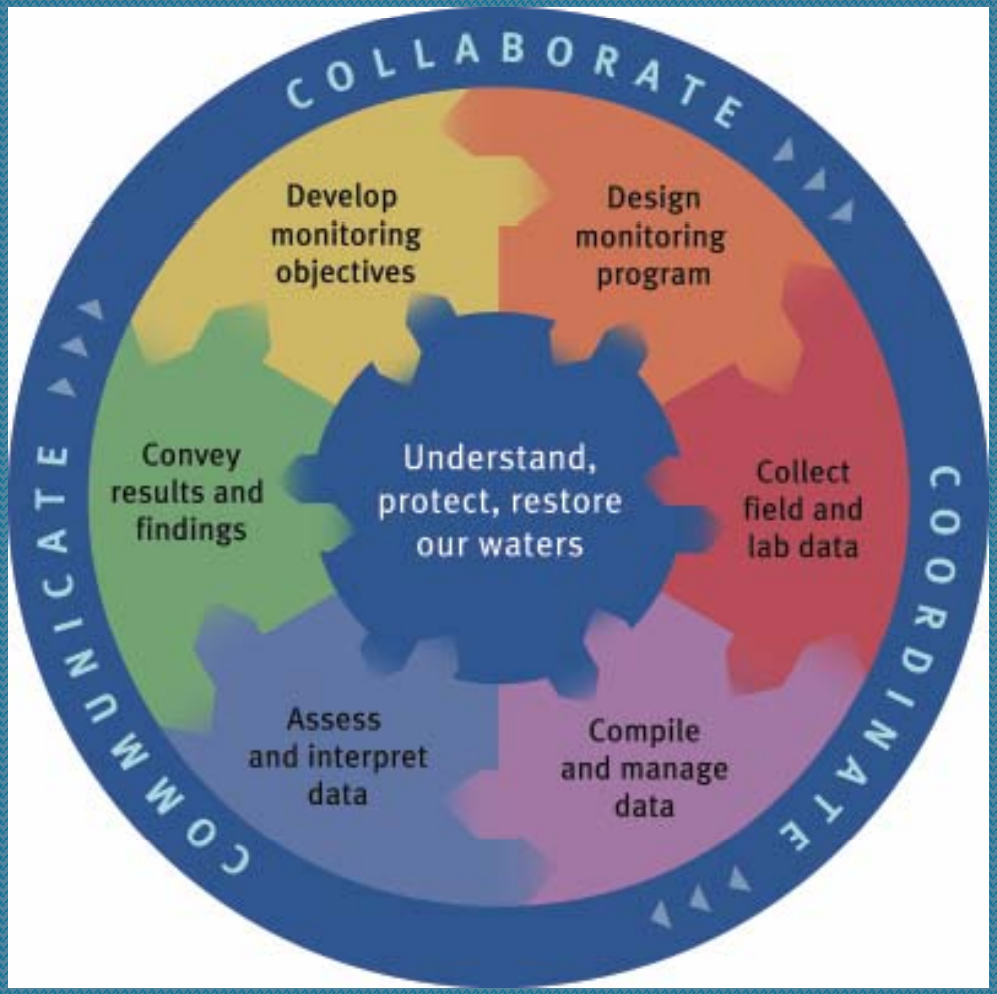
USGS Data & Reports: From the Lab to the Public

Michael Lewis
Katie Walton-Day
USGS Colorado Water Science Center

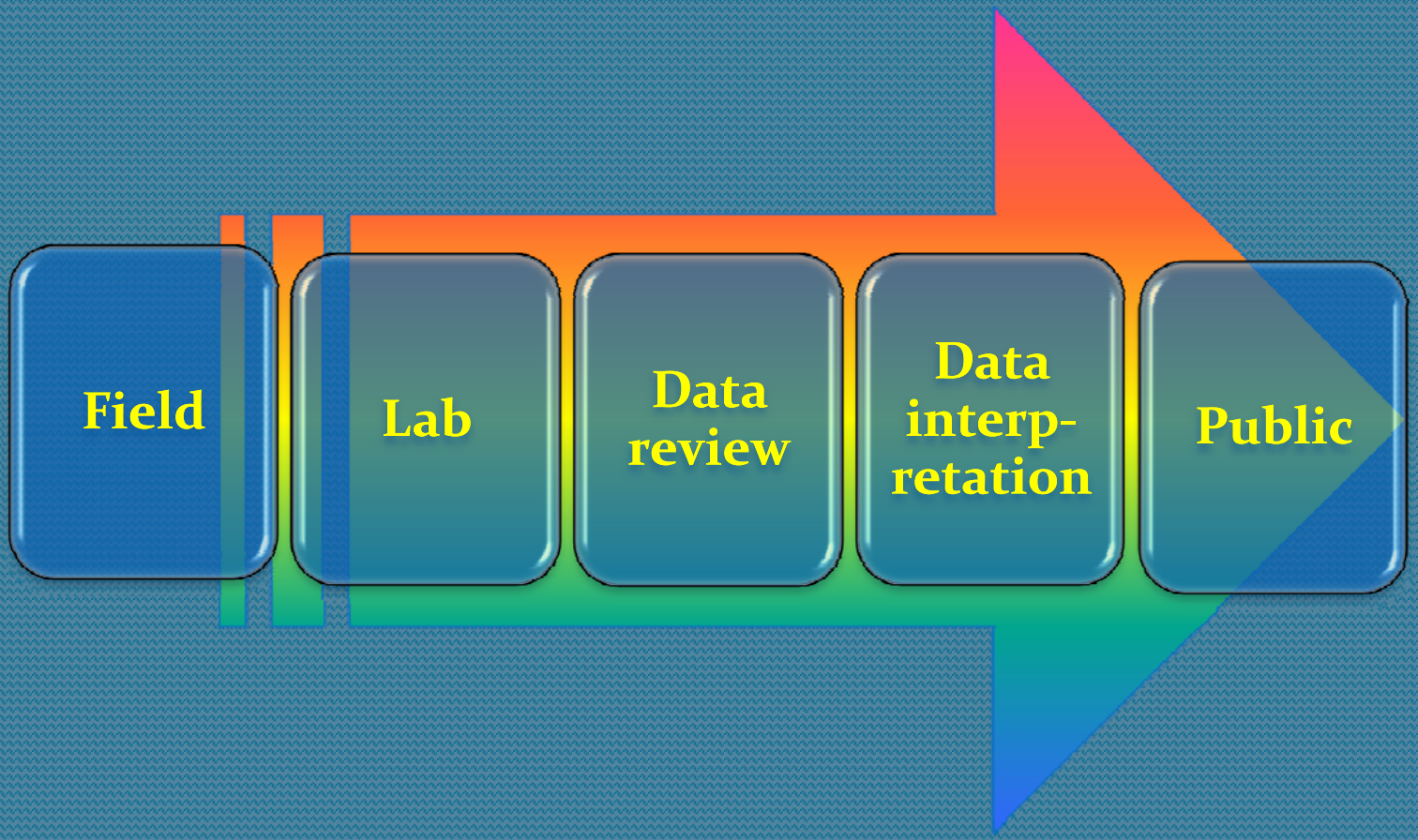
USGS
science for a changing world

NWQMC Monitoring Framework



USGS
science for a changing world

Data Flow



USGS
science for a changing world

Field

Collection & Processing

Documentation

Login & Shipping

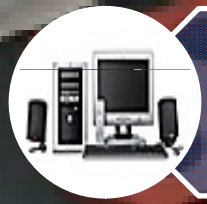
USGS
science for a changing world

Lab

Login and sample tracking

Analytical methods

Quality assurance



Data Management & LIMS

USGS
science for a changing world

LIMS

- Seamless data transfer to NWIS by NWQL
- Includes all analytical metadata

NWIS

- Data validation by USGS Water Science Centers
- 3-sets of eyes & consistent criteria

NWISWeb

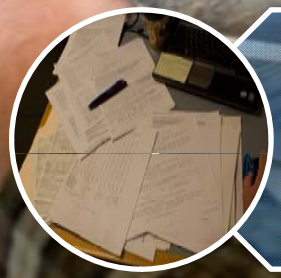
- Provisional data soon after analysis
- Approved data after review

USGS
science for a changing world

Data review

Field Notes

Field & Analytical Data



Sample Coding

USGS
science for a changing world

Field Notes

Paper or electronic

Field methods

Completeness

Measurements & calculations

USGS
science for a changing world

Basic Tenets of Data Review

- Timeliness of review is critical
- Outlier doesn't mean wrong
- Multiple lines of evidence invaluable
- Deal with problems quickly and thoroughly
- Lab staff are a tremendous asset

#1 Rule of Data Review

Consistency

USGS
science for a changing world

Review Criteria

Logic tests

Outlier identification and remedy

Logic Tests

(aka – Is it even possible?)

- Part vs Whole
- Ion Balance
- $1 < pH < 14$
- $0 < DO < 20$
- $0\ ^{o} < Temperature < 40^{o}\ C$

USGS
science for a changing world

Logic Tests

(aka – Is it even possible?)

- **The illogical, if not impossible results:**
  - **0 > DO > 20**
  - **0 > Temperature > 40º C**
  - **1 > pH >14**
- **Typically these are field values**
  - **Review field notes**
  - **Revise the value only with proof…..don't guess.**

USGS
science for a changing world

Logic Tests

Part vs Whole

- Dissolved concentrations cannot exceed total concentrations.
  - e.g. Filtered Fe $\leq$ Total Fe
  - e.g. where Total N = NO_2 + NO_3 + NH_3 + Organic N,
    - NO_2, NO_3, NH_3, and Organic N $\leq$ Total N

- Allow for analytical variability and uncertainty:
  - Concentrations $\geq$ 1 mg/L, 10% exceedance is allowed
  - Concentrations < 1 mg/L, exceedance may equal the LRL of the least precise of the 2 methods.

USGS
science for a changing world

Logic Tests

Ion Balance

Σ cations = Σ anions

5% difference OK for many natural waters

Differences >> 5% allowable at very low ionic strength

USGS
science for a changing world

OUTLIERS

an observation that is numerically distant from the rest of the data

- Outliers in space (1 well in a network)
- Outliers in time (new maximum in a time series)
- Outliers in relations (flow versus concentration)

USGS
science for a changing world

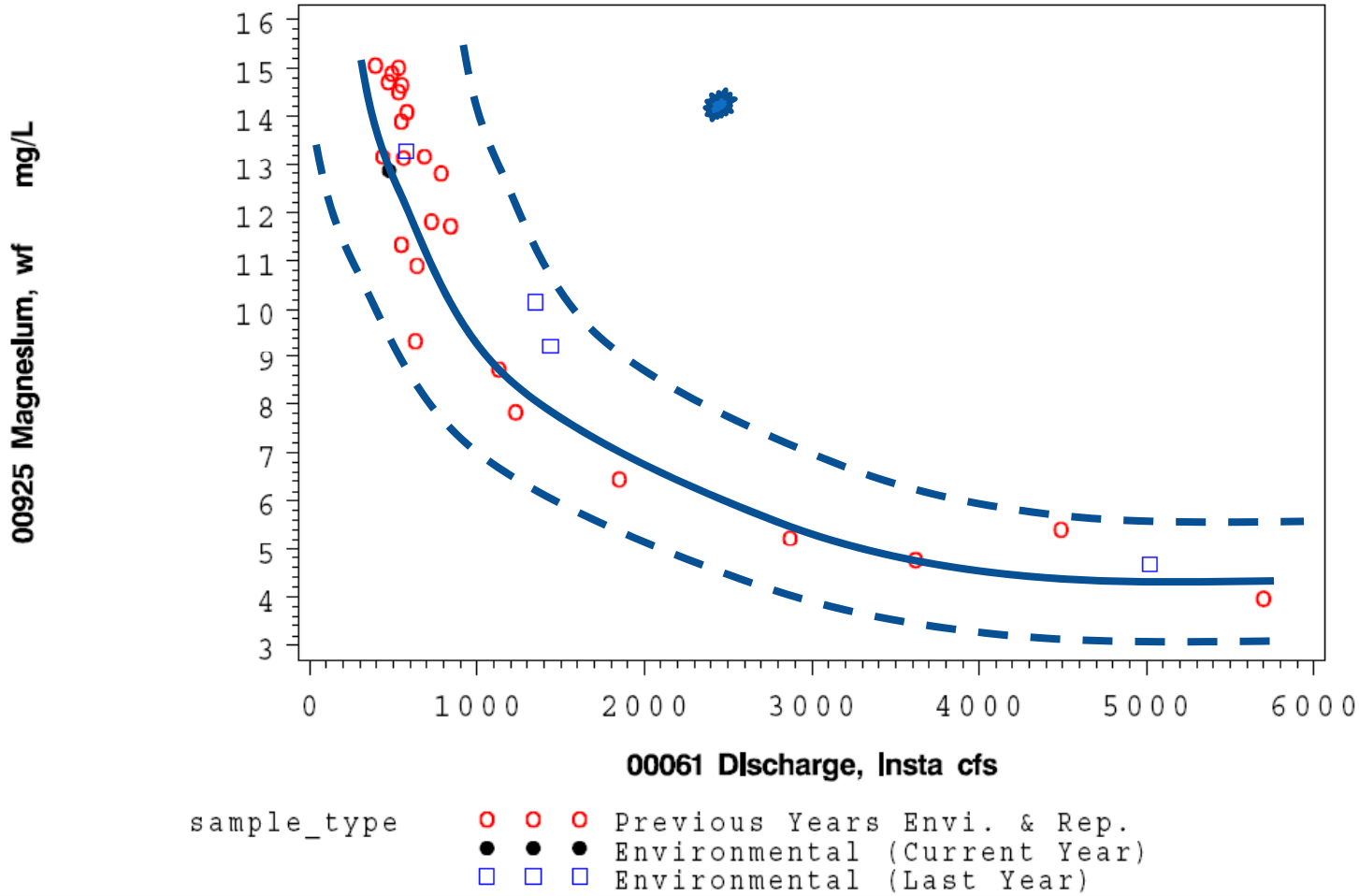
Adobe Reader - [qplot209085000[1].pdf]

File Edit View Document Tools Window Help

Save a Copy Search Select 140% Help Search Web Adobe Reader Tips Here

Pages

STATION: ROARING FORK RIVER AT GLENWOOD SPRINGS, CO. 09085000



Attachments

Comments

8.50 x 11.00 in

20 of 44

start Mich... Wat... 2 M... 2 I... 2 W... WR... 2 M... Ado... 3:10 PM

USGS science for a changing world

OUTLIERS

Not all outliers are bad……..

……they may only be misunderstood

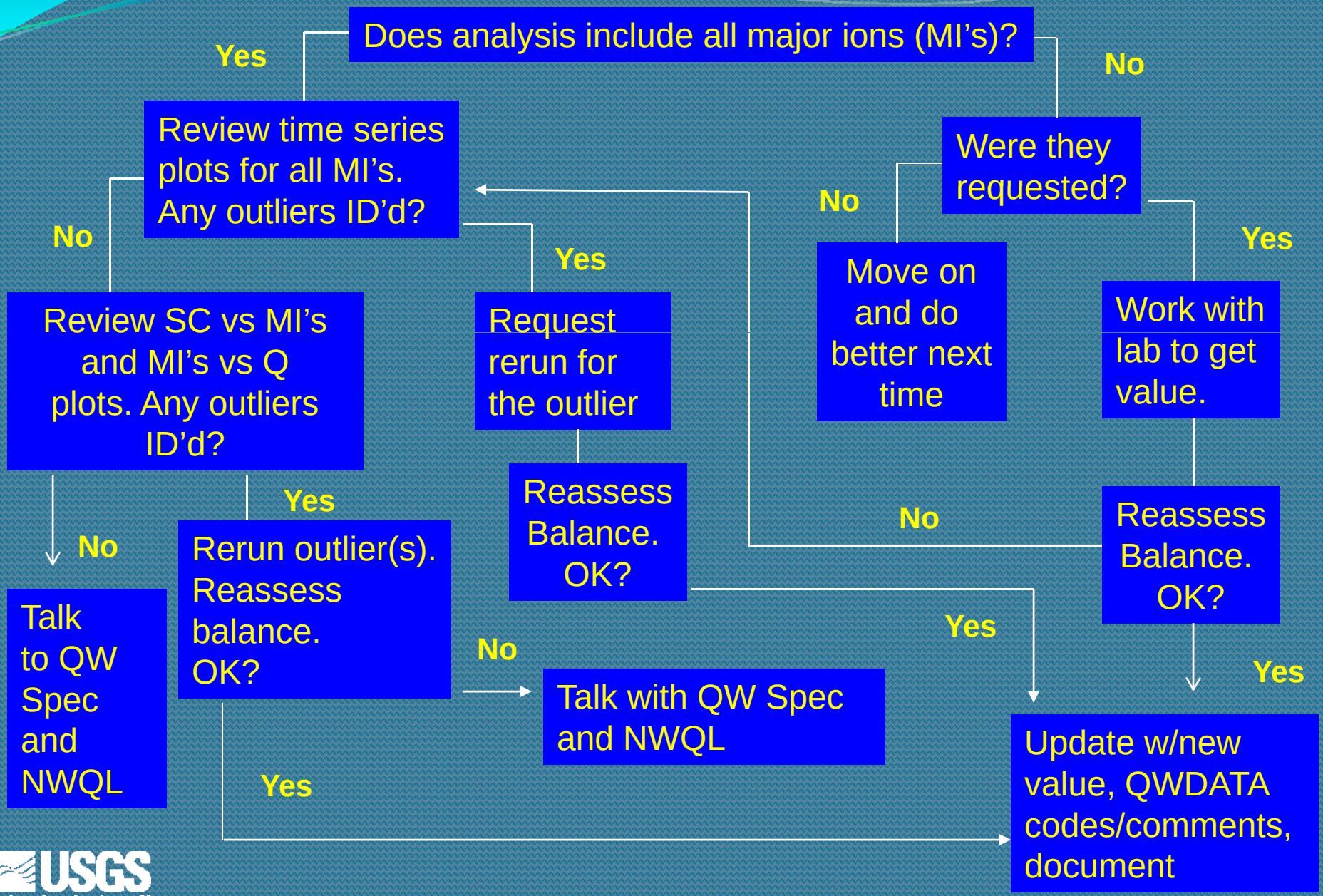
USGS
science for a changing world

OUTLIERS

Steps taken once identified

- Multiple lines of evidence to reject or accept
- Review field notes
- Review significant dependent relations
- Review field QC samples (field blanks)
- Discuss with lab
- Rerun the analysis

Outlier Identification & Remedy: Failed Ion Balance



USGS
science for a changing world

The case of the covert outlier

SAMPLE CODING

Data can be rendered useless without comprehensive and consistent metadata.

