

OUTPUT DESCRIPTION for DIAGNOSTICS

The output for HYSSR called DIAGNOSTICS (Unit 6 in the HYSSR.CON file) provides information about the data used during each period of the regulation. This output file is controlled by the PRN option on record code 01 in the HYSSR.IN file (Unit 5 in the HYSSR.CON file). When PRN = 0 (zero) or the option is not input and the study length is six or more years, HYSSR will output only limited information and error messages to the DIAGNOSTICS file. When PRN = 0 and the study length is less than six years, or PRN = 2 or 4, HYSSR also writes information for each year and period to the DIAGNOSTICS file.

Each DIAGNOSTICS file provides a list of the input from HYSSR.IN and any associated error messages. Errors in this input usually cause HYSSR to terminate execution. HYSSR lists the study type (**IRS**) as either 0 (continuous) or 2 (refill). Then it indicates whether natural flows have been depleted by writing the factor it used. A depletion factor of 0.000 (zero) indicates that the flows have not been depleted. HYSSR also writes the method of study in use. The study method is specified by the OBJ option on record code 01 in HYSSR.IN in conjunction with data input from TDDATA and TDMODS. Most studies use either **TREATY AUTOMATIC REGULATION** (OBJ = 0) or **TREATY AUTOMATIC REGULATION W/ FISH FLOWS** (OBJ = 2). Treaty Automatic Regulation regulates the system to meet the firm hydro load by using the rule curves provided at each storage project. Treaty Automatic Regulation W/ Fish Flows regulates the system to meet the system load using a combination of rule curves based on CRC's, ARC's, and VRC's at most projects and rule curves based on both the fish rule curves (input on record codes 46 and 47) and the CRC's, ARC's, and VRC's at projects which will contribute to downstream target flows. These target flows are specified on record code 72 (input to TDDATA or TDMODS). Once the load has been met, the system is regulated again and projects with fish rule curves that are able to contribute additional flow for the target are drafted to meet the target flow. The projects to be drafted for a target flow are indicated by record code 88 in the HYSSR.IN file.

When information is written to the DIAGNOSTICS file for each year and period, that period's information begins with: BPSP: DIAGNOSTICS FOR period year (period number). For example :

BPSP: DIAGNOSTICS FOR 31 JUL 1931 (8). Probably the most commonly used information in the DIAGNOSTICS is the table of rule curves for each storage project. This table contains the values used by the regulator for each rule curve plus project full and empty. The table values are:

- SUB** project full in KAF
- MRC** the flood control rule curve value in KAF (input on record code 62)
(uses SUB if no MRC was input)
- ORC** the operating rule curve (briefly the ORC is the higher of the ARC and CRC1 unless the VRC is lower but never higher than the MRC or lower than the LLVECC)
- CRC1** the first year critical rule curve value in KAF
- CRC2** the second year critical rule curve value in KAF
- CRC3** the third year critical rule curve value in KAF
- CRC4** the fourth year critical rule curve value in KAF
- ARC** the Assured Refill Curve in KAF (input on record code 41)
- VRC** the Variable Refill Curve in KAF (input on record code 63)
- LLVECC** the Lower Limit Variable Energy Content Curve in KAF (input on record code 48)
- SLB** project empty in KAF

**** CRCs WERE REORDERED** and used by the regulator may not be the same values input on record codes 42, 43, 44, and 45. When CRC2 is greater than CRC1, HYSSR replaces CRC2 with CRC1. When CRC3 is greater than CRC2, HYSSR replaces CRC3 with CRC2. When CRC4 is greater than CRC3, HYSSR replaces CRC4 with CRC3. Finally HYSSR compares each CRC to the ORC and replaces any CRC greater than the ORC with the ORC. So rule curve order is:

$$\text{MRC} \geq \text{ORC} \geq \text{CRC1} \geq \text{CRC2} \geq \text{CRC3} \geq \text{CRC4} \geq \text{SLB}$$

$$\text{RC1} \geq \text{RC2} \geq \text{RC3} \geq \text{RC4} \geq \text{RC5} \geq \text{RC6} \geq \text{RC7}$$

!! FISH RULE CURVES USED indicates that the rule curves listed are not the values which

were input as CRC1, CRC2, CRC3, CRC4, ARC, VRC and SLB. Instead the rule curves are based on record codes 46 and 47 (the fish rule curves).

