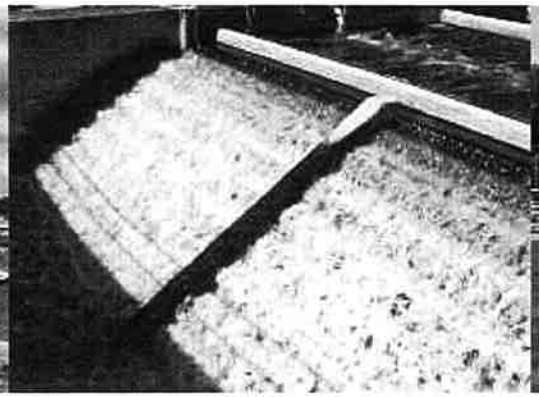
Lexington-Fayette Urban County Government
Division of Water Quality

Town Branch and West Hickman Creek Wastewater Treatment Plants
Local Limits Evaluation

October 1, 2009



Contents

Town Branch WWTP

1. Local limits based on water quality standards
2. Town Branch influent data
3. Town Branch effluent data
4. Town Branch domestic and commercial sampling data
5. Town Branch plant flow data
6. Town Branch industrial flow data
7. Town Branch SSTWAM
8. Local limits based on activated sludge inhibition levels

West Hickman Creek WWTP

1. Local limits based on water quality standards
2. West Hickman influent data
3. West Hickman influent data
4. West Hickman effluent data
5. West Hickman domestic and commercial sampling data
6. West Hickman plant flow data
7. West Hickman SSTWAM
8. Local limits based on activated sludge inhibition levels

TOWN BRANCH WWTP

Local Limits Determination Based on Chronic Water Quality Standards

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE								MAXIMUM LOADING		INDUSTRIAL			Current Limits (mg/l)	Industry Contribution (lbs/day) Sample Data	Proposed Limits (mg/L)
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Upstream Flow (MGD) (Qstr)	Upstream Conc. (mg/l) (Cstr)	Removal Efficiency (%) (Rpotw)	Chronic WQS (mg/l) (Ccrit)	Domestic and Conc. (mg/l) (Cdom)	Commercial Flow (MGD) (Qdom)	Allowable Headworks (lbs/day) (Lhw)	Domestic/ Commercial (lbs/day) (Ldom)	Allowable Loading (lbs/day) (Lind)	Local Limit (mg/l) (Cind)	Safety Factor (%) (SF)			
Arsenic	0.939948	21.6345	0		45	0.15	0.002166667	20.69455	49.20865	0.373951	43.91384	5.60185	10	0.38	0.21606061	0.38
Cadmium	0.939948	21.6345	0		67	0.000579	0.00068	20.69455	0.316576	0.117363	0.167555	0.021374	10	0.12	0.030028	0.02
Chromium	0.939948	21.6345	0		41.63768836	23.75	0.002666667	20.69455	7342.501	0.460247	6607.791	842.9201	10	7.0	0.35875112	7.0
Hex. Chrom.	0.939948	21.6345	0		-6.060606061	0.011	0.004666667	20.69455	1.871335	0.805432	0.878769	0.1121	10	0.19	0.69480556	0.11
Copper	0.939948	21.6345	0		70.69230612	0.022418	0.024211111	20.69455	13.80156	4.178658	8.242745	1.051482	10	1.0	3.63453091	1.0
Cyanide (F)	0.939948	21.6345	0		69	0.0052	0.00425	20.69455	3.026597	0.733518	1.990419	0.253907	10	0.23	0.39422857	0.23
Cyanide (T)	0.939948	21.6345	0		69		0.014	20.69455	-	2.416296	-	-	10	1.5	0.30924444	1.5
Fluoride	0.939948	21.6345	0		0		0.368	20.69455	-	63.51406	-	-	10			
Lead	0.939948	21.6345	0		80.79944144	0.011746	0.0032	20.69455	11.03797	0.552296	9.381873	1.196795	10	0.3	1.22171305	0.3
Mercury	0.939948	21.6345	0		92.57936508	0.000051	0.00003224	20.69455	0.124006	0.005564	0.106041	0.013527	10	0.0005	0.00279925	[redacted]
Molybdenum	0.939948	21.6345	0					20.69455	-	0	-	-	10			
Nickel	0.939948	21.6345	0		81.01984633	0.124264	0.004166667	20.69455	118.1295	0.719136	105.5975	13.4705	10	2.5	3.13403613	2.5
Selenium	0.939948	21.6345	0		50	0.005	0.005	20.69455	1.804317	0.862963	0.760923	0.097067	10			
Silver	0.939948	21.6345	0		75	0.022102	0.00217	20.69455	15.95161	0.374526	13.98192	1.783598	10	0.64	0.20757752	0.64
Zinc	0.939948	21.6345	0		76.97660708	0.28581	0.1865	20.69455	223.9861	32.18851	169.3989	21.60931	10	4.1	11.7096194	4.1
Oil & Grease	0.939948	21.6345	0		82.35294118		24	20.69455	-	4142.222	-	-	10	100		100.0
Phosphorous	0.939948	21.6345	0		57.78894472		10.8	20.69455	-	1864	-	-	10			

Limit Change	
Lowered	
Raised	[redacted]

(Qind) Industrial User total plant discharge flow in Million Gallons per Day (MGD) that contains a particular pollutant.
(Qpotw) POTW's average influent flow in MGD.
(Qstr) Receiving stream (upstream) 7Q10 flow in MGD.
(Cstr) Receiving stream background level in mg/l.
(Rpotw) Removal efficiency across POTW as percent. ***** Removal Efficiencies in red are literature values**
(Ccrit) State chronic water quality standard for a particular pollutant in mg/l.
(Qdom) Domestic/commercial background flow in MGD.
(Cdom) Domestic/commercial background concentration for a particular pollutant in mg/l.
(Lhw) Maximum allowable headworks pollutant loading to the POTW in pounds per day (lbs/day).
(Ldom) Domestic/commercial background loading to the POTW for a particular pollutant in pounds per day (lbs/day).
(Lind) Maximum allowable industrial loading to the POTW in pounds per day.
(Cind) Industrial allowable local limit for a given pollutant in mg/l.
(SF) Safety factor as a percent.
8.34 Unit conversion factor

