

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

Date: 4/12/2017

New Permit Renewal Permit Amended Permit

Type of Discharge: Process/Domestic Wastewater

Facility Name: Ash Grove Cement (Outfall 003)

Permit No.: AR0042846

Design Flow Rate (MGD): 3.36¹

Receiving Stream: Unnamed tributary of French Creek

HUC + Reach Code: 11140106+004² **7Q10:** 0 cfs

Planning Segment: 1B **County:** Little River

Proposed Effluent Limits in mg/L:

No changes from current effluent limits shown below.

Current Effluent Limits in mg/L:

May-October: 10.0/2.0 (BOD5/DO)
November-April: 10.0/5.0 (BOD5/DO)

TMDL Limits: None

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

Reach No.	Length (miles)	DO WQS _C (mg/L)	DO Sag _C (mg/L)	Distance to DO Sag _C (miles)	DO WQS _P (mg/L)	DO Sag _P (mg/L)	Distance to DO Sag _P (miles)
1	1.0	2.0	1.995	0.05	5.0	4.977	0.2

Values in above table are from a modeling analysis dated 4/12/2017.

Outfall Location (Lat/Long): 33° 41' 15.3" N; 94° 25' 28.7" W (Outfall 003)

Remarks: This is for the reissuance of the discharge permit for this existing facility. The 208 Plan is being updated to revise the facility flow from 0.83 MGD to 3.36 MGD at Outfall 003. This 208 update will be public noticed with the draft renewal permit.

¹ Flow is based on the highest monthly average flow reported on Form 2C during the past two years at Outfall 003.
² Reach number listed is closest downstream 3-digit reach which is assigned to Walnut Bayou.

Ammonia Calculations

Facility Name Ash Grove Cement - Outfall 003
 Major or Minor Minor
 Permit Number AR0042846
 Receiving Stream tributary of French Creek
 7Q10, cfs 0
 0.25/0.67 multiplier 0.67
 Qb, cfs 0.00
 Qe, MGD 3.36
 Qe, cfs 5.19
 Cb, mg/l 0.1

USGS StreamStats

Highest monthly avg past 2 years
Assumed background in model

COLOR KEY

	User Inputs
	Calculated values

Ecoregion or River name Gulf Coastal Plains

Watershed area (mi²) 1

Regulation No. 2 Chronic Toxicity Criteria (Instream Concentration)

	AML, mg/l	DML, mg/l
April	6.1	6.1
May - October	6.1	6.1
November - March	17	17

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

$C_e = (IWC (Q_e + Q_b) - C_b \times Q_b) / Q_e$
 Monthly Avg., mg/l
 April 6.10
 May - October 6.10
 November - March 17.00

Chronic Toxicity Criteria vs. D.O. Model Limits

Month	Monthly Average, mg/l		Permit Limits	
	Toxicity-based	Oxygen-based	Toxicity-based	Oxygen-based
April	6.10	2	6.10	3
May - October	6.10	3	6.10	4.5
November - March	17.00	2	17.00	3

* Ammonia limits are not included in the permit because the permit contains BOD5 limits, which includes both nitrogenous and carbonaceous portions of oxygen demand. In addition, the ammonia sample reported in renewal application was non-detect.

Permit Engineer: Guy Lester Date: 4/12/2017

Reviewing Engineer: Shane Byrum Date: 4/12/2017

Model Input Data

Facility Name: Ash Grove Cement (Outfall 003)

Permit Number: AR0042846

W.S. Drainage Area (mi²): 1.0 Ecoregion: Gulf Coastal Plains

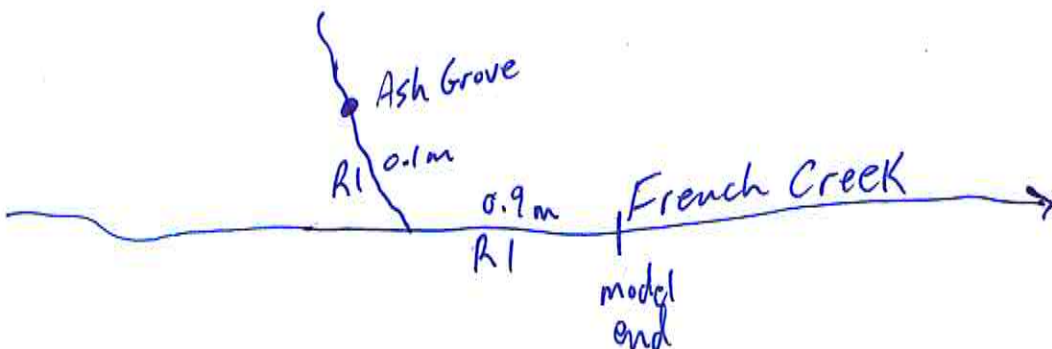
	Critical Season (May-Oct.)	Primary Season (Nov.-Apr.)
D.O. Standard (mg/L)	2.0	5.0
Temp. Standard (°C)	30	22
Q stream (cfs)	5.208	5.208
Velocity stream (fps)	0.165	0.165
Depth stream (ft)	1.098	1.098

