Upper Deer Creek Regional Stormwater Facility

Effectiveness Study 2006 - 2010

Dana Morton & Greg McGrath

CDM

Features

- Retrofit treatment for 516 acres of tributary area
  - Untreated downtown industrial/residential area
  - Over 70% impervious
- Compensatory treatment via expansion planned for new Jacksonville Courthouse and Library
- 7 acre facility provides flood control
- Adjacent brownfield site requires a hydraulic barrier to keep groundwater pollution isolated
- Performance monitoring

City of Jacksonville NPDES/MS4 Permit

STATE OF FLORIDA
MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT

PERMIT NUMBER: FLS000012 Major Facility

ISSUANCE DATE: October 8, 2002

EXPIRATION DATE: October 7, 2007

City of Jacksonville MS4– Municipal Separate Storm Sewer System Permittee(s):

CO-PERMITTEE(S):

City of Jacksonville
220 East Bay Street
Jacksonville, Florida 32202

City of Atlantic Beach
1200 Sandpiper Lane
Atlantic Beach, Florida 32233-5834

Florida Department of Transportation – District Two
1109 South Marion Street
Lake City, Florida 32025-5874

City of Neptune Beach
116 First Street
Neptune Beach, Florida 32266-6140

Phase I MS4 Monitoring Plans must meet the following goals:

1. Identify potential water quality problem areas related to stormwater runoff that can be targeted for corrective action.
2. Measure the effectiveness of stormwater pollution reduction measures (i.e., BMPs) that have been or will be implemented; and
3. Document pollutant loadings and/or trends in pollutant loadings for specific watersheds or outfalls.

Monitoring Plan

- Seven storm events (0.2 – 1.5 inches)
  - Three dry season (October 1 through April 30)
  - Four wet season (May 1 through September 30)
- Inflow location center of 72 inch inlet pipe designated “UDC1”
- Outflow location 24 inch discharge pipe designated “UDC2”

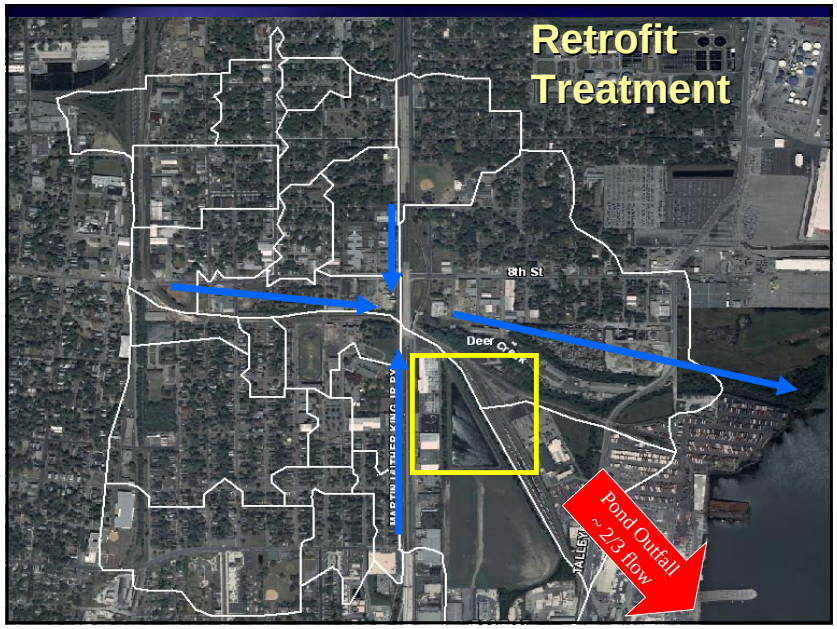
Monitoring Plan Constituents

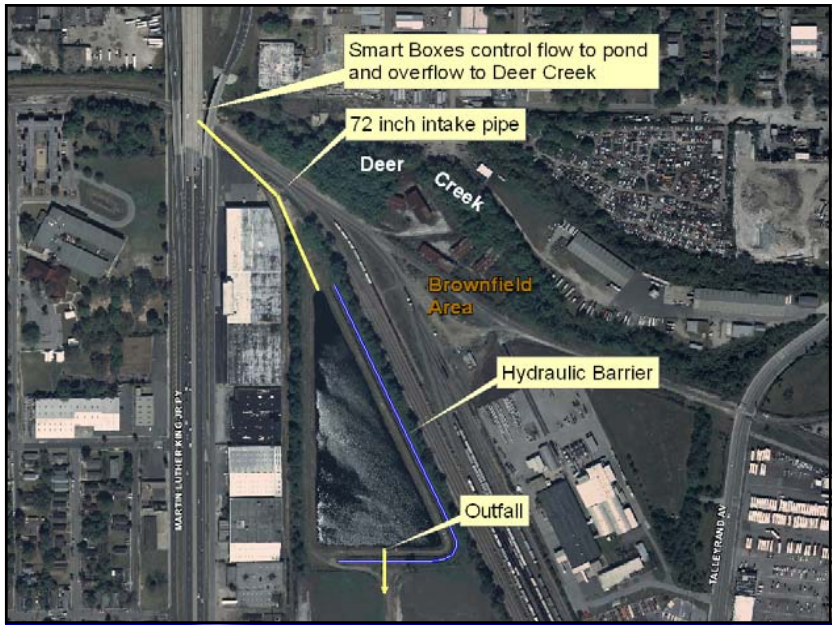
Flow weighted composite:

