

Amended Flux Chambers Results from Sept 2007

Turner/Jensen

Deployed Two Mud Chambers



Purposes of Experiments

- Building understanding of methylation
- Supply of inorganic mercury for methylation comes from water column?
- How do much higher and much lower water column total mercury affect flux/methylation?
- How does much higher sediment mercury affect methyl flux/production?
- Can manipulations affect methyl production?

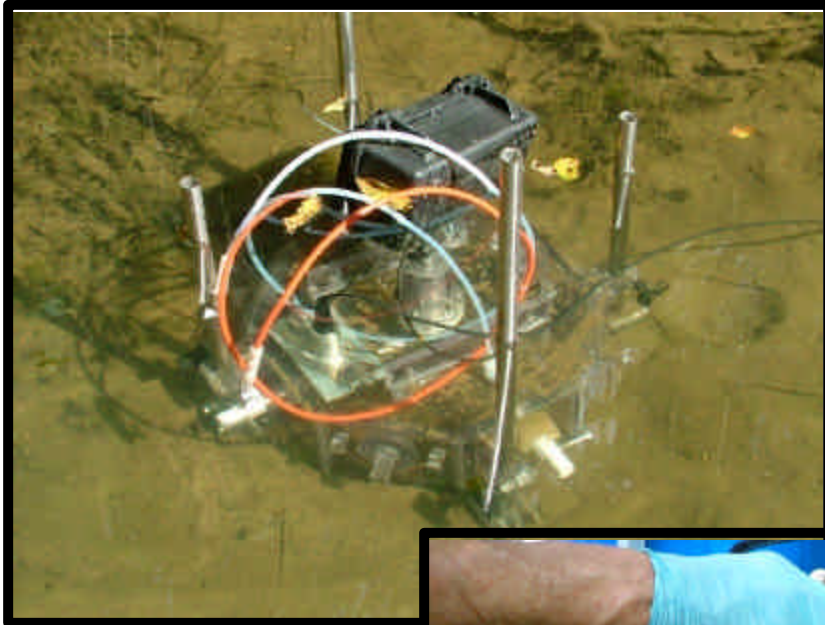
Amended Flux Chambers

Sept 07

- Day 1 - Both unamended
- Day 2
 - #1: Highly enriched soil extract (17X increase)
 - 20X dilution of 9000 ng/L THg, 2.22 ng/L
 - #2: Total replacement with “clean” water from Lyndhurst (35% reduction in filter-passing THg)
- Day 3
 - #1: Soil slurry from elevated Hg bank at Basic Park (3X increase in sediment THg)
 - Acclimated overnight before closing