$$Lhw = \frac{8.34 * (Ccrit * (Qstr + Qpotw) - (Cstr * Qstr))}{1 - Rpotw}$$

Town Branch Influent

	2007toxic	2008toxic	8/12/2008	1/15/2008	2/14/2008	3/4/2008	4/10/2008	5/19/2008	6/17/2008	7/10/2008	8/21/2007	9/24/2007	10/21/2007	11/13/2007	12/13/2007	8/18/2008	8/22/2008	10/1/2008
cyanide (f)	< 0.01	< 0.005															< 0.01	0.033
cyanide (t)		< 0.01																< 0.02
chromium hex	0.005	< 0.005																< 0.005
chromium	< 0.002	0.006	0.003	0.003	< 0.002	0.006	0.003	0.011	0.004	0.003	0.006	< 0.002	< 0.002	0.002	0.004			
nickel	< 0.002	0.006	0.005	0.005	0.002	0.006	0.004	0.005	0.004	0.006	0.286	0.007	0.005	0.01	0.004			
zinc	0.074	0.175	0.236	0.116	0.083	0.175	0.088	0.185	0.164	0.224	1.34	0.735	0.206	0.292	0.097			
arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.001	< 0.001			
cadmium	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.001	< 0.001			
copper	0.016	0.046	0.046	0.032	0.014	0.046	0.022	0.048	0.038	0.056	0.01	0.074	0.074	0.083	0.034			
lead	< 0.002	0.004	0.006	0.003	< 0.002	0.004	0.003	0.007	0.003	0.007	0.002	0.006	0.003	0.019	0.003			
silver	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			
mercury	0.00014	0.000042					2.8E-05											0.00003
fluoride																		
phosphorous	1.77	6.19																
oil/grease	6	28																
Selenium																		
benzene		< 0.000005														< 5E-06		
toluene		< 0.000005														< 5E-06		
ethylbenzene		< 0.000005														< 5E-06		
xylene		< 0.000005														< 5E-06		
phenol	< 0.05	0.232															5E-06	0.15

	All results less than detection = substituded 1/2 detection value
	Values not used due to high detection limit
	Values not used due to suspected lab errors

Town Branch Influent

	10/8/2008	9/14/2008	1/26/2009	2/10/2009	2/12/2009	2/13/2009	4/2/2009	12/16/2008		comments	Influent Average	Effluent Average	%%%%% Removal		Eff Avg
												0			
cyanide (f)				< 0.004	< 0.004	< 0.004					0.01	0.00457	54.2857		
cyanide (t)				< 0.004							0.011333	0.01467	-29.412		
chromium hex				< 0.004	< 0.004	0.005	0.005				0.004714	0.005	-6.0606		
chromium	0.013	< 0.002	0.004				0.00252				0.004238	0.00247	41.6377	Cr	0.002473
nickel	0.006	0.004	0.006				0.00356				0.019819	0.00376	81.0198	Ni	0.003762
zinc	0.552	0.218	0.208				0.109				0.277737	0.06394	76.9766	Zn	0.063944
arsenic	0.006	< 0.002	< 0.002				< 0.02				0.002368	0.00206	13.2099	As	0.002056
cadmium	< 0.001	< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0001				0.00085	0.00082	3.64146	Cd	0.000819
copper	0.104	0.04	0.053	0.0292	0.026	0.0174	0.023				0.042345	0.01241	70.6923	Cu	0.01241
lead	0.024	0.004	0.004	< 0.002	0.003	< 0.002	0.00158				0.005208	0.001	80.7994	Pb	0.001
silver	0.004	< 0.002	< 0.002	0.0039	0.0179	0.0037	0.00161				0.00296	0.00253	14.5976	Ag	0.002528
mercury							0.000015				5.04E-05	3.7E-06	92.5794	Hg	3.74E-06
fluoride															
phosphorous											3.98	1.68	57.7889		
oil/grease											17	3	82.3529		
Selenium				< 0.01	< 0.01	< 0.01					0.01	0.01	0		
benzene											0.000005	5E-06	0		
toluene											0.000005	5E-06	0		
ethylbenzene											0.000005	5E-06	0		
xylene											0.000005	5E-06	0		
phenol											0.108001	0.02625	75.6936		

Town Branch Effluent

	toxic07	toxic08	8/12/2008	1/15/2008	2/14/2008	3/4/2008	4/10/2008	5/19/2008	6/17/2008	7/10/2008	8/21/2007	9/24/2007	10/21/2007	11/13/2007	12/13/2007	8/22/2008	8/18/2008	10/1/2008
cyanide (f)	< 0.001	< 0.005																
cyanide (t)		< 0.02														< 0.01		
chromium hex	< 0.005	< 0.005																< 0.02
chromium	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	0.004	0.002	< 0.002	< 0.002	0.006	< 0.002	< 0.002	< 0.002	0.004			< 0.005
nickel	< 0.002	0.003	< 0.002	0.004	0.002	0.003	< 0.002	< 0.002	0.003	0.007	0.015	0.004	0.004	0.003	0.004			
zinc	0.024	0.048	0.06	0.09	0.048	0.048	0.043	0.043	0.06	0.078	0.06	0.099	0.085	0.077	0.097			
arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			
cadmium	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			
copper	< 0.002	< 0.002	0.002	0.022	0.014	0.046	0.003	0.003	0.007	0.008	0.004	0.014	0.036	0.01	0.034			
lead	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			
silver	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			
mercury	2.4E-06	< 5E-06					< 5E-06											< 0.000005
fluoride																		
phosphorous	1.44	1.92																
oil/grease	< 2	4																
Selenium																		
benzene			5E-06														< 5E-06	
toluene			5E-06														< 5E-06	
ethylbenzene			5E-06														< 5E-06	
xylene			5E-06														< 5E-06	
phenol	< 0.05	<0.05														5E-06		< 0.05

	All results less than detection = substituded 1/2 detection value
	Values not used due to high detection limit
	Values not used due to suspected lab errors/ outling value

Town Branch Effluent

	9/14/2008	1/26/2009	2/10/2009	2/12/2009	2/13/2009	4/2/2009	4/29/2009	Average
cyanide (f)			< 0.004	< 0.004	< 0.004		< 0.004	0.00457
cyanide (t)			< 0.004					0.01467
chromium hex			< 0.004	< 0.004	0.005	0.007		0.005
chromium	< 0.002	< 0.002				0.00252		0.00247
nickel	< 0.002	< 0.002				0.00371		0.00376
zinc	0.064	0.078				0.049		0.06394
arsenic	< 0.001	< 0.001				< 0.02		0.00206
cadmium	< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0001		0.00082
copper	0.003	0.034	0.0059	0.003	0.0032	0.00452		0.01241
lead	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		0.001
silver	< 0.002	< 0.002	0.0032	0.0126	0.003	0.000278		0.00253
mercury						< 0.0000013		3.7E-06
fluoride								
phosphorous								1.68
oil/grease								3
Selenium			< 0.01	< 0.01	< 0.01			0.01
benzene								5E-06
toluene								5E-06
ethylbenzene								5E-06
xylene								5E-06
phenol							< 0.005	0.02625

