

# **APPENDIX F**

## **BIOLOGICAL OPINION SPILL**



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### **Introduction:**

Each year, the US Army Corps of Engineers tracks the amount of water spilled over the spill gates of a project for juvenile fish passages, which is referred to as Biological Opinion spill, or BiOp spill for short. BiOp spill does not include involuntary spill that occurs for flood control or spill because of physical problems with the hydropower system. It also does not include other “miscellaneous” passage of water through a project such as through fish ladders, sluiceways, lockages, etc. This appendix provides an overview of how the BiOp spill amounts were calculated, tables of the BiOp spill amounts for COE projects on the Lower Columbia and Snake rivers and graphs of the data.

### **Overview of Spill calculations**

The calculations of BiOp spill for juvenile fish passages are based on methods that have been used over the past several years to monitor how well the projects and BPA are implementing juvenile fish spill based on the instructions given to the projects and BPA by the Corps via teletypes. Excel spreadsheets have been developed that display the actual project spill and calculate the spill specified for juvenile fish passage (BiOp spill). Both of these values are displayed on a graph so that with a quick glance BiOp spill operations can be monitored.

The mathematical functions developed to calculate BiOp spill take into consideration the BiOp spill requirements, the 120/115% gas cap in effect, the minimum generation requirements, any major tests that are going on during the spill season, and in some cases the 1% efficiency unit operating requirements. Each project has its own function. The Corps can make these functions available for review. Each year several of the functions are modified to take into consideration any changes in effect for the current year. These changes are usually due to research ongoing at the project (Like the RSW test at Lower Granite). Sometimes changes are needed due to changing instructions to the project. For example in 2001 there was a minimum spill level of 15 kcfs set at The Dalles. With respect to short tests at projects, like a three-day spill test or other short-term regulation changes, these functions are not always adjusted.

One item to consider when seeing if the projects and BPA are complying with their instructions is to review how the projects operate the spill gates. The spill gates are opened a number of stops. These stops are a set distance. For example, a stop may be 1 foot. The project can open the gate 1 stop (1 foot) or 2 stops (2 feet) but not 1.5 stops. This means that the project can spill certain amounts; lets say for example 98 kcfs or 102 kcfs (each additional stop open increases spill 4 kcfs) but not 100 kcfs. So if the spill cap at the project were 100 kcfs the project would spill 98 kcfs not 102 kcfs, which would be over the spill cap. See the spill patterns in the Fish Passage Plan for examples of this. See notes below for changes in this at TDA and JDA.

Note: Starting this year, the day and night spill times were adjusted to reflect Table Bon-6 in the FPP.

### **Project specific information**

In paragraphs below, spill refers to spill for juvenile fish passage. It is important to note that for all projects, spill was never voluntarily to exceed the 120% TDG cap.

#### **Bonneville:**

Spill started April 12 at a spill level of 50 kcfs 24 hours a day. Spill was at a low level to protect chum redds. The spill level was raised to 75 kcfs April 16. On April 21 nighttime spill level was increased to 125 kcfs, daytime spill was limited to the 75 kcfs adult fallback limit. From April 23 to May 10 the day and nighttime spill level were set according to the amount of outflow from the project. Again this was to protect chum redds. On May 10 the amount spilled was according to the BiOp spill levels, 75 kcfs during the day up to the 120% gas cap at night. From June 20 to August 1 spill alternated between spilling to the BiOp spill levels and spilling 50 kcfs 24 hours a day. On August 1 spill returned to spilling the BiOp spill levels.

In early August it was determined that the gate hoists at Bonneville were not calibrated correctly (they were 0.3 feet to low). In order to correct this starting August 9 the daytime spill level of 75 kcfs was set by using the pattern in the fish plan and adding 0.3 feet to each gate. The spill level reported was based on the incorrect gate hoist setting. This was to keep the reported spill amount the same until data correction details could be worked out. Nighttime spill was left the same because the 120% TDG gas caps were set using the old (incorrect) calibration. Spill ended August 31 at midnight.

#### **The Dalles**

Spill started April 12. The spill level was 40% of the project outflow. Note after discussion at TMT it was decided to spill as close as possible to the 40% level starting May 19. Previously the 40% level was treated as a not to exceed level. The new interpretation was to be as close as possible 40%, either above or below. Spill was shut off for a short period of time June 23 in order to do a spillway inspection. Spill ended August 31 at midnight.

