



Minnesota Pollution Control Agency

PFC Contamination Update

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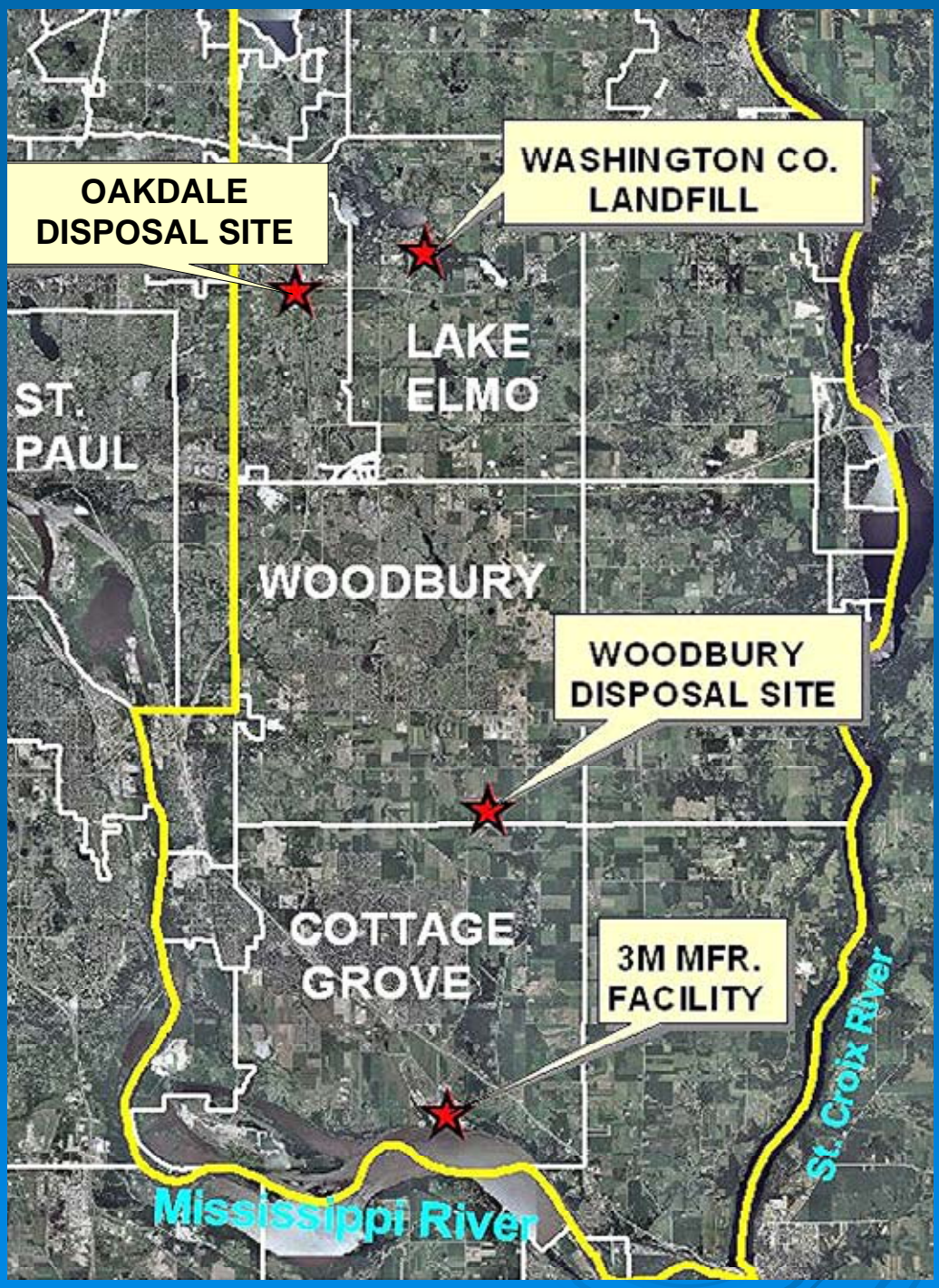
Environmental Reporting Unit Supervisor

March 15, 2007

Presentation overview

- ▶ Background on PFCs
- ▶ Investigation in Washington County
- ▶ Ongoing cleanup in Lake Elmo, Oakdale, Woodbury and Cottage Grove
 - Commissioner's Notice Letters
- ▶ Additional research on PFCs in the ambient environment





Locations of 3M sites in Washington County



Primary PFCs of interest in Minnesota

- ▶ PFOS: $C_8F_{17}SO_3$
Perfluorooctane sulfonate and its salts
- ▶ PFOA: $C_8F_{15}O_2$
Perfluorooctanoic acid and its salts
- ▶ PFBA: $C_4F_7O_2$
Perfluorobutanoic acid and its salts



Current MDH guidelines

- ▶ As a cautious public health approach, MDH uses the following PFC guidelines:
 - PFOS HBV — 0.3 ppb
 - PFOA HBV — 0.5 ppb
 - PFBA - Advice/Personal Choice --- 1.0 ppb
 - Also, look at all PFCs together
- ▶ PFBA value is not a “bright line”
- ▶ Based on information for PFOS, PFOA
- ▶ Values are protective until other information is available