Background	TB																						
							Domestic and Commercial																
			Chevy Chase		Chevy Chase		Chevy Chase		Masterson		Masterson		Masterson		Masterson		Masterson		Masterson		Masterson		Masterson
			10/24/07		12/19/2007		5/30/2008		9/30/2008		10/28/2008		12/9/2008		12/2/2008		12/31/2008		2/10/2009		2/12/2009		2/13/2009
cyanide (f)							[illegible]		[illegible]						[illegible]	<	0.005	<	0.004	<	0.004	<	0.004
cyanide (t)						<	0.02	<	0.02	<	0.02			<	0.02	<	0.01	<	0.004	<	0.004		
chromium hex						<	0.005	<	0.005	<	0.005			<	0.005		0.005	<	0.004	<	0.004		0.004
chromium		<	0.002	<	0.002		0.004	<	0.002	<	0.002				0.004								
nickel			0.004	<	0.002		0.003		0.006		0.006				0.004								
zinc			0.07		0.059		0.371		0.2		0.204				0.215								
arsenic		<	0.002	<	0.002	<	0.002	<	0.002		0.003			<	0.002								
cadmium		<	0.001	<	0.001	<	0.001	<	0.001	<	0.001			<	0.001			<	0.0002	<	0.0002	<	0.0002
copper			0.012		0.011		0.06		0.028						0.039				0.019		0.011		0.0214
lead			0.001	<	0.001		0.019	<	0.001	<	0.001			<	0.001			<	0.002	<	0.002	<	0.002
silver		<	0.002	<	0.002	<	0.002	<	0.002	<	0.002			<	0.002				0.0028		0.0032		0.0032
mercury					0.000027		0.0001		0.0000062		0.000016						0.000012						
fluoride							0.368																
phosphorous							10.8																
oil/grease							24						24										
Selenium																		<	0.005	<	0.005	<	0.005
benzene									0.005														
toluene									0.005														
ethylbenzene									0.005														
xylene									0.005														
benzo(a)anthracene						<	0.02																
benzo(a)pyrene						<	0.02																
benzo(b)fluoranthene						<	0.02																
benzo(k)fluoranthene						<	0.02																
chrysene						<	0.02																
dibenzo(a,h)anthracene						<	0.02																
indeno(1,2,3-cd)pyrene						<	0.02																
acenaphthene						<	0.02																
acenaphtylene						<	0.02																
anthracene						<	0.02																
benzo(g,h,i)perylene						<	0.02																
fluoranthene						<	0.02																
fluorene						<	0.02																
phenanthrene						<	0.02																
pyrene						<	0.02																
naphthalene						<	0.02																
phenol							0.087		0.06														

All results less than detection = substituded 1/2 detection value

Values not used due to high detection limit

Values not used due to suspected lab errors

Background											
		Masterson			AVERAGE						
		4/2/2009									
cyanide (f)					0.00425						
cyanide (t)					0.014						
chromium hex		0.005			0.004666667						
chromium					0.002666667						
nickel					0.004166667						
zinc					0.1865						
arsenic					0.002166667						
cadmium	<	0.0002			0.00068						
copper		0.016			0.024211111						
lead	<	0.002			0.0032						
silver		0.001			0.00217						
mercury					0.00003224						
fluoride					0.368						
phosphorous					10.8						
oil/grease					24						
Selenium					0.005						
benzene					0.005						
toluene					0.005						
ethylbenzene					0.005						
xylene					0.005						
benzo(a)anthracene					0.02						
benzo(a)pyrene					0.02						
benzo(b)fluoranthene					0.02						
benzo(k)fluoranthene					0.02						
chrysene					0.02						
dibenzo(a,h)anthracene					0.02						
indeno(1,2,3-cd)pyrene					0.02						
acenaphthene					0.02						
acenaphtylene					0.02						
anthracene					0.02						
benzo(g,h,I)perylene					0.02						
fluoranthene					0.02						
fluorene					0.02						
phenanthrene					0.02						
pyrene					0.02						
naphthalene					0.02						
phenol					0.0735						

TOWN BRANCH Plant Flows

2007 Flow		
January	27.8	
February	30.6	LOW
March	20.8	12.2
April	16.0	12.9
May	15.6	13.9
June	12.9	
July	14.4	
August	25.2	
September	13.9	
October	12.2	
November	16.1	
December	49.9	
Average	21.27991667	13

2006 Flow		
January	16.99	
February	16.47	LOW
March	19.29	13.81
April	19.83	15.15
May	23.91	12.02
June	15.15	
July	18.09	
August	12.02	
September	29.07	
October	45.3	
November	33.47	
December	13.81	
Average	21.95	13.66

	AvgLOW
2007	13
2006	13.66
2005	14.2
2004	21.4
2003	16.6
2002	15.833
AVG	15.78217

2005 Flow		
January	30.7	
February	22.8	LOW
March	22.6	13.9
April	22.4	14.1
May	17.4	14.6
June	14.6	
July	17.5	
August	16.6	
September	16.4	
October	13.9	
November	14.1	
December	16.8	
Average	18.81666667	14.2

2004 Flow		
January	27.8	
February	23.5	LOW
March	24.8	20.6
April	23.5	20.7
May	27.2	22.9
June	25.6	
July	20.6	
August	22.9	
September	20.7	
October	27.2	
November	32.4	
December	31.7	
Average	25.658	21.4

	Avg Flow
2007	21.28
2006	21.95
2005	18.82
2004	25.66
2003	23.11
2008	18.987
AVG	21.6345

2003 Flow		
January	19.5	
February	29.5	LOW
March	18.6	15.9
April	24.3	16.3
May	32.2	17.6
June	25	
July	16.3	
August	17.6	
September	21.9	
October	15.9	
November	27	
December	29.5	
Average	23.10833333	16.6

2008 Flow		
January	20.83	
February	29.99	LOW
March	30.17	14.5
April	23.91	15.4
May	20.54	17.6
June	18.43	
July	14.21	
August	13.28	
September	13.94	
October	12.85	
November	12.40	
December	17.30	
Average	18.987	15.833

