Appendix D

2014 FOP Implementation Reports

With Hourly Spill, Flow and TDG Graphs

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FISH OPERATIONS PLAN IMPLEMENTATION REPORT
April 2014

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 2014 Spring Fish Operations Plan (2014 Spring FOP) posted to TMT on April 1, 2014. The 2014 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 early June. To the extent Corps project operations that are not specified in the 2014 Spring 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 2014 Water Management Plan (WMP), WMP seasonal updates, and the 2014 Fish Passage Plan (FPP).

The Corps' April 2014 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,
- % average percent Total Dissolved Gas (TDG) levels 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 2014 Spring FOP in April.

Data Reporting:

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

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

[1] Averages reported consistent with the current and applicable Oregon TDG waiver (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG waiver and the Washington TDG criteria adjustment 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 graphs begin on March 31 and end on April 27 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

Each figure represents one week of a project's operation. The graphs start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill graphs) on March 31 for the lower Snake River and the lower Columbia River projects.

March 31 – April 6	Figures 1 – 4
April 7 – April 13	Figures 5 – 12
April 14 – April 20	Figures 13 – 20
April 21 – April 27	Figures 21 – 28

A. Upper Graph: Displays the average daily %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 2014 Spring FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the Oregon 120 %TDG waiver limit for the tailwater of the dam.
2. The blue dot-dash line represents the Washington 120 %TDG criteria adjustment for the tailwater of the dam.
3. The black solid line represents the Washington 115 %TDG criteria adjustment for the forebay of the next dam downstream.

B. Lower Graph: 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 river flow through the project 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 2014 Spring 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 river flow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2014 Spring 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 (50 kcfs) dam;
    - minimum spill at John Day is 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 2014 Spring FOP, the heavy pink line will be below or above the heavy black line in the graphs. Actual deviations from the target operation during voluntary spill hours are described below in the April 2014 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 reduction 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 2014 Spring 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 (except as otherwise noted in the 2014 Spring FOP for Bonneville and The Dalles dams,[4] which may range up to ±3 kcfs) as compared to those specified in the 2014 Spring FOP and the RCC spill priority list (defining the project %TDG spill caps). A number of factors influence actual

[3] Involuntary spill conditions are identified in the graphs but are not considered variances so 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.

[4] As specified in the 2014 Spring FOP (p. 15), this applies when the spill level is below 40% of total flow at The Dalles Dam.

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 2014 Spring FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Report 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 2014 Spring 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.

April Operations:

The month of April was characterized by below average flows for the lower Snake River and slightly below average flows for the lower Columbia River. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the April 2014 adjusted volume runoff on the lower Columbia was below the 30 year average (1981-2010): 13.1MAF (million acre feet) or 95 % of average as measured at The Dalles. The Runoff Processor also indicated April 2014 adjusted volume runoff on the lower Snake was below the 30 year average (1981-2010): 4.1MAF or 90 % of average as measured at Lower Granite Dam. The monthly precipitation summary for April was below average at 97 % on the Snake River above Ice Harbor Dam and below average on the Columbia River above The Dalles Dam at 97 %.

In accordance with the 2014 Spring FOP, spring spill operations commenced on April 3 at 0001 hours at the Corps' lower Snake projects and on April 10 at 0001 hours at the lower Columbia projects.
During the April reporting period, the planned 2014 Spring 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 river flow 24-hours/day.

- Lower Monumental Dam - The hourly target spill level was the %TDG cap 24 hours/day, approximate gas cap range: 20 – 29 kcfs.
- Ice Harbor Dam - The hourly target spill level was 45 kcfs daytime and the %TDG cap nighttime, approximate gas cap range: 75 – 95 kcfs. Nighttime spill hours are 1800-0500.
- McNary Dam - The hourly target spill level was 40 % of total river flow for 24-hours/day.
- John Day Dam - The hourly target spill level was 30 % of total river flow for 24-hours/day until the alternating two-treatment operation begins (2014 Spring FOP p. 14) on April 27).
- The Dalles Dam - The hourly target spill level was 40 % of total river flow for 24-hours/day.
- Bonneville Dam - The hourly target spill level was 100 kcfs 24 hours/day.

Operational Adjustments

1. Little Goose Dam:

Between April 27 at 0001 hours and April 30 at 0800 hours, Little Goose Dam operated above the Minimum Operating Pool (MOP) elevation of 633-634 feet in order to properly store the navigation lock bulkhead. Due to an emergency navigation lock outage that occurred at Little Goose Dam between the dates of March 25 and April 21, the project was unable to conduct this operation as previously scheduled prior to April 3. This operation was coordinated during the April 23 TMT and there were no objections.

2. Dworshak Dam:

Dworshak Dam operations were coordinated with TMT at meetings on April 2, April 9 and April 30 to deviate from flood control requirements to the extent possible in order to minimize fish impacts. At the April 2 TMT meeting there was inquiry regarding flood control requirements that would increase Dworshak Dam outflows to 25 kcfs for 10 days and then reduce to below 5 kcfs in May. This increase in outflows was due to a significant increase in the water supply forecast. Based on concerns from TMT that the higher discharge could have near-term TDG impacts and could reduce flow augmentation available for the bulk of the juvenile outmigration in late April and early May, the Corps proposed consideration of a flood control deviation to increase outflows to 20 kcfs instead of 25 kcfs. On April 4, the deviation request was approved and the modified operation was implemented until April 18, 2014 when outflows were reduced to10 kcfs (full powerhouse) through the end of April. These operations were discussed at TMT on April 9 and April 30.

At the April 30 TMT meeting, some representatives proposed an operation to extend the full powerhouse operation for an additional day (through May 2), then reduce outflows to 5 kcfs on May 3, and then down to 2.4 kcfs on May 4 as the project transitioned to refilling of the reservoir pool. Discussion of this proposal included TMT's representatives' acknowledgment that, based on the current forecast, the operation could potentially risk reservoir refill by the end of June as required in the BiOp (i.e. Dworshak reservoir elevation could be up to 2 feet below full in June). TMT members either supported or did not object to the operation as proposed and the Action Agencies agreed to implement the request.

April 2014 Spill Variance Table

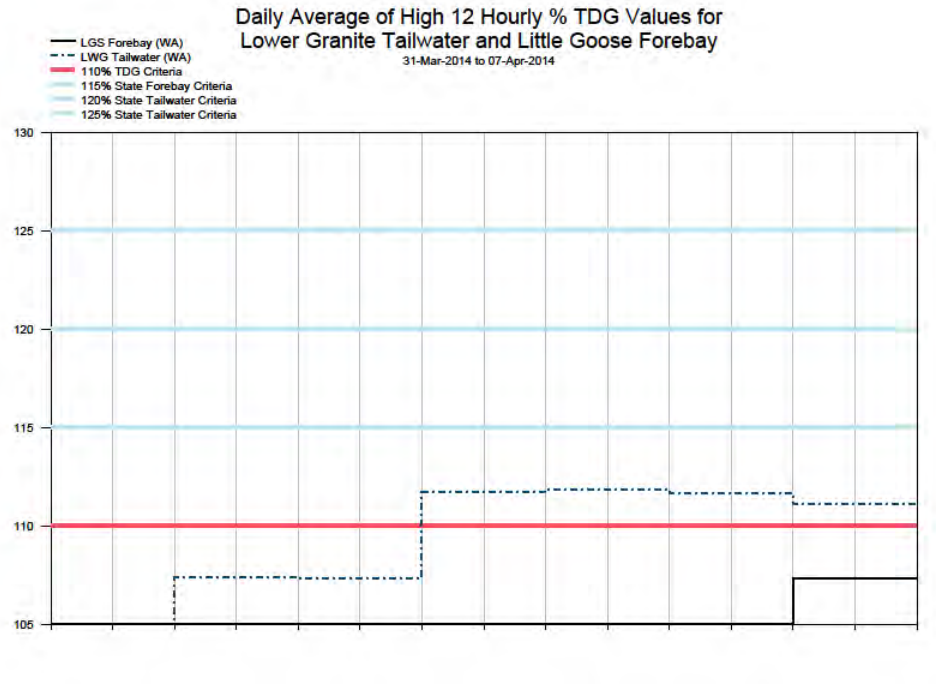
Table 1: April 2014 (4/3 – 4/27) - FOP Implementation Report Table

Project	Parameter	Date	Time[5]	Hours	Type	Reason
	Additional Spill	4/17/14	1700-1800	2	Operational Limitations	Due to an unexpected transmission line outage, multiple projects had to reduce generation which impacted hourly spill.
Lower Granite			1700-1800	2		Lower Granite: Hourly spill increased to 37.8 kcfs (above FOP spill of 20 kcfs).
Little Goose			1700-1800	2		Little Goose: Hourly spill increased to 47.3% (above 30% ± 1.0% range). 24 hr avg. spill was 40.0%.
Ice Harbor			1700-1800	2		Ice Harbor: Hourly spill increased to 65.4 kcfs (above FOP spill of 45 kcfs).
John Day			1700-1800	2		John Day: Hourly spill increased to 44.5% (above 30% ± 1.0% range). 24 hr avg. spill was 30.7%.
The Dalles			1700-1800	2		The Dalles: Hourly spill increased to 57.1% (above 40% ± 1.0% range). 24 hr avg. spill was 40.8%.
Bonneville			1700	1		Bonneville: Hourly spill increased to 109.1 kcfs (above FOP spill of 100 kcfs).
John Day	Additional Spill	4/21/14	1900	1	Transmission Stability	Hourly spill increased to 31.3% (above 30.0% ± 1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 32.1%.

[5] 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.

John Day	Additional Spill	4/27/14	0900	1	Transmission Stability	Hourly spill increased to 32.6% (above 30.0% ± 1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 34.6%.
The Dalles	Reduced Spill	4/13/14	0800	1	Operational Limitations	Hourly spill decreased to 38.5% (below 40.0% ± 1% range) due to transmission system emergency. Project increased generation for part of the hour to assure system reliability. 24 hr avg. spill was 39.9%.
The Dalles	Reduced Spill	4/21/14	2000	1	Human/Program Error	Hourly spill decreased to 38.9% (below 40.0% ± 1% range). GDACS error reporting spill rate. Spill was reduced due to program malfunction. 24 hr avg. spill was 39.9%.
The Dalles	Reduced Spill	4/22/14	0200	1	Transmission Stability	Hourly spill decreased to 38.9% (below 40.0% ± 1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 40.8%
The Dalles	Reduced Spill	4/22/14	2000	1	Transmission Stability	Hourly spill decreased to 38.8% (below 40.0% ± 1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 40.8%
The Dalles	Reduced Spill	4/27/14	0700	1	Transmission Stability	Hourly spill decreased to 38.6% (below 40.0% ± 1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 41.4%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
31-Mar-2014 to 07-Apr-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

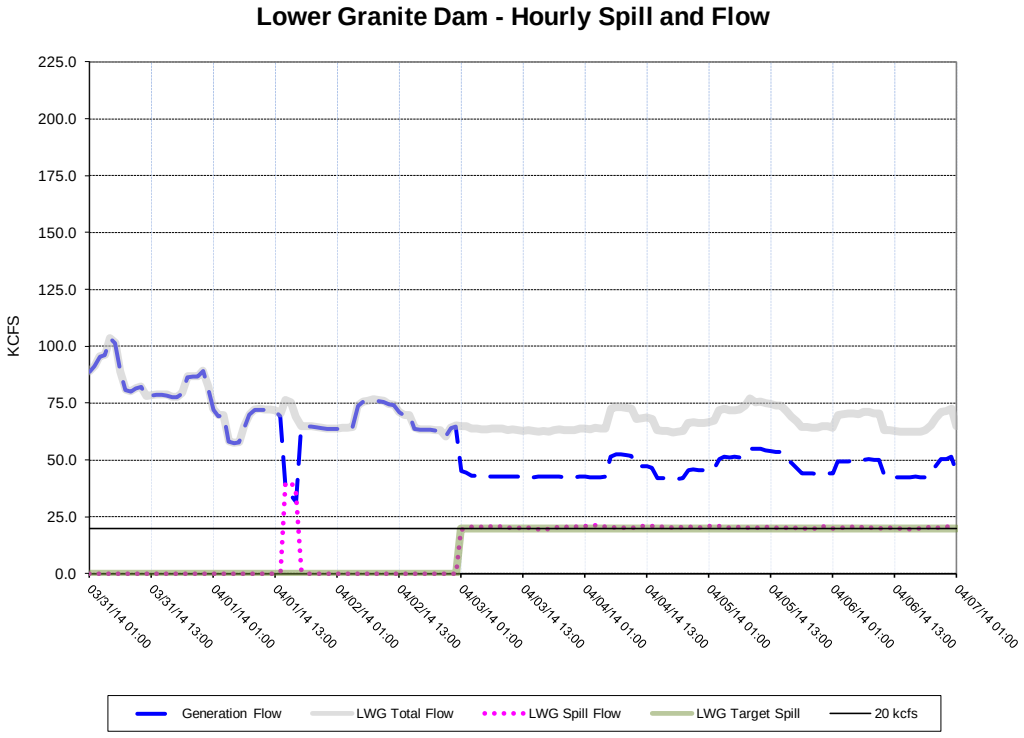
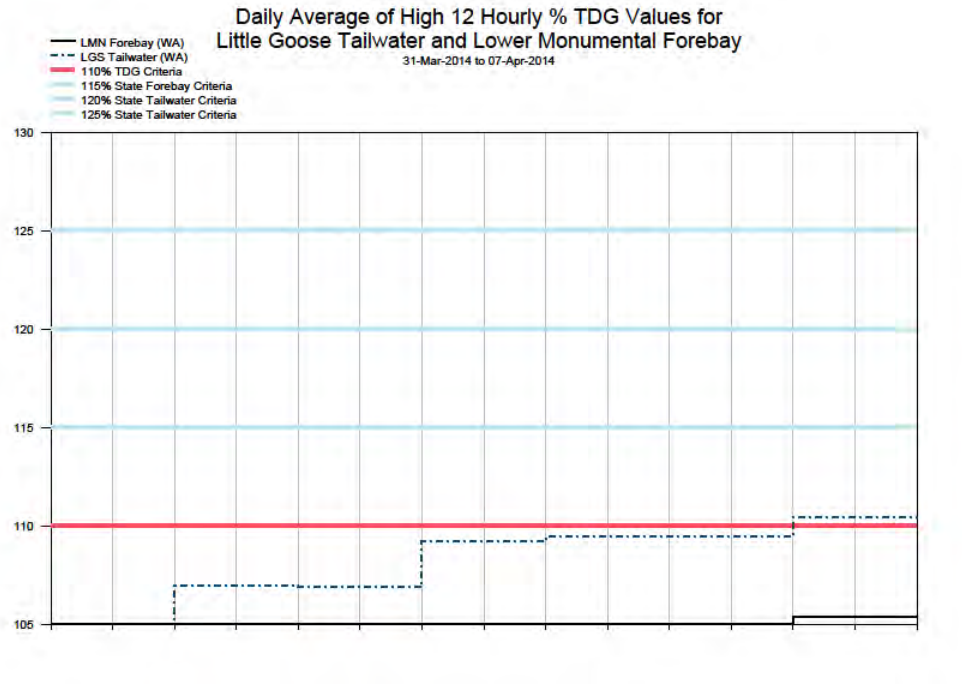

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
03/31/14 01:00
03/31/14 13:00
04/01/14 01:00
04/01/14 13:00
04/02/14 01:00
04/02/14 13:00
04/03/14 01:00
04/03/14 13:00
04/04/14 01:00
04/04/14 13:00
04/05/14 01:00
04/05/14 13:00
04/06/14 01:00
04/06/14 13:00
04/07/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 2



Little Goose Dam - Hourly Spill and Flow

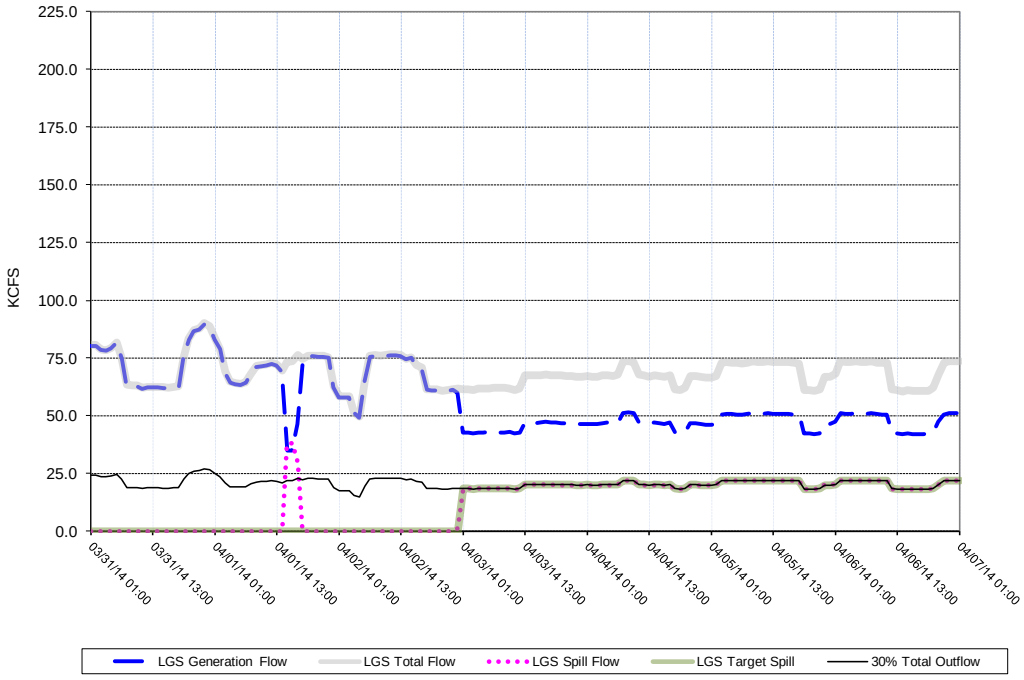
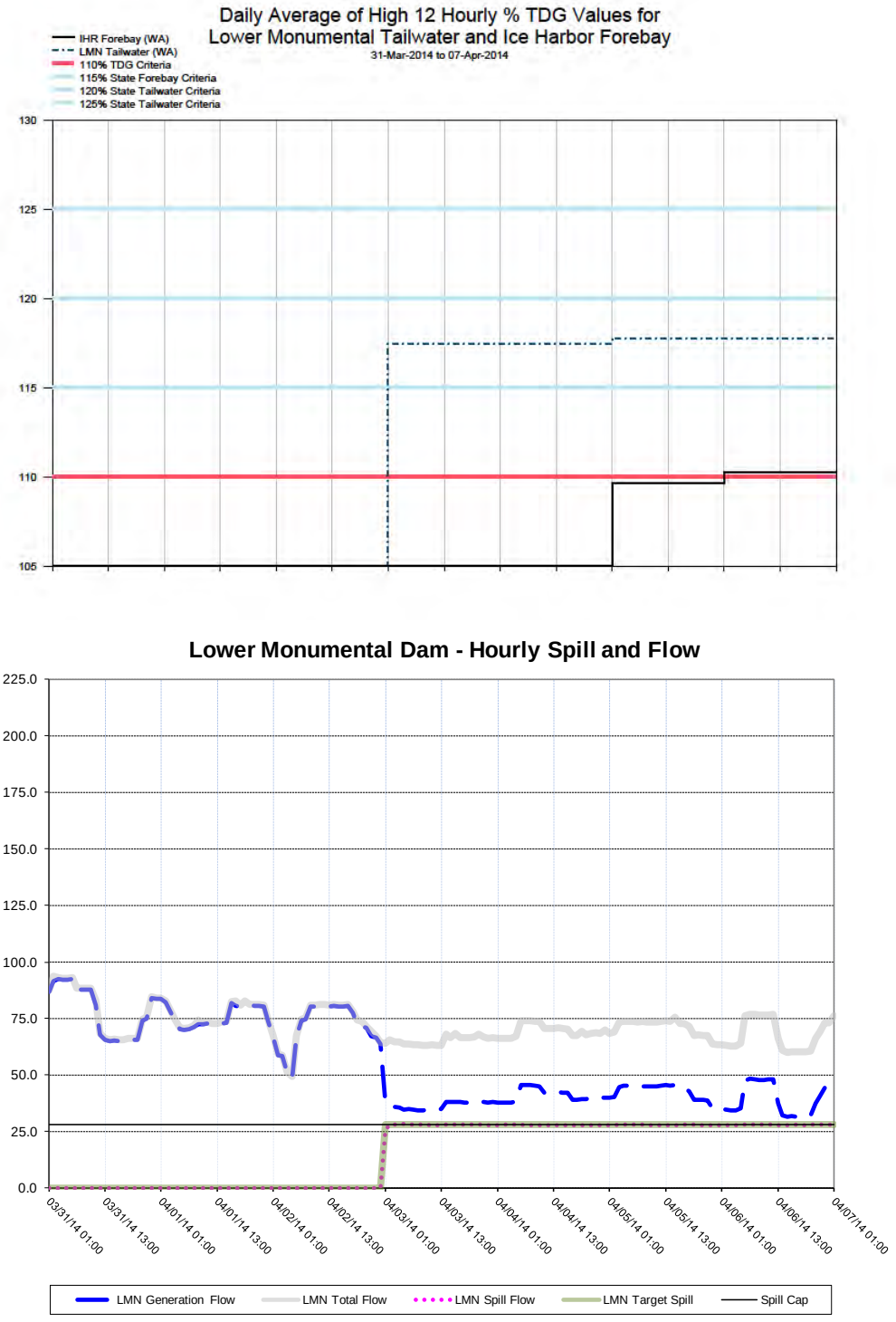


Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
31-Mar-2014 to 07-Apr-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
03/31/14 01:00
03/31/14 13:00
04/01/14 01:00
04/01/14 13:00
04/02/14 01:00
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04/03/14 01:00
04/03/14 13:00
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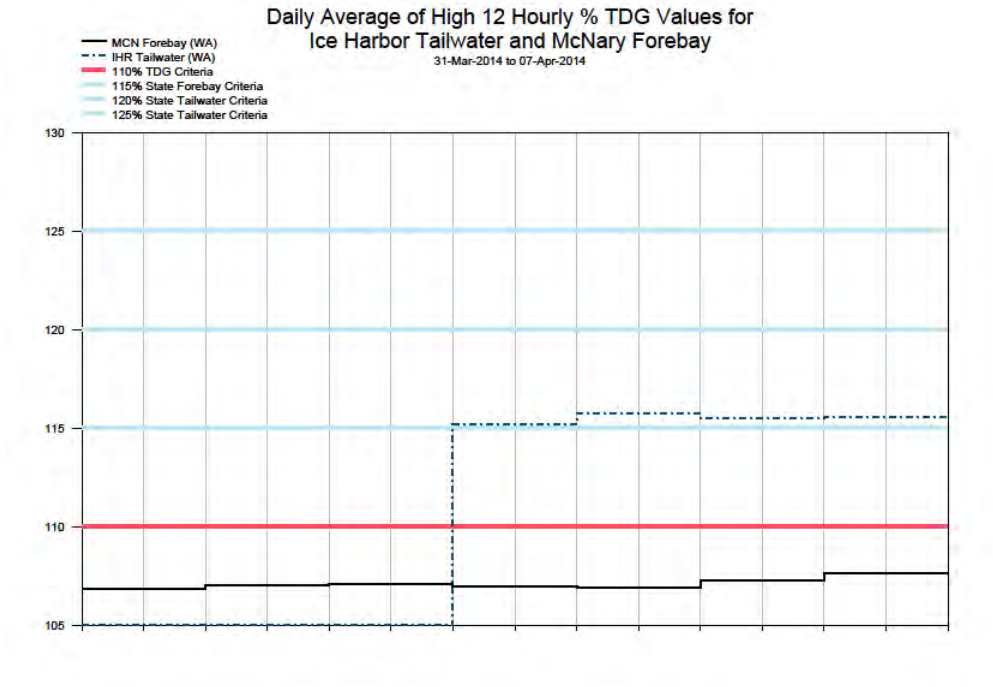
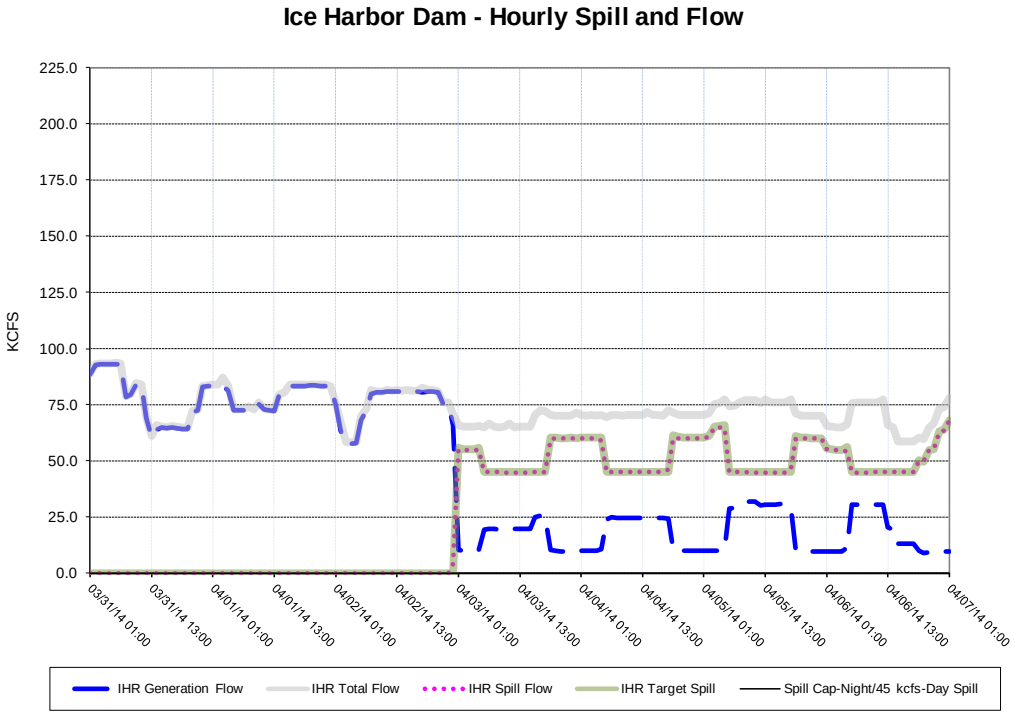
04/04/14 13:00
04/05/14 01:00
04/05/14 13:00
04/06/14 01:00
04/06/14 13:00
04/07/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
31-Mar-2014 to 07-Apr-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
03/31/14 01:00
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04/03/14 13:00
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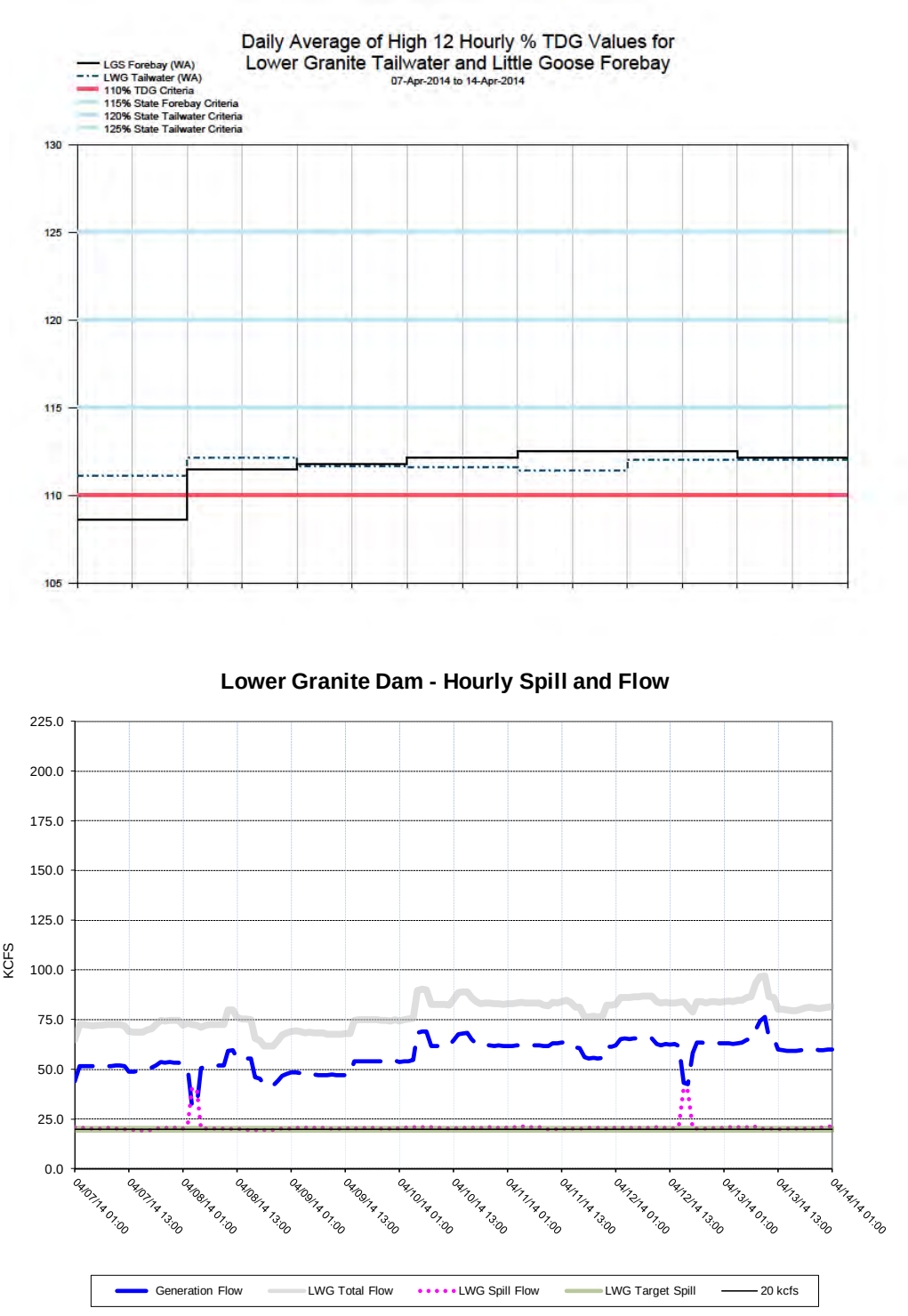
04/04/14 13:00
04/05/14 01:00
04/05/14 13:00
04/06/14 01:00
04/06/14 13:00
04/07/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 5


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
07-Apr-2014 to 14-Apr-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
04/07/14 01:00
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04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
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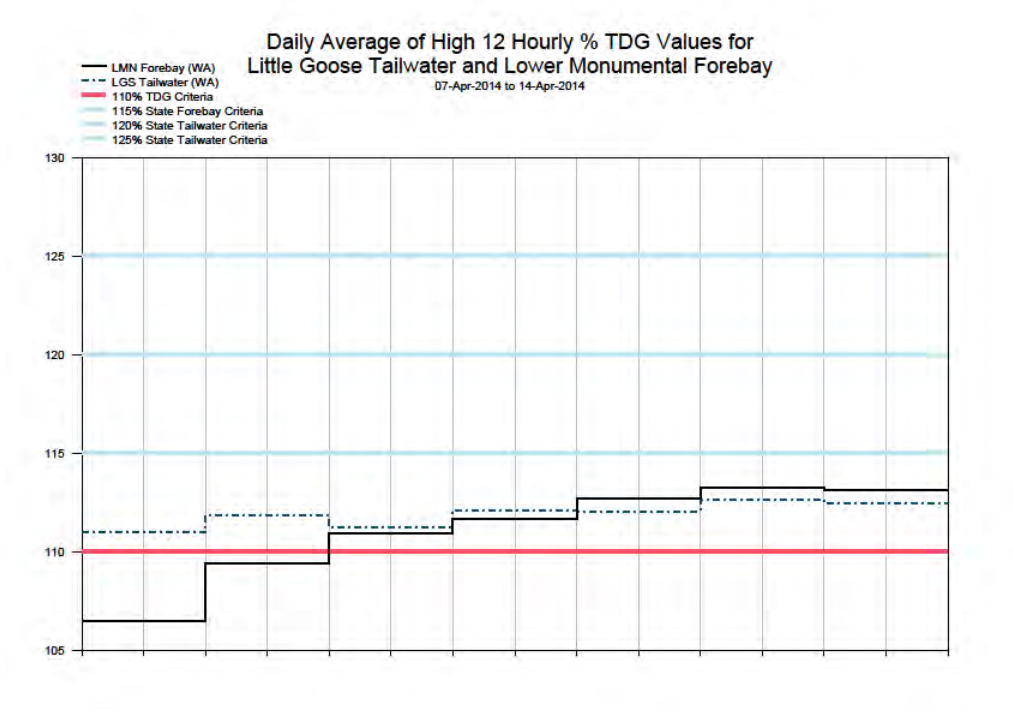
04/14/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 6


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
07-Apr-2014 to 14-Apr-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
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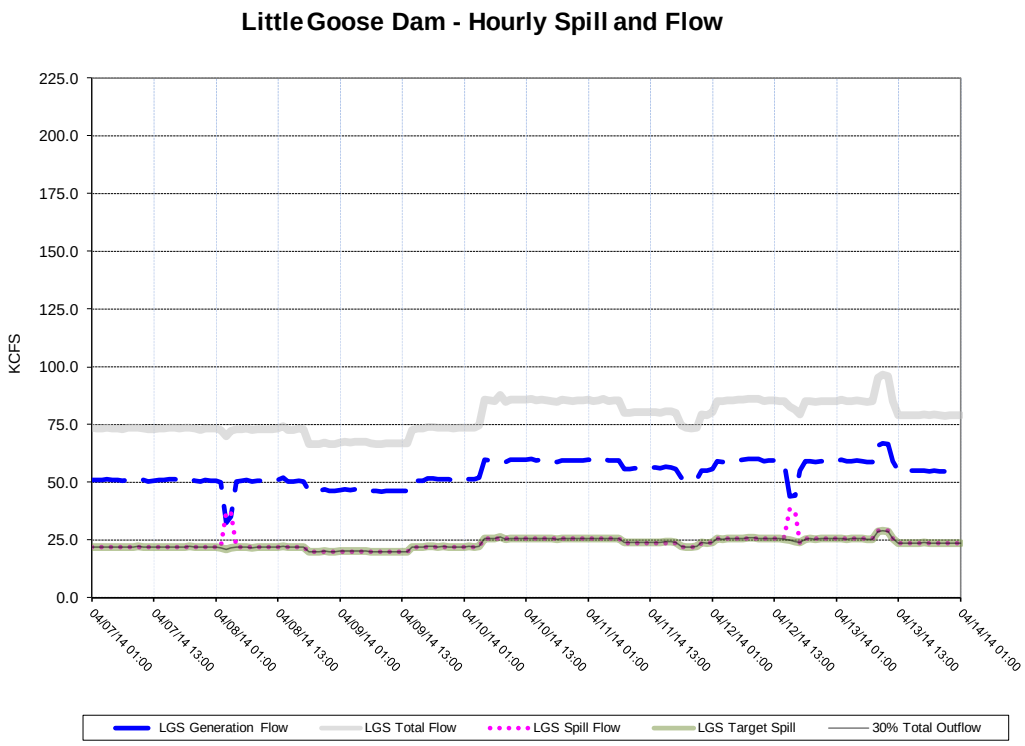
105


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
04/07/14 01:00
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04/11/14 01:00
04/11/14 13:00
04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
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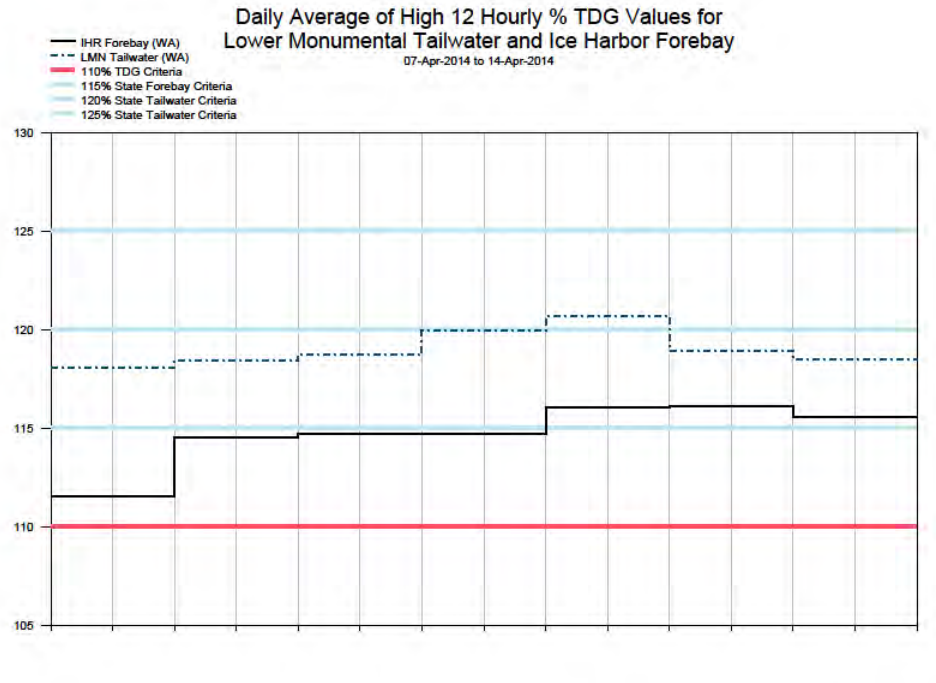
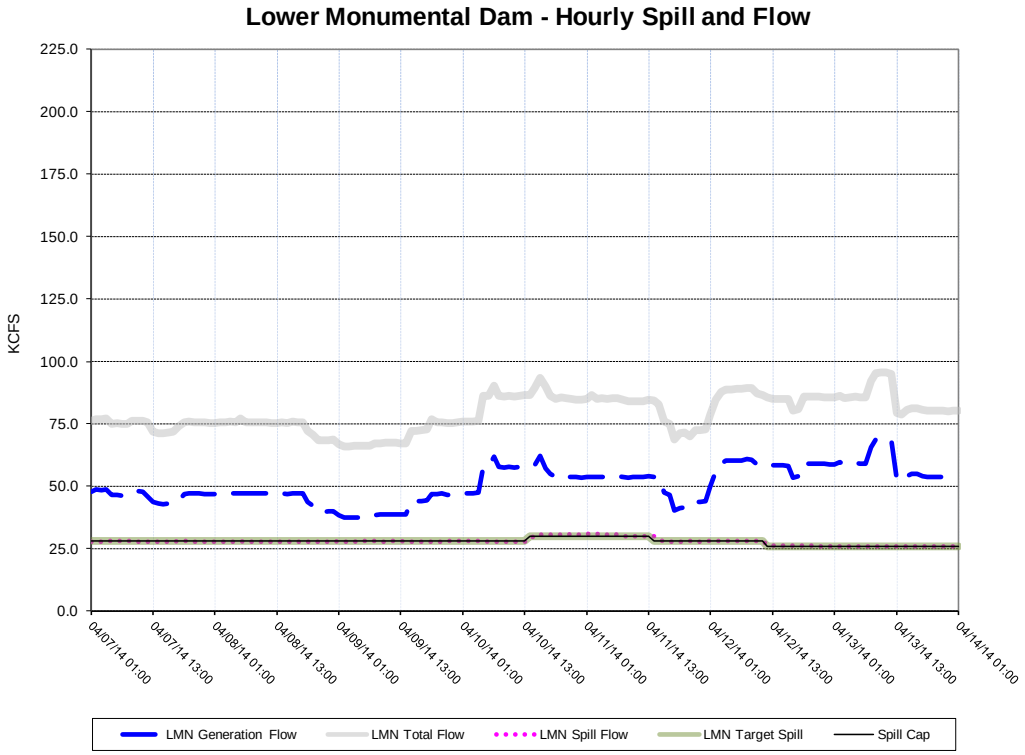
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 7


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
07-Apr-2014 to 14-Apr-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
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04/07/14 01:00
04/07/14 13:00
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04/10/14 01:00
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04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
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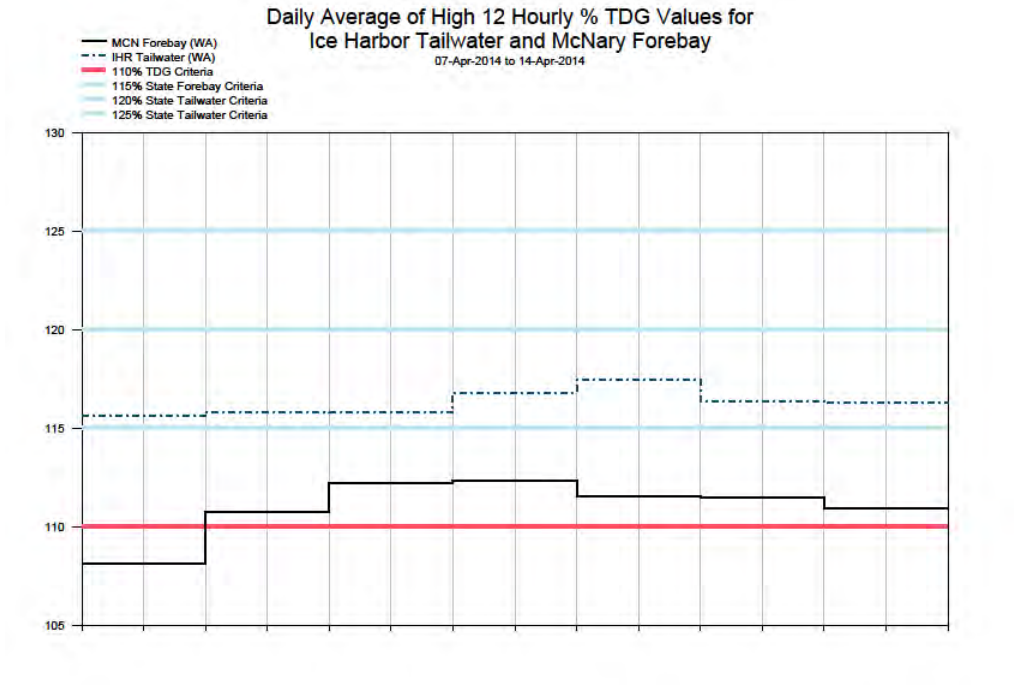
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 8


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
07-Apr-2014 to 14-Apr-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

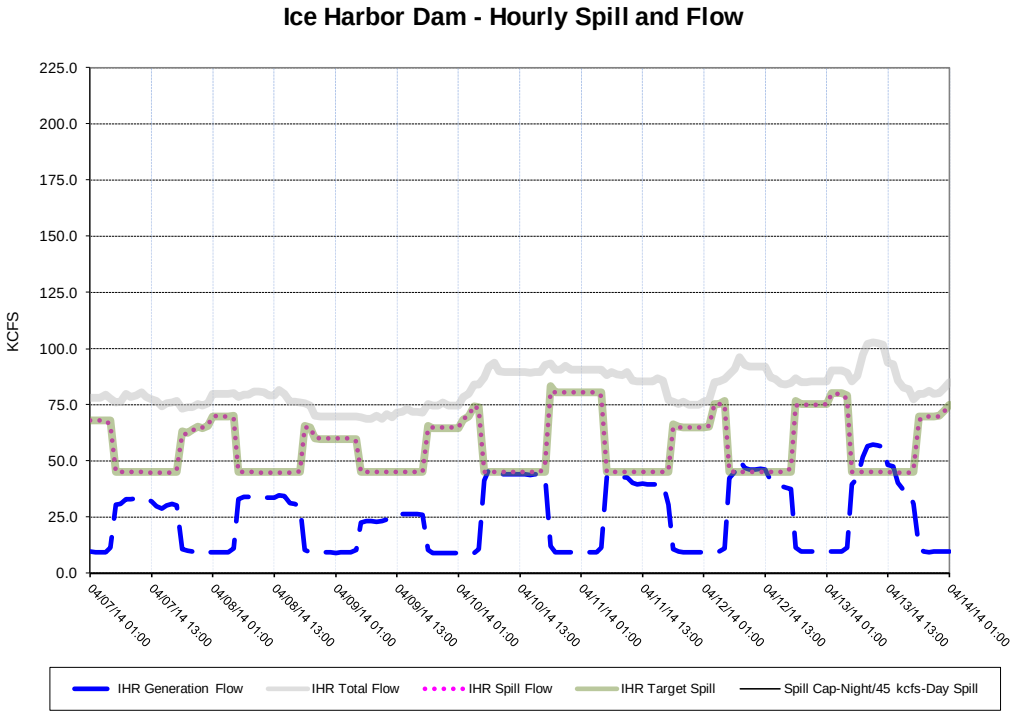

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/07/14 01:00
04/07/14 13:00
04/08/14 01:00
04/08/14 13:00
04/09/14 01:00
04/09/14 13:00
04/10/14 01:00
04/10/14 13:00
04/11/14 01:00
04/11/14 13:00
04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
04/13/14 13:00
04/14/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 9

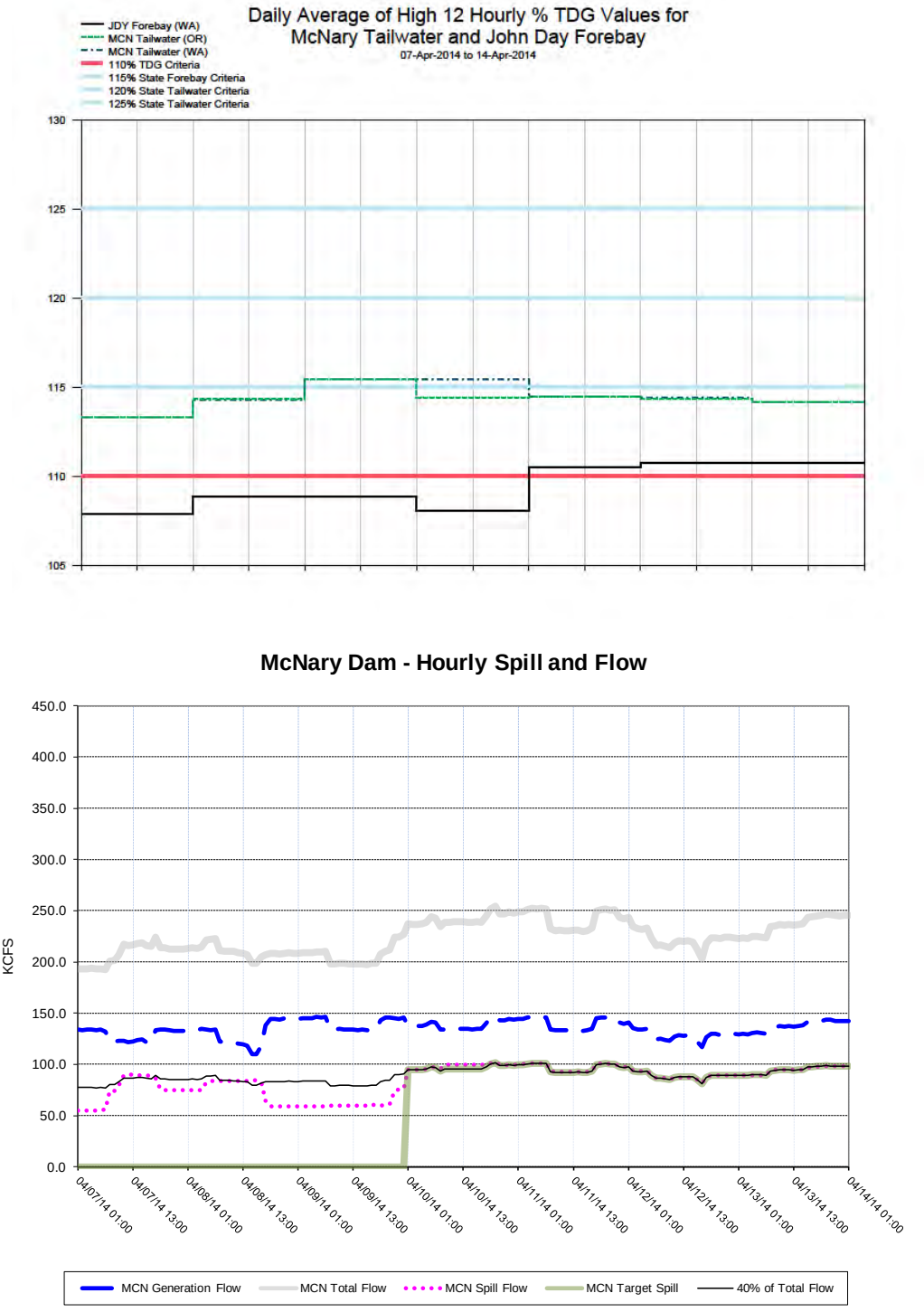
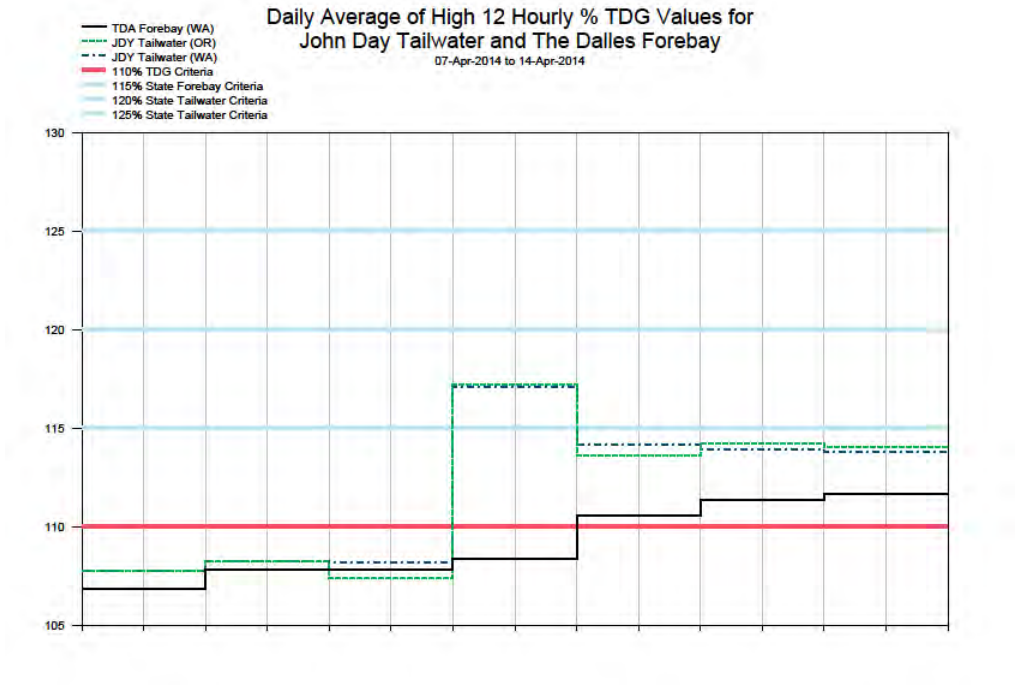

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
07-Apr-2014 to 14-Apr-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
McNary 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
04/07/14 01:00
04/07/14 13:00
04/08/14 01:00
04/08/14 13:00
04/09/14 01:00
04/09/14 13:00
04/10/14 01:00
04/10/14 13:00
04/11/14 01:00
04/11/14 13:00
04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
04/13/14 13:00
04/14/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 10


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
07-Apr-2014 to 14-Apr-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

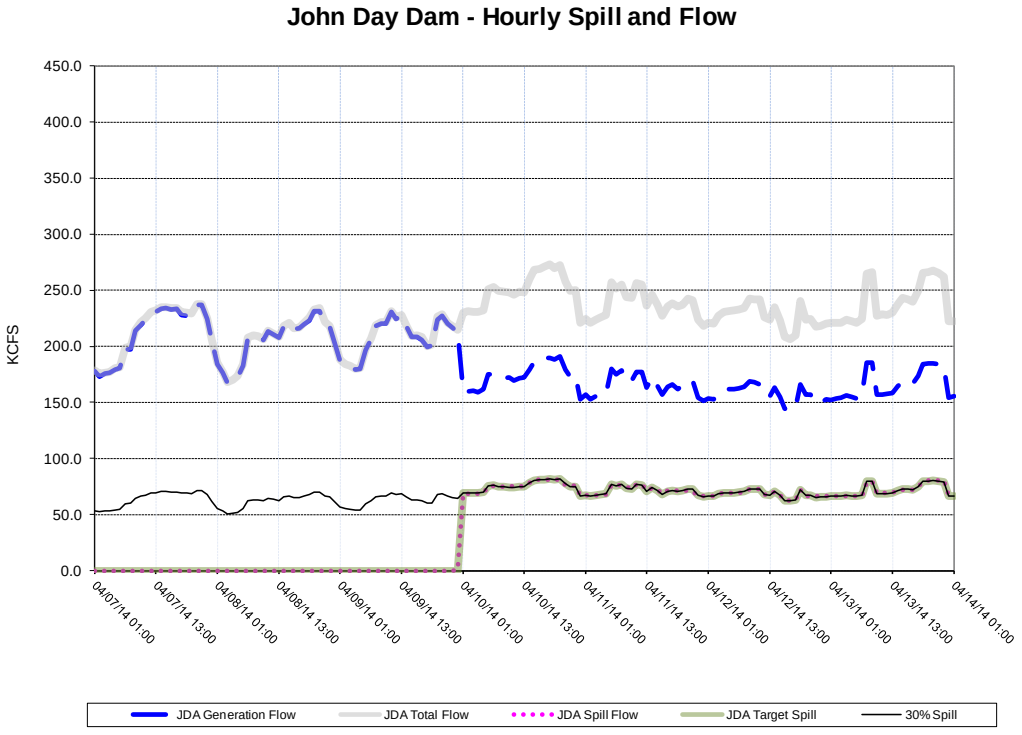
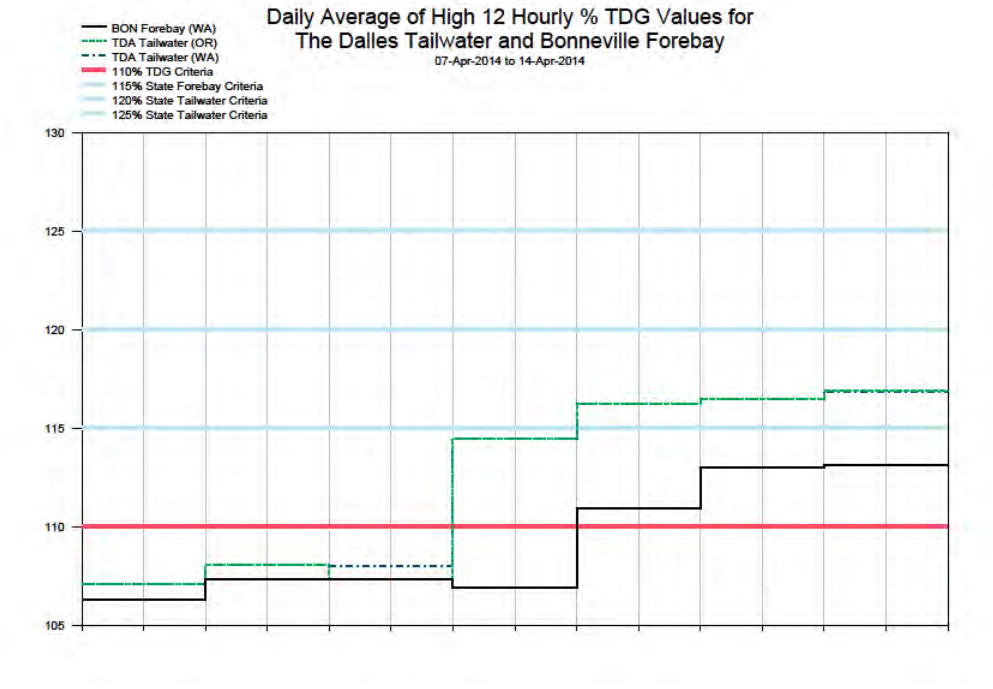

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/07/14 01:00
04/07/14 13:00
04/08/14 01:00
04/08/14 13:00
04/09/14 01:00
04/09/14 13:00
04/10/14 01:00
04/10/14 13:00
04/11/14 01:00
04/11/14 13:00
04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
04/13/14 13:00
04/14/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 11


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
07-Apr-2014 to 14-Apr-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

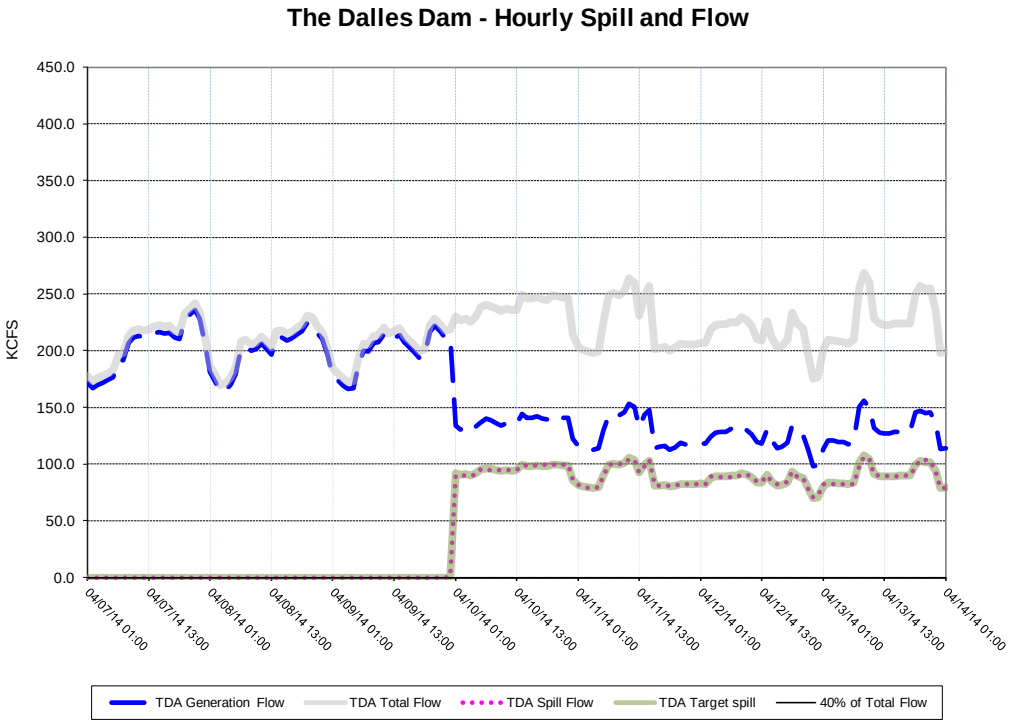
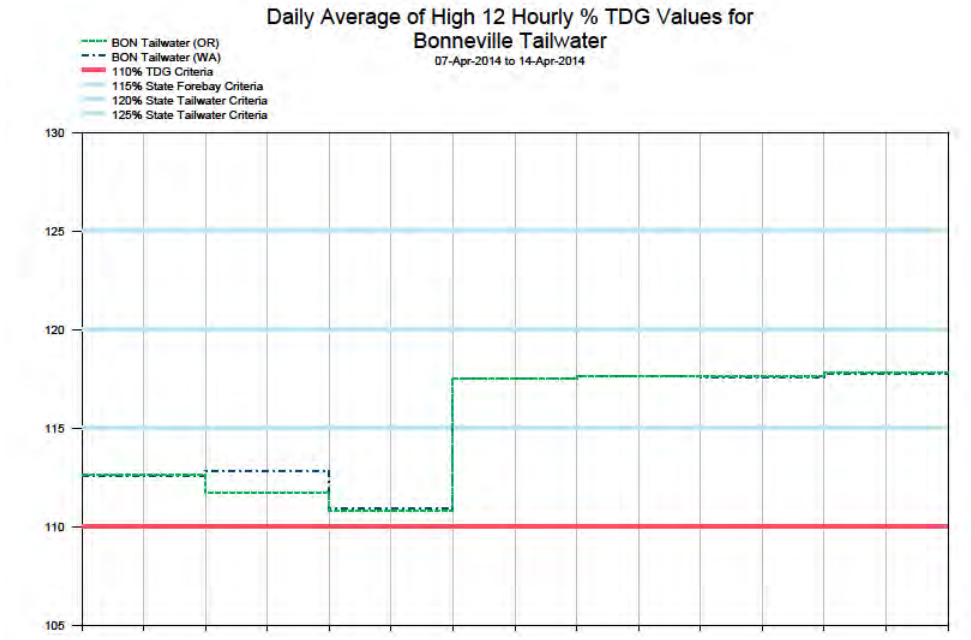

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/07/14 01:00
04/07/14 13:00
04/08/14 01:00
04/08/14 13:00
04/09/14 01:00
04/09/14 13:00
04/10/14 01:00
04/10/14 13:00
04/11/14 01:00
04/11/14 13:00
04/12/14 01:00
04/12/14 13:00
04/13/14 01:00
04/13/14 13:00
04/14/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
07-Apr-2014 to 14-Apr-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

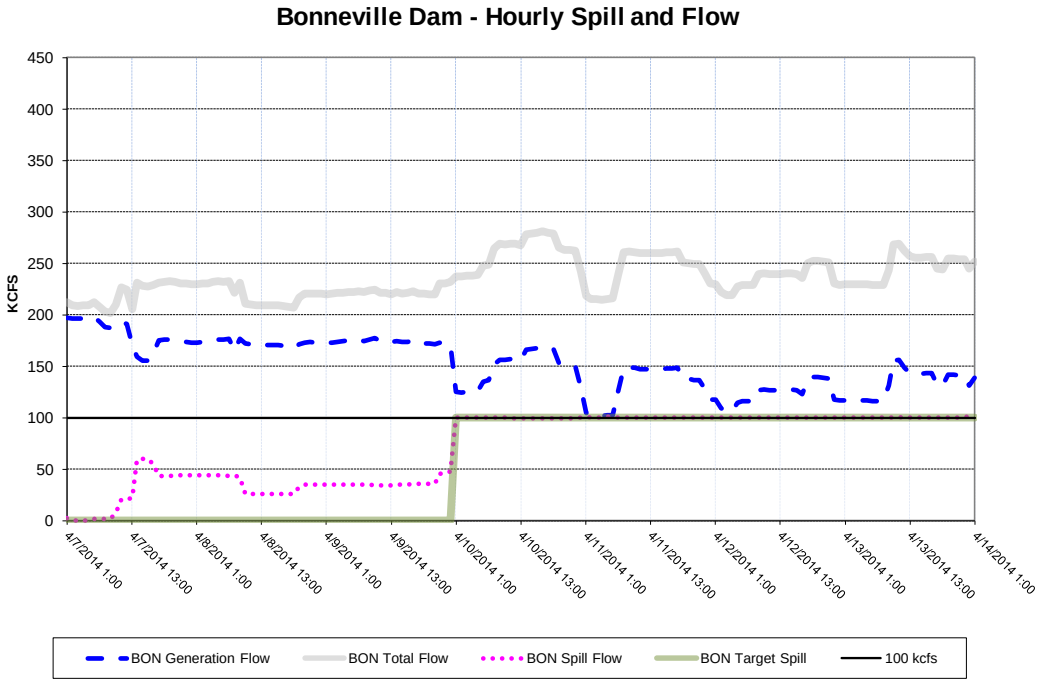

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
4/7/2014 1:00
4/7/2014 13:00
4/8/2014 1:00
4/8/2014 13:00
4/9/2014 1:00
4/9/2014 13:00
4/10/2014 1:00
4/10/2014 13:00
4/11/2014 1:00
4/11/2014 13:00
4/12/2014 1:00
4/12/2014 13:00
4/13/2014 1:00
4/13/2014 13:00
4/14/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 13

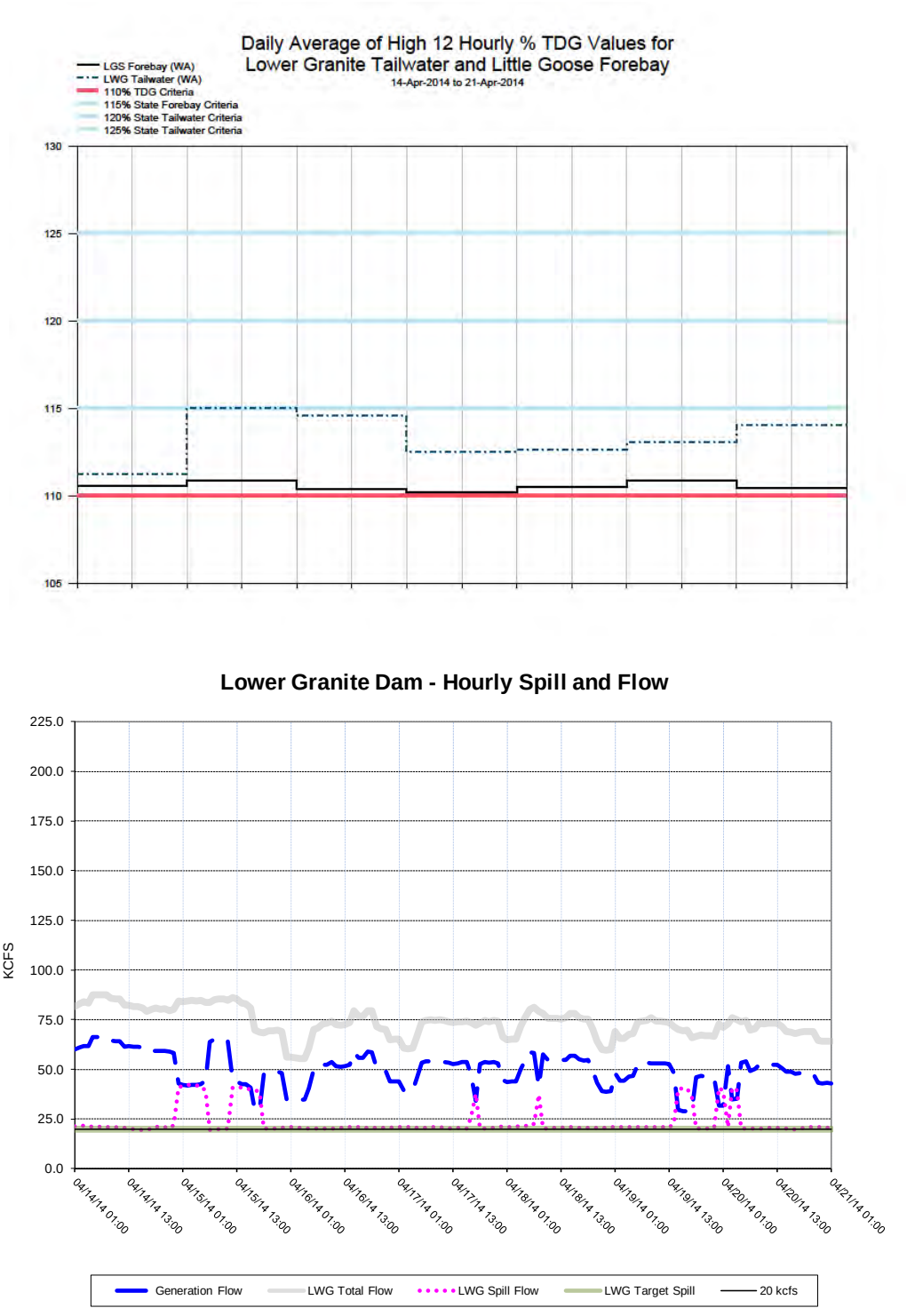
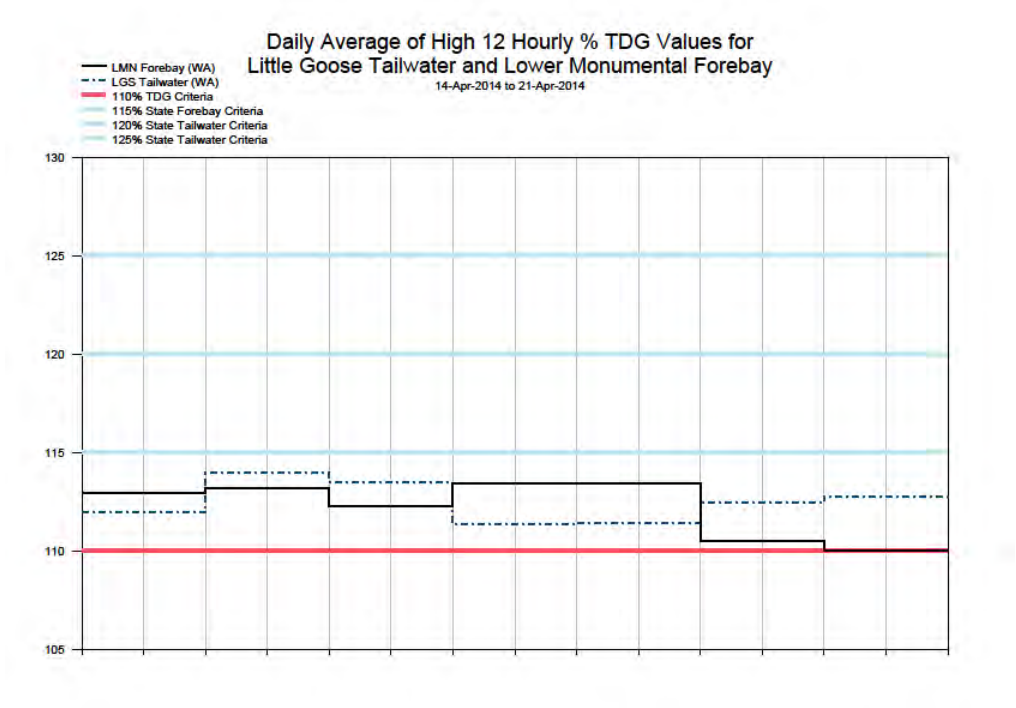

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
14-Apr-2014 to 21-Apr-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Lower Granite 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
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 14


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
14-Apr-2014 to 21-Apr-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

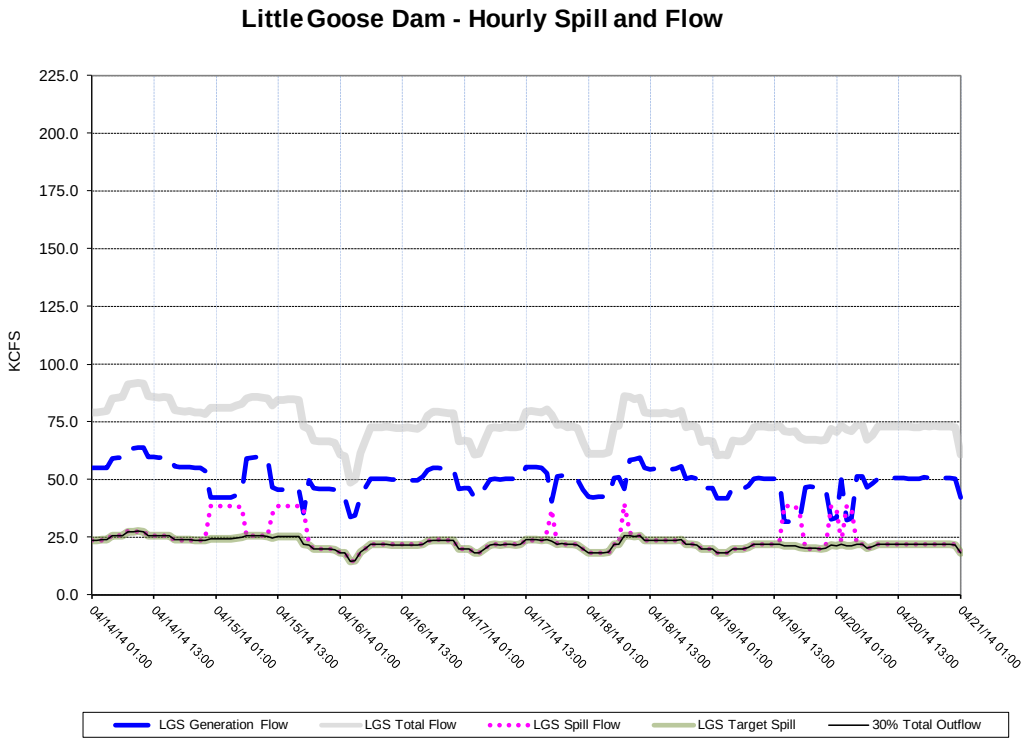
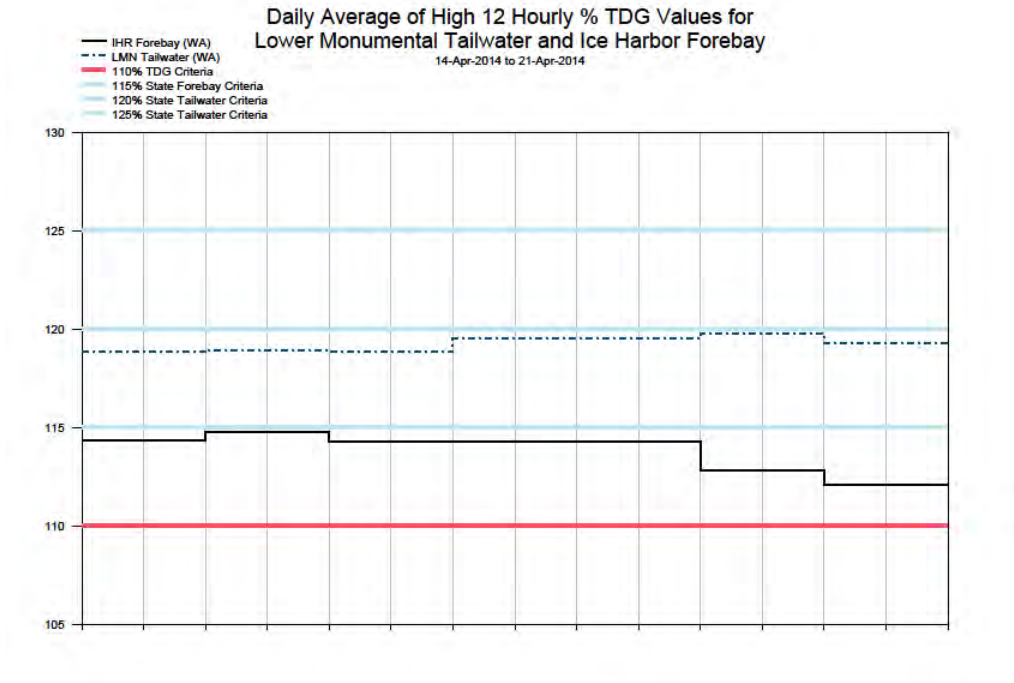

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 15


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
14-Apr-2014 to 21-Apr-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

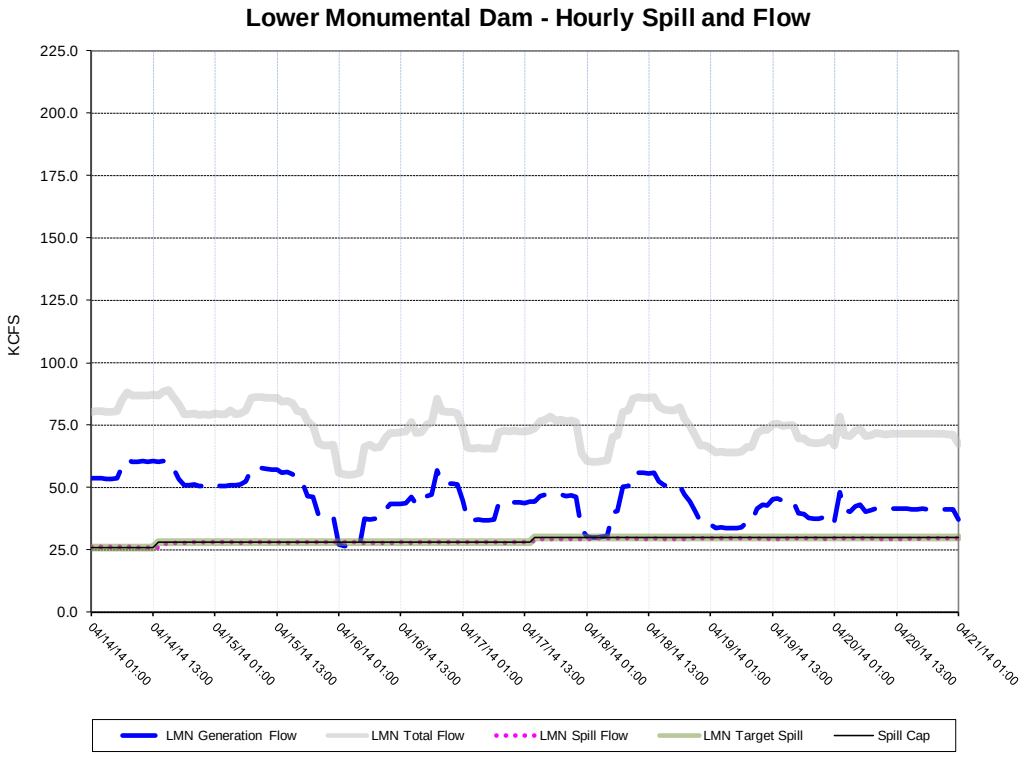
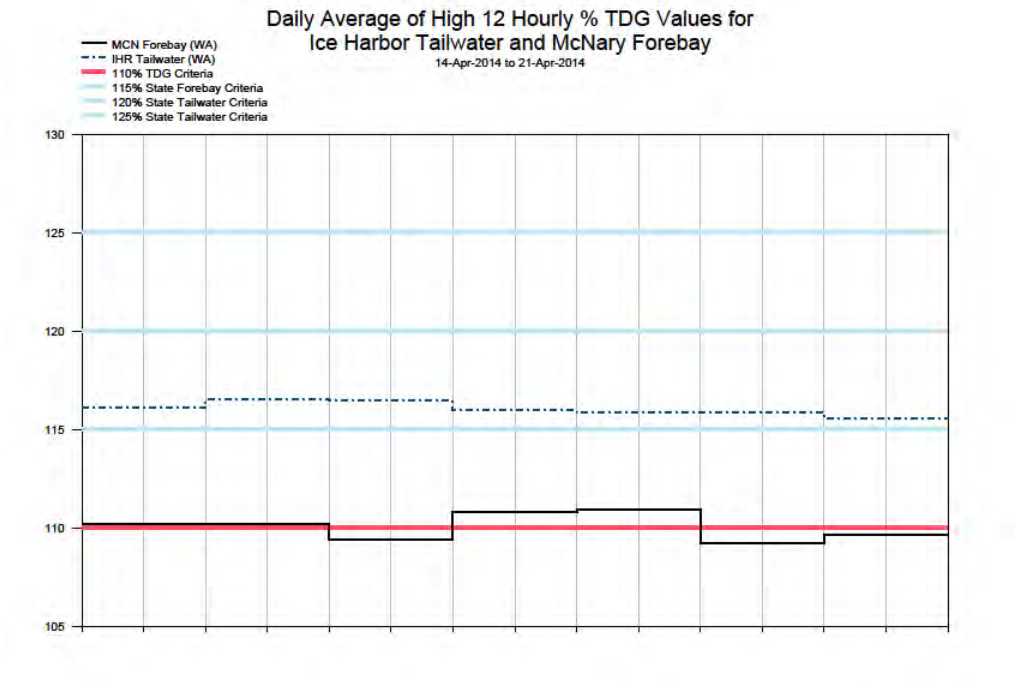

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 16


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
14-Apr-2014 to 21-Apr-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

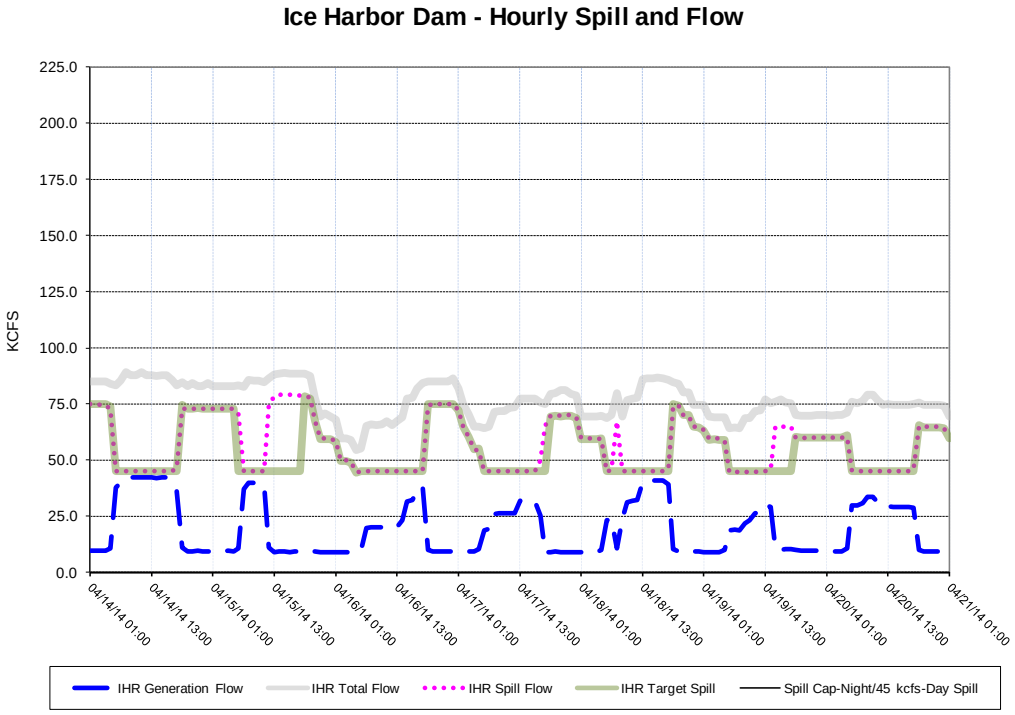
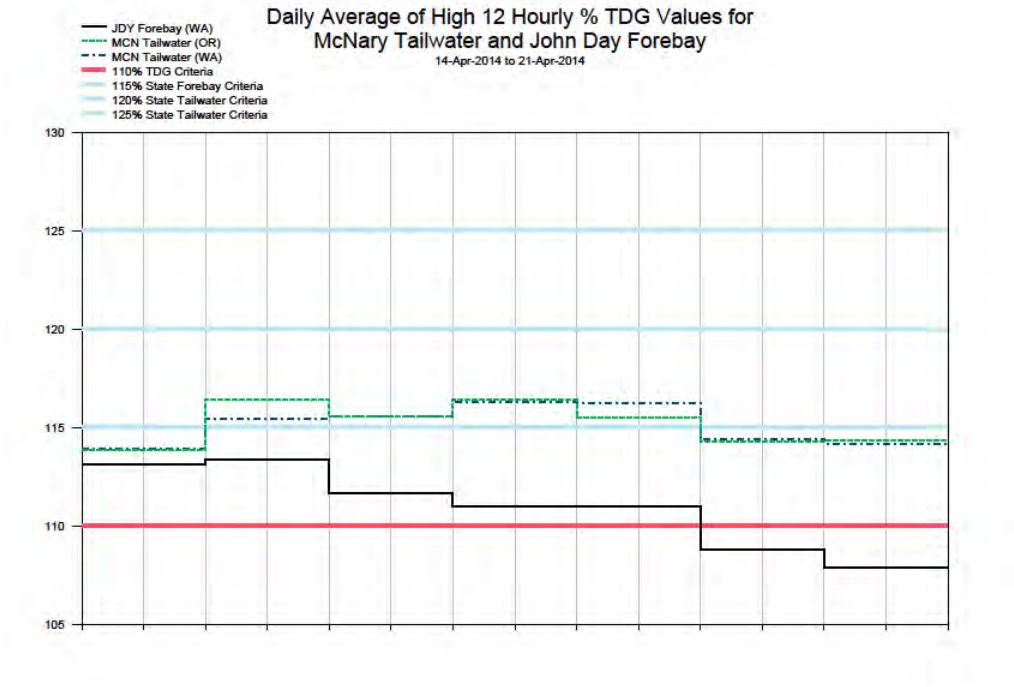

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 17


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
14-Apr-2014 to 21-Apr-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

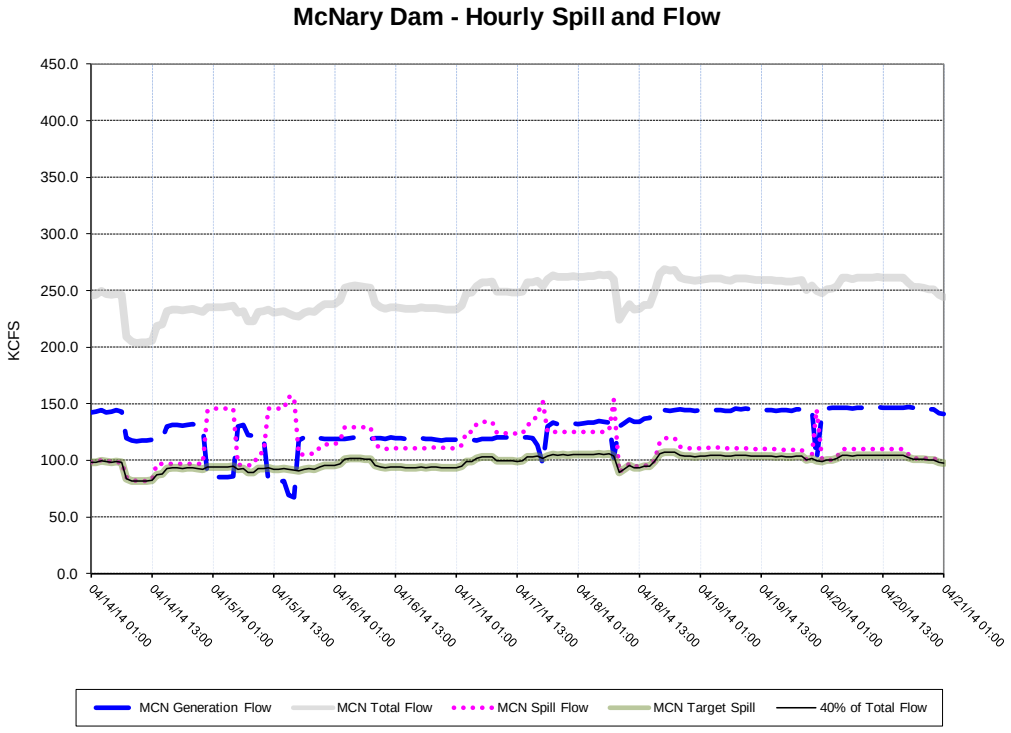
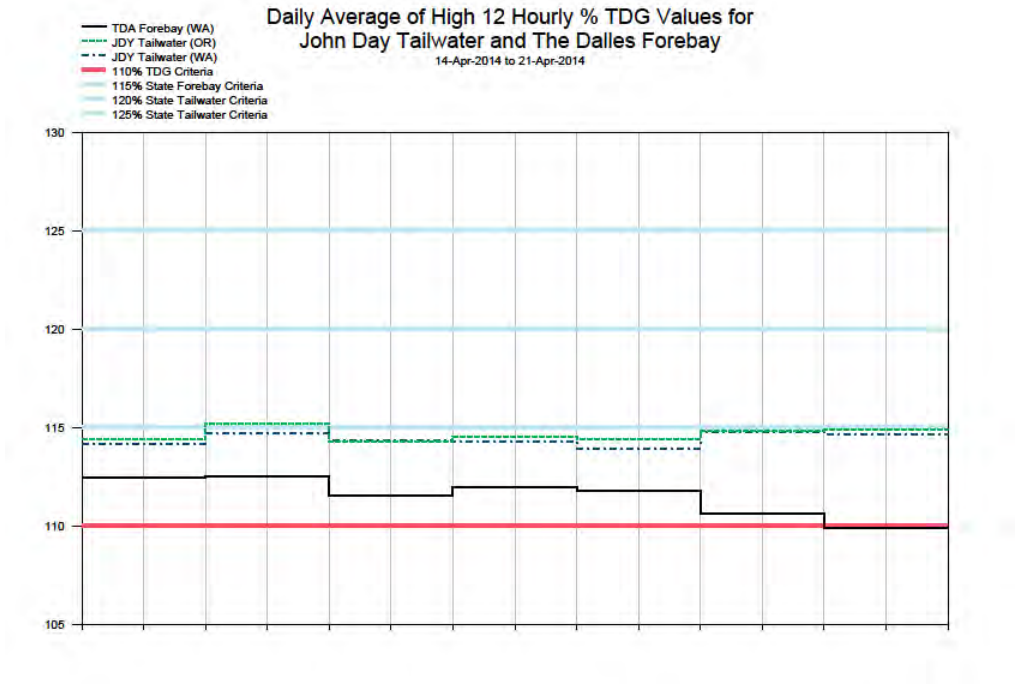

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 18


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
14-Apr-2014 to 21-Apr-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

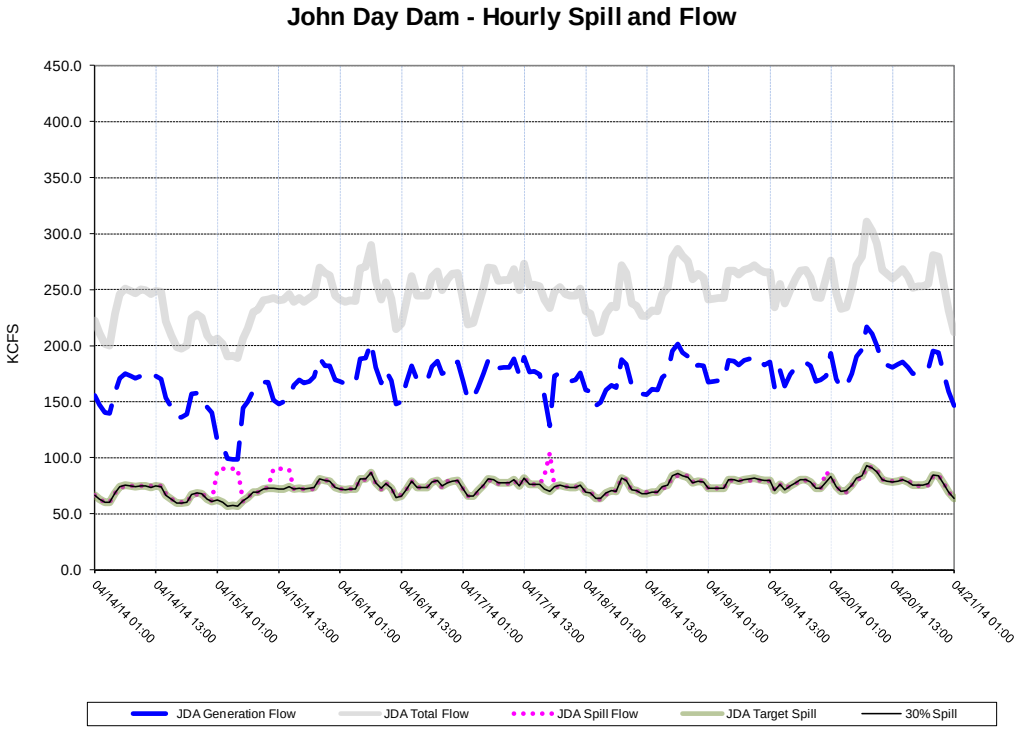
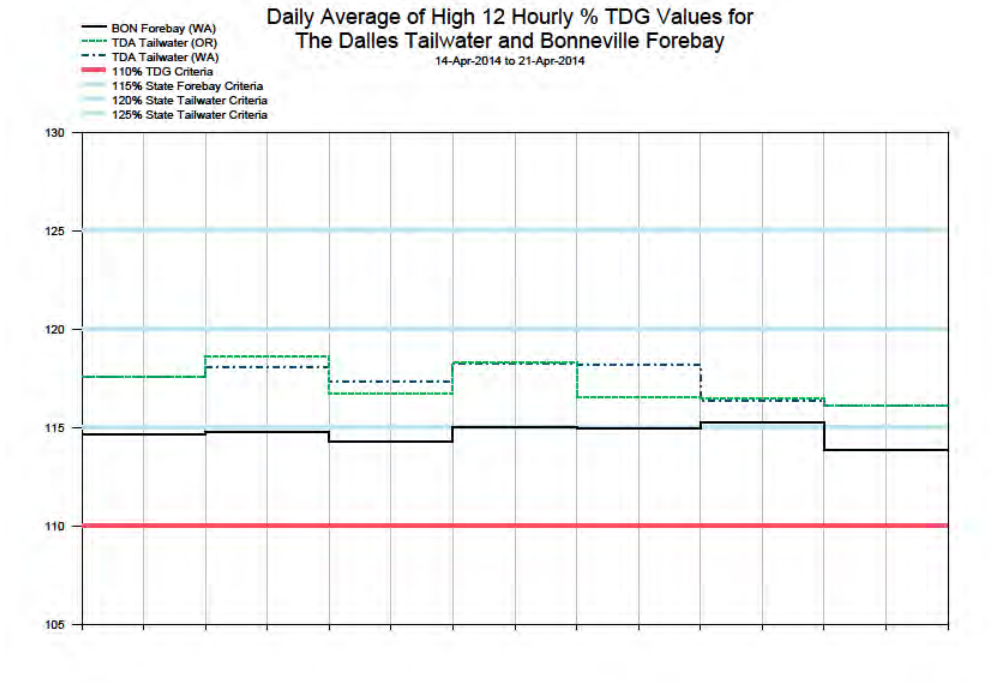

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 19


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
14-Apr-2014 to 21-Apr-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

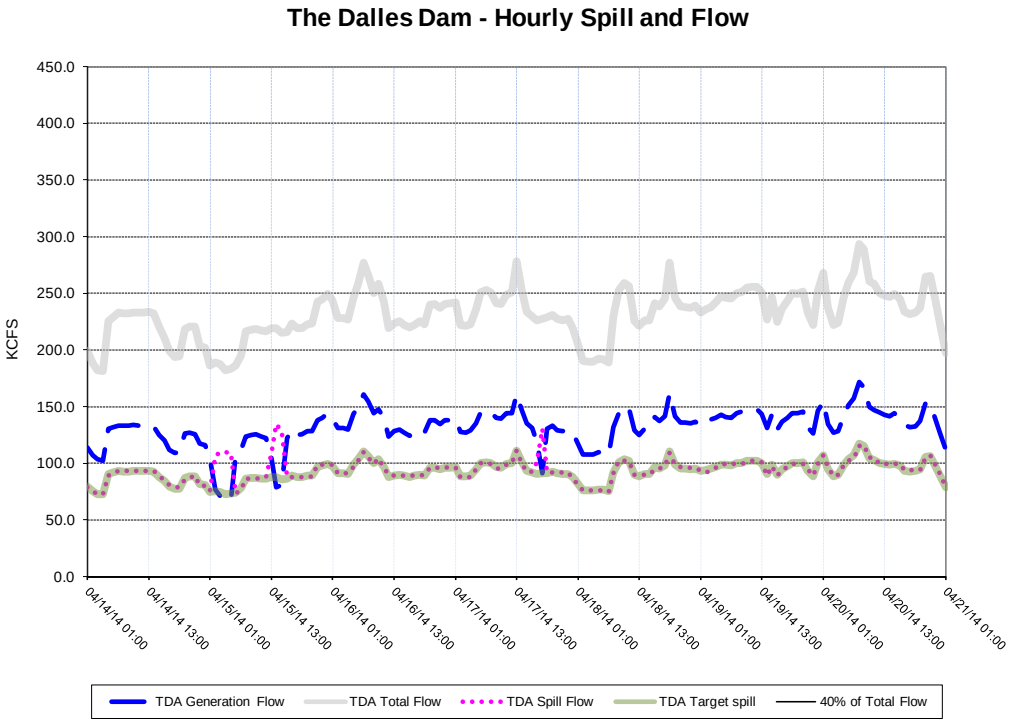

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/14/14 01:00
04/14/14 13:00
04/15/14 01:00
04/15/14 13:00
04/16/14 01:00
04/16/14 13:00
04/17/14 01:00
04/17/14 13:00
04/18/14 01:00
04/18/14 13:00
04/19/14 01:00
04/19/14 13:00
04/20/14 01:00
04/20/14 13:00
04/21/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 20

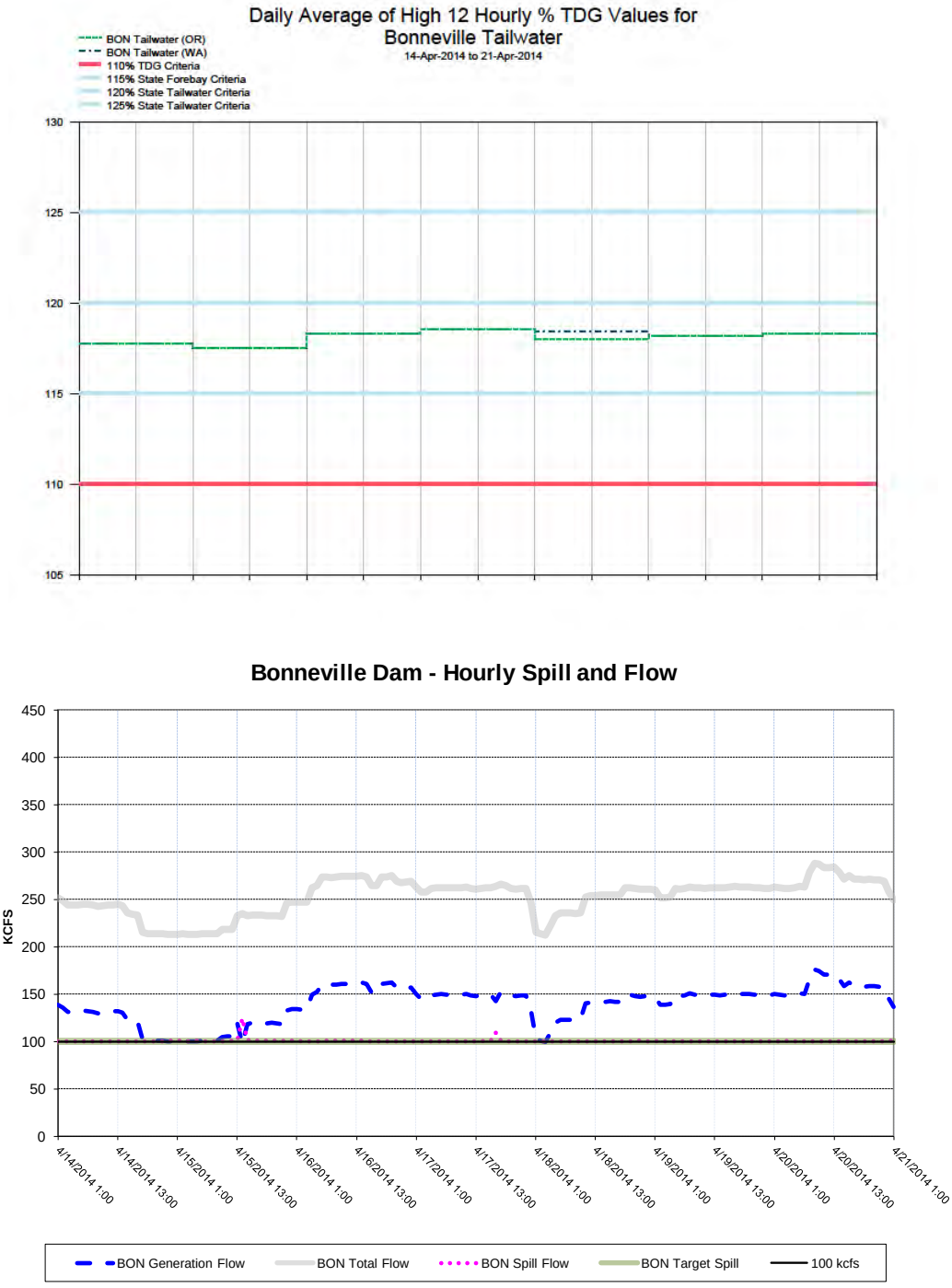

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
14-Apr-2014 to 21-Apr-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
4/14/2014 1:00
4/14/2014 13:00
4/15/2014 1:00
4/15/2014 13:00
4/16/2014 1:00
4/16/2014 13:00
4/17/2014 1:00
4/17/2014 13:00
4/18/2014 1:00
4/18/2014 13:00
4/19/2014 1:00
4/19/2014 13:00
4/20/2014 1:00
4/20/2014 13:00
4/21/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 21

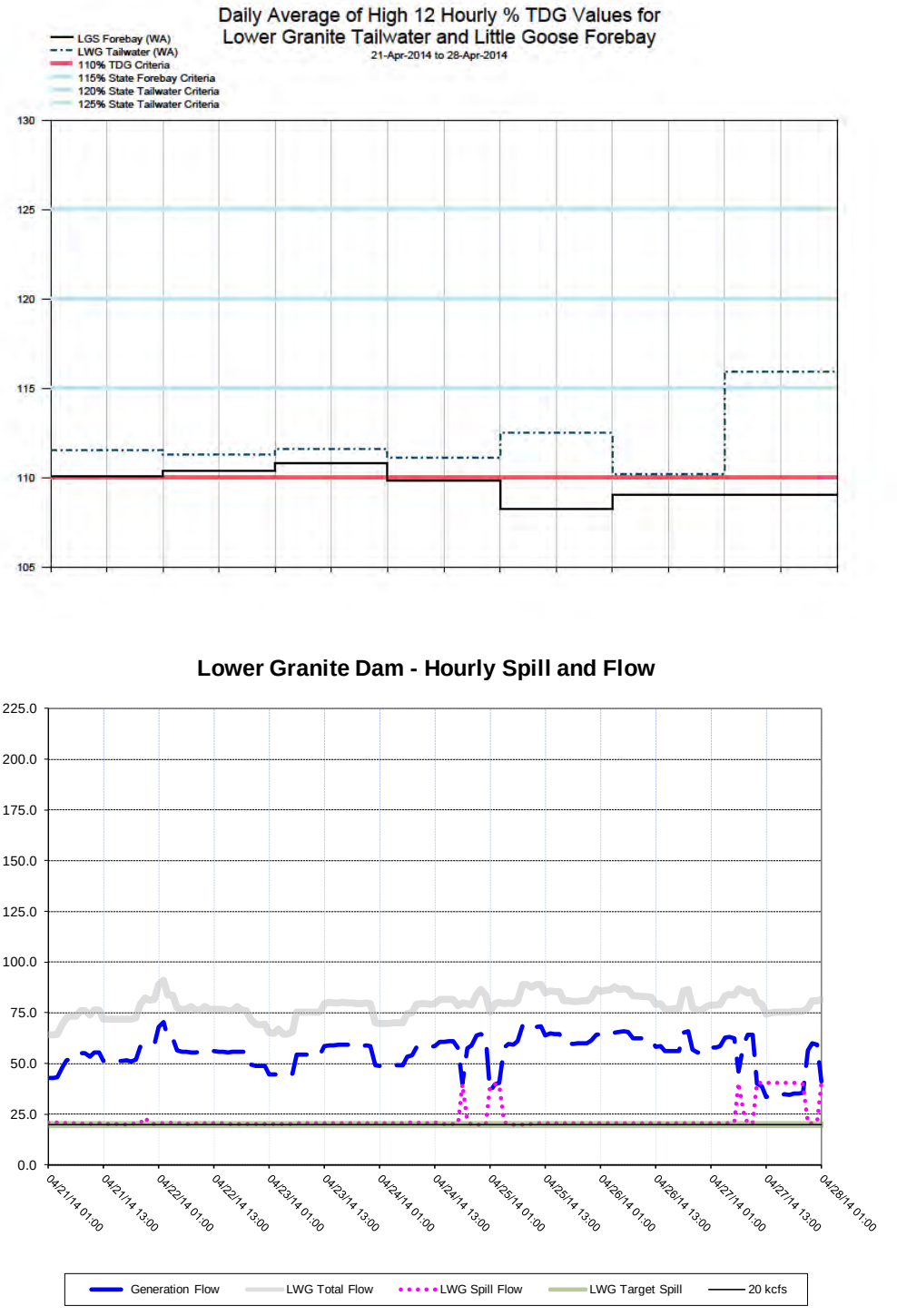
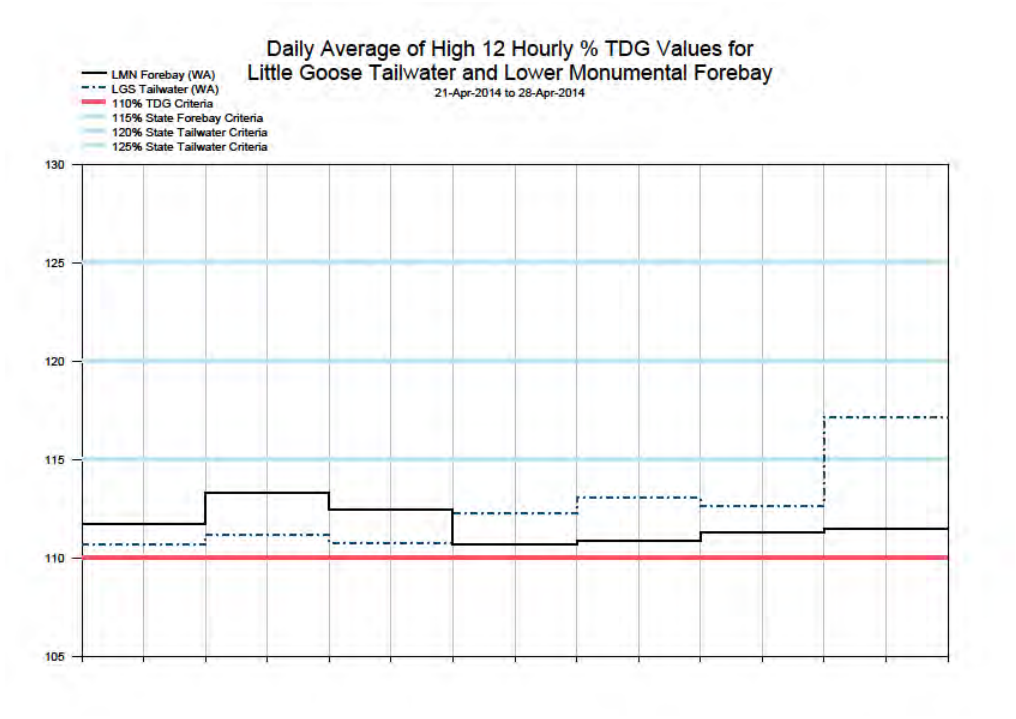

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
21-Apr-2014 to 28-Apr-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Lower Granite 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
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 22


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
21-Apr-2014 to 28-Apr-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

