

Benefits of Clean Sampling



By: Rick Cantu – Superintendent
City of Manchester, NH

Tel. (603) 624-6526

Email: rcantu@manchesternh.gov

What Will I Learn?

- EPA develops the permit
 - conservative based
- Metals are based on your toxicity testing ambient water results
- Plants are not given credit for pollutants they don't discharge (BOD, TSS, Phosphorus or Nitrogen) nor is this credit put in a region-wide kitty
- A Permittee can submit an application that stacks the deck in their favor
- The rivers are much cleaner than the sampling data indicate
- Clean sampling may avoid millions in capital and tens of thousands in annual O&M costs

7Q10 Flow and Available Dilution

The 7Q10 flow – lowest average weekly (7Q) flow over a 10-year (10) period.

The dilution factor is then calculated reserving 10% of the receiving body capacity for future use (safety factor) - NH

Treatment plant **design flow** is factored into the equation to determine dilution factor (all in cfs) – For Manchester it is:

$$\text{Dilution Factor} = ((638.7 + 52.6) / 52.6) \times 0.9 = \mathbf{11.82 \text{ dilution}}$$

(38% increase in dilution) Actual five-year anticipated average flow = 24 mgd (37.2 cfs) Dilution Factor = $((638.7 + 37.2) / 37.2) \times 0.9 = \mathbf{16.35 \text{ dilution}}$

Current upgrade $((638.7 + 66.19) / 66.19) \times 0.9 = \mathbf{9.6 \text{ dilution}}$
(23% loss of dilution)

VI. Chemical Analysis		Receiving	
Parameter	Effluent	Water	Min Limit
Hardness	X	X	0.5 mg/l
TRC	X		0.02 mg/l
Alkalinity	X	X	2.0 mg/l
pH	X	X	
Conductivity	X	X	
TSS	X		
TDS	X		
Ammonia	X	X	0.1 mg/l
Total Organic Carbon	X	X	0.5 mg/l
Total Metals			
Cd	X	X	0.5 ug/l
Pb	X	X	0.5 ug/l
Cu	X	X	3 ug/l
Zn	X	X	5 ug/l
Ni	X	X	5 ug/l
Al	X	X	20 ug/l
Other as permit requires			

- **NPDES Monitoring**
- **Conventional Pollutants**
- **Chlorine Residual**
- **Bacteria**
- **Nutrients**
- **Metals**

NPDES requires a WWTP to test for metals from the WET test ambient river Sample.



You will receive 5-years worth of toxicity data from your annual/semi-annual or quarterly testing results.

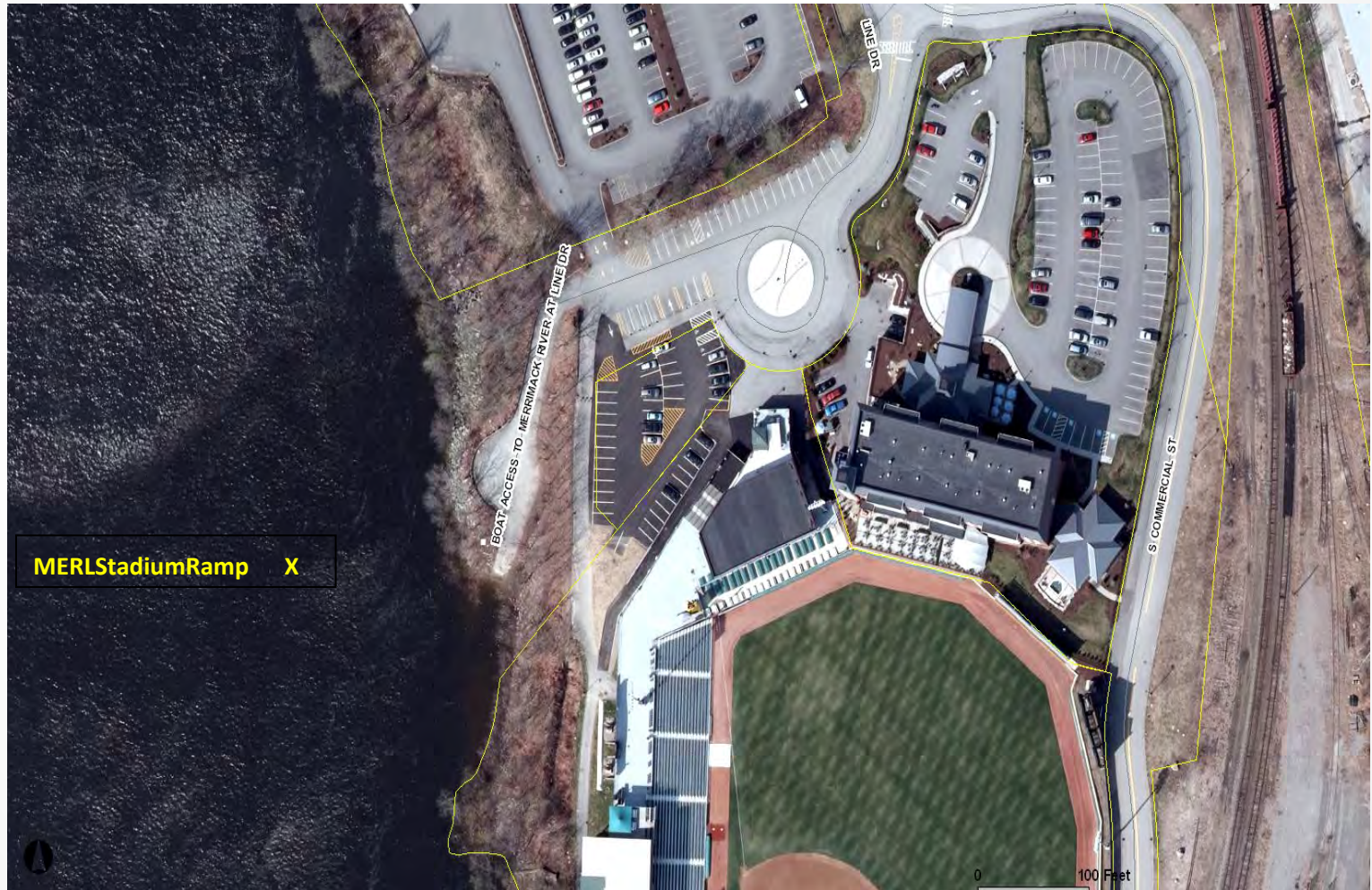
These are the samples that were taken under less than ideal conditions (usually little concern for quality).

