NACWA
2011 Winter Conference

Heart of the Valley MSD:
Clear Water Reduction Program

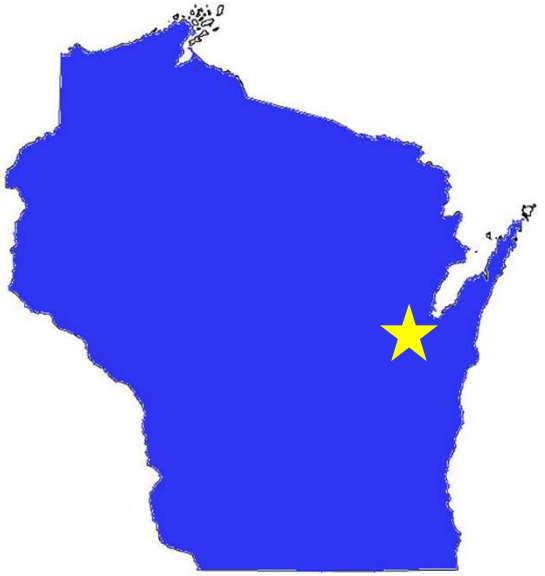
February 3, 2011

Heart of the Valley Metropolitan Sewerage District

DONOHUE & ASSOCIATES

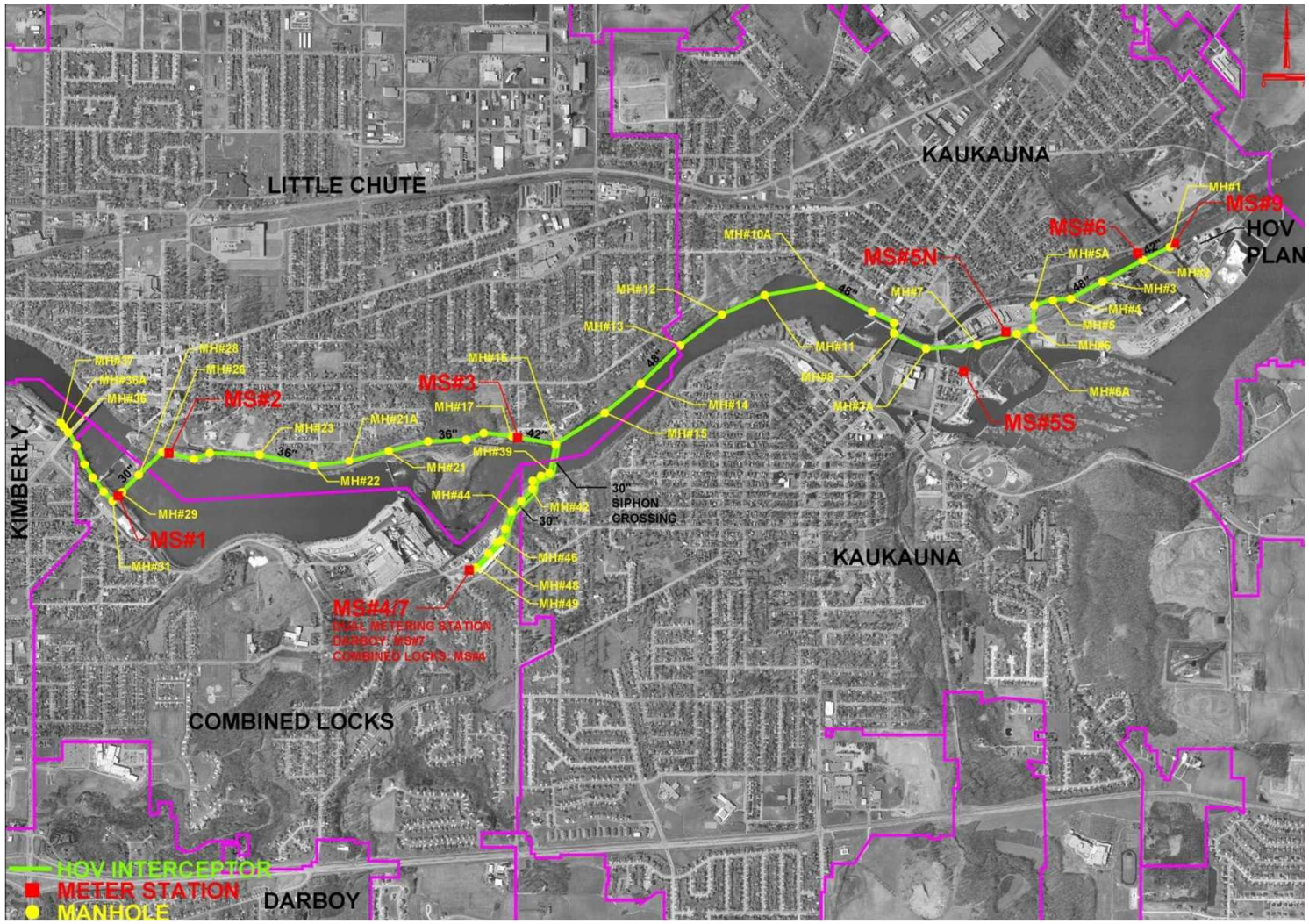
HOVMSD Characteristics

- **Serves over 45,000 people**
- **Includes 5 member communities**
  - City of Kaukauna
  - Village of Little Chute
  - Village of Kimberly
  - Village of Combined Locks
  - Darboy Sanitary District



