

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 week² 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 $\pm 1\%$ 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 1% range) due to volume of water needed to empty the navigation lock. See p. 3. 24 hr avg. spill was 37.4%.

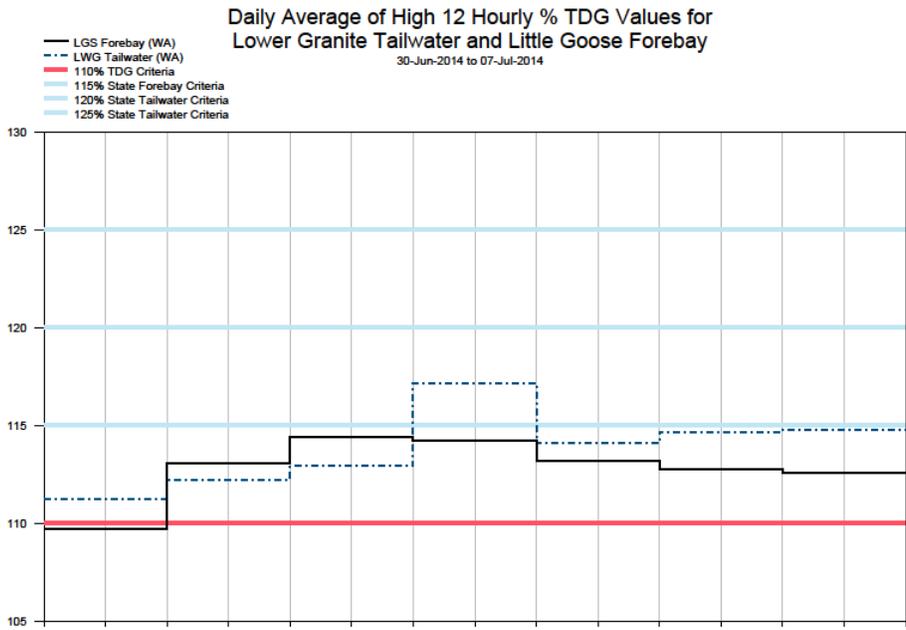
Lower Monumental	Reduced Spill	7/1/14	1700	1	Navigation	Hourly spill decreased to 12.2 kcfs (below 17 kcfs \pm 2 kcfs range). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/3/14	1700-1800	2	Navigation	Hourly spill decreased to 11.8 kcfs and 12.9 kcfs (below 17 kcfs \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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 \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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% \pm 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 \pm 3 kcfs range) due to a miscalculation.

Figure 1



Lower Granite Dam - Hourly Spill and Flow

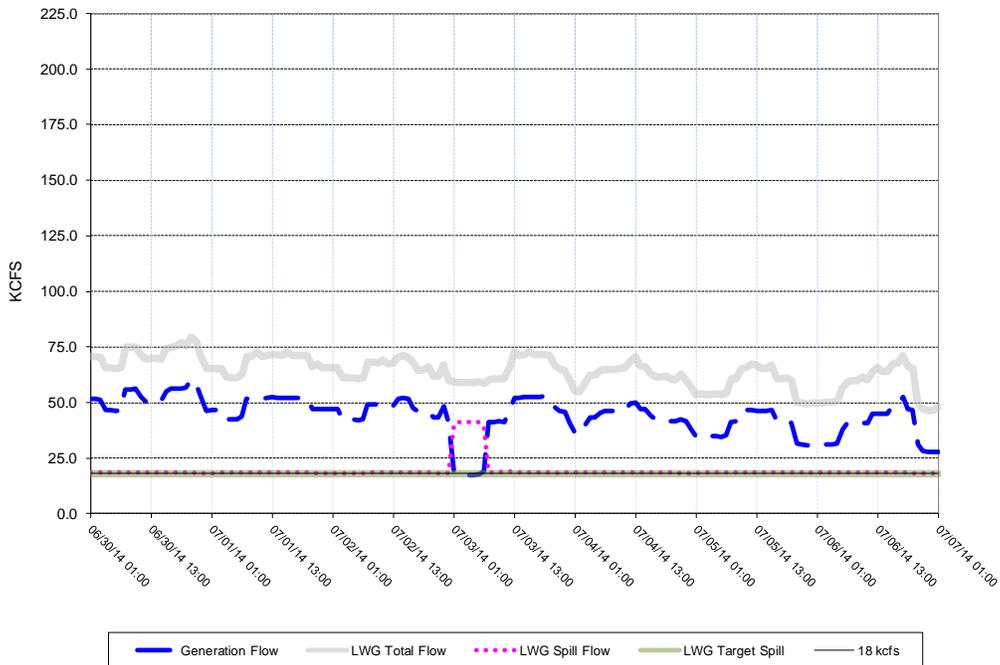
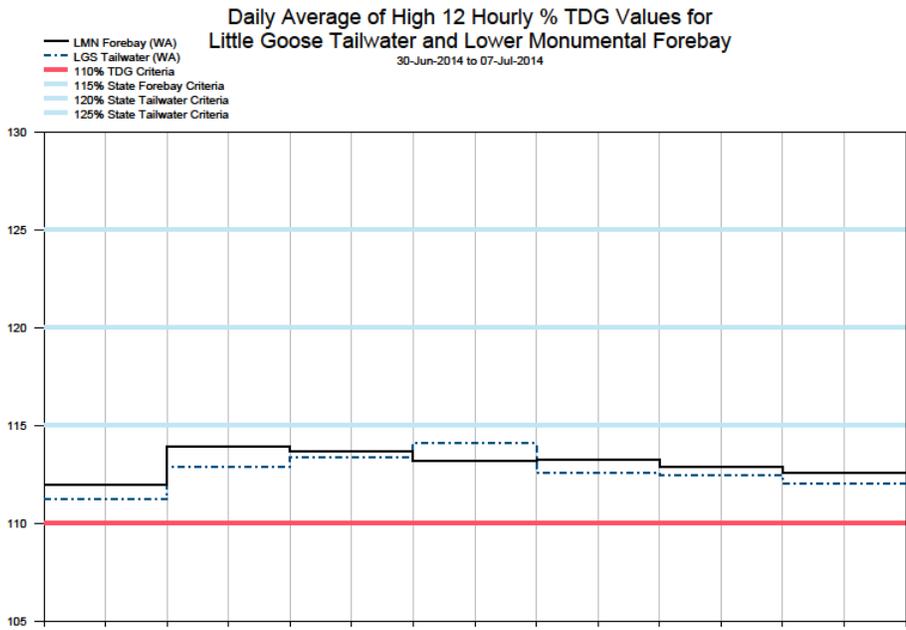


Figure 2



Little Goose Dam - Hourly Spill and Flow

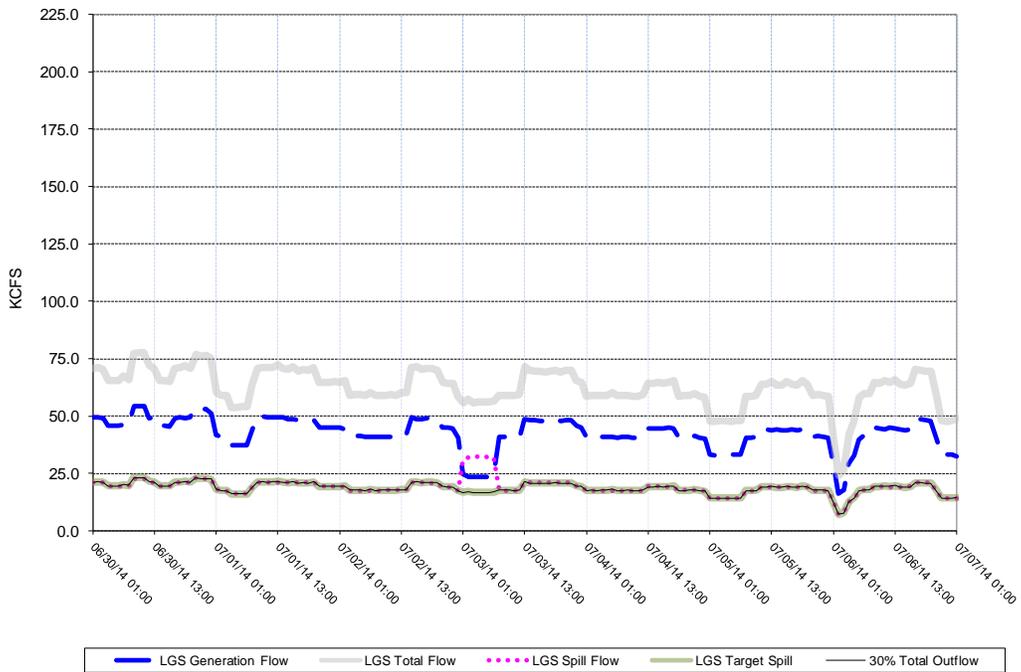


Figure 3

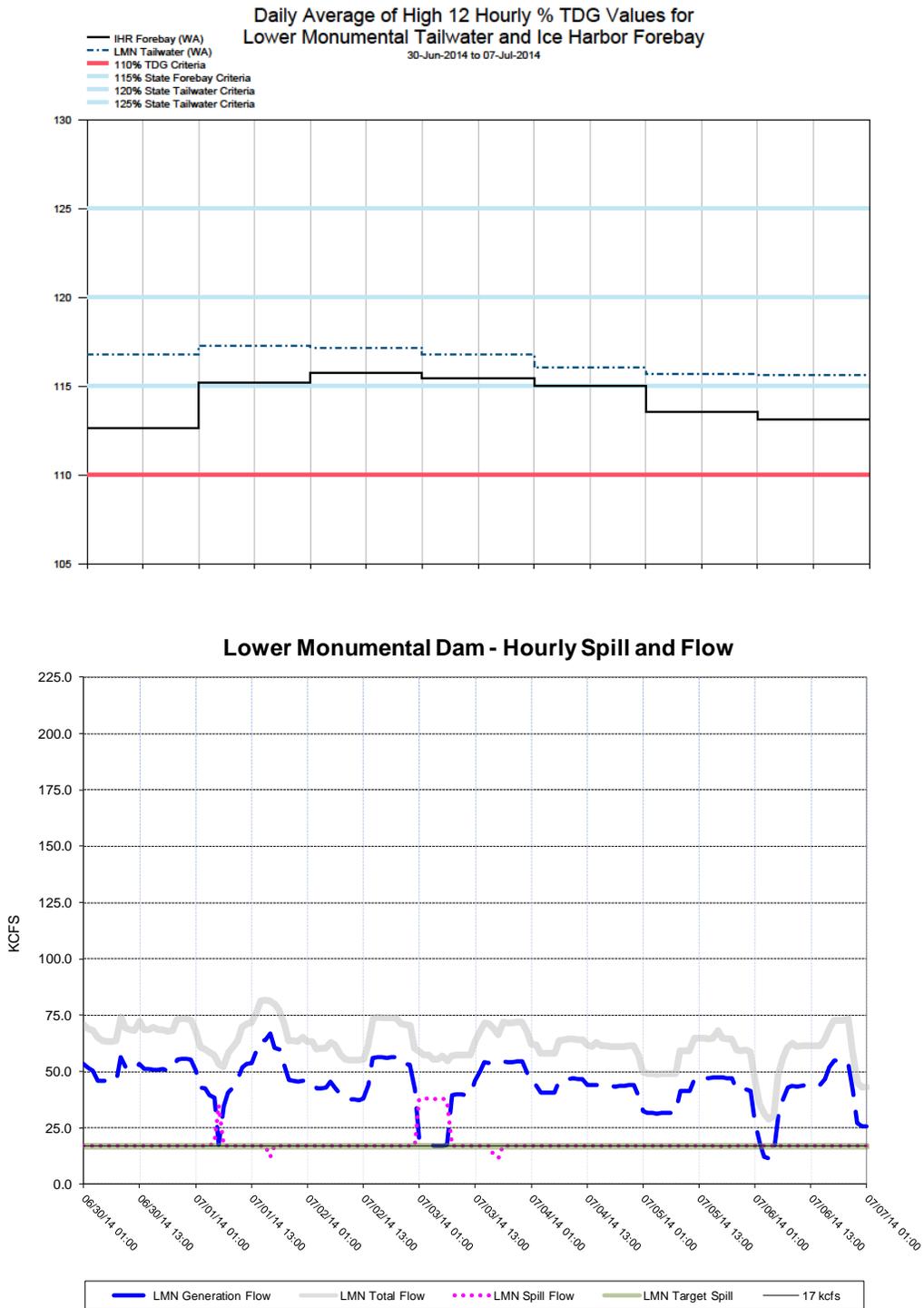


Figure 4

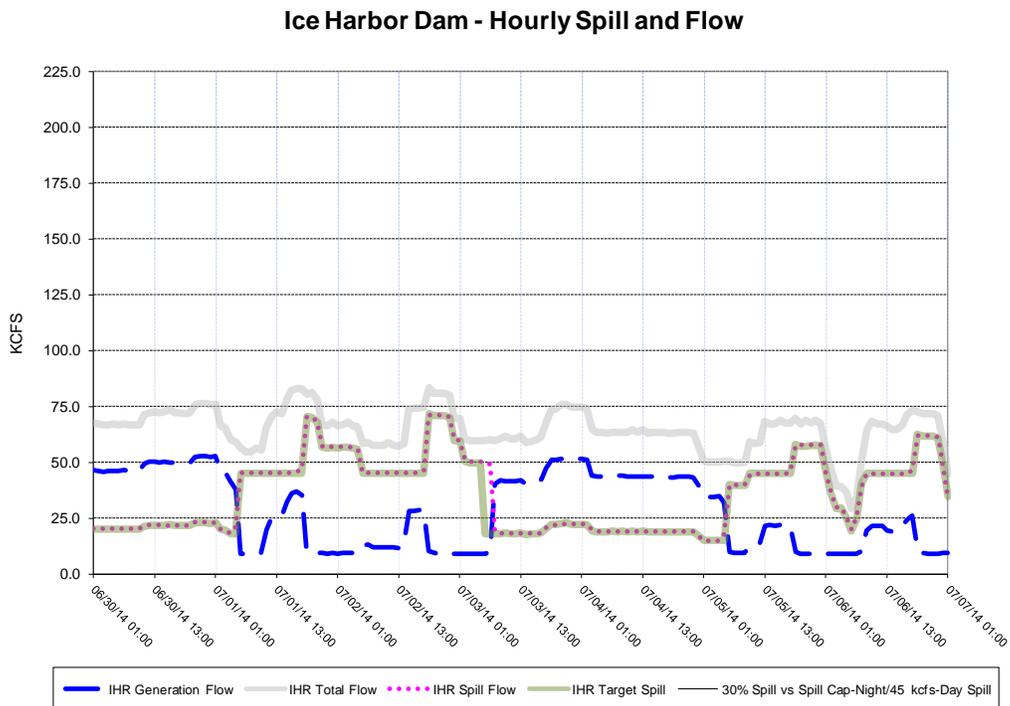
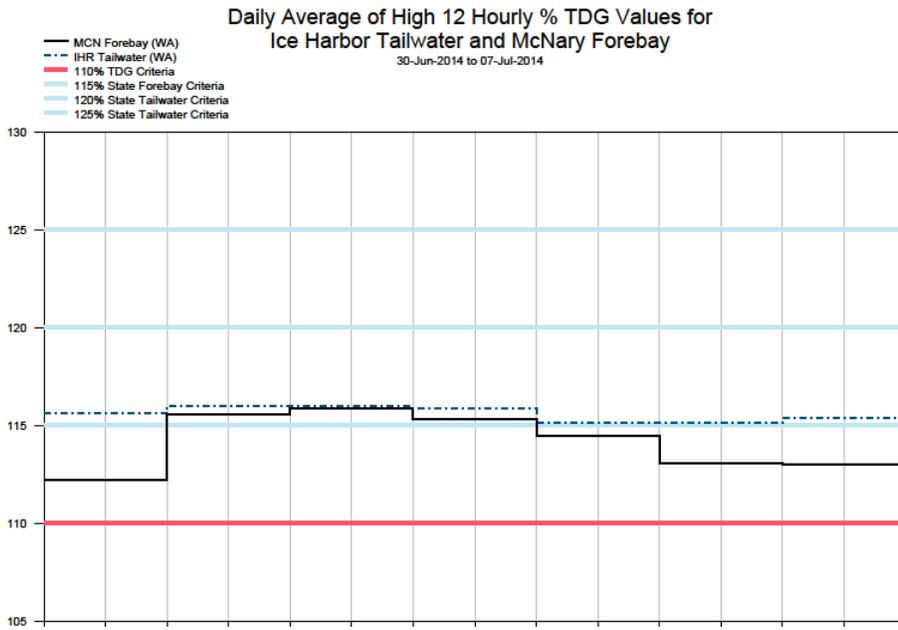


Figure 5

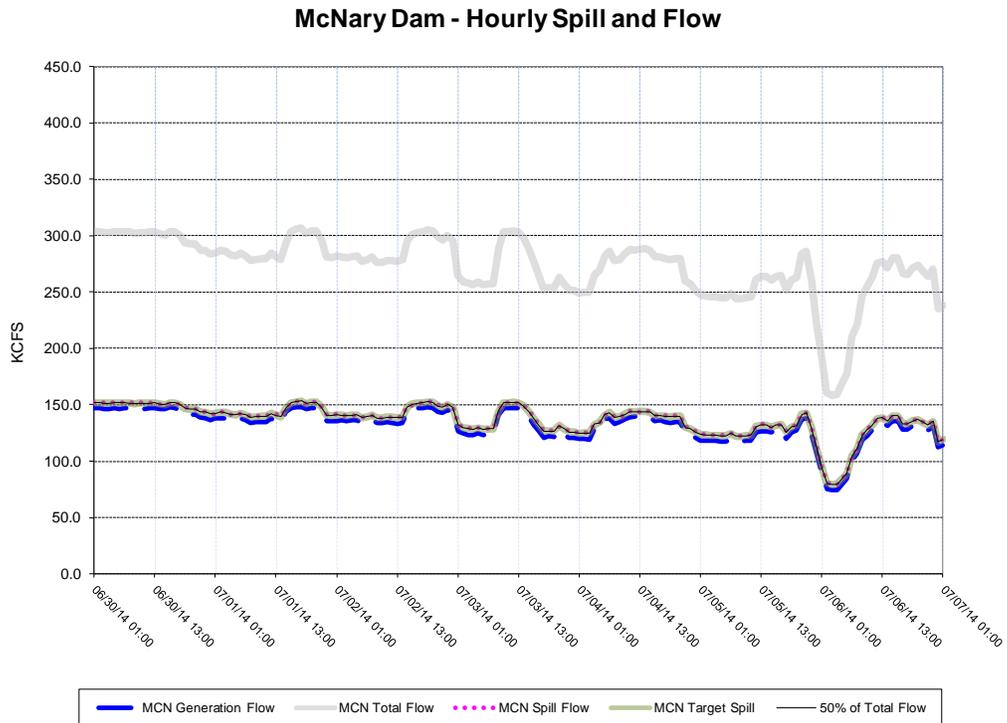
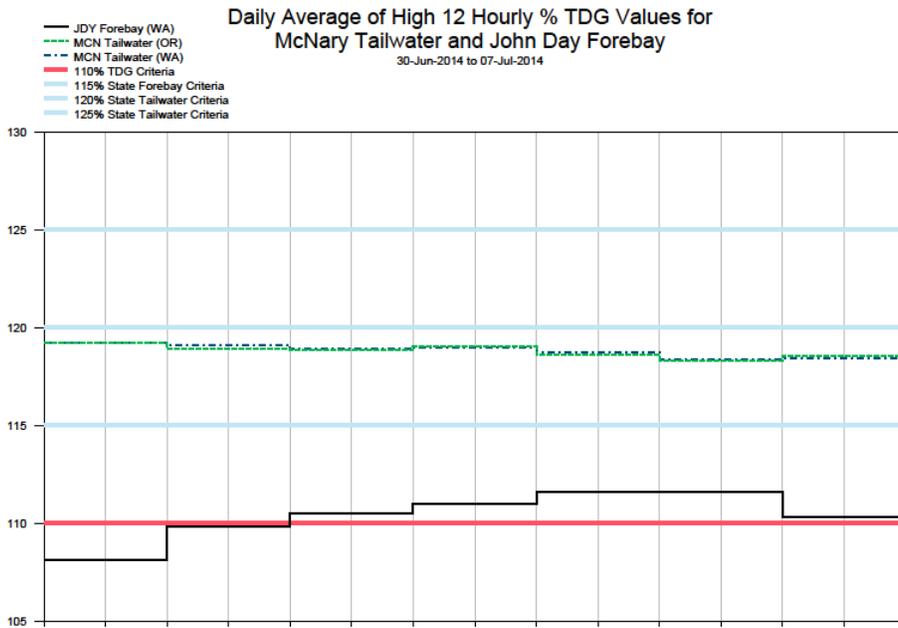
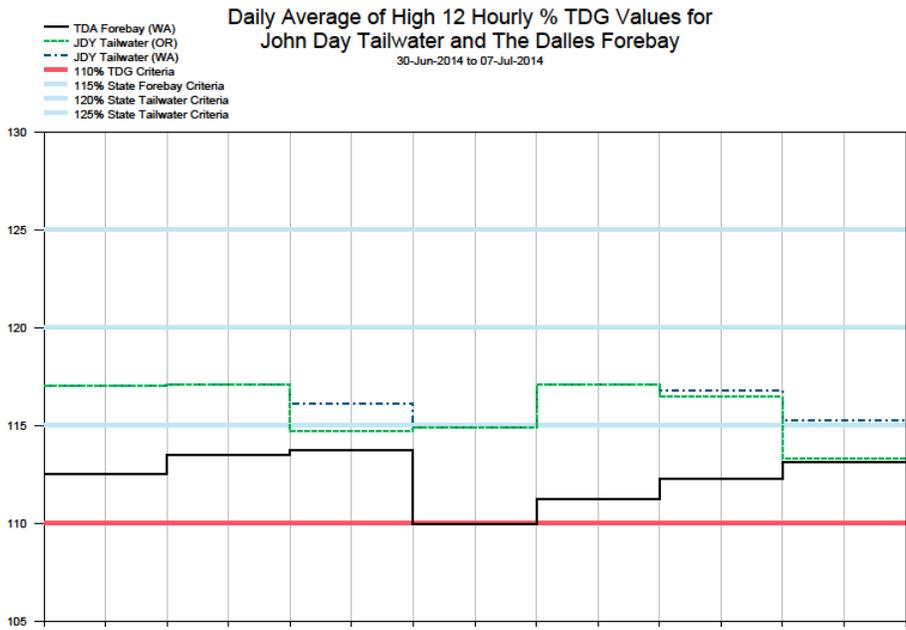


