An Integrated Groundwater Database System:

Sharing Data Using GIS and the Web

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Illinois State Water Survey

Illinois State WATER SURVEY

ISWS Statewide Databases

- **Groundwater Quality - w/ 1.3 million records of mostly ambient water quality information**
- **Water Inventory Program (IWIP) - water use data for public, self-supplied industry, and other uses collected since 1980**
- **Aquifer properties – results of aquifer and pumping tests conducted by ISWS staff over the last 40+ years**
- **Water levels – historical and project data, some collected monthly for over 50 years**

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Where we were

- Dependent on System Admin for information
- Loss of system support personnel/ funding
- No way to compare data from databases without programming
- Separate databases
  - Outdated Unix system
  - Paper files
  - Excel/Dbase/etc.

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Goals

- **Database Goals**
  - Correct data so useable by others
  - Provide desktop access to data for staff
  - Maintain daily operations
  - Modernize our data for GIS use and analysis
  - Integrate lab and project data
  - One system for all data (user buy-in)
- **GIS/Web Goals**
  - Provide desktop/Web access for staff
  - Maintain confidentiality where appropriate
  - Provide useful data to other agencies via the IEPA SWAP Site

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WQ Challenges/Problems

- **Database**
  - Correct data
  - Find missing data (dates, locations, etc)
  - Eliminate Duplicates (lab, reused numbers)
  - Provide useful interface for new users
  - Other problems (storet, funding, project data)
- **GIS/Web**
  - Integrate SQL with ArcSDE and ArcIMS
  - Coordinating multiple agency efforts (communication, responsibilities)
  - Compatible software, security, code

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Where we are

- In-house system that links all our data (SQL, .NET, ArcIMS*) *still in progress
- Locational information for most, heading toward “all”
- Relational databases that allow movement between each to view all characteristics/ history for the well
  - Quality
  - Aquifer Properties
  - Pumpage
  - Water Levels

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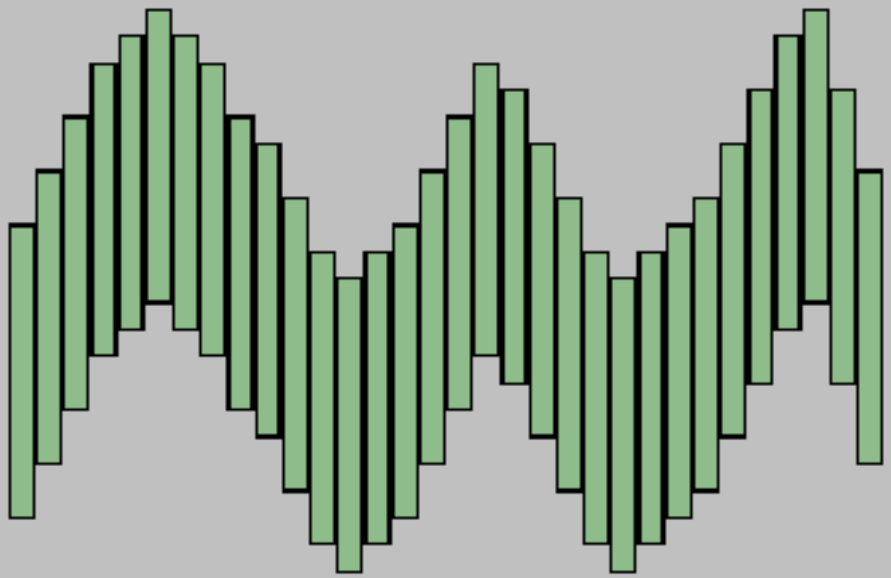
GWInfo Database Portal

Ground Water Tracking and Analysis



Aquifer Tests

Groundwater

Groundwater Quality

Pumpage

Sample Tracker

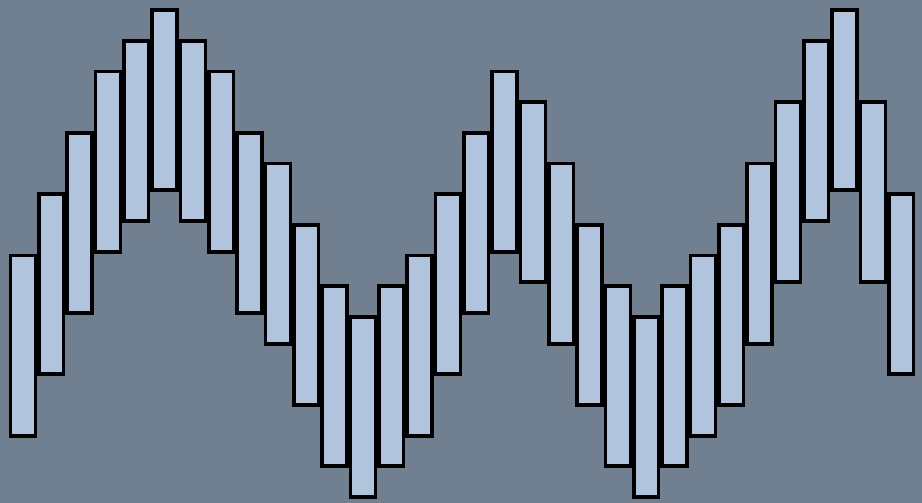
Water Levels

Exit Program

Illinois State Water Survey

SAMPLE Tracker

Sample Analysis and Tracking



SAMPLES

CLIENTS

PROJECTS

REPORTS

QA/QC

GWINFO MAIN

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ISWS Groundwater Data - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media Links

Address http://gismaps.sws.uiuc.edu/cws/viewer.htm Go

Favorites

Add... Organize...

