

City of Columbia

701 East Broadway, Columbia, Missouri 65201



Agenda Item Number: R 201-14

Department Source: Public Works

To: City Council

From: City Manager & Staff

Council Meeting Date: October 20, 2014

Re: Joint Funding Agreement with the United States Geological Survey (USGS) for Groundwater Monitoring of McBaine Bottoms, including the Eagle Bluffs Conservation Area

Documents Included With This Agenda Item

Council memo, Resolution/Ordinance, Exhibits to Resolution/Ordinance

Supporting documentation includes: Proposal for Hydrologic Monitoring of McBaine Bottoms, including the Eagle Bluffs Conservation Area

Executive Summary

Authorizing the City Manager to execute a Joint Funding Agreement with the United States Geological Survey (USGS) for groundwater monitoring in the McBaine Bottoms, around the City's wetland treatment units, and on the Eagle Bluffs Conservation property, for a period of one year. These wells will be monitored for constituents of interest to the City, including inorganic ions, pesticides, wastewater organics and pharmaceutical compounds. The cost for this project is shared between the departments of Public Works and Water and Light, and the funds have been appropriated in the operating budgets.

Discussion

In 1992, a collaborative agreement between the USGS, the City of Columbia, and the Missouri Department of Conservation began groundwater monitoring in the McBaine Bottoms, around the City's wetland treatment units, and on the Eagle Bluffs Conservation property. The purpose of the study was to assess the effect of the constructed wetlands on the ground water quality and flow. This initial study was completed in 1999 and a significant conclusion was that compounds associated with sewage effluent in the wetlands could potentially migrate from the wetlands toward the City's municipal water supply well field. Based on the results, the parties involved concurred that the water quality monitoring should continue and that all analysis should be performed by the USGS laboratory for consistency. The purpose of performing these studies is to provide the City with the information needed to protect the well field and ensure good quality drinking water for the City.

The USGS has provided the City with a proposal (attached) to continue the monitoring for an additional five years, renewable annually, which includes detailed information on the purpose and objective of the study, the wells to be monitored, analysis to be performed, and the annual cost for each of the five years. The Joint Funding Agreement is for a one year period beginning October 1, 2014 through September 30, 2015.

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Fiscal Impact

Short-Term Impact: The cost to the City for year one (FY15) of the proposal is \$67,000.00, with the Public Works Department paying 80% or \$53,600, and the Water and Light Department paying 20% or \$13,400.00. The funding has been included in operating budget of each department and will require no special appropriations.

Long-Term Impact: The costs for year two through five are included in the proposal and will be appropriated each year with the annual budget.

Vision, Strategic & Comprehensive Plan Impact

Vision Impact: Environment

Strategic Plan Impact: Health, Safety and Wellbeing, Infrastructure

Comprehensive Plan Impact: Environmental Management

Suggested Council Action

Authorize an agreement with the United States Geological Survey (USGS) for Groundwater Monitoring.

Legislative History

Agreements with the USGS for groundwater monitoring have been authorized through Council since 1997.


Department Approved


City Manager Approved

Introduced by _____ Council Bill No. R 201-14

A RESOLUTION

authorizing a joint funding agreement with the U.S. Geological Survey, United States Department of the Interior for water resources investigations relating to the hydrologic monitoring of well sites in the vicinity of the wetland treatment units and the Eagle Bluffs Conservation Area.

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF COLUMBIA, MISSOURI, AS FOLLOWS:

SECTION 1. The City Manager is hereby authorized to execute a joint funding agreement with the U.S. Department of the Interior, U.S. Geological Survey for water resources investigations relating to the hydrologic monitoring of well sites in the vicinity of the wetland treatment units and the Eagle Bluffs Conservation Area. The form and content of the agreement shall be substantially as set forth in "Exhibit A" attached hereto. Any actions taken by or on behalf of the City in connection with such funding agreement prior to the date of this resolution are hereby approved and ratified.

ADOPTED this _____ day of _____, 2014.

ATTEST:

City Clerk

Mayor and Presiding Officer

APPROVED AS TO FORM:

City Counselor

Form 9-1366
(Oct. 2005)

**U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

JOINT FUNDING AGREEMENT

FOR

WATER RESOURCES INVESTIGATIONS

Customer #: 6000001787
Agreement #: 15EMSG178700001
Project #: SG009DH
TIN #: 43-6000810
Fixed Cost Agreement YES

THIS AGREEMENT is entered into as of the, 1st day of October, 2014 by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the City of Columbia, Missouri, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation hydrologic monitoring of McBaine Bottoms, including the Eagle Bluffs Conservation area, herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of \$0.00 .

