A Department of Ecology Report

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Waste Load Allocations for Biochemical Oxygen Demand for Inland Empire Paper Company

Abstract

Waste Load Allocations (WLAs) for biochemical oxygen demand for the Inland Empire Paper Company (IEP) discharge to the Spokane River were revised based on new data collected by IEP during 1995. The new data showed lower ratios of ultimate carbonaceous to 5-day BOD and higher rates of BOD decay compared with the previous data collected by Ecology during 1992. The revised WLAs were found to be similar to, but more restrictive than the WLAs previously proposed by Ecology.

Introduction

This report documents the revision of recommended waste load allocations (WLAs) for 5-day biochemical oxygen demand (BOD_5) based on new data submitted by Esvelt Environmental Engineering (Esvelt, 1996). Esvelt (1996) presented a data report prepared by Cavender (1996) for Inland Empire Paper Company (IEP). The original recommended WLAs by Ecology are documented in the report by Pelletier (1994).

The report submitted by Esvelt (1996) contains data collected by IEP during the summer of 1995. Tests were performed on effluent and river samples by the IEP laboratory and by the Washington State University (WSU) Environmental Engineering Labs. Effluent measurements of ultimate carbonaceous biochemical oxygen demand (CBODU) were performed according to proposed standard methods (APHA *et al.*, 1992), which are consistent with methods recommended by Pelletier (1994).

Significant findings from the IEP 1995 effluent and river studies appear to be as follows:

- The ratio of CBODU/BOD_5 in effluent from IEP was found to be significantly lower in the 1995 samples compared with the two samples collected by Ecology during 1992.
- The decay rate of CBODU in effluent from IEP was found to be significantly higher in the 1995 samples compared with Ecology's 1992 samples.
- The effluent CBODU data collected by IEP during 1995 appears to be of better quality than the data collected by Ecology during 1992. The results of split samples by the IEP and WSU labs were not significantly different. The duration of the incubations for the IEP/WSU 1995 data was generally longer (47 to 80 days) compared with the Ecology data (36 to 37 days). The longer tests by IEP and WSU probably resulted in greater accuracy of the tests compared with Ecology's data because of the relatively low decay rates.

by Greg Pelletier

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- Temperatures in the Spokane River upstream from Upriver Dam were higher during IEP's 1995 sampling events compared with Ecology's and IEP's 1992 data.
- Dissolved oxygen (DO) in the Spokane River upstream from IEP and Upriver Dam was lower during IEP's 1995 sampling events compared with Ecology's and IEP's 1992 data.

Based on the results of the 1995 sampling by IEP, Esvelt suggested that the waste load allocations (WLAs) recommended by Ecology may be too low by approximately a factor of 7. This conclusion is incorrect because it is based on the assumption that the WLA would be directly proportional to the ratio of CBODU/BOD_5, and does not take into consideration the importance of the significantly higher decay rate for CBODU determined during the 1995 tests. Also, Esvelt's conclusions did not take into consideration the new river data which showed higher temperatures and lower DO in the river, or the projected increase in effluent flow rate.

CBODU Results from the Tests by IEP and WSU During 1995

Although the lab testing methods for CBODU by IEP and WSU during 1995 appear to be appropriate, the method of calculation for CBODU and the decay rate were not consistent with standard methods (APHA *et al.*, 1992; NCASI, 1987a and b). The CBODU was generally assumed to be equal to the cumulative amount of carbonaceous BOD (CBOD) exerted by the end of the test instead of being calculated by the first-order model specified in APHA *et al.* (1992). Also, the decay rate calculated by IEP was for total BOD instead of CBOD.

Estimates of CBODU and the decay rate of CBODU were recalculated from the raw data provided by Esvelt (1996) and Cavender (1996). NCASI's BODFO program was used to calculate CBODU and the decay rate using the first order model specified by APHA (1992) and NCASI (1987a and b). The results of this recalculation are presented in Tables 1 and 2, and summarized in Table 3. The average ratio of CBODU/BOD_5 was found to be 6.38 and the average decay rate of CBODU was found to be 0.0469 day^{-1} (base e at 20 degrees C) (Table 3). The recalculated ratio of CBODU/BOD_5 of 6.38 is higher than the ratio of 5.6 presented by Esvelt (1996) because of the higher values of CBODU calculated by the BODFO program compared with the BOD exerted at the end of the incubations.

Figure 1 presents all of the raw data for CBOD during the tests by IEP and WSU during 1995 and by Ecology during 1992. In general, the IEP and WSU data show greater exertion of CBOD during the first 40 days of the test compared with the Ecology data. This is consistent with the lower decay rates for Ecology's 1992 data. Because the net effect of higher CBODU decay rates and lower CBODU concentrations shown in the 1995 data is greater consumption of oxygen during the first few days of incubation compared with the 1992 data, it is reasonable to expect that the 1995 data may result in more restrictive WLAs for BOD loading to the river, which has a travel time of approximately 3 to 4 days between IEP and Upriver Dam.

Table 1. Summary of ultimate CBOD tests conducted by Inland Empire Paper Company (IEPC) for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank-corrected accumuated total BOD of first dilution (column 3 of Cavender, 1996) (mg/L)	(2) Dilution and Blank-corrected accumuated total BOD of second dilution (column 4 of Cavender, 1996) (mg/L)	(3) Interpolated Accumulated NBOD of first dilution (interpolated column 5 of Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of second dilution (interpolated column 6 of Cavender, 1996) (mg/L)	(5) Accumulated CBOD for 100 mL sample (col 1 - col 3)	(6) Accumulated CBOD for 150 mL sample (col 2 - col 4)
IEPC Sample Series 1, Sample Date 6/16/95:						
0	0	0	0	0	0.00	0.00
4	6	6.4	0.18	0.08	5.82	6.32
5	**7.8**	**8.8**	0.22	0.10	7.58	8.70
10	19.5	17.4	0.45	0.20	19.05	17.20
13	23.4	21	0.58	0.26	22.82	20.74
17	27.6	24.4	0.76	0.34	26.84	24.06
20	30.9	26.6	0.89	0.40	30.01	26.20
24	35.4	29.2	1.07	0.48	34.33	28.72
27	34.8	29.2	1.20	0.53	33.60	28.67
31	36	30.6	1.38	0.61	34.62	29.99
33	37.2	31.6	1.47	0.65	35.73	30.95
35	38.1	32.4	1.56	0.69	36.54	31.71
39	41.1	34.6	1.74	0.77	39.36	33.83
42	42.9	36	1.87	0.83	41.03	35.17
47	43.5	37	2.10	0.93	41.40	36.07
49	43.8	36.8	2.19	0.97	41.61	35.83
52	44.7	38.4	2.32	1.03	42.38	37.37
Results of NCASI's BODFO program:						Average
Ultimate CBOD:					**45.47**	**38.41** **41.9**
CBOD decay rate:					**0.05081**	**0.05498** **0.0529**
Total 5-day BOD:					**7.8**	**8.8** **8.3**
Ratio of Ultimate CBOD to BOD5:					**5.83**	**4.36** **5.10**