- arsenic
- groundwater
- Links
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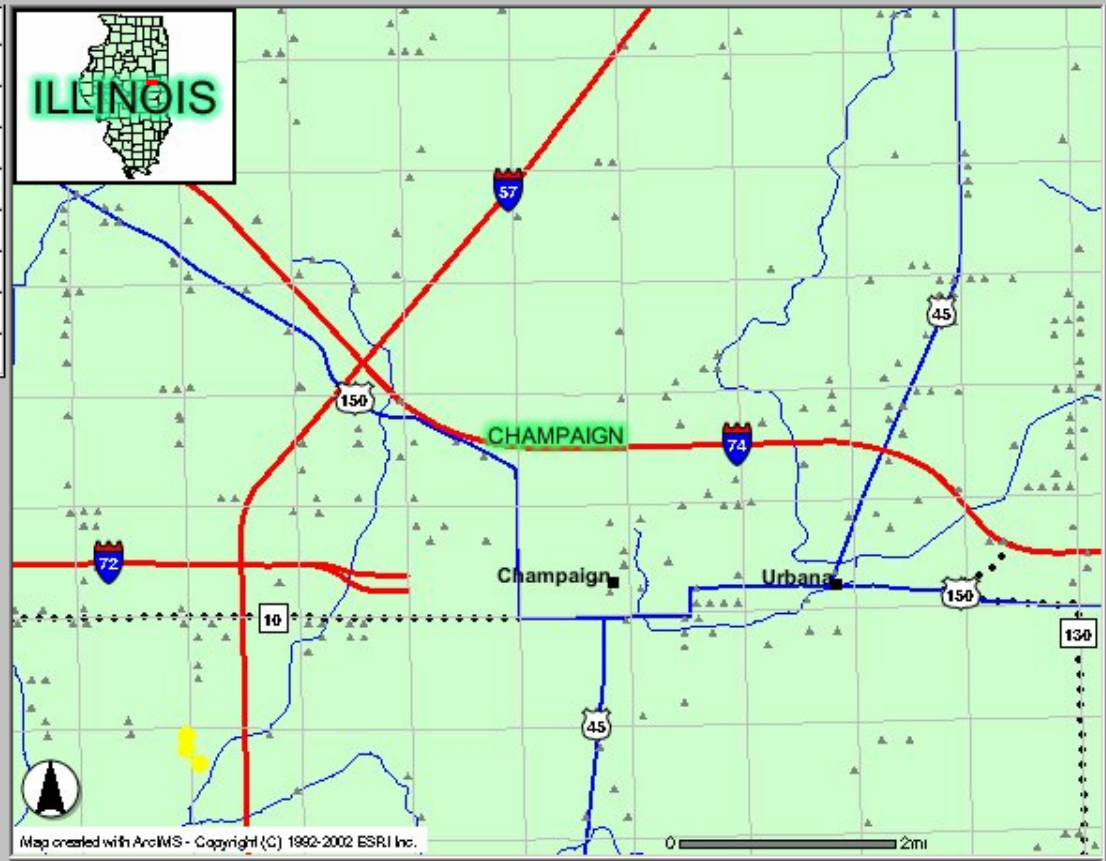
- steve
- university of Illinois
- weather
- Bacteriological Contaminat...
- Central Illinois Youth Foot...
- Database Locations
- environmental data intera...
- Google
- Kids Korner
- Log In
- Microsoft Outlook Web Ac...
- Troop 101 - Champaign, Ill...
- USGS News Release
- WATER SUPPLY MANAGE...
- XtremeLearning Login
- Acustrip 481396 Arsenic T...
- EPA Quality System - Doc...
- http--www.epa.gov-qualit...
- MP3U.com
- Welcome to Industrial Tes...
- AWWA
- endnote
- funding
- imperial valley
- MTAC

ISWS Groundwater Data



Layers

Visible Active

- Water Quality Wells
- Hyperlink to Private Wells by Section
- Community Water Supplies (groundwater) 2001
- Aggregate Industrial Commercial Groundwater 1983 (MGD)
- Aggregate Industrial Commercial Groundwater 2001 (MGD)
- Aggregate Industrial Commercial Groundwater without Power Generation 2001 (MGD)
- Aggregate Industrial Commercial Surface Water without Power

Rec	Site ID	Name	Depth
1	10269	1316	240
2	10270	1317	240
3	10271	1318	240
4	10272	1319	268
5	10280	1327	110

