Baytown Groundwater Contamination Site Update

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Minnesota Department of Health
Environmental Health Division

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- MN Dept. of Health - Jim Kelly, Patrick Sarafolean, Michael Convery, Bob Smude, Ron Thompson, Tannie Eshenaur
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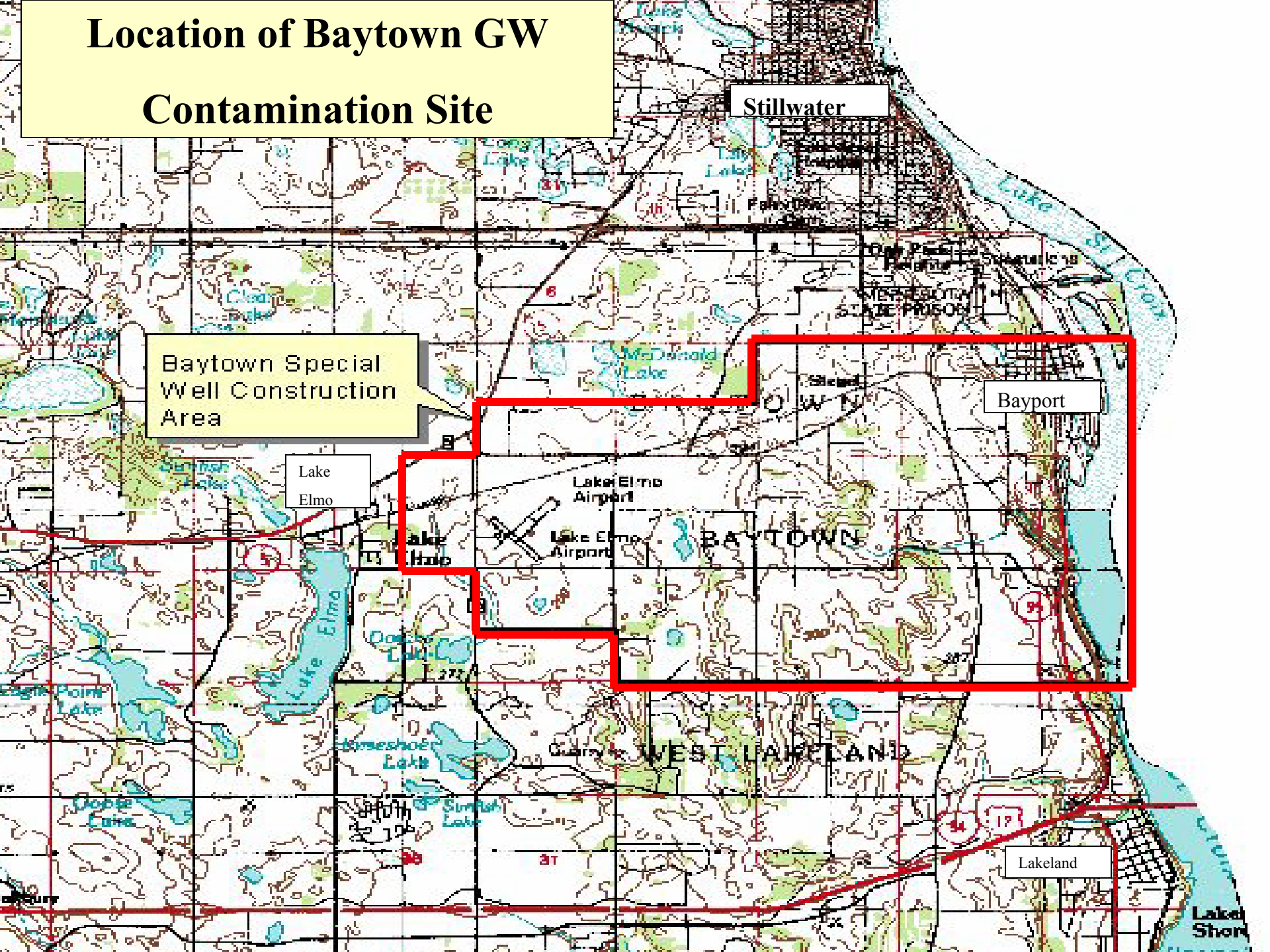
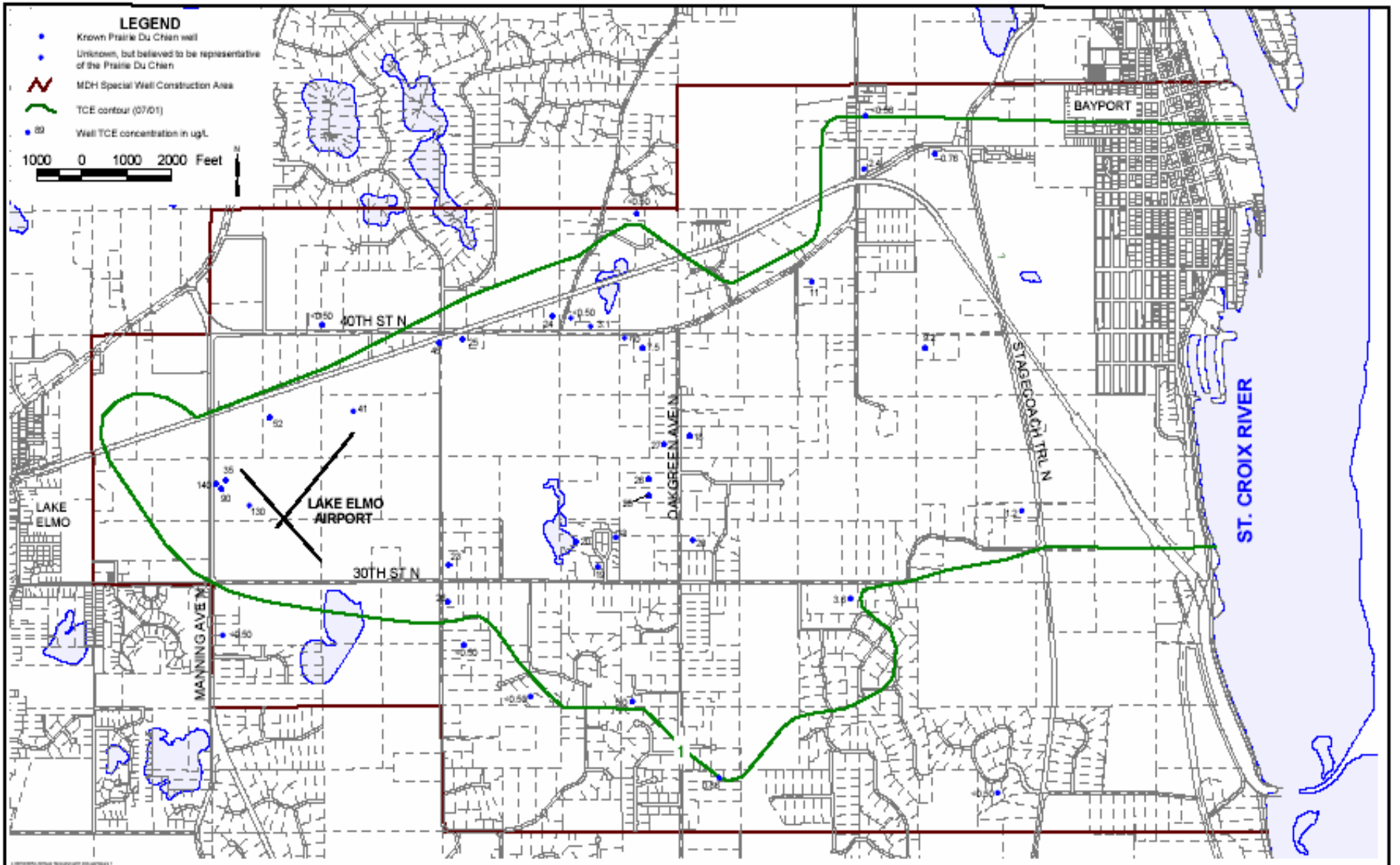
- Wenck Associates - Keith Benker, Matt Bowers
- Baytown Township - Kent Grandlienard
- West Lakeland Township - John McPherson, Terry Spawn
- Bayport - Mel Horak

