

**Arkansas Division of Environmental Quality
Water Quality Management Plan Update Summary Sheet**

Date: June 29, 2021 Prepared by: Kai Imamura Reviewed by: Shane Byrum

New Permit Renewal Permit Amended Permit

Permit No.: AR0020117 **Facility Name:** City of Mountain View

Type of Discharge: treated municipal wastewater

Design Flow: 0.95 MGD **County:** Stone

Outfall Coordinates: Latitude: 35° 52' 01.54" N; Longitude: 92° 08' 47.01" W

Receiving Stream: Hughes Creek, thence to Tubbs Creek, thence to Lick Fork Creek, thence to South Sylamore Creek, thence to the White River

HUC + Reach: AR_11010004_010 **Planning Segment:** 4F **7Q10:** 0 cfs (critical)
0.25 cfs (primary season)¹

Ecoregion: Ozark Highlands **Watershed Size at Outfall (mi²):** 3.29

Current Effluent Limits in mg/L (CBOD₅/TSS/NH₃-N/DO):

May – October: 10/15.0/3.9/6.0
November – March: 10/15.0/10.0/7.0
April: 10/15.0/3.9/7.0

Proposed Effluent Limits in mg/L (CBOD₅/TSS/NH₃-N/DO):

May – October: 10/15.0/3.9/6.0
November – March: 10/15.0/8.0/7.0
April: 10/15.0/3.9/7.0

TMDL Limits (if any): None

Justification (Sag = Minimum Modeled Value ≠ Difference in Value):

Reach No.	Length (miles)	DO _C (mg/L)	Sag _C (mg/L)	Distance to Sag _C (miles)	DO _P (mg/l)	Sag _P (mg/L)	Distance to Sag _P (miles)
1	1.0	5.0	5.03	0.3	6.0	6.06	0.5

Values in above table are from a modeling analysis dated 6/29/2021.

Remarks: This is for the modification of the discharge permit for this existing facility. The 208 Plan is being updated to revise the design flow from 0.73 MGD to 0.95 MGD, and revise the monthly average ammonia limit for November through March from 10.0 mg/L to 8.0 mg/L for months of November through April.

¹ 7Q10 values are based on USGS StreamStats

Ammonia Calculations			
POTW?	Yes	(Yes or No)	
Facility Name	Mountain View WWTP		
Major or Minor	Minor		
Permit Number	AR0020117		
Receiving Stream	Hughes Creek		
7Q10, cfs	0	USGS Map	
0.25/0.67 multiplier	0.67		
Qb, cfs	0.00		
Qe, MGD	0.95	Design flow	
Qe, cfs	1.47		
Cb, mg/l	0	Maximal input upstream	
Ecoregion or River name	Ozark Highlands		
Watershed area (mi ²)	3.29		
Regulation No. 2 Chronic Toxicity Criteria (Instream Concentration)			
	AML, mg/l	DML, mg/l	
April	3.9	3.9	
May - October	3.9	3.9	
November - March	10.3	10.3	

Allowable Effluent Conc., mg/l

$$(Q_e * C_e) + (Q_b * C_b) = (Q_e + Q_b) * IWC$$

Qe	Effluent Flow
Ce	Allowable Effluent Concentration
Qb	% of Low Flow of Receiving Stream
Cb	Background Concentration
IWC	Instream Waste Concentration Chronic Toxicity Criteria

Allowable Effluent Conc. (Ce), mg/l

Ce = (IWC (Qe + Qb) - Cb X Qb) / Qe		
	Monthly Avg., mg/l	7-Day Avg, mg/l
April	3.90	3.90
May - October	3.90	3.90
November - March	10.30	10.30

Chronic Toxicity Criteria vs. D.O. Model Limits

Month	Monthly Average, mg/l		Permit Limits	7-Day Average, mg/l		Permit Limits
	Toxicity limit	D.O. limit		Toxicity limit	D.O. limit	
April	3.90	8	3.90	3.90	12	3.90
May - October	3.90	3.9	3.90	3.90	5.85	3.90
November - March	10.30	8	8.00	10.30	12	10.30