Table 1. Summary of ultimate CBOD tests conducted by Inland Empire Paper Company (IEPC) for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank-corrected accumuated total BOD of first dilution (column 3 of Cavender, 1996) (mg/L)	(2) Dilution and Blank-corrected accumuated total BOD of second dilution (column 4 of Cavender, 1996) (mg/L)	(3) Interpolated Accumulated NBOD of first dilution (interpolated column 5 of Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of second dilution (interpolated column 6 of Cavender, 1996) (mg/L)	(5) Accumulated CBOD for 100 mL sample (col 1 - col 3)	(6) Accumulated CBOD for 150 mL sample (col 2 - col 4)	
IEPC Sample Series 2, Sample Date 8/22/95:							
0	0	0	0	0	0.00	0.00	
3	**2.5**	**3**	0.13	0.06	2.37	2.94	
6	**9.5**	**10.6**	0.27	0.12	9.23	10.48	
8	12.5	13.2	0.36	0.16	12.14	13.04	
10	14.5	15.4	0.45	0.20	14.05	15.20	
15	19	19.4	0.67	0.30	18.33	19.10	
17	20.5	20.6	0.76	0.34	19.74	20.26	
20	22.5	22	0.89	0.40	21.61	21.60	
24	24.5	23.8	1.07	0.48	23.43	23.32	
29	26.5	25.8	1.29	0.57	25.21	25.23	
34	27	26.8	1.52	0.67	25.48	26.13	
38	27	27	0.361	0.366	26.64	26.63	
Results of NCASI's BODFO program:							Average
Ultimate CBOD:					**30.32**	**28.85**	**29.6**
CBOD decay rate:					**0.06392**	**0.07201**	**0.0680**
Total 5-day BOD (interpolated):					**7.17**	**8.07**	**7.6**
Ratio of Ultimate CBOD to BOD5:					**4.23**	**3.58**	**3.90**

Table 1. Summary of ultimate CBOD tests conducted by Inland Empire Paper Company (IEPC) for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank-corrected accumuated total BOD of first dilution (column 3 of Cavender, 1996) (mg/L)	(2) Dilution and Blank-corrected accumuated total BOD of second dilution (column 4 of Cavender, 1996) (mg/L)	(3) Interpolated Accumulated NBOD of first dilution (interpolated column 5 of Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of second dilution (interpolated column 6 of Cavender, 1996) (mg/L)	(5) Accumulated CBOD for 100 mL sample (col 1 - col 3)	(6) Accumulated CBOD for 150 mL sample (col 2 - col 4)
IEPC Sample Series 3, Sample Date 9/12/95:						
0	0	0	0	0	0.00	0.00
3	**2**	**3**	0.13	0.06	1.87	2.94
6	**9**	**9.5**	0.27	0.12	8.73	9.38
10	15	18.5	0.45	0.20	14.55	18.30
15	20	23	0.67	0.30	19.33	22.70
19	28	30	0.85	0.38	27.15	29.62
22	25	28.5	0.98	0.44	24.02	28.06
24	26	29.5	1.07	0.48	24.93	29.02
27	30	32	1.20	0.53	28.80	31.47
31	33	34.5	1.38	0.61	31.62	33.89
37	37	37	1.65	0.73	35.35	36.27
42	38	38.5	1.87	0.83	36.13	37.67
50	41	41	2.23	0.99	38.77	40.01
58	43	43	2.59	1.3	40.41	41.70
64	45		2.86		42.14	
70	46		3.12		42.88	
80	47		1.75		45.25	
Results of NCASI's BODFO program:						Average
Ultimate CBOD:					**48.41**	**43.86** **46.1**
CBOD decay rate:					**0.03511**	**0.04810** **0.0416**
Total 5-day BOD (interpolated):					**6.67**	**7.33** **7.0**
Ratio of Ultimate CBOD to BOD5:					**7.26**	**5.98** **6.62**

Table 1. Summary of ultimate CBOD tests conducted by Inland Empire Paper Company (IEPC) for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank-corrected accumuated total BOD of first dilution (column 3 of Cavender, 1996) (mg/L)	(2) Dilution and Blank-corrected accumuated total BOD of second dilution (column 4 of Cavender, 1996) (mg/L)	(3) Interpolated Accumulated NBOD of first dilution (interpolated column 5 of Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of second dilution (interpolated column 6 of Cavender, 1996) (mg/L)	(5) Accumulated CBOD for 100 mL sample (col 1 - col 3)	(6) Accumulated CBOD for 150 mL sample (col 2 - col 4)	
IEPC Sample Series 4, Sample Date 9/20/95:							
0	0	0	0	0	0.00	0.00	
5	**6**	**6**	0.22	0.10	5.78	5.90	
9	7	7.5	0.40	0.18	6.60	7.32	
14	12	14	0.62	0.28	11.38	13.72	
16	13	14.5	0.71	0.32	12.29	14.18	
19	14	13	0.85	0.38	13.15	12.62	
22	17	16.5	0.98	0.44	16.02	16.06	
29	19	19.5	1.29	0.57	17.71	18.93	
37	22	21.5	1.65	0.73	20.35	20.77	
44	27	24	1.96	0.87	25.04	23.13	
51	28	24.5	2.28	1.01	25.72	23.49	
56	28	24.5	2.50	1.12	25.50	23.38	
62	28		2.77		25.23		
72	28		1.3		26.70		
Results of NCASI's BODFO program:							Average
Ultimate CBOD:					**31.33**	**26.05**	**28.7**
CBOD decay rate:					**0.03308**	**0.04420**	**0.0386**
Total 5-day BOD:					**6.00**	**6.00**	**6.0**
Ratio of Ultimate CBOD to BOD5:					**5.22**	**4.34**	**4.78**

Table 2. Summary of ultimate CBOD tests conducted by Washington State University for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank corrected accumuated total BOD of 1:5 sample (WW 1:5 WSU appendix in Cavender, 1996) (mg/L)	(2) Dilution and Blank corrected accumuated total BOD of 1:10 sample (WW 1:10 of WSU appendix in Cavender, 1996) (mg/L)	(3) Dilution and Blank corrected accumuated total BOD of 1:20 sample (WW 1:20 of WSU appendix in Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of 1:5 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(5) Interpolated Accumulated NBOD of 1:10 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(6) Interpolated Accumulated NBOD of 1:20 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(7) Accumulated CBOD of 1:5 sample (col 1 - col 4)	(8) Accumulated CBOD of 1:10 sample (col 2 - col 5)	(9) Accumulated CBOD of 1:20 sample (col 3 - col 6)	
WSU Sample Set 1, Sample Date 8/22/95:										
0	0	0	0	0	0	0	0.00	0.00	0.00	
5	**5.7**	**5.4**	**5.2**	0.02	0.01	0.00	5.68	5.39	5.20	
8	9.8	11.3	10.7	0.04	0.01	0.00	9.76	11.29	10.70	
12	14.7	12.9	12	0.05	0.02	0.00	14.65	12.88	12.00	
16	17.1	15.2	11.1	0.07	0.02	0.00	17.03	15.18	11.10	
26	22.2	28.8	14.8	0.12	0.03	0.00	22.08	28.77	14.80	
40	31.3	31.4	36.4	0.18	0.05	0.00	31.12	31.35	36.40	
47	27.7	32.3	36.7	0.21	0.06	0.00	27.49	32.24	36.70	
Results of NCASI's BODFO program:										Average (1:5 and 1:10 only)
Ultimate CBOD:							**34.07**	**41.71**	**626.1**	**37.9**
CBOD decay rate:							**0.04347**	**0.03461**	**0.001328**	**0.0390**
Total 5-day BOD:							**5.70**	**5.40**	**5.20**	**5.6**
Ratio of Ultimate CBOD to BOD5:							**5.98**	**7.72**	**120.40**	**6.85**
WSU Sample Set 2, Sample Date 9/12/95:										
0	0	0	0	0	0	0	0.00	0.00	0.00	
5	**6.9**	**6.1**	**6.7**	0.02	0.01	0.00	6.88	6.09	6.70	
19	33.1	30.3	30.6	0.08	0.02	0.00	33.02	30.28	30.60	
26	43.2	41.5	46.9	0.12	0.03	0.00	43.08	41.47	46.90	
36	47.7	45.5	60	0.16	0.05	0.00	47.54	45.45	60.00	
48	49.3	44.4	46.4	0.21	0.06	0.00	49.09	44.34	46.40	
58	52.1	46.6	55.2	1.58	1.76	1.76	50.52	44.84	53.44	
Results of NCASI's BODFO program:										Average (1:5 and 1:10 only)
Ultimate CBOD:							**54.75**	**48.66**	**57.99**	**51.7**
CBOD decay rate:							**0.04860**	**0.05351**	**0.04886**	**0.0511**
Total 5-day BOD:							**6.90**	**6.10**	**6.70**	**6.5**
Ratio of Ultimate CBOD to BOD5:							**7.93**	**7.98**	**8.65**	**7.96**

