

Appendix F

2011 Percent TDG Instance

Tracking System

INTRODUCTION

The US Army Corps of Engineers (Corps) tracks the number of instances when the percent TDG exceeds the Oregon and Washington water quality standards (WQS) as described in Part 1.1.6 of this report. This appendix provides the TDG tracking system results from April 1 through August 31. As discussed in Part 1.1.7, there was a change in the Chief Joseph Dam spill management process in 2011. In order to account for spill operations, Chief Joseph is included in this appendix.

Table F-1 provides a listing of the five causes (Types) that are designated to each percent TDG instance when the daily high 12 hour average is exceeded. In 2009, the definitions were condensed to three main types and two sub-types, which included all the previous 14 instance types used from 2002 to 2008.

Table F-2 designates a specific instance type for all the TDG instances that exceed the Oregon and Washington state WQS at the Corps' lower Columbia River and lower Snake River dams plus Chief Joseph Dam at the Middle Columbia River. Tables F-3A and F-3B provide the percent TDG instance type totals for each project. Table F-4 breaks down the number of hours and range of percent TDG instances per project that exceed the state WQS of 125 percent. Table F-5 provides a historical summary from 2002 to 2011 of the number of hours that exceeded the 125 percent TDG state standards during the spill season. The number of hours for 2011 may be higher compared to previous years due to the addition of Chief Joseph Dam.

Table F-6 provides the maximum hourly percent TDG value and number of instances that exceed the Colville Tribe TDG WQS of 110 percent at the forebay and tailwater of the Chief Joseph Dam at the Middle Columbia River.

Table F-7 provides a list of TDG gauges that malfunctioned during the 2011 spill season which resulted in percent TDG instances. Malfunction gauge TDG instances are noted as Type 2a instance in Tables F-2, F-3A and F-3B to indicate when a TDG instance occurred and appeared as part of the real-time operational review. Table F-2 is based on raw data and is populated during real-time operations. Tables F-4, F-5 and F-6 do not include the malfunctioning gauge data since they provide statistical information on hourly TDG levels.

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

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

**TABLE F-2
PERCENT TDG INSTANCE TYPE TRACKING
APRIL 2011**

| DATE | Lower Granite | Lower Granite | Little Goose | Little Goose | Lower Monum. | Lower Monum. | Ice Harbor | Ice Harbor | Chief Joseph | Chief Joseph | McNary | McNary | John Day | John Day | The Dalles | The Dalles | Bonn | Bonn | Camas |
|-------------------------------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|---------|-----------|----------|-----------|------------|------------|---------|-----------|---------|
| | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay |
| 4/1/11 | --- | 1 | --- | --- | --- | --- | --- | 1 | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | --- | --- |
| 4/2/11 | --- | 1 | --- | --- | --- | --- | --- | 1 | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | --- | --- |
| 4/3/11 | --- | 1 | --- | --- | --- | --- | --- | 1 | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | 1 | --- |
| 4/4/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | 1 | 1 |
| 4/5/11 | --- | 1 | 1 | --- | --- | --- | --- | 1 | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | 1 | 1 |
| 4/6/11 | --- | 1 | --- | --- | --- | --- | --- | 1 | --- | --- | --- | 1 | --- | 1 | 1 | --- | 1 | 1 | 1 |
| 4/7/11 | --- | 1 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | 1 | --- | --- | --- | --- | 1 | 1 | 1 |
| 4/8/11 | --- | --- | 1 | --- | 1 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1 |
| 4/9/11 | --- | --- | 1 | --- | 1 | --- | 1 | --- | --- | --- | --- | 1 | --- | 1 | --- | --- | --- | --- | --- |
| 4/10/11 | --- | --- | 1 | --- | 1 | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/11/11 | --- | --- | --- | --- | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/12/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- | 3 |
| 4/13/11 | --- | --- | --- | --- | 3 | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | 3 | 3 |
| 4/14/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/15/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/16/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- | --- |
| 4/17/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/18/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/19/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/20/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- |
| 4/21/11 | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/22/11 | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/23/11 | --- | --- | --- | --- | --- | 3 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- | --- |
| 4/24/11 | --- | --- | 1 | --- | 3 | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- | 3 |
| 4/25/11 | --- | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/26/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/27/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/28/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/29/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/30/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| APRIL GRAND TOTAL = 71 | | | | | | | | | | | | | | | | | | | |