Minor Permits

Fish Early Life Stages Absent - Primary Season (November - March), mg/L

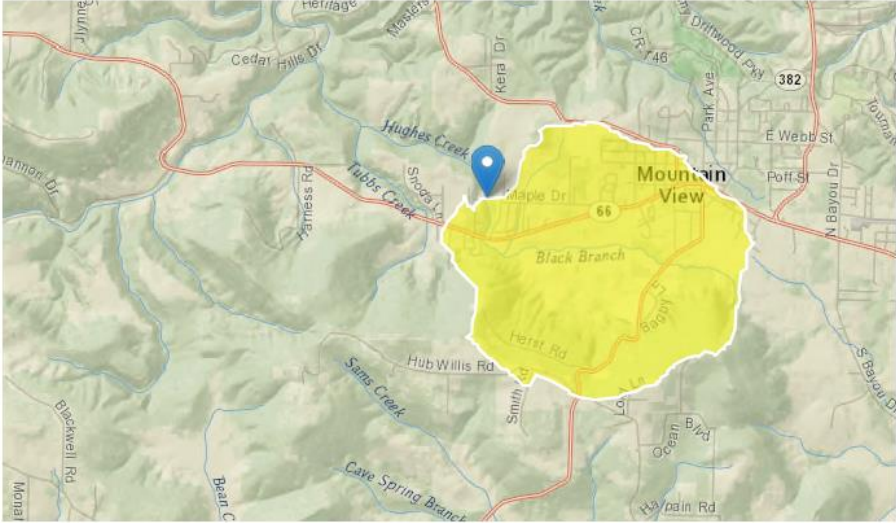
Ecoregion	Temperature	pH	4-day average	30-day average
Arkansas River	14	7.6	10.3	10.3
Arkansas River Valley	14	6.7	16.7	16.7
Boston Mountains	14	6.9	15.8	15.8
Delta	14	7.1	14.7	14.7
Gulf Coastal Plains	14	6.6	17	17
Ouachita Mountains	14	7.1	14.7	14.7
Ouachita River (L. Mo. to Mouth)	14	6.7	16.7	16.7
Ozark Highlands	14	7.6	10.3	10.3
Red River	14	7.5	11.3	11.3
White River (Dam #10 Mouth)	14	7.7	9.3	9.3

Fish Early Life Stages Present - Critical Season (April - October), mg/L

Ecoregion	Temperature	pH	4-day average	30-day average
Arkansas River	32	7.6	3.2	3.2
Arkansas River Valley	31	6.7	5.6	5.6
Boston Mountains	31	6.9	5.3	5.3
Delta	30	7.1	5.2	5.2
Gulf Coastal Plains	30	6.6	6.1	6.1
Ouachita Mountains	30	7.1	5.2	5.2
Ouachita River (L. Mo. to Mouth)	32	6.7	5.2	5.2
Ozark Highlands	29	7.6	3.9	3.9
Red River	32	7.5	3.5	3.5
White River (Dam #10 Mouth)	32	7.7	2.9	2.9

StreamStats Report

Region ID: AR
Workspace ID: AR20210520145554804000
Clicked Point (Latitude, Longitude): 35.86713, -92.14624
Time: 2021-05-20 09:56:16 -0500



DRNAREA	Area that drains to a point on a stream	3.29	square miles
Probability Statistics Flow Report [Pzero Flow Region 1 2008 5065]			
Statistic		Value	Unit
Probability zero flow 7Day		0.213	dim
Probability zero flow 7 day Nov to Apr		0.00574	dim
Seasonal Flow Statistics Flow Report [Low Flow Region 1 2008 5065]			
Statistic		Value	Unit
Nov to Apr 7 Day 10 Year Low Flow		0.25	ft^3/s

Figure D-10. Dissolved Oxygen and Saturation Values for Ozark Highlands Ecoregion Reference Streams during Summer Period