Select Rectangle

Internet

Start Inbox - Microsoft O... 21 Reminders Undeliverable: Pizz... Steves Presentatio... JonathanFoote_G... ISWS Groundwat... 10:15 AM

Source Water Assessment Program - Microsoft Internet Explorer

Illinois Environmental Protection Agency

www.epa.state.il.us

Rod R. Blagojevich, Governor

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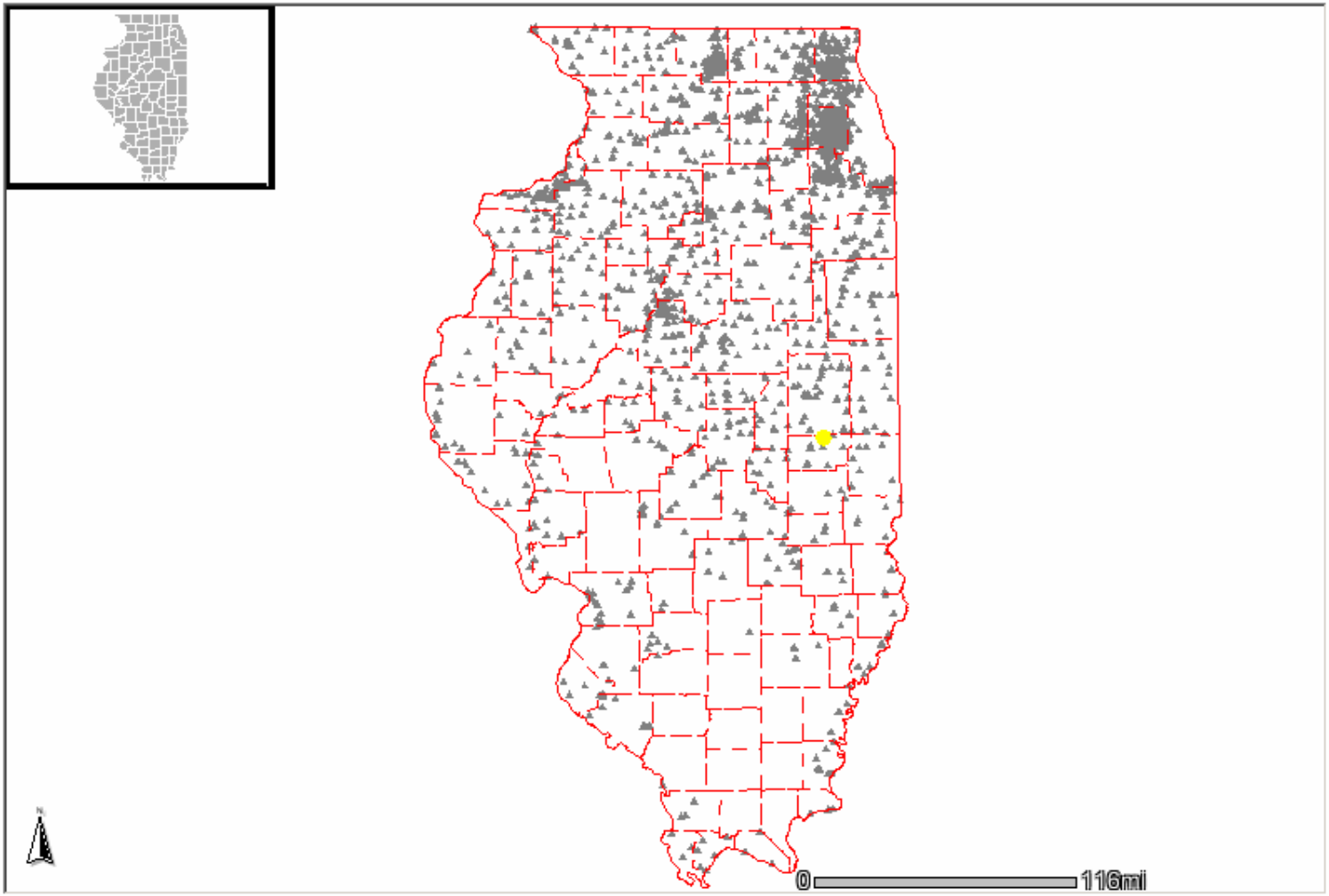

Refresh Map

Select Active Layer:

1992 Well Pumpage

Available Layers:

- Admin/PLSS
- Environmental Concerns
- Infrastructure
- Misc
- Resource
- Surficial/Bedrock Geology
- Water Quality
- Water Resources
- Water Use/Source Water P
- Background Images

Refresh Map

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Zoom to Full Extent

Internet

Start | Inbox - Microso... | 20 Reminders | RE: FW: CWS s... | Steves Present... | NEIGPC 5-14-04... | Source Water A... | Source Water ... | 10:39 AM