Figure 6



John Day Dam - Hourly Spill and Flow

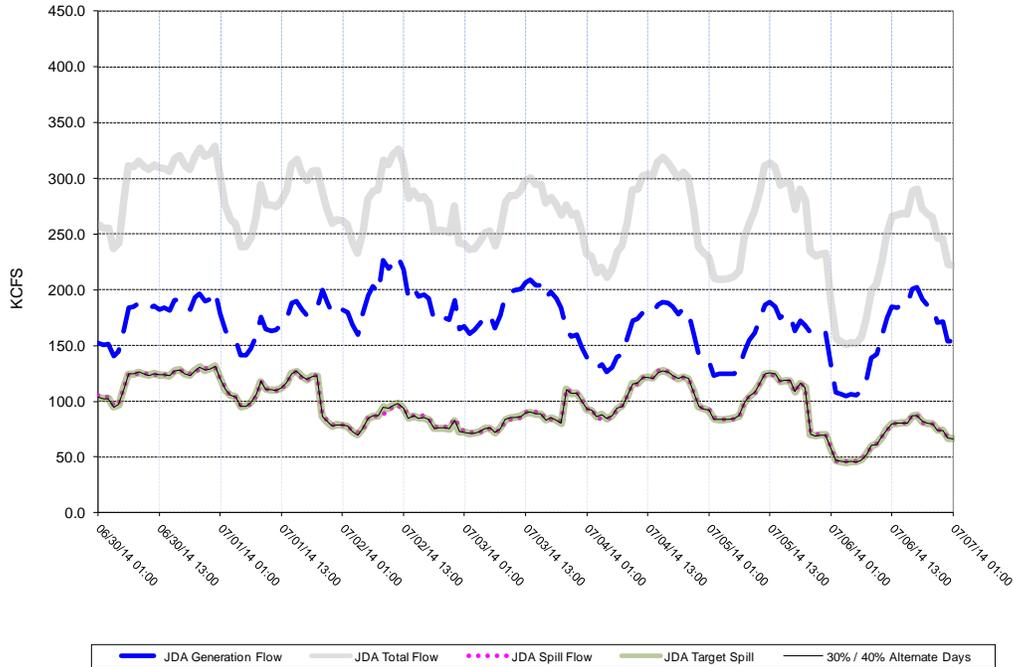
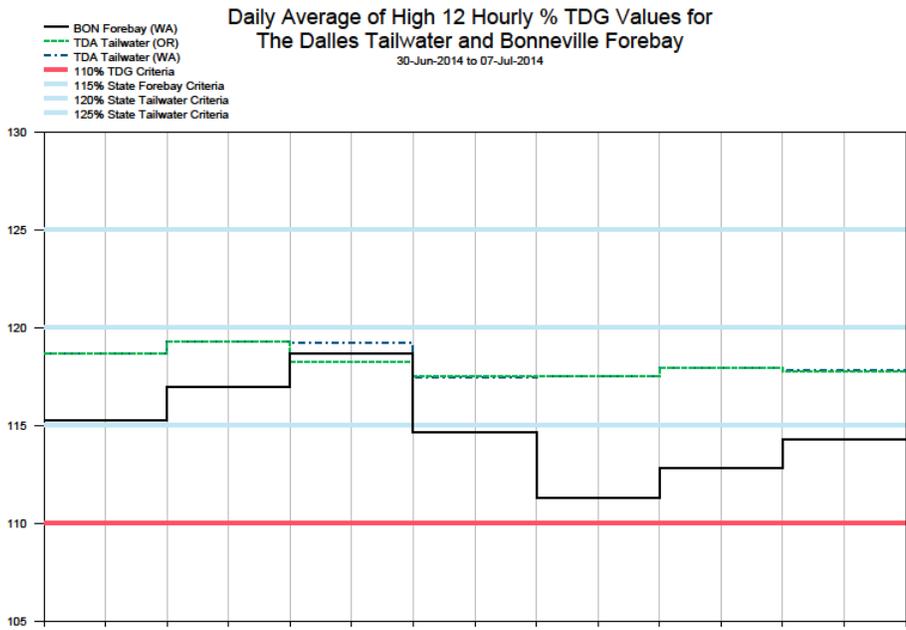


Figure 7



The Dalles Dam - Hourly Spill and Flow

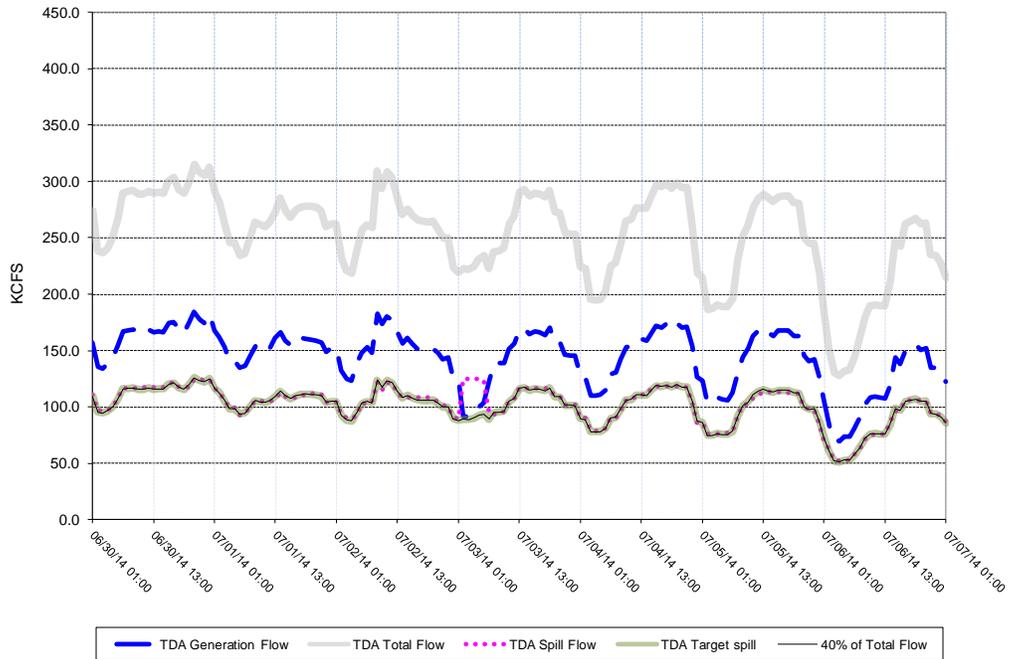


Figure 8

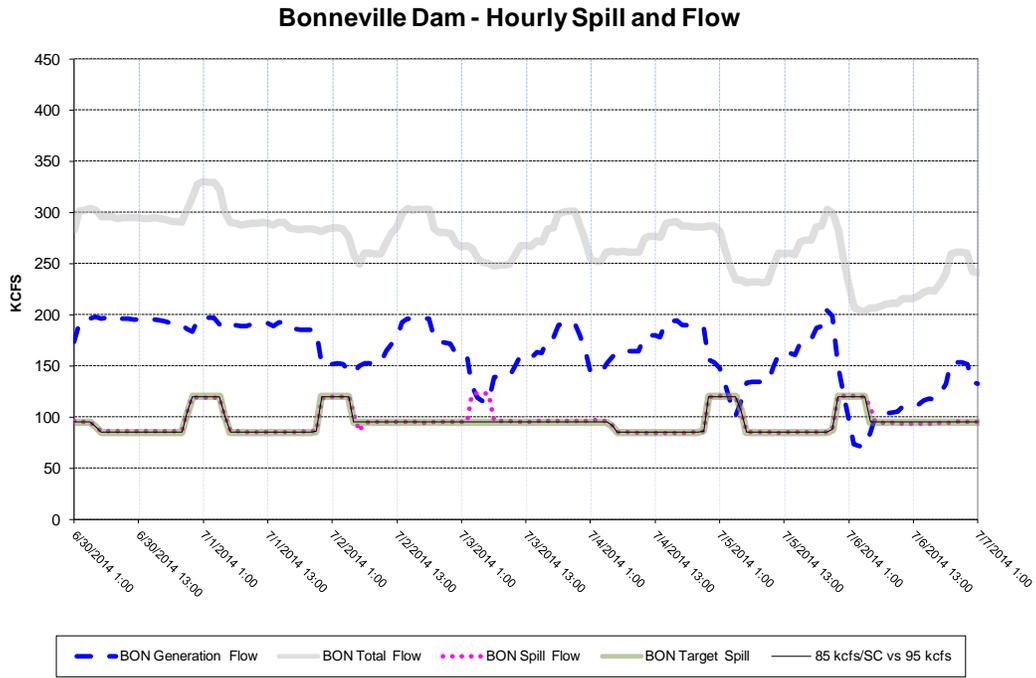
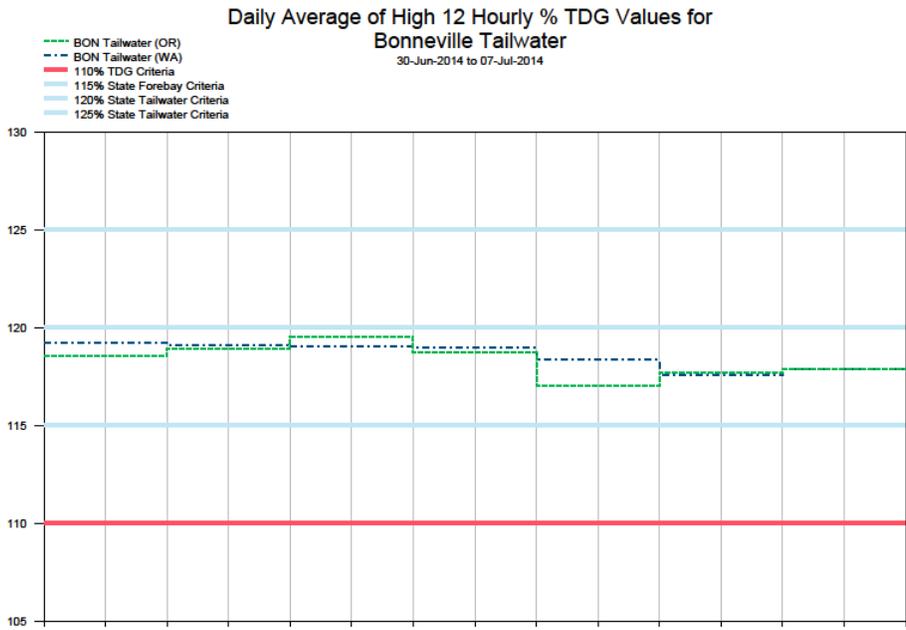


Figure 9

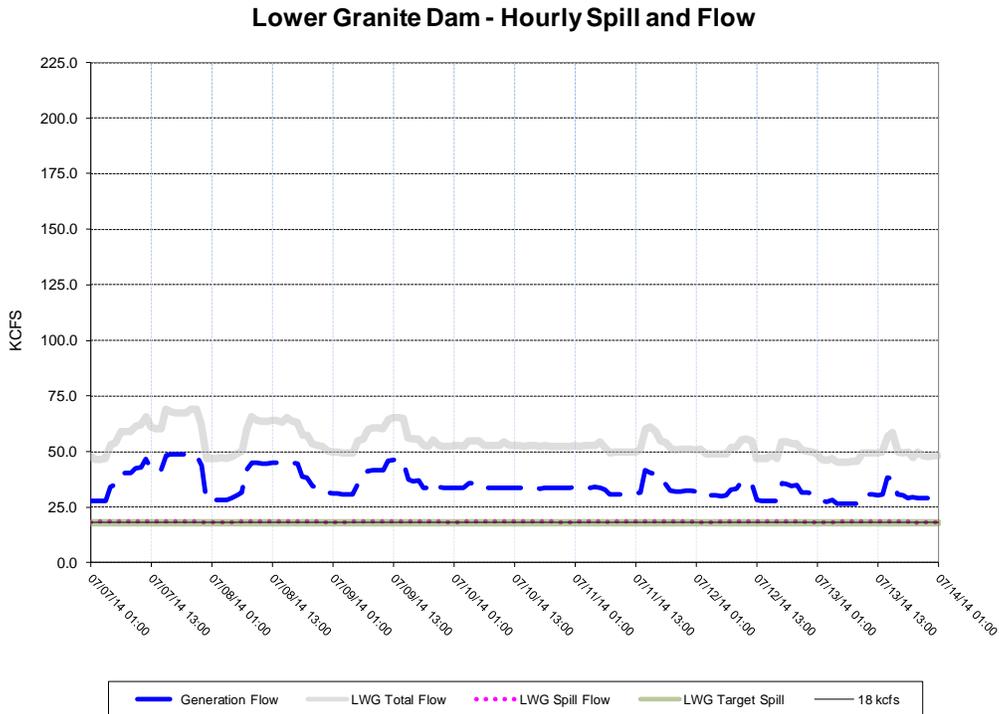
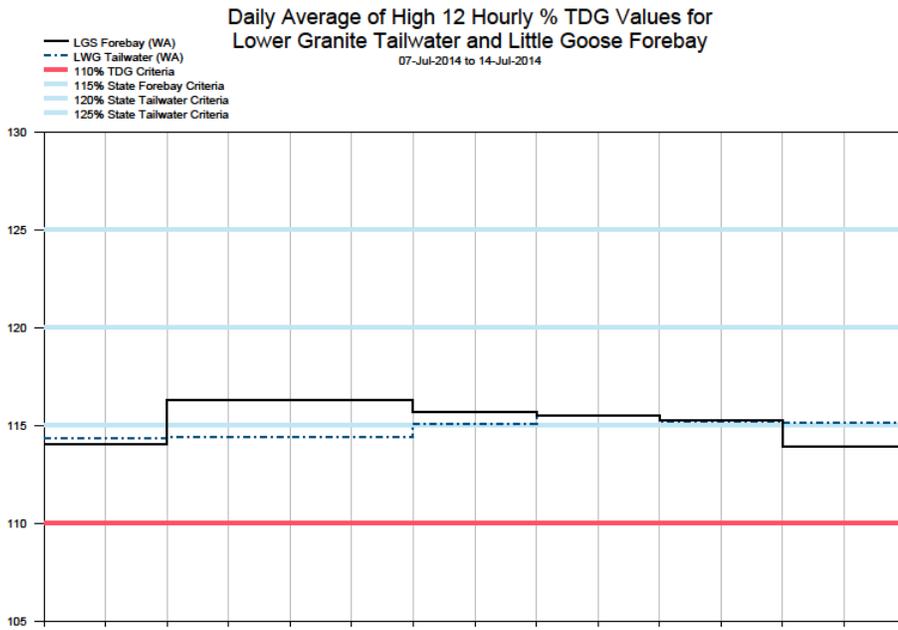
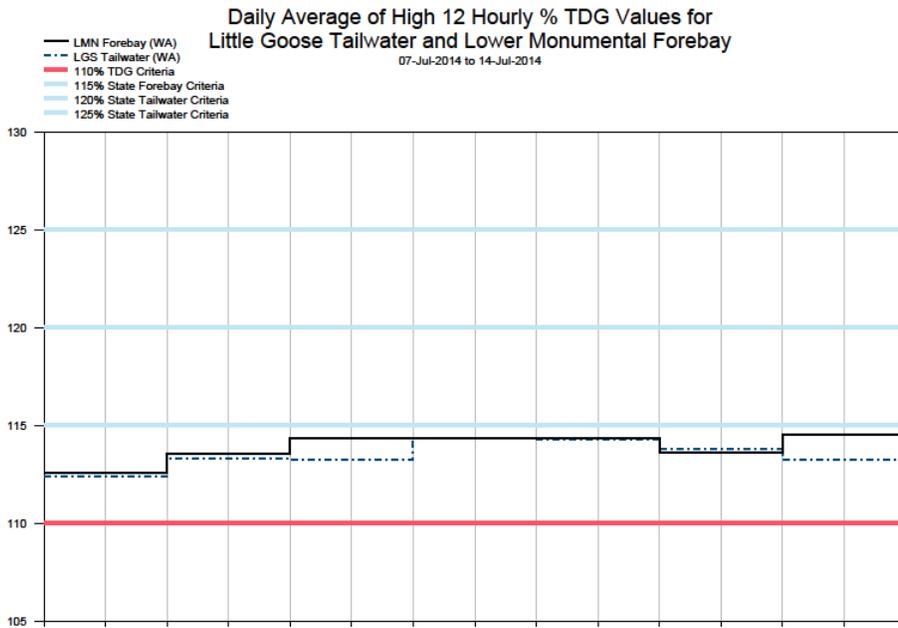