Location of Baytown GW Contamination Site





Overall Extent of TCE Plume, July 2001

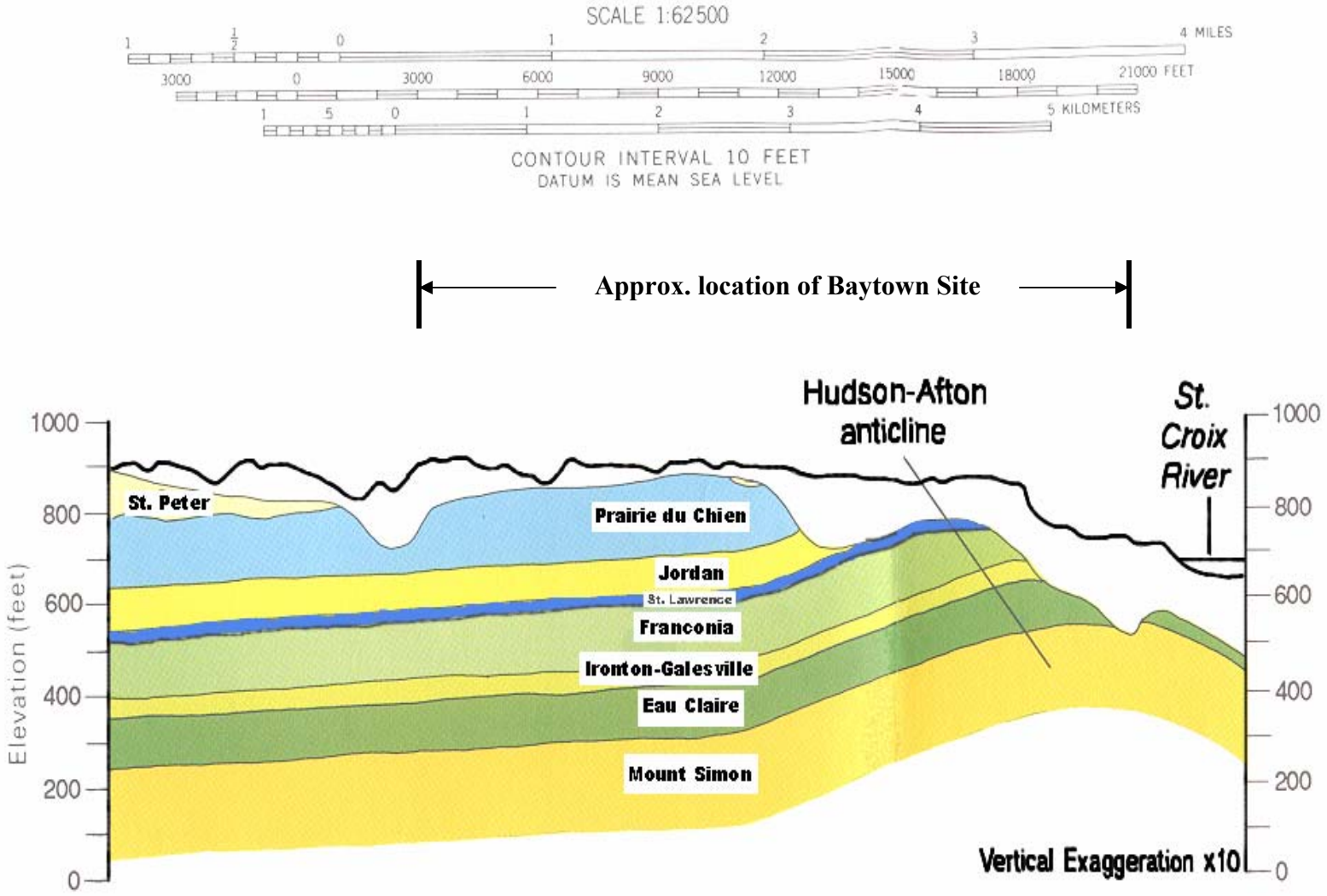
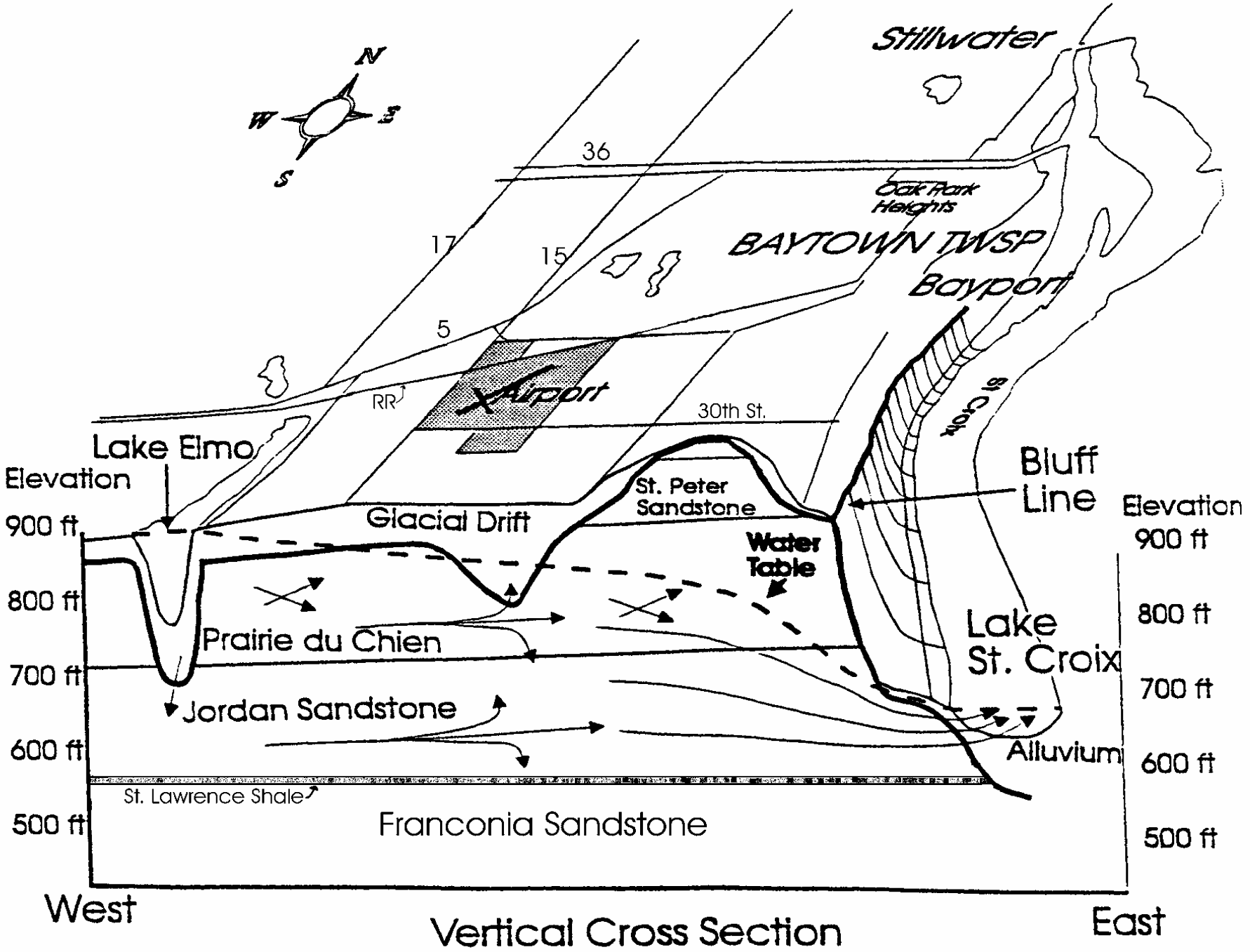
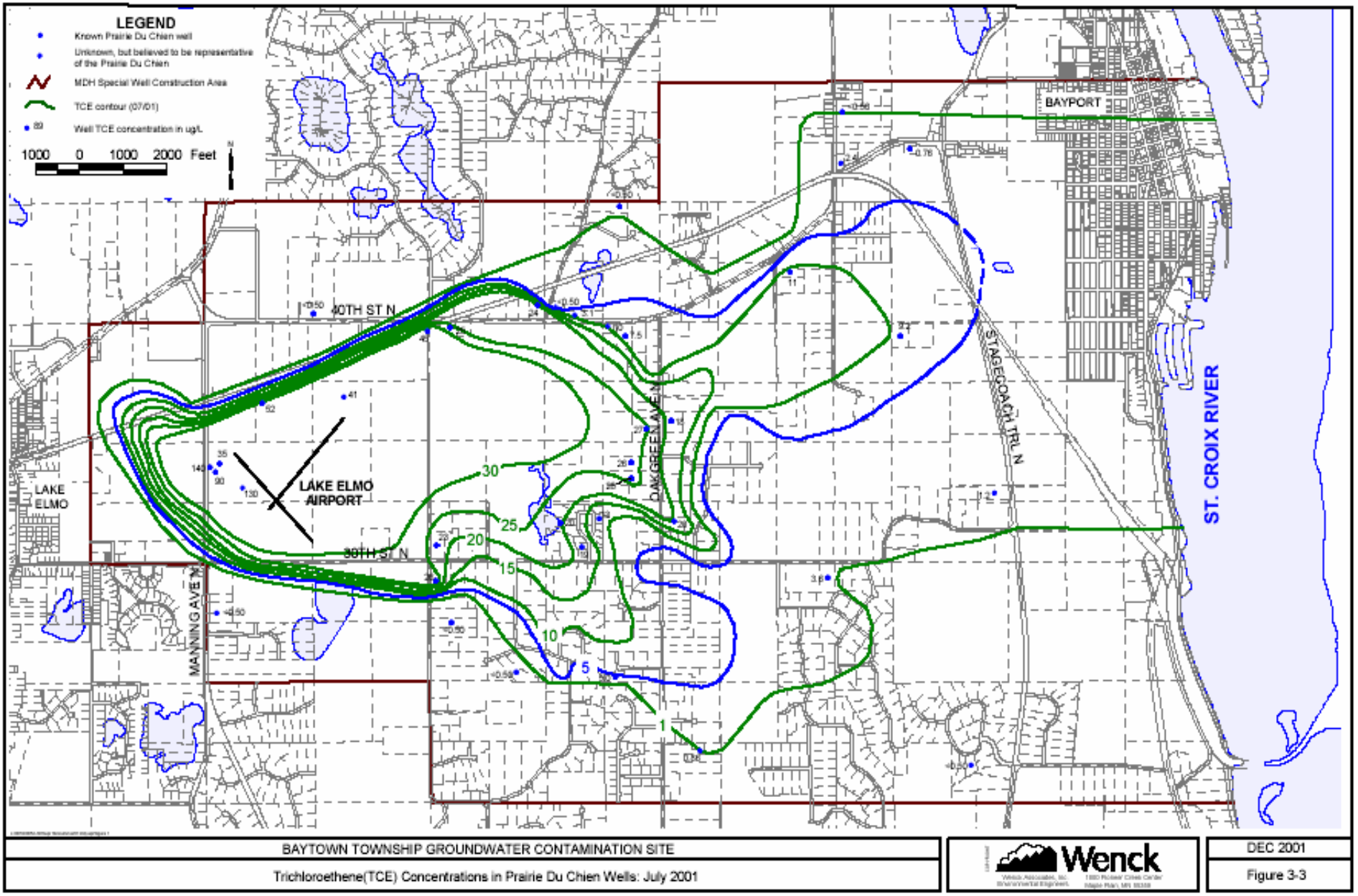


