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"ENGINEERING TODAY FOR TOMORROW'S FUTURE"

**Betsy-Jeff Penn**

## **4-H Educational Center:**

**Case Study for the Upgrade of a Recirculating Sand  
Filter Using Synthetic Media Filters**

by

**Gary S. MacConnell, PE**

**Zack L. Fuller, PE**

# Original Permit



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- NPDES Permit
- Permitted Flow: 8,400 GPD
- Limits:

BOD 5

TSS

Monthly Ave

30.0 mg/l

30.0 mg/l

Daily Max

5.0 mg/l

45.0 mg/l

NH<sub>3</sub>-N

Fecal Coliform

Monthly Ave

22.0 mg/l

200 / 100 ml

Daily Max

N/A

400 / 100 ml

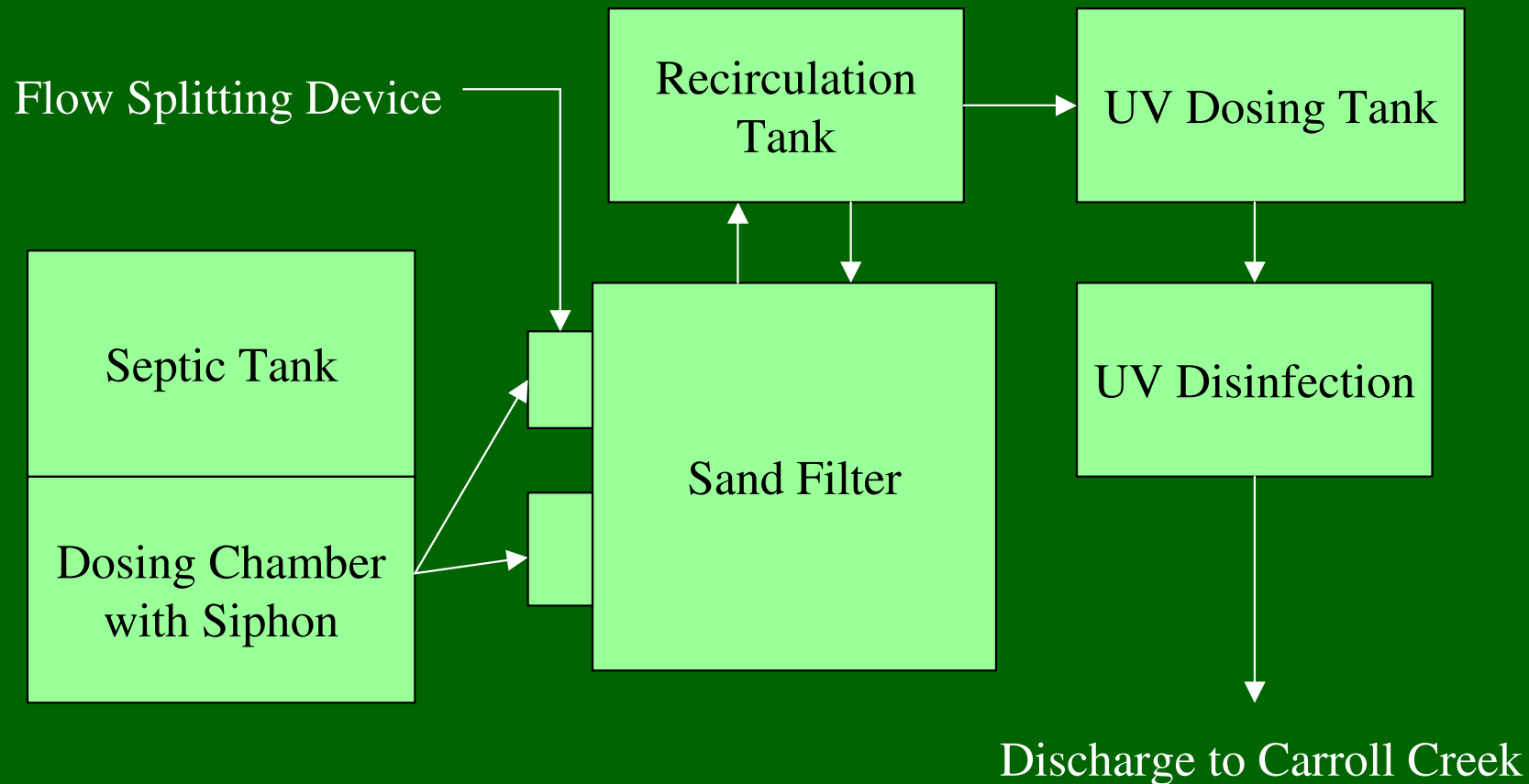
# Original Treatment Train



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- Flow Diagram



# Deficiencies



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- Dosing Bell - Not Functional
- Sand Filter - Structural Integrity
- Spray Distribution - Un-Even
- Bed – Rocks on Top, Not Able to Clean
- Sand Media - Clogged
- Under Drains – Clogged





