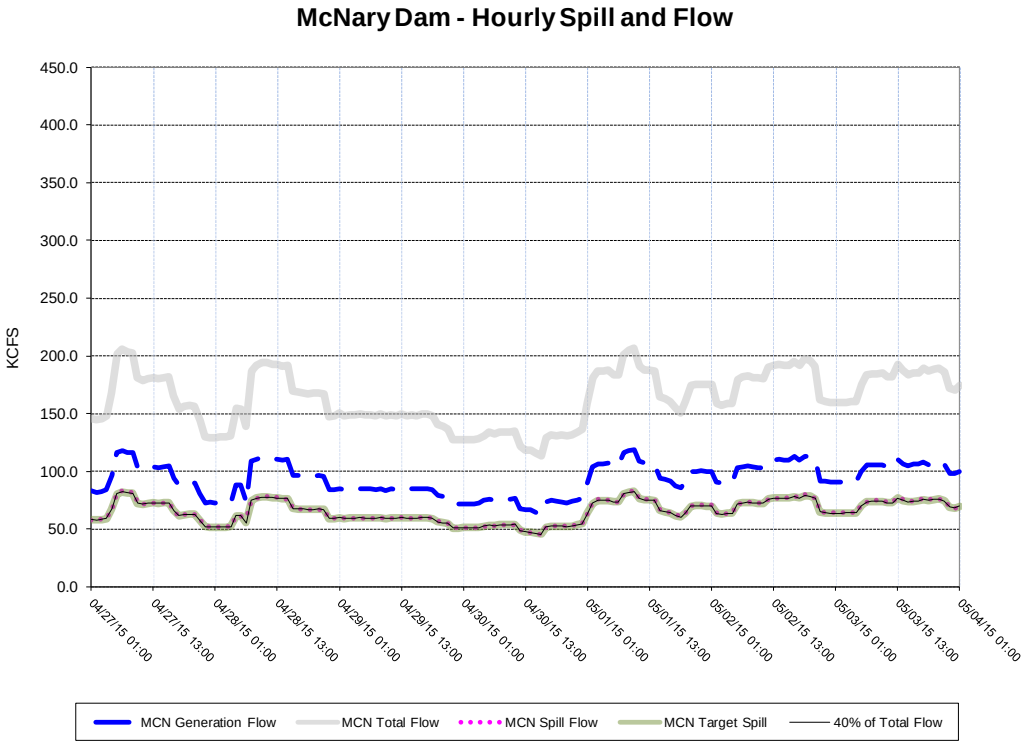
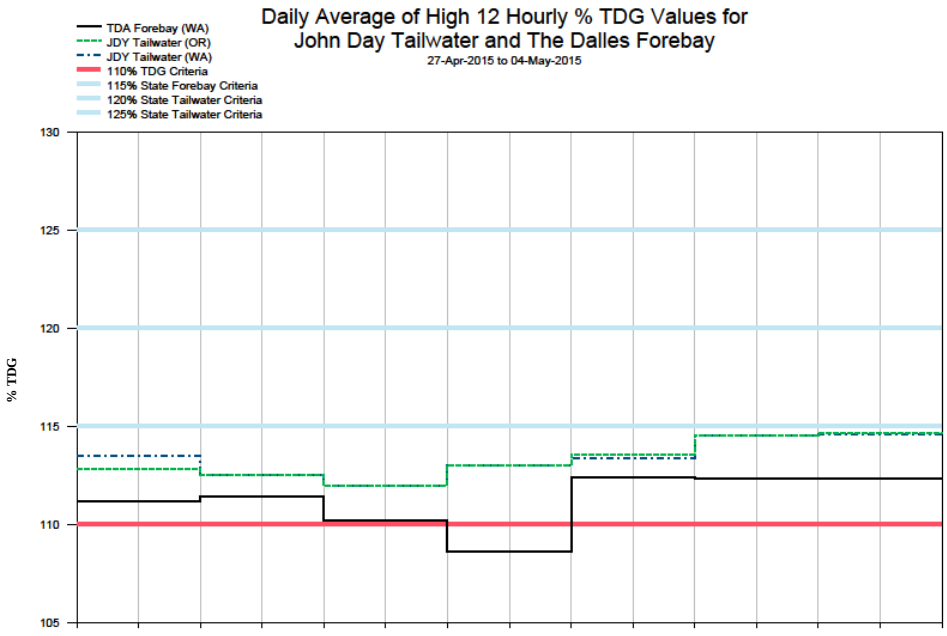

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/27/15 01:00
04/27/15 13:00
04/28/15 01:00
04/28/15 13:00
04/29/15 01:00
04/29/15 13:00
04/30/15 01:00
04/30/15 13:00
05/01/15 01:00
05/01/15 13:00
05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 6


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
27-Apr-2015 to 04-May-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

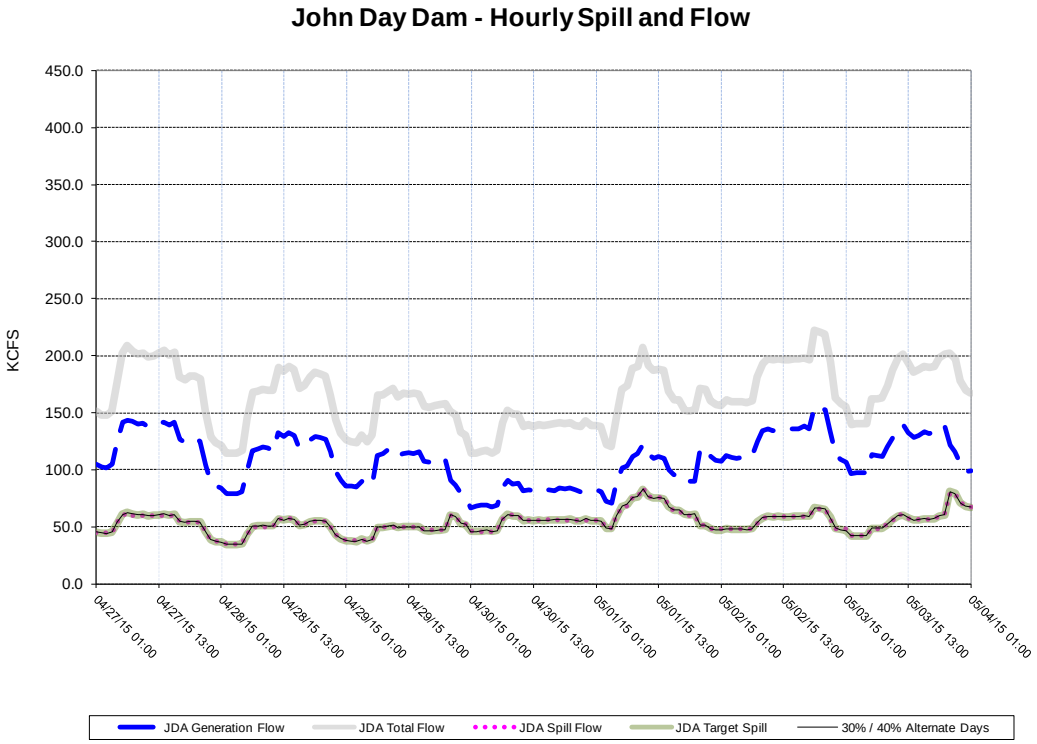
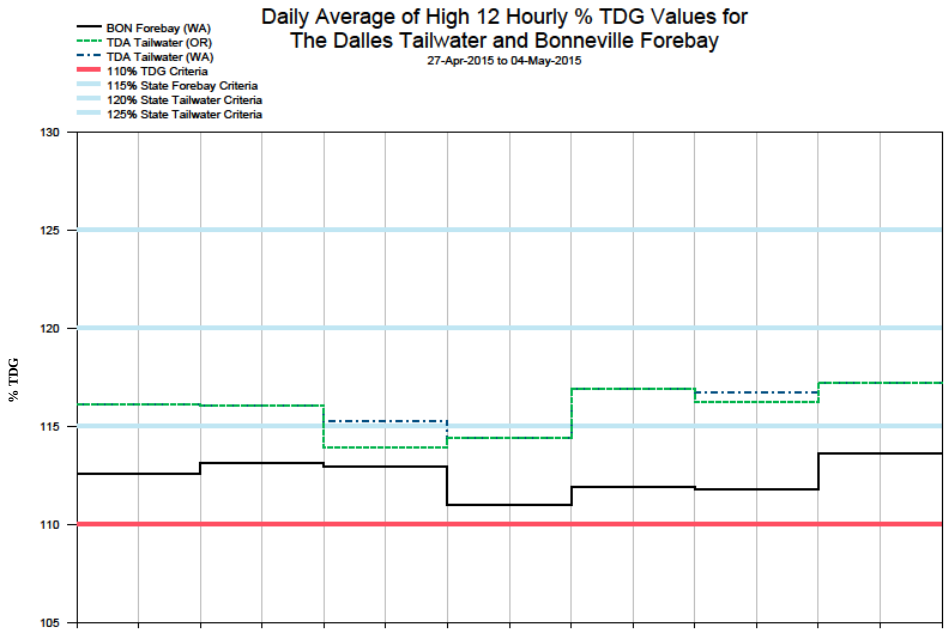

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/27/15 01:00
04/27/15 13:00
04/28/15 01:00
04/28/15 13:00
04/29/15 01:00
04/29/15 13:00
04/30/15 01:00
04/30/15 13:00
05/01/15 01:00
05/01/15 13:00
05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% / 40% Alternate Days

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
27-Apr-2015 to 04-May-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

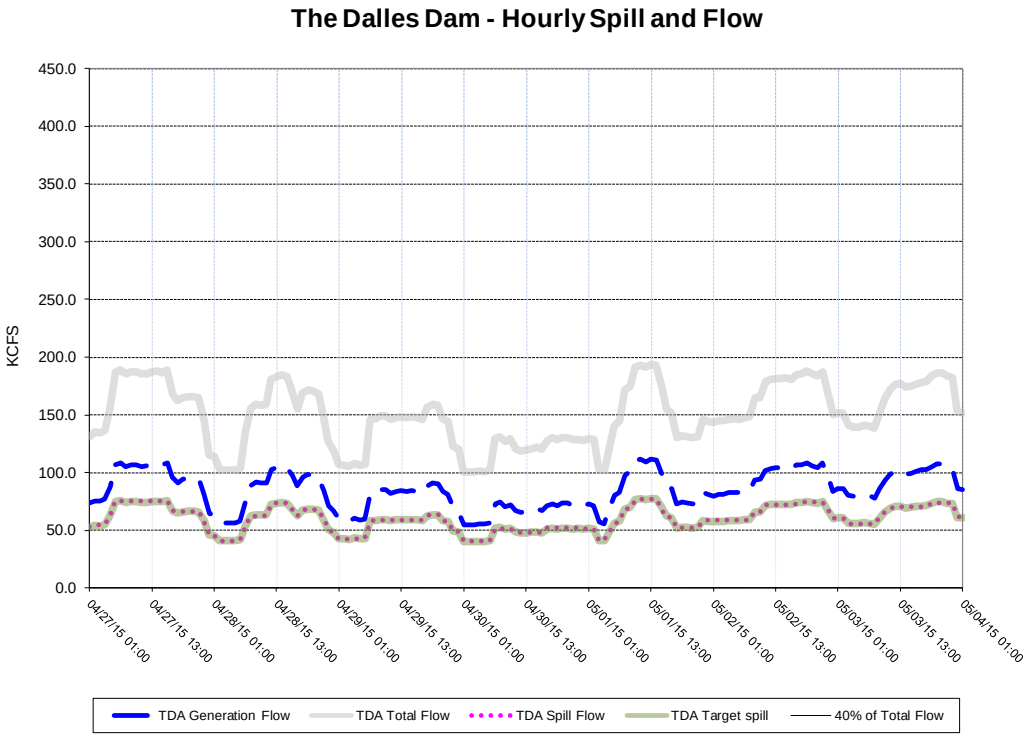
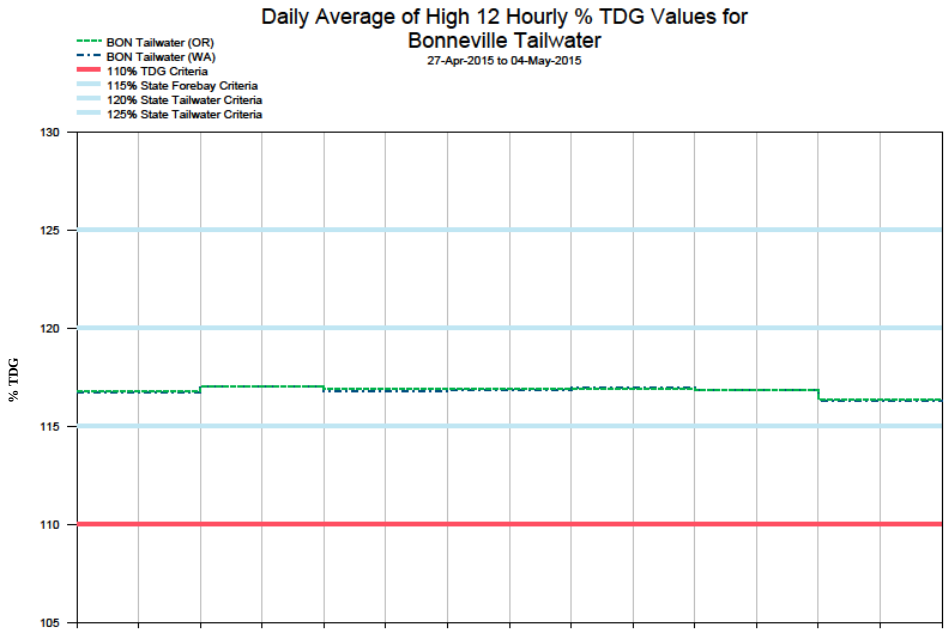

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/27/15 01:00
04/27/15 13:00
04/28/15 01:00
04/28/15 13:00
04/29/15 01:00
04/29/15 13:00
04/30/15 01:00
04/30/15 13:00
05/01/15 01:00
05/01/15 13:00
05/02/15 01:00
05/02/15 13:00
05/03/15 01:00
05/03/15 13:00
05/04/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 8


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
27-Apr-2015 to 04-May-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

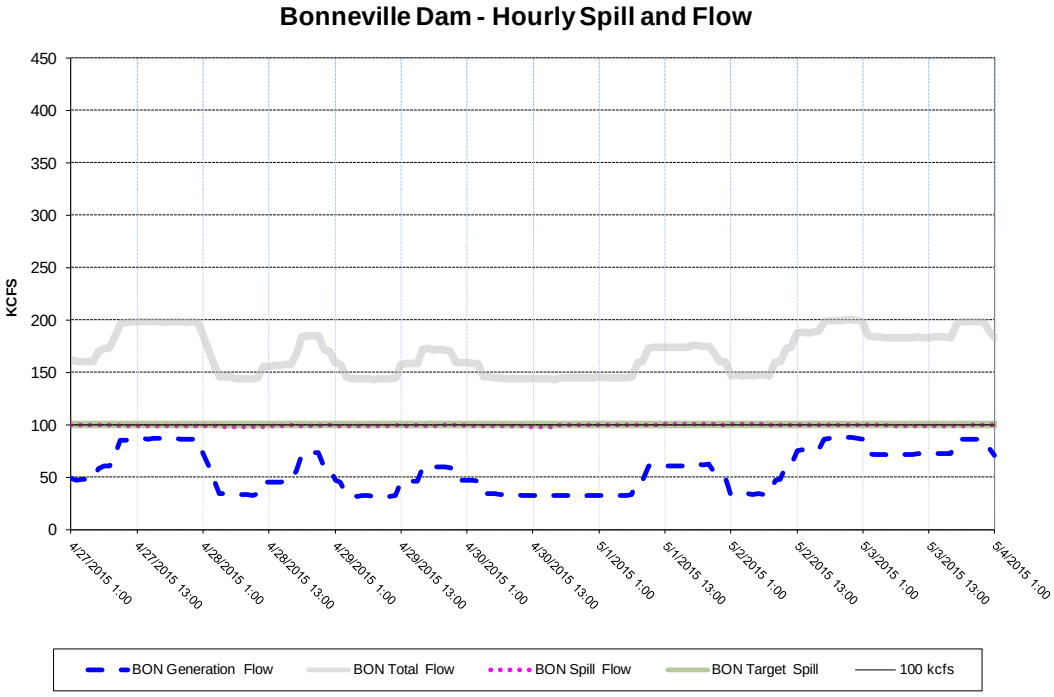
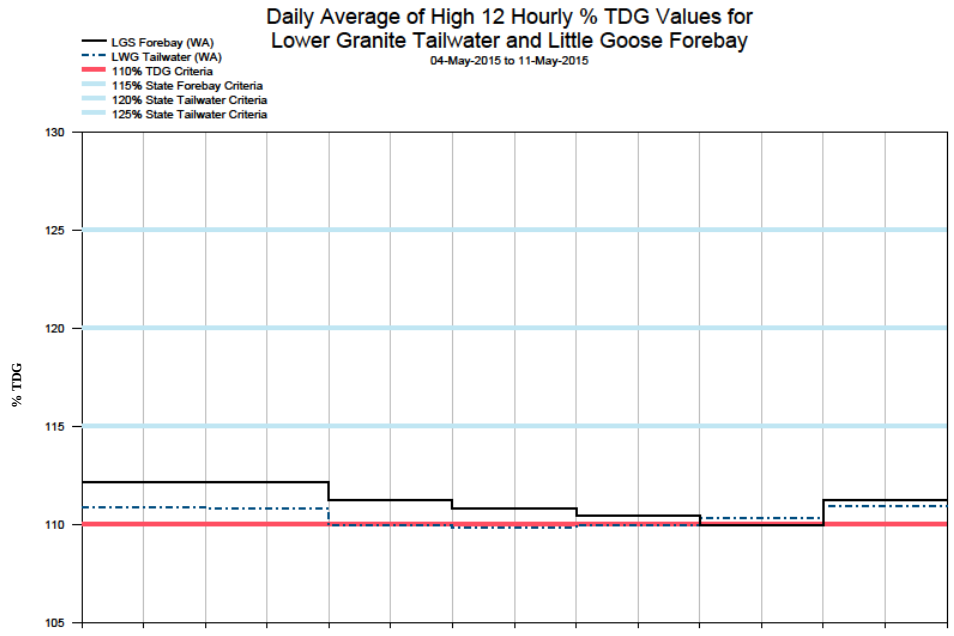

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
4/27/2015 1:00
4/27/2015 13:00
4/28/2015 1:00
4/28/2015 13:00
4/29/2015 1:00
4/29/2015 13:00
4/30/2015 1:00
4/30/2015 13:00
5/1/2015 1:00
5/1/2015 13:00
5/2/2015 1:00
5/2/2015 13:00
5/3/2015 1:00
5/3/2015 13:00
5/4/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
04-May-2015 to 11-May-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

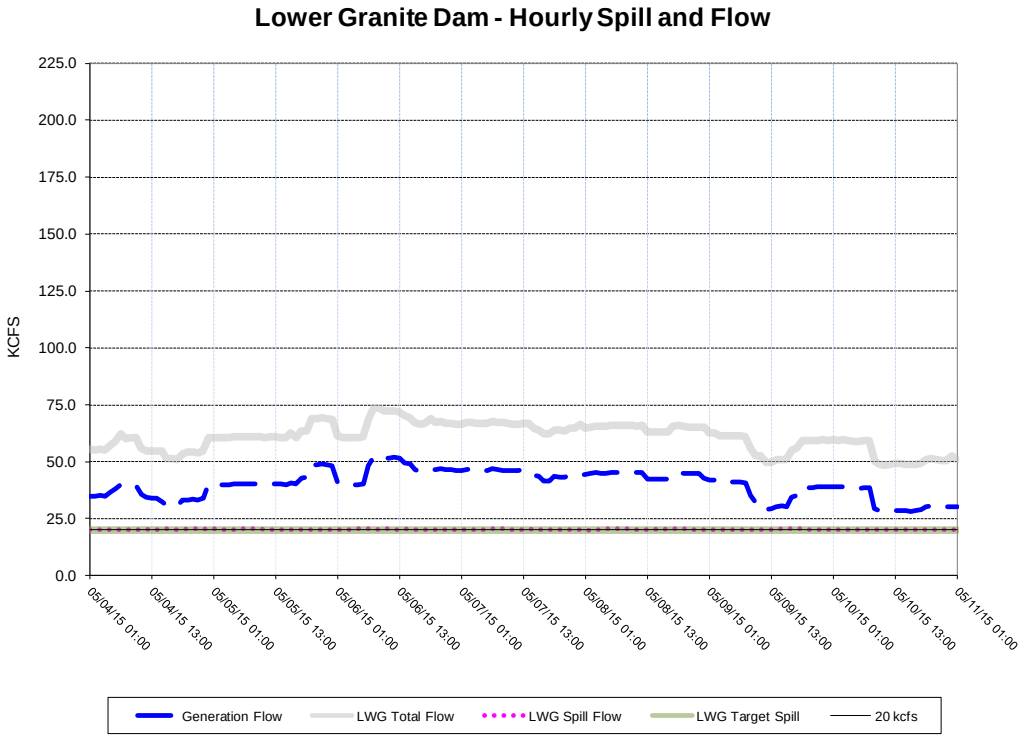
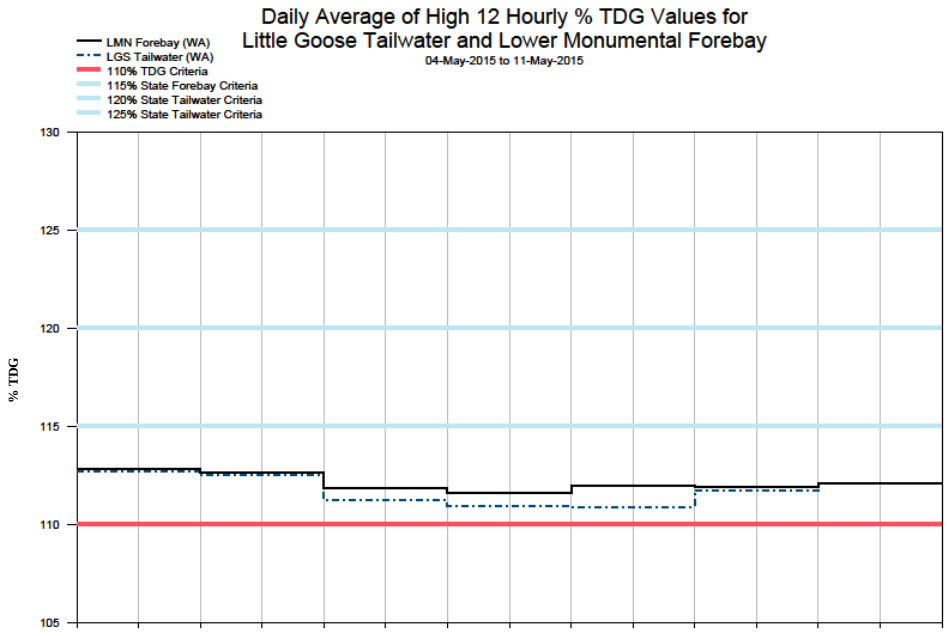