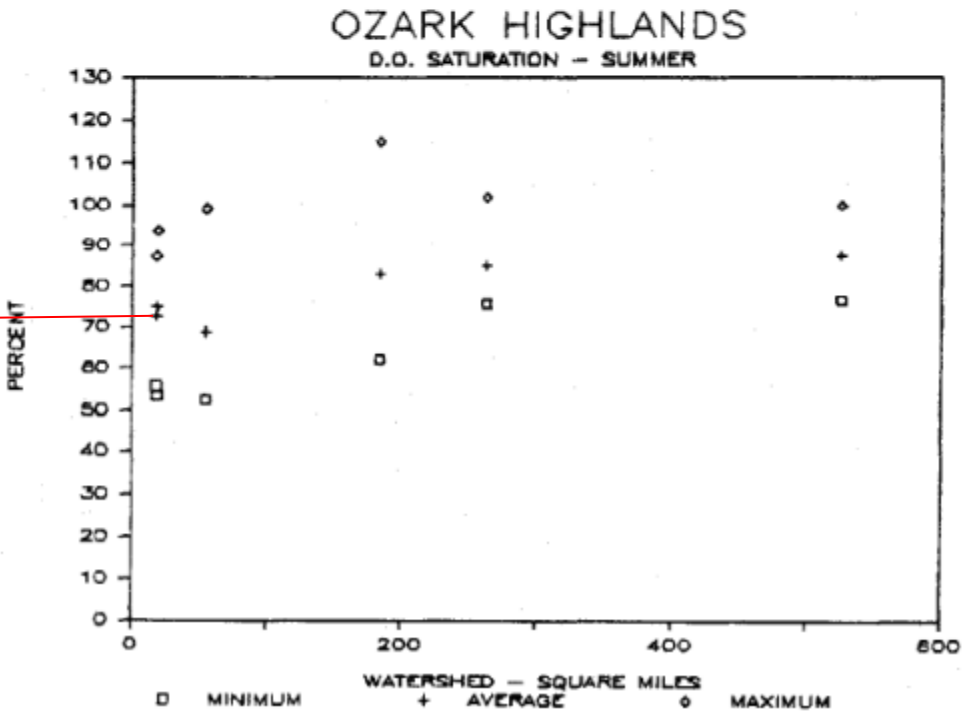
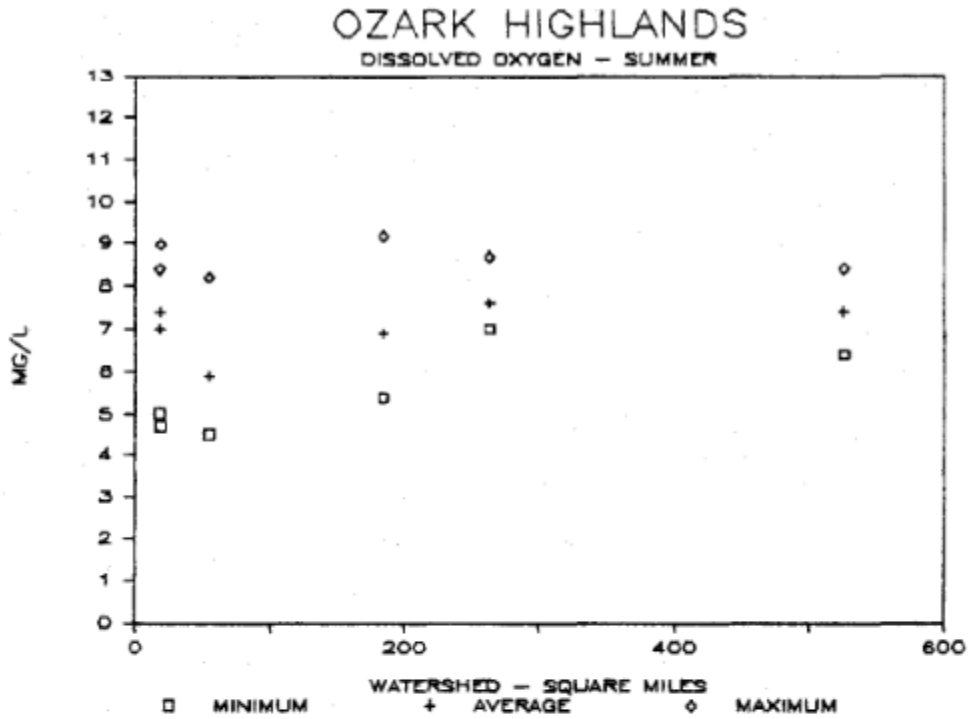