Table 2. Summary of ultimate CBOD tests conducted by Washington State University for effluent from IEPC (based on analysis of raw data presented by Cavender, 1996).

Day	(1) Dilution and Blank corrected accumuated total BOD of 1:5 sample (WW 1:5 WSU appendix in Cavender, 1996) (mg/L)	(2) Dilution and Blank corrected accumuated total BOD of 1:10 sample (WW 1:10 of WSU appendix in Cavender, 1996) (mg/L)	(3) Dilution and Blank corrected accumuated total BOD of 1:20 sample (WW 1:20 of WSU appendix in Cavender, 1996) (mg/L)	(4) Interpolated Accumulated NBOD of 1:5 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(5) Interpolated Accumulated NBOD of 1:10 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(6) Interpolated Accumulated NBOD of 1:20 sample (interpolated from Tab 6 of WSU appendix in Cavender, 1996; NBOD = 4.57 * NO3-N) (mg/L)	(7) Accumulated CBOD of 1:5 sample (col 1 - col 4)	(8) Accumulated CBOD of 1:10 sample (col 2 - col 5)	(9) Accumulated CBOD of 1:20 sample (col 3 - col 6)	
WSU Sample Set 4, Sample Date 9/26/95:										
0	**0**	**0**	**0**	0	0	0	0.00	0.00	0.00	
12	**14.4**	**13.2**	**12.4**	0.05	0.02	0.00	14.35	13.18	12.40	
22	23.9	21.2	20.3	0.10	0.03	0.00	23.80	21.17	20.30	
34	33.3	38.2	57.5	0.15	0.04	0.00	33.15	38.16	57.50	
44	32.1	33.8	44.3	0.20	0.06	0.00	31.90	33.74	44.30	
55	32.6	31.3	35.2	1.48	1.75	1.79	31.12	29.55	33.41	
										Average (1:5 and 1:10 only)
Results of NCASI's BODFO program:										
Ultimate CBOD:							**34.96**	**36.62**	**49.18**	**35.8**
CBOD decay rate:							**0.05099**	**0.04628**	**0.03955**	**0.0486**
Total 5-day BOD:							**6.00**	**5.50**	**5.17**	**5.8**
Ratio of Ultimate CBOD to BOD5:							**5.83**	**6.66**	**9.52**	**6.24**
WSU Sample Set 5, Sample Date 10/9/95:										
0	**0**	**0**	**0**	--	0	0	--	0.00	0.00	
12	**15.9**	**15.7**	**14.6**	--	0.02	0.00	--	15.68	14.60	
24		36.9	31.8		0.03	0.00		36.87	31.80	
34		53.7	51.4		0.04	0.00		53.66	51.40	
43		48.6	50		0.05	2.26		48.55	47.74	
66		56.9			2.15			54.75		
										Average (1:10 only)
Results of NCASI's BODFO program:										
Ultimate CBOD:							--	**62.83**	**128.3**	**62.8**
CBOD decay rate:							--	**0.03572**	**0.01193**	**0.0357**
Total 5-day BOD:							--	**6.54**	**6.08**	**6.5**
Ratio of Ultimate CBOD to BOD5:							--	**9.60**	**21.09**	**9.60**

Table 3. Relationships between ultimate CBOD (CBODU) and 5-day BOD (BOD5) and summary of BOD decay rates from the ultimate BOD tests by IEPC and WSU during June-October, 1995.

	CBODU (mg/L)	CBODU decay rate (day^-1 base e at 20 degrees C)	BOD5 (mg/L)	Ratio of CBODU/BOD5
IEPC				
6/16/95	41.9	0.0529	8.3	5.10
8/22/95	29.6	0.0680	7.6	3.90
9/12/95	46.1	0.0416	7.0	6.62
920/95	28.7	0.0386	6.0	4.78
average	36.6	0.0503	7.2	5.10
WSU				
8/22/95	37.9	0.0390	5.6	6.85
9/12/95	51.7	0.0511	6.5	7.96
9/26/95	35.8	0.0486	5.8	6.24
10/9/95	62.8	0.0357	6.5	9.60
average	47.1	0.0436	6.1	7.66
Average of IEPC and WSU	41.8	0.0469	6.7	6.38