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 10


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
04-May-2015 to 11-May-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

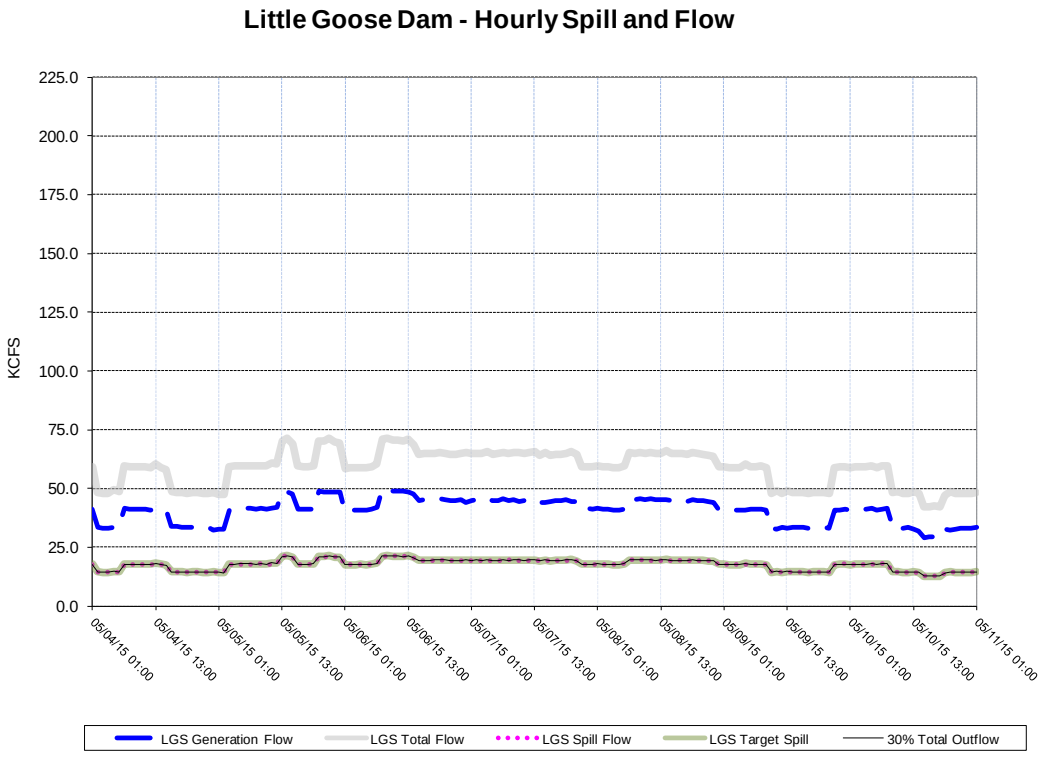
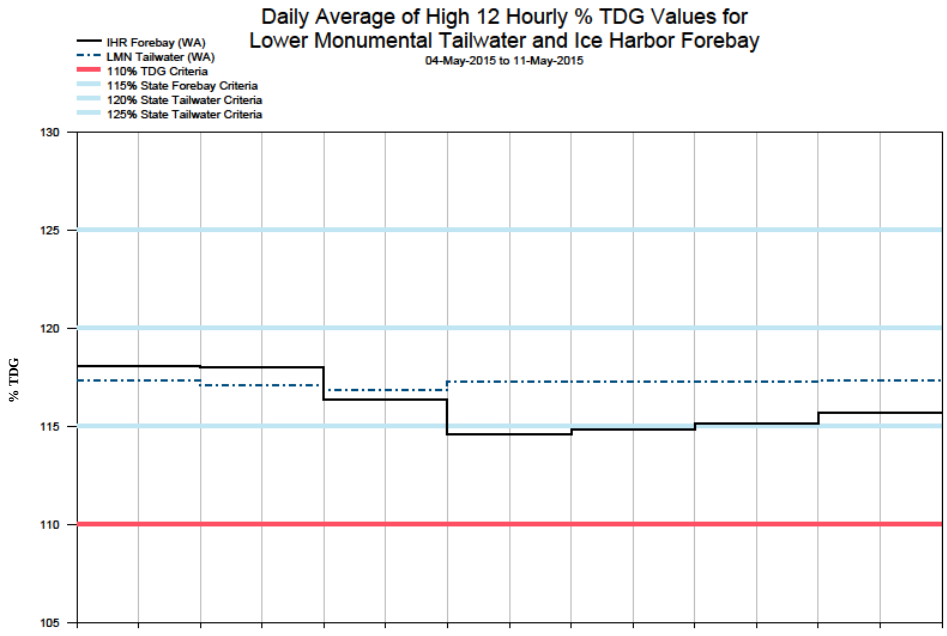

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
04-May-2015 to 11-May-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

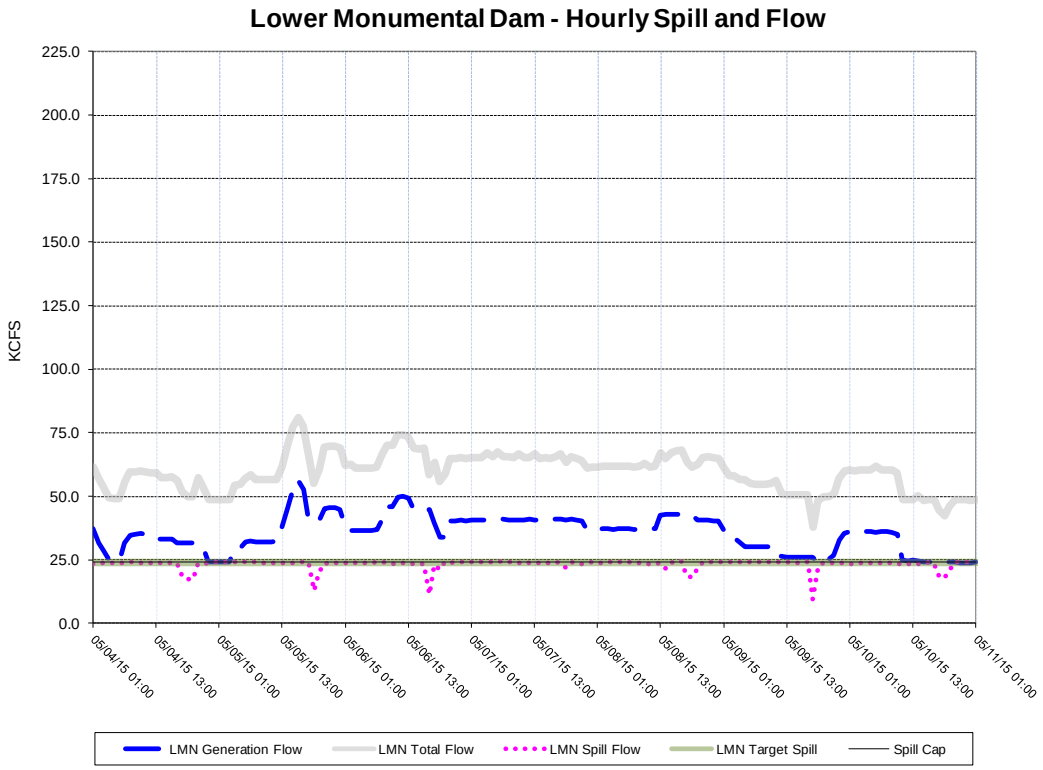
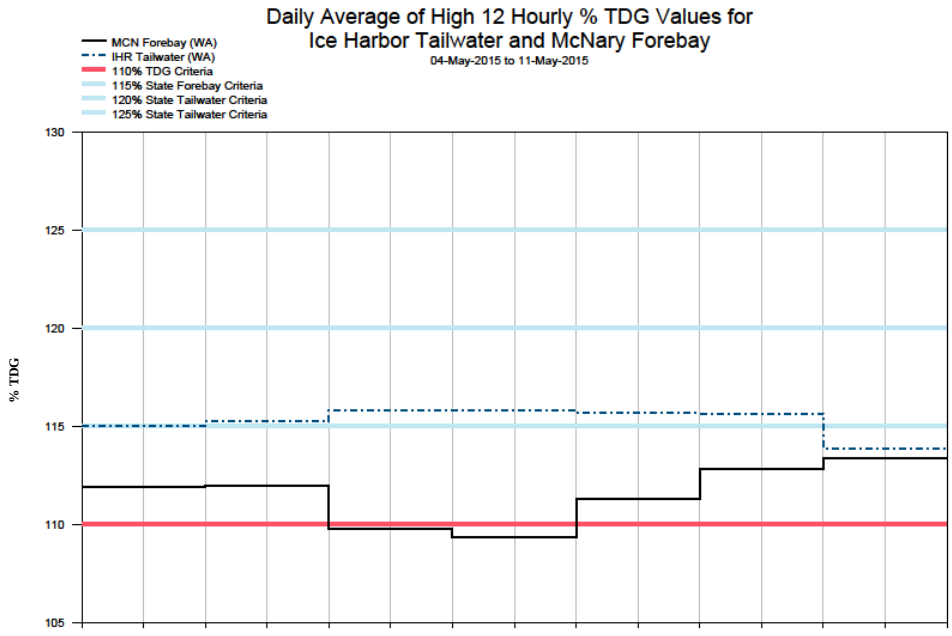

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
04-May-2015 to 11-May-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

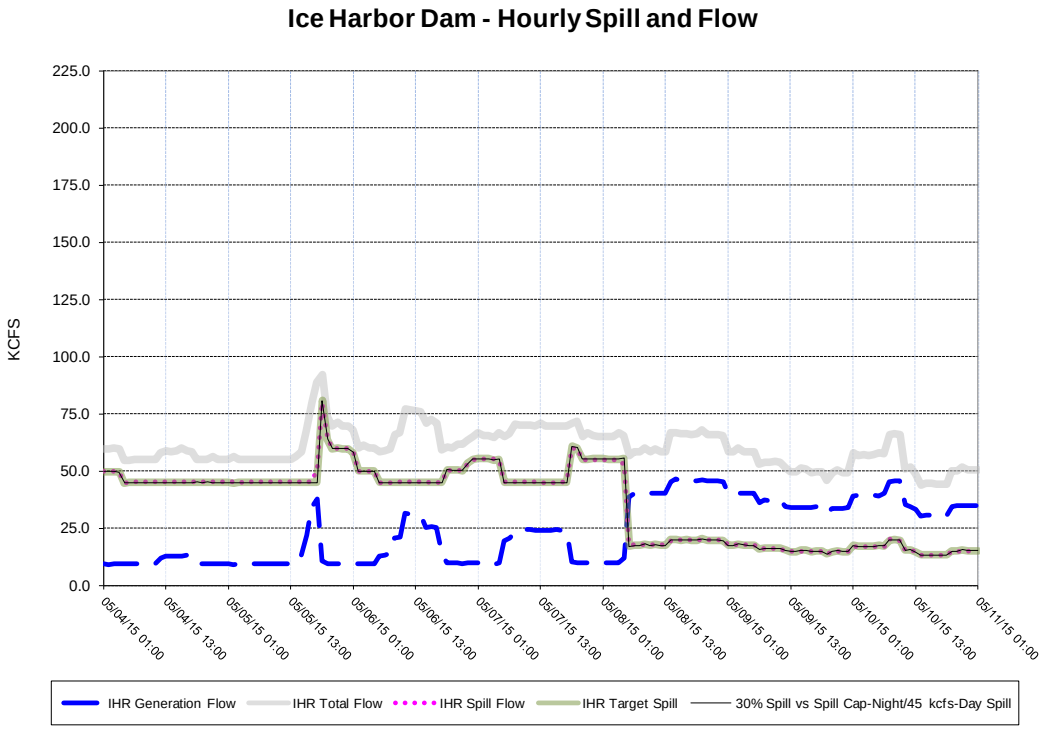
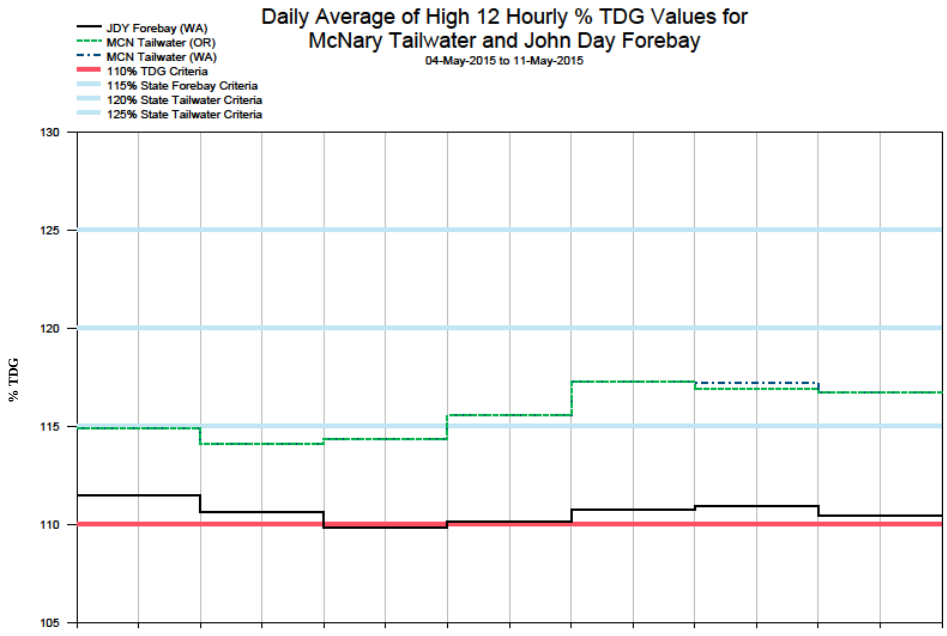

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
30% Spill vs Spill Cap-Night/45 kcfs-Day Spill

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
04-May-2015 to 11-May-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

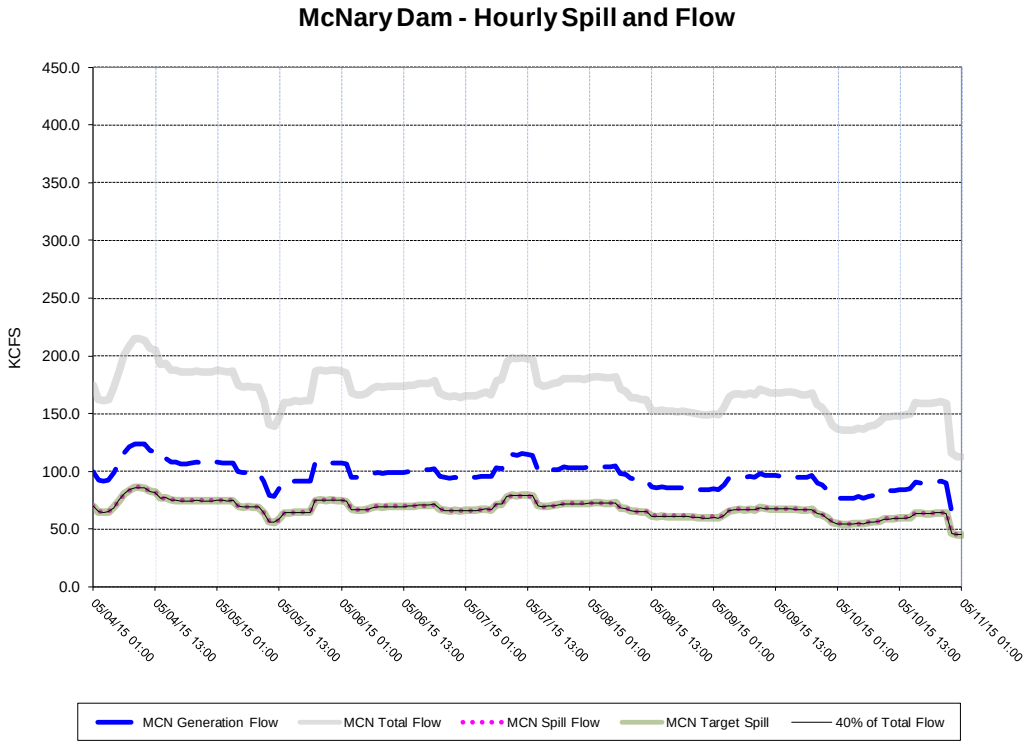
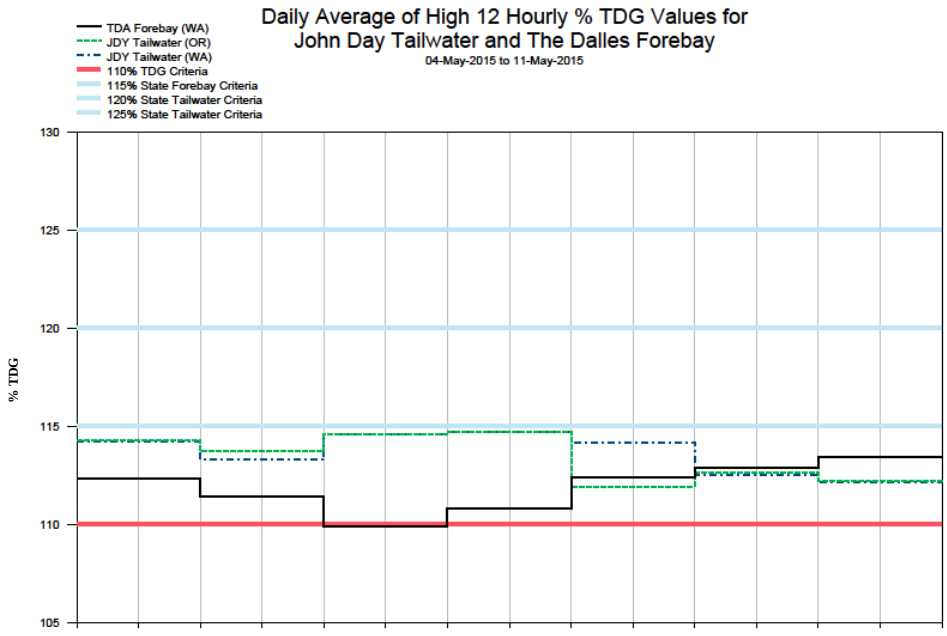

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 14


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
04-May-2015 to 11-May-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