Photos of Methods

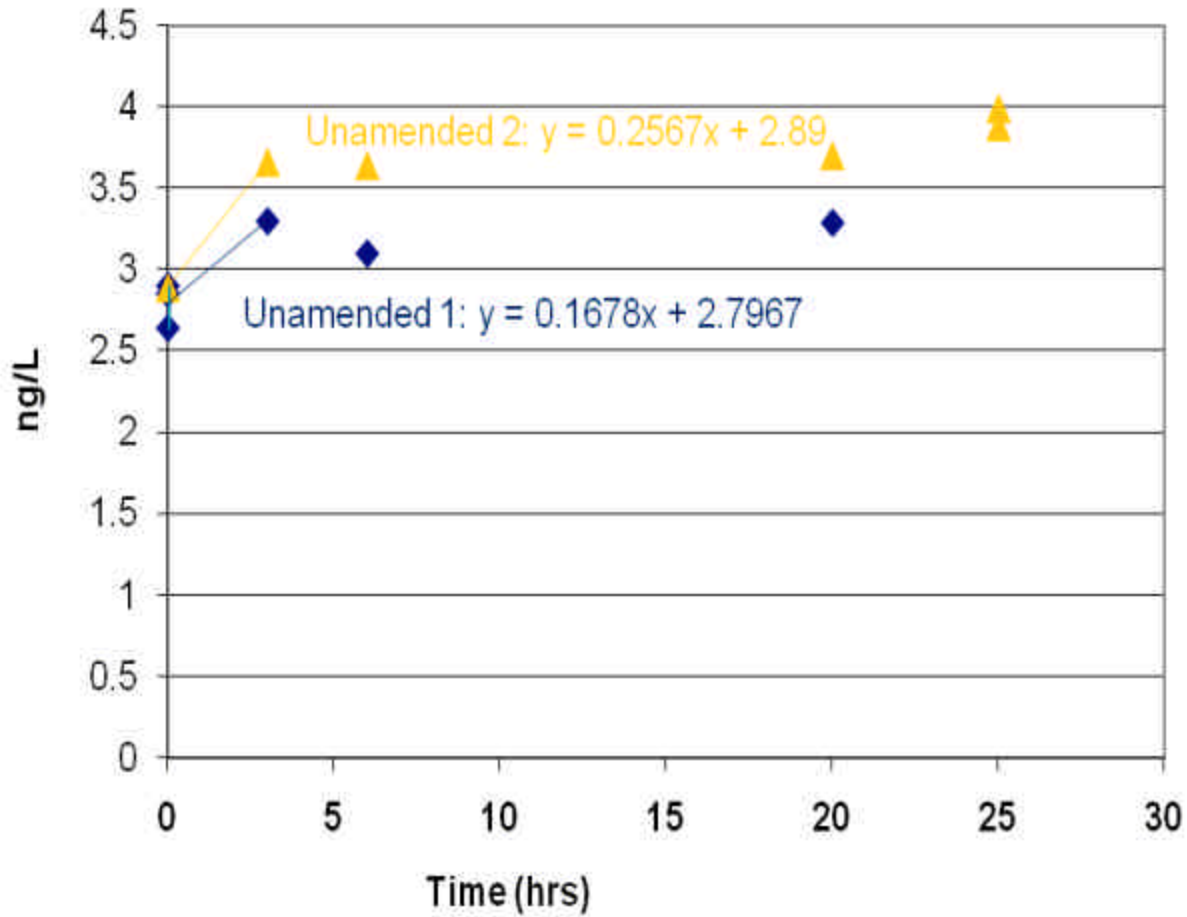
Feed/sample tubes, feed pump, filter funnel