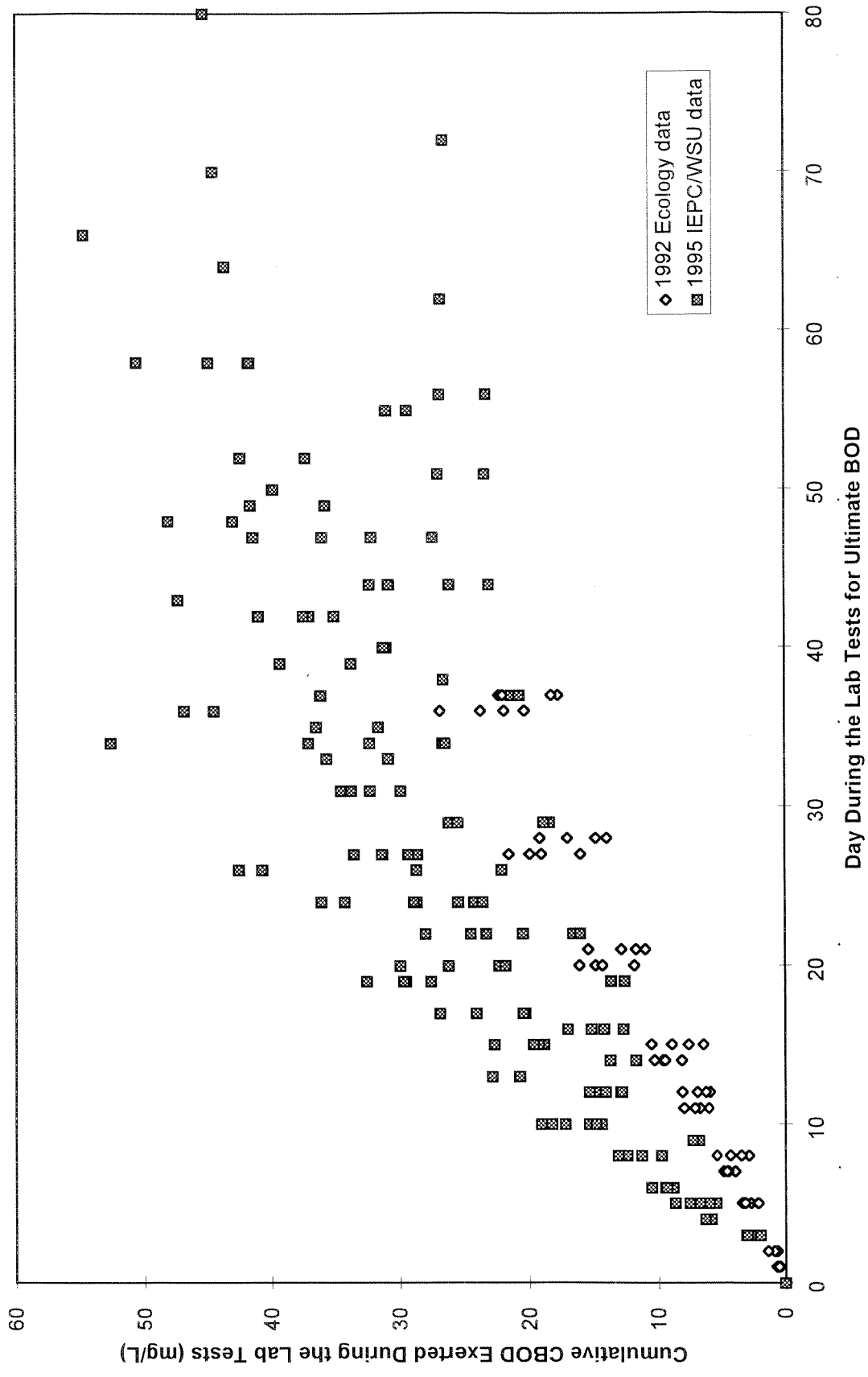

Figure 1. CBOD of effluent from IEPC exerted during all lab tests by Ecology during 1992, and by IEPC and WSU during 1995.

Calibration and Verification of the QUAL2E Model Using the 1995 CBODU Data

The QUAL2E model was used to estimate WLAs for BOD_5 for IEP, as documented in Pelletier (1994). The model was re-calibrated by using the 1995 CBODU data collected by IEP to estimate the ratio of CBODU/BOD_5 and the CBODU decay rate. All other model parameters were left the same as presented in Pelletier (1994) to check the re-calibration of the model compared with Ecology's September 1-2, 1992 sampling data, and for re-verification with IEP's August-September 1992 data. The QUAL2E input files for the revised model calibration and verification are presented in Appendix A. The use of IEP's 1995 data for CBODU/BOD_5 ratios and CBODU decay rate did not significantly change the accuracy of the model, as shown in Figures 2 and 3. The re-calibrated QUAL2E model was found to adequately represent DO over the range of river and loading conditions monitored by Ecology and IEP during August and September, 1992.

Revised Waste Load Allocations for BOD_5

WLAs for BOD_5 were estimated as the maximum amount of loading from IEP which would meet the water quality standard for DO in the Spokane River under an assumed set of critical conditions. Separate WLAs were estimated for the July-September and October-June periods that are used in the current NPDES permit. Seasonal permit periods are used to account for variations in loading capacity from seasonal changes in river flow, temperature, and DO. The July-September period contains the months with least loading capacity for BOD because of relatively low river flows and high temperatures.

Dissolved Oxygen Standard and Targets for QUAL2E Modeling

The Spokane River is Class A according to Chapter 173-201A WAC, which requires a water quality criterion of 8 mg/L of DO at all times. Concentrations of DO less than 8 mg/L were frequently observed during August-September 1992 and 1995 in the river downstream from the effluent discharge. Natural ground water inflows with DO less than 8 mg/L and relatively high river temperatures during summer are probably major contributors to excursions below the DO criterion of 8 mg/L in this segment of the river.

For the purpose of estimating allowable BOD loading from IEP, the DO standard was assumed to be met if: 1) the QUAL2E model predicted DO to be greater than 8 mg/L; or 2) IEP was predicted to cause an insignificant depletion when DO was less than 8 mg/L. Insignificant depletion was defined as less than 0.2 mg/L depletion below background conditions when predicted DO was less than 8 mg/L using the QUAL2E model.

The location where critical conditions were predicted to occur was selected using an objective analysis of the QUAL2E model results based on interpretation of the water quality standards. The procedure used to predict the location for critical conditions included consideration of diurnal variations. The procedure was as follows:

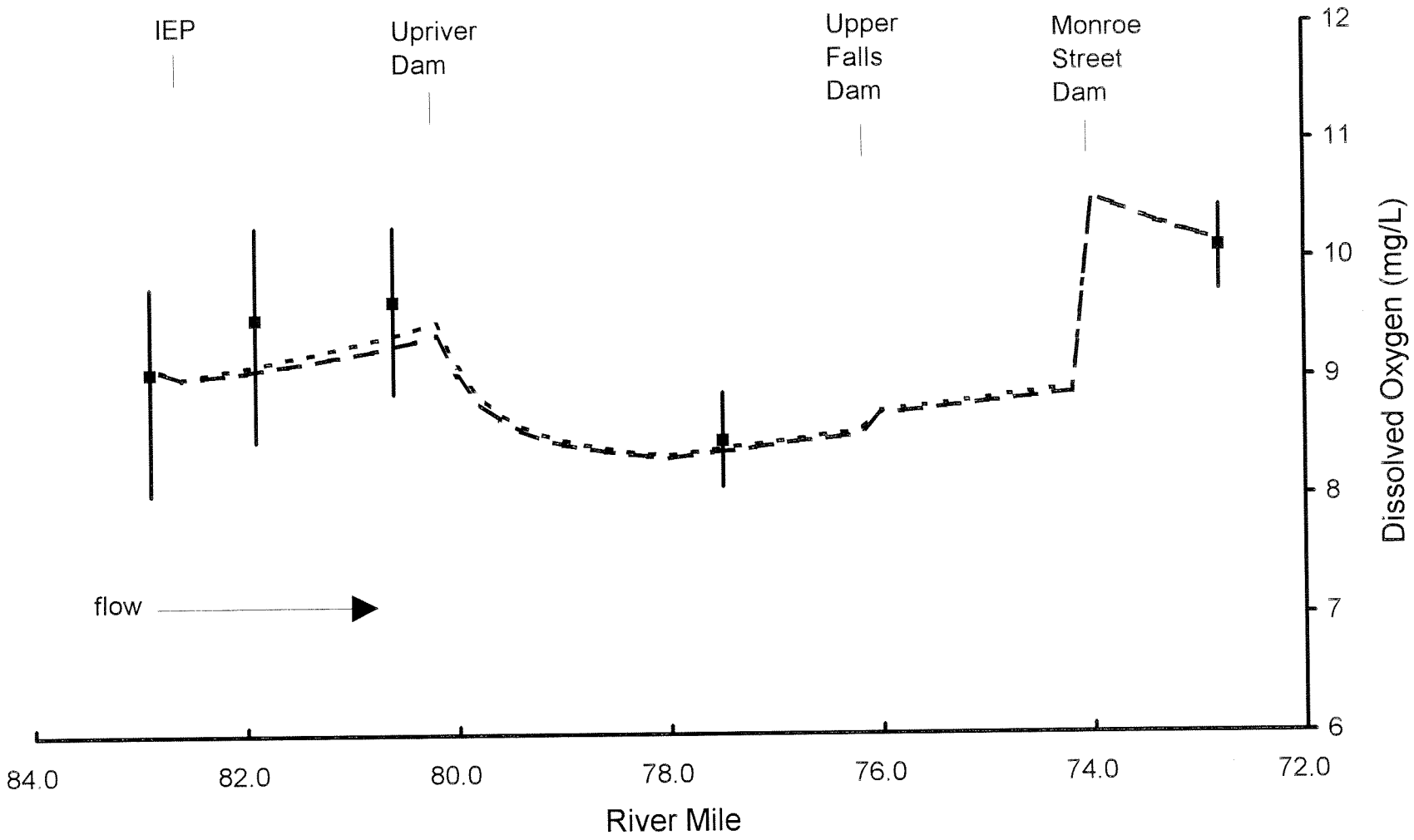

Figure 2. Calibration of QUAL2E to predict dissolved oxygen in the Spokane River from Inland Empire Paper Co. to USGS station 12422500 (RM 83 to 72.9) during Ecology's Sep 1-2 1992 sampling (small dashed line is original Ecology 1994 calibration; large dashed line is using CBODU/BOD5 = 6.38 and K1 = 0.0469 day^{-1} from IEP/WSU 1995 data; vertical ranges and squares are observed averages and ranges).