#### **John Day**

Spill started April 12. The spill level was 60% of the project outflow at night. Note after discussion at TMT it was decided to spill as close as possible to the 60% level starting May 19. Previously the 60% level was treated as a not to exceed level. The new interpretation was to be as close as possible to 60%, either above or below. On July 21 the spill amount was changed to as close as possible to 30% 24 hours a day. Spill ended August 31 at midnight.

#### **McNary**

Spill started April 12. The spill amount was spill to the 120% gas cap at night. Spill could be reduced if necessary for safe fish barge operation. There were numerous changes in the spill pattern because of problems with the gate hoists. Due to generation

### **Ice Harbor**

Spill started April 12. The spill amount was 45 kcfs during daytime and spill to the 120% TDG cap at night. Starting April 15 and continuing until July 18 spill alternated between spilling 45 kcfs 24 hours a day and spilling to the 120% TDG cap 24 hours a day. Spilled was stopped for a short period of time May 11 in order to install a fish release pipe. On July 18 the spill amount returned to 45 kcfs during daytime and spill to the 120% TDG cap at night. Spill ended August 31 at midnight.

### **Lower Monumental**

Spill started April 24. The spill amount was either 45% or 50% of the project outflow depending on the project outflow at night. Spill could be reduced if necessary for safe fish barge operation. On April 30 the spill time was changed to 24 hours a day. Due to low forecasted flows in the Snake River spill ended May 14, which is earlier than normal.

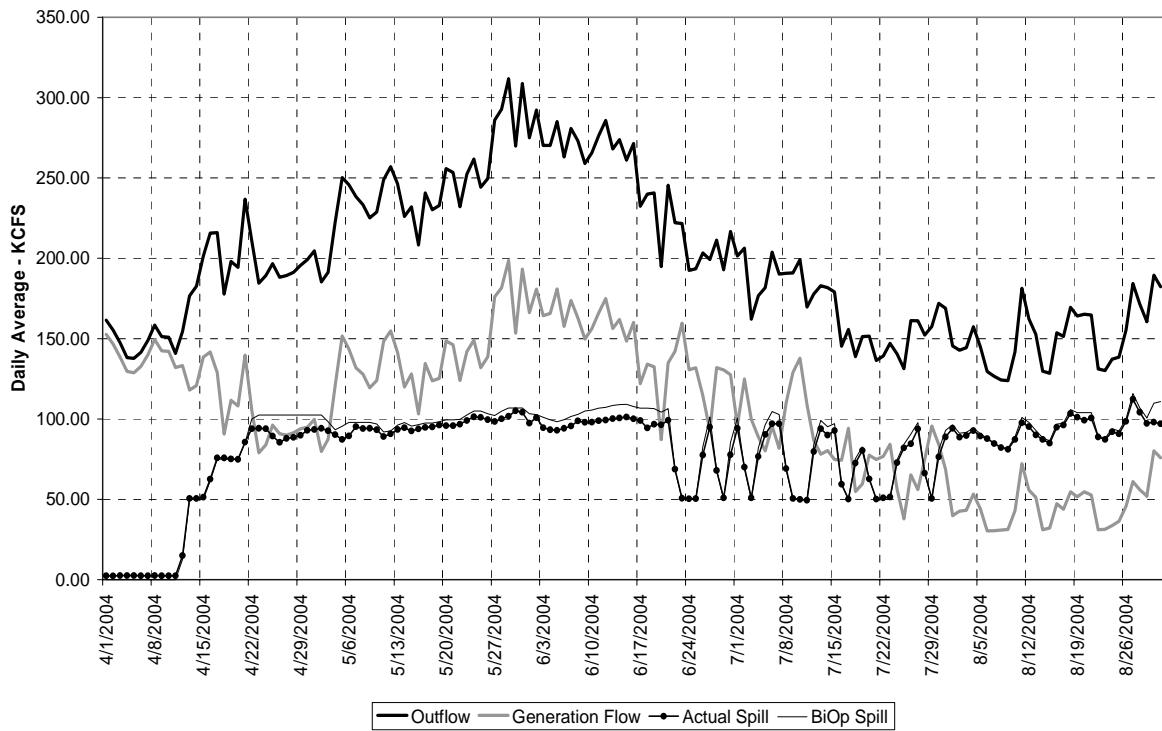
### **Little Goose:**

Spill started April 7. The spill amount was spill to the 120% TDG cap at night. Due to low forecasted flows in the Snake River spill ended May 14, which is earlier than normal.