- NH3, TKN, NO23
- TP, OP
- TSS
- Cd, Cr, Cu, Zn

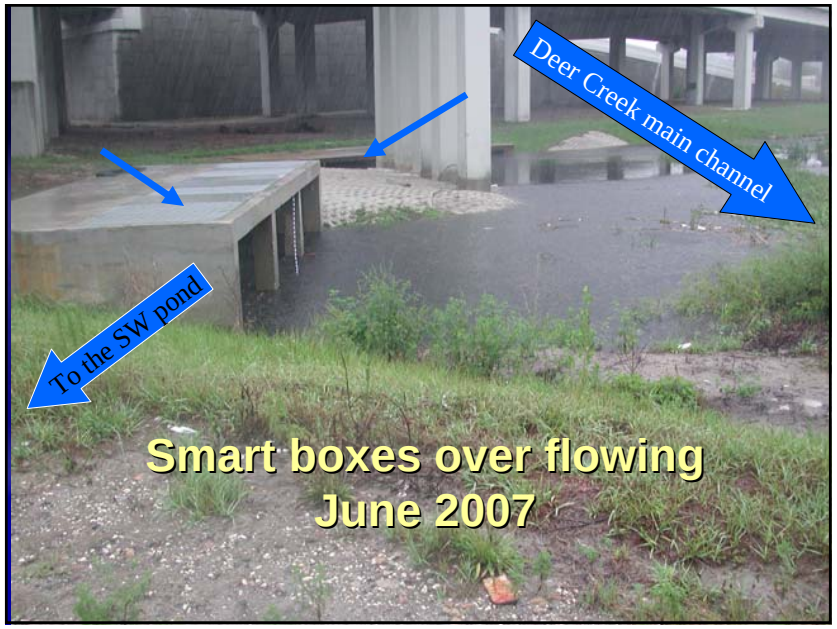
Grab:

- Oil & Grease
- Fecal coliform bacteria


Retrofit Treatment
8th St
Deer Creek
Pond Outfall ~ 2/3 flow

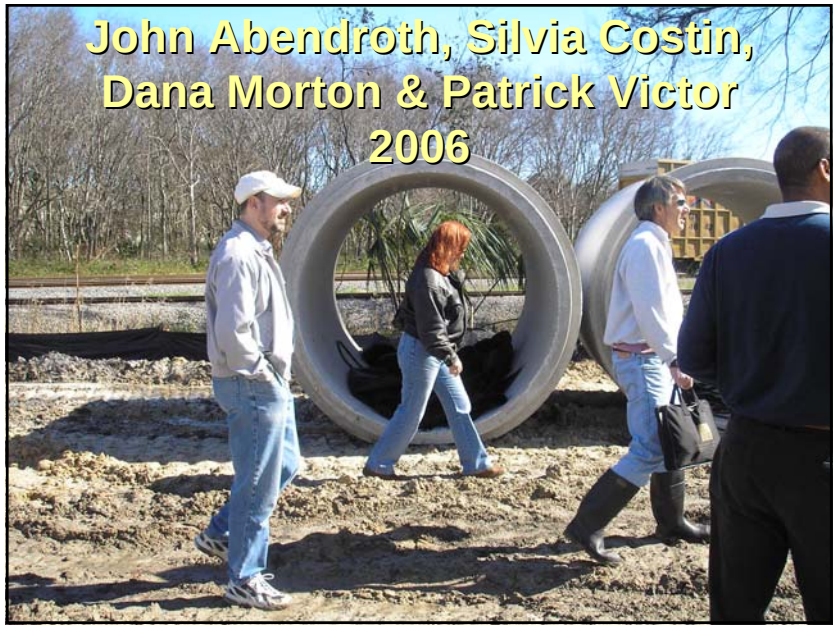

Smart Boxes control flow to pond and overflow to Deer Creek
72 inch intake pipe
Deer Creek
Brownfield Area
Hydraulic Barrier
Outfall

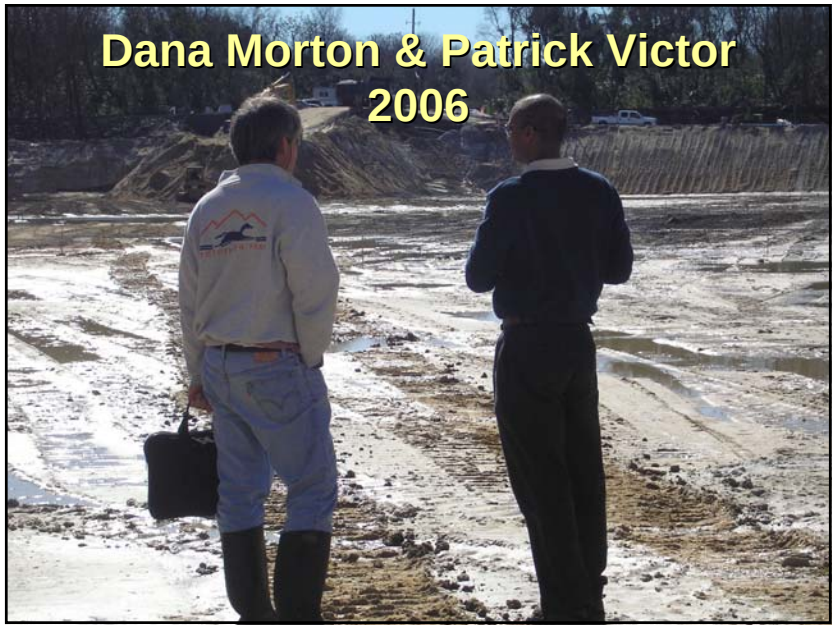

Smart Box (1 of 2)