Figure 3: Geologic cross section of the Hudson-Afton anticline in the area of West Lakeland Township, approximately 2 miles south of Baytown Township. (Figure modified from Fig. 2, Mossler and Bloomgren, 1990)


N
W
E
S
Stillwater
36
Oak Park Heights
BAYTOWN TWSP
17
15
5
Baypoint
RR
Airport
30th St.
St. Croix R.
Lake Elmo
Elevation
900 ft
800 ft
700 ft
600 ft
500 ft
Glacial Drift
St. Peter Sandstone
Water Table
Bluff Line
Elevation
900 ft
800 ft
700 ft
600 ft
500 ft
Prairie du Chien
Lake St. Croix
Jordan Sandstone
Alluvium
St. Lawrence Shale
Franconia Sandstone
West
East
Vertical Cross Section

Brief Site History

- **1987 to 1988 - TCE discovered by MDH near Bayport**
  - Source not found, but highest TCE concentrations detected beneath the Lake Elmo airport
  - TCE and carbon tetrachloride detected in private wells
  - Carbon tetrachloride traced to grain elevators near railroad
  - TCE is the main contaminant of concern
  - Special Well Construction Advisory issued by MDH
- **1990's - Private well testing by MAC (Wenck Assoc.)**
  - Attempted to test all wells in and near plume in 1999
  - Since 1999, high risk and "sentry" wells tested at least annually
  - Wells over 30 µg/L (HRL) had GAC filters installed



BAYTOWN TOWNSHIP GROUNDWATER CONTAMINATION SITE

Trichloroethene(TCE) Concentrations in Prairie Du Chien Wells: July 2001

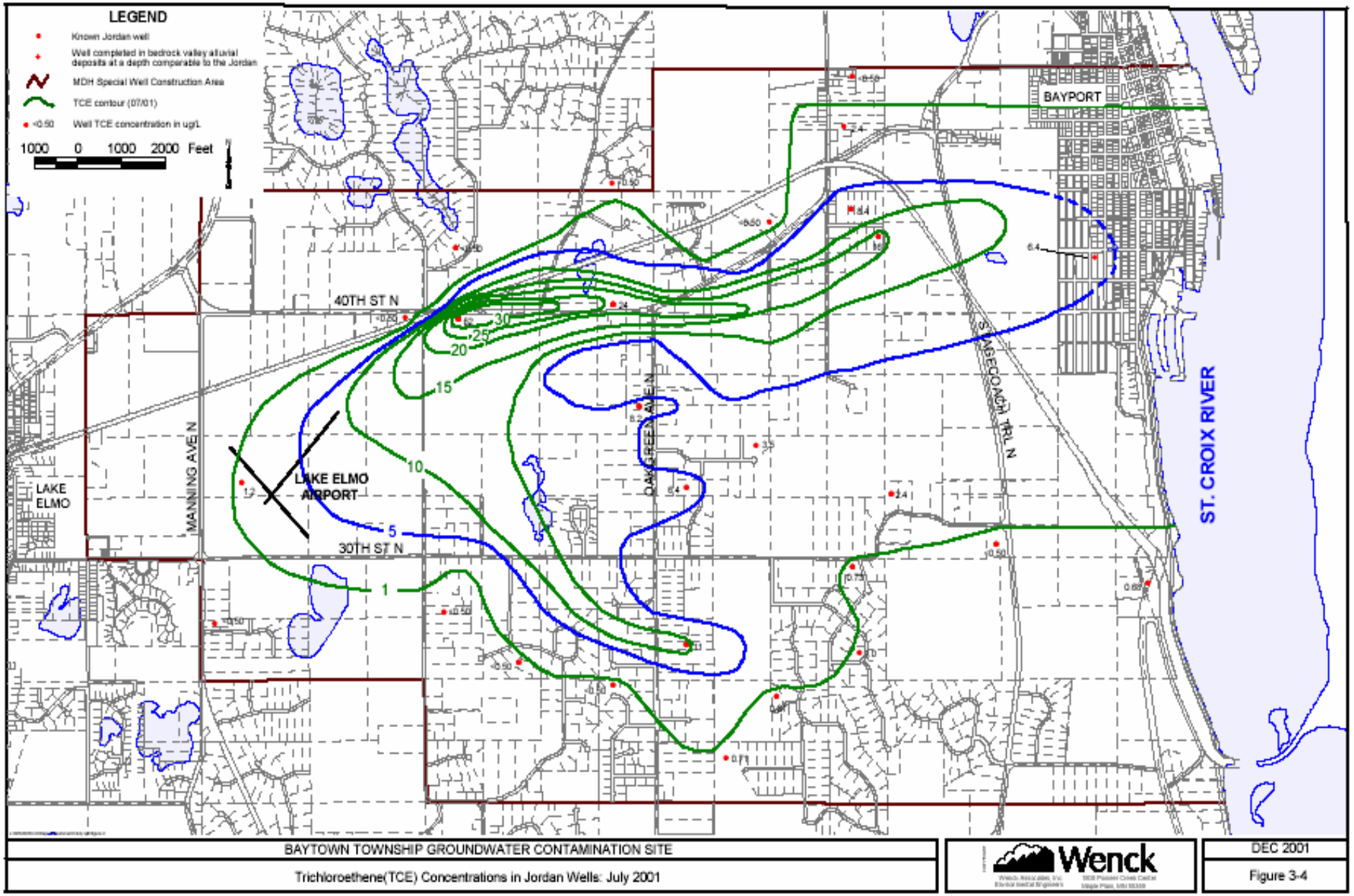
Wenck Associates, Inc. Environmental Engineers. 1800 Pioneer Creek Center Maple Plain, MN 55359