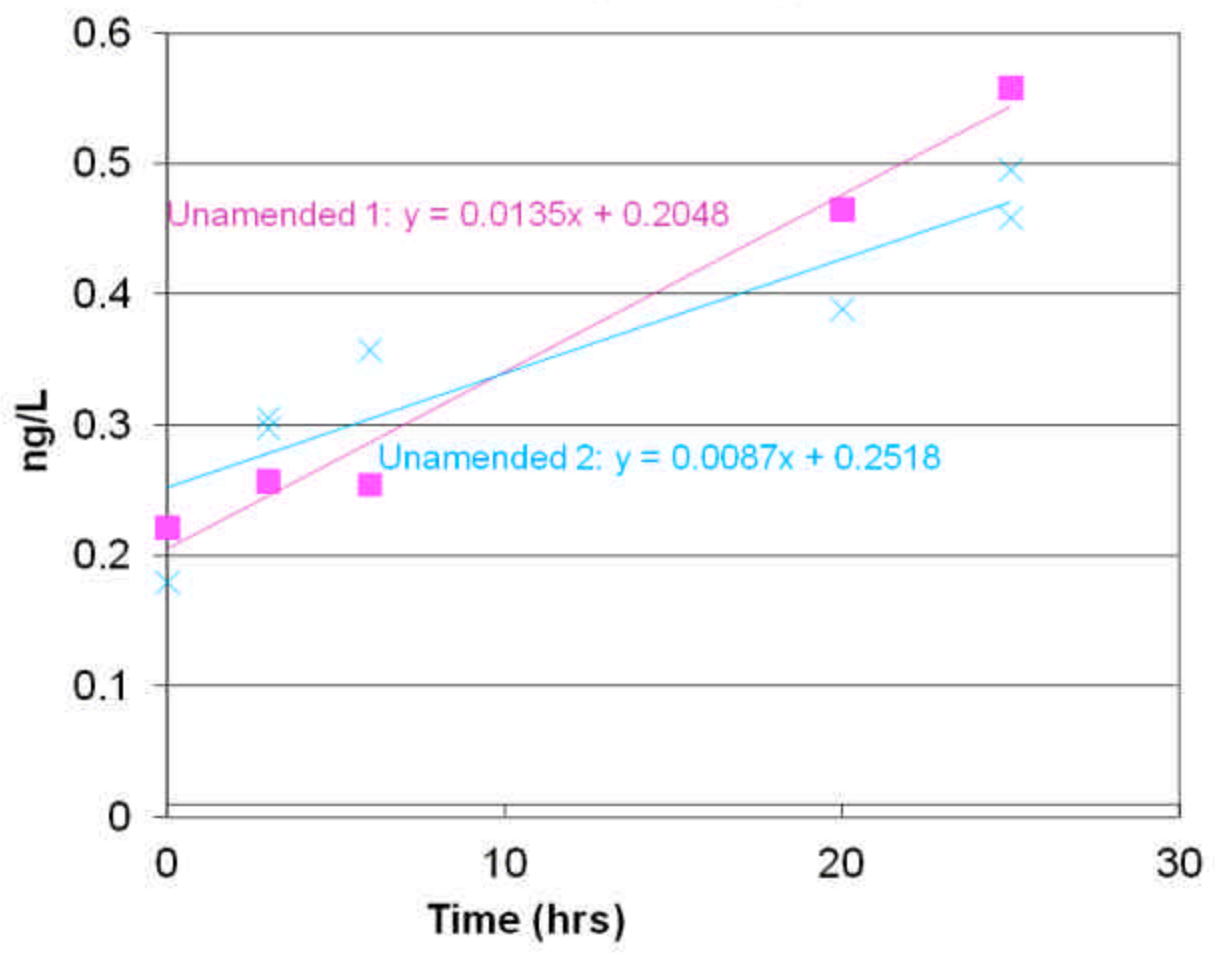
Other Methods

- For clean water exchange, diaphragm pump used to deliver several chamber volumes from large carboy of filtered Lyndhurst Avenue water.
- For soil addition, a slurry was prepared and delivered via funnel and large PVC tube to multiple chamber ports. Slurry allowed to settle and acclimate overnight before beginning experiment in morning.
- Sampling methods the same.
- Full day allowed between experiment days.