- **District owns interceptors and plant; Communities own collection system**

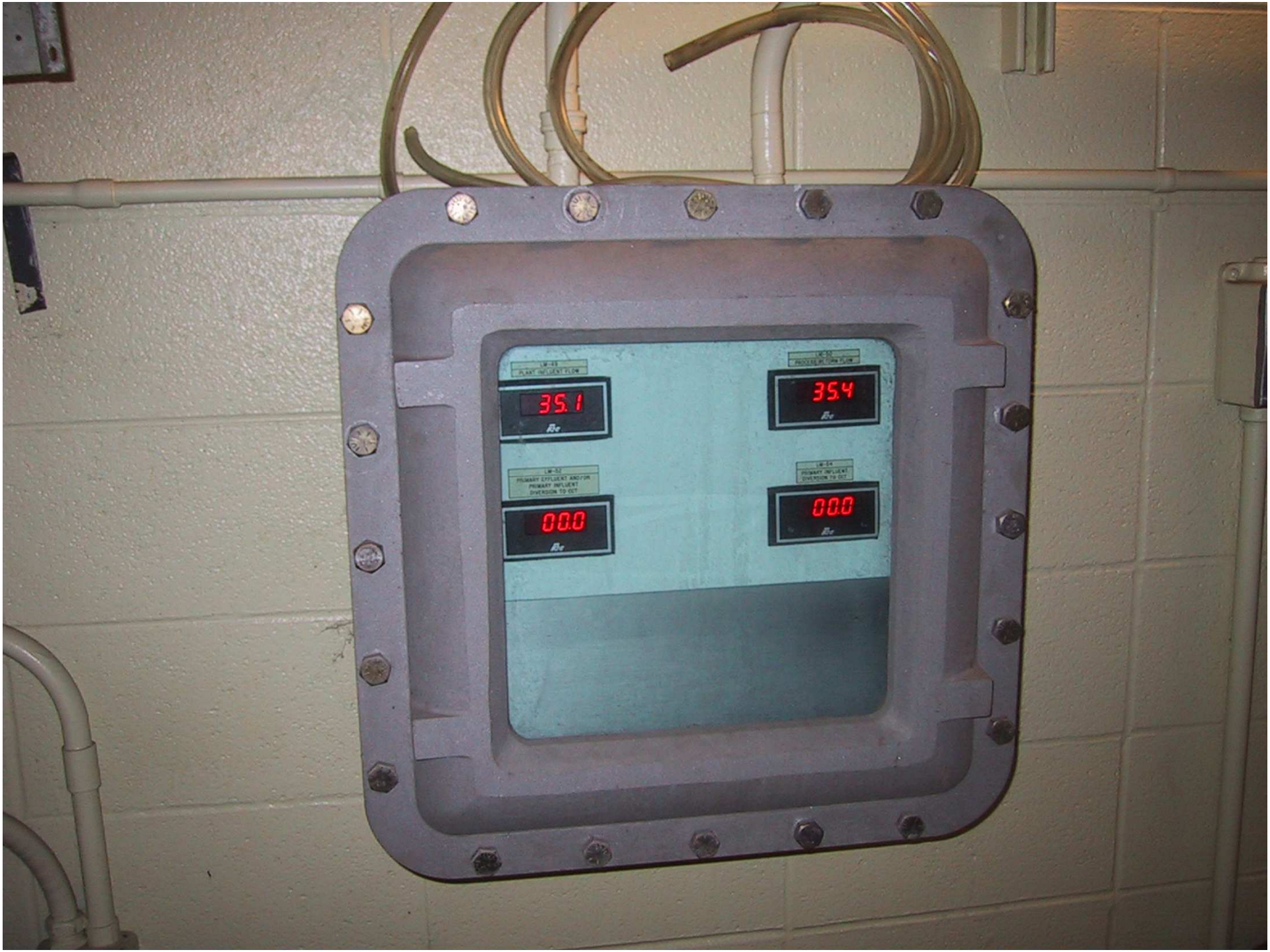
HOVMSD


LITTLE CHUTE
KAUKAUNA
KIMBERLY
COMBINED LOCKS
DARBOY
KAUKAUNA
MS#1
MS#2
MS#3
MS#4/7
MS#5N
MS#5S
MS#6
MS#9
HOV PLAN
MH#1
MH#2
MH#3
MH#4
MH#5
MH#5A
MH#6
MH#6A
MH#7
MH#7A
MH#8
MH#10A
MH#11
MH#12
MH#13
MH#14
MH#15
MH#15A
MH#17
MH#21
MH#21A
MH#22
MH#23
MH#26
MH#28
MH#29
MH#31
MH#35
MH#36A
MH#37
MH#39
MH#42
MH#44
MH#46
MH#48
MH#49
30" SIPHON CROSSING
48"
42"
36"
30"
HOV INTERCEPTOR
METER STATION
MANHOLE