Good metadata begins with good field notes, especially observations.

SAMPLE CODING

Consistent metadata required for each sample

- Location, date, time
- Field methods and equipment used
- QC sample data

USGS
science for a changing world

Ready for Public Consumption

Approved data are set to “Approved” in NWIS

Rejected data are maintained in NWIS but masked from NWISWeb

All approved data readily available through NWISWeb, USGS web utilities and reports

USGS DataSources

- Annual Data Reports
- NWISWeb
- NWIS Mapper
- WaterWatch
- Water QualityWatch
- GroundwaterWatch

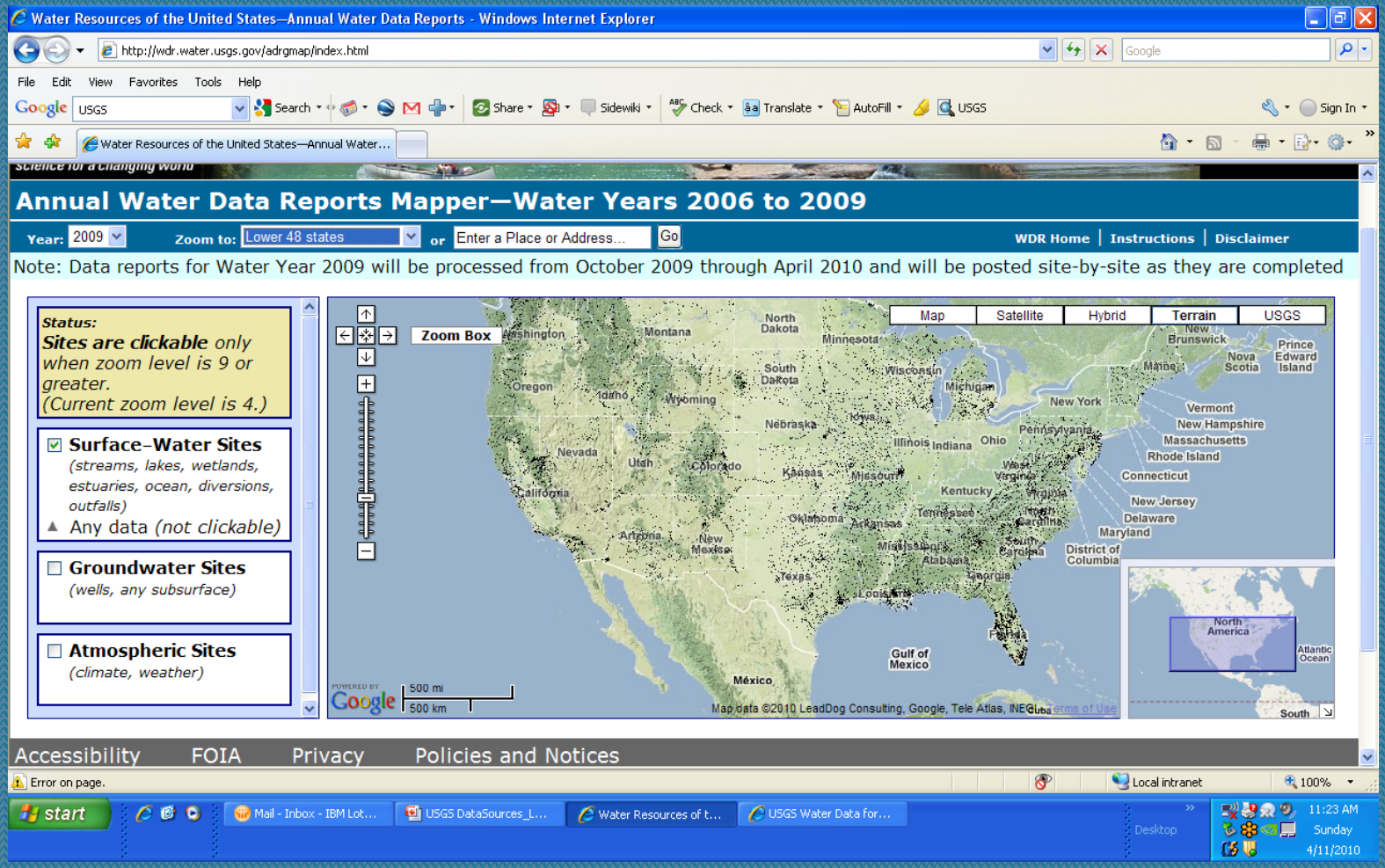
USGS
science for a changing world

Annual Data Reports

- Supplements direct access to data
- Published for each USGS Water Science Center
- Published electronically since 2007 Water Year
- Includes on-line mapper utility for site location
- Completeness varies by Center
- http://wdr.water.usgs.gov/

USGS
science for a changing world

Annual Data Reports Mapper



USGS
science for a changing world

NWISWeb

- On-line access to 1.5 million sites nationwide
- Real-time and historical data
- Continuous and discrete measurement data
- Multiple search routines
- Multiple output options
- http://waterdata.usgs.gov/nwis

USGS
science for a changing world

NWISWeb

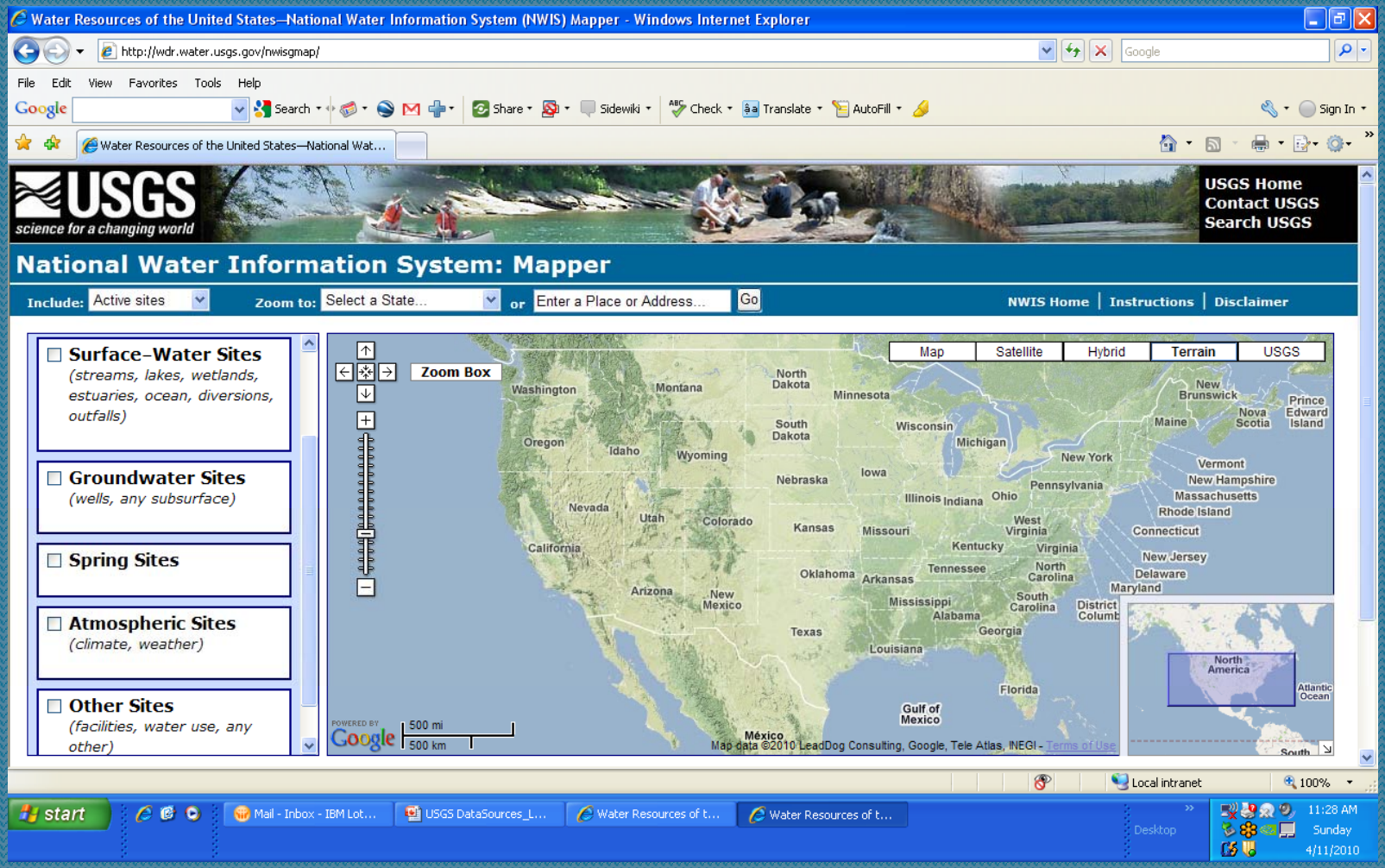
USGS Water Data for the Nation - Windows Internet Explorer
http://nwis.waterdata.usgs.gov/nwis/
File Edit View Favorites Tools Help
USGS Water Data for the...
New Tab
USGS
science for a changing world
USGS Home
Contact USGS
Search USGS
National Water Information System: Web Interface
USGS Water Resources
(District Access)
Data Category:
Home
Geographic Area:
United States
GO
News - updated March 17, 2010
USGS Water Data for the Nation
Data Category
Real-time data
Current-conditions data transmitted from selected surface-water, groundwater, and water-quality sites.
Site information
Descriptive site information for all sites with links to all available water data for individual sites.
Surface water
Water flow and levels in streams, lakes, and springs.
Groundwater
Water levels in wells.
Water quality
Chemical and physical data for streams, lakes, springs, and wells.
Mapper
Map of all sites with links to all available water data for individual sites.
Introduction
These pages provide access to water-resources data collected at approximately 1.5 million sites in all 50 States, the District of Columbia, and Puerto Rico. Online access to this data is organized around the categories listed to the left.
The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing our water resources.
About us
Help
Tutorial
Done
Local intranet
100%
start
Mail - Inbox - IBM Lot...
U:\Michael\PRESENT...
Lewis_NWQMC.ppt [...
Presentation1 [Comp...
USGS Water Data for...
Desktop
10:51 AM
Sunday
4/11/2010

NWIS Mapper

- Map-based web search utility for NWISWeb
- Click and zoom or address searches
- Map, satellite, hybrid, or terrain backgrounds
- http://wdr.water.usgs.gov/nwisgmap/

USGS
science for a changing world

NWIS Mapper

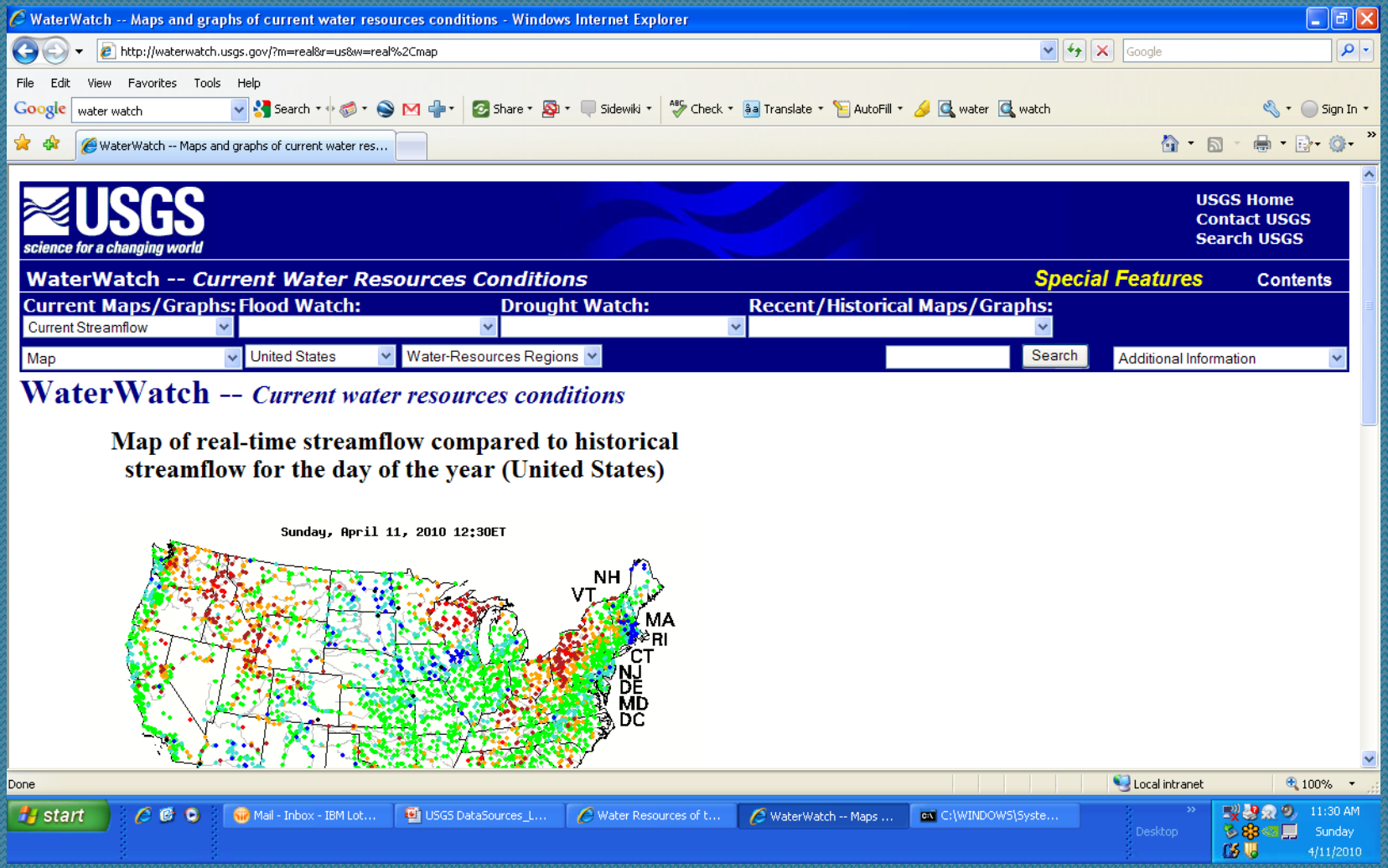

Water Resources of the United States—National Water Information System (NWIS) Mapper - Windows Internet Explorer
http://wdr.water.usgs.gov/nwisgmap/
USGS
science for a changing world
USGS Home
Contact USGS
Search USGS
National Water Information System: Mapper
Include: Active sites
Zoom to: Select a State...
or Enter a Place or Address...
Go
NWIS Home | Instructions | Disclaimer
Surface-Water Sites
(streams, lakes, wetlands, estuaries, ocean, diversions, outfalls)
Groundwater Sites
(wells, any subsurface)
Spring Sites
Atmospheric Sites
(climate, weather)
Other Sites
(facilities, water use, any other)
Zoom Box
Map
Satellite
Hybrid
Terrain
USGS
500 mi
500 km
Map data ©2010 LeadDog Consulting, Google, Tele Atlas, INEGI - Terms of Use

