

# **Appendix F**

## **% TDG Instance Tracking System**



## INTRODUCTION

The U.S. Army Corps of Engineers (Corps) tracks the number of instances that the percent TDG exceeds the 2007 Oregon and Washington water quality standards (WQS) and designates a cause for each instance during the spill for fish passage season, April 3 through August 31. Both Oregon and Washington states changed their water quality standards which would affect TDG instance tracking information provided in this appendix. The changes to the state WQS were not implemented in 2010 because of the NOAA Fisheries 2008 Biological Opinion litigation. Because of the litigation, the Corps operated consistent with the U.S. District Court of Oregon order, which means the previous TDG monitoring system with forebay gages and the method for calculating the 12 hour average used in 2007 continued through 2010. The 2007 Oregon and Washington specified method of calculating the “daily % TDG” is an average of the 12 highest hourly readings in a given day. This method of calculating the high 12 hour averages is called the Oregon/Washington method and is used for this appendix.

There are instances that occurred outside of the spill season, but they are not included in this report since they are not associated with spill for fish. The 2007 state WQS are 115 percent in the forebays and 120 percent in the tailwaters of the Columbia and Snake River dams, under the provisions of the state water quality exemptions granted by the states. The percent TDG instances are based on the daily high 12 hour average, except for those instances above 125 percent which are hourly. This information is provided to the Technical Management Team Regional Forum (TMT) and can be found at <http://www.nwd-wc.usace.army.mil/tmt/documents/ops/spill/> and also in Appendix E at the end of each monthly Court FOP Implementation Report.

Table F-1 provides a listing of the five causes (Types) that are designated to each percent TDG instances when the daily high 12 hour average is exceeded. These definitions of instance types have been evolving since 2003. From 2002 to 2008, 14 instance types were used and in 2009 the definitions were condensed to three main types and two sub-types, which included all the previous 14 instance types. Table F-2 designates a specific instance type for all the instances at the Corps’ lower Columbia River and lower Snake River projects. Tables F-3A and F-3B provide the total number of each percent TDG instance type for each project. Table F-4 provides the maximum hourly % TDG value and number of instances, both hourly and daily high 12 hour average, for all the Corps lower Columbia River and lower Snake River projects plus Chief Joseph Dam on the Middle Columbia River. Table F-5 provides a historical summary from 2001 to 2010 of the number of hours that exceeded the 125 percent TDG Oregon and Washington state standards during the spill season; Table F-6 breaks down the number of hours and range of %TDG instances over 125 percent per project for 2010.

Table F-7 gives a list of TDG gages that malfunctioned during the 2010 spill season and resulted in percent TDG instances. The gage data collected when a gage was malfunctioning is included in Tables F-2 and F-3 to show when a TDG instance from a malfunctioning gage occurred and appeared as part of the real-time operational review. Malfunctioning gage TDG instances are included as instance Type 2a. This data is

considered probably not representative of true conditions and are the result of a malfunctioning TDG gage, so in a sense, they may not necessarily be an instance, but without actual data we cannot say that conclusively. Tables F-4, F-5 and F-6 do not include the malfunctioning gage data since they provide statistical information on hourly TDG levels and the Corps chooses to use only data that we have a high level of confidence in.

**TABLE F-1  
TYPES OF PERCENT TDG INSTANCE TRACKING**

<b>Type 1 Condition</b>	<b>TDG levels exceed the TDG standard due to exceeding powerhouse capacity at run-of-river projects resulting in spill above the BiOp fish spill levels. This condition type includes:</b>
	<ul style="list-style-type: none"> <li>• High runoff flows and flood control efforts.</li> <li>• BPA load requirements are lower than actual powerhouse capacity.</li> <li>• Involuntary spill at Mid Columbia or lower Snake river dams resulting in high TDG levels entering the lower Columbia River.</li> </ul>
<b>Type 1a Condition</b>	<b>Planned and unplanned outages of hydro power equipment including generation unit, intertie line, or powerhouse outages.</b>
<b>Type 2 Exceedance</b>	<b>TDG exceedances due to the operation or mechanical failure of non-generating equipment. This exceedance type includes:</b>
	<ul style="list-style-type: none"> <li>• Flow deflectors unable to function for TDG abatement with tailwater elevations above 19 - 26 feet at Bonneville Dam.</li> <li>• Spill gates stuck in open position or inadvertently left open.</li> <li>• Increased spill in a bulk spill operation to pass debris.</li> <li>• Communication errors, such as teletype were transmitted but change was not timely made or misinterpretation of intent of teletype by Project operator.</li> </ul>
<b>Type 2a Exceedance</b>	<b>Malfunctioning FMS gauge, resulting in fewer TDG or temperature measurements when setting TDG spill caps.</b>
<b>Type 3 Exceedance</b>	<b>TDG exceedances due to uncertainties when using best professional judgment, SYSTDG model and forecasts. This exceedance type includes:</b>
	<ul style="list-style-type: none"> <li>• Uncertainties when using best professional judgment to apply the spill guidance criteria, e.g., travel time, degassing, and spill patterns.</li> <li>• Uncertainties when using the SYSTDG model to predict the effects of various hydro system operations, temperature, degassing, and travel time.</li> <li>• Uncertainties when using forecasts for flows, temperature and wind.</li> <li>• Unanticipated sharp rise in water temperature (a 1.5 degree F. or greater change in a day).</li> <li>• Bulk spill pattern being used which generated more TDG than expected.</li> </ul>

