**Wastewater Treatment Plant Study, 2009-2011**
**June 1 2010 Data Report and Summary**

**Project Collaborators:**

**US Geological Survey**
**Minnesota Pollution Control Agency**
**St. Cloud State University**
**St. Thomas University**

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**Study Overview:**

- During this study, 48 stream locations and 25 wastewater treatment plants (Fig. 1, Table 1) were sampled to determine the occurrence of a broad suite of organic chemicals including endocrine active chemicals and pharmaceuticals in water and bottom sediments (Table 2). Samples were collected upstream, downstream, and at the point of discharge of each plant. Sampling occurred between September 2, 2009 and November 23, 2009.

- Sampling included wastewater treatment plants of differing treatment types (continuous flow vs. periodic releases), processing steps (activated sludge vs. trickling filters), and plant design flows (ranging from 0.04 to 251 million gallons per day).

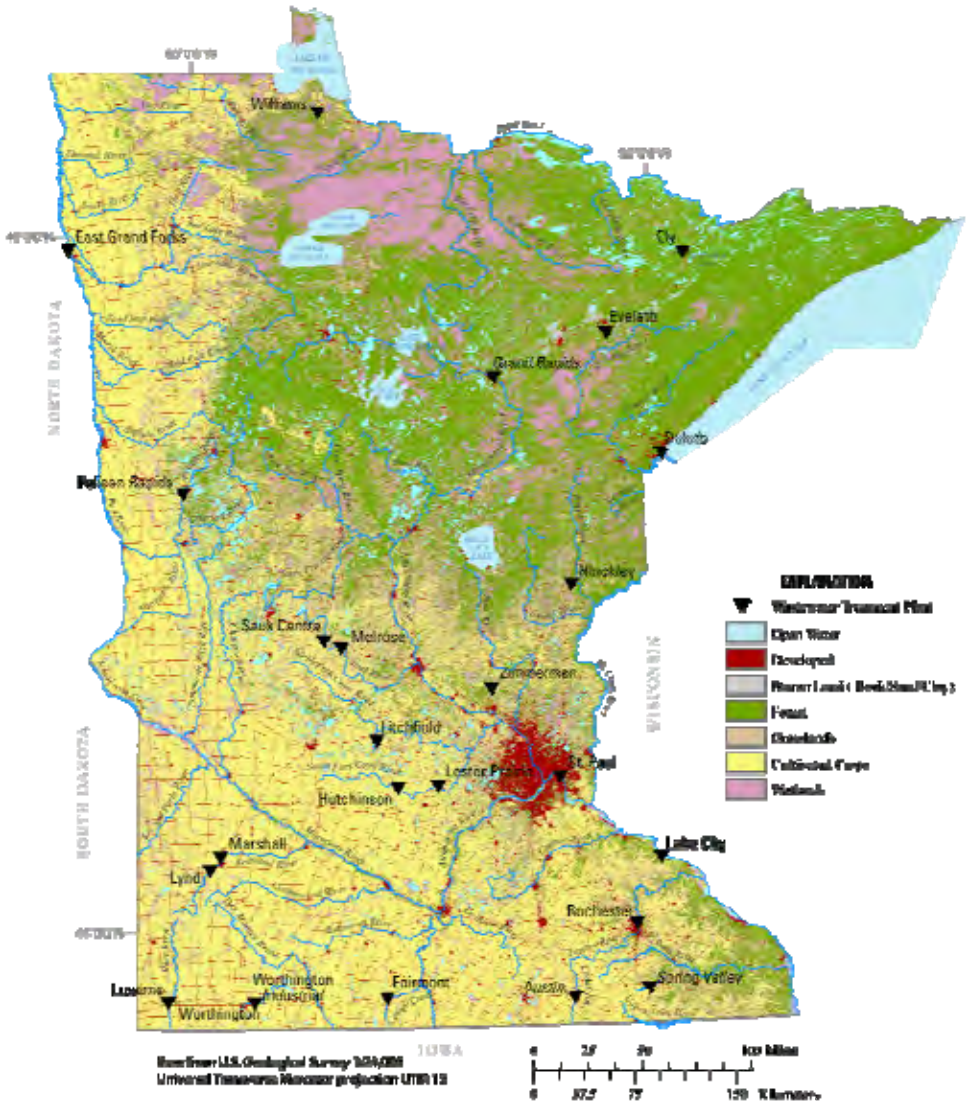


**Figure 1**. Map showing the sampling locations. Each triangle represents an upstream, effluent and downstream sample.

**Data:**

**Pharmaceuticals**. Analysis of surface water samples show that pharmaceuticals are present in Minnesota wastewaters (Fig. 2) and streams (Fig 3). Pharmaceuticals detected include carbamazepine (anticonvulsant), diphenhydramine (antihistamine), trimethoprim and sulfamethoxazole (antibiotics), diltiazem (heart arrhythmia medication), caffeine (stimulant), codeine, cotinine (nicotine metabolite), and 1,7-dimethylxanthine (caffeine metabolite). The concentrations were generally low (less than 1 microgram per liter) and many were estimated below laboratory reporting levels.

Pharmaceuticals generally occurred as mixtures with the number detected ranging from 0 to 9 among all samples. More pharmaceuticals were detected in WWTP effluent samples (average of 4 pharmaceuticals) than in samples collected downstream of effluent (average of 2 pharmaceuticals) and stream samples collected upstream of effluent (average of 1 pharmaceutical). Some of the pharmaceuticals such as caffeine were present both upstream and downstream of wastewater discharges while other pharmaceuticals such as carbamazepine were found primarily downstream from wastewater treatment plant discharge (Fig. 3).

**Figure 2.** Map showing the number of pharmaceuticals detected in wastewater treatment plant effluent samples collected during 2009. (*Preliminary results subject to revision*.)

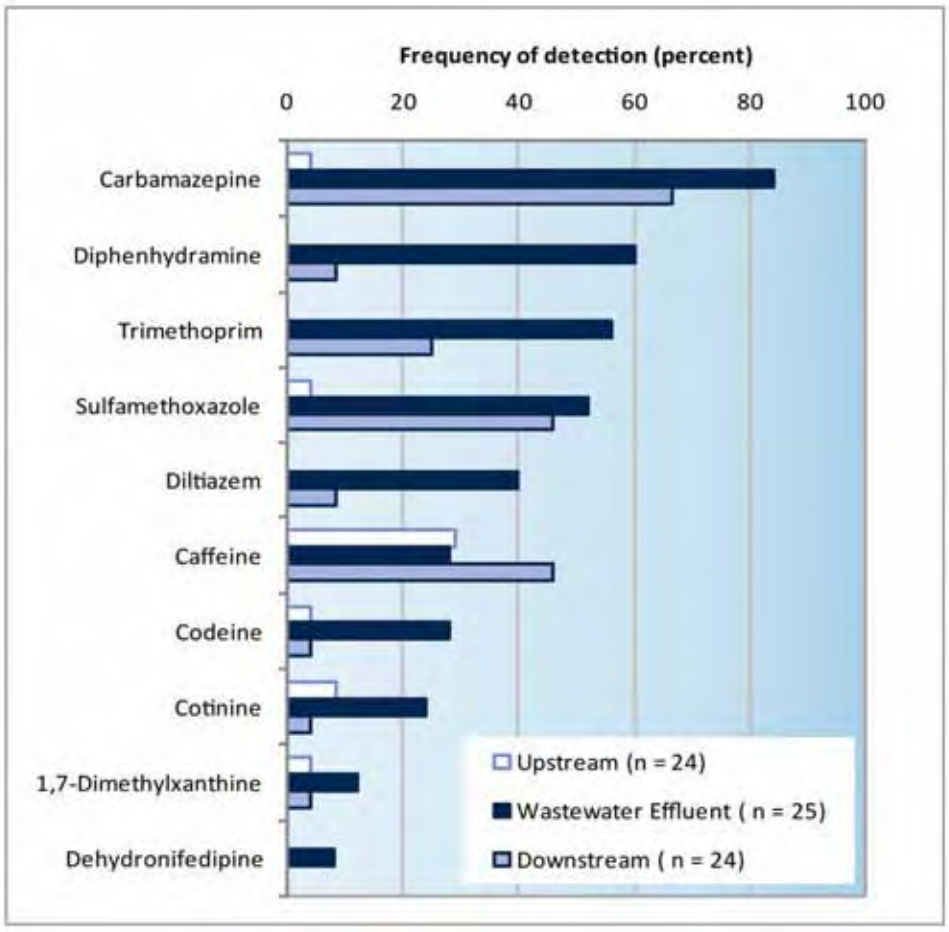


**Figure 3.** Graph showing the frequency of detection of pharmaceutical compounds measured in water samples collected from wastewater effluent and from stream sites located upstream and downstream of effluent discharge during 2009. (*Preliminary results subject to revision*.)

**Stream bottom sediments**. Preliminary results suggest that the bottom sediments in the rivers contain numerous chemicals including endocrine active chemicals. Thirty five of the 57 chemicals analyzed were detected among the 24 bottom sediment samples analyzed. A wide variety of chemicals (35 of the 57 analyzed) were detected above laboratory detection limits including polyaromatic hydrocarbons, plant and animal sterols, alkylphenols, plastic components, and fragrances, and antimicrobial chemicals. 3-methyl-1H-indole, 2,6-dimethlnaphthalene, beta-sitosterol, beta-stigmastanol, fluoranthene, indole, p-cresol, 3-beta-coprostanol, cholesterol, pyrene, and benzo[a]pyrene were detected in greater than 80 percent of the samples (Fig. 4). In reference to endocrine active chemicals, 4-nonylphenol was detected in 58 percent of the samples. Bisphenol A was detected in 46 percent of the bottom sediment samples. 4-nonylphenol diethoxylate was detected in 21 percent of the samples, and 4-tert-octylphenol nonylphenol diethoxylate and octylphenol monoethoxylate were each found in 8 percent of the samples.

No consistent pattern in the total number of chemicals was found between the bottom sediment samples collected upstream and downstream of wastewater effluent. There was however, a fairly consistent patterns in selected chemicals such as 3-beta-coprostanol (a fecal sterol) of greater concentrations downstream than upstream of wastewater treatment plant effluent at most streams measured. In contrast, the concentrations and presence of polyaromatic hydrocarbons (PAHs) do not have a consistent pattern between upstream and downstream occurrence.

Bottom sediments are an important potential storage area for organic chemicals in aquatic ecosystems. Chemical concentrations in bottom sediments are often normalized to organic carbon content in the sediment for context. Organic carbon ranged from 8-190 grams per kilogram with an average of 42 grams per kilogram among all sites. There was no pattern in organic carbon between upstream and downstream samples. Sediments with high organic content can interfere with laboratory analyses. For example, natural organic material in soil might influence the extraction efficiency of the analytical method and recoveries of chemicals of interest might be reduced. A censored value (for example, <300) for a constituent does not

imply that the chemical is absent from the sample, but is not quantifiable above the stated reporting limit.

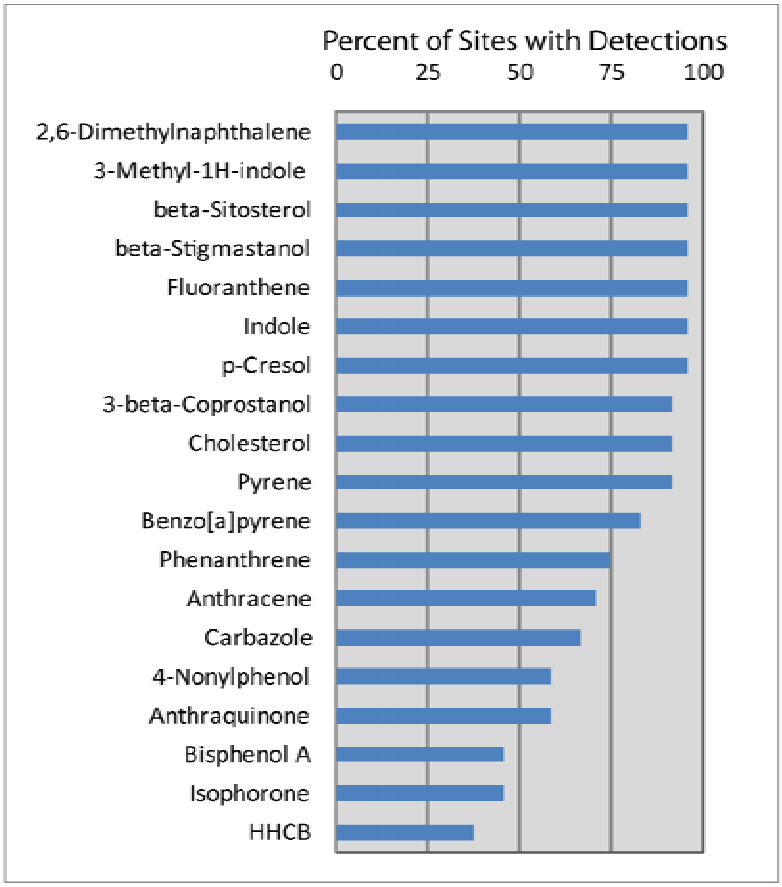


**Figure 4**. Bar chart showing the percent of sites with detections in sediment. Chemicals detected in greater than 20 percent of the samples are shown in this graph. (*Preliminary results subject to revision*.)

**Nutrient concentrations.** Levels of nutrients ranged greatly among the samples collected from wastewater treatment plants highlighting the variety in influent quality and processing techniques among the treatment plants (Fig. 5). Nutrient concentrations also varied among streams throughout the state reflecting the diversity of point and nonpoint sources of nutrients to streams and in-stream processing.

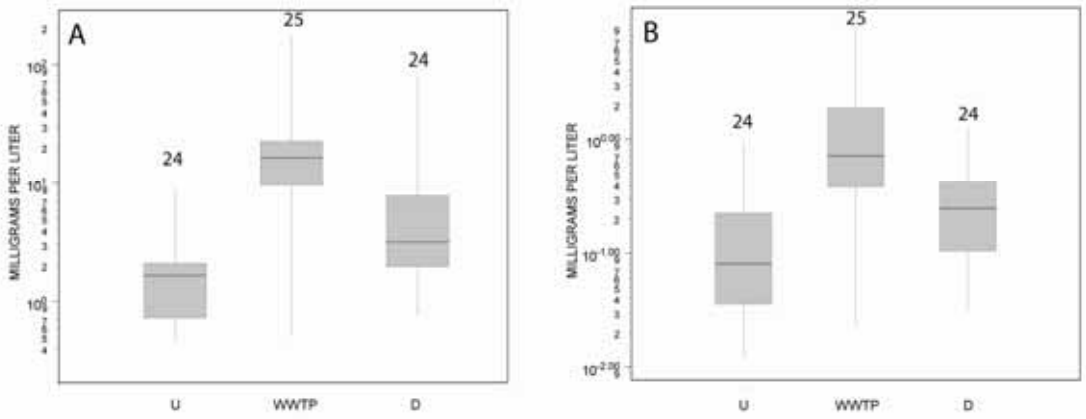


**Figure 5**. Boxplots on a log scale showing: A) total nitrogen, and B) total phosphorus concentrations in wastewater effluent samples and stream samples collected once during 2009 [U, upstream; W, wastewater effluent; D, downstream. The extent of the gray boxes show the 25th and 95th percentiles. The line in the center of the box is the median or 50th percentile. The extent of the upper line is the 90th percentile and the extent of the lower line extent is the 10th percentile. The numbers above each box show the number of samples. (*Preliminary results subject to revision*.)

**Quality assurance.** Samples were collected to assess potential sources of contamination and variability. Six field blank samples were analyzed for inorganic constituents (nutrients, chloride, and sulfate), and seven blank samples were analyzed for pharmaceuticals on USGS schedule 2080. Ammonia plus organic nitrogen in filtered water samples was the only constituent detected among the six inorganic samples at estimated concentrations of 0.07 milligrams per liter, which is below the method detection limit of 0.1 mg/L. This concentration is less than concentrations found in all environmental samples (0.18 -13 mg/L). No pharmaceuticals were detected in any of the field blanks.

**Study Accomplishments and Status:**

- All sites (25 wastewater treatment plants and 48 stream sites) were sampled in 2009
- A preliminary progress report to the MN State Legislature was completed in April 2010
- All treatment plant operators were contacted for ancillary information on particular treatment plants
- The USGS website is under continual update to reflect new data and results http://mn.water.usgs.gov/projects/EACWWTP/index.html
- Pharmaceutical, nutrient, and major ion analyses for water samples are complete
- Organic wastewater indicator chemical analyses for bottom sediments are complete
- Study on contaminant time of travel in surface water is ongoing
- Alkylphenol and hormone data for water samples will be reported pending quality assurance review.
- Total estrogenicity analyses of water samples is in the quality assurance phase

**Table 1. List of sampling sites and sampling dates.**

| City | Position | Station Name | USGS Station ID | | Latitude | Longitude | Date Sampled |
|---|---|---|---|---|---|---|---|
| Austin | Upstream | Cedar River above Treatment Plant at Austin, MN | 05455975 | | 433924.8 | 925829.47 | 9/8/2009 |
| Austin | WWTP | Austin WWTP Outflow at Austin, MN | 433913092581601 | | 433913 | 925815.6 | 9/8/2009 |
| Austin | downstream | Cedar River below Treatment Plant at Austin, MN | 05455978 | | 433858.56 | 925825.74 | 9/8/2009 |
| Duluth | Upstream | St. Louis River at Hwy 23 above Fond Du Lac, MN | 04024025 | | 463929.76 | 921702.14 | 10/1/2009 |
| Duluth | WWTP | Western Lake Superior Sanitary District - WWTP at Duluth, MN | 464538092072601 | | 464528.35 | 920712.05 | 10/1/2009 |
| Duluth | downstream | Lake Superior in St. Louis Bay at Duluth, MN | 464523092065501 | | 464521.77 | 920715.42 | 10/1/2009 |
| East Grand Forks | upstream | Red R. of the North above WWTP at East Grand Forks, MN | 05082520 | | 475831.78 | 970333.23 | 10/21/2009 |
| East Grand Forks | WWTP | Wastewater Lift Sta. Outflow at East Grand Forks, MN | 475834097032002 | | 475833.92 | 970328.93 | 10/21/2009 |
| East Grand Forks | downstream | Red river of the North Below WWTP at East Grand Forks, MN | 475854097032001 | | 475853.22 | 970321.79 | 10/21/2009 |
| Ely | Upstream | Shagwa Lake at Mouth of Burntside River near Ely, MN | 475504091545401 | | 475505.23 | 915453.43 | 9/28/2009 |
| Ely | WWTP | Ely WWTP Outflow at Ely, MN | 475435091522601 | | 475435.2 | 915225.6 | 9/28/2009 |
| Ely | downstream | Shagawa Lake near Ely WWTP Outflow at Ely, MN | 475436091522501 | | 475435.69 | 915226.35 | 9/28/2009 |
| Eveleth | Upstream | Elbow Creek above Eveleth WWTP at Eveleth, MN | 04018765 | | 472737.5 | 923244.6 | 9/29/2009 |
| Eveleth | WWTP | Eveleth WWTP Outlflow at Eveleth, MN | 472737092324501 | | 472737.2 | 923245.3 | 9/29/2009 |
| Eveleth | downstream | Elbow Creek below Eveleth WWTP at Eveleth, MN | 04018767 | | 472736 | 923246.4 | 9/29/2009 |
| Fairmont | Upstream | Center Creek on Co. Rd. 143, at Fairmont, MN | 05318170 | | 434021.78 | 942745.13 | 9/9/2009 |