Flow Characteristics

- **Plant flows**
  - Average daily flow 6.5 mgd
- **Daily peaking factors**
  - At the plant is usually 2, recently as high as 7+
  - Individual communities peaked as high 20+
- **Performance**
  - Existing facilities were not capable of handling peak wastewater ➡ sanitary sewer overflows


IN MIRROR ARE
THAN THEY APPEAR


35.1
35.4
00.0
00.0


ON PLATE -0.250--KAISER PRECIS
-LOT 514431--LOT 51445

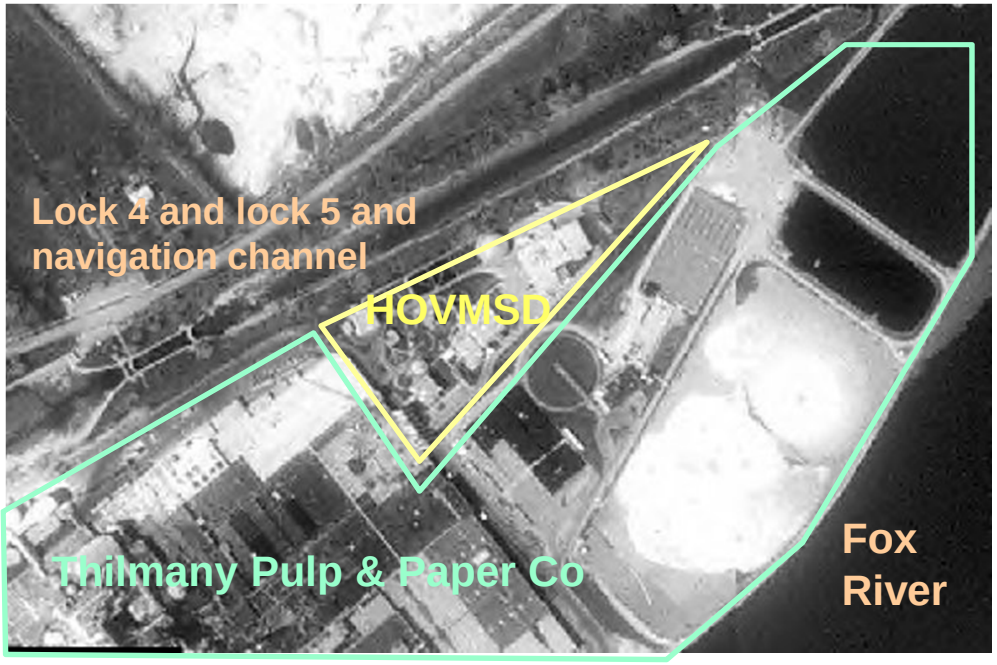

NOTICE
DANGER


MAXCAP 6000

EXIT

The Situation

- Sanitary sewer overflows must be stopped
- Aging infrastructure (1890)
- Landlocked treatment plant site
- Costs for a second or relocated WWTP are prohibitive
- Infrastructure in the river bed (interceptor), capacity is limited, bedrock at or near surface



The Plan

- **Facilities Plan recommended removing 30% of the peak wet weather induced inflow**
  - Improve the existing sewer system
  - Eliminate illicit connections
- **Facilities Plan approved by WDNR**
- **Plant and interceptor upgrade design depends on 30% wet weather reduction**

The Challenge

- **Communities realized that there was an economic benefit to paying surcharge fee for excess flow rather than working toward flow removal**
- **Financial incentive-loan program by HOVMSD**
  - Early attempts to remove clear water had mixed success
  - Some communities pursued programs to identify and remove clear water; others diverted funds to finance related projects
- **Variable Community Situations**
  - Age and condition of sewers, residential/industrial mix of service area, tax base
- **Finger Pointing:**
  - "We made significant financial investments on our own, they didn't"
  - "Delinquent communities are the source of the problem"

The Challenge

- Reverse *Field of Dreams* mentality—"If we ignore them, they will go away"
- Communities believed that the 30% clear water reduction goal was not realistic, fair, or equitable

- End result—little if any actual wet weather flow reductions were achieved
- Financial disincentives were insignificant compared to the large rehabilitation costs

The Approach

- Develop fair and equitable goals for individual communities
- Develop an atmosphere of open communication
- CMOM review used as a starting point
- Compliance with enforcement

The Approach

- Sewer System Evaluation Survey
- Develop an 8 year action plan
- Revise user charges
- Cross the public-private line
- Revise ordinances and construction standards
- Provide continual support to District communities

Fair and Equitable Goals

- Initially, all individual community reduction goals were 30% of inflow – abandoned
- USEPA definition of excess inflow (greater than 275 gpcd) was used to define problematic sewerage systems and re-proportion community-specific reduction goals (communities varied from 150-750 gpcd)
- Reviewed system capacities to determine if flow reductions would result in SSO reductions