Deer Creek main channel
To the SW pond
Smart boxes over flowing
June 2007


Under construction
2006


72 inch ID Inlet Structure
2006


John Abendroth, Silvia Costin,
Dana Morton & Patrick Victor
2006

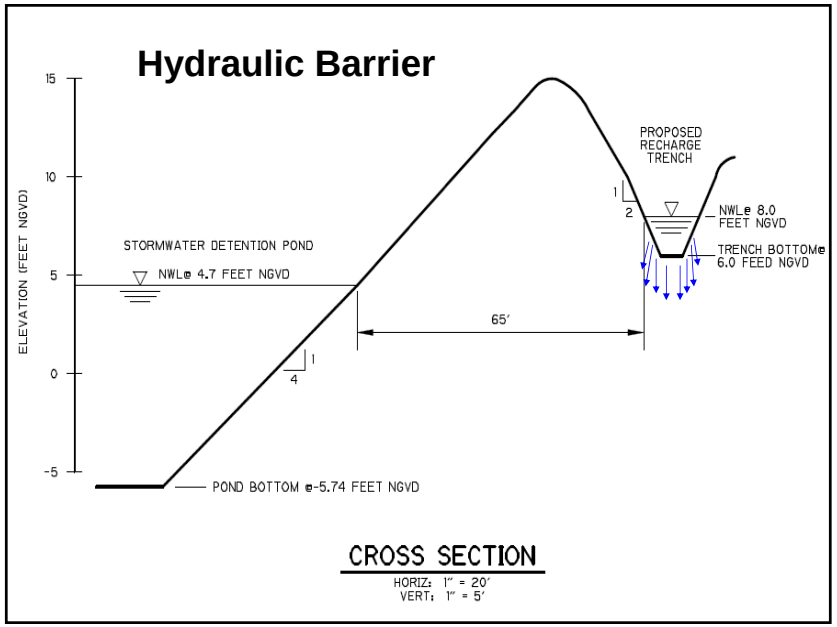

Dana Morton & Patrick Victor
2006

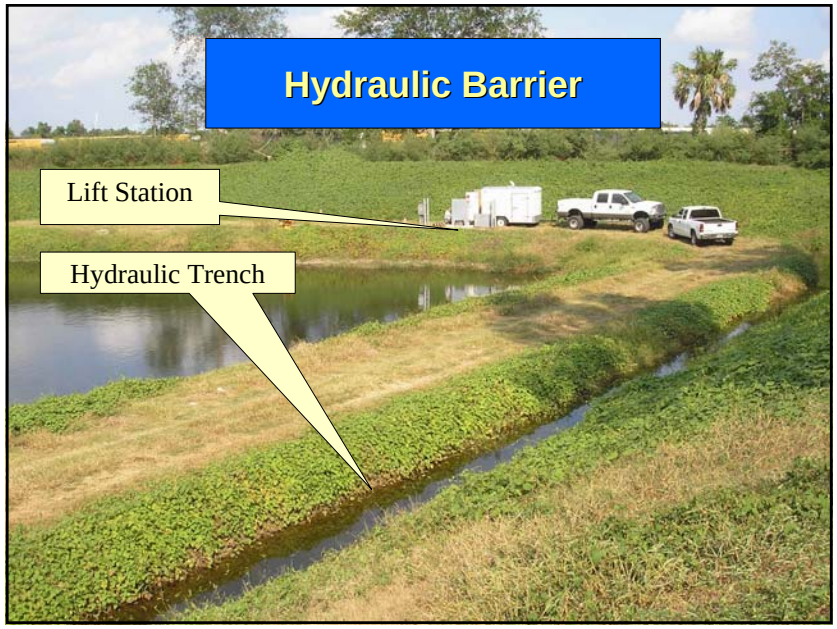

Under construction
2006

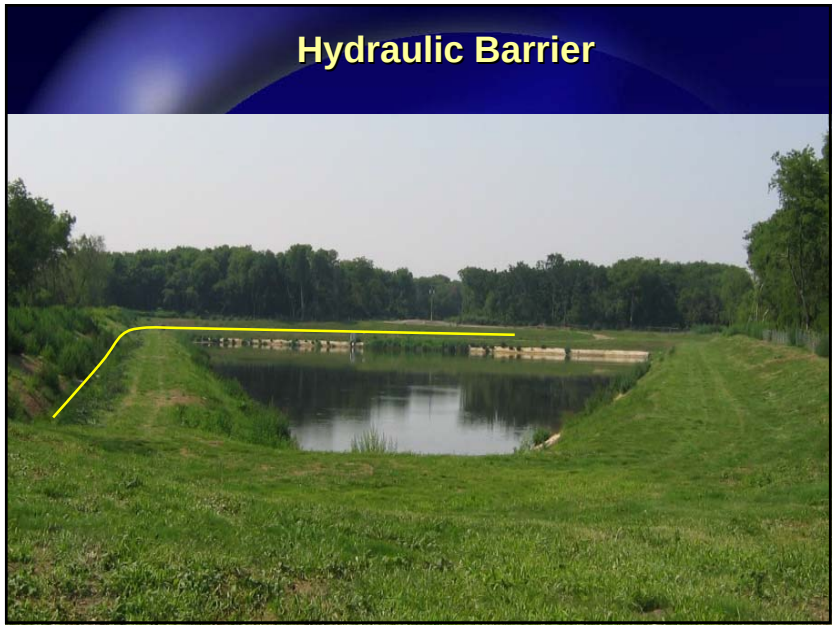

Under construction
2006
2D 3D
Road
Aerial
Bird's eye
Labels
Traffic
bing

Hydraulic Barrier

- Groundwater modeling to characterize transport of contaminants from adjacent brownfields site (MODFLOW).
- Small trench surrounds RSF on elevated grade;
- Constant head applied above water level of pond:
  - Maintained by 500 GPM pump
  - Constant circulation of water from pond, up into trench, and down soil column isolates contaminants (a 'curtain' of water)