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|---|---|---|---|---|---|---|---|
| Fairmont | WWTP | Fairmont WWTP Outflow at Fairmont, MN | 434018094273301 | | 434016.84 | 942734.1 | 9/9/2009 |
| Fairmont | downstream | Center Creek below WWTP at Fairmont, MN | 05318171 | | 434022.72 | 942726.18 | 9/9/2009 |
| Grand Rapids | Upstream | Mississippi River above WWTP at Grand Rapids, MN | 05211020 | | 471357.6 | 933123.6 | 9/30/2009 |
| Grand Rapids | WWTP | Grand Rapids WWTP Outflow at Grand Rapids, MN | 471336093301801 | | 471308.42 | 932935.45 | 9/30/2009 |
| Grand Rapids | downstream | Mississippi River below WWTP at Grand Rapids, MN | 05211030 | | 471259.39 | 932917.1 | 9/30/2009 |
| Hinckley | Upstream | Grindstone River above WWTP near Hinckley, MN | 05337003 | | 460106.86 | 925433.46 | 9/2/2009 |
| Hinckley | WWTP | Hinckley WWTP near Hinckley, MN | 460107092543101 | | 460107.35 | 925432.66 | 9/2/2009 |
| Hinckley | downstream | Grindstone River below Hinckley, MN | 05337005 | | 460048.4 | 925323.57 | 9/2/2009 |
| Hutchinson | Upstream | South Fork of the Crow River above WWTP at Hutchinson, MN | 05278570 | | 445220.41 | 942124.86 | 9/14/2009 |
| Hutchinson | WWTP | Hutchinson WWTP Outlow at Hutchinson, MN | 445220094212201 | | 445218.87 | 942121.82 | 9/14/2009 |
| Hutchinson | downstream | South Fork of the Crow River below Hutchinson, MN | 05278580 | | 445202.91 | 942107.69 | 9/14/2009 |
| Lake City | upstream | Mississippi River (Lake Pepin) above Lake City, MN | 05355260 | | 442821.6 | 921624.8 | 9/23/2009 |
| Lake City | WWTP | Lake City WWTP Outfllow at Lake City, MN | 442626092152201 | | 442626 | 921521.99 | 9/23/2009 |
| Lake City | downstream | Mississippi River (Lake Pepin) at Mile 771 near Lake City, MN | 05355331 | | 442624.9 | 921516 | 9/23/2009 |
| Lester Prairie | Upstream | South Fork Crow River above WWTP at Lester Prairie, MN | 05270845 | | 445227.7 | 940303.7 | 9/15/2009 |
| Lester Prairie | WWTP | Lester Prairie WWTP Outflow at Lester Prairie, MN | 445243094020301 | | 445243.3 | 940203.1 | 9/15/2009 |
| Lester Prairie | downstream | South Fork Crow River below WWTP at Lester Prairie, MN | 05270850 | | 445251.93 | 940111 | 9/15/2009 |
| Litchfield | Upstream | Jewitts Creek at U.S. HWY. 12 in Litchfield, MN | 05278080 | | 450830.49 | 943122.53 | 10/8/2009 |
| Litchfield | WWTP | Litchfield WWTP Outflow near Litchfield, MN | 450833094311001 | | 450832.9 | 943109.9 | 10/8/2009 |

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|---|---|---|---|---|---|---|---|
| Litchfield | downstream | Jewitts Creek near Litchfield, MN | 05278083 | | 450843.27 | 943059.71 | 10/8/2009 |
| Luverne | Upstream | Rock River above WWTP near Luverne, MN | 06483005 | | 433855.77 | 961154.54 | 10/6/2009 |
| Luverne | WWTP | Luverne WWTP Outlflow near Luverne, MN | 433856096115801 | | 433856.2 | 961158.3 | 10/6/2009 |
| Luverne | downstream | Rock River below WWTP near Luverne, MN | 06483010 | | 433851.83 | 961157.03 | 10/6/2009 |
| Lynd | Upstream | Redwood River above Lynd WWTP near Lynd, MN | 05314985 | | 442415.1986 | 955231.6992 | 11/23/2009 |
| Lynd | WWTP | Lynd WWTP Outflow near Lynd, MN | 442415095523001 | | 442415.00012 | 955230 | 11/23/2009 |
| Lynd | downstream | Redwood River below Lynd WWTP near Lynd, MN | 05314988 | | 442419.299 | 955221.2016 | 11/23/2009 |
| Marshall | Upstream | Redwood River above WWTP below Marshall, MN | 05315045 | | 442845.5 | 954633.79 | 10/7/2009 |
| Marshall | WWTP | Marshall WWTP outfall at Marshall, MN | 442846095463201 | | 442846 | 954632 | 10/7/2009 |
| Marshall | downstream | Redwood River below WWTP near Marshall, MN | 05315050 | | 442912.1 | 954557.47 | 10/7/2009 |
| Melrose | Upstream | Sauk River above Melrose WWTP at Melrose, MN | 05270195 | | 454037.14 | 944813.38 | 9/17/2009 |
| Melrose | WWTP | Melrose WWTP Outflow at Melrose, MN | 454040094480701 | | 454039.7 | 944807.2 | 9/17/2009 |
| Melrose | downstream | Sauk River below Melrose WWTP at Melrose, MN | 05270197 | | 454045.2 | 944742.7 | 9/17/2009 |
| Pelican Rapids | Upstream | Pelican River above WWTP at Pelican Rapids, MN | 05040540 | | 463411.89 | 960509.38 | 10/19/2009 |
| Pelican Rapids | WWTP | Pelican Rapids WWTP Outflow at Pelican Rapids, MN | 463408096052401 | | 463408 | 960524.3 | 10/19/2009 |
| Pelican Rapids | downstream | Pelican River below WWTP at Pelican Rapids, MN | 05040345 | | 463411.8 | 960534 | 10/19/2009 |
| Rochester | Upstream | South Fork Zumbro River at Rochester, MN | 05372995 | | 440345.29 | 922754.75 | 9/22/2009 |
| Rochester | WWTP | Rochester WWTP Outflow at Rochester, MN | 440350092275501 | | 440353 | 922753.83 | 9/22/2009 |
| Rochester | downstream | South Fork Zumbro R. below WWTP near Rochester, MN | 05373005 | | 440433.34 | 922759.58 | 9/22/2009 |
| Sauk Centre | Upstream | Sauk River above Sauk Centre WWTP at Sauk Centre, MN | 05270181 | | 454308.18 | 945623.93 | 9/16/2009 |

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|---|---|---|---|---|---|---|---|
| Sauk Centre | WWTP | Sauk Centre WWTP Outflow at Sauk Centre, MN | 454308094562601 | | 454308.5 | 945626 | 9/16/2009 |
| Sauk Centre | downstream | Sauk River below Sauk Centre WWTP at Sauk Centre, MN | 05270183 | | 454251.04 | 945617.75 | 9/16/2009 |
| Spring Valley | Upstream | Spring Valley Creek above Spring Valley WWTP Outflow at Spring Valley, MN | 05383820 | | 434120.07 | 922250.52 | 9/21/2009 |
| Spring Valley | WWTP | Spring Valley WWTP Outflow at Spring Valley, MN | 434122092225001 | | 434121.7 | 922250.2 | 9/21/2009 |
| Spring Valley | downstream | Spring Valley Creek below Spring Valley WWTP Outflow at Spring Valley, MN | 05383822 | | 434122.38 | 922246.33 | 9/21/2009 |
| St. Paul | Upstream | Mississippi River at Industrial Mollasses St. Paul, MN | 05331005 | | 445511.04 | 930304.46 | 9/24/2009 |
| St. Paul | WWTP | Metro Plant (WWTP) Outflow in St. Paul, MN | 445509093024301 | | 445509 | 930243 | 9/24/2009 |
| St. Paul | downstream | Mississippi River at South St. Paul, MN | 05331400 | | 445405.9 | 930217.6 | 9/24/2009 |
| Williams | Upstream | Williams Creek above WWTP at Williams, MN | 05318495 | | 484626.53 | 945708.38 | 10/20/2009 |
| Williams | WWTP | Williams WWTP Outflow at Williams, MN | 484627094570801 | | 484626.84 | 945708.77 | 10/20/2009 |
| Williams | downstream | Williams Creek below WWTP at Williams, MN | 05318500 | | 484627.23 | 945708.8 | 10/20/2009 |
| Worthington | Upstream | Okabena Creek above WWTP Outflow at Worthington, MN | 05474883 | | 433838.6 | 953443.6 | 9/9/2009 |
| Worthington | WWTP-Domestic | Worthington WWTP Outflow at Worthington, MN | 433838095344201 | | 433838.9 | 953442.4 | 9/9/2009 |
| Worthington | WWTP-Industrial | Industrial WWTP Outflow near Worthington, MN | 433847095330001 | | 433847 | 953260 | 9/9/2009 |
| Worthington | downstream | Okabena Creek below WWTP Outflow at Worthington, MN | 05474884 | | 433848.54 | 953257.78 | 9/9/2009 |
| Zimmerman | Upstream | Tibbets Brook above WWTP outflow at Zimmerman, MN | 05274850 | | 452559.09 | 933454.5 | 9/3/2009 |
| Zimmerman | WWTP | Zimmerman WWTP outflow at Zimmerman, MN | 452559093345601 | | 452557.84 | 933455.23 | 9/3/2009 |
| Zimmerman | downstream | Tibbets Brook below WWTP outflow at Zimmerman, MN | 05274855 | | 452558.54 | 933456.6 | 9/3/2009 |

**Table 2. Physical properties and chemicals analyzed for in water or bottom sediment samples.**

[MRL, minimum reporting level; EDP, endocrine-disrupting potential; $K_{ow}$, octanol-water partition coefficient; CASRN, Chemical Abstracts Services Registry Number; µS/cm, microsiemens per centimeter at 25 degrees Celsius (°C); FIELD, field sample; mg/L, milligrams per liter; --, not available; NWQL, National Water Quality Laboratory; USGS–NRP, U.S. Geological Survey National Research Program (laboratory); EDTA, ethylenediaminetetraacetic acid; NTA; nitrilotriacetic acid; NPEC, nonlyphenol ethoxycarboxylate; µg/L, micrograms per liter; ng/L, nanograms per liter;; S, suspected; K, known; E or e, remark code estimated concentration reported; F, fungicide; H, herbicide; I, insecticide; GUP, general-use pesticide; FR, flame retardant; WW, wastewater; manuf., manufacturing; %, percent; >, greater than; CP, combustion product; PAH, polycyclic aromatic hydrocarbon; UV, ultraviolet; NA, not applicable; Compounds measured in both water and sediment samples unless otherwise marked].

| Property/chemical name | MRL[1] | Log $K_{ow}$[3] | CASRN[4] | Possible compound uses or sources[5] |
|---|---|---|---|---|
| **Nutrients Analyzed in Water at the USGS National Water Quality Laboratory (mg/L)** | | | | |
| Ammonia plus organic nitrogen, filtered | 0.1 | -- | 17778-88-0 | Nutrient |
| Ammonia plus organic nitrogen, unfiltered | 0.1 | -- | 17778-88-0 | Nutrient |
| Ammonia as nitrogen | 0.02 | -- | 7664–41–7 | Nutrient |
| Nitrite plus nitrate | 0.04 | -- | -- | Nutrient |
| Nitrogen, nitrite | 0.002 | -- | 14797–65–0 | Nutrient |
| Orthophosphate | 0.008 | -- | 14265–44–2 | Nutrient |
| Total phosphorus, filtered | 0.006 | -- | 7723–14–0 | Nutrient |
| Total phosphorus, unfiltered | 0.008 | -- | 7723-14-0 | Nutrient |
| **Chemicals Analyzed in Water at Larry Barber's USGS National Research Program Laboratory(ng/L)** | | | | |
| 4-Nonylphenol[1] | 100 | 5.92 | 25154–52–3 | Surfactant metabolite. |
| 4-Nonylphenolmonoethoxylate[1] | 50 | 5.58 | 27986–36–3 | Surfactant metabolite. |

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|---|---|---|---|---|
| 4-Nonylphenoldiethoxylate[1] | 50 | -- | 9016–45–9 | Surfactant metabolite. |
| 4-*tert*-Octylphenol[1] | 5 | 5.28 | 140–66–9 | Surfactant metabolite. |
| 4-*tert*-Octylphenolmonoethoxylate[1] | 5 | -- | 9036–19–5 | Surfactant metabolite. |
| 4-*tert*-Octylphenoldiethoxylate[1] | 5 | -- | 2315–64–0? | Surfactant metabolite. |
| Bisphenol A[1] | 5 | 3.64 | 80–05–7 | FR, manuf. polycarbonate resins, antioxidant. |
| Fluoxetine[1] | 50 | -- | 58–08–2 | Stimulant. |
| Fluvoxamine[1] | 5 | -- | 57–88–5 | Animal steroid |
| Diethylpthalate[1] | 5 | -- | -- | Pharmaceutical |
| Triclocarban[1] | 50 | -- | 134–62–3 | I, urban uses, mosquito repellent. |
| Triclosan[1] | 5 | -- | 3380–34–5 | Antimicrobial. |
| 17β-estradiol[1] | 5 | -- | -- | Reproductive Hormone |
| 17α-ethynylestradiol[1] | 5 | -- | -- | Ovulation inhibitor |
| Estrone[1] | 5 | -- | -- | Reproductive hormone |
| Estriol[1] | 5 | -- | -- | Reproductive hormone |
| 1,4-Dichlorobenzene[1] | 5 | 3.28 | 106–46–7 | Moth repellent, fumigant, deodorant. |
| 2,6-Di-*tert*-butyl-1,4-benzoquinone[1] | 5 | 4.07 | 719–22–2 | Antioxidant by-product. |
| 5-methyl-1H-benzotriazole[1] | 5 | 1.71 | 136–85–6 | Antioxidant in antifreeze and deicers |
| N,N,diethyl-*meta*-toluamide[1] | 5 | 2.26 | 134–62–3 | I, urban uses, mosquito repellent. |

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|---|---|---|---|---|
| 4-Androstene-3,17-dione [1] | 5 | -- | -- | Anabolic agent and natural steroid |
| Testosterone [1] | 5 | -- | -- | Reproductive hormone |
| D6-Bisphenol A (percent) | -- | -- | 86588–58–1 | Surrogate standard. |
| D21-2,6-Di-*tert*-butyl-4-methylphenol (percent) | -- | -- | 64502–99–4 | Surrogate standard. |
| 4-*n*-Nonylphenol (percent) | -- | -- | 104–40–5 | Surrogate standard. |
| 4-*n*-Nonylphenolmonoethoxylate (percent) | -- | -- | -- | Surrogate standard. |
| 4-*n*-Nonylphenoldiethoxylate (percent) | -- | -- | -- | Surrogate standard. |
| D4-17-$\beta$-Estradiol (percent) | -- | -- | 66789–03–5 | Surrogate standard. |
| D7-Cholesterol (percent) | -- | -- | -- | Surrogate standard. |
| **Pharmaceuticals Analyzed in Water at the USGS National Water Quality Laboratory(ug/L)** | | | | |
| 1,7-Dimethylxanthine[1] | 0.12 | -0.39 | 611-59-6 | Precursor is a stimulant |
| Acetaminophen[1] | 0.08 | 0.27 | 103-90-2 | Analgesic |
| Albuterol | 0.06 | 0.64 | 18559-94-9 | Bronchodilator |
| Caffeine[1] | 0.20 | .16 | 58–08–2 | Beverages, diuretic, very mobile/biodegradable |
| Carbamazepine[1] | 0.04 | 2.25 | 298-46-4 | Antiepileptic |
| Codeine[1] | 0.04 | 1.28 | 76-57-3 | Opiate agonist |
| Cotinine[1] | 0.026 | .34 | 486–56–6 | Primary nicotine metabolite |
| Dehydronifedipine[1] | 0.08 | -- | 67035-22-7 | Precursor is an antiangial |