**TABLE F-2
PERCENT TDG INSTANCE TYPE TRACKING
MAY 2011**

| DATE | Lower Granite | Lower Granite | Little Goose | Little Goose | Lower Monum. | Lower Monum. | Ice Harbor | Ice Harbor | Chief Joseph | Chief Joseph | McNary | McNary | John Day | John Day | The Dalles | The Dalles | Bon | Bon | Camas |
|---------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|---------|-----------|----------|-----------|------------|------------|---------|-----------|---------|
| | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay |
| 5/1/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/2/11 | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/3/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/4/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/5/11 | --- | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- | --- |
| 5/6/11 | --- | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/7/11 | --- | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/8/11 | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/9/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/10/11 | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 | --- |
| 5/11/11 | --- | --- | --- | --- | --- | 3 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/12/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5/13/11 | --- | --- | --- | --- | --- | --- | 3 | --- | --- | --- | --- | 3 | --- | --- | --- | --- | 3 | 1 | --- |
| 5/14/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | --- | --- | 1 | 1 | --- | --- | --- | --- | 1 | 1 | 1 |
| 5/15/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | --- | --- | --- | --- | --- | 1 | 1 |
| 5/16/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | --- | 1 | --- | 1 | --- | --- | --- | 1 | 1 |
| 5/17/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | --- | --- | 1 | 1 | --- | N/A | --- | --- | 1 | 1 | 1 |
| 5/18/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | --- | 1 | 1 | 1 | --- | N/A | --- | --- | 1 | 1 | 1 |
| 5/19/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 2a | 1 |
| 5/20/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 2a | 1 |
| 5/21/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/22/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | 1 | 1 | N/A | N/A | N/A |
| 5/23/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/24/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/25/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/26/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/27/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/28/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/29/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/30/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5/31/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

MAY GRAND TOTAL = 190

N/A represents days when project flow exceeded the 7Q10 criteria.

**TABLE F-2
PERCENT TDG INSTANCE TYPE TRACKING
JUNE 2011**

| DATE | Lower Granite | Lower Granite | Little Goose | Little Goose | Lower Monum. | Lower Monum. | Ice Harbor | Ice Harbor | Chief Joseph | Chief Joseph | McNary | McNary | John Day | John Day | The Dalles | The Dalles | Bon | Bon | Camas |
|-------------------------------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|---------|-----------|----------|-----------|------------|------------|---------|-----------|---------|
| | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay |
| 6/1/11 | --- | --- | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/2/11 | --- | --- | --- | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/3/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/4/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/5/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/6/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/7/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/8/11 | --- | 1 | --- | 1 | N/A | N/A | N/A | N/A | N/A | --- | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/9/11 | --- | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/10/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/11/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/12/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/13/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/14/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/15/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/16/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/17/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/18/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/19/11 | --- | --- | 1 | 1 | 1 | --- | 1 | 1 | N/A | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/20/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | N/A | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/21/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/22/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 2a | 1 |
| 6/23/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | --- | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/24/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 6/25/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | --- | N/A | 1 | 1 | N/A | N/A | N/A |
| 6/26/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/27/11 | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/28/11 | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 6/29/11 | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | --- | 1 | 1 | 1 | 2a | 1 |
| 6/30/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | 1a | --- | --- | 1 | 1 | --- | --- | --- | 1 | 2a | 1 |
| JUNE GRAND TOTAL = 286 | | | | | | | | | | | | | | | | | | | |

N/A represents days when project flow exceeded the 7Q10 criteria.