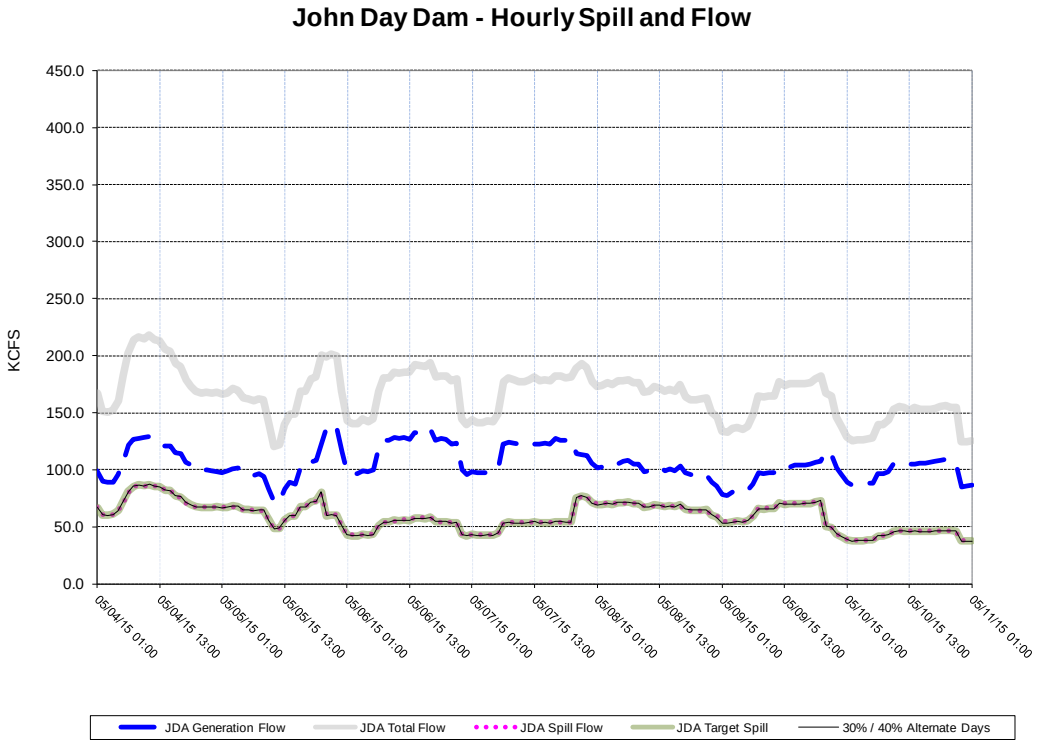
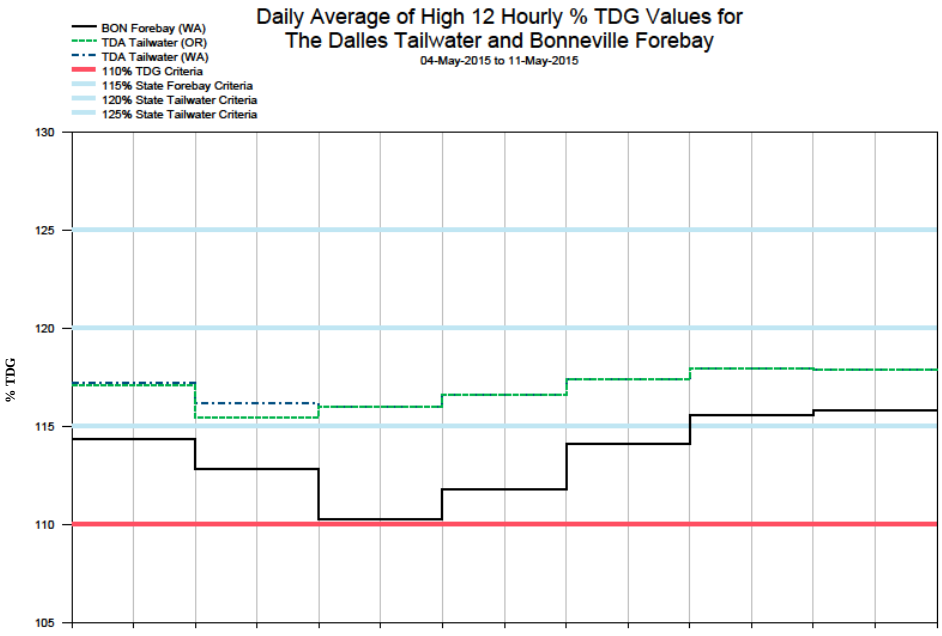

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% / 40% Alternate Days

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
04-May-2015 to 11-May-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

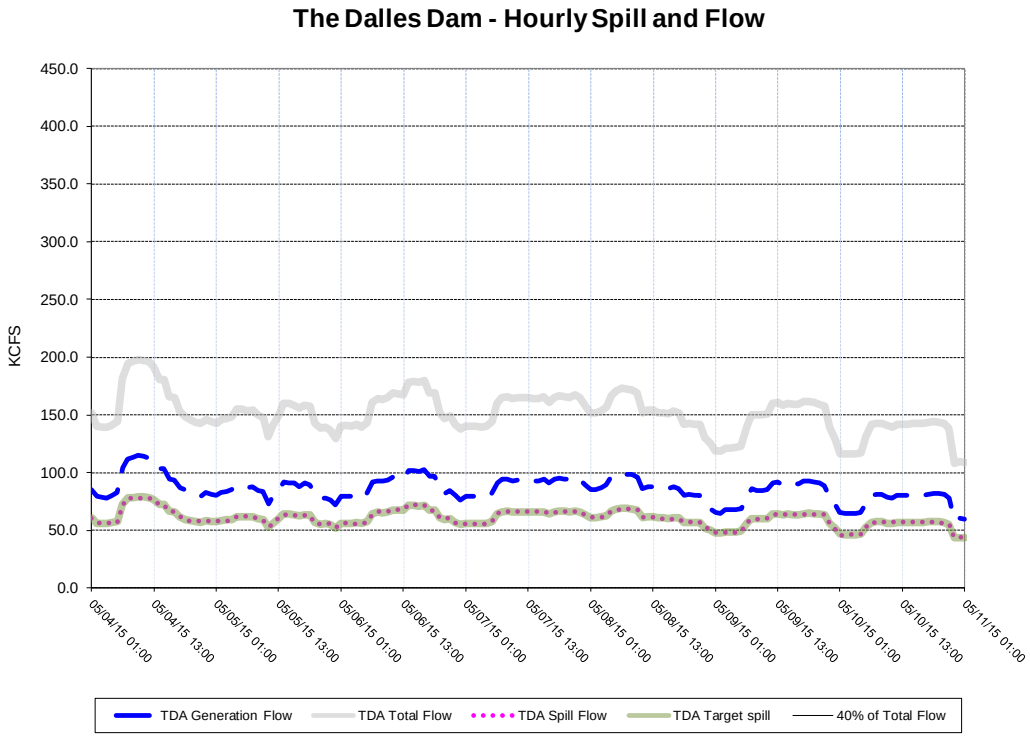
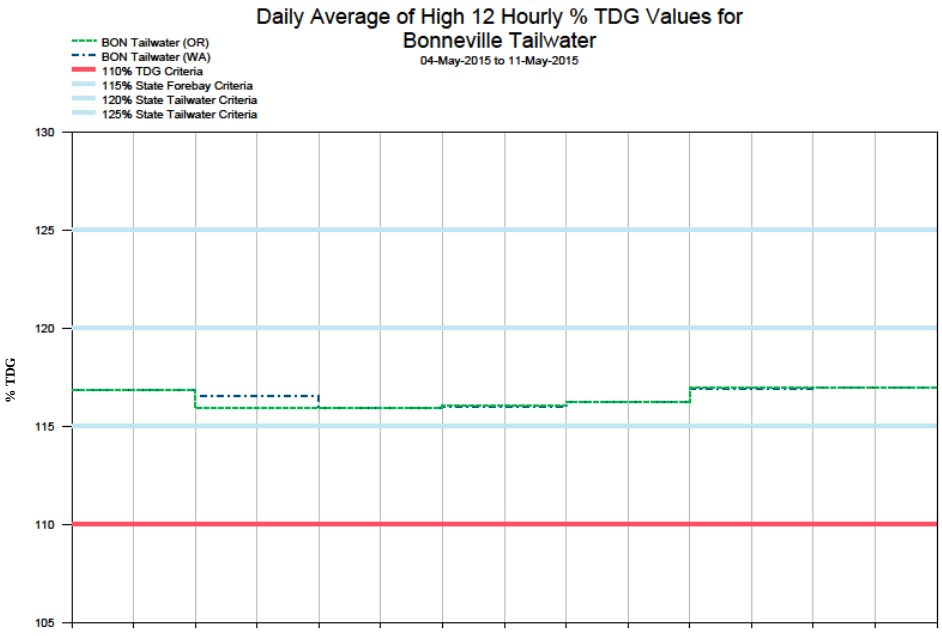

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/04/15 01:00
05/04/15 13:00
05/05/15 01:00
05/05/15 13:00
05/06/15 01:00
05/06/15 13:00
05/07/15 01:00
05/07/15 13:00
05/08/15 01:00
05/08/15 13:00
05/09/15 01:00
05/09/15 13:00
05/10/15 01:00
05/10/15 13:00
05/11/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 16


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
04-May-2015 to 11-May-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

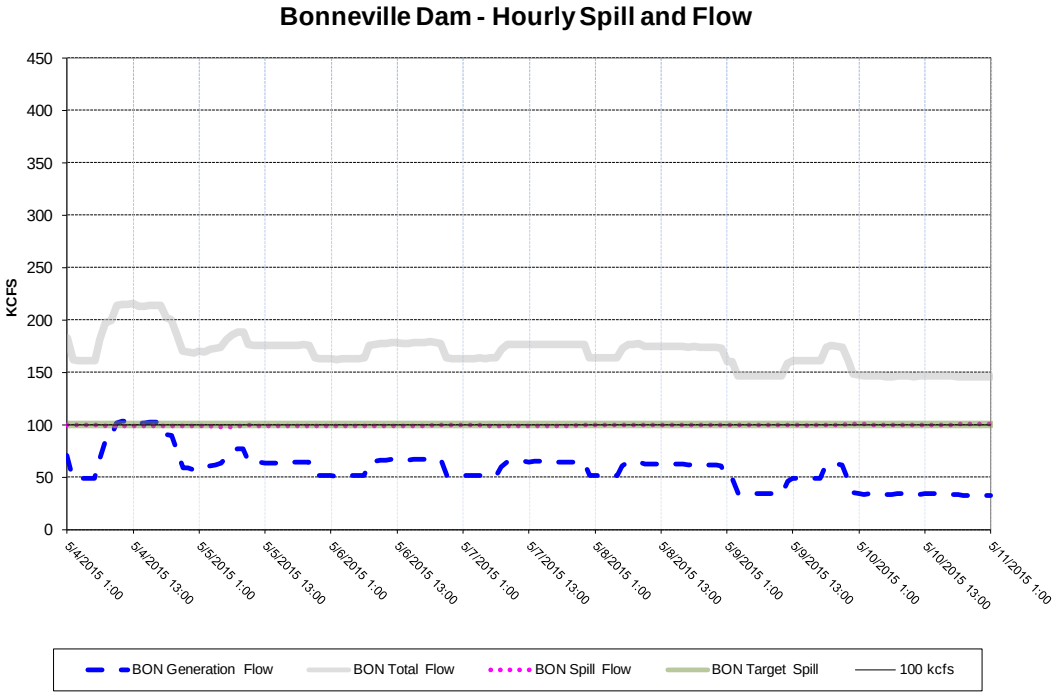
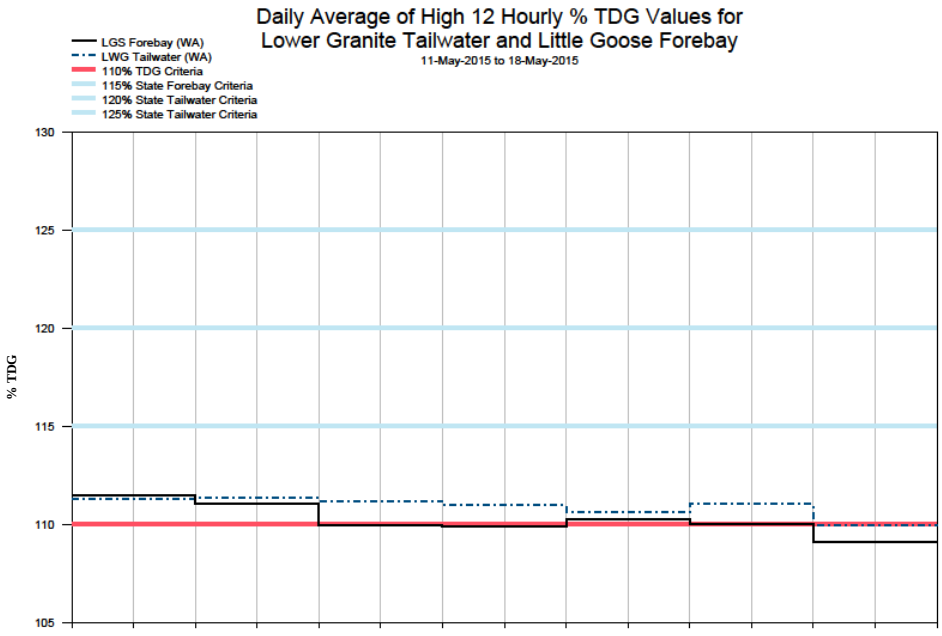

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/4/2015 1:00
5/4/2015 13:00
5/5/2015 1:00
5/5/2015 13:00
5/6/2015 1:00
5/6/2015 13:00
5/7/2015 1:00
5/7/2015 13:00
5/8/2015 1:00
5/8/2015 13:00
5/9/2015 1:00
5/9/2015 13:00
5/10/2015 1:00
5/10/2015 13:00
5/11/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
11-May-2015 to 18-May-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

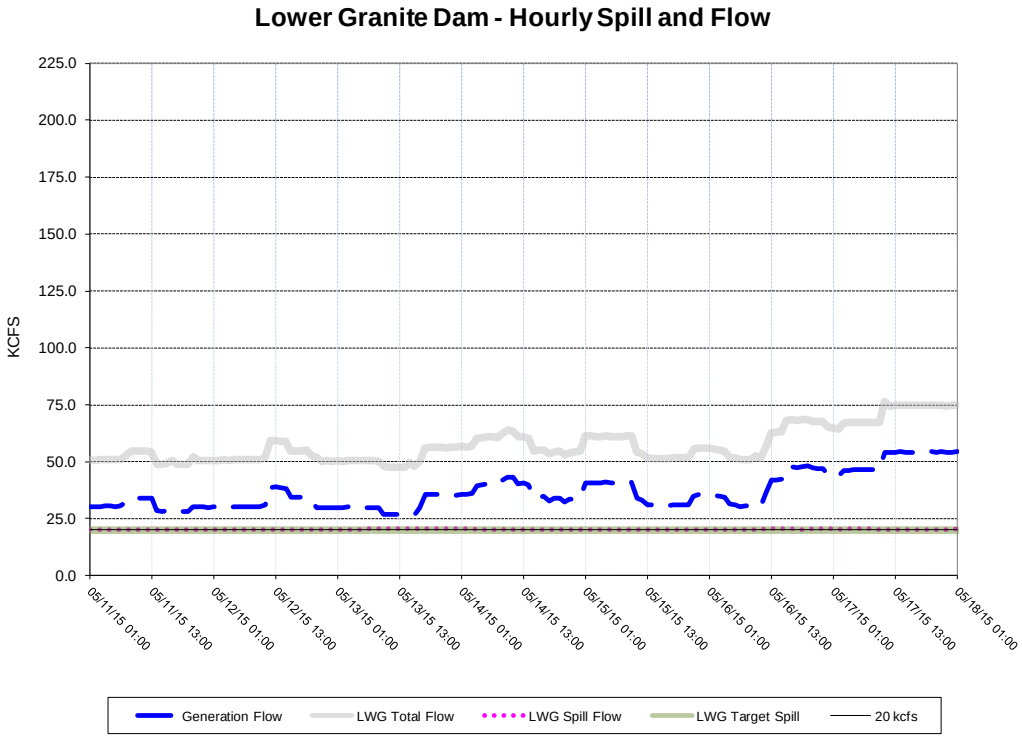
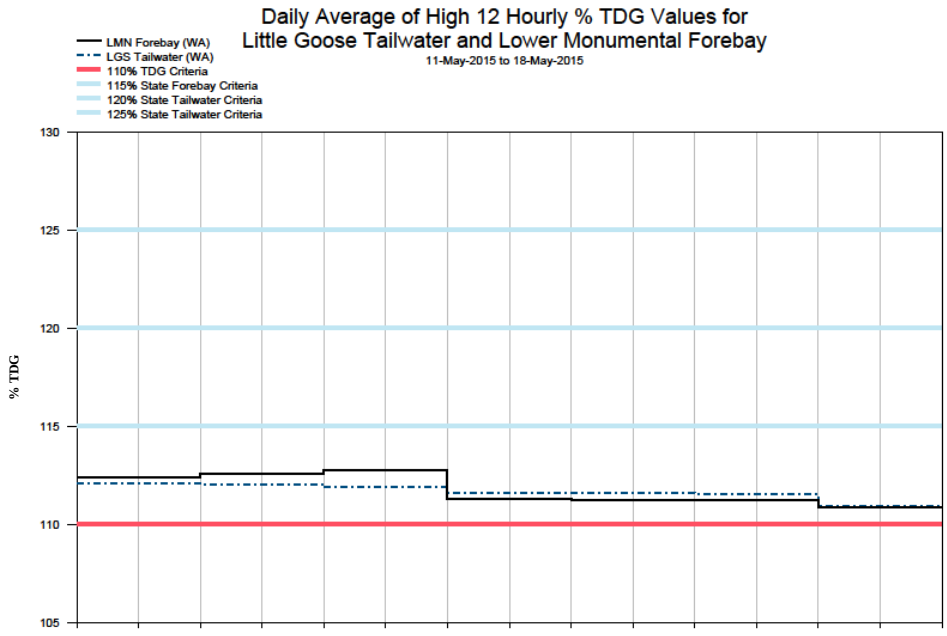

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 18


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
11-May-2015 to 18-May-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

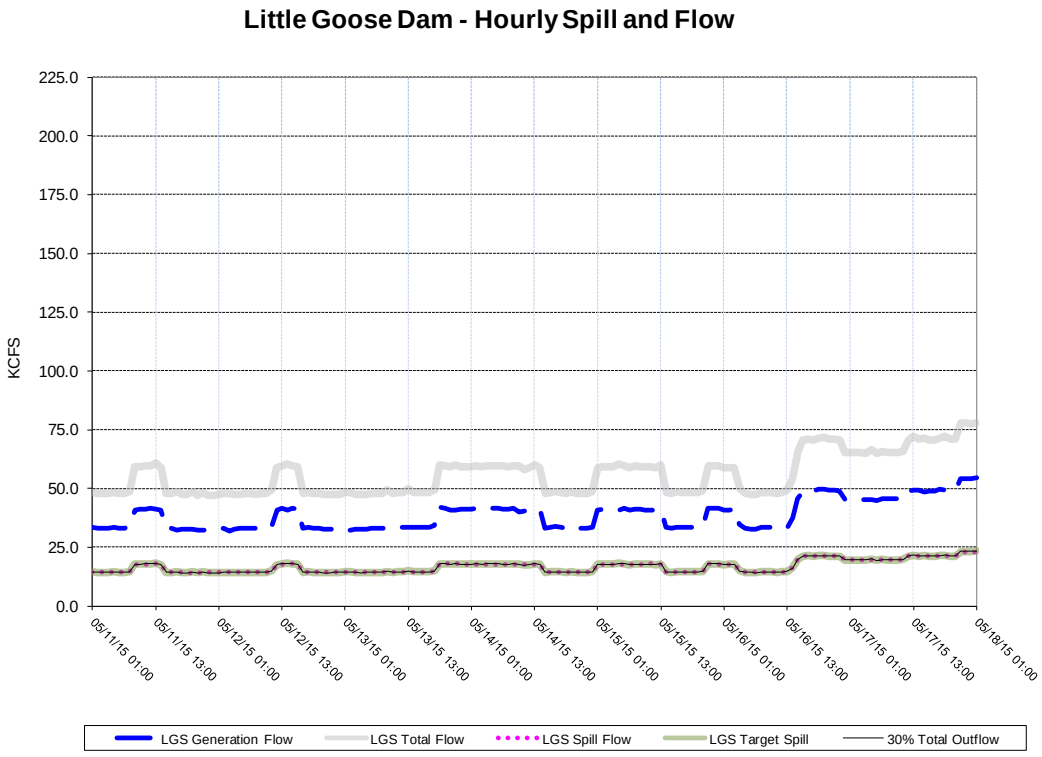
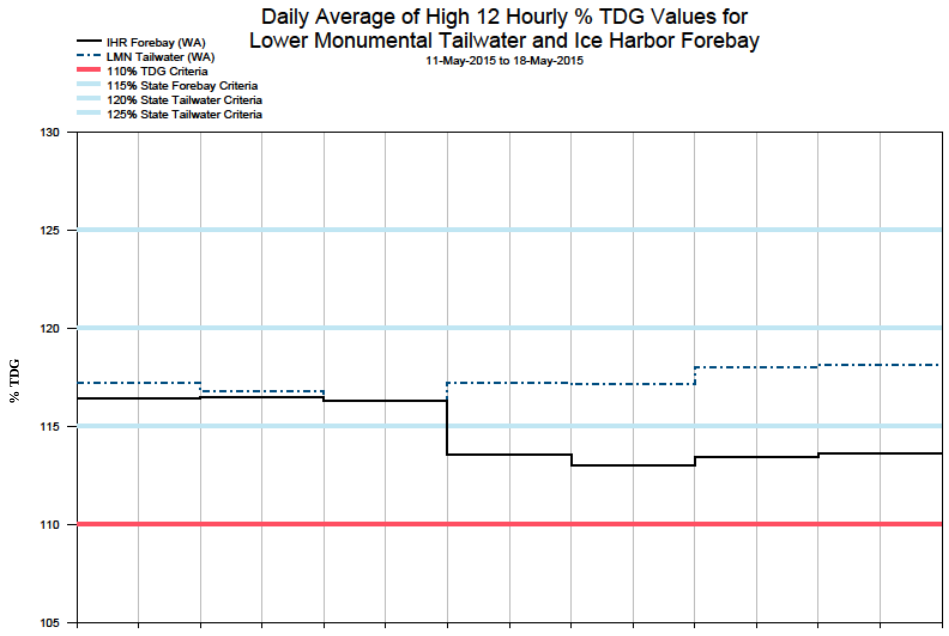

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
11-May-2015 to 18-May-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