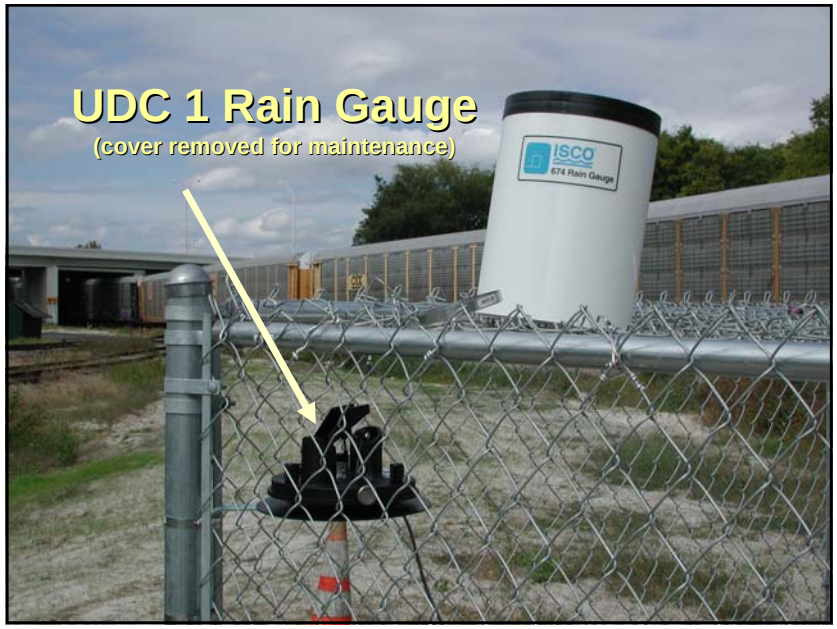


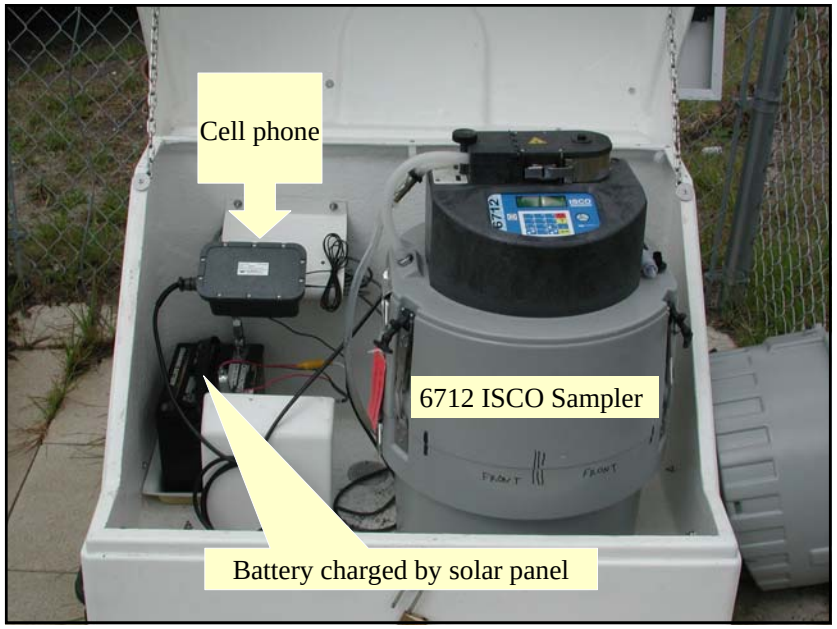

Hydraulic Barrier
Lift Station
Hydraulic Trench

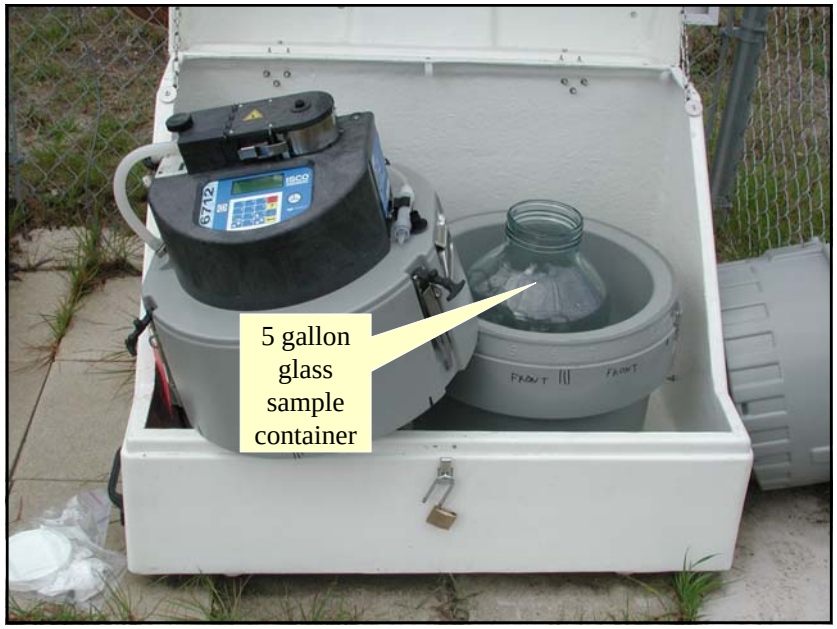

Hydraulic Barrier


July 2009


UDC 1 sampling site under construction
2007


UDC 1 Rain Gauge