**TABLE F-2
PERCENT TDG INSTANCE TYPE TRACKING
JULY 2011**

| DATE | Lower Granite | Lower Granite | Little Goose | Little Goose | Lower Monum. | Lower Monum. | Ice Harbor | Ice Harbor | Chief Joseph | Chief Joseph | McNary | McNary | John Day | John Day | The Dalles | The Dalles | Bon | Bon | Camas |
|-------------------------------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|---------|-----------|----------|-----------|------------|------------|---------|-----------|---------|
| | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay |
| 7/1/11 | --- | 1 | --- | 1 | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | 2a | 1 |
| 7/2/11 | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | N/A | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | 2a | 1 |
| 7/3/11 | --- | --- | 1 | --- | 1 | 1 | 1 | 1 | 1a | --- | 1 | 1 | 1 | --- | --- | --- | 1 | 2a | 1 |
| 7/4/11 | --- | --- | --- | --- | 1 | --- | 1 | --- | 1a | --- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2a | 1 |
| 7/5/11 | --- | 1 | --- | --- | 1 | --- | 1 | 1 | 1a | --- | 1 | 1 | 1 | --- | 1 | 1 | 1 | 2a | 1 |
| 7/6/11 | --- | 1 | --- | --- | 1 | 1 | 1 | 1 | N/A | --- | 1 | 1 | 1 | --- | 1 | 1 | 1 | 2a | 1 |
| 7/7/11 | --- | 1 | 1 | --- | 1 | 1 | 1 | 1 | N/A | --- | 1 | 1 | 1 | --- | 1 | 1 | 1 | 2a | 1 |
| 7/8/11 | --- | --- | 1 | --- | 1 | 1 | 1 | --- | 1a | --- | 1 | 1 | 1 | --- | 1 | --- | --- | 2a | 1 |
| 7/9/11 | --- | --- | --- | --- | 1 | 1 | 1 | --- | 1a | --- | 1 | 1 | 1 | --- | --- | --- | --- | 2a | 1 |
| 7/10/11 | --- | --- | --- | --- | 1 | 1 | 1 | --- | 1a | --- | 1 | 1 | --- | --- | --- | --- | 1 | 2a | 1 |
| 7/11/11 | --- | --- | --- | --- | 1 | --- | 1 | --- | 1a | --- | 1 | 1 | 1 | --- | 1 | --- | --- | 2a | 1 |
| 7/12/11 | --- | --- | --- | --- | 1 | --- | 1 | --- | 1a | --- | 1 | 1 | 1 | --- | 1 | --- | 1 | 2a | 1 |
| 7/13/11 | --- | --- | --- | --- | 1 | --- | 1 | --- | 1a | --- | --- | 1 | 1 | --- | --- | --- | 1 | 2a | 1 |
| 7/14/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 1 | --- | --- | --- | --- | 1 | 2a | 1 |
| 7/15/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | 1 | 1 | --- | --- | 1 | --- | 1 | 2a | 1 |
| 7/16/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | 1 | 1 | --- | --- | --- | --- | 1 | 2a | 1 |
| 7/17/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | 1 | 1 | --- | --- | --- | --- | 1 | 2a | --- |
| 7/18/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | 1 | 1 | --- | --- | --- | --- | --- | 2a | --- |
| 7/19/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 1 | --- | --- | --- | --- | --- | 2a | --- |
| 7/20/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 1 | --- | --- | --- | --- | --- | 2a | --- |
| 7/21/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 1 | --- | --- | --- | --- | --- | 2a | --- |
| 7/22/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 7/23/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 1 | --- | --- | --- | --- | --- | 2a | --- |
| 7/24/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | 1 | 1 | --- | --- | --- | --- | --- | 2a | 1 |
| 7/25/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 7/26/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | 1 |
| 7/27/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 7/28/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 7/29/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 2a | --- | --- | --- | --- | --- | 2a | --- |
| 7/30/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 2a | --- | --- | --- | --- | --- | 2a | --- |
| 7/31/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 2a | --- | --- | --- | --- | --- | 2a | --- |
| JULY GRAND TOTAL = 241 | | | | | | | | | | | | | | | | | | | |

N/A represents days when project flow exceeded the 7Q10 criteria.

**TABLE F-2
PERCENT TDG INSTANCE TYPE TRACKING
AUGUST 2011**

| DATE | Lower Granite | Lower Granite | Little Goose | Little Goose | Lower Monum. | Lower Monum. | Ice Harbor | Ice Harbor | Chief Joseph | Chief Joseph | McNary | McNary | John Day | John Day | The Dalles | The Dalles | Bon | Bon | Camas |
|--------------------------------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|-----------|-----------|-----------|-----------|------------|------------|-----------|-----------|-----------|
| | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay | Tailwater | Forebay |
| 8/1/11 | --- | --- | --- | --- | --- | --- | --- | --- | 1a | --- | --- | 2a | --- | --- | --- | --- | --- | 2a | --- |
| 8/2/11 | --- | 1a | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/3/11 | --- | 1a | --- | --- | --- | --- | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/4/11 | --- | --- | --- | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/5/11 | --- | --- | 1a | --- | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/6/11 | --- | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/7/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/8/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/9/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/10/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/11/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/12/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/13/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/14/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/15/11 | --- | 1a | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/16/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2a | --- |
| 8/17/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/18/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/19/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/20/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/21/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 8/22/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 8/23/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 8/24/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 8/25/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/26/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/27/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 3 |
| 8/28/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/29/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/30/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/31/11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AUGUST GRAND TOTAL = 32 | | | | | | | | | | | | | | | | | | | |
| Total | 0 | 59 | 51 | 47 | 68 | 62 | 70 | 57 | 50 | 3 | 33 | 54 | 18 | 18 | 24 | 19 | 38 | 73 | 48 |
| GRAND TOTAL | 792 | | | | | | | | | | | | | | | | | | |

TABLE F-3A
2011 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 | 56 | 49 | 47 | 64 | 55 | 61 | 57 | 389 |
| 1a | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 5 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 4 | 7 | 9 | 0 | 20 |
| Grand Total | 0 | 59 | 51 | 47 | 68 | 62 | 70 | 57 | 414 |