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|---|---|---|---|---|
| Diltiazem[1] | 0.08 | 2.79 | 42399-41-7 | Antihypertensive |
| Diphendydramine[1] | 0.04 | 3.11 | 58-73-1 | Antipruritic |
| Sulfamethoxazole[1] | 0.16 | 0.48 | 723-46-6 | Antibiotic |
| Thiabendazole[1] | 0.06 | 2.00 | 148-79-8 | Anthelmintic, fungacide |
| Trimethoprim[1] | 0.02 | 0.73 | 738-70-5 | Antibiotic |
| Warfarin[1] | 0.1 | 2.23 | 81-81-2 | Anticoagulant, rodenticide |
| Carbamazepine-d10 (percent) | -- | -- | | Surrogate standard |
| Ethyl Nicotinate-d4 (percent) | -- | -- | | Surrogate Standard |
| **Chemicals analyzed in Bottom Sediment at the USGS National Water Quality Laboratory (ng/g)** | | | | |
| 1,4-Dichlorobenzene[1] | 50 | 3.28 | 106–46–7 | Moth repellent, fumigant, deodorant |
| 1-Methylnaphthalene[1] | 50 | 3.72 | 90–12–0 | 2–5% of gasoline, diesel fuel, or crude oil |
| 2,6-Dimethylnaphthalene[1] | 50 | 4.26 | 581–42–0 | Percent in diesel/kerosene (trace in gasoline) |
| 2-Methylnaphthalene[1] | 50 | 3.72 | 91–57–6 | 2–5% of gasoline, diesel fuel, or crude oil |
| 3-*beta*-Coprostanol[1] | 500 | 8.82 | 360–68–9 | Carnivore fecal indicator. |
| 3-Methyl-1H-indole (skatol) [1] | 50 | 2.60 | 83–34–1 | Fragrance, stench in feces, and coal tar |
| 3-*tert*-Butyl-4-hydroxyanisole[1] | 150 | 3.50 | 25013–16–5 | Antioxidant |
| 4-Cumylphenol[1] | 50 | 4.12 | 599–64–4 | Surfactant metabolite |
| 4-*n*-Octylphenol[1] | 50 | 5.50 | 1806–26–4 | Surfactant metabolite |

| | | | | |
|---|---|---|---|---|
| 4-Nonylphenol[1] | 750 | 5.92 | 84852–15–3 | Surfactant metabolite |
| 4-Nonylphenoldiethoxylate[1] | 1000 | -- | -- | Surfactant metabolite |
| 4-Nonylphenolmonoethoxylate[1] | 500 | 5.58 | -- | Surfactant metabolite |
| 4-*tert*-Octylphenol[1] | 50 | 5.28 | 140–66–9 | Surfactant metabolite |
| 4-tert-Octylphenoldiethoxylate[1] | 50 | -- | -- | Surfactant metabolite |
| 4-tert-Octylphenolmonoethoxylate[1] | 250 | -- | -- | Surfactant metabolite |
| Acetophenone [1] | 150 | 1.67 | 98–86–2 | Fragrance and flavor |
| Acetyl-hexamethyl-tetrahydronaphthalene (tonalide) [1] | 50 | 6.35 | 21145–77–7 | Musk fragrance |
| Anthracene [1] | 50 | 4.35 | 120–12–7 | CP, component of tar, diesel, or crude oil |
| Anthraquinone[1] | 50 | 3.34 | 84–65–1 | Manuf. dye/textiles, seed treatment, bird repellent |
| Atrazine[1] | 100 | 2.82 | 1912–24–9 | Selective triazine herbicide |
| Benzo[a]pyrene [1] | 50 | 6.11 | 50–32–8 | CP, regulated PAH |
| Benzophenone[1] | 50 | 3.15 | 119–61–9 | Fixative for perfumes and soaps |
| *beta*-Sitosterol[1] | 500 | 9.65 | 83–46–5 | Plant sterol |
| *beta*-Stigmastanol[1] | 500 | 9.73 | 19466–47–8 | Herbivore fecal indicator (digestion of sitosterol) |
| Bisphenol A[10] | 50 | 3.64 | 80–05–7 | FR, manuf. polycarbonate resins, antioxidant |
| Bromacil[1] | 500 | 1.68 | 314–40–9 | H (GUP), >80% noncrop usage on grass/brush |

| | | | | |
|---|---|---|---|---|
| Camphor[1] | 50 | 3.04 | 76–22–2 | Flavor, odorant, ointments. |
| Carbazole[1] | 50 | 3.23 | 86–74–8 | I, manuf. dyes, explosives, and lubricants |
| Chlorpyrifos [1] | 50 | 4.66 | 2921–88–2 | I, historically for domestic pest and termite control |
| Cholesterol[1] | 250 | 8.74 | 57–88–5 | Often a fecal indicator, also a plant sterol |
| Diazinon [1] | 50 | 3.86 | 333–41–5 | I, > 40% nonagricultural usage, ants, flies |
| *d*-Limonene[1] | 50 | 4.83 | 5989–27–5 | F, antimicrobial, antiviral, fragrance in aerosols |
| Fluoranthene[1] | 50 | 4.93 | 206–44–0 | CP, in coal tar, asphalt (traces in gasoline or diesel fuel) |
| Hexahydrohexamethyl-cyclopenta-benzopyran (galaxolide) [1] | 50 | 6.26 | 1222–05–5 | Musk fragrance |
| Indole[1] | 100 | 2.05 | 120–72–9 | Pesticide inert ingredient, fragrance in coffee |
| Isoborneol[1] | 50 | 2.85 | 124–76–5 | Fragrance in perfumery, in disinfectants |
| Isophorone[1] | 50 | 2.62 | 78–59–1 | Solvent for lacquer, plastic, oil, silicon, resin |
| Isopropylbenzene (cumene) [1] | 100 | 3.45 | 98–82–8 | Manuf. phenol/acetone, fuels and paint thinner |
| Isoquinoline[1] | 100 | 2.14 | 119–65–3 | Flavors and fragrances |
| Menthol[1] | 50 | 3.38 | 89–78–1 | Cigarettes, cough drops, liniment, mouthwash |
| Metolachlor[1] | 50 | 3.24 | 51218–45–2 | H (GUP), indicator of agricultural drainage |
| N,N-diethyl-*meta*-toluamide[1] | 100 | 2.26 | 134–62–3 | I, urban uses, mosquito repellent |
| Naphthalene [1] | 50 | 3.17 | 91–20–3 | Fumigant, moth repellent, component (10%) of |

| | | | | |
|---|---|---|---|---|
| | | | | gasoline |
| p-Cresol (4-Methylphenol) [1] | 250 | 2.06 | 106–44–5 | Disinfectant |
| Phenanthrene [1] | 50 | 4.35 | 85–01–8 | CP, manuf. explosives, in tar, diesel fuel, or crude oil |
| Phenol [1] | 50 | 1.51 | 108–95–2 | Disinfectant, manuf several products, leachate |
| Prometon[1] | 50 | 3.57 | 1610–18–0 | H (non-crop only), applied prior to blacktop |
| Pyrene [1] | 50 | 4.93 | 129–00–0 | CP , In coal tar, asphalt (traces in gasoline or diesel fuel) |
| Tributyl phosphate[1] | 50 | 3.82 | 126–73–8 | Antifoaming agent, flame retardant |
| Triclosan[1] | 50 | 4.66 | 3380–34–5 | Disinfectant, antimicrobial |
| Triphenyl phosphate[1] | 50 | 4.70 | 115–86–6 | FR, plasticizer, resin, wax, finish, roofing paper |
| Tris(2-butoxyethyl) phosphate[1] | 150 | 3.00 | 78–51–3 | Flame retardant |
| Tris(2-chloroethyl) phosphate [1] | 100 | 1.63 | 115–96–8 | Plasticizer, flame retardant |
| Tris(dichloroisopropyl) phosphate[1] | 100 | 3.65 | 13674–87–8 | Flame retardant |
| Bisphenol A-d3, (percent) | -- | -- | -- | Surrogate standard |
| Caffeine-13C, (percent) | -- | -- | -- | Surrogate standard |
| Decafluorobiphenyl, (percent) | -- | -- | -- | Surrogate standard |
| Fluoranthene-d10, (percent) [1] | -- | -- | -- | Surrogate standard |
| | | | | |
| **Hormones Analyzed in Bottom Sediment at the USGS National Water Quality Laboratory (ng/g)** | | | | |

| | | | | |
|---|---|---|---|---|
| 11-Ketotestosterone [1] | 0.26 | -- | -- | Reproductive hormone |
| 17-alpha-Estradiol [1] | 0.1 | -- | -- | Reproductive hormone |
| 17-beta-Estradiol (E2) [1] | 0.1 | -- | -- | Reproductive hormone |
| 17-alpha-Ethynylestradiol (EE2) [1] | 0.1 | -- | -- | Ovulation inhibitor |
| Norethindrone [1] | 0.1 | -- | -- | Ovulation inhibitor |
| 4-Androstene-3,17-dione [1] | 0.1 | -- | -- | Anabolic agent and natural steroid |
| cis-Androsterone [1] | 0.1 | -- | -- | Urinary steroid |
| Cholesterol [1] | 250 | -- | -- | Plant/animal steroid |
| 3-beta-Coprostanol [1] | 250 | -- | -- | Fecal steroid |
| Dihydrotestosterone [1] | 0.1 | -- | -- | Metabolite of testosterone |
| Bisphenol A [1] | 12 | -- | -- | Plastic component |
| Epitestosterone [1] | 0.5 | -- | -- | Form of testosterone |
| Equilenin [1] | 0.26 | -- | -- | Hormone replacement |
| Equilin [1] | 0.5 | -- | -- | Hormone replacement |
| Estriol [1] | 0.26 | -- | -- | Reproductive hormone |
| Estrone [1] | 0.1 | -- | -- | Reproductive hormone |
| Mestranol [1] | 0.1 | -- | -- | Ovulation inhibitor |
| Progesterone [1] | 0.5 | -- | -- | Reproductive hormone |

| | | | | |
|---|---|---|---|---|
| trans-Diethylstilbestrol [1] | 0.1 | -- | -- | Synthetic metabolic intermediate of diethylstilbestrol |
| Testosterone [1] | 0.1 | -- | -- | Reproductive hormone |
| Testosterone-2,2,4,6,6-d5 | -- | -- | -- | Surrogate Standard |
| 17-alpha-Ethynylestradiol-2,4,16,16-d4 | -- | -- | -- | Surrogate Standard |
| Mestranol-2,4,16,16-d4 | -- | -- | -- | Surrogate Standard |
| Dihydrotestosterone-1,2,4,5a-d4 | -- | -- | -- | Surrogate Standard |
| Bisphenol-A-d16 | -- | -- | -- | Surrogate Standard |
| 4-Androstene-3,17-dione-2,2,4,6,6,16,16-d7 | -- | -- | -- | Surrogate Standard |
| Norethindrone-2,2,4,6,6,10-d6 | -- | -- | -- | Surrogate Standard |
| Cholesterol-d7 | -- | -- | -- | Surrogate Standard |
| Progesterone-2,2,4,6,6,17a,21,21,21-d9 | -- | -- | -- | Surrogate Standard |
| Estriol-2,4,17-d3 | -- | -- | -- | Surrogate Standard |
| Estrone-2,4,16,16-d4 | -- | -- | -- | Surrogate Standard |
| 17-beta-Estradiol-d4 | -- | -- | -- | Surrogate Standard |
| trans-Diethyl-1,1,1',1'-d4-stilbesterol-3,3',5,5'-d4 | -- | -- | -- | Surrogate Standard |

[1]Chemicals with and "E" following the number indicate a compound with low recovery, unstable instrument response, or reference standard prepared from a technical mixture for water analyses (Zaugg and others, 2006). Chemicals with an "e" following the number are estimated if the spike recovery or expected continuing calibration verification concentrations for each set of samples are not within control limits (Zaugg and others, 2006).

[2]Endocrine disrupting potential (EDP) from the following sources: Kime, 1998; Tremblay and Van der Kraak, 1998; EC-BKH, 2000; Nishihara and others, 2000; Global Water Research Coalition, 2003; Versonnen and others, 2003; Institute of Environmental Health, 2005; Korner and others, 2005; and Terasaki and others, 2005; Scheurs and others, 2004.

[3]Log $K_{ow}$ is the octanol-water partition coefficient and is a measure of the equilibrium concentration of a compound between octanol and water. A high value indicates a compound that will preferentially partition into soil organic matter rather than water. It was calculated using the U.S. Environmental Protection Agency's exposure assessment tools and models (EPI-suite software, WSKOWWINTM version 1.40; U.S. Environmental Protection Agency, 2005b).

[4]This report contains Chemical Abstracts Services Registry Numbers (CASRN)®, which is a Registered Trademark of the American Chemical Society. A CASRN is a numeric identifier that can contain up to nine digits, divided by dashes into three parts. For example, 58–08–2 is the CASRN for caffeine. The online database provides a source for the latest registry number information: http://www.cas.org/index.html. Chemical Abstracts Services recommends the verification of the CASRNs through CAS Client Services℠.

[5]Sources are Kime, 1998; Tremblay and Van der Kraak, 1998; EC-BKH, 2000; Nishihara and others, 2000; Zaugg and others, 2007 Versonnen and others, 2003; Barber, Furlong, and others, 2003; Global Water Research Coalition, 2003; Institute of Environmental Health, 2005; Furlong and others, 2008; Korner and others, 2005; Terasaki and others, 2005.

**Table 3. Landuse in the drainage basin upstream of sampling locations sampled during 2009 (Upstream refers to a site located upstream of a wastewater treatment plant; downstream refers to a site located downstream of a treatment plant).**

| US Geological Survey Station identification Number | Site Name | Position in Relation to Wastewater Effluent Discharge | Drainage Area (Square Miles) | Open Water (percent) | Developed (percent) | Barren (percent) | Forest (percent) | Grassland (percent) | Cropland(percent) | Wetland (percent) |
|---|---|---|---|---|---|---|---|---|---|---|
| 04018765 | Elbow Creek above Eveleth WWTP at Eveleth, MN | Upstream | 2 | 1 | 32 | 9 | 46 | 11 | 0 | 1 |
| 04018767 | Elbow Creek below Eveleth WWTP at Eveleth, MN | Downstream | 2 | 1 | 32 | 9 | 46 | 11 | 0 | 1 |
| | | | | | | | | | | |
| 04024025 | St. Louis River at Hwy 23 above Fond Du Lac, MN | Upstream | 3,573 | 4 | 3 | 1 | 62 | 10 | 0 | 21 |
| | | | | | | | | | | |
| 05040540 | Pelican River above WWTP at Pelican Rapids, MN | Upstream | 345 | 21 | 6 | 0 | 29 | 23 | 15 | 5 |
| 05040345 | Pelican River below WWTP at Pelican Rapids, MN | Downstream | 345 | 21 | 6 | 0 | 29 | 23 | 15 | 5 |
| | | | | | | | | | | |
| 05082520 | Red R. of the North above WWTP at East Grand Forks, MN | Upstream | 29,860 | 16 | 3 | 0 | 57 | 8 | 1 | 16 |
| | | | | | | | | | | |
| 05211020 | Mississippi River above WWTP at Grand Rapids, MN | Upstream | 3,273 | 16 | 3 | 0 | 57 | 8 | 1 | 16 |
| 05211030 | Mississippi River below WWTP at Grand Rapids, MN | Downstream | 3,277 | 16 | 3 | 0 | 57 | 8 | 1 | 16 |
| | | | | | | | | | | |
| 05270181 | Sauk River above Sauk Centre WWTP at Sauk Centre, MN | Upstream | 375 | 6 | 5 | 0 | 7 | 25 | 51 | 5 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 05270183 | Sauk River below Sauk Centre WWTP at Sauk Centre, MN | Downstream | 375 | 6 | 5 | 0 | 7 | 25 | 51 | 5 |
| | | | | | | | | | | |
| 05270195 | Sauk River above Melrose WWTP at Melrose, MN | Upstream | 434 | 5 | 5 | 0 | 7 | 26 | 51 | 5 |
| 05270197 | Sauk River below Melrose WWTP at Melrose, MN | Downstream | 438 | 5 | 5 | 0 | 7 | 26 | 51 | 5 |
| | | | | | | | | | | |
| 05270845 | South Fork Crow River above WWTP at Lester Prairie, MN | Upstream | 564 | 6 | 6 | 0 | 4 | 9 | 74 | 3 |
| 05270850 | South Fork Crow River below WWTP at Lester Prairie, MN | Downstream | 565 | 6 | 6 | 0 | 4 | 9 | 73 | 3 |
| | | | | | | | | | | |
| 05274850 | Tibbets Brook above WWTP outflow at Zimmerman, MN | Upstream | 7 | 11 | 10 | 0 | 25 | 28 | 18 | 8 |
| 05274855 | Tibbets Brook below WWTP outflow at Zimmerman, MN | Downstream | 7 | 11 | 10 | 0 | 25 | 28 | 18 | 8 |
| | | | | | | | | | | |
| 05278080 | Jewitts Creek at U.S. HWY. 12 in Litchfield, MN | Upstream | 26 | 9 | 13 | 0 | 7 | 10 | 55 | 5 |
| 05278083 | Jewitts Creek near Litchfield, MN | Downstream | 26 | 9 | 13 | 0 | 7 | 10 | 55 | 5 |
| | | | | | | | | | | |
| 05278570 | South Fork of the Crow River above WWTP at Hutchinson, MN | Upstream | 448 | 7 | 6 | 0 | 3 | 8 | 74 | 3 |
| 05278580 | South Fork of the Crow River below Hutchinson, MN | Downstream | 449 | 7 | 6 | 0 | 3 | 8 | 74 | 3 |
| | | | | | | | | | | |
| 05314985 | Redwood River above Lynd WWTP near Lynd, MN | Upstream | 255 | 4 | 6 | 0 | 1 | 19 | 67 | 3 |
| 05314988 | Redwood River below Lynd WWTP near Lynd, MN | Downstream | 255 | 4 | 6 | 0 | 1 | 19 | 67 | 3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 05315045 | Redwood River above WWTP below Marshall, MN | Upstream | 267 | 3 | 7 | 0 | 1 | 19 | 66 | 3 |
| 05315050 | Redwood River below WWTP near Marshall, MN | Downstream | 269 | 3 | 7 | 0 | 1 | 19 | 67 | 3 |
| | | | | | | | | | | |
| 05318170 | Center Creek on Co. Rd. 143, at Fairmont, MN | Upstream | 92 | 6 | 12 | 0 | 1 | 4 | 75 | 2 |
| 05318171 | Center Creek below WWTP at Fairmont, MN | Downstream | 92 | 6 | 12 | 0 | 1 | 4 | 75 | 2 |
| | | | | | | | | | | |
| 05318495 | Williams Creek above WWTP at Williams, MN | Upstream | 13 | 0 | 2 | 0 | 63 | 6 | 1 | 28 |
| 05318500 | Williams Creek below WWTP at Williams, MN | Downstream | 13 | 0 | 2 | 0 | 63 | 6 | 1 | 28 |
| | | | | | | | | | | |
| 05331005 | Mississippi River at Industrial Mollasses St. Paul, MN | Upstream | 36,951 | 6 | 6 | 0 | 20 | 14 | 45 | 9 |
| 05331400 | Mississippi River at South St. Paul, MN | Downstream | 36,955 | 6 | 6 | 0 | 20 | 14 | 45 | 9 |
| | | | | | | | | | | |
| 05337003 | Grindstone River above WWTP near Hinckley, MN | Upstream | 80 | | 4 | 0 | 40 | 32 | 3 | 19 |
| 05337005 | Grindstone River below Hinckley, MN | Downstream | 81 | 2 | 4 | 0 | 40 | 32 | 4 | 19 |
| | | | | | | | | | | |
| 05355260 | Mississippi River (Lake Pepin) above Lake City, MN | upstream | 47,320 | 5 | 6 | 0 | 25 | 15 | 39 | 9 |
| 05355331 | Mississippi River (Lake Pepin) at Mile 771 near Lake City, MN | Downstream | 47,327 | 5 | 6 | 0 | 25 | 15 | 39 | 9 |
| | | | | | | | | | | |
| 05372995 | South Fork Zumbro River at Rochester, MN | Upstream | 301 | 0 | 15 | 0 | 8 | 23 | 52 | 1 |
| 05373005 | South Fork Zumbro R. below WWTP near Rochester, MN | Downstream | 312 | 0 | 15 | 0 | 8 | 24 | 51 | 1 |
| | | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 05383820 | Spring Valley Creek above Spring Valley WWTP Outflow at Spring Valley, MN | Upstream | 16 | 0 | 11 | 0 | 2 | 6 | 81 | 0 |
| 05383822 | Spring Valley Creek below Spring Valley WWTP Outflow at Spring Valley, MN | Downstream | 16 | 0 | 11 | 0 | 2 | 6 | 81 | 0 |
| | | | | | | | | | | |
| 05455975 | Cedar River above Treatment Plant at Austin, MN | Upstream | 244 | 0 | 9 | 0 | 1 | 6 | 82 | 2 |
| 05455978 | Cedar River below Treatment Plant at Austin, MN | Downstream | 244 | 0 | 9 | 0 | 1 | 6 | 82 | 2 |
| | | | | | | | | | | |
| 05474883 | Okabena Creek above WWTP Outflow at Worthington, MN | Upstream | 3 | 0 | 66 | 0 | 0 | 3 | 30 | 1 |
| 05474884 | Okabena Creek below WWTP Outflow at Worthington, MN | Downstream | 6 | 0 | 46 | 0 | 0 | 3 | 49 | 1 |
| | | | | | | | | | | |
| 06483005 | Rock River above WWTP near Luverne, MN | Upstream | 419 | 0 | 6 | 0 | 1 | 17 | 76 | 1 |
| 06483010 | Rock River below WWTP near Luverne, MN | Downstream | 419 | 0 | 6 | 0 | 1 | 17 | 76 | 1 |

***Data Download Date: May 25th, 2010***

Basic measurments of water quality measured by the US Geological Survey.