- (a) by the party of the first part during the period

Amount	Date	to	Date
\$0.00	October 1, 2014		September 30, 2015

- (b) by the party of the second part during the period

Amount	Date	to	Date
\$67,000.00	October 1, 2014		September 30, 2015

USGS DUNS: 137774548

Match Pair Code: XG

- (c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
 - (d) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.
3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered quarterly. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

**U.S. Geological Survey
United States
Department of the Interior**

USGS Point of Contact

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City of Columbia

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Telephone: 573-445-9427
Email:

Signatures and Date

Signature:

Date:

Signature:

Date:

Name:

Michael E. Slifer

Name:

Title:

Director, MO WSC

Title:



SUPPORTING DOCUMENTS INCLUDED WITH THIS AGENDA ITEM ARE AS FOLLOWS:

Proposal for Hydrologic Monitoring of McBaine Bottoms, including the Eagle Bluffs
Conservation Area

HYDROLOGIC MONITORING OF MCBAIN BOTTOMS, INCLUDING THE EAGLE BLUFFS CONSERVATION AREA

INTRODUCTION

The City of Columbia, Missouri and the Missouri Department of Conservation (MDC) in cooperation with the U.S. Geological Survey (USGS) have conducted water-quality monitoring and hydrologic monitoring in McBaine Bottoms (fig. 1) since 1992 to assess the effect of constructed wetlands on groundwater quality and flow. A significant conclusion resulting from analysis of data collected during the first few years of investigation was that inorganic compounds associated with sewage effluent in the wetlands could potentially migrate from the wetlands toward the city of Columbia municipal well field. Analysis of samples from as many as 32 monitoring wells in the vicinity of the wetlands and well field over the next few years conclusively showed that concentrations of calcium, chloride, potassium, sodium, and sulfate (indicator constituents) substantially changed in the groundwater beneath Eagle Bluffs Conservation Area and at treatment wetland unit 1. Water-level measurements made during these years showed that the groundwater flow direction was radially away from the wetlands and that the effluent enriched groundwater had the potential to migrate toward the city of Columbia well field. Fifty-five groundwater level monitoring wells were installed in McBaine Bottoms in 2000. These wells were used in conjunction with the existing water-quality monitoring wells to provide a comprehensive monitoring-well network that could be used to map the groundwater surface and better interpret groundwater flow directions. Analysis of the data collected from these wells showed that water from the wetlands and treatment cells flows toward the city of Columbia well field (fig. 1).

In addition to increased concentrations of inorganic constituents, such as chloride, the effluent contains a variety of man-made organic compounds. In a sample collected in June 1999 from the effluent at treatment wetland unit 1 below the wastewater treatment outfall, several pharmaceutical and wastewater indicator compounds were detected. The compounds and concentrations, in micrograms per liter, included: cimetidine (stomach and intestinal ulcers), 3.53 (estimated); sulfamethoxazole (bladder infections), 1.02; gemfibrozil (high triglycerides), 0.556; NPEOI (surfactant), 2.0 (estimated); bisphenol A (epoxy resins and plastics), 3.2; ethanol,2-butoxy-phosphate (plastics), 3.2; and paranonylphenol (endocrine disruptor), 29.4 (estimated).

From 1999 through 2003, more than 35 wastewater indicator compounds and pesticides were detected in samples from the city outflow adjacent to treatment wetland unit 3. Most concentrations were estimated or their presence verified, but not quantified. In a sample from the city outflow collected in August 2007, 29 wastewater indicator compounds were detected; the presence 10 of the compounds was verified, but not quantified.

In 2003, groundwater sampling was focused on determining the presence or absence of about 70 wastewater indicator compounds such as caffeine, pharmaceuticals, cholesterol, hormones, polycyclic aromatic hydrocarbons (PAHs), and common household disinfectants. Some samples also were collected to analyze for a class of compounds broadly characterized as "emerging contaminants". These compounds include potential endocrine disruptor compounds

that may modify the normal functioning of human and wildlife hormone systems and cause developmental, behavioral, and reproductive problems. Eleven wastewater indicator compounds were detected in samples from monitoring wells. Detected concentrations were estimated or their presence verified, but not quantified, except for atrazine concentrations of 0.007 and 0.008 microgram per liter and phenol concentrations that ranged from 0.5 to 1.8 micrograms per liter.

Previous work has identified that changes in groundwater chemistry are occurring because of the current operation of the wastewater treatment wetlands and practice of discharging treated sewage effluent on the Eagle Bluffs Conservation Area and that this water can potentially reach the city of Columbia water-supply wells. Routine monitoring of a selected number of wells located in critical areas will allow the tracking of long-term changes in water quality and flow. This information will enable city of Columbia water-resource managers to develop better well-field operational and contingency plans designed to protect the well field.