WaterWatch

- Streamflow web utility
- Data synthesis by State or Region
- Low and High-Flow statistical summaries
- Map and tabular output
- http://waterwatch.usgs.gov/

USGS
science for a changing world

WaterWatch



USGS
science for a changing world

WaterQualityWatch

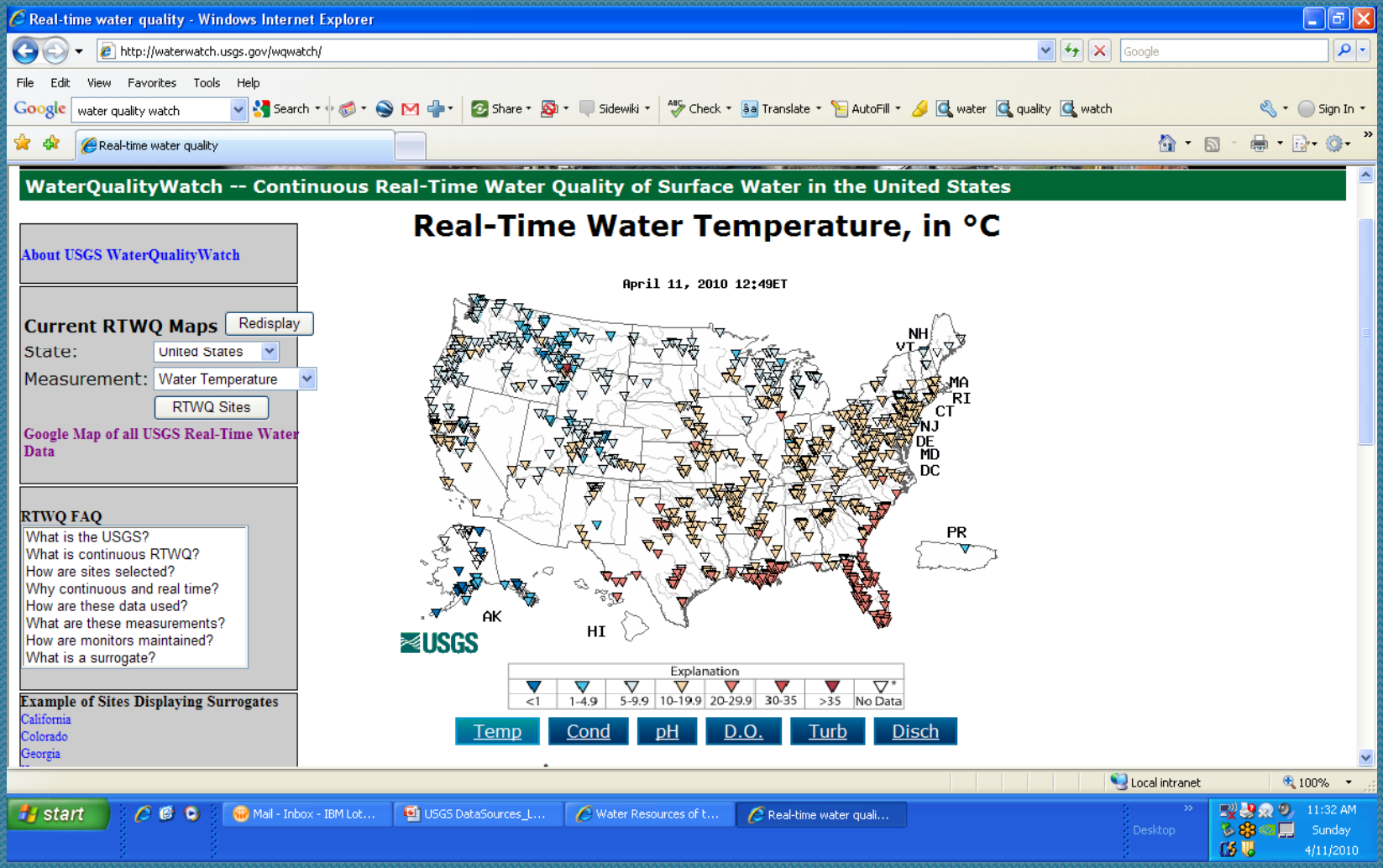
Map utility for continuous water-quality data

Temperature, conductivity, pH, DO, turbidity

http://waterwatch.usgs.gov/wqwatch/

USGS
science for a changing world

WaterQualityWatch



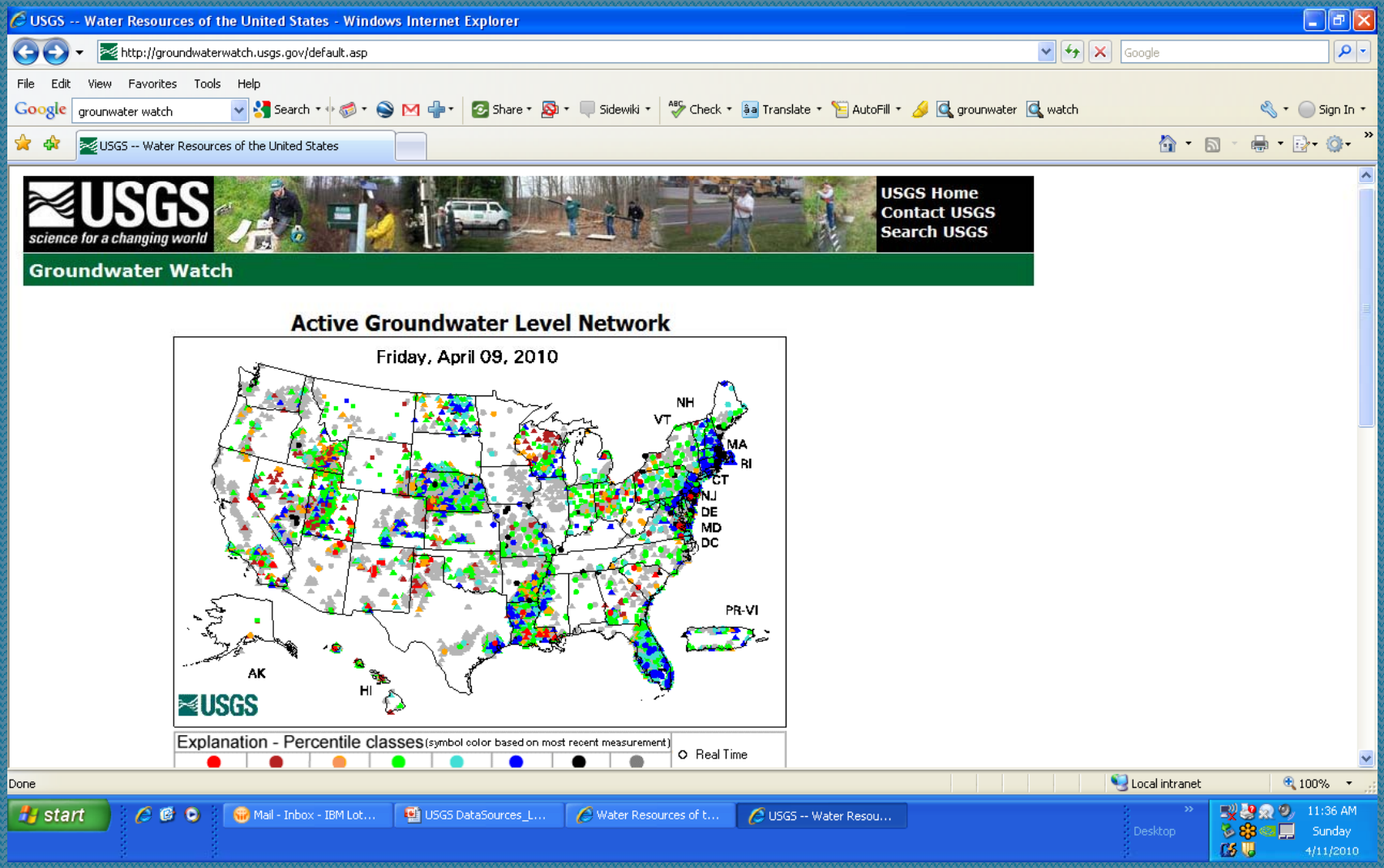
USGS
science for a changing world

Groundwater Watch

- Map utility for groundwater level data
- Continuous or discrete measurements
- Graphical and tabular output
- Plots and statistical summaries
- http://groundwaterwatch.usgs.gov/

USGS
science for a changing world

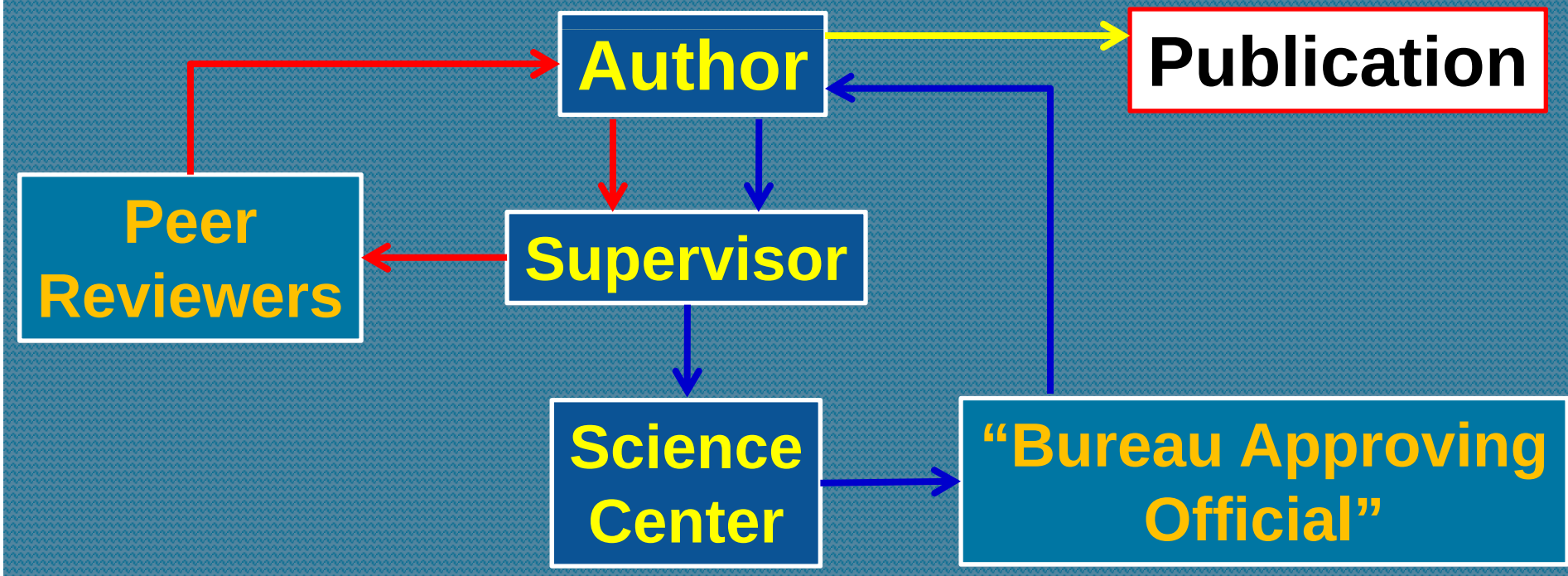
Groundwater Watch



USGS
science for a changing world

USGS Publications
Review and Approval Process

"Fundamental Science Practices"



USGS
science for a changing world

USGS Report Series

- Professional Paper
- Scientific Investigations Report (SIR)
- Scientific Investigations Map (SIM)
- Circular
- Techniques and Methods
- Fact Sheet
- Data Series
- Open-File report

USGS
science for a changing world

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | USGS Publications Wareh...

Page Safety Tools

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Publications Warehouse Basic Search

Title and/or Author Search Advanced Search

Go

Search Tips

Welcome to the Publications Warehouse

The Publications Warehouse contains:

- Bibliographic citations for over 70,000 publications
- Full product and thematic map content for over 40,000 publications
- USGS numbered series begun in 1880

Use the Publications Warehouse Web Site to:

- Locate products by author , title, year, or product type
- Locate products **recently published** by USGS, by month
- Discover availability, price, and purchase options for hard copies

Future enhancements will include:

- Citations for all USGS-authored products
- Geographic search for newly published products

Product Information

- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Data
- Software
- Biology Publications

Products Beyond the Pubs Warehouse

- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse

- News
- Contents
- Descriptions of USGS Series
- MIA

Done | Local intranet | 100%

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/index.jsp?view=adv

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Advanced Search

Search only online documents:

Search text in title:

Specify publication year: Any Year

Or...

Specify a year range to search: from: Any Year thru: Any Year

Author's First Name:

Author's Last Name:

Select USGS publication series: Any Series

USGS Report Number: - Year Sequence

Sort Options:
- Report Number
- Year
- Author
- Title

Search Now | Clear Search Criteria

Goto Basic Search >>

Search Tips >>

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

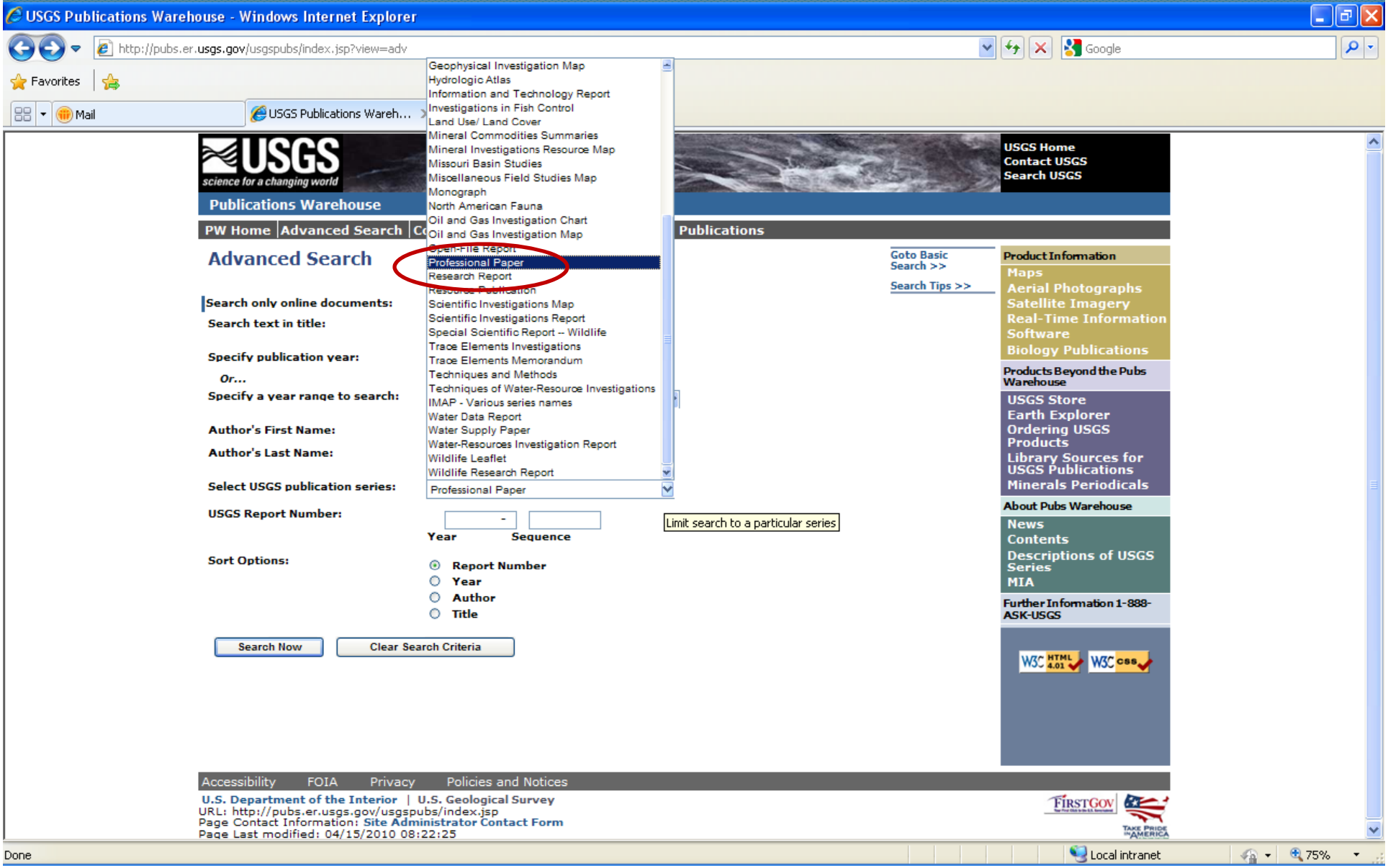
Further Information 1-888-ASK-USGS

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://pubs.er.usgs.gov/usgspubs/index.jsp
Page Contact Information: Site Administrator Contact Form
Page Last modified: 04/15/2010 08:18:06

Local intranet 75%

USGS Publications Warehouse: http://pubs.er.usgs.gov



USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/index.jsp?view=adv

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Advanced Search

Search only online documents:

Search text in title:

Specify publication year: Any Year

Or...