Fair and Equitable Goals

- **Community Specific Goals:**

Combined Locks	35%
Darboy	0%*
Kaukauna	35%
Kimberly	40%
Little Chute	25%

*Collection System installed in 1980

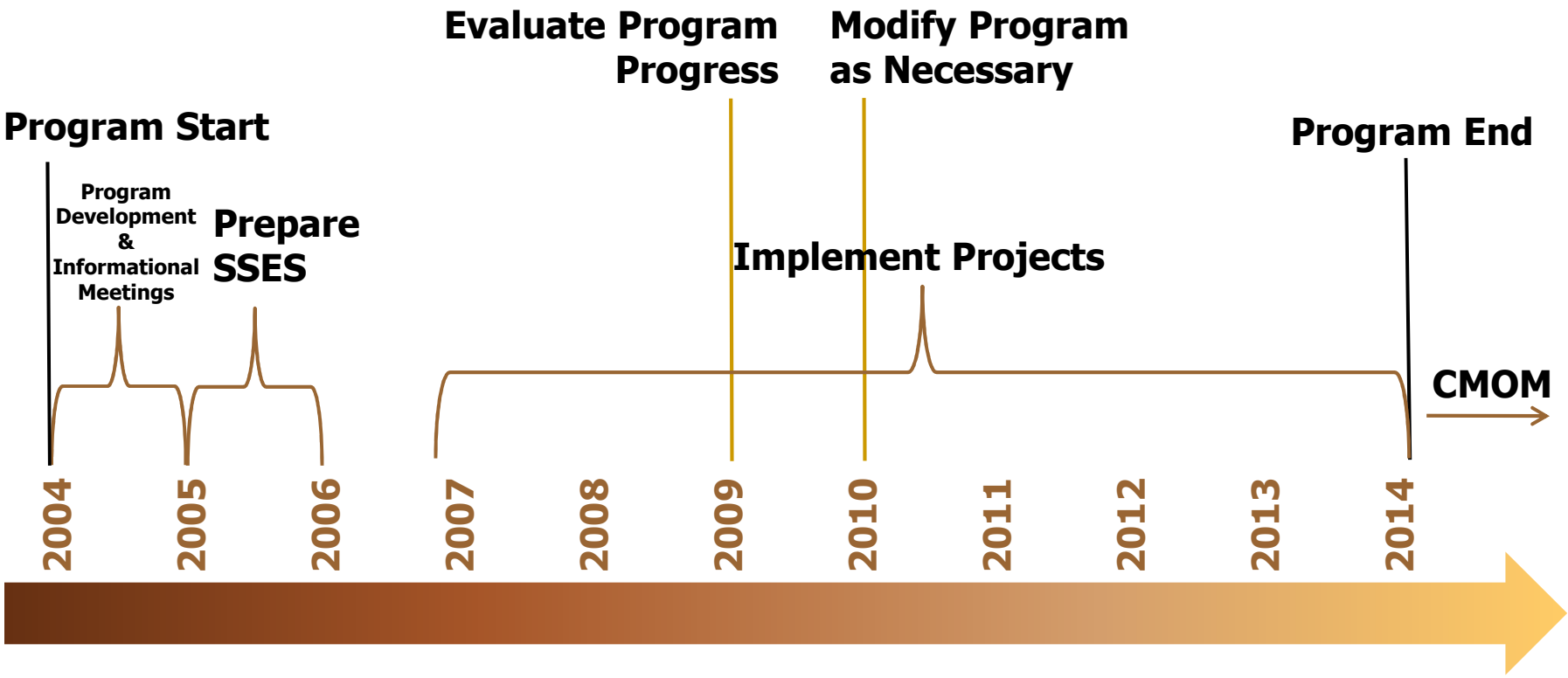
Open Communication

- **Develop a *Technical Advisory Committee***
- **Develop technical memoranda**
- **Attended by administrators and public works representatives from each community**
- **Disseminate and share information**
- **Meetings focus on a single topic: some administrative, some technical**
  - Clear water reduction goals
  - SSES plans
  - Private lateral investigation and rehabilitation
  - Product demonstrations
  - Progress updates

Open Communication

- **Information exchange examples**
  - Smoke testing results
  - Wet Weather physical inspections
  - Mini-storm sewers
  - In-house inspections

Program Schedule



Compliance with Enforcement

- **Voluntary compliance is naive**
- **Pursuant to Wisconsin Statutes, *Special Orders* are issued:**
  - Serves as an enforcement mechanism
  - Provides uniform direction for requirements and deadlines
  - Establishes forfeiture for failure to comply
- **First Special Orders: SSES first two years**
- **Future Special Orders: Community specific projects on a two year basis**

Noncompliance with Costs

- Flow based surcharges were implemented
- Financially encourages communities to immediately start clear water reduction projects
- Heavy costs for peaking during wet weather
- Surcharges have ranged from $0 to $29,000 per month—annually up to $103,000 for a community of 14,000 residents
- Surcharges eliminated based upon community cooperation

Crossing Public – Private Lines

- **Major political issue**
- **Based on clear water reductions for typical system repairs, some communities could not achieve their reduction goals if they only improved public utilities**
- **Private laterals and connections have one of the biggest impacts on clear water reduction; half of the lineal footage of the sewer system**

Crossing Public – Private Lines

- Communities educated public with video evidence of deficiencies and illicit connections
- Sample inspection reports, ordinances, and rehabilitation methods were presented to communities for their use
- Communities shared information and ordinances to present the public with a consistent approach to private sewerage issues
- Informational brochures developed for the general public for use by all communities

