Developing Your Best Local Limits

Gary A. Bauer, P.E.
Senior Chemical Engineer

Jones & Henry Engineers

Why are there Local Limits?

- To prevent the introduction of pollutants into POTW's that will:
  - Interfere with waste water treatment or operations
  - Pass-through to the receiving water
  - Limit wastewater or sludge use options
  - Endanger the POTW workers
- Allow certain industries to do business in your city

Why are there Local Limits?

- National Pollutants of Concern

Arsenic	Copper	Mercury	Selenium	BOD-5
Cadmium	Cyanide	Molybdenum	Silver	TSS
Chromium	Lead	Nickel	Zinc	Ammonia

- NPDES permitted
- Includes categorical standards
- Biosolids regulated
- Community or POTW specific

These are your Pollutants of Concern (POC)

Technically Based Local Limits

- What is “Technically Based?”
- What Ohio EPA is saying is: “Show Me”
  - Show me you don’t have this pollutant
  - Show me you have this pollutant under control
  - Show me how you are going to control this pollutant

Show me you don't have this pollutant

WWTP Screening Data Hexavalent Chromium Sampling					
LOCATION	DATE	TEST	RESULT	PQL	UNIT
Influent grab	3/24/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/23/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	9/22/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/17/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/23/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/22/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/24/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/21/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/22/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/13/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/30/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/20/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/21/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/20/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/24/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/19/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L

Is this a good justification?

Show me you don't have this pollutant

WWTP Screening Data Hexavalent Chromium Sampling					
LOCATION	DATE	TEST	RESULT	PQL	UNIT
Influent grab	3/24/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/23/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	9/22/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/17/2013	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/23/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/22/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/24/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/21/2014	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/22/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/13/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/30/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/20/2015	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	3/21/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	6/20/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	8/24/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L
Influent grab	12/19/2016	HEXAVALENT CHROMIUM	Not detected	15	ug/L

Is this a good justification? DEPENDS…

What is the Waste Load Allocation value for Hex Chromium?

Waste Load Allocation Values (Part II)

Typical Waste Load Allocations

- Arsenic 105 ug/l
- Cadmium 6.3 ug/l
- Chromium, hexavalent 11 ug/l
- Chromium, total 105 ug/l
- Copper 26 ug/l
- Cyanide, Free 5.2 ug/l
- Lead 30 ug/l
- Molybdenum 10,483 ug/l
- Nickel 141 ug/l
- Selenium 5 ug/l
- Silver 1.3 ug/l
- Zinc 332 ug/l

Make sure your samples are tested in the proper range!

Show me you don't have this pollutant

WWTP Screening Data Cadmium Sampling					
LOCATION	DATE	TEST	RESULT	PQL	UNIT
Influent grab	6/11/13	CADMIUM	Not detected	0.50	ug/L
Influent grab	8/13/13	CADMIUM	Not detected	0.50	ug/L
Influent grab	12/10/13	CADMIUM	Not detected	0.50	ug/L
Influent grab	3/10/14	CADMIUM	Not detected	0.50	ug/L
Residential grab	5/27/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	5/27/14	CADMIUM	Not detected	0.50	ug/L
Residential grab	5/28/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	5/28/14	CADMIUM	Not detected	0.50	ug/L
Residential grab	6/3/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	6/3/14	CADMIUM	Not detected	0.50	ug/L
Residential grab	6/4/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	6/4/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	6/10/14	CADMIUM	Not detected	0.50	ug/L
Residential grab	6/11/14	CADMIUM	Not detected	0.50	ug/L
Influent grab	6/11/14	CADMIUM	Not detected	0.50	ug/L

Waste load allocation value for Cadmium is 6.3 ug/L.