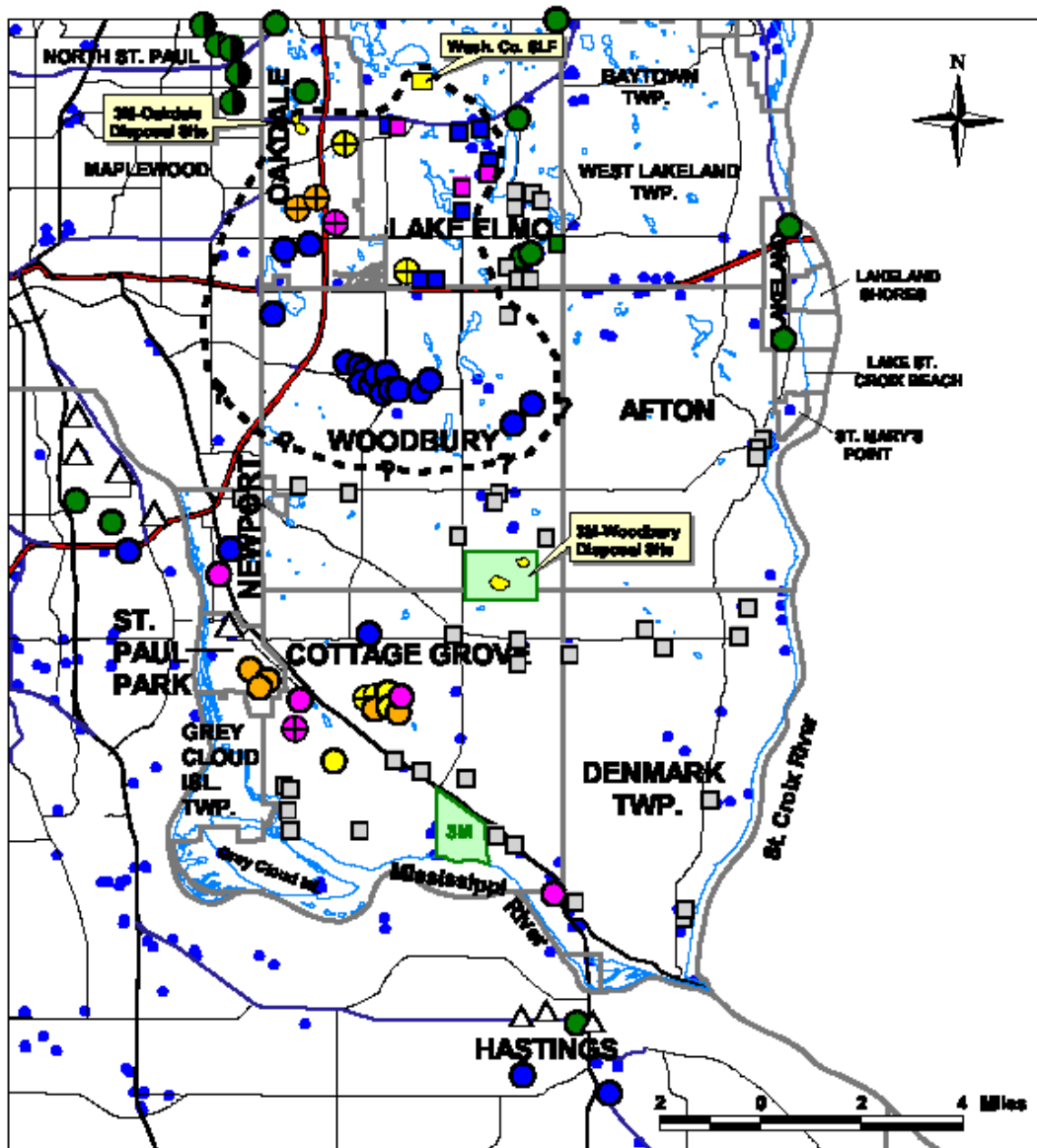


PFBA data available

- ▶ **Historic literature summary**
 - Indicates liver is a primary endpoint of toxicity, but suggest toxicity is less than PFOA
- ▶ **3M Toxicokinetic study – preliminary results**
 - Shorter half-life in test animals
- ▶ **3M 28-day study – draft report**
 - Liver weight and decreased cholesterol
- ▶ **EPA Developmental study – ongoing**
 - Results ~ 2-3 months away
- ▶ **3M 90-day study – planning underway**
 - Results ~ 6 months away



PFBA public well test results



PUBLIC WELL PFBA RESULTS

SYMBOLS

- City well, tested for 7 PFCs, ND or only PFBA
- ⊕ City well, tested for 7 PFCs, PFBA and other PFCs
- City well, tested only for PFOA and PFOS
- △ City well, not used in winter
- Public, non-community well, ND or only PFBA

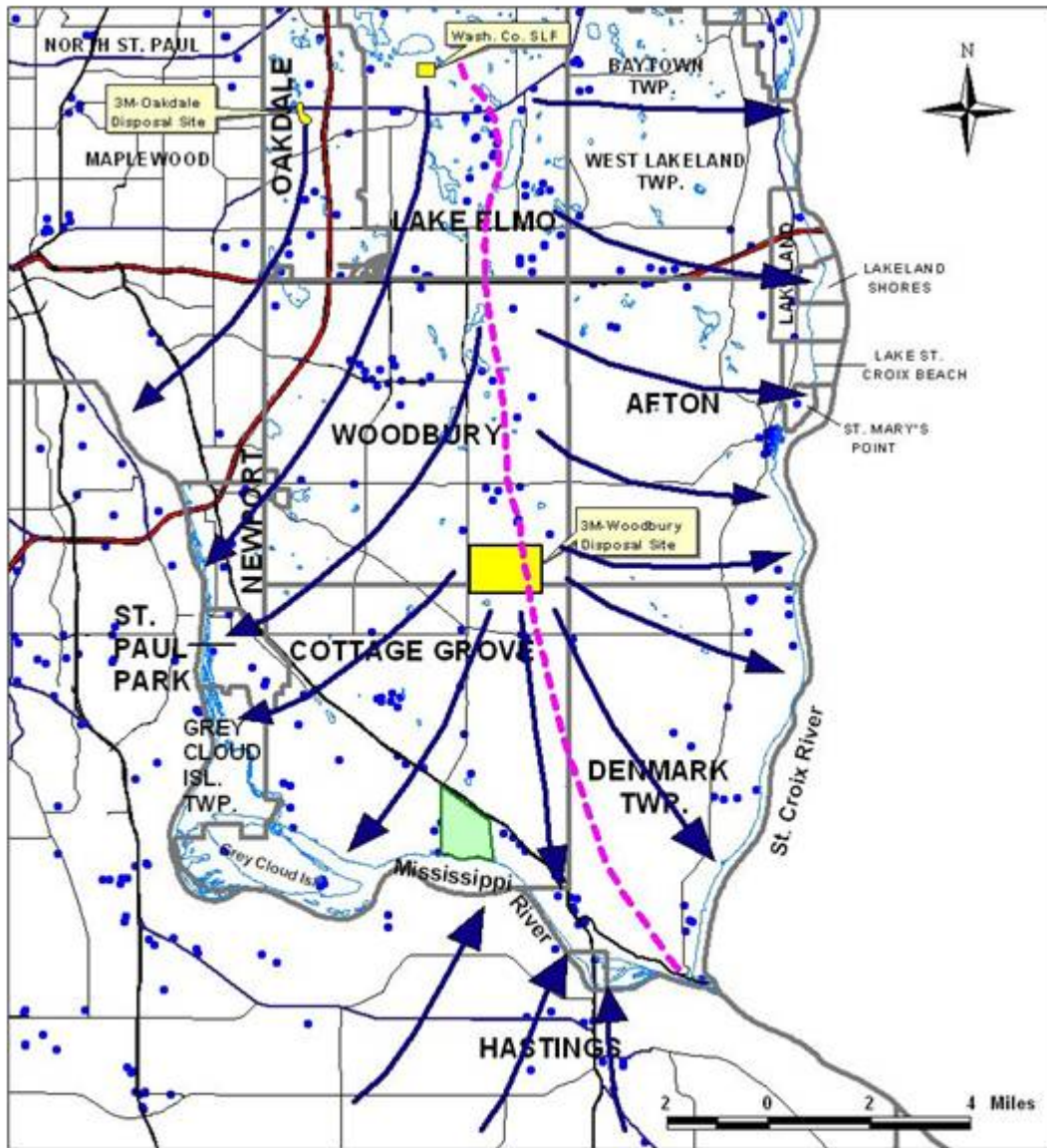
PFBA Concentrations

- PFBA not detected
- PFBA: 0.2 - 0.5 ug/L
- PFBA: 0.6 - 0.9 ug/L
- PFBA: 1.0 - 1.5 ug/L
- PFBA: 1.6 - 2.0 ug/L
- Results pending