Water samples were collected from 15 to 16 monitoring wells from 2005 through 2007. Samples were collected using standard USGS procedures by USGS Missouri Water Science Center personnel and analyzed at the USGS National Water Quality Laboratory in Denver, Colorado. To establish the flow conditions at the time of sampling, water-level measurements were made at the existing 87 groundwater monitoring sites. Samples were collected and water-level measurements were made twice per year. Two deep wells were drilled in McBaine Bottoms in 2007--one west of treatment wetland unit 3 and the other adjacent to monitoring wells MW4-2A and MW4-2B on the Eagle Bluffs Conservation Area. The largest chloride concentration detected in samples collected during 2007 was 230 milligrams per liter (monitoring well MW4-2B). Chloride concentrations in samples from the deep wells were 213 (monitoring well MW-116C) and 205 milligrams per liter (monitoring well MW4-2C).

Between 2008 and 2012, thirty-seven groundwater samples and 12 surface-water samples were collected and analyzed for wastewater compounds and pharmaceuticals. A total of 34 compounds were detected in groundwater samples, and of those, 14 compounds were found in quantifiable concentrations. In contrast, a total of 56 compounds were detected in surface-water samples, and 33 were found in quantifiable concentrations. The compounds DEET, Bisphenol A, and p-Cresol were the most frequently detected compounds in groundwater with 23, 18, and 11 detections respectively. The compounds 5-Methyl-1H-benzotriazole, Benzophenone, Carbamazepine, Cholesterol, Hexahydrohexamethyl cyclopentabenzopyran, Tributyl phosphate, Triethyl citrate, Tris(2-butoxyethyl) phosphate, and Tris(dichloroisopropyl) phosphate were detected in every surface-water sample.

STUDY AREA

McBaine Bottoms is located 7 miles southwest of Columbia, Missouri, along the north bank of the Missouri River. The area is bounded to the southwest by the Missouri River and to the northeast by Perche Creek. The city of Columbia wastewater treatment wetlands are located along Perche Creek north of the Eagle Bluffs Conservation Area, which occupies the southern part of McBaine Bottoms.

The surficial material underlying the Eagle Bluffs Conservation Area mainly consists of Missouri River alluvium, which is comprised of coarse sand and gravel in the lower part and

fine sand, silt, or clay in the upper part. The average saturated thickness is approximately 60 feet.

PURPOSE FOR STUDY

The combination of effluent-enriched groundwater and a groundwater flow pattern that can transport contaminants toward the city of Columbia well field is cause for concern about the potential for introduction of effluent-enriched groundwater into the municipal water supply of Columbia. The purpose of this long-term monitoring plan is to provide the city of Columbia with the information needed to protect the well field and ensure good-quality drinking water for the city.

OBJECTIVE

The objective of this long-term groundwater-monitoring plan is to continue to monitor the water quality throughout McBaine Bottoms to track changes in groundwater quality related to the city of Columbia public-supply well field and the Eagle Bluffs Conservation Area. The wells sampled are those most likely to intercept groundwater flowing from beneath the Eagle Bluffs Conservation Area and the wastewater treatment wetlands toward the city of Columbia well field. This plan includes the routine sampling of some monitoring wells and some surface water sites.

APPROACH

The first project task scheduled for FY2015 is the installation of up to two deep (more than 80 ft deep) monitoring wells. One of these locations could be gained by attempting to rehabilitate existing damaged monitoring well MW13-67 so that it can be sampled and used as an additional deep aquifer monitoring point between the Eagle Bluffs Conservation Area and the City of Columbia well field. If well MW13-67 cannot be rehabilitated, it will be replaced by a new deep well (more than 80 ft deep) drilled nearby and well MW13-67 will be abandoned. A new deep monitoring well will be drilled near the existing well MW-133 to provide a deep aquifer monitoring point between the City of Columbia well field and wastewater treatment wetland unit 1.

Water-samples will be collected from nine groundwater and three surface-water locations (fig. 1, table 1). Groundwater samples will be collected from one well adjacent to wetland treatment unit 1 (MW1-2B), selected wells on the flow path between the wetland treatment units and the municipal well field (MW-133, new deep well MW-133-C), and selected wells on the flow path between the Eagle Bluffs Conservation Area and the municipal well field (MW4-2B, MW4-2C, MW-116, MW-116C, USGS-8S, MW13-67 or its replacement,). Surface-water samples will be collected from the Columbia STP outflow, the Columbia wetland outflow, and the Eagle Bluffs Conservation Area outflow. The sampling schedule in this work plan is proposed for fiscal years 2015 through 2020.

Water-quality sampling will begin during the third quarter FY 2015 with one set of samples collected in FY 2015 and bi-annual sampling in subsequent years. Physical properties will be determined for all samples (pH, temperature, specific conductance, dissolved oxygen, depth to water) and all samples collected will be analyzed for inorganic indicator constituents and nutrients (table 2). Samples will be analyzed for pesticides (table 3) one time each year during

alternate years beginning in FY 2016. Groundwater samples will be analyzed for wastewater organic compounds and pharmaceuticals (table 4) one time each year during alternate years beginning in FY 2017. Surface-water samples will be analyzed for wastewater organic compounds and pharmaceuticals more frequently with annual samples collected beginning in FY 2016.