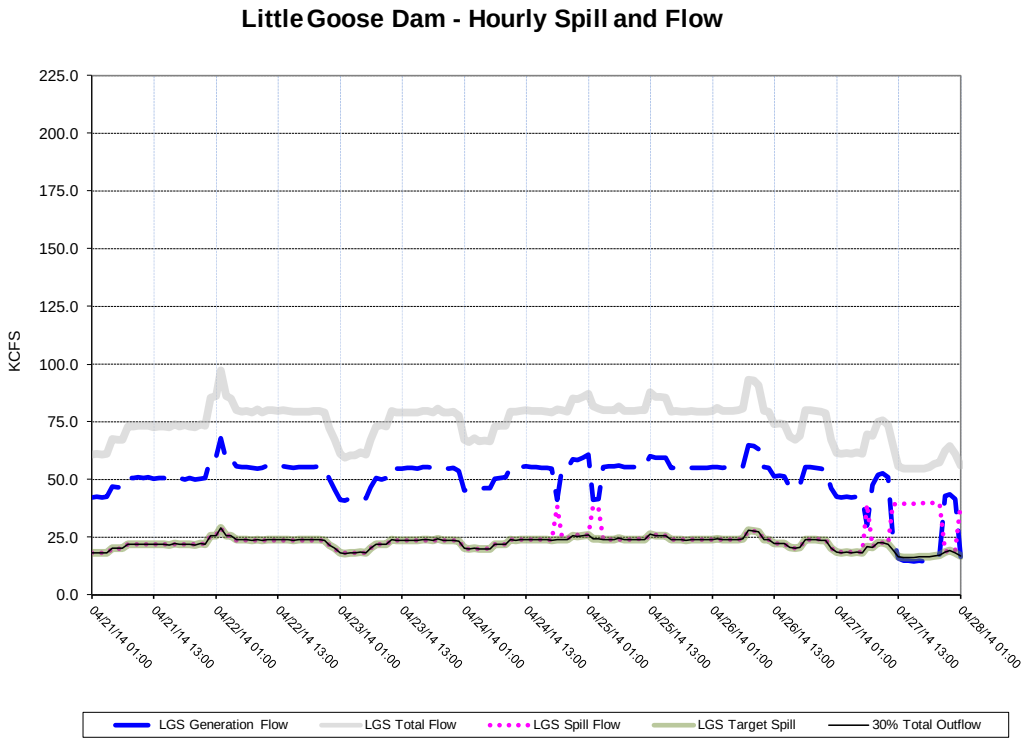

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 23

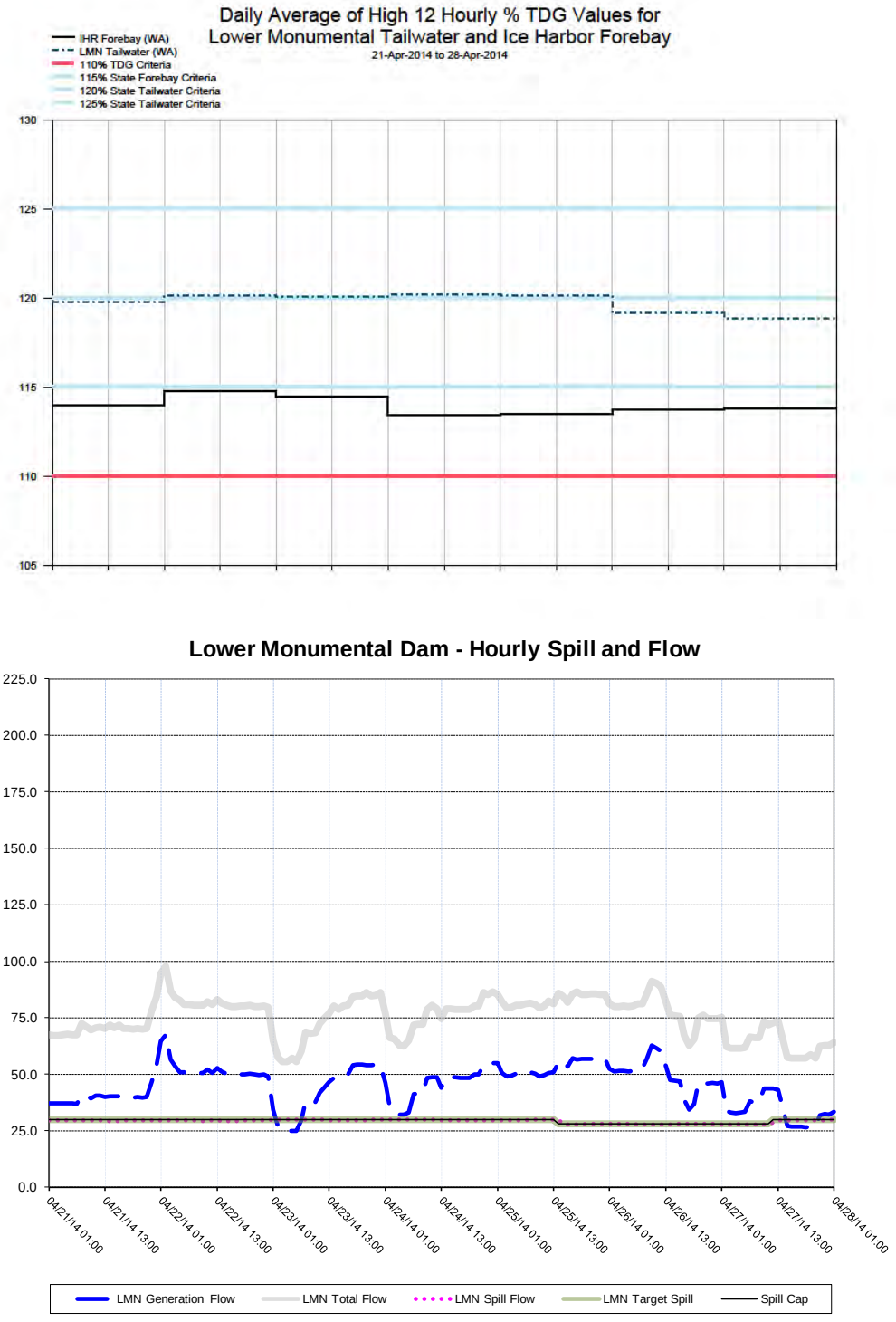
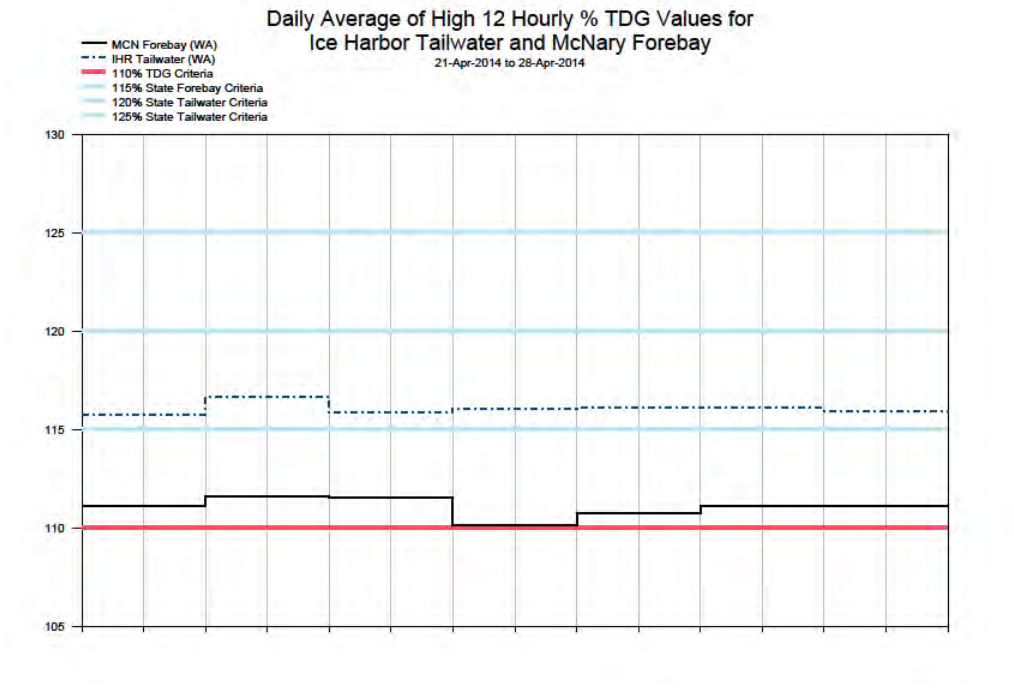

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
21-Apr-2014 to 28-Apr-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Lower Monumental 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
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 24


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
21-Apr-2014 to 28-Apr-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

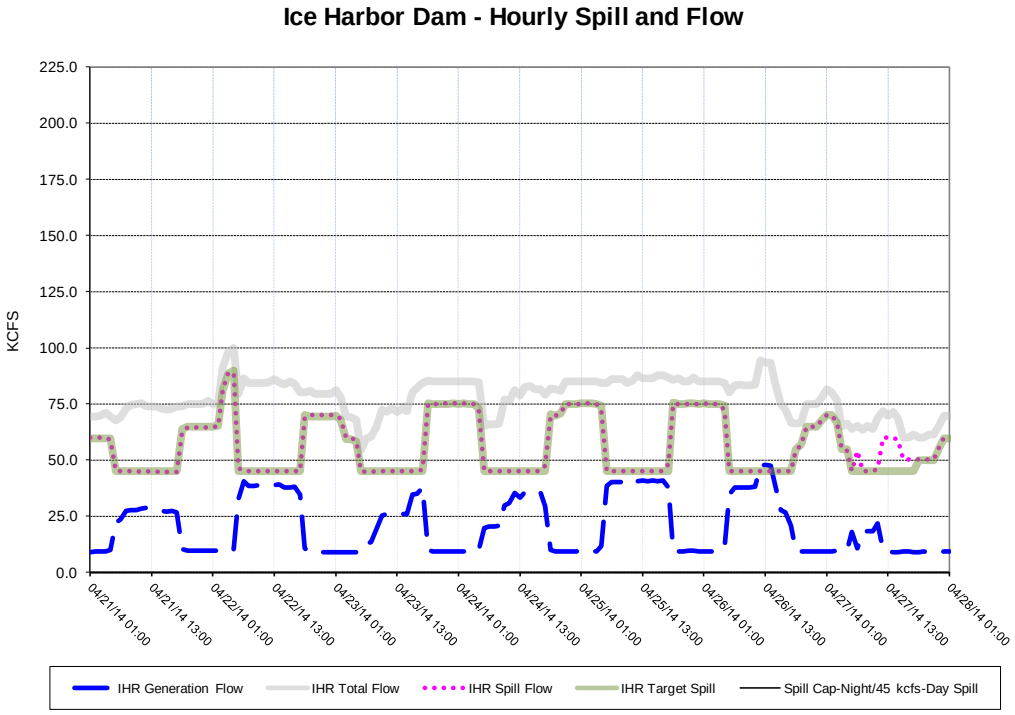
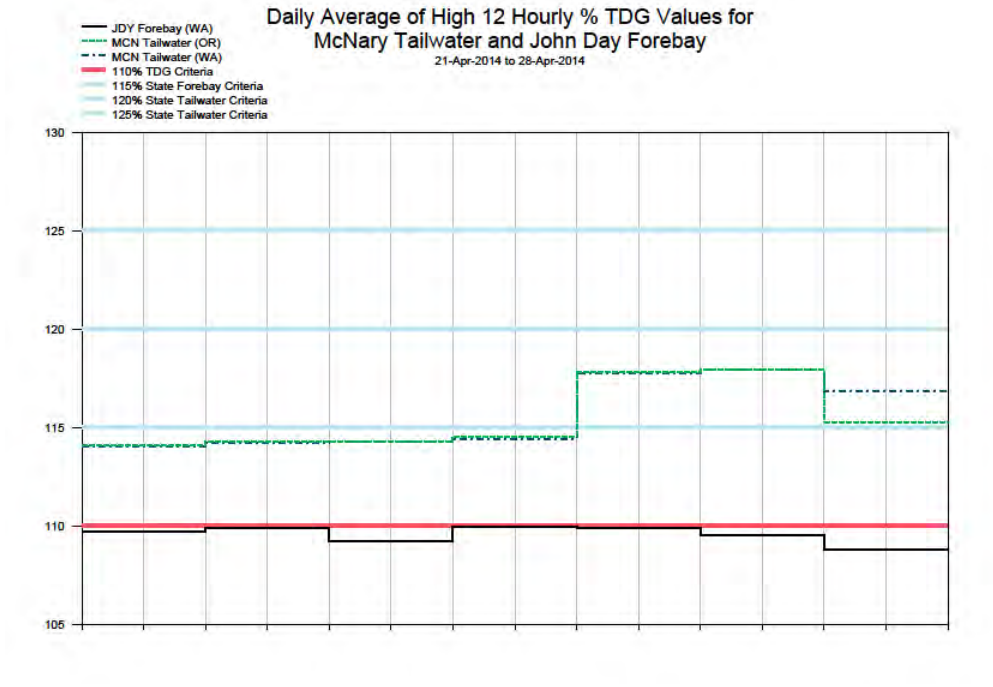

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 25


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
21-Apr-2014 to 28-Apr-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

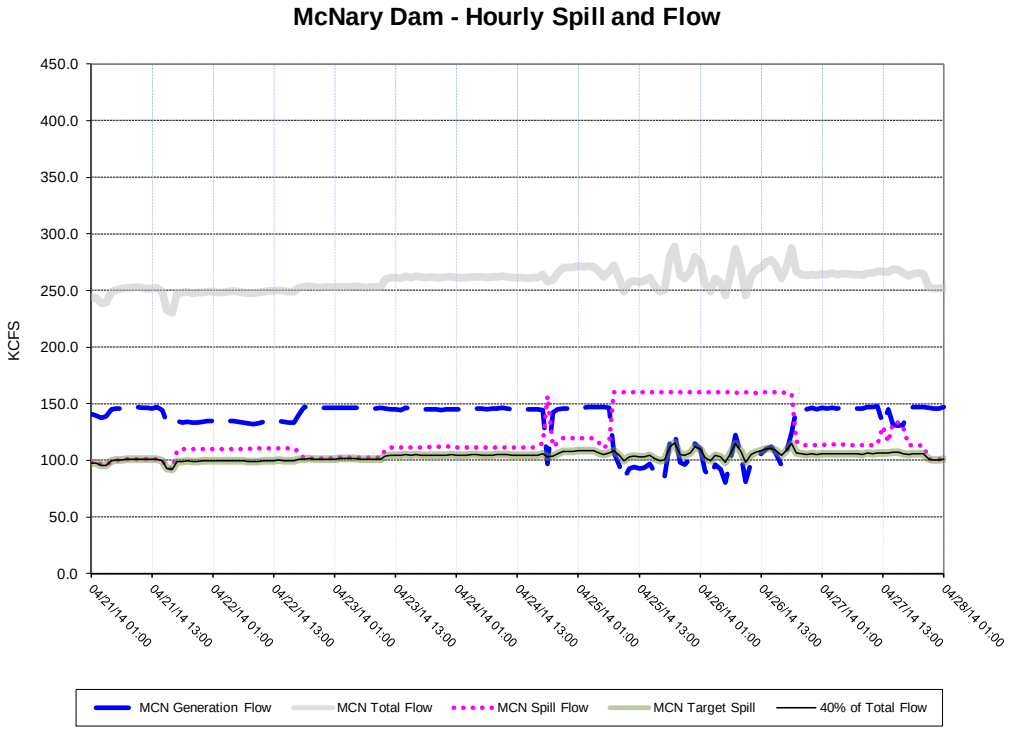
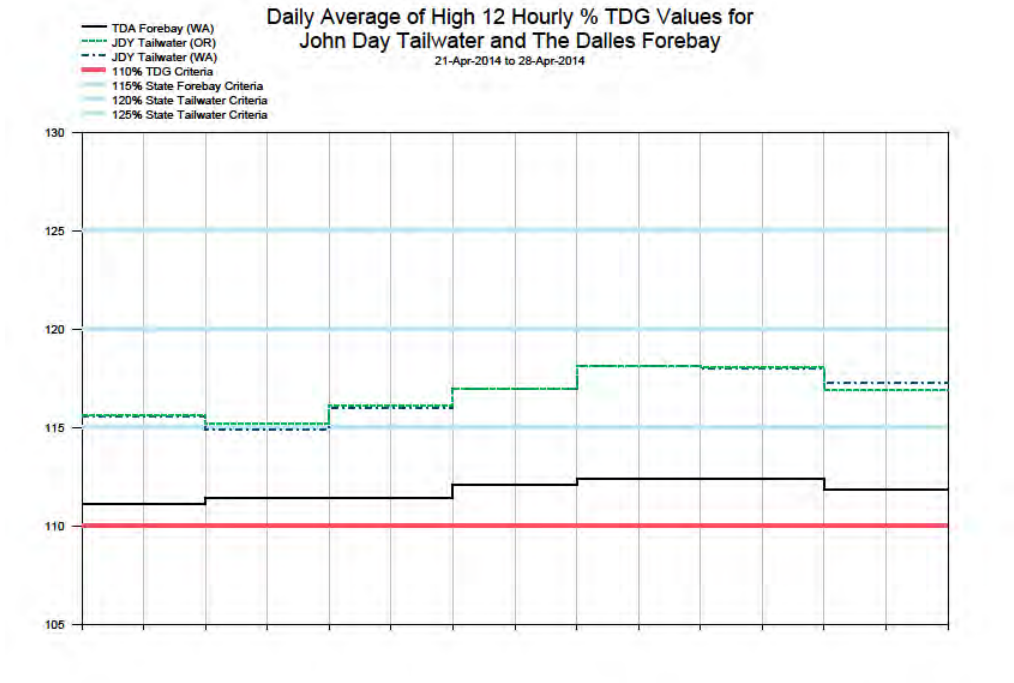

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 26


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
21-Apr-2014 to 28-Apr-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

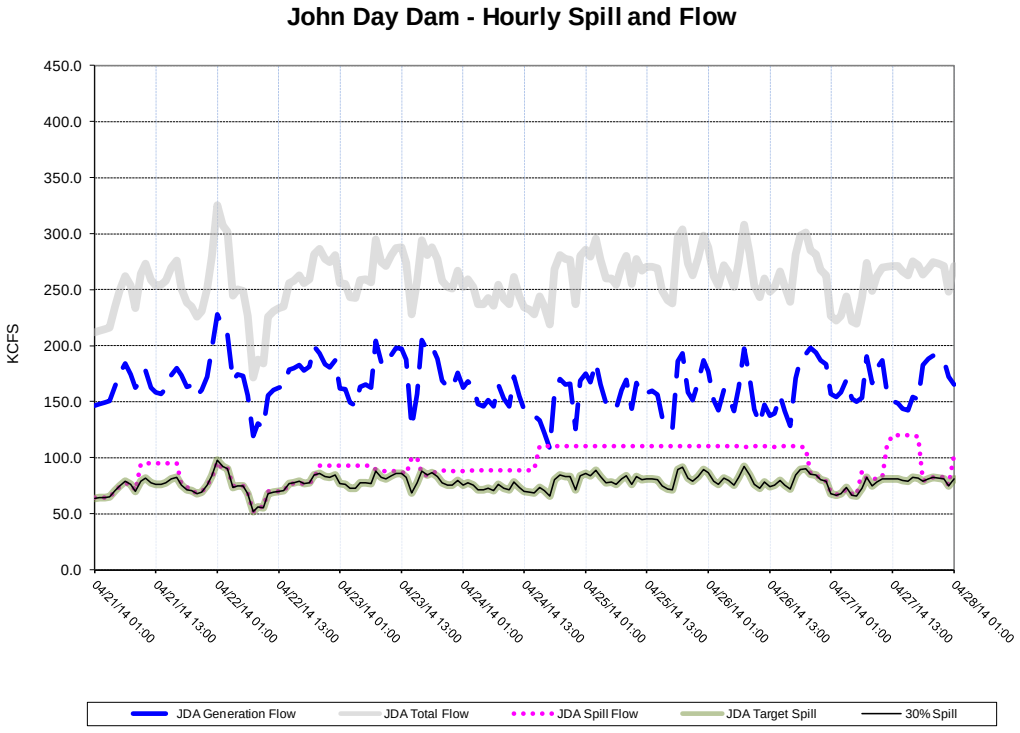
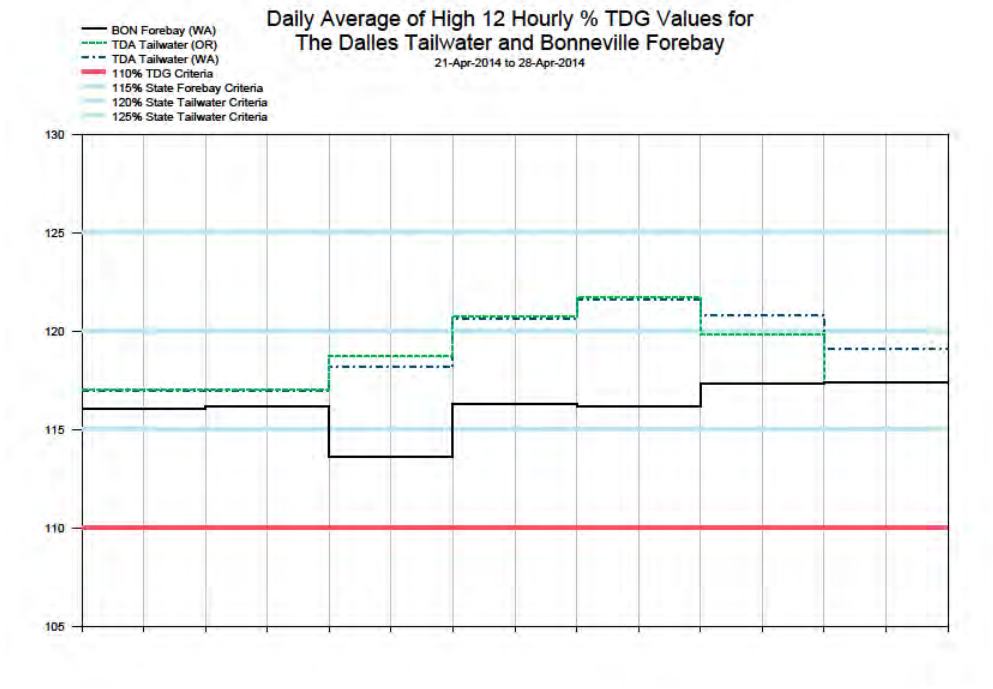

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 27


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
21-Apr-2014 to 28-Apr-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

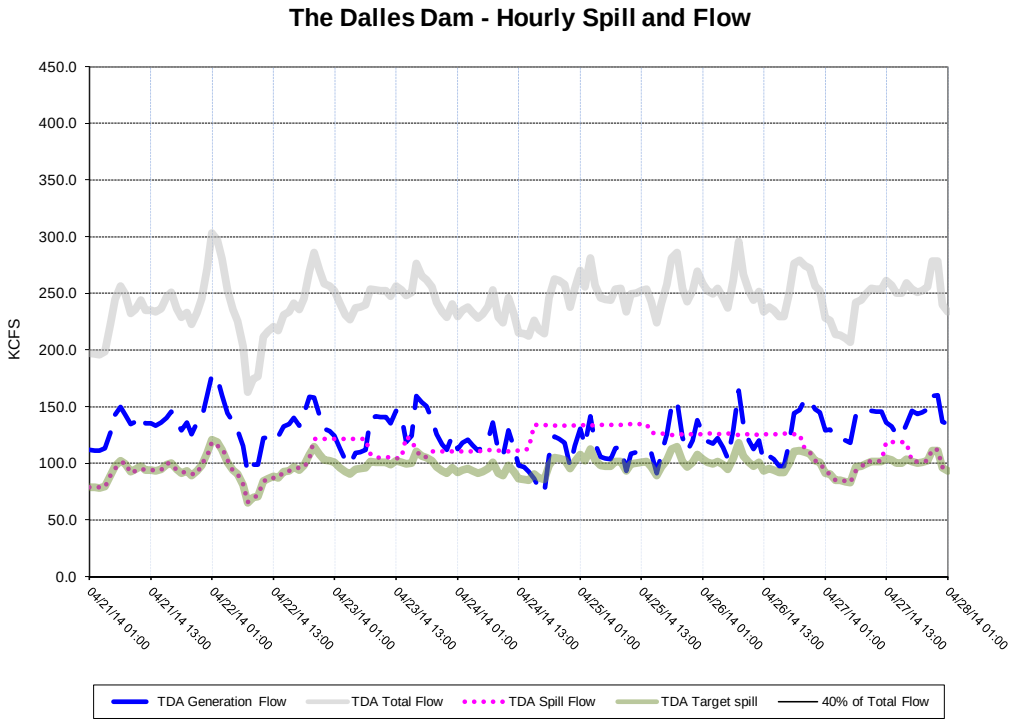

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/21/14 01:00
04/21/14 13:00
04/22/14 01:00
04/22/14 13:00
04/23/14 01:00
04/23/14 13:00
04/24/14 01:00
04/24/14 13:00
04/25/14 01:00
04/25/14 13:00
04/26/14 01:00
04/26/14 13:00
04/27/14 01:00
04/27/14 13:00
04/28/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 28

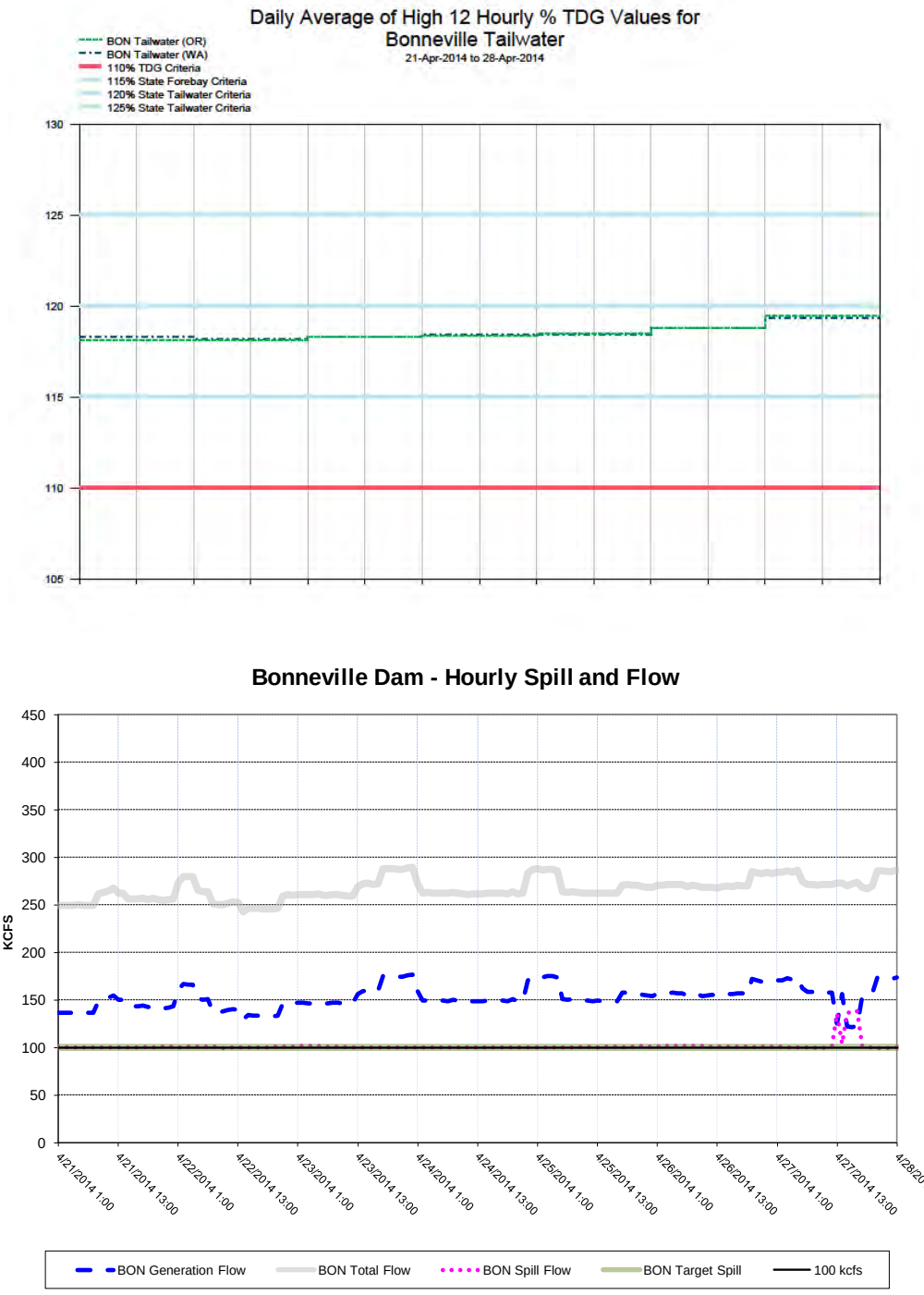

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
21-Apr-2014 to 28-Apr-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
4/21/2014 1:00
4/21/2014 13:00
4/22/2014 1:00
4/22/2014 13:00
4/23/2014 1:00
4/23/2014 13:00
4/24/2014 1:00
4/24/2014 13:00
4/25/2014 1:00
4/25/2014 13:00
4/26/2014 1:00
4/26/2014 13:00
4/27/2014 1:00
4/27/2014 13:00
4/28/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

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

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
4/1/2014	104.4	107.4	104.5	106.9	103.0	104.1	103.6	103.3	107.0	116.6	~~116.6~~	108.9	~~108.1~~	108.5	108.4	~~107.8~~	108.4	107.9	~~113.4~~	113.8
4/2/2014	103.8	107.3	104.0	106.8	103.0	103.9	103.7	103.3	107.0	~~115.7~~	116.2	108.2	~~107.3~~	107.8	106.6	~~106.3~~	106.8	106.9	112.1	~~112.1~~
4/3/2014	103.5	111.8	103.8	109.2	103.7	117.4	103.8	115.3	106.9	115.7	~~115.7~~	107.3	~~106.7~~	106.8	106.1	106.4	~~106.4~~	106.0	112.2	~~112.2~~
4/4/2014	103.8	111.8	104.6	109.4	104.0	117.5	104.3	115.7	106.8	~~114.0~~	114.2	107.2	107.0	~~107.0~~	106.1	106.4	~~106.4~~	106.2	~~110.8~~	111.1
4/5/2014	103.7	111.6	104.7	109.4	104.7	117.8	109.8	115.5	107.3	~~112.8~~	113.3	107.2	~~106.8~~	107.0	106.1	~~106.3~~	106.4	106.2	112.5	~~112.5~~
4/6/2014	103.5	111.1	107.4	110.4	105.4	117.7	110.3	115.6	107.6	113.7	~~113.7~~	107.1	~~106.7~~	106.7	106.1	~~105.8~~	106.3	105.5	~~111.3~~	111.9
4/7/2014	103.3	111.2	108.6	111.0	106.5	118.1	111.7	115.6	108.3	113.3	~~113.3~~	108.0	107.8	~~107.8~~	106.9	107.1	~~107.1~~	106.3	112.8	~~112.8~~
4/8/2014	104.3	112.1	111.6	111.8	109.5	118.4	114.6	115.8	110.8	114.4	~~114.3~~	108.9	108.2	~~108.2~~	107.8	108.1	~~108.1~~	107.3	~~111.8~~	112.9
4/9/2014	104.4	111.7	111.7	111.2	111.0	118.8	114.7	115.7	112.3	115.4	~~115.4~~	108.8	~~107.3~~	108.1	107.8	~~107.3~~	108.0	107.3	~~111.0~~	111.0
4/10/2014	105.0	111.5	112.2	112.1	111.6	120.1	114.8	116.9	112.3	~~114.3~~	115.4	108.2	117.2	~~117.1~~	108.7	114.7	~~114.6~~	106.9	117.7	~~117.7~~
4/11/2014	105.2	111.4	112.5	112.0	112.8	**120.7**	**116.1**	117.4	111.5	114.5	~~114.5~~	110.5	~~113.7~~	114.1	110.6	116.2	~~116.2~~	111.0	117.8	~~117.8~~
4/12/2014	105.2	112.0	112.5	112.6	113.3	118.9	**116.1**	116.4	111.4	~~114.3~~	114.3	110.8	114.1	~~113.9~~	111.4	116.5	~~116.5~~	113.0	117.8	~~117.7~~
4/13/2014	104.7	112.0	112.0	112.4	113.1	118.5	**115.5**	116.3	110.9	114.2	~~114.2~~	110.7	114.1	~~113.8~~	111.6	116.9	~~116.8~~	113.2	117.9	~~117.8~~
4/14/2014	104.3	111.7	110.6	111.9	113.0	118.8	114.4	116.1	110.2	113.9	~~113.8~~	113.2	114.4	~~114.2~~	112.5	117.5	~~117.5~~	114.7	~~117.8~~	117.8
4/15/2014	104.7	115.0	110.8	113.9	113.2	118.9	114.7	116.5	110.2	116.4	~~115.4~~	113.4	115.2	~~114.7~~	112.5	118.6	~~118.1~~	114.7	117.6	~~117.6~~
4/16/2014	104.8	114.2	110.3	113.1	112.2	118.8	114.3	116.4	109.3	115.5	~~115.5~~	111.6	114.3	~~114.1~~	111.6	~~116.7~~	117.3	114.5	118.5	~~118.5~~
4/17/2014	105.2	112.5	110.3	111.4	113.4	119.5	114.3	116.0	110.9	116.4	~~116.3~~	111.0	114.5	~~114.3~~	112.0	118.3	~~118.2~~	115.0	118.6	~~118.6~~
4/18/2014	104.8	112.6	110.5	111.4	113.4	119.5	114.3	115.9	110.9	~~115.4~~	116.2	110.9	114.4	~~113.9~~	111.7	~~116.4~~	118.1	114.8	~~118.1~~	118.5
4/19/2014	104.5	113.4	110.9	112.4	110.5	119.7	112.8	115.9	109.2	~~114.3~~	114.4	108.8	114.8	~~114.7~~	110.6	116.5	~~116.4~~	115.2	118.3	~~118.2~~
4/20/2014	103.9	114.0	110.2	112.8	109.9	119.3	111.9	115.6	109.9	114.3	~~114.1~~	108.0	114.8	~~114.7~~	110.1	116.2	~~116.2~~	113.8	118.4	~~118.4~~
4/21/2014	103.7	111.5	110.1	110.7	111.9	119.8	114.1	115.8	111.1	114.1	~~114.1~~	109.8	115.7	~~115.6~~	111.1	117.0	~~117.0~~	**116.1**	~~118.2~~	118.4
4/22/2014	103.5	111.3	110.4	111.2	113.3	120.1	114.8	116.6	111.6	114.2	~~114.2~~	109.8	115.3	~~114.9~~	111.4	117.1	~~116.9~~	**116.1**	~~118.2~~	118.3
4/23/2014	103.1	111.6	110.8	110.8	112.3	120.0	114.4	115.8	111.5	114.3	~~114.3~~	109.3	116.1	~~116.0~~	111.6	118.8	~~118.2~~	113.7	~~118.5~~	118.5
4/24/2014	102.8	111.1	109.8	112.3	110.7	120.2	113.4	116.0	110.1	114.5	~~114.5~~	109.9	117.1	~~117.1~~	112.1	**120.9**	~~120.8~~	**116.3**	~~118.6~~	118.6
4/25/2014	102.1	112.5	108.1	113.0	110.9	120.1	113.6	116.1	110.9	117.9	~~117.8~~	109.9	118.1	~~118.1~~	112.4	**121.7**	~~121.6~~	**116.2**	118.7	~~118.6~~
4/26/2014	102.5	110.2	109.0	112.7	111.3	119.0	113.7	116.1	111.1	117.9	~~117.9~~	109.5	118.1	~~118.0~~	112.3	~~119.8~~	**120.6**	**117.4**	119.0	~~119.0~~
4/27/2014	102.5	115.9	109.0	117.1	111.5	118.8	113.8	115.9	111.1	~~115.2~~	116.5	108.8	~~116.9~~	116.9	111.9	~~117.4~~	118.9	**117.4**	119.6	~~119.5~~

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

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
May 2014

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 2014 Spring Fish Operations Plan (2014 Spring FOP) posted to TMT on April 1, 2014. The 2014 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 early June. To the extent Corps project operations that are not specified in the 2014 Spring 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 2014 Water Management Plan (WMP), WMP seasonal updates, and the 2014 Fish Passage Plan (FPP).

The Corps' May 2014 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 2014 Spring FOP in May.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs 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 graph.
(B) Hourly Spill and Generation Flows - described in the lower graph.

The weekly graphs begin on April 28 and end on June 1 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

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[1] Averages reported consistent with the current and applicable Oregon TDG waiver (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG waiver and the Washington TDG criteria adjustment 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.

Each figure represents one week of a project's operation. The graphs start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill graphs) on April 28 for the lower Snake River and the lower Columbia River projects.

April 28 – May4	Figures 1 – 4
May 5 – May 11	Figures 5 – 12
May 12 – May 18	Figures 13 – 20
May 19 – May 25	Figures 21 – 28
May 26 – June 1	Figures 29 – 35

A. Upper Graph: Displays the average daily %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 2014 Spring FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the Oregon 120%TDG waiver limit for the tailwater of the dam.
2. The blue dot-dash line represents the Washington 120%TDG criteria adjustment for the tailwater of the dam.
3. The black solid line represents the Washington 115%TDG criteria adjustment for the forebay of the next dam downstream.

B. Lower Graph: 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 river flow through the project 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 2014 Spring 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 river flow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2014 Spring 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 (50 kcfs) dam;
    - minimum spill at John Day is 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 2014 Spring FOP, the dotted pink line will be below or above the heavy green line in the graphs. Actual deviations from the target operation during voluntary spill hours are described below in the May 2014 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 reduction 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 2014 Spring 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 (except as otherwise noted in the 2014 Spring FOP for Bonneville and The Dalles dams,[4] which may range up to ±3 kcfs) as compared to those specified in the 2014 Spring 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

[3] Involuntary spill conditions are identified in the graphs but are not considered variances so 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.

[4] As specified in the 2014 Spring FOP (p. 15), this applies when the spill level is below 40% of total flow at The Dalles Dam.

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 2014 Spring FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Report 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 2014 Spring 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 Operations:

The month of May was characterized by above average flows for the lower Snake River and above average flows for the lower Columbia River. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the May 2014 adjusted volume runoff on the lower Columbia was above the 30 year average (1981-2010): 30.3 MAF (million acre feet) or 120% of average as measured at The Dalles. The Runoff Processor also indicated May 2014 adjusted volume runoff on the lower Snake was above the 30 year average (1981-2010): 7.7 MAF or 111% of average as measured at Lower Granite Dam. The monthly precipitation summary for May was well below average at 48% on the Snake River above Ice Harbor Dam and well below average on the Columbia River above The Dalles Dam at 70%.

During the May reporting period, the planned 2014 Spring 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 river flow 24-hours/day.
- Lower Monumental Dam - The hourly target spill level was the %TDG cap 24 hours/day, approximate gas cap range: 20 – 38 kcfs, depending on whether bulk or uniform spill patterns were used.

- Ice Harbor Dam - The hourly target spill level alternated every two days between 30 percent of total river flow for 24-hours/day vs. 45 kcfs daytime and the %TDG gas cap nighttime (gas cap range ~75 – 95 kcfs). Nighttime spill hours are 1800-0500.
- McNary Dam - The hourly target spill level was 40% of total river flow for 24-hours/day.
- John Day Dam - The hourly target spill level alternated between 40 percent and 30 percent of total river flow for 24-hours/day due to the two-day block spring operation. Spill level changes occurred at 2000 hours.
- The Dalles Dam - The hourly target spill level was 40% of total river flow for 24-hours/day.
- Bonneville Dam - The hourly target spill level was 100 kcfs 24 hours/day.

Operational Adjustments

1. McNary Dam:

For a total of 5 days from May 28, 0600 hours to May 29, 0700 hours; May 29, 1600 hours to June 1, 0700 hours; June 2, 0700 to 1600 hours; and June 5, 0700 hours to June 6, 0700 hours spill at McNary Dam increased by approximately 12-17 kcfs during special operations to limit turbine units to the mid-point of the ±1% peak efficiency range. These special turbine operations were implemented in an effort to help reduce descaling of bypassed juvenile salmon, particularly sockeye that increased to a high of 36.8 percent on May 27. Juvenile sockeye sampled during the mid-point operations had descaling rates of 16.7 percent on May 29, 14.9 percent on May 31 and 25.0 percent on June 6, compared to descaling rates during normal turbine operations of 19.8 percent on June 2, 16.0 percent on June 4, and 0.0 percent on June 8. Concurrent debris removal efforts included spill operations to pass debris on May 29-30 that required intermittent closure of both spillway weirs for boat safety. Due to decreasing juvenile sockeye passage and inconclusive information regarding effects of turbine operations on descaling, the Corps resumed operating all available turbine units within the full ±1% peak efficiency operating range on June 6 at 0700 hours. The Corps implemented the operations in conjunction with debris removal efforts as coordinated with NOAA Fisheries and other Technical Management Team (TMT) members on May 27, May 28, May 29, June 4 and June 6. TMT members supported or did not object to the operations.

May 2014 Spill Variance Table

Table 1: May 2014 (4/28 – 6/1) - FOP Implementation Report Table

Project	Parameter	Date	Time[5]	Hours	Type	Reason
Little Goose	Reduced Spill	5/15/14	0300	1	Navigation	Hourly spill decreased to 28.8% (below 30.0% ±1% range). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 29.9%.
Lower Monumental	Reduced Spill	5/2/14	1900-2100	3	Navigation	Hourly spill decreased to 20.0 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/3/14	1900 & 2100	2	Navigation	Hourly spill decreased to 24.9 and 23.0 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/4/14	2100-2200	2	Navigation	Hourly spill decreased to 10.0 and 24.4 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/5/14	2000 & 2200	2	Navigation	Hourly spill decreased to 21.3 and 23.4 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/6/14	1900-2000	2	Navigation	Hourly spill decreased to19.9 and 21.9 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/7/14	1800-1900	2	Navigation	Hourly spill decreased to 7.7 and 21.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/8/14	1800-1900	2	Navigation	Hourly spill decreased to12.8 and 20.3 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

[5] 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.

Lower Monumental	Reduced Spill	5/9/14	2000-2100	2	Navigation	Hourly spill decreased to12.9 and 19.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/10/14	1700-1800	2	Navigation	Hourly spill decreased to17.3 and 22.4 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/11/14	2000	1	Navigation	Hourly spill decreased to 25.0 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/12/14	1300-1400	2	Navigation	Hourly spill decreased to 12.1 kcfs and 25.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/12/14	1900-2000	2	Navigation	Hourly spill decreased to 16.6 kcfs and 23.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/14/14	0300-0400	2	Navigation	Hourly spill decreased to 10.3 kcfs and 21.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/14/14	2100	1	Navigation	Hourly spill decreased to 13.5 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/15/14	1800	1	Navigation	Hourly spill decreased to 20.1 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/16/14	1800-1900	2	Navigation	Hourly spill decreased to 12.5 kcfs and 21.6 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

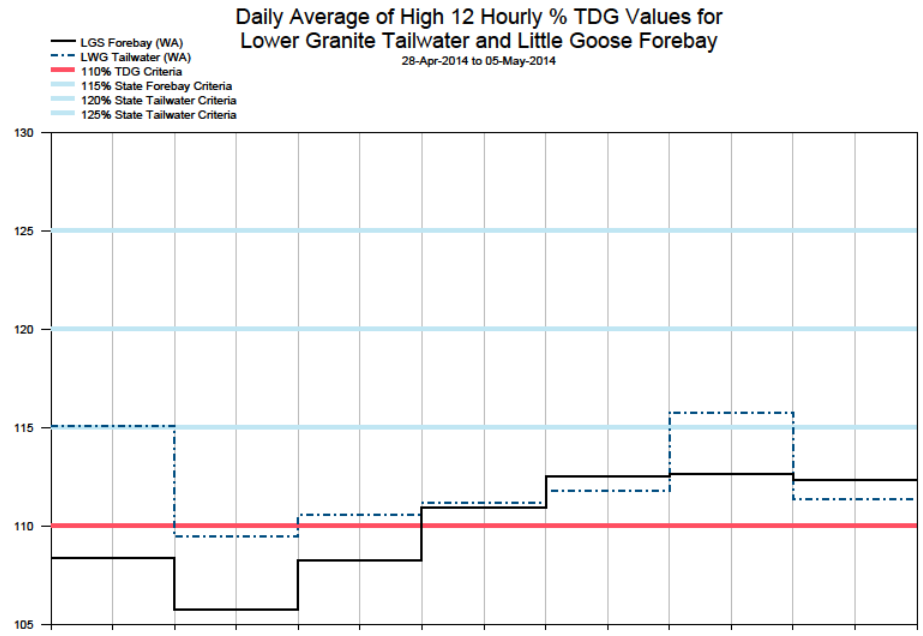
Lower Monumental	Reduced Spill	5/17/14	1800-1900	2	Navigation	Hourly spill decreased to 15.1 kcfs and 19.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/18/14	1800	1	Navigation	Hourly spill decreased to 14.2 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/19/14	1900-2000	2	Navigation	Hourly spill decreased to 10.1 kcfs and 19.4 kcfs (below 26 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/20/14	1700-1900	3	Navigation	Hourly spill decreased ranging from 19.1 to 21.9 kcfs (below 26 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/21/14	1700-1800	2	Navigation	Hourly spill decreased to 13.6 kcfs and 19.4 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/22/14	1700	1	Navigation	Hourly spill decreased to 20.4 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/23/14	1700	1	Navigation	Hourly spill decreased to 15.9 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/24/14	1700-1800	2	Navigation	Hourly spill decreased to 21.9 kcfs and 21.4 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/25/14	1700	1	Navigation	Hourly spill decreased to 19.0 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

Lower Monumental	Reduced Spill	5/26/14	1700-1800	2	Navigation	Hourly spill decreased to 22.4 kcfs and 28.3 kcfs (below 34 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/27/14	1800-1900	2	Navigation	Hourly spill decreased to 25.2 kcfs and 26.7 kcfs (below 36 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/28/14	1700-1800	2	Navigation	Hourly spill decreased to 21.5 kcfs and 29.0 kcfs (below 36 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/29/14	1700-1800	2	Navigation	Hourly spill decreased to 28.5 kcfs and 33.8 kcfs (below 36 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/30/14	1700	1	Navigation	Hourly spill decreased to 29.0 kcfs (below 38 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/1/14	1700-1900	3	Navigation	Hourly spill decreased to 26.9 kcfs, 31.1 kcfs and 32.8 kcfs (below 36 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
John Day	Additional Spill	5/1/14	2300	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 40.1%.
The Dalles	Reduced Spill	5/2/14	0700-0800	2	Transmission Stability	Hourly spill decreased to 38.6% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.2%.

The Dalles	Reduced Spill	5/5/14	0200-0700	6	Operational Limitations	Hourly spill decreased to 96.1 kcfs (below 100 kcfs spill cap). Spill volume limited due to physical limits of spill gate settings. See p. 3 of FOP.
The Dalles	Additional Spill	5/10/14	0900	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. 24 hr avg. spill was 40.2%.
The Dalles	Reduced Spill	5/10/14	1100	1	Transmission Stability	Hourly spill decreased to 38.4% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. 24 hr avg. spill was 40.2%.
The Dalles	Reduced Spill	5/12/14	0700	1	Transmission Stability	Hourly spill decreased to 38.7% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.5%.
The Dalles	Additional Spill	5/13/14	0100	1	Transmission Stability	Hourly spill increased to 41.5% (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 38.5%.
The Dalles	Reduced Spill	5/13/14	0700	1	Transmission stability	Hourly spill decreased to 38.5% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 38.5%.
The Dalles	Increased Spill	5/14/14	2300	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 40.0%.

The Dalles	Additional Spill	5/15/14	2400	1	Transmission Stability	Hourly spill increased to 41.3% (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 39.2%.
The Dalles	Reduced Spill	5/22/14	1000-1800	9	Operational Limitations	Hourly spill decreased to 101.4 kcfs (below 105 kcfs spill cap). Spill volume limited due to physical limits of spill gate settings. See p. 3 of FOP.
The Dalles	Reduced Spill	5/22/14	2000	1	Operational Limitations	Hourly spill decreased to 101.9 kcfs (below 105 kcfs spill cap). Spill volume limited due to physical limits of spill gate settings. See p. 3 of FOP.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
28-Apr-2014 to 05-May-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

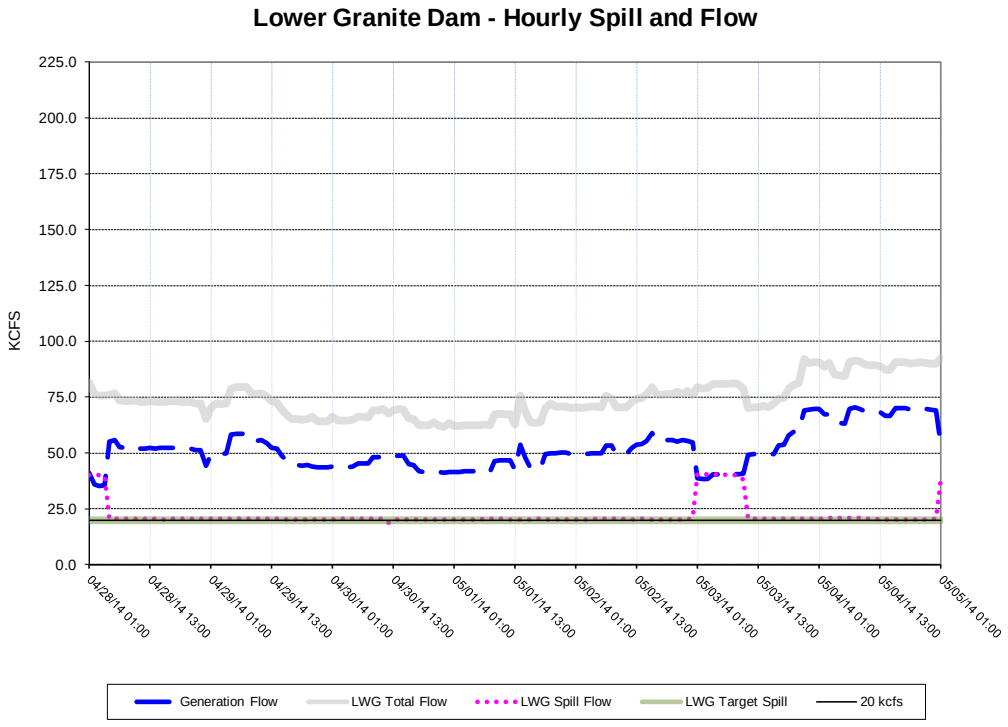
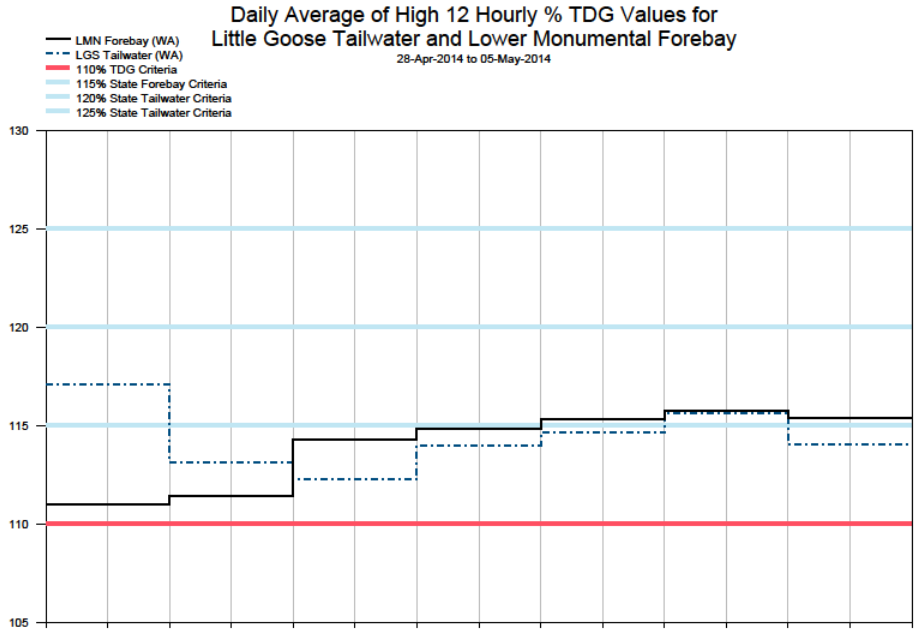

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 01:00
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
28-Apr-2014 to 05-May-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

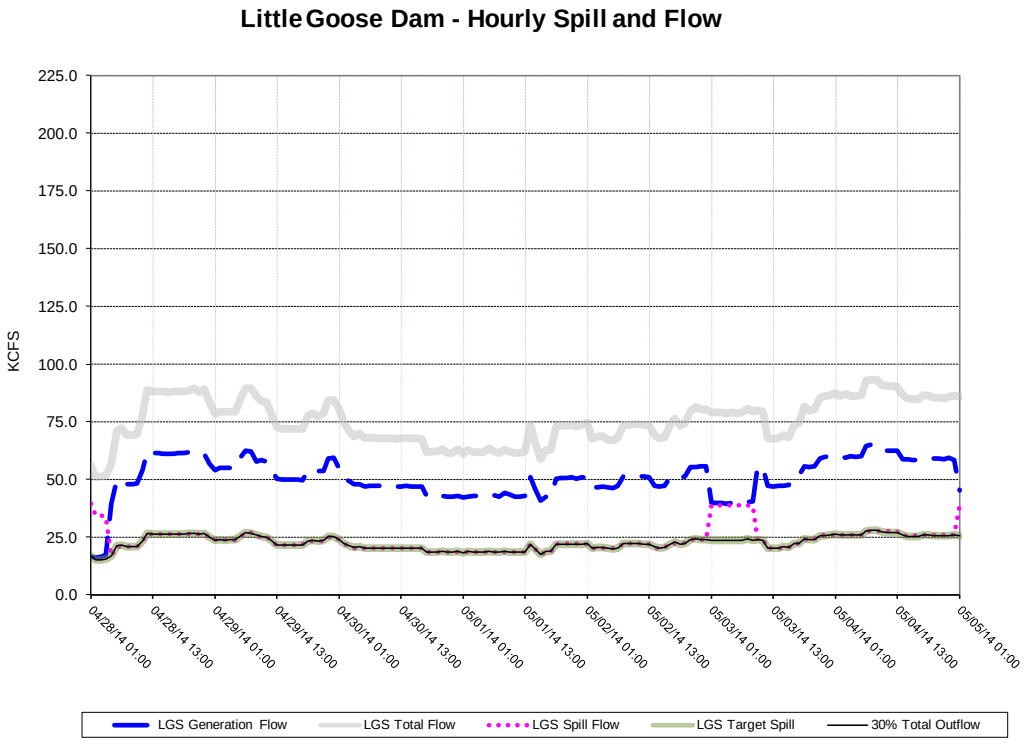
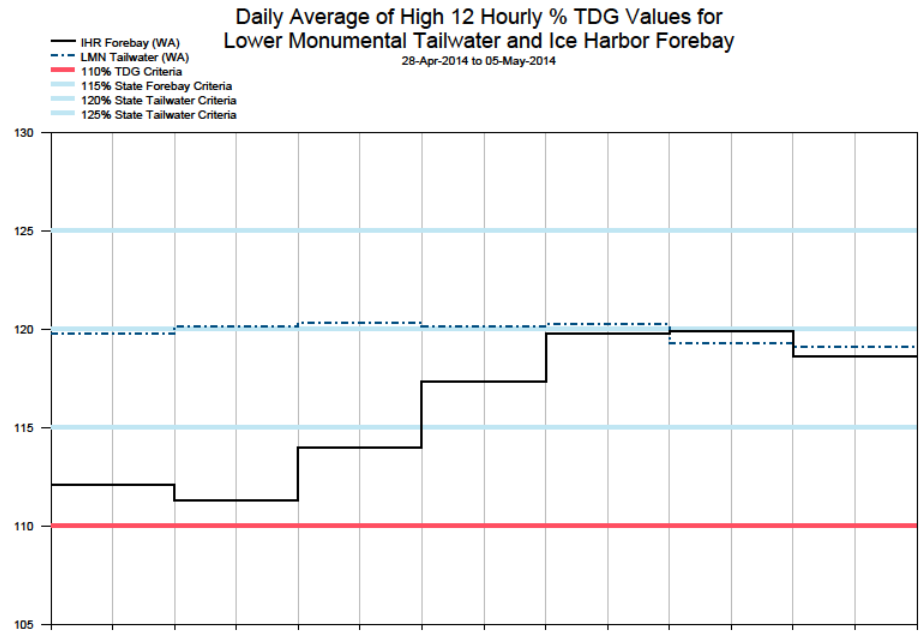
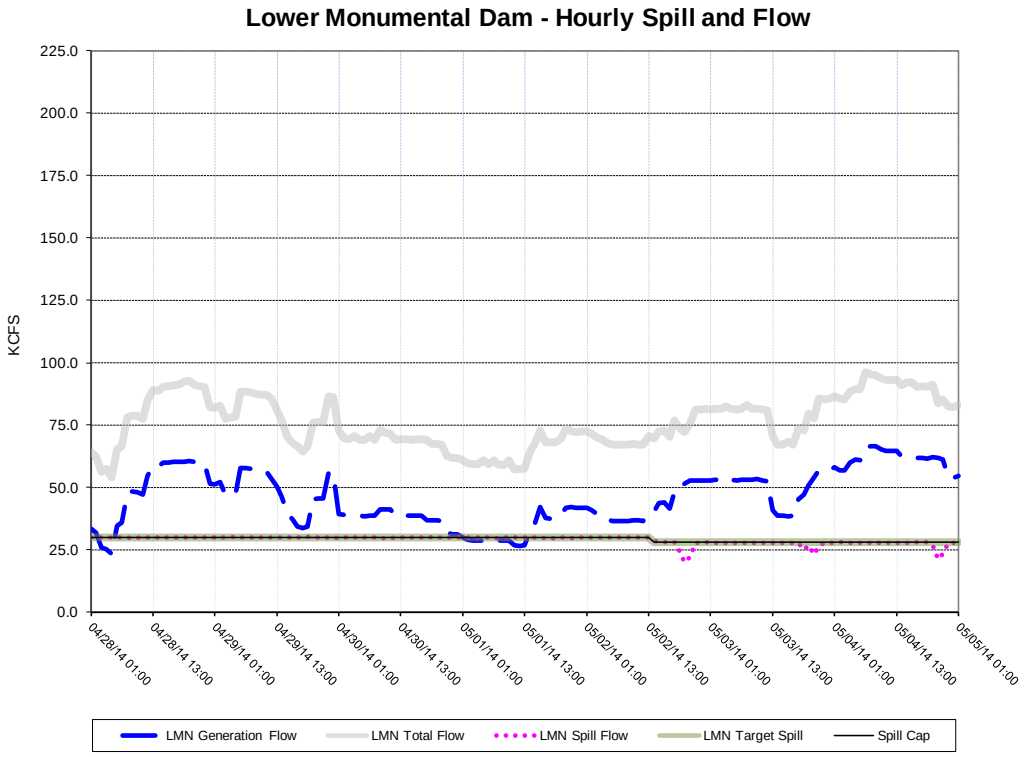

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 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
28-Apr-2014 to 05-May-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
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05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
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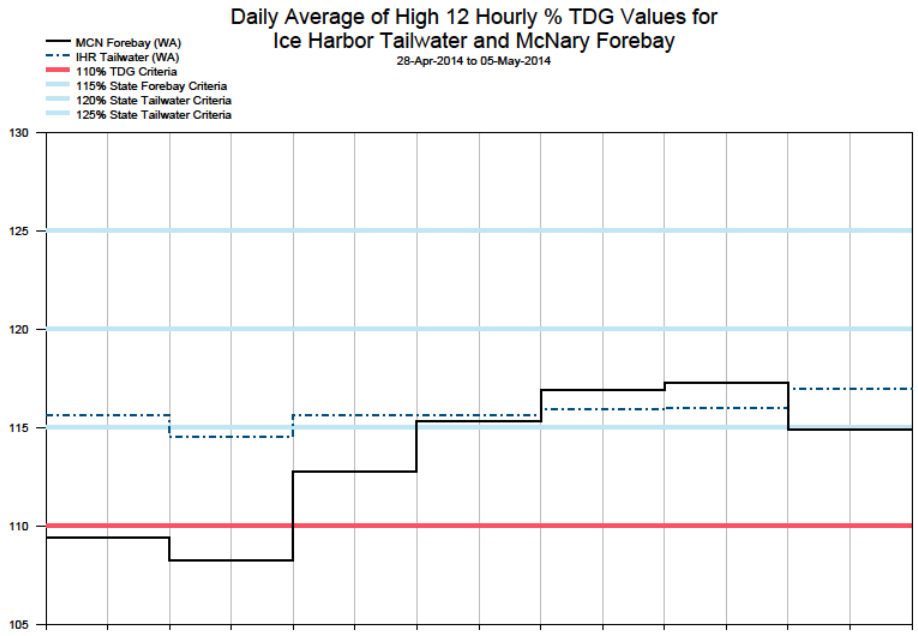
05/05/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
28-Apr-2014 to 05-May-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

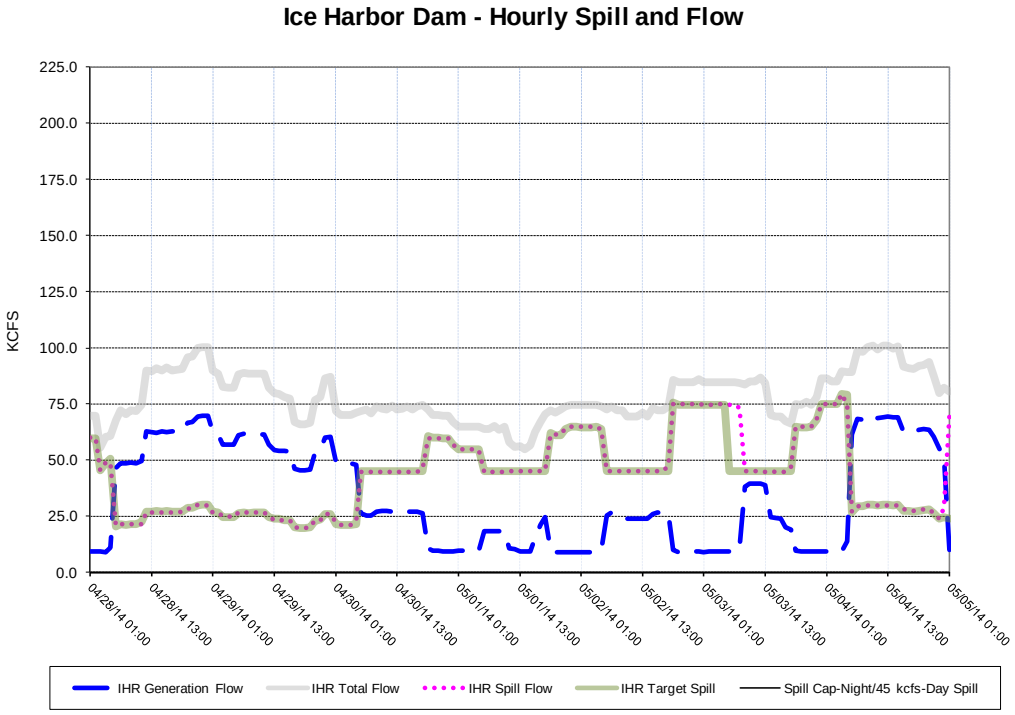
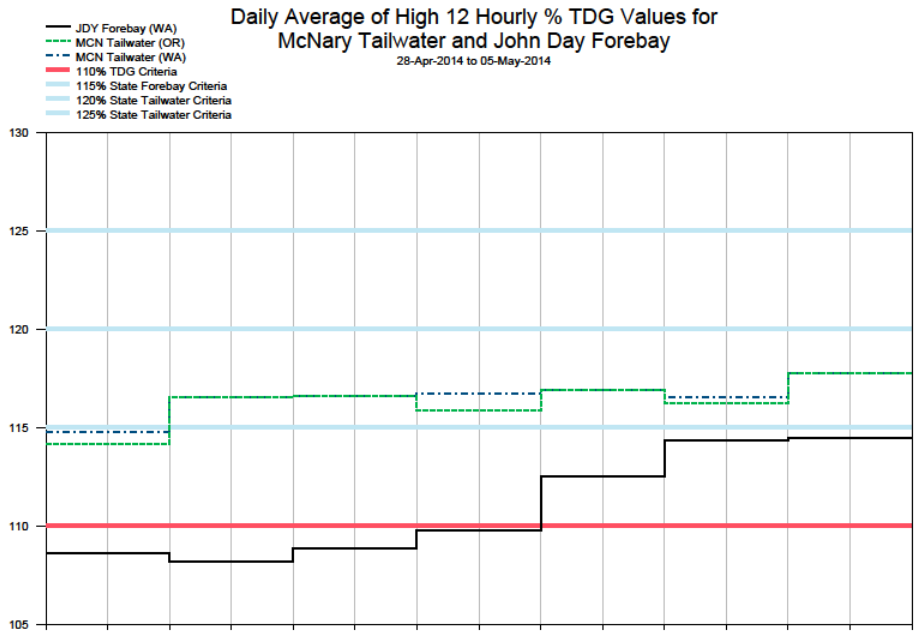

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 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
28-Apr-2014 to 05-May-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

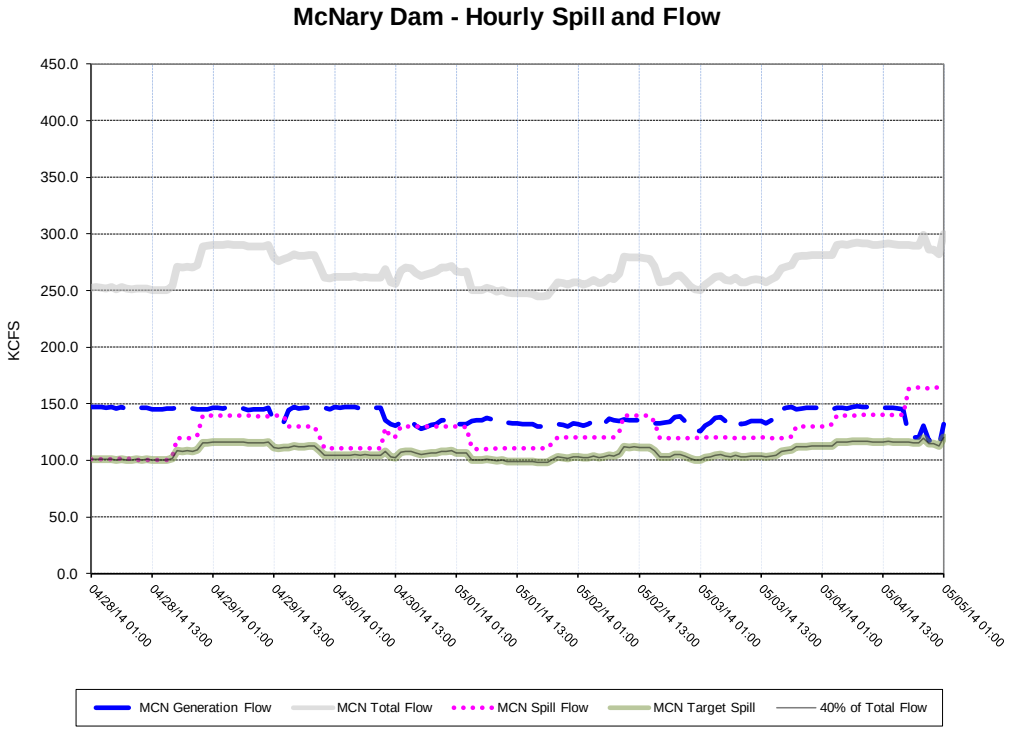
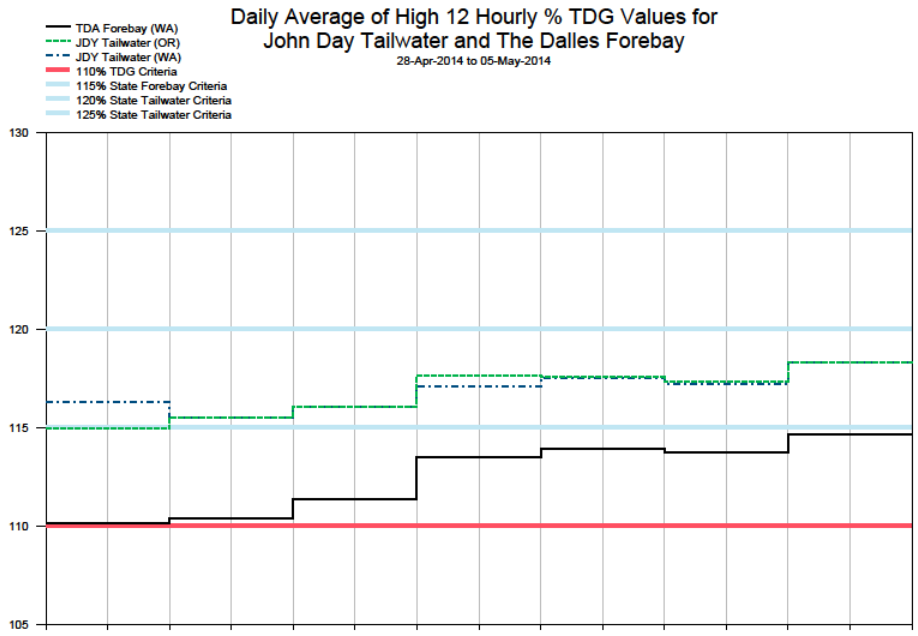

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 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
28-Apr-2014 to 05-May-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

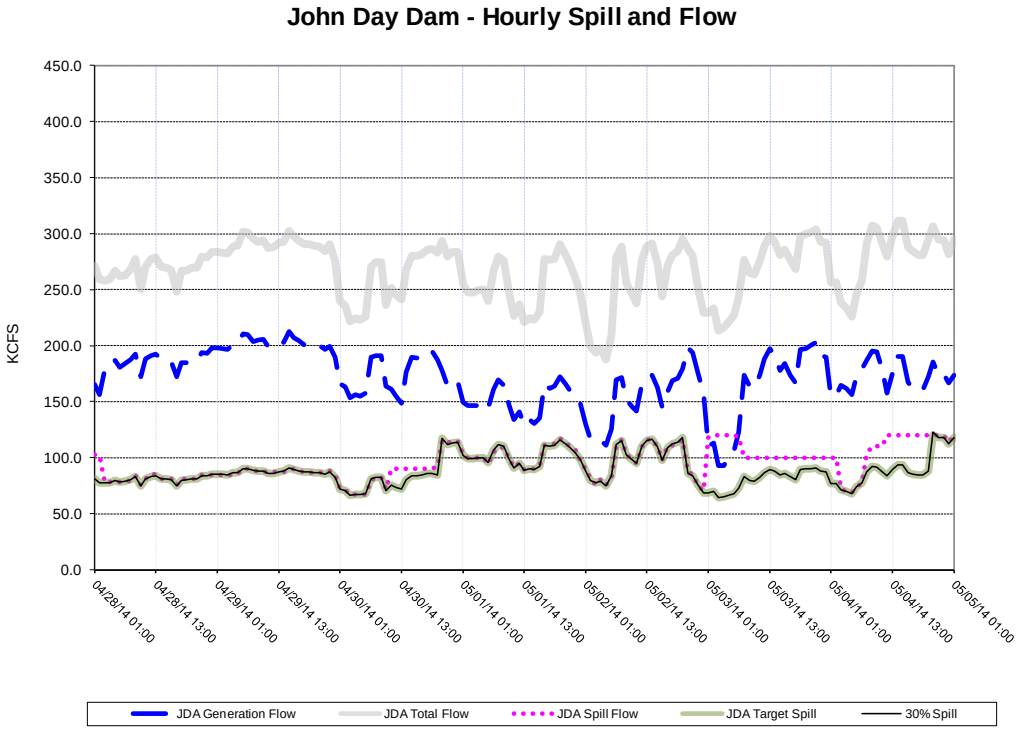
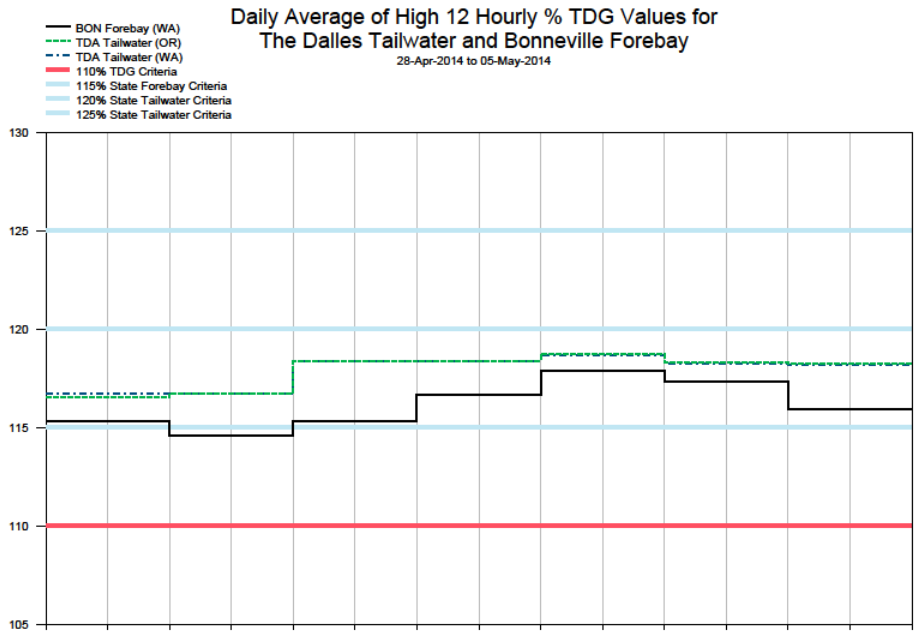

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/28/14 01:00
04/28/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
28-Apr-2014 to 05-May-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

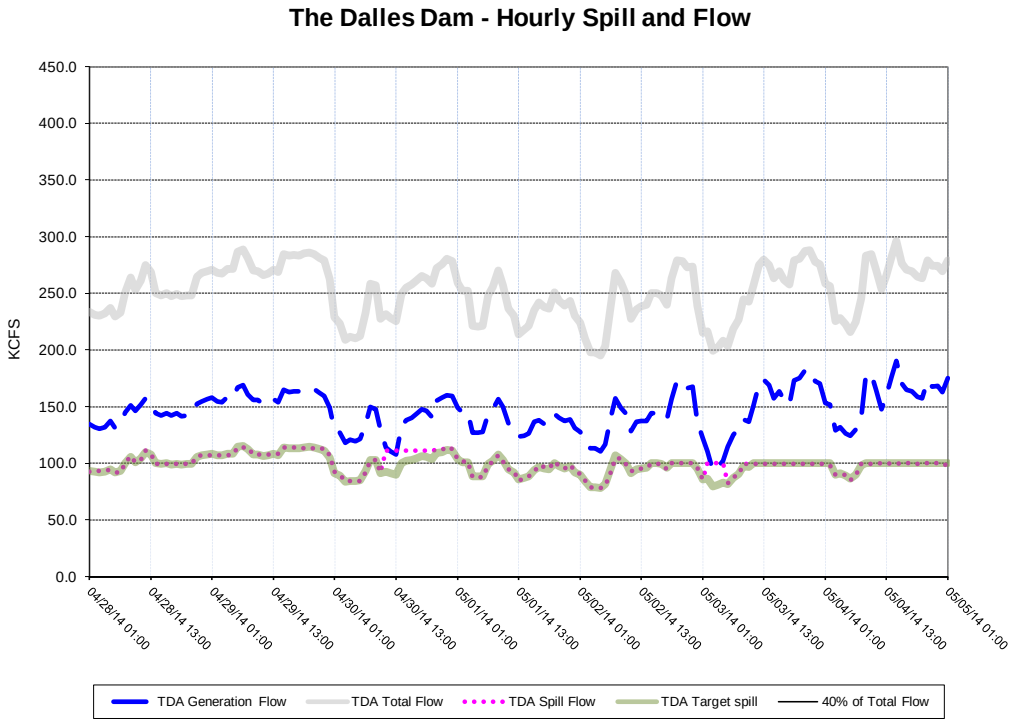
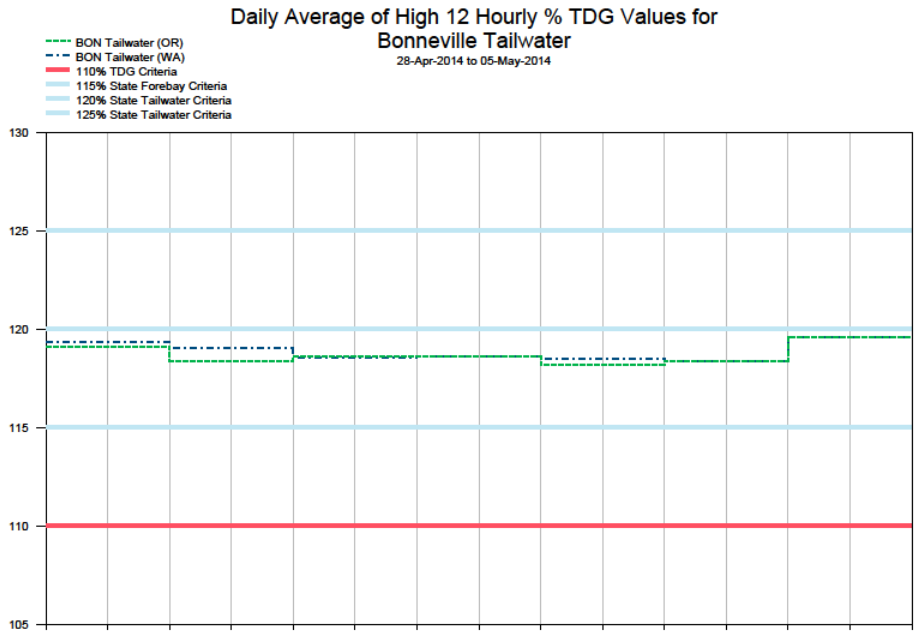

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/28/14 01:00
04/29/14 13:00
04/29/14 01:00
04/29/14 13:00
04/30/14 01:00
04/30/14 13:00
05/01/14 01:00
05/01/14 13:00
05/02/14 01:00
05/02/14 13:00
05/03/14 01:00
05/03/14 13:00
05/04/14 01:00
05/04/14 13:00
05/05/14 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
28-Apr-2014 to 05-May-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

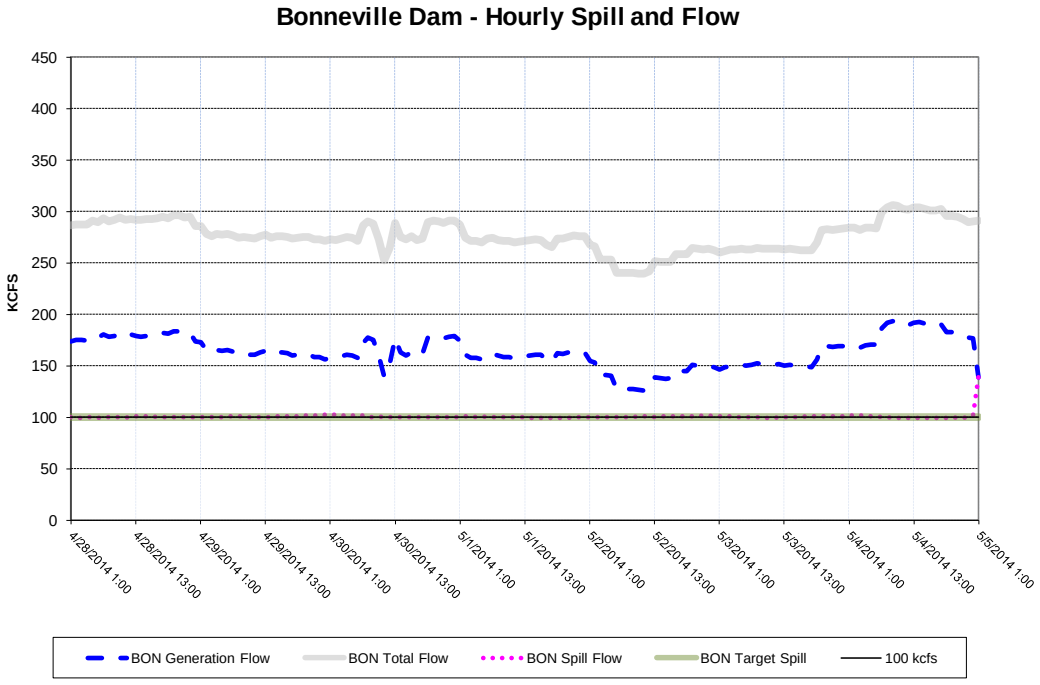
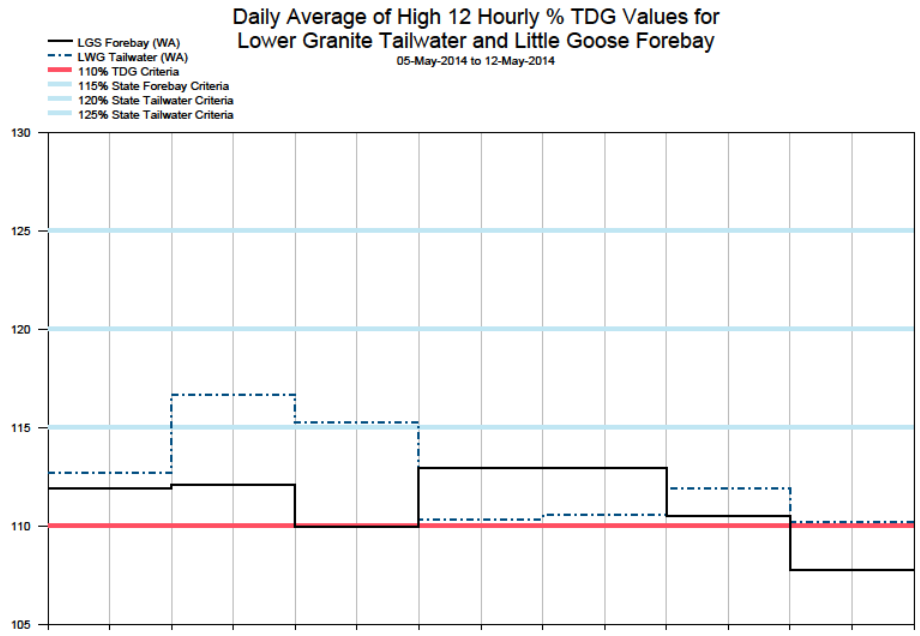

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
4/29/2014 1:00
4/28/2014 13:00
4/29/2014 1:00
4/29/2014 13:00
4/30/2014 1:00
4/30/2014 13:00
5/1/2014 1:00
5/1/2014 13:00
5/2/2014 1:00
5/2/2014 13:00
5/3/2014 1:00
5/3/2014 13:00
5/4/2014 1:00
5/4/2014 13:00
5/5/2014 1:00
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
05-May-2014 to 12-May-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

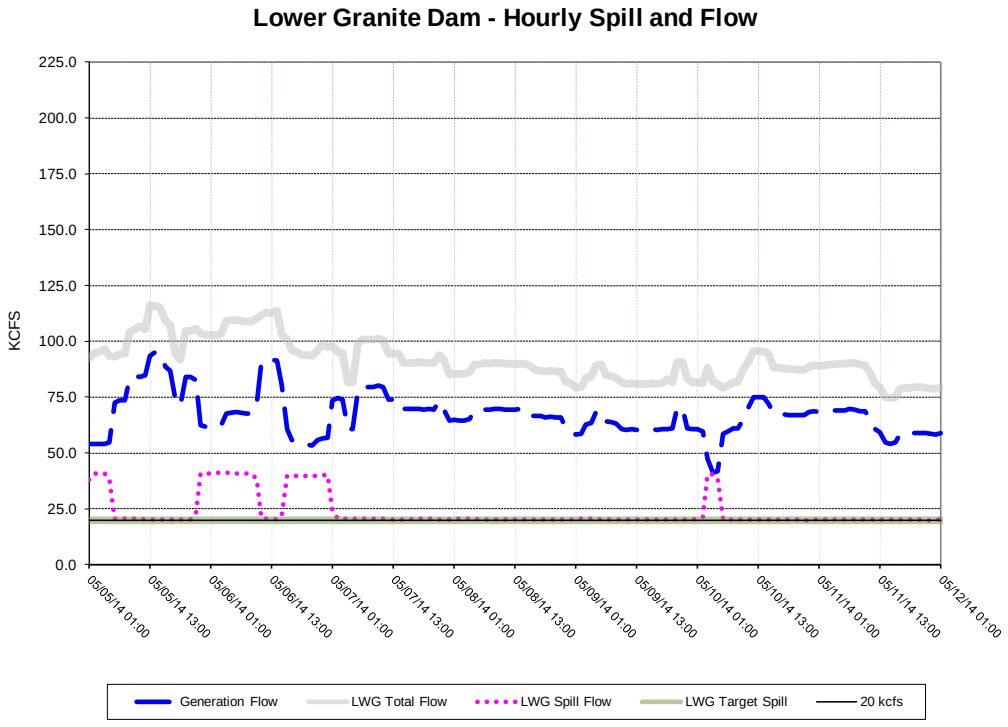
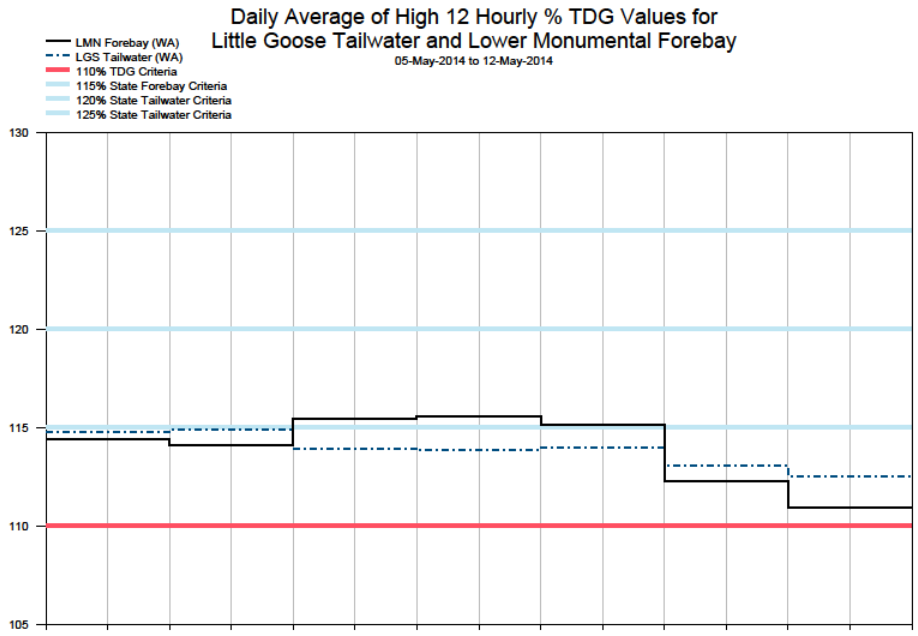

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 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
05-May-2014 to 12-May-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

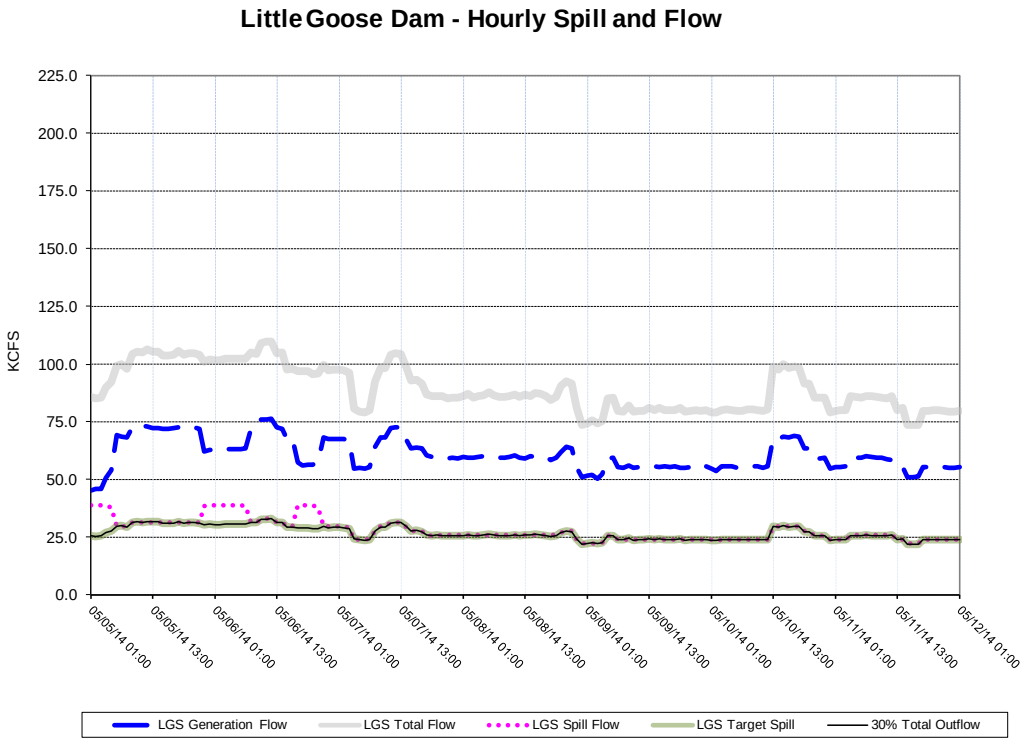
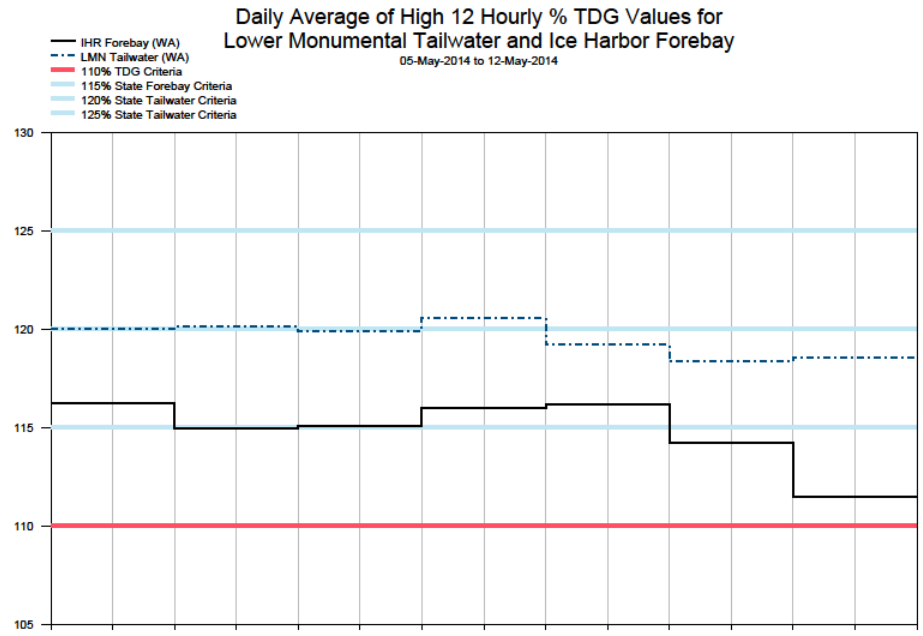

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 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
05-May-2014 to 12-May-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

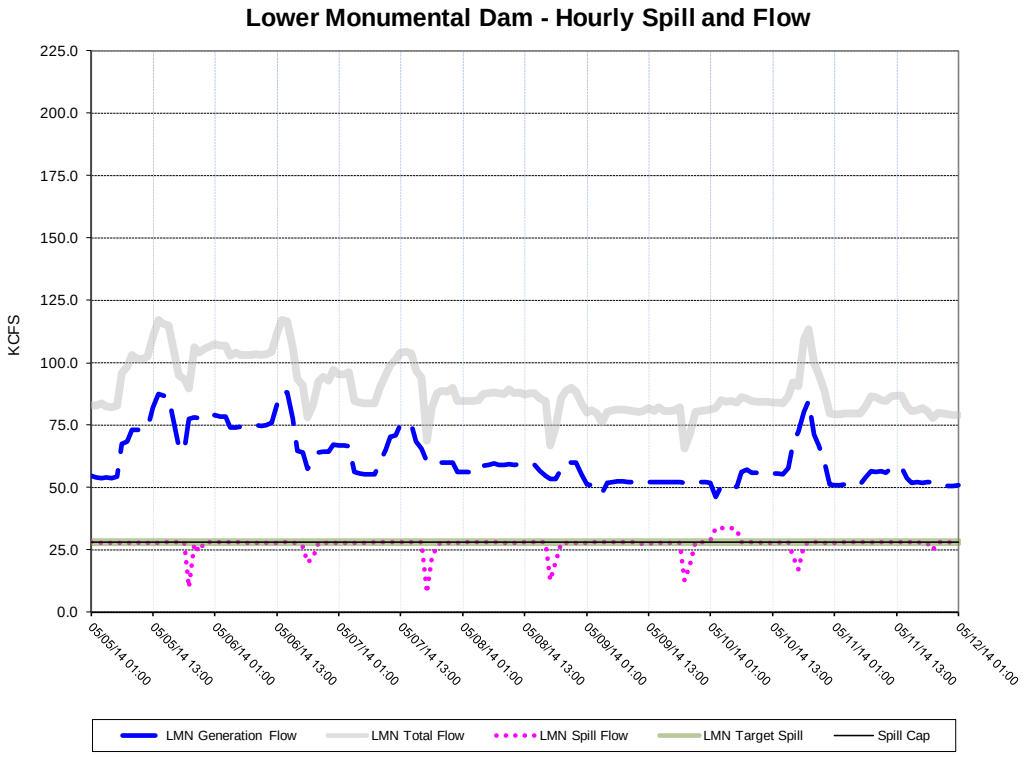
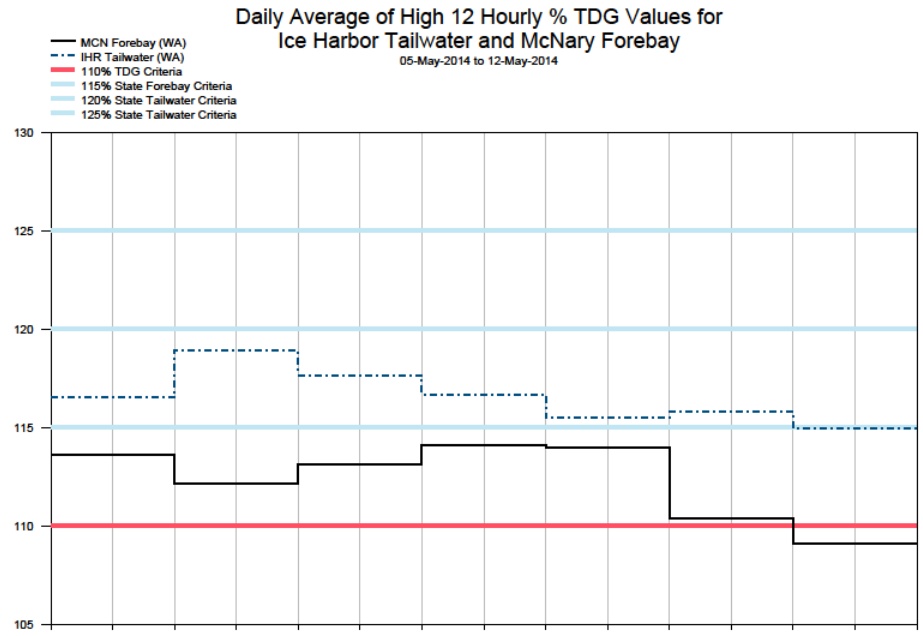

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 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
05-May-2014 to 12-May-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

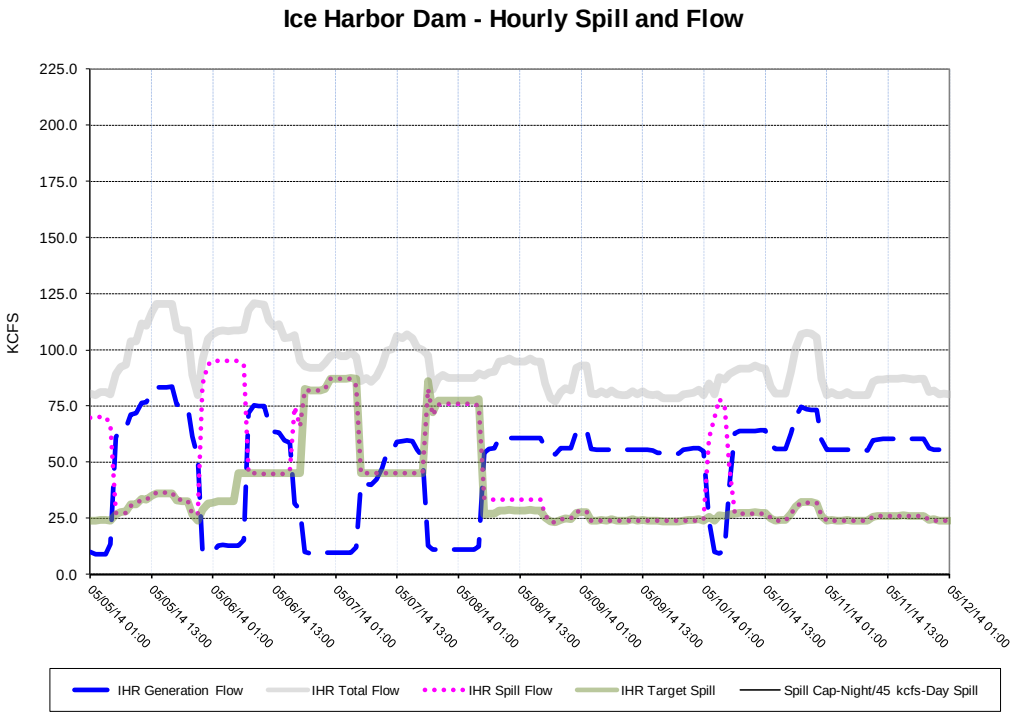
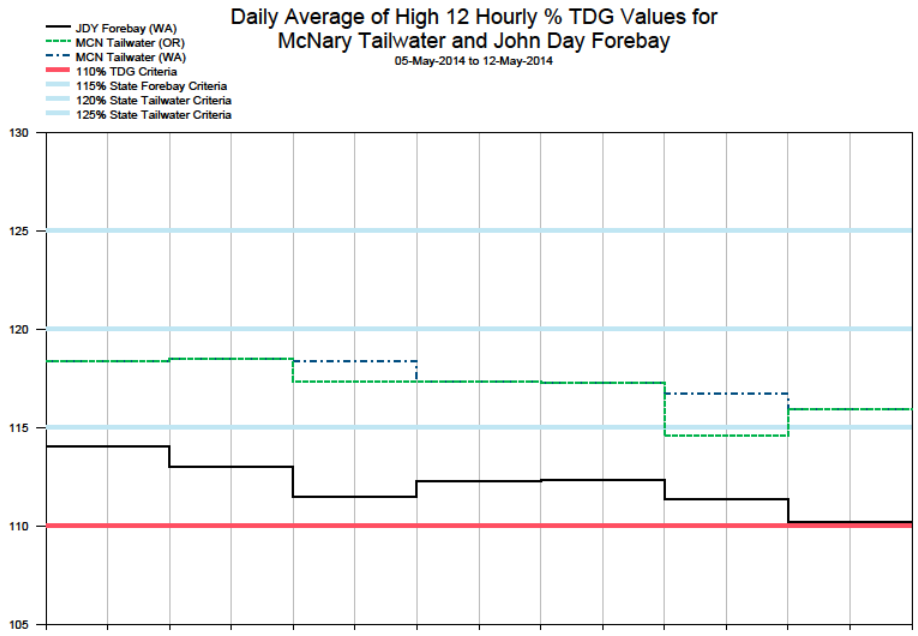

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
05-May-2014 to 12-May-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

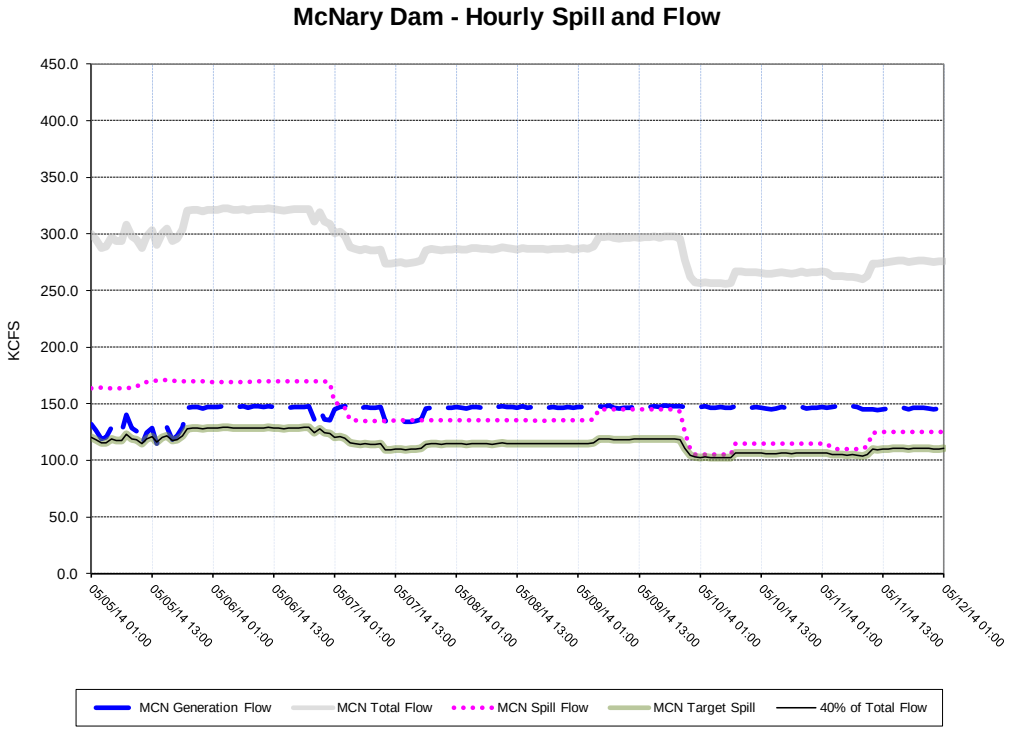
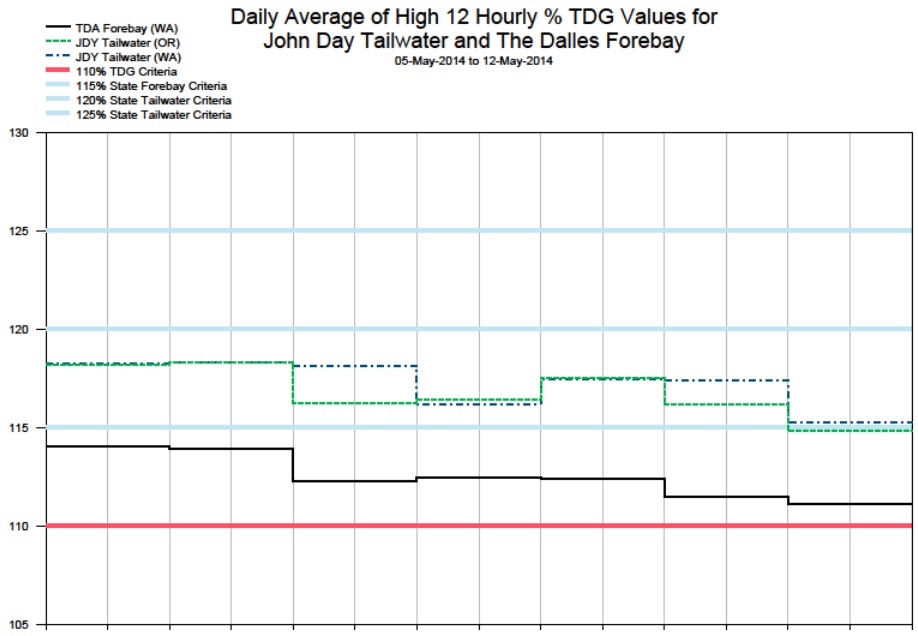

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 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
05-May-2014 to 12-May-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