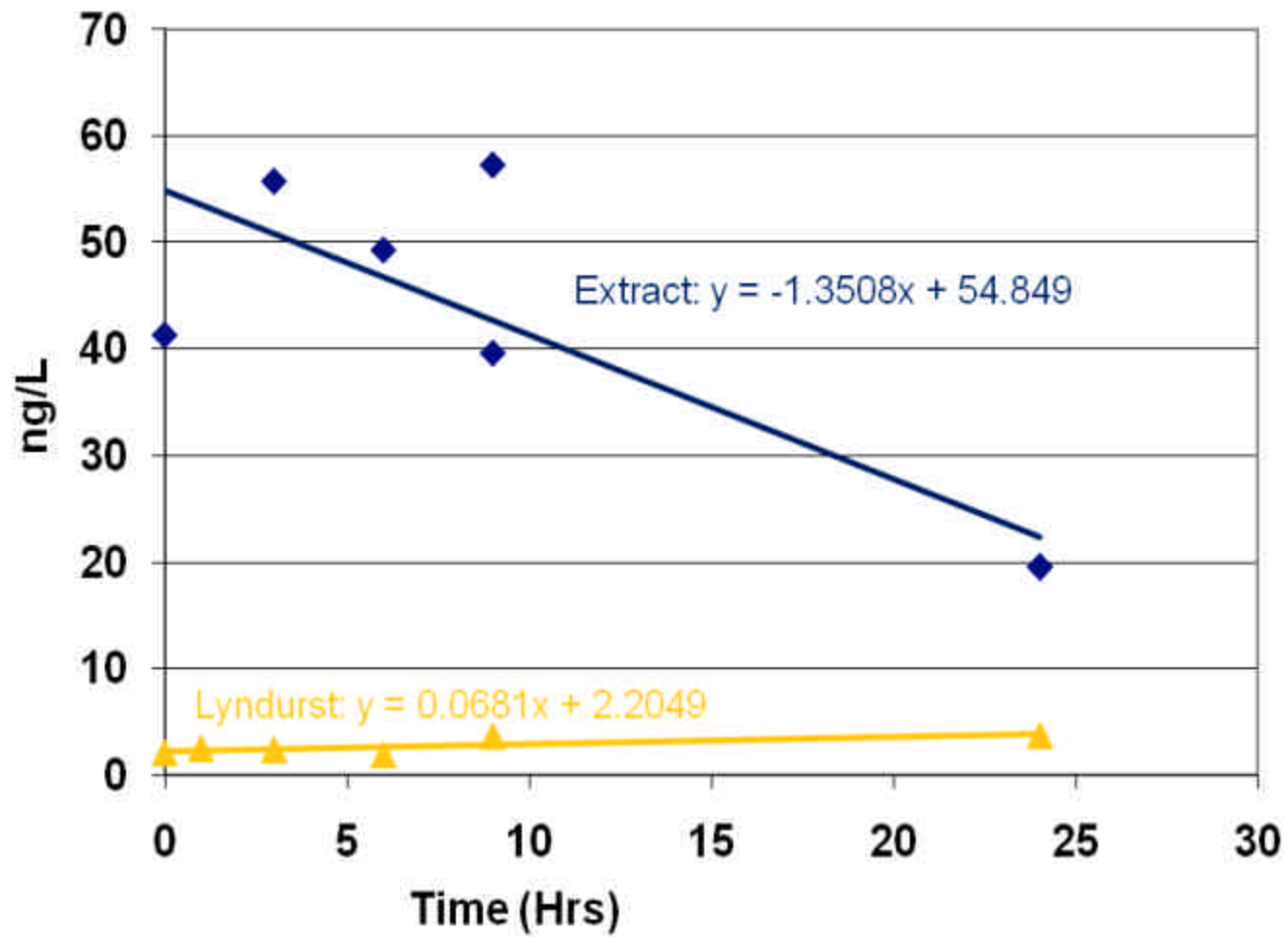
September 2007 Day 1 - Both Unamended Total Mercury