Prepared: 1/19/07



Groundwater flow in Washington County

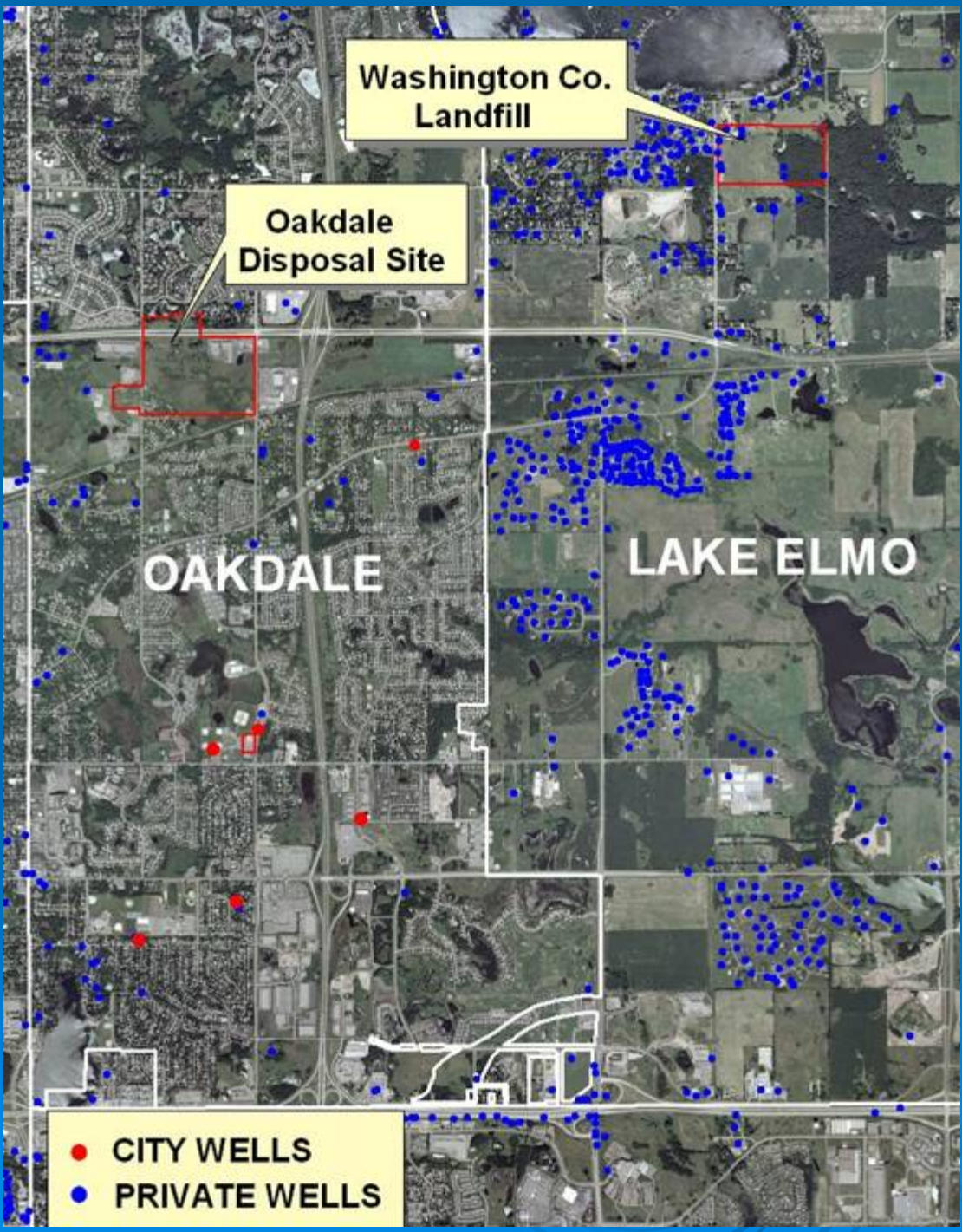


General Groundwater Flow in S. Washington Co.

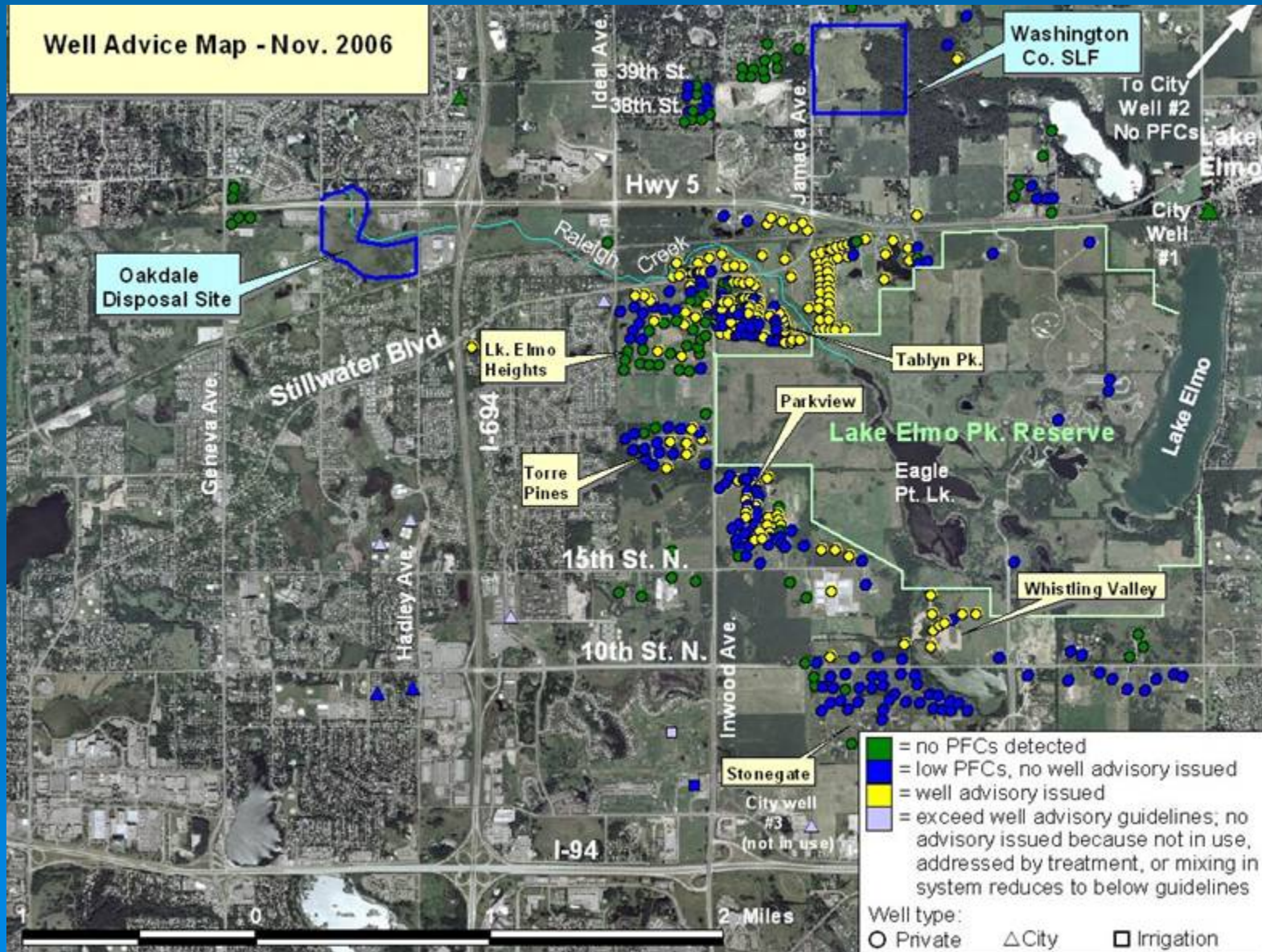
-  Regional groundwater divide
-  Regional groundwater flow direction