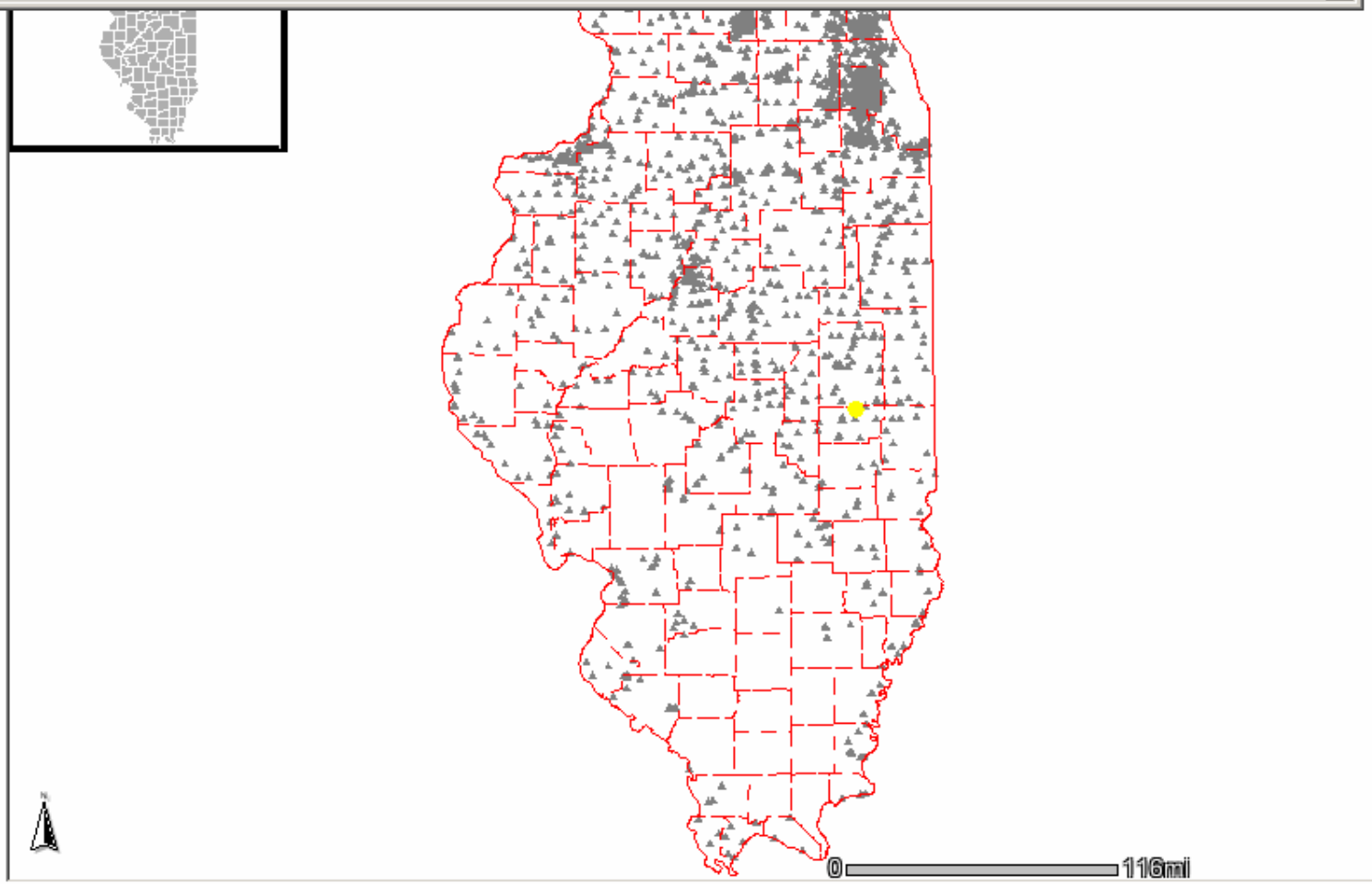
Query/Selection Results - Microsoft Internet Explorer

Save These Data as CSV

1992 Well Pumpage

Rec	sws_id	epa_id	name	well_no	dpth	aquifer	epa_wellno	fips	pm	twn	rng	sec	plot	x_coord	y_coord	annual_gal	m_g_d	yr
1	04190350	0410350	VILLA GROVE	1	645	5151	40003	041	3	16N	09E	10	1G	3373558	2491943	64850614	0.177673	1992
2	04190350	0410350	VILLA GROVE	2	627	3051	40004	041	3	16N	09E	10	1G	3373865	2491904	31125380	0.085275	1992

Zoom to these records



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download | overview | legend/layer

1992 Well Pumpage

Available Layers:

- Admin/PLSS
- Environmental Concerns
- Infrastructure
- Misc
- Resource
- Surficial/Bedrock Geolog
- Water Quality
- Water Resources
- Water Use/Source Wate
  - ISGS Wells
  - Non-CWS Phase I We
  - Non-CWS Surface Wa
  - Non-CWS Wells
  - PWS Watersheds
  - PWS Lakes
  - Zone 1 Source Water
  - Community SW Intak
  - CWS Phase II Wellhe
  - CWS Phase I Wellhea
  - CWS Wells
  - [x] 1992 Well Pumpage
  - Adopted Maximum Se
  - Groundwater Ordinar
- Background Images

