Appendix E

Court Reports

With Hourly Spill, Flow And TDG Graphs

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
April 2010

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

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the U.S. District Court of Oregon April 21, 2010 Order adopting the Spring Fish Operations Plan (2010 Spring FOP). The 2010 Spring FOP and its Addendum describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring fish migration season, generally April through June. To the extent Corps project operations are not specified in the 2010 Spring FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2010 Water Management Plan (WMP), WMP seasonal updates, and the 2010 Fish Passage Plan (FPP).

The Corps' April 2010 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (%TDG) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2010 Spring FOP in April.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per operational week[1] for April displaying the performance of the spill program as follows:

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

[1] Operations are implemented from Monday through Sundays. For the month of April, this included 3 days in March and 2 days in May.

The weekly graphs begin on March 30 and end on May 2 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on March 29 for the lower Snake projects, and start the same hours on April 5 for the lower Columbia projects.

March 29 – April 4	Figures 1 – 4
April 5 – April 11	Figures 5 – 12
April 12 – April 18	Figures 13 – 20
April 19 – April 25	Figures 21 – 28
April 26 – May 2	Figures 29 – 36

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

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

B. Lower Graph: Shows the hourly flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2010 Spring FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Bonneville (75 kcfs) dam.

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

II. A monthly %TDG Table is included at the end of the figures that shows the overall daily results of the average %TDG for the 12 highest hours for all projects. The numbers

in red show exceedances of the TDG gas cap - 115% (forebay) or 120% (tailwater) for each project.

General Implementation Remarks:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described below. When spill levels briefly deviate below or above the level specified in the 2010 Spring FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The 2010 Spring Spill Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the Spring Spill Report Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2010 Spring FOP level of spill while also avoiding exceeding the TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. The low flow conditions that occurred in the lower Snake and Columbia rivers during April resulted in some projects spilling the available flow above minimum generation, which was less than the target spill level. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not account for this volume of water. However, the actual spill volume remains constant. These variances are recorded in the Spring Spill Report Table for Little Goose under the variance type “Navigation.”

Also it is important to note that actual spill levels at Corp’s projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2010 Spring FOP and the RCC spill priority list, which defines the projects’ %TDG spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2010 Spring FOP describes project operations during "Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spring Spill Report Table will replace "Rapid Load Changes" to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These "Transmission Stability" issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary by more than the ±1% requirement or other ranges specified in the 2010 Spring FOP than other hours.

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

April Operations:

Columbia Basin unregulated inflows during April were all well below normal[2]. Consequently, some projects spilled the available flow above minimum generation; therefore, spill levels were less than the targets identified in Table 2 of the 2010 Spring FOP. In accordance with the 2010 Spring FOP, spring spill operations commenced on April 3 at 0001 hours for the Corps' lower Snake projects and on April 10 at 0001 hours for the lower Columbia projects.

During the April reporting period, the daily 2010 Spring FOP and Addendum planned spill operations for fish were as follows:

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

[2] NOAA River Forecast Center's April final water supply forecast indicates 56 percent of normal at Lower Granite Dam and 56 percent of normal at The Dalles Dam

- Ice Harbor Dam - The hourly target spill was 45 kcfs daytime – and %TDG spill cap night-time through April 27. On April 28 the hourly target spill alternated every two days between 45 kcfs daytime – and %TDG spill cap at night-time, vs. 30 percent of total flow for 24-hours per day.
- McNary Dam - The hourly target spill was 40 percent of total flow for 24-hours per day.
- John Day Dam - The hourly target spill was 30 percent of total flow for 24-hours per day through April 27. On April 28 the hourly target spill alternated between 30 percent vs. 40 percent of total flow for 24-hours due to the two treatment spring spill test.
- The Dalles Dam - The target spill was 40 percent of total flow for 24-hours per day.
- Bonneville Dam - The hourly target spill was 100 kcfs 24-hours per day.

Streamflows at the beginning of the 2010 spill season were sufficiently low that several projects operated according to the low flow provisions of the 2010 Spring FOP during the first several days of the spring spill season. Table 1 shows the number of days each project was in a low flow condition per the 2010 Spring FOP during the reporting period.

Table 1: Number of Days Projects Generated at Minimum Levels and Spilled Remainder.

Project	Number of Days[3]
Lower Granite	11
Lower Monumental	16
Ice Harbor	28
Bonneville	9
Total	**64**

***Operational Adjustments**:*

1. Little Goose Dam:
   Prior to filing the Notice of 2010 Spring Operations with the Court, Section 2.3.1.2 of the 2010 FPP was revised on March 30, which provides two spillway weir configurations and their associated alternate spill patterns, as well as a uniform spill pattern without the use of a spillway weir. The purpose of the revision was to clarify the operation of the spillway weir during the low flows experienced this spring such as the operation of the spillway weir in the high crest position when flows are less than 38 kcfs. The FPP revision was agreed to by representatives from CRITFC, IDFG, ODFW, USFWS, NOAA, BPA, and the Corps, via conference call on March 30.

2. John Day Dam:
   - In order to implement a component of the 2008 BiOp RPA Action 48 the Corps temporarily stopped spill on April 10 from 0700 to 1600 hours to allow contractors safe access to finish avian wire installation. Installation was planned

[3] A day is counted as 6-hours or more that are minimum generation and spilling remainder.

for completion prior to initiation of the fish passage spill season but high winds prevented the contractor from finalizing the work on schedule. On April 9, the Corps notified the TMT of the delay and the Corps' plan to temporarily stop spill on April 10, to complete the avian line installation. TMT members raised no objection to this proposal.

- On May 11, 2010, research staff from the Pacific Northwest National Laboratory arrived at the John Day Dam Smolt Monitoring Facility to discover 144 dead juveniles in the holding tanks being used for dam passage survival evaluations. When PNNL staff arrived, they immediately noticed the lack of water to the holding tanks and found steelhead and yearling Chinook mortalities, consisting of 73 dead juvenile yearling Chinook salmon and 71 dead steelhead. Of these fish, 17 (12%) were Endangered Species Act (ESA)-listed wild steelhead trout and 10 (7%) were ESA-listed wild Chinook salmon (see Attachment for more detail). On May 13, notification about this incident was sent to FPOM, and was discussed at the FPOM meeting the same day. (*see* Attachment for more detail).

3. Bonneville Dam:
   - In order to complete maintenance work at Bonneville Dam, Powerhouse 2, the Corps temporarily changed powerhouse priority as specified in the 2010 FPP. At 0001 hours on April 10, priority shifted from Powerhouse 2 to Powerhouse 1. At 1800 hours on April 10, the powerhouse priority reverted back to the priority specified in the 2010 FPP. This operation was coordinated with regional salmon managers at the Fish Passage Operations and Maintenance Team (FPOM) meeting on March 11. This operation did not change the spill operation as specified in the 2010 Spring FOP.
   - On April 15, the Corps observed that the Camas-Washougal gage was in excess of water quality criterion (115 %TDG). The recommended spill cap operation to return water quality conditions to 115%TDG was 50 kcfs. In response to concerns about poor project passage conditions with these low spill levels, and the large number of fish passing the project due to upstream hatchery releases, the Corps proposed to operate Bonneville Dam with a spill cap of 75 kcfs and continue to manage spill levels to the Camas-Washougal and Cascade Island TDG gages. The 75 kcfs spill cap was to be reevaluated if Camas-Washougal or Cascade Island readings exceeded 120 percent TDG. This proposed operation was coordinated with TMT and the Oregon and Washington water quality agencies and implemented between April 16 and April 20.
   - In order to complete installation of equipment associated with fish research activities, the Corps temporarily closed the Bonneville Powerhouse 2 Corner Collector (B2CC) at 0700 on April 20. This changed the operation of the B2CC as specified in the 2010 Spring FOP, which stated the B2CC will operate from the morning of April 10 through the remainder of the spring season. At 1300 hours on April 22, the Corps reopened the B2CC and resumed operations as specified in the 2010 Spring FOP. This operation did not impact 2010 Spring FOP spill operations and was coordinated with regional salmon managers at the FPOM meeting on March 11.

- Due to concerns about boater safety, the Corps closed the B2CC on April 26 at 1500 hours to complete the repairs on the boat exclusion device that keeps boats out of the B2CC. This operation temporarily changed the operation of the B2CC from that specified in the 2010 Spring FOP, which states the B2CC will operate from the morning of April 10 through the remainder of the spring season. This operation did not impact spill operations identified in the 2010 Spring FOP and TMT was notified by email on April 26. On April 27, at 1200 hours, the Corps reopened the B2CC and resumed operations as specified in the 2010 Spring FOP.

4. Lower Snake River Juvenile Transportation Operations:
   In the 2010 Spring FOP submitted to the Court on March 31, the Corps stated if the April final water supply forecast indicates a seasonal regulated flow of ≤65 kcfs in the lower Snake River, the Corps and NOAA, in coordination with the regional sovereigns, would consider the best available science to make a final determination on spill and juvenile transportation operations.[4] NOAA presented this low flow transportation proposal and rationale to the Independent Science Advisory Board (ISAB). The ISAB concluded that "a mixed strategy of spill and transport during the critical spring migration period allows learning from spill conditions and supports potential advances in knowledge to improve decision-making in the future." The transport operations were included in the Addendum to the 2010 Spring FOP and the Corps, in coordination with NOAA and the regional sovereigns through the TMT, determined the following start dates for transport initiation at the three collector projects while continuing FOP specified spill: Lower Granite Dam, April 24; Little Goose, May 2; and Lower Monumental, May 5. Transport operations commenced on the dates stated above, and spill was implemented as identified in the 2010 Spring FOP.

5. Libby Dam:
   The water supply forecast for Libby Dam was projected to be below normal and to retain water in the reservoir until the May final water supply forecast was issued, the Corps proposed to keep Libby Dam discharges at minimum flow -4,000 cfs, (or those required for listed bull trout) instead of releasing higher flows in accordance with the VARQ Flood Control Operating Procedure s. This proposal was presented to TMT during the April 14 meeting for consideration; and on April 21, TMT members were either in support of, or raised no objection to this proposal.

   The Corps also presented two alternative operations for Libby Dam after the issuance of the May final forecast. The Corps proposed to keep Libby Dam discharge at project minimums until the beginning of the sturgeon flows on or about June 1. The volume of water stored behind Libby Dam that would otherwise be released above minimums between the beginning of refill and the beginning of sturgeon flows would be released either by the end of June or the end of August. These alternatives were first presented at the April 14 TMT meeting and follow-up TMT discussions occurred on April 21. These alternatives increased the probability of reaching minimum

[4] The Corps' April 13 STP model run indicated an April 3 – June 20 mean daily flow of 48.3 kcfs.

reservoir elevations to allow for the spill for the sturgeon operation at Libby Dam as specified in the USFWS 2006 Libby BiOp and clarified RPA.

After discussion of these alternatives at the April 28 TMT meeting, the Corps decided to implement the alternative operation with the objective of releasing the stored volume by the end of June. Some TMT members requested that Libby operations be monitored during June to achieve the greatest biological benefit for Kootenai River white sturgeon with a smoother transition from June into July operations. Libby operations will be an ongoing agenda item to be regularly discussed at TMT.

CENWP-OD-J

17 May 2010

MEMORANDUM FOR THE RECORD

SUBJECT: Memorandum Concerning Juvenile Fish Mortalities at the John Day Dam (JDA) Smolt Monitoring Facility (SMF).

On May 11, 2010, Pacific Northwest National Laboratory (PNNL) staff discovered 144 dead juvenile Chinook salmon and steelhead at the JDA SMF. PNNL project staff arrived at the JDA SMF at 2100 hrs on the evening of May 10 to pick up tagged juvenile salmonids. These juveniles were to be released at 2200 hrs downstream of The Dalles Dam. While filling totes used to transport the tagged fish, a plastic pipe joint on a water supply line ruptured. PNNL staff notified JDA Corps biologists of the broken line and Corps biologists subsequently shut off the water supply to the broken pipe. Repairs to the water supply line were not discussed by PNNL and Corps biologists at that time. After the water was shut off, PNNL staff loaded the buckets of fish into the transport totes and noted that water was still circulating in the holding tank from which they had removed fish. Unbeknownst to the PNNL staff and the Corps biologist had inadvertently shut off the fresh water supply lines to tanks holding other live tagged fish as well. When PNNL staff arrived at the JDA SMF the following morning, May 11, they immediately noticed the lack of water to the holding tanks and found 71 steelhead and 73 yearling Chinook mortalities. These mortalities represent 0.3 percent of the estimated total number of steelhead and 0.2 percent of the estimated total number of yearling Chinook salmon that passed John Day Dam on May 11. Of these, 17 (12%) were Endangered Species Act (ESA)-listed wild steelhead trout and 10 (7%) were ESA-listed wild Chinook salmon (*see* attached Table 1 for more detail).

Future and Preventative Measures:

1. All outside plumbing is being replaced to ensure that failures from aged components, such as this ruptured pipe joint, will not reoccur this field season.
2. Standpipes will be refitted to ensure no loss of water from seepage around the standpipe base.
3. Spare water supply line parts will be on site and ready to use for repairs in the event of supply line failure. Research staff will be trained on procedures for response to supply line failures.
4. The fresh water manifold that supplies the outside holding tanks has been secured so that it cannot be used as a water source to fill fish transport totes. Only a small number of trained authorized research staff will have access to this manifold.
5. A backup water supply and 4 port manifold will been installed in the event an emergency mandates a shut off of the water supply from the SMF. This backup

line is supplied independently of the water source that the holding tanks currently use.

6. The Corps will develop a standard operating procedure (SOP) to be followed when holding fish at the SMF for research purposes. The SOP will include a checklist that ensures monitoring of critical water supply lines and valves occurs daily.
7. A tag-out system for identifying critical fish holding tank water supply valves will be established and implemented. The tag-out procedure will be carried out by a Corps biologist or his designee and the tag will state "Do not close – Fish water supply".
8. The Corps' biologists and research biologists will notify each other as soon as deficiencies are noted with any aspect of the facility to coordinate a plan of action consistent with procedures noted above.

The Corps informed regional fish managers, including NOAA Fisheries, on May 13, 2010.

Table 1. Species and origin of juvenile fish mortalities found at John Day Dam Smolt Monitoring Facility on May 11, 2010.

ESU	Hatchery or Wild	Age	Age detail	Clipped	Approx Number Dead
Snake River Steelhead	Hatchery	Juvenile	yearling	clipped	7
Upper Columbia Steelhead	Hatchery	Juvenile	yearling	Clipped	8
Middle Columbia Steelhead	Hatchery	Juvenile	yearling	clipped	5
Snake River Spring Chinook	Hatchery	Juvenile	yearling	clipped	2
Snake River Fall Chinook	Hatchery	Juvenile	yearling	clipped	2
Upper Columbia Spring Chinook	Hatchery	Juvenile	yearling	clipped	2
Snake River Steelhead	Hatchery	Juvenile	yearling	not-clipped	1
Snake River Steelhead	Wild	Juvenile	yearling	NA	3*
Upper Columbia Steelhead	Hatchery	Juvenile	yearling	not-clipped	5
Upper Columbia Steelhead	Wild	Juvenile	yearling	NA	4*
Middle Columbia Steelhead	Wild	Juvenile	yearling	NA	10*
Middle Columbia Steelhead	Hatchery	Juvenile	yearling	not-clipped	1
Snake River Spring Chinook	Hatchery	Juvenile	yearling	not-clipped	2
Snake River Spring Chinook	Wild	Juvenile	yearling	NA	5*
Snake River Fall Chinook	Hatchery	Juvenile	yearling	not-clipped	11
Upper Columbia Spring Chinook	Hatchery	Juvenile	yearling	not-clipped	7
Upper Columbia Spring Chinook	Wild	Juvenile	yearling	NA	5*
Unlisted Species	Hatchery or Wild	Age	Age detail	Clipped	
Spring Chinook	Hatchery	Juvenile	yearling	clipped	37
Steelhead	Hatchery	Juvenile	yearling	clipped	27
				TOTAL	**144**

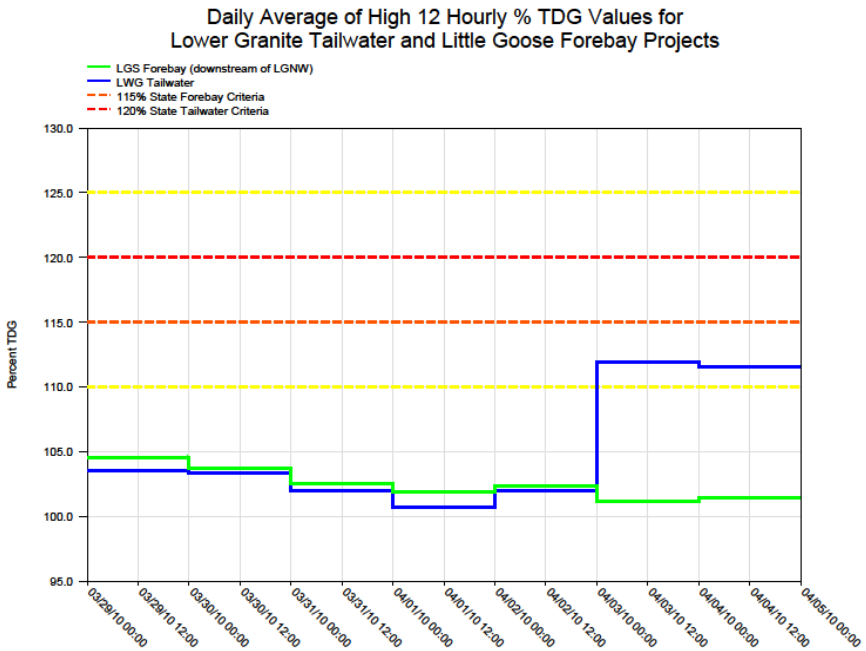
*ESA-listed fish

April 2010 Spring Spill Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Increased percent spill.	4/4/2010	2000	1	Operational Limitations	Hourly spill increased to 32.2 percent (above 30.0 percent ± 1.0 percent range); due to bringing a second generation unit on-line. The 24-hr average spill was 30.3 percent.
Little Goose	Reduced percent spill.	4/6/2010	0600	1	Operation Limitations	Hourly spill dropped to 28.9 percent (below 30.0 percent +/- 1 percent range): due to low flow conditions; a slight change in generation causes the percent spill to go outside of the +/- 1 percent range while bringing unit online. 24-hr average spill was 29.9 percent.
Little Goose	Reduced percent spill.	4/7/2010	0800 & 1200	2	Navigation	Hourly spill dropped to 28.3 percent and 28.5 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.8 percent.
Little Goose	Reduced percent spill.	4/9/2010	0600 & 0800	2	Navigation	Hourly spill dropped to 28.0 percent and 28.1 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24 hr average spill was 29.6 percent.
Little Goose	Reduced percent spill.	4/10/2010	0400	1	Operation Limitations	Hourly spill dropped to 28.8 percent (below 30.0 percent +/- 1 percent range): due to percent spill fluctuating with physical limits of spill gate settings. 24-hr average spill was 29.8 percent.
Little Goose	Reduced percent spill.	4/12/2010	0200, 1600, 1800	3	Navigation	Hourly spill dropped to {27.2 – 28.1 percent} (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.7 percent.

Little Goose	Reduced percent spill.	4/13/2010	0400	1	Navigation	Hourly spill dropped to 28.3 percent & 28.8 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.0 percent.
Little Goose	Reduced percent spill.	4/13/2010	1700	1	Maintenance	Hourly spill dropped to 28.3 percent & 28.8 percent (below 30.0 percent +/- 1 percent range): due to switching units while removing trash. 24-hr average spill was 30.0 percent.
Little Goose	Reduced percent spill.	4/14/2010	1000	1	Navigation	Hourly spill dropped to 28.7 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9 percent.
Little Goose	Reduced percent spill.	4/17/2010	1100	1	Navigation	Hourly spill dropped to 28.6 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.8 percent.
Little Goose	Reduced percent spill	4/21/10	0100	1	Navigation	Hourly spill dropped to 28.8 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9 percent.
Little Goose	Reduced percent spill	4/26/10	1600, 1800	2	Navigation	Hourly spill dropped to {28.7 – 28.9 percent} (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.8 percent.
Little Goose	Reduced percent spill	4/27/10	1300, 1600	2	Navigation	Hourly spill dropped to 28.9 percent (below 30.0 percent +/- 1 percent range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.8 percent.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
03/28/10 00:00
03/29/10 12:00
03/30/10 00:00
03/30/10 12:00
03/31/10 00:00
03/31/10 12:00
04/01/10 00:00
04/01/10 12:00
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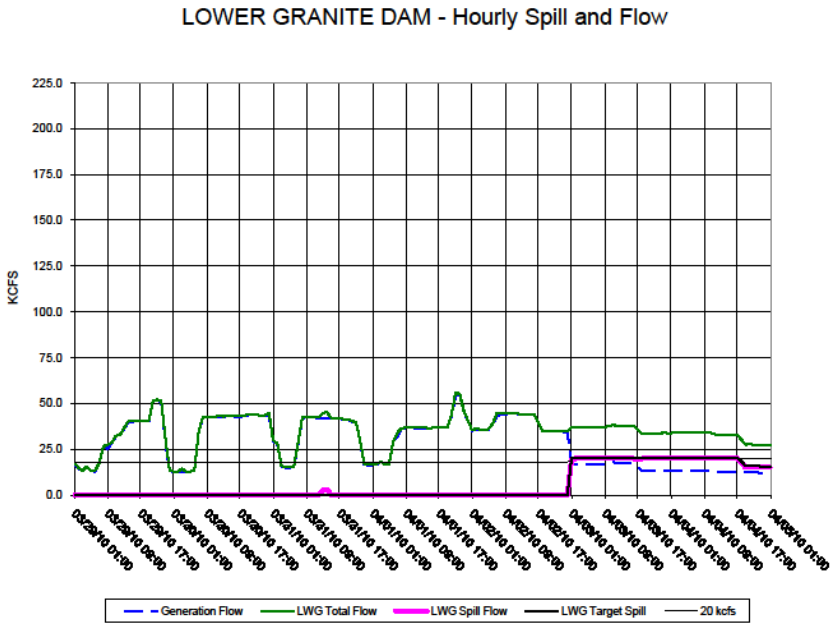
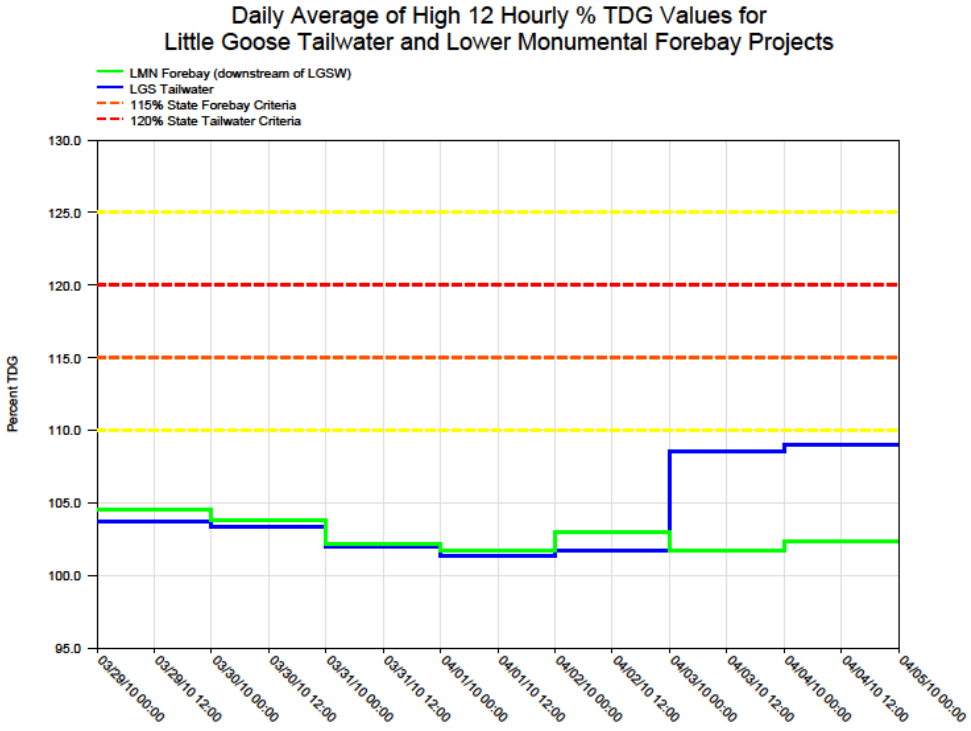

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 2


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
03/29/10 00:00
03/29/10 12:00
03/30/10 00:00
03/30/10 12:00
03/31/10 00:00
03/31/10 12:00
04/01/10 00:00
04/01/10 12:00
04/02/10 00:00
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04/05/10 00:00

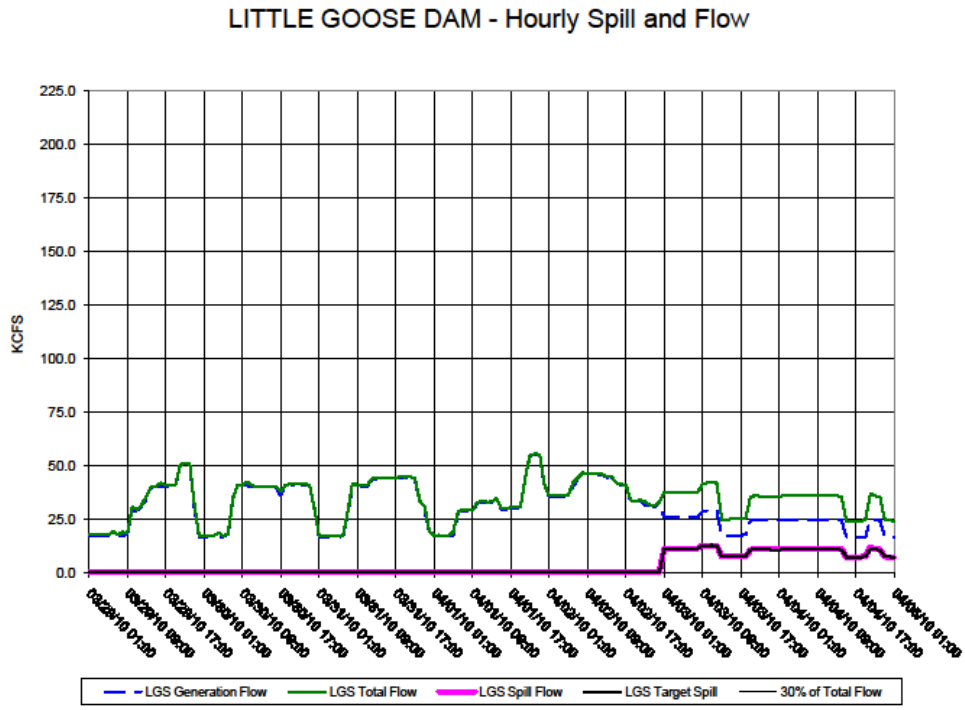
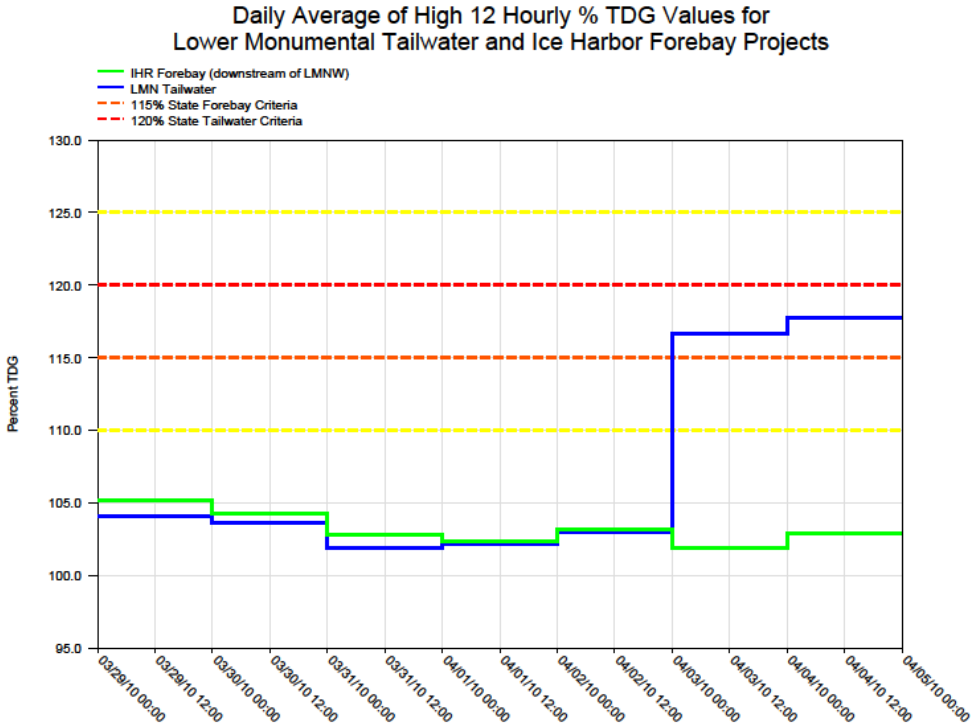

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
03/29/10 00:00
03/29/10 12:00
03/30/10 00:00
03/30/10 12:00
03/31/10 00:00
03/31/10 12:00
04/01/10 00:00
04/01/10 12:00
04/02/10 00:00
04/02/10 12:00
04/03/10 00:00
04/03/10 12:00
04/04/10 00:00
04/04/10 12:00
04/05/10 00:00

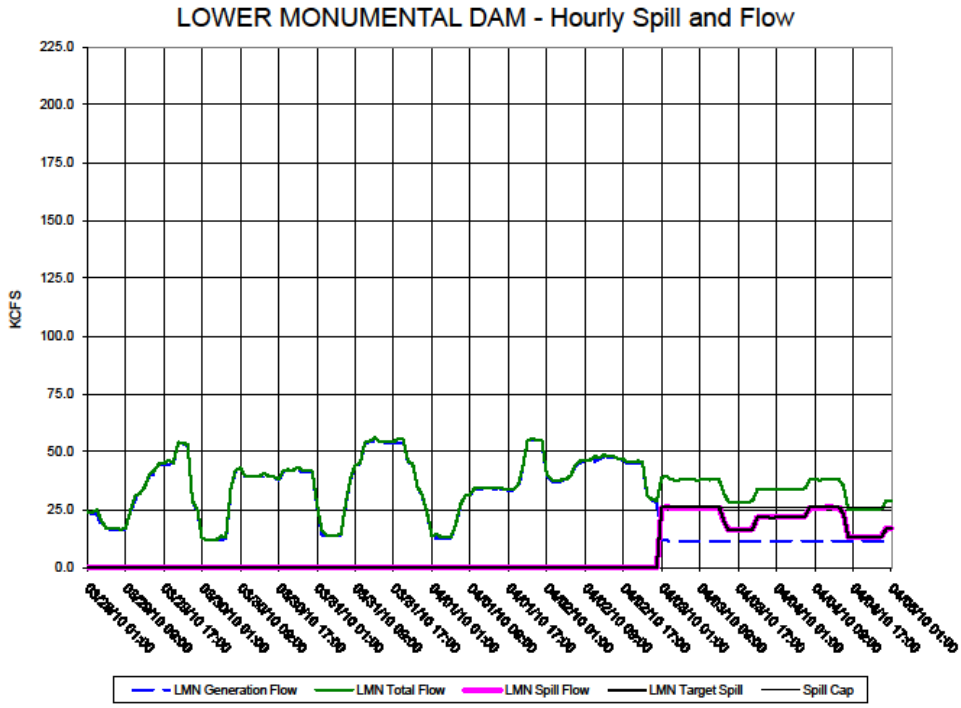
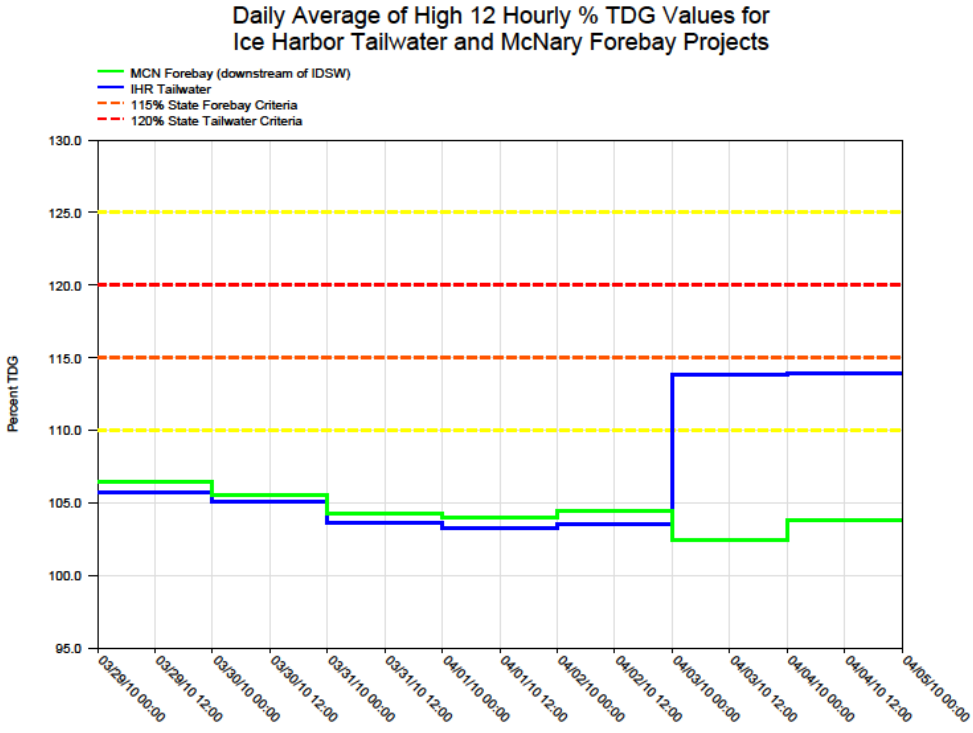

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
03/29/10 00:00
03/29/10 12:00
03/30/10 00:00
03/30/10 12:00
03/31/10 00:00
03/31/10 12:00
04/01/10 00:00
04/01/10 12:00
04/02/10 00:00
04/02/10 12:00
04/03/10 00:00
04/03/10 12:00
04/04/10 00:00
04/04/10 12:00
04/05/10 00:00

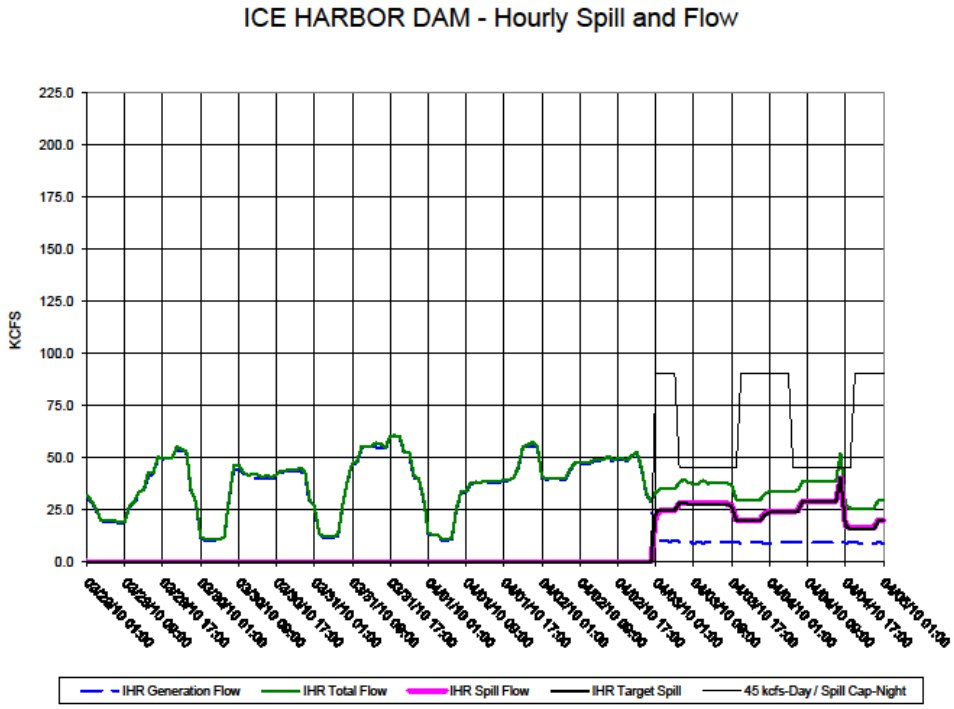
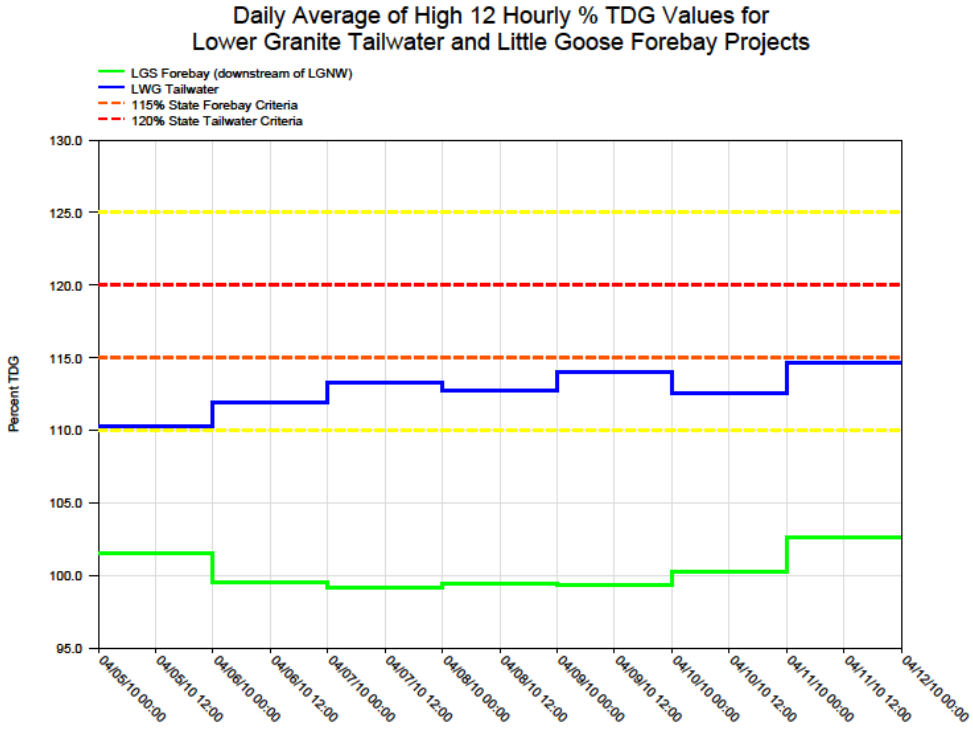

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45 kcfs-Day / Spill Cap-Night

Figure 5


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

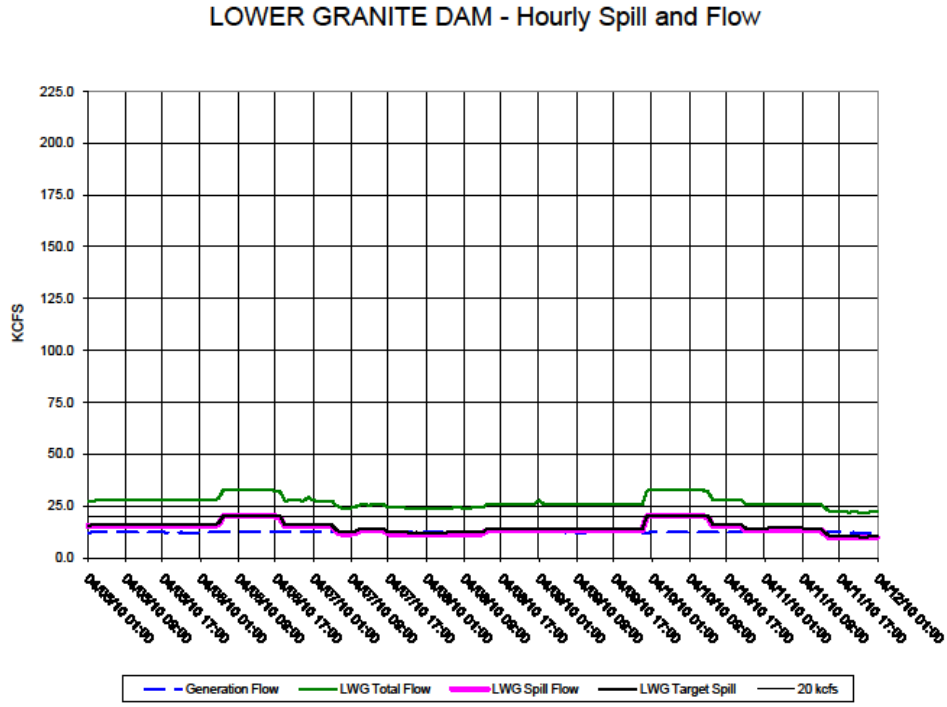
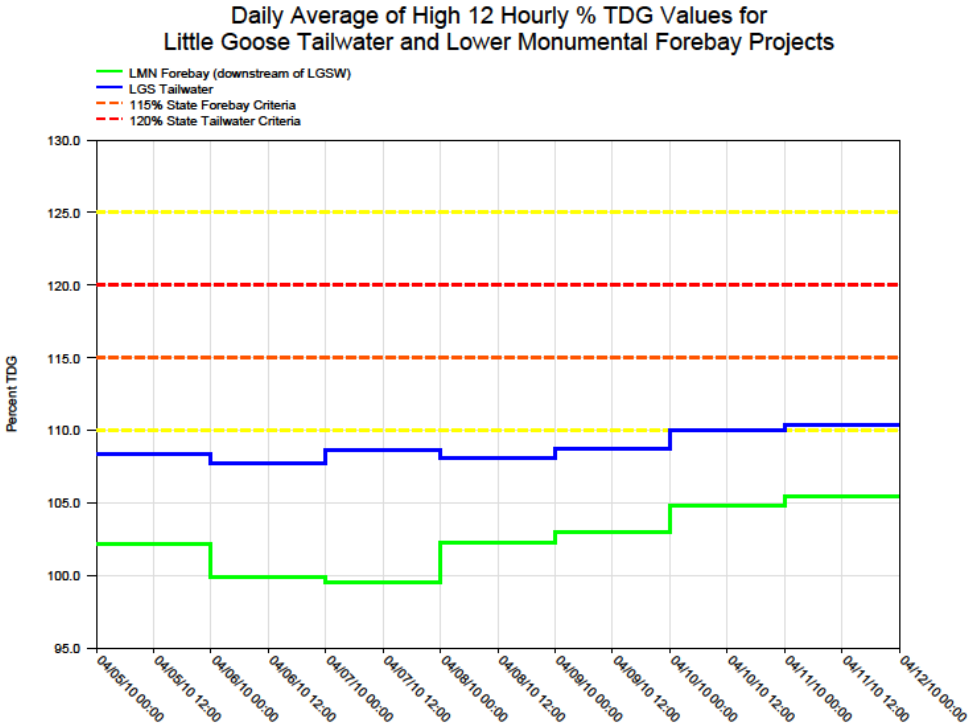

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 6


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

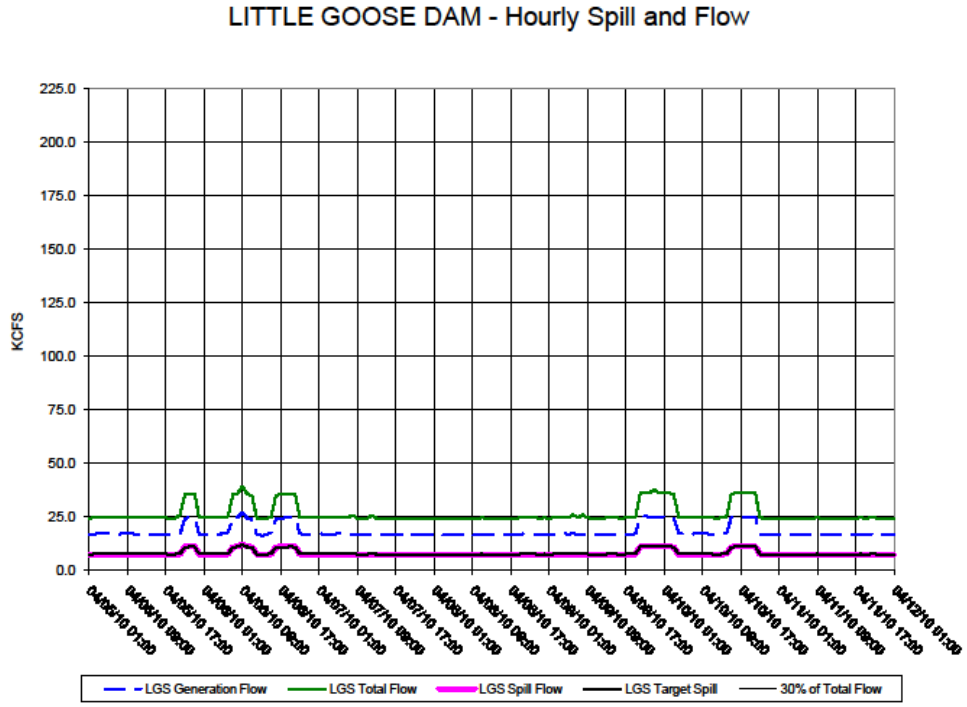
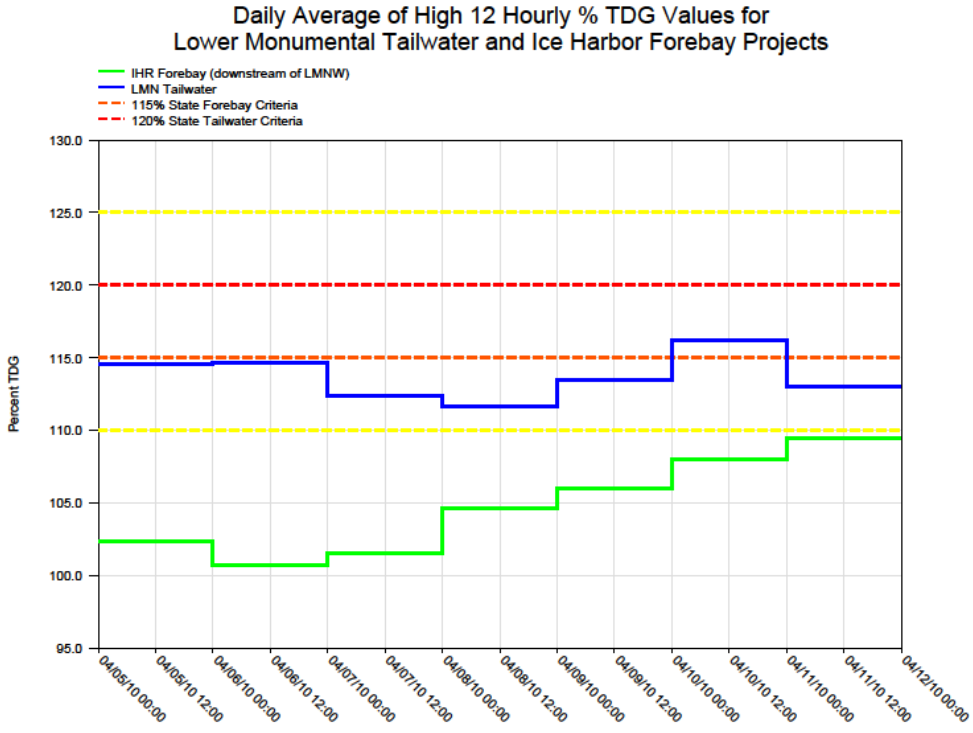

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 7


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

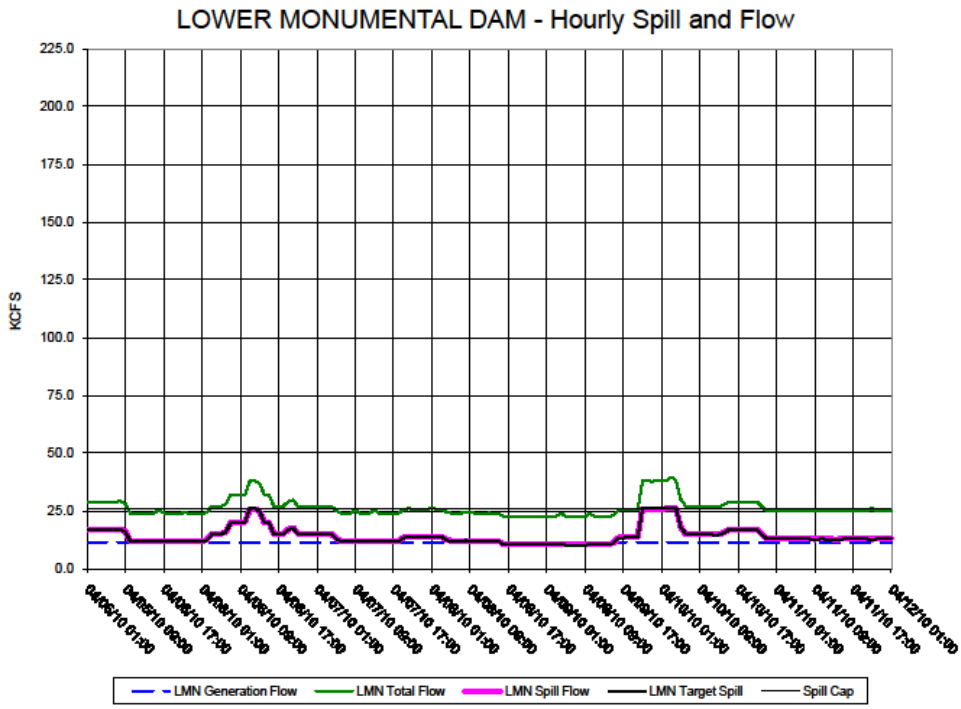
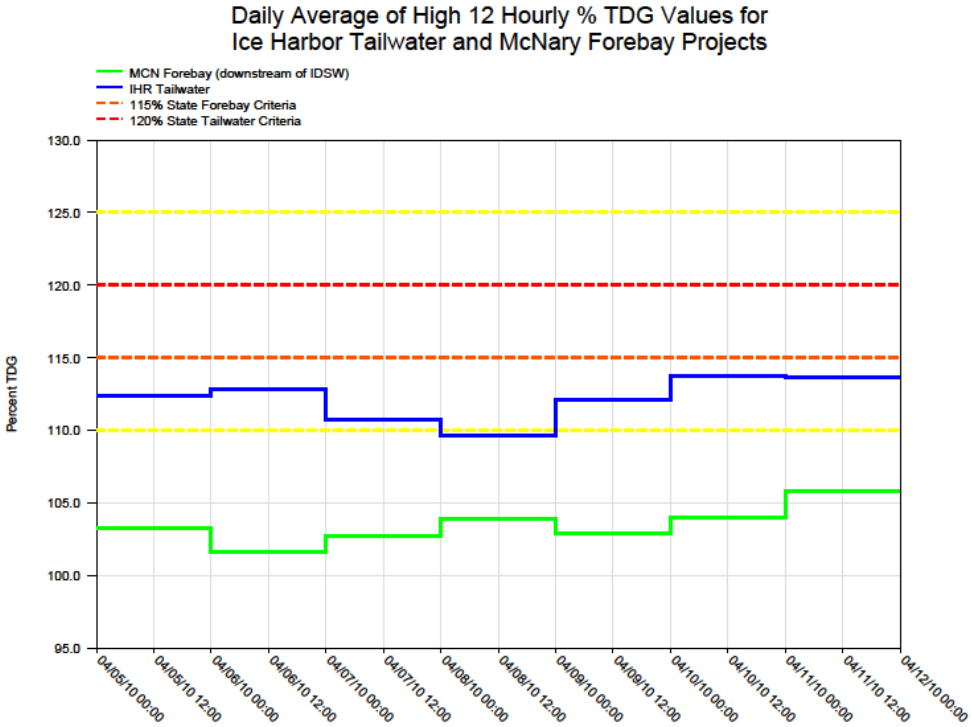

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 8


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

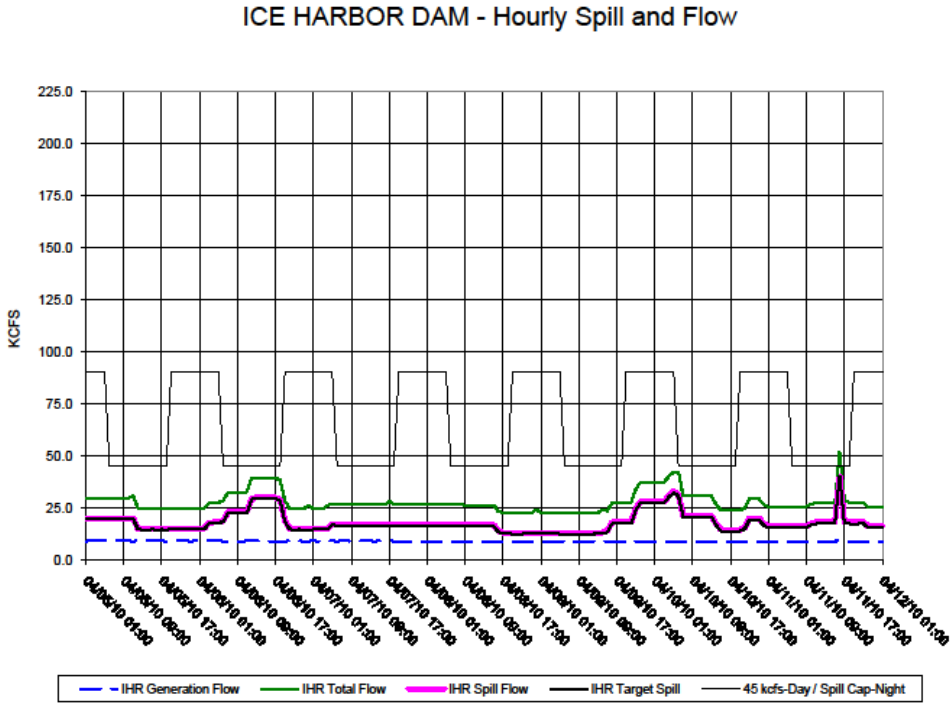
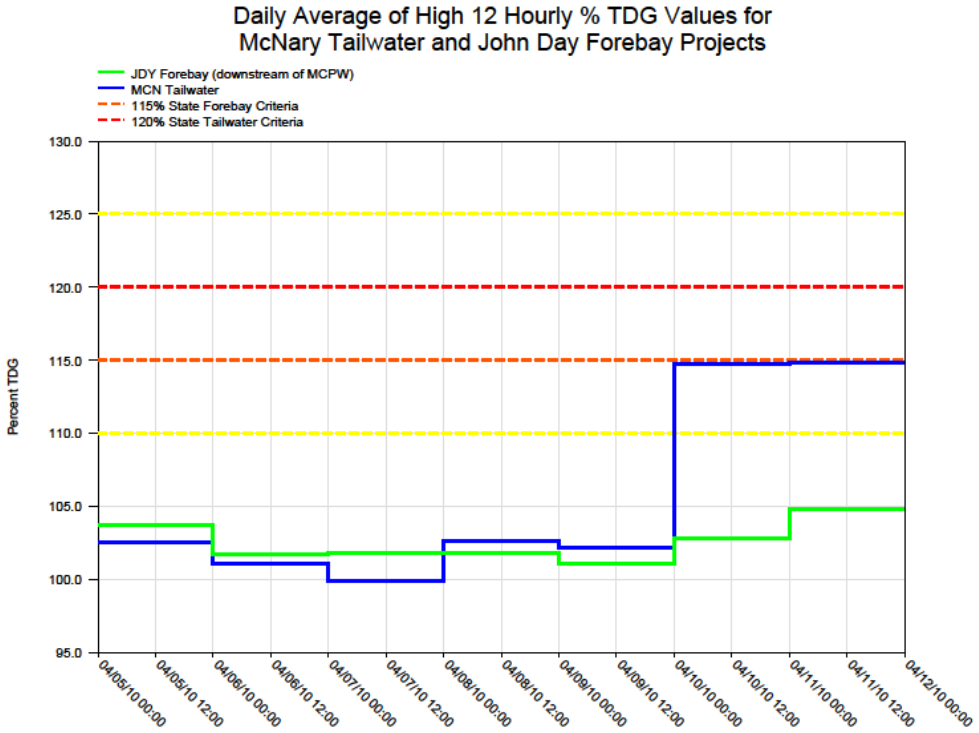

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45 kcfs-Day / Spill Cap-Night

Figure 9


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

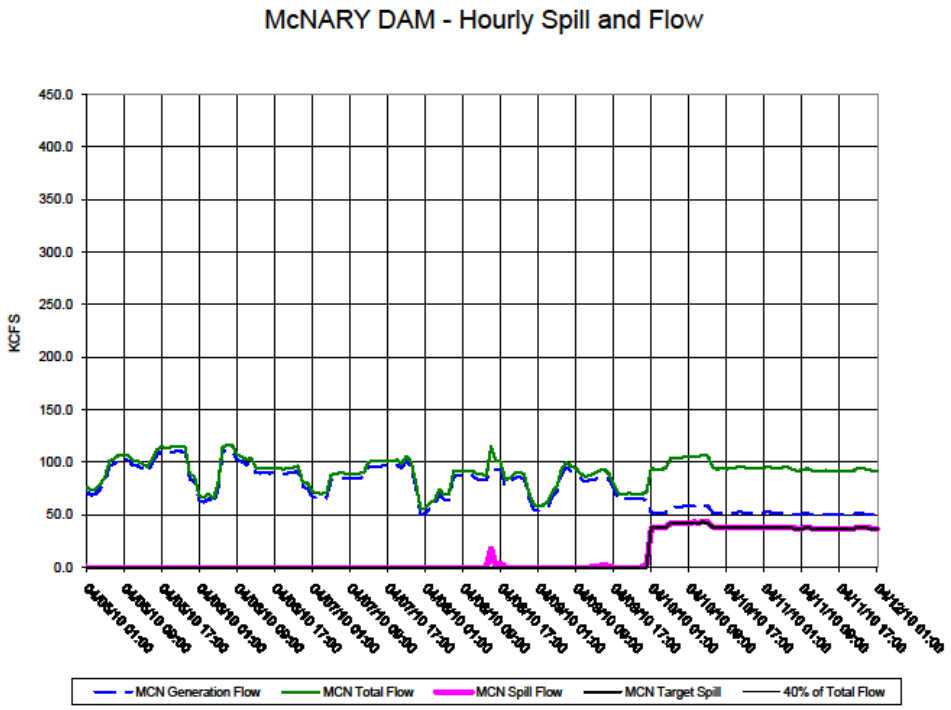
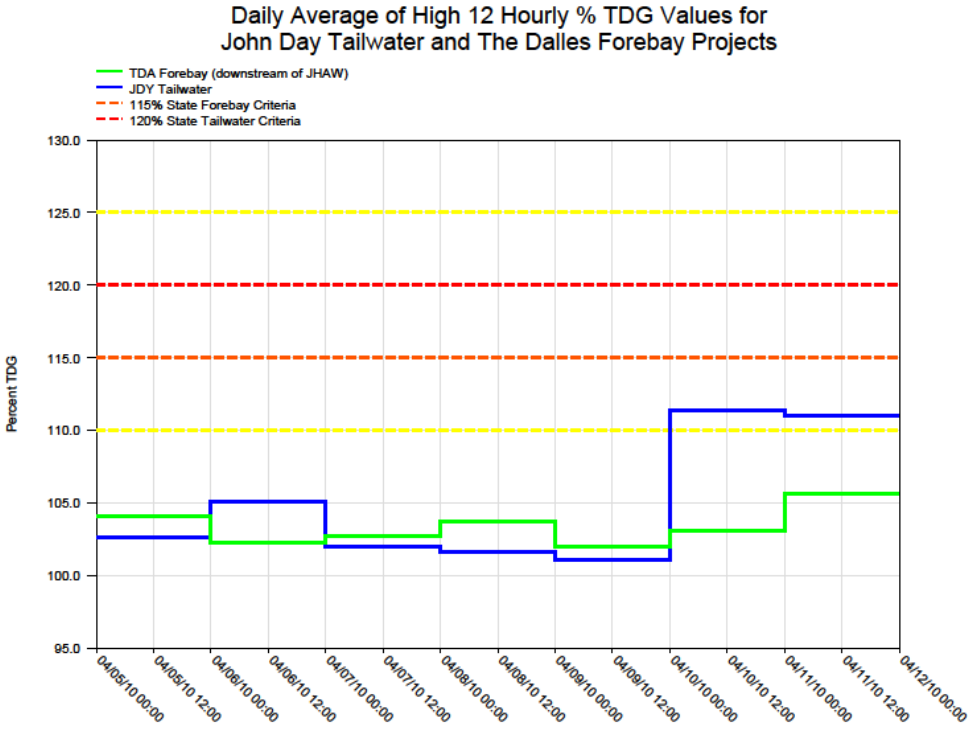

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 10


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
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04/11/10 12:00
04/12/10 00:00

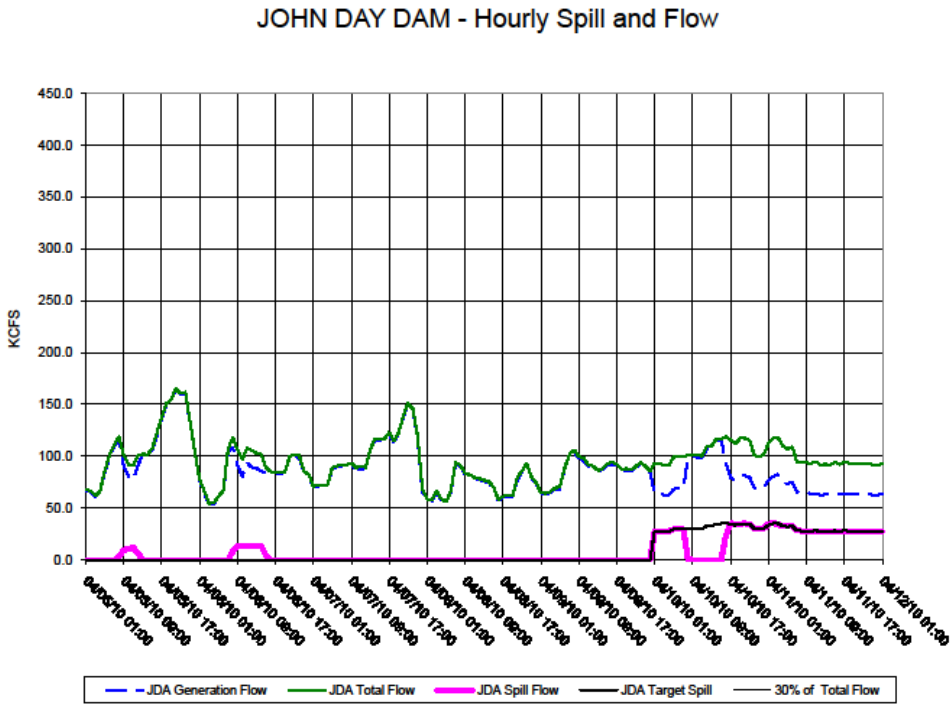
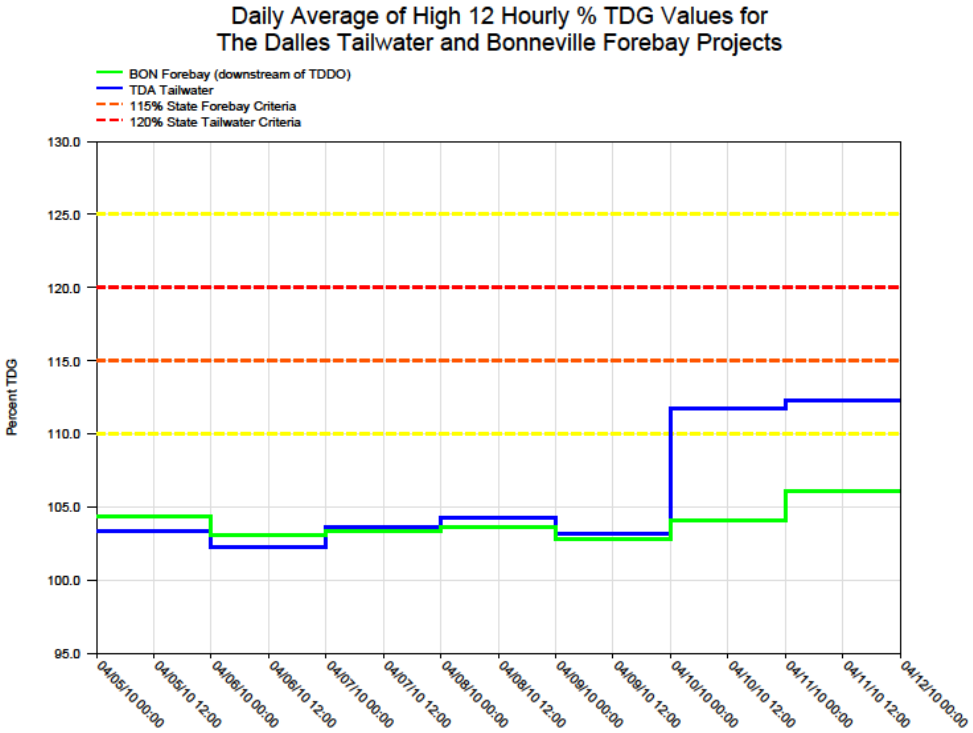

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
04/09/10 12:00
04/10/10 00:00
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04/11/10 00:00
04/11/10 12:00
04/12/10 00:00

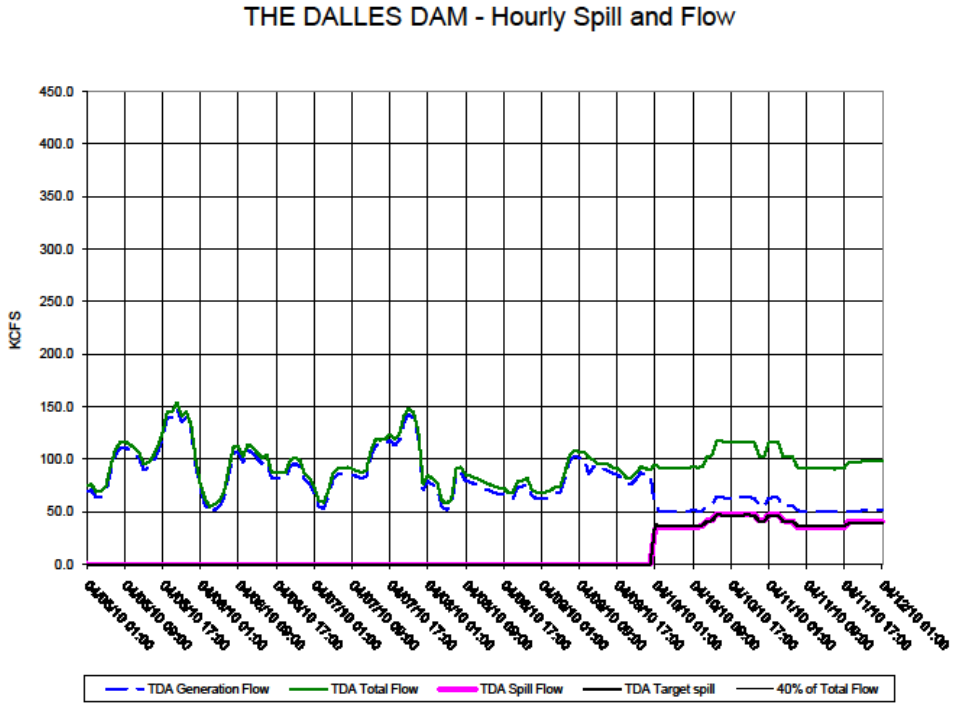
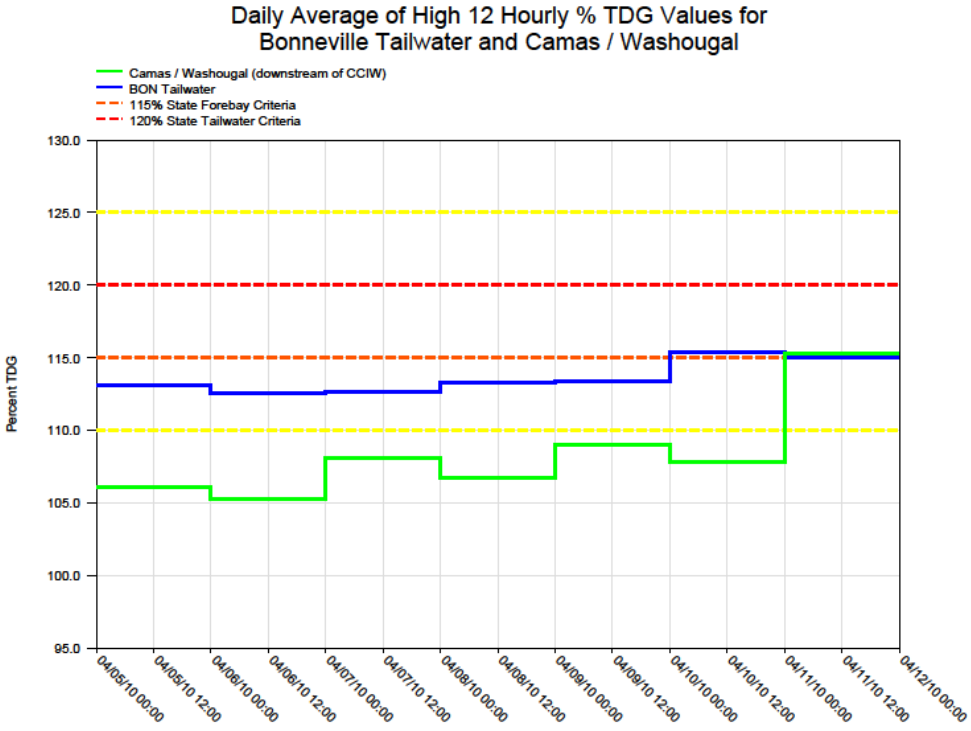

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/05/10 00:00
04/05/10 12:00
04/06/10 00:00
04/06/10 12:00
04/07/10 00:00
04/07/10 12:00
04/08/10 00:00
04/08/10 12:00
04/09/10 00:00
04/09/10 12:00
04/10/10 00:00
04/10/10 12:00
04/11/10 00:00
04/11/10 12:00
04/12/10 00:00

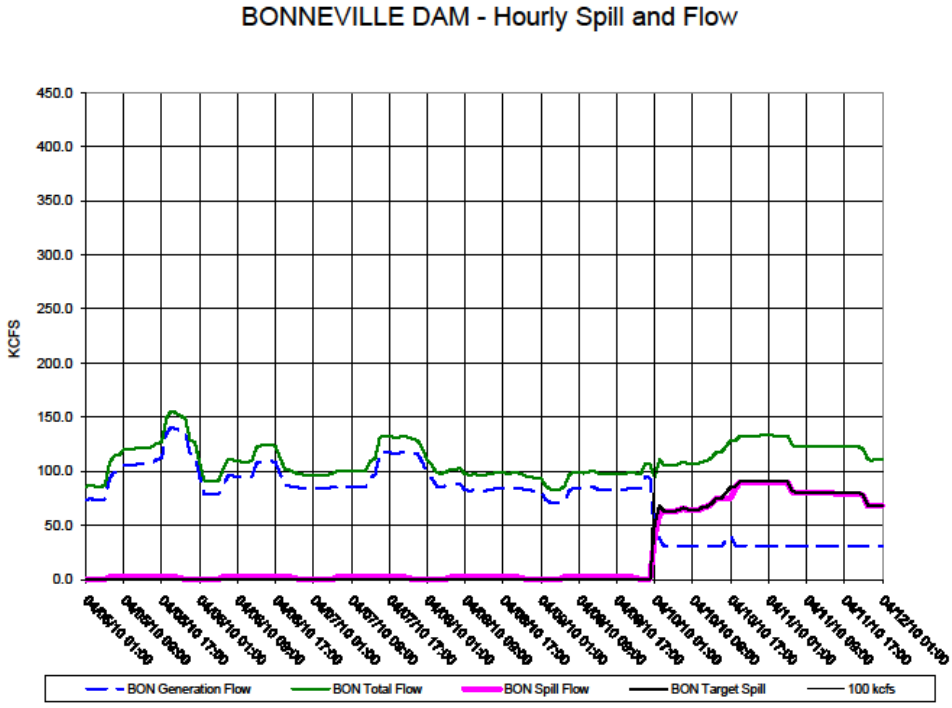
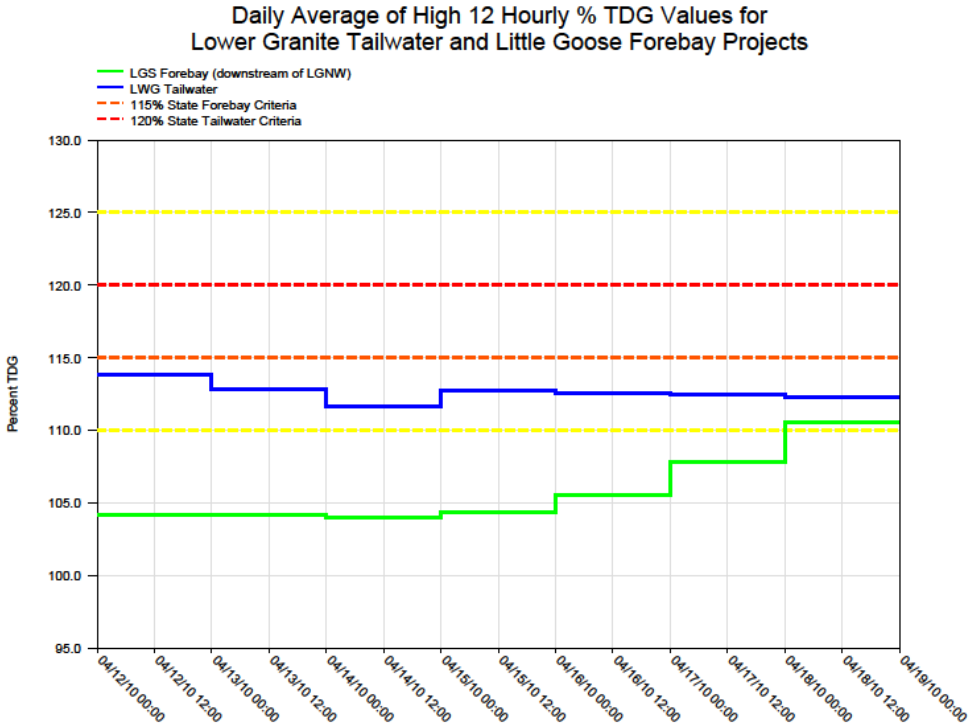

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 13


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
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04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

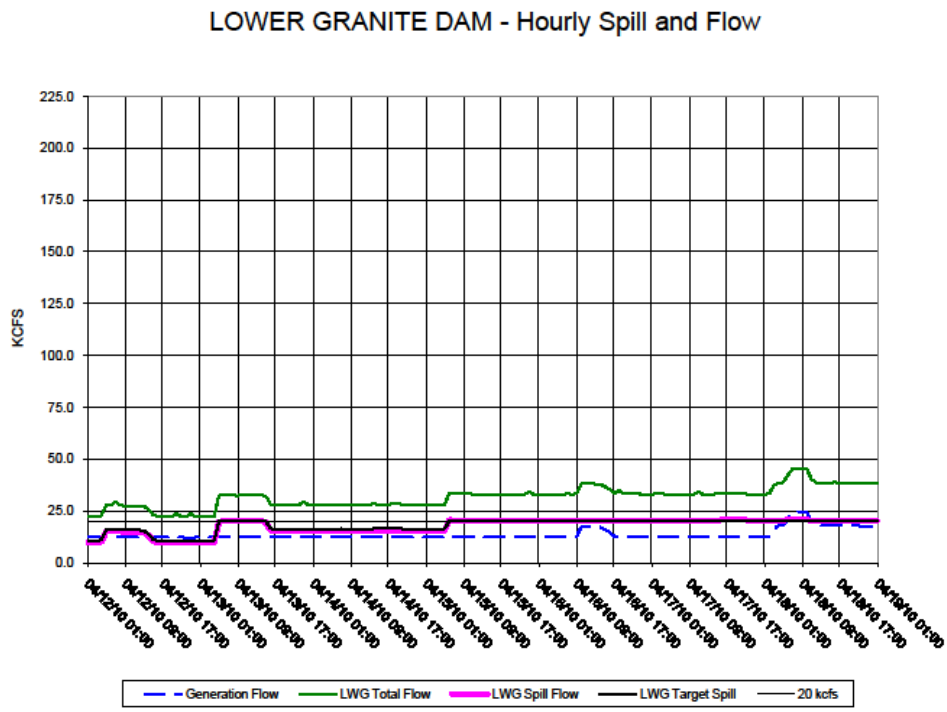
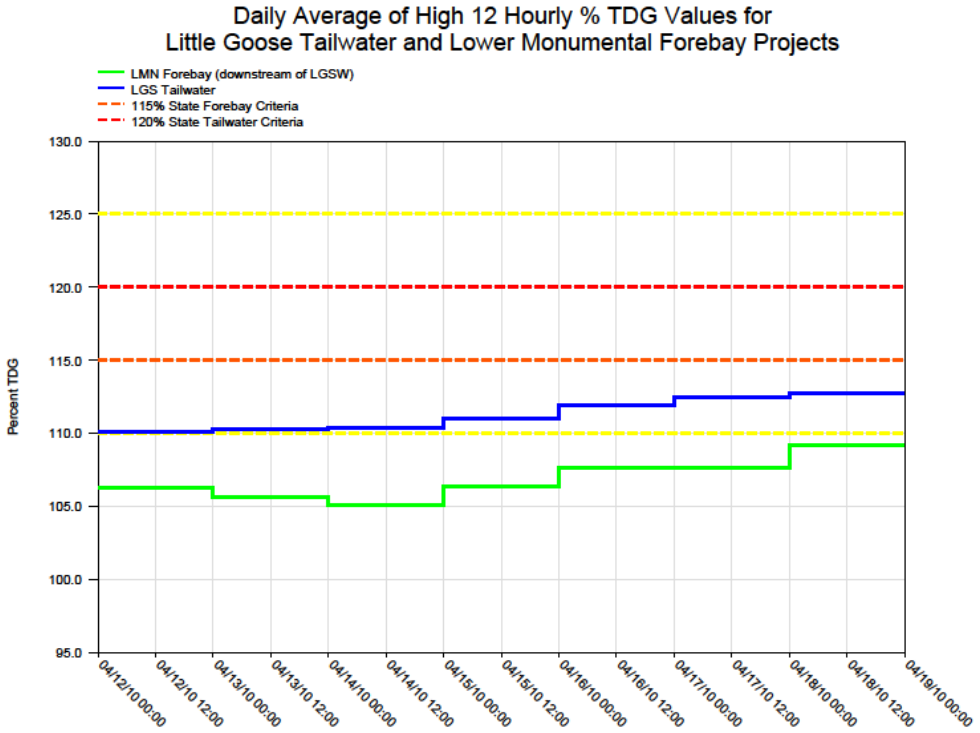

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 14


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
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04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

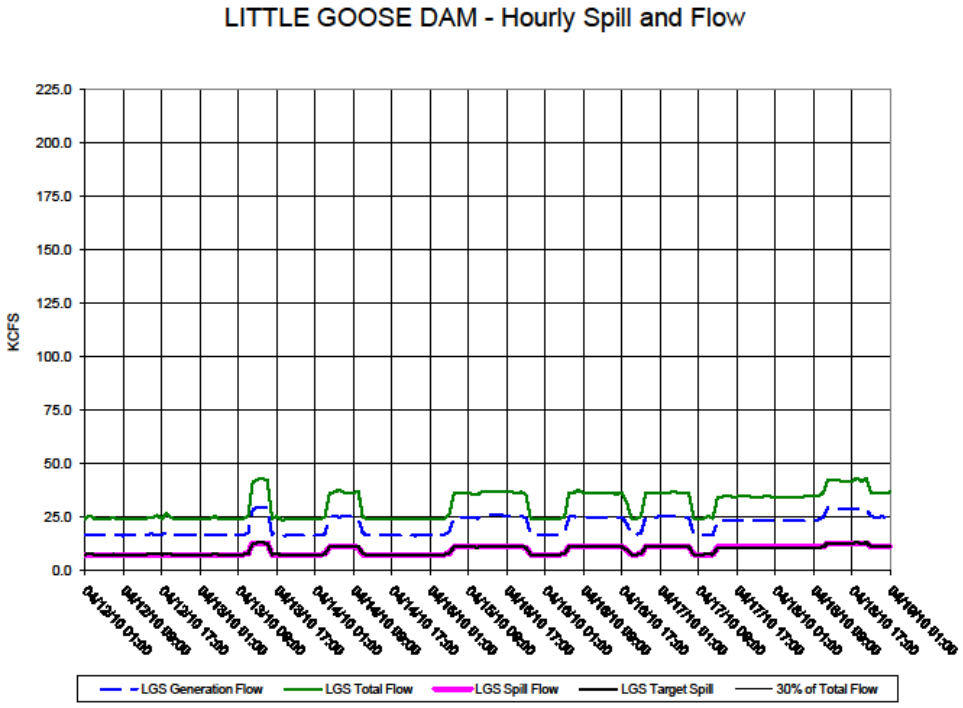
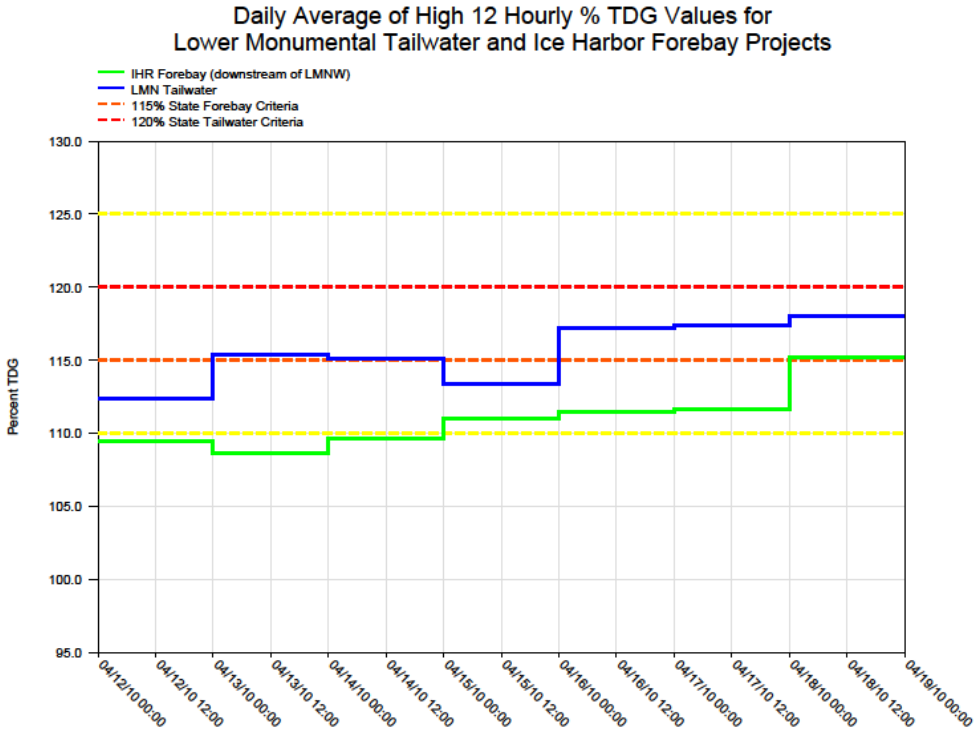

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 15


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
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04/18/10 12:00
04/19/10 00:00

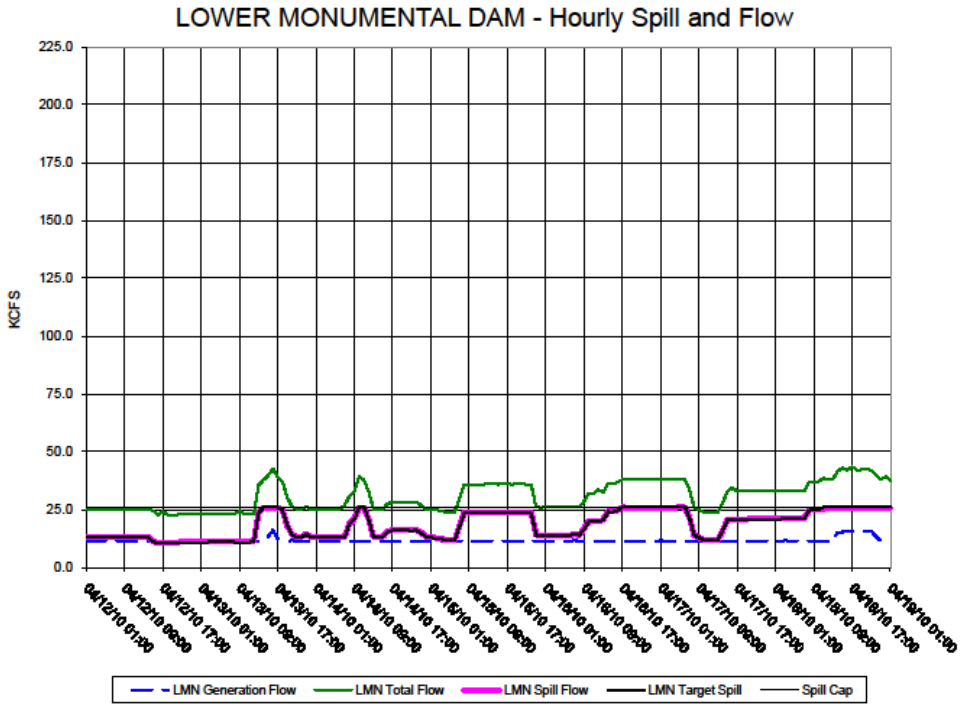
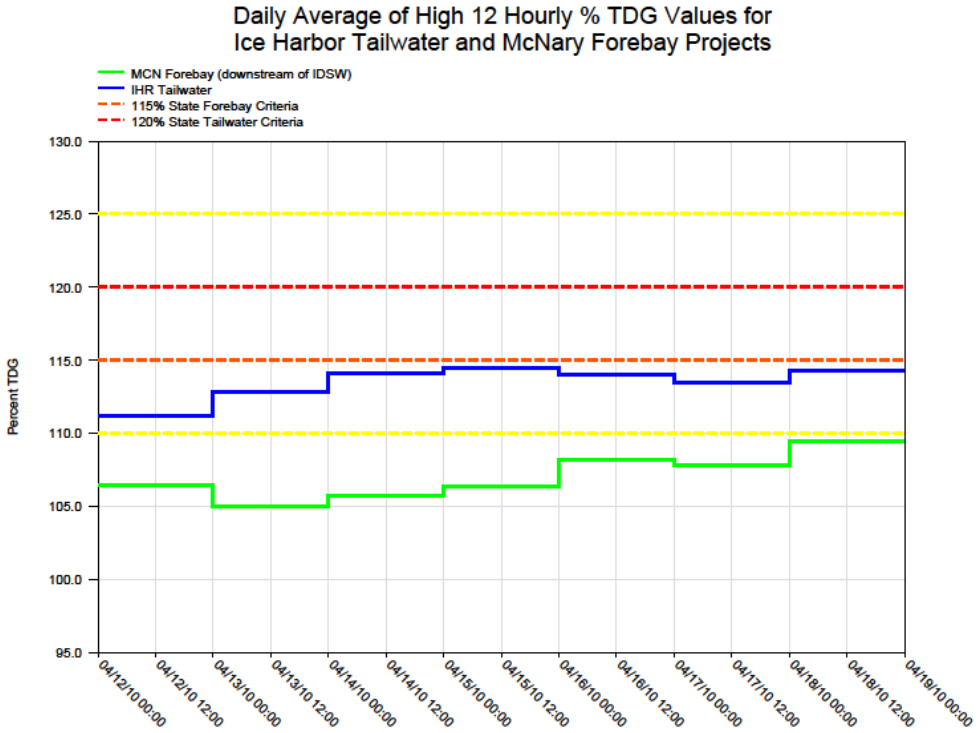

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 16


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
04/17/10 00:00
04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

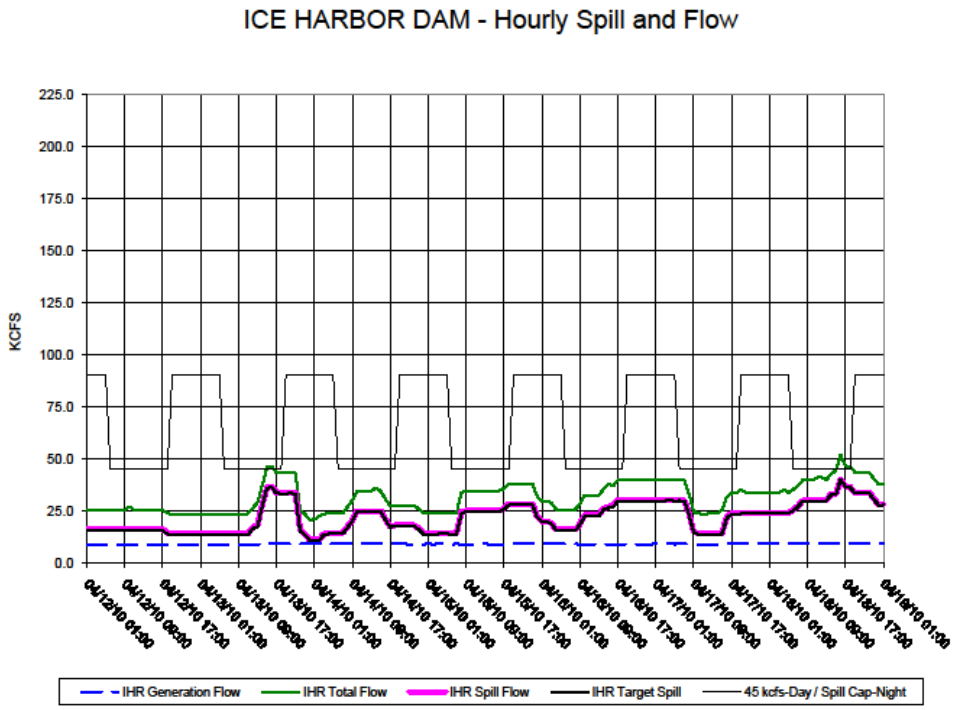
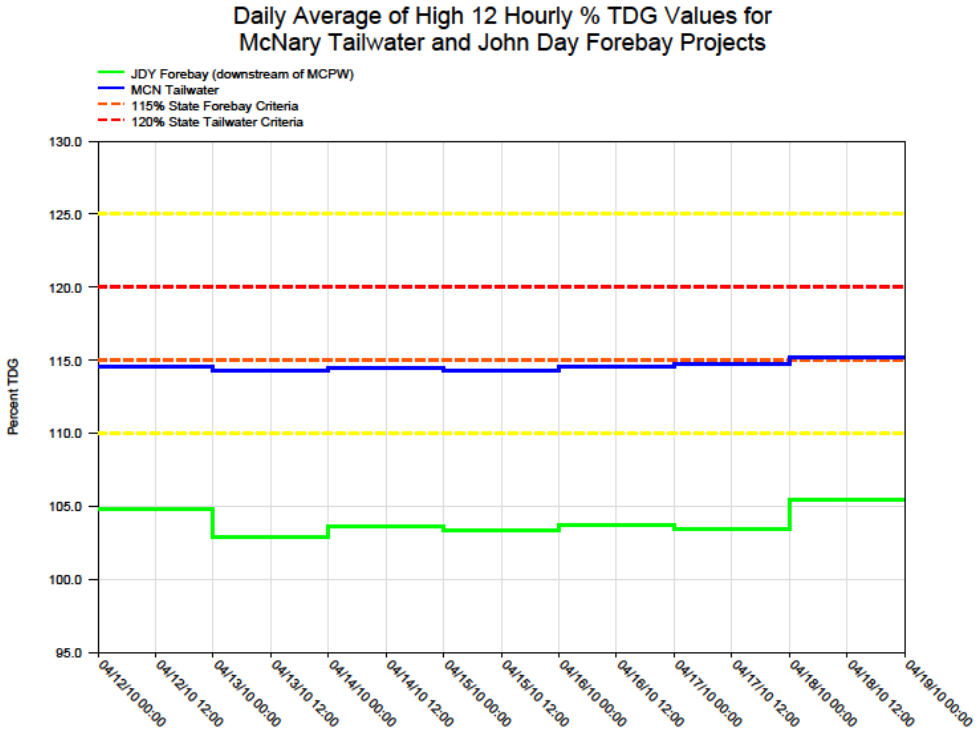

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45 kcfs-Day / Spill Cap-Night

Figure 17


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
04/17/10 00:00
04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

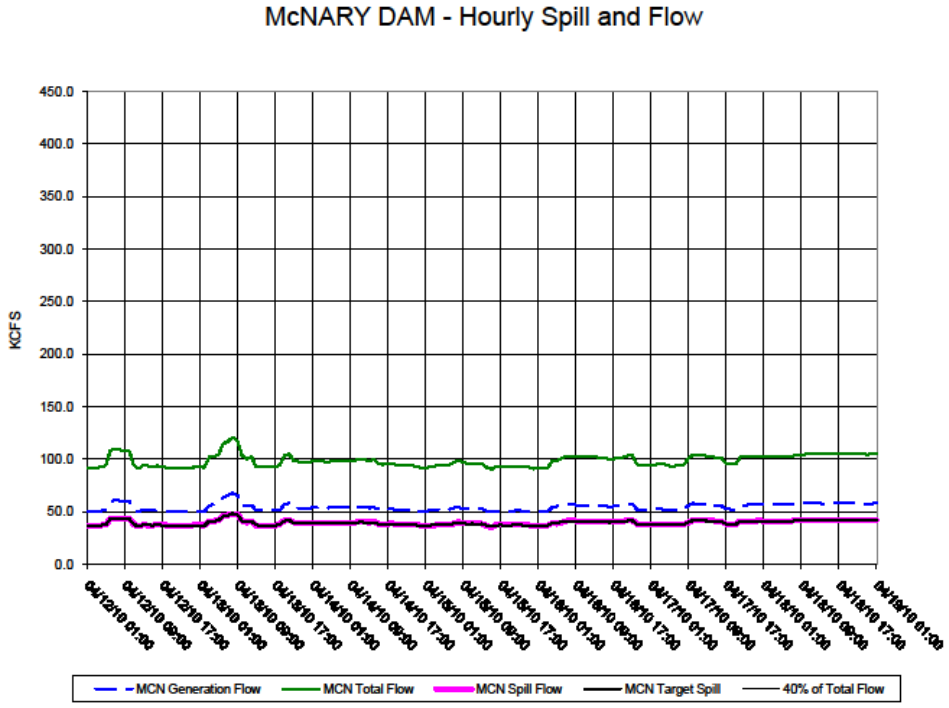
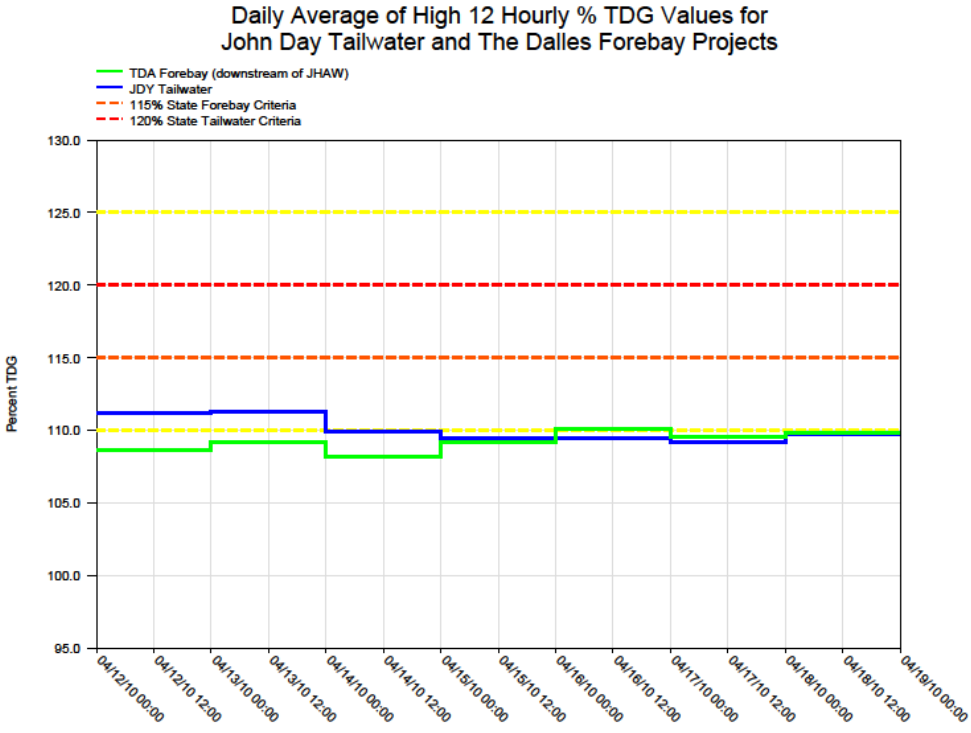

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 18


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
04/17/10 00:00
04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

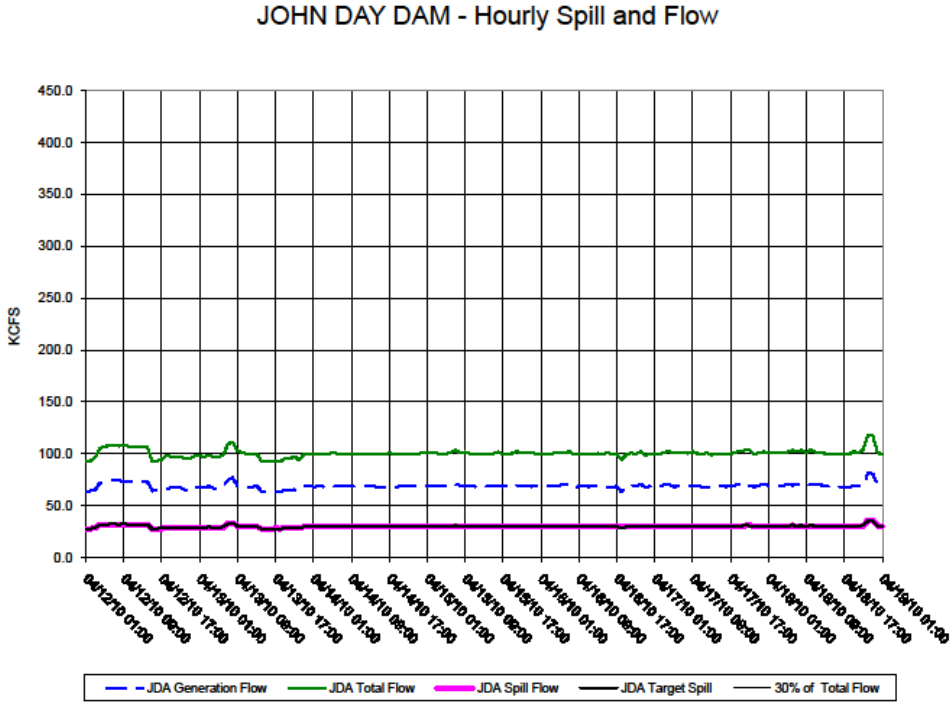
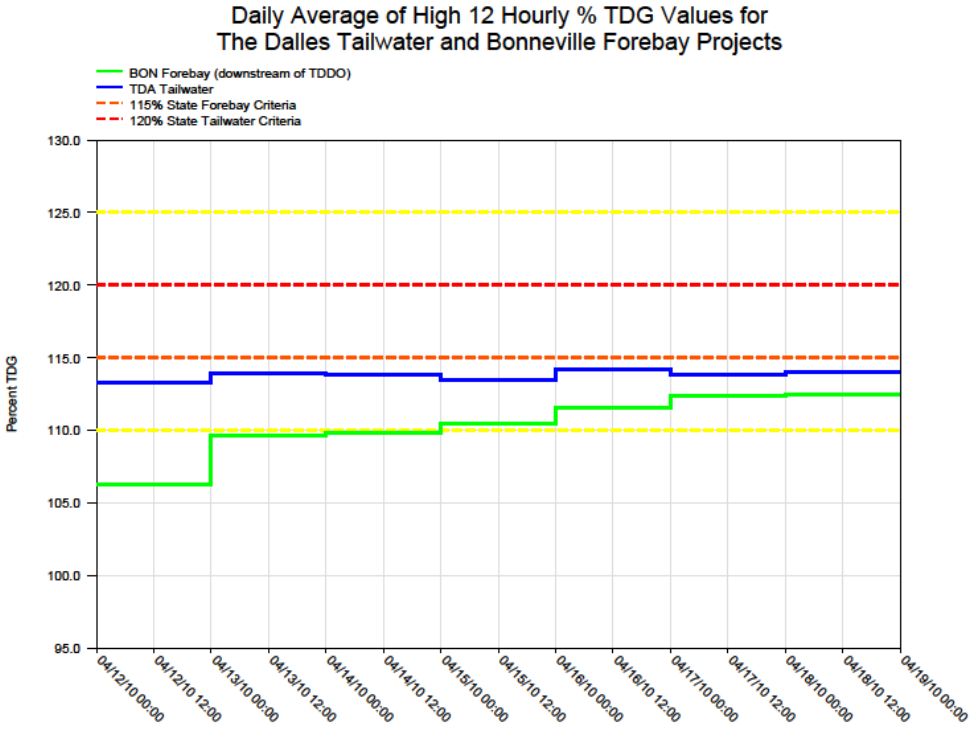

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
04/17/10 00:00
04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

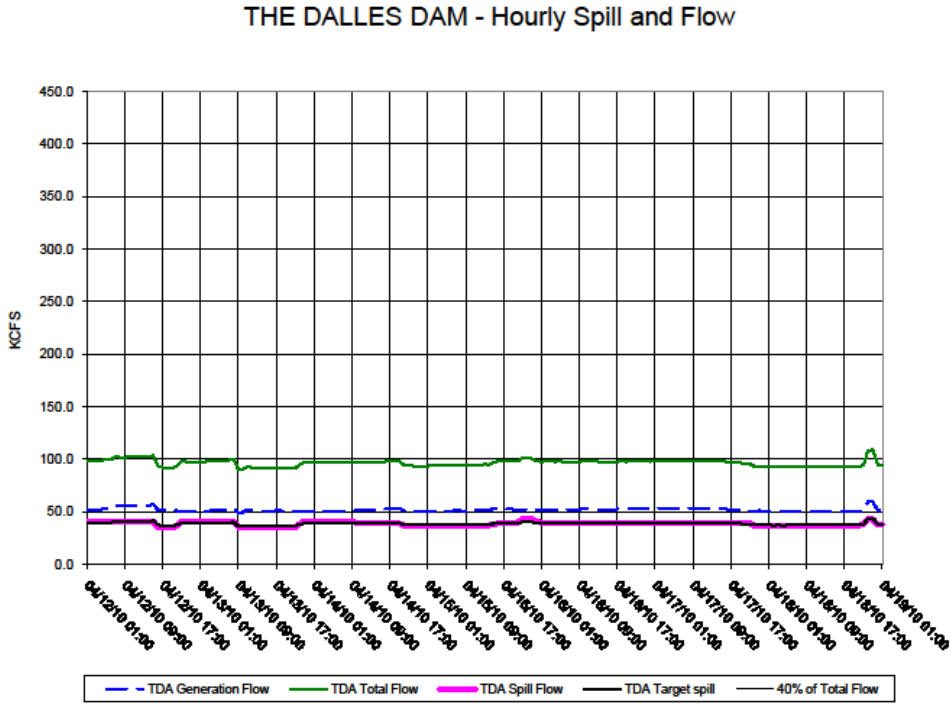
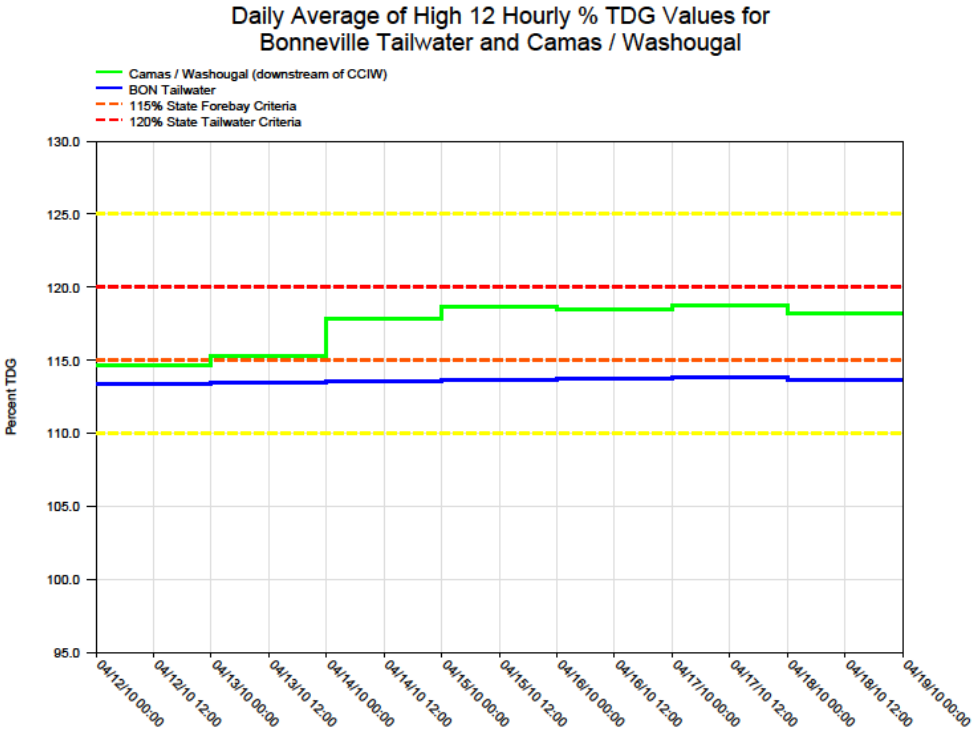

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/12/10 01:00
04/12/10 09:00
04/12/10 17:00
04/13/10 01:00
04/13/10 09:00
04/13/10 17:00
04/14/10 01:00
04/14/10 09:00
04/14/10 17:00
04/15/10 01:00
04/15/10 09:00
04/15/10 17:00
04/16/10 01:00
04/16/10 09:00
04/16/10 17:00
04/17/10 01:00
04/17/10 09:00
04/17/10 17:00
04/18/10 01:00
04/18/10 09:00
04/18/10 17:00
04/19/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/12/10 00:00
04/12/10 12:00
04/13/10 00:00
04/13/10 12:00
04/14/10 00:00
04/14/10 12:00
04/15/10 00:00
04/15/10 12:00
04/16/10 00:00
04/16/10 12:00
04/17/10 00:00
04/17/10 12:00
04/18/10 00:00
04/18/10 12:00
04/19/10 00:00

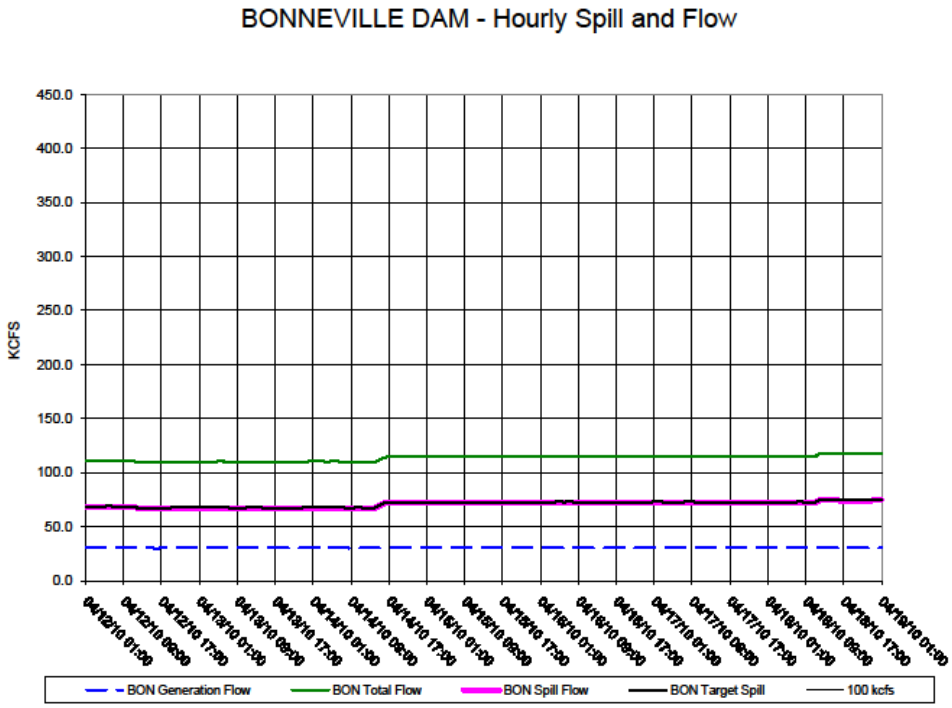
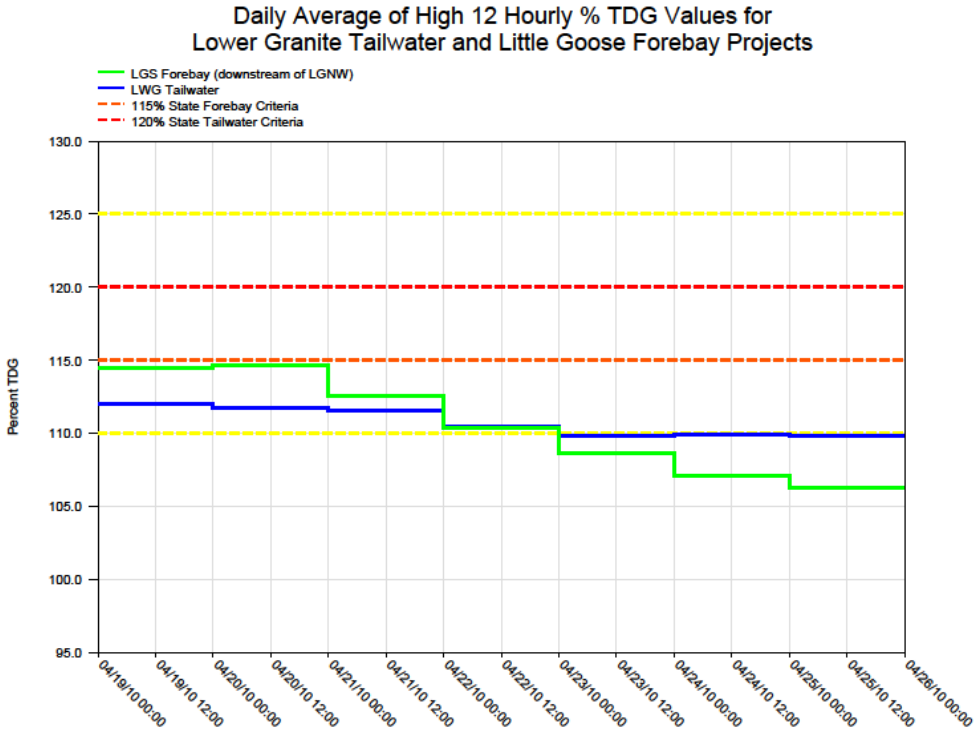

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 21


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
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04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

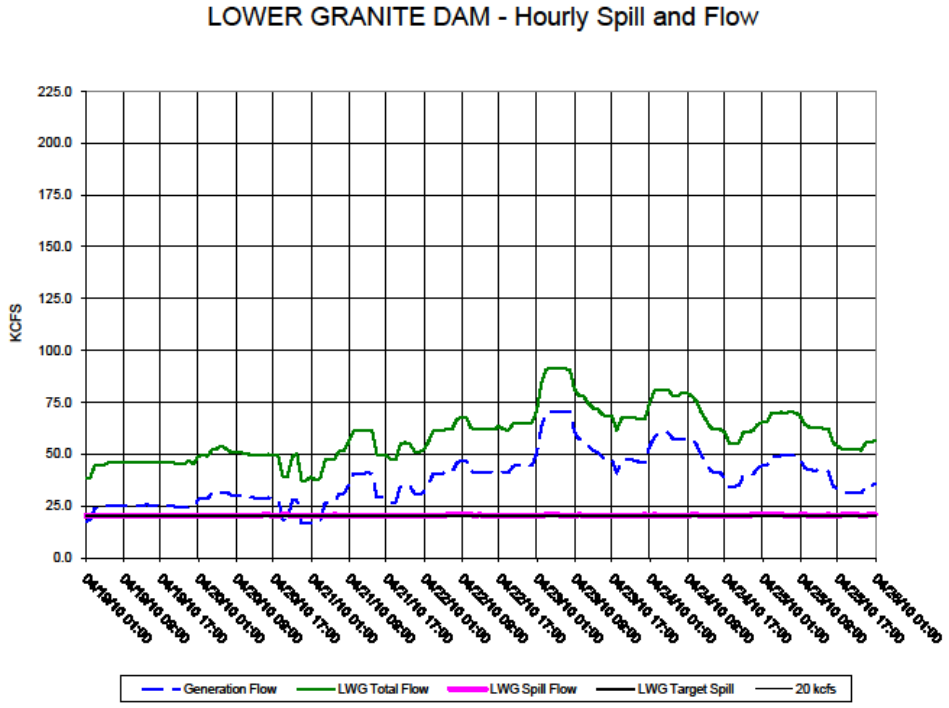
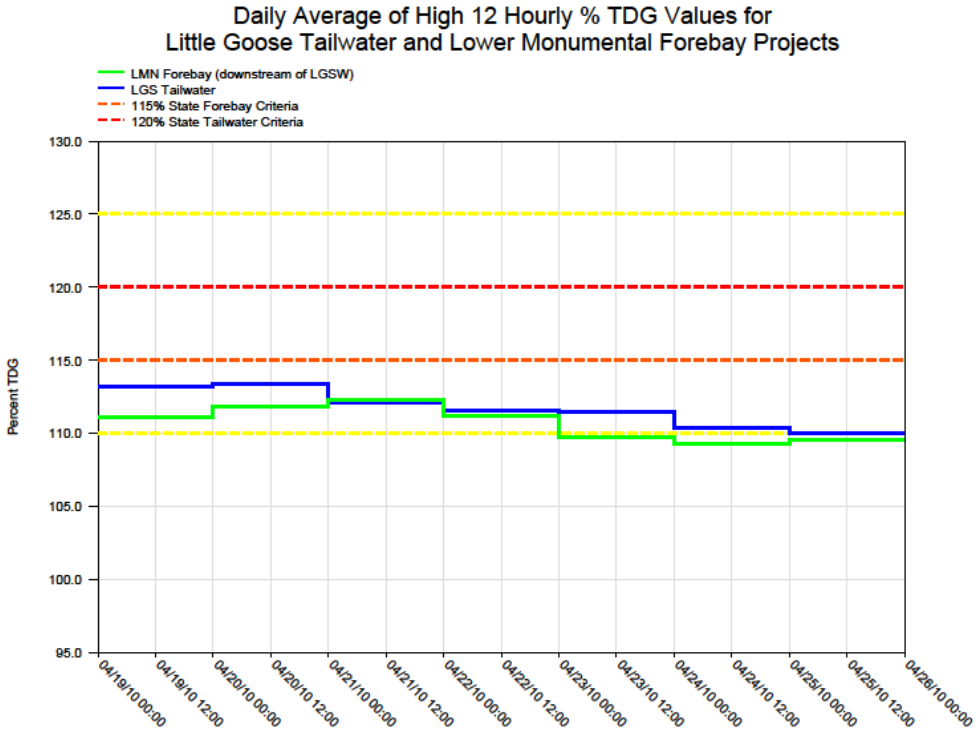

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 22


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

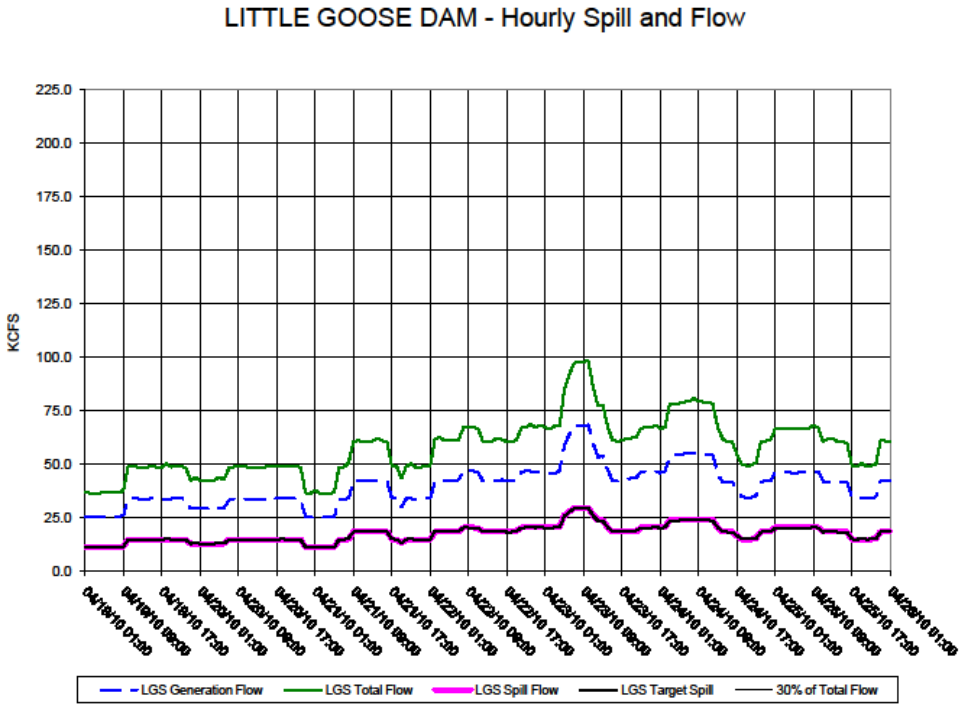
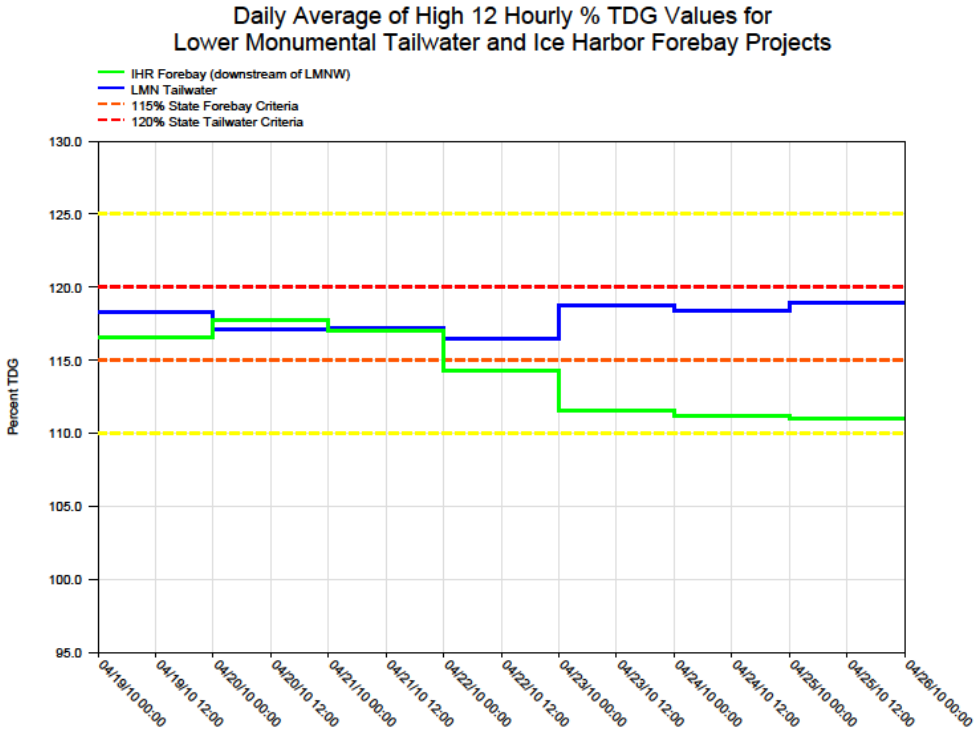

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 23


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

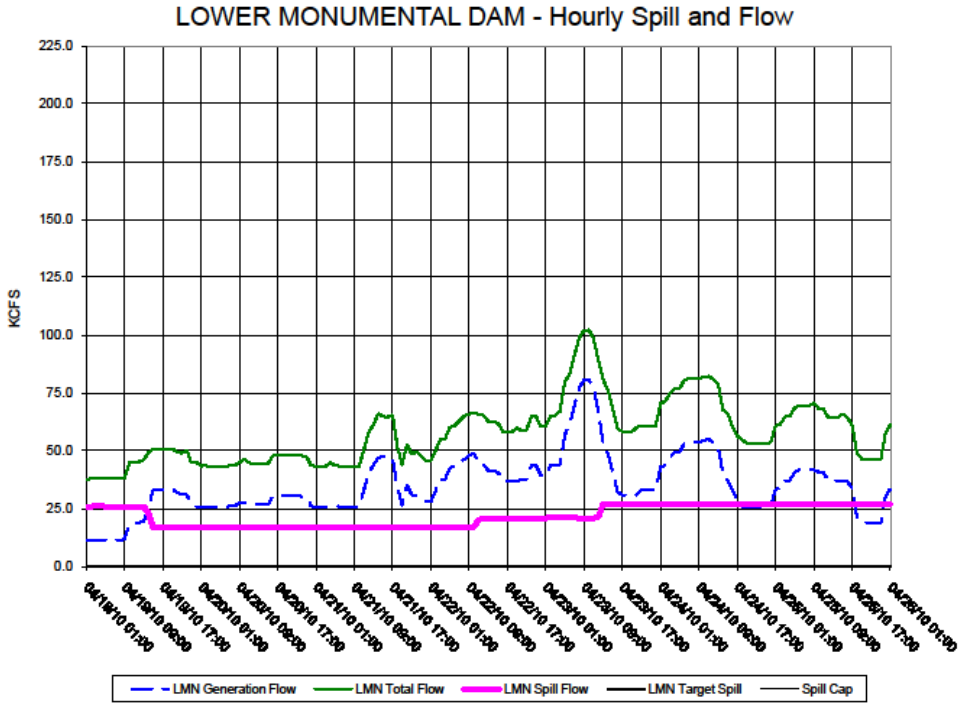
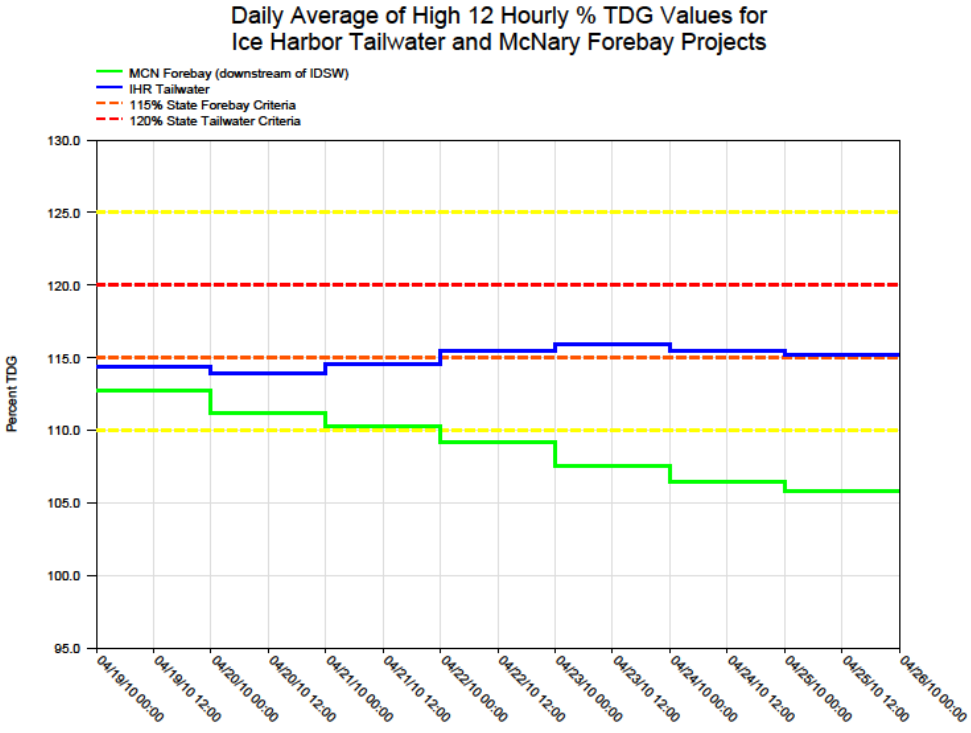

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 24


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

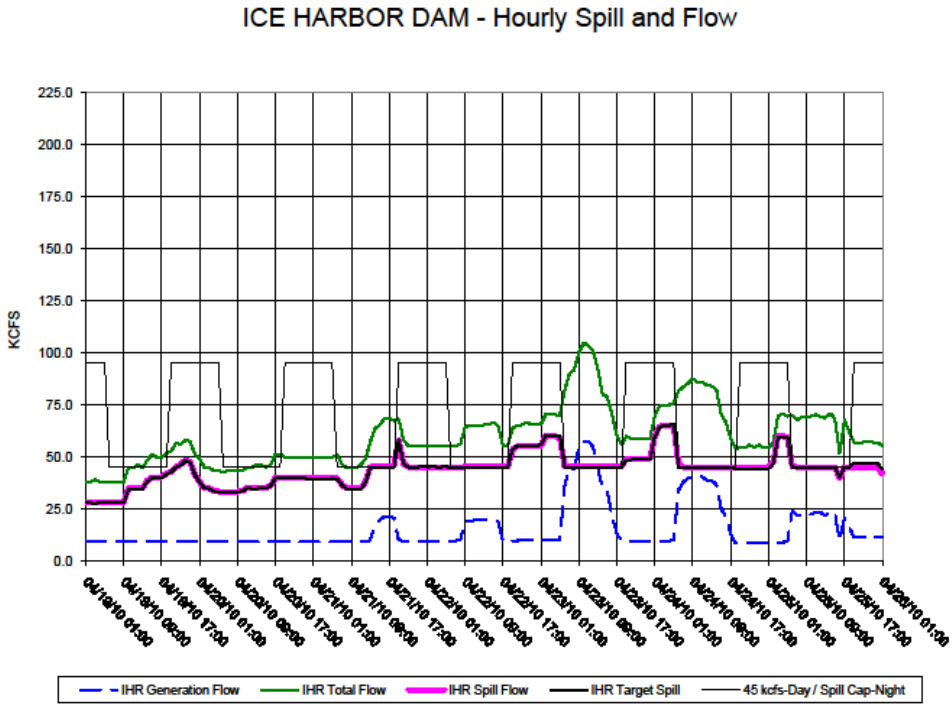
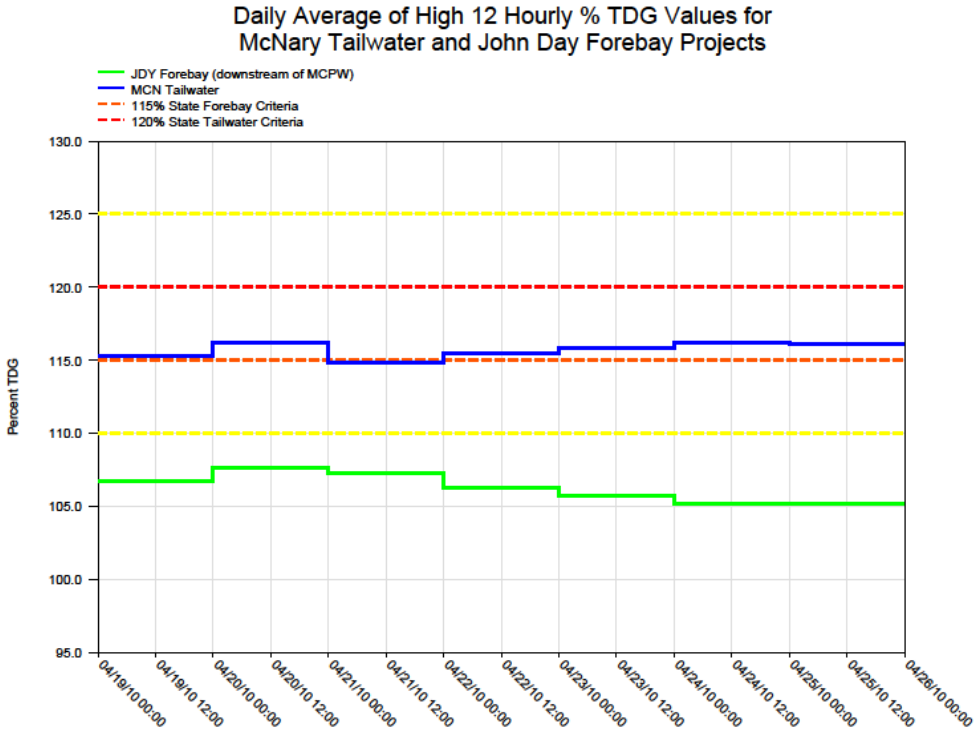

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45 kcfs-Day / Spill Cap-Night

Figure 25


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

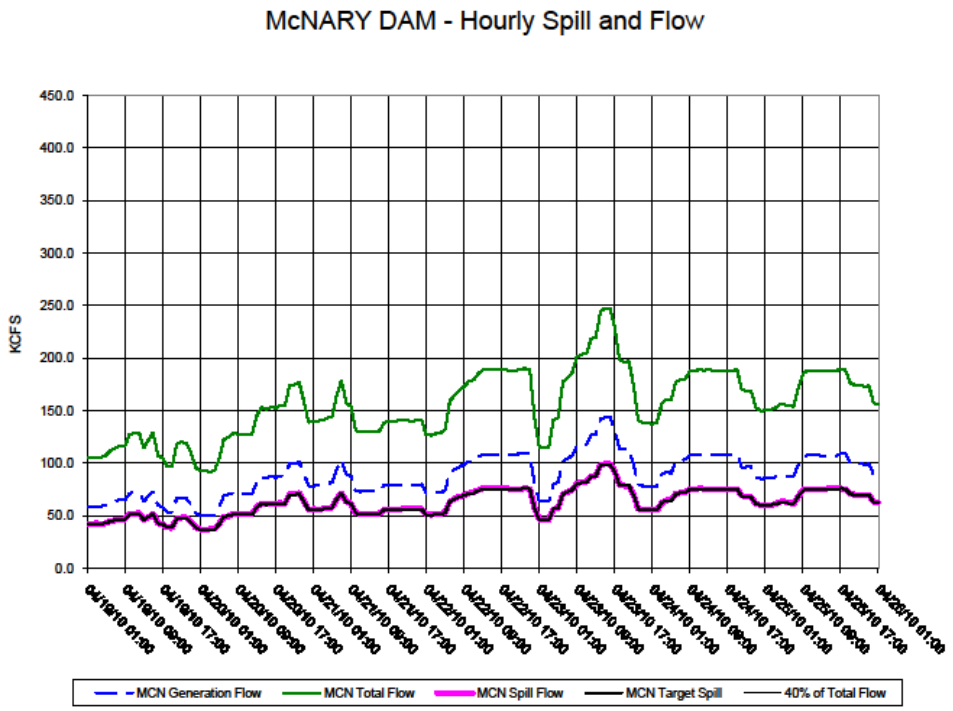
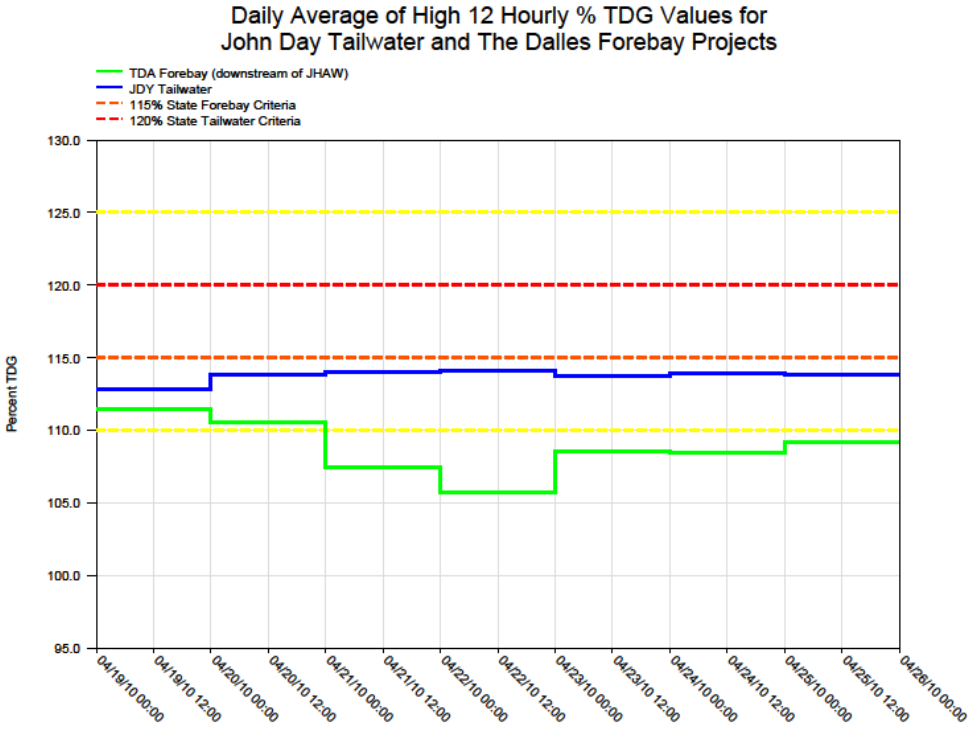

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 26


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

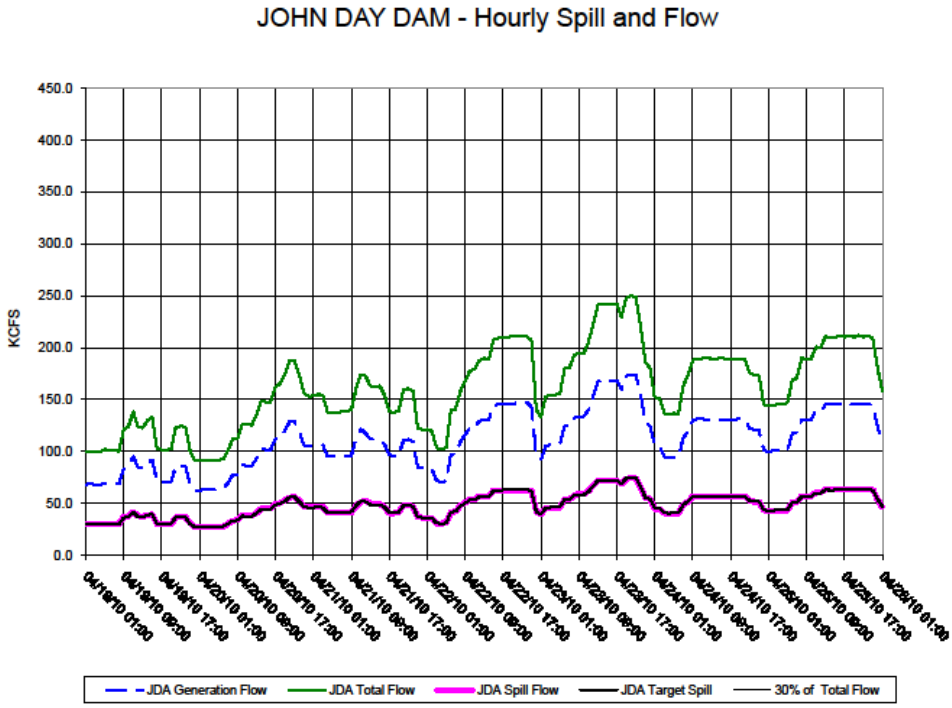
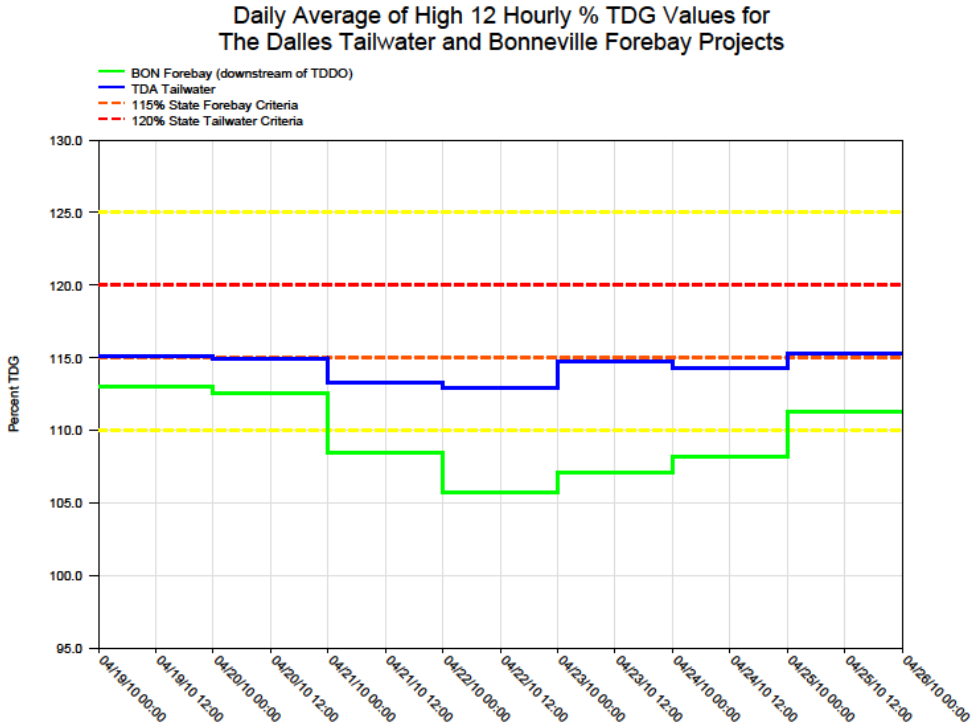

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/18/10 01:00
04/18/10 09:00
04/18/10 17:00
04/19/10 01:00
04/19/10 09:00
04/19/10 17:00
04/20/10 01:00
04/20/10 09:00
04/20/10 17:00
04/21/10 01:00
04/21/10 09:00
04/21/10 17:00
04/22/10 01:00
04/22/10 09:00
04/22/10 17:00
04/23/10 01:00
04/23/10 09:00
04/23/10 17:00
04/24/10 01:00
04/24/10 09:00
04/24/10 17:00
04/25/10 01:00
04/25/10 09:00
04/25/10 17:00
04/26/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% of Total Flow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

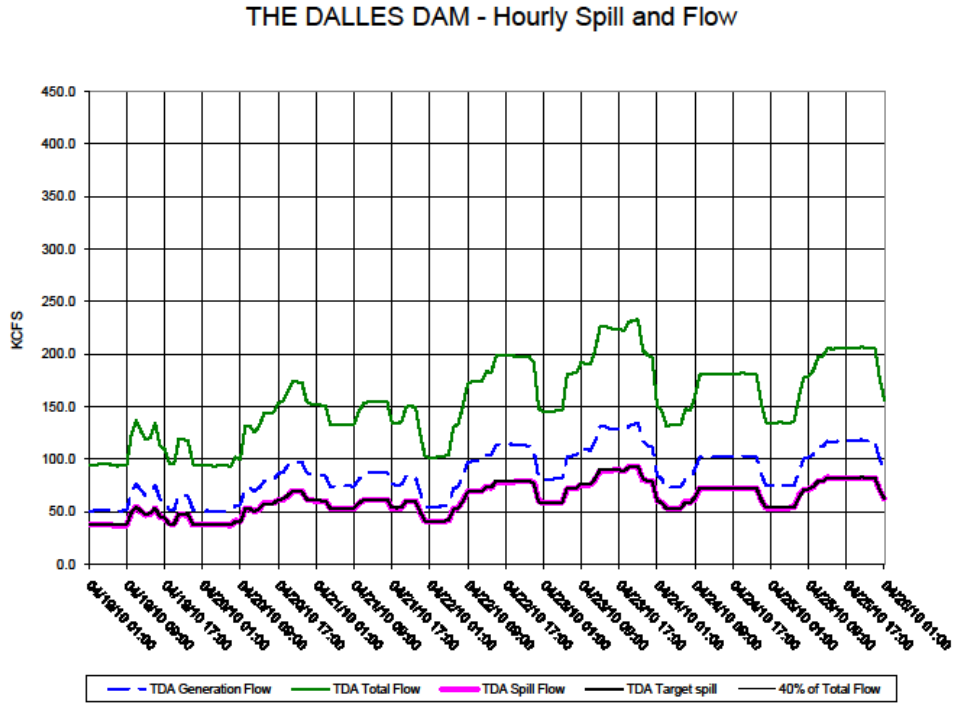
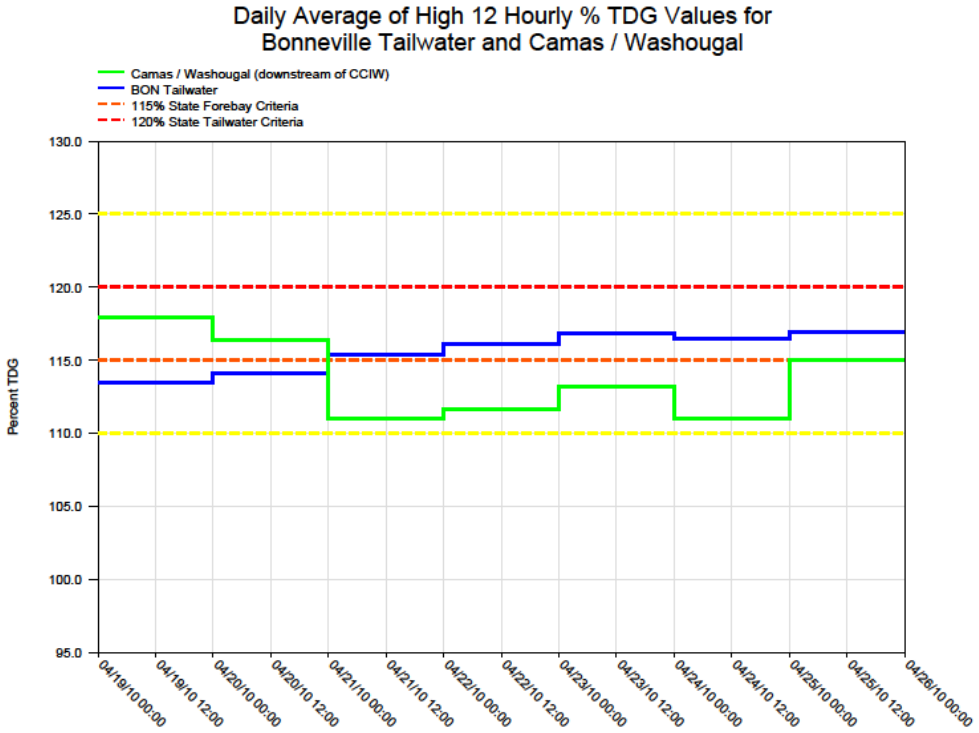

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/19/10 01:00
04/19/10 09:00
04/19/10 17:00
04/20/10 01:00
04/20/10 09:00
04/20/10 17:00
04/21/10 01:00
04/21/10 09:00
04/21/10 17:00
04/22/10 01:00
04/22/10 09:00
04/22/10 17:00
04/23/10 01:00
04/23/10 09:00
04/23/10 17:00
04/24/10 01:00
04/24/10 09:00
04/24/10 17:00
04/25/10 01:00
04/25/10 09:00
04/25/10 17:00
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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/19/10 00:00
04/19/10 12:00
04/20/10 00:00
04/20/10 12:00
04/21/10 00:00
04/21/10 12:00
04/22/10 00:00
04/22/10 12:00
04/23/10 00:00
04/23/10 12:00
04/24/10 00:00
04/24/10 12:00
04/25/10 00:00
04/25/10 12:00
04/26/10 00:00

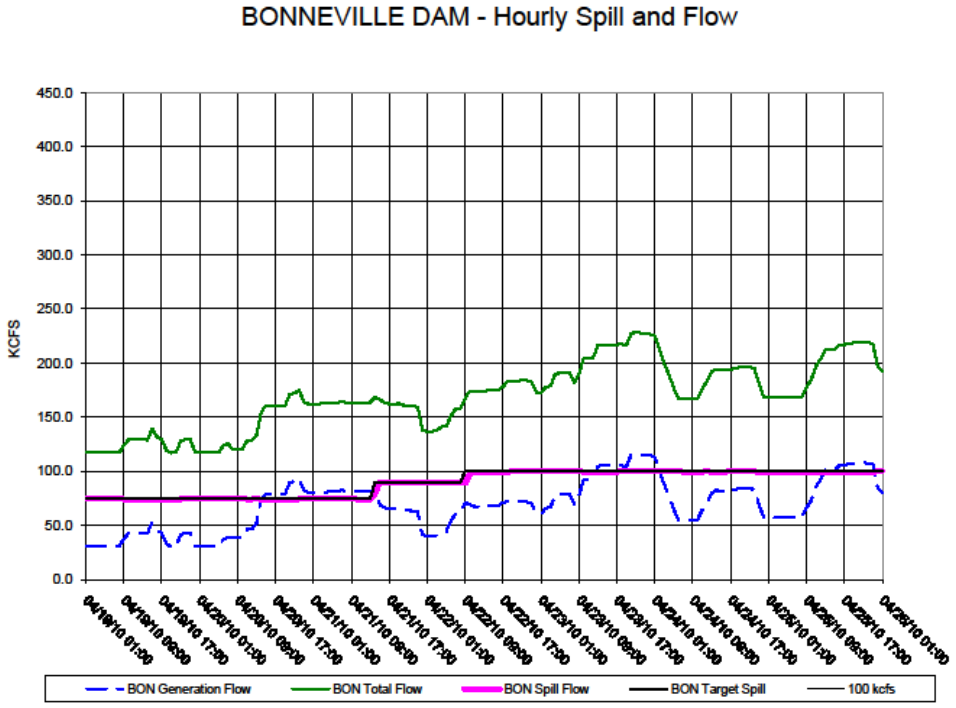
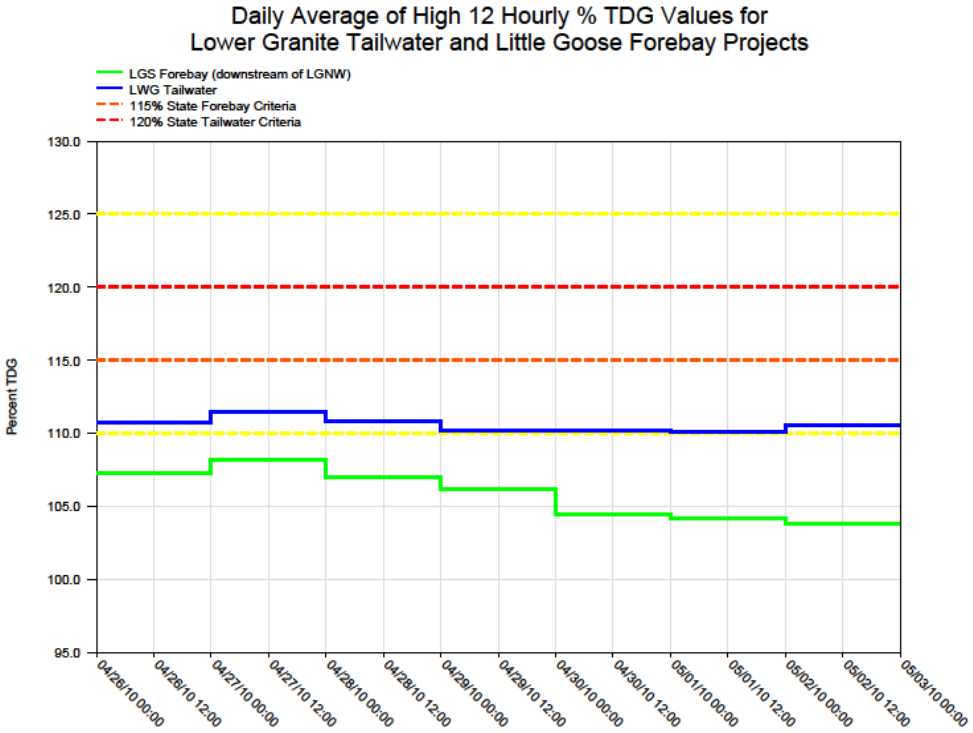

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Figure 29


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

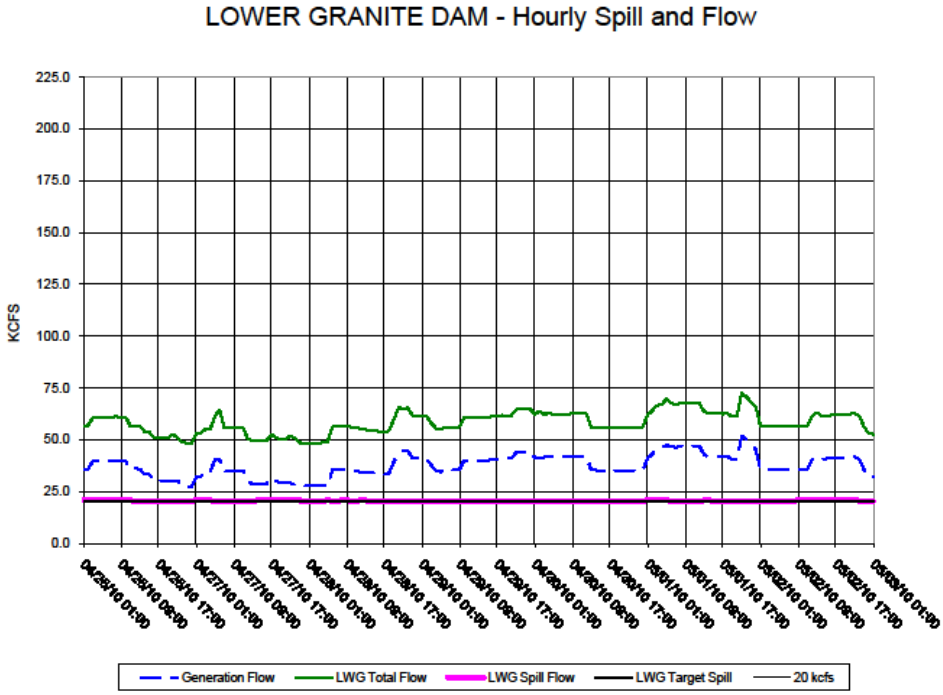
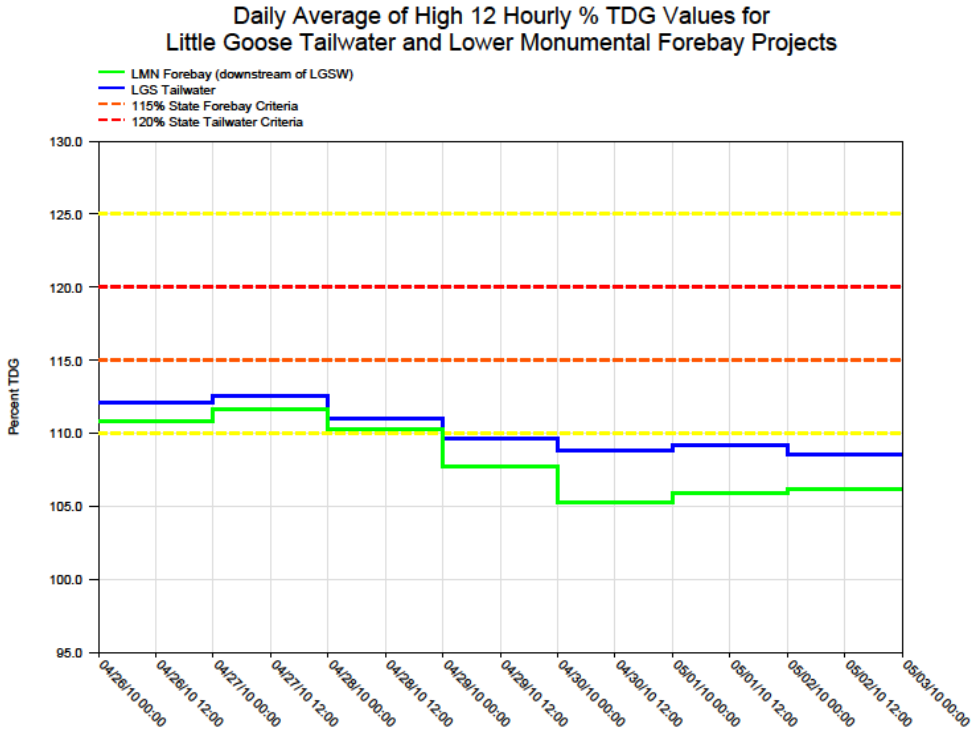