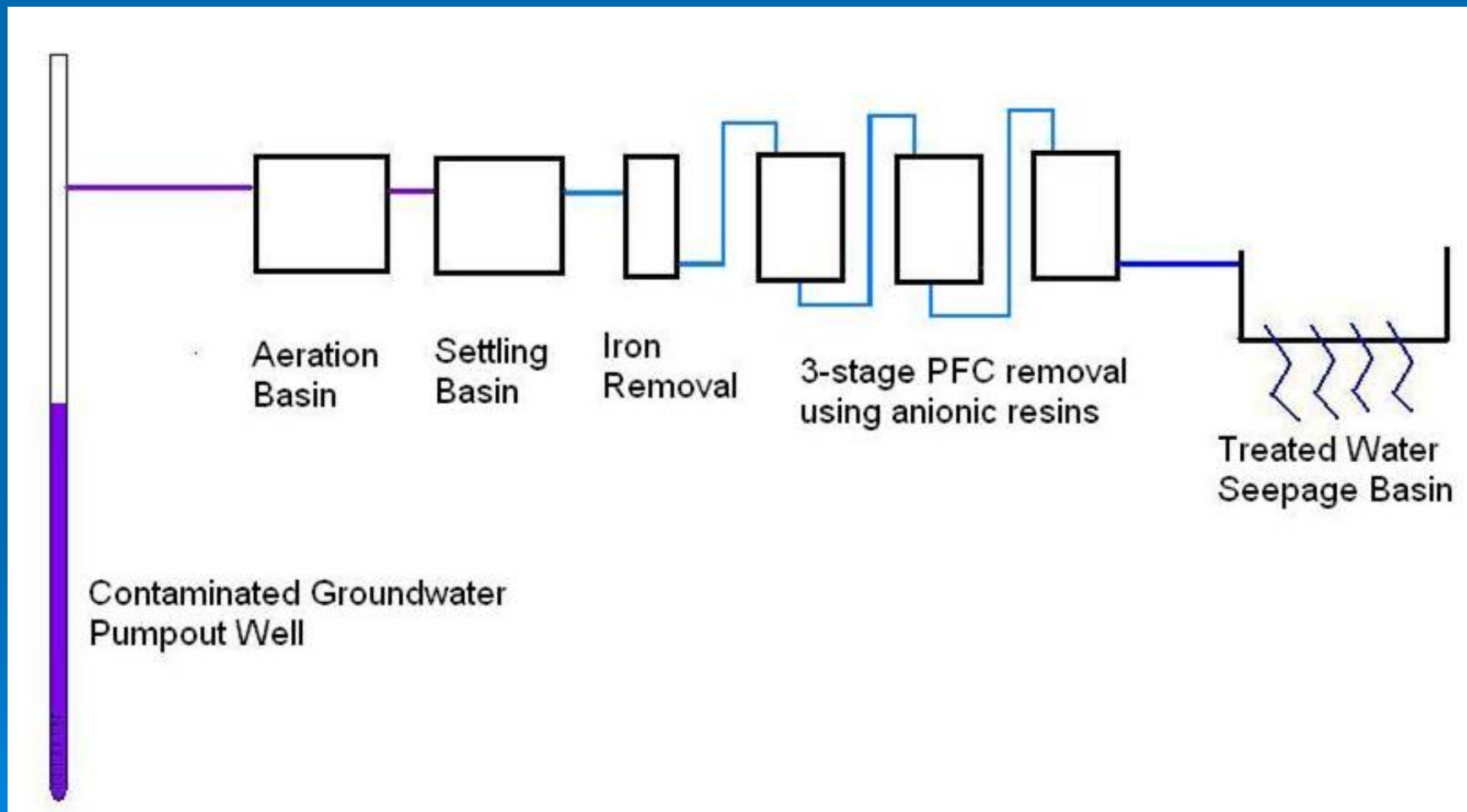
Oakdale and Lake Elmo areas



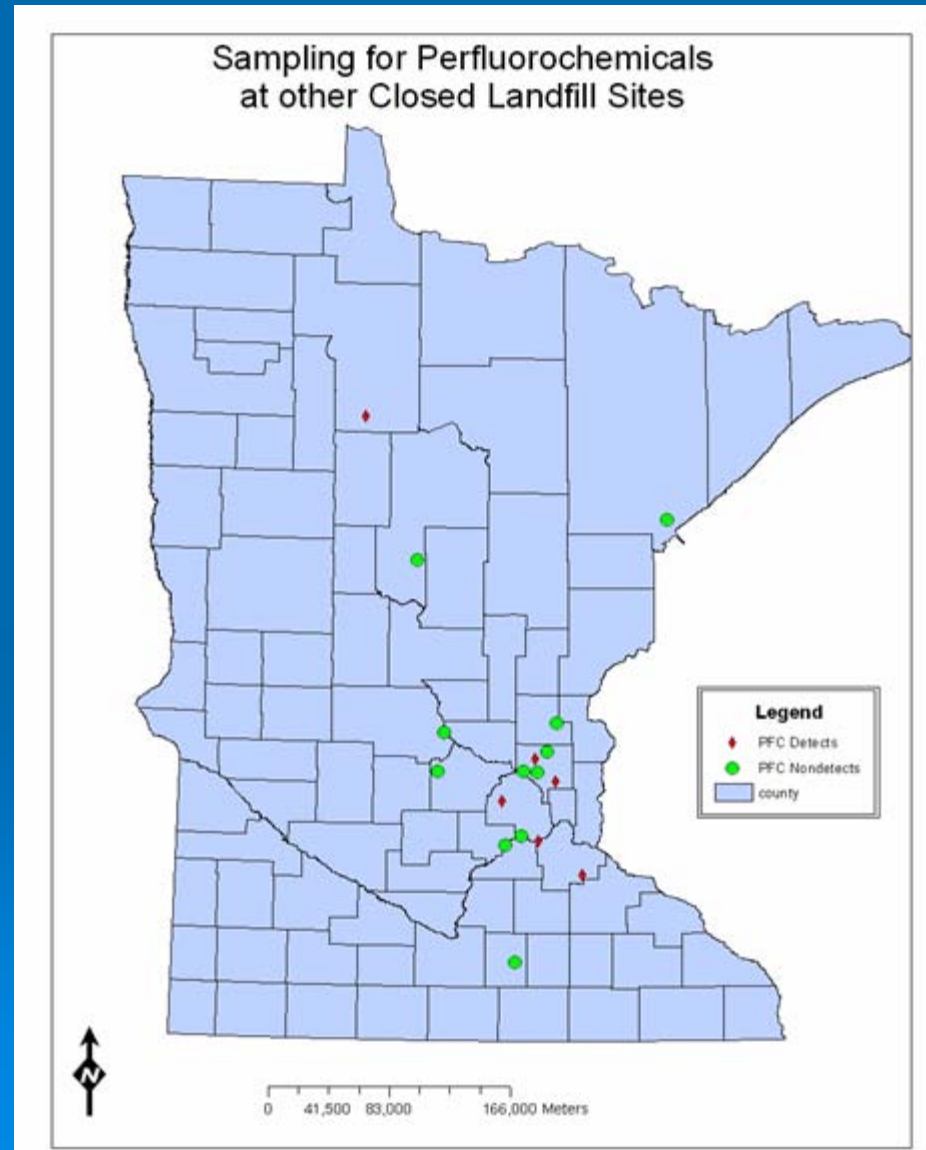
Sampling in Lake Elmo, Oakdale



Washington County Landfill groundwater treatment alternative



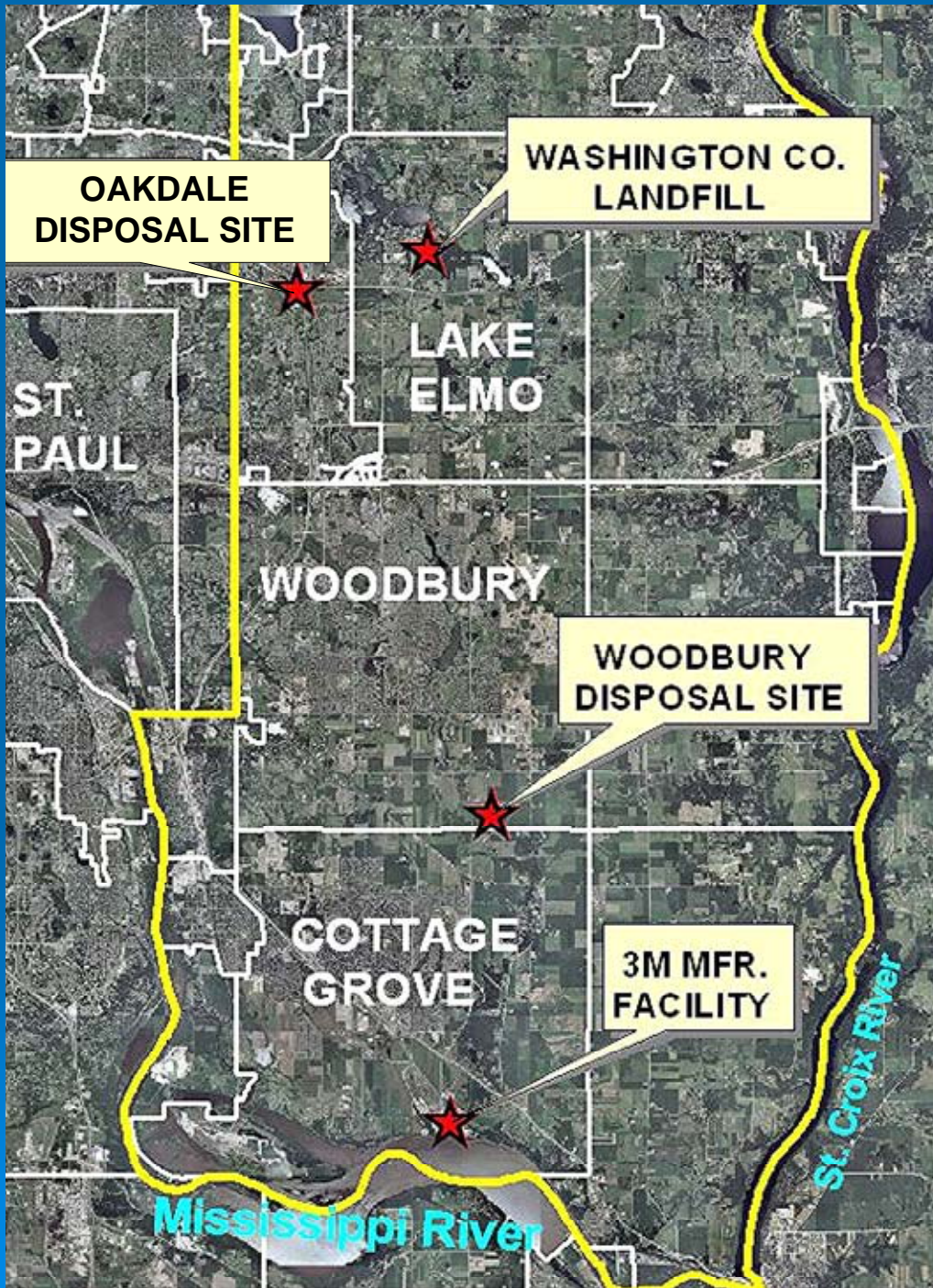
PFC sampling at other CLP sites



MPCA Superfund Program

- ▶ Investigate and if necessary, clean up hazardous waste sites
 - MDH assesses human health risks
- ▶ Identify Responsible Parties
 - Review and approve work
- ▶ Superfund contracts work and seeks cost recovery
- ▶ 3M is RP for investigations and clean up at Chemolite, Oakdale and Woodbury sites.
 - Commissioner's Notice Letters – 3/13/07





Locations of 3M sites in Washington County



3M Oakdale Disposal Site

- ▶ Used by 3M for disposal of industrial wastes from Chemolite Facility between 1956-60
- ▶ Wastes/drums were excavated in 1983
- ▶ Ground water pump-out system installed in 1984
 - Isopropyl ether
 - Discharged to sanitary sewer





The 3 Dump Sites that Constitute the "Oakdale Dump"

0 0.2 0.4 Miles

■ Location of 3rd Groundwater Pumpout System

Prepared 8/2008

3M Oakdale Disposal Site

- ▶ Discharge water sampled in Summer 2004 for PFOA, PFOS
- ▶ Monitoring wells and pump-out wells sampled by 3M in Spring 2005
- ▶ 3M required to conduct investigation to determine full extent of PFC contamination (Winter 2005/Spring 2006)
- ▶ Response action report due April 1st
 - Excavation, capping, ground water, ground water treatment, surface water drainage