DEC 2001

Figure 3-3

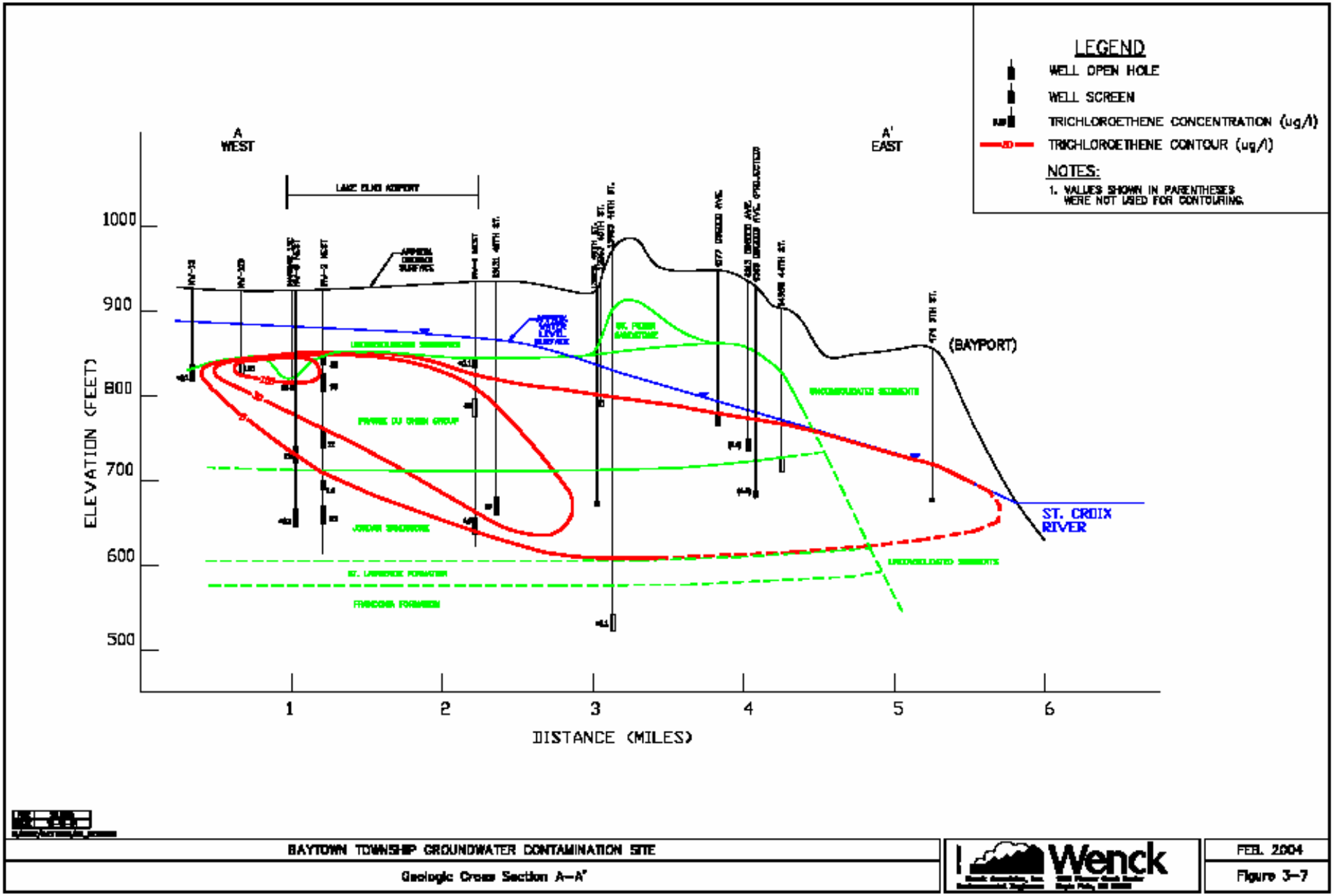
TCE Concentrations in the Prairie du Chien – July 2001

The blue line is the 5 µg/L TCE contour, green lines are the 1, 10, 15, 20, 25, and 30 µg/L TCE contours



TCE Concentrations in the Jordan – July 2001

The blue line is the 5 µg/L TCE contour, green lines are the 1, 10, 15, 20, 25, and 30 µg/L TCE contours



Cross-section showing downward migration of TCE plume in the Prairie du Chien and Jordan Aquifers

Why All The Excitement Around Baytown Recently?

2001

- EPA released a draft reassessment of TCE toxicity

2002

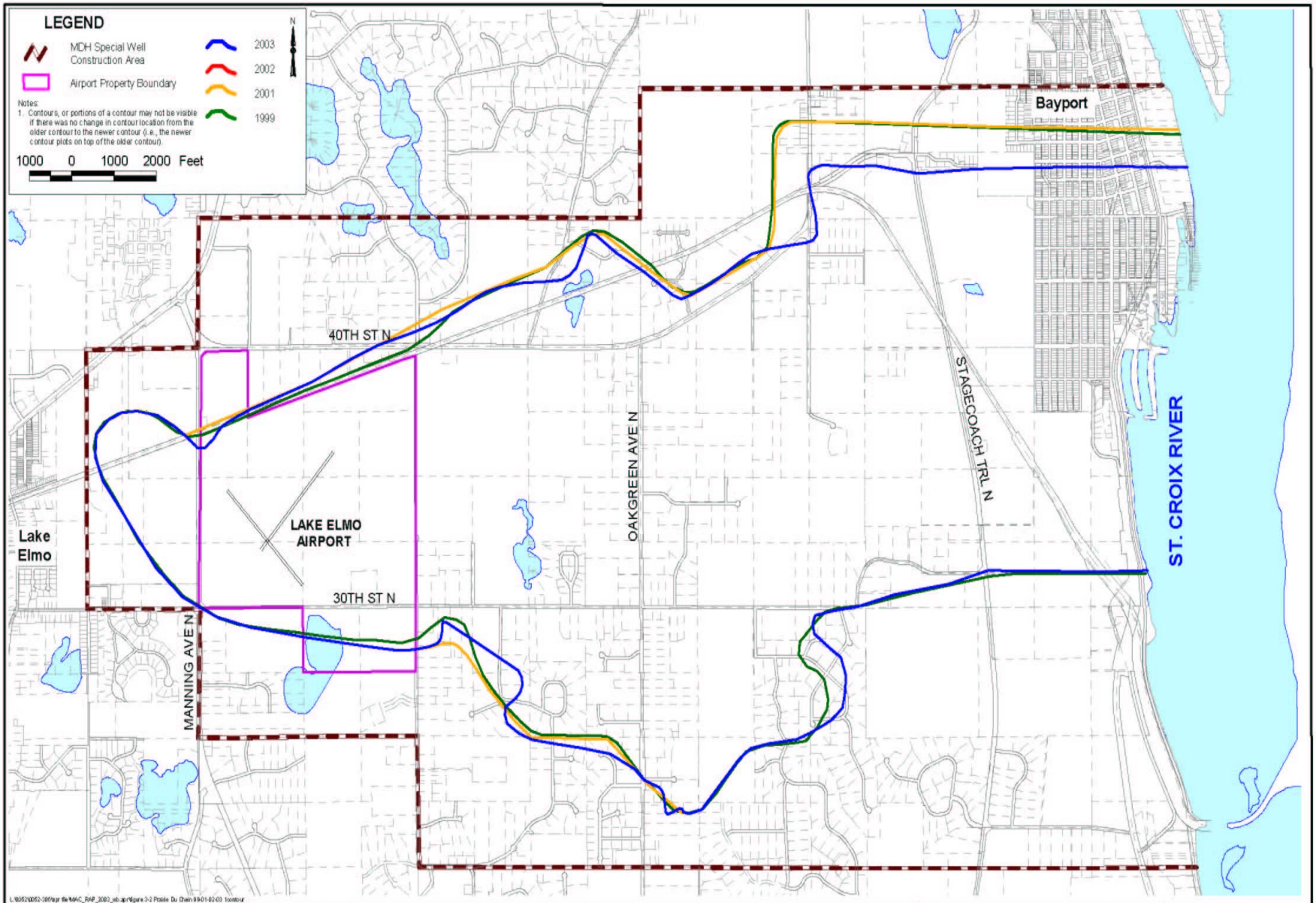
- MDH issued a “recommended interim exposure limit” for TCE of 5 µg/L
- MDH expanded the Special Well Construction Area to current dimensions and encouraged drilling to Franconia
- MPCA sampled over 300 wells and provided over 25,000 gallons of bottled water
- MAC installed approximately 116 GAC filters

Developments in 2003

- MPCA continued sampling private wells (frequency based on TCE concentrations)
- MAC installed 8 additional GAC filters at homes where TCE exceeded 5 µg/L
- MPCA conducted additional investigation on and west of the Lake Elmo Airport; identified possible source west of airport
- TCE detected in the Franconia and one Bayport city well
- Baytown Township adopted a water sampling and GAC filter ordinance. (West Lakeland Township followed suit in 2004)

Extent of the Problem

- The TCE plume covers approximately 6 square miles and the outer edges are remarkably stable
- Highest TCE concentrations are found beneath and immediately west of Lake Elmo airport.
- Four aquifers are contaminated:
  - Glacial drift - west of airport, airport, and in Bayport
  - Prairie du Chien – west of airport and east to river
  - Jordan – under airport and east to river
  - Franconia – near river bluffs
- TCE present in Bayport city water supply



