

**Total Maximum Daily Load for
Fecal Pathogens in Buffalo and
Whiteoak Bayous**

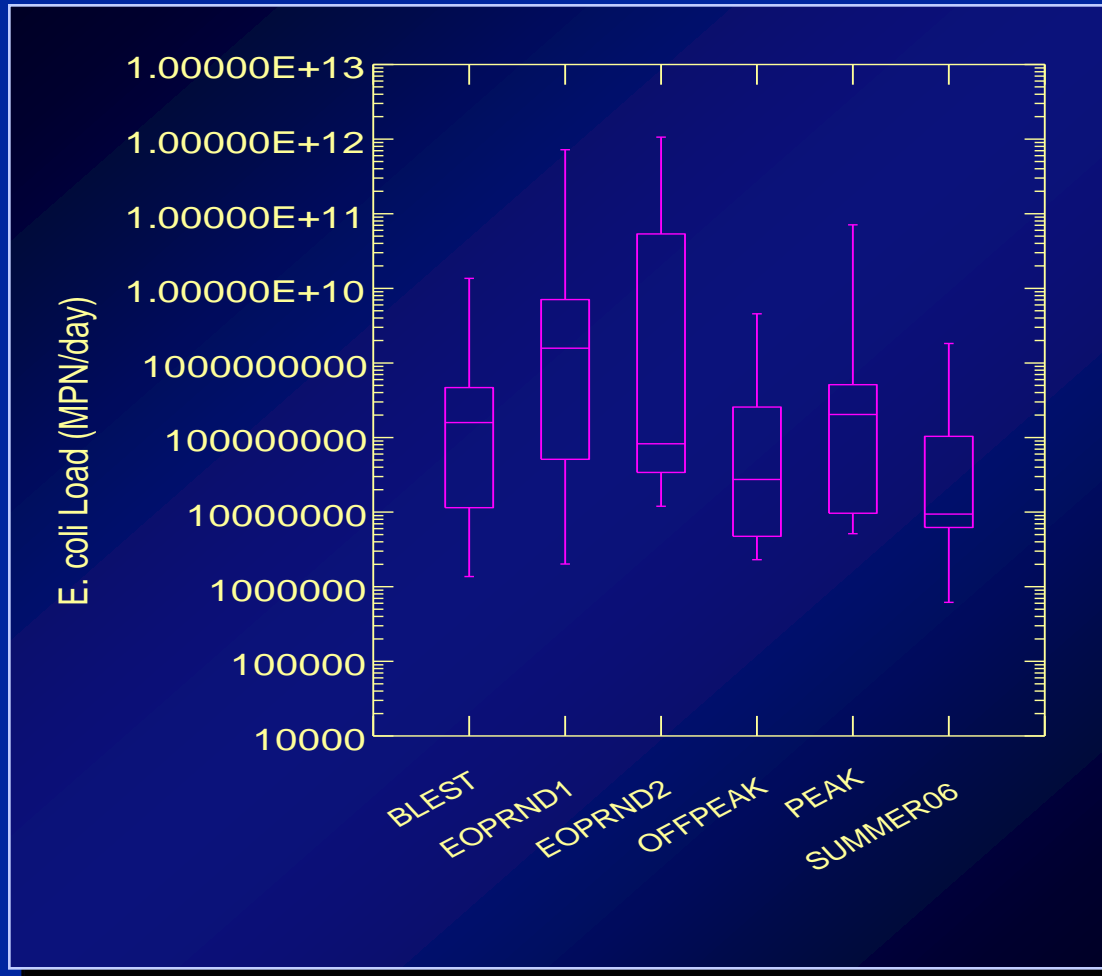
Stakeholder Meeting

February 8, 2007

WWTP Sampling

	Summer 2000	Summer 2006	End of Pipe 2006
Organization	UH	TCEQ	Harris Cty
# of plants	64	99	26
Targeted Watersheds	BB/ WOB	BB/WOB	WOB
Type of Sampling	Weir	Weir	End of Pipe to bayou

Comparison of *E. coli* Loads - 1017



Box Plots developed using paired data only from Whiteoak Bayou, n = 18

BLEST Results using all WWTP data sources – Segment 1017

	WWTP and Biosolid Load (billion MPN/day)			Waste Load % Reduction		
	Dry	Interm.	Wet	Low	Interm.	High
BLEST v1.0	59.39	62.45	186.61	100%	100%	100%
Summer (2006)	8.97	9.43	133.59	100%	100%	100%
End of Pipe Rnd 1, 2 (2006)	416.16	437.60	561.76	100%	100%	100%