If monitoring well MW13-67 cannot be rehabilitated and must be replaced by a new well, then samples collected during the third quarter FY2015 will be analyzed for a reduced set of constituents that will only include inorganic indicator constituents and nutrients (table 2). Every two years, beginning in FY2016, a mass water-level measurement will be made and a water-level map constructed.

DELIVERABLES

After the validation of all water-level and analytical data, the data will be provided to the City of Columbia. All of the data will be archived in the USGS National Water Information System database available on the World Wide Web. Hard copies of the data will be made available upon request. Annual briefings of study progress will be provided to city of Columbia personnel.

BENEFITS

The data set will help managers and planners assess the magnitude of the potential detrimental effects that effluent-enriched ground and surface water could pose on the municipal supply. Information from this study will help to more efficiently locate new groundwater monitoring sites (if necessary) or identify existing sites that will be monitored in the future to protect this valuable resource.

TIMELINE AND BUDGET

USGS personnel trained in the hydrologic sciences will do all fieldwork, data review and processing, and project management. The USGS National Water Quality Laboratory in Denver, Colorado, will complete all laboratory chemical analyses. Periodic review of the data and trends may warrant changes in the focus of the project.

Federal Fiscal Year	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
Fiscal Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Install deep monitoring wells	X	X	X																					
Groundwater and surface-water inorganic samples			X		X		X		X		X		X		X		X		X		X		X	
Groundwater and surface-water pesticide samples							X						X										X	
Groundwater wastewater organics and pharmaceutical samples											X							X						
Surface-water wastewater organics and pharmaceutical samples							X				X				X			X					X	
Mass water-level measurements							X								X						X			

	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Well Drilling	\$33,000	\$0	\$0	\$0	\$0	\$0
Salaries	\$21,800	\$26,470	\$23,740	\$32,370	\$29,570	\$34,160
Travel and vehicles	\$3,700	\$3,810	\$3,600	\$4,030	\$3,810	\$4,260
Equipment and miscellaneous	\$2,700	\$1,440	\$1,480	\$1,530	\$1,570	\$1,610
Laboratory and lab supplies	\$5,800	\$25,440	\$34,030	\$26,270	\$34,050	\$27,720
Total	\$67,000	\$57,160	\$62,850	\$64,200	\$69,000	\$67,750