Specify a year range to search: from: Any Year thru: Any Year

Author's First Name:

Author's Last Name: Tweto

Select USGS publication series: Professional Paper

USGS Report Number: -
Year Sequence

Sort Options:
- Report Number
- Year
- Author
- Title

Search Now | Clear Search Criteria

Goto Basic Search >>

Search Tips >>

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

Further Information 1-888-ASK-USGS

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://pubs.er.usgs.gov/usgspubs/index.jsp
Page Contact Information: Site Administrator Contact Form
Page Last modified: 04/15/2010 08:22:25

Done | Local intranet | 75%

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/index.jsp?jboEventVo=PubResultView&jboEvent=Search&view=adv&pxfield_title=&pxfield_year=&pxfield_year_start=&pxfield_

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Advanced Search

Go Back to Search Page >>

Sort by: Report Number Year Author Title Sort Now

Jump To: Previous 1-6 of 6 Next

More Info... 1987 • PP • 1321-A
Rock units of the Precambrian basement in Colorado
Tweto, Ogden

More Info... 1986 • PP • 1241-D
The Precambrian of the Rocky Mountain region
Hedge, Carl E.; Harrison, Jack Edward; Houston, R. S.; Tweto, O. L.; Peterman, Z. E.; Reid, R. R.

More Info... (and Abstract) 1978 • PP • 1017
Ore deposits of the Gilman District, Eagle County, Colorado
Lovering, T. S.; Tweto, Ogden; Lovering, T. G.

More Info... 1977 • PP • 956
Geology of the Minturn 15-minute quadrangle, Eagle and Summit counties, Colorado
Tweto, Ogden Linne; Lovering, Thomas Seward

More Info... 1972 • PP • 726-C
Gravity and magnetic features as related to geology in the Leadville 30-minute Quadrangle, Colorado
Tweto, Ogden; Case, James E.

More Info... Purchase Now 1953 • PP • 245
Geology and ore deposits of the Boulder County tungsten district, Colorado
Lovering, T. S.; Tweto, Ogden

Jump To: Previous 1-6 of 6 Next

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

Further Information 1-888-ASK-USGS

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: http://pubs.er.usgs.gov/usgspubs/index.jsp
Page Contact Information: Site Administrator Contact Form
Page Last modified: 04/15/2010 08:21:30

Local intranet 75%

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Publication Citation

Return to Full Listing >>

Previous Citation ● Viewing Record #3 ● Next Citation

USGS Series	Professional Paper
Report Number	1017
Title	Ore deposits of the Gilman District, Eagle County, Colorado
Edition	-
Language	ENGLISH
Author(s)	Lovering, T. S.; Tweto, Ogden; Lovering, T. G.
Year	1978
Originating office	
USGS Library Call Number	-
Physical description	90 p.
ISBN	

Online Document Versions

- View Report as .DJVU *Requires plug-in*
- View Plate as .DJVU *Requires plug-in*

Download free Lizardtech plug-in now. Plug-in provides searchable text, section 508 compliant accessibility, advanced navigation, and print controls.

Currently not available through the USGS Store

Abstract

The Gilman mining district, known also in the past as the Red Cliff district, is in the mountains of southeastern Eagle County, west-central Colorado. The district is the leading source of zinc in Colorado and one of the major base-metal mining districts in the State. As valued at the time of production, total output of zinc, silver, copper, lead, and gold through 1972 was about $328 million. About 90 percent of this total was produced after 1930. The productive part of the district is an area of about 3 square miles (7.8 square kilometers) on the northeast side of the deep canyon of the Eagle River between the small towns of Gilman and Red Cliff. The ore deposits are principally replacement deposits in dolomites of Mississippian and Devonian age and in quartzite of Cambrian age. A few productive veins occur in Precambrian rocks. The replacement deposits crop out in the cliffs of the canyon wall and extend northeastward downdip beneath Battle Mountain, which is composed of a thick sequence of Pennsylvanian clastic rocks. The deposits were originally worked through several separate mines along the canyon wall, but since 1918, all deposits in dolomite rocks, except some small ones near Red Cliff, have been worked through the Eagle mine of the New Jersey Zinc Company at Gilman. The Gilman district lies on the eastern flank of the huge anticline of the Sawatch Range, near the steeply plunging north end of the anticline. Sedimentary rocks on the flank of this part of the anticline dip homoclinally northeastward to a synclinal axis about 8 mi (miles) (13 km (kilometers> northeast of Gilman and then rise more steeply to the Gore fault at the edge of the Gore Range. The homocline is broken by only a few faults most of which have displacements of less than 100 ft (feet) (30 m (meters>. In contrast, the underlying Precambrian rocks are broken by numerous faults and shear zones related to the Homestake shear zone, a northeast-trending master shear zone several miles wide. Fractures and shear zones along the northwest side of the master zone extend beneath the Gilman district. The Gilman district is at the northwestern edge of the northeast-trending Colorado mineral belt as defined by mineralized areas and bodies of intrusive porphyries. Neighboring mining districts in the mineral belt to the southeast of Gilman are the Kokomo lead-zinc district, 13 mi (21 km) distant; the Climax molybdenum district, 16 mi (26 km) distant; and the Leadville district, 20 mi (32 km) distant. These districts, as well as others farther away, are characterized by abundant intrusive rocks of Laramide and middle Tertiary ages and by complex faults systems. The Gilman district, in contrast, contains only a single sill of porphyry and has very simple geologic structure. This probably reflects a position either at the side of or high above a batholith that is inferred from geologic and geophysical data to underlie the mineral belt at shallow depth. The rock column preserved in the district consists, in succession downward, of (1) grit, conglomerate, sandstone, and shale of the Pennsylvanian Minturn Formation, as much as 6,300 ft (1,920 m) thick; (2) shale, limestone, and. sandstone of the Pennsylvanian Belden Formation, 200 ft (61 m) thick; (3) a sill of quartz latite porphyry of the Cretaceous Pando Porphyry about 80 ft (24 m) thick intruded in the basal shale of the Belden Formation; (4) dolomitized

Hardcopy Availability
Not in Stock

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

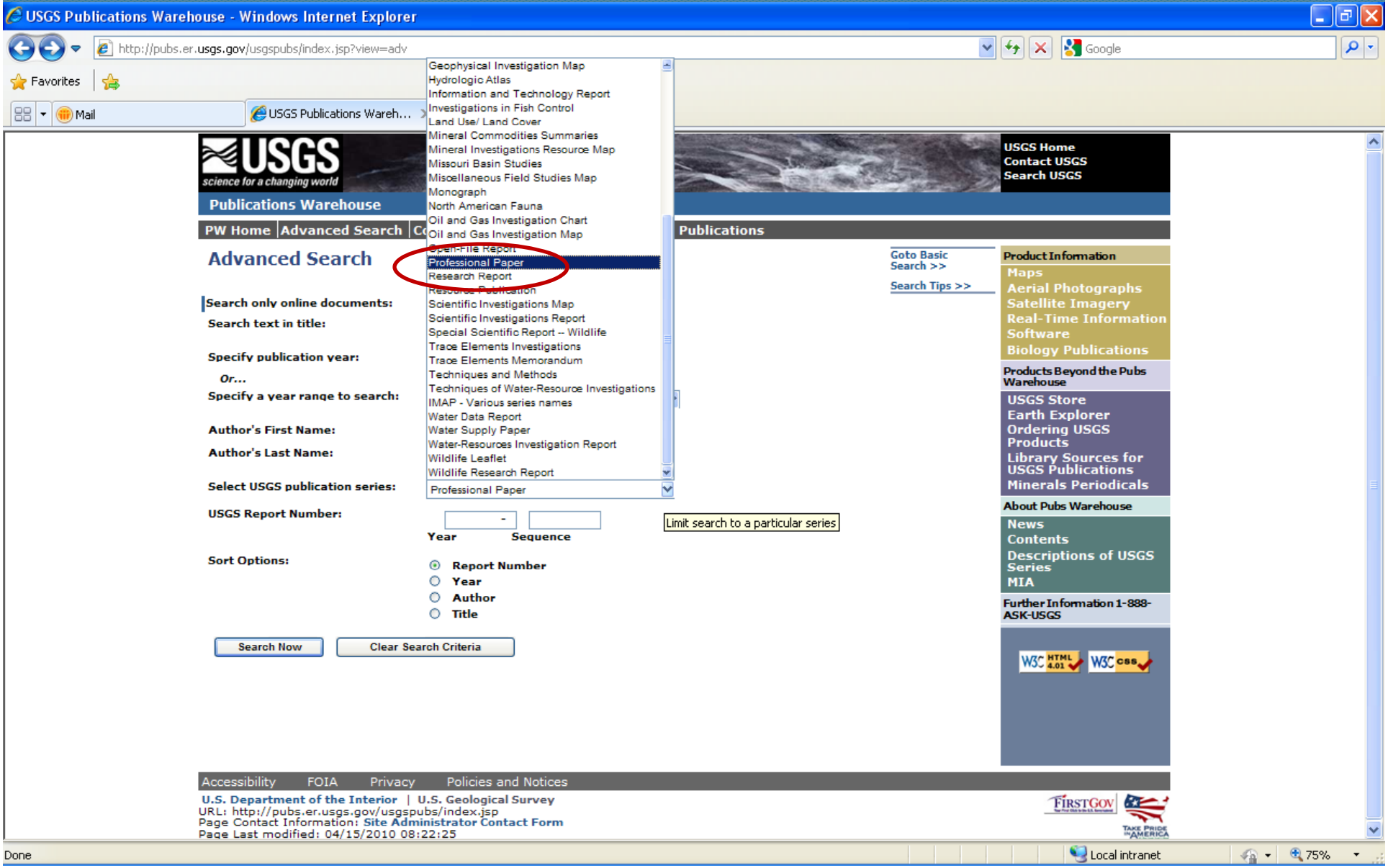
Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

Further Information 1-888-ASK-USGS

W3C HTML 4.01 W3C CSS

USGS Publications Warehouse: http://pubs.er.usgs.gov



USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/index.jsp?view=adv

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS Publications Wareh...

Page Safety Tools

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Advanced Search

Goto Basic Search >>

Search Tips >>

Search only online documents: ☐

Search text in title:

Specify publication year: Any Year

Or...

Specify a year range to search: from: Any Year thru: Any Year

Author's First Name:

Author's Last Name: Church

Select USGS publication series: Professional Paper

USGS Report Number: -
Year Sequence

Sort Options:
- Report Number
- Year
- Author
- Title

Search Now | Clear Search Criteria

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

Further Information 1-888-ASK-USGS

W3C HTML 4.01 | W3C CSS

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/index.jsp?jboEventVo=PubResultView&jboEvent=Search&view=adv&pxfield_title=&pxfield_year=&pxfield_year_start=&pxfield_

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS Publications Wareh...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Advanced Search

Go Back to Search Page >>

Sort by: Report Number Year Author Title Sort Now

Jump To: Previous 1-4 of 4 Next

More Info... Purchase Now
2004 • PP • 1652
Integrated investigations of environmental effects of historical mining in the Basin and Boulder Mining Districts, Boulder River watershed, Jefferson County, Montana
edited by Nimick, D. A.; Church, S. E.; Finger, S. E.

More Info... (and Abstract) Purchase Now
2007 • PP • 1651
Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado
Edited by Church, Stanley E.; Von Guerard, Paul; Finger, Susan E.

More Info... Purchase Now
1984 • PP • 1342
The evolution of the Southern California Uplift, 1955 through 1976
Castle, R. O.; Elliott, M. R.; Church, J. P.; Wood, S. H.

More Info... Purchase Now
1983 • PP • 1245
Historical surface deformation near Oildale, California
Castle, Robert O.; Church, J. P.; Yerkes, R. F.; Manning, J. C.

Jump To: Previous 1-4 of 4 Next

Product Information
- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse
- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse
- News
- Contents
- Descriptions of USGS Series
- MIA

Further Information 1-888-ASK-USGS

W3C HTML 4.01 W3C CSS

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Publications Warehouse - Windows Internet Explorer

http://pubs.er.usgs.gov/usgspubs/pp/pp1651

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS Publications Wareh...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Publications Warehouse

PW Home | Advanced Search | Contents | MIA | FAQ | Contact Us | New Publications

Publication Citation

Return to Full Listing >>

Previous Citation ● Viewing Record #2 ● Next Citation

USGS Series	Professional Paper
Report Number	1651
Title	Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado
Edition	Version 1.0
Language	ENGLISH
Author(s)	Edited by Church, Stanley E.; Von Guerard, Paul; Finger, Susan E.
Year	2007
Originating office	Geological Survey (U.S.)
USGS Library Call Number	(200) B no.1651
Physical description	Report: 2 volumes of 1096 p.(by chapter); Downloads Directory; Also available on CD-ROM
ISBN	

Online Document Versions

- View online document file(s)

In Stock at the USGS Store

Abstract

This publication comprises a Volume Contents of chapters (listed below) and a CD-ROM of data (contents shown in column at right). The Animas River watershed in southwest Colorado is one of many watersheds in the western United States where historical mining has left a legacy of acid mine drainage and elevated concentrations of potentially toxic trace elements in surface streams. U.S. Geological Survey scientists have completed a major assessment of the environmental effects of historical mining in the Animas River watershed focusing on the area upstream of Silverton

Hardcopy Availability

Purchase Now

Price: $50.00
Item: 207949

Order Form (pdf)

Product Information

- Maps
- Aerial Photographs
- Satellite Imagery
- Real-Time Information
- Software
- Biology Publications

Products Beyond the Pubs Warehouse

- USGS Store
- Earth Explorer
- Ordering USGS Products
- Library Sources for USGS Publications
- Minerals Periodicals

About Pubs Warehouse

- News
- Contents
- Descriptions of USGS Series

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Professional Paper 1651: Integrated Investigations of Environmental Effects of Historical - Windows Internet Explorer

http://pubs.usgs.gov/pp/1651/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

USGS Professional Paper 1651: Integrated Investigati...

Page Safety Tools

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

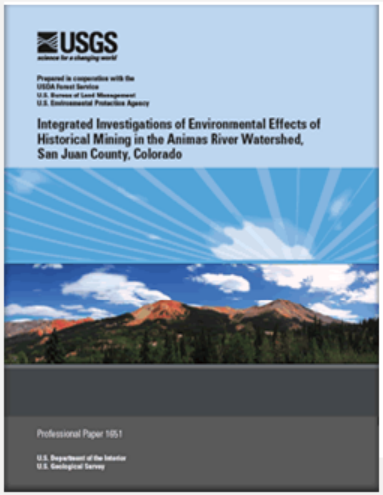
Professional Paper 1651

>> Pubs Warehouse > P 1651

Prepared in cooperation with the USDA Forest Service, U.S. Bureau of Land Management, and U.S. Environmental Protection Agency

Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado

Edited by Stanley E. Church, Paul von Guerard, and Susan E. Finger



This publication comprises a Volume Contents of chapters (listed below) and a CD-ROM of data (contents shown in column at right).

The Animas River watershed in southwest Colorado is one of many watersheds in the western United States where historical mining has left a legacy of acid mine drainage and elevated concentrations of potentially toxic trace elements in surface streams. U.S. Geological Survey scientists have completed a major assessment of the environmental effects of historical mining in the Animas River watershed focusing on the area upstream of Silverton, Colo.—the Mineral Creek, Cement Creek, and upper Animas River basins. The study demonstrated how the watershed approach can be used to assess and rank mining-affected sites for possible cleanup. The study was conducted in collaboration with State and Federal land-management agencies and regional stakeholders groups.

This book is available for purchase at Information Services, U.S. Geological Survey (1-888-ASK-USGS).

Version 1.0

Posted March 2008

Database from Volume's accompanying CD-ROM.

- **Front Matter** PDF (336 kB)

  The Front Matter includes a Volume Contents of chapters which is listed below.

- **Downloads Directory**

  Contains: plates, tables, associated GIS

USGS Publications Warehouse: http://pubs.er.usgs.gov

USGS Professional Paper 1651: Integrated Investigations of Environmental Effects of Historical - Windows Internet Explorer

http://pubs.usgs.gov/pp/1651/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

USGS Professional Paper 1651: Integrated Investigati...