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
20 kcfs

Figure 30


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

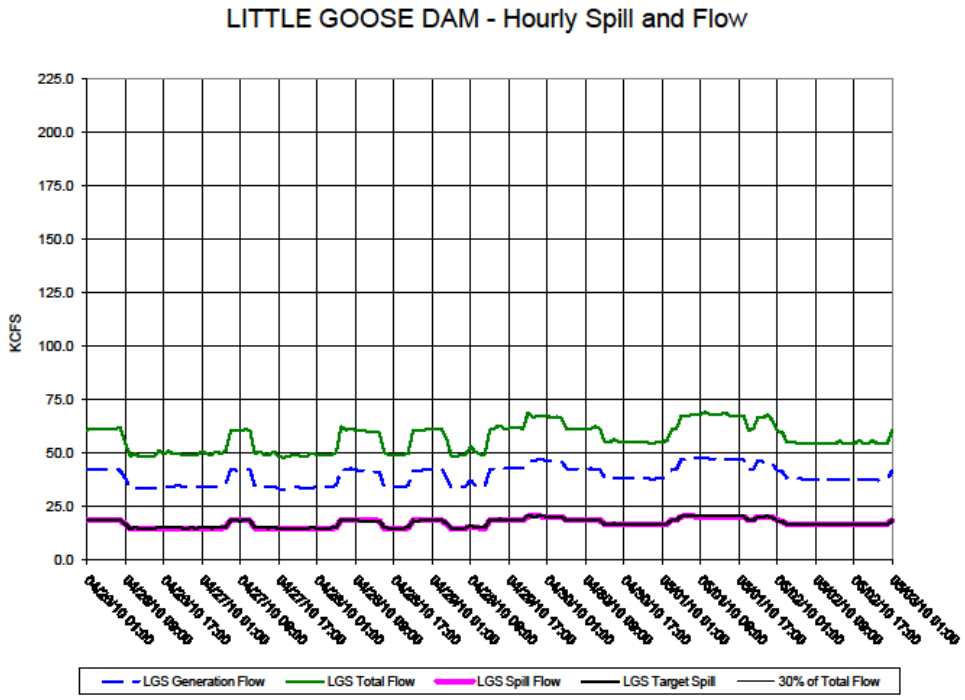
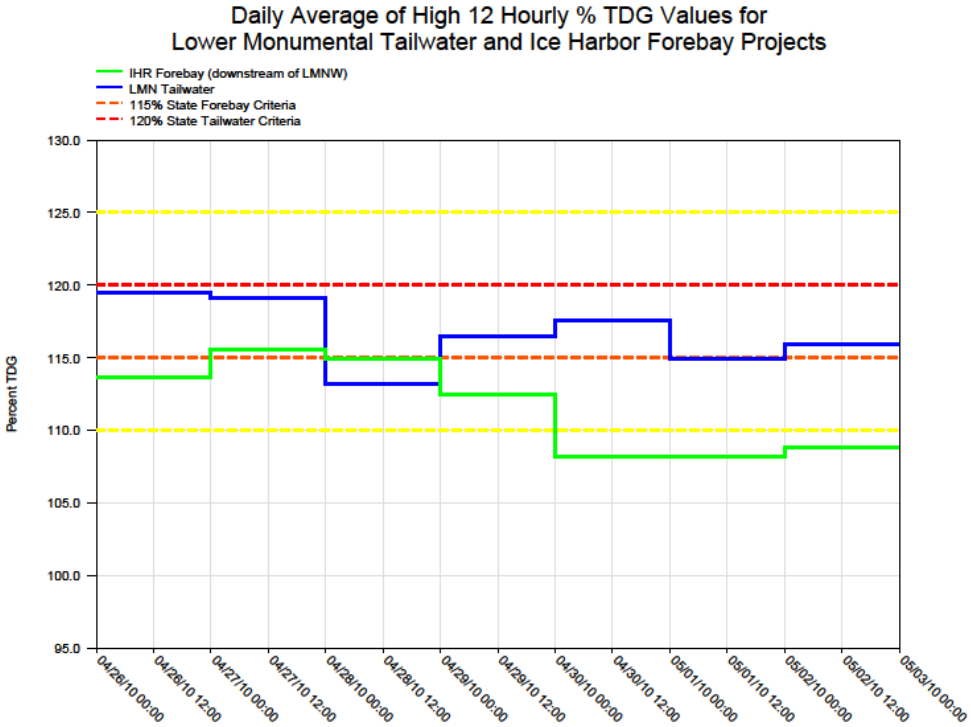

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 31


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
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05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

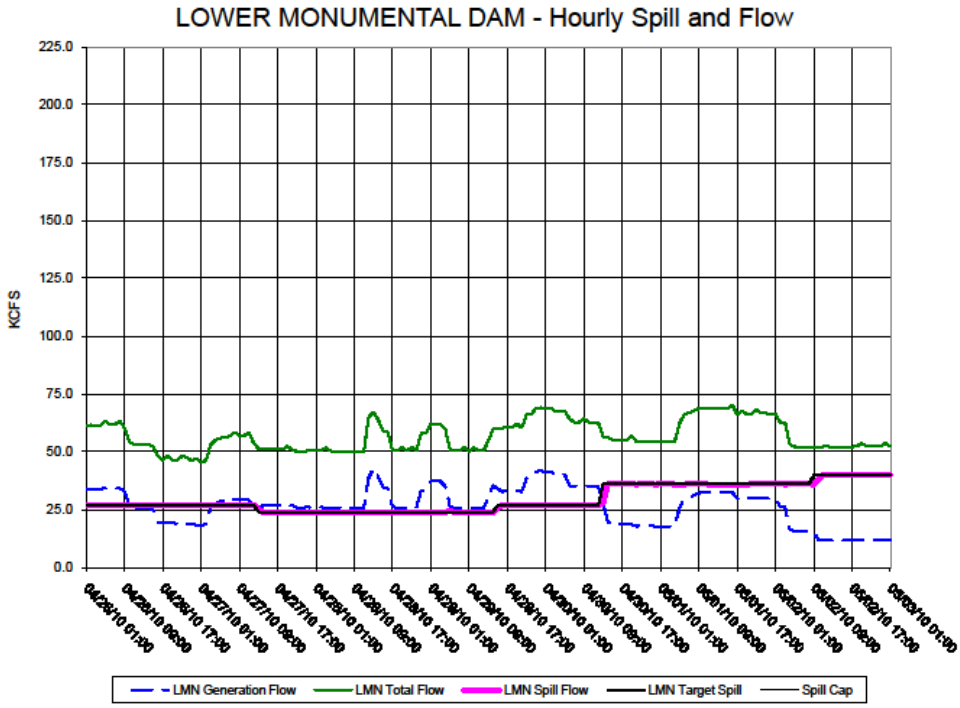
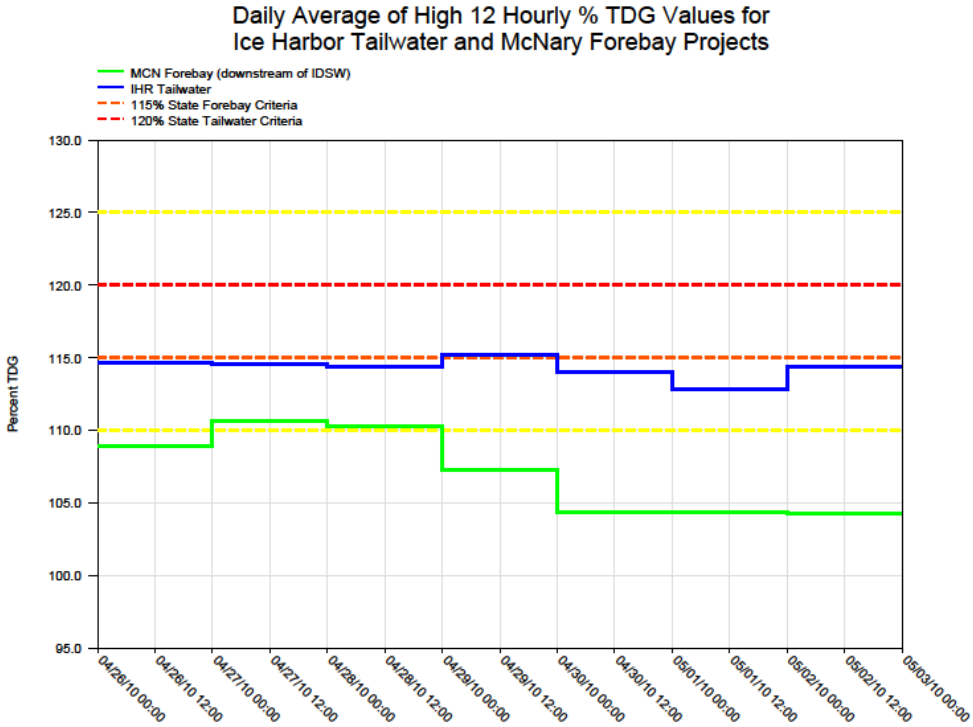

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
Spill Cap

Figure 32


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
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05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

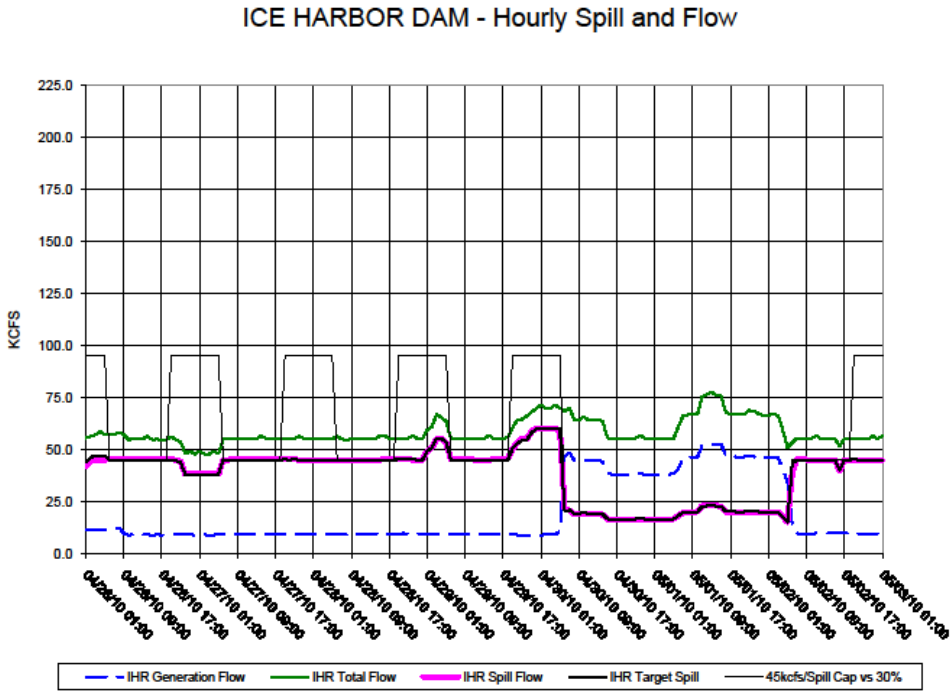
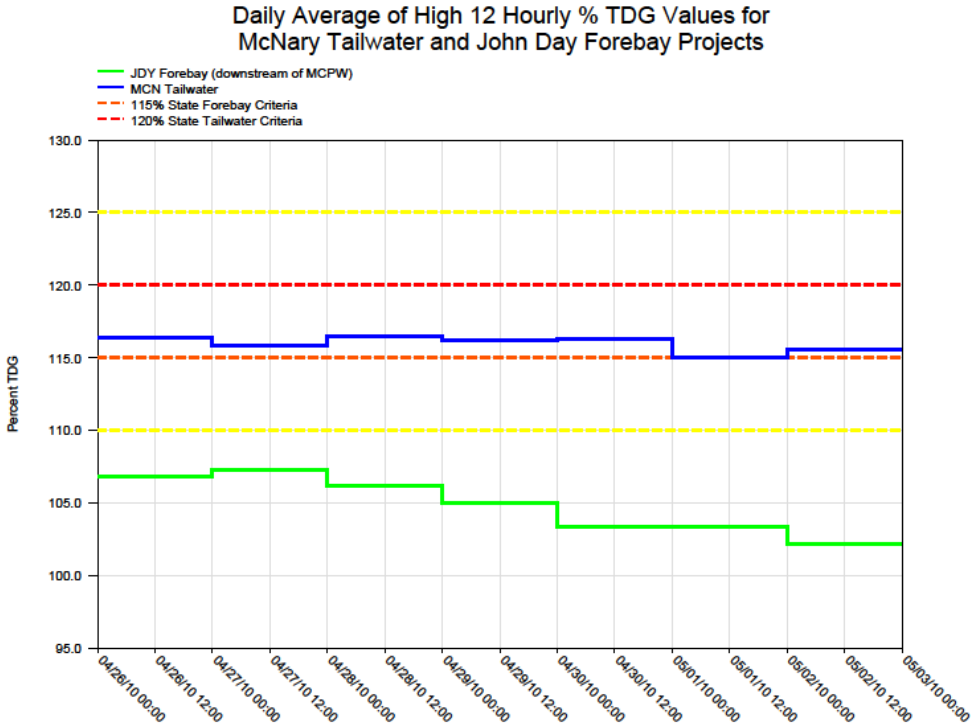

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 33


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

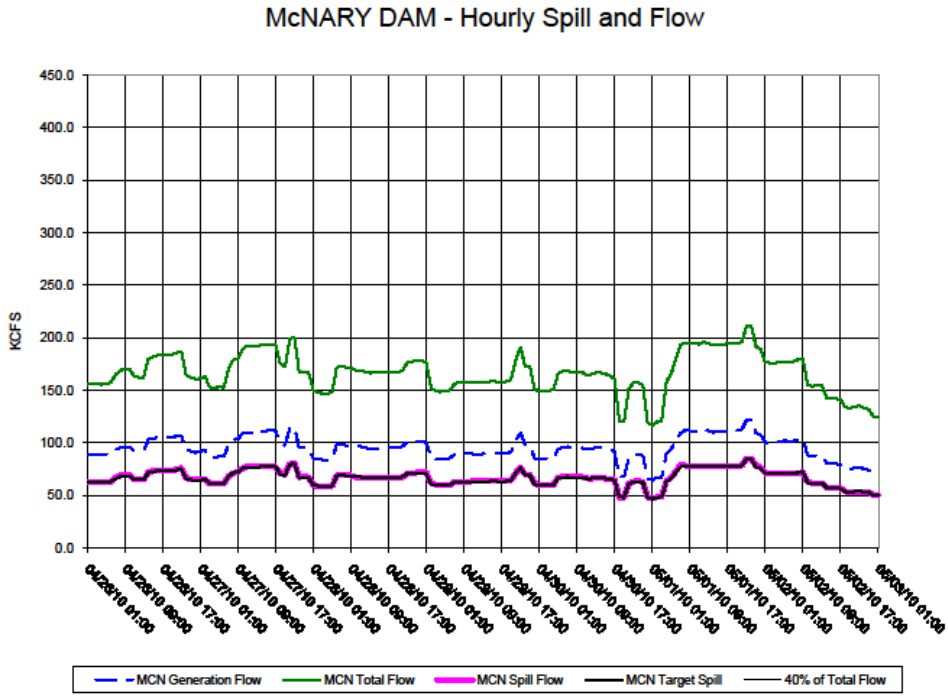
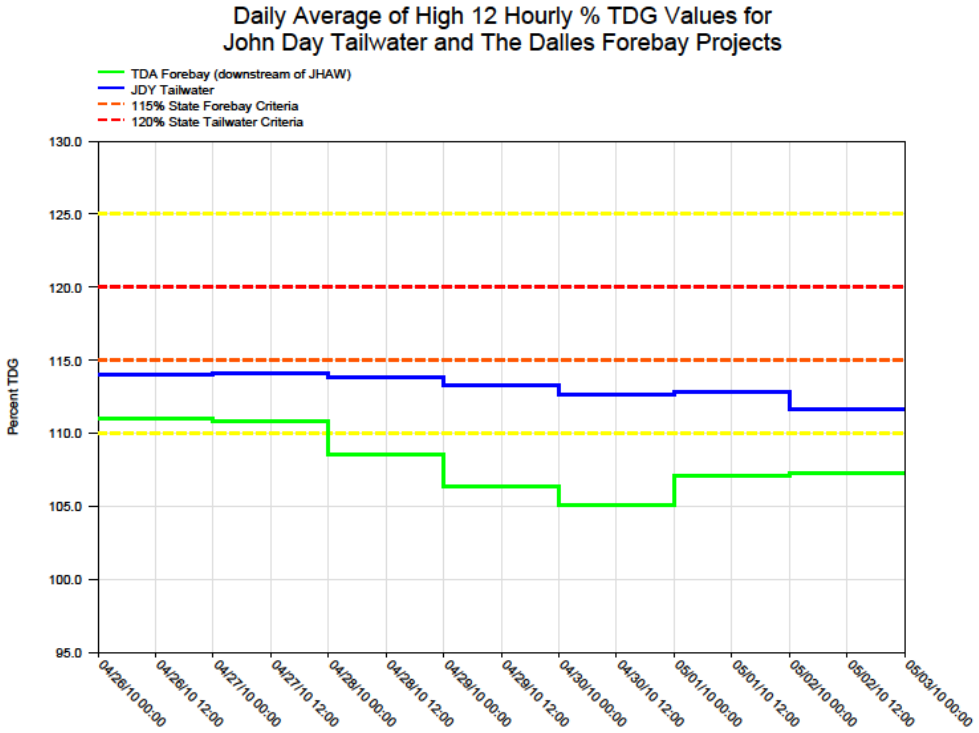

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/26/10 01:00
04/26/10 09:00
04/26/10 17:00
04/27/10 01:00
04/27/10 09:00
04/27/10 17:00
04/28/10 01:00
04/28/10 09:00
04/28/10 17:00
04/29/10 01:00
04/29/10 09:00
04/29/10 17:00
04/30/10 01:00
04/30/10 09:00
04/30/10 17:00
05/01/10 01:00
05/01/10 09:00
05/01/10 17:00
05/02/10 01:00
05/02/10 09:00
05/02/10 17:00
05/03/10 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
40% of Total Flow

Figure 34


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

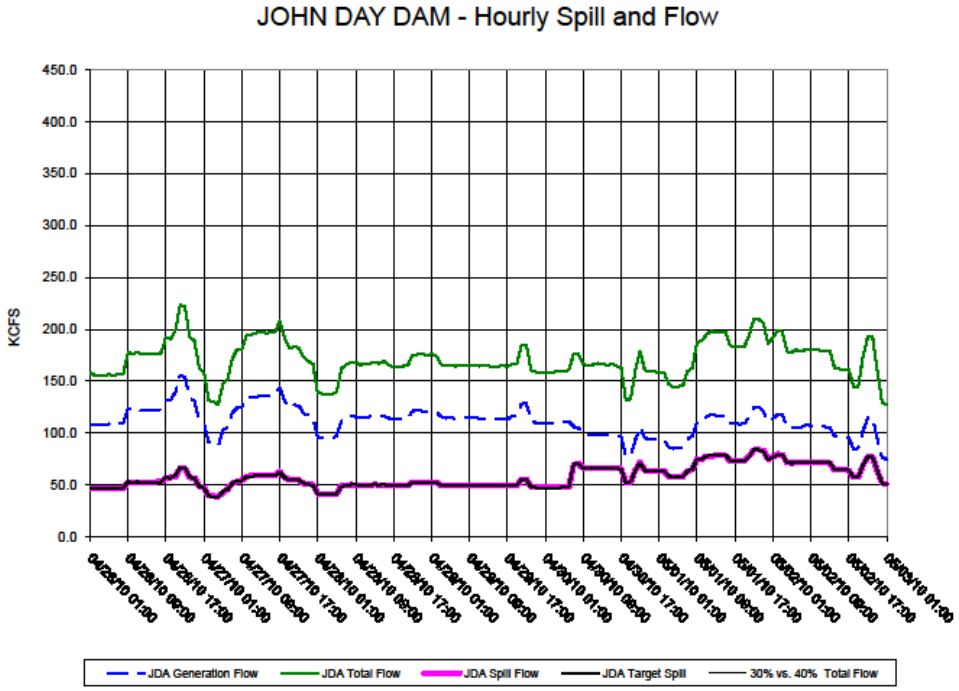
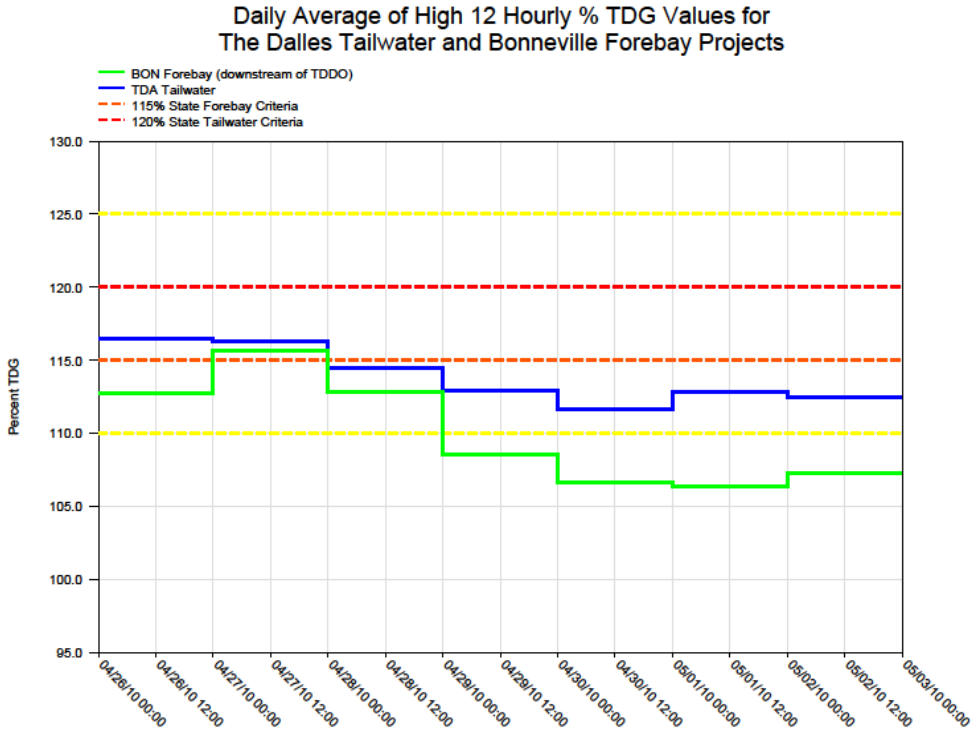

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/26/10 01:00
04/26/10 09:00
04/26/10 17:00
04/27/10 01:00
04/27/10 09:00
04/27/10 17:00
04/28/10 01:00
04/28/10 09:00
04/28/10 17:00
04/29/10 01:00
04/29/10 09:00
04/29/10 17:00
04/30/10 01:00
04/30/10 09:00
04/30/10 17:00
05/01/10 01:00
05/01/10 09:00
05/01/10 17:00
05/02/10 01:00
05/02/10 09:00
05/02/10 17:00
05/03/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 35


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00

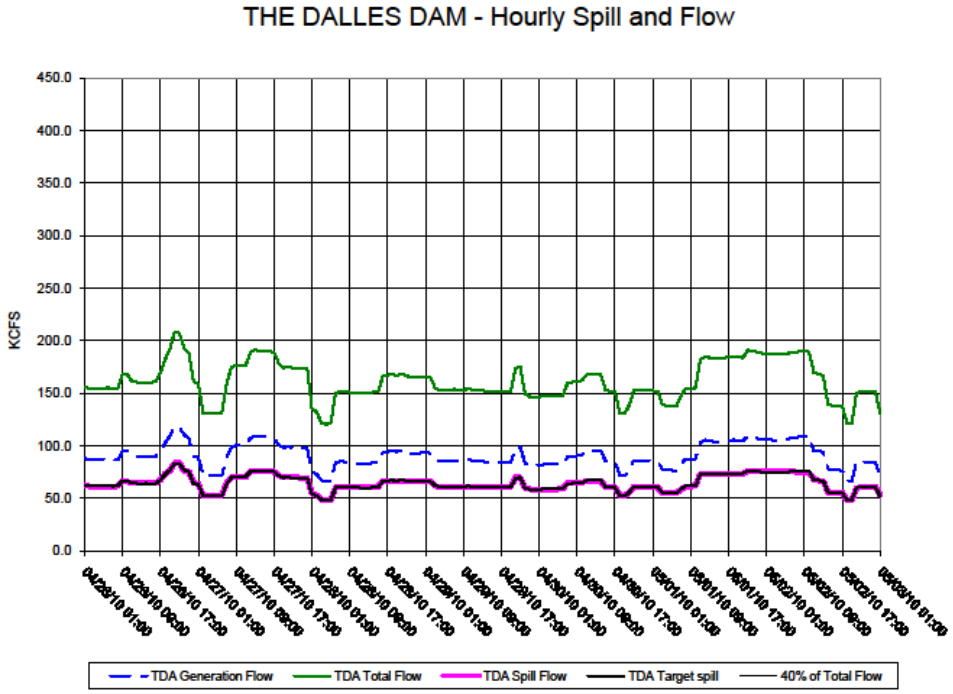
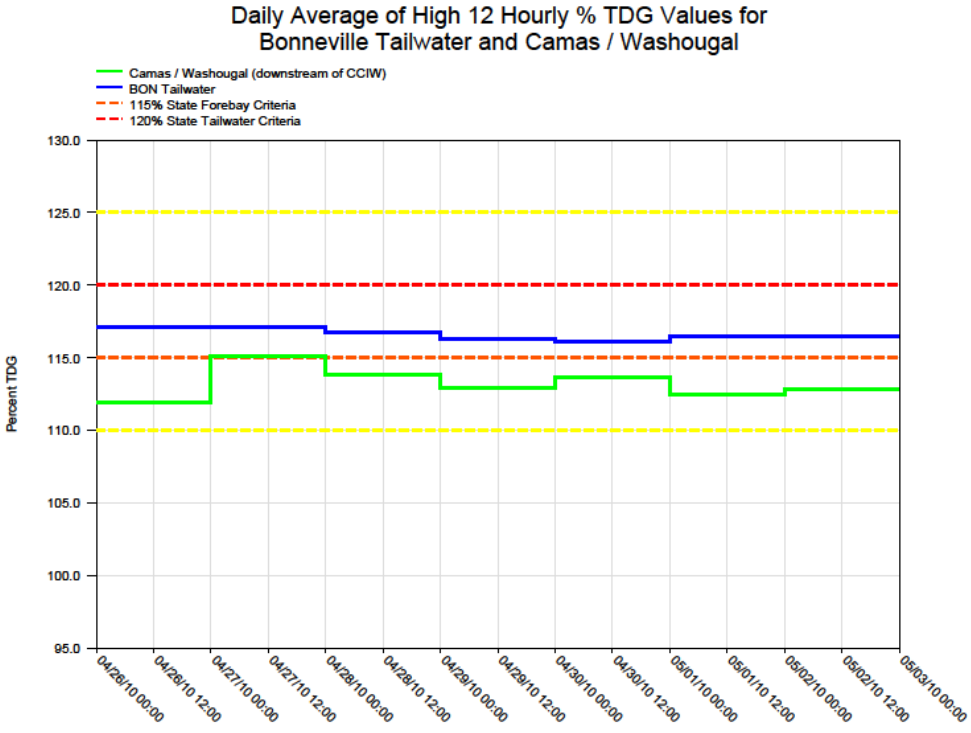
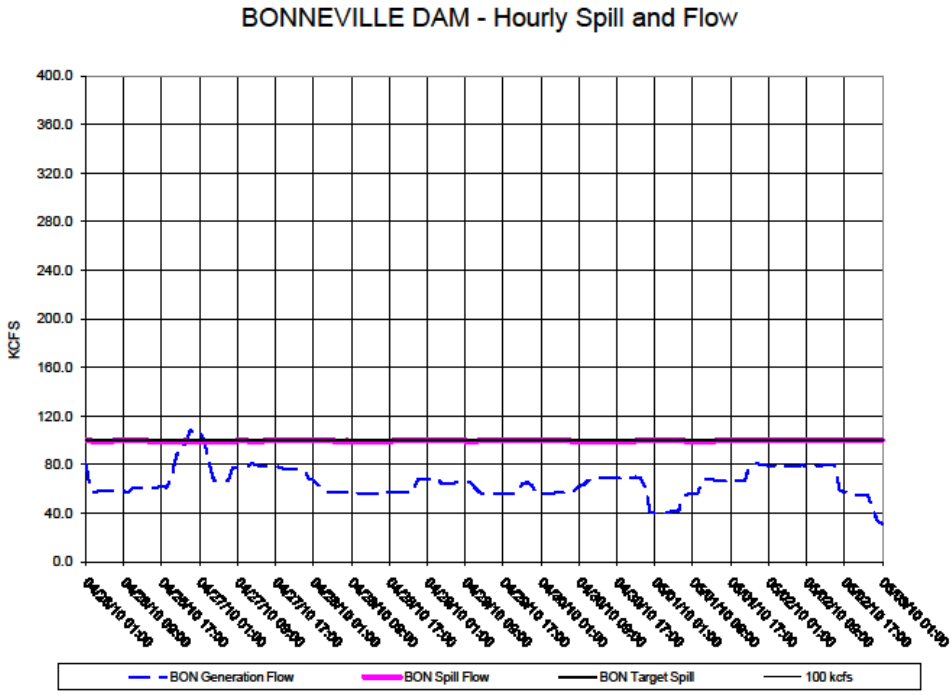

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
04/26/10 00:00
04/26/10 12:00
04/27/10 00:00
04/27/10 12:00
04/28/10 00:00
04/28/10 12:00
04/29/10 00:00
04/29/10 12:00
04/30/10 00:00
04/30/10 12:00
05/01/10 00:00
05/01/10 12:00
05/02/10 00:00
05/02/10 12:00
05/03/10 00:00


BONNEVILLE DAM - Hourly Spill and Flow
KCFS
400.0
360.0
320.0
280.0
240.0
200.0
160.0
120.0
80.0
40.0
0.0
BON Generation Flow
BON Spill Flow
BON Target Spill
100 kcfs

Average Percent TDG for Highest 12-Hours: April 3 – May 2, 2010

Date	FIXED MONITORING STATIONS																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
04/03/2010	101.4	111.9	101.1	108.5	101.7	116.6	101.9	113.8	102.4	101.7	101.8	104.2	103.5	103.7	103.3	111.3	105.2
04/04/2010	100.4	111.6	101.4	109.0	102.3	117.8	102.9	114.0	103.8	102.7	104.2	101.9	104.6	104.2	104.1	112.2	104.8
04/05/2010	99.7	110.3	101.5	108.3	102.1	114.5	102.3	112.3	103.3	102.5	103.7	103.8	104.1	103.3	104.3	113.1	106.1
04/06/2010	98.8	111.9	100.0	107.7	100.5	114.7	100.9	112.8	101.6	101.1	101.7	105.0	102.3	102.5	103.0	112.6	105.3
04/07/2010	99.3	113.2	99.8	108.7	100.2	112.3	102.4	110.7	102.7	101.9	101.8	101.9	102.7	103.6	103.4	112.7	108.1
04/08/2010	100.4	112.7	100.3	108.1	102.2	111.7	104.6	109.6	103.9	102.6	101.8	101.6	103.7	104.3	103.6	113.3	106.7
04/09/2010	99.3	114.0	99.3	108.7	102.9	113.5	105.9	112.1	102.9	102.3	101.1	101.1	102.0	103.2	102.8	113.4	109.0
04/10/2010	100.8	112.5	101.0	110.0	104.8	116.2	108.0	113.8	104.0	114.7	102.8	111.4	103.1	111.7	104.1	115.4	107.8
04/11/2010	101.6	114.7	102.6	110.3	105.4	113.0	109.5	113.6	105.8	114.8	104.8	111.0	105.6	112.3	106.1	115.0	115.3
04/12/2010	102.3	113.8	104.2	110.1	106.3	112.3	109.4	111.1	106.5	114.6	104.8	111.2	108.7	113.3	106.3	113.4	114.6
04/13/2010	102.1	112.8	104.1	110.2	105.6	115.4	108.7	112.8	105.0	114.3	102.9	111.3	109.1	113.9	109.6	113.4	115.3
04/14/2010	101.2	111.7	104.0	110.3	105.1	115.1	109.6	114.1	105.7	114.4	103.6	109.9	108.1	113.8	109.8	113.6	117.9
04/15/2010	101.5	112.7	104.4	111.0	106.4	113.4	111.0	114.4	106.3	114.2	103.3	109.5	109.1	113.5	110.5	113.6	118.6
04/16/2010	102.9	112.6	105.6	111.9	107.7	117.2	111.4	114.0	108.1	114.5	103.7	109.4	110.1	114.2	111.5	113.8	118.4
04/17/2010	101.7	112.5	107.8	112.4	107.7	117.4	111.6	113.4	107.8	114.7	103.5	109.2	109.6	113.9	112.4	113.8	118.7
04/18/2010	101.9	112.3	110.5	112.8	109.2	118.0	115.2	114.3	109.4	115.2	105.4	109.7	109.8	114.0	112.5	113.7	118.2
04/19/2010	103.9	112.0	114.4	113.2	111.0	118.3	116.5	114.4	112.8	115.2	106.7	112.9	111.4	115.1	113.0	113.4	118.0
04/20/2010	104.2	111.7	114.7	113.4	111.8	117.1	117.7	113.9	111.2	116.2	107.6	113.8	110.6	115.0	112.6	114.1	116.4
04/21/2010	103.3	111.6	112.5	112.1	112.3	117.2	117.0	114.6	110.3	114.8	107.2	114.0	107.4	113.3	108.4	115.3	111.0
04/22/2010	102.3	110.4	110.3	111.5	111.2	116.5	114.3	115.5	109.2	115.4	106.2	114.1	105.7	112.9	105.7	116.1	111.6
04/23/2010	100.9	109.8	108.7	111.4	109.7	118.7	111.5	115.9	107.5	115.9	105.7	113.8	108.5	114.7	107.1	116.9	113.2
04/24/2010	99.7	109.9	107.1	110.4	109.2	118.4	111.2	115.5	106.5	116.2	105.2	113.9	108.5	114.3	108.2	116.4	111.0
04/25/2010	99.0	109.8	106.3	110.0	109.6	118.9	111.0	115.2	105.8	116.1	105.1	113.8	109.2	115.3	111.3	116.9	115.0
04/26/2010	102.7	110.8	107.3	112.1	110.9	119.4	113.6	114.6	108.9	116.4	106.8	114.0	111.0	116.5	112.8	117.1	111.9
04/27/2010	104.2	111.5	108.1	112.5	111.7	119.1	115.6	114.6	110.6	115.9	107.2	114.1	110.8	116.3	115.6	117.1	115.1
04/28/2010	103.5	110.8	107.0	111.0	110.3	113.1	114.9	114.4	110.2	116.4	106.1	113.8	108.5	114.5	112.8	116.8	113.8
04/29/2010	102.9	110.2	106.2	109.6	107.7	116.4	112.4	115.2	107.3	116.2	105.0	113.3	106.4	113.0	108.6	116.3	112.9
04/30/2010	101.0	110.2	104.5	108.8	105.2	117.6	108.2	114.0	104.3	116.3	103.4	112.6	105.0	111.7	106.6	116.1	113.6
05/01/2010	100.2	110.1	104.1	109.2	105.8	114.9	108.2	112.8	104.4	115.0	103.4	112.8	107.1	112.8	106.3	116.5	112.5
05/02/2010	100.1	110.6	103.8	108.6	106.2	115.9	108.8	114.4	104.2	115.5	102.1	111.7	107.3	112.4	107.3	116.5	112.8

Generated: Monday May 3, 2010

Number of hours of data reported in a given day

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

Big, bold, red text denotes %TDG Instances.

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

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

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
May 2010

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

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the U.S. District Court of Oregon April 21, 2010 Order adopting the Spring Fish Operations Plan (2010 Spring FOP). The 2010 Spring FOP and its Addendum describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring fish migration season, generally April through June. To the extent Corps project operations are not specified in the 2010 Spring FOP, the FCRPS operations will be consistent with the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2010 Water Management Plan (WMP), WMP seasonal updates, and the 2010 Fish Passage Plan (FPP).

The Corps' May 2010 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (%TDG) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2010 Spring FOP in May.

Data Reporting:

I. For each project providing fish passage operations, this report contains two graphs per operational week[1] for May displaying the performance of the spill program as follows:

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

The weekly graphs begin on May 3 and end on May 30 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

[1] Operations are implemented from Monday through Sunday.

Each figure represents one week of operation for a project. The graphs start at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on May 3 for the lower Snake River and lower Columbia River projects.

May 3 – May 9	Figures 1 – 8
May 10 – May 16	Figures 9 – 16
May 17 – May 23	Figures 17 – 24
May 24 – May 30	Figures 25 – 32

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

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

B. Lower Graph: Shows the hourly flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2010 Spring FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Bonneville (75 kcfs) dam.

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

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

General Implementation Remarks:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described below. When spill levels briefly deviate below or above the level specified in the 2010 Spring FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The May 2010 Spill Variance Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the May 2010 Spill Variance Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2010 Spring FOP level of spill while also avoiding exceeding the %TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. The low flow conditions that occurred in the lower Snake and Columbia rivers during May resulted in some projects spilling the available inflow above minimum generation, which was less than the target spill level. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not account for this volume of water. However, the actual spill volume remains constant. These variances are recorded in the May 2010 Spill Variance Table for Little Goose under the variance type "Navigation."

Also it is important to note that actual spill levels at Corp's projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2010 Spring FOP and the RCC spill priority list, which defines the projects' %TDG spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2010 Spring FOP describes project operations during "Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the May 2010 Spill Variance Report Table will replace "Rapid Load Changes" to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These "Transmission Stability" issues occur because projects must be

available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and following the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary by more than the ± 1% requirement or other ranges specified in the 2010 Spring FOP than other hours.

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

May Operations:

Columbia Basin inflows during May continued to be below normal[2]. Consequently, some projects were required to operate according to the low flow provisions of the 2010 Spring FOP by implementing minimum generation resulting in spill levels less than the targets identified in Table 2 of the 2010 Spring FOP. All remaining flow above minimum generation was spilled in accordance with the 2010 Spring FOP.

During the May reporting period, the daily 2010 Spring FOP and Addendum planned spill operations for fish were as follows:

1. Lower Granite Dam - The hourly target spill was a fixed quantity of 20 kcfs 24-hours per day.
2. Little Goose Dam - The hourly target spill was 30 percent of total flow for 24-hours per day.
3. Lower Monumental Dam - The hourly target spill was to the %TDG spill cap for 24-hours per day.
4. Ice Harbor Dam - The hourly target spill alternated every two days between 45 kcfs daytime – and %TDG spill cap at night-time, vs. 30 percent of total flow for 24-hours.
5. McNary Dam - The hourly target spill was 40 percent of total flow for 24-hours per day.
6. John Day Dam - The hourly target spill alternated between 30 percent vs. 40 percent of total flow for 24-hours due to the two treatment spring spill test.
7. The Dalles Dam - The target spill was 40 percent of total flow for 24-hours per day.
8. Bonneville Dam - The hourly target spill was 100 kcfs 24-hours per day.

As noted above, streamflows during the 2010 spring season have been sufficiently low that the low flow provisions of the 2010 Spring FOP were implemented at several projects during the

[2] NOAA River Forecast Center's Runoff Processor indicates 63 percent of normal at Lower Granite Dam and 65 percent of normal at The Dalles Dam for May 2010.

month of May. Table 1 shows the number of days each project was in a low flow condition during the reporting period.

Table 1: Number of Days Projects Generated at Minimum Levels and Spilled Remainder

Project	**Number of Days**[3]
Lower Monumental	2
Ice Harbor	12
Total	**14**

***Operational Adjustments**:*

1. Little Goose Dam:
   On May 13, in accordance with spillway weir (SW) operating criteria identified in the 2010 FPP, the Corps changed the position of the SW from the HI crest (7.2 kcfs discharge) to LO crest (11.2 kcfs discharge) position. This position was maintained until May 18. During the crest height change on May 13, 9,572 adult Chinook passed Little Goose Dam - increasing from 1,622 adults passing on May 12. Previously, the cumulative 2010 spring adult Chinook passage at Little Goose Dam (from April 1 to May 12) was 34,719, in contrast to 53,094 adult Chinook passing at Lower Monumental Dam for this same time period. This suggested a delay in adult fish passage at Little Goose Dam, which appeared to improve with the adjustment noted above. It was thought that the uniform pattern that occurs during a change in position of the Little Goose SW may improve tailrace conditions to facilitate the adults ability to find the ladder entrance; therefore on May 17, regional salmon managers requested that the Corps provide a test operation consistent with the May 13 HI to LO SW crest change operation to determine if a similar increase in adult passage at Little Goose Dam might reoccur.

   Following coordination with FPOM on May 18, the Corps implemented the recommended operation. On May 18, 9863 adult Chinook passed Little Goose Dam. On May 24, FPOM discussed options for operating the SW to optimize passage conditions for both adults and juveniles. FPOM recommended reverting back to the FPP operation with the HI crest configuration to provide improved passage conditions for juveniles. The Corps implemented this operation as recommended at 0800 hours on May 25. Regional salmon managers then suggested taking the SW out of service to assess fish passage under this condition. The Corps implemented this operation beginning at 1400 hours on May 25 until 1600 hours on May 27. Data collected on adult Chinook passage during this period appears to verify that the uniform pattern is beneficial to adult passage.[4] The 2010 FPP operation resumed on May 27 and was maintained for the remainder of the month. Although several SW configuration changes were made during this period, the Corps maintained the 30% spill operation called for in the 2010 Spring FOP and Addendum.

[3] A day is counted as 6-hours or more that are minimum generation and spilling remainder.
[4] Adult counts at Little Goose Dam: May 25 - 2,425; May 26 - 1,158; and, May 27 - 468.

2. Lower Snake River Juvenile Transportation Operations:
   Consistent with the transportation operations included in the Addendum to the 2010 Spring FOP, the Corps, in coordination with NOAA and regional sovereigns, through the TMT, determined the following start dates for transportation initiation at the three collector projects while continuing FOP specified spill: Lower Granite Dam, April 24; Little Goose, May 2; and Lower Monumental, May 5. Transportation operations began on the dates noted and continued throughout the month of May. In accordance with Appendix B of the 2010 FPP, every other day barging of fish began on May 30 at all three projects due to a decline in the number of fish collected for transportation.

3. Libby Dam:
   Libby Dam operated at minimum outflows for the first part of May. The Corps' May final April-August water supply forecast was above 4800 KAF (4887 KAF), i.e. a Tier 2 condition for Kootenai River white sturgeon and bull trout. In accordance with the USFWS 2006 Libby BiOp and clarified RPA sturgeon operation, the Corps plans to spill up to 10 kcfs above full powerhouse outflows to provide favorable spawning conditions (as determined by the USFWS and sturgeon technical team) in early June. In order to position the reservoir to implement this spill operation, the Corps delayed initiation of VARQ operations, storing an additional volume of 260 KAF. As described in the April monthly report, the changes in the implementation of VARQ and the "flow neutral" operation (release 260 KAF by the end of June) were discussed extensively and agreed to by all TMT representatives. In May, outflow was maintained at 4 kcfs through May 14, and then increased to the minimum bull trout flow of 6 kcfs on May 16. The storage of 260 KAF was completed on May 23 and Libby ramped up to a full VARQ outflow of 14.5 kcfs on May 23, which was continued for the rest of May.

4. Dworshak Dam:
   On May 19, the Corps implemented System Operational Request (SOR) 2010-02, 2010 Dworshak Operation[5]. The objective of the SOR was an increase in outflow at Dworshak Dam to full powerhouse capacity (10-10.5 kcfs) for a three day period during the week of May 17, to increase Snake River flows during the anticipated peak of the hydrograph. Following this operation, Dworshak outflow would be reduced to a level appropriate to achieve refill of Dworshak reservoir by June 30. The SOR was discussed at the May 19 TMT meeting and no objections were raised. The Corps implemented the SOR starting at 0001 hours on May 19 and ended at 2359 hours on May 21. The operation of 1.2 kcfs minimum powerhouse discharge continued at Dworshak on May 22 to target refill by June 30.

5. Priest Rapids Flow Objectives:
   Through weekly coordination at TMT during May, Grand Coulee was drafted below flood control to augment flows at Priest Rapids. The resulting average flows for the month were 119.6 kcfs as compared to the BiOp flow objective of 135 kcfs. The objective was to provide effective fish flows at Priest Rapids while conserving water at Grand Coulee to ensure a refill objective and to avoid a sharp decline in outflows during June.

[5] This SOR was submitted by NOAA Fisheries, U.S. Fish & Wildlife Service, Washington Department Fish & Wildlife, Idaho Department of Fish & Game, Oregon Department of Fish Wildlife, and the Shoshone-Bannock Tribes.

6. BPA Transmission Issue:

   On May 19, BPA experienced a transmission issue resulting from planned transmission maintenance work and an unplanned transmission outage, combined with ongoing grid operations, which unexpectedly led to a limited amount of transmission capacity available to move power. In an effort to minimize possible disruption of operations specified in the 2010 Spring FOP, BPA requested that a two-day block of fish research treatments at John Day and Ice Harbor dams be rearranged. Following coordination with TMT and receiving no objections from any the sovereigns to the proposed modification to rearranging research treatments at either dam, the Corps accommodated the request. At John Day Dam, instead of initiating 30 percent spill on May 20, the Corps continued the 40 percent spill treatment. On May 22, 30 percent spill resumed with the continuation of alternating treatments for the remainder of the month. At Ice Harbor, instead of initiating 30 percent spill on May 20, the Corps continued the gas cap/45 kcfs daytime operation. On May 22, 30 percent spill resumed with the continuation of alternating treatments for the remainder of the month. The accommodation of this request allowed BPA to reduce generation and spill more water during a period when transmission outages were limiting BPA's access to load. No disruption of spill levels specified in the 2010 Spring FOP occurred.

May 2010 Spill Variance Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Additional Spill	5/18/2010	0300-0400	2	Operational Limitations	Hourly spill increased to 21.1 and 21.5 kcfs (above 20 kcfs +/- 1 kcfs range). Spill fluctuated due to physical limits of the spill gate settings.
Little Goose	Reduced % Spill	5/5/2010	0700	1	Navigation	Hourly spill dropped to 28.7% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	5/7/2010	1700	1	Human/Program Error	Hourly spill dropped to 27.8% (below 30.0% +/- 1% range): Malfunctioning computer program delayed receipt of hourly data needed to make timely adjustments. 24-hr average spill was 29.8%.
Little Goose	Reduced % Spill	5/14/2010	1300	1	Navigation	Hourly spill dropped to 28.5% (below 30.0% +/- 1% range): Reduced spill for safe passage of fish barge.
Little Goose	Reduced % Spill	5/24/2010	1400 & 1600	2	Navigation	Hourly spill dropped to 28.8% (below 30.0% +/- 1% range): Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/5/2010	1800-2000	3	Navigation	Hourly spill dropped to 10.8 to 30.4 kcfs (spill cap of 40 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	5/6/2010	1800-1900	2	Navigation	Hourly spill dropped to 16.6 to 21.9 kcfs (spill cap of 40 kcfs). Reduced spill for safe passage of fish barge.

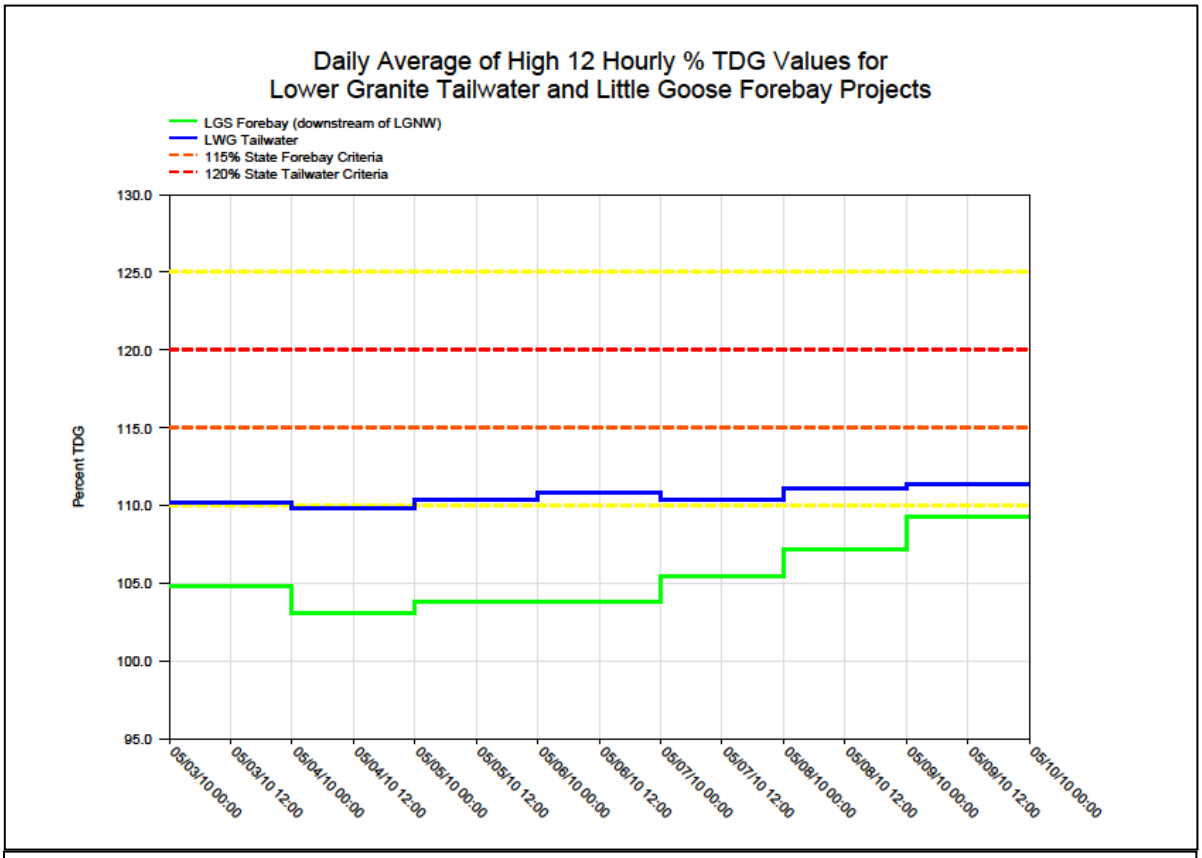
Lower Monumental	**Reduced Spill**	**5/7/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 11.0 to 27.4 kcfs (spill cap of 43 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/8/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 11.4 to 36.3 kcfs (spill cap of 43 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/9/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 14.2 to 22.1 kcfs (spill cap of 35 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/10/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 15.0 to 30.4 kcfs (spill cap of 35 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/11/2010**	**1900-2200**	**4**	**Navigation**	**Hourly spill dropped to 4.1 to 25.4 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/12/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 12.9 to 30.2 kcfs (spill cap of 35 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/13/2010**	**1800-1900**	**2**	**Navigation**	**Hourly spill dropped to 14.5 to 14.9 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/14/2010**	**1900-2000**	**2**	**Navigation**	**Hourly spill dropped to 10.1 to 15.6 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/15/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 4.8 to 24.8 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**

Lower Monumental	**Reduced Spill**	**5/16/2010**	**1800-1900**	**2**	**Navigation**	**Hourly spill dropped to 11.5 to 15.3 kcfs (spill cap of 18 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/17/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 9.9 to 11.6 kcfs (spill cap of 13 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/18/2010**	**1900-2000**	**2**	**Navigation**	**Hourly spill dropped to 7.6 to 12.8 kcfs spill cap of 18 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/19/2010**	**1900-2000**	**2**	**Navigation**	**Hourly spill dropped to 7.5 to 9.4 kcfs (spill cap of 18 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/20/2010**	**2000-2200**	**3**	**Navigation**	**Hourly spill dropped to 13.8 to 22.2 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/22/2010**	**1900-2000**	**2**	**Navigation**	**Hourly spill dropped to 11.8 to 12.3 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/23/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 10.9 to 14.5 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/24/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 12.1 to 23.3 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/25/2010**	**1800-1900**	**2**	**Navigation**	**Hourly spill dropped to 15.0 to 17.1 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**

Lower Monumental	**Reduced Spill**	**5/26/2010**	**1800-2000**	**3**	**Navigation)**	**Hourly spill dropped to 12.4 to 25.7 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/27/2010**	**1900-2000**	**2**	**Navigation**	**Hourly spill dropped to 8.5 to 18.8 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/28/2010**	**1800-1900**	**2**	**Navigation**	**Hourly spill dropped to 14.2 to 22.8 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Lower Monumental	**Reduced Spill**	**5/30/2010**	**1800-2000**	**3**	**Navigation**	**Hourly spill dropped to 14.4 to 24.8 kcfs (spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.**
Ice Harbor	**Reduced % Spill**	**5/4/2010**	**0700**	**1**	**Human/Program Error**	**Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): Malfunctioning computer program delayed receipt of hourly data needed to make timely adjustments.**
Ice Harbor	**Reduced % Spill**	**5/15/2010**	**1800**	**1**	**Navigation**	**Hourly spill decreased to 28.6% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.8%.**
McNary	**Additional % Spill**	**5/12/2010**	**1700**	**1**	**Human/Program Error**	**Hourly spill increased to 41.2% (above 40.0% +/- 1% range): Target spill was set at 83 kcfs but actual spill was 90 kcfs because of a computer error. 24 hr avg. spill was 40.2%.**

McNary	**Additional % Spill**	**5/25/2010**	**0900**	**1**	**Maintenance**	**Hourly spill increased to 43.1% (above 40.0% +/- 1% range): Project was performing maintenance which interfered with designated spill levels.**

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
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05/09/10 12:00
05/10/10 00:00

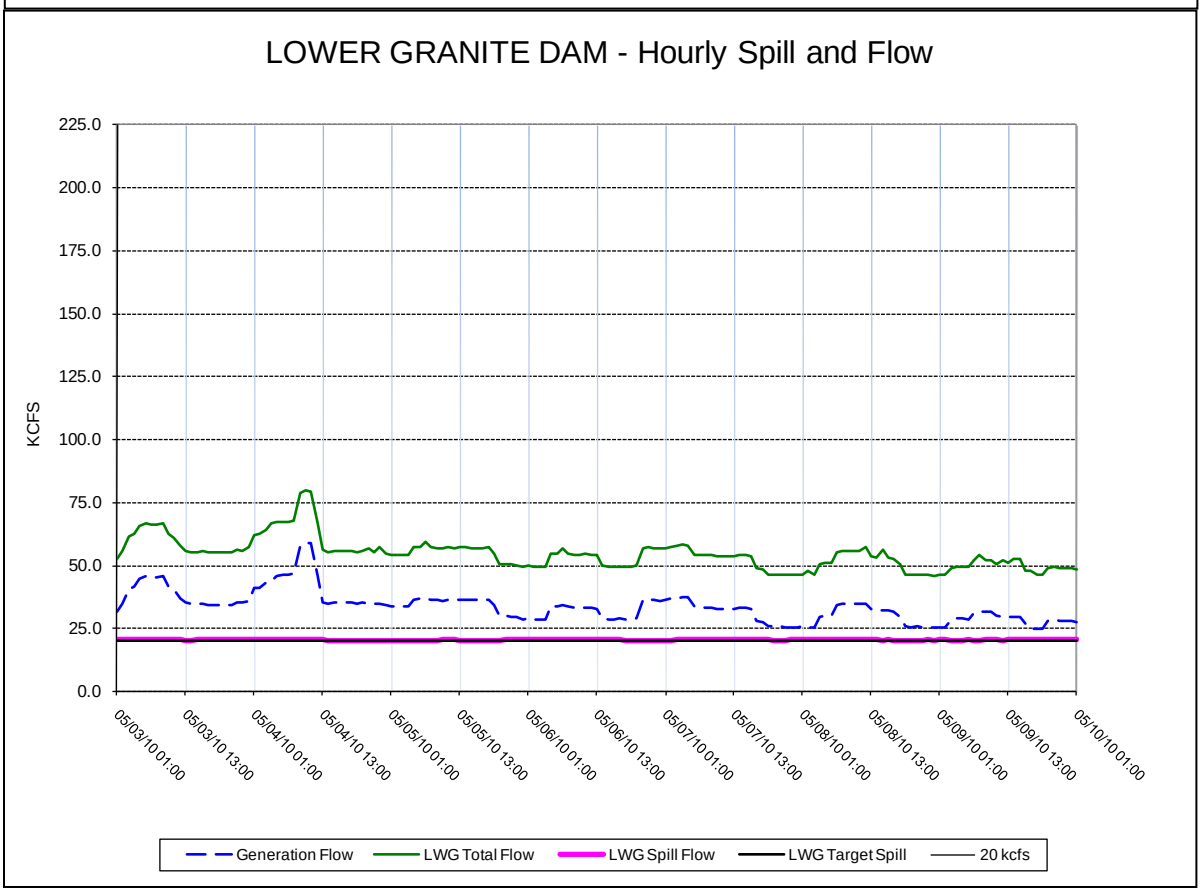
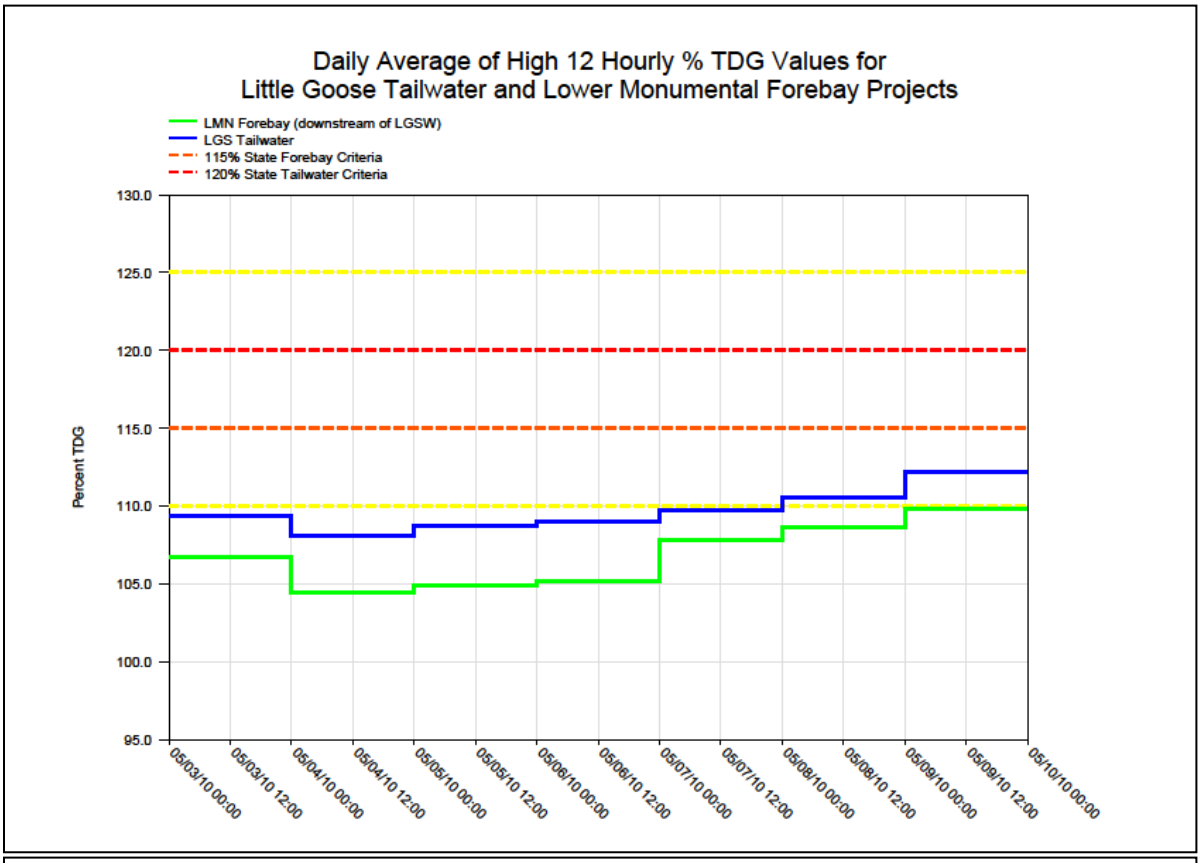

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

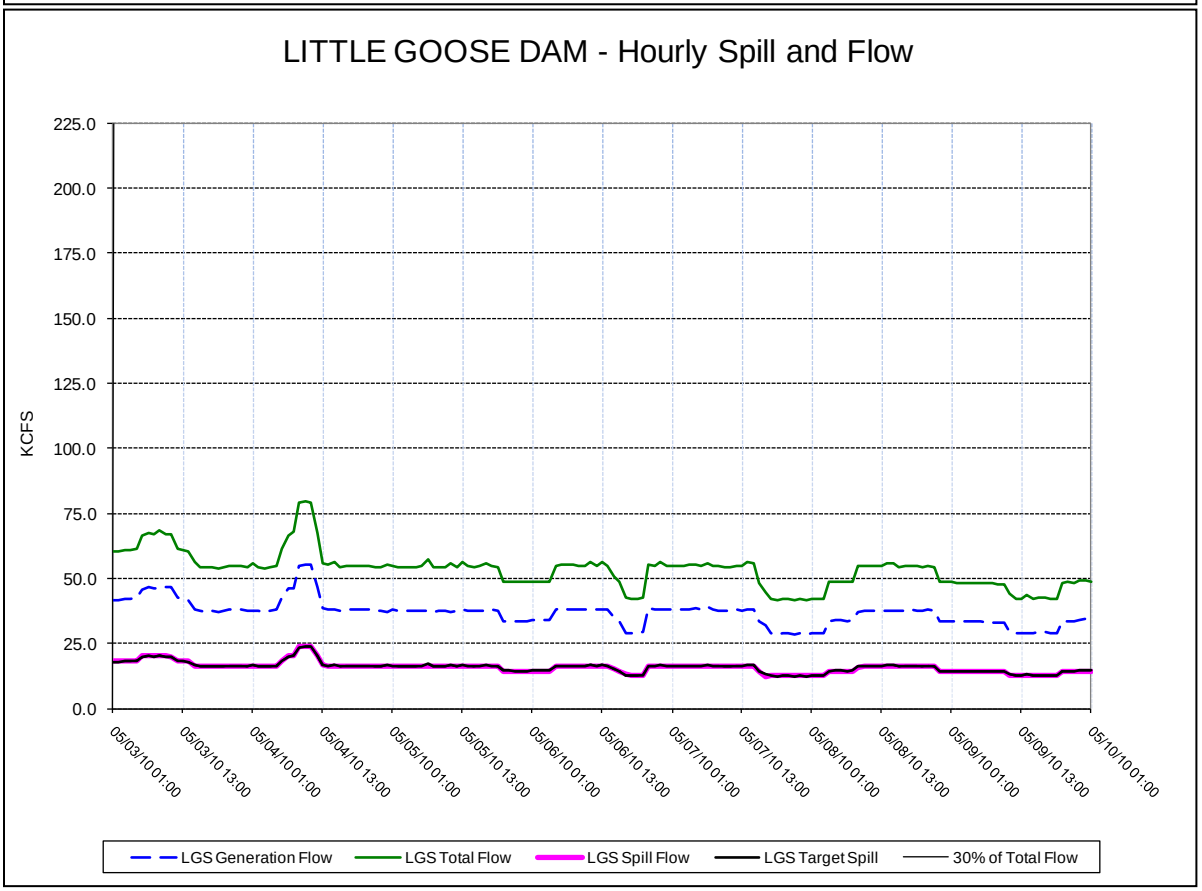
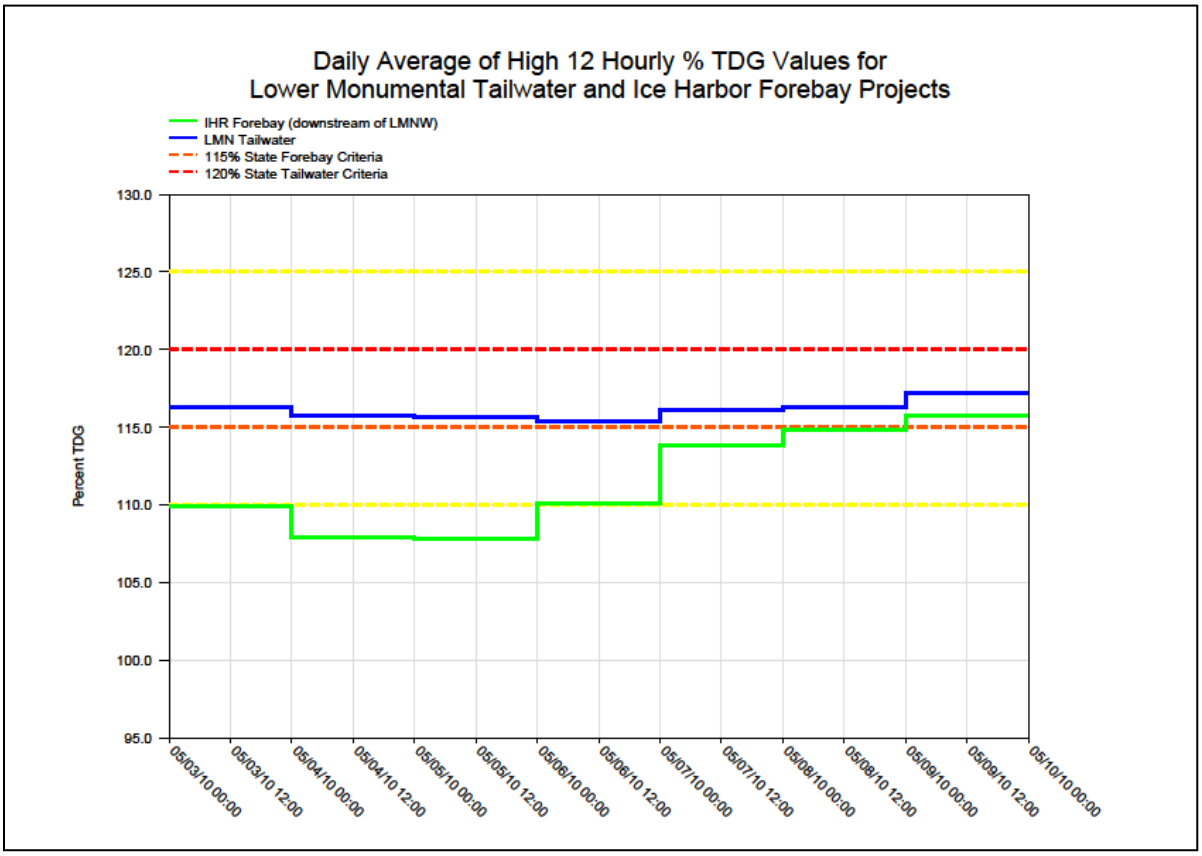

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

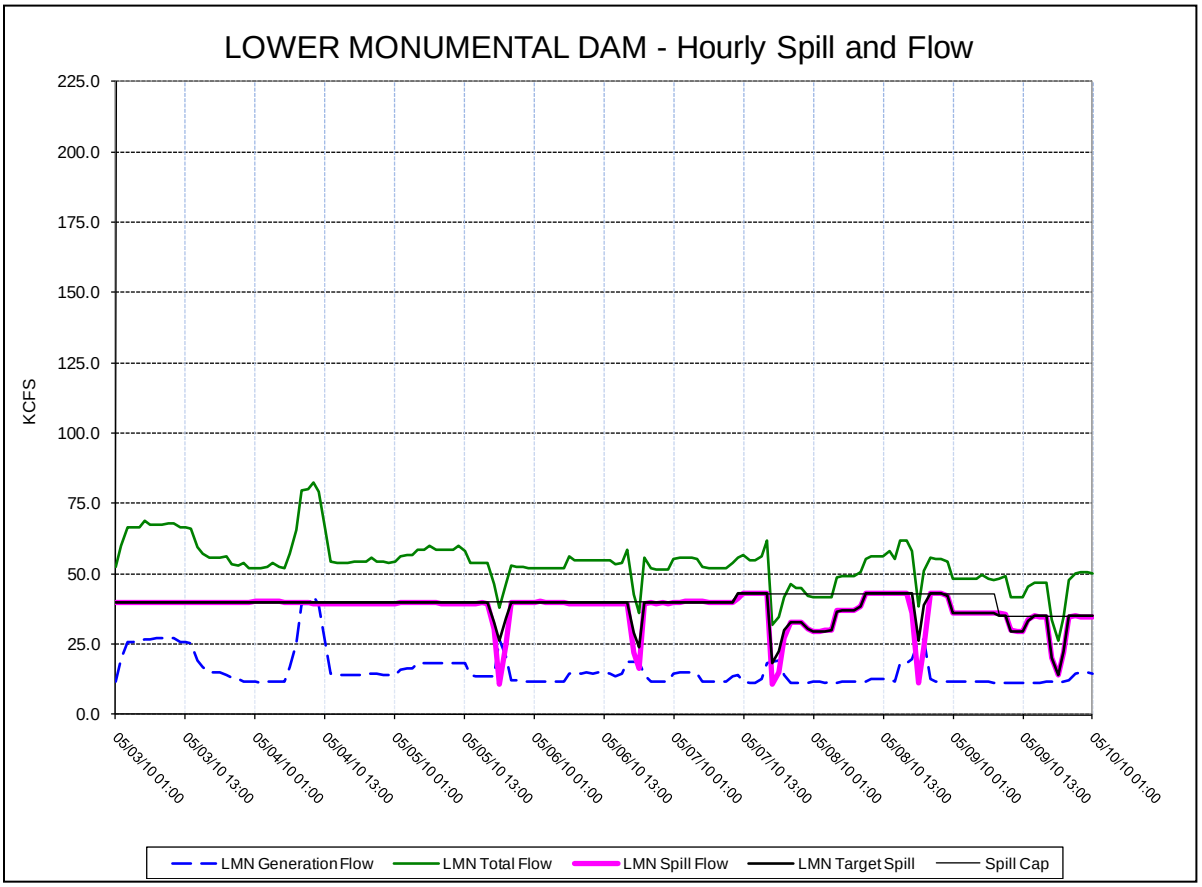
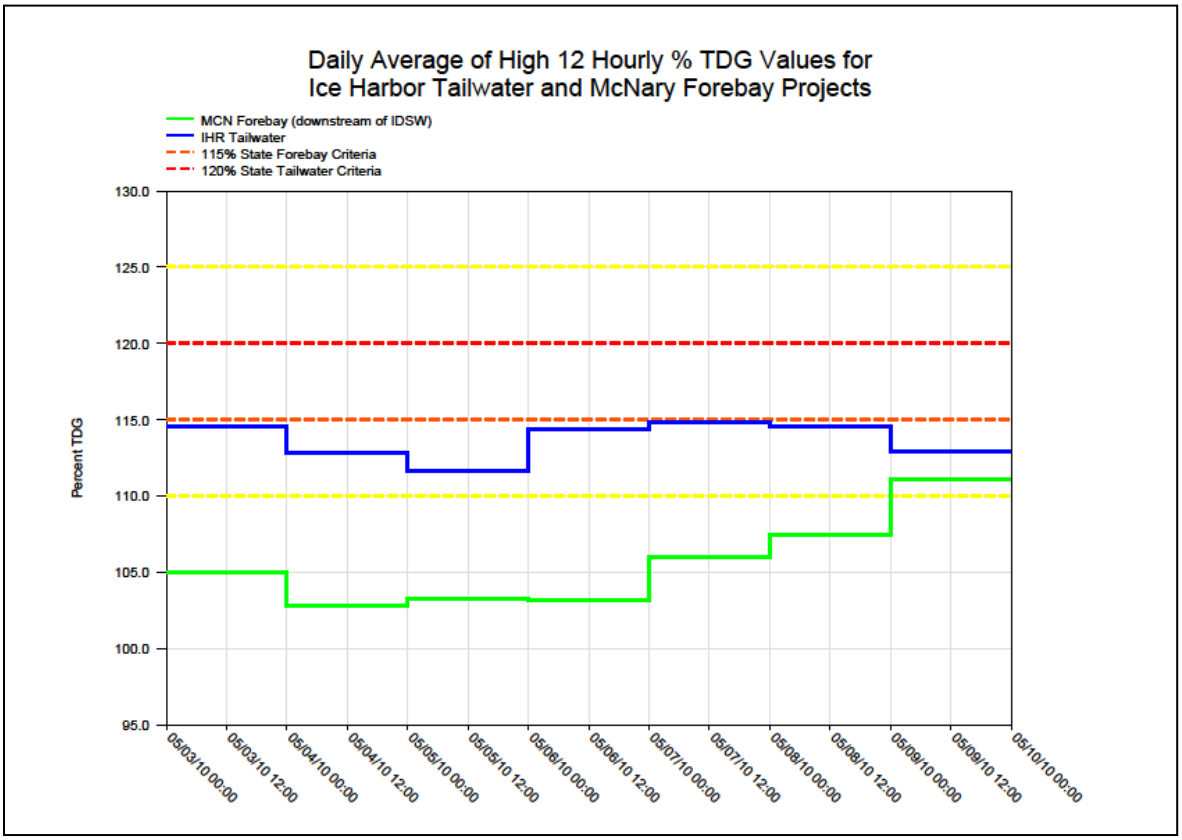

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

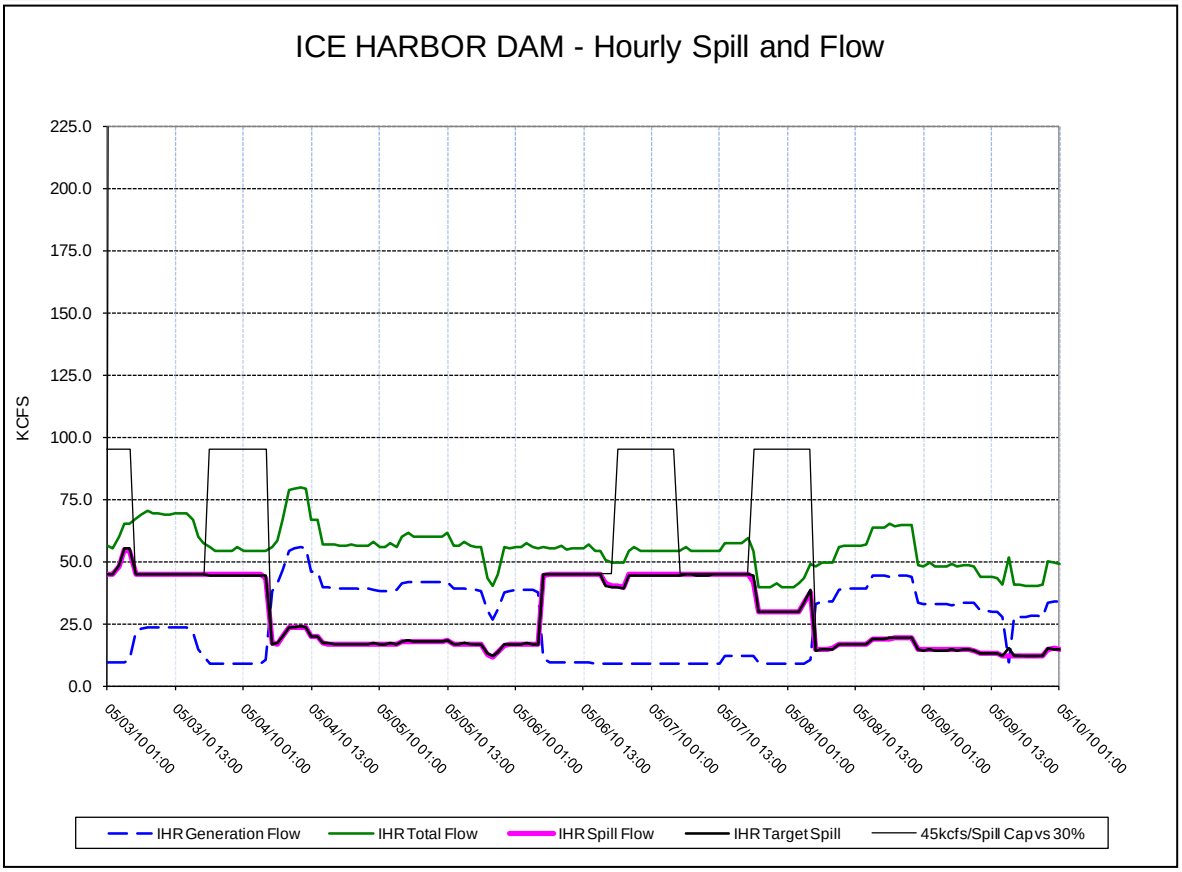
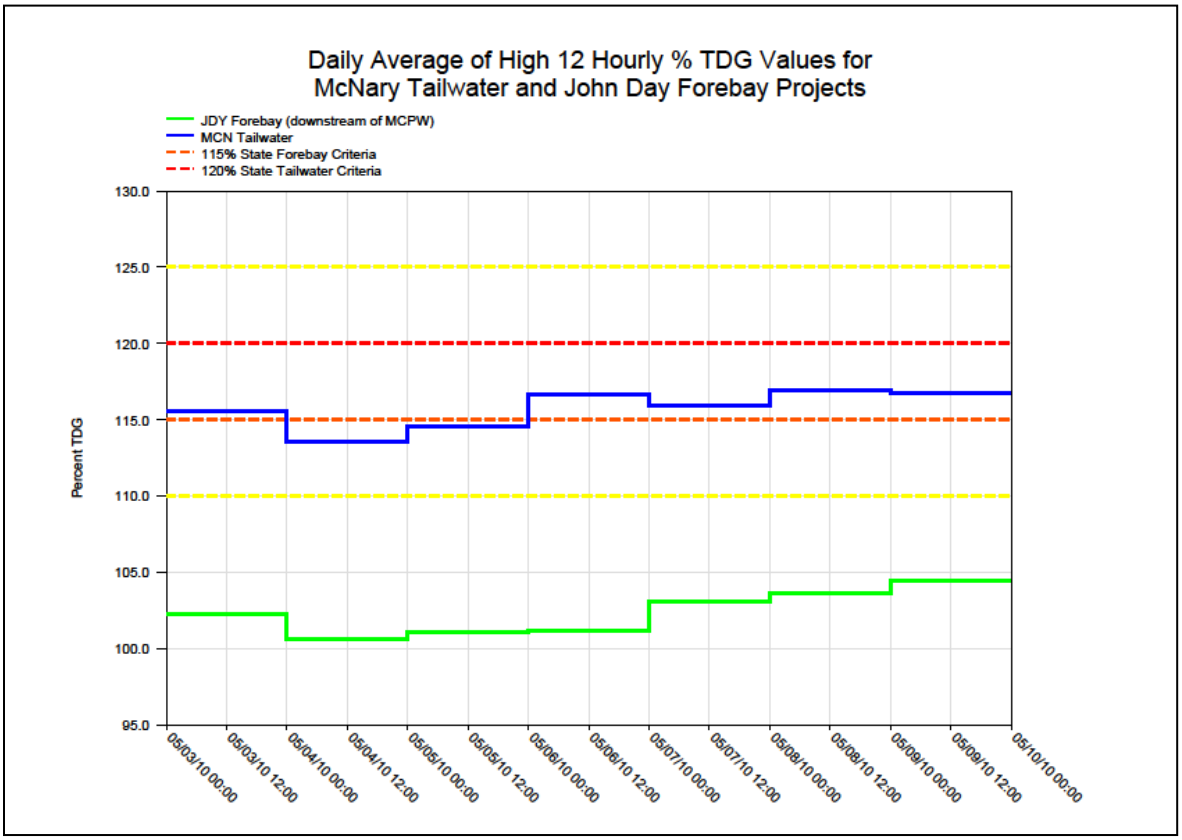

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

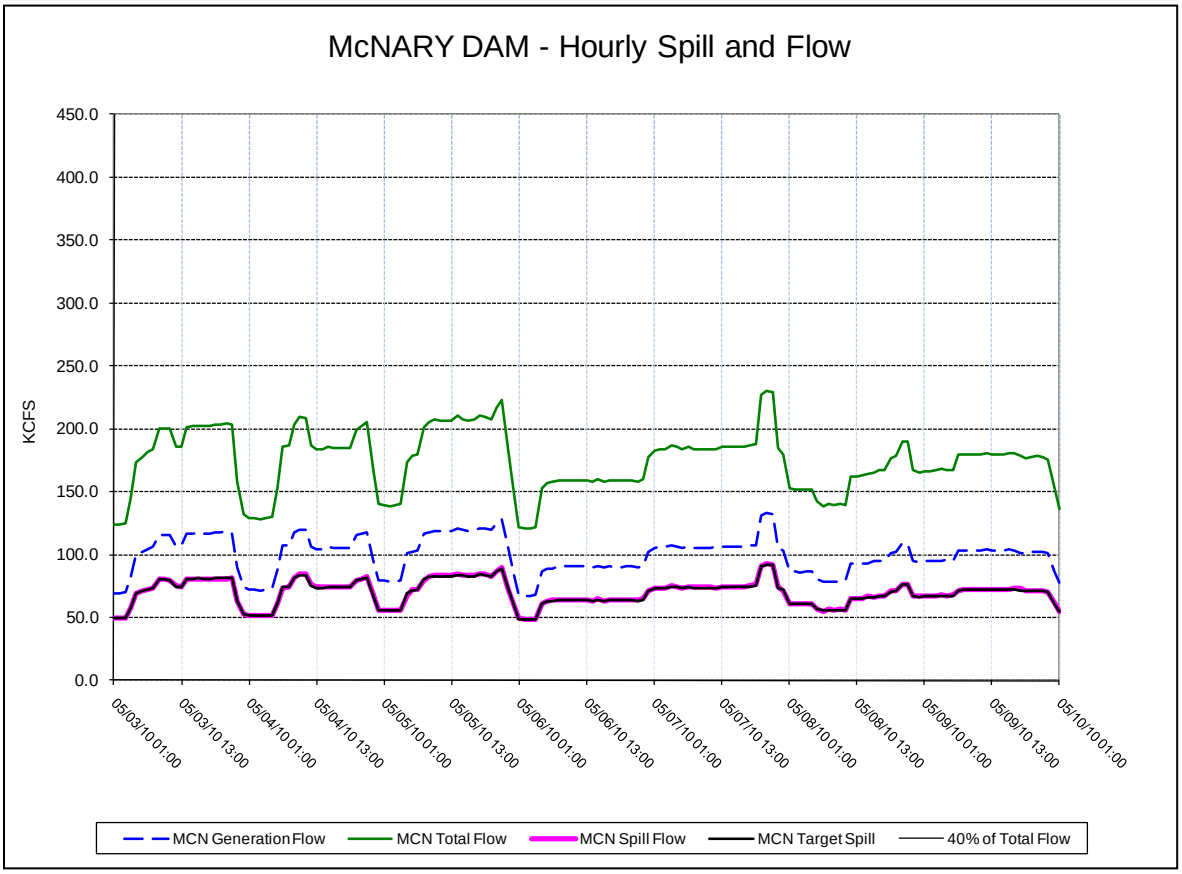
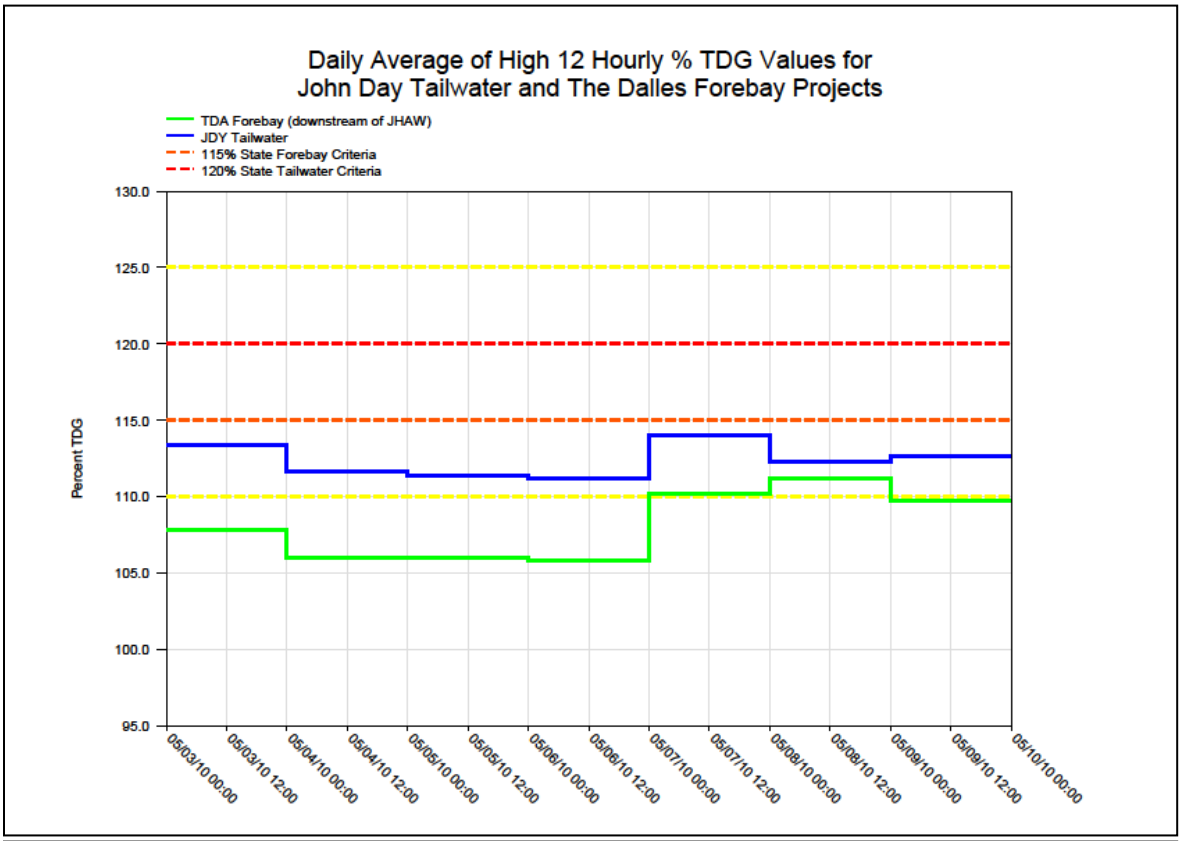

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

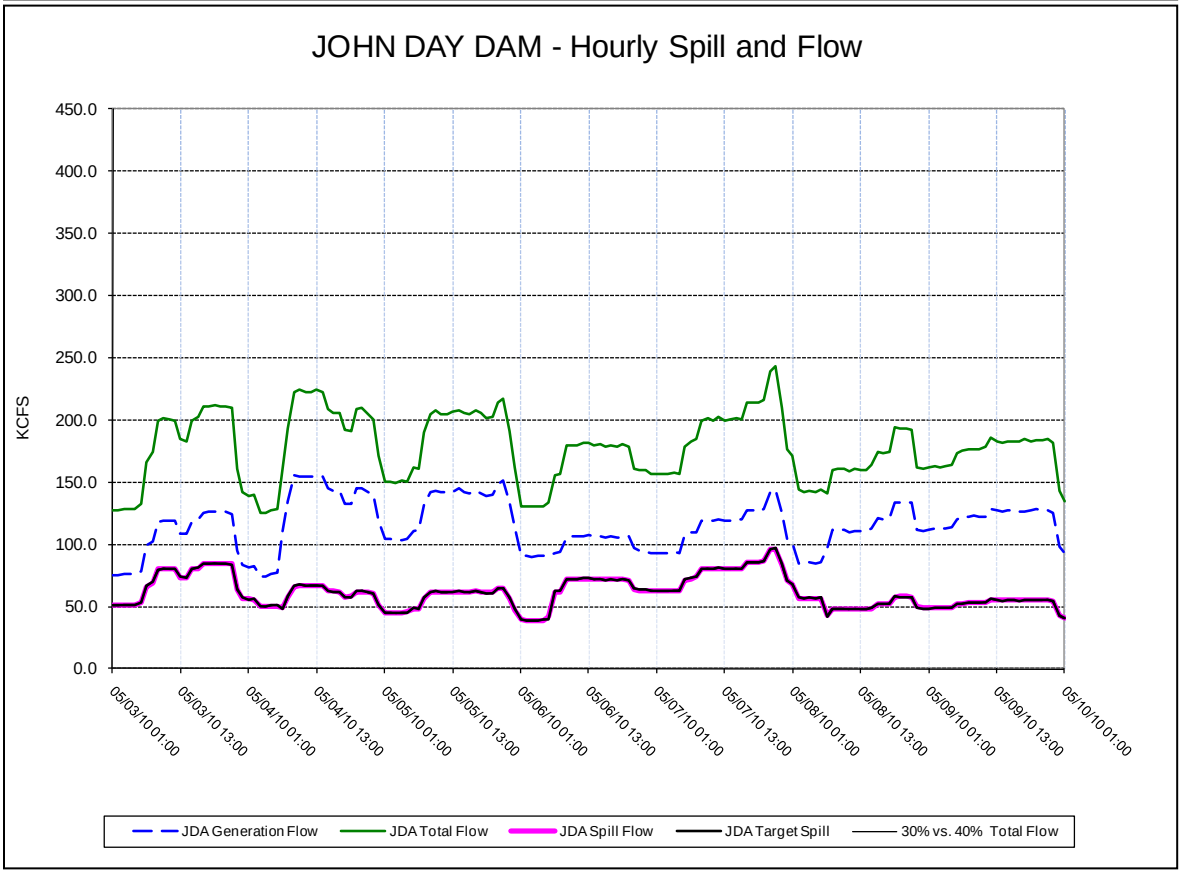
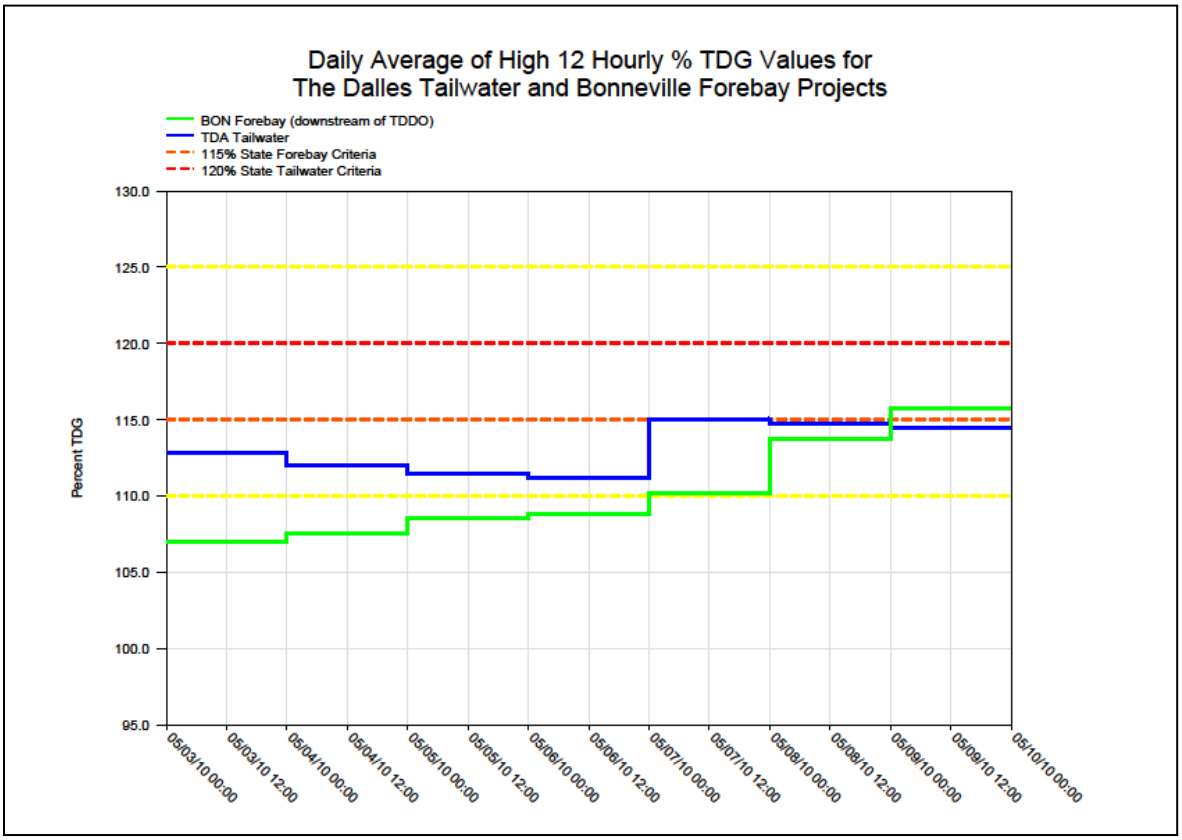

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

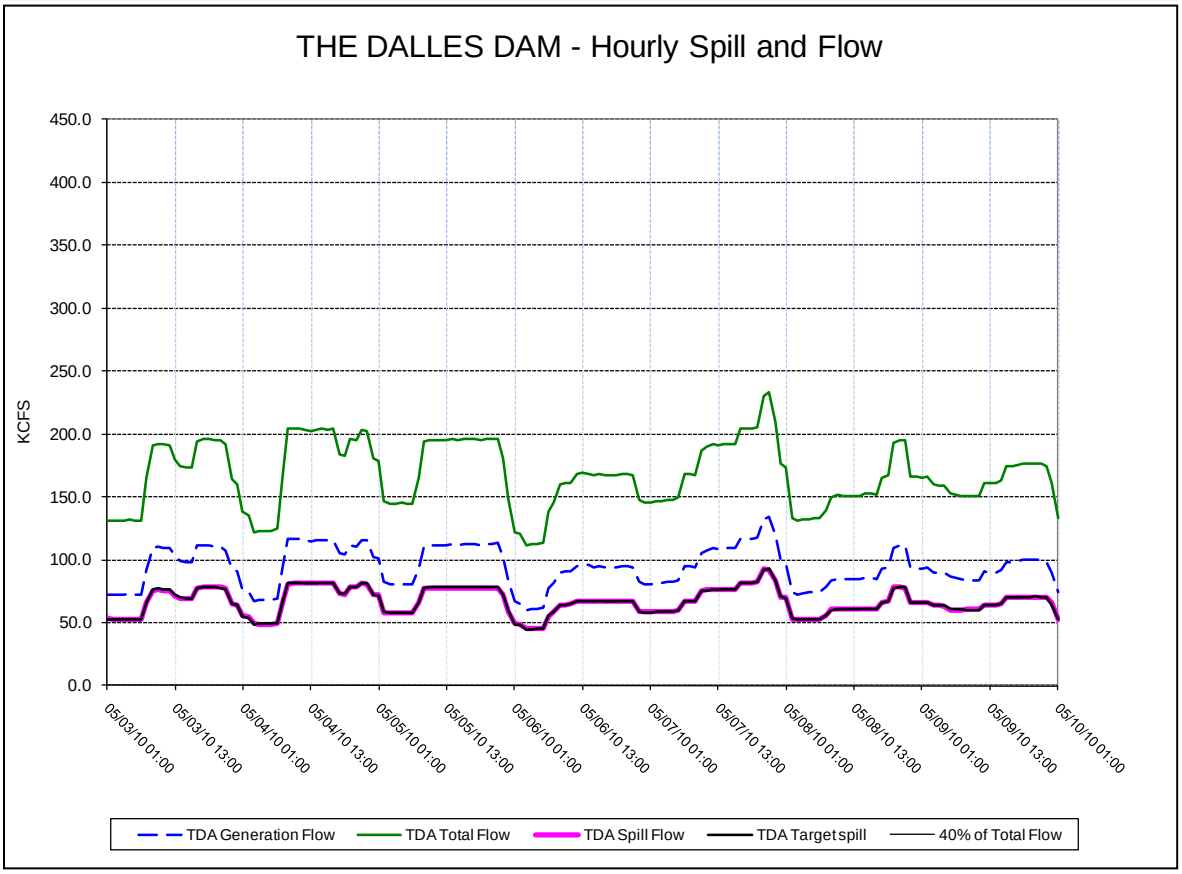
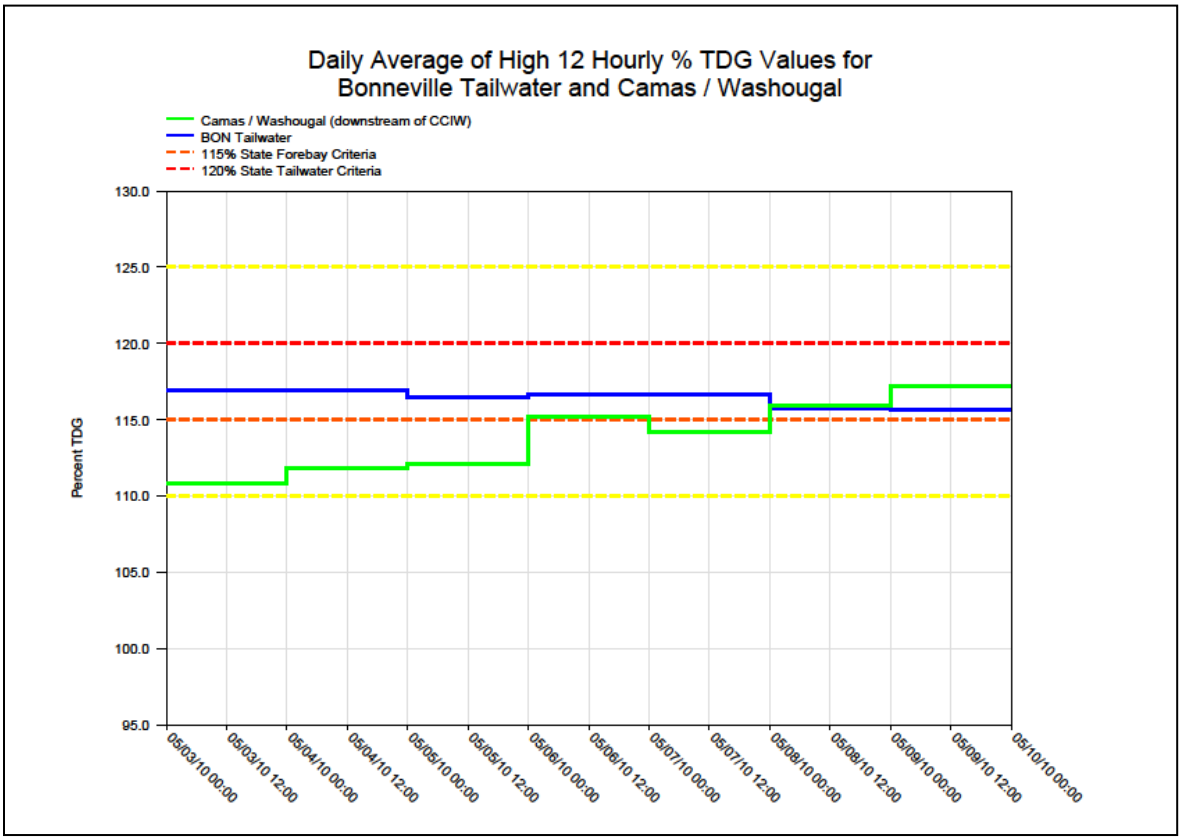

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/03/10 01:00
05/03/10 13:00
05/04/10 01:00
05/04/10 13:00
05/05/10 01:00
05/05/10 13:00
05/06/10 01:00
05/06/10 13:00
05/07/10 01:00
05/07/10 13:00
05/08/10 01:00
05/08/10 13:00
05/09/10 01:00
05/09/10 13:00
05/10/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/03/10 00:00
05/03/10 12:00
05/04/10 00:00
05/04/10 12:00
05/05/10 00:00
05/05/10 12:00
05/06/10 00:00
05/06/10 12:00
05/07/10 00:00
05/07/10 12:00
05/08/10 00:00
05/08/10 12:00
05/09/10 00:00
05/09/10 12:00
05/10/10 00:00

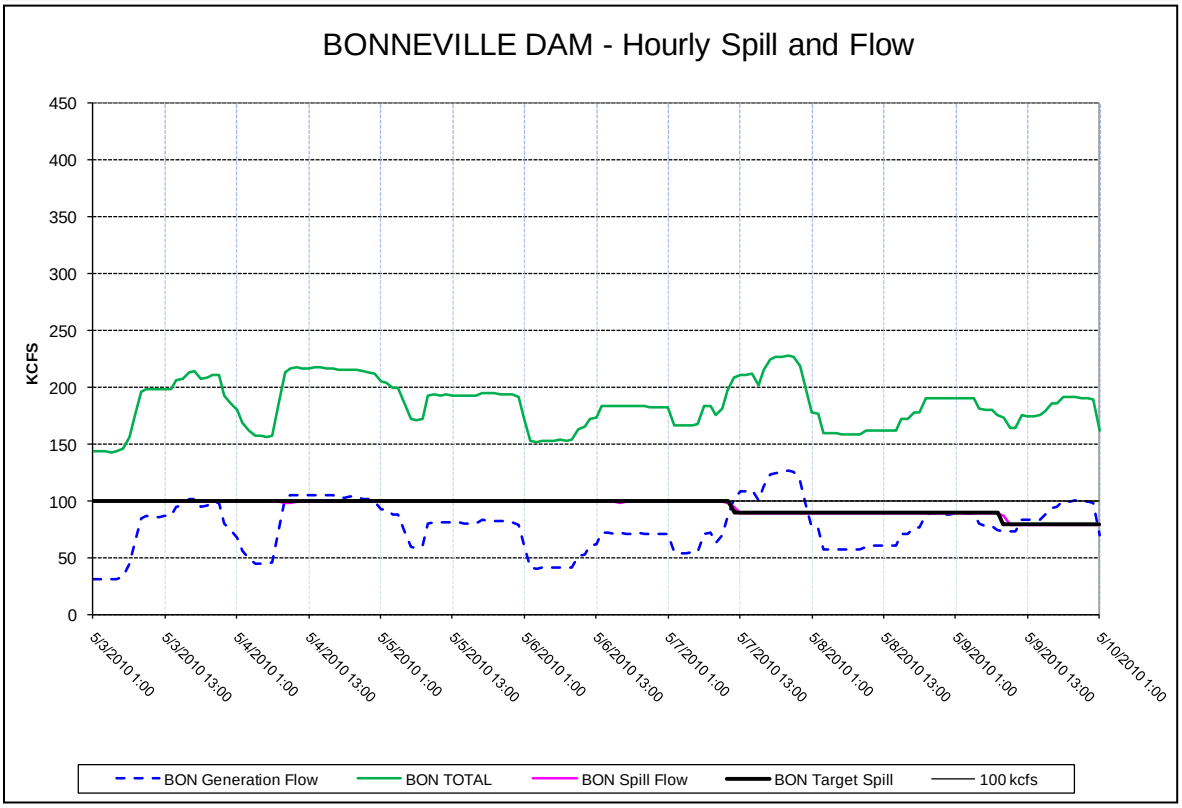
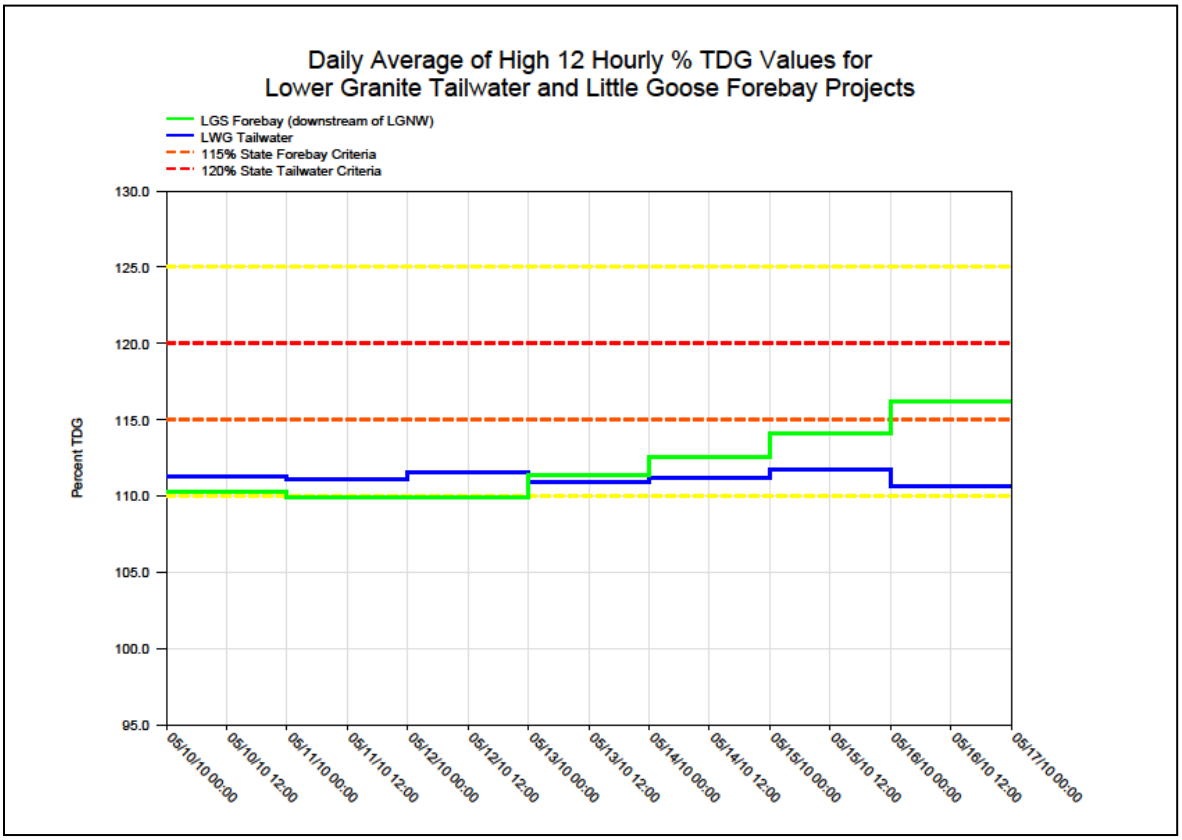

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/3/2010 1:00
5/3/2010 13:00
5/4/2010 1:00
5/4/2010 13:00
5/5/2010 1:00
5/5/2010 13:00
5/6/2010 1:00
5/6/2010 13:00
5/7/2010 1:00
5/7/2010 13:00
5/8/2010 1:00
5/8/2010 13:00
5/9/2010 1:00
5/9/2010 13:00
5/10/2010 1:00
BON Generation Flow
BON TOTAL
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 Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

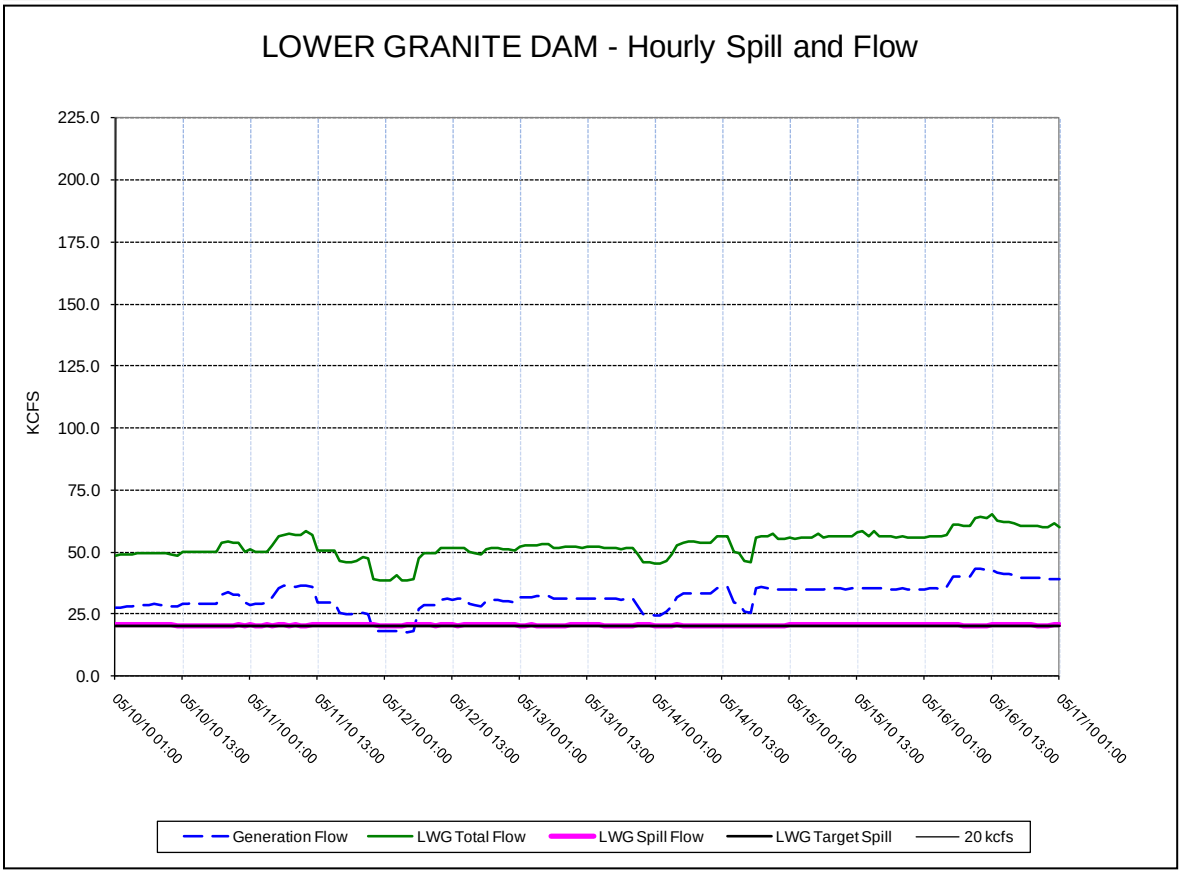
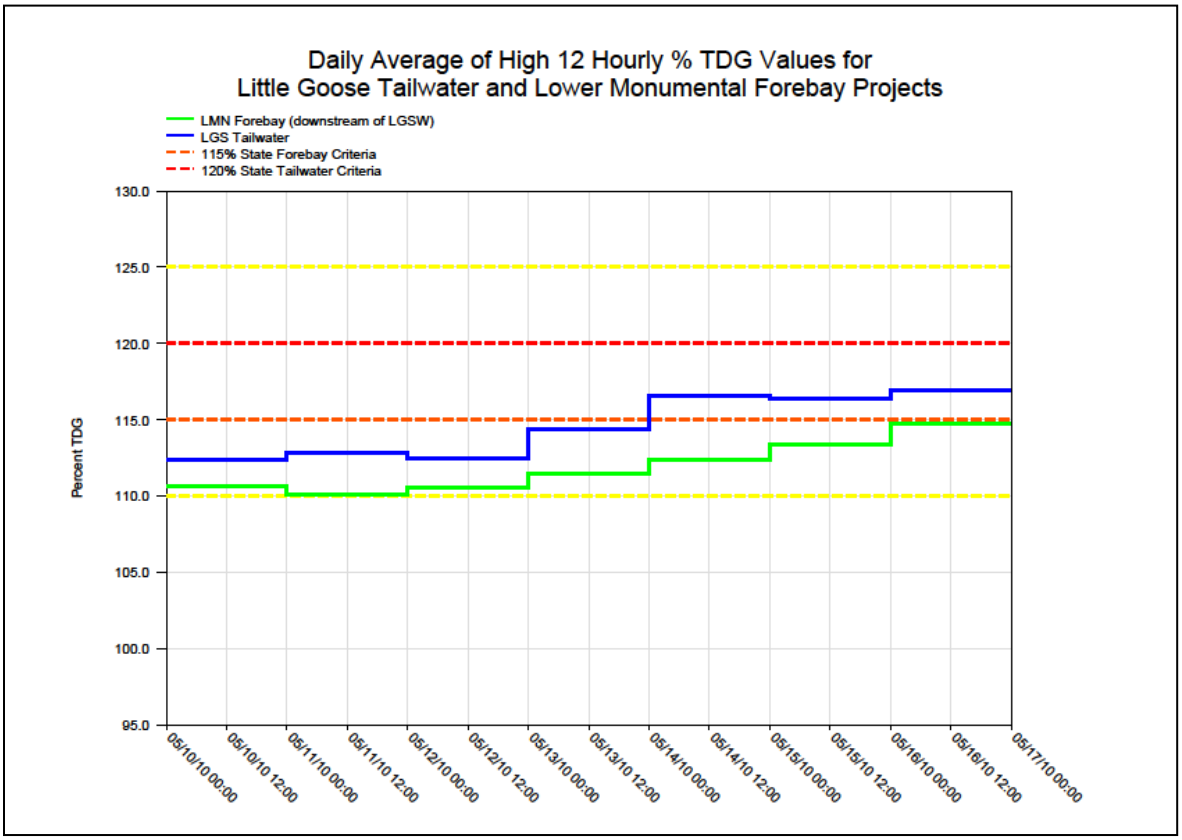

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

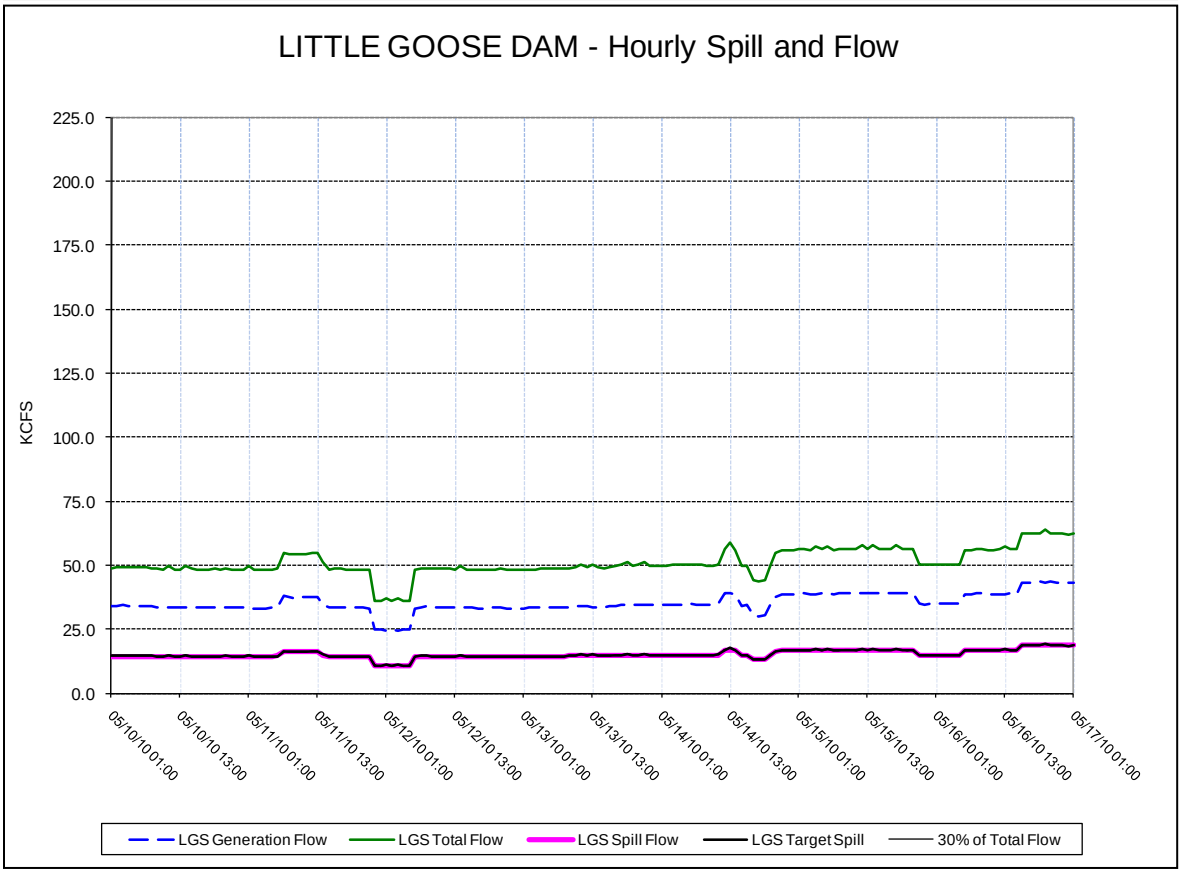
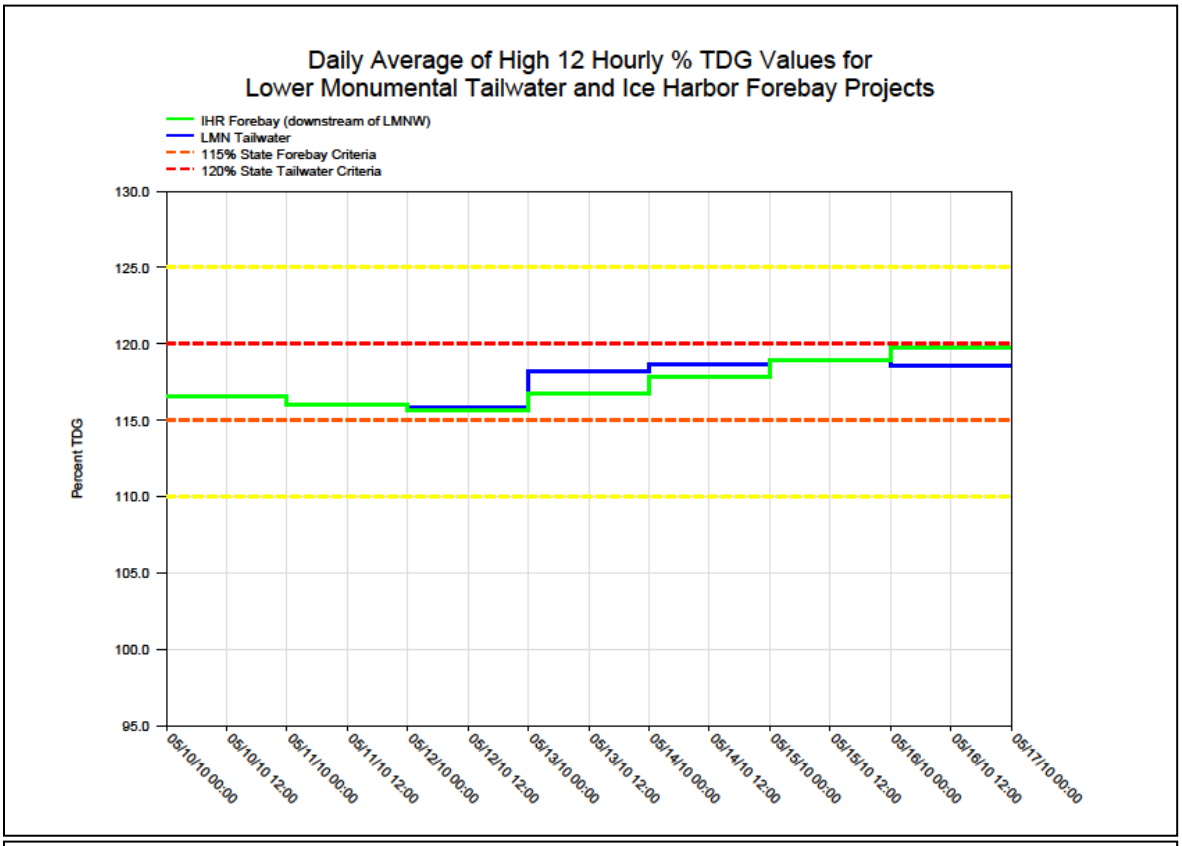

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

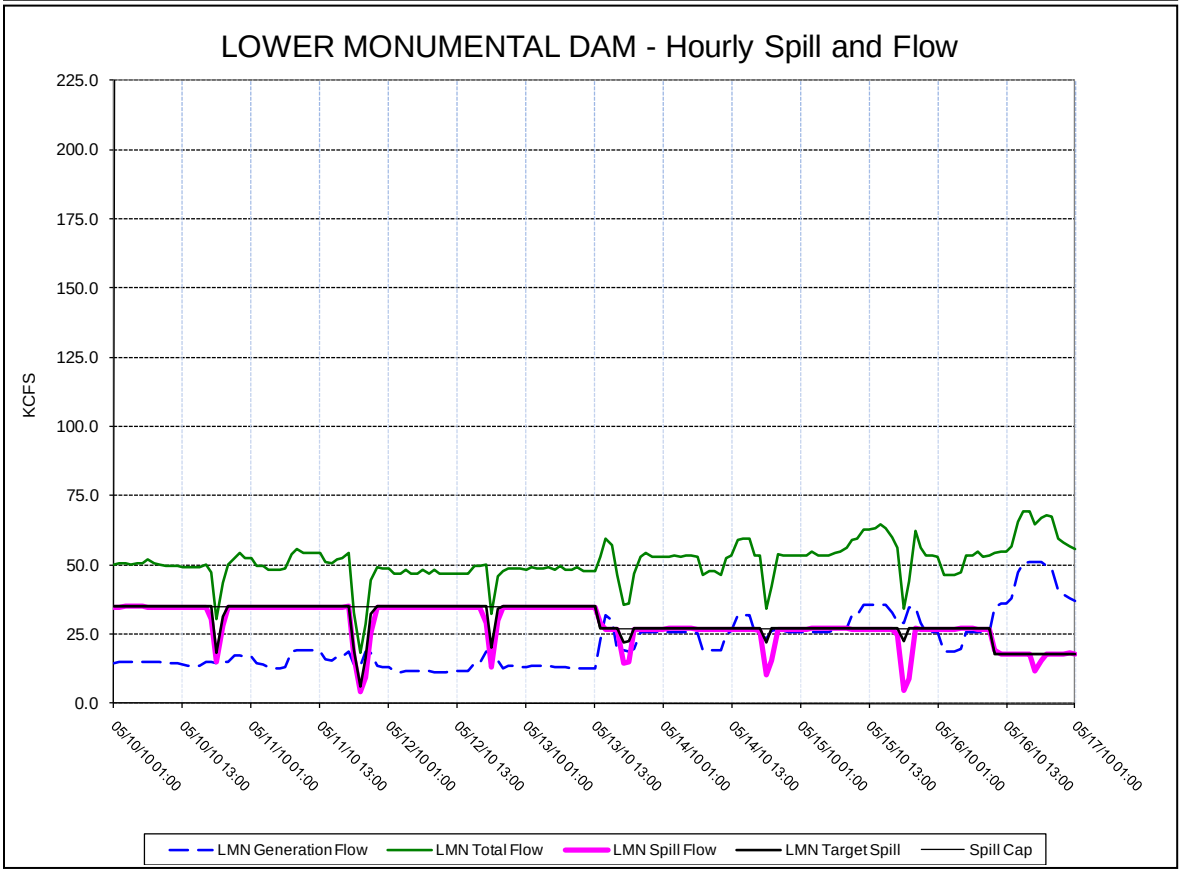
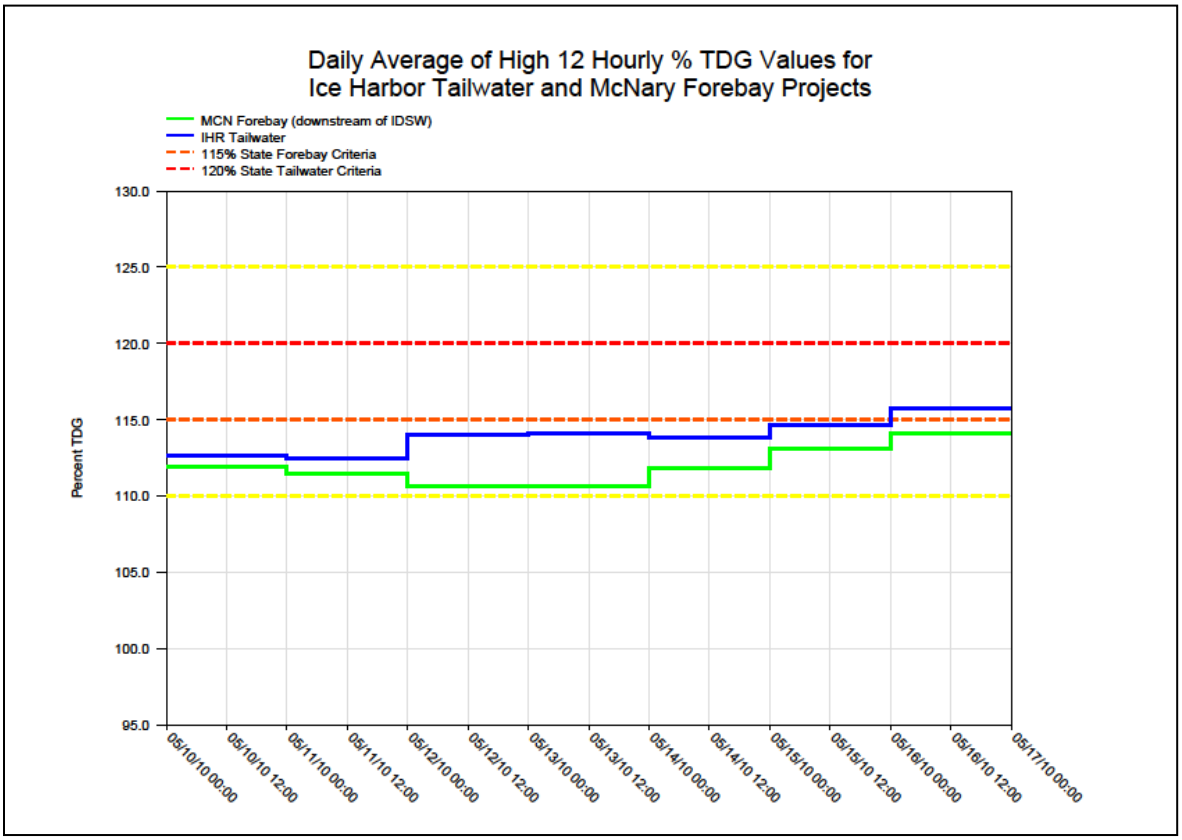

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

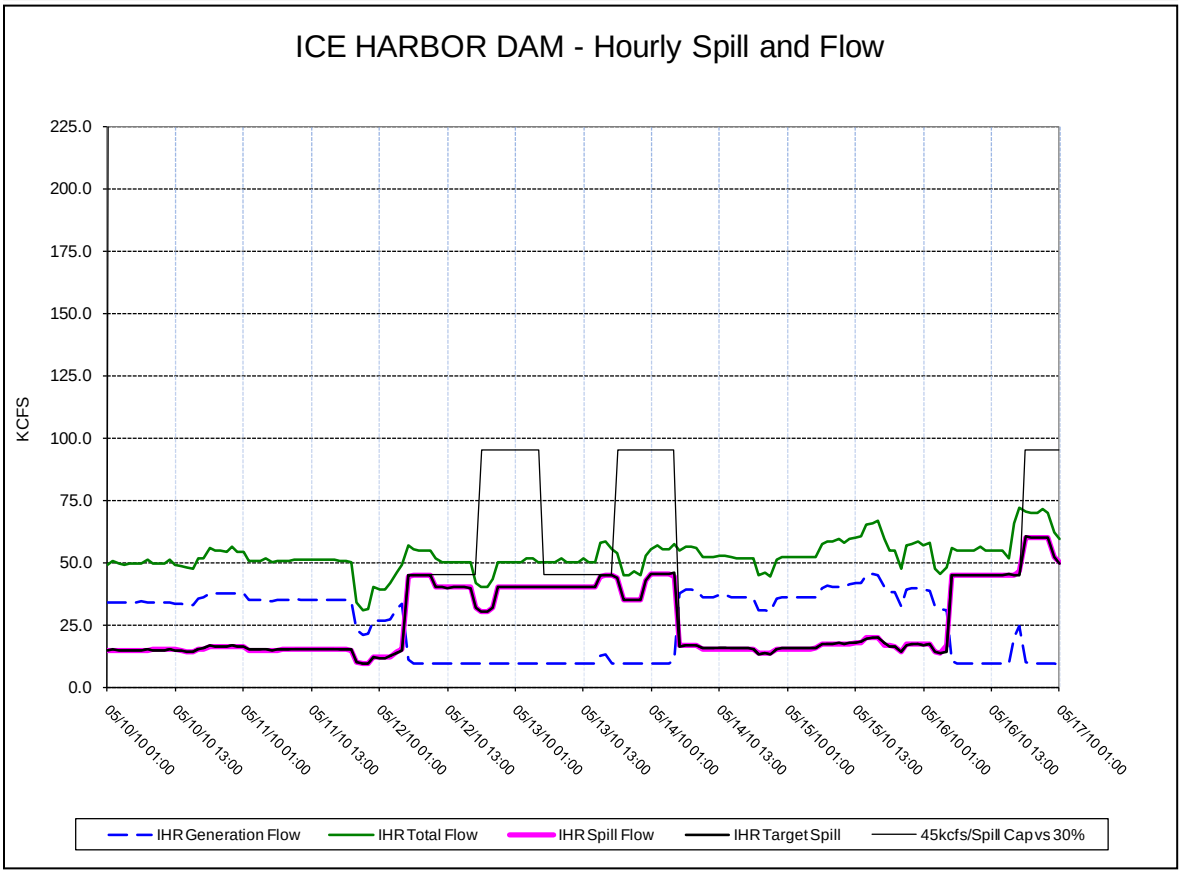
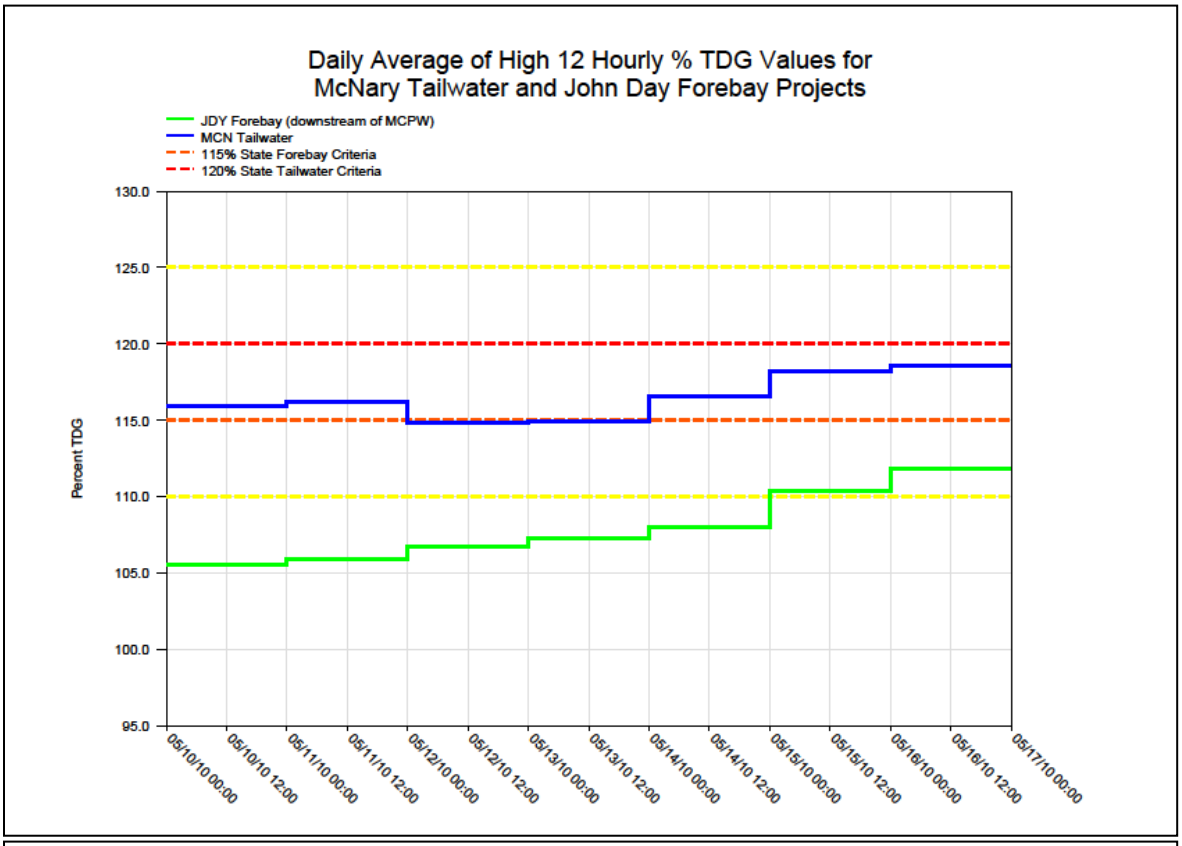

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

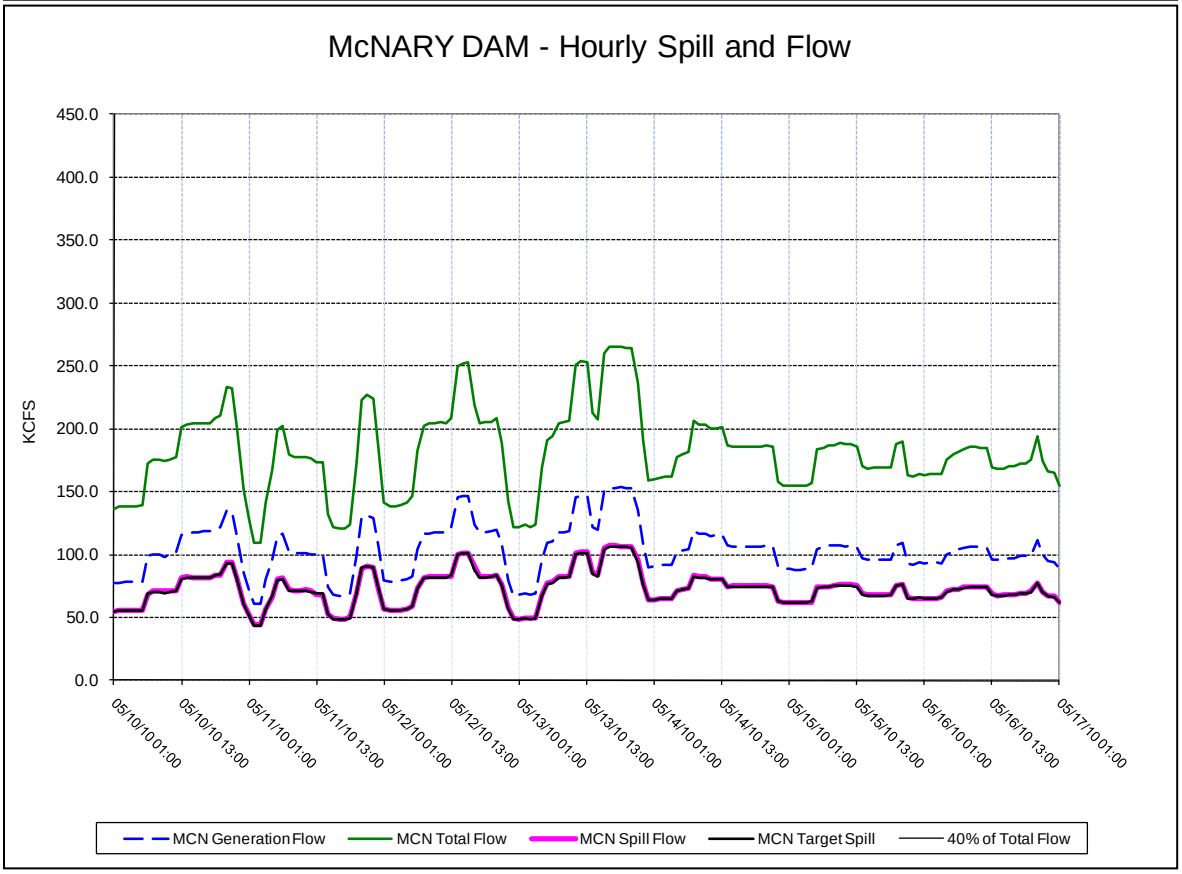
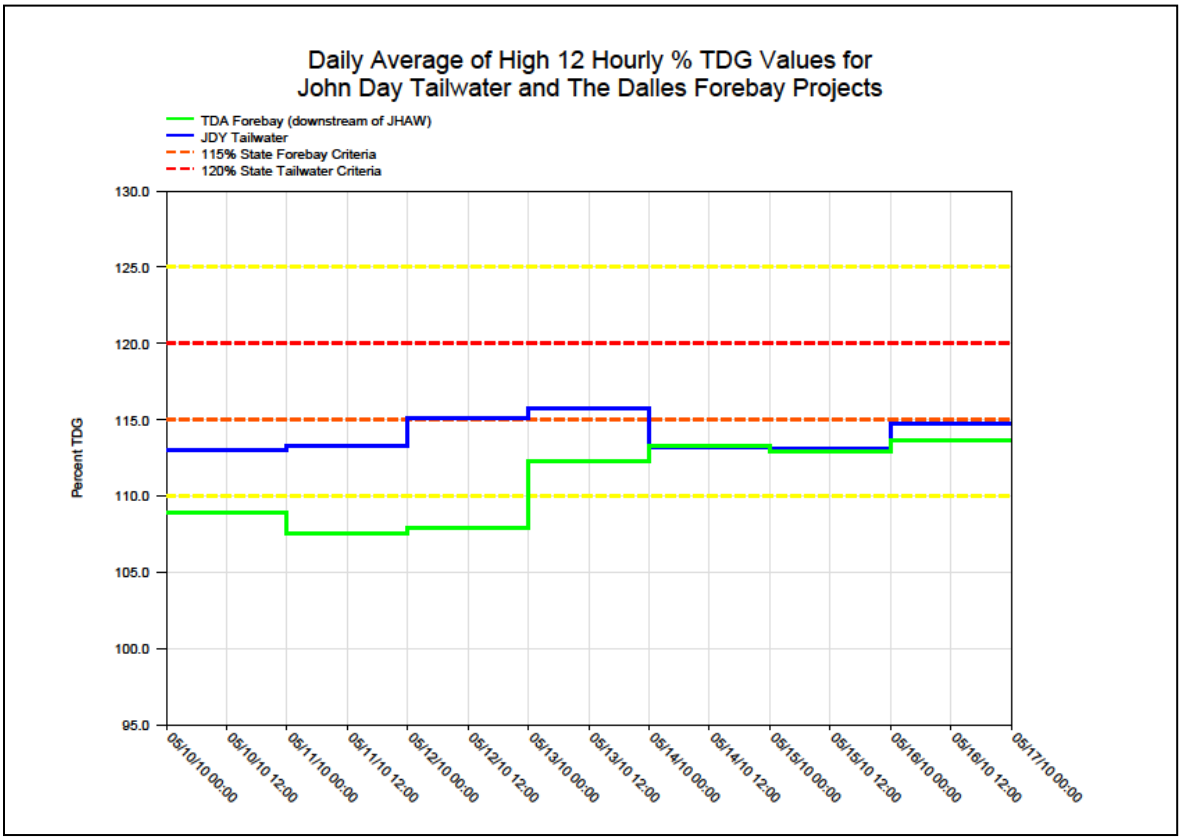

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

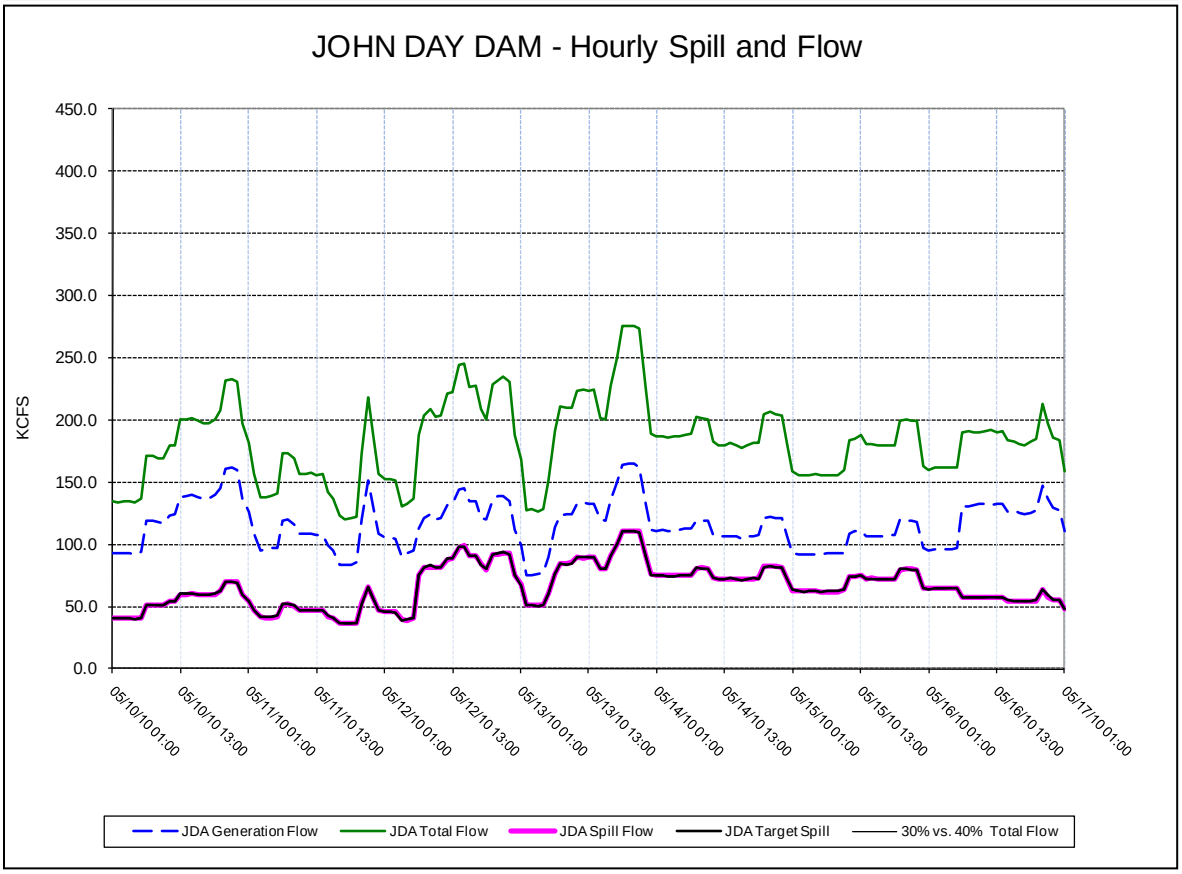
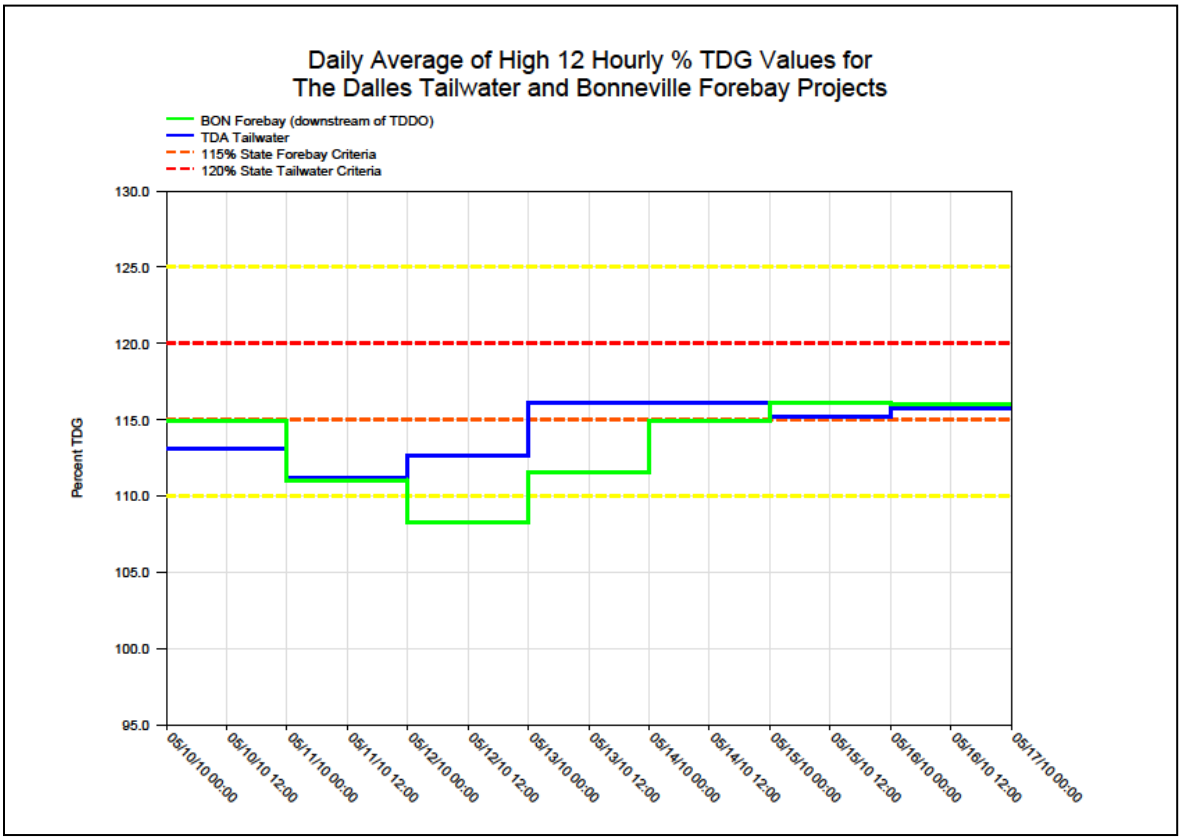

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

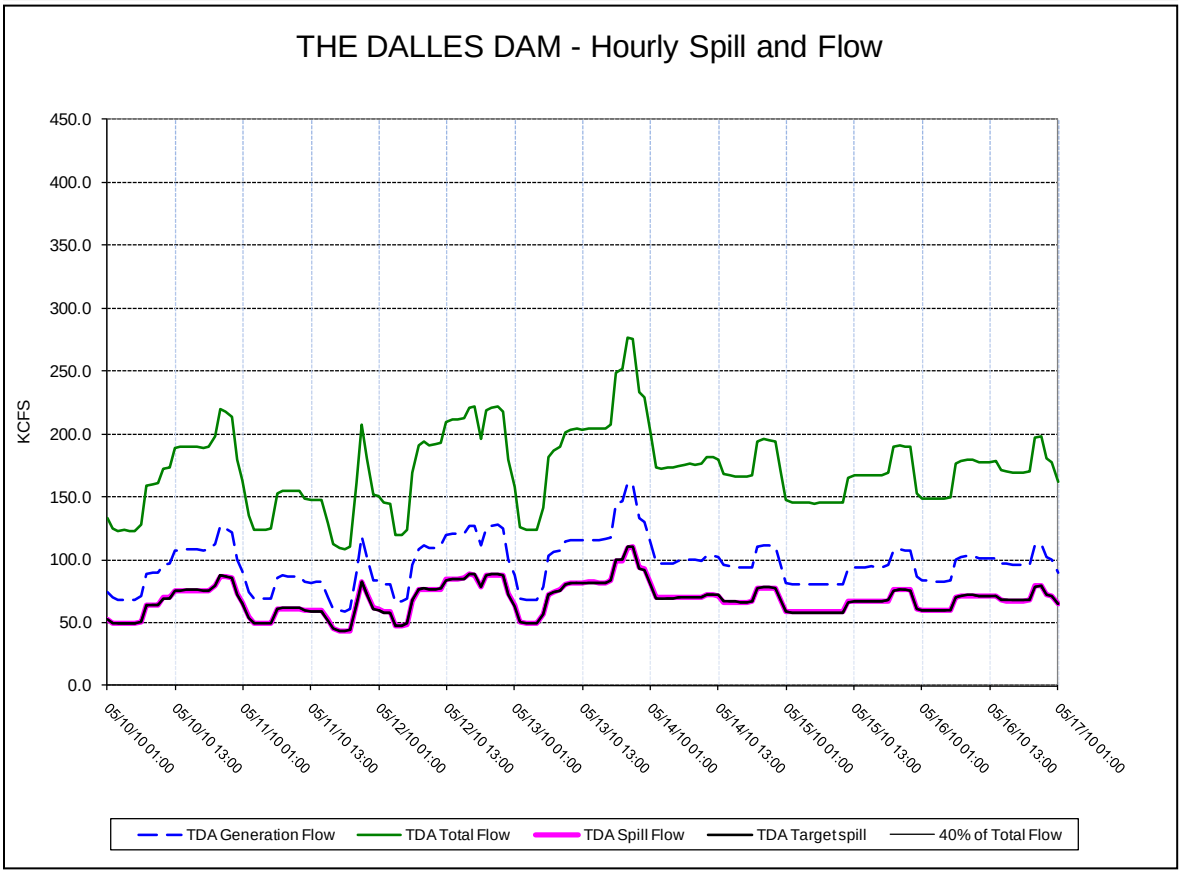
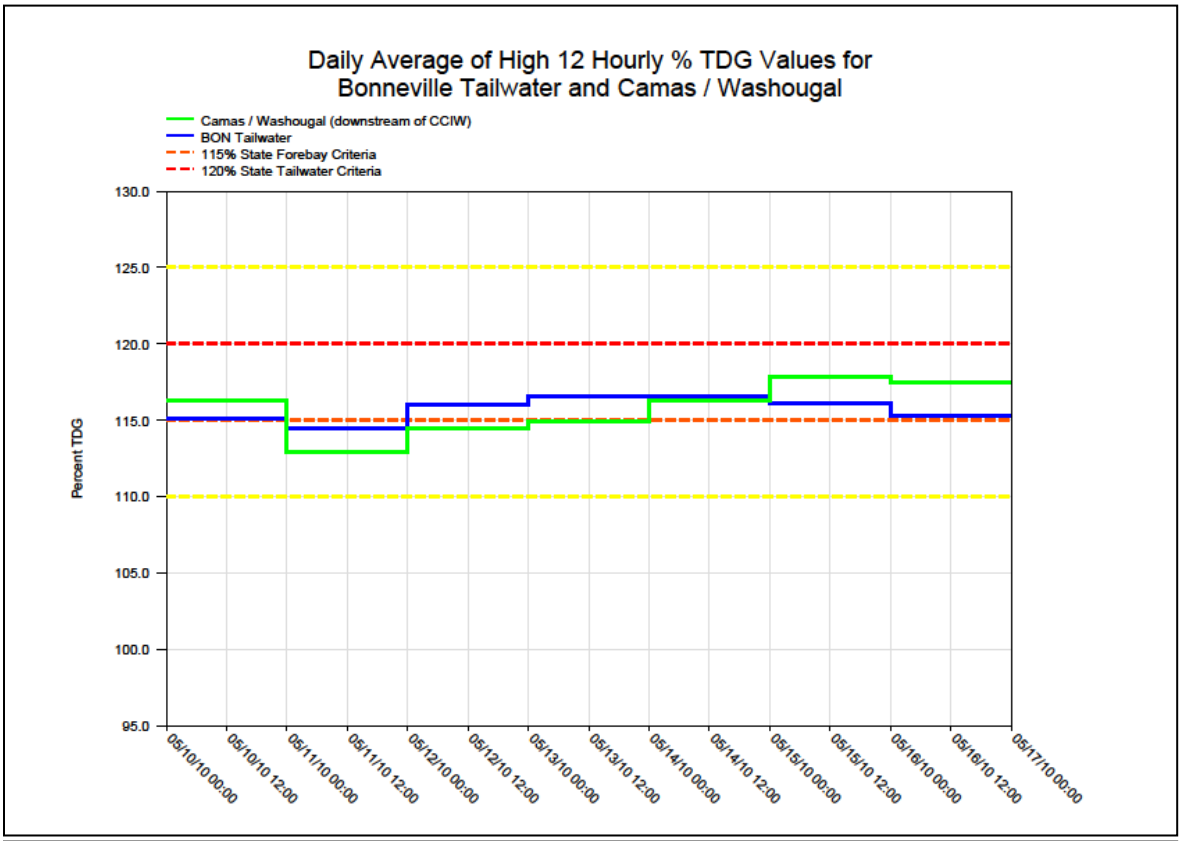

