

FISH SPILL PROGRAM

PROGRAM: FISHSPIL.EXE

INTRODUCTION: One possible non-power requirement at a project is forced spill for fish passage. The water which is spilled at a project does not go through the powerhouse and is not used to generate power at that project. These spill values are based on a percentage of a project's regulated flow during particular periods. The spill percentages and their applicable periods are specified in the Pacific Northwest Coordination Agreement (PNCA) February 1 Data Submittal.

The Fish Spill program calculates the forced spill for fish at a project. The program uses the spill percentages from the February 1 Data Submittal and the regulated flows developed during a HYSSR regulation to calculate the forced spill values. These resulting spill values are in units of cfs and are used as input to the TDMODS file, which is an input file to the HYSSR regulator. The program is called Fish Spill because it is used to compute forced spill past projects during the fish migration period, however, the program can be used to determine other types of forced spill at a project.

Spill during a period at some projects may be divided into parts for each day. An example of this type of spill is when one spill percentage is specified for the daytime hours and a different spill percentage is specified for the night. Projects with this type of spill specify the number of hours for each spill and often set a limit to the spill during these hours. Also there may be a spill limit for the entire day. The Fish Spill program can calculate spill for projects with this type of spill.

Spill in cfs may be input by period at a project and the program will create a spill record containing the period and corresponding spill value for each year of the study. This feature is used when a specific spill is needed which is not a percentage of the regulated flow at the project.

INPUT: The Fish Spill program executes in batch mode, so it requires a control file named **C:\HYSSR\CONFILES\FISHSPIL.CON**. This control file defines the names of the input data file, the

diagnostic output file listing the input and any errors, the Study Characteristics file, the output file containing the resulting spill values, and the TABOUT file. A sample control file follows:

```
* C:\HYSSR\CONFILES\FISHSPIL.CON
*
* Unit 5 is the input file
* Unit 6 is the output file listing of input and errors
* Unit 7 is the Study Characteristics file
* Unit 8 contains the resulting fish spill values
* Unit 14 is the TABOUT file
*
*      FORMAT  T4,I2,T7,A26,T34,A11,T46,A7,T54,A10,T65,I4
*
*-----*
*UNIT FILE NAME                FORMAT      STATUS   ACCESS  RECL
*-----*
*
*   5  C:\REFILL93\FISHSPIL.DAT  FORMATTED  OLD
*   6  C:\REFILL93\FISHSPIL.PRN  FORMATTED  UNKNOWN
*   7  C:\REFILL93\STCHAR93.STY  UNFORMATTED  OLD
*   8  C:\REFILL93\FISHSPIL.93   FORMATTED  UNKNOWN
*  14  C:\REFILL93\TABOUT.93     UNFORMATTED  OLD      DIRECT  104
*-----*
```

The input file may contain record codes 77, 78, 79, 80 and 81 in addition to record code 99 which is for user comments. Record code 77 specifies spill percentages by period for a project where a simple spill percentage for the period is available. Record code 78 specifies the spill limit in cfs for a project by period which is the maximum spill allowed using the spill percentages on record code 77. Record code 79 defines spill percentages, durations, and limits when a project's spill changes during the course of the day. Record code 80 specifies a project minimum flow below which projects listed on that record should not spill. Record code 81 specifies by period a spill in cfs which should be used for all years at that project.

Record code 99: This record is used solely for user comments and is not read by the program. The only requirement is that "99" appear in columns 1 - 2.

Record code 77: This record code contains the spill percentages for a project entered without the percent (%) symbol. The spill percentages should be taken from the PNCA February 1 Data Submittal. These records must be in standard HYSSR record format with the external project number, the period identifiers, and the spill percentages in their appropriate columns. No year is input with the spill percentages; the program uses the spill percentage values for all years being studied. Example input follows the record code descriptions.

Record code 78: This record code contains the spill limits for a project in cfs. These spill limits are used as a maximum to the spill computed using the spill percentages input on record code 77. These spill limits should also be taken from the PNCA February 1 Data Submittal and input using standard HYSSR format. No year is input. Standard HYSSR format follows:

STANDARD HYSSR FORMAT

<u>Columns</u>	<u>Data</u>
1 - 2	Record code 77 or 78
8 - 10	Project number
21 - 23	Period identifier
24 - 32	Spill Percentage entered without % symbol or spill limit in cfs
33 - 35	Period identifier
36 - 44	Spill percentage or spill limit
45 - 80	Repeat Period identifier -- data

Record code 79: This record code contains spill percentages, durations, and limits for projects and periods which have spill divided into two parts each day. Again the information comes from the PNCA February 1 Data Submittal and is input using the record format below:

<u>Columns</u>	<u>Data</u>
1 - 2	Record code 79
8 - 10	Project number
13 - 15	Period identifier
21 - 22	Data identifier
23 - 32	Data
33 - 35	Data identifier
36 - 44	Data
45 - 80	Repeat Data identifier -- data

There are seven possible data identifiers for spill specified on record code 79. They are:

VL1 and **VL2** - specify the spill percentages to be applied to a part of each day during a period. The percentages are input without the % symbol. Data for VL1 is for one part of the day and data for VL2 is for the second part of the day.

DR1 and **DR2** - specify the percentage of each day that the spill percentages are in effect. The duration percentage is entered without the % symbol. DR1 is the duration for VL1 and DR2 is the duration for VL2.

LM1 and **LM2** - specify the spill limit in cfs for each part of the spill. LM1 is the spill limit for VL1 and DR1 and LM2 is the spill limit for VL2 and LM2.

LMT - is the overall spill limit in cfs for this project and period.

To help clarify the use of these identifiers the following example is given from the February 1, 1995 Data Submittal for Bonneville project.