TABLE F-3B
2011 MID and LOWER COLUMBIA RIVER PERCENT TDG
INSTANCE TYPE TOTALS

| TDG Instance Types | Chief Joseph Forebay | Chief Joseph Tailwater | 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 | 2 | 3 | 33 | 49 | 18 | 18 | 24 | 19 | 31 | 11 | 40 | 248 |
| 1a | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2a | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 59 | 0 | 64 |
| 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 3 | 8 | 19 |
| Grand Total | 50 | 3 | 33 | 54 | 18 | 18 | 24 | 19 | 38 | 73 | 48 | 378 |

TABLE F-4
2011 – NUMBER of HOURS and RANGE
OVER 125 PERCENT TDG

April 1 – August 31, Lower Snake and Columbia R. and Mid. Columbia R.

| Station | Gauge ID | Range of %TDG | Number of Hours |
|----------------------------|----------|---------------|-----------------|
| Chief Joseph Forebay | CHJ | 125.1 - 139.2 | 207 |
| Lower Granite Tailwater | LGNW | 125.1 - 133.0 | 504 |
| Little Goose Forebay | LGSA | 125.1 - 125.8 | 24 |
| Little Goose Tailwater | LGSW | 125.1 - 142.1 | 603 |
| Lower Monumental Forebay | LMNA | 125.1 - 140.6 | 679 |
| Lower Monumental Tailwater | LMNW | 125.1 - 131.0 | 144 |
| Ice Harbor Forebay | IHRA | 125.1 - 127.1 | 91 |
| Ice Harbor Tailwater | IDSW | 125.1 - 130.6 | 263 |
| McNary Tailwater | MCPW | 125.1 - 129.2 | 498 |
| John Day Forebay | JDY | 125.1 - 125.4 | 6 |
| John Day Tailwater | JHAW | 125.1 - 125.6 | 7 |
| Bonneville Tailwater* | CCIW | 125.1 - 129.1 | 32 |
| Camas Washougal | CWMW | 125.1 - 127.9 | 116 |
| TOTAL HOURS: | | | 3174 |

*Bonneville Tailwater gauge was destroyed due to high flows on May 18, 2011.

TABLE F-5
2002 -2011 – NUMBER of HOURS OVER 125 PERCENT TDG

| Year | Number of Hours |
|-------------|------------------------|
| 2011* | 3174 |
| 2010 | 555 |
| 2009 | 52 |
| 2008 | 668 |
| 2007 | 0 |
| 2006 | 589 |
| 2005 | 0 |
| 2004 | 0 |
| 2003 | 417 |
| 2002 | 85 |
| Average | 554 |

*2011 includes Chief Joseph Dam and it accounts for 207 hours over 125 percent TDG.

TABLE F-6
2011 - MAXIMUM PERCENT TDG and NUMBER of INSTANCES
Colville Tribe TDG Water Quality Standards

| Station | APR | MAY | JUN | JUL | AUG | TOTAL |
|-------------------------------|------------|------------|------------|------------|------------|--------------|
| Chief Joseph Forebay (CHJ) | | | | | | |
| Maximum hourly % TDG | 109.4 | 130.4 | 139.2 | 123.1 | 115.7 | |
| Number of hours over 110% | 0 | 199 | 264 | 667 | 534 | 1664 |
| Chief Joseph Tailwater (CHQW) | | | | | | |
| Maximum hourly % TDG | 119.2 | 121.9 | 119.5 | 119.3 | 116.0 | |
| Number of hours over 110% | 104 | 306 | 264 | 672 | 516 | 1862 |

TABLE F-7 ¹
2011 –MALFUNCTIONING TDG GAUGE

| PROJECT | Gauge ID | Dates | Number of Days* | Hours with Questionable Data | Reason for Failed Gauge | Effects on % TDG Reading |
|---------------------------------------|-----------------|--------------|------------------------|-------------------------------------|--------------------------------|---------------------------------|
| Chief Joseph Forebay | CHJ | 5/3-5/4 | 2 | 0400-1400 | Probe failure | Missing values |
| Chief Joseph Forebay | CHJ | 5/24-5/25 | 2 | 1900-1000 | Probe failure | Missing values |
| McNary Tailwater | MCPW | 7/30 - 8/1 | 3 | 1000 - 1000 | Punctured Membrane | Increased: 148.5 - 154.7 |
| The Dalles Forebay | TDA | 6/23 | 1 | 0000 - 0800 | Transmission Failed | Missing values |
| Bonneville Tailwater (Cascade Island) | CCIW | 5/18 - 8/17 | 91 | 1500 - 1200 | Destroyed Gage | Missing Values |
| Total | | | 99 | | | |

¹ Table F-7 provides additional information on instance Type 2a in Tables F-2 and F-3. Tables F-4, F-5, and F-6 do not include malfunctioning gauge data. * Table F-7 includes only days with more than 8 hours of malfunctioning data.