HOVMSD Sewer Ordinances

- Replace older laterals as part of roadway projects
- Inspection at sale of property
- Encourage mini storm sewers
- HOVMSD oversight authority strengthened to inspect and approve new construction

Lateral Replacements

- Replace on older house construction (Pre-1960s) as part of roadway projects (all communities)
- Road construction scope of services billed to homeowner, renovations by landowner (Kimberly and Combined Locks)
- Resident has option to televise laterals to prove compliance with plumbing standards (Combined Locks and Kimberly)
- Regularly scheduled in-home inspections (Darboy and Kimberly)

Periodic Inspections

Illegal sump pump hook up
BEFORE

AFTER

Periodic Inspections

Water runs into the sanitary sewer when the valve is open

Water goes to the sump pump when the valve is closed

– WARNING –

SUMP PUMP WATER DISCHARGED INTO SANITARY SEWER WILL BE FINED $250.00 PER DAY PER VIOLATION.

Ordinance 83-6.

DARBOY JT. SANITARY DIST. NO. 1

Sometimes it's easy to know when a 'fix' isn't technically working as it was intended…


There I Fixed It


There I Fixed It


There I Fixed It

But with inflow and infiltration projects, the answer isn't always obvious.

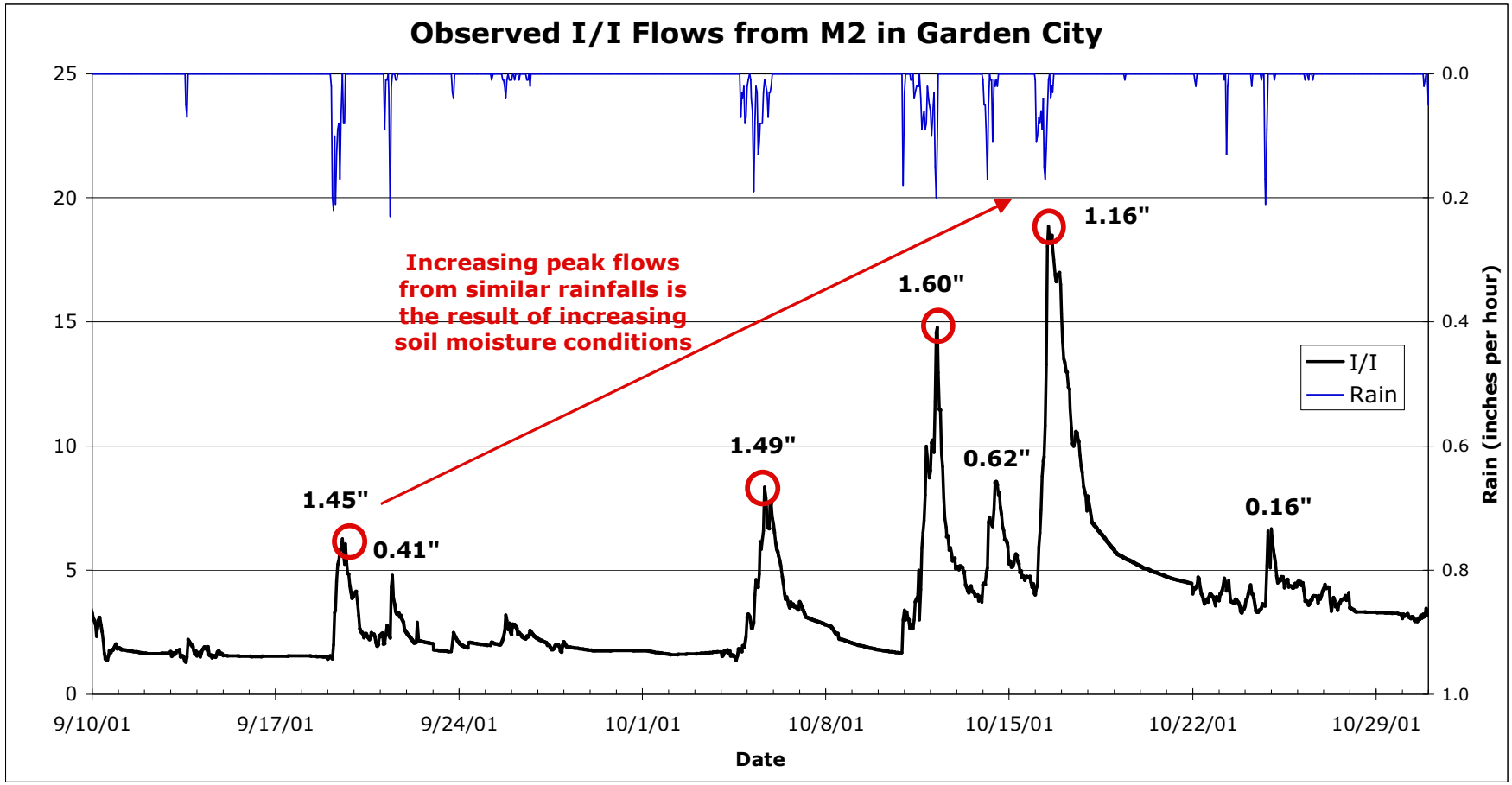
How do we accurately and quickly determine if 'fixes' are having the intended results?