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Map: 2401877.32 , 3369939.03 -- ScaleFactor: 3888.068926553671 -- Latitude/Longitude: 42.2724/-91.7188

Internet

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Source Water Assessment Program - Microsoft Internet Explorer

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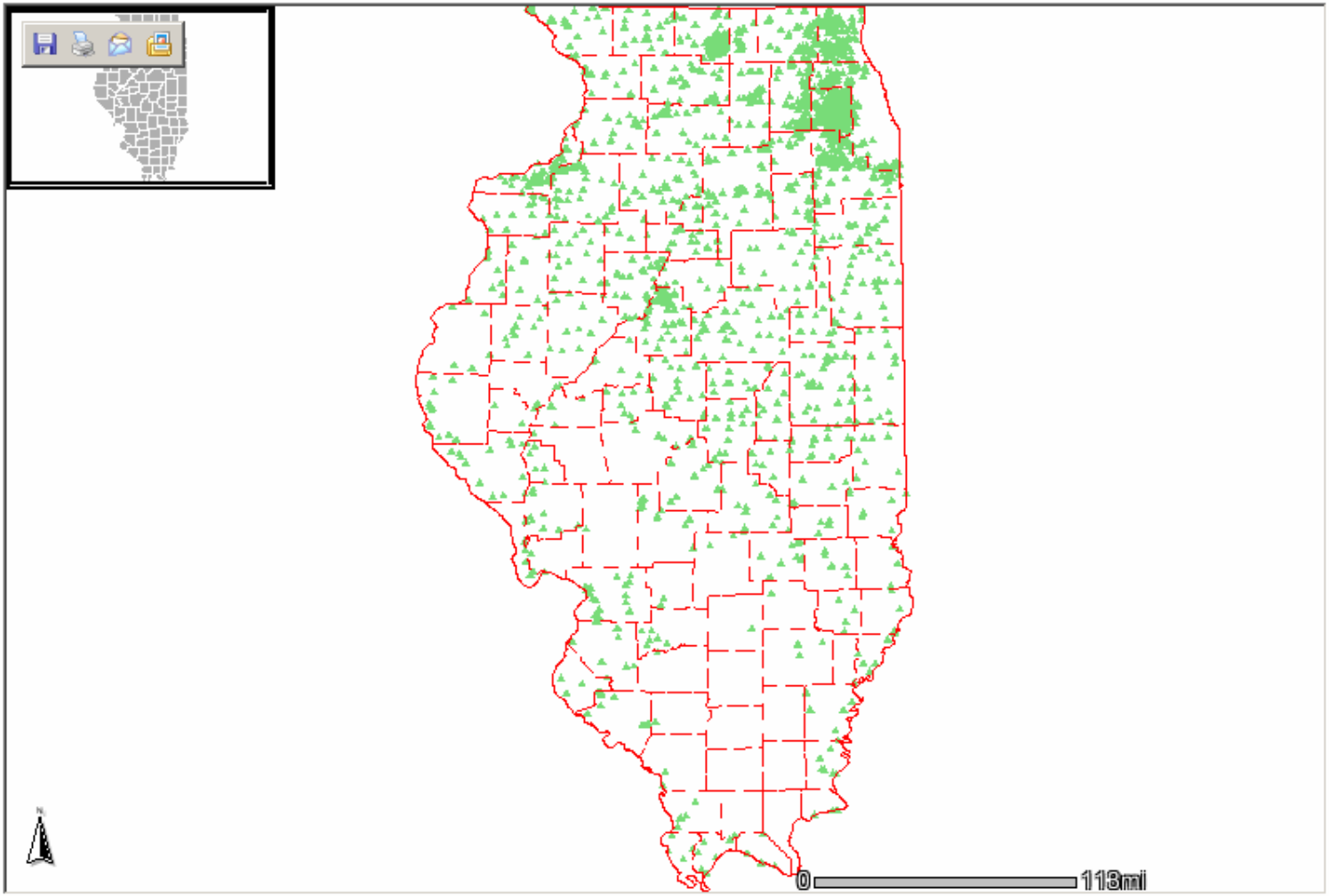

- Quaternary Deposits
- Bedrock Valleys
- Bedrock Geology
- Bedrock Topography
- Physiographic Divisio
- Water Quality
  - 305(b) Watersheds
  - 305(b) Stream Monit
  - 305(b) Assessed Stre
  - 305(b) Assessed Lak
  - 305(b) Monitored Bas
  - Median Nitrate Conc
  - VOC
  - IO
  - SOC
  - 303(d) Streams
  - 303(d) Lakes
- Water Resources
  - NRCS 12 Digit Waters
  - 8-Digit HUC
  - USGS Stations
  - Potential for Aquifer
  - Regulated Recharge
  - Class III Ground Wat
  - Major Bedrock Aquife
  - Major Sand & Gravel
  - Karst Areas