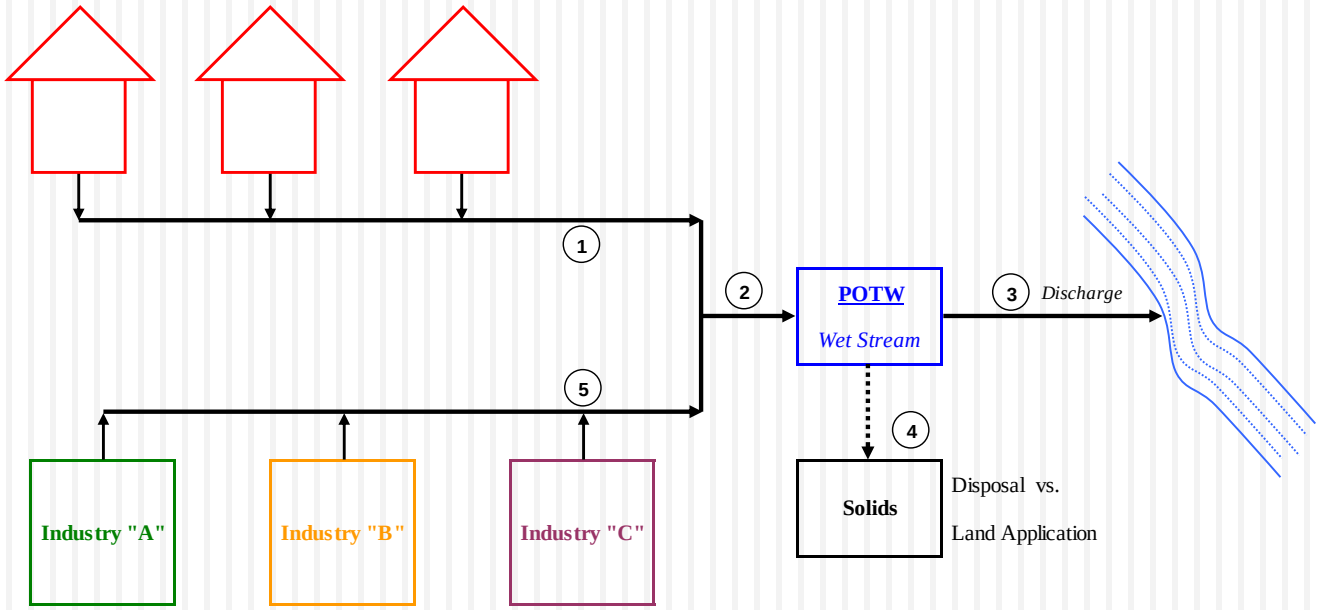
Cadmium is not a POC.

Show me you have this pollutant under control
Show me how you are going to control this pollutant

- The permittee shall continue to review and develop local limits as necessary. The following information must be submitted to Ohio EPA:
  - Treatment plant flow
  - Industrial flows
  - Domestic background concentrations
  - Treatment plant removal efficiencies
  - Review of the Maximum Allowable Headworks Loading (MAHL) and the Maximum Allowable Industrial Loading (MAIL)
  - The method of allocating available MAIL to the industrial users

The collection of this data is the Mass Balance

Local Limits Mass Balance Flow Sheet



SAMPLING

1. Domestic Background
2. Headworks Loading
3. Effluent
4. Sludge
5. Industrial Loading

Mass Balance

2 = 1 + 5

2 = 3 + 4

Flow Data

WWTP Flow Data	
Month	Average Flow
January 14	1.081 MGD
February 14	1.325 MGD
March 14	1.336 MGD
April 14	1.646 MGD
May 14	1.486 MGD
June 14	1.326 MGD
Average =	**1.367 MGD**

Industrial User Flow Data	
Industry	Average Flow
Industry A	2,300 gal/day
Industry B	7,500 gal/day
Industry C	1,200 gal/day
Industry D	211,000 gal/day
Average =	**222,000 gal/day**

Sampling and Data Collection

Flow Data

- WWTP Influent – Before mixing with any recycle streams
- WWTP Effluent
- WWTP Sludge Flow – Gallons per Day and Percent Solids
- Industrial Users – Total Flow from Permitted Users
- Any unusual waste streams:
  - Hauled wastes
  - Periodic dischargers or discharges