**TABLE F-2  
PERCENT TDG INSTANCE TYPE TRACKING  
APRIL 2010**

DATE	Lower	Lower	Little	Little	Lower	Lower	Ice	Ice	McNary	McNary	John	John	The	The	Bonn	Bonn	Camas
	Granite	Granite	Goose	Goose	Monum.	Monum.	Harbor	Harbor			Day	Day	Dalles	Dalles			
	Forebay	Tailrace	Forebay														
4/3/10	Spill Begins																
4/4/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/5/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/6/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/7/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/8/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/9/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/10/10	---	---	---	---	---	---	---	---	Spill Begins								
4/11/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/12/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/13/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/14/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/15/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/16/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/17/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
4/18/10	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
4/19/10	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
4/20/10	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
4/21/10	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	---
4/22/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/23/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/24/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/25/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/26/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/27/10	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	<b>3</b>	---	<b>3</b>
4/28/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/29/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4/30/10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>APRIL GRAND TOTAL = 16</b>																	

**TABLE F-2  
PERCENT TDG INSTANCE TYPE TRACKING  
MAY 2010**

DATE	Lower	Lower	Little	Little	Lower	Lower	Ice	Ice	McNary	McNary	John	John	The	The	Bon	Bon	Camas
	Granite	Granite	Goose	Goose	Monum.	Monum.	Harbor	Harbor			Day	Day	Dalles	Dalles			
	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay
5/1/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/2/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/3/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/4/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/5/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/6/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
5/7/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/8/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<b>3</b>
5/9/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	<b>3</b>	---	<b>3</b>
5/10/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
5/11/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	---
5/12/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	---
5/13/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	---
5/14/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
5/15/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	<b>3</b>	---	<b>3</b>
5/16/2010	---	---	<b>3</b>	---	---	---	<b>3</b>	---	---	---	---	---	---	---	<b>3</b>	---	<b>3</b>
5/17/2010	---	---	<b>3</b>	---	<b>3</b>	---	<b>3</b>	---	---	---	---	---	---	---	<b>3</b>	---	<b>3</b>
5/18/2010	---	---	---	---	<b>3</b>	---	<b>3</b>	---	---	---	---	---	---	---	---	---	---
5/19/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/20/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/21/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/22/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/23/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/24/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/25/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/26/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/27/2010	---	---	---	---	---	---	<b>3</b>	---	---	---	---	---	---	---	---	---	<b>3</b>
5/28/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/29/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/30/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5/31/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>MAY GRAND TOTAL = 28</b>																	