[USGS, U.S. Geological Survey; mg/L, milligram per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius ($^{o}$C); $^{O}$F, degrees Farenheight; WE, waste effluent; WS, surface water; NTRU, nepholpmetric turbidity ratio units; ft3/s, cubic feet per second; mm/Hg, millimeters of mercury; WWTP, wastewater-treatment plant; -- not analyzed]

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Air pressure (mm/Hg) | Air temperat ($^{o}$C) | Instantaneous discharge (ft$^3$/s) |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 475504091545401 | 20090928 | 947 | 900964 | WS | 715 | 10.2 | -- |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 475436091522501 | 20090928 | 1109 | 900963 | WS | 715 | 12.1 | -- |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 04018765 | 20090929 | 1101 | 900956 | WS | 727 | -- | 0.03 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | 04018767 | 20090929 | 1022 | 900957 | WS | 727 | -- | 0.47 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 04024025 | 20091001 | 1308 | 1000003 | WS | 749 | 14 | 498 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 464523092065501 | 20091001 | 957 | 1000001 | WS | 749 | 10.2 | -- |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | 05040345 | 20091019 | 1314 | 1000019 | WS | 727 | 6.9 | 130 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | 05040540 | 20091019 | 1435 | 1000020 | WS | 727 | 6.9 | 122 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | 05082520 | 20091021 | 1104 | 1000021 | WS | 747 | -- | 4450 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | 475854097032001 | 20091021 | 1014 | 1000025 | WS | 747 | -- | 4450 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 05211020 | 20090930 | 1421 | 900958 | WS | 733 | 16.5 | 253 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 05211030 | 20090930 | 1241 | 900959 | WS | 733 | 12.5 | 266 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270181 | 20090916 | 1036 | 900925 | WS | 739 | 16.5 | 25 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270183 | 20090916 | 933 | 900926 | WS | 739 | 16.5 | 26 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 05270195 | 20090917 | 1007 | 900927 | WS | 738 | 22 | 34 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 05270197 | 20090917 | 915 | 900928 | WS | 738 | 17.8 | 34 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 05270845 | 20090915 | 1230 | 900929 | WS | 742 | 22.5 | 42 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 05270850 | 20090915 | 1045 | 900930 | WS | 742 | 22.9 | 46 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | 05274850 | 20090903 | 1046 | 900837 | WS | 742 | 20.5 | 0.6 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | 05274855 | 20090903 | 850 | 900836 | WS | 742 | 17 | 2.2 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | 05278080 | 20091008 | 935 | 1000008 | WS | 734 | 7.5 | 11 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | 05278083 | 20091008 | 850 | 1000009 | WS | 734 | 5.8 | 14 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 05278570 | 20090914 | 1215 | 900931 | WS | 742 | 30 | 21 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 05278580 | 20090914 | 1116 | 900932 | WS | 739 | 24 | 26 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | 05314985 | 20091123 | 1429 | 1000096 | WS | 730 | 10.3 | 44 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | 05314988 | 20091123 | 1323 | 1000097 | WS | 730 | 10 | 46 |

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Air pressure (mm/Hg) | Air temperat ($^{o}$C) | Instantaneous discharge ($ft^3/s$) |
|---|---|---|---|---|---|---|---|---|
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | 05315045 | 20091007 | 1108 | 1000010 | WS | 728 | 12 | 30 |
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | 05315050 | 20091007 | 1010 | 1000011 | WS | 728 | 11.5 | 30 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 05318170 | 20090909 | 946 | 900859 | WS | 737 | 22 | 0.36 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 05318171 | 20090909 | 843 | 900858 | WS | 737 | 19.5 | 1.6 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | 05318495 | 20091020 | 1112 | 1000022 | WS | 737 | 8.8 | 0.65 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | 05318500 | 20091020 | 1054 | 1000023 | WS | 737 | 8.8 | 0.58 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | 05331005 | 20090924 | 1357 | 900933 | WS | 750 | 26.5 | -- |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 05331400 | 20090924 | 1244 | 900934 | WS | 750 | 24.5 | 3540 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 05337003 | 20090902 | 1157 | 900834 | WS | 742 | 19 | 18 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 05337005 | 20090902 | 1005 | 900833 | WS | 742 | 18.5 | 19 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 05355260 | 20090923 | 953 | 900935 | WS | 749 | 20 | -- |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 05355331 | 20090923 | 835 | 900936 | WS | 749 | 4.9 | -- |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | 05372995 | 20090922 | 1119 | 900937 | WS | 737 |  | 59 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 05373005 | 20090922 | 949 | 900938 | WS | 737 | 17.5 | 61 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | 05383820 | 20090921 | 1059 | 900939 | WS | 728 | 18.8 | 3.5 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | 05383822 | 20090921 | 1020 | 900940 | WS | 728 | 17.6 | 4 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | 05455975 | 20090908 | 946 | 900856 | WS | 735 | 23 | 30 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 05455978 | 20090908 | 846 | 900855 | WS | 735 | 19.5 | 38 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 05474883 | 20090909 | 1841 | 900863 | WS | 737 | 28.5 | 0.13 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 05474884 | 20090909 | 1738 | 900862 | WS | 737 | 30 | 4.6 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | 06483005 | 20091006 | 940 | 1000012 | WS | 717 | 7.5 | 43 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | 06483010 | 20091006 | 827 | 1000013 | WS | 717 | 7.5 | 46 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 433838095344201 | 20090909 | 1606 | 900860 | WE | 737 | 31 | 3.2 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | 433847095330001 | 20090909 | 1711 | 900861 | WE | 737 | 27 | 2.3 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | 433856096115801 | 20091006 | 725 | 1000014 | WE | 717 | 8.5 | 0.77 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | 433913092581601 | 20090908 | 755 | 900854 | WE | 735 | 17 | 4.2 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | 434018094273301 | 20090909 | 755 | 900857 | WE | 737 | 19.5 | 1.9 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 434122092225001 | 20090921 | 944 | 900941 | WE | 728 | 17.9 | 0.3 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 440350092275501 | 20090922 | 843 | 900942 | WE | 737 | 16.2 | 22 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1230 | 1000098 | WE | 730 | 18.2 | -- |

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Air pressure (mm/Hg) | Air temperat ($^{o}$C) | Instantaneous discharge (ft$^{3}$/s) |
|---|---|---|---|---|---|---|---|---|
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | 442626092152201 | 20090923 | 749 | 900943 | WE | 749 | 19 | 1.1 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 442846095463201 | 20091007 | 917 | 1000015 | WE | 728 | 8.5 | 6.9 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | 445220094212201 | 20090914 | 1006 | 900944 | WE | 739 | 21.5 | 4 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | 445243094020301 | 20090915 | 849 | 900945 | WE | 742 | 20.5 | 0.21 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1046 | 900946 | WE | 750 | 23.5 | 258 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | 450833094311001 | 20091008 | 808 | 1000016 | WE | 734 | 9 | 2.4 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | 452559093345601 | 20090903 | 832 | 900835 | WE | 742 | 17 | 0.04 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | 454040094480701 | 20090917 | 833 | 900947 | WE | 738 | 16.1 | 3.7 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | 454308094562601 | 20090916 | 835 | 900948 | WE | 739 | 14.8 | 0.7 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | 460107092543101 | 20090902 | 850 | 900832 | WE | 742 | 18.5 | 0.74 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | 463408096052401 | 20091019 | 1146 | 1000024 | WE | 727 | 14.5 | 0.93 |
| WLSSD - WWTP AT DULUTH, MN | 464538092072601 | 20091001 | 815 | 1000002 | WE | 749 | 10.5 | -- |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | 471336093301801 | 20090930 | 932 | 900960 | WE | 733 | 3.7 | 13 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | 472737092324501 | 20090929 | 936 | 900961 | WE | 727 |  | 0.41 |
| ELY WWTP OUTFLOW AT ELY, MN | 475435091522601 | 20090928 | 1033 | 900962 | WE | 715 | 10.2 | 0.79 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 475834097032001 | 20091021 | 908 | 1000028 | WE | 747 | 2.7 | 1.7 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | 484627094570801 | 20091020 | 1039 | 1000026 | WE | 737 | 8.8 | 0.04 |

***Data Download Date: May 25th, 2010***

Basic measurments of water quality measured by the US G

[USGS, U.S. Geological Survey; mg/L, milligram per liter; µS/cm, microsiemens per c water; NTRU, nepholpmetric turbidity ratio units; ft3/s, cubic feet per second; mm/Hg,

| USGS station name | Dissolved oxygen (mg/L) | pH (standard units) | Specific conductance (µS/cm) | Water temperature($^{o}$C) | Turbidity (NTRU) |
|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 6.7 | 7.6 | 94 | 17.8 | 3.8 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 6.8 | 7.2 | 96 | 17.9 | 13 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 7.7 | 8 | 736 | 10.2 | 1 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | 7.7 | 7.3 | 582 | 16.6 | 7.5 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 8.3 | 7.8 | 248 | 15.6 | 5.5 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 7.4 | 7.6 | 544 | 16.3 | 6.8 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | 13.7 | 8.3 | 375 | 6.4 | 1 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | 13.7 | 8.4 | 373 | 6.3 | 0.8 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | 11.4 | 8.2 | 843 | 6.1 | 84 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | 11.4 | 8.1 | 838 | 6.1 | 63 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 7.6 | 7.9 | 297 | 16.8 | 1.1 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 7.6 | 8.1 | 322 | 17 | 1.4 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 5.6 | 7.9 | 422 | 18.8 | 17 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 4.7 | 7.7 | 469 | 17.8 | 16 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 6.3 | 8 | 537 | 21.2 | 19 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 4.5 | 7.7 | 712 | 20.5 | 14 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 7.8 | 8.1 | 793 | 19.7 | 8.6 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 7 | 8 | 773 | 19.2 | 12 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | 6.9 | 7.3 | 484 | 12 | 16 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | 5.3 | 7.1 | 662 | 14.9 | 15 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | 6.9 | 7.4 | 499 | 7.5 | 1.5 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | 6.9 | 7.5 | 680 | 9 | 4.2 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 5.6 | 8 | 673 | 22.5 | 21 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 6.4 | 7.9 | 903 | 21.6 | 12 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | 12.8 | 8.3 | 1100 | 6.5 | 2.4 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | 12.1 | 8.2 | 1130 | 6.4 | 2.7 |

| USGS station name | Dissolved oxygen (mg/L) | pH (standard units) | Specific conductance (µS/cm) | Water temperature($^{o}$C) | Turbidity (NTRU) |
|---|---|---|---|---|---|
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | 6.8 | 8.1 | 1480 | 9.2 | 7.1 |
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | 7.6 | 8.1 | 1640 | 9.3 | 6.7 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 5.9 | 7.8 | 1540 | 18.5 | 9.4 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 4.9 | 7 | 1290 | 18.9 | 5.7 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | 7.7 | 7.6 | 522 | 6.4 | 2.7 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | 7.9 | 7.5 | 543 | 7 | 2.5 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | 6.4 | 8.3 | 602 | 22.7 | 13 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 5.7 | 8.2 | 688 | 22.9 | 12 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 8.4 | 7.9 | 185 | 17.8 | 3.8 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 5.6 | 7.7 | 208 | 15.5 | 3.6 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 5.6 | 8.1 | 472 | 22.3 | 9.4 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 4.9 | 8.1 | 467 | 22.3 | 6.3 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | 5.9 | 7.7 | 670 | 19.8 | 15 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 6.2 | 6.9 | 1020 | 19.5 | 8.4 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | 10.6 | 7.8 | 613 | 14 | 1.5 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | 8.6 | 7.7 | 694 | 14.4 | 1.4 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | 7.5 | 8.1 | 446 | 18.3 | 4.2 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 5.5 | 7.8 | 512 | 17.4 | 5.1 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 10.8 | 7.8 | 1130 | 23.9 | 12 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 5.7 | 7.5 | 2600 | 26.4 | 12 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | 7.6 | 8.1 | 623 | 9.1 | 24 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | 8 | 8 | 658 | 9.3 | 24 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 6.9 | 7.3 | 2320 | 20.2 | 2.1 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | 5.2 | 7.4 | 3220 | 30.9 | 1.1 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | 6.5 | 7.4 | 1720 | 15.5 | 4.5 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | 6.9 | 7 | 1440 | 19.9 | 7.6 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | 6.3 | 6.7 | 1140 | 19.7 | 1.3 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 6.7 | 7.3 | 1190 | 18.8 | 0.8 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 6.2 | 6.2 | 1710 | 21.2 | 3 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 10.7 | 8.6 | 2300 | 6.2 | 18 |

| USGS station name | Dissolved oxygen (mg/L) | pH (standard units) | Specific conductance (µS/cm) | Water temperature($^{o}$C) | Turbidity (NTRU) |
|---|---|---|---|---|---|
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | 4.9 | 7.2 | 1500 | 22 | 3 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 6.7 | 7.4 | 3420 | 19.3 | 5.5 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | 7.2 | 7.7 | 2310 | 18.5 | 0.7 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | 6 | 7.8 | 2540 | 20.1 | 1.1 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 4.5 | 7 | 1420 | 22 | 1.5 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | 7.3 | 7.8 | 1890 | 19.7 | 0.5 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | 4.2 | 7 | 762 | 19.5 | 2 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | 6.1 | 7.1 | 2130 | 23.3 | 2.1 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | 7.6 | 7.3 | 2250 | 18 | 4.8 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | 7.5 | 7.2 | 1100 | 18.3 | 0.8 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | 5.6 | 7.7 | 2480 | 15.8 | 10 |
| WLSSD - WWTP AT DULUTH, MN | 3.4 | 7.2 | 1900 | 33.6 | 5.6 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | 2.6 | 8.1 | 1390 | 18.2 | 1.6 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | 7 | 7.1 | 575 | 17.4 | 8.7 |
| ELY WWTP OUTFLOW AT ELY, MN | 8.1 | 7.2 | 550 | 15.1 | 2.1 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 11.5 | 8.1 | 1340 | 6.1 | 7.4 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | 9.5 | 7.8 | 680 | 12.4 | 4.7 |

***Data Download Date: May 25th, 2010***

Concentrations of major ions and nutrients in water samples analyzed at the U.S. Geological Survey National Water Quality Laboratory

[mg/L, milligram per liter; <, less than; E, estimated; --, not analyzed; ENV, environmental sample; BLANK, blank sample for quality-assurance purposes; REPLICATE, replicate sample for quality-assurance purposes; WE, wastewater effluent; WS, surface water; OAQ, artificial blank water; WEQ, relicate of wastewater effluent sample; WWTP, wastewater-treatment plant].

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Sample medium | Chloride (mg/L) |
|---|---|---|---|---|---|---|---|
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 475436091522501 | 20090928 | 1109 | 900963 | ENV | WS | 6.25 |
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 475504091545401 | 20090928 | 947 | 900964 | ENV | WS | 5.93 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 04018765 | 20090929 | 1415 | 900109 | BLANK | OAQ | <0.12 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 04018765 | 20090929 | 1101 | 900956 | ENV | WS | 118 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | 04018767 | 20090929 | 1022 | 900957 | ENV | WS | 80.9 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 04024025 | 20091001 | 1308 | 1000003 | ENV | WS | 8.04 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 464523092065501 | 20091001 | 957 | 1000001 | ENV | WS | 36.5 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | 05040345 | 20091019 | 1314 | 1000019 | ENV | WS | 17.3 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | 05040540 | 20091019 | 1435 | 1000020 | ENV | WS | 13.6 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | 05082520 | 20091021 | 1104 | 1000021 | ENV | WS | 18.7 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | 475854097032001 | 20091021 | 1014 | 1000025 | ENV | WS | 18.6 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 05211020 | 20090930 | 1421 | 900958 | ENV | WS | 4.35 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 05211030 | 20090930 | 1241 | 900959 | ENV | WS | 9.48 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270181 | 20090916 | 1420 | 900101 | BLANK | OAQ | <0.12 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270181 | 20090916 | 1036 | 900925 | ENV | WS | 18.9 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270183 | 20090916 | 933 | 900926 | ENV | WS | 26.8 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 05270195 | 20090917 | 1007 | 900927 | ENV | WS | 30.1 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 05270197 | 20090917 | 915 | 900928 | ENV | WS | 67.4 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 05270845 | 20090915 | 1230 | 900929 | ENV | WS | 43.1 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 05270850 | 20090915 | 1045 | 900930 | ENV | WS | 41.7 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | 05274850 | 20090903 | 1046 | 900837 | ENV | WS | 30.4 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | 05274855 | 20090903 | 850 | 900836 | ENV | WS | 80.8 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | 05278080 | 20091008 | 935 | 1000008 | ENV | WS | 22.1 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | 05278083 | 20091008 | 1200 | 1000001 | BLANK | OAQ | <0.12 |