(cover removed for maintenance)
ISCO
674 Rain Gauge


Cell phone
6712 ISCO Sampler
Battery charged by solar panel



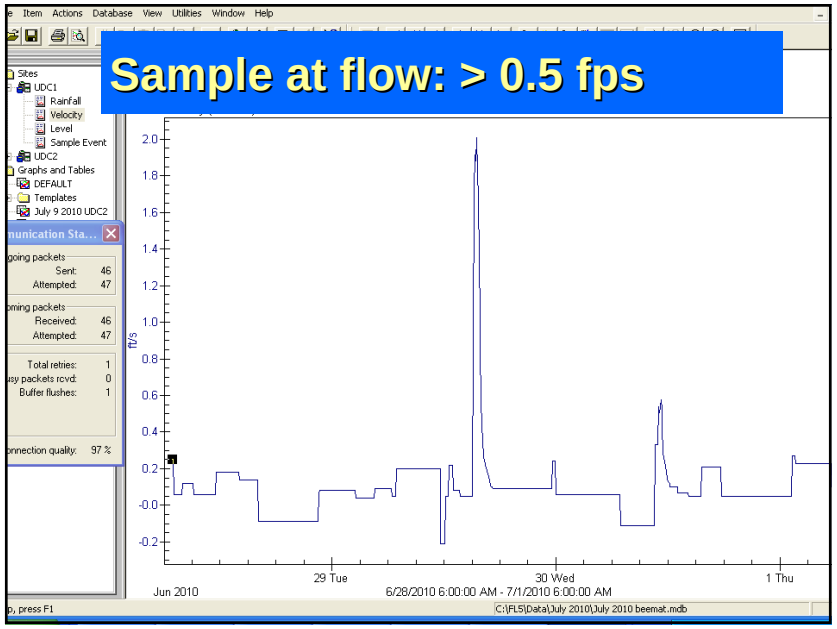
Performance Monitoring at Intake

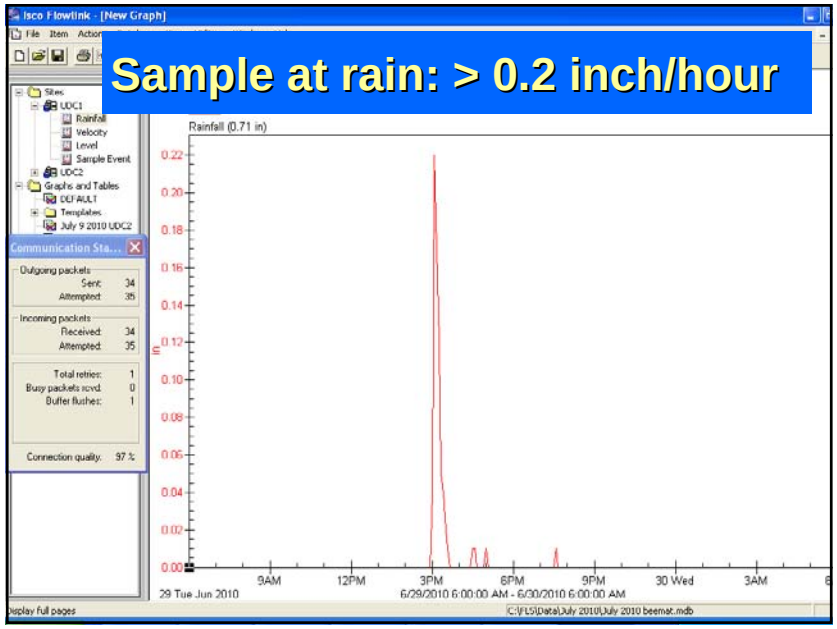
ISCO 750 Area Velocity Meter
ISCO 6712 Auto-Sampler

