Narragansett Bay Commission

Mass-Based Limits Tutorial

Kerry M. Britt
Pretreatment Manager

Background

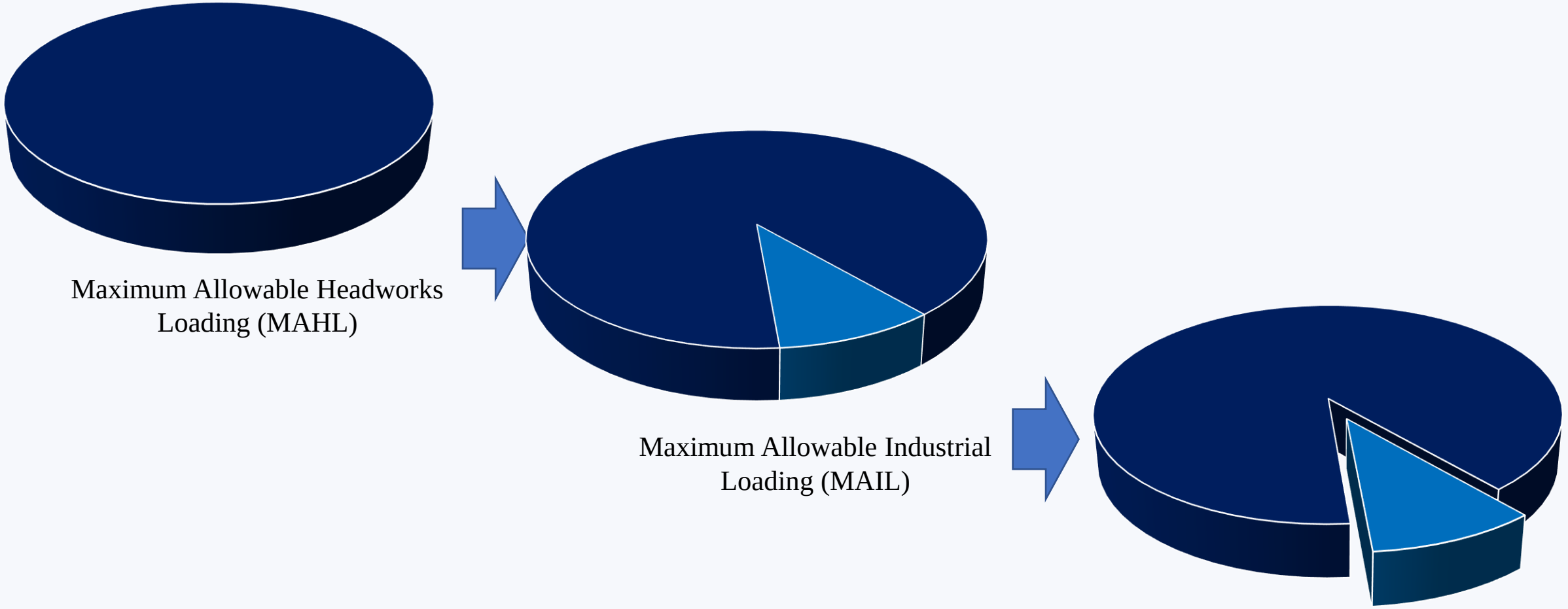
- RI Department of Environmental Management (DEM) issued revised RIPDES permits to the NBC
- Permits became effective in December 2018
- Required an evaluation of the existing Local Discharge Limits
- Required Enforceable Local Limits to be developed for:
  - Biochemical Oxygen Demand (BOD)
  - Total Suspended Solids (TSS)
  - Total Nitrogen
  - Ammonia
  - Arsenic

Local Limits Evaluation

- Two methods of calculating limits
  - Equal Allocation
  - Flow Based Allocation

- Both Methods were used
  - Metals & Cyanide – equal allocation
  - BOD, TSS, Total Nitrogen & Ammonia – flow-based allocation