Sampling and Data Collection

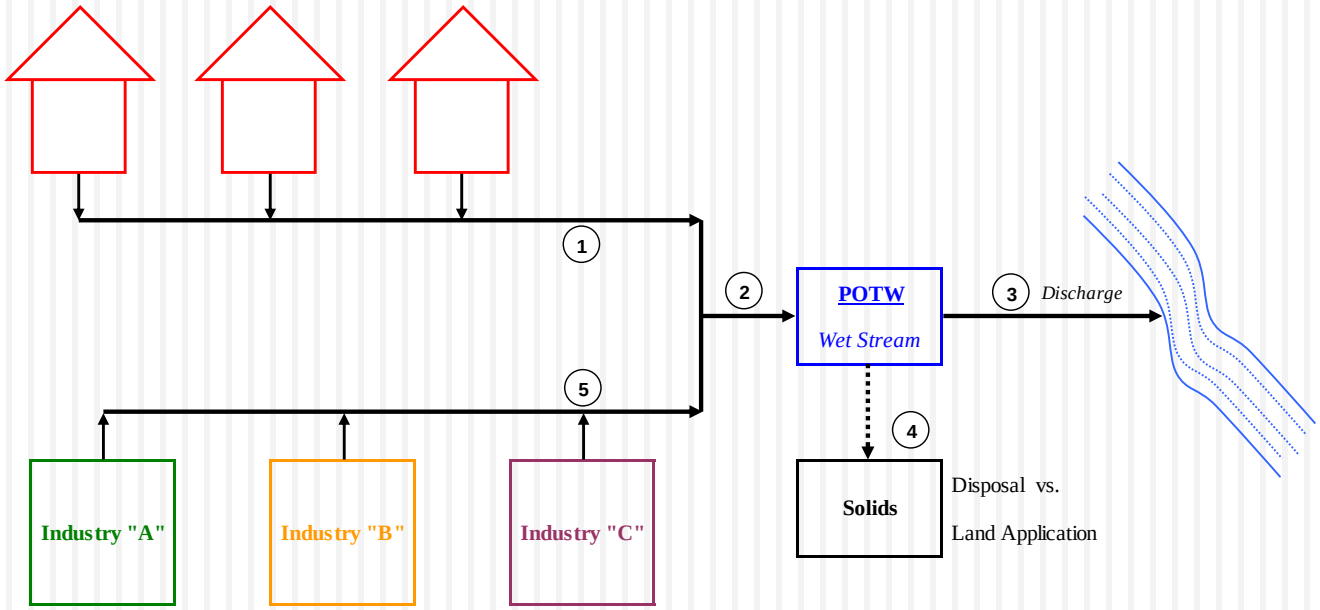
Sampling

- Collect background samples from residential only areas
- Include commercial dischargers if they are not permitted
- Use at least two different background sampling areas if possible
- Sample for all your POCs
- Collect 7-8 samples for each POC
- Collect samples over a 2-3 week period; different sample days
- Sample WWTP influent and effluent during the same periods
  - Matched pairs if possible

Cautions

- Sampling
  - Locations
  - Conditions
  - Results
- POTW Operations
- Industry Operations
- Other “Unusual” Occurrences

Local Limits Mass Balance



SAMPLING

1. Domestic Background
2. Headworks Loading
3. Effluent
4. Sludge
5. Industrial Loading

Mass Balance

2 = 1 + 5

2 = 3 + 4

POTW Removal Rates

Analysis	PQL (ug/l)	INFLUENT Sample Results Below PQL	INFLUENT Sample Results Influent (ug/l)	INFLUENT Surrogate Used* (ug/l)	EFFLUENT Sample Results Below PQL	EFFLUENT Sample Results Effluent (ug/l)	EFFLUENT Surrogate Used* (ug/l)
Copper	10.0						
5/19/13			40				
5/20/13			33		x		5.0
5/21/13			32		x		5.0
5/22/13			35		x		5.0
5/27/13			110		x		5.0
5/28/13			27		x		5.0
5/29/13			58		x		5.0
5/30/13			18		x		5.0
			Average =	44.13			5.00

* Results below PQL calculated at 1/2 PQL value

% Removal	Copper
88.7%	Calculated Value
86.0%	Literature Value

Analysis	PQL (ug/l)	INFLUENT Sample Results Below PQL	INFLUENT Sample Results Influent (ug/l)	INFLUENT Surrogate Used* (ug/l)	EFFLUENT Sample Results Below PQL	EFFLUENT Sample Results Effluent (ug/l)	EFFLUENT Surrogate Used* (ug/l)
Zinc	10.0						
5/19/13			67.0				
5/20/13			68.0		x		5.0
5/21/13			110.0			11	
5/22/13			77.0		x		5.0
5/27/13			85.0			12	
5/28/13			54.0			14	
5/29/13			120.0			13	
5/30/13			35.0			12	
			Average =	77.00			10.29

% Removal	Zinc
86.6%	Calculated Value
79.0%	Literature Value

Local Limits Calculations

- Calculate Your Local Limits Based On:
  - NPDES Effluent Limits
  - Activated Sludge Inhibition Level
  - USEPA 503 Sludge Regulations
  - Nitrification Inhibition Level
  - Anaerobic Digester Inhibition Level
- Also Include:
  - Safety Factor
  - Room for Growth?

