Total Maximum Daily Loads of Carbonaceous Biochemical Oxygen Demand (CBOD) and Nitrogenous Biochemical Oxygen Demand (NBOD) for the Little Youghiogheny River

APPENDIX - A

Report Version: December 14, 2000

LYR-INPRG Model Desription:

INPRG is a steady state, mathematical model developed by MDE for simulating free flowing streams for conventional pollutants. This program prepares input data and runs a free flowing stream model based upon the Streeter Phelp's equations. The program is written in FORTRAN IV. This program reads in raw data for tributary drainage area planimeter readings, station elevations, gaging station flow, velocity data, and stream temperature values. It computes a 90th percentile (design) stream temperature, plots a regression between flow and stream velocity, and computes elevation differences between stations. The program can independently perform statistical analysis of data sets to obtain average values and predict levels of confidence. It also computes reaeration values for the stream reaches using Tsivoglou's formula. It adjusts all reaction rates in the model to the stream design temperature. The model is also capable of independently computing oxygen production, photosynthesis, and respiration values based upon chlorophyll-a concentrations in the stream or estuary. LYR-INPRG is the Little Youghiogheny River INPRG model that was prepared for this TMDL.

INPRG Input Data:

As discussed above INPRG prepares input data and runs a free flowing stream model based upon the Streeter Phelp's equations. This program requires input data for tributary drainage area planimeter readings, station elevations, and segment lengths to calculate tributary flows, stream velocities and reaeration rates. An uncalibrated INPRG model of the Little Youghiogheny River was used in 1983 to develop the wastewater release rate relationship in the existing 80-DP-1086 Trout Run WWTP discharge permit. The same INPRG model station locations that were used in the 1983 INPRG model were also chosen for LYR-INPRG and are shown in Figure 1. The 1983 INPRG model input values for drainage areas, station elevations, and stream lengths for each INPRG model station were checked and adjusted accordingly based on new GIS information and are shown in Table 1.

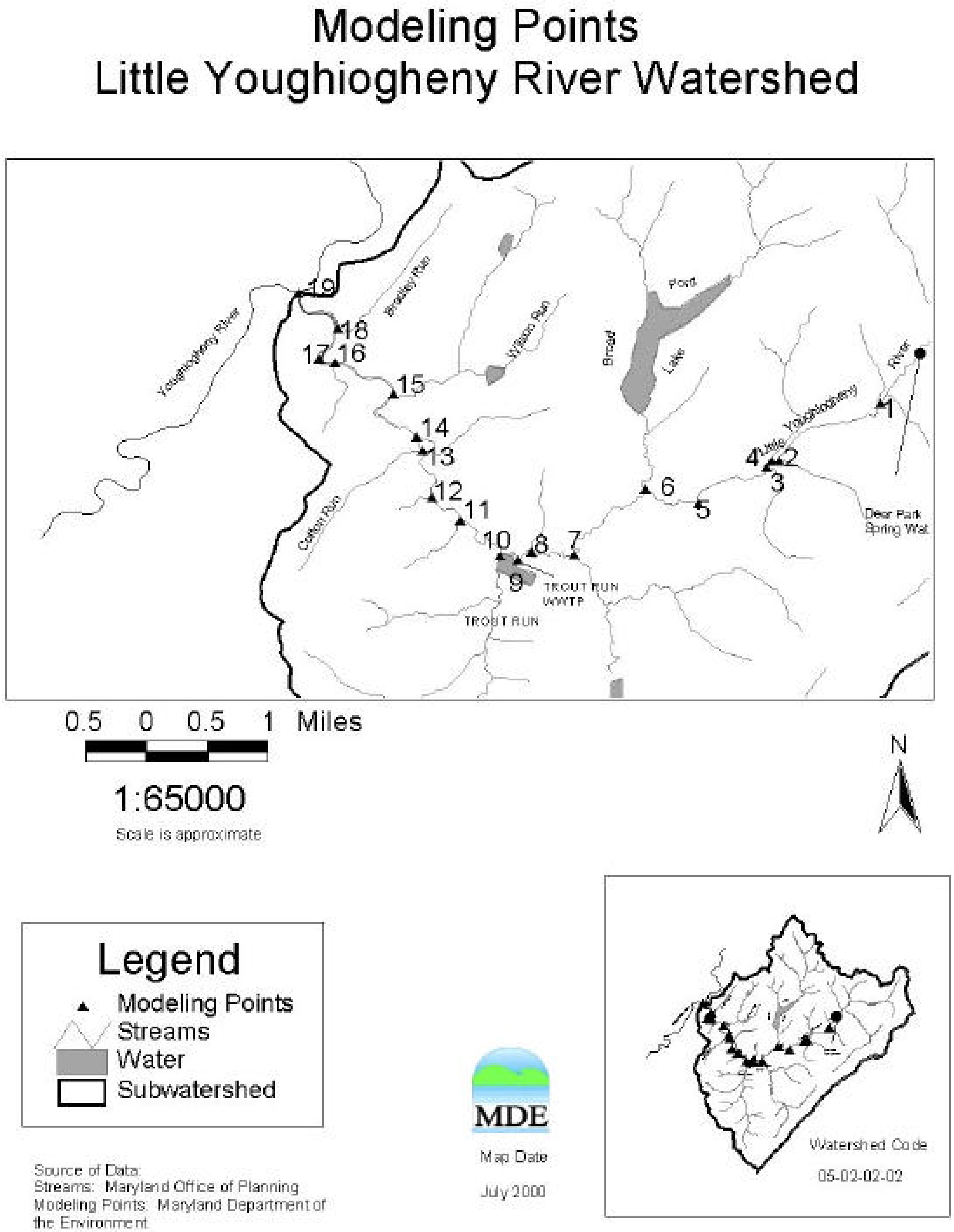

Figure 1: Little Youghiogheny River INPRG (LYR-INPRG) Stream Model Stations

STATION	TRIBUTARY	D.A. mi^2	STATION ELEV. ft.	STREAM LENGTH ft.	STREAM LENGTH meters
	BACKGROUND	9.98	-	-	-
1	DEER PARK WATER	-	2423.7	5400	1646
2	UNNAMED TRIB.	0.72	2408.9	200	61
3	UNNAMED TRIB.	1.02	2408.4	400	122
4	UNNAMED TRIB.	1.04	2407.4	3400	1036
5	-	-	2397.4	2600	793
6	BROADFORD RUN	7.90	2392.7	4600	1402
7	UNNAMED TRIB.	6.08	2384.3	2200	671
8	UNNAMED TRIB.	0.61	2380.3	1000	305
9	TROUT RUN WWTP	-	2379.3	1000	305
10	TROUT RUN	7.02	2378.4	3326	1014
11	UNNAMED TRIB.	0.48	2374.0	1871	571
12	UNNAMED TRIB.	0.20	2371.5	2079	634
13	COTTON RUN	0.89	2368.8	832	254
14	UNNAMED TRIB.	0.83	2367.7	3118	950
15	WILSON RUN	2.42	2363.6	3326	1014
16	UNNAMED TRIB.	0.50	2359.8	520	159
17	-	-	2359.5	2000	610
18	BRADLEY RUN	1.25	2358.5	2200	671
19	CONFLUENCE YOUGH. RIVER	_	2357.4		

Table 1: LYR-INPRG Model Input Data

Stream Flow Calibration:

INPRG calculates tributary stream flows for each station by multiplying the corresponding tributary drainage area by the inputted stream flow runoff rate. The stream flow runoff rate is determined by selecting a representative reference stream gaging station near the study stream. USGS gaging station 03075500 on the Youghiogheny River near Oakland was used.

Prior to running the model for the development of a revised release rate relationship for the Trout Run WWTP, calibration and verification runs for observed stream flow conditions were made. The calibration run for the September 3, 1997 steam flow conditions assumed an average runoff rate of 0.234 $cfs/mi.^2$ No flow contribution from Broadford Run was included since there was no observed flow from the tributary on September 3, 1997 due to the upstream impoundment Broadford Lake. The observed and predicted stream flows are shown in Table 2. The location of the water quality stations where the September 3, 1997 stream flow measurements were made are shown in Figure 2.

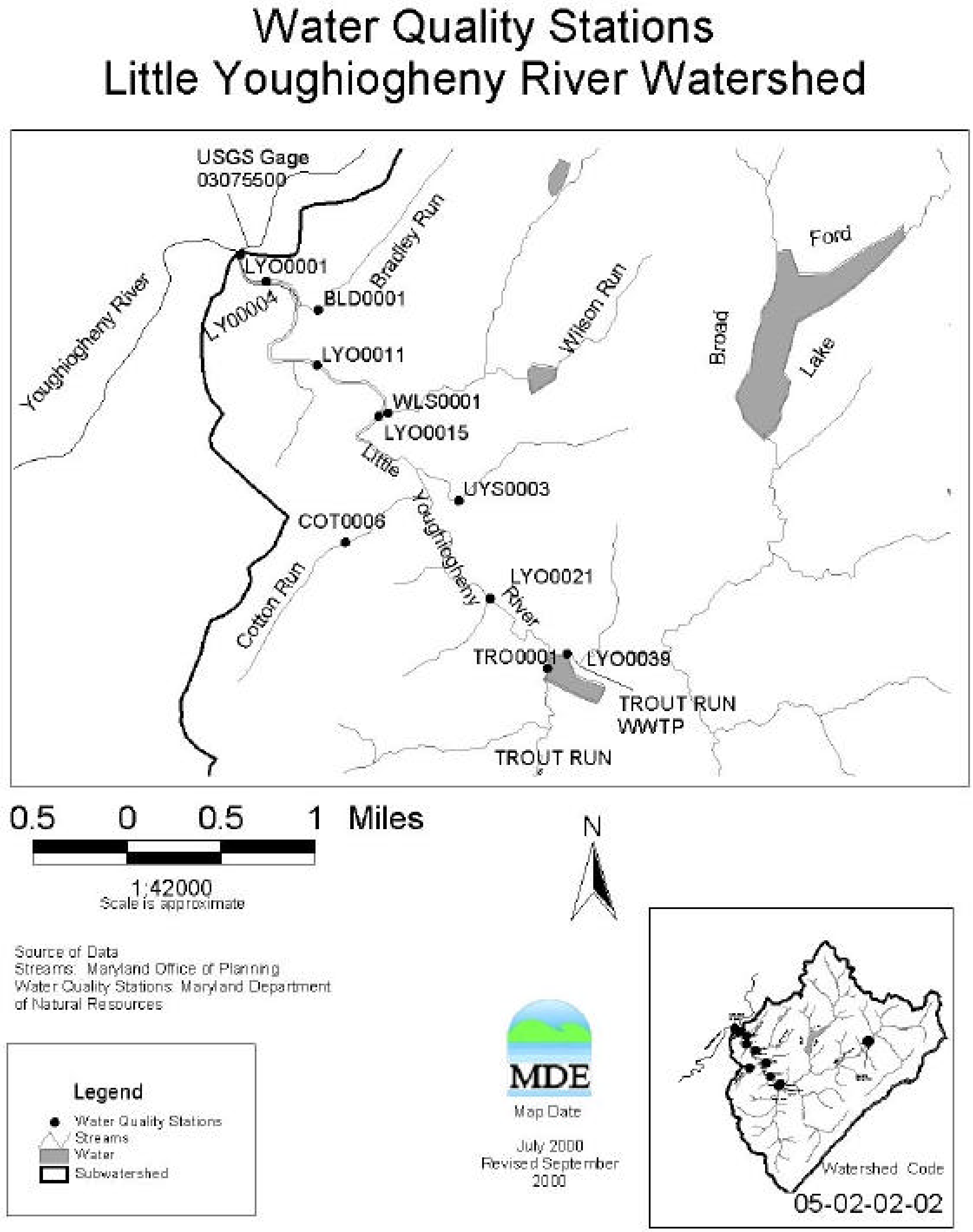

Figure 2: Little Youghiogheny River Watershed Water Quality Stations

W.Q. STATION	RIVER Mi.	9/3/97 CU. M. / DAY	MODEL CU. M. / DAY
LYO0001	0.03	23630	18916
LYO0011	1.11	18224	17914
LYO0015	1.61	15485	16528
LYO0021	3.16	20695	15154
LYO0039	3.99	10030	11135

Table 2: 9/3/97 Little Youghiogheny River Stream Flow Calibration

A plot of the observed Little Youghiogheny River stream flows and model predicted stream flows are shown in Figure 3 below.

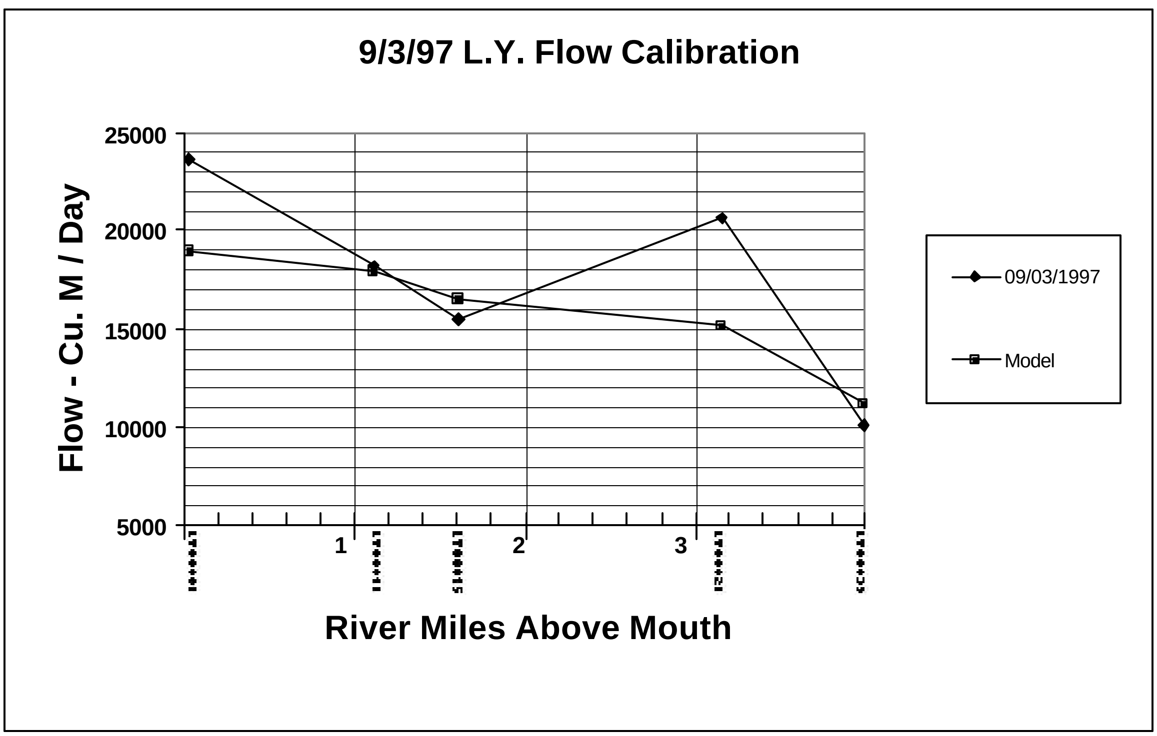

Figure 3: Little Youghiogheny River 9-3-97 Stream Flow Calibration

Stream Flow Verification:

Verification of the LYR-INPRG stream flow predictions was performed using August 11, 1997 observed flows. The verification run for the August 11, 1997 steam flow conditions assumed an average runoff rate of 0.2142 cfs/mi.[2] No flow contribution from Broadford Run was included since there was no observed flow from the tributary on August 11, 1997 due to the upstream impoundment Broadford Lake. The August 11, 1997 observed flows and LYR-INPRG predicted flows are shown in Table 3 below.