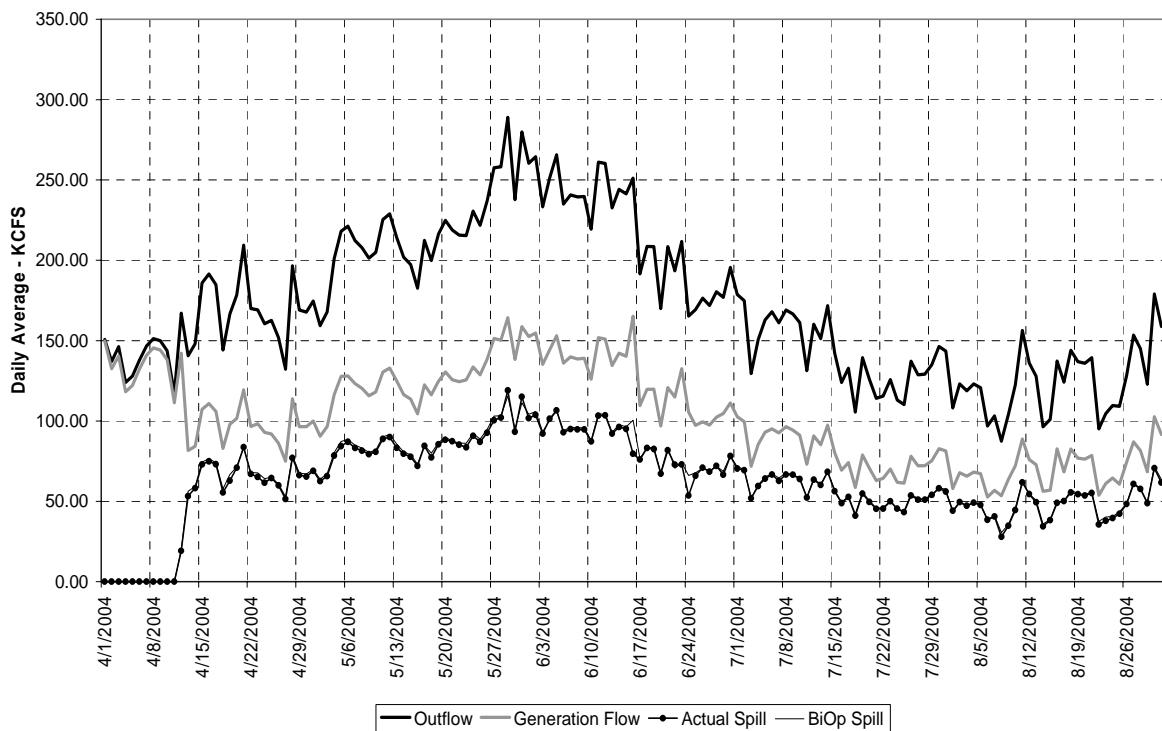
### **Lower Granite:**

Spill started April 3. Spill alternated between spilling to the 120% cap at night and spilling using the RSW 24 hours a day. When spilling using the RSW the total spill amount was approximately 18.7 kcfs. Spill was shut off for short periods of time from April 7 – 9 due to dive work. After April 9 spill was using the RSW 24 hours a day all the time. Due to low forecasted flows in the Snake River spill ended May 14, which is earlier than normal.