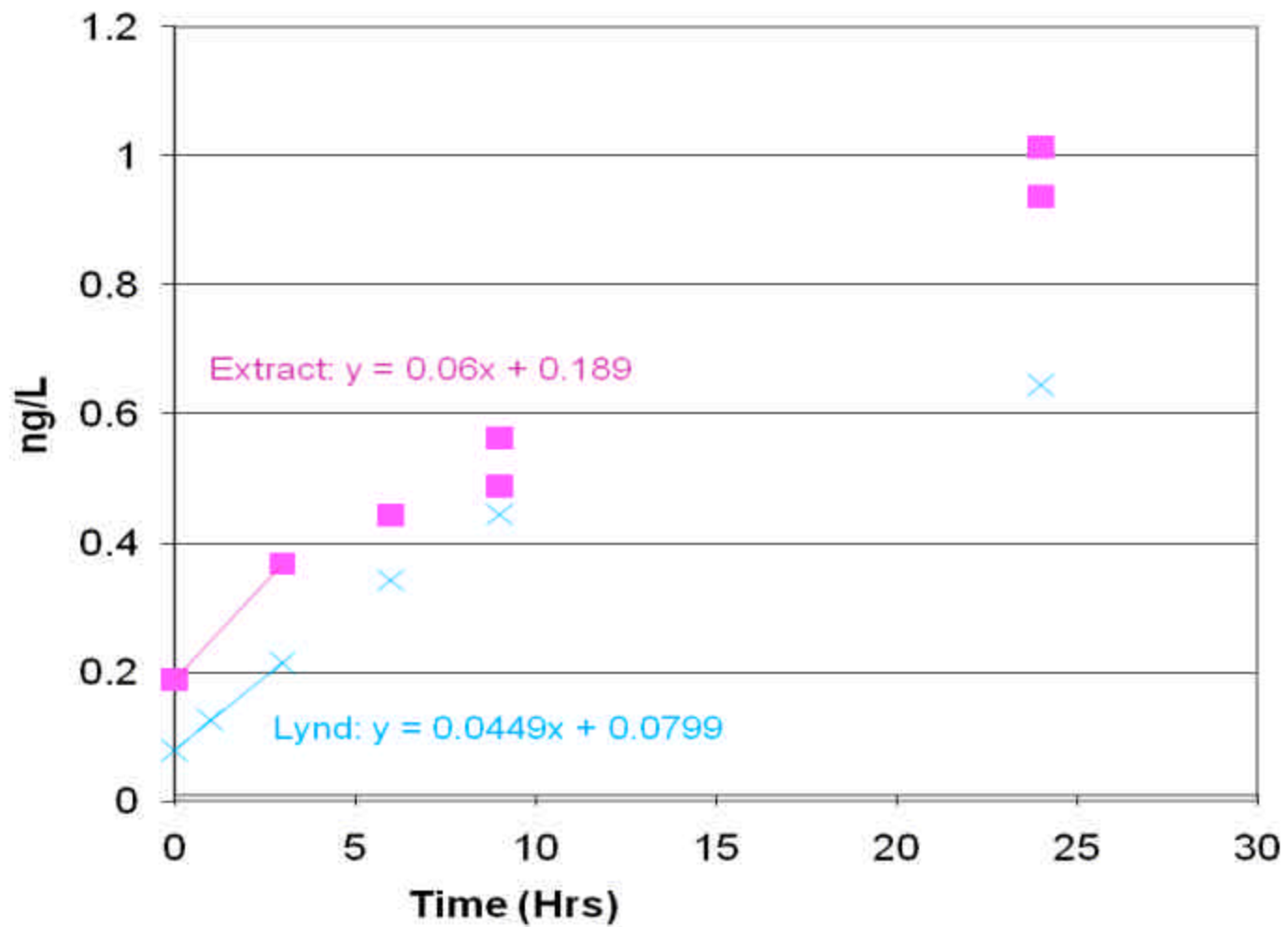
September Day 1 - Both Unamended Methyl Mercury