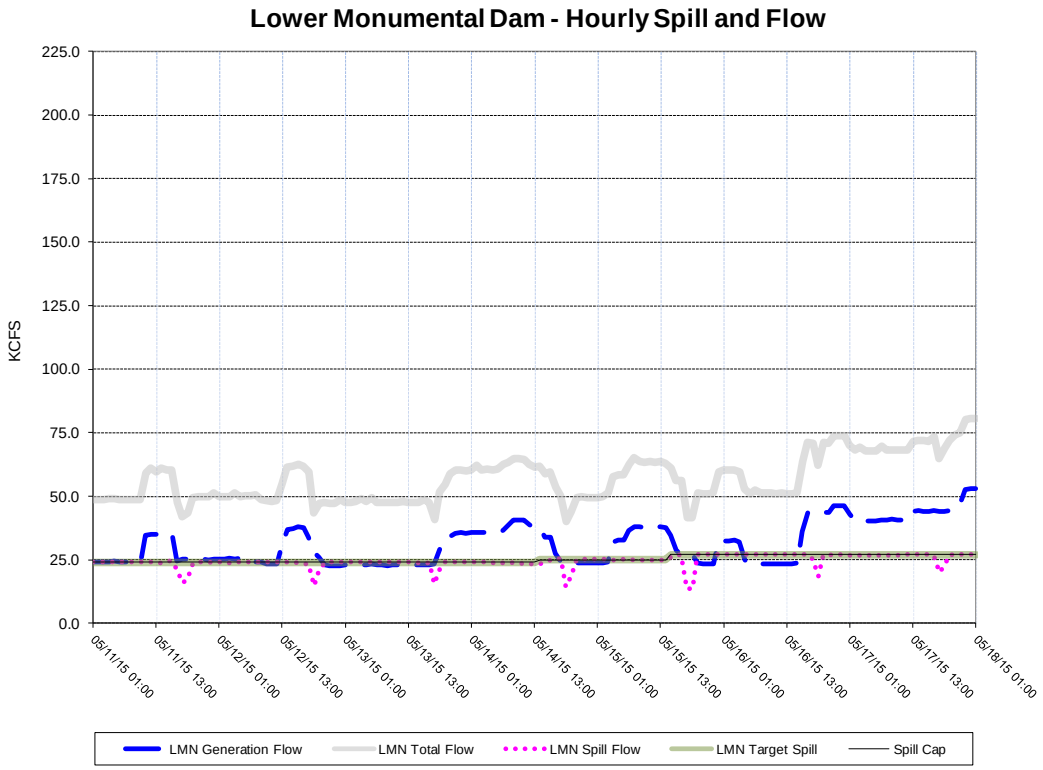
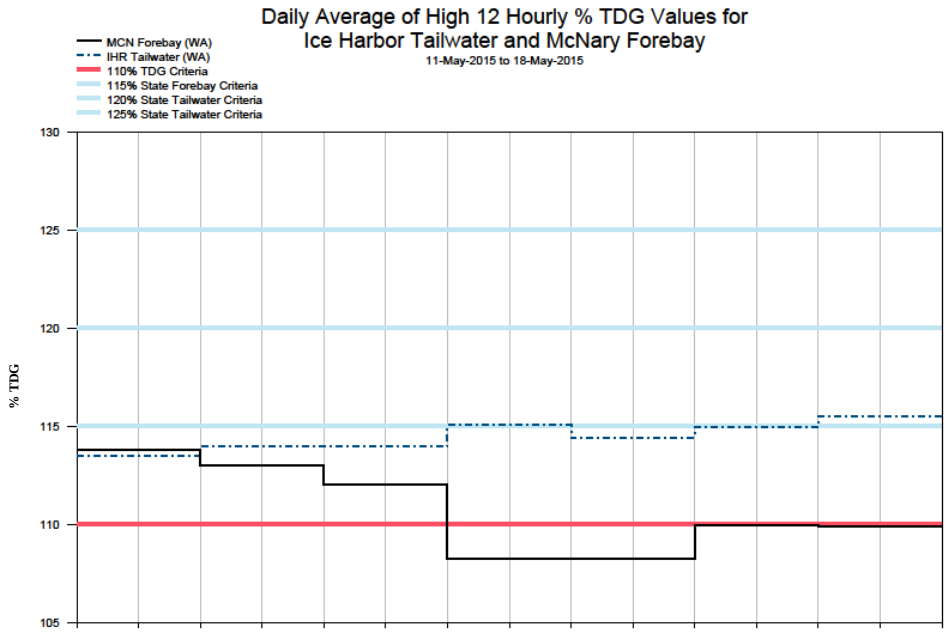

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 20


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
11-May-2015 to 18-May-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

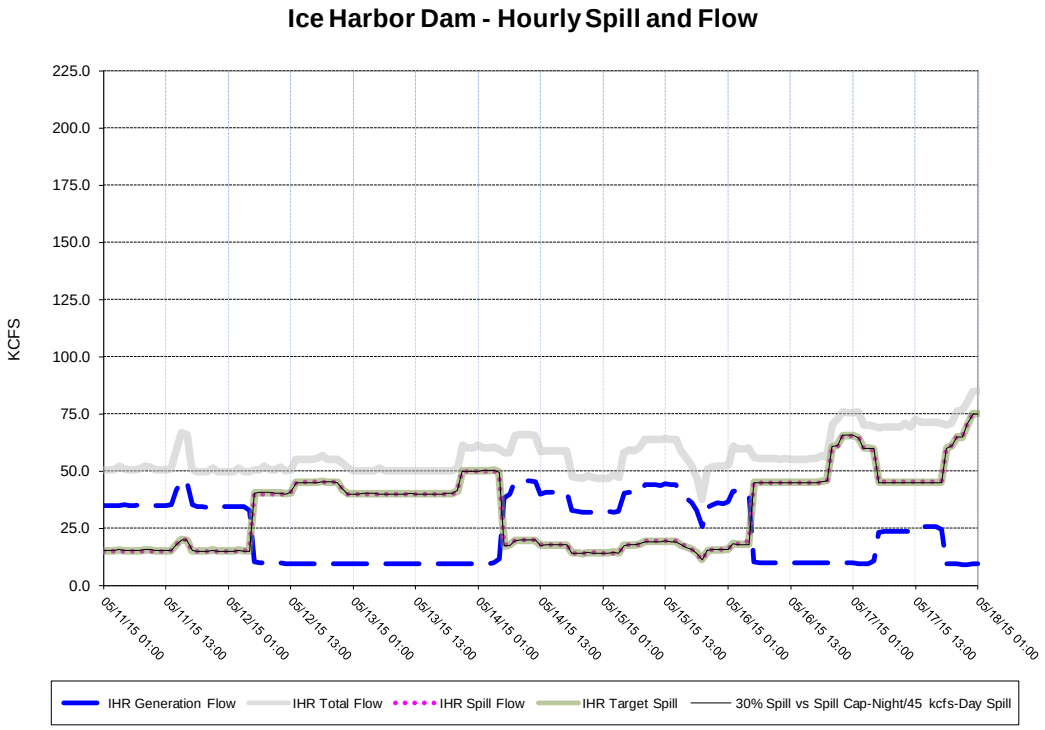
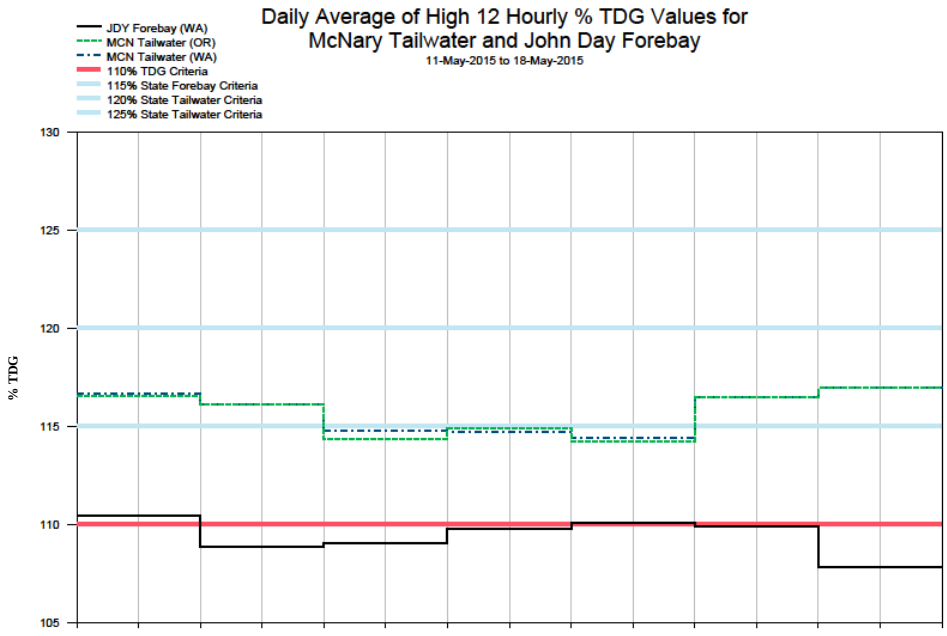

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
30% Spill vs Spill Cap-Night/45 kcfs-Day Spill

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
11-May-2015 to 18-May-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

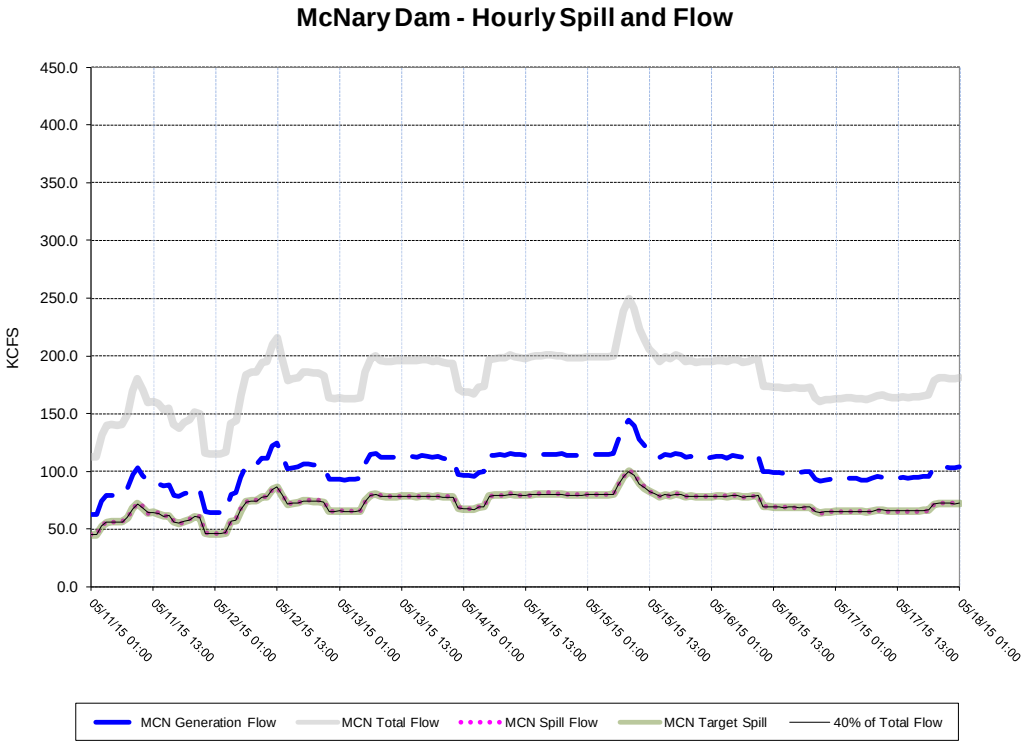
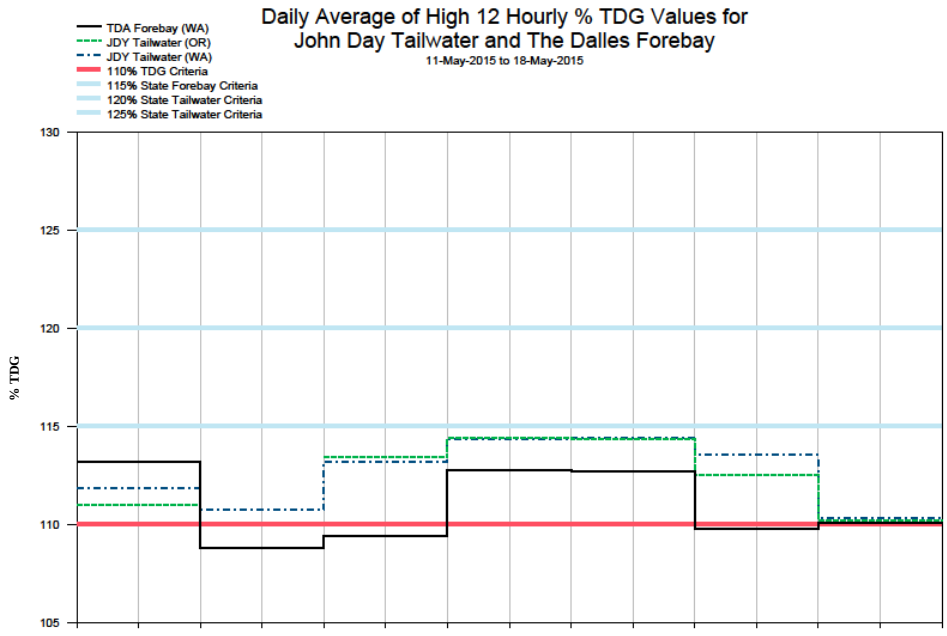

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 22


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
11-May-2015 to 18-May-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

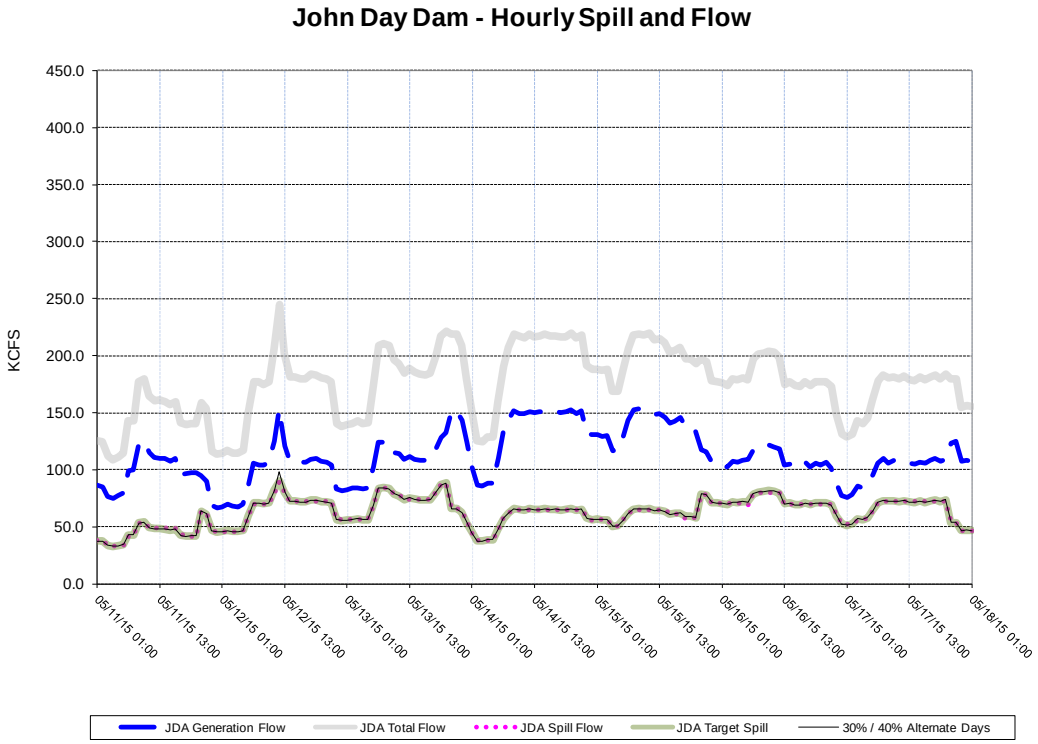
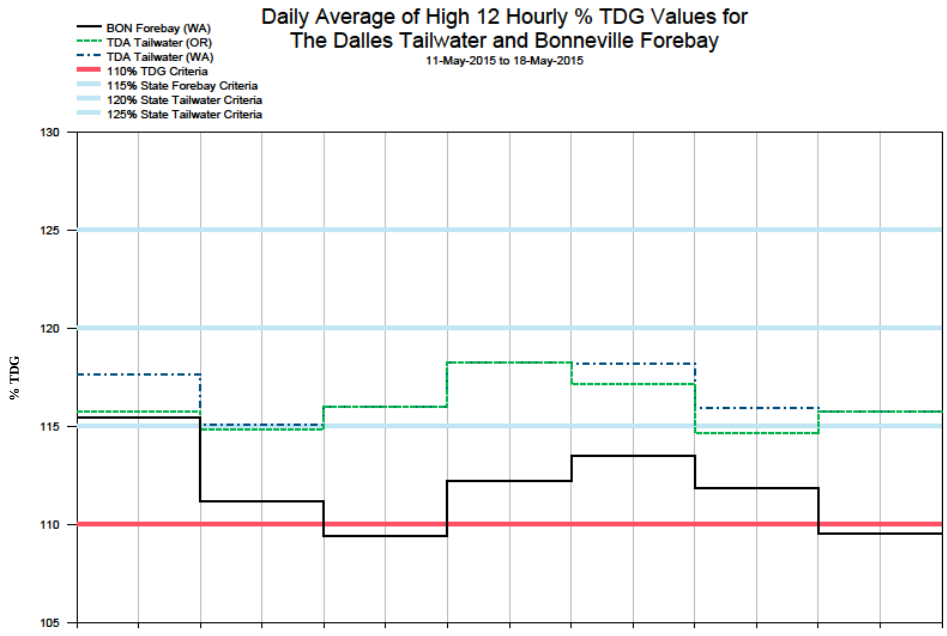

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% / 40% Alternate Days

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
11-May-2015 to 18-May-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

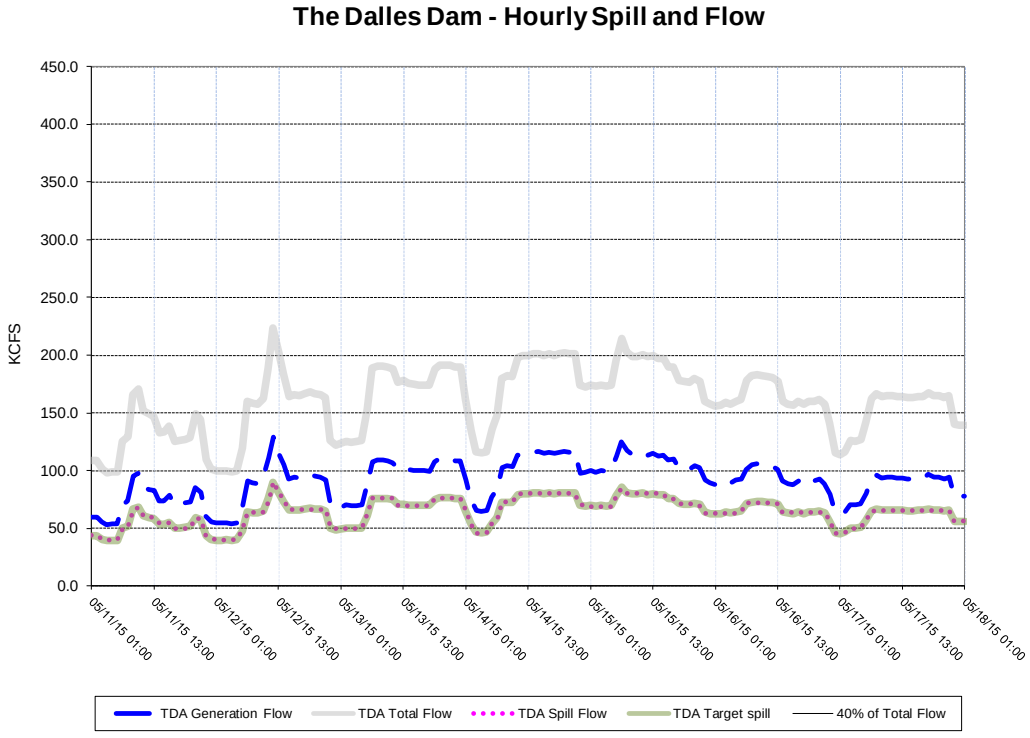
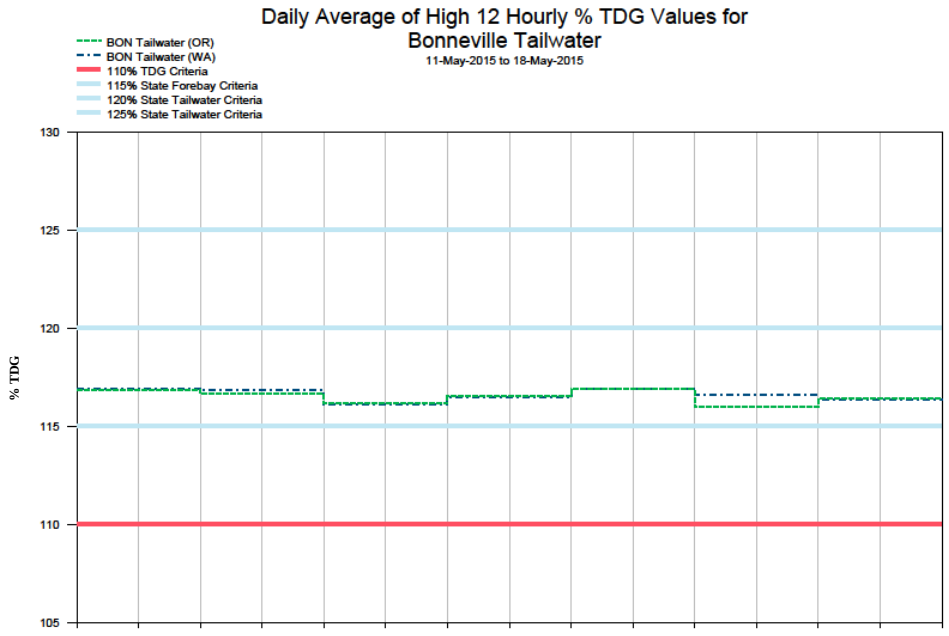