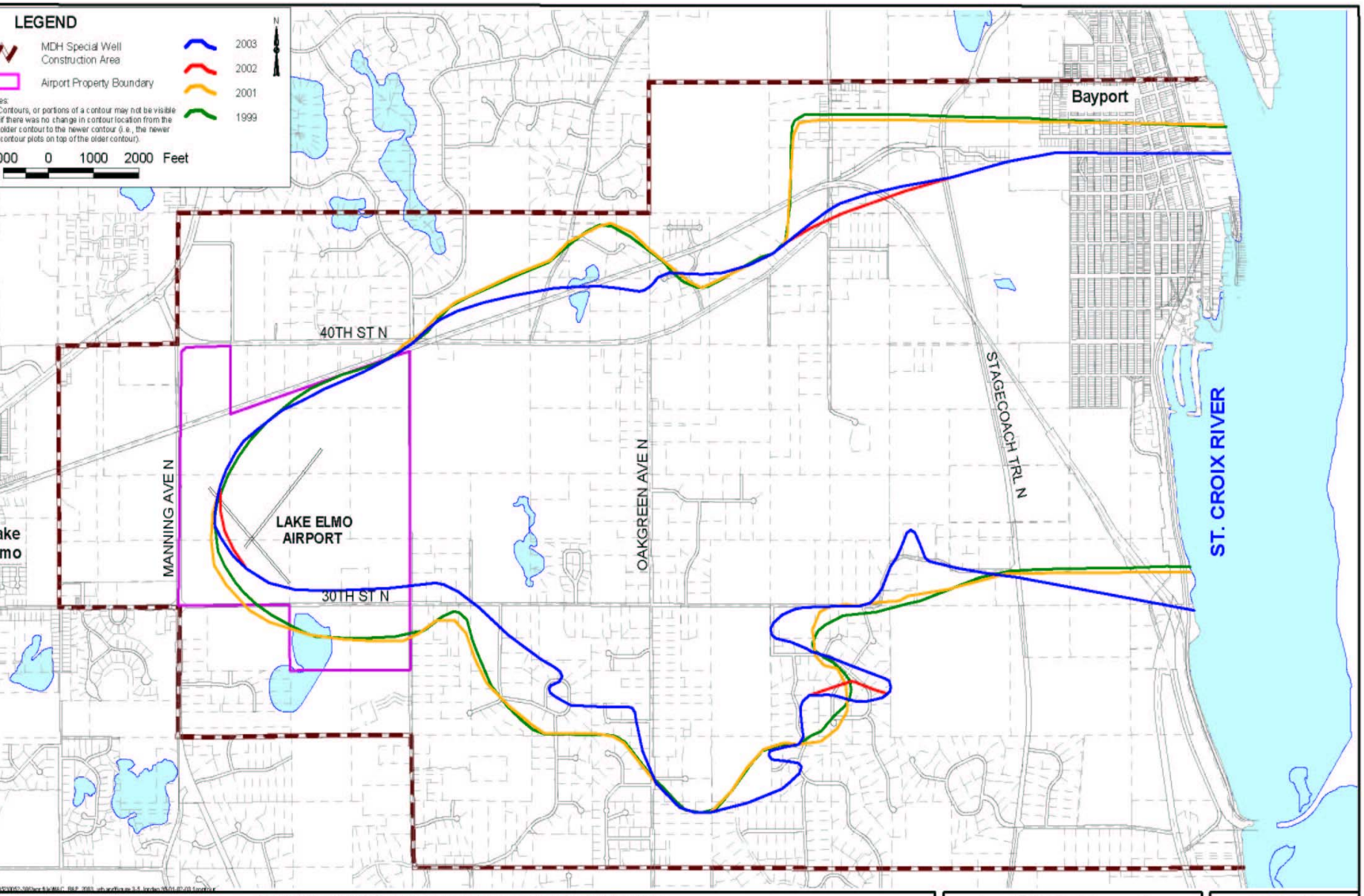
BAYTOWN TOWNSHIP GROUNDWATER CONTAMINATION SITE

1 ug/L Contour for Trichloroethene(TCE) Concentrations in Prairie Du Chien Wells

Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359

FEB 2004

Figure 3-2



BAYTOWN TOWNSHIP GROUNDWATER CONTAMINATION SITE

1 ug/L Contour for Trichloroethene(TCE) Concentrations in Jordan Wells

Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359-0249

FEB 2004

Figure 3-5

Extent of the Problem

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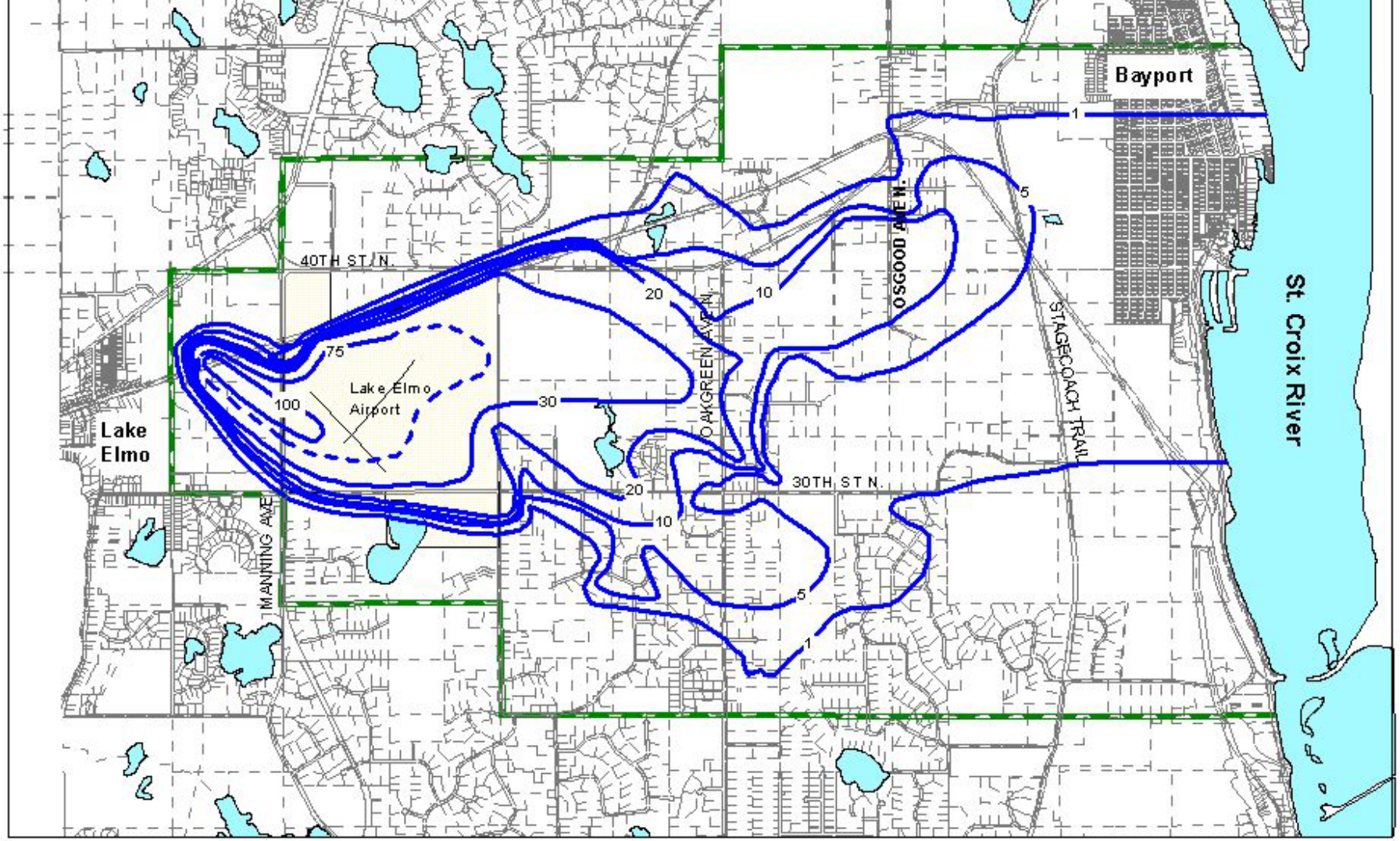