Q_{DESIGN} (MGD): 3.36 (highest monthly average past two years)

Receiving Stream: Unnamed tributary, thence to French Creek

Permit type: Process/Domestic

Model Schematic (not to scale)



Engineer: SIB
Date: 4-12-17

Input Model Coefficients

Reach 1

Coefficient – at 20° C	Input value	Justification
BOD _{ult} /BOD ₅	2.3	EPA Guidance
K _d (1/day)	0.4	MOA
K _n (1/day)	0.4	MOA
SOD (g/m ² /day)	1.0	MOA
K _a (1/day)	4.5 (critical season) 4.5 (primary season)	O'Conner-Dobbins formula

Engineer: SB

Date: 4-12-17

Quick Calculator

Stream Hydraulics (Critical and Primary Seasons)

Headwater in CFS	0.072323	0.5	0.567722	0.4	24.35498	0.1	Accum
		FPS		Feet		Feet	MGD
3.36 Discharger 1 in MGD	Reach 1 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 2 in MGD	Reach 2 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 3 in MGD	Reach 3 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 4 in MGD	Reach 4 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 5 in MGD	Reach 5 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 6 in MGD	Reach 6 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 7 in MGD	Reach 7 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 8 in MGD	Reach 8 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 9 in MGD	Reach 9 Velocity	0.165	Depth	1.098	Width	28.720	3.360
0 Discharger 10 in MGD	Reach 10 Velocity	0.165	Depth	1.098	Width	28.720	3.360

1 CFS is 0.64631674 MGD

1 MGD is 1.547229 CFS

BVC

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*                               SIMPLIFIED METHOD PROGRAM                               *
*                               COMPLETE INPUT LISTING                               *
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42846-C

4/12/2017

--*-*-* Run Information *-*-*-*-*

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Name of receiving stream ----- Un.Trib.French Crk.
Number of discharges ----- 1
Number of reaches ----- 1
Reaeration type ----- O'Connor-Dobbins
Run title ----- Ash Grove - Critical

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--*-*-* Upstream Parameters *-*-*-*-*

Parameter	Value	Comment
Flow (cfs)	0.000	
Temperature (°C)	30.000	
Dissolved Oxygen (mg/l)	-0.000	
5-Day BOD (mg/l)	1.000	
Ult. CBOD / 5-Day BOD	2.300	
pH (su)	7.000	
Ammonia (mg/l)	0.100	
Alkalinity (mg/l)	-0.000	

--*-*-* Effluent Parameters *-*-*-*-*

Number of Discharges = 1

For Discharge Number 1 (Ash Grove 003)

Parameter	Value	Comment
Flow (MGD)	3.360	Max. Flow Rate
Temperature (°C)	30.000	Reg. 2 Std.
Dissolved Oxygen (mg/l)	2.000	
5-Day BOD (mg/l)	10.000	
Ult. CBOD / 5-Day BOD	2.300	EPA Guidance
pH (su)	7.000	
Ammonia (mg/l)	3.000	
Alkalinity (mg/l)	-0.000	
Beginning of Reach Number	1.000	

--*-*-* Reach Information *-*-*-*-*

Number of Reaches = 1
Reaeration Type is O'Connor-Dobbins

For Reach Number 1

Parameter	Value	Comment
Length (mile)	1.000	
Velocity (fps)	0.165	
Slope (ft/mile)	-0.000	
Average Depth (ft)	1.098	
Temperature (°C)	30.000	Calculated

BOD Removal Rate	(1/day)	0.400	Draft EPA MOA
NH3 Decay Rate	(1/day)	0.400	Draft EPA MOA
Sediment Oxygen Demand	(g/m ² /day)	1.790	k20=1.0
Photosynthesis/respiration	(mg/L/day)	-0.000	