W.Q. STATION	RIVER Mi.	8/11/97 CU. M. / DAY	MODEL CU. M. / DAY
LYO0001	0.03	22554	19436
LYO0011	1.11	20915	18519
LYO0015	1.61	18665	17250
LYO0021	3.16	-	15810
LYO0039	3.99	7119	10193

Table 3: 8/11/97 Little Youghiogheny River Stream Flow Verification

A plot of the observed Little Youghiogheny River stream flows and model predicted stream flows are shown in Figure 4 below.

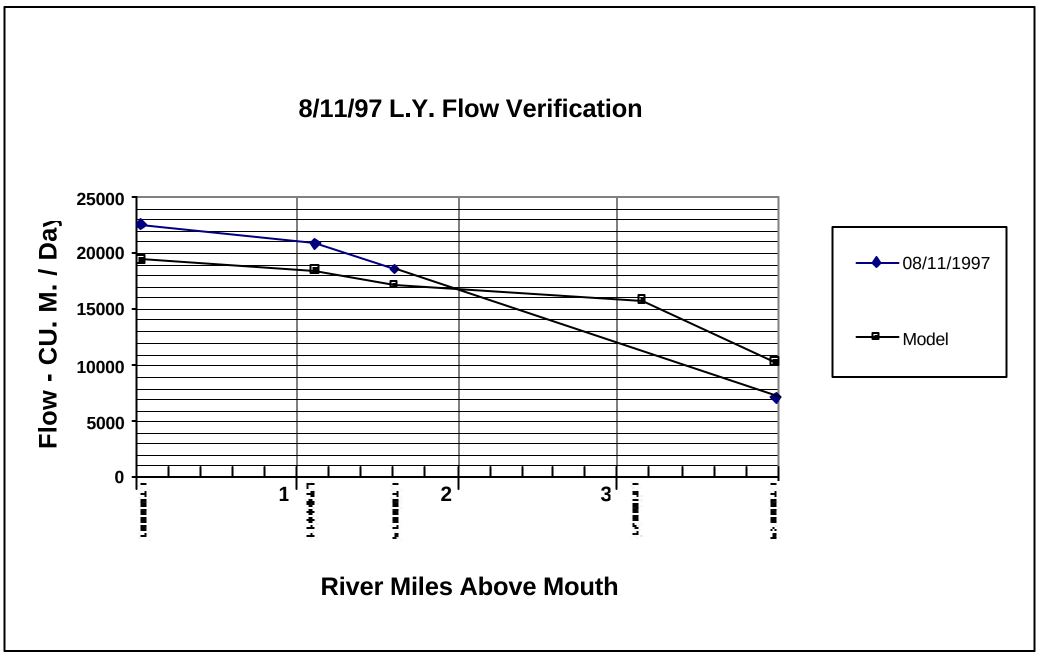

Figure 4: Little Youghiogheny River 8-11-97 Stream Flow Verification

Time of Travel Calibration:

To estimate receiving stream travel times, INPRG requires stream flow vs. stream velocity input data from which it will determine a logarithmic flow vs. velocity regression equation for the receiving stream. The stream flow vs. stream velocity data can be from a local USGS gaging station or from site specific stream studies.

Site specific stream studies were used to calibrate the LYR-INPRG model. The MDE Field Operations Program conducted site specific studies of the Little Youghiogheny River in 1994 and 1997. MDE collected stream flow, velocity, and cross-sectional data of the Little Youghiogheny River beginning at the Trout Run WWTP continuing downstream to the confluence with the Youghiogheny River. A dye study for the determination of stream travel time was conducted in the Fall of 1997. A receiving stream logarithmic flow vs. velocity regression equation was developed using the 1994 and 1997 field measured Little Youghiogheny River flows and velocities shown in Table 4 below. The logarithmic flow vs. velocity regression equation is shown in Figure 5.

DATE	LYO0001			LYO0011			LYO0015		
	FLOW cfs	VEL. fps	VEL. M/Day	FLOW cfs	VEL. fps	VEL. M/Day	FLOW cfs	VEL. fps	VEL. M/Day
8/8/94				44.82	1.503	39,573	49.85	2.570	67,666
8/10/94				34.20	1.196	31,490			
8/11/97	9.33	0.185	4,882	8.55	0.391	10,304	7.80	0.287	7,429
9/3/97	9.67	0.158	4,161	7.45	0.347	9,125	6.20	0.141	3,706
DATE	LYO0021			LYO0039					
	FLOW cfs	VEL. fps	VEL. M/Day	FLOW cfs	VEL. fps	VEL. M/Day	FLOW cfs	VEL. fps	VEL. M/Day
8/8/94	40.46	0.832	21,912	39.69	2.239	58,966			
8/10/94	25.92	0.636	16,740						
8/11/97									
9/3/97	8.46	0.304	7,992						

Table 4: 1994 & 1997 Little Youghiogheny River Field Measured Flows and Velocities

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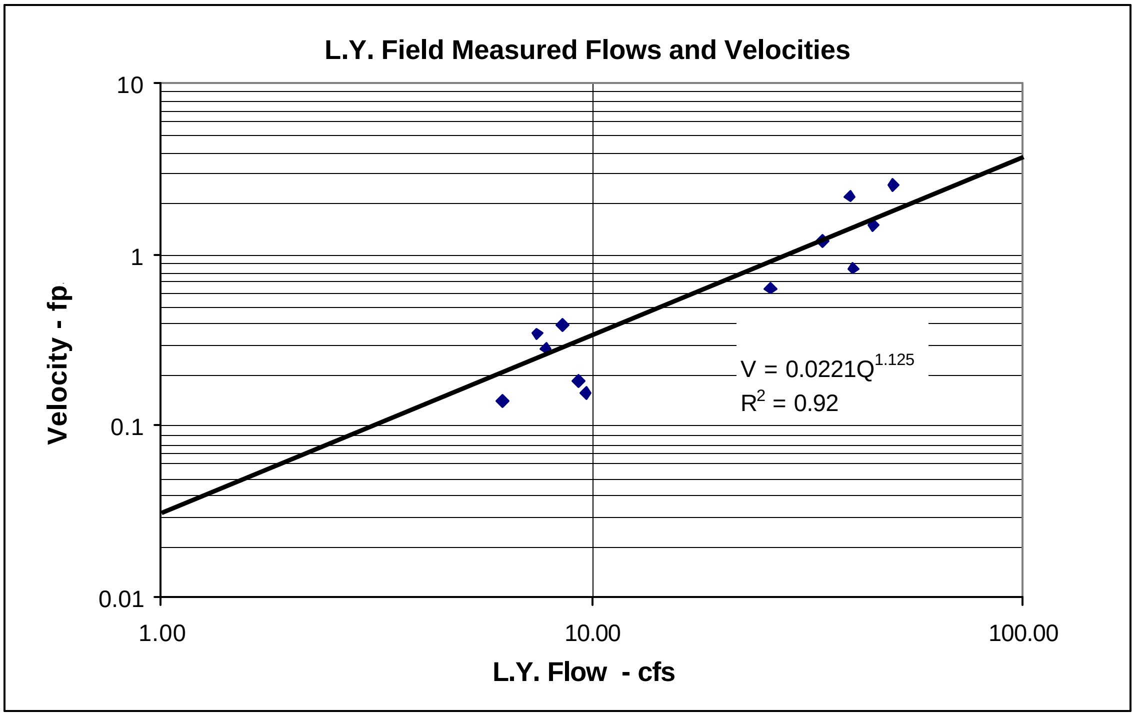

Figure 5: Little Youghiogheny River Logarithmic Flow vs. Velocity Regression Equation

The INPRG program has a subroutine to compute velocities (V_t) for each modeling segment estimated from the above relationship and corrected for the streambed slope with a factor of 0.5. The time of travel (t) for a particular segment is the segment length (ℓ) divided by segment velocity (V_t). LYR-INPRG was run for the observed 1997 dye study flow conditions to compare how well the model matched the observed velocities. The dye study velocities and model predicted velocities are shown in Table 5 and plotted in Figure 6.

W.Q. Model Station		River Dist. Meters	Dye Study Meters/Day	Model Run Meters/Day
LYO0001	19	0	3450	3321
	18	671	3450	3321
	17	1281	3450	3180
LYO0011	16	1440	3450	3416
LYO0015	15	2454	3535	4722
	14	3404	3535	4627
	13	3658	3535	4490
	12	4292	3535	4290
LYO0021	11	4863	3535	4316
	10	5877	3535	4209
LYO0039	9	6182	3535	2455
	8	6487		2588
	7	7158		3366
	6	8560		2176
	5	9353		2165
	4	10389		2762
	3	10511		2314
	2	10572		2089
	1	12218		2023

Table 5: 1997 Little Youghiogheny River Dye Study and Model Velocities

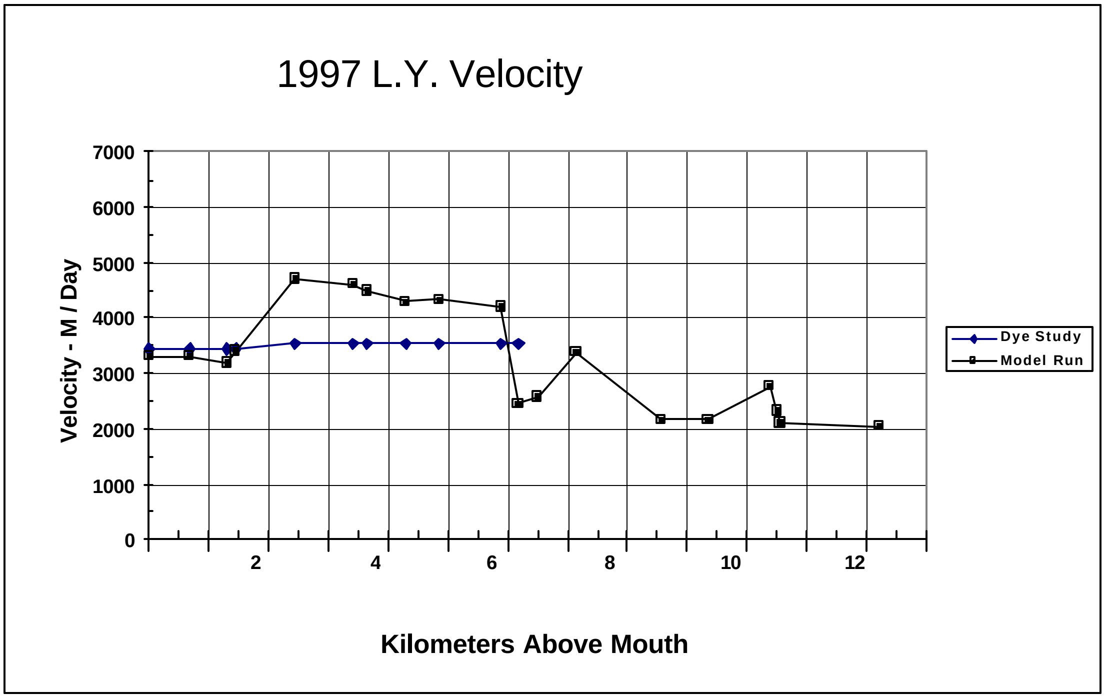

Figure 6: Little Youghiogheny River Dye Study and Model Velocities

LYR-INPRG CBOD, NBOD and Dissolved Oxygen Calibration:

Once the LYR-INPRG model was calibrated and verified for stream flows and velocities, calibration runs were made for CBOD, NBOD and dissolved oxygen. Calibration of the model for CBOD, NBOD and dissolved oxygen were achieved through the adjustment of the carbonaceous deoxygenation rate k_c and the nitrogenous deoxygenation rate k_n. September 4, 1997 water quality data were used for the calibration runs. The observed water quality and model predictions are shown in Table 6. The observed data and model predictions are shown in Figures 7 through 9.

W.Q. STATION	RIVER Mi.	9/4/97 CBOD mg/l	MODEL CBOD mg/l	9/4/97 NBOD mg/l	MODEL NBOD mg/l	9/4/97 AM DO mg/l	9/4/97 PM DO mg/l	MODEL AVG. DO mg/l
LYO0001	0.03	1.5	1.1	2.0	1.2	8.0	8.9	8.5
LYO0011	1.11	1.5	1.1	1.8	1.3	8.2	9.8	8.7
LYO0015	1.61	1.5	1.15	1.7	1.3	8.0	9.6	8.7
LYO0021	3.16	1.5	1.2	1.5	1.4	9.2	10.3	8.8
LYO0039	3.99	1.5	1.2	1.7	1.4	8.3	9.8	8.6

Table 6: 9/4/97 Little Youghiogheny River CBOD, NBOD , DO and Model Predictions

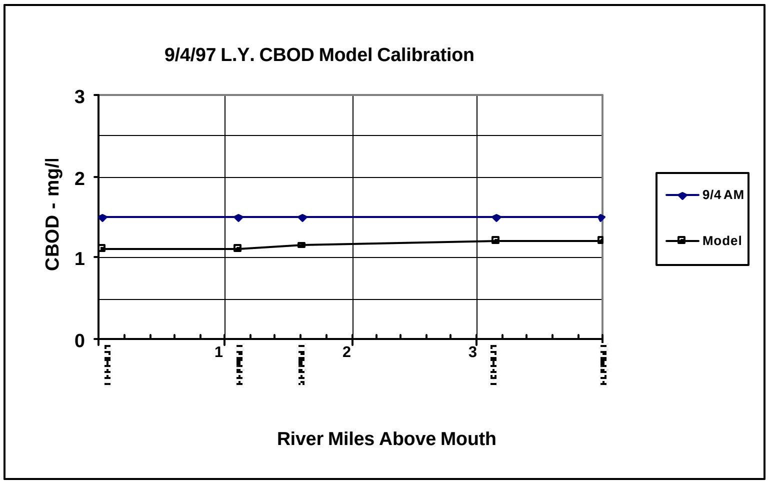

Figure 7: 9/4/97 Little Youghiogheny River CBOD and Model Predictions

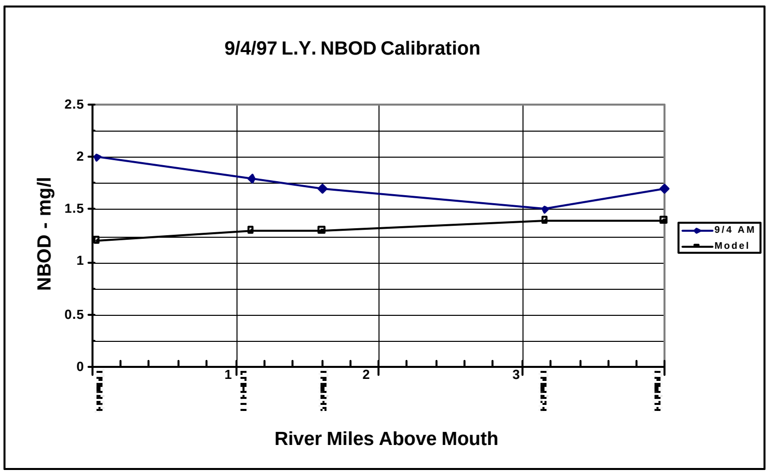

Figure 8: 9/4/97 Little Youghiogheny River NBOD and Model Predictions

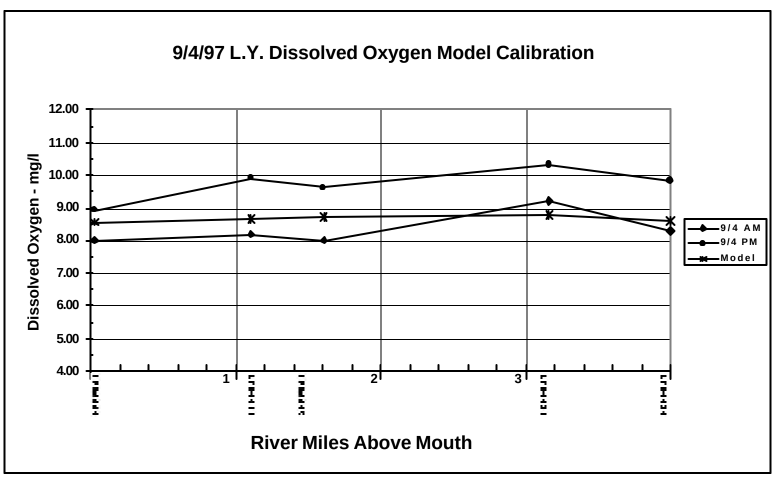

Figure 9: 9/4/97 Little Youghiogheny River Dissolved Oxygen and Model Predictions

LYR-INPRG CBOD, NBOD and Dissolved Oxygen Verification:

The August 12, 1997 water quality data was used for verification of the LYR-INPRG model predictions for CBOD, NBOD and dissolved oxygen. The observed water quality and model predictions are shown in Table 7 below. The observed data and model predictions are shown in Figures 10 through 12 below.