**TABLE F-2  
PERCENT TDG INSTANCE TYPE TRACKING  
JUNE 2010**

DATE	Lower	Lower	Little	Little	Lower	Lower	Ice	Ice	McNary	McNary	John	John	The	The	Bon	Bon	Camas
	Granite	Granite	Goose	Goose	Monum.	Monum.	Harbor	Harbor			Day	Day	Dalles	Dalles			
	Forebay	Tailrace	Forebay														
6/1/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
6/2/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6/3/2010	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6/4/2010	---	1	---	---	---	---	---	1	---	---	---	---	---	---	---	1	---
6/5/2010	---	1	1	1	1	1	1	1	---	1	---	---	---	---	---	1	---
6/6/2010	---	1	1	1	1	1	1	1	---	1	---	---	---	---	1	1	1
6/7/2010	---	1	1	1	1	1	1	1	1	---	---	---	---	---	1	1	1
6/8/2010	---	1	1	1	1	1	1	1	1	1	---	---	---	---	---	1	1
6/9/2010	---	1	1	1	1	1	1	1	1	1	---	---	---	---	1	1	1
6/10/2010	---	1	1	1	1	1	1	1	---	1	---	---	---	---	---	1	1
6/11/2010	---	1	1	1	1	1	1	1	---	1	---	---	---	---	---	1	1
6/12/2010	---	1	1	---	1	1	1	1	---	1	---	---	---	---	1	1	1
6/13/2010	---	1	1	---	1	---	1	1	1	---	---	---	---	---	1	1	1
6/14/2010	---	1	1	---	1	---	1	---	1	---	1	---	---	---	---	---	---
6/15/2010	---	1	1	---	1	1	1	---	---	---	---	---	---	---	---	1	---
6/16/2010	---	1	1	---	1	1	1	---	---	1	---	---	---	---	---	1	---
6/17/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1	1
6/18/2010	---	1	---	---	---	---	---	---	---	1	---	---	---	---	---	1	1
6/19/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1	1
6/20/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---
6/21/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1	---
6/22/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1	---
6/23/2010	---	---	---	---	---	---	---	---	---	1	---	---	---	---	1	1	1
6/24/2010	---	---	---	---	---	---	1	---	1	1	---	---	---	---	1	1	1
6/25/2010	---	---	---	---	---	---	1	---	1	1	---	---	---	---	---	1	1
6/26/2010	---	---	---	---	---	---	---	---	1	1	---	---	---	---	---	1	1
6/27/2010	---	---	---	---	---	---	---	---	1	1	---	---	---	---	---	1	1
6/28/2010	---	---	---	---	---	---	1	---	1	1	---	---	---	---	1	1	1
6/29/2010	---	---	---	---	---	---	---	---	1	1	---	---	---	---	---	1	---
6/30/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1
<b>JUNE GRAND TOTAL = 165</b>																	

**TABLE F-2  
PERCENT TDG INSTANCE TYPE TRACKING  
JULY 2010**

DATE	Lower	Lower	Little	Little	Lower	Lower	Ice	Ice	McNary	McNary	John	John	The	The	Bon	Bon	Camas
	Granite	Granite	Goose	Goose	Monum.	Monum.	Harbor	Harbor			Day	Day	Dalles	Dalles			
	Forebay	Tailrace	Forebay														
7/1/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1
7/2/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/3/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/4/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/5/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/6/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/7/2010	---	---	---	---	---	2a	---	---	---	2a	---	---	---	---	---	---	---
7/8/2010	---	---	---	---	---	2a	---	---	---	2a	---	---	---	---	3	---	3
7/9/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	---	3
7/10/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/11/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/12/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/13/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/14/2010	---	---	---	---	---	---	---	2a	---	---	---	---	---	---	---	---	---
7/15/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/16/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/17/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/18/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/19/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/20/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/21/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/22/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/23/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/24/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/25/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/26/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
7/27/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2a	3
7/28/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/29/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7/30/2010	---	---	---	---	---	1a	---	---	---	---	---	---	---	---	---	---	---
7/31/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>JULY GRAND TOTAL = 20</b>																	

**TABLE F-2  
PERCENT TDG INSTANCE TYPE TRACKING  
AUGUST 2010**

DATE	Lower Granite	Lower Granite	Little Goose	Little Goose	Lower Monum.	Lower Monum.	Ice Harbor	Ice Harbor	McNary	McNary	John Day	John Day	The Dalles	The Dalles	Bon Forebay	Bon Tailrace	Camas Forebay
	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay	Tailrace	Forebay
8/1/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
8/2/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
8/3/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/4/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/5/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/6/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/7/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/8/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/9/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/10/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/11/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/12/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/13/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/14/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/15/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/16/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3
8/17/2010	---	---	---	---	---	2a	---	---	---	---	---	---	---	---	---	---	3
8/18/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/19/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/20/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/21/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/22/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/23/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/24/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/25/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/26/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/27/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/28/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/29/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/30/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8/31/2010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>AUGUST GRAND TOTAL = 5</b>																	
<b>Total</b>	<b>0</b>	<b>15</b>	<b>14</b>	<b>7</b>	<b>14</b>	<b>14</b>	<b>31</b>	<b>11</b>	<b>11</b>	<b>23</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>27</b>	<b>52</b>
<b>GRAND TOTAL</b>	<b>234</b>																