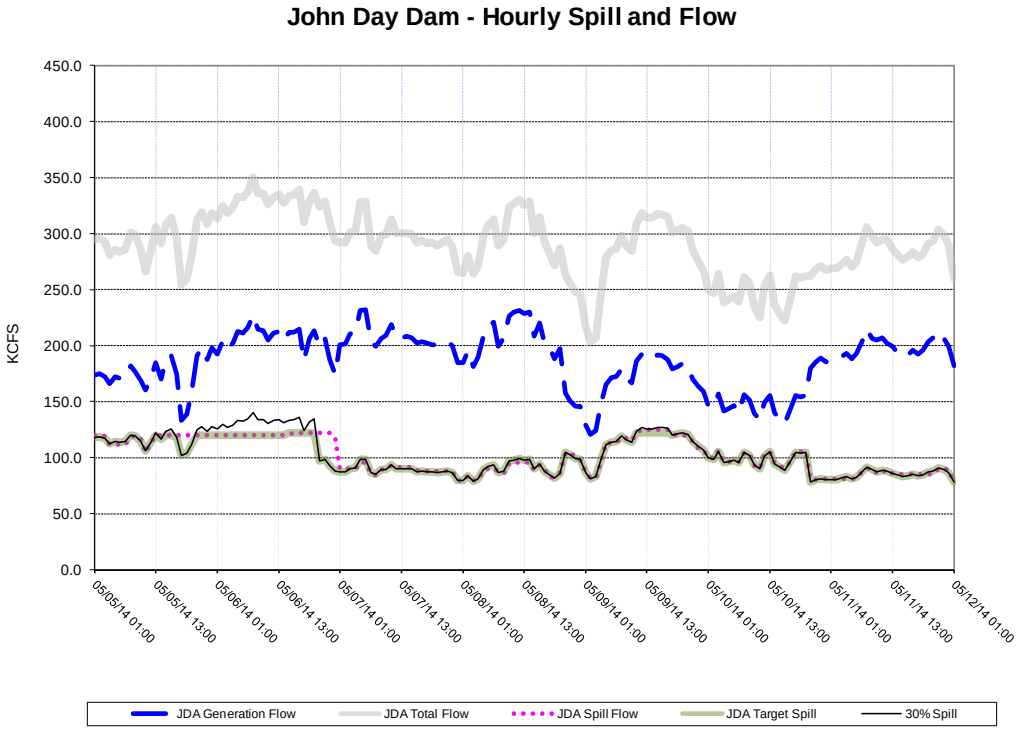
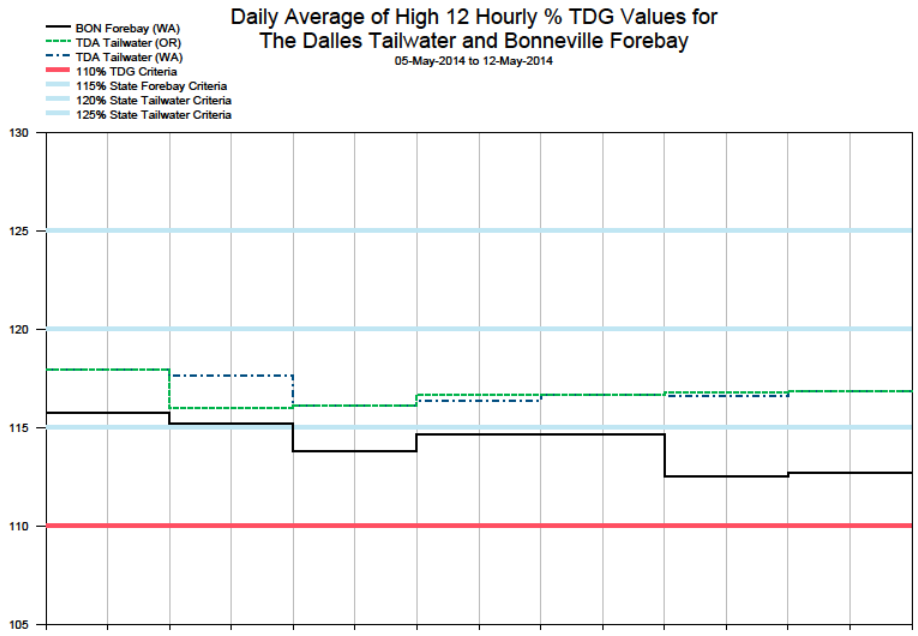

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
05-May-2014 to 12-May-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

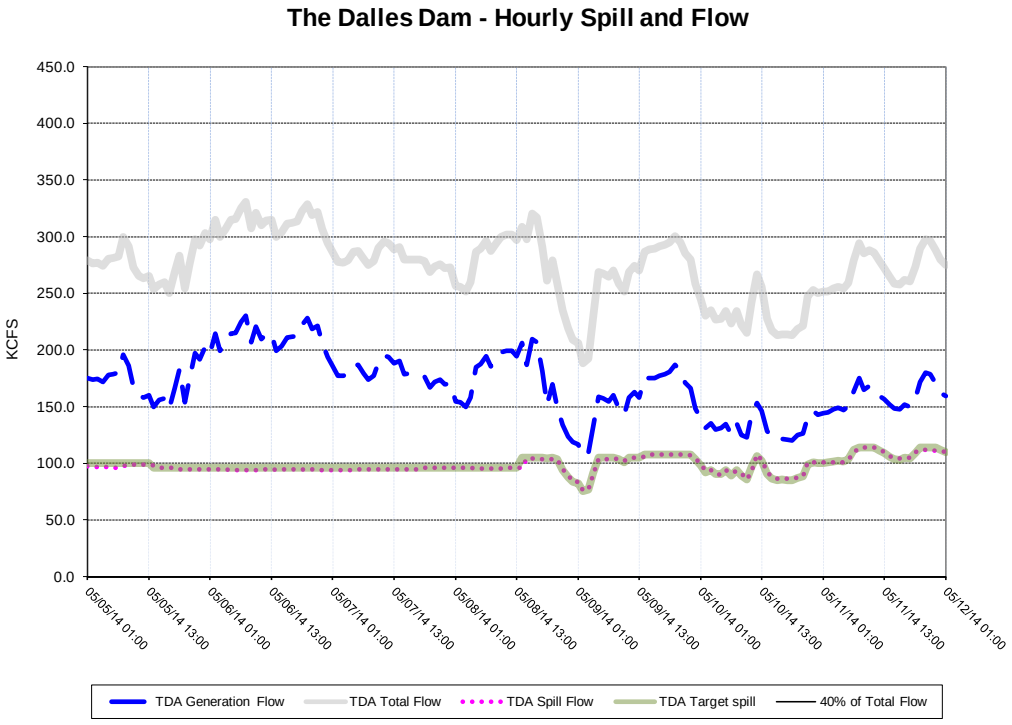
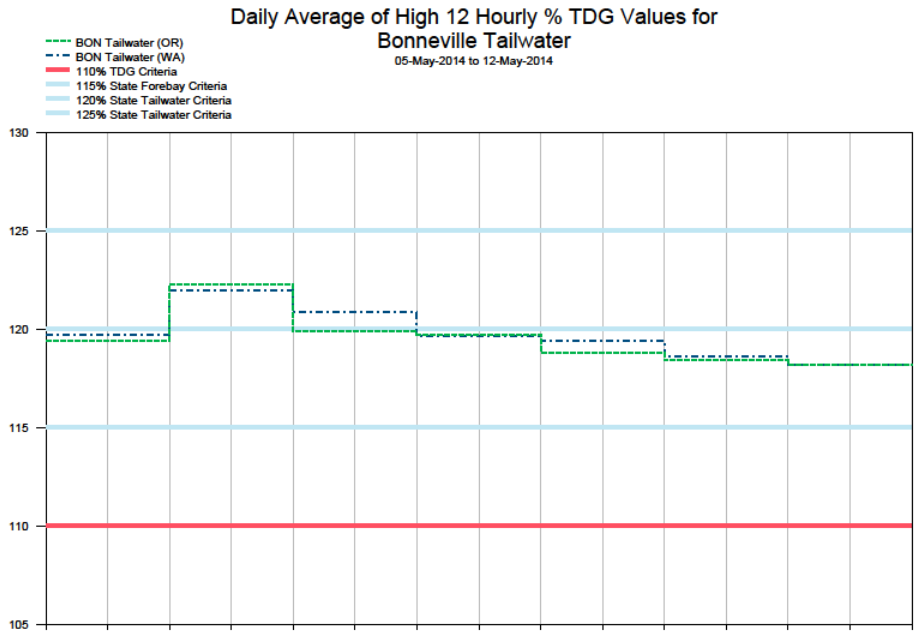

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/05/14 01:00
05/05/14 13:00
05/06/14 01:00
05/06/14 13:00
05/07/14 01:00
05/07/14 13:00
05/08/14 01:00
05/08/14 13:00
05/09/14 01:00
05/09/14 13:00
05/10/14 01:00
05/10/14 13:00
05/11/14 01:00
05/11/14 13:00
05/12/14 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
05-May-2014 to 12-May-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

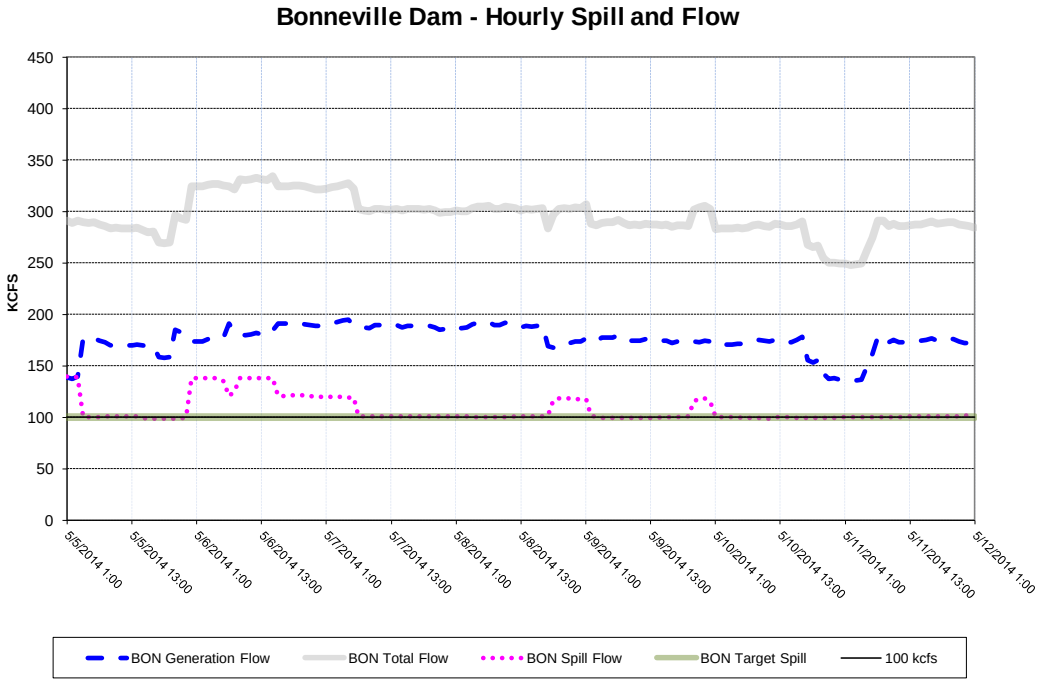
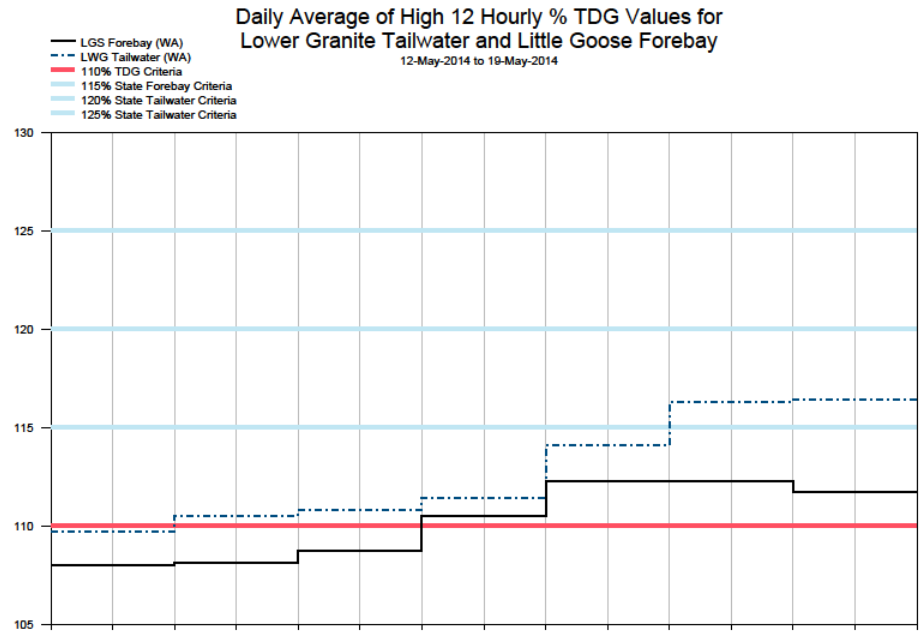

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/5/2014 1:00
5/5/2014 13:00
5/6/2014 1:00
5/6/2014 13:00
5/7/2014 1:00
5/7/2014 13:00
5/8/2014 1:00
5/8/2014 13:00
5/9/2014 1:00
5/9/2014 13:00
5/10/2014 1:00
5/10/2014 13:00
5/11/2014 1:00
5/11/2014 13:00
5/12/2014 1:00
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
12-May-2014 to 19-May-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

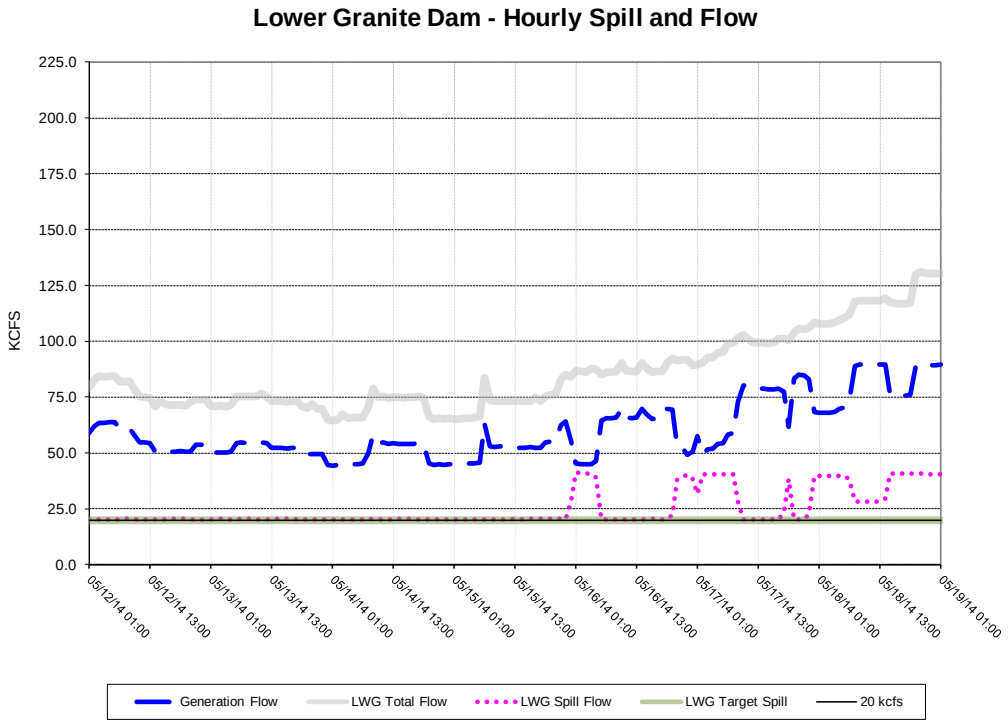
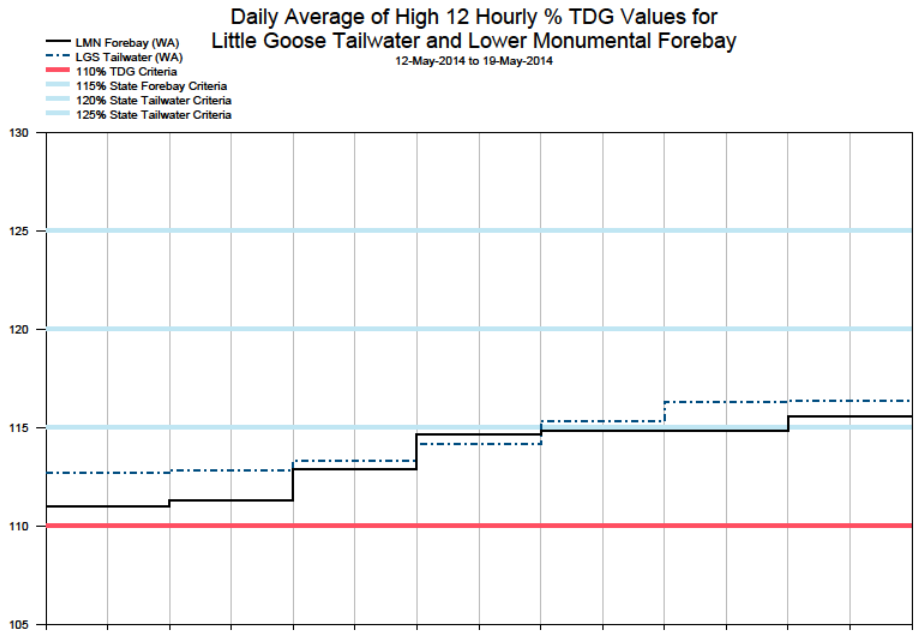

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

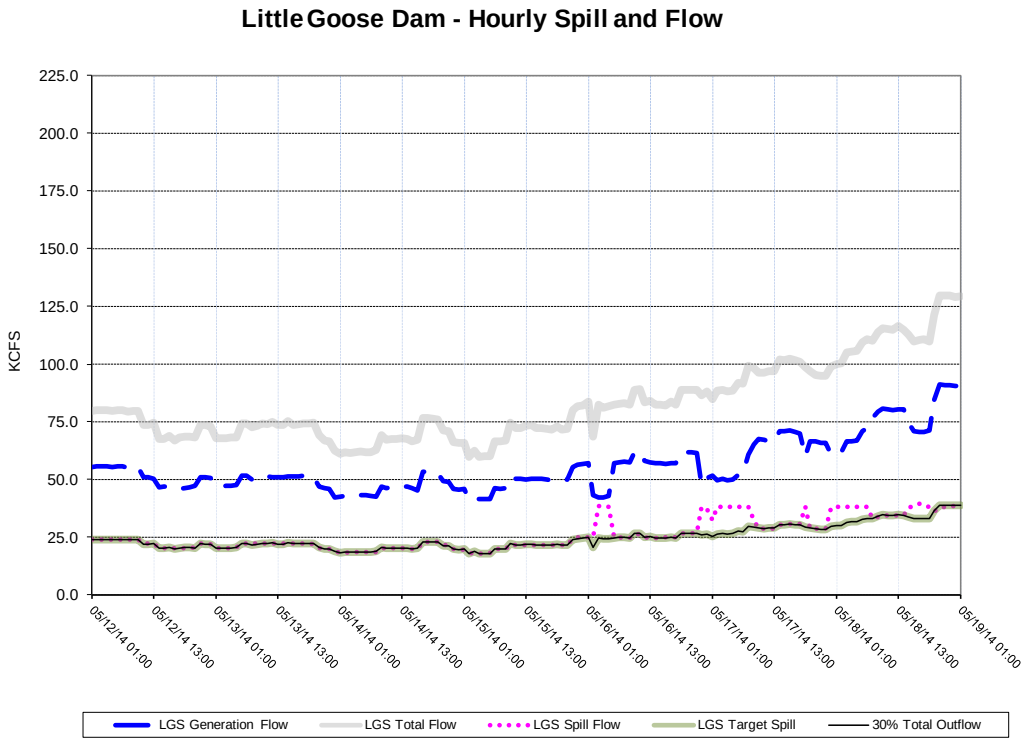
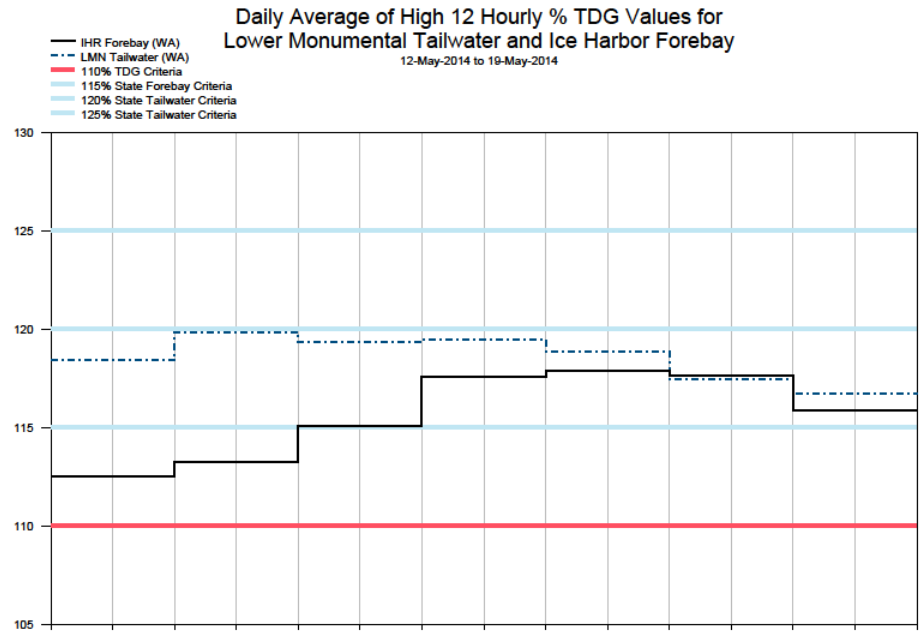

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

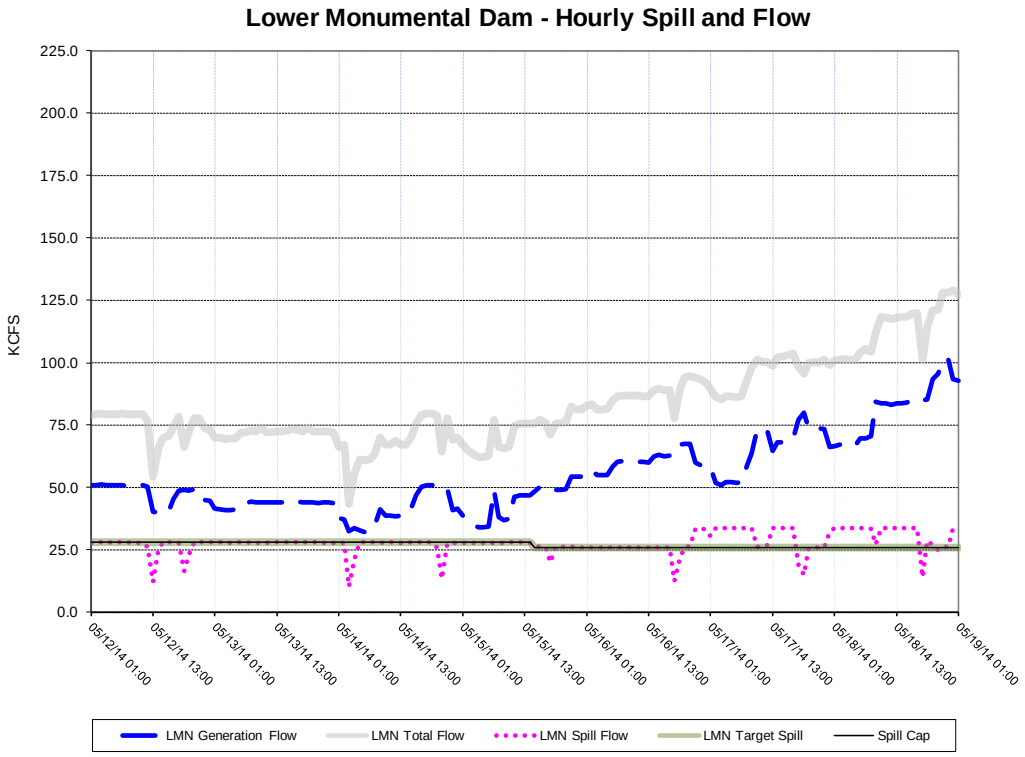
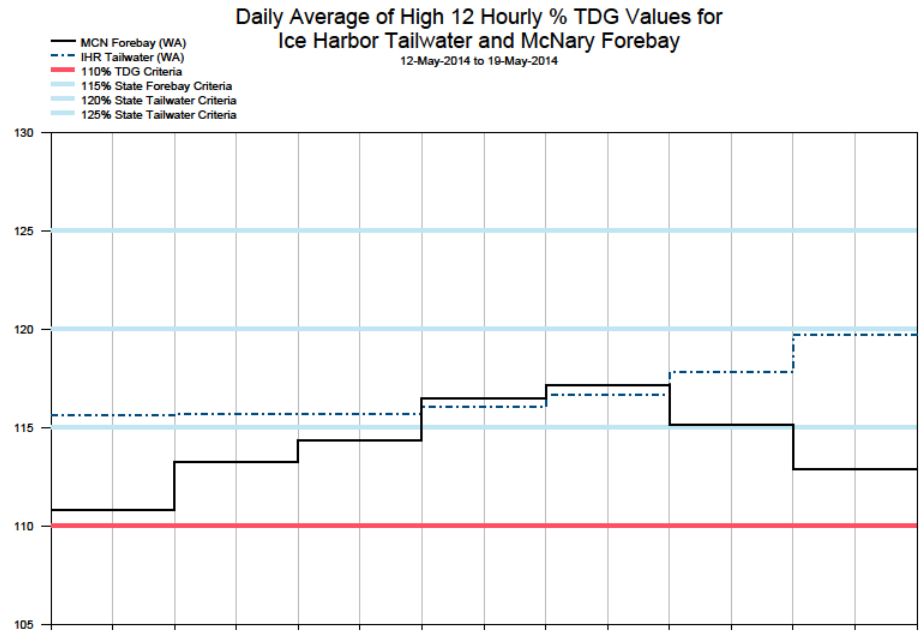

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

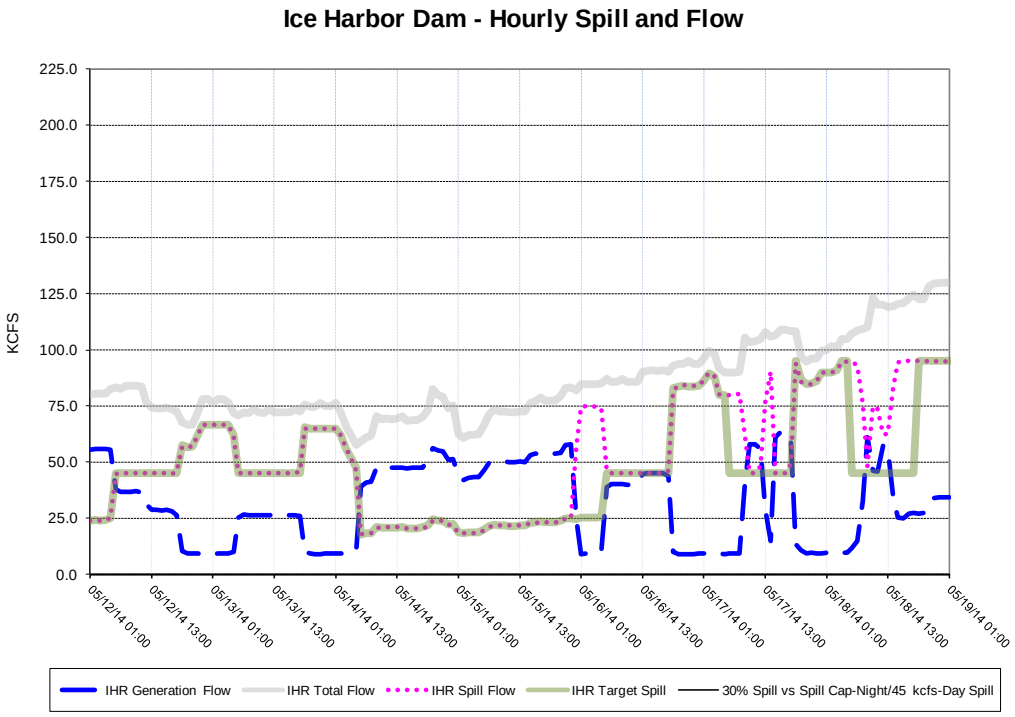
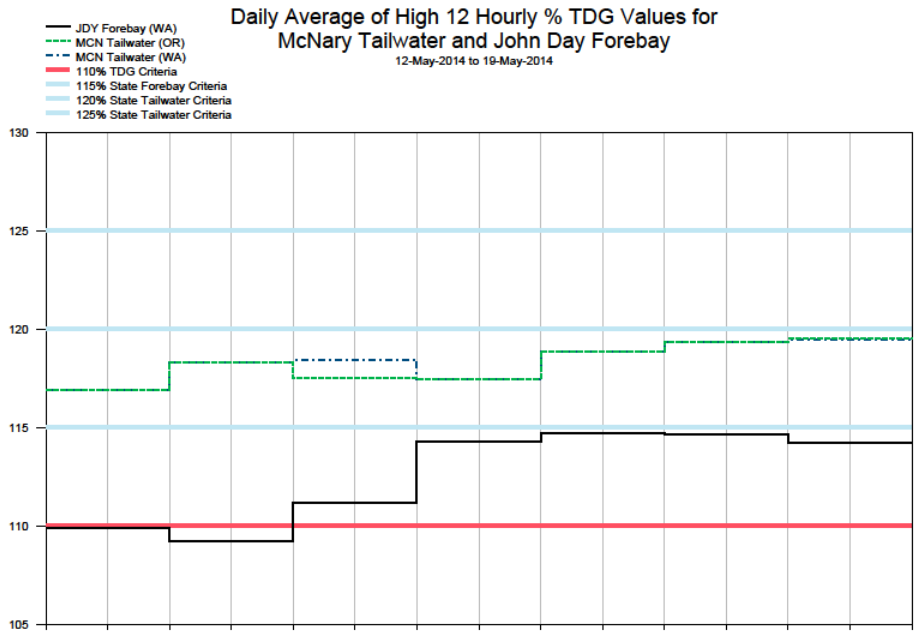

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

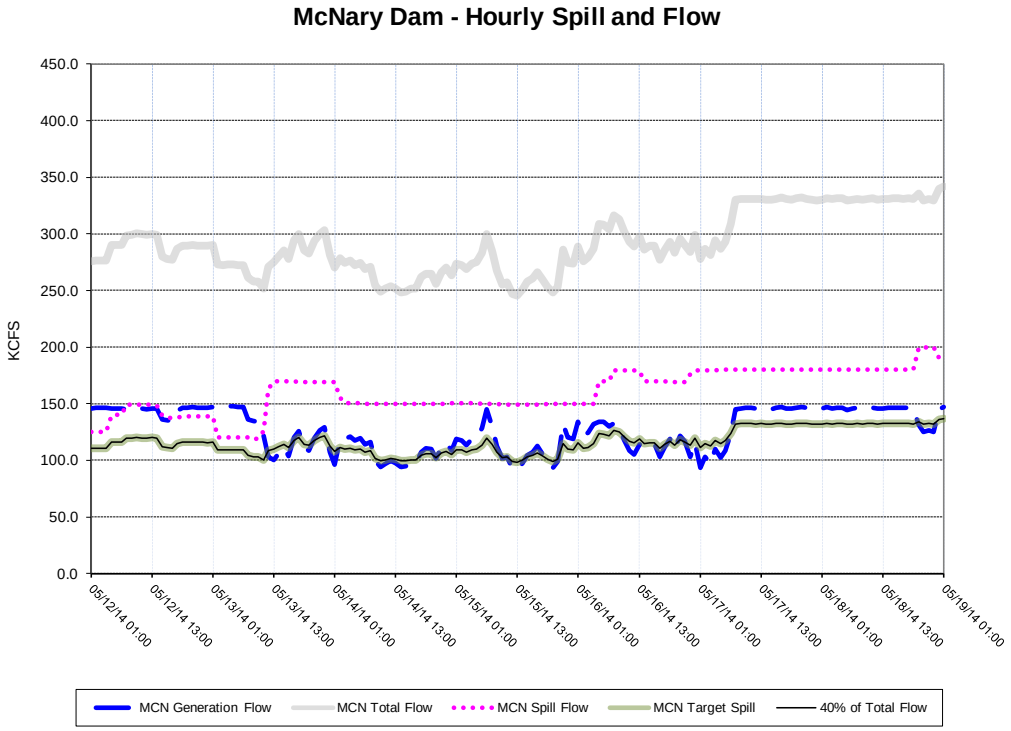
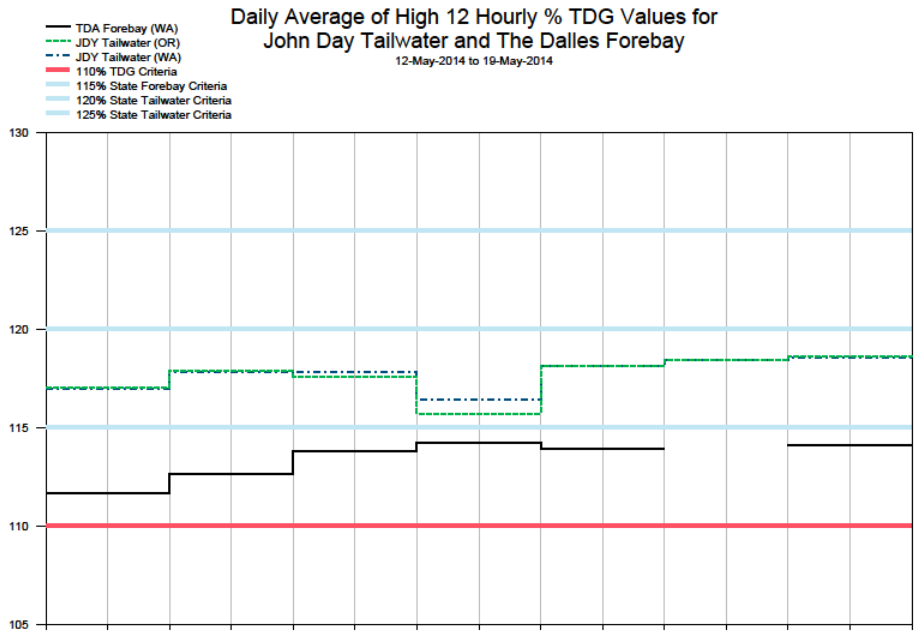

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

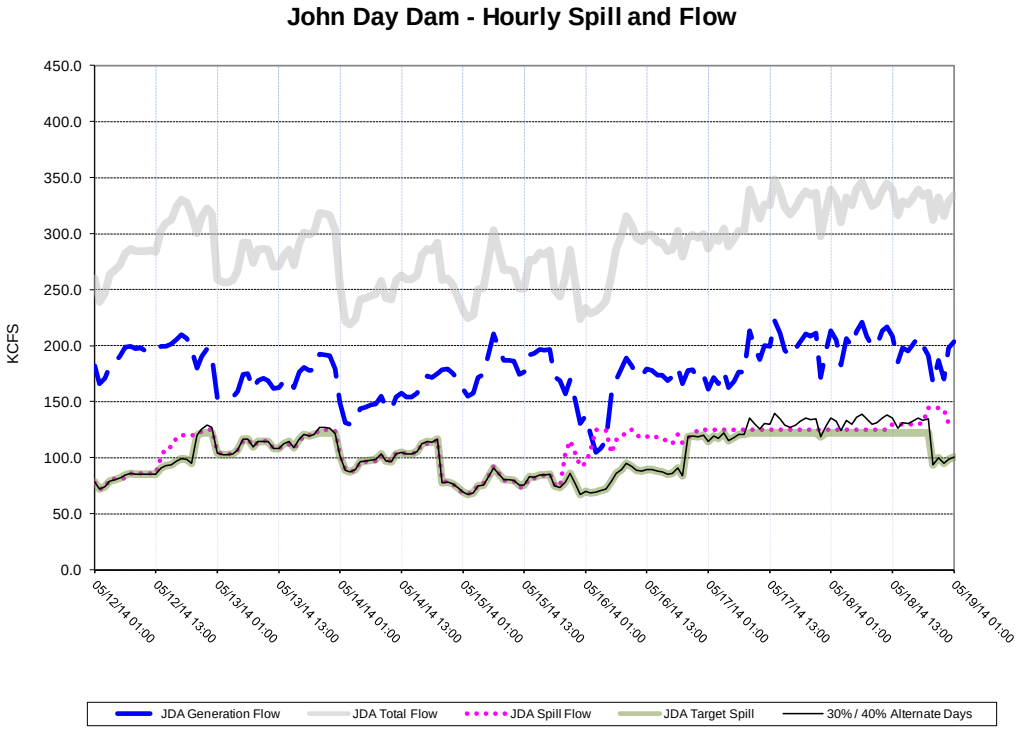
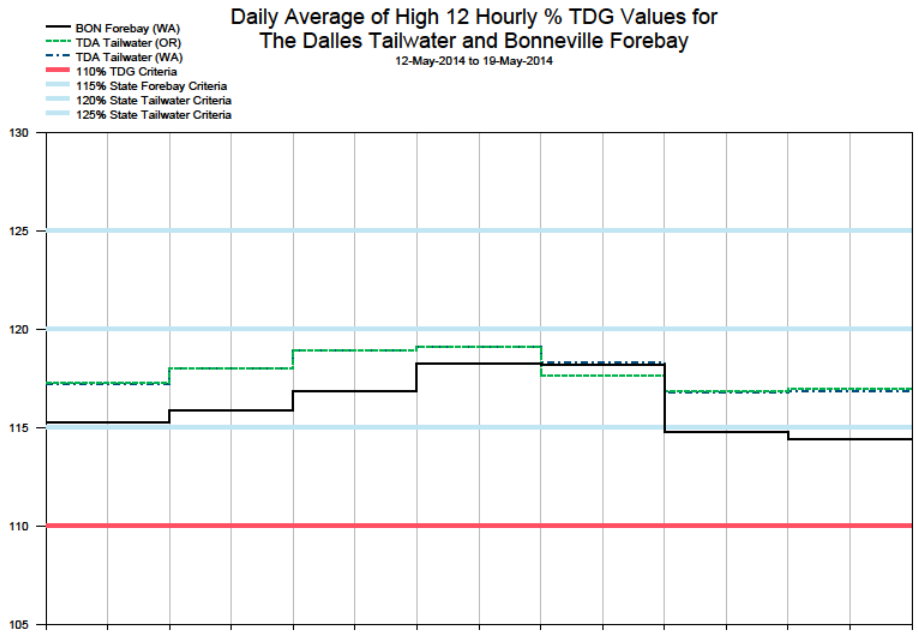

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

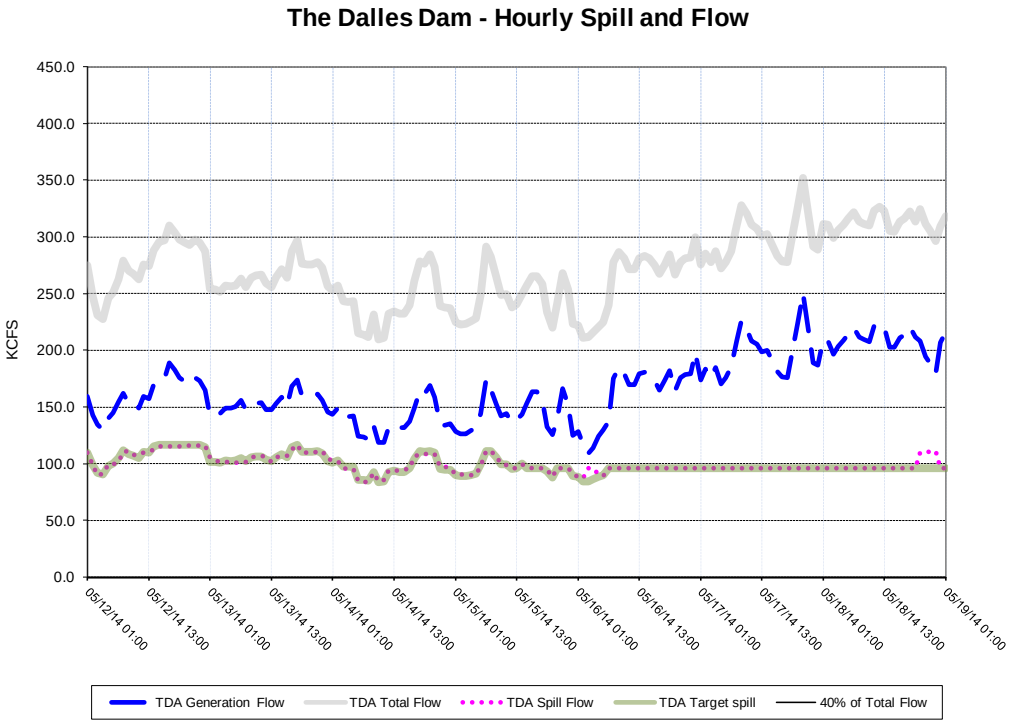
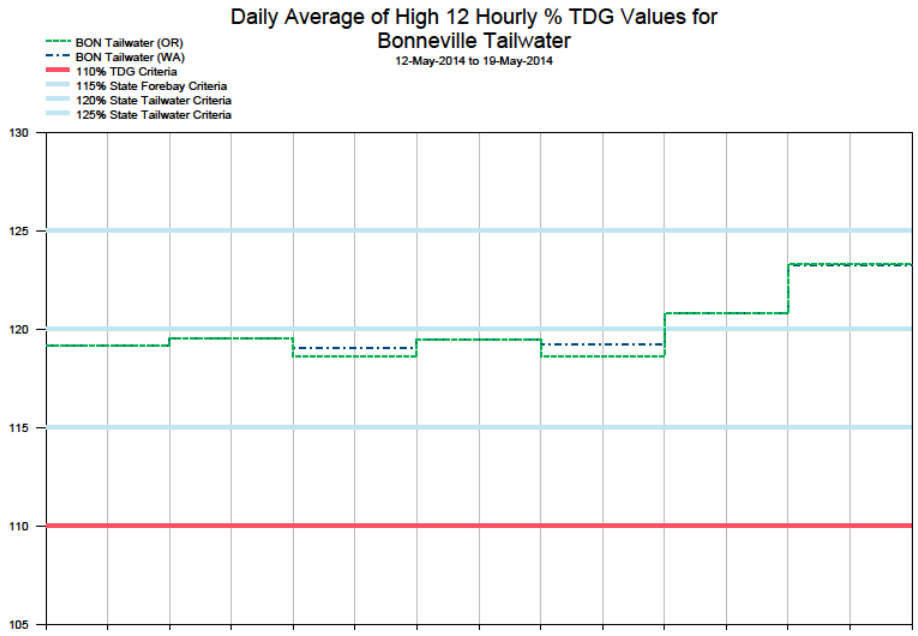

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/12/14 01:00
05/12/14 13:00
05/13/14 01:00
05/13/14 13:00
05/14/14 01:00
05/14/14 13:00
05/15/14 01:00
05/15/14 13:00
05/16/14 01:00
05/16/14 13:00
05/17/14 01:00
05/17/14 13:00
05/18/14 01:00
05/18/14 13:00
05/19/14 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
12-May-2014 to 19-May-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

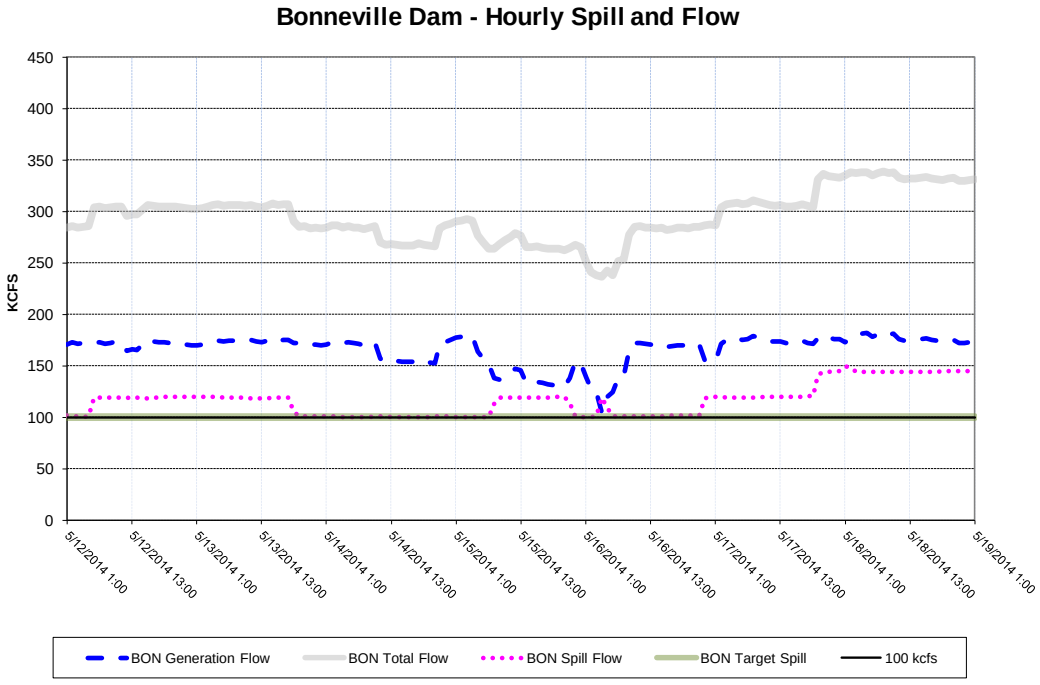
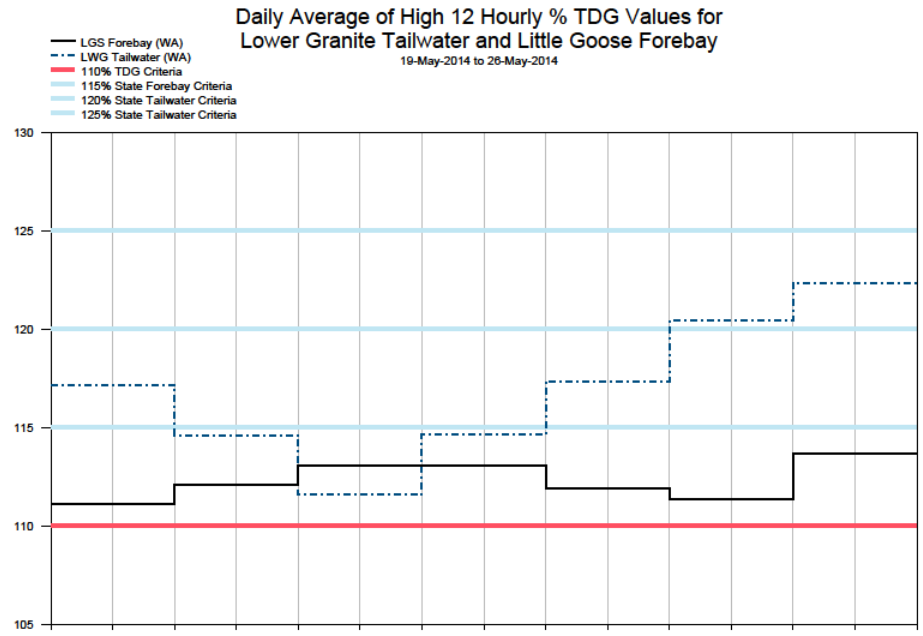

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/12/2014 1:00
5/12/2014 13:00
5/13/2014 1:00
5/13/2014 13:00
5/14/2014 1:00
5/14/2014 13:00
5/15/2014 1:00
5/15/2014 13:00
5/16/2014 1:00
5/16/2014 13:00
5/17/2014 1:00
5/17/2014 13:00
5/18/2014 1:00
5/18/2014 13:00
5/19/2014 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
19-May-2014 to 26-May-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

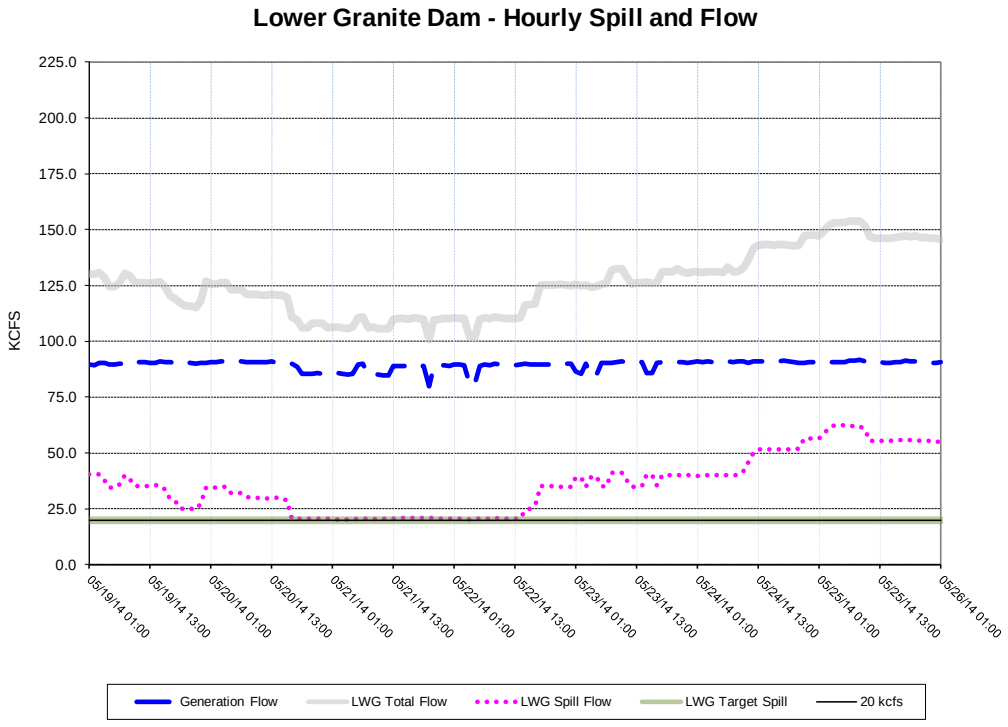
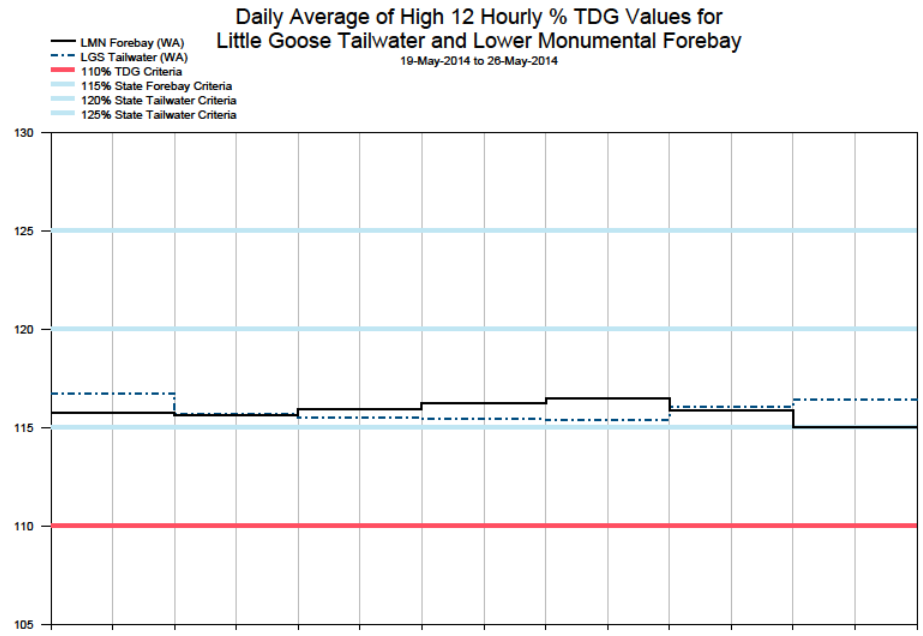

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

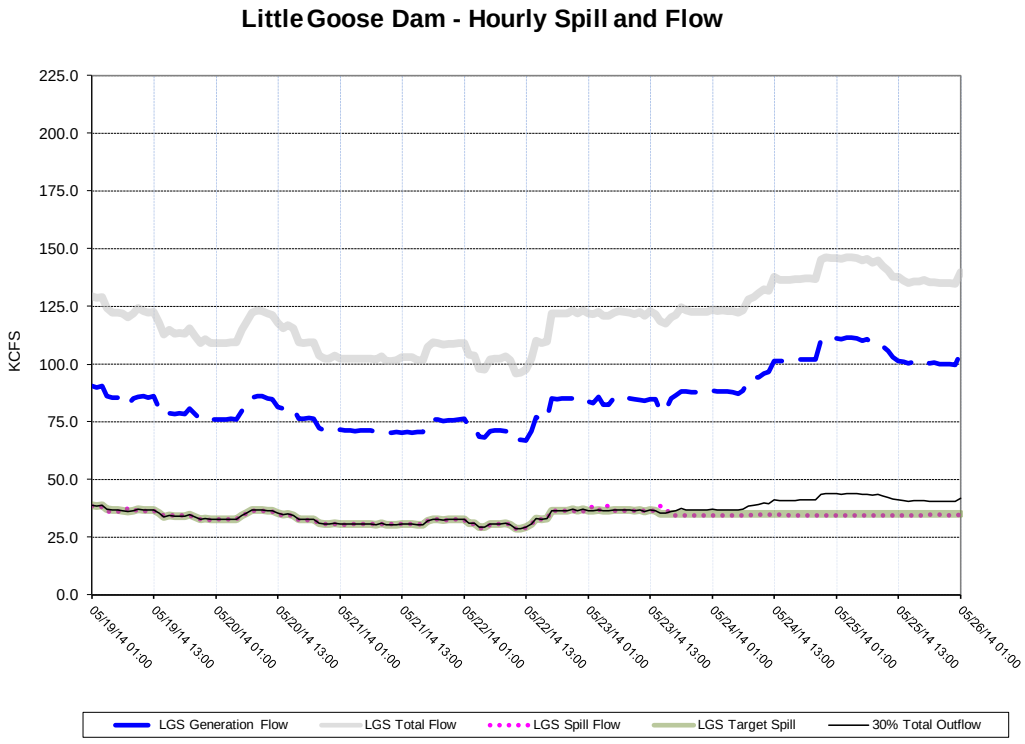
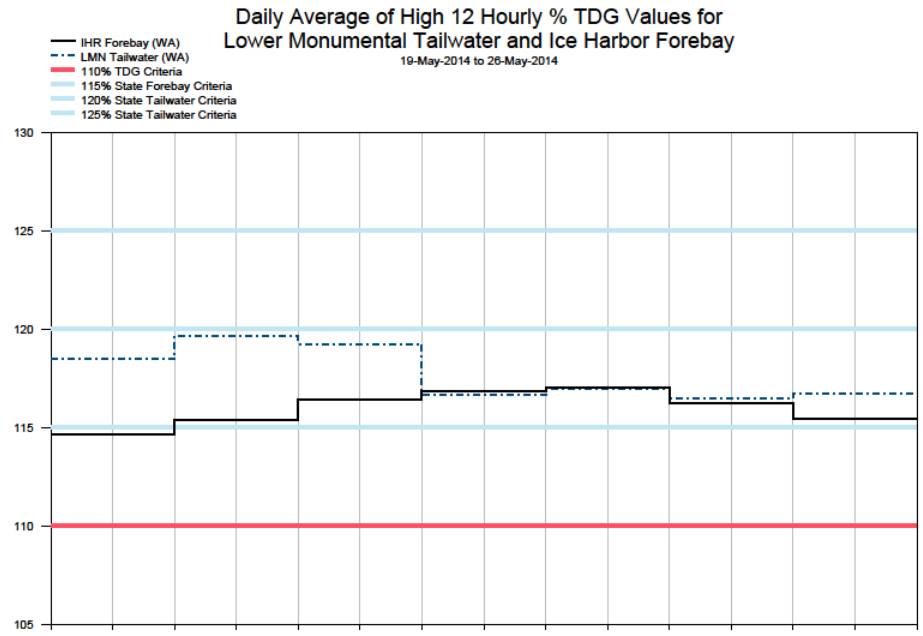

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

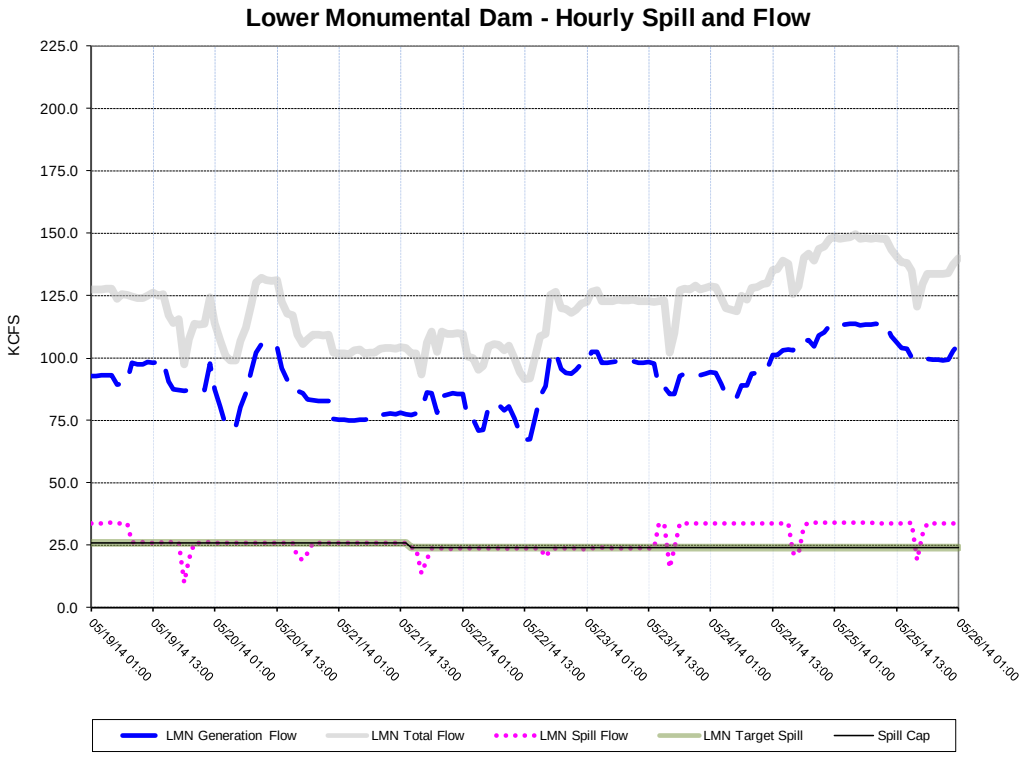
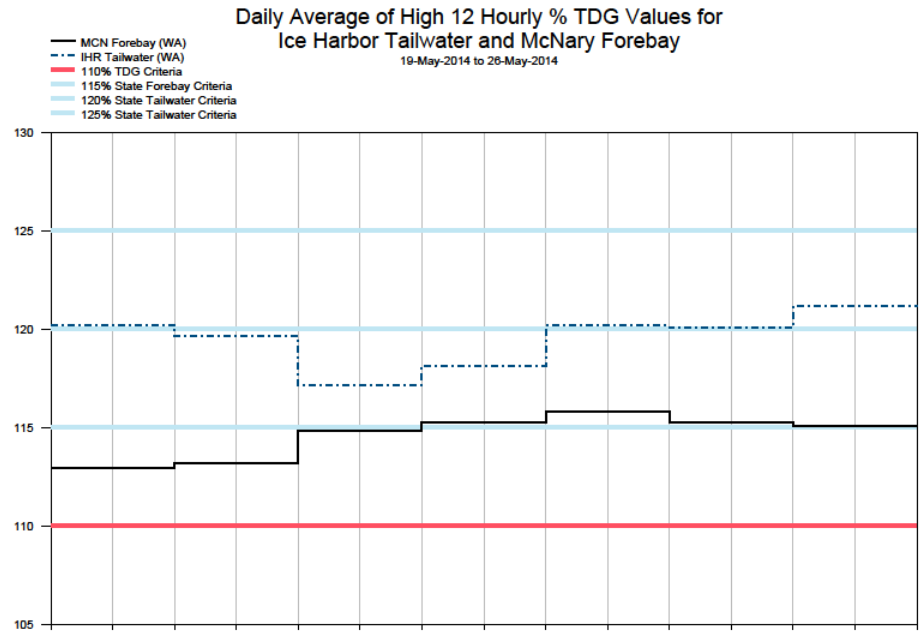

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

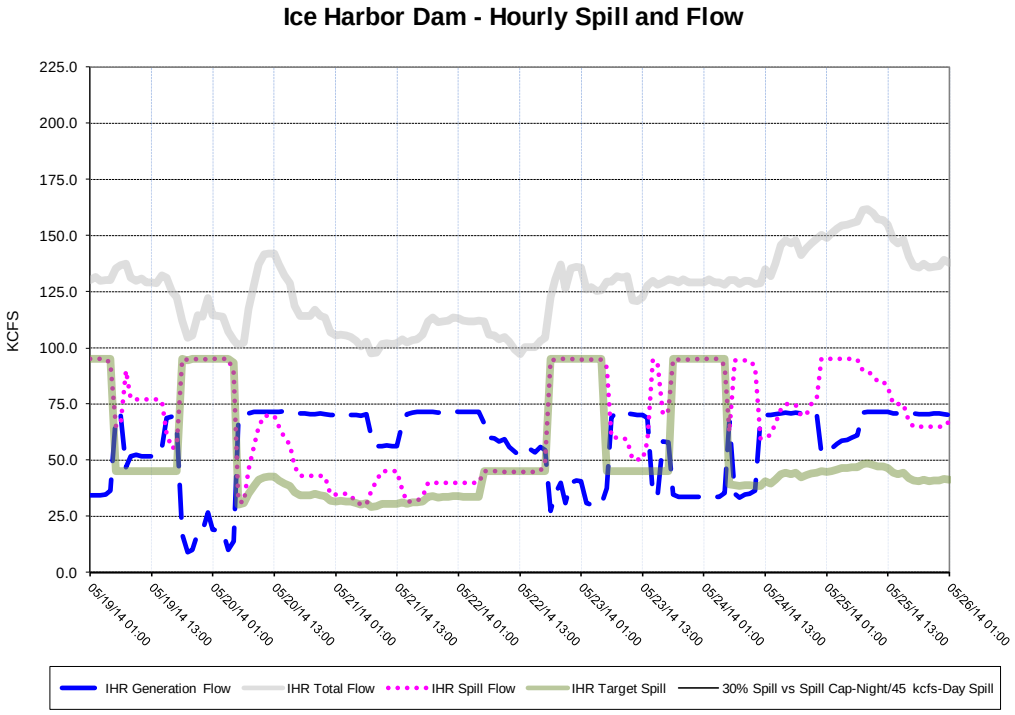
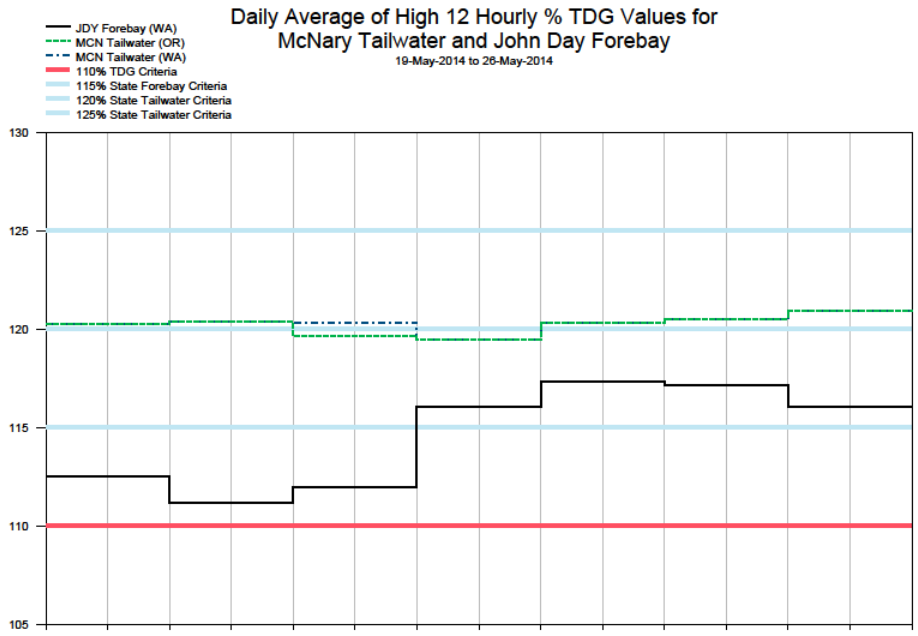

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

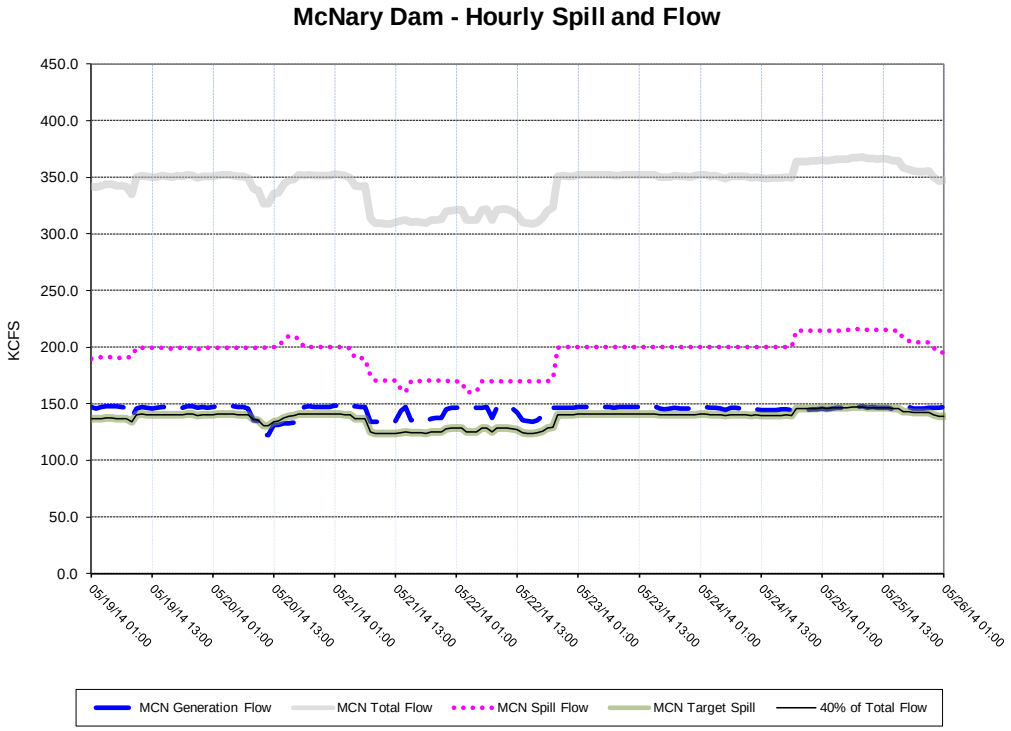
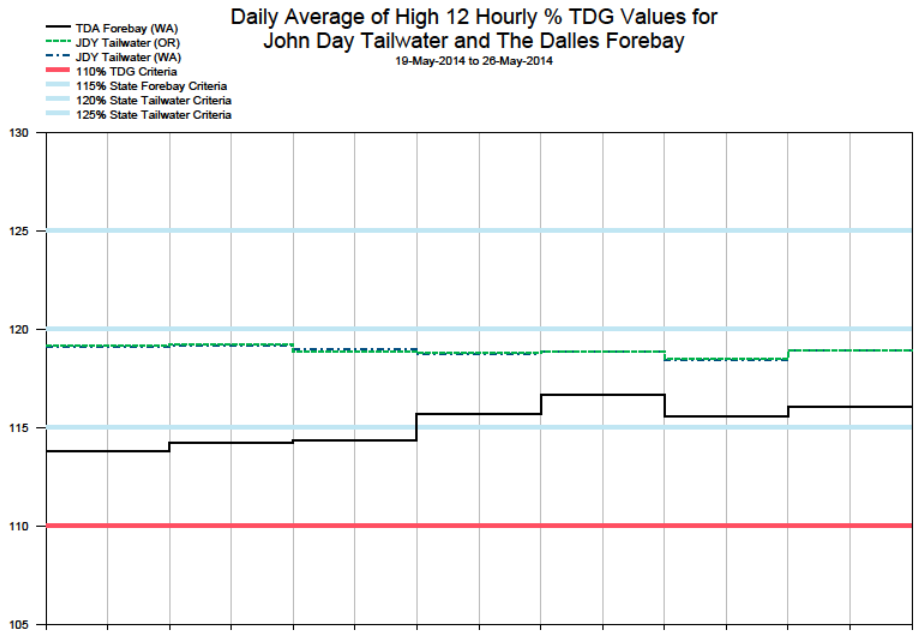

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

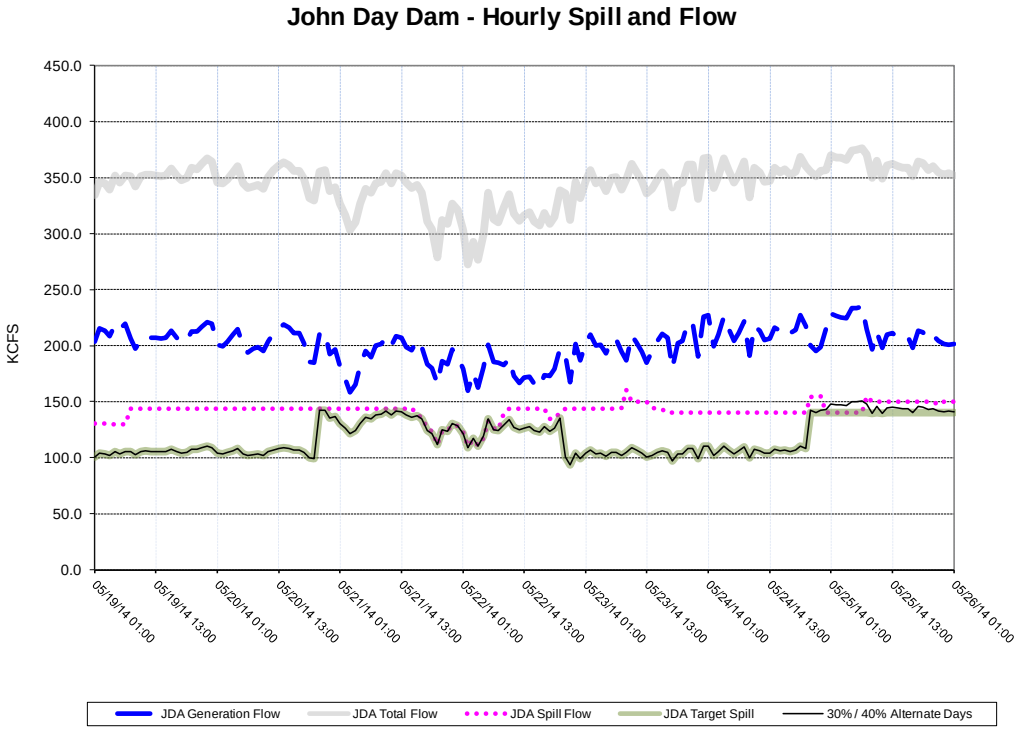
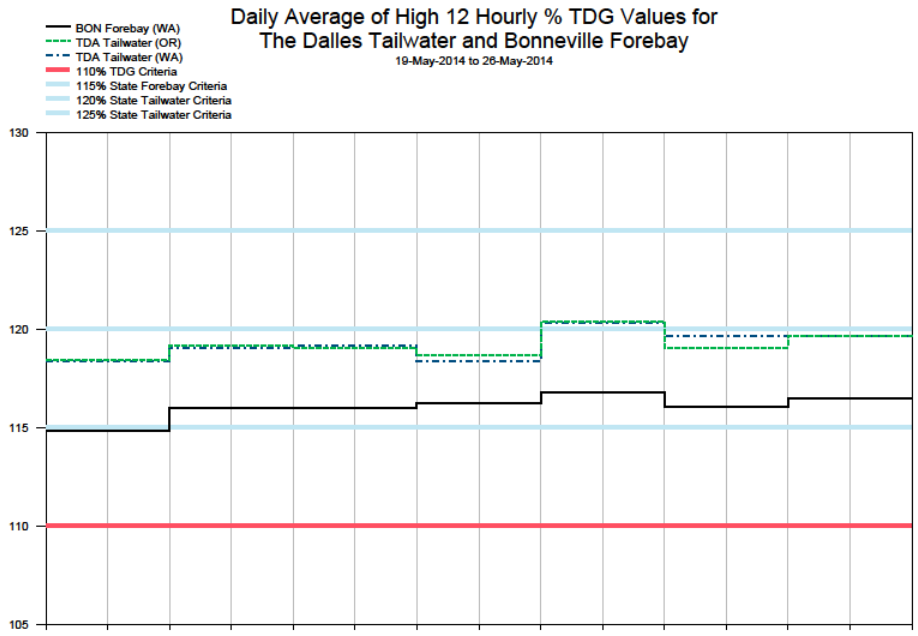

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

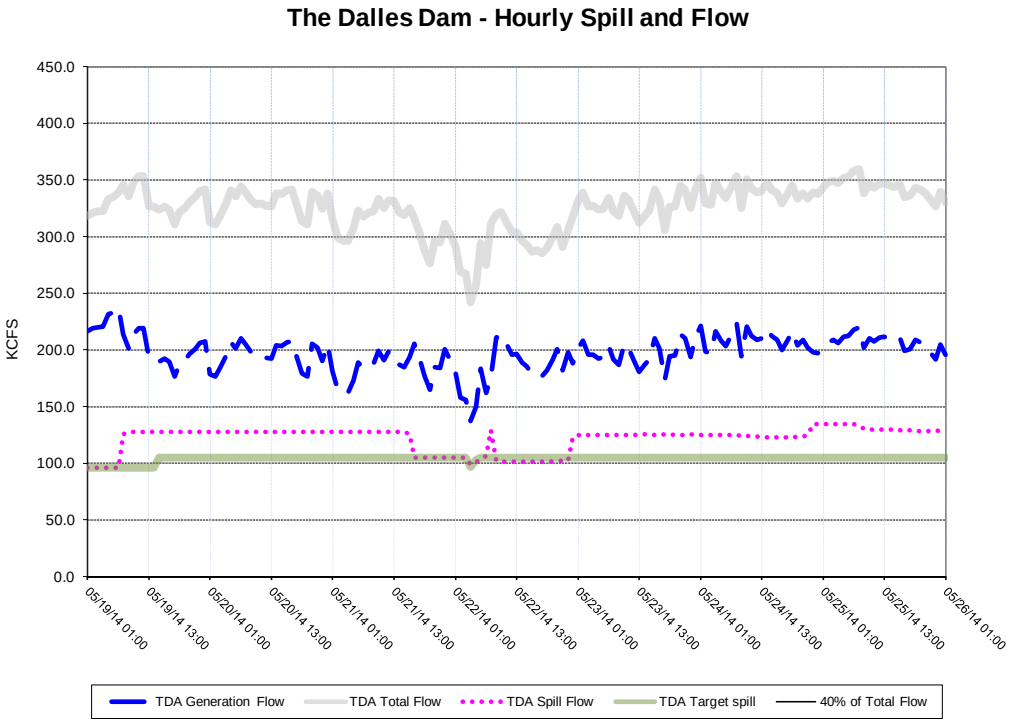
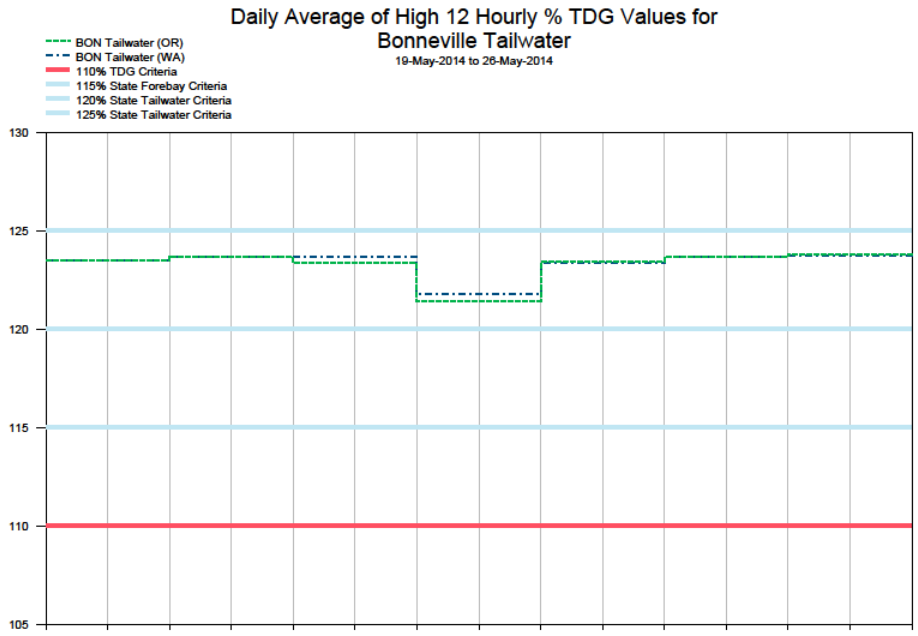

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/19/14 01:00
05/19/14 13:00
05/20/14 01:00
05/20/14 13:00
05/21/14 01:00
05/21/14 13:00
05/22/14 01:00
05/22/14 13:00
05/23/14 01:00
05/23/14 13:00
05/24/14 01:00
05/24/14 13:00
05/25/14 01:00
05/25/14 13:00
05/26/14 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
19-May-2014 to 26-May-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

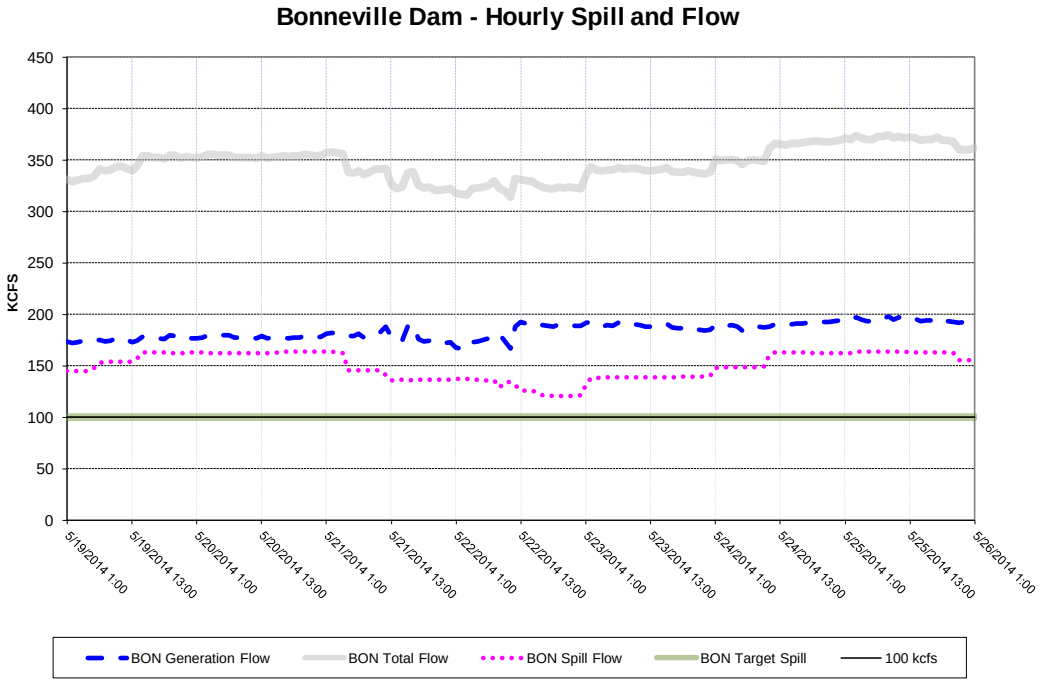
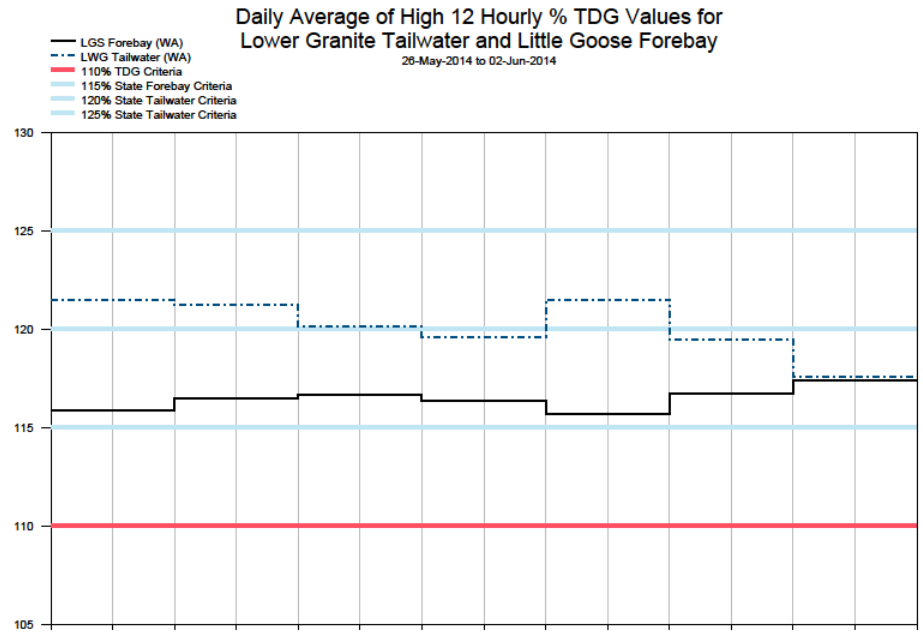

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/19/2014 1:00
5/19/2014 13:00
5/20/2014 1:00
5/20/2014 13:00
5/21/2014 1:00
5/21/2014 13:00
5/22/2014 1:00
5/22/2014 13:00
5/23/2014 1:00
5/23/2014 13:00
5/24/2014 1:00
5/24/2014 13:00
5/25/2014 1:00
5/25/2014 13:00
5/26/2014 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
26-May-2014 to 02-Jun-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

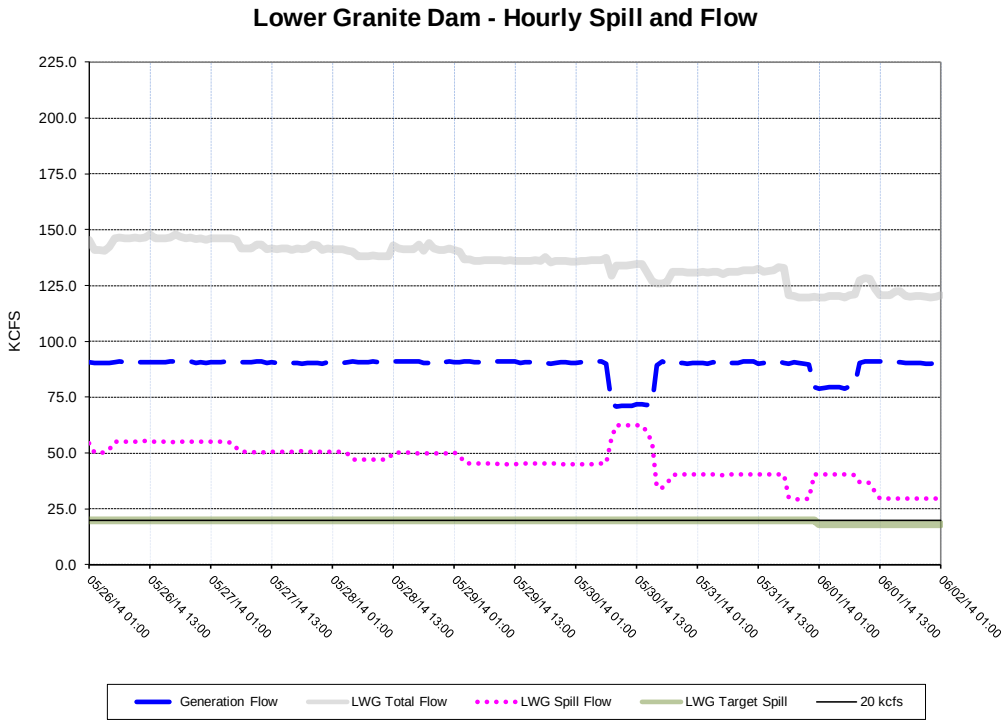
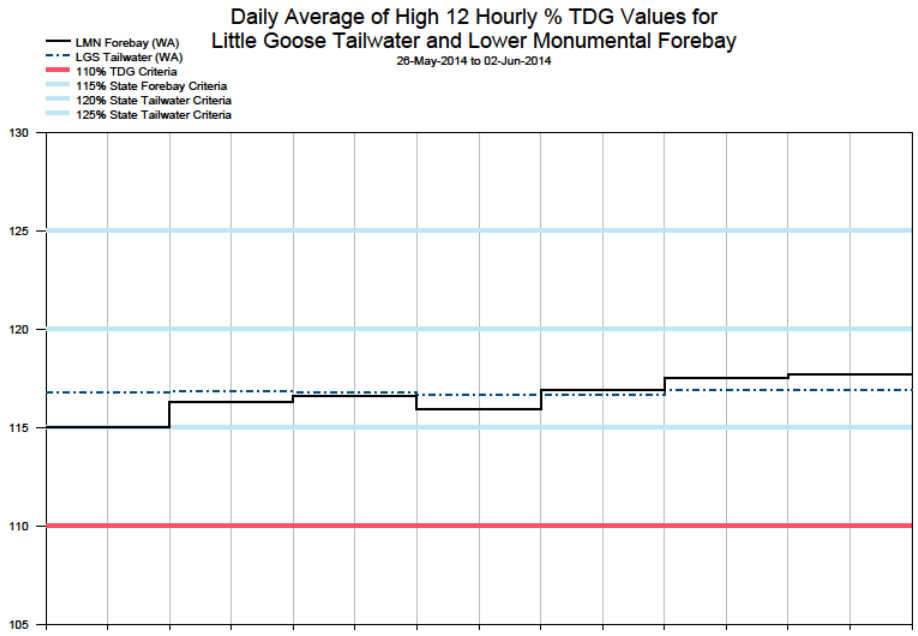

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

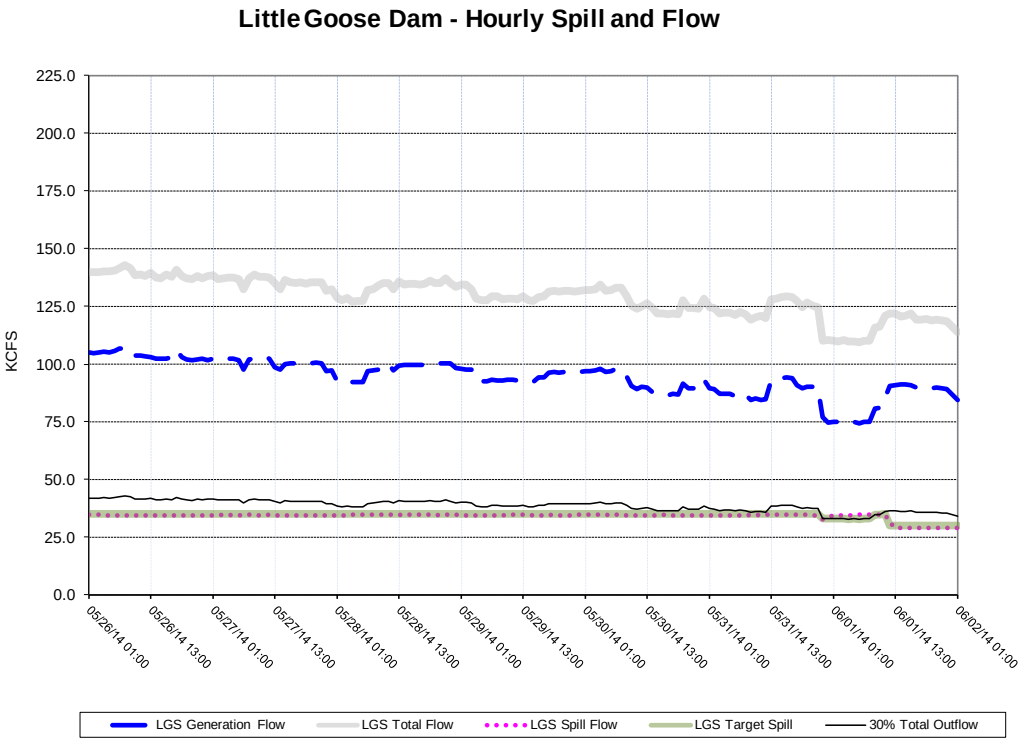
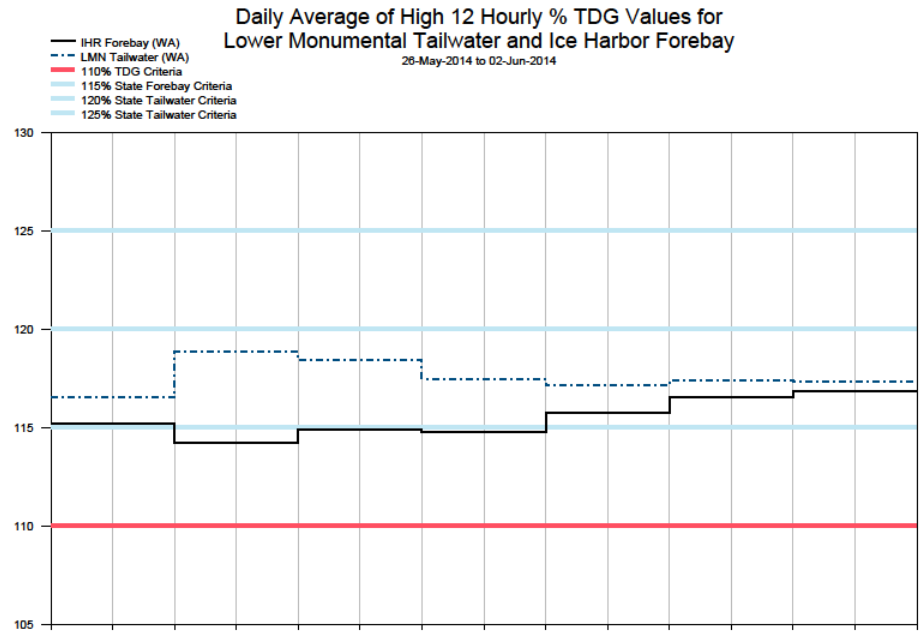

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

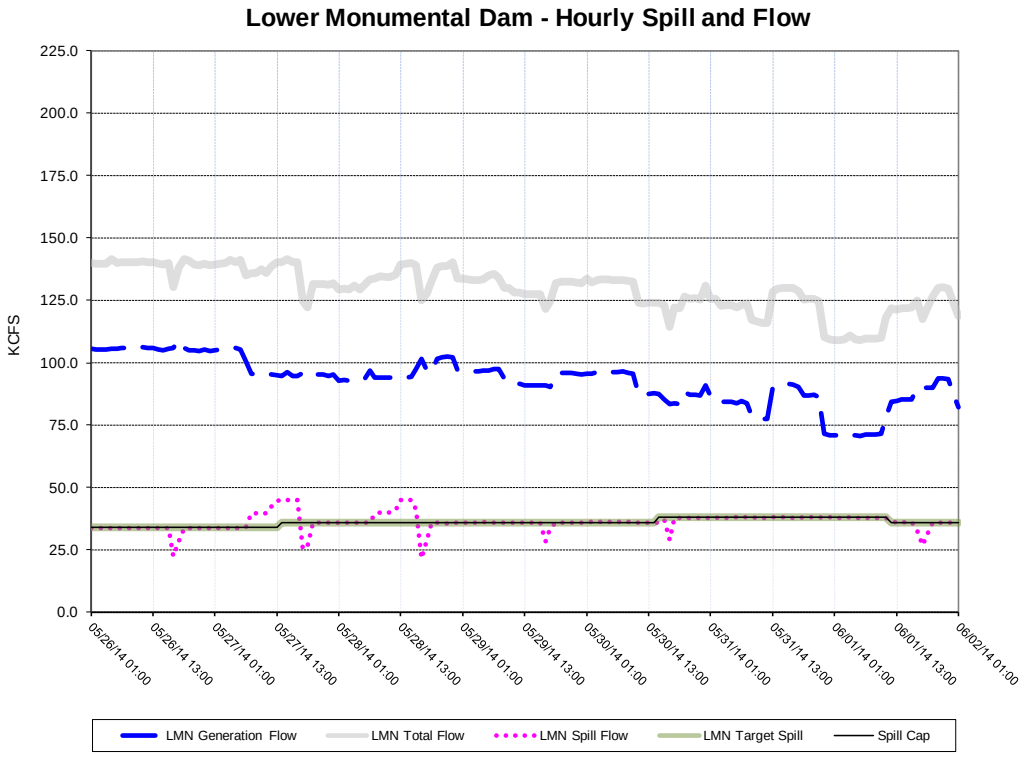
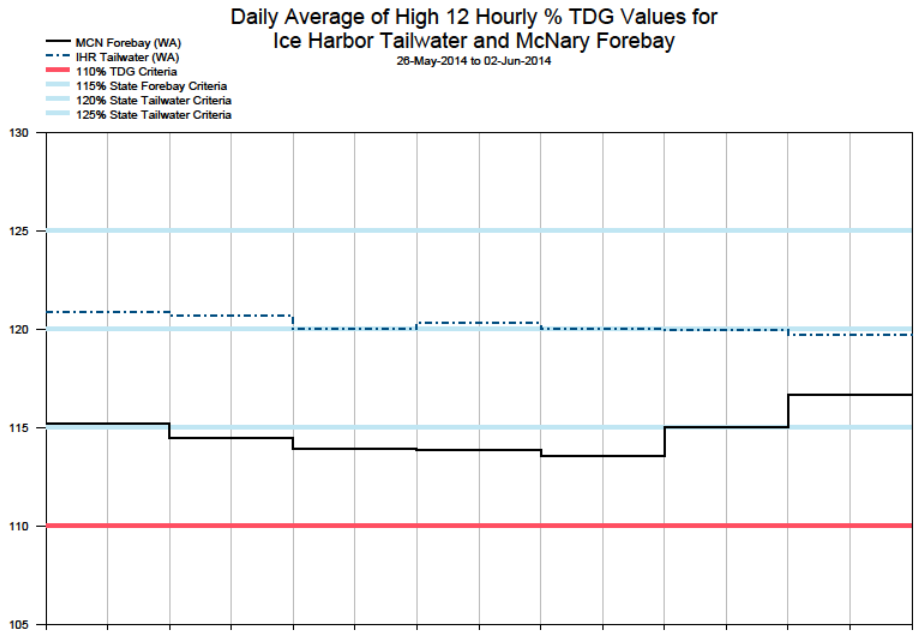

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

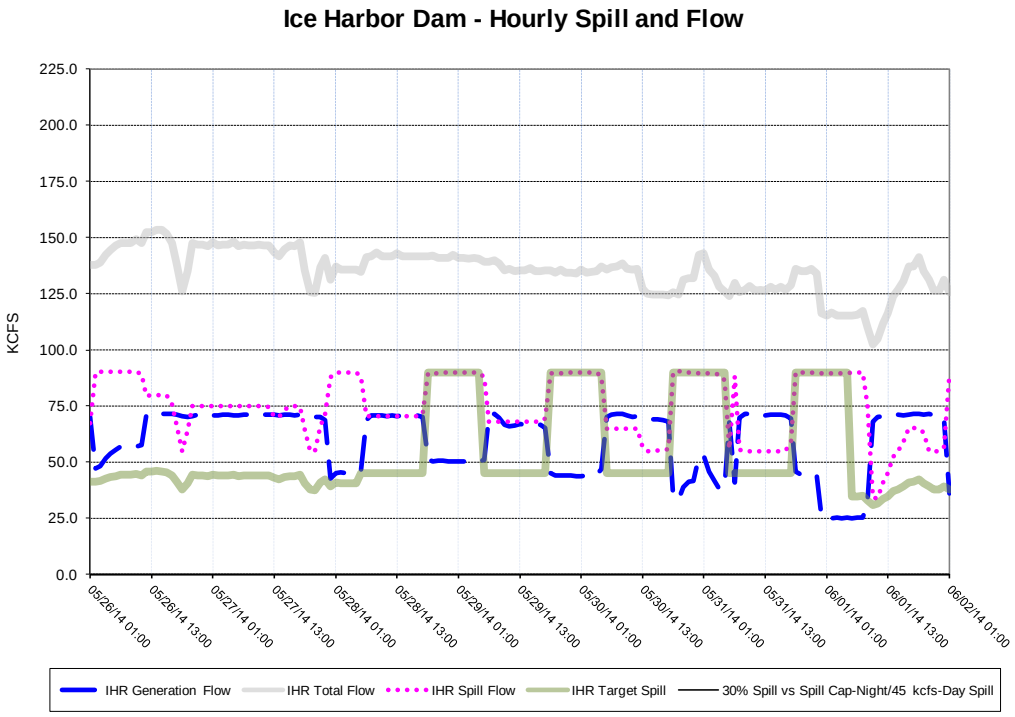
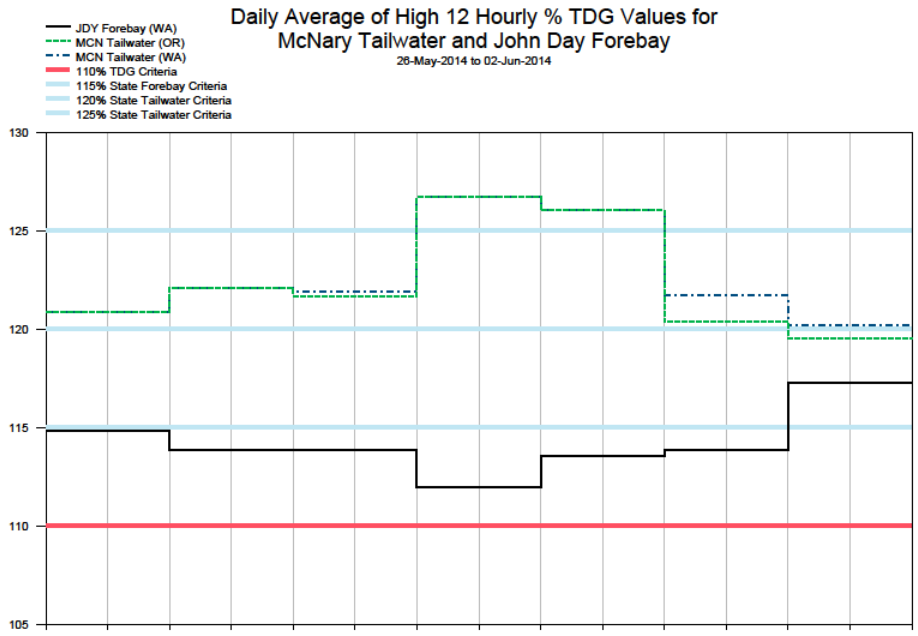

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

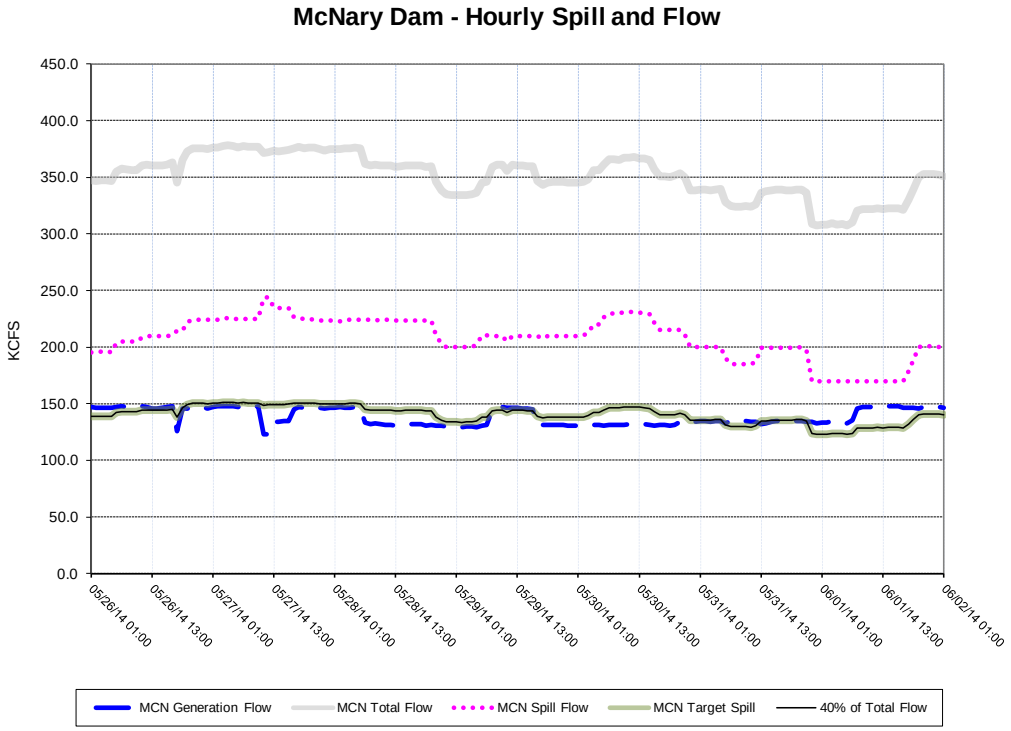
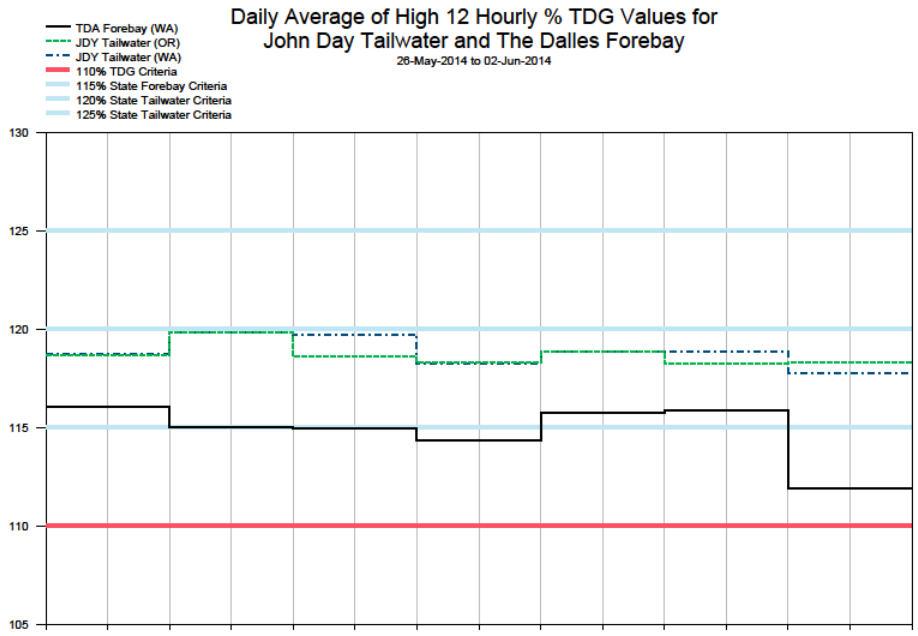

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

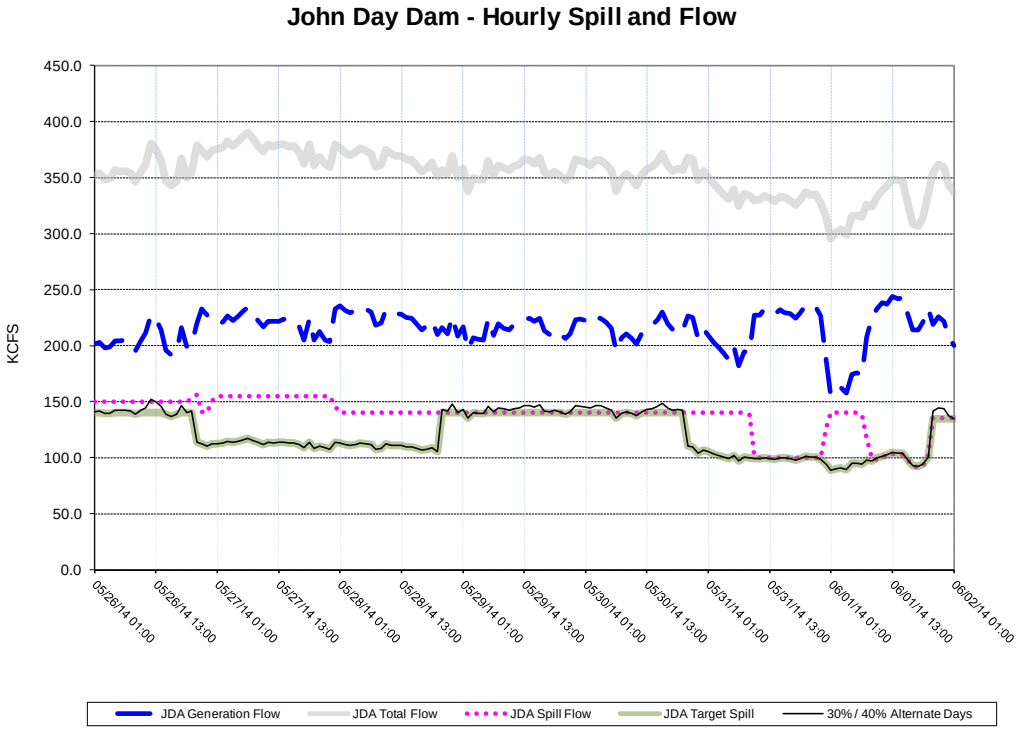
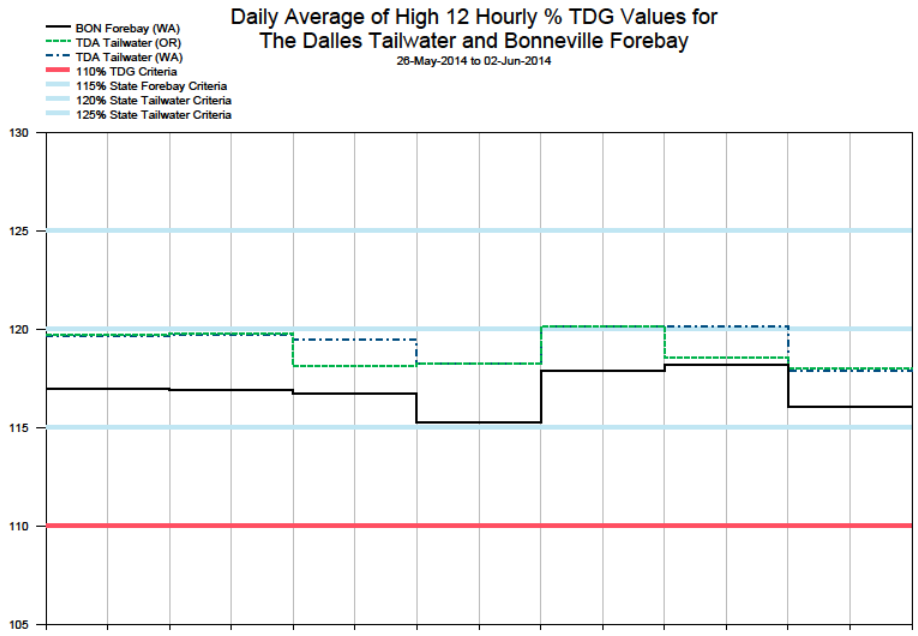