Program Evaluation Tools

- **Previous evaluation tools have limitations**
  - Antecedent moisture fluctuations
  - Need big rainfall events
  - Need time to develop trends
- **Improved technology introduced options**
  - Antecedent Moisture Model

Hydrologic Model Description

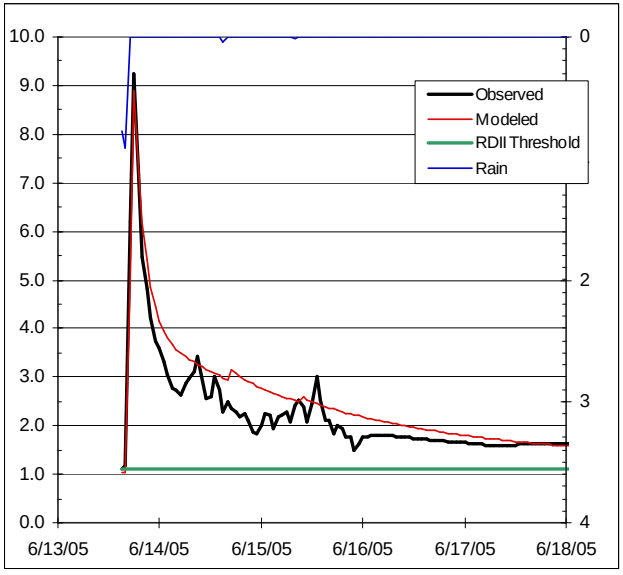
-Effects of Antecedent Moisture on Wet Weather Flows-



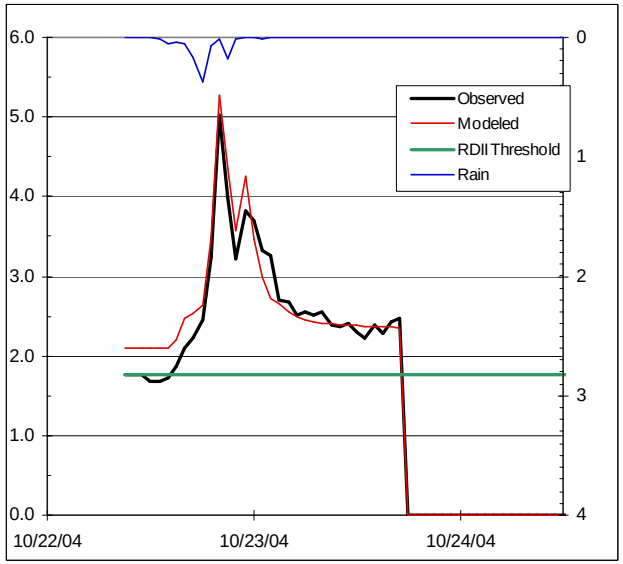
Model Calibration/Validation

-Pre-rehabilitation models-

Little Chute Pre-Rehabilitation Calibration Results		
Storm	**Peak Flow Error (%)**	**Volume Error (%)**
10/22/04	-2.4%	10.5%
10/28/04	12.3%	-8.6%
06/13/05	-3.8%	23.7%
08/18/05	7.6%	-9.6%
08/26/05	-8.1%	-9.9%
05/10/06	14.2%	5.6%
Net Average Error	3.3%	2.0%
Total Average Error	8.1%	11.3%