Town Branch Industrial Flow

Industry		Flow (MGD)	Domestic (GPD)	Process	Air Pollution	N/C cooling	In Product	Total	Process+Air pollution	%process	Regulated Flow	
Aramark	Industrial Laundry	0.100265	1875	96210		1120	1060	99205	96210	96.981	0.100265	
Cardinal Hill	Hospital	0.0075	7500					7500	0	0		Convential polutants
Central Baptist	Hospital	0.173	173000	2000				175000	2000	1.142857		Convential polutants
Chevron Terminal	Remediation site	0.0005		500				500	500	100		Not sampled
Chevron 49166	Remediation site	0.002		2000				2000	2000	100		Not sampled
Cintas	Industrial Laundry	0.0445	2000	42500				44500	42500	95.50562	0.0445	
B&H sanitation	Hauled waste, grease traps, septic	0						0	0			Convential polutants
Star Mfg	Metal coating - Phosphatizing	0.00608		6080				6080	6080	100	0.00608	Ni, Cu, Zn
Blackburn	Prison	0.06105	61050					61050	0	0		Convential polutants
CKP Heat treat	Metal Heat Treating	0.002313	770	1543				2313	1543	66.7099	0.002313	Cu,
Lexel Imaging	CRT Manufacturing	0.013237		7567	5670			13237	13237	100	0.007567	
Semicon	Electron gun assembly	0.003	2500	500				3000	500	16.66667	0.0025	
BG Airport	Aircraft Deicing	0.00234		2340				2340	2340	100.0		Convential polutants
CKES	Hauled waste, grease traps, septic	0.0001	0.0001					0.0001				Convential polutants
Concord Cleaners	Remediation site	0.0005		500				500	500	100.0		Not sampled
Creation Technologies	Circuit Board Assembly	0.012	4200	7800				12000	7800	65.0	0.012	Cu, Pb, Ni
Dixie Consumer	Printing - Paper cups	0.04185	10000	600		31250		41850	600	1.4	0.04185	Cu
Eastern State	Hospital	0.007665	7665					7665	0	0.0		Convential polutants
Fayette Plating	Metal Plating	0.000035		35				35	35	100.0	0.000035	no flow
Federal Medical Center	Prison	0.59	590000	0				590000	0	0.0		Convential polutants
GE FROST	Incandescent Bulb Frosting	0.0582		58200				58200	58200	100.0	0.0582	Pb, Cu, Zn, Cr
GE Lamp	Incandescent bulb assembly	0.011805	9601	630		1574		11805	630	5.3	0.011805	Hg, Conventional pollutants
GE Lighting 01	Incandescent bulb manufacturing	0.147	2000	49800				51800	49800	96.1	0.147	Pb, Cu, Zn, Cr
Hart's 02	Industrial Laundry	0.010506		10506				10506	10506	100.0	0.010506	
Kentucky Horse Park	Office + Research	0.0221	22100	1000				23100	1000	4.3	0.0221	Convential polutants
Kentucky Portable	Hauled waste, septic	0.0001	0.0001					0.0001	0			Convential polutants
Lexington Herald Leader	Newpaper Printing	0.00955	6750	1000		800	1000	8550	1000	11.7		Not sampled
Lexmark	Corporate Offices + Research	0.155	65000	1500		90000		156500	1500	1.0	0.155	Pb, Cu
Lextran	Transportation Maintenance, vehicle washing	0.004008	795	3213				4008	3213	80.2	0.004008	Pb, Cu
Metal Cleaners	Paint striping + painting	0.0015	150	1350				1500	1350	90.0	0.0015	Zn, Pb, Cu, Cr, Ag
Pepsi	Soft Drink Bottling	0.0015		1500			39450	1500	1500	100.0		Convential polutants
Rexroth	Metal Machining	0.003825	3290	535				3825	535	14.0	0.003825	Cu, Zn
Roto-Rooter	Hauled waste, grease traps, septic	0.0002	0.0002					0.0002	0			Convential polutants
Samaritan Hosp	Hospital	0.049604	49604	800				50404	800	1.6		Convential polutants
Smuckers	Food Manufacturing - Peanut Butter	0.0084	2400	6000				8400	6000	71.4		Convential polutants
Smurfit Stone	Printing - Corregated Boxes	0.00076	700	60				760	60	7.9	0.00076	Cu
Square D	Metal Plating	0.122944		82886	4320	35738		122944	87206	70.9	0.122944	Cu, Zn, Ni, Cr
St. Joseph Hosp	Hospital	0.0484	48400	800				49200	800	1.6		Convential polutants
Trane	Air Handler Assembly	0.029	19000	0	0	10000		29000	0	0.0		No Process flow
Turner Sanitation	Hauled waste, grease traps, septic	0.0001	0.0001					0.0001	0			Convential polutants
UK Campus	Higher Education + Research	0.08339	83390	1500				84890	1500	1.8	0.08339	Hg, Conventional pollutants
UK Diagnostic	Animal Diagnostic	0.012784	1920	10864	← Necropsy			12784	10864	85.0		Convential polutants
UKMC-1&2	Hospital + Research	0.101864	101864	3000				104864	3000	2.9	0.1018	Hg, Conventional pollutants
Universal Rent-All	Hauled waste, septic							0	0			Convential polutants
Va Cooper	Hospital	0.067244	62214	1000		5030		68244	1000	1.5		Convential polutants
VA Leestown	Hospital	0.059757	59757	1000				60757	1000	1.6		Convential polutants
Total		2.077476						1992316	417309		0.939948	TB IU Flow

Average industrial flows are based on 1 year's data and from industry's permit applications

Parameter	CAS Number	Reported Discharge (mg/l)		ilculated Effluent Limitations (m		Reasonable Potential		Data Source	No. of Samples	Effluent Requirement		Justification	
		Average	Maximum	Average	Maximum	Average	Maximum			Average	Maximum	Average	Maximum
Chloride	16887006	0.000000	0.000000	600.000000	1,200.000000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Residual Chlorine		0.000000	0.000000	0.011000	0.019000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Iron	7439896	0.000000	0.000000	1.000000	4.000000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Arsenic	7440382	0.000000	0.000000	0.150000	0.340000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Cadmium	7440439	0.000000	0.000000	0.000579	0.006054	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Chromium	7440439	0.000000	0.000000	23.756667	NA	0.00%	0.00%	No Data	0	None	None	HH DWS	NA
Total Recoverable Copper	7440508	0.000000	0.000000	0.022418	0.036808	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Lead	7439921	0.000000	0.000000	0.011746	0.301428	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Mercury	7439976	0.000000	0.000000	0.000051	0.001700	0.00%	0.00%	No Data	0	None	None	HH Fish	Acute
Total Recoverable Nickel	7440020	0.000000	0.000000	0.124264	1.117674	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Selenium	7782492	0.000000	0.000000	0.005000	0.020000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Silver	7440224	0.000000	0.000000	NA	0.022102	0.00%	0.00%	No Data	0	None	None	NA	Acute
Total Recoverable Zinc	7440666	0.000000	0.000000	0.285810	0.285810	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Free Cyanide	57125	0.000000	0.000000	0.005200	0.022000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Chromium (VI)	18540299	0.000000	0.000000	0.011000	0.016000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute

Hardness	Chronic	Acute
Metal limitations are developed using the mixed hardness of the effluent and receiving waters	279.00	279