After the table listing the rule curves, the DIAGNOSTICS provide intermediate information about how the projects and system are being regulated. It indicates the rule curve value and the corresponding system generation for each iteration as HYSSR regulates to meet the load. When there are target flows to meet, the DIAGNOSTICS section provides information about the target flows and the flows at upstream projects.

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INIT: NO GENERATING CHARACTERISTICS FOR TIMOTHY
INIT: NO GENERATING CHARACTERISTICS FOR BONNERS FERY
INIT: NO GENERATING CHARACTERISTICS FOR DUNCAN
INIT: NO GENERATING CHARACTERISTICS FOR ARROW
01      NSY      28.NSP      9.NLY      29.NLP      9.      0.
01      IRP      0.IRS      0.OBJ      2.TOL      10.     0.
01      BCP      3610.ECP   3705.STY   90.TRC      0.      0.
01      PRN      0.GCL      1.        0.         0.      0.
01      STN LWSNAKA2
06      1
06      6
48      10      29JAN      2364.FEB   2259.MAR   2170.AP1   2177.     0.
48      10      30JAN      2615.FEB   2510.MAR   2411.AP1   2470.     0.
48      10      31JAN      2554.FEB   2460.MAR   2376.AP1   2427.     0.
48      10      32JAN      1729.FEB   1660.MAR   1725.AP1   1814.     0.
48      10      33JAN      1192.FEB   1110.MAR   1056.AP1   1137.     0.
48      19      29JAN      7669.FEB   8151.MAR   7744.AP1   8342.     0.
48      19      30JAN      9107.FEB   9007.MAR   8497.AP1   8440.     0.
48      19      31JAN      9107.FEB   9107.MAR   8555.AP1   8443.     0.
48      19      32JAN      3922.FEB   3922.MAR   4082.AP1   4491.     0.
48      19      33JAN      3922.FEB   3922.MAR   3985.AP1   4505.     0.
06      21
06      41
06      46
06      49
06      50
06      59
06      72
88      76      APR      31MAY      31JUN      31JUL      31      0
88      76      AG1      31AUG      31      0      0
88      80      AG1      10AUG      10      0      0
88      80      JUN      19JUL      19AG1     19AUG      19      0
88      80      AG1      3AUG      3      0      0
06      84
06      169
88      400     APR      3MAY      3JUN      3JUL      3      0

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GCL DRAFT LIMIT RATE = 1.3 FT\DAY

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MAIN: THE STUDY TYPE (IRS) SWITCH IS SET TO 0
TEMPORARY CYCLICAL FILE HAS BEEN BUILT
DEPLET: ALL FLOWS HAVE BEEN DEPLETED BY A FACTOR OF 0.000
TREATY AUTOMATIC REGULATION W/ FISH FLOWS, IMODE = 5
1BPSP: DIAGNOSTICS FOR 15 AUG 1928( 9)

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BPSP 193 IMODE,MLSIG,IFRSIG,SLIM = 5 0 0 7.00
***** BASE ECC IS BASED ON HIGHER OF ARC AND CRC1

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NO.	PROJECT	SUB	MRC	ORC	CRC1	CRC2	CRC3	CRC4	ARC	VRC	LLECC	SLB
167	WHITE RIVER	46.6	47.0	46.6	46.6	46.6	46.6	46.6	0.0*****		0.0	0.0
166	TIMOTHY	61.7	62.0	61.7	61.7	61.7	50.2	14.9	4.1*****		0.0	0.0
153	UPPER BAKER	220.6	221.0	220.6	220.6	220.6	220.6	220.6	0.0*****		0.0	35.9
154	LOWER BAKER	142.4	143.0	142.4	142.4	142.4	142.4	142.4	0.0*****		0.0	0.0
RCVL0D: NO MAND RULE CURVE FOR ROSS												
		SUB USED										
150	ROSS	1052.2	1052.2	1052.2	1052.2	1052.2	1051.0	820.1	405.7*****		0.0	0.0
157	CUSHMAN NO 1	372.1	368.0	368.0	368.0	368.0	364.0	294.1	105.3*****		0.0	0.0
155	ALDER	179.7	179.7	179.7	179.7	179.7	155.7	155.7	179.7*****		0.0	18.2