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

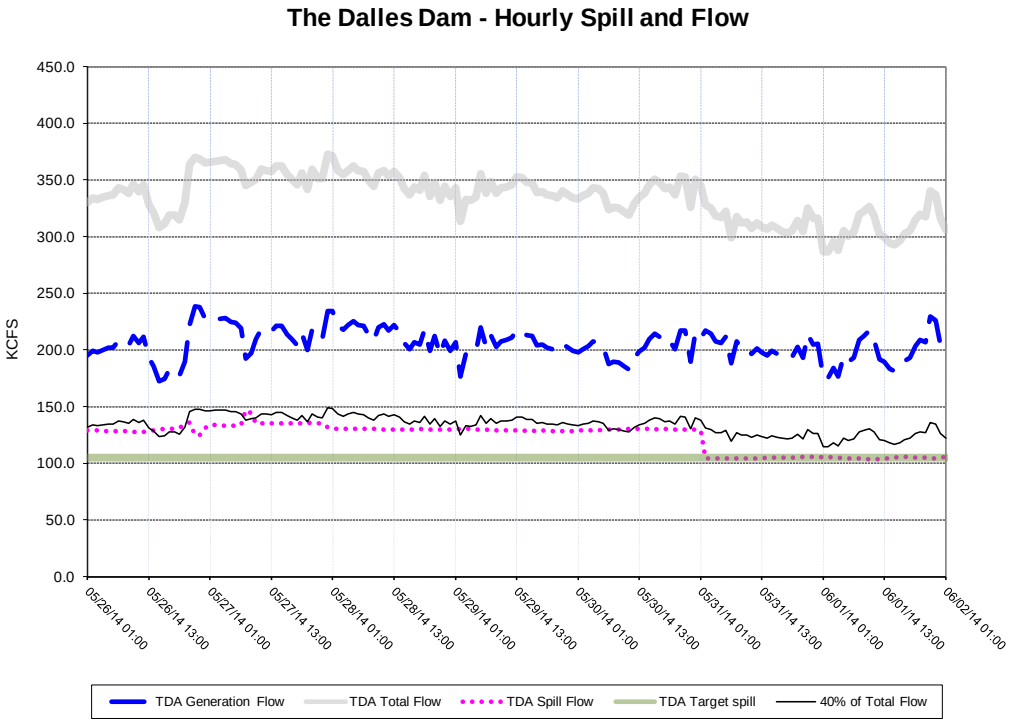
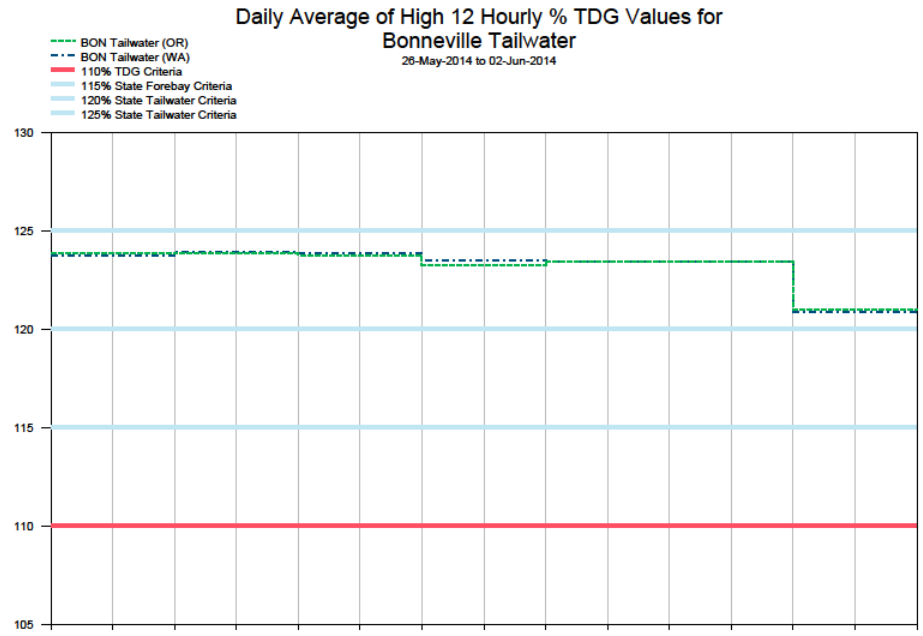

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/26/14 01:00
05/26/14 13:00
05/27/14 01:00
05/27/14 13:00
05/28/14 01:00
05/28/14 13:00
05/29/14 01:00
05/29/14 13:00
05/30/14 01:00
05/30/14 13:00
05/31/14 01:00
05/31/14 13:00
06/01/14 01:00
06/01/14 13:00
06/02/14 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
26-May-2014 to 02-Jun-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

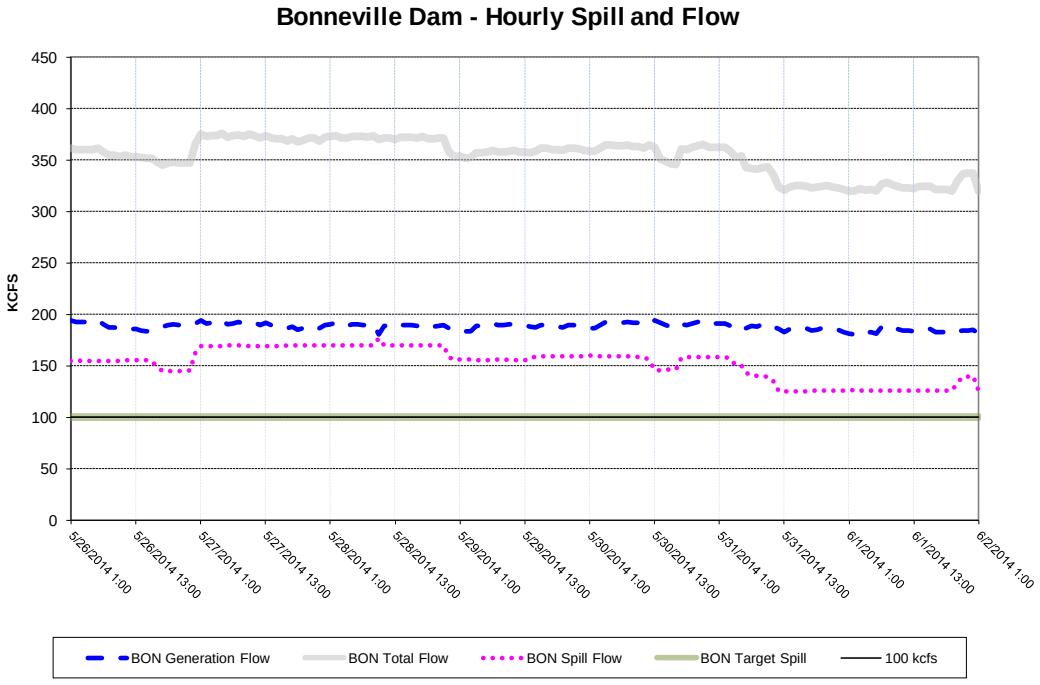

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/26/2014 1:00
5/26/2014 13:00
5/27/2014 1:00
5/27/2014 13:00
5/28/2014 1:00
5/28/2014 13:00
5/29/2014 1:00
5/29/2014 13:00
5/30/2014 1:00
5/30/2014 13:00
5/31/2014 1:00
5/31/2014 13:00
6/1/2014 1:00
6/1/2014 13:00
6/2/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Table 1
Average Percent TDG Values For April 28 – June 1

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
4/28/2014	101.5	114.8	108.2	116.9	110.9	119.8	111.9	115.6	109.2	~~114.4~~	114.6	108.5	~~114.9~~	116.1	110.2	~~116.5~~	116.6	115.2	~~119.3~~	119.3
4/29/2014	100.0	109.6	105.7	112.9	111.6	120.1	111.4	114.5	108.5	116.5	~~116.5~~	108.3	115.5	~~115.5~~	110.3	116.7	~~116.7~~	114.6	~~118.5~~	119.2
4/30/2014	101.5	110.5	108.3	112.3	114.3	**120.3**	114.0	115.6	112.9	~~116.5~~	116.6	108.9	~~116.0~~	116.1	111.4	~~118.3~~	118.4	**115.4**	118.7	~~118.7~~
5/1/2014	103.9	111.3	110.9	114.0	114.9	120.1	**117.5**	115.6	**115.5**	~~115.8~~	116.7	109.8	117.5	~~117.1~~	113.6	118.4	~~118.4~~	**116.9**	~~118.7~~	118.7
5/2/2014	105.6	111.8	112.6	114.6	115.4	120.2	**119.8**	115.9	**117.0**	116.9	~~116.9~~	112.6	117.6	~~117.5~~	113.9	118.7	~~118.7~~	**117.9**	~~118.4~~	118.7
5/3/2014	105.8	115.8	112.6	115.6	**115.7**	119.2	**119.9**	116.0	**117.2**	~~116.3~~	116.4	114.4	117.3	~~117.2~~	113.9	118.3	~~118.1~~	**117.1**	118.6	~~118.5~~
5/4/2014	105.4	111.3	112.3	114.0	115.3	119.1	**118.5**	117.0	114.8	117.8	~~117.8~~	114.4	118.3	~~118.3~~	114.6	118.3	~~118.2~~	**115.9**	119.8	~~119.8~~
5/5/2014	104.2	112.7	112.0	114.8	114.4	120.0	**116.1**	116.5	113.5	118.4	~~118.4~~	114.0	~~118.2~~	118.2	114.0	117.9	~~117.8~~	**115.7**	~~119.8~~	119.9
5/6/2014	103.2	116.7	112.1	114.9	114.2	120.1	115.0	118.9	112.1	118.4	~~118.4~~	113.0	118.3	~~118.3~~	113.8	~~115.9~~	117.5	115.2	**122.4**	~~122.1~~
5/7/2014	103.9	115.2	109.8	113.8	**115.5**	119.9	115.2	117.6	113.3	~~117.3~~	118.3	111.4	~~116.1~~	117.9	112.3	116.1	~~116.1~~	113.7	~~120.0~~	**120.8**
5/8/2014	104.9	110.4	112.9	113.8	**115.5**	**120.5**	**116.0**	116.6	114.1	117.3	~~117.3~~	112.3	116.5	~~116.2~~	112.4	116.7	~~116.4~~	114.7	119.9	~~119.8~~
5/9/2014	104.9	110.5	112.9	114.0	115.1	119.2	**116.1**	115.5	114.0	117.3	~~117.3~~	112.3	117.5	~~117.5~~	112.4	~~116.6~~	116.7	114.6	~~119.0~~	119.6
5/10/2014	104.3	111.9	110.3	113.0	112.1	118.3	114.1	115.8	110.2	~~114.5~~	116.4	111.3	~~116.1~~	117.3	111.5	116.7	~~116.6~~	112.5	~~118.5~~	118.8
5/11/2014	103.1	110.2	107.7	112.5	110.9	118.5	111.4	114.8	109.3	115.9	~~115.9~~	110.1	~~114.8~~	115.0	111.3	~~116.8~~	116.8	112.8	118.4	~~118.4~~
5/12/2014	102.2	109.8	108.0	112.7	111.0	118.4	112.6	115.6	110.9	116.9	~~116.9~~	109.9	117.3	~~117.3~~	111.7	117.2	~~117.2~~	115.3	119.3	~~119.3~~
5/13/2014	102.7	110.6	108.1	112.8	111.4	119.8	113.3	115.7	113.4	118.4	~~118.4~~	109.1	117.8	~~117.8~~	112.8	~~118.1~~	118.1	**116.0**	119.7	~~119.7~~
5/14/2014	104.1	110.9	108.7	113.3	113.0	119.2	115.1	115.6	114.5	~~117.4~~	118.4	111.3	~~117.5~~	117.8	113.9	119.0	~~119.0~~	**117.0**	~~118.8~~	119.2
5/15/2014	105.8	111.5	110.5	114.1	114.7	119.5	**117.6**	116.0	**116.7**	117.4	~~117.4~~	114.4	~~115.8~~	116.1	114.2	119.1	~~119.1~~	**118.2**	119.7	~~119.7~~
5/16/2014	105.8	114.1	112.3	115.3	114.8	118.8	**117.9**	116.7	**117.1**	118.9	~~118.9~~	114.7	118.2	~~118.1~~	113.9	~~117.5~~	118.2	**118.1**	~~119.0~~	119.3
5/17/2014	105.7	116.3	112.2	116.3	114.8	117.2	**117.6**	117.9	114.9	119.3	~~119.3~~	114.6	118.4	~~118.4~~	114.1	116.8	~~116.8~~	114.5	**121.4**	~~121.4~~
5/18/2014	105.5	116.6	111.7	116.4	**115.6**	116.7	**115.8**	119.9	112.9	119.5	~~119.5~~	114.2	118.6	~~118.5~~	114.1	117.0	~~116.8~~	114.4	**123.5**	~~123.5~~
5/19/2014	104.3	117.1	111.0	116.7	**115.7**	118.5	114.6	120.2	112.9	120.2	~~120.2~~	112.4	119.1	~~119.1~~	113.9	118.4	~~118.3~~	114.9	**123.9**	~~123.8~~
5/20/2014	104.2	114.6	112.2	115.6	**115.6**	119.6	115.4	119.6	113.3	120.4	~~120.4~~	111.2	119.2	~~119.1~~	114.3	119.2	~~119.0~~	**116.0**	**124.0**	~~123.9~~
5/21/2014	105.6	111.6	113.1	115.4	**116.0**	119.2	**116.5**	117.0	114.9	~~119.5~~	120.3	112.0	~~118.8~~	118.9	114.3	~~119.0~~	119.2	**115.9**	~~123.6~~	**123.9**
5/22/2014	106.1	115.1	113.0	115.4	**116.3**	116.3	**116.9**	118.4	115.3	119.6	~~119.6~~	**116.2**	118.8	~~118.7~~	**115.9**	118.8	~~118.6~~	**116.3**	~~121.7~~	**122.0**
5/23/2014	106.1	117.3	111.8	115.4	**116.5**	116.9	**117.0**	120.2	**115.8**	~~120.3~~	120.3	**117.3**	118.9	~~118.8~~	**116.6**	120.3	~~120.3~~	**116.8**	**123.7**	~~123.7~~
5/24/2014	105.6	**120.6**	111.5	116.0	**115.7**	116.5	**116.1**	120.1	115.2	**120.5**	~~120.5~~	**117.1**	118.5	~~118.4~~	**115.6**	~~119.0~~	119.5	**116.0**	**123.9**	~~123.9~~
5/25/2014	106.4	**122.3**	113.7	116.4	115.0	116.7	115.4	**121.2**	115.1	**120.9**	~~120.9~~	**116.0**	118.9	~~118.9~~	**116.1**	119.7	~~119.7~~	**116.6**	**124.0**	~~124.0~~
5/26/2014	106.7	**121.4**	**115.9**	116.8	115.0	116.5	115.1	**120.8**	115.2	**120.9**	~~120.9~~	114.8	118.7	~~118.7~~	**116.1**	119.7	~~119.7~~	**116.9**	**124.1**	~~124.0~~
5/27/2014	106.7	**121.2**	**116.5**	116.8	**116.4**	118.8	114.2	**120.6**	114.5	**122.1**	~~122.1~~	113.8	119.8	~~119.8~~	115.0	119.7	~~119.7~~	**116.9**	**124.1**	~~124.1~~
5/28/2014	106.7	120.1	**116.6**	116.8	**116.6**	118.4	114.8	119.9	113.9	~~121.7~~	**121.8**	113.8	~~118.5~~	119.6	114.8	~~118.0~~	119.3	**116.6**	~~124.0~~	**124.1**
5/29/2014	106.3	119.6	**116.3**	116.6	**115.8**	117.2	114.7	120.3	113.7	**126.7**	~~126.7~~	111.8	118.3	~~118.2~~	114.3	118.4	~~118.3~~	115.4	~~123.5~~	**123.7**
5/30/2014	107.0	**121.5**	**115.8**	116.7	**117.0**	117.2	**115.8**	120.0	113.7	**126.0**	~~126.0~~	113.6	118.8	~~118.8~~	**115.8**	120.2	~~120.1~~	**118.0**	**123.8**	~~123.7~~
5/31/2014	107.6	119.0	**116.8**	116.9	**117.6**	117.4	**116.6**	120.0	115.1	~~120.4~~	**121.3**	113.9	~~118.1~~	118.8	**115.9**	~~118.4~~	120.1	**118.2**	~~123.5~~	**123.7**
6/1/2014	107.6	117.6	**117.4**	116.9	**117.8**	117.2	**116.9**	119.7	**116.7**	~~119.6~~	120.1	**117.6**	118.4	~~117.9~~	111.9	118.1	~~118.0~~	**115.9**	**121.5**	~~121.4~~

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)

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
June 2014

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 2014 Spring and Summer Fish Operations Plans (2014 FOPs) posted to the TMT website on April 1, 2014 and June 13, 2014. The 2014 FOPs describe 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 August. To the extent Corps project operations that are not specified in the 2014 FOPs, 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 2014 Water Management Plan (WMP), WMP seasonal updates, and the 2014 Fish Passage Plan (FPP).

The Corps' June 2014 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 2014 FOPs in June.

Data Reporting:

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

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

[1] Averages reported consistent with the current and applicable Oregon TDG waiver (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG waiver and the Washington TDG criteria adjustment 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 graphs begin on June 2 and end on June 29 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

Each figure represents one week of a project's operation. The graphs start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill graphs) on June 2 for the lower Snake River and the lower Columbia River projects.

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

A. Upper Graph: Displays the average daily %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 2014 FOPs; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the Oregon 120%TDG waiver limit for the tailwater of the dam.
2. The blue dot-dash line represents the Washington 120%TDG criteria adjustment for the tailwater of the dam.
3. The black solid line represents the Washington 115%TDG criteria adjustment for the forebay of the next dam downstream.

B. Lower Graph: 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 river flow through the project 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 2014 FOPs.
- 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 river flow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2014 FOPs;
    - 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 (50 kcfs) dam;
    - minimum spill at John Day is 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 2014 FOPs, the dotted pink line will be below or above the heavy green line in the graphs. Actual deviations from the target operation during voluntary spill hours are described below in the June 2014 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 reduction 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 2014 FOPs 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 (except as otherwise noted in the 2014 FOPs for Bonneville and The Dalles dams,[4] which may range up to ±3 kcfs) as compared to those specified in the 2014 FOPs and the RCC spill priority list (defining the project %TDG spill caps). A number of factors influence actual spill, including

[3] Involuntary spill conditions are identified in the graphs but are not considered variances so 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.

[4] As specified in the 2014 FOPs (p. 15), this applies when the spill level is below 40% of total flow at The Dalles Dam.

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 2014 FOPs describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Report 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 2014 FOPs) 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.

June Operations:

The month of June was characterized by slightly below average flows for the lower Snake River and slightly above average flows for the lower Columbia River. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the June 2014 adjusted volume runoff on the lower Columbia was above the 30 year average (1981-2010): 27.6 MAF (million acre feet) or 106% of average as measured at The Dalles. The Runoff Processor also indicated June 2014 adjusted volume runoff on the lower Snake was below the 30 year average (1981-2010): 5.8 MAF or 95% of average as measured at Lower Granite Dam. The monthly precipitation summary for June was well below average at 66% on the Snake River above Ice Harbor Dam and well below average on the Columbia River above The Dalles Dam at 86%.

During the June reporting period, the planned 2014 FOPs spill operations were carried out as follows:

- Lower Granite Dam - The hourly target spill level was 20 kcfs 24-hours/day through June 20. The operation transitioned to the summer spill level of 18 kcfs 24-hours/day on June 21.
- Little Goose Dam - The hourly target spill level was 30% of total river flow 24-hours/day.
- Lower Monumental Dam - The hourly target spill level was the %TDG cap 24 hours/day,. The operation transitioned to the summer spill level of 17 kcfs 24-hours/day on June 21.

- Ice Harbor Dam - The hourly target spill level alternated every two days between 30 percent of total river flow for 24-hours/day vs. 45 kcfs daytime and the %TDG gas cap nighttime (gas cap range ~75 – 95 kcfs). Nighttime spill hours are 1800-0500.
- McNary Dam - The hourly target spill level was 40% of total river flow for 24-hours/day through June 15. The operation transitioned to the summer spill level of 50% of total river flow 24-hours/day on June 21.
- John Day Dam - The hourly target spill level alternated between 40% and 30% of total river flow for 24-hours/day due to the two-day block spring operation. Spill level changes occurred at 2000 hours.
- The Dalles Dam - The hourly target spill level was 40% of total river flow for 24-hours/day.
- Bonneville Dam - The hourly target spill level was 100 kcfs 24 hours/day through June 15. The operation transitioned to the summer spill levels of alternating every two days between 95 kcfs 24-hours/day vs. 85 kcfs daytime/121 kcfs nighttime on June 16.

Operational Adjustments

No Operational Adjustments for the reporting period in June.

June 2014 Spill Variance Table

Table 1: June 2014 (6/2 – 6/29) - FOPs Implementation Report Table

Project	Parameter	Date	Time[5]	Hours	Type	Reason
Little Goose	Reduced Spill	6/16/14	0900	1	Navigation	Hourly spill decreased to 28.6% (below 30.0% ±1% range). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 30.0%.
Little Goose	Additional Spill	6/18/14	1400	1	Operational Limitations	Hourly spill increased to 40.6% (above 30.0% ±1% range) due to project spilling to pass debris. Coordinated through FPOM on June 18, 2014. 24 hr avg. spill was 30.3%.
Little Goose	Reduced Spill	6/19/14	1300	1	Navigation	Hourly spill decreased to 28.8% (below 30.0% ±1% range). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	6/23/14	2100	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Lower Monumental	Reduced Spill	6/3/14	1700	1	Navigation	Hourly spill decreased to 30.3 kcfs (below 36 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/5/14	1700-1800	2	Navigation	Hourly spill decreased to19.7 kcfs and 20.6 kcfs (below 26 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/9/14	1700-1900	3	Navigation	Hourly spill decreased to12.5 kcfs, 16.5 kcfs and 20.8 kcfs (below 24 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/11/14	1700-1800	2	Navigation	Hourly spill decreased to16.6 kcfs, and 21.3 kcfs (below 25 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/13/14	1800	1	Navigation	Hourly spill decreased to15.3 kcfs, (below 25 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/15/14	1700-1800	2	Navigation	Hourly spill decreased to15.4 kcfs and 23.5 kcfs (below 28 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

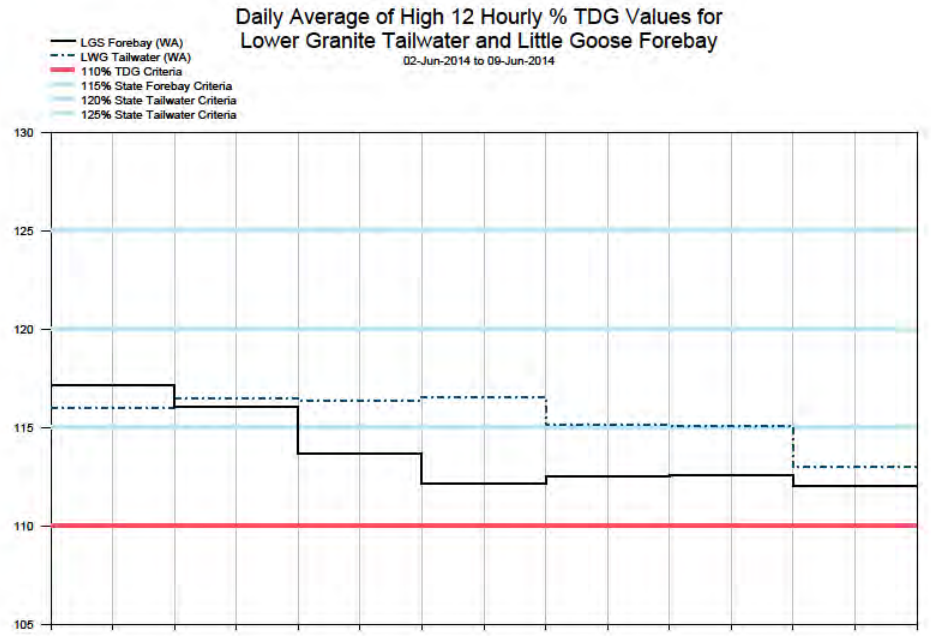
[5] Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Spill Variance Table as an hour.

Lower Monumental	Reduced Spill	6/17/14	1800-1900	2	Navigation	Hourly spill decreased to 22.0 kcfs and 27.1 kcfs (below 30 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/19/14	1700-1800	2	Navigation	Hourly spill decreased to 20.1 kcfs and 26.1 kcfs (below 30 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/21/14	1700	1	Navigation	Hourly spill decreased to 13.4 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/25/14	1700	1	Navigation	Hourly spill decreased to 11.9 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/27/14	1700-1800	2	Navigation	Hourly spill decreased to 14.5 kcfs and 14.9 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
John Day	Reduced Spill	6/22/14	1000	1	Transmission Stability	Hourly spill decreased to 38.9% (below 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%.
John Day	Reduced Spill	6/27/14	0500	1	Transmission Stability	Hourly spill decreased to 38.8% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 38.2%.
John Day	Reduced Spill	6/27/14	1700	1	Transmission Stability	Hourly spill decreased to 38.3% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 38.2%.
The Dalles	Additional Spill	6/4/14	1500	1	Transmission Stability	Hourly spill increased to 41.4% (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 38.4%.
The Dalles	Reduced Spill	6/4/14	1900	1	Transmission Stability	Hourly spill decreased to 38.3% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 38.4%.

The Dalles	Additional Spill	6/6/14	0200	1	Transmission Stability	Hourly spill increased to 41.3% (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 38.2%.
The Dalles	Reduced Spill	6/6/14	1500-1600	2	Human Program Error	Hourly spill decreased to 123.6 kcfs (below 130 kcfs fish passage spill cap ± 3 kcfs range). Delay in changing to requested spill cap.
The Dalles	Additional Spill	6/11/14	2200	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 40.1%.
The Dalles	Additional Spill	6/11/14	2300	1	Transmission Stability	Hourly spill increased to 41.5% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation.. See p. 3-4 of FOP. 24 hr avg. spill was 40.1%.
The Dalles	Additional Spill	6/14/14	1700	1	Transmission Stability	Hourly spill increased to 41.3% (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%.
The Dalles	Reduced Spill	6/19/14	0600	1	Transmission Stability	Hourly spill decreased to 38.9% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. 24 hr avg. spill was 39.9%.
The Dalles	Additional Spill	6/20/14	0100	1	Transmission Stability	Hourly spill increased to 41.3% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. 24 hr avg. spill was 40.1%.
The Dalles	Additional Spill	6/20/14	0900	1	Transmission Stability	Hourly spill increased to 41.6% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4 of FOP. 24 hr avg. spill was 40.1%.
The Dalles	Reduced Spill	6/20/14	2200	1	Transmission Stability	Hourly spill decreased to 38.9% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. 24 hr avg. spill was 40.1%.

The Dalles	Reduced Spill	6/23/14	1100	1	Human/Program Error	Hourly spill decreased to 38.4% (below 40.0% ±1% range) due to a malfunction of the program that manages generation. 24 hr avg. spill was 39.8%.
The Dalles	Reduced Spill	6/23/14	1900	1	Transmission Stability	Hourly spill decreased to 38.8% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.8%.
The Dalles	Additional Spill	6/25/14	2400	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 40.1%.
The Dalles	Additional Spill	6/26/14	2400	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 of the FOP. 24 hr avg. spill was 39.8%.
The Dalles	Reduced Spill	6/27/14	1700	1	Transmission Stability	Hourly spill decreased to 35.7% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.7%.
The Dalles	Additional Spill	6/28/14	0200	1	Transmission Stability	Hourly spill increased to 41.6% (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 42.6%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
02-Jun-2014 to 09-Jun-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

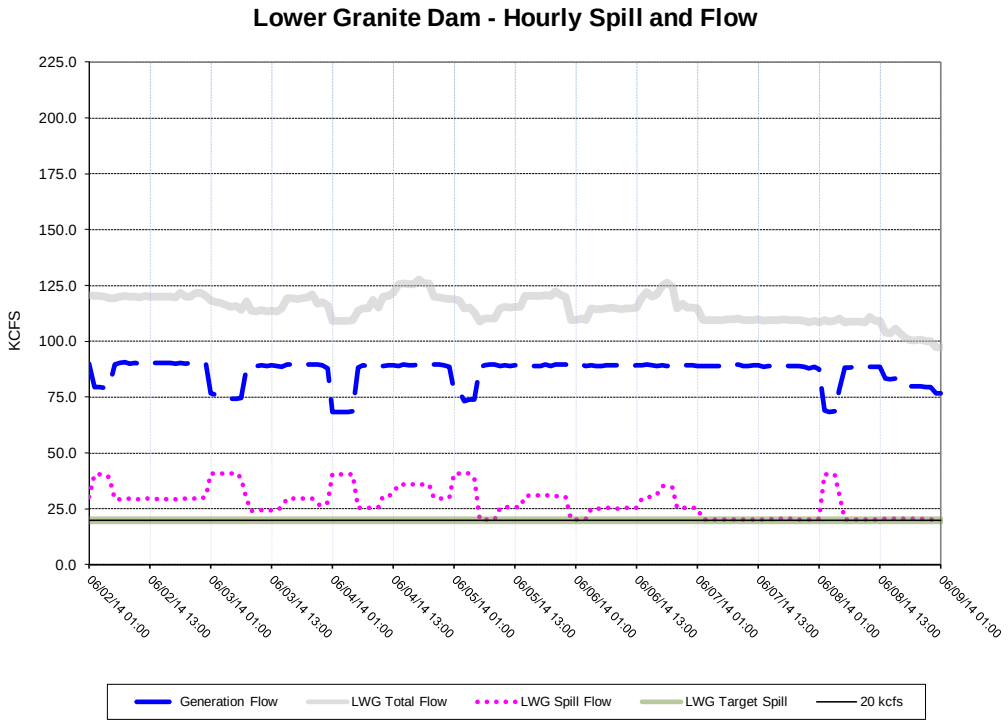
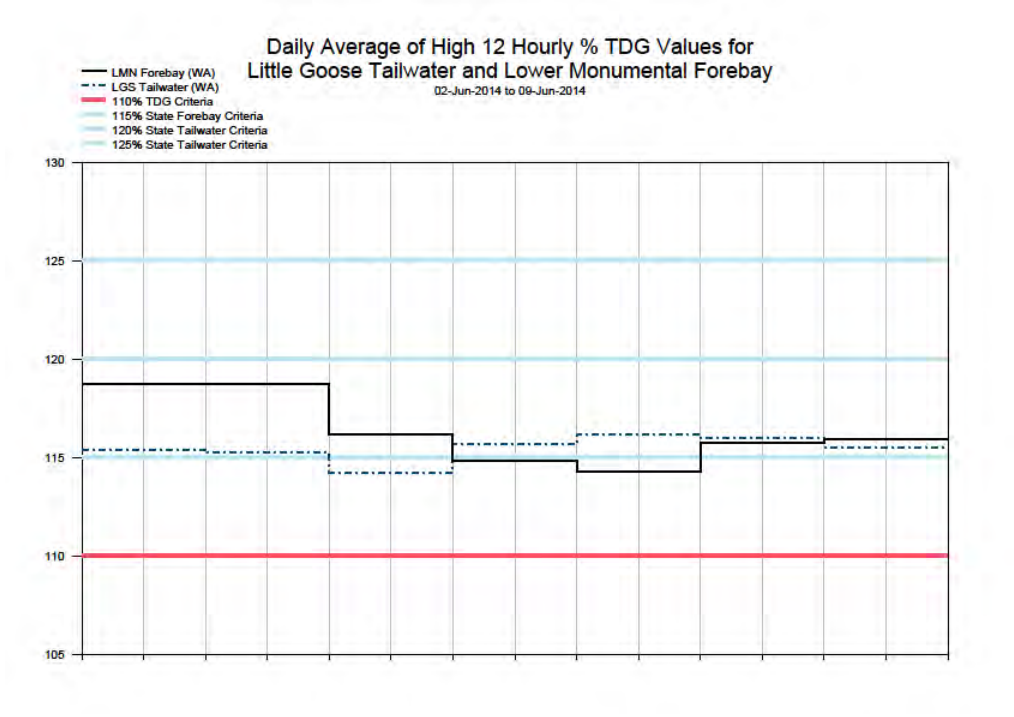

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 01:00
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
02-Jun-2014 to 09-Jun-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

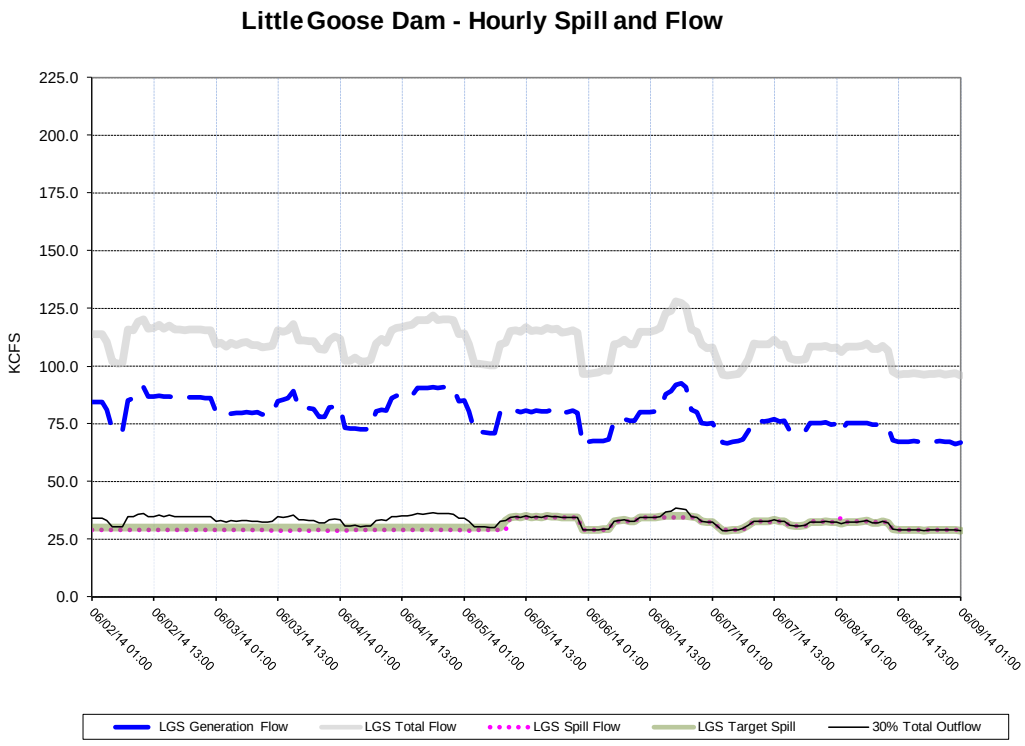

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 3

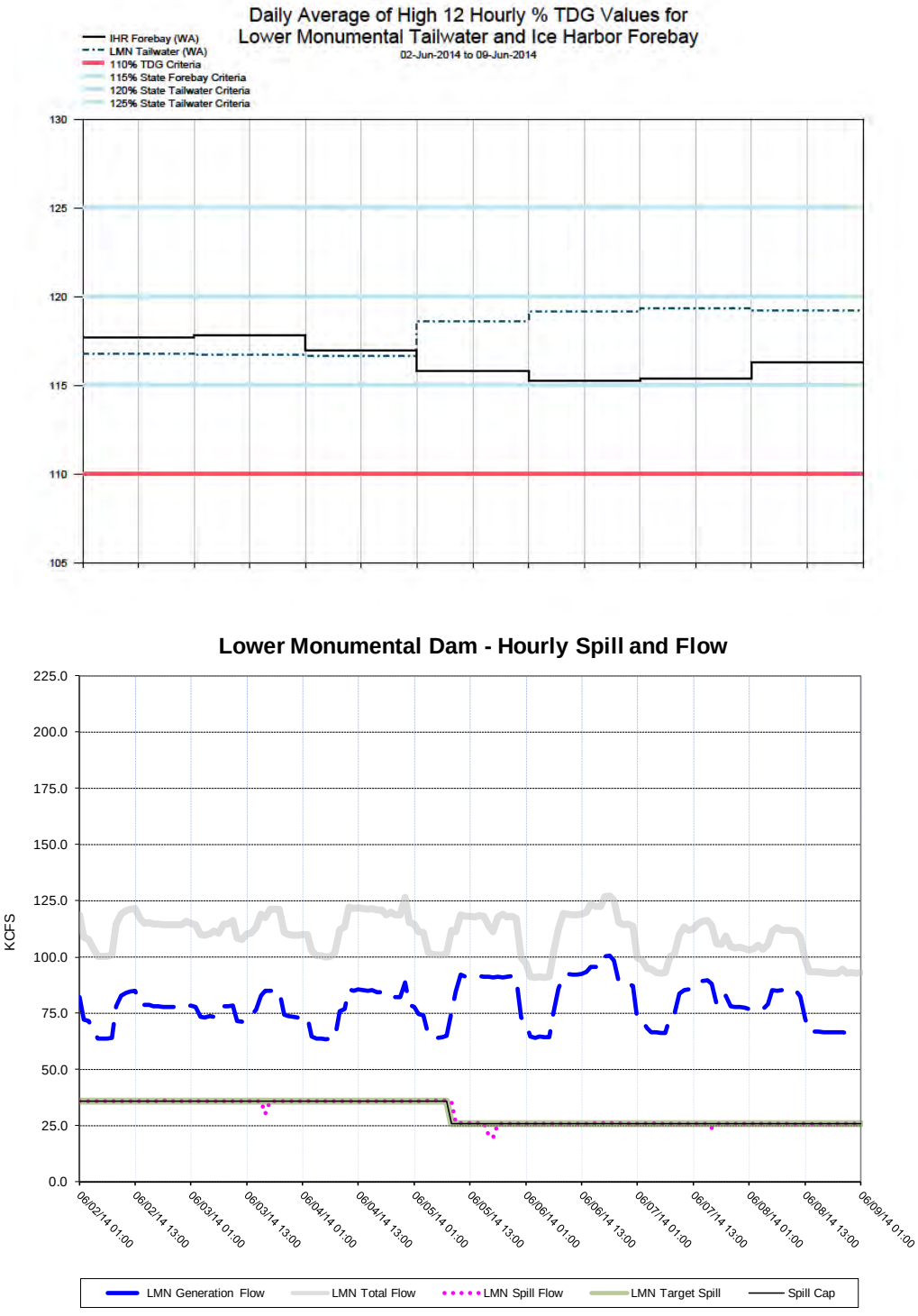
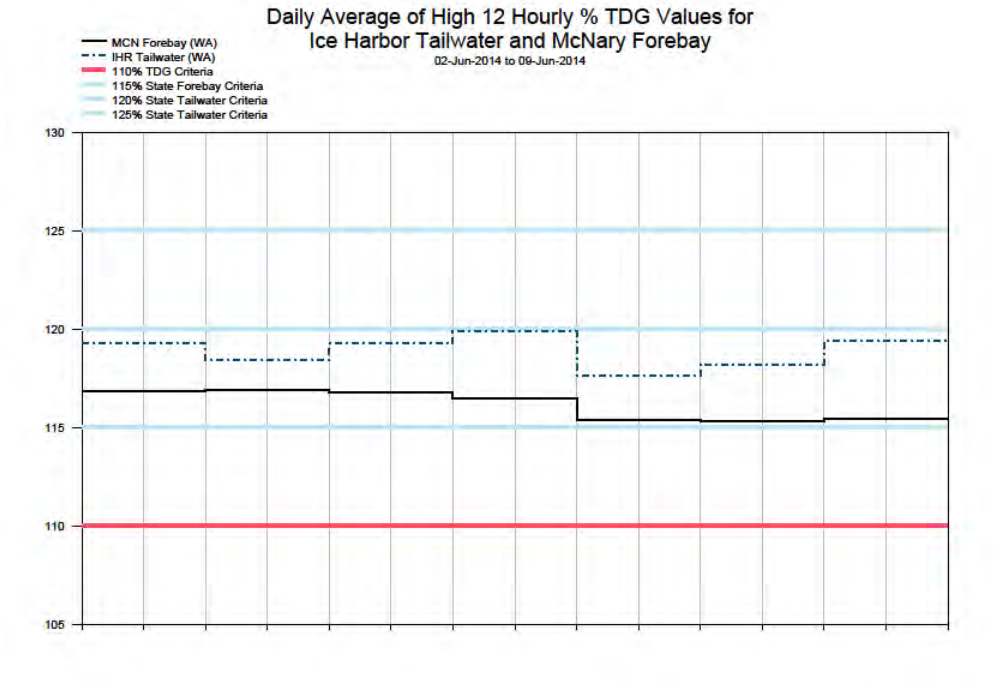

Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
02-Jun-2014 to 09-Jun-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Lower Monumental 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
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 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
Ice Harbor Tailwater and McNary Forebay
02-Jun-2014 to 09-Jun-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

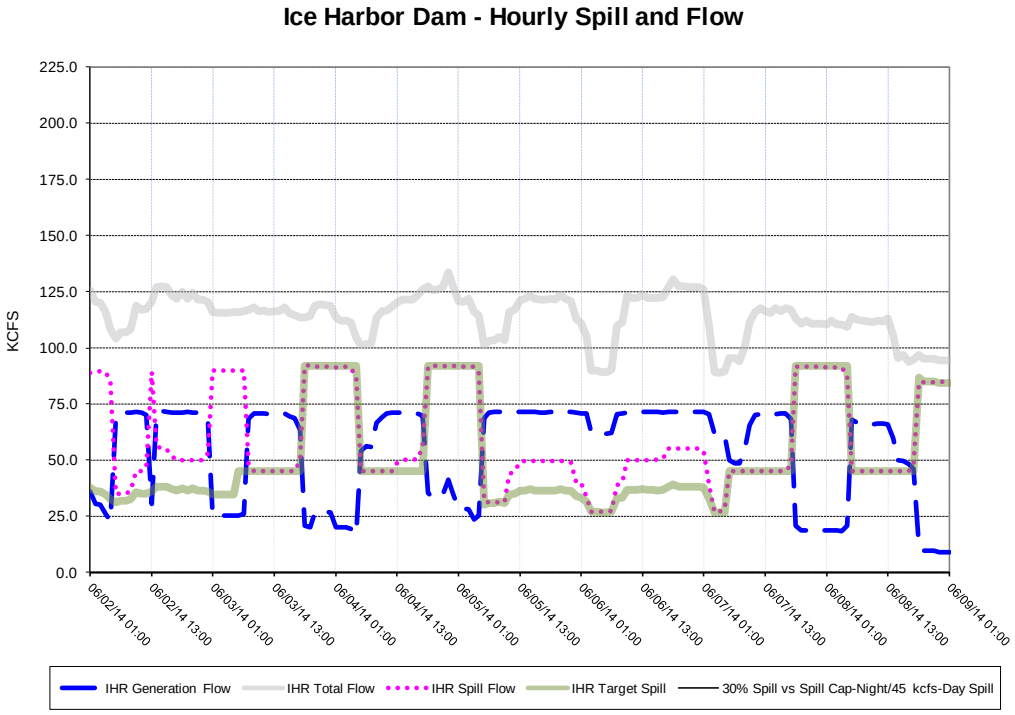
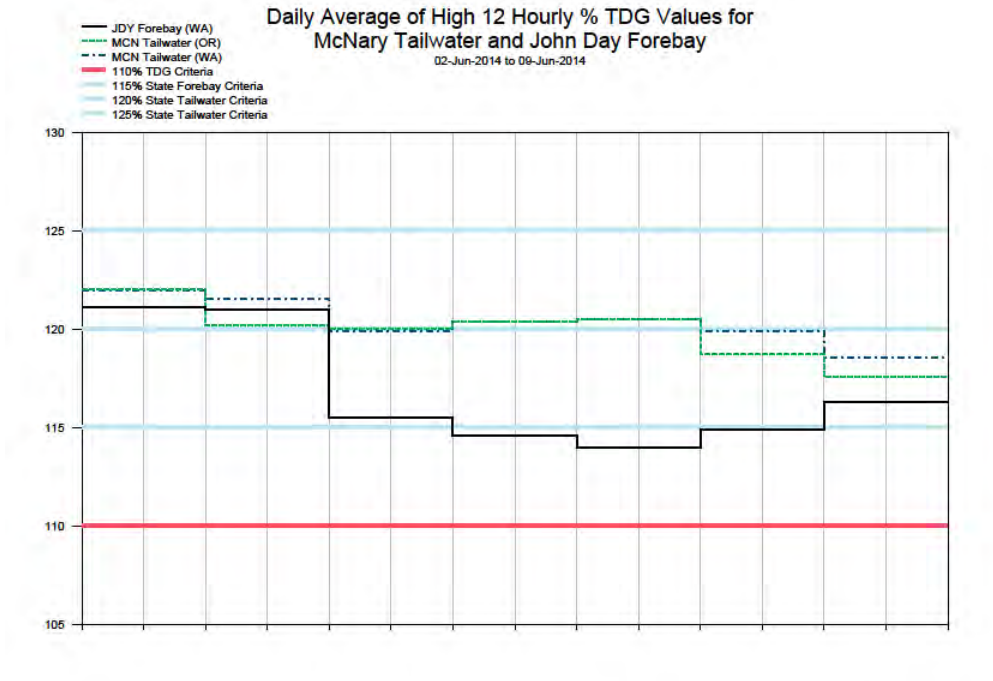

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 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 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
02-Jun-2014 to 09-Jun-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

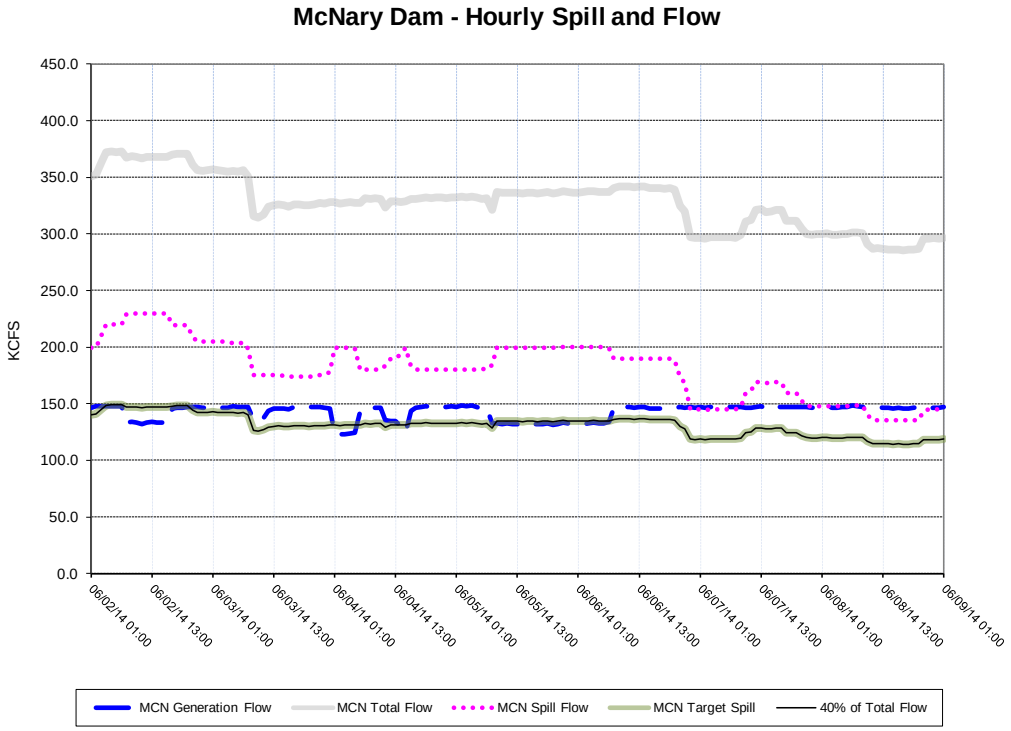
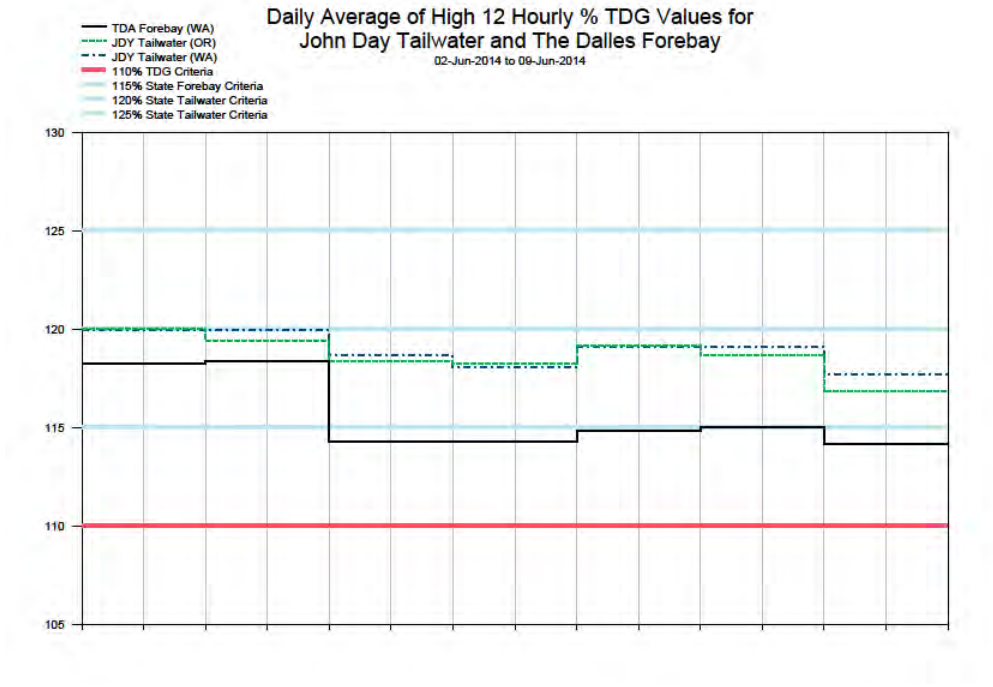

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 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
02-Jun-2014 to 09-Jun-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

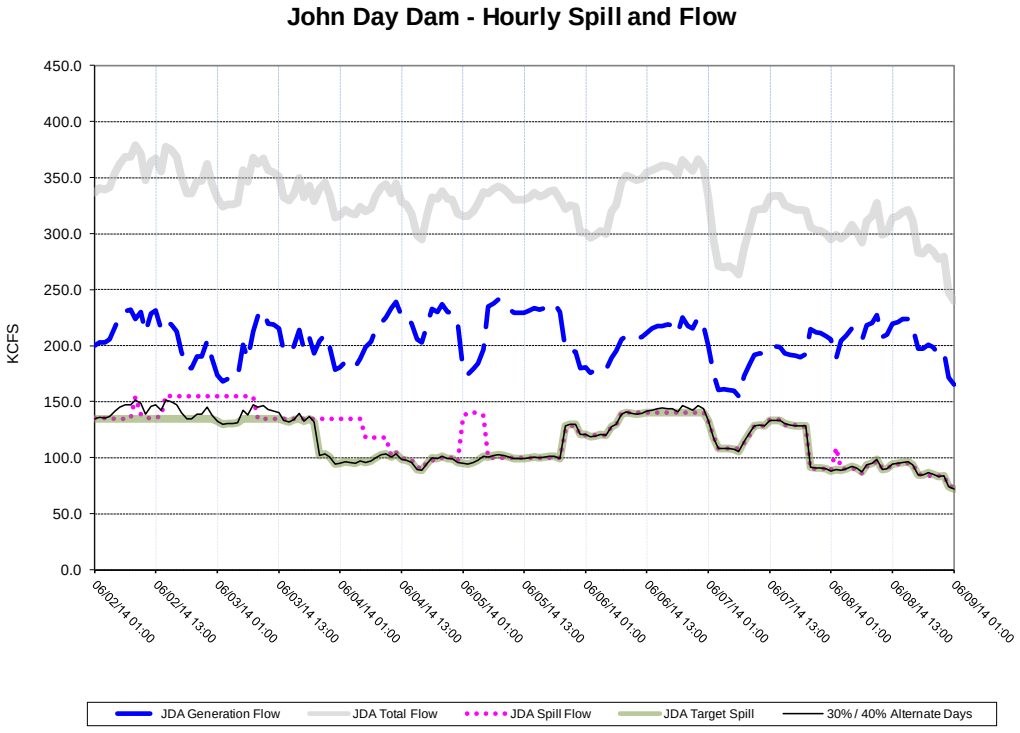
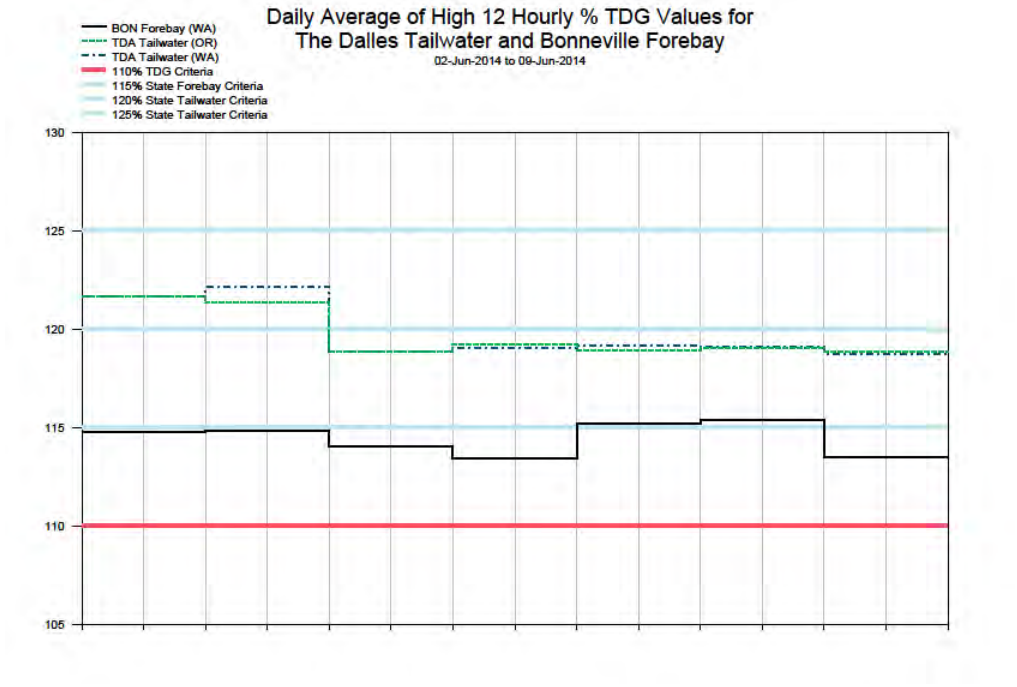

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 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
02-Jun-2014 to 09-Jun-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

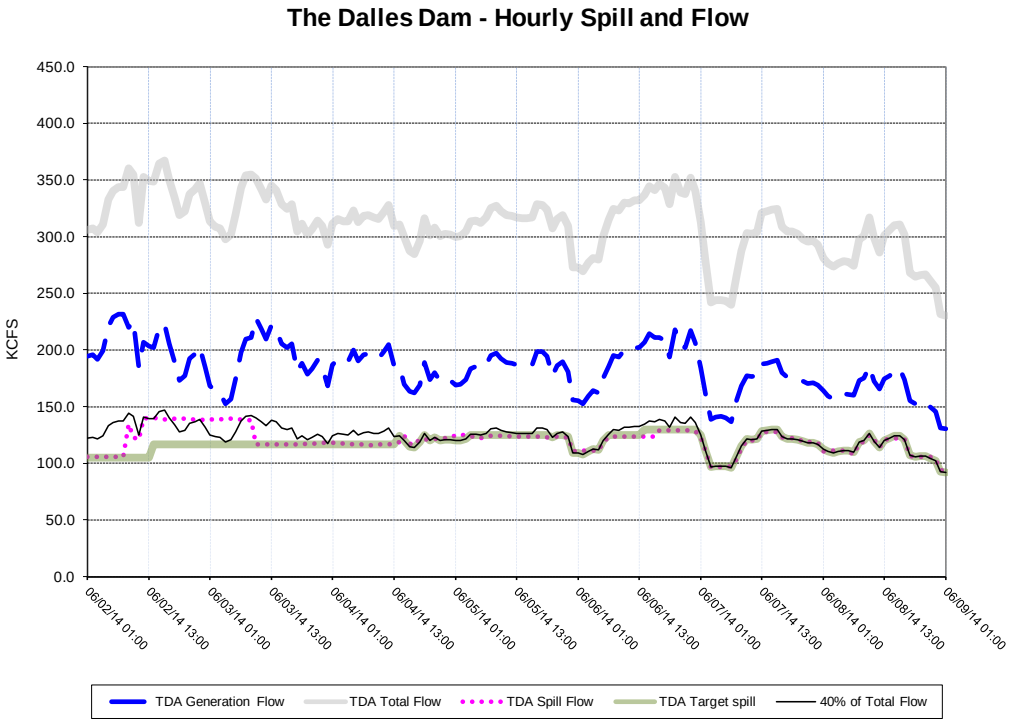
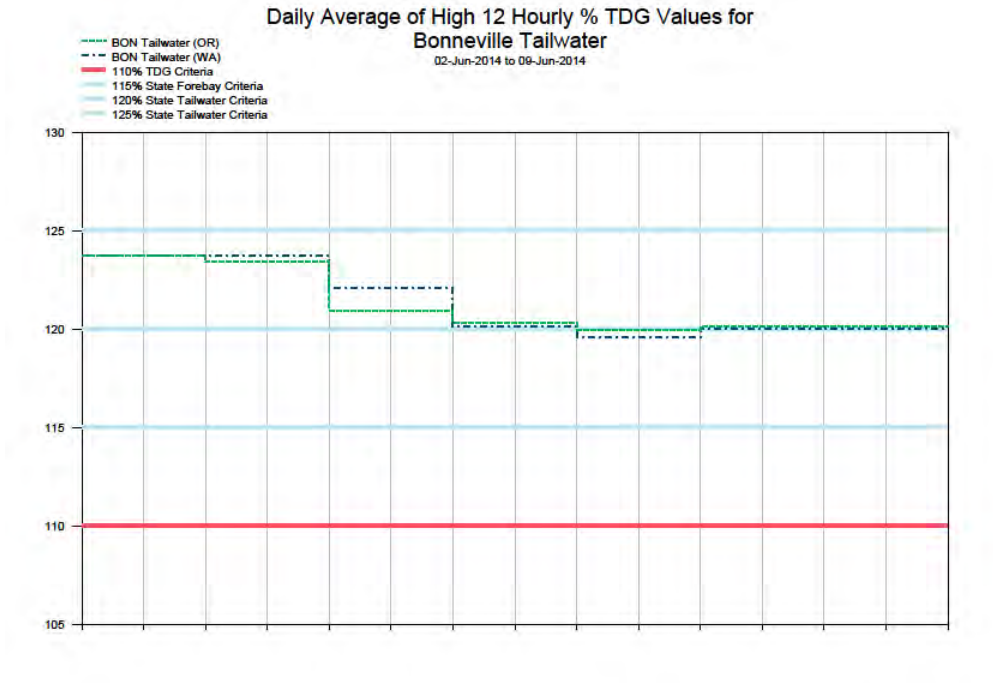

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/02/14 01:00
06/02/14 13:00
06/03/14 01:00
06/03/14 13:00
06/04/14 01:00
06/04/14 13:00
06/05/14 01:00
06/05/14 13:00
06/06/14 01:00
06/06/14 13:00
06/07/14 01:00
06/07/14 13:00
06/08/14 01:00
06/08/14 13:00
06/09/14 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
02-Jun-2014 to 09-Jun-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

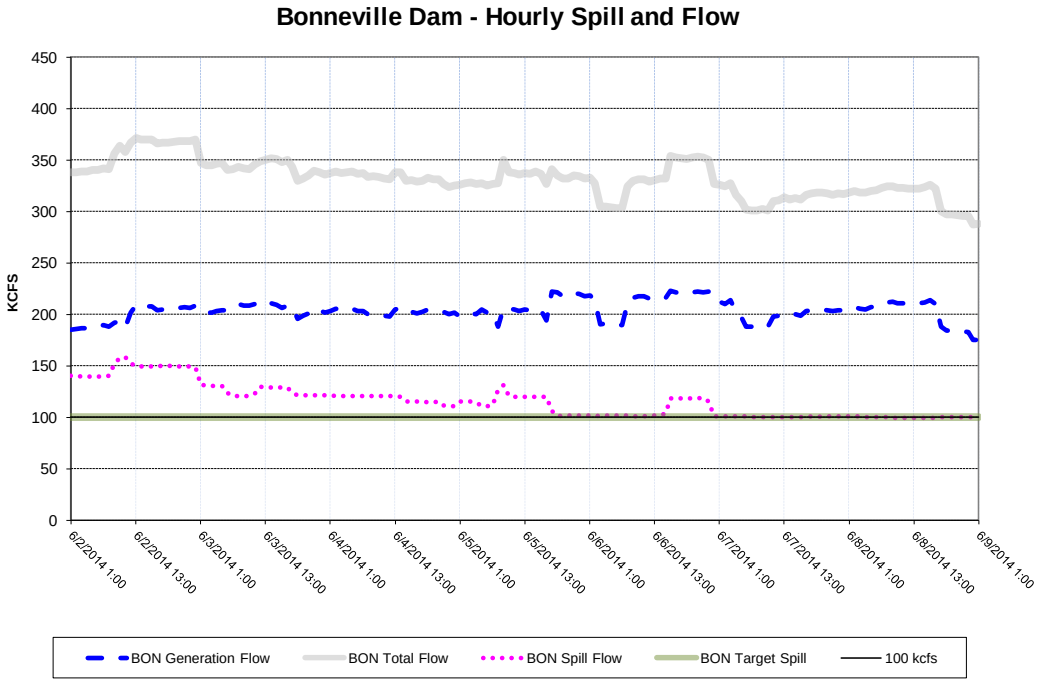
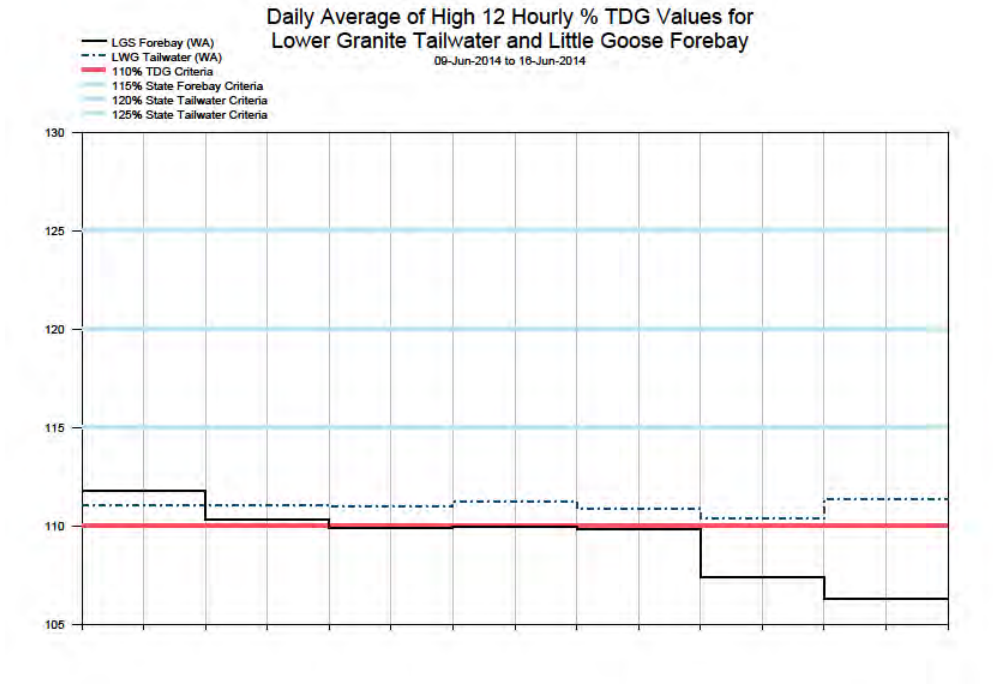

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/2/2014 1:00
6/2/2014 13:00
6/3/2014 1:00
6/3/2014 13:00
6/4/2014 1:00
6/4/2014 13:00
6/5/2014 1:00
6/5/2014 13:00
6/6/2014 1:00
6/6/2014 13:00
6/7/2014 1:00
6/7/2014 13:00
6/8/2014 1:00
6/8/2014 13:00
6/9/2014 1:00
BON 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
09-Jun-2014 to 16-Jun-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

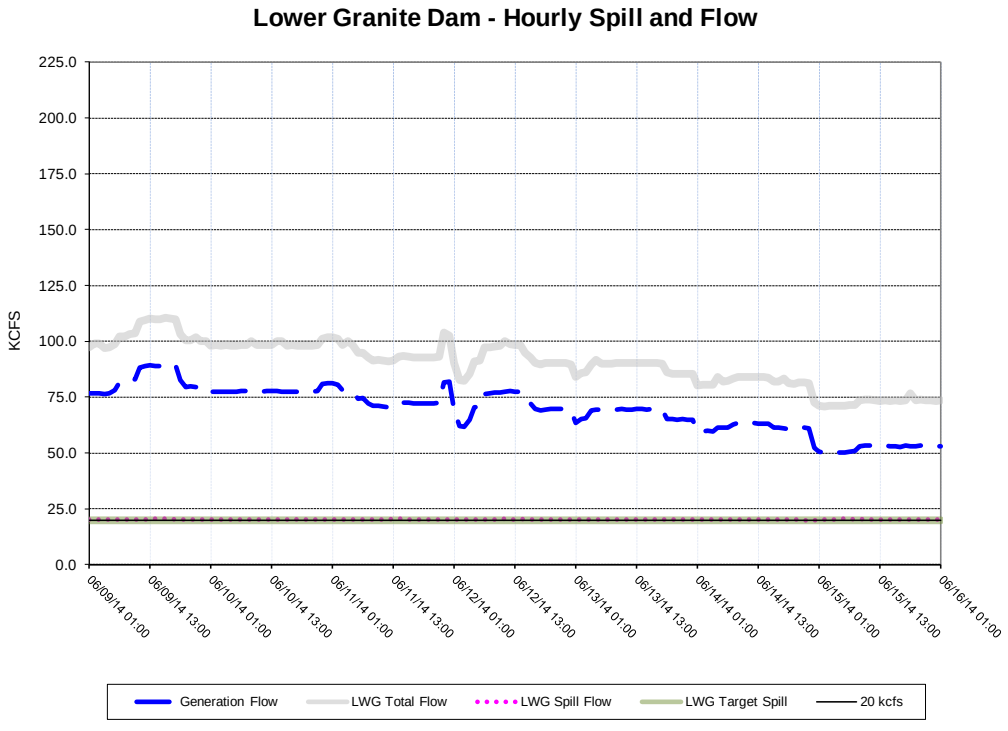
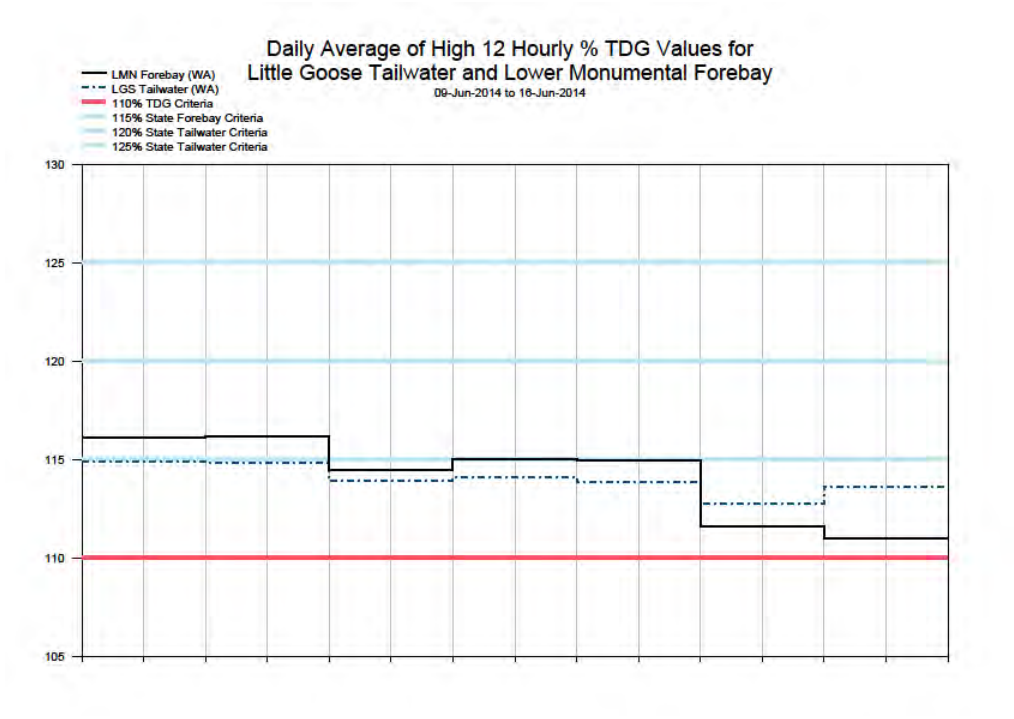

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

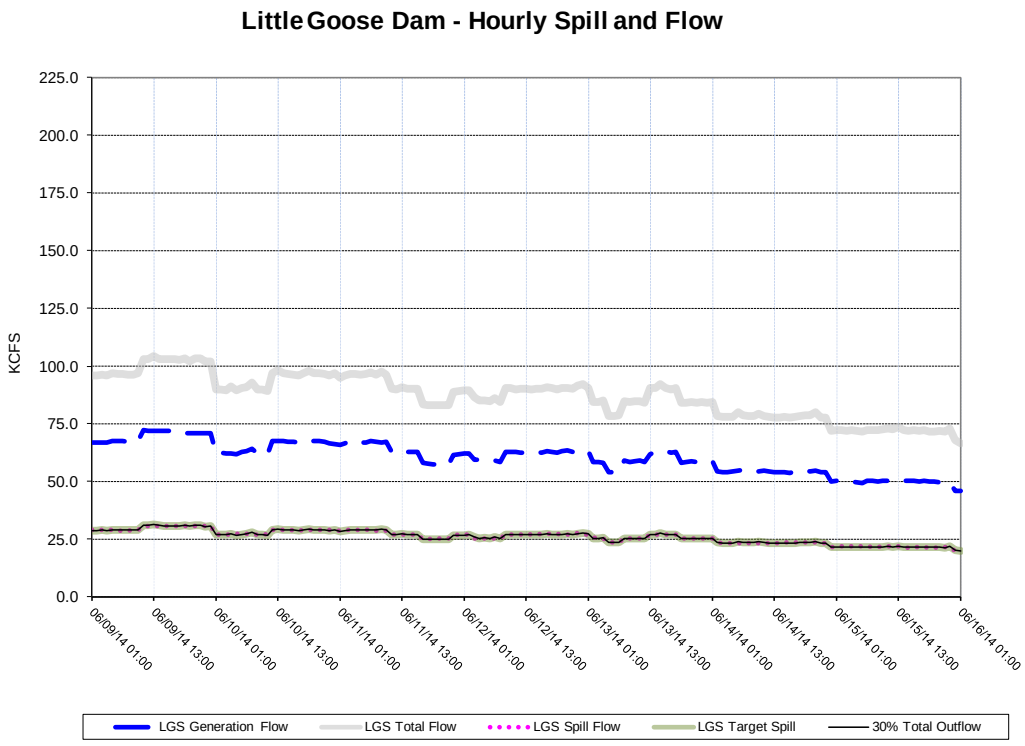
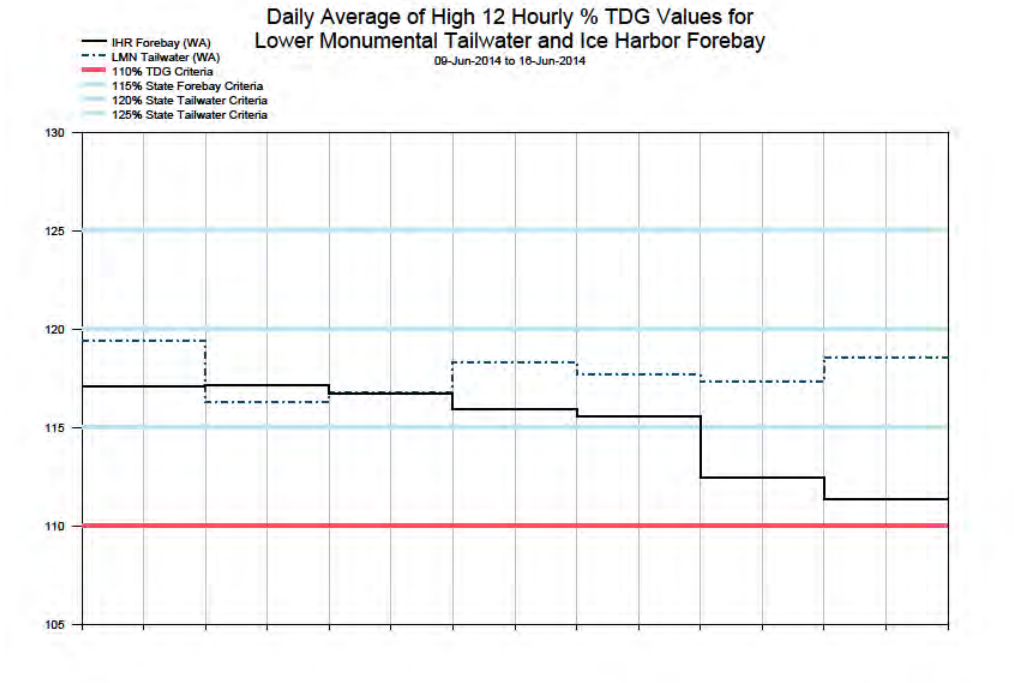

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

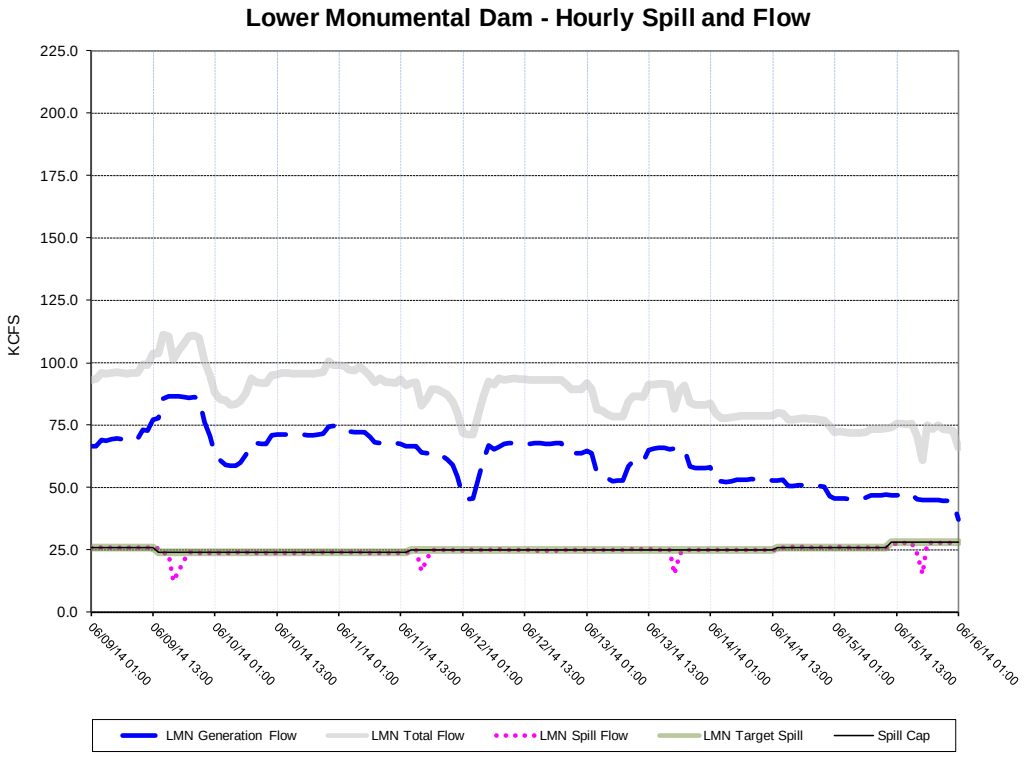
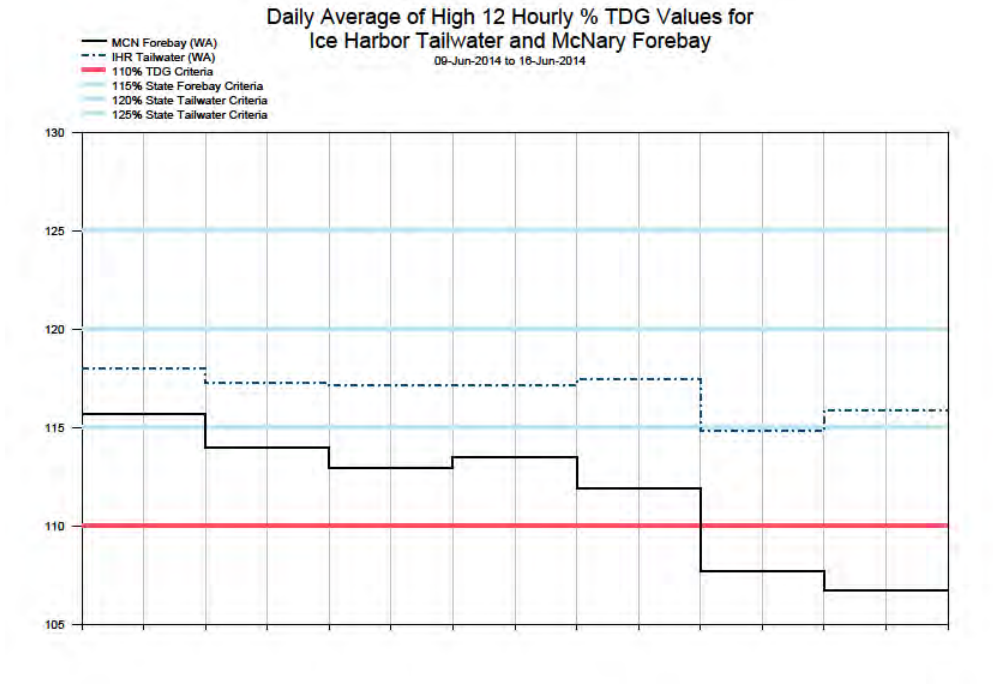

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

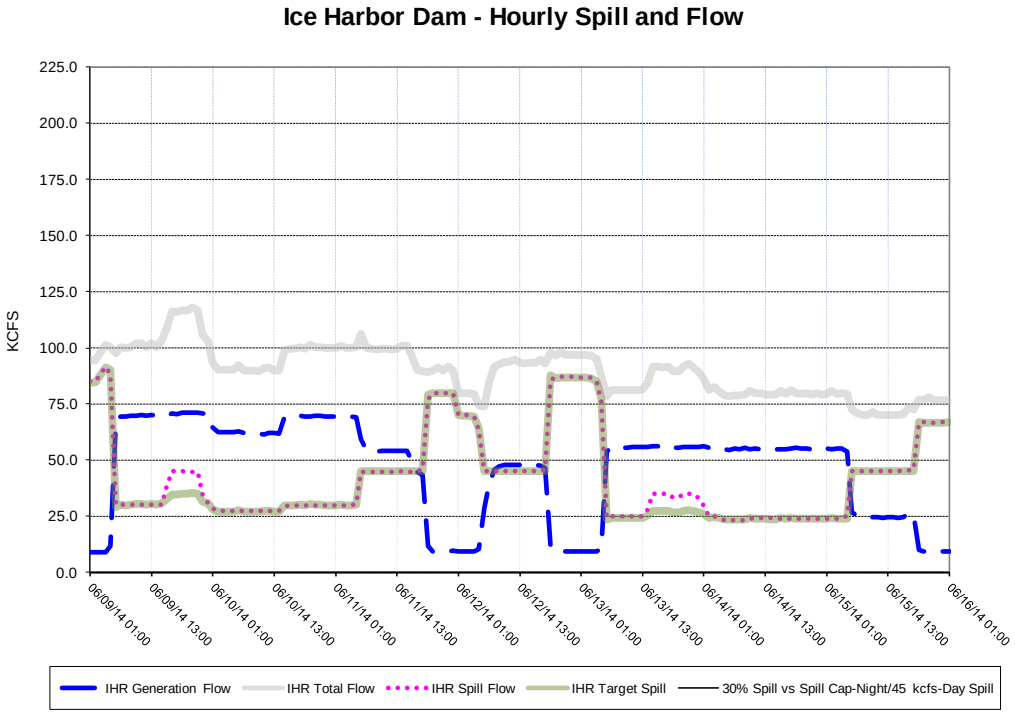
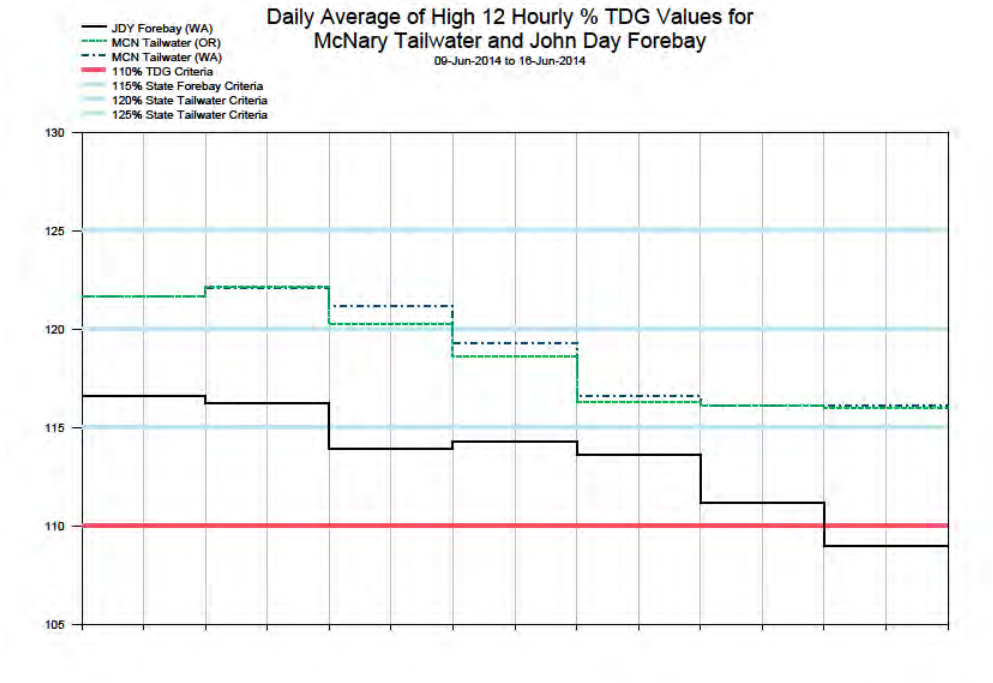

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

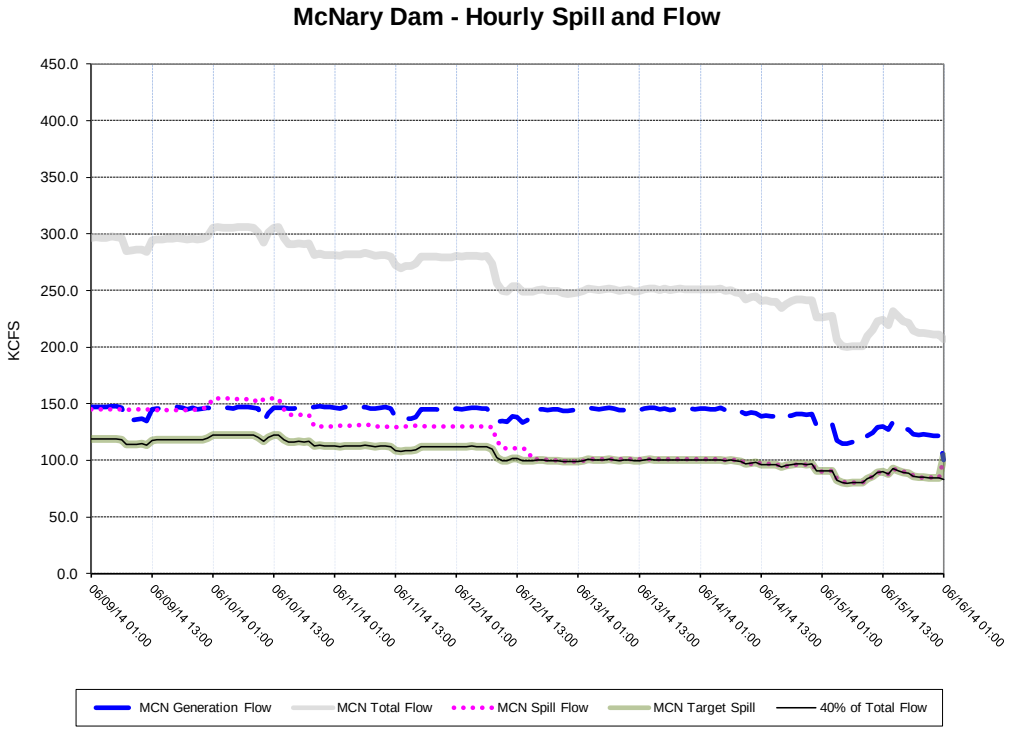
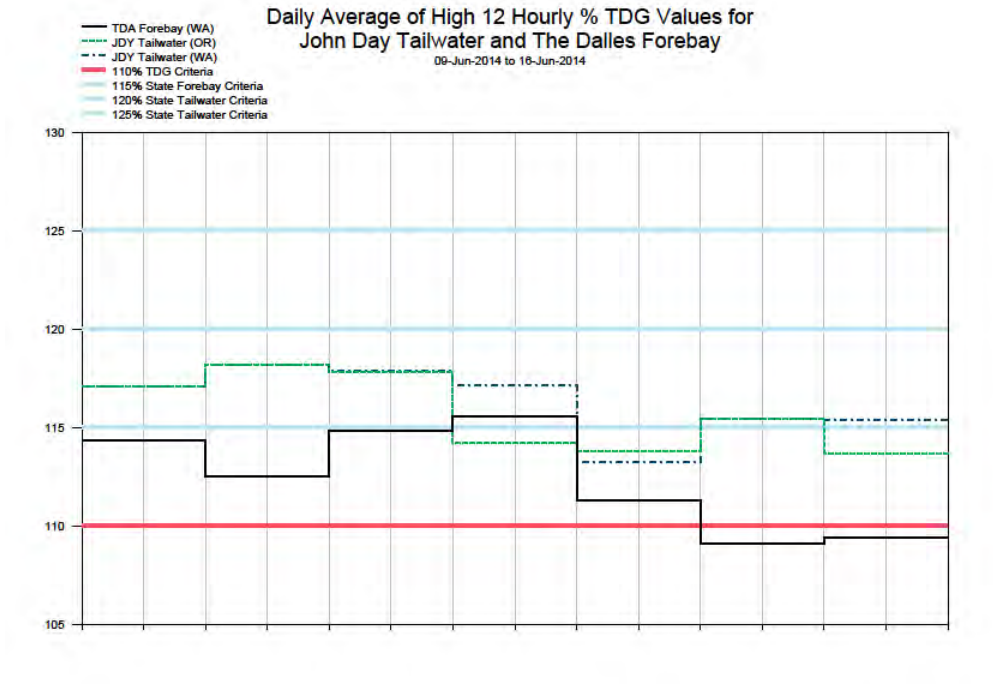

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

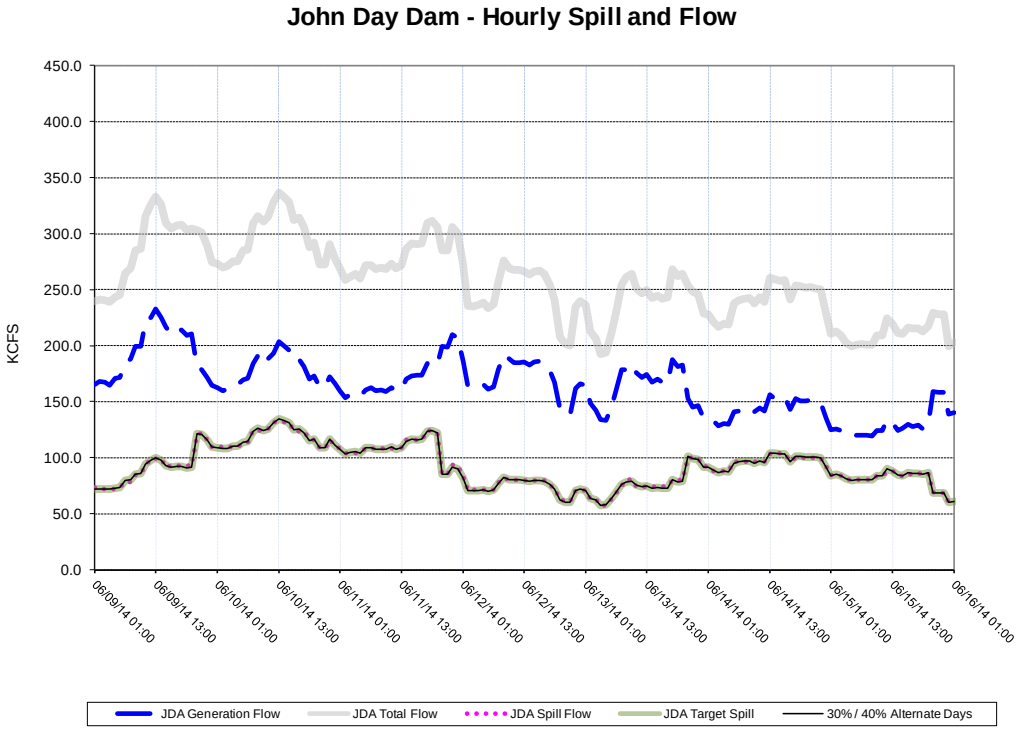
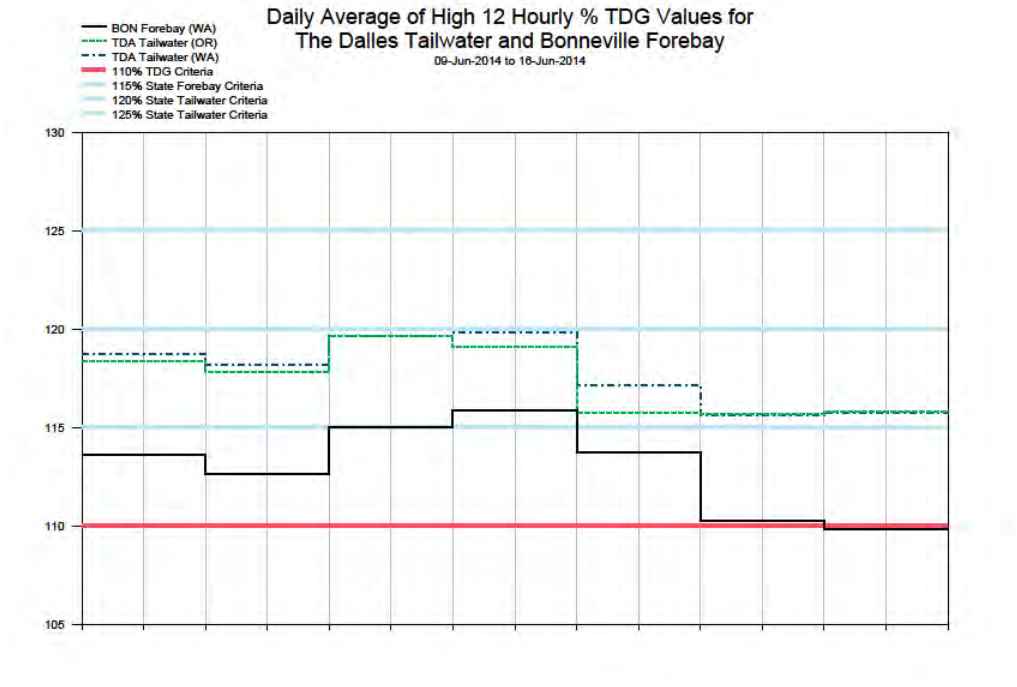

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 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
09-Jun-2014 to 16-Jun-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

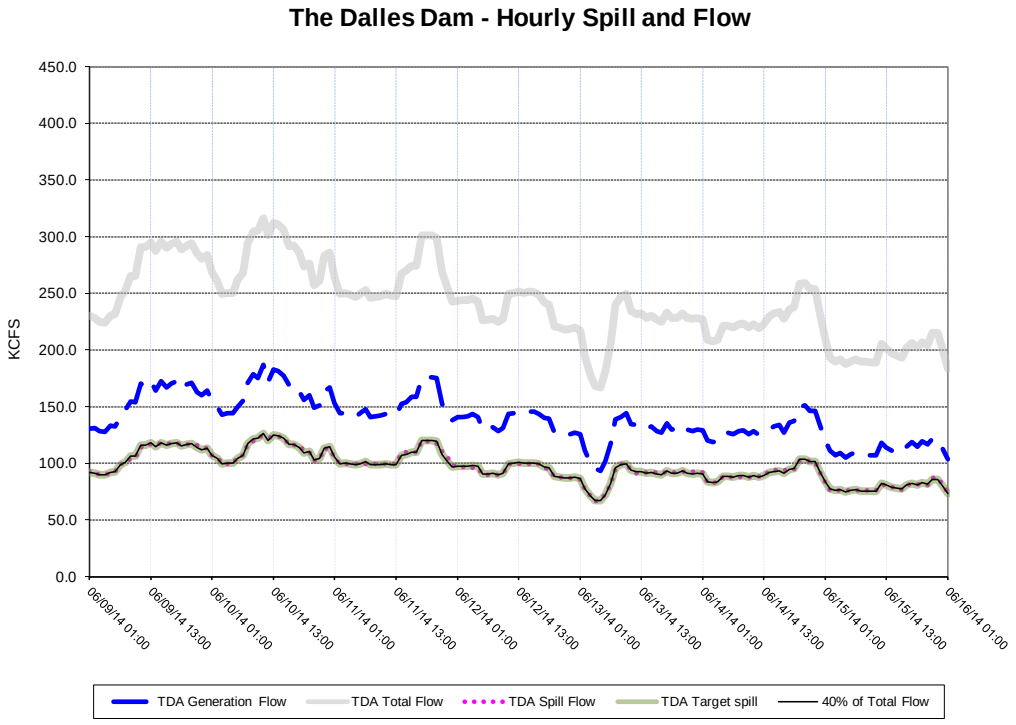

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/09/14 01:00
06/09/14 13:00
06/10/14 01:00
06/10/14 13:00
06/11/14 01:00
06/11/14 13:00
06/12/14 01:00
06/12/14 13:00
06/13/14 01:00
06/13/14 13:00
06/14/14 01:00
06/14/14 13:00
06/15/14 01:00
06/15/14 13:00
06/16/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 16

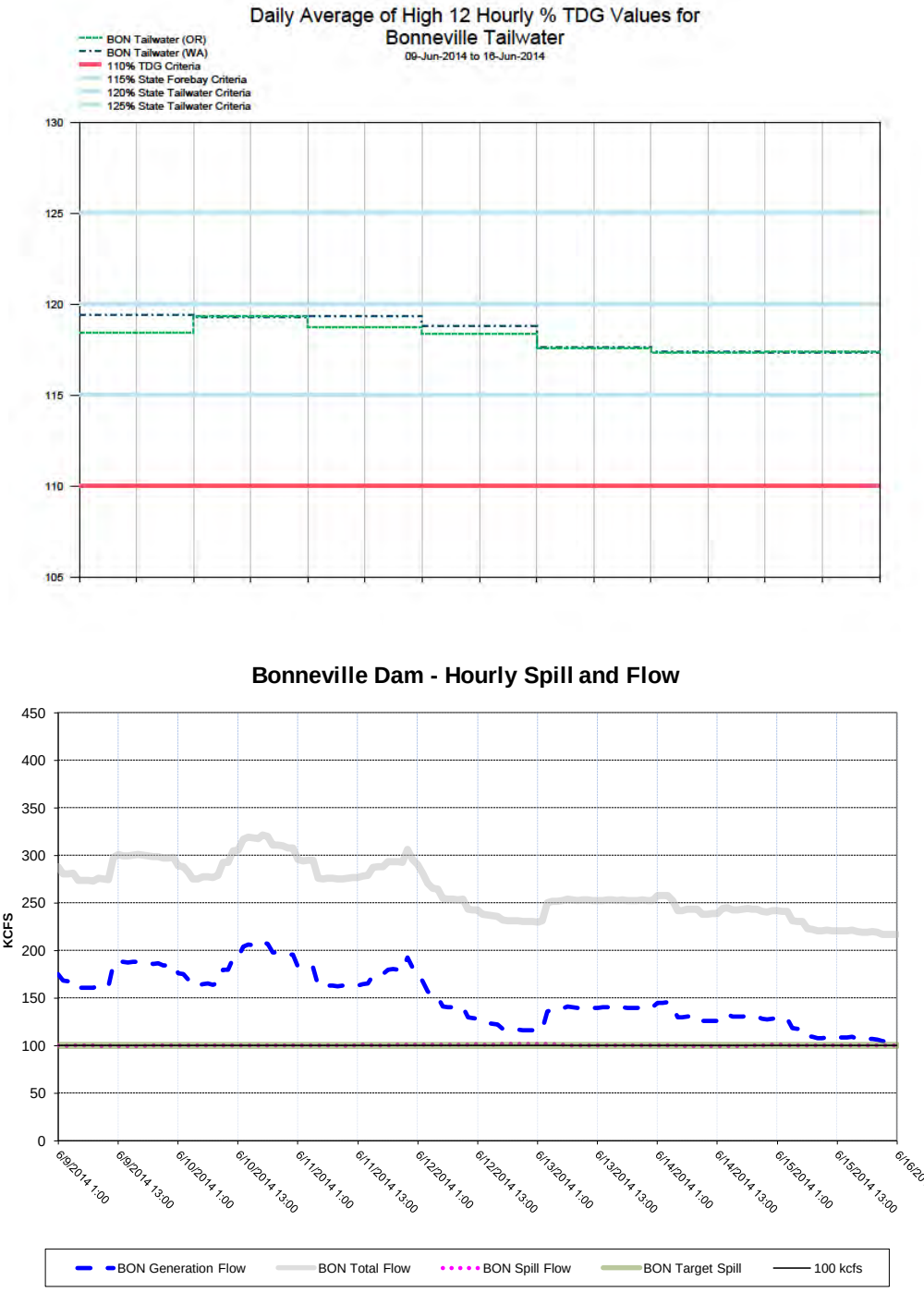
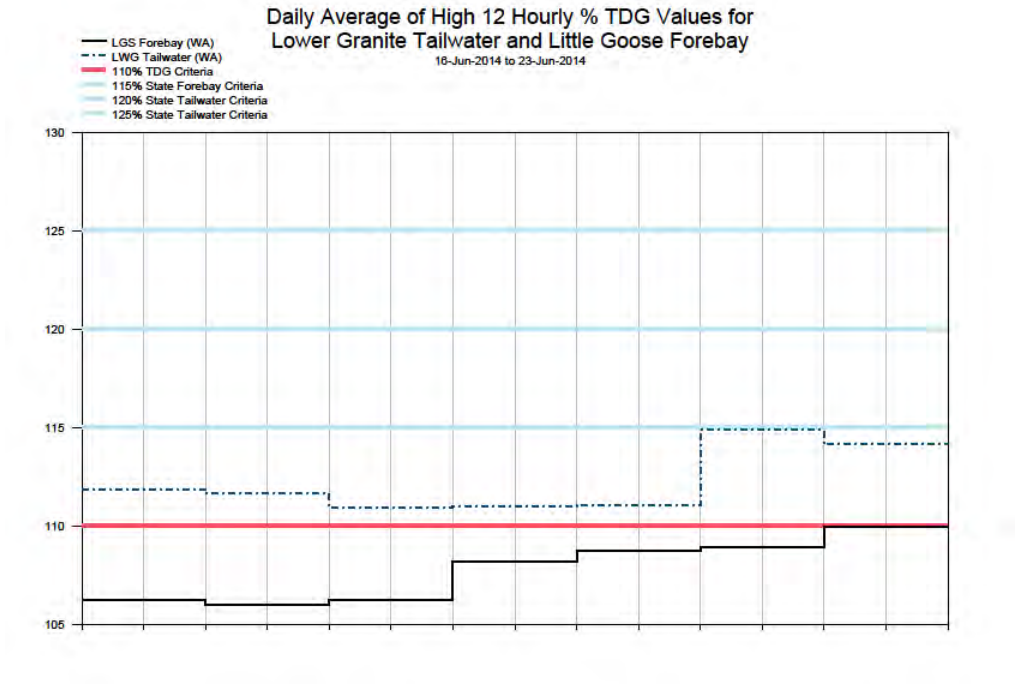

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
09-Jun-2014 to 16-Jun-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/8/2014 1:00
6/9/2014 13:00
6/10/2014 1:00
6/10/2014 13:00
6/11/2014 1:00
6/11/2014 13:00
6/12/2014 1:00
6/12/2014 13:00
6/13/2014 1:00
6/13/2014 13:00
6/14/2014 1:00
6/14/2014 13:00
6/15/2014 1:00
6/15/2014 13:00
6/16/2014 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
16-Jun-2014 to 23-Jun-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

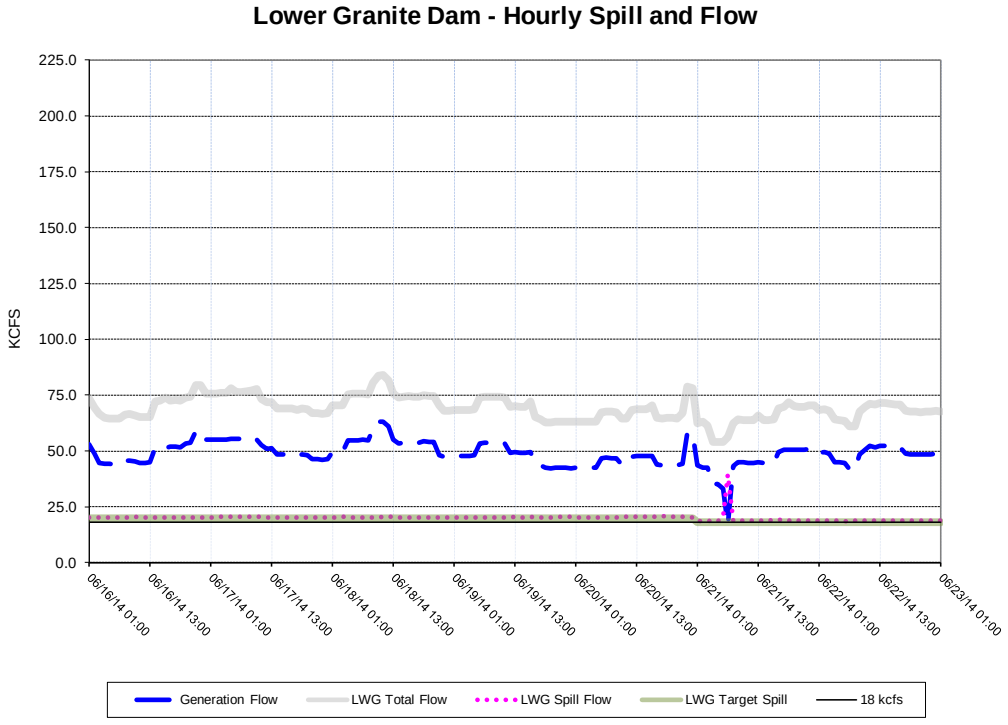
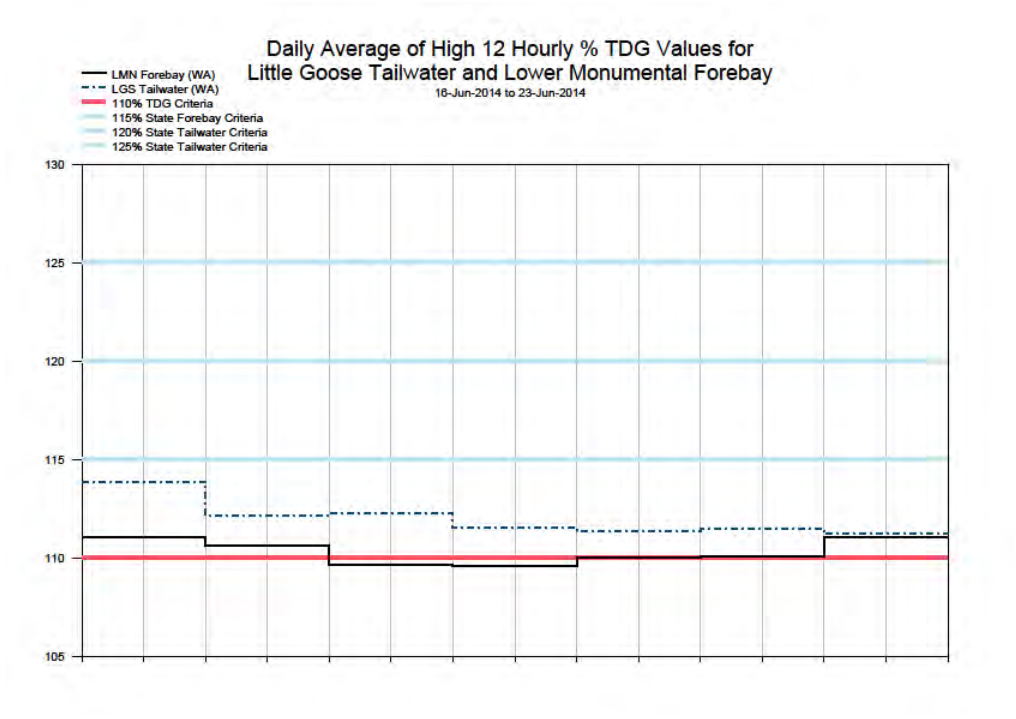

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 18


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
16-Jun-2014 to 23-Jun-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