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/11/15 01:00
05/11/15 13:00
05/12/15 01:00
05/12/15 13:00
05/13/15 01:00
05/13/15 13:00
05/14/15 01:00
05/14/15 13:00
05/15/15 01:00
05/15/15 13:00
05/16/15 01:00
05/16/15 13:00
05/17/15 01:00
05/17/15 13:00
05/18/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 24


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
11-May-2015 to 18-May-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

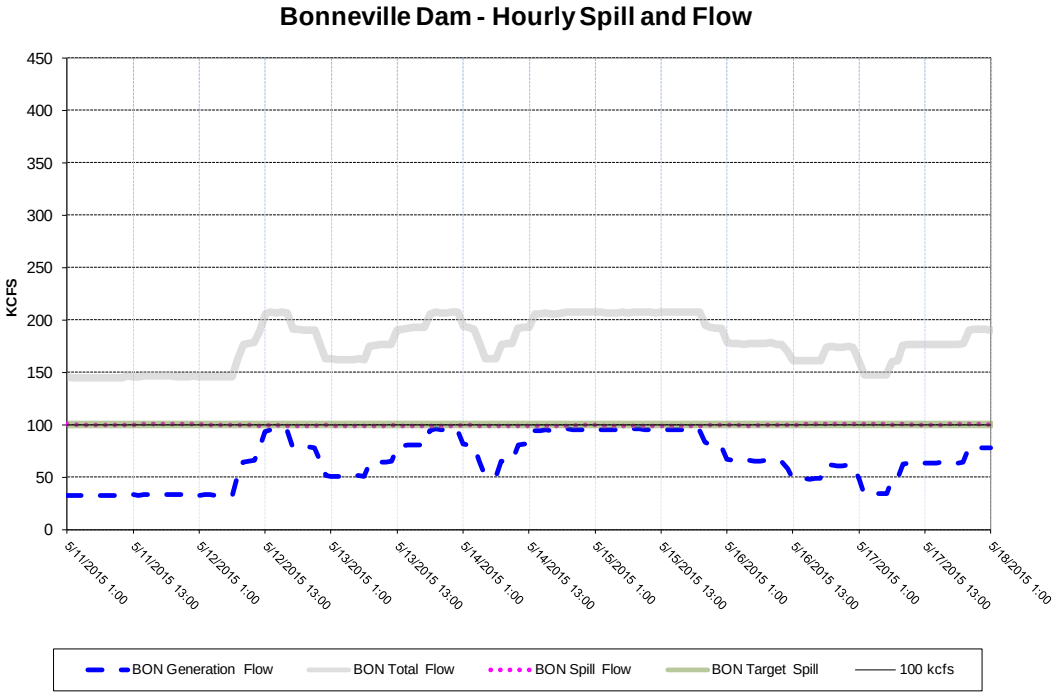
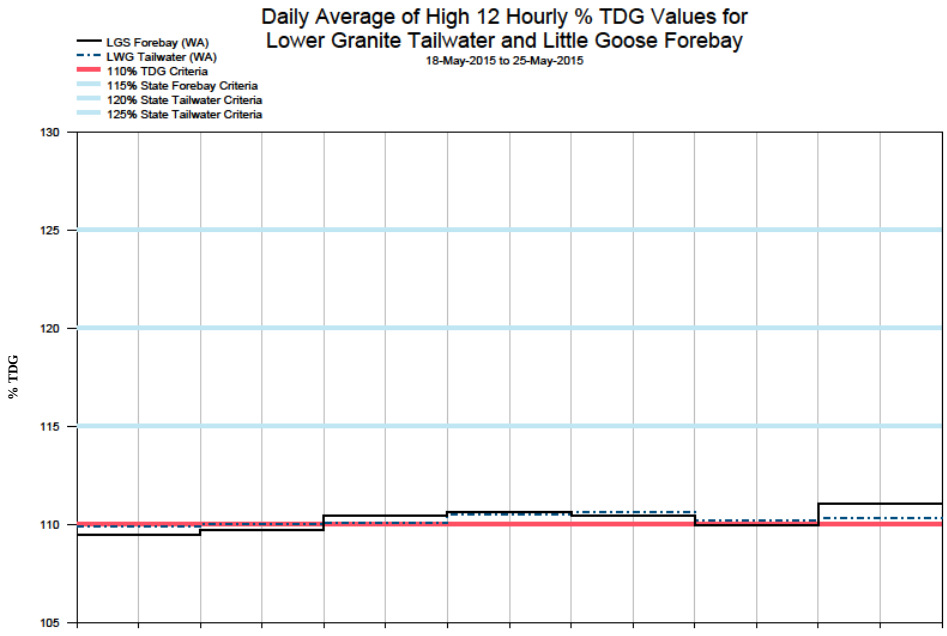

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/11/2015 1:00
5/11/2015 13:00
5/12/2015 1:00
5/12/2015 13:00
5/13/2015 1:00
5/13/2015 13:00
5/14/2015 1:00
5/14/2015 13:00
5/15/2015 1:00
5/15/2015 13:00
5/16/2015 1:00
5/16/2015 13:00
5/17/2015 1:00
5/17/2015 13:00
5/18/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
18-May-2015 to 25-May-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

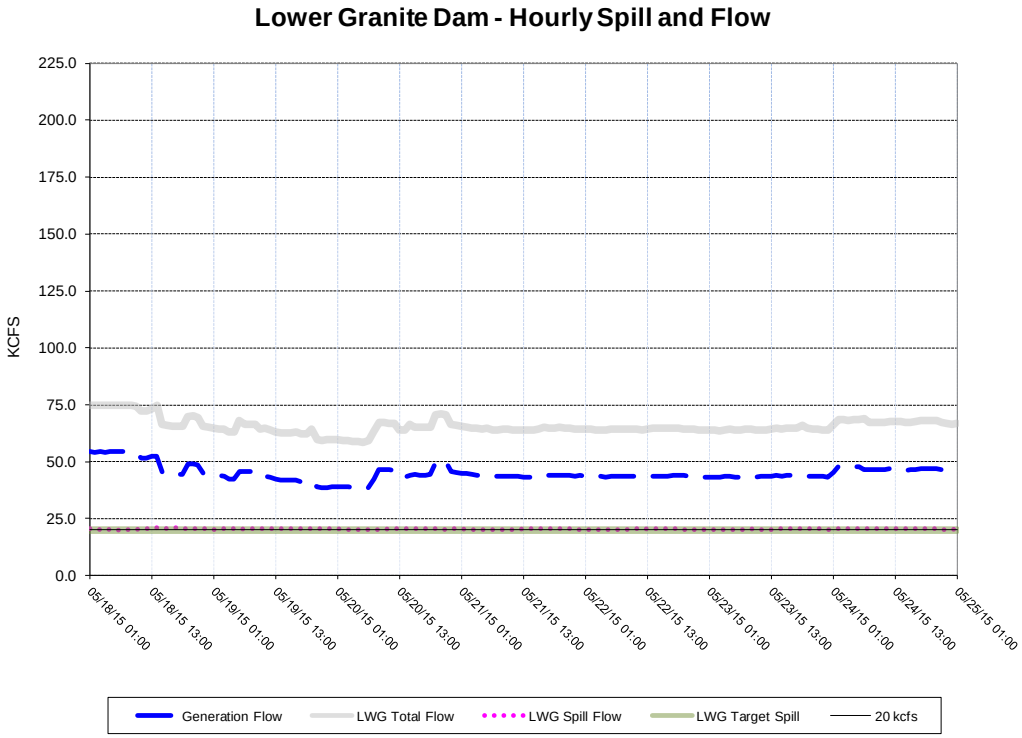
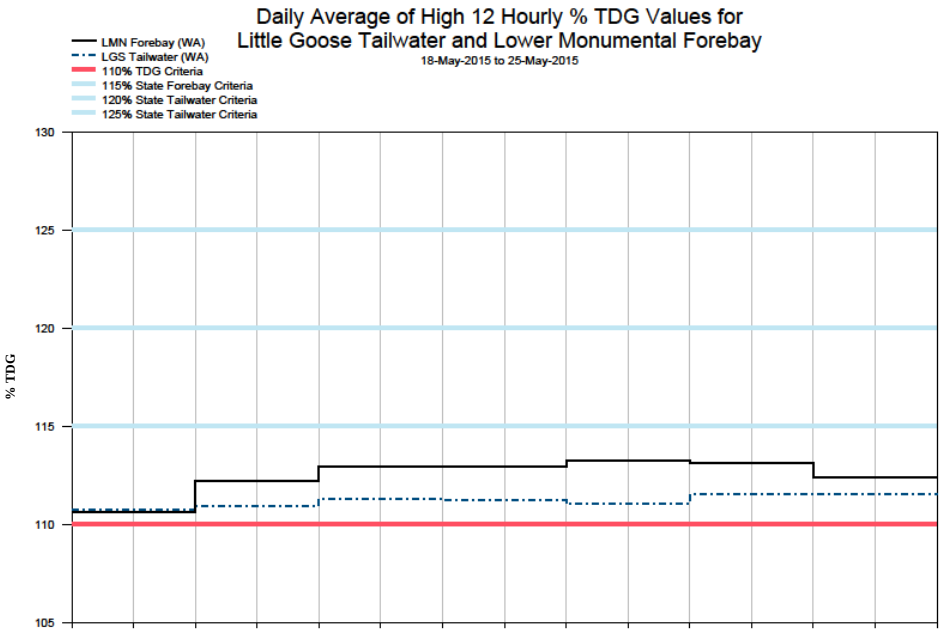

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 26


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
18-May-2015 to 25-May-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

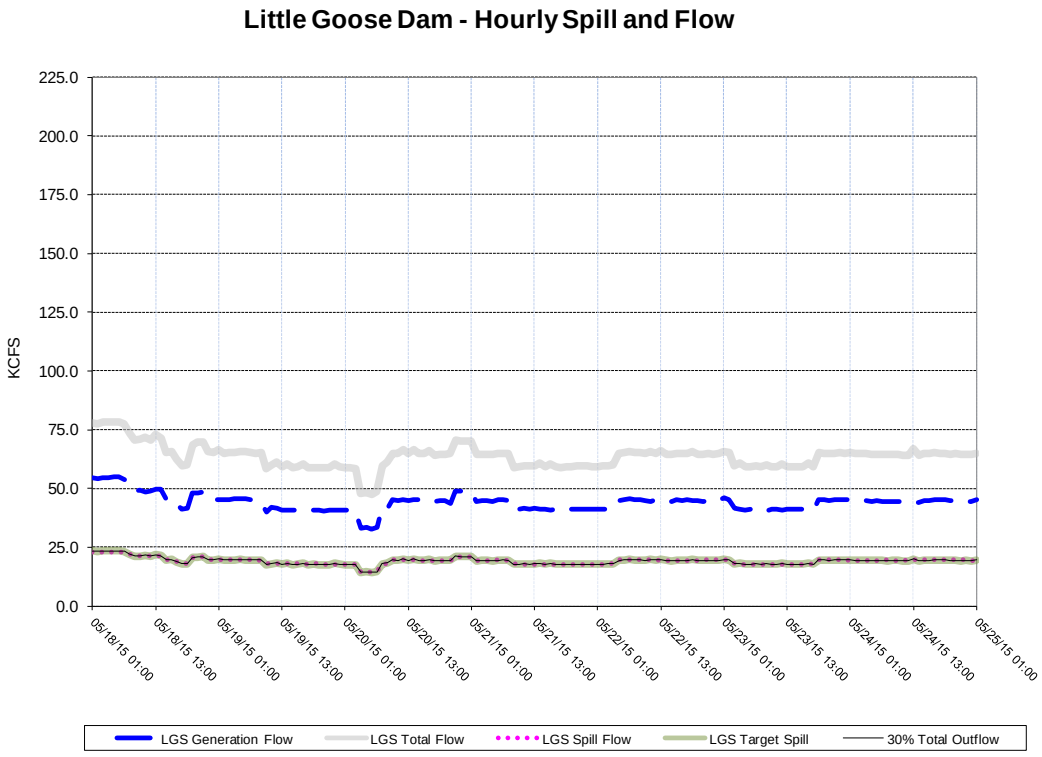
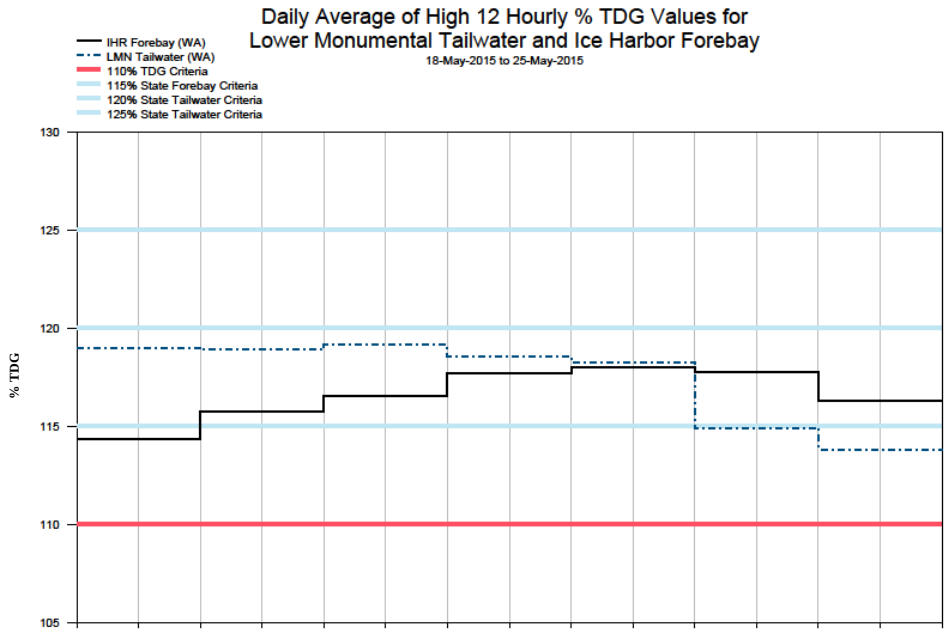

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
18-May-2015 to 25-May-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

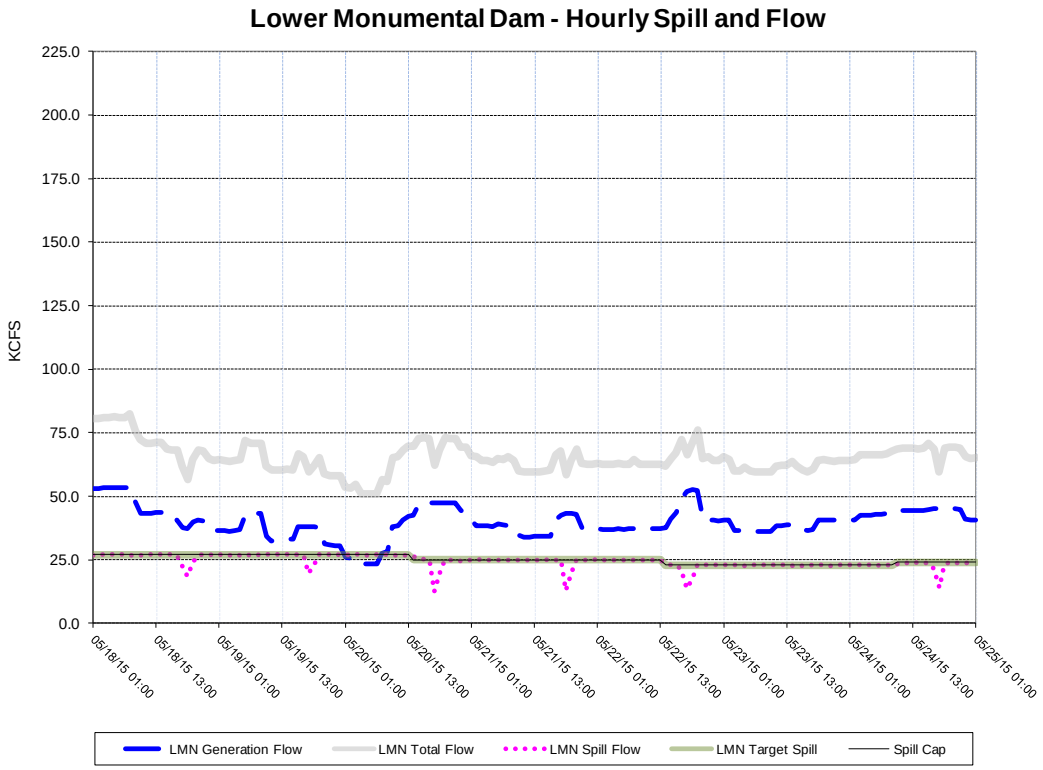
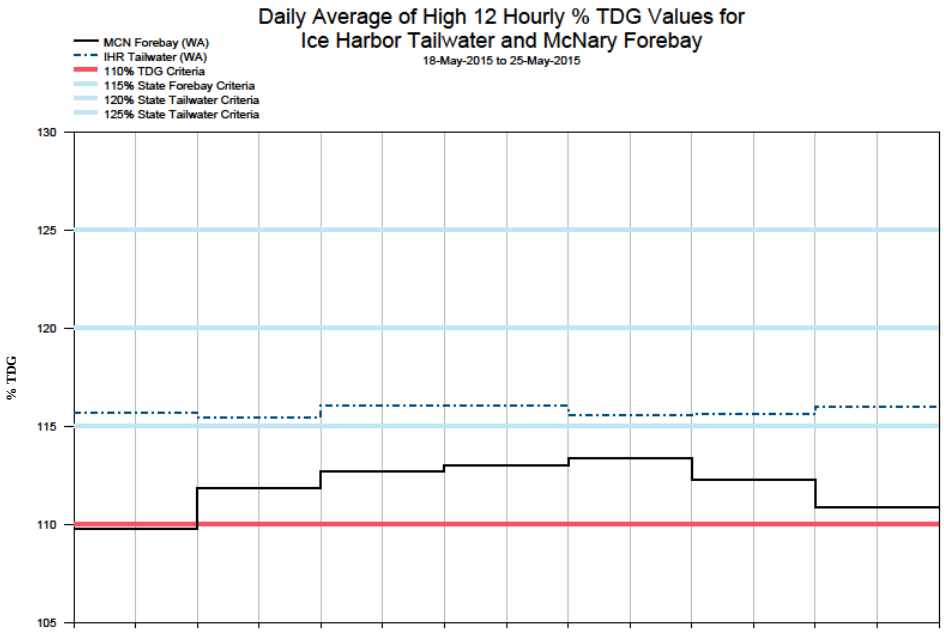

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 28


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
18-May-2015 to 25-May-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