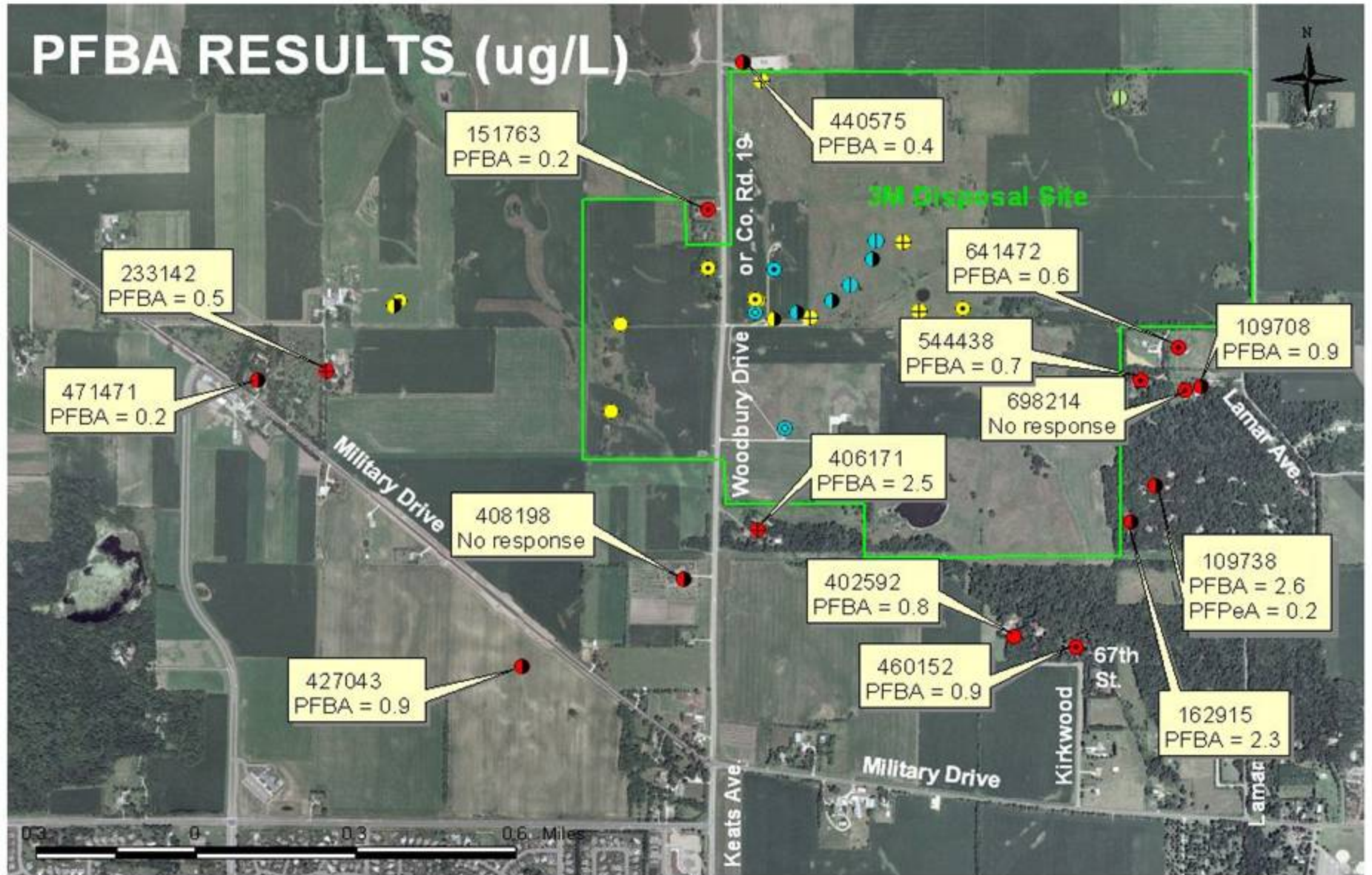


Woodbury Disposal Site

- ▶ Used for disposal of industrial wastes from 1960-1966
- ▶ Barrier well system installed in early 1970s to control release of solvents
- ▶ Pump-out water found to contain PFOS, PFOA and solvents (Fall 2004)
 - PFOS and PFOA not found in nearby residential wells (Spring 2005)
- ▶ PFBA detected in pump out water, nearby residential wells, municipal wells (December 2006)



PFBA RESULTS (ug/L)



Well Type:

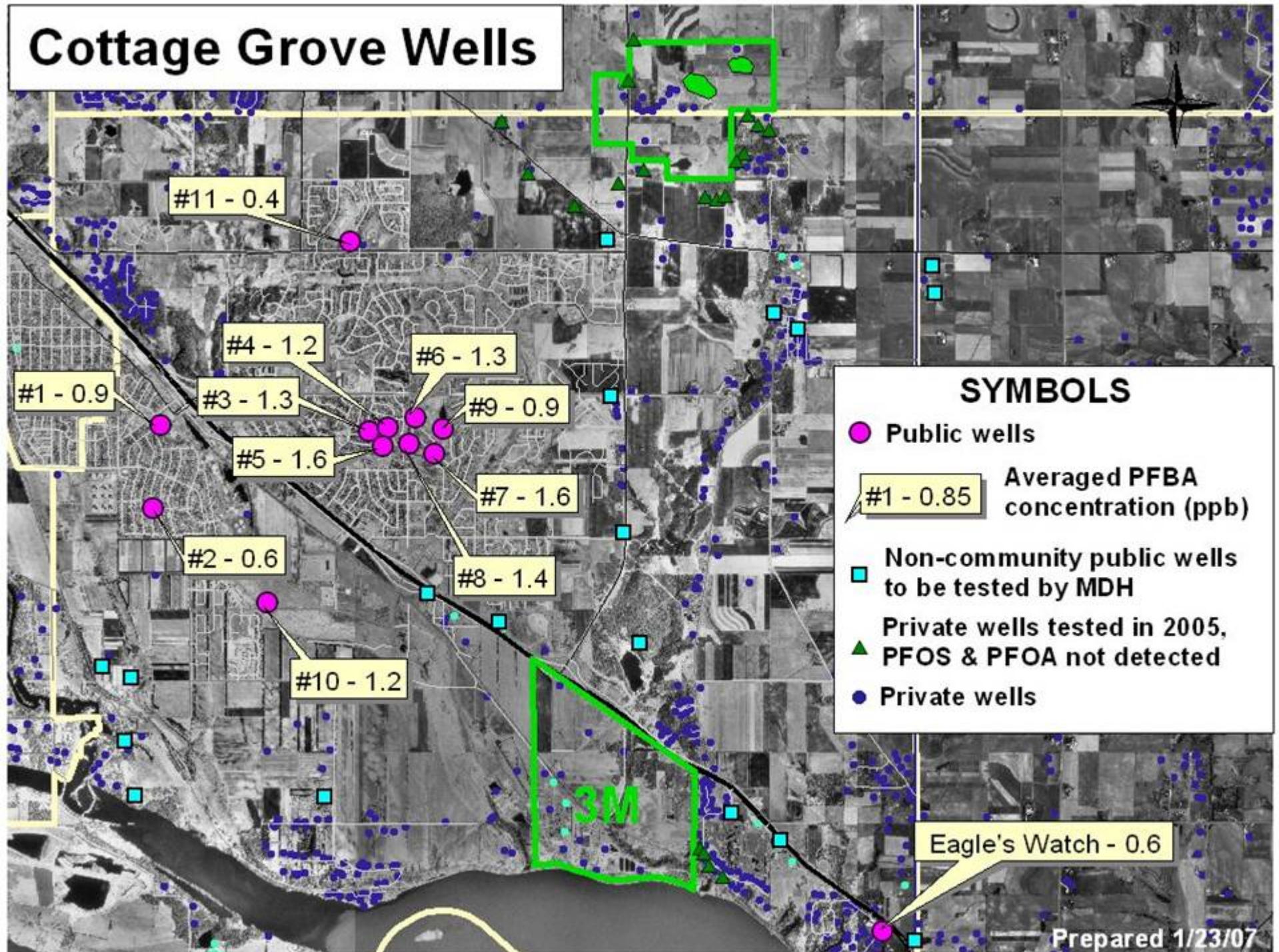
- Private well - sampled
- Unknown use
- 3M Observation well
- 3M Pump-out well

Aquifer Information:

- ⊕ Unknown
- Unconsolidated sediments
- ⊕ St. Peter Sandstone
- Ⓛ St. Peter - Prairie du Chien
- Prairie du Chien Dolomite
- ⊙ Prairie du Chien - Jordan
- ⊙ Jordan Sandstone

Prepared 1/24/07

Cottage Grove Wells



Woodbury Disposal Site

- ▶ Evaluate existing barrier systems ability to capture all PFCs
- ▶ Install sentinel monitoring wells between the site and nearby residences
- ▶ Reassess PFC waste remaining on the site
- ▶ Determine if the discharge pipeline is leaking
- ▶ Monitoring and investigation work plan under review by MPCA



MPCA-MDH ground water sampling strategy

- ▶ Start near potential source area
- ▶ Sample selected wells with known geology to determine how far and deep contamination has gone
- ▶ Concentrate sampling in areas with highest PFBA levels
- ▶ Where information needed to predict PFC concentration distribution in each aquifer, it may not be necessary to sample every private well



3M Chemolite Site

- ▶ Manufactured PFCs from 1940s - 2002
- ▶ On-site disposal of PFC wastes
 - HF sludges and tars neutralized
 - Existing cap/unknown area
- ▶ Ground water pump out system — facility production wells
- ▶ Pump out water used as process water — treated prior to discharge to Mississippi River