Page Safety Tools

Church, S.E., von Guerard, Paul, and Finger, S.E., eds., 2007, Integrated investigations of environmental effects of historical mining in the Animas River watershed, San Juan County, Colorado: U.S. Geological Survey Professional Paper 1651, 1,096 p. plus CD-ROM. [In two volumes.]

Front Matter PDF (336 kB)—includes a Volume Contents, which is defined below:

Volume 1

A. Summary and conclusions from investigation of the effects of historical mining in the Animas River watershed, San Juan County, Colorado PDF (83.4 MB)
By U.S. Geological Survey
B. The Animas River watershed, San Juan County, Colorado PDF (13.5 MB)
By Paul von Guerard, Stanley E. Church, Douglas B. Yager, and John M. Besser
C. History of mining and milling practices and production in San Juan County, Colorado, 1871–1991 PDF (293 MB)
Table 1. Summary of metal production from mines in San Juan County [expanded version] PDF (224 kB)
By William R. Jones
D. Impacts of historical mining on aquatic ecosystems—An ecological risk assessment PDF (1.3 MB)
By John M. Besser, Susan E. Finger, and Stanley E. Church
E. Watershed-Scale Characterization and Investigation of Processes Responsible for Environmental Effects of Historical Mining
E1. Geologic framework PDF (204.3 MB)
Plate 1. Generalized geologic map of part of the Animas River watershed and vicinity, Silverton, Colorado, by D.B. Yager and D.J. Bove PDF (21.9 MB)
Plate 2. Ferricrete, manganocrete, and bog iron occurrences with selected sedge bogs and active iron bogs andsprings in part of the Animas River watershed, San Juan County, Colorado, by D.B. Yager, S.E. Church, P.L. Verplanck, and Laurie Wirt PDF (2.8 MB)
By Douglas B. Yager and Dana J. Bove
E2. Imaging spectroscopy applied to the Animas River watershed and Silverton caldera PDF (10 MB)
By J. Bradley Dalton, Dana J. Bove, Carol S. Mladinich, and Barnaby W. Rockwell
E3. Major styles of mineralization and hydrothermal alteration and related solid- and aqueous-phase geochemical signatures PDF (8.5 MB)
By Dana J. Bove, M. Alisa Mast, J. Bradley Dalton, Winfield G. Wright, and Douglas B. Yager
E4. Helicopter electromagnetic and magnetic surveys PDF (5.9 MB)
Plate 3. Total field magnetic map of the Animas River watershed study area, Colorado, by B.D. Smith, R.R. McDougal, Maryla Descz-Pan, and D.B. Yager PDF (3.3 MB)
Plate 4. Apparent conductivity map of the Animas River watershed study area, Colorado, by B.D. Smith, R.R. McDougal, Maryla Descz-Pan, and D.B. Yager PDF (3.1 MB)
By Bruce D. Smith, Robert R. McDougal, Maryla Deszcz-Pan, and Douglas B. Yager
E5. Mine inventory and compilation of mine-adit chemistry data PDF (1.2 MB)
By Stanley E. Church, M. Alisa Mast, E. Paul Martin, and Carl L. Rich
E6. Mine adits, mine-waste dumps, and mill tailings as sources of contamination PDF (84 MB)
By J. Thomas Nash and David L. Fey
E7. Characterization of background water quality PDF (16.1 MB)
By M. Alisa Mast, Philip L. Verplanck, Winfield G. Wright, and Dana J. Bove
E8. Aqueous-sulfate stable isotopes—A study of mining-affected and undisturbed acidic drainage PDF (327 kB)
By D. Kirk Nordstrom, Winfield G. Wright, M. Alisa Mast, Dana J. Bove, and Robert O. Rye

USGS Publications Warehouse: http://pubs.er.usgs.gov

http://pubs.usgs.gov/pp/1651/downloads/Vol1_combinedChapters/vol1_chapC.pdf - Windows Internet Explorer

http://pubs.usgs.gov/pp/1651/downloads/Vol1_combinedChapters/vol1_chapC.pdf

File Edit Go To Favorites Help

Favorites | USGS Toxic Substances Hyd...

http://pubs.usgs.gov/pp/1651/downloads/Vol1_combi...

Page Safety Tools

1 / 48 121% Find

History of Mining and Milling Practices and Production in San Juan County, Colorado, 1871–1991

By William R. Jones

Chapter C of

Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado

Edited by Stanley E. Church, Paul von Guerard, and Susan E. Finger

USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS National Water-Quality Assessment (NAWQA) Program - Windows Internet Explorer

http://water.usgs.gov/nawqa/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS National Water-Qu...

Page Safety Tools

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

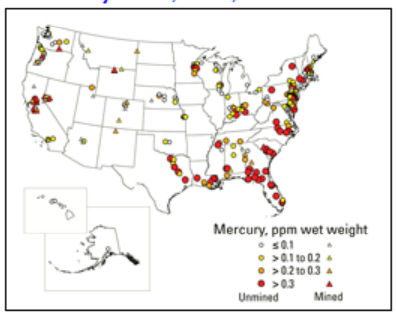
National Water-Quality Assessment (NAWQA) Program

Home | Headlines | Featured Studies | Liaison Committee | Informing Decision Makers | Data | Modeling/Software | Publications | Maps

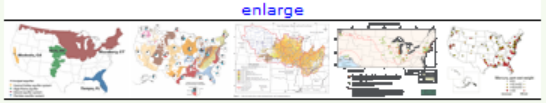
National Maps

view all maps

Mercury in Fish, Water, and Sediment



Click a thumbnail below to stop/change -- Click a map above to enlarge



Featured Studies

view all studies

- National-Synthesis Assessments
  - Pesticides

The National Water-Quality Assessment Program (NAWQA) provides an understanding of water-quality conditions; whether conditions are getting better or worse over time; and how natural features and human activities affect those conditions. Regional and national assessments are possible because of a consistent study design and uniform methods of data collection and analysis. Monitoring data are integrated with geographic information on hydrological characteristics, land use, and other landscape features in models to extend water-quality understanding to unmonitored areas. Local, State, Tribal, and national stakeholders use NAWQA information to design and implement strategies for managing, protecting, and monitoring water resources in many different hydrologic and land-use settings across the Nation.

Featured Headlines, Activities, and Publications

view all headlines

- **Contaminant Transport to Public Supply Wells** (publications; press release; video podcast) (February 11, 2010)
- **Redox Conditions in Aquifers** (fact sheet, Decision-support tool (Microsoft Excel), additional information) (January 12, 2010)
- **Pesticide Trends in Corn Belt Streams and Rivers** (report; journal article; press release) (November 9, 2009)
- **Agricultural Chemicals in our Environment** (fact sheet; technical announcement; journal article series) (October 22, 2009)
- **Chloride in Groundwater and Surface Water** (report; press release) (September 16, 2009)
- **Prediction of atrazine concentrations** (interactive online mapping; technical announcement; report) (August 20, 2009)
- **Mercury in Fish, Water, and Sediment** (report; press release; podcast) (August 19, 2009)

Informing Decision Makers -- Linking Science to Water Management

more on informing decision makers

USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS NAWQA: Headlines, Activities, and Publications - Windows Internet Explorer

http://water.usgs.gov/nawqa/headlines/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS NAWQA: Headlines...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

National Water-Quality Assessment (NAWQA) Program

Home | Headlines | Featured Studies | Liaison Committee | Informing Decision Makers | Data | Modeling/Software | Publications | Maps

Headlines, Activities, and Publications

General Information
- About the Program
- Glossary
- Related Sites
- Contact us
- NAWQA Intranet

2010

Publication release: Contaminant Transport to Public Supply Wells (publications; press release; video podcast) (February 11, 2010)

Publication release: Redox Conditions in Aquifers (fact sheet, Decision-support tool (Microsoft Excel), additional information) (January 12, 2010)

2009

Publication release: Pesticide Trends in Corn Belt Streams and Rivers (report; journal article; press release) (November 9, 2009)

Publication release: Agricultural Chemicals in our Environment (fact sheet; technical announcement; journal article series) (October 22, 2009)

Publication release: Chloride in Groundwater and Surface Water (report; press release) (September 16, 2009)

Modeling Tools: Prediction of atrazine concentrations (interactive online mapping; technical announcement; report) (August 20, 2009)

Publication release: Mercury in Fish, Water, and Sediment (report; press release; podcast) (August 19, 2009)

Publication release: Water quality in the High Plains aquifer (report; press release) (July 16, 2009)

Publication release: Trends in Stream Nutrient Concentrations and Loads (July 15, 2009)

Publication release: Water Quality in Carbonate Aquifers (June 26, 2009)

Website Update: NAWQA Publications Now Available On-line by State or by selected topics, such as nutrients, pesticides, mercury, aquatic ecology, or drinking water. (April 2, 2009)

USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS NAWQA: Changes in Nutrient and Sediment Concentrations in Streams and Rivers of the United - Windows Internet Explorer

http://water.usgs.gov/nawqa/pubs/nutrient_trends/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS NAWQA: Changes i...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

National Water-Quality Assessment (NAWQA) Program

Home | Headlines | Featured Studies | Liaison Committee | Informing Decision Makers | Data | Modeling/Software | Publications | Maps

Changes in Nutrient and Sediment Concentrations in Streams and Rivers of the United States, 1993-2003

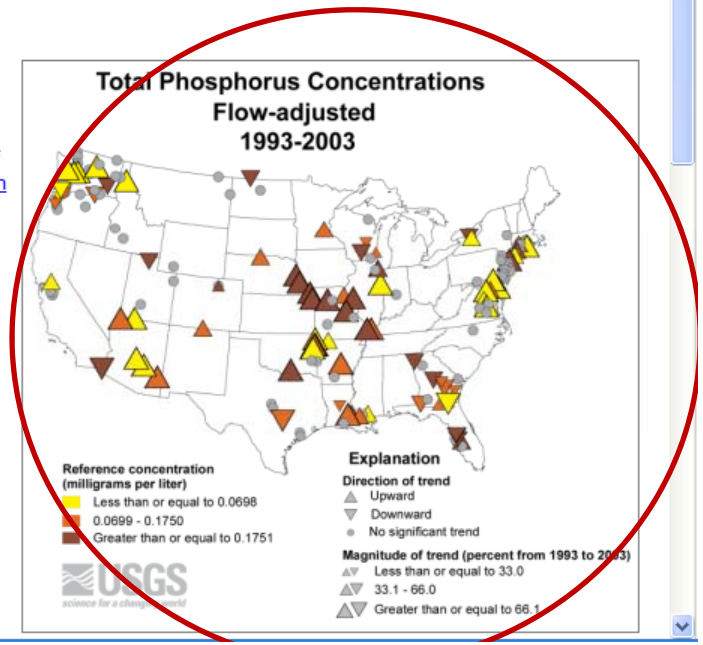
For information on changes in nutrient concentrations and loads in streams and rivers and how these changes correspond to streamflow and nutrient sources, see the USGS report: Nutrient Trends in Streams and Rivers of the United States, 1993-2003

For information on how trends in total nitrogen and total phosphorus concentrations vary by major geographic regions of the U.S., see the article and supplemental material in Environmental Science and Technology: Regional Nutrient Trends in Streams and Rivers of the United States, 1993-2003

Technical Announcement

Maps - Changes in nutrient concentrations, sources, and streamflow, 1993-2003

- Changes in total phosphorus concentrations
- Changes in total phosphorus concentrations, adjusted for streamflow
- Changes in total nitrogen concentrations
- Changes in total nitrogen concentrations, adjusted for streamflow
- Changes in streamflow
- Changes in phosphorus and nitrogen inputs from manure
- Changes in phosphorus and nitrogen inputs from fertilizer
- Changes in population density and nitrogen loading from atmospheric deposition



USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS NAWQA: Changes in Nutrient and Sediment Concentrations in Streams and Rivers of the United - Windows Internet Explorer

http://water.usgs.gov/nawqa/pubs/nutrient_trends/fa-tp.html

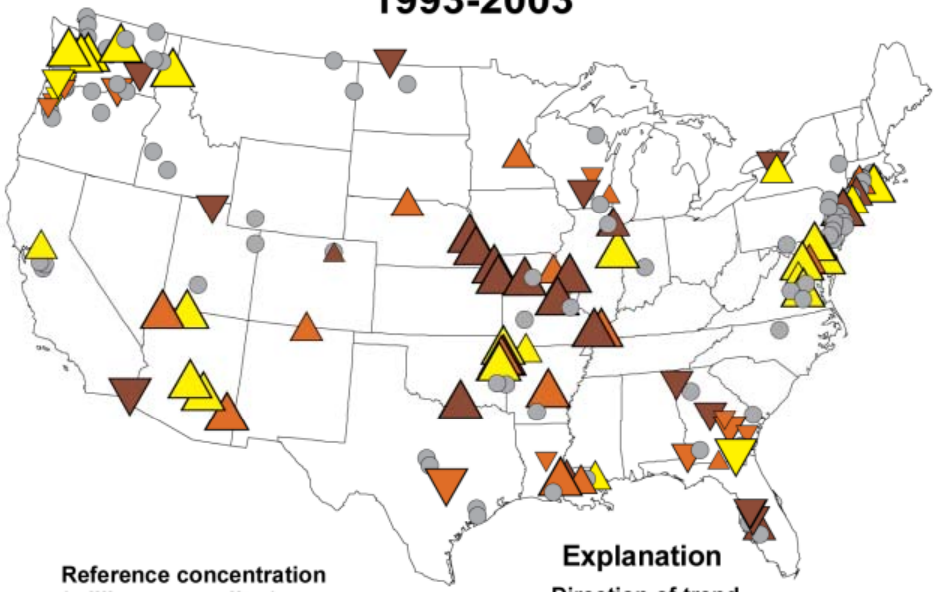
File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS NAWQA: Changes i...

Page Safety Tools

Total Phosphorus Concentrations
Flow-adjusted
1993-2003



Reference concentration (milligrams per liter)

- Less than or equal to 0.0698
- 0.0699 - 0.1750
- Greater than or equal to 0.1751

Explanation

Direction of trend

- Upward
- Downward
- No significant trend

Magnitude of trend (percent from 1993 to 2003)

- Less than or equal to 33.0
- 33.1 - 66.0
- Greater than or equal to 66.1

USGS
science for a changing world

USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS NAWQA: Changes in Nutrient and Sediment Concentrations in Streams and Rivers of the United - Windows Internet Explorer

http://water.usgs.gov/nawqa/pubs/nutrient_trends/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS NAWQA: Changes i...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

National Water-Quality Assessment (NAWQA) Program

Home | Headlines | Featured Studies | Liaison Committee | Informing Decision Makers | Data | Modeling/Software | Publications | Maps

Changes in Nutrient and Sediment Concentrations in Streams and Rivers of the United States, 1993-2003

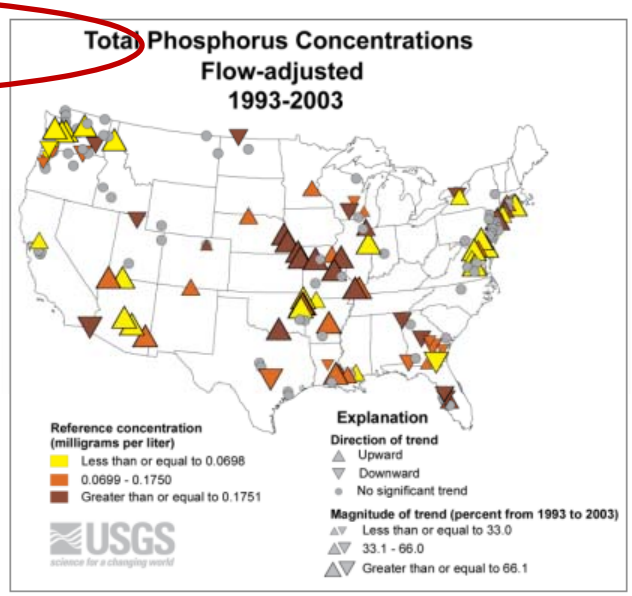
For information on changes in nutrient concentrations and loads in streams and rivers and how these changes correspond to streamflow and nutrient sources, see the USGS report: Nutrient Trends in Streams and Rivers of the United States, 1993-2003

For information on how trends in total nitrogen and total phosphorus concentrations vary by major geographic regions of the U.S., see the article and supplemental material in Environmental Science and Technology: Regional Nutrient Trends in Streams and Rivers of the United States, 1993-2003

Technical Announcement

Maps - Changes in nutrient concentrations, sources, and streamflow, 1993-2003

- Changes in total phosphorus concentrations
- Changes in total phosphorus concentrations, adjusted for streamflow
- Changes in total nitrogen concentrations
- Changes in total nitrogen concentrations, adjusted for streamflow
- Changes in streamflow
- Changes in phosphorus and nitrogen inputs from manure
- Changes in phosphorus and nitrogen inputs from fertilizer
- Changes in population density and nitrogen loading from atmospheric deposition



USGS NAWQA Program: http://water.usgs.gov/NAWQA

USGS Scientific Investigations Report 2008-5202: Nutrient Trends in Streams and Rivers of the U - Windows Internet Explorer

http://pubs.usgs.gov/sir/2008/5202/

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | USGS Scientific Investigat...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Scientific Investigations Report 2008–5202

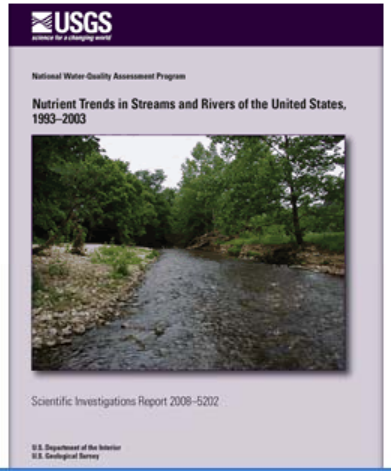
>> Pubs Warehouse > SIR 2008-5202

National Water-Quality Assessment Program

Nutrient Trends in Streams and Rivers of the United States, 1993–2003

By Lori A. Sprague, David K. Mueller, Gregory E. Schwarz, and David L. Lorenz

Abstract



Trends in streamflow and concentrations and loads of total phosphorus, total nitrogen, and nitrate were determined for the period from 1993 to 2003 in selected streams and rivers of the United States. Flow-adjusted trends in concentration (the trends that would have occurred in the absence of natural changes in streamflow), non-flow-adjusted trends in concentration (the trends resulting from both natural and human factors), and trends in load (trends in the nutrient mass transported downstream) were determined, and the results were examined spatially to determine whether a consistent pattern of trends occurred across groups of sites at multiple locations. Relations between the trends and changes in nutrient sources and streamflow are examined. See document for complete abstract.

