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MEMORANDUM

TO: Ed Bowles, ODFW

FROM: Michel DeHart

DATE: February 19, 2008

RE: Data Request to determine the volume of spill affected by the operation of the Camas/Washougal TDG monitor.

In response to your request the FPC staff summarized the empirical data from Bonneville Dam for 2006 and 2007 (a high flow year and a lower flow year) to determine the impact of the use of the Camas/Washougal monitoring station on the volume of water spilled at Bonneville Dam. In the analysis involuntary spill was removed from the estimates and volume spill was then estimated. One must take into consideration that using empirical data to develop volumes under different operations is not exact, since the actual operations involved managing spill to the 115% TDG at Camas/Washougal.

The 100/100 kcfs day/night spring spill agreement was based on the volume of spill expected if the Camas/Washougal TDG monitor controlled spill. There is no biological basis for restricting nighttime spill to 100 Kcfs during the spring. Considerably more spill could occur if nighttime spill were allowed to occur up to the spill cap of 120% at the Cascade Island gauge. This would be consistent with present dissolved gas waivers.

In summary, the conclusions regarding the operation of the Camas/Washougal TDG station are:

- The differences in spill volume in the spring were not as large as during the summer since the 100 Kcfs nighttime spill already caps spill volume.
- An overall reduction of 347 KAF occurred over the entire 2007 spring spill season, but the most pronounced reduction (345 KAF) occurred on only 11 days with up to an 8% reduction in daily average spill.
- In general, spring spill in 2006 was often higher than the 100 Kcfs daily average, but there were still 22 out of 71 days when spill was restricted based on TDG at

Camas/Washougal. An overall reduction of 422 KAF occurred over the entire 2006 spring spill season. The magnitude observed in 2006 of individual day differences was greater than observed in 2007, with up to a 22% reduction in daily average spill.

- Summer spill reductions due to operating to Camas/Washougal were estimated to be 461 KAF for 2007 and 431 KAF for 2006, assuming a gas cap nighttime spill of 116 Kcfs for 2006 and 133 Kcfs for 2007.
- The total (spring and summer) reduction in spill was estimated at 853 KAF for 2006 and 806 KAF for 2007.

2007 Spring

The flows during 2007 were sufficiently low that the project did not exceed the 100/100 Kcfs springtime spill. There were 41 days during this period when the TDG reading at Camas/Washougal was greater than 114%. The COE manages TDG such that the Camas/Washougal reading does not exceed 115%, so there were more days (64 out of the 71 day season) when spill averaged less than 99.5 Kcfs. There were ten days out of 71 when the 24 hour average spill was between 92.2 Kcfs and 94.4 Kcfs, with hourly values as low as 88.8 Kcfs.

# days with spill less than 99.5 Kcfs	Spill volume on those days KAF	Spill Volume for 100/100 KAF	Difference KAF
64	12349	12694	-345

# days with spill less than 95 Kcfs	Spill volume on those days KAF	Spill Volume for 100/100 KAF	Difference KAF
11	2036	2182	-146

The reduction in volume on the 64 days where spill was restricted to less than 99.5 Kcfs was 345 KAF. However, on the 11 days when spill was less than 95 Kcfs the volume difference was 146 KAF.

2006 Spring

Due to high flows there were many days when spill exceeded the 100 Kcfs daily average during the spring. However, even with these high flows spill averaged less than 99.5 Kcfs on 22 out of 71 days. Eight of the 22 days has 24 hour averages less than 85 Kcfs and two days were less than 80 Kcfs.

# days with spill less than 99.5 Kcfs	Spill volume on those days KAF	Spill Volume for 100/100 KAF	Difference KAF
22	3942	4364	-422
# days with spill less than 85 Kcfs	Spill volume on those days KAF	Spill Volume for 100/100 KAF	Difference KAF
8	1309	1587	-278
# days with spill less than 80Kcfs	Spill volume on those days KAF	Spill Volume for 100/100 KAF	Difference KAF
2	311	397	-86

Summer Spill

The summer analysis estimated the actual spill that occurred during the summers of 2006 and 2007 (involuntary daytime spill above the prescribed 75 kcfs or 85 Kcfs was removed). The summer spill for 2006 did not include the 85/gas cap period, so for modeling purposes the volume during daytime hours was assumed to be 85 kcfs from June 21 to July 15 and night-time spill was assumed to be to the 120% spill cap.

Choosing a spill cap for any given year is a difficult task since empirical data is constrained based on actual management. For this analysis the spill caps determined by the COE on a daily basis were averaged over the summer spill season. The spill cap assumed for 2006 was 116 Kcfs and the spill cap assumed for 2007 was 133 Kcfs. The estimated spill (assuming project minimum flows contained in the COE's Water Management Plan) was calculated for each year.

2007 Summer

85/gas cap 75/gas cap Camas/Wash KAF	85/gas cap 75/gas cap No Camas/Wash KAF	Difference KAF
12796	13257	-461

2006 Summer

85/gas cap 75/gas cap Camas/Wash KAF	85/gas cap 75/gas cap No Camas/Wash KAF	Difference KAF
12329	12760	-431