Toxicity

Type of Test	Maximum	Units	Justification	ercent Effluent
Chronic	1.00	TUc	Chronic	100.00%

Town Branch WWTP

Local Limits Determination Based on Activated Sludge Inhibition Level

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE						MAXIMUM LOADING		INDUSTRIAL			Current Limits
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Removal Efficiency (%) (Rprim)	Activated Sluc Inhibition Lev (mg/l) (Ccrit)	Domestic or Commercial Conc. (mg/l) (Cdom)	Domestic or Commercial Flow (MGD) (Qdom)	Allowable Headworks (lbs/day) (Lhw)	Domestic/ Commercial (lbs/day) (Ldom)	Allowable Loading (lbs/day) (Lind)	Local Limit (mg/l) (Cind)	Safety Factor (%) (SF)	
Arsenic	0.939948	21.6345		0.1	0.002166667	20.69455	18.04317	0.373951	15.86491	2.0238	10	0.38
Cadmium	0.939948	21.6345	15	1	0.00068	20.69455	212.2726	0.117363	190.928	24.35565	10	0.12
Chromium	0.939948	21.6345	27	1	0.002666667	20.69455	247.1668	0.460247	221.9898	28.31804	10	7
Hex. Chror	0.939948	21.6345		1	0.004666667	20.69455	180.4317	0.805432	161.5831	20.61228	10	0.25
Copper	0.939948	21.6345	22	1	0.024211111	20.69455	231.3227	4.178658	204.0118	26.02468	10	1
Cyanide	0.939948	21.6345	27	0.1	0.014	20.69455	24.71668	2.416296	19.82871	2.529441	10	1.1
Iron	0.939948	21.6345				20.69455	-	0	-	-	10	
Lead	0.939948	21.6345	57	0.1	0.0032	20.69455	41.96087	0.552296	37.21248	4.746995	10	0.3
Mercury	0.939948	21.6345	10	0.1	0.00003224	20.69455	20.04797	0.005564	18.03761	2.30096	10	0.0005
Molybdenu	0.939948	21.6345				20.69455	-	0	-	-	10	
Nickel	0.939948	21.6345	14	1	0.004166667	20.69455	209.8043	0.719136	188.1048	23.99551	10	4.1
Selenium	0.939948	21.6345			0.005	20.69455	-	0.862963	-	-	10	
Silver	0.939948	21.6345	20	0.25	0.00217	20.69455	56.38492	0.374526	50.3719	6.42567	10	1.1
Zinc	0.939948	21.6345	27	0.3	0.1865	20.69455	74.15003	32.18851	34.54651	4.406911	10	4.1

(Qind) Industrial User total plant discharge flow in Million Gallons per Day (MGD) that contains a particular pollutant.
(Qpotw) POTW's average influent flow in MGD.
(Rprim) Removal efficiency across across primary treatment as percent. [ ] Literature Data
(Ccrit) Activated sludge threshold inhibition level, mg/l.
(Qdom) Domestic/commercial background flow in MGD.
(Cdom) Domestic/commercial background concentration for a particular pollutant in mg/l.
(Lhw) Maximum allowable headworks pollutant loading to the POTW in pounds per day (lbs/day).
(Ldom) Domestic/commercial background loading to the POTW for a particular pollutant in pounds per day (lbs/day).
(Lind) Maximum allowable industrial loading to the POTW in pounds per day.
(Cind) Industrial allowable local limit for a given pollutant in mg/l.
(SF) Safety factor as a percent.
8.34 Unit conversion factor

$$Lhw = \frac{8.34 * Ccrit * Qpotw}{1 - Rprim}$$

WEST HICKMAN WWTP

Local Limits Determination Based on Chronic Water Quality Standards

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE								MAXIMUM LOADING		INDUSTRIAL			Current Limit (mg/l)	Industry Contribution (lbs/day) Sample data	Proposed Limit (mg/L)
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Upstream Flow (MGD) (Qstr)	Upstream Conc. (mg/l) (Cstr)	Removal Efficiency (%) (Rpotw)	Chronic WQS (mg/l) (Ccrit)	Domestic and Conc. (mg/l) (Cdom)	Commercial Flow (MGD) (Qdom)	Allowable Headworks (lbs/day) (Lhw)	Domestic/ Commercial (lbs/day) (Ldom)	Allowable Loading (lbs/day) (Lind)	Local Limit (mg/l) (Cind)	Safety Factor (%) (SF)			
Arsenic	0.141631	22.2995	0	0.002	45	0.15	0.002166667	22.15787	50.72123	0.400393	45.24871	38.307	10	4.5	0.3193787	4.5
Cadmium	0.141631	22.2995	0	0.002	67	0.000576	0.00064	22.15787	0.324616	0.11827	0.173884	0.1472	10	0.22	0.00787201	0.14
Chromium	0.141631	22.2995	0	0.005	82	0.348	0.004333333	22.15787	359.5571	0.800785	322.8006	273.28	10	7	0.56392523	7.0
Hex. Chrom.	0.141631	22.2995	0	0.01	0	0.011	0.008555556	22.15787	2.045756	1.581038	0.260143	0.2202	10	0.25	0.06030907	0.22
Copper	0.141631	22.2995	0	0.0095	87.4607791	0.022281	0.017744444	22.15787	33.04649	3.279113	26.46272	22.403	10	1	0.09135328	1.0
Cyanide (F)	0.141631	22.2995	0	0.0225	69	0.0052	0.0055	22.15787	3.119628	1.016381	1.791284	1.5165	10	1	0.01765096	1.0
Cyanide (T)	0.141631	22.2995	0	0.02	69		0.022571429	22.15787	-	4.171124	-	-	10	1.4	0.05186476	1.4
Fluoride	0.141631	22.2995	0		0		0.598	22.15787	-	110.5084	-	-	10	N/A		
Lead	0.141631	22.2995	0	0.005	61	0.011639	0.001	22.15787	5.550246	0.184797	4.810425	4.0725	10	0.6	0.10957815	0.60
Mercury	0.141631	22.2995	0	0.000005	90.60880829	0.000051	2.33333E-05	22.15787	0.100998	0.004312	0.086586	0.0733	10	0.0005	0.00026321	0.0050
Molybdenum	0.141631	22.2995	0					22.15787	-	0	-	-	10	N/A		
Nickel	0.141631	22.2995	0	0.002	42	0.12351	0.003833333	22.15787	39.60366	0.708387	34.93491	29.576	10	4.1	0.38363431	4.1
Selenium	0.141631	22.2995	0			0.005	0.01	22.15787	0.929889	1.847966	-1.01107	-0.856	10	N/A		
Silver	0.141631	22.2995	0	0.002	75	0.021831	0.00228	22.15787	16.24033	0.421336	14.19496	12.017	10	4.8	0.18072045	4.8
Zinc	0.141631	22.2995	0	0.022	77.79877185	0.284073	0.286333333	22.15787	237.9656	52.91343	161.2556	136.52	10	4.1	1.04541651	4.1
Oil & Grease	0.141631	22.2995	0		86.66666667		44	22.15787	-	8131.052	-	-	10	100		100.0
Phenols	0.141631	22.2995	0	0.1		0.000005										
Phosphorous	0.141631	22.2995	0		78.91963109		7.13	22.15787	-	1317.6	-	-	10	N/A		