Figure 10



Little Goose Dam - Hourly Spill and Flow

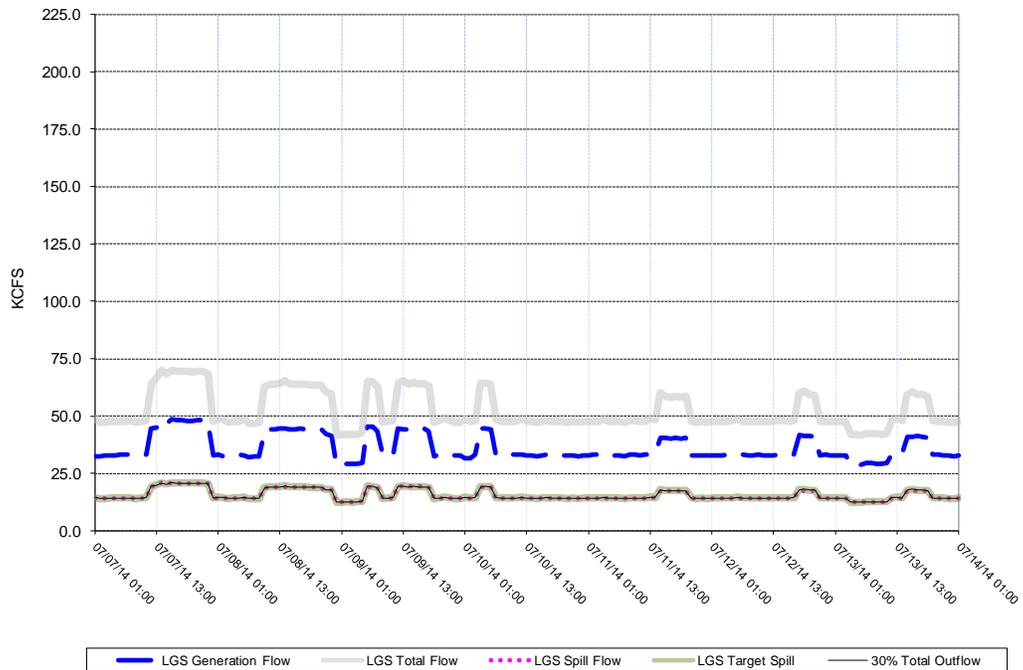


Figure 11

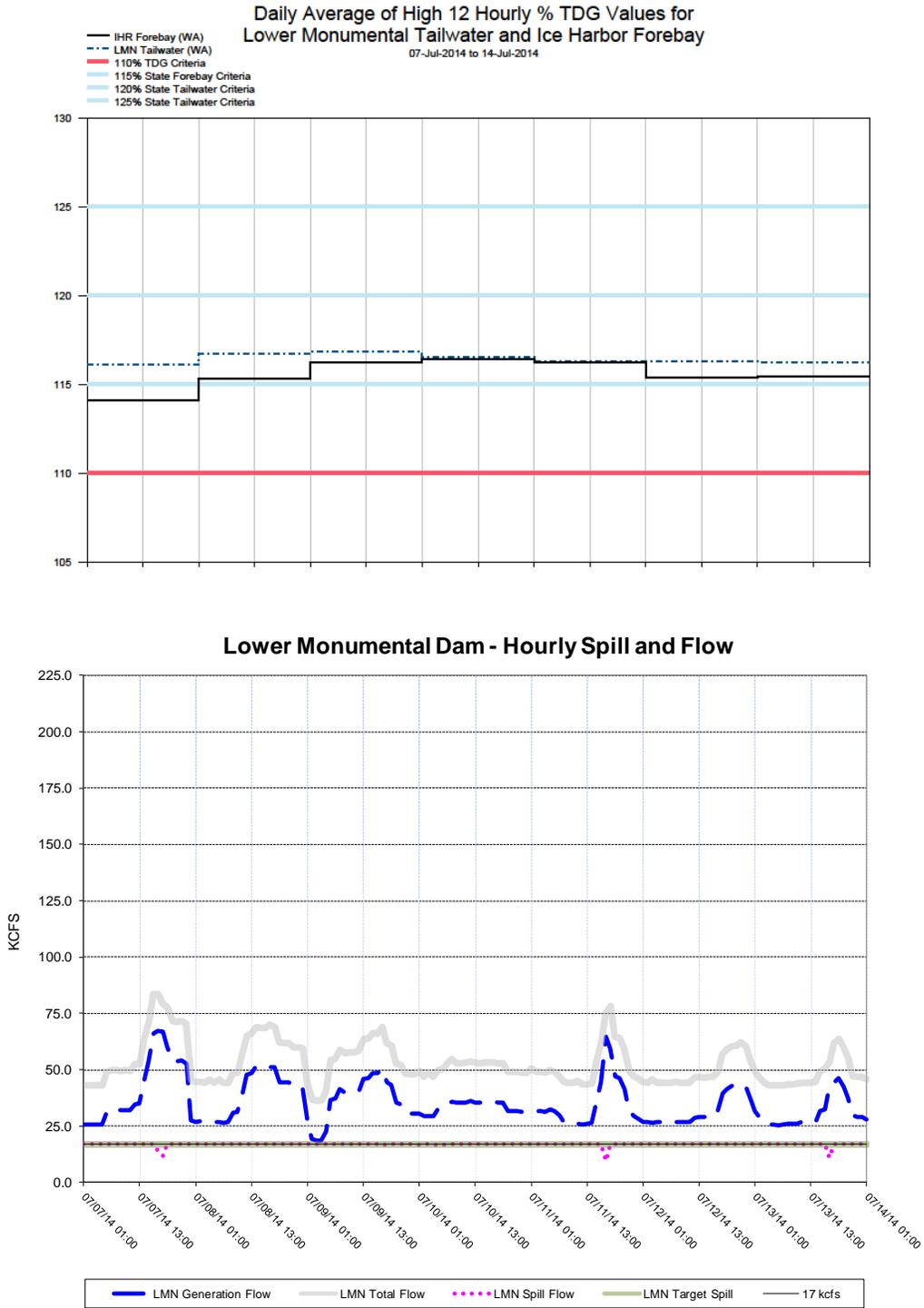


Figure 12

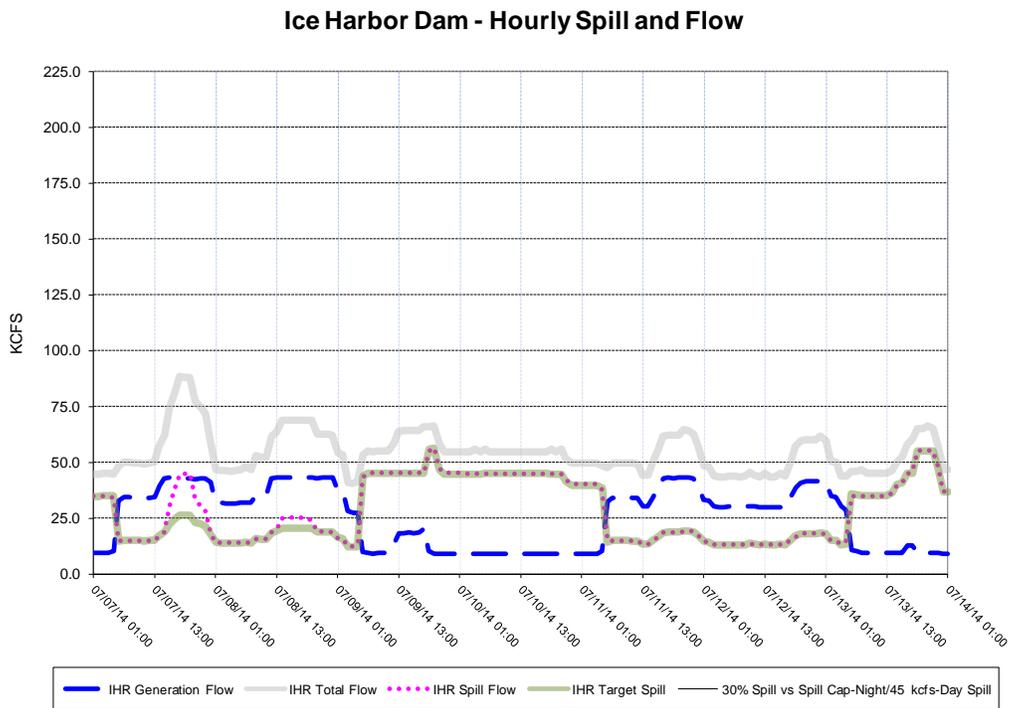
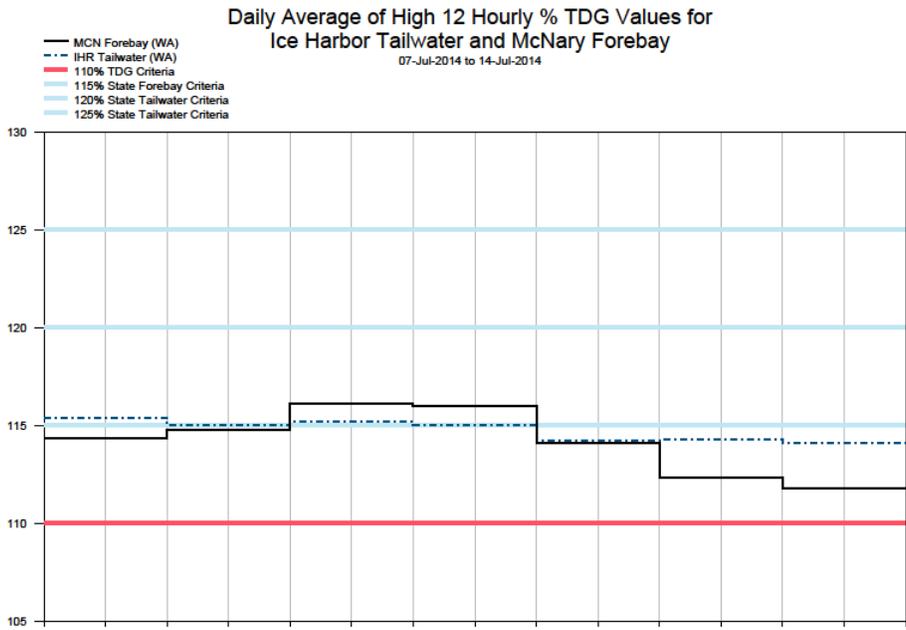
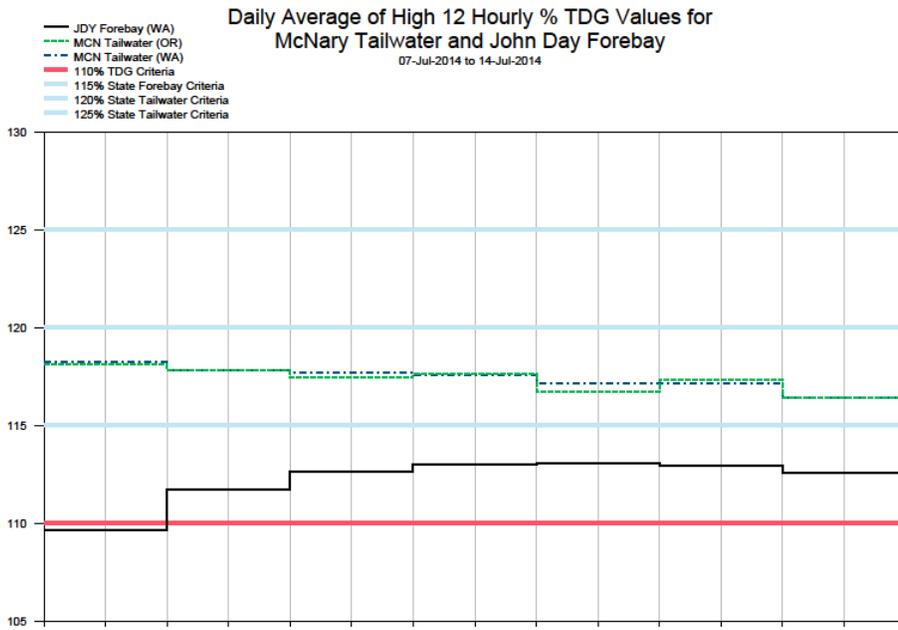


Figure 13



McNary Dam - Hourly Spill and Flow

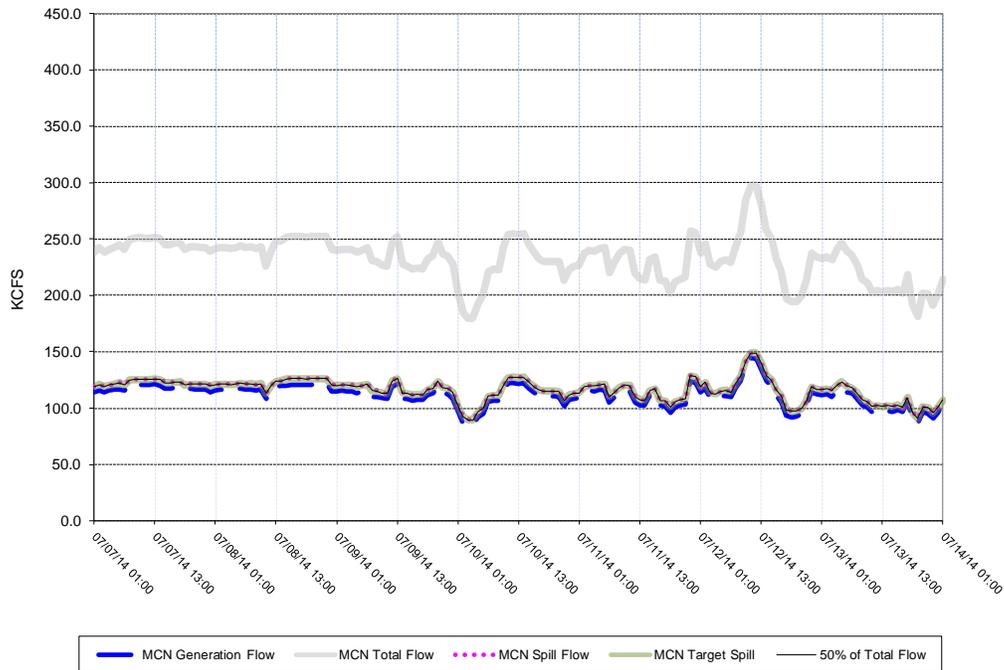
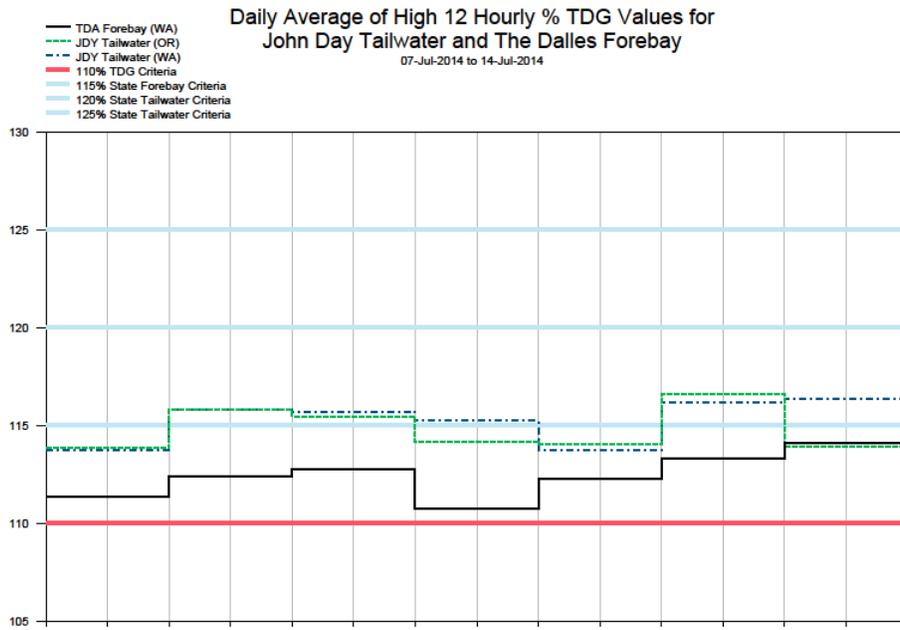


Figure 14



John Day Dam - Hourly Spill and Flow

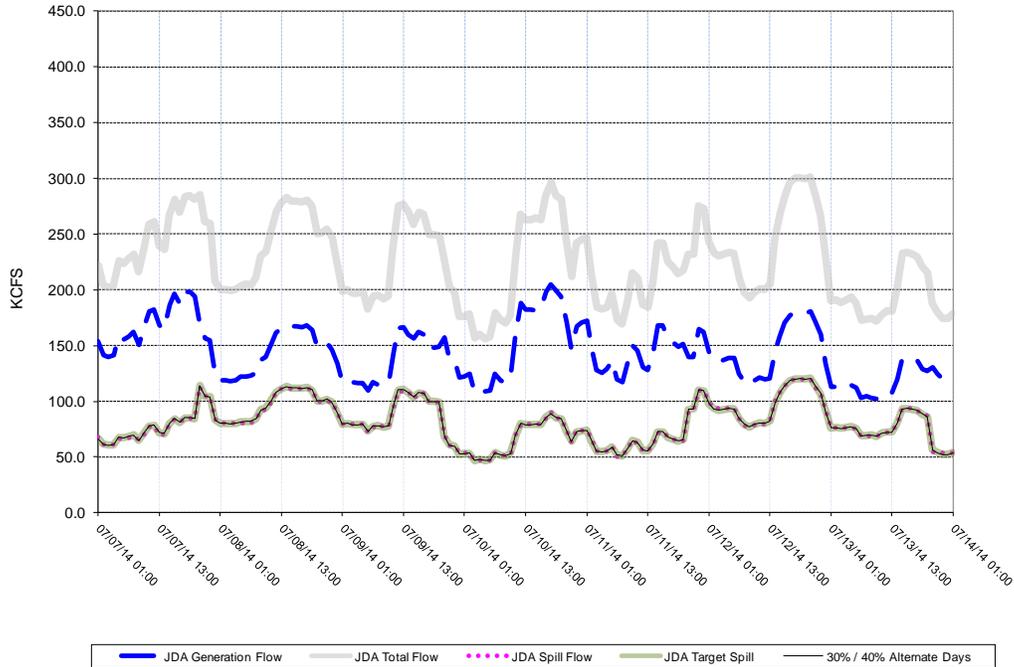
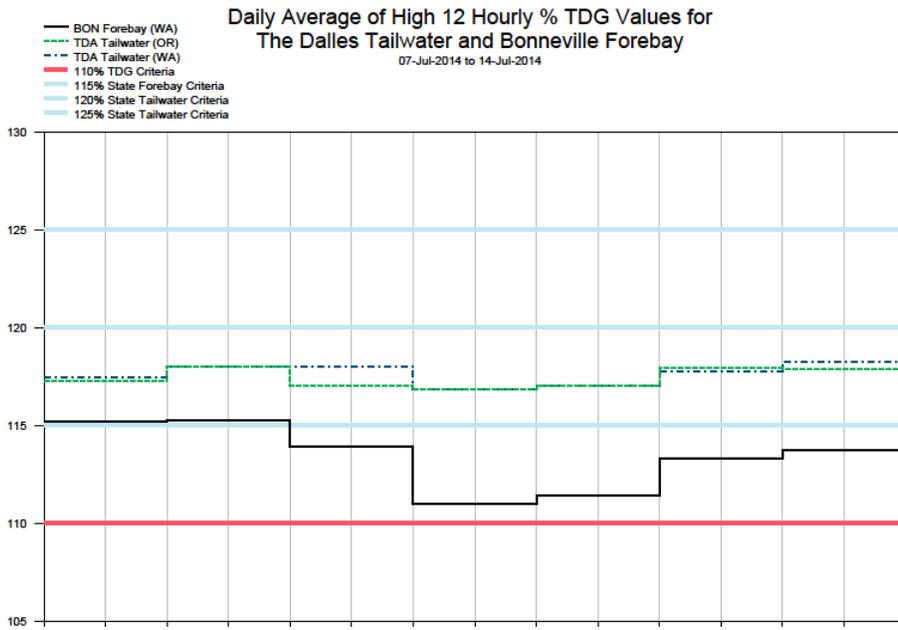