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/10/10 00:00
05/10/10 12:00
05/11/10 00:00
05/11/10 12:00
05/12/10 00:00
05/12/10 12:00
05/13/10 00:00
05/13/10 12:00
05/14/10 00:00
05/14/10 12:00
05/15/10 00:00
05/15/10 12:00
05/16/10 00:00
05/16/10 12:00
05/17/10 00:00

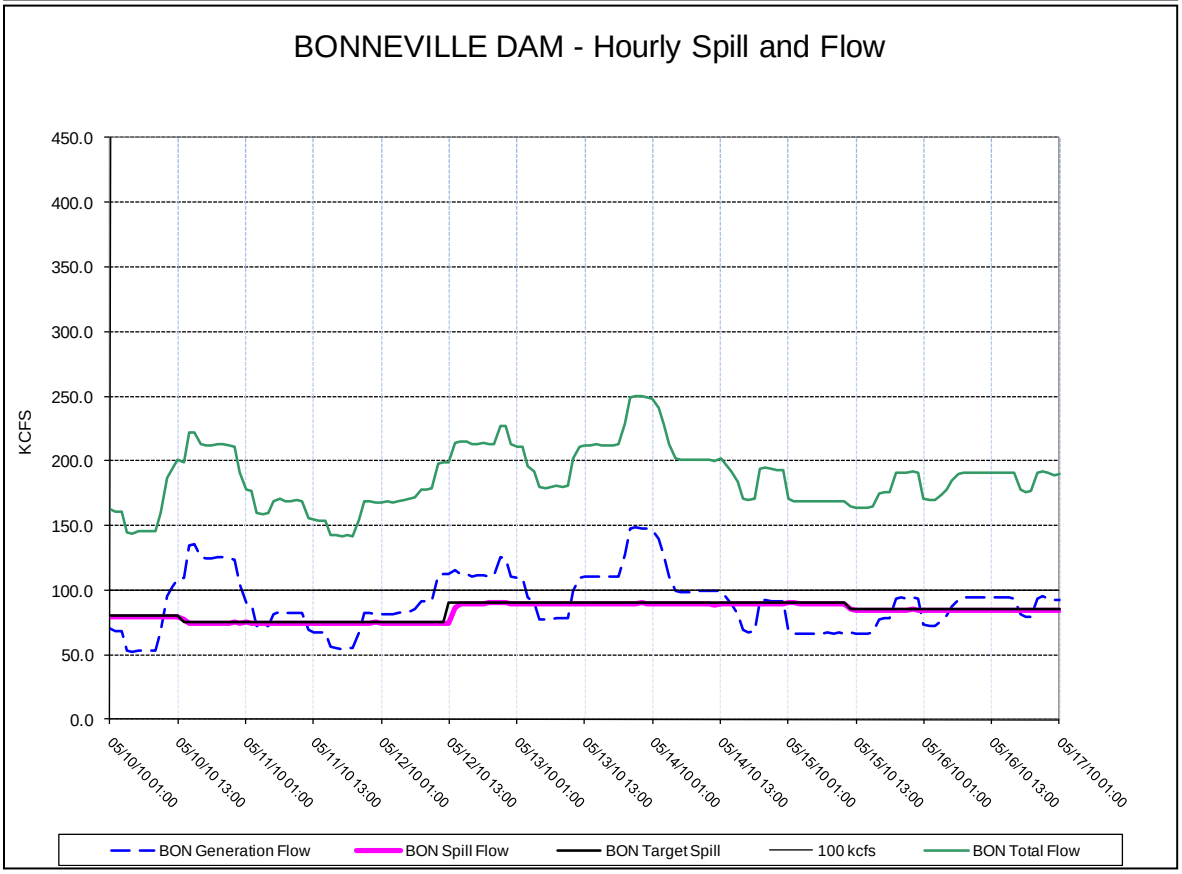
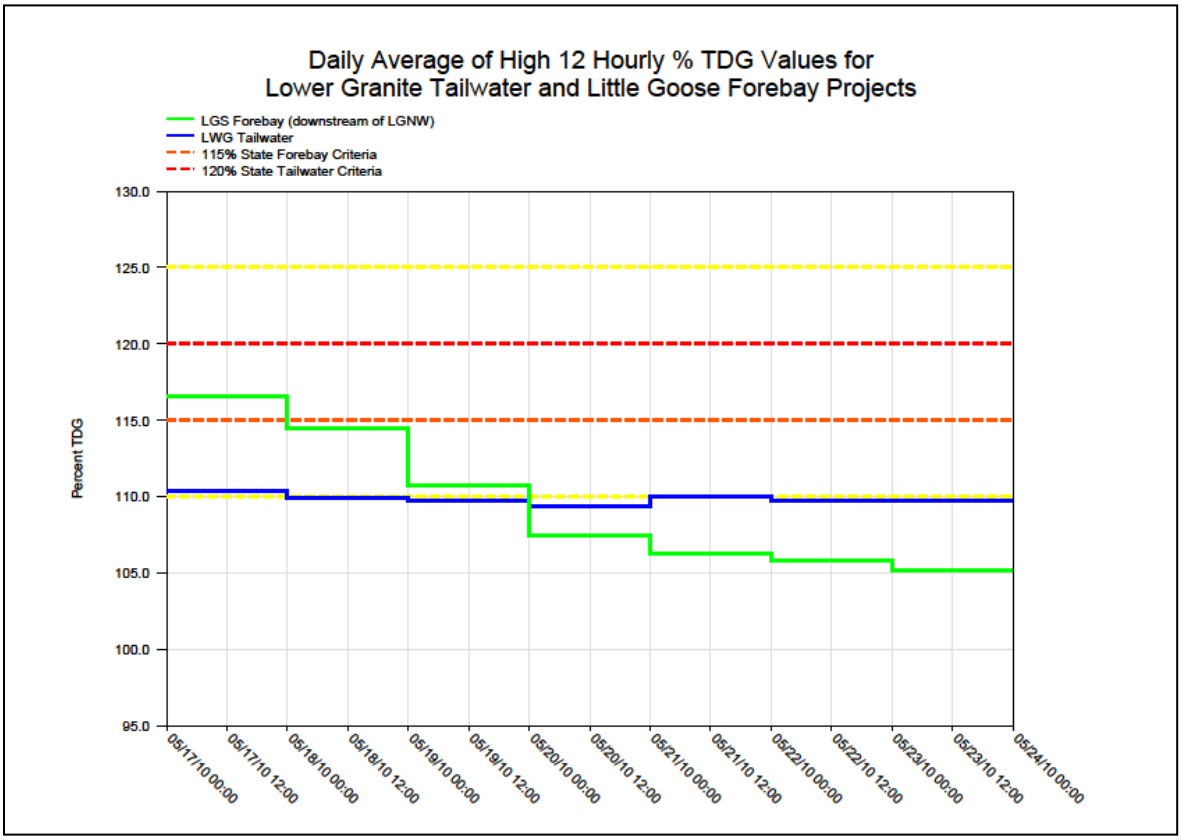

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/10/10 01:00
05/10/10 13:00
05/11/10 01:00
05/11/10 13:00
05/12/10 01:00
05/12/10 13:00
05/13/10 01:00
05/13/10 13:00
05/14/10 01:00
05/14/10 13:00
05/15/10 01:00
05/15/10 13:00
05/16/10 01:00
05/16/10 13:00
05/17/10 01:00
BON Generation Flow
BON Spill Flow
BON Target Spill
100 kcfs
BON Total Flow

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

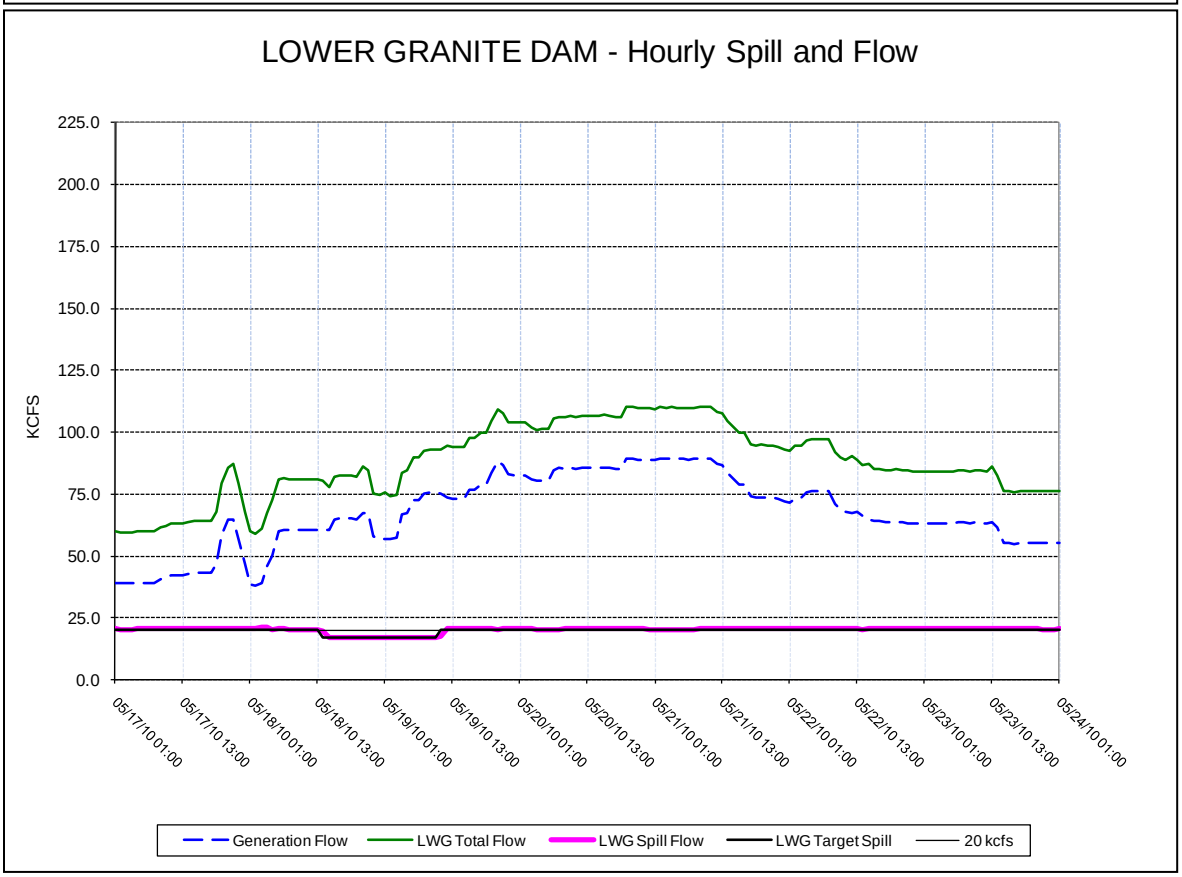
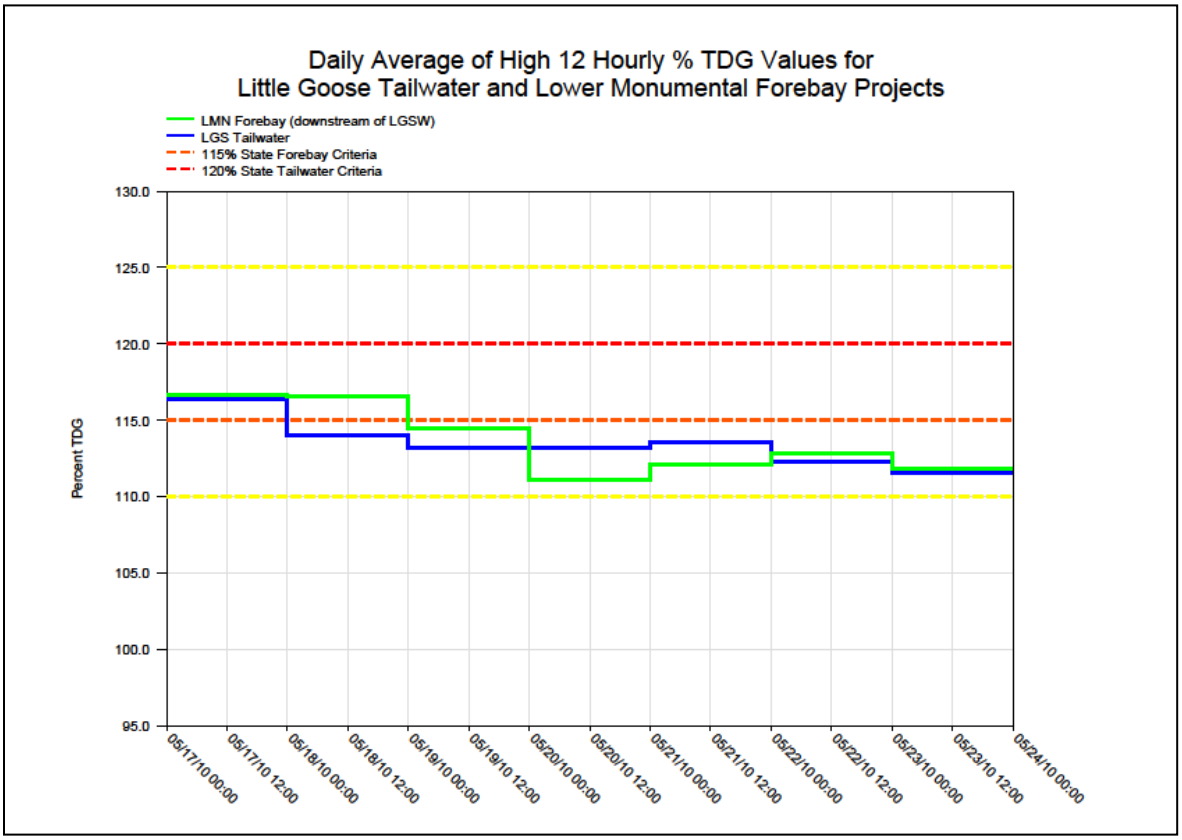

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

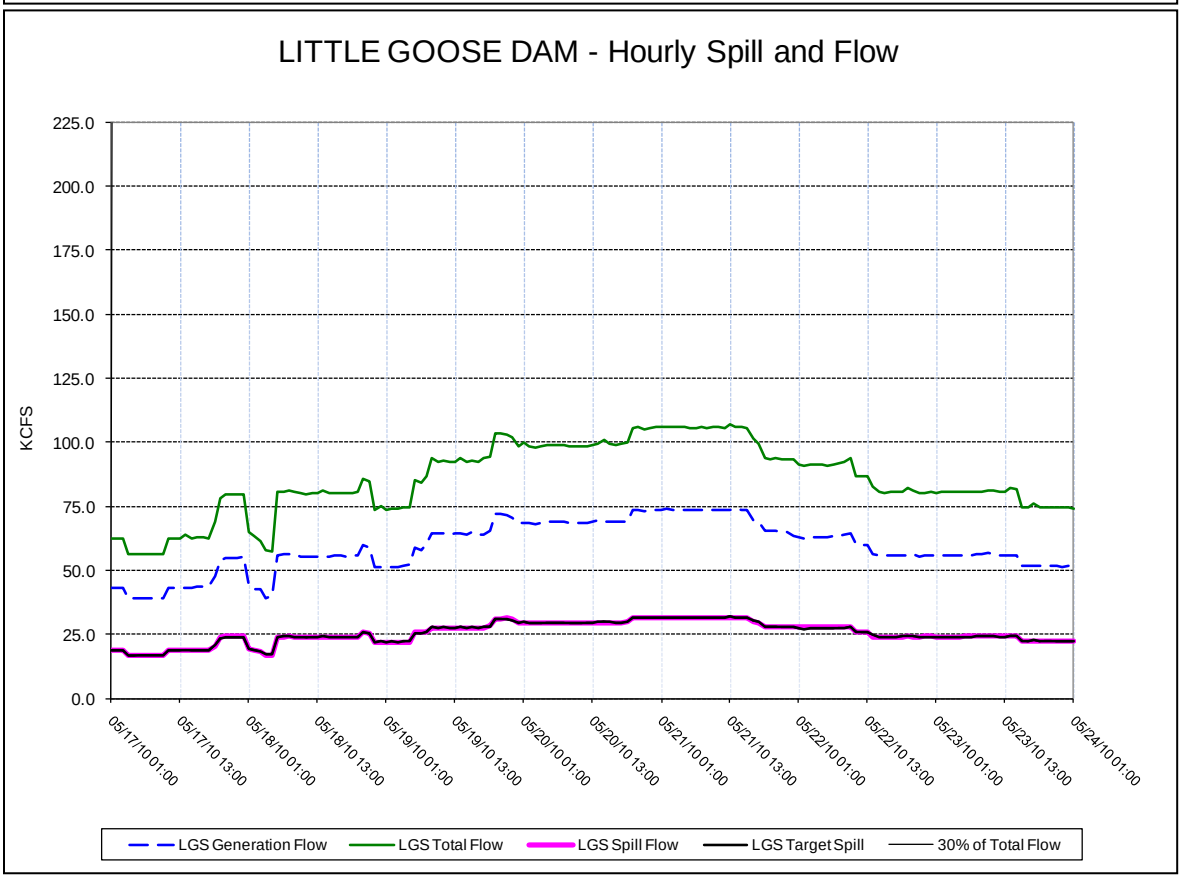
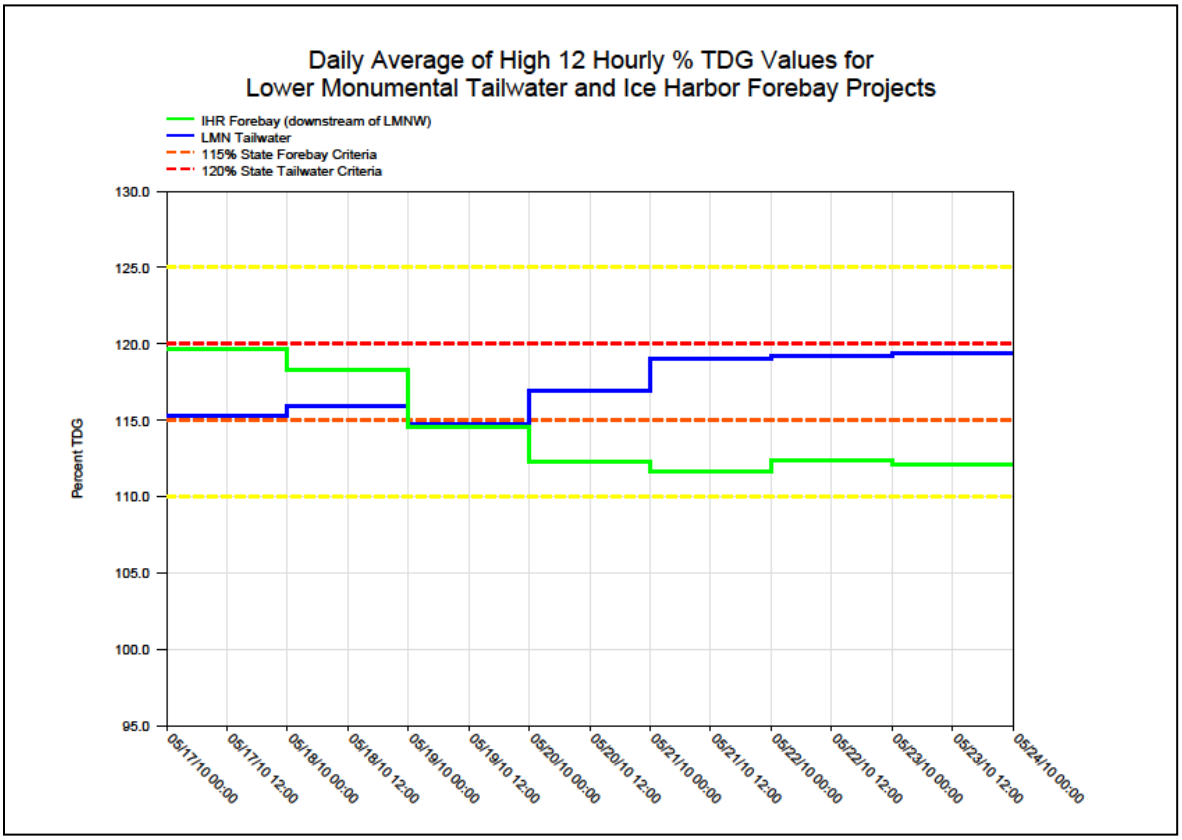

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

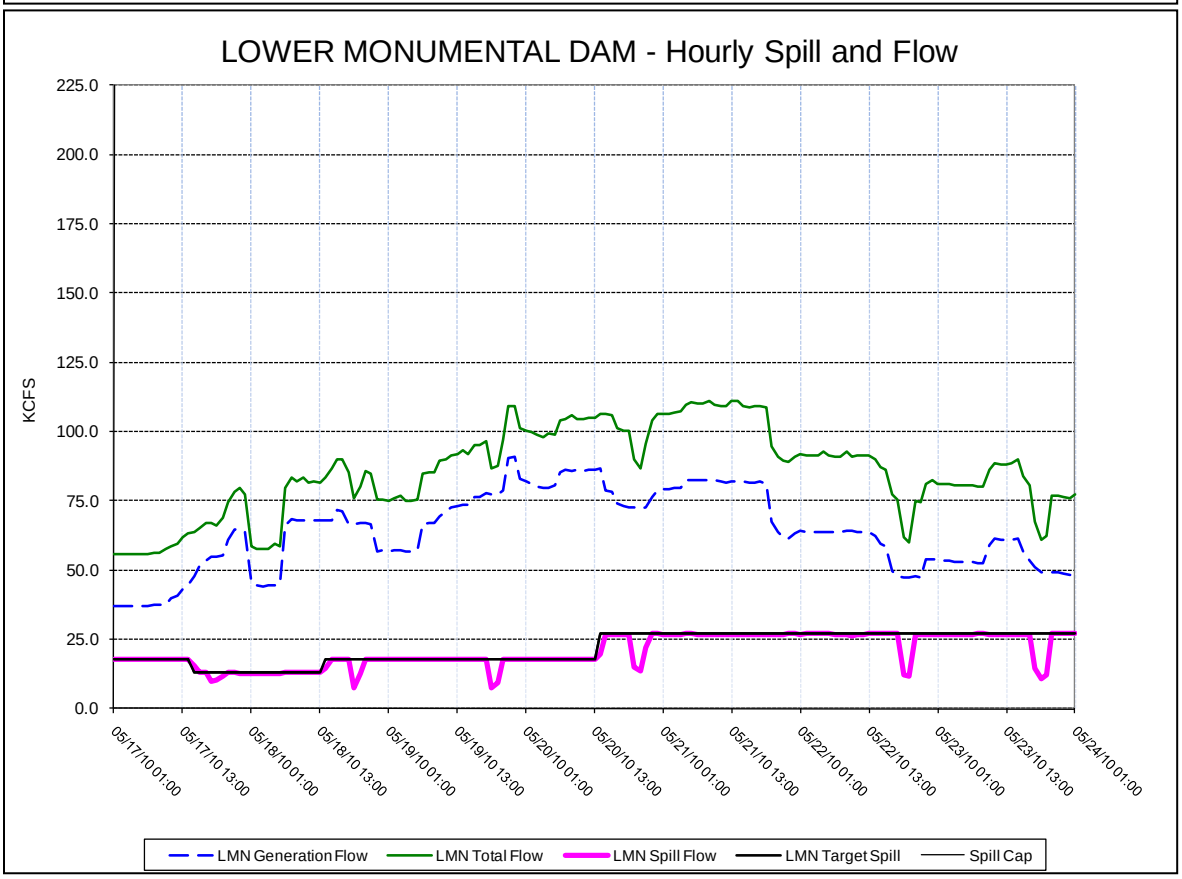
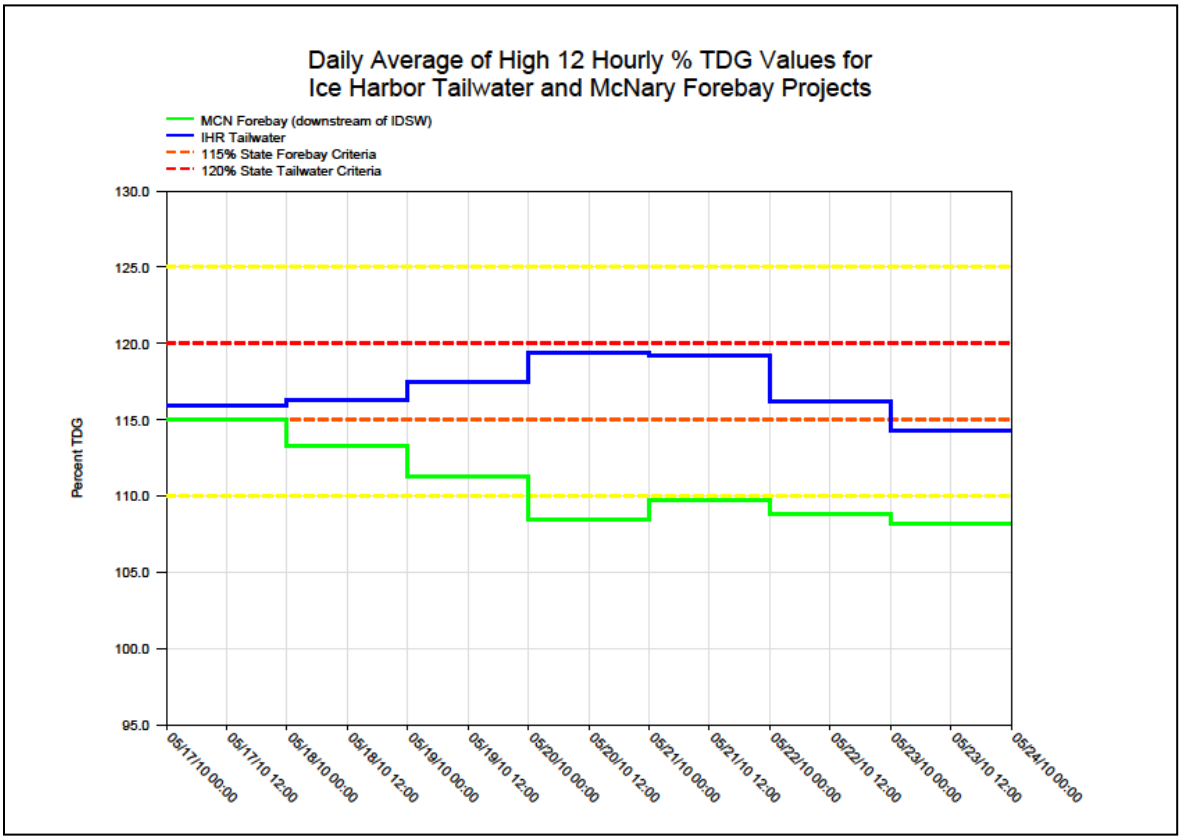

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

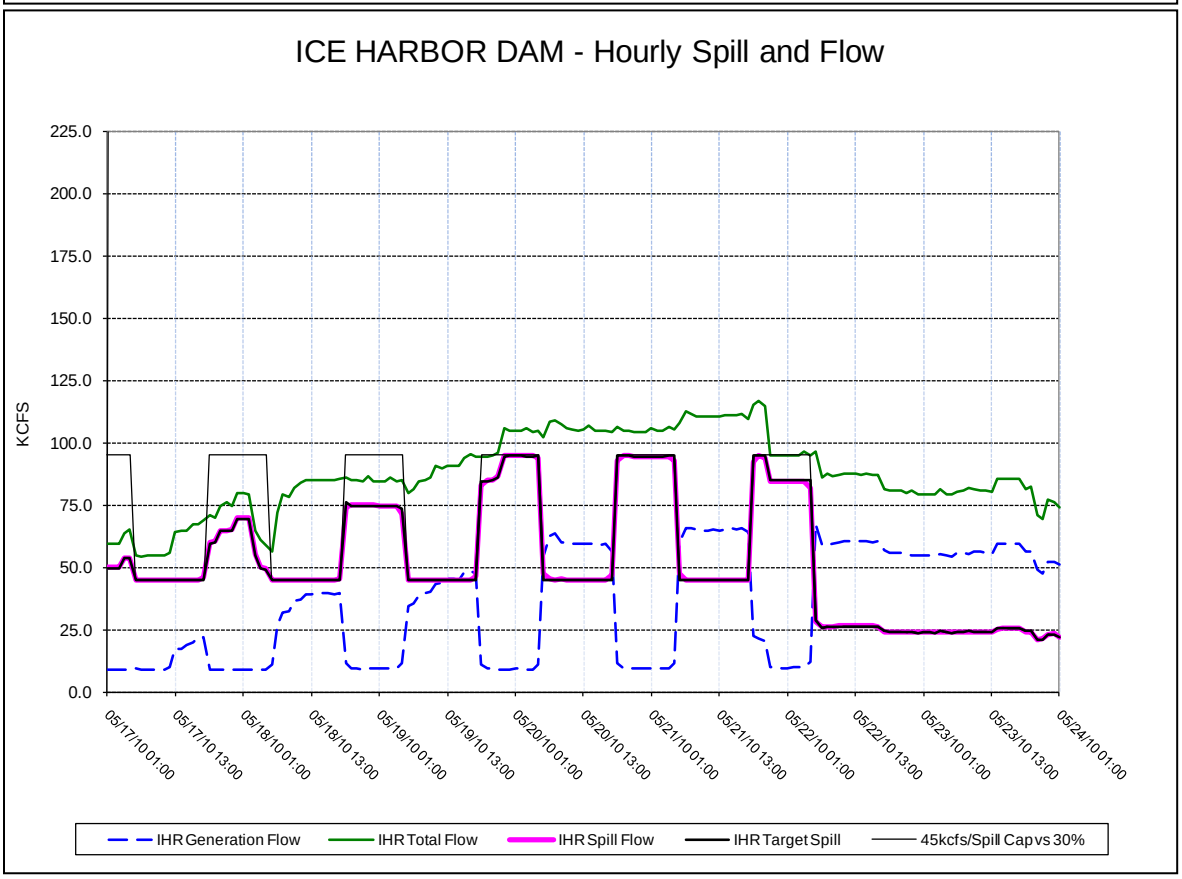
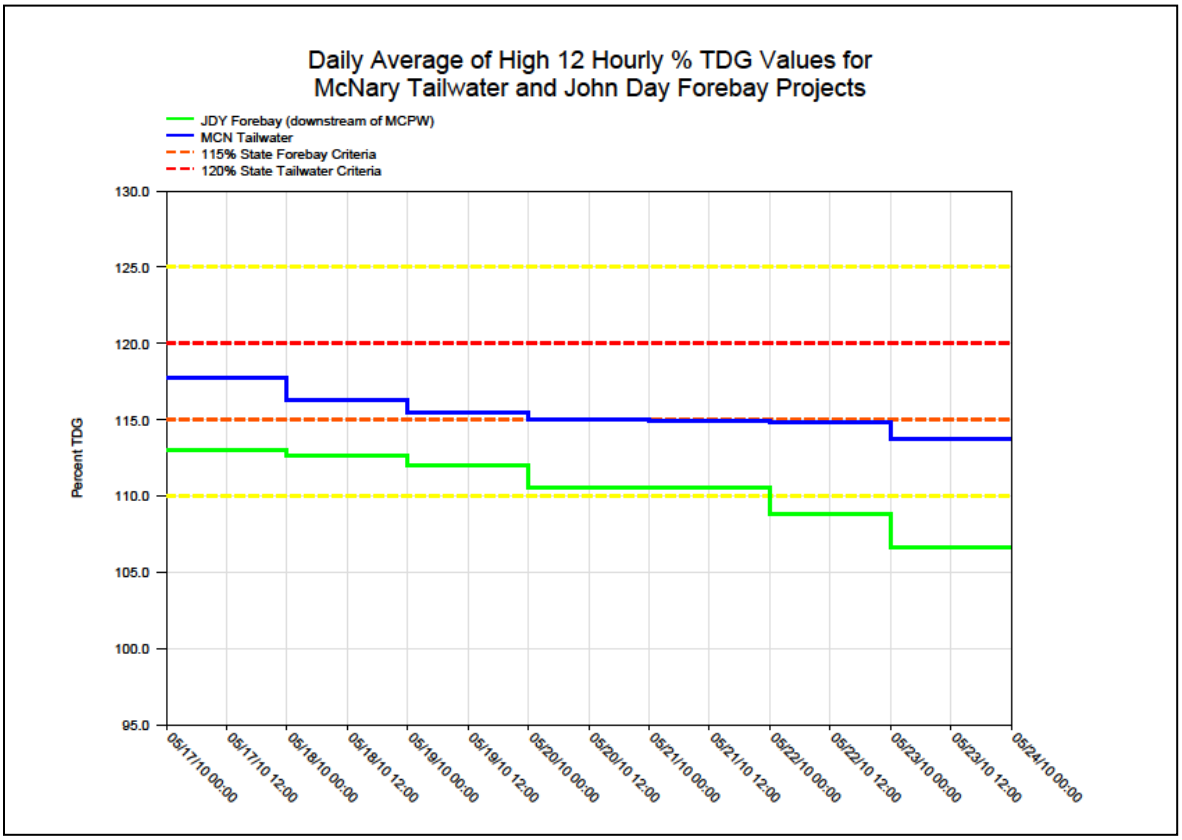

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

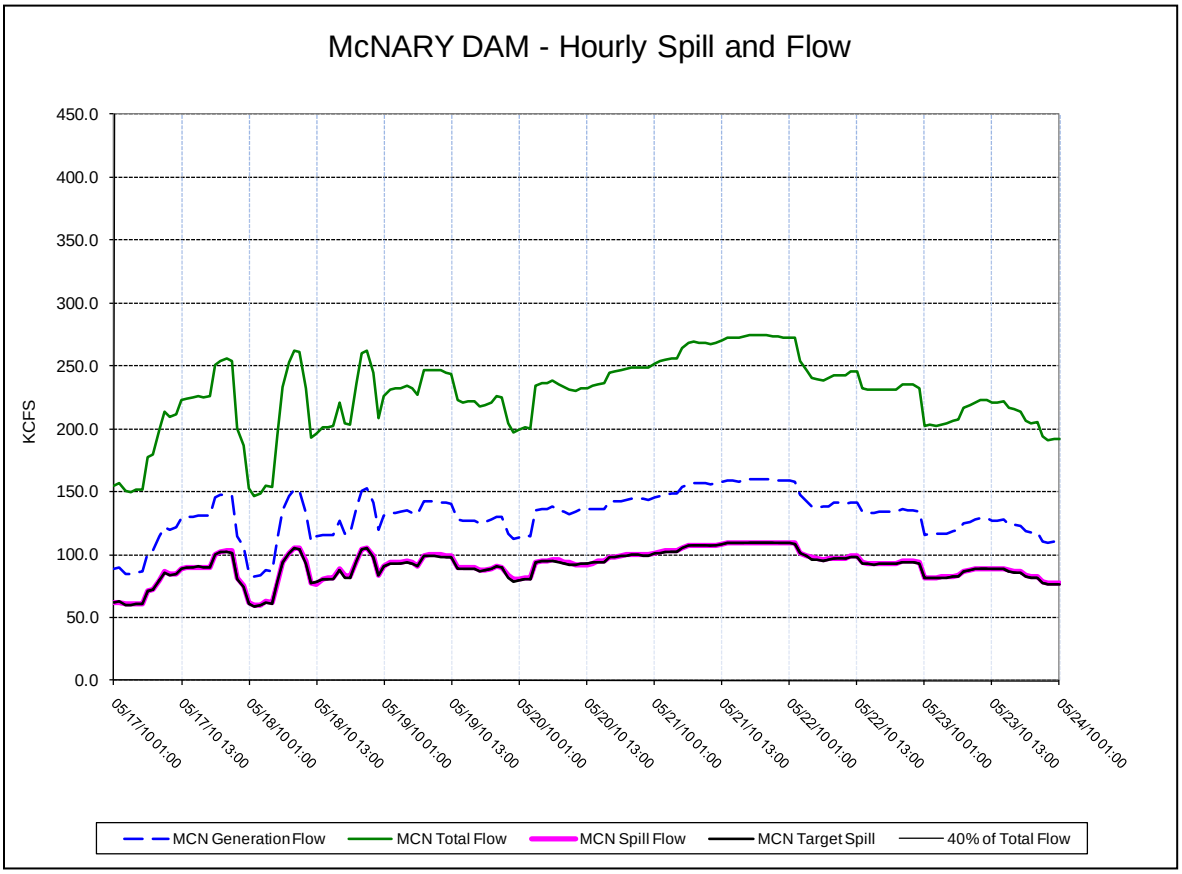
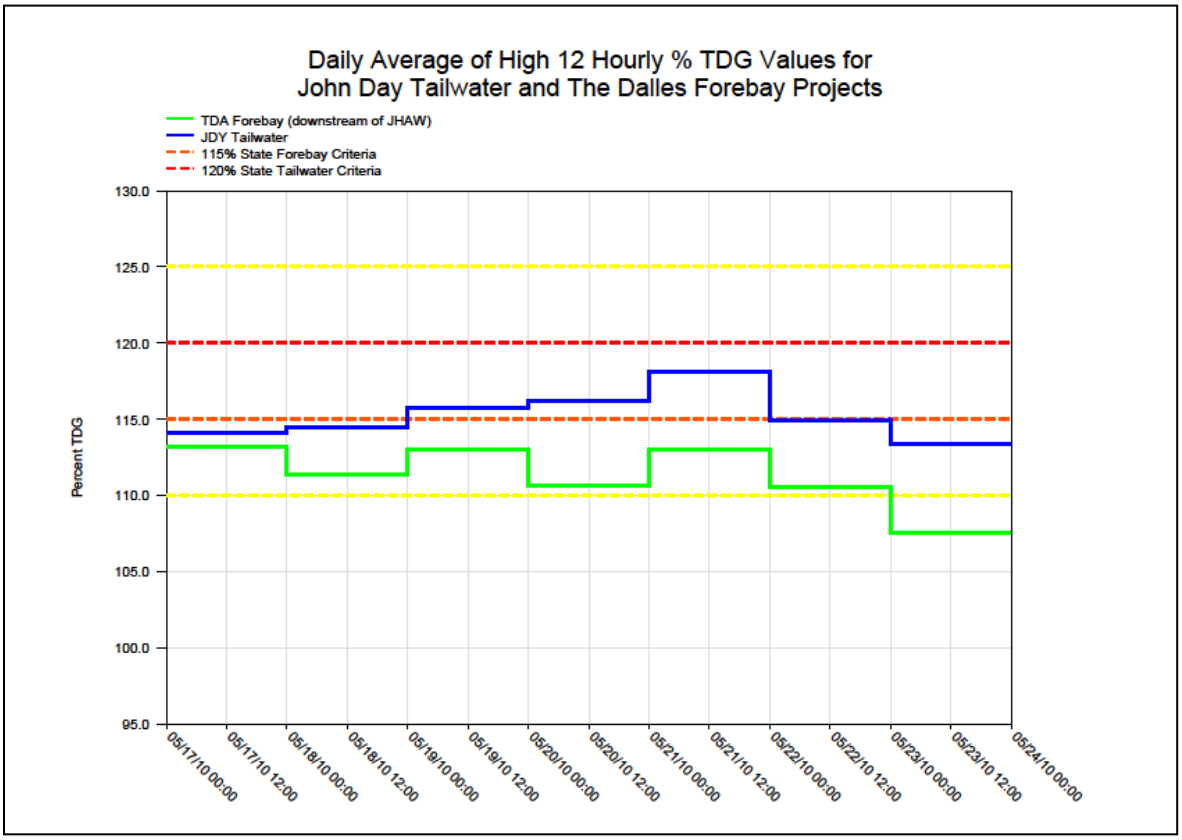

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

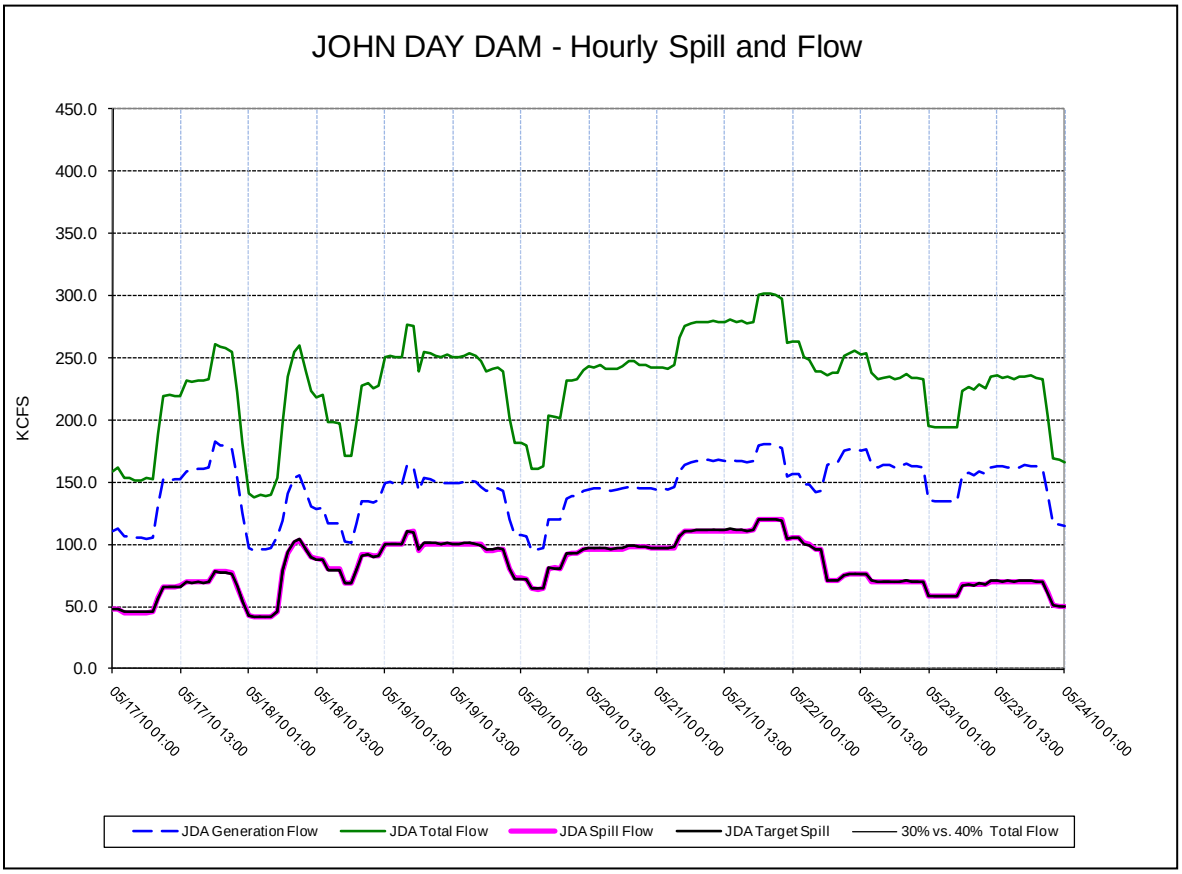
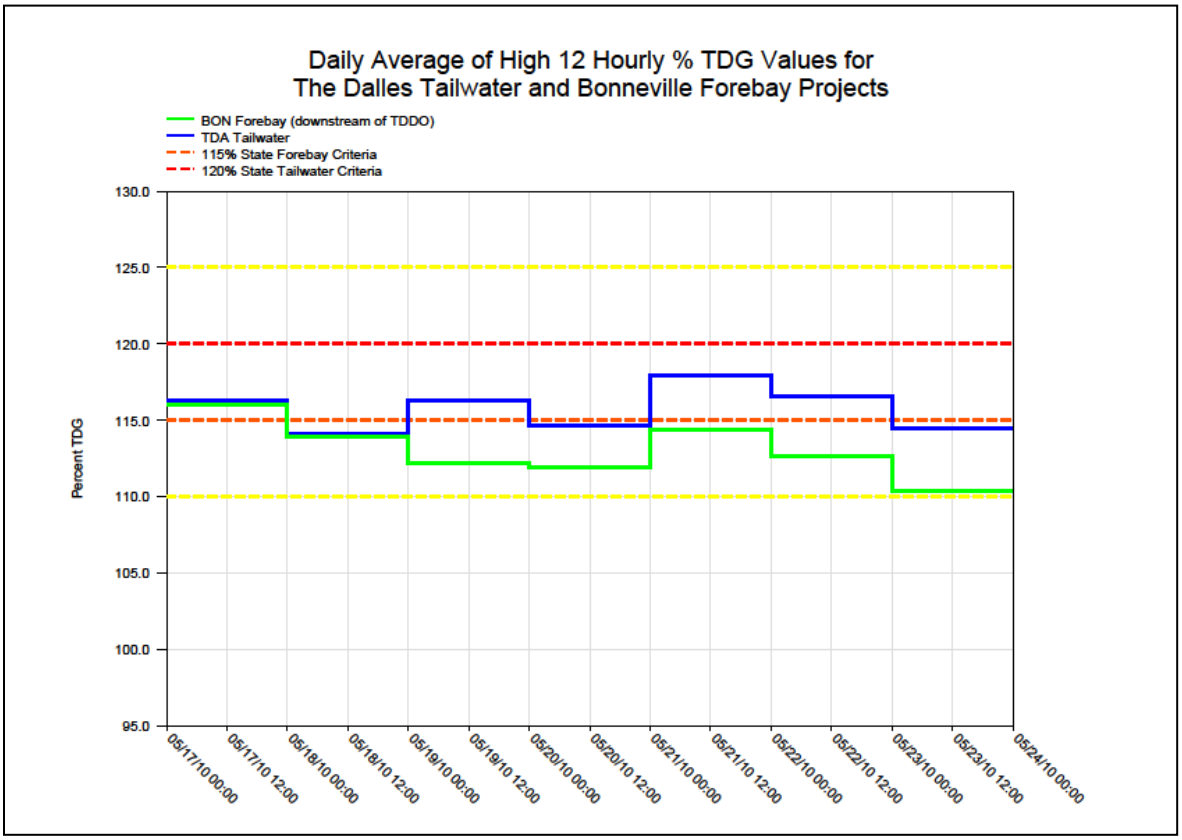

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

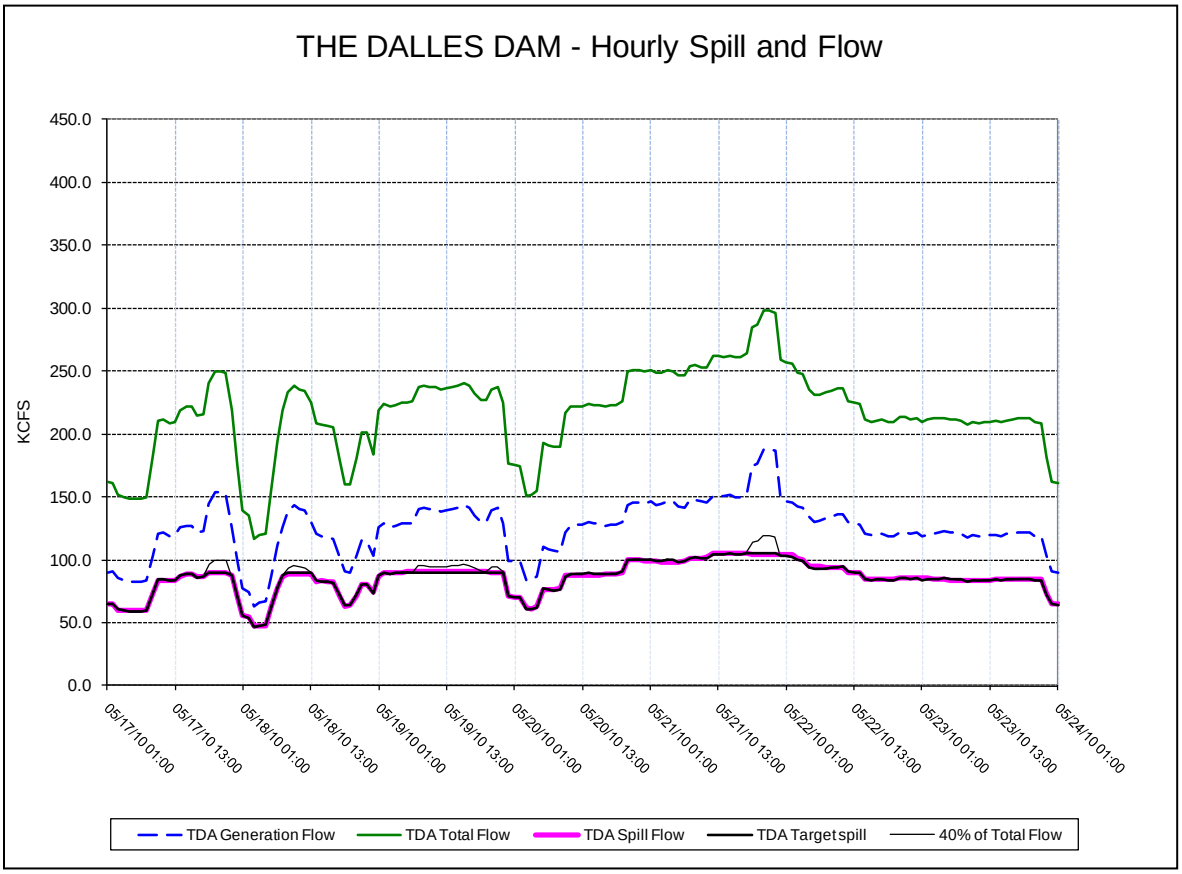
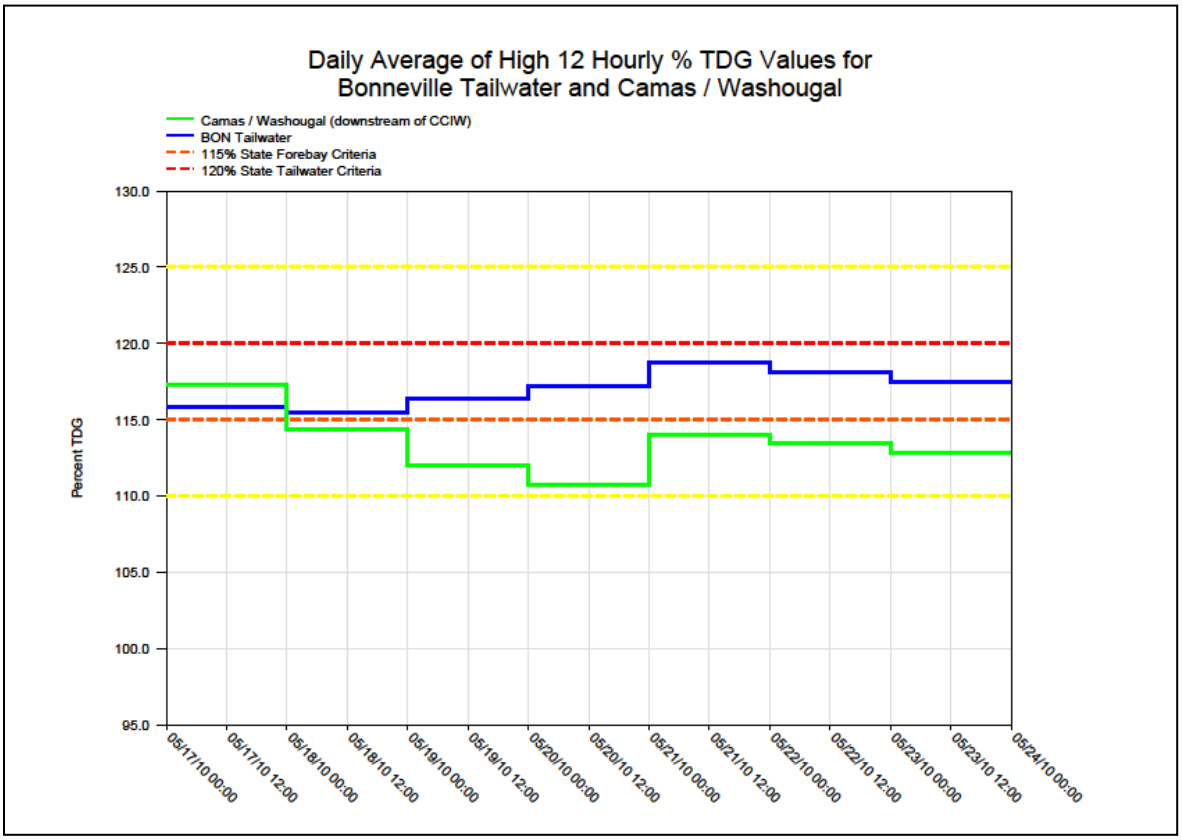

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/17/10 01:00
05/17/10 13:00
05/18/10 01:00
05/18/10 13:00
05/19/10 01:00
05/19/10 13:00
05/20/10 01:00
05/20/10 13:00
05/21/10 01:00
05/21/10 13:00
05/22/10 01:00
05/22/10 13:00
05/23/10 01:00
05/23/10 13:00
05/24/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/17/10 00:00
05/17/10 12:00
05/18/10 00:00
05/18/10 12:00
05/19/10 00:00
05/19/10 12:00
05/20/10 00:00
05/20/10 12:00
05/21/10 00:00
05/21/10 12:00
05/22/10 00:00
05/22/10 12:00
05/23/10 00:00
05/23/10 12:00
05/24/10 00:00

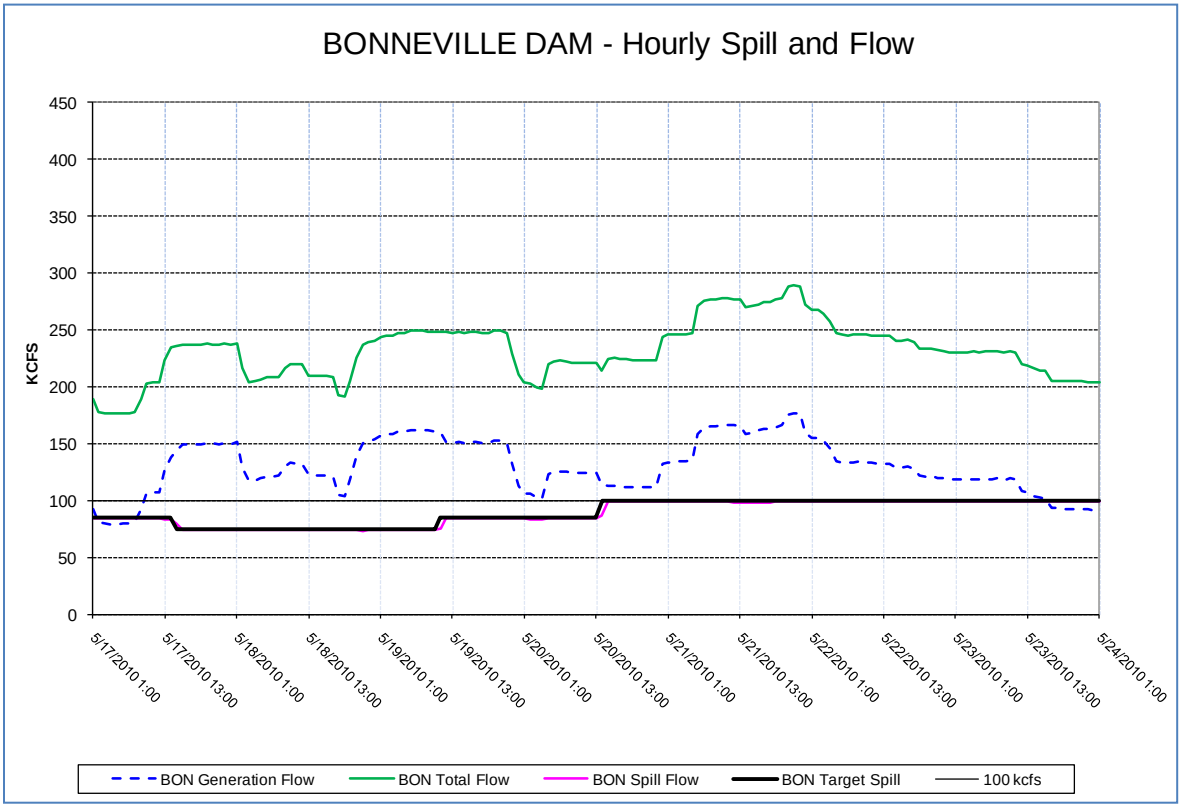
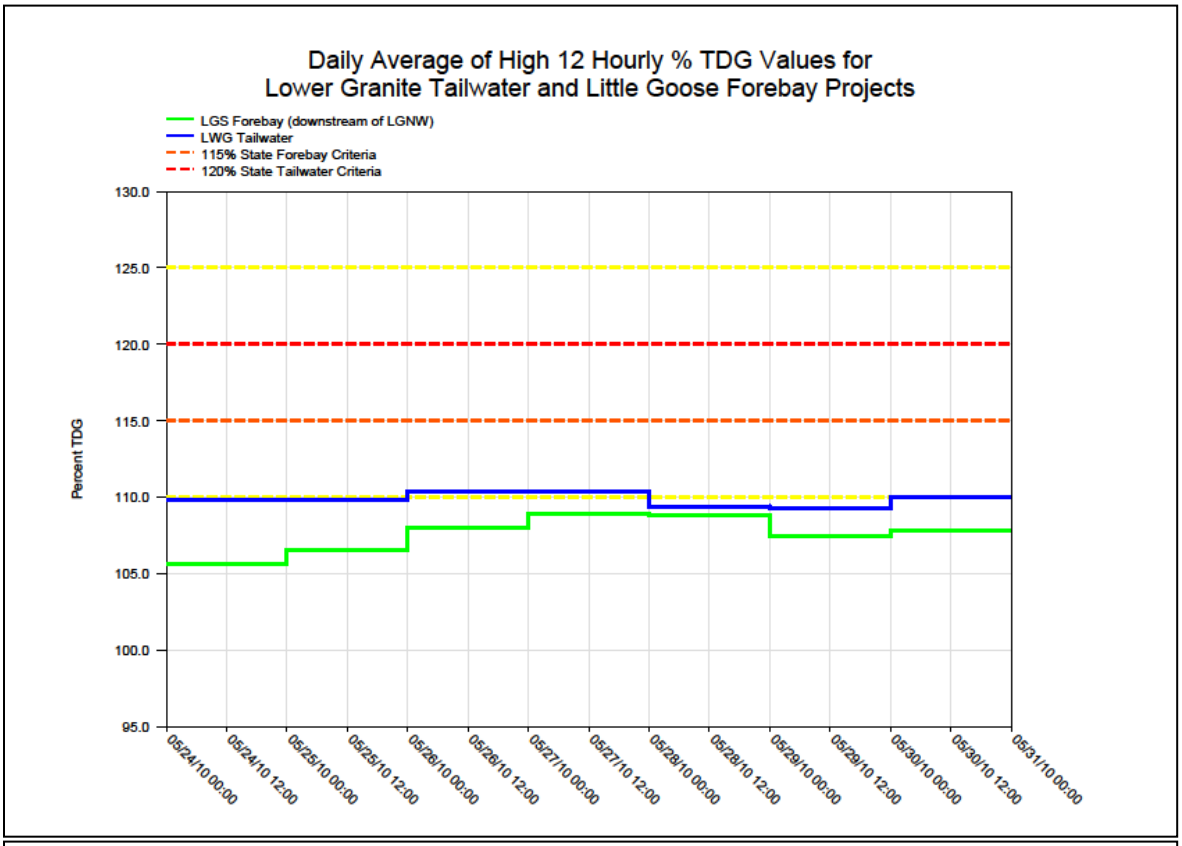

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/17/2010 1:00
5/17/2010 13:00
5/18/2010 1:00
5/18/2010 13:00
5/19/2010 1:00
5/19/2010 13:00
5/20/2010 1:00
5/20/2010 13:00
5/21/2010 1:00
5/21/2010 13:00
5/22/2010 1:00
5/22/2010 13:00
5/23/2010 1:00
5/23/2010 13:00
5/24/2010 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 Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

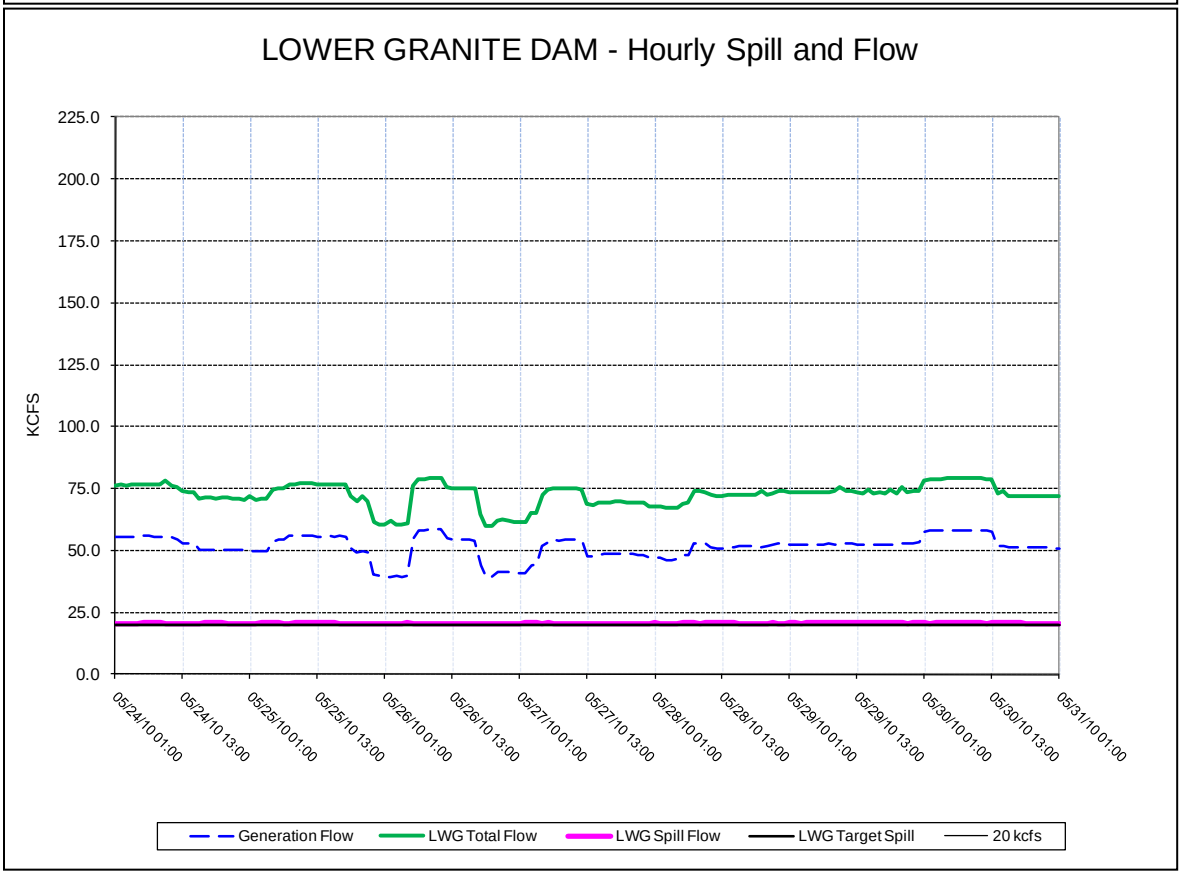
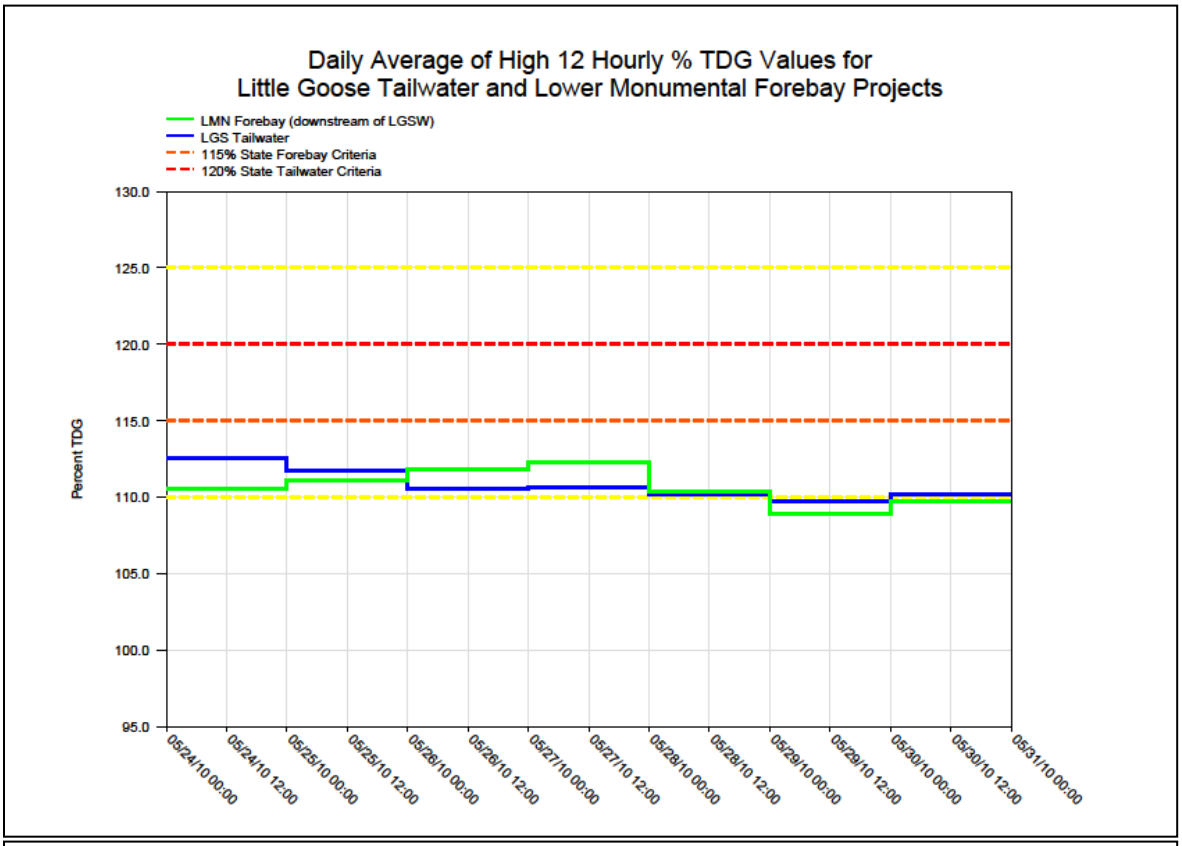

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

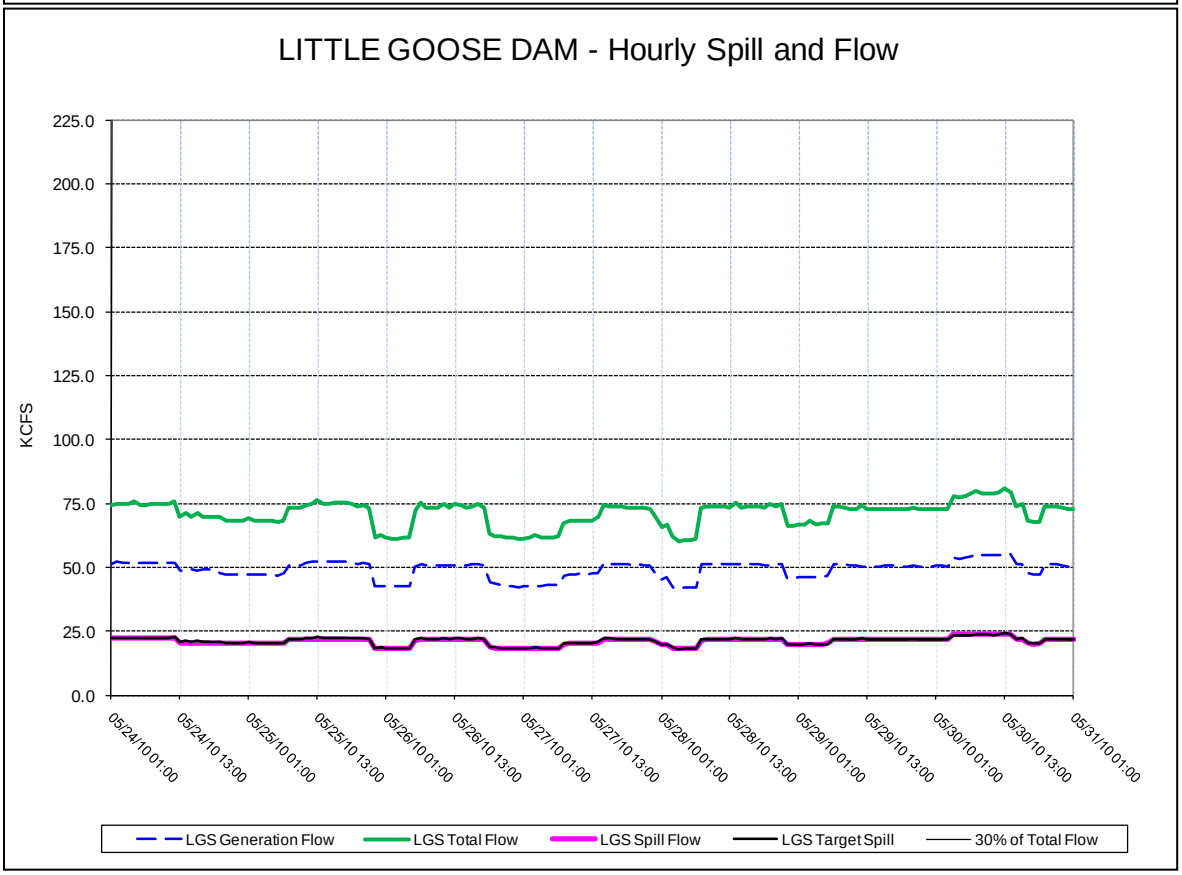
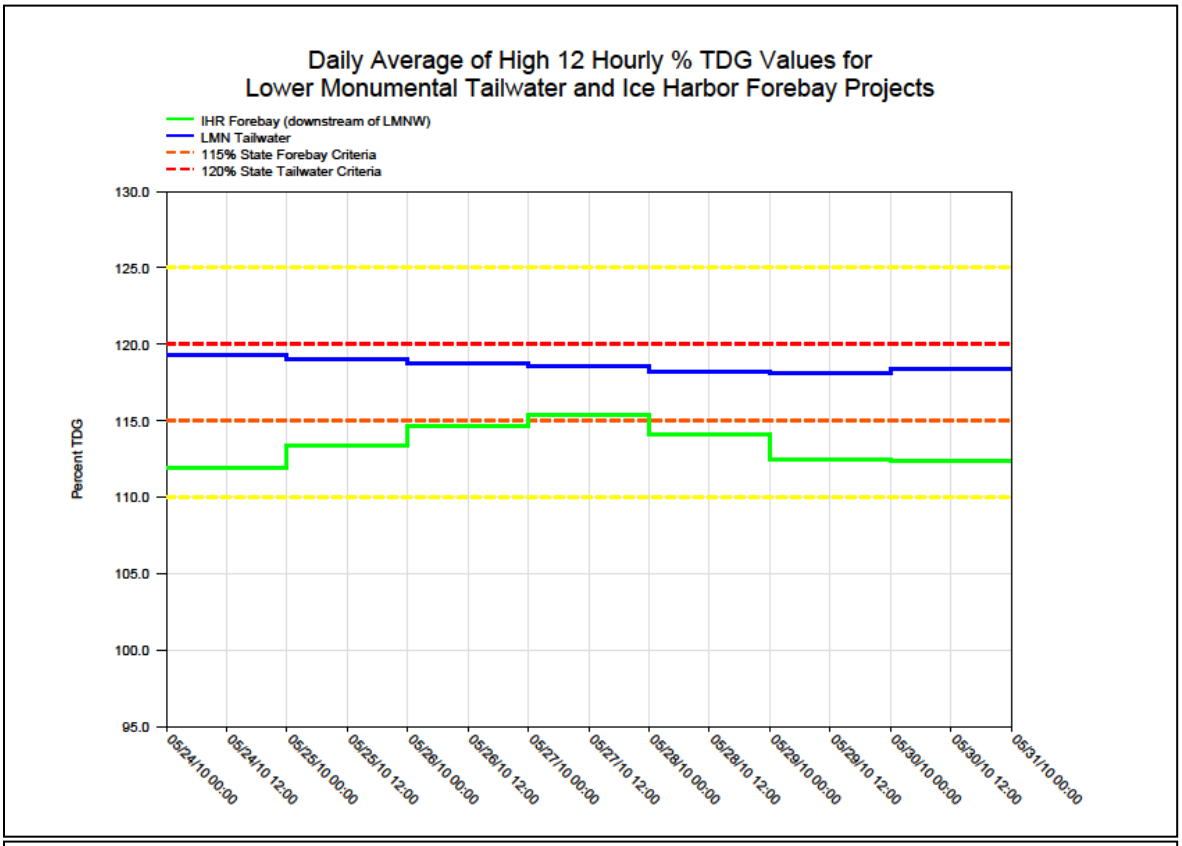

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

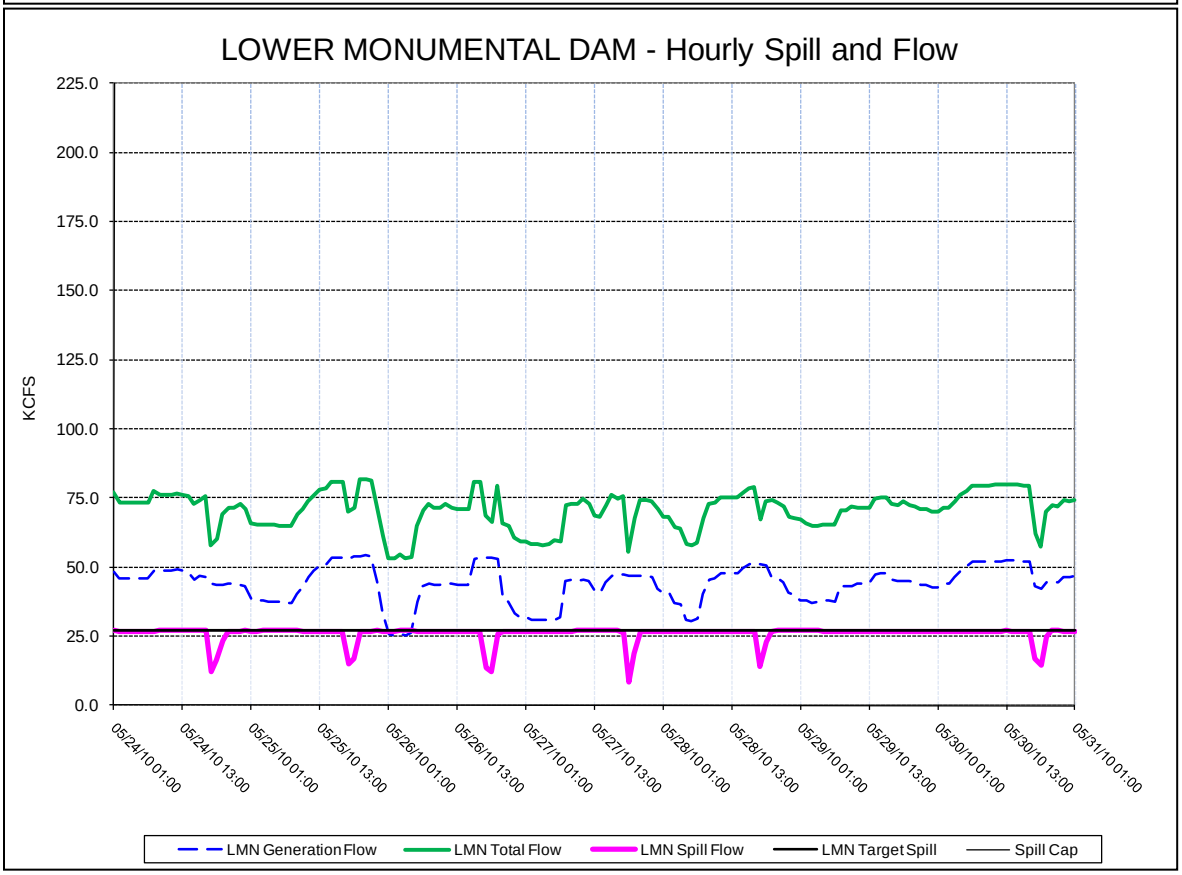
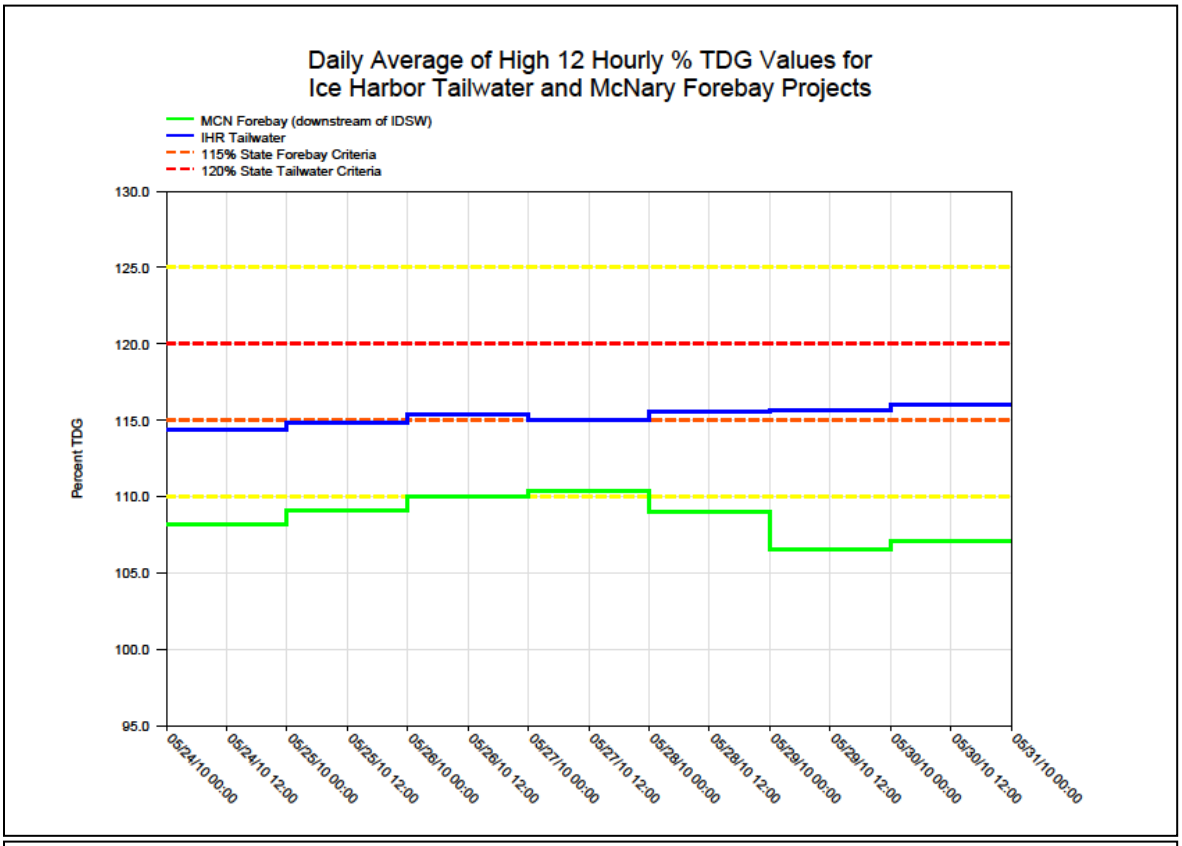

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

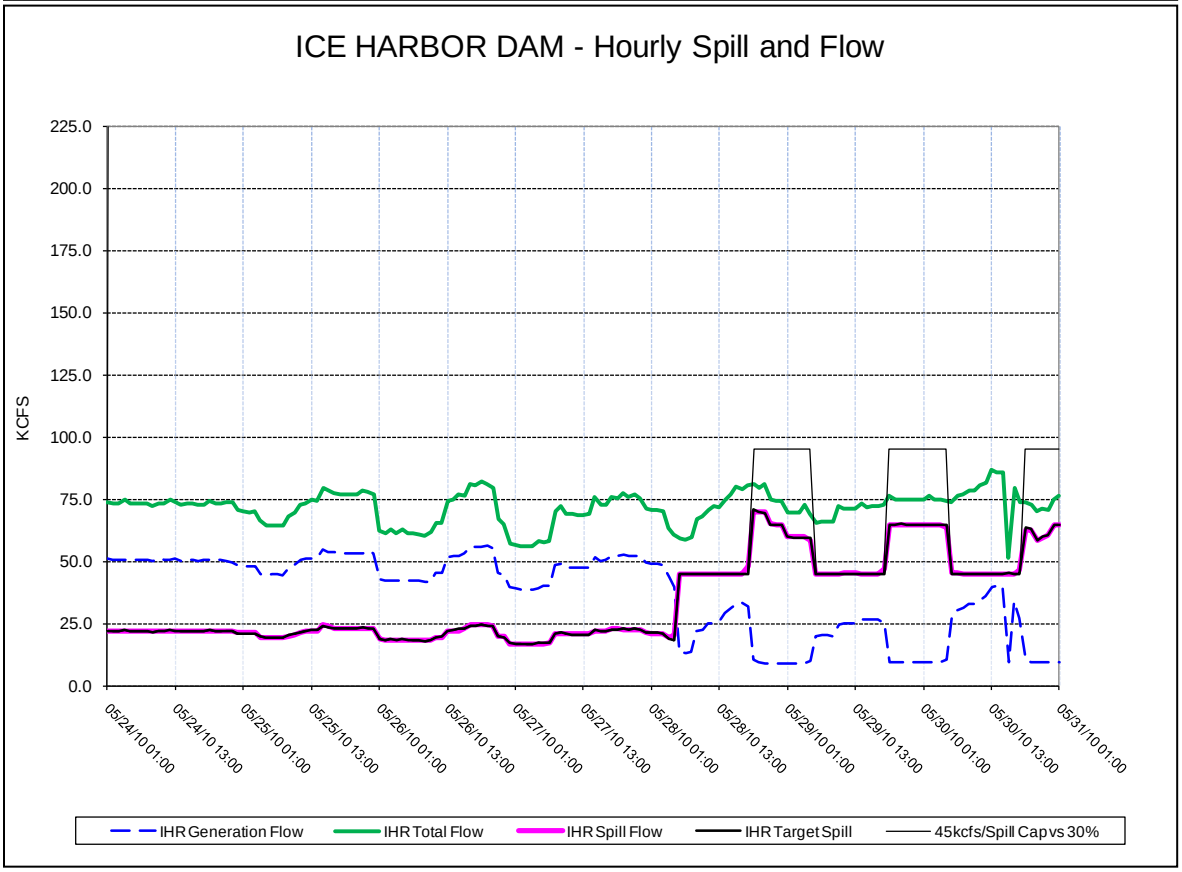
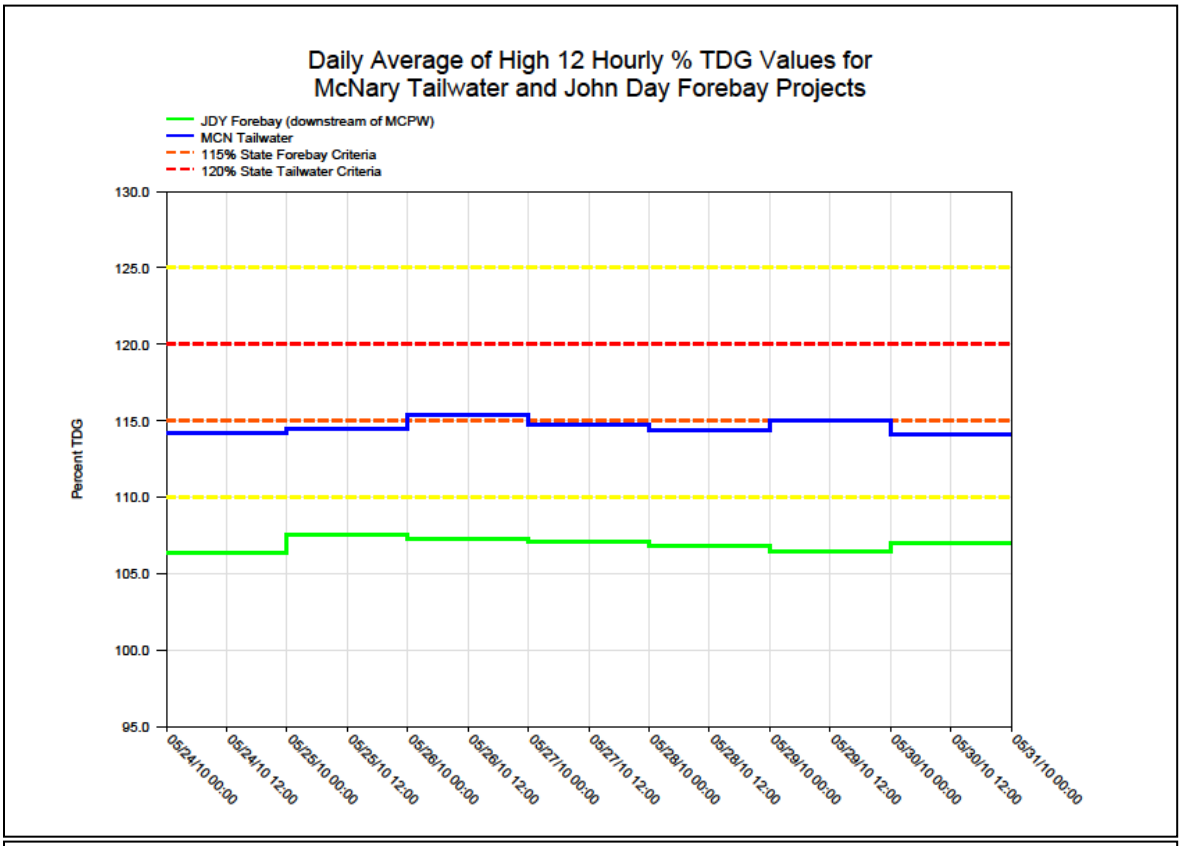

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

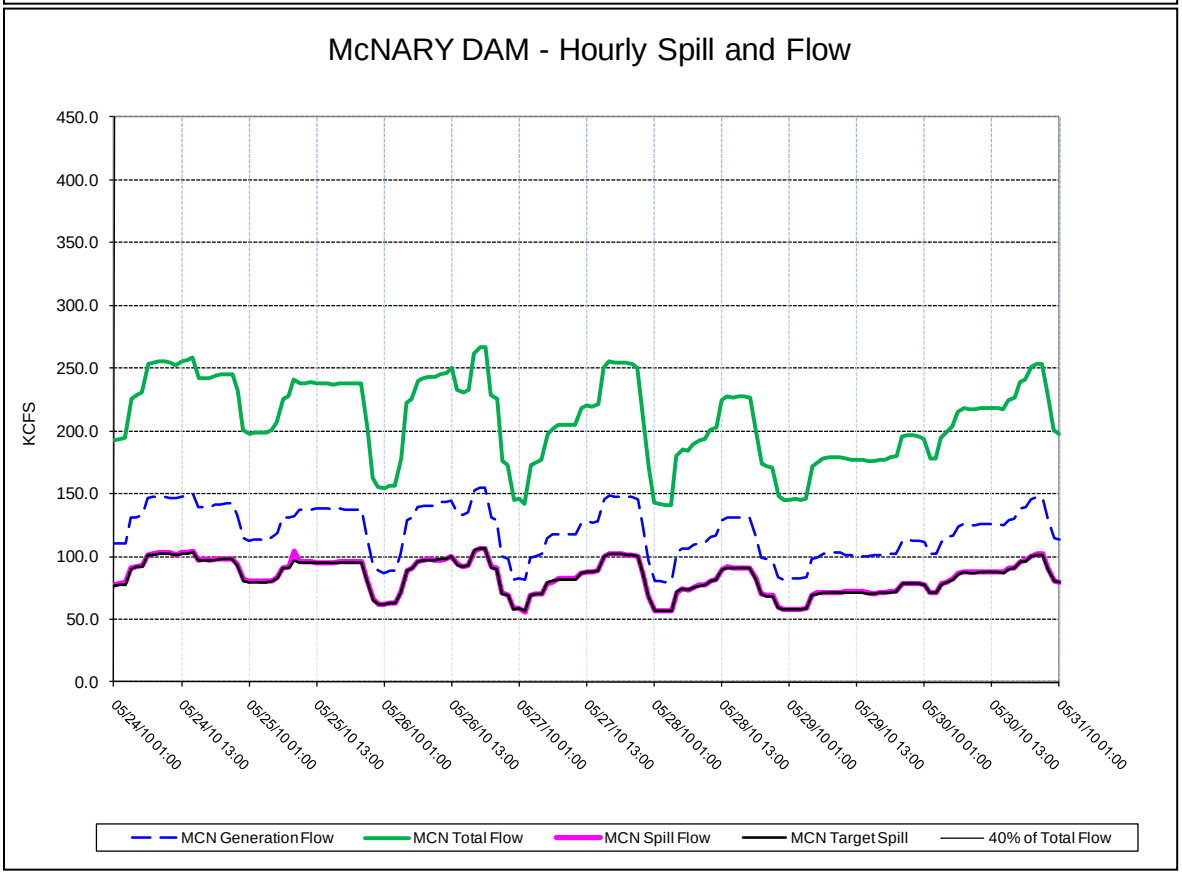
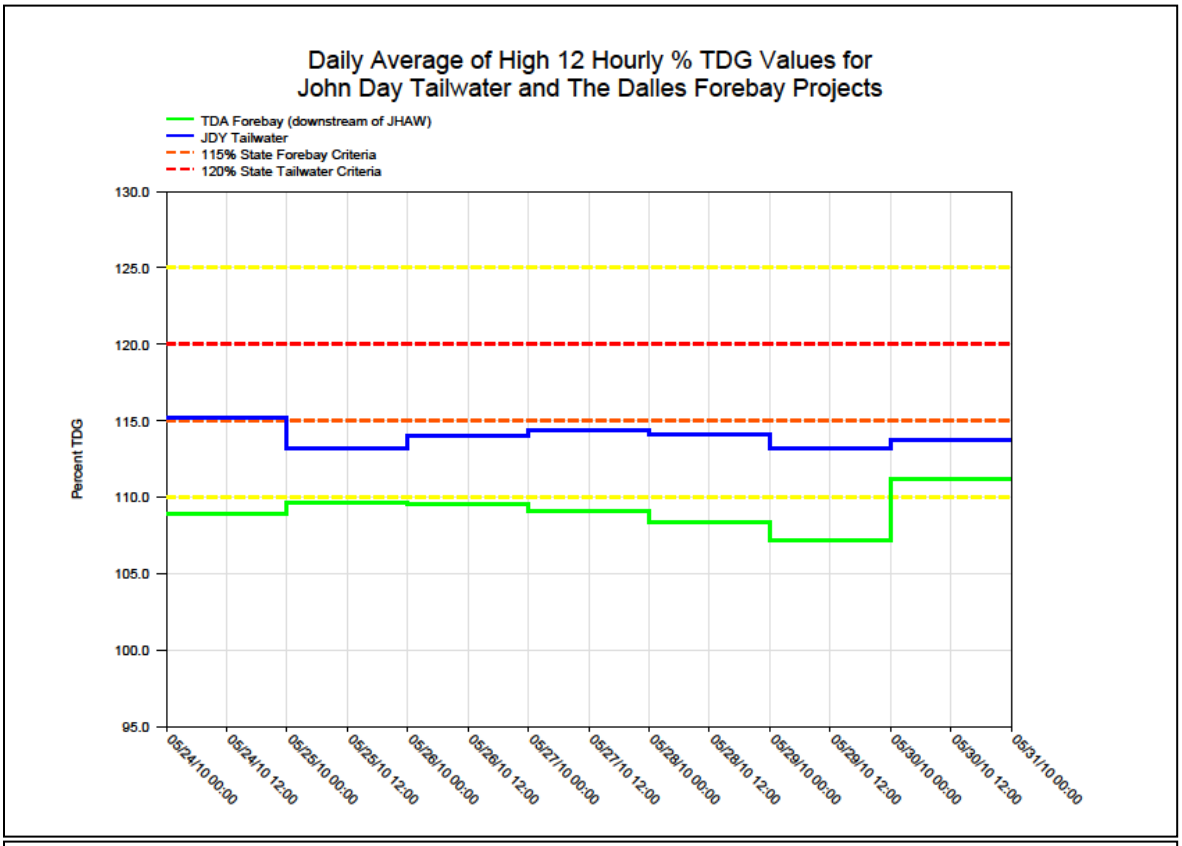

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

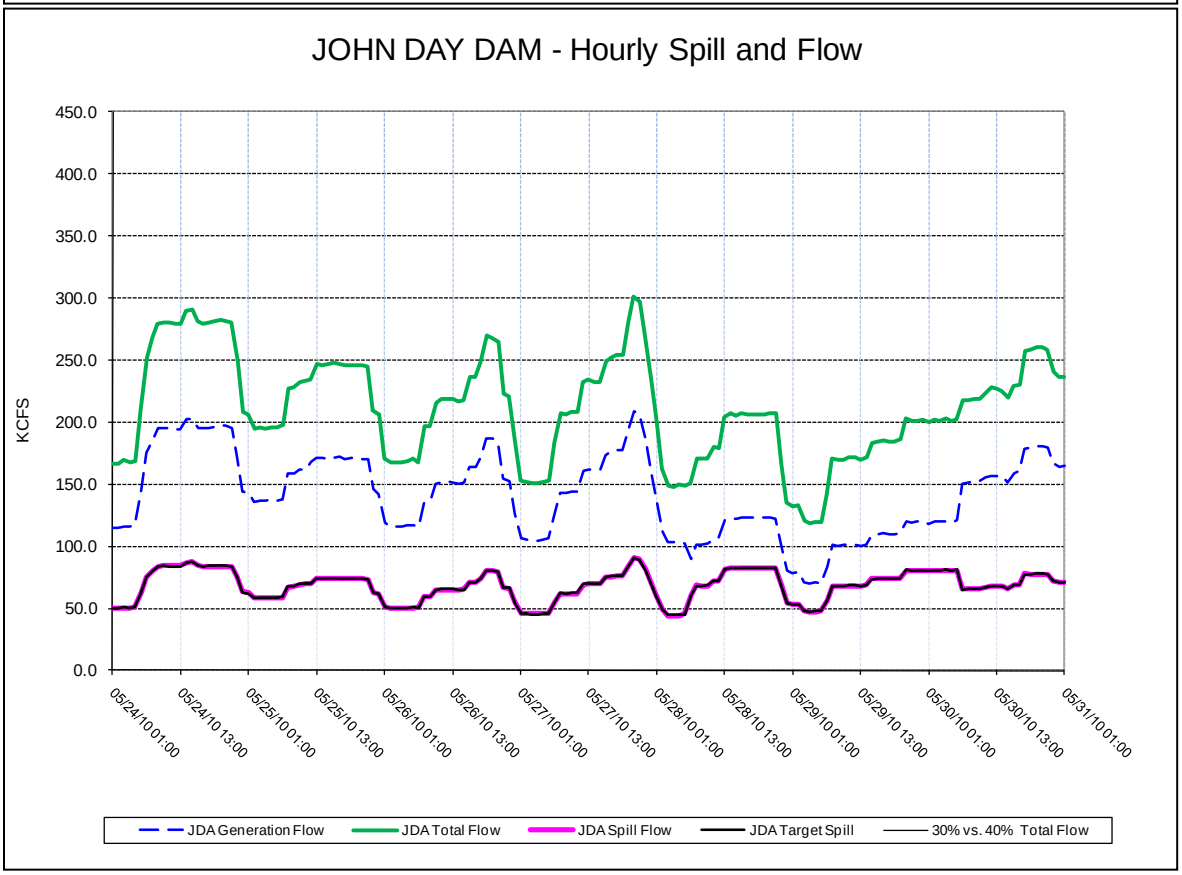
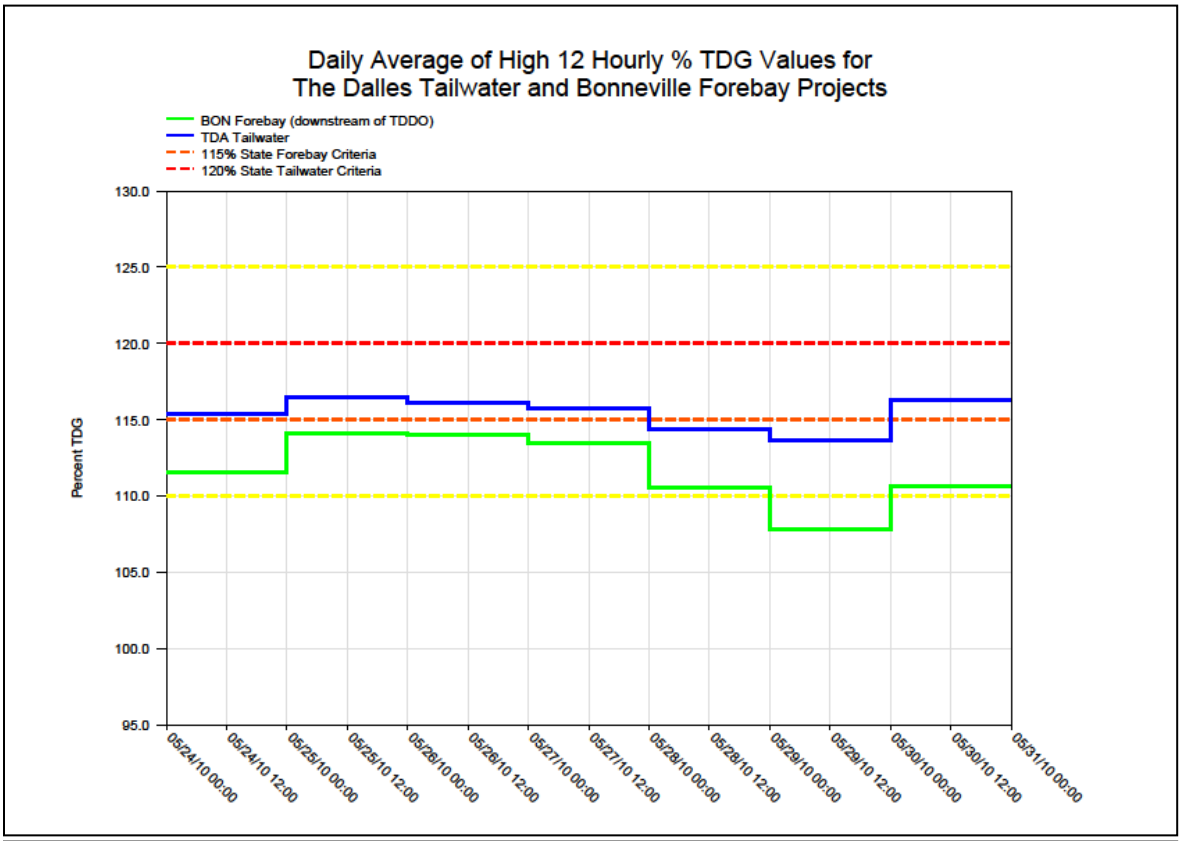

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00

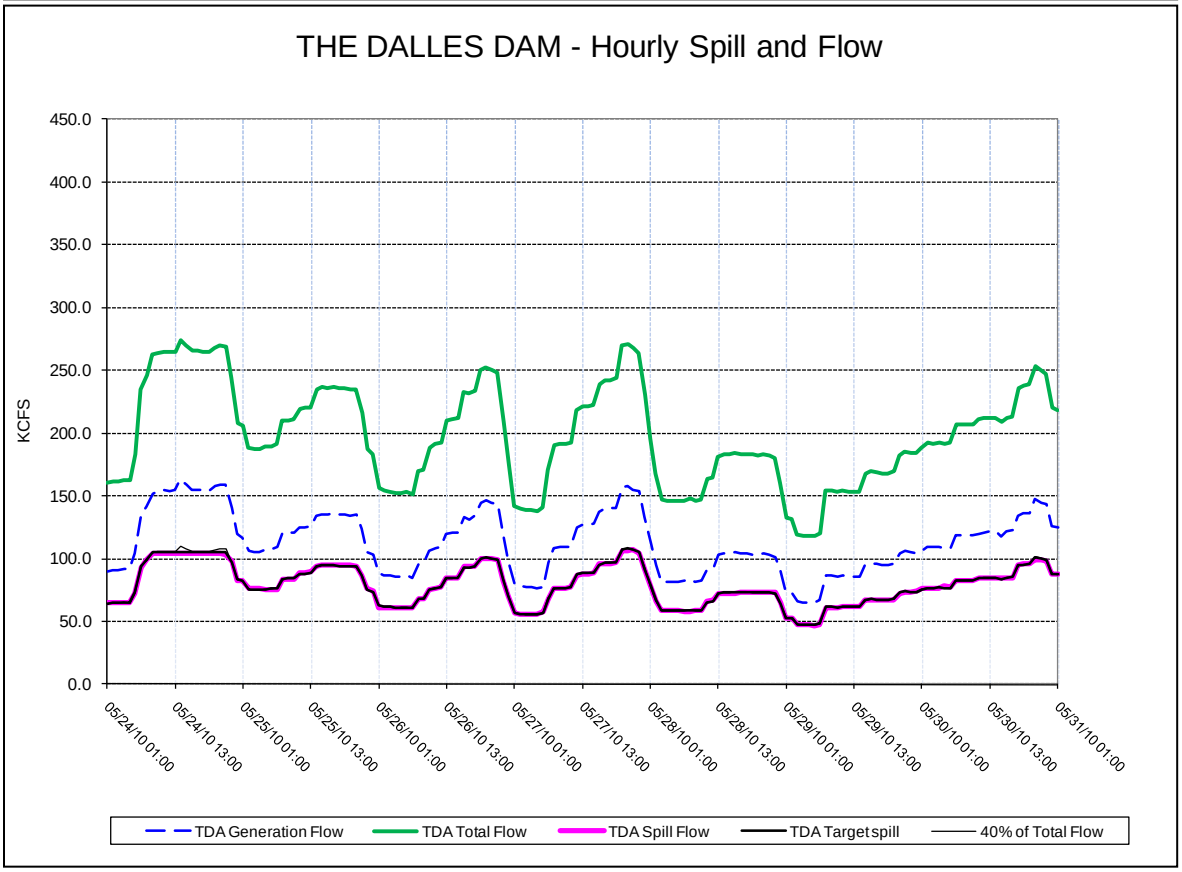
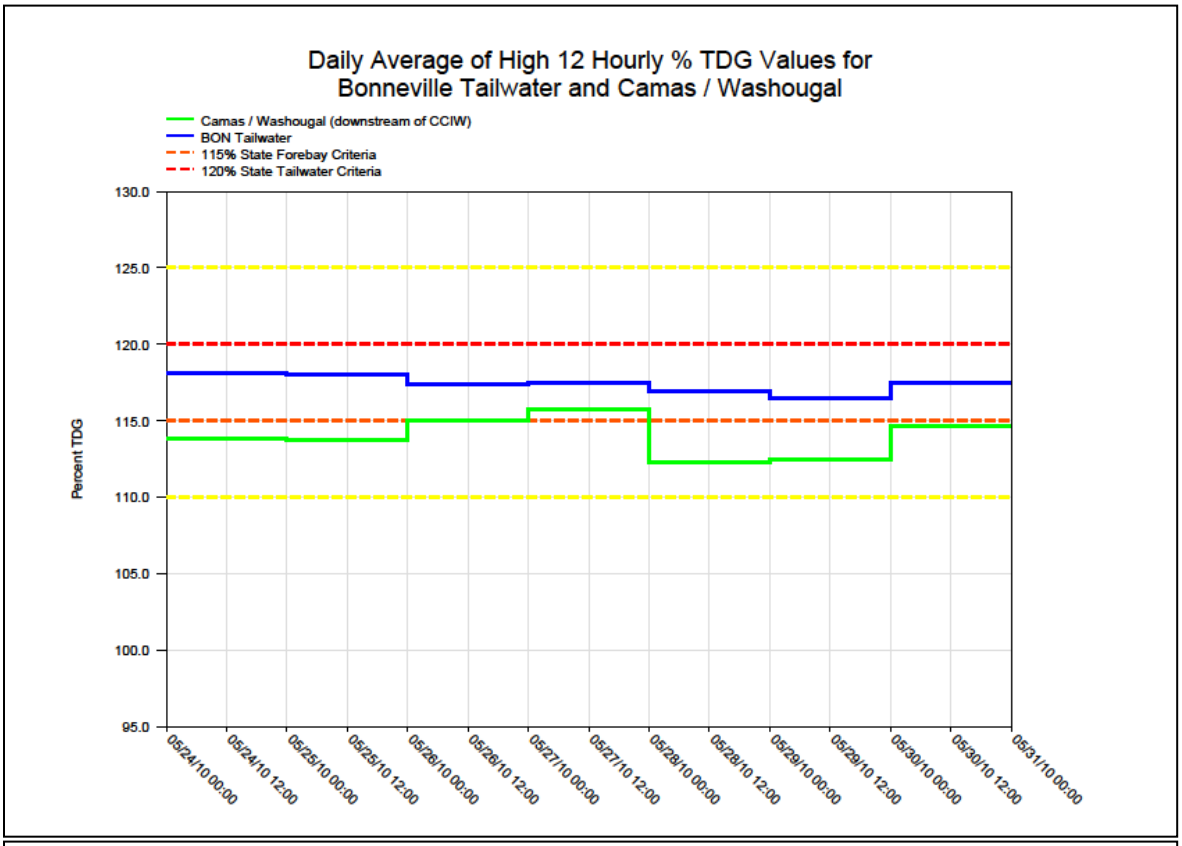
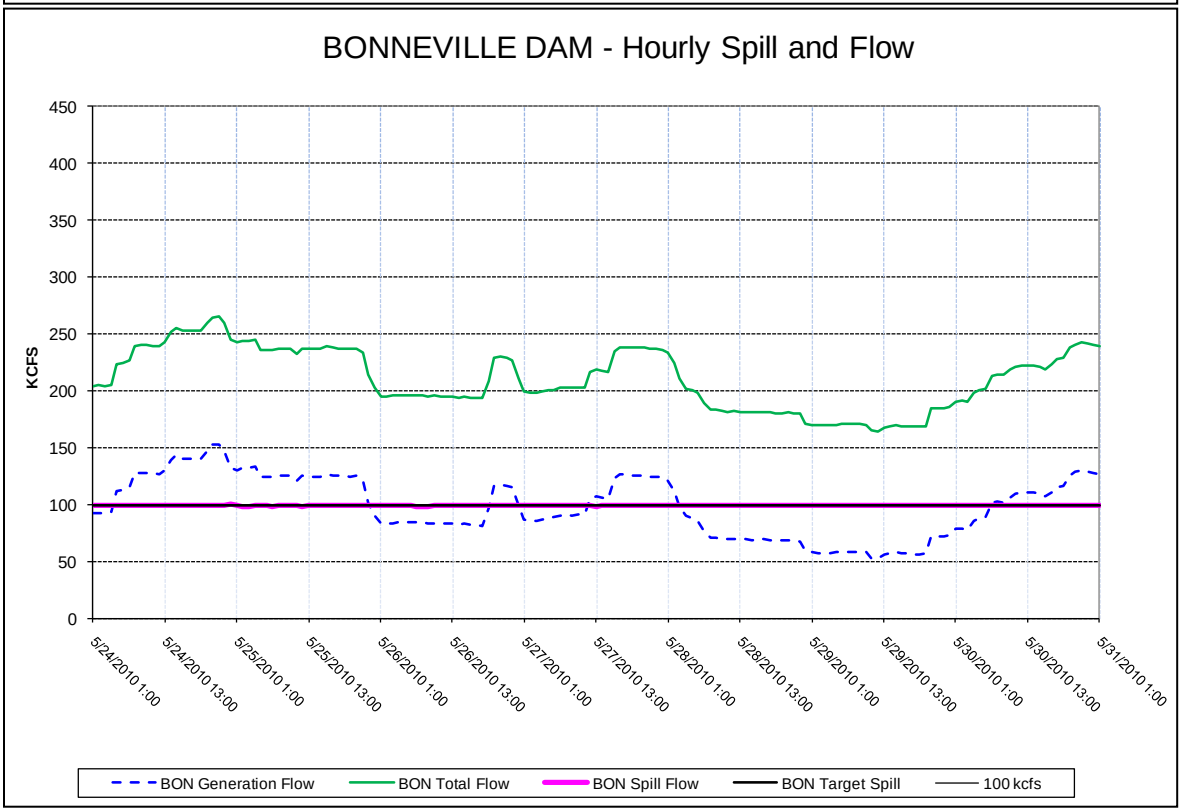

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/24/10 01:00
05/24/10 13:00
05/25/10 01:00
05/25/10 13:00
05/26/10 01:00
05/26/10 13:00
05/27/10 01:00
05/27/10 13:00
05/28/10 01:00
05/28/10 13:00
05/29/10 01:00
05/29/10 13:00
05/30/10 01:00
05/30/10 13:00
05/31/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/24/10 00:00
05/24/10 12:00
05/25/10 00:00
05/25/10 12:00
05/26/10 00:00
05/26/10 12:00
05/27/10 00:00
05/27/10 12:00
05/28/10 00:00
05/28/10 12:00
05/29/10 00:00
05/29/10 12:00
05/30/10 00:00
05/30/10 12:00
05/31/10 00:00


BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/24/2010 1:00
5/24/2010 13:00
5/25/2010 1:00
5/25/2010 13:00
5/26/2010 1:00
5/26/2010 13:00
5/27/2010 1:00
5/27/2010 13:00
5/28/2010 1:00
5/28/2010 13:00
5/29/2010 1:00
5/29/2010 13:00
5/30/2010 1:00
5/30/2010 13:00
5/31/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
100 kcfs

Average Percent TDG for Highest 12-Hours: May 3 – May 30, 2010

Date	FIXED MONITORING STATIONS																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
5/3/2010	101.5	110.2	104.8	109.4	106.7	116.3	109.9	114.5	104.9	115.5	102.2	113.4	107.8	112.9	107.0	116.9	110.8
5/4/2010	100.5	109.8	103.1	108.1	104.4	115.7	107.9	112.8	102.8	113.6	100.8	111.6	106.0	112.0	107.5	116.9	111.8
5/5/2010	101.2	110.4	103.8	108.7	104.9	115.6	107.8	111.7	103.3	114.6	101.0	111.4	106.0	111.5	108.5	116.5	112.1
5/6/2010	100.4	110.8	103.8	109.0	105.1	115.3	110.1	114.3	103.2	116.6	101.1	111.1	105.8	111.2	108.8	116.7	**115.2**
5/7/2010	100.4	110.4	105.5	109.7	107.8	116.1	113.8	114.8	105.9	115.9	103.1	114.0	110.1	115.1	110.2	116.7	114.2
5/8/2010	101.7	111.1	107.2	110.5	108.7	116.3	114.8	114.6	107.5	116.9	103.6	112.2	111.1	114.8	113.7	115.8	**116.0**
5/9/2010	102.4	111.3	109.3	112.2	109.8	117.2	**115.7**	112.9	111.1	116.7	104.4	112.6	109.8	114.4	**115.8**	115.7	**117.2**
5/10/2010	102.9	111.3	110.3	112.4	110.7	116.5	**116.5**	112.6	111.9	115.9	105.5	113.0	108.9	113.1	115.0	115.1	**116.3**
5/11/2010	102.6	111.1	109.9	112.8	110.1	116.0	**116.0**	112.5	111.4	116.2	105.9	113.2	107.6	111.2	111.0	114.5	112.9
5/12/2010	102.1	111.5	109.9	112.4	110.6	115.8	**115.6**	114.0	110.6	114.8	106.7	115.1	107.9	112.6	108.3	116.0	114.4
5/13/2010	102.3	110.9	111.4	114.4	111.4	118.2	**116.7**	114.1	110.7	115.0	107.2	115.7	112.3	116.1	111.5	116.5	114.9
5/14/2010	102.9	111.1	112.6	116.6	112.4	118.7	**117.9**	113.8	111.8	116.5	108.0	113.2	113.3	116.1	114.9	116.5	**116.2**
5/15/2010	103.0	111.8	114.1	116.3	113.4	119.0	**118.9**	114.6	113.1	118.2	110.4	113.1	112.9	115.2	**116.1**	116.1	**117.8**
5/16/2010	103.9	110.7	**116.2**	116.9	114.7	118.6	**119.7**	115.7	114.1	118.6	111.8	114.8	113.6	115.8	**116.1**	115.3	**117.5**
5/17/2010	103.9	110.4	**116.6**	116.4	**116.6**	115.3	**119.6**	115.9	115.0	117.8	113.0	114.1	113.2	116.3	**116.0**	115.8	**117.3**
5/18/2010	103.6	109.9	114.5	114.0	**116.6**	115.9	**118.3**	116.3	113.3	116.3	112.7	114.4	111.4	114.1	113.9	115.5	114.4
5/19/2010	102.8	109.7	110.7	113.1	114.4	114.8	114.5	117.4	111.2	115.5	112.0	115.7	113.0	116.3	112.2	116.3	112.0
5/20/2010	101.5	109.4	107.5	113.1	111.1	116.9	112.3	119.4	108.4	115.0	110.5	116.2	110.6	114.6	111.9	117.2	110.7
5/21/2010	103.1	110.0	106.3	113.5	112.1	119.0	111.7	119.2	109.8	114.9	110.5	118.1	113.0	117.9	114.3	118.7	114.0
5/22/2010	102.7	109.7	105.8	112.3	112.8	119.2	112.4	116.2	108.8	114.9	108.8	115.0	110.6	116.5	112.7	118.1	113.4
5/23/2010	103.0	109.8	105.2	111.5	111.8	119.4	112.1	114.2	108.2	113.7	106.7	113.4	107.5	114.4	110.3	117.5	112.8
5/24/2010	102.6	109.8	105.6	112.6	110.6	119.3	111.9	114.4	108.2	114.2	106.3	115.2	108.9	115.4	111.5	118.1	113.9
5/25/2010	103.5	109.8	106.5	111.8	111.1	119.0	113.4	114.8	109.1	114.5	107.5	113.2	109.6	116.4	114.1	118.0	113.7
5/26/2010	103.8	110.3	108.0	110.5	111.9	118.7	114.6	115.3	110.0	115.4	107.2	114.0	109.6	116.1	114.0	117.3	115.0
5/27/2010	103.8	110.3	108.9	110.7	112.3	118.6	**115.4**	115.1	110.4	114.7	107.1	114.4	109.1	115.8	113.4	117.5	**115.7**
5/28/2010	102.9	109.4	108.8	110.2	110.3	118.2	114.1	115.5	109.0	114.4	106.8	114.1	108.3	114.4	110.5	116.9	112.3
5/29/2010	101.2	109.3	107.4	109.7	108.9	118.1	112.5	115.7	106.5	115.0	106.4	113.2	107.2	113.6	107.8	116.5	112.5
5/30/2010	101.5	110.0	107.8	110.2	109.7	118.4	112.4	116.0	107.1	114.1	107.0	113.7	111.1	116.3	110.7	117.5	114.6

Generated: Tuesday June 1, 2010

Number of hours of data reported in a given day

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

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

Total Dissolved Gas Monitoring Stations

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

Effective April, 2006

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
June 2010

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

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the U.S. District Court of Oregon April 21, 2010 Joint Order adopting the 2010 Spring Fish Operations Plan (2010 Spring FOP), and the June 16, 2010 Order adopting the 2010 Summer Fish Operations Plan (2010 Summer FOP). The 2010 Spring FOP and Addendum, and the 2010 Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring and summer fish migration seasons, generally April through August[1]. To the extent Corps project operations are not specified in the 2010 Spring FOP or the 2010 Summer FOP, the FCRPS operations will be consistent with the 2010 NOAA Fisheries Supplemental Biological Opinion (2010 Supp BiOp), the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2010 Water Management Plan (WMP), WMP seasonal updates, and the 2010 Fish Passage Plan (FPP).

The Corps' June 2010 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (%TDG) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2010 Spring FOP or 2010 Summer FOP in June.

Data Reporting:

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

[1] The 2010 Summer FOP identified various projects in which spill operations transitioned from spring operations to summer operations during the month of June. Other projects transitioned to summer operations on or about July 1.
[2] Operations are implemented from Monday through Sunday.

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

The weekly graphs begin on May 31 and end on July 4 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

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

May 31 – June 6	Figures 1 – 8
June 7 – June 13	Figures 9 – 16
June 14 – June 20	Figures 17 – 24
June 21 – June 27	Figures 25 – 32
June 28 – July 4	Figures 33 – 40

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

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

B. Lower Graph: Shows the hourly flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2010 Spring FOP or the 2010 Summer FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Bonneville (75 kcfs) dam.
    - Minimum spill at John Day is 25% of project outflow.

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

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

General Implementation Remarks:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described below. When spill levels briefly deviate below or above the level specified in the 2010 Spring FOP or 2010 Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The June 2010 Spill Variance Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the June 2010 Spill Variance Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2010 Spring FOP or 2010 Summer FOP level of spill while also avoiding exceeding the %TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. Minor low flow conditions that occurred in the lower Snake River during June resulted in Ice Harbor spilling the available inflow above minimum generation, which was less than the target spill level. The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam and Ice Harbor Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not account for this volume of water. However, the actual spill volume remains constant. These variances are recorded in the June 2010 Spill Variance Table for Little Goose and Ice Harbor dams under the variance type “Navigation.”

Also it is important to note that actual spill levels at Corp’s projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2010 Spring FOP or 2010 Summer FOP and the RCC spill priority list, which defines the projects’ %TDG spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2010 Spring FOP and 2010 Summer FOP describe project operations during “Rapid Load Changes” (p. 6). For reporting purposes, the notation “Transmission Stability” in the June 2010 Spill Variance Report Table will replace “Rapid Load Changes” to identify

instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These "Transmission Stability" issues occur because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and following the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary by more than the ±1% requirement or other ranges specified in the 2010 Spring FOP or 2010 Summer FOP than other hours.

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

June Operations:

The month of June was characterized by above average flows[3] for the lower Columbia River and the lower Snake River, caused by above normal rainfall in June affecting the Snake basin and other portions of the Columbia basin. Conditions in June were substantially different from the low flow conditions experienced in April and May, and were not predicted by the long term forecasts.

Because of the below average snow pack and below average water supply forecasts, there were significant concerns earlier in the spring that some of the projects would not fill. Consequently, storage reservoir pool elevations were relatively high going into June consistent with flood control rule curves. The change in conditions in June resulted in regulated flow at The Dalles averaging 316.5 kcfs - the sixth highest June flow during the last twenty years. The Snake and Columbia rivers flows were a result of high flows in unregulated tributaries (natural flows) and higher than anticipated discharges from storage projects, including Hungry Horse, Grand Coulee, Albeni Falls and Dworshak, necessary to manage final reservoir refill.

With the high flow conditions there were instances of involuntary spill continuing through the month as flows exceeded powerhouse capacity. In some of these instances of involuntary spill, the resultant Daily Average of High 12 Hourly %TDG values exceeded the 115 percent forebay and 120 percent tailrace standards as shown in the corresponding %TDG graphs for the lower Columbia and Snake rivers.

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

[3] NOAA River Forecast Center's Runoff Processor indicates 104 percent of normal at Lower Granite Dam and 118 percent of normal at The Dalles Dam for June 2010.

1. Lower Granite Dam - The hourly target spill level was a fixed quantity of 20 kcfs 24-hours/day in accordance with the 2010 Spring FOP, and 18 kcfs 24-hours /day in accordance with the 2010 Summer FOP.
2. Little Goose Dam - The hourly target spill level was 30 percent of total flow for 24-hours/day in accordance with the 2010 Spring and Summer FOPs.
3. Lower Monumental Dam - The hourly target spill level was to the %TDG spill cap for 24-hours/day in accordance with the 2010 Spring FOP, and 17 kcfs 24-hours/day in accordance with the 2010 Summer FOP.
4. Ice Harbor Dam - The hourly target spill alternated every two days between 45 kcfs daytime/%TDG spill cap at nighttime vs. 30 percent of total flow for 24-hours in accordance with the 2010 Spring and Summer FOPs.
5. McNary Dam - The hourly target spill level was 40 percent of total flow for 24-hours/day up to June 19, at which time the target spill level changed to 50% of total flow for 24-hours/day in accordance with the 2010 Spring and Summer FOPs.
6. John Day Dam - The hourly target spill level alternated between 30 percent vs. 40 percent of total flow for 24-hours for the two treatment spring and summer spill test.
7. The Dalles Dam - The target spill level was 40 percent of total flow for 24-hours/day in accordance with the 2010 Spring and Summer FOPs.
8. Bonneville Dam - The hourly target spill level was 100 kcfs 24-hours/day up to June 16, at which time the target spill level alternated between 95 kcfs 24-hours/day vs. 85 kcfs daytime /121 kcfs at nighttime in accordance with the 2010 Spring and Summer FOPs.

As noted above, streamflows during June have been sufficiently high that the low flow provisions of the 2010 Spring FOP or 2010 Summer FOP were implemented at only Ice Harbor during the month of June. Table 1 shows the number of days Ice Harbor was in a low flow condition during the reporting period.

Table 1: Number of Days Projects Generated at Minimum Levels and Spilled Remainder

Project	Number of Days
Ice Harbor	6
Total	6

***Operational Adjustments**:*

1. John Day and Ice Harbor Dams:
From June 5 through June 9, the Corps temporarily modified the spill treatment schedules for John Day (30% vs. 40%) and Ice Harbor (45kcfs/gas cap vs. 30%). BPA requested a change in the planned dates for implementation of the spill treatments at John Day and Ice Harbor dams because of an unexpected increase in river flows and a desire to reduce TDG levels in the lower Columbia River. The request was to switch the start dates of the two treatments from the original spill treatment schedule, which provided for the 30% spill treatment to begin at John Day and Ice Harbor dams on June 5. The proposal was to instead start the 45 kcfs/gas cap treatment at Ice Harbor and the 40% treatment at John Day on June 5 and switch to the 30% treatment at both dams on June 7. The 2010 Spring FOP allows for a temporary

modification at Ice Harbor Dam but was not explicitly provided for John Day Dam. On June 4 via email, the Corps provided TMT with the proposed change in start dates for the spill treatments and indicated that the Corps would implement the change unless there was an objection. The change was implemented to reduce %TDG levels, the spill levels would not be affected, and fish tests would not be impacted. On the morning of June 9 (0600 hours for John Day and 0500 hours for Ice Harbor) the Corps reverted back to original spill treatment schedules for John Day and Ice Harbor.

2. McNary Dam SW Removal:
The spill way weirs (SWs) located in spill bays 19 and 20 at McNary Dam were removed on June 21 instead of June 6 as stated in the 2010 Spring FOP. On June 2, regional salmon managers requested that the Corps delay moving the SWs during the unexpected high flows in early June to facilitate the passage of late migrating yearling Chinook salmon and steelhead. Based on this recommendation the Corps postponed the removal of the SWs until June 10 through 13. On June 7, FPAC recommended continuing to delay the removal of the SWs until approximately June 15 as high flows persisted at McNary Dam. Based on FPAC's recommendation the Corps initiated the removal operation on June 17 and the SWs were removed on June 21. The Corps maintained the 40% spill operation called for in the 2010 Spring FOP and Addendum during the SW removal operation. This operational change was coordinated with FPOM and TMT.

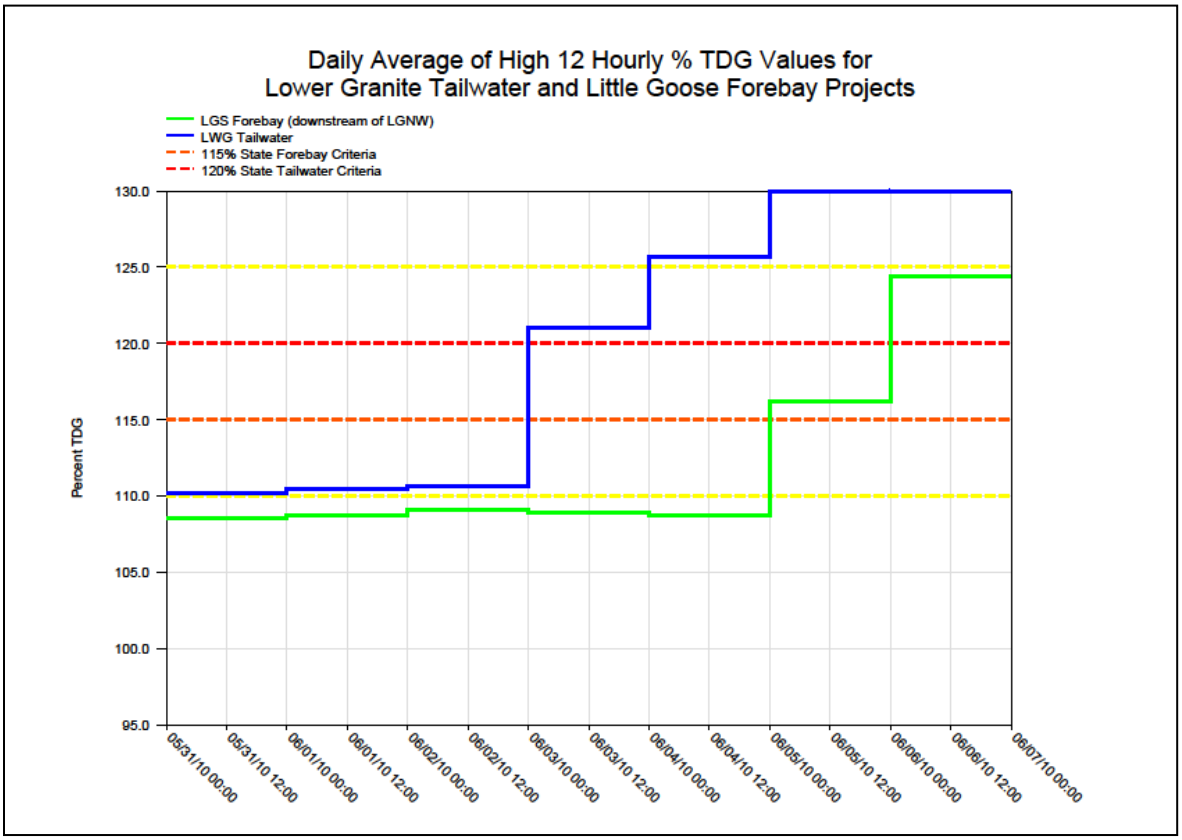
3. Lower Granite Dam Navigation Lock Floating Guidewall Accident:
On June 11 at 1145 hours, a barge hit the Lower Granite Dam navigation lock guidewall, located upstream of the dam, damaging the structure so that it was no longer attached to the dam. In order to minimize the probability that the guidewall would be pulled by the current into the spillway, the Corps immediately shut off spillbays 6-8 while a tug boat held the guidewall in place. Closing down spillbays 6-8 modified the Lower Granite Dam spill pattern identified in the 2010 Fish Passage Plan and spill that would have passed via spillbays 6-8 was redistributed through the remaining spillbays in order to achieve the spill levels identified in the 2010 Spring FOP. The Corps continued with the modified spill pattern until the guidewall was repaired on June 23 at which time the Corps reverted back to the spill pattern specified in the 2010 FPP. The Corps maintained the 20 kcfs spill levels called for in the 2010 Spring FOP and Addendum during the repair of the guide wall. TMT representatives were notified of the accident and the resulting spill pattern change on June 11.

June 2010 Spill Variance Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Additional Spill	7/4/10	0600	1	Human/Program Error	Hourly spill increased to 19.4 kcfs (above 18 kcfs +/- 1% range): due to malfunctioning spillway gate sensors sending erroneous data to GDAC.
Little Goose	Reduced % Spill	6/1/10	2400	1	Navigation[4]	Hourly spill dropped to 28.7% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. 24-hour average spill was 29.9%.
Little Goose	Reduced % Spill	6/26/10	1200	1	Navigation[4]	Hourly spill dropped to 28.4% (below 30.0% +/- 1% range): Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/1/10	1900-2000	2	Navigation[4]	Hourly spill dropped to 12.0 to 24.1 kcfs (below spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/3/10	1900	1	Navigation[4]	Hourly spill dropped to 17.5 kcfs (below spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/15/10	1800-1900	2	Navigation[4]	Hourly spill dropped to 19.2 and 22.3 kcfs (below spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/19/10	1800-1900	2	Navigation[4]	Hourly spill dropped to 19.1 and 22.6 kcfs (below spill cap of 27 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/23/10	1800-1900	2	Navigation[4]	Hourly spill dropped to 9.4 and 14.9 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/25/10	1700	1	Navigation[4]	Hourly spill dropped to 14.0 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/27/10	1800-1900	2	Navigation[4]	Hourly spill dropped to 10.3 to 15.1 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	6/29/10	1700-1800	2	Navigation[4]	Hourly spill dropped to 11.5 to 15.3 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/1/10	1800-1900	2	Navigation[4]	Hourly spill dropped to 12.3 to 15.8 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Ice Harbor	Reduced % Spill	6/2/10	0200	1	Navigation[4]	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. 24-hour average spill was 29.7%.
Ice Harbor	Reduced % Spill	6/30/10	1800	1	Navigation[4]	Hourly spill dropped to 28.8% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. 24-hour average spill was 29.8%.
Ice Harbor	Reduced % Spill	7/4/10	1300	1	Navigation[4]	Hourly spill dropped to 28.8% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. 24-hour average spill was 29.8%.
McNary	Reduced % Spill	6/30/10	0200-0700	6	Human/Program Error	Hourly spill dropped to 45.3 - 47.0% (below 50.0% +/- 1% range): Spill inadvertently set at a level below what was specified in the FOP. 24-hour average spill percentage was 48.6%".
John Day	Additional % Spill	6/17/10	2400	1	Human/Program Error	Hourly spill increased to 31.2 % (above 30.0% +/- 1% range): Log book indicates a request to change to 95 kcfs at 2300, but change did not occur until a few minutes later.
The Dalles	Additional % Spill	5/31/10	2300	1	Human/Program Error	Hourly spill increased to 41.1% (above 40.0% +/- 1% range): Log book indicates a request to change to 76 kcfs at 2234, but change did not occur until later in the hour. 24-hour avg. spill was 40.4%.
The Dalles	Reduced % Spill	6/13/10	1600-1700	2	Operational Limitations	Hourly spill dropped to 38.1 to 38.4% (below 40.0% +/- 1% range): Project was using the new spill pattern for 125 kcfs which resulted in 121.9-122.8 kcfs spill due to spill stop settings (see p.3). 24-hour avg. spill was 39.0%.
The Dalles	Reduced % Spill	6/14/10	0900-1400	6	Operational Limitations	Hourly spill dropped to 38.3 to 38.8% (below 40.0% +/- 1% range): Project was using the new 125 kcfs spill pattern which resulted in 122.9-123.5 kcfs spill stop settings (see p. 3). 24-hour avg. spill was 39.7%
The Dalles	Additional % Spill	6/17/10	1000-1100	2	Maintenance	Hourly spill increased to 41.2 to 42.9 % (above 40.0% +/- 1% range because Line 2 went out of service. 24-hour avg. spill was 39.9%.
The Dalles	Additional % Spill	6/21/10	1600	1	Transmission Stability	Hourly spill increased to 41.6 % (above 40.0% +/- 1% range): Due to project being on response during rapidly changing load as described on p. 3-4. 24-hour avg. spill was 39.9%.
Bonneville	Additional Spill	6/4/10	1500-1600	2	Maintenance	Hourly spill was 99.3 and 93.3 kcfs instead of decreasing to the new spill cap of 90 kcfs because units were switching off and on for maintenance.