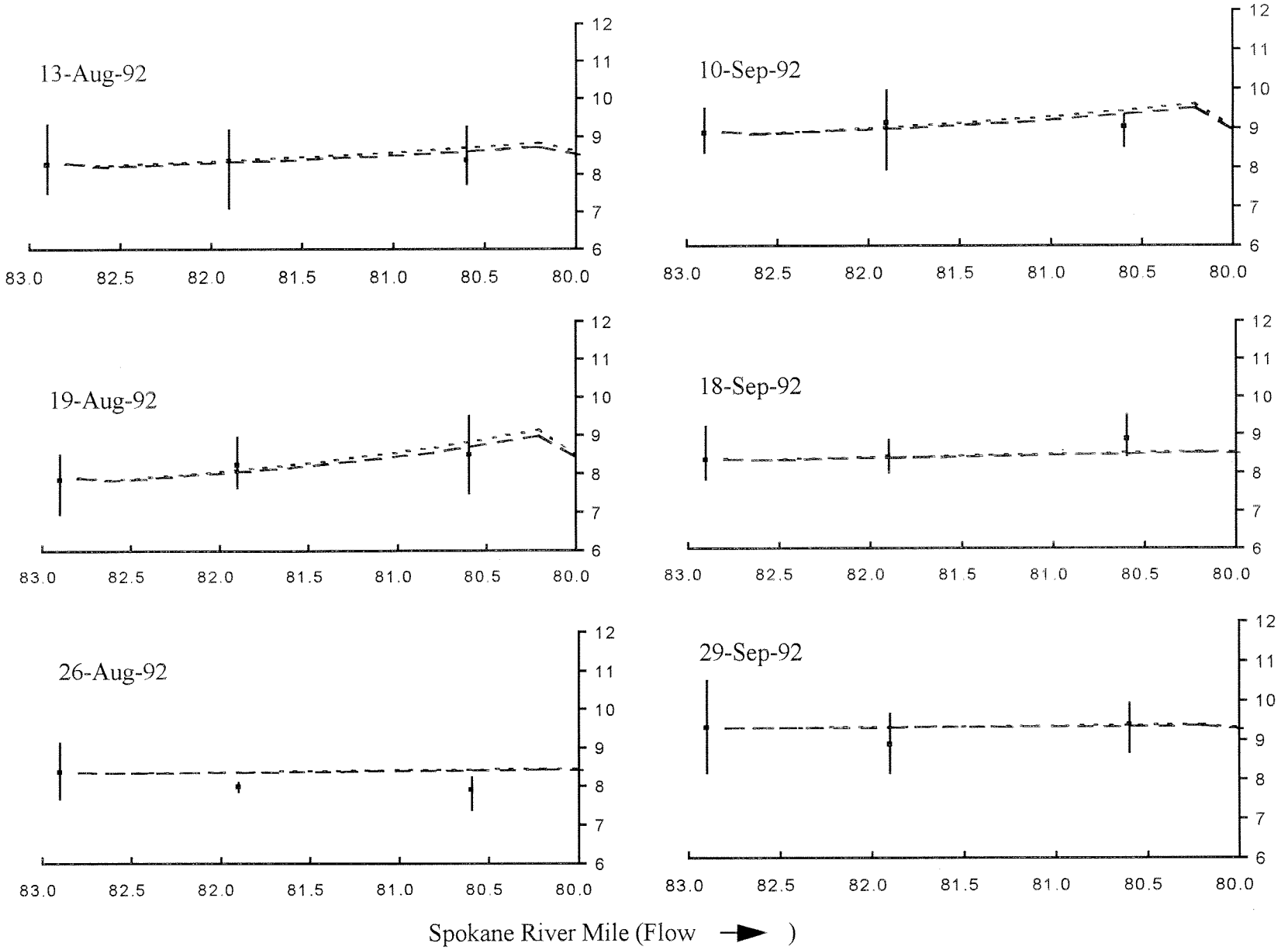

Figure 3. Verification of the QUAL2E model for prediction of dissolved oxygen in the Spokane River from Inland Empire Paper Co. to Upriver Dam. Small dashed lines are QUAL2E predicitons using CBODU/BOD5 ratio of 38.8 and K1 of 0.008 d^-1; large dashed lines are predictions using CBODU/BOD5 of 6.38 and K1 of 0.0469 d^-1; vertical lines and squares are averages and ranges for Aug-Sep 1992.

- The QUAL2E model was used to predict diurnal average DO for the critical conditions with and without loading from IEP. The conditions without loading from IEP were assumed to represent the background condition.
- The diurnal minimum DO was predicted by subtracting half the observed diurnal range from the QUAL2E predictions for diurnal average DO.
- When the predicted diurnal minimum DO was less than 8 mg/L, the critical location was determined to be the location where the difference in DO with versus without loading from IEP was no more than 0.2 mg/L. The loading from IEP which was predicted to cause 0.2 mg/L depletion of DO relative to background conditions was proposed for the WLA.

Critical Conditions for WLA Modeling of Dissolved Oxygen

When a steady-state water quality model such as QUAL2E is used to derive a WLA, the pollutant loading is introduced into the model under a given set of assumed water quality conditions (*e.g.* receiving water flows, temperature, background, and nonpoint source loading). A trial procedure was used to find a WLA for BOD that produced an in-stream DO concentration that just satisfied the water quality standard for DO (USEPA, 1983). The receiving water conditions that were used in WLA modeling are called critical conditions. The critical conditions used in the QUAL2E model for estimating WLAs of BOD for IEP were the same as those presented in Pelletier (1994), with the following exceptions:

- The ratio of CBODU/BOD_5 used to calculate the effluent load from IEP was estimated to be 6.38 based on the 1995 data collected by IEP.
- The decay rate of CBODU was estimated to be 0.0469 day^{-1} (at 20 degrees C, base e) based on the 1995 data collected by IEP.
- The diurnal average headwater DO and river temperature for the July-September season were estimated to be 7.2 mg/L and 18.1 degrees C based on the critical 10th percentile of temperature and the corresponding headwater DO on the same date (September 14, 1995), considering all data collected by IEP during 1992 and 1995 (Table 4). This combination was found to be more restrictive than the alternative of using the critical 10th percentile of headwater DO with its corresponding river temperature (August 22, 1995).
- An effluent flow rate of 4.8 mgd from IEP was assumed to account for the projected increase of approximately 20 percent (personal communication with Pat Hallinan, Eastern Regional Office, Department of Ecology).