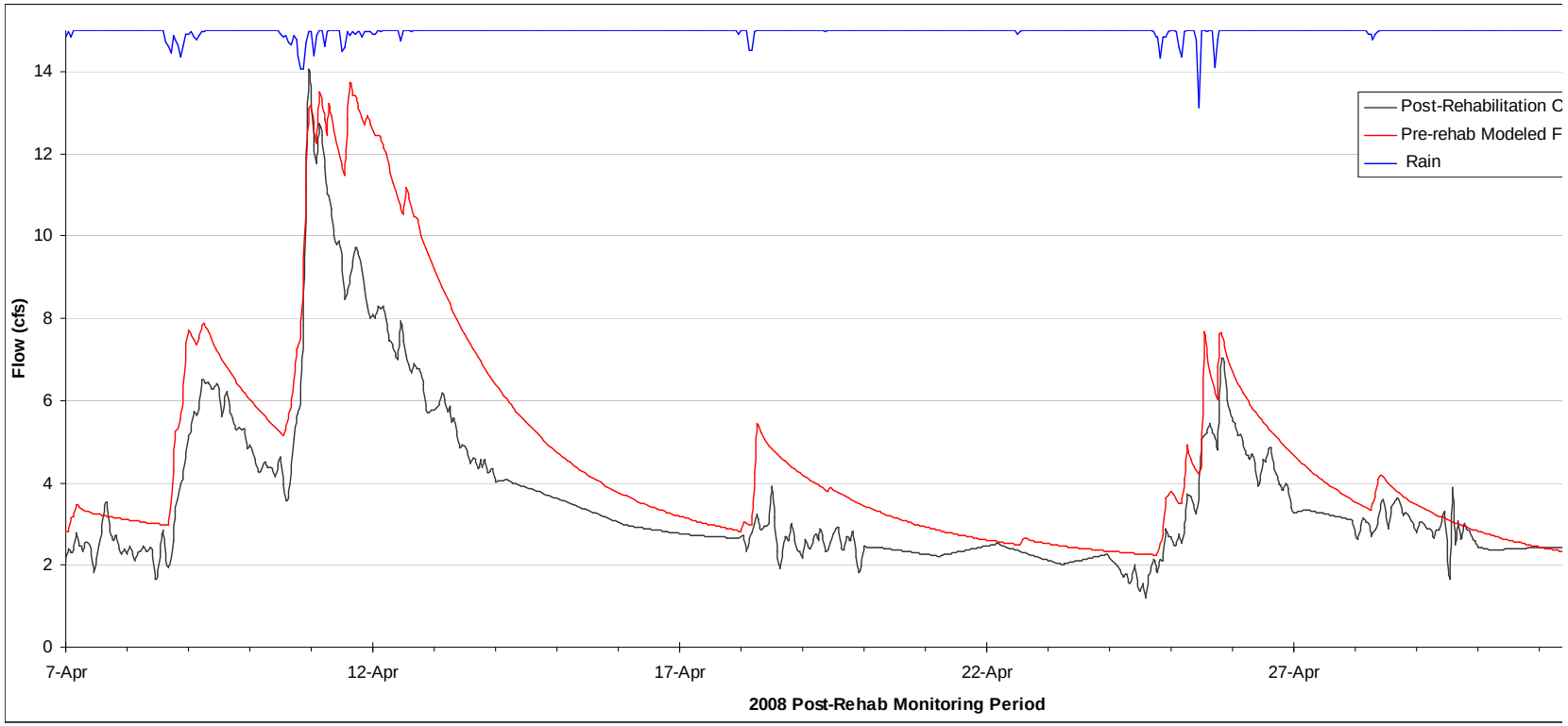
Kaukauna Pre-Rehabilitation Calibration Results		
Storm	**Peak Flow Error (%)**	**Volume Error (%)**
10/22/04	5.1%	3.7%
10/28/04	18.9%	-2.3%
07/24/05	-5.7%	-2.0%
08/26/05	6.2%	-12.0%
05/10/06	11.5%	3.6%
05/24/06	6.0%	1.8%
10/02/06	11.4%	-3.9%
07/30/06	9.1%	-6.0%
Net Average Error	7.8%	-2.1%
Total Average Error	9.2%	4.4%



Effectiveness of I/I Removal

-Compare Pre-rehabilitation model to post-rehabilitation data for Little Chute and Kaukauna-

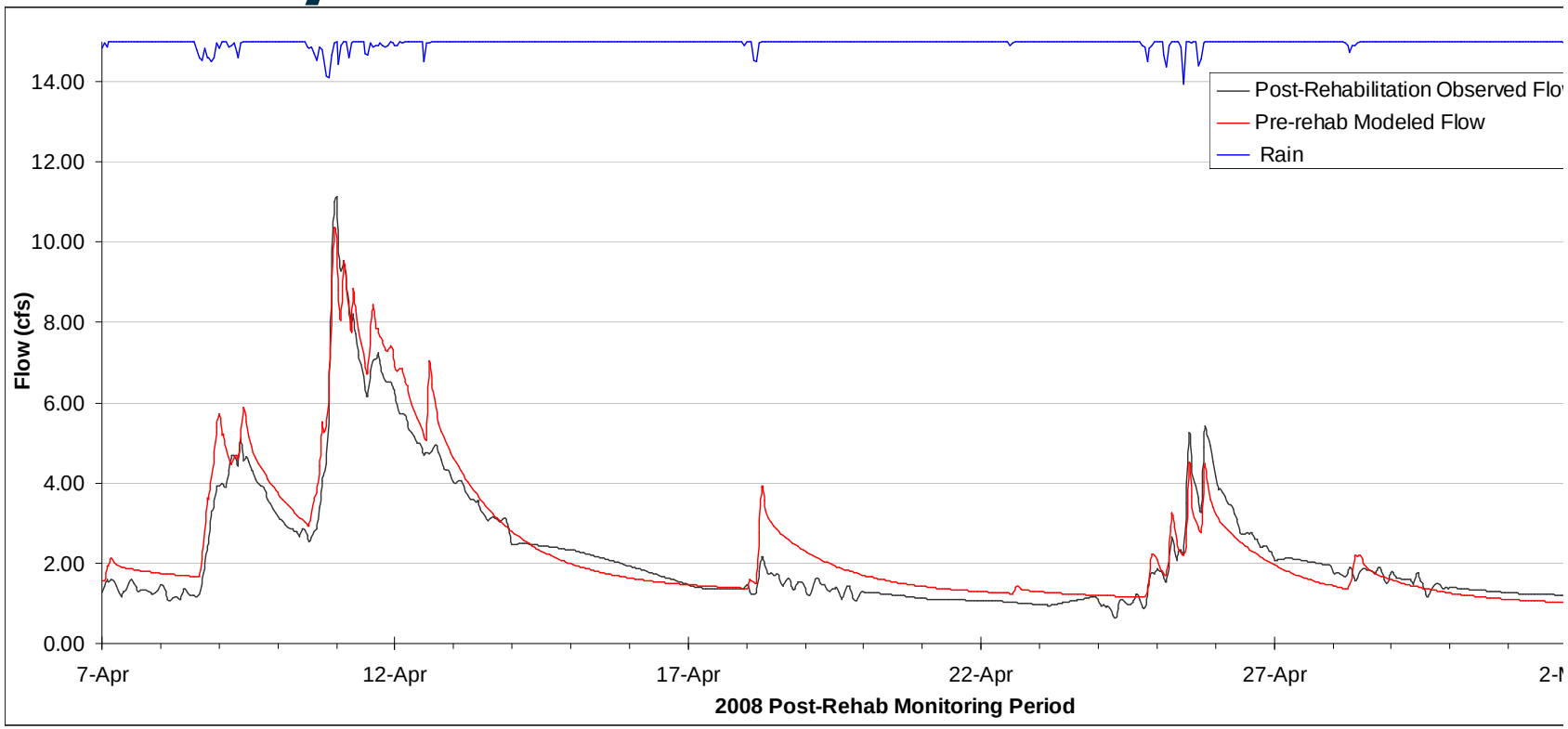
Results: (Little Chute shown)