[4] Additional details provided on p. 3

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
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06/06/10 12:00
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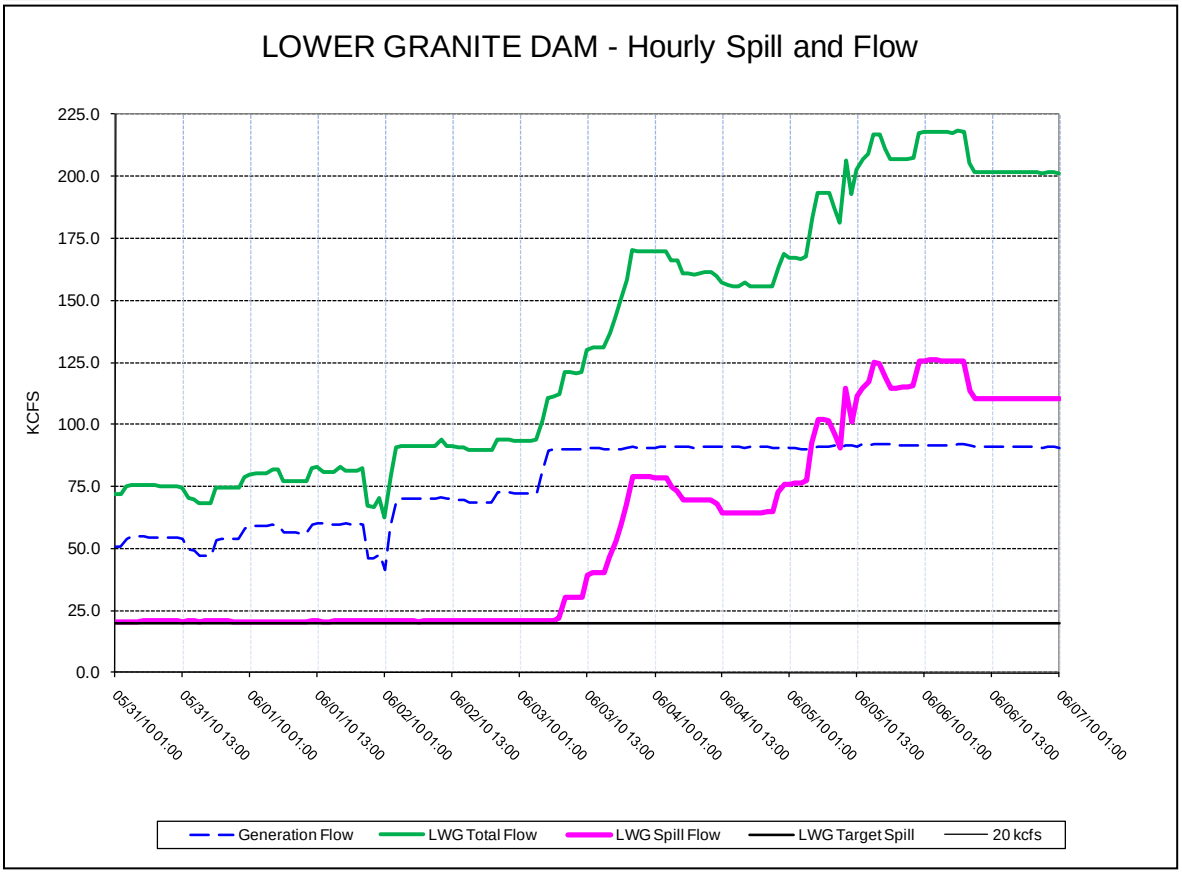
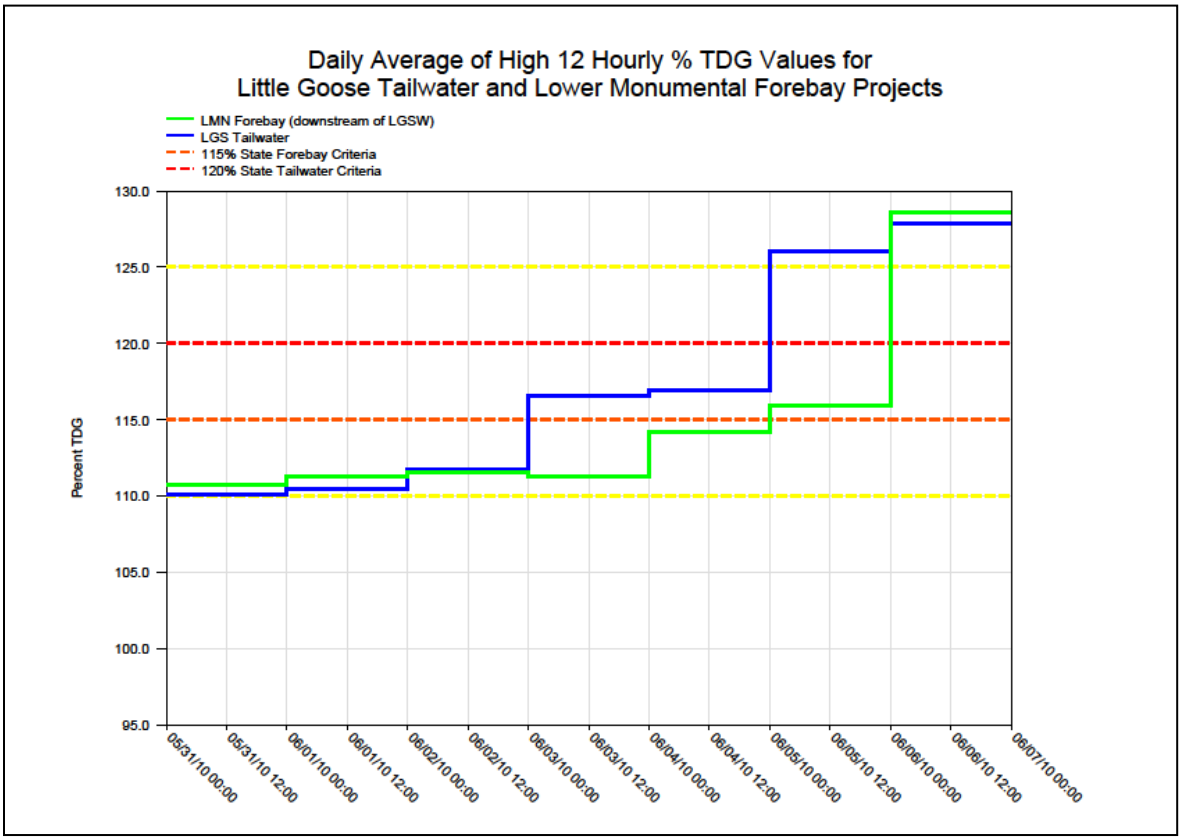

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

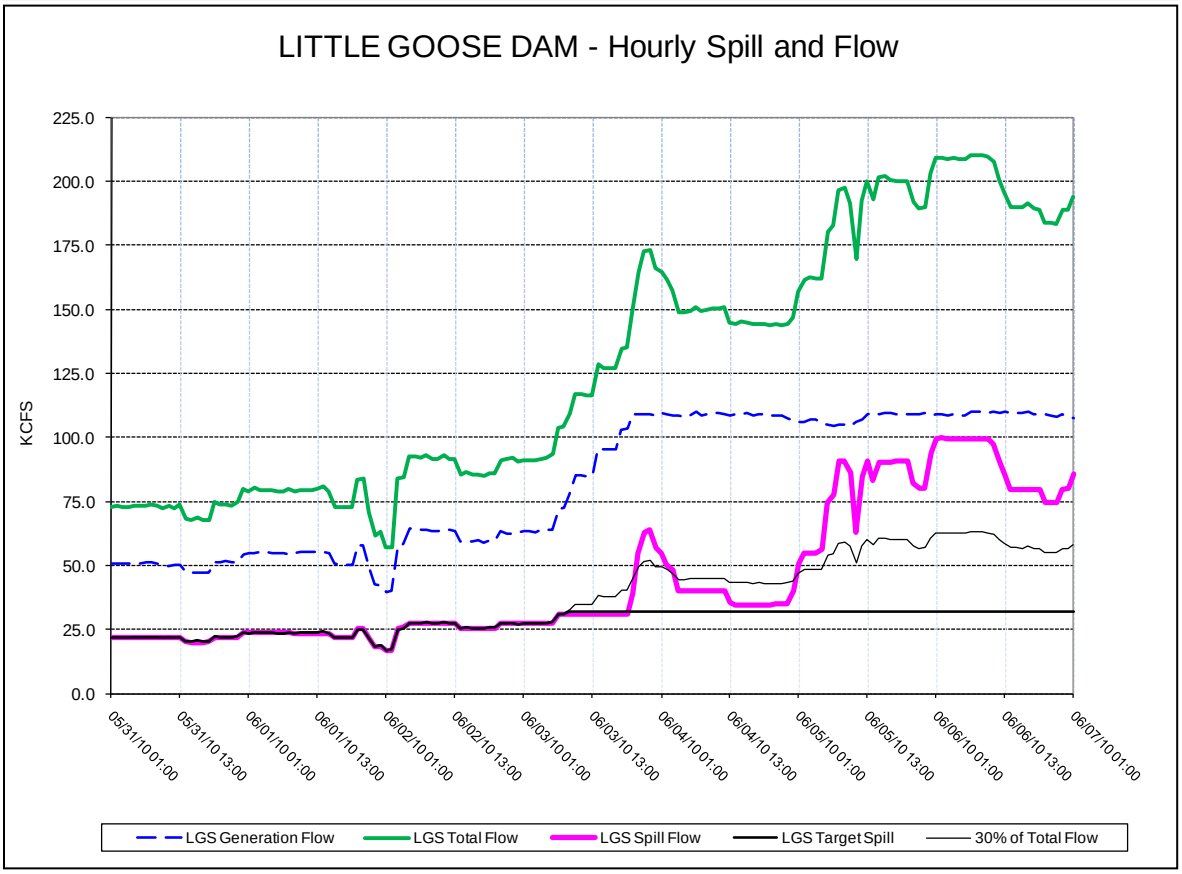
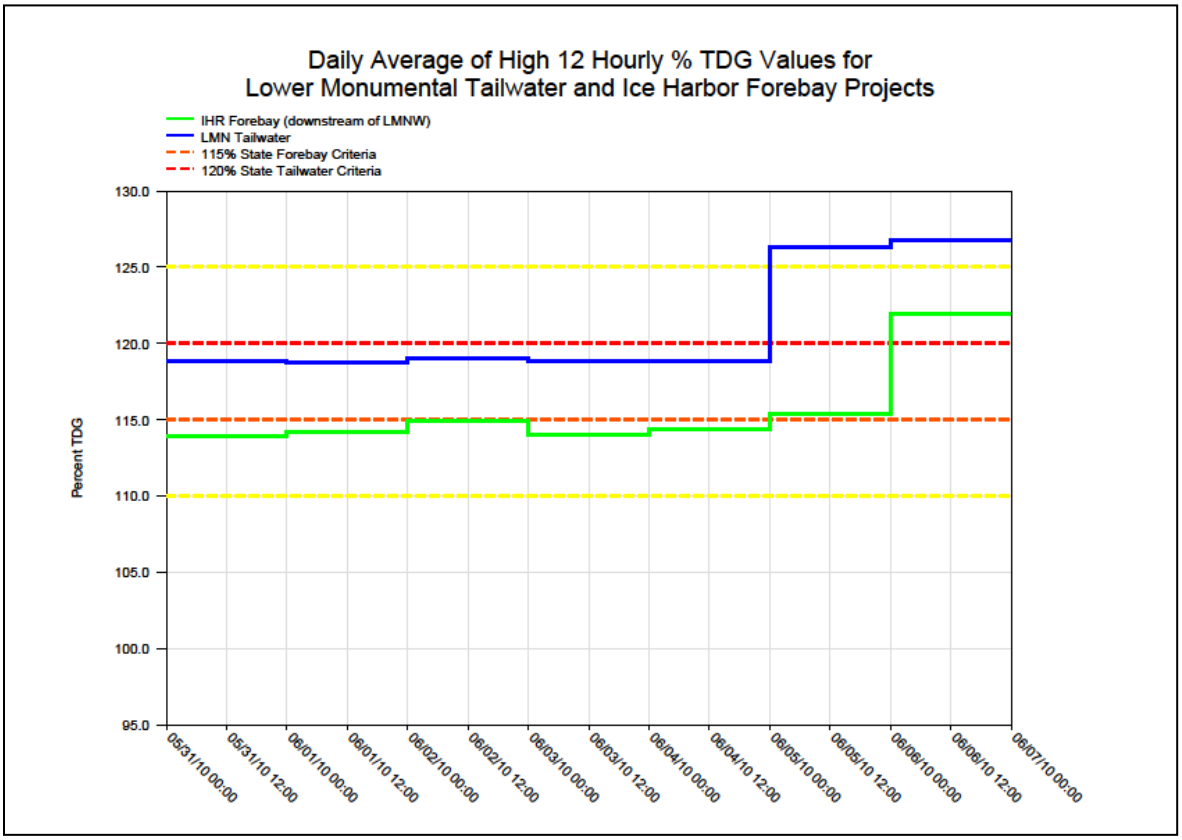

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

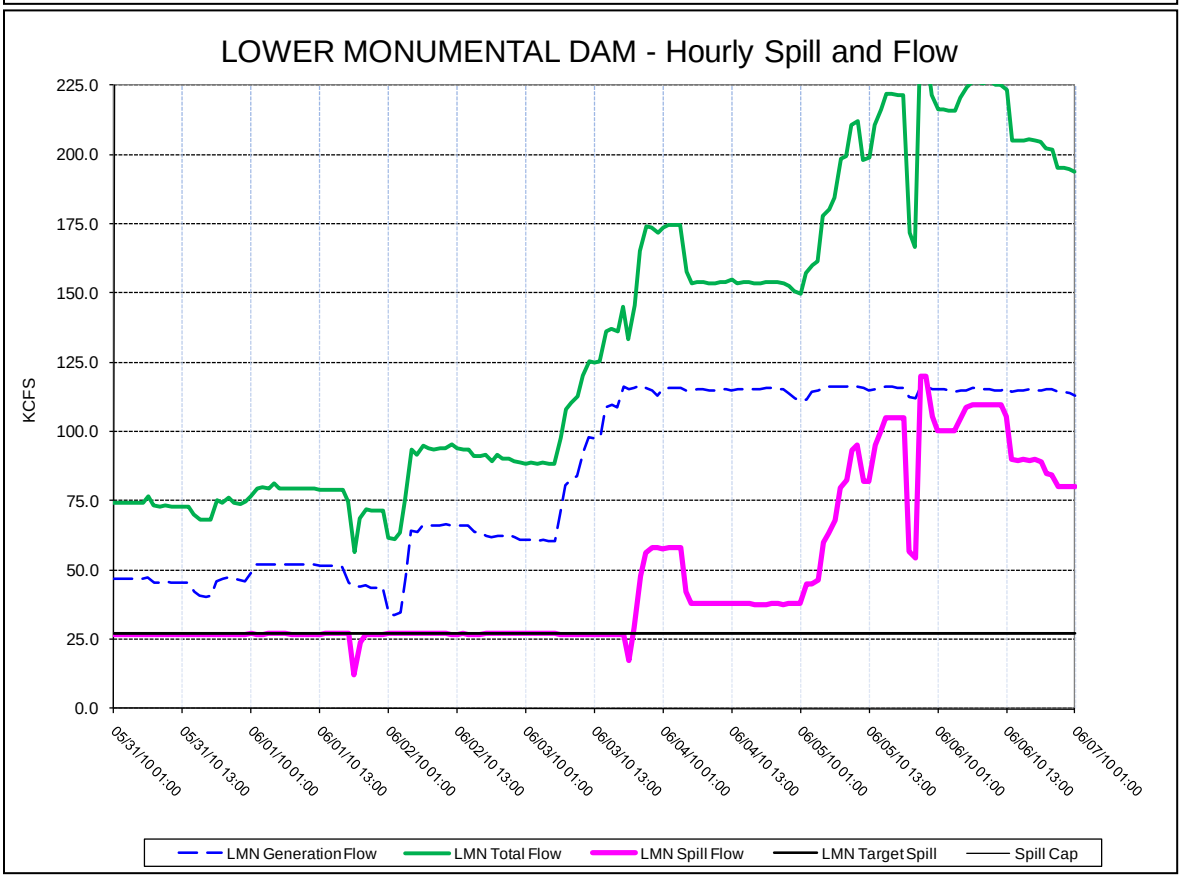
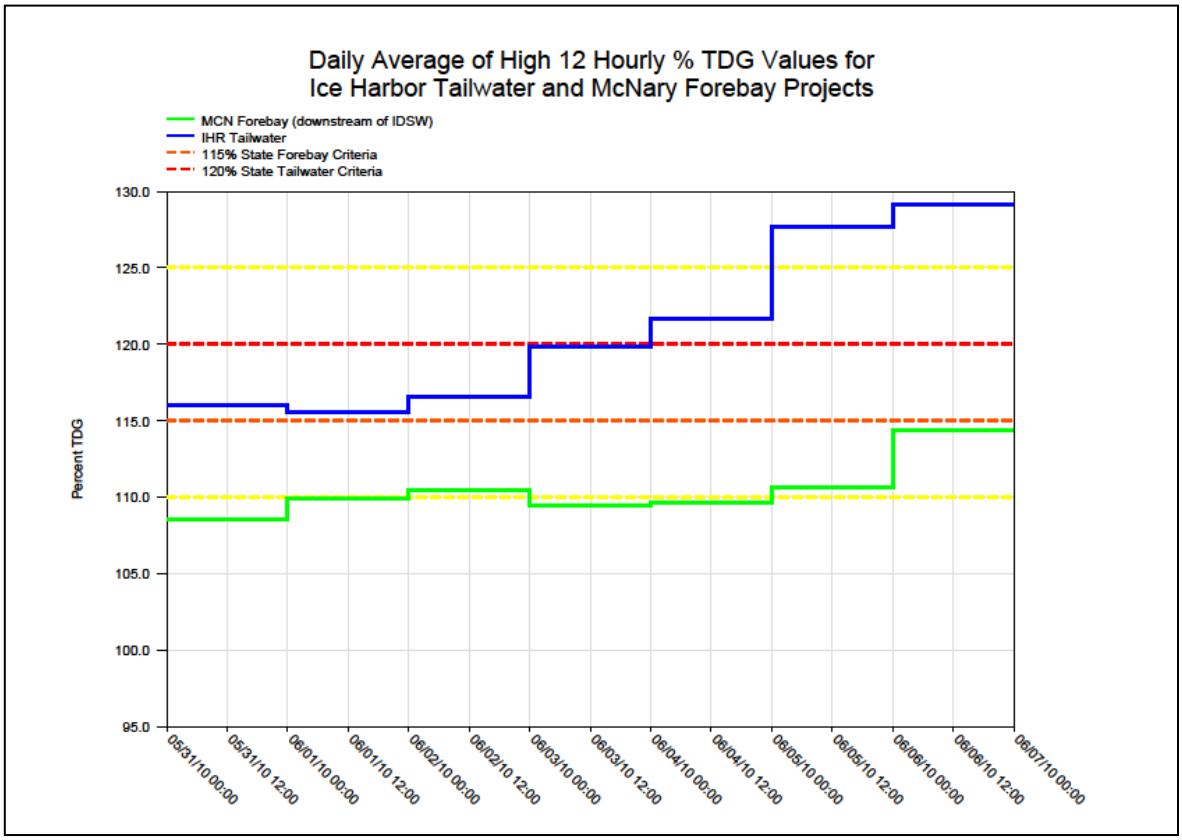

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

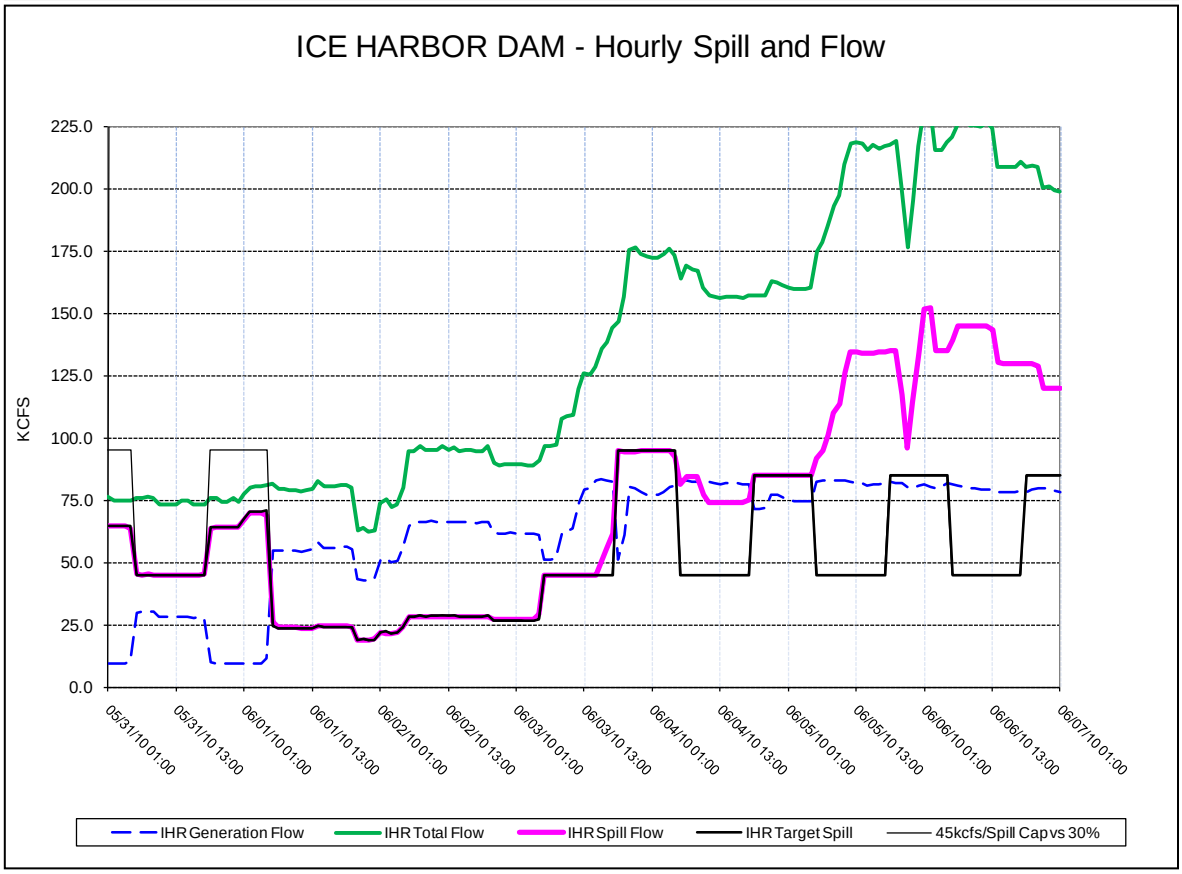
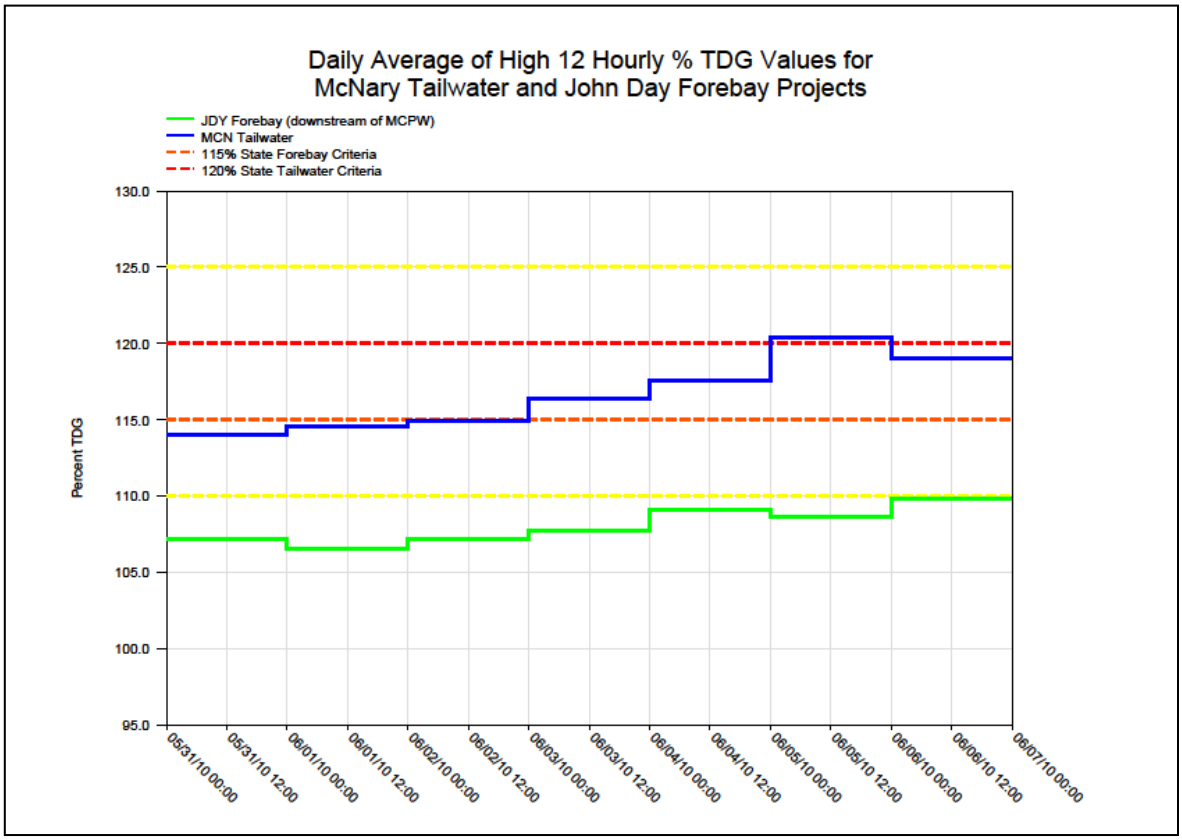

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

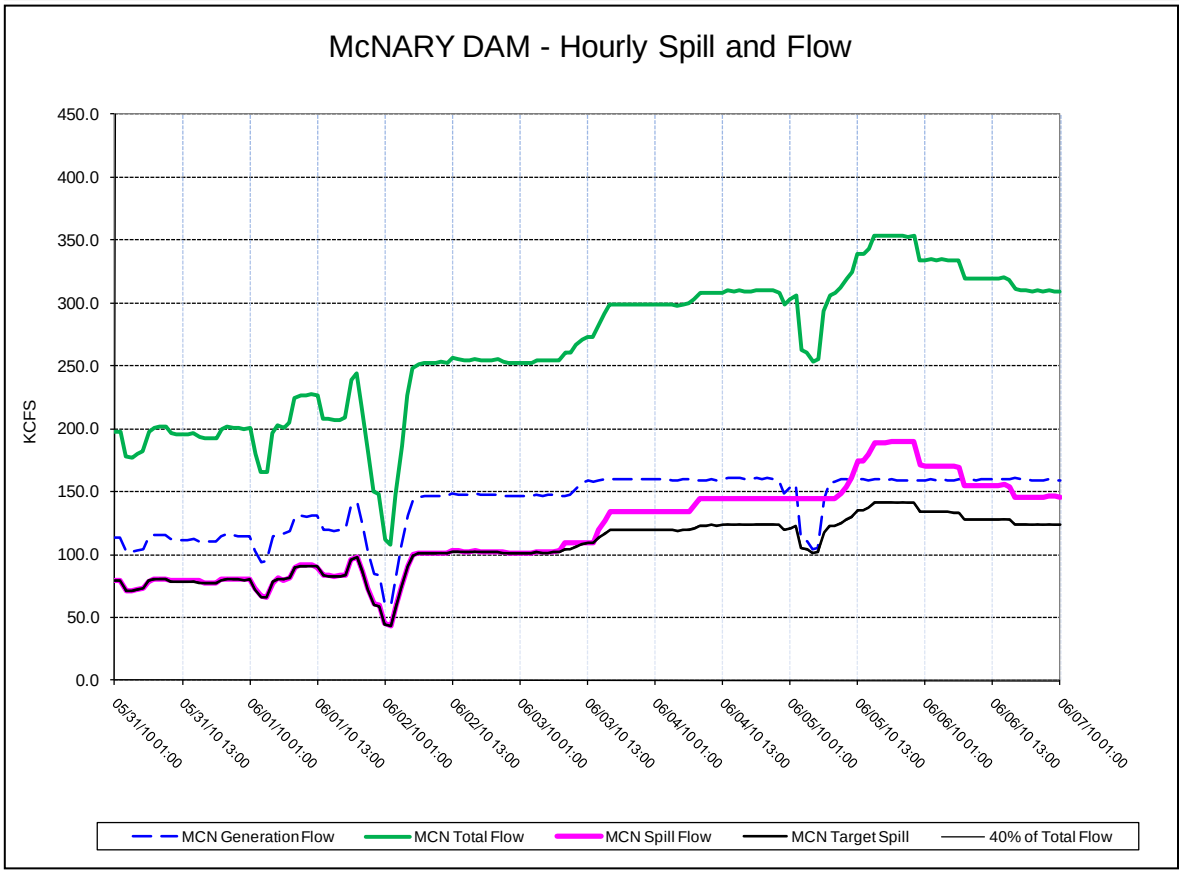
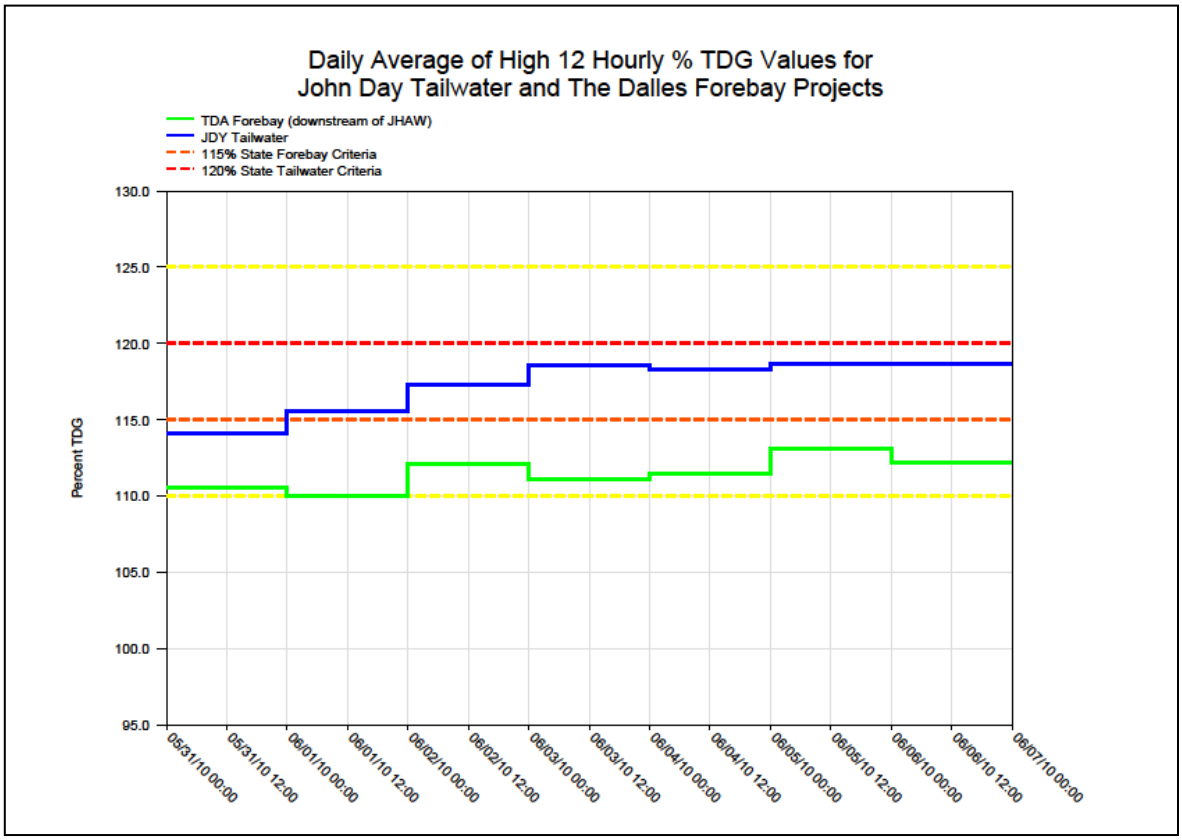

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

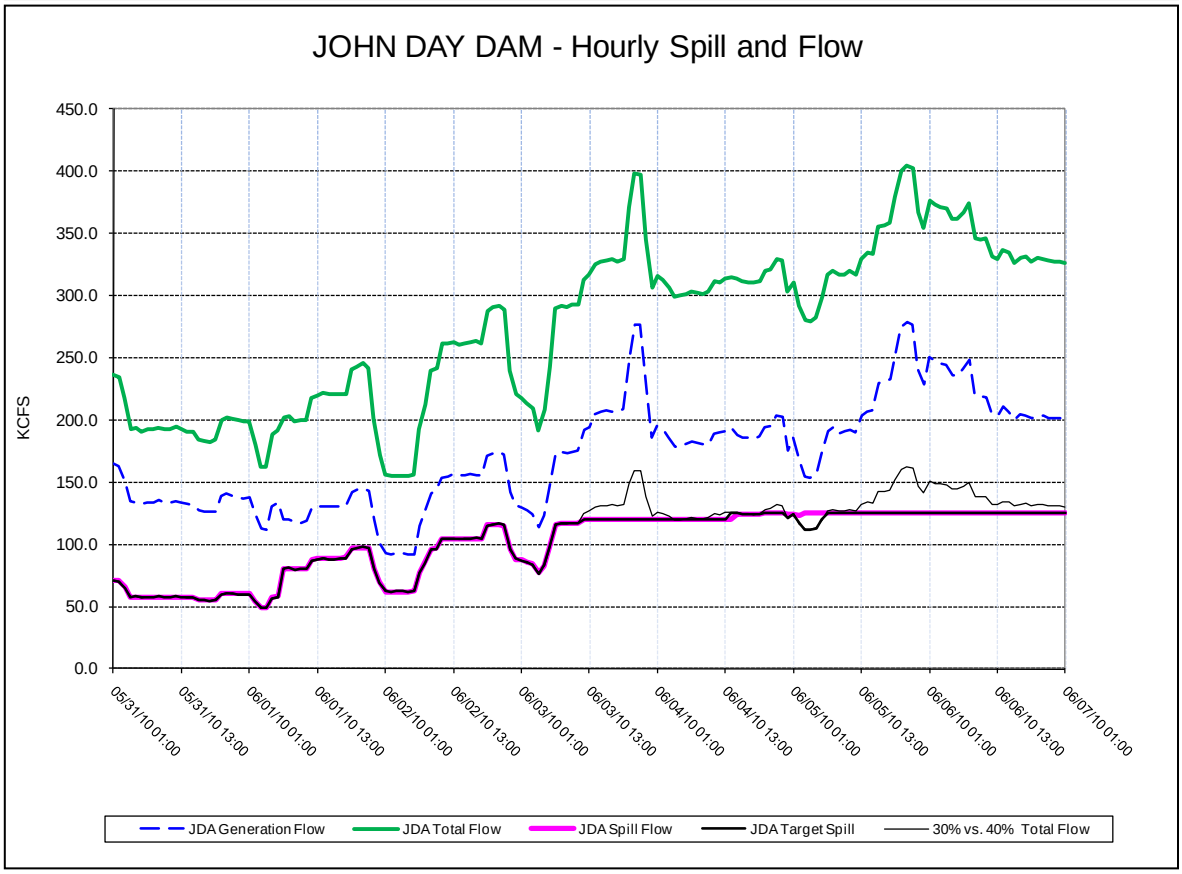
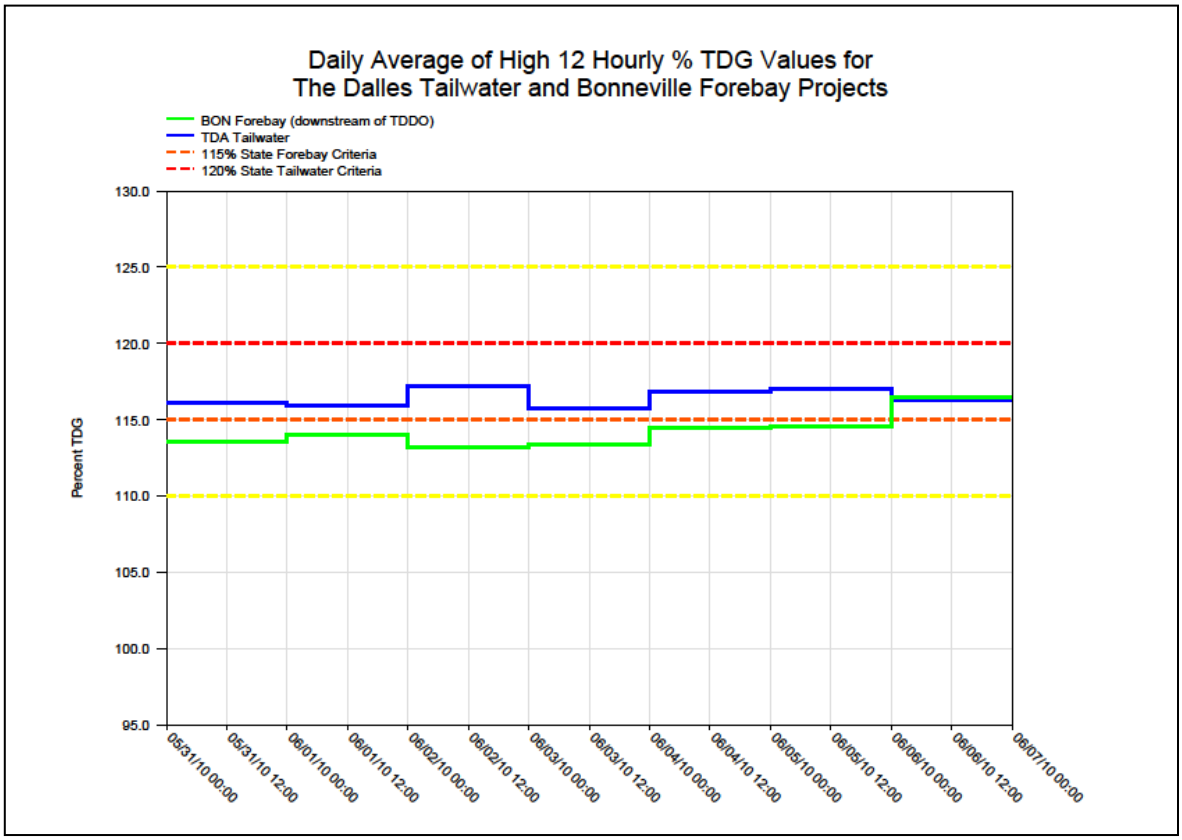

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

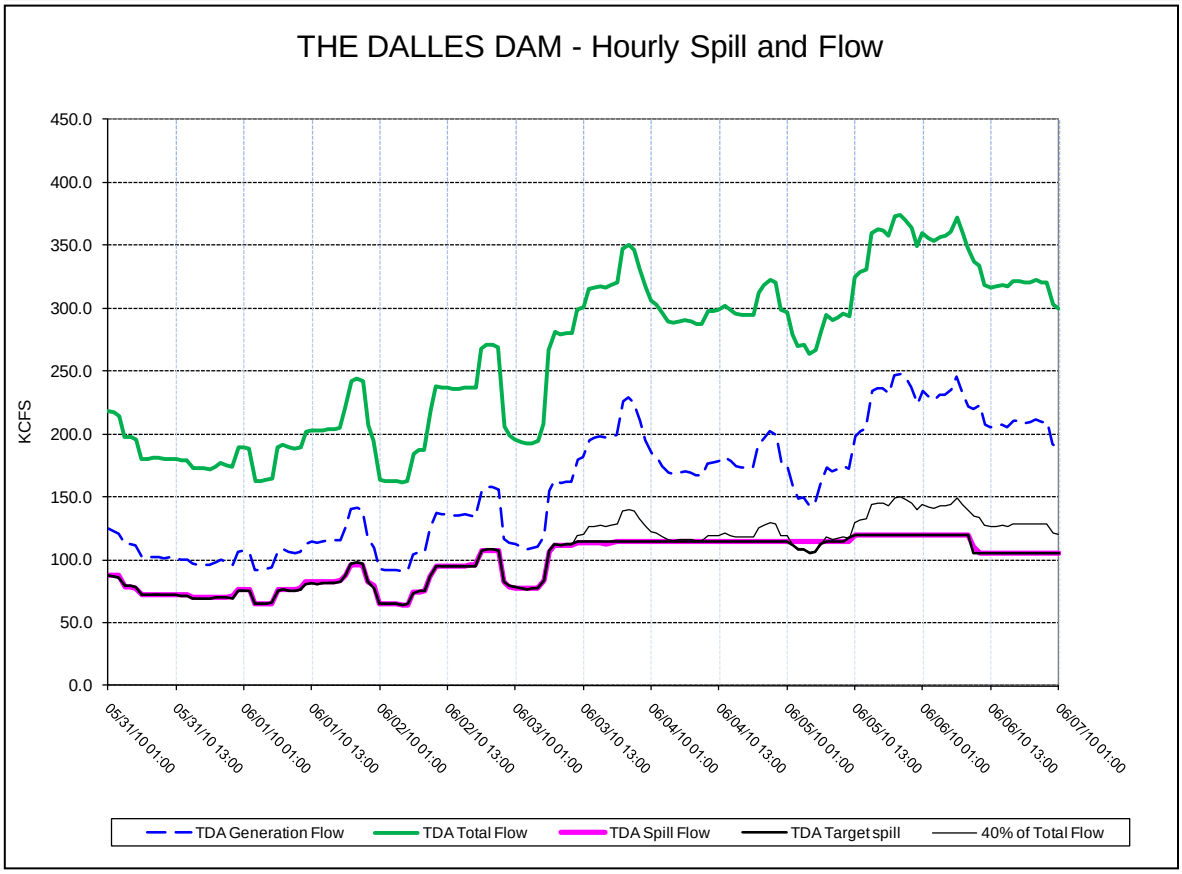
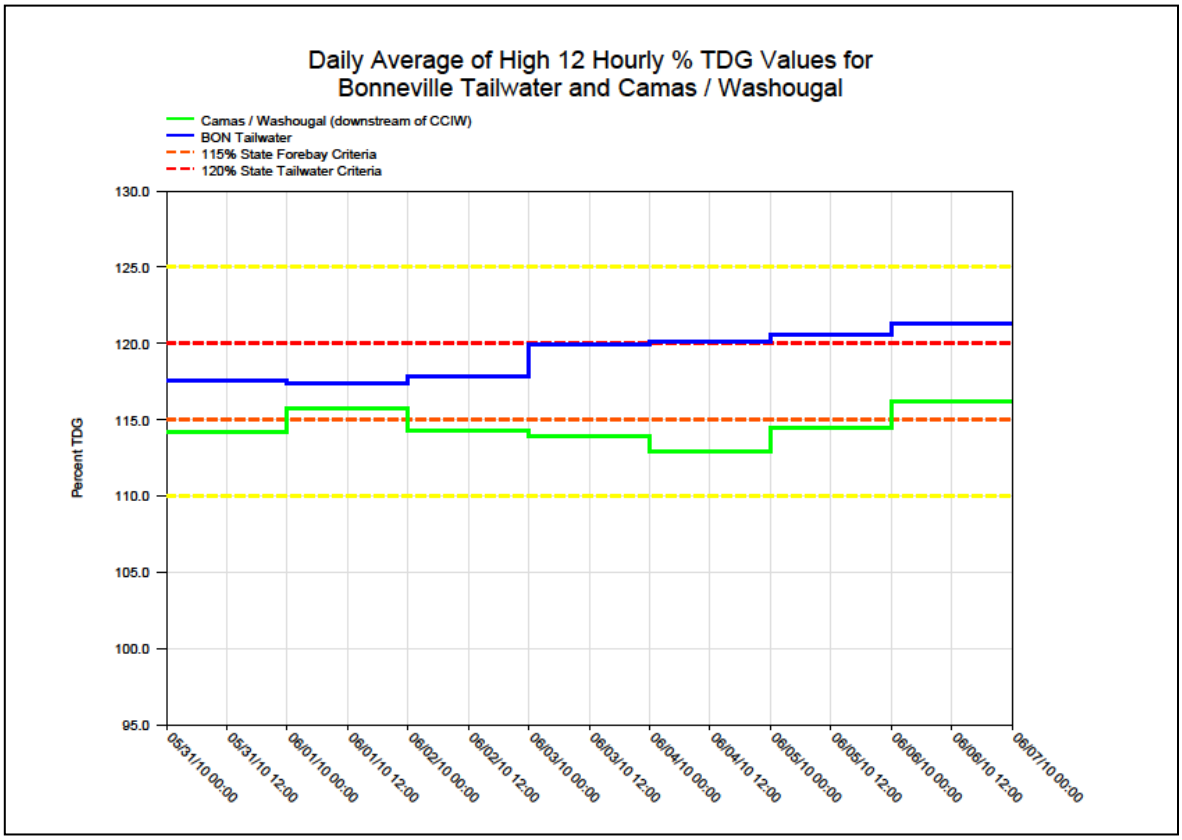

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
05/31/10 01:00
05/31/10 13:00
06/01/10 01:00
06/01/10 13:00
06/02/10 01:00
06/02/10 13:00
06/03/10 01:00
06/03/10 13:00
06/04/10 01:00
06/04/10 13:00
06/05/10 01:00
06/05/10 13:00
06/06/10 01:00
06/06/10 13:00
06/07/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

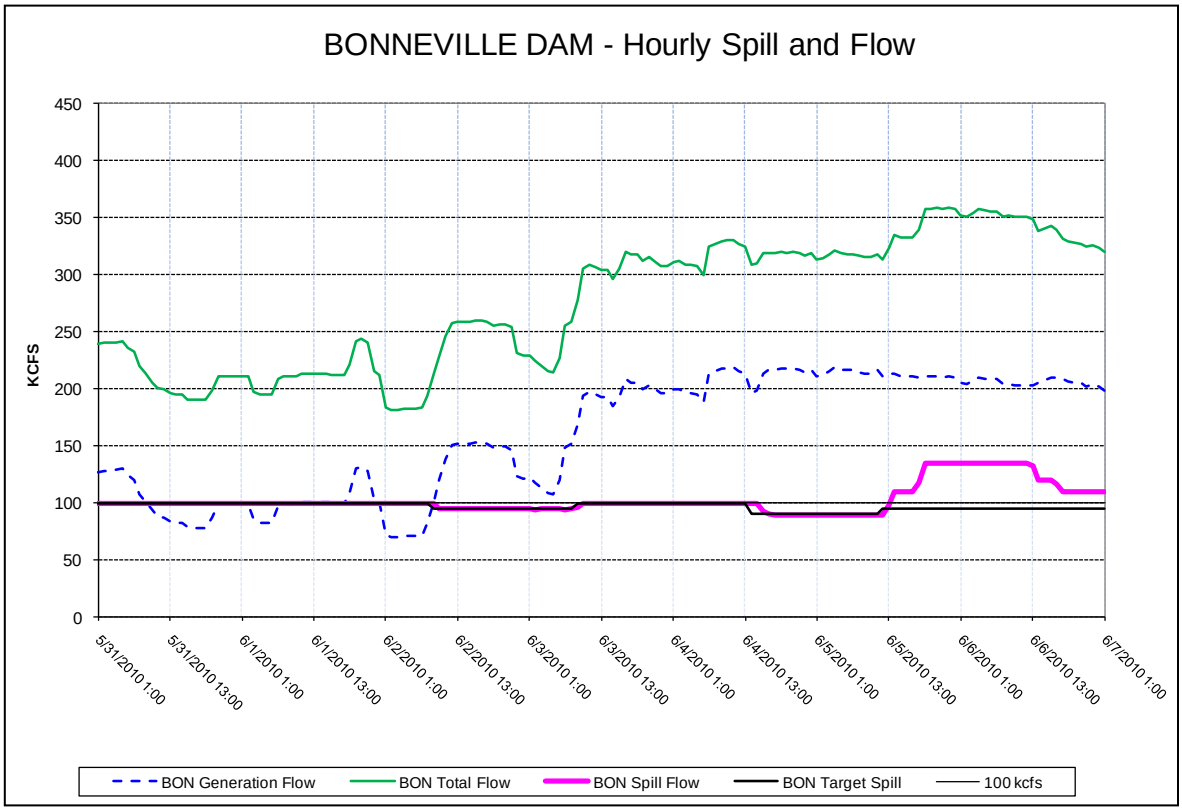
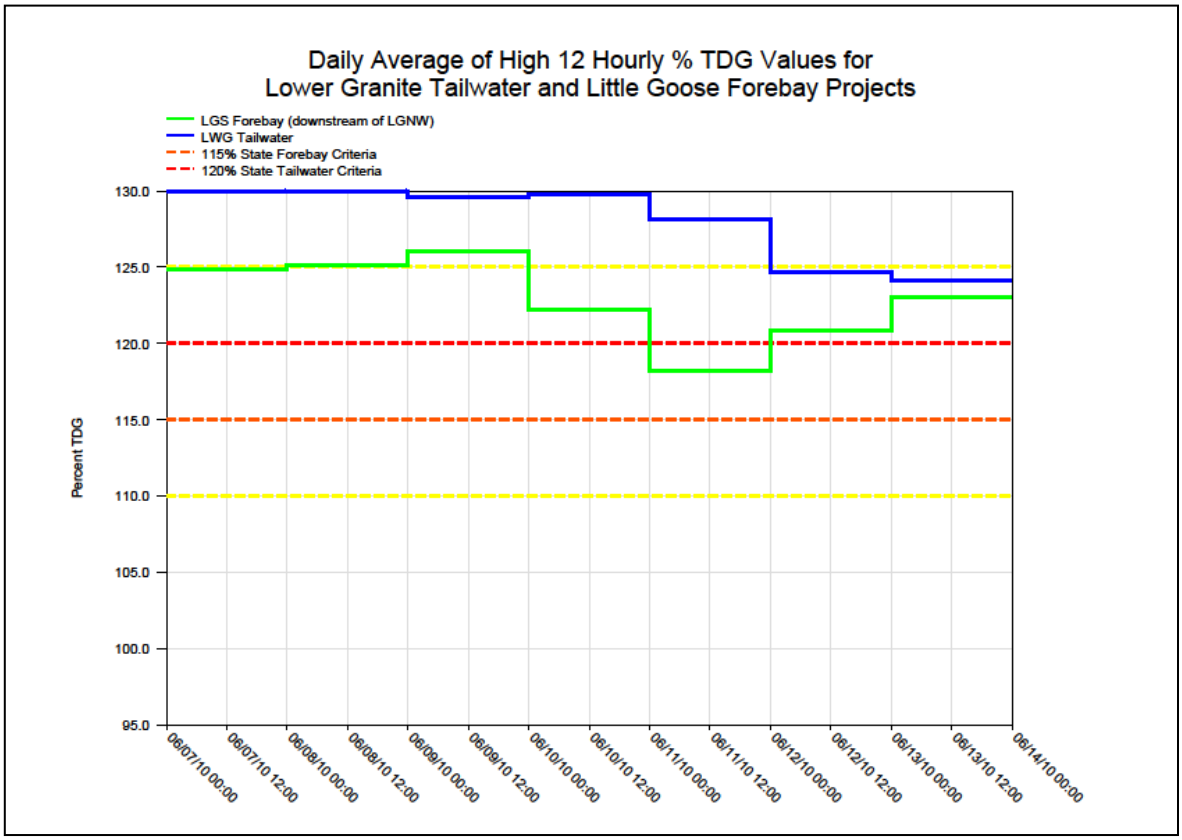

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
5/31/2010 1:00
5/31/2010 13:00
6/1/2010 1:00
6/1/2010 13:00
6/2/2010 1:00
6/2/2010 13:00
6/3/2010 1:00
6/3/2010 13:00
6/4/2010 1:00
6/4/2010 13:00
6/5/2010 1:00
6/5/2010 13:00
6/6/2010 1:00
6/6/2010 13:00
6/7/2010 1:00
BON 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 Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

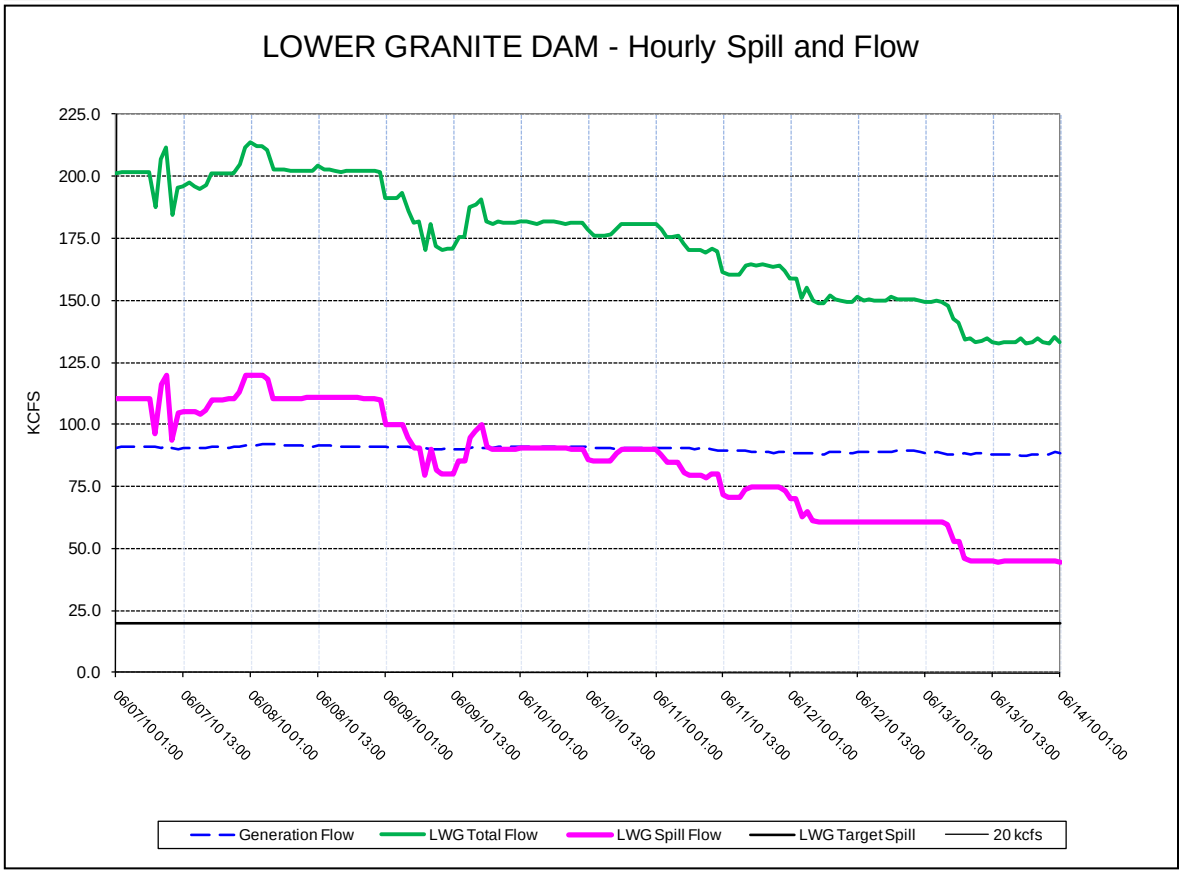
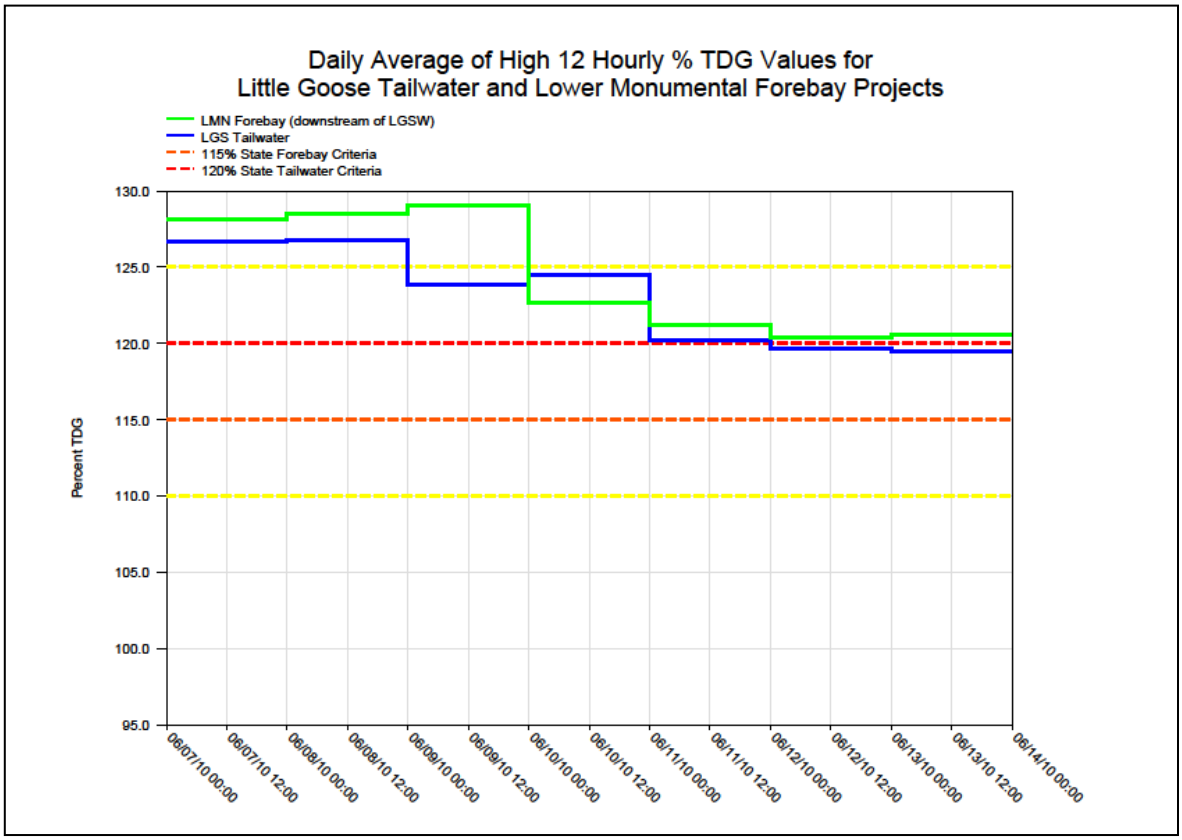

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

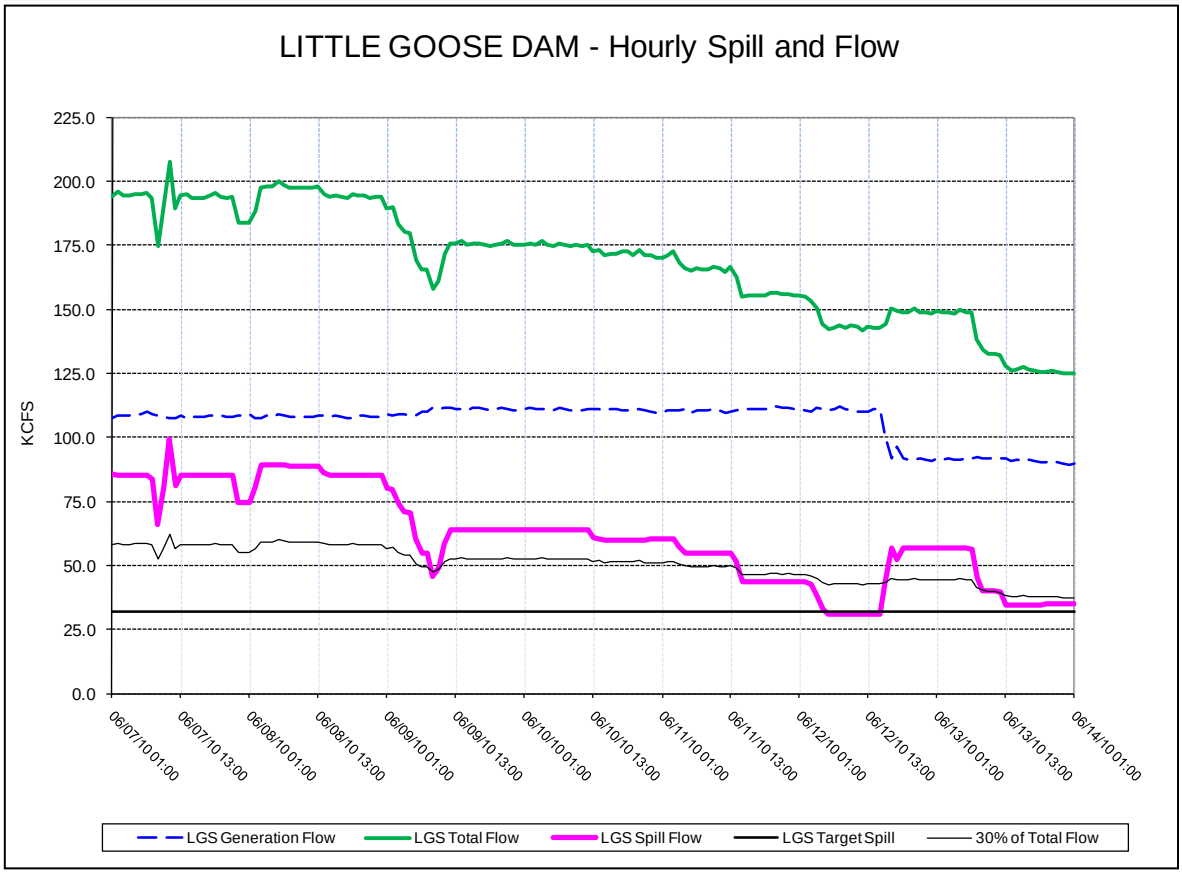
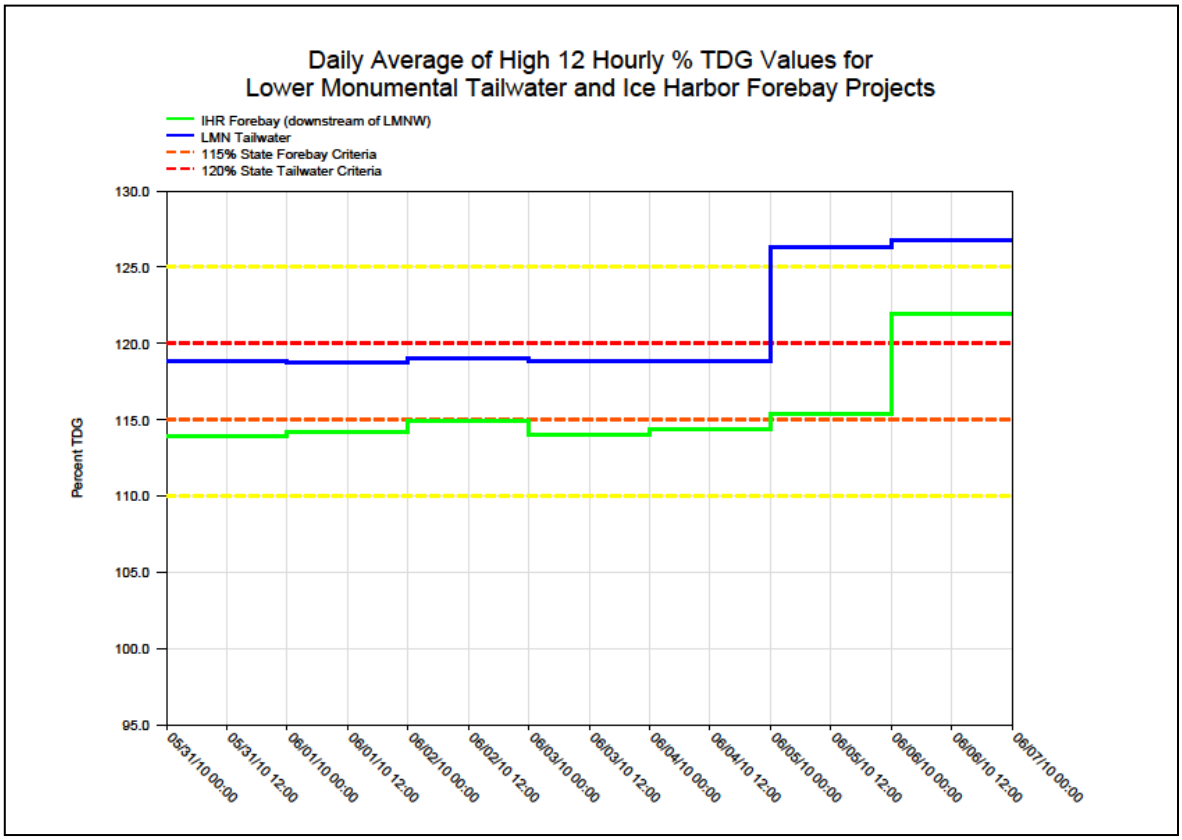

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
05/31/10 00:00
05/31/10 12:00
06/01/10 00:00
06/01/10 12:00
06/02/10 00:00
06/02/10 12:00
06/03/10 00:00
06/03/10 12:00
06/04/10 00:00
06/04/10 12:00
06/05/10 00:00
06/05/10 12:00
06/06/10 00:00
06/06/10 12:00
06/07/10 00:00

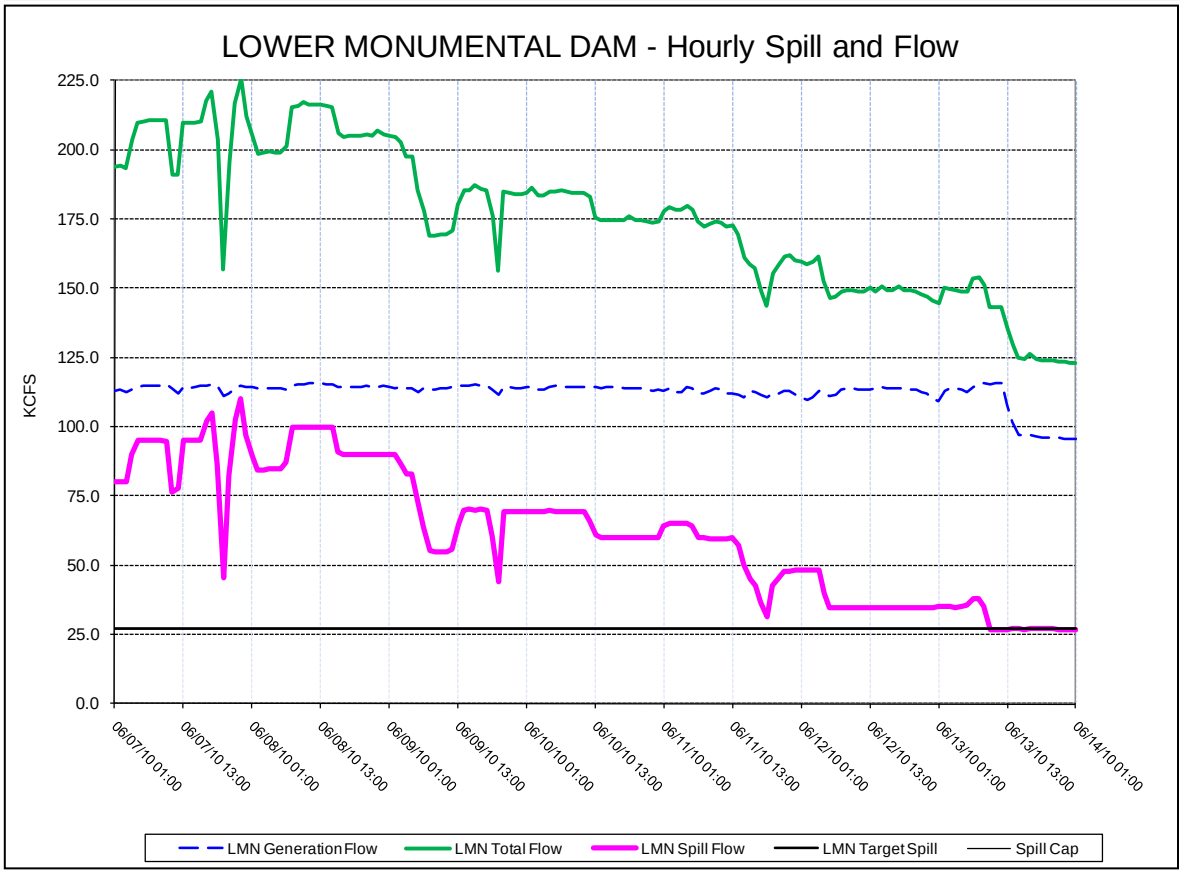
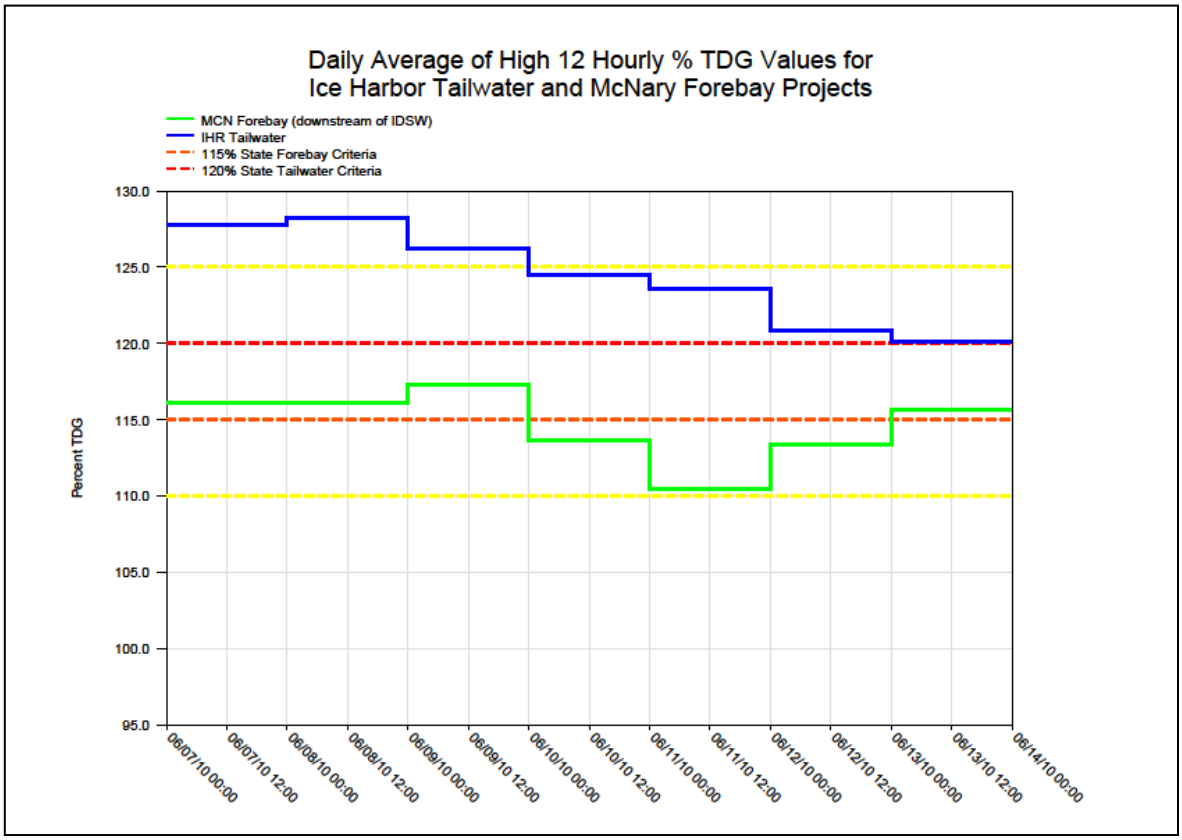

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

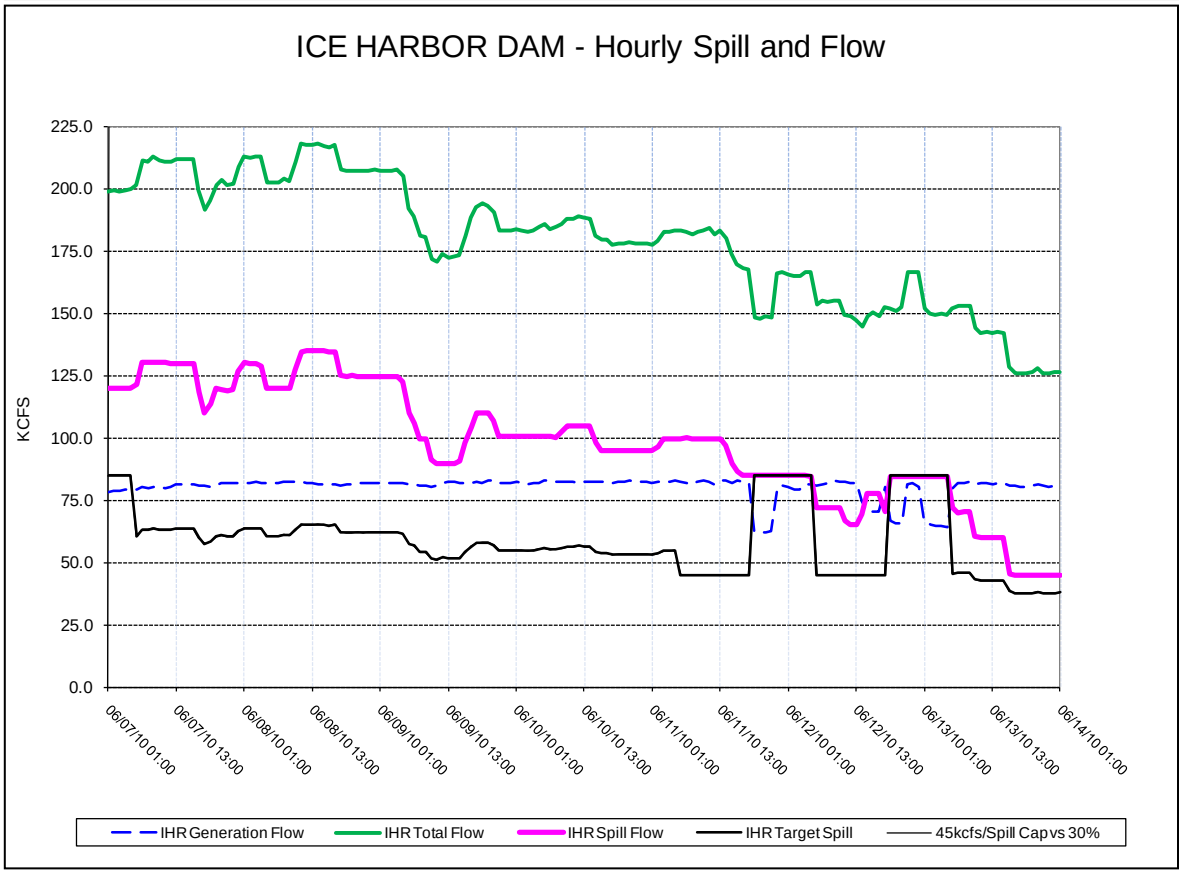
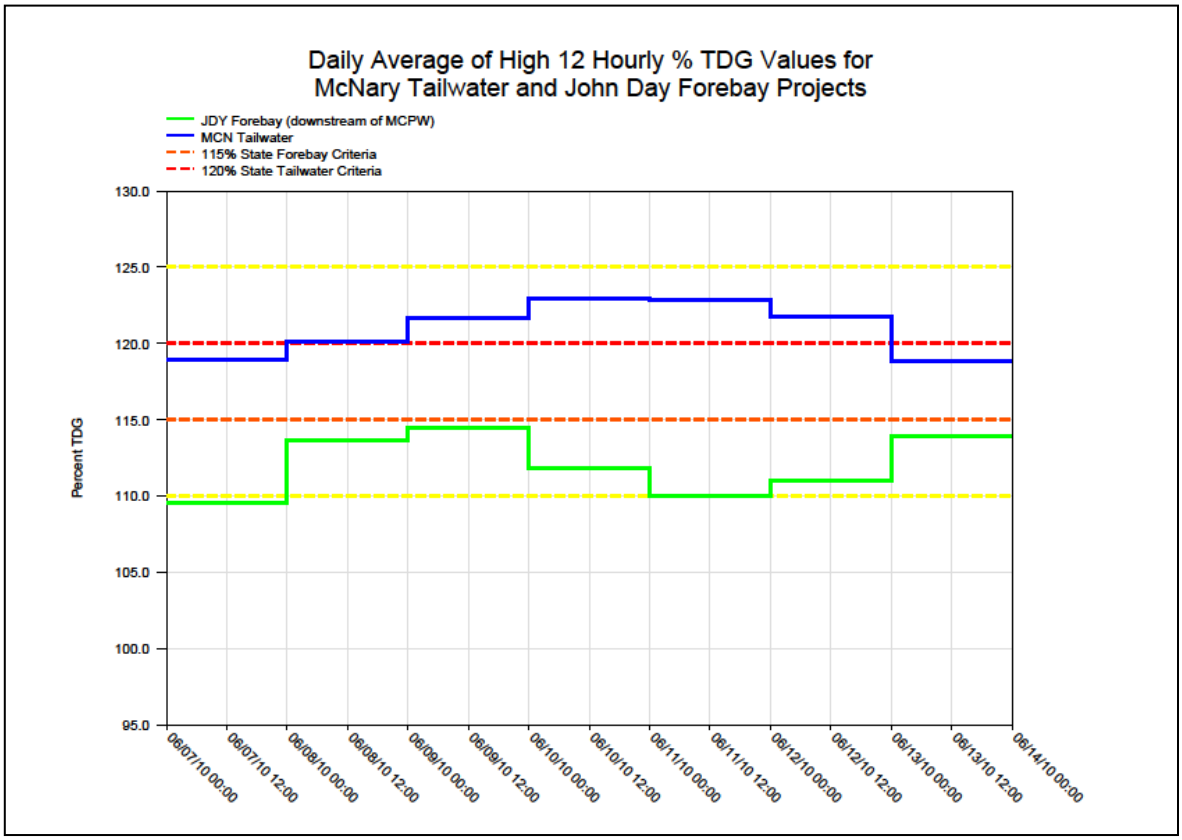

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

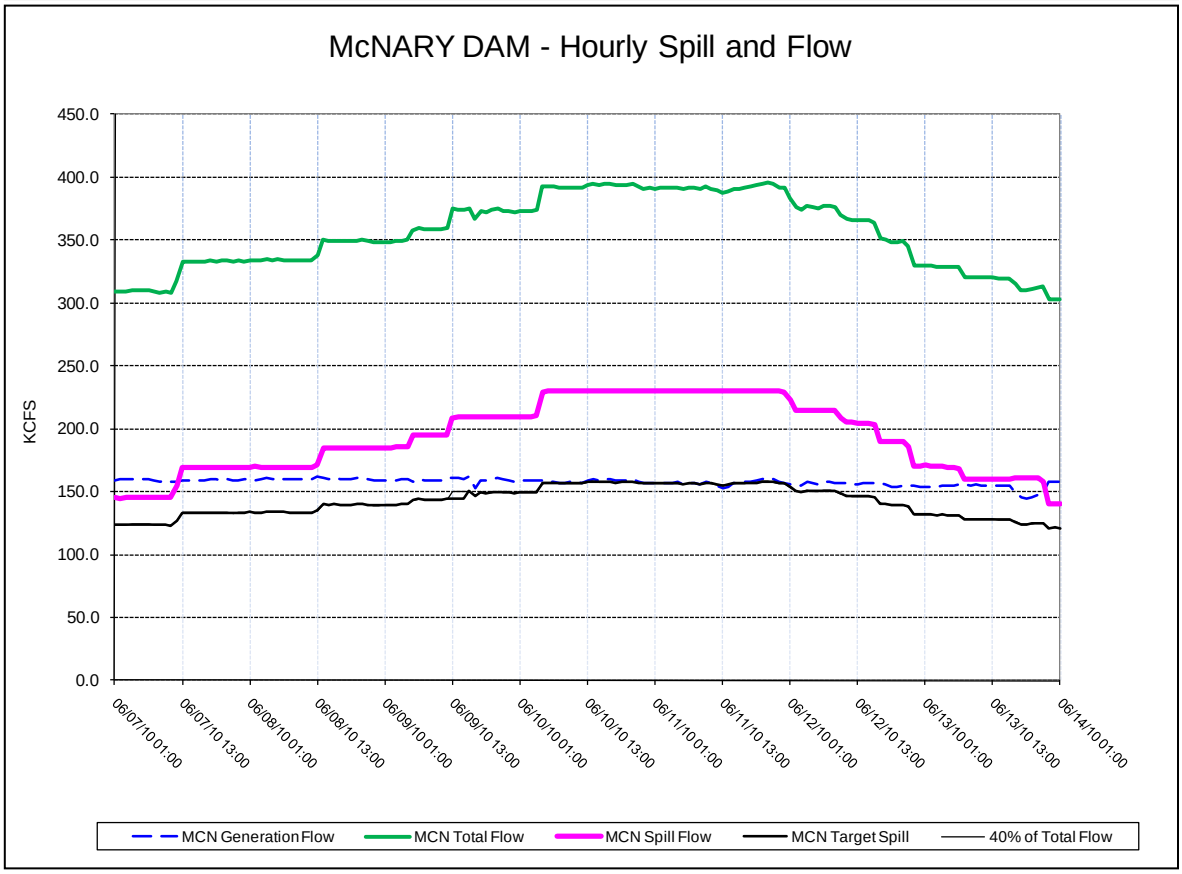
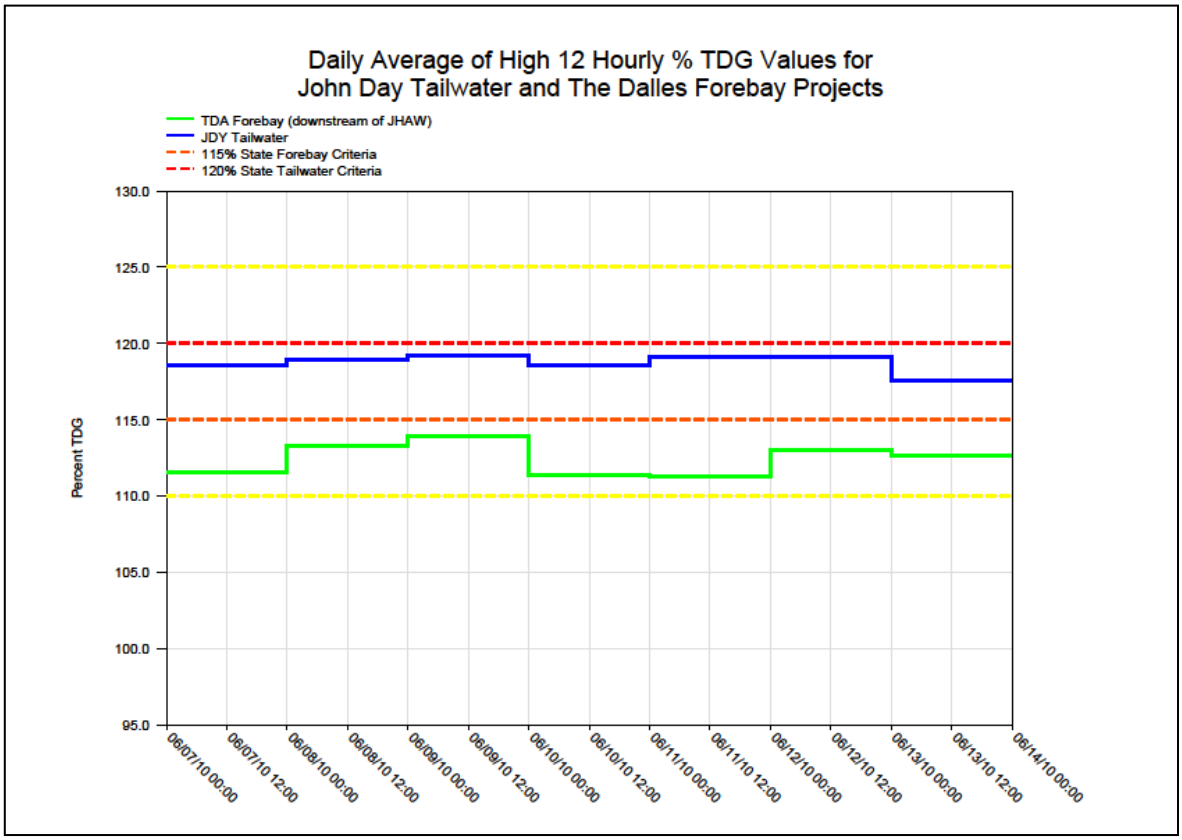

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

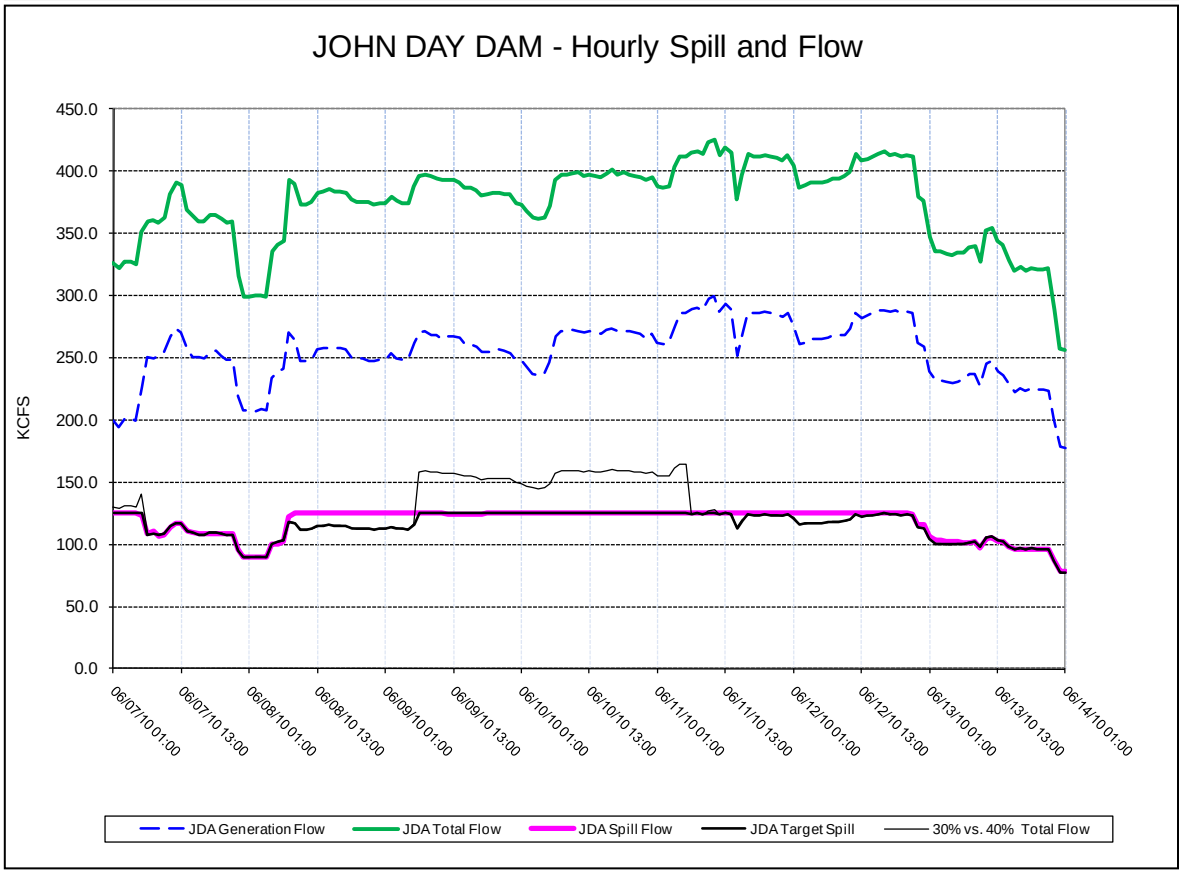
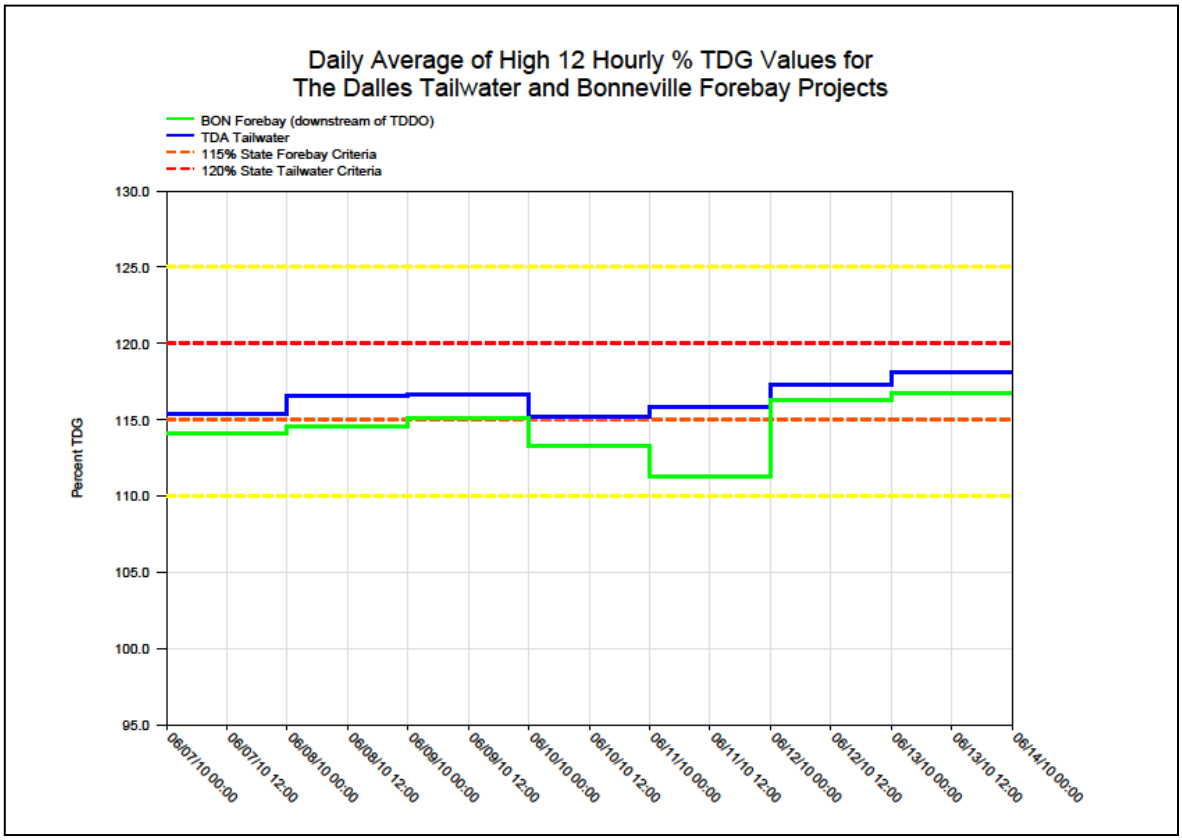

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

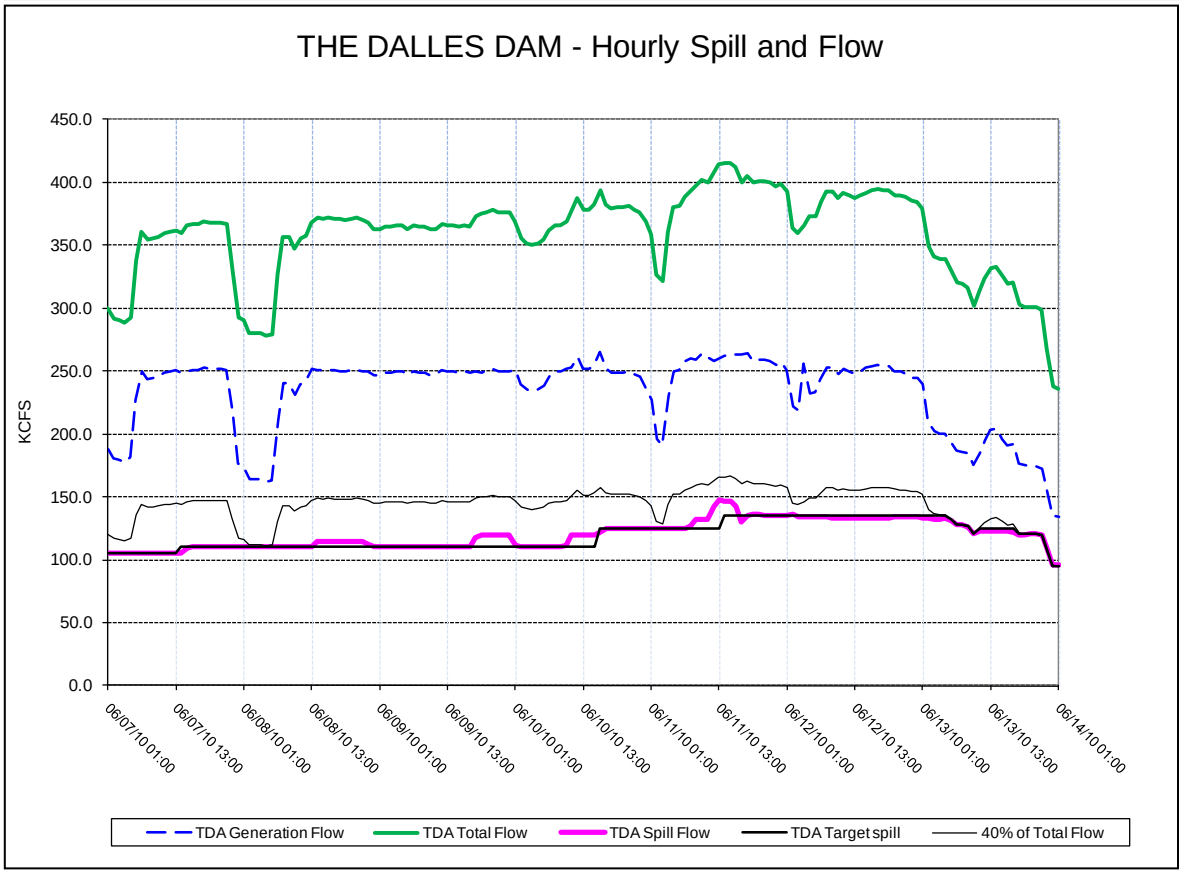
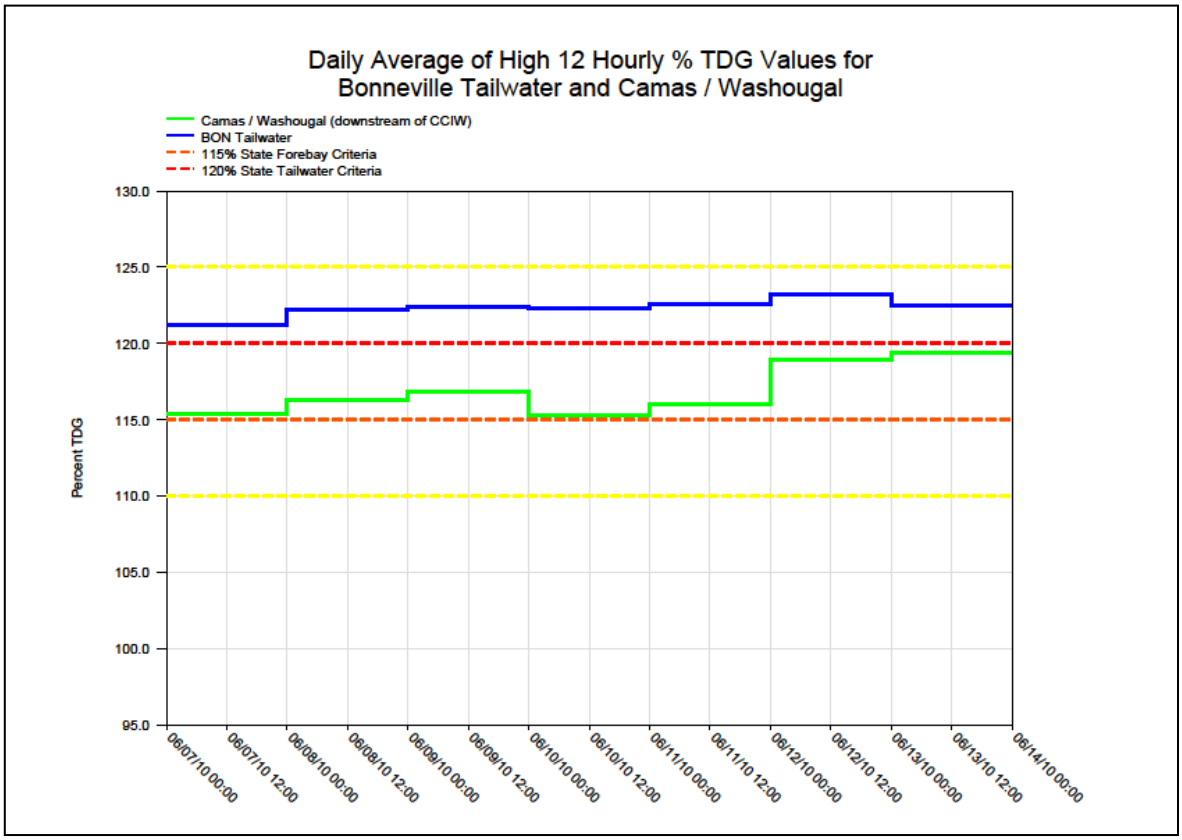

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/07/10 01:00
06/07/10 13:00
06/08/10 01:00
06/08/10 13:00
06/09/10 01:00
06/09/10 13:00
06/10/10 01:00
06/10/10 13:00
06/11/10 01:00
06/11/10 13:00
06/12/10 01:00
06/12/10 13:00
06/13/10 01:00
06/13/10 13:00
06/14/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/07/10 00:00
06/07/10 12:00
06/08/10 00:00
06/08/10 12:00
06/09/10 00:00
06/09/10 12:00
06/10/10 00:00
06/10/10 12:00
06/11/10 00:00
06/11/10 12:00
06/12/10 00:00
06/12/10 12:00
06/13/10 00:00
06/13/10 12:00
06/14/10 00:00

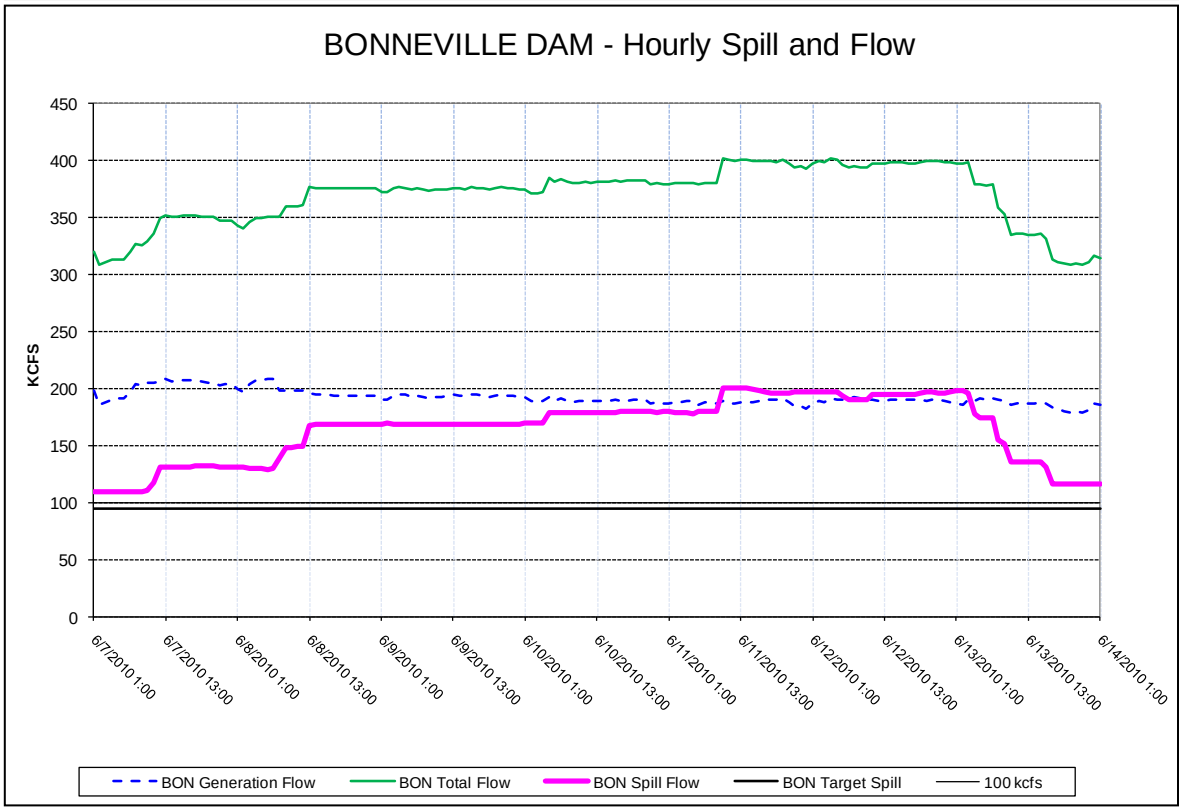
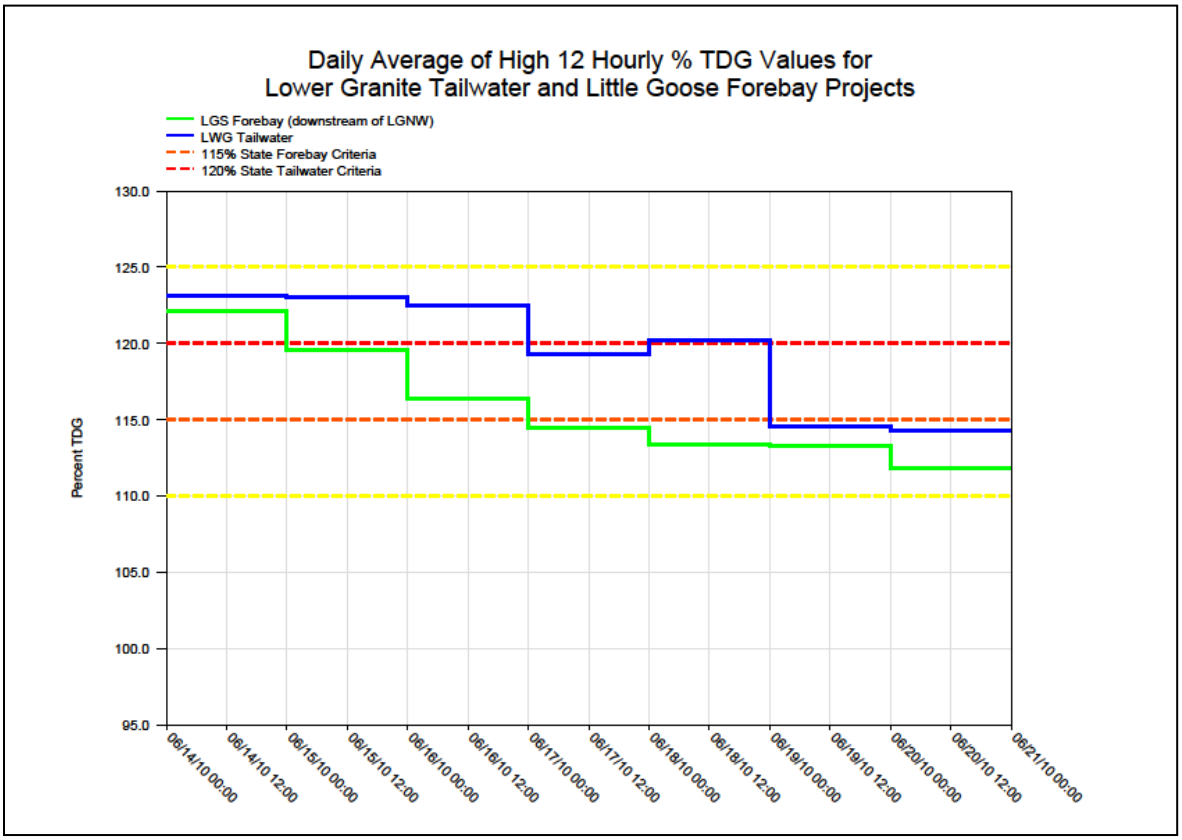

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/7/2010 1:00
6/7/2010 13:00
6/8/2010 1:00
6/8/2010 13:00
6/9/2010 1:00
6/9/2010 13:00
6/10/2010 1:00
6/10/2010 13:00
6/11/2010 1:00
6/11/2010 13:00
6/12/2010 1:00
6/12/2010 13:00
6/13/2010 1:00
6/13/2010 13:00
6/14/2010 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 Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

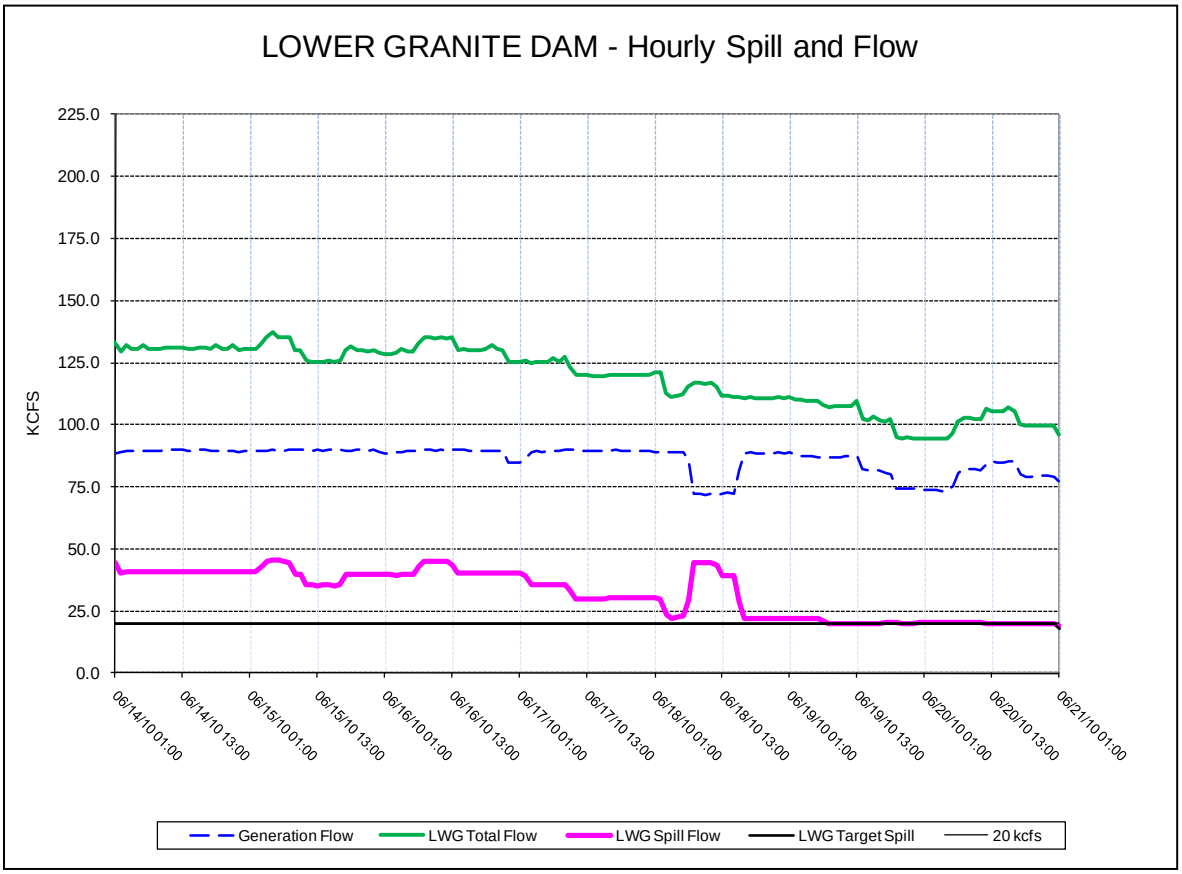
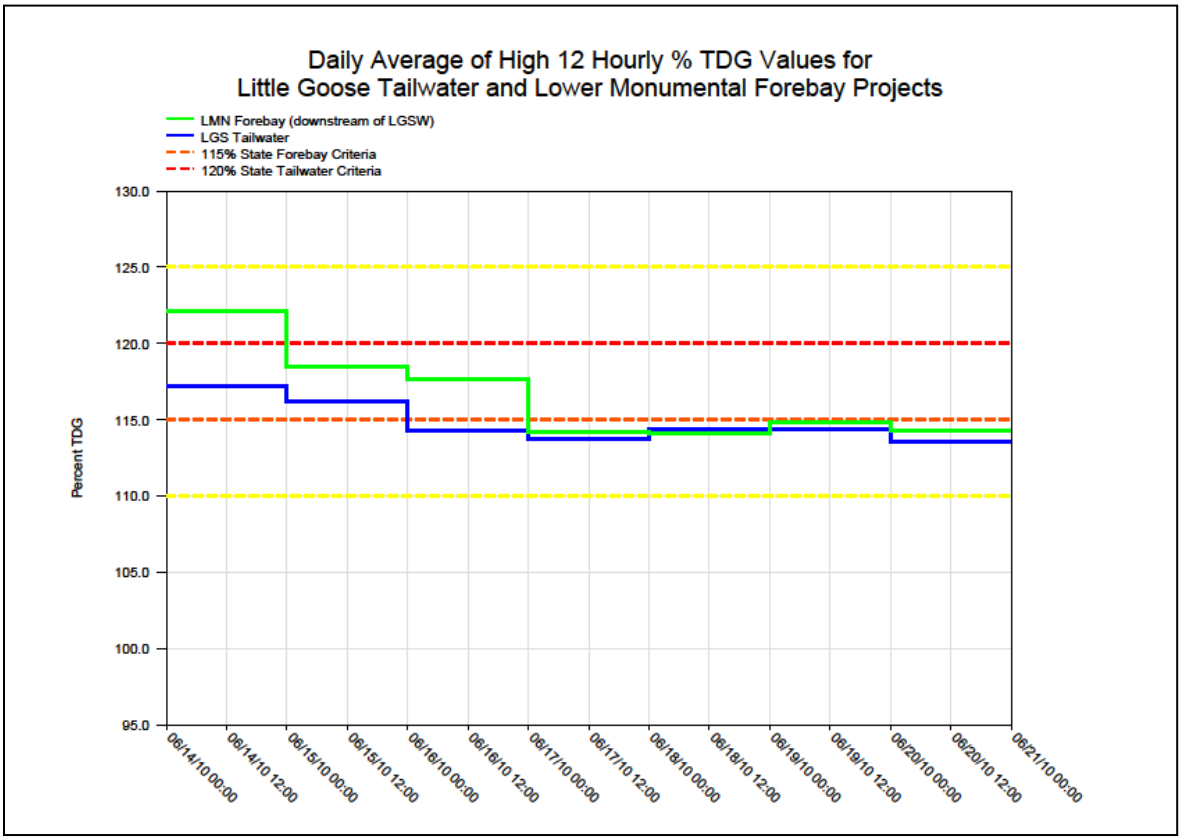

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

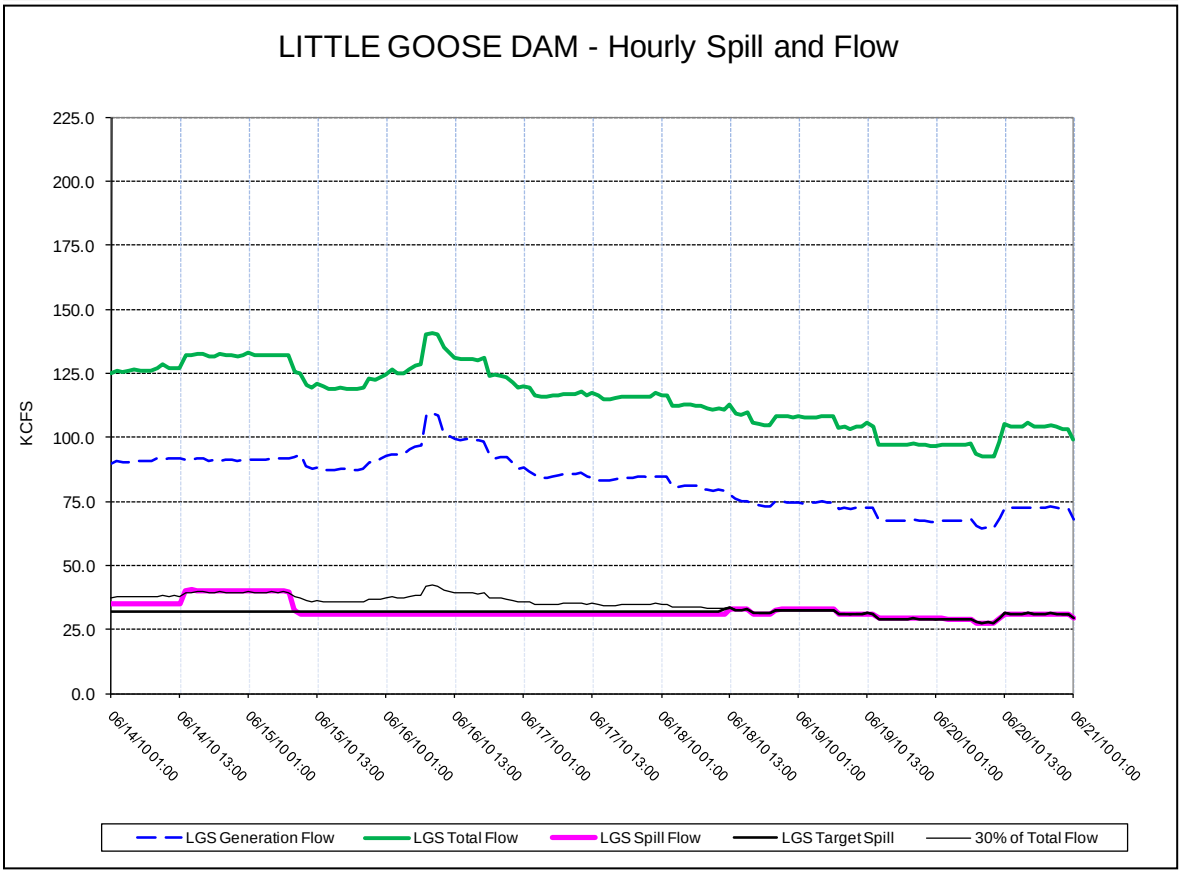
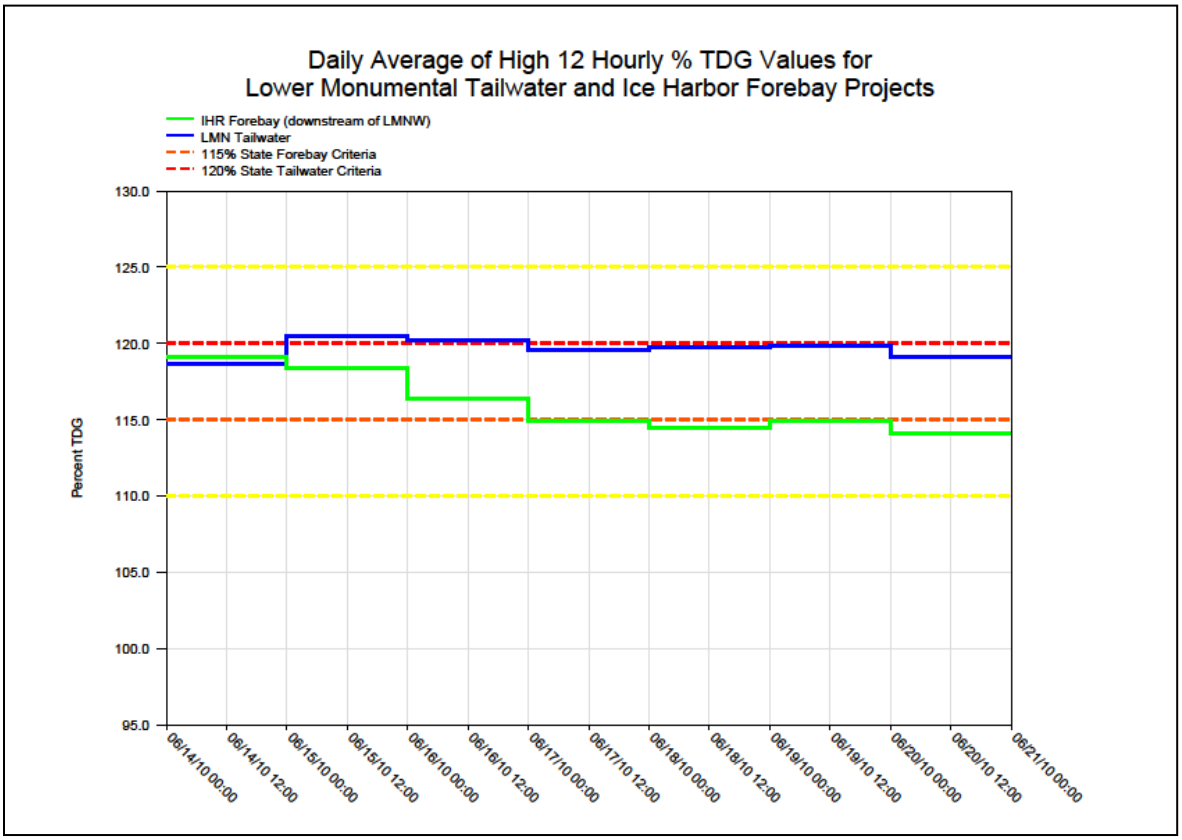

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

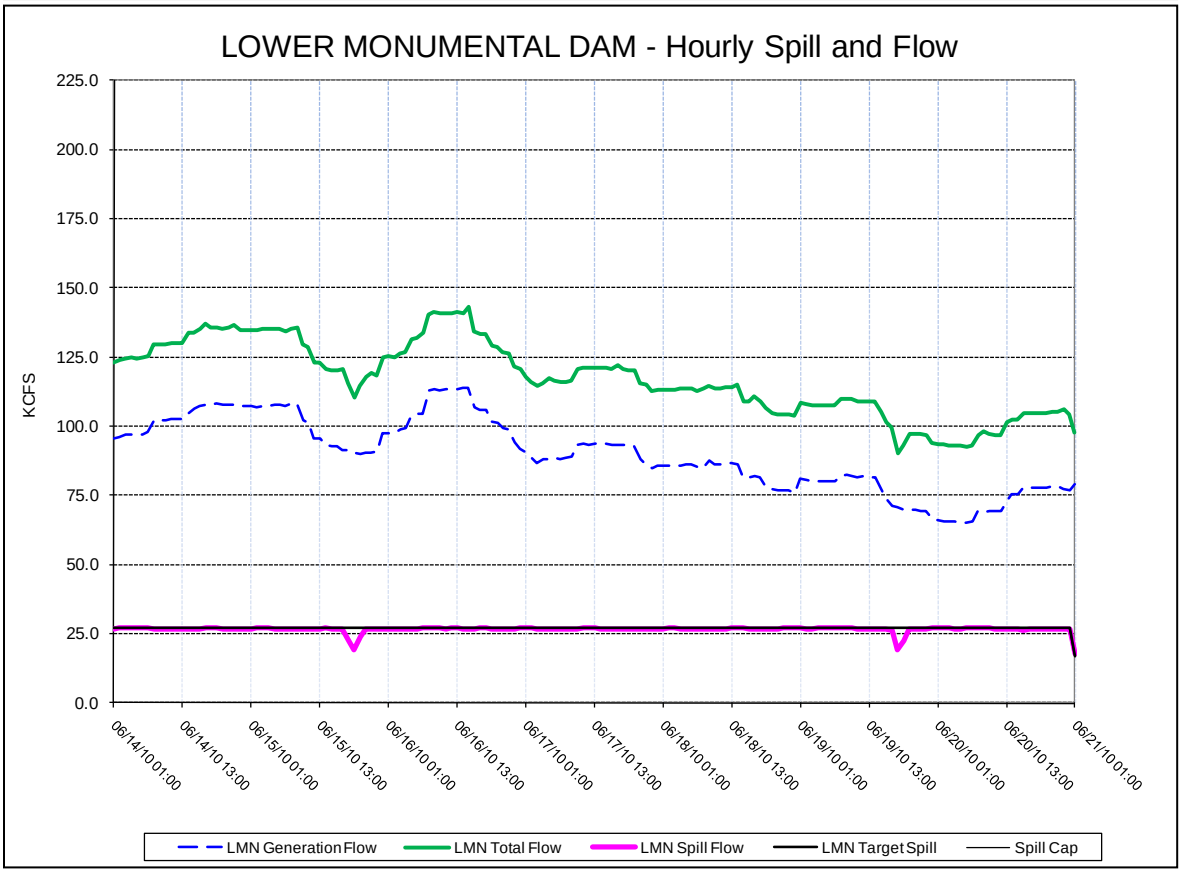
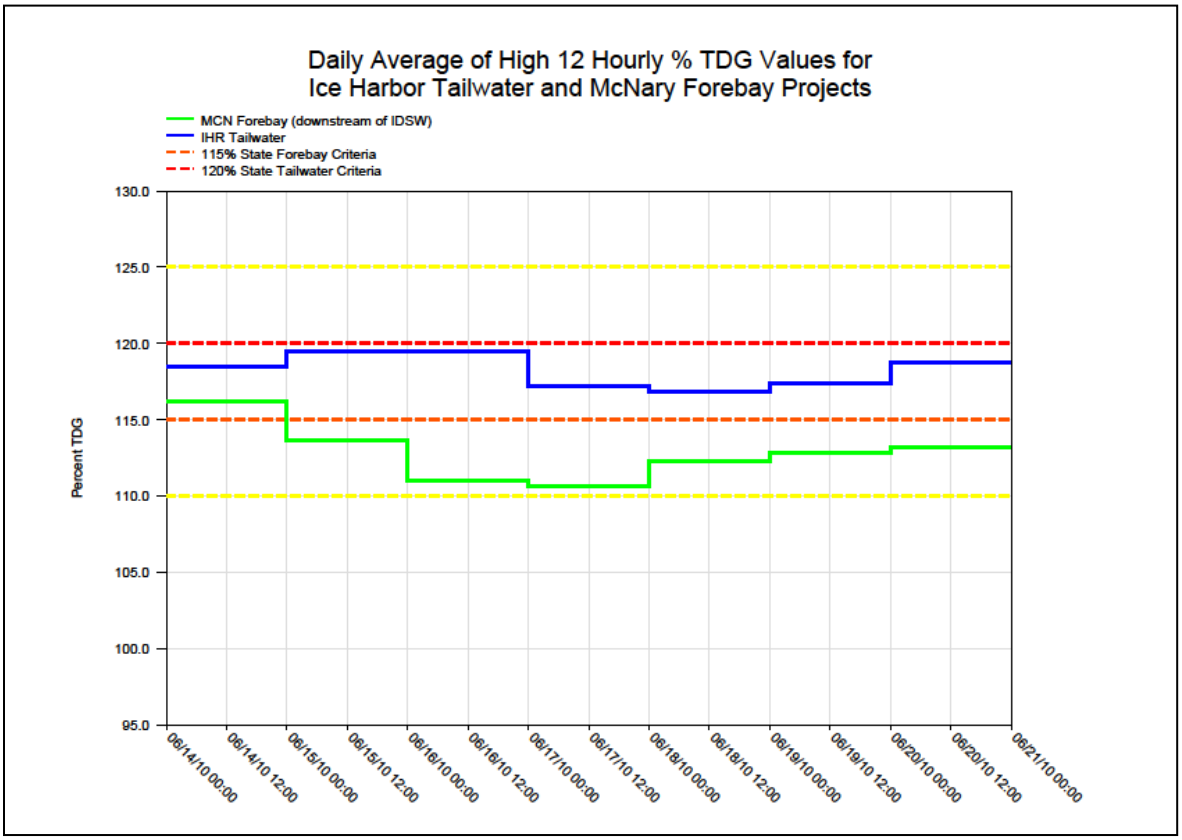

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

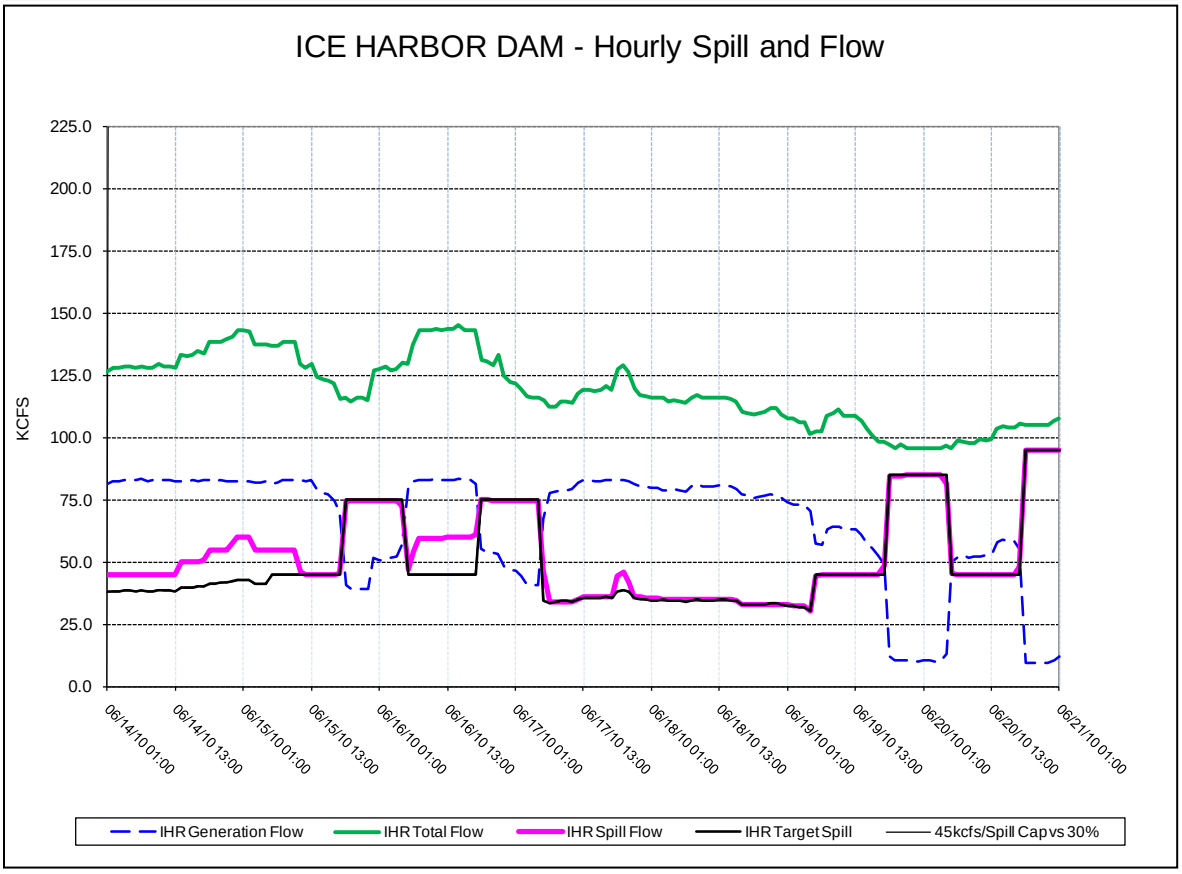
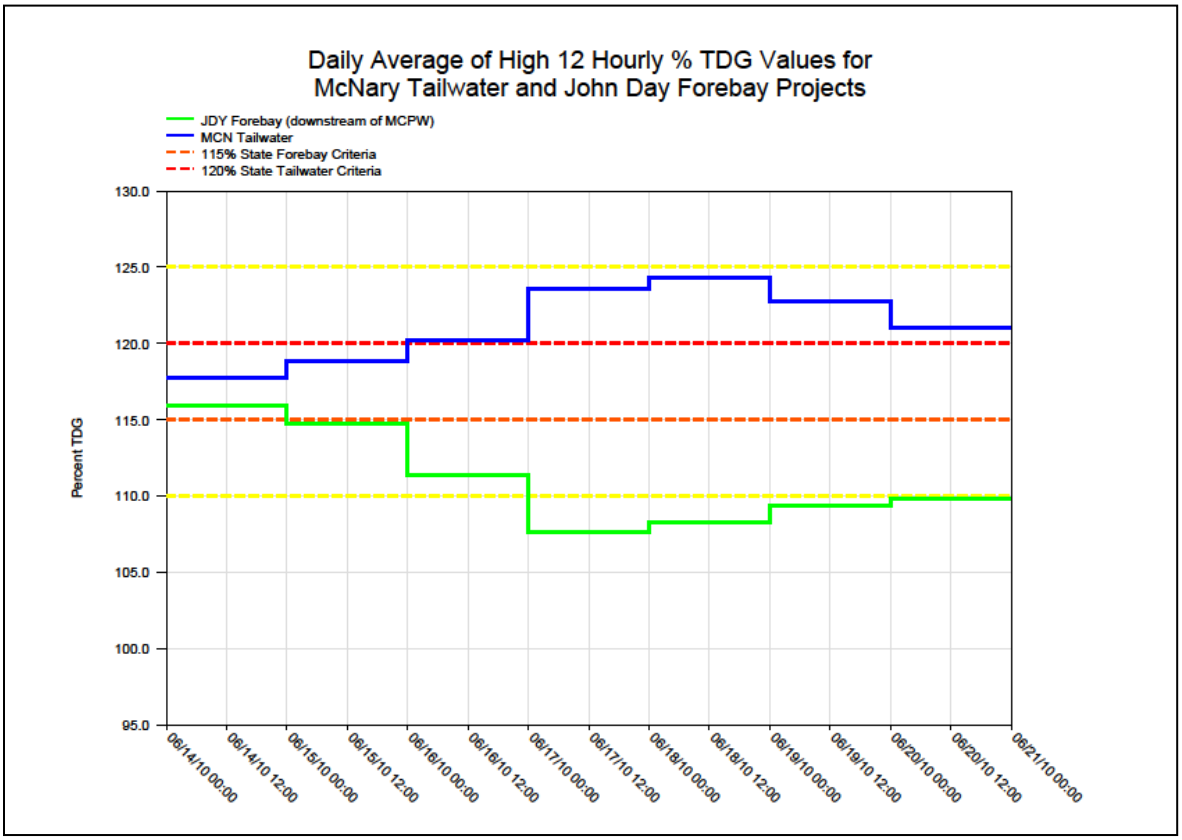

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

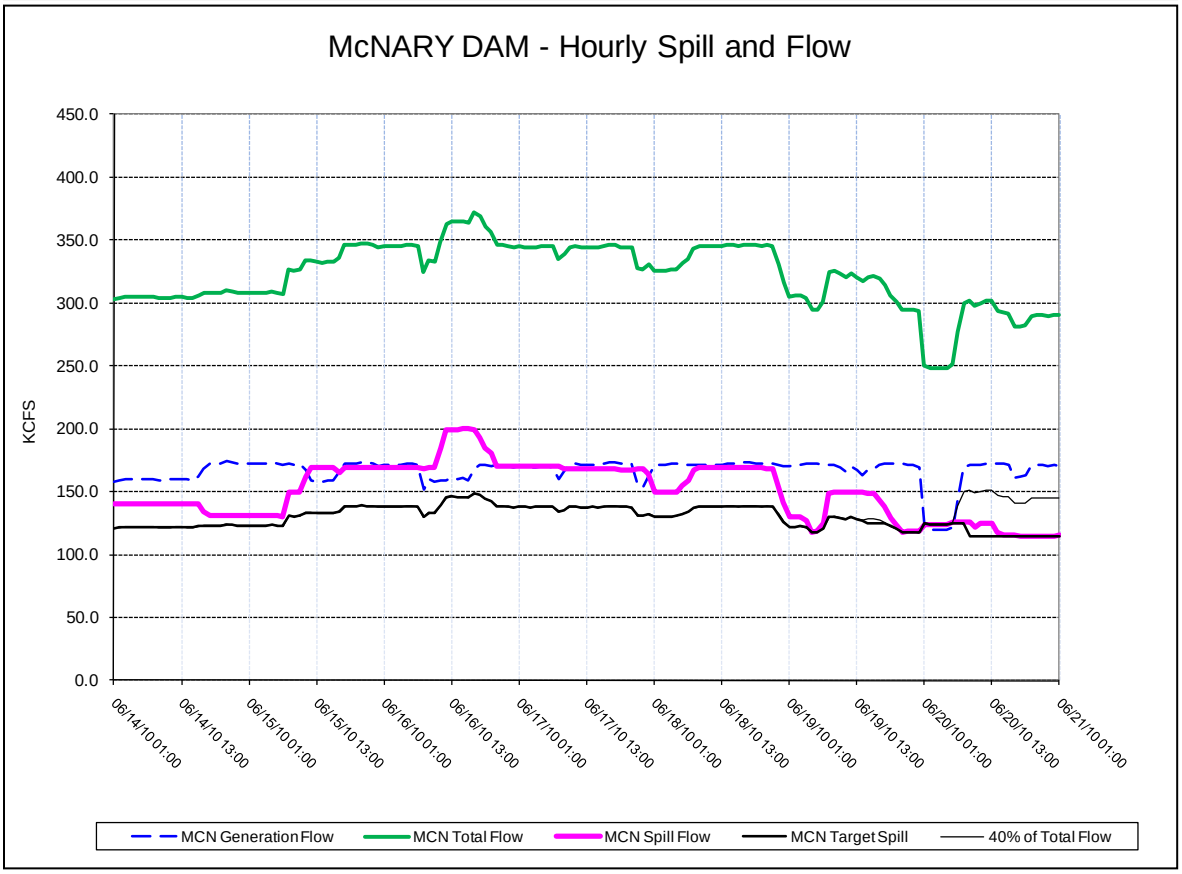
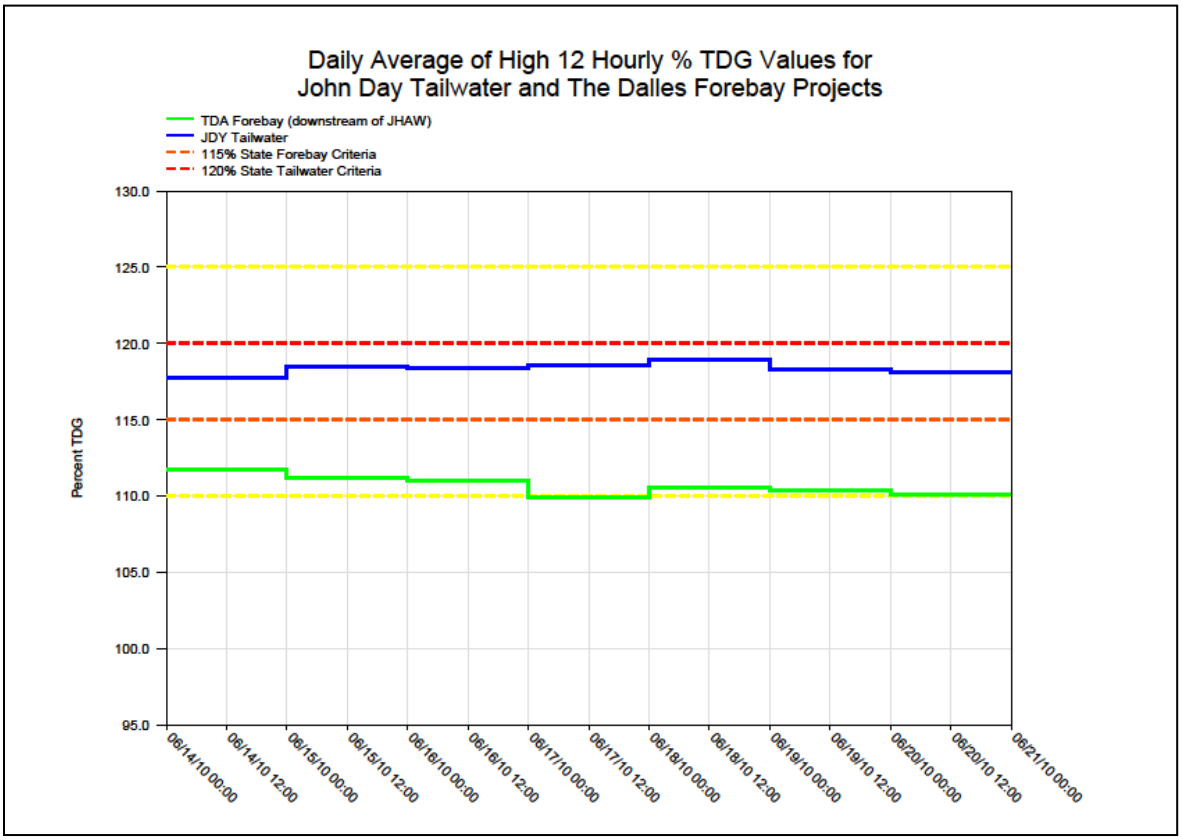

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

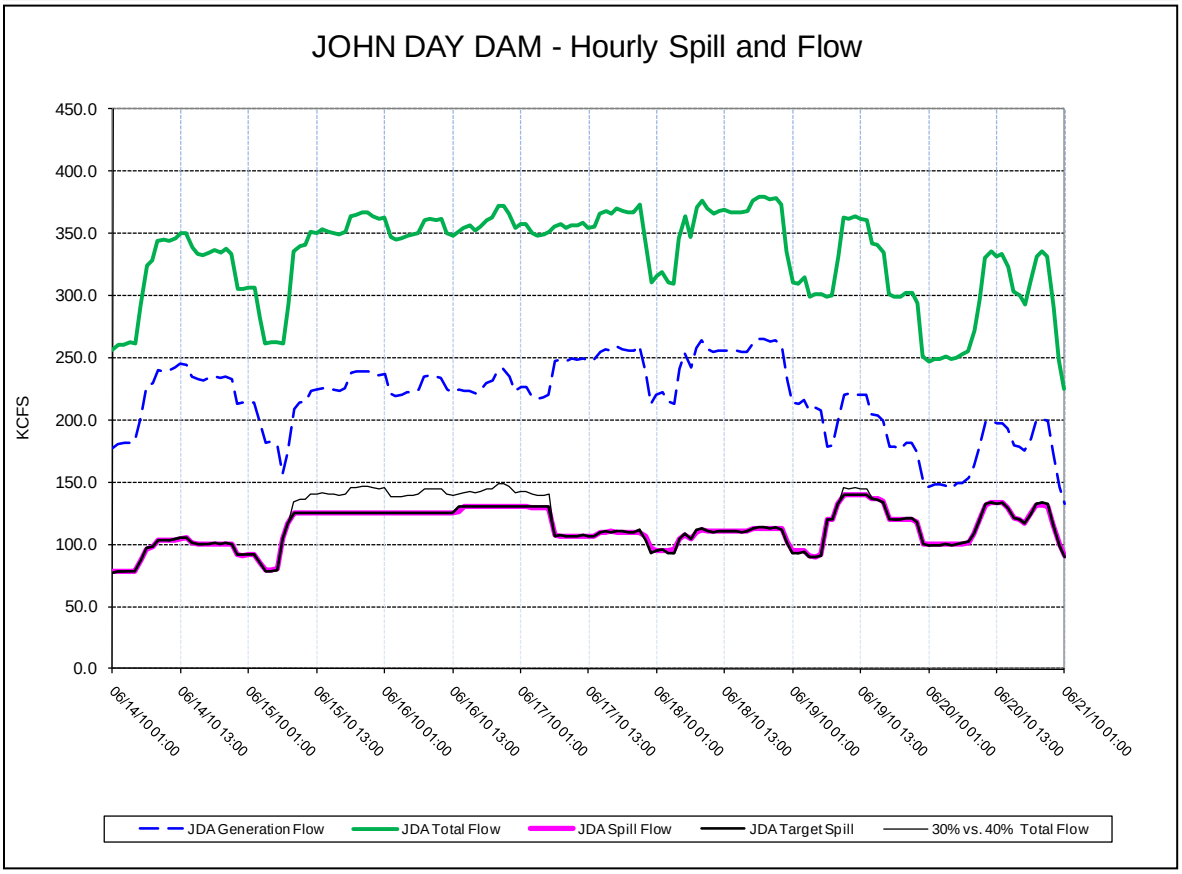
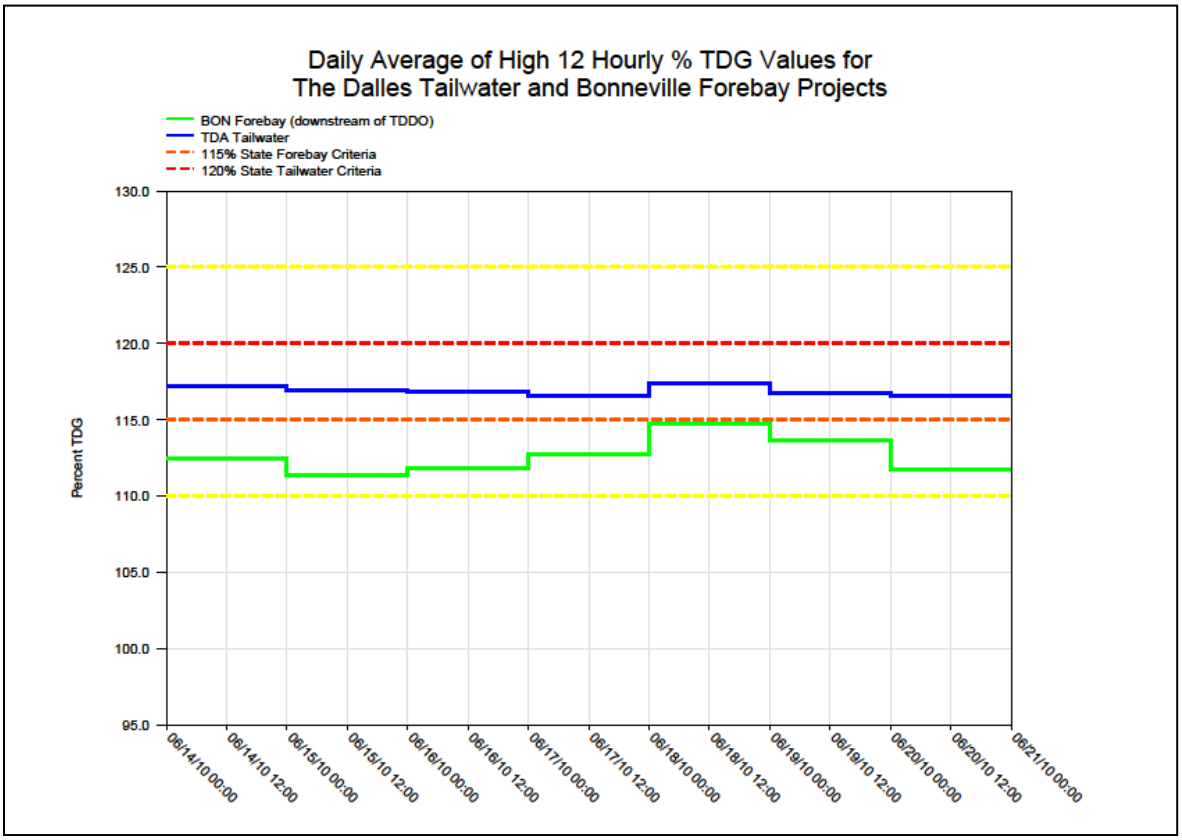

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

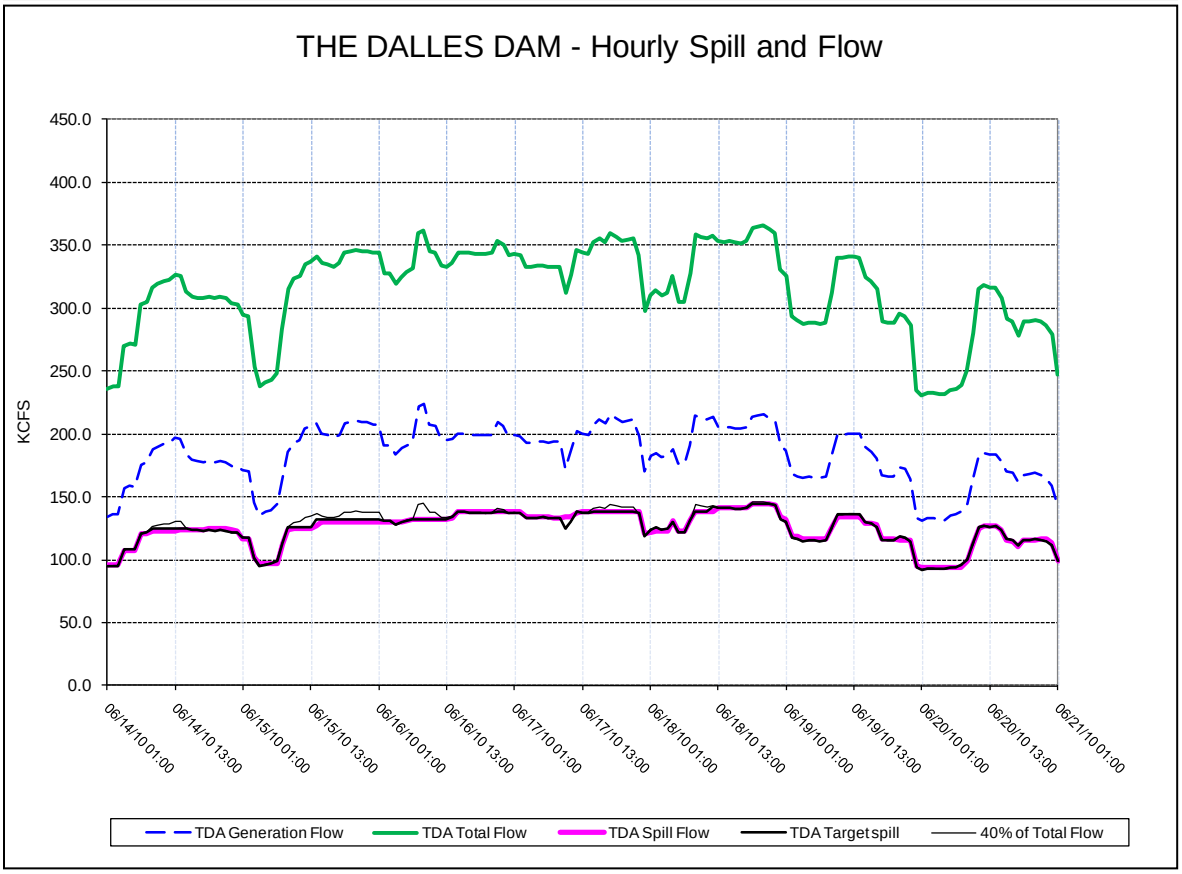
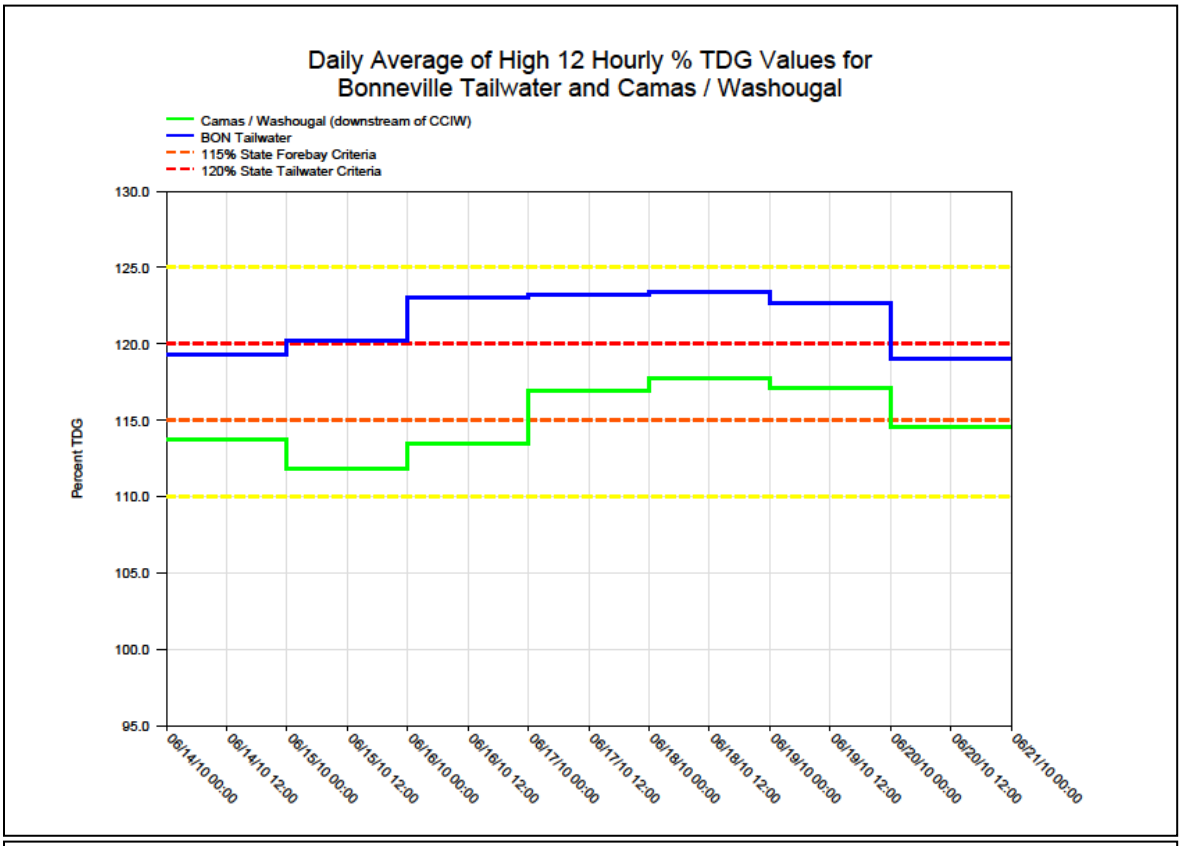

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/14/10 01:00
06/14/10 13:00
06/15/10 01:00
06/15/10 13:00
06/16/10 01:00
06/16/10 13:00
06/17/10 01:00
06/17/10 13:00
06/18/10 01:00
06/18/10 13:00
06/19/10 01:00
06/19/10 13:00
06/20/10 01:00
06/20/10 13:00
06/21/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/14/10 00:00
06/14/10 12:00
06/15/10 00:00
06/15/10 12:00
06/16/10 00:00
06/16/10 12:00
06/17/10 00:00
06/17/10 12:00
06/18/10 00:00
06/18/10 12:00
06/19/10 00:00
06/19/10 12:00
06/20/10 00:00
06/20/10 12:00
06/21/10 00:00

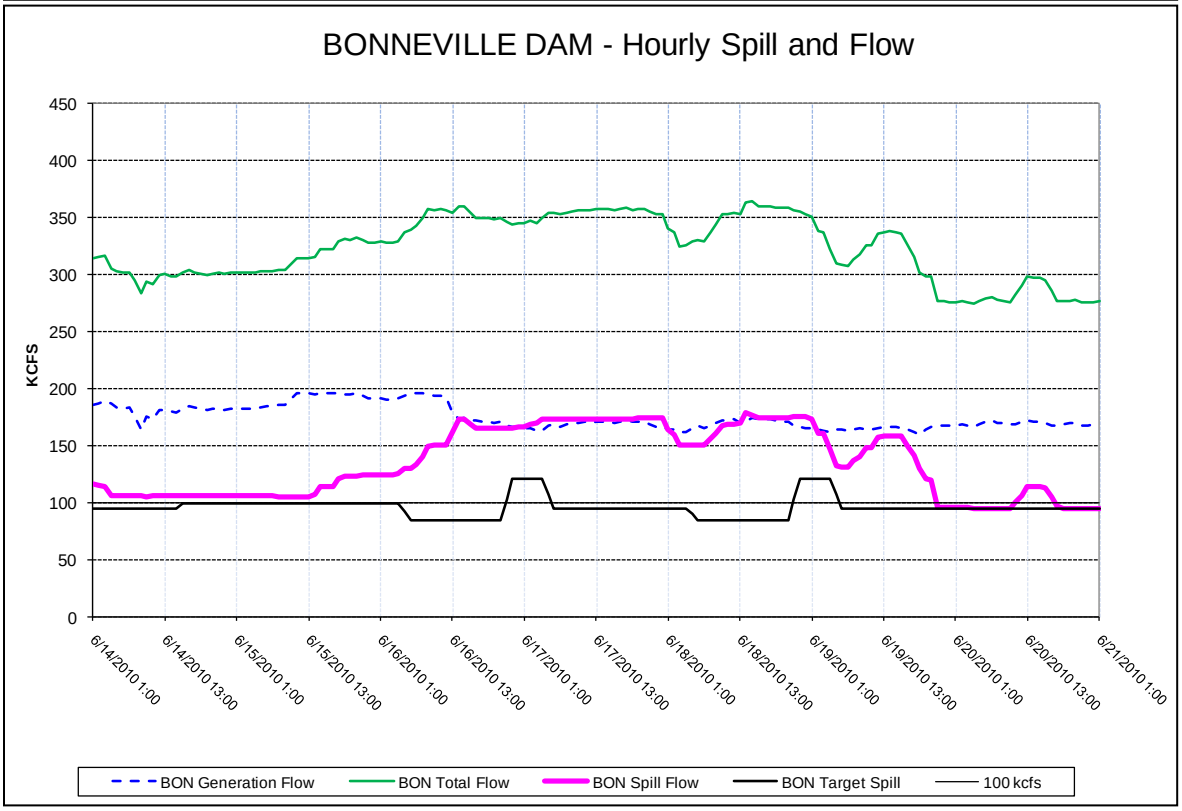
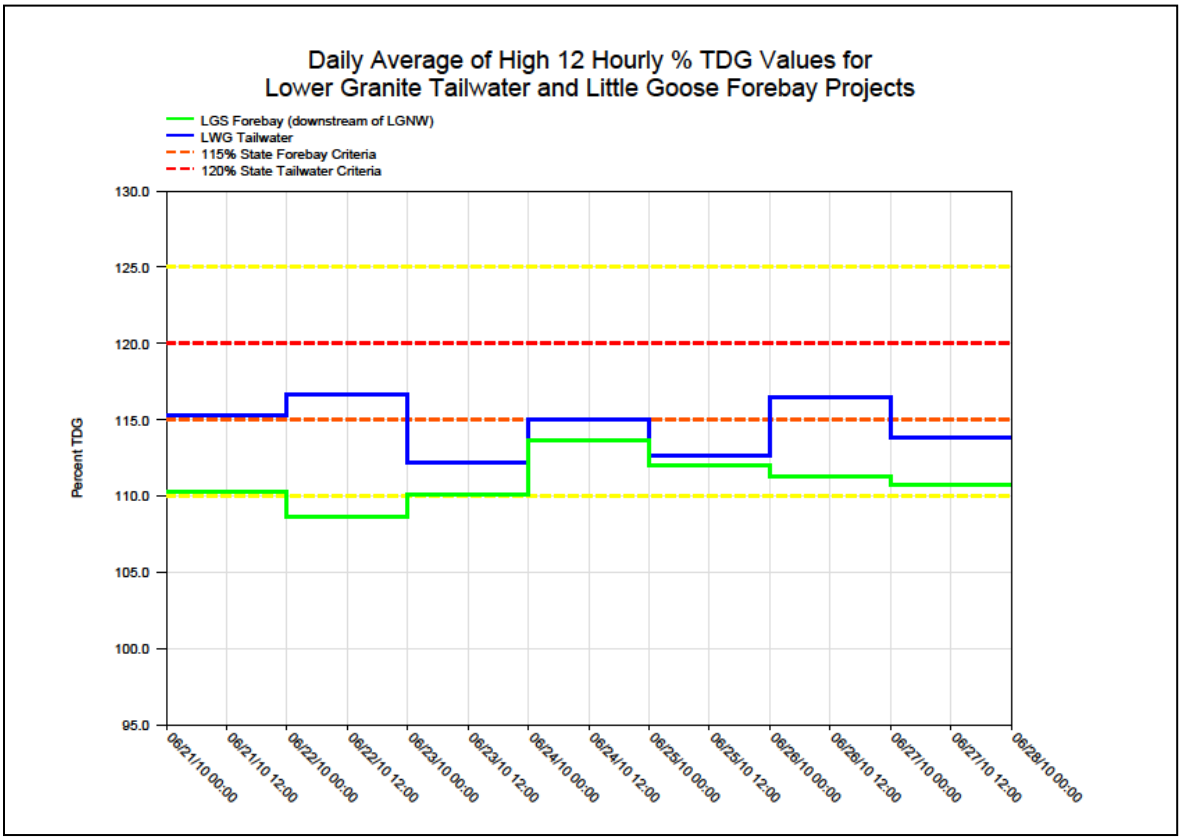

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/14/2010 1:00
6/14/2010 13:00
6/15/2010 1:00
6/15/2010 13:00
6/16/2010 1:00
6/16/2010 13:00
6/17/2010 1:00
6/17/2010 13:00
6/18/2010 1:00
6/18/2010 13:00
6/19/2010 1:00
6/19/2010 13:00
6/20/2010 1:00
6/20/2010 13:00
6/21/2010 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 Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

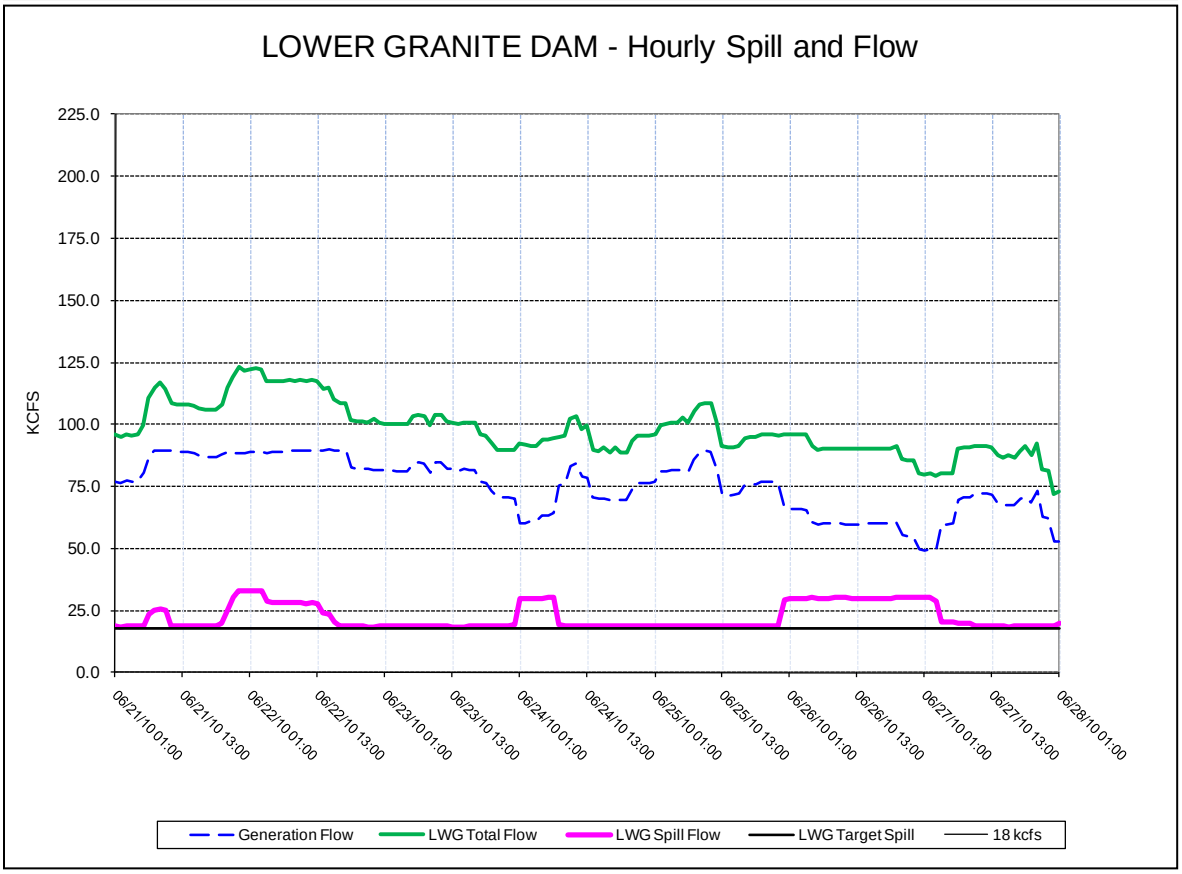
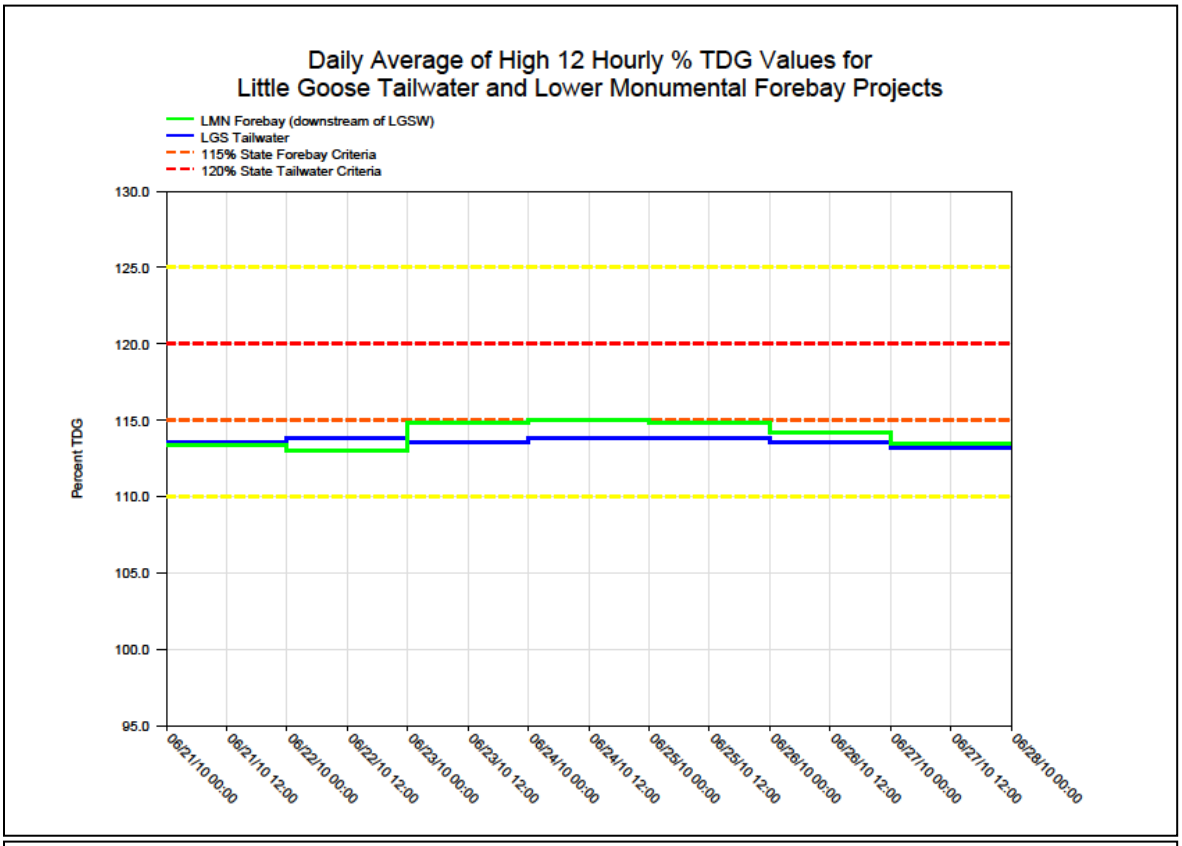

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

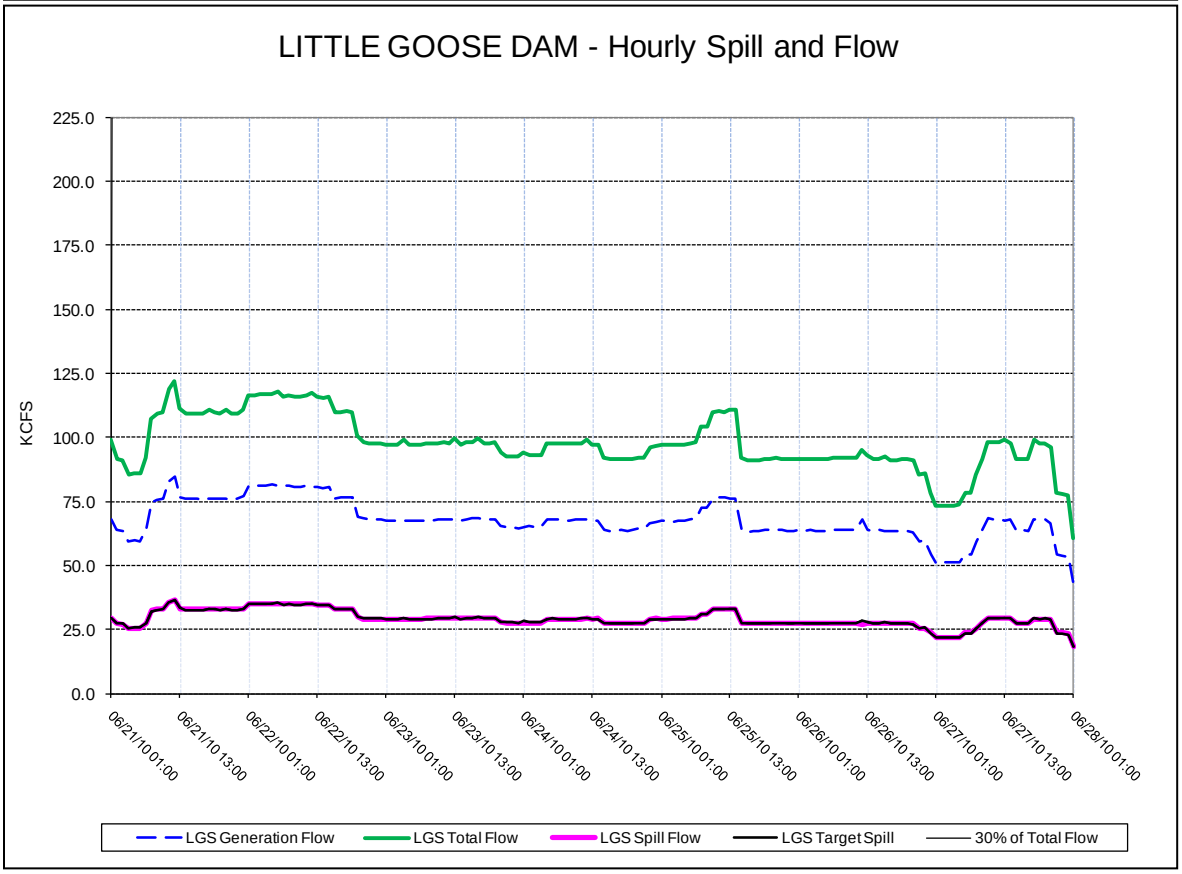
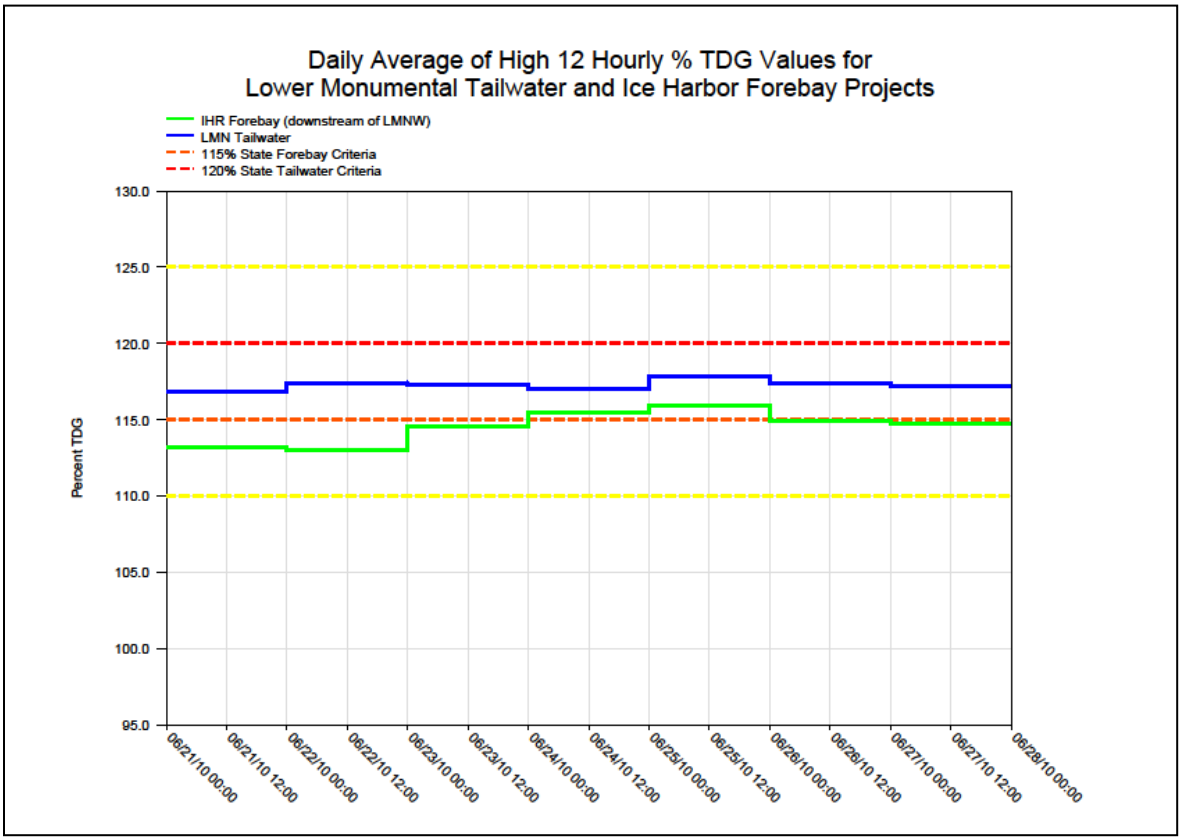