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Map: 2985611.22 , 1698471.59 -- ScaleFactor: 3783.356713432253 -- Latitude/Longitude: 37.6808/-89.55

Internet

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Source Water Assessment Program - Microsoft Internet Explorer

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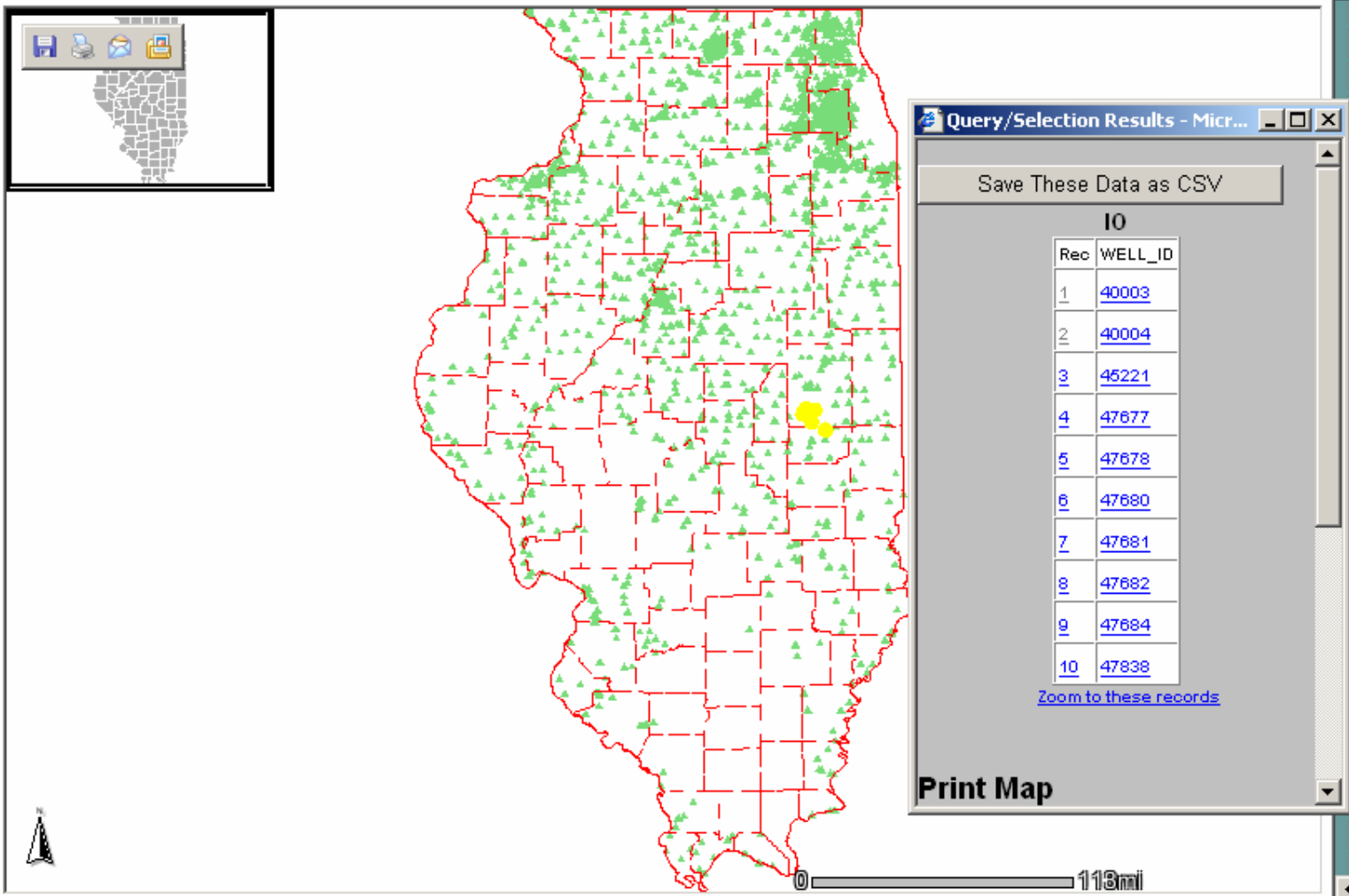

Query/Selection Results - Micr...

Save These Data as CSV

IO

Rec	WELL_ID
1	40003
2	40004
3	45221
4	47677
5	47678
6	47680
7	47681
8	47682
9	47684
10	47838

Zoom to these records

Print Map

- Quaternary Deposits
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  - USGS Stations
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  - Regulated Recharge
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Map: 2157056.1 , 3226947.7 -- ScaleFactor: 3783.356713432253 -- Latitude/Longitude: 41.8588/-92.6082

Internet

Start | 4 Microsoft O... | Steves Present... | Source Water A... | Point Forecast -... | Source Water A... | Query/Selecti... | D:\public\IEPA F... | 3:48 PM

Water Quality Database::Facility Search::0410350 - Microsoft Internet Explorer

File Edit View Favorites Tools Help | Back | Search | Favorites | Media | Links

Address http://maps.epa.state.il.us/cgi-bin/swap/wq_facility.cgi?wellid=40003&analyte=IO | Go

Favorites

Add... Organize...