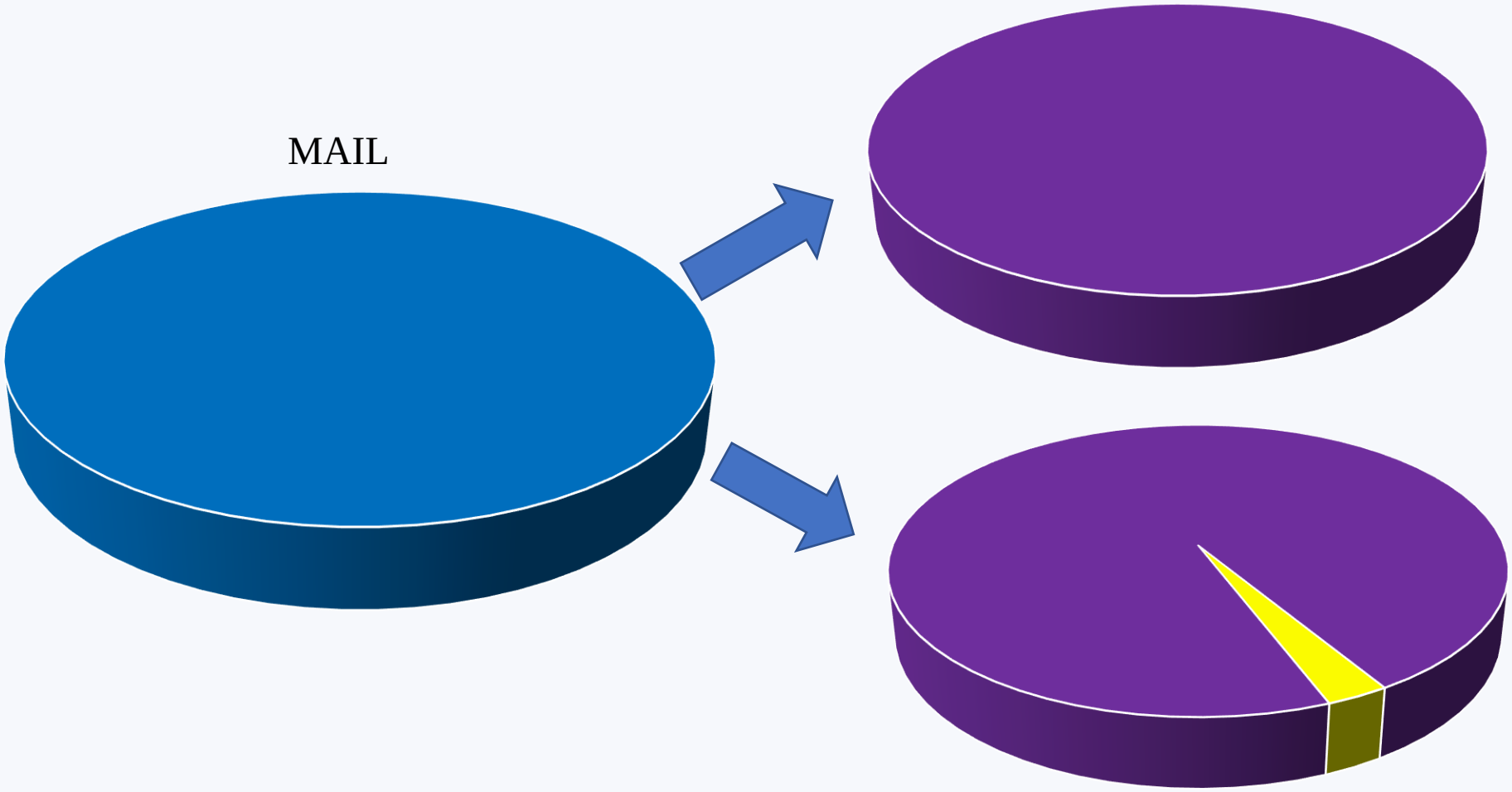
Steps to Calculating Local Limits



Maximum Allowable Headworks Loading (MAHL)