Effectiveness of I/I Removal

-Compare Pre-rehabilitation model to post-rehabilitation data-

Kimberly Results:

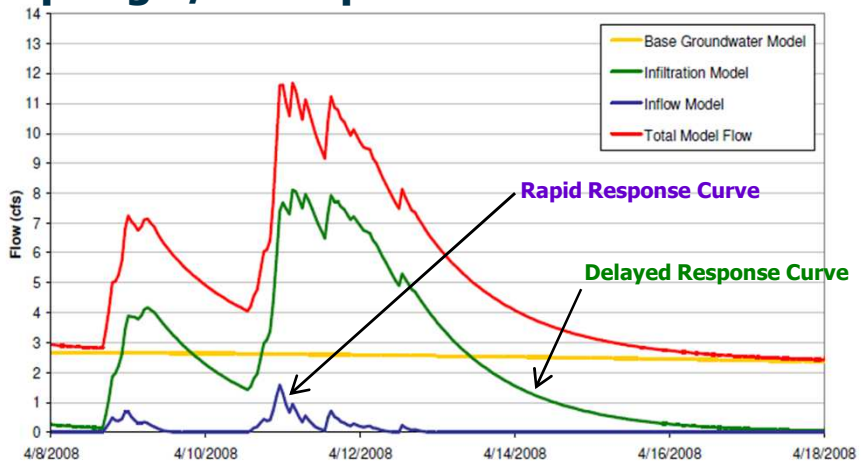


Hydrograph Decomposition

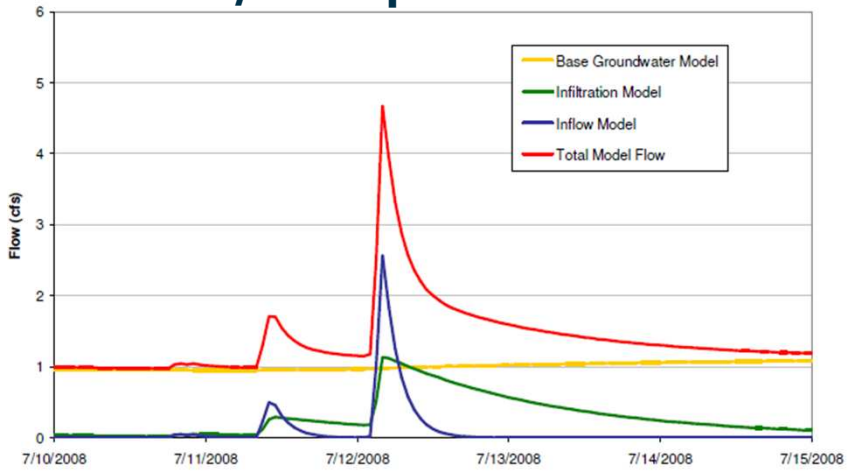
-Little Chute/Kaukauna-

- Spring Events Dominated by Infiltration
- Summer Events Dominated by Inflow

Spring I/I Components



Summer I/I Components



Program Progress Summary Update

Community	Progress	Goal	Project Costs
Kaukauna	10%	40%	$4.7M
Darboy	Negligible	0%	$0.2M
Kimberly	10%	35%	$2.5M
Little Chute	25%	25%	$2.2M
Combined Locks	15%	35%	$0.7M
District	Independently Modeled	0%	$4.4M
District Wide	**11%**	**30%**	**$14.7M**

Observations

- **Multi-jurisdictional cooperation along with public and private efforts have set the stage for success**
- **Strategies will serve communities as they:**
  - Continue to expand with community growth
  - Comply with pending CMOM legislation
- **Focus will shift from reactionary to preservation and maintenance**
- ***Dollars spent are now perceived as dollars invested***

Questions?