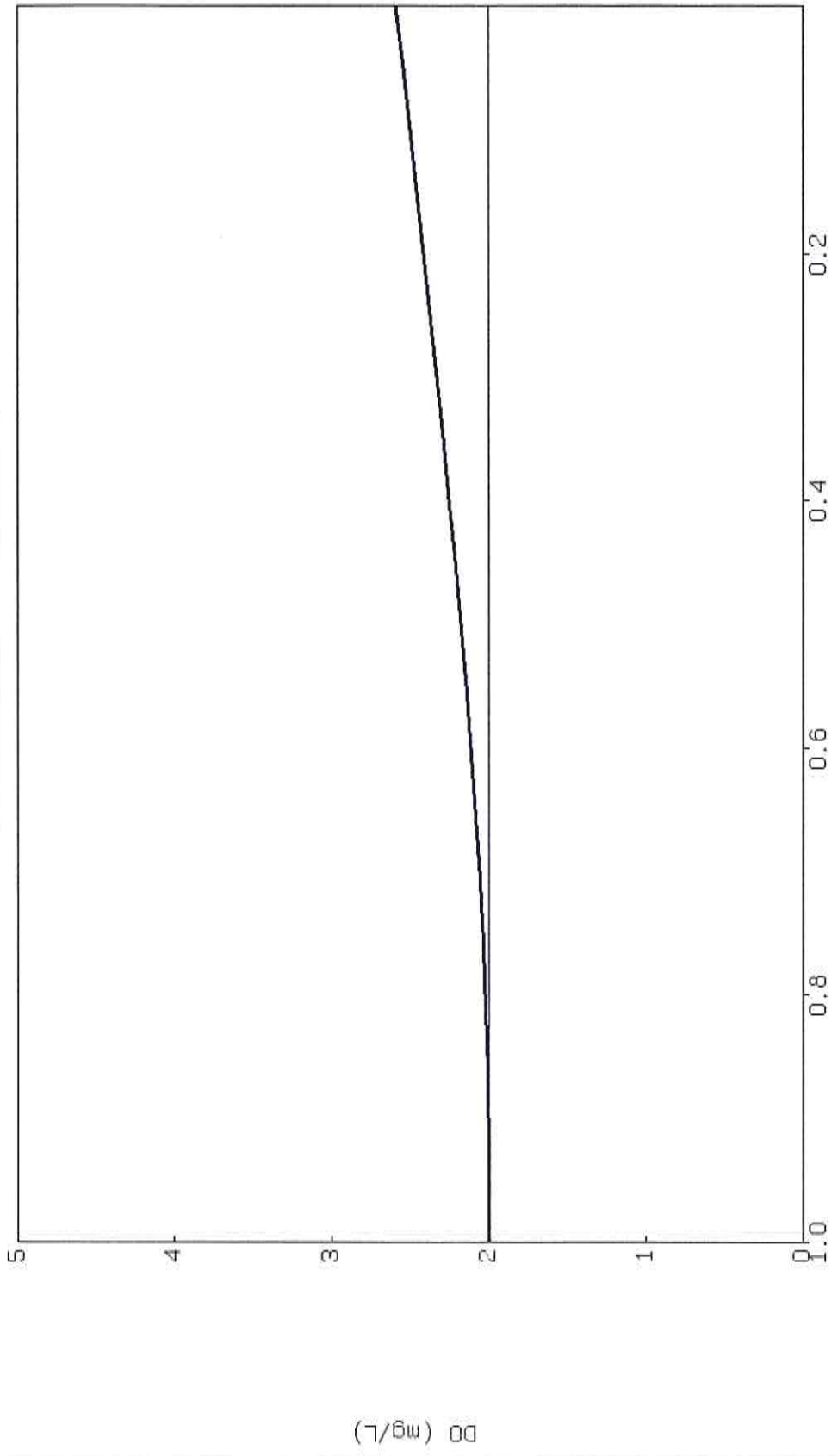
Temperature-corrected BOD removal rate	(1/day)	0.633
Temperature-corrected NH3 decay rate	(1/day)	0.864
Calculated reaeration rate at 20° C	(1/day)	4.554
Temperature-corrected reaeration rate	(1/day)	5.779
Calculated reach-averaged width	(ft)	28.672