“During the period from April 20 through August 31, spill will be 100% during the night (1800 - 0600) and limited to 75 kcfs during the day (0600 - 1800).” Project spill limit for each period is 130 kcfs.

Samples of record code 79 for this would be as follows:

79	83	APR	VL1	100.0DR1	33.33LM1	75000VL2	100.0
79	83	APR	DR2	33.33LMT	130000		
79	83	JUL	VL1	100.0DR1	50LM1	75000VL2	100.0
79	83	JUL	DR2	50.0LMT	130000		

In this example, the durations (DR1 and DR2) for the two spills are 12 hours each or 50%. However, since spill does not begin until April 20, the durations for the second half of April (APR) have been multiplied by two-thirds (spill 10 of the 15 days in the period). The resulting DR1 and DR2 are 33.33% (50% times 2/3). The day time limit for spill is 75000 cfs (LM1) and the spill percentage is 100.0% because all flow up to 75000 cfs needs to be spilled. The spill percentage for night time is also 100.0% and since no spill limit is given no LM2 data is input. The overall spill limit (LMT) is 130000 cfs.

Record Code 80: This record code is used when there is a requirement that a project's regulated flow be above a certain amount before that project or another project has forced spill. No year or period is input for this data so the requirement applies to all periods and years where forced spill has been computed. For example, spill is not allowed at Lower Granite when the average flow for a period is less than 100,000 cfs. First the program computes Lower Granite's spill using record codes 77 and 78. Then it checks Lower Granite's regulated flow against 100,000 cfs and if the regulated flow for the period is less than 100,000 cfs no spill value would be output on record code 76 for Lower Granite for that year and period.

FORMAT

<u>Columns</u>	<u>Data</u>
1 - 2	Record code 80
8 - 10	Project number
21 - 23	QMN
24 - 32	Flow requirement for spill
33 - 35	PRJ
36 - 44	Project where spill will occur
45 - 47	PRJ
48 - 56	Project where spill will occur
57 - 59	PRJ
60 - 68	Project where spill will occur

69 - 71 **PRJ**
 72 - 80 Project where spill will occur

An example of this record for Lower Granite follows:

80 76 QMN 100000PRJ 76

Record code 81: This record code contains a project's forced spill values in cfs by period using standard HYSSR format. The program outputs these spill values on record code 76 for each year of the study. A sample input and output follows:

SAMPLE INPUT:

81 69 JUN 2857JUL 4229AG1 2353

OUTPUT:

76 69 28AG1 2353
 76 69 29JUN 2857JUL 4229AG1 2353
 76 69 30JUN 2857JUL 4229AG1 2353
 etc.

99 The following is sample input data

77	82	APR	43.3MAY	46.2JUN	48JUL	41.2
77	82	AG1	45.1AUG	47SEP	40	
77	79	MAY	51JUN	52.2JUL	53.5SEP	49.1
78	82	APR	100000MAY	100000JUN	100000JUL	100000
78	82	AG1	100000AUG	100000SEP	100000	
79	83	APR	VL1 100.0DR1	33.33LM1	75000VL2	100.0
79	83	APR	DR2 33.33LMT	130000		
79	83	JUL	VL1 100.0DR1	50LM1	75000VL2	100.0
79	83	JUL	DR2 50.0LMT	130000		
80	76	QMN	100000PRJ	76		
80	76	QMN	85000PRJ	77PRJ	78	
81	69	JUN	2857JUL	4229AG1	2353	

Two other files are required as input to the Fish Spill program. The Study Characteristics file provides project numbers and project order for the program. The TABOUT file contains the regulated flows for the projects. These flows are used to compute the forced spill in cfs for each period for all the years of record in the study.

OUTPUT: The Fish Spill program produces two types of output: a diagnostic output file and the output file containing computed spill in cfs.

The output file containing the computed spill values uses record code 76 in standard HYSSR format. Each record contains the external project number, the year, the period identifiers, and the resulting spill values.

A sample of this output file follows:

76	67	30APR	4418.9MAY	10200.0JUL	4725.7AG1	2763.8
76	79	30APR	9574.9MAY	9630.5JUN	6940.6JUL	2545.7
76	83	30APR	25779.4MAY	80444.4JUN	18519.5JUL	2320.0
76	67	31APR	240.3MAY	10200.0JUL	4833.3AG1	2188.9
76	79	31APR	6514.7MAY	9607.7JUN	4373.0JUL	1919.9
76	83	31APR	26457.9MAY	80303.1JUN	18538.6JUL	2261.2

The diagnostic output file contains a listing of the input data and any error messages. This file is designed to assist the user in checking data. The program writes each input record to this file as it is read. If an error is detected (either the record code is not 77, 78, 79, 80, 81 or 99, or the external project number does not match the project numbers found in the Study Characteristics file) an error message will be written. The possible error messages are:

******ERROR: () IS INVALID CARD CODE** where () is the record code which is not valid.

Valid record codes for this program are **77, 78, 79, 80, 81** and **99**.

() IS NOT A VALID PROJECT NUMBER FOR THIS STUDY where () is the project number which did not have a match in the Study Characteristics file.

NOTE: These errors will not stop program execution, but the input records containing these errors will be ignored and no spill values will be computed for the projects specified on these invalid records.

PROGRAM EXECUTION ON THE PC:

To execute the Fish Spill program, have a copy of **FISHSPIL.EXE** in the local **C:\HYSSR\PGM** subdirectory, and the program will execute using the datasets named in **FISHSPIL.CON**. This control file must be in the local **C:\HYSSR\CONFILES** subdirectory and changed to meet the data file naming conventions being used. The existing format of the confile may not be altered.