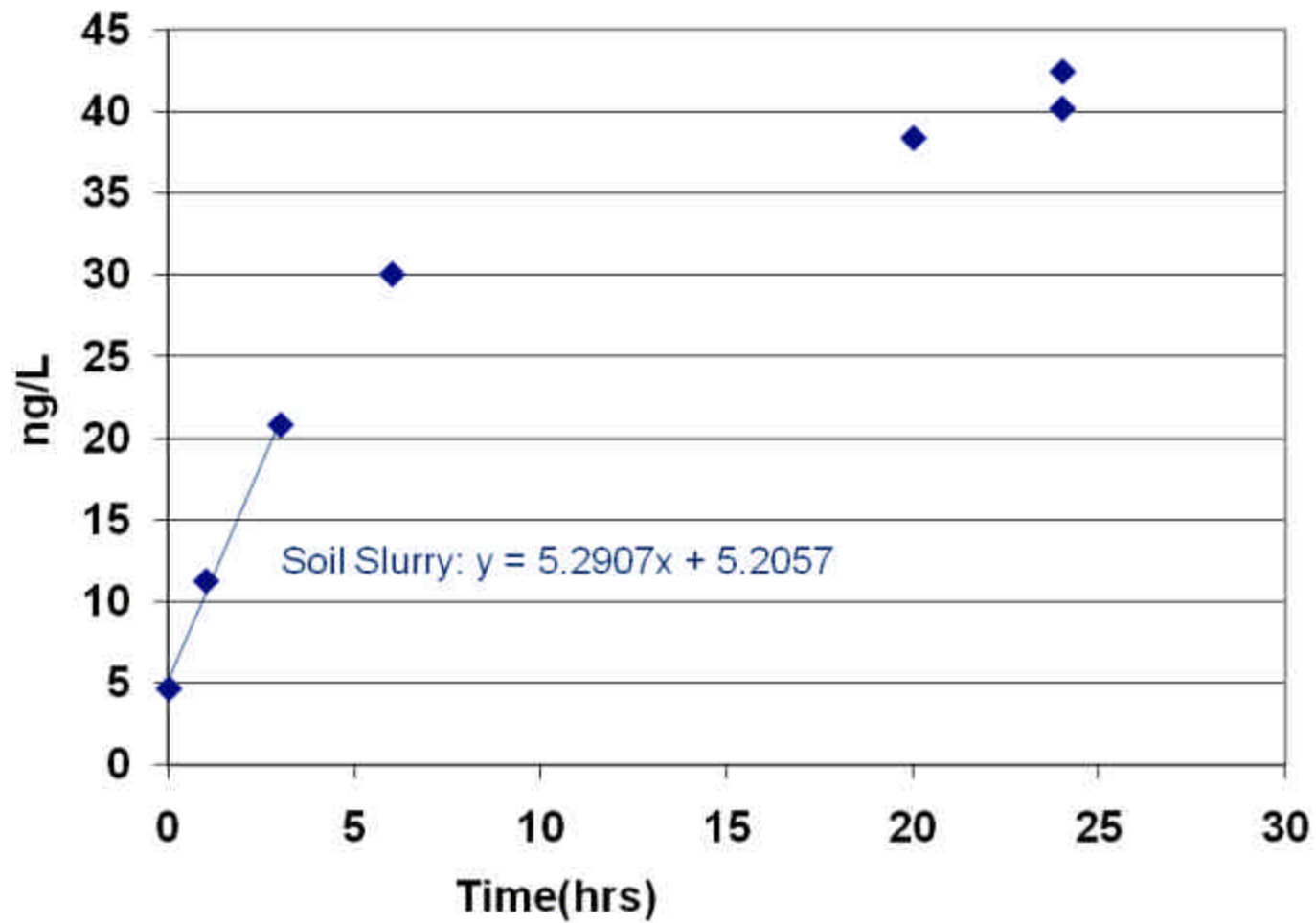
September 2007 Day 2 - Extract & Lyndhurst Water Total Mercury