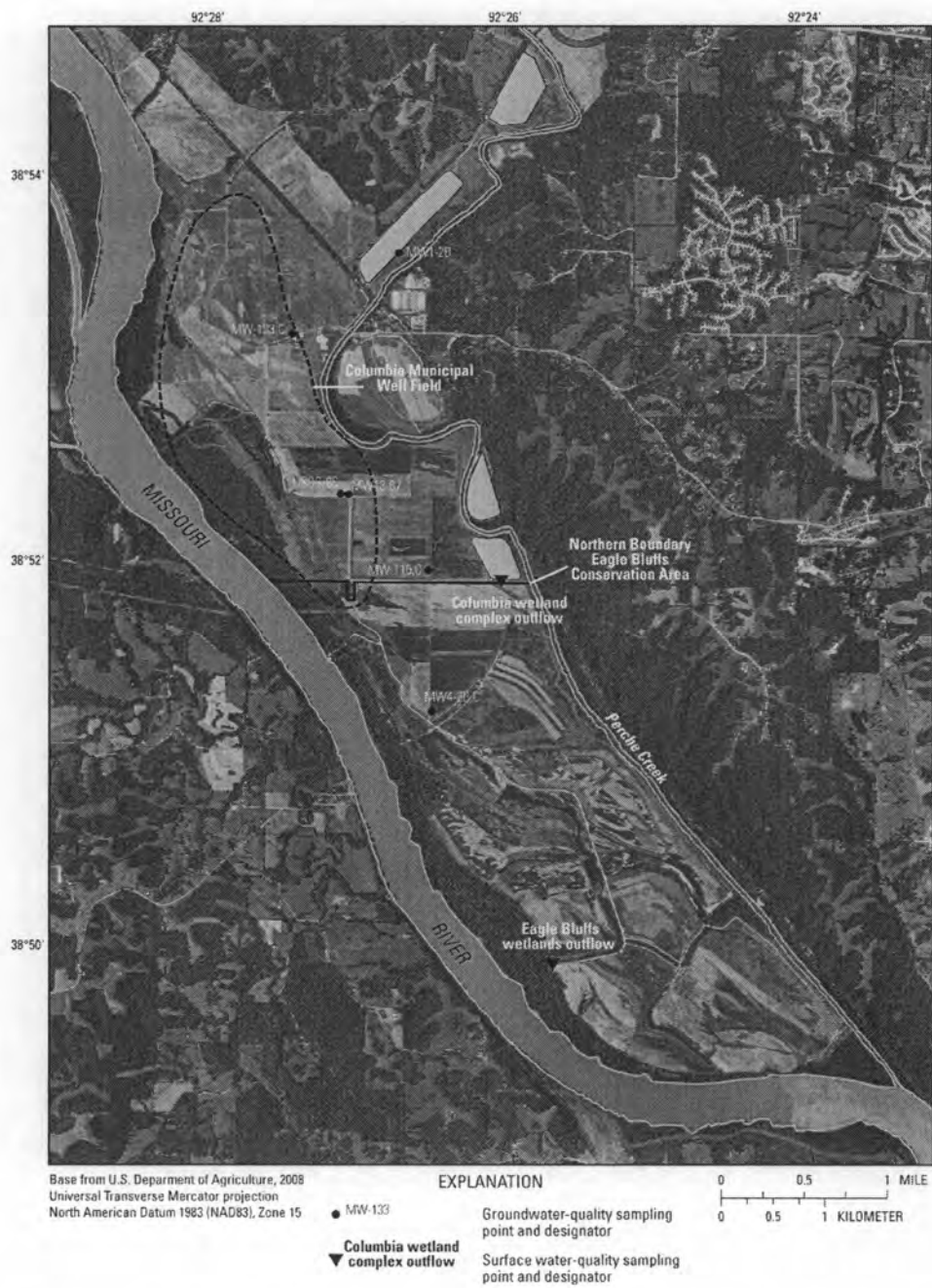


Figure 1. Location of water-quality sampling points in McBaine Bottoms, near Columbia, Missouri (Columbia wastewater treatment plant not shown on map).

Table 1. Sampling sites.

Site	Site Type	Number of samples per year inorganic(organic)
MW1-2B	GW	2(1)
MW4-2B	GW	2(1)
MW4-2C	GW	2(1)
MW-116	GW	2(1)
MW-116C	GW	2(1)
MW-133	GW	2(1)
MW-133C (new well)	GW	2(1)
USGS-8S	GW	2(0)
MW13-67 (or equivalent new well)	GW	2(1)
Columbia STP outflow	SW	2(1)
Columbia wetland outflow	SW	2(1)
Eagle Bluffs outflow	SW	2(1)
Quality Assurance samples	QA	3(1)
Total		27(12)

Analyte ▲	Lab Code	Parameter Code	M	CAS Number	RL	Unit		
Fluoranthene		34376	B0009	206-44-0	0.2	ug/L		
Hexahydrohexamethylcyclopentabenzopyran (HHCB)		62823	B0053	1222-05-5	0.2	ug/L		
Indole		62824	B0054	120-72-9	0.2	ug/L		
Isoborneol		62825	B0055	124-76-5	0.2	ug/L		
Isophorone		34408	B0010	78-59-1	0.2	ug/L		
Isoquinoline		62826	B0056	119-65-3	0.2	ug/L		
d-Limonene		62819	B0049	5989-27-5	0.2	ug/L		
Menthol		62827	B0057	89-78-1	0.2	ug/L		
Metalaxyl		04254	B0002	57837-19-1	0.2	ug/L		
Metolachlor		82612	B0078	51218-45-2	0.2	ug/L		
Naphthalene		34696	B0016	91-20-3	0.2	ug/L		
1-Methylnaphthalene		81696	B0077	90-12-0	0.2	ug/L		
2,6-Dimethylnaphthalene		62805	B0035	581-42-0	0.2	ug/L		
2-Methylnaphthalene		30194	B0003	91-57-6	0.2	ug/L		
4-Nonylphenol diethoxylate, (sum of all isomers) aka NP2EO		61703	B0025		3.2	ug/L		
p-Cresol		77146	B0071	106-44-5	0.2	ug/L		
4-Cumylphenol		62808	B0038	599-64-4	0.2	ug/L		
para-Nonylphenol (total) (branched)		62829	B0059	84852-15-3	1.6	ug/L		
4-n-Octylphenol		62809	B0039	1806-26-4	0.2	ug/L		
4-tert-Octylphenol		62810	B0040	140-66-9	0.4	ug/L		
Phenanthrene		34461	B0011	85-01-8	0.2	ug/L		
Phenol		34694	B0015	108-95-2	0.2	ug/L		
Pentachlorophenol		39032	B0018	87-86-5	0.8	ug/L		
Tributyl phosphate		62832	B0062	126-73-8	0.2	ug/L		
Triphenyl phosphate		62834	B0064	115-86-6	0.2	ug/L		
Tris(2-butoxyethyl)phosphate		62830	B0060	78-51-3	0.2	ug/L		
Tris(2-chloroethyl)phosphate		62831	B0061	115-96-8	0.2	ug/L		
bis(2-Ethylhexyl) phthalate		39100	00076	117-81-7	2	ug/L		
Diethyl phthalate		34336	00076	84-66-2	0.2	ug/L		
Prometon		39056	B0019	1610-18-0	0.2	ug/L		
Pyrene		34469	B0012	129-00-0	0.2	ug/L		
Methyl salicylate		62828	B0058	119-36-8	0.2	ug/L		
Sample volume		99963	B0081			mL		
3-Methyl-1(H)-indole (Skatole)		62807	B0037	83-34-1	0.2	ug/L		
beta-Sitosterol		62815	B0045	83-46-5	1.6	ug/L		
beta-Stigmastanol		61948	B0034	19466-47-8	1.7	ug/L		
Triclosan		61708	B0029	3380-34-5	0.2	ug/L		
Tris(dichlorisopropyl)phosphate		61707	B0028	13674-87-8	0.2	ug/L		