**TABLE F-3A**  
**2010 SPILL SEASON**  
**LOWER SNAKE RIVER PERCENT TDG INSTANCE TYPE TOTALS**

TDG Instance Types	Lower Granite Forbay	Lower Granite Tailwater	Little Goose Forbay	Little Goose Tailwater	Low Monumental forebay	Low Monumental Tailwater	Ice Harbor Forbay	Ice Harbor Tailwater	Totals
1	0	15	12	7	12	10	15	10	81
1a	0	0	0	0	0	1	0	0	1
2	0	0	0	0	0	0	0	0	0
2a	0	0	0	0	0	3	0	1	4
3	0	0	2	0	2	0	16	0	20
<b>Grand Total</b>	<b>0</b>	<b>15</b>	<b>14</b>	<b>7</b>	<b>14</b>	<b>14</b>	<b>31</b>	<b>11</b>	<b>106</b>

**TABLE F-3B**  
**2010 SPILL SEASON**  
**LOWER COLUMBIA RIVER PERCENT TDG INSTANCE TYPE TOTALS**

TDG Instance Types	McNary Forbay	McNary Tailwater	John Day Forbay	John Day Tailwater	The Dalles Forbay	The Dalles Tailwater	BON Forbay	BON Tailwater	Camas/Washougal Forbay	Totals
1	11	21	1	0	0	0	7	26	19	85
1a	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
2a	0	2	0	0	0	0	0	1	0	3
3	0	0	0	0	0	0	7	0	33	40
<b>Grand Total</b>	<b>11</b>	<b>23</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>27</b>	<b>52</b>	<b>128</b>

**TABLE F-4**  
**2010 SPILL SEASON - MAXIMUM %TDG and NUMBER of INSTANCES**  
**Starting April 3, L. Snake R and April 10, L. Columbia R:**

<b>Station</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>
<b><u>Middle Columbia River</u></b>					
Chief Joseph Forebay (CHJ)					
Maximum hourly % TDG	108.0	106.3	118.3	116.6	112.4
Number of hours over 110%	0	0	272	728	175
Chief Joseph Tailwater (CHQW)					
Maximum hourly % TDG	108.6	107.4	124.8	116.6	114.8
Number of hours over 110%	0	0	474	703	282
<b><u>Lower Snake River</u></b>					
Lower Granite Forebay (LWG)					
Maximum hourly % TDG	104.5	104.1	109.7	104.8	103.8
Number of hours over 115%	0	0	0	0	0
Number of days high 12 hour avg over 115%	0	0	0	0	0
Lower Granite Tailwater (LGNW)					
Maximum hourly % TDG	115.3	113.4	133.8	117.2	119.7
Number of hours over 120%	0	0	329	0	0
Number of days high 12 hour avg over 120%	0	0	15	0	0
Little Goose Forebay (LGSA)					
Maximum hourly % TDG	115.8	117.3	126.2	113.7	114.6
Number of hours over 115%	6	42	279	0	0
Number of days high 12 hour avg over 115%	0	2	12	0	0
Little Goose Tailwater (LGSW)					
Maximum hourly % TDG	113.9	117.3	142.6	113.8	115.1
Number of hours over 120%	0	0	159	0	0
Number of days high 12 hour avg over 120%	0	0	7	0	0
Lower Monumental Forebay (LMNA)					
Maximum hourly % TDG	112.4	117.0	129.7	113.1	113.2
Number of hours over 115%	0	44	279	0	0
Number of days high 12 hour avg over 115%	0	2	12	0	0
Lower Monumental Tailwater (LMNW)					
Maximum hourly % TDG	119.9	119.9	128.0	131.6	117.6
Number of hours over 120%	0	0	199	18	0
Number of days high 12 hour avg over 120%	0	0	10	3	1
Ice Harbor Forebay (IHRA)					
Maximum hourly % TDG	118.1	120.1	125.7	115.3	114.6
Number of hours over 115%	98	242	326	3	0
Number of days high 12 hour avg over 115%	5	11	15	0	0
Ice Harbor Tailwater (IDSW)					
Maximum hourly % TDG	116.5	120.1	130.4	116.5	115.9
Number of hours over 120%	0	2	216	0	0
Number of days high 12 hour avg over 120%	0	0	10	1	0
<b><u>Lower Columbia River</u></b>					
McNary Washington Forebay (MCNA)					
Maximum hourly % TDG	114.2	116.6	118.6	115.1	109.8
Number of hours over 115%	0	5	236	2	0
Number of days high 12 hour avg over 115%	0	0	11	0	0
McNary Tailwater (MCPW)					
Maximum hourly % TDG	116.9	118.9	124.5	125.8	117.6
Number of hours over 120%	0	0	315	2	0
Number of days high 12 hour avg over 120%	0	0	21	2	0

**TABLE F-4 (continued)**  
**2010 SPILL SEASON - MAXIMUM %TDG and NUMBER of INSTANCES**  
**Starting April 3, L. Snake R and April 10, L. Columbia R:**