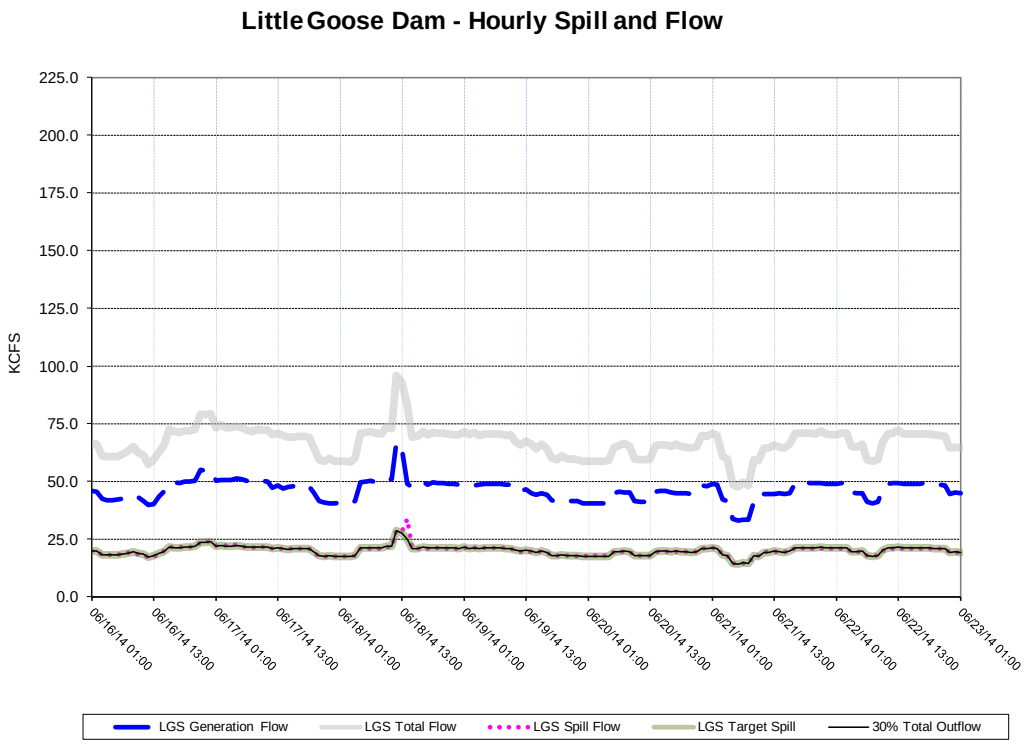
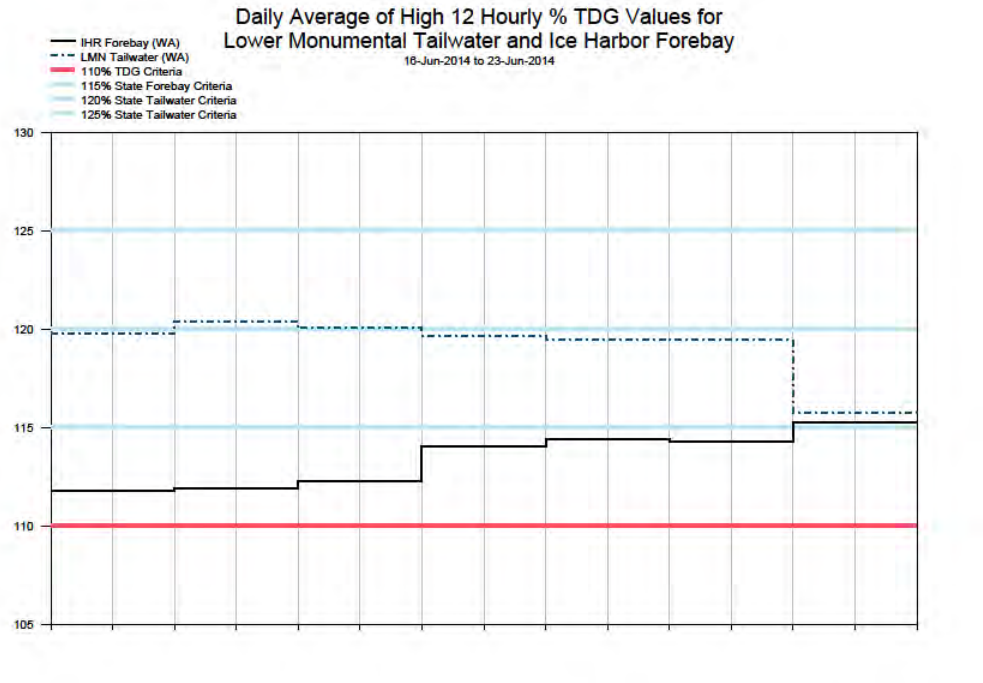

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 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
16-Jun-2014 to 23-Jun-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

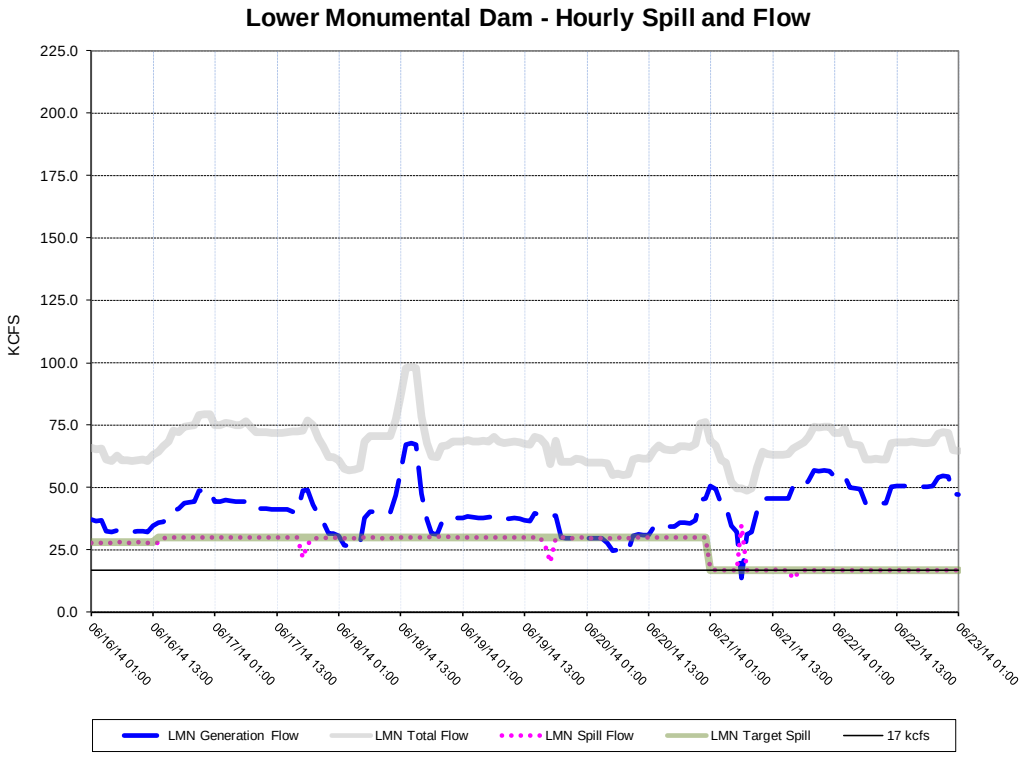
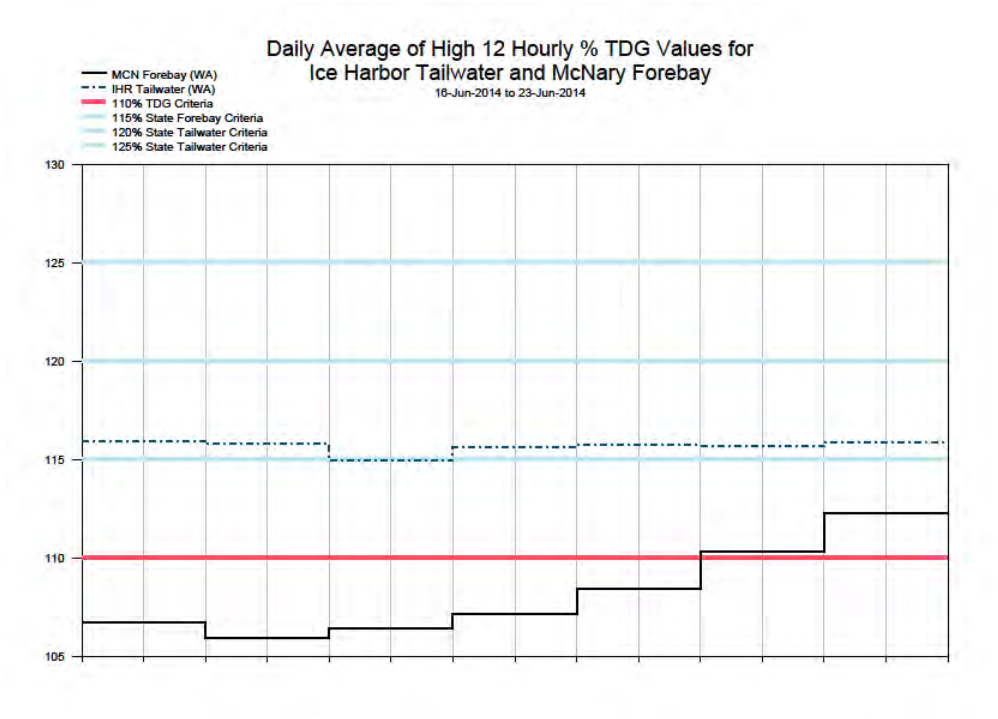

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 20


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
16-Jun-2014 to 23-Jun-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

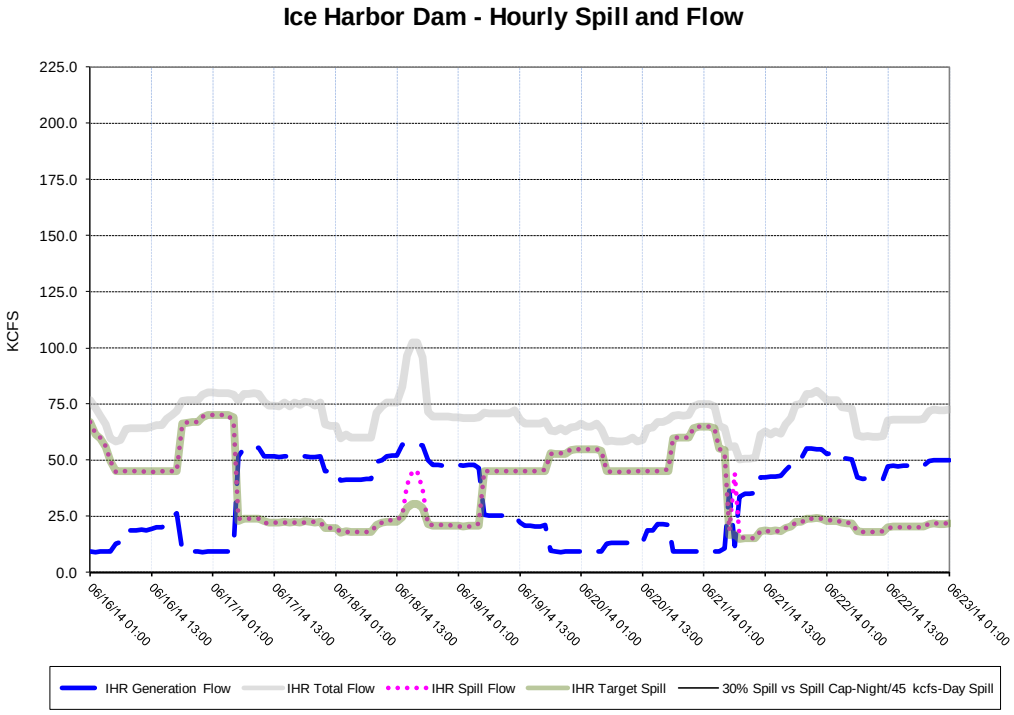
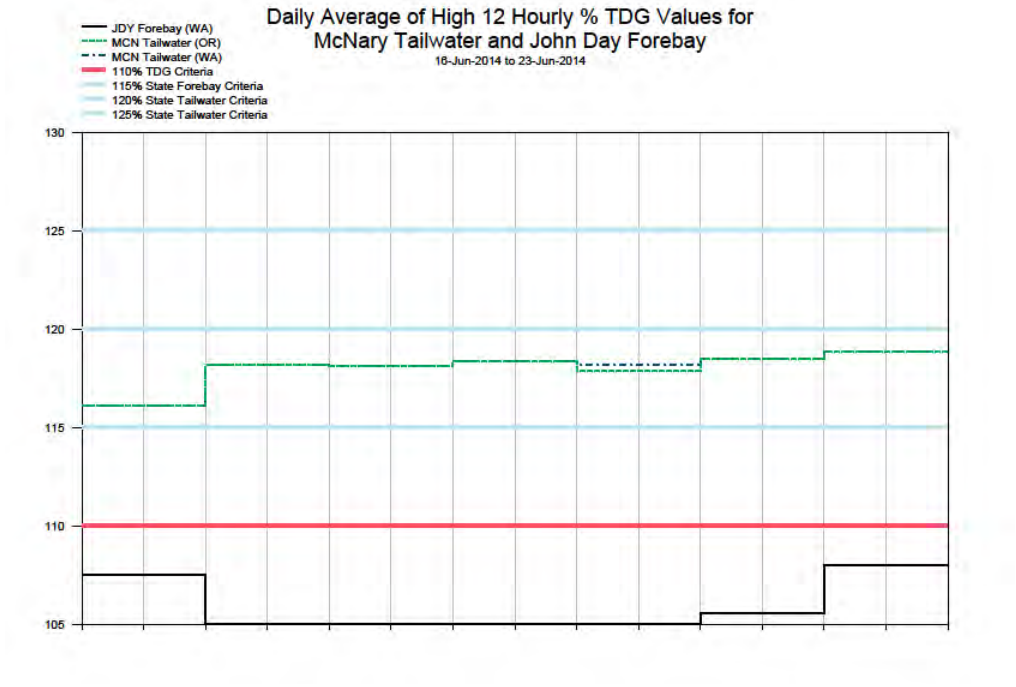

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 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
16-Jun-2014 to 23-Jun-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

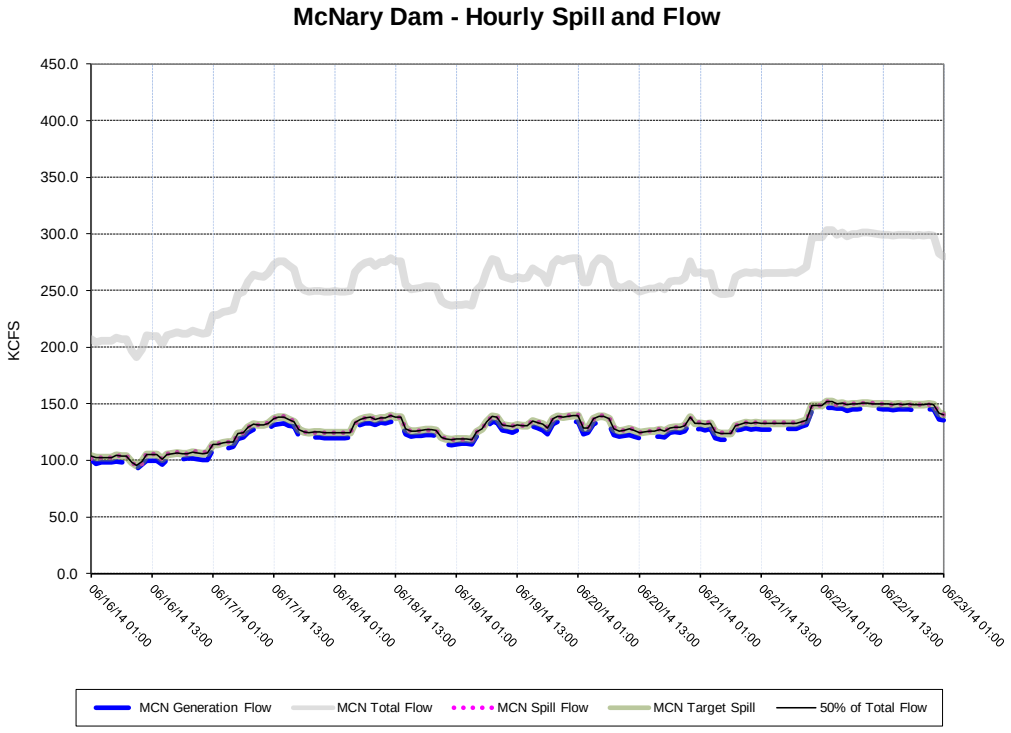
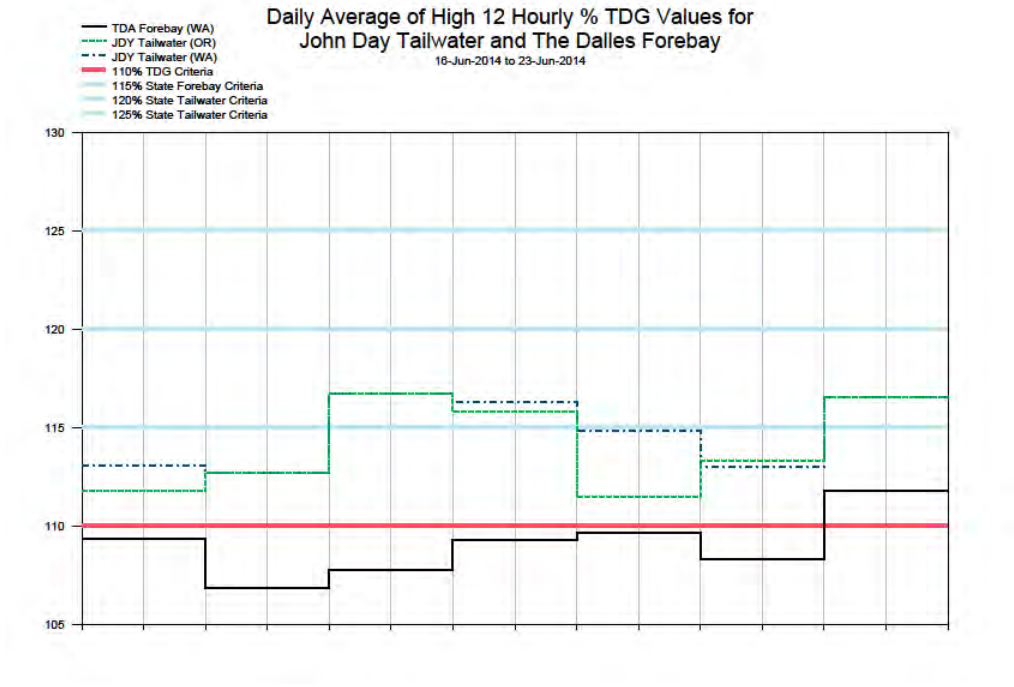

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 22


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
16-Jun-2014 to 23-Jun-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

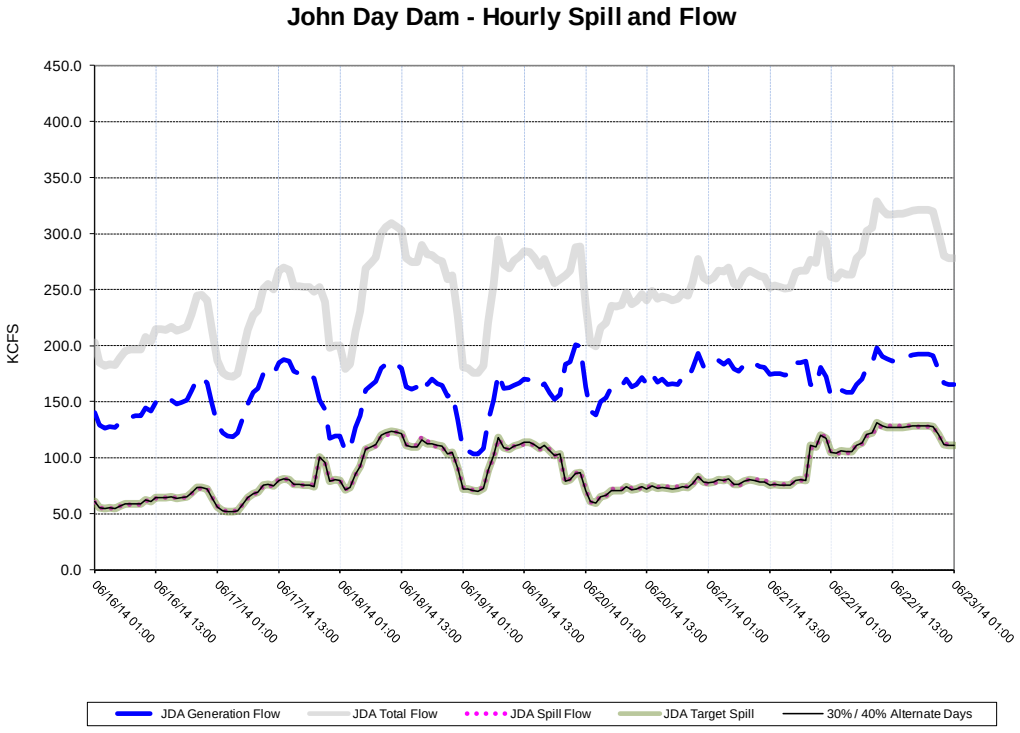
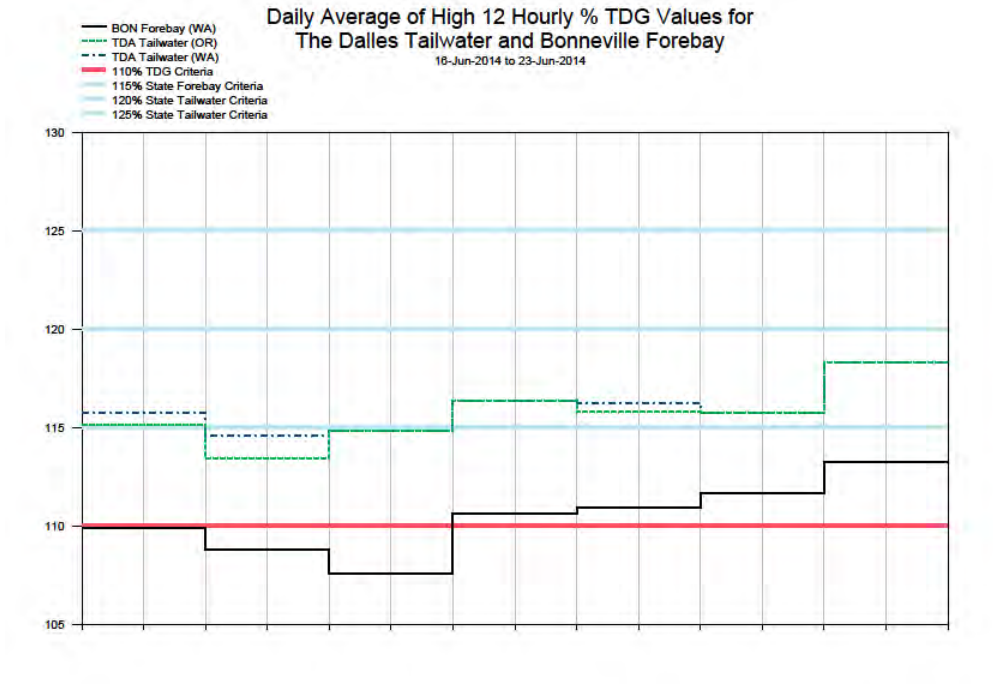

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 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
16-Jun-2014 to 23-Jun-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

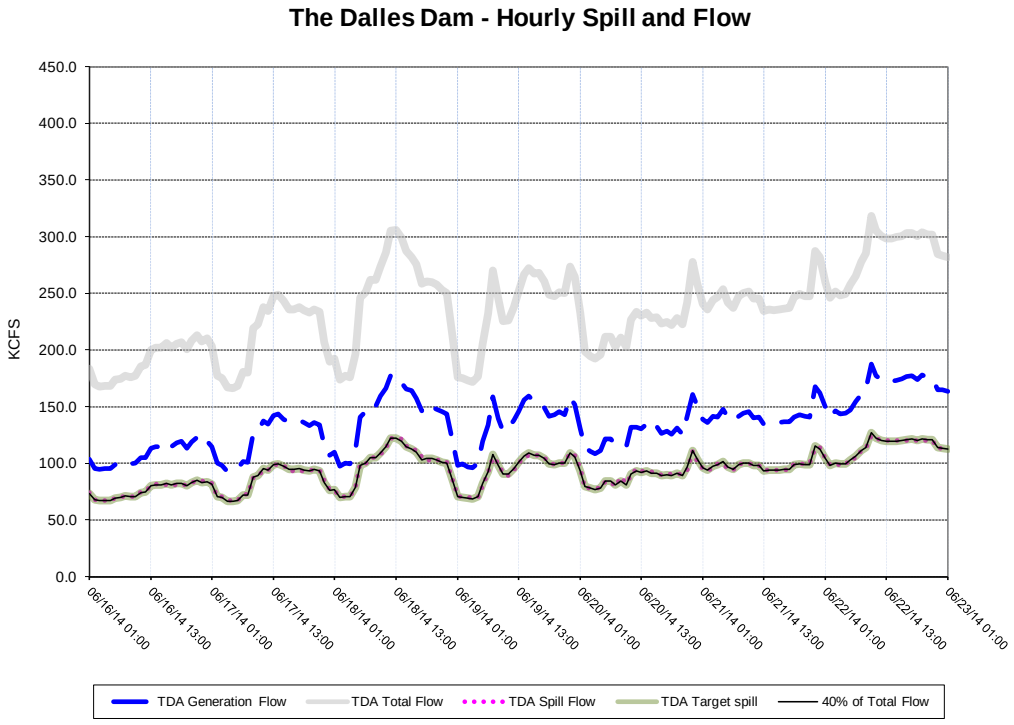

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/16/14 01:00
06/16/14 13:00
06/17/14 01:00
06/17/14 13:00
06/18/14 01:00
06/18/14 13:00
06/19/14 01:00
06/19/14 13:00
06/20/14 01:00
06/20/14 13:00
06/21/14 01:00
06/21/14 13:00
06/22/14 01:00
06/22/14 13:00
06/23/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 24

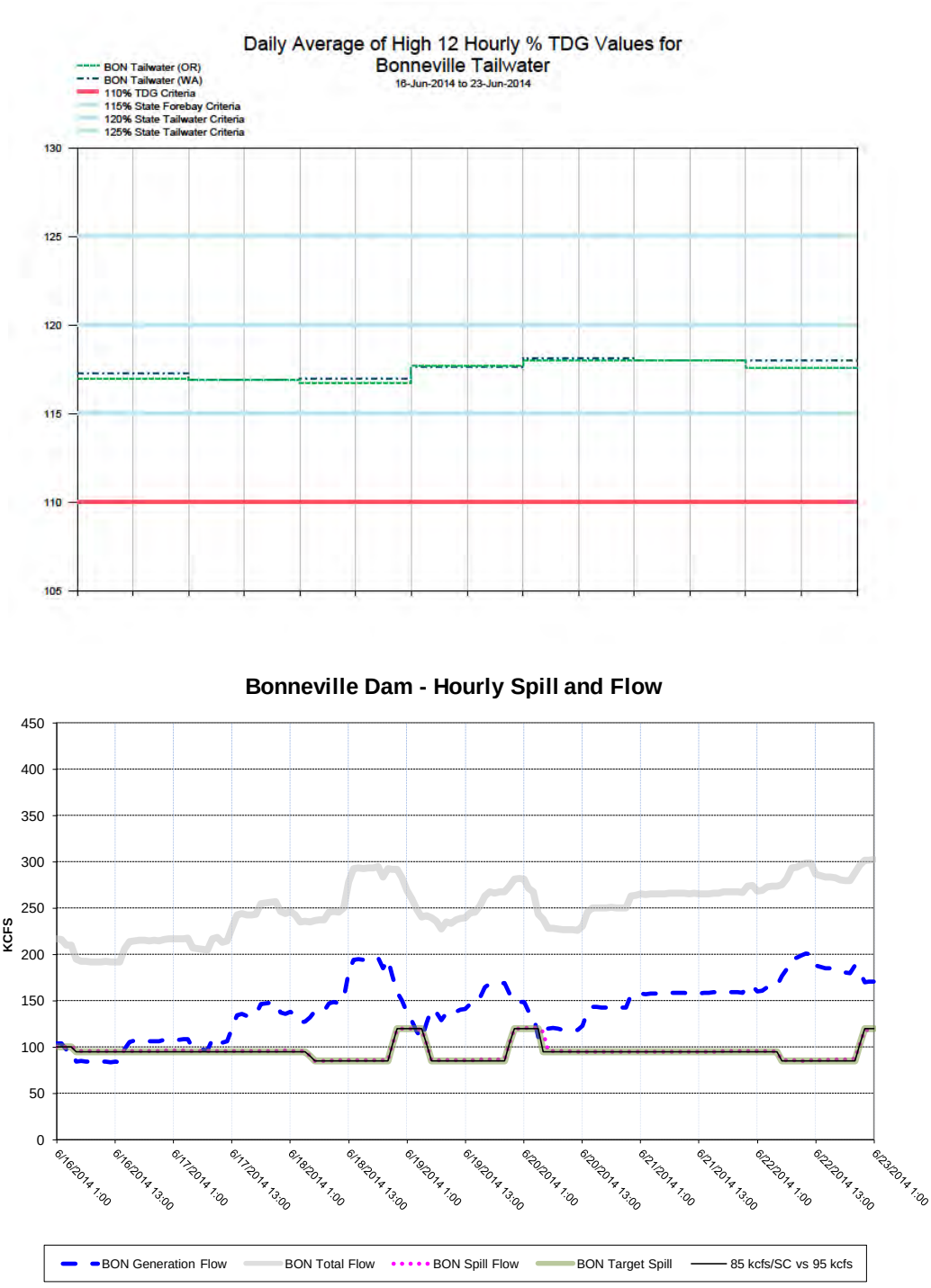

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
16-Jun-2014 to 23-Jun-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/16/2014 1:00
6/16/2014 13:00
6/17/2014 1:00
6/17/2014 13:00
6/18/2014 1:00
6/18/2014 13:00
6/19/2014 1:00
6/19/2014 13:00
6/20/2014 1:00
6/20/2014 13:00
6/21/2014 1:00
6/21/2014 13:00
6/22/2014 1:00
6/22/2014 13:00
6/23/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 25

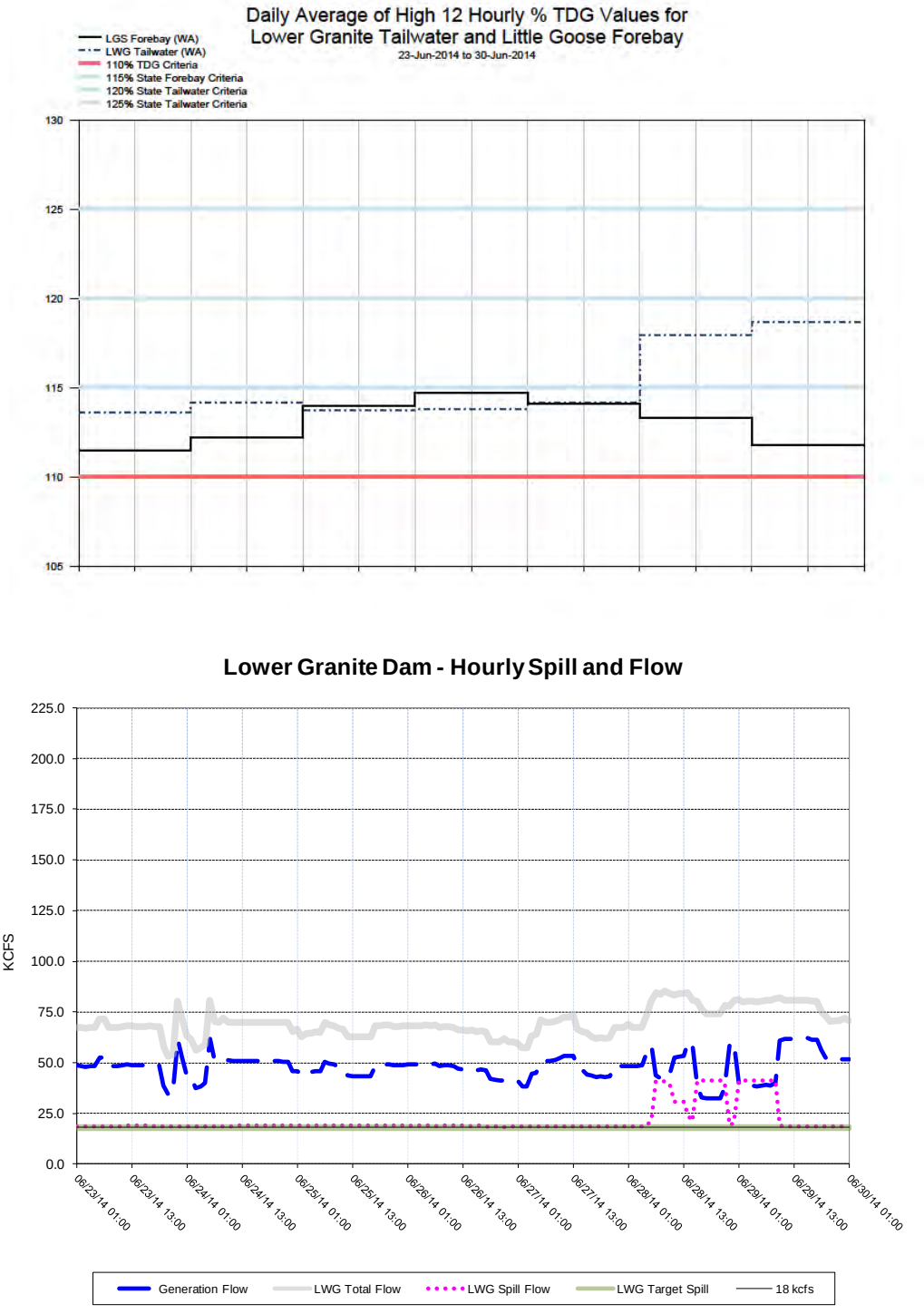
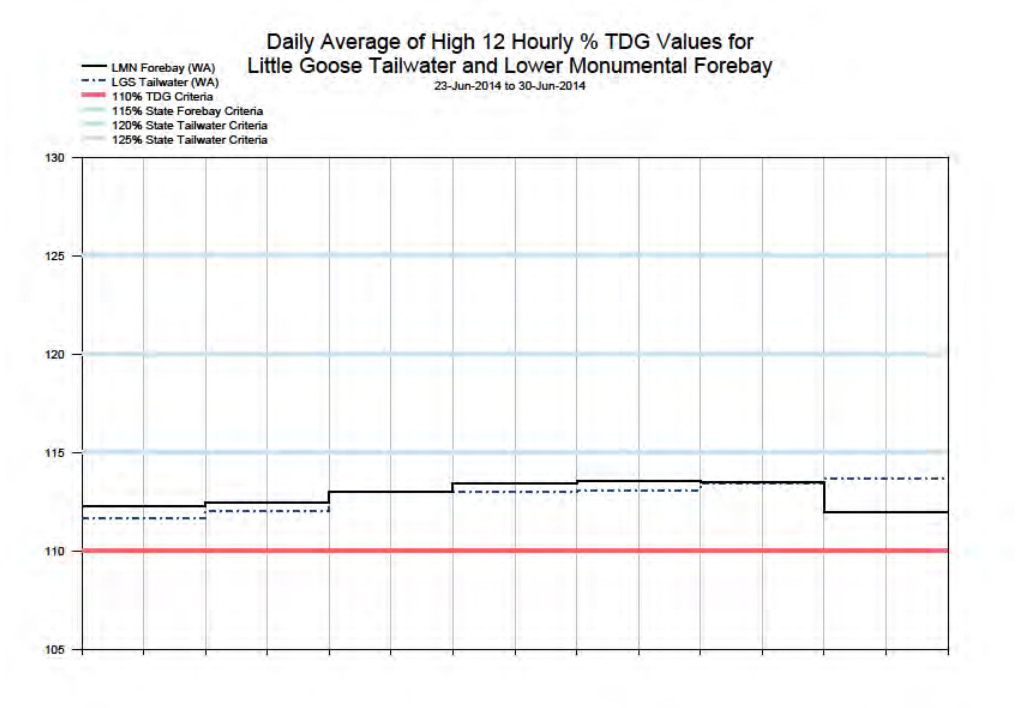

Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
23-Jun-2014 to 30-Jun-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Lower Granite 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
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 26


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
23-Jun-2014 to 30-Jun-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

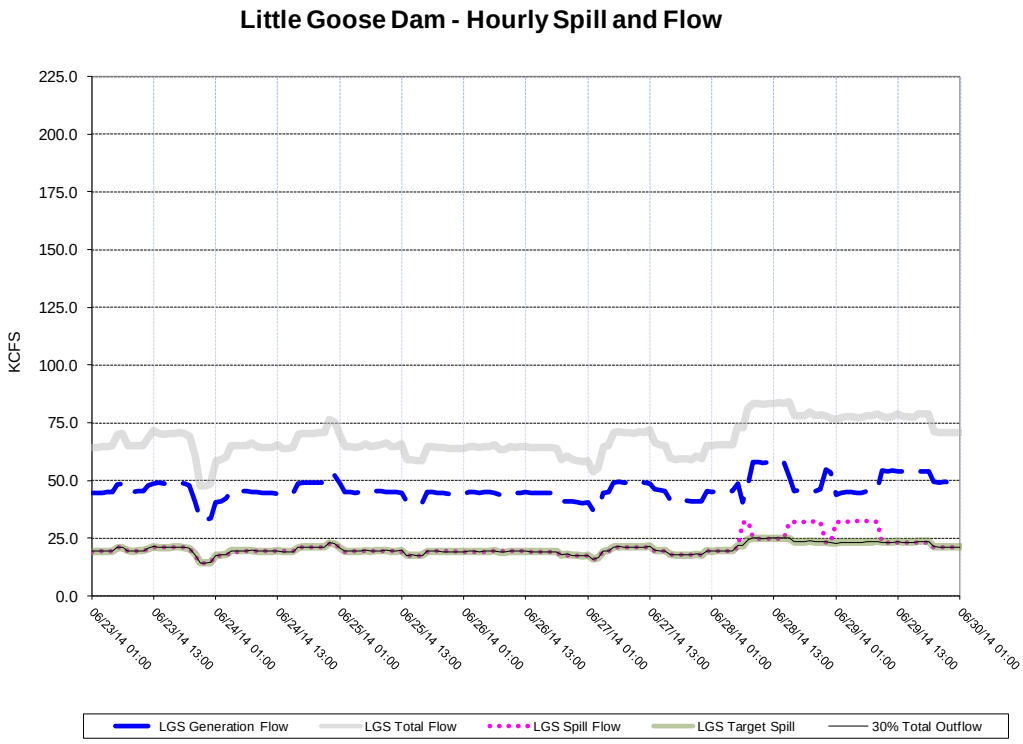
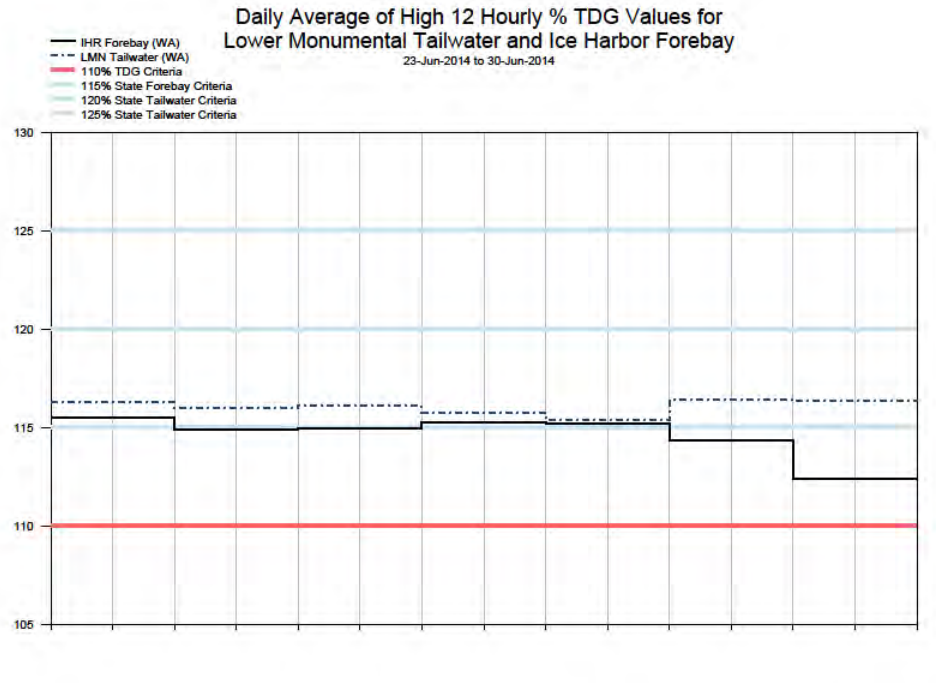

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 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
23-Jun-2014 to 30-Jun-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

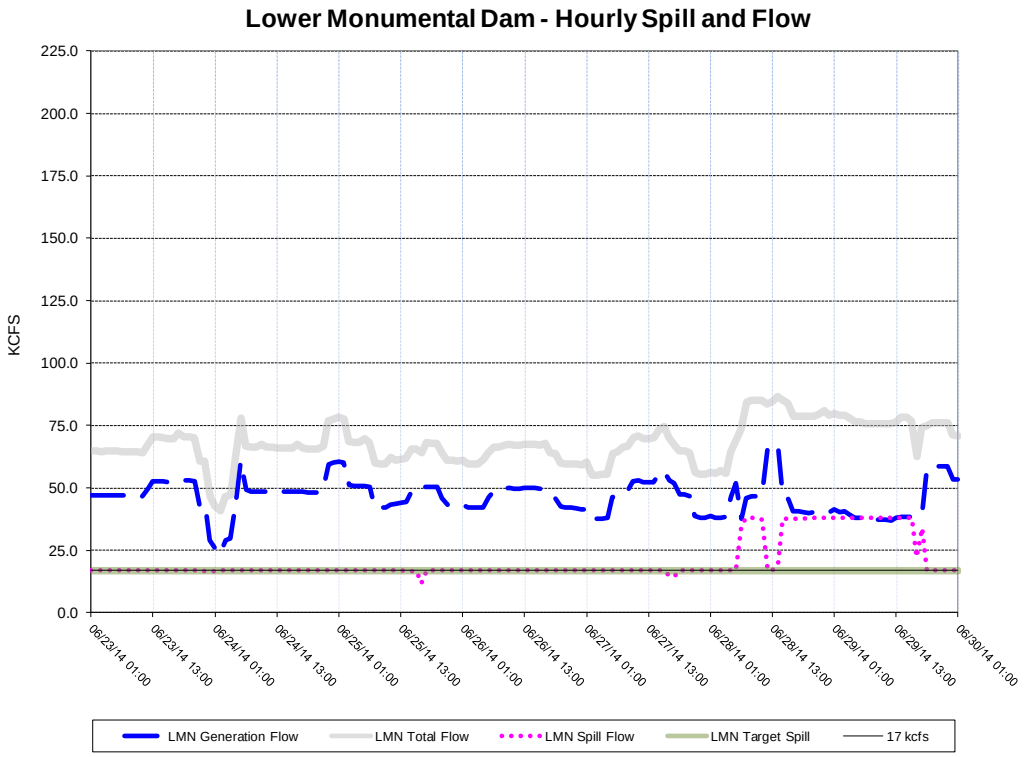
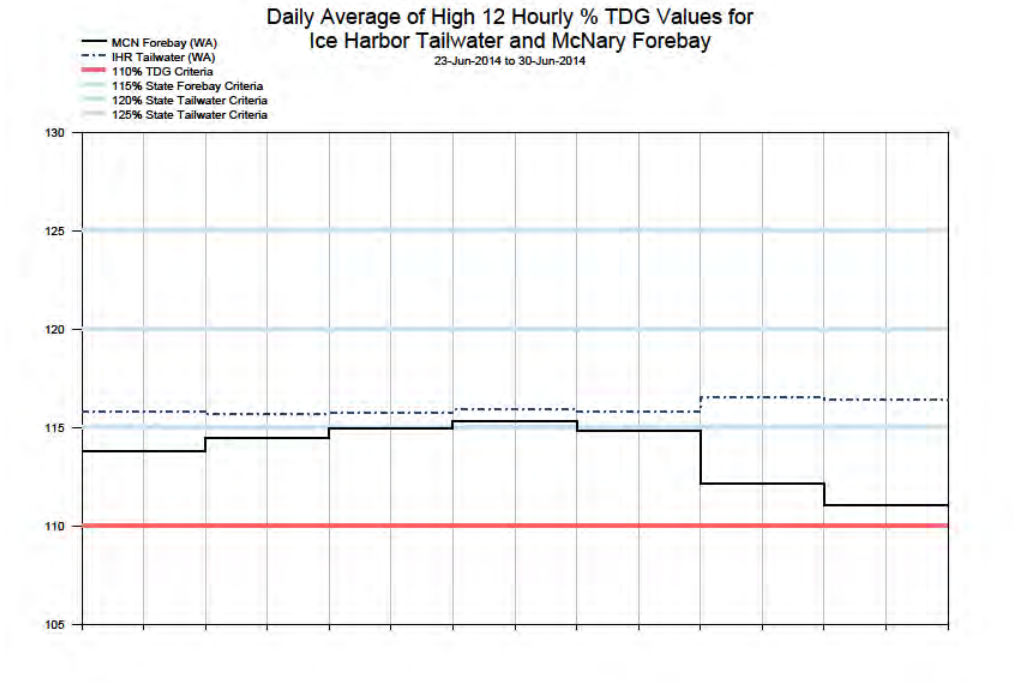

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 28


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
23-Jun-2014 to 30-Jun-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

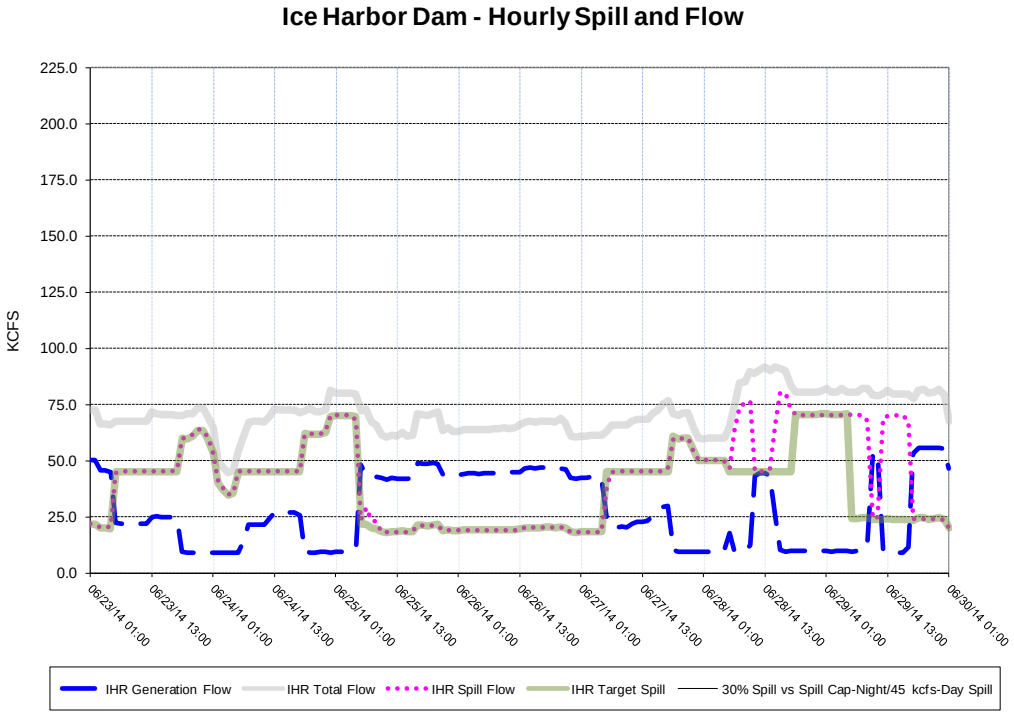

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 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

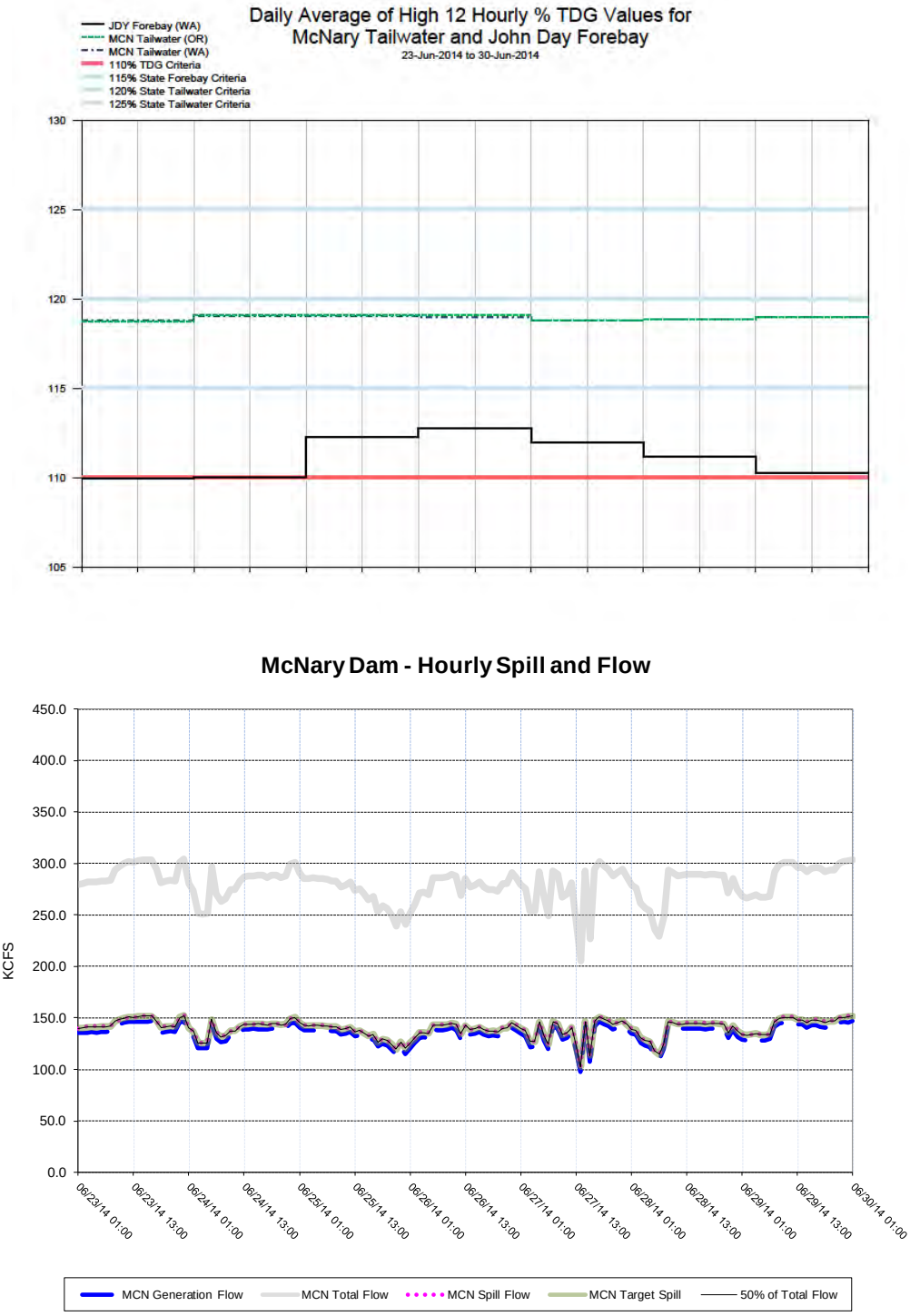
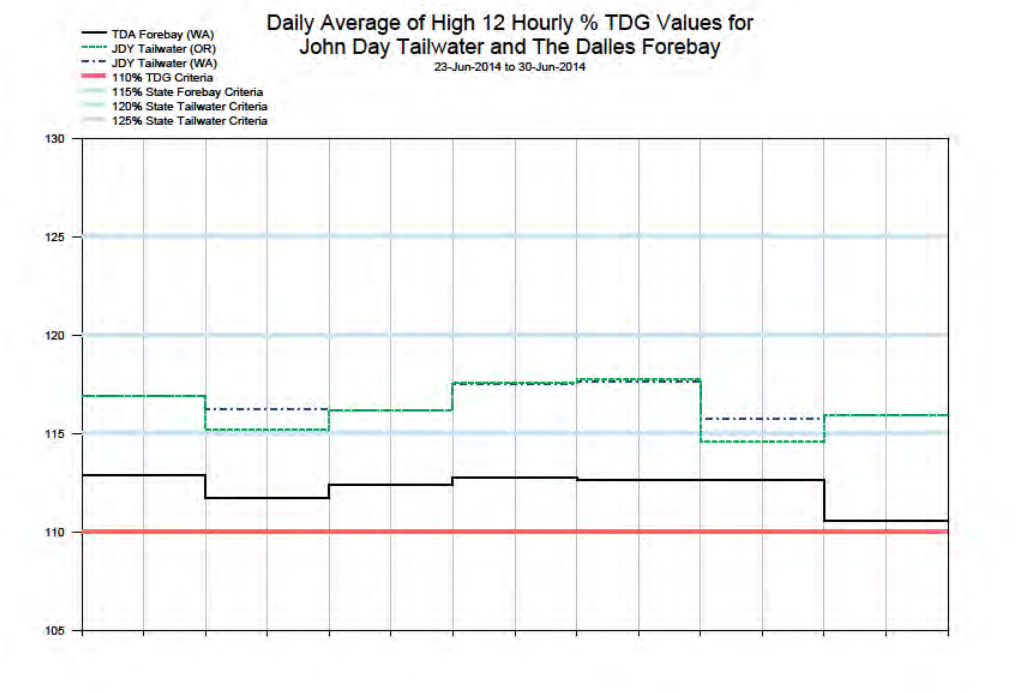

Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
23-Jun-2014 to 30-Jun-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
McNary 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
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 30


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
23-Jun-2014 to 30-Jun-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

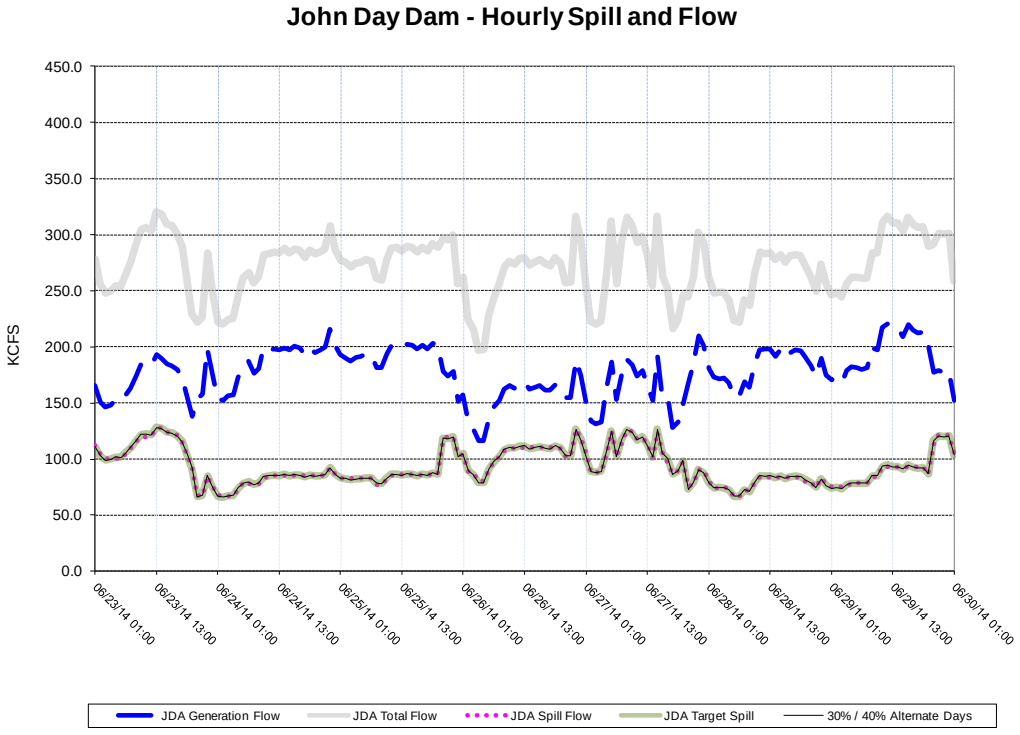
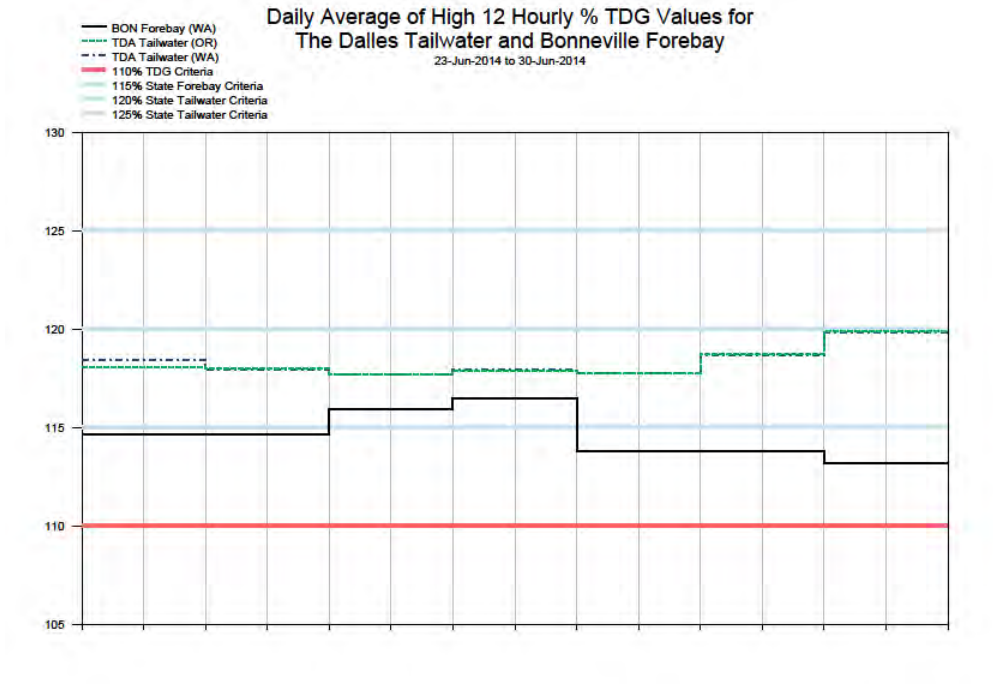

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 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
23-Jun-2014 to 30-Jun-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

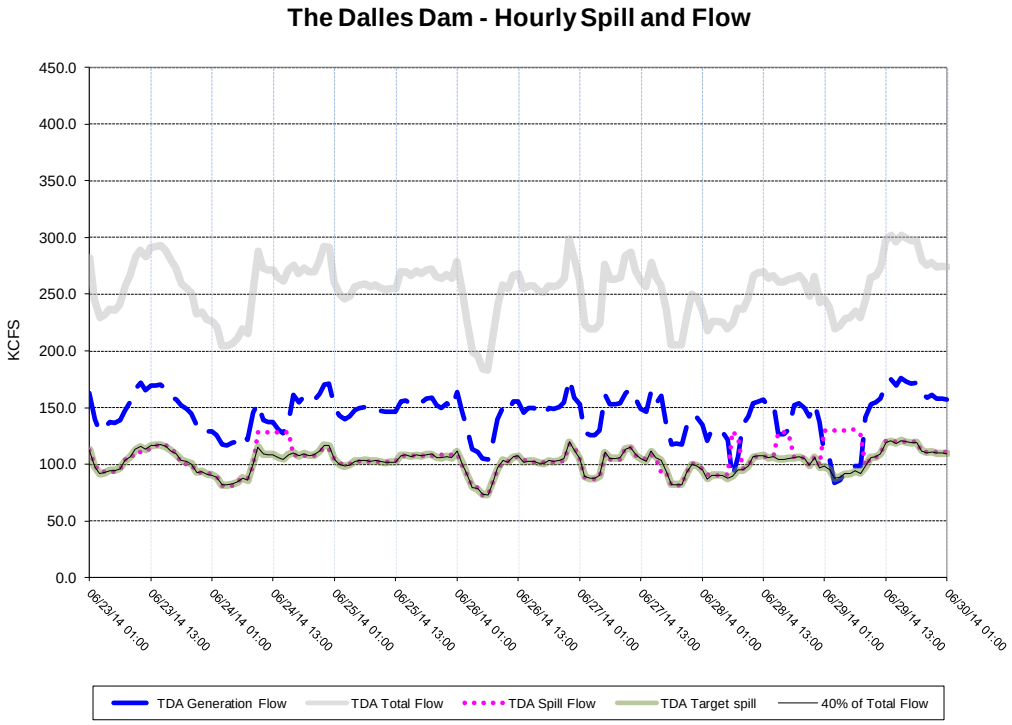

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/23/14 01:00
06/23/14 13:00
06/24/14 01:00
06/24/14 13:00
06/25/14 01:00
06/25/14 13:00
06/26/14 01:00
06/26/14 13:00
06/27/14 01:00
06/27/14 13:00
06/28/14 01:00
06/28/14 13:00
06/29/14 01:00
06/29/14 13:00
06/30/14 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 32

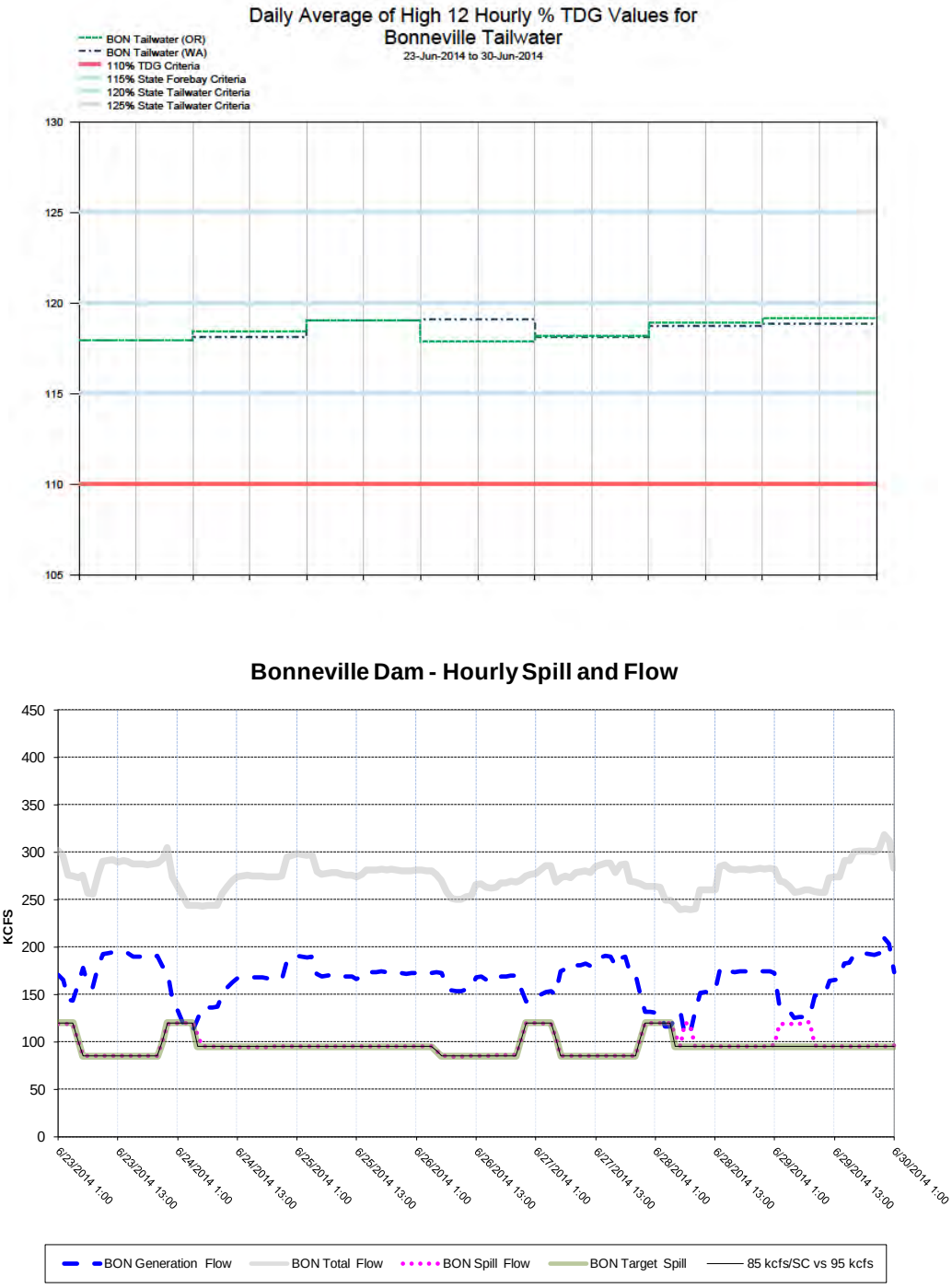

Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
23-Jun-2014 to 30-Jun-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105
Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/23/2014 1:00
6/23/2014 13:00
6/24/2014 1:00
6/24/2014 13:00
6/25/2014 1:00
6/25/2014 13:00
6/26/2014 1:00
6/26/2014 13:00
6/27/2014 1:00
6/27/2014 13:00
6/28/2014 1:00
6/28/2014 13:00
6/29/2014 1:00
6/29/2014 13:00
6/30/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Table 1
Average Percent TDG Values For June 2 – June 29

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
6/2/2014	106.6	116.0	**117.0**	115.3	**118.7**	116.8	**117.8**	119.2	**116.9**	**122.0**	~~122.0~~	**121.1**	120.0	~~120.0~~	**118.3**	**121.8**	~~121.8~~	114.8	~~124.0~~	**124.0**
6/3/2014	106.5	116.5	**116.0**	115.2	**118.6**	116.7	**117.8**	118.4	**116.9**	~~120.1~~	**121.4**	**120.9**	~~119.4~~	119.9	**118.4**	~~121.0~~	**122.1**	114.8	~~123.6~~	**124.0**
6/4/2014	105.8	116.4	113.6	114.1	**116.1**	116.7	**117.0**	119.5	**116.7**	120.0	~~119.9~~	115.3	~~118.3~~	118.6	114.3	~~119.0~~	119.0	113.9	~~121.2~~	**122.1**
6/5/2014	105.3	116.5	112.1	115.7	114.8	118.6	**115.8**	119.9	**116.5**	120.4	~~120.3~~	114.5	118.3	~~118.0~~	114.5	119.2	~~119.0~~	113.6	120.1	~~120.1~~
6/6/2014	105.2	115.1	112.5	116.2	114.4	119.2	115.3	117.8	115.3	**120.5**	~~120.5~~	113.9	119.1	~~119.1~~	114.9	~~118.9~~	119.2	115.3	120.1	~~119.7~~
6/7/2014	105.2	115.1	112.6	115.9	**115.8**	119.3	115.4	118.4	115.3	~~118.7~~	119.6	114.9	~~118.6~~	119.0	115.0	~~119.0~~	119.1	115.4	120.3	~~120.2~~
6/8/2014	105.1	113.0	111.9	115.4	**115.9**	119.2	**116.3**	119.4	**115.5**	~~117.6~~	118.4	**116.4**	~~116.8~~	117.4	114.3	118.9	~~118.7~~	113.5	120.3	~~120.2~~
6/9/2014	105.5	111.1	111.7	114.9	**116.1**	119.4	**117.1**	118.0	**115.7**	**121.7**	~~121.6~~	**116.6**	117.1	~~117.1~~	114.3	~~118.3~~	118.7	113.6	~~118.6~~	119.4
6/10/2014	105.6	111.1	110.3	114.7	**116.1**	115.8	**117.1**	117.2	113.9	**122.1**	~~122.1~~	**116.2**	118.2	~~118.2~~	112.5	~~117.8~~	118.2	112.5	119.5	~~119.5~~
6/11/2014	105.4	111.0	109.8	113.8	114.4	117.1	**116.7**	117.1	113.1	~~120.2~~	**120.9**	113.8	~~117.8~~	117.8	115.1	~~119.7~~	119.7	115.2	~~118.9~~	119.5
6/12/2014	105.2	111.2	109.9	114.1	115.0	118.3	**115.9**	117.1	113.5	~~118.5~~	119.2	114.3	~~114.0~~	116.9	**115.5**	~~119.0~~	119.8	**115.9**	~~118.4~~	118.9
6/13/2014	105.0	110.7	109.7	113.7	114.9	117.6	115.4	117.4	111.7	~~116.3~~	116.5	113.5	113.9	~~113.3~~	111.1	~~115.7~~	116.9	113.6	~~117.7~~	117.7
6/14/2014	103.9	110.3	107.3	112.6	111.5	117.3	112.3	114.8	107.5	116.1	~~116.1~~	111.0	115.4	~~115.4~~	109.2	115.7	~~115.6~~	110.1	~~117.4~~	117.5
6/15/2014	103.3	111.4	106.3	113.7	111.0	118.5	111.5	115.9	106.7	~~116.0~~	116.1	108.9	~~113.6~~	115.2	109.4	115.8	~~115.7~~	109.8	117.5	~~117.4~~
6/16/2014	103.4	111.8	106.2	113.9	111.1	119.9	111.8	115.9	106.7	116.1	~~116.1~~	107.4	~~111.8~~	112.8	109.3	~~115.0~~	115.7	109.9	~~117.0~~	117.4
6/17/2014	102.9	111.5	106.0	112.1	110.6	120.4	111.9	115.8	105.9	118.1	~~118.1~~	104.5	112.8	~~112.8~~	106.6	~~113.3~~	114.5	108.7	117.1	~~117.1~~
6/18/2014	102.6	110.9	106.3	112.2	109.6	120.0	112.4	114.9	106.5	118.1	~~118.1~~	102.9	116.7	~~116.7~~	108.0	114.9	~~114.9~~	107.6	~~117.0~~	117.1
6/19/2014	102.5	111.0	108.3	111.4	109.6	119.7	114.1	115.6	107.2	118.4	~~118.4~~	103.6	~~115.8~~	115.9	109.3	116.4	~~116.4~~	110.7	117.8	~~117.7~~
6/20/2014	103.1	111.0	108.7	111.4	110.0	119.5	114.4	115.7	108.4	~~117.9~~	118.1	104.0	~~111.3~~	114.5	109.6	~~115.7~~	116.2	110.9	~~118.0~~	118.3
6/21/2014	103.9	114.9	108.9	111.5	110.0	119.2	114.3	115.7	110.6	118.5	~~118.5~~	105.7	113.6	~~113.3~~	108.5	115.9	~~115.9~~	111.7	118.1	~~118.1~~
6/22/2014	104.1	114.0	110.0	111.2	111.1	115.7	115.3	115.9	112.4	118.9	~~118.8~~	108.2	116.5	~~116.5~~	112.1	~~118.4~~	118.4	113.3	~~117.8~~	118.1
6/23/2014	104.0	113.7	111.5	111.7	112.3	116.3	**115.5**	115.8	113.9	118.8	~~118.7~~	110.0	116.9	~~116.9~~	112.9	~~118.0~~	118.4	114.7	~~118.0~~	118.1
6/24/2014	104.0	114.2	112.3	112.1	112.4	115.8	114.8	115.7	114.6	119.1	~~119.0~~	110.0	~~115.2~~	116.0	111.7	117.9	~~117.9~~	114.6	118.5	~~118.3~~
6/25/2014	103.7	113.7	114.1	113.0	113.0	116.1	115.0	115.7	115.0	119.1	~~119.0~~	112.4	116.4	~~116.3~~	112.5	117.8	~~117.8~~	**116.1**	119.2	~~119.2~~
6/26/2014	103.9	113.9	114.7	112.9	113.4	115.7	115.2	115.9	115.3	119.1	~~119.0~~	112.8	117.6	~~117.5~~	112.8	~~117.8~~	117.9	**116.4**	~~118.1~~	119.3
6/27/2014	103.1	114.1	114.0	113.1	113.6	115.4	115.2	115.7	114.7	118.8	~~118.7~~	111.9	117.7	~~117.6~~	112.6	117.7	~~117.7~~	113.8	118.4	~~118.3~~
6/28/2014	102.7	117.9	113.3	113.4	113.4	116.4	114.3	116.5	112.1	118.9	~~118.8~~	111.1	~~114.5~~	115.4	112.5	118.7	~~118.6~~	113.8	119.1	~~119.0~~
6/29/2014	101.5	118.7	111.7	113.7	111.9	116.4	112.3	116.4	111.1	119.0	~~119.0~~	110.2	116.1	~~116.0~~	110.5	119.9	~~119.8~~	113.2	119.4	~~119.2~~

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)

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
July 2014

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 2014 Summer Fish Operations Plan (FOP) posted to the TMT website on June 13, 2014. The 2014 Summer FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the summer fish migration season, generally mid-June through August. To the extent Corps project operations that are not specified in the 2014 Summer 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 2014 Water Management Plan (WMP), WMP seasonal updates, and the 2014 Fish Passage Plan (FPP).

The Corps' July 2014 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 2014 Summer FOP in July.

Data Reporting:

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

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

[1] Averages reported consistent with the current and applicable Oregon TDG waiver (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG waiver and the Washington TDG criteria adjustment 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 graphs begin on June 30 and end on August 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.

Each figure represents one week of a project's operation. The graphs start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill graphs) on June 30 for the lower Snake River and the lower Columbia River projects.

June 30 – July 6	Figures 1 – 8
July 7 – July 13	Figures 9 – 16
July 14 – July 20	Figures 17 – 24
July 21 – July 27	Figures 25 – 32
July 28 – August 3	Figures 33 – 40

A. Upper Graph: Displays the average daily %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 2014 Summer FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the Oregon 120%TDG waiver limit for the tailwater of the dam.
2. The blue dot-dash line represents the Washington 120%TDG criteria adjustment for the tailwater of the dam.
3. The black solid line represents the Washington 115%TDG criteria adjustment for the forebay of the next dam downstream.

B. Lower Graph: 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 river flow through the project 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 2014 Summer 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 river flow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2014 Summer 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 (50 kcfs) dam;
    - minimum spill at John Day is 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 2014 Summer FOP, the dotted pink line will be below or above the heavy green line in the graphs. Actual deviations from the target operation during voluntary spill hours are described below in the July 2014 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 reduction 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 2014 Summer 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 (except as otherwise noted in the 2014 Summer FOP for Bonneville and The Dalles dams,[4]

[3] Involuntary spill conditions are identified in the graphs but are not considered variances so 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.

[4] As specified in the 2014 Summer FOP (p. 14), this applies when the spill level is below 40% of total flow at The Dalles Dam.

which may range up to ±3 kcfs) as compared to those specified in the 2014 Summer 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 2014 Summer FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Report 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 2014 Summer 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.

July Operations:

The month of July was characterized by slightly below average flows for the lower Snake River and slightly above average flows for the lower Columbia River. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the July 2014 adjusted volume runoff on the lower Columbia was above the 30 year average (1981-2010): 15.7 MAF (million acre feet) or 108% of average as measured at The Dalles. The Runoff Processor also indicated July 2014 adjusted volume runoff on the lower Snake was below the 30 year average (1981-2010): 2.1 MAF or 93% of average as measured at Lower Granite Dam. The monthly precipitation summary for July was well below average at 51% on the Snake River above Ice Harbor Dam and well below average on the Columbia River above The Dalles Dam at 56%.

During the July reporting period, the planned 2014 Summer FOP spill operations were carried out as follows:

- Lower Granite Dam - The hourly target spill level was 18 kcfs 24-hours/day.
- Little Goose Dam - The hourly target spill level was 30% of total river flow 24-hours/day until July 26 when the spill transitioned to low flow operations, which included uniform spill of 11 kcfs until August 01 when the operation transitioned to 9 kcfs as inflow decreased.
- Lower Monumental Dam - The hourly target spill level was 17 kcfs 24 hours/day.
- Ice Harbor Dam - The hourly target spill level alternated every two days between 30% of total river flow for 24-hours/day vs. 45 kcfs daytime and the %TDG cap nighttime (gas cap range ~75 – 95 kcfs) until July 13 when the operation transitioned to 45 kcfs spill during the daytime and the %TDG cap spill during the nighttime. Nighttime spill hours are 1800-0500.
- McNary Dam - The hourly target spill level was 50% of total river flow for 24-hours/day.
- John Day Dam - The hourly target spill level alternated every two days between 40% and 30% of total river flow for 24-hours/day until July 21 when the operation transitioned to 30% of total river flow for 24-hours/day. Spill level changes occurred at 2000 hours.
- The Dalles Dam - The hourly target spill level was 40% of total river flow for 24-hours/day.
- Bonneville Dam - The hourly target spill level alternated every two days between 95 kcfs 24-hours/day vs. 85 kcfs daytime/121 kcfs nighttime.

Operational Adjustments

1. Bonneville Dam.

On July 15 and 16, Bonneville Dam performed digital governor model validation testing of turbine units 12-18 at powerhouse 2 (PH2) for compliance with the Western Electricity Coordinating Council's North American Electric Reliability Corporation (WECC/NERC) standards. Testing required PH2 turbine units 12-18 to be tested one at a time and operate out of FPP unit priority and below the ±1% best efficiency range for approximately 10 minutes per unit (for a total of 70 minutes over two days). Spill was maintained at the FOP summer target level throughout the testing. This operation was coordinated with TMT at the July 9 meeting and with FPOM via Memo of Coordination *14BON30* on July 9 and via conference call on July 14. TMT and FPOM members either supported or did not object to the testing.

July 2014 Spill Variance Table

Table 1: July 2014 (6/30 – 8/3) – Summer FOP Implementation Report Table

Project	Parameter	Date	Time[5]	Hours	Type	Reason
Little Goose	Reduced Spill	6/30/14	0700	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.7%.
Little Goose	Reduced Spill	7/6/14	0600	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/8/14	0100	1	Navigation	Hourly spill decreased to 28.7% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/9/14	2100	1	Navigation	Hourly spill decreased to 28.7% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/11/14	1300	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/12/14	1900	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/14/14	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. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/15/14	1200	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/15/14	2000	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.

[5] 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.

Little Goose	Reduced Spill	7/16/14	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. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/16/14	1500-1600	2	Navigation	Hourly spill decreased to 28.7% and 28.9 % (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/17/14	1300	1	Navigation	Hourly spill decreased to 28.8% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/18/14	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. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/20/14	0700	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 29.9%.
Little Goose	Reduced Spill	7/21/14	1300	1	Navigation	Hourly spill decreased to 28.9% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.8%.
Little Goose	Reduced Spill	7/22/14	0400	1	Navigation	Hourly spill decreased to 28.5% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 29.9%.
Little Goose	Reduced Spill	7/23/14	1300	1	Navigation	Hourly spill decreased to 28.8% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 30.0%.
Little Goose	Reduced Spill	7/25/14	0100	1	Navigation	Hourly spill decreased to 28.3% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 37.4%.
Little Goose	Reduced Spill	7/25/14	0500	1	Navigation	Hourly spill decreased to 28.5% (below 30.0% ±1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 37.4%.

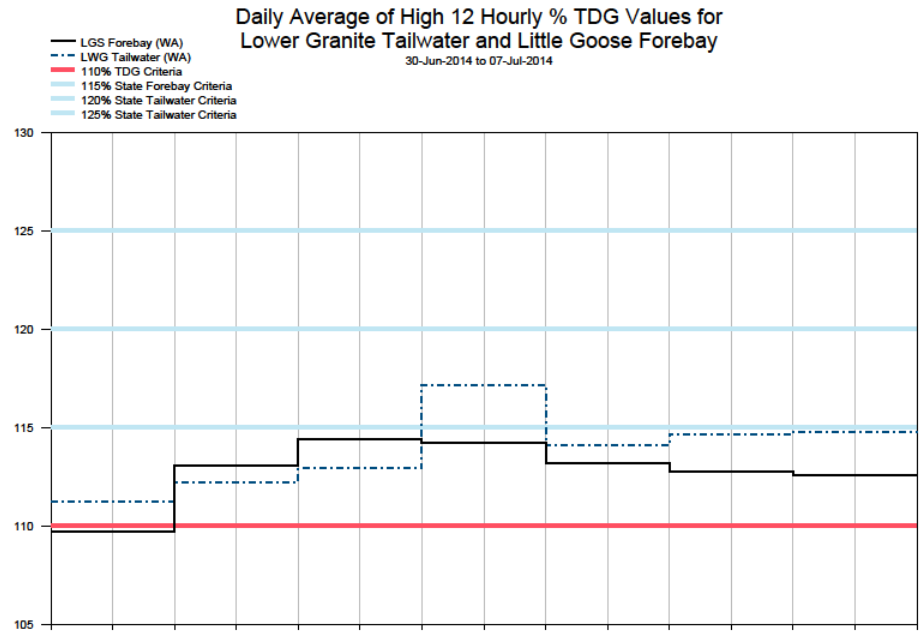
Lower Monumental	Reduced Spill	7/1/14	1700	1	Navigation	Hourly spill decreased to 12.2 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/3/14	1700-1800	2	Navigation	Hourly spill decreased to 11.8 kcfs and 12.9 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/7/14	1700-1800	2	Navigation	Hourly spill decreased to 13.9 kcfs and 11.8 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/11/14	1700	1	Navigation	Hourly spill decreased to 9.7 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/13/14	1700	1	Navigation	Hourly spill decreased to 11.0 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/15/14	1600-1700	2	Navigation	Hourly spill decreased to 11.9 kcfs and 14.3 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/17/14	1700	1	Navigation	Hourly spill decreased to 13.1 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/19/14	1700-1800	2	Navigation	Hourly spill decreased to 11.3 kcfs and 14.3 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/23/14	1700-1800	2	Navigation	Hourly spill decreased to 12.3 kcfs and 13.4 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/25/14	1700	1	Navigation	Hourly spill decreased to 12.1 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/27/14	1700	1	Navigation	Hourly spill decreased to 10.1 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/29/14	1700	1	Navigation	Hourly spill decreased to 11.5 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.

Lower Monumental	Reduced Spill	7/31/14	1800	1	Navigation	Hourly spill decreased to 8.8 kcfs (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	8/2/14	1700-1800	2	Navigation	Hourly spill decreased to 10.2 kcfs and 14.7 (below 17 kcfs ±2 kcfs range). Reduced spill for safe passage of fish barge.
Ice Harbor	Reduced Spill	7/21/14	1400	1	Maintenance	Hourly spill remained at 30.0 kcfs (below FOP 45 kcfs), while generation increased above minimum range (9.2-10.9 kcfs) to 14.4 kcfs, for testing after planned maintenance. Outage is scheduled in the FPP, Appendix A, page A-9.
John Day	Reduced Spill	7/2/14	0500	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.2%.
John Day	Reduced Spill	7/2/14	0900	1	Transmission Stability	Hourly spill decreased to 28.1% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.2%.
John Day	Reduced Spill	7/2/14	1000	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.2%.
John Day	Additional Spill	7/2/14	2400	1	Transmission Stability	Hourly spill increased to 31.8% (above 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.2%.
John Day	Reduced Spill	7/4/14	0400	1	Transmission Stability	Hourly spill decreased to 38.3% (below 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%.
John Day	Reduced Spill	7/16/14	1100	1	Transmission Stability	Hourly spill decreased to 38.0% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. 24 hr avg. spill was 39.7%.

John Day	Reduced Spill	7/16/14	1500	1	Transmission Stability	Hourly spill decreased to 38.7% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.7%.
John Day	Reduced Spill	7/17/14	0400	1	Transmission Stability	Hourly spill decreased to 38.8% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. was 38.2% (Transition day for two–treatment spill, daily target was 38.3%).
John Day	Additional Spill	7/17/14	0600	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 38.2% (Transition day for two–treatment spill, daily target was 38.3%).
John Day	Reduced Spill	7/23/14	1500	1	Maintenance	Hourly spill decreased to 28.8% (below 30.0% ±1% range) due to generator testing. 24 hr avg. spill was 29.9%.
John Day	Reduced Spill	7/24/14	0800	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.0%.
John Day	Reduced Spill	7/24/14	1300	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 30.0%.
The Dalles	Reduced Spill	7/1/14	1300	1	Transmission Stability	Hourly spill decreased to 38.9% (below 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	Reduced Spill	7/5/14-7/6/14	2400-0100	2	Transmission Stability	Hourly spill decreased to 38.3% and 38.8% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill on 7/5/14 and 7/6/14 were 39.8% and 40.0 respectively.

The Dalles	Reduced Spill	7/9/14	0700	1	Transmission Stability	Hourly spill decreased to 38.5% (below 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%.
The Dalles	Reduced Spill	7/9/14	1200	1	Transmission Stability	Hourly spill decreased to 38.8% (below 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%.
The Dalles	Reduced Spill	7/11/14	0700	1	Transmission Stability	Hourly spill decreased to 38.8% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation. See p. 3-4. 24 hr avg. spill was 39.8%.
The Dalles	Additional Spill	7/14/14	2000-2100	2	Transmission Stability	Hourly spill increased to 41.3% and 41.4% (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 40.1%.
The Dalles	Reduced Spill	7/22/14	1800	1	Transmission Stability	Hourly spill decreased to 38.7% (below 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	Reduced Spill	7/29/14	0900	1	Transmission Stability	Hourly spill decreased to 38.9% (below 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%.
Bonneville	Reduced Spill	7/2/14	0600	1	Human/Program Error	Hourly spill decreased to 86.3 kcfs, (below 95 kcfs ±3 kcfs range) due to a miscalculation.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
30-Jun-2014 to 07-Jul-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

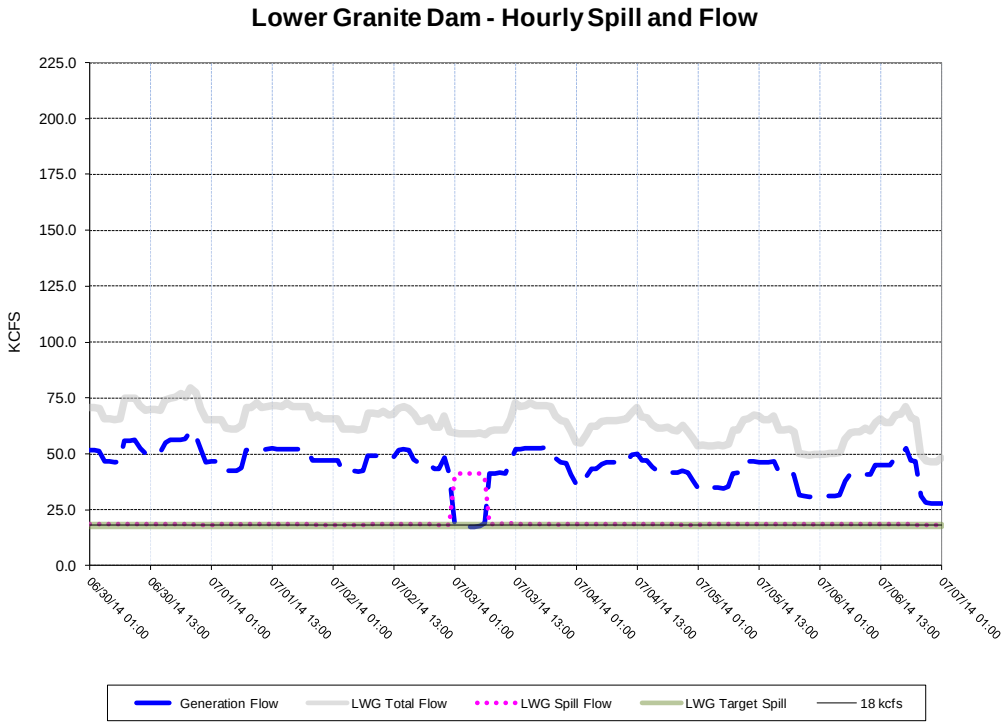
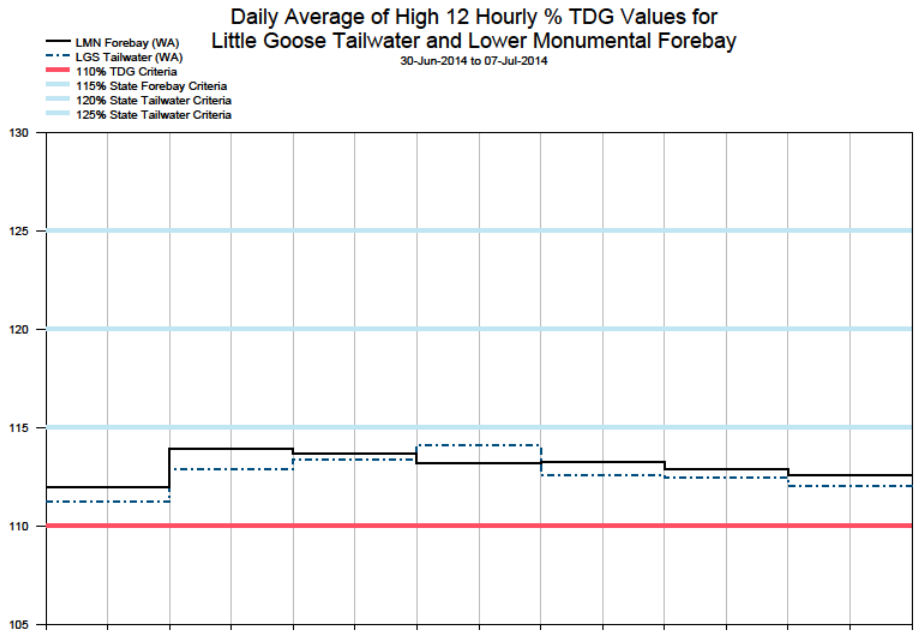

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 2


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
30-Jun-2014 to 07-Jul-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

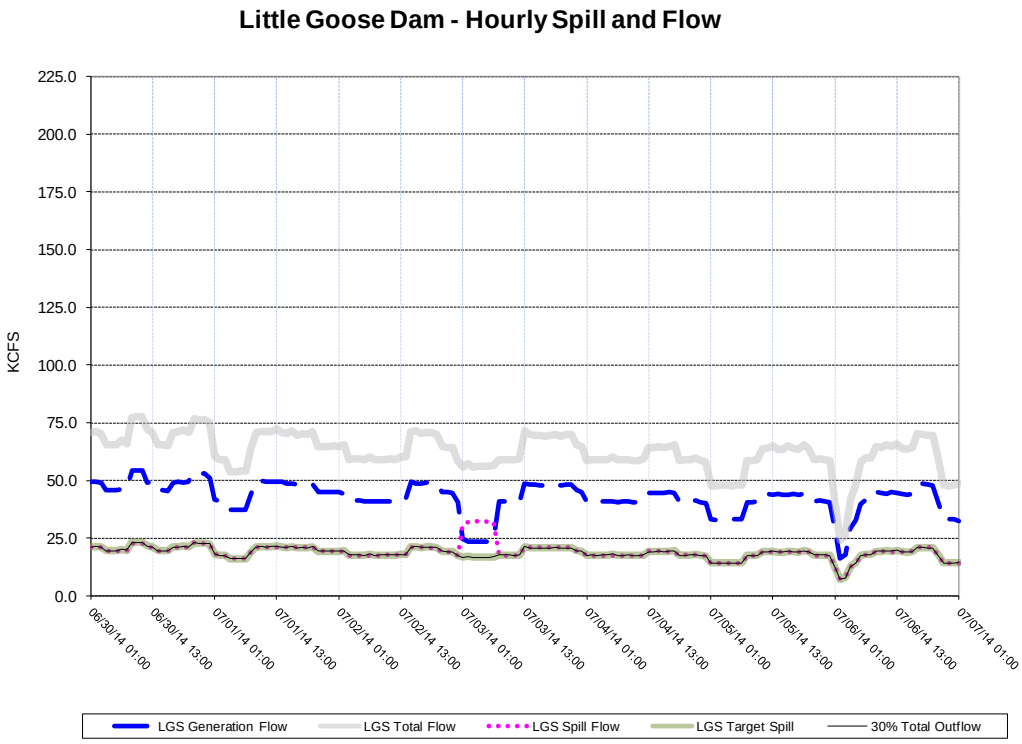
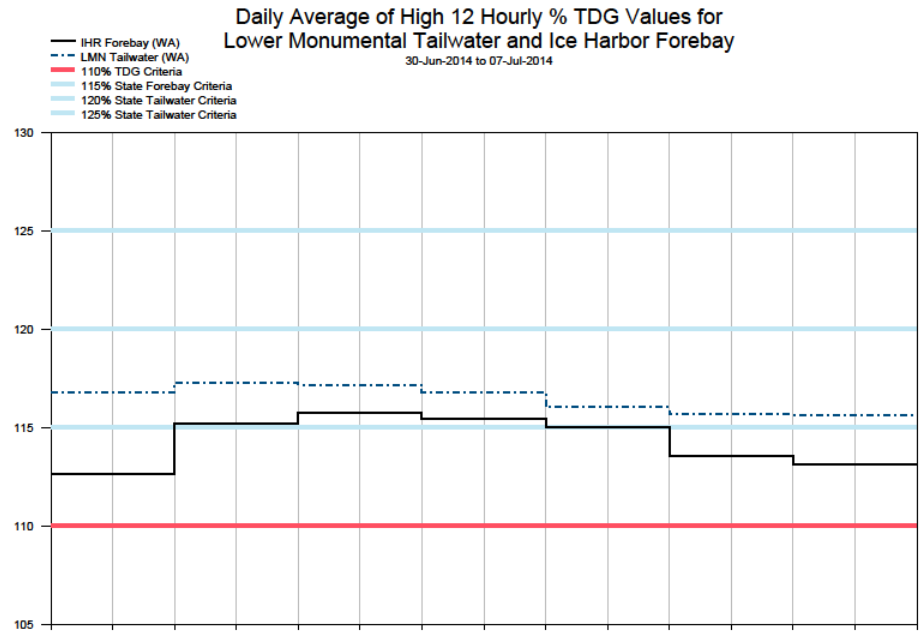

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 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
30-Jun-2014 to 07-Jul-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

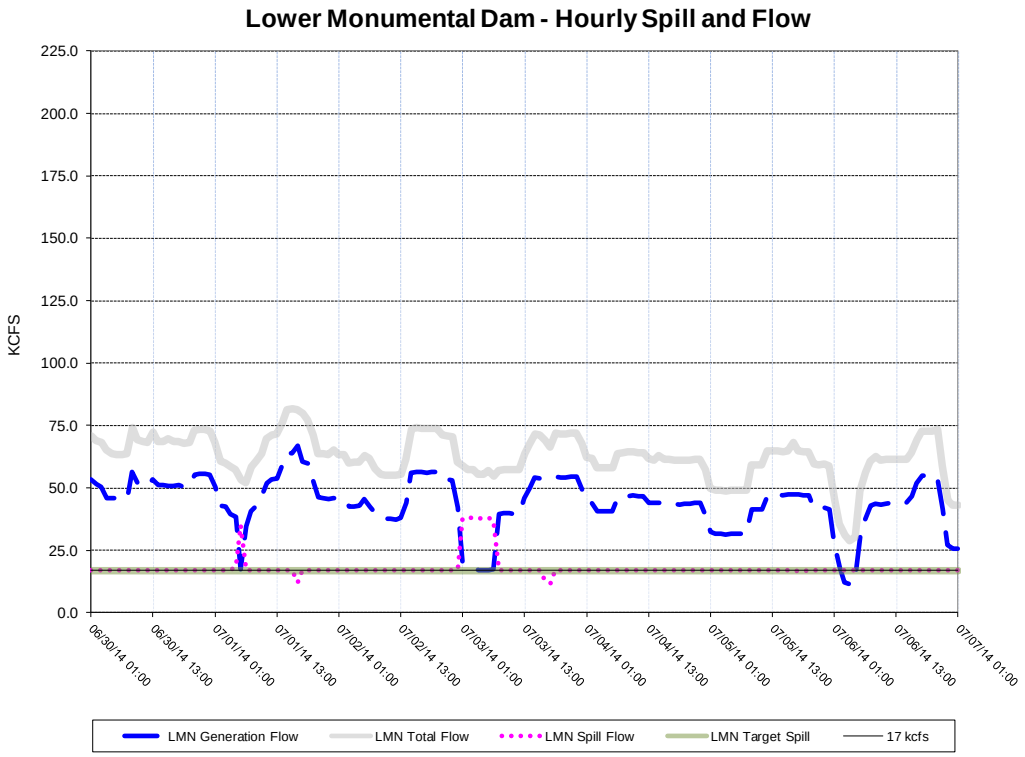
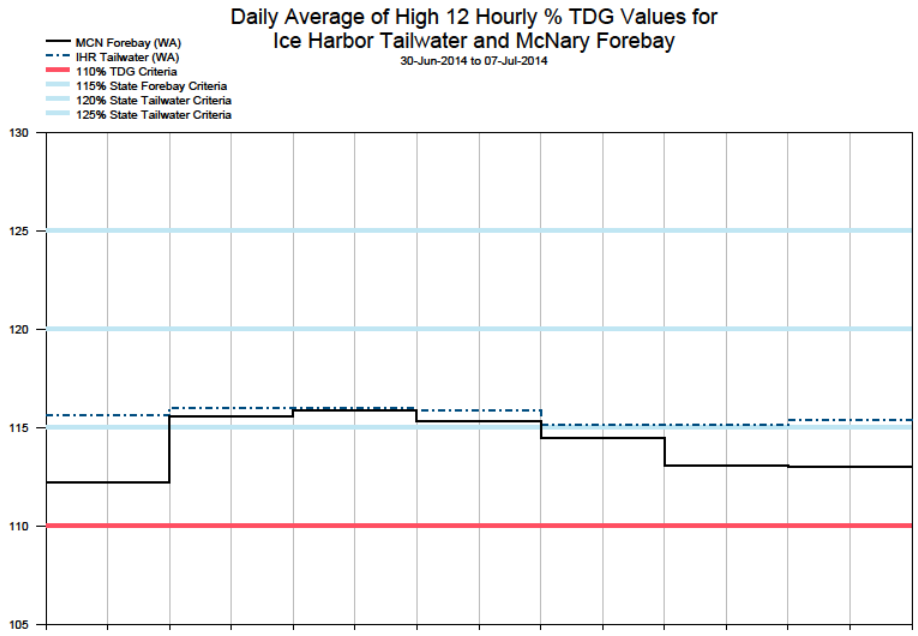

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
30-Jun-2014 to 07-Jul-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

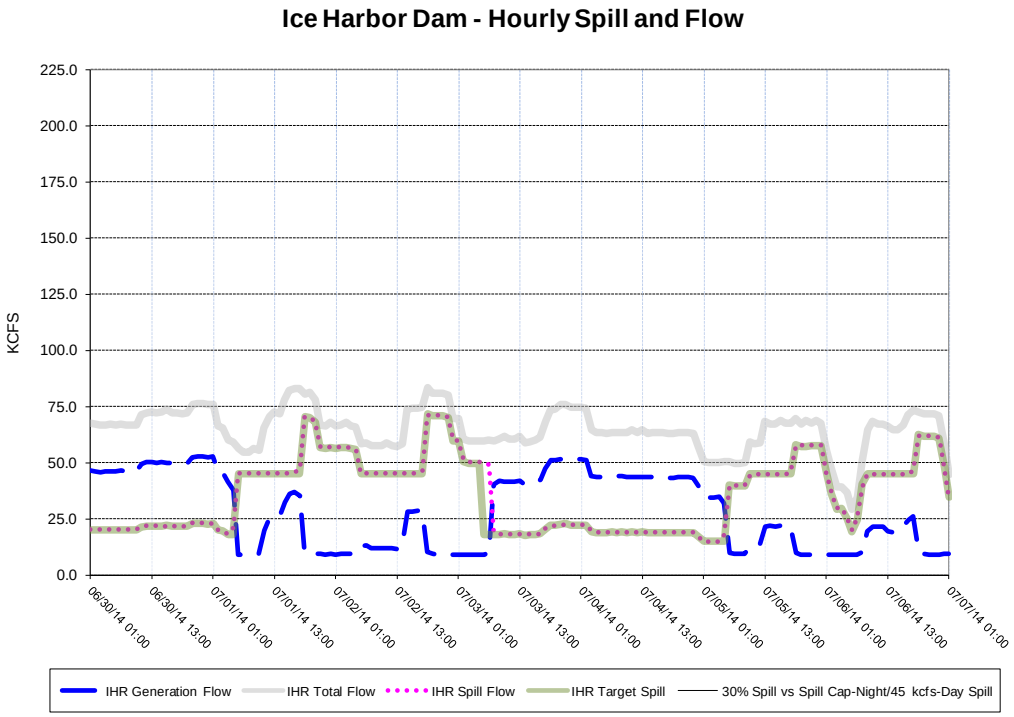
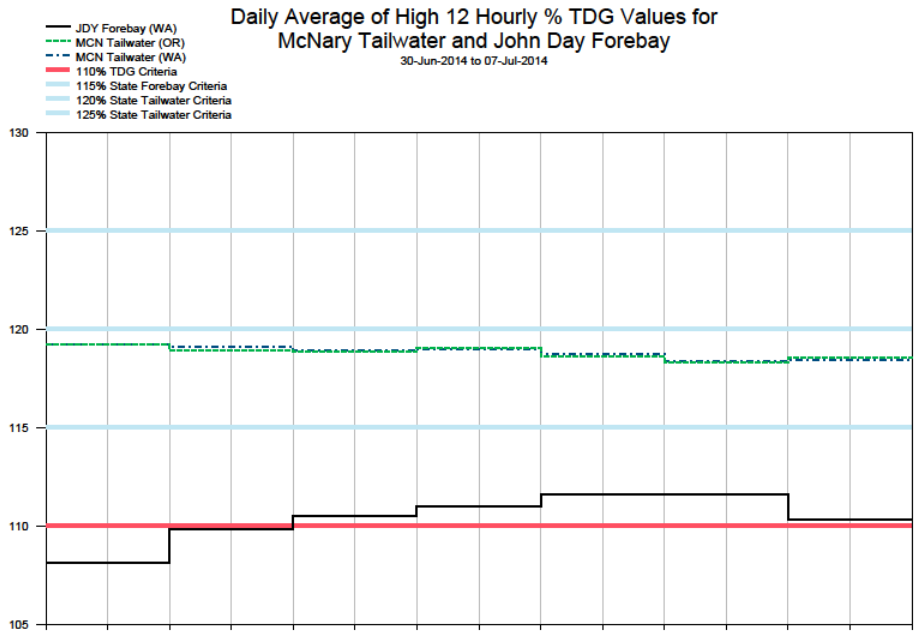

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 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 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
30-Jun-2014 to 07-Jul-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

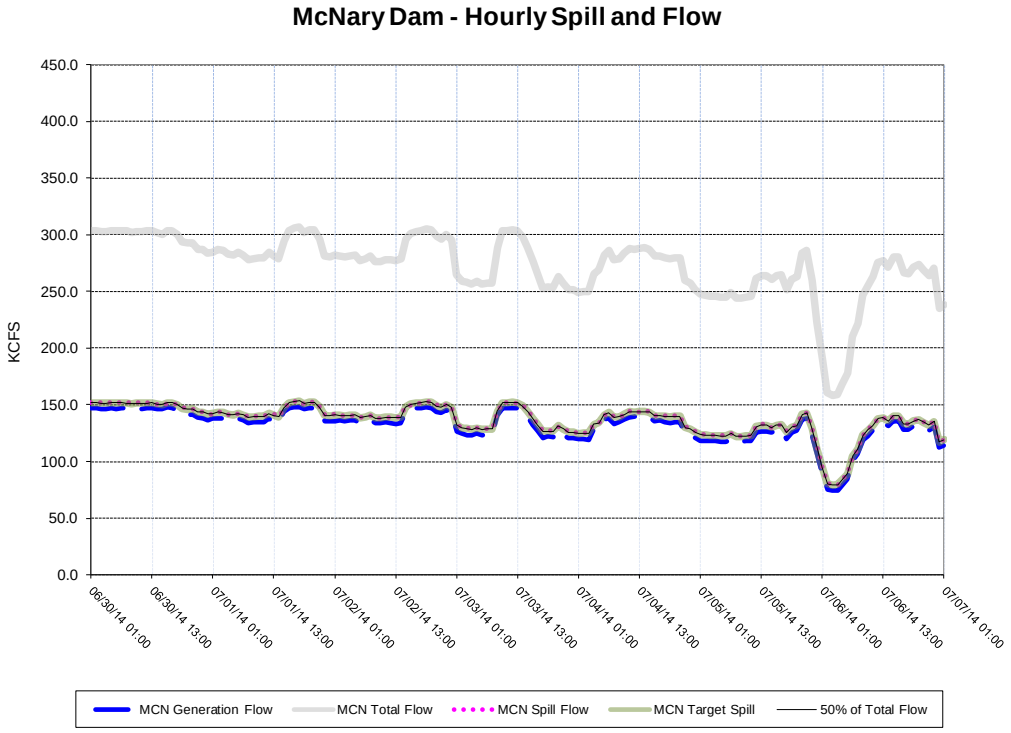
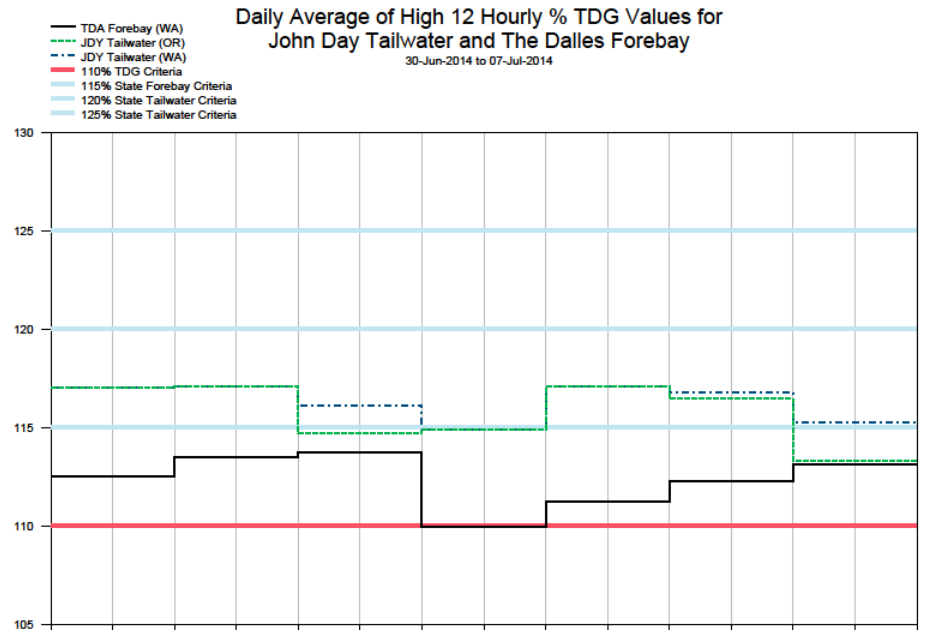