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Sample medium | Chloride (mg/L) |
|---|---|---|---|---|---|---|---|
| JEWITTS CREEK NEAR LITCHFIELD, MN | 05278083 | 20091008 | 850 | 1000009 | ENV | WS | 64 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 05278570 | 20090914 | 1215 | 900931 | ENV | WS | 24.3 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 05278580 | 20090914 | 1116 | 900932 | ENV | WS | 66.9 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | 05314985 | 20091123 | 1429 | 1000096 | ENV | WS | 20.8 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | 05314988 | 20091123 | 1323 | 1000097 | ENV | WS | 24.3 |
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | 05315045 | 20091007 | 1108 | 1000010 | ENV | WS | 58.2 |
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | 05315050 | 20091007 | 1010 | 1000011 | ENV | WS | 93.1 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 05318170 | 20090909 | 946 | 900859 | ENV | WS | 39.8 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 05318171 | 20090909 | 843 | 900858 | ENV | WS | 173 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | 05318495 | 20091020 | 1112 | 1000022 | ENV | WS | 5.58 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | 05318500 | 20091020 | 1054 | 1000023 | ENV | WS | 6.24 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | 05331005 | 20090924 | 1357 | 900933 | ENV | WS | 36.2 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 05331400 | 20090924 | 1244 | 900934 | ENV | WS | 53.5 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 05337003 | 20090902 | 1157 | 900834 | ENV | WS | 5.72 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 05337005 | 20090902 | 1005 | 900833 | ENV | WS | 10.5 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 05355260 | 20090923 | 953 | 900935 | ENV | WS | 28.7 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 05355331 | 20090923 | 835 | 900936 | ENV | WS | 43 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | 05372995 | 20090922 | 1119 | 900937 | ENV | WS | 51.5 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 05373005 | 20090922 | 1430 | 900103 | BLANK | OAQ | <0.12 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 05373005 | 20090922 | 949 | 900938 | ENV | WS | 135 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | 05383820 | 20090921 | 1059 | 900939 | ENV | WS | 20.5 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | 05383822 | 20090921 | 1020 | 900940 | ENV | WS | 40.1 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | 05455975 | 20090908 | 946 | 900856 | ENV | WS | 19.1 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 05455978 | 20090908 | 846 | 900855 | ENV | WS | 45.8 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 05474883 | 20090909 | 1841 | 900863 | ENV | WS | 129 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 05474884 | 20090909 | 1738 | 900862 | ENV | WS | 376 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | 06483005 | 20091006 | 940 | 1000012 | ENV | WS | 17.8 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | 06483010 | 20091006 | 827 | 1000013 | ENV | WS | 26.3 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 433838095344201 | 20090910 | 630 | 900091 | BLANK | OAQ | <0.12 |

| USGS station name | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Type | Sample medium | Chloride (mg/L) |
|---|---|---|---|---|---|---|---|
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 433838095344201 | 20090909 | 1606 | 900860 | ENV | WE | 415 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | 433847095330001 | 20090909 | 1711 | 900861 | ENV | WE | 413 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | 433856096115801 | 20091006 | 725 | 1000014 | ENV | WE | 293 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | 433913092581601 | 20090908 | 755 | 900854 | ENV | WE | 237 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | 434018094273301 | 20090909 | 755 | 900857 | ENV | WE | 218 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 434122092225001 | 20090921 | 944 | 900941 | ENV | WE | 181 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 440350092275501 | 20090922 | 843 | 900942 | ENV | WE | 289 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1800 | 1000010 | BLANK | OAQ | <0.12 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1230 | 1000098 | ENV | WE | 391 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1235 | 1000008 | REPLICATE | WEQ | 392 |
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | 442626092152201 | 20090923 | 749 | 900943 | ENV | WE | 270 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 442846095463201 | 20091007 | 917 | 1000015 | ENV | WE | 498 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | 445220094212201 | 20090914 | 1006 | 900944 | ENV | WE | 344 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | 445243094020301 | 20090915 | 849 | 900945 | ENV | WE | 523 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1046 | 900946 | ENV | WE | 250 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1051 | 900106 | REPLICATE | WEQ | 249 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | 450833094311001 | 20091008 | 808 | 1000016 | ENV | WE | 319 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | 452559093345601 | 20090903 | 832 | 900835 | ENV | WE | 137 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | 454040094480701 | 20090917 | 833 | 900947 | ENV | WE | 415 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | 454308094562601 | 20090916 | 835 | 900948 | ENV | WE | 478 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | 460107092543101 | 20090902 | 850 | 900832 | ENV | WE | 254 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | 463408096052401 | 20091019 | 1146 | 1000024 | ENV | WE | 441 |
| WLSSD - WWTP AT DULUTH, MN | 464538092072601 | 20091001 | 815 | 1000002 | ENV | WE | 190 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | 471336093301801 | 20090930 | 932 | 900960 | ENV | WE | 76.3 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | 472737092324501 | 20090929 | 936 | 900961 | ENV | WE | 76 |
| ELY WWTP OUTFLOW AT ELY, MN | 475435091522601 | 20090928 | 1033 | 900962 | ENV | WE | 61.7 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 475834097032001 | 20091021 | 908 | 1000028 | ENV | WE | 71.6 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | 484627094570801 | 20091020 | 1039 | 1000026 | ENV | WE | 32.2 |

***Data Download Date: May 25th, 2010***

Concentrations of major ions and nutrients in water samp.

[mg/L, milligram per liter; <, less than; E, estimated; --, not analyzed; ENV, environmental s
WE, wastewater effluent; WS, surface water; OAQ, artificial blank water; WEQ, relicate of wa

| USGS station name | Sulfate (mg/L) | Ammonia plus organic nitrogen filtered (mg/l as nitrogen) | Ammonia plus organic nitrogen unfiltered (mg/l as nitrogen) | Dissolved ammonia (mg/L as nitrogen) | Dissolved nitrite plus nitrate (mg/L as nitrogen) | Dissolved nitrite (mg/L as nitrogen) | Dissolved orthophosphate (mg/L as phosphorus) | Total phosphorus filtered (mg/L) | Total phosphorus unfiltered (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 4.46 | 0.35 | 1.4 | 0.097 | <0.04 | E0.001 | 0.009 | 0.014 | 0.352 |
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 4.24 | 0.29 | 0.47 | <0.02 | <0.04 | <0.002 | <0.008 | E0.004 | 0.023 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | <0.18 | <0.1 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 25.6 | 0.38 | 0.41 | <0.02 | 0.19 | 0.009 | 0.031 | 0.04 | 0.049 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | 52.1 | 1.1 | 2.1 | 0.131 | 12.7 | 0.012 | 0.128 | 0.159 | 0.522 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 19.9 | 0.61 | 0.63 | E0.012 | E0.04 | <0.002 | E0.007 | 0.019 | 0.04 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 54.7 | 1.8 | 1.9 | 0.892 | 0.31 | 0.034 | 0.024 | 0.094 | 0.128 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | 12.2 | 0.67 | 0.77 | 0.064 | E0.04 | 0.003 | 0.063 | 0.069 | 0.084 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | 11.3 | 0.6 | 0.69 | E0.013 | E0.04 | E0.001 | 0.009 | E0.003 | 0.012 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | 213 | 0.89 | 1 | <0.02 | 0.68 | 0.013 | 0.144 | 0.163 | 0.309 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | 210 | 0.77 | 1 | <0.02 | 0.68 | 0.012 | 0.144 | 0.163 | 0.269 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 7.25 | 0.55 | 0.65 | <0.02 | <0.04 | E0.002 | E0.008 | 0.013 | 0.026 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 18.4 | 0.63 | 0.72 | 0.046 | E0.04 | 0.006 | 0.012 | 0.024 | 0.036 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <0.18 | E0.07 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 19.4 | 0.75 | 1.7 | <0.02 | 0.13 | 0.007 | E0.007 | 0.01 | 0.107 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 20.1 | 0.78 | 1.7 | <0.02 | 0.74 | 0.03 | E0.007 | 0.009 | 0.105 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 26 | 0.75 | 1.7 | 0.048 | 1.16 | 0.043 | E0.008 | 0.014 | 0.133 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 32 | 0.99 | 1.7 | 0.031 | 4.3 | 0.136 | E0.008 | 0.081 | 0.223 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 77.8 | 0.92 | 1.2 | <0.02 | 1.32 | 0.016 | 0.111 | 0.131 | 0.225 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 74 | 0.92 | 1.4 | <0.02 | 1.22 | 0.024 | 0.116 | 0.143 | 0.248 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | 6.04 | 0.85 | 1 | 0.321 | 1.11 | 0.044 | 0.009 | 0.007 | 0.071 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | 24.9 | 0.99 | 1.4 | 0.362 | 0.57 | 0.027 | 0.166 | 0.186 | 0.347 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | 35.4 | 0.89 | 1.1 | E0.013 | 0.56 | 0.011 | 0.059 | 0.077 | 0.098 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | <0.18 | E0.05 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |

| USGS station name | Sulfate (mg/L) | Ammonia plus organic nitrogen filtered (mg/l as nitrogen) | Ammonia plus organic nitrogen unfiltered (mg/l as nitrogen) | Dissolved ammonia (mg/L as nitrogen) | Dissolved nitrite plus nitrate (mg/L as nitrogen) | Dissolved nitrite (mg/L as nitrogen) | Dissolved orthophosphate (mg/L as phosphorus) | Total phosphorus filtered (mg/L) | Total phosphorus unfiltered (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| JEWITTS CREEK NEAR LITCHFIELD, MN | 44.8 | 0.95 | 1.2 | 0.065 | 2.83 | 0.03 | 0.051 | 0.072 | 0.107 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 91 | 0.92 | 1.6 | 0.113 | 0.22 | 0.027 | 0.051 | 0.083 | 0.254 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 109 | 1 | 1.5 | 0.114 | 3.42 | 0.03 | 0.227 | 0.256 | 0.39 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | 309 | 0.54 | 0.65 | E0.013 | 2.66 | 0.012 | E0.005 | E0.005 | 0.019 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | 317 | 0.57 | 0.69 | E0.011 | 2.59 | 0.012 | 0.011 | 0.015 | 0.035 |
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | 507 | 0.48 | 0.63 | 0.028 | 1.22 | 0.021 | 0.838 | 0.858 | 0.936 |
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | 553 | 0.56 | 0.68 | E0.016 | 2.5 | 0.014 | 1.24 | 1.19 | 1.26 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 573 | 1.1 | 1.3 | 0.083 | 0.44 | 0.041 | 0.12 | 0.234 | 0.279 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 202 | 1.1 | 1.2 | 0.121 | 15.4 | 0.097 | 0.469 | 0.523 | 0.575 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | 3.27 | 0.37 | 0.38 | <0.02 | 0.09 | 0.007 | E0.007 | E0.005 | 0.017 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | 3.58 | 0.41 | 0.41 | <0.02 | 0.37 | 0.007 | 0.014 | 0.012 | 0.032 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | 50.6 | 0.63 | 1 | 0.081 | 0.4 | 0.019 | 0.015 | 0.031 | 0.11 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 53 | 0.94 | 1.4 | 0.187 | 1.66 | 0.038 | E0.007 | 0.04 | 0.123 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 2.11 | 0.54 | 0.56 | <0.02 | E0.03 | 0.002 | 0.017 | 0.025 | 0.039 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 2.55 | 0.56 | 0.6 | <0.02 | 0.23 | 0.004 | 0.025 | 0.035 | 0.048 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 31.7 | 0.83 | 1.1 | 0.021 | 0.21 | 0.026 | 0.108 | 0.176 | 0.246 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 30.9 | 0.9 | 1.1 | 0.218 | 1.03 | 0.076 | 0.171 | 0.197 | 0.251 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | 32.9 | 0.44 | 0.75 | <0.02 | 0.86 | 0.03 | E0.005 | 0.029 | 0.104 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | <0.18 | <0.1 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 46.3 | 0.65 | 0.9 | 0.083 | 6.97 | 0.027 | 0.185 | 0.213 | 0.353 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | 23.6 | 0.18 | 0.25 | <0.02 | 8.93 | 0.035 | 0.018 | 0.017 | 0.026 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | 26.7 | 0.29 | 0.38 | <0.02 | 9.99 | 0.041 | 0.626 | 0.639 | 0.648 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | 25.2 | 0.32 | 0.63 | E0.016 | 0.47 | 0.018 | E0.005 | 0.011 | 0.069 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 26.8 | 0.57 | 1.1 | 0.041 | 7.17 | 0.033 | 0.718 | 0.747 | 0.882 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 151 | 0.39 | 0.51 | <0.02 | 1.07 | 0.015 | E0.004 | 0.009 | 0.036 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 235 | 0.9 | 1.2 | 0.063 | 79.1 | 0.052 | 0.244 | 0.263 | 0.419 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | 72.4 | 0.44 | 0.64 | 0.033 | 1.94 | 0.016 | 0.018 | 0.03 | 0.081 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | 70.7 | 0.45 | 0.67 | <0.02 | 2.53 | 0.017 | 0.094 | 0.129 | 0.184 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | <0.18 | E0.07 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |

| USGS station name | Sulfate (mg/L) | Ammonia plus organic nitrogen filtered (mg/l as nitrogen) | Ammonia plus organic nitrogen unfiltered (mg/l as nitrogen) | Dissolved ammonia (mg/L as nitrogen) | Dissolved nitrite plus nitrate (mg/L as nitrogen) | Dissolved nitrite (mg/L as nitrogen) | Dissolved orthophosphate (mg/L as phosphorus) | Total phosphorus filtered (mg/L) | Total phosphorus unfiltered (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 312 | 0.91 | 0.99 | 0.047 | 22.5 | 0.006 | 0.238 | 0.26 | 0.469 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | 173 | 0.96 | 1.1 | 0.041 | 170 | 0.003 | 0.281 | 0.321 | 0.396 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | 95.2 | 1.5 | 2.2 | 0.307 | 20.4 | 0.022 | 2.97 | 2.83 | 3.02 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | 40.4 | 1.9 | 2.4 | 0.352 | 50.5 | 0.115 | 5.59 | 5.43 | 5.85 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | 42.4 | 1.1 | 1.2 | 0.219 | 20.5 | 0.094 | 0.606 | 0.654 | 0.722 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 49.8 | 0.91 | 1.1 | 0.038 | 17.5 | 0.02 | 4.85 | 4.71 | 4.75 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 84.9 | 0.97 | 1.3 | 0.075 | 20.2 | E0.002 | 0.572 | 0.621 | 0.959 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.18 | <0.1 | <0.1 | <0.02 | <0.04 | <0.002 | <0.008 | <0.006 | <0.008 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 363 | 3.3 | 6 | 1.03 | 0.83 | 0.134 | 1.41 | 1.43 | 1.88 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 363 | 3.3 | 5.9 | 0.881 | 0.82 | 0.131 | 1.37 | 1.4 | 1.85 |
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | 28.1 | 2.1 | 2.4 | 0.685 | 13.9 | 1.09 | 0.218 | 0.321 | 0.51 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 1050 | 1.3 | 1.8 | 0.023 | 17.3 | 0.01 | 8.7 | 7.9 | 8.41 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | 211 | 0.8 | 0.91 | 0.026 | 23.9 | 0.016 | 1.52 | 1.4 | 1.45 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | 54.7 | 1.2 | 1.1 | <0.02 | 9.65 | 0.004 | 1.88 | 1.76 | 1.75 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 71.9 | 2.5 | 2.6 | 1.25 | 17 | 0.153 | 0.09 | 0.16 | 0.24 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 71.7 | 2.6 | 2.6 | 1.28 | 17.4 | 0.15 | 0.098 | 0.157 | 0.238 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | 104 | 0.88 | 0.95 | <0.02 | 18.7 | 0.003 | 0.081 | 0.086 | 0.102 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | 44.1 | 0.94 | 1.4 | 0.053 | 0.07 | 0.006 | 0.23 | 0.289 | 0.433 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | 94 | 1.4 | 1.6 | 0.206 | 30.7 | 0.045 | 0.777 | 0.758 | 1.02 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | 45.1 | 5 | 6.2 | 3.87 | 19.7 | 0.665 | 0.065 | 0.102 | 0.384 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | 19.7 | 0.8 | 0.94 | 0.101 | 8.71 | 0.193 | 0.38 | 0.413 | 0.477 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | 87.9 | 9.9 | 11 | 7.4 | 0.06 | 0.019 | 7.84 | 7.75 | 8.12 |
| WLSSD - WWTP AT DULUTH, MN | 288 | 9.3 | 10 | 7.87 | <0.04 | 0.004 | 0.281 | 0.487 | 0.567 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | 160 | 1.7 | 1.8 | 0.546 | 0.08 | 0.034 | 0.048 | 0.108 | 0.114 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | 55.3 | 1.2 | 2.2 | 0.157 | 14.2 | 0.005 | 0.137 | 0.17 | 0.745 |
| ELY WWTP OUTFLOW AT ELY, MN | 44.9 | 13 | 14 | 13.2 | 0.21 | 0.059 | E0.006 | 0.017 | 0.079 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 354 | 7.2 | 7.1 | 4.96 | 0.13 | 0.05 | 1.83 | 1.87 | 1.97 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | 19 | 0.81 | 0.98 | E0.011 | 11.8 | 0.004 | 0.515 | 0.519 | 0.718 |

***Data Download Date: May 25th, 2010***

Concentrations of pharmaceutical compoounds in water samples analyzed at the U.S. Geological Survey National Water Quality Laborat

[All concentrations are in µg/L, micrograms per liter; <, less than; E, estimated; --, not analyzed; ENV, environmental sample; BLANK, blank sample for quality-assurance purposes; REPLICATE, replicate sample for quality-relicate of wastewater effluent sample; WWTP, wastewater-treatment plant].