Legend

□ Property Lines

Source: St. Paul Park, MN
USGS Quadrangle 1967
Revised 1993

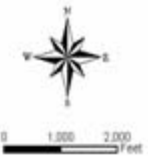
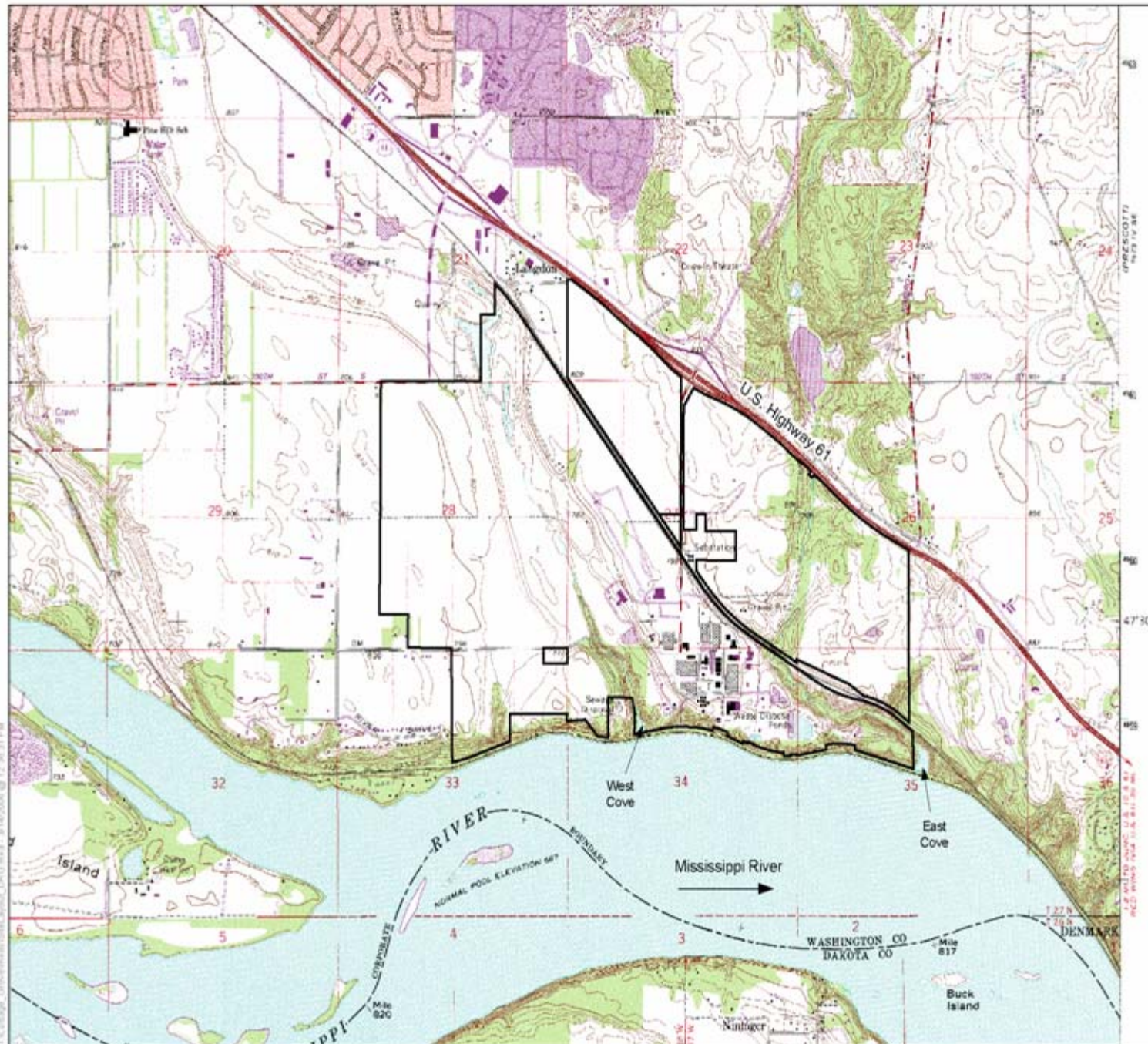


Figure 2-1
Site Location Map
3M Cottage Grove, MN



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3M Chemolite Site

- ▶ 3M conducted facility-wide assessment in spring/summer 2005
- ▶ MPCA required focused investigation to determine full extent of PFC contamination (summer/fall 2006)
- ▶ Interim response action for on-site disposal areas approved
 - 6 acre geo-membrane cap
- ▶ Additional proposed response actions due April 30, 2007



Summary

- ▶ Historical disposal, release of solvents, successful response actions for original contaminants
- ▶ PFCs detected, site investigations completed or ongoing, response actions forthcoming
- ▶ Point of use monitoring to continue with further response actions as required
- ▶ Consent Orders – implement remedies, long term O&M, cost reimbursement

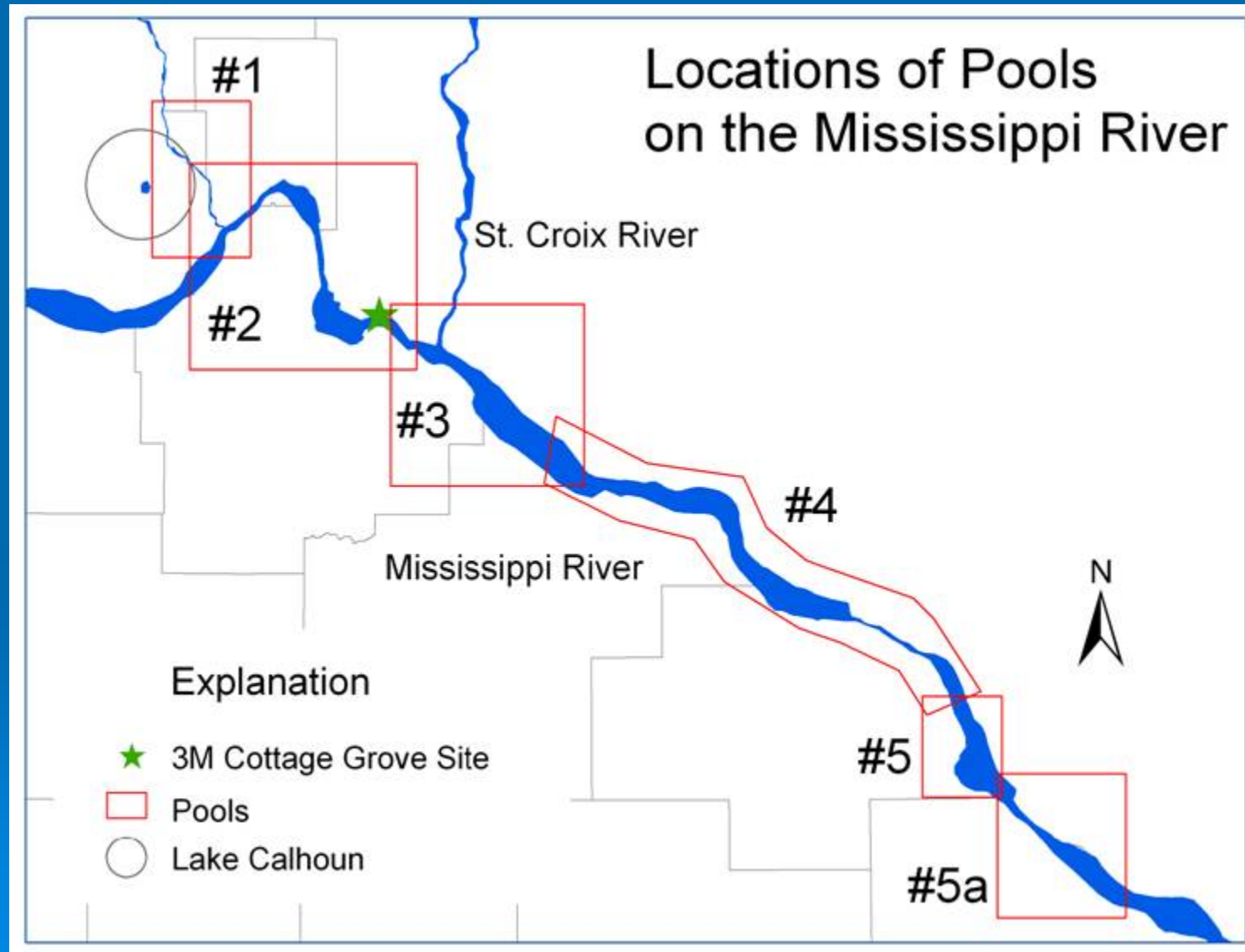


PFCs in ambient environment

- ▶ Role of Environmental Analysis and Outcomes Division
 - Find out where PFCs are occurring in the “ambient” environment
 - Focus is on fish, shallow ground water, surface water
 - Expertise to remediation, regulatory efforts