****

Limit Change	
Lowered	
Raised	

(Qind) Industrial User total plant discharge flow in Million Gallons per Day (MGD) that contains a particular pollutant.
(Qpotw) POTW's average influent flow in MGD.
(Qstr) Receiving stream (upstream) 7Q10 flow in MGD.
(Cstr) Receiving stream background level in mg/l.
(Rpotw) Removal efficiency across POTW as percent.
(Ccrit) State chronic water quality standard for a particular pollutant in mg/l.
(Qdom) Domestic/commercial background flow in MGD.
(Cdom) Domestic/commercial background concentration for a particular pollutant in mg/l.
(Lhw) Maximum allowable headworks pollutant loading to the POTW in pounds per day (lbs/day).
(Ldom) Domestic/commercial background loading to the POTW for a particular pollutant in pounds per day (lbs/day).
(Lind) Maximum allowable industrial loading to the POTW in pounds per day.
(Cind) Industrial allowable local limit for a given pollutant in mg/l.
(SF) Safety factor as a percent.
8.34 Unit conversion factor

***** Removal Efficiencies in red are literature values**

Max effluent limitation used for Silver: No average available

$$Lhw = \frac{8.34 * (Ccrit * (Qstr + Qpotw) - (Cstr * Qstr))}{1 - Rpotw}$$

West Hickman Influent

	toxic07	toxic08	8/12/2008	6/17/2008	8/21/2007	9/24/2007	10/21/2007	11/13/2007	12/13/2007	1/15/2008	2/14/2008	3/4/2008	4/10/2008	5/19/2008	6/17/2008	7/10/2008
cyanide (f)	< 0.02	< 0.01														
cyanide (t)		< 0.02														
chromium hex	< 0.01	< 0.01														
chromium	0.002	0.004	< 0.002	0.004	0.006	< 0.002	0.002	0.002	0.002	0.004	< 0.002	0.004	0.005	0.003	0.004	< 0.002
nickel	0.004	0.006	0.004	0.006	0.006	0.006	0.005	0.003	0.003	0.003	0.002	0.006	0.003	0.002	0.006	0.005
zinc	0.11	0.151	0.212	0.288	0.374	0.32	0.276	0.172	0.062	0.15	0.061	0.151	0.109	0.155	0.288	0.219
arsenic	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
cadmium	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
copper	0.02	0.028	0.041	0.039	0.048	0.057	0.04	0.026	0.011	0.027	0.002	0.028	0.016	0.026	0.039	0.044
lead	< 0.002	< 0.002	< 0.002	< 0.002	0.004	0.004	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.003
silver	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
mercury	0.0000464	0.000016														
fluoride																
phosphorous	2.5	5.09														
oil/grease	5	25														
Selenium																
benzene		< 0.000005														
toluene		< 0.000005														
ethylbenzene		< 0.000005														
xylene		< 0.000005														
phenol	0.05															

All results less than detection = substituded 1/2 detection value
Values not used due to high detection limit
Values not used due to suspected lab errors

West Hickman Influent

	10/1/2008	9/14/2008	8/22/2008	8/18/2008	10/8/2008	1/26/2009	2/10/2009	2/12/2009	2/13/2009	4/2/2009	comments	Influent Average	Effluent Average	%%%% Removal	
cyanide (f)	0.036						< 0.004	< 0.004	< 0.004			0.022	0.013714	37.66234	
cyanide (t)	0.02						< 0.004					0.01467	0.014667	0	
chromium hex	0.01						< 0.004	< 0.004	0.007	0.004		0.007	0.006714	4.081633	
chromium		0.003			0.016	< 0.002				0.00163	9/16 PTE=<0.002	0.00363	0.002903	20.05623	
nickel		0.004			0.003	0.004				0.00535	3/16 PTE=<0.002	0.00432	0.003415	20.9094	
zinc		0.268			0.561	0.167				0.14		0.2117	0.047	77.79877	✓
arsenic		< 0.002			0.004	< 0.002				< 0.02	14/16 PTE=<0.002	0.003	0.003053	-1.75439	
cadmium		< 0.001			< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0001	100% PTE=<0.002	0.00099	0.000909	7.889467	
copper		0.036			0.046	0.03	0.231	0.0013	0.0168	0.019		0.03792	0.004755	87.46078	✓
lead		< 0.002			< 0.002	0.004	< 0.002	< 0.002	< 0.002	< 0.005	100% PTE=<0.002	0.00243	0.025455	-945.455	
silver		< 0.002			< 0.002	< 0.002	0.0039	0.0071	0.003	0.00051	100% PTE=<0.002	0.00228	0.002185	4.282474	
mercury	0.000012									0.00008		3.9E-05	3.63E-06	90.60881	✓
fluoride															
phosphorous												3.795	0.8	78.91963	✓
oil/grease												15	2	86.66667	✓
Selenium							< 0.01	< 0.01	< 0.01						
benzene				< 0.000005								5E-06	0.000005	0	
toluene				< 0.000005								5E-06	0.000005	0	
ethylbenzene				< 0.000005								5E-06	0.000005	0	
xylene				< 0.000005								5E-06	0.000005	0	
phenol	0.24		0.276									0.18867	0.035	81.44876	

West Hichman Effluent

	Toxic 07	Toxic 08	8/12/2008	6/17/2008	8/21/2007	9/24/2007	10/21/2007	11/13/2007	12/13/2007	1/15/2008	2/14/2008	3/4/2008	4/10/2008	5/19/2008	7/10/2008	10/1/2008
cyanide (f)	< 0.02	< 0.01														0.044
cyanide (t)		< 0.02														< 0.02
chromium hex	< 0.01	< 0.01														< 0.01
chromium	< 0.002	0.008	< 0.002	< 0.002	0.004	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.008	0.005	0.002	< 0.002	
nickel	0.002	0.004	0.003	0.003	0.006	0.002	0.003	0.003	0.003	0.003	< 0.002	0.004	< 0.002	< 0.002	0.004	
zinc	0.028	0.06	0.055	0.047	0.053	0.054	0.06	0.05	0.029	0.062	0.019	0.06	0.052	0.041	0.037	
arsenic	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
cadmium	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
copper	0.002	0.009	0.006	0.004	0.005	0.018	0.009	0.005	0.003	0.004	0.002	0.009	0.003	0.005	0.004	
lead	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
silver	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
mercury	3.2E-06	< 5E-06														< 0.000005
fluoride																
phosphorous	0.39	1.21														
oil/grease	< 2	2														
Selenium																
benzene		< 5E-06														
toluene		< 5E-06														
ethylbenzene		< 5E-06														
xylene		< 5E-06														
phenol	< 0.05															< 0.05