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

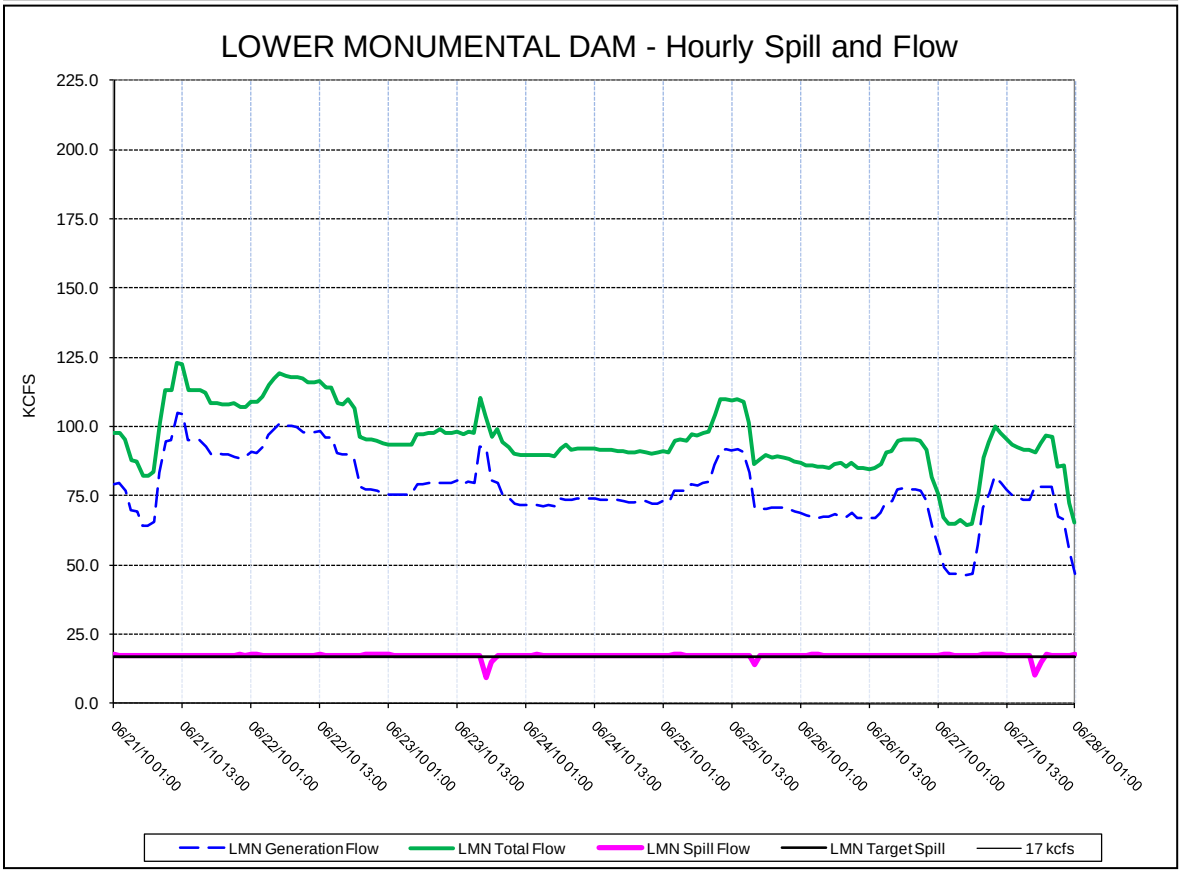
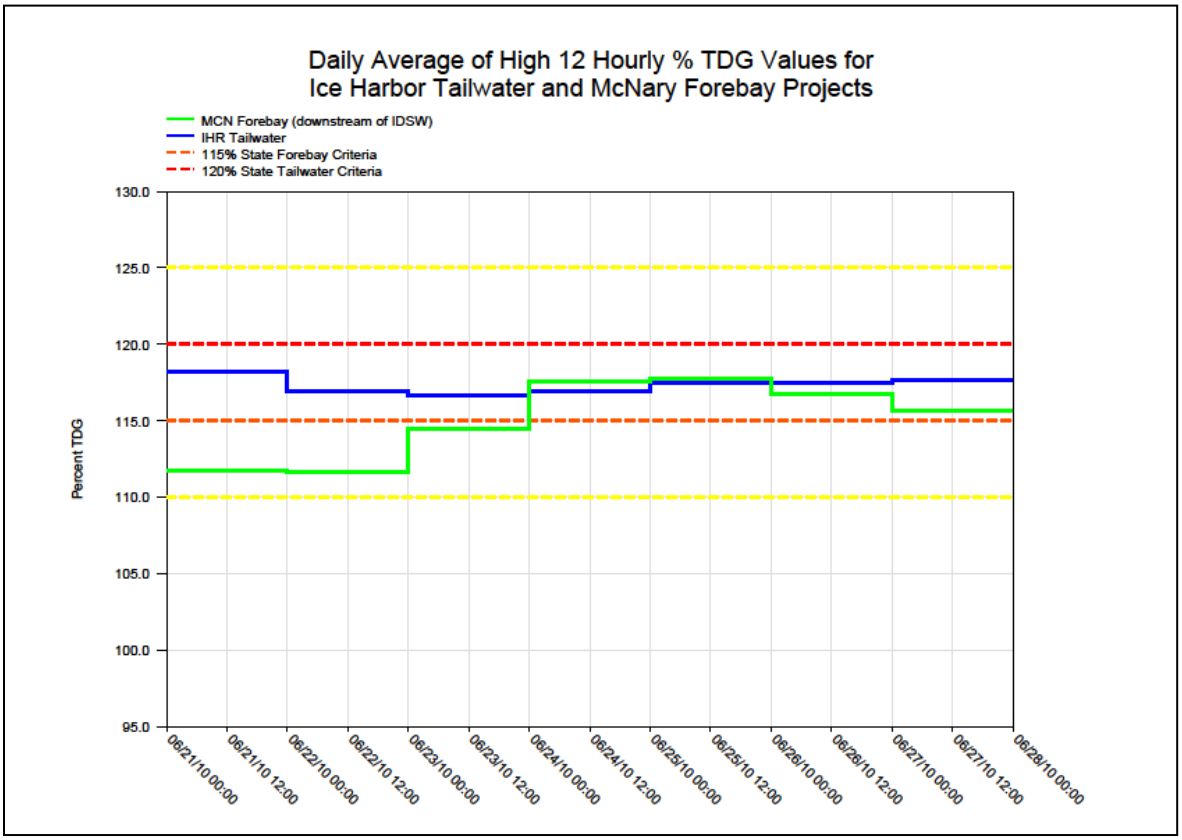

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

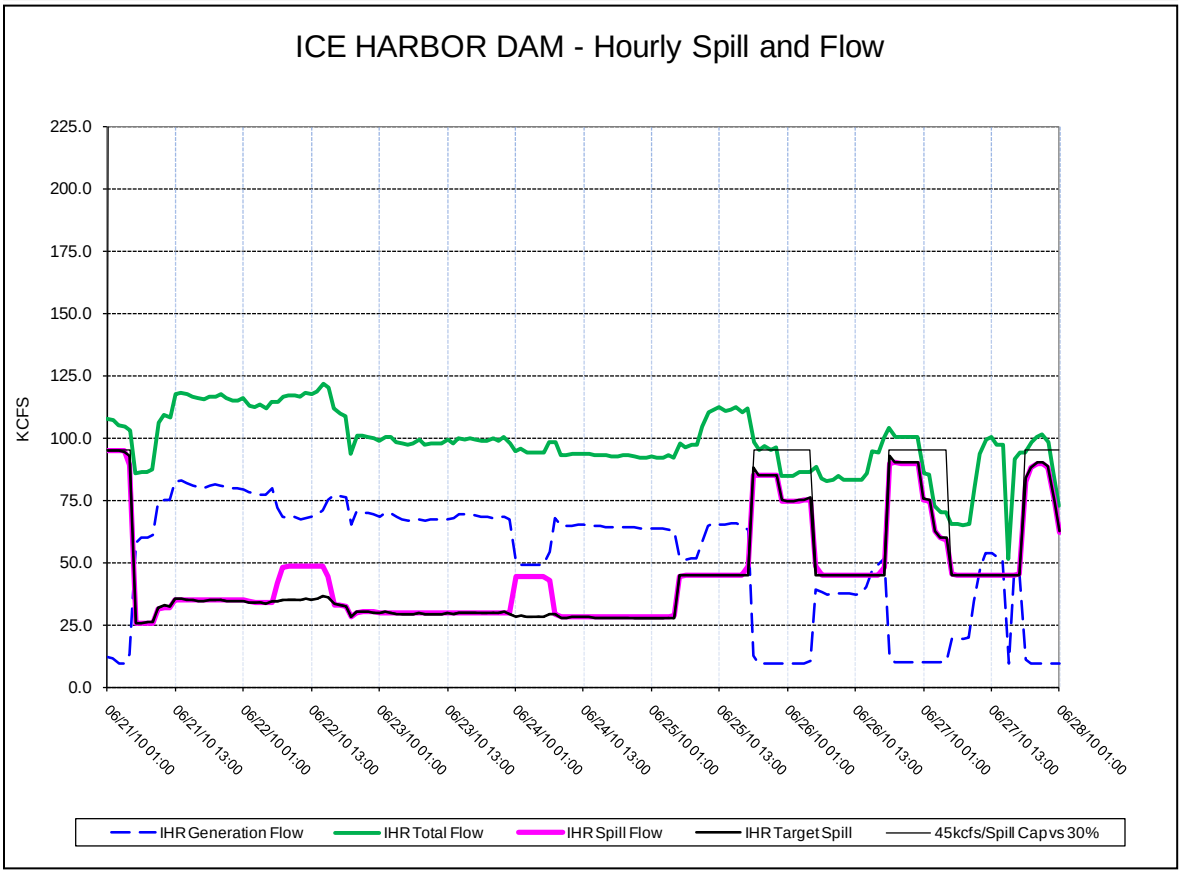
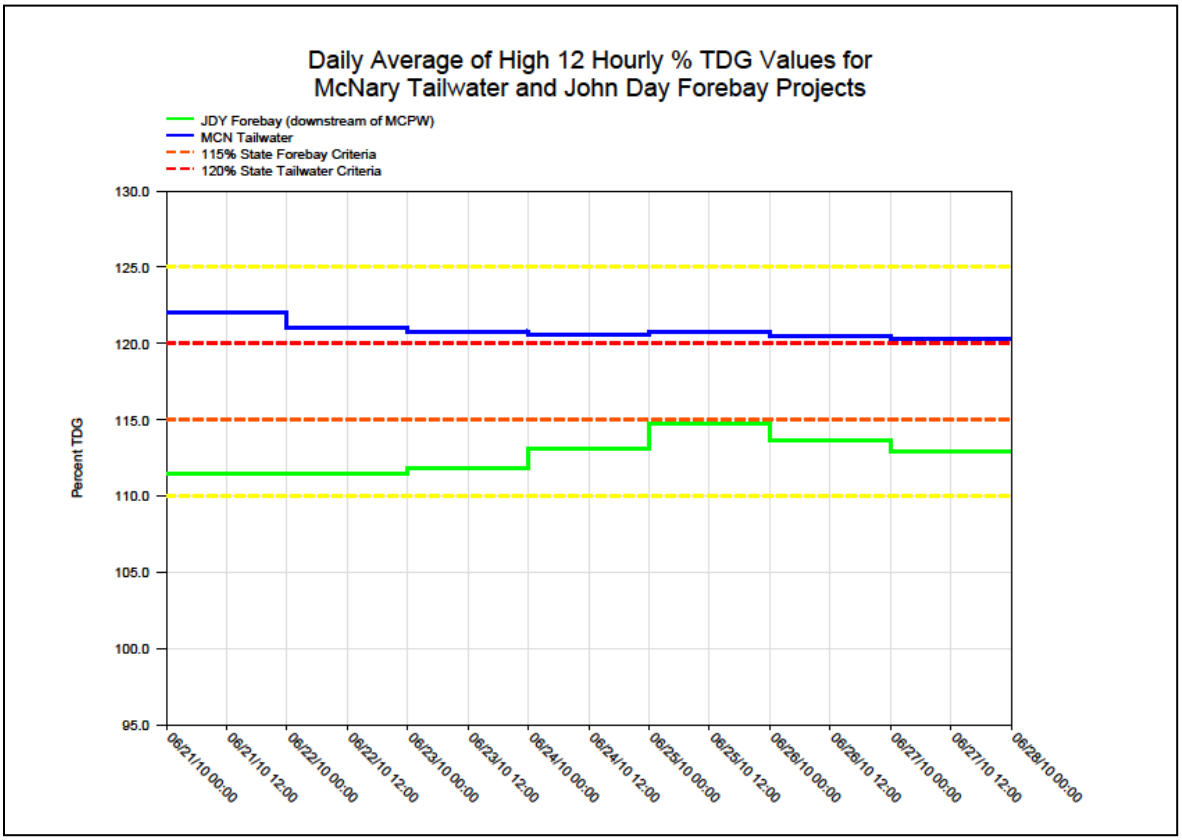

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

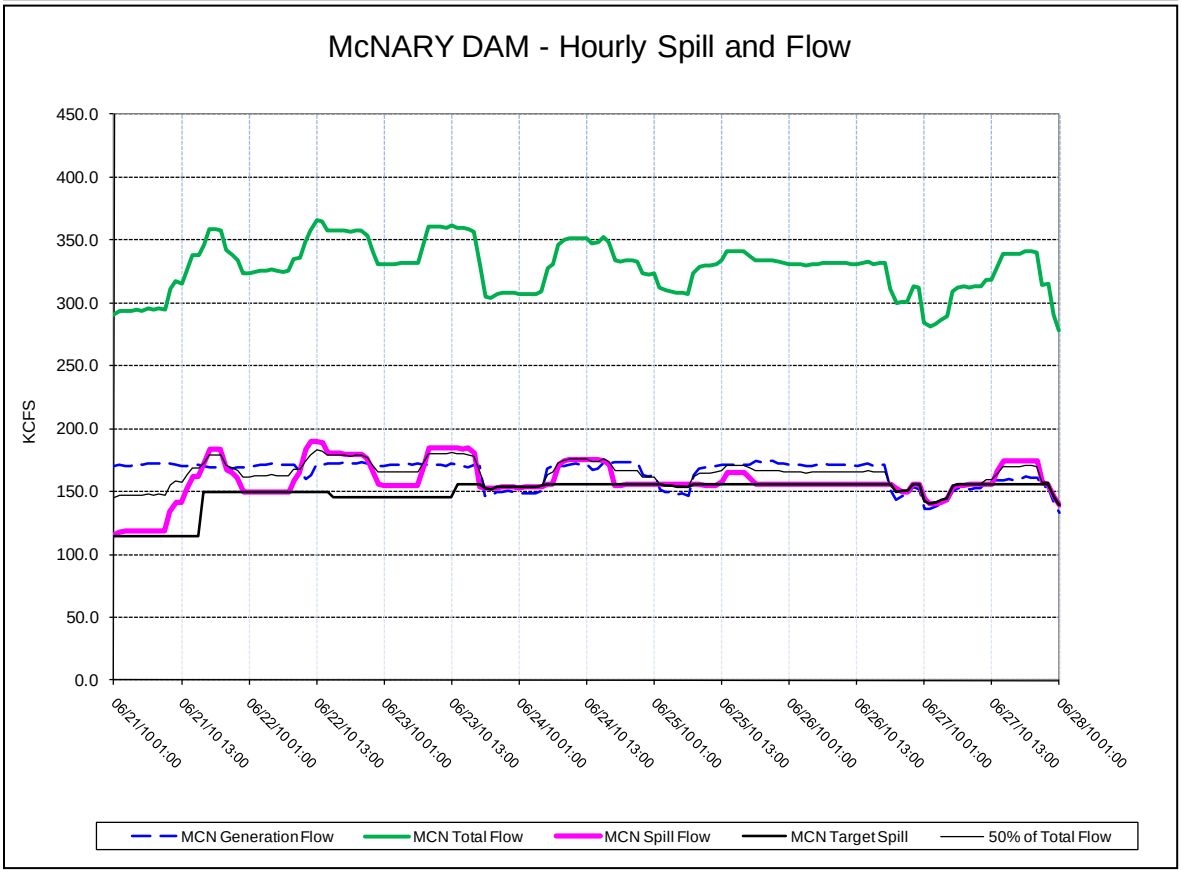
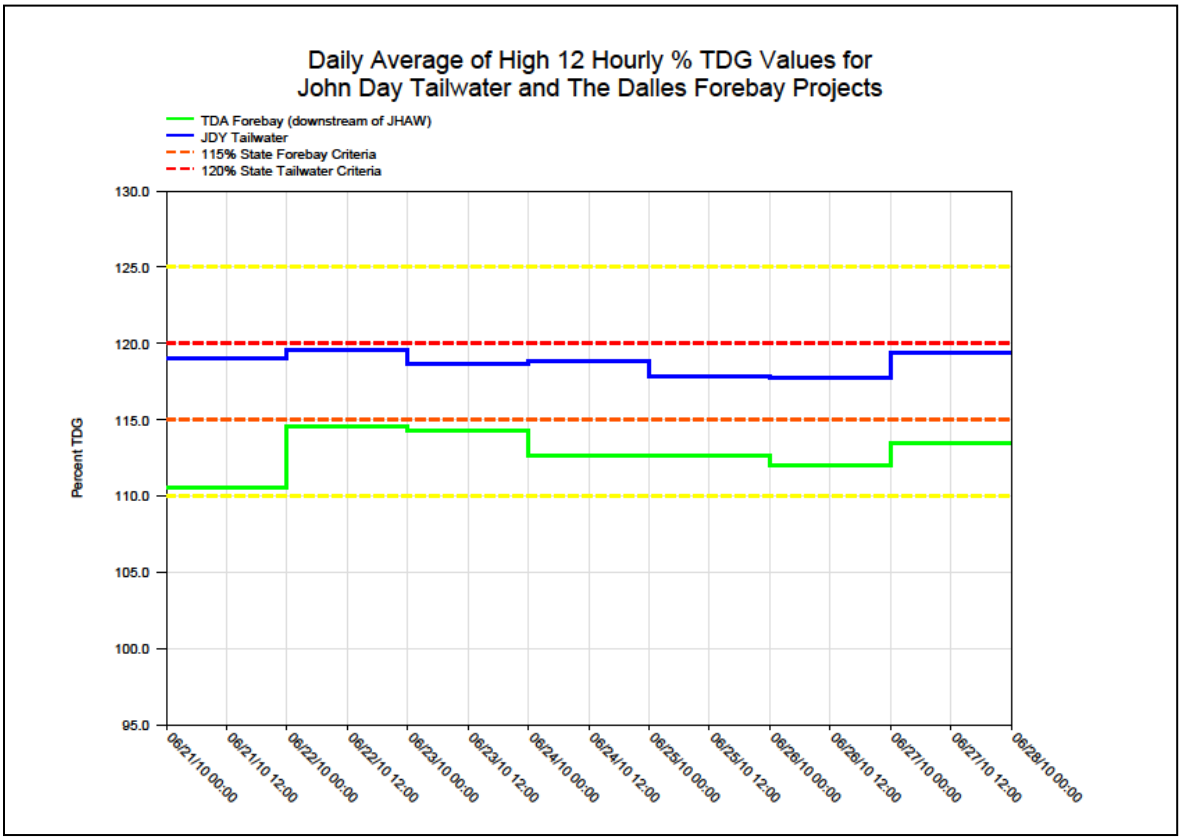

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

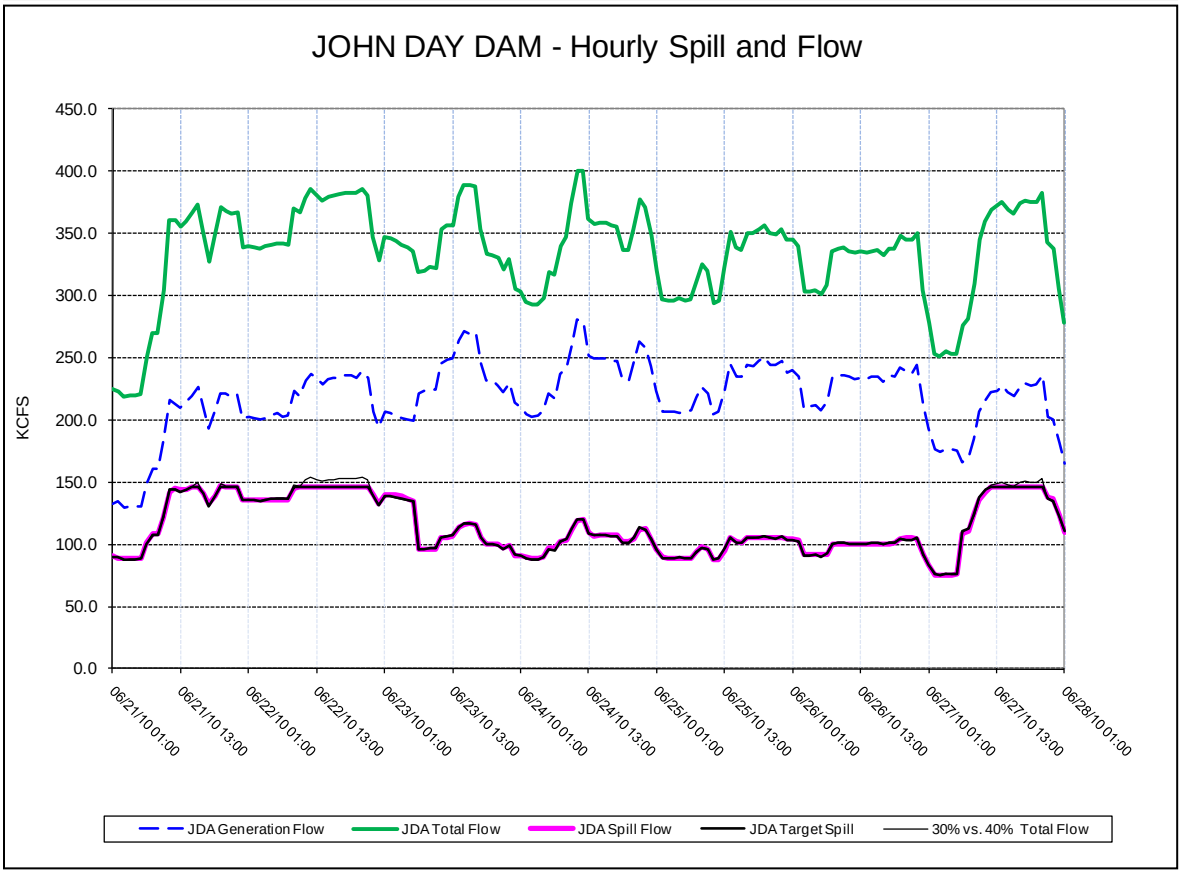
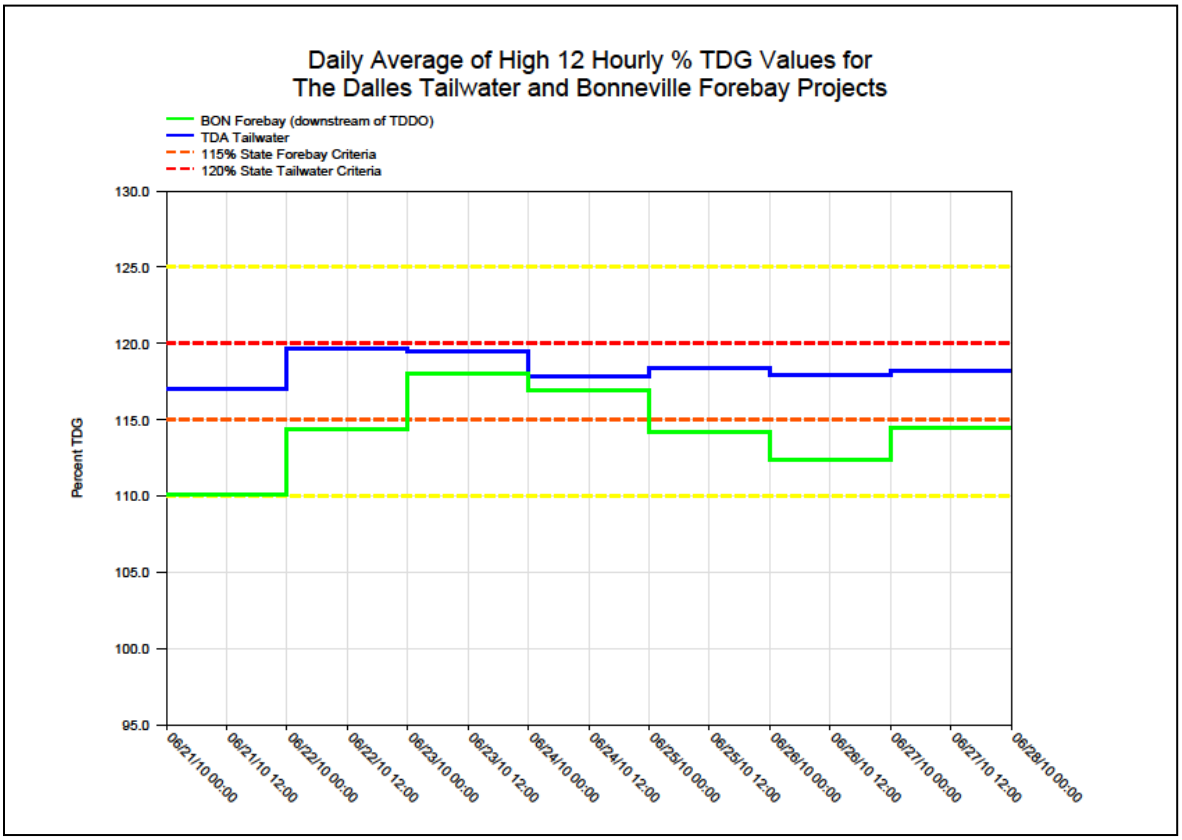

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

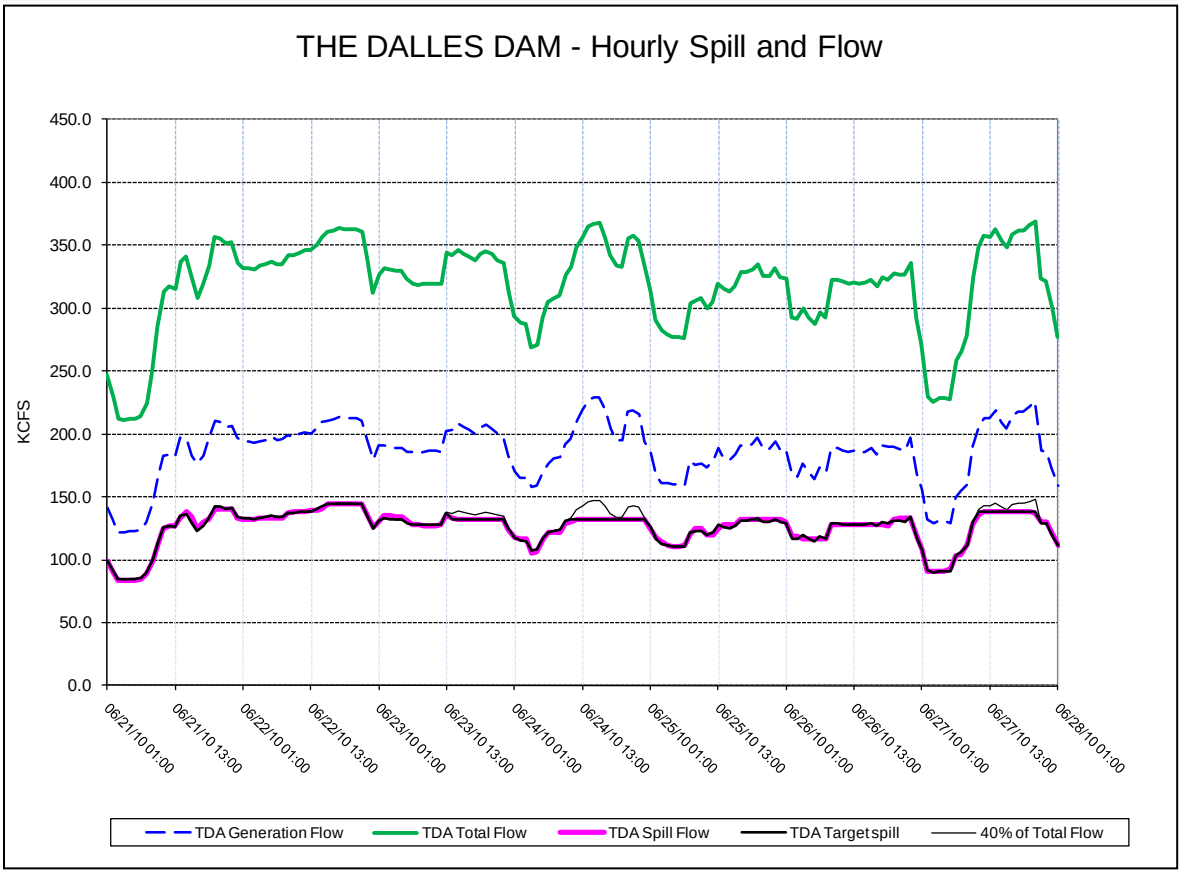
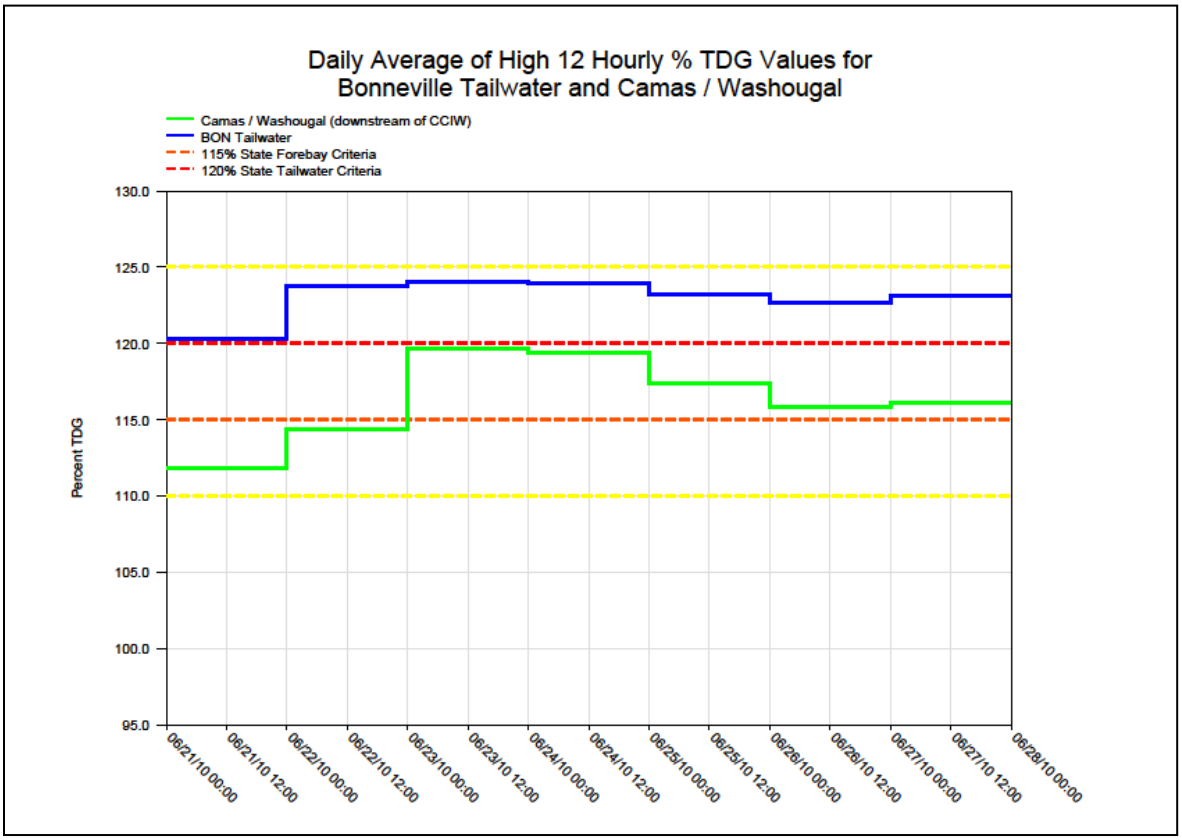

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/21/10 01:00
06/21/10 13:00
06/22/10 01:00
06/22/10 13:00
06/23/10 01:00
06/23/10 13:00
06/24/10 01:00
06/24/10 13:00
06/25/10 01:00
06/25/10 13:00
06/26/10 01:00
06/26/10 13:00
06/27/10 01:00
06/27/10 13:00
06/28/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/21/10 00:00
06/21/10 12:00
06/22/10 00:00
06/22/10 12:00
06/23/10 00:00
06/23/10 12:00
06/24/10 00:00
06/24/10 12:00
06/25/10 00:00
06/25/10 12:00
06/26/10 00:00
06/26/10 12:00
06/27/10 00:00
06/27/10 12:00
06/28/10 00:00

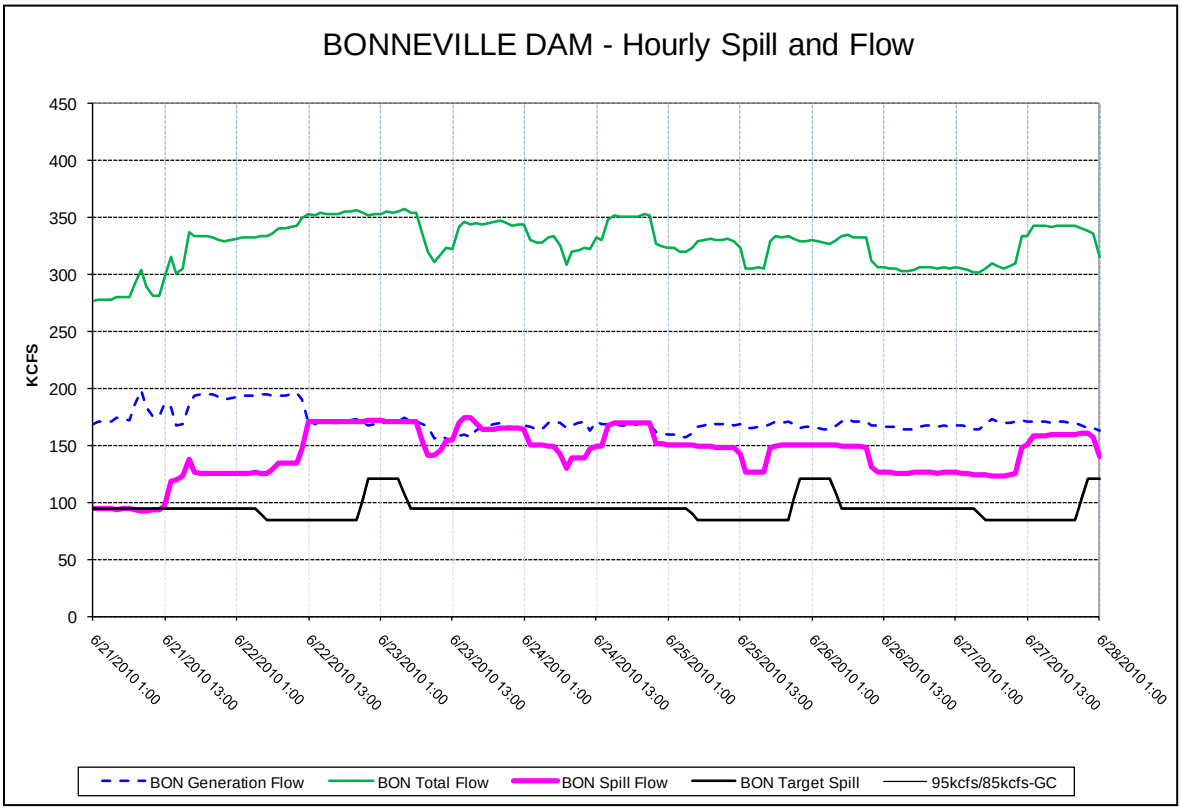
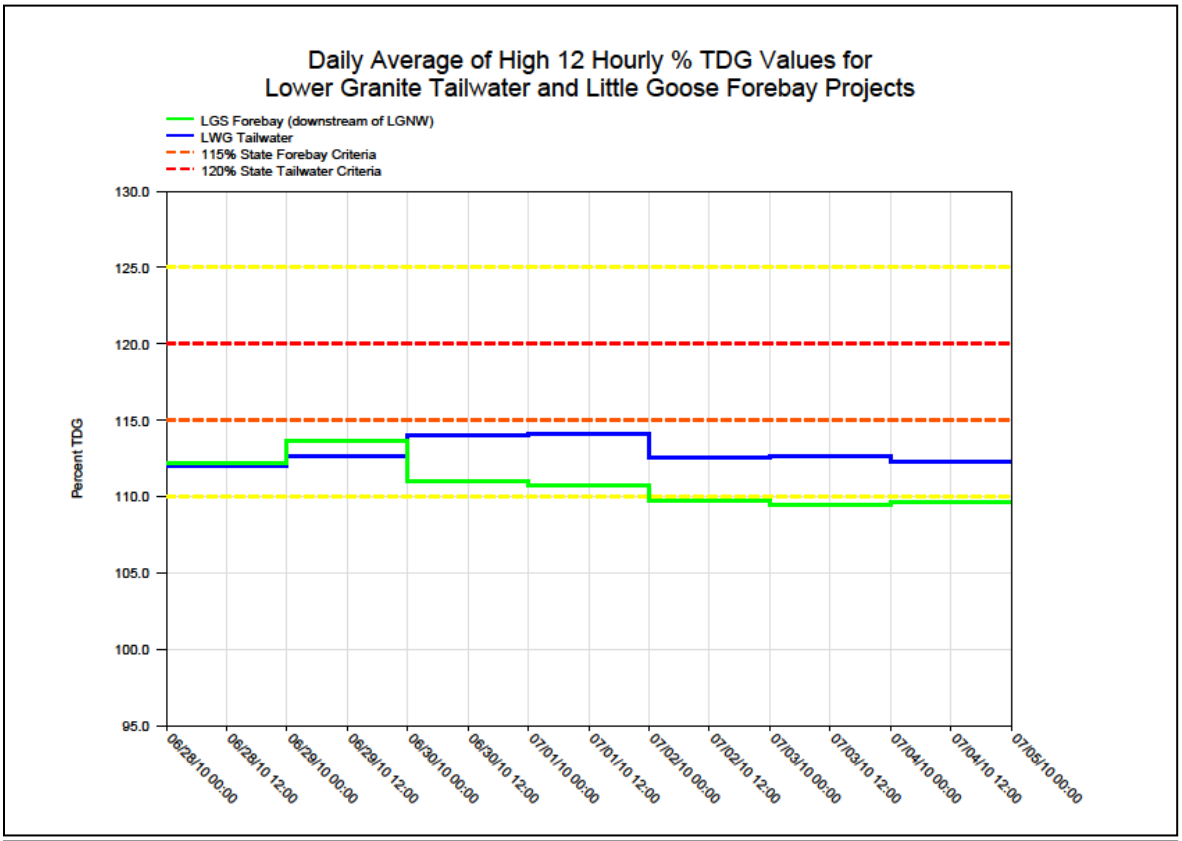

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/21/2010 1:00
6/21/2010 13:00
6/22/2010 1:00
6/22/2010 13:00
6/23/2010 1:00
6/23/2010 13:00
6/24/2010 1:00
6/24/2010 13:00
6/25/2010 1:00
6/25/2010 13:00
6/26/2010 1:00
6/26/2010 13:00
6/27/2010 1:00
6/27/2010 13:00
6/28/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
95kcfs/85kcfs-GC

Figure 33


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

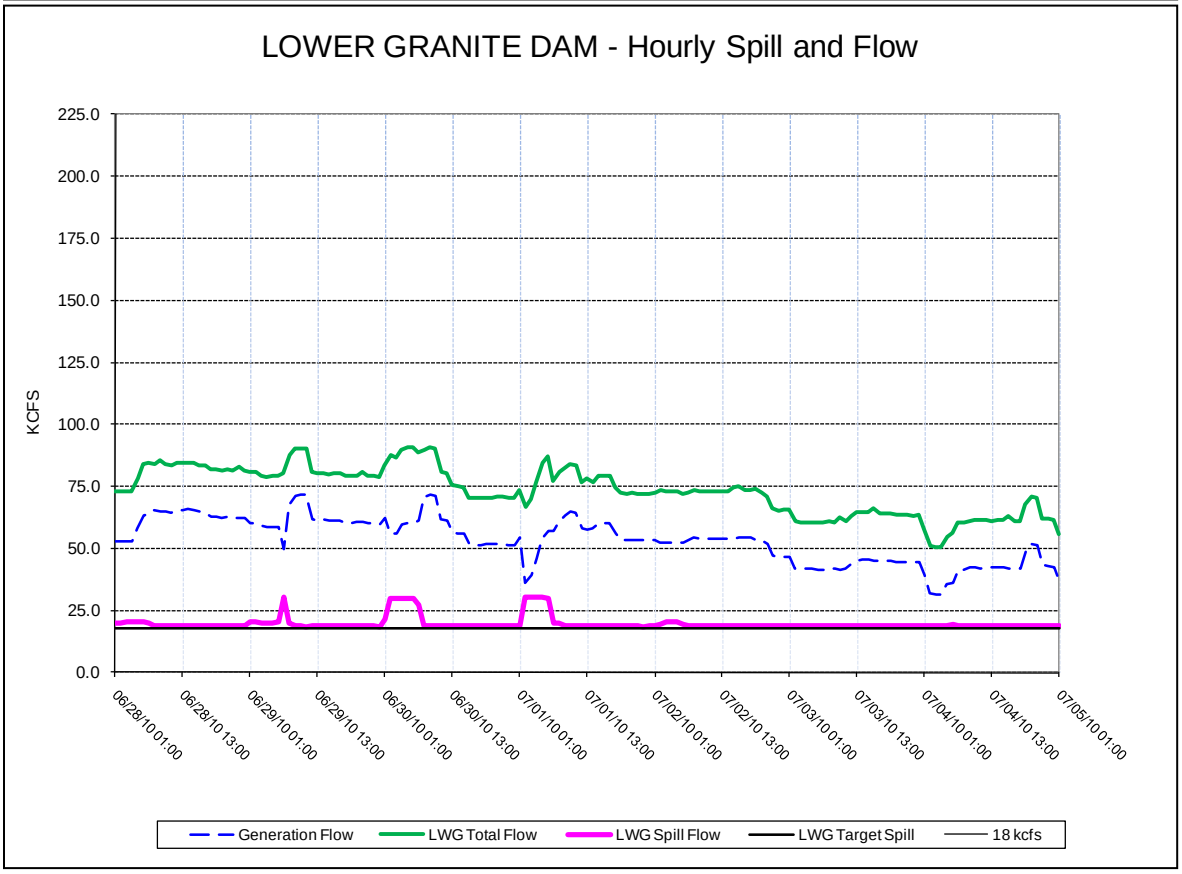
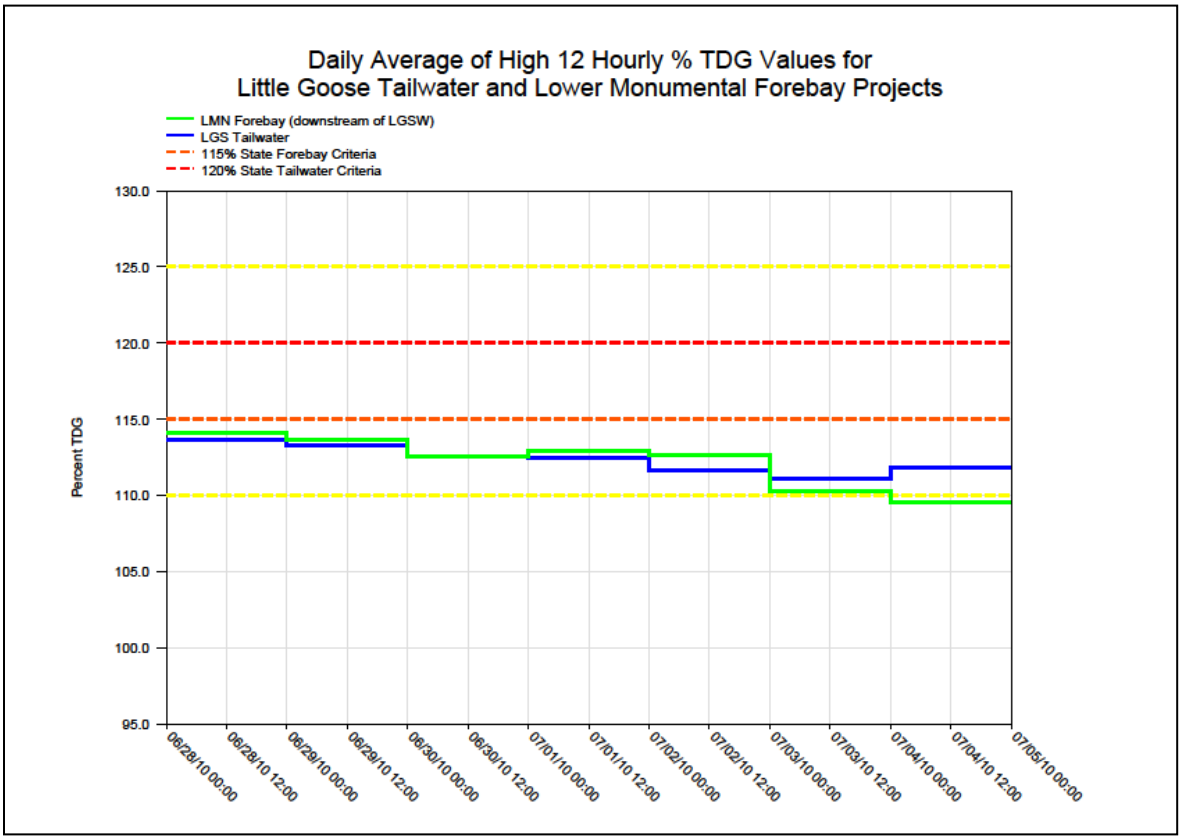

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

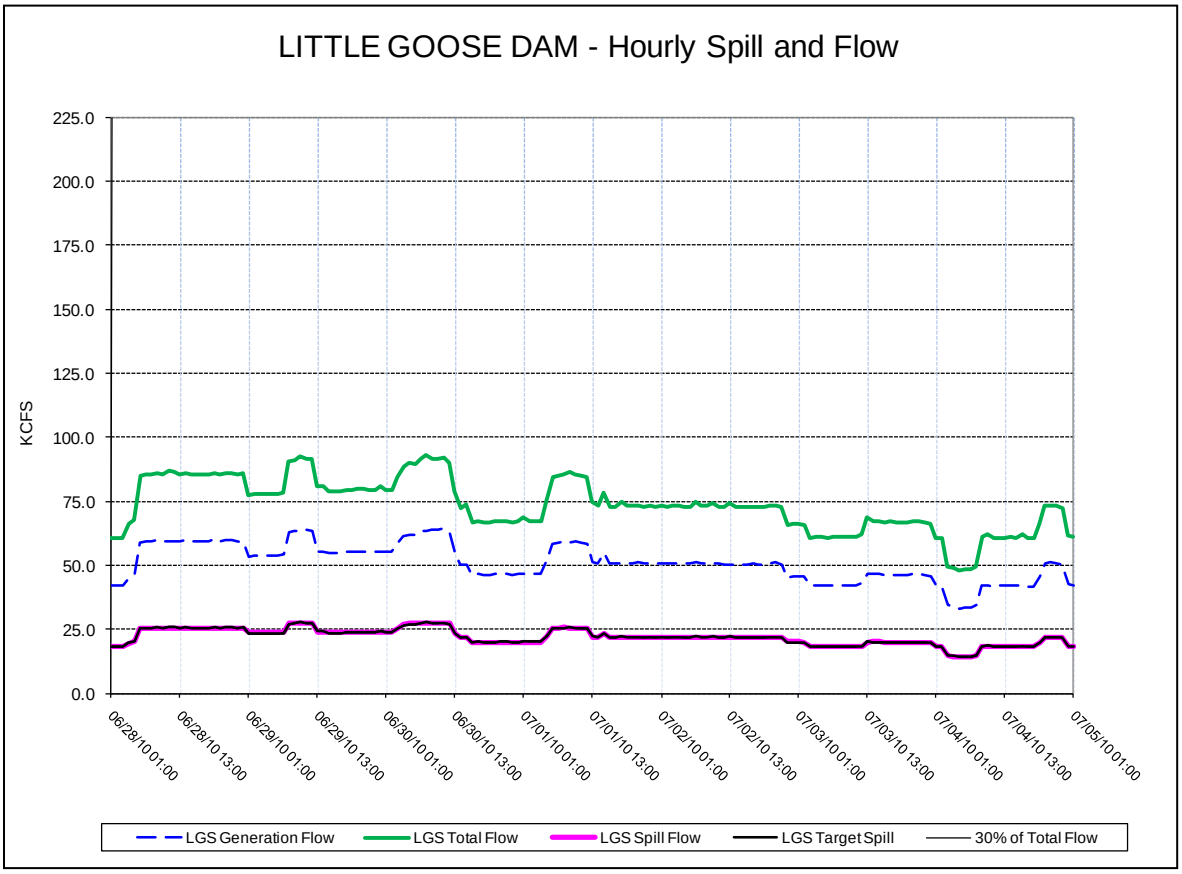
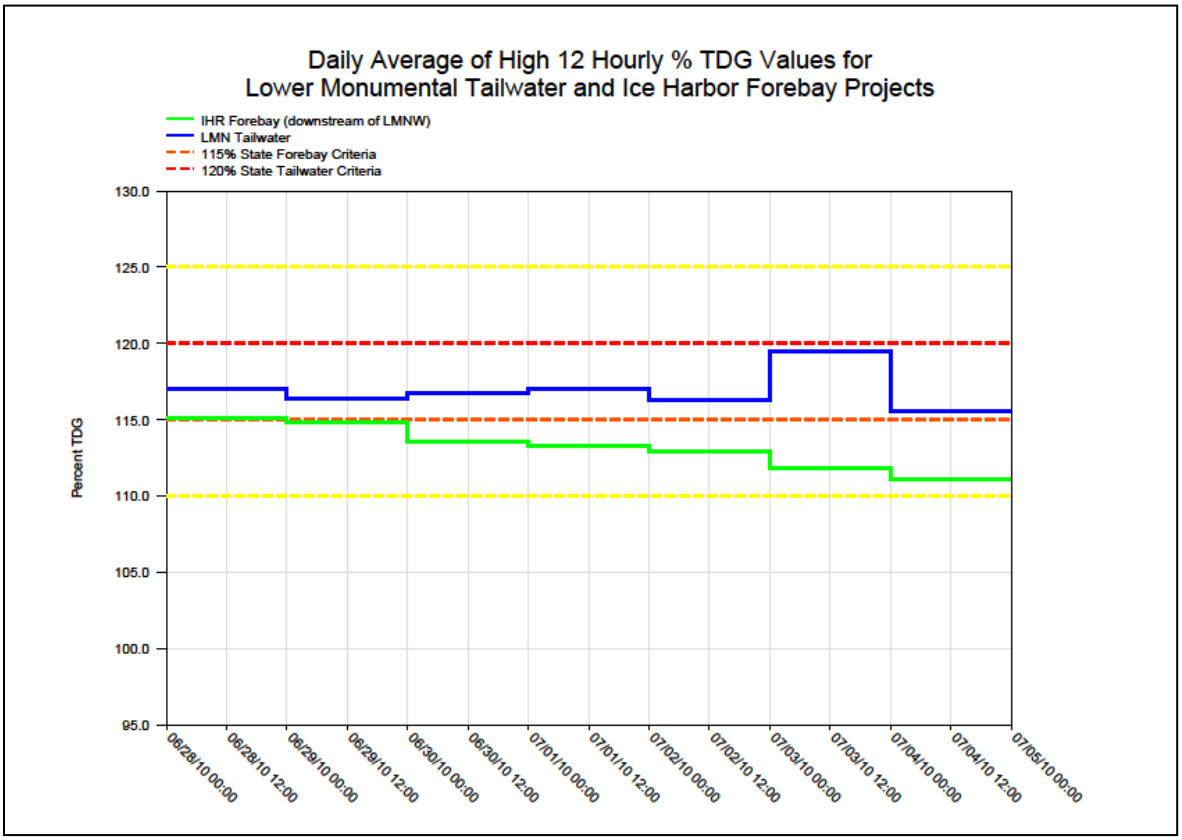

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 35


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

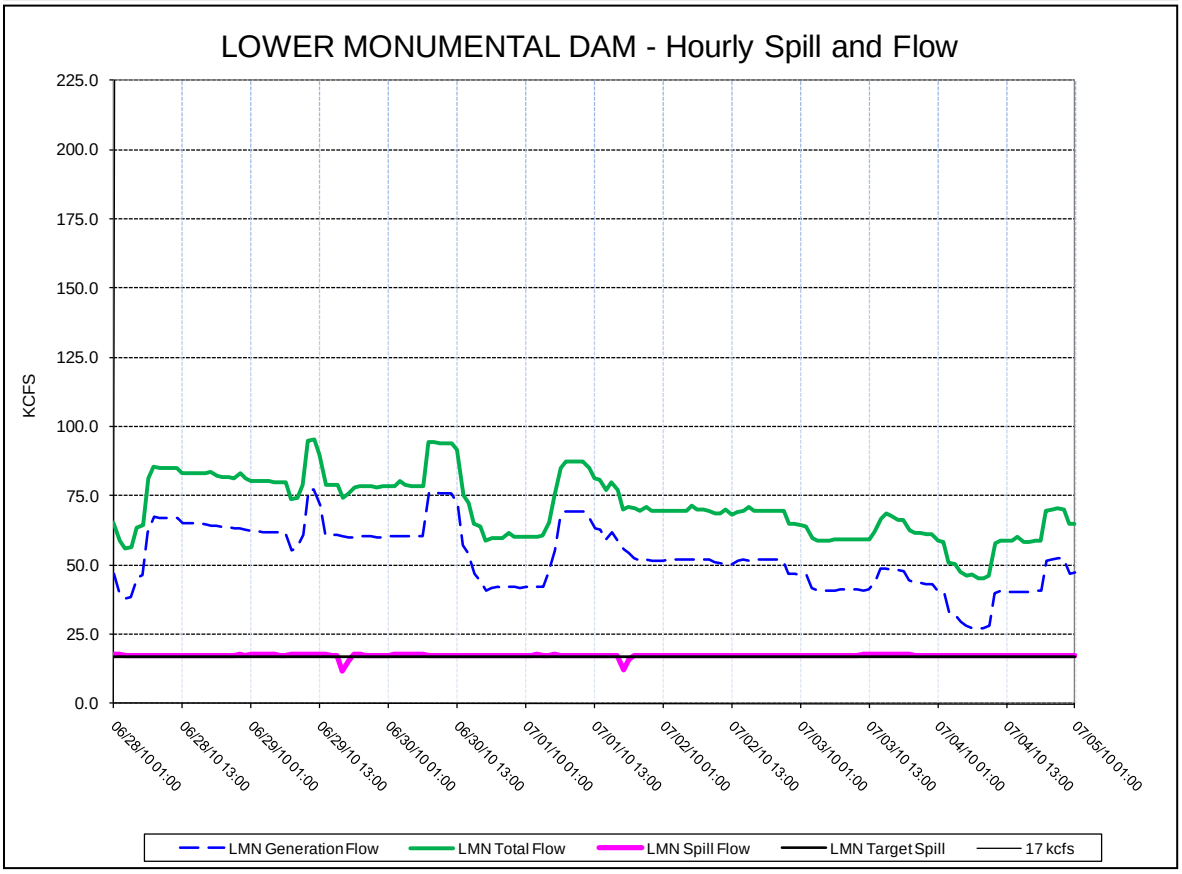
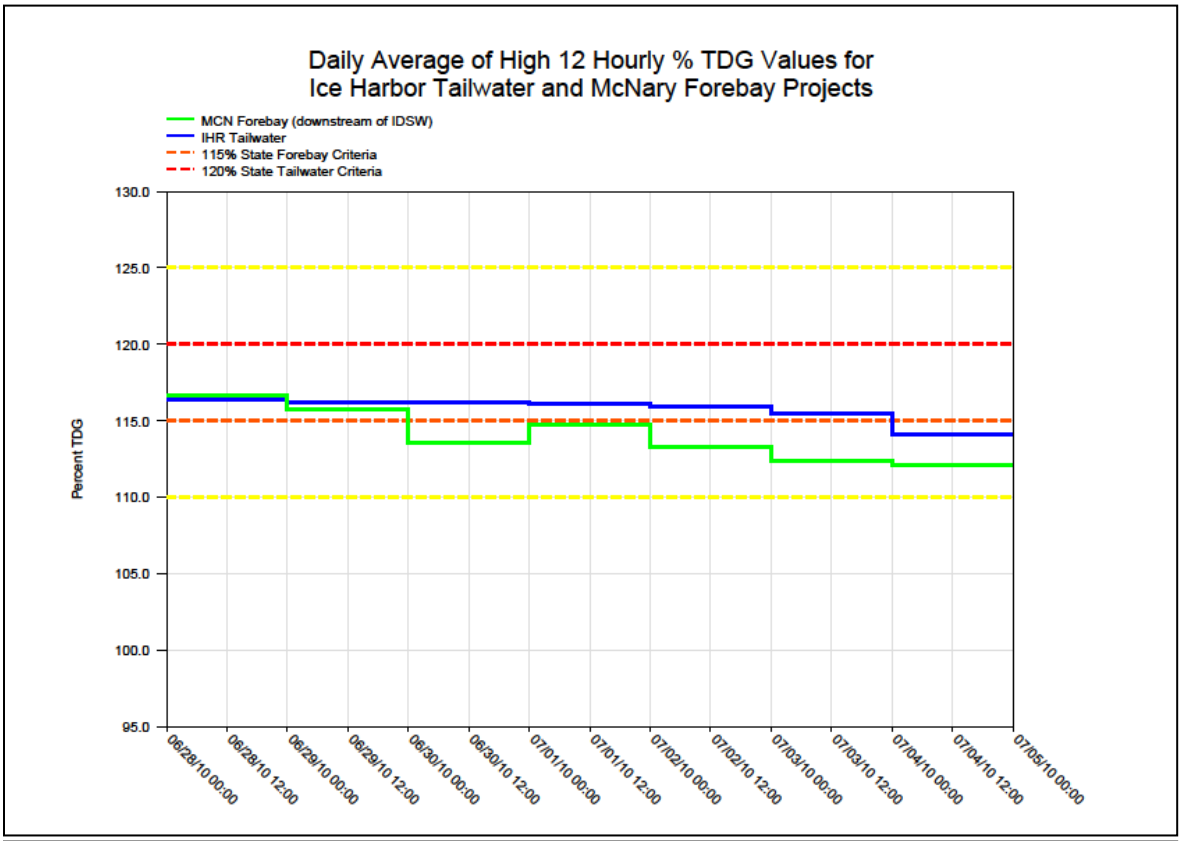

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

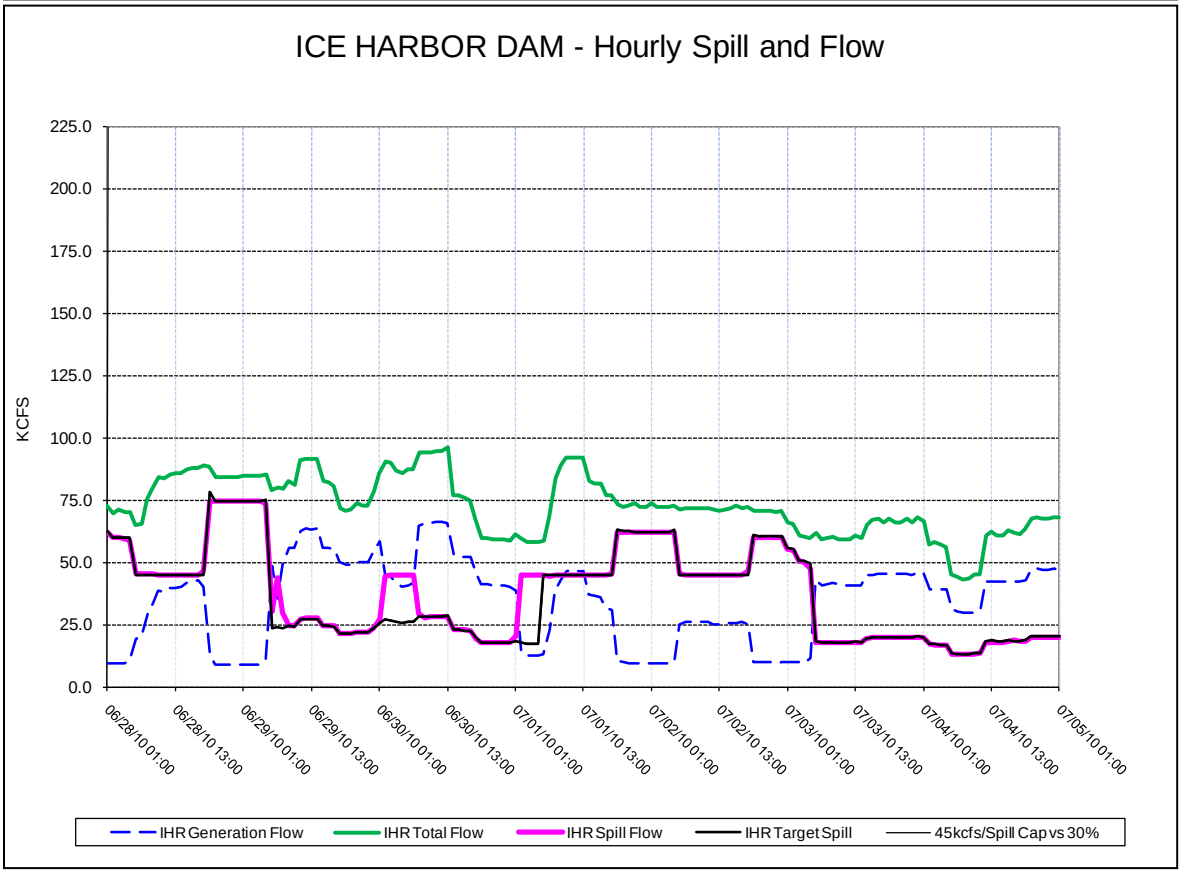
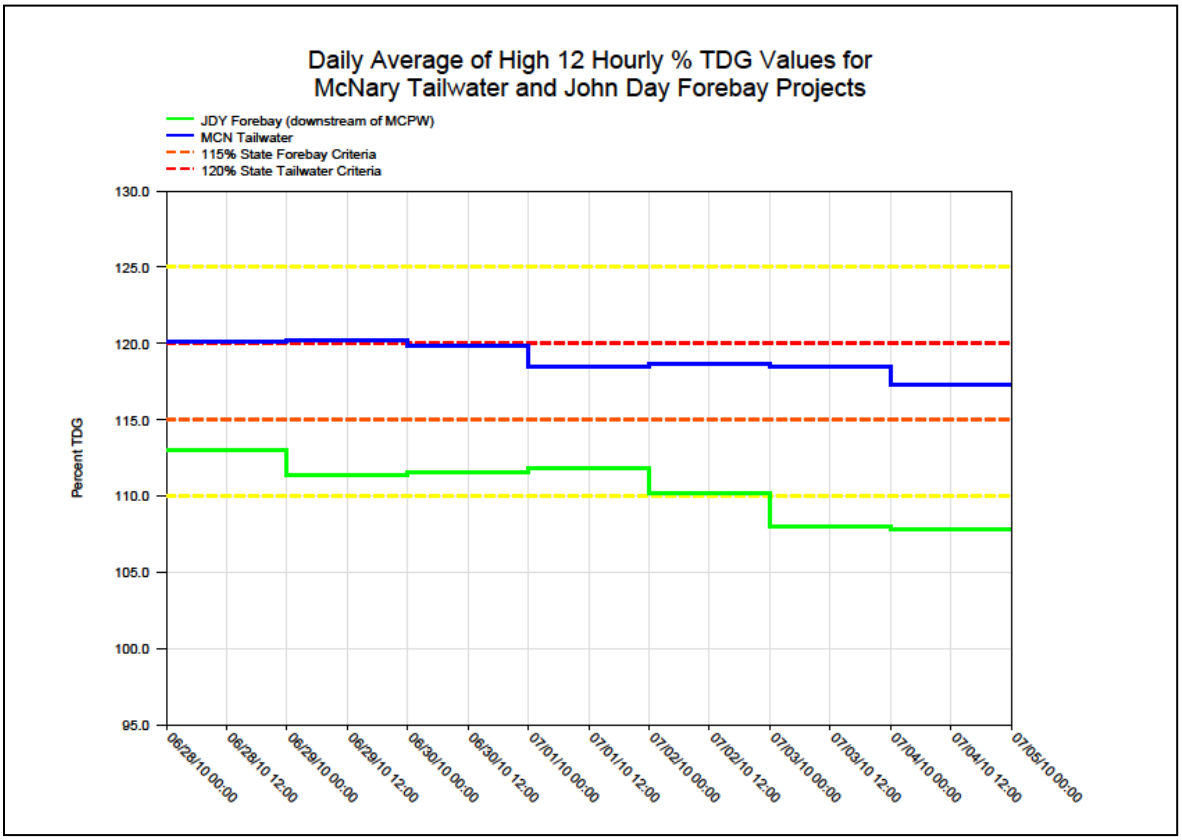

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 37


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
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07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

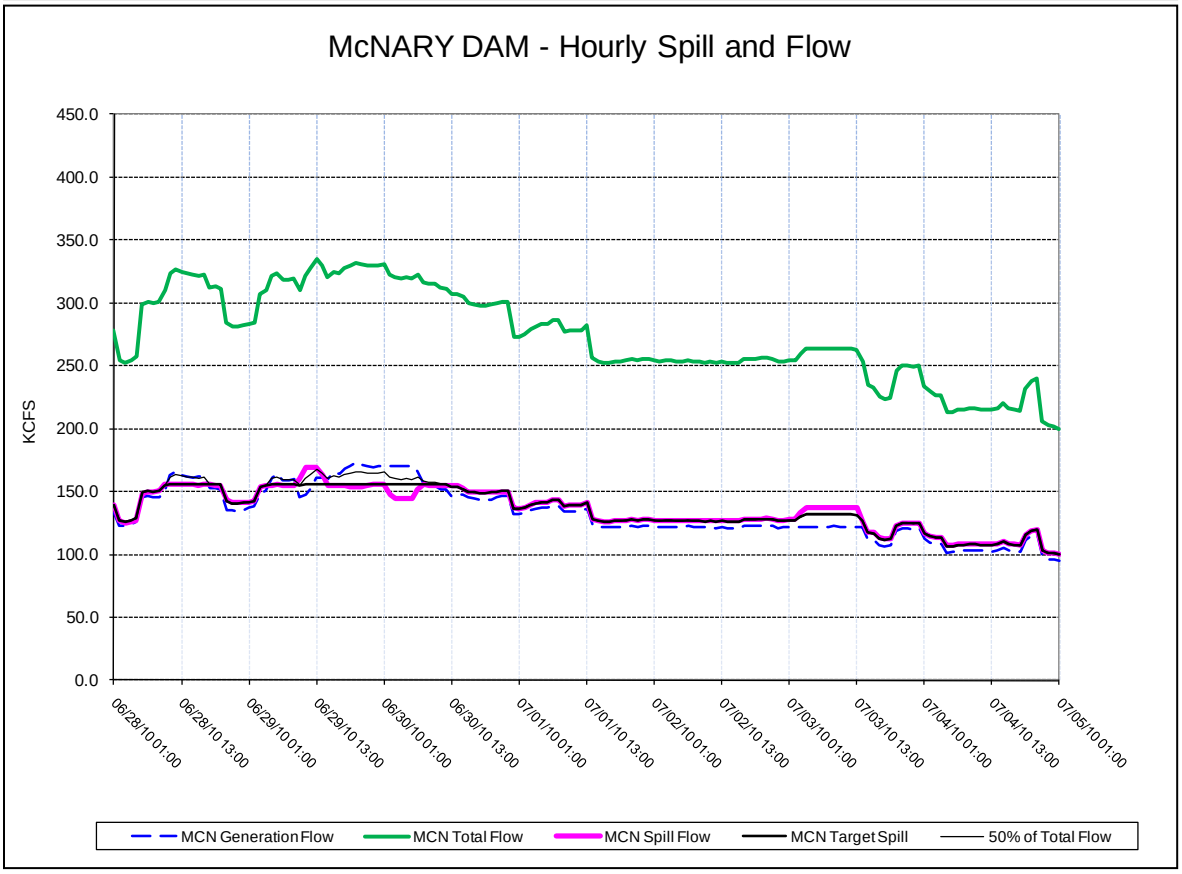
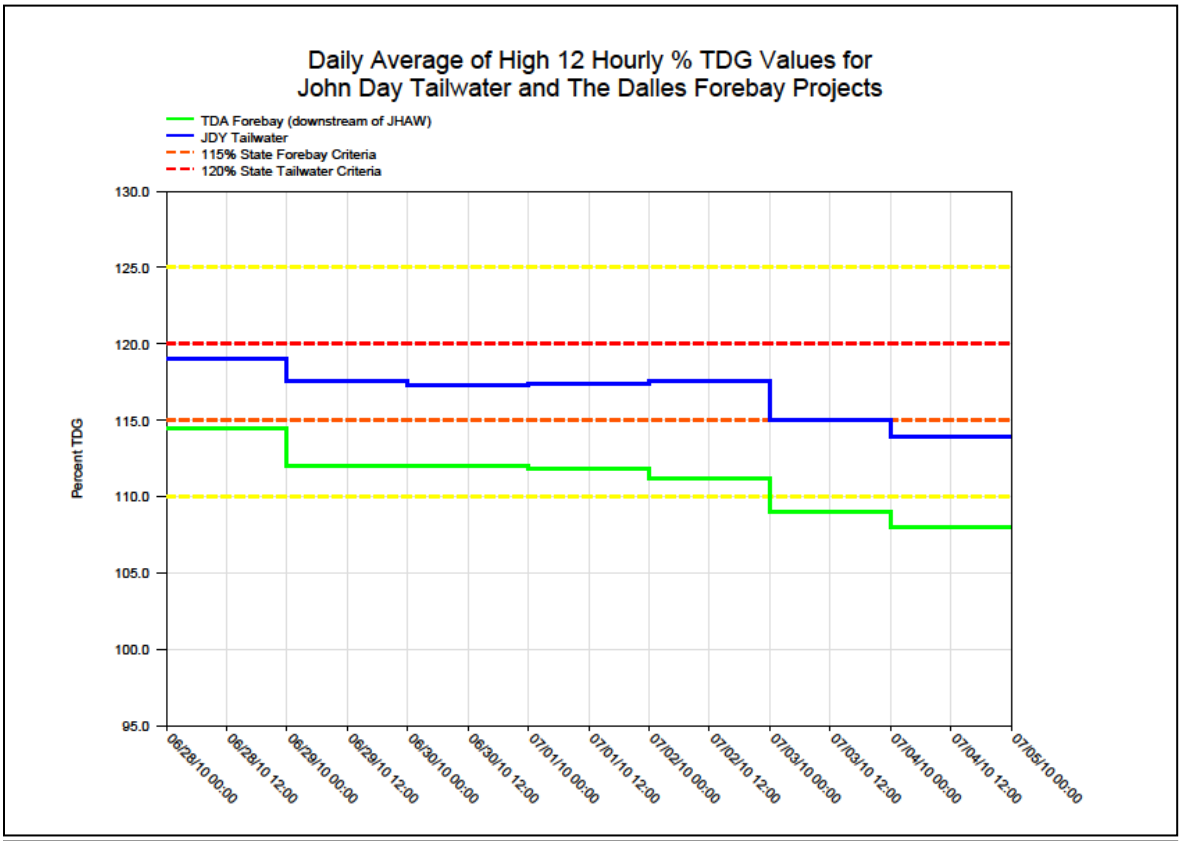

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

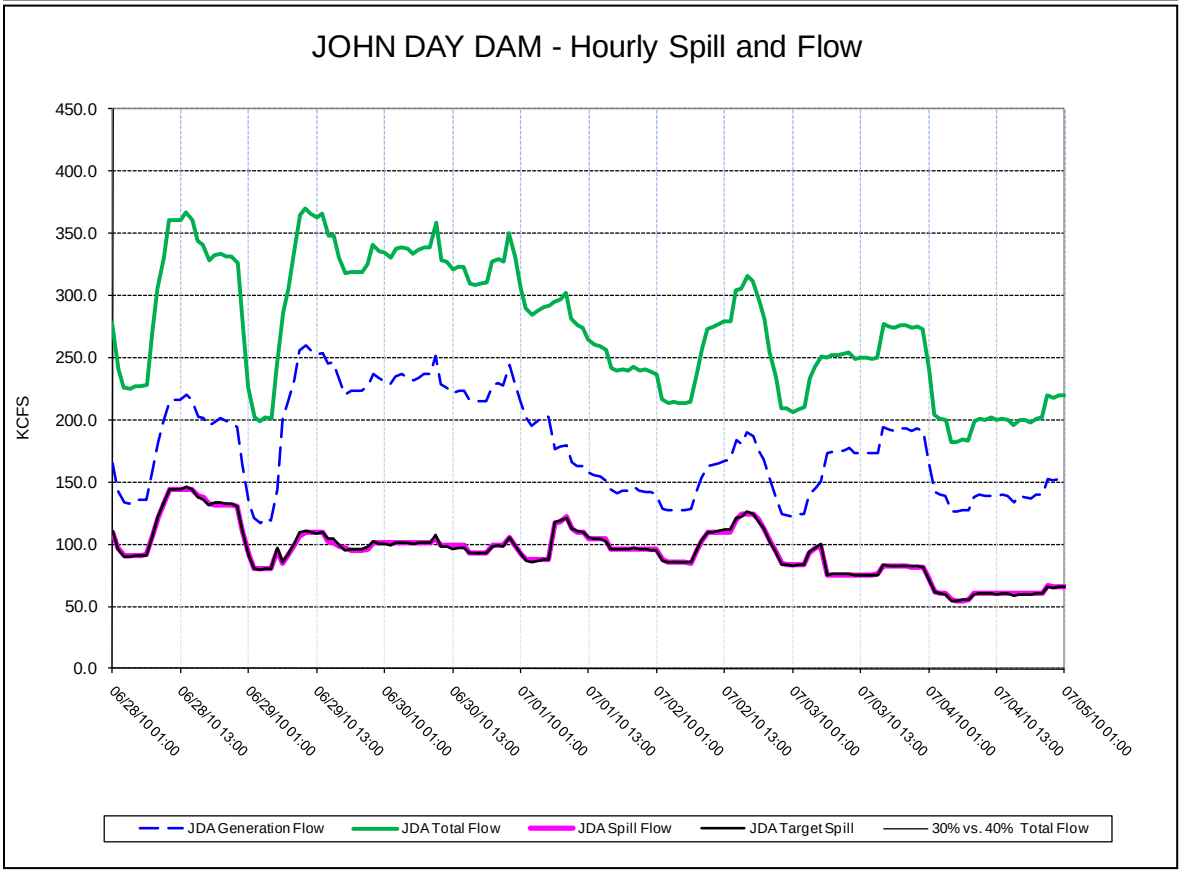
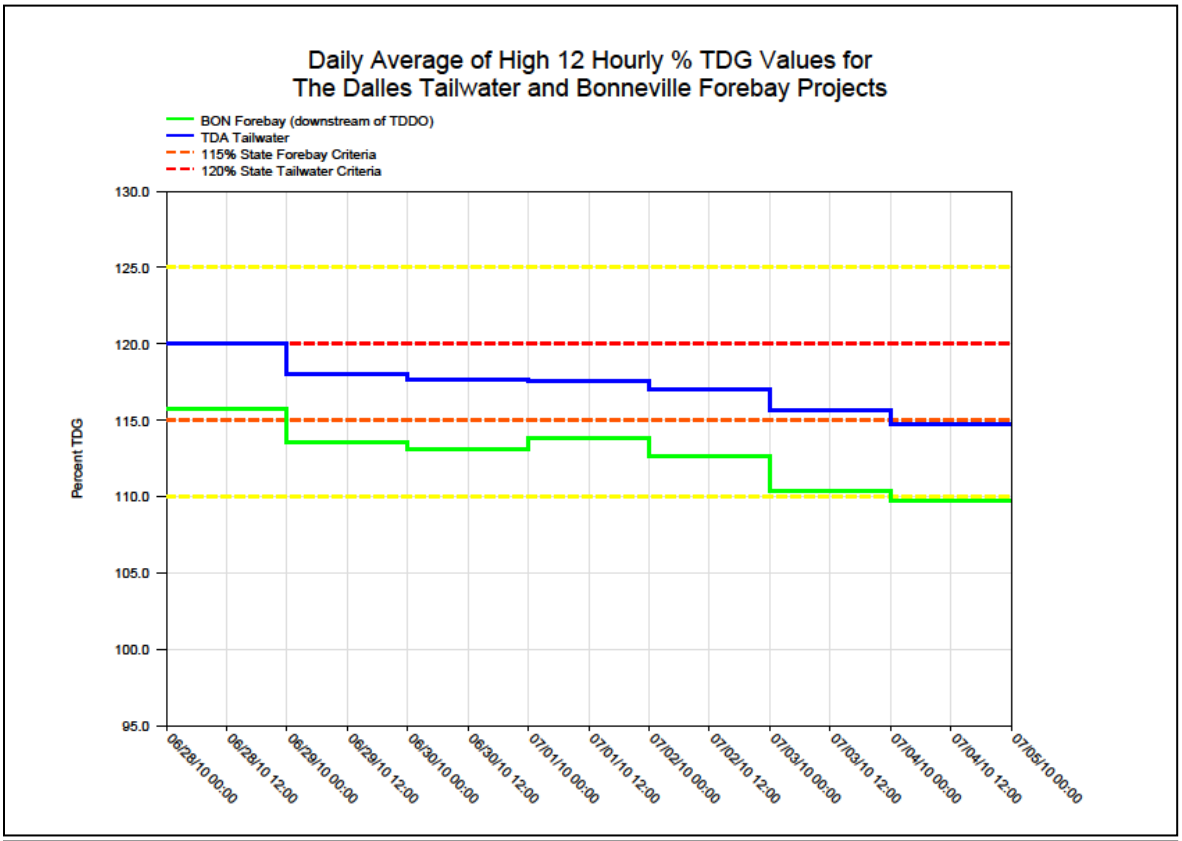

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 39


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00

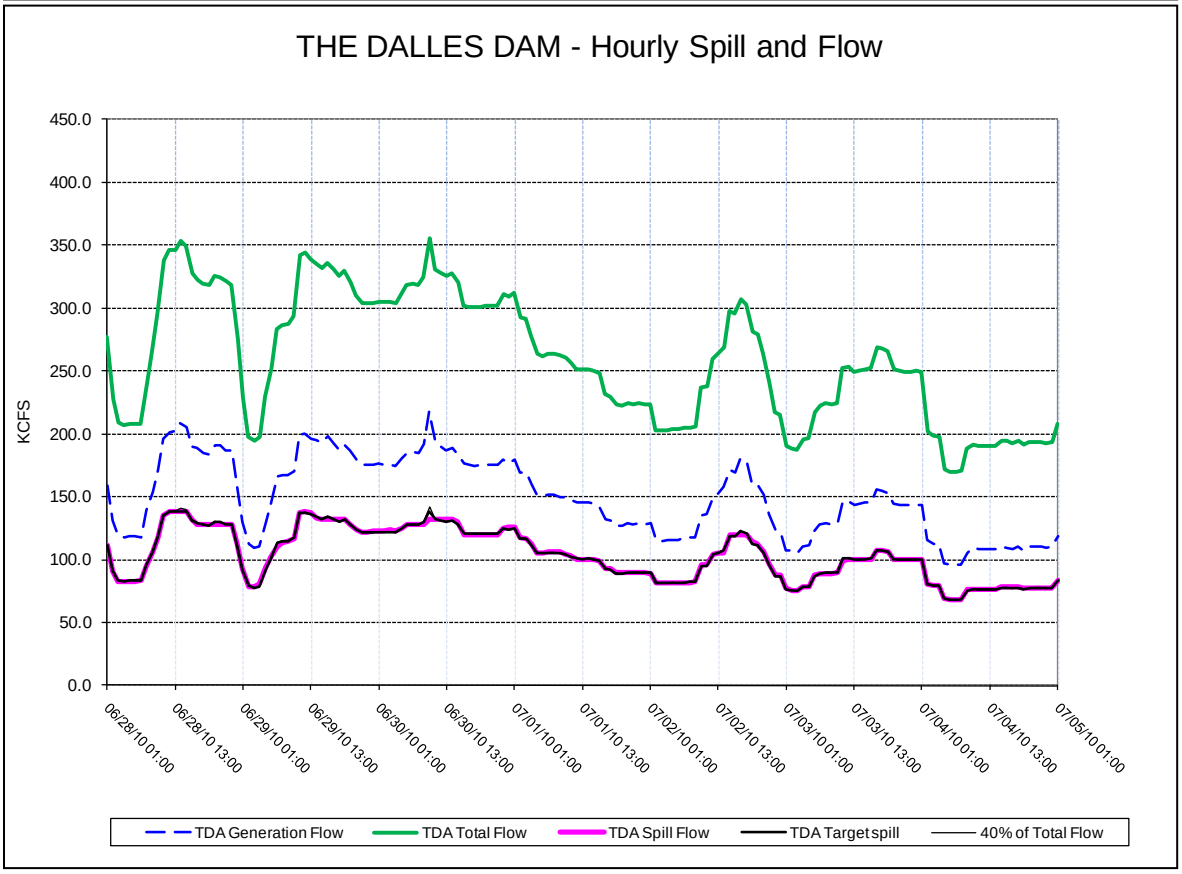
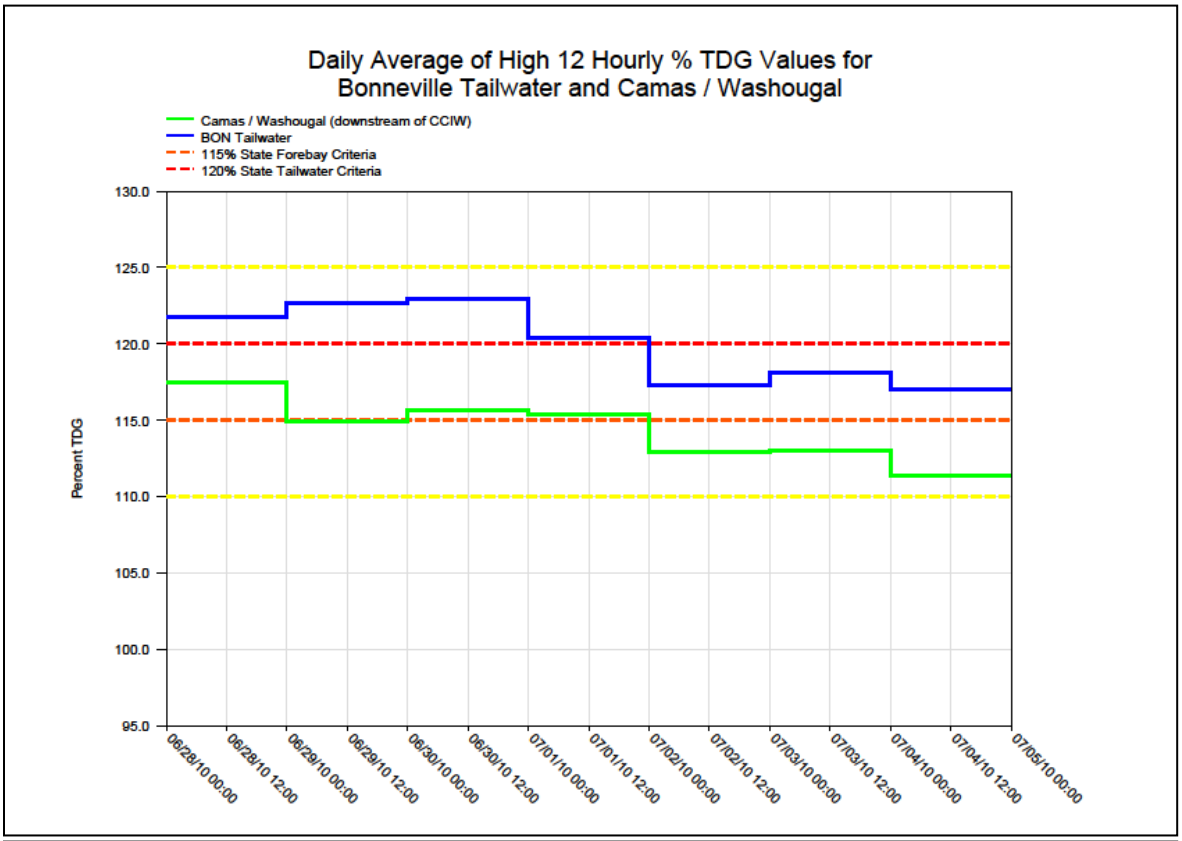
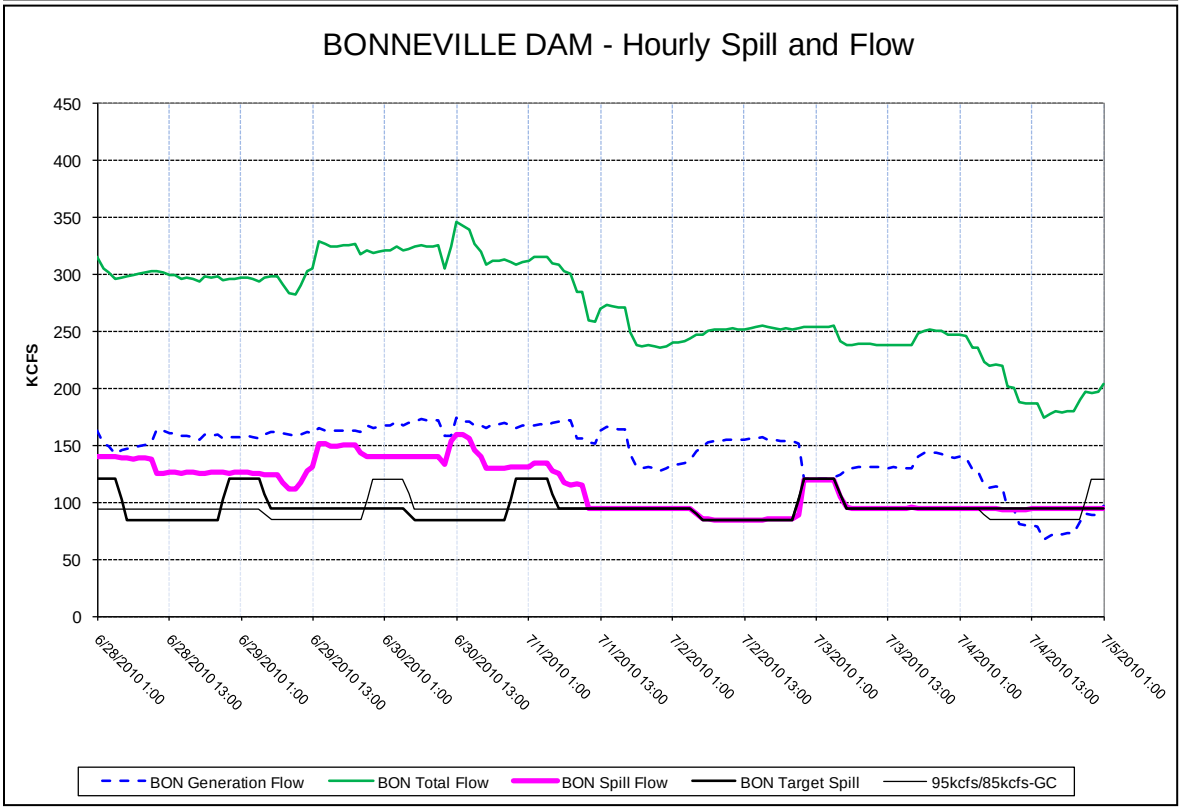

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
06/28/10 01:00
06/28/10 13:00
06/29/10 01:00
06/29/10 13:00
06/30/10 01:00
06/30/10 13:00
07/01/10 01:00
07/01/10 13:00
07/02/10 01:00
07/02/10 13:00
07/03/10 01:00
07/03/10 13:00
07/04/10 01:00
07/04/10 13:00
07/05/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
06/28/10 00:00
06/28/10 12:00
06/29/10 00:00
06/29/10 12:00
06/30/10 00:00
06/30/10 12:00
07/01/10 00:00
07/01/10 12:00
07/02/10 00:00
07/02/10 12:00
07/03/10 00:00
07/03/10 12:00
07/04/10 00:00
07/04/10 12:00
07/05/10 00:00


BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
6/28/2010 1:00
6/28/2010 13:00
6/29/2010 1:00
6/29/2010 13:00
6/30/2010 1:00
6/30/2010 13:00
7/1/2010 1:00
7/1/2010 13:00
7/2/2010 1:00
7/2/2010 13:00
7/3/2010 1:00
7/3/2010 13:00
7/4/2010 1:00
7/4/2010 13:00
7/5/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
95kcfs/85kcfs-GC

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
July 2010

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

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the U.S. District Court of Oregon June 16, 2010 Order adopting the 2010 Summer Fish Operations Plan (2010 Summer FOP). The 2010 Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the summer fish migration season, generally July through August[1]. To the extent Corps project operations are not specified in the 2010 Summer FOP, the FCRPS operations will be consistent with the 2010 NOAA Fisheries Supplemental Biological Opinion (2010 Supp BiOp), the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2010 Water Management Plan (WMP), WMP seasonal updates, and the 2010 Fish Passage Plan (FPP).

The Corps' July 2010 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (%TDG) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2010 Summer FOP in July.

Data Reporting:

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

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

[1] Operations are implemented from Monday through Sunday.

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

Each figure represents one week of operation for a project. The graphs start at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on July 5 for the lower Snake River and lower Columbia River projects.

July 5 – July 11	Figures 1 – 8
July 12 – July 18	Figures 9 – 16
July 19 – July25	Figures 17 – 24
July 26 – August 1	Figures 25 – 32

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

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

B. Lower Graph: Shows the hourly flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2010 Summer FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Bonneville (50 kcfs) dam.
    - Minimum spill at John Day is 25 percent of project outflow.

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

II. A monthly %TDG Table is included at the end of the figures that shows the overall daily results of the average %TDG for the 12 highest hours for all projects. The numbers in red show

exceedances of the TDG gas cap - 115 percent (forebay) or 120 percent (tailwater) for each project.

General Implementation Remarks:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described below. When spill levels briefly deviate below or above the level specified in the 2010 Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The July 2010 Spill Variance Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the July 2010 Spill Variance Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2010 Summer FOP level of spill while also avoiding exceeding the %TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not account for this volume of water. 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.”

Also it is important to note that actual spill levels at Corp’s projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2010 Summer FOP and the RCC spill priority list, which defines the projects’ %TDG spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2010 Summer FOP describes project operations during “Rapid Load Changes” (p. 6). For reporting purposes, the notation “Transmission Stability” in the July 2010 Spill Variance Report Table will replace “Rapid Load Changes” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be

available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and following the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary by more than the ±1percent requirement or other ranges specified in the 2010 Summer FOP than other hours.

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

July Operations:

The month of July was characterized by average flows[2] for the lower Columbia River and average flows for the lower Snake River.

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

- Lower Granite Dam - The hourly target spill discharge was a fixed quantity 18 kcfs 24-hours/day in accordance with the 2010 Summer FOP.
- Little Goose Dam - The hourly target spill discharge was 30 percent of total river discharge for 24-hours/day in accordance with the 2010 Summer FOP.
- Lower Monumental Dam - The hourly target spill discharge was a fixed 17 kcfs 24-hours/day in accordance with the 2010 Summer FOP.
- Ice Harbor Dam - the hourly target spill alternated between 45 kcfs day/TDG spill cap night and 30 percent of total river discharge for 24-hours up to July 13, at which time the target spill was changed to 45 kcfs day/TDG spill cap night in accordance with the 2010 Summer FOP.
- McNary Dam - The hourly target spill discharge was 50 percent of total river discharge for 24-hours/day at in accordance with the 2010 Summer FOP.
- John Day Dam - The hourly target spill discharge alternated between 30 percent vs. 40 percent of total river discharge for 24-hours due to the two treatment spill tests up to July 23, at which time the target spill was changed to 30 percent of total river discharge for 24-hours/day in accordance with the 2010 Summer FOP.
- The Dalles Dam - The target spill discharge was 40 percent of total river discharge for 24-hours/day in accordance with the 2010 Summer FOP.

[2] NOAA River Forecast Center's Runoff Processor indicates 100 percent of normal at Lower Granite Dam, and 94 percent of normal at The Dalles Dam for July 2010.

- Bonneville Dam - The hourly target spill discharge alternated between 95 kcfs 24-hours/day, and 85 kcfs day/121 kcfs night up to July 19, at which time the target spill was changed to 75 kcfs day/TDG spill cap night in accordance with the 2010 Summer FOP.

As noted above, streamflows during July have been low enough that the low flow provisions of the 2010 Summer FOP were implemented at four projects during the month of July. Table 1 shows the number of days Ice Harbor; McNary; The Dalles and Bonneville was in a low flow condition during the reporting period.

Table 1: Number of Days Projects Generated at Minimum Levels and Spilled Remaining Flow

Project	**Number of Days**
Ice Harbor	24
McNary	1
The Dalles	2
Bonneville	5
Total	**32**

***Operational Adjustments**:*

1. Bonneville Dam Corner Collector Outage:
On July 8 at 0710 hours the Corps temporarily closed the Bonneville Corner Collector (B2CC) for a period of 4 hours. The closure of the B2CC was required in order to repair a transducer damaged by debris on the turbine intake extensions. The transducers are necessary to conduct fish research at Bonneville Dam. This operation was coordinated with FPOM members on June 7 and with TMT members on July 7. TMT members either supported the action or did not object. On July 8 at 1110 hours, the Corps re-opened the B2CC and resumed normal operations consistent with the 2010 Summer FOP.

2. Lower Granite Dam Spillway Weir Out of Service:
On July 14 at 0900 hours, the Corps stopped spill from the Spillway Weir (SW) at Lower Granite Dam in order to refasten a guard rail in a foot-traffic access area on the downstream side of the SW. On July 13, the guard rail was damaged by large debris, creating unsafe working conditions for project staff. During the July 14, TMT meeting, the Corps informed TMT members that repairing the guardrail may require curtailing spill temporarily and no objections were noted. On July 14 at 0954 hours, Lower Granite Dam resumed normal operations of the SW as specified in the 2010 FPP. During the repair operation, the Corps did not deviate from the 18 kcfs spill requirement specified in the 2010 Summer FOP.

3. McNary Start of Juvenile Transportation:
On July 15 at 0700 hours, the juvenile transportation operation was initiated at McNary Dam. Fish were collected everyday and barged every other day. The 2010 Summer FOP specifies the initiation of transportation at McNary Dam will begin anytime between July 15-30 in accordance with the 2008 BiOp and in coordination with NOAA Fisheries and the TMT. During the July 14 TMT meeting, NOAA Fisheries proposed, and other TMT members supported, initiating transportation on July 15.

4. Modified Minimum Operation Pool at Ice Harbor Dam:
On July 16, the Corps modified the Minimum Operating Pool (MOP) range at Ice Harbor Dam due to navigation safety concerns. The normal Ice Harbor Dam MOP range is 437.0 to 438.0 ft.; however, because of differences in gauge readings at the Ice Harbor forebay and Lower Monumental tailrace and to ensure safe barge access to the navigation locks, the Corps modified this range to 437.0 to 438.5 ft. This operation was coordinated with TMT on an emergency conference call on July 16. No objections were raised by TMT members.

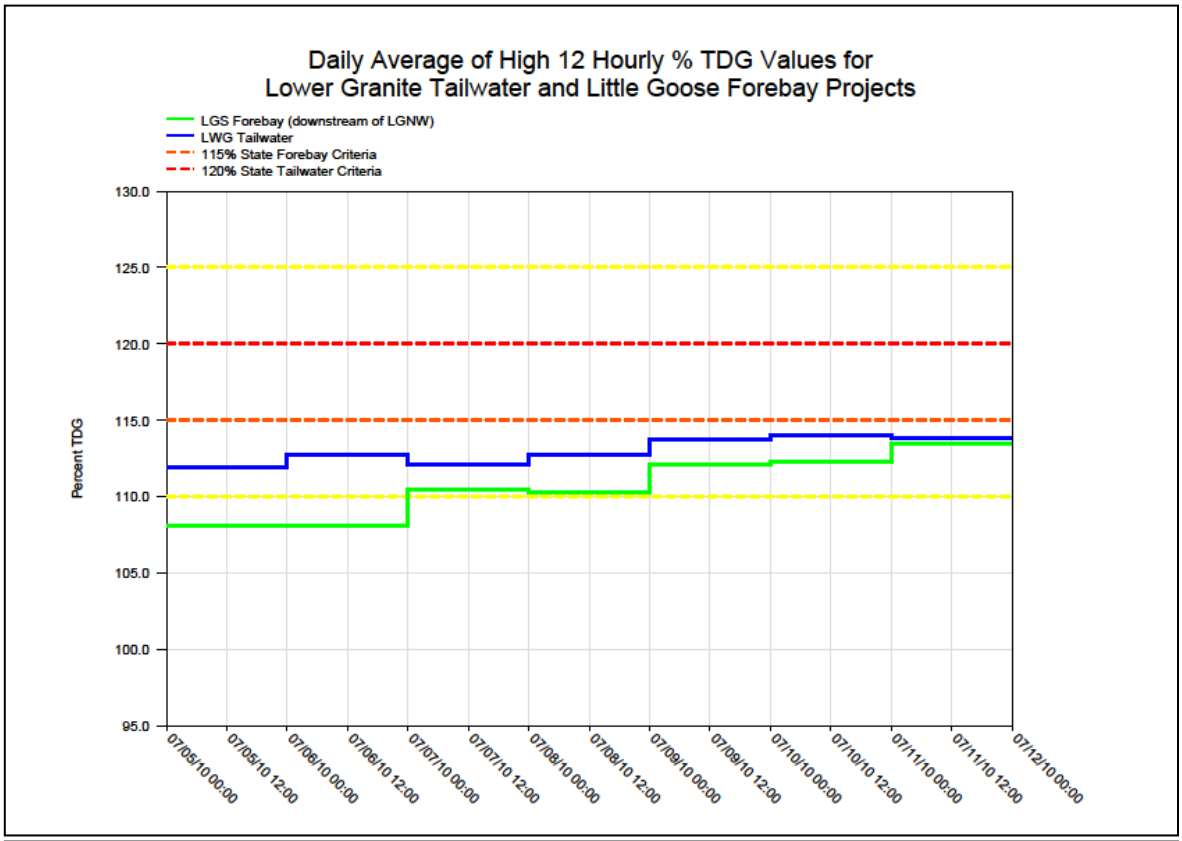
The Corps uses elevation measuring gauges in the forebay of Ice Harbor and tailrace of Lower Monumental dams to monitor water depth and provide safe navigation lock access. At Ice Harbor, the forebay gauge is reading higher elevations than the gauge in the Lower Monumental tailrace. The Corps has been evaluating the likely causes of this condition and it appears to be the result of localized hydraulic effects (large eddies) in the Lower Monumental tailwater, and waves that occur between Lower Monumental and Ice Harbor dams with operational changes such as turning turbine units off and on. The TMT was briefed on this operation at subsequent meetings on July 21 and July 28. On August 3, the Corps informed TMT that Ice Harbor Dam forebay would be operated between elevations 437.5 to 438.5 ft. for the remainder of August. No objections were raised by TMT members.

July 2010 Spill Variance Table

Project	Parameter	Date	Time	Hours	Type	Reason
Little Goose	Reduced % Spill	7/13/10	0300	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	7/14/10	0800	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.8%.
Little Goose	Reduced % Spill	7/14/10	0900	1	Human/ Program error	Hourly spill dropped to 28.3% (below 30.0% +/- 1% range): GDAC program malfunctioned resulting in failure to increase spill. 24-hr average spill was 29.8%.
Little Goose	Reduced % Spill	7/14/10	1600	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.8%.
Little Goose	Reduced % Spill	7/17/10	1900	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	7/18/10	1100	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	7/25/10	2000	1	Navigation	Hourly spill dropped to 28.6% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 30.0%.
Little Goose	Reduced % Spill	7/28/10	1200	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	7/29/10	1300 & 2300	2	Navigation	Hourly spill dropped to 28.7 to 28.8% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	7/31/10	1300	1	Navigation	Hourly spill dropped to 28.9% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	8/1/10	1200-1300	2	Navigation	Hourly spill dropped to 28.5-28.8% (below 30.0% +/- 1% range): due to volume of water needed to empty the navigation lock. See page 3. 24-hr average spill was 29.7%.
Lower Monumental	Reduced Spill	7/5/10	1700-1800	2	Navigation	Hourly spill dropped to 15.5 to 15.9 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/7/10	1700-1800	2	Navigation	Hourly spill dropped to 13.0 to 15.0 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/9/10	1700-	1	Navigation	Hourly spill dropped to 13.3 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/11/10	1900-	1	Navigation	Hourly spill dropped to 15.9 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/13/10	1700-1800-	2	Navigation	Hourly spill dropped to 12.6-14.8 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/15/10	1700-1800-	2	Navigation	Hourly spill dropped to 12.6-13.6 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/17/10	1700-1900-	3	Navigation	Hourly spill dropped to 10.7-15.1 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/19/10	1800	1	Navigation	Hourly spill dropped to 14.5 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/21/10	1700-1800	2	Navigation	Hourly spill dropped to 12.4-12.5 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/23/10	1700-1800	2	Navigation	Hourly spill dropped to 11.5-14.1 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	7/25/10	1700-1800	2	Navigation	Hourly spill dropped to 11.9-15.4 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Additional Spill	7/26/10	0700-1800--	12	Maintenance	Hourly spill increased to 34.0-35.1 kcfs (above FOP spill of 17 kcfs) due to the project putting an additional unit on line for testing after annual maintenance. Unit was operated at various levels to check operation of the turbine, breaker and other equipment.
Lower Monumental	Additional Spill	7/27/10	0700-1600--	10	Maintenance	Hourly spill increased to 25.2-39.9 kcfs (above FOP spill of 17 kcfs) due to the project putting an additional unit on line for testing after annual maintenance. Unit was operated at various levels to check operation of the turbine, breaker and other equipment.
Lower Monumental	Reduced spill	7/27/10	1700-1800--	2	Navigation	Hourly spill dropped to 10.7-14.4 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Additional Spill	7/28/10	0700-1800--	12	Maintenance	Hourly spill increased to 25.1 32.3 kcfs (above FOP spill of 17 kcfs) due to the project putting an additional unit on line for testing after annual maintenance. Unit was operated at various levels to check operation of the turbine, breaker and other equipment.
Lower Monumental	Additional Spill	7/29/10	0700-1600--	10	Maintenance	Hourly spill increased to 29.5-30.2 kcfs (above FOP spill of 17 kcfs) due to the project putting an additional unit on line for testing after annual maintenance. Unit was operated at various levels to check operation of the turbine, breaker and other equipment.
Lower Monumental	Additional Spill	7/30/10	0700-2000--	14	Maintenance	Hourly spill increased to 29.0-29.9 kcfs (above FOP spill of 17 kcfs) due to the project putting an additional unit on line for testing after annual maintenance. Unit was operated at various levels to check operation of the turbine, breaker and other equipment.
Lower Monumental	Reduced spill	7/31/10	1700-1800--	2	Navigation	Hourly spill dropped to 13.2-16.9 kcfs (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Ice Harbor	Reduced spill	7/16/10	1300-1600	4	Maintenance	Project generated between 10.6-14.2 kcfs which is outside of minimum generation range 8.5-10.3 kcfs for Units 1-3. Project was returning Unit 6 to service after annual maintenance and testing.
McNary	Reduced	7/14/10	0900-	2	Navigation	Hourly spill dropped to 37.7-47.0% (below FOP spill of 50%). Reduced spill

	% Spill		1000			for safe passage of fish barge. 24 hr avg. spill was 49.5%.
McNary	Reduced % Spill	7/18/10	0700 & 1100	2	Navigation	Hourly spill dropped to 37.8-44.9% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.3%.
McNary	Reduced % Spill	7/22/10	0700 & 1000	2	Navigation	Hourly spill dropped to 44.3-44.9% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.8%.
McNary	Reduced % Spill	7/24/10	0700 & 1100	2	Navigation	Hourly spill dropped to 40.3-45.4% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.5%.
McNary	Reduced % Spill	7/26/10	0700 & 1000	2	Navigation	Hourly spill dropped to 44.9% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.5%.
McNary	Reduced % Spill	7/26/10	1500	1	Transmission Stability	Hourly spill dropped to 48.0% (below FOP spill of 50%). due to project being on response during rapidly changing load. See p. 3-4. 24 hr avg. spill was 49.5%.
McNary	Reduced % Spill	7/28/10	0700 & 1000	2	Navigation	Hourly spill dropped to 42.0% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.6%.
McNary	Reduced % Spill	7/30/10	0700 & 1000	2	Navigation	Hourly spill dropped to 44.1% (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.6%.
John Day	Reduced % Spill	7/22/10	1100	1	Maintenance	Hourly spill dropped to 28.8% (below FOP spill of 30%) due to project switching units off and on for maintenance. 24 hr avg. spill was 29.9%.
John Day	Additional % Spill	8/1/10	1200	1	Human/Program Error	Hourly spill increased to 31.2% (above FOP spill of 30%) Log book indicates a request to change spill and generation, but generation change was delayed. 24 hr avg. spill was 30.1%.
The Dalles	Reduced % Spill	7/16/10	0100	1	Operational Limitations	Hourly spill dropped to 38.5% (below FOP spill of 40%). The project was using the new 50 and 62 kcfs spill patterns, which resulted in 48 and 60 kcfs spill. 24 hr avg. spill was 40.2%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
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07/11/10 12:00
07/12/10 00:00

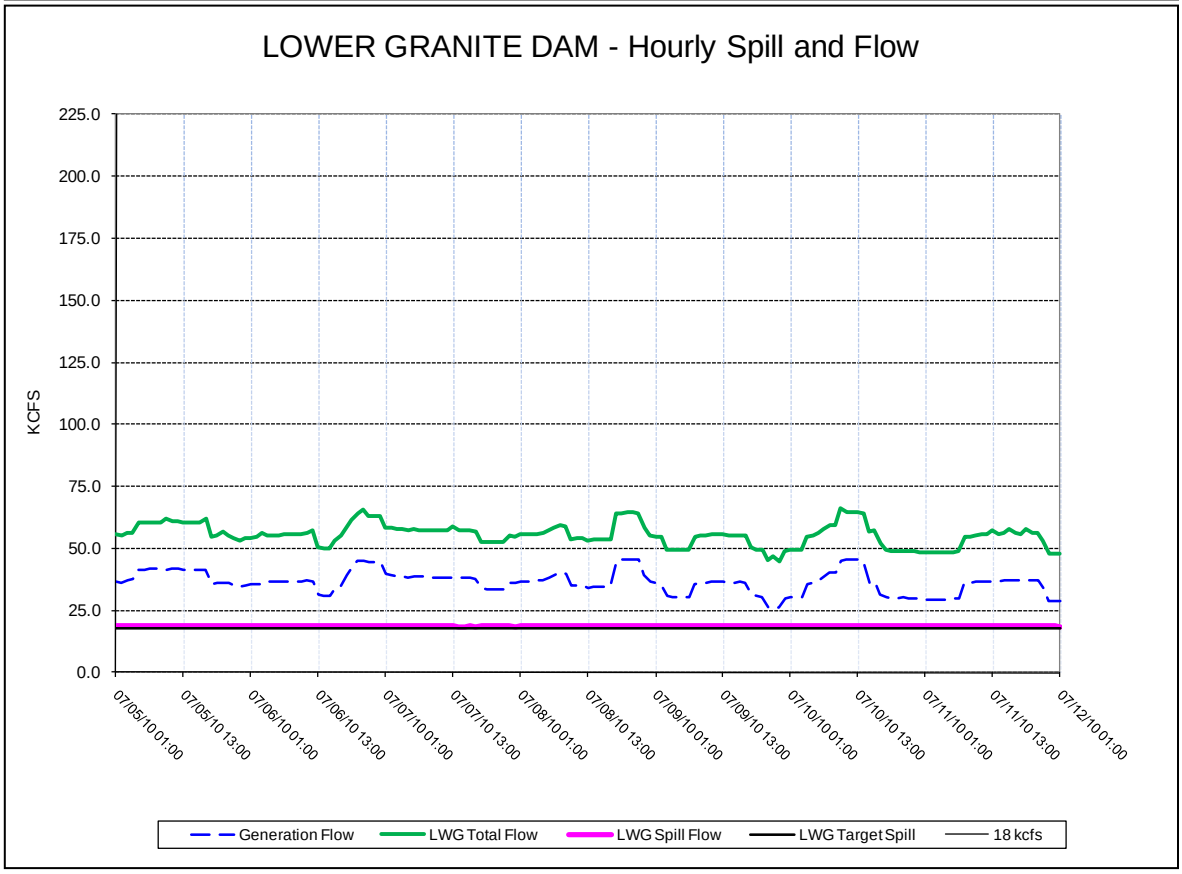
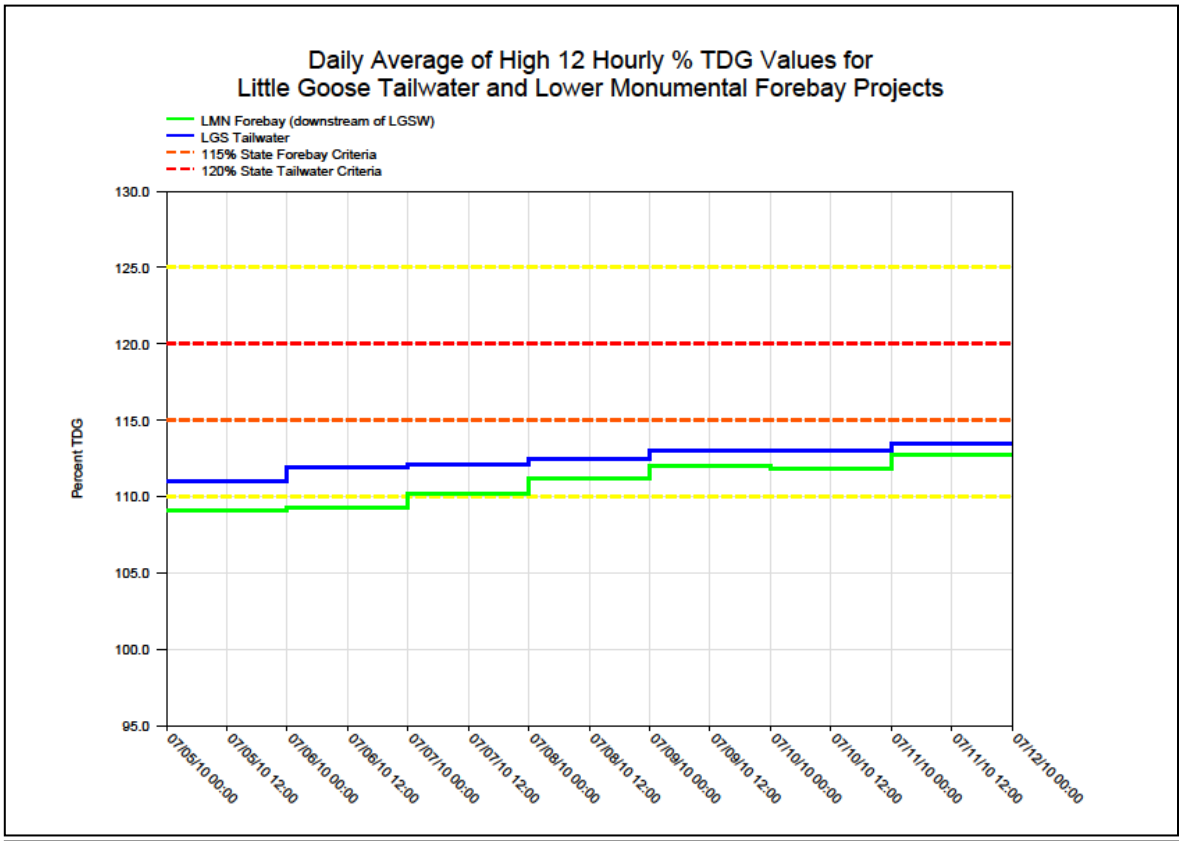

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
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07/11/10 12:00
07/12/10 00:00

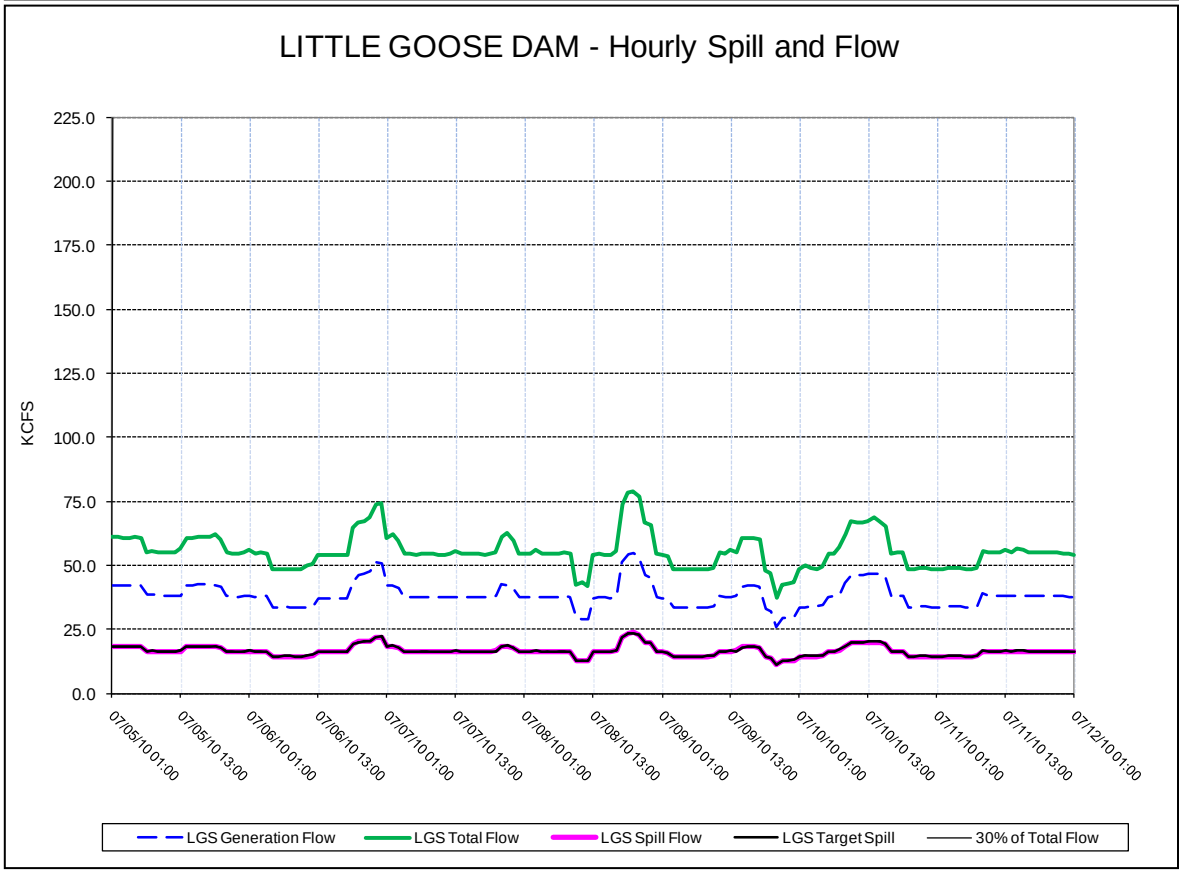
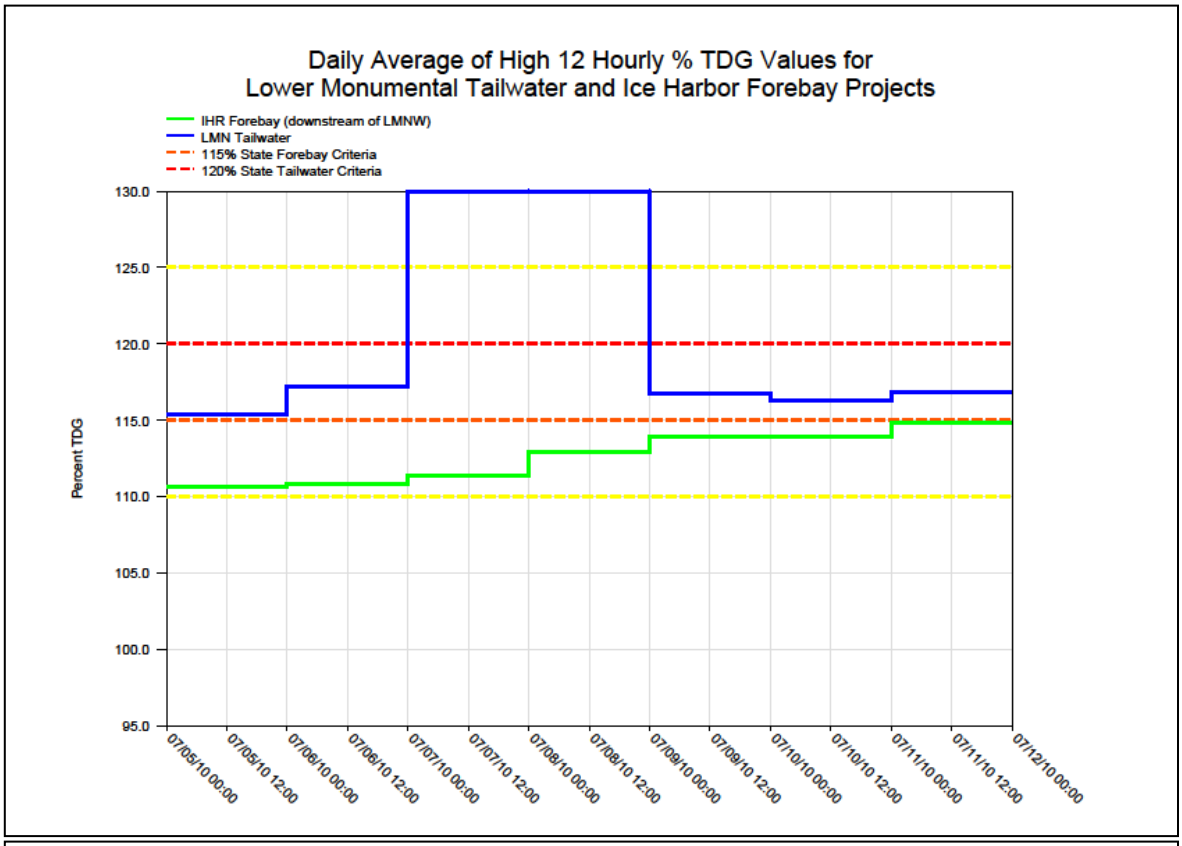

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
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07/11/10 12:00
07/12/10 00:00

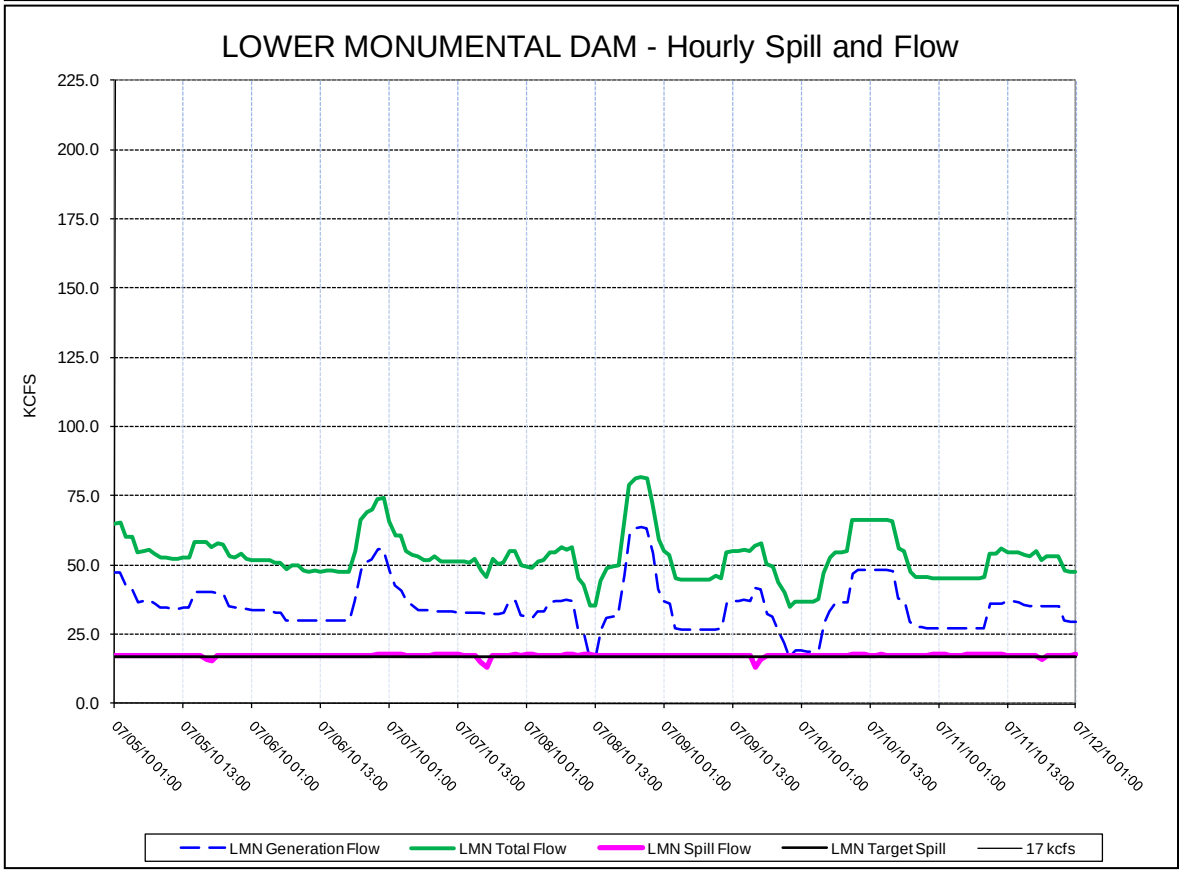
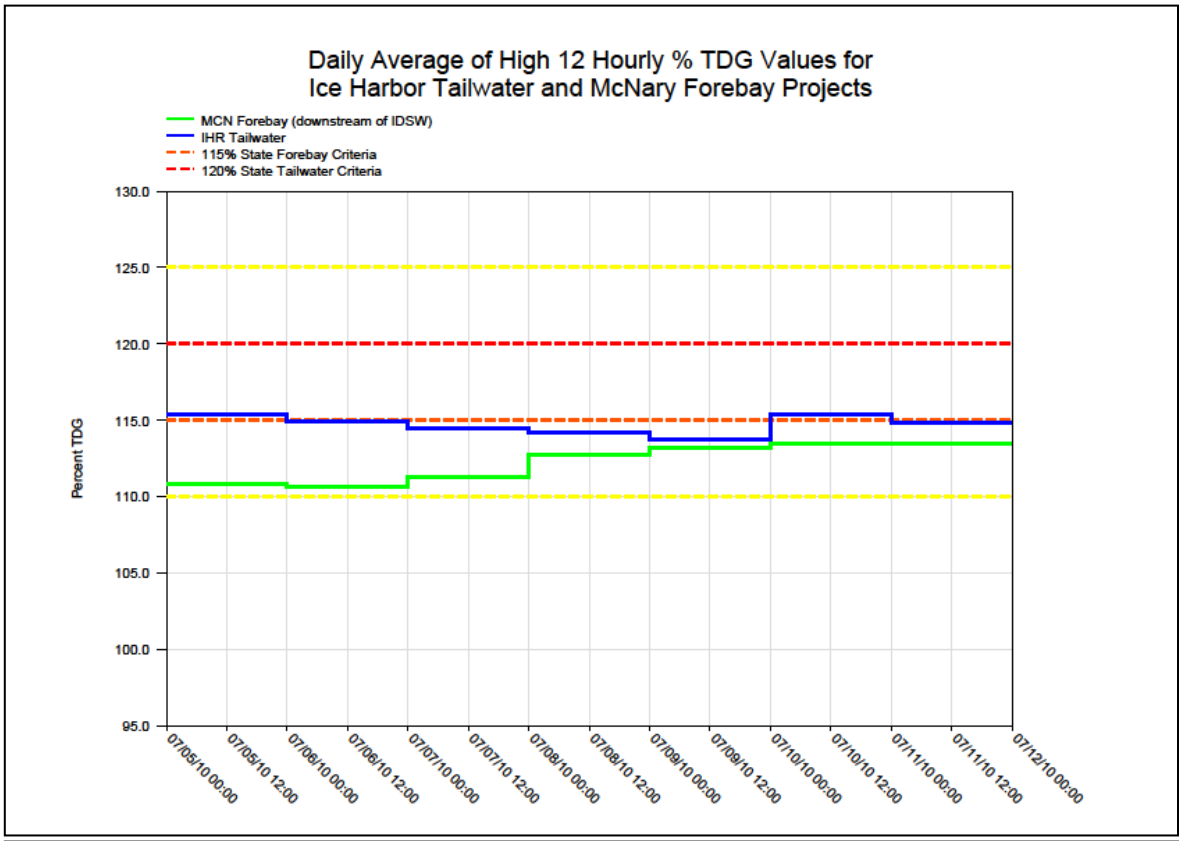

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
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07/11/10 00:00
07/11/10 12:00
07/12/10 00:00

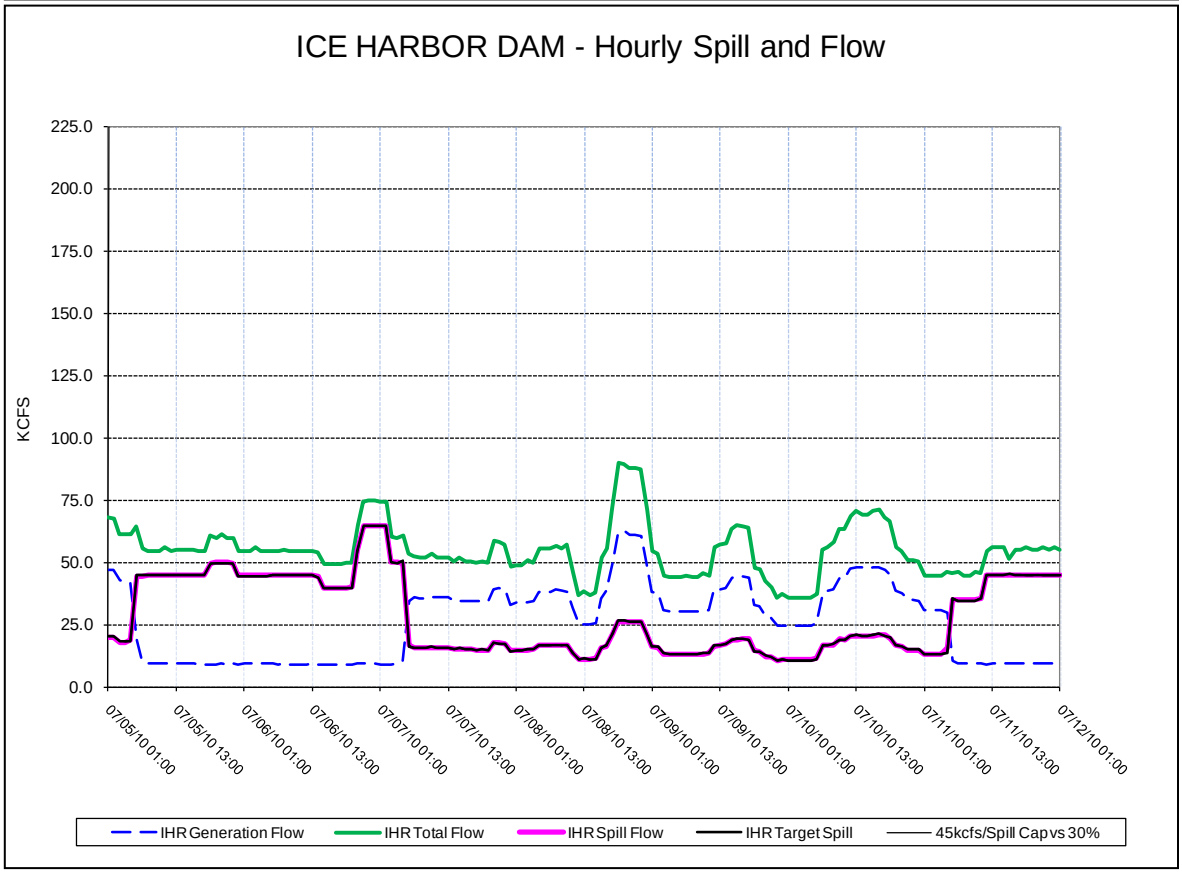
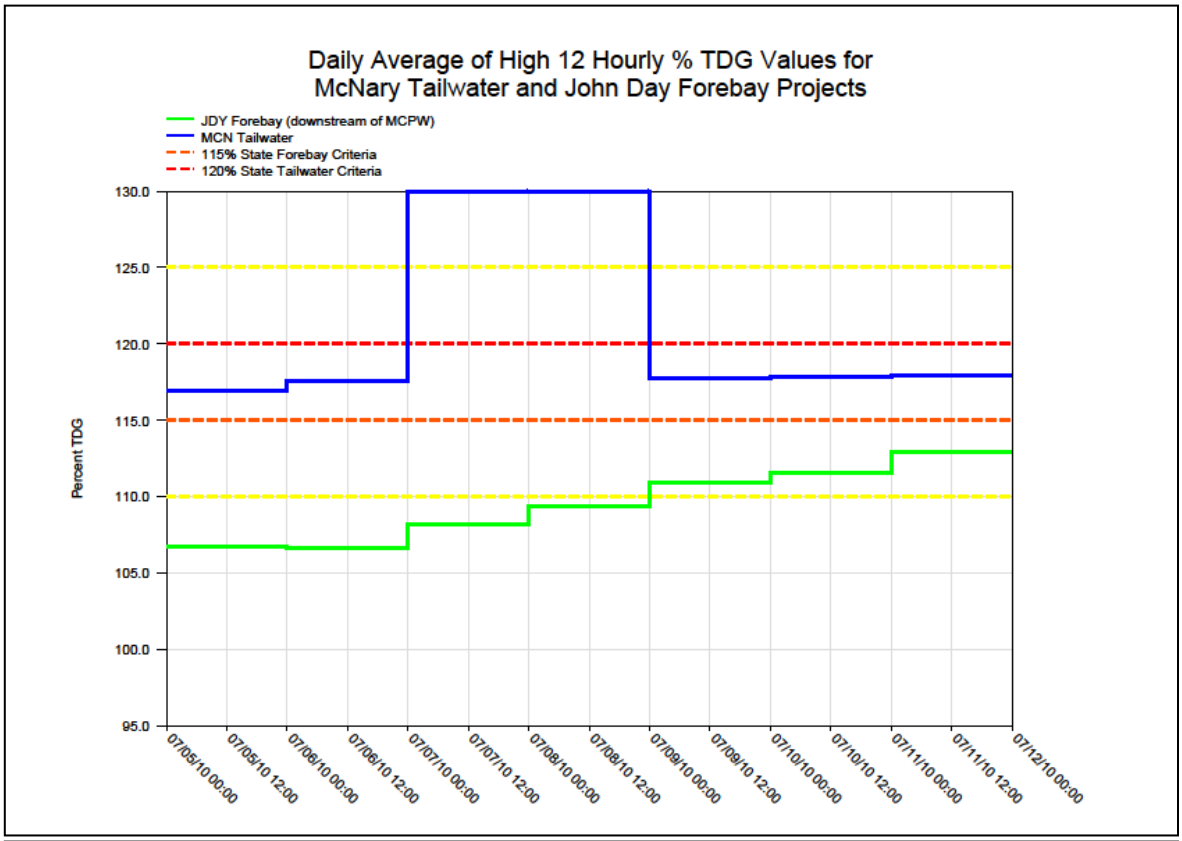

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
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07/11/10 12:00
07/12/10 00:00

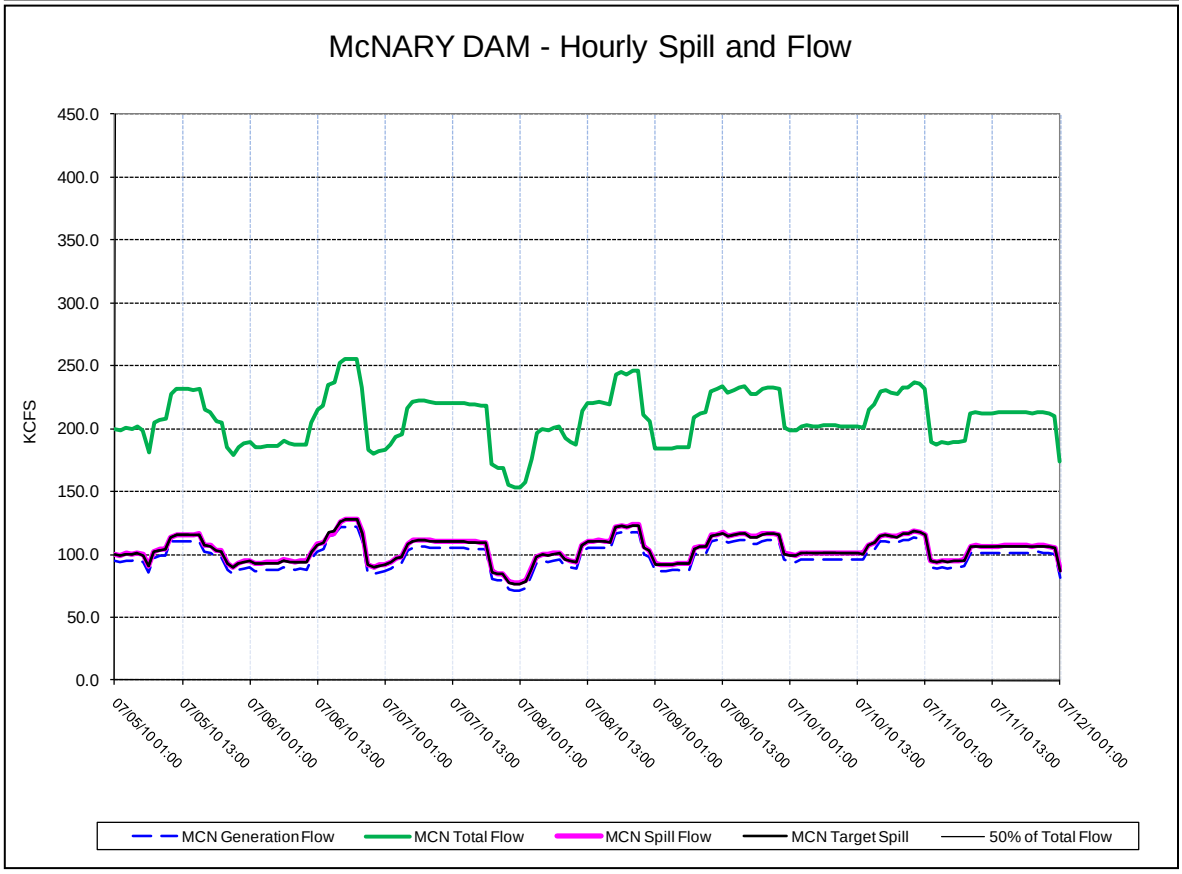
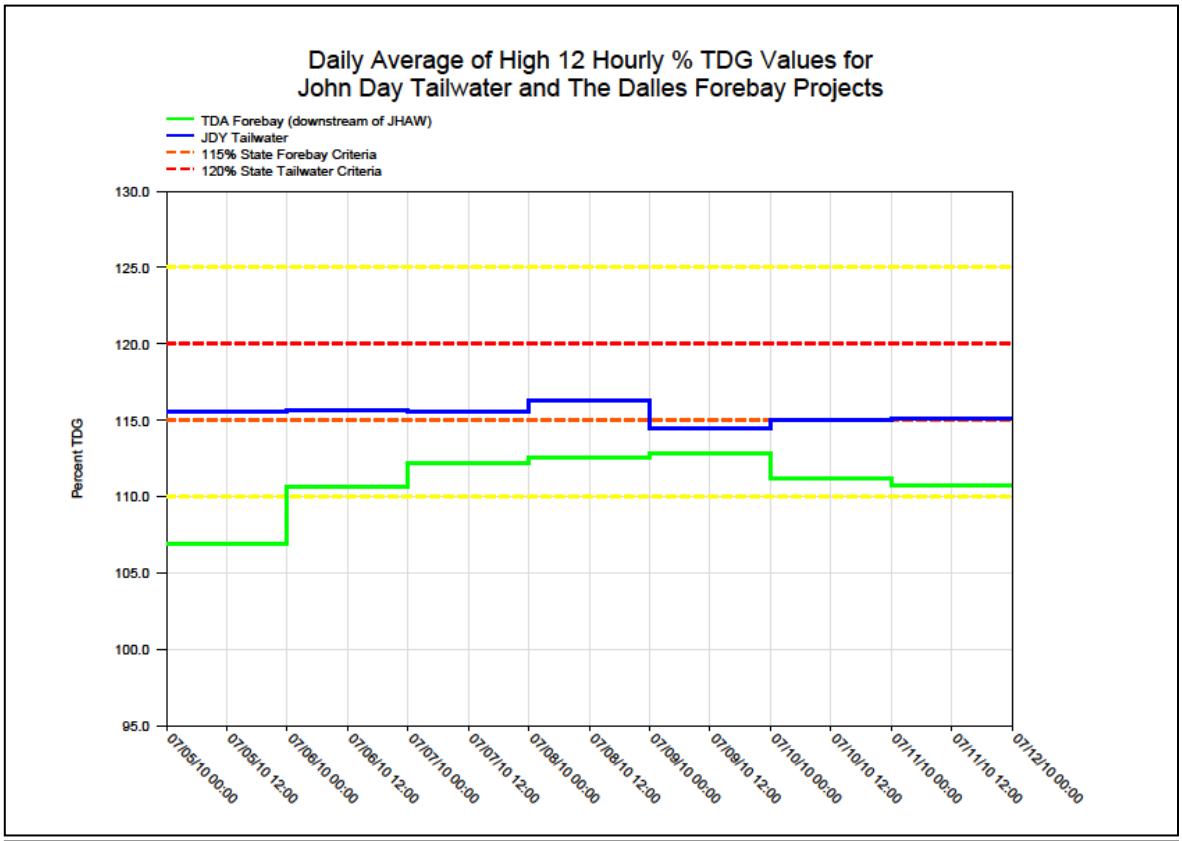

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
07/09/10 12:00
07/10/10 00:00
07/10/10 12:00
07/11/10 00:00
07/11/10 12:00
07/12/10 00:00

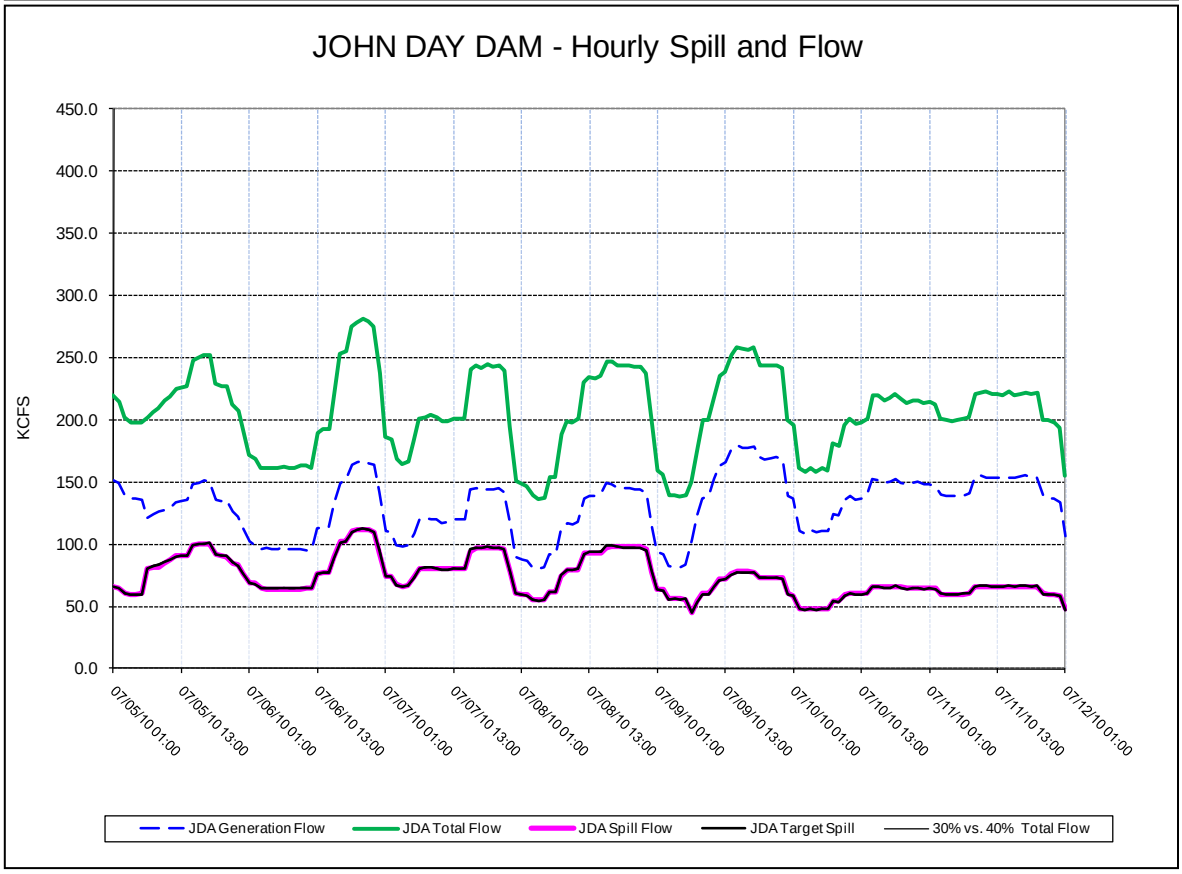
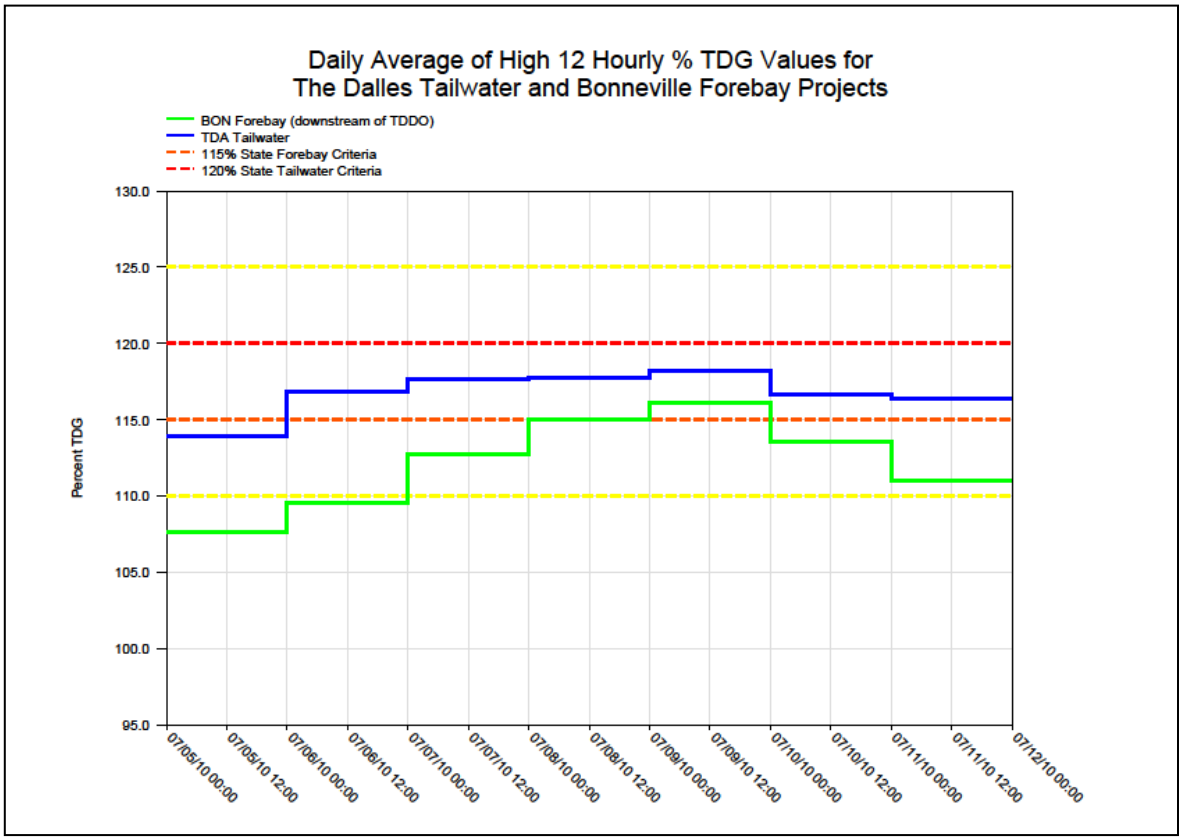

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
07/09/10 12:00
07/10/10 00:00
07/10/10 12:00
07/11/10 00:00
07/11/10 12:00
07/12/10 00:00

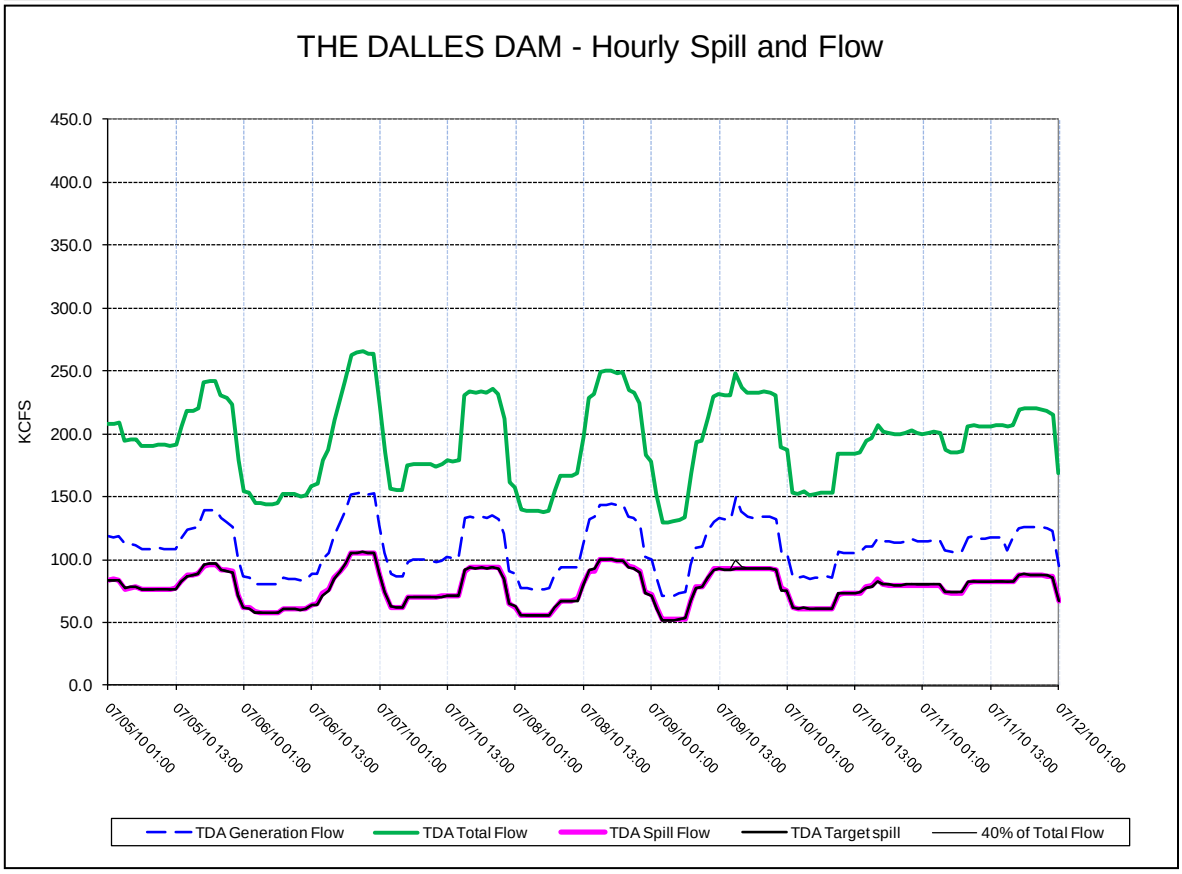
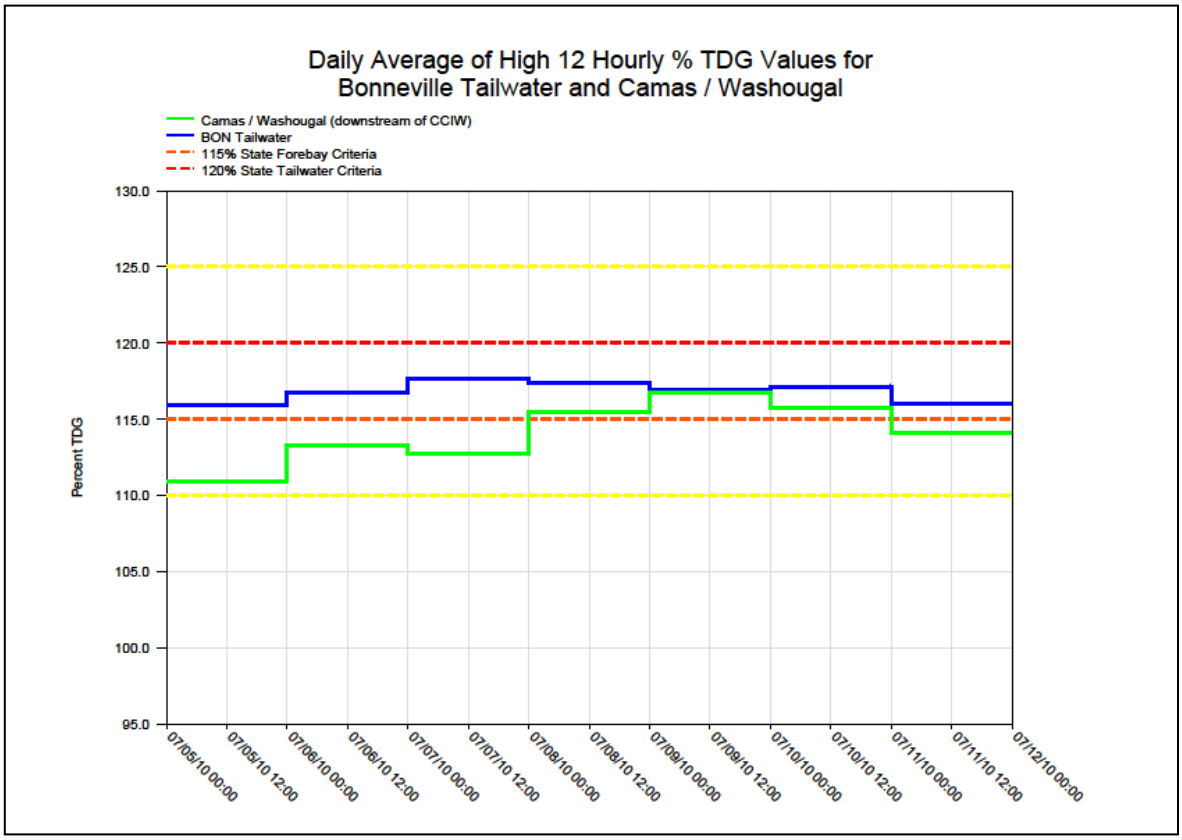