BLEST Results using all WWTP data sources - Segment 1014

	WWTP and Biosolid Load (billion MPN/day)			Waste Load % Reduction		
	Dry	Interm.	Wet	Low	Interm.	High
BLEST v1.0	1.35	1.42	112.97	100%	99%	100%
Summer (2006)	19.16	20.15	131.70	100%	99%	100%
End of Pipe Rnd 1, 2 (2006)	n/a	n/a	n/a	n/a	n/a	n/a

n/a – data were not collected for Buffalo Bayou

BLEST Results using all WWTP data sources– Mouth of Reservoirs

	WWTP and Biosolid Load (billion MPN/day)			Waste Load % Reduction		
	Dry	Interm.	Wet	Low	Interm.	High
BLEST v1.0	6.46	6.80	134.35	100%	100%	100%
TCEQ	5,438	5,718	5,846	100%	100%	100%
Harris County	n/a	n/a	n/a	n/a	n/a	n/a

n/a – data were not collected for Buffalo Bayou

Sensitivity of BLEST Model – Segment 1013

	Wasteload Allocation % Reduction			Load Allocation % Reduction		
	Dry	Interm.	Wet	Low	Interm.	High
OSSF between 1% and 35%	100%	99%	100%	100%	0%-44%	98%
High Intensity EMC (10,658- 66,260 MPN/dL)	100%	100%	99%-100%	100%	29%	98%
Baseline	100%	100%	100%	100%	29%	98%

Sensitivity of BLEST Model – Segment 1017

	Wasteload Allocation % Reduction			Load Allocation % Reduction		
	Dry	Interm.	Wet	Low	Interm.	High
OSSF between 1% and 35%	100%	100%	100%	42%	42%	96%
High Intensity EMC (10,658- 66,260 MPN/dL)	100%	99%- 100%	99%- 100%	97%	97%	98%
Baseline	100%	100%	100%	97%	97%	98%

Regrowth Evaluation for Whiteoak

<i>E. coli</i> Sources	Dry Condition		Intermediate Condition		Wet Condition	
	Q (MGD)	Load (billion MPN/day)	Q (MGD)	Load (billion MPN/day)	Q (MGD)	Load (billion MPN/day)
Load Allocation		94.32		94.32		94.32
OSSE	2.77E-02	3,153.90	2.77E-02	3,153.90	2.77E-02	3,153.90
Bed Sediment	-	-	-	-	-	1,949.07
Direct Deposition	-	35.87	-	35.87	-	35.87
Regrowth		59.39		62.45		62.45
Upstream Input		0.00		0.00		0.00
None	0.00	0.00	0.00	0.00	0.00	0.00
Margin of Safety (MOS)		4.96		8.18		91.74
Margin of Safety (5% of Target Load)		4.96		8.18		91.74
Final Load Calculation						
Estimated Current Load	20.82	3,595.92	34.28	23,533.80	384.69	586,154.54
Contact Recreation Target (126 MPN/dL)	20.82	99.29	34.28	163.53	384.69	1,834.81
Non-contact Recreation Target (605 MPN/dL)	20.82	476.74	34.28	785.18	384.69	8,809.98
TMDL Target		99.29		163.53		1,834.81
Percent Reduction (Contact Recreation)	W LA	100%		100%		100%
	LA	97%		97%		98%
Baseline - no regrowth	LA	97%		97%		98%

Die-off?

Regrowth load assumed to double existing WWTP concentration

Regrowth Evaluation

Die-off Rate Measured in Work Order 2	Die-off Rate Measured in Work Order 8	Estimated Regrowth Rate from NSF Study
1.3 – 3 per day	0.52 – 1.36 per day	1.6 – 2 per day

***E. coli* in sediment downstream of WWTPs**

Work Order 6 (2004)	Work Order 8 (2005)	End of Pipe study (2006)¹
4,700 – 230,000 MPN/100 g	35 – 610,000 MPN/100 g	400 – 60,000 MPN/dL ~ 150 – 23,000 MPN/100 g

¹ Concentrations in MPN/dL were converted to MPN/100 g by using sediment density of 2.65 g/mL

Effect of WWTP sludge banks

- Assuming 100 ft² of sludge bank downstream of every WWTP
- 57 WWTPs in Whiteoak Bayou
- Resuspension rate calculated for sludge banks with maximum sediment concentration observed in End of Pipe study (60,000 MPN/dL)
- Resuspension rate in BLEST: 2,740,000 MPN/ft²/hr
- Resuspension rate for Sludge Banks: 621,000 MPN/ft²/hr

Effect of WWTP sludge banks – Whiteoak Bayou

<i>E. coli</i> Sources	Dry Condition		Intermediate Condition		Wet Condition	
	Q (MGD)	Load (billion MPN/day)	Q (MGD)	Load (billion MPN/day)	Q (MGD)	Load (billion MPN/day)
Load Allocation		94.32		94.32		94.32
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Bed Sediment	-	-	-	-	-	1,949.07
Direct Deposition	-	35.87	-	35.87	-	35.87
Sludge Banks	-	-	-	-	-	1.36
Upstream Input		0.00		0.00		0.00
None	0.00	0.00	0.00	0.00	0.00	0.00
Margin of Safety (MOS)		4.96		8.18		91.74
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Baseline - no sludge banks	LA	97%		97%		98%