Table 4. Summary of Spokane River data collected by IEP during 1992 and 1995.

	Diurnal average temperature for all Spokane River stations and depths sampled by IEP (deg C)	Diurnal average temperature for all Spokane River stations and depths sampled by IEP (deg F)	Diurnal average DO for the Spokane River station upstream from IEP (mg/L)	
Sorted by Date:				
13-Aug-92	16.6	61.9	8.3	
19-Aug-92	16.7	62.1	7.8	
26-Aug-92	18.0	64.4	8.4	
10-Sep-92	13.0	55.4	8.9	
18-Sep-92	14.3	57.7	8.3	
29-Sep-92	14.2	57.6	9.3	
03-Aug-95	17.8	64.0	7.0	
08-Aug-95	16.2	61.1	6.7	
10-Aug-95	18.7	65.7	7.3	
15-Aug-95	16.6	61.8	7.0	
17-Aug-95	15.8	60.4	6.8	
22-Aug-95	16.5	61.6	6.6	
24-Aug-95	15.5	59.9	7.2	
29-Aug-95	16.1	61.0	6.8	
31-Aug-95	15.8	60.5	7.1	
05-Sep-95	15.1	59.2	6.5	
07-Sep-95	13.9	57.1	6.7	
12-Sep-95	18.1	64.5	7.6	
14-Sep-95	18.1	64.6	7.2	
19-Sep-95	17.4	63.4	7.4	
21-Sep-95	16.2	61.1	8.0	
26-Sep-95	15.7	60.3	7.7	
Sorted by Temperature:				
10-Aug-95	18.7	65.7	7.3	
14-Sep-95	**18.1**	**64.6**	**7.2**	**<--- critical 10th percentile by temperature**
12-Sep-95	18.1	64.5	7.6	
26-Aug-92	18.0	64.4	8.4	
03-Aug-95	17.8	64.0	7.0	
19-Sep-95	17.4	63.4	7.4	
19-Aug-92	16.7	62.1	7.8	
13-Aug-92	16.6	61.9	8.3	
15-Aug-95	16.6	61.8	7.0	
22-Aug-95	16.5	61.6	6.6	
08-Aug-95	16.2	61.1	6.7	
21-Sep-95	16.2	61.1	8.0	
29-Aug-95	16.1	61.0	6.8	
31-Aug-95	15.8	60.5	7.1	
17-Aug-95	15.8	60.4	6.8	
26-Sep-95	15.7	60.3	7.7	
24-Aug-95	15.5	59.9	7.2	
05-Sep-95	15.1	59.2	6.5	
18-Sep-92	14.3	57.7	8.3	
29-Sep-92	14.2	57.6	9.3	
07-Sep-95	13.9	57.1	6.7	
10-Sep-92	13.0	55.4	8.9	
Sorted By DO:				
05-Sep-95	15.1	59.2	6.5	
22-Aug-95	**16.5**	**61.6**	**6.6**	**<--- critical 10th percentile by DO**
08-Aug-95	16.2	61.1	6.7	
07-Sep-95	13.9	57.1	6.7	
29-Aug-95	16.1	61.0	6.8	
17-Aug-95	15.8	60.4	6.8	
03-Aug-95	17.8	64.0	7.0	
15-Aug-95	16.6	61.8	7.0	
31-Aug-95	15.8	60.5	7.1	
14-Sep-95	18.1	64.6	7.2	
24-Aug-95	15.5	59.9	7.2	
10-Aug-95	18.7	65.7	7.3	
19-Sep-95	17.4	63.4	7.4	
12-Sep-95	18.1	64.5	7.6	
26-Sep-95	15.7	60.3	7.7	
19-Aug-92	16.7	62.1	7.8	
21-Sep-95	16.2	61.1	8.0	
13-Aug-92	16.6	61.9	8.3	
18-Sep-92	14.3	57.7	8.3	
26-Aug-92	18.0	64.4	8.4	
10-Sep-92	13.0	55.4	8.9	
29-Sep-92	14.2	57.6	9.3	

Revised WLAs for BOD_5

Revised WLAs for BOD_5 were estimated from CBODU using the ratio of CBODU/BOD_5 of 6.38. The WLAs were derived based on the BOD load from IEP which caused no more than a 0.2 mg/L depletion of DO compared with DO predictions with no loading from IEP when predicted DO was less than 8 mg/L. The QUAL2E input files for the critical conditions for the revised WLAs are presented in Appendix A. The following revised WLAs for BOD_5 from IEP were found by the trial procedure using the QUAL2E model with and without the proposed water level change by the City of Spokane above Upriver Dam:

WLA for Maximum 1-day average BOD_5 (lbs/day)		
Permit Period	Without Water Level Change	With Water Level Change
July-September	390	370
October-June	4,200	3,900

The revised WLAs were found to be similar to, but more restrictive than the WLAs previously proposed by Ecology (Pelletier, 1994). This finding is consistent with the higher rate of consumption of DO in the first few days of the CBODU tests by IEP during 1995 compared with the tests by Ecology during 1992. The similarity of the revised WLAs with the previously proposed WLAs confirms the robustness of the model over a wide range of BOD kinetic parameters and the importance of accounting for the inter-relationship between the ratio of CBODU/BOD_5 and the CBODU decay rate.

Recommended Implementation of WLAs in NPDES Permit Limits

The revised WLAs are recommended as maximum 1-day average loads for BOD_5. Since the DO criterion is a single value that is to be exceeded at all times, the WLAs would be protective of the standard if only a daily maximum limit for BOD_5 is included in the permit. If the Eastern Regional Office decides to also include a maximum average monthly limit in the permit, the statistical procedure described in the USEPA Technical Support Document would be appropriate (USEPA, 1991). The maximum average monthly limit, if included, would vary depending on the variability of effluent BOD concentrations.

The statistical procedure described by USEPA (1991) can be used to calculate a multiplier which can be applied to the maximum 1-day average WLAs to estimate maximum average monthly limits. The following formula relates maximum average monthly limits (AML) to the WLA:

$$AML = WLA * \exp[0.5\sigma^2 - 2.326\sigma] * \exp[1.645\sigma_n - 0.5\sigma_n^2]$$

where:

σ^2 = $\ln(CV^2 + 1)$

CV = long-term (seasonal) coefficient of variation of effluent BOD_5
= standard deviation/mean

σ_n^2 = $\ln((CV^2/n) + 1)$

n = number of samples per month for compliance monitoring.

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Environmental Investigations and Laboratory Services Program
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If you have special accommodation needs, please contact Barbara Tovrea (360) 407-6696 (voice). Ecology's telecommunication device for the deaf (TDD) number at Ecology Headquarters is (360) 407-6006.

Appendix A

Appendix A contains the following QUAL2E input files:

- re-calibration to Ecology's September 1-2, 1992 sampling data (XCAL05.IN);
- re-verification of IEP's August-September, 1992 sampling data (XX13AUG.IN, XX19AUG.IN, XX26AUG.IN, XX10SEP.IN, XX18SEP.IN, and XX29SEP.IN);
- critical conditions for July-September without the proposed change in water level at Upriver Dam (X2C0000.IN and X2C0390.IN);
- critical conditions for October-June September without the proposed change in water level at Upriver Dam (XD0000.IN and XD4200.IN);
- critical conditions for July-September with the proposed change in water level at Upriver Dam (X2G0000.IN and X2G0370.IN);
- critical conditions for October-June September without the proposed change in water level at Upriver Dam (XH0000.IN and XH3900.IN).