Local Limits Calculations

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE						MAXIMUM LOADING		INDUSTRIAL MAIL	Conc.	
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Removal Efficiency (%) (Rpotw)	NPDES Limits (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	0.221	1.367	45	0.1030	0.0015	1.146	2.135	0.014	1.694	0.919	20
Cadmium	0.221	1.367	67	0.0044	0.0003	1.146	0.152	0.002	0.119	0.065	20
Chromium (total)	0.221	1.367	82	0.1030	0.0025	1.146	6.524	0.024	5.195	2.819	20
Chromium (hex)	0.221	1.367		0.0110	0.0050	1.146	0.125	0.048	0.053	0.029	20
Copper	0.221	1.367	78	0.0180	0.0370	1.146	0.933	0.354	0.393	0.213	20
Cyanide	0.221	1.367	69	0.0052	0.0025	1.146	0.191	0.024	0.129	0.070	20
Lead	0.221	1.367	61	0.0170	0.0022	1.146	0.497	0.021	0.377	0.204	20
Molybdenum	0.221	1.367	48.6	10.2700	0.0050	1.146	227.794	0.048	182.187	98.846	20
Nickel	0.221	1.367	42	0.0980	0.0057	1.146	1.926	0.054	1.487	0.807	20
Selenium	0.221	1.367	50	0.0050	0.0017	1.146	0.114	0.016	0.075	0.041	20
Silver	0.221	1.367	75	0.0013	0.0025	1.146	0.059	0.024	0.024	0.013	20
Zinc	0.221	1.367	74.3	0.2310	0.0785	1.146	10.247	0.750	7.448	4.041	20
BEHP	0.221	1.367	72	0.0084	0.0070	1.146	0.342	0.067	0.207	0.112	20
TDS	0.221	1.367	-11.2	1504.0000	400.0000	1.146	15419.760	3823.056	8512.752	4618.614	20

Local Limits Calculations

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE								MAXIMUM LOADING		INDUSTRIAL MAIL	INDUSTRIAL Conc.	
	IU Pollut. Flow (MGD) (Qind)	POTW Flow (MGD) (Qpotw)	Sludge Flow (MGD) (Qsldg)	Percent Solids (%) (PS)	Removal Efficiency (%) (Rpotw)	503 Sludge Criteria (mg/kg) (Cslcrit)	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	0.221	1.367	0.013	2.19	45	41	0.0015	1.146	0.216	0.014	0.159	0.086	20
Cadmium	0.221	1.367	0.013	2.19	67	39	0.0003	1.146	0.138	0.002	0.108	0.059	20
Chromium (total)	0.221	1.367	0.013	2.19	82		0.0025	1.146	-	0.024	-	-	20
Chromium (hex)	0.221	1.367	0.013	2.19	0		0.0050	1.146	-	0.048	-	-	20
Copper	0.221	1.367	0.013	2.19	78	1500	0.0370	1.146	4.566	0.354	3.299	1.790	20
Cyanide	0.221	1.367	0.013	2.19	69		0.0025	1.146	-	0.024	-	-	20
Lead	0.221	1.367	0.013	2.19	61	300	0.0022	1.146	1.168	0.021	0.913	0.495	20
Molybdenum	0.221	1.367	0.013	2.19	48.6	75	0.0050	1.146	0.366	0.048	0.245	0.133	20
Nickel	0.221	1.367	0.013	2.19	42	420	0.0057	1.146	2.374	0.054	1.845	1.001	20
Selenium	0.221	1.367	0.013	2.19	50	100	0.0017	1.146	0.475	0.016	0.364	0.198	20
Silver	0.221	1.367	0.013	2.19	75		0.0025	1.146	-	0.024	-	-	20
Zinc	0.221	1.367	0.013	2.19	74.3	2800	0.0785	1.146	8.948	0.750	6.408	3.477	20
BEHP	0.221	1.367	0.013	2.19	72		0.0070	1.146	-	0.067	-	-	20
TDS	0.221	1.367	0.013	2.19	-11.2		400.0000	1.146	-	3823.056	-	-	20