W.Q. STATION	RIVER Mi.	8/12/97 CBOD mg/l	MODEL CBOD mg/l	8/12/97 NBOD mg/l	MODEL NBOD mg/l	8/11/97 PM DO mg/l	8/12/97 AM DO mg/l	MODEL AVG. DO mg/l
LYO0001	0.03	3.0	3.1	3.9	2.8	8.3	6.3	6.8
LYO0011	1.11	3.0	3.4	3.6	3.2	8.8	6.3	7.1
LYO0015	1.61	4.5	3.6	3.3	3.4	8.4	6.2	7.1
LYO0021	3.16	6.0	4.0	3.2	4.0	9.9	7.2	7.2
LYO0039	3.99	3.0	2.2	2.9	1.8	9.3	6.5	7.4

Table 7: 8/12/97 Little Youghiogheny River CBOD, NBOD , DO and Model Predictions

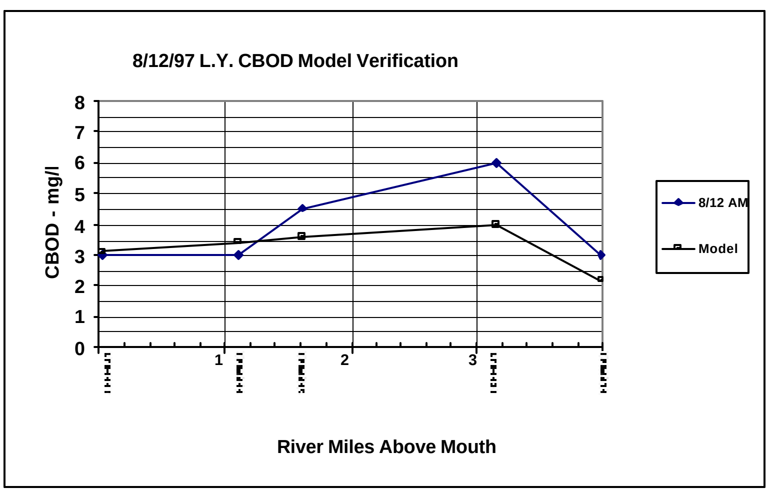

Figure 10: 8/12/97 Little Youghiogheny River CBOD and Model Predictions

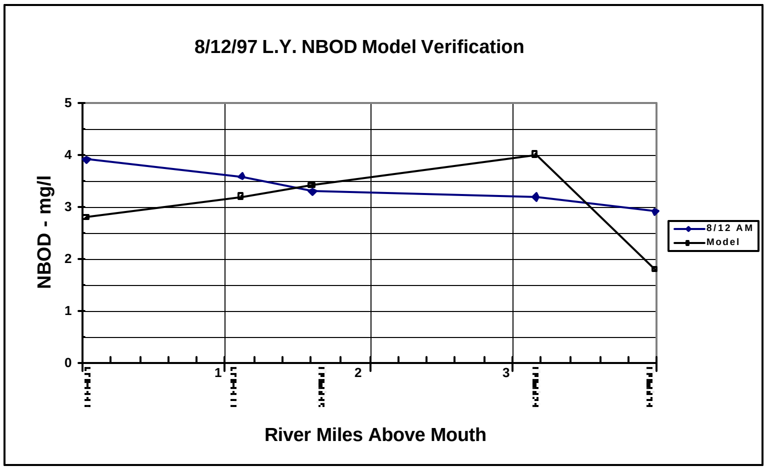

Figure 11: 8/12/97 Little Youghiogheny River NBOD and Model Predictions

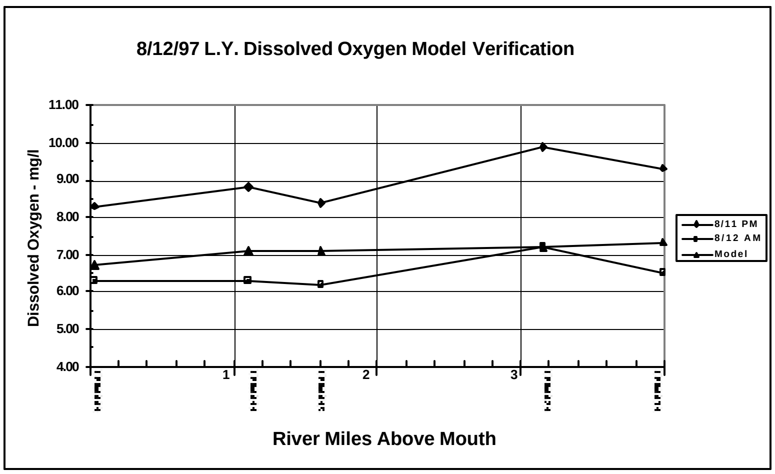

Figure 12: 8/12/97 Little Youghiogheny River Dissolved Oxygen and Model Predictions

Application of LYR-INPRG Model:

Once the LYR-INPRG model was calibrated and verified input data was assembled to simulate summer 7Q10 low-flow and average stream flow conditions. The following sections discuss the development of the summer condition LYR-INPRG input data sets.

Estimation of Summer Stream Temperature:

The INPRG program determines a 90th percentile stream temperature by developing a frequency distribution of the inputted stream temperatures. A 90th percentile stream temperature of 22.7 degrees Celsius was determined from the temperature data shown in Table 8.

station	year	month	day	hour	minute	watemp
LYO0001	97	6	2	9	20	16.5
LYO0001	97	6	16	8	40	16.6
LYO0001	97	6	30	8	45	18.8
LYO0001	97	7	8	7	20	17
LYO0001	97	7	28	9	10	22.6
LYO0001	97	8	11	19	0	22.4
LYO0001	97	8	12	7	20	20.1
LYO0001	97	9	3	16	40	21.9
LYO0001	97	9	4	7	53	13.2
LYO0001	97	9	4	16	15	18.2
LYO0004	94	6	21	8	35	23.2
LYO0004	94	7	19	10	55	23.5
LYO0004	94	8	3	10	10	19.1
LYO0004	94	9	8	7	45	14.1
LYO0004	94	10	13	10	40	8.8
LYO0004	95	6	27	11	0	21.6
LYO0004	95	7	19	12	0	.
LYO0004	95	8	15	10	10	22.4
LYO0004	95	9	11	10	3	14.8
LYO0004	95	10	23	10	19	7.7
LYO0004	96	6	18	10	55	21.4
LYO0004	96	7	30	10	53	19.3
LYO0004	96	8	13	10	55	15.8
LYO0004	96	9	17	10	45	14.7
LYO0004	96	10	29	11	25	10
LYO0004	97	6	17	10	38	18.4
LYO0004	97	7	22	11	0	21.7
LYO0004	97	8	19	10	45	19.7
LYO0004	97	9	15	12	0	.
LYO0004	97	10	21	11	5	7.1
LYO0004	98	6	23	10	20	20.3
LYO0004	98	7	28	11	17	21.8
LYO0004	98	8	11	10	20	20.8
LYO0004	98	9	29	10	25	16.5
LYO0004	98	10	20	10	20	11.4
LYO0011	94	8	8	18	38	20.5
LYO0011	94	8	9	6	35	17.8
LYO0011	94	8	9	11	10	19.3
LYO0011	94	8	9	17	15	22.2
LYO0011	94	8	10	6	15	.
LYO0011	94	8	10	6	40	19.3
LYO0011	97	6	2	9	55	16.1
LYO0011	97	6	16	9	40	16.7
LYO0011	97	6	30	9	35	19.4
LYO0011	97	7	8	8	25	18.4
LYO0011	97	7	28	9	45	22.7
LYO0011	97	8	11	18	30	23.6
LYO0011	97	8	12	7	55	20.2
LYO0011	97	9	3	17	0	20.6
LYO0011	97	9	4	8	40	13.9
LYO0011	97	9	4	16	38	19.4
LYO0011	98	7	21	12	30	26.4
LYO0011	98	8	24	9	20	21.5
LYO0011	98	8	31	12	15	22.6
LYO0011	98	9	15	9	5	19

station	year	month	day	hour	minute	watemp
LYO0015	94	8	8	18	33	20.5
LYO0015	94	8	9	6	50	17.8
LYO0015	94	8	9	11	30	19.4
LYO0015	94	8	9	17	30	22
LYO0015	94	8	10	7	10	19.4
LYO0015	97	6	2	10	15	15.9
LYO0015	97	6	16	10	0	16.5
LYO0015	97	6	30	9	55	18.9
LYO0015	97	7	8	8	42	18.6
LYO0015	97	7	28	10	0	22.5
LYO0015	97	8	11	18	0	23
LYO0015	97	8	12	8	25	20.3
LYO0015	97	9	3	17	15	20.8
LYO0015	97	9	4	9	10	14
LYO0015	97	9	4	16	50	18.9
LYO0021	94	8	8	18	10	20.7
LYO0021	94	8	9	7	39	17.6
LYO0021	94	8	9	12	5	19.8
LYO0021	94	8	9	17	58	21.7
LYO0021	94	8	10	8	0	19.2
LYO0021	97	6	2	10	50	15.9
LYO0021	97	6	16	11	0	17.9
LYO0021	97	6	30	10	40	19.9
LYO0021	97	7	8	9	20	19.1
LYO0021	97	7	28	10	50	23.5
LYO0021	97	8	11	17	20	23.7
LYO0021	97	8	12	9	15	20.1
LYO0021	97	9	3	17	45	19.9
LYO0021	97	9	4	10	0	13.1
LYO0021	97	9	4	17	18	18.5
LYO0039	94	8	8	17	25	20.8
LYO0039	94	8	9	8	15	17.9
LYO0039	94	8	9	12	40	20.1
LYO0039	94	8	9	18	30	21.4
LYO0039	94	8	10	8	45	19.3
LYO0039	97	6	2	12	0	15.6
LYO0039	97	6	2	12	0	15.6
LYO0039	97	6	16	11	55	17.3
LYO0039	97	6	16	11	55	.
LYO0039	97	6	30	11	25	20.4
LYO0039	97	6	30	11	25	.
LYO0039	97	7	8	10	24	19.6
LYO0039	97	7	8	10	24	19.6
LYO0039	97	7	28	11	50	23.6
LYO0039	97	7	28	11	50	23.6
LYO0039	97	8	11	16	37	22.6
LYO0039	97	8	12	9	55	20.3
LYO0039	97	9	3	18	15	20
LYO0039	97	9	4	10	45	14.2
LYO0039	97	9	4	17	37	17.9

Table 8: Little Youghiogheny River Stream Temperatures in Degrees Celsius

All of the model reaction rates (k_2, k_c and k_n) were adjusted by LYR-INPRG to the 90th percentile stream temperature of 22.7 degrees Celsius.

Estimation of Summer Stream Water Quality:

The Little Youghiogheny River background and tributary summer condition water quality shown in Table 9 below was used as LYR-INPRG input data. The input data was estimated from the water quality data shown in Tables 10 through 15.