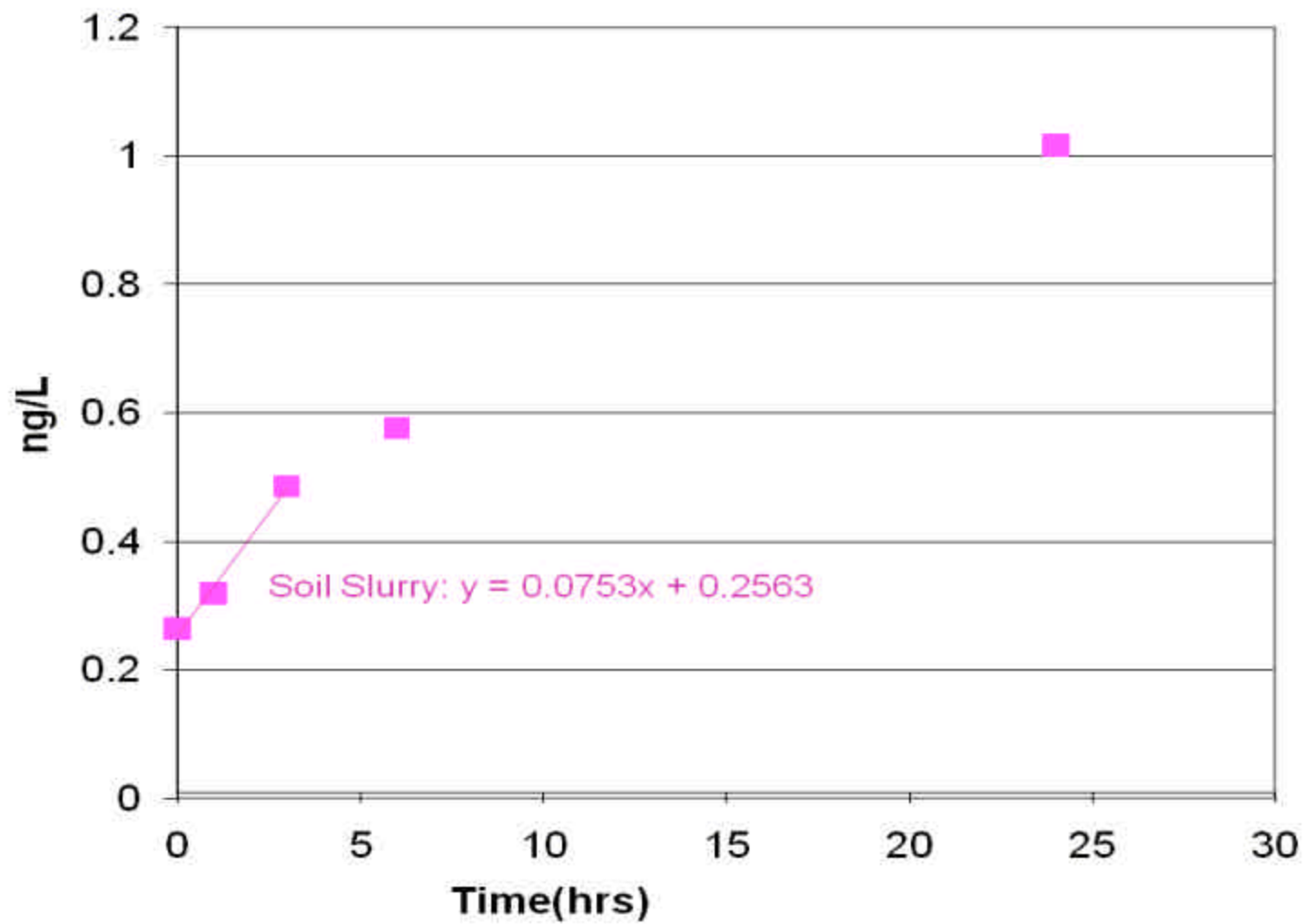
September Day 2 - Extract & Lyndhurst Water Methyl Mercury



September 2007 Day 3 - Soil Slurry Total Mercury



September Day 3 - Soil Slurry Methyl Mercury



Calculated Flux Results for September 2007 Amendments

Total Mercury				
Experiment	Slope	Hours	Day	Flux
	ng/L/hr	Regressed		ng/m ² /hr
Natural-1	0.168	3	1	21.5
Natural-2	0.257	3	1	32.9
Extract	-1.351	24	2	-172.9
LYND	0.068	24	2	8.7
Soil	5.291	3	3	677.2