Figure 15



The Dalles Dam - Hourly Spill and Flow

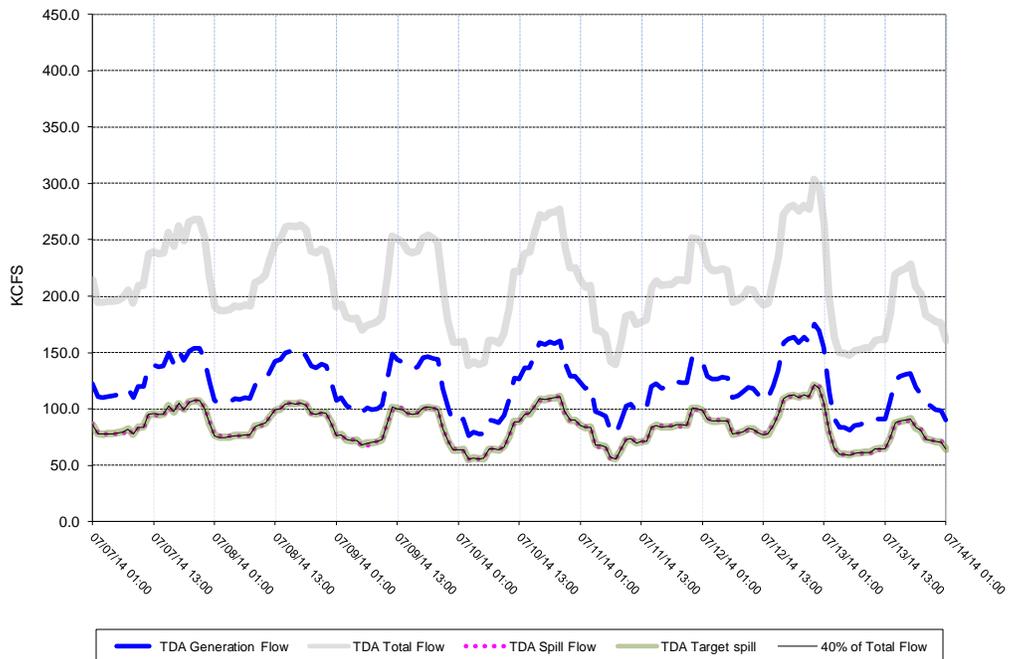


Figure 16

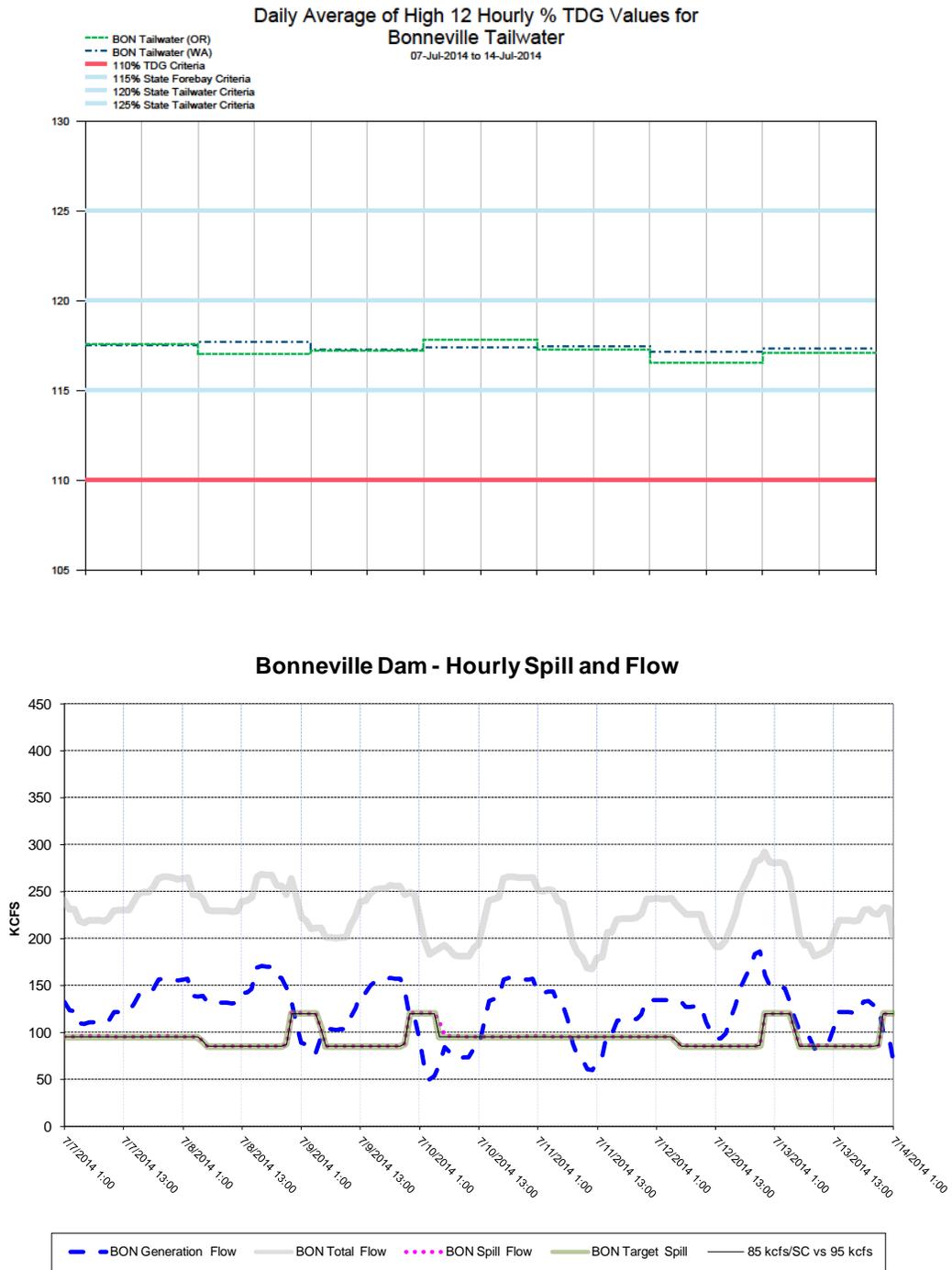
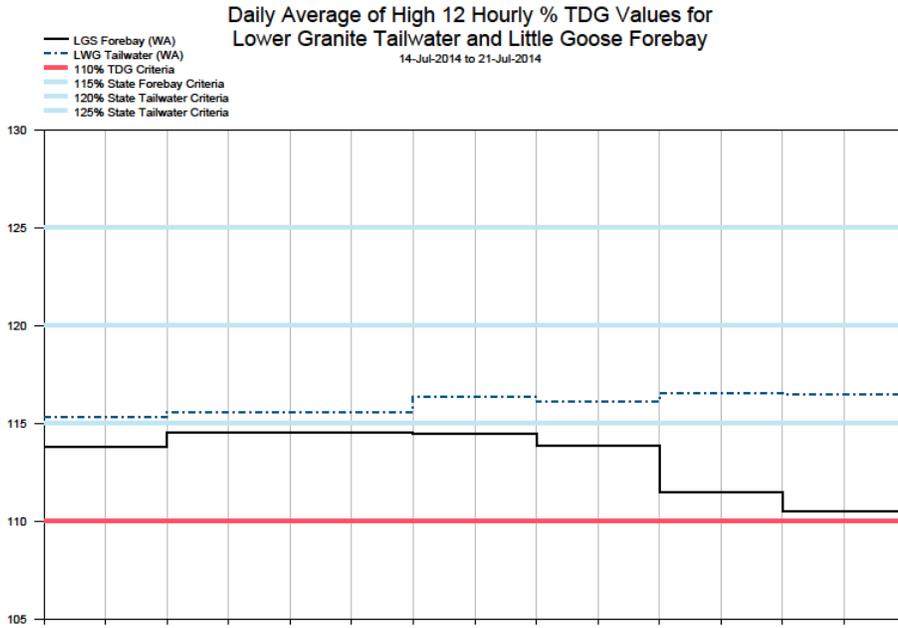


Figure 17



Lower Granite Dam - Hourly Spill and Flow

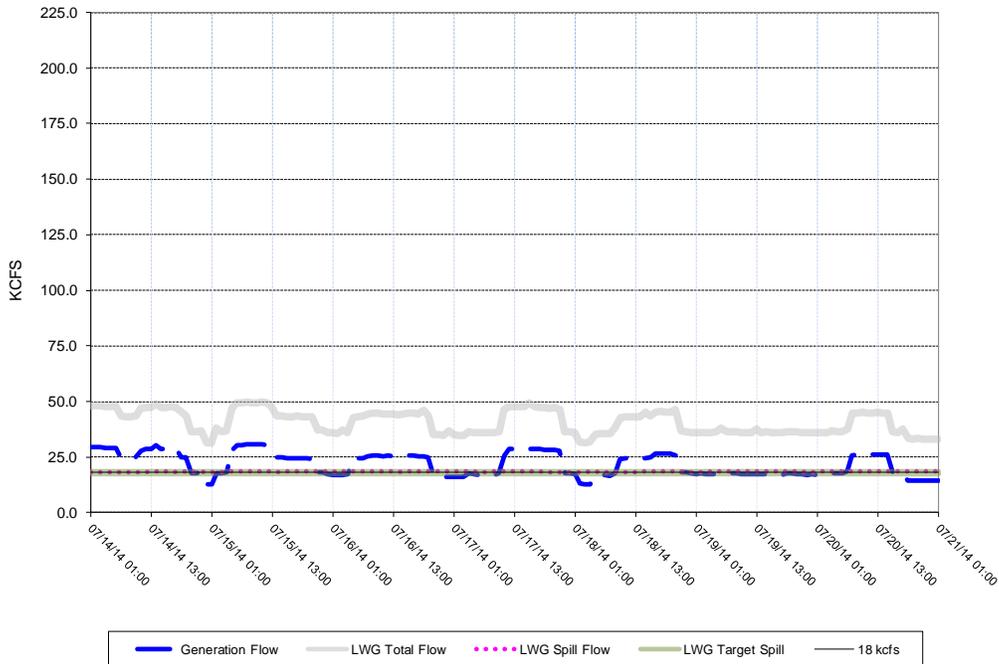
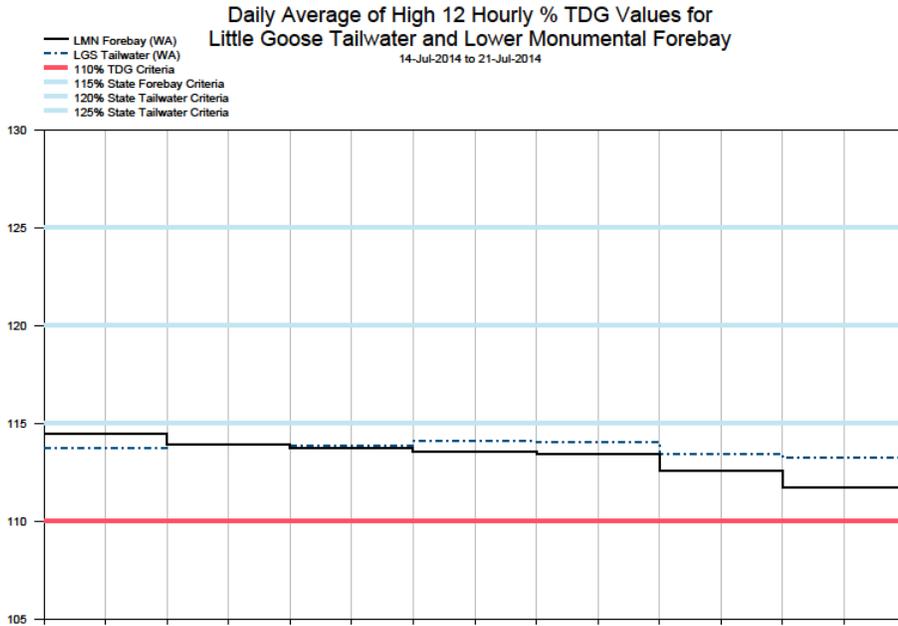


Figure 18



Little Goose Dam - Hourly Spill and Flow

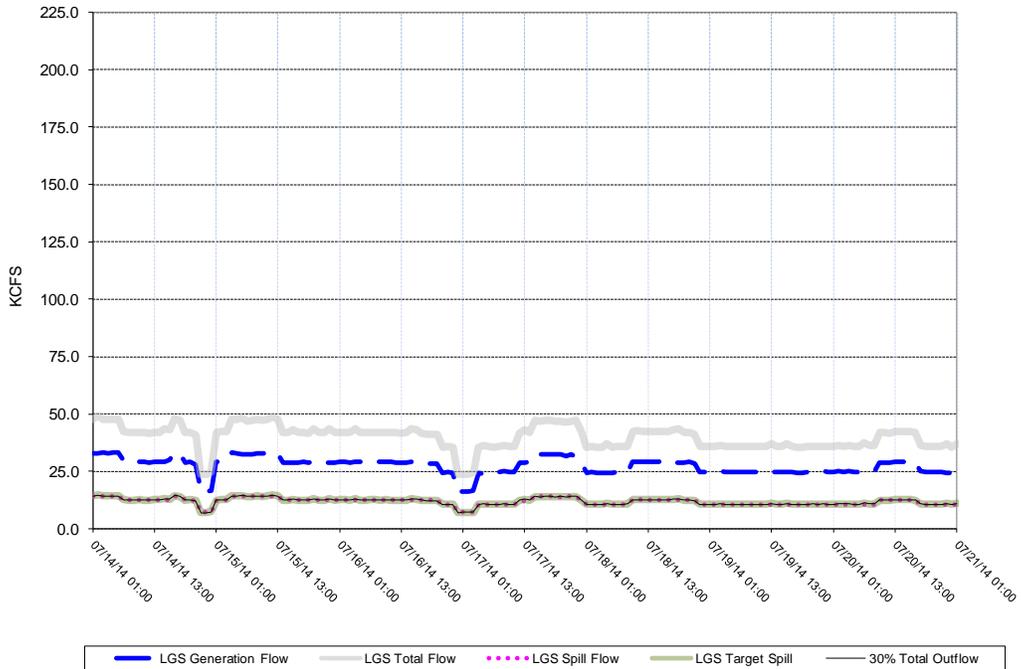


Figure 19

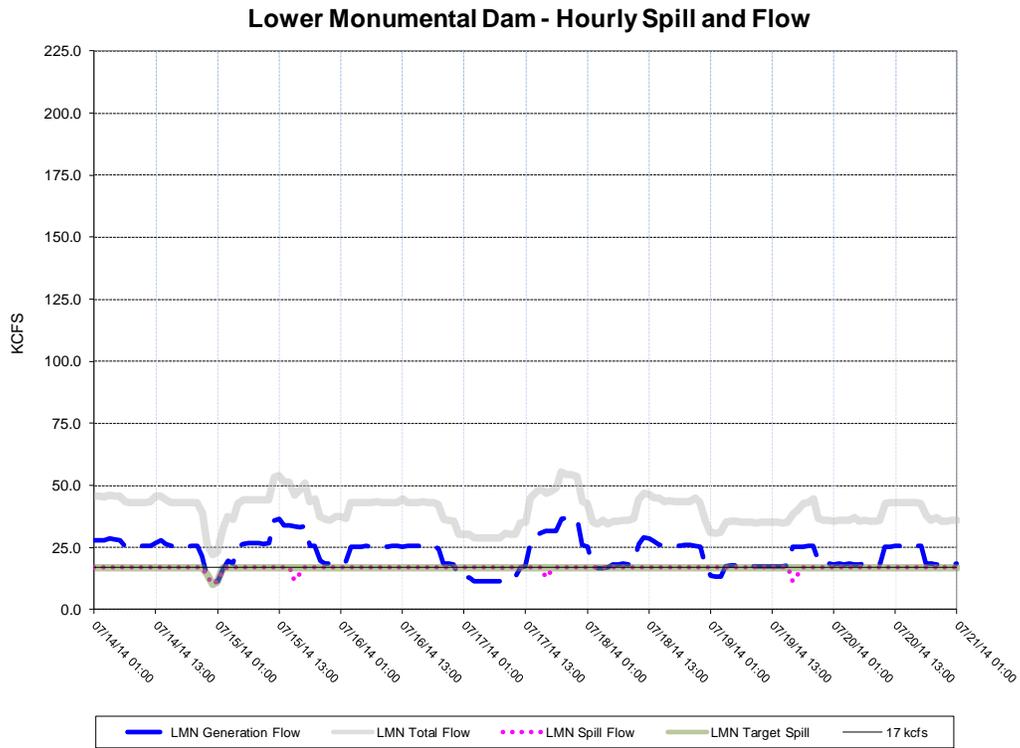
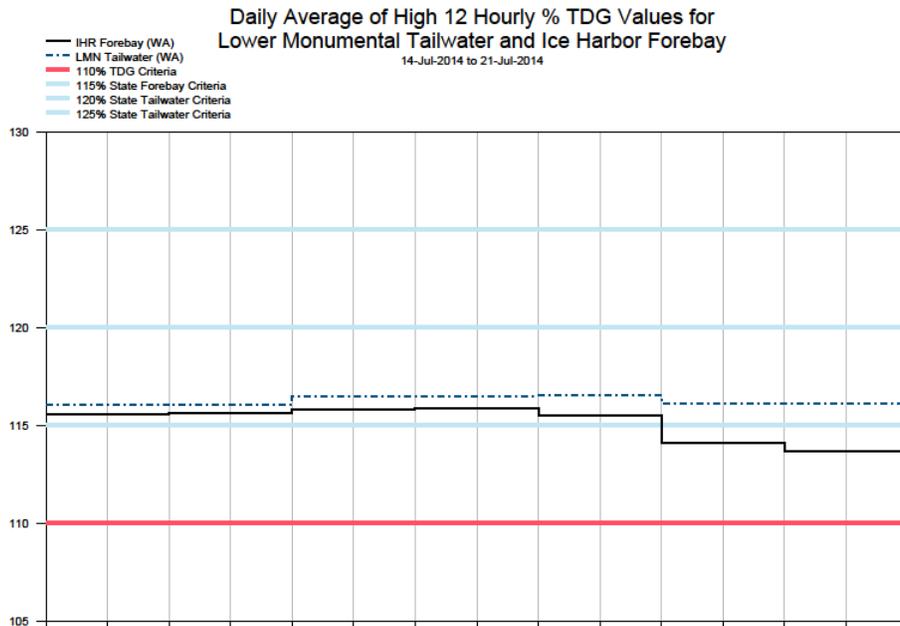
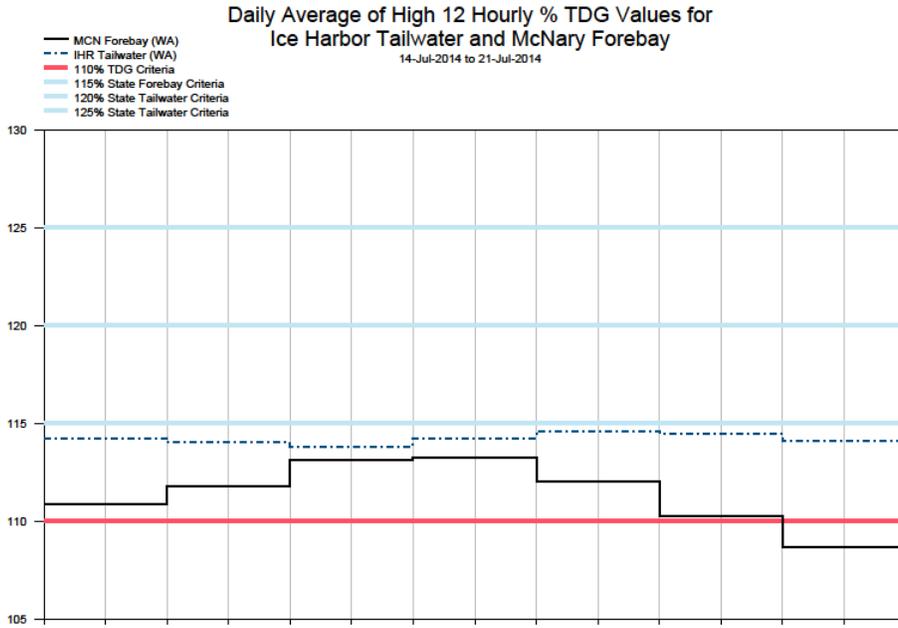


Figure 20



Ice Harbor Dam - Hourly Spill and Flow

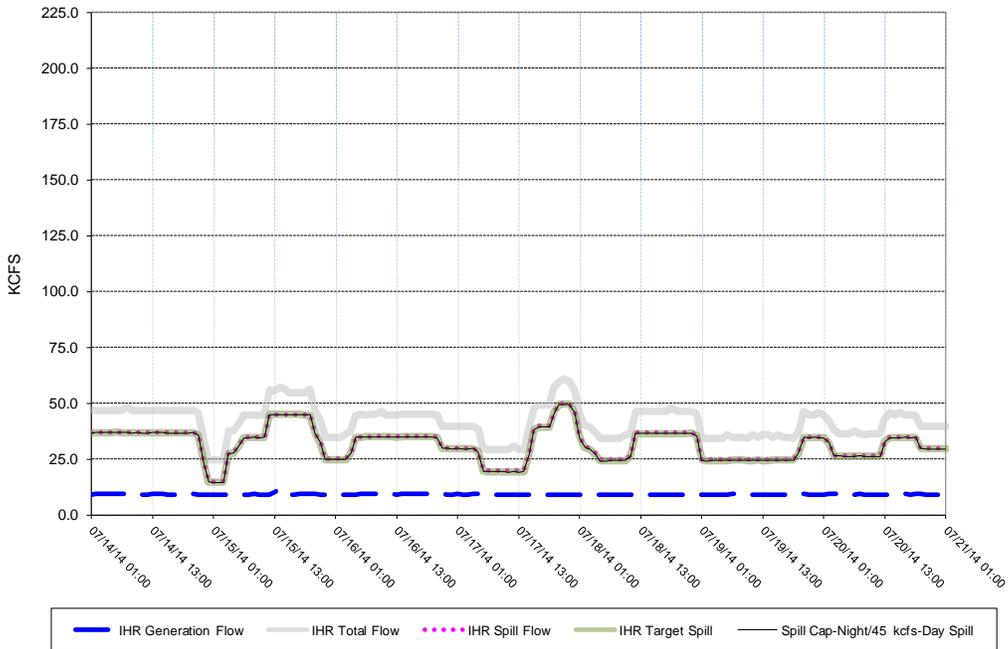
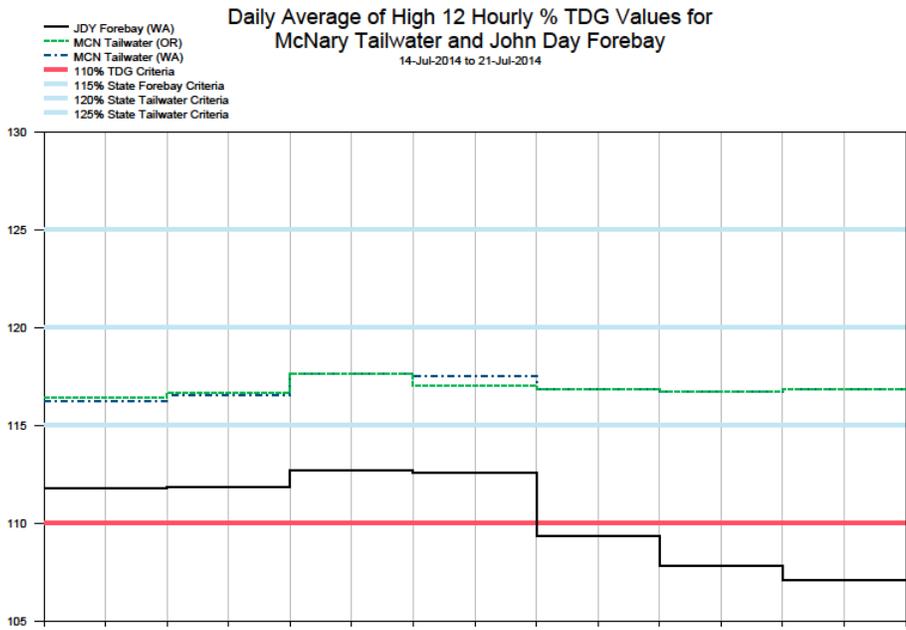