STATION	TRIBUTARY	CBOD mg/l	NBOD mg/l	DO mg/l
	BACKGROUND	2.25	2.3	7.47
1	DEER PARK WATER	-	-	-
2	UNNAMED TRIB.	2.25	2.3	7.47
3	UNNAMED TRIB.	2.25	2.3	7.47
4	UNNAMED TRIB.	2.25	2.3	7.47
5	-	-	-	-
6	BROADFORD RUN	2.25	2.3	7.47
7	UNNAMED TRIB.	2.25	2.3	7.47
8	UNNAMED TRIB.	2.25	2.3	7.47
9	TROUT RUN WWTP	-	-	-
10	TROUT RUN	2.25	3.1	7.95
11	UNNAMED TRIB.	2.25	2.3	7.47
12	UNNAMED TRIB.	2.25	2.3	7.47
13	COTTON RUN	2.25	2.1	7.69
14	UNNAMED TRIB.	1.5	1.38	7.95
15	WILSON RUN	2.25	1.93	7.47
16	UNNAMED TRIB.	1.5	1.47	7.16
17	-	-	-	-
18	BRADLEY RUN	1.5	1.47	7.16
19	CONFLUENCE YOUGH. RIVER	-	-	-

Table 9: LYR-INPRG Model Water Quality Input Data

station	year	month	day	hour	minute	bod5	ibod	tknw	tknf	watemp	do_fld
BLD0001	94	8	8	18	50	.	.	.	.	19.1	7.4
BLD0001	94	8	9	6	10	.	4	0.27	0.22	16.1	7.3
BLD0001	94	8	9	10	55	.	3	0.52	0.24	17.7	8
BLD0001	94	8	9	17	5	.	.	.	.	21	7.6
BLD0001	94	8	10	6	15	.	2	0.37	0.23	17.1	7.4
BLD0001	97	6	2	9	40	.	.	0.377	.	14.9	8.4
BLD0001	97	6	16	9	5	.	.	0.464	.	15.2	8.2
BLD0001	97	6	30	9	10	.	.	.	.	18.2	7.5
BLD0001	97	7	8	7	55	.	.	0.27	.	14.3	7.9
BLD0001	97	7	28	9	30	.	.	0.21	.	18.6	7.4
BLD0001	97	8	11	18	45	.	.	.	.	18.8	7.5
BLD0001	97	8	12	7	45	1	.	0.17	0.18	15.2	7.8
BLD0001	97	9	3	16	55	.	.	.	.	17.6	7.8
BLD0001	97	9	4	8	20	1	.	0.19	0.15	11	9.22
BLD0001	97	9	4	16	28	.	.	.	.	16.6	8.3
AVERAGE						**1**	**3.0**	**0.316**	**0.204**	**16.76**	**7.848**

Table 10: Water Quality Station BDL0001

station	year	month	day	hour	minute	bod5	ibod	tknw	tknf	watemp	do_fld
COT0006	94	8	8	18	20	.	.	.	.	17.7	8.4
COT0006	94	8	9	7	10	.	4	0.26	0.16	14.3	8.7
COT0006	94	8	9	11	40	.	5	1.4	1.2	17.1	8.7
COT0006	94	8	9	17	35	.	.	.	.	18.7	8.4
COT0006	94	8	10	7	20	.	4	0.32	0.26	15.6	8.5
COT0006	97	6	2	10	26	.	.	0.448	.	13.5	9.7
COT0006	97	6	16	10	35	.	.	0.547	.	14.2	9.6
COT0006	97	6	30	10	10	.	.	.	.	15.1	9.6
COT0006	97	7	8	8	52	.	.	0.34	.	14.6	9.2
COT0006	97	7	28	10	25	.	.	0.31	.	20.4	8.2
COT0006	97	8	11	17	50	.	.	.	.	19.6	7.9
COT0006	97	8	12	8	40	2	.	0.38	0.27	16.6	7.9
COT0006	97	9	3	17	35	.	.	.	.	16.7	8.3
COT0006	97	9	4	9	25	1	.	0.16	0.09	10.6	10
COT0006	97	9	4	15	0	.	.	.	.	15.4	9.5
AVERAGE						**1.5**	**4.3**	**0.463**	**0.396**	**16.007**	**8.84**

Table 11: Water Quality Station COT0006

station	year	month	day	hour	minute	bod5	ibod	tknw	tknf	watemp	do_fld
TRO0001	97	6	2	11	40	.	.	0.598	.	15.2	9.2
TRO0001	97	6	16	11	40	.	.	0.77	.	17.3	9.2
TRO0001	97	6	30	11	16	.	.	.	.	18.9	8.9
TRO0001	97	7	8	10	5	.	.	0.82	.	19.2	8.4
TRO0001	97	7	28	11	40	.	.	0.51	.	24.6	7.7
AVERAGE								**0.675**		**19.04**	**8.68**

Table 12: Water Quality Station TRO0001

station	year	month	day	hour	minute	bod5	ibod	tknw	tknf	watemp	do_fld
TRO0007	94	8	8	17	50	.	.	.	.	21.2	7.7
TRO0007	94	8	9	8	1	.	4	0.45	0.32	16.4	7.8
TRO0007	94	8	9	12	25	.	5	0.41	0.28	19.7	8.2
TRO0007	94	8	9	18	15	.	.	.	.	22.1	7.8
TRO0007	94	8	10	8	30	.	5	0.91	0.41	18	7.5
TRO0007	97	8	11	16	20	.	.	.	.	23.6	8.5
TRO0007	97	8	12	9	40	2	.	0.55	0.45	19.6	7.3
TRO0007	97	9	3	18	5	.	.	.	.	18.8	8.3
TRO0007	97	9	4	10	30	1	.	0.4	0.33	12.3	9.7
TRO0007	97	9	4	17	30	.	.	.	.	17.5	9.7
AVERAGE						**1.5**	**4.7**	**0.544**	**0.358**	**18.92**	**8.25**

Table 13: Water Quality Station TRO0007

station	**year**	**month**	**day**	**hour**	**minute**	**bod5**	**ibod**	**tknw**	**tknf**	**watemp**	**do_fld**
UYS0003	94	8	8	16	55	.	.	.	.	20.9	8.6
UYS0003	94	8	9	7	25	.	3	0.16	0.16	15.6	8.3
UYS0003	94	8	9	11	55	.	4	0.19	0.26	19.4	9.2
UYS0003	94	8	9	17	45	.	.	.	.	20.8	8.7
UYS0003	94	8	10	7	40	.	3	0.29	0.2	17.1	8.1
UYS0003	97	6	2	10	37	.	.	0.539	.	14.7	9.6
UYS0003	97	6	16	10	45	.	.	0.587	.	15.8	9.7
UYS0003	97	6	30	10	20	.	.	.	.	17.3	9.3
UYS0003	97	7	8	9	0	.	.	0.3	.	16	8.7
UYS0003	97	7	28	10	35	.	.	0.2	.	21.5	8.4
UYS0003	97	8	11	17	30	.	.	.	.	22.2	8.7
UYS0003	97	8	12	9	0	1	.	0.26	0.18	18.1	8
UYS0003	97	9	3	17	25	.	.	.	.	17.3	8.8
UYS0003	97	9	4	9	40	1	.	0.14	0.07	11.3	10.1
UYS0003	97	9	4	17	10	.	.	.	.	16.7	9.9
AVERAGE						**1**	**3.3**	**0.296**	**0.174**	**17.647**	**8.94**

Table 14: Water Quality Station UYS0003

station	**year**	**month**	**day**	**hour**	**minute**	**bod5**	**ibod**	**tknw**	**tknf**	**watemp**	**do_fld**
WLS0001	94	8	8	18	30	.	.	.	.	21.8	7.3
WLS0001	94	8	9	6	45	.	3	0.36	0.35	19.4	7.7
WLS0001	94	8	9	11	20	.	4	0.55	0.43	20.5	7.6
WLS0001	94	8	9	17	25	.	.	.	.	22.7	7.5
WLS0001	94	8	10	7	5	.	5	0.39	0.32	20.7	7.7
WLS0001	97	6	2	10	8	.	.	0.286	.	16.6	8.9
WLS0001	97	6	16	9	55	.	.	0.771	.	18.3	8.4
WLS0001	97	6	30	9	50	.	.	.	.	20.7	8
WLS0001	97	7	8	8	35	.	.	0.37	.	18.6	8.1
WLS0001	97	7	28	9	55	.	.	0.42	.	21.8	7.6
WLS0001	97	8	11	18	5	.	.	.	.	21	7.8
WLS0001	97	8	12	8	15	2	.	0.31	0.27	19.6	7.4
WLS0001	97	9	3	17	10	.	.	.	.	19.1	8.1
WLS0001	97	9	4	8	55	1	.	0.32	0.27	14.6	9.3
WLS0001	97	9	4	16	46	.	.	.	.	17.4	9
AVERAGE						**1.5**	**4.0**	**0.42**	**0.328**	**19.52**	**8.027**

Table 15: Water Quality Station WSL0001

Development of Revised Trout Run WWTP Release Rate Relationship:

Once the LYR-INPRG model input data was revised for summer temperature and water quality conditions it was then used to develop a new release rate relationship for the Trout Run WWTP. The same method that was employed in 1983 for the development of the existing 80-DP-1086 Trout Run WWTP discharge permit release rate relationship was also utilized for this TMDL. Three different Trout Run WWTP wastewater discharge conditions were selected for investigation. The same three wastewater discharge flows that were investigated in 1983, 0.2 mgd, 0.6 mgd and 2.0 mgd were selected. Model runs were made for each flow condition to determine the required Little Youghiogheny River stream flow immediately upstream of the Trout Run WWTP to meet the dissolved oxygen standard of a minimum daily average of 6.0 mg/l. The resulting flows are listed in Table 16 as LYR-INPRG model L.Y. River flow. The corresponding 1983 flows are also listed in Table 16 as 1983 INPRG model L.Y. River flow for comparison purposes

TROUT RUN WWTP FLOW MGD	TROUT RUN WWTP FLOW CFS	LYR-INPRG MODEL L.Y. RIVER FLOW CFS	1983 INPRG MODEL L.Y. RIVER FLOW CFS
0.2	0.3094	3.67	3.41
0.6	0.9383	5.60	6.81
2.0	3.0945	8.50	13.62

Table 16: Trout Run WWTP and Little Youghiogheny River Release Rate Relationship Flows

A new Trout Run WWTP release rate relationship was developed by determining a Q_{plant} vs. Q_{river} logarithmic regression equation using the LYR-INPRG model L.Y. River flow values shown in Table 16 above. The flow values and corresponding release rate relationships are shown in Figure 13 below.

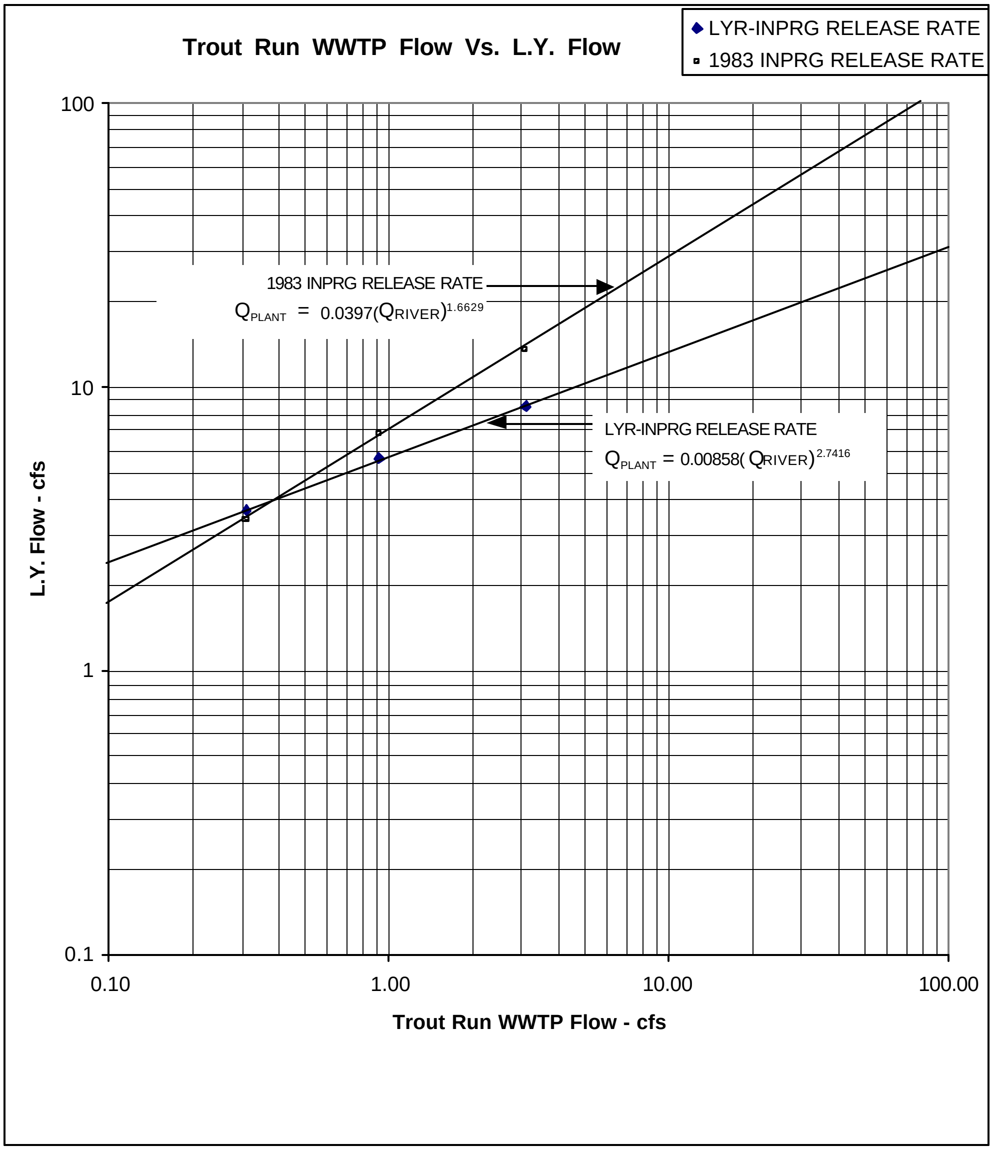

Figure 13: Trout Run WWTP Flow vs. Little Youghiogheny River Flow

The new release rate relationship was then used to establish the new permitted Trout Run WWTP flow during 7Q10 low-flow conditions for the low-flow scenario model runs.

Estimation of 7-Day, 10-Year Low-flow and Permitted Trout Run WWTP Release Rate:

The USGS gaging station 03075500 located on the Youghiogheny River near Oakland was used to estimate the Little Youghiogheny River 7Q10 low-flow. Listed below are USGS gaging station 03075500 statistics.

Station Name:	Youghiogheny River near Oakland, MD
Station Number:	03075500
Latitude (dd.mm.ss)	39.25.19
Longitude (dd.mm.ss)	79.25.32
Drainage area (square miles)	134
7Q10 Flow (cfs)	5.6

7Q10 low-flow runoff rate = 5.6 ÷ 134 = 0.04179 cfs/sq. mile.

The above calculated 7Q10 low-flow runoff rate of 0.04179 cfs/sq. mile was input into the LYR-INPRG program which computes the 7Q10 flow for each modeling segment using the drainage area for the model segment. Using the above 7Q10 low-flow runoff rate and the assumption that there will be no inflow from Broadford Run results in a Little Youghiogheny River 7Q10 low-flow of 0.81 cfs immediately above the Trout Run WWTP. Substitution of a flow of 0.81 cfs into the new Trout Run WWTP release rate relationship results in a permitted flow of 0.00486 cfs or 3,100 gpd.

Estimation of Average Summer Stream Flow Conditions:

The USGS gaging station 03075500 located on the Youghiogheny River near Oakland was used to estimate the Little Youghiogheny River average summer flow. Listed below in Table 17 are USGS gaging station 03075500 statistics of mean monthly data for water years 1941 through 1998.

USGS GAGING STATION 03075500 YOUGHIOGHENY RIVER MONTHLY STREAM FLOW STATISTICS	
MONTH	STREAM FLOW - CFS
JUNE	206
JULY	163
AUGUST	133
SEPTEMBER	87.9
OCTOBER	117

Table 17: USGS Gaging Station 03075500 Monthly Stream Flow Statistics

The average summer flow of 141.3 cfs was determined by averaging the flows shown in Table 17. An average summer runoff rate of 1.05448 cfs/sq. mile was calculated as shown below.

Average summer runoff rate = 141.3 ÷ 134 = 1.05448 cfs/sq. mile.

Using the above average summer runoff rate and the assumption that there will be inflow from Broadford Run, results in a Little Youghiogheny River average summer flow of 8.33 cfs immediately above the Trout Run WWTP. Substitution of a flow of 8.33 cfs into the new Trout Run WWTP release rate relationship results in a permitted flow of 86.83 cfs or 56 mgd. Since a wastewater flow of 56 mgd cannot realistically be expected to occur, an inspection of the most recent three years of the Trout Run WWTP monthly operating reports from June through October was made. A practical maximum Trout Run WWTP summer flow of 3.0 mgd was determined from the inspection of the reports and was used for the Scenario 2 in the main document.

LYR-INPRG Results for TMDL Scenarios:

The following sections present the LYR-INPRG model results for the seven TMDL scenarios presented in the main document.