Local Limits Calculations

- Select the lowest value for each POC

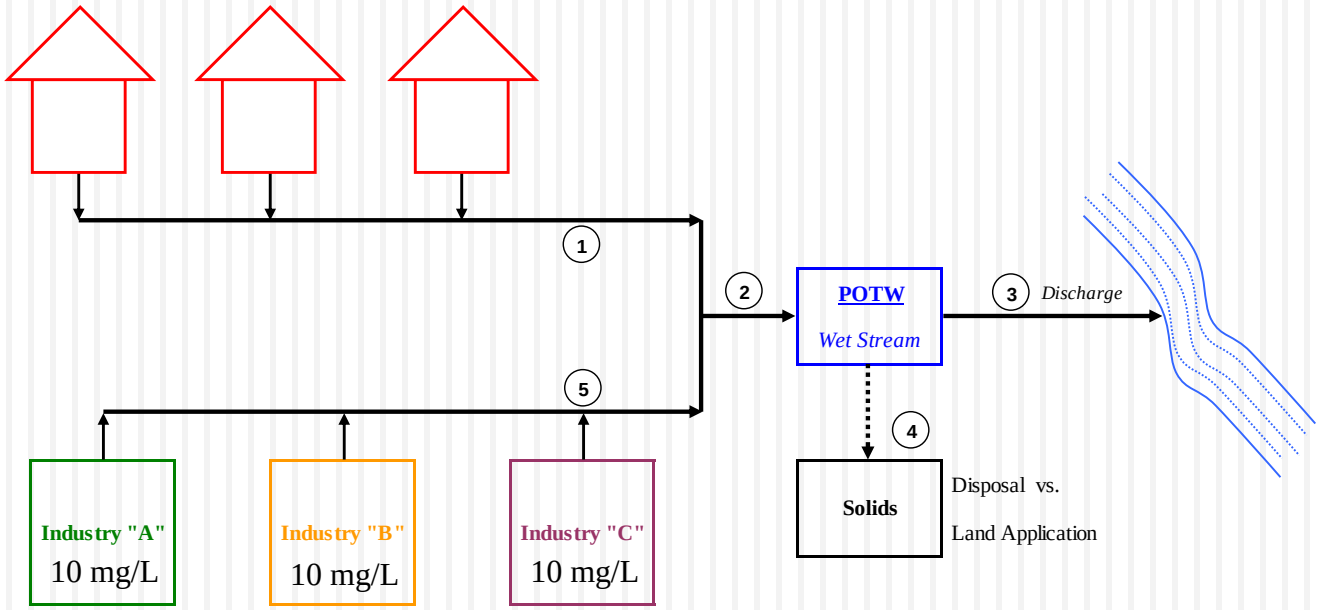
Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE MAIL Limits (lbs/day)				
	NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
Arsenic	1.694	0.898	0.159	24.860	0.159
Cadmium	0.119	10.728	0.108	143.717	0.108
Chromium	5.195	12.470	-	12.644	5.195
Chromium, Hex	0.053	12.446	-	9.073	0.053
Copper	0.393	11.339	3.299	1.719	0.393
Cyanide	0.129	1.226	-	9.979	0.129
Lead	0.377	21.190	0.913	11.672	0.377
Molybdenum	182.187	-	0.245	-	0.245
Nickel	1.487	10.551	1.845	3.877	1.487
Selenium	0.075	-	0.364	-	0.075
Silver	0.024	-	-	-	0.024
Zinc	7.448	2.998	6.408	2.089	2.089
BEHP	0.207	-	-	-	0.207
TDS	8512.752	-	-	-	8512.752

	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE Concentration Based Limits (Total Average Flow)				
	NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
	0.919	0.487	0.086	13.488	0.086
	0.065	5.820	0.059	77.974	0.059
	2.819	6.766	-	6.860	2.819
	0.029	6.753	-	4.922	0.029
	0.213	6.152	1.790	0.933	0.213
	0.070	0.665	-	5.414	0.070
	0.204	11.497	0.495	6.333	0.204
	98.846	-	0.133	-	0.133
	0.807	5.724	1.001	2.103	0.807
	0.041	-	0.198	-	0.041
	0.013	-	-	-	0.013
	4.041	1.627	3.477	1.133	1.133
	0.112	-	-	-	0.112
	4618.614	-	-	-	4618.614

Allocations - 1

- Uniform Allocation (Concentration)
  - Simplest Method – Every industry receives the same limits for each pollutant
  - Most Conservative – Not every industry will use their allocation
  - Most Protective of WWTP – Unused allocation can cover for issues such as slugs, spills, etc.