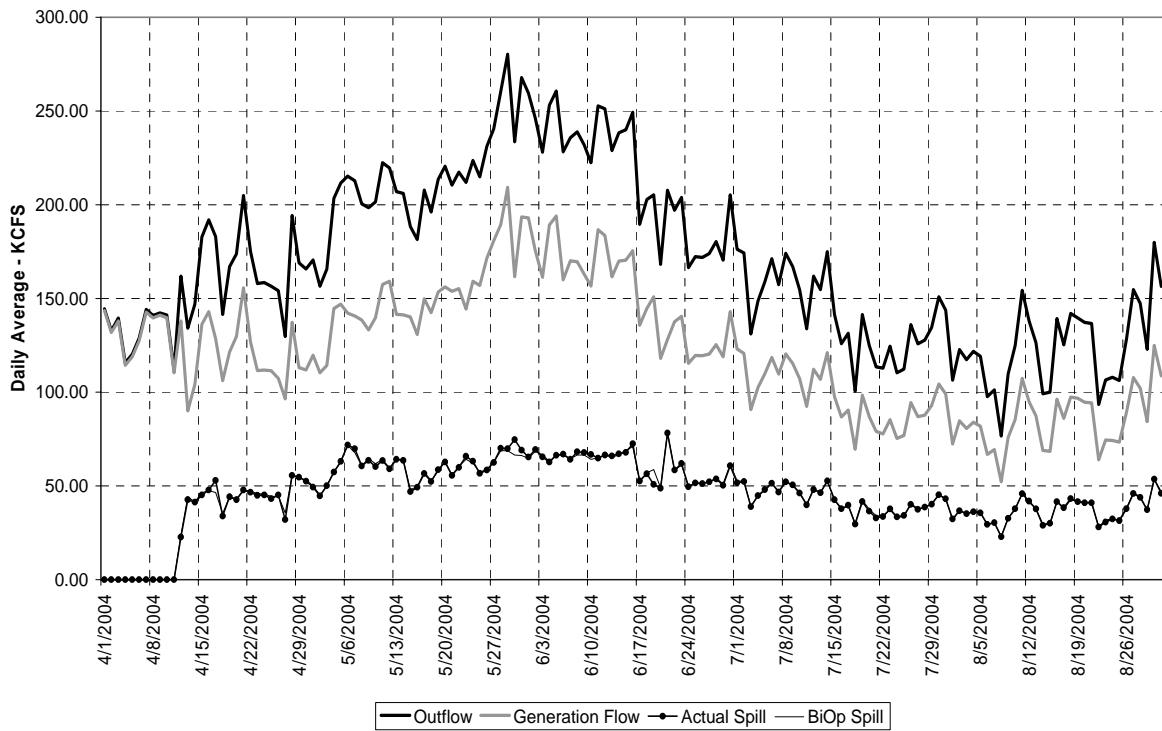
**FIGURE F-1**  
**BiOp Spill at Bonneville**



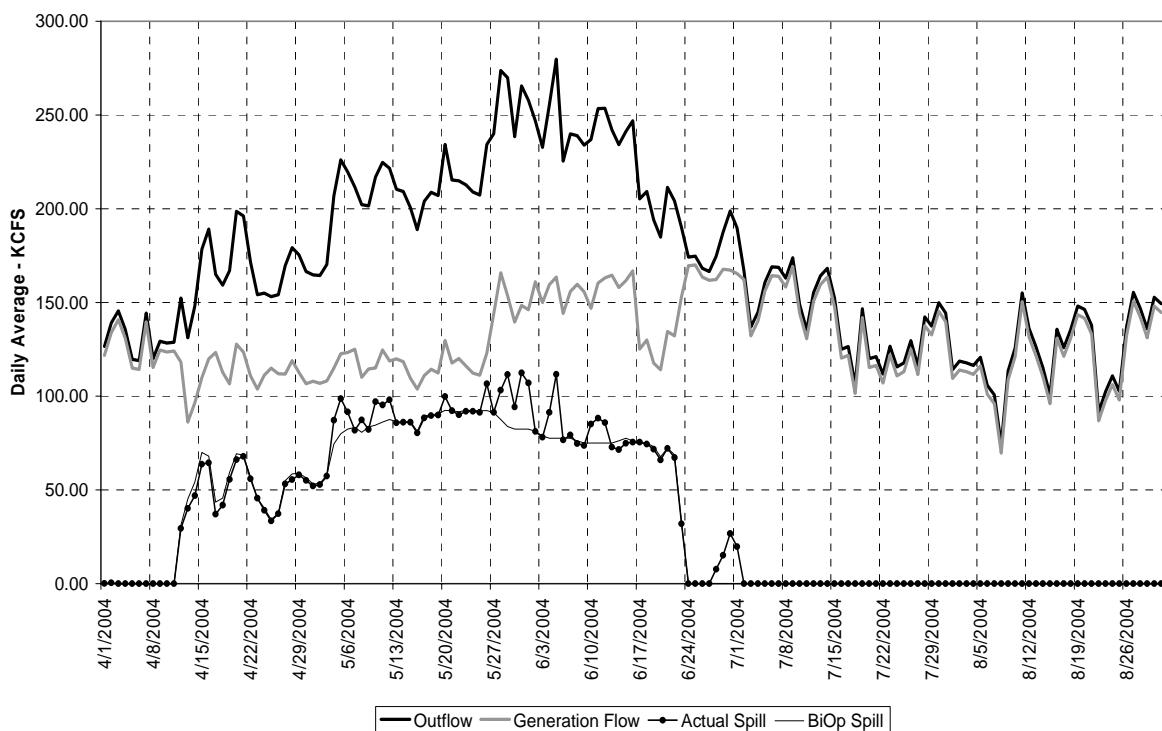
**FIGURE F-2**  
**BiOp Spill at The Dalles**