Scenario One:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	2.25	2.30	7.47	7.29	15.58	7.30
2	10572	2.87	5.65	0	2.83	5.45	0
3	10511	2.73	5.25	0	2.70	5.02	0
4	10389	2.54	4.70	0	2.51	4.52	0
5	9353	1.61	2.79	1.14	1.61	2.79	1.14
6	8560	1.05	1.75	1.18	1.05	1.75	1.18
7	7158	0.49	0.76	2.34	1.02	1.23	3.89
8	6487	0.80	0.94	4.19	0.84	0.98	4.28
9	6182	0.73	0.84	4.22	2.28	3.22	4.28
10	5877	1.97	2.75	3.68	2.04	2.84	4.73
11	4863	1.52	2.06	4.24	1.53	2.07	4.29
12	4292	1.31	1.74	4.21	1.31	1.74	4.23
13	3658	1.10	1.43	4.23	1.13	1.45	4.33
14	3404	1.06	1.35	4.36	1.07	1.35	4.45
15	2454	0.83	1.03	4.62	0.93	1.09	4.82
16	1440	0.72	0.82	4.94	0.73	0.83	4.97
17	1281	0.69	0.78	4.93	0.69	0.78	4.93
18	671	0.54	0.60	4.77	0.58	0.63	4.85
19	0	0.45	0.48	4.75			

Table 18: LYR-INPRG Model Results for Scenario One

Scenario one assumed the facility effluent concentrations shown in Table 19 below in addition to the existing 7Q10 low-flow nonpoint source loads shown in Table 20 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	20,350	30	15	6
DEER PARK SPRING WATER	36,000	30	25	6

Table 19: Scenario One Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	2.25	5.06	2.30	5.17	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	2.25	0.36	2.30	0.37	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	2.25	0.52	2.30	0.53	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	2.25	0.53	2.30	0.54	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	2.25	3.08	2.30	3.15	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	2.25	0.31	2.30	0.32	7.47
STA. 10 / TROUT RUN	0.29	2.25	3.56	3.10	4.90	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	2.25	0.24	2.30	0.25	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	2.25	0.10	2.30	0.10	7.47
STA. 13 / COTTON RUN	0.04	2.25	0.45	2.10	0.42	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	1.50	0.28	1.38	0.26	7.95
STA. 15 / WILSON RUN	0.10	2.25	1.23	1.93	1.05	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	1.50	0.17	1.47	0.17	7.16
STA. 18 / BRADLEY RUN	0.05	1.50	0.42	1.47	0.41	7.16

Table 20: Scenario One Assumed Nonpoint Source Concentrations and Loads

Scenario Two:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	2.25	2.30	7.47	2.48	2.89	7.46
2	10572	2.41	2.81	7.61	2.40	2.77	7.60
3	10511	2.39	2.77	7.61	2.38	2.73	7.60
4	10389	2.38	2.72	7.60	2.37	2.69	7.59
5	9353	2.34	2.65	7.69	2.34	2.65	7.69
6	8560	2.31	2.61	7.69	2.28	2.49	7.60
7	7158	2.25	2.46	7.68	2.25	2.43	7.63
8	6487	2.24	2.41	7.67	2.24	2.41	7.67
9	6182	2.24	2.40	7.67	8.16	11.62	7.44
10	5877	8.14	11.59	7.41	7.07	10.05	7.51
11	4863	7.03	9.99	7.51	6.97	9.90	7.51
12	4292	6.95	9.87	7.52	6.93	9.83	7.52
13	3658	6.91	9.79	7.52	6.80	9.62	7.52
14	3404	6.79	9.61	7.52	6.69	9.44	7.53
15	2454	6.66	9.39	7.54	6.41	8.98	7.54
16	1440	6.38	8.93	7.54	6.32	8.85	7.53
17	1281	6.32	8.83	7.52	6.32	8.83	7.52
18	671	6.29	8.79	7.47	6.16	8.59	7.47
19	0	6.12	8.54	7.42			

Table 21: LYR-INPRG Model Results for Scenario Two

Scenario two assumed the facility effluent concentrations shown in Table 22 below in addition to the existing average summer flow nonpoint source loads shown in Table 23 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,000,000	30	15	6
DEER PARK SPRING WATER	36,000	30	25	6

Table 22: Scenario Two Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	10.53	2.25	127.7	2.30	130.5	7.47
STA. 2 / UNNAMED TRIBUTARY	0.76	2.25	9.21	2.30	9.42	7.47
STA. 3 / UNNAMED TRIBUTARY	1.08	2.25	13.1	2.30	13.3	7.47
STA. 4 / UNNAMED TRIBUTARY	1.10	2.25	13.3	2.30	13.6	7.47
STA. 6 / BROADFORD RUN	8.33	2.25	101.1	2.30	103.3	7.47
STA. 7 / UNNAMED TRIBUTARY	6.41	2.25	77.8	2.30	79.5	7.47
STA. 8 / UNNAMED TRIBUTARY	0.64	2.25	7.80	2.30	7.98	7.47
STA. 10 / TROUT RUN	7.40	2.25	89.8	3.10	123.7	7.95
STA. 11 / UNNAMED TRIBUTARY	0.51	2.25	6.14	2.30	6.27	7.47
STA. 12 / UNNAMED TRIBUTARY	0.21	2.25	2.56	2.30	2.62	7.47
STA. 13 / COTTON RUN	0.94	2.25	11.4	2.10	10.62	7.69
STA. 14 / UNNAMED TRIBUTARY	0.88	1.50	7.08	1.38	6.51	7.95
STA. 15 / WILSON RUN	2.55	2.25	31.0	1.93	26.55	7.47
STA. 16 / UNNAMED TRIBUTARY	0.53	1.50	4.26	1.47	4.18	7.16
STA. 18 / BRADLEY RUN	1.32	1.50	10.7	1.47	10.45	7.16

Table 23: Scenario Two Assumed Nonpoint Source Concentrations and Loads

Scenario Three:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	2.25	2.30	7.47	3.75	2.03	7.30
2	10572	1.48	0.74	5.29	1.52	0.83	5.42
3	10511	1.47	0.80	5.41	1.53	0.92	5.57
4	10389	1.44	0.86	5.54	1.50	0.96	5.68
5	9353	0.96	0.60	5.90	0.96	0.60	5.90
6	8560	0.63	0.37	5.85	0.63	0.37	5.85
7	7158	0.29	0.16	6.16	0.88	0.81	6.55
8	6487	0.69	0.62	6.47	0.74	0.67	6.50
9	6182	0.64	0.57	6.39	0.89	0.95	6.38
10	5877	0.76	0.81	6.19	1.14	1.38	6.63
11	4863	0.84	1.00	6.30	0.87	1.02	6.32
12	4292	0.73	0.85	6.24	0.74	0.86	6.25
13	3658	0.62	0.71	6.21	0.67	0.75	6.25
14	3404	0.62	0.69	6.25	0.65	0.71	6.29
15	2454	0.50	0.54	6.32	0.63	0.64	6.41
16	1440	0.48	0.48	6.40	0.50	0.49	6.41
17	1281	0.47	0.46	6.38	0.47	0.46	6.38
18	671	0.37	0.36	6.26	0.41	0.40	6.29
19	0	0.32	0.30	6.20			

Table 24: LYR-INPRG Model Results for Scenario Three

Scenario three assumed the facility effluent concentrations shown in Table 25 below in addition to the existing 7Q10 low-flow nonpoint source loads shown in Table 26 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,100	30	15	6
DEER PARK SPRING WATER	36,000	10	0	6

Table 25: Scenario Three Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	2.25	5.06	2.30	5.17	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	2.25	0.36	2.30	0.37	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	2.25	0.52	2.30	0.53	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	2.25	0.53	2.30	0.54	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	2.25	3.08	2.30	3.15	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	2.25	0.31	2.30	0.32	7.47
STA. 10 / TROUT RUN	0.29	2.25	3.56	3.10	4.90	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	2.25	0.24	2.30	0.25	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	2.25	0.10	2.30	0.10	7.47
STA. 13 / COTTON RUN	0.04	2.25	0.45	2.10	0.42	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	1.50	0.28	1.38	0.26	7.95
STA. 15 / WILSON RUN	0.10	2.25	1.23	1.93	1.05	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	1.50	0.17	1.47	0.17	7.16
STA. 18 / BRADLEY RUN	0.05	1.50	0.42	1.47	0.41	7.16

Table 26: Scenario Three Assumed Nonpoint Source Concentrations and Loads

Scenario Four:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	1.35	1.38	7.47	2.43	1.76	7.30
2	10572	0.95	0.64	5.93	0.98	0.68	6.03
3	10511	0.95	0.66	6.02	0.98	0.71	6.13
4	10389	0.92	0.67	6.12	0.95	0.72	6.22
5	9353	0.61	0.45	6.45	0.61	0.45	6.45
6	8560	0.40	0.28	6.43	0.40	0.28	6.43
7	7158	0.19	0.12	6.68	0.54	0.50	6.92
8	6487	0.42	0.38	6.90	0.45	0.41	6.92
9	6182	0.39	0.35	6.85	0.64	0.74	6.85
10	5877	0.55	0.62	6.70	0.75	0.93	7.02
11	4863	0.55	0.68	6.80	0.57	0.69	6.82
12	4292	0.48	0.57	6.77	0.49	0.58	6.77
13	3658	0.41	0.47	6.75	0.43	0.50	6.78
14	3404	0.40	0.46	6.78	0.42	0.47	6.81
15	2454	0.32	0.36	6.84	0.40	0.42	6.89
16	1440	0.31	0.31	6.90	0.31	0.32	6.90
17	1281	0.30	0.30	6.88	0.30	0.30	6.88
18	671	0.23	0.23	6.81	0.26	0.25	6.82
19	0	0.20	0.19	6.77			

Table 27: LYR-INPRG Model Results for Scenario Four

Scenario four assumed the facility effluent concentrations shown in Table 28 below in addition to a 40% reduction in existing 7Q10 low-flow nonpoint source loads as shown in table 29 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,100	30	15	6
DEER PARK SPRING WATER	36,000	7	1	6

Table 28: Scenario Four Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	1.35	3.04	1.38	3.10	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	1.35	0.22	1.38	0.22	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	1.35	0.31	1.38	0.32	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	1.35	0.32	1.38	0.32	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	1.35	1.85	1.38	1.89	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	1.35	0.19	1.38	0.19	7.47
STA. 10 / TROUT RUN	0.29	1.35	2.14	1.86	2.94	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	1.35	0.15	1.38	0.15	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	1.35	0.06	1.38	0.06	7.47
STA. 13 / COTTON RUN	0.04	1.35	0.27	1.26	0.25	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	0.90	0.17	0.83	0.16	7.95
STA. 15 / WILSON RUN	0.10	1.35	0.74	1.16	0.63	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	0.90	0.10	0.88	0.10	7.16
STA. 18 / BRADLEY RUN	0.05	0.90	0.25	0.88	0.25	7.16

Table 29: Scenario Four Assumed Nonpoint Source Concentrations and Loads

Scenario Five:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	2.03	2.07	7.47	2.03	2.07	7.47
2	10572	0.69	0.64	5.92	0.78	0.74	6.03
3	10511	0.75	0.71	6.02	0.86	0.83	6.14
4	10389	0.81	0.77	6.12	0.91	0.87	6.23
5	9353	0.55	0.51	6.37	0.55	0.51	6.37
6	8560	0.34	0.30	6.34	0.34	0.30	6.34
7	7158	0.15	0.12	6.61	0.75	0.75	6.89
8	6487	0.58	0.56	6.76	0.62	0.61	6.79
9	6182	0.53	0.52	6.67	0.80	0.92	6.66
10	5877	0.68	0.77	6.46	1.04	1.31	6.85
11	4863	0.75	0.93	6.49	0.78	0.95	6.51
12	4292	0.65	0.78	6.41	0.66	0.79	6.42
13	3658	0.55	0.64	6.37	0.59	0.68	6.41
14	3404	0.55	0.63	6.41	0.57	0.65	6.45
15	2454	0.44	0.48	6.47	0.56	0.58	6.55
16	1440	0.42	0.43	6.53	0.44	0.44	6.54
17	1281	0.41	0.41	6.51	0.41	0.41	6.51
18	671	0.32	0.31	6.40	0.36	0.35	6.43
19	0	0.27	0.26	6.35			

Table 30: LYR-INPRG Model Results for Scenario Five

Scenario five assumed the facility effluent concentrations shown in Table 31 below in addition to a 10% reduction in existing 7Q10 low-flow nonpoint source loads as shown in Table 32 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,100	30	15	6
DEER PARK SPRING WATER	NO DISCHARGE	-	-	-

Table 31: Scenario Five Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	2.03	4.56	2.07	4.65	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	2.03	0.33	2.07	0.34	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	2.03	0.47	2.07	0.48	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	2.03	0.48	2.07	0.48	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	2.03	2.78	2.07	2.84	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	2.03	0.28	2.07	0.28	7.47
STA. 10 / TROUT RUN	0.29	2.03	3.21	2.79	4.41	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	2.03	0.22	2.07	0.22	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	2.03	0.09	2.07	0.09	7.47
STA. 13 / COTTON RUN	0.04	2.03	0.41	1.89	0.38	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	1.35	0.25	1.24	0.23	7.95
STA. 15 / WILSON RUN	0.10	2.03	1.11	1.74	0.95	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	1.35	0.15	1.32	0.15	7.16
STA. 18 / BRADLEY RUN	0.05	1.35	0.38	1.32	0.37	7.16

Table 32: Scenario Five Assumed Nonpoint Source Concentrations and Loads

Scenario Six:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	1.35	1.38	7.47	2.07	1.76	7.30
2	10572	0.82	0.64	6.08	0.85	0.68	6.16
3	10511	0.82	0.66	6.15	0.86	0.71	6.26
4	10389	0.81	0.67	6.25	0.85	0.72	6.34
5	9353	0.55	0.45	6.54	0.55	0.45	6.54
6	8560	0.35	0.28	6.53	0.35	0.28	6.53
7	7158	0.17	0.12	6.76	0.52	0.50	6.97
8	6487	0.41	0.38	6.95	0.44	0.41	6.97
9	6182	0.38	0.35	6.90	0.63	0.74	6.89
10	5877	0.54	0.62	6.75	0.74	0.93	7.05
11	4863	0.55	0.68	6.83	0.56	0.69	6.84
12	4292	0.48	0.57	6.79	0.48	0.58	6.80
13	3658	0.40	0.47	6.78	0.43	0.50	6.80
14	3404	0.40	0.46	6.80	0.42	0.47	6.83
15	2454	0.32	0.36	6.86	0.40	0.42	6.91
16	1440	0.30	0.31	6.91	0.31	0.32	6.92
17	1281	0.30	0.30	6.90	0.30	0.30	6.90
18	671	0.23	0.23	6.82	0.26	0.25	6.83
19	0	0.20	0.19	6.78			

Table 33: LYR-INPRG Model Results for Scenario Six

Scenario six assumed the facility effluent concentrations shown in Table 34 below in addition to a 40% reduction in existing 7Q10 low-flow nonpoint source loads as shown in Table 35 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,100	30	15	6
DEER PARK SPRING WATER	36,000	5	1	6