--*-*-* Results for Un.Trib.French Crk. *-*-*-*-*

Discharge is to -- Un.Trib.French Crk.
Run Title is -- Ash Grove - Critical

River Mile	DO Predicted	DO Observed	BOD Predicted	BOD Observed	NH3 Predicted	NH3 Observed
1.000	2.000		23.000		3.000	
0.950	1.995		22.732		2.952	
0.900	1.996		22.467		2.906	
0.850	2.004		22.205		2.859	
0.800	2.017		21.946		2.814	
0.750	2.034		21.690		2.769	
0.700	2.056		21.437		2.726	
0.650	2.081		21.188		2.682	
0.600	2.110		20.941		2.640	
0.550	2.141		20.696		2.598	
0.500	2.174		20.455		2.557	
0.450	2.210		20.217		2.516	
0.400	2.248		19.981		2.476	
0.350	2.287		19.748		2.437	
0.300	2.327		19.518		2.398	
0.250	2.368		19.290		2.360	
0.200	2.411		19.066		2.323	
0.150	2.454		18.843		2.286	
0.100	2.498		18.624		2.250	
0.050	2.542		18.407		2.214	
-0.000						
-0.000	2.586		18.192		2.179	

Dissolved Oxygen Profile
Ash Grove - Critical



River Mile

Max unionized ammonia = 0.0239 mg/L

BVC

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*                               SIMPLIFIED METHOD PROGRAM                               *
*                               COMPLETE INPUT LISTING                               *
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42846-P

4/12/2017

--*-*-* Run Information *-*-*-*-*

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Name of receiving stream ----- Un.Trib.French Crk.
Number of discharges ----- 1
Number of reaches ----- 1
Reaeration type ----- O'Connor-Dobbins
Run title ----- Ash Grove-primary

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--*-*-* Upstream Parameters *-*-*-*-*

Parameter	Value	Comment
Flow (cfs)	0.000	
Temperature (°C)	22.000	
Dissolved Oxygen (mg/l)	-0.000	
5-Day BOD (mg/l)	1.000	
Ult. CBOD / 5-Day BOD	2.300	
pH (su)	7.000	
Ammonia (mg/l)	0.100	
Alkalinity (mg/l)	-0.000	

--*-*-* Effluent Parameters *-*-*-*-*

Number of Discharges = 1

For Discharge Number 1 (Ash Grove 003)

Parameter	Value	Comment
Flow (MGD)	3.360	Max. Flow Rate
Temperature (°C)	22.000	Reg. 2 Std.
Dissolved Oxygen (mg/l)	5.000	
5-Day BOD (mg/l)	10.000	
Ult. CBOD / 5-Day BOD	2.300	EPA Guidance
pH (su)	7.000	
Ammonia (mg/l)	2.000	
Alkalinity (mg/l)	-0.000	
Beginning of Reach Number	1.000	

--*-*-* Reach Information *-*-*-*-*

Number of Reaches = 1
Reaeration Type is O'Connor-Dobbins

For Reach Number 1

Parameter	Value	Comment
Length (mile)	1.000	
Velocity (fps)	0.165	
Slope (ft/mile)	-0.000	
Average Depth (ft)	1.098	
Temperature (°C)	22.000	Calculated

BOD Removal Rate	(1/day)	0.400	Draft EPA MOA
NH3 Decay Rate	(1/day)	0.400	Draft EPA MOA
Sediment Oxygen Demand	(g/m ² /day)	1.120	k20=1.0
Photosynthesis/respiration	(mg/L/day)	-0.000	