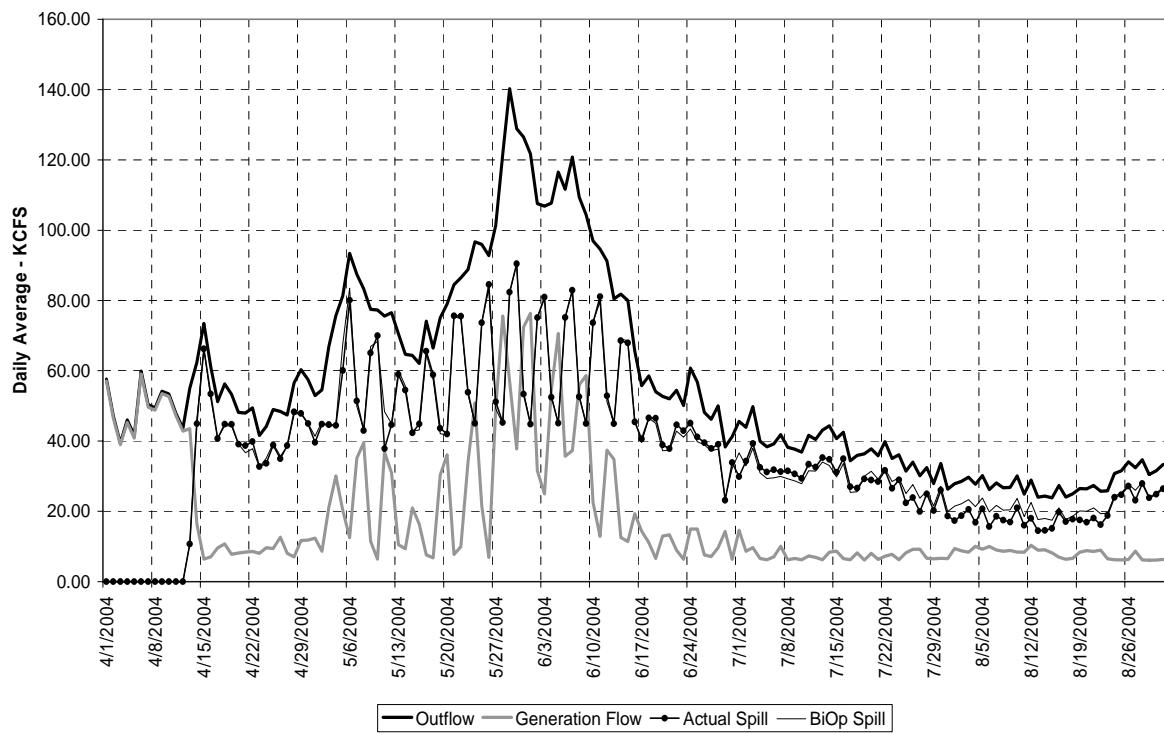
**FIGURE F-3**  
**BiOp Spill at John Day**



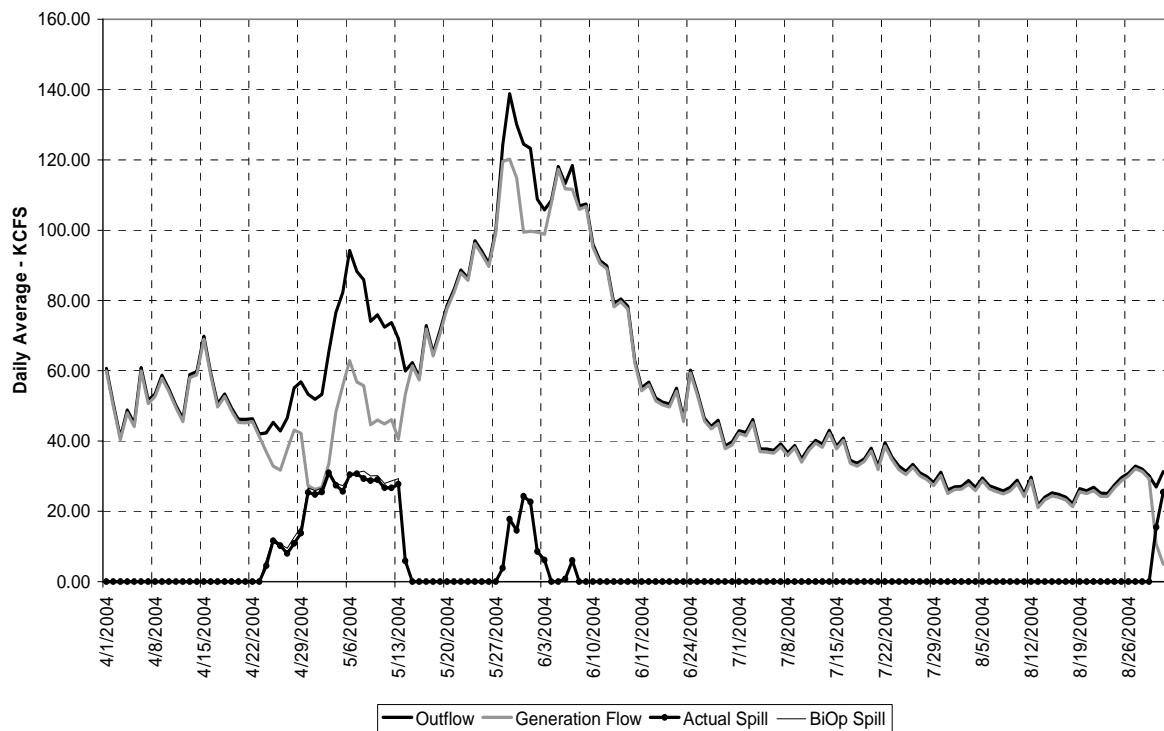
**FIGURE F-4**  
**BiOp Spill at McNary**