First posted May 28, 2009

- **Report** PDF (12.3 MB)

For additional information contact:

Director, Colorado Water Science Center
U.S. Geological Survey
Box 25046, Mail Stop 415
Denver, CO 80225

http://co.water.usgs.gov/

Part or all of this report is presented in Portable Document Format (PDF); the latest version of Adobe Reader or similar software is required to view it. Download the latest version of Adobe Reader, free of charge.

Toxic Substances Hydrology Program: http://toxics.usgs.gov

USGS Toxic Substances Hydrology Program - Windows Internet Explorer

http://toxics.usgs.gov/

File Edit View Favorites Tools Help

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

The **Toxic Substances Hydrology Program** provides objective scientific information on environmental contamination to improve characterization and management of contaminated sites, to protect human and environmental health, and to reduce potential future contamination problems. Read more about the Toxics Program

Recent Headlines

view all headlines

Phytoplankton in Coastal Waters and Global Climate Change?

Surprising Findings on Mercury in Yellowstone National Park

Visualizing Contamination Pathways in the Subsurface

New Approach to Evaluating Selenium Toxicity in the

Research Projects

view all research

Subsurface Point-Source Contamination
Projects: Petroleum (crude, gasolene, produced water) | Chlorinated Solvents | Mixed Wastes (landfills, wastewater) | Fractured-Rock Aquifers

Watershed-and Regional Scale Contamination
Projects: Hard-Rock Mining | Pesticides | Emerging Contaminants | Mercury | Amphibian Research | Priority Ecosystems

Methods Development
Topics: Microbial Geochemistry | Geochemistry | Hydrology | Contaminant Geophysics | Modeling

Crosscutting Topics

view all topics

- Agricultural Chemicals
- Contaminant Occurrence Studies
- Contaminant Plume Geochemistry and Microbiology
- Geophysical Characterization
- Ground-Water Contaminant Transport
- Methods
- Models
- Natural Attenuation
- Nutrients

Search the Toxics site:

Google™ Custom Search Go

Toxics Home
About The Program
Research Projects
- Subsurface Point-Source
- Watershed-and Regional Scale
- Methods Development

Crosscutting Topics
- Agricultural Chemicals
- Contaminant Occurrence
- Contaminant Plumes
- Contaminant Transport (GW)
- Contaminant Transport (SW)
- Geophysical Characterization
- Methods
- Models
- Natural Attenuation
- Nutrients
- Site Remediation
- Tracer Tests
- Unsaturated Zone

Headlines

Publications
- Search Publications
- Publications by Category
- New Pubs
- Upcoming
- Publication Headlines
- On-Line Fact Sheets

Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov

USGS Toxic Substances Hydrology Program -- Headlines - Windows Internet Explorer

http://toxics.usgs.gov/highlights/

File Edit View Favorites Tools Help

Favorites

Mail | USGS Toxic Substances H...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

Headlines

Highlights of our latest research findings, and examples of application to real problems.

2009

- Surprising Findings on Mercury in Yellowstone National Park
- New Approach to Evaluating Selenium Toxicity in the Environment
- Fish in Some Streams Accumulate Mercury
- USGS Contributes to the Design of a Proposed National Mercury Monitoring Network (MercNet)
- A New Source of Methylmercury Entering the Pacific Ocean

2008

- Visualizing Contamination Pathways in the Subsurface
- Can We Use Phytoplankton in Coastal Waters as an Indicator of Global Climate Change?
- Mercury Found to Migrate Horizontally from Landfill
- Tackling Fish Endocrine Disruption
- Pesticides are Detected in Vernal Pools in Parks and Wildlife Refuges
- Measuring Antidepressants, Fungicides, and Insecticides in the Environment
- Detergents in Streams May Just Disappear

Search the Toxics site:

Google™ Custom Search Go

Toxics Home
About The Program
Research Projects
- Subsurface Point-Source
- Watershed-and Regional Scale
- Methods Development

Crosscutting Topics
- Agricultural Chemicals
- Contaminant Occurrence
- Contaminant Plumes
- Contaminant Transport (GW)
- Contaminant Transport (SW)
- Geophysical Characterization
- Methods
- Models
- Natural Attenuation
- Nutrients
- Site Remediation
- Tracer Tests
- Unsaturated Zone

Headlines

Publications
- Search Publications
- Publications by Category
- New Pubs
- Upcoming
- Publication Headlines
- On-Line Fact Sheets

Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov

USGS Toxic Substances Hydrology Program -- Headlines - Windows Internet Explorer

http://toxics.usgs.gov/highlights/

- Measuring Antidepressants, Fungicides, and Insecticides in the Environment
- Detergents in Streams May Just Disappear
- Emerging Contaminants Targeted in a Reconnaissance of Ground Water and Untreated Drinking-Water Sources
- Biosolids, Animal Manure, and Earthworms: Is There a Connection?

2007

- Detecting Amphibian-Killing Fungus Helps Scientists Study Amphibian Declines
- Climate-Driven Ocean Changes Affect Estuaries: Pacific Ocean Cooling Triggers Phytoplankton Blooms in San Francisco Bay
- USGS Science Featured in a Special Issue of Applied Geochemistry on Contamination from Oil Production
- Hydrogen Measured in a New Test for Determining Subsurface Microbiological Activity at Contamination Sites
- Wastewater Indicators Shown to Degrade in Streams
- New Report Presents a Framework for Assessing the Sustainability of Monitored Natural Attenuation
- Endocrine Disruption Found in Fish Exposed to Municipal Wastewater
- Widespread Accumulations of Natural Perchlorate in Southwestern Soils
- What Mobilizes Arsenic in Ground Water?
- Mercury Concentrations in Streams Found to Go Through Daily Cycles
- Streamflow and Nutrient Delivery from the Mississippi River Basin to the Gulf of Mexico

2006

- Household Chemicals and Drugs Found in Biosolids from Wastewater Treatment Plants
- Biofilms in Streams Help Create Daily Variations in Metal Concentrations
- Monitoring Volatile Organic Compounds in Ground Water with Diffusion Samplers

New Pubs
Upcoming
Publication Headlines
On-Line Fact Sheets
Meetings
Photo Gallery
Frequently Asked Questions
Links to Other Sources
Toxics Intranet

Toxic Substances Hydrology Program: http://toxics.usgs.gov

Emerging Contaminants Targeted in a Reconnaissance of Ground Water and Untreated Drinking-Water - Windows Internet Explorer

http://toxics.usgs.gov/highlights/gwsw_ec.html

File Edit View Favorites Tools Help

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

Headlines

Emerging Contaminants Targeted in a Reconnaissance of Ground Water and Untreated Drinking-Water Sources

Two national-scale reconnaissance studies recently conducted by the U.S. Geological Survey (USGS) were the first to collect baseline information on the environmental occurrence of pharmaceuticals, personal-care products, detergents, flame retardants, naturally occurring sterols, and other organic contaminants in ground water and untreated sources of drinking water in the United States. These contaminants are commonly associated with human- and animal-waste sources, though other natural and human-related sources are also possible. These studies follow a previous reconnaissance of U.S. streams (see side bar).

USGS scientists collected water-quality samples from 121 locations as part of two national-scale reconnaissance studies on the occurrence of organic wastewater contaminants in ground water and untreated sources of drinking water across the United States. All of the samples were raw water, collected from sampling ports at wellheads for ground water (A) or at intake structures for surface water (B) before any treatment or processing.
(Larger Version)

Ground Water

Ground-water samples were collected from a network of 47 wells with common environmental conditions and which typically were not used for drinking water. The wells, in 18 states, were analyzed for 65 chemicals. The most frequently detected chemicals include *N,N*-diethyltoluamide (insect repellant), bisphenol A (plastic- and epoxy-manufacturing ingredient), tri(2-chloroethyl) phosphate (fire retardant), sulfamethoxazole (veterinary and human antibiotic), and 4-octylphenol monoethoxylate (detergent metabolite). The concentrations of chemicals detected were low. Eighty-seven percent of the 137 measured detections were less than 1 microgram per liter (µg/L). Mixtures of chemicals were common. Although similar chemicals were detected in the previous national stream reconnaissance, the chemicals were detected less frequently in this study's ground-water sites (35 percent of the sites) than they were in the stream reconnaissance (86 percent of the sites).

Untreated Drinking-Water Sources

Water samples were collected from untreated sources of drinking water at 25 ground-water and 49 surface-water sites in 25 states and Puerto Rico. The most frequently detected chemicals in surface water were cotinine (nicotine metabolite), and 1,7-dimethylxanthine (caffeine metabolite); and in ground water were carbamazepine (pharmaceutical), bisphenol-A (plastic- and epoxy-manufacturing ingredient), 1,7-dimethylxanthine (caffeine metabolite), and tri(2-

Search the Toxics site:
Google™ Custom Search Go

- Toxics Home
- About The Program
- Research Projects
  - Subsurface Point-Source
  - Watershed-and Regional Scale
  - Methods Development
- Crosscutting Topics
  - Agricultural Chemicals
  - Contaminant Occurrence
  - Contaminant Plumes
  - Contaminant Transport (GW)
  - Contaminant Transport (SW)
  - Geophysical Characterization
  - Methods
  - Models
  - Natural Attenuation
  - Nutrients
  - Site Remediation
  - Tracer Tests
  - Unsaturated Zone
- Headlines
- Publications
  - Search Publications
  - Publications by Category
  - New Pubs
  - Upcoming
  - Publication Headlines
  - On-Line Fact Sheets
- Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov

Emerging Contaminants Targeted in a Reconnaissance of Ground Water and Untreated Drinking-Water - Windows Internet Explorer

http://toxics.usgs.gov/highlights/gwsw_ec.html

File Edit View Favorites Tools Help

Favorites

Mail | Emerging Contaminants T...

Page Safety Tools

Recent advances in laboratory analytical methods have given scientists the tools to detect a wide range of contaminants in the environment at extremely low concentrations. The findings of these reconnaissance studies support other recent scientific studies using low-level detection technologies that document the environmental presence of chemicals not commonly monitored in water resources—chemicals often associated with human and animal wastewaters and biosolids. As detection technologies improve, scientists are likely to find more and a larger variety of these chemicals in ground water, streams, rivers, and drinking-water sources in the future. It is important to note that detection at a low concentration does not necessarily signal a health concern, and that some of the chemicals detected in these reconnaissance studies can occur naturally. Data from these surveys will help scientists, regulators, water-resource managers, and health professionals to determine if the concentrations and mixtures of chemicals measured in these waters pose a threat to human or environmental health, and will help with the development of mitigating strategies where needed.

References

Barnes, K.K., Kolpin, D.W., Furlong, E.T., Zaugg, S.D., Meyer, M.T., and Barber, L.B., 2008, A national reconnaissance of pharmaceuticals and other organic wastewater contaminants in the United States--I. Groundwater: Science of the Total Environment, doi:10.1016/j.scitotenv.2008.04.028.

Focazio, M.J., Kolpin, D.W., Barnes, K.K., Furlong, E.T., Meyer, M.T., Zaugg, S.D., Barber, L.B., and Thurman, E.M., 2008, A national reconnaissance for pharmaceuticals and other organic wastewater contaminants in the United States--II. Untreated drinking water sources: Science of the Total Environment, doi:10.1016/j.scitotenv.2008.02.021.

Barnes, K.K., Kolpin, D.W., Focazio, M.J., Furlong, E.T., Meyer, M.T., Zaugg, S.D., Haack, S.K., Barber, L.B., and Thurman, E.M., 2008, Water-quality data for pharmaceuticals and other organic wastewater contaminants in ground water and in untreated drinking water sources in the United States, 2000-01: U.S. Geological Survey Open-File Report 2008-1293, 6 p. plus tables.

Emerging Contaminants

In 2002 the Toxic Substances Hydrology Program published the results of the "National Reconnaissance of Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in Streams." The study documented the presence of low levels of many emerging contaminants, including prescription and non-prescription drugs, hormones, and other wastewater compounds, in a network of 139 targeted streams across the United States. This study was the first national-scale examination of emerging contaminants in streams and supported the USGS mission to assess the quantity and quality of the Nation's water resources.

More Information

- National Stream Reconnaissance for Emerging Contaminants

More Information

- Emerging Contaminants National Source-Water Reconnaissance
- Emerging Contaminants National Ground-Water Reconnaissance

Two Journal Articles, One open-file report

Related Headlines

- Measuring Antidepressants, Fungicides, and Insecticides in the Environment
- Detergents in Streams May Just Disappear
- Biosolids, Animal Manure, and Earthworms: Is There a Connection?
- Wastewater Indicators Shown to Degrade in Streams

Toxic Substances Hydrology Program: http://toxics.usgs.gov

USGS Open-File Report 2008-1293: Water-Quality Data for Pharmaceuticals and Other Organic Waste - Windows Internet Explorer

http://pubs.usgs.gov/of/2008/1293/

File Edit View Favorites Tools Help

USGS Home
Contact USGS
Search USGS

Open-File Report 2008–1293

>> Pubs Warehouse > OF 2008-1293

Water-Quality Data for Pharmaceuticals and Other Organic Wastewater Contaminants in Ground Water and in Untreated Drinking Water Sources in the United States, 2000–01

By Kimberlee K. Barnes, Dana W. Kolpin, Michael J. Focazio, Edward T. Furlong, Michael T. Meyer, Steven D. Zaugg, Sheridan K. Haack, Larry B. Barber, and E. Michael Thurman

Abstract

This report presents water-quality data from two nationwide studies on the occurrence and distribution of organic wastewater contaminants. These data are part of the continuing effort of the U.S. Geological Survey Toxic Substances Hydrology Program to collect baseline information on the environmental occurrence of pharmaceuticals and other organic wastewater contaminants.

In 2000, samples were collected from 47 ambient ground-water sites (not drinking-water wells) in 18 states and analyzed for 65 organic wastewater contaminants. In the summer of 2001, samples were collected from 74 sources of raw, untreated, drinking water in 25 states and Puerto Rico and analyzed for 100 organic wastewater contaminants. These sources comprise 25 ground-water and 49 surface-water sources of drinking water serving populations ranging from one family to more than 8 million people. Site selection for both studies focused on areas known or suspected to contain sources of animal and/or human wastewater.

The five most frequently detected compounds in samples collected from ambient ground-water sites are N,N-diethyltoluamide (35 percent, insect repellant), bisphenol A (30 percent, plastic- and epoxy-manufacturing ingredient), tri(2-chloroethy) phosphate (30 percent, fire retardant), sulfamethoxazole (23 percent, veterinary and human antibiotic), and 4-octylphenol monoethoxylate (19 percent, detergent metabolite). The five most frequently detected organic wastewater contaminants in samples of untreated drinking water from surface-water sources are cholesterol (59 percent, natural sterol), metolachlor (53 percent

Version 1.0

Posted September 2008

- **Report** PDF (262 kB)

For additional information contact:
Director, USGS Iowa Water Science Center
P.O. Box 1230
Iowa City, IA 52244
(319) 337–4191
(319) 358-3606 Fax

Or visit the Iowa Water Science Center Web site at:
http://ia.water.usgs.gov

Part or all of this report is presented in Portable Document Format (PDF); the latest version of

Toxic Substances Hydrology Program: http://toxics.usgs.gov

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-1293.pdf - Windows Internet Explorer

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-1293.pdf

File Edit Go To Favorites Help

Favorites

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-12...