| Data Download Date: May 25th, 2010 | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Medium | Sample Type | Thiabendazole |
|---|---|---|---|---|---|---|---|
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 475436091522501 | 20090928 | 1109 | 900963 | WS | ENV | <0.06 |
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 475504091545401 | 20090928 | 947 | 900964 | WS | ENV | <0.06 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | 04018765 | 20090929 | 1101 | 900956 | WS | ENV | <0.06 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | 04018767 | 20090929 | 1022 | 900957 | WS | ENV | <0.06 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 04024025 | 20091001 | 1308 | 1000003 | WS | ENV | <0.06 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | 05040345 | 20091019 | 1314 | 1000019 | WS | ENV | <0.06 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | 05040540 | 20091019 | 1435 | 1000020 | WS | ENV | <0.06 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | 05082520 | 20091021 | 1104 | 1000021 | WS | ENV | <0.06 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | 0475854097032001 | 20091021 | 1014 | 1000025 | WS | ENV | <0.06 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 05211030 | 20090930 | 1241 | 900959 | WS | ENV | <0.06 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270181 | 20090916 | 1036 | 900925 | WS | ENV | <0.06 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 05270183 | 20090916 | 933 | 900926 | WS | ENV | <0.06 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 05270195 | 20090917 | 1007 | 900927 | WS | ENV | <0.06 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 05270197 | 20090917 | 1315 | 900102 | OAQ | BLANK | <0.06 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 05270197 | 20090917 | 915 | 900928 | WS | ENV | <0.06 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 05270845 | 20090915 | 1230 | 900929 | WS | ENV | <0.06 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 05270850 | 20090915 | 1045 | 900930 | WS | ENV | <0.06 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | 05274850 | 20090903 | 1046 | 900837 | WS | ENV | <0.06 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | 05274855 | 20090903 | 850 | 900836 | WS | ENV | <0.06 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | 05278080 | 20091008 | 935 | 1000008 | WS | ENV | <0.06 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | 05278083 | 20091008 | 850 | 1000009 | WS | ENV | <0.06 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 05278570 | 20090914 | 1215 | 900931 | WS | ENV | <0.06 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 05278580 | 20090914 | 1116 | 900932 | WS | ENV | <0.06 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | 05314985 | 20091123 | 1429 | 1000096 | WS | ENV | <0.06 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | 05314988 | 20091123 | 1323 | 1000097 | WS | ENV | <0.06 |
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | 05315045 | 20091007 | 1108 | 1000010 | WS | ENV | <0.06 |

| Data Download Date: May 25th, 2010 | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Medium | Sample Type | Thiabendazole |
|---|---|---|---|---|---|---|---|
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | 05315050 | 20091007 | 1010 | 1000011 | WS | ENV | <0.06 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 05318170 | 20090909 | 946 | 900859 | WS | ENV | <0.06 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 05318171 | 20090909 | 843 | 900858 | WS | ENV | <0.06 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | 05318495 | 20091020 | 1112 | 1000022 | WS | ENV | <0.06 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | 05318500 | 20091020 | 1054 | 1000023 | WS | ENV | <0.06 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | 05331005 | 20090924 | 1357 | 900933 | WS | ENV | <0.06 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 05331400 | 20090924 | 1244 | 900934 | WS | ENV | <0.06 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 05337003 | 20090902 | 1157 | 900834 | WS | ENV | <0.06 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 05337005 | 20090902 | 1005 | 900833 | WS | ENV | <0.06 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 05355260 | 20090923 | 953 | 900935 | WS | ENV | <0.06 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 05355331 | 20090923 | 835 | 900936 | WS | ENV | <0.06 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | 05372995 | 20090922 | 1119 | 900937 | WS | ENV | <0.06 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | 05373005 | 20090922 | 949 | 900938 | WS | ENV | <0.06 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | 05383820 | 20090921 | 1059 | 900939 | WS | ENV | <0.06 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | 05383822 | 20090921 | 1020 | 900940 | WS | ENV | <0.06 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | 05455975 | 20090908 | 946 | 900856 | WS | ENV | <0.06 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 05455978 | 20090908 | 1400 | 900090 | OAQ | BLANK | <0.06 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | 05455978 | 20090908 | 846 | 900855 | WS | ENV | <0.06 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 05474883 | 20090909 | 1841 | 900863 | WS | ENV | <0.06 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 05474884 | 20090909 | 1738 | 900862 | WS | ENV | <0.06 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | 06483005 | 20091006 | 940 | 1000012 | WS | ENV | <0.06 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | 06483010 | 20091006 | 827 | 1000013 | WS | ENV | <0.06 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | 433838095344201 | 20090909 | 1606 | 900860 | WE | ENV | <0.06 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | 433847095330001 | 20090909 | 1711 | 900861 | WE | ENV | <0.06 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | 433856096115801 | 20091006 | 725 | 1000014 | WE | ENV | <0.06 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | 433913092581601 | 20090908 | 755 | 900854 | WE | ENV | <0.06 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | 434018094273301 | 20090909 | 755 | 900857 | WE | ENV | <0.06 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 434122092225001 | 20090921 | 1515 | 900104 | OAQ | BLANK | <0.06 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | 434122092225001 | 20090921 | 944 | 900941 | WE | ENV | <0.06 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 440350092275501 | 20090922 | 843 | 900942 | WE | ENV | <0.06 |

| Data Download Date: May 25th, 2010 | USGS station number | Date (yyyymmdd) | Time | Sample Record Number | Sample Medium | Sample Type | Thiabendazole |
|---|---|---|---|---|---|---|---|
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | 440350092275501 | 20090922 | 853 | 900111 | WEQ | SPIKE | <0.06 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1730 | 1000009 | OAQ | BLANK | <0.06 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1230 | 1000098 | WE | ENV | <0.06 |
| LYND WWTP OUTFLOW NEAR LYND, MN | 442415095523001 | 20091123 | 1235 | 1000008 | WEQ | REPLICATE | <0.06 |
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | 442626092152201 | 20090923 | 749 | 900943 | WE | ENV | <0.06 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 442846095463201 | 20091007 | 1415 | 1000002 | OAQ | BLANK | <0.06 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | 442846095463201 | 20091007 | 917 | 1000015 | WE | ENV | <0.06 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | 445220094212201 | 20090914 | 1006 | 900944 | WE | ENV | <0.06 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | 445243094020301 | 20090915 | 849 | 900945 | WE | ENV | <0.06 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1046 | 900946 | WE | ENV | <0.06 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1047 | 900105 | WEQ | REPLICATE | E0.025 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1051 | 900106 | WEQ | REPLICATE | <0.06 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | 450833094311001 | 20091008 | 808 | 1000016 | WE | ENV | <0.06 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | 452559093345601 | 20090903 | 832 | 900835 | WE | ENV | <0.06 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | 454040094480701 | 20090917 | 833 | 900947 | WE | ENV | <0.06 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | 454308094562601 | 20090916 | 835 | 900948 | WE | ENV | <0.06 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | 460107092543101 | 20090902 | 850 | 900832 | WE | ENV | <0.06 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | 463408096052401 | 20091019 | 1146 | 1000024 | WE | ENV | <0.06 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 464523092065501 | 20091001 | 957 | 1000001 | WS | ENV | <0.06 |
| WLSSD - WWTP AT DULUTH, MN | 464538092072601 | 20091001 | 815 | 1000002 | WE | ENV | <0.06 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | 471336093301801 | 20090930 | 932 | 900960 | WE | ENV | <0.06 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | 472737092324501 | 20090929 | 936 | 900961 | WE | ENV | <0.06 |
| ELY WWTP OUTFLOW AT ELY, MN | 475435091522601 | 20090928 | 1800 | 900110 | OAQ | BLANK | <0.06 |
| ELY WWTP OUTFLOW AT ELY, MN | 475435091522601 | 20090928 | 1033 | 900962 | WE | ENV | <0.06 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 475834097032001 | 20091022 | 1000 | 1000003 | OAQ | BLANK | <0.06 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | 475834097032001 | 20091021 | 908 | 1000028 | WE | ENV | <0.06 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | 484627094570801 | 20091020 | 1039 | 1000026 | WE | ENV | <0.06 |

***Data Download Date: May 25th, 2010***

Concentrations of pharmaceutical compoounds in water ɔry.

[All concentrations are in µg/L, micrograms per liter; <, less than; E, estimated; --, not analyzassurance purposes; SPIKE, spike sample for quality-assurance purposes; WE, wastewater effluent; WS, surface water; OAQ, a relicate of wastewater effluent sample; WWTP, wastewater-treatment plant].

| Data Download Date: May 25th, 2010 | 1,7-Dimethylxanthine | Acetaminophen | Albuterol | Caffeine | Carbamazepine | Codeine | Cotinine | Dehydronifedipine |
|---|---|---|---|---|---|---|---|---|
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <0.12 | <0.08 | <0.06 | E0.072 | <0.04 | <0.04 | <0.026 | <0.08 |
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <0.12 | <0.08 | <0.06 | E0.033 | <0.04 | <0.04 | <0.026 | <0.08 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | E0.073 | <0.08 | <0.06 | 1.080 | <0.04 | E0.006 | E0.017 | <0.08 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | <0.12 | <0.08 | <0.06 | E0.101 | 0.064 | <0.04 | <0.026 | <0.08 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | <0.1 | <0.12 | <0.08 | E0.014 | <0.06 | <0.046 | <0.038 | <0.08 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | <0.1 | <0.12 | <0.08 | E0.016 | <0.06 | <0.046 | <0.038 | <0.08 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | <0.1 | E0.019 | <0.08 | E0.058 | <0.06 | <0.046 | <0.038 | <0.08 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.002 | <0.04 | <0.026 | <0.08 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | <0.12 | <0.08 | <0.06 | E0.017 | <0.04 | <0.04 | <0.026 | <0.08 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <0.12 | <0.08 | <0.06 | E0.017 | E0.003 | <0.04 | <0.026 | <0.08 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.005 | <0.04 | <0.026 | <0.08 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | <0.1 | <0.12 | <0.08 | <0.06 | E0.006 | <0.046 | <0.038 | <0.08 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.007 | <0.04 | <0.026 | <0.08 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |

| Data Download Date: May 25th, 2010 | 1,7-Dimethylxanthine | Acetaminophen | Albuterol | Caffeine | Carbamazepine | Codeine | Cotinine | Dehydronifedipine |
|---|---|---|---|---|---|---|---|---|
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | <0.1 | <0.12 | <0.08 | E0.024 | E0.009 | <0.046 | <0.038 | <0.08 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.105 | <0.04 | <0.026 | <0.08 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | <0.1 | <0.12 | <0.08 | E0.051 | E0.055 | <0.046 | <0.038 | <0.08 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | <0.1 | <0.12 | <0.08 | E0.051 | 0.070 | <0.046 | <0.038 | <0.08 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <0.12 | <0.08 | <0.06 | E0.022 | E0.021 | <0.04 | <0.026 | <0.08 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <0.12 | <0.08 | <0.06 | <0.2 | E0.003 | <0.04 | <0.026 | <0.08 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | <0.12 | <0.08 | <0.06 | E0.125 | <0.04 | <0.04 | E0.019 | <0.08 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | <0.12 | <0.08 | <0.06 | E0.035 | 0.071 | <0.04 | <0.026 | <0.08 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.073 | <0.04 | <0.026 | <0.08 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | <0.12 | <0.08 | <0.06 | E0.017 | <0.04 | <0.04 | <0.026 | <0.08 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | <0.12 | <0.08 | <0.06 | E0.079 | E0.023 | E0.013 | <0.026 | <0.08 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.044 | <0.04 | <0.026 | <0.08 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.102 | <0.04 | <0.026 | <0.08 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | <0.1 | <0.12 | <0.08 | 0.338 | 0.089 | 0.056 | 0.056 | <0.08 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | <0.12 | <0.08 | <0.06 | 0.332 | 0.050 | 0.056 | <0.026 | <0.08 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.137 | <0.04 | <0.026 | <0.08 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.393 | <0.04 | <0.026 | <0.08 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.111 | <0.04 | <0.026 | <0.08 |

| Data Download Date: May 25th, 2010 | 1,7-Dimethylxanthine | Acetaminophen | Albuterol | Caffeine | Carbamazepine | Codeine | Cotinine | Dehydronifedipine |
|---|---|---|---|---|---|---|---|---|
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | E0.077 | E0.015 | E0.029 | E0.113 | 0.229 | 0.133 | 0.086 | 0.150 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.1 | <0.12 | <0.08 | 0.081 | <0.06 | <0.046 | <0.038 | <0.08 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.1 | <0.12 | <0.08 | 0.084 | <0.06 | <0.046 | <0.038 | <0.08 |
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.017 | 0.079 | 0.036 | <0.08 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | <0.1 | <0.12 | <0.08 | <0.06 | 0.072 | E0.022 | <0.038 | <0.08 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.075 | <0.04 | <0.026 | <0.08 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.187 | <0.04 | <0.026 | <0.08 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.099 | 0.071 | <0.026 | E0.004 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <0.12 | E0.033 | E0.057 | E0.142 | 0.164 | 0.184 | 0.093 | 0.168 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.097 | 0.068 | <0.026 | E0.004 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | <0.1 | <0.12 | <0.08 | <0.06 | 0.09 | <0.046 | <0.038 | <0.08 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.008 | <0.04 | <0.026 | <0.08 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.02 | <0.04 | <0.026 | <0.08 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | <0.12 | <0.08 | <0.06 | 0.261 | 0.202 | <0.04 | 0.042 | <0.08 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.135 | <0.04 | <0.026 | <0.08 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | E0.082 | <0.12 | <0.08 | 0.665 | <0.06 | E0.016 | E0.048 | <0.08 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 0.137 | <0.08 | <0.06 | 0.769 | E0.003 | <0.04 | 0.070 | <0.08 |
| WLSSD - WWTP AT DULUTH, MN | 0.464 | <0.08 | <0.06 | E9 | <0.04 | <0.04 | 0.220 | <0.08 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | <0.12 | <0.08 | <0.06 | <0.2 | E0.028 | <0.04 | E0.009 | <0.08 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | <0.12 | <0.08 | <0.06 | <0.2 | 0.088 | <0.04 | <0.026 | <0.08 |
| ELY WWTP OUTFLOW AT ELY, MN | <0.12 | <0.08 | <0.06 | <0.2 | <0.04 | <0.04 | <0.026 | <0.08 |
| ELY WWTP OUTFLOW AT ELY, MN | E4.32 | <0.08 | <0.06 | E11.5 | 0.079 | 0.051 | <0.026 | E0.004 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | <0.1 | <0.12 | <0.08 | <0.06 | <0.06 | <0.046 | <0.038 | <0.08 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | <0.1 | <0.12 | <0.08 | <0.06 | E0.007 | <0.046 | <0.038 | <0.08 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | <0.1 | <0.12 | <0.08 | <0.06 | 0.348 | <0.046 | <0.038 | <0.08 |

***Data Download Date: May 25th, 2010***

Concentrations of pharmaceutical compoounds in water s

[All concentrations are in µg/L, micrograms per liter; <, less than; E, estimated; --, not analyzrtificial blank water; WEQ, relicate of wastewater effluent sample; WWTP, wastewater-treatment plant].

| Data Download Date: May 25th, 2010 | Diltiazem | Diphenhydramine | Sulfamethoxazole | Trimethoprim | Warfarin | Sample volume (ml) | Carbamazepine-d10, surrogate (percent recovery) | Ethyl nicotinate-d4 surrogate (percent recovery) |
|---|---|---|---|---|---|---|---|---|
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 873 | 49.1 | 73.4 |
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 886 | 54.7 | 70.3 |
| ELBOW CREEK ABOVE EVELETH WWTP AT EVELETH, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 874 | 31.4 | 61 |
| ELBOW CREEK BELOW EVELETH WWTP AT EVELETH, MN | E0.025 | E0.03 | E0.029 | 0.233 | <0.1 | 888 | 25.6 | 57.4 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 855 | 37.7 | 64.4 |
| PELICAN RIVER BELOW WWTP AT PELICAN RAPIDS, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 867 | 29.5 | 35.1 |
| PELICAN RIVER ABOVE WWTP AT PELICAN RAPIDS, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 885 | 57.8 | 84.5 |
| RED RIVER OF THE NORTH ABV WWTP FOR EAST GRAND FKS | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 871 | 42.6 | 59.9 |
| RED R. OF THE NORTH BELOW WWTP AT EAST GRAND FORKS | <0.06 | <0.036 | E0.004 | <0.034 | <0.08 | 765 | 48.9 | 64.5 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 853 | 43 | 67.7 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 988 | 46.8 | 71.8 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <0.08 | <0.04 | E0.007 | <0.02 | <0.1 | 952 | 45.9 | 69.8 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | <0.08 | <0.04 | E0.004 | <0.02 | <0.1 | 965 | 47.2 | 66.6 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 977 | 109 | 87.4 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <0.08 | <0.04 | E0.006 | <0.02 | <0.1 | 966 | 42.7 | 66.8 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 956 | 36.8 | 60.7 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 961 | 35.5 | 61.8 |
| TIBBETS BROOK ABOVE WWTP OUTFLOW AT ZIMMERMAN, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 943 | 38.1 | 68 |
| TIBBETS BROOK BELOW WWTP OUTFLOW AT ZIMMERMAN, MN | <0.08 | <0.04 | <0.16 | E0.21 | <0.1 | 945 | E28 | E63.2 |
| JEWITTS CREEK AT U.S. HWY. 12 IN LITCHFIELD, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 982 | 29.8 | 57.2 |
| JEWITTS CREEK NEAR LITCHFIELD, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 966 | 29.9 | 55.1 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 979 | 39.8 | 67.4 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 974 | 36.8 | 65.4 |
| REDWOOD RIVER ABOVE LYND WWTP NEAR LYND, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 965 | 64.6 | 71.1 |
| REDWOOD RIVER BELOW LYND WWTP NEAR LYND, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 958 | 55.3 | 64.5 |
| REDWOOD RIVER ABOVE WWTP BELOW MARSHALL, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 972 | 54.8 | 68.2 |

| Data Download Date: May 25th, 2010 | Diltiazem | Diphenhydramine | Sulfamethoxazole | Trimethoprim | Warfarin | Sample volume (ml) | Carbamazepine-d10, surrogate (percent recovery) | Ethyl nicotinate-d4 surrogate (percent recovery) |
|---|---|---|---|---|---|---|---|---|
| REDWOOD RIVER BELOW WWTP NEAR MARSHALL, MN | <0.06 | <0.036 | E0.009 | <0.034 | <0.08 | 968 | 48.6 | 57.9 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 869 | 34.5 | 60.7 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | E0.029 | <0.04 | E0.289 | 0.055 | <0.1 | 898 | 35.1 | 56.8 |
| WILLIAMS CREEK ABOVE WWTP AT WILLIAMS, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 884 | 41.5 | 71.3 |
| WILLIAMS CREEK BELOW WWTP AT WILLIAMS, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 864 | 42.4 | 70.8 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 870 | 51.1 | 65.2 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <0.08 | <0.04 | E0.04 | E0.029 | <0.1 | 865 | 47 | 70.5 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 942 | E42 | E70.3 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 918 | E36.5 | E64.7 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 921 | 43.2 | 55 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 971 | 36.2 | 48 |
| SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 961 | 29 | 50.2 |
| SOUTH FORK ZUMBRO R. BELOW WWTP NEAR ROCHESTER, MN | <0.08 | <0.04 | E0.031 | <0.02 | <0.1 | 968 | 48.7 | 65.3 |
| SPRING VALLEY CK ABV WWTP NR SPRING VALLEY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 984 | 82.1 | 73.4 |
| SPRING VALLEY CK BLW WWTP NR SPRING VALLEY, MN | <0.08 | <0.04 | E0.022 | <0.02 | <0.1 | 989 | 75.1 | 69 |
| CEDAR RIVER ABOVE TREATMENT PLANT AT AUSTIN, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 914 | 73.9 | 75.8 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 900 | 106 | 83.9 |
| CEDAR RIVER BELOW TREATMENT PLANT AT AUSTIN, MN | <0.08 | E0.009 | E0.048 | E0.021 | <0.1 | 895 | 61.9 | 71.9 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 900 | 43.6 | 70.7 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <0.08 | <0.04 | E0.048 | <0.02 | <0.1 | 879 | 38.1 | 53.8 |
| ROCK RIVER ABOVE WWTP NEAR LUVERNE, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 890 | 65.8 | 73.2 |
| ROCK RIVER BELOW WWTP NEAR LUVERNE, MN | <0.06 | <0.036 | <0.16 | E0.006 | <0.08 | 890 | 59.6 | 69.8 |
| WORTHINGTON WWTP OUTFLOW AT WORTHINGTON, MN | <0.08 | E0.012 | <0.16 | E0.017 | <0.1 | 894 | 29.3 | 51.8 |
| INDUSTRIAL WWTP OUTFLOW NEAR WORTHINGTON, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 890 | 33.7 | 52.1 |
| LUVERNE WWTP OUTFLOW NEAR LUVERNE, MN | <0.06 | E0.024 | E0.037 | 0.120 | <0.08 | 852 | 35.1 | 62.9 |
| AUSTIN WWTP OUTFLOW AT AUSTIN, MN | E0.019 | E0.029 | <0.16 | 0.070 | <0.1 | 909 | 16.3 | 40.1 |
| FAIRMONT WWTP OUTFLOW AT FAIRMONT, MN | E0.041 | E0.035 | E0.273 | 0.100 | <0.1 | 875 | 34.1 | 56.5 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 980 | 105 | 91.6 |
| SPRING VALLEY WWTP OUTFLOW NEAR SPRING VALLEY, MN | <0.08 | E0.038 | E0.182 | <0.02 | <0.1 | 981 | 53 | 78 |
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | E0.041 | E0.018 | E0.119 | E0.013 | <0.1 | 958 | 23.1 | 43.1 |