Figure 21



McNary Dam - Hourly Spill and Flow

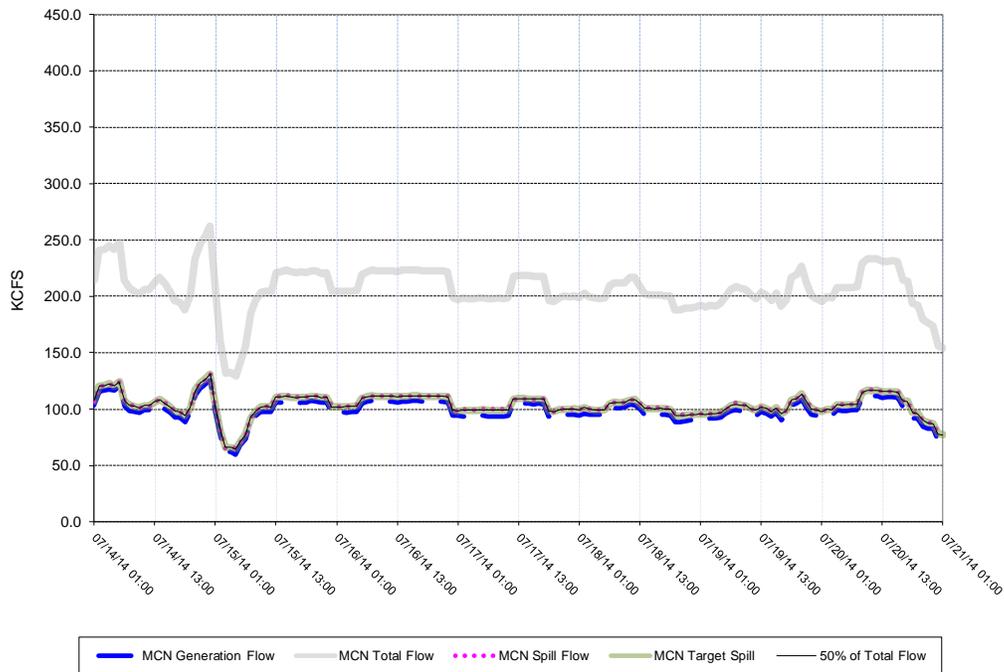
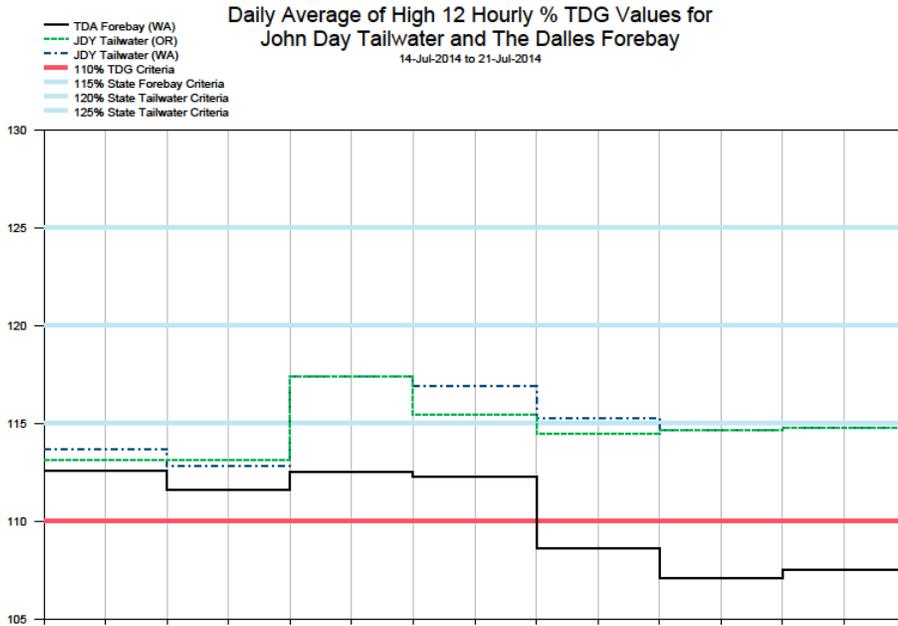


Figure 22



John Day Dam - Hourly Spill and Flow

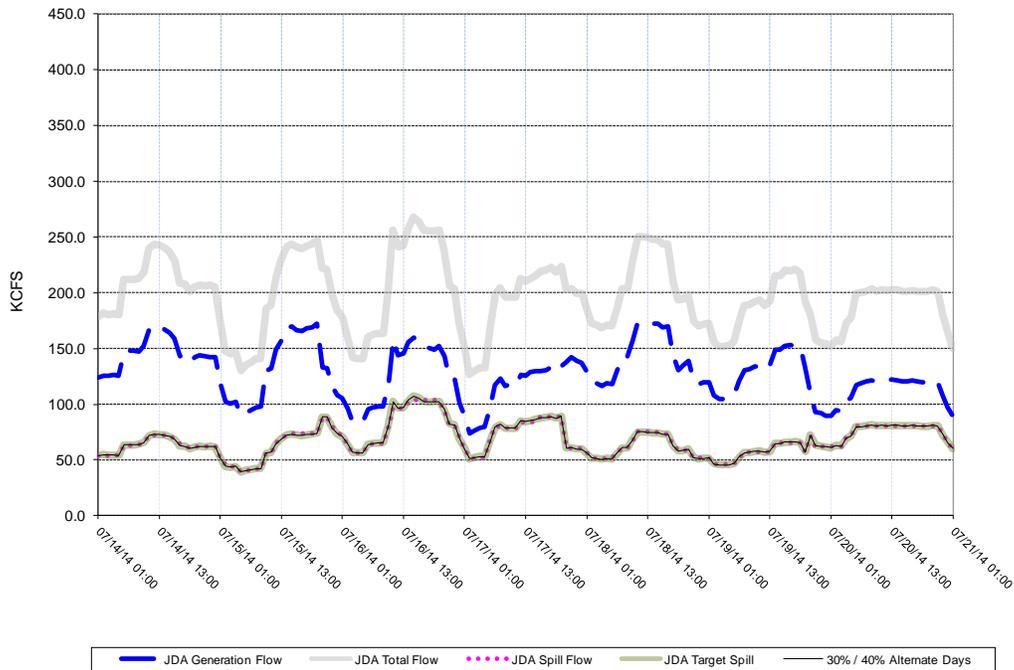
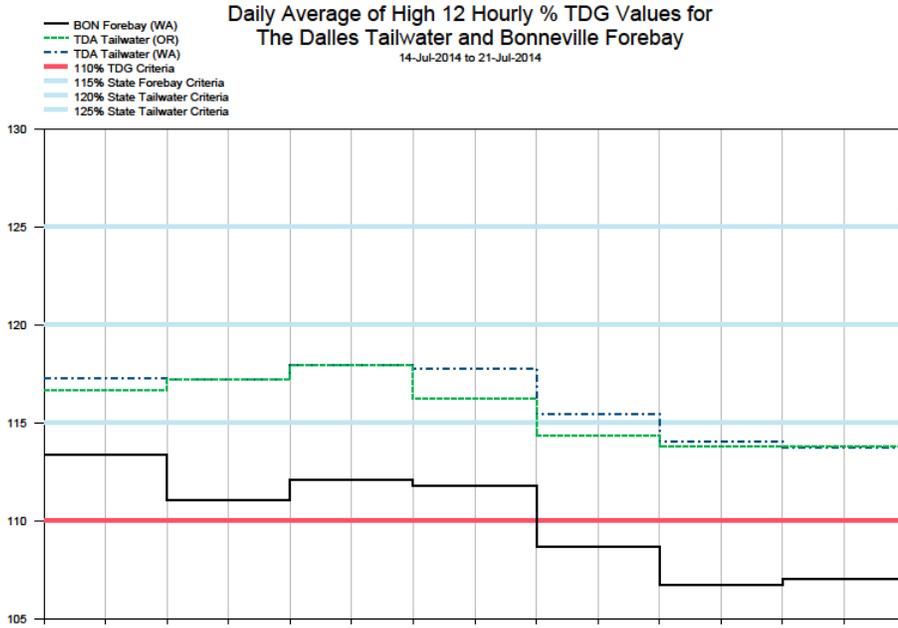


Figure 23



The Dalles Dam - Hourly Spill and Flow

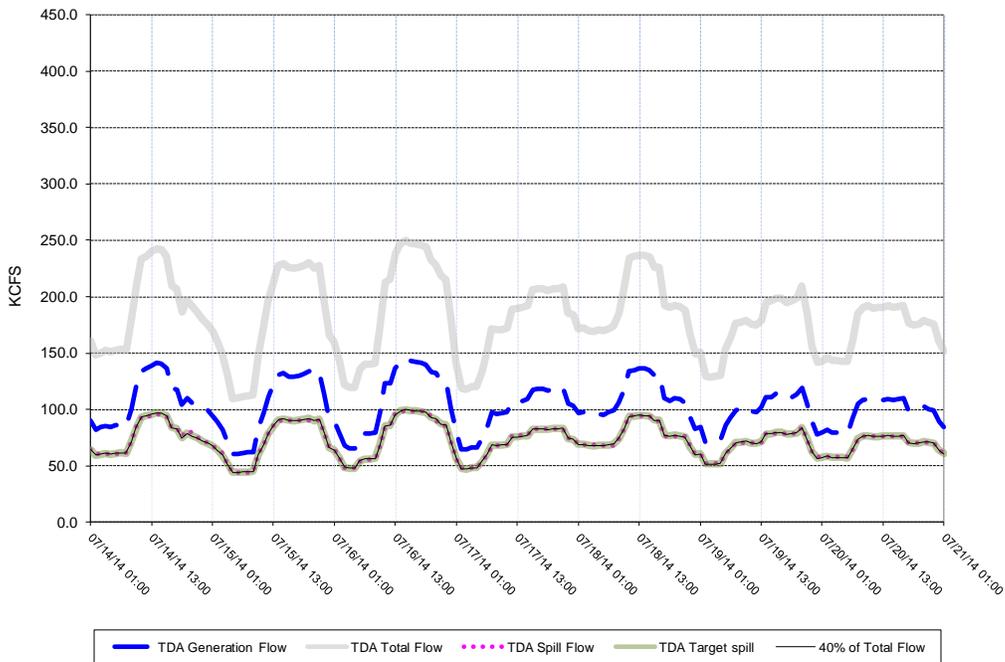


Figure 24

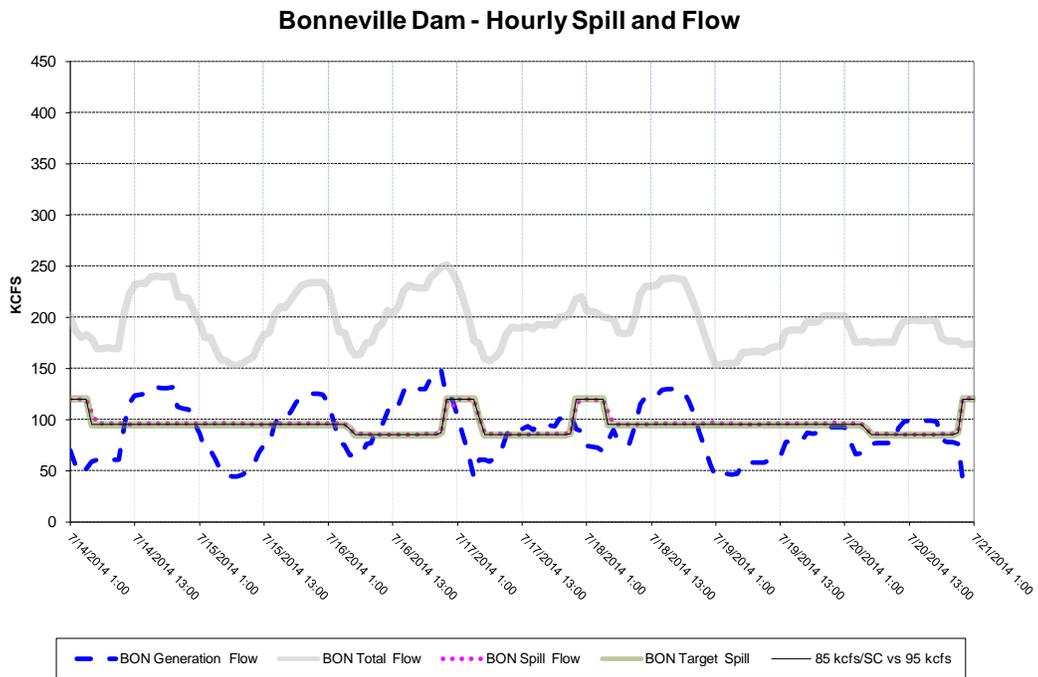
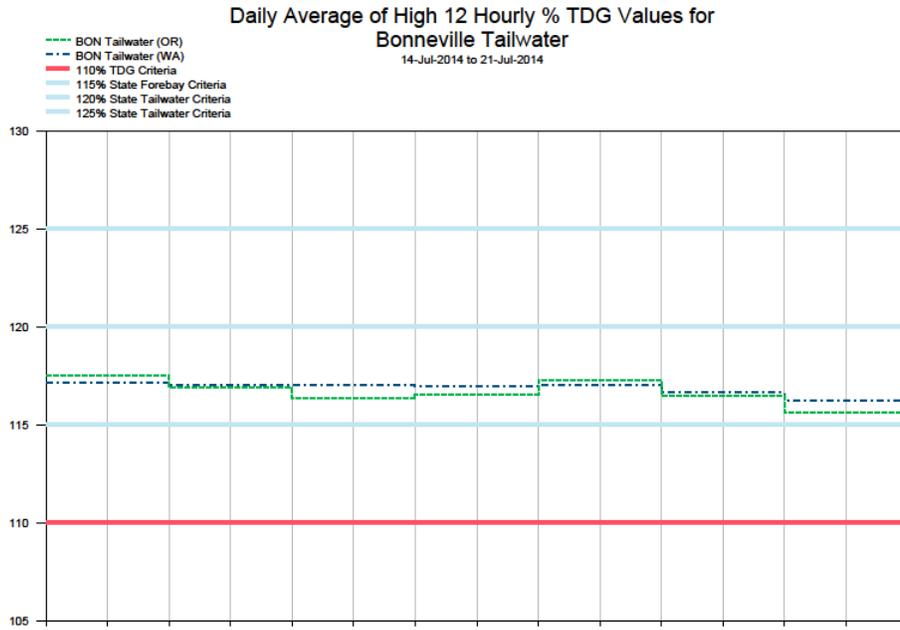


Figure 25

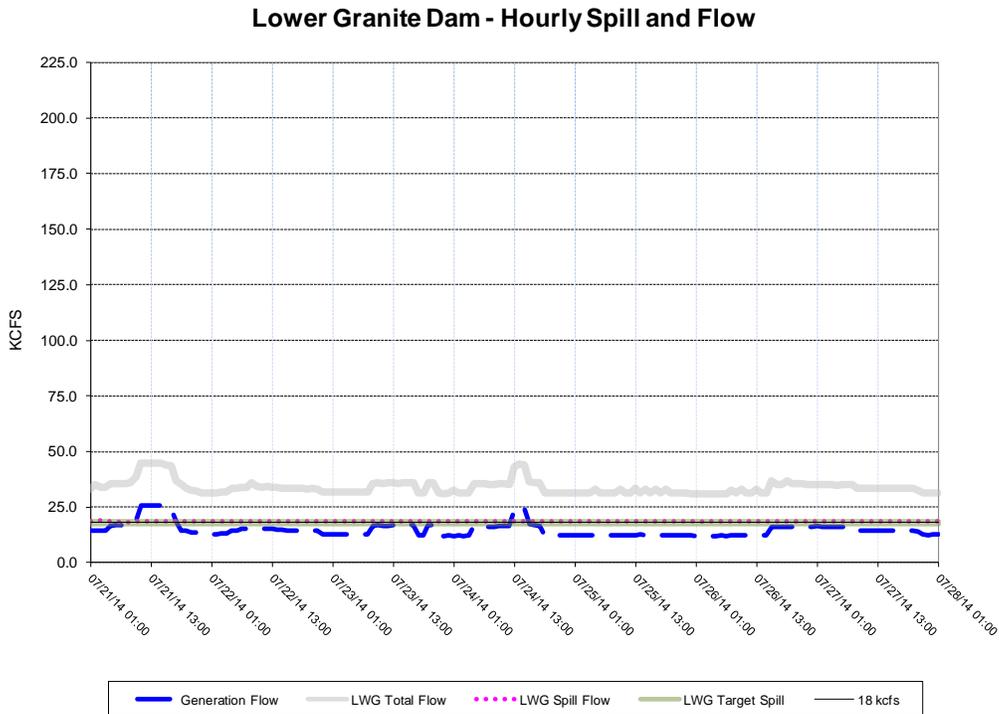
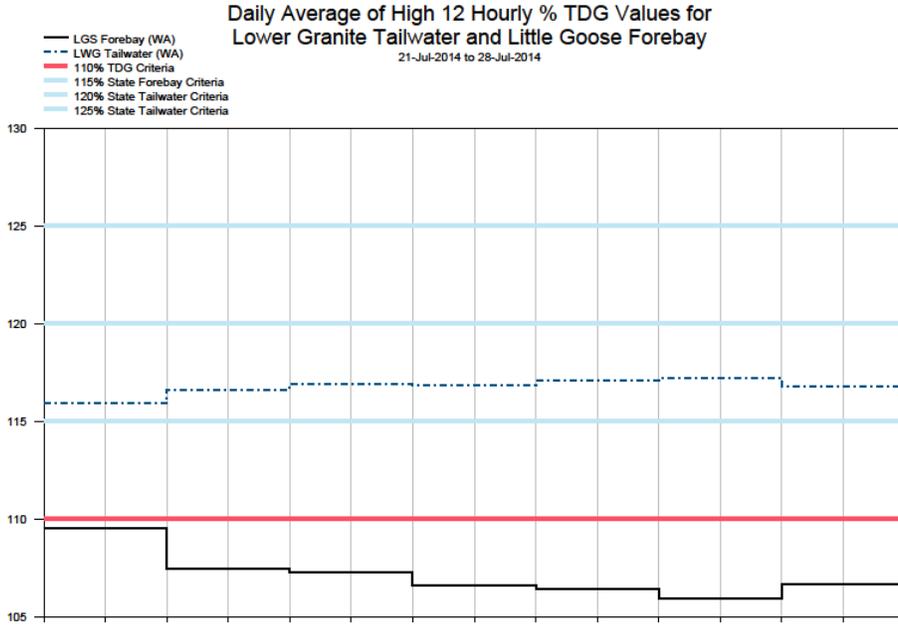