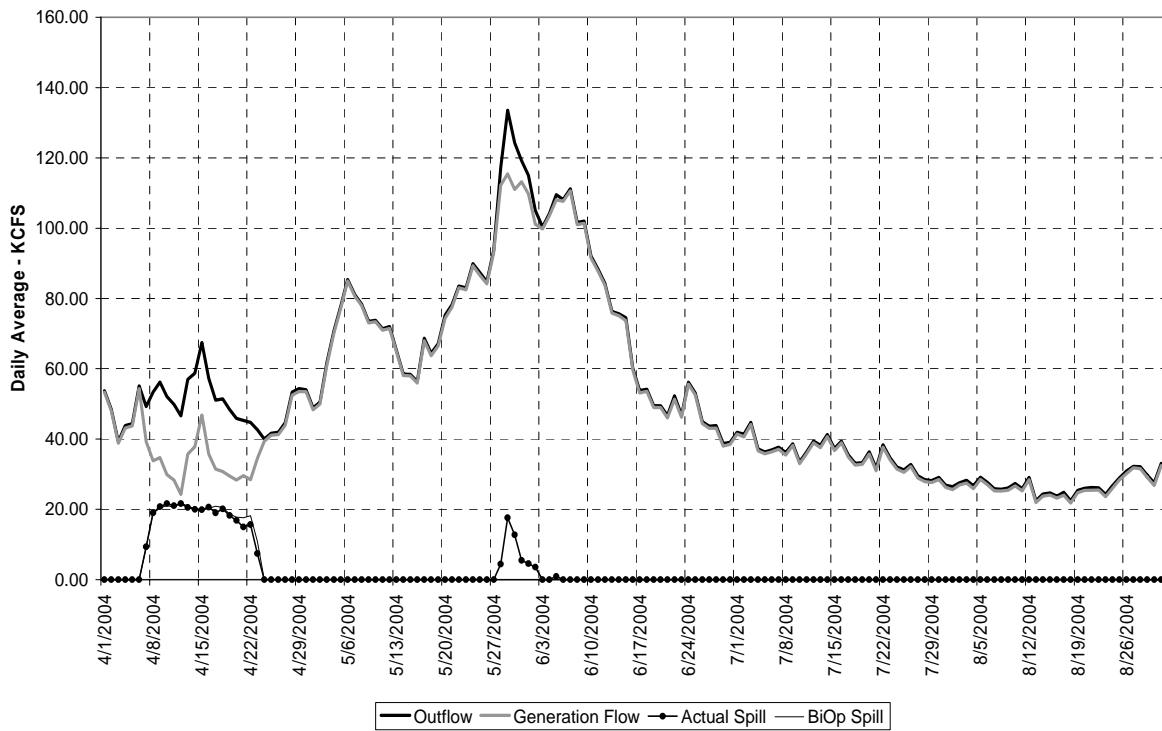
**FIGURE F-5**  
**BiOp Spill at Ice Harbor**



**FIGURE F-6**  
**BiOp Spill at Lower Monumental**



**FIGURE F-7**  
**BiOp Spill at Little Goose**



**FIGURE F-8**  
**BiOp Spill at Lower Granite**