Table 2. Inorganic major Ions (USGS schedule 546) and nutrients (USGS Schedule 800).

Inorganic major Ions (USGS schedule 546)

Analyte ▲	Lab Code	Parameter Code	M	CAS Number	RL	Unit	RL Type	C A	Container
Acid Neutralizing Capacity (ANC), laboratory	70	90410	TT040	471-34-1	8	mg/L	lrl		RU
Calcium	659	00915	PLA11	7440-70-2	0.044	mg/L	lrl		FA
Chloride	1571	00940	IC022	16887-00-6	0.12	mg/L	lrl		FU
Fluoride	31	00950	ISE05	16984-48-8	0.08	mg/L	lrl		FU
Inductively coupled plasma (ICP) setup	2002	L2002				unsp	lrl		FA
Magnesium	663	00925	PLA11	7439-95-4	0.016	mg/L	lrl		FA
pH, laboratory	68	00403	EL006		0.1	pH	mrl		RU
Potassium	2773	00935	PLO03	7440-09-7	0.064	mg/L	lrl		FA
Sodium	675	00930	PLA11	7440-23-5	0.10	mg/L	lrl		FA
specific conductance, laboratory	69	90095	WHT03		5	uS/cm	mrl		RU
Sulfate	1572	00945	IC022	14808-79-8	0.18	mg/L	lrl		FU

Nutrients (USGS Schedule 800)

Analyte ▲	Lab Code	Parameter Code	M	CAS Number	RL	Unit	RL Type	C A	Container
Nitrogen, ammonia as N	3116	00608	00048	7664-41-7	0.02	mg/L	lrl		FCC
nitrogen, ammonia + organic nitrogen	1986	00625	KJ008	17778-88-0	0.10	mg/L	lrl		WCA
nitrogen, nitrite	3117	00613	00049	14797-65-0	0.002	mg/L	lrl		FCC
nitrogen, nitrite + nitrate	1975	00631	CL048		0.04	mg/L	lrl		FCC
Phosphorus	1983	00666	KJ005	7723-14-0	0.04	mg/L	lrl		FCC
phosphorus, phosphate, ortho	3118	00671	00048	14265-44-2	0.008	mg/L	lrl		FCC
Phosphorus	1984	00665	KJ009	7723-14-0	0.04	mg/L	lrl		WCA

Table 3. Pesticides (USGS schedule 2001), wastewater organics (USGS schedule 4433), and pharmaceuticals (USGS schedule 2080).

Pesticides (USGS schedule 2001)