Table 34: Scenario Six Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	1.35	3.04	1.38	3.10	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	1.35	0.22	1.38	0.22	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	1.35	0.31	1.38	0.32	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	1.35	0.32	1.38	0.32	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	1.35	1.85	1.38	1.89	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	1.35	0.19	1.38	0.19	7.47
STA. 10 / TROUT RUN	0.29	1.35	2.14	1.86	2.94	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	1.35	0.15	1.38	0.15	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	1.35	0.06	1.38	0.06	7.47
STA. 13 / COTTON RUN	0.04	1.35	0.27	1.26	0.25	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	0.90	0.17	0.83	0.16	7.95
STA. 15 / WILSON RUN	0.10	1.35	0.74	1.16	0.63	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	0.90	0.10	0.88	0.10	7.16
STA. 18 / BRADLEY RUN	0.05	0.90	0.25	0.88	0.25	7.16

Table 35: Scenario Six Assumed Nonpoint Source Concentrations and Loads

Scenario Seven:

Station	River Dist. Above Mouth Meters	Upstream Just Before mixing			Downstream Just After Mixing		
		CBOD mg/l	NBOD mg/l	D.O. mg/l	CBOD mg/l	NBOD mg/l	D.O. mg/l
1	12218	1.8	1.84	7.47	1.80	1.84	7.47
2	10572	0.61	0.57	6.12	0.69	0.66	6.21
3	10511	0.67	0.63	6.21	0.77	0.74	6.32
4	10389	0.72	0.68	6.30	0.80	0.78	6.39
5	9353	0.49	0.45	6.53	0.49	0.45	6.53
6	8560	0.30	0.27	6.51	0.30	0.27	6.51
7	7158	0.13	0.11	6.75	0.67	0.67	6.99
8	6487	0.51	0.50	6.88	0.55	0.54	6.90
9	6182	0.47	0.46	6.79	0.74	0.87	6.79
10	5877	0.63	0.73	6.59	0.94	1.19	6.95
11	4863	0.68	0.84	6.62	0.70	0.86	6.64
12	4292	0.59	0.71	6.55	0.60	0.72	6.56
13	3658	0.49	0.58	6.52	0.54	0.62	6.55
14	3404	0.50	0.57	6.55	0.52	0.59	6.59
15	2454	0.39	0.44	6.61	0.50	0.52	6.67
16	1440	0.38	0.38	6.67	0.39	0.40	6.67
17	1281	0.37	0.37	6.64	0.37	0.37	6.64
18	671	0.29	0.28	6.54	0.32	0.32	6.57
19	0	0.25	0.24	6.50			

Table 36: LYR-INPRG Model Results for Scenario Seven

Scenario seven assumed the facility effluent concentrations shown in Table 37 below in addition to a 20% reduction in existing 7Q10 low-flow nonpoint source loads as shown in Table 38 below.

FACILITY	FACILITY FLOW gpd	BOD_5 mg/l	TKN mg/l	DO mg/l
TROUT RUN WWTP	3,100	30	15	6
DEER PARK SPRING WATER	NO DISCHARGE	-	-	-

Table 37: Scenario Seven Assumed Facility Effluent Concentrations

MODEL STATION / NONPOINT SOURCE	FLOW cfs	CBOD mg/l	CBOD LOAD lbs/day	NBOD mg/l	NBOD LOAD lbs/day	DO mg/l
BACKGROUND	0.42	1.80	4.05	1.84	4.14	7.47
STA. 2 / UNNAMED TRIBUTARY	0.03	1.80	0.29	1.84	0.30	7.47
STA. 3 / UNNAMED TRIBUTARY	0.04	1.80	0.41	1.84	0.42	7.47
STA. 4 / UNNAMED TRIBUTARY	0.04	1.80	0.42	1.84	0.43	7.47
STA. 6 / BROADFORD RUN	-	-	-	-	-	-
STA. 7 / UNNAMED TRIBUTARY	0.25	1.80	2.47	1.84	2.52	7.47
STA. 8 / UNNAMED TRIBUTARY	0.03	1.80	0.25	1.84	0.25	7.47
STA. 10 / TROUT RUN	0.29	1.80	2.85	2.48	3.92	7.95
STA. 11 / UNNAMED TRIBUTARY	0.02	1.80	0.19	1.84	0.20	7.47
STA. 12 / UNNAMED TRIBUTARY	0.01	1.80	0.08	1.84	0.08	7.47
STA. 13 / COTTON RUN	0.04	1.80	0.36	1.68	0.34	7.69
STA. 14 / UNNAMED TRIBUTARY	0.03	1.20	0.22	1.10	0.21	7.95
STA. 15 / WILSON RUN	0.10	1.80	0.98	1.54	0.84	7.47
STA. 16 / UNNAMED TRIBUTARY	0.02	1.20	0.14	1.18	0.13	7.16
STA. 18 / BRADLEY RUN	0.05	1.20	0.34	1.18	0.33	7.16

Table 38: Scenario Seven Assumed Nonpoint Source Concentrations and Loads

List of Equations for INPRG Model:

The following equations are used in the INPRG Mathematical Model for Freshwater Streams:

1. Equations for Conversion of BOD to CBOD and TKN to NBOD:

   As per guidelines of the Surface Discharge Permits Division, the following equations are used to convert BOD and TKN to CBOD and NBOD, respectively:

   CBOD = 1.5 * BOD

   NBOD = 4.6 * TKN

2. Equations To Estimate Decay of CBOD and NBOD Matter:

   The following equations are used in the INPRG to characterize decay of the CBOD and NBOD matter with first order kinetics:

   k_c at temperature (T) = $k_{c20} * \{1.047^{(T-20)}\}$

   k_n at temperature (T) = $k_{n20} * \{1.08^{(T-20)}\}$

   $L_{ct} = L_{co} * e^{-(k_c * t)}$ and $L_{nt} = L_{no} * e^{-(k_n * t)}$

   Where: T is 90th Percentile Stream Temperature for Summer period, ° C
   k_{c20} is Standard CBOD Decay rate at 20° C, per day
   k_{n20} is Standard NBOD Decay rate at 20° C, per day
   k_c temperature corrected CBOD Decay Rate, per day
   k_n temperature corrected NBOD Decay Rate, per day
   t is time of travel, days
   L_{co} is initial ultimate CBOD concentration, mg/l
   L_{ct} is ultimate CBOD concentration at downstream after time of travel (t), mg/l
   L_{no} is initial NBOD concentration, mg/l
   L_{nt} is NBOD concentration at downstream after time of travel (t), mg/l

3. Reaeration Rates:

   The reaeration rates (k_a) are estimated using Tsivoglou's Formula. Refer to U.S. EPA Publication "Rates, Constants and Kinetics Formulations in Surface Water Quality Modeling, 2nd Edition, EPA/600/3-85/040, June 1985" for this formula.

   $k_a = \{0.054 * (\hat{I}\ H \div t)\} * \{1.022^{(T-25)}\}$

   Where: k_a is reaeration rate at temperature (T), per day
   Î H is difference of elevations at two modeling points of a segment, ft.

List of Equations for INPRG Model, Continued:

4. Equation for Dissolved Oxygen Sag Prediction:

   The following equation for dissolved oxygen deficit is based on the Streeter- Phelps equation:

   $D = [\{kc * (Lct - Lco) \div (k\mathbf{a} - kc)\} * \{e^{-(kc * t)} - e^{-(k\mathbf{a} * t)}\}]$
   $+ [\{kn * (Lnt - Lno) \div (k\mathbf{a} - kn)\} * \{e^{-(kn * t)} - e^{-(k\mathbf{a} * t)}\}] - [\{P - R - (S \div d)\} * t]$

   Where: D is dissolved oxygen deficit, mg/l

   P is algal photosynthetic oxygen production rate, mg/l- day

   R is algal respiration (dissolved oxygen consumption) rate, mg/l- day

   S is sediment oxygen demand rate, gm/m^2- day

   d is stream depth, meters

5. Equation for Saturation Dissolved Oxygen:

   The INPRG program estimates the dissolved oxygen saturation (C_S) in mg/l at each modeling point using the following formula:

   $C_S = \{(14.62 - 0.3893 * T) + (0.006969 * T^2) - (5.897 * 10^{-5} * T^3)\} * \{1 - (6.97 * 10^{-6} * \hat{I}\ H)\}$

6. Equation for Dissolved Oxygen:

   The INPRG program uses the following formula to estimate dissolved oxygen at each modeling point:

   $C = C_S - D$

   Where: C is dissolved oxygen after time of travel (t), mg/l

Water Quality Data

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
BLD0001	94	8	8	18	50	.	.	.	.	.	.	.	.	.	.	0.43	19.1	7.4
BLD0001	94	8	9	6	10	0.50	0.45	6	.	4	0.27	0.22	0.023	0.812	0.01	.	16.1	7.3
BLD0001	94	8	9	10	55	1.68	1.00	12	.	3	0.52	0.24	0.032	0.993	0.067	.	17.7	8
BLD0001	94	8	9	17	5	.	.	.	.	.	.	.	.	.	.	.	21	7.6
BLD0001	94	8	10	6	15	1.12	.	5	.	2	0.37	0.23	0.016	0.883	0.04	.	17.1	7.4
BLD0001	97	5	5	9	45	.	.	7	.	.	0.671	.	0.011	1.007	0.02	.	9.8	10.4
BLD0001	97	5	19	9	50	.	.	5	.	.	0	.	0.026	0.276	0.042	.	14.9	9
BLD0001	97	6	2	9	40	.	.	7	.	.	0.377	.	0.044	0.837	0.037	.	14.9	8.4
BLD0001	97	6	16	9	5	.	.	14	.	.	0.464	.	0.038	0.974	0.027	.	15.2	8.2
BLD0001	97	6	30	9	10	.	.	19	.	.	.	.	0.028	.	.	.	18.2	7.5
BLD0001	97	7	8	7	55	.	.	1	.	.	0.27	.	0.033	0.806	0.017	.	14.3	7.9
BLD0001	97	7	28	9	30	.	.	8	.	.	0.21	.	0.032	0.624	0.018	.	18.6	7.4
BLD0001	97	8	11	18	45	.	.	.	.	.	.	.	.	.	.	0.26	18.8	7.5
BLD0001	97	8	12	7	45	1.12	0.75	3	1	.	0.17	0.18	0.021	0.797	0.013	.	15.2	7.8
BLD0001	97	9	3	16	55	.	.	.	.	.	.	.	.	.	.	0.19	17.6	7.8
BLD0001	97	9	4	8	20	1.54	1.00	5	1	.	0.19	0.15	0.022	0.685	0.025	.	11	9.22
BLD0001	97	9	4	16	28	.	.	.	.	.	.	.	.	.	.	.	16.6	8.3

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
COT0006	94	8	8	18	20	.	.	.	.	.	.	.	.	.	.	0.93	17.7	8.4
COT0006	94	8	9	7	10	0.76	0.60	7	.	4	0.26	0.16	0.024	1.607	0.019	.	14.3	8.7
COT0006	94	8	9	11	40	6.93	2.99	2	.	5	1.4	1.2	0.027	2.767	0.054	.	17.1	8.7
COT0006	94	8	9	17	35	.	.	.	.	.	.	.	.	.	.	.	18.7	8.4
COT0006	94	8	10	7	20	0.70	.	3	.	4	0.32	0.26	0.013	1.614	0.03	.	15.6	8.5
COT0006	97	5	5	9	10	.	.	5	.	.	0.049	.	0.025	1.074	0.021	.	7.3	11
COT0006	97	5	19	10	50	.	.	7	.	.	0.047	.	0.029	1.189	0.029	.	15.1	9.7
COT0006	97	6	2	10	26	.	.	15	.	.	0.448	.	0.033	1.622	0.049	.	13.5	9.7
COT0006	97	6	16	10	35	.	.	20	.	.	0.547	.	0.019	2.314	0.038	.	14.2	9.6
COT0006	97	6	30	10	10	.	.	20	.	.	.	.	0.02	.	.	.	15.1	9.6
COT0006	97	7	8	8	52	.	.	1	.	.	0.34	.	0.021	1.835	0.024	.	14.6	9.2
COT0006	97	7	28	10	25	.	.	14	.	.	0.31	.	0.034	1.495	0.042	.	20.4	8.2
COT0006	97	8	11	17	50	.	.	.	.	.	.	.	.	.	.	0.19	19.6	7.9
COT0006	97	8	12	8	40	1.82	1.00	14	2	.	0.38	0.27	0.028	1.628	0.051	.	16.6	7.9
COT0006	97	9	3	17	35	.	.	.	.	.	.	.	.	.	.	0.29	16.7	8.3
COT0006	97	9	4	9	25	1.82	1.25	8	1	.	0.16	0.09	0.013	1.333	0.024	.	10.6	10
COT0006	97	9	4	15	0	.	.	.	.	.	.	.	.	.	.	.	15.4	9.5

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0001	97	5	5	10	15	.	.	11	.	.	0.851	.	0.012	1.372	0.066	.	11.3	10.4
LYO0001	97	5	19	9	30	.	.	23	.	.	0.366	.	0.034	1.009	0.057	.	16.4	8.1
LYO0001	97	6	2	9	20	.	.	35	.	.	1.239	.	0.179	1.902	0.146	.	16.5	9.2
LYO0001	97	6	16	8	40	.	.	25	.	.	0.749	.	0.051	1.689	0.065	.	16.6	8.2
LYO0001	97	6	30	8	45	.	.	33	.	.	.	.	0.08	.	.	.	18.8	7.5
LYO0001	97	7	8	7	20	.	.	11	.	.	0.79	.	0.08	1.706	0.086	.	17	6.5
LYO0001	97	7	28	9	10	.	.	25	.	.	0.61	.	0.051	1.393	0.083	.	22.6	6.3
LYO0001	97	8	11	19	0	.	.	.	.	.	.	.	.	.	.	9.22	22.4	8.3
LYO0001	97	8	12	7	20	23.80	14.20	22	2	.	0.84	0.47	0.087	1.726	0.131	.	20.1	6.3
LYO0001	97	9	3	16	40	.	.	.	.	.	.	.	.	.	.	9.66	21.9	7.2
LYO0001	97	9	4	7	53	7.14	2.74	24	1	.	0.44	0.29	0.06	1.212	0.09	.	13.2	8
LYO0001	97	9	4	16	15	.	.	.	.	.	.	.	.	.	.	.	18.2	8.9