Allocations - 1



SAMPLING

1. Domestic Background
2. Headworks Loading
3. Effluent
4. Sludge
5. Industrial Loading

Mass Balance

2 = 1 + 5

2 = 3 + 4

Allocations - 1

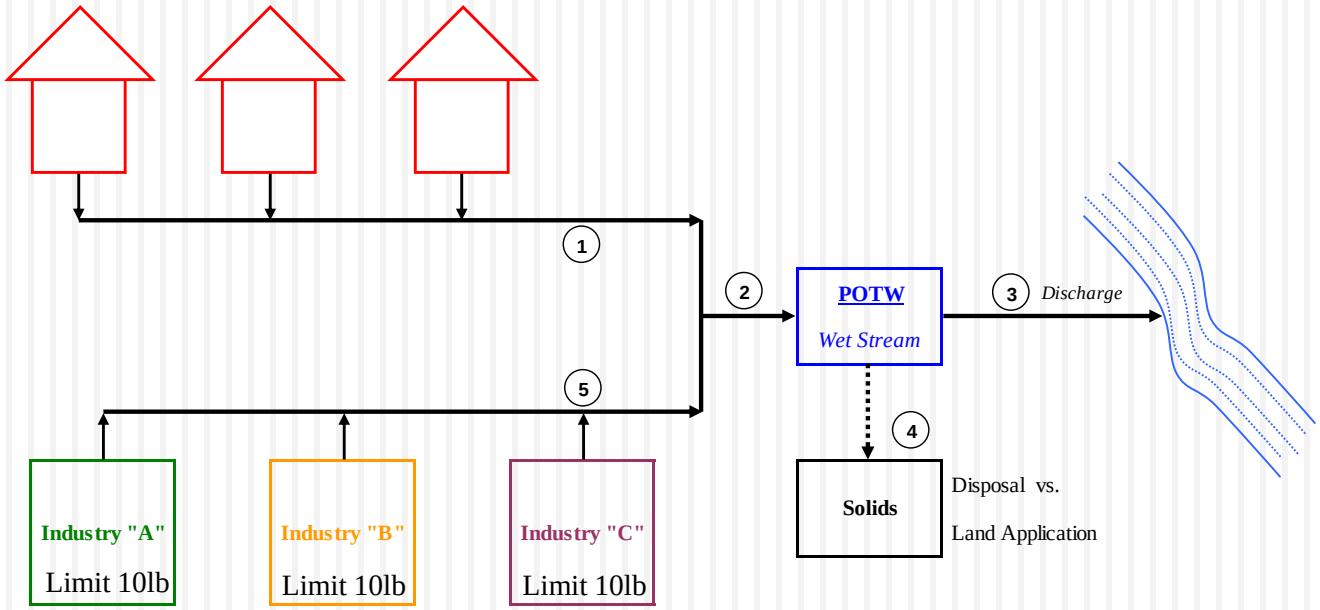
Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE MAIL Limits (lbs/day)				
	NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
Arsenic	1.694	0.898	0.159	24.860	0.159
Cadmium	0.119	10.728	0.108	143.717	0.108
Chromium	5.195	12.470	-	12.644	5.195
Chromium, Hex	0.053	12.446	-	9.073	0.053
Copper	0.393	11.339	3.299	1.719	0.393
Cyanide	0.129	1.226	-	9.979	0.129
Lead	0.377	21.190	0.913	11.672	0.377
Molybdenum	182.187	-	0.245	-	0.245
Nickel	1.487	10.551	1.845	3.877	1.487
Selenium	0.075	-	0.364	-	0.075
Silver	0.024	-	-	-	0.024
Zinc	7.448	2.998	6.408	2.089	2.089
BEHP	0.207	-	-	-	0.207
TDS	8512.752	-	-	-	8512.752

	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE Concentration Based Limits (Total Average Flow)				
	NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
	0.919	0.487	0.086	13.488	0.086
	0.065	5.820	0.059	77.974	0.059
	2.819	6.766	-	6.860	2.819
	0.029	6.753	-	4.922	0.029
	0.213	6.152	1.790	0.933	0.213
	0.070	0.665	-	5.414	0.070
	0.204	11.497	0.495	6.333	0.204
	98.846	-	0.133	-	0.133
	0.807	5.724	1.001	2.103	0.807
	0.041	-	0.198	-	0.041
	0.013	-	-	-	0.013
	4.041	1.627	3.477	1.133	1.133
	0.112	-	-	-	0.112
	4618.614	-	-	-	4618.614

Allocations - 2

- Uniform Allocation (Poundage)
  - Every industry receives the same amount (pounds per day) for each pollutant
  - Also conservative – Not every industry will use their allocation