Calculation is completed and Data determines if you are Meeting WQ criteria

Scout the Site - Structures



MERLStadiumRamp Sampling Location



Is this a good sampling location?



Rapids will scour sediment that are heavier in contaminants.
Bridge will add metals to water.
Rip rap under bridge will add erosion pollutants.

Think, Think, THINK Contamination



Metals dust, coal train dust, metals in rocks,
Preservatives in railroad ties, railroad ties,
Scattered garbage.

What Contamination Potential?

- Where has it walked?
- Where has it rested?
- Where has it flown?
- Discussion Reveals –
- (W) Storage yards, industrial sites, construction sites,
- (R) Fertilized lawns, fields, beaches, CSO outfalls, wetlands
- (F) Air stacks, Smog, Wind gusts



- Construction Work Sites



Plant Construction Add Numerous Pollutants

Site inspections before going out to sample is one of the worse things you can do when doing permit compliance

sampling – Metals, Lime, Construction Debris etc.





Dusts, sludge, grime, mists, etc.



Lead, Cadmium, Sulfur (post corrosion), Iron, Aluminum



Atomized mists – whatever is in your effluent is now on you clothes.

Potential Metal Contamination



Copper – Copper – Copper !!!



Previous flooding – Any and all types of waste products on brush, trees, ground and vegetation



- Preparation and double bag at laboratory
- Pre-label sample containers in clean environment before going out into the field
- Have samples lined up in cooler sequentially for use
- Remove metal items (watches, rings, chains glasses if metal testing)
- Non-latex gloves
- Trip Blank opened and secured at site away from activity
- Keep samples containers in cooler and open for very short periods of time



- Home-made clean sampling apparatus
- Plastic pole
- Plastic pipe
- Viton O-rings
- Nylon screws
- Nylon rope



Preparing to Sample



Chose the location wisely

Mark bottles in a clean environment and not In the field at the last Minute.



Musts & No No's of Clean Sampling



- Cotton shirts
- Cotton shorts/pants
- Rubber boots/sandals
- Nylon snaps/buckles
- No belts
- No wallet
- No phones
- No jewelry
- No pen clips
- No glasses
- No coins in pockets
- No watches
- No underarm deodorant

Team of 2 – Clean Hands Dirty Hands



Sampling Protocol

- Sample in moving water away from shore
- Wait for sampler to sink before next action
- Draw sample from 6" to a foot below surface
- Pull sample slowly at first then quickly
- Don't drag sampler on river bottom
- Lift sampler out very quick so no river bed is disturbed



Teflon Beaker Use



Sample Upstream Away from Self



Rinse with River Water



Clean Hands – Seal Bag for Dirty Hands Staff



Fold Small & Seal Bag



Dirty Hands Places in Second Bag & Seals



Lower River Flows

0.54 ug/l 2.9 ug/l Al(TR) 87 ug/l Al(AS) 114 ug/l

	Pb (Tot R)	Pb (AS)	Cu (Tot R)	Cu (AS)	Al (Tot R)	Al (AS)	River cfs
9/2/2014	0	0	2.8	1.5	46	41	2,090 ^P
9/2/2014	0	0	1.8	0.8	43	39	2,020 ^P
9/3/2014	0	0	1.1	1.1	43	37	2,450 ^P
9/3/2014	0	0	1.6	1.1	43	38	2,350 ^P
9/4/2014	0	0	2.3	1.1	37	35	2,310 ^P
9/4/2012	0	0	2.1	0.9	39	36	2,290 ^P
9/5/2014	0	0	1.9	0.7	41	32	2,590 ^P
9/5/2014	0	0	1.1	0.6	38	32	2,570 ^P