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 6


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
30-Jun-2014 to 07-Jul-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

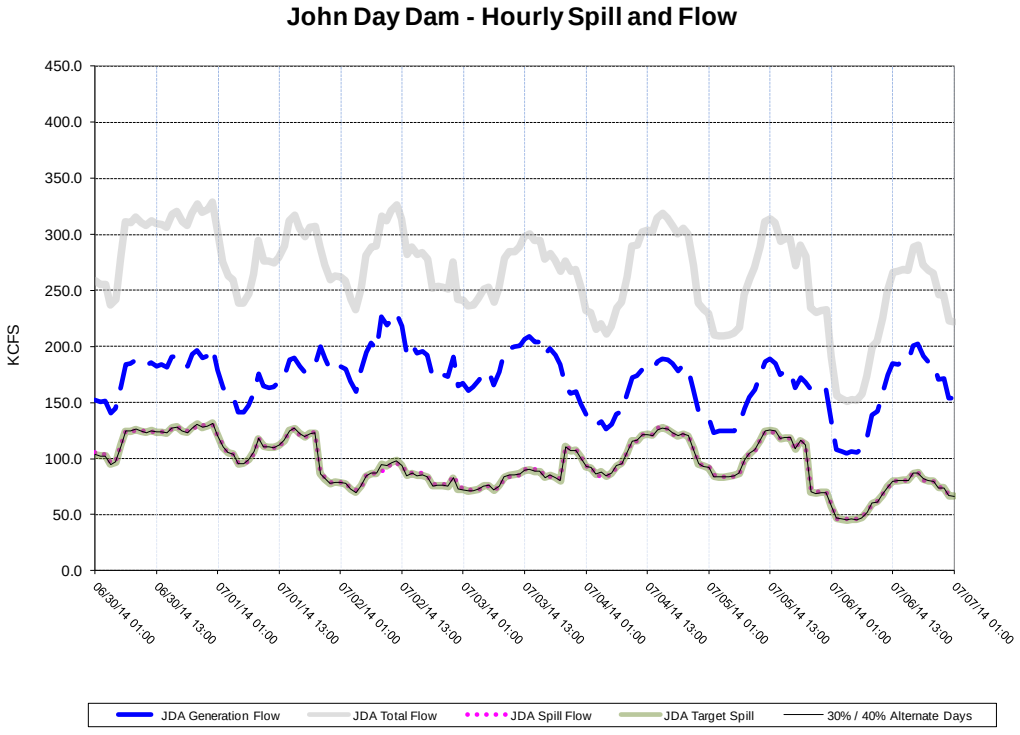
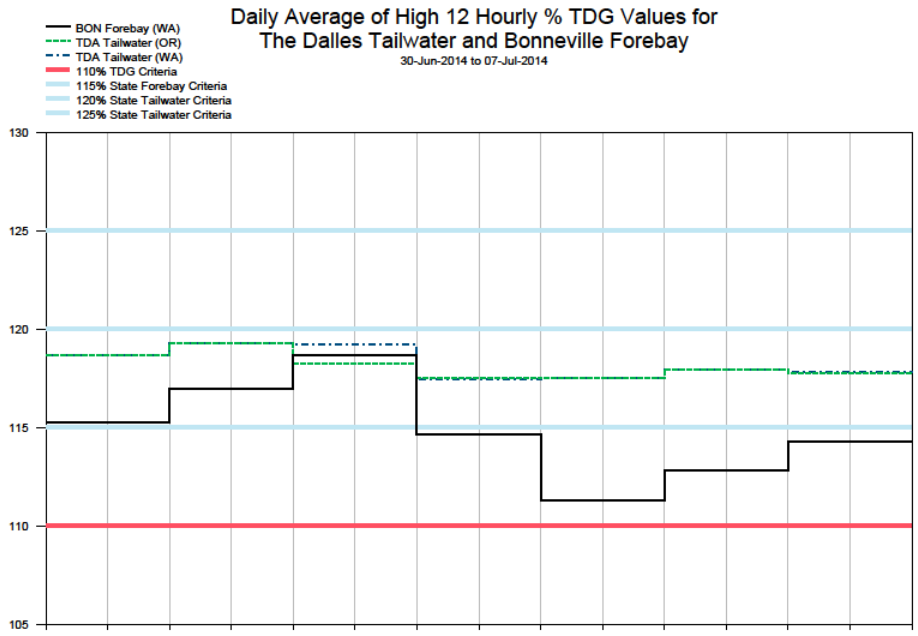

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 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
30-Jun-2014 to 07-Jul-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

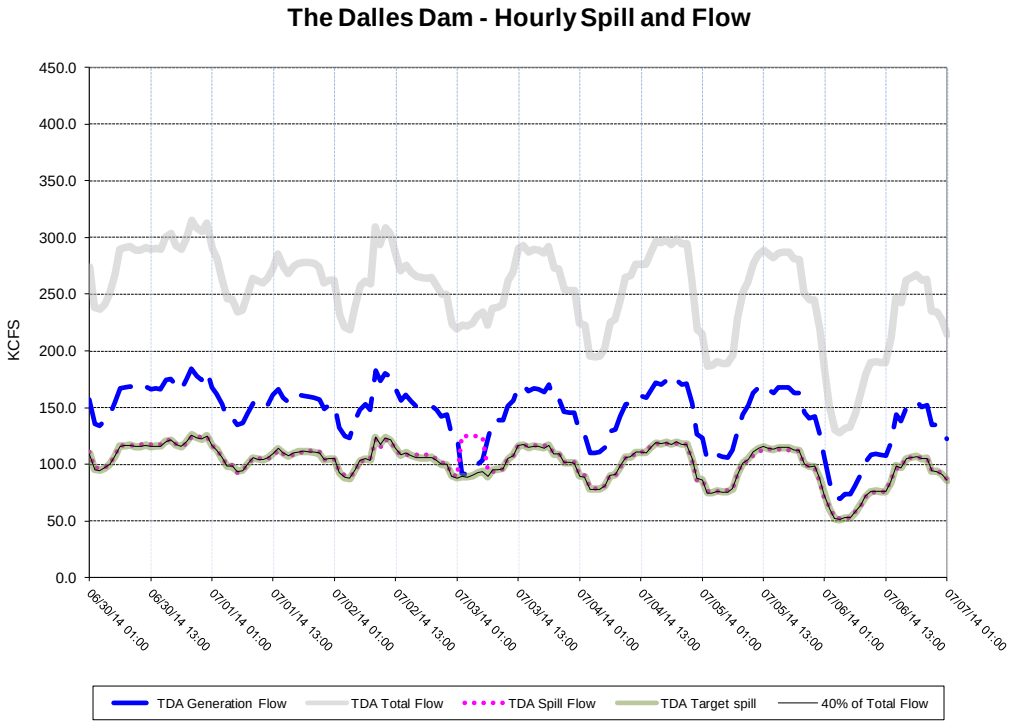
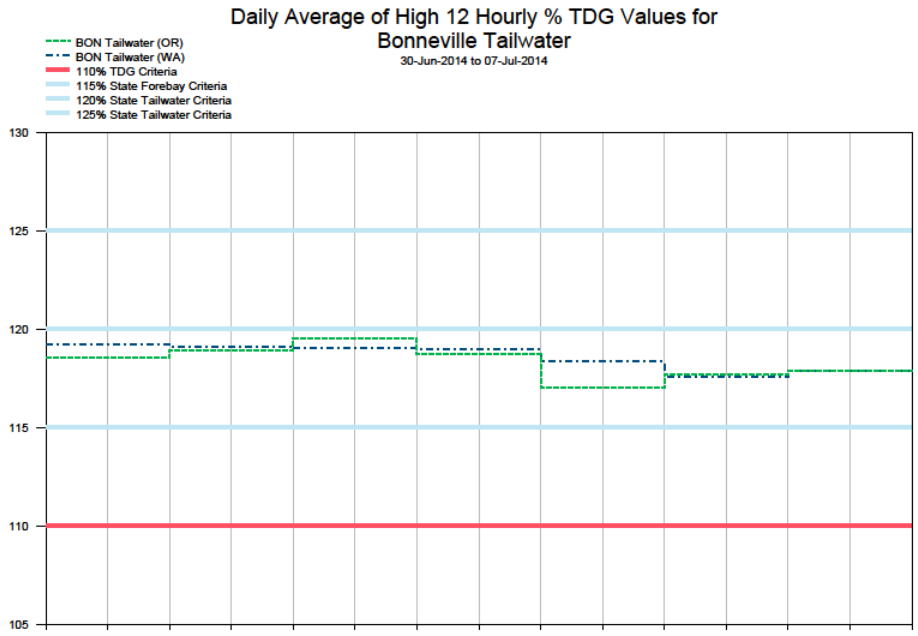

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/30/14 01:00
06/30/14 13:00
07/01/14 01:00
07/01/14 13:00
07/02/14 01:00
07/02/14 13:00
07/03/14 01:00
07/03/14 13:00
07/04/14 01:00
07/04/14 13:00
07/05/14 01:00
07/05/14 13:00
07/06/14 01:00
07/06/14 13:00
07/07/14 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
30-Jun-2014 to 07-Jul-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

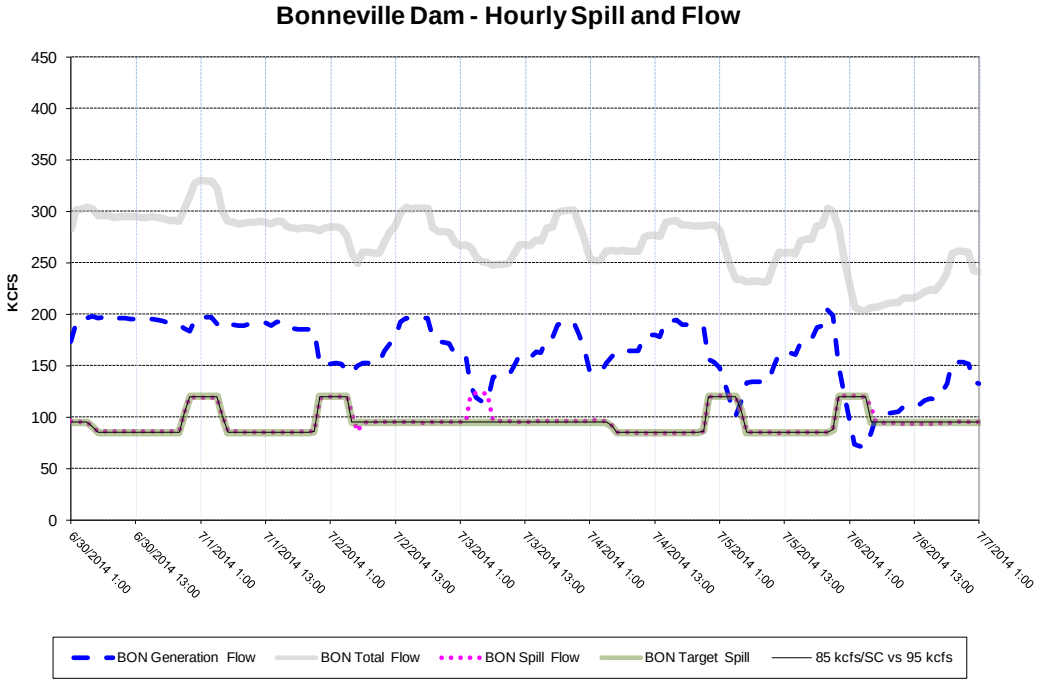
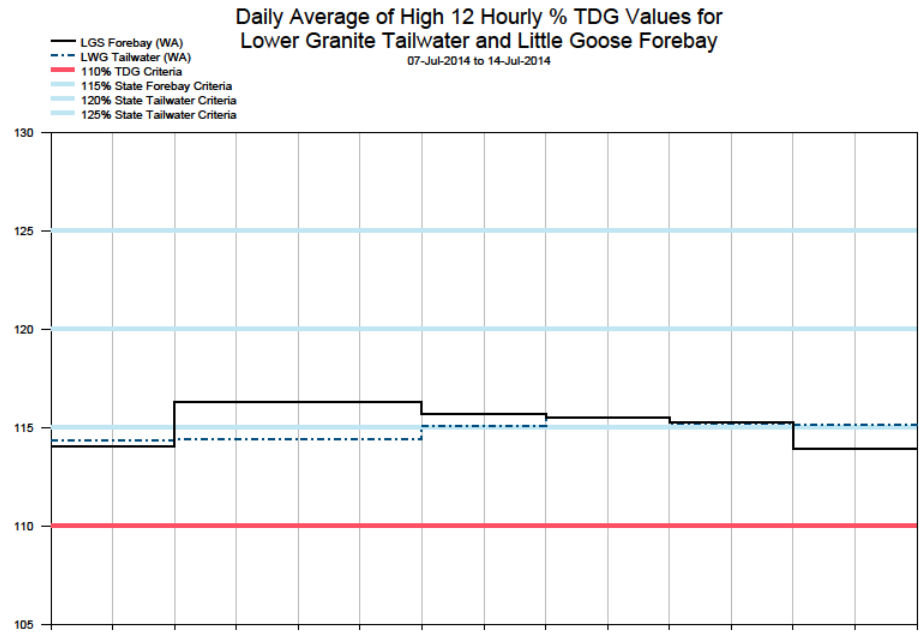

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/30/2014 1:00
6/30/2014 13:00
7/1/2014 1:00
7/1/2014 13:00
7/2/2014 1:00
7/2/2014 13:00
7/3/2014 1:00
7/3/2014 13:00
7/4/2014 1:00
7/4/2014 13:00
7/5/2014 1:00
7/5/2014 13:00
7/6/2014 1:00
7/6/2014 13:00
7/7/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
07-Jul-2014 to 14-Jul-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

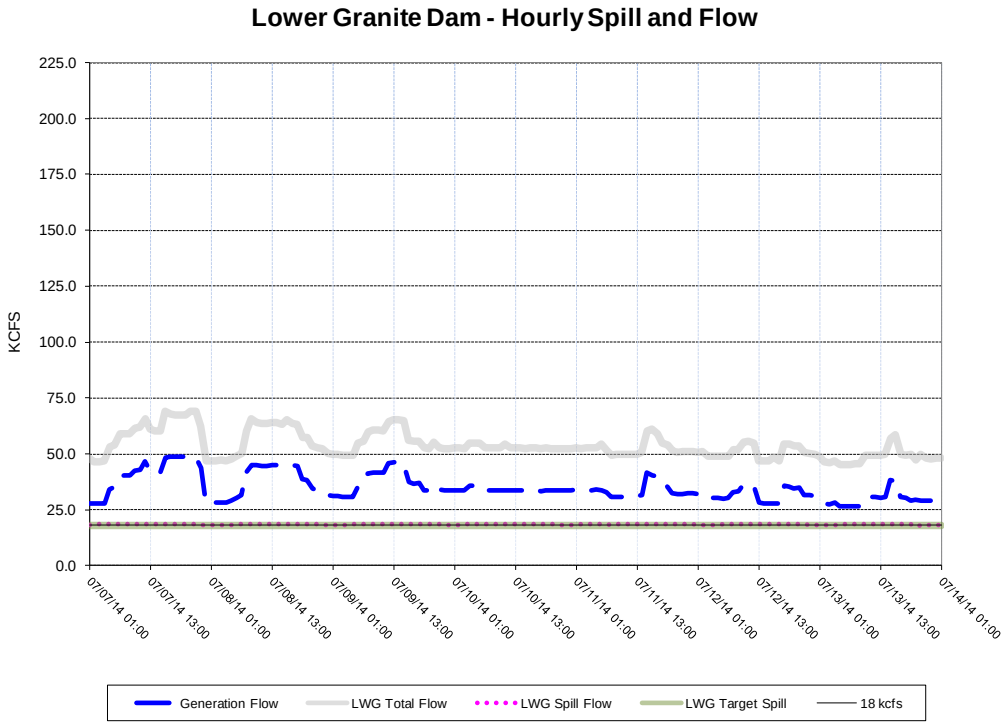
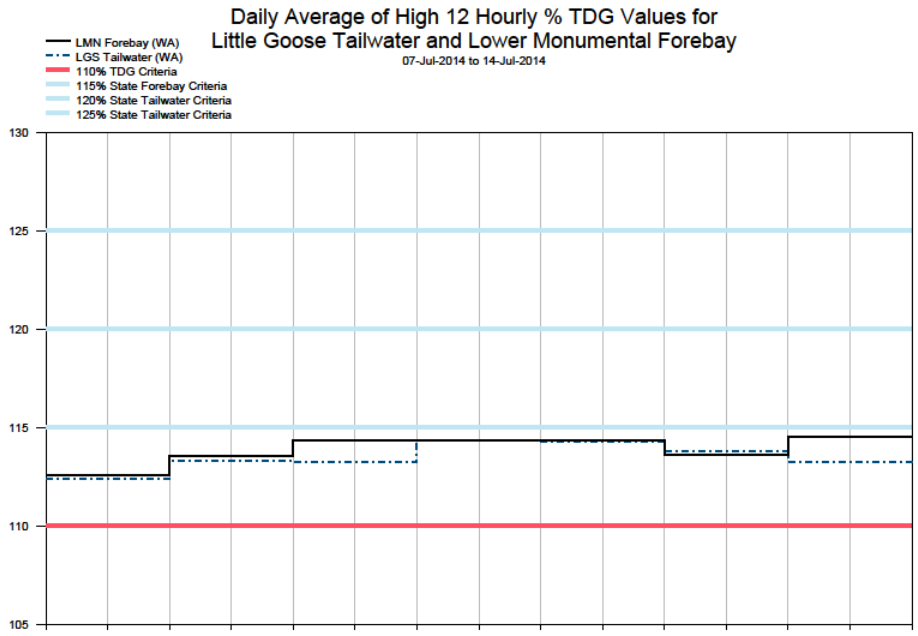

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 10


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
07-Jul-2014 to 14-Jul-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

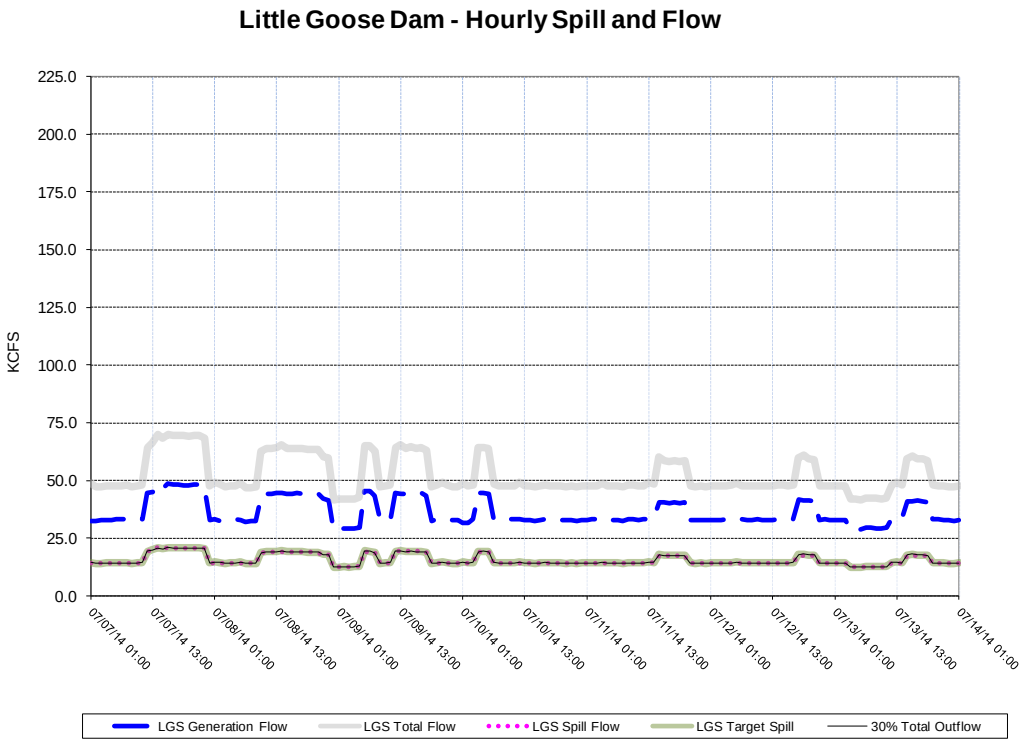
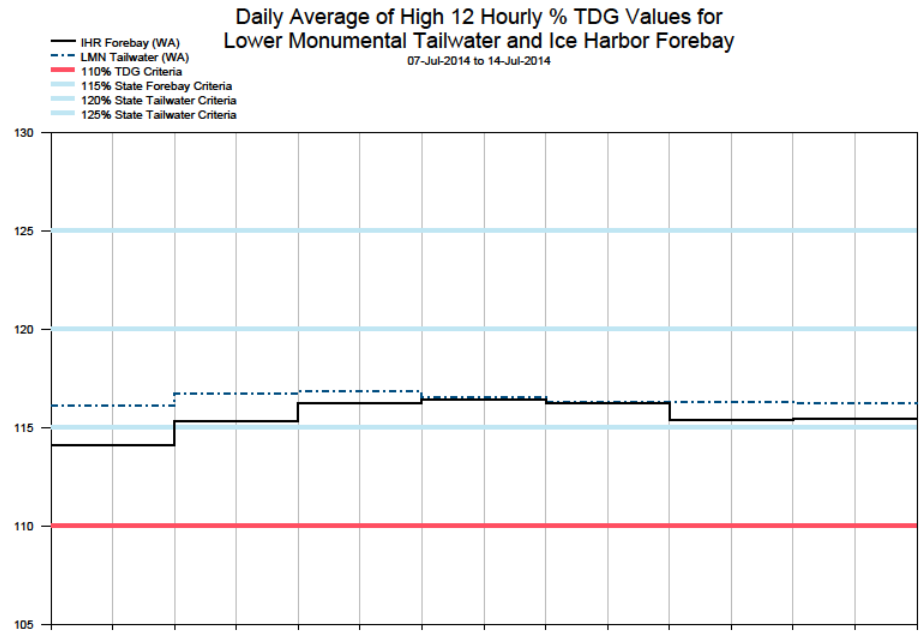

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 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
07-Jul-2014 to 14-Jul-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

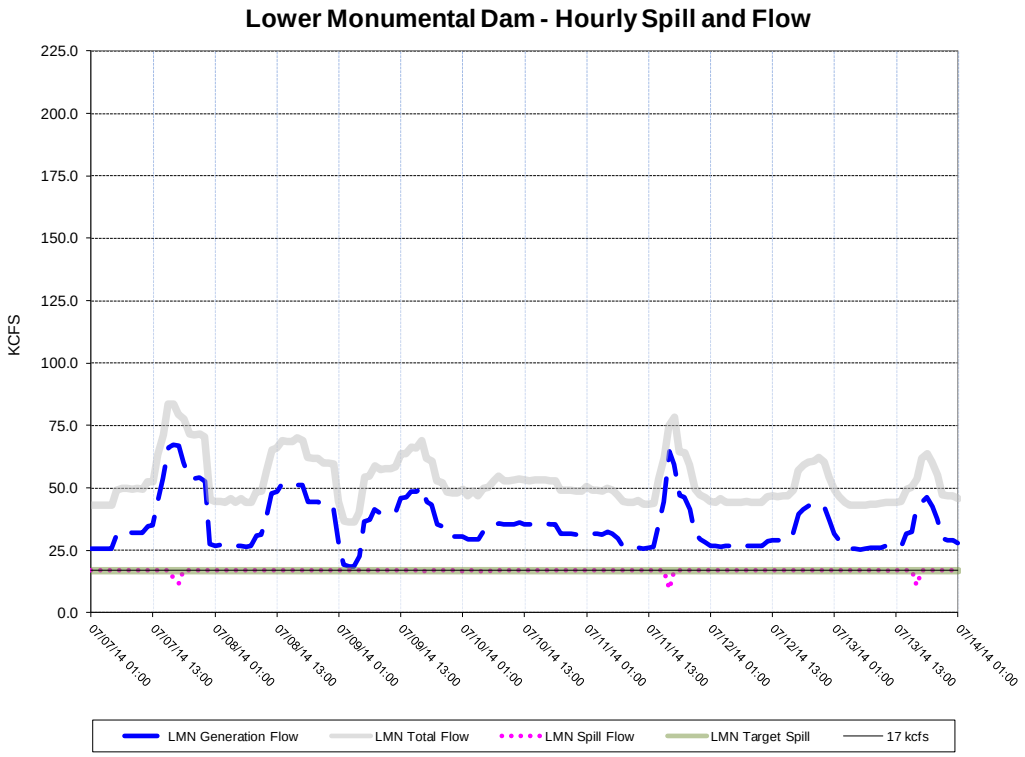
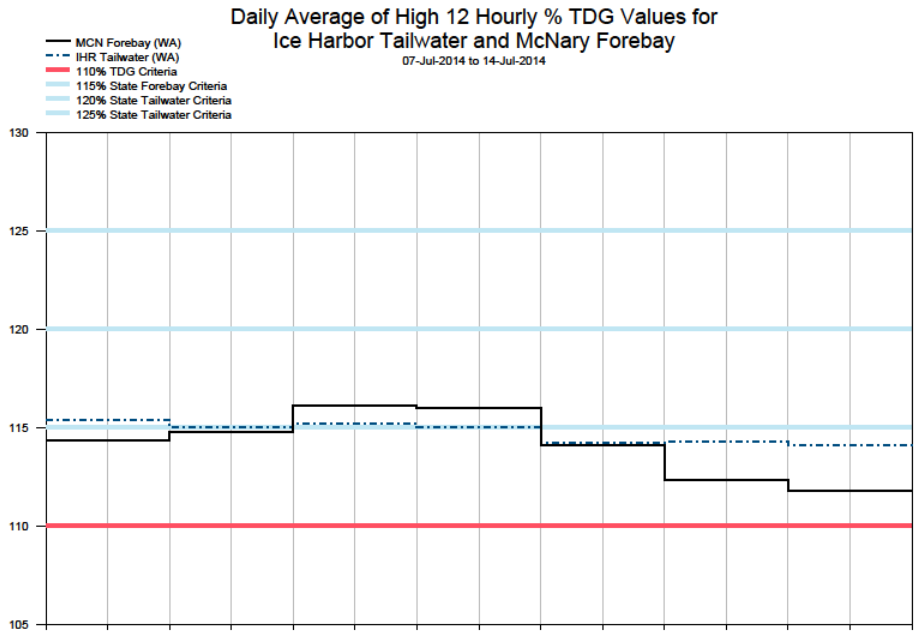

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
07-Jul-2014 to 14-Jul-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

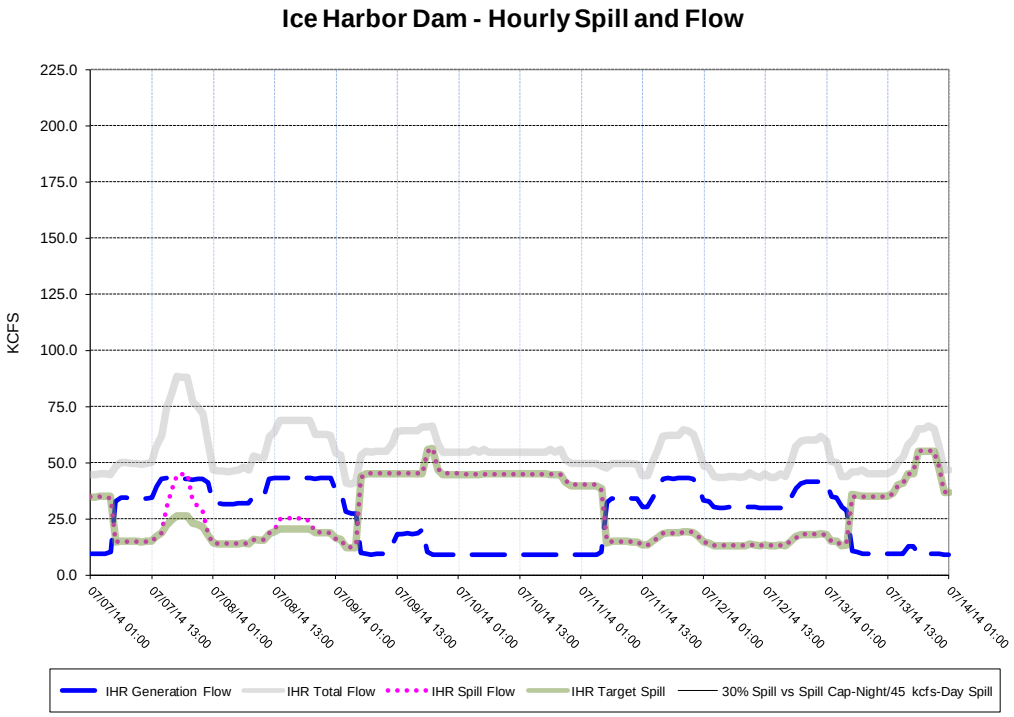
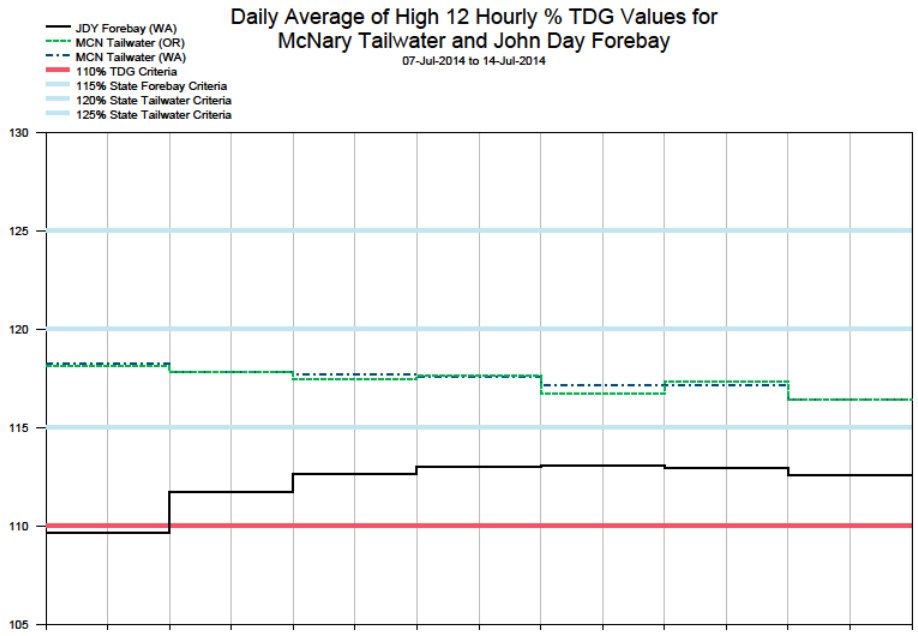

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 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
07-Jul-2014 to 14-Jul-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

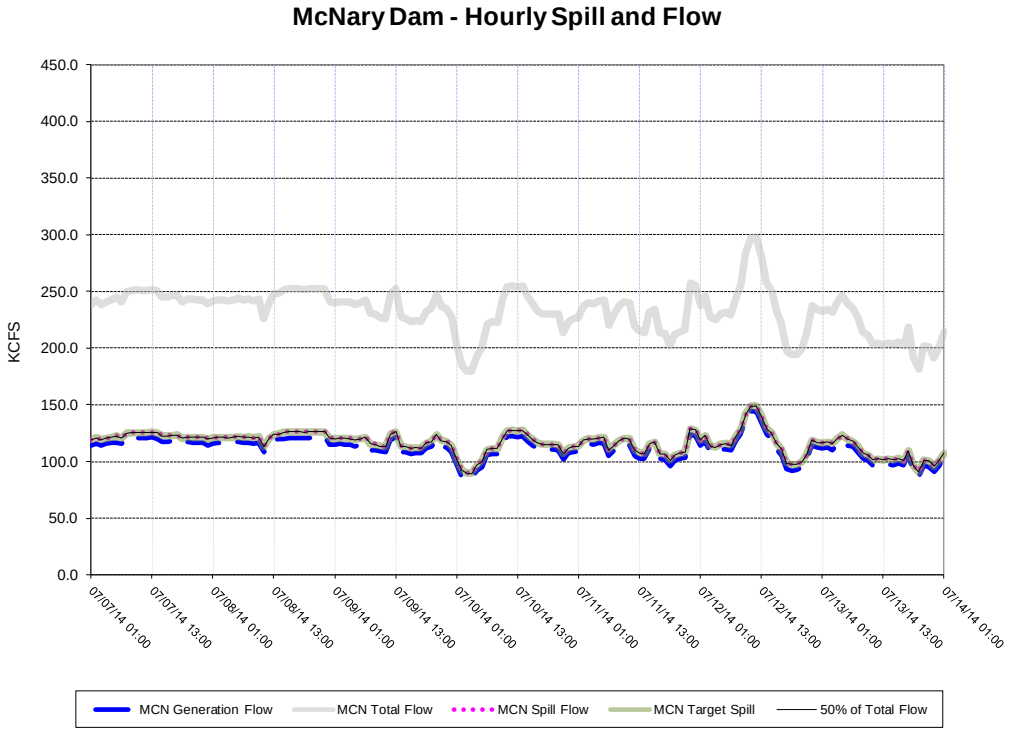
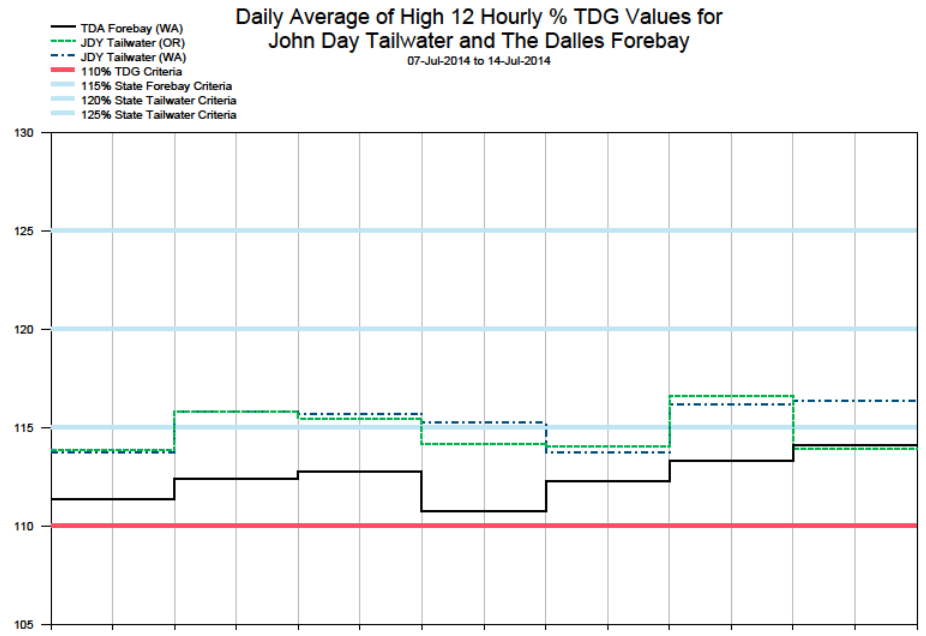

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 14


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
07-Jul-2014 to 14-Jul-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

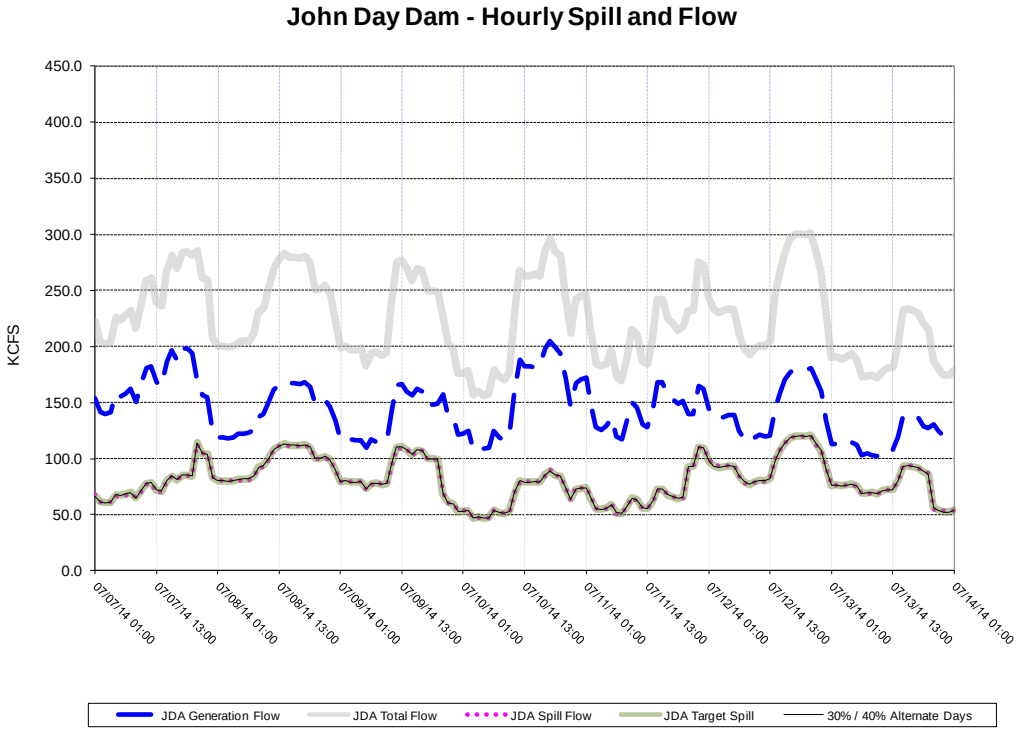
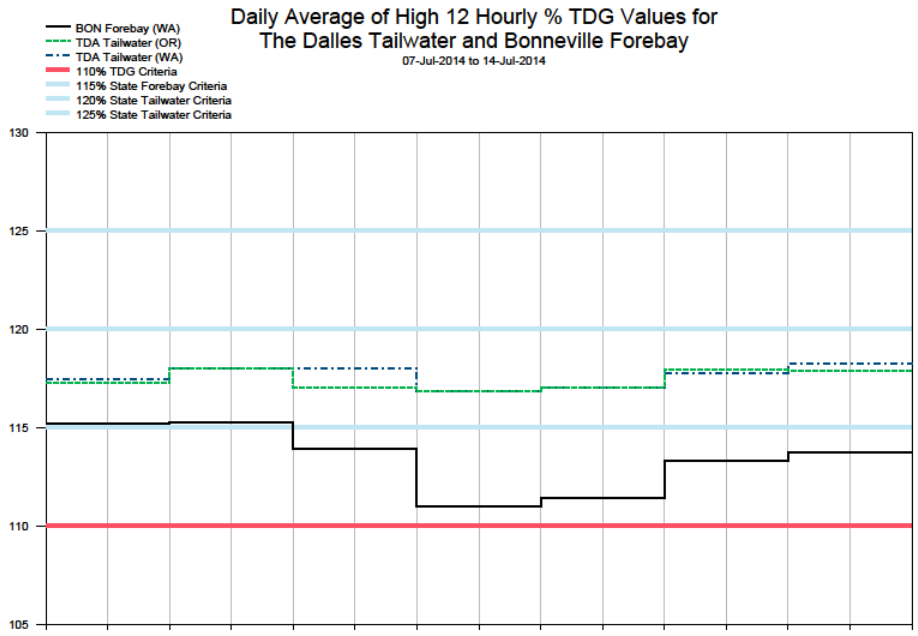

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 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
07-Jul-2014 to 14-Jul-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

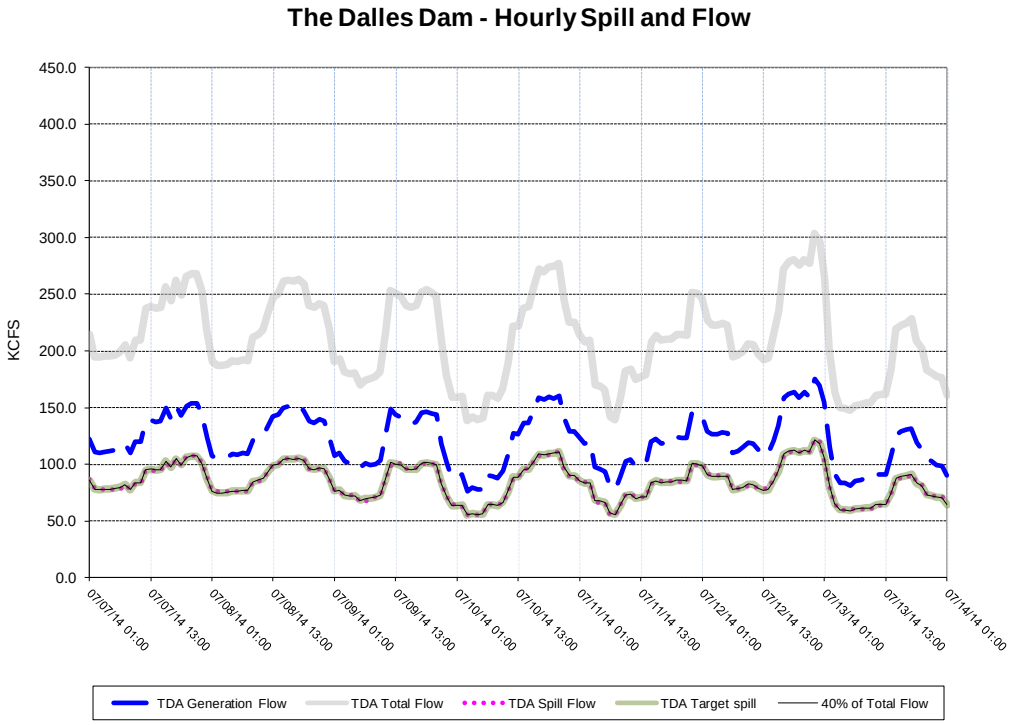
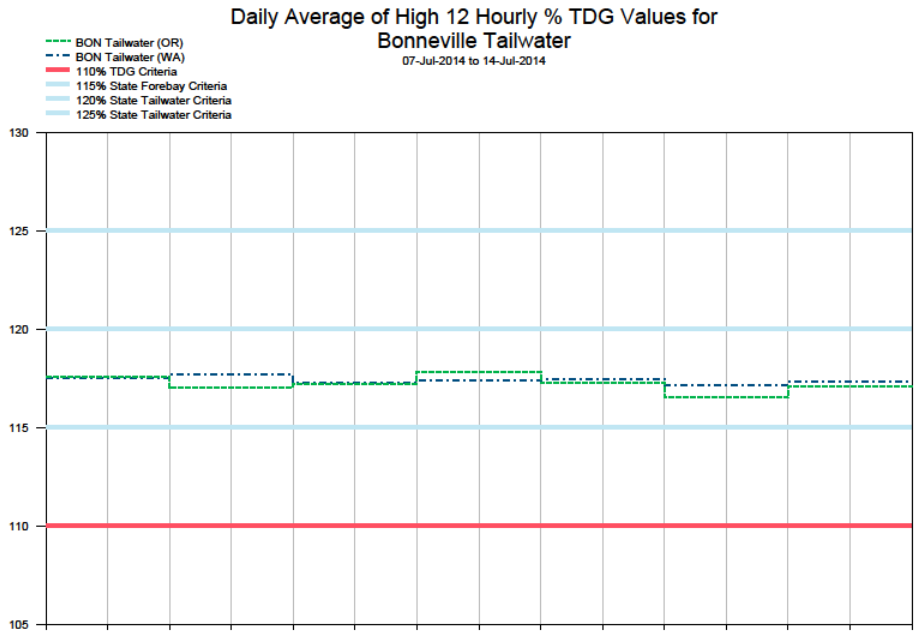

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/07/14 01:00
07/07/14 13:00
07/08/14 01:00
07/08/14 13:00
07/09/14 01:00
07/09/14 13:00
07/10/14 01:00
07/10/14 13:00
07/11/14 01:00
07/11/14 13:00
07/12/14 01:00
07/12/14 13:00
07/13/14 01:00
07/13/14 13:00
07/14/14 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
07-Jul-2014 to 14-Jul-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

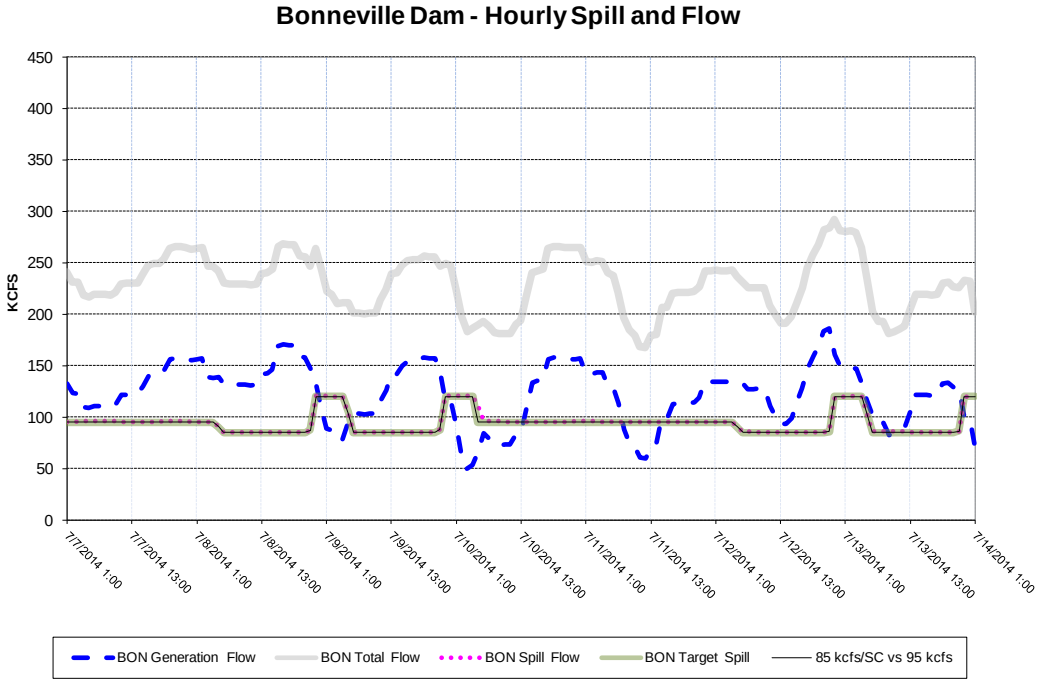
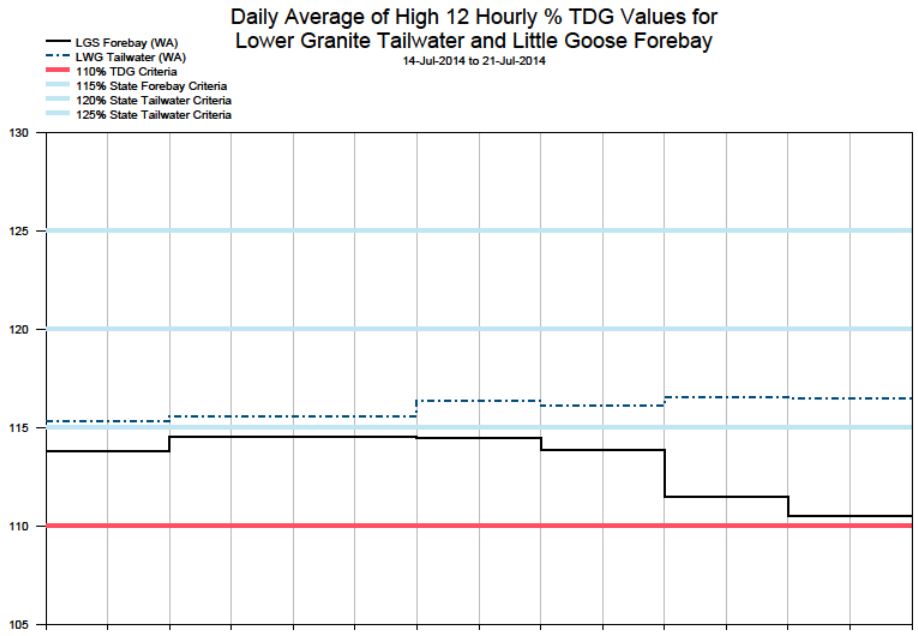

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/7/2014 1:00
7/7/2014 13:00
7/8/2014 1:00
7/8/2014 13:00
7/9/2014 1:00
7/9/2014 13:00
7/10/2014 1:00
7/10/2014 13:00
7/11/2014 1:00
7/11/2014 13:00
7/12/2014 1:00
7/12/2014 13:00
7/13/2014 1:00
7/13/2014 13:00
7/14/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
14-Jul-2014 to 21-Jul-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

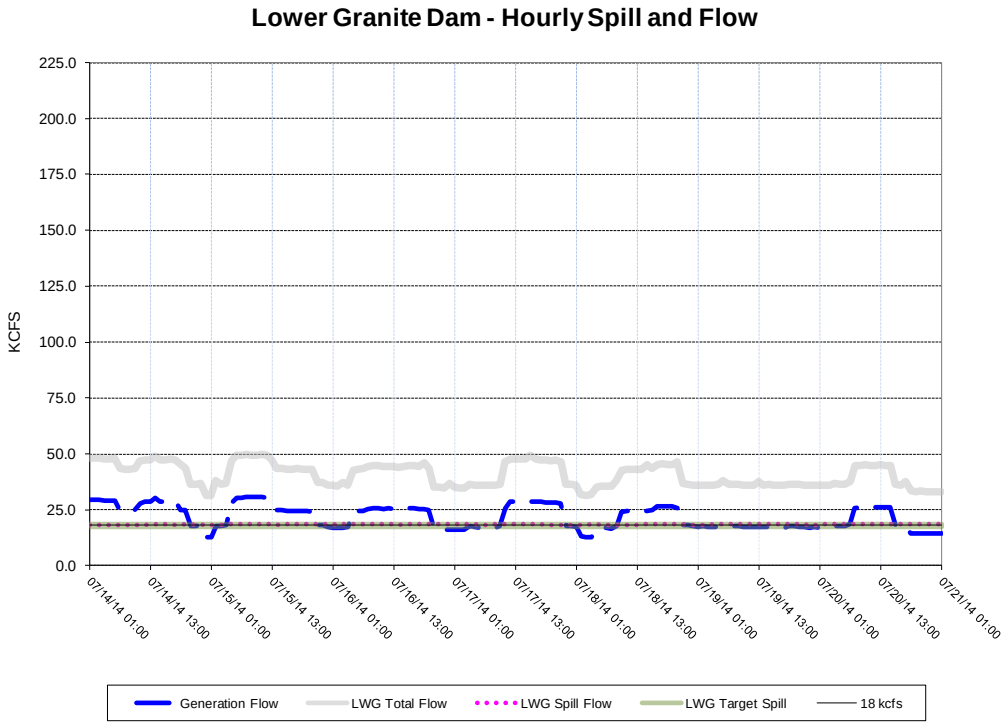
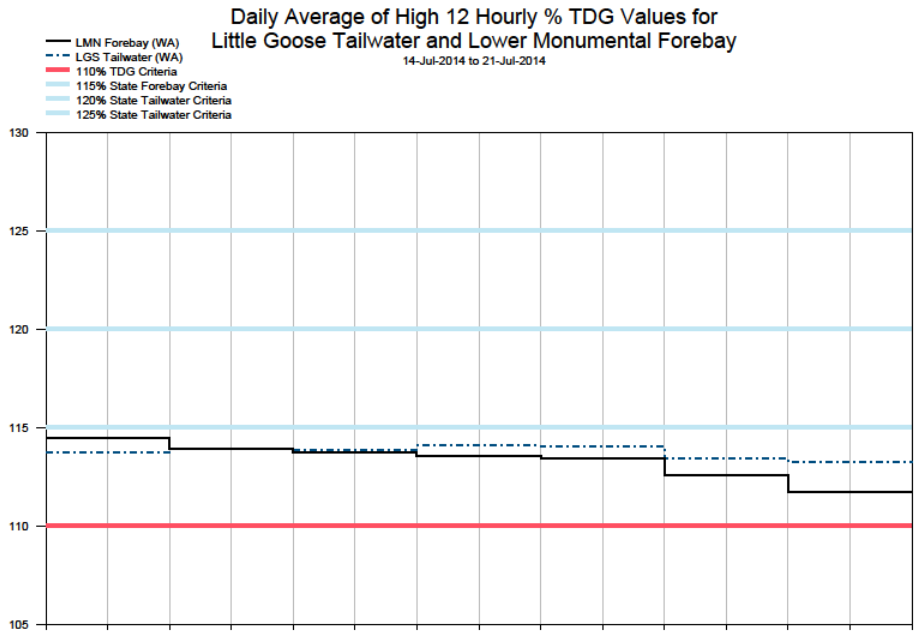

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 18


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
14-Jul-2014 to 21-Jul-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

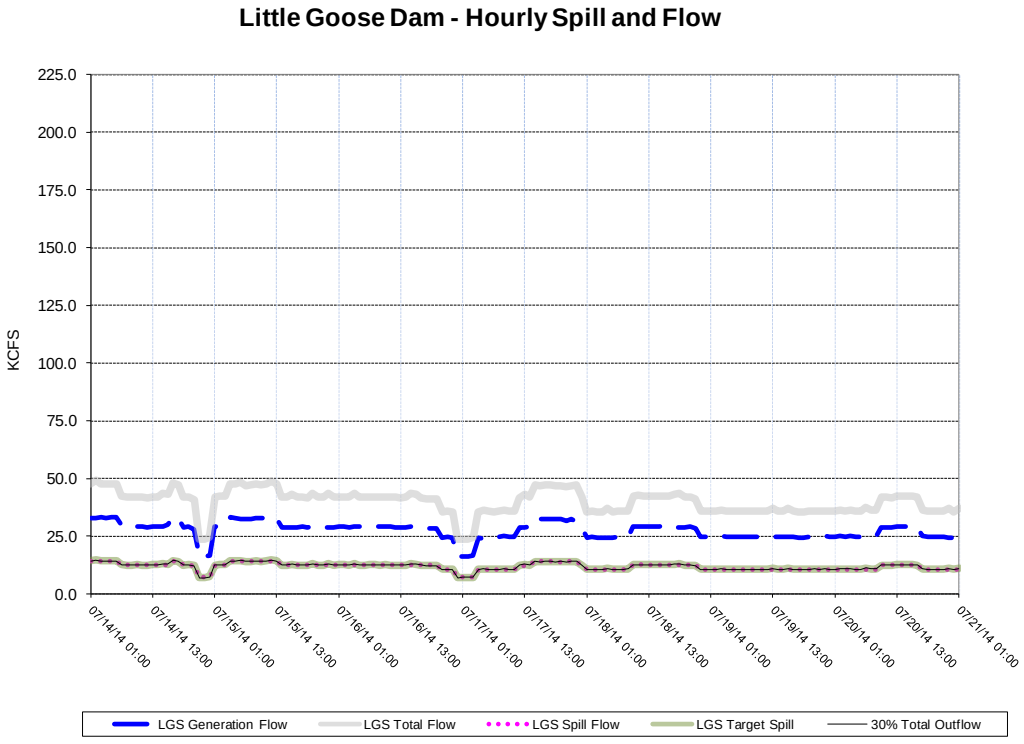
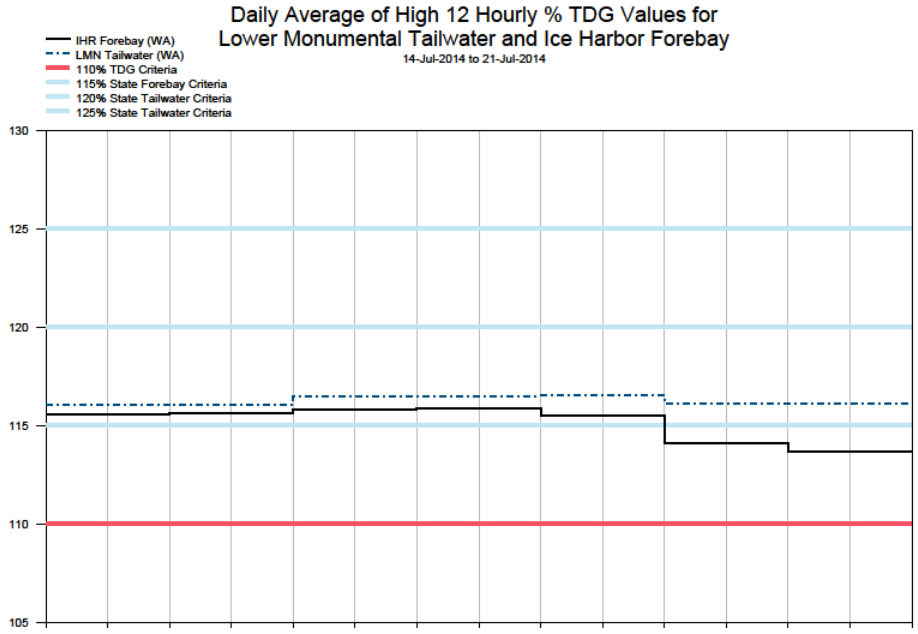

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 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
14-Jul-2014 to 21-Jul-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

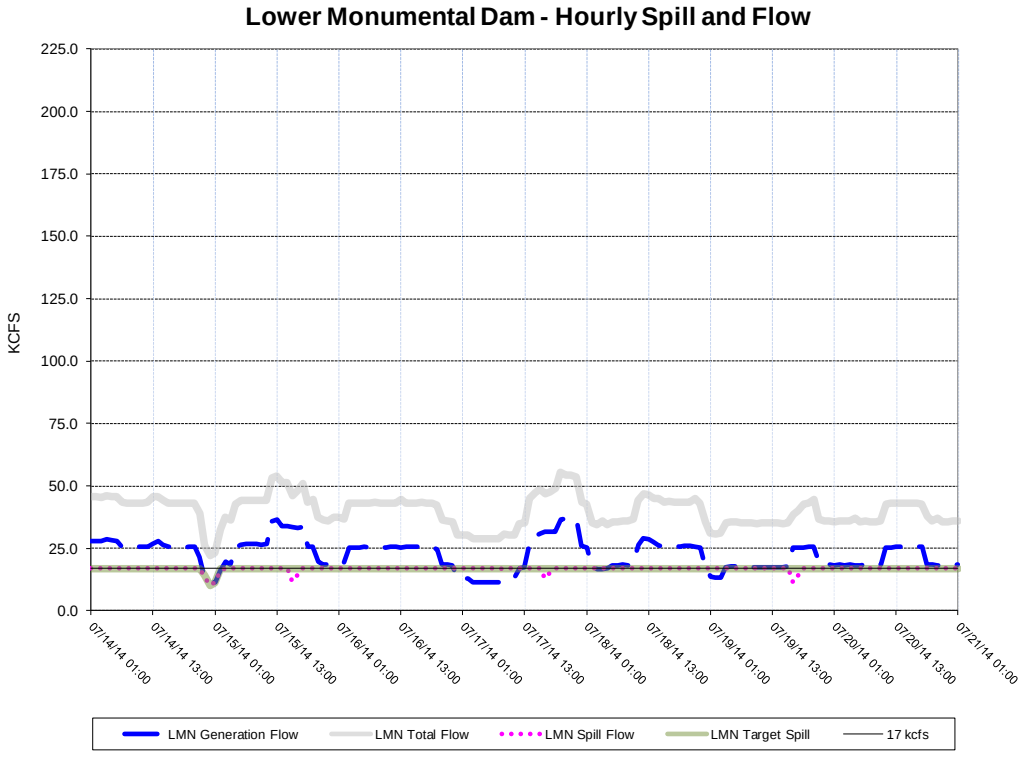
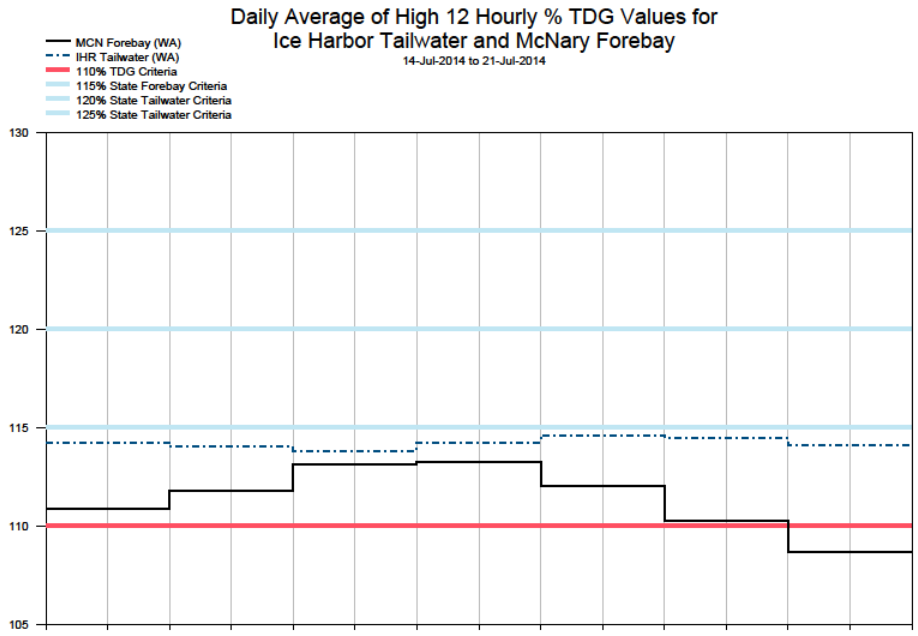

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 20


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
14-Jul-2014 to 21-Jul-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

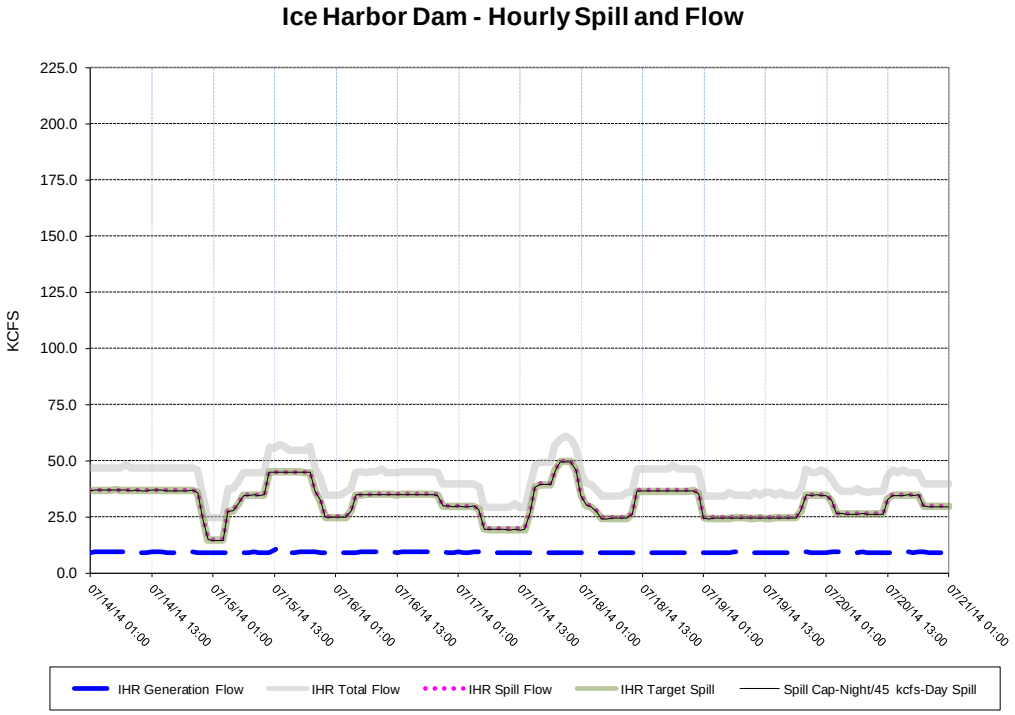
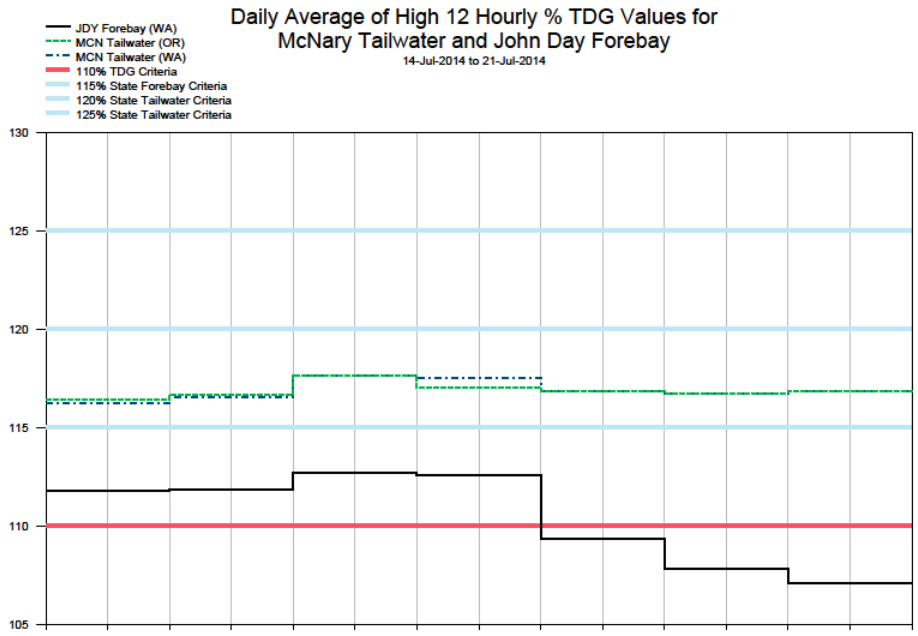

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
14-Jul-2014 to 21-Jul-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

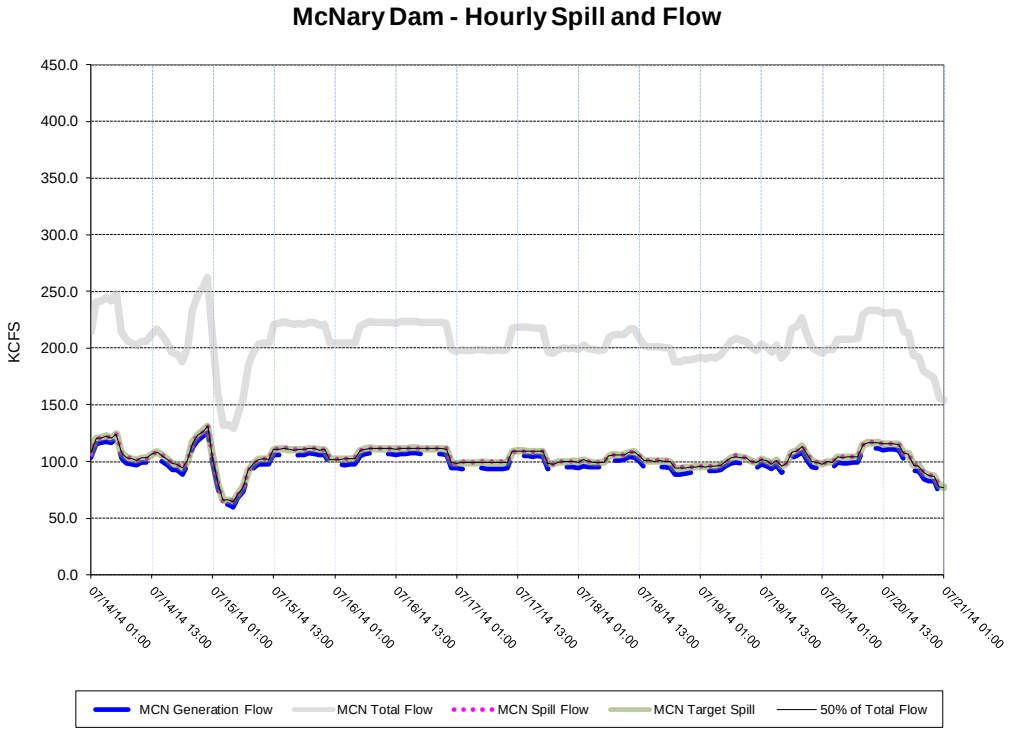
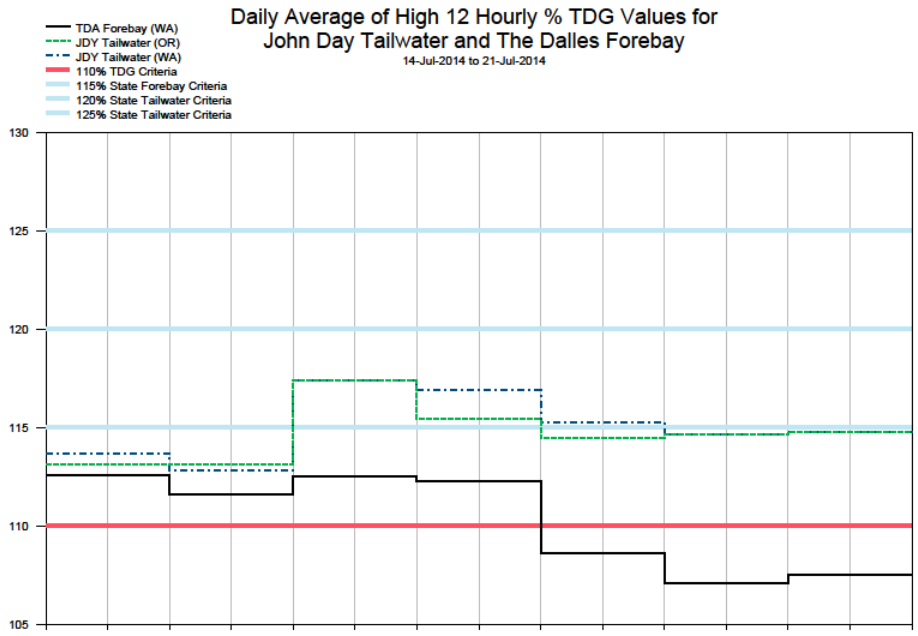

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 22


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
14-Jul-2014 to 21-Jul-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

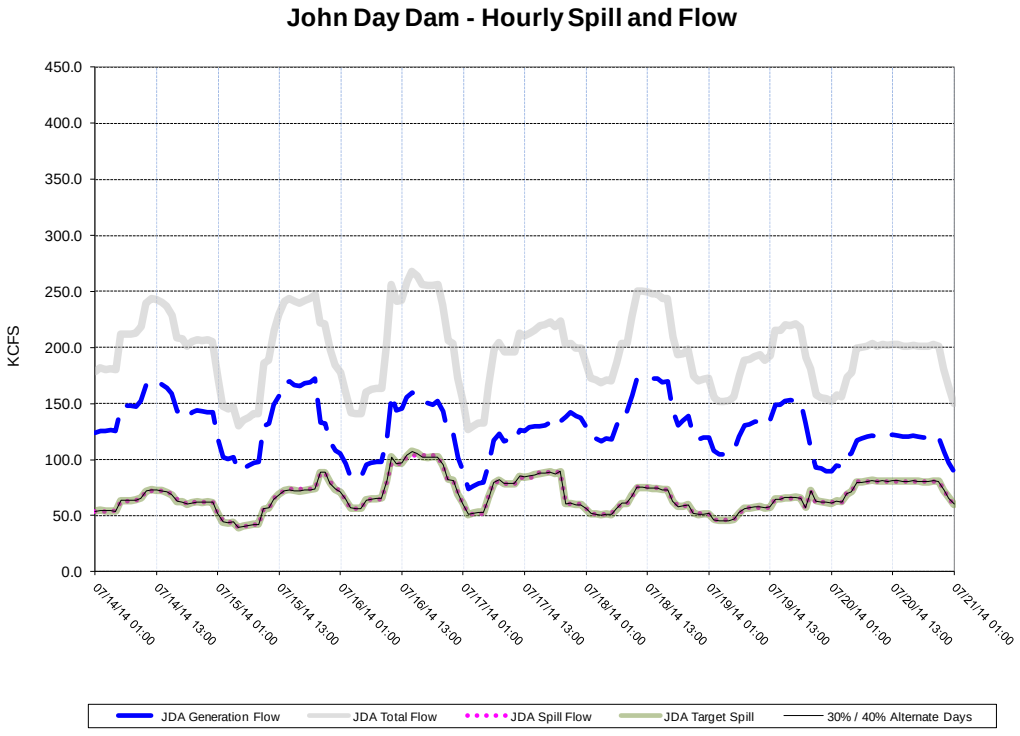
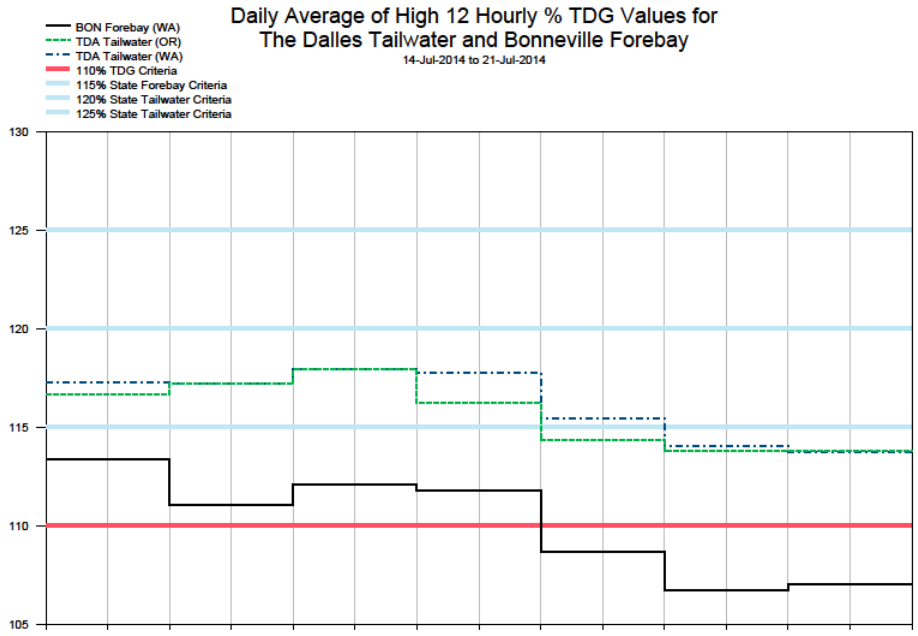

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 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
14-Jul-2014 to 21-Jul-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

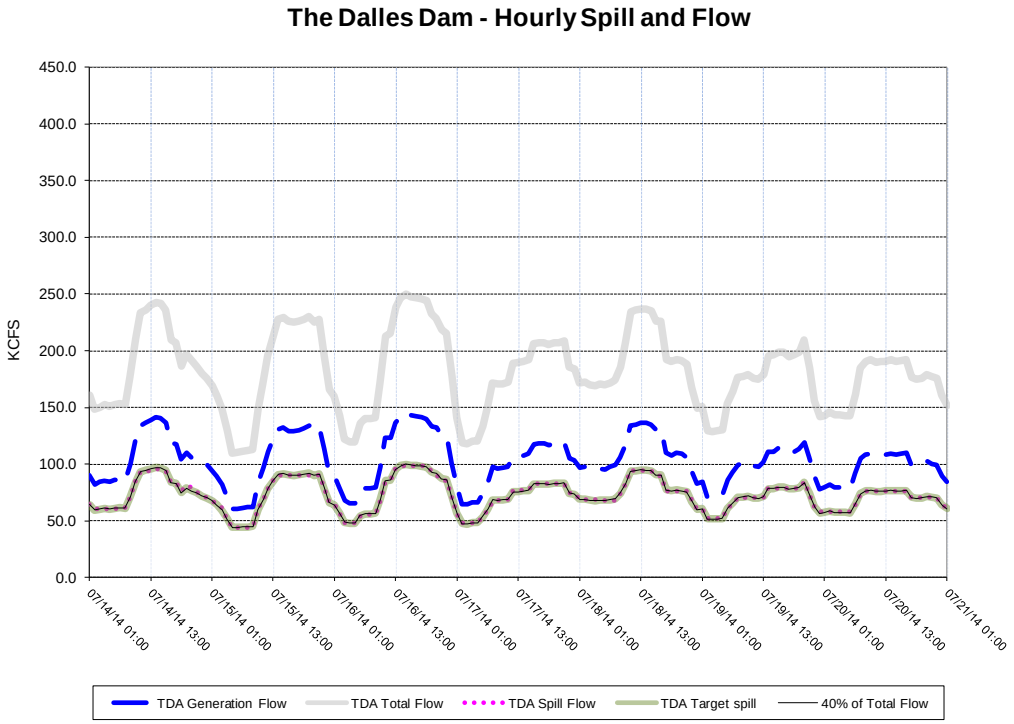
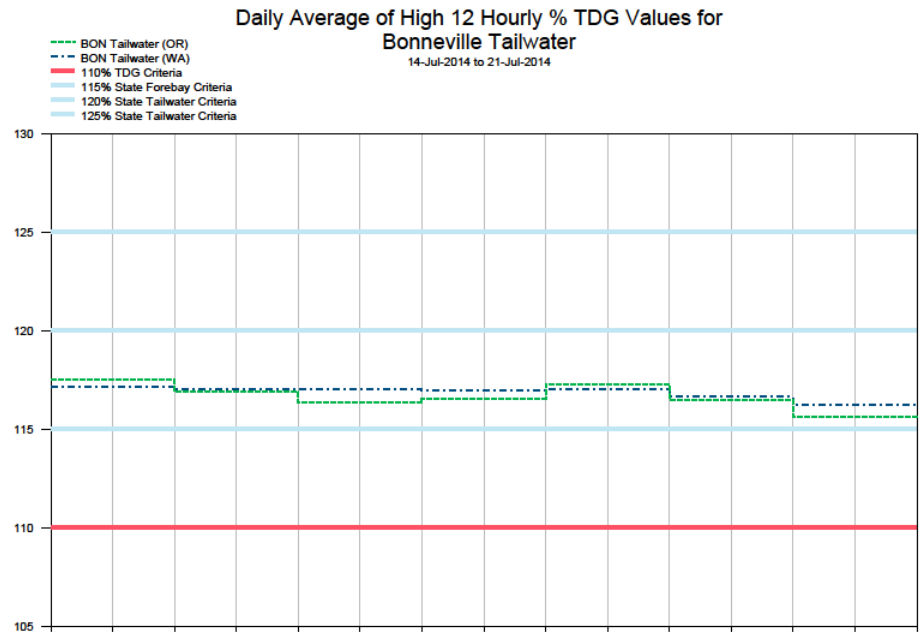

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/14/14 01:00
07/14/14 13:00
07/15/14 01:00
07/15/14 13:00
07/16/14 01:00
07/16/14 13:00
07/17/14 01:00
07/17/14 13:00
07/18/14 01:00
07/18/14 13:00
07/19/14 01:00
07/19/14 13:00
07/20/14 01:00
07/20/14 13:00
07/21/14 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
14-Jul-2014 to 21-Jul-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

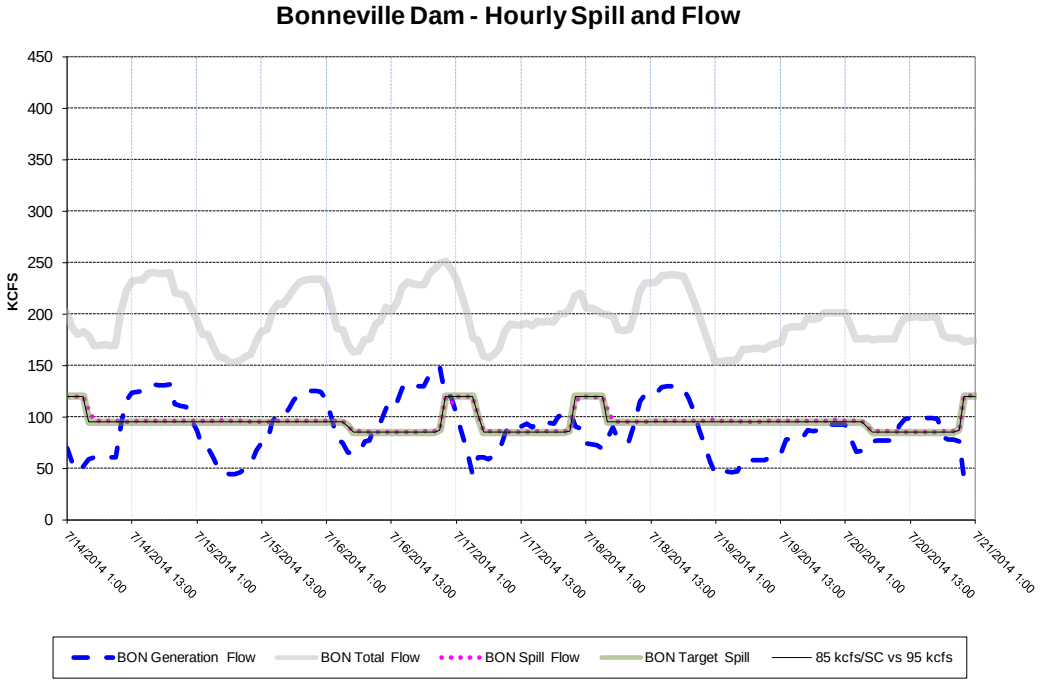
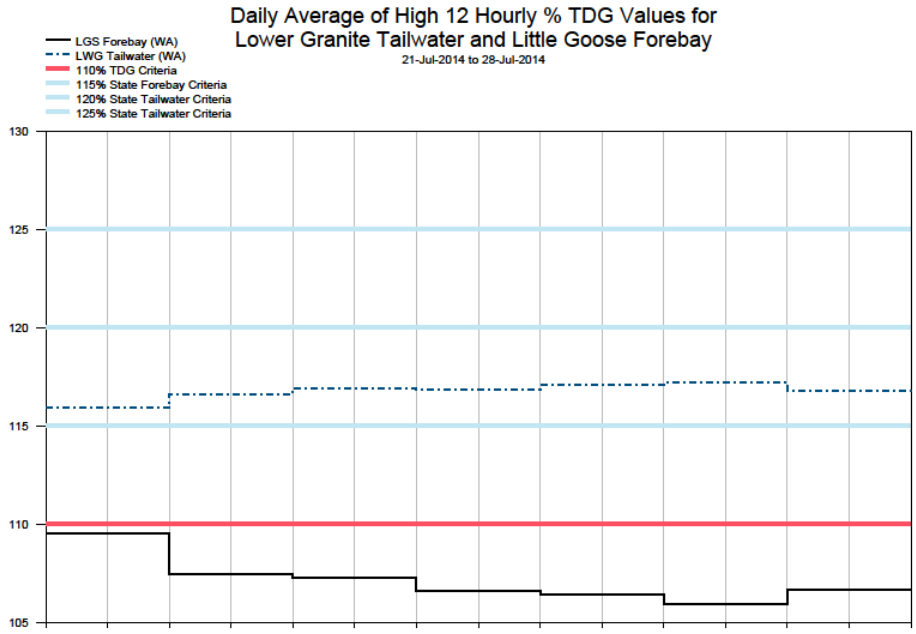

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/14/2014 1:00
7/14/2014 13:00
7/15/2014 1:00
7/15/2014 13:00
7/16/2014 1:00
7/16/2014 13:00
7/17/2014 1:00
7/17/2014 13:00
7/18/2014 1:00
7/18/2014 13:00
7/19/2014 1:00
7/19/2014 13:00
7/20/2014 1:00
7/20/2014 13:00
7/21/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
21-Jul-2014 to 28-Jul-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

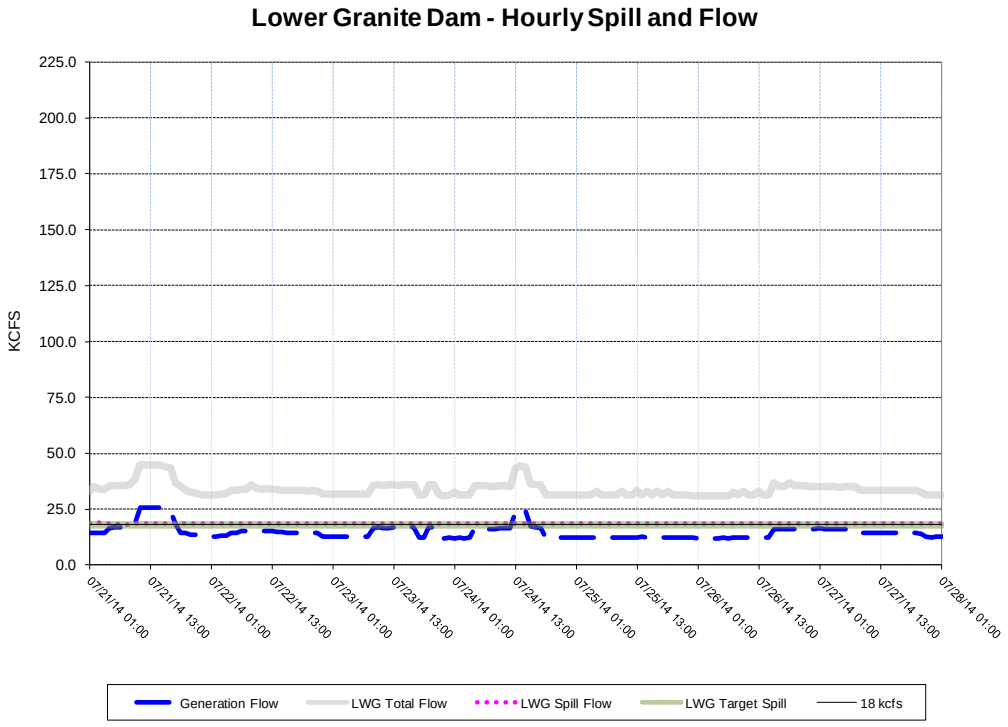
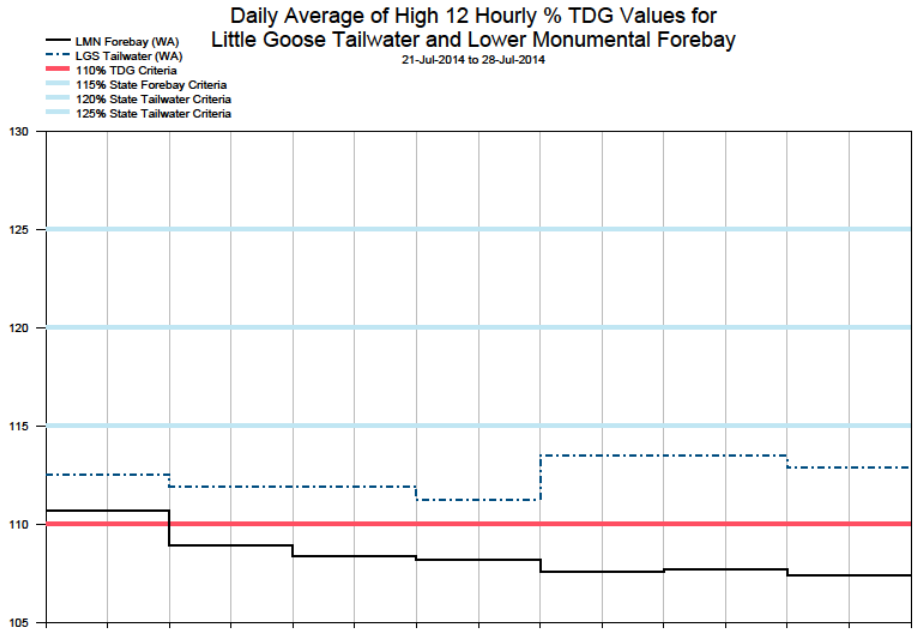

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 26


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
21-Jul-2014 to 28-Jul-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

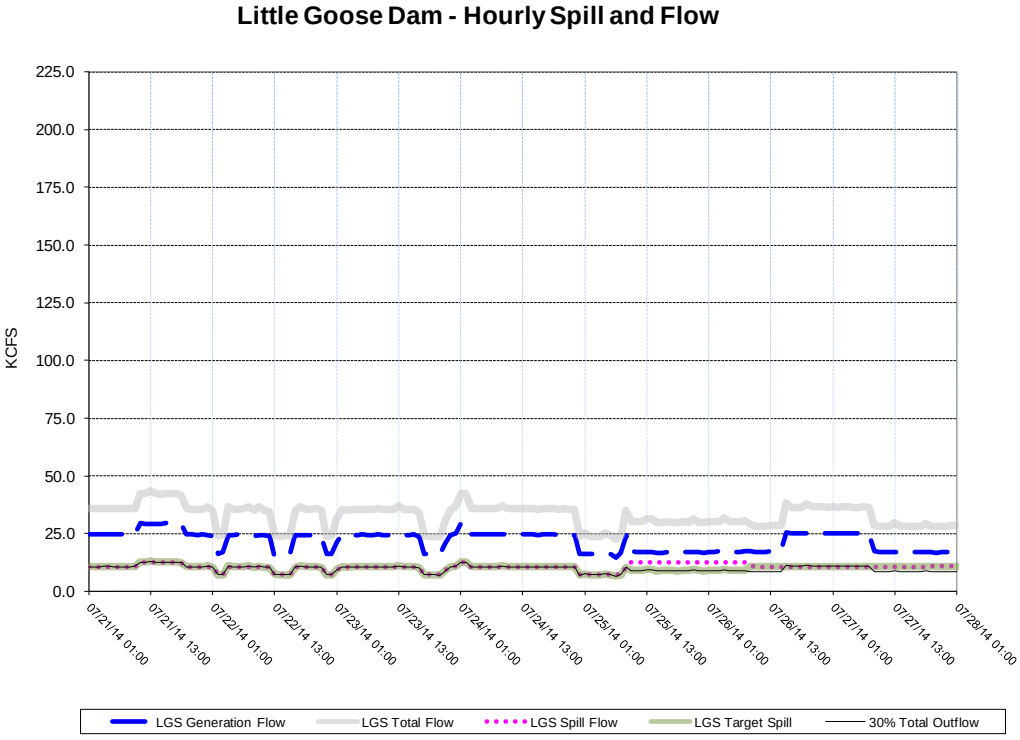
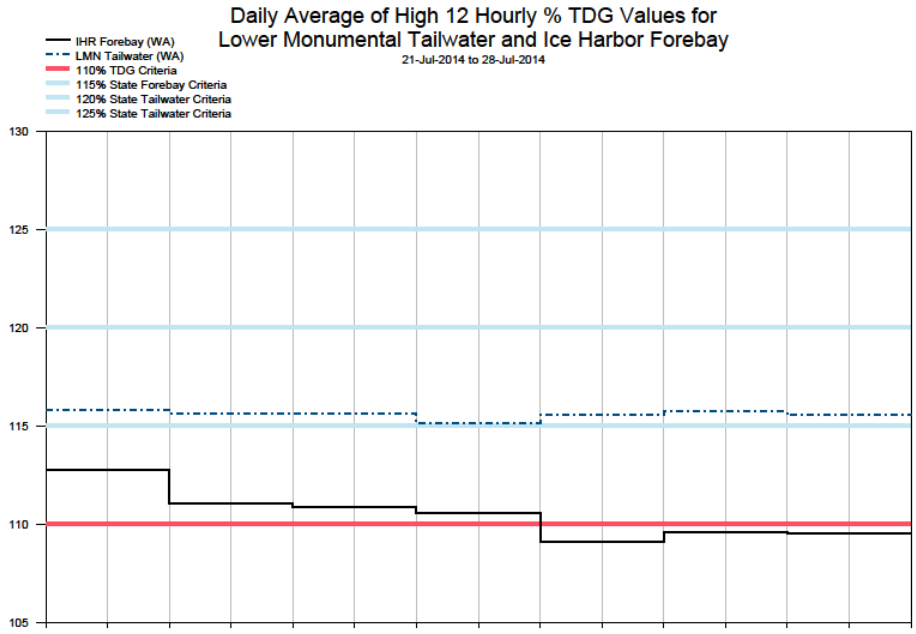

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 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
21-Jul-2014 to 28-Jul-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

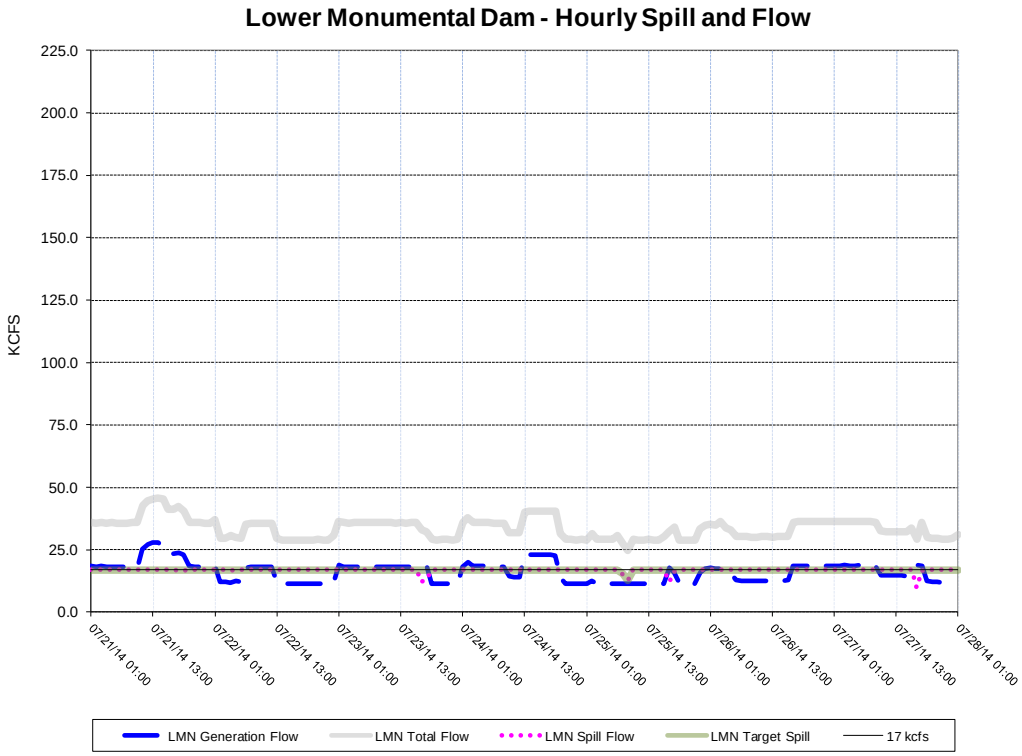
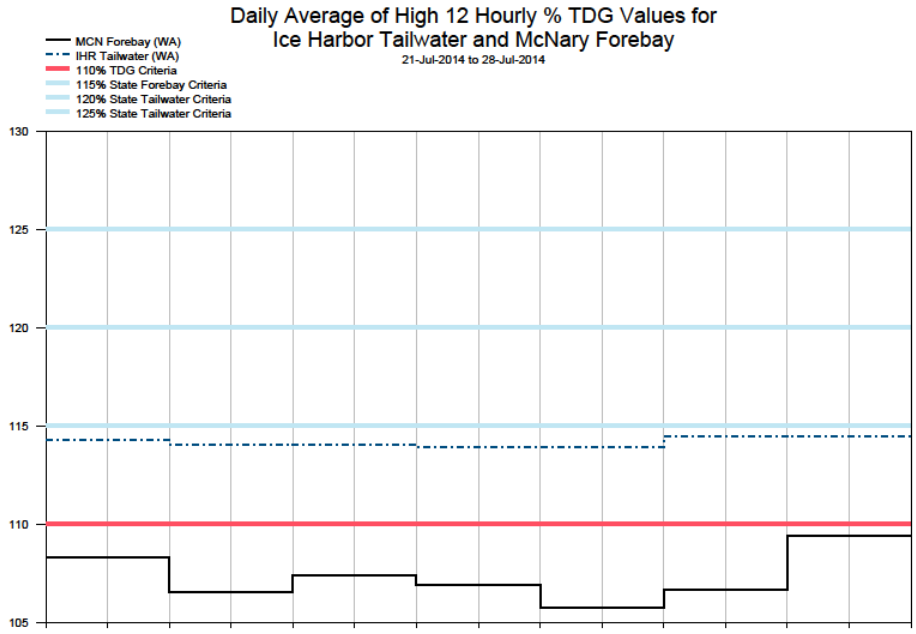

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 28


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
21-Jul-2014 to 28-Jul-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

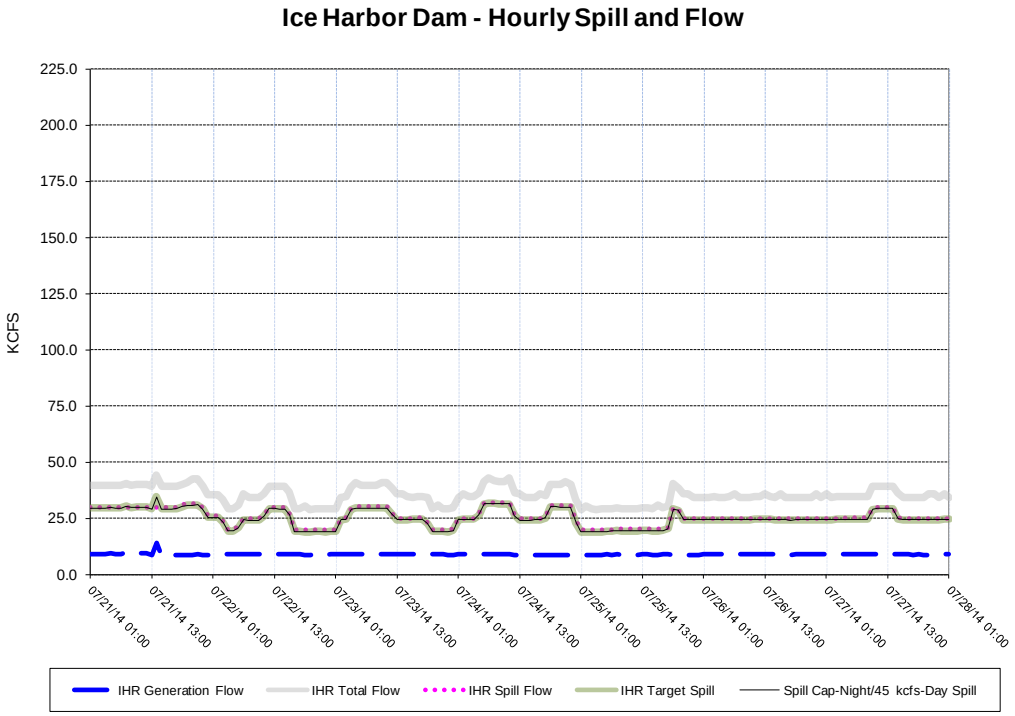
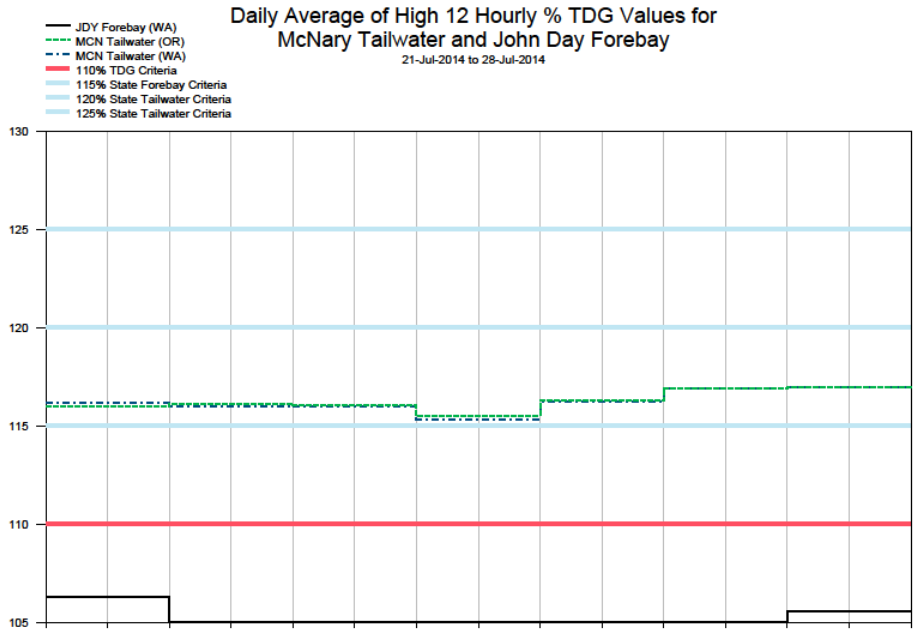

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
21-Jul-2014 to 28-Jul-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

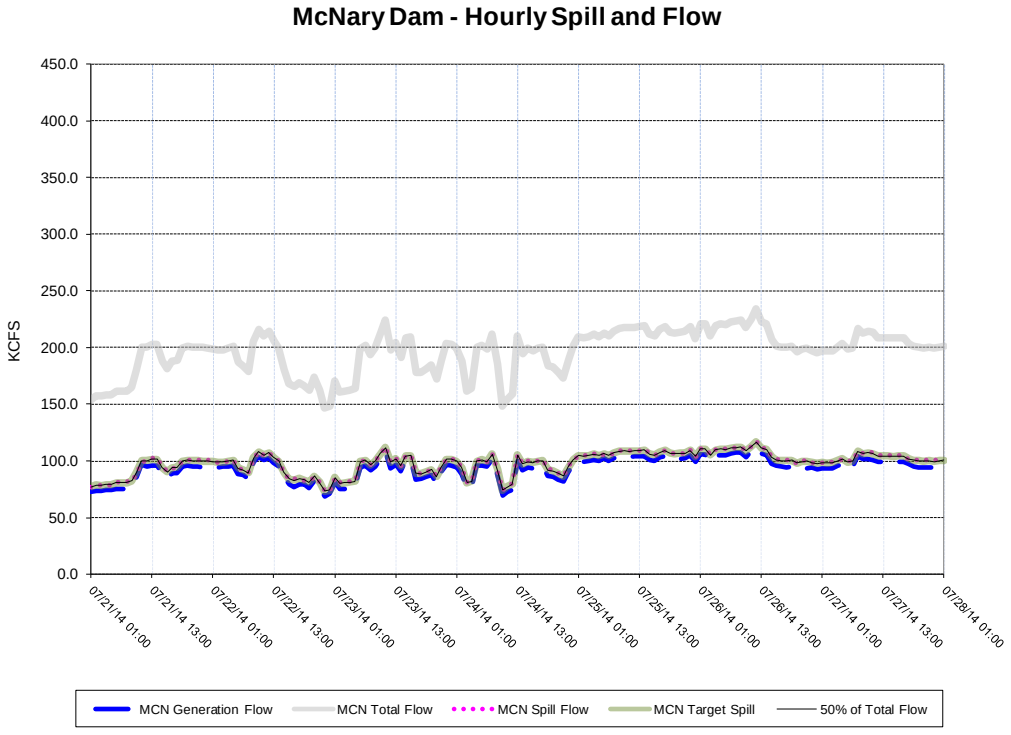
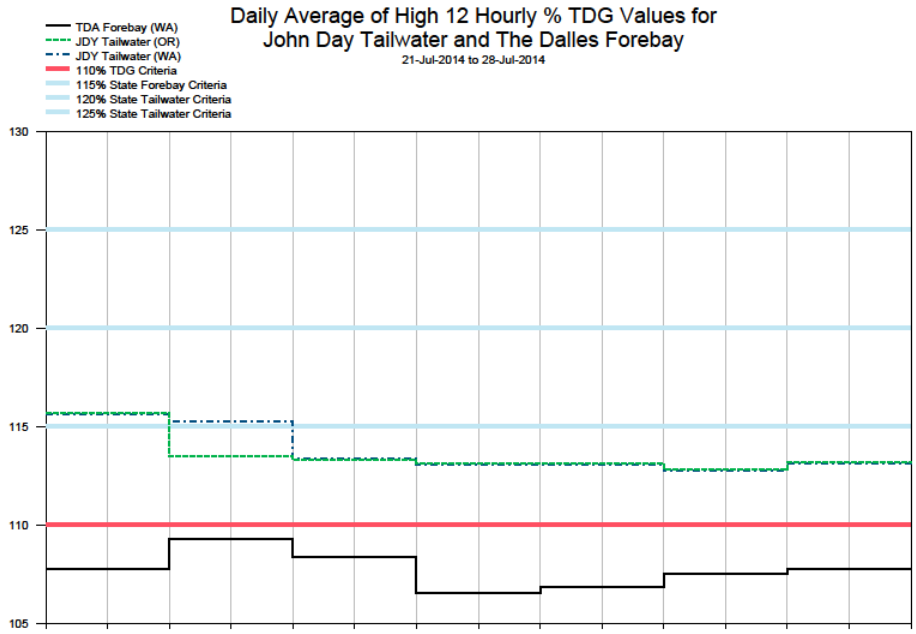

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 30


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
21-Jul-2014 to 28-Jul-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