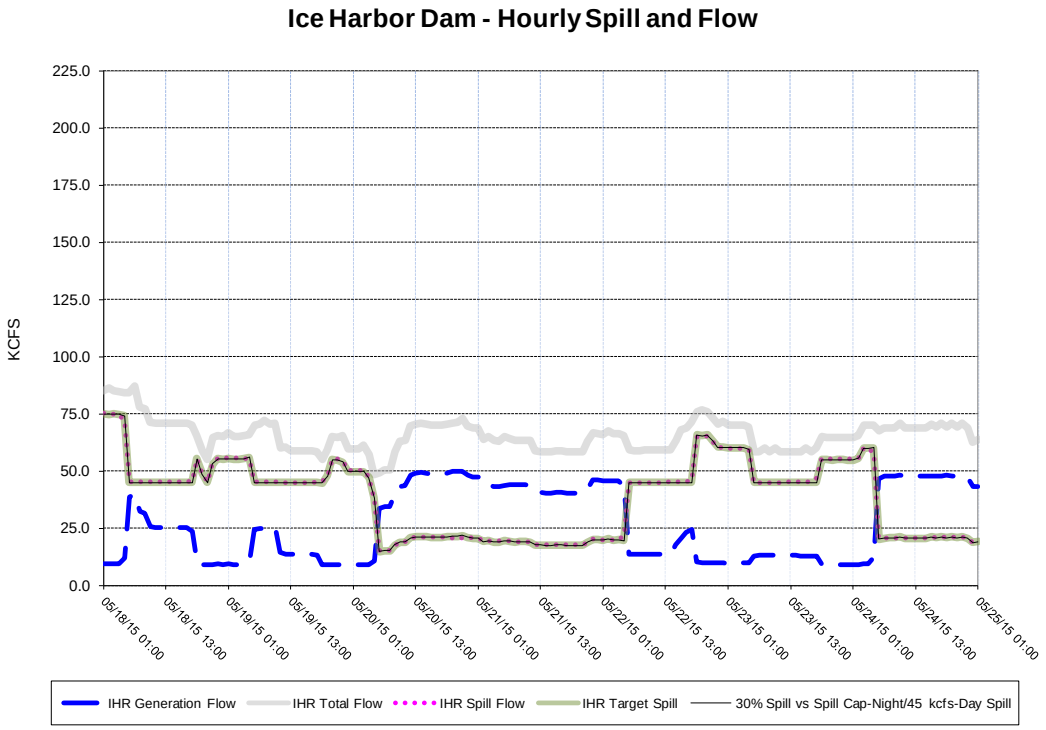
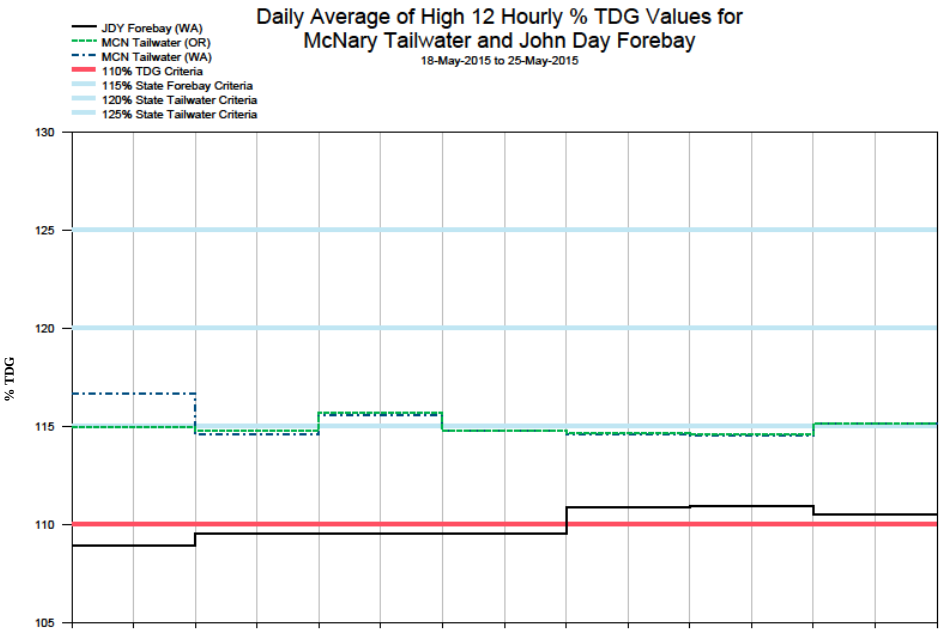

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
30% Spill vs Spill Cap-Night/45 kcfs-Day Spill

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
18-May-2015 to 25-May-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

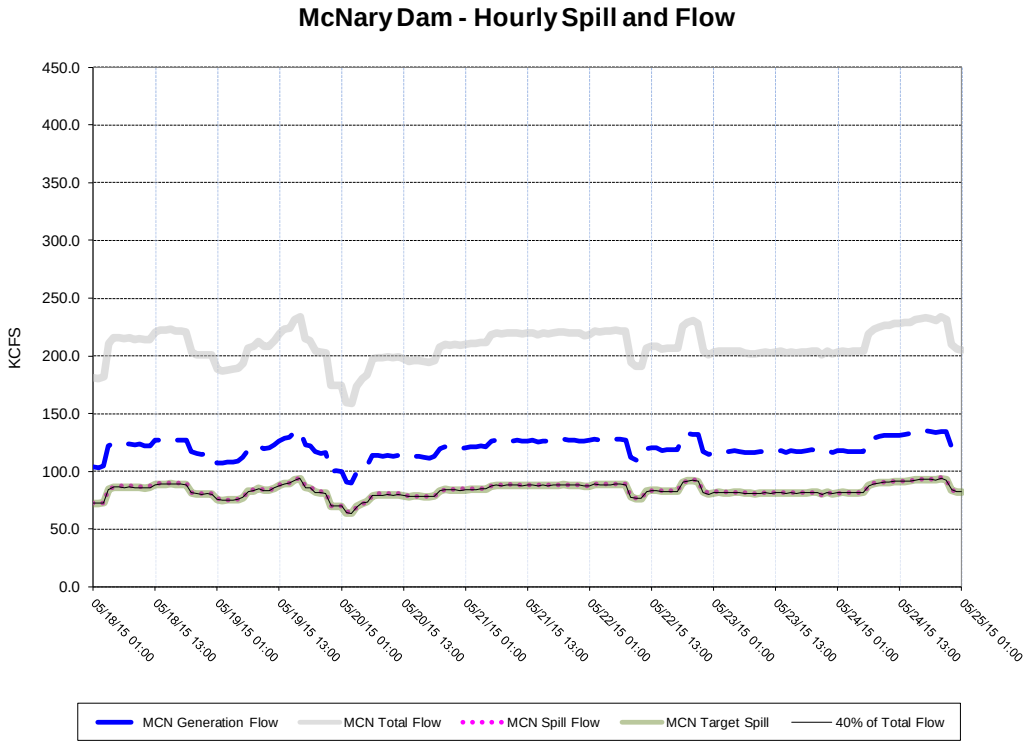
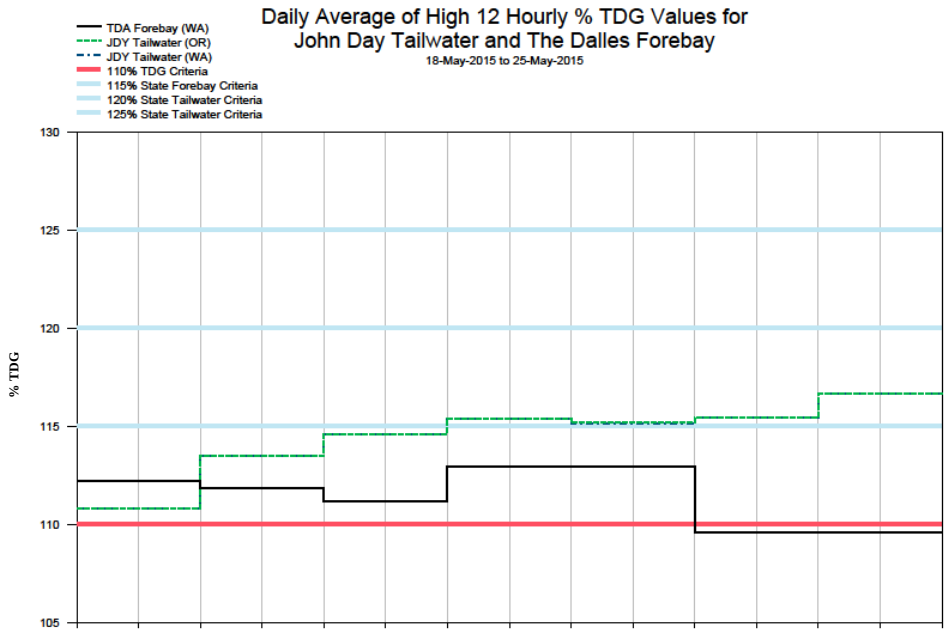

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 30


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
18-May-2015 to 25-May-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

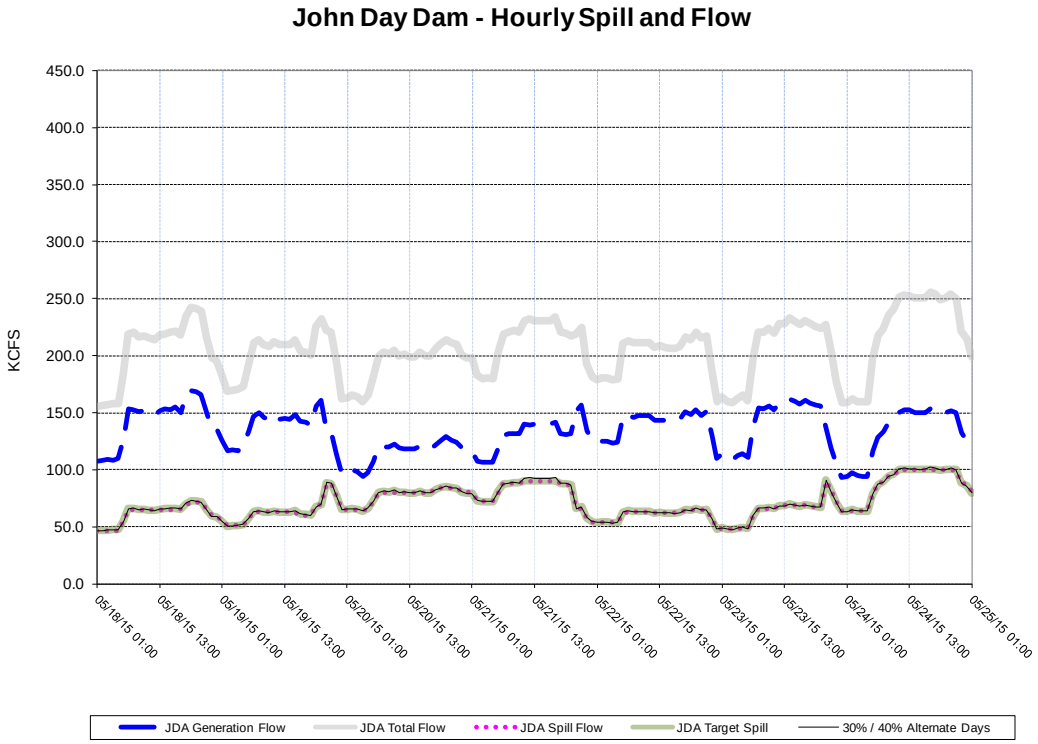
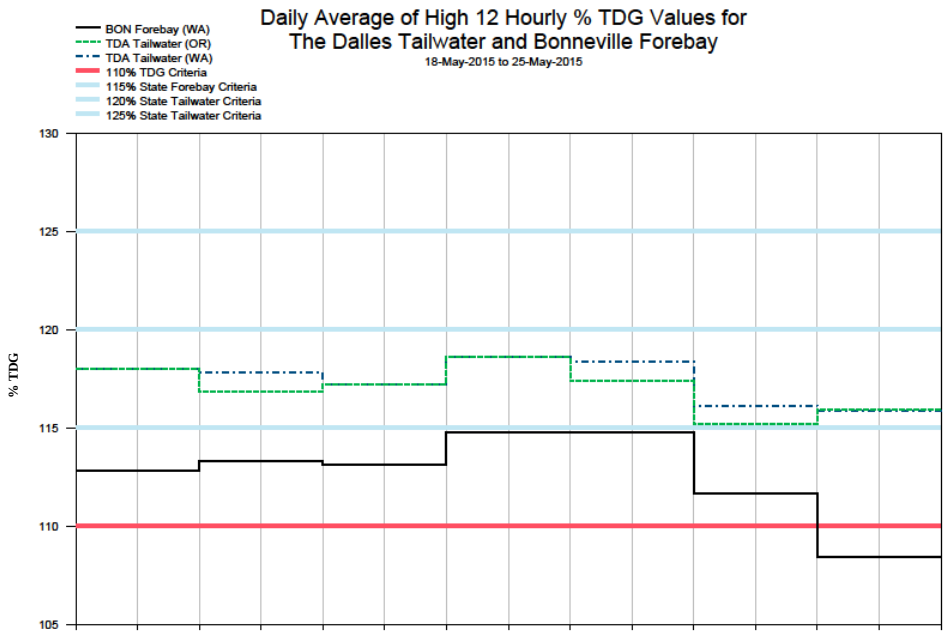

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% / 40% Alternate Days

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
18-May-2015 to 25-May-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

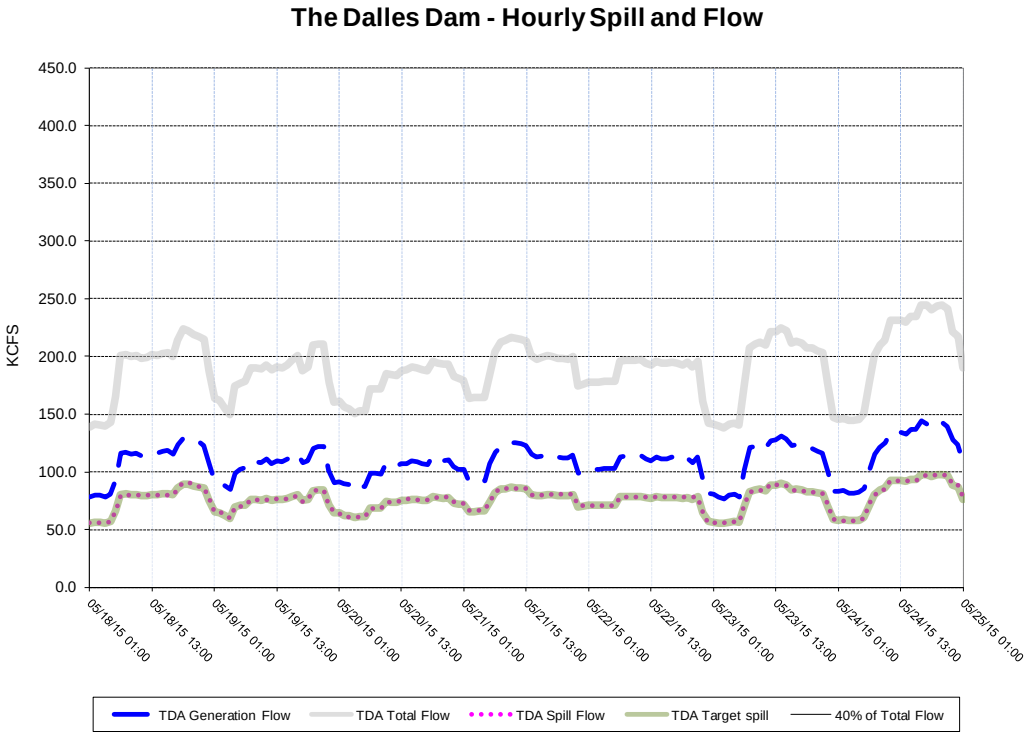
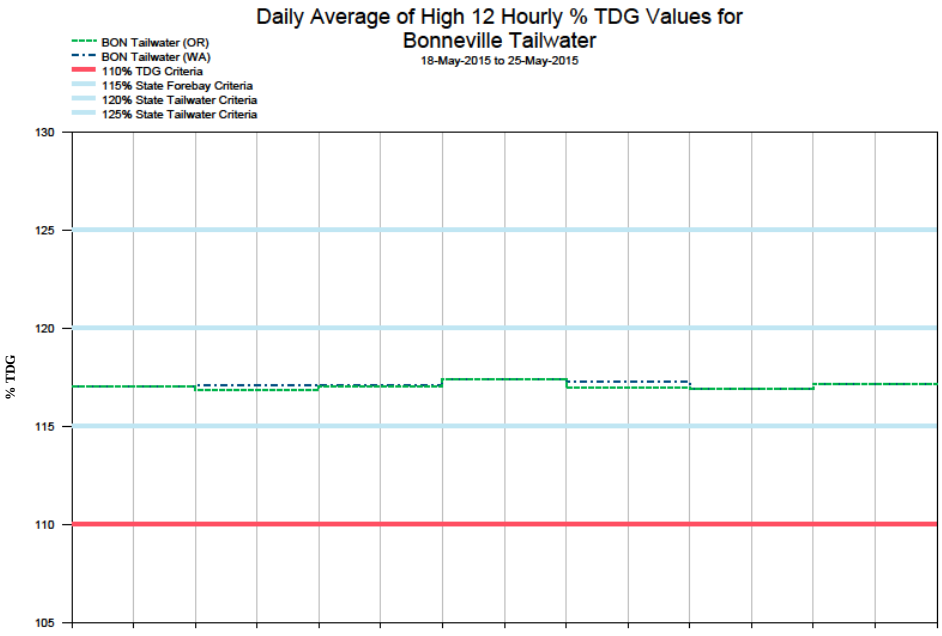

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/18/15 01:00
05/18/15 13:00
05/19/15 01:00
05/19/15 13:00
05/20/15 01:00
05/20/15 13:00
05/21/15 01:00
05/21/15 13:00
05/22/15 01:00
05/22/15 13:00
05/23/15 01:00
05/23/15 13:00
05/24/15 01:00
05/24/15 13:00
05/25/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 32


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
18-May-2015 to 25-May-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

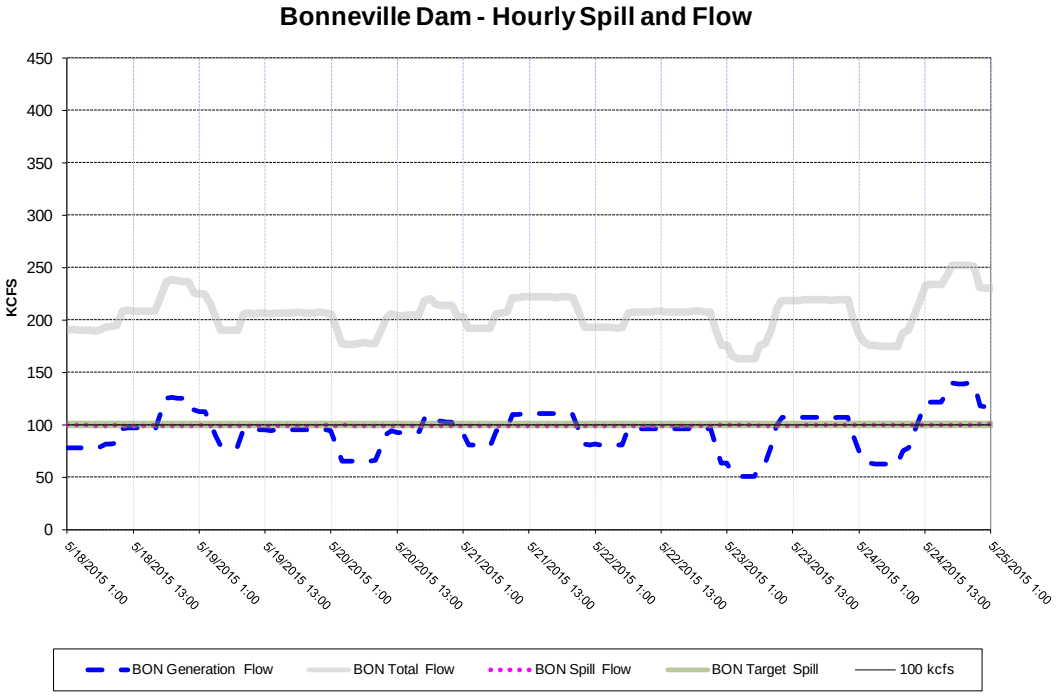
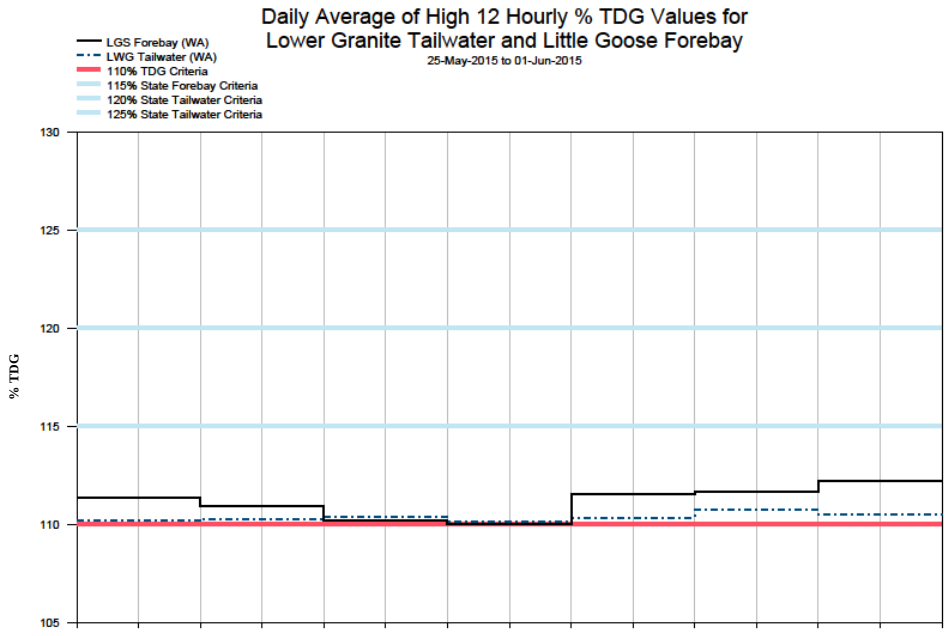

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/18/2015 1:00
5/18/2015 13:00
5/19/2015 1:00
5/19/2015 13:00
5/20/2015 1:00
5/20/2015 13:00
5/21/2015 1:00
5/21/2015 13:00
5/22/2015 1:00
5/22/2015 13:00
5/23/2015 1:00
5/23/2015 13:00
5/24/2015 1:00
5/24/2015 13:00
5/25/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 33


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
25-May-2015 to 01-Jun-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