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# Problems / Concerns



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- Aerosols
- Health Concerns
- Leaking Sand Filter
- Treatment Level
- Aesthetics
- Rain/Freezing

# Construction Issues



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- Campers on Site - Safety
- Continuous Operation
- Demolition of Old System

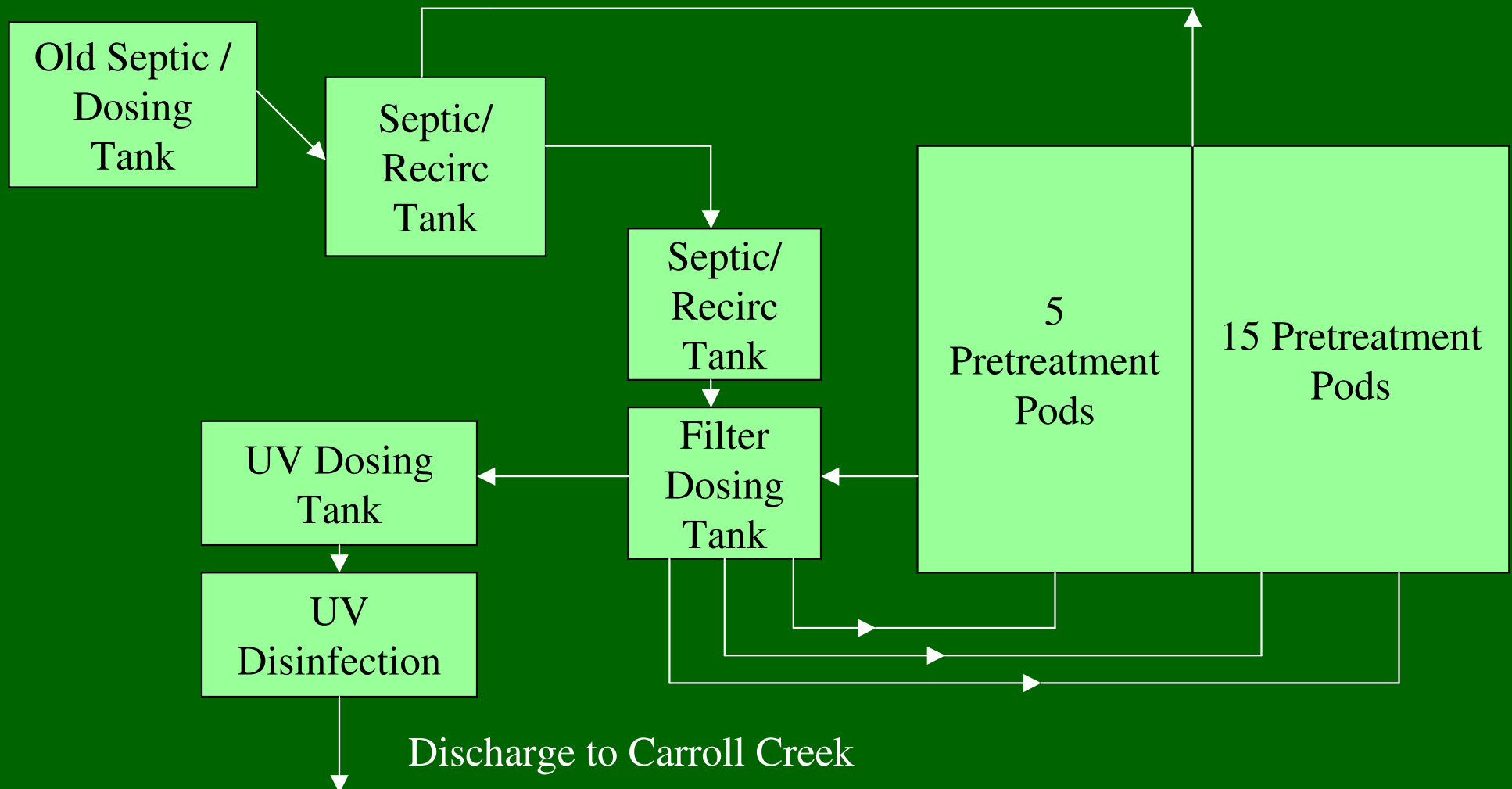
# Construction Issues



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- Flow Diagram



















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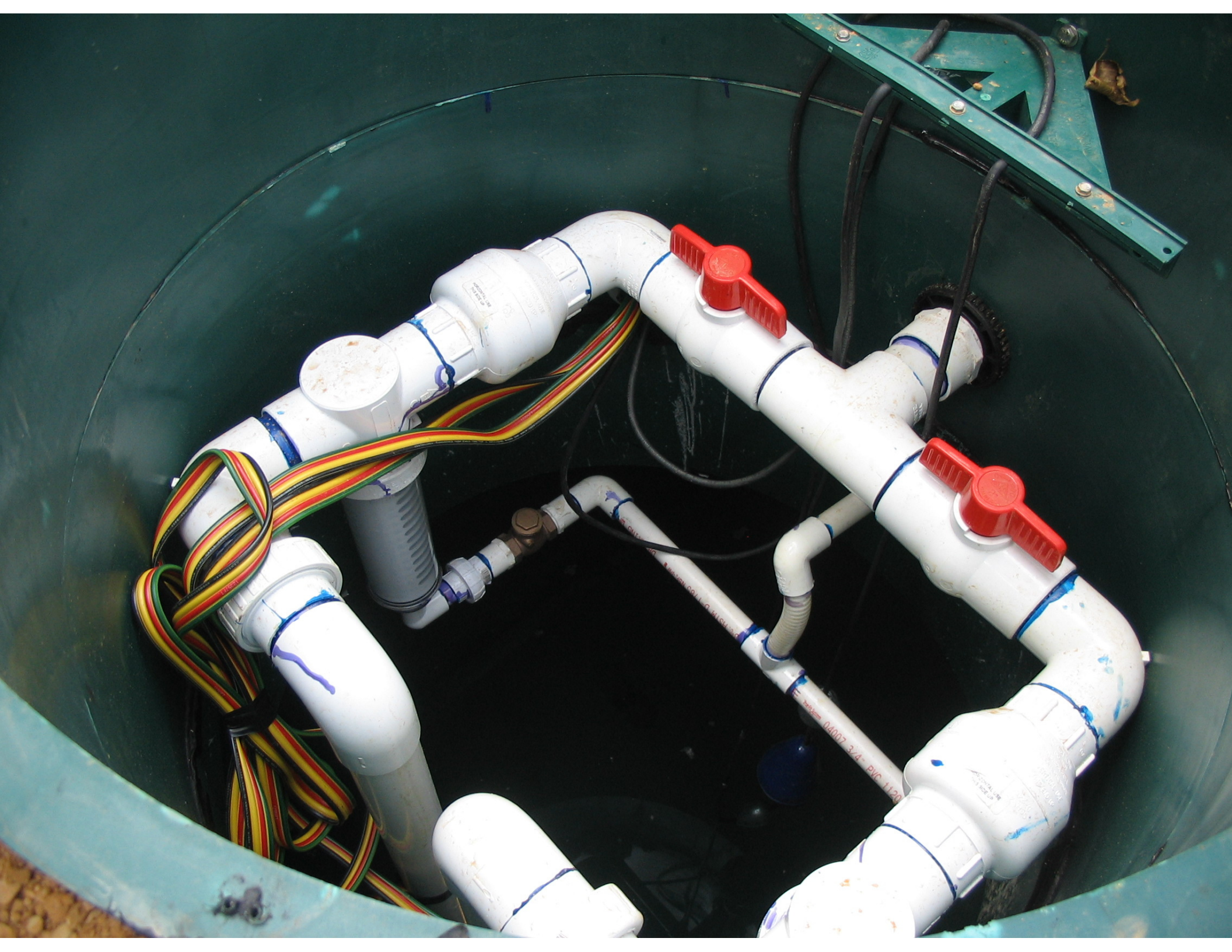












# Benefits of Synthetic Media Filters



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- Uniform Media with Larger Pore Space
- Enclosed: No Aerosols, Rain, Freezing, Dust
- No Algae
- Less Maintenance
- Media Inexpensive and Easy to Replace



# Modified Permit

- NPDES Permit
- Permitted Flow: 13,100 GPD
- Limits:

	BOD 5	TSS
Monthly Ave	30.0 mg/l	30.0 mg/l
Daily Max	45.0 mg/l	45.0 mg/l
	NH3-N	Fecal Coliform
Monthly Ave	12.0 mg/l	200 / 100 ml
Daily Max	N/A	400 / 100 ml

# Performance



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	BOD5	TSS
High	10 mg/l	4.0 mg/l
Low	2.0 mg/l	$\leq 2.0$ mg/l
Average	3.0 mg/l	2.0 mg/l
	NH3-N	Fecal Coliform
High	30.0 mg/l*	2.0 / 100 ml
Low	0.30 mg/l	$\leq 1.0$ / 100 ml
Average	1.50 mg/l	1.0 / 100 ml

\* Reading taken shortly after project start up.









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# The End

## Any Questions ?