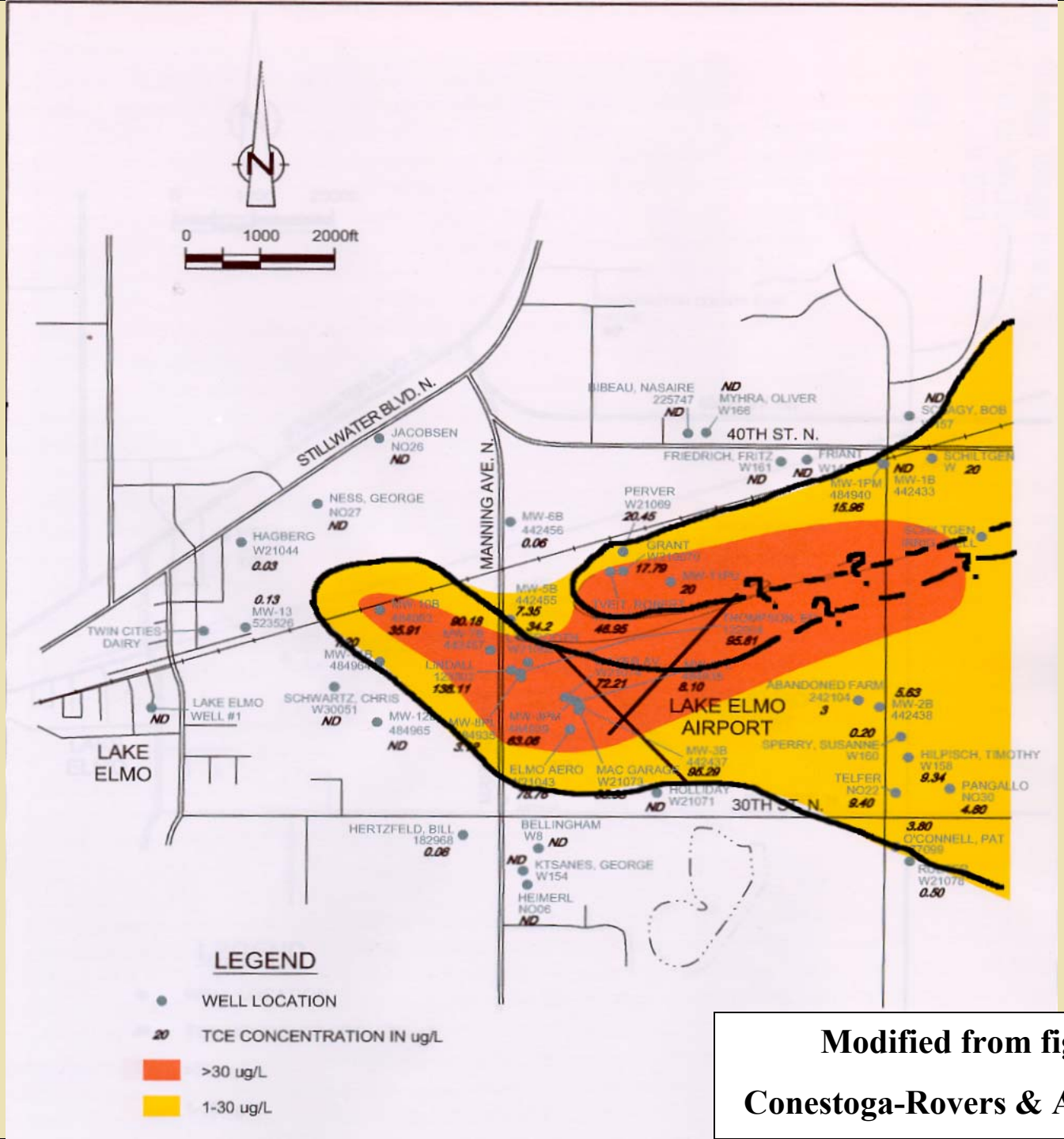
2003 Trichloroethene (TCE) Concentrations - Prairie Du Chien

TCE contour (in ug/L)

MDH Special Well Construction Area

N

Modified from Wenck Figure 3-1, Feb. 2004



Modified from figure 1.3

Conestoga-Rovers & Assocs. (2002)

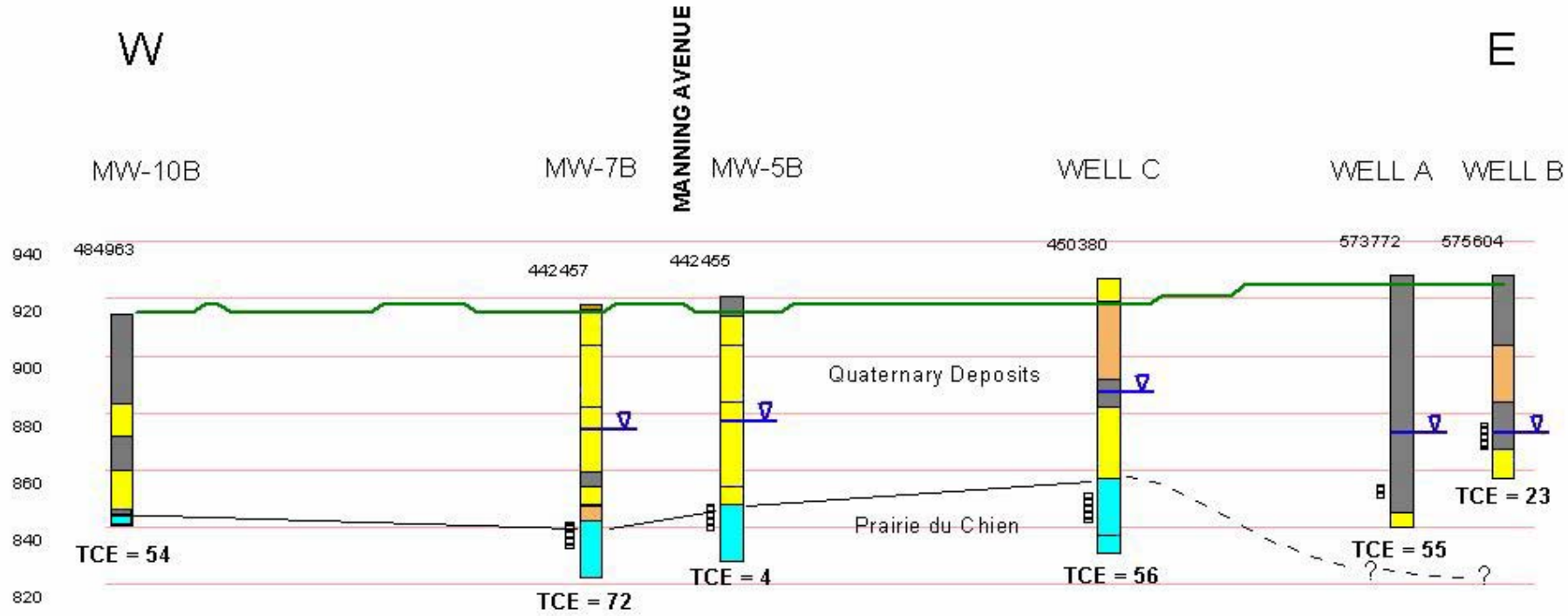


Figure 7: Cross-section On and Near Lake Elmo Airport

Clay and /or Silt

Sand

Gravel

Boulder

Dolomite

Ground surface

Surface of water table

Well screen

Top of Prairie du Chien bedrock

Top of bedrock uncertain

TCE values in ug/L, from October 1995

0 0.1 0.2 0.3 0.4 Miles

Horizontal scale

Vertical exaggeration = 10x

Note: All well log info., except MW-10B, from CWI. MW-10B info. from boring log in Delta, 1996. Ground elev. data is correct to within 1 meter; where well logs protrude above the ground surface indicates errors in surveying by the driller. More recent boring logs near wells A and B suggest the unconsolidated materials in this area contain more sand than the logs in CWI indicate.