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/05/10 01:00
07/05/10 13:00
07/06/10 01:00
07/06/10 13:00
07/07/10 01:00
07/07/10 13:00
07/08/10 01:00
07/08/10 13:00
07/09/10 01:00
07/09/10 13:00
07/10/10 01:00
07/10/10 13:00
07/11/10 01:00
07/11/10 13:00
07/12/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/05/10 00:00
07/05/10 12:00
07/06/10 00:00
07/06/10 12:00
07/07/10 00:00
07/07/10 12:00
07/08/10 00:00
07/08/10 12:00
07/09/10 00:00
07/09/10 12:00
07/10/10 00:00
07/10/10 12:00
07/11/10 00:00
07/11/10 12:00
07/12/10 00:00

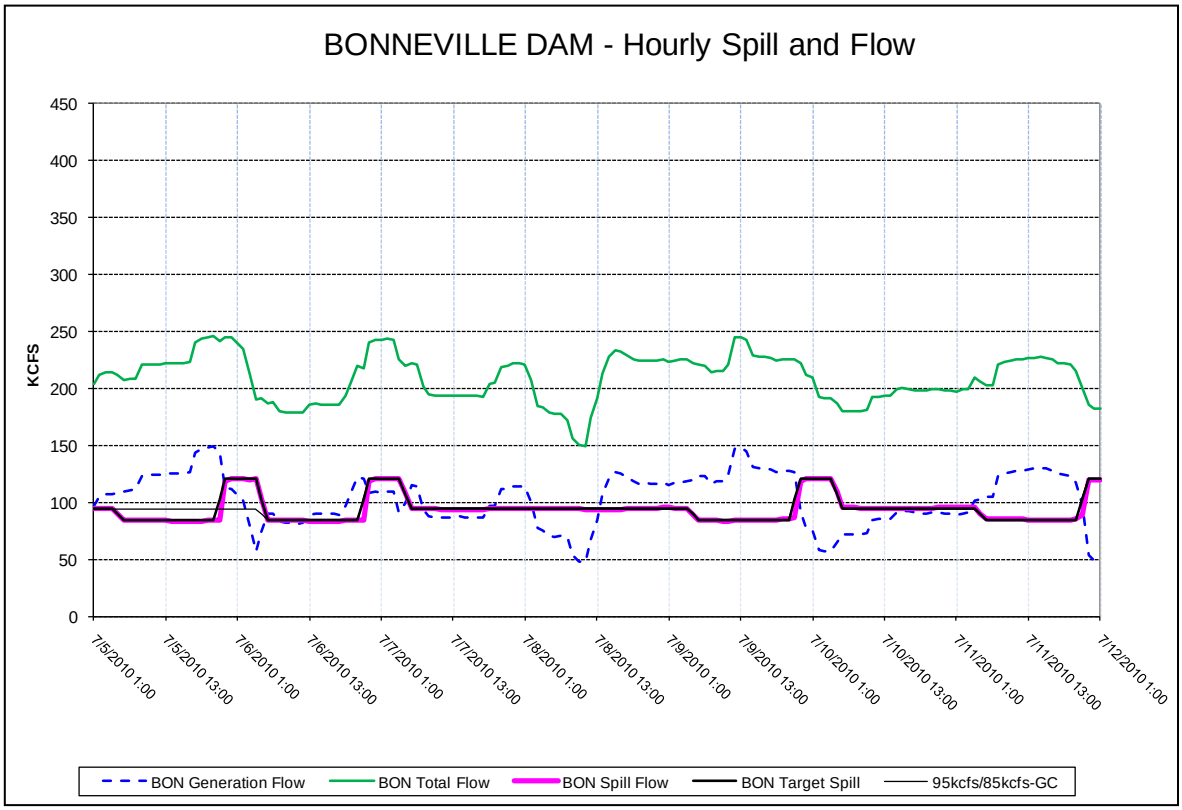
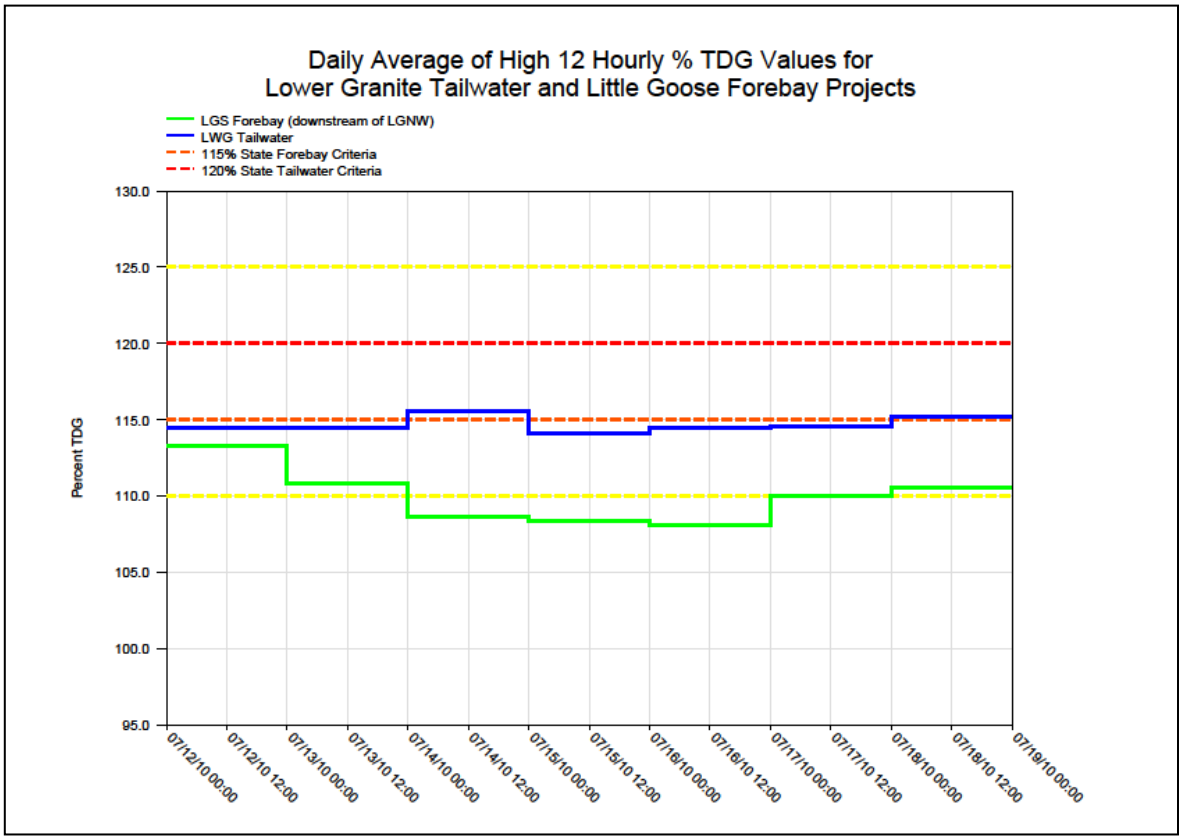

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/5/2010 1:00
7/5/2010 13:00
7/6/2010 1:00
7/6/2010 13:00
7/7/2010 1:00
7/7/2010 13:00
7/8/2010 1:00
7/8/2010 13:00
7/9/2010 1:00
7/9/2010 13:00
7/10/2010 1:00
7/10/2010 13:00
7/11/2010 1:00
7/11/2010 13:00
7/12/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
95kcfs/85kcfs-GC

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

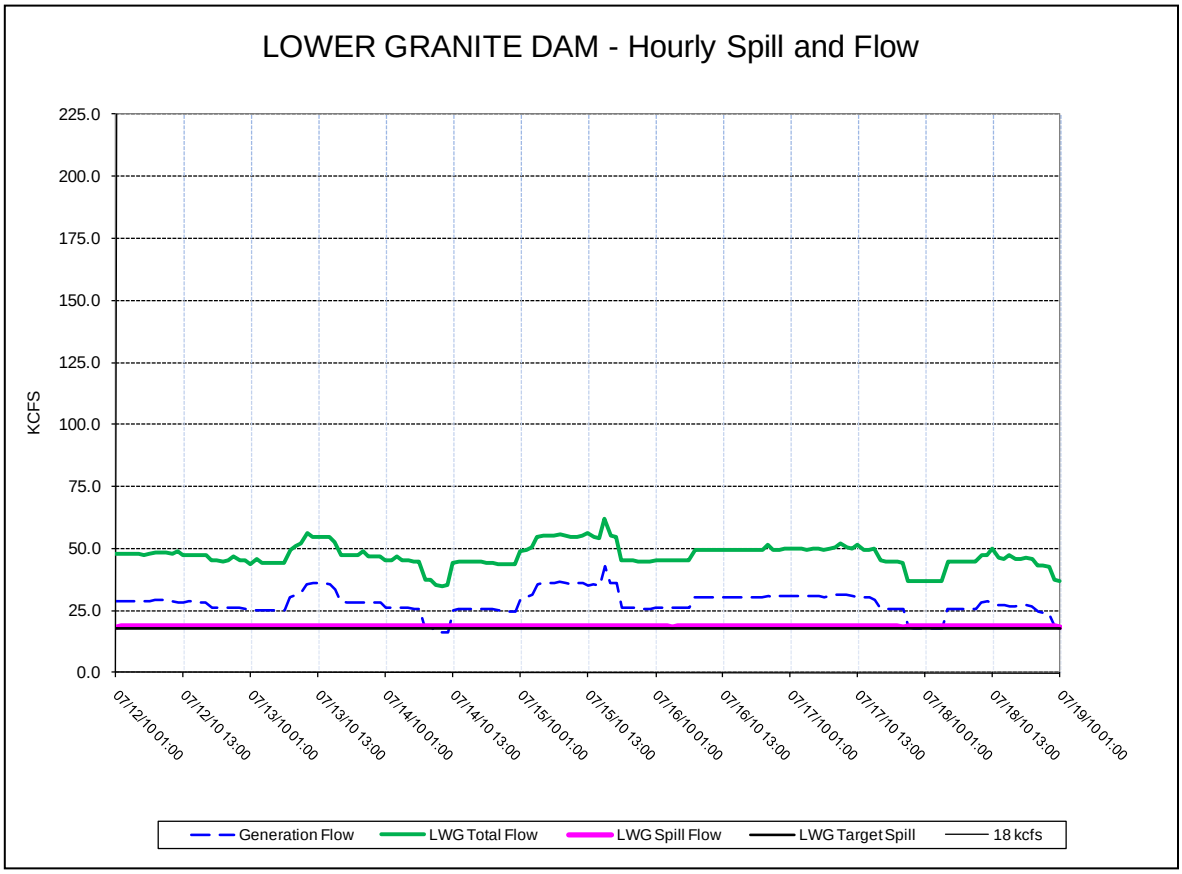
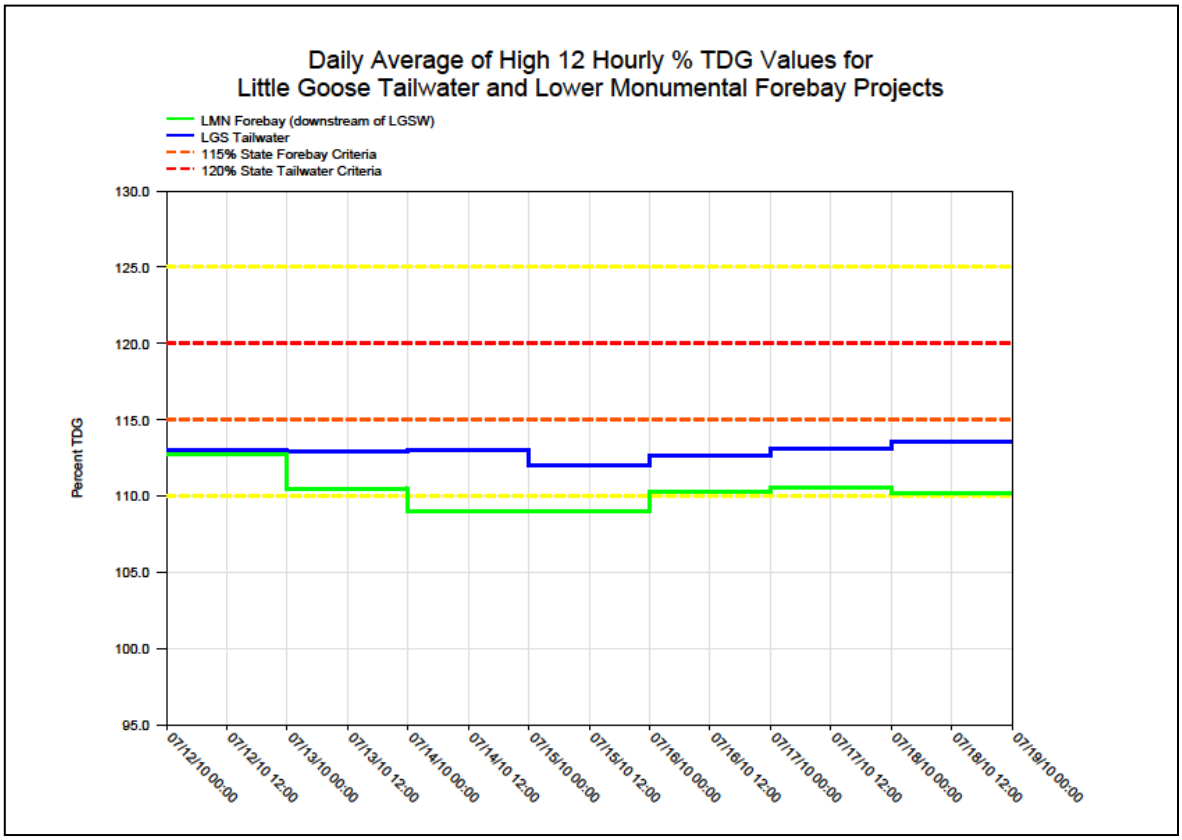

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

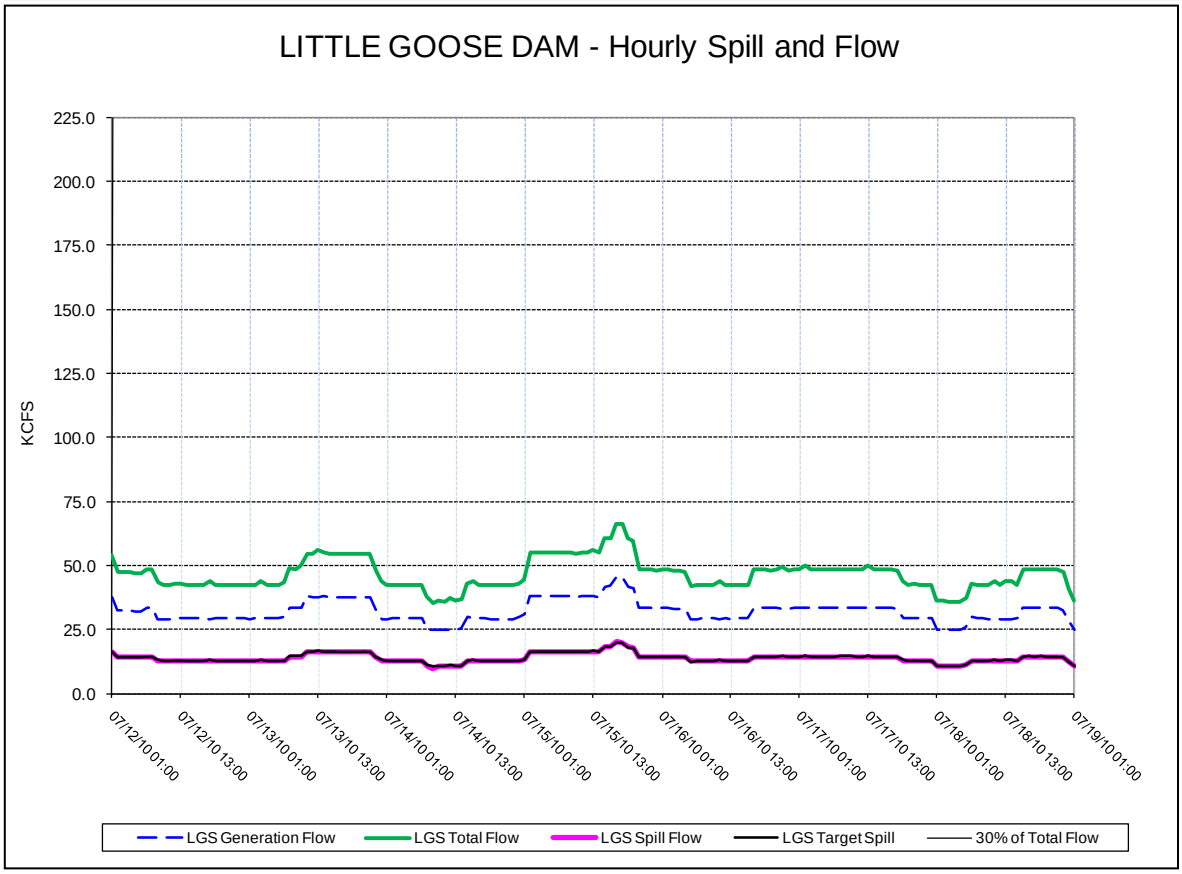
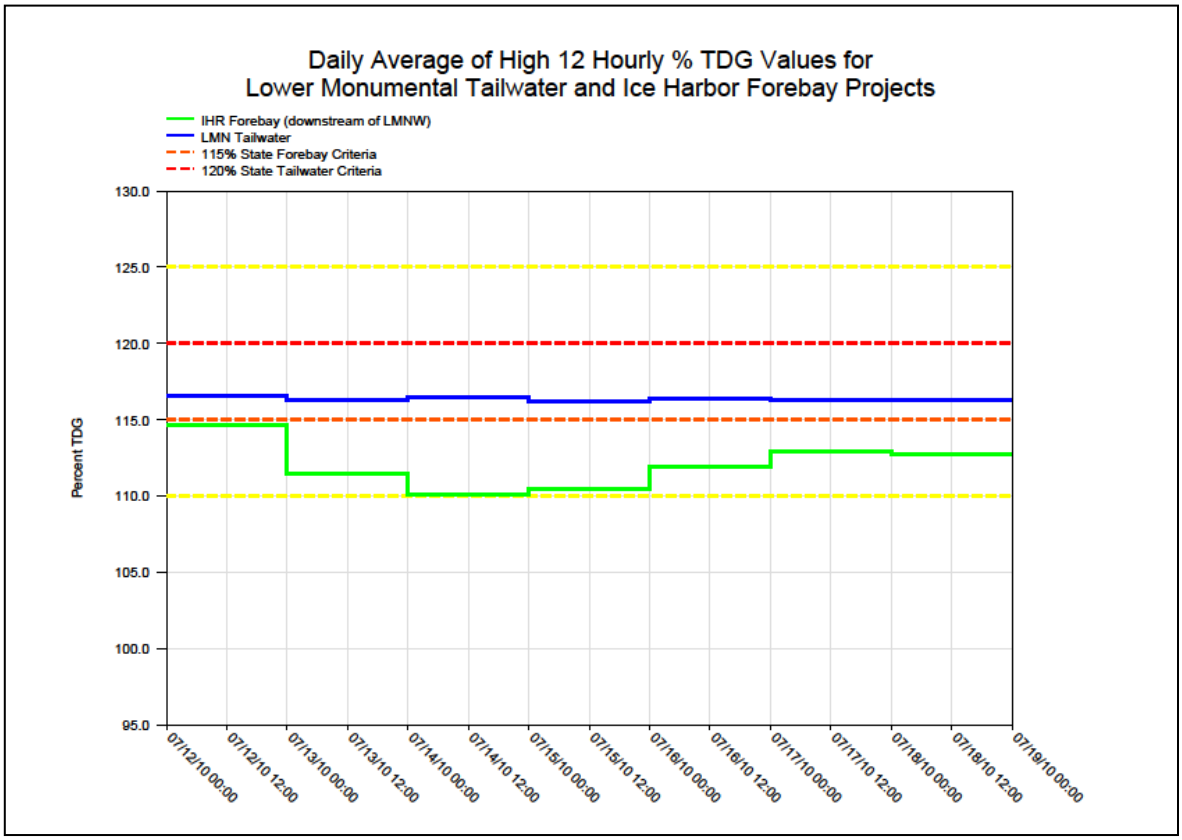

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

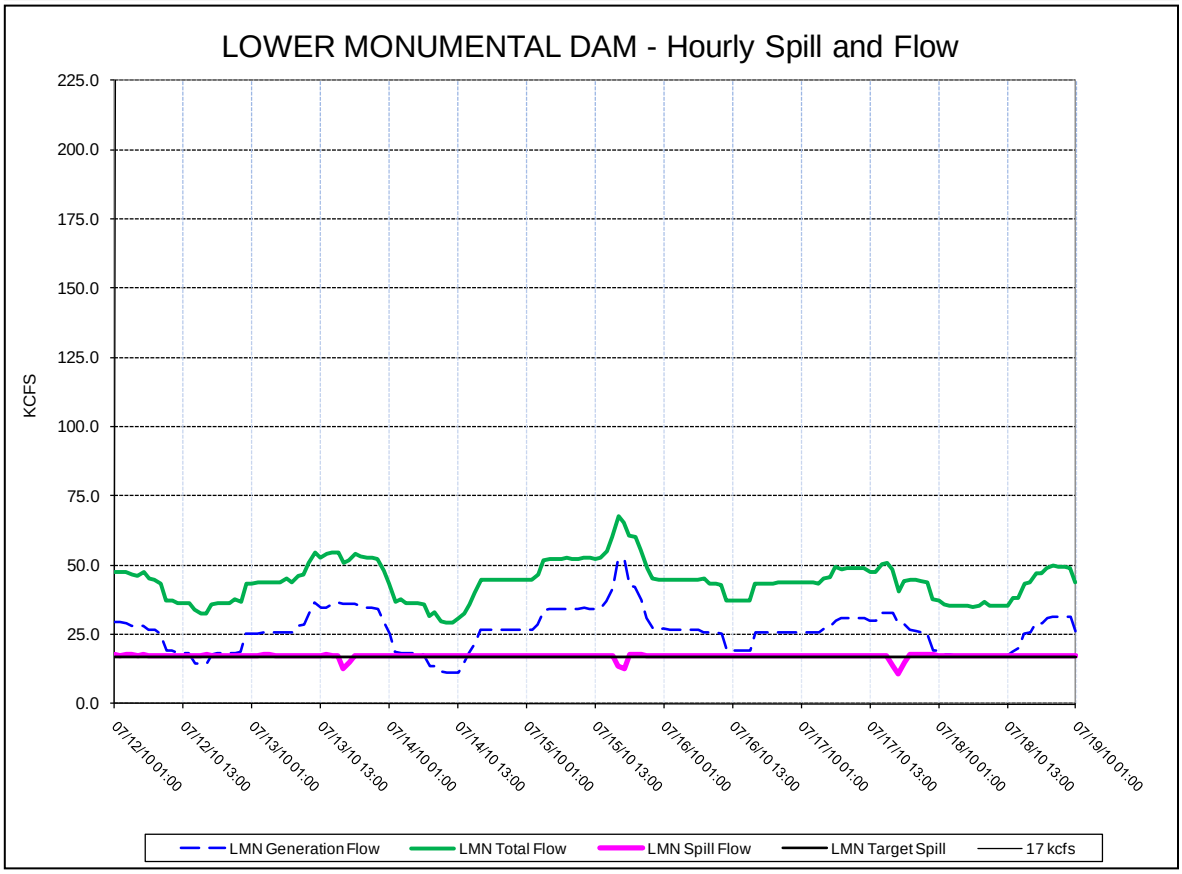
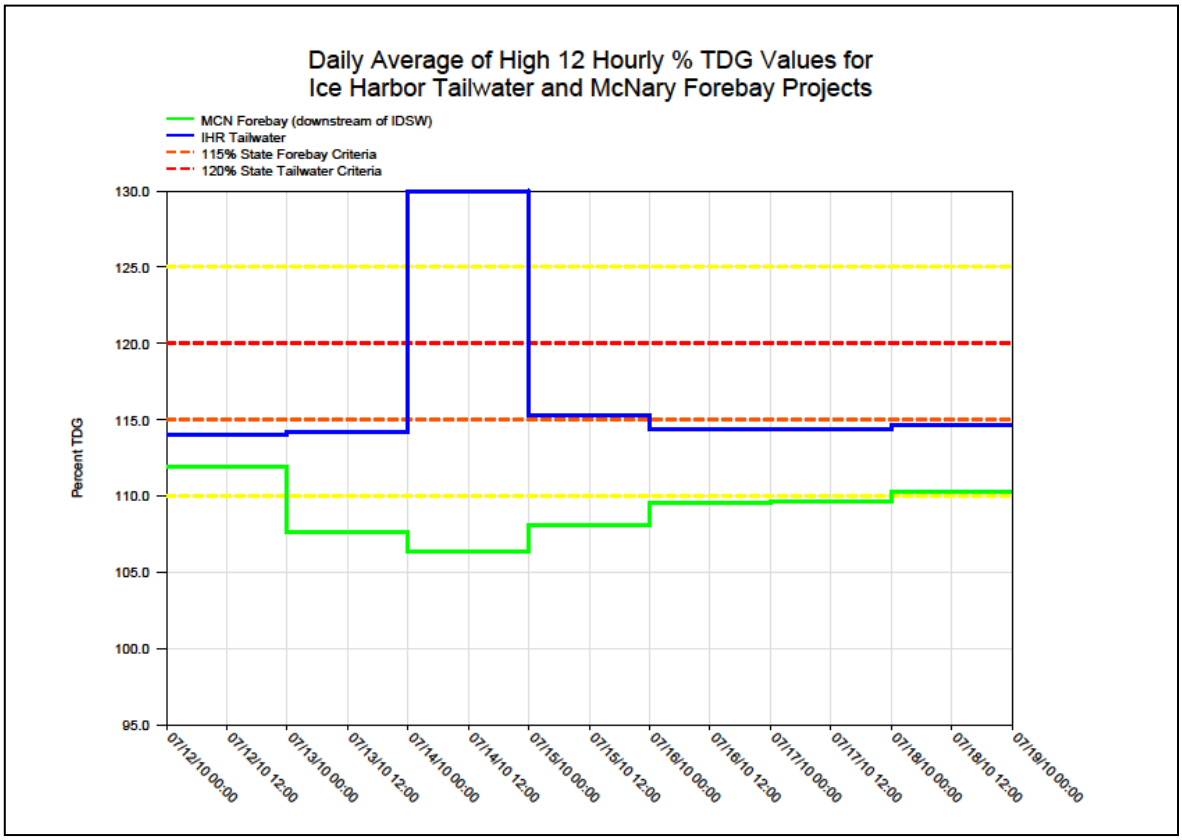

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

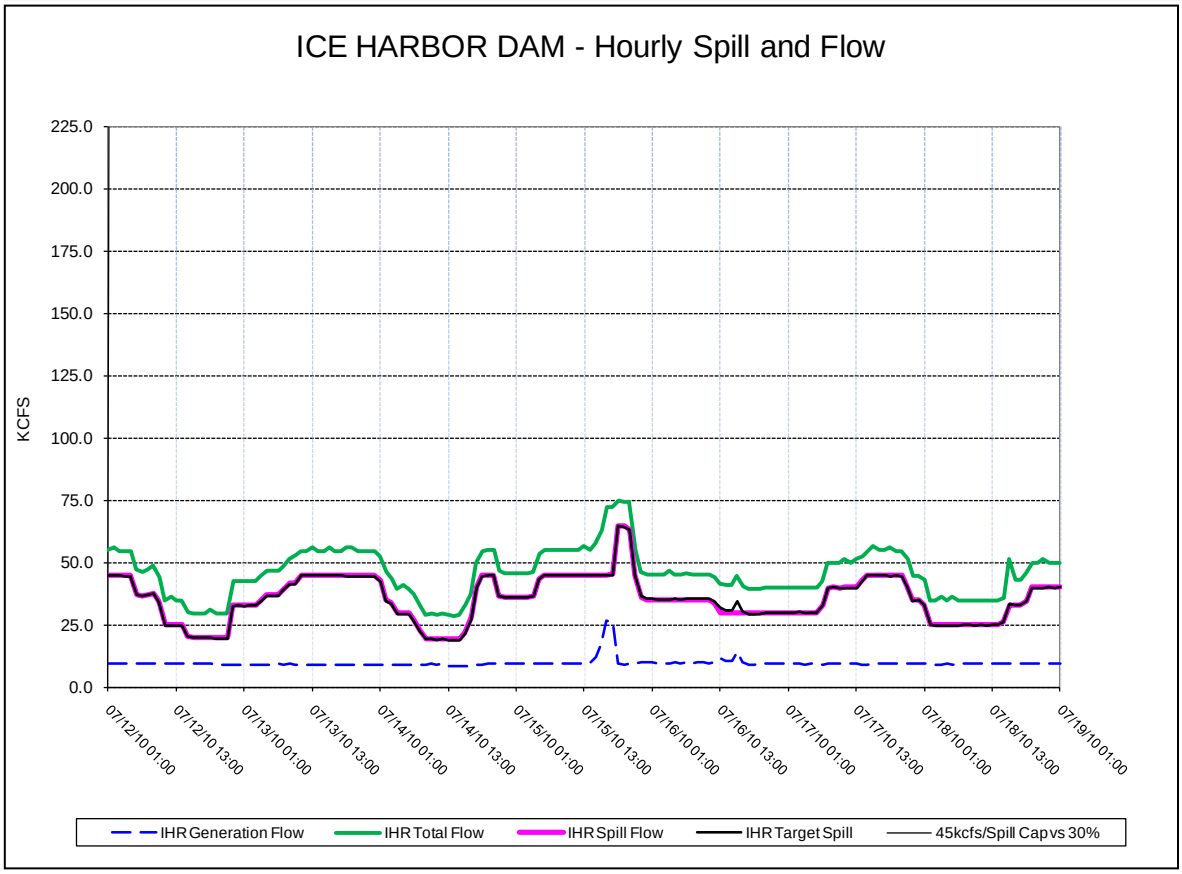
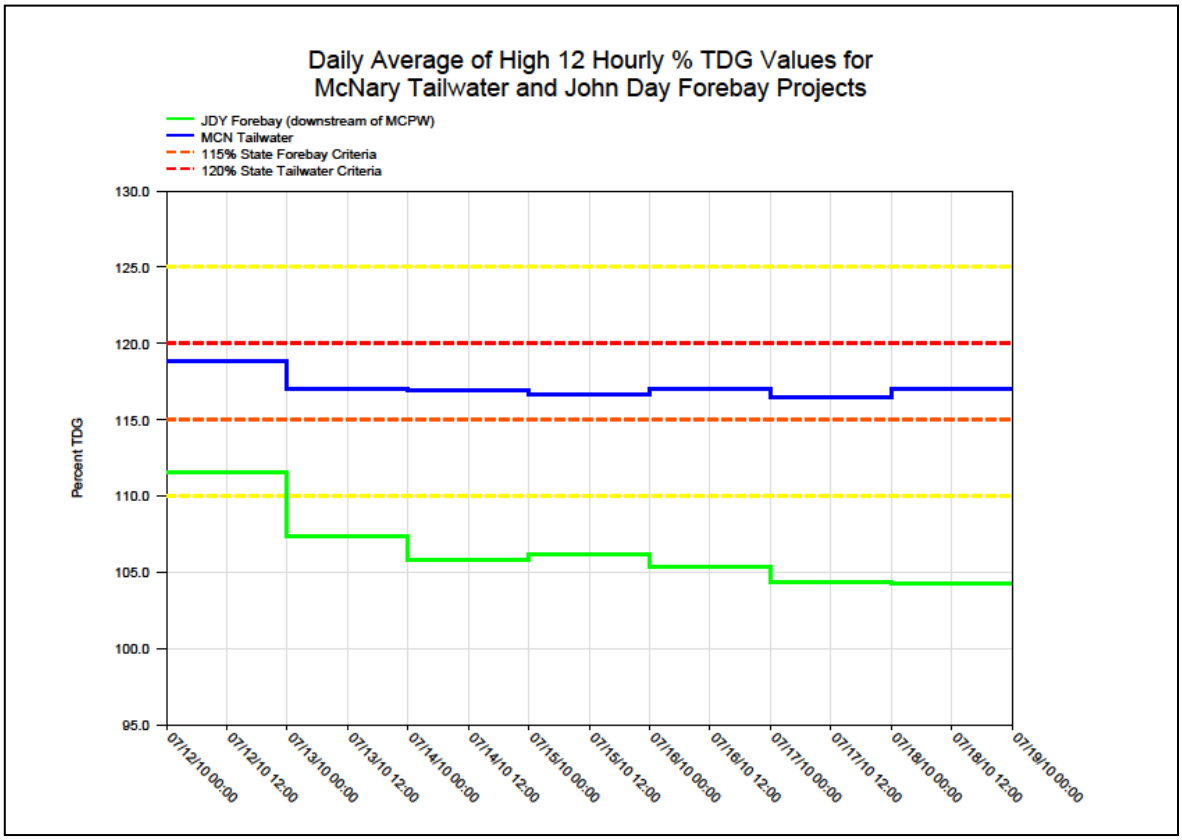

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

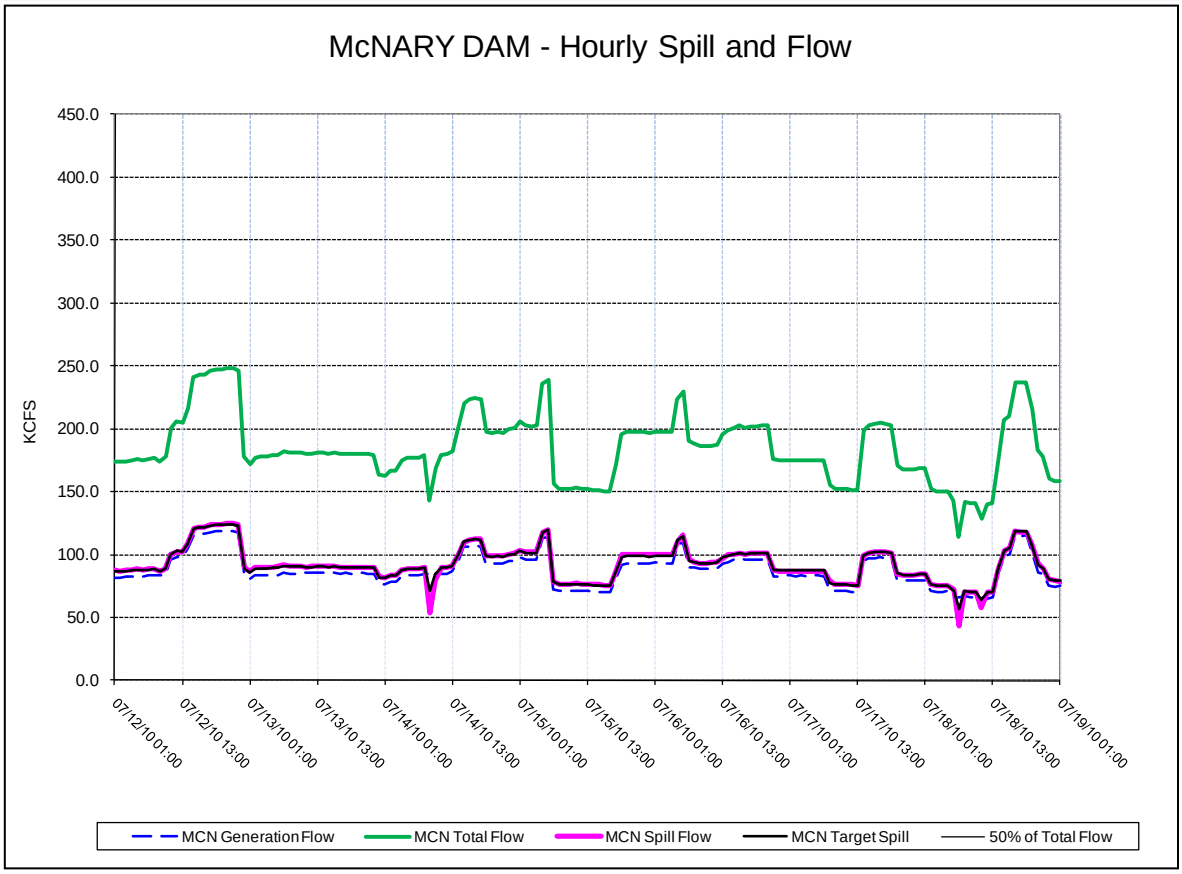
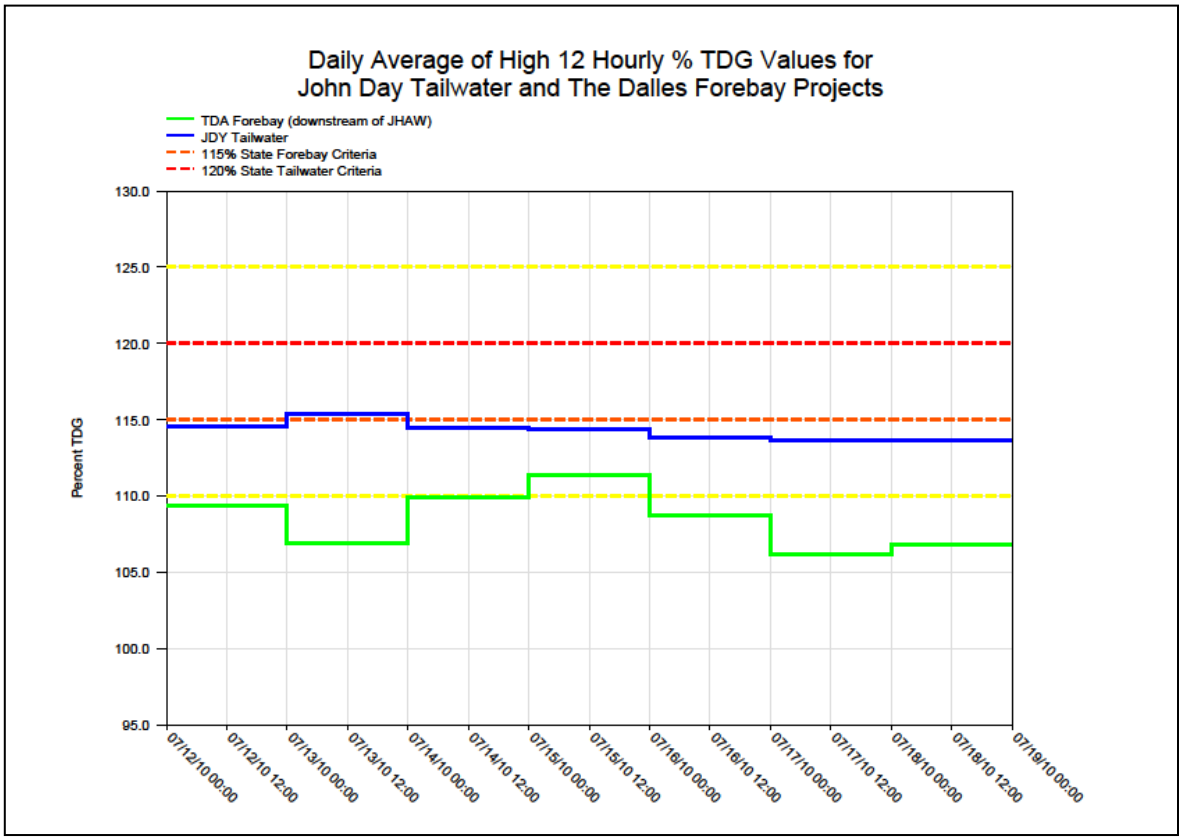

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

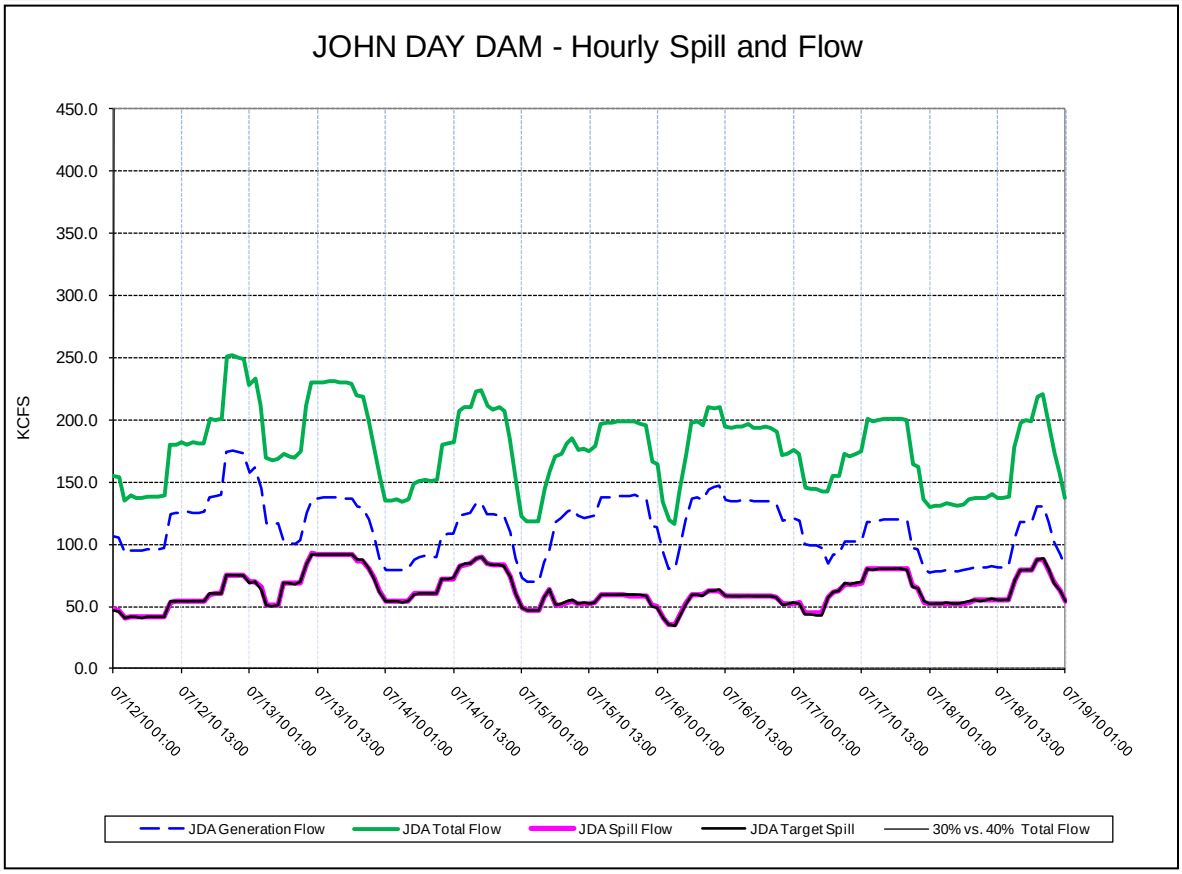
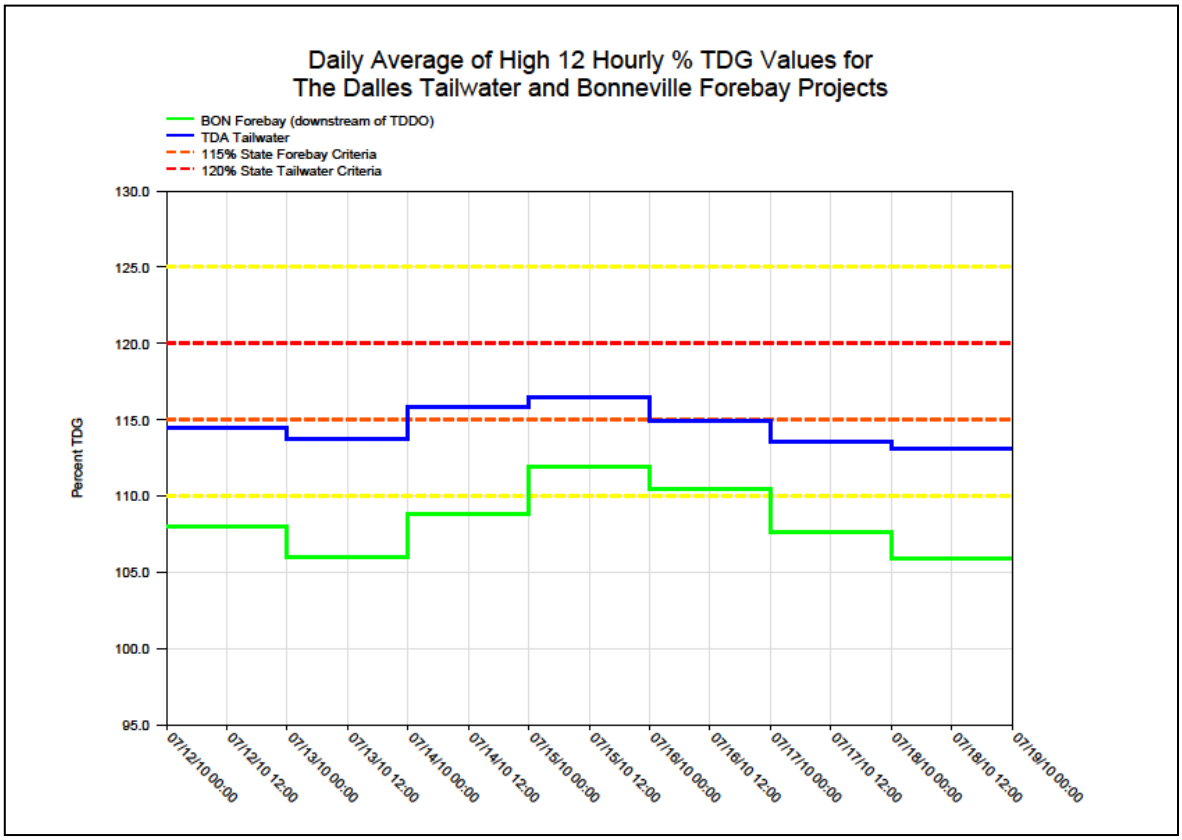

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

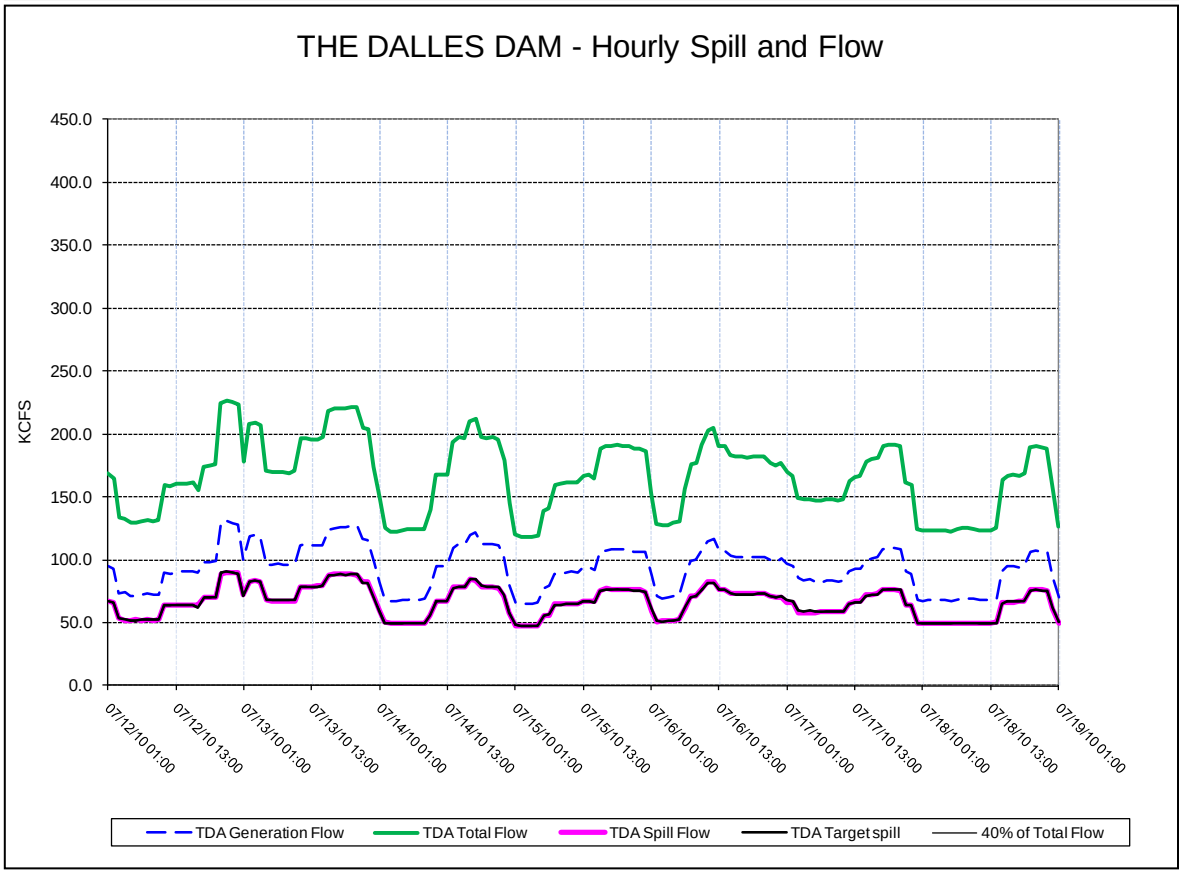
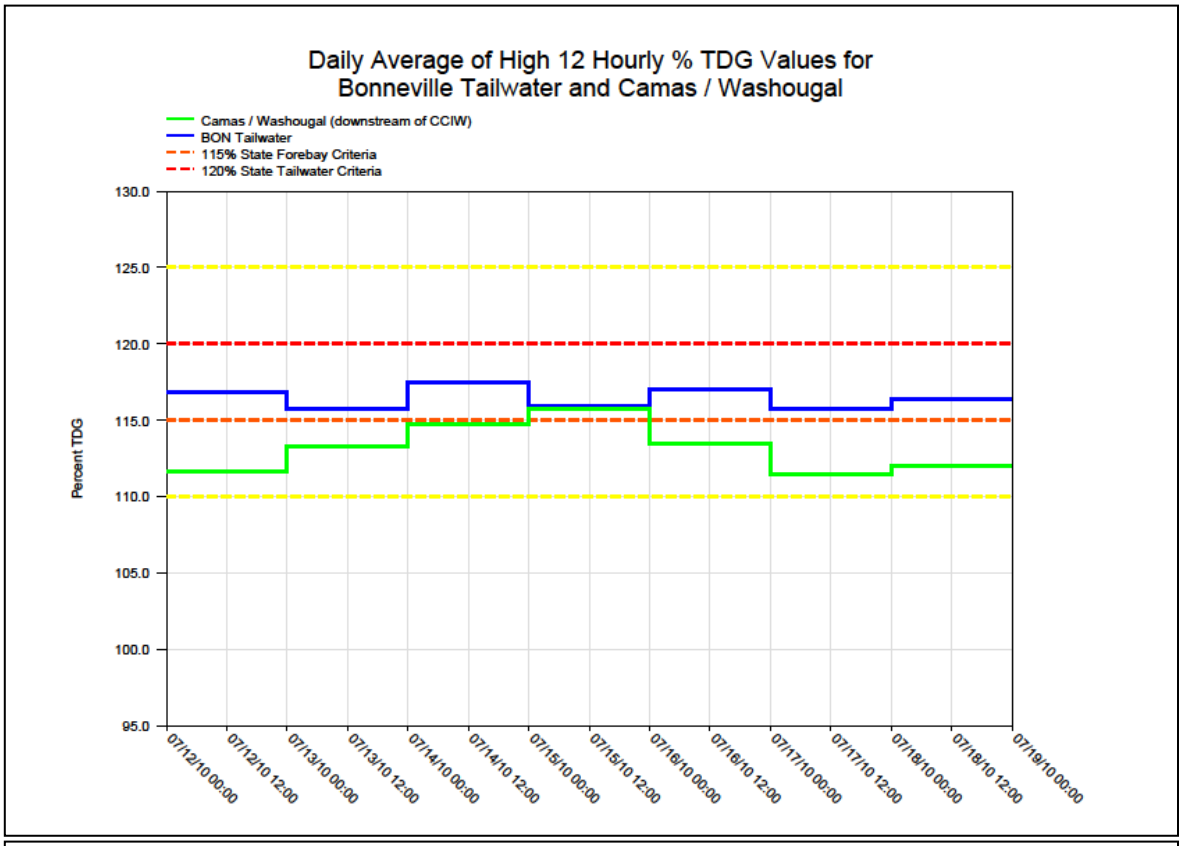

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/12/10 01:00
07/12/10 13:00
07/13/10 01:00
07/13/10 13:00
07/14/10 01:00
07/14/10 13:00
07/15/10 01:00
07/15/10 13:00
07/16/10 01:00
07/16/10 13:00
07/17/10 01:00
07/17/10 13:00
07/18/10 01:00
07/18/10 13:00
07/19/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/12/10 00:00
07/12/10 12:00
07/13/10 00:00
07/13/10 12:00
07/14/10 00:00
07/14/10 12:00
07/15/10 00:00
07/15/10 12:00
07/16/10 00:00
07/16/10 12:00
07/17/10 00:00
07/17/10 12:00
07/18/10 00:00
07/18/10 12:00
07/19/10 00:00

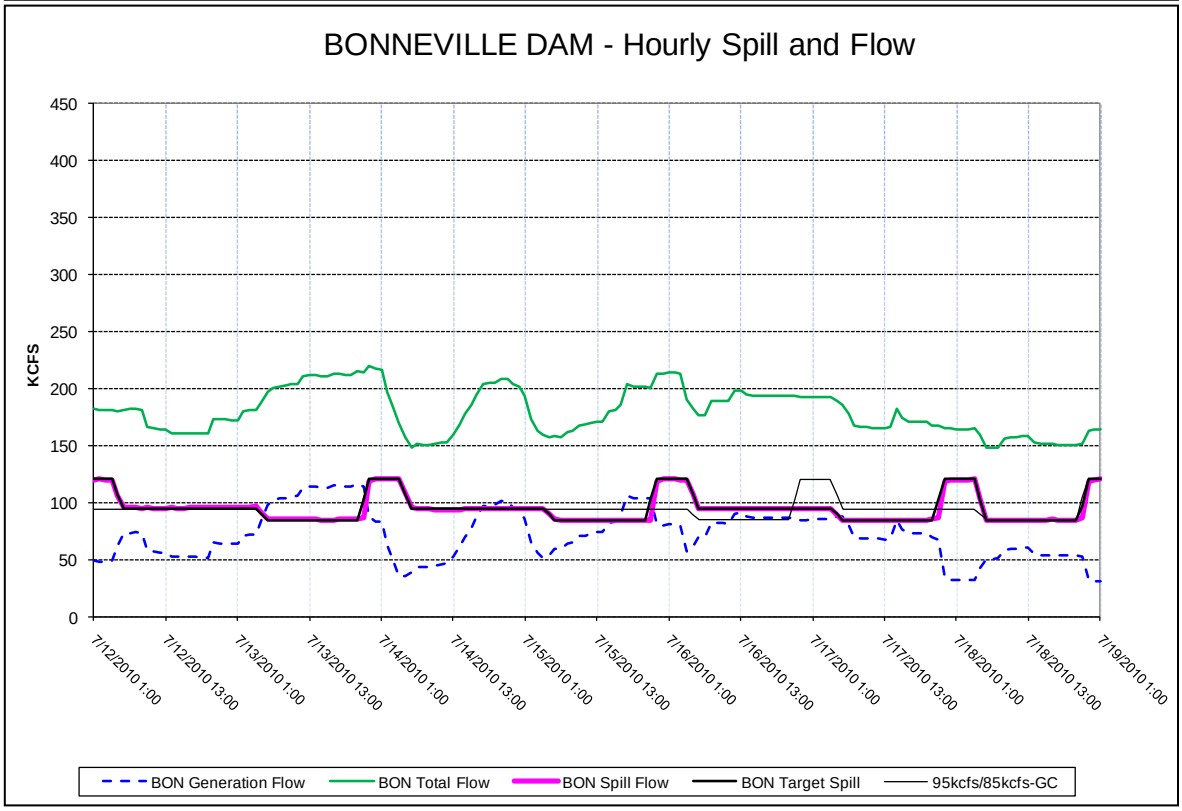
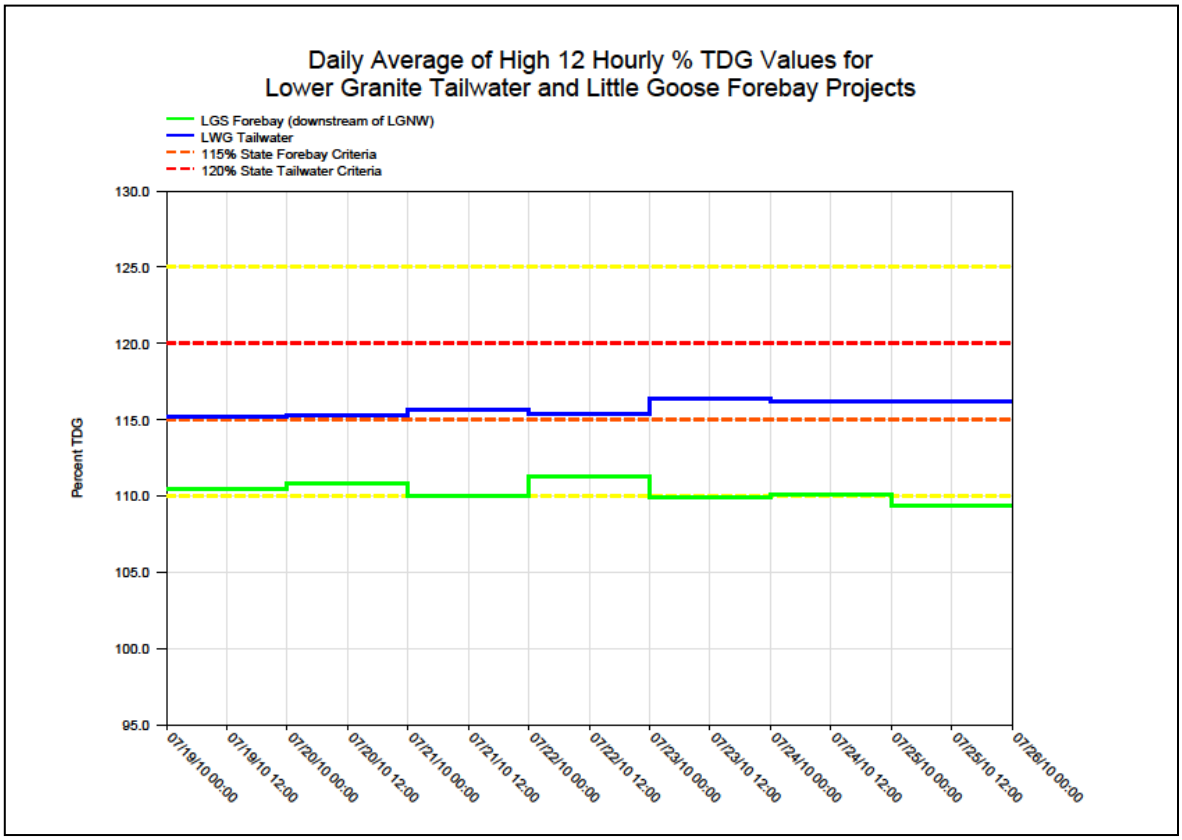

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/12/2010 1:00
7/12/2010 13:00
7/13/2010 1:00
7/13/2010 13:00
7/14/2010 1:00
7/14/2010 13:00
7/15/2010 1:00
7/15/2010 13:00
7/16/2010 1:00
7/16/2010 13:00
7/17/2010 1:00
7/17/2010 13:00
7/18/2010 1:00
7/18/2010 13:00
7/19/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
95kcfs/85kcfs-GC

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

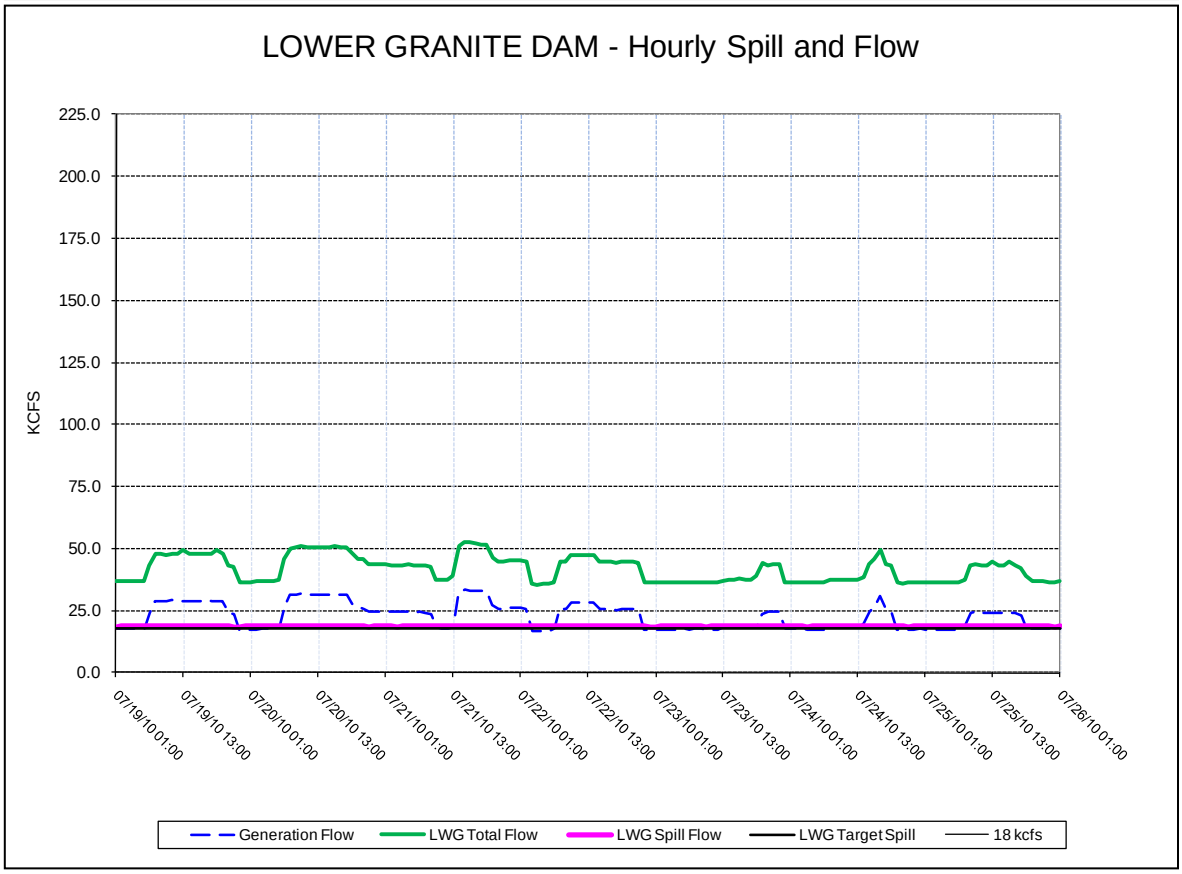
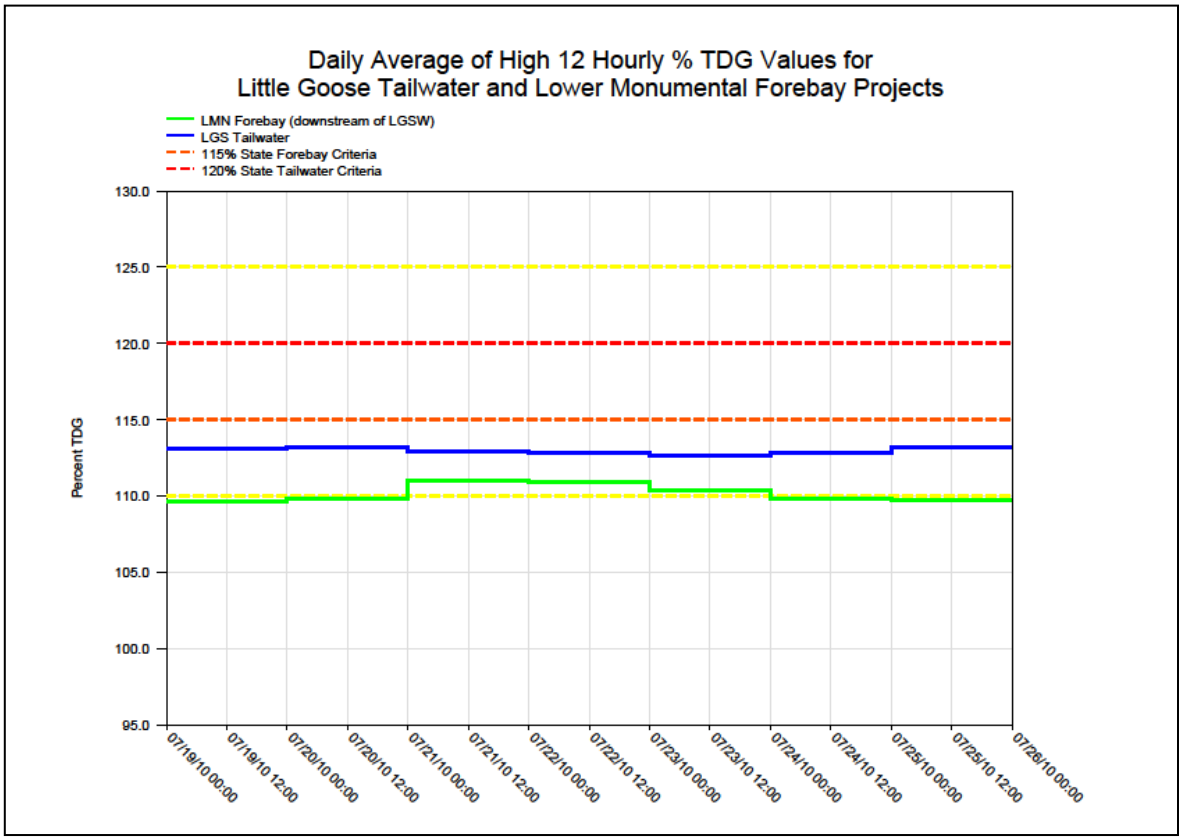

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

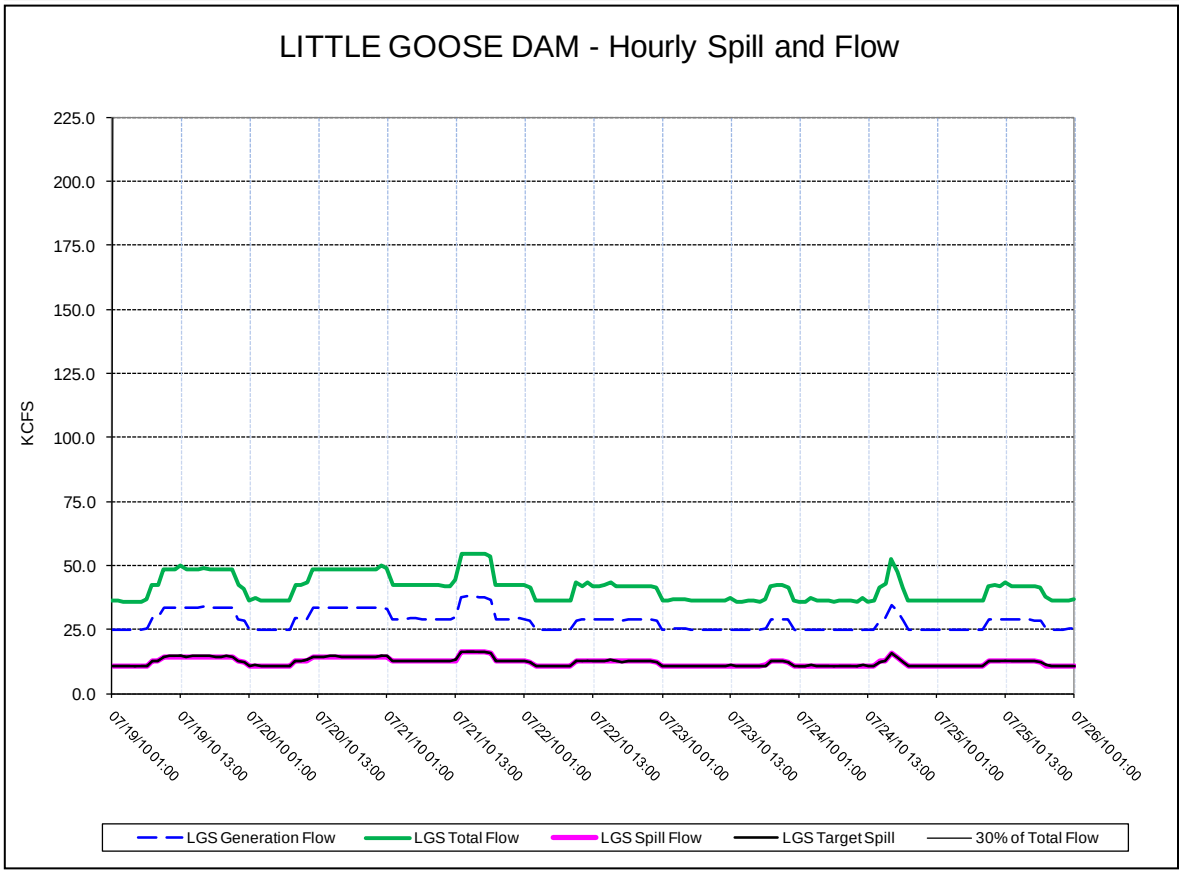
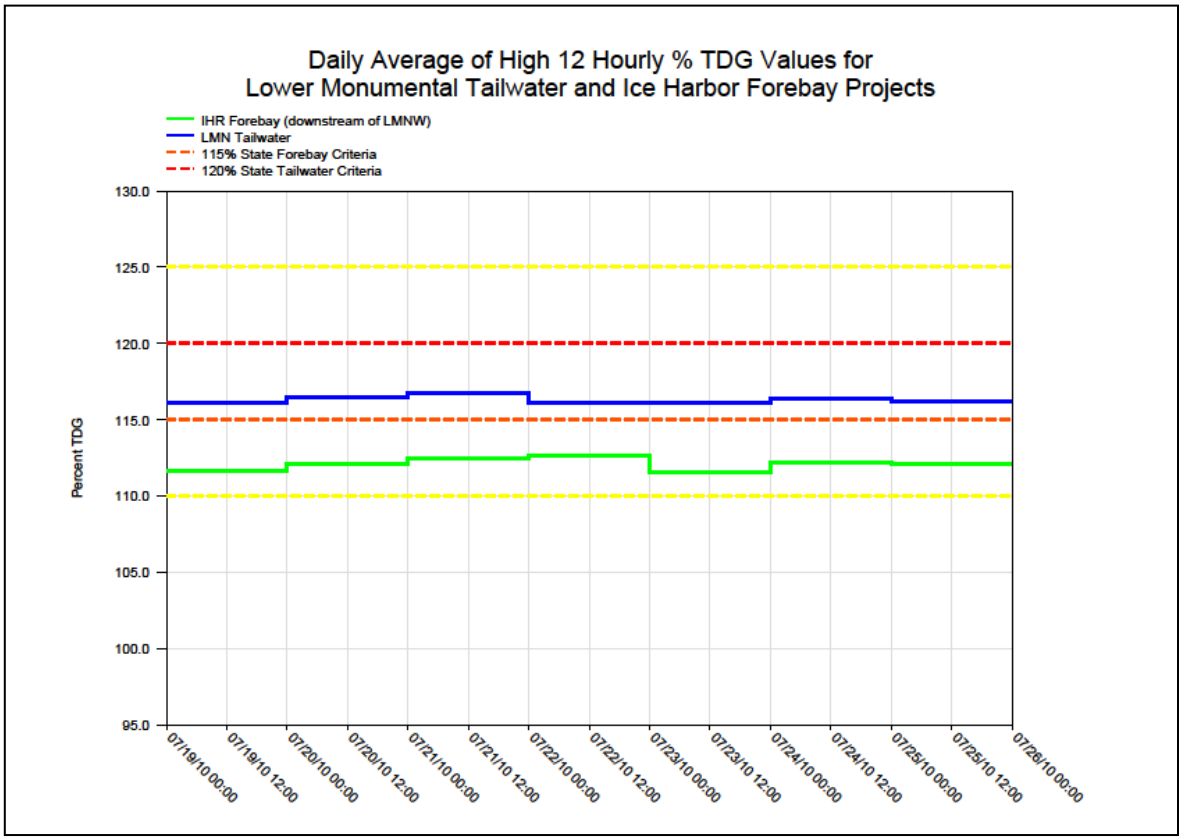

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

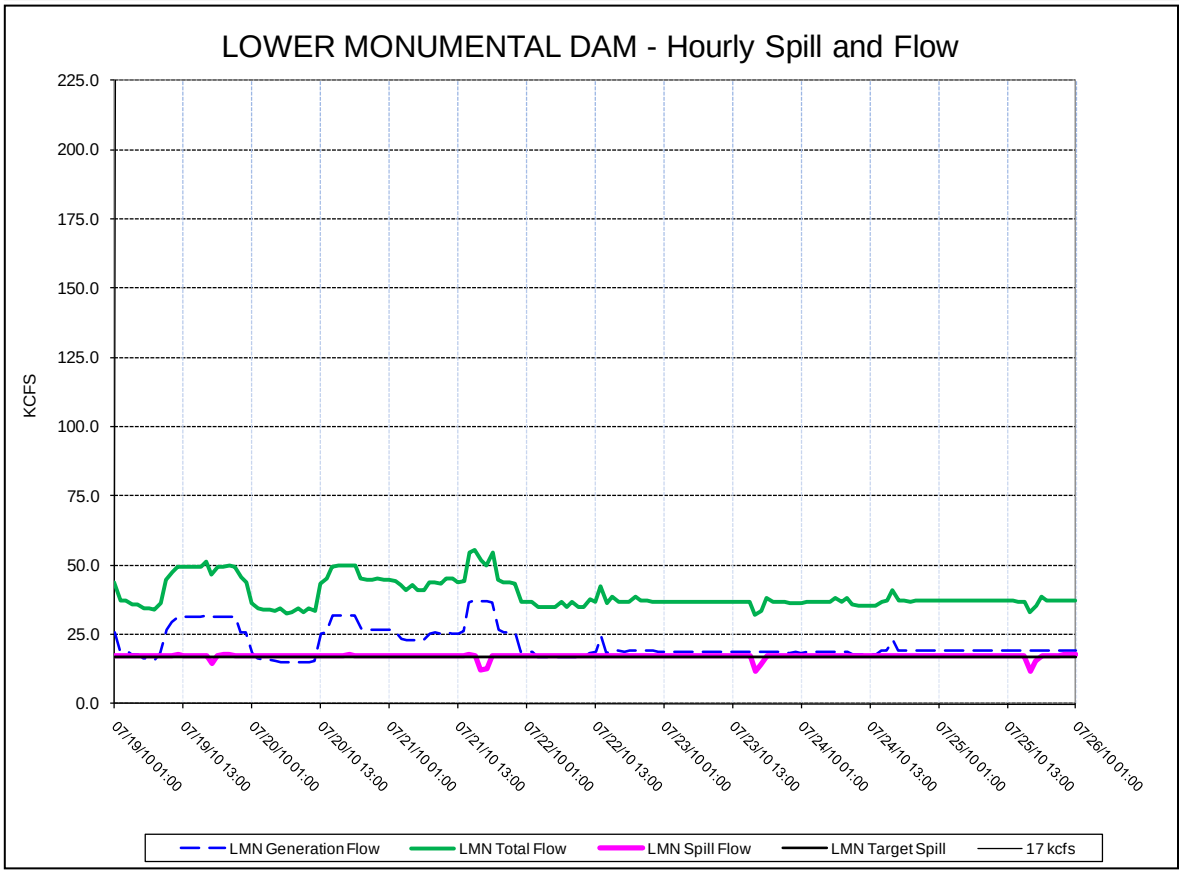
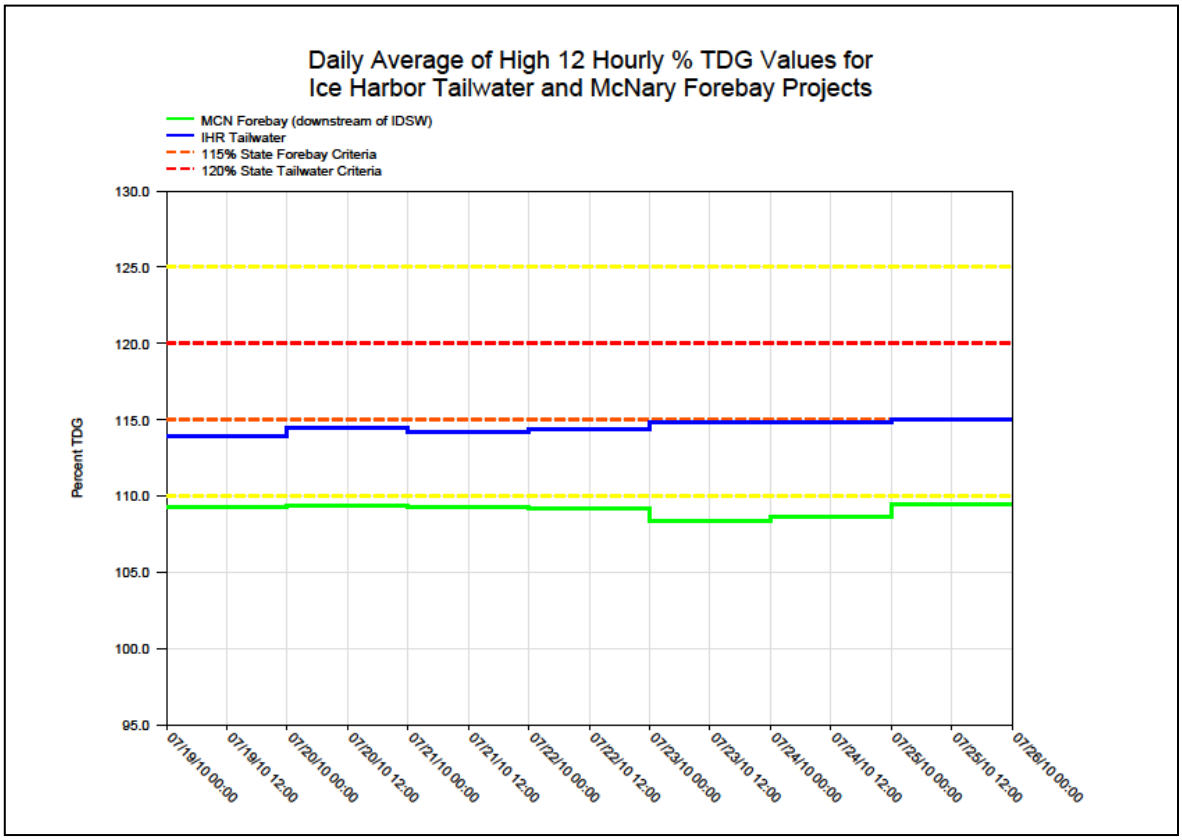

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

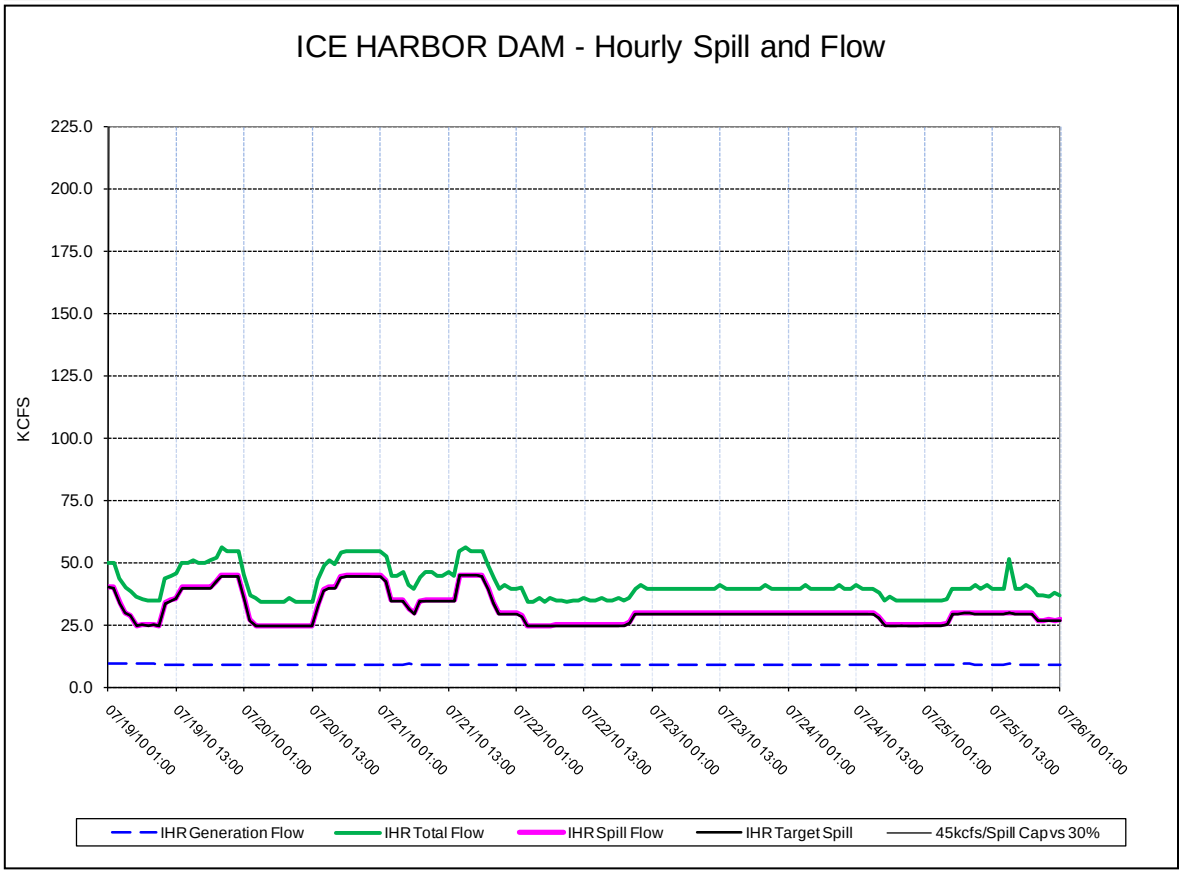
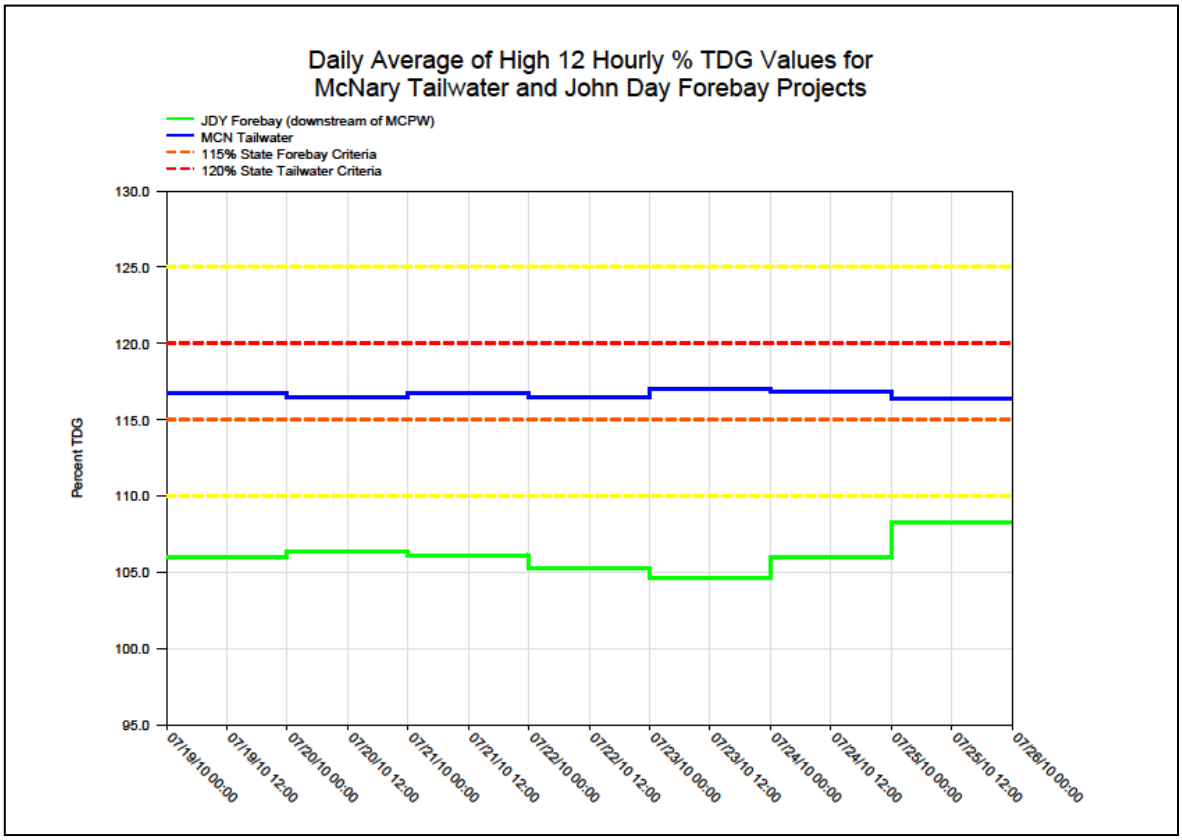

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap vs 30%

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

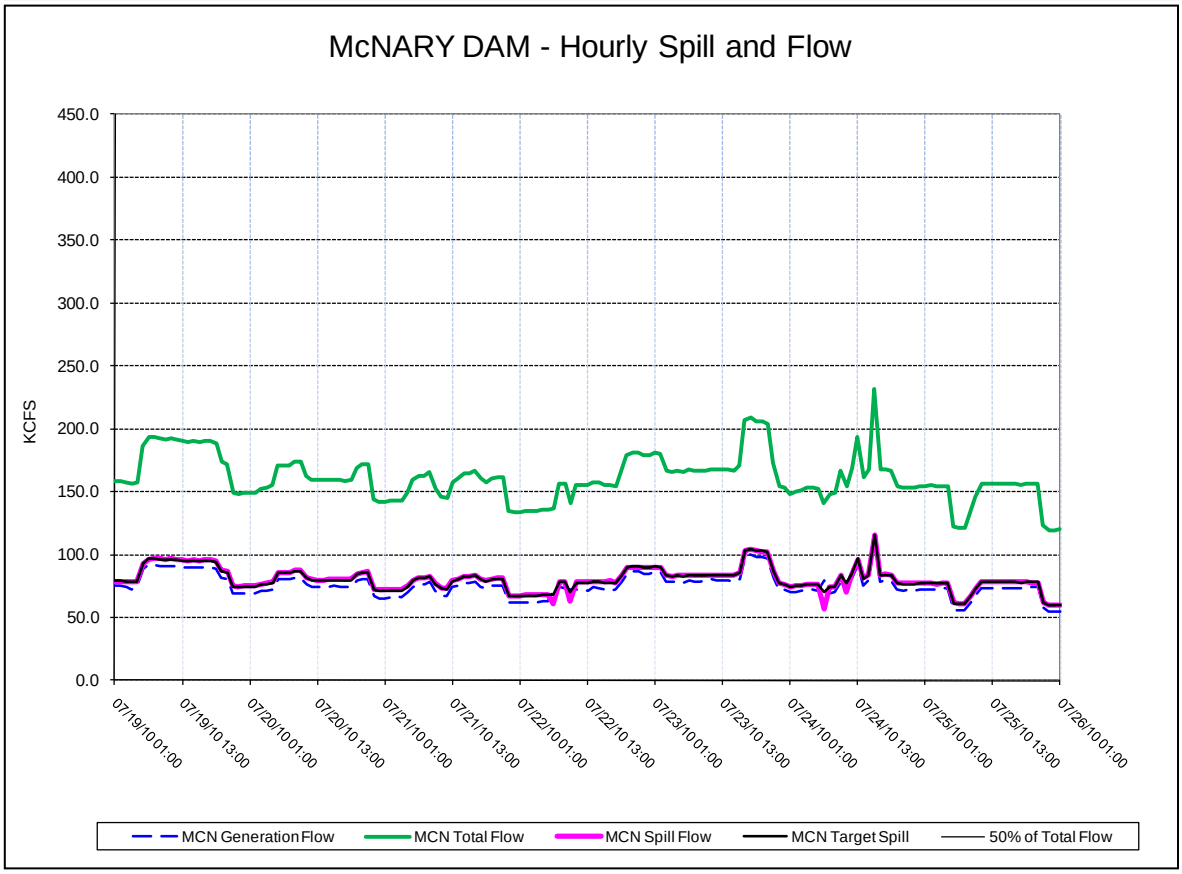
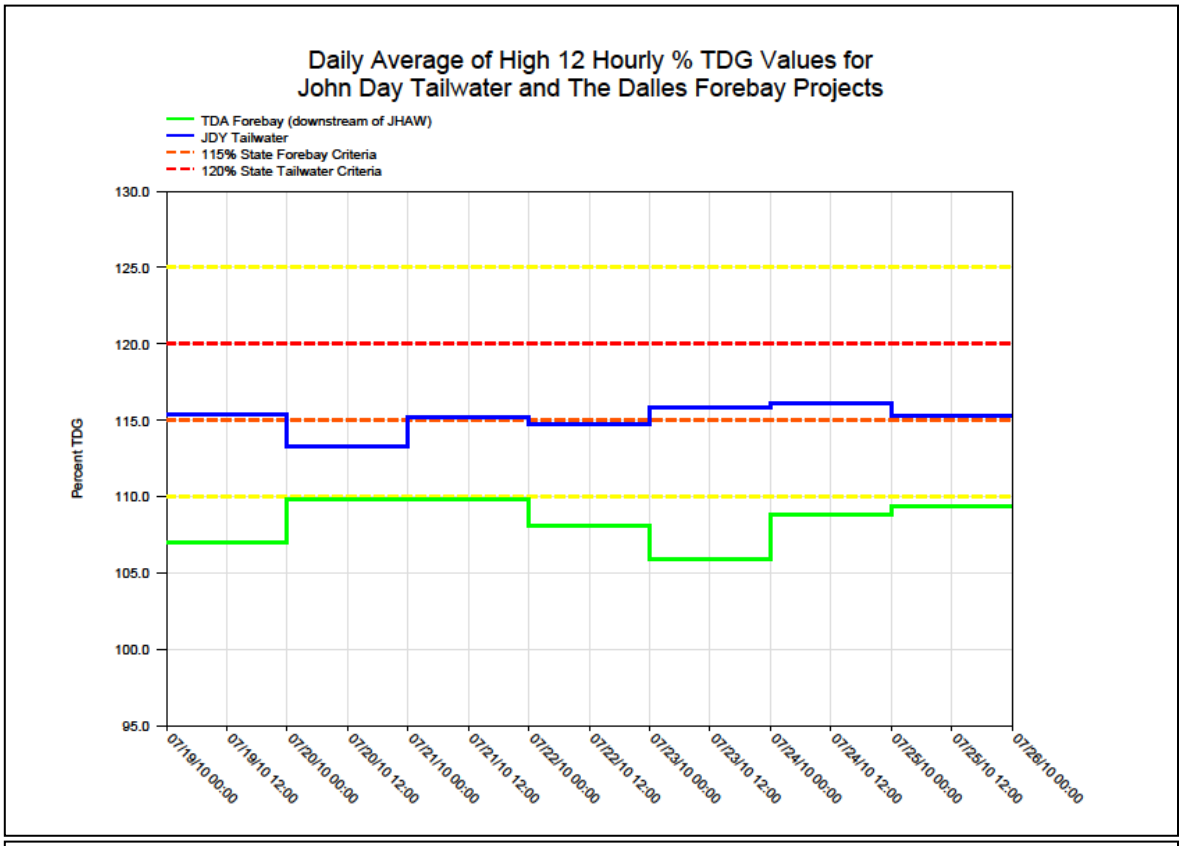

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

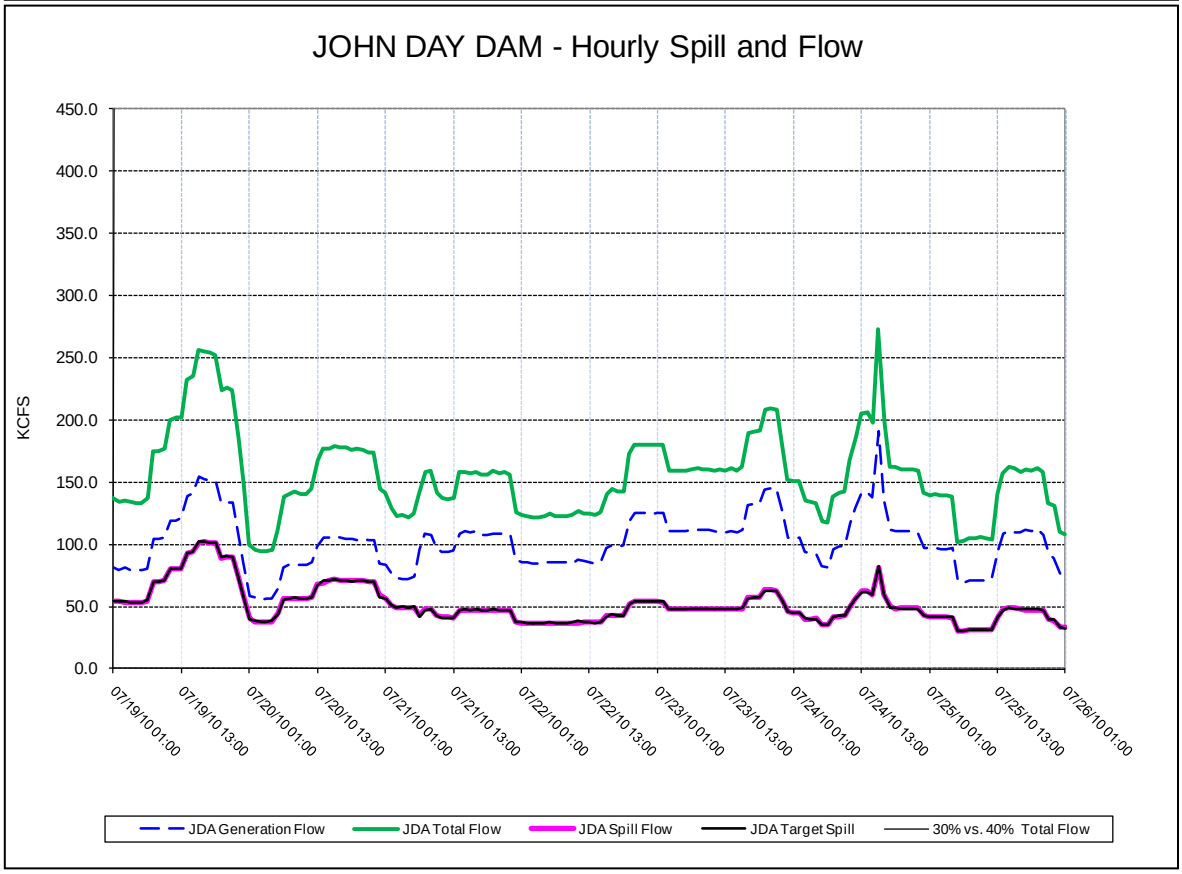
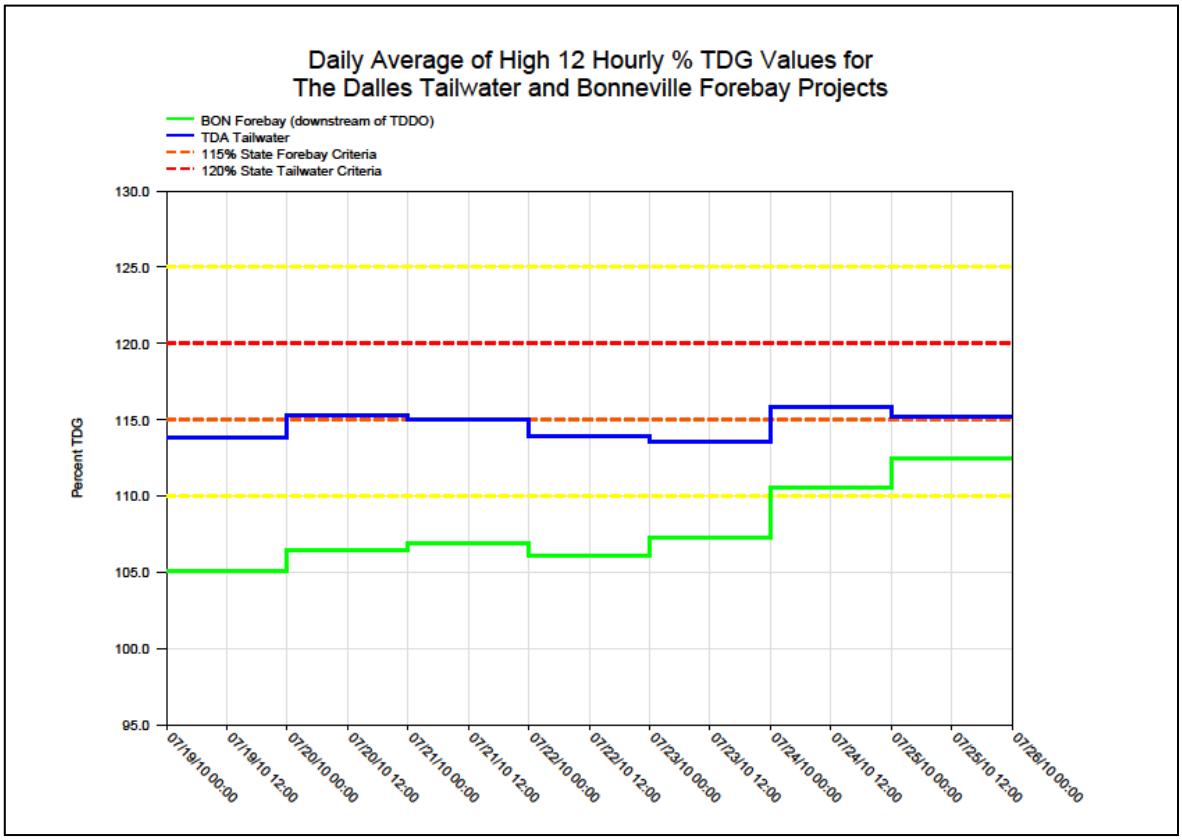

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% vs. 40% Total Flow

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

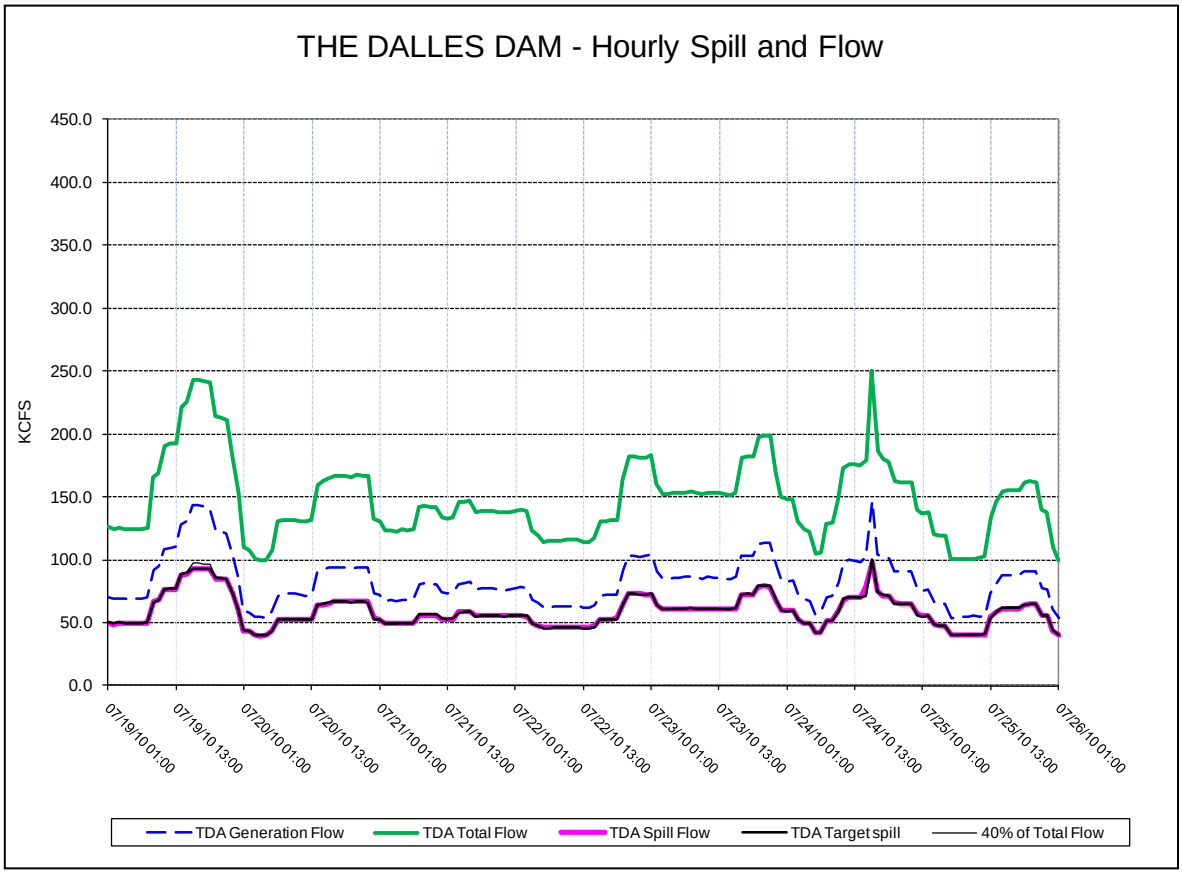
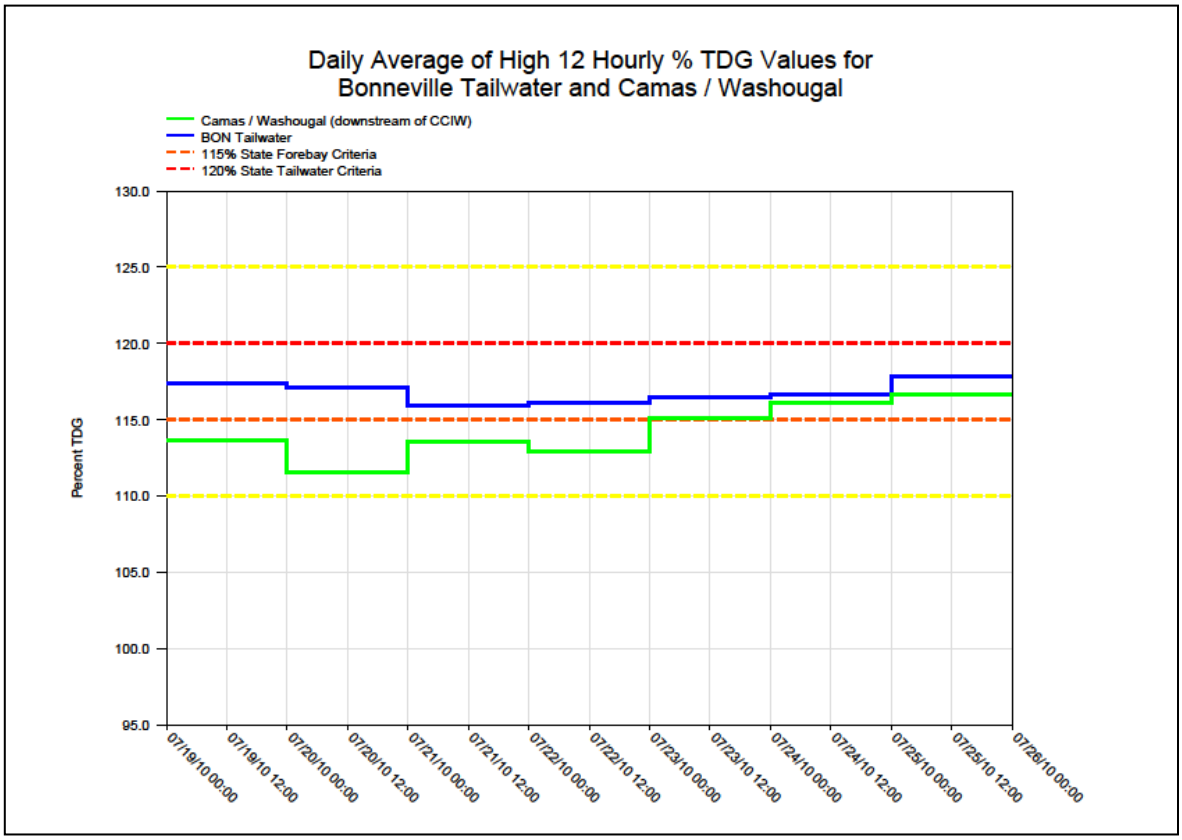

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/19/10 01:00
07/19/10 13:00
07/20/10 01:00
07/20/10 13:00
07/21/10 01:00
07/21/10 13:00
07/22/10 01:00
07/22/10 13:00
07/23/10 01:00
07/23/10 13:00
07/24/10 01:00
07/24/10 13:00
07/25/10 01:00
07/25/10 13:00
07/26/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/19/10 00:00
07/19/10 12:00
07/20/10 00:00
07/20/10 12:00
07/21/10 00:00
07/21/10 12:00
07/22/10 00:00
07/22/10 12:00
07/23/10 00:00
07/23/10 12:00
07/24/10 00:00
07/24/10 12:00
07/25/10 00:00
07/25/10 12:00
07/26/10 00:00

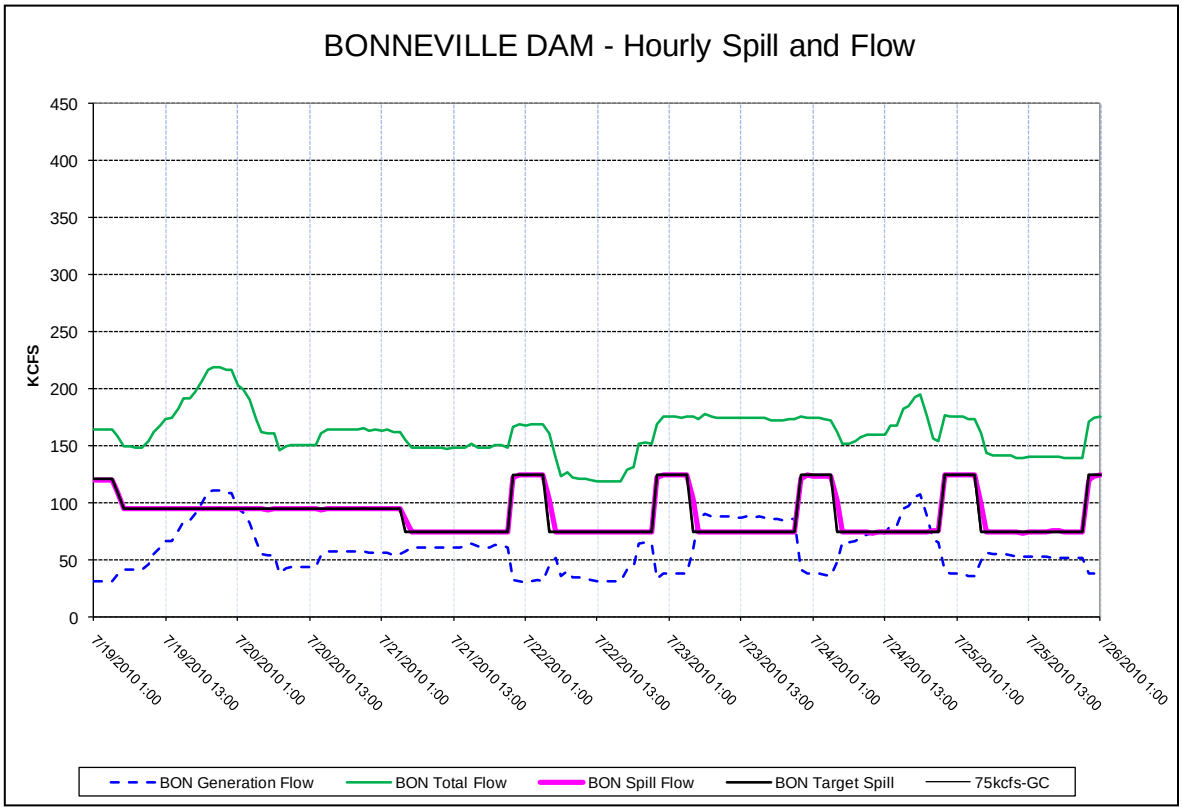
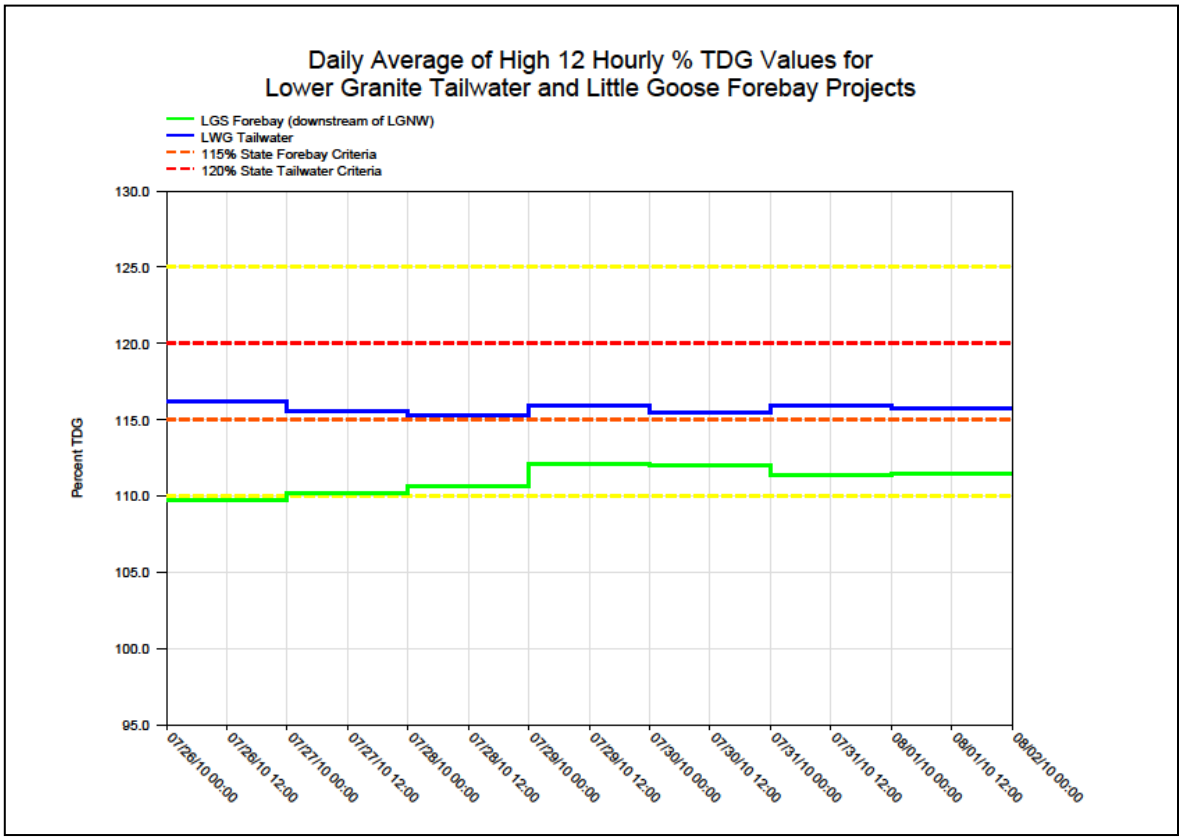

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/19/2010 1:00
7/19/2010 13:00
7/20/2010 1:00
7/20/2010 13:00
7/21/2010 1:00
7/21/2010 13:00
7/22/2010 1:00
7/22/2010 13:00
7/23/2010 1:00
7/23/2010 13:00
7/24/2010 1:00
7/24/2010 13:00
7/25/2010 1:00
7/25/2010 13:00
7/26/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs-GC

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

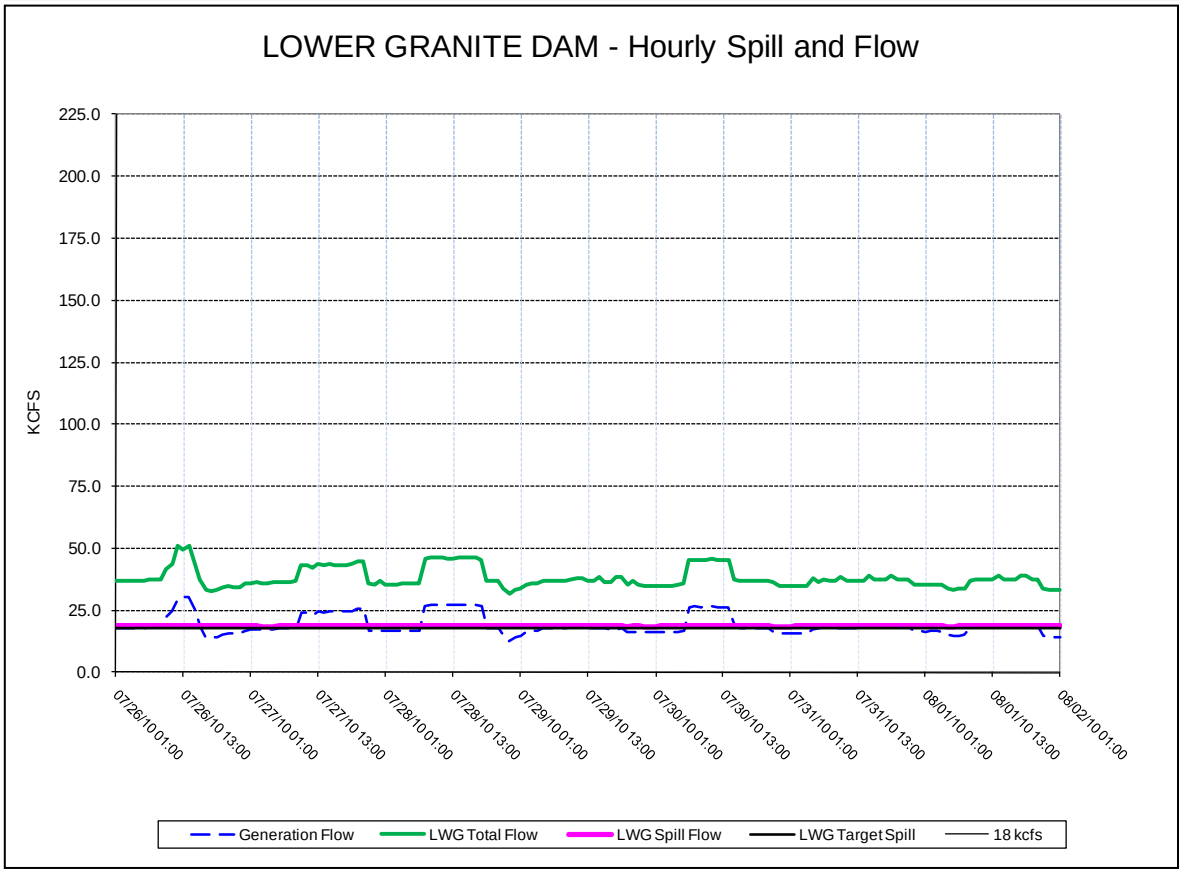
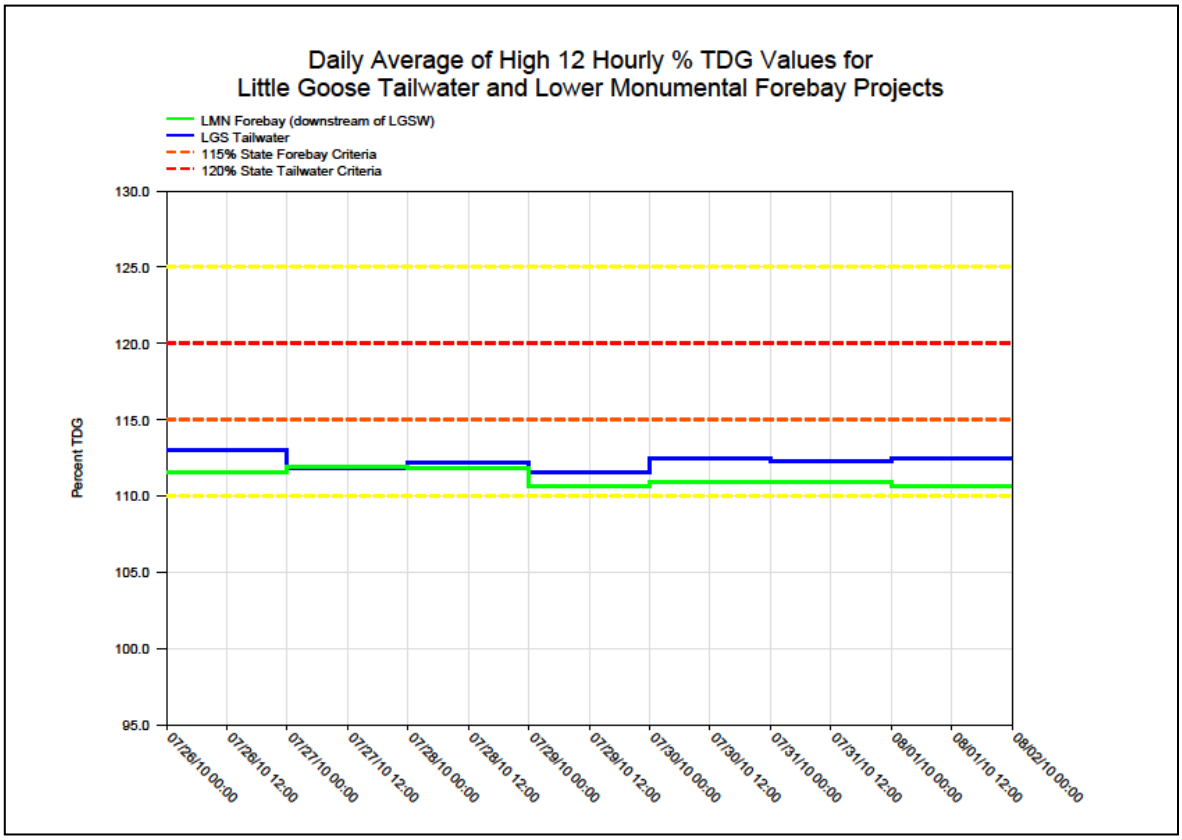

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

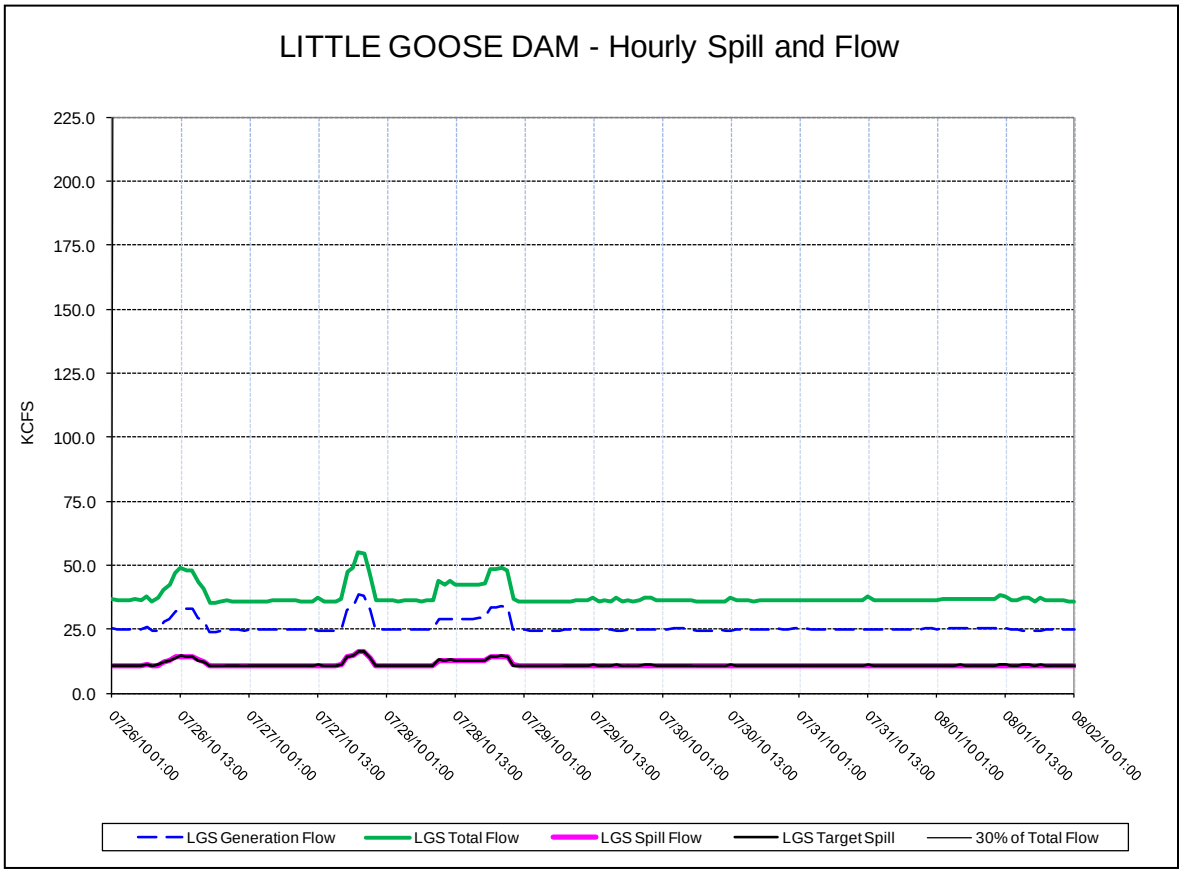
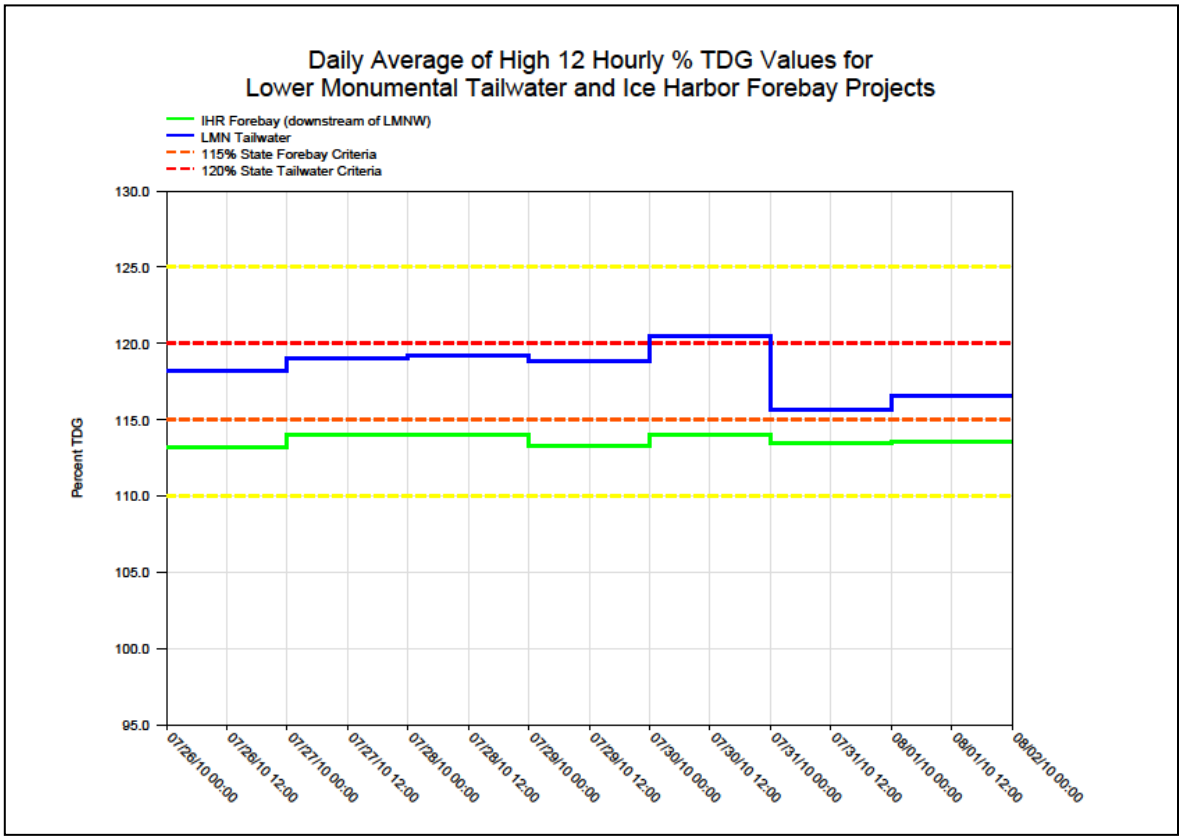

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

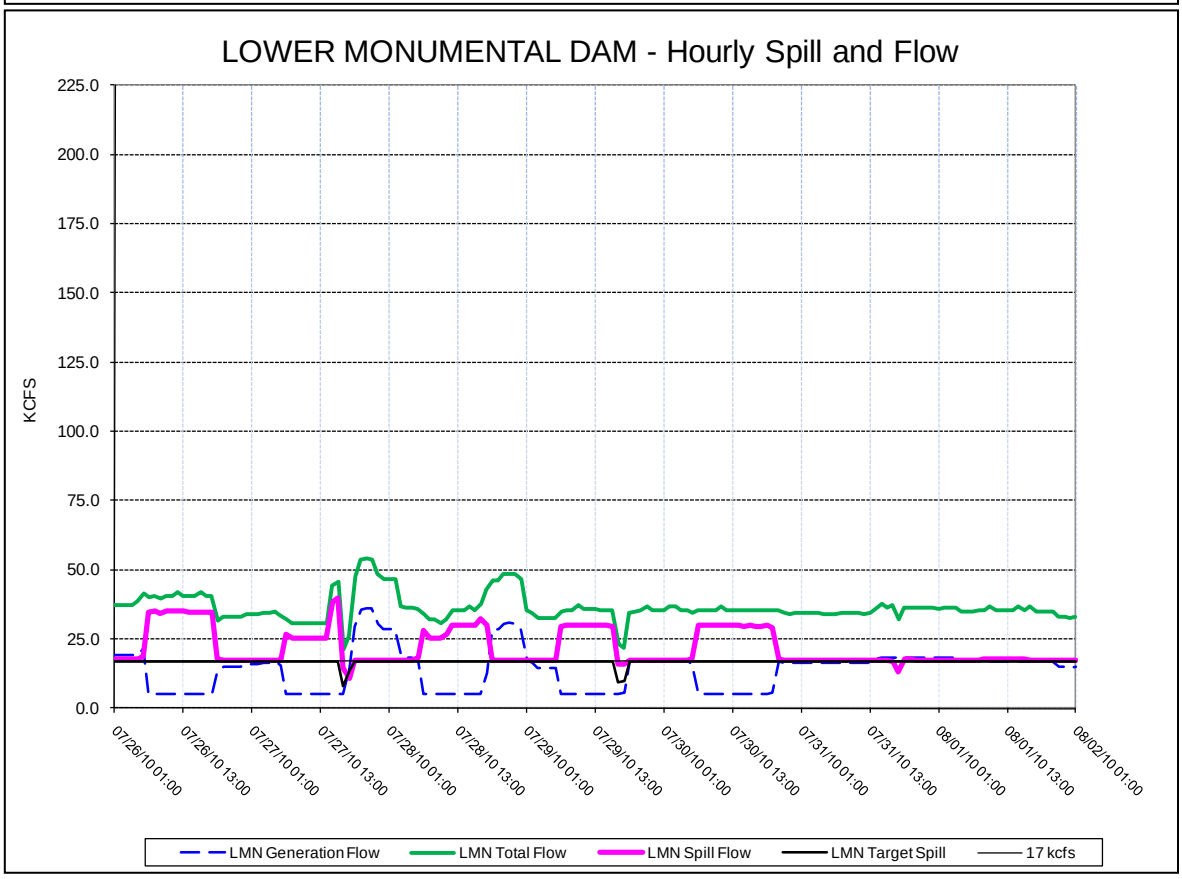
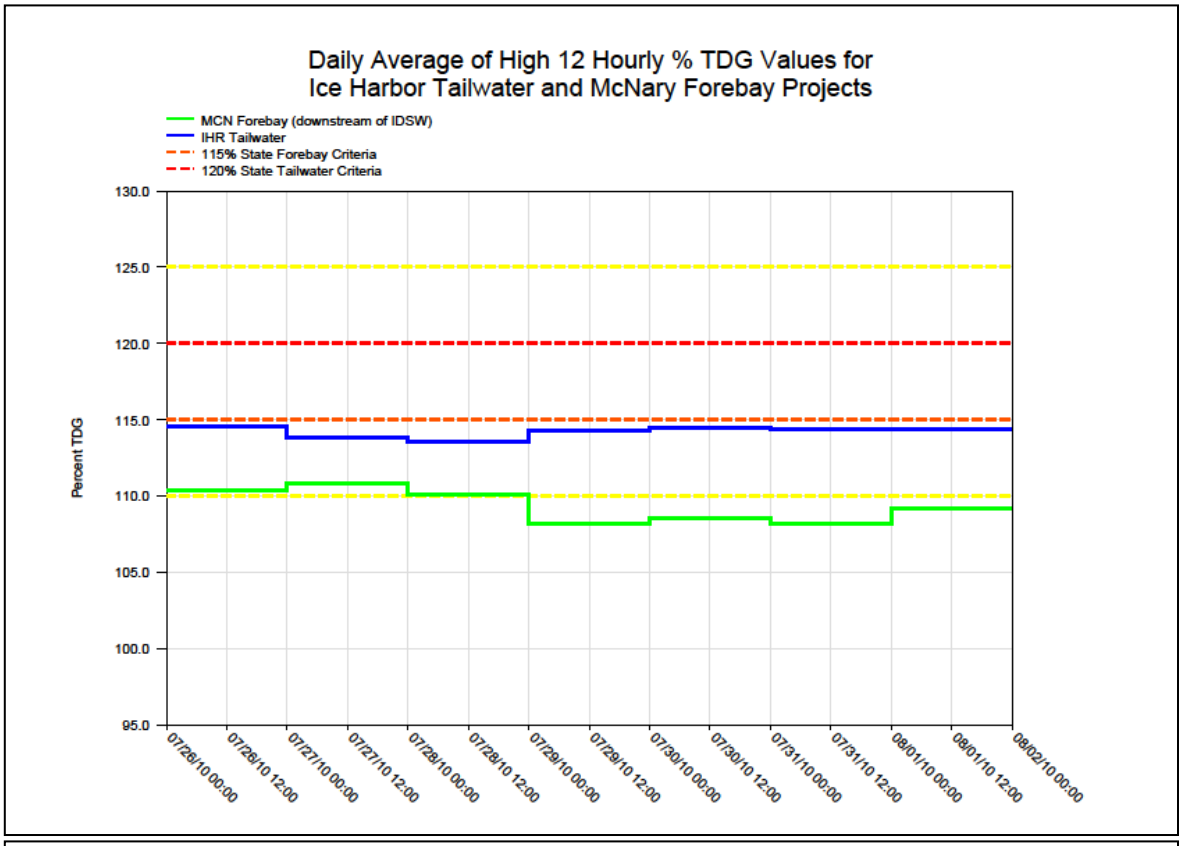

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

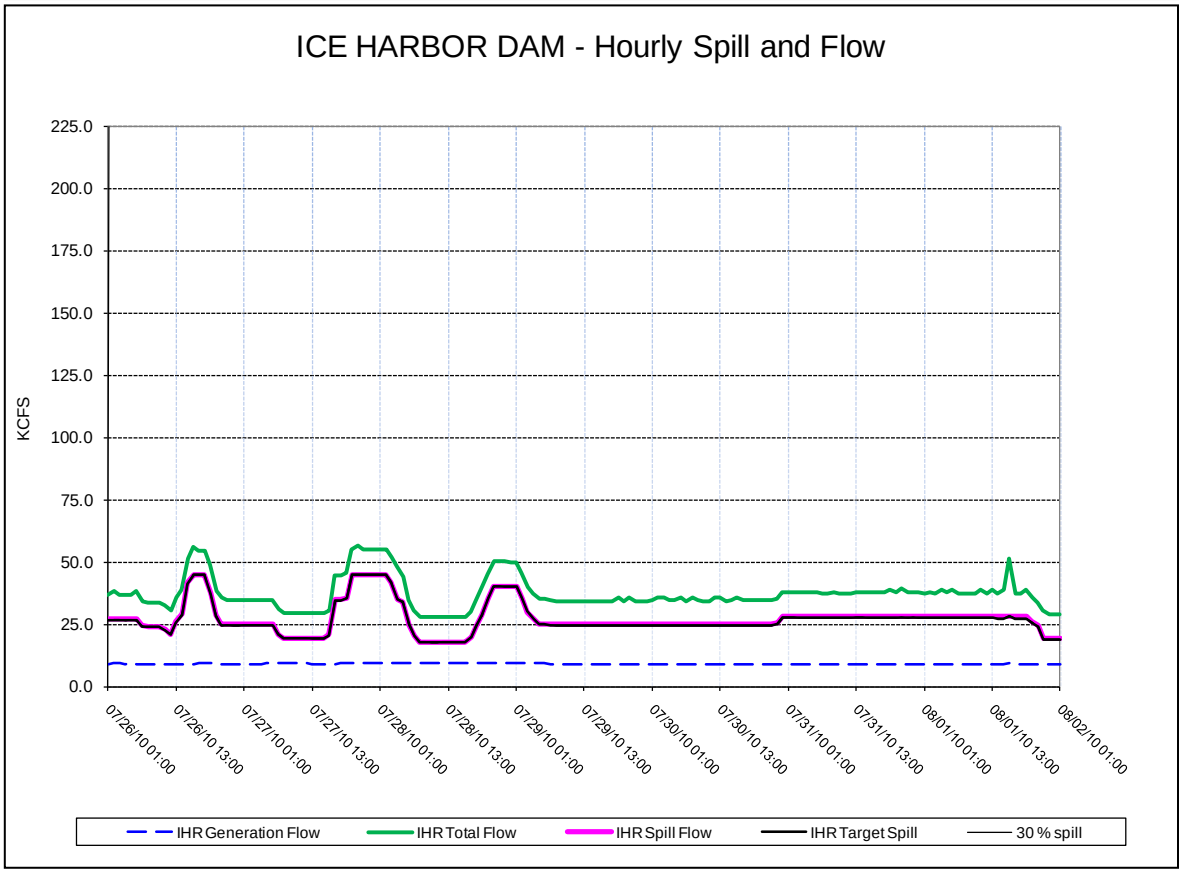
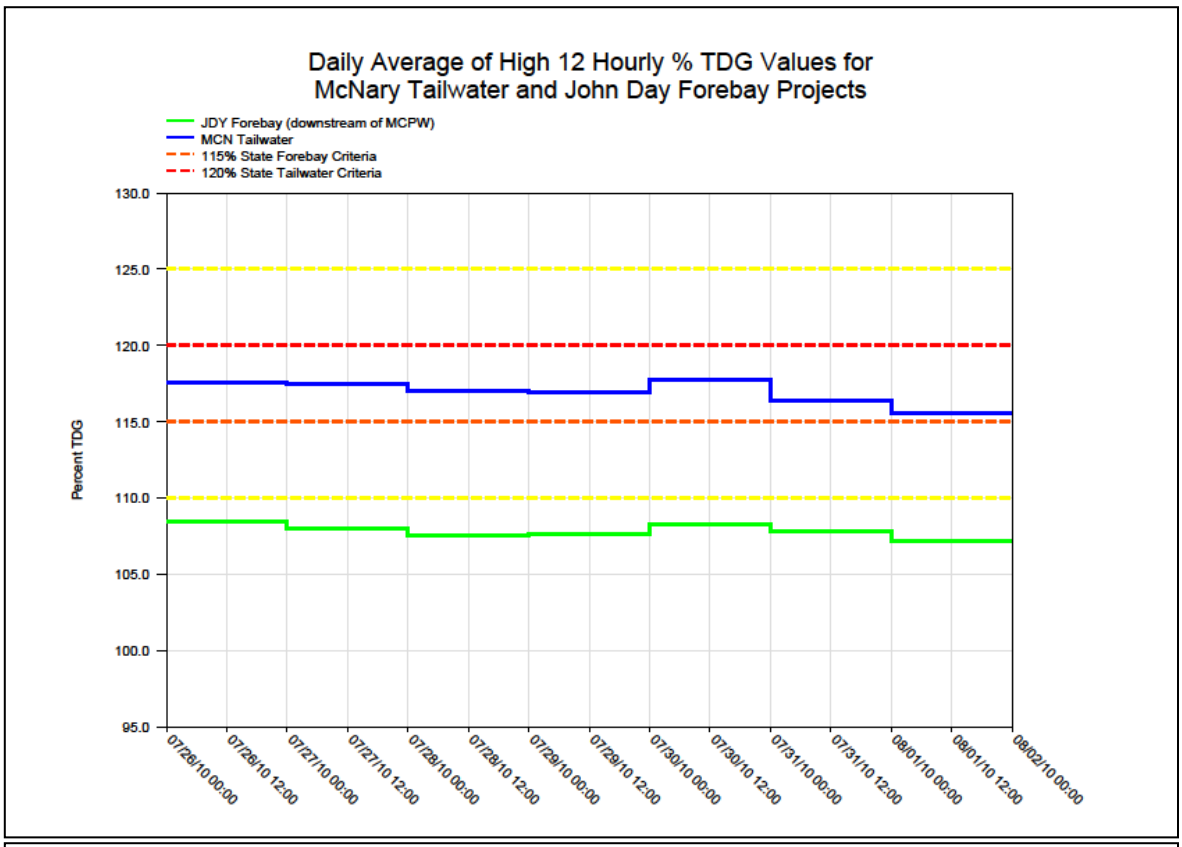

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
30 % spill

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

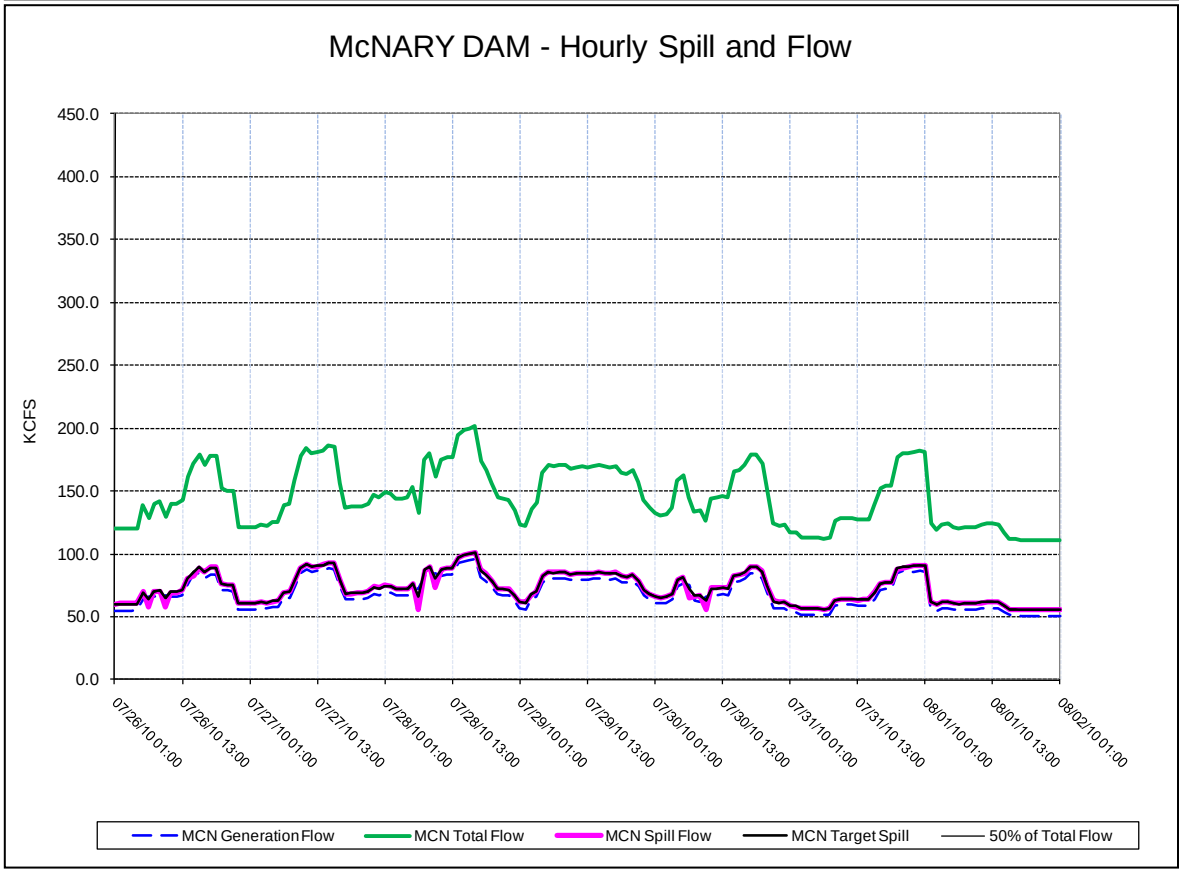
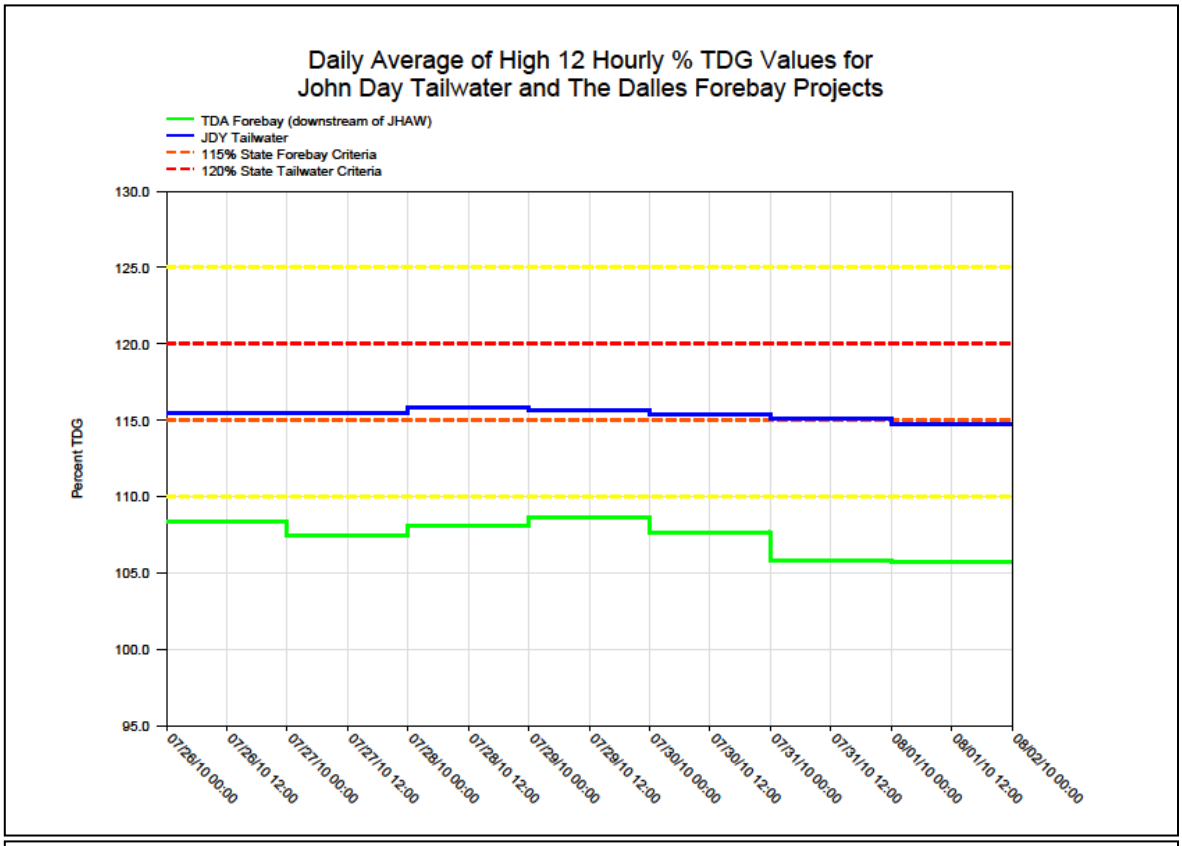

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

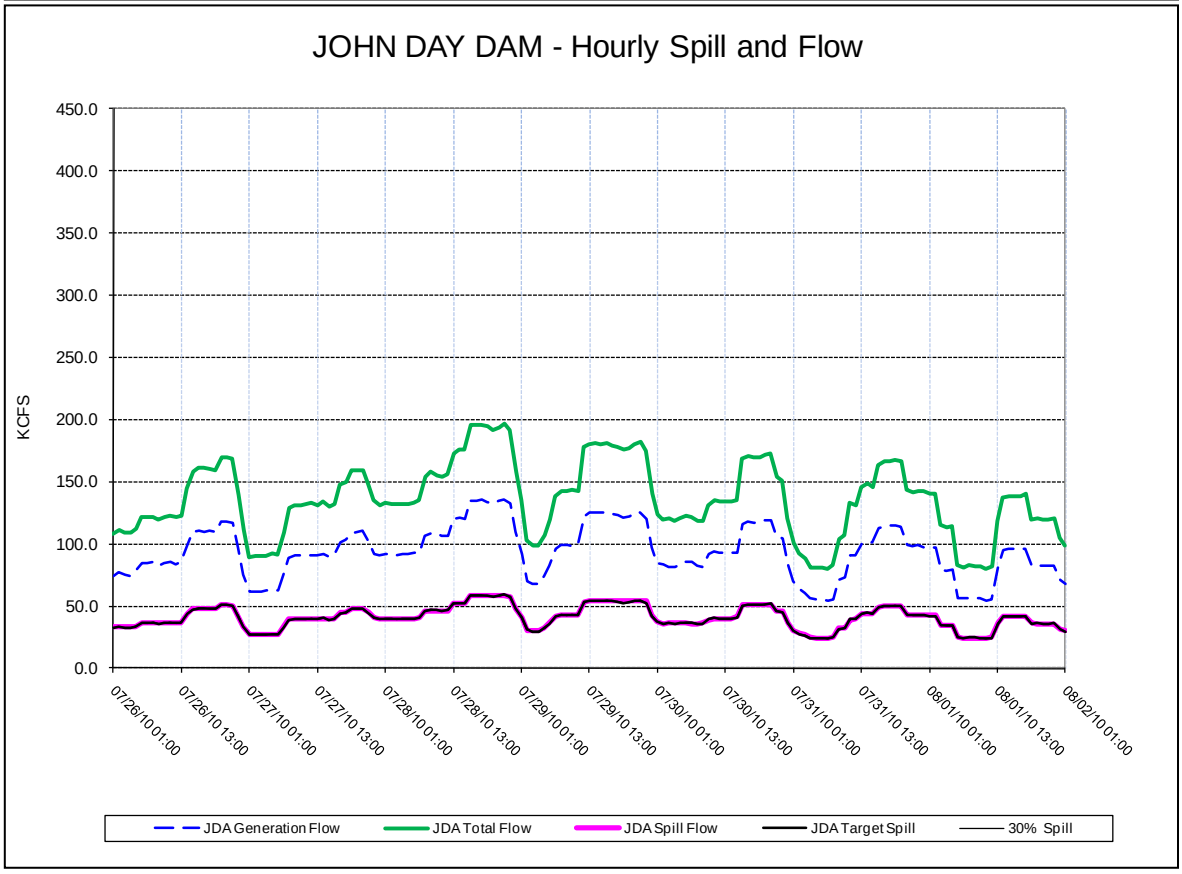
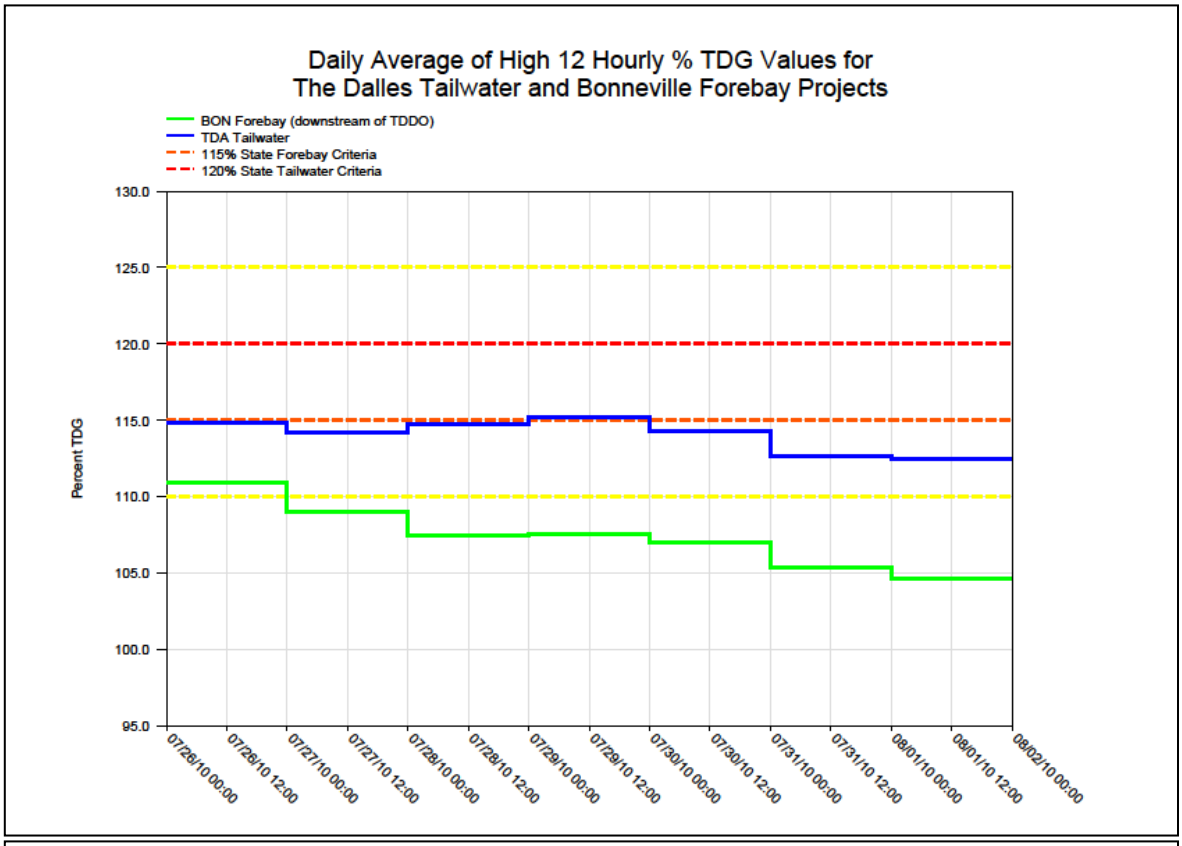

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
07/30/10 12:00
07/31/10 00:00
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00

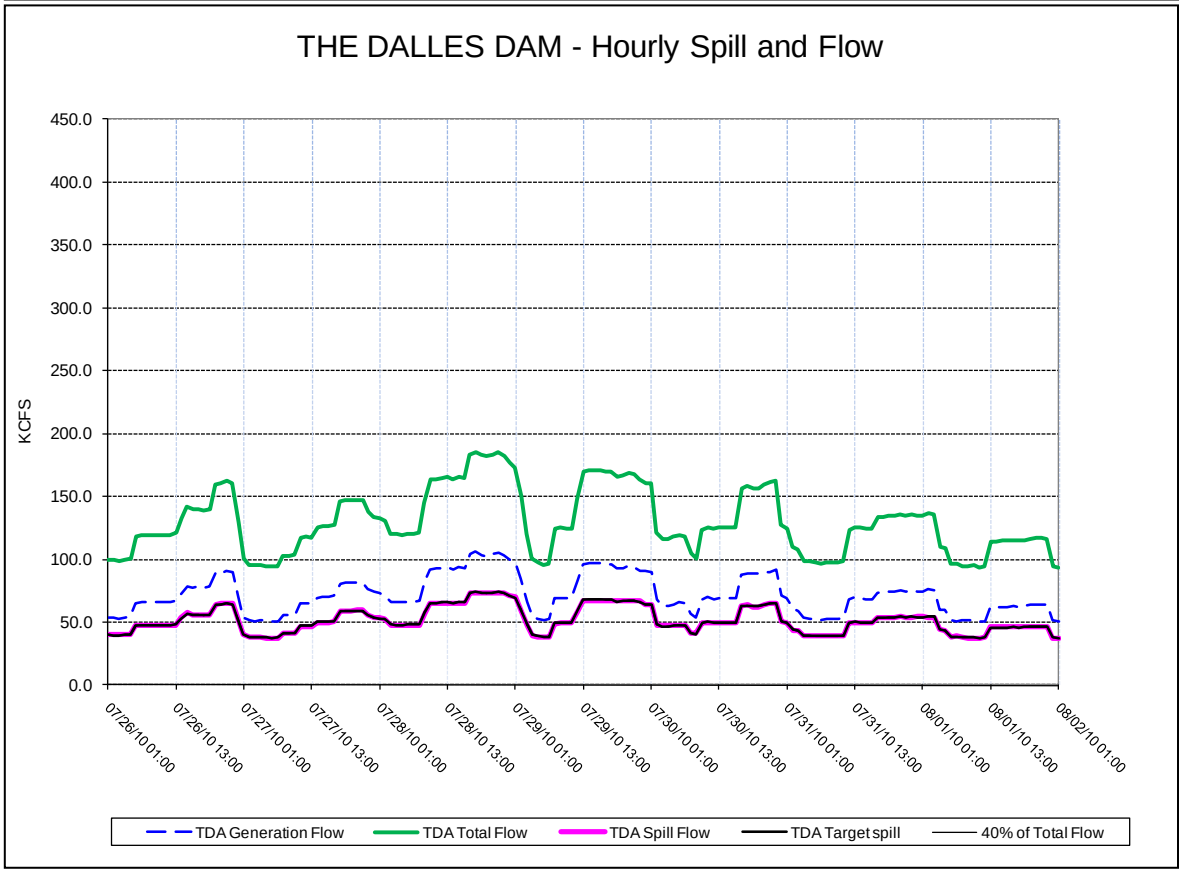
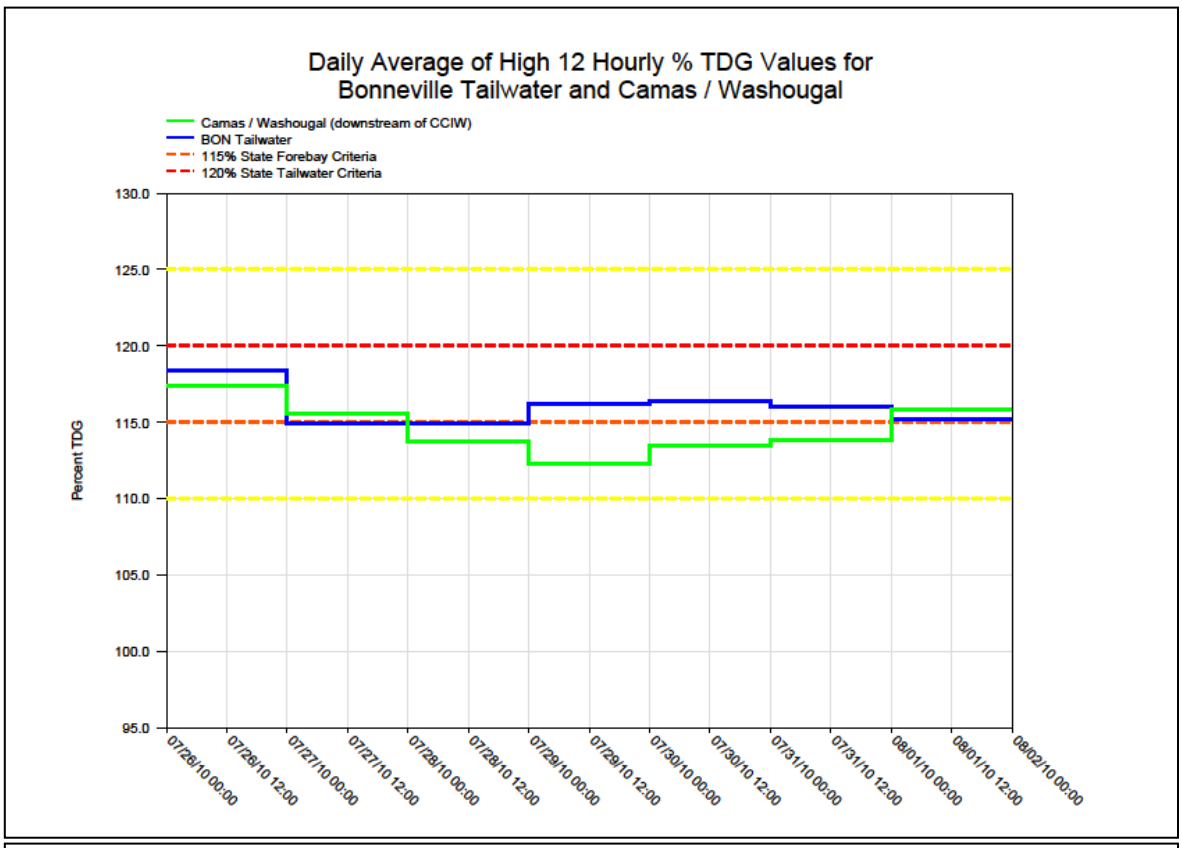

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
07/26/10 01:00
07/26/10 13:00
07/27/10 01:00
07/27/10 13:00
07/28/10 01:00
07/28/10 13:00
07/29/10 01:00
07/29/10 13:00
07/30/10 01:00
07/30/10 13:00
07/31/10 01:00
07/31/10 13:00
08/01/10 01:00
08/01/10 13:00
08/02/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
07/26/10 00:00
07/26/10 12:00
07/27/10 00:00
07/27/10 12:00
07/28/10 00:00
07/28/10 12:00
07/29/10 00:00
07/29/10 12:00
07/30/10 00:00
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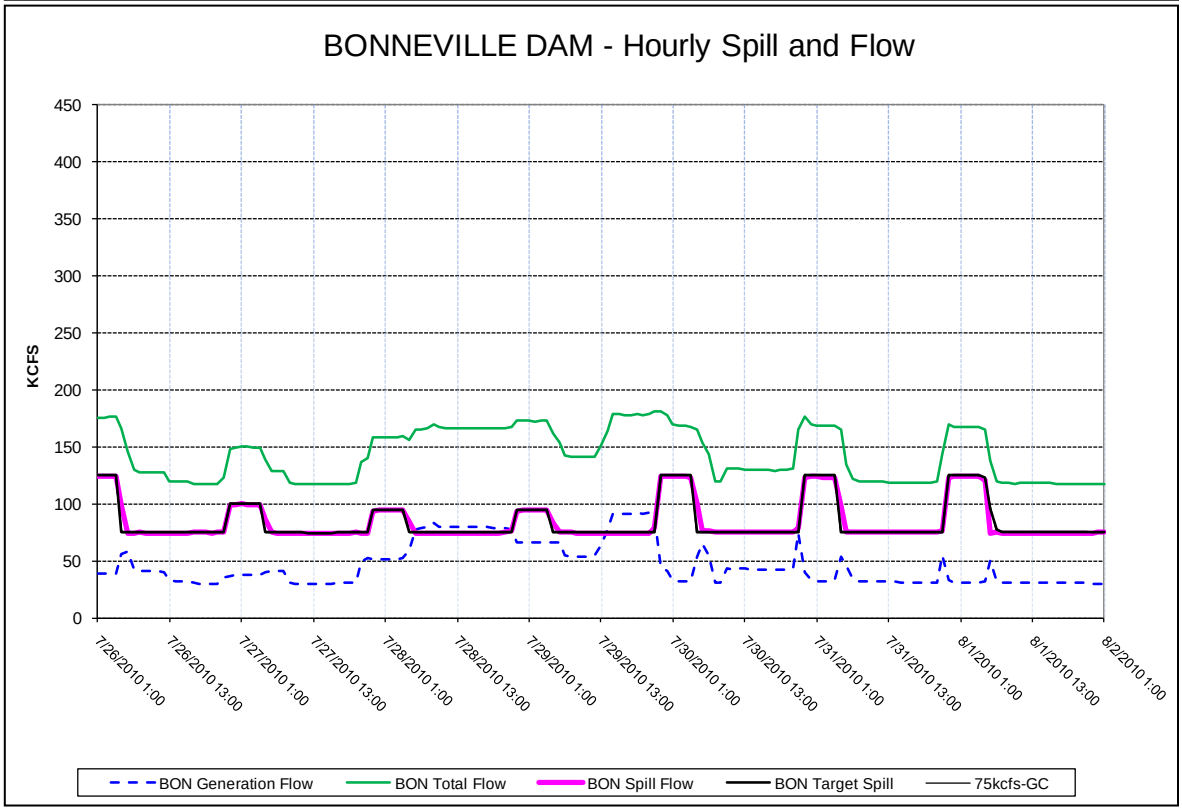
07/31/10 12:00
08/01/10 00:00
08/01/10 12:00
08/02/10 00:00


BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
7/26/2010 1:00
7/26/2010 13:00
7/27/2010 1:00
7/27/2010 13:00
7/28/2010 1:00
7/28/2010 13:00
7/29/2010 1:00
7/29/2010 13:00
7/30/2010 1:00
7/30/2010 13:00
7/31/2010 1:00
7/31/2010 13:00
8/1/2010 1:00
8/1/2010 13:00
8/2/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs-GC

FISH OPERATIONS PLAN IMPLEMENTATION REPORT
August 2010

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

Introduction:

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the U.S. District Court of Oregon June 16, 2010 Order adopting the 2010 Summer Fish Operations Plan (2010 Summer FOP). The 2010 Summer FOP describe the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the summer fish migration season, generally July through August.[1] To the extent Corps project operations are not specified in the 2010 Summer FOP, the FCRPS operations will be consistent with the 2010 NOAA Fisheries Supplemental Biological Opinion (2010 Supp BiOp), the 2008 NOAA Fisheries Biological Opinion (2008 BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2010 Water Management Plan (WMP), WMP seasonal updates, and the 2010 Fish Passage Plan (FPP).