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0004	94	1	25	10	45	.	.	16	.	.	0.866	.	.	2.766	0.138	.	0.6	12.5
LYO0004	94	2	7	10	20	.	.	12	.	.	0.95	.	.	2.35	0.09	.	1.2	12.4
LYO0004	94	3	8	10	30	.	.	48	.	.	0.536	.	.	1.836	0.074	.	2.2	12.3
LYO0004	94	4	4	10	30	.	.	16	.	.	0.486	.	.	1.346	0.041	.	6.8	11
LYO0004	94	5	10	8	55	.	.	22	.	.	0.329	.	.	1.204	0.019	.	10.9	8.65
LYO0004	94	6	21	8	35	.	.	30	.	.	0.95	.	.	1.76	0.14	.	23.2	7.1
LYO0004	94	7	19	10	55	.	.	20	.	.	0.76	.	.	1.528	0.167	.	23.5	8.2
LYO0004	94	8	3	10	10	.	.	30	.	.	0.96	.	.	1.624	0.147	.	19.1	7.2
LYO0004	94	9	8	7	45	.	.	12	.	.	0.202	.	.	0.849	0.036	.	14.1	7.8
LYO0004	94	10	13	10	40	.	.	2	.	.	0.982	.	.	1.343	0.053	.	8.8	9.6
LYO0004	94	11	21	8	45	.	.	28	.	.	2.124	.	.	2.659	0.252	.	9.5	9.5
LYO0004	94	12	6	10	30	.	.	.	.	.	0.855	.	.	2.077	0.084	.	10.8	10.4
LYO0004	95	1	18	9	5	.	.	4	.	.	0.463	.	.	1.642	0.044	.	6.3	12
LYO0004	95	2	14	10	5	.	.	10	.	.	0.591	.	.	1.715	0.047	.	7	10.9
LYO0004	95	3	27	9	35	.	.	4	.	.	0.291	.	.	1.071	0.013	.	7.4	11
LYO0004	95	4	18	10	30	.	.	18	.	.	1.023	.	.	1.568	0.121	.	10.3	9.6
LYO0004	95	5	24	9	55	.	.	16	.	.	0.977	.	.	1.821	0.106	.	16.8	8.6
LYO0004	95	6	27	11	0	.	.	32	.	.	0.816	.	.	1.673	0.098	.	21.6	6.7
LYO0004	95	7	19	12	0	.	.	.	.	.	.	.	.	.	.	.	.	.
LYO0004	95	8	15	10	10	.	.	28	.	.	0.809	.	.	2.072	0.103	.	22.4	6.9
LYO0004	95	9	11	10	3	.	.	12	.	.	0.804	.	.	2.166	0.108	.	14.8	6.3
LYO0004	95	10	23	10	19	.	.	10	.	.	2.187	.	.	2.907	0.314	.	7.7	10.1
LYO0004	95	11	7	10	45	.	.	10	.	.	0.809	.	.	1.385	0.095	.	4.7	10.3
LYO0004	95	12	5	10	34	.	.	4	.	.	0.583	.	.	1.782	0.055	.	3	11.6
LYO0004	96	1	30	10	35	.	.	2	.	.	0.388	.	.	1.712	0.042	.	2.2	11.6
LYO0004	96	2	27	10	42	.	.	318	.	.	1.501	.	.	2.579	0.401	.	6	10.1
LYO0004	96	3	19	9	50	.	.	2	.	.	0.412	.	.	1.6	0.041	.	5.4	10.5
LYO0004	96	4	16	11	0	.	.	30	.	.	0.847	.	.	1.842	0.111	.	7.3	9.5
LYO0004	96	5	21	10	42	.	.	6	.	.	0.502	.	.	1.393	0.033	.	18.1	8.4
LYO0004	96	6	18	10	55	.	.	14	.	.	0.697	.	.	1.494	0.062	.	21.4	7.5
LYO0004	96	7	30	10	53	.	.	70	.	.	0.875	.	.	1.73	0.154	.	19.3	7.2
LYO0004	96	8	13	10	55	.	.	36	.	.	0.658	.	.	1.112	.	.	15.8	7.6
LYO0004	96	9	17	10	45	.	.	18	.	.	1.039	.	.	1.706	0.193	.	14.7	7.7
LYO0004	96	10	29	11	25	.	.	2	.	.	0.36	.	.	1.115	0.053	.	10	10.1
LYO0004	96	11	25	11	10	.	.	2	.	.	0.153	.	.	0.988	0.014	.	3.9	11.7
LYO0004	96	12	17	11	0	.	.	14	.	.	0.42	.	.	1.475	0.037	.	4.8	10.9
LYO0004	97	1	7	10	55	.	.	6	.	.	0.543	.	.	1.521	0.097	.	1.5	11.7
LYO0004	97	2	4	11	35	.	.	12	.	.	0.919	.	.	1.821	0.072	.	2.3	11.4
LYO0004	97	3	25	10	34	.	.	12	.	.	0.314	.	.	1.3	0.047	.	5.7	11.2
LYO0004	97	4	29	10	43	.	.	8	.	.	0.493	.	.	1.107	0.065	.	8.6	11.1
LYO0004	97	5	20	10	56	.	.	36	.	.	.	.	.	.	0.053	.	14.9	8
LYO0004	97	6	17	10	38	.	.	22	.	.	0.946	.	.	1.887	0.063	.	18.4	7.5
LYO0004	97	7	22	11	0	.	.	24	.	.	0.69	.	.	1.897	0.11	.	21.7	5.9
LYO0004	97	8	19	10	45	.	.	30	.	.	0.84	.	.	1.555	0.092	.	19.7	7.1
LYO0004	97	9	15	12	0	.	.	.	.	.	.	.	.	.	.	.	.	.
LYO0004	97	10	21	11	5	.	.	2	.	.	0.41	.	.	0.761	0.067	.	7.1	9.3
LYO0004	97	11	4	11	18	.	.	14	.	.	1.11	.	.	2.002	0.135	.	6.1	10.2
LYO0004	97	12	16	10	12	.	.	2	.	.	0.35	.	.	1.588	0.032	.	0.8	12

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0004	98	1	13	10	35	.	.	12	.	.	0.37	.	.	1.596	0.05	.	4.9	10.7
LYO0004	98	2	3	10	8	.	.	2	.	.	0.06	.	.	1.422	0.068	.	2.5	11.4
LYO0004	98	3	17	10	15	.	.	10	.	.	0.4	.	.	1.426	0.082	.	2.7	11.9
LYO0004	98	4	28	10	11	.	.	16	.	.	0.57	.	.	1.288	0.064	.	10.1	9.8
LYO0004	98	5	12	10	45	.	.	24	.	.	0.58	.	.	1.377	0.058	.	12.4	8.9
LYO0004	98	6	23	10	20	.	.	20	.	.	0.91	.	.	1.918	0.08	.	20.3	8
LYO0004	98	7	28	11	17	.	.	20	.	.	0.61	.	.	1.842	0.078	.	21.8	7.5
LYO0004	98	8	11	10	20	.	.	32	.	.	1.08	.	.	1.699	0.128	.	20.8	6.6
LYO0004	98	9	29	10	25	.	.	28	.	.	1.28	.	.	3.636	0.183	.	16.5	6.4
LYO0004	98	10	20	10	20	.	.	12	.	.	0.63	.	.	0.977	0.114	.	11.4	7.9
LYO0004	98	11	23	11	6	.	.	6	.	.	0.45	.	.	0.783	0.084	.	3.3	11.4
LYO0004	98	12	8	10	30	.	.	28	.	.	3.07	.	.	3.701	0.432	.	11.3	8.3

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0011	94	8	8	18	38	.	.	.	.	.	.	.	.	.	.	47.8	20.5	8.2
LYO0011	94	8	9	6	35	8.40	4.98	7	.	4	0.46	0.31	0.029	1.145	0.049	.	17.8	7.4
LYO0011	94	8	9	11	10	11.06	7.73	3	.	4	0.57	0.3	0.037	1.281	0.065	.	19.3	8.1
LYO0011	94	8	9	17	15	.	.	.	.	.	.	.	.	.	.	.	22.2	8.7
LYO0011	94	8	10	6	15	7.00	4.24	.	.	.	.	.	.	.	.	.	.	.
LYO0011	94	8	10	6	40	.	.	20	.	4	0.67	0.35	0.021	1.299	0.094	34.2	19.3	7.2
LYO0011	97	5	5	9	37	.	.	11	.	.	1.168	.	0.019	1.69	0.071	.	10.4	10.4
LYO0011	97	5	19	10	15	.	.	18	.	.	0.248	.	0.031	0.801	0.051	.	16.1	9
LYO0011	97	6	2	9	55	.	.	33	.	.	0.782	.	0.11	1.452	0.117	.	16.1	8.9
LYO0011	97	6	16	9	40	.	.	27	.	.	0.69	.	.	1.602	0.052	.	16.7	8.6
LYO0011	97	6	30	9	35	.	.	36	.	.	.	.	0.052	.	.	.	19.4	7.5
LYO0011	97	7	8	8	25	.	.	13	.	.	0.64	.	0.073	1.605	0.08	.	18.4	6.8
LYO0011	97	7	28	9	45	.	.	29	.	.	0.61	.	0.043	1.422	0.089	.	22.7	6.7
LYO0011	97	8	11	18	30	.	.	.	.	.	.	.	.	.	.	8.55	23.6	8.8
LYO0011	97	8	12	7	55	21.14	11.71	22	2	.	0.8	0.36	0.051	1.615	0.131	.	20.2	6.3
LYO0011	97	9	3	17	0	.	.	.	.	.	.	.	.	.	.	7.45	20.6	8.4
LYO0011	97	9	4	8	40	5.74	2.24	15	1	.	0.39	0.25	0.043	1.203	0.072	.	13.9	8.2
LYO0011	97	9	4	16	38	.	.	.	.	.	.	.	.	.	.	.	19.4	9.9
LYO0011	98	3	10	11	35	2.86	2.09	33	1	.	0.19	.	0.011	1.164	0.035	.	3	13.2
LYO0011	98	3	16	12	5	7.56	5.38	8	1	.	0.36	.	0.106	1.41	0.048	.	2.7	13.5
LYO0011	98	3	23	12	10	2.52	1.79	10	1	.	0.1	.	0.029	0.79	0.023	.	3.8	12.6
LYO0011	98	3	30	11	25	13.78	10.17	10	1	.	0.4	.	0.028	1.306	0.044	.	13.6	11.2
LYO0011	98	7	21	12	30	3.86	2.09	1	1	.	0.62	.	0.017	1.263	0.058	.	26.4	8.8
LYO0011	98	8	24	9	20	9.41	4.49	17	1	.	0.59	.	0.048	.	0.079	.	21.5	6.4
LYO0011	98	8	31	12	15	12.26	6.88	22	1	.	0.5	.	0.023	1.028	0.073	.	22.6	7.6
LYO0011	98	9	15	9	5	6.22	2.69	10	5	.	1.6	.	0.579	2.006	0.161	4.29	19	3.9

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0015	94	8	8	18	33	.	.	.	.	.	.	.	.	.	.	47.5	20.5	8
LYO0015	94	8	9	6	50	8.40	5.48	8	.	3	0.43	0.33	0.031	1.116	0.05	.	17.8	7.4
LYO0015	94	8	9	11	30	10.78	7.97	10	.	4	0.43	0.32	0.026	1.143	0.048	.	19.4	8.1
LYO0015	94	8	9	17	30	.	.	.	.	.	.	.	.	.	.	.	22	8.7
LYO0015	94	8	10	7	10	7.84	4.73	19	.	3	0.8	0.39	0.025	1.428	0.142	.	19.4	7.3
LYO0015	97	5	5	9	22	.	.	8	.	.	0.193	.	0.026	0.703	0.088	.	9.3	10.4
LYO0015	97	5	19	10	35	.	.	19	.	.	0.159	.	0.028	0.71	0.032	.	15.9	9
LYO0015	97	6	2	10	15	.	.	34	.	.	0.41	.	0.047	1.108	0.083	.	15.9	8.8
LYO0015	97	6	16	10	0	.	.	26	.	.	0.565	.	0.046	1.476	0.049	.	16.5	8.7
LYO0015	97	6	30	9	55	.	.	31	.	.	.	.	0.059	.	.	.	18.9	8.1
LYO0015	97	7	8	8	42	.	.	16	.	.	0.62	.	0.068	1.51	0.066	.	18.6	6.9
LYO0015	97	7	28	10	0	.	.	30	.	.	0.63	.	0.049	1.468	0.092	.	22.5	6.7
LYO0015	97	8	11	18	0	.	.	.	.	.	.	.	.	.	.	7.63	23	8.4
LYO0015	97	8	12	8	25	25.34	14.45	29	3	.	0.71	0.36	0.044	1.478	0.123	.	20.3	6.2
LYO0015	97	9	3	17	15	.	.	.	.	.	.	.	.	.	.	6.33	20.8	7.7
LYO0015	97	9	4	9	10	6.86	3.24	15	1	.	0.36	0.25	0.051	1.172	0.077	.	14	8
LYO0015	97	9	4	16	50	.	.	.	.	.	.	.	.	.	.	.	18.9	9.6

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0021	94	8	8	18	10	.	.	.	.	.	.	.	.	.	.	40.9	20.7	8
LYO0021	94	8	9	7	39	7.28	4.98	2	.	3	0.41	0.28	0.028	1.105	0.039	.	17.6	7.7
LYO0021	94	8	9	12	5	7.39	5.23	5	.	4	0.44	0.3	0.032	1.143	0.036	.	19.8	8.3
LYO0021	94	8	9	17	58	.	.	.	.	.	.	.	.	.	.	.	21.7	8.3
LYO0021	94	8	10	8	0	7.14	4.24	7	.	5	0.78	0.37	0.021	1.405	0.115	25.7	19.2	7.1
LYO0021	97	5	5	8	52	.	.	13	.	.	0.41	.	0.041	0.894	0.084	.	9.1	10.4
LYO0021	97	5	19	11	20	.	.	7	.	.	0.13	.	0.024	0.658	0.028	.	17.2	9.7
LYO0021	97	6	2	10	50	.	.	29	.	.	0.515	.	0.044	1.108	0.069	.	15.9	8.7
LYO0021	97	6	16	11	0	.	.	20	.	.	0.573	.	0.048	1.43	0.064	.	17.9	9
LYO0021	97	6	30	10	40	.	.	25	.	.	.	.	0.133	.	.	.	19.9	8.3
LYO0021	97	7	8	9	20	.	.	9	.	.	0.81	.	0.098	1.664	0.066	.	19.1	7.6
LYO0021	97	7	28	10	50	.	.	18	.	.	0.61	.	0.059	1.44	0.067	.	23.5	7.5
LYO0021	97	8	11	17	20	.	.	.	.	.	.	.	.	.	.	.	23.7	9.9
LYO0021	97	8	12	9	15	22.68	13.71	16	4	.	0.69	0.35	0.036	1.445	0.147	.	20.1	7.2
LYO0021	97	9	3	17	45	.	.	.	.	.	.	.	.	.	.	8.46	19.9	8.5
LYO0021	97	9	4	10	0	5.32	2.74	9	1	.	0.33	0.28	0.046	1.111	0.088	.	13.1	9.2
LYO0021	97	9	4	17	18	.	.	.	.	.	.	.	.	.	.	.	18.5	10.3