Fish sampling locations



Fish sampling

- ▶ 2004 - Pool 2
- ▶ 2005 - Pool 2, Lake Pepin (Pool 4), 3M-collected bluegill
- ▶ 2006 – Pool 3, Lake Pepin, Pools 5 & 5a, St. Croix River and Lake Calhoun

Walleye, SM bass, white bass, carp, smallmouth buffalo, forage fish, Northern pike, catfish, bluegills, LM bass

- ▶ Minn. DNR, MPCA, Wis. DNR



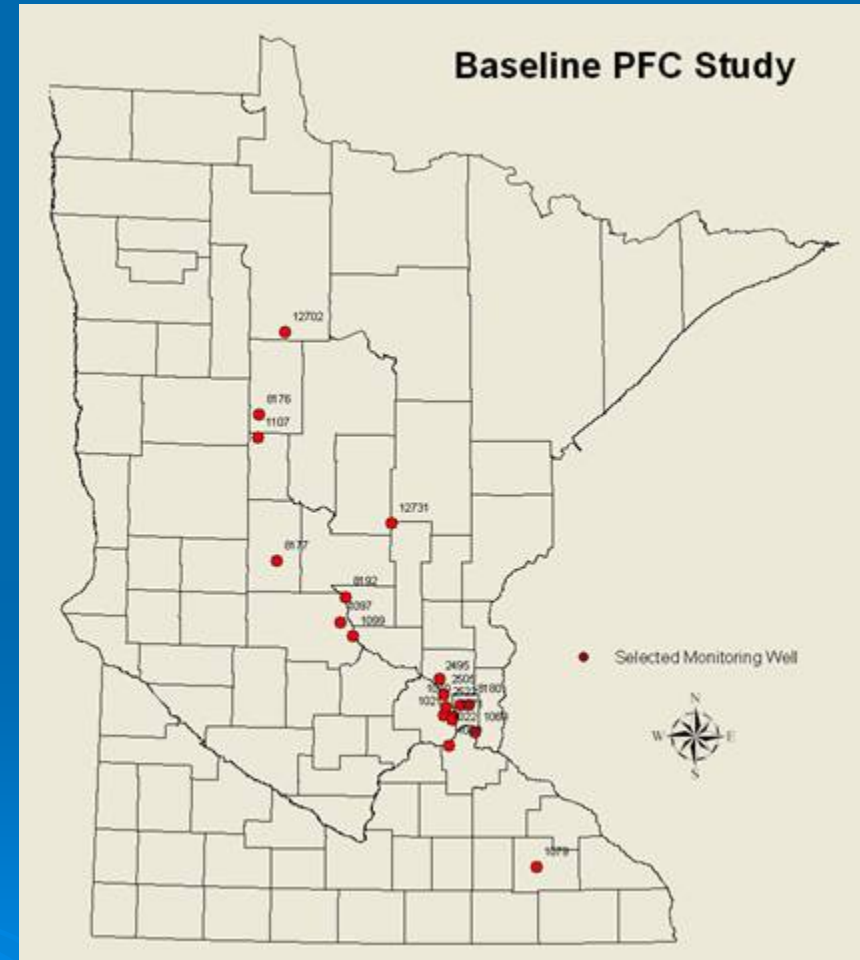
Fish results thus far

- ▶ PFCs present in all fish sampled, at varying levels, lower downstream
- ▶ Minn. Dept. of Health fish consumption advisory added for bluegill in Pool 2
- ▶ Concentrations in white bass and smallmouth bass relatively higher — walleye relatively lower
- ▶ Consumption advisories already in place
- ▶ 123 fish samples — results in March 2007
- ▶ 170 fish samples total 2005-2006



Ground water monitoring

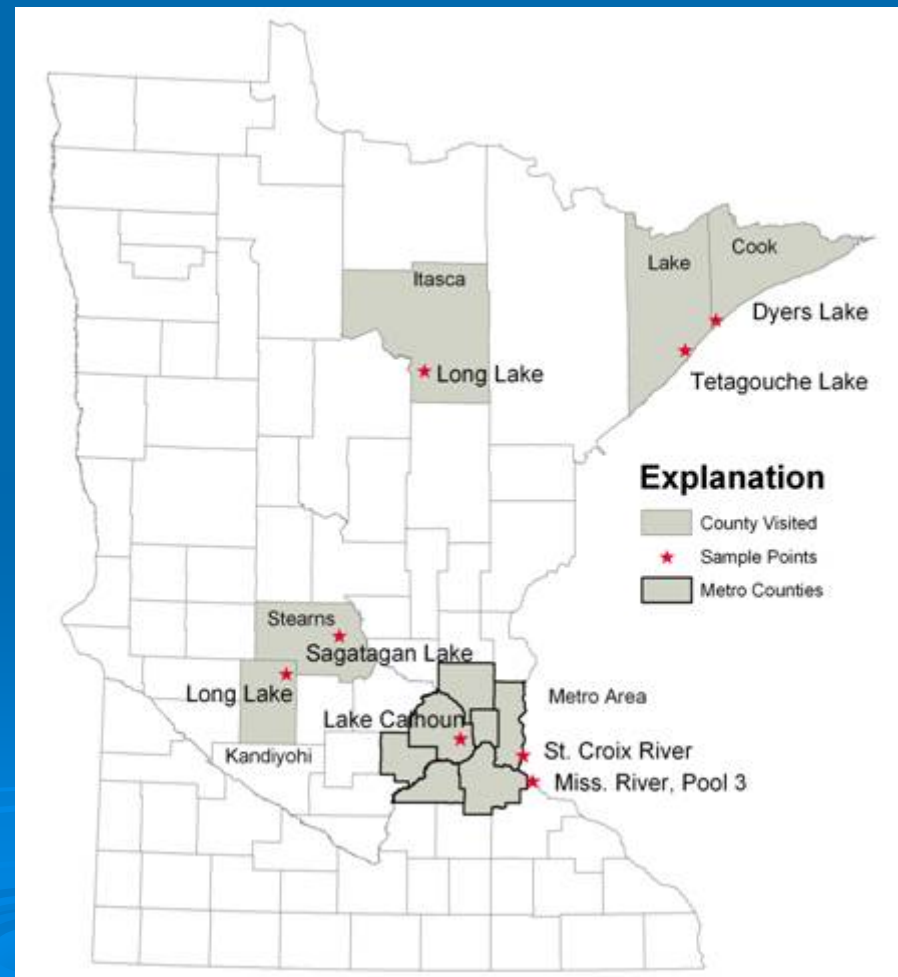
- ▶ Ambient monitoring network — 17 shallow wells
- ▶ Attenuation/breakdown of PFCs in ground water — partnering with EPA lab in Oklahoma



Surface water monitoring

PFC surface water sampling Fall 2006

- ▶ Six lakes
- ▶ St. Croix and Mississippi rivers



Other PFC-related activities

- ▶ PFCs in wastewater treatment systems — influent, effluent and sludge
- ▶ Water quality criteria for PFOA and PFOS for Mississippi River and specific surface waters in Oakdale, Lake Elmo
- ▶ Air transport, ambient monitoring
- ▶ Learn from data, plan for further sampling

