ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

WATER QUALITY MANAGEMENT PLAN UPDATE

SUMMARY SHEET

Type of Discharge: Municipal X , Industrial ___ , Other _____

Facility Name Mountain Pine

Receiving Stream Glazypeau Creek

Segment 2-F County Garland

Permit No. AR 0021539 Update Method _____

Date _____ Flow 0.15 MGD

Critical Limits CBOD5/TSS/NH3-N/EFF. D.O. 30/90 Year-Round

Seasonal Limits CBOD5/TSS/NH3-N/EFF. D.O. _____

Justification Desk Top Model

Already included in WQMP Y/N _____

If Yes, list the information currently in the Plan:

Receiving Stream _____

Limits _____

Section, Range & Township, or Latitude and Longitude

Existing _____

New Site _____

Water Quality Standards Change by Use Attainability Analysis Y/N ___

If yes, list changes _____

DESK TOP MODEL
MOUNTAIN PINE
DISCHARGE TO GLAZYPEAU CREEK

July 9, 1987

I. Introduction

A desk top model was performed on Glazypeau Creek, the receiving stream of the Mountain Pine sewage treatment plant discharge, in order to determine the effluent limits that will maintain the existing dissolved oxygen standard of this stream. The Mountain Pine facility is currently operating under NPDES permit # AR0021539, which is up for renewal. The present discharge enters Glazypeau Creek in the SW 1/4 Section 17, Range 20 West, Township 2 South in Garland County, and is located in planning segment 2F of the Ouachita River basin. The design flow of this facility is 0.15 million gallons per day.

Regulation No. 2, Arkansas Water Quality Standards, lists Glazypeau Creek as a coolwater fishery, with an applicable dissolved oxygen standard of 6 mg/l. When the stream temperature is above 22°C a 1 mg/l diurnal fluctuation is allowed for not more than 8 hours in any 24 hour period. When the stream temperature is 22°C or less the 6 mg/l standard continues to apply.

The desk top model, utilizing the steady state Streeter-Phelps equation, was used to determine the effluent limits necessary to protect the dissolved oxygen standard in the receiving stream during both critical and seasonal flow periods. The model was applied to the design flow of 0.15 MGD.

II. Data Used in the Model

The input parameters used in the model for the Mountain Pine discharge to Glazypeau Creek are:

Q7-10 flow = 1.0 cfs*
Seasonal flow = 2.0 cfs**
Stream slope = 20 feet/mile (from attached map)
Velocity = 0.25 feet/second
Stream depth = 1.0 feet
Critical temperature = 28°C
Seasonal temperature = 20°C
*From USGS flow data
**Based on seasonal runoff from watershed of 30 square miles

The reaeration rate, Ka, was calculated using the Tsivoglou formula for flow rates less than 10 cfs:

$$Ka = 1.8\ S\ V$$

where S = slope, feet/mile
V = velocity, feet/second

This resulted in Ka = 9.0/day.

The deoxygenation rate, Kd, was selected as 0.5/day and was taken from "Technical Guidance Manual for Performing Wasteload Allocations", Book II, Chapter 1, Appendix A, U.S.E.P.A., October, 1983. This rate applies to streams with rocky-gravelly substrates.

The EPA accepted literature value of 0.4/day was used for the ammonia removal rate, Kn.

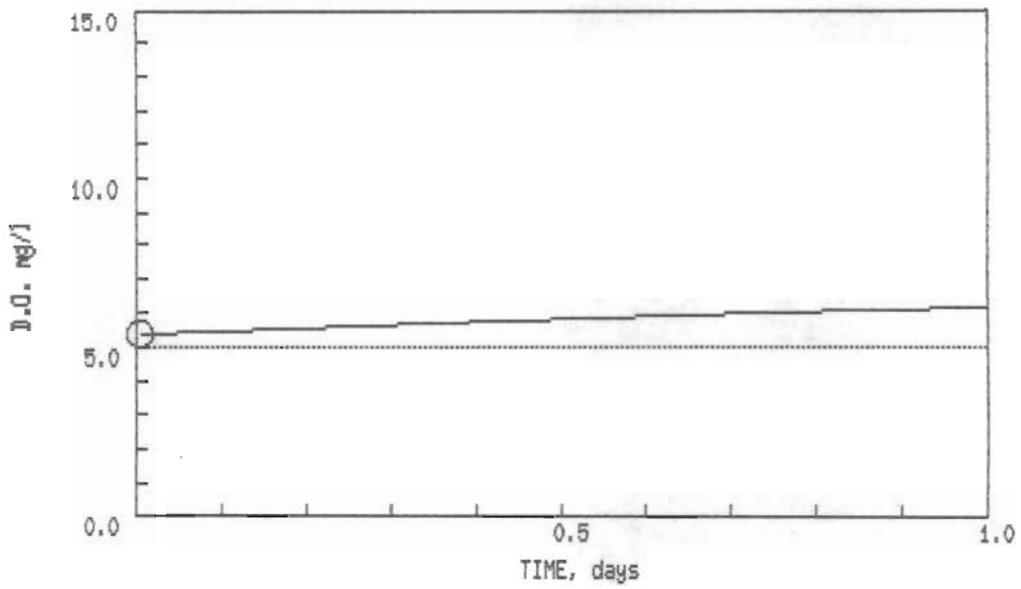
The benthal demand, B, was chosen as 1.5 $g/m^2/day$ because of the effluent TSS concentration of 90 mg/l. This value is within the ranges suggested by the above reference.