XCAL05.IN:

```
TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              CALIBRATION TO 01-SEP TO 02-SEP-92 DATA: XCAL05.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.            0.00023      1.0      13.7      0.0
HYDRAULICS RCH=   2.             0.0085     0.69      1.62     0.185
HYDRAULICS RCH=   3.             0.0023     0.79      1.87     0.210
HYDRAULICS RCH=   4.             0.0051     0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
```

```
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   59.3
INITIAL COND-1 RCH=   2.   55.5
INITIAL COND-1 RCH=   3.   55.5
INITIAL COND-1 RCH=   4.   55.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            385.         9.06  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                 5.09         2.25  21.0
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.074   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
```

XX13AUG.IN:

```
TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              13-AUG-92 VERIFICATION BASED ON XCAL05: XX13AUG.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
```

```
REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   61.8
INITIAL COND-1 RCH=   2.   61.8
INITIAL COND-1 RCH=   3.   61.8
INITIAL COND-1 RCH=   4.   61.8
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            372.        8.25  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                5.64        1.20  76.6
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 1.000   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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XX19AUG.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              19-AUG-92 VERIFICATION BASED ON XCAL05: XX19AUG.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   62.1
INITIAL COND-1 RCH=   2.   62.1
INITIAL COND-1 RCH=   3.   62.1
INITIAL COND-1 RCH=   4.   62.1
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            274.        7.84  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                5.72        1.70  40.2
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.093   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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XX26AUG.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              26-AUG-92 VERIFICATION BASED ON XCAL05: XX26AUG.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   64.3
INITIAL COND-1 RCH=   2.   64.3
INITIAL COND-1 RCH=   3.   64.3
INITIAL COND-1 RCH=   4.   64.3
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0           1423.         8.35  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                5.08         1.50  34.2
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.031   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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XX10SEP.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              10-SEP-92 VERIFICATION BASED ON XCAL05: XX10SEP.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   55.4
INITIAL COND-1 RCH=   2.   55.4
INITIAL COND-1 RCH=   3.   55.4
INITIAL COND-1 RCH=   4.   55.4
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            322.        8.85  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                5.02        3.20  82.7
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.094   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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XX18SEP.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              18-SEP-92 VERIFICATION BASED ON XCAL05: XX18SEP.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   57.7
INITIAL COND-1 RCH=   2.   57.7
INITIAL COND-1 RCH=   3.   57.7
INITIAL COND-1 RCH=   4.   57.7
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0          1110.        8.33  1.75
ENDATA10
HEADWTR-2  HDW=   1.             1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC              4.97        2.00  50.9
ENDATA11
POINTLD-2  PTL=   1.                  1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.036   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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XX29SEP.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEP 1995 data
TITLE02              29-SEP-92 VERIFICATION BASED ON XCAL05: XX29SEP.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0       13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69       1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79       1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74       2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   57.5
INITIAL COND-1 RCH=   2.   57.5
INITIAL COND-1 RCH=   3.   57.5
INITIAL COND-1 RCH=   4.   57.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0          1347.        9.28  1.75
ENDATA10
HEADWTR-2  HDW=   1.             1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC              4.47        4.80  19.3
ENDATA11
POINTLD-2  PTL=   1.                  1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05 0.000   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05 0.031   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05 1.000   68.
ENDATA12
ENDATA13
ENDATA13A
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X2C0000.IN

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              JUL-SEP from XCAL05; IEPC BOD5 =    0#/DAY; X2C0000.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0       13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69       1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79       1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74       2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   64.6
INITIAL COND-1 RCH=   2.   64.6
INITIAL COND-1 RCH=   3.   64.6
INITIAL COND-1 RCH=   4.   64.6
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            377.          7.2  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                0.00          0.0    0.
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.19   68.
ENDATA12
ENDATA13
ENDATA13A
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X2C0390.IN

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              JUL-SEP from XCAL05; IEPC BOD5 =  390#/DAY; X2C0390.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   64.6
INITIAL COND-1 RCH=   2.   64.6
INITIAL COND-1 RCH=   3.   64.6
INITIAL COND-1 RCH=   4.   64.6
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            377.          7.2  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                 7.43          2.4  62.1
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.19   68.
ENDATA12
ENDATA13
ENDATA13A
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XD0000.IN

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              OCT-JUN BASED ON XCAL05; IEPC BOD5 =    0#/DAY; XD0000.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 11.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 1400.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   56.5
INITIAL COND-1 RCH=   2.   56.5
INITIAL COND-1 RCH=   3.   56.5
INITIAL COND-1 RCH=   4.   56.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            831.          8.8  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                0.00          0.0    0.
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.10   68.
ENDATA12
ENDATA13
ENDATA13A
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XD4200.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              OCT-JUN BASED ON XCAL05; IEPC BOD5 = 4200#/DAY; XD4200.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 11.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 1400.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.             0.00023       1.0      13.7       0.0
HYDRAULICS RCH=   2.              0.0085      0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023      0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051      0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1      0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   56.5
INITIAL COND-1 RCH=   2.   56.5
INITIAL COND-1 RCH=   3.   56.5
INITIAL COND-1 RCH=   4.   56.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0             831.          8.8  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                 7.43          2.4  669.
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.10   68.
ENDATA12
ENDATA13
ENDATA13A