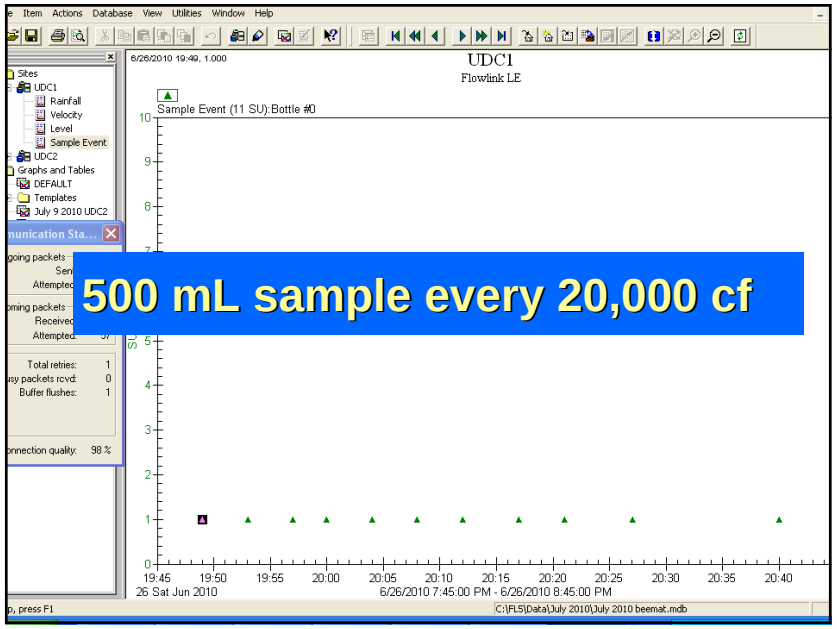

New sampling assembly
ISCO 750 Area Velocity Meter
ISCO 6712 Auto-Sampler

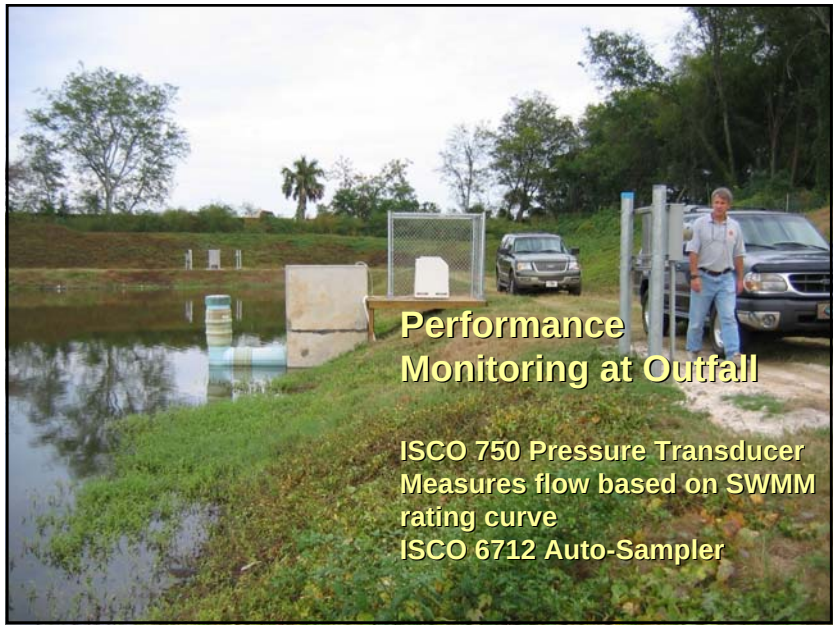

Slightly used sampling assembly

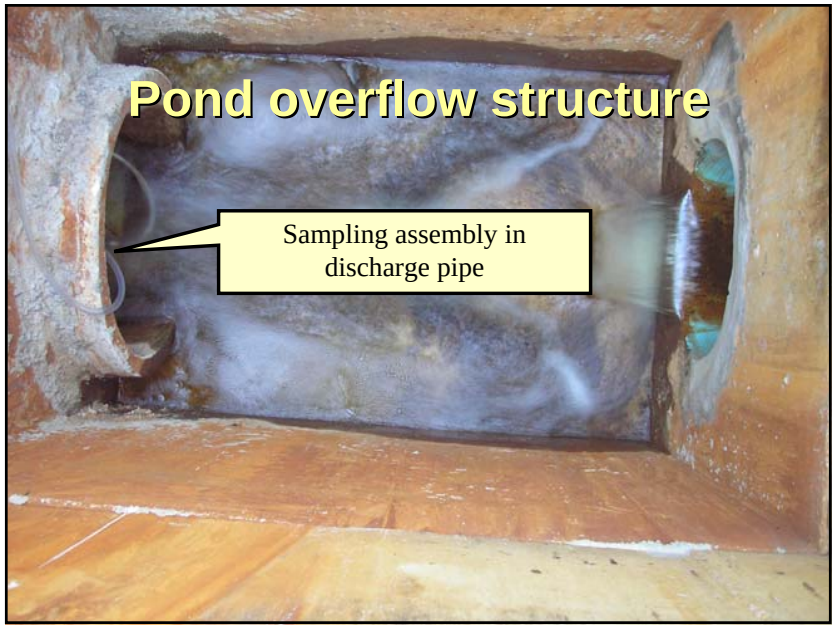

3741
CHEVROLET
UDC1 Clean out trash pile

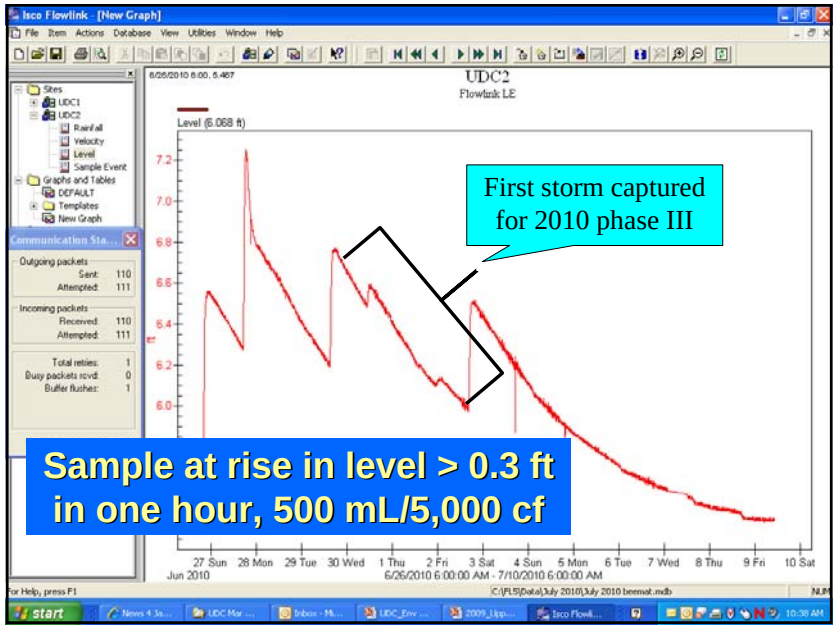

Item Actions Database View Utilities Window Help
Sites
UDC1
Rainfall
Velocity
Level
Sample Event
UDC2
Graphs and Tables
DEFAULT
Templates
July 9 2010 UDC2
Sample at flow: > 0.5 fps
going packets
Sent: 46
Attempted: 47
oming packets
Received: 46
Attempted: 47
Total retries: 1
sy packets rcvd: 0
Buffer flushes: 1
onnection quality: 97 %
ft/s
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
29 Tue
30 Wed
1 Thu
Jun 2010
6/28/2010 6:00:00 AM - 7/1/2010 6:00:00 AM
p, press F1
C:\FLS\Data\July 2010\July 2010 beemat.mdb


Sample at rain: > 0.2 inch/hour
Isco Flowlink - [New Graph]
Rainfall (0.71 in)
9AM
12PM
3PM
6PM
9PM
30 Wed
3AM
29 Tue Jun 2010
6/29/2010 6:00:00 AM - 6/30/2010 6:00:00 AM