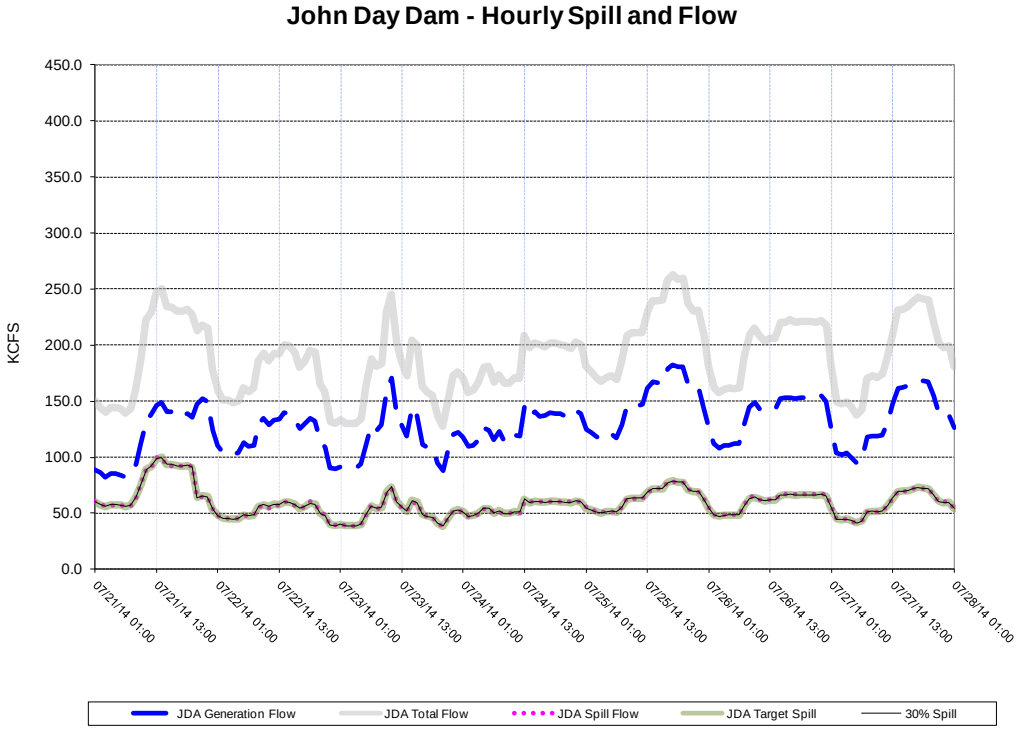
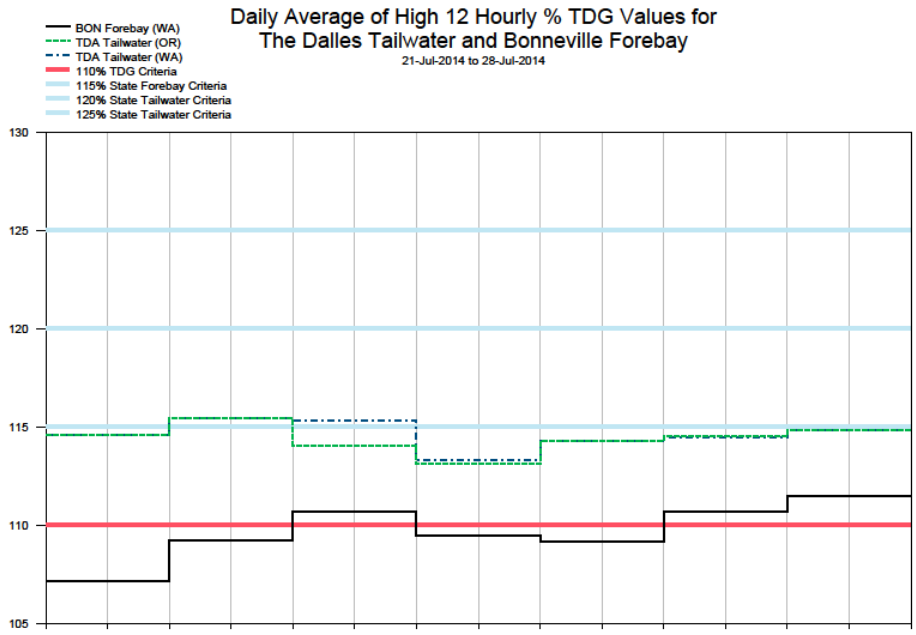

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
21-Jul-2014 to 28-Jul-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

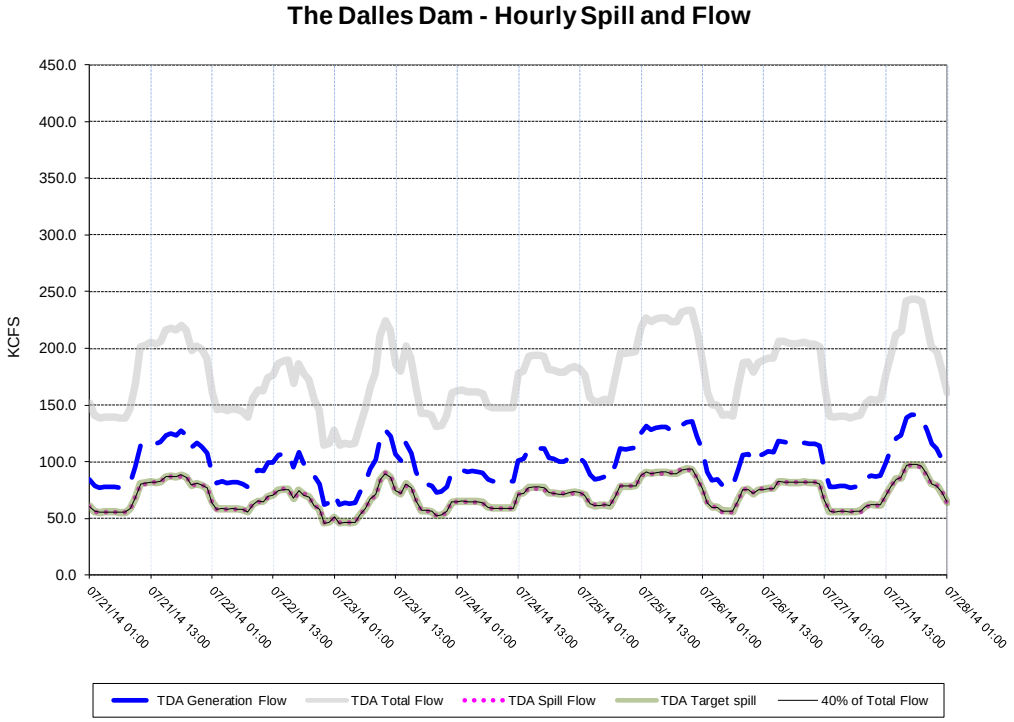
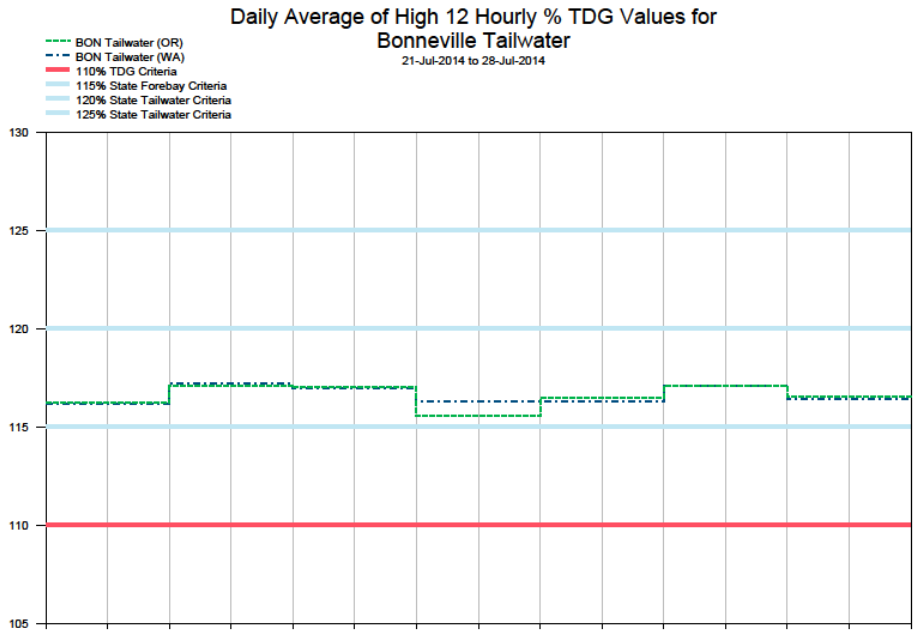

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/21/14 01:00
07/21/14 13:00
07/22/14 01:00
07/22/14 13:00
07/23/14 01:00
07/23/14 13:00
07/24/14 01:00
07/24/14 13:00
07/25/14 01:00
07/25/14 13:00
07/26/14 01:00
07/26/14 13:00
07/27/14 01:00
07/27/14 13:00
07/28/14 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
21-Jul-2014 to 28-Jul-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

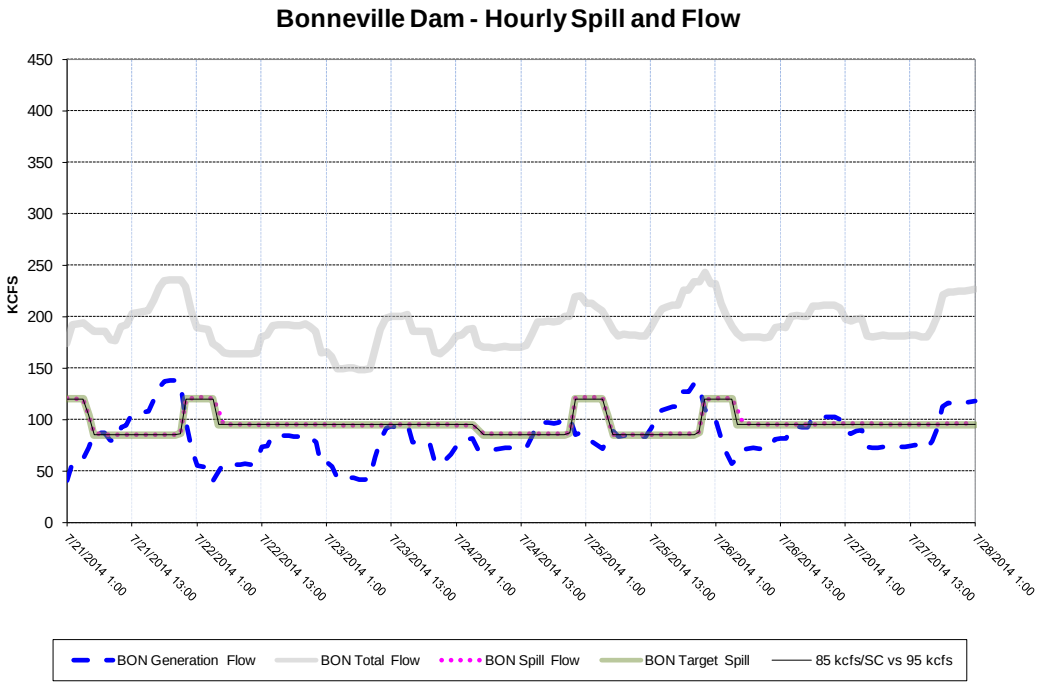
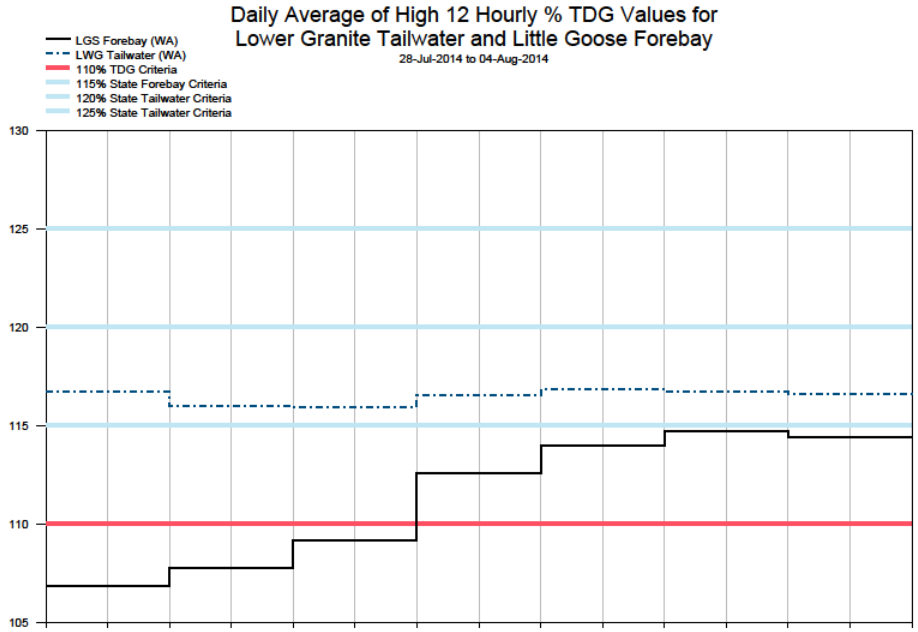

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/21/2014 1:00
7/21/2014 13:00
7/22/2014 1:00
7/22/2014 13:00
7/23/2014 1:00
7/23/2014 13:00
7/24/2014 1:00
7/24/2014 13:00
7/25/2014 1:00
7/25/2014 13:00
7/26/2014 1:00
7/26/2014 13:00
7/27/2014 1:00
7/27/2014 13:00
7/28/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 33


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
28-Jul-2014 to 04-Aug-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

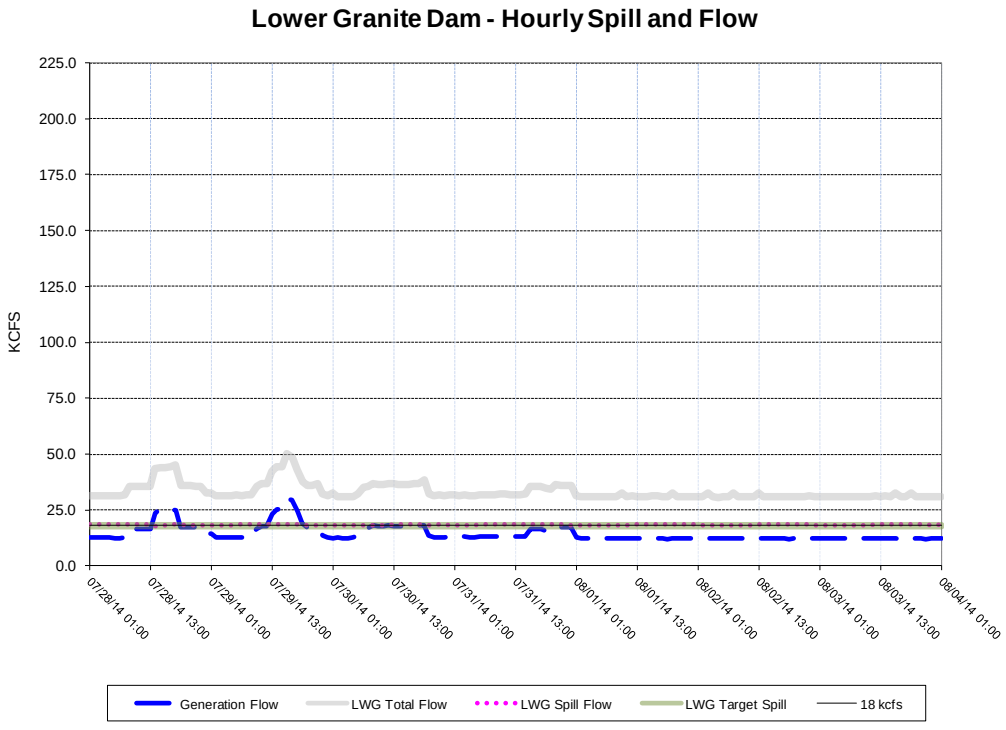
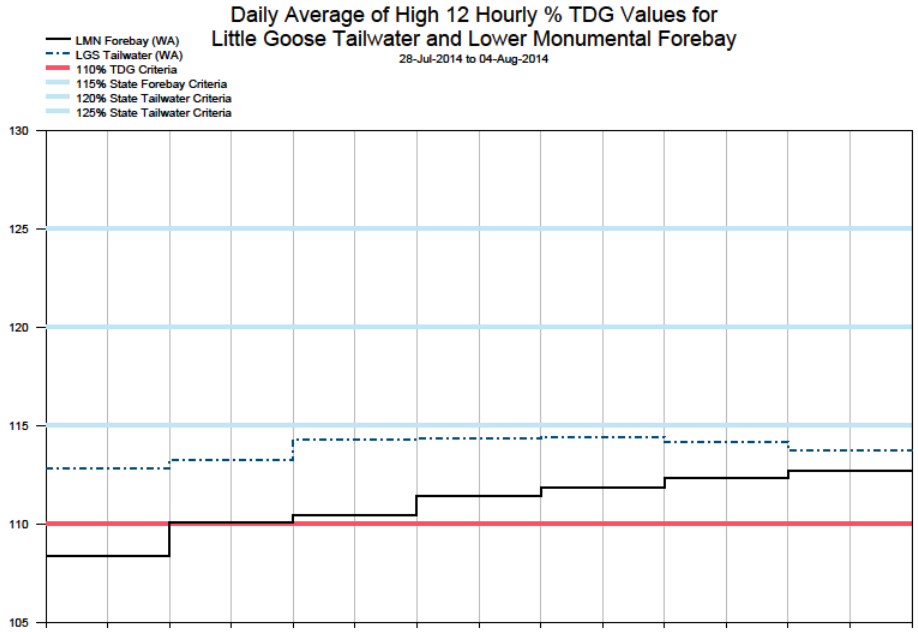

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 34


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
28-Jul-2014 to 04-Aug-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

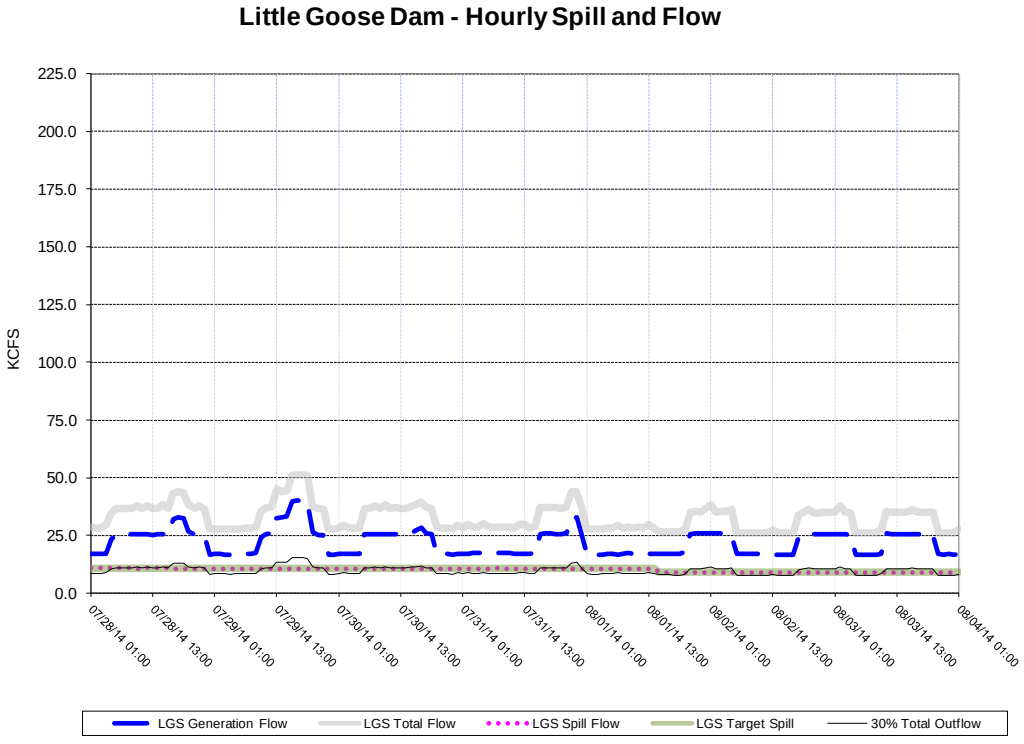
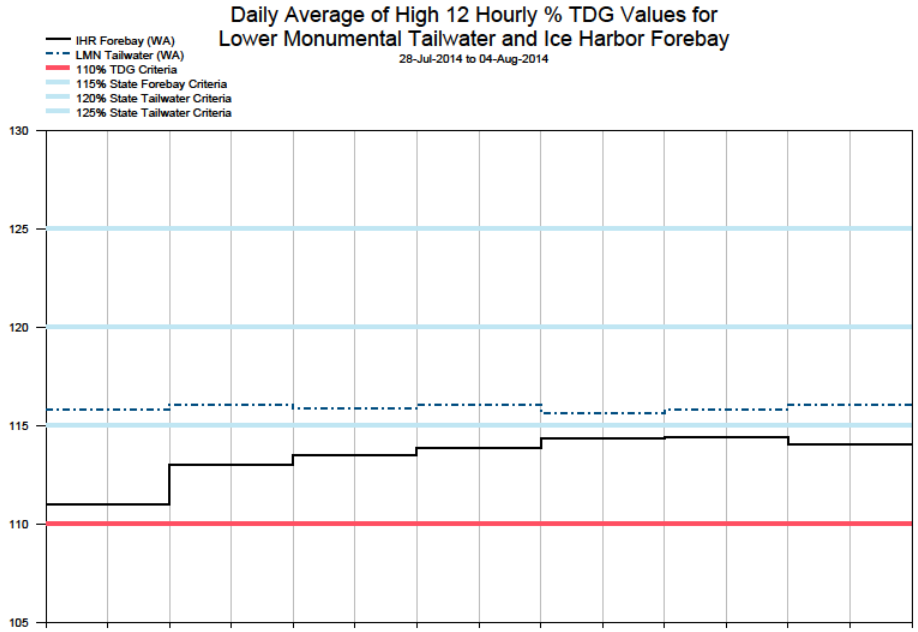

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 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
28-Jul-2014 to 04-Aug-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

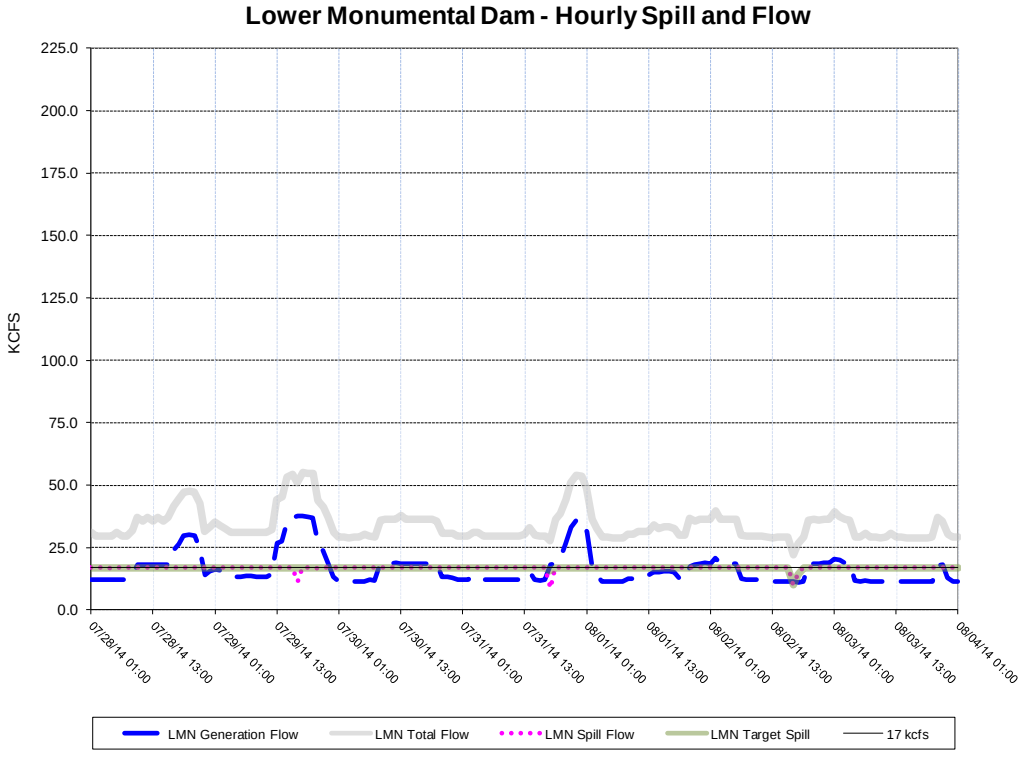
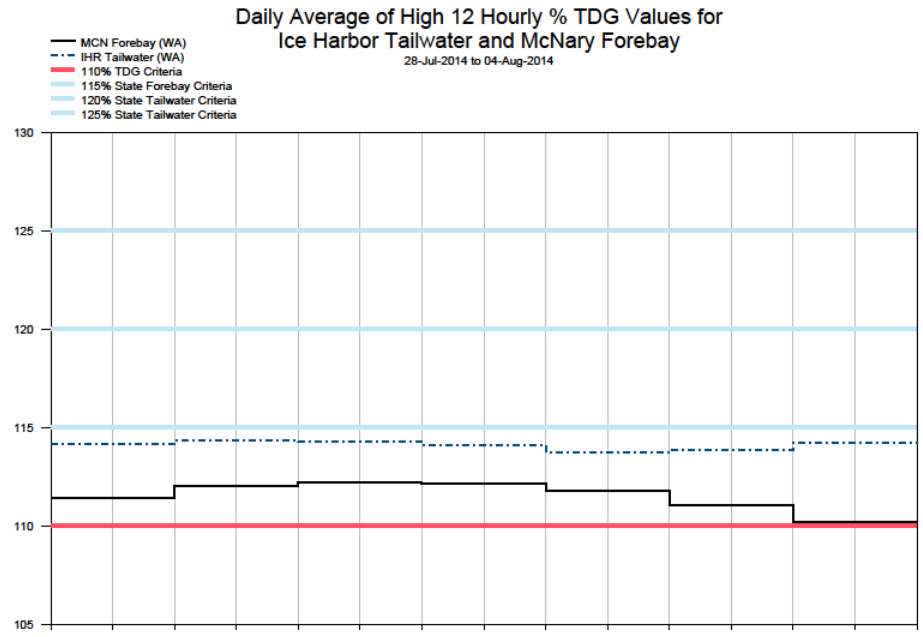

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
28-Jul-2014 to 04-Aug-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

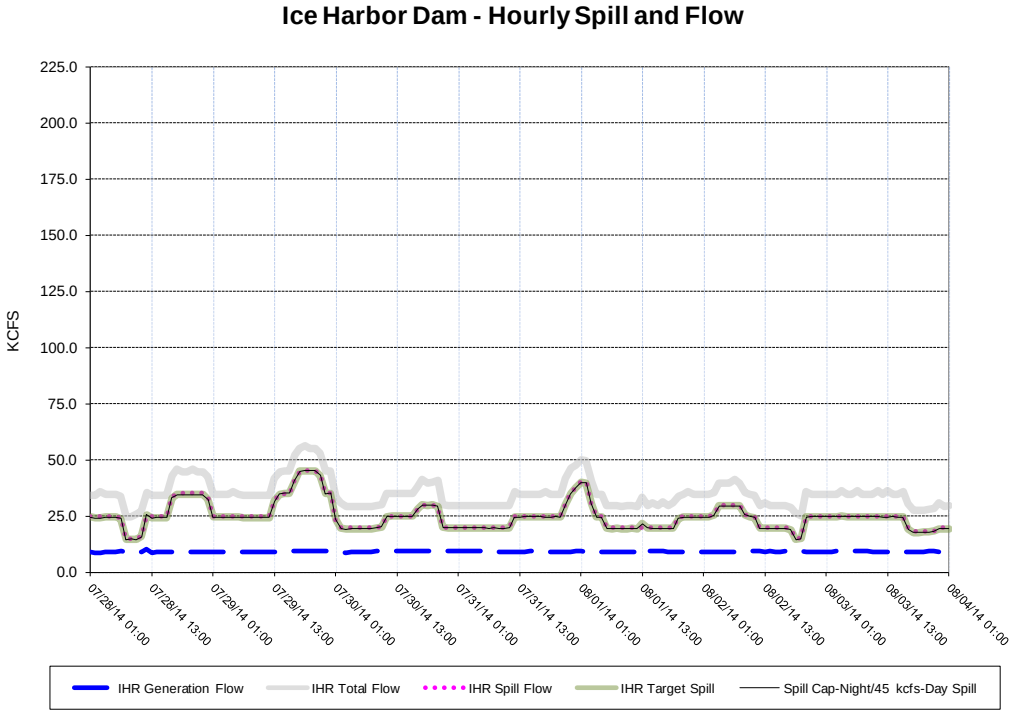
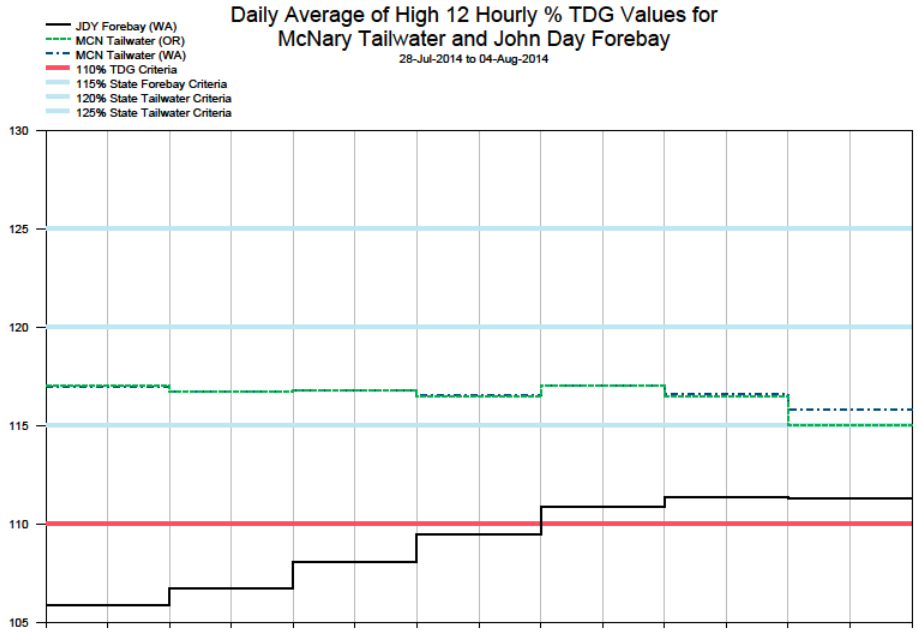

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 37


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
28-Jul-2014 to 04-Aug-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

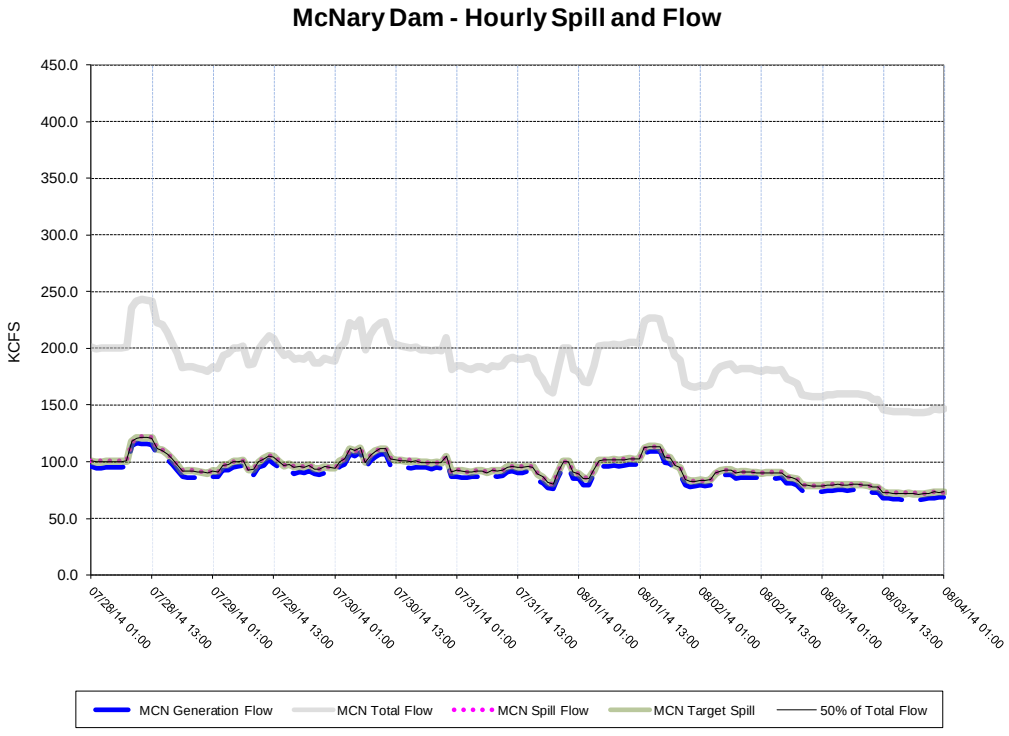
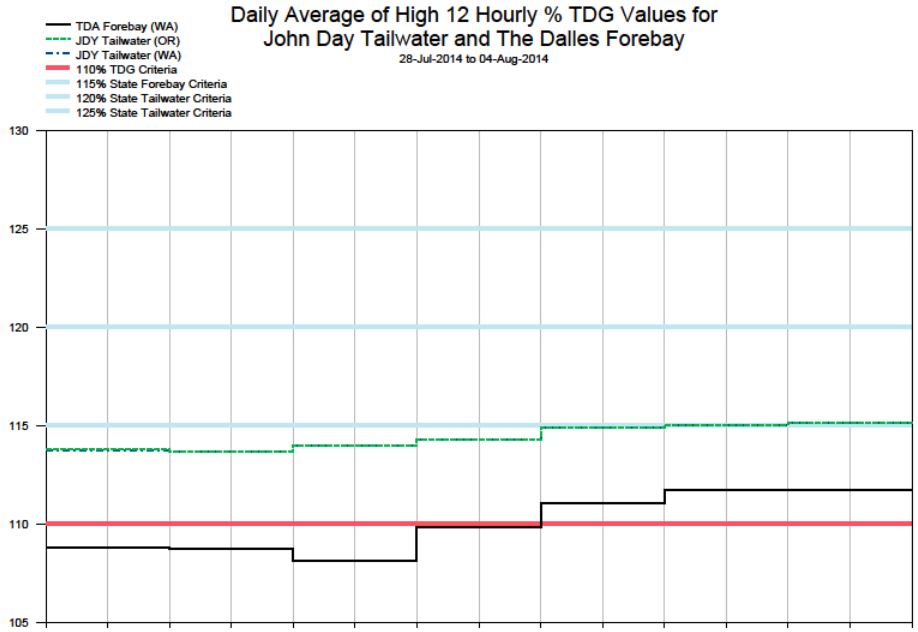

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 38


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
28-Jul-2014 to 04-Aug-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

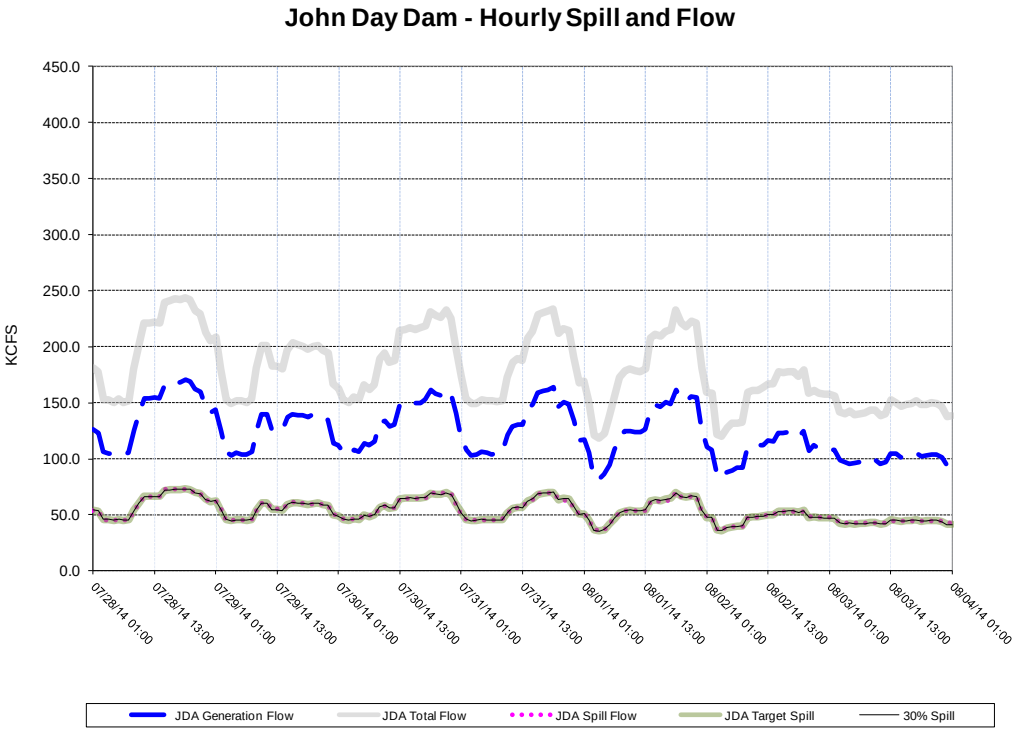
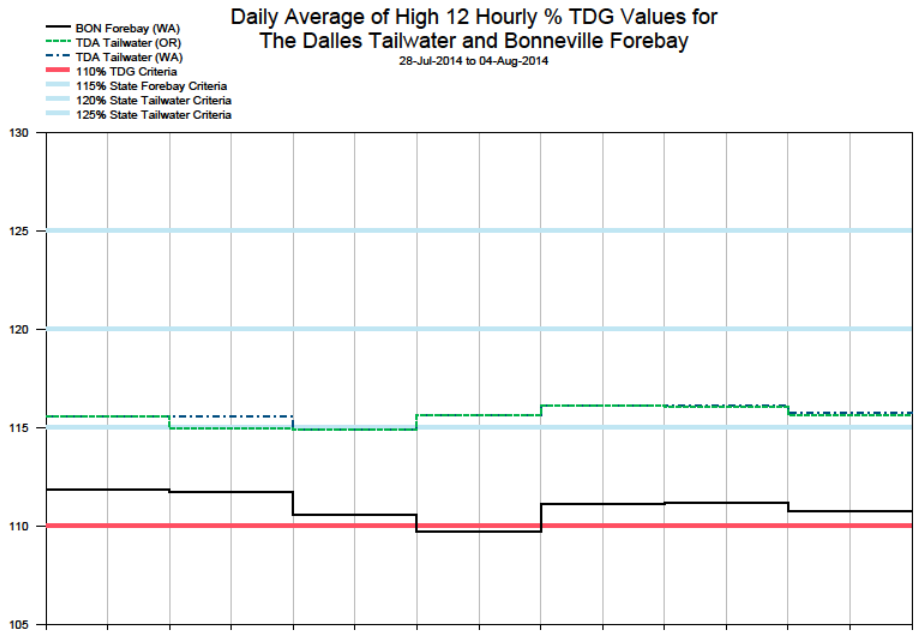

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 39


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
28-Jul-2014 to 04-Aug-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

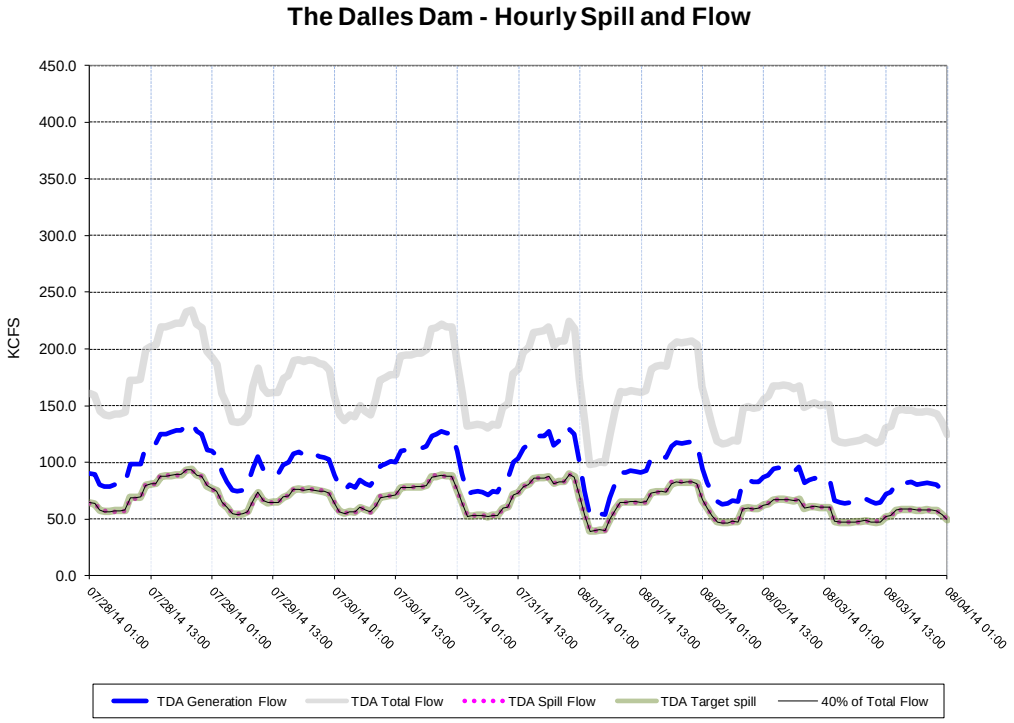
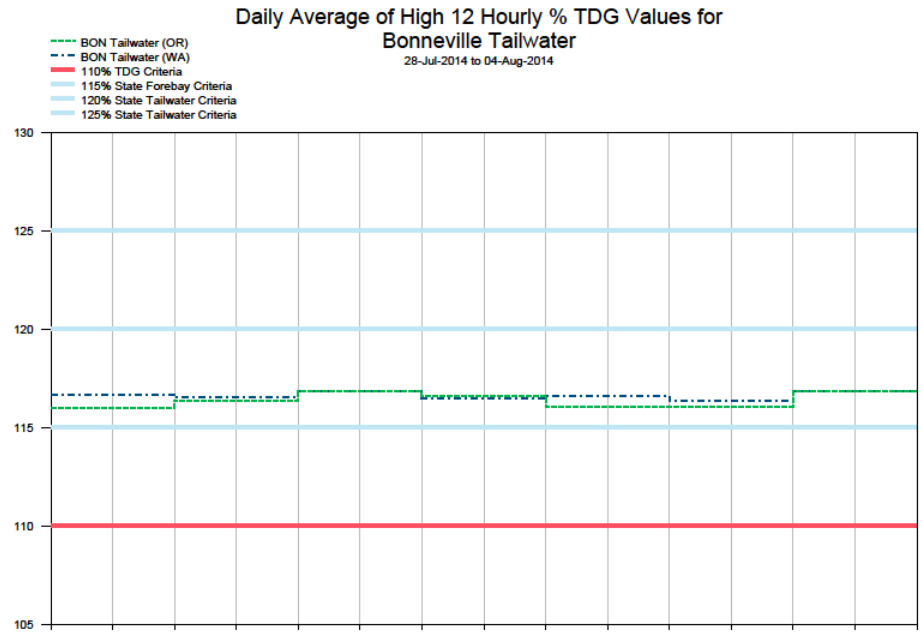

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/28/14 01:00
07/28/14 13:00
07/29/14 01:00
07/29/14 13:00
07/30/14 01:00
07/30/14 13:00
07/31/14 01:00
07/31/14 13:00
08/01/14 01:00
08/01/14 13:00
08/02/14 01:00
08/02/14 13:00
08/03/14 01:00
08/03/14 13:00
08/04/14 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
28-Jul-2014 to 04-Aug-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

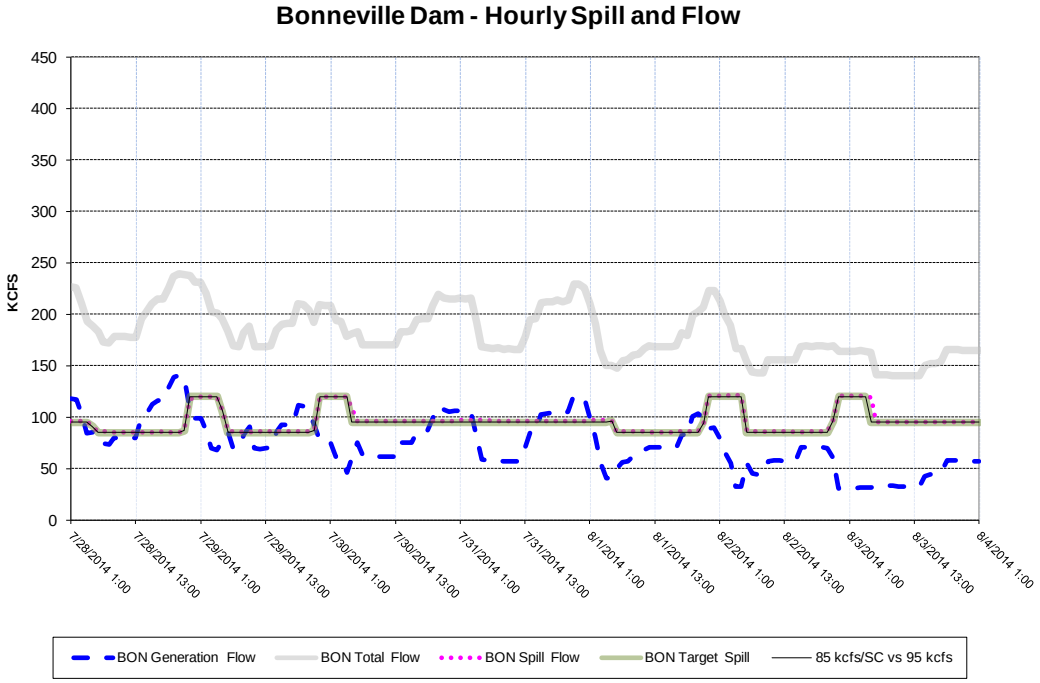

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/28/2014 1:00
7/28/2014 13:00
7/29/2014 1:00
7/29/2014 13:00
7/30/2014 1:00
7/30/2014 13:00
7/31/2014 1:00
7/31/2014 13:00
8/1/2014 1:00
8/1/2014 13:00
8/2/2014 1:00
8/2/2014 13:00
8/3/2014 1:00
8/3/2014 13:00
8/4/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Table 1
Average Percent TDG Values For June 30 – August 3

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
6/30/2014	101.4	111.2	109.7	111.2	112.1	116.8	112.8	115.3	112.5	119.2	~~119.2~~	108.2	117.1	~~117.0~~	112.8	118.8	~~118.8~~	115.3	~~118.7~~	119.4
7/1/2014	103.2	112.2	113.3	112.9	113.9	117.2	115.2	116.0	**115.8**	~~118.9~~	119.0	110.0	~~117.0~~	117.0	113.5	119.3	~~119.2~~	**117.2**	~~119.0~~	119.2
7/2/2014	103.7	112.9	114.4	113.3	113.6	117.0	**115.7**	115.9	**115.9**	118.9	~~118.9~~	110.5	~~114.7~~	115.8	113.7	~~118.1~~	119.1	**118.7**	119.7	~~119.3~~
7/3/2014	103.8	117.2	114.2	114.1	113.2	116.6	115.4	115.9	115.3	119.0	~~119.0~~	111.1	115.1	~~115.1~~	110.0	117.5	~~117.5~~	114.4	~~118.9~~	119.2
7/4/2014	103.4	114.1	113.2	112.6	113.2	115.9	115.0	115.1	114.4	~~118.6~~	118.6	111.6	117.1	~~117.1~~	111.4	117.5	~~117.5~~	111.3	~~117.3~~	118.5
7/5/2014	103.2	114.7	112.7	112.5	112.8	115.7	113.5	115.1	113.0	118.3	~~118.3~~	111.5	~~116.5~~	116.6	112.4	118.0	~~118.0~~	112.9	117.9	~~117.8~~
7/6/2014	101.8	114.8	112.6	112.0	112.5	115.6	113.2	115.4	113.0	118.5	~~118.4~~	110.3	~~113.3~~	114.8	113.1	~~117.7~~	117.7	114.3	~~118.0~~	118.1
7/7/2014	101.3	114.3	114.1	112.4	112.7	116.1	114.2	115.4	114.5	~~118.1~~	118.1	109.8	114.0	~~113.9~~	111.5	~~117.3~~	117.3	115.2	117.8	~~117.8~~
7/8/2014	102.8	114.4	**116.3**	113.3	113.6	116.7	115.3	115.0	115.1	117.8	~~117.8~~	111.8	115.8	~~115.8~~	112.5	118.0	~~118.0~~	115.2	~~117.3~~	117.9
7/9/2014	103.0	114.4	**116.2**	113.3	114.3	116.8	**116.3**	115.2	**116.1**	~~117.4~~	117.6	112.7	~~115.4~~	115.5	112.7	~~116.9~~	118.0	113.8	~~117.4~~	117.5
7/10/2014	102.9	115.1	**115.6**	114.4	114.4	116.5	**116.4**	114.9	**116.0**	117.6	~~117.6~~	113.0	~~114.1~~	115.0	110.9	116.9	~~116.9~~	110.8	117.9	~~117.6~~
7/11/2014	103.8	115.5	**115.5**	114.3	114.3	116.3	**116.2**	114.1	114.0	~~116.8~~	116.9	113.0	114.3	~~113.8~~	112.3	117.1	~~117.1~~	111.4	~~117.4~~	117.7
7/12/2014	103.4	115.1	115.2	113.6	113.6	116.3	115.4	114.3	112.3	117.3	~~117.1~~	112.9	116.5	~~116.4~~	113.5	118.0	~~117.9~~	113.3	~~116.8~~	117.3
7/13/2014	102.8	115.1	113.9	113.2	114.5	116.1	**115.5**	114.2	111.8	~~116.4~~	116.4	112.5	~~113.7~~	116.3	114.1	~~117.8~~	118.3	113.7	~~117.2~~	117.5
7/14/2014	103.2	115.3	113.9	113.7	114.4	116.0	**115.5**	114.1	111.0	116.6	~~116.3~~	111.8	~~113.1~~	113.7	112.4	~~116.6~~	117.1	113.3	117.6	~~117.4~~
7/15/2014	103.6	115.5	114.5	113.9	113.9	116.0	**115.6**	114.0	111.8	116.6	~~116.5~~	111.8	113.1	~~112.8~~	111.8	~~117.2~~	117.2	111.2	~~117.1~~	117.2
7/16/2014	103.6	115.5	114.5	113.8	113.7	116.5	**115.8**	113.7	113.1	117.6	~~117.6~~	112.7	117.4	~~117.4~~	112.5	~~117.9~~	117.9	112.1	~~116.6~~	117.2
7/17/2014	104.6	116.4	114.4	114.1	113.5	116.5	**115.8**	114.4	113.2	~~117.0~~	117.4	112.5	~~115.4~~	116.7	112.3	~~116.1~~	117.6	111.6	~~116.7~~	117.1
7/18/2014	104.4	116.0	113.8	113.9	113.4	116.5	**115.5**	114.6	111.9	~~116.8~~	116.8	109.2	~~114.4~~	115.2	108.4	~~114.3~~	115.2	108.6	117.4	~~117.2~~
7/19/2014	103.0	116.5	111.4	113.4	112.5	116.0	114.0	114.4	110.2	116.7	~~116.7~~	107.7	114.6	~~114.6~~	107.1	~~113.8~~	113.9	106.8	~~116.6~~	116.8
7/20/2014	102.8	116.4	110.5	113.2	111.7	116.1	113.7	114.1	108.6	~~116.8~~	116.8	107.1	114.8	~~114.8~~	107.6	113.8	~~113.7~~	107.0	~~115.9~~	116.4
7/21/2014	102.1	115.9	109.4	112.4	110.6	115.8	112.7	114.3	108.2	116.0	~~116.0~~	106.2	115.6	~~115.6~~	107.8	114.6	~~114.6~~	107.2	116.4	~~116.3~~
7/22/2014	100.8	116.6	107.4	111.8	108.9	115.6	111.0	114.0	106.5	116.1	~~116.0~~	104.2	~~113.5~~	114.9	109.3	~~115.4~~	115.4	109.4	~~117.1~~	117.3
7/23/2014	102.1	116.9	107.3	111.9	108.4	115.6	110.8	114.0	107.4	116.0	~~116.0~~	103.3	113.3	~~113.3~~	108.2	~~114.0~~	115.2	110.6	117.1	~~117.1~~
7/24/2014	102.1	116.8	106.5	111.2	108.1	115.1	110.4	113.9	106.8	115.5	~~115.3~~	103.4	113.1	~~113.0~~	106.5	~~113.2~~	113.2	109.3	~~115.8~~	116.4
7/25/2014	101.5	117.1	106.4	113.5	107.6	115.5	109.1	113.9	105.7	116.3	~~116.2~~	103.5	113.1	~~113.1~~	107.0	114.3	~~114.3~~	109.1	116.6	~~116.4~~
7/26/2014	101.5	117.2	106.0	113.4	107.7	115.7	109.6	114.5	106.9	116.9	~~116.9~~	104.2	112.8	~~112.7~~	107.5	114.5	~~114.5~~	110.7	~~117.0~~	117.2
7/27/2014	101.5	116.8	106.7	112.9	107.4	115.5	109.5	114.4	109.6	117.0	~~117.0~~	105.6	113.2	~~113.1~~	107.8	~~114.8~~	114.8	111.6	116.7	~~116.6~~
7/28/2014	101.4	116.6	106.8	112.8	108.4	115.8	111.1	114.0	111.5	117.0	~~117.0~~	105.9	113.8	~~113.7~~	108.8	~~115.6~~	115.6	111.8	~~116.2~~	116.8
7/29/2014	101.3	116.0	107.7	113.2	110.0	116.1	113.0	114.3	112.0	116.7	~~116.7~~	106.7	113.7	~~113.7~~	108.7	~~114.9~~	115.5	111.7	~~116.5~~	116.7
7/30/2014	102.6	116.0	109.5	114.3	110.4	115.8	113.5	114.2	112.2	116.8	~~116.8~~	108.2	114.0	~~114.0~~	108.2	114.9	~~114.9~~	110.4	~~116.9~~	117.0
7/31/2014	103.4	116.5	112.9	114.3	111.4	116.1	113.8	113.9	112.1	116.5	~~116.4~~	109.5	~~114.3~~	114.3	110.0	115.6	~~115.6~~	109.8	116.8	~~116.7~~
8/1/2014	104.1	116.8	113.9	114.4	111.9	115.8	114.4	113.7	111.8	117.0	~~117.0~~	110.9	114.9	~~114.9~~	111.1	116.1	~~116.1~~	111.1	~~116.3~~	116.8
8/2/2014	104.2	116.7	114.7	114.1	112.3	115.8	114.4	113.8	111.0	~~116.5~~	116.5	111.3	115.0	~~115.0~~	111.7	~~116.0~~	116.1	111.2	~~116.1~~	116.5
8/3/2014	104.0	116.6	114.4	113.6	112.8	116.1	114.0	114.2	110.1	~~115.0~~	115.7	111.3	115.1	~~115.1~~	111.7	115.6	~~115.6~~	110.7	117.0	~~117.0~~

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)

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
August 2014

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 2014 Summer Fish Operations Plan (FOP) posted to the TMT website on June 13, 2014. The 2014 Summer FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the summer fish migration season, generally mid-June through August. To the extent Corps project operations that are not specified in the 2014 Summer 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 2014 Water Management Plan (WMP), WMP seasonal updates, and the 2014 Fish Passage Plan (FPP).

The Corps' August 2014 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 2014 Summer FOP in August.

Data Reporting:

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

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

[1] Averages reported consistent with the current and applicable Oregon TDG waiver (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG waiver and the Washington TDG criteria adjustment 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 graphs begin on August 4 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.
Each figure represents one week of a project's operation. The graphs start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill graphs) on August 4 for the lower Snake River and the lower Columbia River projects.

August 4 – August 10	Figures 1 – 8
August 11 – August 17	Figures 9 – 16
August 18 – August 24	Figures 17 – 24
August 25 – August 31	Figures 25 – 32

A. Upper Graph: Displays the average daily %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 2014 Summer FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the Oregon 120%TDG waiver limit for the tailwater of the dam.
2. The blue dot-dash line represents the Washington 120%TDG criteria adjustment for the tailwater of the dam.
3. The black solid line represents the Washington 115%TDG criteria adjustment for the forebay of the next dam downstream.

B. Lower Graph: 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 river flow through the project 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 2014 Summer 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 river flow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2014 Summer 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 (50 kcfs) dam;
    - minimum spill at John Day is 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 2014 Summer FOP, the dotted pink line will be below or above the heavy green line in the graphs. Actual deviations from the target operation during voluntary spill hours are described below in the August 2014 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 reduction 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 2014 Summer 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 (except as otherwise noted in the 2014 Summer FOP for Bonneville and The Dalles dams,[4] which may range up to ±3 kcfs) as compared to those specified in the 2014 Summer 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

[3] Involuntary spill conditions appear in the graphs 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.

[4] As specified in the 2014 Summer FOP (p. 14), this applies when the spill level is below 40% of total flow at The Dalles Dam.

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 2014 Summer FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Report 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 2014 Summer 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.

August Operations:

The month of August was characterized by below average flows for the lower Snake River and slightly above average flows for the lower Columbia River. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the August 2014 adjusted volume runoff on the. lower Snake was below the 30 year average (1981-2010): 1.1 MAF or 86% of average as measured at Lower Granite Dam. For the lower Columbia, the Runoff Processor indicated the August 2014 adjusted volume runoff was above the 30 year average (1981-2010): 7.8 MAF (million acre feet) or 102% of average as measured at The Dalles. The monthly precipitation summary for August was well above average at 192% on the Snake River above Ice Harbor Dam and above average on the Columbia River above The Dalles Dam at 117%.

During the August reporting period, the planned 2014 Summer FOP spill operations were carried out as follows:

- Lower Granite Dam - The hourly target spill level was 18 kcfs 24-hours/day.
- Little Goose Dam - The hourly target spill level transitioned to uniform spill of 9 kcfs on August 1 and to 7 kcfs on August 22 as inflow decreased.
- Lower Monumental Dam - The hourly target spill level was 17 kcfs 24 hours/day.

- Ice Harbor Dam - The hourly target spill level was 45 kcfs during the daytime and the %TDG cap during the nighttime. Nighttime spill hours are 1800-0500.
- McNary Dam - The hourly target spill level was 50% of total river flow for 24-hours/day.
- John Day Dam - The hourly target spill level was 30% of total river flow for 24-hours/day. The Dalles Dam - The hourly target spill level was 40% of total river flow for 24-hours/day.
- Bonneville Dam - The hourly target spill level alternated every two days between 95 kcfs 24-hours/day vs. 85 kcfs daytime/121 kcfs nighttime.

Operational Adjustments

Dworshak Dam.

On August 15 at 1411 hours, turbine Unit 3 at Dworshak Dam was forced out of service due to a ground fault, reducing project turbine output from approximately 10 kcfs to 4.5 kcfs. Prior to the Unit 3 outage, the Corps had coordinated with TMT to maintain Dworshak total outflow at approximately 10 kcfs (full powerhouse) to provide cool water for temperature moderation in the lower Snake River and to draft Dworshak reservoir to elevation 1,535 feet by August 31, in accordance with the 2014 FCRPS BiOp. As a result of the Unit 3 outage and reduced project output, maintaining outflow at 10 kcfs to achieve BiOp temperature and elevation objectives would require spill in excess of the State of Idaho 110% TDG water quality standard. On August 18, the Corps provided information about the outage to regional salmon managers, and at the August 20 TMT meeting a Systems Operations Request (SOR) was submitted recommending the Corps increase output from Dworshak Dam though spill up to 120% TDG. The Corps coordinated with the Idaho Department of Environmental Quality (IDEQ) for a temporary exemption of the 110% TDG water quality standard. The Corps also coordinated with the Nez Perce Tribe and contacted the hatchery operators downstream of Dworshak Dam. The hatchery operators indicated that 120% TDG would have adverse impacts on hatchery smolts. IDEQ provided a short-term TDG standard exemption on August 22. Beginning that day at 1600 hours, the Corps implemented a spill operation targeting 115% TDG in the tailrace, resulting in total outflow of approximately 8.8 kcfs. During the period that the short-term exemption was implemented from August 22–31, Dworshak spill ranged from 3.3–4.3 kcfs (average 3.9 kcfs) and TDG ranged from 113.1–116.1% (average 114.7%). This operation was coordinated with TMT on August 20 and 27 and salmon managers either supported or did not object. The Dworshak reservoir was drafted to elevation 1535 feet on September 6.

August 2014 Spill Variance Table

Table 1: August 2014 (8/4 – 8/31) – Summer FOP Implementation Report Table

Project	Parameter	Date	Time[5]	Hours	Type	Reason
Lower Granite	Reduced Spill	8/14/14	0900	1	Maintenance	Spill was reduced from 18 kcfs to 13.3 kcfs to operate unit 6 for maintenance in addition to operating unit 5 at minimum generation (FOP Table 1).
Lower Granite	Reduced Spill	8/27/14	1300	1	Maintenance	Spill was reduced from minimum generation spill of 14.9 kcfs to 11.9 kcfs to operate unit 5 for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
Lower Monumental	Reduced Spill	8/8/14	0500	1	Maintenance	Spill was reduced from minimum generation spill of 14.4 kcfs to 13.0 kcfs to operate units for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
Lower Monumental	Reduced Spill	8/10/14	0200	1	Maintenance	Spill was reduced from minimum generation spill of 16.2 kcfs to 14.9 kcfs to operate units for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
Lower Monumental	Reduced Spill	8/10/14	1800	1	Navigation	Spill was reduced from minimum generation spill of 16.6 kcfs to 10.0 kcfs. Reduced spill for safe passage of a fish barge.
Lower Monumental	Reduced Spill	8/11/14	0600	1	Navigation	Spill was reduced from minimum generation spill of 16.6 kcfs to 14.9 kcfs. Reduced spill for safe passage of a commercial barge.
Lower Monumental	Reduced Spill	8/14/14	1800-1900	2	Navigation	Spill was reduced from minimum generation spill of 13.7 kcfs and 15.2 kcfs to 11.6 kcfs and 14.5 kcfs respectively. Reduced spill for safe passage of a fish barge.
Lower Monumental	Reduced Spill	8/16/14	0200-0400	3	Navigation	Spill was reduced to 0 kcfs to allow recovery of a barge that disconnected from the tug while passing below the spillway. After the barge was recovered and the tow reconnected, spill of approximately 15 kcfs resumed at 0400.
Lower Monumental	Reduced Spill	8/21/14	1700	1	Maintenance	Spill was reduced from minimum generation spill of 12.9 kcfs to 11.6 kcfs to operate unit 3 for maintenance in addition to operating unit 5 at minimum generation (FOP Table 1).

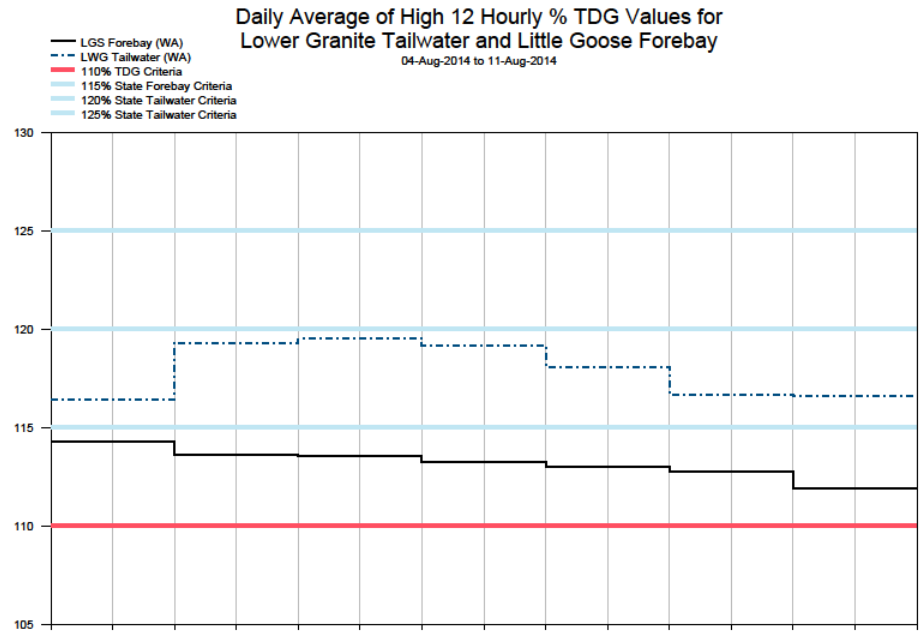
[5] Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Spill Variance Table as an hour.

Project	Parameter	Date	Time[5]	Hours	Type	Reason
Lower Monumental	Reduced Spill	8/27/14	0400	1	Maintenance	Spill was reduced from minimum generation spill of 12.0 kcfs to 9.9 kcfs to operate units for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
Lower Monumental	Reduced Spill	8/31/14	0100	1	Maintenance	Spill was reduced from minimum generation spill of 15.0 kcfs to 12.0 kcfs to operate units for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
Ice Harbor	Reduced Spill	8/7/14	0800	1	Maintenance	Spill was reduced from minimum generation spill of 20.0 kcfs to 18.9 kcfs to operate unit 2 for maintenance in addition to operating unit 1 at minimum generation (FOP Table 1).
Ice Harbor	Reduced Spill	8/7/14	1100-1200	2	Maintenance	Spill was reduced from minimum generation spill of 25.0 kcfs to 18.9 kcfs to operate unit 2 for maintenance in addition to operating unit 1 at minimum generation (FOP Table 1).
Ice Harbor	Reduced Spill	8/11/14	1600	1	Maintenance	Spill was reduced from minimum generation spill of 22.7 kcfs to 20.2 kcfs to operate unit 2 for maintenance in addition to operating unit 1 at minimum generation (FOP Table 1).
McNary	Reduced Spill	8/4/14	0200	1	Human/Program Error	Hourly spill decreased to 48.7% (below 50.0% ±1% range). Delay in changing to 88 kcfs. 24-hr avg spill 50.2%.
John Day	Reduced Spill	8/7/14	1300	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 30.0%.
John Day	Additional Spill	8/10/14	0100	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 p. 3-4). 24-hr avg spill 29.9%.
John Day	Reduced Spill	8/14/14	1000	1	Human/Program Error	Hourly spill decreased to 28.8% (below 30.0% ±1% range). Delay in changing to 47 kcfs. 24-hr avg spill 29.9%.
John Day	Additional Spill	8/19/14	2300	1	Human/Program Error	Hourly spill increased to 31.1% (above 30.0% ±1% range). Delay in changing to 36 kcfs. 24-hr avg spill 30.0%.

Project	Parameter	Date	Time[5]	Hours	Type	Reason
John Day	Additional Spill	8/20/14	0100	1	Transmission Stability	Hourly spill increased to 31.2% (above 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 30.1%.
John Day	Reduced Spill	8/28/14	0800	1	Transmission Stability	Hourly spill decreased to 28.9% (below 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 30.1%.
John Day	Reduced Spill	8/28/14	1300	1	Human/Program Error	Hourly spill decreased to 28.5% (below 30.0% ±1% range). No spill through bays 18-19 during planned closure of SWs. 24-hr avg spill 30.1%.
John Day	Additional Spill	8/28/14	1400	1	Human/Program Error	Hourly spill increased to 32.7% (above 30.0% ±1% range). Computer program was reconfiguring to new spill pattern after planned closure of SWs. 24-hr avg spill 30.1%.
John Day	Additional Spill	8/30/14	1400	1	Transmission Stability	Hourly spill increased to 31.4% (above 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 30.1%.
John Day	Additional Spill	8/30/14	1600	1	Transmission Stability	Hourly spill increased to 32.0% (above 30.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 30.1%.
The Dalles	Reduced Spill	8/11/14	1900	1	Transmission Stability	Hourly spill decreased to 37.9% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 39.8%.
The Dalles	Reduced Spill	8/28/14	1300	1	Transmission Stability	Hourly spill decreased to 37.4% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 39.8%.
The Dalles	Reduced Spill	8/28/14	1500	1	Transmission Stability	Hourly spill decreased to 37.4% (below 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p.3-4). 24-hr avg spill 39.8%.
The Dalles	Additional Spill	8/30/14	1600	1	Transmission Stability	Hourly spill increased to 43.0% (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 40.2%.

Project	Parameter	Date	Time[5]	Hours	Type	Reason
The Dalles	Additional Spill	8/30/14	1700	1	Transmission Stability	Hourly spill increased to 41.5 % (above 40.0% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg spill 40.2%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
04-Aug-2014 to 11-Aug-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

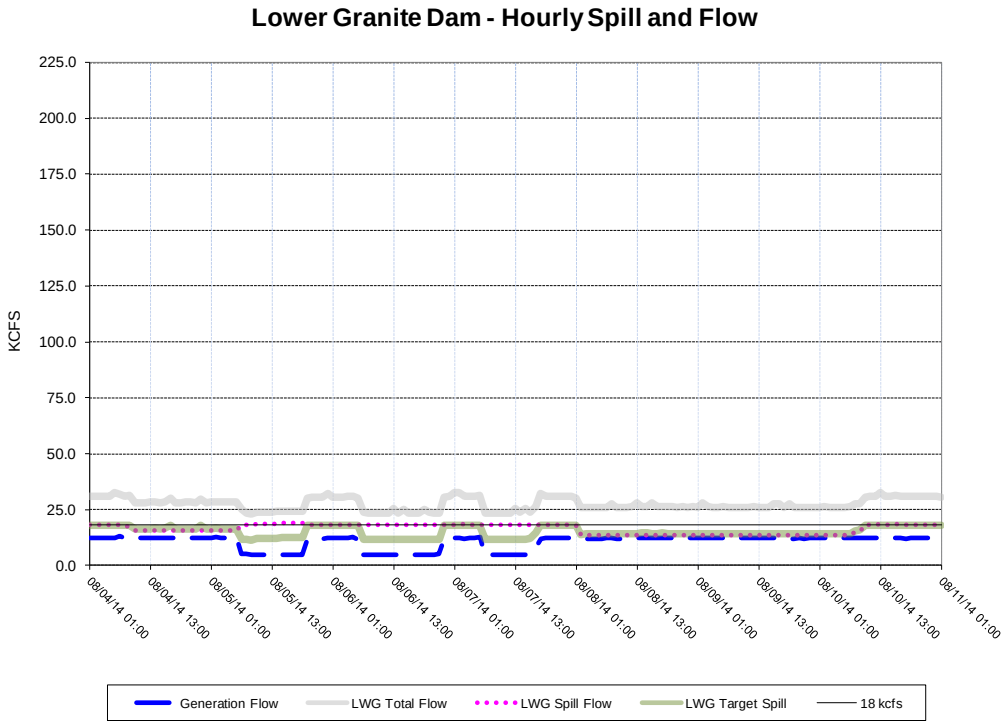
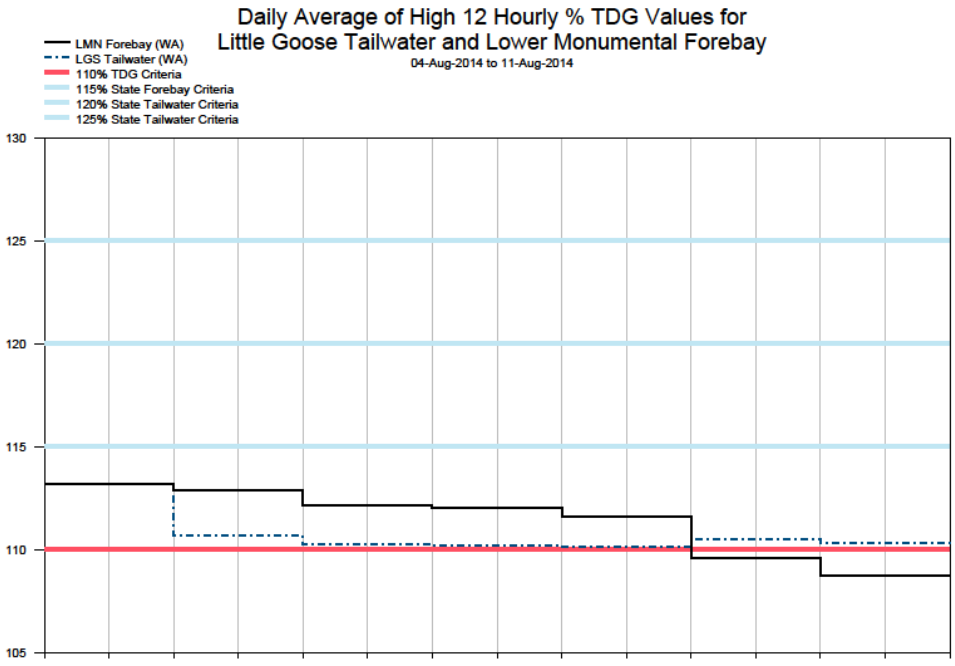
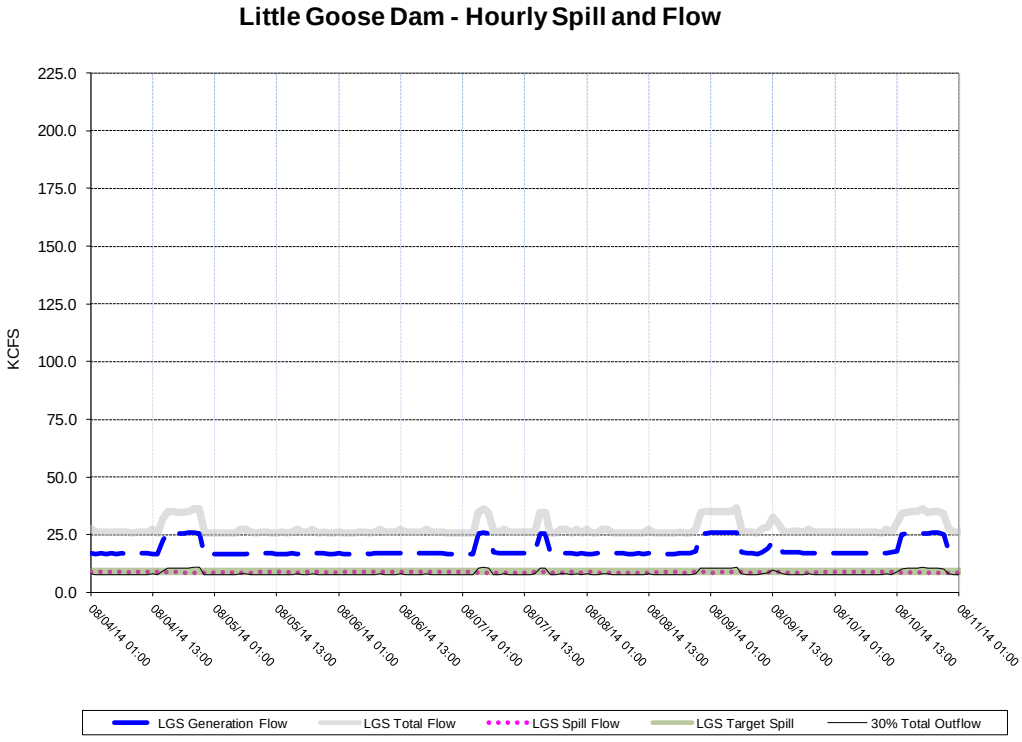

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 2


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
04-Aug-2014 to 11-Aug-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
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
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
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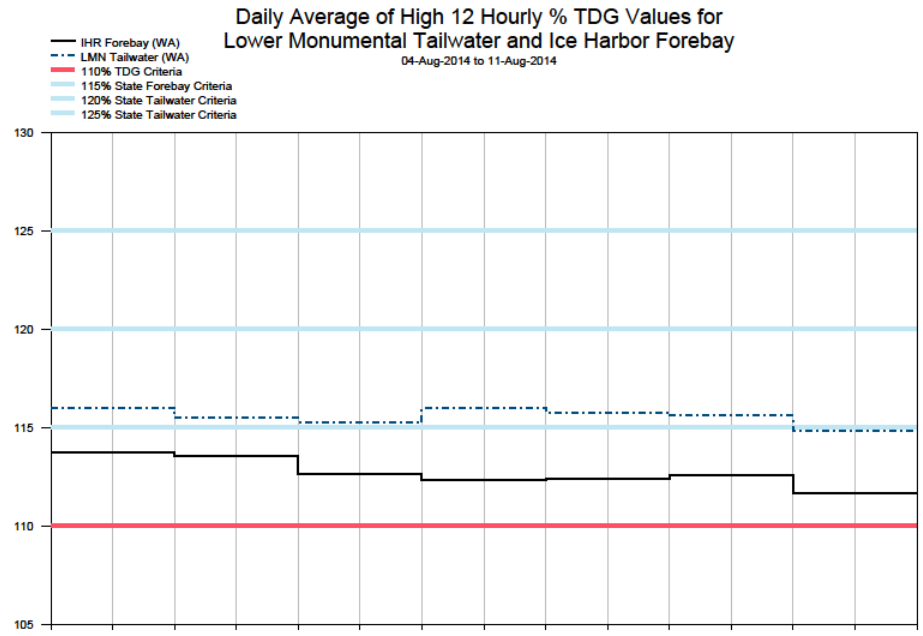
08/11/14 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
04-Aug-2014 to 11-Aug-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

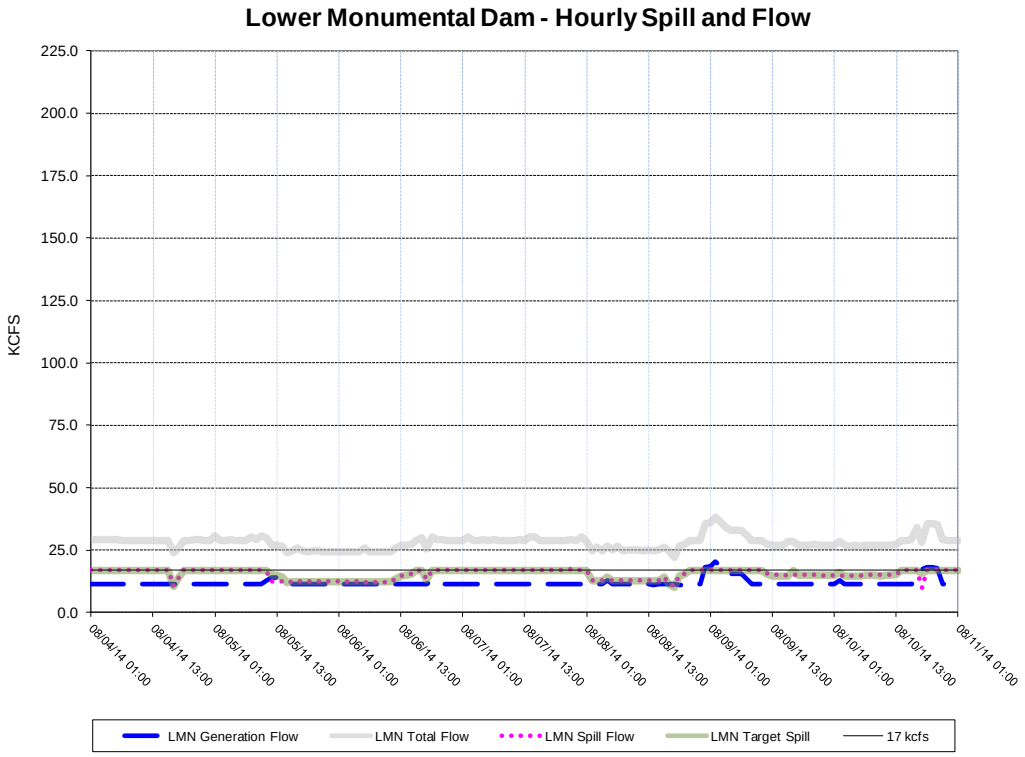
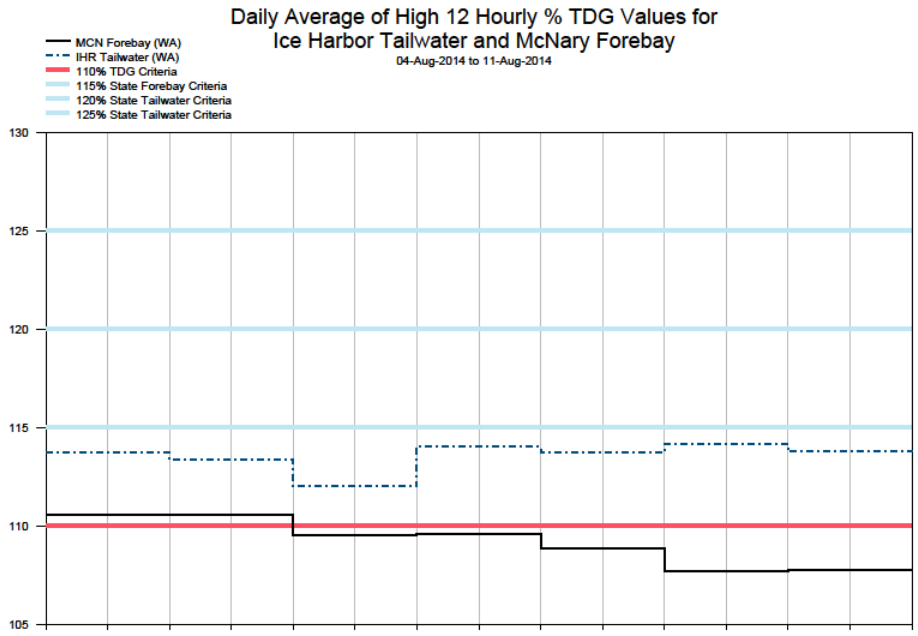

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
04-Aug-2014 to 11-Aug-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

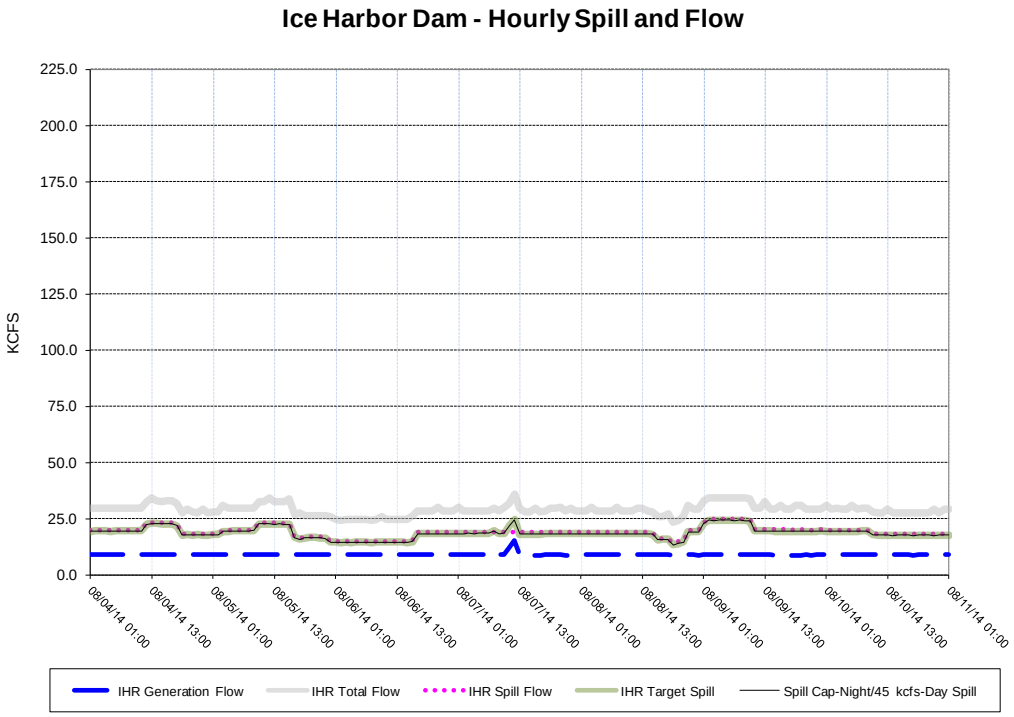
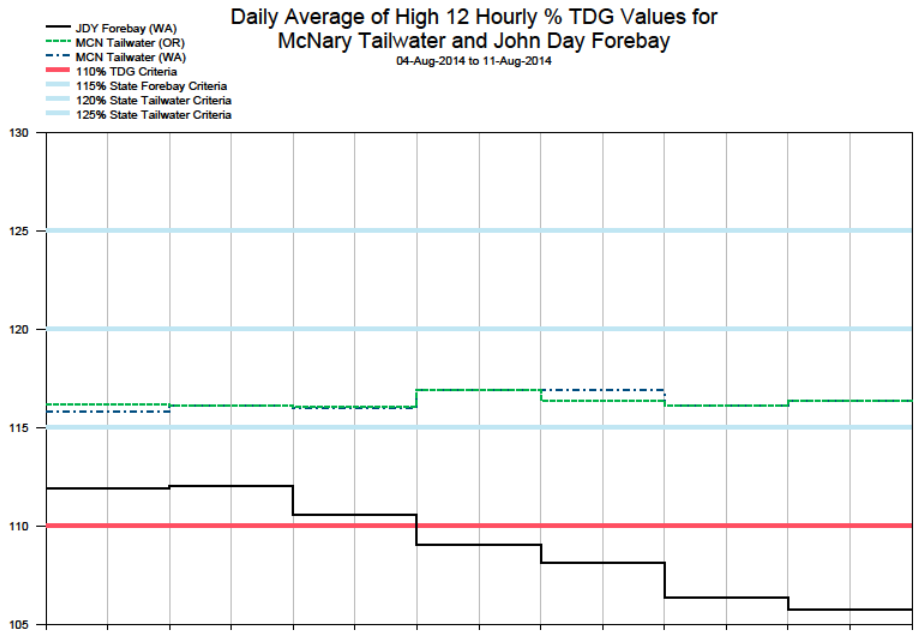

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 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
04-Aug-2014 to 11-Aug-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

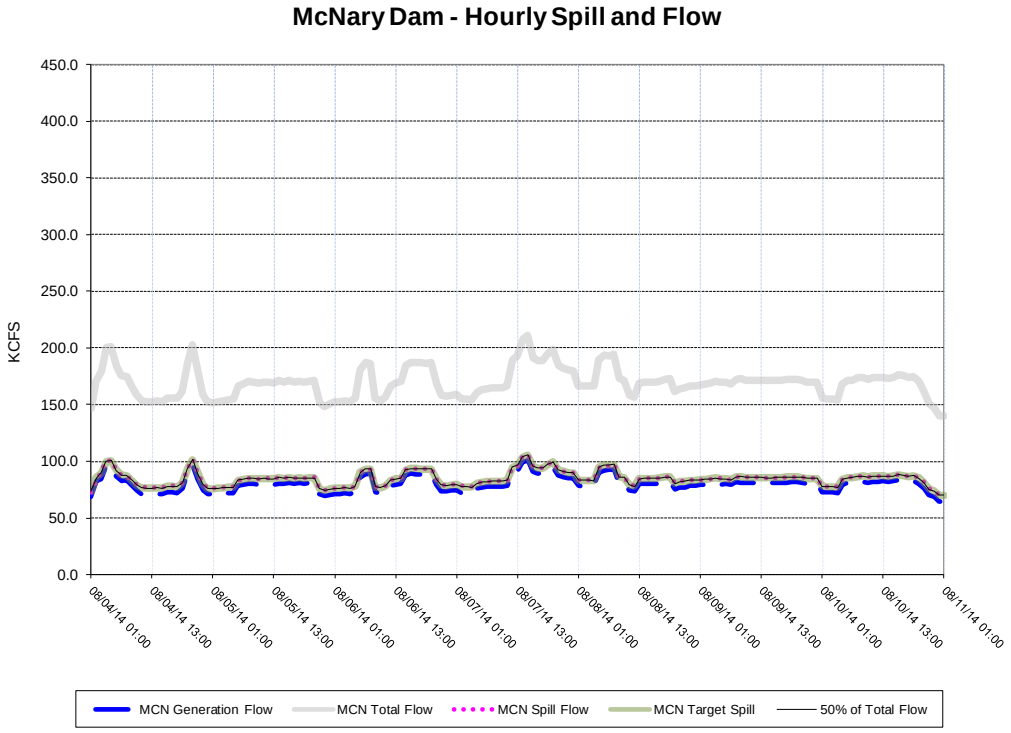
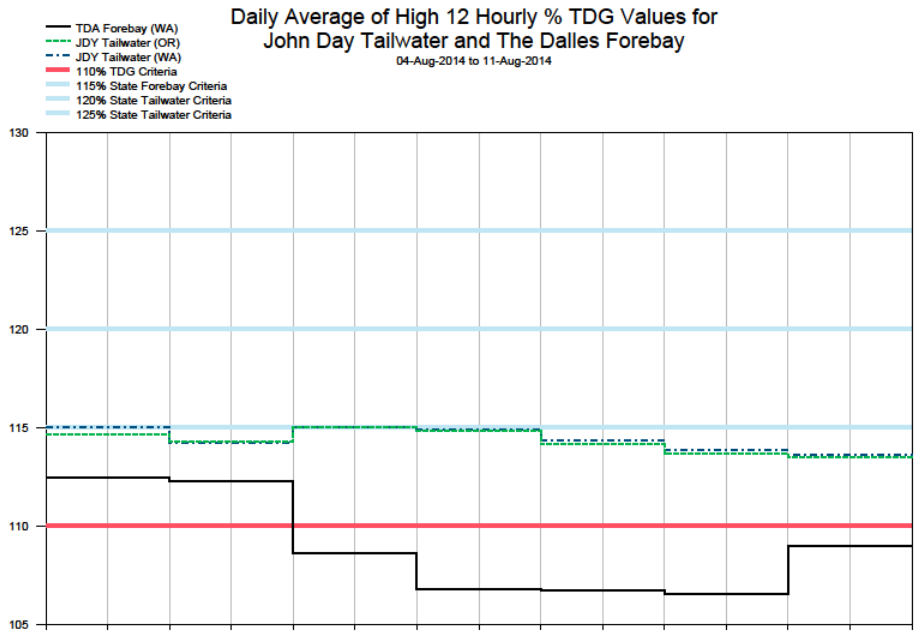

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 6


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
04-Aug-2014 to 11-Aug-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

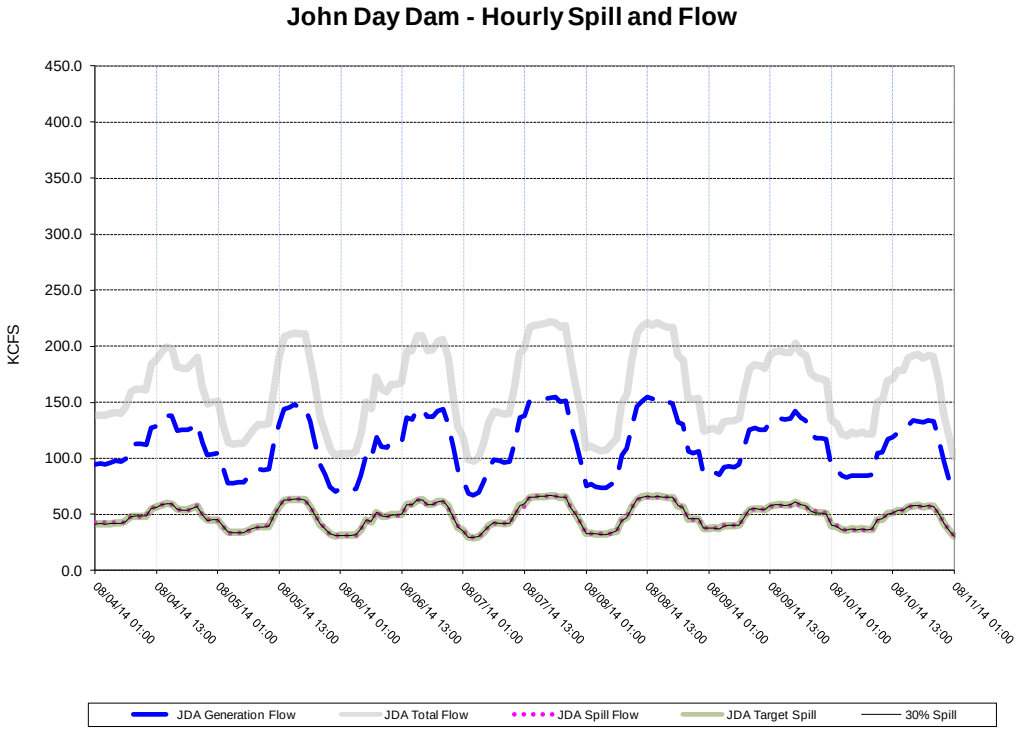
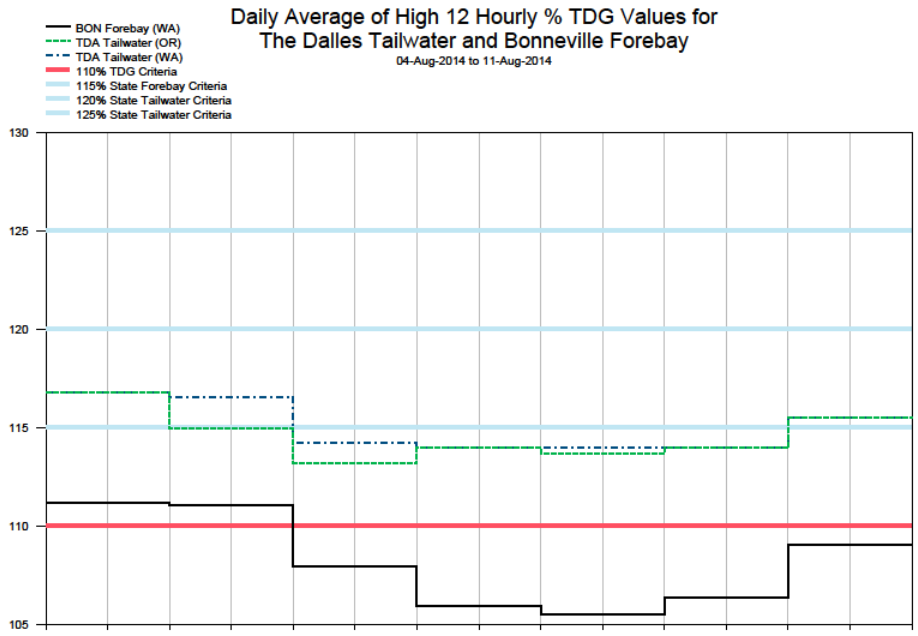

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
04-Aug-2014 to 11-Aug-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

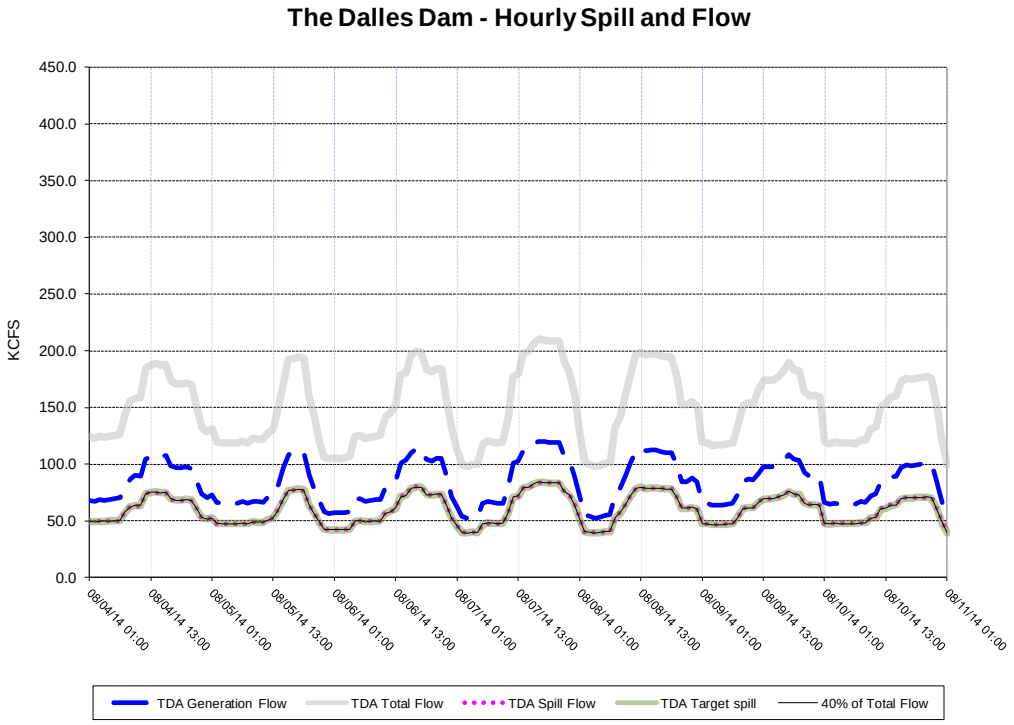
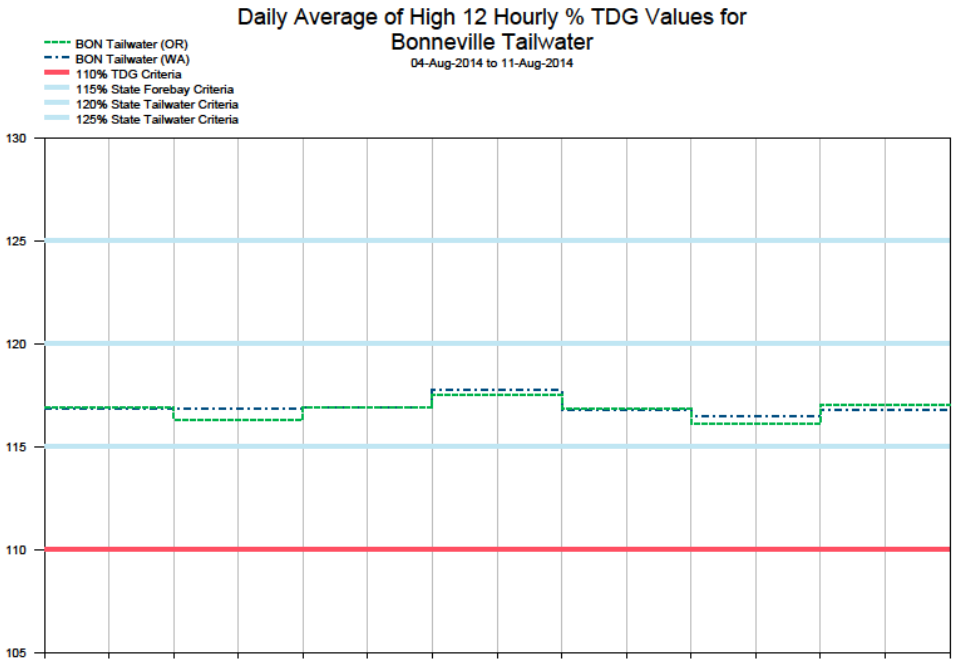

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/04/14 01:00
08/04/14 13:00
08/05/14 01:00
08/05/14 13:00
08/06/14 01:00
08/06/14 13:00
08/07/14 01:00
08/07/14 13:00
08/08/14 01:00
08/08/14 13:00
08/09/14 01:00
08/09/14 13:00
08/10/14 01:00
08/10/14 13:00
08/11/14 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
04-Aug-2014 to 11-Aug-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

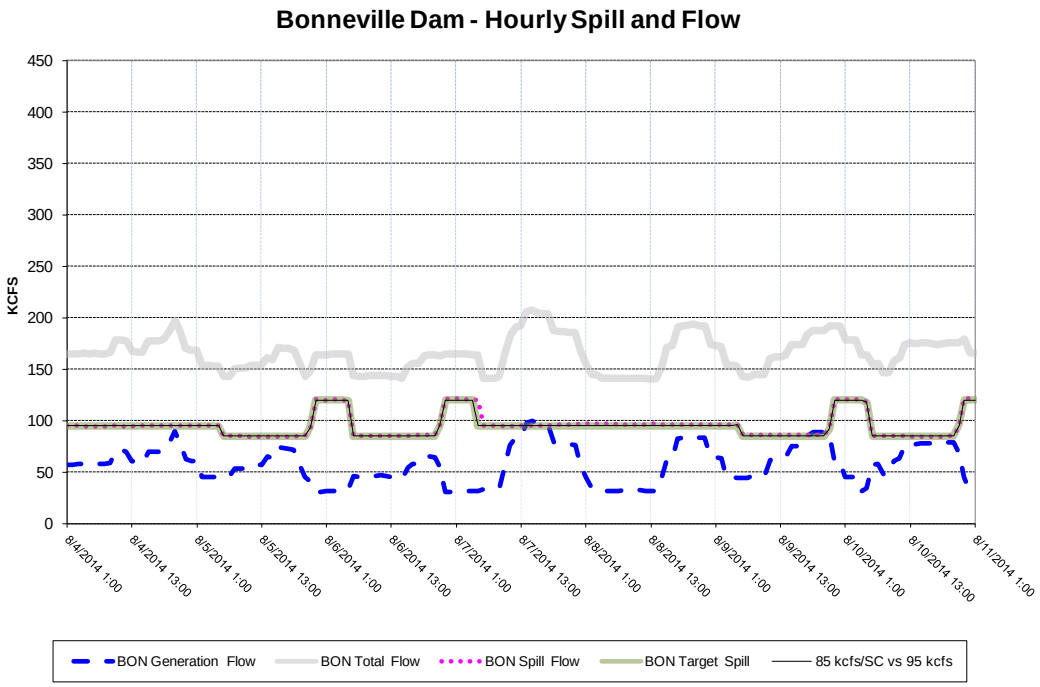
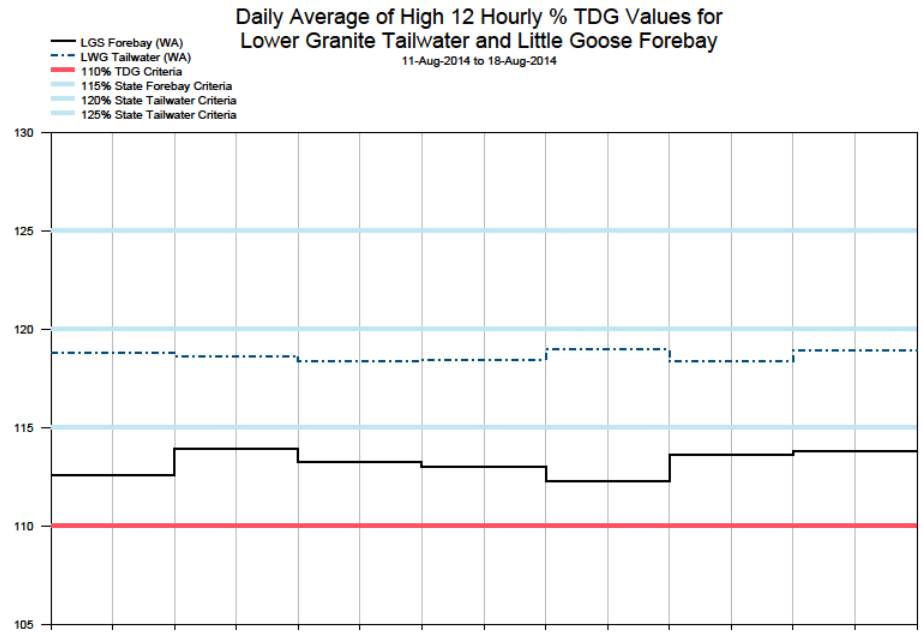

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/4/2014 1:00
8/4/2014 13:00
8/5/2014 1:00
8/5/2014 13:00
8/6/2014 1:00
8/6/2014 13:00
8/7/2014 1:00
8/7/2014 13:00
8/8/2014 1:00
8/8/2014 13:00
8/9/2014 1:00
8/9/2014 13:00
8/10/2014 1:00
8/10/2014 13:00
8/11/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
11-Aug-2014 to 18-Aug-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

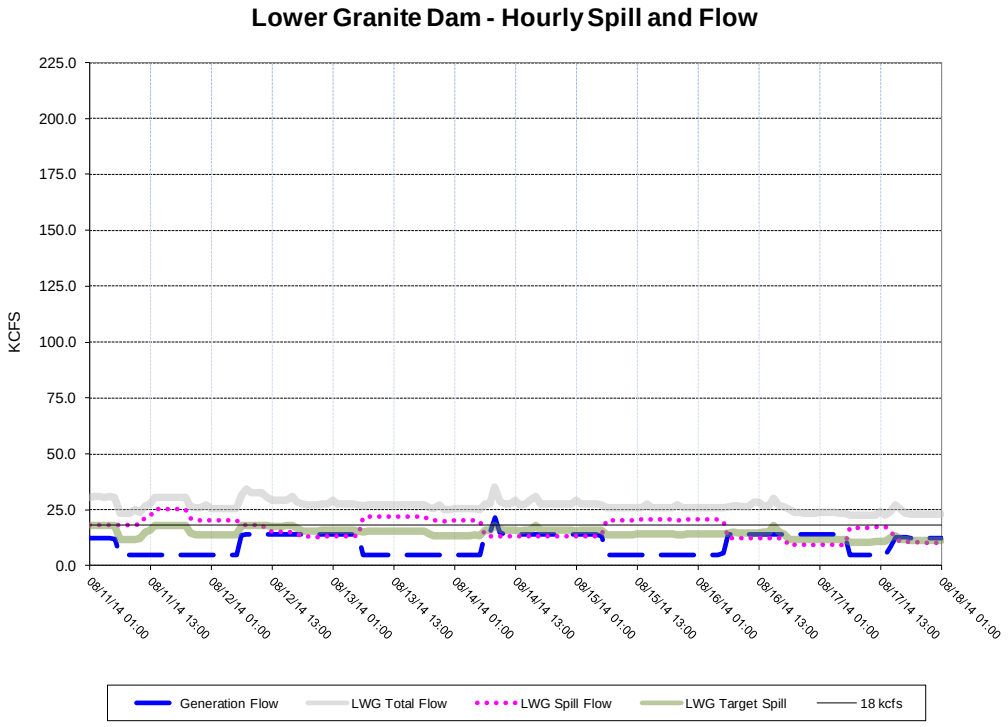
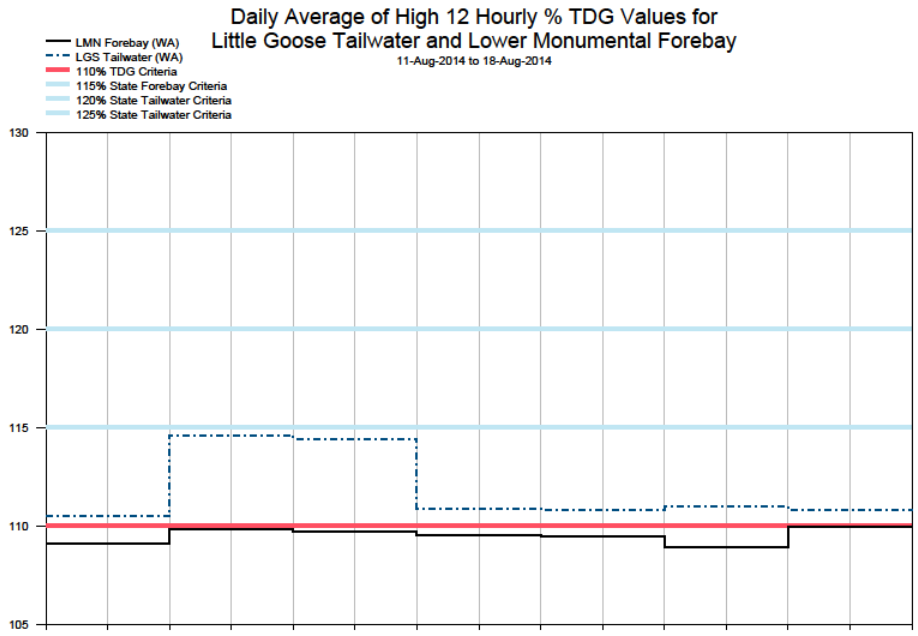