Page Safety Tools

i (1 of 14) 130% Find

USGS
science for a changing world

Water-Quality Data for Pharmaceuticals and Other Organic Wastewater Contaminants in Ground Water and in Untreated Drinking Water Sources in the United States, 2000–01

Toxic Substances Hydrology Program: http://toxics.usgs.gov

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-1293.pdf - Windows Internet Explorer

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-1293.pdf

File Edit Go To Favorites Help

Favorites

http://pubs.usgs.gov/of/2008/1293/pdf/OFR2008-12...

Page Safety Tools

(5 of 14) 130% Find

1. Map showing location of surface- and ground-water sampling sites, 2000 through 2001 3

Tables

[Click on table title to view in Excel format]

1. Surface- and ground-water sites analyzed in 2000 and 2001
2. Samples collected from surface- and ground-water sites analyzed for selected antibiotic analytes in 2000 and 2001
3. Samples collected from surface- and ground-water sites analyzed for selected human pharmaceutical analytes in 2000 and 2001
4. Samples collected from surface- and ground-water sites analyzed for selected organic wastewater analytes in 2000 and 2001
5. Quality-assurance samples from surface- and ground-water sites analyzed in 2000 and 2001
6. Naturally occurring compounds

Toxic Substances Hydrology Program: http://toxics.usgs.gov

Table%201[1] [Compatibility Mode] - Microsoft Excel

C121 | Well-Whipple 5

Table 1. Surface- and ground-water sites analyzed in 2000 and 2001.
[USGS, U.S. Geological Survey; ID, identification; SRCWTR-74 sites, untreated drinking water sources study, Focazio and others, 2008; GWRECON-47 sites, ground-water study, Barnes and others, 2008; NA, not available]

Project code	Site code	Site name	USGS Site ID
SRCWTR	AL01s	Hamilton Creek at Snow RD near Semmes	02480002
SRCWTR	AL02s	Hamilton Creek at Pump Station intake	02480004
GWRECON	CA01g	001N006E28K001S	340824116212701
GWRECON	CA02g	CA valley dairy - well	NA
GWRECON	CA04g	CA field well	NA
GWRECON	FL01g	EVANS DE-02	302017083111201
GWRECON	FL02g	Blue Springs near Dell	02319950
GWRECON	FL03g	Well	300310083065001
SRCWTR	FL03s	Caloosahatchee River	264311081405301
GWRECON	FL04g	Pinco NWSTP S.T. well near Crystal Beach	280632082455003
GWRECON	FL05g	Buckhorn Springs BH-2A NRSD well near Brandon	275421082150401
SRCWTR	FL06g	CWW1	301900084144901
SRCWTR	FL07g	CWW2	301859084141901
GWRECON	GA01g	12L061	313020084142501
SRCWTR	GA08s	Ocmulgee River above Macon	325437083395301
SRCWTR	GA09s	Oostanaula River at Rome	02388520
SRCWTR	HI01g	Schofield MW2-2	212959158031901
SRCWTR	HI02g	Schofield MW2-3	212904158025101
GWRECON	ID01g	09S 16E 03ABC1	424040114335501
GWRECON	ID02g	04N 01W 03ADBB1	434302116261301
SRCWTR	ID03g	4N 2E 32CAD1	433820116143401
SRCWTR	ID04g	02S 34E 24ACBC1	431410112252401
GWRECON	IN01g	Residential well, Elkhart	414218086001101
GWRECON	IN02g	USEPA well 116A at Himco Landfill, Elkhart	414216086001701
GWRECON	IN03g	USEPA well 101A at Himco Landfill, Elkhart	414215086001702
SRCWTR	KS01s	Kansas River near Desoto	06892350
SRCWTR	KS02s	Little Arkansas River near Sedgwick	07144100

Table 1

Ready

Toxic Substances Hydrology Program: http://toxics.usgs.gov

USGS Toxic Substances Hydrology Program - Windows Internet Explorer

http://toxics.usgs.gov/

File Edit View Favorites Tools Help

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

The **Toxic Substances Hydrology Program** provides objective scientific information on environmental contamination to improve characterization and management of contaminated sites, to protect human and environmental health, and to reduce potential future contamination problems. Read more about the Toxics Program

Recent Headlines

view all headlines

Phytoplankton in Coastal Waters and Global Climate Change?

Surprising Findings on Mercury in Yellowstone National Park

Visualizing Contamination Pathways in the Subsurface

Research Projects

view all research

Subsurface Point-Source Contamination
Projects: Petroleum (crude, gasolene, produced water) | Chlorinated Solvents | Mixed Wastes (landfills, wastewater) | Fractured-Rock Aquifers

Watershed-and Regional Scale Contamination
Projects: Hard-Rock Mining | Pesticides | Emerging Contaminants | Mercury | Amphibian Research | Priority Ecosystems

Methods Development
Topics: Microbial Geochemistry | Geochemistry | Hydrology | Contaminant Geophysics | Modeling

Crosscutting Topics

view all topics

- Agricultural Chemicals
- Contaminant Occurrence Studies
- Contaminant Plume Geochemistry and Microbiology
- Geophysical Characterization
- Ground-Water Contaminant Transport
- Methods
- Models
- Natural Attenuation
- Nutrients

Search the Toxics site:

Toxics Home
About The Program
Research Projects
Subsurface Point-Source
Watershed-and Regional Scale
Methods Development
Crosscutting Topics
Agricultural Chemicals
Contaminant Occurrence
Contaminant Plumes
Contaminant Transport (GW)
Contaminant Transport (SW)
Geophysical Characterization
Methods
Models
Natural Attenuation
Nutrients
Site Remediation
Tracer Tests
Unsaturated Zone
Headlines
Publications
Search Publications
Publications by Category
New Pubs
Upcoming
Publication Headlines
On-Line Fact Sheets
Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov

The Toxics Bibliographic Search Engine - Windows Internet Explorer

http://toxics.usgs.gov/cgi-bin/bib_search.cgi

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | The Toxics Bibliographic S...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

Toxics Bibliographic Search Engine

Find results by

Crosscutting topic: No Topic Selected

- No Topic Selected
- Agricultural Chemicals
- Contaminant Occurrence Studies
- Contaminant Plume Geochemistry
- Contaminant Transport - Ground Water
- Contaminant Transport - Surface Water
- Fate of Nutrients
- Geophysical Characterization
- Methods - All
- Methods - Field
- Methods - Laboratory
- Methods - Study Approaches
- Model - All
- Model - Applications
- Model - Development
- Model - Statistical
- Natural Attenuation
- Site Remediation
- Tracer Tests
- Unsaturated Zone

Research issue: arch Issue Selected

Publication type:

Word(s) in the **title:**

(This field includes information such as journal name or report series name.)

Author(s):

Range of publication **years:**

w year or the high year text input boxes.

Output format

Sort by: Author

Results page format: Basic Web Page

GO Search the Data Base | Reset the Form

Search the Toxics site:

Google™ Custom Search | Go

Toxics Home
About The Program
Research Projects
- Subsurface Point-Source
- Watershed-and Regional Scale
- Methods Development

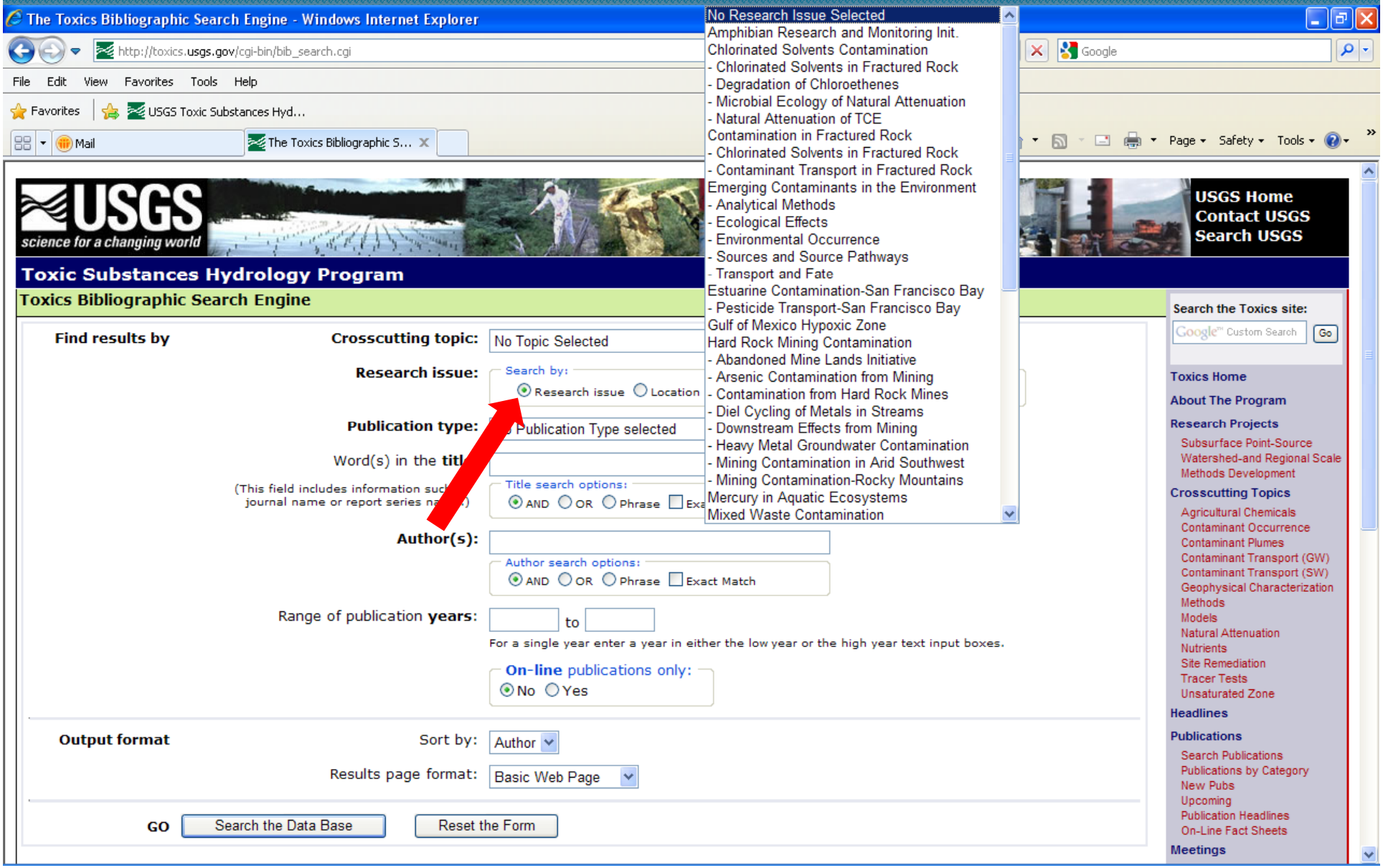
Crosscutting Topics
- Agricultural Chemicals
- Contaminant Occurrence
- Contaminant Plumes
- Contaminant Transport (GW)
- Contaminant Transport (SW)
- Geophysical Characterization
- Methods
- Models
- Natural Attenuation
- Nutrients
- Site Remediation
- Tracer Tests
- Unsaturated Zone

Headlines

Publications
- Search Publications
- Publications by Category
- New Pubs
- Upcoming
- Publication Headlines
- On-Line Fact Sheets

Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov



Toxic Substances Hydrology Program: http://toxics.usgs.gov

The Toxics Bibliographic Search Engine - Windows Internet Explorer

http://toxics.usgs.gov/cgi-bin/bib_search.cgi

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | The Toxics Bibliographic S...

Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

Toxics Bibliographic Search Engine

Find results by

Crosscutting topic: No Topic Selected

Research issue: Search by: Research issue / Location

No Investigation Location Selected
Amargosa Desert Res. Site, NV
Animas River, CO, Boulder River, MT
Bemidji Res. Site, MN
Cape Cod Res. Site, MA
Cedar River Study Site, IA
Cotton Belt Study, Southern States
Galloway Township Res. Site, NJ
Injection Well Sites, FL
Laurel Bay Res. Site, SC
Lower Calcasieu River Study, LA
Management Systems Eval. Areas, Midwest
Mirror Lake Frac. Rock Res. Site, NH
Mississippi River Basin and Gulf of Mexico
Naval Air Warfare Center Res. Site, NJ
Norman Landfill Res. Site, OK
Osage-Skiatook Petroleum Res. Site, OK
Pensacola Res. Site, FL
Picatinny Arsenal Res. Site, NJ
Pinal Creek Res. Site, AZ
Plains Agchemicals Study, GA
San Francisco Bay Watershed, CA
San Francisco Bay, CA
Summitville Mine Study Site, CO
Tar Creek Study Site, OK
Upper Arkansas River Res. Site, CO
Upper Midwest Corn Belt
Whitewood Creek Study, SD
Wurtsmith Air Force Base Res. Site, MI

Publication type: No Publication Type selected

Word(s) in the **title:**

(This field includes information such as journal name or report series name.)

Title search options: AND OR Phrase Exact Match

Author(s):

Author search options: AND OR Phrase Exact Match

Range of publication **years:** to

For a single year enter a year in either the low year or the high year text input boxes.

On-line publications only: No Yes

Output format

Sort by: Author

Results page format: Basic Web Page

GO Search the Data Base Reset the Form

Search the Toxics site: Google™ Custom Search Go

Toxics Home
About The Program
Research Projects
Subsurface Point-Source
Watershed-and Regional Scale
Methods Development
Crosscutting Topics
Agricultural Chemicals
Contaminant Occurrence
Contaminant Plumes
Contaminant Transport (GW)
Contaminant Transport (SW)
Geophysical Characterization
Methods
Models
Natural Attenuation
Nutrients
Site Remediation
Tracer Tests
Unsaturated Zone
Headlines
Publications
Search Publications
Publications by Category
New Pubs
Upcoming
Publication Headlines
On-Line Fact Sheets
Meetings

Toxic Substances Hydrology Program: http://toxics.usgs.gov

The Toxics Bibliographic Search Engine - Windows Internet Explorer

http://toxics.usgs.gov/cgi-bin/bib_search.cgi

File Edit View Favorites Tools Help

Favorites | USGS Toxic Substances Hyd...

Mail | The Toxics Bibliographic S... | Page Safety Tools

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

Toxic Substances Hydrology Program

Toxics Bibliographic Search Engine

Find results by

Crosscutting topic: No Topic Selected

Research issue: Search by: Research issue / Location — No Research Issue Selected

Publication type: No Publication Type selected

- No Publication Type selected
- Books and Book Chapters
- Conference Proceedings Papers
- Fact Sheets
- Journal Articles
- Newsletter and Magazine Articles
- On-Line Web Pages
- Patents
- Program Overview Papers
- Reports (USGS)
- Reports (non-USGS)
- Review Papers
- Student Theses/Dissertations

Word(s) in the **title:** Match

(This field includes information such as journal name or report series name.)

Author(s): Match

Range of publication **years:** the low year or the high year text input boxes.

On-line publications only: No / Yes

Output format

Sort by: Author

Results page format: Basic Web Page

GO: Search the Data Base | Reset the Form

Search the Toxics site: Google™ Custom Search Go

- Toxics Home
- About The Program
- Research Projects
  - Subsurface Point-Source
  - Watershed-and Regional Scale
  - Methods Development
- Crosscutting Topics
  - Agricultural Chemicals
  - Contaminant Occurrence
  - Contaminant Plumes
  - Contaminant Transport (GW)
  - Contaminant Transport (SW)
  - Geophysical Characterization
  - Methods
  - Models
  - Natural Attenuation
  - Nutrients
  - Site Remediation
  - Tracer Tests
  - Unsaturated Zone
- Headlines
- Publications
  - Search Publications
  - Publications by Category
  - New Pubs
  - Upcoming
  - Publication Headlines
  - On-Line Fact Sheets
- Meetings

USGS Library: http://library.usgs.gov

USGS Library: Home Page - Windows Internet Explorer

http://library.usgs.gov/

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | USGS Library: Home Page

Page Safety Tools

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

USGS Library

USGS Employees Only

USGS Digital Desktop Library

Welcome to the largest earth science library in the world!