Maximum Allowable Industrial Loading (MAIL)

Steps to Calculating Local Limits

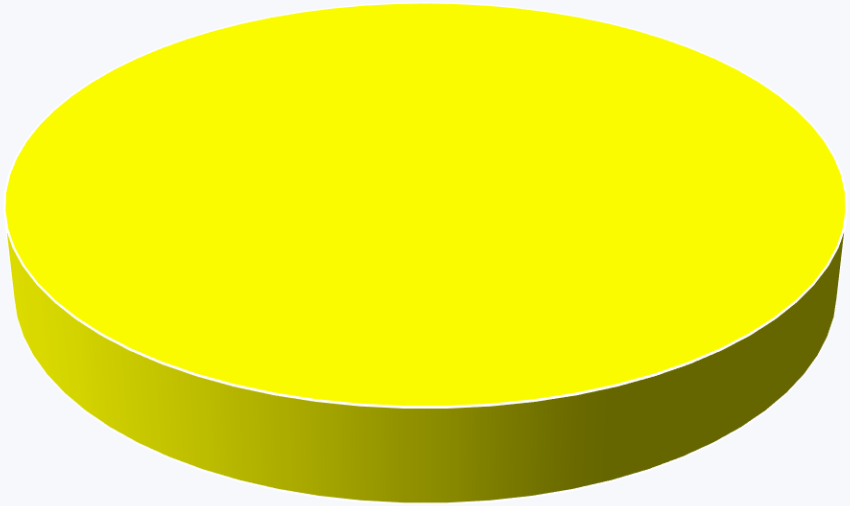


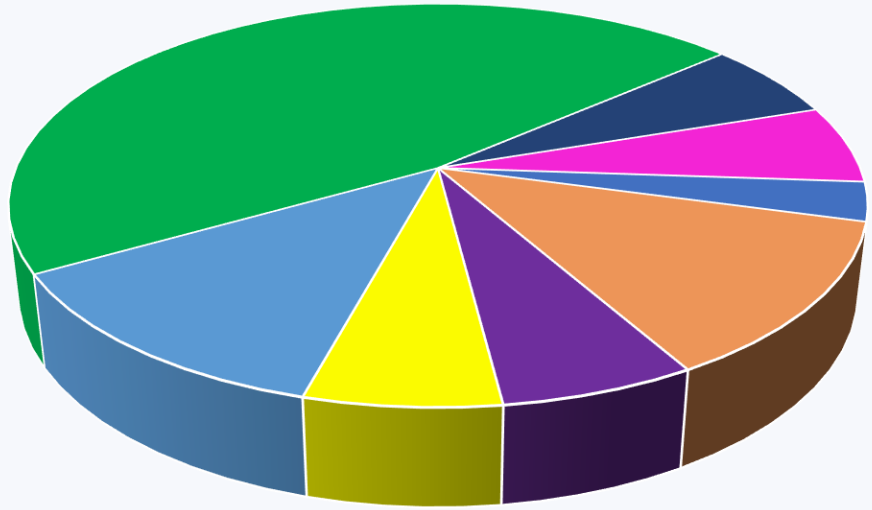
Equal Allocation – same limit for all users

Flow Based - able to allocate majority of loading to a subset of users while the remaining users are assigned a low limit

Steps to Calculating Local Limits

Companies needing the largest allocation





Load allocated to individual categories

Flow-Based Allocation = Mass-Based Limits

- Why use this method for BOD, TSS, Total Nitrogen & Ammonia
- Using the equal allocation method the limits would be difficult for most users currently sampling for BOD & TSS
- Decision was made to allocate the loading to the companies that need it
- Allows for companies that have been discharging to the NBC for many years to continue discharge at the same levels be in compliance