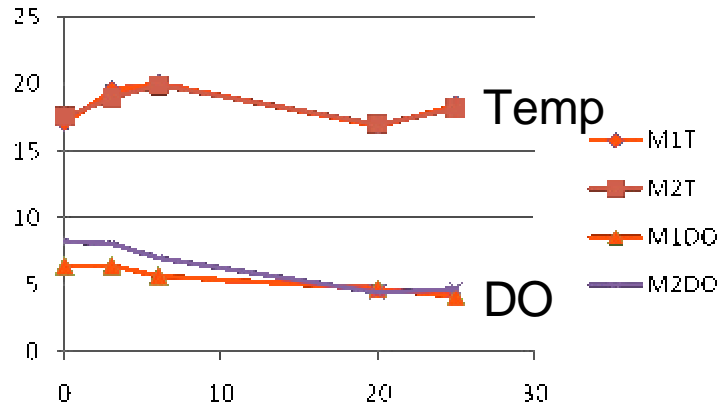
Methyl Mercury				
Experiment	Slope	Hours	Day	Flux
	ng/L/hr	Regressed		ng/m ² /hr
Natural-1	0.014	24	1	1.7
Natural-2	0.009	24	1	1.1
Extract	0.060	3	2	7.7
LYND	0.045	3	2	5.7
Soil	0.074	3	3	9.5

Results of Sediment Beneath Chambers on Day 3 (ng/g, dry)

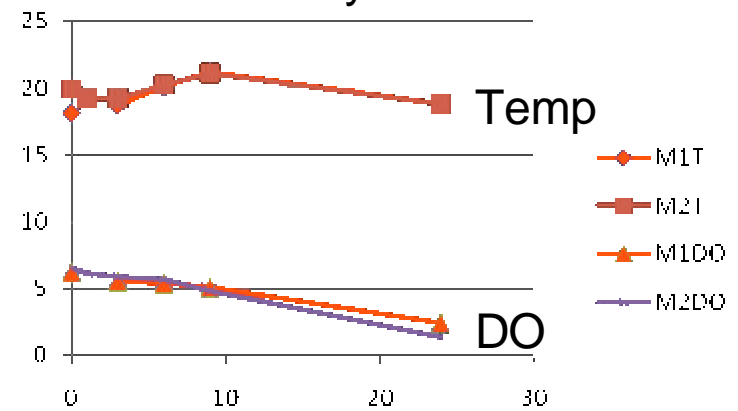
Location	THg	MHg
Inside M1	6,171/6,834	10.4
Outside M1	21,710	18.9/15.8
Inside M2	9,244	16.8
Outside M2	15,498	26.4
Bank soil for slurry delivered to M1	61,041	5.512

Temp & DO

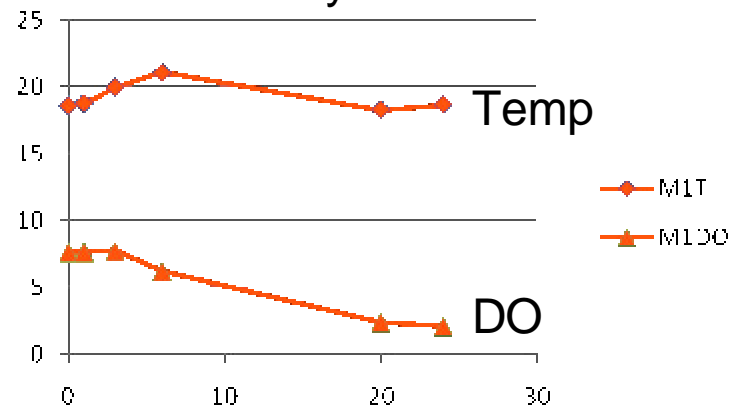
Day 1



Day 2



Day 3



Amended Flux Summary

- Responses to THg in overlying water
 - 17X increase yielded a 5X increase in MeHg flux
 - 35% decrease seemed to **increase** MeHg flux
- Soil slurry produced highest MeHg flux
- Plateau-ing may be due to redox changes at interface (DO decline?) but
- Amended flux results difficult to interpret
 - Unaccounted for loss of THg from soil extract
 - Too many choices when calculating flux
 - Inside/Outside soils – no explanation

Next Steps

- MHg-free amendments would be helpful
- A “sterile” or “SRB-inhibited” test might be informative
- Repeat soil extract amendments in April/May when apparent river-wide methylation rates highest