Find

- Search Library Catalog
- Frequently Asked Questions
- USGS Search Assistance - FAQ's
- Selected Map Bookmarks
- Digital Library for Earth System Education
- USGS Thesaurus
- State Geological Surveys

Databases

- National Geologic Map Database
- Earthquake Hazards Program Grants: Technical Reports
- U.S. Board on Geographic Names
- USGS Earth Science Photographic Archive
- USGS Field Records Collection
- USGS Search Assistance – FAQ's
- USGS Reports & Maps (Publications

Information & Services

- Exchange & Gift Program
- Special Collections
- Classification System
- Collection Development Policy
- Library History
- Visiting the Library
- Help in the Library
- Borrowing

Library Home

Collection
- Search Catalog
- New Acquisitions
- Special Collections

Services
- Ask a Librarian
- Visiting
- Borrowing
- Exchange & Gifts
- Z39.50 Services

Locations & Contacts
- Staff Contacts
- Denver, CO
- Flagstaff, AZ

Local intranet 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

http://libraryphoto.cr.usgs.gov/

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | U.S. Geological Survey P...

Page Safety Tools

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

U.S. Geological Survey Photographic Library

Home | About the USGS Photo Library | Resolutions and Downloading | Contact Us |

Select a Search Method: tips

- Key Word Search
- Earthquakes
- Mines, Mills, Quarries
- Mount St. Helens
- National Parks
- Photographers
- Pioneer Photographers
- Portrait Collection

Welcome to the U.S. Geological Survey Photographic Library

This site is designed to provide free viewing and downloading of the entire USGS photographic collection.

"**Select a Search Method**" menu accesses the photographs. The "**Key Word Search**" feature allows the user the freedom to search for any desired subject. Choosing from the list of subjects on this menu allows searching within specific categories.

Images are available to view and download at no charge.
Terms of Use, Copyright, and Publishing Information.

Digital resolution options of each image include:

- 100 dots per inch (dpi) thumbnail-resolution GIF file
- 700 dpi medium-resolution JPG file
- 1400 dpi high-resolution JPG file
- 1600+ dpi full-resolution JPG file

For more information, visit **Resolutions and Downloading** at the top of this page.

William T. Mulkey, Jack Rimmer, and Jack Lean. Denali National Park and Preserve, Alaska. cc 1919. ID. **Capps, S.R. 1127**

Done | Local intranet | 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

http://libraryphoto.cr.usgs.gov/msh.htm

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | U.S. Geological Survey P...

Page Safety Tools

Select a Search Method: tips

Key Word Search

Earthquakes

Mines, Mills, Quarries

Mount St. Helens

National Parks

Photographers

Pioneer Photographers

Portrait Collection

Mount St. Helens

Select One

1964 - 1984

Mount St. Helens 1964
Mount St. Helens 1967
Mount St. Helens 1970
Mount St. Helens 1972
Mount St. Helens 1973
Mount St. Helens 1974
Mount St. Helens 1975
Mount St. Helens 1977
Mount St. Helens 1978
Mount St. Helens 1979
Mount St. Helens 1980
Mount St. Helens 1980 March
Mount St. Helens 1980 April
Mount St. Helens 1980 May
Mount St. Helens 1980 May 18
Mount St. Helens 1980 June
Mount St. Helens 1980 July
Mount St. Helens 1980 July 22
Mount St. Helens 1980 August
Mount St. Helens 1980 August 7
Mount St. Helens 1980 September
Mount St. Helens 1980 October

Submit

Canyonlands National Park, Utah. Frank Masland inspecting petroglyphs in the lower part of the south fork of Horse Canyon in The Maze. Photo by U.S. National Park Service, May 1962.
ID. Lohman, S.W. 685

Local intranet 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

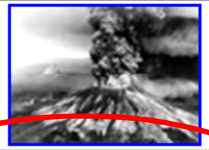
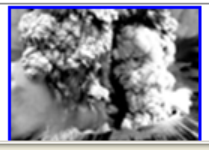
http://libraryphoto.cr.usgs.gov/cgi-bin/search.cgi?search_mode=exact;selection=Mount%20St.%20Helens%20May%2018%2C%201980%7CMount%20St.%20He

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | U.S. Geological Survey P...

Page Safety Tools

36.		southeast flank of Mount St. Helens. A beheaded shoestring glacier is visible on the mountain. Photo by Lyn Topinka. Skamania County, Washington. October 1980.	ID. CVO-F. 120ct cvof0120
37.		Lahar from May 18, 1980, down the South Fork Toutle River drainage, west flank of Mount St. Helens. Photo by Lyn Topinka. Cowlitz County, Washington. October 4, 1980.	ID. CVO-F. 121ct cvof0121
38.		Aerial view of eruption of Mount St. Helens. Skamania County, Washington. May 18, 1980. Published opposite p. 1 in U.S. Geological Survey. Yearbook. 1980.	ID. Mount St. Helens - 2 msh00002
39.		Mount St. Helens in eruption on May 18, 1980; with the upper third of the mountain centered in the photo? Mount Adams in background. Skamania County, Washington.	ID. Mount St. Helens - 3 msh00003
40.		Eastern Washington resident sweeping ash from the May 18, 1980 eruption of Mount St. Helens from the roof of his house. Washington. After May 18, 1980. Lower photo, page 17 in U.S. Geological Survey. Eruptions of Mount St. Helens: Past, Present, and Future by Robert I. Tilling. 1984.	ID. Mount St. Helens - 3ct mshct003
41.		Closer view of crater of Mount St. Helens on May 18, 1980. Skamania County, Washington.	ID. Mount St. Helens - 4 msh00004

Local intranet 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

U.S. Geological Survey Photographic Library

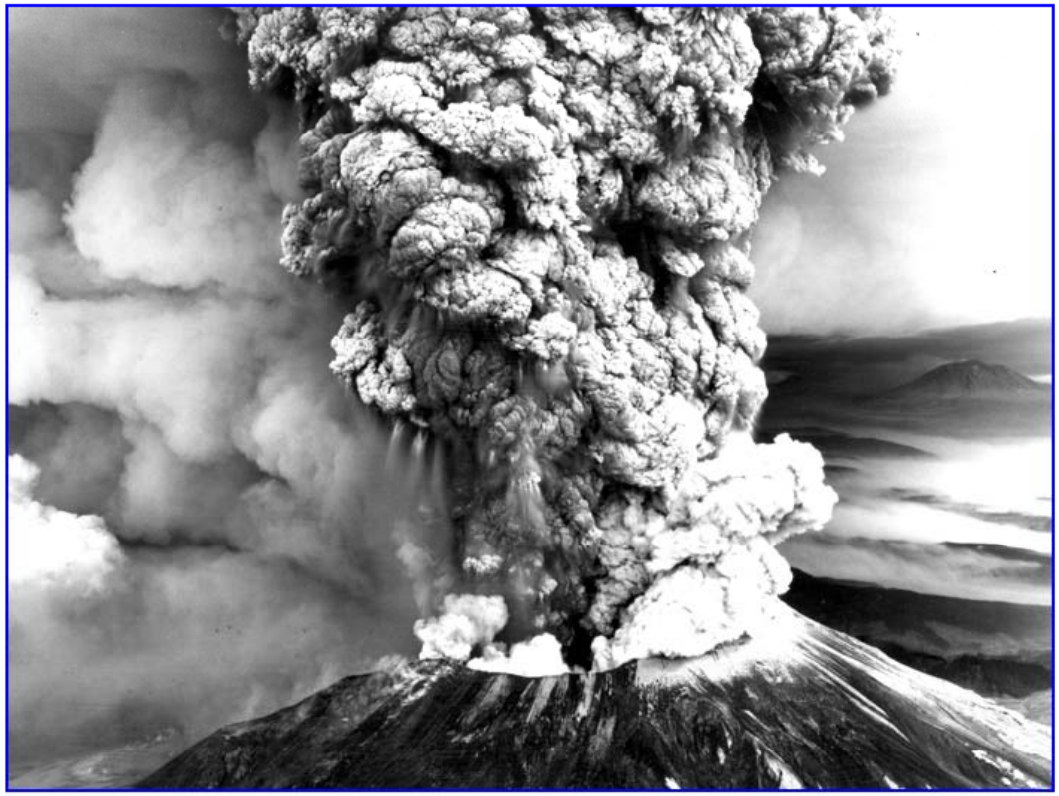
Home | About the USGS Photo Library | Resolutions and Downloading | Contact Us |

Select a Search Method: tips

- Key Word Search
- Earthquakes
- Mines, Mills, Quarries
- Mount St. Helens
- National Parks
- Photographers
- Pioneer Photographers
- Portrait Collection

ID. Mount St. Helens - 3

Click on photo for higher resolution.



Mount St. Helens in eruption on May 18, 1980; with the upper third of the mountain centered in the photo? Mount Adams in background. Skamania County, Washington.

Image file: /htmllib/btch152/btch152j/btch152z/msh00003.jpg

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

USGS
science for a changing world

USGS Home
Contact USGS
Search USGS

U.S. Geological Survey Photographic Library

Home | About the USGS Photo Library | Resolutions and Downloading | Contact Us |

Select a Search Method: tips

- Key Word Search
- Earthquakes
- Mines, Mills, Quarries
- Mount St. Helens
- National Parks
- Photographers
- Pioneer Photographers
- Portrait Collection

Resolutions and Downloading

Each image is available to download in the following resolution choices:

- 100 dots per inch (dpi) thumbnail-resolution GIF files
- 700 dpi medium-resolution JPG file
- 1400 dpi high-resolution JPG
- 1600+ dpi full-resolution JPG file

The original photograph, slide, or negative is scanned at 600 dpi, and is then optimized and formatted within Photoshop CS2. This allows for the creation of multi-resolution options without losing any detail within the photograph. All images can be viewed solely, without the caption or the website header and footer by clicking on the image file link located below the caption.

To access the resolution options:

- After completing a search, the first images to appear are 100 dpi thumbnail-resolution GIF files.
- Left-clicking on the GIF thumbnail image will open the 700 dpi medium-resolution JPG file of the same photograph.
- Left-clicking on the JPG medium resolution image will open the 1400 dpi high-resolution JPG file of the same photograph.
- Left-clicking on the 1400 dpi high-resolution file will access the full resolution image of the same photograph.

These digital images vary in size from a few hundred kilobytes (kb) to 12 or more megabytes (mb) in a JPG format. For faster downloading results, we suggest using a high speed internet connection.

To download an image:

- Select the image and resolution desired
- Right-click anywhere within the image
- Select SAVE IMAGE AS
- Choose a location on your computer and save

To download a caption:

- Select the image
- Highlight the caption by left-clicking and dragging the mouse over the text
- Right-click anywhere on the highlighted text and select COPY
- Select location to paste the text, such as a word document or text
- Right-click onto the new document and select PASTE
- Identify and save this file onto your computer

For questions regarding resolution options, image or caption downloading, or scanning processes, please contact Photo Collection at (303) 236-1010 or den_lib@usgs.gov.

Wright Brothers National Memorial, North Carolina. Granite boulder marking the site of the first successful flight of a motor-driven airplane made by Orville Wright on December 17, 1903, near Kill Devil Hills. September 7, 1929.
ID. Stephenson, L.W. 1346

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

http://libraryphoto.cr.usgs.gov/parks.htm

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | U.S. Geological Survey P...

Page Safety Tools

Home | About the USGS Photo Library | Resolutions and Downloading | Contact Us |

Select a Search Method: tips

Key Word Search

Earthquakes

Mines, Mills, Quarries

Mount St. Helens

National Parks

Photographers

Pioneer Photographers

Portrait Collection

National Parks - Monuments - Seashores

Select One

A-G

Arches National Park
Aztec Ruins National Monument
Badlands National Monument
Bandelier National Monument
Big Bend National Park
Black Canyon of the Gunnison National Park
Canyon de Chelly National Monument
Canyonlands National Park
Cape Cod National Seashore
Cape Hatteras National Seashore
Capitol Reef National Park
Capulin Volcano National Monument
Carlsbad Caverns National Park
Castillo de San Marcos National Monument
Catoctin Mountain Park
Cedar Breaks National Monument
Chaco Culture National Historic Park
Chesapeake and Ohio Canal National Historic Park
Chimney Rock National Historic Site
Colorado National Monument
Craters of the Moon National Monument
Crater Lake National Park

Submit

H-Z

North Cascades National Park
Ozark National Scenic Riverways
Petrified Forest National Park
Point Reyes National Seashore
Rainbow Bridge National Monument
Rock Creek Park
Rocky Mountain National Park
Saguaro National Park
Scotts Bluff National Monument
Sequoia National Park
Sequoia and Kings Canyon National Park
Shenandoah National Park
Sunset Crater Volcano National Monument
Theodore Roosevelt National Park
Walnut Canyon National Monument
Washington National Monument
White Sands National Monument
Wright Brothers National Memorial
Wupatki National Monument
Yellowstone National Park
Yosemite National Park
Zion National Park

Submit

Arches National Park, Utah. Delicate Arch with tour
providing a perspective, and the cautionary Nationa
Parks sign, 1972. ID. Colton, R.B. 610ct

Local intranet 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

http://libraryphoto.cr.usgs.gov/cgi-bin/search.cgi?seach_mode=exact;selection=Yellowstone%20National%20Park%7CYellowstone%20National%20Park;start=37

File Edit View Favorites Tools Help

Favorites ftp--ftpint.usgs.gov-private...

Mail

ftp--ftpint.usgs.gov-private-cr-co-denver-PiceanceReport-SWanalysis-EagleWaterQuantityfigs
ftp://ftpint.usgs.gov/private/cr/co/denver/PiceanceReport/SWanalysis/EagleWaterQuantityfigs.pdf

Page Safety Tools

389.		Yellowstone National Park, Wyoming. Lone Star Geyser in Lone Star Geyser Basin. 1883(?).	ID. Jackson, W.H. 244 jwh00244
390.		Yellowstone National Park, Wyoming. Rendezvous camp at Fort D.A. Russell near Cheyenne where the survey was organized and equipped for field service. 1870. U.S. Geological and Geographical Survey of the Territories (Hayden Survey).	ID. Jackson, W.H. 247 jwh00247
391.		Wyoming. Group of all the members of the Survey, made while in camp at Red Buttes at the junction of the North Platte and Sweetwater Rivers. Standing left to right: John "Potato John" Raymond and "Val," cooks; Sanford R. Gifford, landscape painter; Henry W. Elliott, artist; James Stevenson, assistant; H.D. Schmidt, naturalist; E. Campbell Carrington, zoologist; L.A. Bartlett, general assistant; William Henry Jackson, photographer. Sitting left to right: C.S. Turnbull, secretary; J.H. Beaman, meteorologist; Ferdinand.V. Hayden, geologist in charge; Cyrus Thomas, agriculturist; Raphael, hunter; A.L. Ford, mineralogist. 1870.U.S. Geological and Geographical Survey of the Territories (Hayden Survey). See also photo jwh00283.	ID. Jackson, W.H. 282 jwh00282
392.		Wyoming. Group of all the members of the Survey, made while in camp at Red Buttes at the junction of the North Platte and Sweetwater Rivers. Standing left to right: John "Potato John" Raymond and "Val," cooks; Sanford R. Gifford, landscape painter; Henry W. Elliott, artist; James Stevenson, assistant; H.D. Schmidt, naturalist; E. Campbell Carrington, zoologist; L.A. Bartlett, general assistant; William Henry Jackson, photographer. Sitting left to right: C.S. Turnbull, secretary; J.H. Beaman, meteorologist; Ferdinand V. Hayden, geologist in charge; Cyrus Thomas, agriculturist; Raphael, hunter; A.L. Ford, mineralogist. August 24, 1870. U.S. Geological and Geographical Survey of the	ID. Jackson, W.H. 283 jwh00283

(16 items remaining) Downloading picture http://libraryphoto.cr.usgs.gov/images/header_graphic_usgsIdentifier_white.jpg...

Local intranet 125%

USGS Photographic Archive: http://libraryphoto.cr.usgs.gov

U.S. Geological Survey Photographic Library - Windows Internet Explorer

http://libraryphoto.cr.usgs.gov/cgi-bin/show_picture.cgi?ID=ID. Jackson, W.H. 282

File Edit View Favorites Tools Help

Favorites | ftp--ftpint.usgs.gov-private...

Mail | U.S. Geological Survey P...

Page Safety Tools

Home | About the USGS Photo Library | Resolutions and Downloading | Contact Us |

Select a Search Method: tips

- Key Word Search
- Earthquakes
- Mines, Mills, Quarries
- Mount St. Helens
- National Parks
- Photographers
- Pioneer Photographers
- Portrait Collection

ID. Jackson, W.H. 282

Click on photo for higher resolution.

Members of the Hayden Survey: 1870
U.S. Geological and Geographical Survey of the Territories

Local intranet 125%