2.12 0.98 41.3 36.3

Flows are > 3X the 7Q10 but less than 4 X
 Second Round of Sampling

10/16/14 Storm – High River Water & Debris



Lowest Flows – 10/16 Storm

Non Clean	0.54 ug/l		2.9 ug/l		Al(TR) 87 ug/l	Al(AS) 114 ug/l	
	Pb (Tot R)	Pb (AS)	Cu (Tot R)	Cu (AS)	Al (Tot R)	Al (AS)	River cfs
10/6/2014	0	0 0	0.5 7	0.6	20 39	20	1,210 ^P
10/14/2014	0	0.5	0.6	0	28	23	1,510 ^P
10/14/2014	0	0	0.6	0	45	28	1,590 ^P
10/15/2014	0	0	1.4	0	20	23	1,140 ^P
10/15/2014	0	0	0	0	15	28	1,000 ^P
10/16/2014	2.8	2.7	2.7	0	130	57	2,870 ^P
10/16/2014	0.6	0.07	1.3	0	140	60	2,750 ^P
10/17/2014	0	0.6	0.7	0	69	46	8,220 ^P
10/17/2014	0	0	0.7	0	82	49	8,420 ^P

Contaminants from first flush subside even though 3X increase in flows – Fourth Round

2009 vs 2014

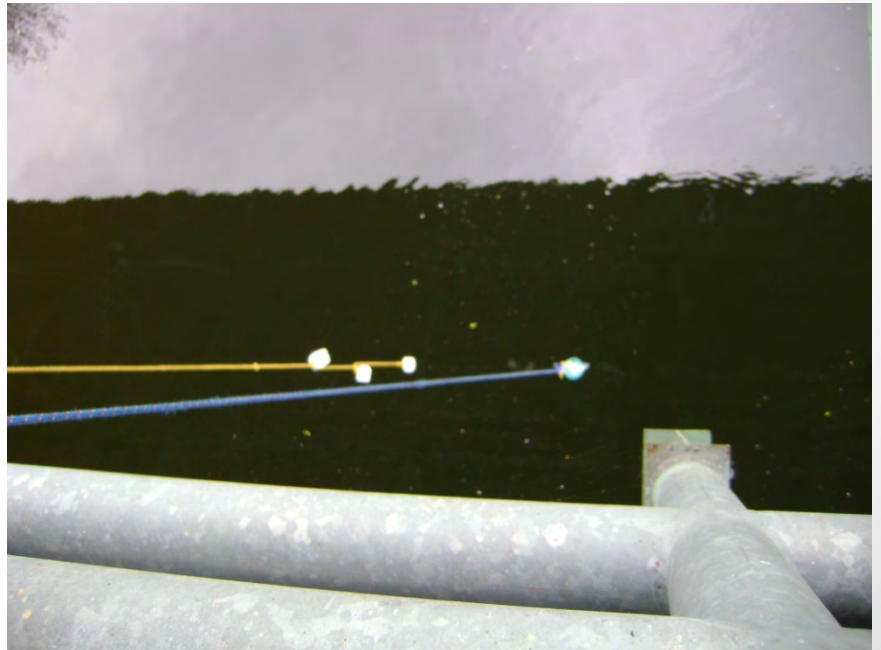
	2014	2009	2014	2009	2014	2009			
	cfs	cfs	TRA	TRA	ASA	ASA	% dif CFS	% dif TRA	% dif ASA
2014 2009									
09/23/14 - 9/21/09	1,630	2,370	29	42.1	26	41.3	31.2%	31.1%	37.0%
09/23/14 - 9/21/09	1,580	2,090	30	37.3	26	39.6	24.4%	19.6%	34.3%
09/24/14 - 9/22/09	1,480	1,700	25	34.2	22	33.6	12.9%	26.9%	34.5%
09/24/14 - 9/22/09	1,320	1,760	28	33	25	33.3	25.0%	15.2%	24.9%
09/25/14 - 9/23/09	1,470	1,620	27	31.9	25	31.8	9.3%	15.4%	21.4%
09/25/14 - 9/23/09	1,380	1,690	31	30.6	24	31.4	18.3%	-1.3%	23.6%
09/26/14 - 9/24/09	1,140	1,570	26	29.8	23	29.7	27.4%	12.8%	22.6%
09/26/14 - 9/24/09	1,140	1,570	28	29.5	27	28.7	27.4%	5.1%	5.9%

Metals Everywhere!



New Ford truck beds
Are made of
Aluminum!

Galvanized steel contains— iron,
Aluminum, nickel, chromium,
copper, tungsten, molybdenum –
zinc oxide coating (sacrificial anode)





Standard Sampling from Hooksett Railroad Bridge

QUESTIONS