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 10


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
11-Aug-2014 to 18-Aug-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

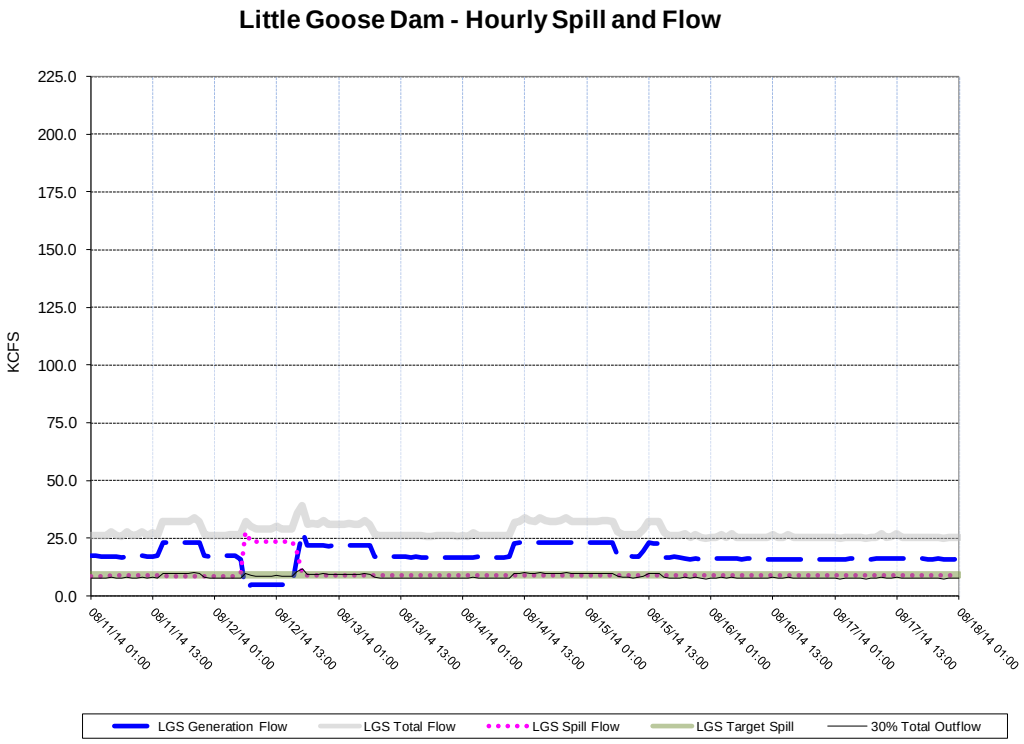
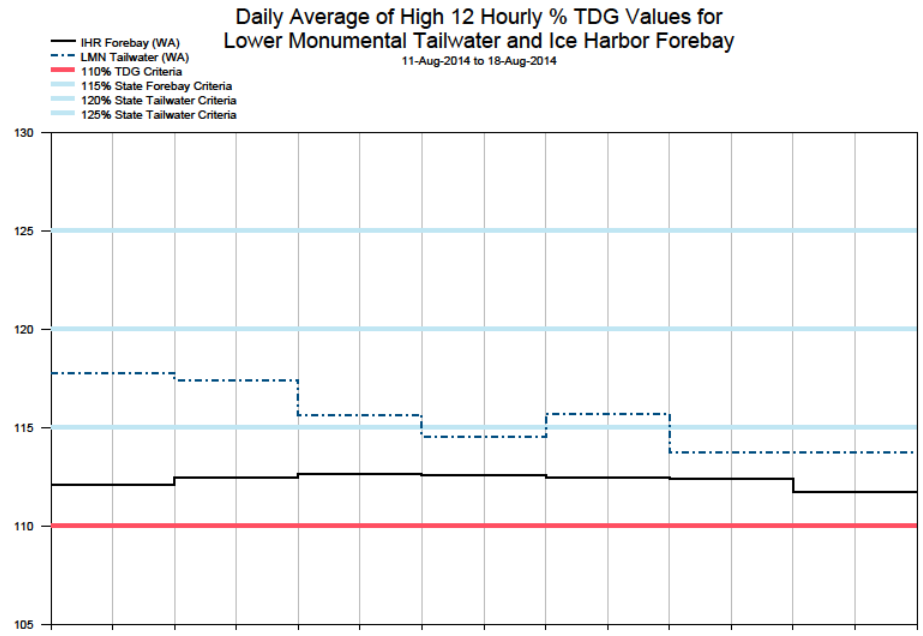

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 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
11-Aug-2014 to 18-Aug-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

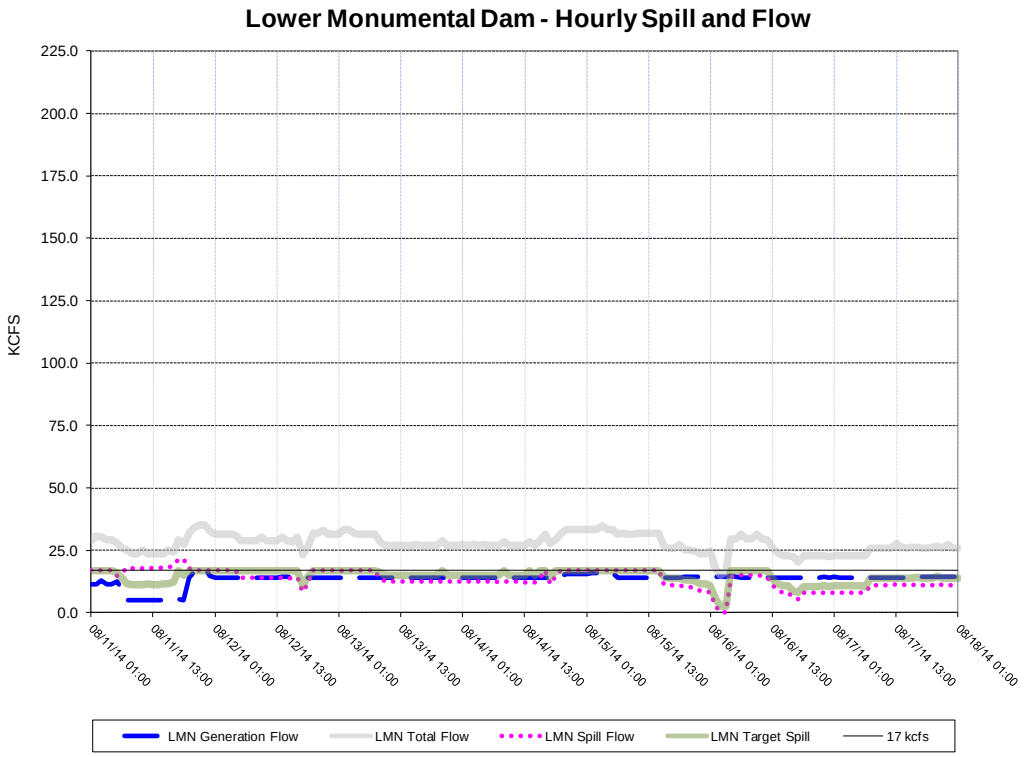
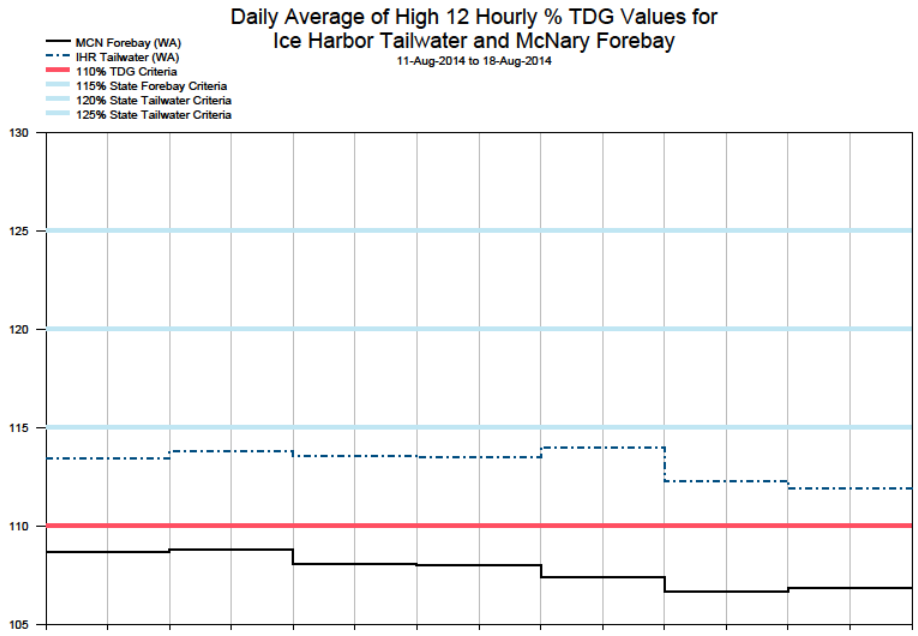

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
11-Aug-2014 to 18-Aug-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

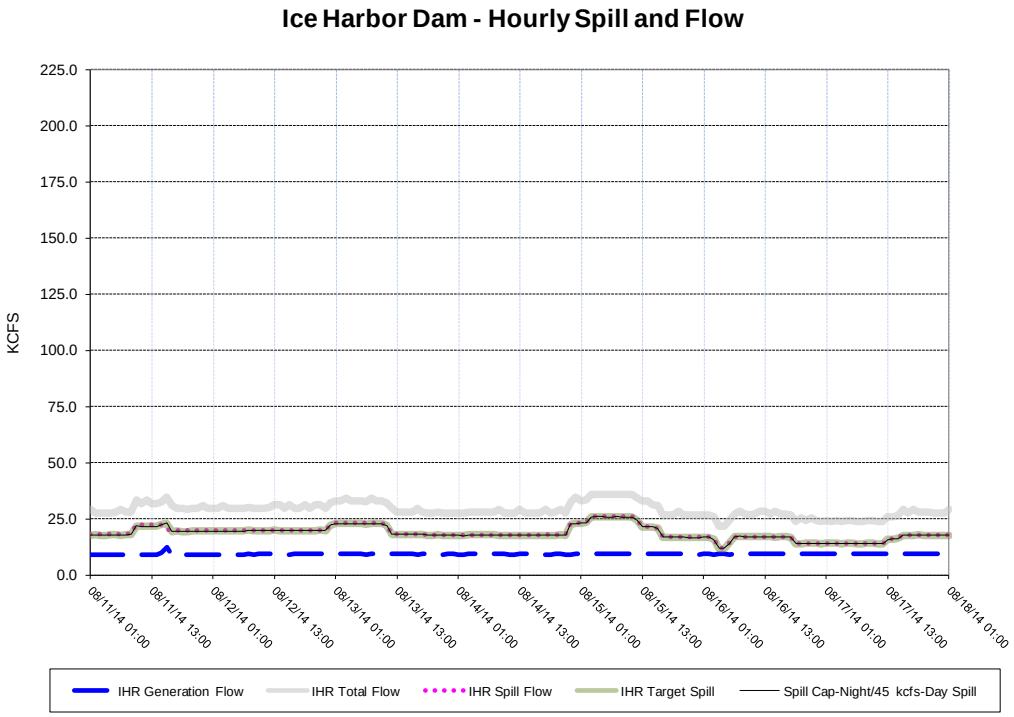
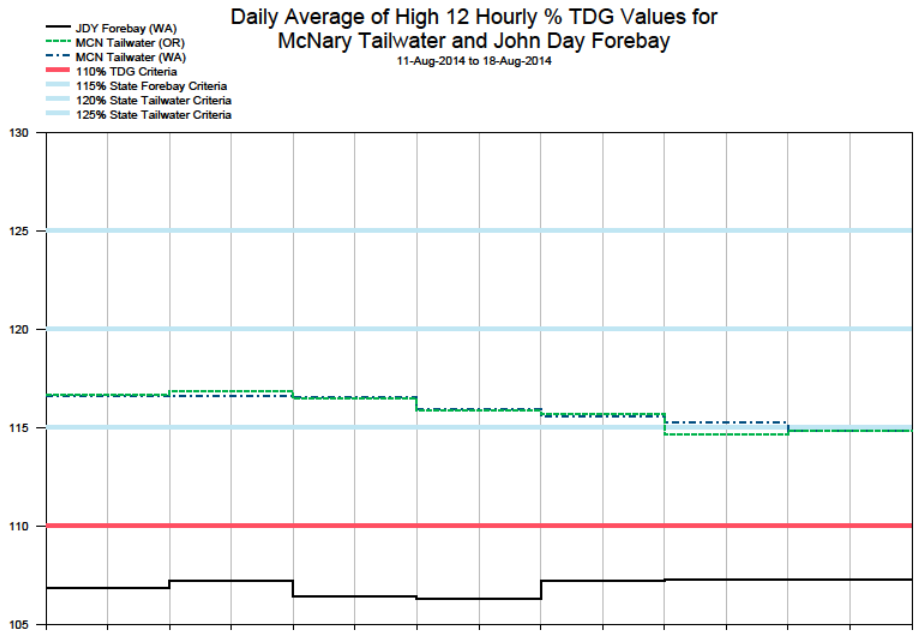

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
11-Aug-2014 to 18-Aug-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

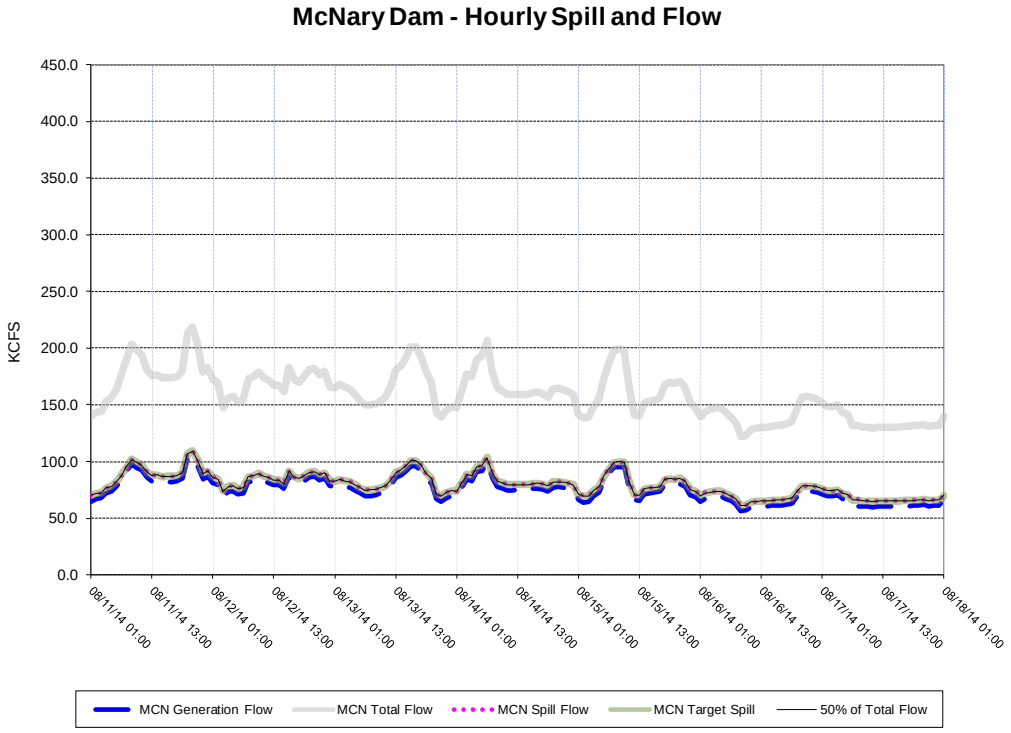
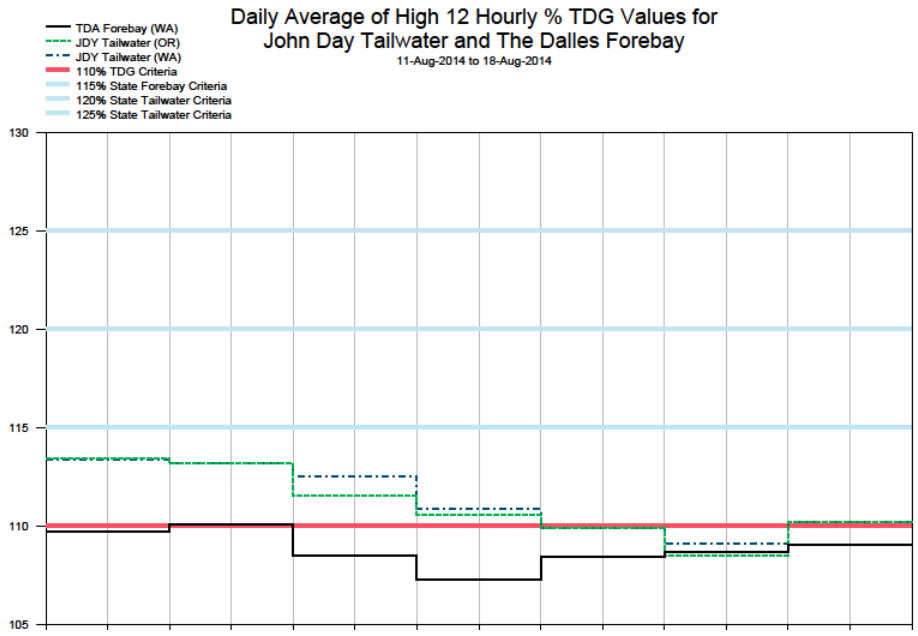

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 14


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
11-Aug-2014 to 18-Aug-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

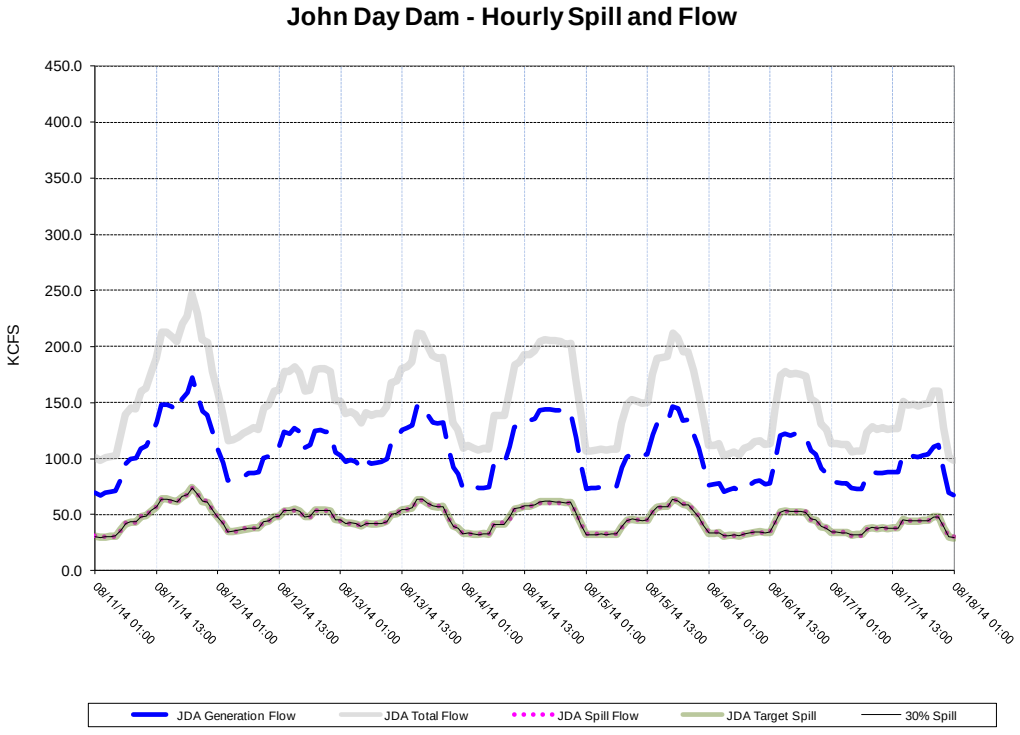
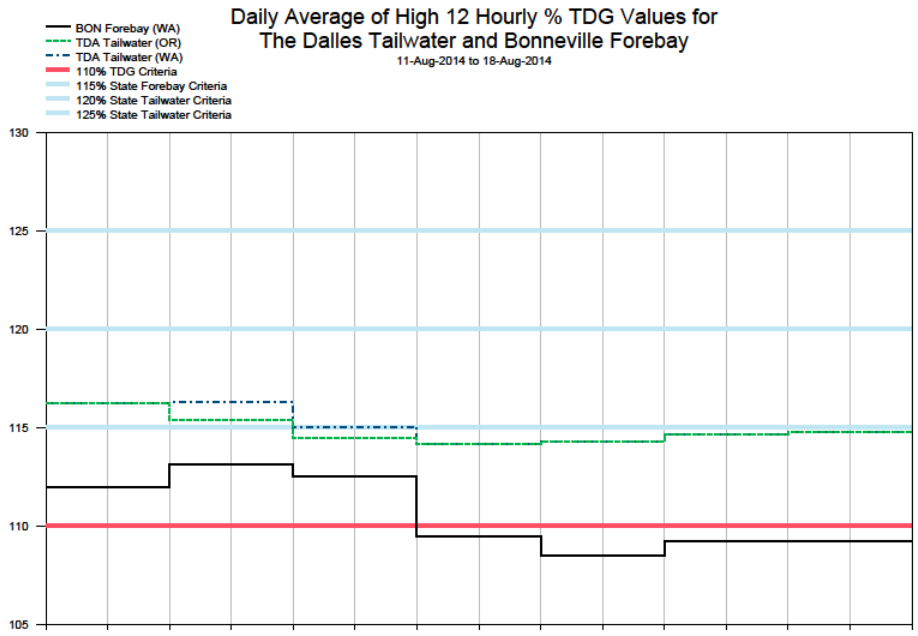

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
11-Aug-2014 to 18-Aug-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

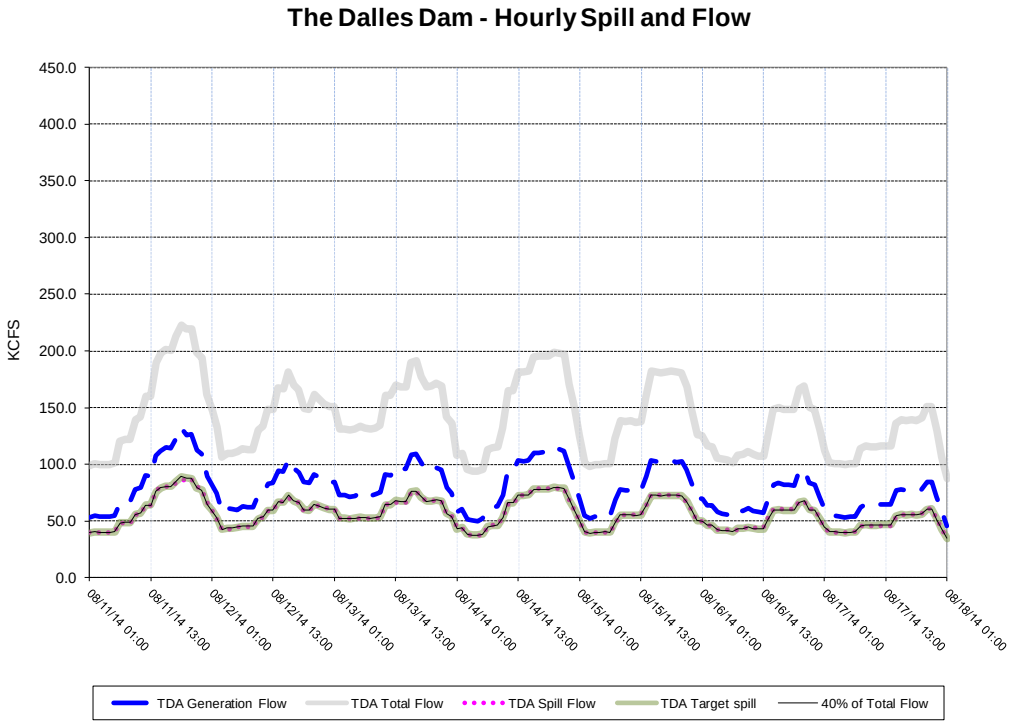
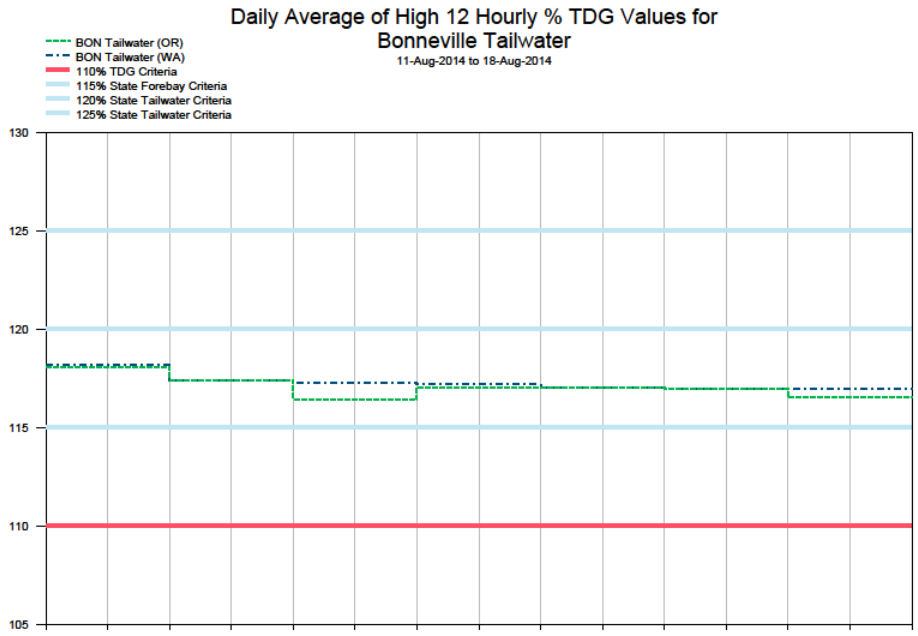

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/11/14 01:00
08/11/14 13:00
08/12/14 01:00
08/12/14 13:00
08/13/14 01:00
08/13/14 13:00
08/14/14 01:00
08/14/14 13:00
08/15/14 01:00
08/15/14 13:00
08/16/14 01:00
08/16/14 13:00
08/17/14 01:00
08/17/14 13:00
08/18/14 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
11-Aug-2014 to 18-Aug-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

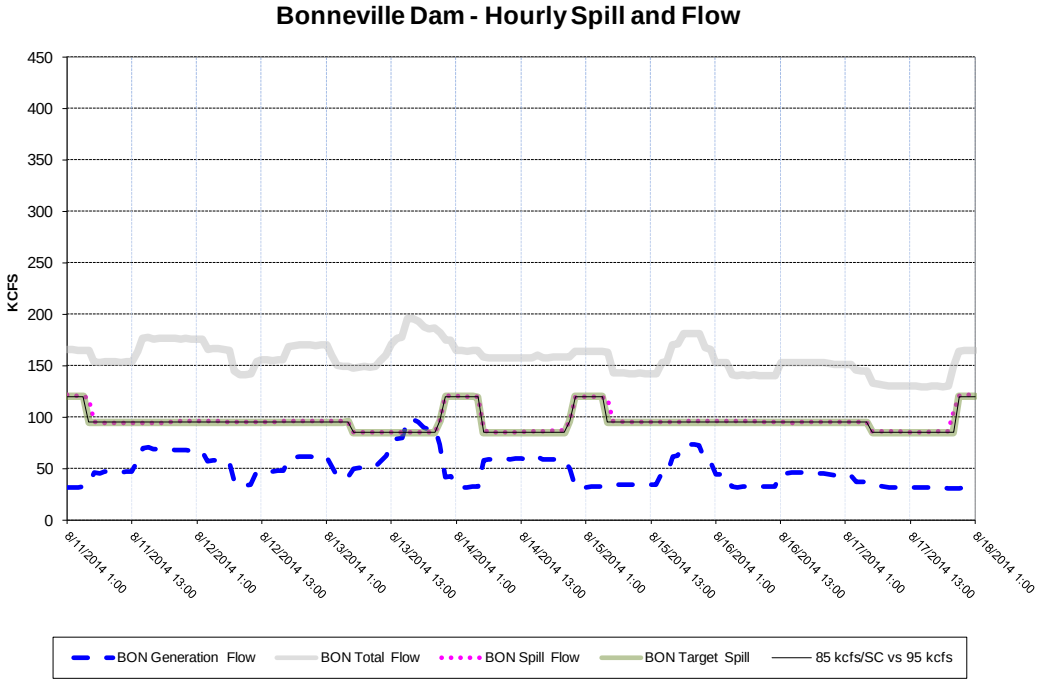
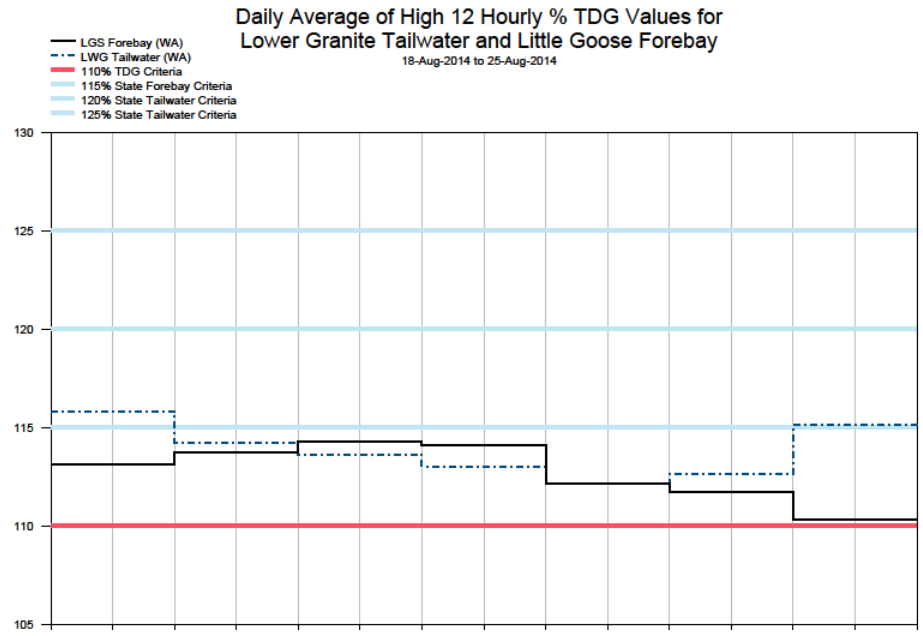

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/11/2014 1:00
8/11/2014 13:00
8/12/2014 1:00
8/12/2014 13:00
8/13/2014 1:00
8/13/2014 13:00
8/14/2014 1:00
8/14/2014 13:00
8/15/2014 1:00
8/15/2014 13:00
8/16/2014 1:00
8/16/2014 13:00
8/17/2014 1:00
8/17/2014 13:00
8/18/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
18-Aug-2014 to 25-Aug-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

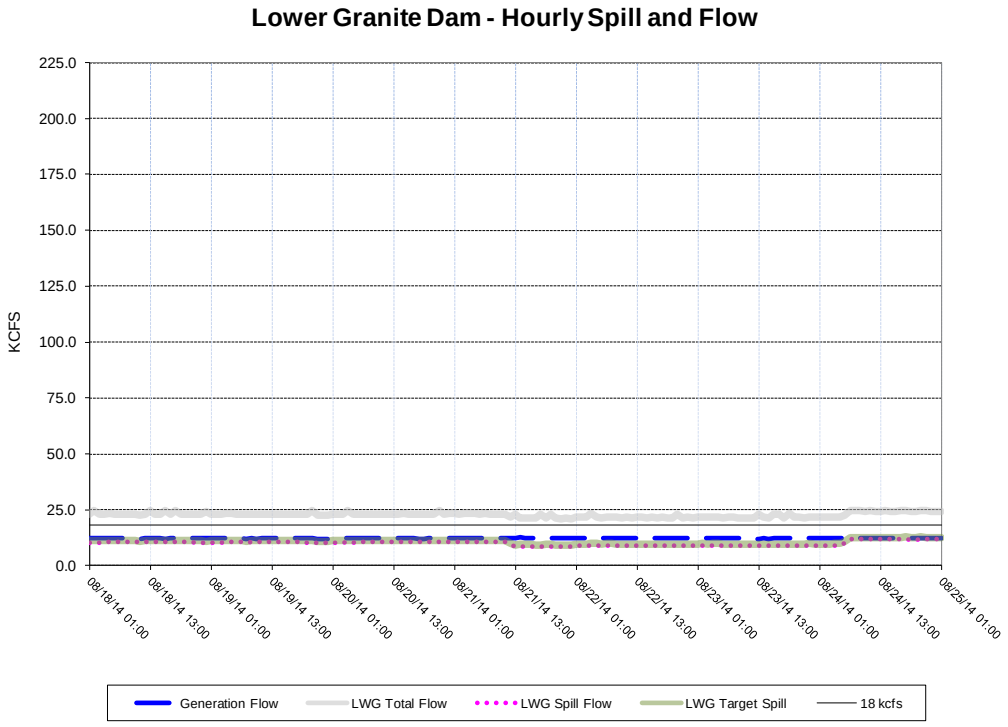
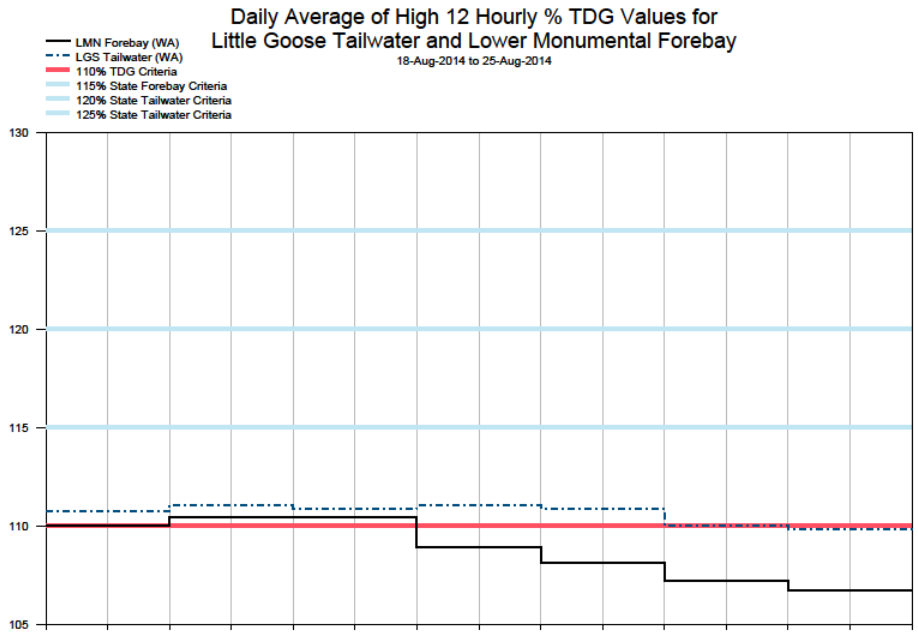

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 18


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
18-Aug-2014 to 25-Aug-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

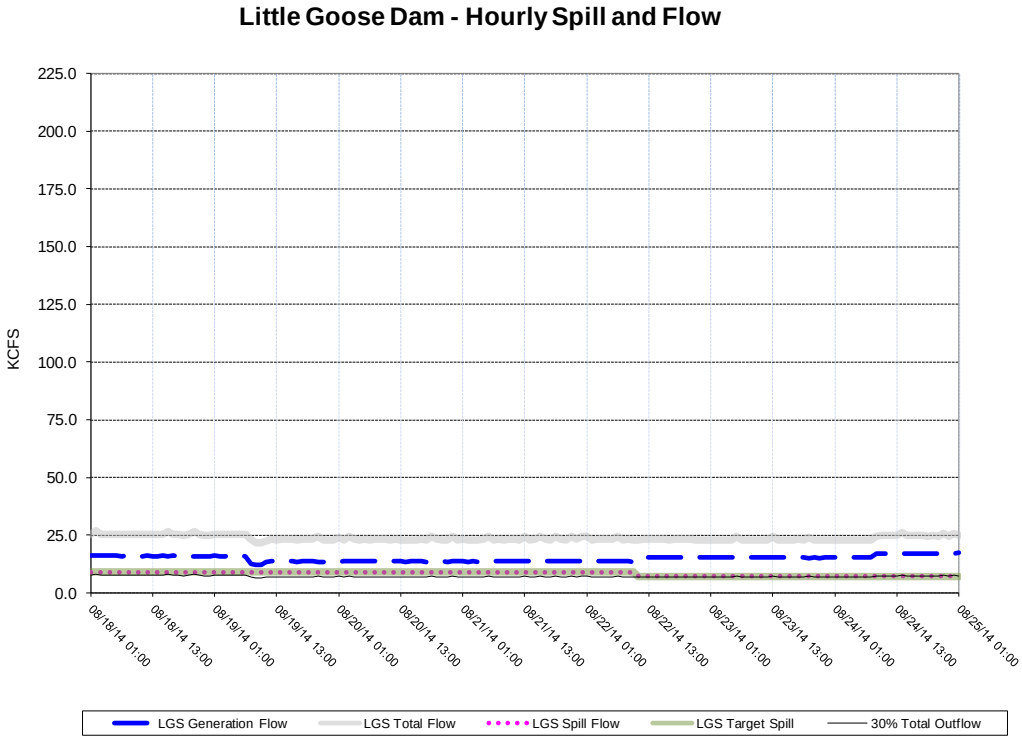
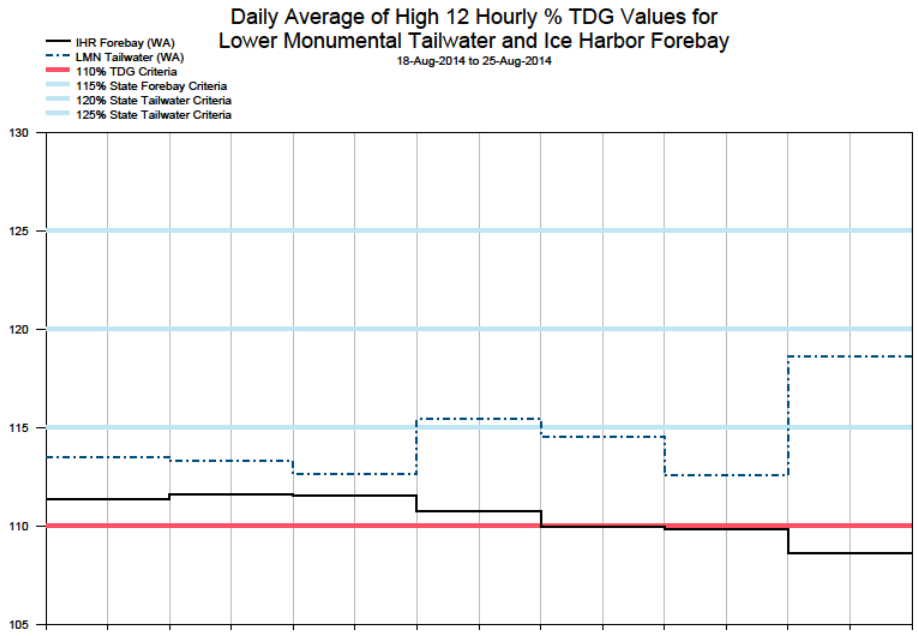

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 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
18-Aug-2014 to 25-Aug-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

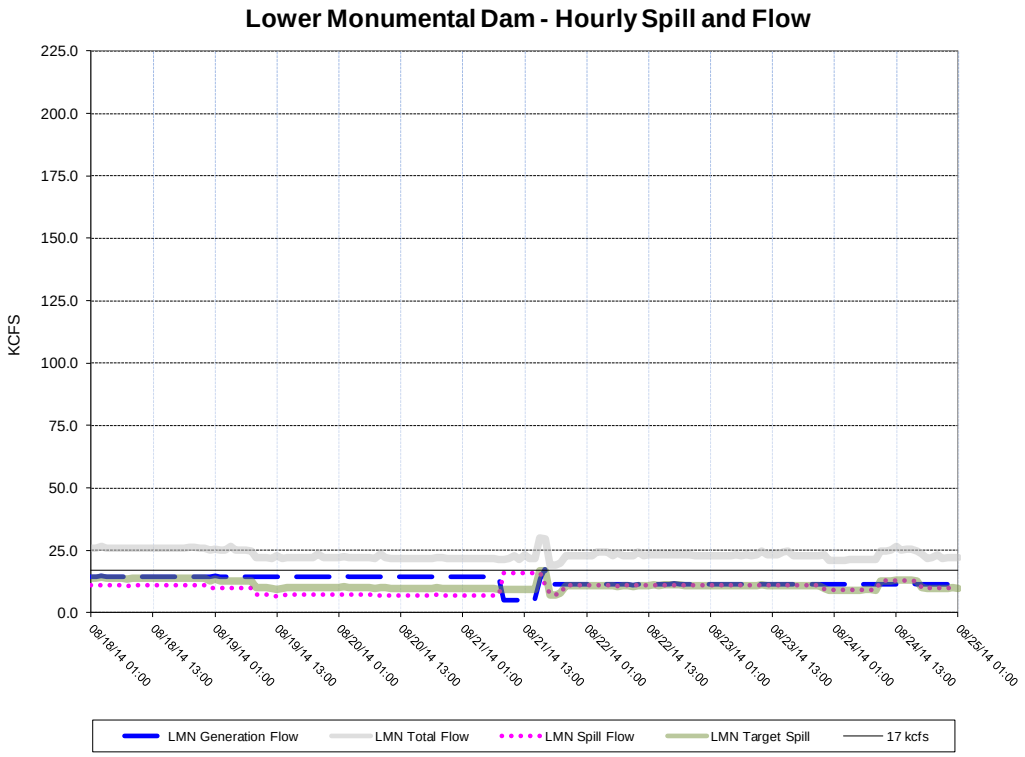
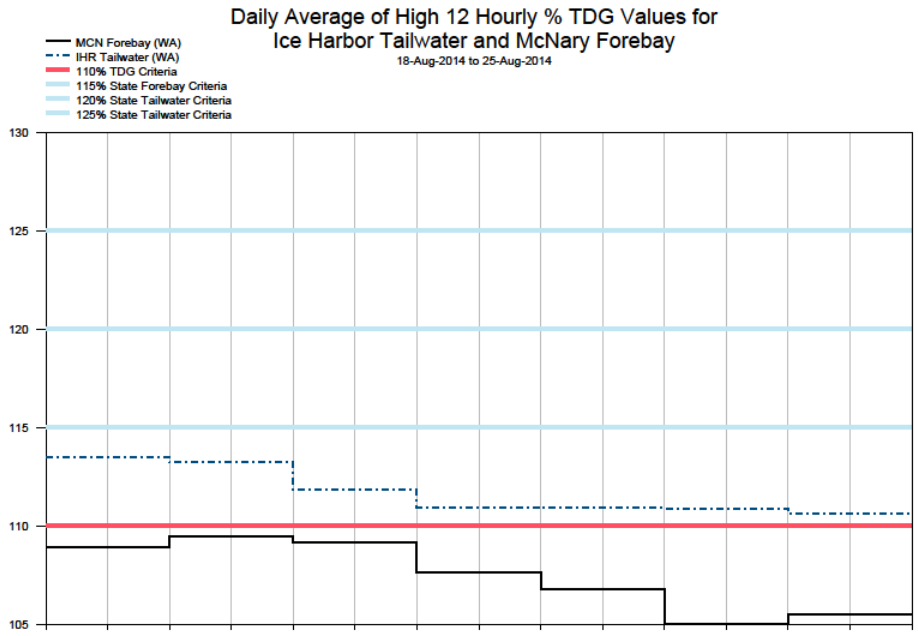

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 20


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
18-Aug-2014 to 25-Aug-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

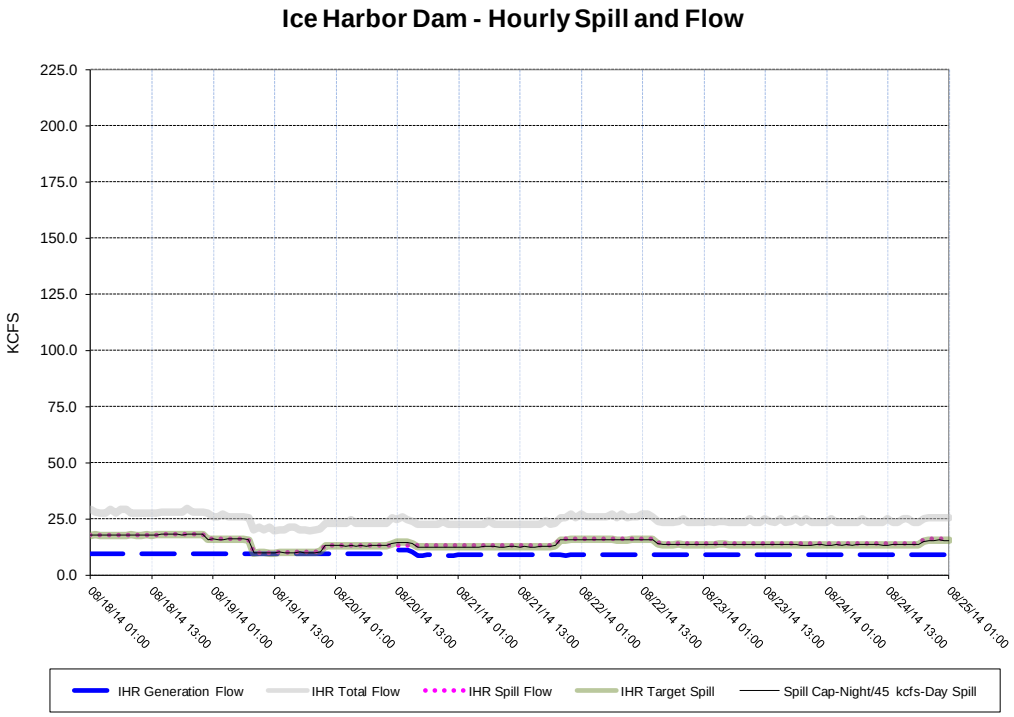
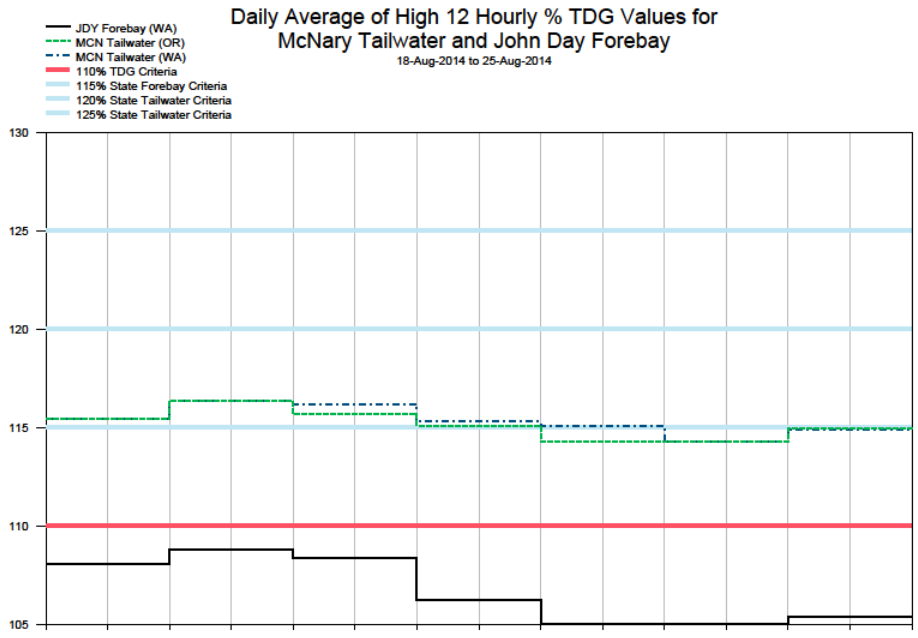

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
18-Aug-2014 to 25-Aug-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

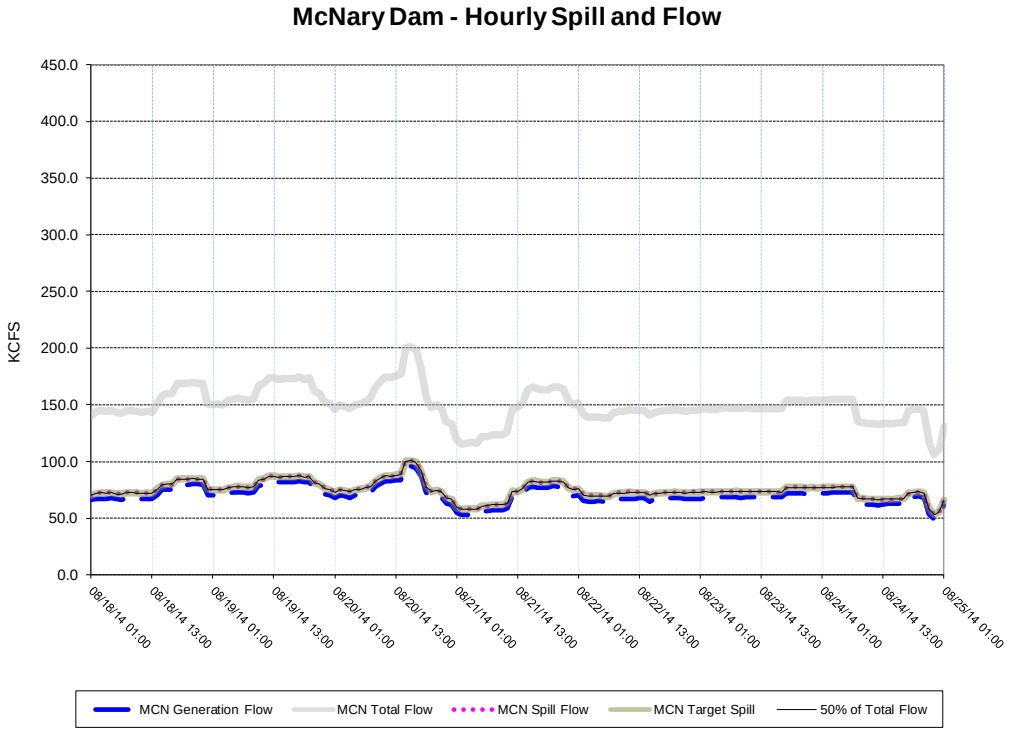
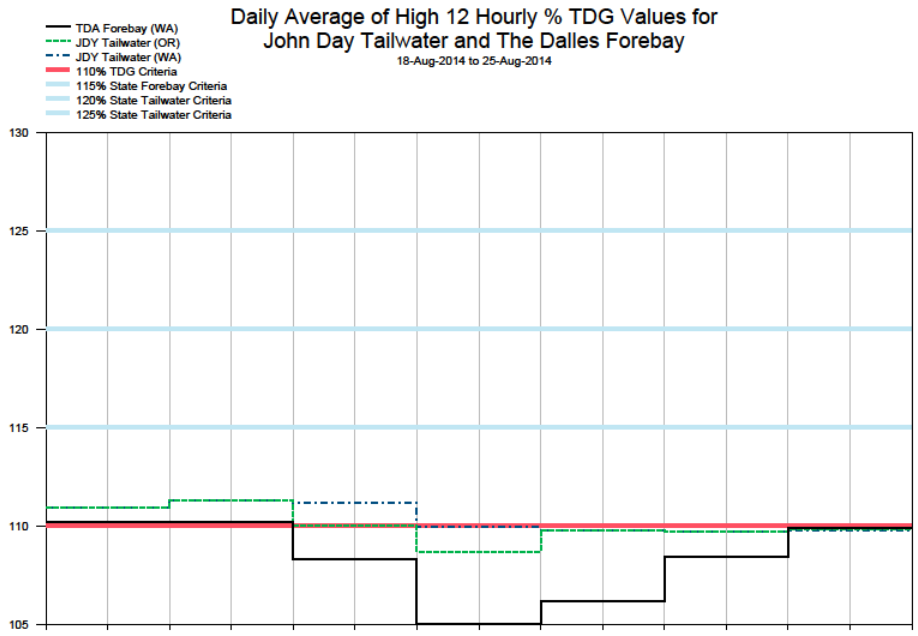

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 22


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
18-Aug-2014 to 25-Aug-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

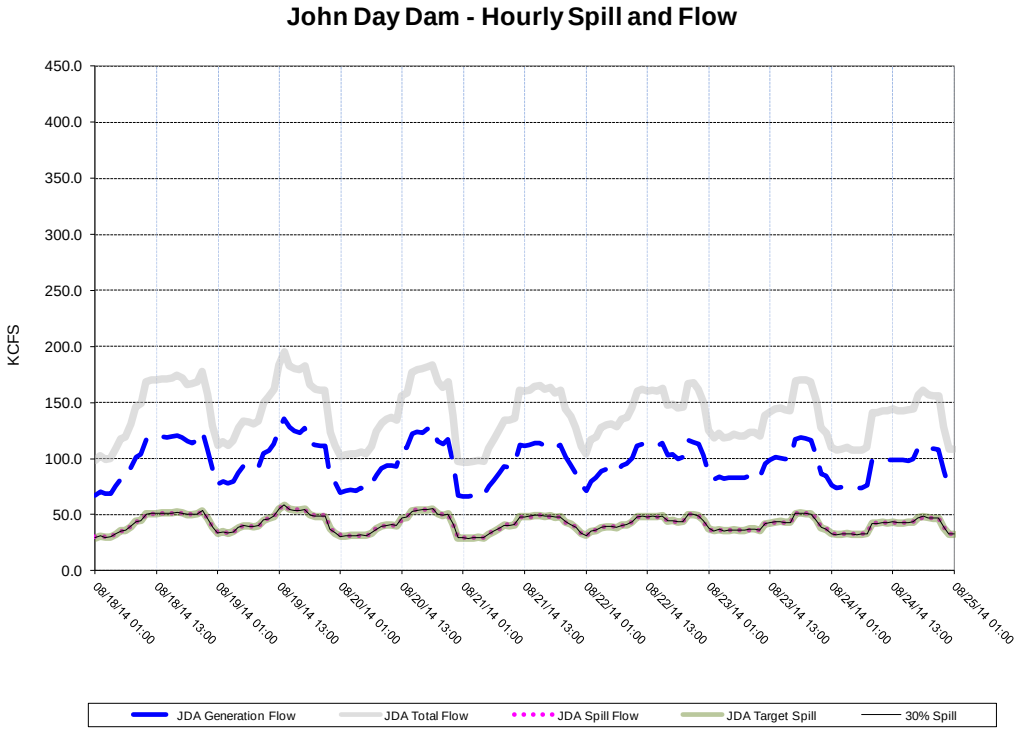
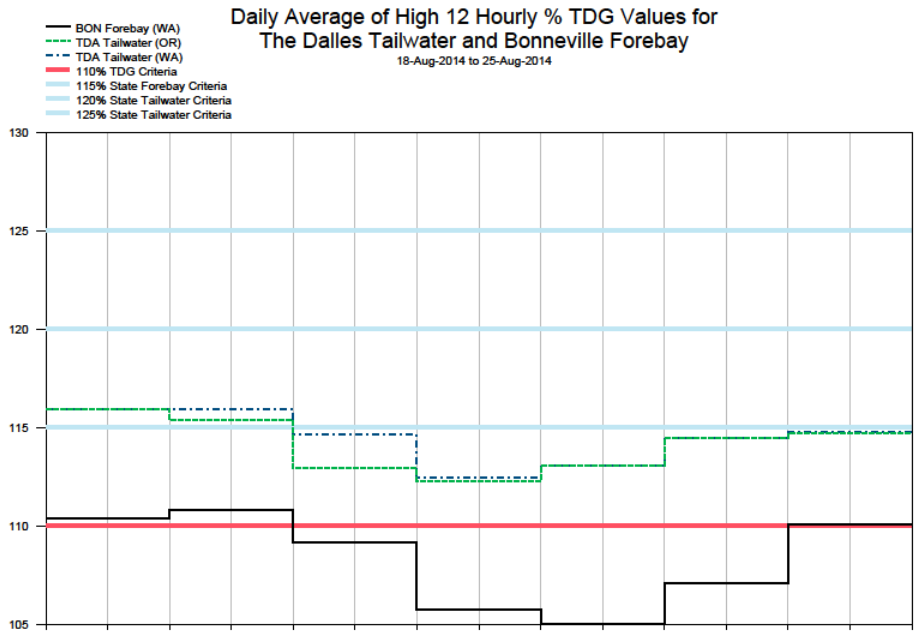

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
18-Aug-2014 to 25-Aug-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

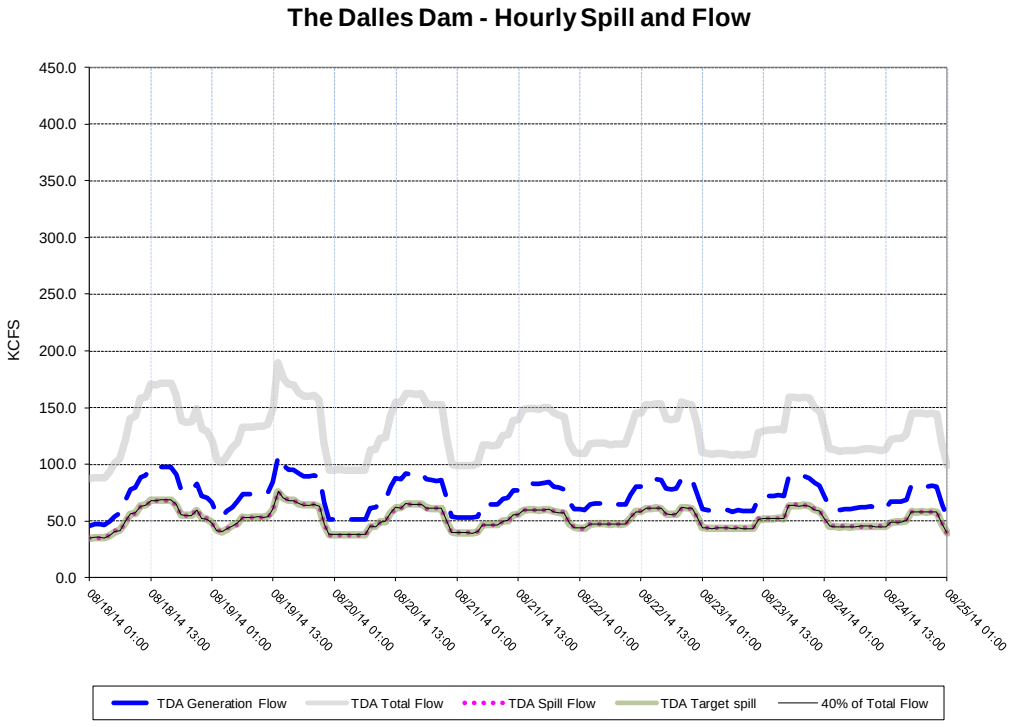
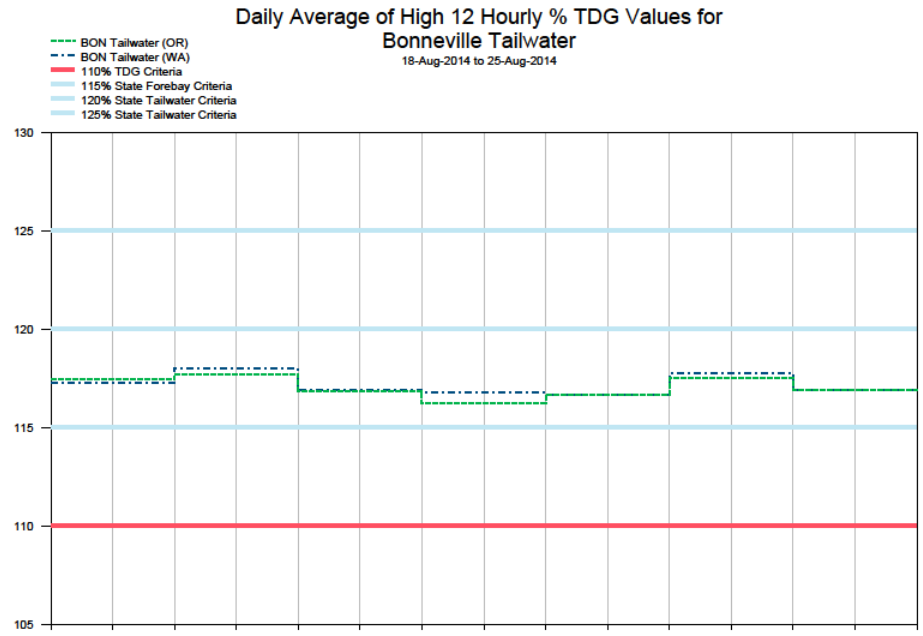

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/18/14 01:00
08/18/14 13:00
08/19/14 01:00
08/19/14 13:00
08/20/14 01:00
08/20/14 13:00
08/21/14 01:00
08/21/14 13:00
08/22/14 01:00
08/22/14 13:00
08/23/14 01:00
08/23/14 13:00
08/24/14 01:00
08/24/14 13:00
08/25/14 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
18-Aug-2014 to 25-Aug-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

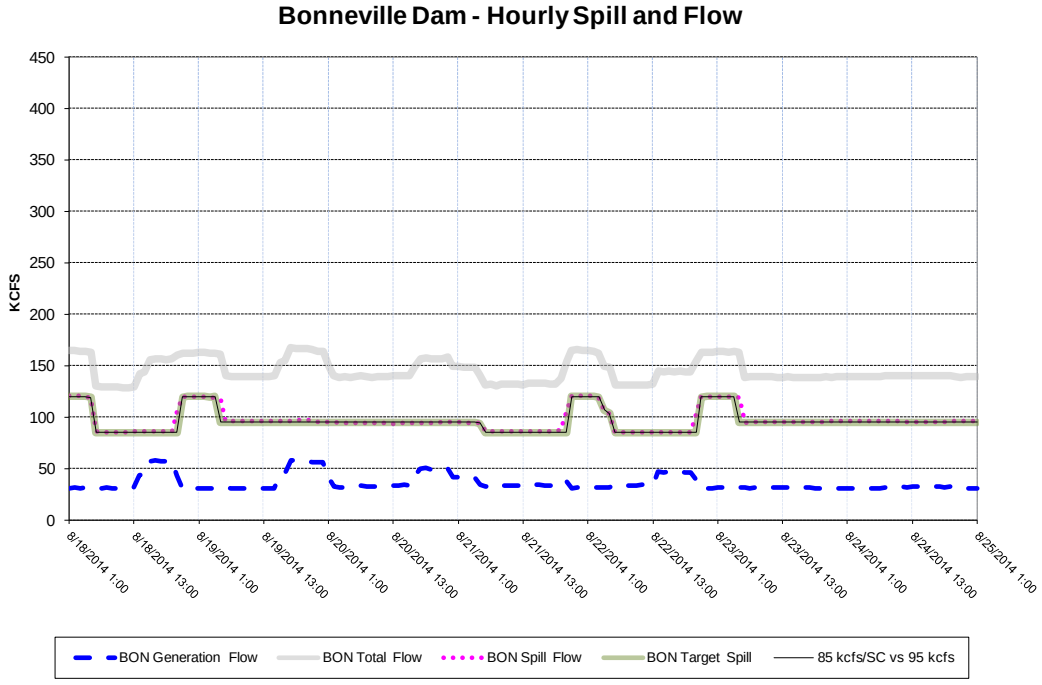
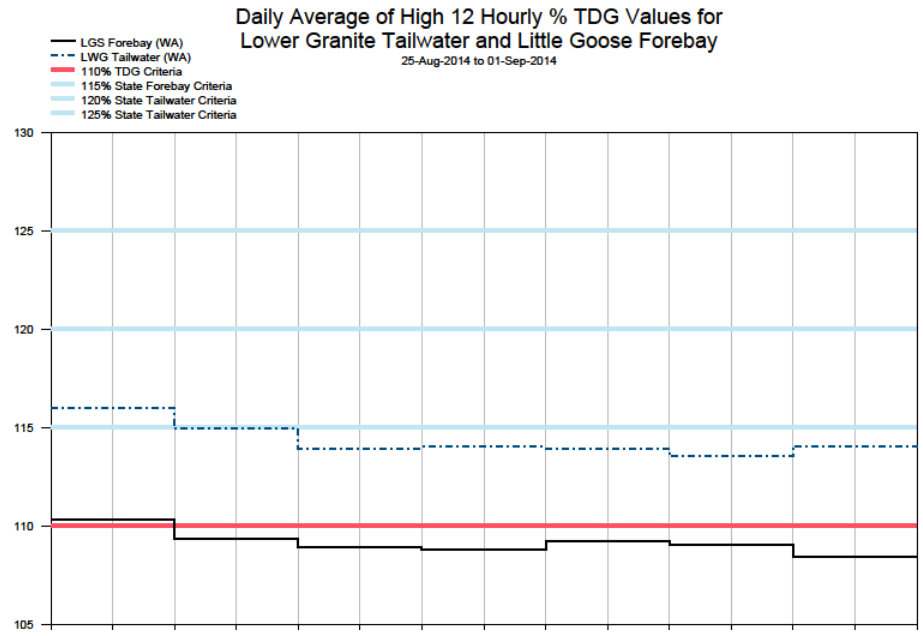

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/18/2014 1:00
8/18/2014 13:00
8/19/2014 1:00
8/19/2014 13:00
8/20/2014 1:00
8/20/2014 13:00
8/21/2014 1:00
8/21/2014 13:00
8/22/2014 1:00
8/22/2014 13:00
8/23/2014 1:00
8/23/2014 13:00
8/24/2014 1:00
8/24/2014 13:00
8/25/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
25-Aug-2014 to 01-Sep-2014
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

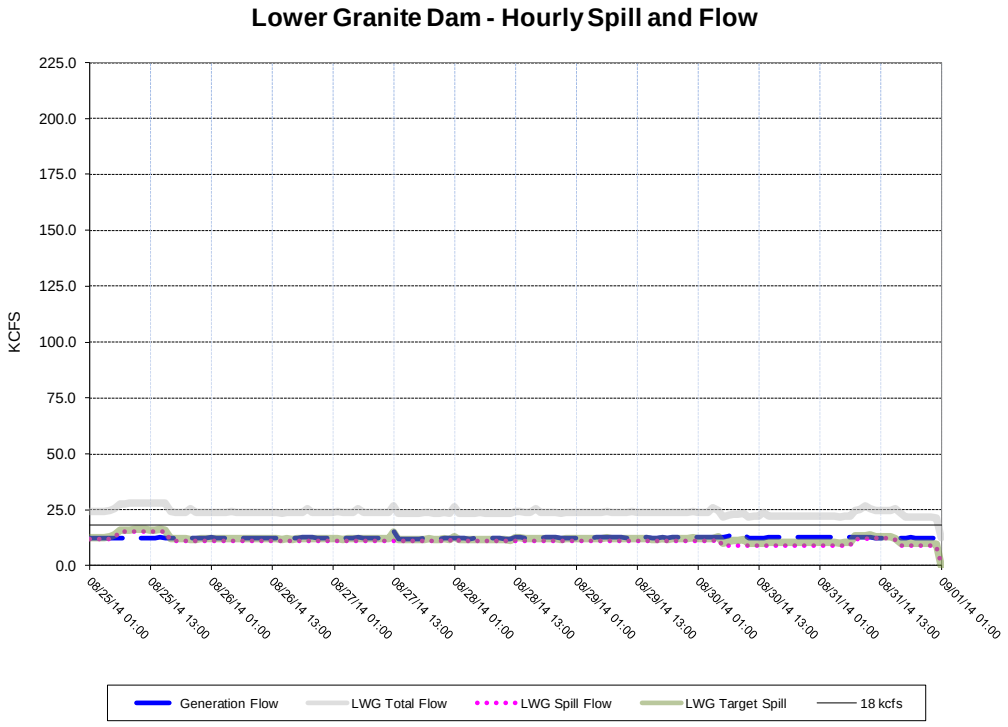
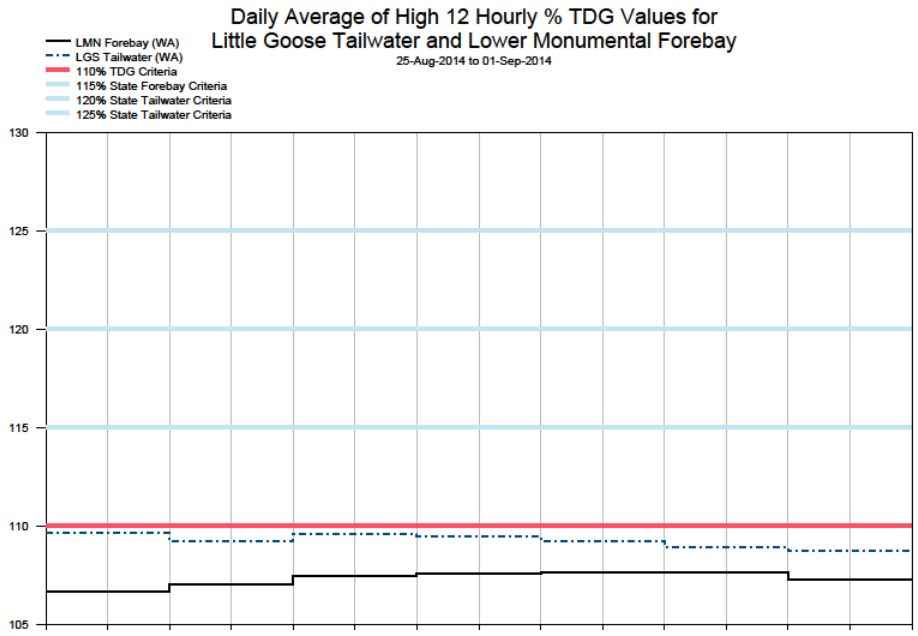

Lower Granite Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 26


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
25-Aug-2014 to 01-Sep-2014
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

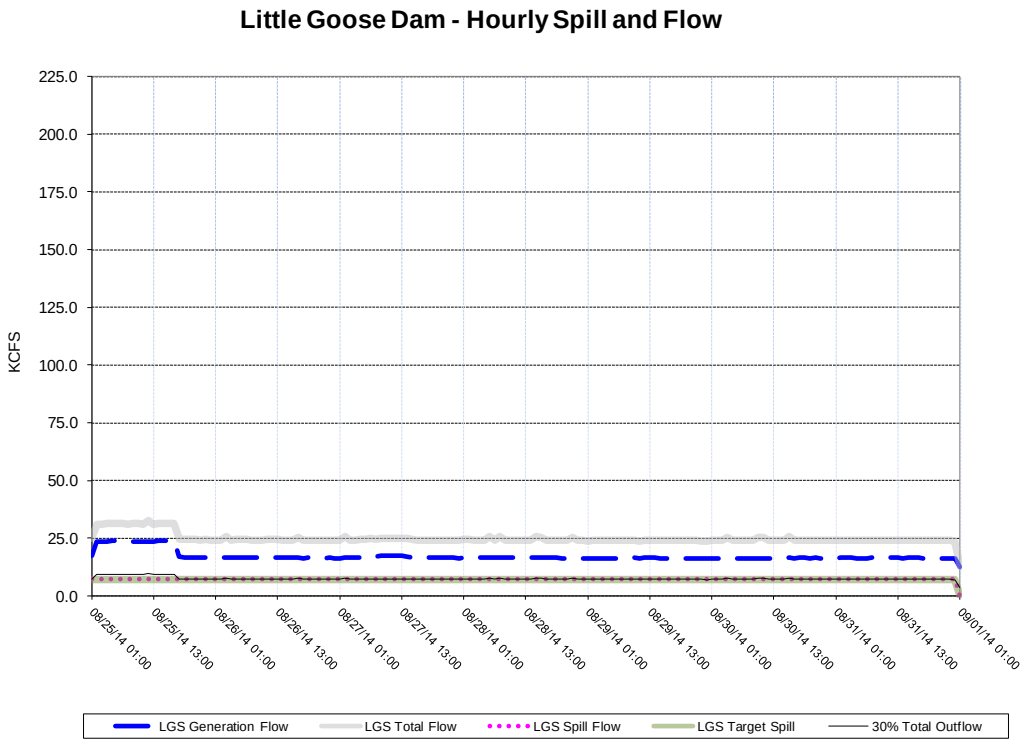
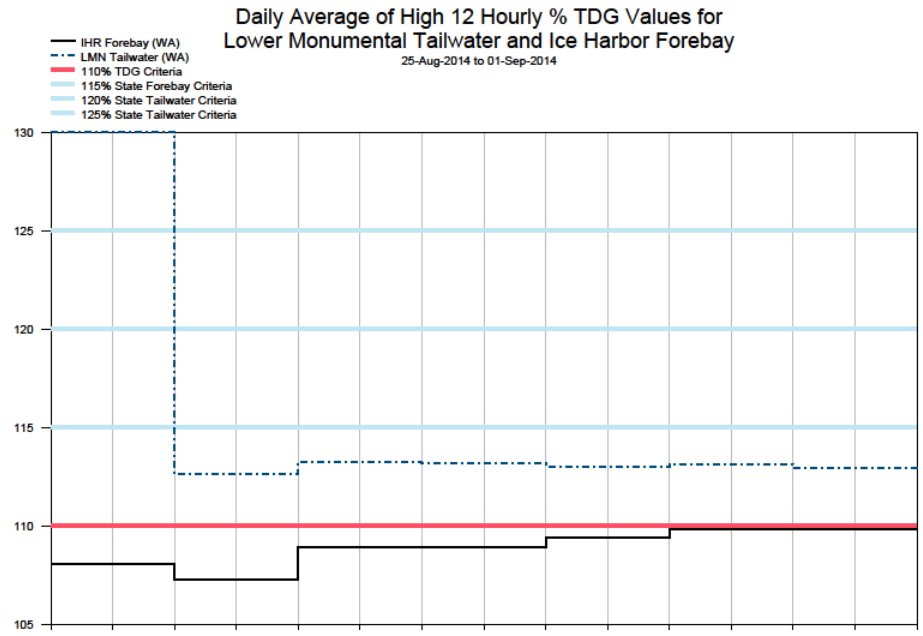

Little Goose Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 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
25-Aug-2014 to 01-Sep-2014
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

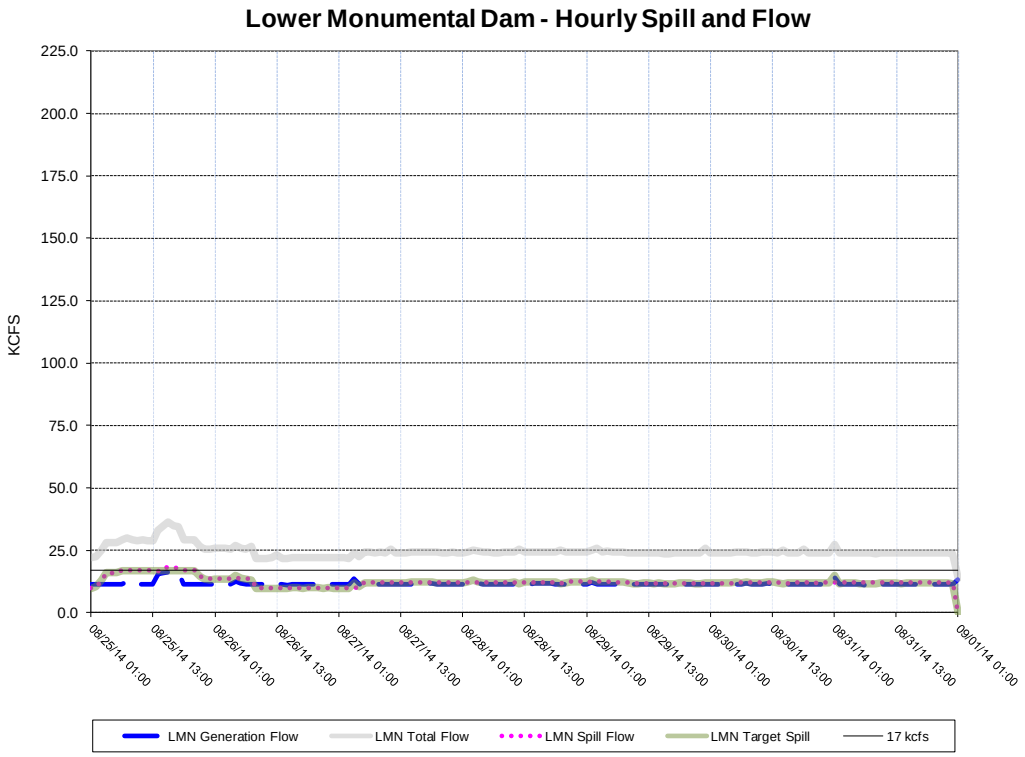
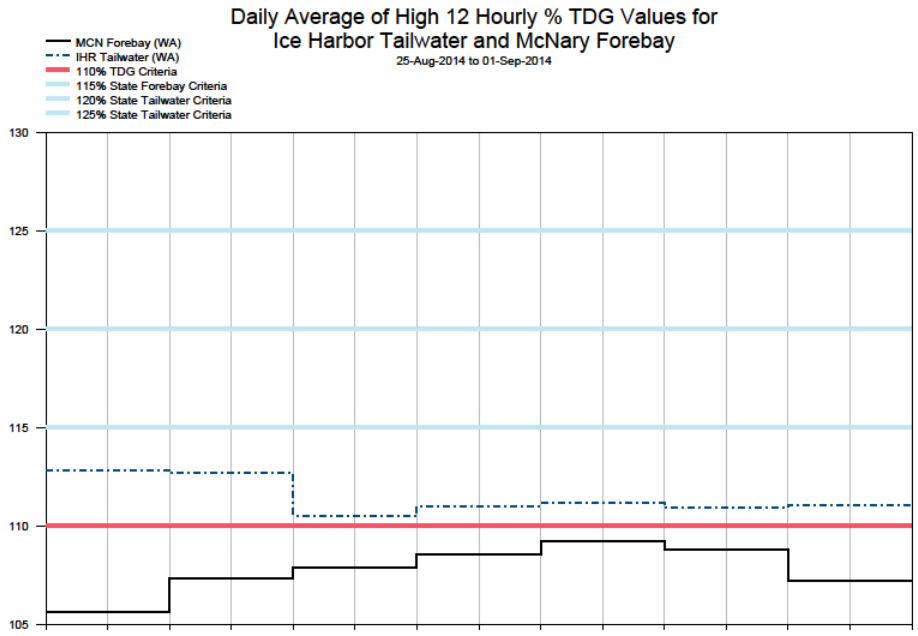

Lower Monumental Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 28


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
25-Aug-2014 to 01-Sep-2014
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

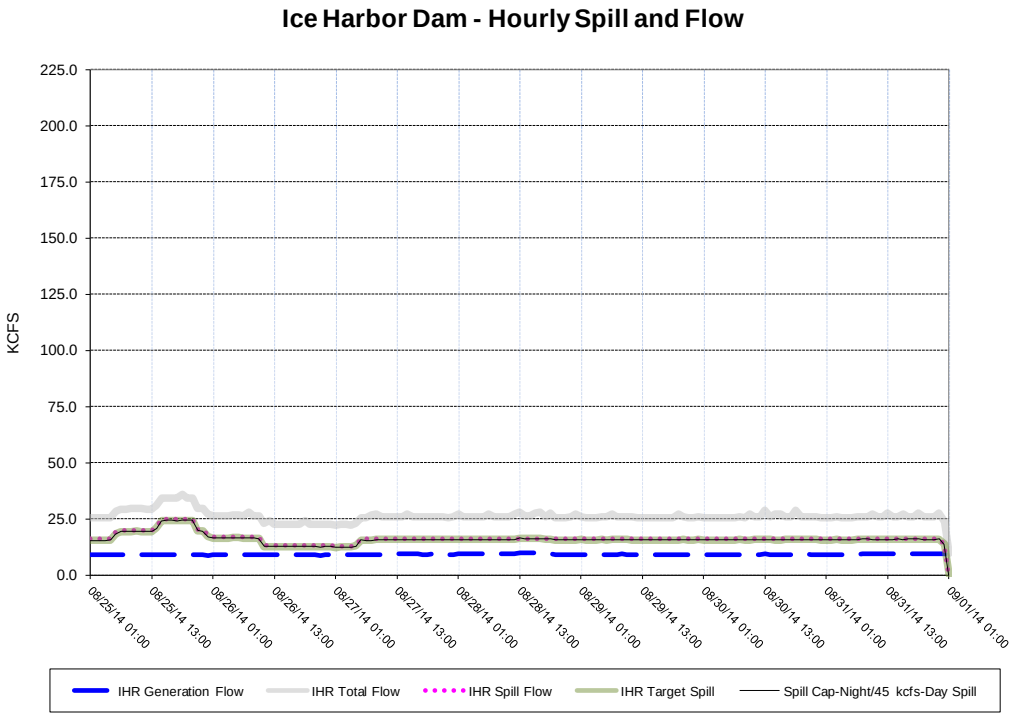
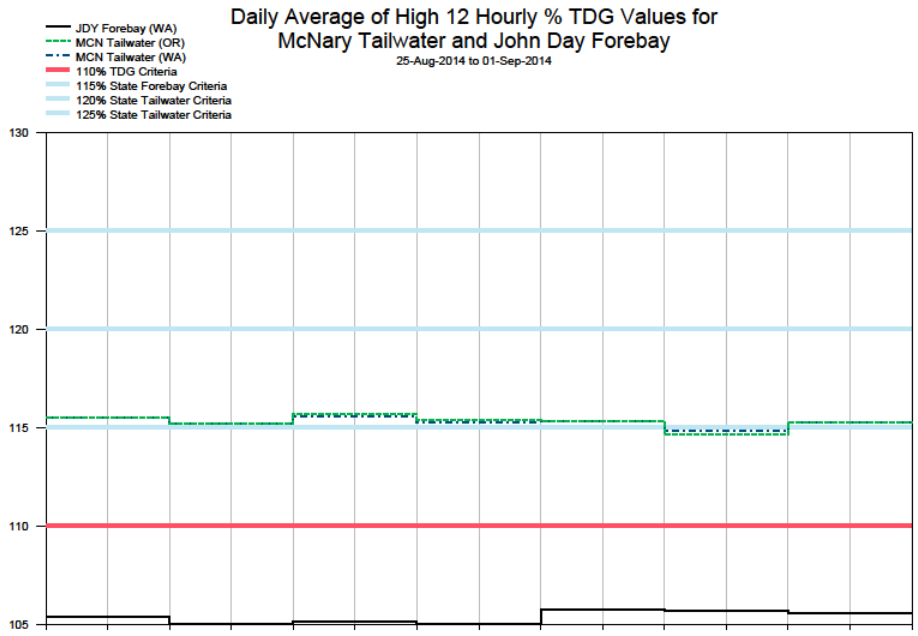

Ice Harbor Dam - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
25-Aug-2014 to 01-Sep-2014
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

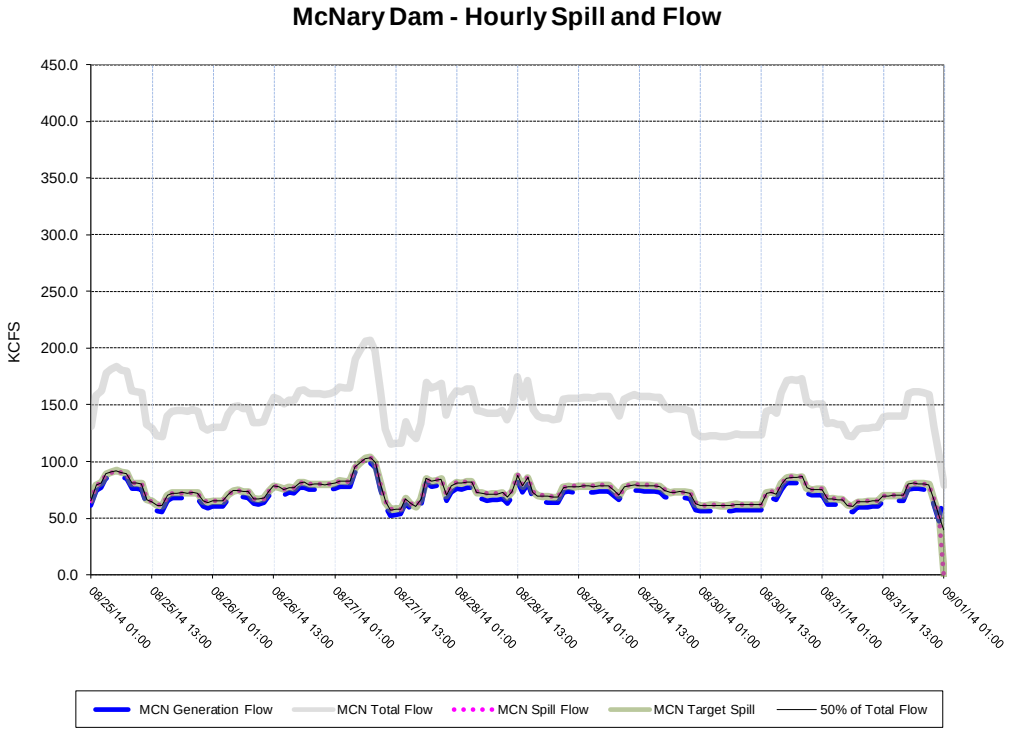
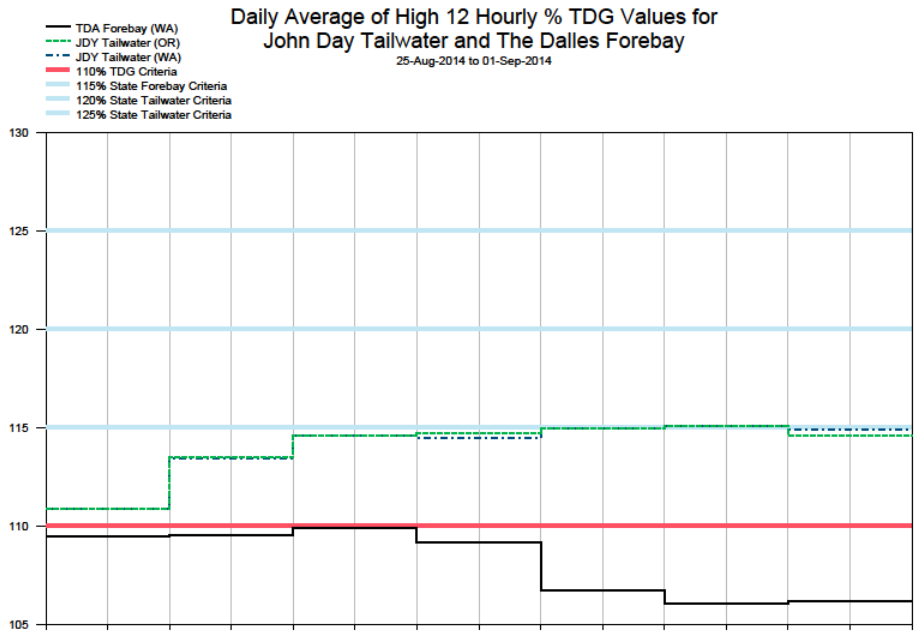

McNary Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 30


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
25-Aug-2014 to 01-Sep-2014
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

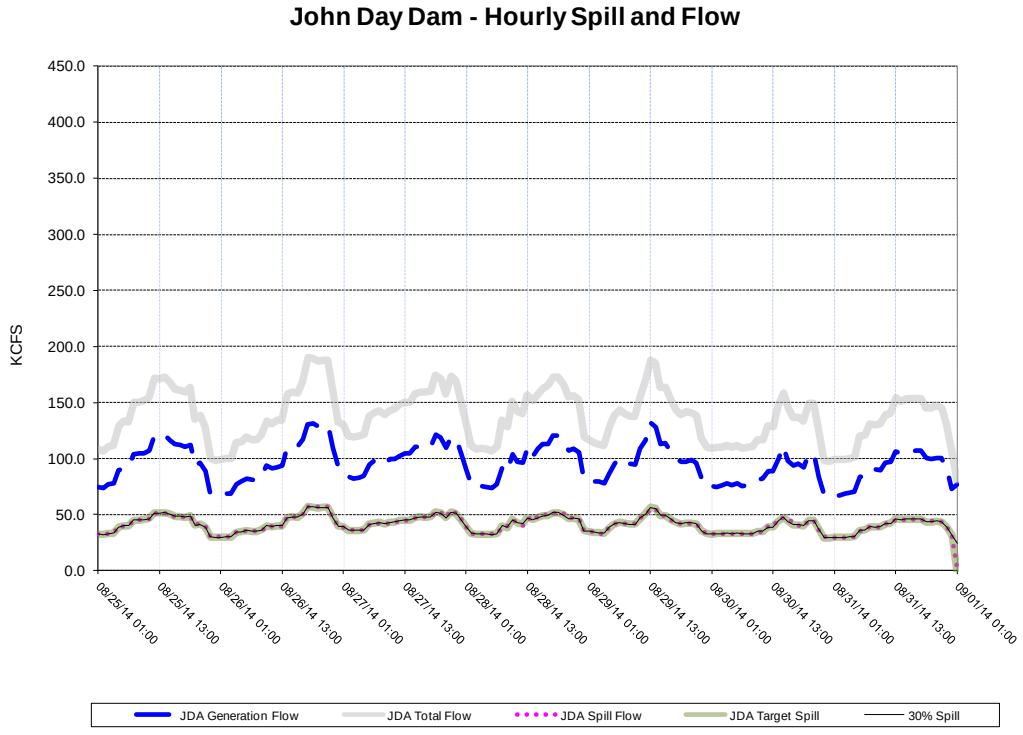
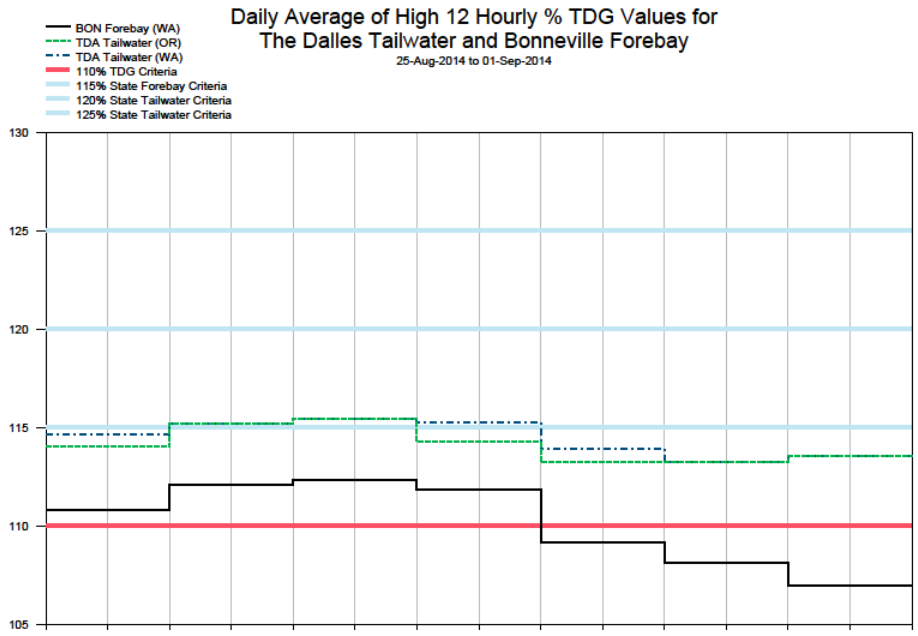

John Day Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
25-Aug-2014 to 01-Sep-2014
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

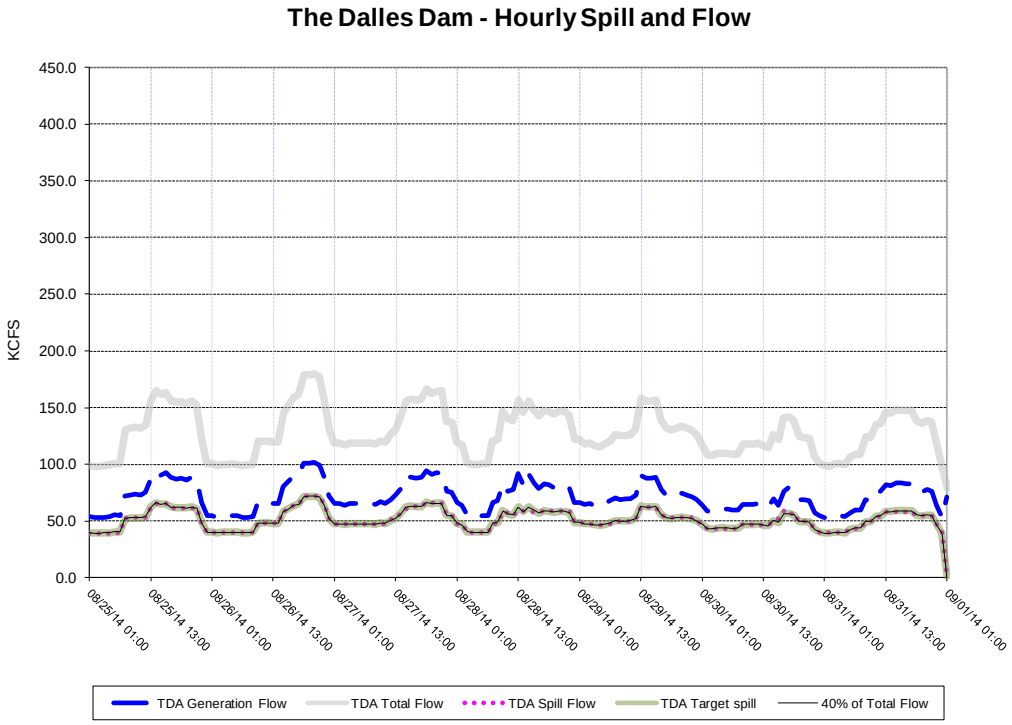
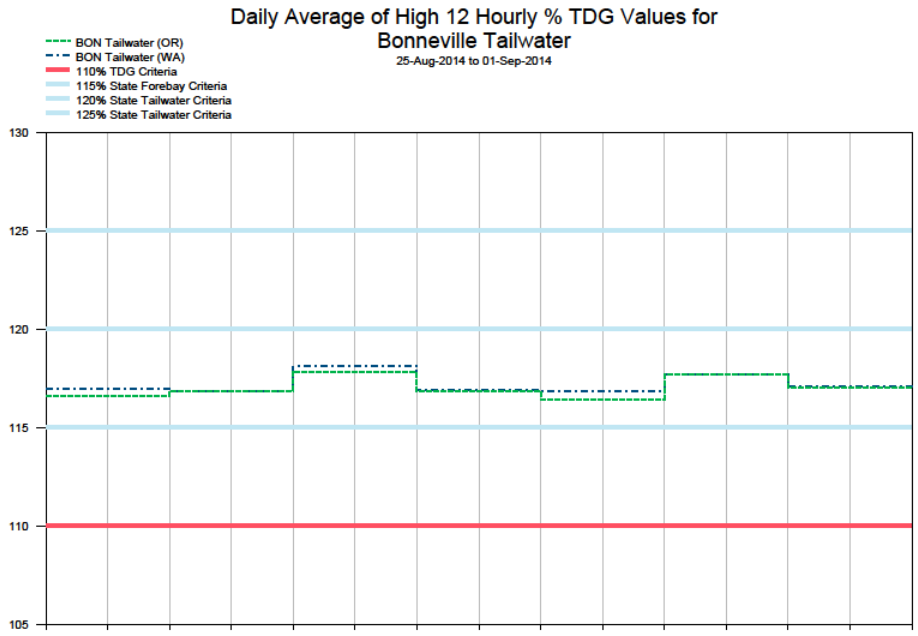

The Dalles Dam - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/25/14 01:00
08/25/14 13:00
08/26/14 01:00
08/26/14 13:00
08/27/14 01:00
08/27/14 13:00
08/28/14 01:00
08/28/14 13:00
08/29/14 01:00
08/29/14 13:00
08/30/14 01:00
08/30/14 13:00
08/31/14 01:00
08/31/14 13:00
09/01/14 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
25-Aug-2014 to 01-Sep-2014
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
130
125
120
115
110
105

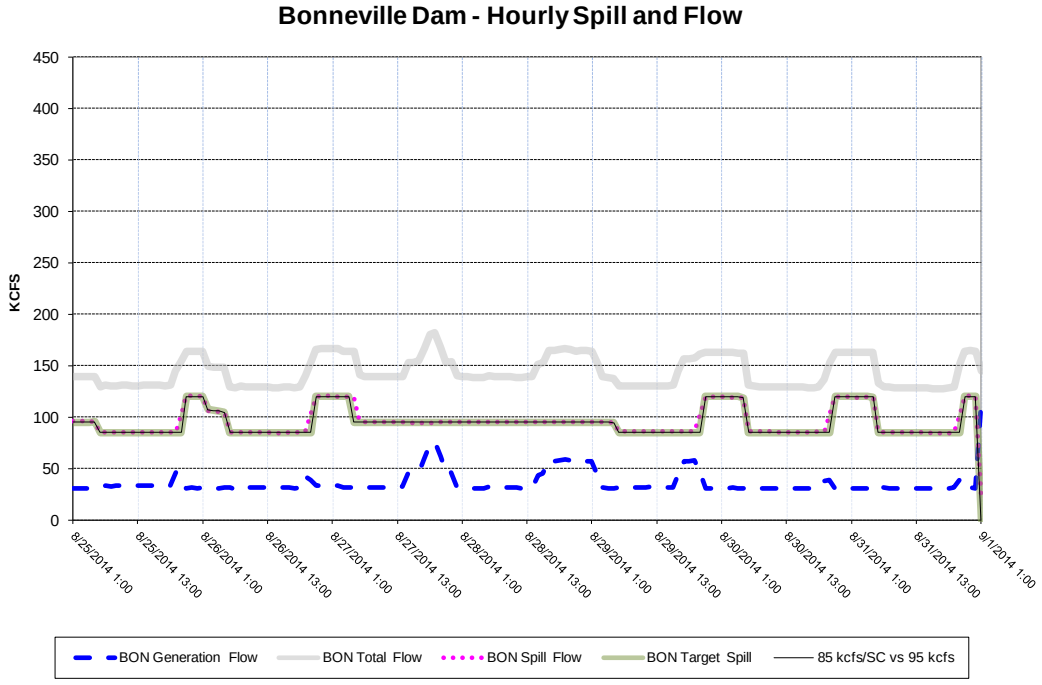

Bonneville Dam - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/25/2014 1:00
8/25/2014 13:00
8/26/2014 1:00
8/26/2014 13:00
8/27/2014 1:00
8/27/2014 13:00
8/28/2014 1:00
8/28/2014 13:00
8/29/2014 1:00
8/29/2014 13:00
8/30/2014 1:00
8/30/2014 13:00
8/31/2014 1:00
8/31/2014 13:00
9/1/2014 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/SC vs 95 kcfs

Table 2
Average Percent TDG Values For August 4 – August 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
8/4/2014	103.8	116.3	114.1	113.1	113.1	115.9	113.7	113.7	110.5	116.1	~~115.8~~	112.0	~~114.6~~	114.9	112.4	116.8	~~116.8~~	111.1	117.2	~~117.1~~
8/5/2014	103.8	119.3	113.6	110.6	112.8	115.5	113.5	113.3	110.5	116.1	~~116.1~~	112.0	114.2	~~114.2~~	112.2	~~114.9~~	116.4	111.0	~~116.7~~	117.1
8/6/2014	103.3	119.5	113.6	110.2	112.1	115.4	112.6	112.1	109.5	116.1	~~116.0~~	110.5	115.0	~~115.0~~	108.4	~~113.2~~	114.0	107.8	~~117.2~~	117.2
8/7/2014	101.8	119.1	113.2	110.2	112.0	116.0	112.4	114.0	109.6	116.9	~~116.9~~	109.0	~~114.8~~	114.8	106.8	114.0	~~114.0~~	105.9	~~117.6~~	117.9
8/8/2014	101.7	117.7	113.0	110.1	111.5	115.6	112.4	113.6	108.8	~~116.3~~	116.8	108.1	~~114.1~~	114.3	106.7	~~113.6~~	113.9	105.5	117.1	~~117.0~~
8/9/2014	101.2	116.6	112.7	110.5	109.4	115.6	112.6	114.2	107.7	116.1	~~116.1~~	106.2	~~113.6~~	113.7	106.6	113.9	~~113.9~~	106.5	~~116.5~~	116.7
8/10/2014	101.0	116.5	111.9	110.3	108.7	114.9	111.6	113.7	107.8	116.3	~~116.3~~	105.8	~~113.5~~	113.5	109.0	115.5	~~115.5~~	109.1	117.3	~~117.0~~
8/11/2014	101.2	118.8	112.6	110.5	109.1	117.7	112.1	113.4	108.7	116.7	~~116.6~~	106.9	113.4	~~113.4~~	109.7	116.3	~~116.3~~	112.0	~~118.1~~	118.4
8/12/2014	101.2	118.5	113.9	114.6	109.8	117.2	112.4	113.8	108.8	116.8	~~116.6~~	107.2	~~113.1~~	113.1	110.1	~~115.3~~	116.2	113.1	117.6	~~117.6~~
8/13/2014	100.9	118.4	113.1	114.3	109.7	115.6	112.6	113.6	108.1	~~116.4~~	116.4	106.3	~~111.5~~	112.4	108.3	~~114.4~~	114.9	112.3	~~116.8~~	117.4
8/14/2014	101.4	118.4	113.0	110.9	109.5	114.7	112.5	113.5	108.0	115.8	~~115.8~~	106.3	~~110.5~~	110.7	107.2	114.1	~~114.1~~	109.4	~~117.1~~	117.4
8/15/2014	101.8	118.9	112.3	110.8	109.5	115.7	112.4	114.0	107.4	115.7	~~115.5~~	107.3	109.8	~~109.8~~	108.4	114.3	~~114.2~~	108.5	117.2	~~117.2~~
8/16/2014	101.8	118.3	113.7	110.9	108.9	113.5	112.4	111.9	106.7	~~114.6~~	115.1	107.3	~~108.4~~	108.9	108.6	~~114.7~~	114.7	109.2	117.2	~~117.2~~
8/17/2014	101.8	118.9	113.8	110.8	110.0	113.7	111.7	112.0	107.0	114.8	~~114.8~~	107.2	110.2	~~110.2~~	109.0	114.8	~~114.8~~	109.2	~~116.9~~	117.2
8/18/2014	101.5	115.2	113.1	110.7	110.1	113.4	111.4	113.5	108.9	115.5	~~115.5~~	108.2	110.9	~~110.9~~	110.2	~~115.9~~	115.9	110.5	117.7	~~117.5~~
8/19/2014	101.5	114.2	113.7	111.0	110.5	113.3	111.6	113.1	109.4	116.4	~~116.4~~	108.8	~~111.3~~	111.3	110.1	~~115.4~~	115.8	110.8	~~117.8~~	118.3
8/20/2014	101.5	113.5	114.3	110.7	110.4	112.6	111.5	111.6	109.1	~~115.7~~	116.0	108.2	~~110.0~~	111.0	108.0	~~112.8~~	114.5	109.0	~~117.1~~	117.1
8/21/2014	99.8	113.0	114.0	111.0	108.9	115.4	110.6	110.9	107.6	115.1	~~115.1~~	106.1	~~108.6~~	109.7	104.8	~~112.3~~	112.3	105.7	~~116.6~~	117.0
8/22/2014	99.9	112.2	112.2	110.8	108.1	114.5	109.9	110.9	106.7	~~114.2~~	115.0	104.9	109.8	~~109.7~~	106.2	113.1	~~113.1~~	104.7	116.9	~~116.9~~
8/23/2014	99.5	112.6	111.6	109.9	107.1	112.4	109.8	110.8	104.7	~~114.3~~	114.3	104.6	109.7	~~109.6~~	108.4	114.6	~~114.6~~	107.4	~~117.6~~	117.9
8/24/2014	100.9	115.1	110.3	109.8	106.6	112.6	108.5	110.5	105.5	114.9	~~114.9~~	105.3	~~109.8~~	109.8	109.9	~~114.7~~	114.7	110.2	117.1	~~117.1~~
8/25/2014	100.2	116.0	110.2	109.5	106.7	113.1	108.0	112.8	105.6	115.5	~~115.5~~	105.3	~~110.8~~	110.8	109.3	~~114.0~~	114.7	111.0	~~116.9~~	117.1
8/26/2014	98.9	114.7	109.3	109.2	107.0	112.6	107.3	112.6	107.4	~~115.2~~	115.2	104.8	113.9	~~113.8~~	109.5	~~115.3~~	115.3	112.2	117.1	~~117.1~~
8/27/2014	98.2	113.9	108.9	109.6	107.5	113.2	108.9	110.5	107.8	115.6	~~115.5~~	105.1	114.6	~~114.5~~	109.9	115.4	~~115.4~~	112.3	~~118.0~~	118.3
8/28/2014	99.2	114.0	108.8	109.4	107.5	113.1	108.9	111.0	108.6	115.3	~~115.3~~	104.5	114.8	~~114.6~~	108.9	~~114.2~~	115.1	111.6	~~117.1~~	117.2
8/29/2014	101.6	113.9	109.2	109.2	107.6	113.0	109.4	111.1	109.2	115.3	~~115.3~~	105.7	114.9	~~114.9~~	106.6	~~113.2~~	113.8	109.2	~~116.7~~	117.1
8/30/2014	102.1	113.4	109.0	108.9	107.6	113.1	109.8	110.9	108.7	~~114.6~~	114.6	105.6	115.1	~~115.0~~	106.0	113.2	~~113.2~~	108.1	117.9	~~117.9~~
8/31/2014	102.1	114.0	108.4	108.6	107.2	112.9	109.8	111.0	107.1	115.3	~~115.3~~	105.5	~~114.6~~	114.7	106.1	113.5	~~113.5~~	107.0	~~117.2~~	117.3

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)