Figure 26

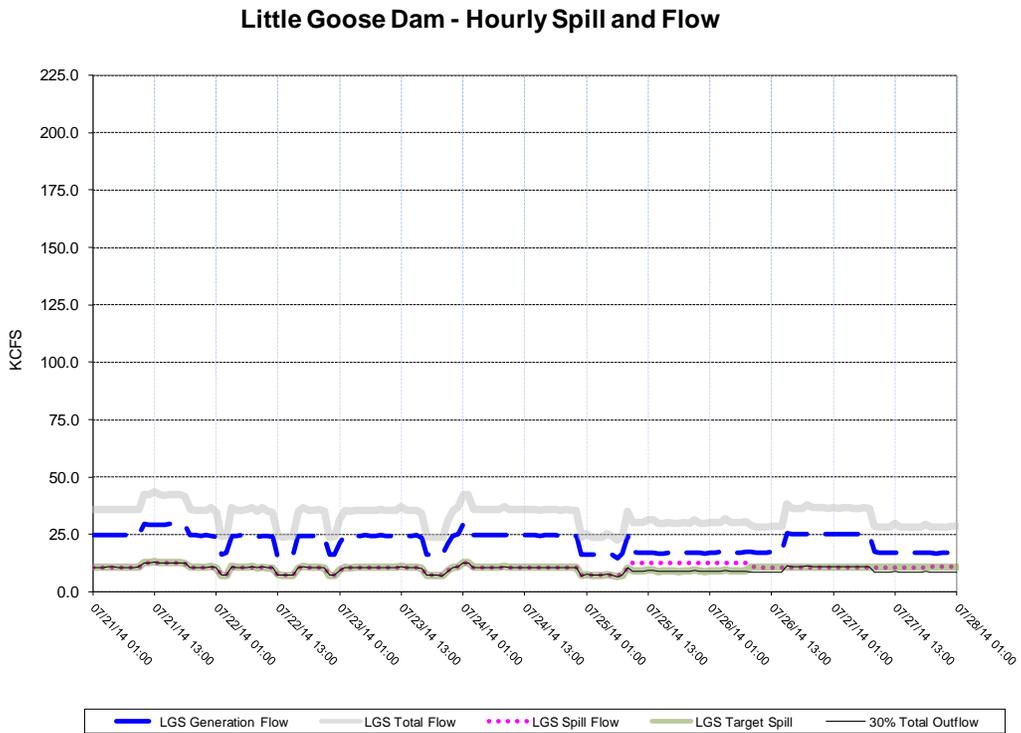
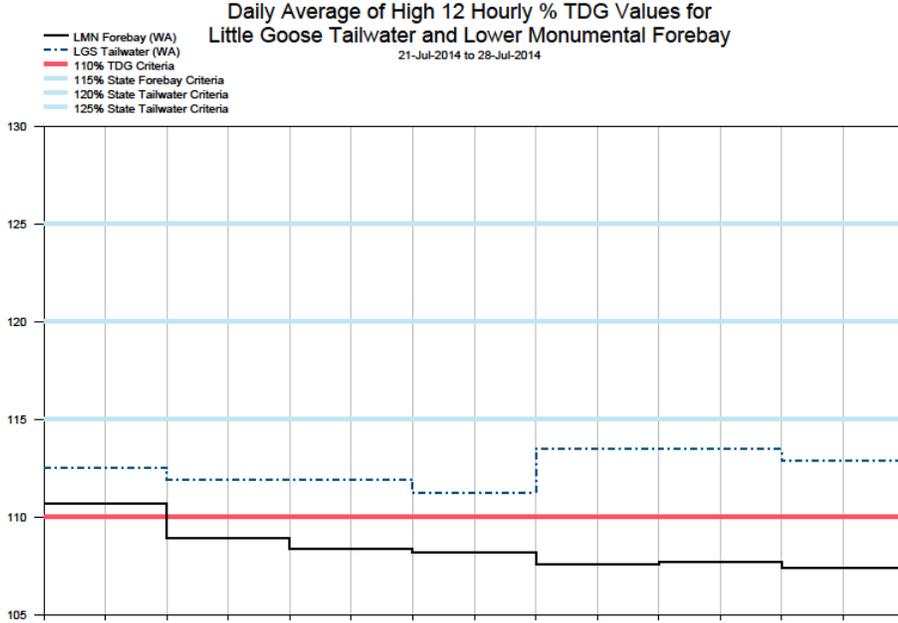


Figure 27

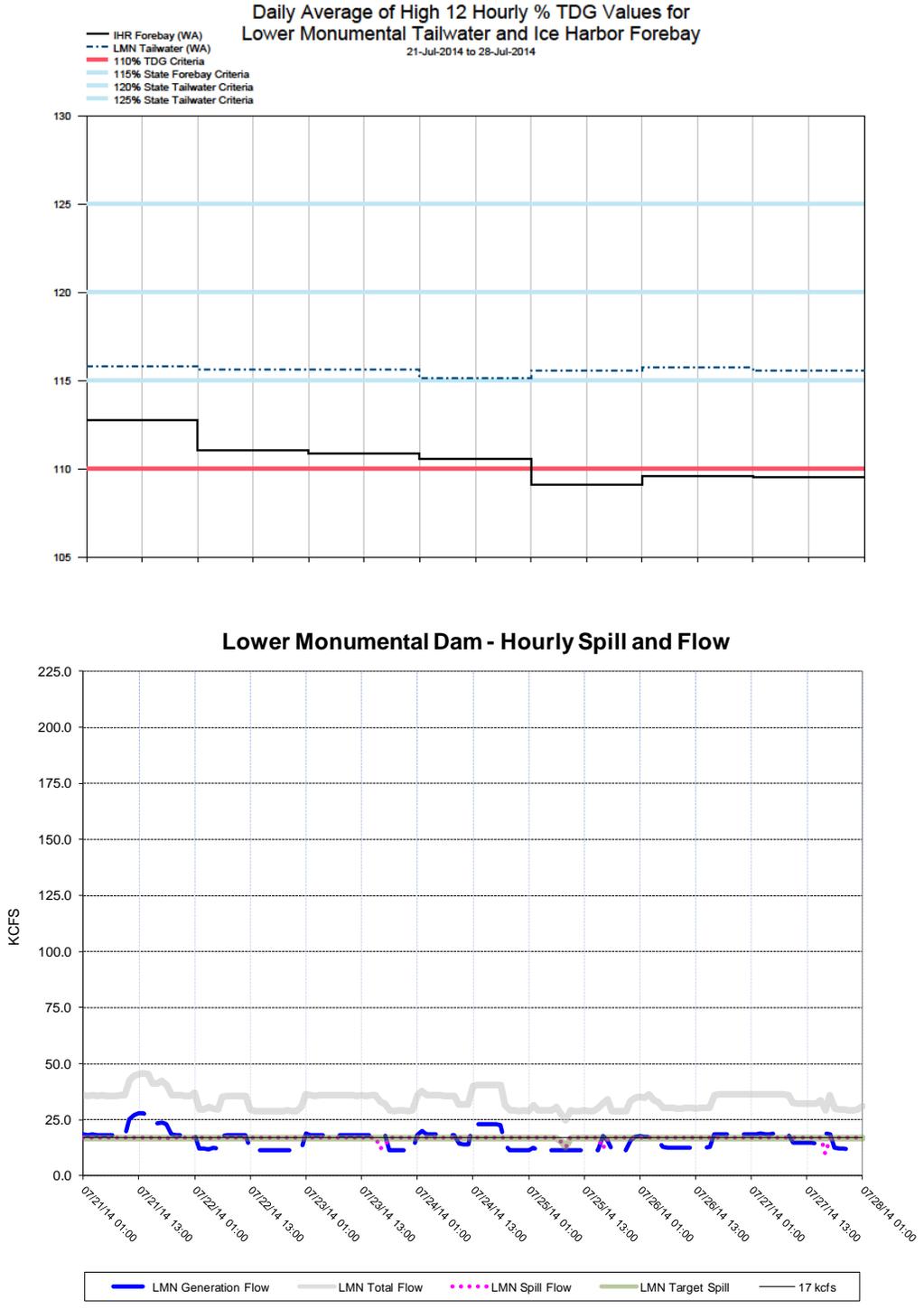


Figure 28

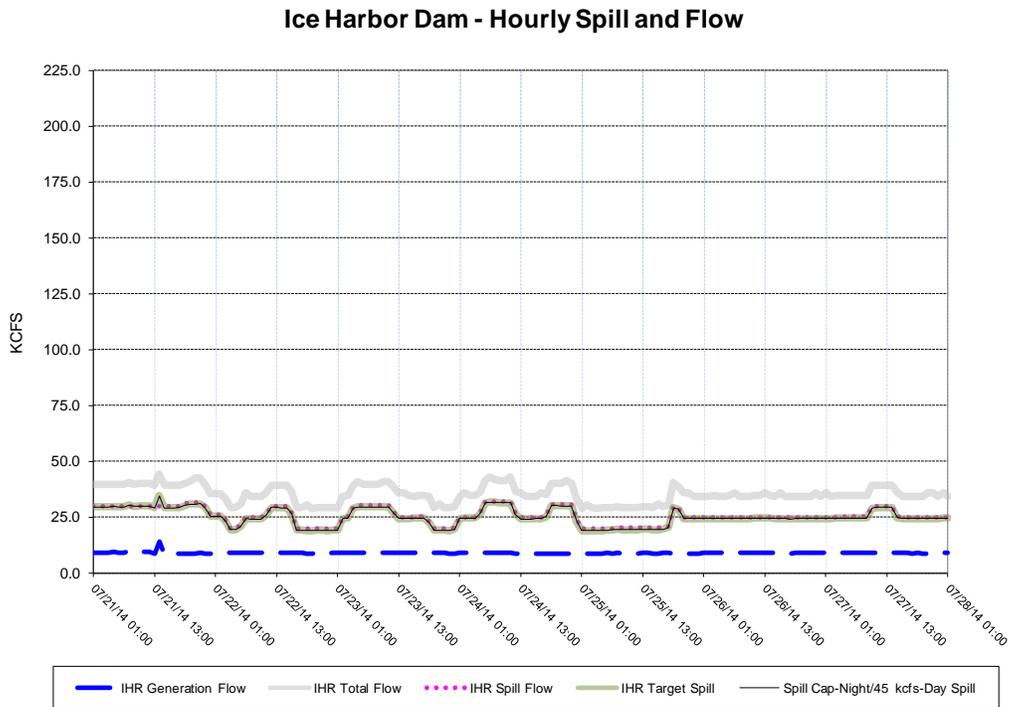
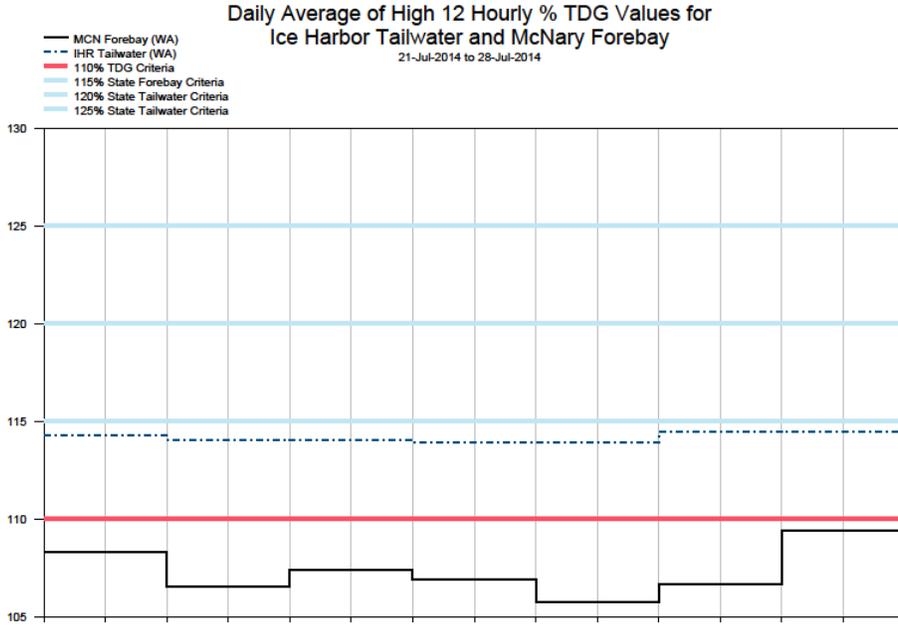
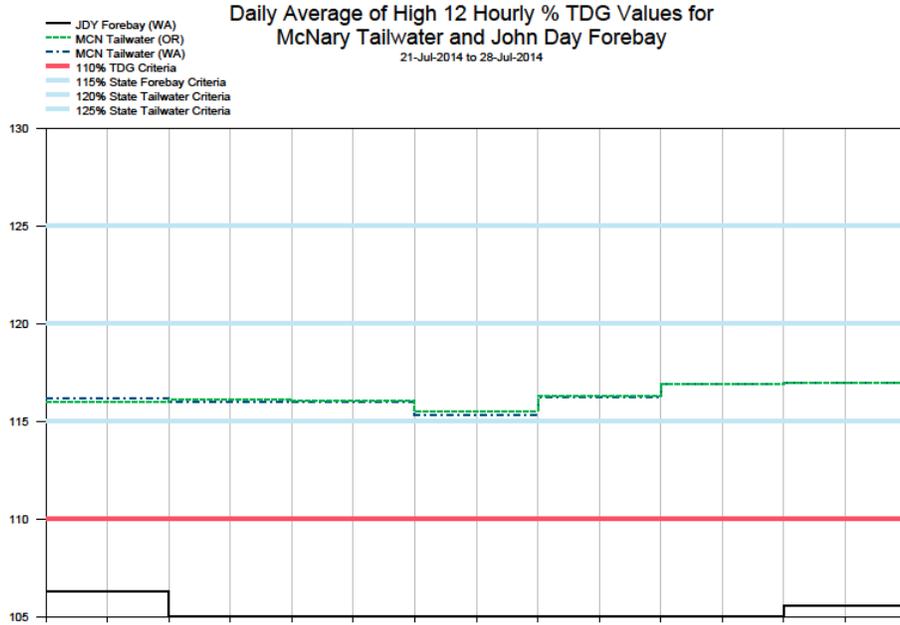


Figure 29



McNary Dam - Hourly Spill and Flow

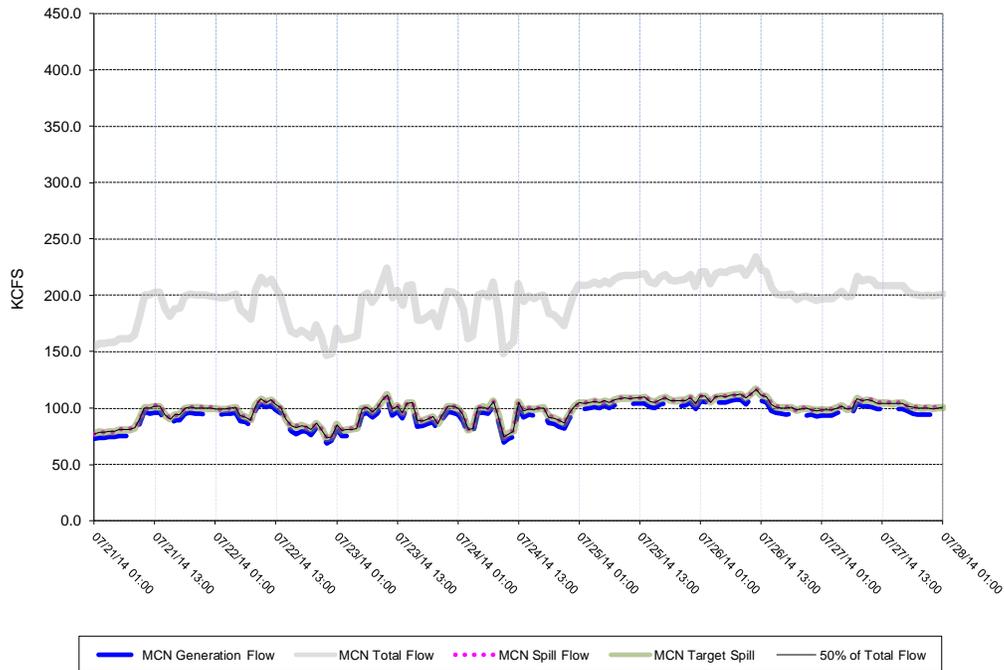


Figure 30

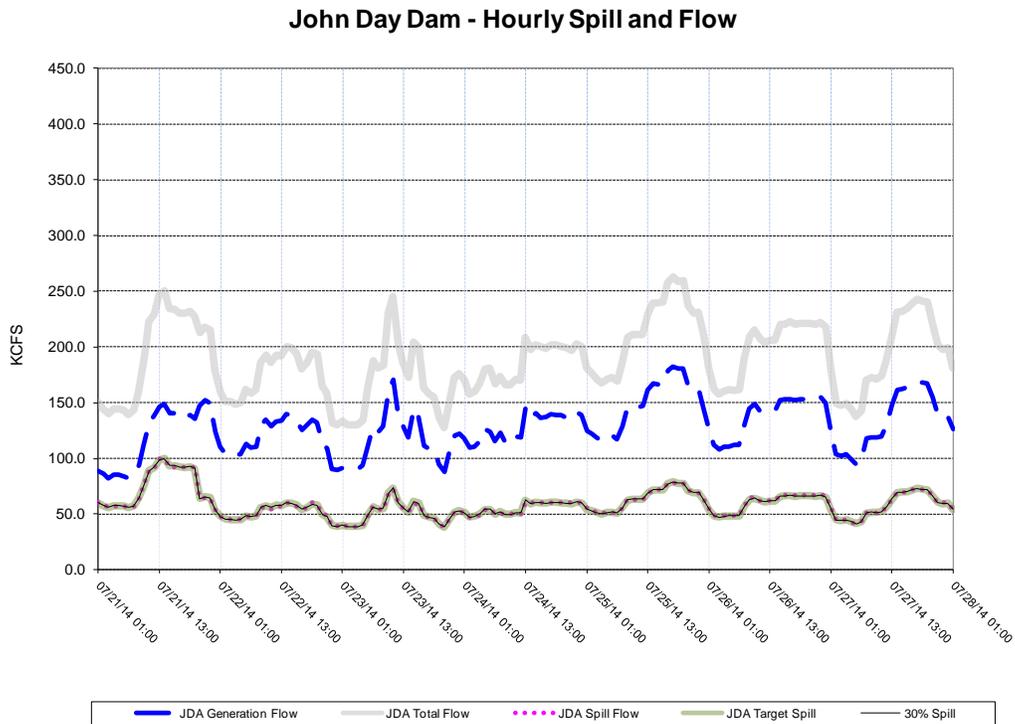
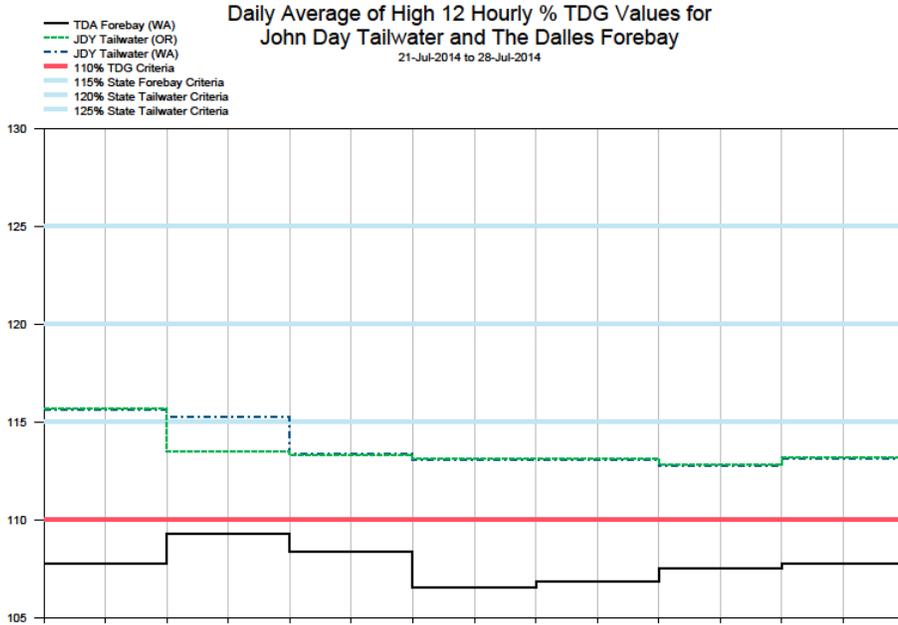