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X2G0000.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              JUL-SEP from XCAL05; IEPC BOD5 =    0#/DAY; X2G0000.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.           0.000207      1.0      15.2       0.0
HYDRAULICS RCH=   2.             0.0085     0.69      1.62     0.185
HYDRAULICS RCH=   3.             0.0023     0.79      1.87     0.210
HYDRAULICS RCH=   4.             0.0051     0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   64.6
INITIAL COND-1 RCH=   2.   64.6
INITIAL COND-1 RCH=   3.   64.6
INITIAL COND-1 RCH=   4.   64.6
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            377.          7.2  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                0.00          0.0    0.
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.19   68.
ENDATA12
ENDATA13
ENDATA13A
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X2G0370.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              JUL-SEP from XCAL05; IEPC BOD5 =  370#/DAY; X2G0370.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 13.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 2100.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.           0.000207      1.0      15.2       0.0
HYDRAULICS RCH=   2.             0.0085     0.69      1.62     0.185
HYDRAULICS RCH=   3.             0.0023     0.79      1.87     0.210
HYDRAULICS RCH=   4.             0.0051     0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   64.6
INITIAL COND-1 RCH=   2.   64.6
INITIAL COND-1 RCH=   3.   64.6
INITIAL COND-1 RCH=   4.   64.6
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            377.          7.2  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                7.43          2.4  58.9
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.19   68.
ENDATA12
ENDATA13
ENDATA13A
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XH0000.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              OCT-JUN BASED ON XCAL05; IEPC BOD5 =    0#/DAY; XH0000.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 11.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 1400.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.           0.000207      1.0      15.2       0.0
HYDRAULICS RCH=   2.             0.0085     0.69      1.62     0.185
HYDRAULICS RCH=   3.             0.0023     0.79      1.87     0.210
HYDRAULICS RCH=   4.             0.0051     0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   56.5
INITIAL COND-1 RCH=   2.   56.5
INITIAL COND-1 RCH=   3.   56.5
INITIAL COND-1 RCH=   4.   56.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.         7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.         7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0           831.         8.8  1.75
ENDATA10
HEADWTR-2  HDW=   1.             1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC               0.00         0.0    0.
ENDATA11
POINTLD-2  PTL=   1.                  1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.10   68.
ENDATA12
ENDATA13
ENDATA13A
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XH3900.IN:

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TITLE01              IEPC/SPOKANE R DO - CBODU/BOD5 and K1 from IEPC 1995 data
TITLE02              OCT-JUN BASED ON XCAL05; IEPC BOD5 = 3900#/DAY; XH3900.IN
TITLE03   NO         CONSERVATIVE MINERAL I
TITLE04   NO         CONSERVATIVE MINERAL II
TITLE05   NO         CONSERVATIVE MINERAL III
TITLE06   NO         TEMPERATURE
TITLE07  YES         BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES         ALGAE AS CHL-A IN UG/L
TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
TITLE10                (ORGANIC-P, DISSOLVED-P)
TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
TITLE12                (ORGANIC-N, AMMONIA-N, NITRITE-N, NITRITE-N)
TITLE13  YES         DISSOLVED OXYGEN IN MG/L
TITLE14   NO         FECAL COLIFORMS IN NO./100 ML
TITLE15   NO         ARBITRARY NON-CONSERVATIVE NH3N    MG/L
ENDTITLE
LIST DATA INPUT
WRITE OPTIONAL SUMMARY
NO FLOW AUGMENTATION
STEADY STATE
DISCHARGE COEFFICIENTS
NO PRINT SOLAR/LCD DATA
NO PLOT DO AND BOD
FIXED DNSTM COND (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.00000
INPUT METRIC (YES=1)    =   0.00000          OUTPUT METRIC (YES=1)   =   0.00000
NUMBER OF REACHES       =   4.00000          NUMBER OF JUNCTIONS     =   0.00000
NUM OF HEADWATERS       =   1.00000          NUMBER OF POINT LOADS   =   1.00000
TIME STEP (HOURS)       =                    LNTH  COMP  ELEMENT (DX)=   0.20000
MAXIMUM ITERATIONS      =  30.00000          TIME INC. FOR RPT2 (HRS)=
ENDATA1
O UPTAKE BY NH3 OXID(MG O/MG N)= 3.4300  O UPTAKE BY NO2 OXID(MG O/MG N)= 1.1400
O PROD  BY ALGAE (MG O/MG A)   = 1.6000  O UPTAKE BY ALGAE (MG O/MG A)  = 2.0000
N CONTENT OF ALGAE (MG N/MG A) = 0.0800  P CONTENT OF ALGAE (MG P/MG A) = 0.0110
ALG MAX SPEC GROWTH RATE(1/DAY)= 2.3000  ALGAE RESPIRATION RATE (1/DAY) = 0.1200
N HALF SATURATION CONST (MG/L) = 0.0200  P HALF SATURATION CONST  (MG/L)= 0.0050
LIN ALG EXCO (1/FT)/(UGCHLA/L) = 0.0130  NLINCO (1/FT)/(UGCHLA/L)**(2/3)= 0.0000
LIGHT FUNCTION OPTION (LFNOPT) = 1.0000  LIGHT SAT'N COEFF (BTU/FT2/MIN)= 0.0920
DAILY AVERAGING OPTION (LAVOPT)=      2  LIGHT AVERAGING FACTOR (AFACT) = 1.0000
NUMBER OF DAYLIGHT HOURS (DLH) = 11.000  TOTAL DAILY SOLR RAD (BTU/FT2) = 1400.0
ALGY GROWTH CALC OPTION(LGROPT)= 2.0000  ALGAL PREF FOR NH3-N (PREFN)   = 0.9000
ALG/TEMP SOLR RAD FACTOR(TFACT)= 0.4500  NITRIFICATION INHIBITION COEF  = 0.6000
ENDATA1A
THETA    BOD SETT    1.000
THETA    SOD RATE    1.065
THETA    ORGN SET    1.000
THETA    NH3 DECA    1.080
THETA    PORG SET    1.000
THETA    ALG SETT    1.000
ENDATA1B
STREAM REACH      1.RCH= IEPC-UPRIVERDAM   FROM         83.0    TO          80.2
STREAM REACH      2.RCH= UPRIVER-GREENST   FROM         80.2    TO          78.0
STREAM REACH      3.RCH= GREEN-MONROEDAM   FROM         78.0    TO          74.2
STREAM REACH      4.RCH= MONROE-USGS4225   FROM         74.2    TO          72.8
ENDATA2
ENDATA3
FLAG FIELD RCH=   1.        14          1 6 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   2.        11          2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   3.        19          2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
FLAG FIELD RCH=   4.         7          2 2 2 2 2 2 5
ENDATA4
HYDRAULICS RCH=   1.            0.000207      1.0      15.2       0.0
HYDRAULICS RCH=   2.              0.0085     0.69      1.62     0.185
HYDRAULICS RCH=   3.              0.0023     0.79      1.87     0.210
HYDRAULICS RCH=   4.              0.0051     0.74      2.71     0.135
ENDATA5
ENDATA5A
REACT COEF RCH=   1.  0.0469    0.00    0.00   1     0.2
REACT COEF RCH=   2.  0.0469    0.00    0.00   3
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REACT COEF RCH=   3.  0.0469    0.00    0.00   3
REACT COEF RCH=   4.  0.0469    0.00    0.00   3
ENDATA6
N AND P COEF   RCH=   1.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   2.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   3.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
N AND P COEF   RCH=   4.   0.10  0.000   0.50   0.00   3.00   0.10   0.00   0.00
ENDATA6A
ALG/OTHER COEF RCH=   1.    15.   2.00   0.10
ALG/OTHER COEF RCH=   2.    15.   2.00   0.10
ALG/OTHER COEF RCH=   3.    15.   2.00   0.10
ALG/OTHER COEF RCH=   4.    15.   2.00   0.10
ENDATA6B
INITIAL COND-1 RCH=   1.   56.5
INITIAL COND-1 RCH=   2.   56.5
INITIAL COND-1 RCH=   3.   56.5
INITIAL COND-1 RCH=   4.   56.5
ENDATA7
INITIAL COND-2 RCH=   1.
INITIAL COND-2 RCH=   2.
INITIAL COND-2 RCH=   3.
INITIAL COND-2 RCH=   4.
ENDATA7A
INCR INFLOW-1  RCH=   1.  -256.
INCR INFLOW-1  RCH=   2.   576.          7.80  1.16
INCR INFLOW-1  RCH=   3.  -180.
INCR INFLOW-1  RCH=   4.   105.          7.80  1.16
ENDATA8
INCR INFLOW-2  RCH=   1.
INCR INFLOW-2  RCH=   2.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
INCR INFLOW-2  RCH=   3.
INCR INFLOW-2  RCH=   4.   0.00  0.016  0.005  0.000  0.852  0.002  0.005
ENDATA8A
ENDATA9
HEADWTR-1 HDW=   1.  RM 83.0            831.          8.8  1.75
ENDATA10
HEADWTR-2  HDW=   1.              1.77 0.105 0.025 0.000 0.598 0.009 0.005
ENDATA10A
POINTLD-1 PTL=   1. IEPC                 7.43          2.4  621.
ENDATA11
POINTLD-2  PTL=   1.                   1.769 0.022 0.000 0.089 0.035 0.005
ENDATA11A
DAM DATA       DAM=   1.    2.    1.  1.60  1.05  0.00   35.
DAM DATA       DAM=   2.    3.   10.  1.60  1.05  0.00   64.
DAM DATA       DAM=   3.    4.    1.  1.60  1.05  0.10   68.
ENDATA12
ENDATA13
ENDATA13A
```