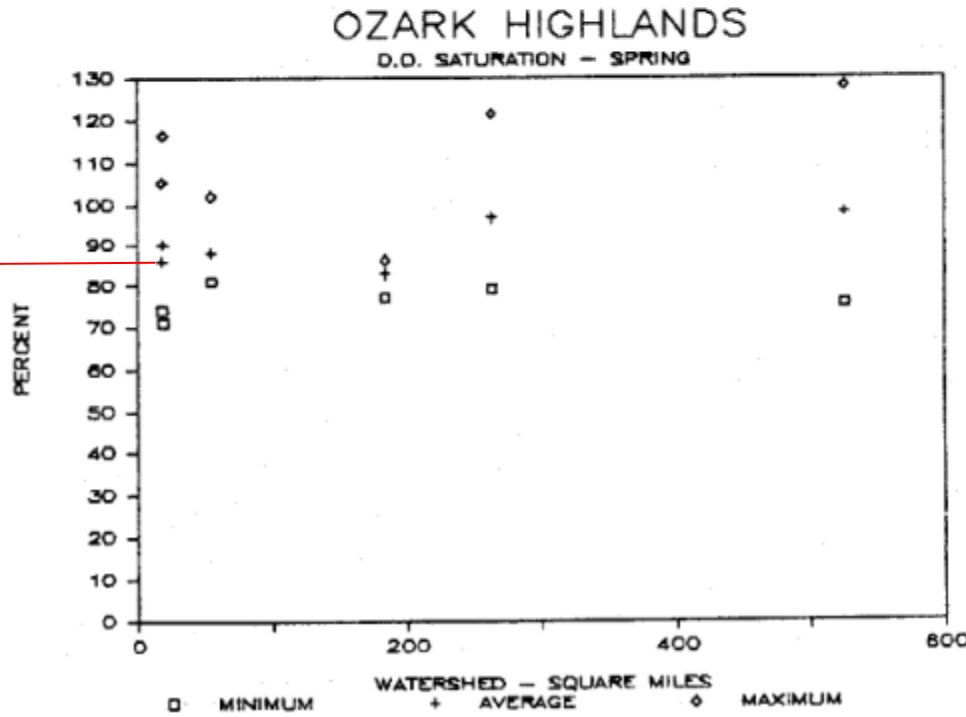
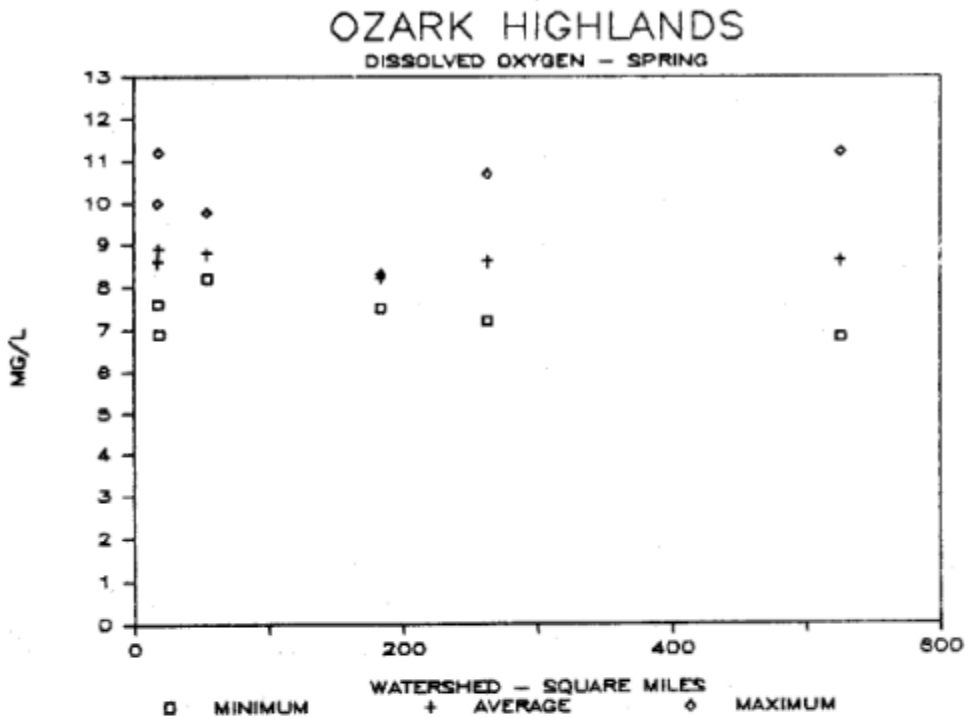