All results less than detection = substituded 1/2 detection value
Values not used due to high detection limit
Values not used due to suspected lab errors

West Hichman Effluent

	9/14/2008	8/22/2008	8/18/2008	10/8/2008	1/26/2009	2/10/2009	2/12/2009	2/13/2009	4/2/2009	Average
cyanide (f)		< 0.01				< 0.004	< 0.004	< 0.004		0.0137143
cyanide (t)						< 0.004				0.0146667
chromium hex						0.004	0.004	0.005	0.004	0.0067143
chromium	< 0.002			0.004	< 0.002				0.00016	0.0029032
nickel	0.003			0.003	0.011				0.00188	0.0034147
zinc	0.05			0.032	0.066				0.038	0.047
arsenic	< 0.002			0.004	< 0.002				< 0.02	0.0030526
cadmium	[illegible]			< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.002	< 0.0001	0.0009091
copper	0.002			< 0.002	0.004	0.0022	0.001	0.0034	0.002	0.0047545
lead	< 0.002			< 0.002	0.519	< 0.002	< 0.002	< 0.002	< 0.001	0.0254545
silver	< 0.002			< 0.002	< 0.002	0.0032	0.0058	0.0029	0.000176	0.0021853
mercury									< 0.0000013	3.625E-06
fluoride										#DIV/0!
phosphorous										0.8
oil/grease										2
Selenium						< 0.01	< 0.01	< 0.01		0.01
benzene			< 0.000005							0.000005
toluene			< 0.000005							0.000005
ethylbenzene			< 0.000005							0.000005
xylene			< 0.000005							0.000005
phenol		< 0.005								0.035

WEST HICKMAN Plant Flows

2007 Flow		
January	27.1	
February	20.5	LOW
March	22.3	13.7
April	23.3	14.8
May	17.9	15.1
June	15.1	
July	17.8	
August	14.8	
September	13.7	
October	16.6	
November	17.9	
December	31.3	
AVERAGE	19.853	14.53

2006 Flow		
January	20.6	
February	20.5	LOW
March	19.125	14.58
April	19.18	15.36
May	30.19	16.75
June	15.36	
July	16.75	
August	14.58	
September	18.49	
October	52.486	
November	42.74	
December	18.77	
AVERAGE	24.064	15.56

	AVG LOW
2007	14.53
2006	15.56
2005	15.27
2004	21.63
2003	18.03
2002	15.27
AVG	16.715

2005 Flow		
January	28.7	
February	22	LOW
March	23.2	14.6
April	21.6	14.8
May	19.7	16.4
June	14.6	
July	16.4	
August	18.1	
September	16.5	
October	14.8	
November	16.9	
December	18.4	
Average	19.242	15.27

2004 Flow		
January	27.9	
February	23.3	LOW
March	23	19.9
April	25.3	22
May	26.6	23
June	26	
July	19.9	
August	24.2	
September	22	
October	23.8	
November	29.8	
December	27.8	
Average	24.967	21.63

	Avg Flow
2007	19.853
2006	24.064
2005	19.242
2004	24.967
2003	24.75
2008	20.921
AVG	22.2995

2003 Flow		
January	17.9	
February	34.1	LOW
March	22	16.7
April	25.7	17.9
May	31.5	19.5
June	28.3	
July	19.5	
August	19.8	
September	23.7	
October	16.7	
November	28.1	
December	29.7	
Average	24.75	18.03

2008 Flow		
January	22.67	
February	33.12	LOW
March	33.29	14.4
April	24.03	15.1
May	21.10	16.3
June	15.39	
July	14.75	
August	14.41	
September	15.22	
October	15.11	
November	16.70	
December	25.28	
Average	20.921	15.27

WH Industry Flow

West Hickman Industrial Flow

		Flow (MGD)	Flow (GPD)	Domestic	Process	Process Flow (mgd)		
Linkbelt	Construction Equipment manufacturing	0.00385	3850	0	3850	0.00385	0.00385	Zn, Cr+6
St. Joseph East	Hospital	0.07327	73270	55000	0	0		Conventional Pollutants
Central KY Processing	Metal Plating	0.135	135000	0	135000	0.135	0.135	Zn, Ni, Cu, Cr,
International Paper	Corregated paper Manufacturing	0.009877	9877	2025	1281	0.001281	0.001281	Cu,
			0			0		
Shriners	Hospital	0.02123	21230	10931	68	0.000068		Conventional Pollutants
Komatsu Reman	Construction equipment parts remanufacturing	0.0015	1500	0	1500	0.0015	0.0015	Cu, Pb, Zn
BP Products	Groundwater remediation	0.0011	1100	0	1100	0.0011		Not Sampled
Total Flow		0.245827	Total	67956	142799	0.142799	0.141631	

Average flow based on 1 year's data and facility's permit application

Background	WH			Domestic and Commercial														
			Beaumont	Beaumont	Beaumont	Hartland	Hartland	Hartland	Hartland	Hartland	Hartland	Hartland	Hartland	Hartland			
			10/24/07	12/19/2007	5/30/2008	9/30/2008	10/28/2008	12/2/2008	12/31/2008	2/10/2009	2/12/2009	2/13/2009	4/2/2009	AVERAGE
cyanide (f)					0.100	0.052	0.224	0.166	< 0.01	< 0.004	< 0.004	< 0.004		0.0055
cyanide (t)					< 0.02	< 0.02	0.08	< 0.02	< 0.01	< 0.004	< 0.004			0.022571429
chromium hex					< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.004	< 0.004	0.005	0.004	0.008555556
chromium		<	0.002	0.002	0.003	< 0.002	< 0.002	0.015						0.004333333
nickel			0.003	< 0.002	0.002	0.006	0.006	0.004						0.003833333
zinc			0.055	0.074	0.137	0.2	0.182	1.070						0.286333333
arsenic		<	0.002	< 0.002	< 0.002	< 0.002	0.003	0.002						0.002166667
cadmium		<	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.0001	0.0001	< 0.0001	< 0.0001	0.0006400
copper			0.01	0.014	0.026	0.028		0.026		0.020	0.008	0.011	0.016	0.017744444
lead		<	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.0010	< 0.001	< 0.001	0.001
silver		<	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		0.0039	0.003	0.003	0.001	0.00228
mercury				0.00005	0.000042	0.000013	0.0000	0.000015	< 0.000005					2.33333E-05
fluoride					0.598									0.598
phosphorous					7.13									7.13
oil/grease					57			31						44
Selenium										< 0.01	< 0.01	< 0.01		0.01
benzene						0.005								0.005
toluene						0.005								0.005
ethylbenzene						0.005								0.005
xylene						0.005								0.005
benzo(a)anthracene					< 0.02									0.02
benzo(a)pyrene					< 0.02									0.02
benzo(b)fluoranthene					< 0.02									0.02
benzo(k)fluoranthene					< 0.02									0.02
chrysene					< 0.02									0.02
dibenzo(a,h)anthracene					< 0.02									0.02
indeno(1,2,3-cd)pyrene					< 0.02									0.02
acenaphthene					< 0.02									0.02
acenaphtylene					< 0.02			All results less than detection = substituded 1/2 detection value						0.02
anthracene					< 0.02			Values not used due to high detection limit						0.02
benzo(g,h,i)perylene					< 0.02			Values not used due to suspected lab errors or interference						0.02
fluoranthene					< 0.02									0.02
fluorene					< 0.02									0.02
phenanthrene					< 0.02									0.02
pyrene					< 0.02									0.02
naphthalene					< 0.02									0.02
phenol					0.038			0.15						0.094