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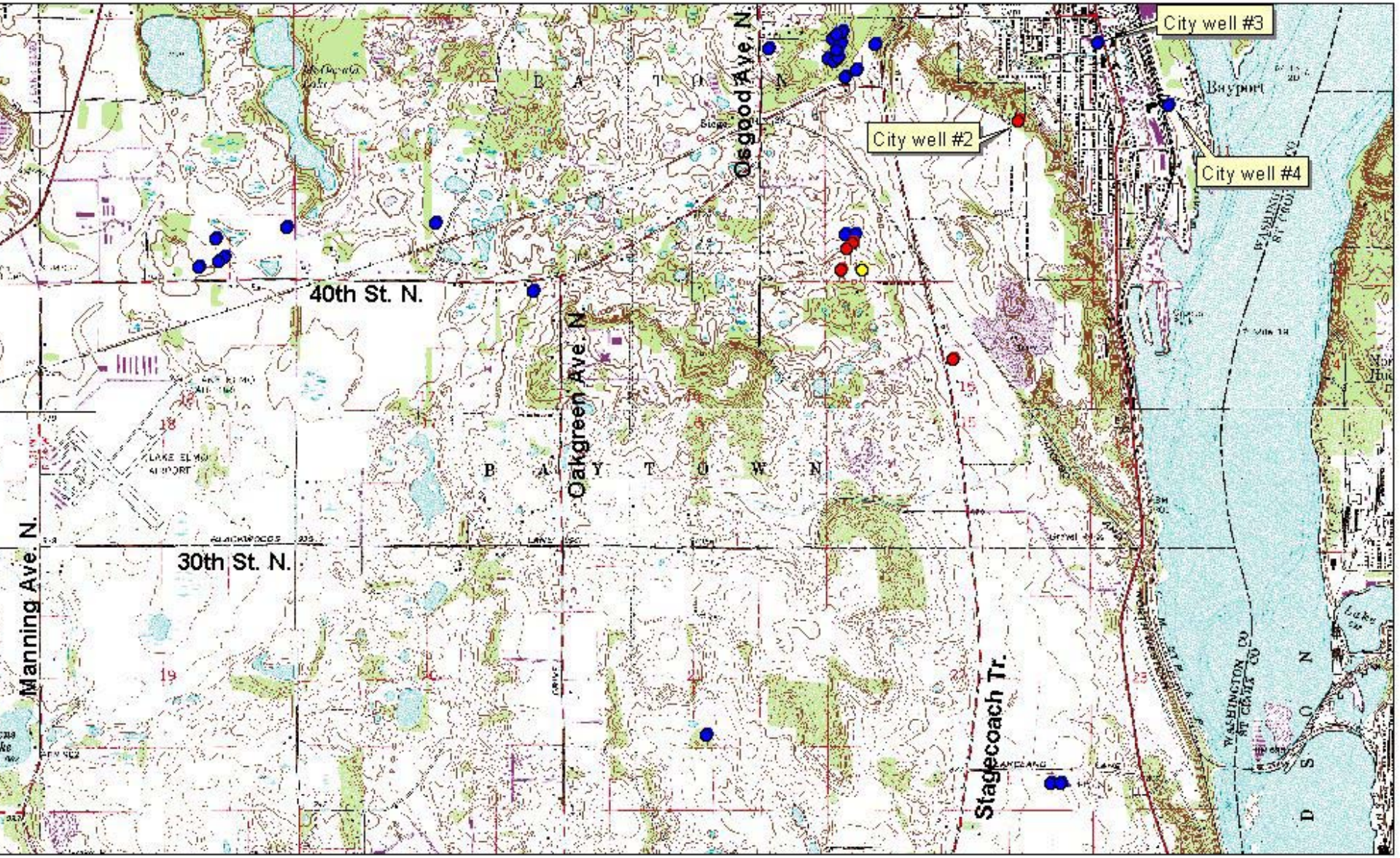
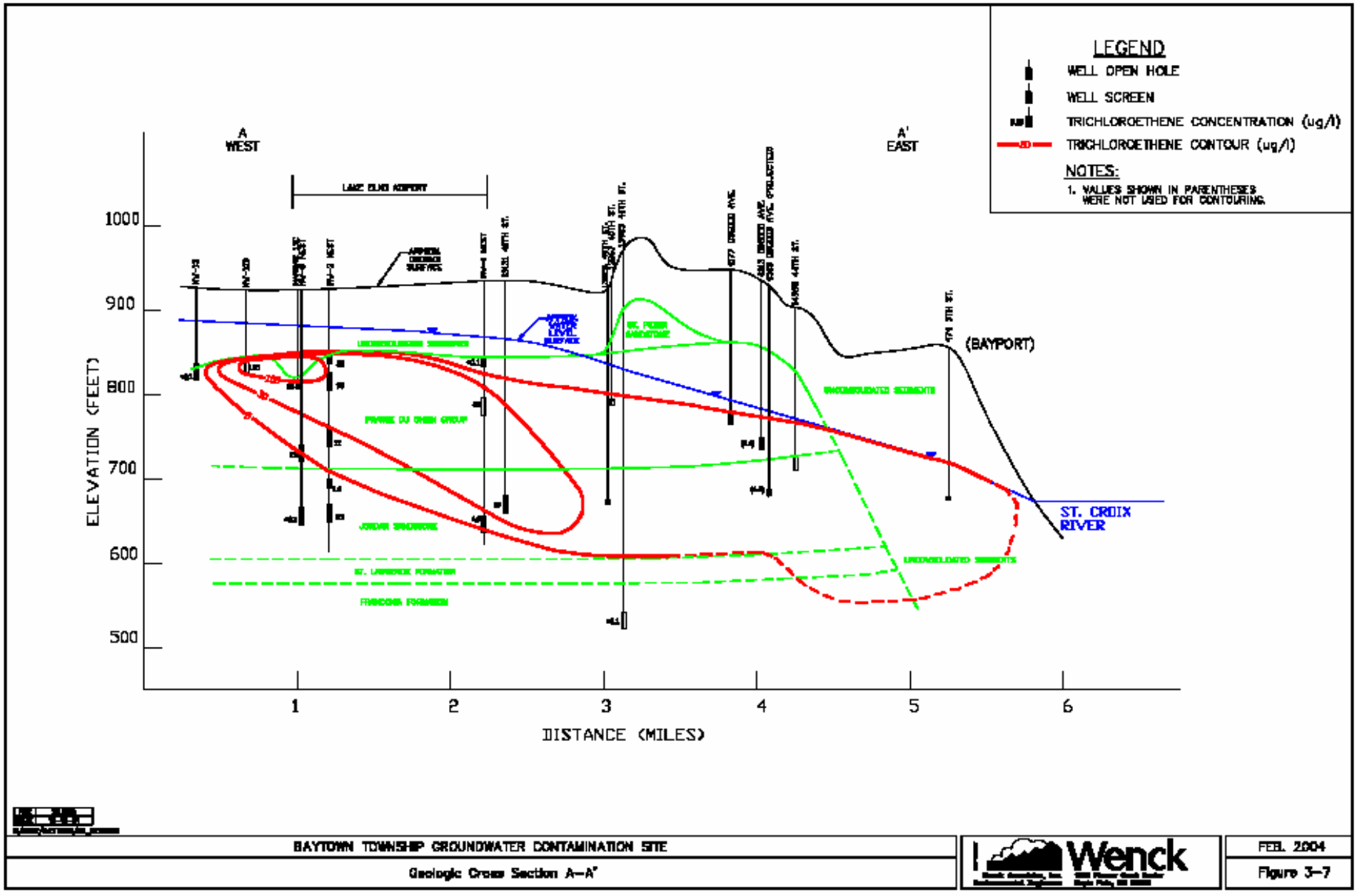