Analyte▲	Lab	Parameter	M	CAS Number	RL	Unit	RL	C	Container
alpha-HCH		34253	GCM35	319-84-6	0.0040	ug/L	lrl	C	48 (GCC)
Acetochlor		49260	GCM33	34256-82-1	0.010	ug/L	lrl		48 (GCC)
Alachlor		46342	GCM35	15972-60-8	0.008	ug/L	lrl		48 (GCC)
2,6-Diethylaniline		82660	GCM35	579-66-8	0.0060	ug/L	irl		48 (GCC)
Atrazine		39632	GCM35	1912-24-9	0.008	ug/L	lrl		48 (GCC)
Azinphos-methyl		82686	GCM35	86-50-0	0.12	ug/L	lrl	C	48 (GCC)
Benfluralin		82673	GCM35	1861-40-1	0.014	ug/L	lrl		48 (GCC)
Butylate		04028	GCM35	2008-41-5	0.0040	ug/L	lrl		48 (GCC)
Carbaryl		82680	GCM35	63-25-2	0.06	ug/L	lrl		48 (GCC)
Carbofuran		82674	GCM35	1563-66-2	0.060	ug/L	lrl		48 (GCC)
Chlorpyrifos		38933	GCM35	2921-88-2	0.010	ug/L	irl		48 (GCC)
cis-Permethrin		82687	GCM35	61949-76-6	0.010	ug/L	lrl		48 (GCC)
Cyanazine		04041	GCM35	21725-46-2	0.022	ug/L	lrl		48 (GCC)
Dacthal		82682	GCM35	1861-32-1	0.0076	ug/L	lrl		48 (GCC)
2-Chloro-4-isopropylamino-6-		04040	GCM35	6190-65-4	0.010	ug/L	lrl		48 (GCC)
Diazinon		39572	GCM35	333-41-5	0.0060	ug/L	lrl	C	48 (GCC)
Diazinon-d10 (<i>surrogate</i>)		91063	GCM35	100155-47-3		pct			48 (GCC)
Dieldrin		39381	GCM35	60-57-1	0.008	ug/L	lrl		48 (GCC)
Disulfoton		82677	GCM35	298-04-4	0.040	ug/L	lrl	C	48 (GCC)
EPTC		82668	GCM35	759-94-4	0.0056	ug/L	lrl		48 (GCC)
Ethalfuralin		82663	GCM35	55283-68-6	0.006	ug/L	lrl		48 (GCC)
Ethoprophos		82672	GCM35	13194-48-4	0.016	ug/L	lrl		48 (GCC)
Fipronil		62166	GCM31	120068-37-3	0.018	ug/L	lrl		48 (GCC)
Desulfinylfipronil amide		62169	GCM31		0.029	ug/L	irl		48 (GCC)
Fipronil sulfide		62167	GCM31	120067-83-6	0.016	ug/L	lrl		48 (GCC)
Fipronil sulfone		62168	GCM31	120068-36-2	0.024	ug/L	lrl		48 (GCC)
Desulfinylfipronil		62170	GCM31		0.012	ug/L	irl		48 (GCC)
Fonofos		04095	GCM35	944-22-9	0.0048	ug/L	lrl		48 (GCC)
alpha-HCH-d6 (<i>surrogate</i>)		91065	GCM35	86194-41-4		pct			48 (GCC)
Lindane		39341	GCM35	58-89-9	0.0040	ug/L	lrl		48 (GCC)
Linuron		82666	GCM35	330-55-2	0.06	ug/L	lrl		48 (GCC)
Malathion		39532	GCM35	121-75-5	0.016	ug/L	lrl	C	48 (GCC)
Methyl parathion		82667	GCM35	298-00-0	0.008	ug/L	lrl	C	48 (GCC)

Analyte	Lab	Parameter	M	CAS Number	RL	Unit	RL	C	Container
Metolachlor		39415	GCM35	51218-45-2	0.012	ug/L	lrl		48 (GCC)
Metribuzin		82630	GCM35	21087-64-9	0.012	ug/L	lrl		48 (GCC)
Molinate		82671	GCM35	2212-67-1	0.008	ug/L	lrl		48 (GCC)
Napropamide		82684	GCM35	15299-99-7	0.010	ug/L	lrl		48 (GCC)
p,p'-DDE		34653	GCM35	72-55-9	0.0048	ug/L	lrl	C	48 (GCC)
Parathion		39542	GCM35	56-38-2	0.020	ug/L	lrl	C	48 (GCC)
Pebulate		82669	GCM35	1114-71-2	0.0160	ug/L	lrl		48 (GCC)
Pendimethalin		82683	GCM35	40487-42-1	0.012	ug/L	lrl		48 (GCC)
Phorate		82664	GCM35	298-02-2	0.020	ug/L	lrl		48 (GCC)
Prometon		04037	GCM35	1610-18-0	0.012	ug/L	lrl		48 (GCC)
Propachlor		04024	GCM35	1918-16-7	0.006	ug/L	lrl		48 (GCC)
Propanil		82679	GCM35	709-98-8	0.010	ug/L	lrl		48 (GCC)
Propargite		82685	GCM35	2312-35-8	0.020	ug/L	lrl		48 (GCC)
Propyzamide		82676	GCM35	23950-58-5	0.008	ug/L	lrl		48 (GCC)
Sample volume		99856	GCM35			mL			48 (GCC)
set number, schedule 2001		99818	GCM35			no.			48 (GCC)
Simazine		04035	GCM35	122-34-9	0.006	ug/L	lrl		48 (GCC)
Tebuthiuron		82670	GCM35	34014-18-1	0.028	ug/L	lrl		48 (GCC)
Terbacil		82665	GCM35	5902-51-2	0.024	ug/L	lrl		48 (GCC)
Terbufos		82675	GCM35	13071-79-9	0.018	ug/L	lrl		48 (GCC)
Thiobencarb		82681	GCM35	28249-77-6	0.016	ug/L	lrl		48 (GCC)
Tri-allate		82678	GCM35	2303-17-5	0.0046	ug/L	lrl		48 (GCC)
Trifluralin		82661	GCM35	1582-09-8	0.018	ug/L	lrl		48 (GCC)

Table 4. Wastewater organics (USGS schedule 4433) and pharmaceuticals (USGS schedule 2080).