3	LIBBY	5869.4	5869.4	4977.8	4977.8	4977.8	4977.8	4977.8	3808.1*****	0.0	889.9	!
5	DUNCAN	1424.9	1424.9	1417.8	1417.8	1417.8	355.4	290.8	106.2*****	0.0	25.0	
6	CORRA LINN	817.0	570.0	570.0	570.0	570.0	570.0	570.0	0.0*****	0.0	144.0	
1	MICA	7000.0	7000.0	6966.3	6966.3	6966.3	5193.1	3132.8	5323.0*****	0.0	-5000.0	
2	ARROW	7327.3	7327.3	7130.5	7130.5	7130.5	6260.8	3878.2	227.3*****	0.0	227.3	
10	HUNGRY HORSE	3071.5	3071.5	2832.1	2832.0	2831.9	2831.9	2831.9	2342.5*****	0.0	0.0	!
11	KERR	1792.0	1792.0	1792.0	1792.0	1792.0	1792.0	1792.0	0.0*****	0.0	572.8	
RCVL0D: NO MAND RULE CURVE FOR NOXON SUB USED												
38	NOXON	496.0	496.0	496.0	496.0	496.0	496.0	496.0	0.0*****	0.0	265.3	
16	ALBENI FALLS	1540.0	1540.0	1540.0	1540.0	1540.0	1493.8	1493.8	0.0*****	0.0	384.8	
18	POST FALLS	235.0	235.0	235.0	235.0	235.0	235.0	235.0	0.0*****	0.0	11.9	
64	LONG LAKE	104.3	104.0	104.0	104.0	104.0	104.0	104.0	0.0*****	0.0	1.5	
19	GRAND COULEE	9107.4	9107.4	8336.4	8330.6	8324.7	8324.7	8324.7	3921.9*****	0.0	3921.9	!
20	CHELAN	1676.0	1677.0	1676.0	1676.0	1676.0	1676.0	1657.6	998.6*****	0.0	998.6	
21	BROWNLEE	1420.1	1420.1	1281.5	1281.5	1281.5	1163.6	1133.9	444.7*****	0.0	444.7	
31	DWORSHAK	3468.0	3468.0	2238.0	2238.0	2238.0	2238.0	2238.0	1919.2*****	0.0	1452.8	!
RCVL0D: NO MAND RULE CURVE FOR LOWR GRANITE SUB USED												
76	LOWR GRANITE	487.6	487.6	443.6	443.6	443.6	443.6	443.6	0.0*****	0.0	0.0	
RCVL0D: NO MAND RULE CURVE FOR LITTLE GOOSE SUB USED												
77	LITTLE GOOSE	565.5	565.5	516.5	516.5	516.5	516.5	516.5	0.0*****	0.0	0.0	*
RCVL0D: NO MAND RULE CURVE FOR LOWR MONMNTL SUB USED												
78	LOWR MONMNTL	377.0	377.0	357.0	357.0	357.0	357.0	357.0	0.0*****	0.0	0.0	*
RCVL0D: NO MAND RULE CURVE FOR ICE HARBOR SUB USED												
79	ICE HARBOR	406.3	406.3	381.3	381.3	381.3	381.3	381.3	0.0*****	0.0	0.0	
81	JOHN DAY	2523.9	2524.8	2242.4	2242.4	2242.4	2242.4	2240.7	0.0*****	0.0	1989.9	*
40	ROUND BUTTE	524.0	524.0	524.0	524.0	524.0	524.0	477.0	404.2*****	0.0	249.7	
159	SWIFT NO 1	447.1	447.0	447.0	447.0	447.0	447.0	199.2	0.0*****	0.0	0.0	
161	YALE	189.6	190.0	189.6	189.6	189.6	175.9	92.0	0.0*****	0.0	0.0	
162	MERWIN	183.7	184.0	183.7	183.7	183.7	173.6	69.1	0.2*****	0.0	0.2	
163	MOSSYROCK	1297.8	1297.8	1297.8	1297.8	1297.8	667.8	667.8	1297.8*****	0.0	0.0	*

** - CRCS WERE REORDERED

!! - FISH RULE CURVES USED

CORLIN AT 21: ELV,STORIJC,SONE = 0.174332E+04 0.595738E+06 0.570000E+06
MTLS: PLOAD = 10347.50 SLOAD = 6000.00 TOL = 10.00
MTLS: ITR= 1 RCV= 2.000 SPG= 12315.44 RCVL= 2.000 SPGL= 12315.44 RCVH= 1.000 SPGH= 0.00
MTLS: ITR= 1 RCV= 2.000 SPG= 12315.44 RCVL= 2.000 SPGL= 12315.44 RCVH= 1.000 SPGH= 0.00
MTLS: TOTAL ITERATIONS = 1 PSL0D = 16347.5000 SLOAD = 6000.00