Allocations - 2



SAMPLING

1. **Domestic Background**
2. **Headworks Loading**
3. **Effluent**
4. **Sludge**
5. **Industrial Loading**

Mass Balance

2 = 1 + 5

2 = 3 + 4

Allocations - 2

Pollutant	ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE MAIL Limits (lbs/day)				
	NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
Arsenic	1.694	0.898	0.159	24.860	0.159
Cadmium	0.119	10.728	0.108	143.717	0.108
Chromium	5.195	12.470	-	12.644	5.195
Chromium, Hex	0.053	12.446	-	9.073	0.053
Copper	0.393	11.339	3.299	1.719	0.393
Cyanide	0.129	1.226	-	9.979	0.129
Lead	0.377	21.190	0.913	11.672	0.377
Molybdenum	182.187	-	0.245	-	0.245
Nickel	1.487	10.551	1.845	3.877	1.487
Selenium	0.075	-	0.364	-	0.075
Silver	0.024	-	-	-	0.024
Zinc	7.448	2.998	6.408	2.089	2.089
BEHP	0.207	-	-	-	0.207
TDS	8512.752	-	-	-	8512.752

ENVIRONMENTAL CRITERIA AND PROCESS DATA BASE Concentration Based Limits (Total Average Flow)				
NPDES	Act. Sludge Inhibition	503 Sludge	Nitrification Inhibition	MINIMUM
0.919	0.487	0.086	13.488	0.086
0.065	5.820	0.059	77.974	0.059
2.819	6.766	-	6.860	2.819
0.029	6.753	-	4.922	0.029
0.213	6.152	1.790	0.933	0.213
0.070	0.665	-	5.414	0.070
0.204	11.497	0.495	6.333	0.204
98.846	-	0.133	-	0.133
0.807	5.724	1.001	2.103	0.807
0.041	-	0.198	-	0.041
0.013	-	-	-	0.013
4.041	1.627	3.477	1.133	1.133
0.112	-	-	-	0.112
4618.614	-	-	-	4618.614

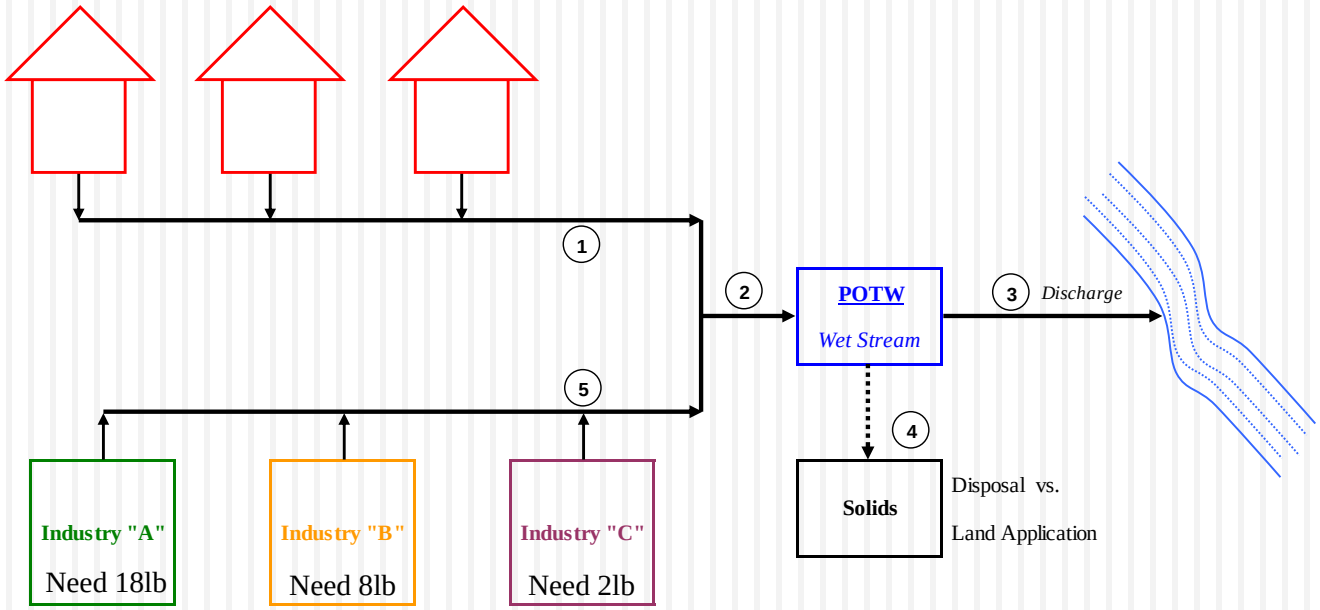
Allocations - 2

- Uniform Allocation (Poundage)
  - Every industry receives the same amount (pounds per day) for each pollutant
  - Also conservative – Not every industry will use their allocation
  - More complicated – Requires flow monitoring of industries
  - Results in different concentration limits for every pollutant at each industry (Based on flow)
  - Custom discharge limits (permit) for each industry