The Corps' August 2010 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- hourly flow through the powerhouse at each dam;
- hourly flow over the spillway compared to the spill target for that hour; and,
- resultant 12-hour average Total Dissolved Gas (%TDG) levels in the tailrace at each project and in the subsequent downstream project's forebay and the Camas-Washougal gauge below Bonneville Dam.

This report also provides information on issues presented and unanticipated or emergency situations that arose during implementation of the 2010 Summer FOP in August.

Data Reporting:

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

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

[1] Operations are implemented from Monday through Sunday.

The weekly graphs begin on August 2 and end on September 5 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville dams.

Each figure represents one week of operation for a project. The graphs start at 0000 hours (TDG graph) and 0100 hours (flow/spill graph) on August 5 for the lower Snake River and lower Columbia River projects.

August 2 – August 8	Figures 1 – 8
August 9 – August 15	Figures 9 – 16
August 16 – August22	Figures 17 – 24
August 23 – August 29	Figures 25 – 32
August 30 – September 5	Figures 33 – 40

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

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

B. Lower Graph: Shows the hourly flow and spill at the dam.

- The dotted blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The medium green line represents the average hourly total river flow through the project in kcfs.
- The heavy red line represents the hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2010 Summer FOP.
- Each graph includes a heavy black line that represents the target spill. This is the hourly maximum spill level that is subject to the following conditions:

    - Spill percentage or discharge specified in the FOP;
    - Spill caps as set daily for TDG management;
    - Test spill levels for fish passage research;
    - Minimum generation for power system needs; and,
    - Minimum spill at Bonneville (50 kcfs) dam.
    - Minimum spill at John Day is 25 percent of project outflow.

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

II. A monthly %TDG Table is included at the end of the figures that shows the overall daily results of the average %TDG for the 12 highest hours for all projects. The numbers in red show

exceedances of the TDG gas cap - 115 percent (forebay) or 120 percent (tailwater) for each project.

General Implementation Remarks:

For all projects that spill for fish passage, the target spill may be limited to a lesser quantity due to various conditions, as described below. When spill levels briefly deviate below or above the level specified in the 2010 Summer FOP, the heavy red line will be below or above the heavy black line in the graphs. Actual operation deviations from the target operation during voluntary spill hours are described below. The August 2010 Spill Variance Table includes average hourly data; therefore, while spill may vary from target spill for only a portion of an hour, the August 2010 Spill Variance Table characterizes the reduction as a full hour. There are instances when the hourly spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2010 Summer FOP level of spill while also avoiding exceeding the %TDG spill cap.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and spill the remainder of project inflow. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam the volume of water released during navigational lockages appears to result in an overall project spill percentage reduction because the calculations do not account for this volume of water. 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.”

Also it is important to note that actual spill levels at Corp’s projects may range from 1 to 2 kcfs (Bonneville Dam may range from 1 to 3 kcfs) lower or higher than specified in the 2010 Summer FOP and the RCC spill priority list, which defines the projects’ %TDG spill caps. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

Additionally, the 2010 Summer FOP describes project operations during “Rapid Load Changes” (p. 6). For reporting purposes, the notation “Transmission Stability” in the August 2010 Spill Variance Report Table will replace “Rapid Load Changes” to identify instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. These “Transmission Stability” issues occur because projects must be

available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be able to respond to within hour changes that result from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and following the peak load hours, however, within-hour changes in intermittent generation can occur at any hour of the day. Sometimes several hours after peak load hours the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, these "Transmission Stability" hours may have a greater instance of reporting actual spill percentages that vary by more than the ±1percent requirement or other ranges specified in the 2010 Summer FOP than other hours.

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

August Operations:

The month of August was characterized by lower than average flows for the lower Snake and the lower Columbia rivers. The NOAA River Forecast Center's Runoff Processor indicated 92 percent of normal at Lower Granite Dam, and 86 percent of normal at The Dalles Dam for August 2010.

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

- Lower Granite Dam - The hourly target spill discharge was a fixed quantity 18 kcfs 24-hours/day.
- Little Goose Dam - The hourly target spill discharge was 30 percent of total river discharge for 24-hours/day.
- Lower Monumental Dam - The hourly target spill discharge was a fixed 17 kcfs 24-hours/day.
- Ice Harbor Dam - the hourly target spill was 45 kcfs day and the TDG spill cap at night.
- McNary Dam - The hourly target spill discharge was 50 percent of total river discharge for 24-hours/day.
- John Day Dam - The hourly target spill was 30 percent of total river discharge for 24-hours.
- The Dalles Dam - The target spill discharge was 40 percent of total river discharge for 24-hours/day.
- Bonneville Dam - The hourly target spill discharge was 75 kcfs during the day and the TDG spill cap night.

Streamflows during August were low enough that the low flow provisions of the 2010 Summer FOP were implemented at six projects during the month of August. Table 1 shows the number of days Lower Granite, Lower Monumental, Ice Harbor, McNary, The Dalles, and Bonneville were in a low flow condition during the reporting period.

Table 1: Number of Days Projects Generated at Minimum Levels and Spilled Remaining Flow

Project	**Number of Days**[2]
Lower Granite	19
Lower Monumental	22
Ice Harbor	27
McNary	4
The Dalles	2
Bonneville	13

***Operational Adjustments**:*

1. Little Goose Dam

- Spillway Weir Removal from Service:

  On August 5 at 0822 hours, the Corps removed the spillway weir (SW) from service for the remainder of spill season. The 2010 FPP change form dated March 30, 2010 specified: "When daily average discharge drops below 32 kcfs in the summer while the SW-HI is installed and forecasts predict flows to remain below 32 kcfs for at least three days, the SW will be closed for the remainder of the spill season." Based on these criteria, the SW was to be removed on August 9. However adult steelhead passage appeared to be delayed with the SW in operation and the Corps coordinated its removal with FPOM on August 3 and with TMT on August 4. FPOM and TMT members either supported the action or did not object. The Corps maintained the 30% spill requirement specified in the 2010 Summer FOP throughout the SW removal.

- Modified Minimum Operation Pool Range:

  On August 5, the Corps modified the MOP operating range due to navigation safety concerns. The 2010 Summer FOP provides: "…adjustments to pool elevation in the Little Goose pool of up to 1.0 feet above the MOP operating range may be necessary to accommodate safe entrance to the navigation lock …" The normal MOP range for Little Goose is 633.0 to 634.0 feet, but during low flow conditions (approximately 32 kcfs or lower as a daily average), gauge readings indicated there was insufficient depth over the navigation sill for safe transit at the entrance to the Lower Granite navigation lock. In order to ensure safe navigation under these flow conditions, the Corps revised the operating range at Little Goose Dam to 633.5 to 634.5 feet for the remainder of the spill season (August 31). This operation was coordinated with TMT and no concerns were raised by TMT members.

[2] In Table 1, a day is counted as six hours or more where minimum generation occurred while spilling all remaining flow.

- Modified Spill Operation:

  On August 20, consistent with the 2010 Summer FOP "Low Flow Operations" provisions, the Corps modified the Little Goose Dam spill operation from 30 percent spill 24 hours/day to a constant 24 hour rate of spill (11.2 kcfs on August 20, 9.6 kcfs on August 23, and 7.5 kcfs on August 28). Spill at the 7.5 kcfs level continued through the remainder of spill season (August 31). The Corps coordinated this operation with FPOM and TMT and the operation was either supported or no objection was raised.

2. Lower Granite and Lower Monumental Dams Spill Pattern Change for Safe Navigation

   Due to navigation safety concerns, on August 12, the Corps modified the spill patterns at Lower Granite and Lower Monumental dams. This continued through the end of spill season (August 31). Consistent with the 2010 Summer FOP, the Corps presented the navigation safety concerns to TMT on August 11 and informed TMT that spill patterns may temporarily be adjusted in order to provide safe conditions for navigation. TMT members recommended that the Corps coordinate this operation with FPOM at the August 12 meeting. FPOM recommended temporarily closing the SW at Lower Monumental and redistributing the spill pattern across the remaining open spillbays. Following FPOM's recommendation, the Corps implemented this operation. The Corps further coordinated this operation with TMT on August 13 and TMT members either supported or did not object to this operation.

3. Lower Monumental Dam

- Change in Turbine Unit Priority:

  On August 13, the Corps modified the turbine unit priority as specified in the 2010 FPP in an effort to better achieve the target spill level specified in the 2010 Summer FOP. On August 11, the Corps informed TMT that turbine Unit 2 was out of service, and consistent with the unit priority list specified in the 2010 FPP, the Corps was operating Unit 5. At minimum generation, Unit 5 discharges approximately 14.4 kcfs, whereas Unit 3 discharges approximately 11.5 kcfs. TMT recommended that FPOM discuss altering the unit priority list since operating Unit 3 would result in an additional 3 kcfs of spill. FPOM recommended this change and after coordination with TMT, on August 13, the Corps adopted the changed unit priority. FPOM and TMT members either supported or did not object to this temporary turbine unit priority change.

4. McNary Dam

- Start of Juvenile Truck Transportation:

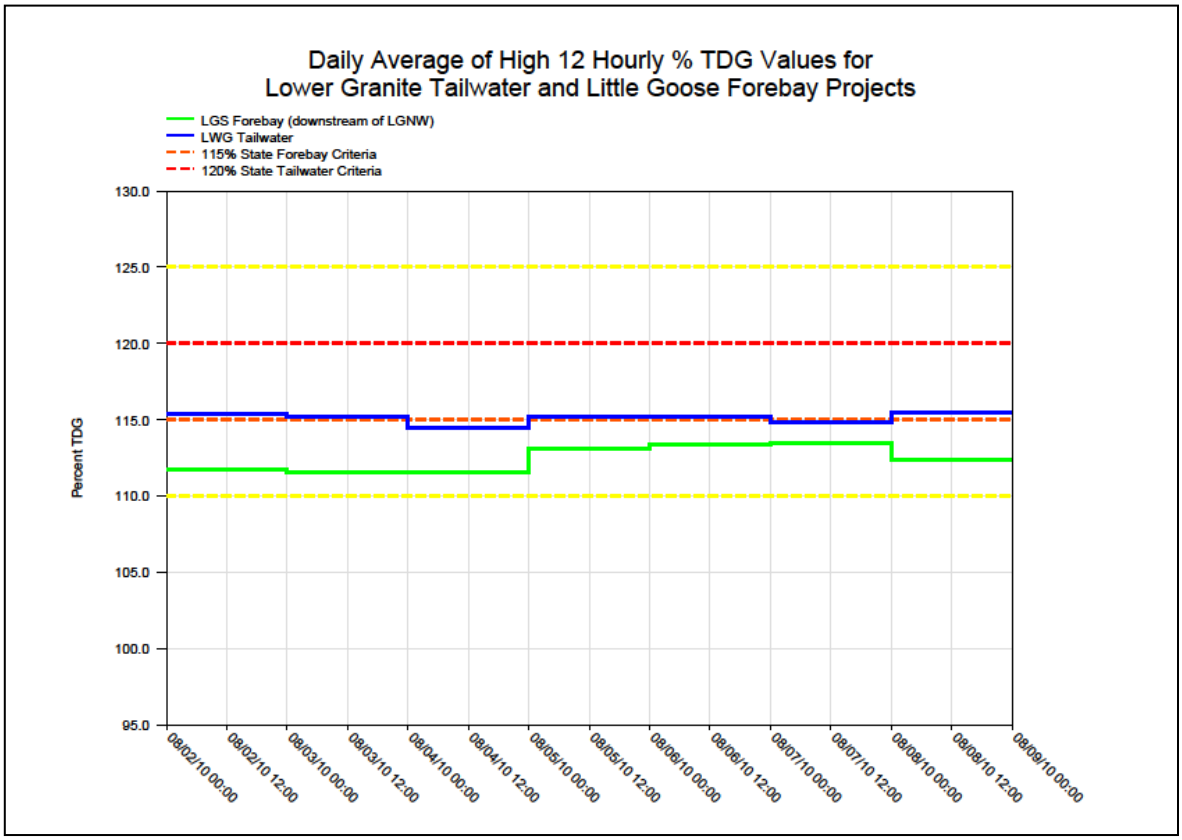
  On August 6, the Corps initiated every other day juvenile truck transportation (even days during the month of August) at McNary Dam. Every other day truck transportation was originally scheduled to commence at McNary Dam on August 18 (even days during the month); however, TMT recommended the operation begin earlier than originally scheduled. Truck transportation was implemented in conjunction with the every other day barge transportation (odd days during the month of August), which commenced at McNary Dam on July 16. The goal of adding the additional juvenile truck transportation days was to ensure juveniles would not be held in the raceways for more than 24 hours when water temperatures were above 68 degrees Fahrenheit. This operation resulted in transporting juvenile fish every day, either via barge or truck, from August 6 through August 18. On August 18, the Corps reverted to every other day truck only transportation operation as specified in the 2010 Summer FOP. The Corps coordinated this operation with FPOM and TMT on August 5. FPOM and TMT members either supported or did not object to this operation.

August 2010 Spill Variance Table

Project	Parameter	Date	Time	Hours	Type	Reason
Lower Granite	Additional % Spill	8/16/10	0700 - 1900	13	Maintenance	Hourly spill increased ranging between 20.2 – 25.2 kcfs (above FOP spill of 18 kcfs) due to units taken off line for testing as part of scheduled transformer testing.
Lower Granite	Additional % Spill	8/17/10	0700 - 1800	12	Maintenance	Hourly spill increased ranging between 23.0 - 23.7 kcfs (above FOP spill of 18 kcfs) due to units taken off line for testing as part of scheduled transformer testing.
Lower Granite	Additional % Spill	8/18/10	0700 - 1800	12	Maintenance	Hourly spill increased ranging between 23.6 - 23.7 kcfs (above FOP spill of 18 kcfs) due to units taken off line for testing as part of scheduled transformer testing.
Lower Granite	Additional % Spill	8/19/10	0700 - 1900	13	Maintenance	Hourly spill increased ranging between 21.9 - 25.3 kcfs (above FOP spill of 18 kcfs) due to units taken off line for testing as part of scheduled transformer testing.
Little Goose	Additional % Spill	8/2/10	0700	1	Maintenance	Hourly spill increased to 50.9% (above FOP spill of 30%) due to testing an additional unit after annual maintenance. 24-hr average spill was 30.7%.
Little Goose	Reduced % Spill	8/2/10	0900 & 1700	2	Maintenance	Hourly spill decreased ranging between 27.7 – 28.9% (below FOP spill of 30%) due to testing unit as part of annual maintenance. 24-hr average spill was 30.7%.
Little Goose	Reduced % Spill	8/3/10	0800 & 2400	2	Navigation	Hourly spill decreased to 28.2% for both hours (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 32.3%.
Little Goose	Additional % Spill	8/3/10	1000-1100	2	Maintenance	Hourly spill increased to 32.6% and 82.6% , respectively (above FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 32.3%.
Little Goose	Additional % Spill	8/4/10	0800	1	Maintenance	Hourly spill increased to 31.1% (above FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 30.1%.
Little Goose	Reduced % Spill	8/7/10	1200-1300	2	Navigation	Hourly spill decreased ranging between 27.0 – 28.5% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9%.
Little Goose	Additional % Spill	8/8/10	0800-1000	3	Maintenance	Hourly spill increased ranging between 31.6 - 32.5% (above FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 30.0%.
Little Goose	Reduced % Spill	8/8/10	1100; 1300; 1600; 2100	4	Navigation	Hourly spill decreased ranging between 28.1 - 28.7% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.0%.
Little Goose	Reduced % Spill	8/9/10	0900	1	Navigation	Hourly spill decreased to 28.4% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	8/10/10	0500; 0700;1000; 1300; 2100	5	Navigation	Hourly spill decreased ranging between 28.0 - 28.8% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.9%.
Little Goose	Reduced % Spill	8/11/10	0100; 0500; 1000;1100; 2300	5	Navigation	Hourly spill decreased ranging between 28.0 - 28.7% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.7%.
Little Goose	Reduced % Spill	8/12/10	0100	1	Navigation	Hourly spill decreased to 28.6% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.4%.
Little Goose	Additional %Spill	8/12/10	1000-1300; & 2100-2400	6	Maintenance	Hourly spill increased to 33.0 % (above FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 30.4%.
Little Goose	Reduced % Spill	8/12/10	1500-2000	6	Maintenance	Hourly spill decreased to 26.9 % (below FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 30.4%.
Little Goose	Additional %Spill	8/13/10	0100 -1300; & 1500-1700	16	Maintenance	Hourly spill increased ranging between 31.2 - 67.2% (above FOP spill of 30%) due to scheduled transformer testing. 24-hr average spill was 32.7%.
Little Goose	Reduced % Spill	8/13/10	2300	1	Navigation	Hourly spill decreased to 27.4% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 32.7%.
Little Goose	Reduced % Spill	8/14/10	0800; 1100 & 1300	3	Navigation	Hourly spill decreased ranging between 27.4 -28.4% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.4%.
Little Goose	Reduced % Spill	8/15/10	0400; 0900; 1200;1300; 2100	5	Navigation	Hourly spill decreased ranging between 27.5-28.7% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.2%.
Little Goose	Reduced % Spill	8/16/10	1300; 1600; 1800;	3	Navigation	Hourly spill decreased ranging between 27.4-28.6% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.5%.
Little Goose	Reduced % Spill	8/16/10	1500	1	Human/Program Error	Hourly spill decreased to 28.4% (below FOP spill of 30%). Log book indicates request to change spill and generation and spill was reduced before generation/flow. 24 hr avg. spill was 29.5%.
Little Goose	Reduced % Spill	8/17/10	0300; 0900; 1100; 2400	4	Navigation	Hourly spill decreased ranging between 28.5-28.8% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.0%.
Little Goose	Reduced % Spill	8/18/10	0700	1	Navigation	Hourly spill decreased to 28.9% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 30.1%.
Little Goose	Reduced % Spill	8/19/10	0700 & 1900	2	Navigation	Hourly spill decreased ranging between 28.0-28.9% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 29.7%.

Little Goose	Reduced % Spill	8/20/10	0100	1	Navigation	Hourly spill decreased to 28.1% (below FOP spill of 30%) due to volume of water needed to empty the navigation lock. See p. 3. 24-hr average spill was 32.0%.
Lower Monumental	Reduced Spill	8/2/10	1700-1800--	2	Navigation	Hourly spill decreased to 10.7and 12.5 kcfs, respectively (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	8/6/10	1800-1900--	2	Navigation	Hourly spill decreased to i 10.8and 14.9 kcfs, respectively (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Lower Monumental	Reduced Spill	8/12/10	1800-1900--	2	Navigation	Hourly spill decreased to 9.2and12.0 kcfs, respectively (below FOP spill of 17 kcfs). Reduced spill for safe passage of fish barge.
Ice Harbor	Reduced Spill	8/6/10	1300-1400	2	Maintenance	Testing unit 5 as part of annual maintenance.
Ice Harbor	Reduced Spill	8/11/10	1400	1	Maintenance	Switching units on and off as part of a fish screen inspection.
Ice Harbor	Reduced Spill	8/18/10	1300-1400	2	Maintenance	Switching units on and off as part of an annual maintenance repair.
McNary	Reduced % Spill	8/3/10	0700 & 1000	2	Navigation	Hourly spill decreased to 44.3 and44.9%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.7%.
McNary	Reduced % Spill	8/7/10	0900-1000	2	Navigation	Hourly spill decreased to 48.7 and 46.7-%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.7.
McNary	Reduced % Spill	8/9/10	0700; 0900-1000	3	Navigation	Hourly spill decreased to 38.7, 47.3, and 46.6%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.5%.
McNary	Reduced % Spill	8/11/10	0700 &1000	2	Navigation	Hourly spill decreased to 42.0 and46.7%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.7%.
McNary	Reduced % Spill	8/13/10	0700 &1000	2	Navigation	Hourly spill decreased to 40.3 and 44.1%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.4%.
McNary	Reduced % Spill	8/15/10	0700 &1000	2	Navigation	Hourly spill decreased to 45.2 and 46.6%, respectively (below FOP spill of 50%). Reduced spill for safe passage of fish barge. 24 hr avg. spill was 49.6%.
McNary	Additional % Spill	8/18/10	1100	1	Human/Program Error	Hourly spill increased to 51.7% (above FOP spill of 50%). Performing monthly check on the GDAC data system. 24hr avg. spill was 50.2%
John Day	Additional % Spill	8/8/10	0100	1	Human/Program Error	Hourly spill increased to 31.7% (above FOP spill of 30%). Log book indicates request to change to 30 kcfs at 2400, with change occurring later in the hour. 24hr avg. spill was 30.1%.
John Day	Reduced % Spill	8/17/10	0700	1	Human/Program Error	Hourly spill decreased to 28.0% (below FOP spill of 30%). Spill inadvertently remained unchanged when generation was increased. 24hr avg. spill was 29.9%
The Dalles	Reduced % Spill	8/12/10	0600	1	Transmission Stability	Hourly spill decreased to 38.2% (below FOP spill of 40%). Project on response during rapidly changing load. See p. 3-4. 24 hr avg. spill was 39.8%.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
08/06/10 12:00
08/07/10 00:00
08/07/10 12:00
08/08/10 00:00
08/08/10 12:00
08/09/10 00:00

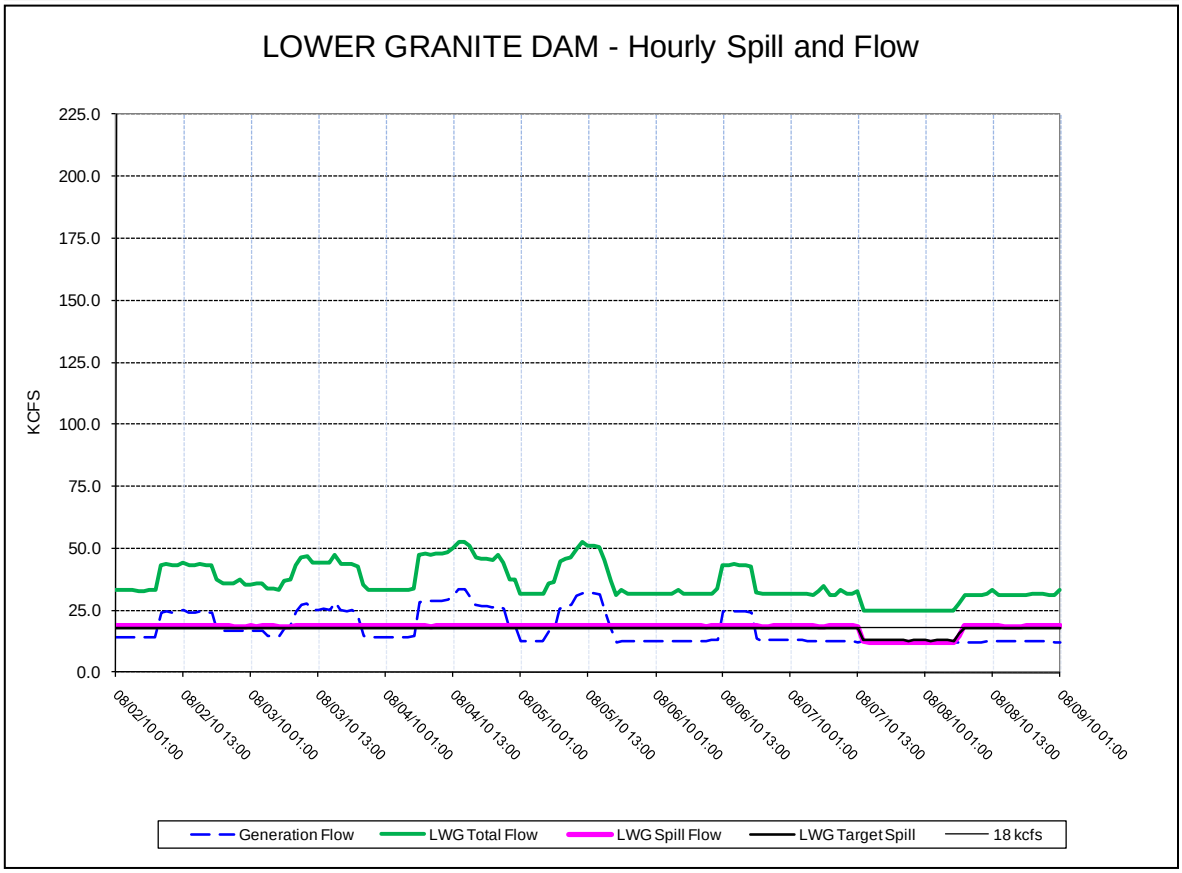
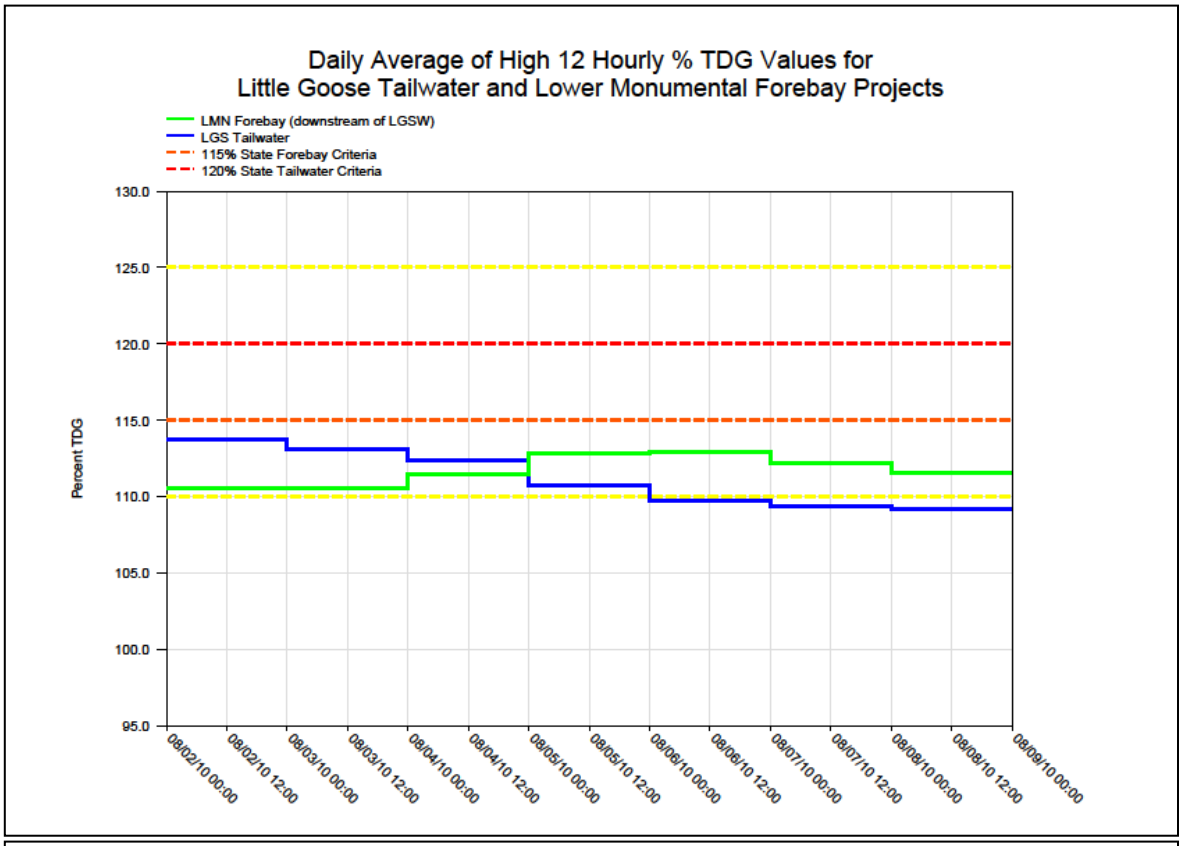

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
08/06/10 12:00
08/07/10 00:00
08/07/10 12:00
08/08/10 00:00
08/08/10 12:00
08/09/10 00:00

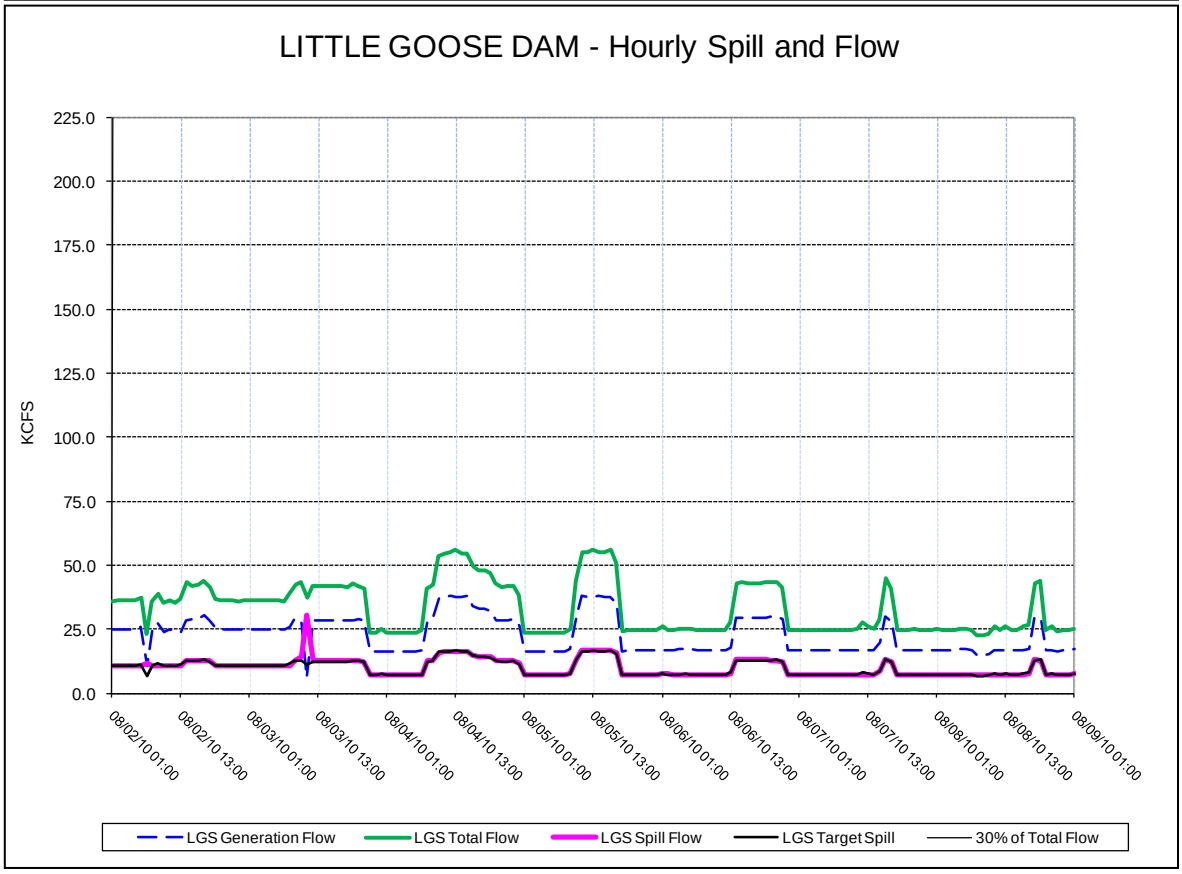
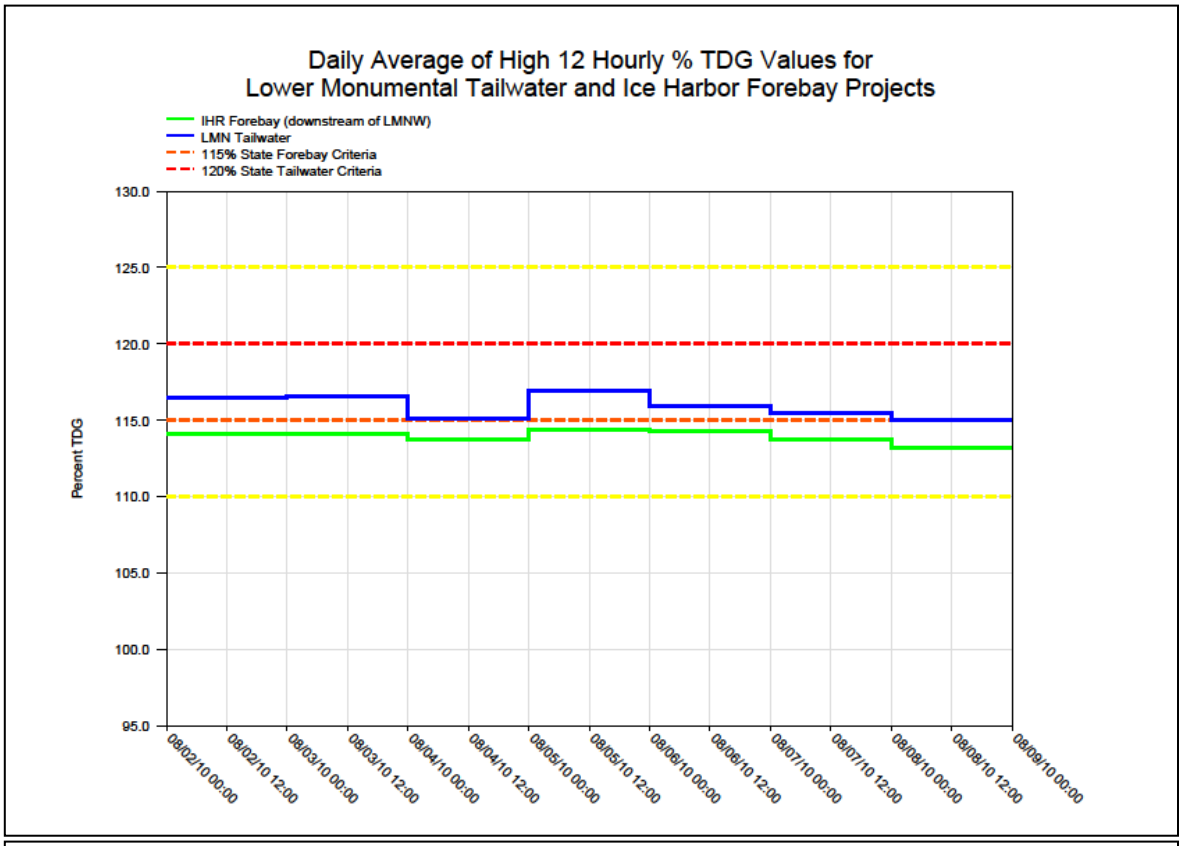

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
08/06/10 12:00
08/07/10 00:00
08/07/10 12:00
08/08/10 00:00
08/08/10 12:00
08/09/10 00:00

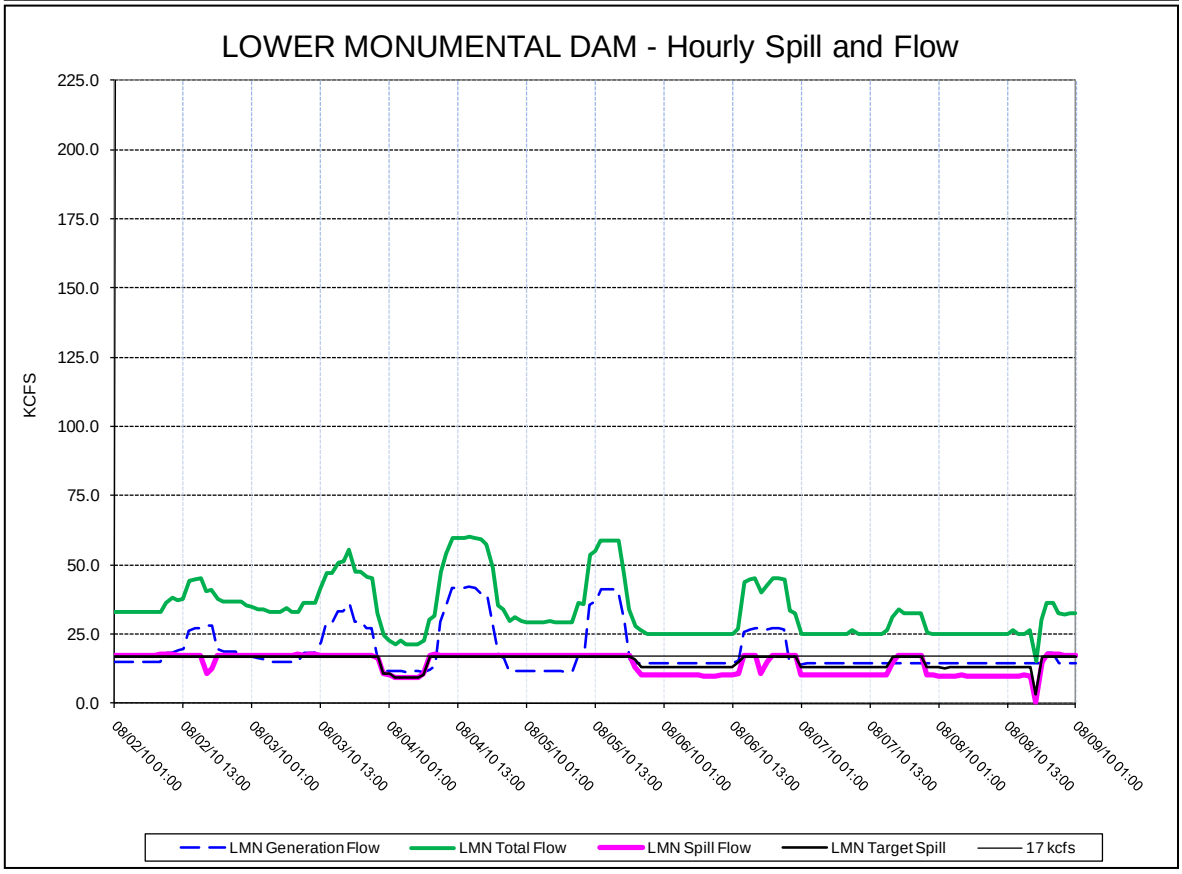
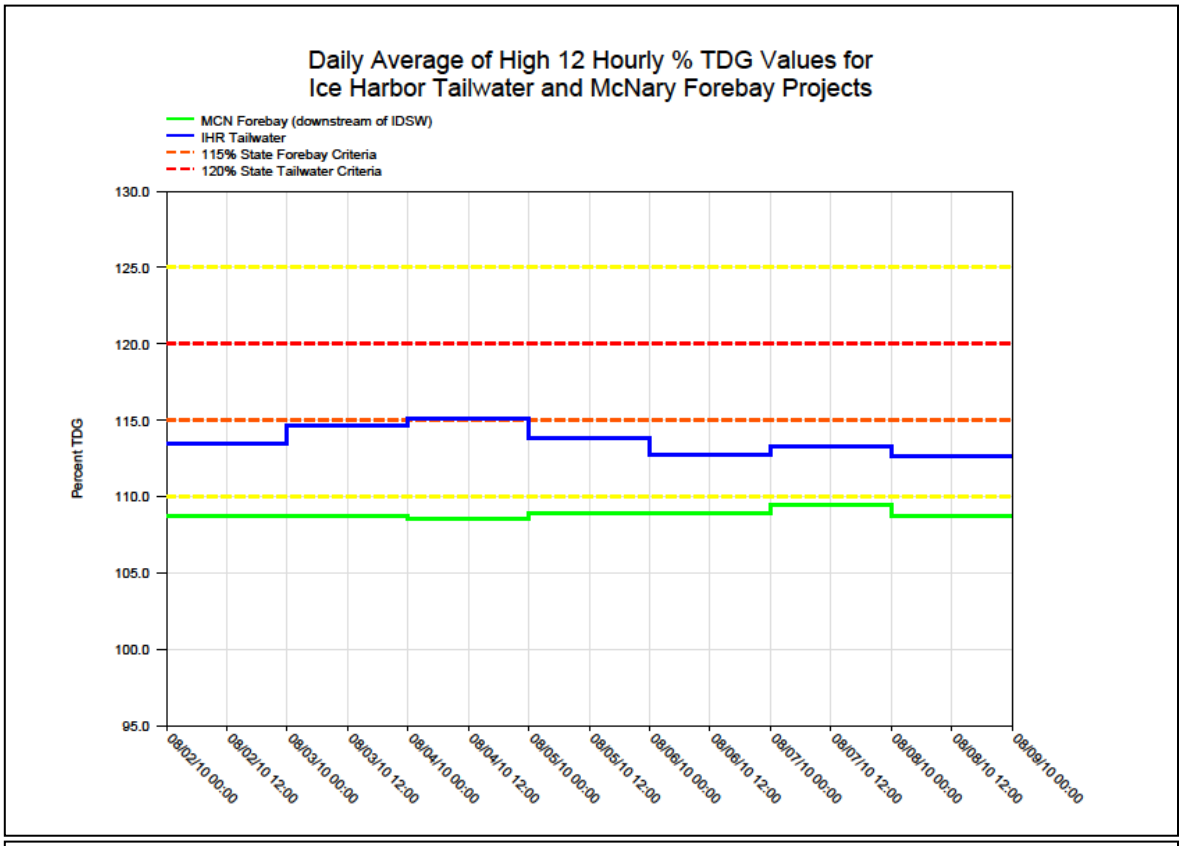

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
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08/08/10 12:00
08/09/10 00:00

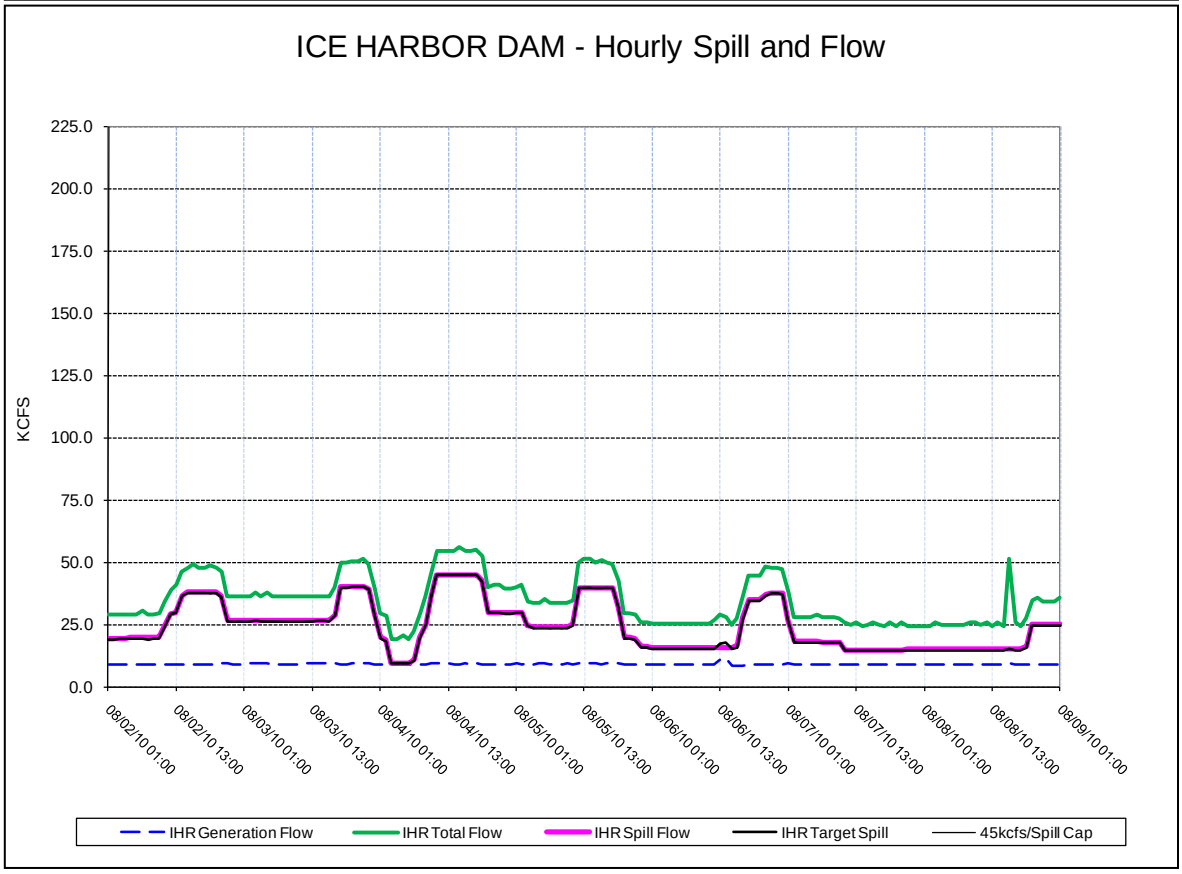
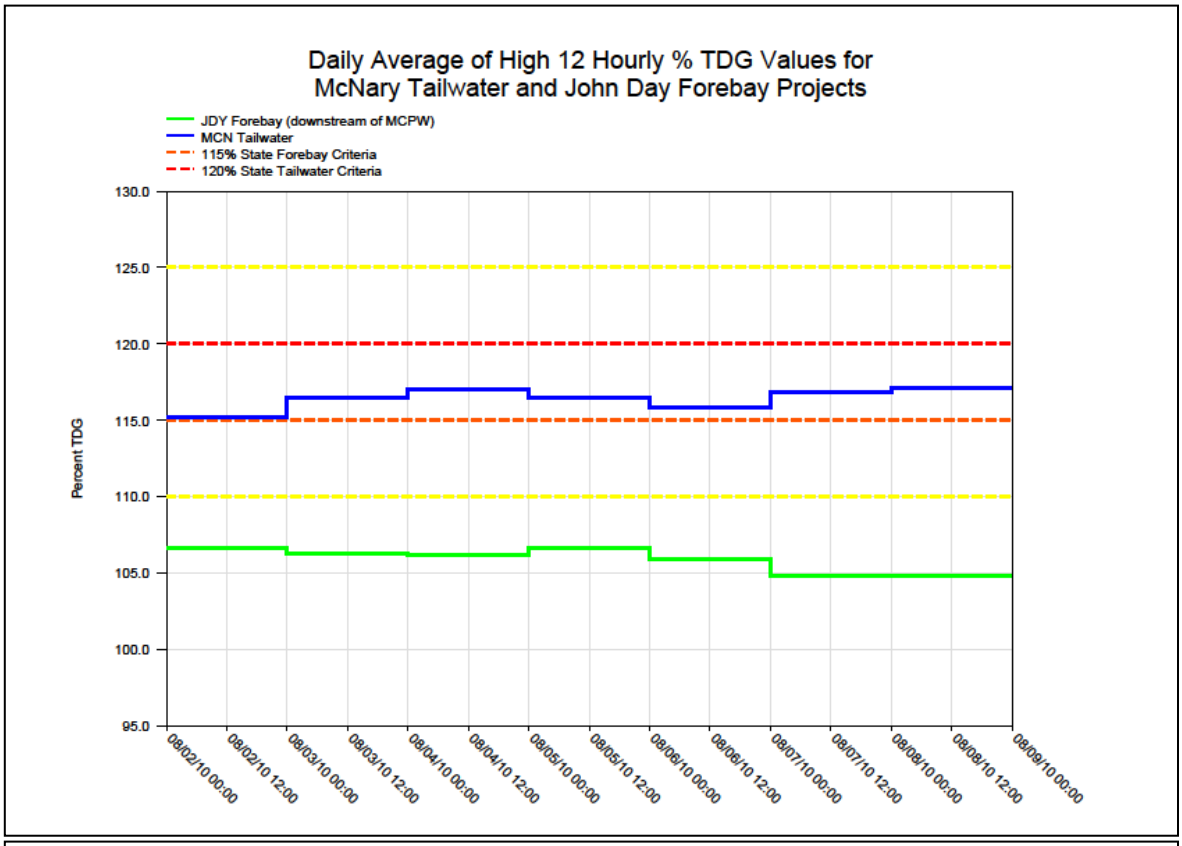

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
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08/08/10 12:00
08/09/10 00:00

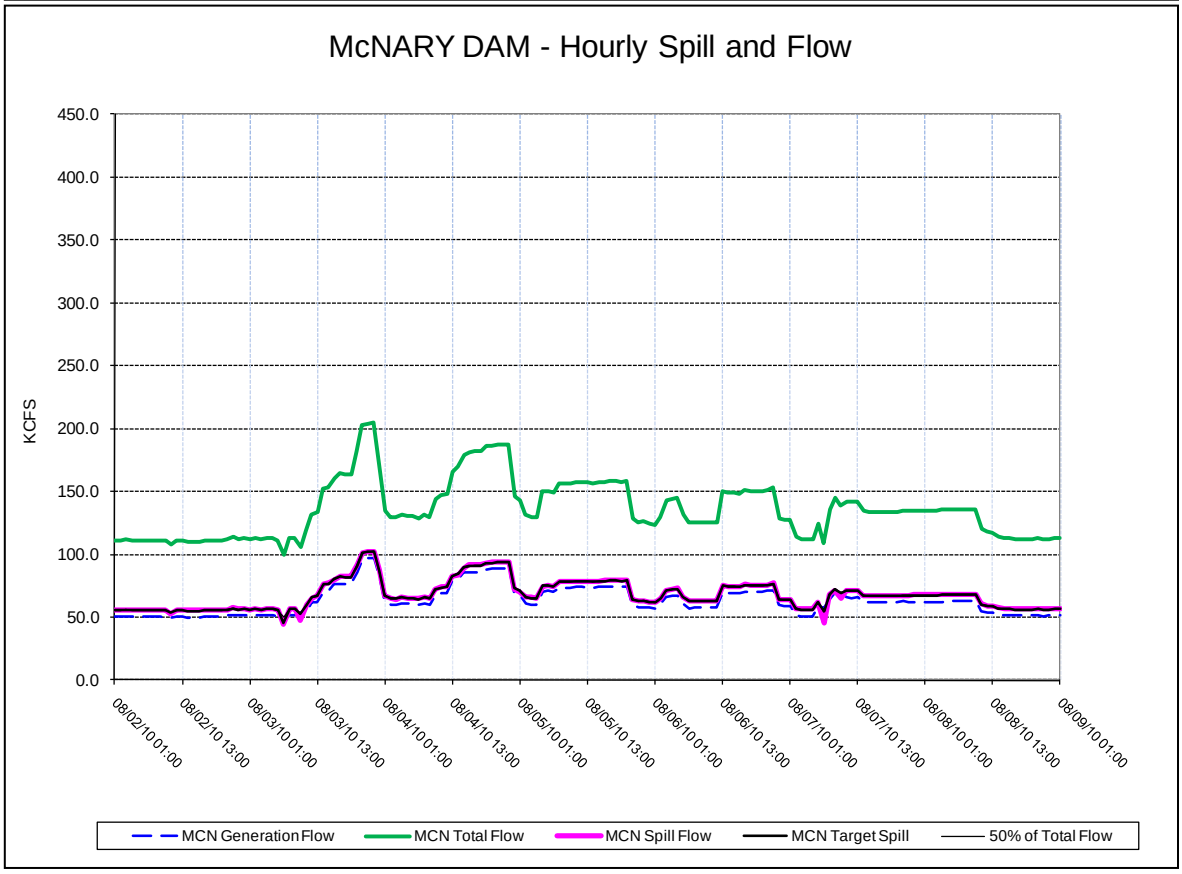
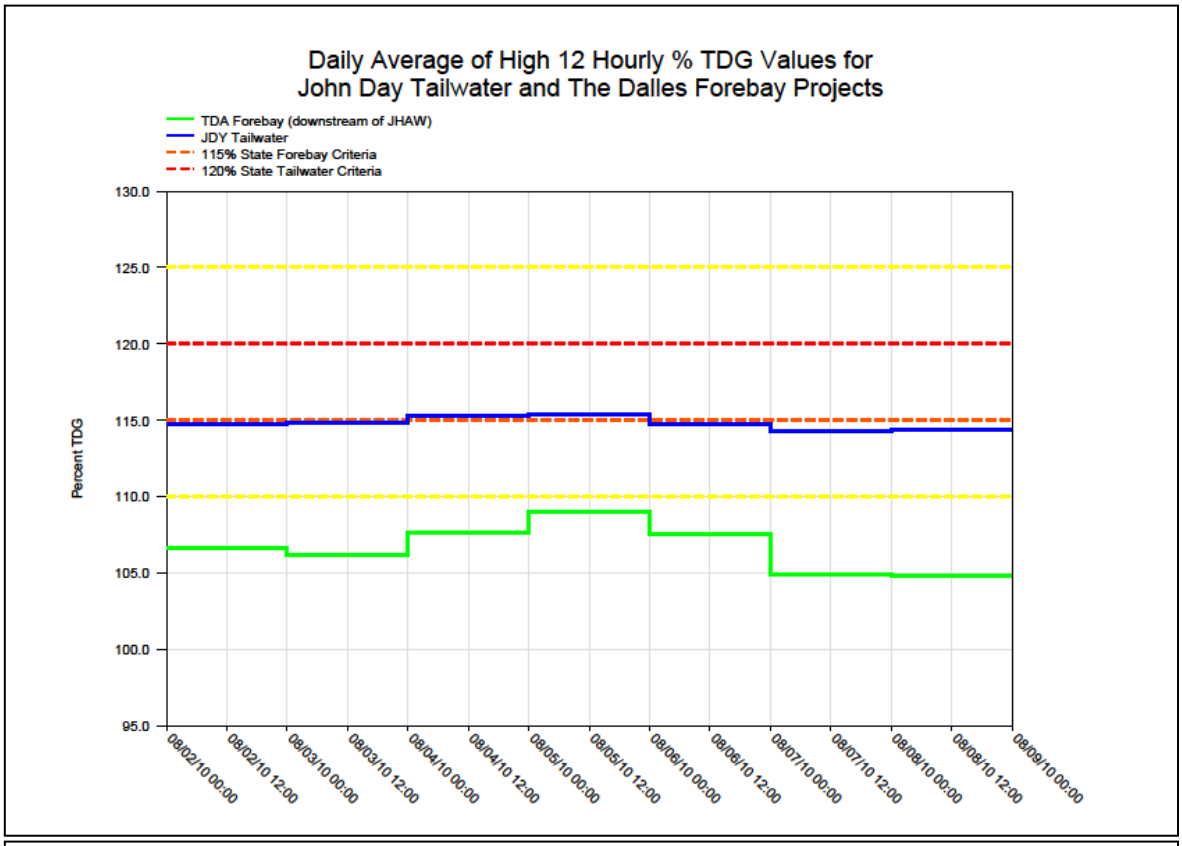

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
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08/08/10 12:00
08/09/10 00:00

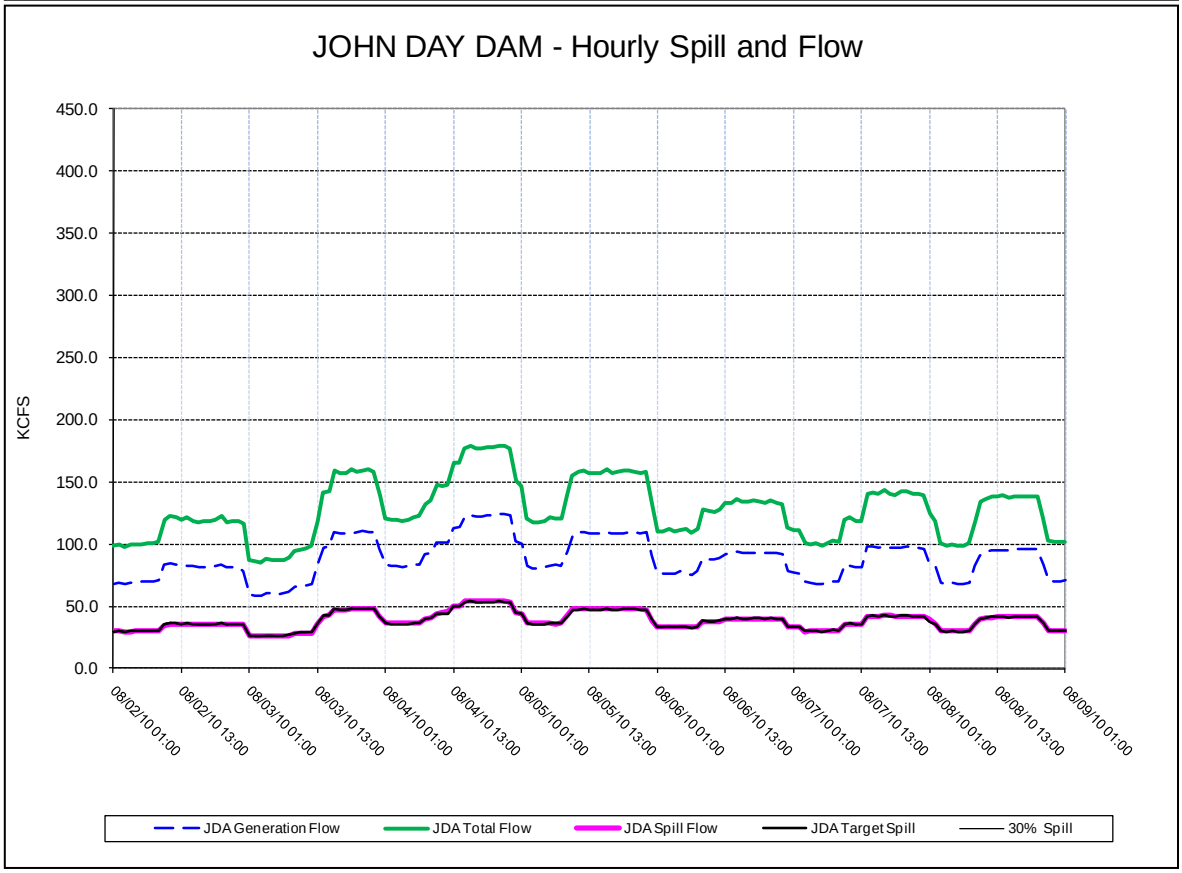
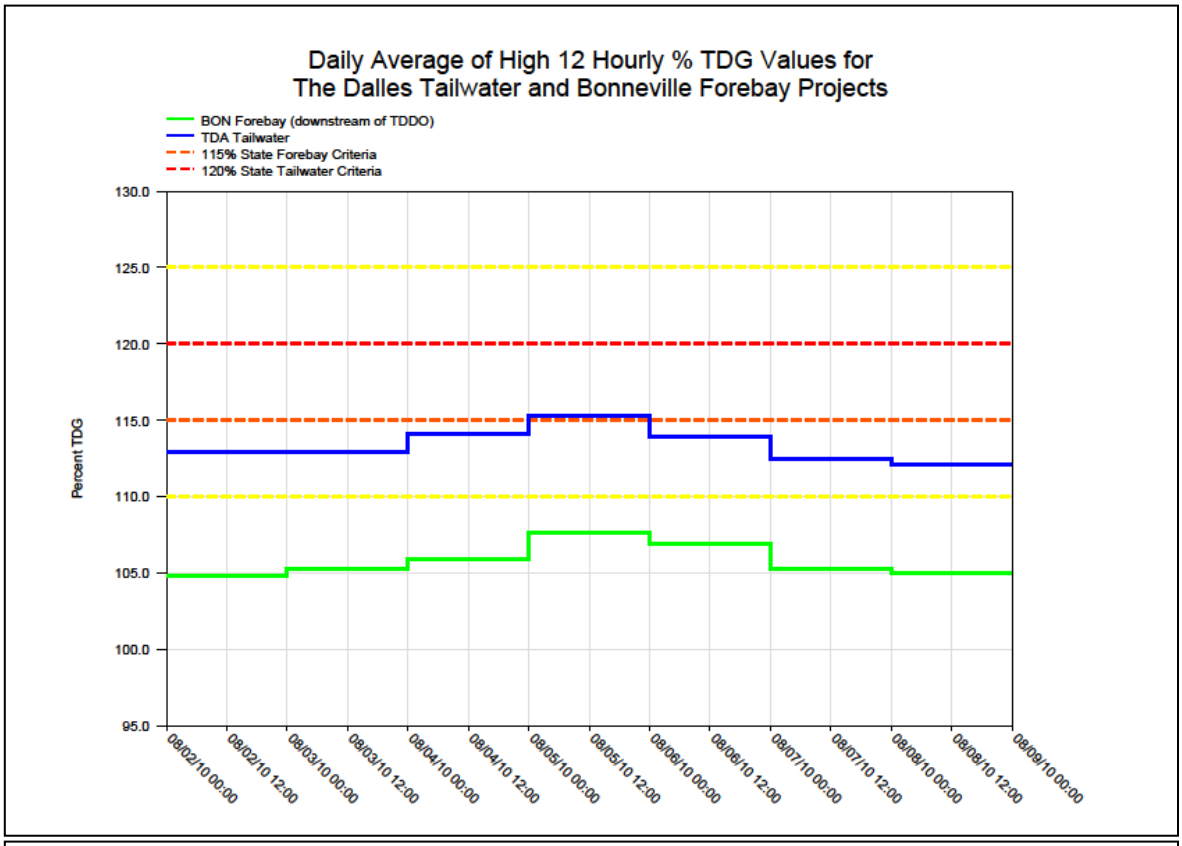

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
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08/08/10 12:00
08/09/10 00:00

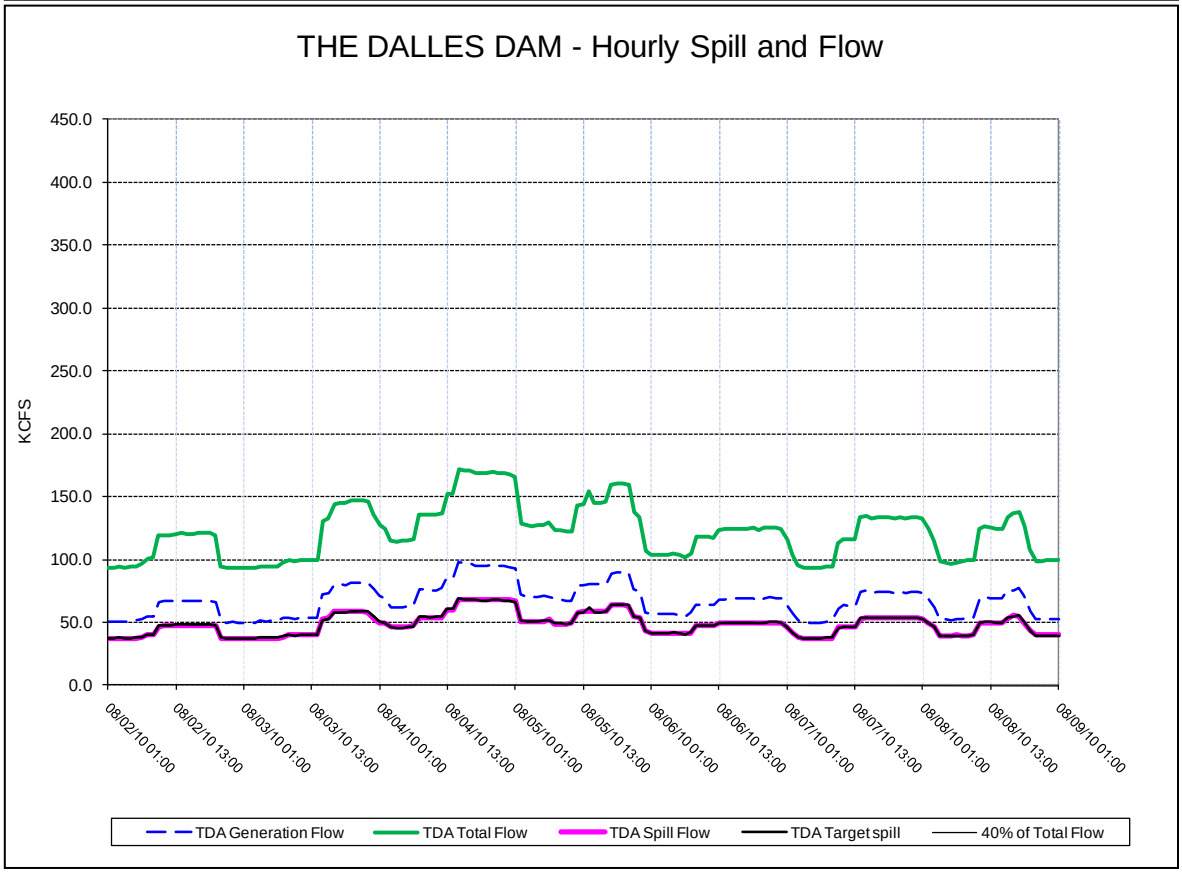
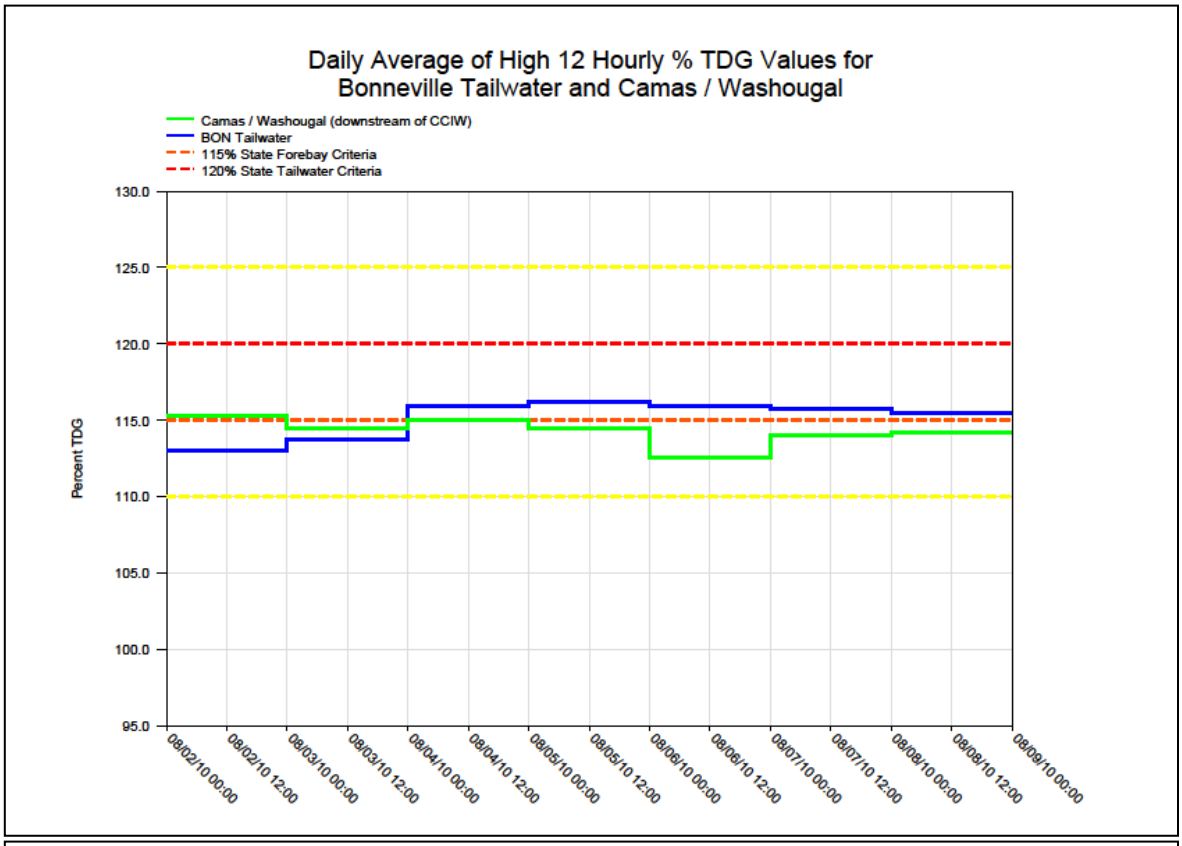

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/02/10 01:00
08/02/10 13:00
08/03/10 01:00
08/03/10 13:00
08/04/10 01:00
08/04/10 13:00
08/05/10 01:00
08/05/10 13:00
08/06/10 01:00
08/06/10 13:00
08/07/10 01:00
08/07/10 13:00
08/08/10 01:00
08/08/10 13:00
08/09/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/02/10 00:00
08/02/10 12:00
08/03/10 00:00
08/03/10 12:00
08/04/10 00:00
08/04/10 12:00
08/05/10 00:00
08/05/10 12:00
08/06/10 00:00
08/06/10 12:00
08/07/10 00:00
08/07/10 12:00
08/08/10 00:00
08/08/10 12:00
08/09/10 00:00

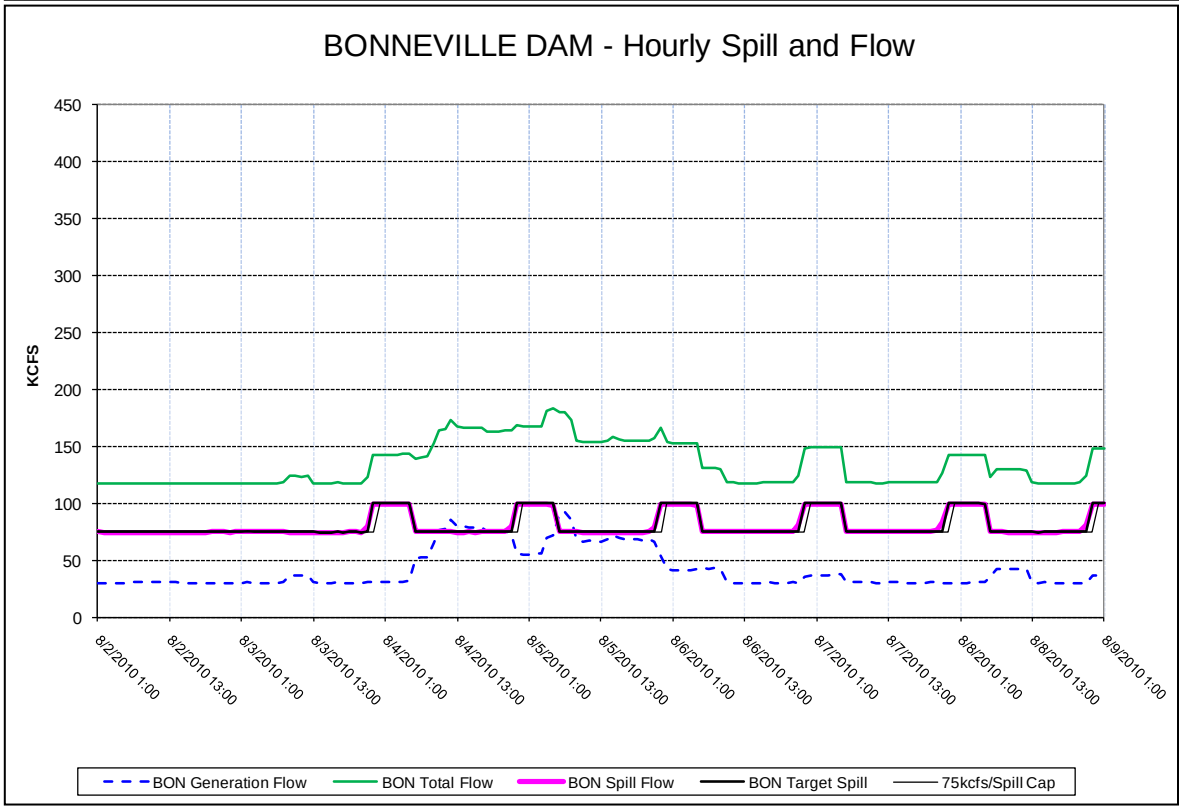
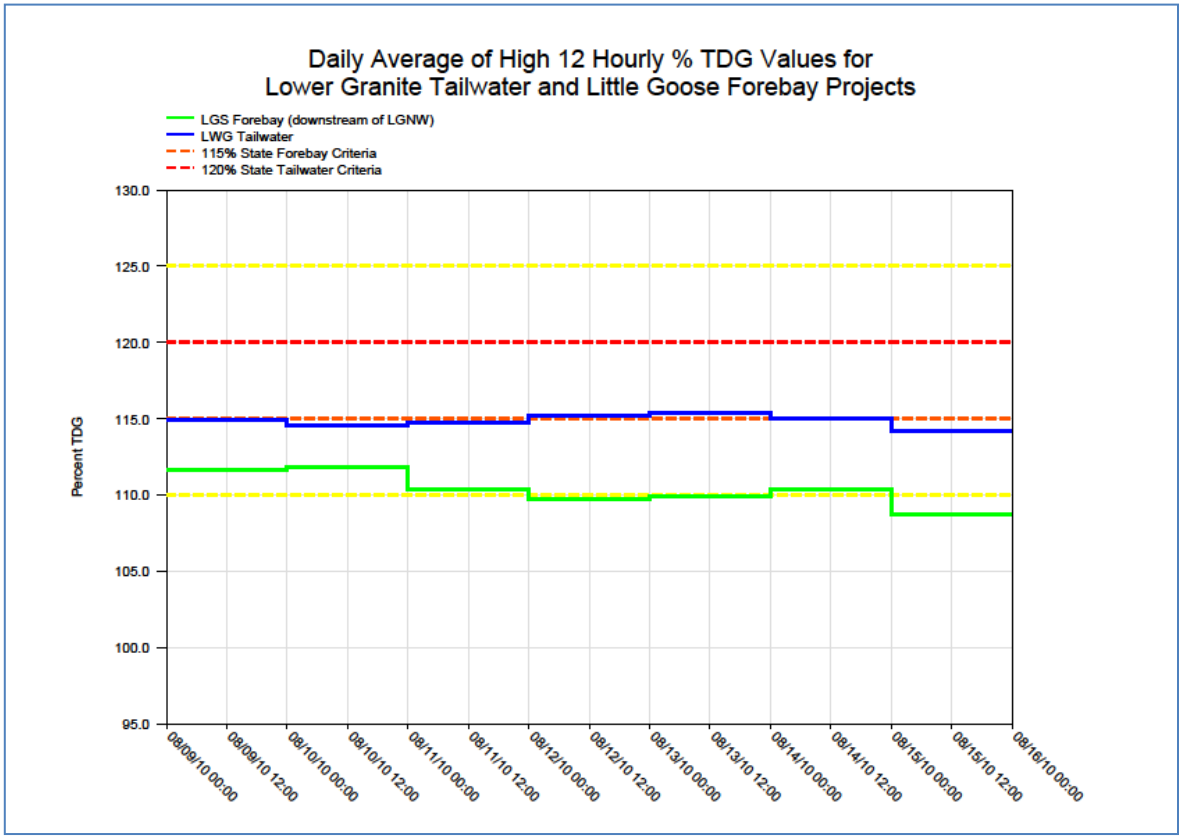

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/2/2010 1:00
8/2/2010 13:00
8/3/2010 1:00
8/3/2010 13:00
8/4/2010 1:00
8/4/2010 13:00
8/5/2010 1:00
8/5/2010 13:00
8/6/2010 1:00
8/6/2010 13:00
8/7/2010 1:00
8/7/2010 13:00
8/8/2010 1:00
8/8/2010 13:00
8/9/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs/Spill Cap

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

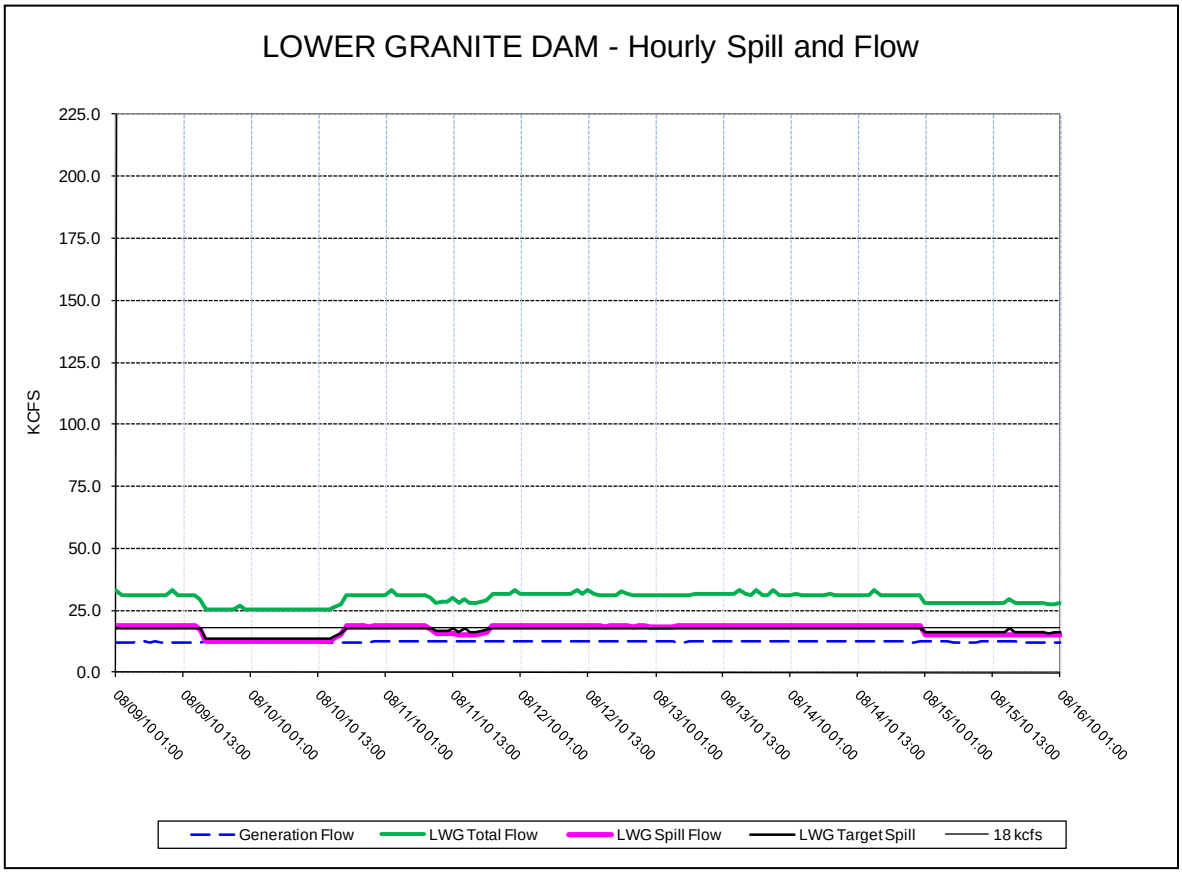
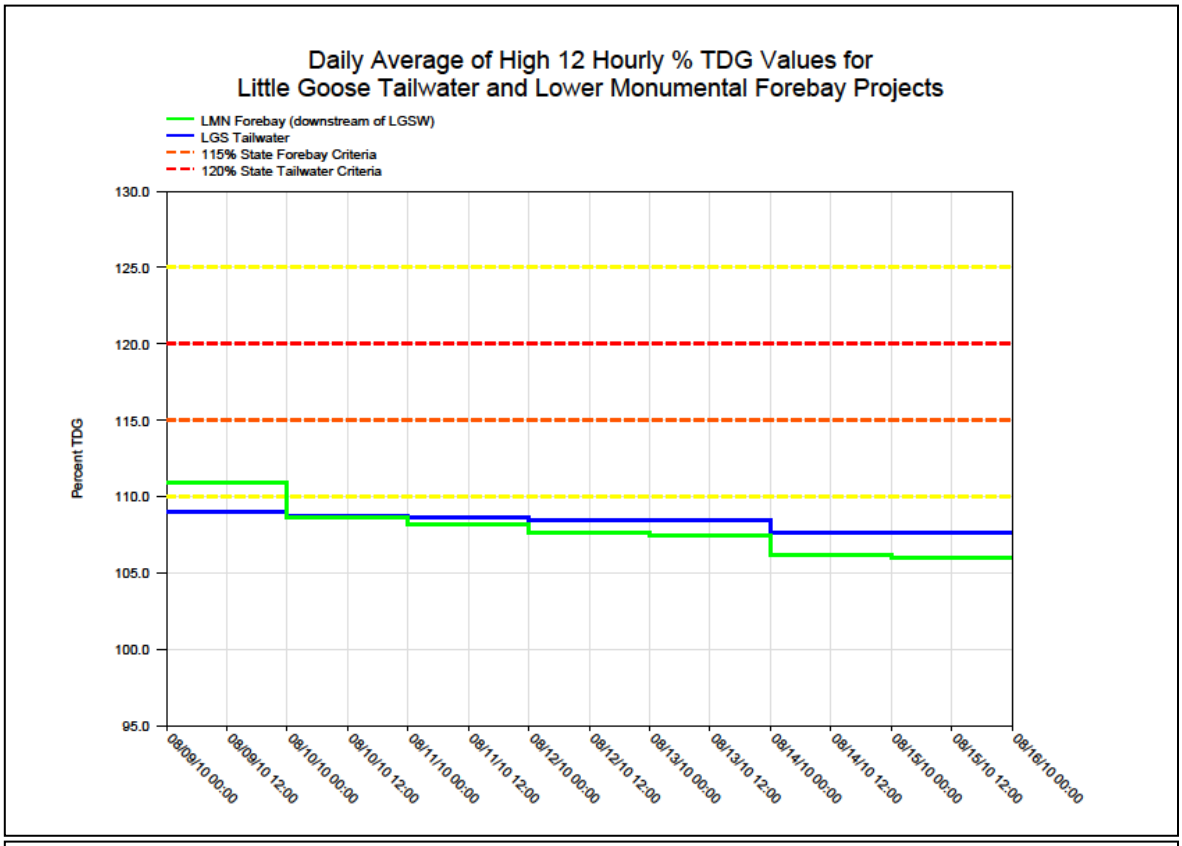

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

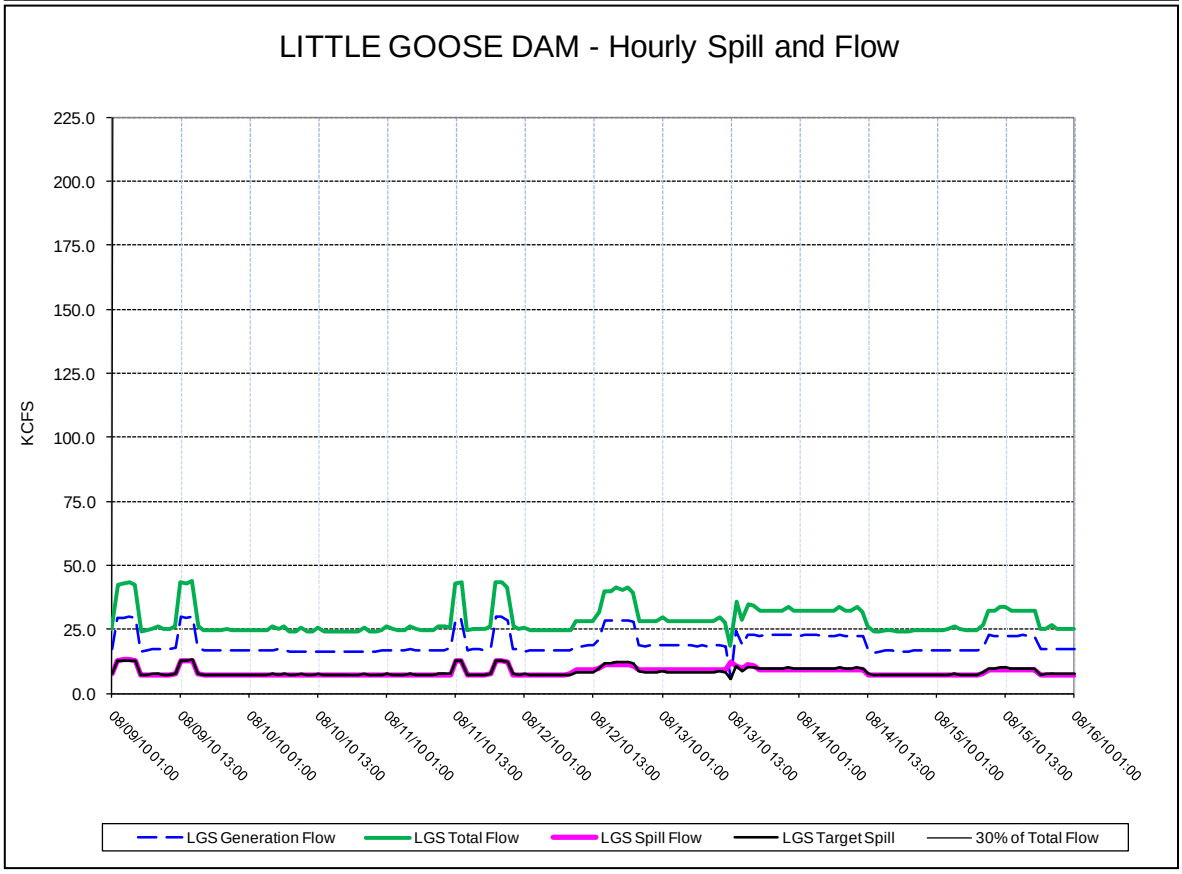
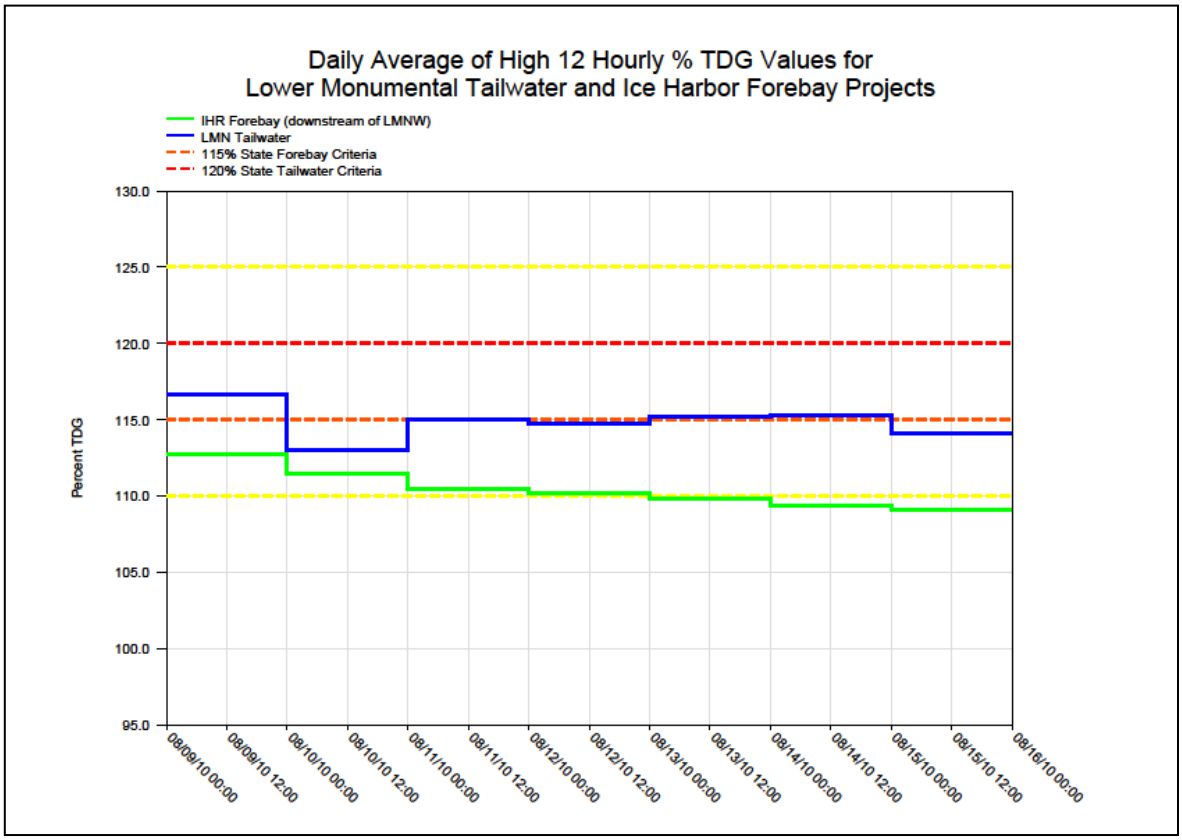

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

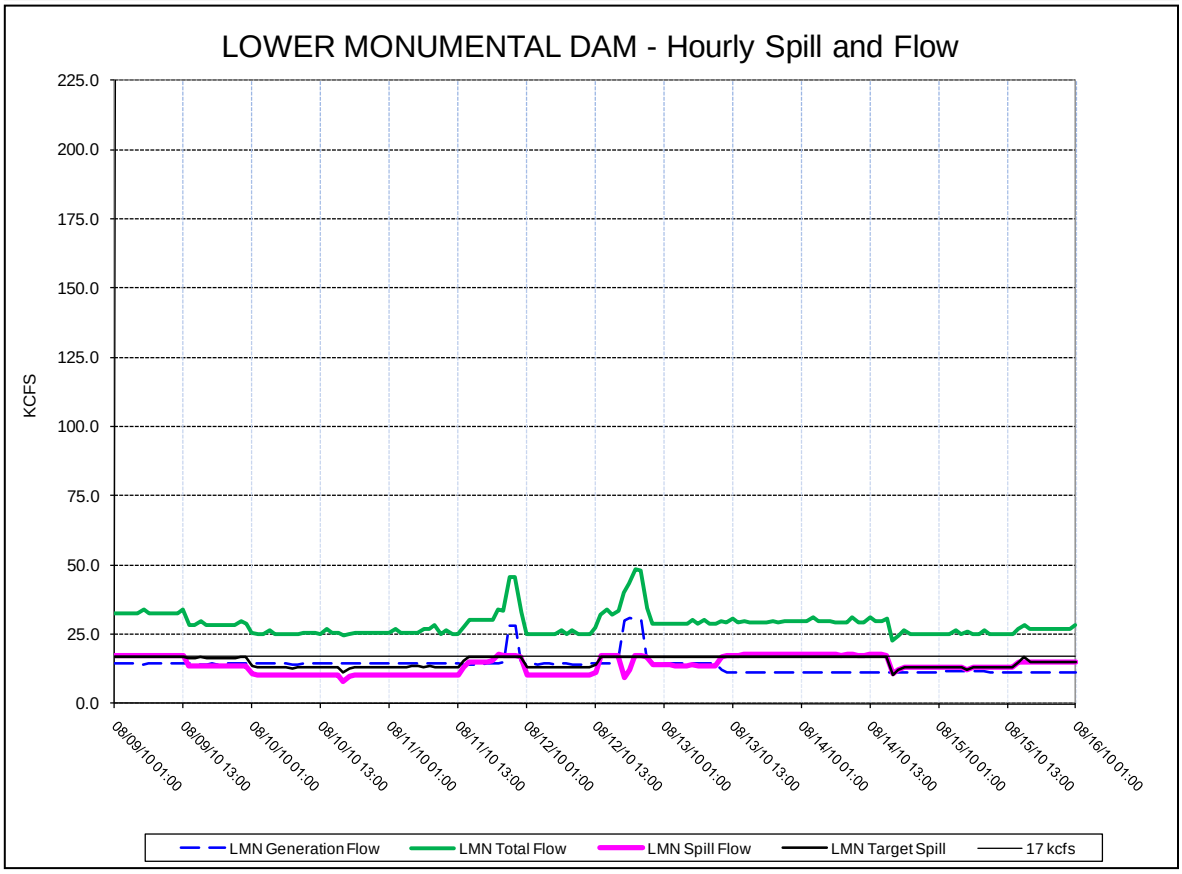
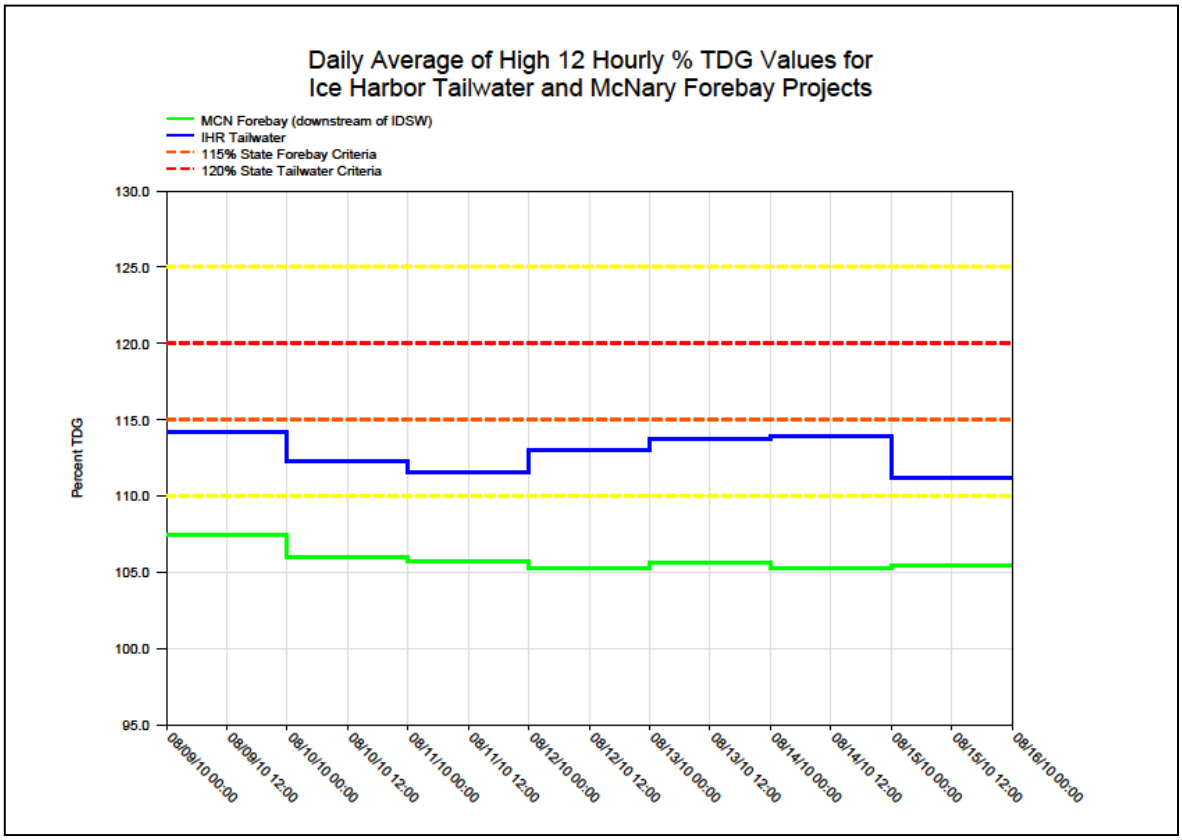

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

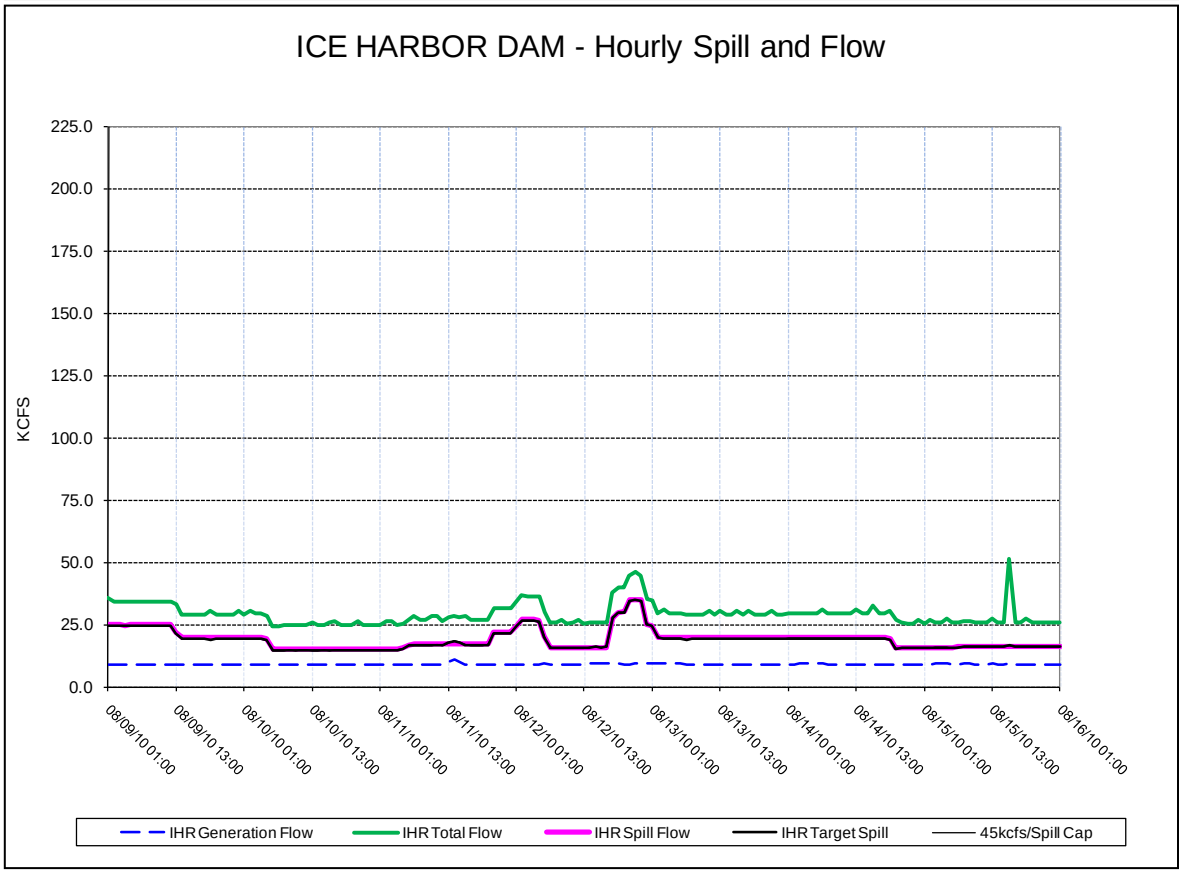
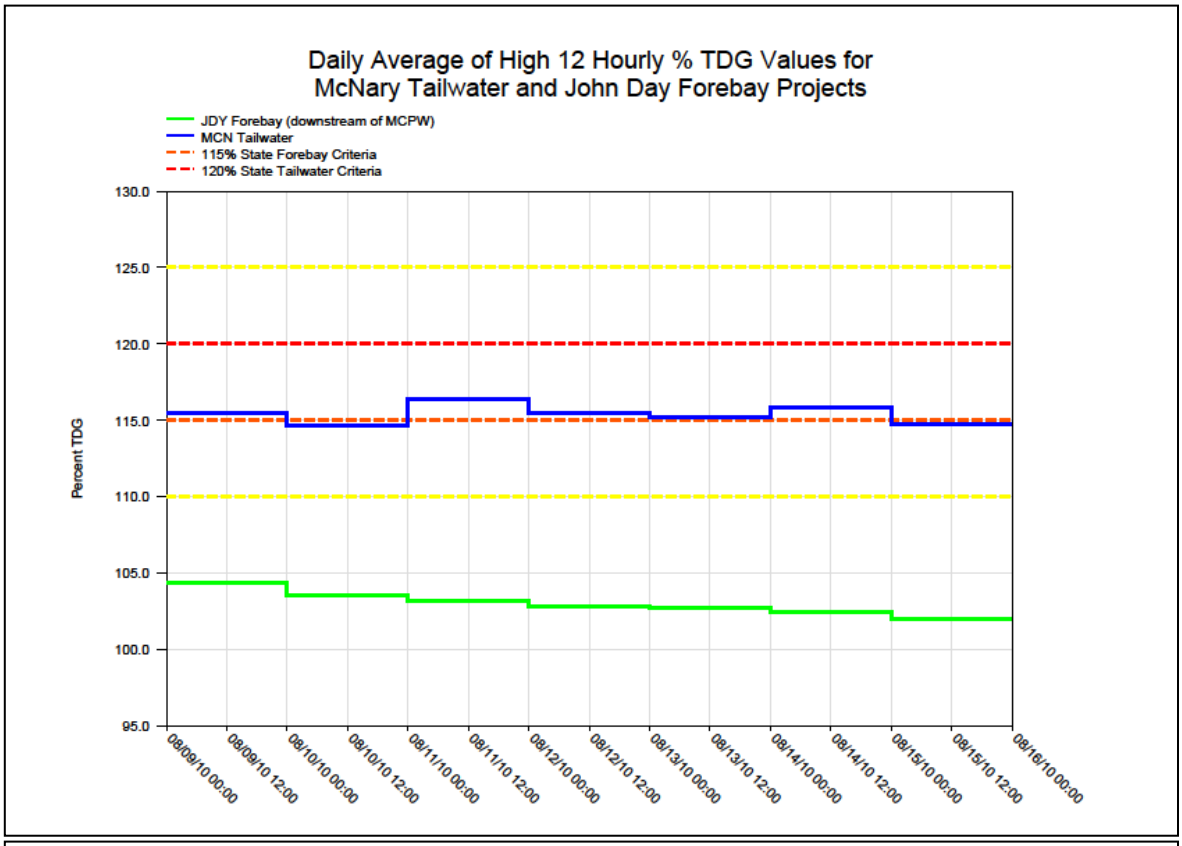

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

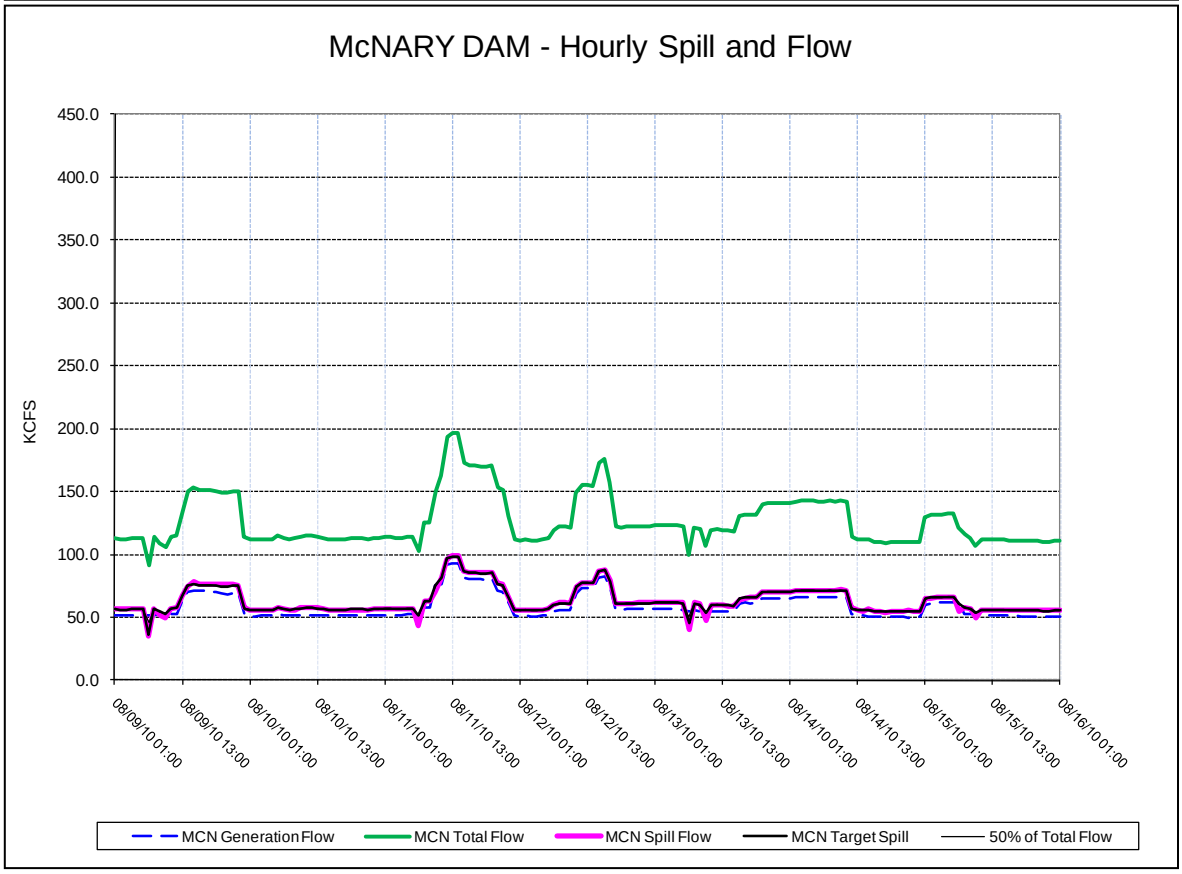
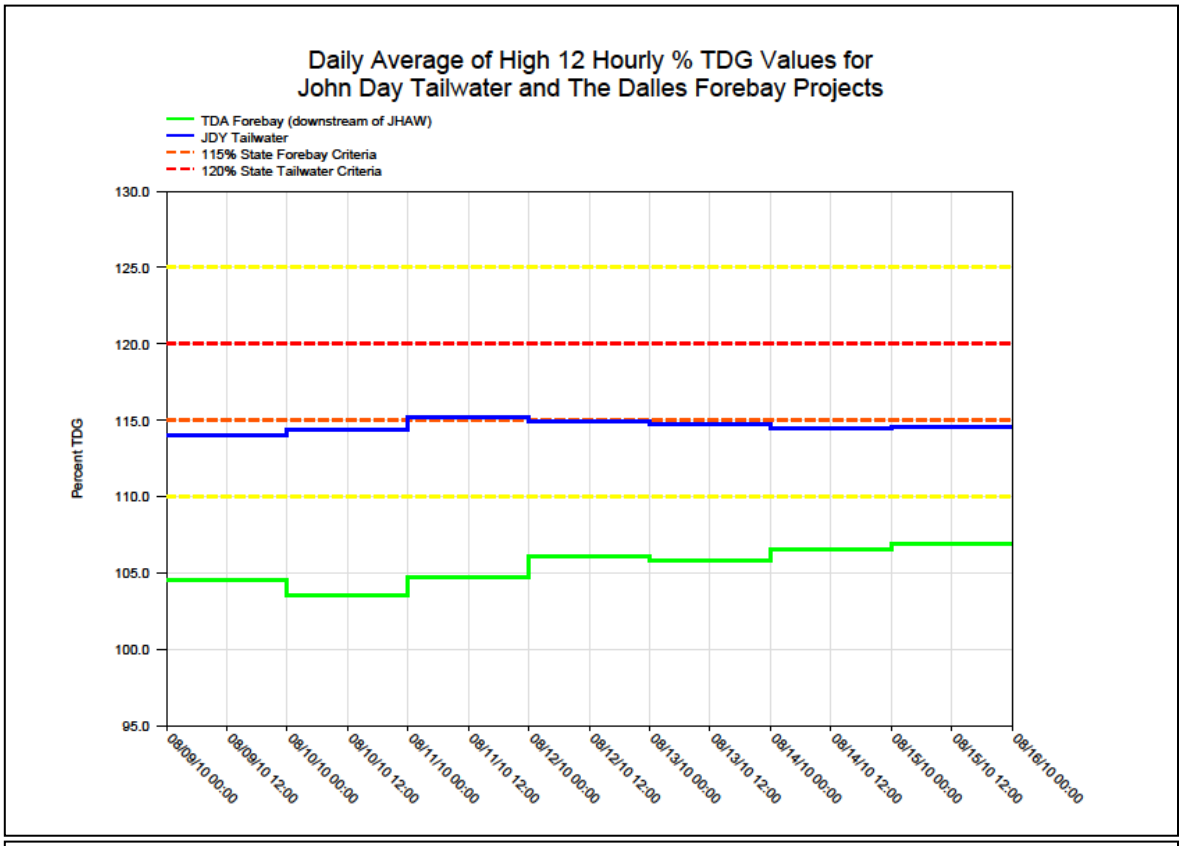

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

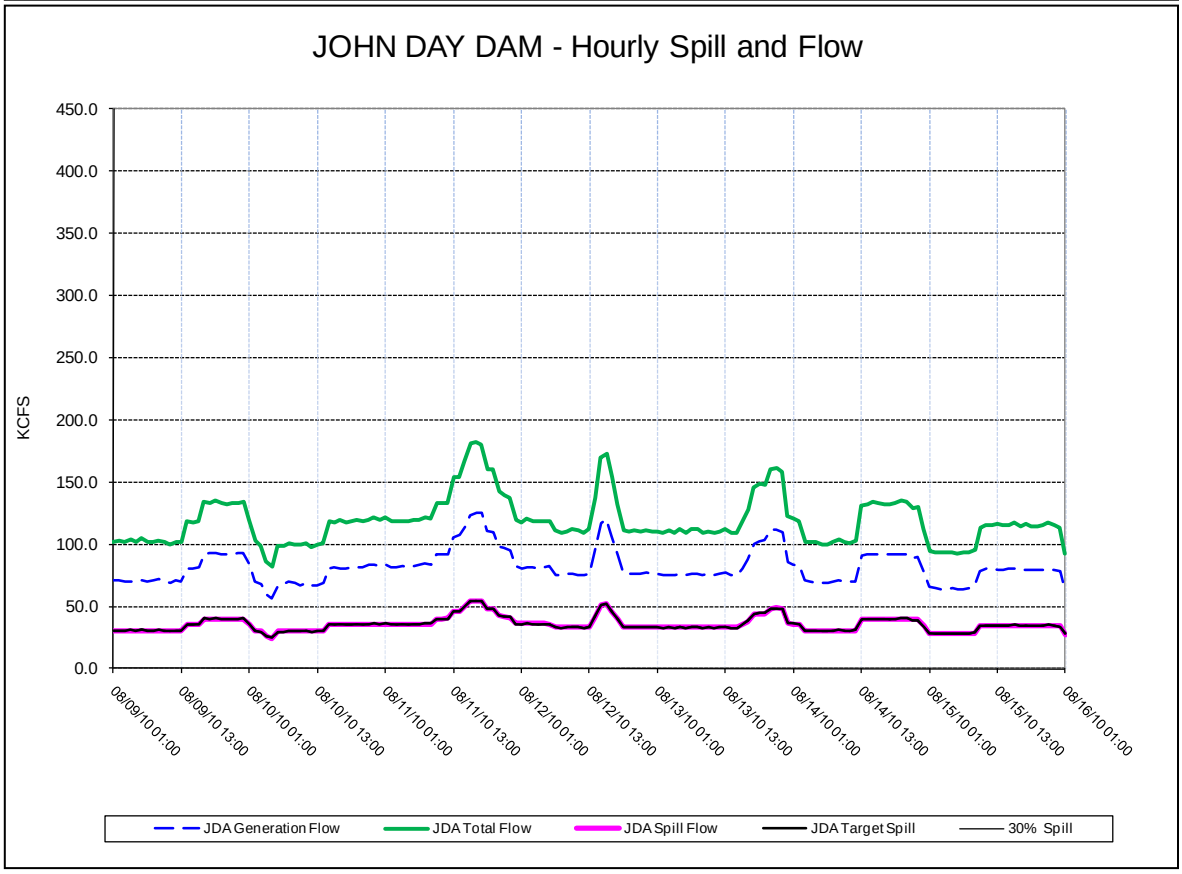
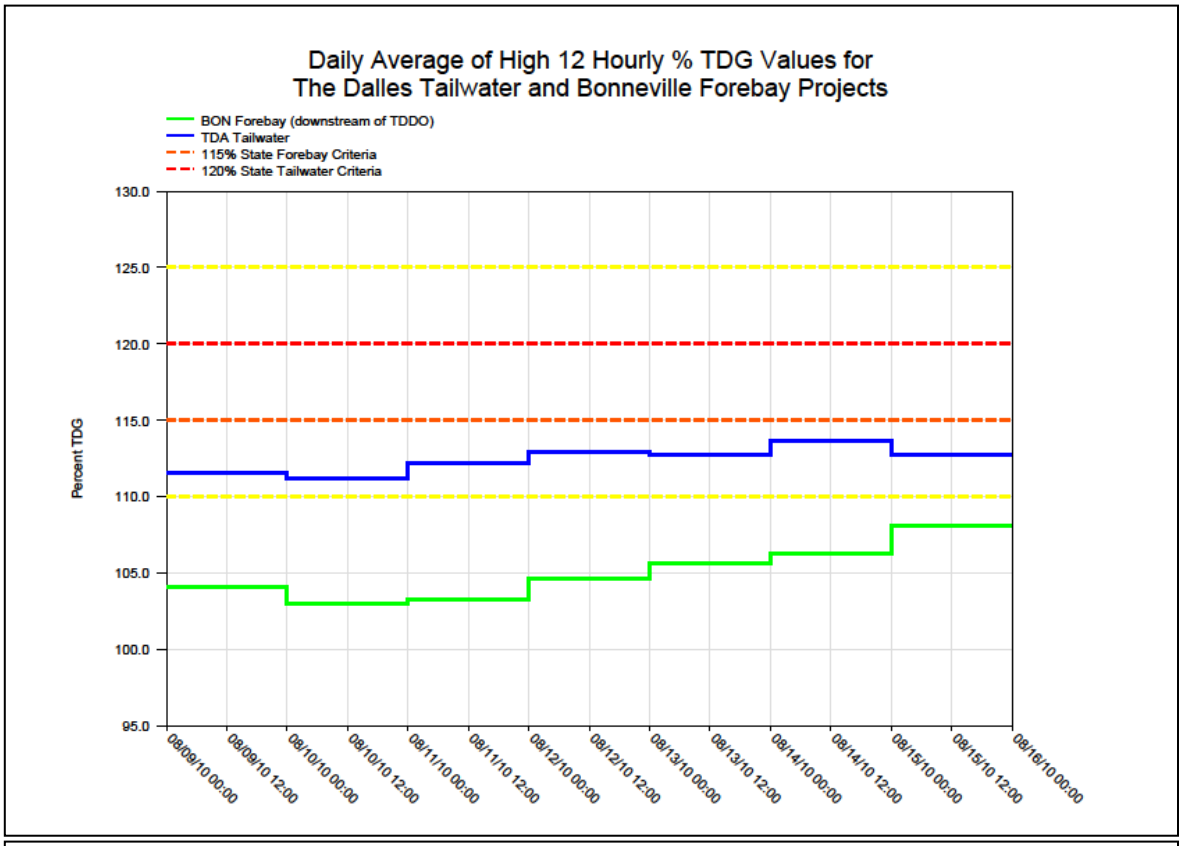

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

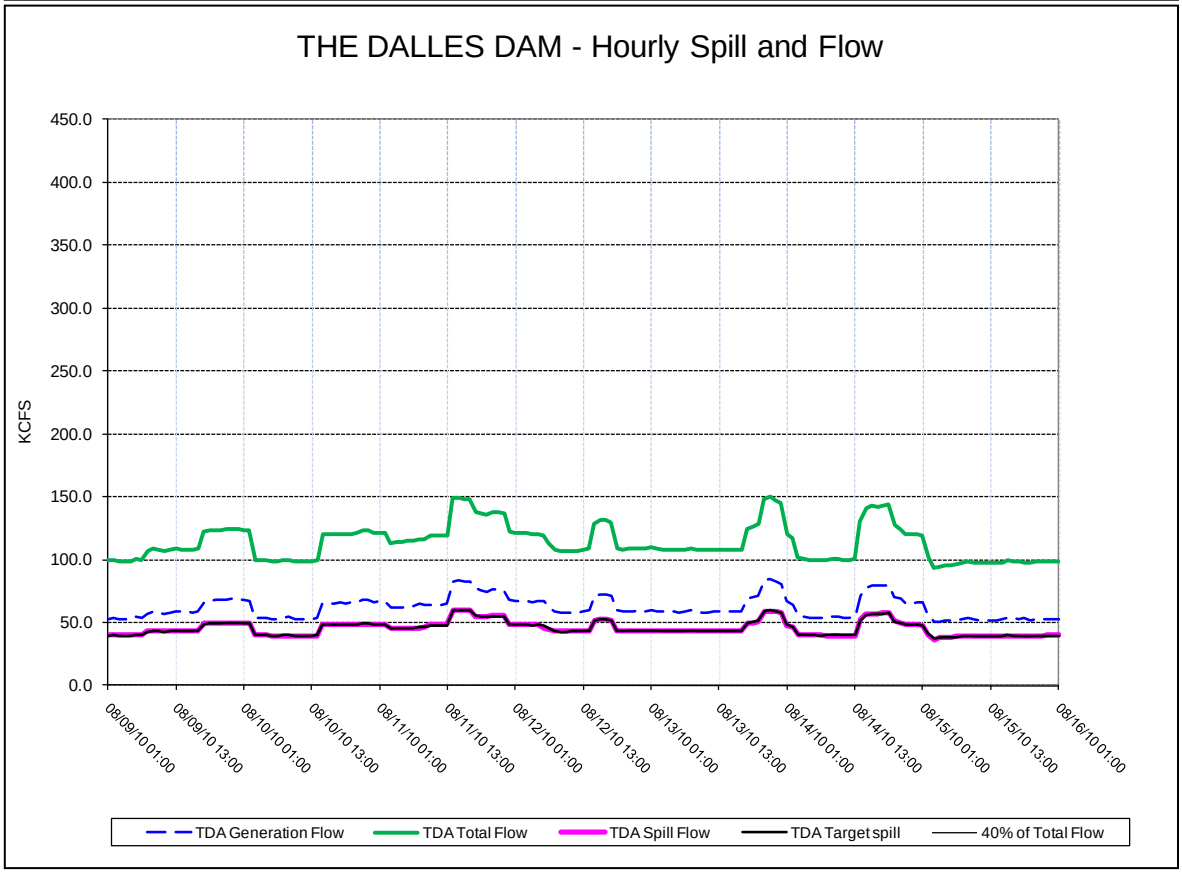
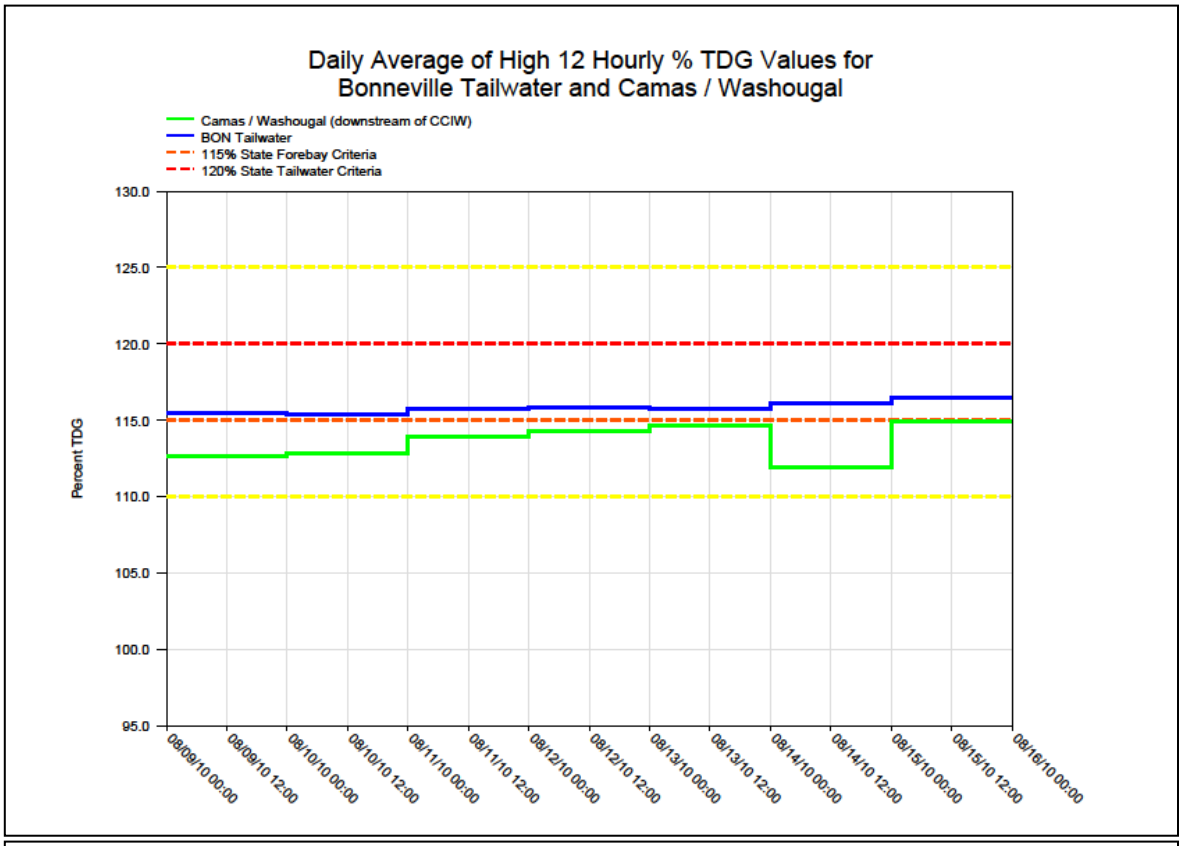

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/09/10 01:00
08/09/10 13:00
08/10/10 01:00
08/10/10 13:00
08/11/10 01:00
08/11/10 13:00
08/12/10 01:00
08/12/10 13:00
08/13/10 01:00
08/13/10 13:00
08/14/10 01:00
08/14/10 13:00
08/15/10 01:00
08/15/10 13:00
08/16/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/09/10 00:00
08/09/10 12:00
08/10/10 00:00
08/10/10 12:00
08/11/10 00:00
08/11/10 12:00
08/12/10 00:00
08/12/10 12:00
08/13/10 00:00
08/13/10 12:00
08/14/10 00:00
08/14/10 12:00
08/15/10 00:00
08/15/10 12:00
08/16/10 00:00

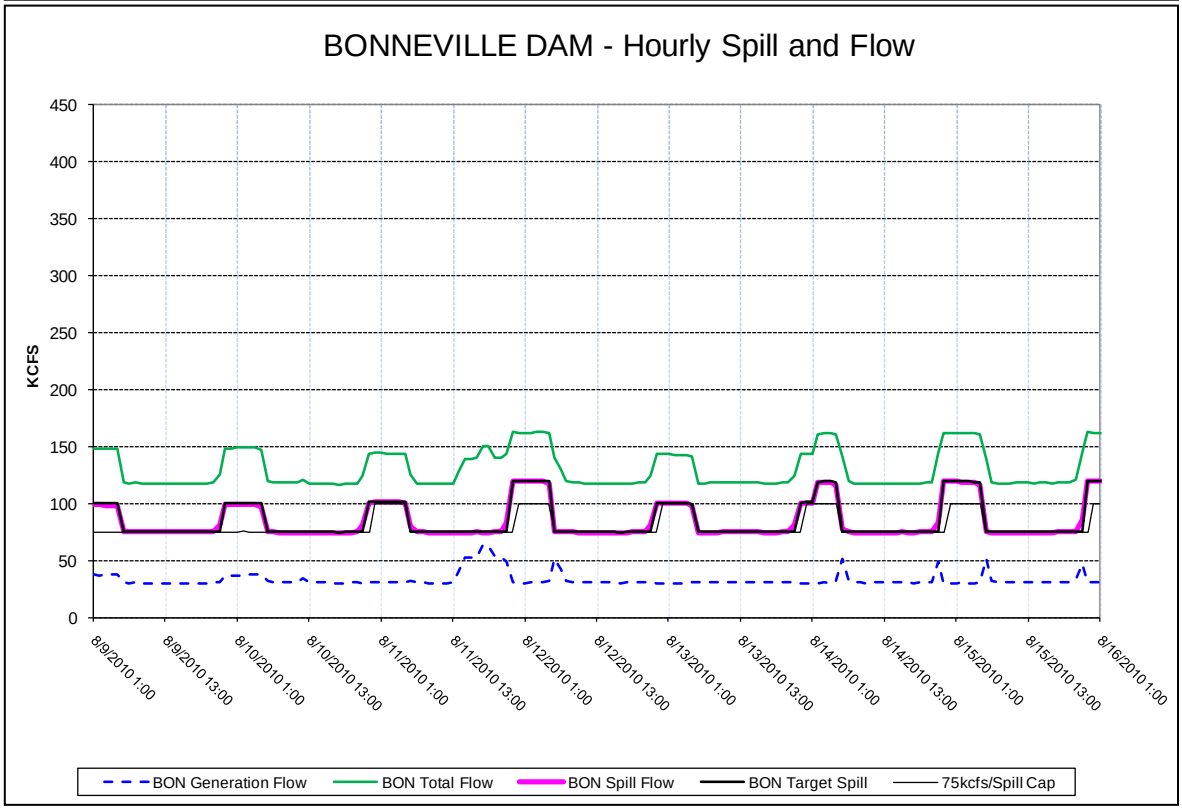
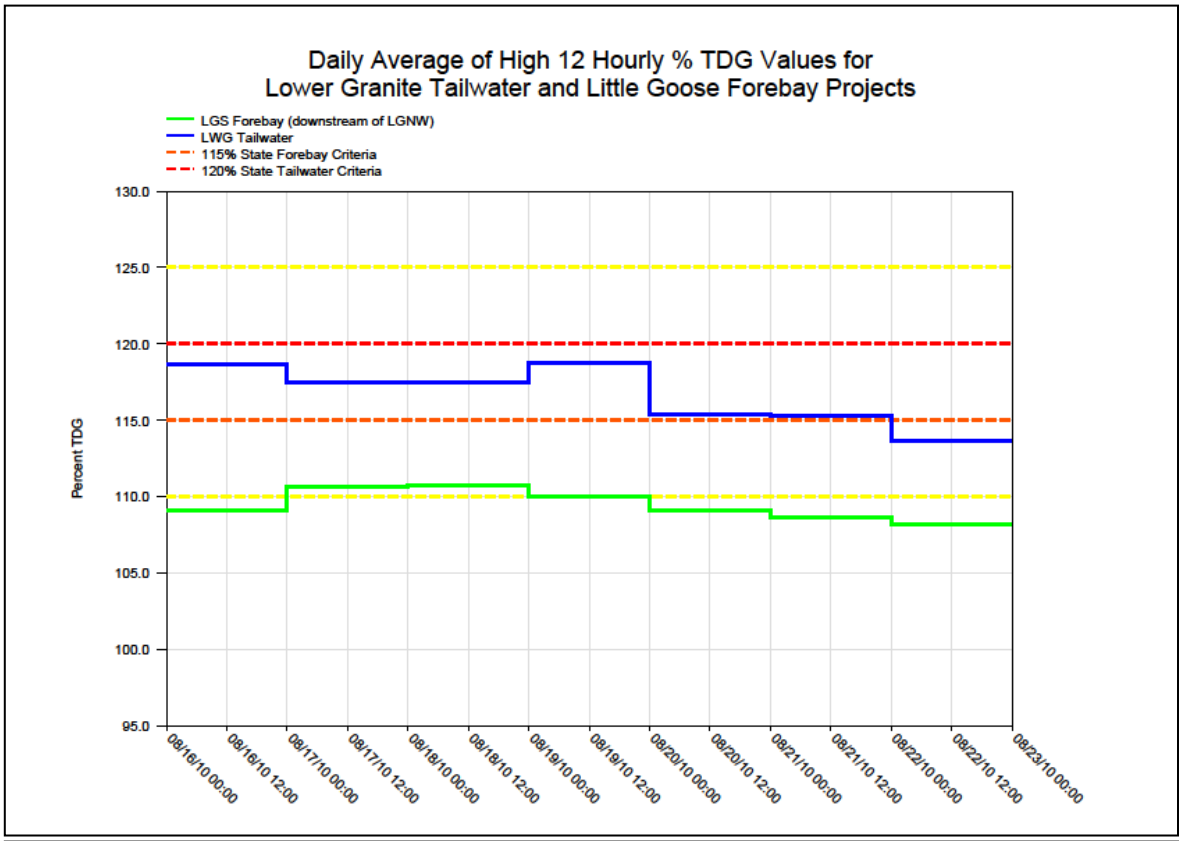

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/9/2010 1:00
8/9/2010 13:00
8/10/2010 1:00
8/10/2010 13:00
8/11/2010 1:00
8/11/2010 13:00
8/12/2010 1:00
8/12/2010 13:00
8/13/2010 1:00
8/13/2010 13:00
8/14/2010 1:00
8/14/2010 13:00
8/15/2010 1:00
8/15/2010 13:00
8/16/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs/Spill Cap

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

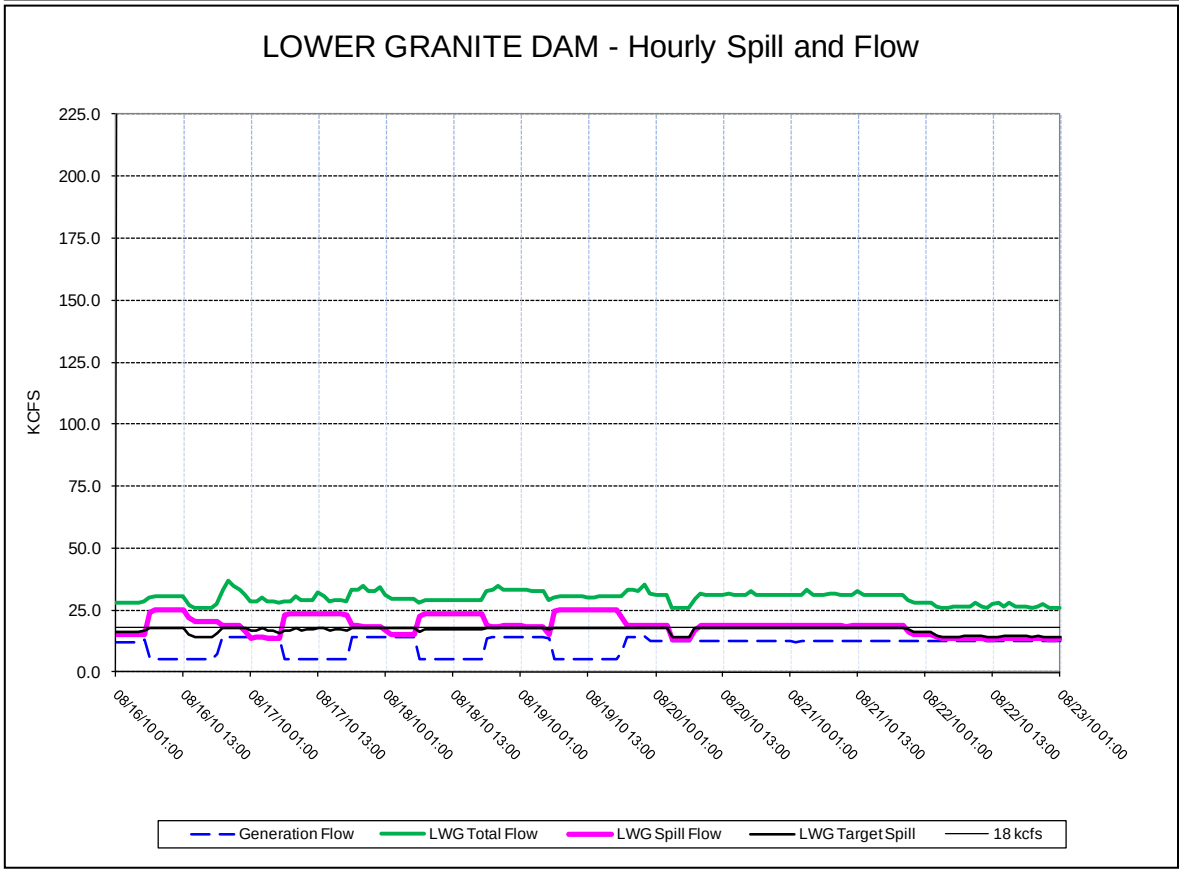
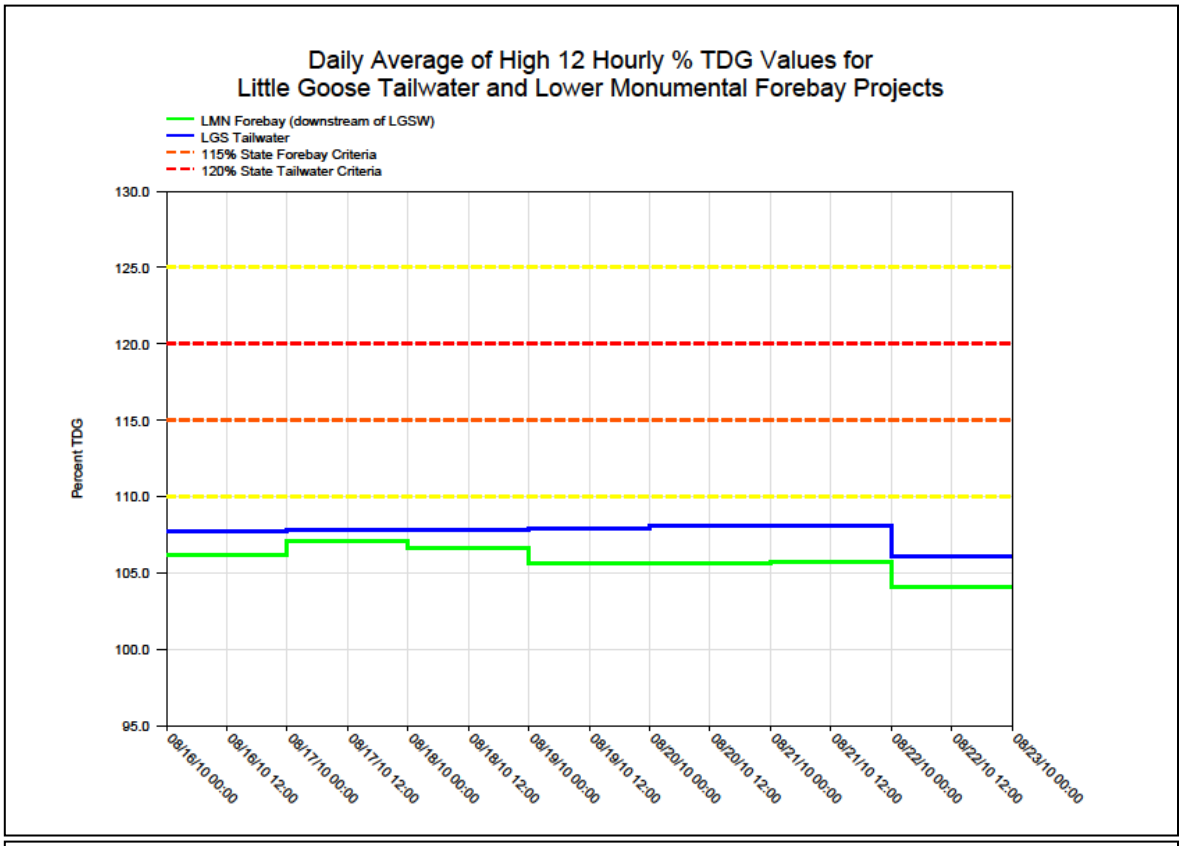

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

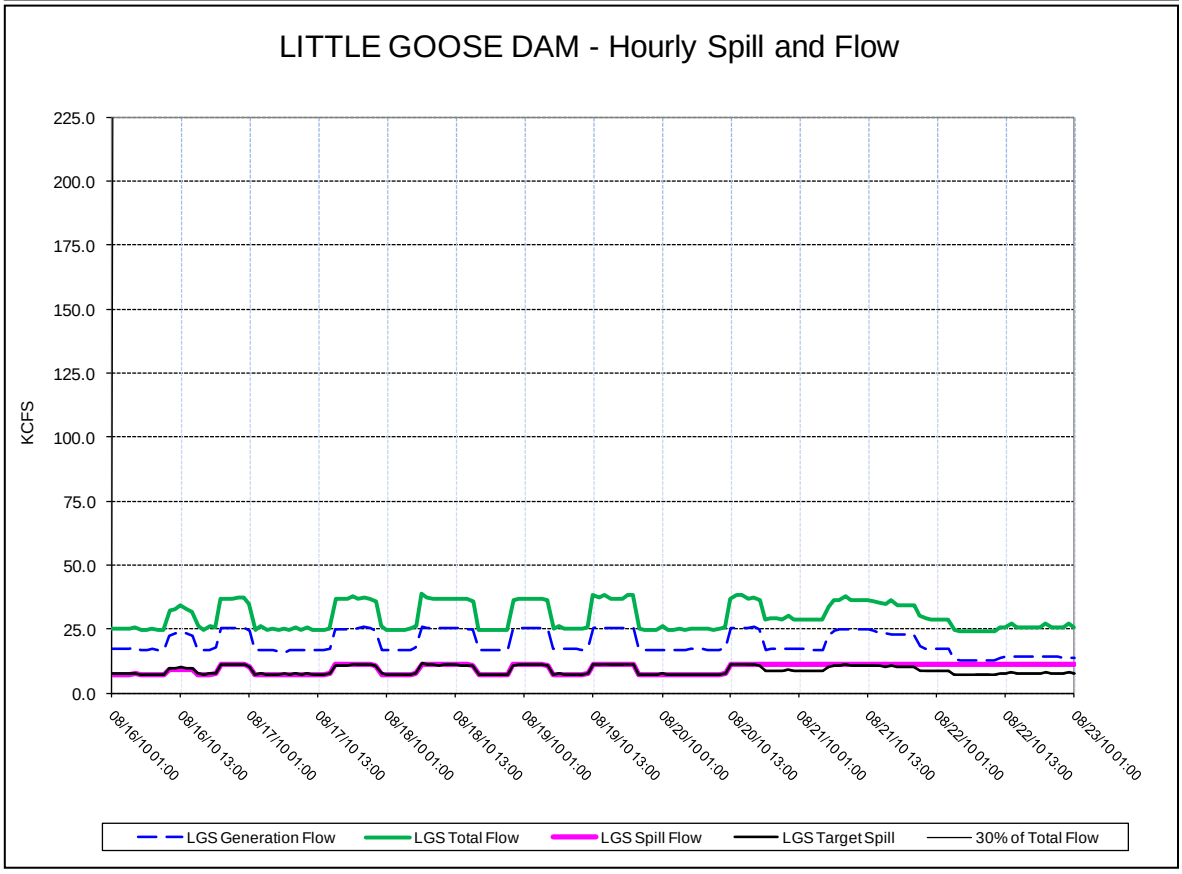
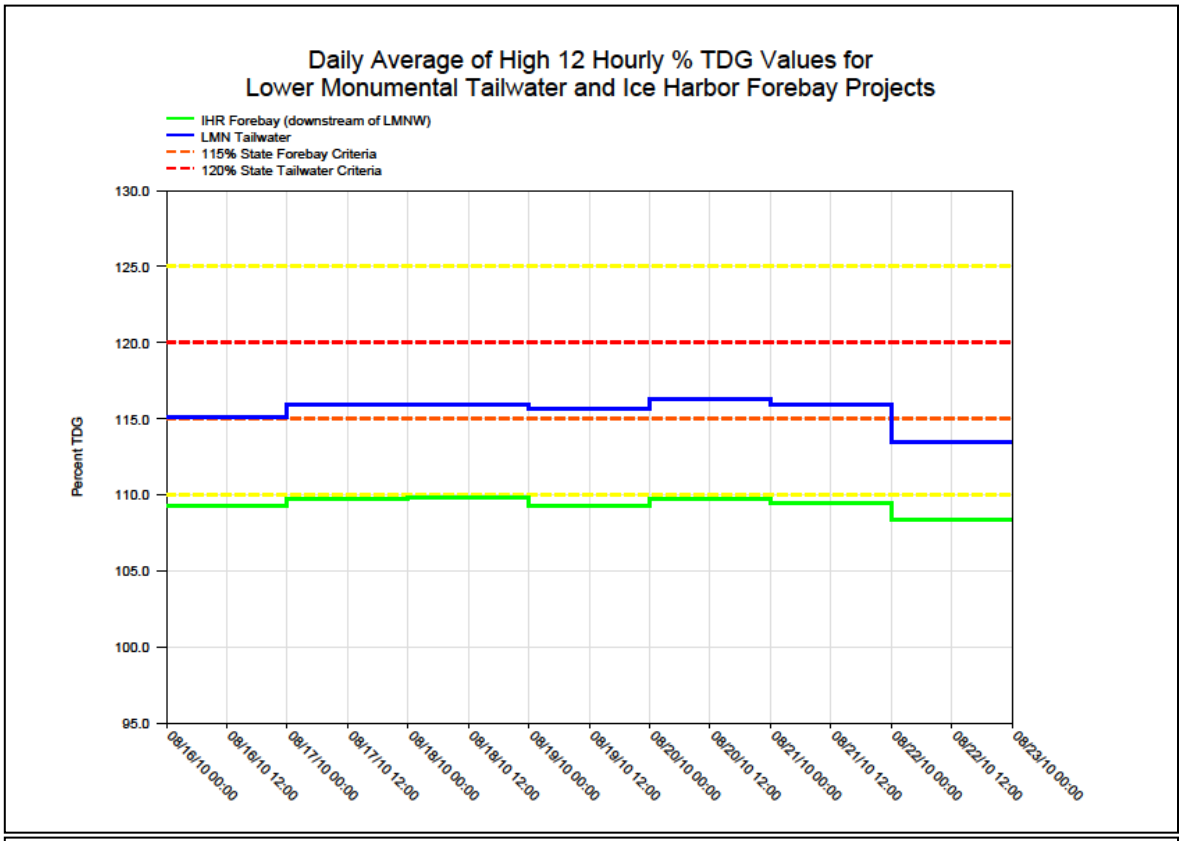