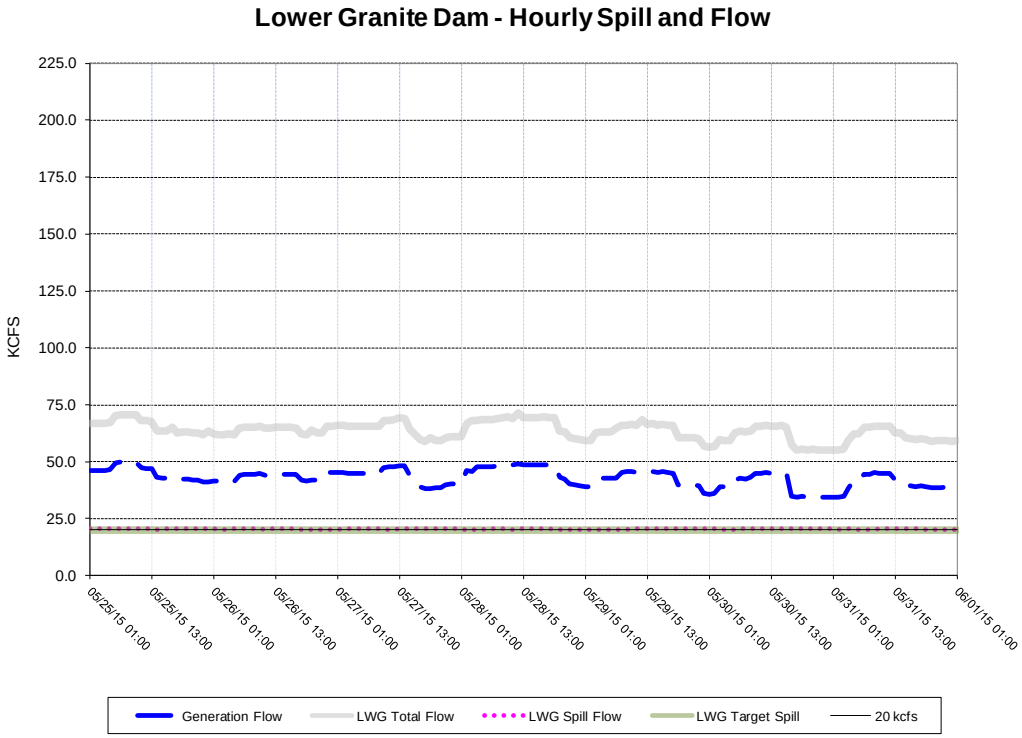
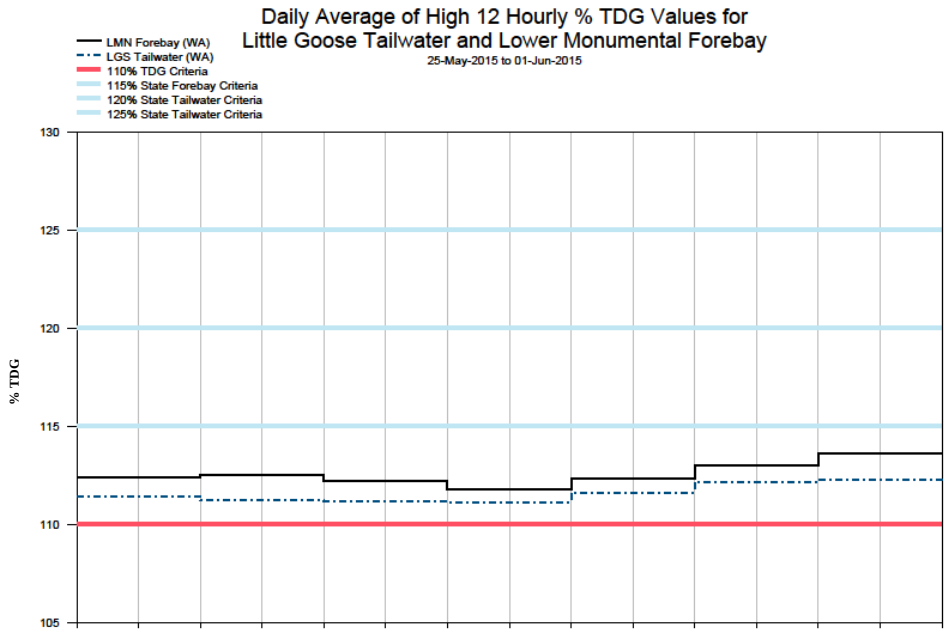

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 34


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
25-May-2015 to 01-Jun-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

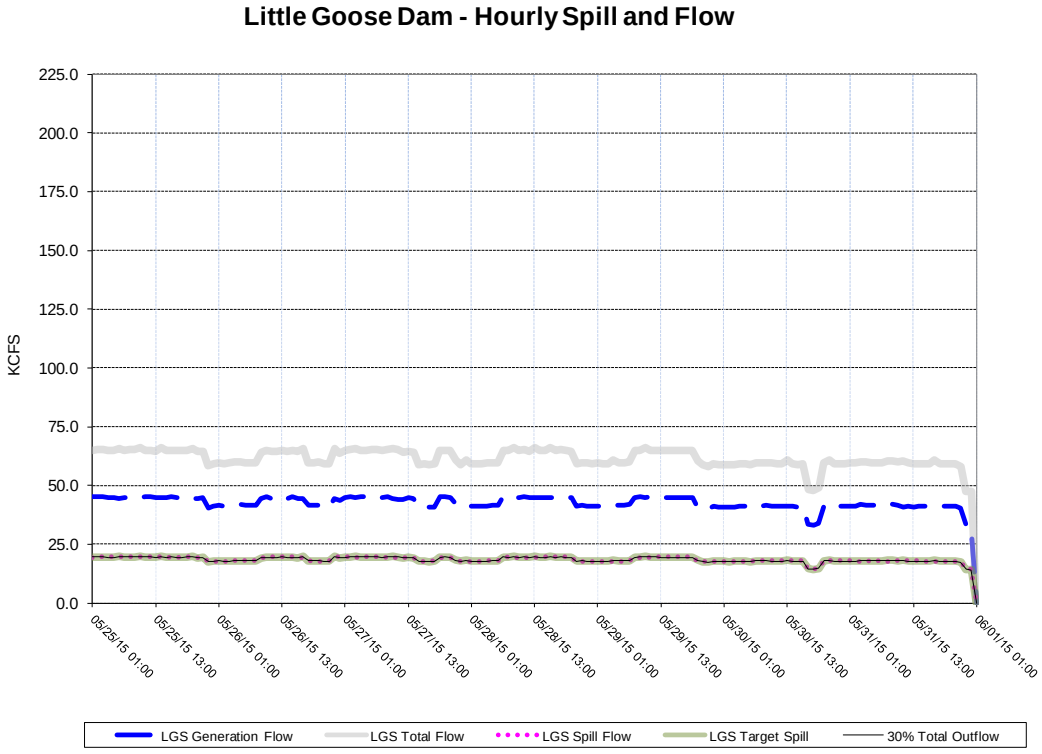
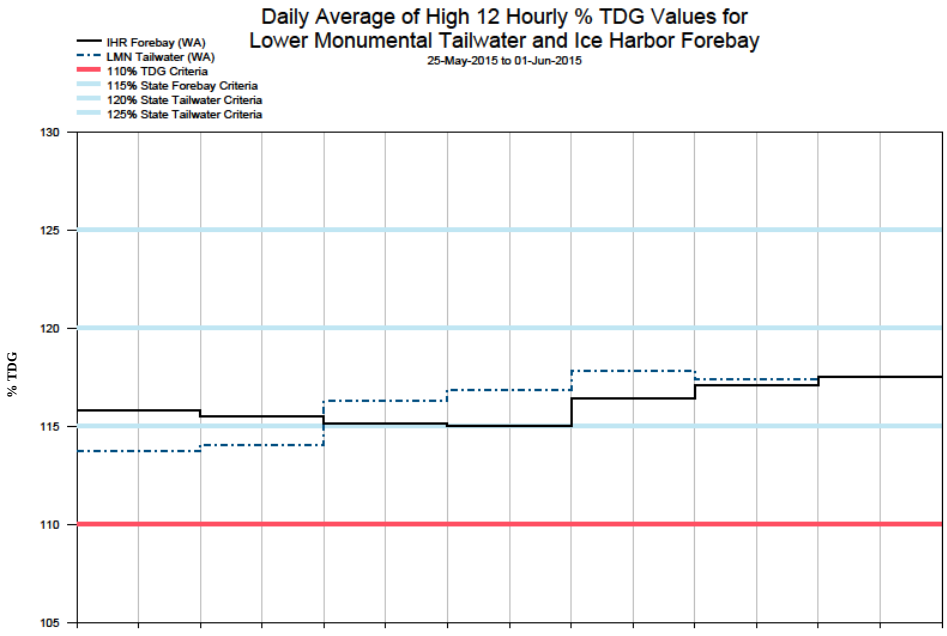

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 35


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
25-May-2015 to 01-Jun-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

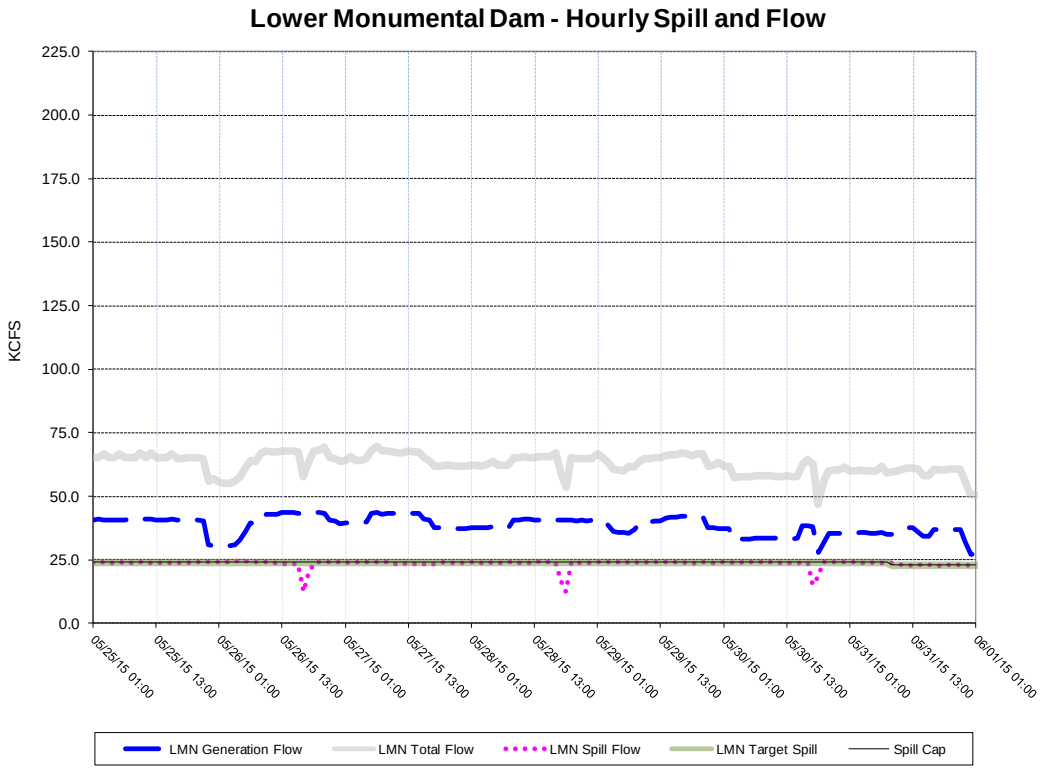
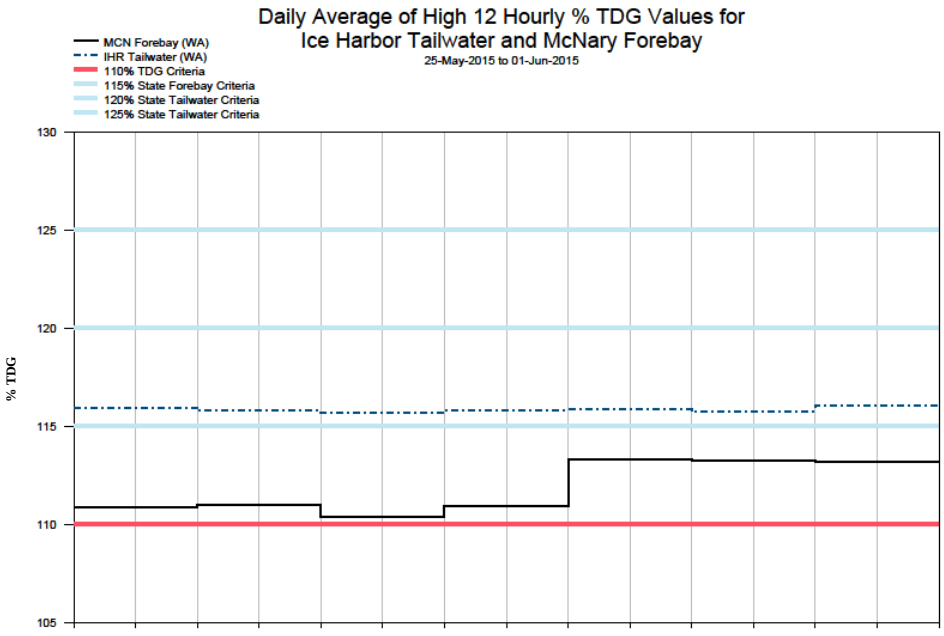

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
25-May-2015 to 01-Jun-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

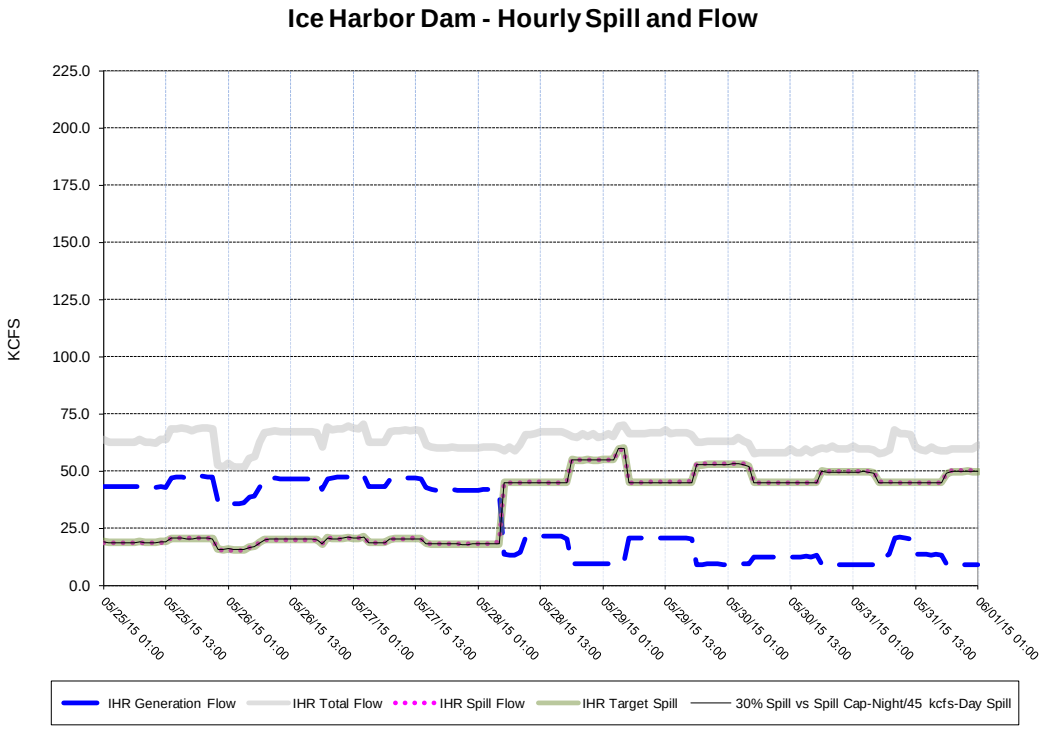
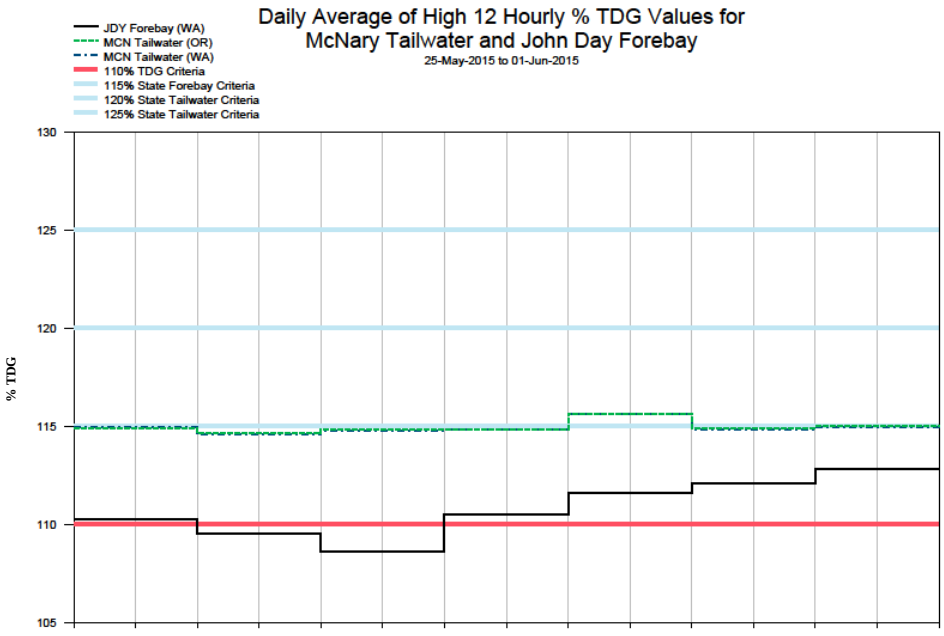

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
30% Spill vs Spill Cap-Night/45 kcfs-Day Spill

Figure 37


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
25-May-2015 to 01-Jun-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

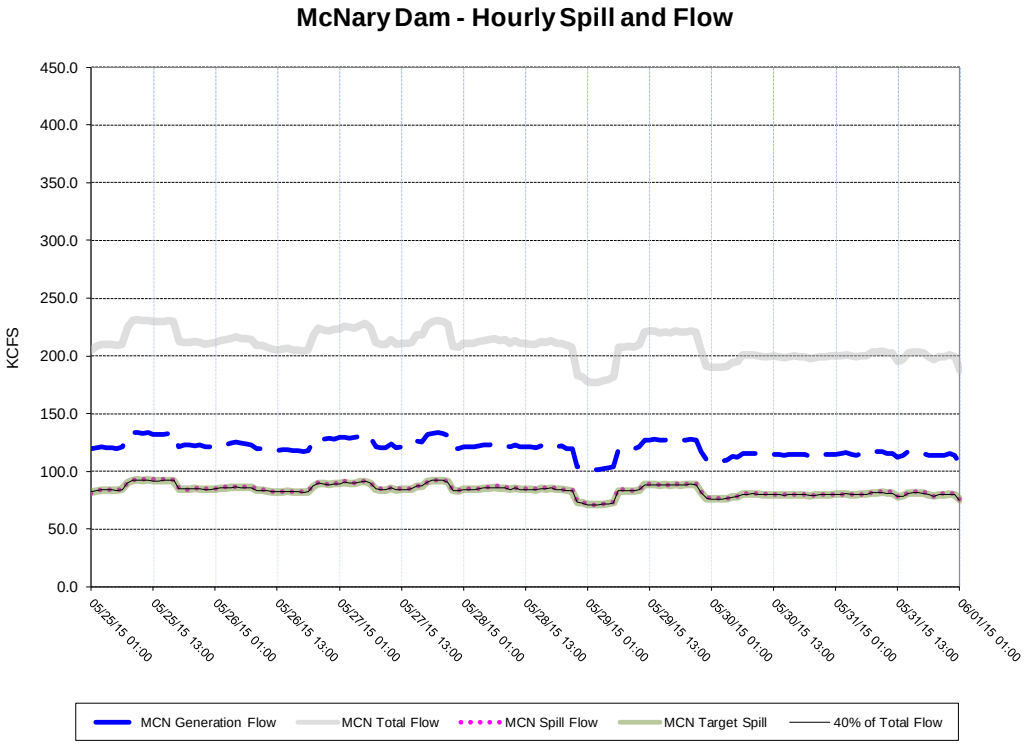
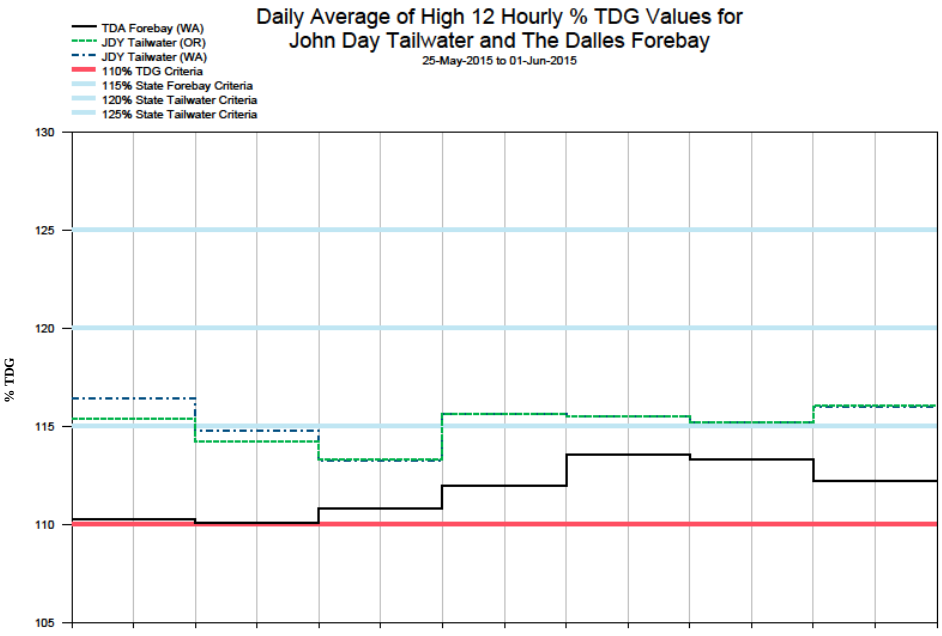