Allocations - 3

- Custom Allocation (Poundage) – Need Based
  - Every industry receives a different amount (pounds per day) for each pollutant

Allocations - 3



SAMPLING

1. Domestic Background
2. Headworks Loading
3. Effluent
4. Sludge
5. Industrial Loading

Mass Balance

2 = 1 + 5

2 = 3 + 4

Allocations - 3

- Custom Allocation (Poundage) – Need Based
  - Every industry receives a different amount (pounds per day) for each pollutant
  - More complicated – Must set limits for each industrial user
  - Allows distribution of specific pollutants to industrial users that need them
  - Requires flow monitoring of industries
  - Less conservative – Giving out more of the pounds that are available (MAIL)
  - Custom discharge limits for each industry

Allocations - 4

- Custom Allocation (Combo)
  - More complicated – Must set limits for each industrial user
  - Requires flow monitoring of industries
  - Custom discharge limits for each industry
  - Set poundage (need based) limits for certain POCs
  - Set concentration based limits for other POCs
  - Flexible for a specific industry that might require more pounds that are available in MAIL for a specific pollutant

Allocations - 4

Safety Factor =	20%	Industry A Flow = 2,300		Industry B Flow = 7,500		Industry C Flow = 1,200		Industry D Flow = 211,000			
	Available	Local Limit		Local Limit		Local Limit		Local Limit		Total	Remaining
	MAIL lbs	(lb/day)	(mg/l)	(lb/day)	(mg/l)	(lb/day)	(mg/l)	(lb/day)	(mg/l)	MAIL lbs	MAIL lbs
Arsenic	0.159	0.007	0.390	0.024	0.390	0.004	0.390	0.100	0.057	0.136	0.023
Cadmium	0.108	0.002	0.110	0.007	0.110	0.001	0.110	0.070	0.040	0.080	0.028
Chromium, Tot	5.195	0.053	2.770	0.107	1.710	0.017	1.710	0.500	0.284	0.677	4.518
Chromium, Hex	0.053	0.0004	0.020	0.0013	0.020	0.0002	0.020	0.0176	0.010	0.0194	0.0331
Copper	0.393	0.065	3.380	0.013	0.200	0.002	0.200	0.200	0.114	0.279	0.113
Cyanide	0.129	0.010	0.500	0.001	0.010	0.000	0.010	0.018	0.010	0.028	0.101
Lead	0.377	0.013	0.690	0.001	0.010	0.000	0.010	0.018	0.010	0.032	0.345
Molybdenum	0.245	0.0005	0.024	0.002	0.024	0.0002	0.024	0.042	0.024	0.044	0.201
Nickel	1.487	0.076	3.980	0.095	1.520	0.015	1.520	0.100	0.057	0.286	1.200
Selenium	0.075	0.001	0.070	0.004	0.070	0.001	0.070	0.035	0.020	0.042	0.034
Silver	0.024	0.008	0.430	0.004	0.070	0.001	0.070	0.005	0.003	0.018	0.005
Zinc	2.089	0.050	2.610	0.093	1.480	0.015	1.480	1.400	0.796	1.557	0.532
BEHP	0.207	0.002	0.110	0.007	0.110	0.001	0.110	0.088	0.050	0.098	0.109
TDS	8512.7	38.3	2000.0	75.0	1200.0	12.0	1200.0	8300.0	4720.3	8425.3	87.4

Final Review

- Collect good data
- Show the EPA what you have or don't have
- Determine your safety factors and room for growth
- Know your WWTP
- Know your industries
- Allocate your POCs the way that works best for you

Final Review

- Any Questions?

Gary A. Bauer, P.E.
Jones & Henry Engineers, Ltd.
3103 Executive Parkway; Suite 300
Toledo, Ohio 43606
gbauer@jheng.com
(419) 473-9611