Figure D-11. Dissolved Oxygen and Saturation Values for Ozark Highlands Ecoregion Reference Streams during Spring Period



Critical Season Hydraulics

0 Headwater in CFS
 0.95 Discharger 1 in MGD _____ Reach 1 Velocity FPS
 Depth Feet Width Feet MGD

Primary Season Hydraulics

0.25 Headwater in CFS
 0.95 Discharger 1 in MGD _____ Reach 1 Velocity FPS
 Depth Feet Width Feet MGD

Sediment Oxygen Demand (SOD) for Various Temperatures and Ecoregion ⁵

Rocky Substrate ⁴						Applicable Ecoregions ⁶ Ozark Highlands Boston Mountains Ouachita Mountains
TSS ¹	SOD ₂₀	SOD ₂₂	SOD ₂₉	SOD ₃₀	SOD ₃₁	
15 ²	0.3	0.34	0.51	0.54	0.57	
20 ²	0.5	0.56	0.84	0.90	0.95	
30 ²	1.0	1.12	1.69	1.79	1.90	
45 ³	1.4	1.57	2.37	2.51	2.66	
90 ³	1.8	2.02	3.04	3.22	3.42	
Mixed Substrate						Arkansas River Valley Gulf Coastal Plain
TSS ¹	SOD ₂₀	SOD ₂₂	SOD ₂₉	SOD ₃₀	SOD ₃₁	
15 ²	0.4	0.45	0.68	0.72	0.76	
20 ²	0.7	0.79	1.18	1.25	1.33	
30 ²	1.3	1.46	2.20	2.33	2.47	
45 ³	1.6	1.80	2.70	2.87	3.04	
90 ³	1.9	2.13	3.21	3.40	3.61	
Sandy Substrate ⁴						Arkansas River Valley Gulf Coastal Plain Delta
TSS ¹	SOD ₂₀	SOD ₂₂	SOD ₃₀	SOD ₃₁	SOD ₃₂	
15 ²	0.5	0.56	0.90	0.95	1.01	
20 ²	0.8	0.90	1.43	1.52	1.61	
30 ²	1.5	1.69	2.69	2.85	3.0	
45 ³	1.8	2.02	3.22	3.42	3.62	
90 ³	2.0	2.25	3.58	3.80	4.02	

- ¹ Projected TSS instream after mixing.
- ² TSS values are from MOA with EPA found in the CPP. SOD values for rocky substrate are the lower end of range given in the MOA. SOD values for sandy substrate are the upper end of range given in the MOA.
- ³ These TSS concentrations are outside of the range given in the MOA, so the corresponding SOD values are estimated.
- ⁴ SOD values given in this table are the lower and upper ends of the recommended range. SOD values between the upper and lower values are acceptable based on nature of substrate.
- ⁵ Deviations from these rates may take place in situations of high instream dilution, which significantly reduces the impact of the benthic (sediment) deposits on oxygen consumption. In these situations, justification on a case by case basis will be provided in the documentation submitted to EPA.
- ⁶ Applicable ecoregions are based on the general characteristics of waterbodies within each ecoregion (Rocky, Gravel, or Mixed). A different substrate type may be used based on site specific observations of the particular stream in question.

MODEL INPUT DATA

Drainage Area (mi²): 3.29

Ecoregion: Ozark Highlands

Design Flow (MGD): 0.95

	Critical Season (May-Oct)	Primary Season (Nov-Apr)
DO Standard (mg/L)	5.0*	6.0
Temperature Standard (°C)	29	22
Upstream Flow (cfs)	0**	0.25**

*The critical season DO standard for the next size category of stream applies because the discharge is > 1 cfs, therefore is assumed to support aquatic life.

**Based on USGS StreamStats for Hughes Creek at outfall location.

Upstream River Parameters	Critical Season (May-Oct.)	Primary Season (Nov.-Apr.)
Flow (cfs)	0	0.25
Temp. Standard (°C)	29	22
Dissolved Oxygen (mg/L)	5.6*	7.48**
5-Day BOD (CBOD ₅) (mg/L)	1.0	1.0
Ult. CBOD/CBOD ₅ (unitless)	2.3	2.3
Ammonia (mg/L)	0.1	0.1
Upstream River Mile (miles)	1.0	1.0