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 38


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
25-May-2015 to 01-Jun-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

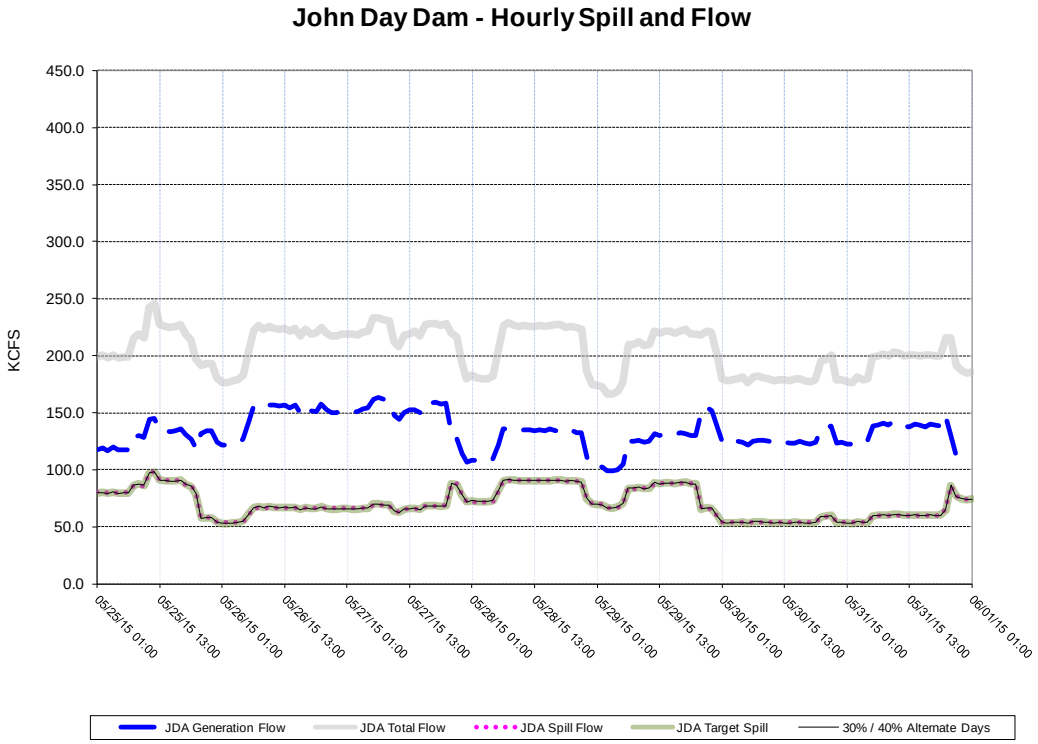
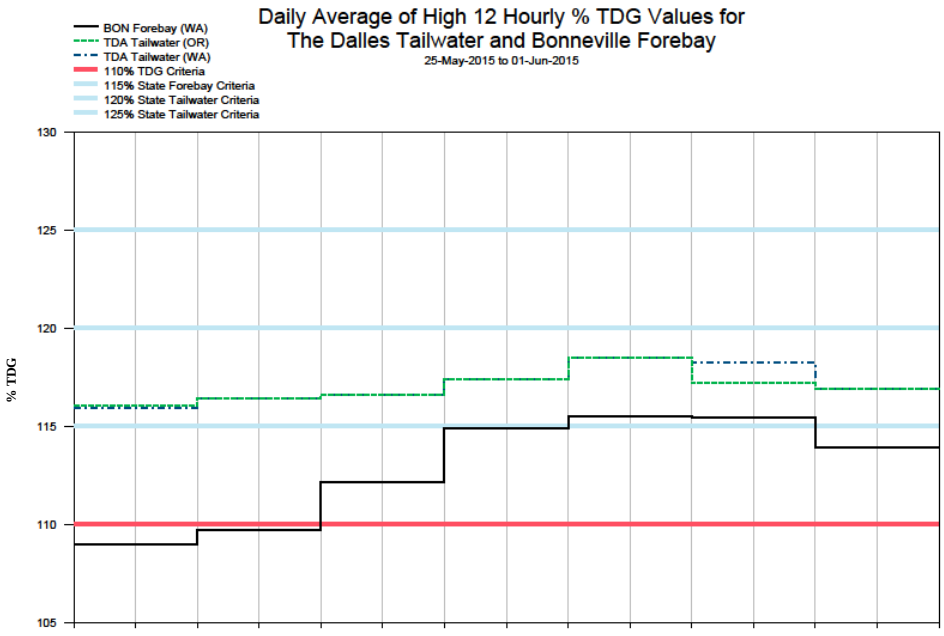

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% / 40% Alternate Days

Figure 39


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
25-May-2015 to 01-Jun-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

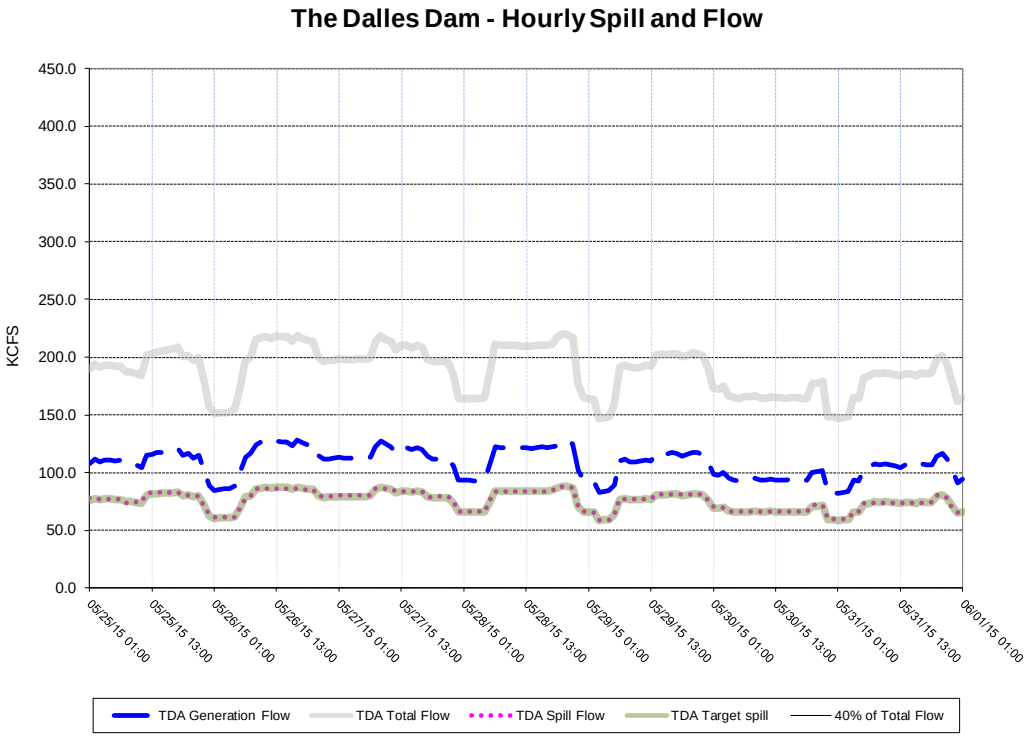
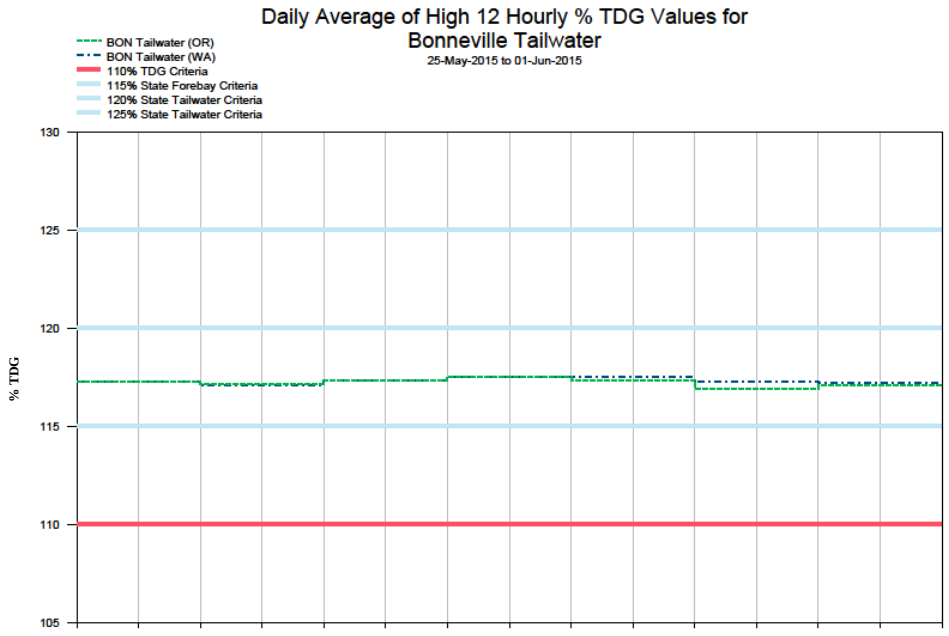

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/25/15 01:00
05/25/15 13:00
05/26/15 01:00
05/26/15 13:00
05/27/15 01:00
05/27/15 13:00
05/28/15 01:00
05/28/15 13:00
05/29/15 01:00
05/29/15 13:00
05/30/15 01:00
05/30/15 13:00
05/31/15 01:00
05/31/15 13:00
06/01/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 40


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
25-May-2015 to 01-Jun-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
% TDG
130
125
120
115
110
105

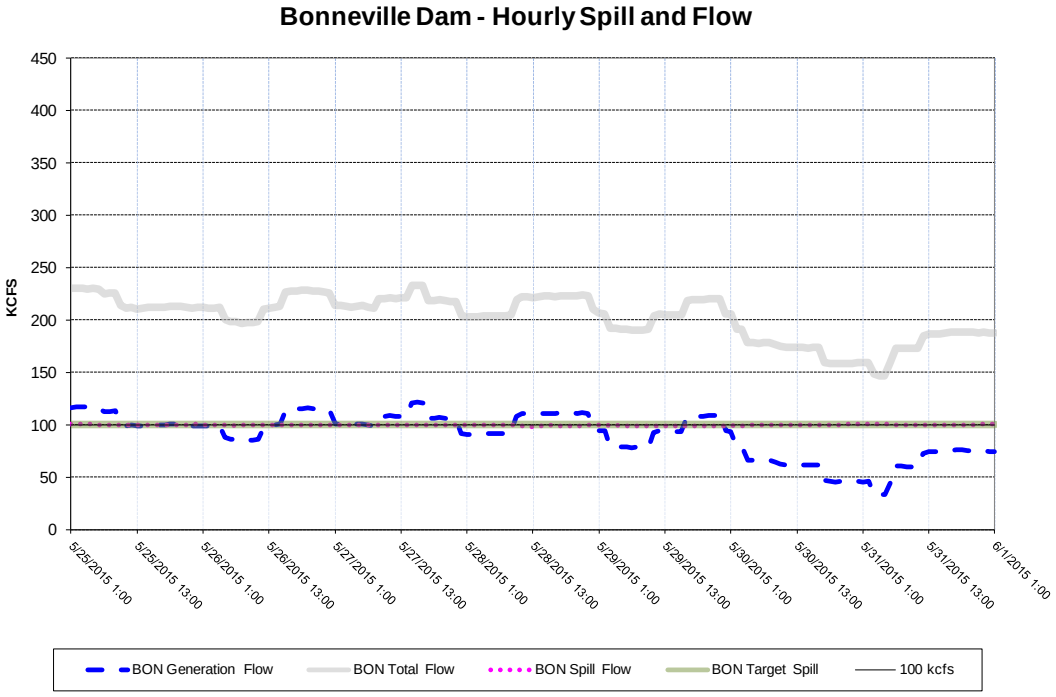

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/25/2015 1:00
5/25/2015 13:00
5/26/2015 1:00
5/26/2015 13:00
5/27/2015 1:00
5/27/2015 13:00
5/28/2015 1:00
5/28/2015 13:00
5/29/2015 1:00
5/29/2015 13:00
5/30/2015 1:00
5/30/2015 13:00
5/31/2015 1:00
5/31/2015 13:00
6/1/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Table 1
Average Percent TDG Values For April 27 – May 31

Date	FIXED MONITORING STATIONS																			
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW		JDY	JHAW		TDA	TDDO		BON	CCIW	
Method:	WA	WA	WA	WA	WA	WA	WA	WA	WA	OR	WA	WA	OR	WA	WA	OR	WA	WA	OR	WA
Gas Cap %	115	120	115	120	115	120	115	120	115	120	120	115	120	120	115	120	120	115	120	120
4/27/2015	101.4	111.4	110	112.2	111.3	117.9	116	114.1	109.4	~~115.7~~	115.9	108.3	~~112.8~~	113.3	111.2	116.1	~~116.1~~	112.6	116.9	~~116.9~~
4/28/2015	102.3	111.5	111.1	112.2	112	118.4	117.7	115.3	112.1	115.7	~~115.4~~	108.7	112.5	~~112.5~~	111.4	116	~~116~~	113.1	117.2	~~117.2~~
4/29/2015	102.3	111.5	111.1	111.9	111.9	117.3	117.9	113.9	112.1	116.4	~~116.3~~	106.7	111.9	~~111.9~~	109.9	~~113.8~~	115	112.8	117.1	~~117~~
4/30/2015	102.5	111.5	109.7	111.8	112.3	117.8	117.8	113.9	111.5	~~117.3~~	117.3	106.7	113.2	~~113.2~~	108.7	~~114.5~~	114.5	111.1	117.1	~~117.1~~
5/1/2015	104.8	111.4	110.7	112.5	112.9	118.5	118.1	114.6	111.8	~~116.3~~	117.3	108.6	113.6	~~113.3~~	112.4	116.9	~~116.9~~	111.9	~~117.1~~	117.2
5/2/2015	104.8	111.1	110.8	112.1	112.8	118	117.5	114.8	111.5	~~115.9~~	116	110.3	114.6	~~114.5~~	112.2	~~116.2~~	116.5	111.8	~~117~~	117.1
5/3/2015	103.5	110.5	110.8	112.5	112.6	117.7	117.4	114.9	111.9	115.6	~~115.6~~	111.3	114.6	~~114.6~~	112.3	117.2	~~117.2~~	113.8	116.5	~~116.5~~
5/4/2015	104.2	110.8	112.1	112.7	112.8	117.3	118.1	115	111.9	~~114.8~~	114.9	111.5	114.3	~~114.2~~	112.3	~~117~~	117.2	114.3	117.1	~~117.1~~
5/5/2015	104.1	110.7	112.1	112.4	112.6	117.1	117.9	115.4	111.9	114.1	~~114.1~~	110.4	113.8	~~113.3~~	111.3	~~115.4~~	115.9	112.6	~~116.1~~	116.7
5/6/2015	102.7	109.9	111.2	111.2	111.9	116.8	116.3	115.8	109.7	~~114.4~~	114.4	109.8	114.6	~~114.6~~	109.9	116	~~116~~	110.2	116.2	~~116.1~~
5/7/2015	102.6	109.9	110.7	110.9	111.6	117.2	114.5	115.7	109.4	115.6	~~115.6~~	110.2	114.7	~~114.7~~	110.9	116.6	~~116.6~~	111.9	116.2	~~116.2~~
5/8/2015	102.5	109.9	110.4	110.9	111.9	117.3	114.8	115.7	111.3	117.2	~~117.2~~	110.8	~~112~~	113.9	112.4	~~117.4~~	117.4	114.2	116.4	~~116.4~~
5/9/2015	102.4	110.3	109.8	111.7	111.9	117.3	115.1	115.6	112.9	~~116.9~~	117.2	110.9	112.6	~~112.5~~	112.9	117.9	~~117.9~~	115.6	117.1	~~117.1~~
5/10/2015	103.5	111	111.3	112.1	112.1	117.3	115.7	113.8	113.3	116.7	~~116.7~~	110.4	112.1	~~112.1~~	113.4	117.9	~~117.9~~	115.8	117.2	~~117.2~~
5/11/2015	104.1	111.3	111.5	112	112.4	117.2	116.4	113.5	113.8	~~116.5~~	116.6	110.4	~~111~~	111.6	113	~~115.6~~	117.5	115.3	~~117~~	117.1
5/12/2015	104.4	111.3	111	112	112.5	116.8	116.4	114	113	~~116~~	116.1	108.9	~~110.2~~	110.7	108.6	~~114.8~~	114.9	111	~~116.8~~	117
5/13/2015	104.4	111.2	109.9	111.8	112.7	116.3	116.3	113.9	112	~~114.3~~	114.7	109	113.7	~~113.6~~	109.4	116	~~116~~	109.4	116.4	~~116.3~~
5/14/2015	103.9	110.9	109.9	111.6	111.3	117.2	113.5	115	108.3	114.9	~~114.7~~	109.9	114.4	~~114.3~~	112.7	~~118.2~~	118.2	112.5	~~116.8~~	116.8
5/15/2015	103.5	110.6	110.2	111.6	111.2	117.1	113	114.4	108.3	~~114.2~~	114.3	110.1	~~114.3~~	114.4	112.7	~~117.1~~	118.1	113.5	117.1	~~117~~
5/16/2015	102.6	111	110	111.4	111.2	118	113.4	114.9	109.9	116.4	~~116.4~~	109.8	~~112.5~~	113.3	109.6	~~114.6~~	115.7	111.7	~~116.1~~	116.7
5/17/2015	102.8	109.8	109.1	110.9	110.8	118.1	113.6	115.5	109.8	116.9	~~116.9~~	107.7	110.3	~~110.1~~	110.2	~~115.8~~	115.8	109.6	116.6	~~116.5~~
5/18/2015	102.8	109.9	109.5	110.7	110.7	119	114.4	115.7	109.7	~~114.8~~	116.5	109	110.8	~~110.8~~	112.2	118	~~118~~	112.9	117.3	~~117.3~~
5/19/2015	103.1	110	109.7	110.9	112.2	118.9	115.8	115.4	111.9	114.8	~~114.6~~	109.5	113.6	~~113.6~~	111.7	~~116.8~~	117.7	113.3	~~117.1~~	117.3
5/20/2015	104.3	110.1	110.5	111.3	113	119.1	116.6	116	112.7	115.6	~~115.5~~	109.5	114.6	~~114.6~~	111.4	117.3	~~117.3~~	113.2	~~117.3~~	117.3
5/21/2015	105	110.5	110.6	111.2	113	118.6	117.7	116	113	114.8	~~114.8~~	109.5	~~115.4~~	115.4	112.9	118.6	~~118.6~~	114.8	117.6	~~117.6~~
5/22/2015	105.1	110.6	110.4	111	113.2	118.2	118	115.6	113.3	114.7	~~114.6~~	110.9	115.2	~~115.1~~	112.9	~~117.3~~	118.3	114.8	~~117.2~~	117.4
5/23/2015	104.4	110.2	109.9	111.5	113.1	114.4	117.7	115.6	112.2	114.5	~~114.5~~	110.9	~~115.4~~	115.4	109.4	~~115.2~~	115.9	111.5	117.1	~~117.1~~
5/24/2015	103.4	110.3	111.1	111.5	112.4	113.8	116.3	116	110.8	~~115.1~~	115.1	110.5	~~116.6~~	116.6	109.7	115.9	~~115.9~~	108.4	117.5	~~117.5~~
5/25/2015	103.5	110.2	111.3	111.4	112.4	113.7	115.7	115.9	110.9	114.8	~~114.8~~	110.2	~~115.4~~	116.2	110.3	116	~~115.9~~	109	~~117.5~~	117.5
5/26/2015	103.4	110.3	110.9	111.2	112.5	114.3	115.5	115.8	111	114.6	~~114.6~~	109.5	~~114.2~~	114.6	110.1	116.4	~~116.4~~	109.8	117.4	~~117.4~~
5/27/2015	103.3	110.4	110.2	111.1	112.2	116.3	115.2	115.7	110.4	114.8	~~114.8~~	108.6	113.4	~~113.2~~	110.9	116.6	~~116.6~~	112.3	117.6	~~117.5~~
5/28/2015	102.9	110.1	110.1	111.1	111.8	116.8	115	115.8	111	114.9	~~114.8~~	110.7	115.6	~~115.6~~	112.2	~~117.4~~	117.4	115	117.7	~~117.7~~
5/29/2015	103	110.3	111.6	111.6	112.3	117.8	116.4	115.8	113.3	~~115.6~~	115.6	111.7	115.5	~~115.5~~	113.5	~~118.5~~	118.5	115.5	~~117.6~~	117.7
5/30/2015	103.5	110.7	111.7	112.1	113	117.3	117.1	115.7	113.1	114.9	~~114.8~~	112.1	115.2	~~115.2~~	113.2	~~117.1~~	118.1	115.4	~~117.1~~	117.5
5/31/2015	104	110.5	112.2	112.3	113.6	117.5	117.5	116	113.2	115	~~115~~	112.9	116	~~116~~	112.3	116.9	~~116.9~~	113.9	~~117.3~~	117.4

Note: The Oregon TDG standard modification (OR) and the Washington TDG criteria adjustments (WA) have different methodologies for calculating TDG. When the standards vary or conflict, the Corps applies the more stringent standard. TDG values are presented in Table 1 by displaying the highest value %TDG (more stringent), and the lower value is displayed with a strikethrough.

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)
CWMW	Camas / Washougal