Location of Franconia Wells

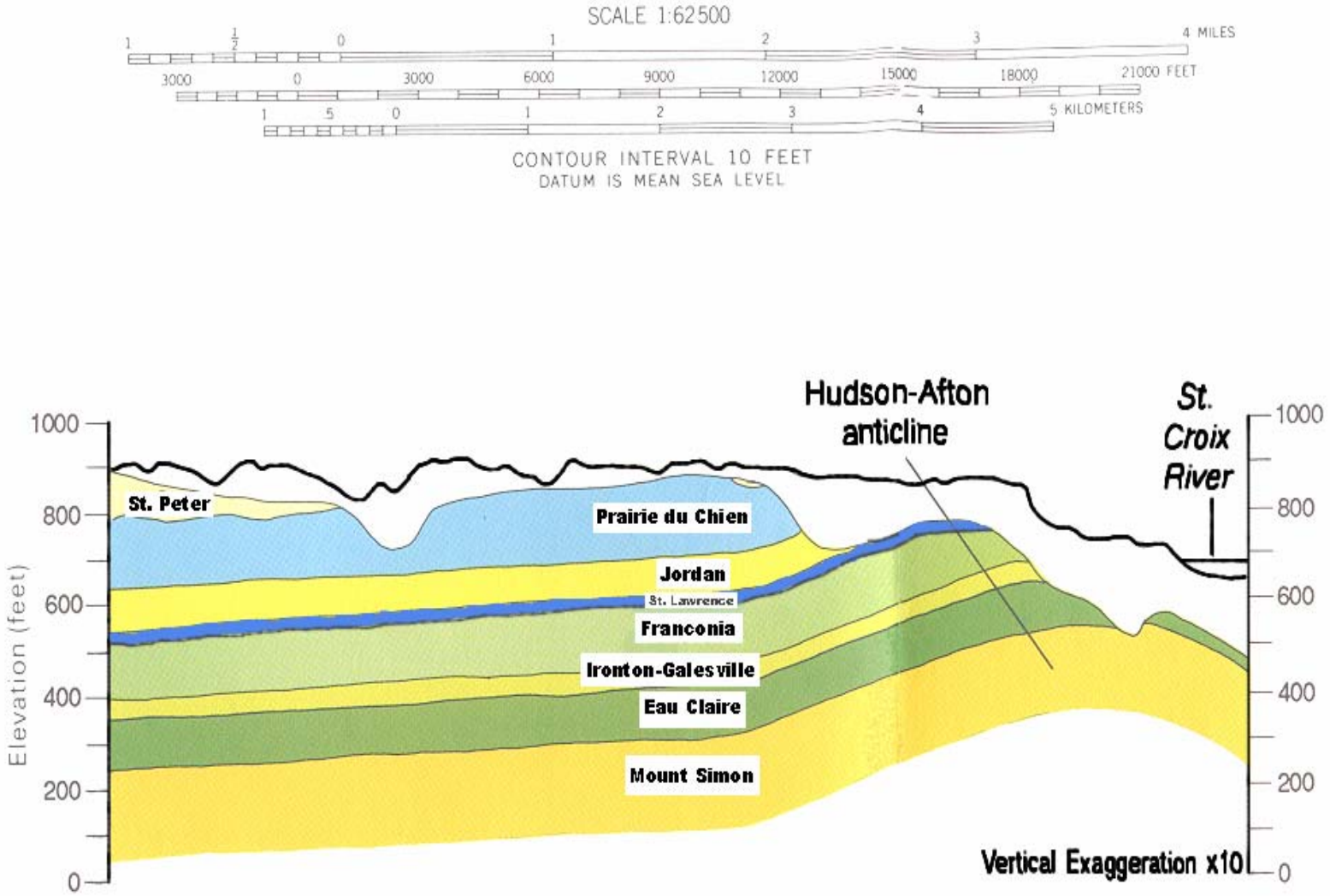
SCALE
5 0 0.5 1 Miles

- TCE detected
- TCE not detected
- TCE detected, but no longer present

N



Cross-section showing downward migration of TCE plume in the Prairie du Chien, Jordan, and Franconia Aquifers (modified from Wenck, 2004)



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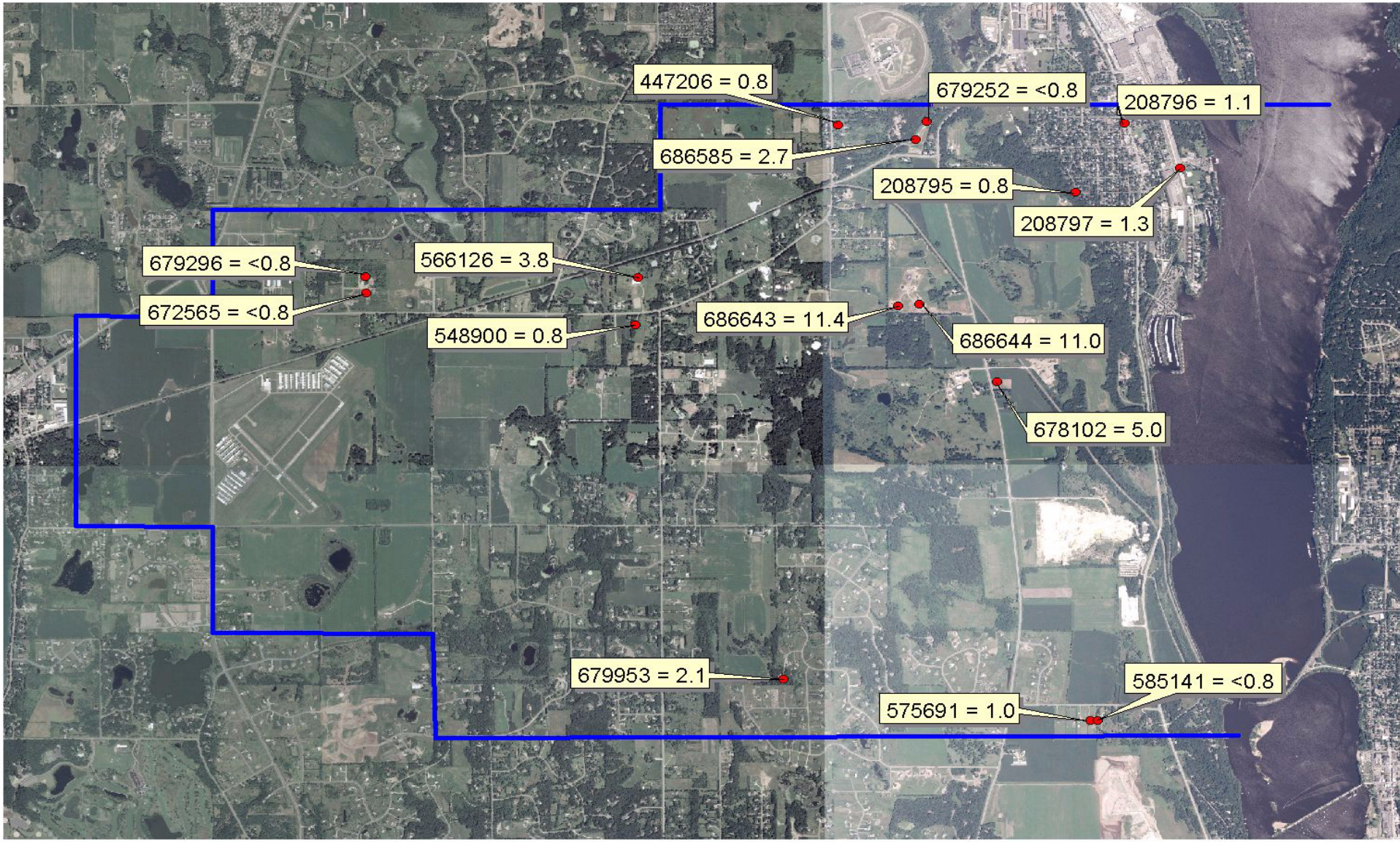
Tritium Testing

- MPCA analyzed samples from 16 wells for tritium – a radioactive isotope of hydrogen used to age-date groundwater
- Elevated tritium was detected in most wells positive for TCE, indicating young or mixed water. Bayport city well #2 did not fit this pattern.
- Tritium may be a good predictor of vulnerability to contamination for those Franconia wells currently located outside the plume. Nitrate may be a better indicator test though, as the analysis is faster and less expensive.

Tritium Results



Source: MN Dep't. of Health, March, 2004

Figure prepared by Pat Sarafolean, MDH

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Bayport City Wells

- First detection of TCE in May 2003 in Well #2
  - May 2003: 1.2 µg/L
  - June 2003: 1.1 µg/L
  - September 2003: 1.9 µg/L
  - November 2003: 3.4 µg/L
  - January 2004: 2.5 µg/L
  - March 2004: 2.2 µg/L
  - April 2004: 3.4 µg/L
- Sampling frequency increased to every six weeks
- Water "blends" in the system, keeping concentrations below 5 µg/L, to date
  - September 2003: 0.9 µg/L
  - November 2003: 0.3 µg/L
  - January 2004: 1.6 µg/L
  - March 2004: 0.9 µg/L
  - April 2004: 0.6 µg/L

Implications for New Well Construction

- MDH is promoting the use of clean aquifers where they exist within the area.
- In those areas where clean water (i.e. TCE < 5 ug/l) is not available, MDH will consider requests for wells that will have GAC filter units installed and maintained either by the MAC and MPCA, or be managed under a township filter ordinance.

Recent Development in Area

- 22 New Wells Constructed in 2003
  - 2 Glacial drift aquifer wells
  - 6 Jordan sandstone aquifer wells
  - 14 Franconia sandstone aquifer wells
- Of those 22 wells:
  - 12 had no VOC detections
  - 10 had TCE (2 drift, 4 Jordan, 4 Franconia)
  - 6 had GAC filters installed (3 Jordan, 3 Franconia)
- Housing prices went up in 2003 (Star Tribune, 4/29/04):
  - Baytown Township - 69%
  - West Lakeland Township – 11%

Township Ordinances

- For property platted on or before April 9, 2002 - MAC and MPCA have committed to installing and maintaining GAC filters for residents, at no charge, if TCE levels ever rise above the HRL or interim HRL.
- For property platted after April 9, 2002 – Property owners are responsible to install and maintain their own filters, if needed, under ordinances adopted by Baytown and West Lakeland Township
- The ordinances require:
  - Residents test their water within 6 months of well construction, and at least every two years thereafter (unless their well is being routinely tested by MPCA or MAC)
  - Testing results must be submitted to the township
  - If a GAC filter is needed, it must meet specifications
  - GAC filters must be replaced, the systems tested, and the results submitted to the township at least every two years

Future Work

- Additional investigations planned by MPCA
- MN Geologic Survey assessment of structural features
- Development of a remedial action plan
- Formally adopt a revised HRL for TCE
- Continued monitoring of city wells, private wells & MAC installed filters
- Encourage community wells
- Ensure adequate oversight of privately installed filters