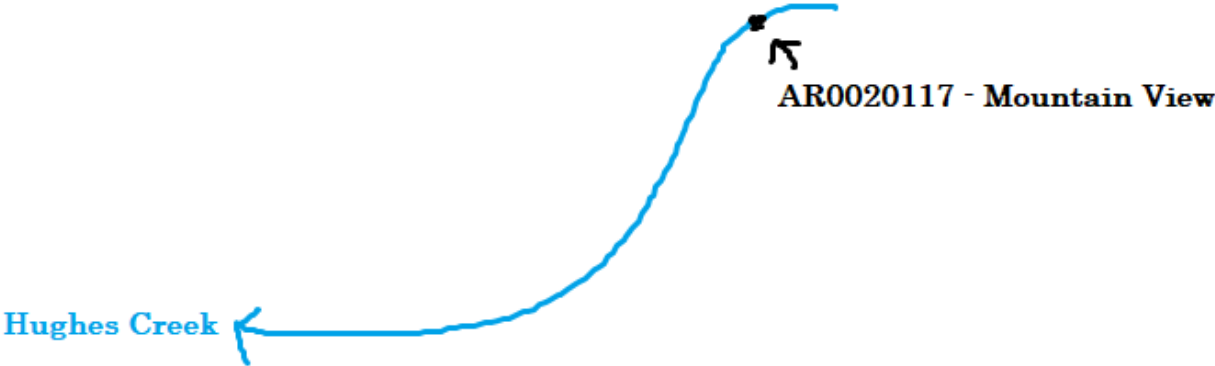
*72% saturation from ecoregion study

**86% saturation from ecoregion study

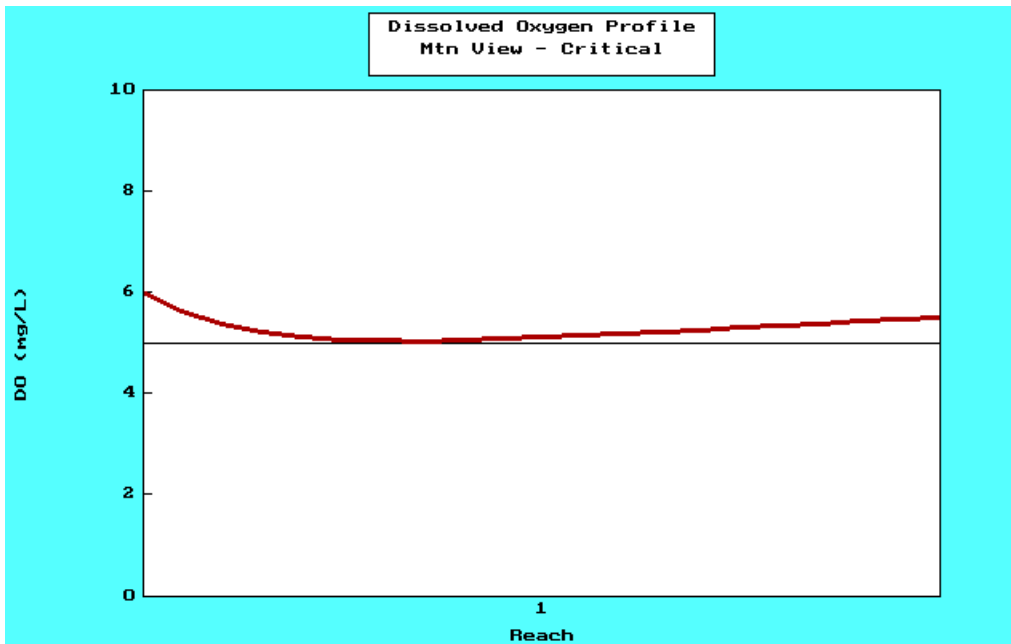
Discharger 1	Critical Season (May-Oct.)	Primary Season (Nov.-Apr.)
Flow (MGD)	0.95	0.95
Temperature (°C)	29	22
Dissolved Oxygen (mg/L)	6.0	7.0
5-Day BOD (CBOD ₅) (mg/L)	10	10
Ult. CBOD/CBOD ₅ (unitless)	2.3	2.3
Ammonia (mg/L)	3.9	10.0

Reach 1	Critical Season	Primary Season	Justification
Length (miles)	1.0	1.0	To Model End
Velocity (fps)	0.108	0.117	Spreadsheet
Average Depth (ft)	0.575	0.612	Spreadsheet
Temperature (°C)	29	22	Rule 2
K_d (1/day)	0.5	0.5	EPA MOA
K_n (1/day)	0.4	0.4	EPA MOA
SOD (g/m ² /day)	0.51	0.34	SOD ₂₀ =0.3, MOA for TSS = 15, rocky substrate
K_a (1/day)	10.6	9.9	O'Conner Dobbins equation