500 mL sample every 20,000 cf
UDC1
Flowlink LE
Sample Event (11 SU):Bottle #0
19:45
19:50
19:55
20:00
20:05
20:10
20:15
20:20
20:25
20:30
20:35
20:40
26 Sat Jun 2010
6/26/2010 7:45:00 PM - 6/26/2010 8:45:00 PM


Performance
Monitoring at Outfall
ISCO 750 Pressure Transducer
Measures flow based on SWMM
rating curve
ISCO 6712 Auto-Sampler


Pond overflow structure
Sampling assembly in
discharge pipe


Isco Flowlink - [New Graph]
UDC2
Flowlink LE
Level (6.068 ft)
First storm captured for 2010 phase III
Sample at rise in level > 0.3 ft in one hour, 500 mL/5,000 cf
27 Sun 28 Mon 29 Tue 30 Wed 1 Thu 2 Fri 3 Sat 4 Sun 5 Mon 6 Tue 7 Wed 8 Thu 9 Fri 10 Sat
Jun 2010
6/26/2010 6:00:00 AM - 7/10/2010 6:00:00 AM


Maintenance visits ~ weekly


September 17, 2007
4.90 inches at Craig Airport


Ant balls
September 17, 2007
4.90 inches at Craig Airport


Ant ball


Ants!!!


Ants!!!

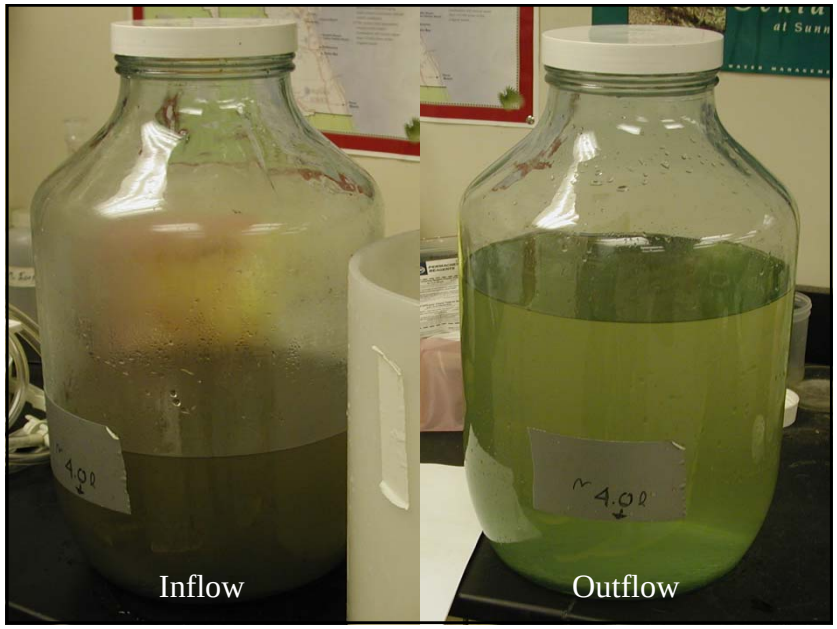

Ants!!!

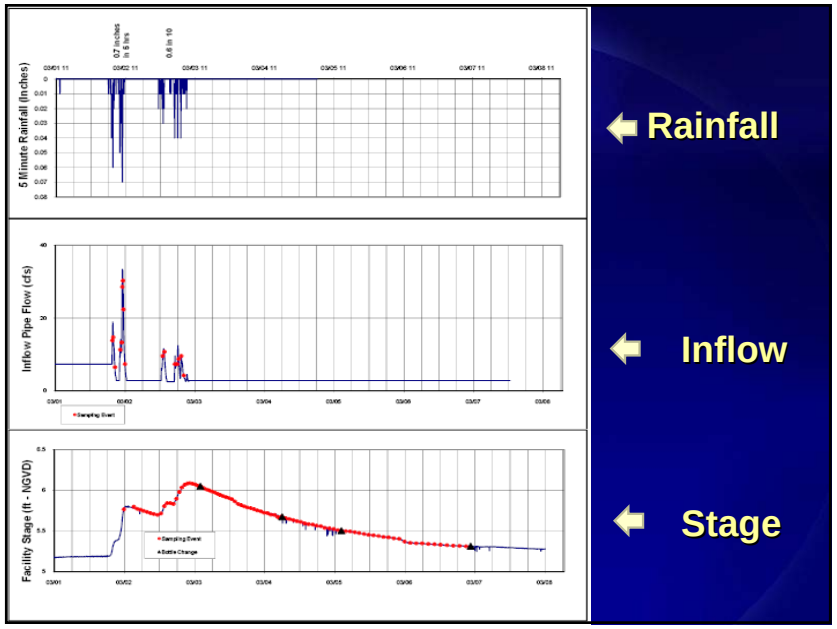

Ants!!!