- arsenic
- groundwater
- Links
- sports
- steve
- university of Ill
- weather
- Bacteriological
- Central Illinois
- Database Loca
- environmental
- Google
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- Log In
- Microsoft Outlc
- Troop 101 - CH
- USGS News Re
- WATER SUPPL'
- XtremeLearnin
- Acustrip 48139
- EPA Quality Sy
- http--www.epa
- MP3U.com
- Welcome to Industrial Test Systems, Inc.
- AWWA
- endnote
- funding
- imperial valley
- MTAC

Query/Selection Results - Micr...

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7	47681
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9	47684
10	47838

Zoom to these records

Print Map

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Map Server

Community Water Supply 0410350

Information and data displayed are provided by the Illinois Environmental Protection Agency (IEPA) and are subject to revision.

Retrieve data (CSV format)

IEPA Water Quality Information - Inorganics

WellNumber	Tap	SampleNumber	SamplePoint	CollectionDate	Collectio
40003	01	B034467	WELL #1	1983-04-19	
40004	01	B034469	WELL #2	1983-04-19	
40003	01	B711518	VILLA GROVE WELL 1	1987-07-15	13:35:00
40003	01	B512912	VILLA GROVE WELL 1	1995-09-07	12:18:00
40003	01	B615465	VILLA GROVE	1996-08-26	13:44:00
40003	01	B815170	VILLA GROVE TAP 1	1998-08-26	11:04:00
40003	01	B016788	VILLA GROVE TAP 1 WELL 1	2000-09-19	12:17:00

Search again

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Internet

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Water Quality Database::Facility Search::0410350 - Microsoft Internet Explorer

File Edit View Favorites Tools Help Back Search Favorites Media Links

Address http://maps.epa.state.il.us/cgi-bin/swap/wq_facility.cgi?facno=0410350&analyte=IO&sampleno=B034467&mode=detail Go

Favorites

Add...

arsenic
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Links
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Bacteriol...
Central Ill...
Database...
environm...
Google
Kids Korner
Log In
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USGS Ne...
WATER S...
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Welcome ...
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WellNumber	Tap	SampleNumber	SamplePoint	CollectionDate	CollectionTime
40003	01	B034467	WELL #1	1983-04-19	
40004	01	B034469	WELL #2	1983-04-19	
40003	01	B711518	VILLA GROVE WELL 1	1987-07-15	13:35:00
40003	01	B512912	VILLA GROVE WELL 1	1995-09-07	12:18:00
40003	01	B615465	VILLA GROVE	1996-08-26	13:44:00
40003	01	B815170	VILLA GROVE TAP 1	1998-08-26	11:04:00
40003	01	B016788	VILLA GROVE TAP 1 WELL 1	2000-09-19	12:17:00

Hide details Search again
Retrieve combined data (CSV format)

Detailed Trip Information for Sample No. B034467

SampleNo.	Analyte	ResultsSign	Results	GWQS	Units
B034467	CONDUCTIVITY		3460		UM/C
B034467	PH,FIELD		8.1		UNIT
B034467	ALKALINITY,TOTAL		380		MG/L
B034467	AMMONIA-N,TOTAL		0.91		MG/L
B034467	NITRATE & NO 2-NTOTAL	<	0.1	10	MG/L
B034467	CYANIDE,TOTAL	<	0.005	0.2	MG/L
B034467	HARDNESS,EDTA		270		MG/L
B034467	CALCIUM,TOTAL		50		MG/L
B034467	MAGNESIUM,TOTAL		28		MG/L
B034467	SODIUM,TOTAL		666		MG/L
B034467	POTASSIUM,TOTAL		4		MG/L
B034467	CHLORIDE,TOTAL		908	200	MG/L
B034467	SULFATE, TOTAL	<	10	400	MG/L
B034467	FLUORIDE, TOTAL		0.43	4	MG/L
B034467	SILICA,TOTAL		9.4		MG/L
B034467	ARSENIC,TOTAL		1	50	UG/L