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

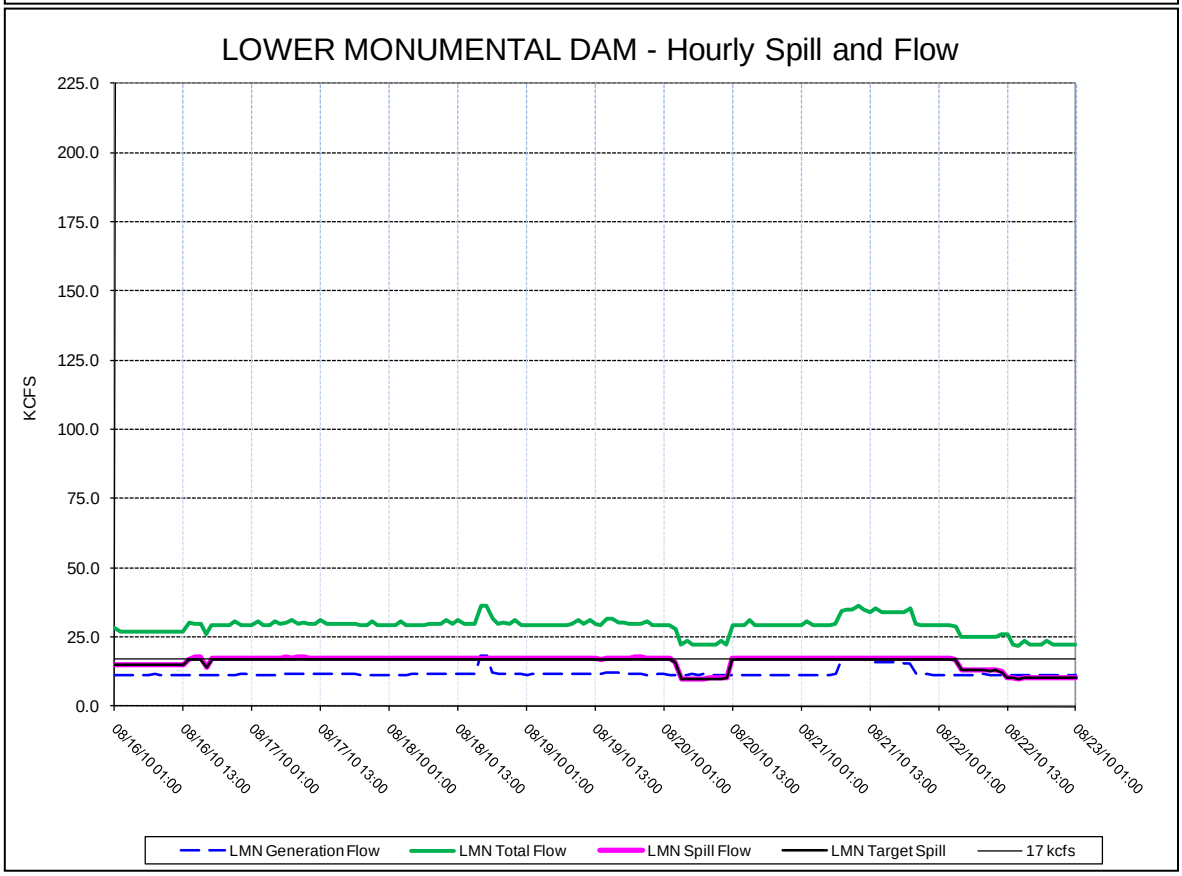
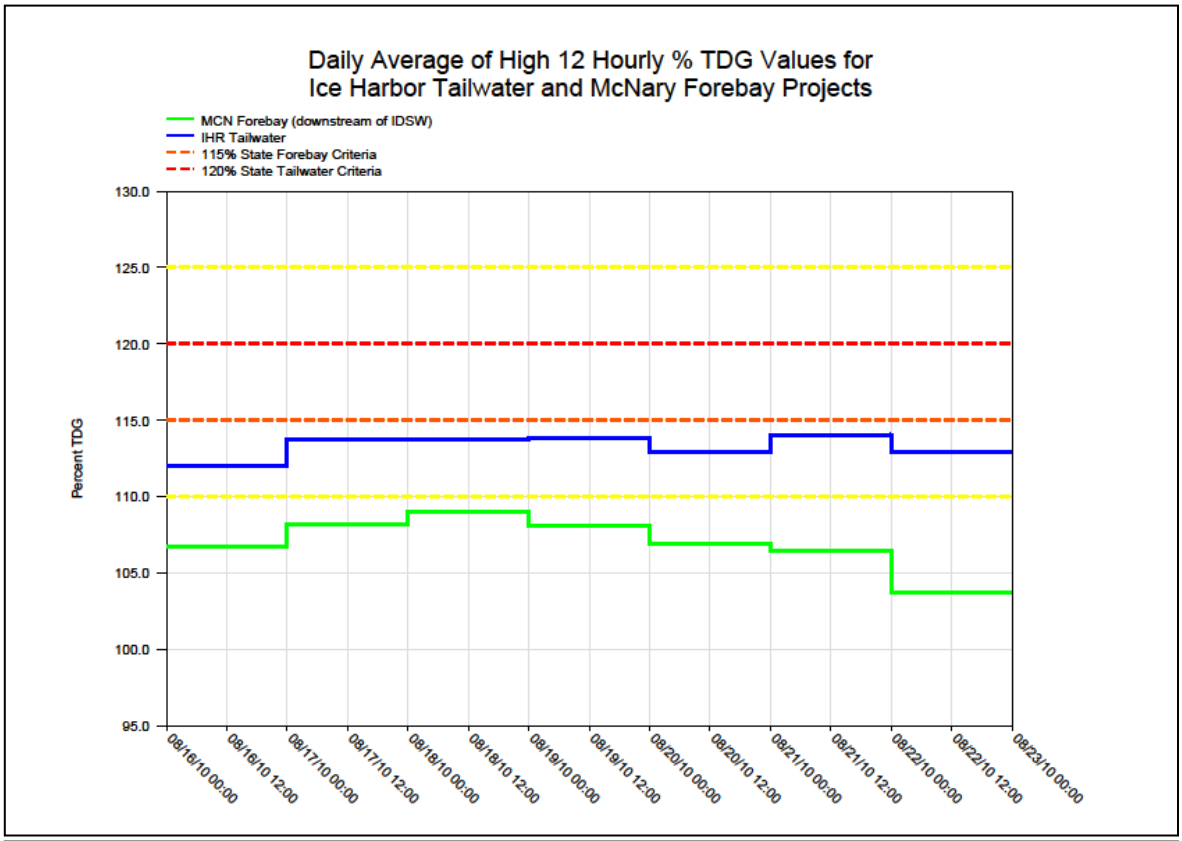

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

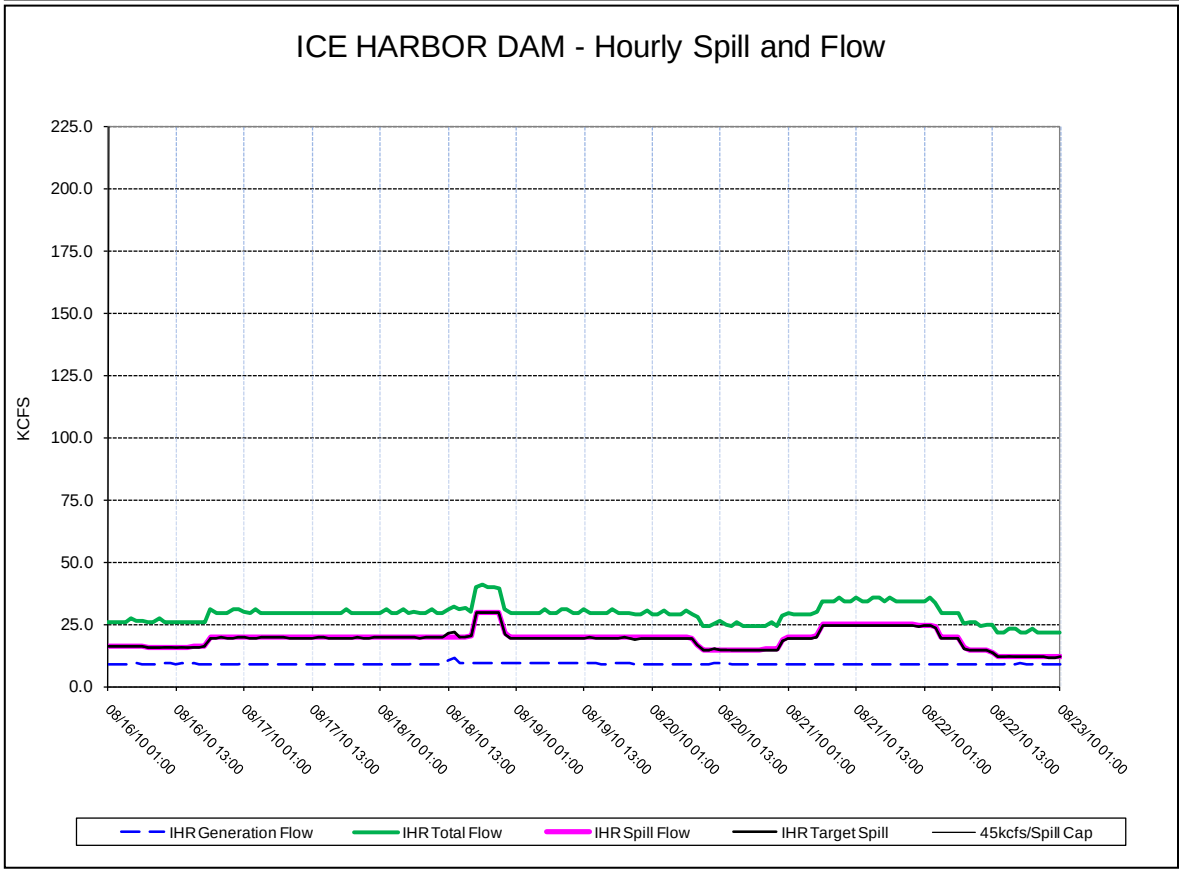
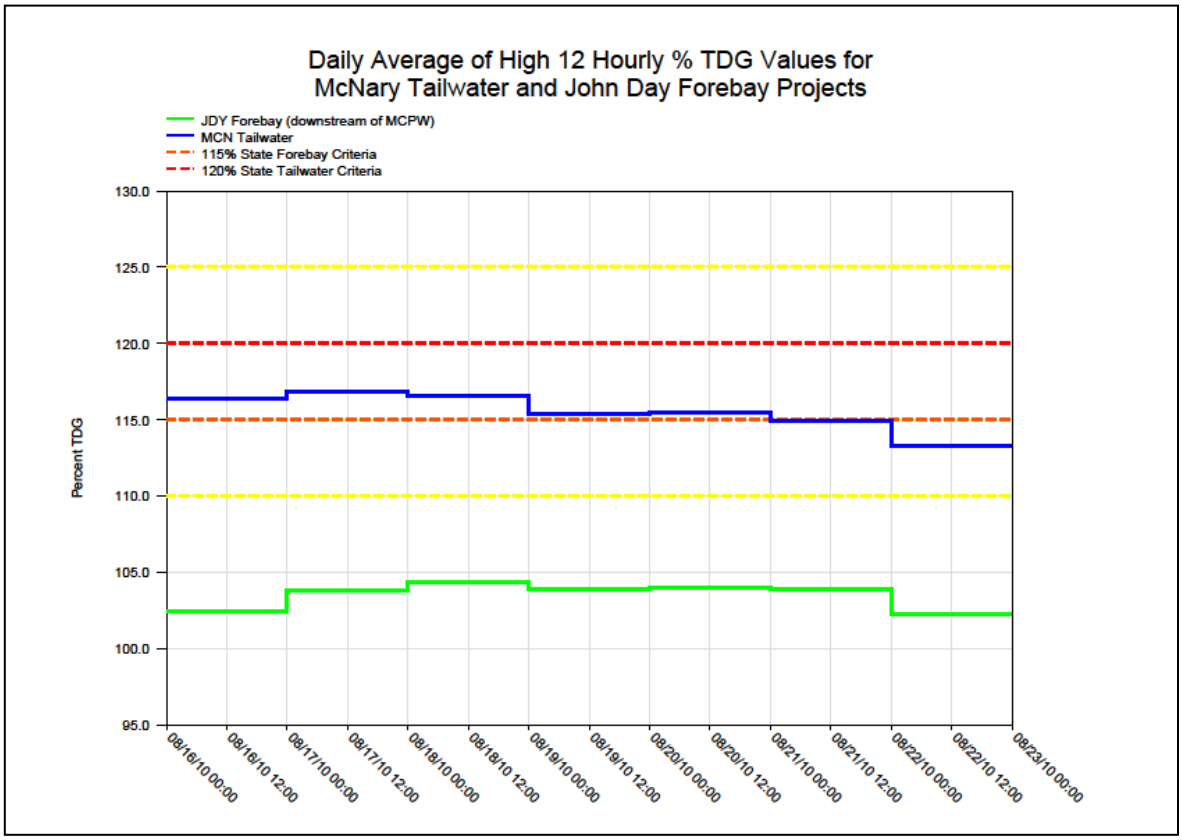

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

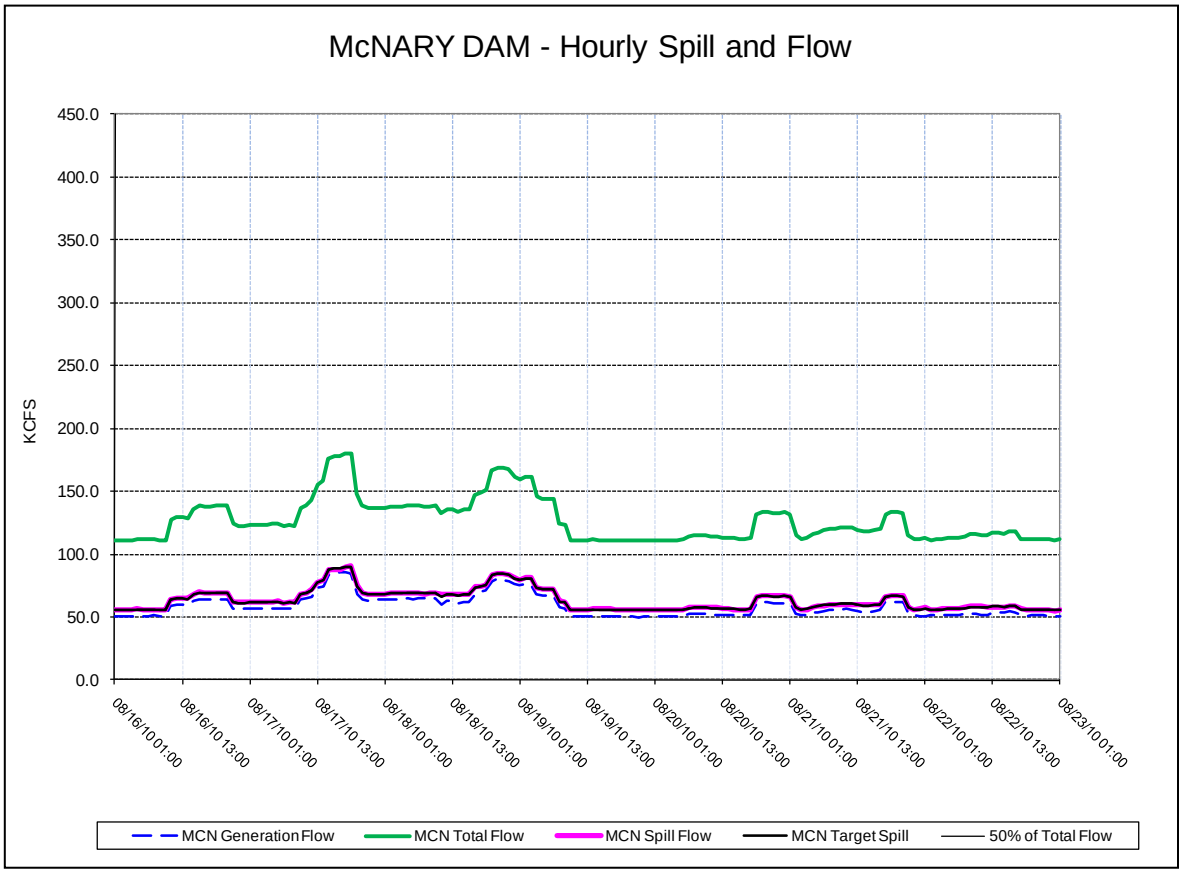
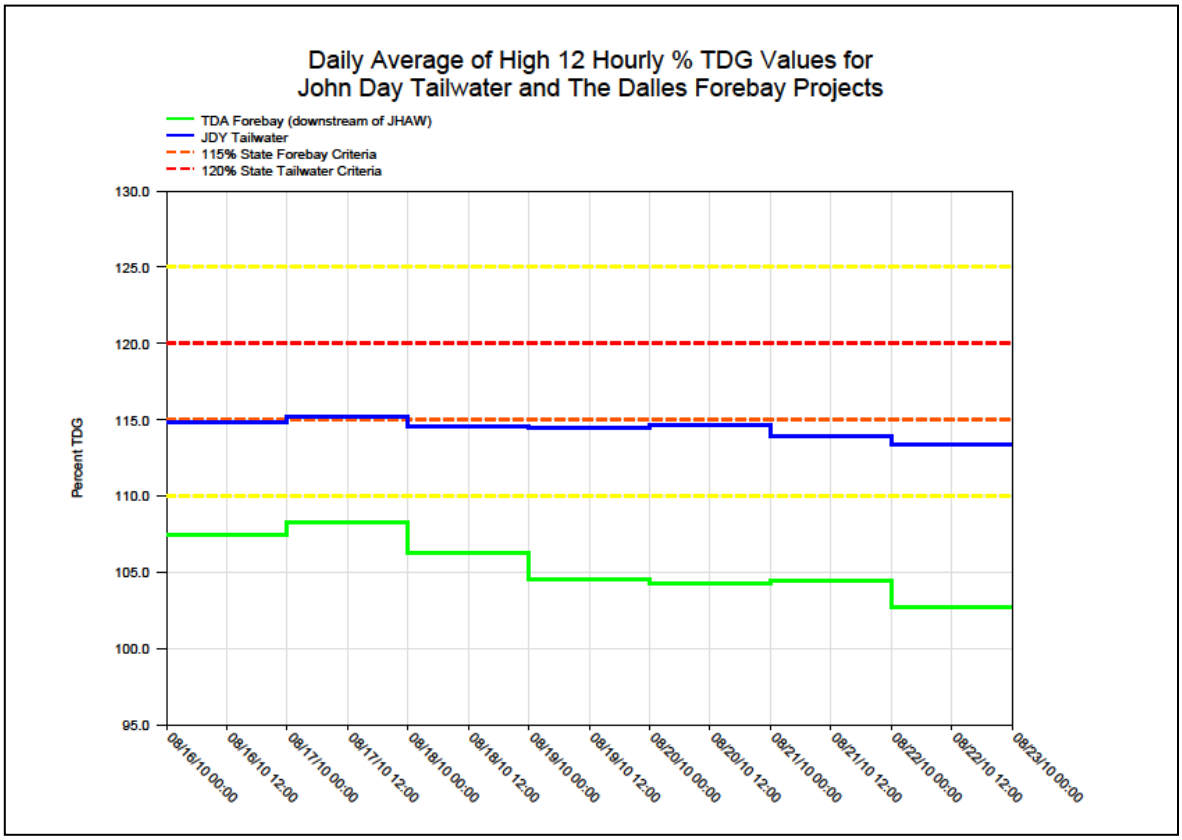

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

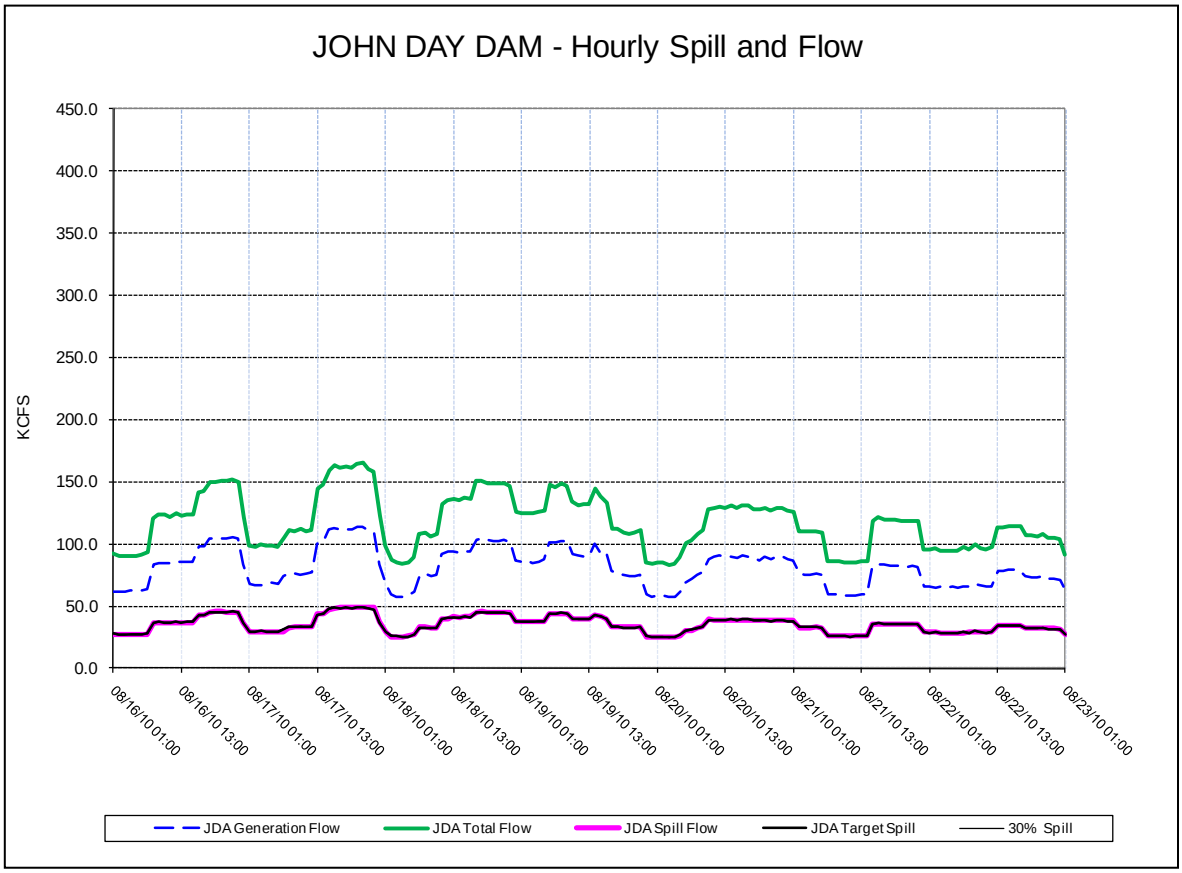
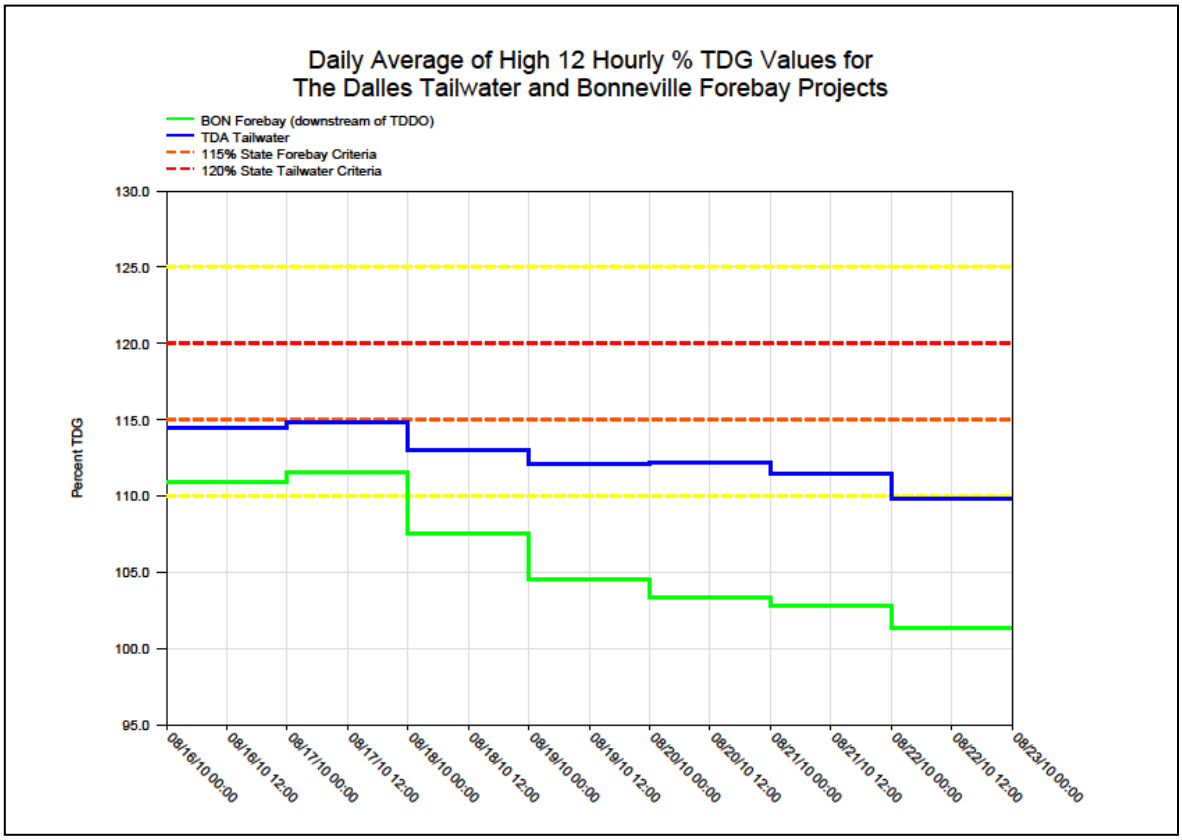

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

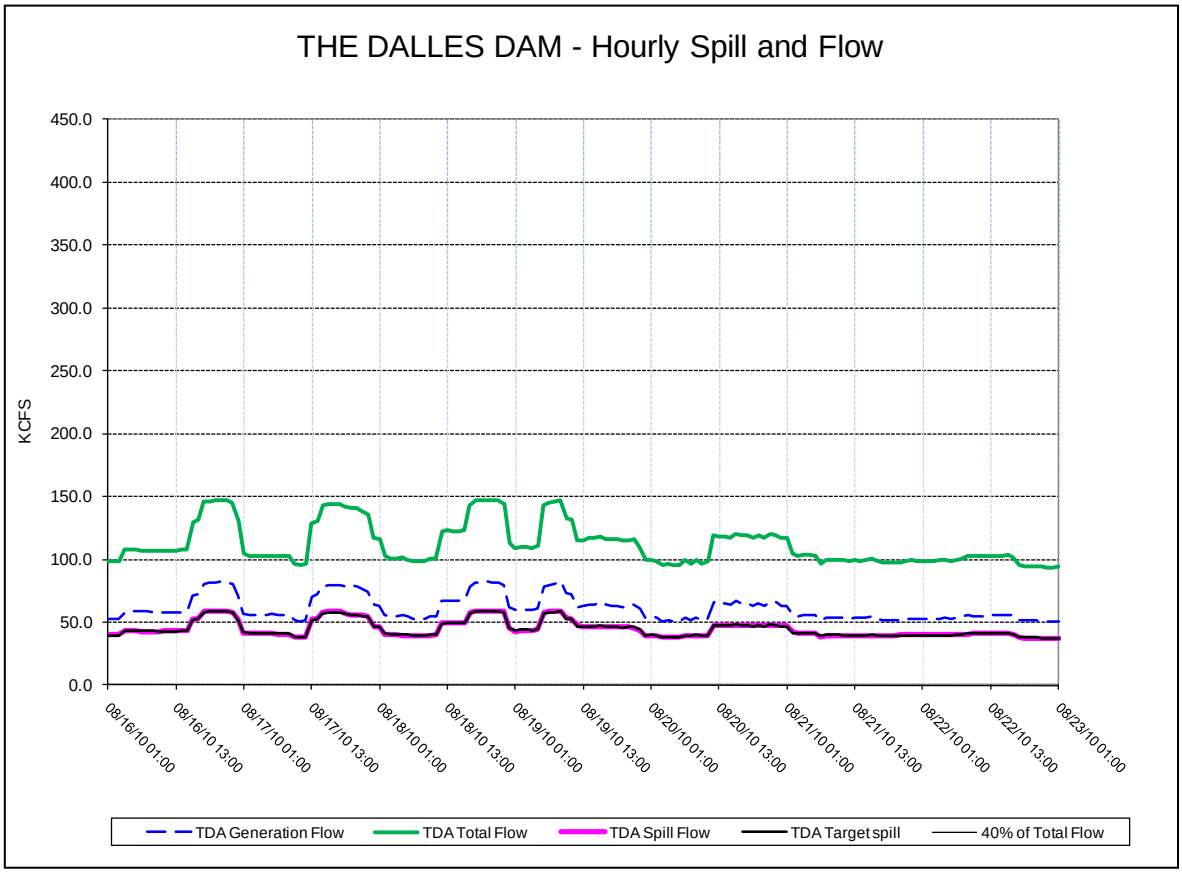
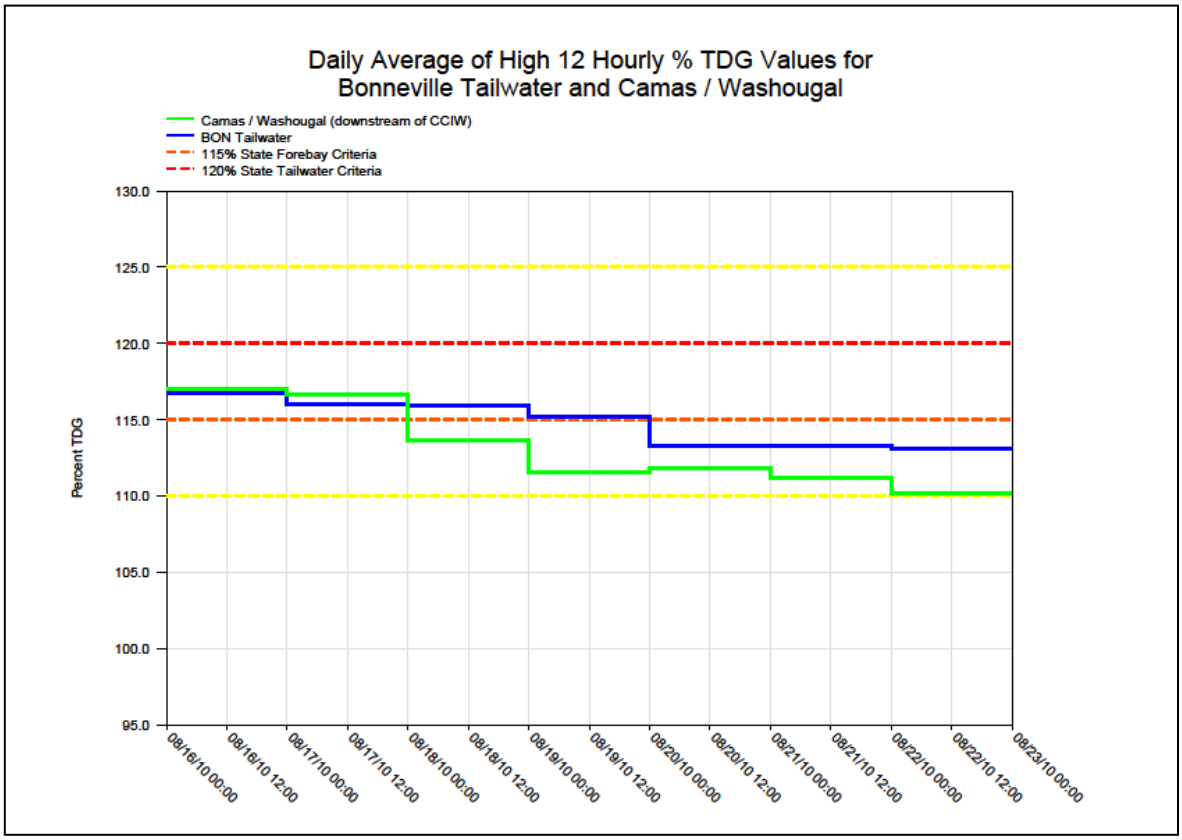

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/16/10 01:00
08/16/10 13:00
08/17/10 01:00
08/17/10 13:00
08/18/10 01:00
08/18/10 13:00
08/19/10 01:00
08/19/10 13:00
08/20/10 01:00
08/20/10 13:00
08/21/10 01:00
08/21/10 13:00
08/22/10 01:00
08/22/10 13:00
08/23/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/16/10 00:00
08/16/10 12:00
08/17/10 00:00
08/17/10 12:00
08/18/10 00:00
08/18/10 12:00
08/19/10 00:00
08/19/10 12:00
08/20/10 00:00
08/20/10 12:00
08/21/10 00:00
08/21/10 12:00
08/22/10 00:00
08/22/10 12:00
08/23/10 00:00

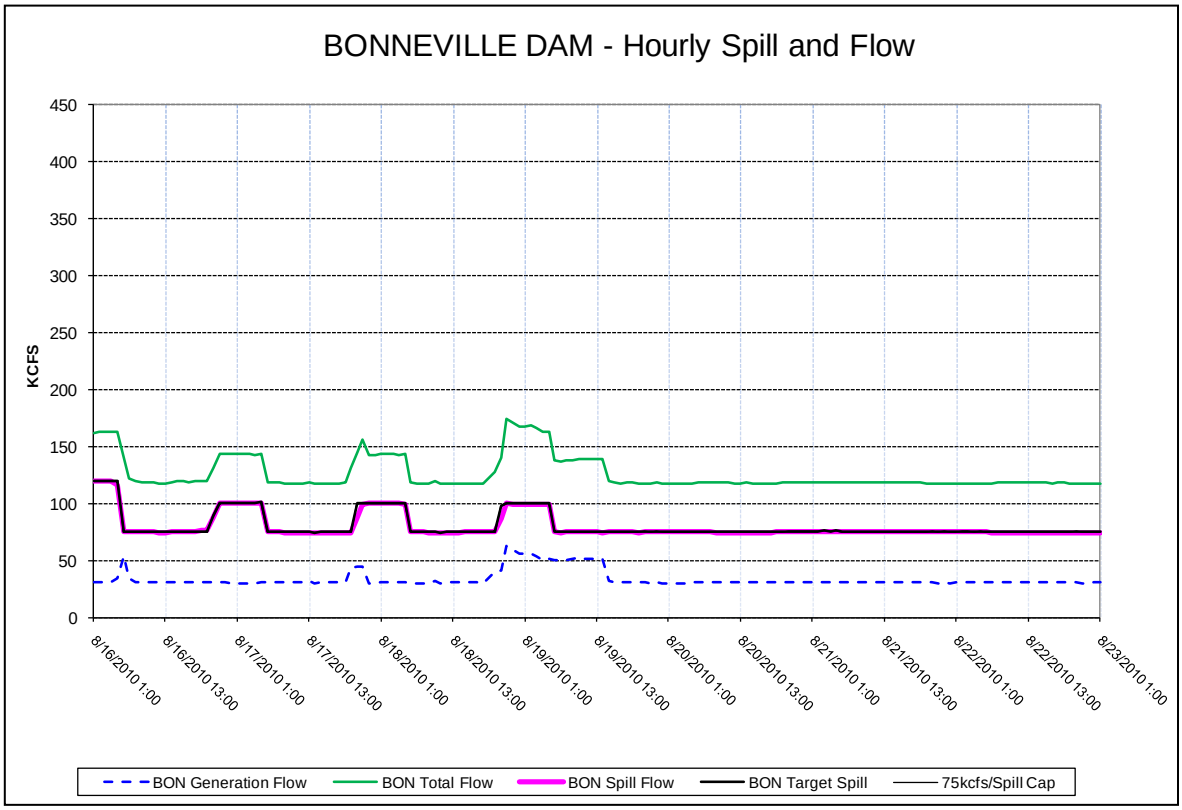
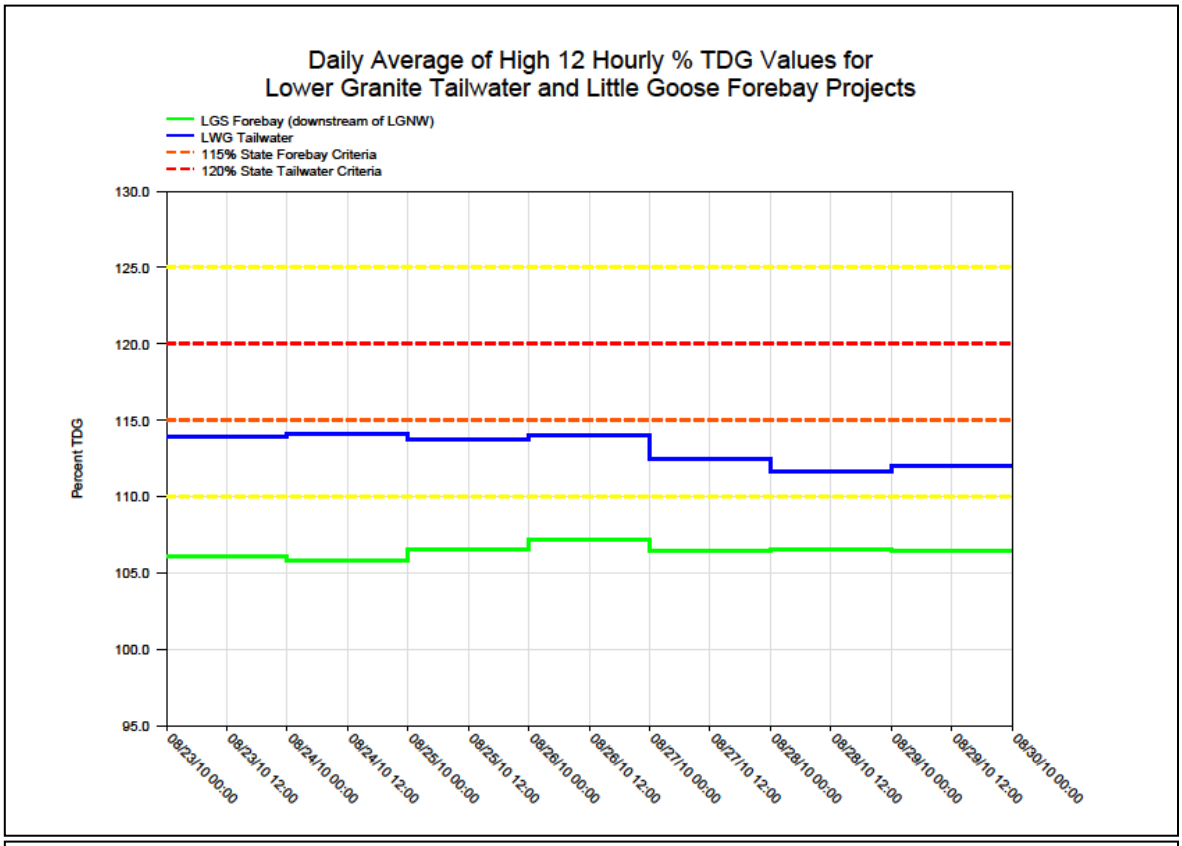

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/16/2010 1:00
8/16/2010 13:00
8/17/2010 1:00
8/17/2010 13:00
8/18/2010 1:00
8/18/2010 13:00
8/19/2010 1:00
8/19/2010 13:00
8/20/2010 1:00
8/20/2010 13:00
8/21/2010 1:00
8/21/2010 13:00
8/22/2010 1:00
8/22/2010 13:00
8/23/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs/Spill Cap

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

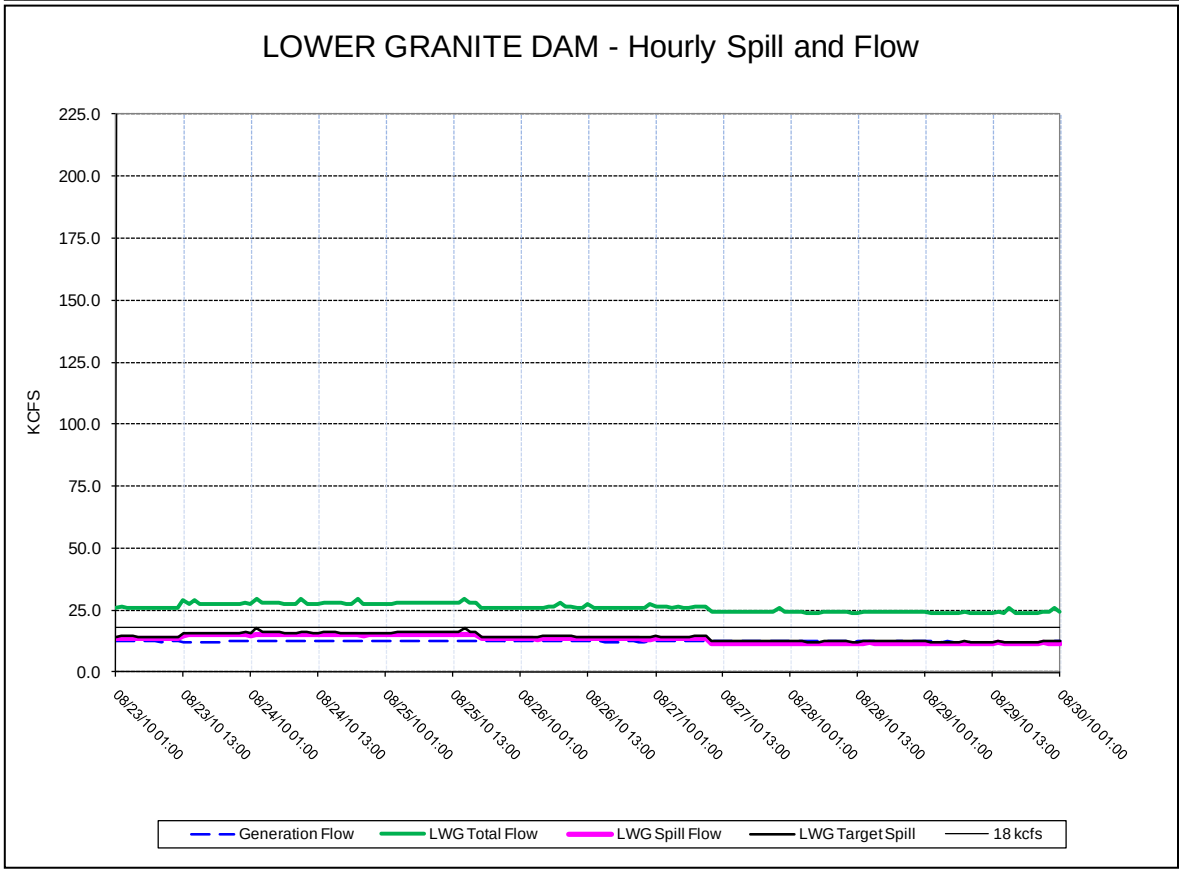
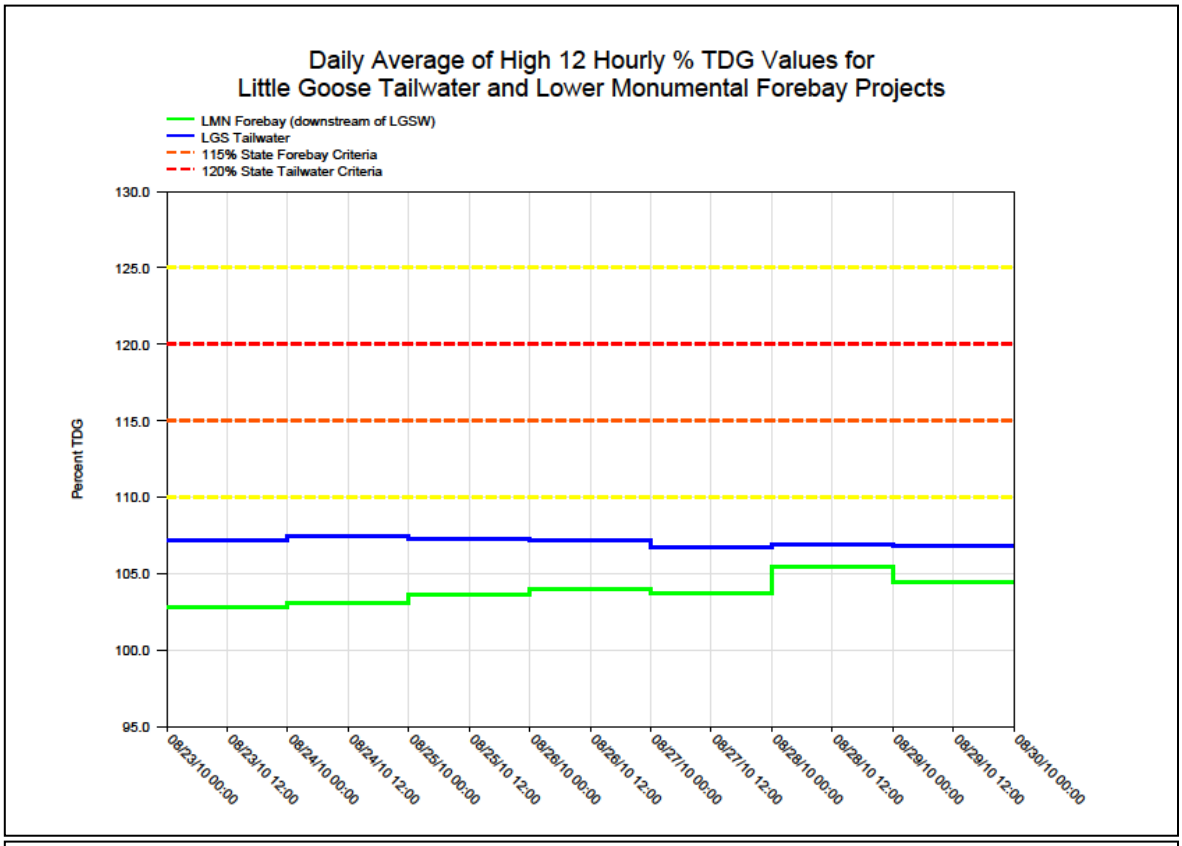

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

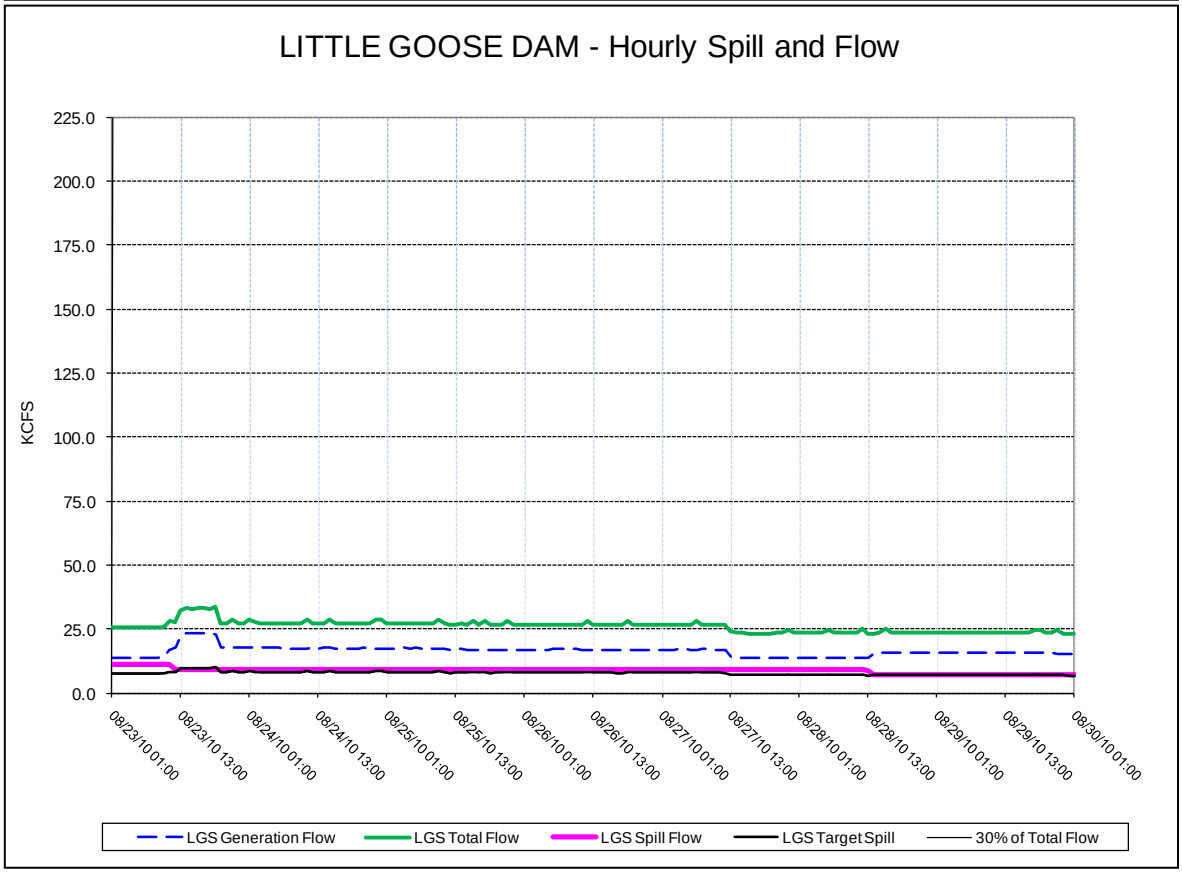
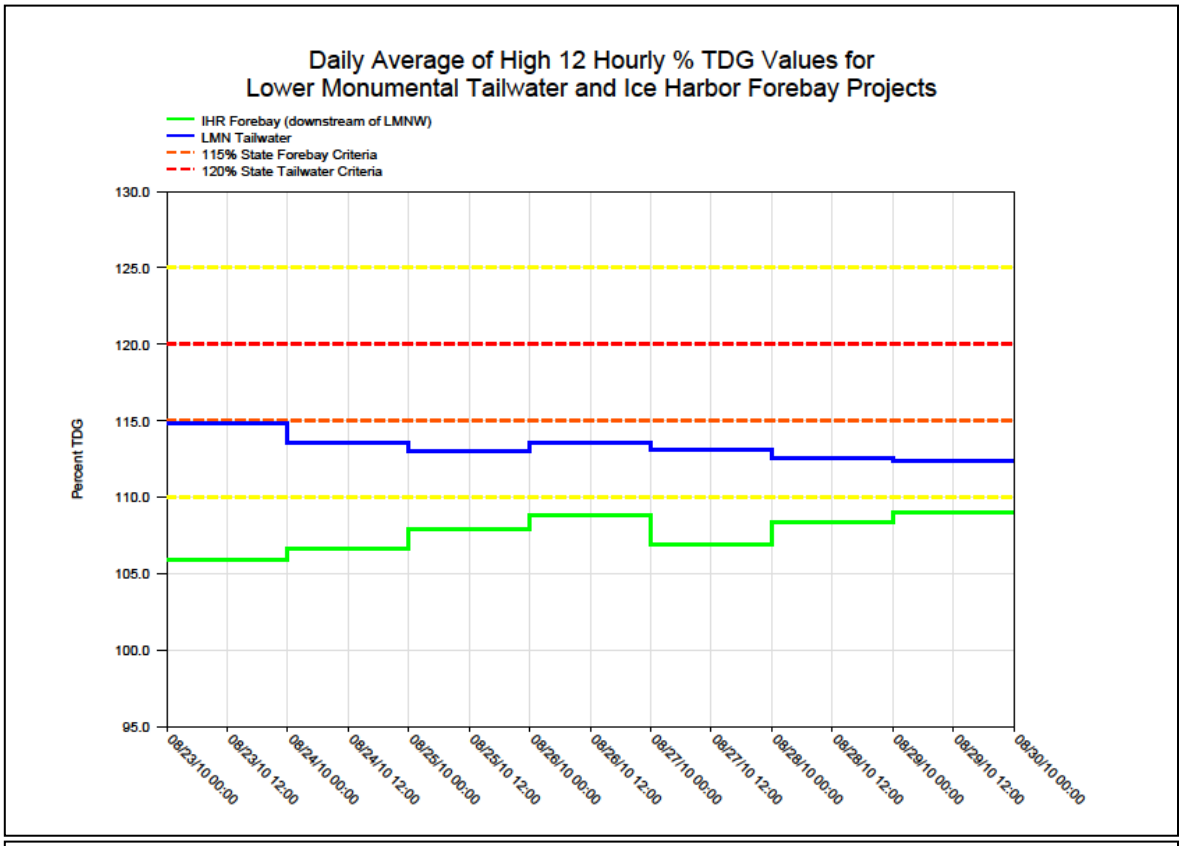

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

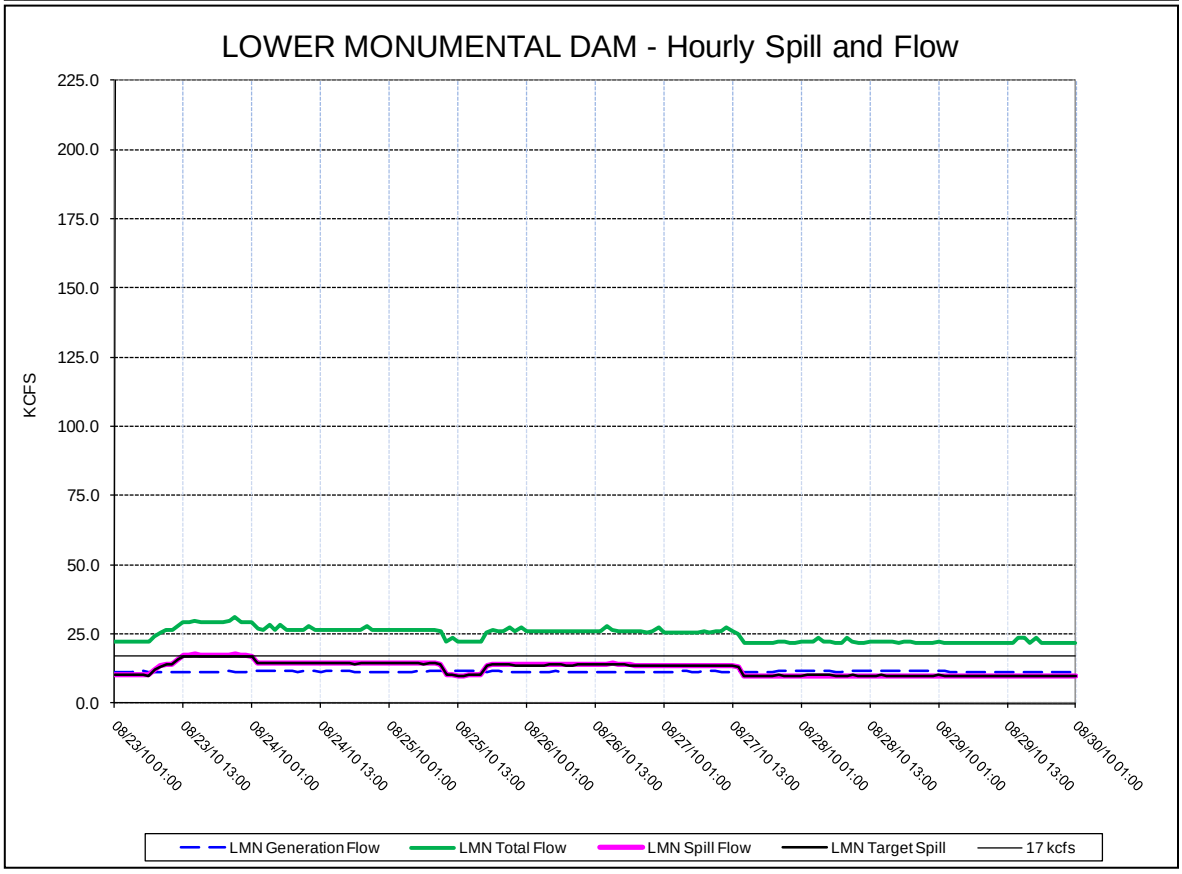
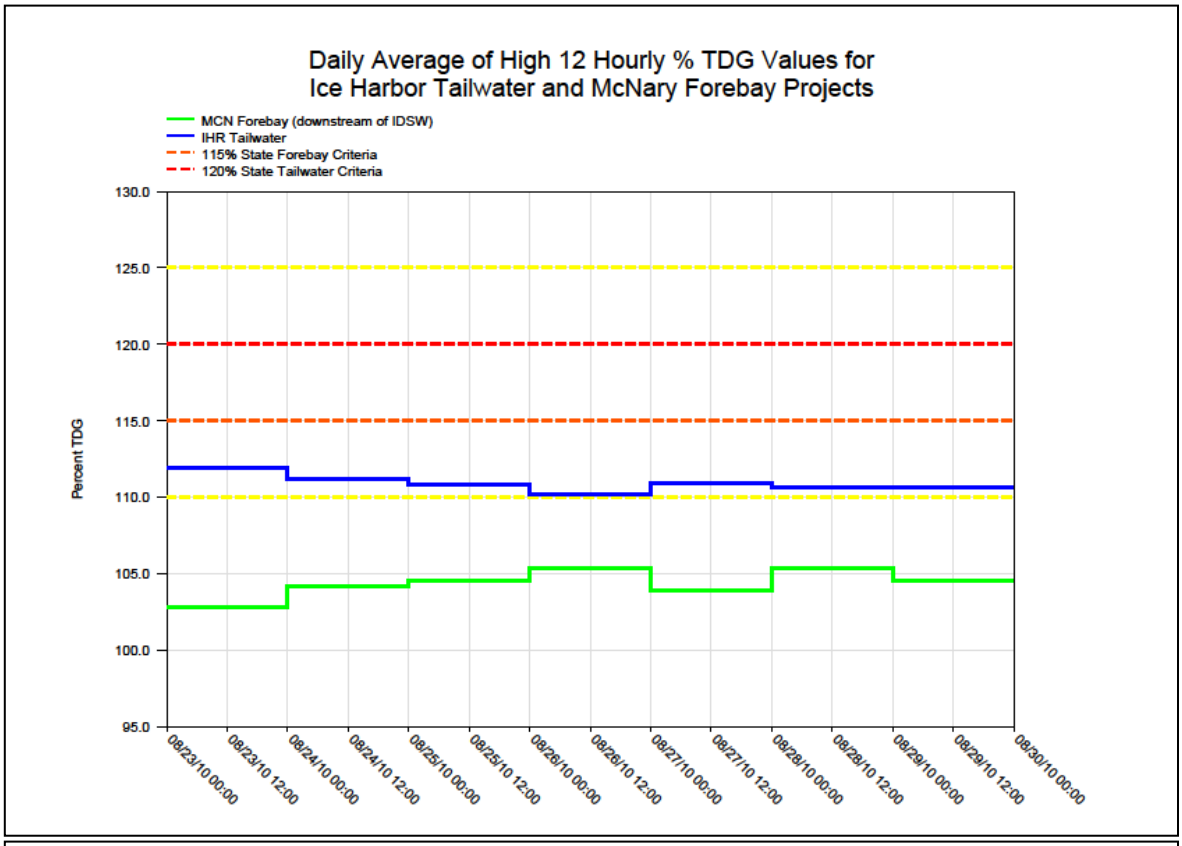

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 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 Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

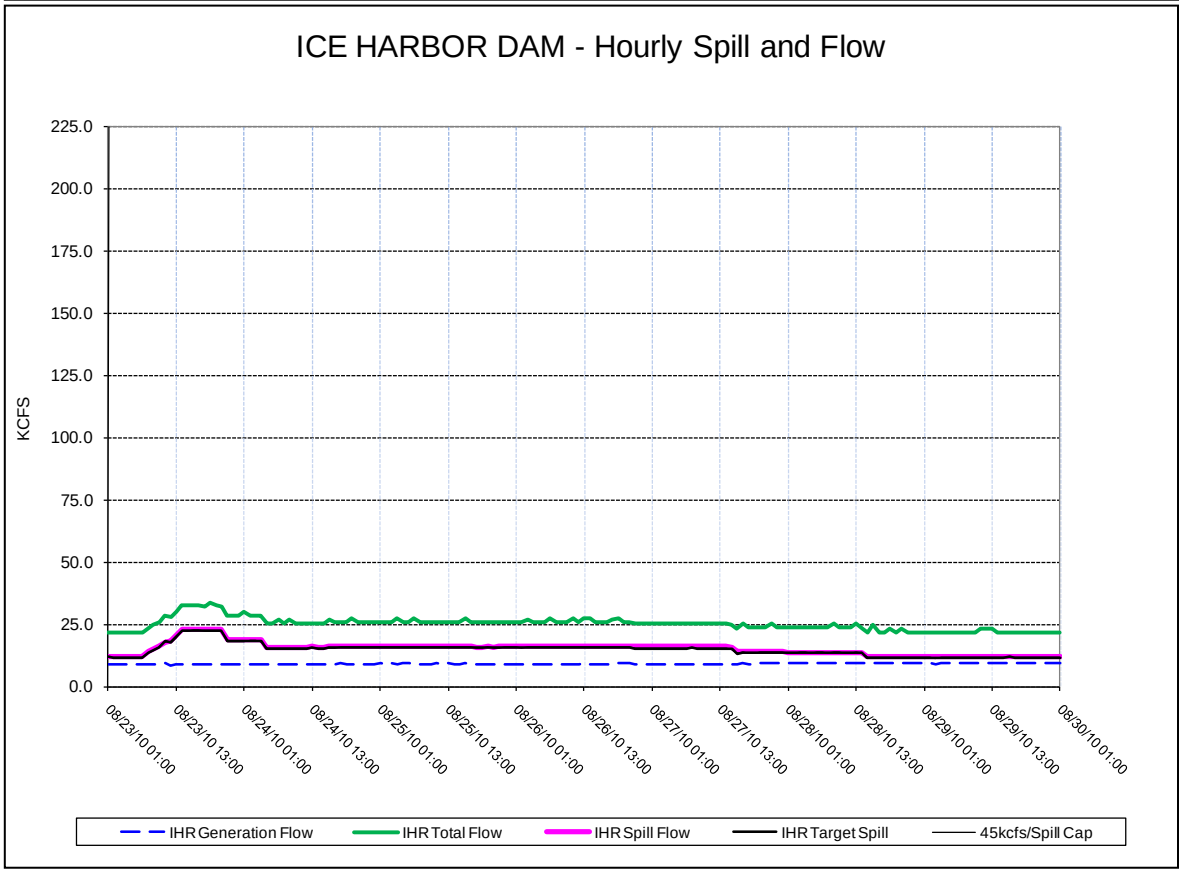
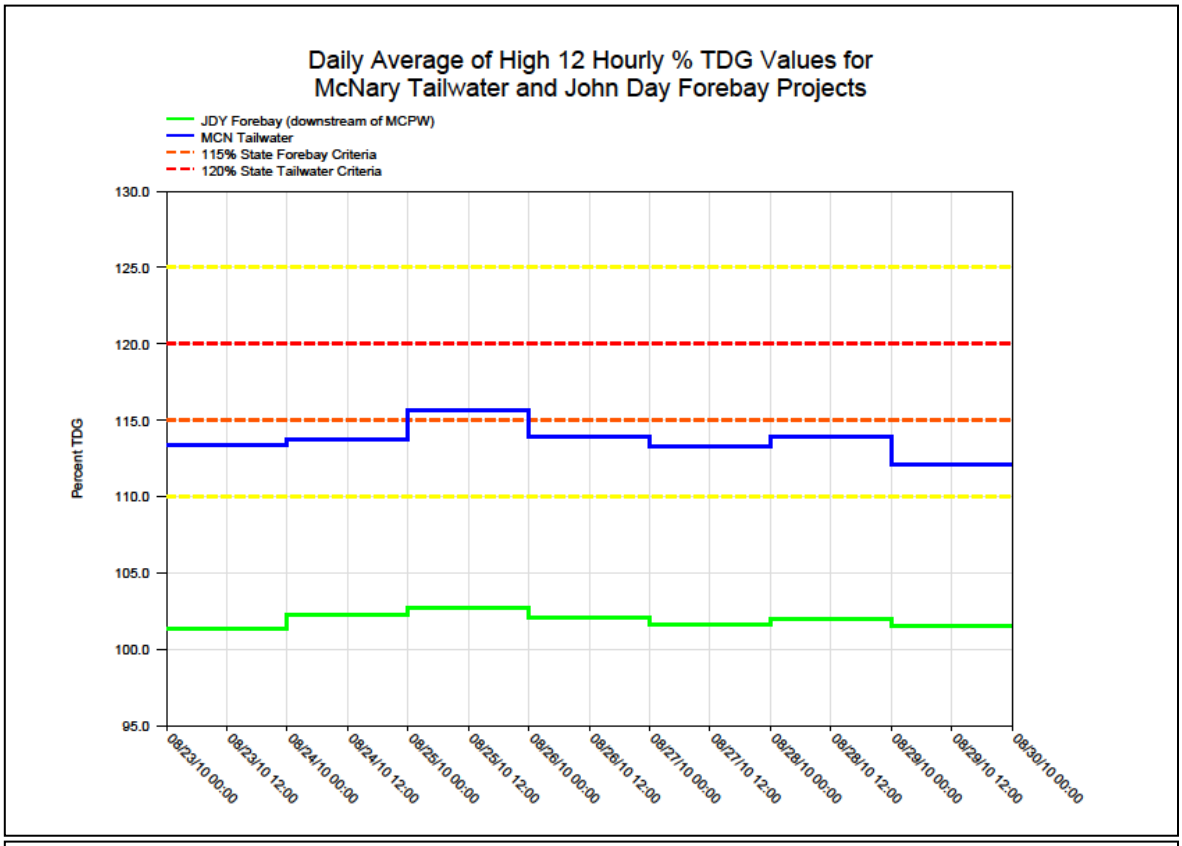

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

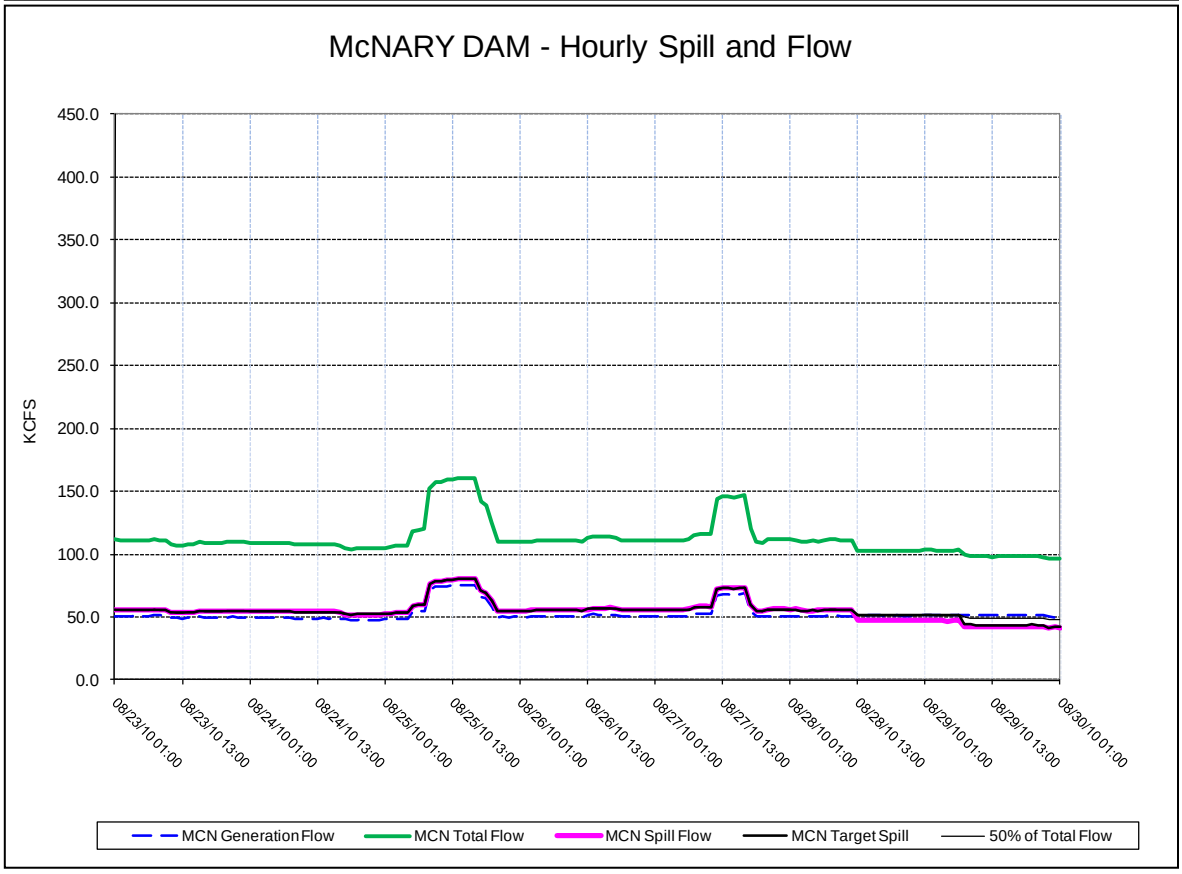
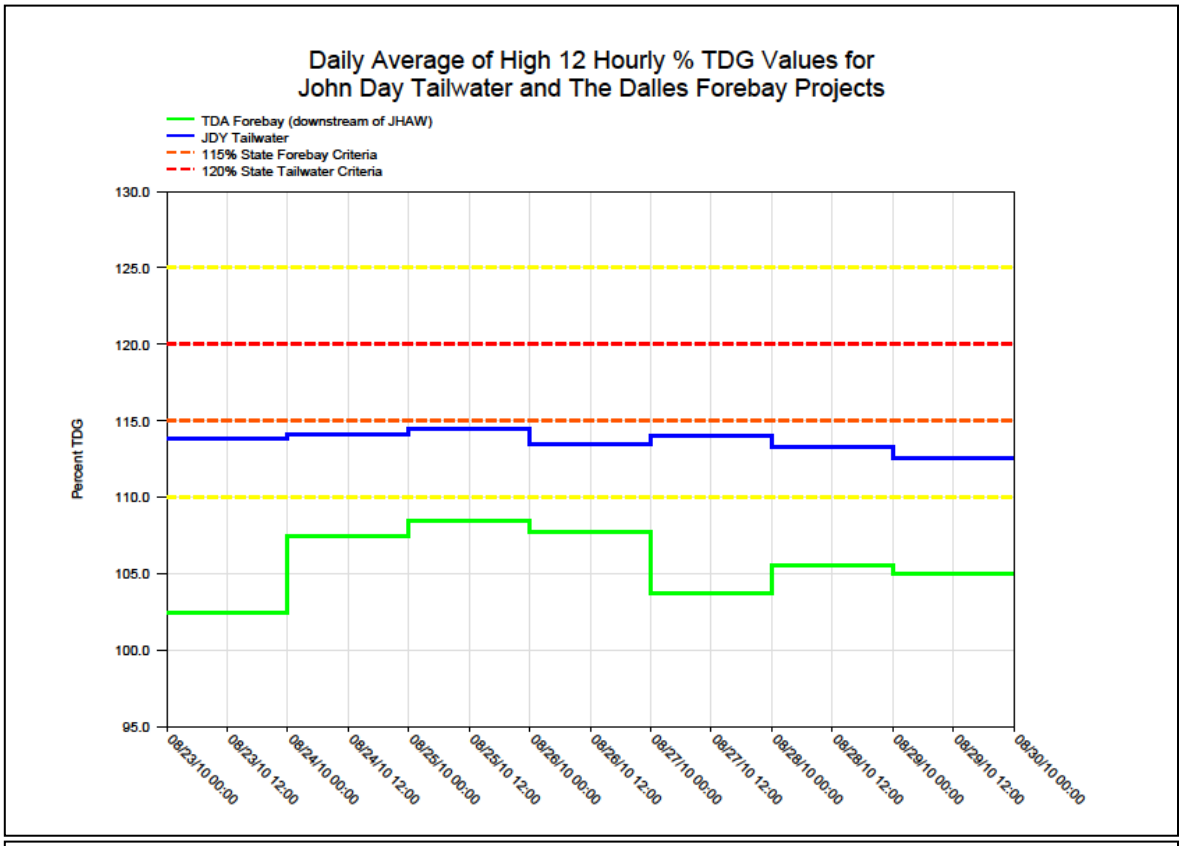

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

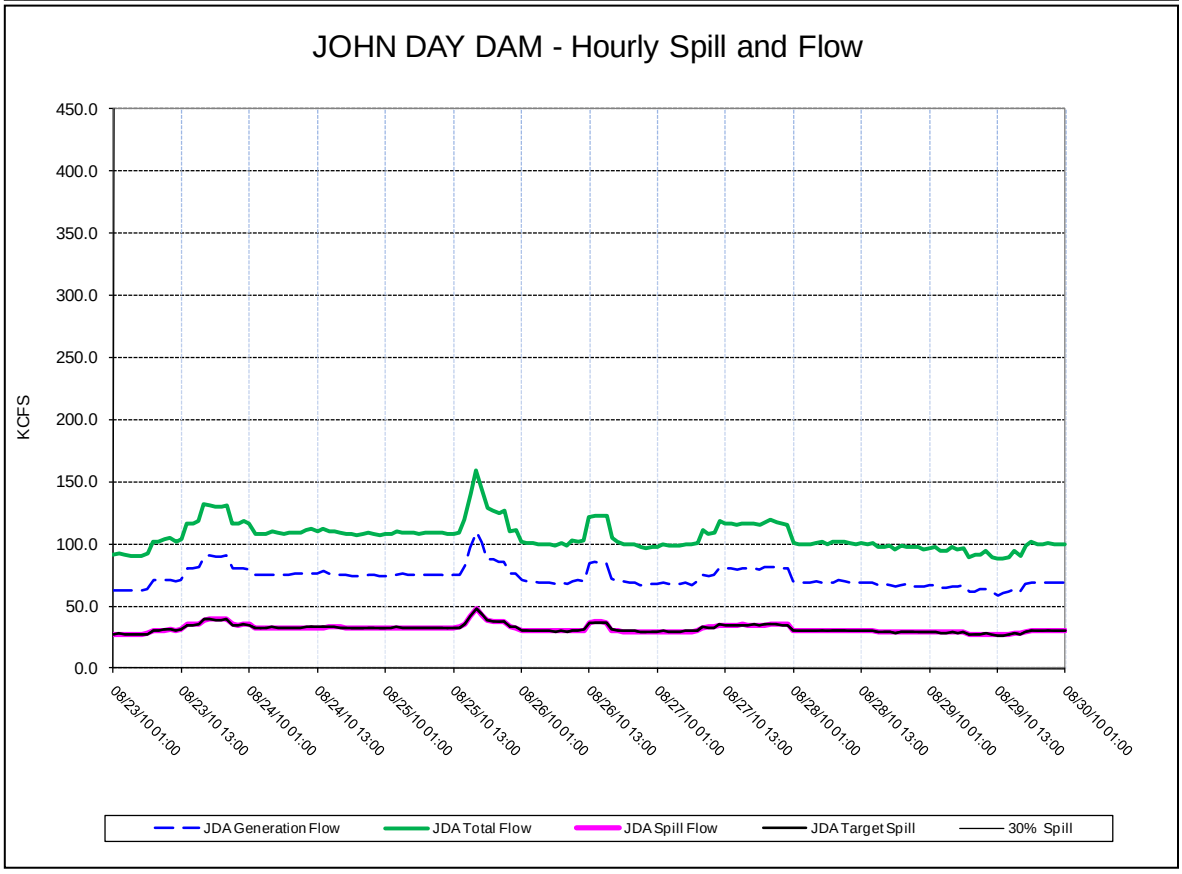
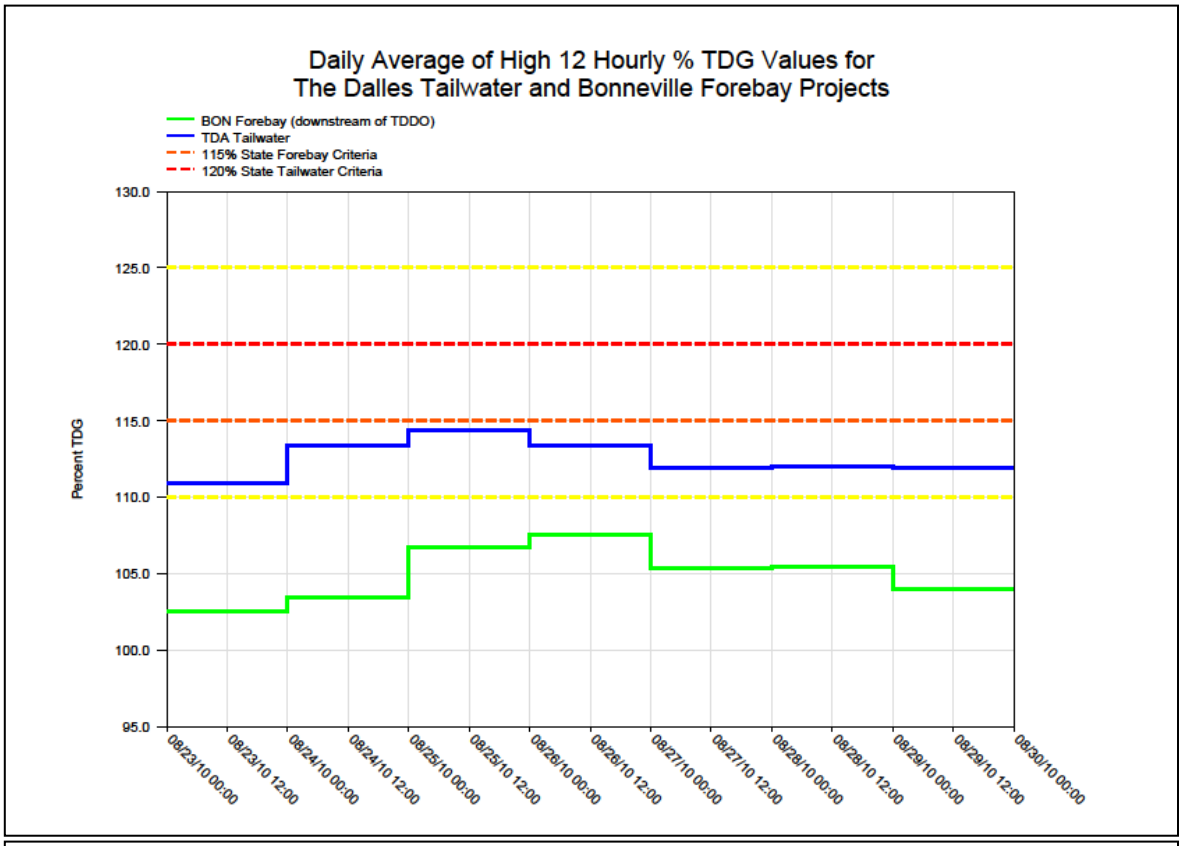

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

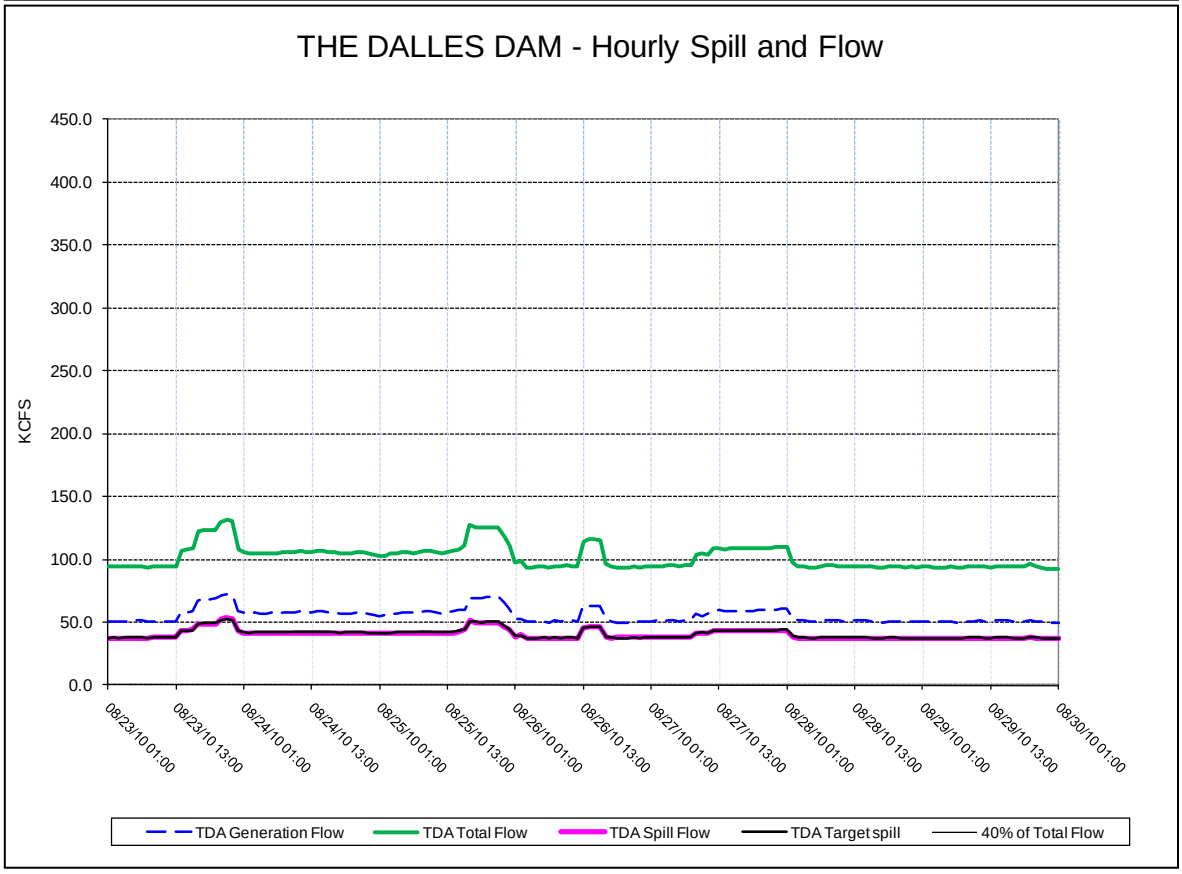
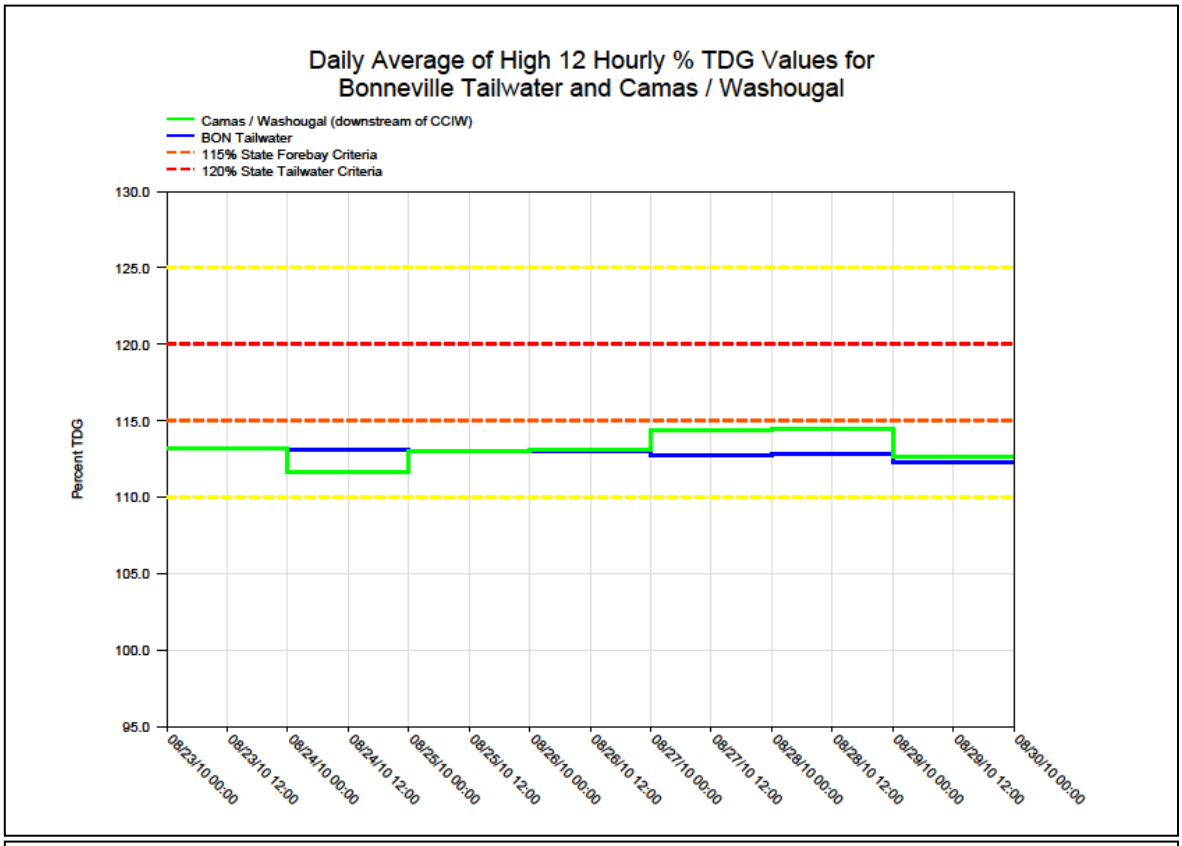

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/23/10 01:00
08/23/10 13:00
08/24/10 01:00
08/24/10 13:00
08/25/10 01:00
08/25/10 13:00
08/26/10 01:00
08/26/10 13:00
08/27/10 01:00
08/27/10 13:00
08/28/10 01:00
08/28/10 13:00
08/29/10 01:00
08/29/10 13:00
08/30/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/23/10 00:00
08/23/10 12:00
08/24/10 00:00
08/24/10 12:00
08/25/10 00:00
08/25/10 12:00
08/26/10 00:00
08/26/10 12:00
08/27/10 00:00
08/27/10 12:00
08/28/10 00:00
08/28/10 12:00
08/29/10 00:00
08/29/10 12:00
08/30/10 00:00

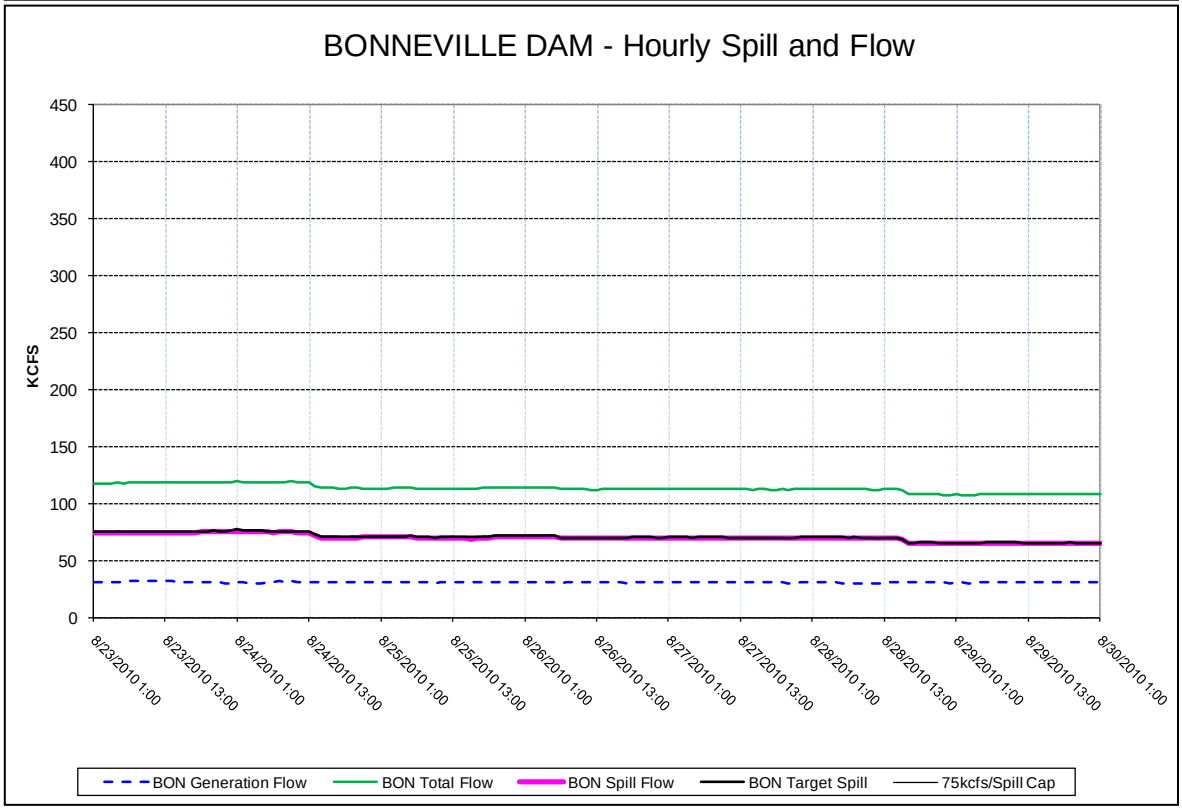
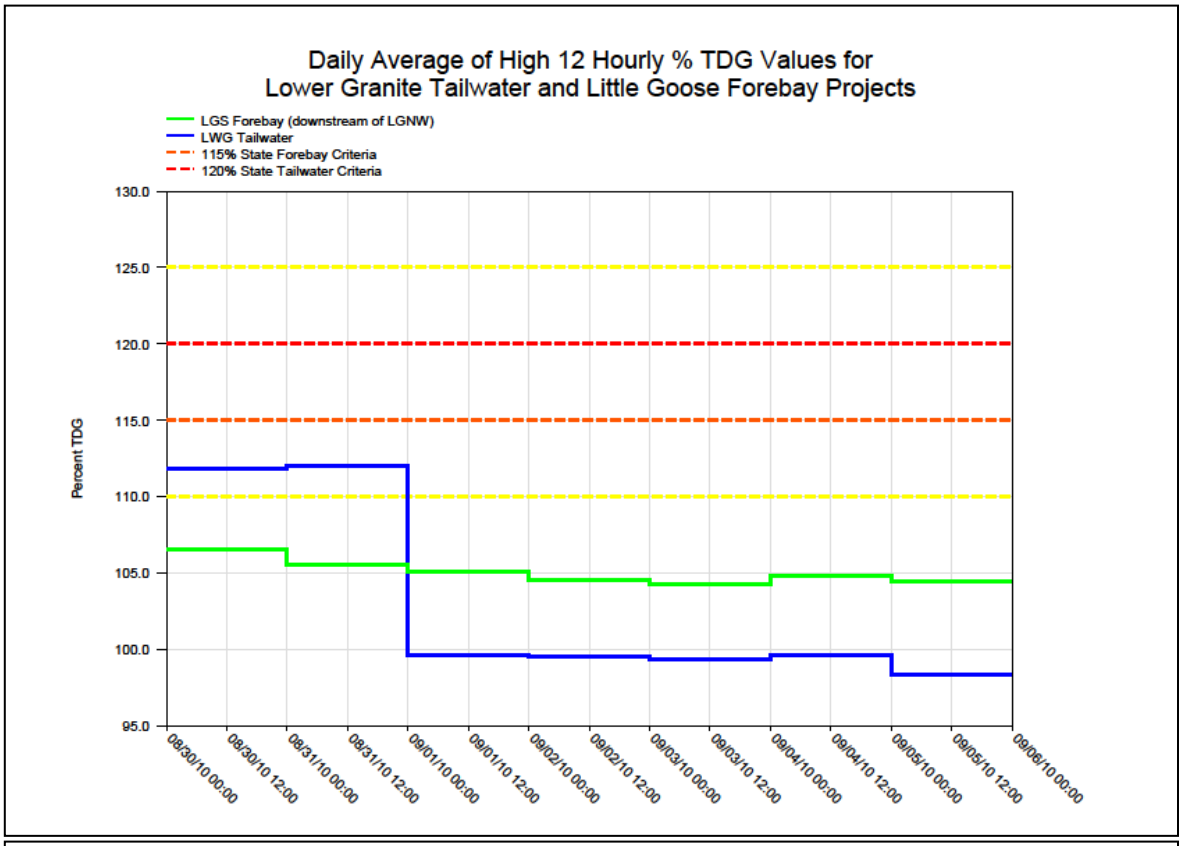

BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/23/2010 1:00
8/23/2010 13:00
8/24/2010 1:00
8/24/2010 13:00
8/25/2010 1:00
8/25/2010 13:00
8/26/2010 1:00
8/26/2010 13:00
8/27/2010 1:00
8/27/2010 13:00
8/28/2010 1:00
8/28/2010 13:00
8/29/2010 1:00
8/29/2010 13:00
8/30/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs/Spill Cap

Figure 33


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay Projects
LGS Forebay (downstream of LGNW)
LWG Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

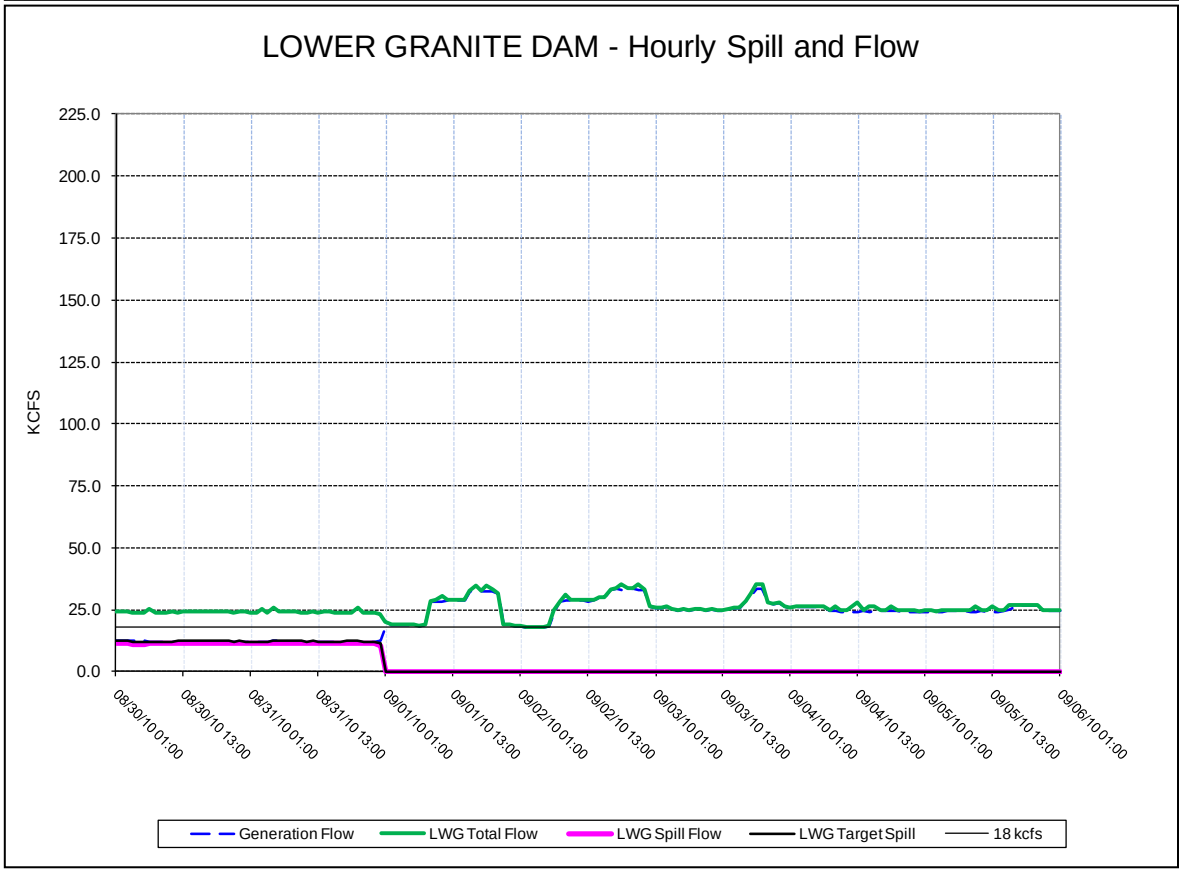
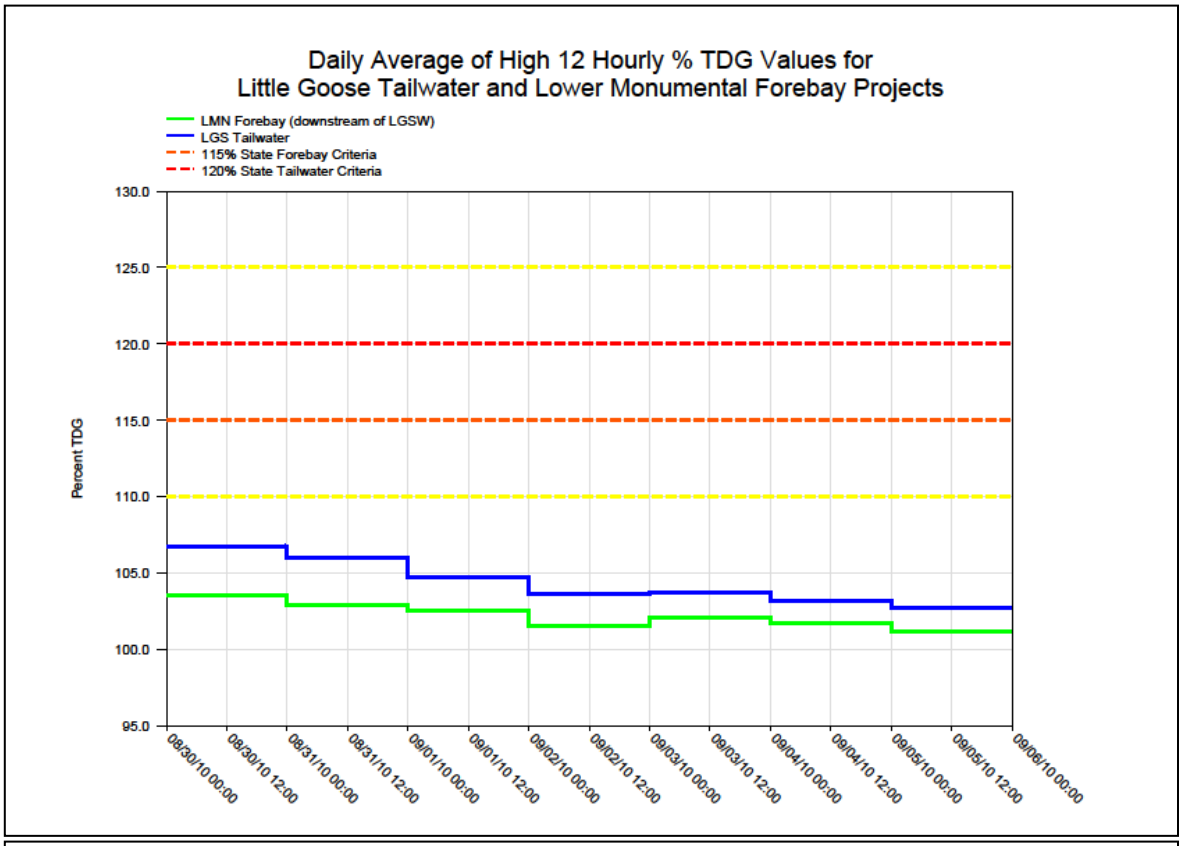

LOWER GRANITE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 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 Projects
LMN Forebay (downstream of LGSW)
LGS Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

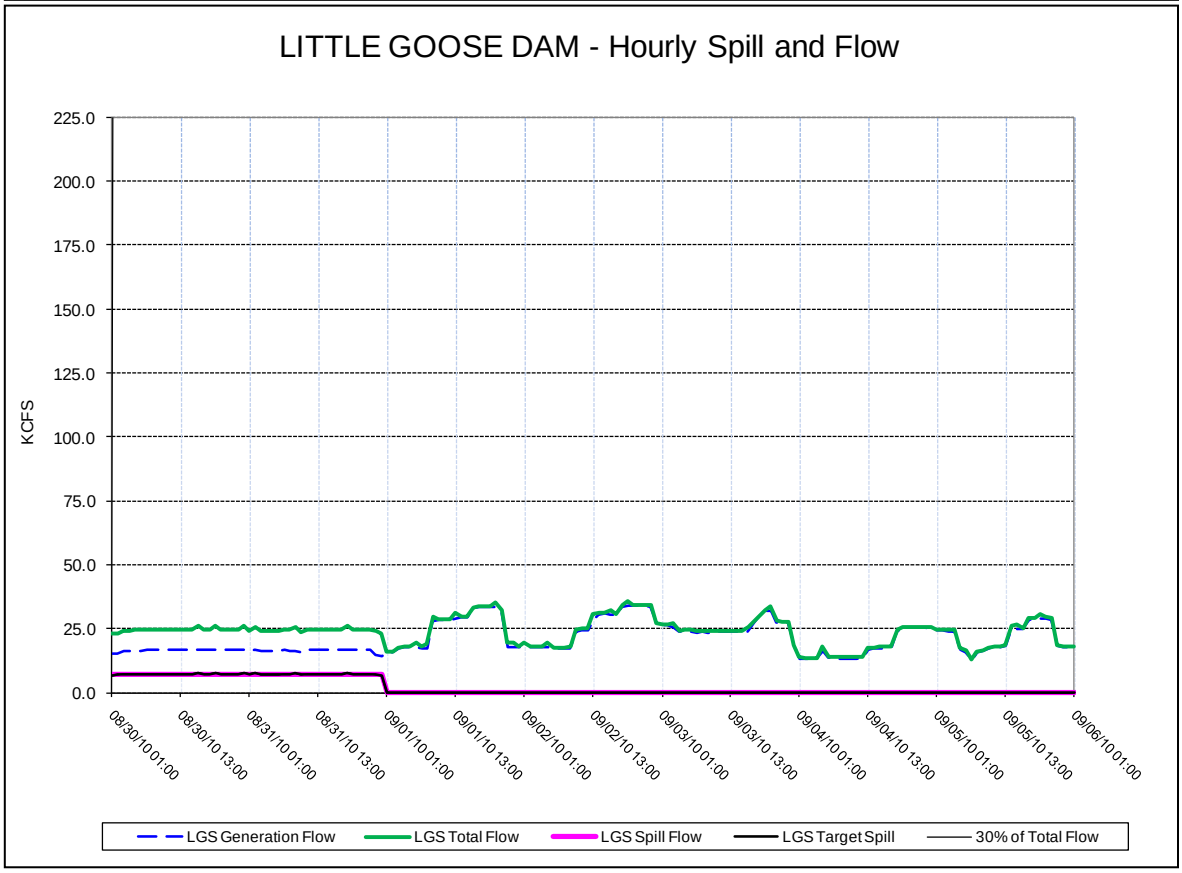
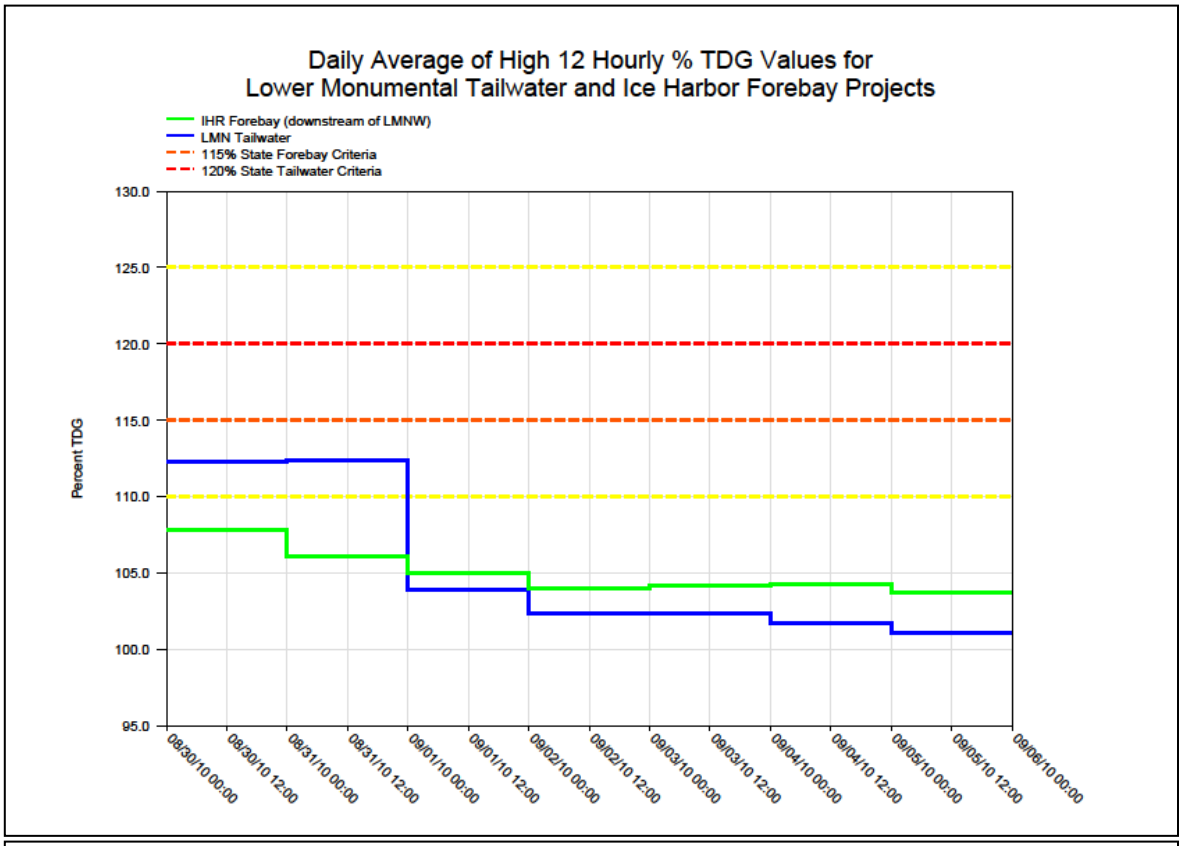

LITTLE GOOSE DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% of Total Flow

Figure 35


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay Projects
IHR Forebay (downstream of LMNW)
LMN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

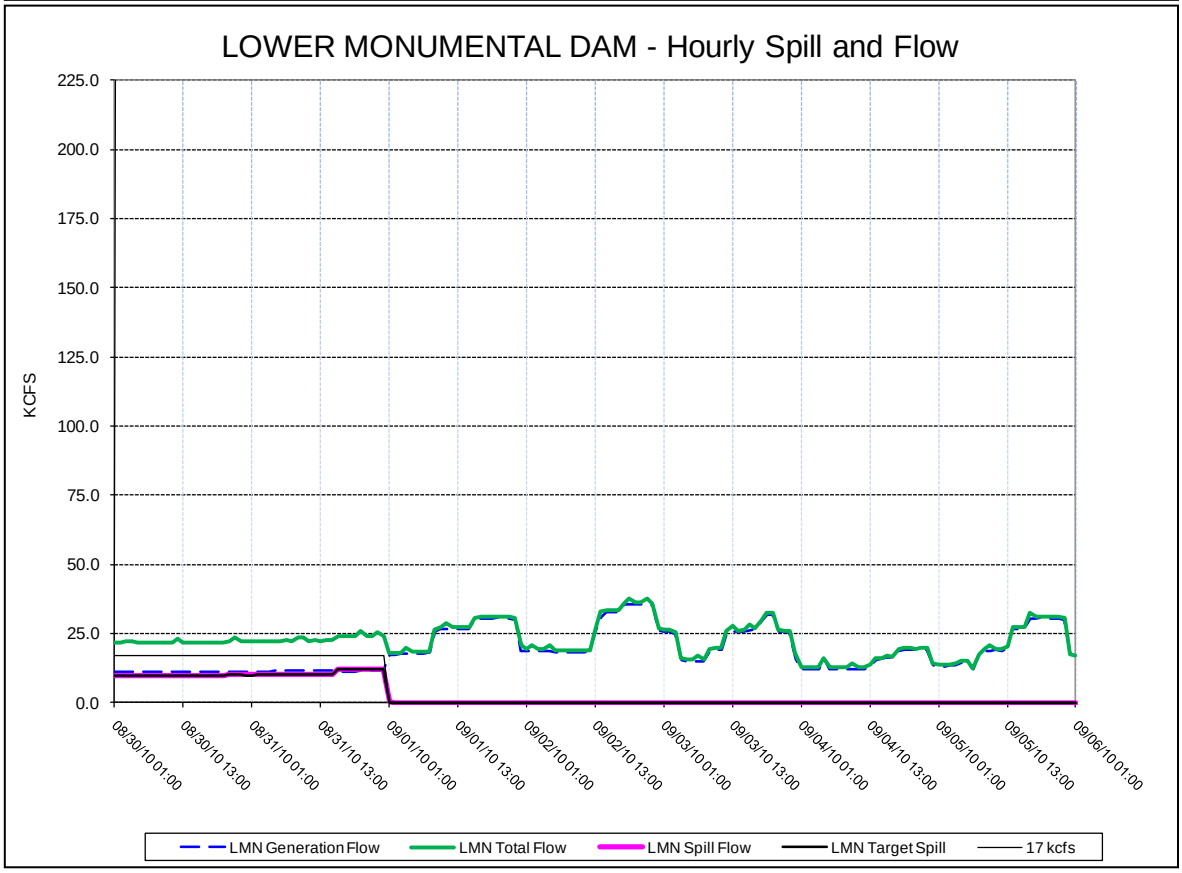
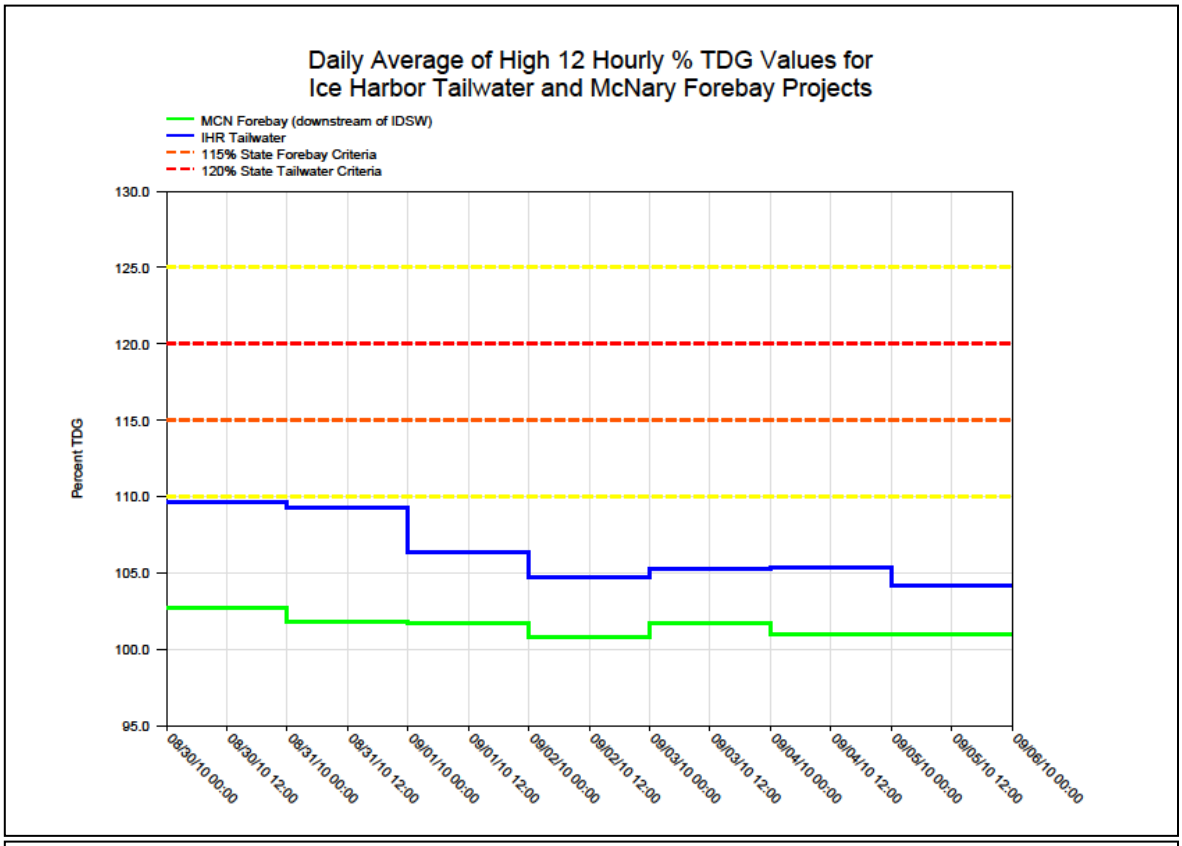

LOWER MONUMENTAL DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay Projects
MCN Forebay (downstream of IDSW)
IHR Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

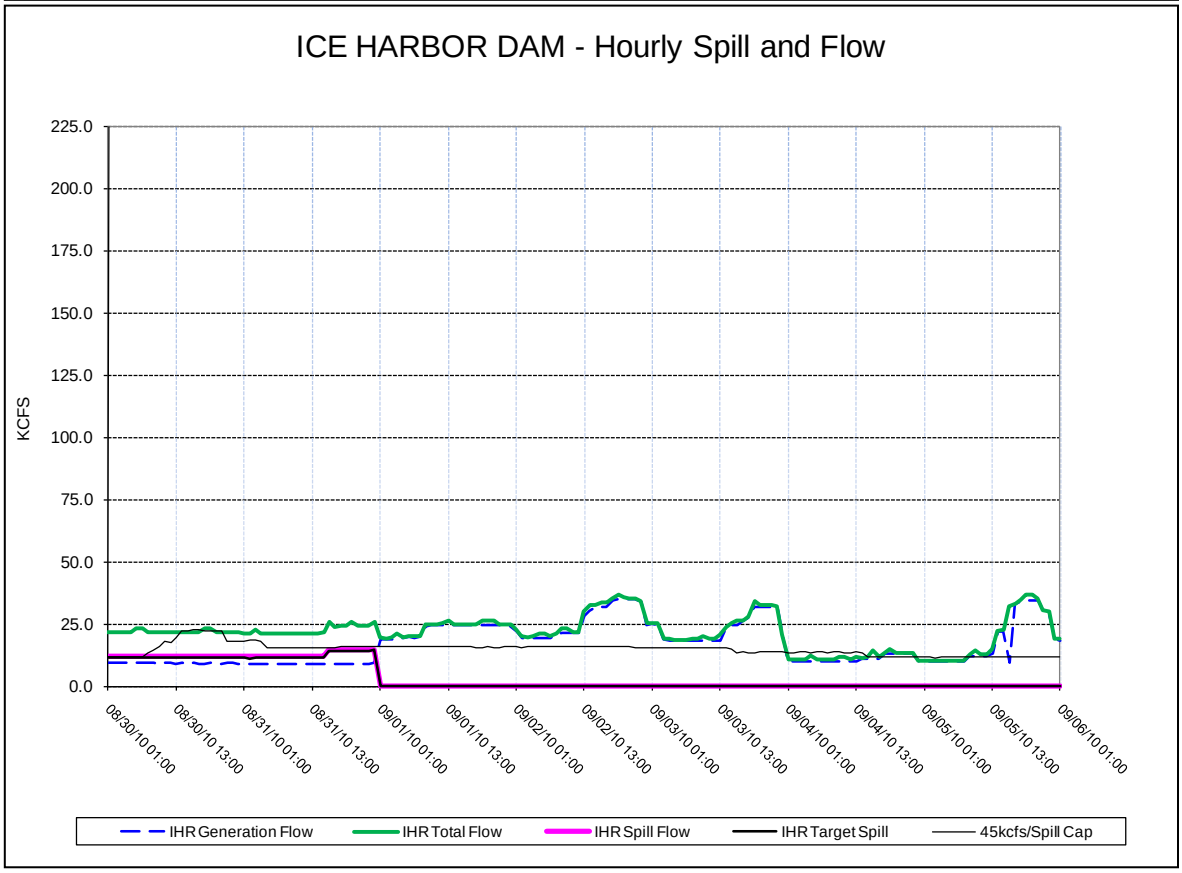
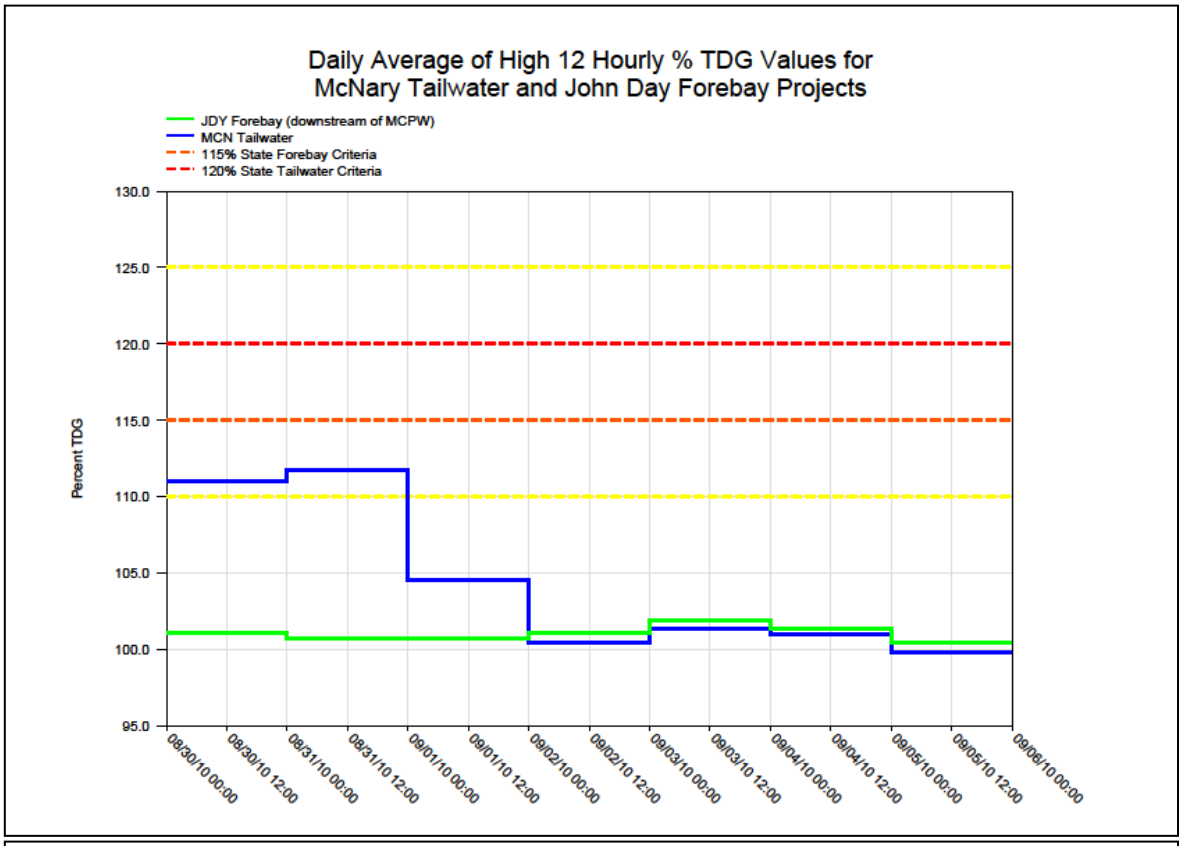

ICE HARBOR DAM - Hourly Spill and Flow
KCFS
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
45kcfs/Spill Cap

Figure 37


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay Projects
JDY Forebay (downstream of MCPW)
MCN Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

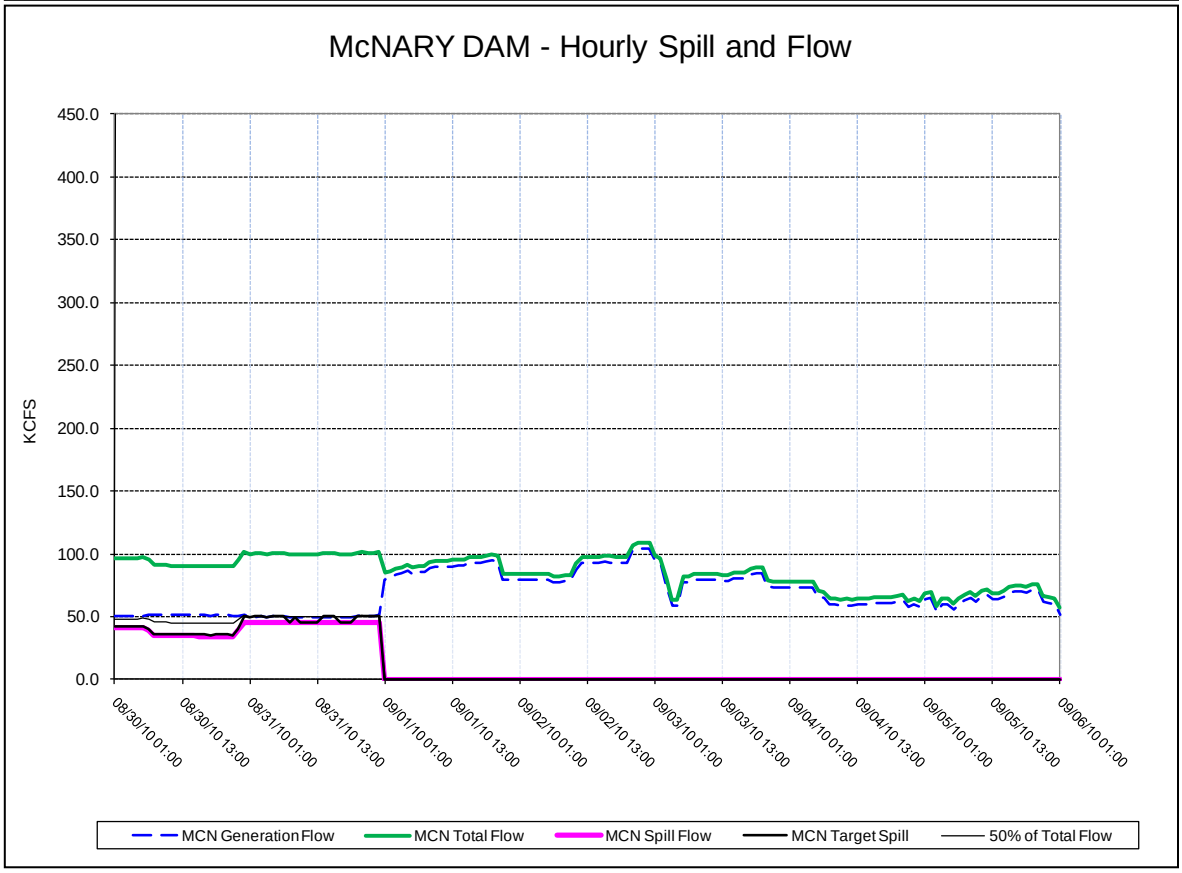
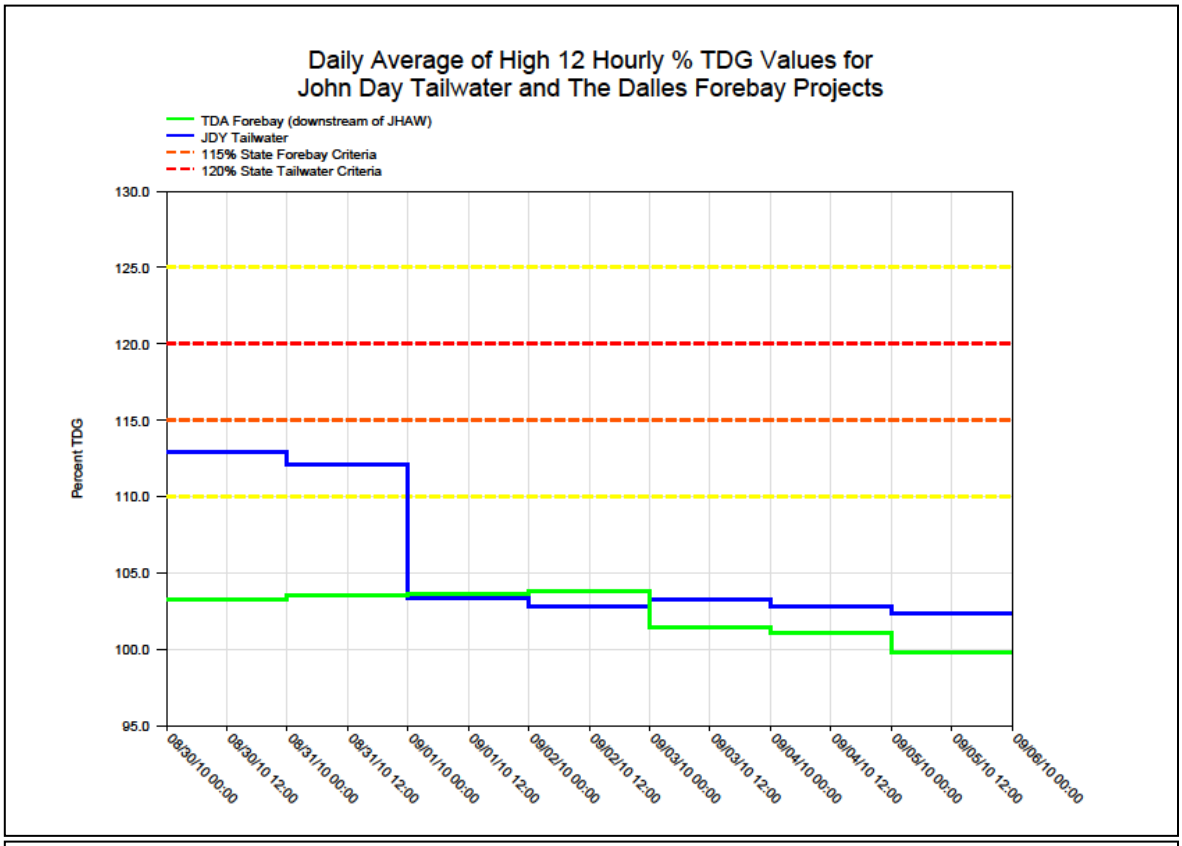

McNARY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 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 Projects
TDA Forebay (downstream of JHAW)
JDY Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

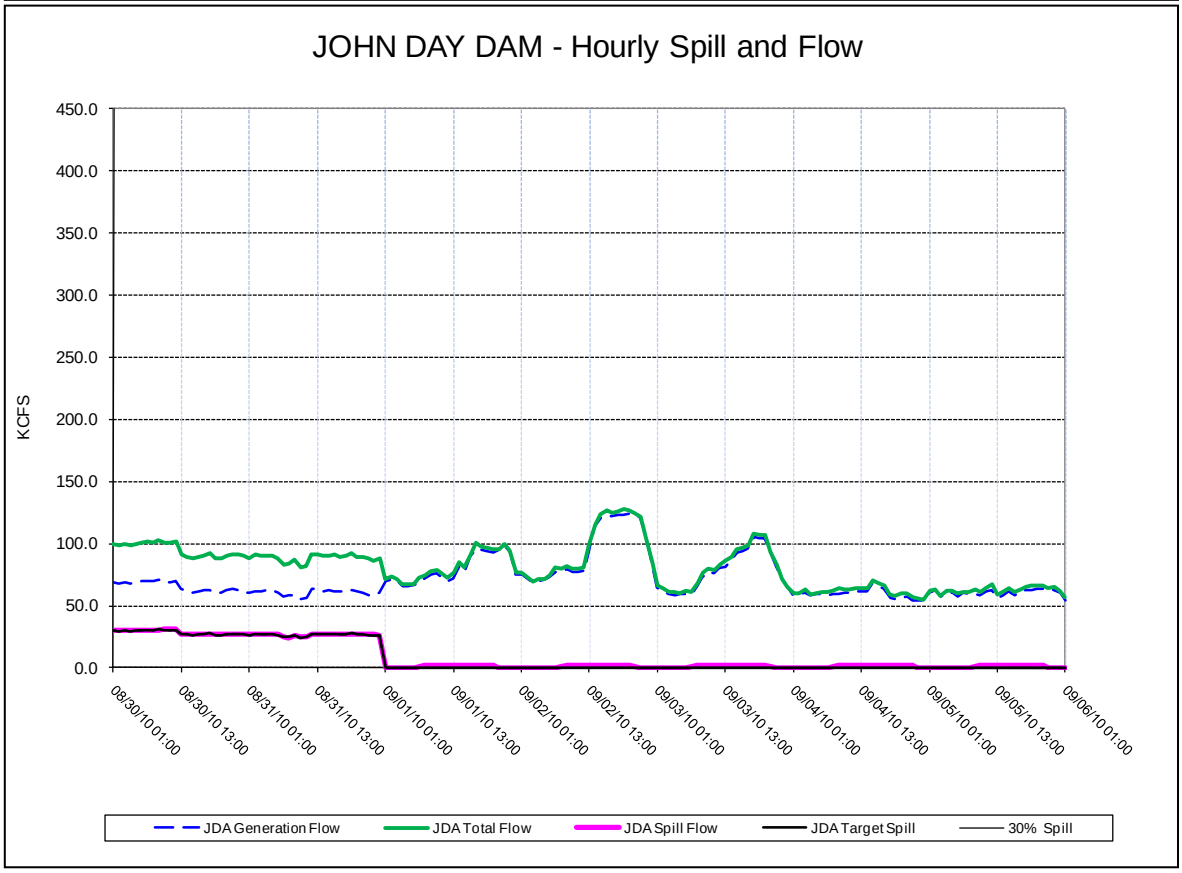
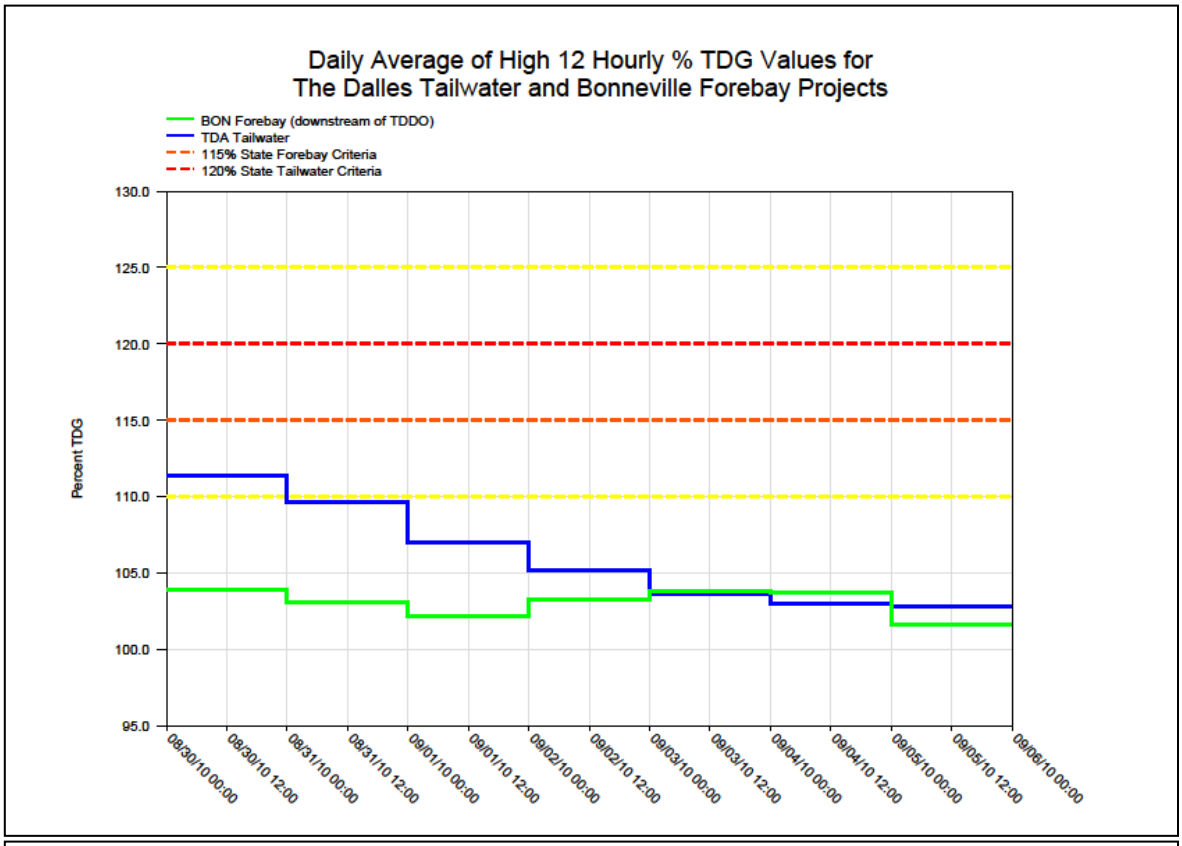

JOHN DAY DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 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 Projects
BON Forebay (downstream of TDDO)
TDA Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00

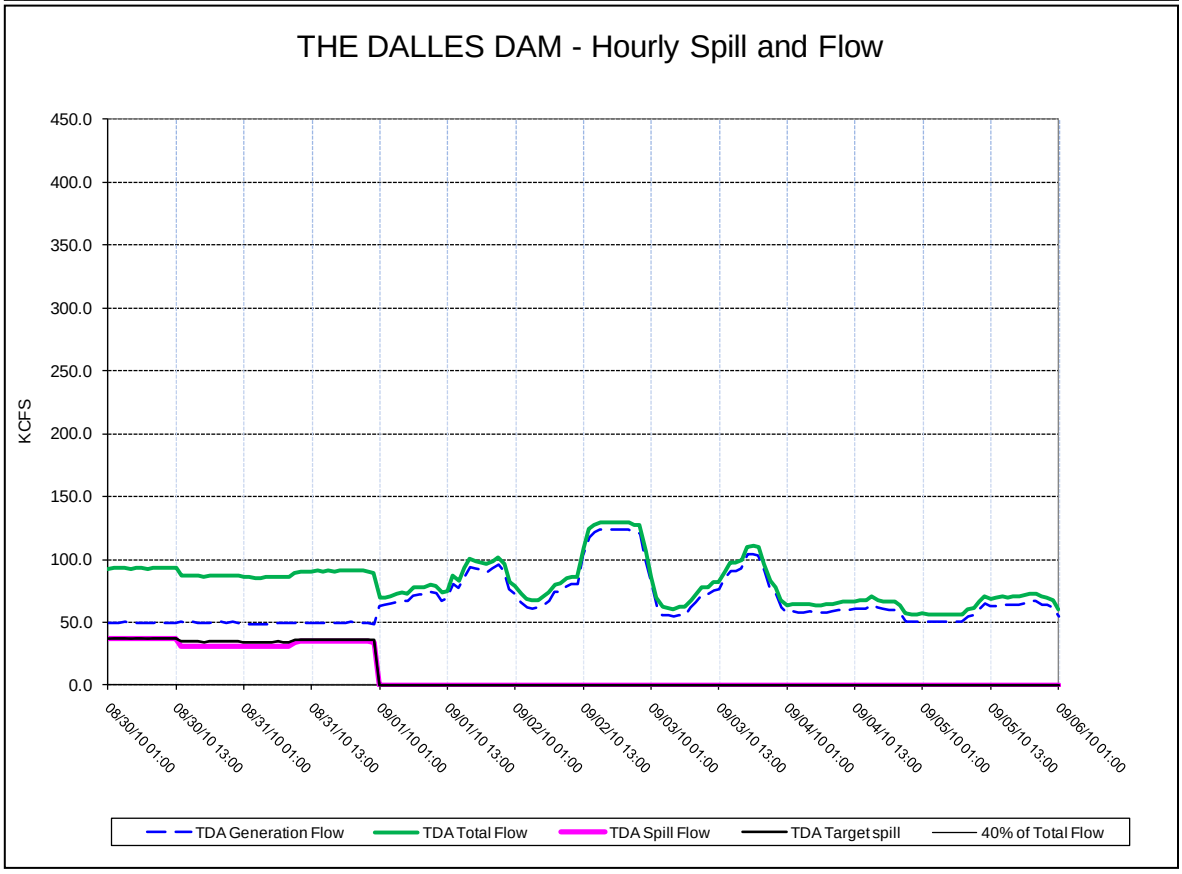
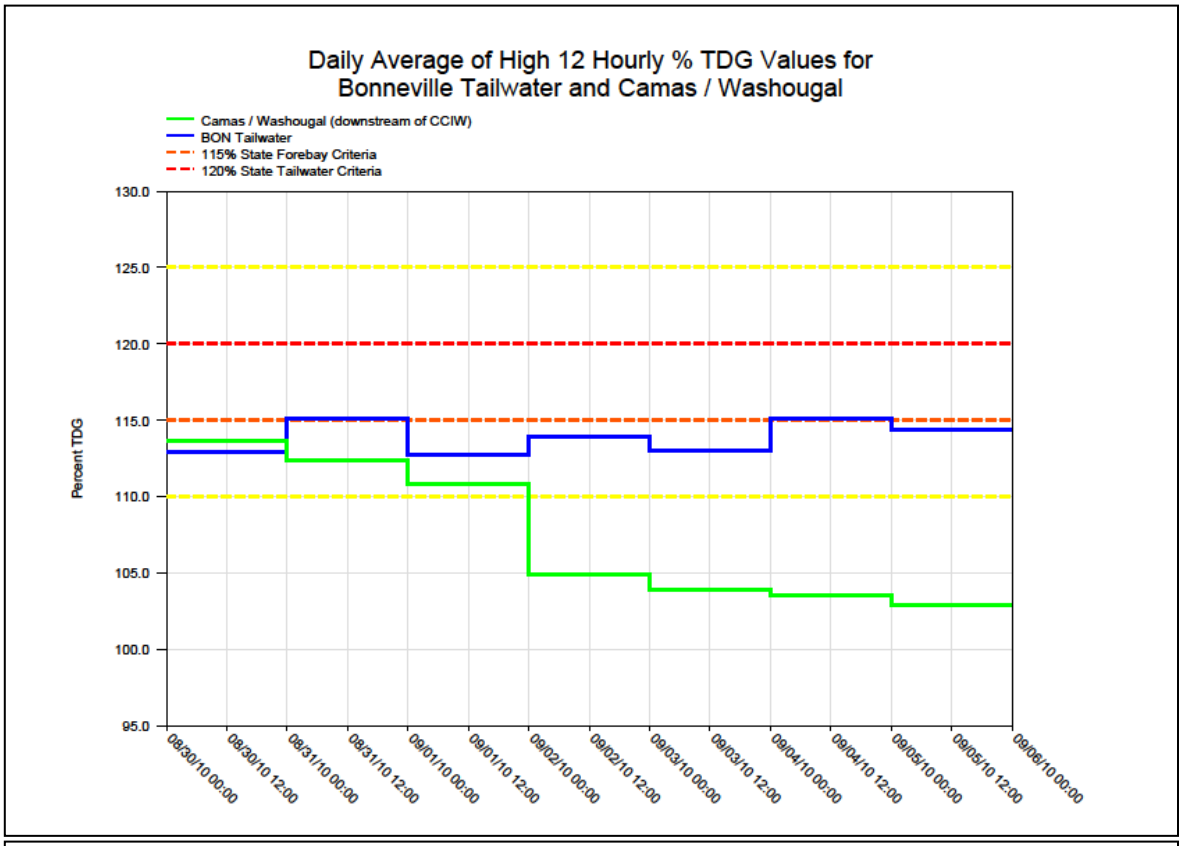
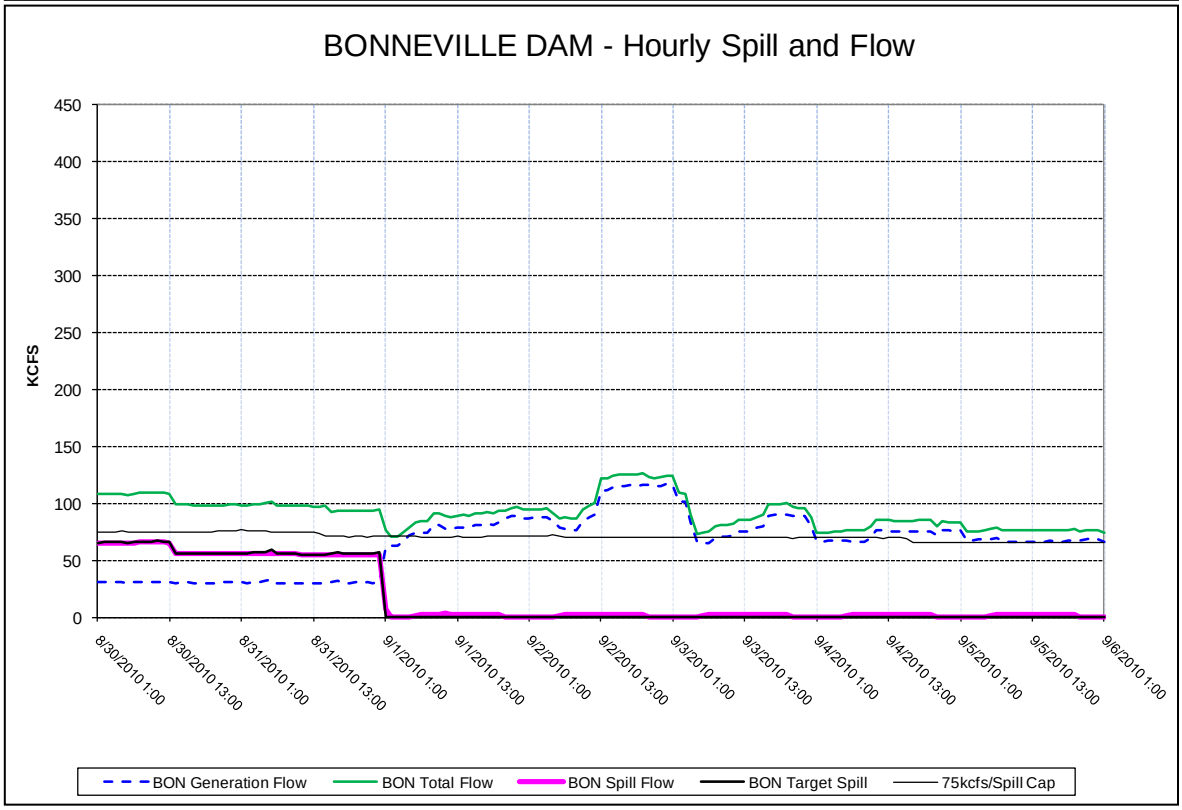

THE DALLES DAM - Hourly Spill and Flow
KCFS
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
08/30/10 01:00
08/30/10 13:00
08/31/10 01:00
08/31/10 13:00
09/01/10 01:00
09/01/10 13:00
09/02/10 01:00
09/02/10 13:00
09/03/10 01:00
09/03/10 13:00
09/04/10 01:00
09/04/10 13:00
09/05/10 01:00
09/05/10 13:00
09/06/10 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 and Camas / Washougal
Camas / Washougal (downstream of CCIW)
BON Tailwater
115% State Forebay Criteria
120% State Tailwater Criteria
Percent TDG
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
08/30/10 00:00
08/30/10 12:00
08/31/10 00:00
08/31/10 12:00
09/01/10 00:00
09/01/10 12:00
09/02/10 00:00
09/02/10 12:00
09/03/10 00:00
09/03/10 12:00
09/04/10 00:00
09/04/10 12:00
09/05/10 00:00
09/05/10 12:00
09/06/10 00:00


BONNEVILLE DAM - Hourly Spill and Flow
KCFS
450
400
350
300
250
200
150
100
50
0
8/30/2010 1:00
8/30/2010 13:00
8/31/2010 1:00
8/31/2010 13:00
9/1/2010 1:00
9/1/2010 13:00
9/2/2010 1:00
9/2/2010 13:00
9/3/2010 1:00
9/3/2010 13:00
9/4/2010 1:00
9/4/2010 13:00
9/5/2010 1:00
9/5/2010 13:00
9/6/2010 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
75kcfs/Spill Cap

Average Percent TDG for Highest 12-Hours: August 2 – August 31, 2010

Date	FIXED MONITORING STATIONS																
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW	CWMW
Gas Cap %	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115
08/02/2010	103.0	115.4	111.7	113.8	110.5	116.5	114.1	113.5	108.8	115.2	106.6	114.7	106.6	112.9	104.8	113.0	115.3
08/03/2010	103.1	115.2	111.5	113.1	110.5	116.6	114.1	114.6	108.7	116.5	106.3	114.9	106.2	112.9	105.2	113.7	114.5
08/04/2010	102.0	114.4	111.5	112.4	111.4	115.1	113.7	115.1	108.6	117.0	106.2	115.3	107.6	114.1	105.9	115.9	115.0
08/05/2010	102.4	115.2	113.1	110.8	112.9	116.9	114.4	113.8	108.9	116.5	106.6	115.4	109.0	115.3	107.6	116.2	114.5
08/06/2010	102.3	115.2	113.4	109.7	112.9	115.9	114.3	112.7	108.9	115.9	105.9	114.7	107.6	114.0	106.9	115.9	112.5
08/07/2010	101.8	114.8	113.5	109.3	112.2	115.4	113.8	113.3	109.5	116.8	104.8	114.3	104.9	112.5	105.3	115.7	114.0
08/08/2010	101.9	115.4	112.3	109.2	111.5	115.0	113.2	112.6	108.7	117.1	104.8	114.4	104.8	112.1	105.0	115.5	114.2
08/09/2010	100.6	114.9	111.7	109.0	110.9	116.7	112.8	114.2	107.5	115.5	104.3	114.0	104.5	111.5	104.1	115.5	112.6
08/10/2010	101.1	114.6	111.8	108.7	108.6	113.0	111.5	112.2	106.0	114.7	103.5	114.4	103.5	111.2	103.0	115.4	112.8
08/11/2010	101.3	114.8	110.4	108.6	108.2	115.0	110.4	111.5	105.7	116.4	103.1	115.2	104.7	112.2	103.2	115.7	114.0
08/12/2010	101.7	115.2	109.7	108.5	107.6	114.7	110.2	113.0	105.2	115.5	102.8	114.9	106.1	112.9	104.6	115.8	114.3
08/13/2010	101.1	115.4	109.9	108.4	107.4	115.2	109.8	113.8	105.6	115.2	102.7	114.7	105.8	112.8	105.6	115.7	114.6
08/14/2010	99.8	115.0	110.4	107.6	106.2	115.3	109.3	113.9	105.2	115.8	102.4	114.5	106.6	113.6	106.3	116.1	111.9
08/15/2010	99.7	114.1	108.8	107.6	105.9	114.1	109.1	111.1	105.4	114.7	102.0	114.6	106.9	112.7	108.1	116.4	114.9
08/16/2010	100.7	118.7	109.0	107.7	106.2	115.1	109.3	112.0	106.7	116.4	102.4	114.9	107.5	114.5	110.9	116.7	117.1
08/17/2010	101.3	117.4	110.6	107.8	107.1	129.8	109.7	113.7	108.2	116.8	103.8	115.2	108.3	114.8	111.6	116.1	116.6
08/18/2010	101.3	117.5	110.7	107.8	106.6	115.9	109.8	113.7	109.0	116.6	104.4	114.5	106.3	113.0	107.6	115.9	113.6
08/19/2010	101.8	118.7	110.0	107.9	105.6	115.6	109.3	113.8	108.1	115.3	103.9	114.5	104.5	112.1	104.6	115.2	111.6
08/20/2010	102.4	115.3	109.0	108.1	105.6	116.3	109.7	112.9	106.9	115.4	104.0	114.7	104.2	112.2	103.4	113.3	111.8
08/21/2010	102.0	115.3	108.6	108.0	105.7	115.9	109.4	114.0	106.4	115.0	103.9	113.9	104.5	111.4	102.8	113.3	111.2
08/22/2010	100.7	113.6	108.2	106.1	104.1	113.5	108.4	112.9	103.7	113.2	102.3	113.4	102.7	109.8	101.3	113.1	110.2
08/23/2010	99.4	113.9	106.1	107.2	102.8	114.8	105.9	112.0	102.8	113.3	101.3	113.9	102.4	110.9	102.5	113.2	113.1
08/24/2010	100.2	114.1	105.8	107.4	103.1	113.5	106.6	111.2	104.1	113.7	102.3	114.1	107.5	113.3	103.4	113.1	111.6
08/25/2010	100.6	113.7	106.6	107.2	103.6	113.0	107.9	110.8	104.5	115.7	102.7	114.5	108.4	114.3	106.7	113.0	113.0
08/26/2010	100.3	114.0	107.2	107.1	104.0	113.5	108.8	110.2	105.3	113.9	102.1	113.5	107.8	113.4	107.5	113.0	113.1
08/27/2010	99.9	112.4	106.4	106.7	103.7	113.1	106.9	110.9	103.9	113.3	101.6	114.0	103.7	111.9	105.3	112.7	114.4
08/28/2010	101.1	111.7	106.5	106.9	105.5	112.5	108.4	110.6	105.3	113.9	102.0	113.3	105.5	112.0	105.4	112.8	114.4
08/29/2010	102.3	112.0	106.4	106.8	104.4	112.3	109.0	110.7	104.6	112.1	101.5	112.5	105.0	111.9	103.9	112.3	112.7
08/30/2010	101.4	111.8	106.5	106.8	103.5	112.3	107.8	109.7	102.7	111.0	101.1	112.9	103.2	111.3	103.9	112.9	113.6
08/31/2010	100.1	112.0	105.5	106.0	102.8	112.3	106.0	109.3	101.8	111.7	100.7	112.1	103.5	109.6	103.0	115.1	112.4

Generated: Wednesday September 1, 2010

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

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

Effective April, 2006