Model Diagram:



CRITICAL SEASON (20117_C .SMP):



Mtn View - Critical		TABULAR MODEL OUTPUT		
	River Mile	DO (mg/L)	BOD (mg/L)	NH3 (mg/L)
1	1.00	6.00	23.00	3.90
2	0.95	5.63	22.51	3.81
3	0.90	5.38	22.04	3.73
4	0.85	5.21	21.57	3.64
5	0.80	5.11	21.11	3.56
6	0.75	5.06	20.67	3.48
7	0.70	5.03	20.23	3.40
8	0.65	5.03	19.80	3.33
9	0.60	5.04	19.38	3.25
10	0.55	5.07	18.97	3.18
11	0.50	5.10	18.57	3.11
12	0.45	5.13	18.18	3.04
13	0.40	5.17	17.79	2.97
14	0.35	5.21	17.42	2.91
15	0.30	5.25	17.05	2.84
16	0.25	5.29	16.69	2.78
17	0.20	5.33	16.33	2.72
18	0.15	5.37	15.99	2.65
19	0.10	5.41	15.65	2.60
20	0.05	5.45	15.32	2.54
21	-0.00	5.49	15.00	2.48

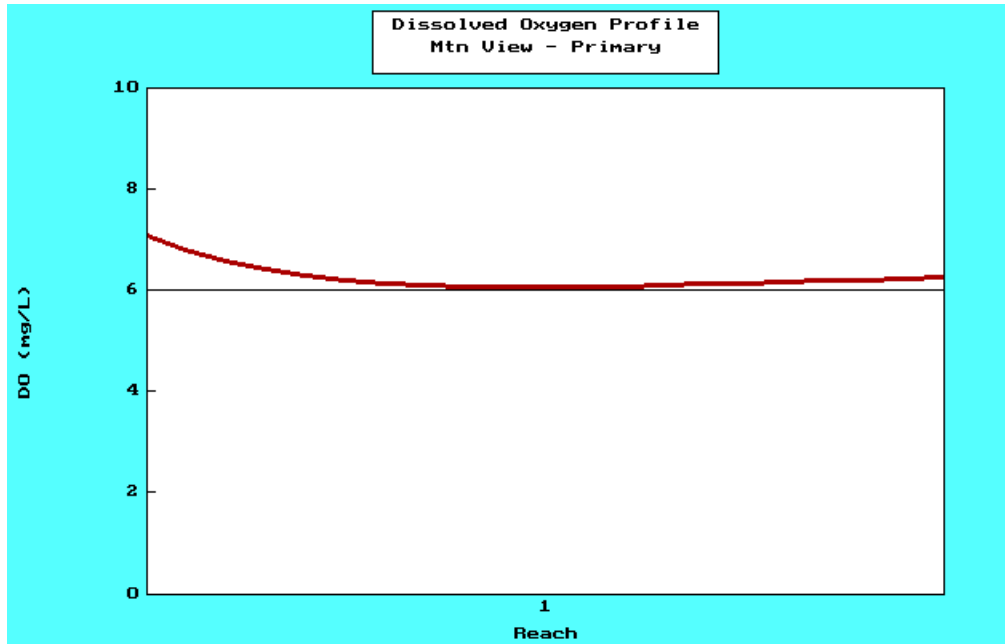
Mtn View - Critical		Run information screen	
Name of receiving stream		Hughes Creek	
Number of discharges	(max = 10)	1	
Number of reaches	(max = 10)	1	
Reaeration type	(O, T, M)	O'Connor-Dobbins	
Run title for screen display		Mtn View - Critical	
Graphics printer type	(HP, FX, LQ, None)	None	
Printed graph resolution	(Low, Med, High)	None	

Mtn View - Critical		Upstream River Parameters		Comments
Flow	(cfs)	0.00	7Q10	
Temperature	(°C)	29.00	Rule 2	
Dissolved Oxygen	(mg/l)	5.60	75%sat EcoStudy	
5-Day BOD	(mg/l)	1.00	default	
Ult. CBOD / 5-Day BOD		2.30	default	
pH	(su)	7.00	default	
Ammonia	(mg/l)	0.10	default	
Alkalinity	(mg/l)	0.00		
Upstream river mile		1.00		