| Data Download Date: May 25th, 2010 | Diltiazem | Diphenhydramine | Sulfamethoxazole | Trimethoprim | Warfarin | Sample volume (ml) | Carbamazepine-d10, surrogate (percent recovery) | Ethyl nicotinate-d4 surrogate (percent recovery) |
|---|---|---|---|---|---|---|---|---|
| ROCHESTER WWTP OUTFLOW AT ROCHESTER, MN | E0.07 | 0.059 | E0.1 | E0.099 | E0.071 | 973 | 28.4 | 46 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 980 | 108 | 91.1 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 943 | 24.5 | 38.7 |
| LYND WWTP OUTFLOW NEAR LYND, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 940 | 25.6 | 41.6 |
| LAKE CITY WWTP OUTFLOW AT LAKE CITY, MN | E0.021 | 0.047 | <0.16 | E0.096 | <0.1 | 967 | 12.1 | 25.4 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 949 | 96.4 | 89.2 |
| MARSHALL WWTP OUTLFOW AT MARSHALL, MN | E0.011 | 0.040 | E0.065 | E0.007 | <0.08 | 968 | 30.3 | 50.2 |
| HUTCHINSON WWTP OUTFLOW AT HUTCHINSON, MN | <0.08 | <0.04 | E0.222 | <0.02 | <0.1 | 985 | 27.5 | 57.7 |
| LESTER PRAIRIE WWTP OUTFLOW AT LESTER PRAIRIE, MN | <0.08 | <0.04 | E0.18 | <0.02 | <0.1 | 960 | 20.5 | 53.9 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E0.026 | E0.038 | E0.267 | 0.178 | <0.1 | 858 | 22.5 | 55.7 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E0.071 | 0.076 | E0.323 | 0.283 | E0.073 | 889 | 23.7 | 53 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E0.021 | E0.03 | E0.227 | 0.164 | <0.1 | 875 | 20 | 51.7 |
| LITCHFIELD WWTP OUTFLOW NEAR LITCHFIELD, MN | <0.06 | 0.036 | <0.16 | <0.034 | <0.08 | 974 | 28.4 | 52.9 |
| ZIMMERMAN WWTP OUTFLOW AT ZIMMERMAN, MN | <0.08 | <0.04 | <0.16 | E0.35 | <0.1 | 929 | E19.3 | E52.3 |
| MELROSE WWTP OUTFLOW AT MELROSE, MN | E0.013 | E0.029 | E0.024 | <0.02 | <0.1 | 972 | 34.7 | 61.4 |
| SAUK CENTRE WWTP OUTFLOW AT SAUK CENTRE, MN | E0.046 | 0.088 | E0.224 | 0.281 | <0.1 | 953 | 20.1 | 46.9 |
| HINCKLEY WWTP NEAR HINCKLEY, MN | <0.08 | <0.04 | <0.16 | E0.165 | <0.1 | 924 | E37.9 | E60.4 |
| PELICAN RAPIDS WWTP OUTFLOW AT PELICAN RAPIDS, MN | <0.06 | <0.036 | <0.16 | 0.091 | <0.08 | 858 | 1.7 | 48.9 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 872 | 22.2 | 54.2 |
| WLSSD - WWTP AT DULUTH, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 870 | 9.5 | 27.7 |
| GRAND RAPIDS WWTP OUTFLOW AT GRAND RAPIDS, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 840 | 20.9 | 23.7 |
| EVELETH WWTP OUTFLOW AT EVELETH, MN | E0.028 | 0.043 | E0.091 | 0.271 | <0.1 | 849 | 32.7 | 62.6 |
| ELY WWTP OUTFLOW AT ELY, MN | <0.08 | <0.04 | <0.16 | <0.02 | <0.1 | 875 | 90.2 | 83.2 |
| ELY WWTP OUTFLOW AT ELY, MN | E0.04 | 0.127 | E0.026 | 0.198 | <0.1 | 864 | 25.9 | 59.7 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 850 | 107 | 86.5 |
| WASTEWATER LIFT STA. OUTFLOW AT EAST GRAND FORKS | <0.06 | <0.036 | <0.16 | <0.034 | <0.08 | 871 | 24.2 | 47.3 |
| WILLIAMS WWTP OUTFLOW AT WILLIAMS, MN | <0.06 | 0.047 | <0.16 | <0.034 | <0.08 | 871 | 36 | 67.6 |

**Water Data Explanations**

Data provided in this Excel spreadsheet were collected as part of an integrated biological and chemical study of endocrine active chemicals (EACs) and pharmaceuticals in streams and wastewater treatment plant (WWTP) effluent samples in Minnesota during 2009. This study was a collaborative effort by the U.S. Geological Survey (USGS), St. Cloud State University, and the University of St. Thomas in collaboration with the Minnesota Pollution Control Agency. The study description, data, and results can be found at http://mn.water.usgs.gov/projects/EACWWTP/index.html. Any questions about the data can be directed to Kathy Lee (klee@usgs.gov).

Water samples were collected according to established protocols (U.S. Geological Survey, 2003). Water samples were collected from 25 WWTPs and at 24 sites upstream and 24 sites downstream of WWTP effluent discharge. Stream and effluent discharge were measured or estimated to calculate approximate dilution factors for receiving waters. Basic water quality parameters (dissolved oxygen, pH, specific conductance, temperature, and turbidity) were measured at each site using a submersible data sonde. Following collection, samples were composited into a Teflon container, distributed to glass bottles, and chilled prior to processing. Chilled water samples were processed within 1-2 hours of collection before shipping to their respective laboratories. Water samples were split into chemical and bioassay fractions. The chemical aliquot of the water samples were sent to USGS laboratories for analyses. The USGS National Water Quality Laboratory (USGS-NWQL) analyzed samples for major ions, nutrients, and pharmaceuticals. Major ions and nutrients were analyzed at the USGS national Water Quality Laboratory using standard analytical techniques described in Fishman and Friedman (1989), Patton and Truitt (1992), Fishman (1993), U.S. Environmental Protection Agency (1993), and Fishman and others (1994). Pharmaceuticals in water samples were analyzed using USGS Schedule 2080 according to Furlong and others (2008).

There are three worksheets within this spreadsheet that contain data related to water samples. The 'Basic QW Parameters' worksheet contains information about the site at the time of sampling such as the water temperature, dissolved oxygen concentration, specific conductance, pH, turbidity, air temperature, barometric pressure, and discharge. Data in the 'Major Ions and Nutrients' and the 'Pharmaceutical Compounds' worksheets contain concentrations of selected chemicals. Data were downloaded from USGS National Water Information System May 17, 2010 by Kathy Lee and provided to the Minnesota Pollution Control Agency on May 28th, 2010. ***Data are subject to revision.***

Method detection limits (MDL) for chemicals in the 'Major Ions and Nutrients' and the 'Pharmaceutical Compounds' worksheets are calculated using a method established by the U.S. Environmental Protection Agency (2005). The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the compound concentration is greater than zero. According to Furlong and others (2008), "Laboratory reporting limits (LRL) are established for censored values. The LRL for each compound is determined according to Childress and others (1999). Values with a qualifier code of 'E' indicate that the concentration of the chemical had a positive identification, but was quantified below the MDL. Because qualitatively identified detections that fall below the MDL can provide useful information, qualitatively identified compound concentrations are reported. Qualitatively identified compound concentrations less than 0.003 micrograms per liter are censored because of the inability to sufficiently discriminate mass spectra signals from instrument or chemical noise. Compounds that are not detected are reported as less than the LRL. In addition, diltiazem and warafin are always coded with an 'E' qualifier code because their recoveries did not meet the recovery criteria".

Childress, C.J.O., Foreman, W.T., Connor, B.F., and Maloney, T.J., 1999, New reporting procedures based on long-term method detection levels and some considerations for interpretations of water-quality data provided by the U.S. Geological Survey National Water Quality Laboratory: U.S. Geological Survey Open-File Report 99–193, 19 p.

Fishman, J.J., and Friedman, L.C., eds., 1989, Methods for the determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water Resources Investigations, book 5, chap. A1, 709 p.

Fishman, M.J., 1993, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of inorganic and organic constituents in water and fluvial sediments: U.S. Geological Survey Open-File Report 93–125, 217 p.

Fishman, M.J., Raese, J.W., Gerlitz, C.N., and Husband, R.A., 1994, U.S. Geological Survey approved inorganic and organic methods for the analysis of water and fluvial sediment, 1954–94: U.S. Geological Survey Open-File Report 94–351, 55 p.

Furlong, E.T., Werner, S.L., Anderson, B.D., and Cahill, J.D., 2008, Determination of human-health pharmaceuticals in filtered water by chemically modified styrene-divinylbenzene resin-based solid-phase extraction and high-performance liquid chromatography/mass spectrometry: U.S. Geological Survey Techniques and Methods, book 5, sec. B, chap. B5, 56 p. http://pubs.usgs.gov/tm/tm5b5/

Patton, C.J., and Truitt, E.P., 1992, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of total phosphorus by a Kjeldahl digestion method and an automated colorimetric finish that includes dialysis: U.S. Geological Survey Open-File Report 92–146, 39 p.

U.S. Environmental Protection Agency, 2005, Guidelines establishing test procedures for the analysis of pollutants (App. B, Part 136, Definition and procedures for the determination of the method detection limit): U.S. Code of Federal Regulations, Title 40, revised as of July 1, 2005, p. 319–322.

U.S. Environmental Protection Agency, 1993, Methods for the determination of inorganic substances in environmental samples—Environmental Monitoring Systems Laboratory, Cincinnati, Ohio: U.S. Environmental Protection Agency EPA/600/R–93/100, variously paginated.

***Data Download Date: May 25th, 2010***

**Concentrations of chemicals in bed sediment samples.**

[USGS, U.S. Geological Survey; NA, sample analyses not available; All concentrations are in g/Kg, grams per kilogram; M, present in sample at concentrations less than reporting limits; E, estimated; na, not analyzed; <, less than; units in micrograms per kilogram (µg/kg) unless otherwise noted; less than values are laboratory reporting limit; estimated values are those that were quantified below reporting limits].

| USGS Station Name | USGS Station Number | Sampling Date | Sampling Time | Laboratory Sample Number | Inorganic carbon, <2mm, g/kg | Organic carbon,<2mm, g/kg | Total carbon, <2mm, g/kg |
|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | 475504091545401 | 20090928 | 1000 | 900977 | 0.2 | 190 | 190 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 475436091522501 | 20090928 | 1100 | 900978 | <0.2 | 8 | 8.1 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | 4024025 | 20091001 | 1300 | 1000038 | 0.4 | 23 | 24 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 464523092065501 | 20091001 | 1000 | 1000037 | 2.4 | 91 | 93 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 5211020 | 20090930 | 1300 | 900986 | 4.9 | 66 | 71 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 5211030 | 20090930 | 1000 | 900987 | 6.9 | 27 | 34 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 5270181 | 20090916 | 1100 | 900915 | 24 | 72 | 96 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | 5270183 | 20090916 | 900 | 900916 | 20 | 66 | 86 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | 5270195 | 20090917 | 1130 | 900914 | 27 | 110 | 130 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | 5270197 | 20090917 | 900 | 900913 | 18 | 33 | 51 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | 5270845 | 20090915 | 1300 | 900917 | 9.2 | 24 | 33 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | 5270850 | 20090915 | 1100 | 900918 | 10 | 29 | 39 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 5278570 | 20090914 | 1400 | 900919 | 10 | 21 | 32 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | 5278580 | 20090914 | 1100 | 900920 | 9.1 | 16 | 25 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 5318170 | 20090908 | 1308 | 900984 | 4.1 | 21 | 25 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | 5318171 | 20090908 | 900 | 900985 | 5.3 | 26 | 32 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | 5331005 | 20090924 | 1500 | 900979 | 15 | 16 | 31 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 445509093024301 | 20090924 | 1000 | 900981 | 7.7 | 27 | 35 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 5331400 | 20090924 | 1300 | 900980 | 13 | 13 | 26 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | 5337003 | 20090901 | 1700 | 900923 | 0.8 | 61 | 61 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | 5337005 | 20090901 | 1400 | 900924 | 0.3 | 24 | 24 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | 5355260 | 20090923 | 1100 | 900983 | 13 | 35 | 48 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | 5355331 | 20090923 | 1300 | 900982 | 17 | 13 | 30 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | 5474883 | 20090909 | 1430 | 900921 | 15 | 17 | 32 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | 5474884 | 20090909 | 1100 | 900922 | 11 | 18 | 29 |

***Data Download Date: May 25th, 2010***

**Concentrations of chemicals in bed sediment samples.**

[USGS, U.S. Geological Survey; NA, sample analyses not available; All concentrations estimated; na, not analyzed; <, less than; units in micrograms per kilogram (µg/kg) unl were quantified below reporting limits].

| USGS Station Name | 1,4-Dichlorobenzene | Atrazine | Bromacil | Camphor | Carbazole | Chlorpyrifos | N,N-diethyl-*meta*-toluamide (DEET) | Diazinon |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <300 | <600 | <3000 | <300 | <300 | <300 | <600 | <300 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | E94 | <480 | <2400 | <240 | 280 | <240 | <480 | <240 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <130 | <250 | <1300 | <130 | M | <130 | <250 | <130 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | E240 | <330 | <1700 | <170 | 170 | <170 | <330 | <170 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <120 | <240 | <1200 | <120 | 320 | <120 | <240 | <120 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <100 | <210 | <1000 | <100 | E30 | <100 | <210 | <100 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <120 | <240 | <1200 | <120 | E20 | <120 | <240 | <120 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <190 | <370 | <1900 | <190 | E30 | <190 | <370 | <190 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <140 | <290 | <1400 | <140 | E20 | <140 | <290 | <140 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <90 | <180 | <890 | <90 | <90 | <90 | <180 | <90 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <110 | <230 | <1100 | <110 | <110 | <110 | <230 | <110 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <46 | <90 | <460 | <50 | E10 | <50 | <90 | <50 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <66 | <130 | <660 | <70 | M | <70 | <130 | <70 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <94 | <190 | <940 | <90 | E70 | <90 | <190 | <90 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <110 | <230 | <1100 | <110 | <110 | <110 | <230 | <110 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <68 | <140 | <680 | <70 | E10 | <70 | <140 | <70 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E53 | <270 | <1400 | <140 | E130 | <140 | <270 | <140 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <120 | <240 | <1200 | <120 | E10 | <120 | <240 | <120 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <180 | <360 | <1800 | <180 | E20 | <180 | <360 | <180 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <70 | <140 | <720 | <70 | <70 | <70 | <140 | <70 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <160 | <320 | <1600 | <160 | <160 | <160 | <320 | <160 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <110 | <230 | <1100 | <110 | <110 | <110 | <230 | <110 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <80 | <160 | <780 | <80 | E10 | <80 | <160 | <80 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <70 | <140 | <680 | <70 | M | <70 | <140 | <70 |

***Data Download Date: May 25th, 2010***

**Concentrations of chemicals in bed sediment samples.**

[USGS, U.S. Geological Survey; NA, sample analyses not available; All concentrations estimated; na, not analyzed; <, less than; units in micrograms per kilogram (µg/kg) unl were quantified below reporting limits].

| USGS Station Name | Metolachlor | *p*-Cresol | Prometon | 1-Methylnaphthalene | 2,6-Dimethylnaphthalene | 2-Methylnaphthalene | 3-*beta*-Coprostanol | 3-Methyl-1H-indole (Skatole) |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <300 | E360 | <300 | <300 | E20 | <300 | <3000 | E70 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <240 | E340 | <240 | E100 | E100 | E190 | E3800 | E90 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <130 | E110 | <130 | <130 | E30 | <130 | E230 | E10 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | <170 | 1000 | <170 | 430 | E340 | 850 | E3700 | E80 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <120 | 600 | <120 | E30 | E70 | E40 | E650 | E70 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <100 | 1800 | <100 | <100 | 230 | <100 | E440 | E60 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <120 | E360 | <120 | <120 | E80 | <120 | <1200 | E80 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <190 | E170 | <190 | <190 | E80 | <190 | E560 | E50 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <140 | E60 | <140 | <140 | E60 | <140 | E420 | E40 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <90 | E160 | <90 | <90 | E50 | <90 | E260 | E30 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <110 | E150 | <110 | <110 | E70 | <110 | E290 | E40 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <50 | E60 | <50 | <50 | E30 | <50 | E180 | E10 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <70 | E60 | <70 | <70 | E30 | <70 | E290 | M |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <90 | E170 | <90 | <90 | E50 | <90 | E380 | E30 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <110 | 680 | <110 | <110 | E70 | <110 | E560 | E80 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <70 | 410 | <70 | E10 | E50 | E20 | E370 | E30 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <140 | E270 | <140 | 180 | E140 | 380 | E1900 | E30 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <120 | E50 | <120 | <120 | E50 | <120 | E620 | E10 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <180 | E130 | <180 | <180 | E40 | <180 | E620 | E30 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <70 | E30 | <70 | <70 | E20 | <70 | E330 | E20 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <160 | E90 | <160 | <160 | 300 | <160 | E630 | E50 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <110 | E60 | <110 | <110 | E70 | <110 | E260 | E10 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <80 | E30 | <80 | <80 | E30 | <80 | E500 | E10 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <70 | E30 | <70 | <70 | E20 | <70 | E570 | M |

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**Concentrations of chemicals in bed sediment samples.**