Wastewater Organic Compounds (USGS Schedule 4433)

Analyte ▲	Lab Code	Parameter Code	M	CAS Number	RL	Unit		
Cotinine		61945	B0031	486-56-6	0.8	ug/L		
2,2',4,4'-Tetrabromodiphenyl ether		63147	00076	5436-43-1	0.3	ug/L		
3,4-Dichlorophenyl isocyanate		63145	00076	102-36-3	1.6	ug/L		
4-Nonylphenol monoethoxylate, (sum of all isomers) aka NP1EO		61704	00076		1.6	ug/L		
4-tert-Octylphenol diethoxylate, aka OP2EO		62486	GCM99		0.5	ug/L		
4-tert-Octylphenol monoethoxylate, aka OP1EO		62485	GCM99		1	ug/L		
5-Methyl-1H-benzotriazole		61944	B0030	136-85-6	1.6	ug/L		
Anthraquinone		62813	B0043	84-65-1	0.2	ug/L		
Acetophenone		62811	B0041	98-86-2	0.4	ug/L		
Acetyl hexamethyl tetrahydronaphthalene (AHTN)		62812	B0042	21145-77-7	0.2	ug/L		
Anthracene		34220	B0007	120-12-7	0.2	ug/L		
Atrazine		39630	00076	1912-24-9	0.2	ug/L		
1,4-Dichlorobenzene		34571	B0014	106-46-7	0.2	ug/L		
Benzo[a]pyrene		34247	B0008	50-32-8	0.2	ug/L		
Benzophenone		62814	B0044	119-61-9	0.2	ug/L		
Bromacil		30234	B0005	314-40-9	0.8	ug/L		
Bromoform		32104	B0006	75-25-2	0.2	ug/L		
3-tert-Butyl-4-hydroxy anisole (BHA)		61702	B0024	25013-16-5	0.2	ug/L		
Caffeine		81436	B0075	58-08-2	0.2	ug/L		
Caffeine-C13		62840	B0066			pct		
Camphor		62817	B0047	76-22-2	0.2	ug/L		
Carbaryl		39750	B0021	63-25-2	0.2	ug/L		
Carbazole		77571	B0073	86-74-8	0.2	ug/L		
Chlorpyrifos		38932	B0017	2921-88-2	0.2	ug/L		
Cholesterol		62818	B0048	57-88-5	1.6	ug/L		
3-beta-Coprostanol		62806	B0036	360-68-9	1.6	ug/L		
Isopropylbenzene		77223	B0072	98-82-8	0.2	ug/L		
Fluoranthene-d10		62842	B0068	93951-69-0		pct		
Bisphenol A-d3		62839	B0065			pct		
Decafluorobiphenyl		62841	B0067	434-90-2		pct		
N,N-diethyl-meta-toluamide (DEET)		61947	B0033	134-62-3	0.2	ug/L		
Diazinon		39570	B0020	333-41-5	0.2	ug/L		
Dichlorvos		30218	B0004	62-73-7	0.2	ug/L		
Bisphenol A		62816	B0046	80-05-7	0.4	ug/L		
Triethyl citrate (ethyl citrate)		62833	B0063	77-93-0	0.2	ug/L		
Tetrachloroethylene		34475	B0013	127-18-4	0.4	ug/L		

Pharmaceuticals (USGS schedule 2080)

Analyte	Lab Code	Parameter Code	M	CAS Number	RL	Unit	RL Type	C A	Container
Cotinine		62005	00021	486-56-6	0.038	ug/L	lrl		GCC
1,7-Dimethylxanthine (p-Xanthine)		62030	00021	611-59-6	0.10	ug/L	lrl		GCC
Acetaminophen		62000	00021	103-90-2	0.12	ug/L	lrl		GCC
Albuterol (Salbutamol)		62020	00021	18559-94-9	0.08	ug/L	lrl		GCC
Sulfamethoxazole		62021	00021	723-46-6	0.16	ug/L	lrl		GCC
Caffeine		50305	00021	58-08-2	0.06	ug/L	lrl		GCC
Carbamazepine		62793	00021	298-46-4	0.06	ug/L	lrl		GCC
Carbamazepine-d10		90797	00021	132183-78-9		pct			GCC
Codeine		62003	00021	76-57-3	0.046	ug/L	lrl		GCC
Dehydronifedipine		62004	00021	67035-22-7	0.08	ug/L	lrl		GCC
Diltiazem		62008	00021	42399-41-7	0.06	ug/L	lrl		GCC
Diphenhydramine		62796	00021	147-24-0	0.036	ug/L	lrl		GCC
Ethyl nicotinate-d4		99571	00021	66148-16-1		pct			GCC
Sample volume		99572	00021		0.1	mL	mrl		GCC
Set number		S2080				no.			GCC
Thiabendazole		62801	00021	148-79-8	0.06	ug/L	lrl		GCC
Trimethoprim		62023	00021	738-70-5	0.034	ug/L	lrl		GCC
Warfarin		62024	00021	81-81-2	0.08	ug/L	lrl		GCC