Ants don’t like mothballs!!

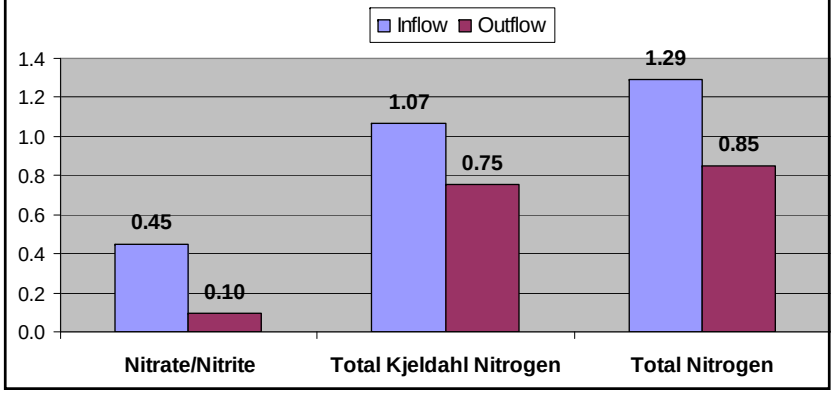
Processing Inflow

Processing Outflow

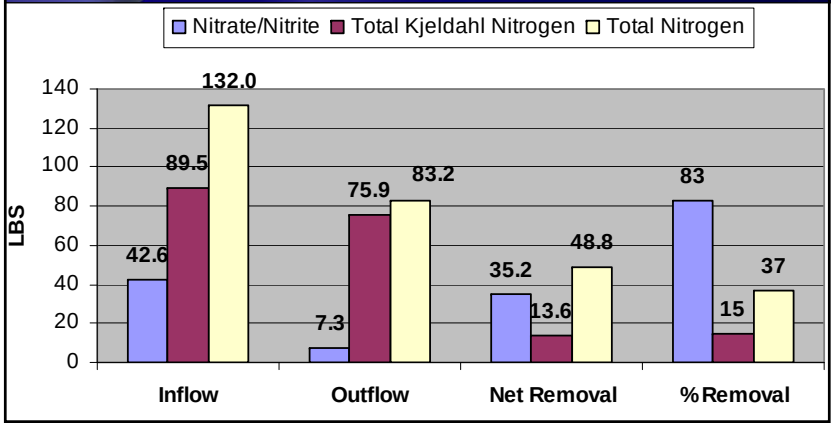

Inflow
Outflow


5 Minute Rainfall (inches)
Inflow Pipe Flow (cfs)
Facility Stage (ft - NGVD)
Rainfall
Inflow
Stage

Nitrogen Event Mean Concentrations (mg/L) Mean for Six Storms



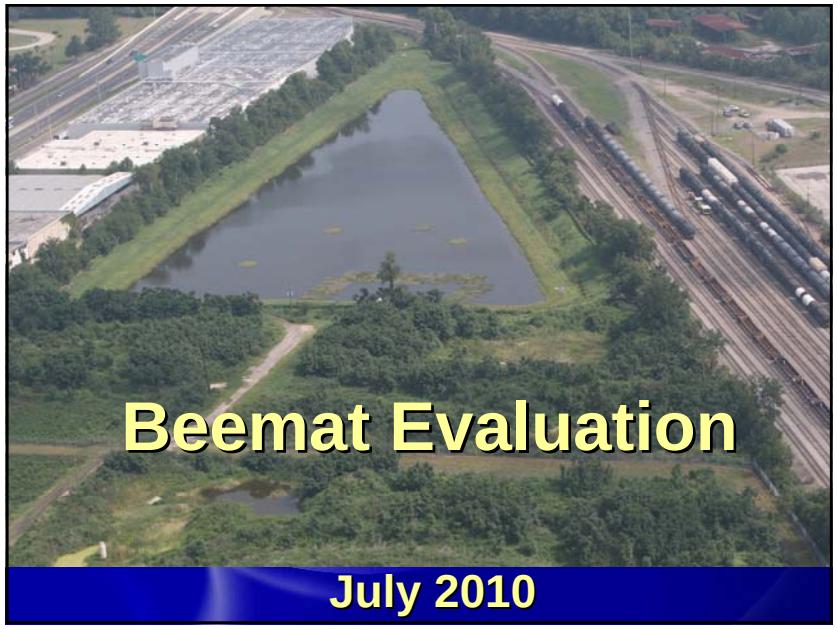
Mass Loadings and Removal in pounds For six storms during study period



Comparison of Expected Removal Efficiencies

Constituent	Published Expected Removal Efficiency (%)	UDC Estimated Removal Efficiency (%)
Total Nitrogen	37	37
Orthophosphate as P	79	27
Phosphorus-Total	69	81
Total Suspended Solids	77	91
Copper	69	82
Zinc	85	94

Construction for expansion to begin this year 5.5 to 12.3 acres.


Beemat Evaluation
July 2010


Building a Beemat

Beemat Evaluation

July 2010