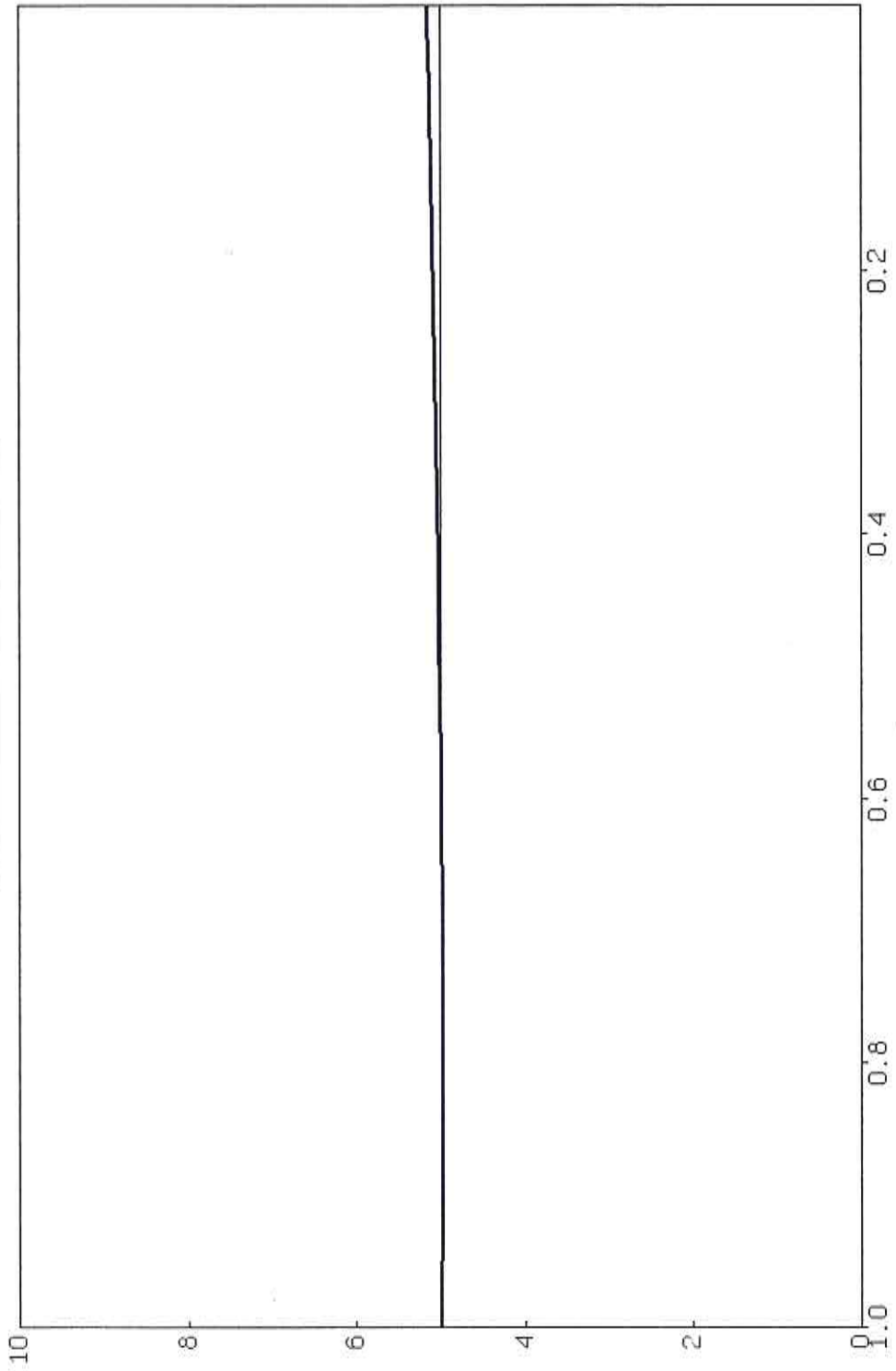
Temperature-corrected BOD removal rate	(1/day)	0.438
Temperature-corrected NH3 decay rate	(1/day)	0.467
Calculated reaeration rate at 20° C	(1/day)	4.554
Temperature-corrected reaeration rate	(1/day)	4.777
Calculated reach-averaged width	(ft)	28.672

--*-*-* Results for Un.Trib.French Crk. *-*-*-*-*

Discharge is to -- Un.Trib.French Crk.
Run Title is -- Ash Grove-primary

River Mile	DO Predicted	DO Observed	BOD Predicted	BOD Observed	NH3 Predicted	NH3 Observed
1.000	5.000		23.000		2.000	
0.950	4.990		22.814		1.983	
0.900	4.983		22.629		1.966	
0.850	4.979		22.446		1.949	
0.800	4.977		22.265		1.932	
0.750	4.977		22.085		1.915	
0.700	4.980		21.906		1.899	
0.650	4.984		21.729		1.883	
0.600	4.990		21.553		1.866	
0.550	4.997		21.379		1.850	
0.500	5.005		21.206		1.834	
0.450	5.015		21.035		1.819	
0.400	5.026		20.865		1.803	
0.350	5.038		20.696		1.788	
0.300	5.051		20.528		1.772	
0.250	5.064		20.362		1.757	
0.200	5.078		20.198		1.742	
0.150	5.093		20.034		1.727	
0.100	5.109		19.872		1.712	
0.050	5.125		19.712		1.697	
-0.000						
-0.000	5.141		19.552		1.683	

Disolved Oxygen Profile
Ash Grove--primary



Max unionized ammonia = 0.0091 mg/L