Mass-Based Limits

*Seasonal limit applicable from

Category	Cat #	BOD (lbs/1000 gal)	TSS (lbs/1000 gal)	TN* (lbs/1000 gal)	NH_3* (lbs/1000 gal)
Pharmaceutical Operations	14	5	5	-	-
Textile Operations	23	20	20	-	-
Industrial Laundries	25	10	10	-	-
Facilities Discharging Toxic and/or Prohibited Pollutants w/ High Conventional Pollutant Loads	28	10	10	-	-
Non-Textile Operations Using Pigments & Dyes	29	20	20	-	-
Aerogel Mfg. w/ High Conventional Pollutant Loads**	32	570	10	300 lbs/day	300 lbs/day
Wholesale Food Processing Operations w/ High Conventional Pollutant Loads	33	75	75	10	2
Manufacturers w/ High Conventional Pollutant Loads and Low Flow	34	10	10	-	-
Brewing & Distilling Operations	36	10	10	-	-
All Other Users		300 ppm	300 ppm	115 ppm	50 ppm

* Seasonal Limit applicable May 1st through October 31st

** Discharge Limits only applicable in Bucklin Point District

Determining Compliance

- Results are received in mg/L
- Need to be compared to limits in lbs/1000 gal
- Easiest way to determine compliance is to divide the results you receive from your lab in mg/L by 120

$$\frac{\text{milligrams (mg)}}{\text{Liter (L)}} \times \frac{\text{1 pound (lb.)}}{\text{453592 mg}} \times \frac{\text{3.78541 L}}{\text{1 gallon}} \times \frac{\text{1000 gal}}{\text{thousand gallons}} = \frac{\text{0.00834 lb.}}{\text{thousand gallons}}$$

NARRAGANSETT BAY COMMISSION
CONVERTING CONCENTRATION (mg/L) TO MASS (lbs/1000 gal.)
WORK SHEET

Company Name: _____
Sample Date: _____
Sample Location: _____

Calculate Daily Flow: Read water meter at start and end of sampling period.

Opening Meter Reading: _____ (gal or cf)
Closing Meter Reading: _____ (gal or cf)

Flow (F) = Closing Meter Reading – Opening Meter Reading (gal or cf)
Flow (F) = _____ - _____ = _____ (gal or cf)

For Cubic Feet Meters: $F_{(gal)} = F_{(cf)} \times 7.48$
$F_{(gal)}$ = _____cubic feet x 7.48 = _____ gal

Fill in Lab Results: Enter the results from your lab report

Pollutant:		
	BOD	_____ mg/L
	TSS	_____ mg/L
	Total Nitrogen	_____ mg/L
	Ammonia	_____ mg/L

Calculate Mass-Based limits for each pollutant in your category: Divide your lab result by 120 to obtain your results in lbs/1000 gallons.

Pollutant:		
	BOD	_____ mg/L ÷ 120 = _____ lbs/1000 gal
	TSS	_____ mg/L ÷ 120 = _____ lbs/1000 gal
	Total Nitrogen	_____ mg/L ÷ 120 = _____ lbs/1000 gal
	Ammonia	_____ mg/L ÷ 120 = _____ lbs/1000 gal

Compare you results with the limits in the table and circle to indicate if you are in compliance

Pollutant:		
	BOD	Compliance Achieved? Yes / No
	TSS	Compliance Achieved? Yes / No
	Total Nitrogen	Compliance Achieved? Yes / No
	Ammonia	Compliance Achieved? Yes / No

Conversions

Mass-Based Limits (lbs/1000 gal)	Concentration (mg/L)
2	240
5	600
10	1200
20	2400
75	9000
570	68,400

Example

Food Processing Company

Required to sample for BOD & TSS

Limits: BOD = 75 lbs/1000 gal or 9,000 mg/L

TSS = 75 lbs/1000 gal or 9,000 mg/L

Results:

BOD = 8,900 mg/L (÷ 120 = 74.17 lbs/1000 gal) Compliant

TSS = 12,525 mg/L (÷ 120 = 104.38 lbs/1000 gal) Non-Compliant

Contact Information:
Kerry M. Britt
401.461.8848 ext. 490
kbritt@narrabay.com