<b>Station</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>
<b>Lower Columbia River</b>					
John Day Forebay (JDY)					
Maximum hourly % TDG	108.2	114	116.4	113.4	107.5
Number of hours over 115%	0.0	0.0	17.0	0.0	0.0
Number of days high 12 hour avg over 115%	0	0	1	0	0
John Day Tailwater (JHAW)					
Maximum hourly % TDG	114.8	118.4	119.8	120.0	116.3
Number of hours over 120%	0.0	0.0	0.0	0.0	0.0
Number of days high 12 hour avg over 120%	0	0	0	0	0
The Dalles Forebay (TDA)					
Maximum hourly % TDG	111.9	113.8	115.3	113.2	109.3
Number of hours over 115%	0.0	0.0	2.0	0.0	0.0
Number of days high 12 hour avg over 115%	0	0	0	0	0
The Dalles Tailwater (TDDO)					
Maximum hourly % TDG	116.8	118.4	121.3	118.7	115.8
Number of hours over 120%	0.0	0.0	10.0	0.0	0.0
Number of days high 12 hour avg over 120%	1	4	7	2	0
Bonneville Forebay (BON)					
Maximum hourly % TDG	115.8	116.5	118.3	116.4	111.8
Number of hours over 115%	16.0	87.0	129.0	28.0	0.0
Number of days high 12 hour avg over 115%	0	0	25	2	0
Cascade Island Washington (CCIW)					
Maximum hourly % TDG	117.5	118.9	124.3	121.7	118.5
Number of hours over 120%	0.0	0.0	496.0	8.0	0.0
Number of days high 12 hour avg over 120%	10	9	19	10	4
Camas/Washougal (CWMW)					
Maximum hourly % TDG	119.6	118.8	120.5	118.5	118.0
Number of hours over 115%	180.0	137.0	372.0	114.0	72.0
Number of days high 12 hour avg over 115%	0	0	0	0	0

**TABLE F-5**  
**2001 -2010 SPILL SEASON – NUMBER of HOURS OVER 125% TDG**

<b>Year</b>	<b>Number of Hours</b>
2010	555
2009	52
2008	668
2007	0
2006	589
2005	0
2004	0
2003	417
2002	85
2001	0
Average	237

**TABLE F-6**  
**2010 SPILL SEASON – NUMBER of HOURS and RANGE OVER 125% TDG**  
**Starting April 3, L. Snake R and April 10, L. Columbia R:**

Station	Gauge ID	Month	Range of %TDG	Number of Hours
Lower Granite Tailwater	LGNW	June	125.1 - 133.8	175
Little Goose Forebay	LGSA	June	125.1 - 126.2	28
Little Goose Tailwater	LGSW	June	125.1 - 142.6	73
Lower Monumental Forebay	LMNA	June	125.1 - 129.7	95
Lower Monumental Tailwater	LMNW	June	125.1 - 128.0	70
Lower Monumental Tailwater	LMNW	July	131.6	1
Ice Harbor Forebay	IHRA	June	125.1 - 125.7	15
Ice Harbor Tailwater	IDSW	June	125.1 - 130.4	97
McNary Tailwater	MCPW	July	125.8	1
<b>TOTAL HOURS:</b>				<b>555</b>

**TABLE F-7 <sup>1</sup>**  
**2010 SPILL SEASON - MALFUNCTIONING TDG GAGES**  
**THAT RESULTED IN TDG INSTANCES**

	Gauge ID	Dates	Number of Days*	Hours with Questionable Data	Reason for Failed Gauge	Effects on % TDG Reading
Lower Monumental Tailwater	LMNW	7/7 - 7/8	2	1200 - 1100	Gauge Malfunctioned	Increased: 116.1 - 140.5
Lower Monumental Tailwater	LMNW	8/17	1	0800 - 1400	Gauge Malfunctioned	Increased: 113.8 - 140.6
Ice Harbor Tailwater	IDSW	7/14	1	0700 - 1400	Gauge Malfunctioned	Increased: 113.0 - 145.3
McNary Tailwater	MCPW	7/7 - 7/8	2	1700, 1900 - 1400	Gauge Malfunctioned	Increased: 117.8 - 148.8
Bonneville Tailwater	CCIW	7/27	1	0100 - 2400	Punctured Membrane	Increased: 18.4 - 120.9

<sup>1</sup> Table F-7 provides additional information on instance Type 2a in Tables F-2 and F-3, which based on the RAW data. Tables F-4, F-5, and F-6 do not include this questionable data because it is based on the REV data.

\* Table F-7 includes days with more than 8 hours of questionable data, which makes it difficult to make spill cap changes.