III. Results and Recommendations

The model indicated that an effluent treatment level of 25/90/15/2 (CBOD5/TSS/NH3-N/D.O.) would not cause a violation of the dissolved oxygen standard during either the critical or seasonal periods.

It is recommended that the Mountain Pine sewage treatment facility maintain an effluent quality of 30 mg/l BOD5 and 90 mg/l TSS for discharge to Glazypeau Creek.

The desk top model input data and dissolved oxygen sag curves are attached.



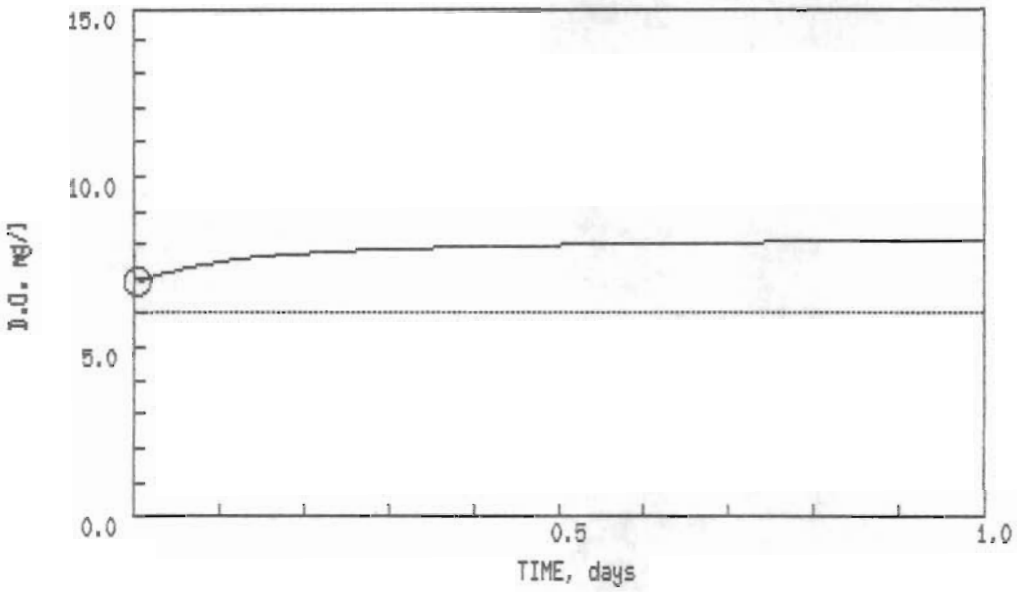
MOUNTAIN PINE CRITICAL 25-90-15-2

Stream Temperature	=	28.00 deg C
Stream flow	=	1.00 cfs
Stream D.O.	=	6.20 mg/l
Stream UOD	=	3.00 mg/l
Waste Temperature	=	30.00 deg C
Waste flow	=	0.15 mgd
Waste flow	=	0.23 cfs
Waste D.O.	=	2.00 mg/l
Waste BODU	=	57.50 mg/l
Benthal Demand	=	1.50 g/m**2/day
Mean Depth	=	1.00 ft.
S	=	4.92 g/m**3/day
S corrected	=	8.80 g/m**3/day
Ammonia_nitrogen	=	15.00 mg/l
NUOD	=	68.55 mg/l
Total UOD of waste	=	126.05 mg/l

Rate constants, per day, (base e)

Kd = 0.50	Kd corrected = 0.73
Ka = 9.00	Ka corrected =10.98
KN = 0.40	KN corrected = 0.60

Temperature of MIX	=	28.38 deg C
UOD of mix	=	26.18 mg/l
D.O. of mix	=	5.41 mg/l
D.O. saturation	=	7.86 mg/l
Minimum D.O.	=	5.41 mg/l
Critical time	=	0.00 day(s)



MOUNTAIN PINE SEASONAL 25-90-15-2

Stream Temperature	=	20.00 deg C
Stream flow	=	2.00 cfs
Stream D.O.	=	7.40 mg/l
Stream UOD	=	3.00 mg/l
Waste Temperature	=	20.00 deg C
Waste flow	=	0.15 mgd
Waste flow	=	0.23 cfs
Waste D.O.	=	2.00 mg/l
Waste BODU	=	57.50 mg/l
Benthal Demand	=	1.50 g/m**2/day
Mean Depth	=	1.00 ft.
S	=	4.92 g/m**3/day
S corrected	=	4.92 g/m**3/day
Ammonia_nitrogen	=	15.00 mg/l
NUOD	=	68.55 mg/l
Total UOD of waste	=	126.05 mg/l

Rate constants, per day, (base e)

Kd = 0.50	Kd corrected = 0.50
Ka = 9.00	Ka corrected = 9.00
KN = 0.40	KN corrected = 0.40

Temperature of MIX	=	20.00 deg C
UOD of mix	=	15.80 mg/l
D.O. of mix	=	6.84 mg/l
D.O. saturation	=	9.20 mg/l
Minimum D.O.	=	6.88 mg/l
Critical time	=	0.00 day(s)