Figure 31

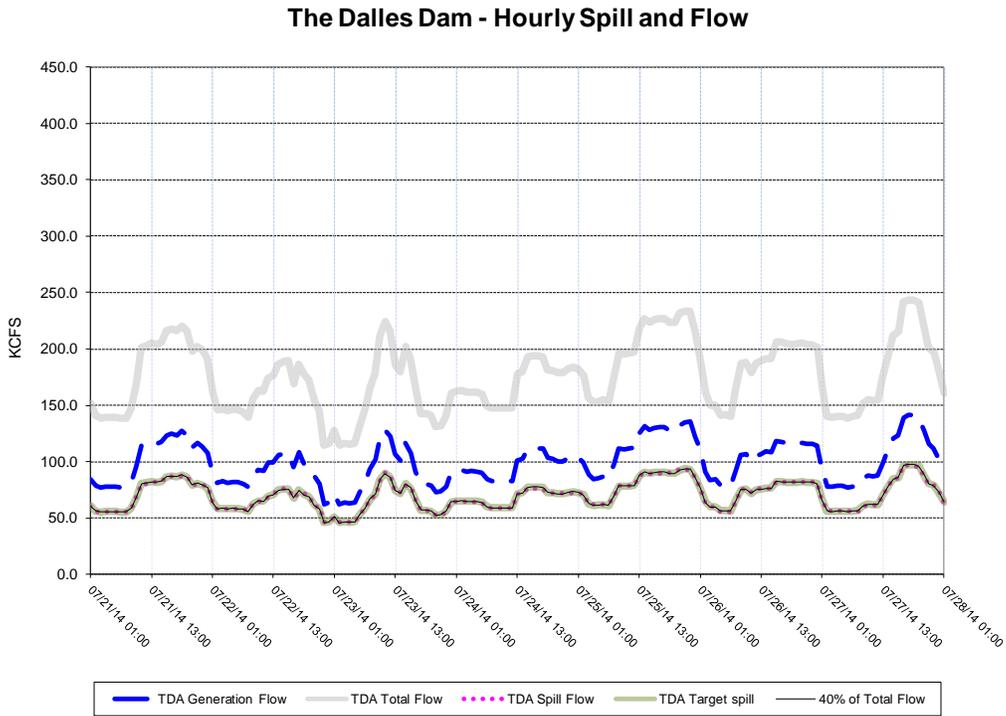
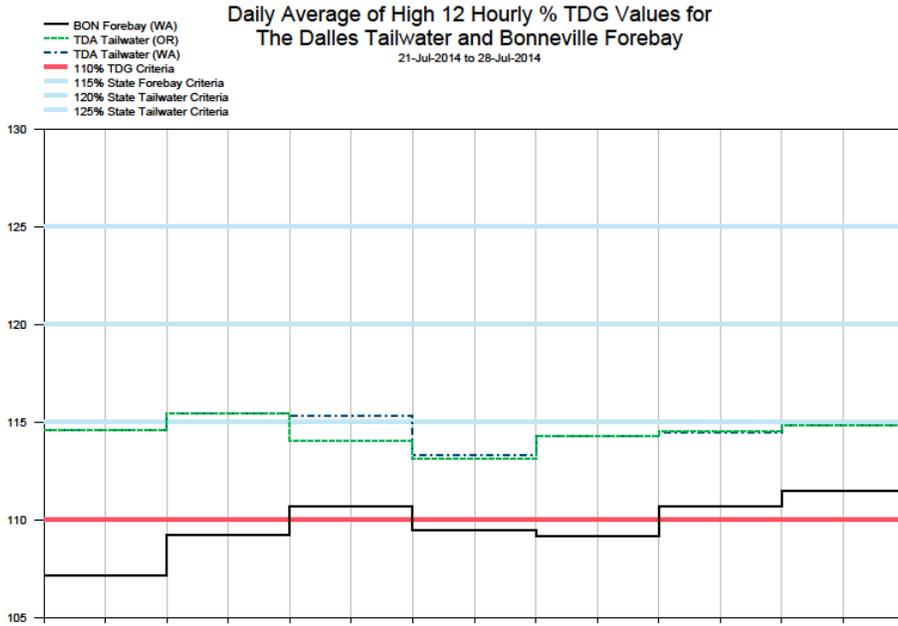


Figure 32

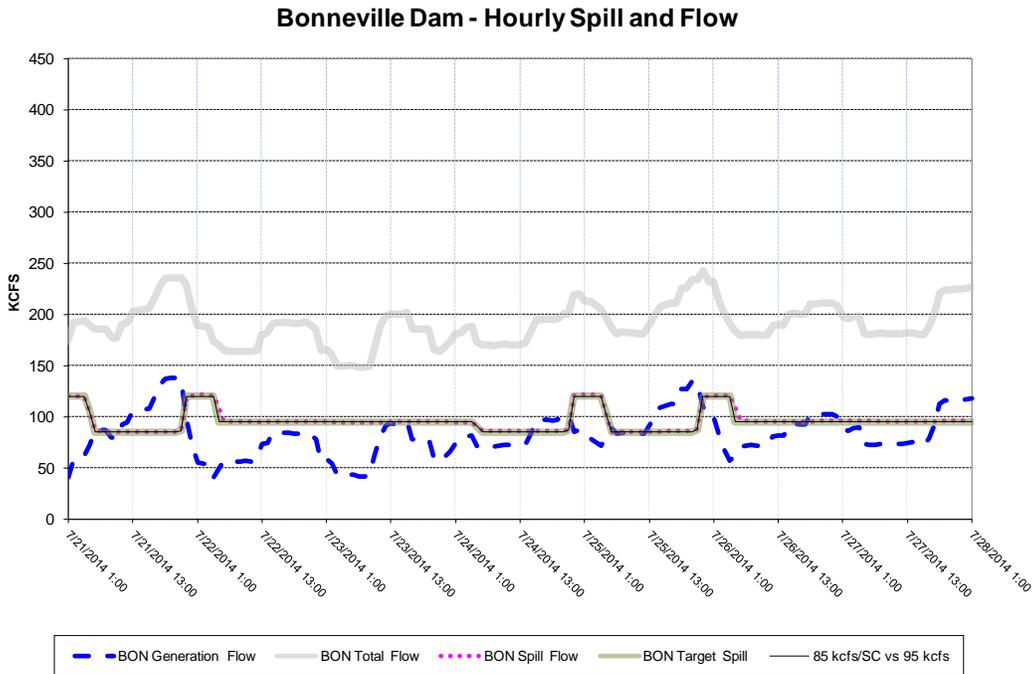
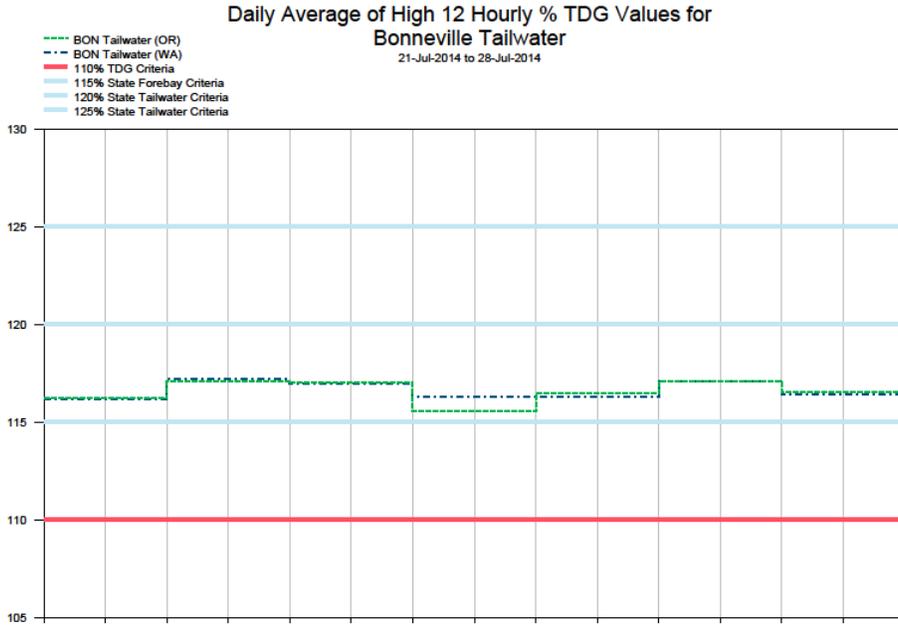


Figure 33

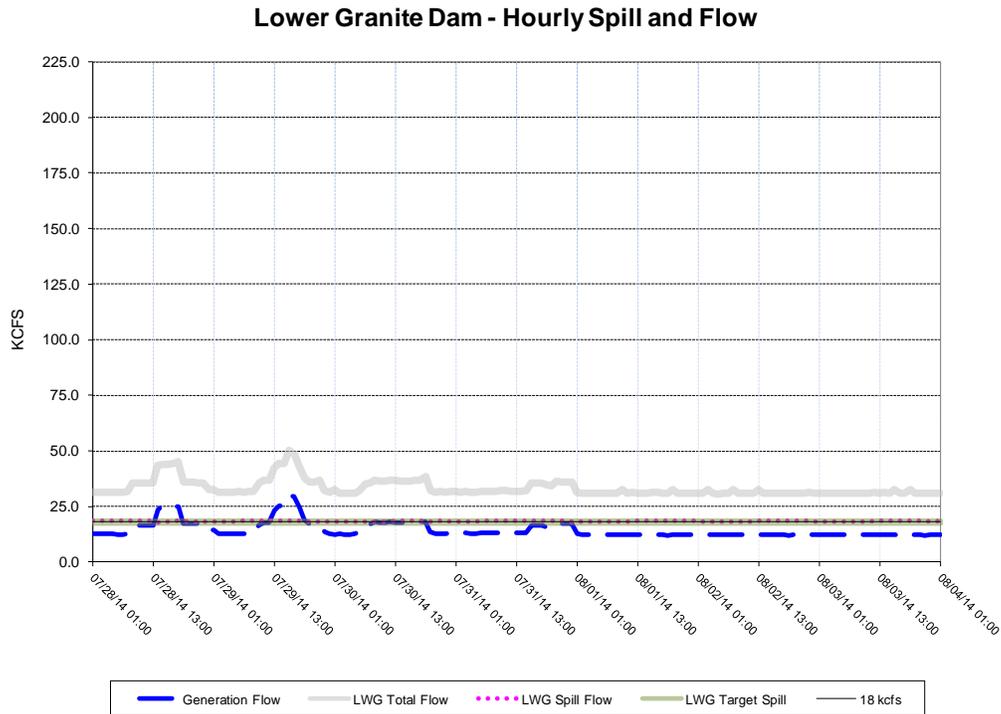
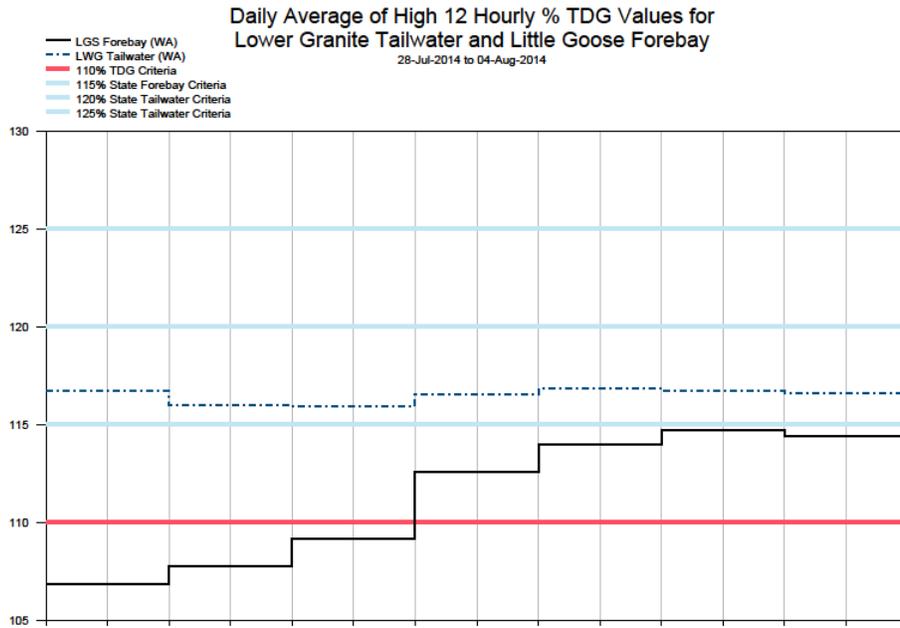
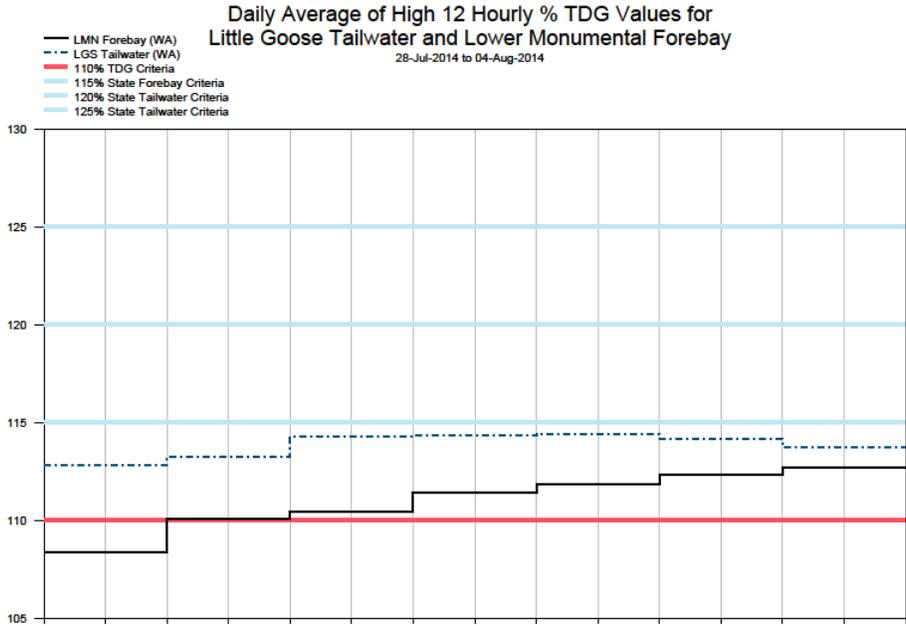


Figure 34



Little Goose Dam - Hourly Spill and Flow

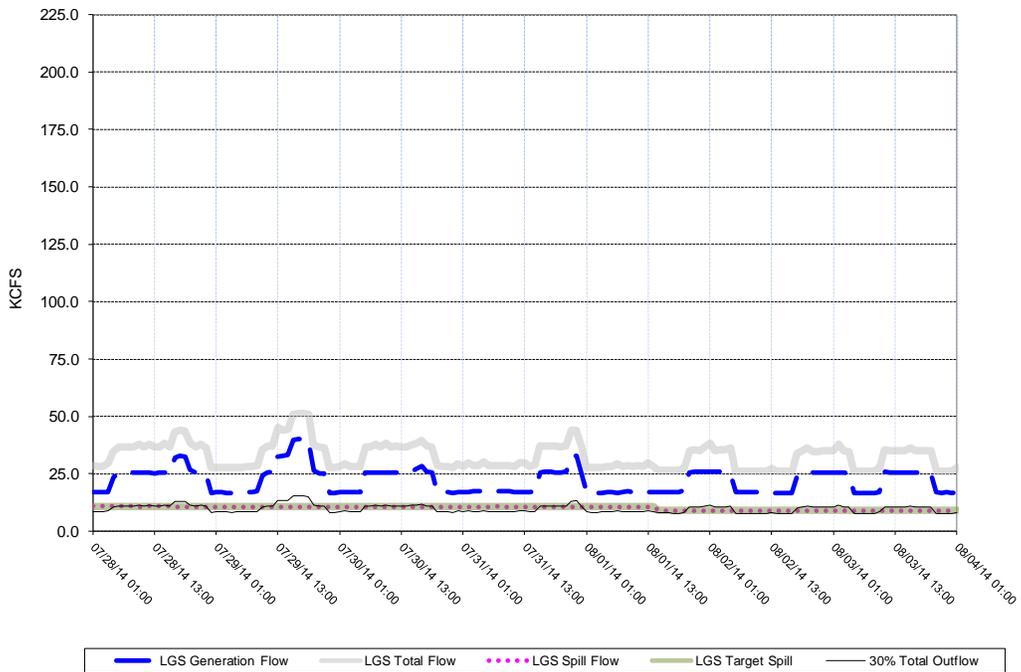


Figure 35

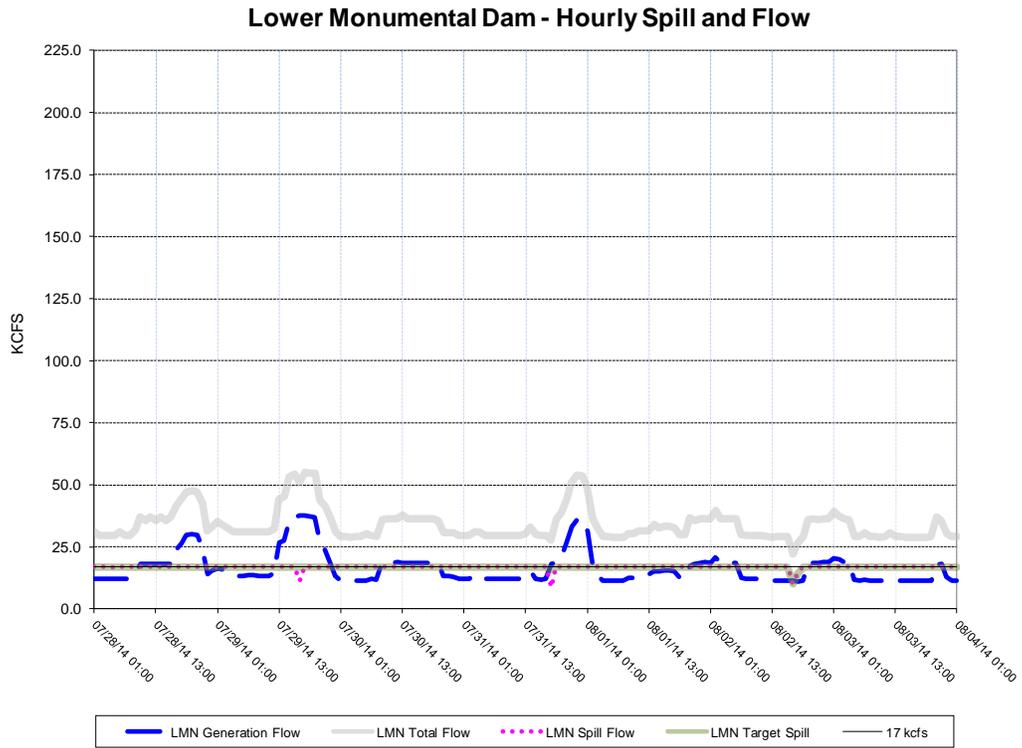
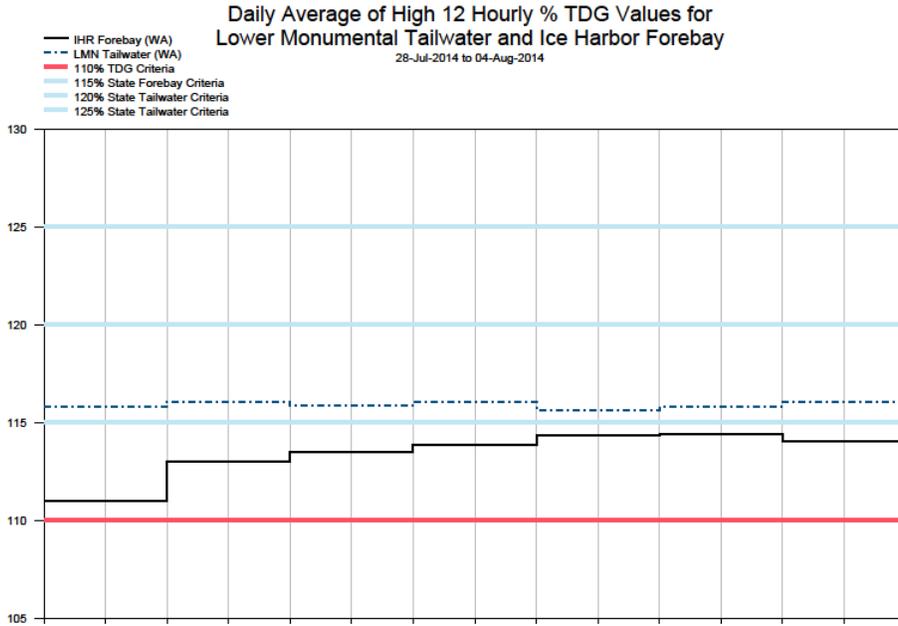