Internet

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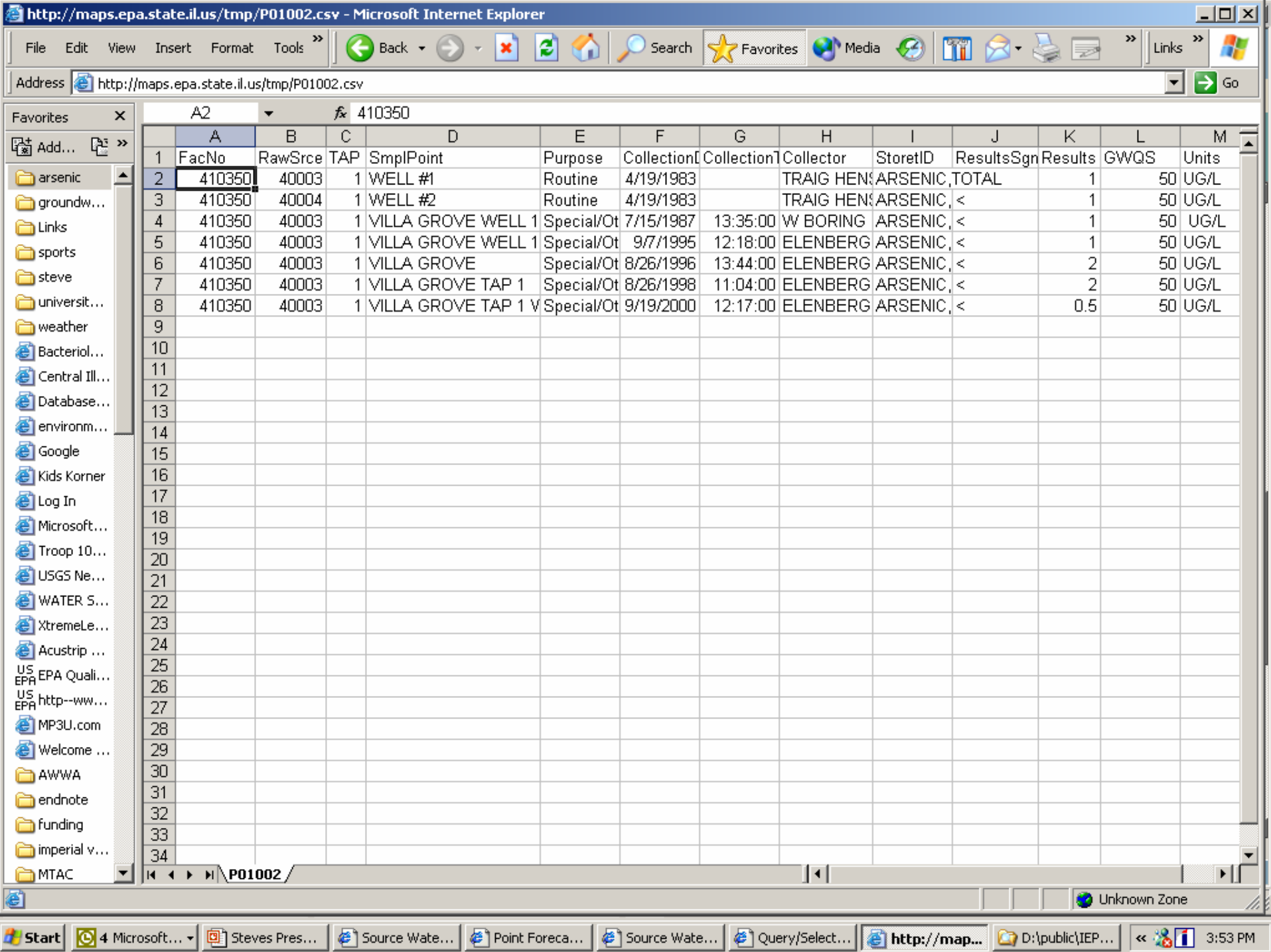

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2	410350	40003	1	WELL #1	Routine	4/19/1983		TRAIG HEN	ARSENIC,	TOTAL	1	50	UG/L
3	410350	40004	1	WELL #2	Routine	4/19/1983		TRAIG HEN	ARSENIC,	<	1	50	UG/L
4	410350	40003	1	VILLA GROVE WELL 1	Special/Ot	7/15/1987	13:35:00	W BORING	ARSENIC,	<	1	50	UG/L
5	410350	40003	1	VILLA GROVE WELL 1	Special/Ot	9/7/1995	12:18:00	ELENBERG	ARSENIC,	<	1	50	UG/L
6	410350	40003	1	VILLA GROVE	Special/Ot	8/26/1996	13:44:00	ELENBERG	ARSENIC,	<	2	50	UG/L
7	410350	40003	1	VILLA GROVE TAP 1	Special/Ot	8/26/1998	11:04:00	ELENBERG	ARSENIC,	<	2	50	UG/L
8	410350	40003	1	VILLA GROVE TAP 1 V	Special/Ot	9/19/2000	12:17:00	ELENBERG	ARSENIC,	<	0.5	50	UG/L
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In Progress/Completed

- In-house desktop system that links all our data (SQL, .NET)
- Currently building additional functionality
- Web/GIS staffs working to provide data on IEPA SWAP site
- Data should be there by July 1

Illinois State WATER SURVEY

Thanks!

- **Illinois EPA - Source Water Assessment Program Site**
  - **Innovative and progressive**
  - **Inter-agency cooperation**
- **Illinois EPA funded, 18-month project**
  - **upgrade our databases**
  - **provide data for the SWAP site**
  - **Water Quality ~ 35,000 ambient samples**
  - **Aquifer Properties ~ 5,000 analyses**
  - **Water Use ~ 9,000 high-capacity wells**

Illinois State WATER SURVEY

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