Parameter	CAS Number	Reported Discharge (mg/l)		Calculated Effluent Limitations (mg/l)		Reasonable Potential		Data Source	No. of Samples	Effluent Requirement		Justification	
		Average	Maximum	Average	Maximum	Average	Maximum			Average	Maximum	Average	Maximum
Chloride	16887006	0.000000	0.000000	600.000000	1,200.000000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Residual Chlorine		0.000000	0.000000	0.011000	0.019000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Iron	7439896	0.000000	0.000000	1.000000	4.000000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Arsenic	7440382	0.000000	0.000000	0.150000	0.340000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Cadmium	7440439	0.000000	0.000000	0.000576	0.006010	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Chromium	7440439	0.000000	0.000000	0.348462	NA	0.00%	0.00%	No Data	0	None	None	HH DWS	NA
Total Recoverable Copper	7440508	0.000000	0.000000	0.022281	0.036560	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Lead	7439921	0.000000	0.000000	0.011639	0.298680	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Mercury	7439976	0.000000	0.000000	0.000051	0.001700	0.00%	0.00%	No Data	0	None	None	HH Fish	Acute
Total Recoverable Nickel	7440020	0.000000	0.000000	0.123510	1.110892	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Selenium	7782492	0.000000	0.000000	0.005000	0.020000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Total Recoverable Silver	7440224	0.000000	0.000000	NA	0.021831	0.00%	0.00%	No Data	0	None	None	NA	Acute
Total Recoverable Zinc	7440666	0.000000	0.000000	0.284073	0.284073	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Free Cyanide	57125	0.000000	0.000000	0.005200	0.022000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute
Chromium (VI)	18540299	0.000000	0.000000	0.011000	0.016000	0.00%	0.00%	No Data	0	None	None	Chronic	Acute

Hardness	Chronic	Acute
Metal limitations are developed using the mixed hardness of the effluent and receiving waters	277.00	277

Toxicity

Type of Test	Maximum	Units	Justification	Percent Effluent
Chronic	1.00	TUc	Chronic	100.00%

West Hickman WWTP

Local Limits Determination Based on Activated Sludge Inhibition Level

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE						MAXIMUM LOADING		INDUSTRIAL		
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Removal Efficiency (%) (Rprim)	Activated Slud Inhibition Lev (mg/l) (Ccrit)	Domestic and Commercial Conc. (mg/l) (Cdom)	Domestic and Commercial Flow (MGD) (Qdom)	Allowable Headworks (lbs/day) (Lhw)	Domestic/ Commercial (lbs/day) (Ldom)	Allowable Loading (lbs/day) (Lind)	Local Limit (mg/l) (Cind)	Safety Factor (%) (SF)
Arsenic	0.141631	22.2995		0.1	0.002166667	22.15787	18.59778	0.400393	16.33761	13.83134	10
Cadmium	0.141631	22.2995	15	1	0.00064	22.15787	218.7974	0.11827	196.7994	166.6094	10
Chromium	0.141631	22.2995	27	1	0.004333333	22.15787	254.7642	0.800785	228.487	193.4359	10
Hex. Chror	0.141631	22.2995		1	0.008555556	22.15787	185.9778	1.581038	165.799	140.3646	10
Copper	0.141631	22.2995	22	1	0.017744444	22.15787	238.4331	3.279113	211.3107	178.8945	10
Cyanide	0.141631	22.2995	27	0.1	0.022571429	22.15787	25.47642	4.171124	18.75765	15.88013	10
Iron	0.141631	22.2995				22.15787	-	0	-	-	10
Lead	0.141631	22.2995	57	0.1	0.001	22.15787	43.25066	0.184797	38.7408	32.79776	10
Mercury	0.141631	22.2995	10	0.1	2.33333E-05	22.15787	20.6642	0.004312	18.59347	15.74114	10
Molybdenu	0.141631	22.2995				22.15787	-	0	-	-	10
Nickel	0.141631	22.2995	14	1	0.003833333	22.15787	216.2533	0.708387	193.9196	164.1713	10
Selenium	0.141631	22.2995			0.01	22.15787	-	1.847966	-	-	10
Silver	0.141631	22.2995	20	0.25	0.00228	22.15787	58.11807	0.421336	51.88493	43.92551	10
Zinc	0.141631	22.2995	27	0.3	0.286333333	22.15787	76.42925	52.91343	15.87289	13.4379	10

(Qind) Industrial User total plant discharge flow in Million Gallons per Day (MGD) that contains a particular pollutant.
(Qpotw) POTW's average influent flow in MGD.
(Rprim) Removal efficiency across across primary treatment as percent. [ ] Literature Data
(Ccrit) Activated sludge threshold inhibition level, mg/l.
(Qdom) Domestic/commercial background flow in MGD.
(Cdom) Domestic/commercial background concentration for a particular pollutant in mg/l.
(Lhw) Maximum allowable headworks pollutant loading to the POTW in pounds per day (lbs/day).
(Ldom) Domestic/commercial background loading to the POTW for a particular pollutant in pounds per day (lbs/day).
(Lind) Maximum allowable industrial loading to the POTW in pounds per day.
(Cind) Industrial allowable local limit for a given pollutant in mg/l.
(SF) Safety factor as a percent.
8.34 Unit conversion factor

$$Lhw = \frac{8.34 * Ccrit * Qpotw}{1 - Rprim}$$