Figure 36

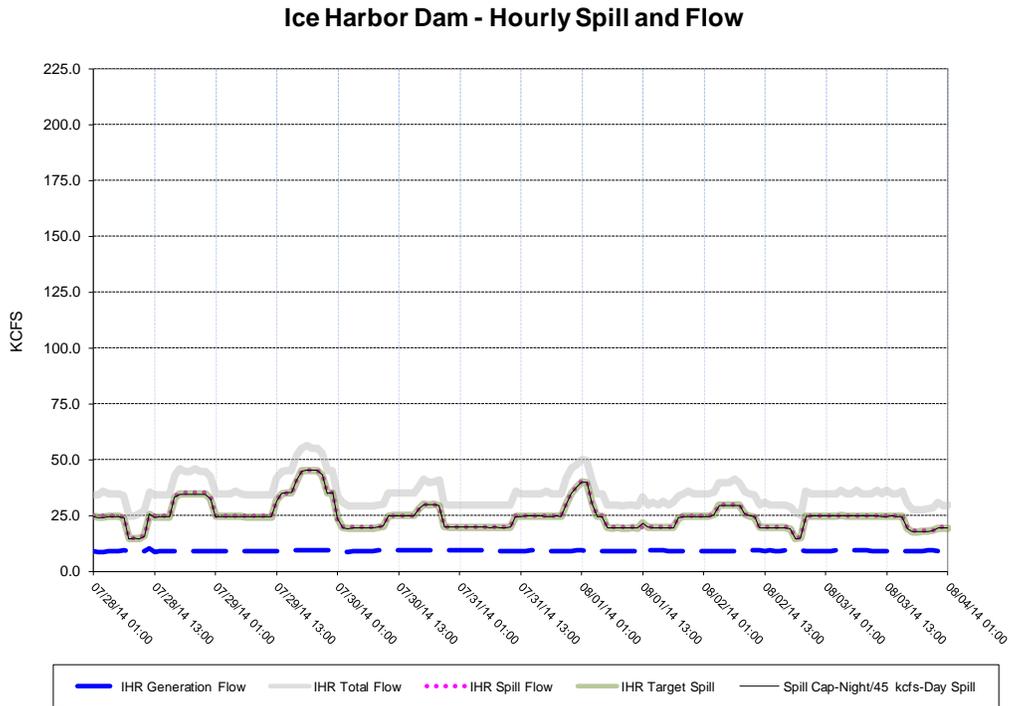
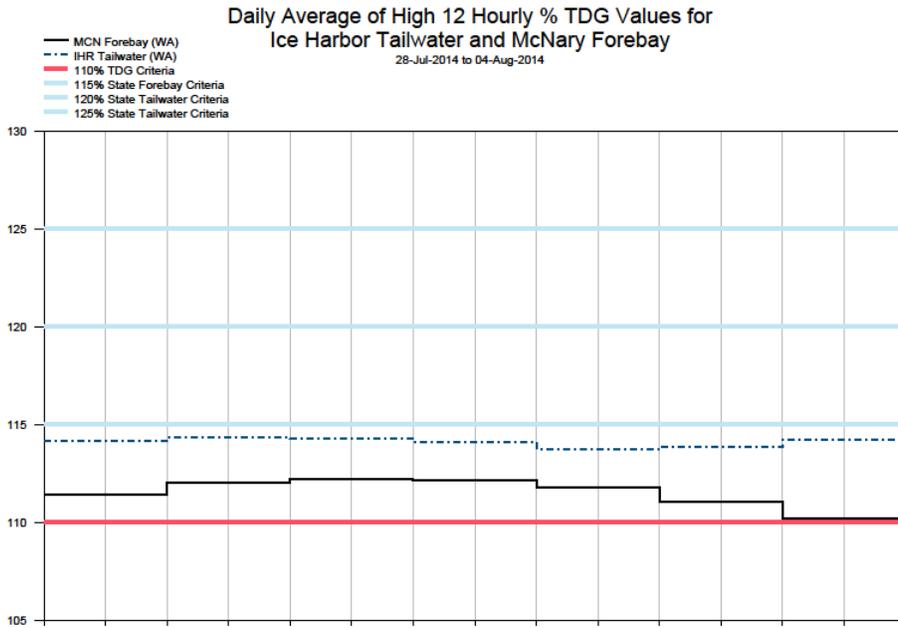
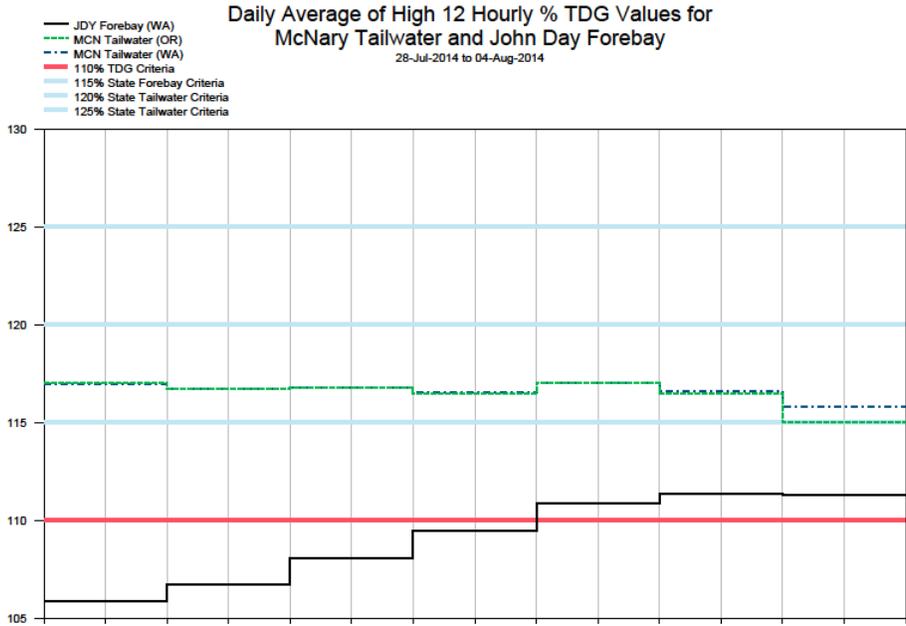


Figure 37



McNary Dam - Hourly Spill and Flow

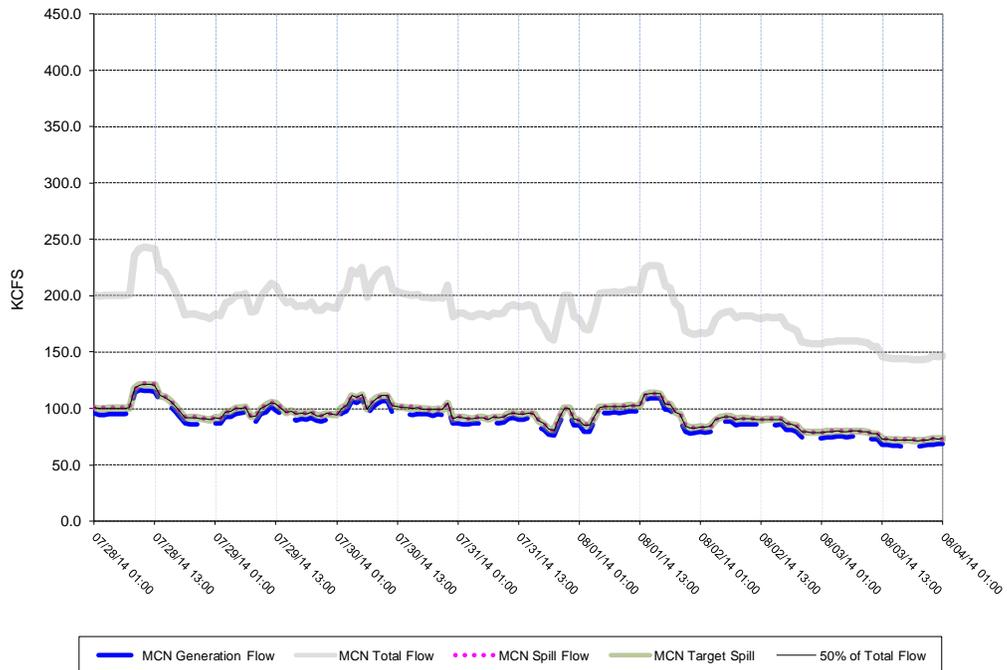
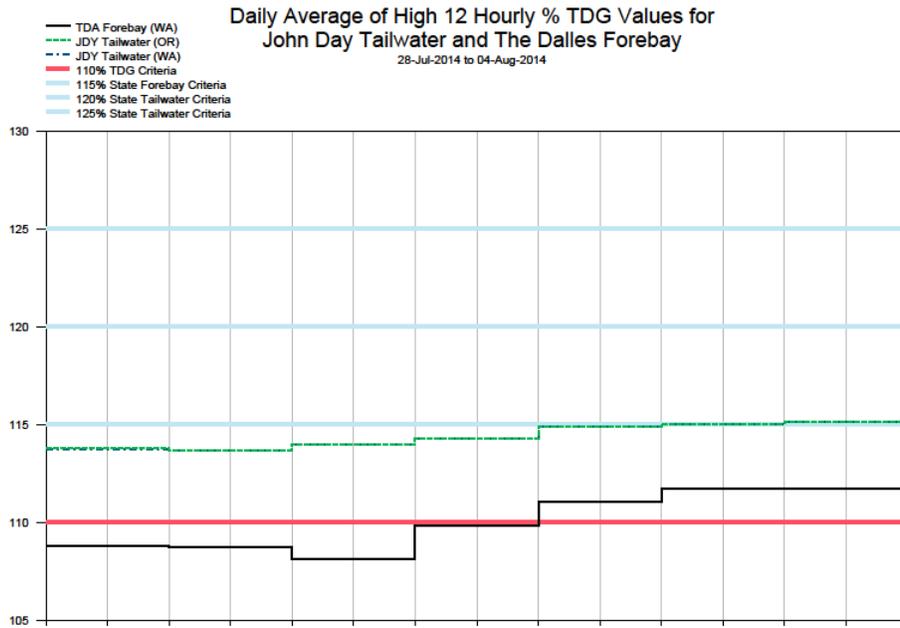


Figure 38



John Day Dam - Hourly Spill and Flow

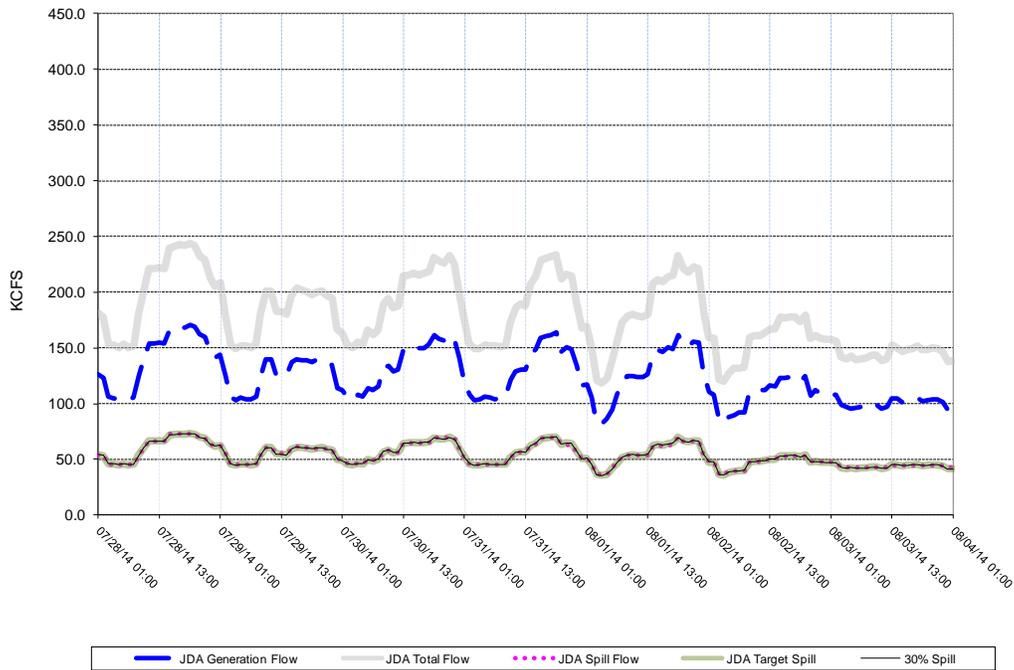
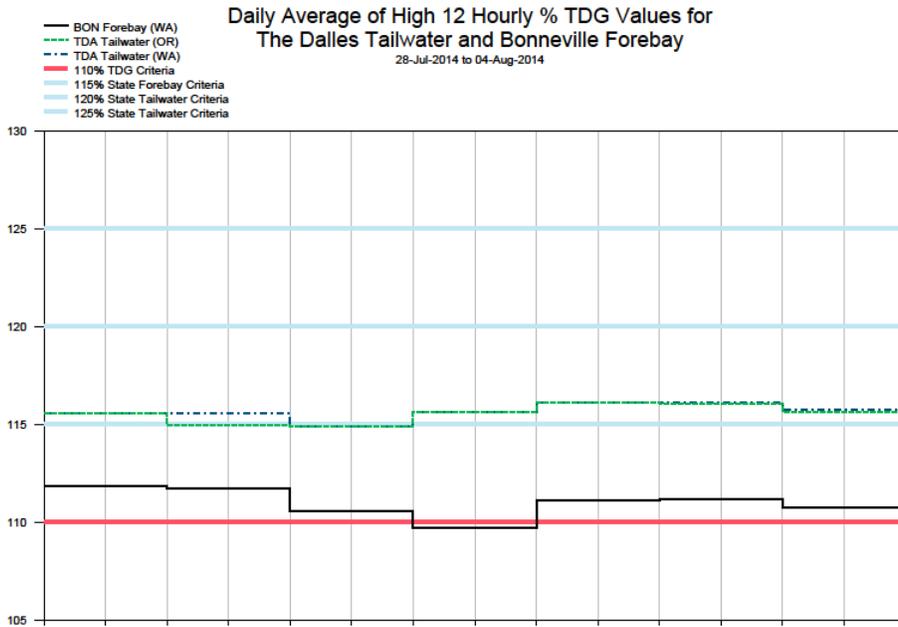


Figure 39



The Dalles Dam - Hourly Spill and Flow

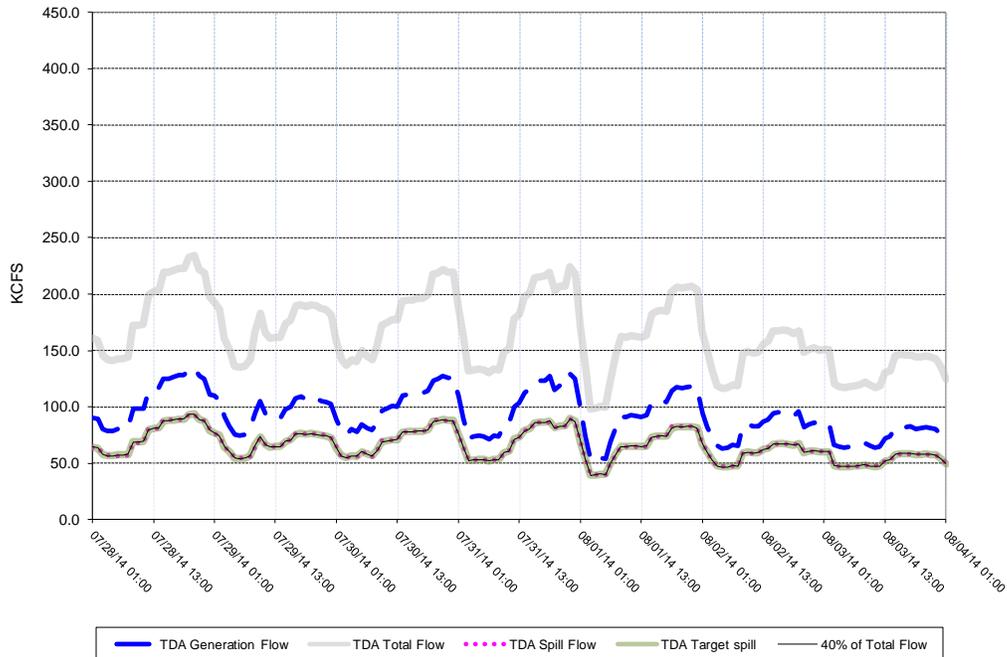


Figure 40

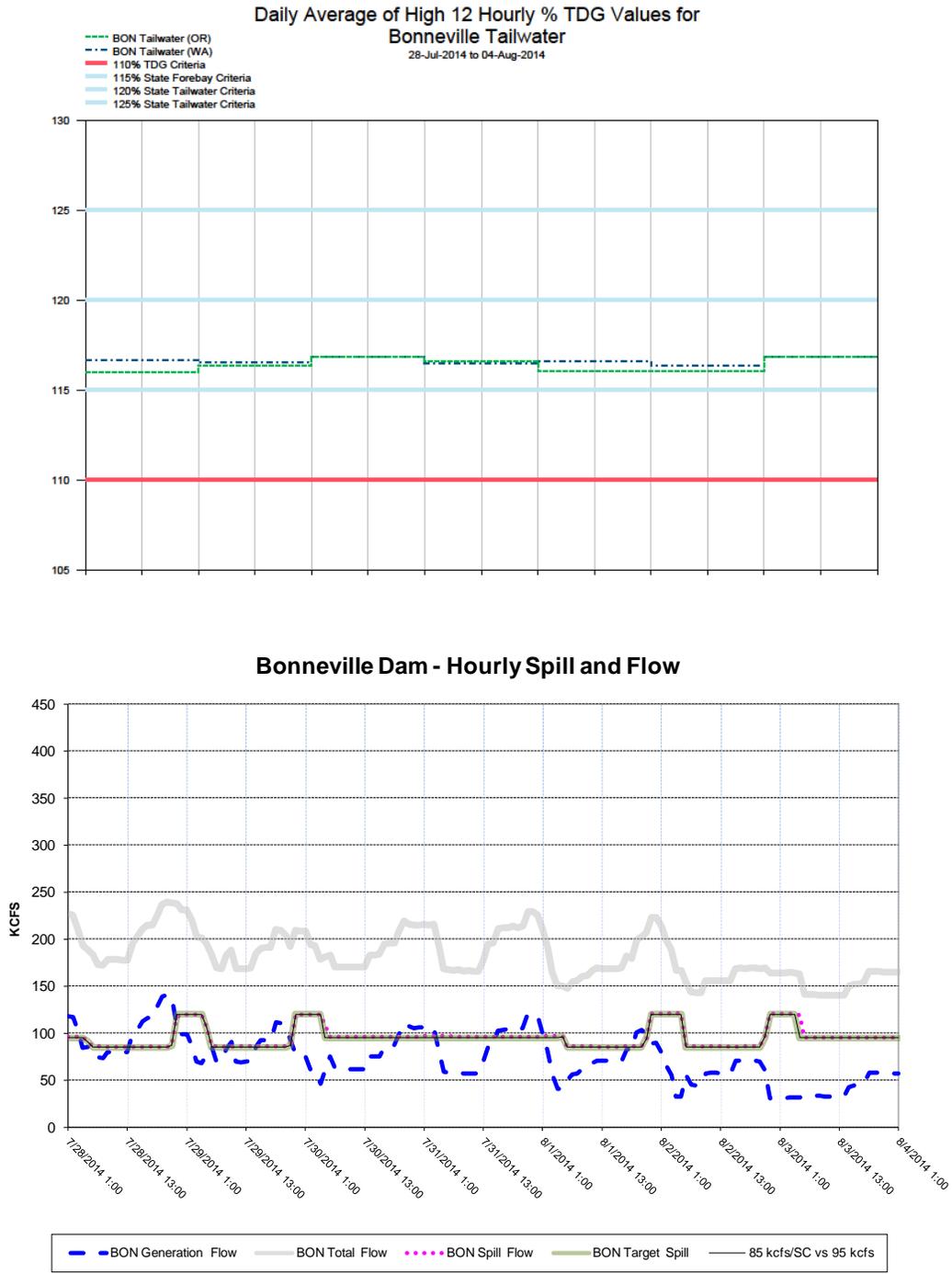


Table 1
Average Percent TDG Values For June 30 – August 3

Date	FIXED MONITORING STATIONS																			
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW		JDY	JHAW		TDA	TDDO		BON	CCIW	
	WA	WA	WA	WA	WA	WA	WA	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)