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
LYO0039	94	8	8	17	25	.	.	.	.	.	.	.	.	.	.	39.2	20.8	7.9
LYO0039	94	8	9	8	15	6.44	4.24	3	.	4	0.47	0.32	0.078	0.989	0.054	.	17.9	7.5
LYO0039	94	8	9	12	40	7.42	5.23	3	.	3	0.44	0.29	0.016	0.926	0.032	.	20.1	7.7
LYO0039	94	8	9	18	30	.	.	.	.	.	.	.	.	.	.	.	21.4	7.6
LYO0039	94	8	10	8	45	7.14	4.73	9	.	5	0.47	0.37	0.014	0.911	0.038	.	19.3	7.1
LYO0039	97	5	5	8	45	.	.	4	.	.	0.049	.	0.025	0.4405	0.02	.	8.7	9.9
LYO0039	97	5	5	8	45	.	.	6	.	.	0.049	.	0.027	0.4345	0.024	.	8.7	9.9
LYO0039	97	5	19	11	45	.	.	10	.	.	0.088	.	0.026	0.514	0.029	.	16.5	9.6
LYO0039	97	5	19	11	45	.	.	10	.	.	0.121	.	0.024	0.551	0.027	.	16.5	9.6
LYO0039	97	6	2	12	0	.	.	60	.	.	0.549	.	0.046	1.017	0.07	.	15.6	8.8
LYO0039	97	6	2	12	0	.	.	28	.	.	0.439	.	0.047	0.903	0.076	.	15.6	8.8
LYO0039	97	6	16	11	55	.	.	20	.	.	0.621	.	0.039	1.234	0.054	.	17.3	8.8
LYO0039	97	6	16	11	55	.	.	18	.	.	0.435	.	0.042	1.04	0.036	.	.	.
LYO0039	97	6	30	11	25	.	.	22	.	.	.	.	0.056	.	.	.	20.4	8.1
LYO0039	97	6	30	11	25	.	.	22	.	.	.	.	0.058	.	0.036	.	.	.
LYO0039	97	7	8	10	24	.	.	14	.	.	0.6	.	0.058	1.182	0.054	.	19.6	7.7
LYO0039	97	7	8	10	24	.	.	.	.	.	.	.	.	.	.	.	19.6	7.7
LYO0039	97	7	28	11	50	.	.	25	.	.	0.5	.	0.067	1.105	0.067	.	23.6	7
LYO0039	97	7	28	11	50	.	.	25	.	.	0.51	.	0.069	1.113	0.069	.	23.6	7
LYO0039	97	8	11	16	37	.	.	.	.	.	.	.	.	.	.	.	22.6	9.3
LYO0039	97	8	12	9	55	18.06	8.47	22	2	.	0.63	0.3	0.036	1.086	0.224	2.91	20.3	6.5
LYO0039	97	9	3	18	15	.	.	.	.	.	.	.	.	.	.	4.1	20	8.1
LYO0039	97	9	4	10	45	5.88	2.24	18	1	.	0.37	0.2	0.051	0.876	0.148	.	14.2	8.3
LYO0039	97	9	4	17	37	.	.	.	.	.	.	.	.	.	.	.	17.9	9.8

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
TRO0001	97	5	5	8	15	.	.	10	.	.	0.049	.	0.039	0.9845	0.032	.	6.9	10.9
TRO0001	97	5	19	12	0	.	.	12	.	.	0.115	.	0.035	1.306	0.03	.	17.3	9.8
TRO0001	97	6	2	11	40	.	.	35	.	.	0.598	.	0.099	1.824	0.089	.	15.2	9.2
TRO0001	97	6	16	11	40	.	.	18	.	.	0.77	.	0.062	3.513	0.046	.	17.3	9.2
TRO0001	97	6	30	11	16	.	.	24	.	.	.	.	0.063	.	.	.	18.9	8.9
TRO0001	97	7	8	10	5	.	.	9	.	.	0.82	.	0.117	3.044	0.078	.	19.2	8.4
TRO0001	97	7	28	11	40	.	.	27	.	.	0.51	.	0.081	2.15	0.068	.	24.6	7.7

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
TRO0007	94	8	8	17	50	.	.	.	.	.	.	.	.	.	.	4.59	21.2	7.7
TRO0007	94	8	9	8	1	6.16	3.74	2	.	4	0.45	0.32	0.046	2.474	0.043	.	16.4	7.8
TRO0007	94	8	9	12	25	6.89	4.19	4	.	5	0.41	0.28	0.035	2.349	0.031	.	19.7	8.2
TRO0007	94	8	9	18	15	.	.	.	.	.	.	.	.	.	.	.	22.1	7.8
TRO0007	94	8	10	8	30	5.32	2.99	10	.	5	0.91	0.41	0.071	2.916	0.122	.	18	7.5
TRO0007	97	8	11	16	20	.	.	.	.	.	.	.	.	.	.	1.05	23.6	8.5
TRO0007	97	8	12	9	40	7.42	3.74	21	2	.	0.55	0.45	0.064	2.354	0.06	.	19.6	7.3
TRO0007	97	9	3	18	5	.	.	.	.	.	.	.	.	.	.	1.93	18.8	8.3
TRO0007	97	9	4	10	30	3.78	1.99	13	1	.	0.4	0.33	0.051	2.164	0.053	.	12.3	9.7
TRO0007	97	9	4	17	30	.	.	.	.	.	.	.	.	.	.	.	17.5	9.7

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
UYS0003	94	8	8	16	55	.	.	.	.	.	.	.	.	.	.	0.47	20.9	8.6
UYS0003	94	8	9	7	25	0.25	0.30	5	.	3	0.16	0.16	0.024	1.434	0.013	.	15.6	8.3
UYS0003	94	8	9	11	55	1.34	1.00	3	.	4	0.19	0.26	0.026	1.434	0.017	.	19.4	9.2
UYS0003	94	8	9	17	45	.	.	.	.	.	.	.	.	.	.	.	20.8	8.7
UYS0003	94	8	10	7	40	0.42	.	4	.	3	0.29	0.2	0.024	1.509	0.019	.	17.1	8.1
UYS0003	97	5	5	9	0	.	.	4	.	.	0.049	.	0.015	0.9725	0.011	.	7.6	11.3
UYS0003	97	5	19	11	5	.	.	5	.	.	0	.	0.025	0.947	0.016	.	16	11
UYS0003	97	6	2	10	37	.	.	15	.	.	0.539	.	0.024	1.244	0.043	.	14.7	9.6
UYS0003	97	6	16	10	45	.	.	8	.	.	0.587	.	0.015	2.229	0.019	.	15.8	9.7
UYS0003	97	6	30	10	20	.	.	9	.	.	.	.	0.013	.	.	.	17.3	9.3
UYS0003	97	7	8	9	0	.	.	1	.	.	0.3	.	0.018	1.593	0.015	.	16	8.7
UYS0003	97	7	28	10	35	.	.	11	.	.	0.2	.	0.014	1.269	0.013	.	21.5	8.4
UYS0003	97	8	11	17	30	.	.	.	.	.	.	.	.	.	.	0.09	22.2	8.7
UYS0003	97	8	12	9	0	3.78	2.24	8	1	.	0.26	0.18	0.006	1.186	0.015	.	18.1	8
UYS0003	97	9	3	17	25	.	.	.	.	.	.	.	.	.	.	0.15	17.3	8.8
UYS0003	97	9	4	9	40	1.82	1.50	6	1	.	0.14	0.07	0.008	0.963	0.017	.	11.3	10.1
UYS0003	97	9	4	17	10	.	.	.	.	.	.	.	.	.	.	.	16.7	9.9

station	year	month	day	hour	minute	chto	chaa	tss	bod5	ibod	tknw	tknf	nh4	tn	tp	flow	watem	do_fld
WLS0001	94	8	8	18	30	.	.	.	.	.	.	.	.	.	.	2.38	21.8	7.3
WLS0001	94	8	9	6	45	3.64	1.99	3	.	3	0.36	0.35	0.061	1.07	0.025	.	19.4	7.7
WLS0001	94	8	9	11	20	5.88	4.34	4	.	4	0.55	0.43	0.076	1.259	0.049	.	20.5	7.6
WLS0001	94	8	9	17	25	.	.	.	.	.	.	.	.	.	.	.	22.7	7.5
WLS0001	94	8	10	7	5	2.80	1.99	5	.	5	0.39	0.32	0.024	1.089	0.025	.	20.7	7.7
WLS0001	97	5	5	9	25	.	.	7	.	.	0.049	.	0.023	0.8255	0.018	.	10.7	9.7
WLS0001	97	5	19	10	30	.	.	2	.	.	0	.	0.033	0.836	0.02	.	15.2	9.2
WLS0001	97	6	2	10	8	.	.	10	.	.	0.286	.	0.03	1.041	0.026	.	16.6	8.9
WLS0001	97	6	16	9	55	.	.	16	.	.	0.771	.	0.044	1.991	0.026	.	18.3	8.4
WLS0001	97	6	30	9	50	.	.	18	.	.	.	.	0.054	.	.	.	20.7	8
WLS0001	97	7	8	8	35	.	.	1	.	.	0.37	.	0.026	1.258	0.019	.	18.6	8.1
WLS0001	97	7	28	9	55	.	.	10	.	.	0.42	.	0.029	1.037	0.026	.	21.8	7.6
WLS0001	97	8	11	18	5	.	.	.	.	.	.	.	.	.	.	0.49	21	7.8
WLS0001	97	8	12	8	15	2.73	1.50	3	2	.	0.31	0.27	0.028	1.096	0.022	.	19.6	7.4
WLS0001	97	9	3	17	10	.	.	.	.	.	.	.	.	.	.	0.94	19.1	8.1
WLS0001	97	9	4	8	55	9.10	5.73	9	1	.	0.32	0.27	0.03	0.98	0.039	.	14.6	9.3
WLS0001	97	9	4	16	46	.	.	.	.	.	.	.	.	.	.	.	17.4	9

Discharge Permits Limits For Wastewater Treatment Plants

1. ***For Trout Run Wastewater Treatment Plant (Expired 8/31/92)***

Effluent Limitations, Outfall 001 (1)

The quality of the effluent discharged by the facility shall be limited at all times as shown below. A streamflow gage shall be installed directly upstream of the facility outfall 001. For the period of June 1through October 31 the permissible daily release rate from the Trout Run WWTP sahll be determined based upon the relationship $Q_{plant(mgd)} = 0.0257[Qriver(cfs)]^{1.6629}$ as shown on permit page 4 and the observed daily Little Youghiogheny River streamflow at the above mentioned gage. Similarly, the permissible daily BOD5, suspended solids, and TKN loading rates shall be determined by the respective relationships on permit page 5.

Effluent Characteristics	Monthly Loading Rate kg/d (lbs/d)	Weekly Loading Rate kg/d (lbs/d)	Monthly Average mg/l	Weekly Average mg/l
BOD_5	93.6 (206.4)	140.4 (309.6)	30	45
TSS	93.6 (206.4)	140.4 (309.6)	30	45
Total Kjeldahl Nitrogen (6/1- 10/31)	46.8 (103.2)	71 (158.3)	15	23

Effluent Characteristics	Maximum	Minimum
Fecal Coliforms	200 MPN/100 ml monthly log mean value	Not applicable
Total Residual Chlorine	The discharge of wastewater containing chlorine or chlorine compounds is prohibited.	
Dissolved Oxygen	Not applicable	5.0 mg/l at anytime 6.0 mg/l daily average
pH	8.5	6.5

(1) Refer to 80-DP-1046 for additional discharge permit conditions.

2. ***For Deer Park Spring Water Company (Expiration 11/30/00)***

Effluent Limitations (2)

During the effective period of this permit, the permittee is authorized to discharge bottle washing rinse water, distillation unit blowdown, water storage tank overflow, excess spring water, and storm water runoff via Outfall 001.

As specified below, such discharge shall be limited and monitored by the permittee at the discharge point from culvert under the railroad tracks.

Effluent Characteristics	Effluent Limitations			
	lbs/day		Other Units	
	Quarterly Average	Daily Maximum	Annual Average	Daily Maximum
Flow	N/A	N/A	(1) gpd	(1) gpd
TSS	N/A	N/A	30 mg/l	45 mg/l
BOD_5	N/A	N/A	30 mg/l	45 mg/l
Temperature	N/A	N/A	N/A	68^{o} F

The pH shall not be less than 6.0 nor greater than 9.0 and shall be monitored once per quarter by grab sample.

(1) Monitoring required without limits.

(2) Refer to 94-DP-2139 for additional discharge permit conditions.

Facilities Performance

Summary of 1999 Plant Performance for Trout Run WWTP

The following data is copied from the Discharge Monitoring Reports for discharge period of 1/99 through 12/99:

MONTHS	FLOW AVE mgd	FLOW MAX mgd	pH MIN	pH MAX	[1] TSS AVE mg/l	TSS MAX mg/l	[2] BOD_5 AVE mg/l	BOD_5 MAX mg/l	TKN AVE mg/l	TKN MAX mg/l	FC MAX MPN/ 100ml	TRC MAX	DO MIN mg/l	DO AVE mg/l
Jan-99	1.088	2.4	6.8	7.1	17.0	21.0	16.0	20			78	N/A	8.2	8.7
Feb	0.557	1.1	6.8	7.3	28.0	29.0	18.0	19			135	N/A	8.2	9.9
Mar	1.159	2.2	6.6	7.1	26.0	35.0	18.0	20			72	N/A	9	9.3
Apr	0.842	1.402	6.7	7	35.0	45.0	21.0	24			22	N/A	8.3	8.9
May	0.31	0.75	6.5	7.6	48.0		30.0	41			95	N/A	7.7	7.8
Jun	0.074	0.4	6.5	6.8	10.0	10.0	12.0	12	9	9	10	N/A	7.2	7.6
Jul	0.081	2	6.5	7	25.0	25.0	19.0	19	10	10	724	N/A	6.9	6.9
Aug	0.033	0.32	6.8	6.8	5.0	8.0	5.0	6	11	17	2	N/A	6.1	6.3
Sep	0.188	2	6.8	7	12.0	26.0	7.0	12	5	9	207	N/A	8	8.8
Oct	0.472	1.65	6.5	7	5.0	12.0	6.0	13	3.0	5.0	617	N/A	6.9	11.2
Nov	0.55	0.915	6.5	7.1	5.0	10.0	4.0	5			2	N/A	8	12.4
Dec	0.503	0.863	6.5	7	6.0	14.0	6.0	13			3	N/A	9.2	12.3
Sumr. Av	0.170	1.274	6.6	6.9	11.4	16.2	9.8	12.4	7.6		312	N/A	7.0	8.2
Yearl Av	**0.488**	**1.333**	**6.63**	**7.07**	**18.500**	**21.36**	**13.5**	**17.0**	7.6		**164**	**N/A**	**7.81**	**9.18**

[1] TSS AVE = Monthly Ave. TSS MAX = Weekly Ave.
[2] BOD_5 AVE = Monthly Ave. BOD_5 MAX = Weekly Ave.
Summer = June - October

Summary of 1999 Plant Performance for Deer Park Spring Water

The following data is copied from the PCS database for discharge period of 1/99 through 12/99:

MONTHS	FLOW AVE mgd	FLOW MAX mgd	pH MIN	pH MAX	TSS AVE mg/l	TSS MAX mg/l	BOD_5 AVE mg/l	BOD_5 MAX mg/l	TEMP AVE DEG. F	TEMP MAX DEG. F
Jan-99										
Feb										
Mar	0.018	0.095	7.1	7.4	3.0	6.0	4.3	5.3		
Apr										
May										
Jun	0.018	0.095	7.3	7.5	2.5	4.0	3.5	5.3		68
Jul										
Aug										
Sep	0.03	0.036	7.3	7.5	5.0	12.0	4.9	3.2	63.3	71.5
Oct										
Nov										
Dec	0.03	0.036	7.4	7.5	5.0	12.0	3.8	4.9		
Yearl Av	**0.024**	**0.066**	**7.28**	**7.48**	**3.875**	**8.50**	**4.1**	**4.7**	**63.3**	**69.75**