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| USGS Station Name | 3-*tert*-Butyl-4-hydroxyanisole | 4-Cumylphenol | 4-*n*-Octylphenol | 4-Nonylphenol | 4-Nonylphenol diethoxylate (NP2EO) (total) | 4-Nonylphenol monoethoxylate (NP1EO) (total) | 4-*tert*-Octylphenol | 4-Octylphenol monoethoxylate (OP1EO) (total) |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <900 | <300 | <300 | <4500 | <6000 | <3000 | <300 | <1500 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <710 | <240 | <240 | E760 | <4800 | <2400 | <240 | <1200 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <380 | <130 | <130 | E1300 | <2500 | <1300 | <130 | <630 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | <500 | <170 | <170 | E6900 | E2100 | E1300 | <250 | E410 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <360 | 400 | <120 | E2200 | <2400 | <1200 | <120 | <600 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <310 | <100 | <100 | E560 | <2100 | <1000 | <100 | <520 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <360 | <120 | <120 | E250 | <2400 | <1200 | <120 | <600 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <560 | <190 | <190 | <2800 | <3700 | <1900 | <190 | <930 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <430 | <140 | <140 | <2200 | <2900 | <1400 | <140 | <720 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <270 | <90 | <90 | <1300 | <1800 | <890 | <90 | <440 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <340 | <110 | <110 | <1700 | <2300 | <1100 | <110 | <570 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <140 | E10 | <50 | E240 | <920 | <460 | <50 | <230 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <200 | M | <70 | E160 | <1300 | <660 | <70 | <330 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <280 | <90 | <90 | E250 | <1900 | <940 | <90 | <470 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <340 | <110 | <110 | E280 | <2300 | <1100 | <110 | <570 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <200 | <70 | <70 | E380 | E1100 | <680 | <70 | E50 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <410 | <140 | <140 | E2500 | E1200 | E750 | <140 | <680 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <360 | <120 | <120 | E330 | <2400 | <1200 | <120 | <600 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <550 | <180 | <180 | <2700 | <3600 | <1800 | <180 | <910 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <220 | <70 | <70 | <1100 | <1400 | <720 | <70 | <360 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <480 | <160 | <160 | <2400 | <3200 | <1600 | <160 | <810 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <340 | <110 | <110 | <1700 | <2300 | <1100 | <110 | <560 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <230 | <80 | <80 | <1200 | E470 | <780 | <80 | <390 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <210 | <70 | <70 | E170 | E380 | <680 | <70 | <340 |

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**Concentrations of chemicals in bed sediment samples.**

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| USGS Station Name | 4-*tert*-Octylphenol | Anthraquinone | Acetophenone | Acetyl hexamethyl tetrahydro naphthalene | Anthracene | 2,2',4,4'-Tetrabromo diphenyl ether (BDE-47) | Benzo[*a*]pyrene | Benzophenone |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <300 | <300 | <900 | <300 | <300 | <301 | <300 | <300 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <240 | E580 | <710 | E20 | 520 | <238 | 1500 | <240 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <130 | <130 | <380 | <130 | E20 | <126 | E30 | <130 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 240 | E340 | <500 | E80 | 370 | <166 | 560 | E120 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <120 | E640 | <360 | <120 | 310 | <120 | 960 | <120 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <100 | <100 | <310 | <100 | E30 | <104 | E90 | <100 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <120 | E64 | E60 | <120 | E30 | <120 | E60 | <120 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <190 | E70 | E110 | <190 | E30 | <186 | E80 | <190 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <140 | E60 | <430 | <140 | E40 | <140 | E120 | <140 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <90 | <90 | <270 | <90 | <90 | <90 | <90 | <90 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <110 | <110 | <340 | <110 | <110 | <110 | <110 | <110 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <50 | E18 | E20 | <50 | E10 | <46 | E30 | <50 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <70 | E14 | <200 | <70 | M | <66.5 | E20 | <70 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <90 | E100 | <280 | <90 | E50 | <94.5 | 180 | <90 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <110 | <110 | <340 | <110 | <110 | <114 | <110 | <110 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <70 | <68 | <200 | <70 | E30 | <68 | 80 | <70 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E90 | E540 | E70 | 190 | 1000 | <136 | 3300 | <240 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <120 | E58 | <360 | <120 | E60 | <120 | 180 | <120 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <180 | <180 | <550 | <180 | <180 | <180 | E30 | <180 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <70 | <70 | <220 | <70 | <70 | <70 | E10 | <70 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <160 | E33 | <480 | <160 | E20 | <162 | E50 | <160 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <110 | <110 | <340 | <110 | <110 | <113 | E20 | <110 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <80 | E30 | <230 | M | E10 | <80 | E50 | <80 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <70 | E20 | <210 | E20 | E10 | <70 | E20 | <70 |

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| USGS Station Name | *beta*-Sitosterol | *beta*-Stigmastanol | Bis(2-ethylhexyl) phthalate | Bisphenol A | Cholesterol | Diethyl phthalate | *d*-Limonene | Fluoranthene |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | E12000 | E10000 | <1500 | <300 | <2500 | <600 | <300 | E70 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | E5400 | E2300 | E610 | <240 | E4900 | <480 | E80 | 6000 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | E5000 | E1400 | <630 | E100 | <1400 | <250 | E60 | E80 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | E7700 | E3500 | E830 | E310 | E3500 | <330 | <170 | 2800 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | E15000 | E3700 | E590 | E190 | E4500 | <240 | E280 | 4700 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | E4000 | E750 | <520 | E40 | E6500 | <210 | <100 | 350 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | E2700 | E810 | <600 | E80 | E3300 | <240 | <120 | 300 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | E3900 | E1200 | <930 | <190 | E4400 | <370 | <190 | 300 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | E4700 | E1100 | <720 | <140 | E6200 | <290 | <140 | 330 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | E4600 | E1100 | <440 | <90 | E2100 | <180 | <90 | E10 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | E3600 | E970 | <570 | E110 | E2000 | <230 | <110 | E20 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | E1600 | E510 | <230 | E70 | E700 | <90 | <50 | 130 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | E2100 | E570 | <330 | E40 | E1900 | <130 | <70 | 70 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | E4000 | E1100 | <470 | <90 | E3400 | <190 | <90 | 830 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | E4300 | E1600 | <570 | <110 | E4300 | <230 | <110 | E40 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | E3000 | E1400 | E170 | E60 | E1600 | <140 | <70 | 200 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | E3600 | E2200 | E560 | E90 | E1800 | <270 | <140 | 5600 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | E3500 | E1500 | <600 | <120 | E1800 | <240 | <120 | 480 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | E13000 | E3600 | <910 | E70 | E2900 | <360 | <180 | E90 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | E3400 | E1200 | <360 | <70 | E1200 | <140 | E50 | E30 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | E3600 | E1800 | <810 | <160 | E2800 | <320 | <160 | E150 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | E2000 | E820 | <560 | <110 | E1500 | <230 | <110 | E60 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | E1800 | E420 | <390 | <80 | E2200 | <160 | <80 | 130 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | E1200 | E400 | <340 | <70 | E1300 | <140 | <70 | 80 |

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| USGS Station Name | Hexahydrohexamethylcyclopentabenzopyran (HHCB) | Indole | Isoborneol | Isophorone | Isopropylbenzene | Isoquinoline | Menthol | Naphthalene |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <300 | 1300 | <300 | <300 | <600 | <600 | <300 | <300 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | E60 | 1000 | <240 | E20 | <480 | <480 | <240 | E240 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <130 | 310 | <130 | <130 | <250 | <250 | <130 | <130 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 400 | 670 | <170 | <170 | E50 | <330 | <170 | 1900 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <120 | 830 | <120 | <120 | <240 | <240 | <120 | E90 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <100 | 360 | <100 | <100 | <210 | <210 | <100 | <100 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <120 | 720 | <120 | E10 | <240 | <240 | <120 | <120 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | E10 | 1200 | <190 | E10 | <370 | <370 | <190 | <190 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <140 | 1100 | <140 | E10 | <290 | <290 | <140 | <140 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <90 | 540 | <90 | M | <180 | <180 | <90 | <90 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <110 | 650 | <110 | <110 | <230 | <230 | <110 | <110 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <50 | 150 | <50 | <50 | <90 | <90 | <50 | <50 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | M | 150 | <70 | <70 | <130 | <130 | <70 | <70 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <90 | 480 | <90 | M | <190 | <190 | <90 | <90 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | E90 | 730 | <110 | <110 | <230 | <230 | <110 | <110 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <70 | 260 | <70 | <70 | <140 | <140 | <70 | E40 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 1000 | 410 | <140 | <140 | <270 | <270 | <140 | 790 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | E30 | E210 | <120 | <120 | <240 | <240 | <120 | <120 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <180 | 740 | <180 | E10 | <360 | <360 | <180 | <180 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <70 | 380 | <70 | M | <140 | <140 | <70 | <70 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <160 | 590 | <160 | E20 | <320 | <320 | <160 | <160 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <110 | 230 | <110 | E10 | <230 | <230 | <110 | <110 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | E30 | 220 | <80 | <80 | <160 | <160 | <80 | <80 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | E40 | 150 | <70 | M | <140 | <140 | <70 | <70 |

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| USGS Station Name | Phenanthrene | Phenol | Pyrene | Tributyl phosphate | Triclosan | Triphenyl phosphate | Tris(2-butoxyethyl) phosphate | Tris(2-chloroethyl) phosphate |
|---|---|---|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <300 | <670 | E40 | <300 | <301 | <300 | <900 | <600 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | 3000 | <320 | 4900 | <240 | E106 | <240 | <710 | <480 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | E50 | <380 | E60 | <130 | <126 | <130 | <380 | <250 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | 1900 | <260 | 2400 | <170 | 352 | <170 | <500 | <330 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | 2300 | <140 | 3800 | <120 | <120 | <120 | <360 | <240 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | 130 | <100 | 240 | <100 | <104 | <100 | <310 | <210 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | 140 | <450 | 240 | <120 | <120 | <120 | <360 | <240 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | E130 | <470 | 240 | <190 | <186 | <190 | <560 | <370 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | na | na | na | na |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | E100 | <210 | 280 | <140 | <140 | <140 | <430 | <290 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <90 | <130 | <90 | <90 | <90 | <90 | <270 | <180 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <110 | <110 | E20 | <110 | <110 | <110 | <340 | <230 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | 70 | <110 | 100 | <50 | <46 | <50 | <140 | <90 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | E30 | <80 | E60 | <70 | E10.8 | M | <200 | <130 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | 440 | <160 | 610 | <90 | <94.5 | <90 | <280 | <190 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <110 | <320 | E30 | <110 | <114 | <110 | <340 | <230 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | 80 | <80 | 180 | <70 | E23.9 | <70 | <200 | <140 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | 3600 | <170 | 6400 | <140 | 186 | <140 | <410 | <270 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | 290 | <120 | 540 | <120 | <120 | <120 | <360 | <240 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <180 | <590 | E60 | <180 | <180 | <180 | <550 | <360 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <70 | <90 | E20 | <70 | <70 | <70 | <220 | <140 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | E50 | <170 | E140 | <160 | <162 | <160 | <480 | <320 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | E30 | <300 | E50 | <110 | <113 | <110 | <340 | <230 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | E60 | <80 | 110 | <80 | <80 | <80 | <230 | <160 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | E40 | <100 | E60 | <70 | <70 | <70 | <210 | <140 |

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| USGS Station Name | Tris(dichloroisopropyl) phosphate | Bisphenol A-d3, Surrogate (percent) | Decafluorobiphenyl, Surrogate (percent) | Fluoranthene-d10, Surrogate (percent) | Sample weight (grams) |
|---|---|---|---|---|---|
| SHAGAWA LAKE AT MOUTH OF BURNTSIDE RIVER NR ELY,MN | <600 | E23 | 40 | 97 | 1.66 |
| SHAGWA LAKE NEAR ELY WWTP OUTFLOW AT ELY, MN | <480 | E15 | 38 | 110 | 2.1 |
| ST. LOUIS RIVER AT HWY. 23 ABOVE FOND DU LAC, MN | <250 | 37 | 19 | 91 | 3.95 |
| LAKE SUPERIOR IN ST. LOUIS BAY AT DULUTH, MN | <330 | 50 | 23 | 81 | 3.01 |
| MISSISSIPPI RIVER ABOVE WWTP AT GRAND RAPIDS, MN | <240 | E30 | 34 | 109 | 4.19 |
| MISSISSIPPI RIVER BELOW WWTP AT GRAND RAPIDS, MN | <210 | E42 | 29 | 205 | 4.82 |
| SAUK RIVER ABV SAUK CENTRE WWTP AT SAUK CENTRE, MN | <240 | 28 | 20 | 106 | 4.18 |
| SAUK RIVER BLW SAUK CENTRE WWTP AT SAUK CENTRE, MN | <370 | 45 | 25 | 124 | 2.68 |
| SAUK RIVER ABOVE MELROSE WWTP AT MELROSE, MN | na | na | na | na | 1.59 |
| SAUK RIVER BELOW MELROSE WWTP AT MELROSE, MN | <290 | 50 | 17 | 129 | 3.46 |
| SOUTH FORK CROW R. ABV WWTP AT LESTER PRAIRIE, MN | <180 | 56 | 23 | 135 | 5.63 |
| SOUTH FORK CROW R. BLW WWTP AT LESTER PRAIRIE, MN | <230 | 49 | 24 | 123 | 4.41 |
| SOUTH FORK CROW RIVER ABOVE WWTP AT HUTCHINSON, MN | <90 | 46 | 18 | 76 | 10.8 |
| SOUTH FORK CROW RIVER BELOW HUTCHINSON, MN | <130 | 51 | 24 | 122 | 7.51 |
| CENTER CREEK ON CO. RD. 143, AT FAIRMONT, MN | <190 | E37 | 40 | 133 | 5.29 |
| CENTER CREEK BELOW WWTP AT FAIRMONT, MN | <230 | E37 | 42 | 147 | 4.37 |
| MISSISSIPPI R AT INDUSTRIAL MOLLASSES ST PAUL, MN | <140 | E37 | 38 | 120 | 7.33 |
| METRO PLANT (WWTP) OUTFLOW IN ST. PAUL, MN | <270 | 48 | 26 | 86 | 3.68 |
| MISSISSIPPI RIVER AT SOUTH ST. PAUL, MN | <240 | 35 | 31 | 105 | 4.16 |
| GRINDSTONE RIVER ABOVE WWTP NEAR HINCKLEY, MN | <360 | 60 | 17 | 98 | 2.74 |
| GRINDSTONE RIVER BELOW HINCKLEY, MN | <140 | 72 | 26 | 117 | 6.9 |
| MISSISSIPPI RIVER (LAKE PEPIN) ABOVE LAKE CITY, MN | <320 | 46 | 17 | 108 | 3.1 |
| MISSISSIPPI R. (LK PEPIN) AT MILE 771 NR LAKE CITY | <230 | 32 | 26 | 98 | 4.43 |
| OKABENA CREEK ABOVE WWTP OUTFLOW AT WORTHINGTON,MN | <160 | 47 | 31 | 137 | 6.47 |
| OKABENA CREEK BELOW WWTP OUTFLOW AT WORTHINGTON,MN | <140 | 54 | 20 | 106 | 7.28 |

**Bed Sediment Data Explanation**

The data in this spreadsheet were collected as part of an integrated biological and chemical study of endocrine active chemicals (EACs) and other organic chemicals in bottom sediments collected from 24 sites up and 24 sites downstream of WWTP effluent discharge, and one site within a discharge channel in Minnesota during 2009-2010. This study was a collaborative effort by the U.S. Geological Survey (USGS), St. Cloud State University, and the University of St. Thomas in collaboration with the Minnesota Pollution Control Agency.

Data in the 'Bed Sediment Data' worksheet include concentrations of organic chemicals in bottom sediment samples collected and analyzed by the USGS National Water Quality Laboratory. Data were downloaded from USGS National Water Information System May 17, 2010 by Kathy Lee and provided to the Minnesota Pollution Control Agency on May 28th, 2010. ***Data are subject to revision.*** The study description, data, and results can be found at http://mn.water.usgs.gov/projects/EACWWTP/index.html. Any questions about the data can be directed to Kathy Lee (klee@usgs.gov).

Bottom-sediment samples were collected upstream and downstream of each WWTP according to established protocols (U.S. Geological Survey, 2003). Bottom sediment was collected once at 5-10 locations at each site using techniques that obtained the most recent bottom sediment deposition (top 10 centimeters of bottom sediment). Samples were collected with a stainless steel Eckman grab sampler or other stainless steel coring equipment. The bottom-sediment sample was discarded and resampled if it contained a large amount of vegetation or appeared to be disturbed. Bottom-sediment samples were transferred to a glass container and homogenized for 5 minutes. Approximately, 100-200 gm of unsieved wet material was placed in a wide-mouth, glass container, and frozen. All samples(49) were archived for potential future analyses, while a subset (25 samples) were sent to USGS National Water Quality Laboratory for analyses according to Burkhardt and others (2006).

Briefly, the method used to analyze bottom sediment was an accelerated solvent extraction, Soxhlet extraction, and solid-phase extraction for sample preparation, with analysis by capillary-column gas chromatography/mass spectrometry. The method identified and quantified individual compounds using retention times and spectral matches, along with standard calibration curves.

Method detection limits for chemicals in the 'Bed-Sediment Data' worksheet are calculated using a method established by the U.S. Environmental Protection Agency (2005). The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the compound concentration is greater than zero. Alphanumeric data-qualifier codes are used to report information about the presence and concentration of a compound when concentrations are less certain because of matrix effects, interferences, and other unexpected circumstances (Burkhardt and others, 2006). If the concentration is less than either the method reporting limit or the lowest calibration standard (usually equivalent to 8.0 micrograms per kilogram) results are reported by using the “E” code to indicate that it has been estimated. The attempt to report consistent data near the method detection limit (MDL) is difficult, especially with the intention to transmit as much information as possible in complex samples and also avoid data censoring. Reporting compound results as estimated because their concentrations are less than the method reporting limit need not decrease confidence in qualitative identification. However, there is more uncertainty for concentrations reported near or less than the MDL.

The concentration of 20 compounds are always reported with the “E” remark code for one of three reasons:
(1) unacceptably low-biased recovery (less than 60 percent) or highly variable method performance (greater than 25 percent relative standard deviation) which applies to the following chemicals: triphenyl phosphate, tri(2-chloroethyl) phosphate, phenol, pentachlorophenol, N,N-diethyl-meta-toluamide (DEET), methyl salicylate, metalaxy, isoquinoline, isophorone, d-limonene, and bisphenol A, acetophenone, 3-tert-butyl-4-hydroxyanisole (BHA), and 3,4-dichlorophenyl isocyanate.

(2) reference standards prepared from technical mixtures which applies to the following chemicals: p-nonylphenol, octylphenol monoethoxylate (OPEO1), octylphenol diethoxylate (OPEO2), nonylphenol monoethoxylate (NPEO1), and nonylphenol diethoxylate (NPEO2).

(3) potential blank contamination: diethyl phthalate, diethylhexyl phthalate.

Burkhardt, M.R., Zaugg, S.D., Smith, S.G., and ReVello, R.C., 2006, Determination of wastewater compounds in sediment and soil by pressurized solvent extraction, solid-phase extraction, and capillary-column gas chromatography/mass spectrometry: U.S. Geological Survey Techniques and Methods, book 5, chap. B2, 40 p. http://pubs.usgs.gov/tm/2006/tm5b2/

U.S. Environmental Protection Agency, 1993, Methods for the determination of inorganic substances in environmental samples—Environmental Monitoring Systems Laboratory, Cincinnati, Ohio: U.S. Environmental Protection Agency EPA/600/R–93/100, variously paginated.