Mtn View - Critical		Parameters for Discharge 1		Comments
Flow	(MGD)	0.95	Design Flow	
Temperature	(°C)	29.00	Rule 2	
Dissolved Oxygen	(mg/l)	6.00		
5-Day BOD	(mg/l)	10.00		
Ult. CBOD / 5-Day BOD		2.30	default	
pH	(su)	7.00	default	
Ammonia	(mg/l)	3.90		
Alkalinity	(mg/l)	0.00		
Beginning of Reach Number		1		
Name of Discharger		Mtn View		

Mtn View - Critical	Parameters for Reach 1		Comments
Length	(mile)	1.00	To Model End
Velocity	(fps)	0.11	Spreadsheet
Slope	(ft/mile)	-0.00	
Average Depth	(ft)	0.57	Spreadsheet
Temperature	(°C)	29.00	Calculated
BOD Removal Rate	(1/day)	0.50	EPA MDA
NH3 Decay Rate	(1/day)	0.40	EPA MDA
Sediment Oxygen Demand	(g/m ² /day)	0.51	k20=0.3(TSS=15)
Photosynthesis/respiration	(mg/L/day)	-0.00	

PRIMARY SEASON (20117_P .SMP):



Mtn View - Primary		TABULAR MODEL OUTPUT		
	River Mile	DO (mg/L)	BOD (mg/L)	NH3 (mg/L)
1	1.00	7.07	19.99	6.85
2	0.95	6.78	19.70	6.77
3	0.90	6.56	19.42	6.69
4	0.85	6.40	19.15	6.60
5	0.80	6.28	18.88	6.52
6	0.75	6.19	18.61	6.45
7	0.70	6.13	18.34	6.37
8	0.65	6.09	18.08	6.29
9	0.60	6.07	17.83	6.21
10	0.55	6.06	17.57	6.14
11	0.50	6.06	17.32	6.06
12	0.45	6.06	17.08	5.99
13	0.40	6.07	16.83	5.92
14	0.35	6.09	16.59	5.85
15	0.30	6.11	16.36	5.78
16	0.25	6.13	16.13	5.71
17	0.20	6.15	15.90	5.64
18	0.15	6.17	15.67	5.57
19	0.10	6.20	15.45	5.50
20	0.05	6.22	15.23	5.44
21	-0.00	6.25	15.01	5.37

Mtn View - Primary	Run information screen	
Name of receiving stream	Hughes Creek	
Number of discharges (max = 10)		1
Number of reaches (max = 10)		1
Reaeration type (O, T, M)	O'Connor-Dobbins	
Run title for screen display	Mtn View - Primary	
Graphics printer type (HP, FX, LQ, None)		None
Printed graph resolution (Low, Med, High)		None

Mtn View - Primary	Upstream River Parameters		Comments
Flow (cfs)	0.25		7Q10(Nov-Apr)
Temperature (°C)	22.00		Rule 2
Dissolved Oxygen (mg/l)	7.48		86%sat ER study
5-Day BOD (mg/l)	1.00		default
Ult. CBOD / 5-Day BOD	2.30		default
pH (su)	7.00		default
Ammonia (mg/l)	0.10		default
Alkalinity (mg/l)	0.00		
Upstream river mile	1.00		model length

Mtn View - Primary	Parameters for Discharge 1		Comments
Flow (MGD)	0.95		Design Flow
Temperature (°C)	22.00		Rule 2
Dissolved Oxygen (mg/l)	7.00		
5-Day BOD (mg/l)	10.00		
Ult. CBOD / 5-Day BOD	2.30		default
pH (su)	7.00		default
Ammonia (mg/l)	8.00		
Alkalinity (mg/l)	0.00		
Beginning of Reach Number	1		
Name of Discharger	Mtn View		

Mtn View - Primary	Parameters for Reach 1		Comments
Length	(mile)	1.00	To Model End
Velocity	(fps)	0.12	Spreadsheet
Slope	(ft/mile)	-0.00	
Average Depth	(ft)	0.61	Spreadsheet
Temperature	(°C)	22.00	Calculated
BOD Removal Rate	(1/day)	0.50	EPA MDA
NH3 Decay Rate	(1/day)	0.40	EPA MDA
Sediment Oxygen Demand	(g/m ² /day)	0.34	k20=0.3(TSS=15)
Photosynthesis/respiration	(mg/L/day)	-0.00	