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WATER PROTECTION PROGRAM

Jasper County, Missouri
Storm Water Management Plan
Small MS4 Permit MO-R040048

THIRD PERMIT TERM
2013-2018

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TRI-STATE ENGINEERING
P.O. Box 1867
Joplin, MO 64802
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JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

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JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
OVERVIEW

The Jasper County Storm Water Management Plan has been developed to implement the minimum control measures (MCM) required the by National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase 2 Program. The six MCM that are required for the program are:

1. Public Education and Outreach
2. Public Involvement / Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post Construction Storm Water Management
6. Pollution Prevention / Good Housekeeping Practices for Municipal Operations

The Phase 2 Storm Water Program for Jasper County covers the urbanized unincorporated areas of the County. These are typically areas outside the incorporation limits of municipalities in Jasper County (Joplin, Webb City, Carl Junction, Carthage, Oronogo, Carterville, etc.) where the population density exceeds a certain level. The total area within the current urbanized unincorporated area (2010 census data) regulated by the program is 8689 acres (13.6 square miles).

The primary county agency responsible for implementing the program is the Jasper County Health Department, 105 Lincoln Street, Carthage, Mo. 64836. The Health department is assisted by other county agencies and consultants.

There are four major receiving waters within the county's program area: Shoal Creek, Turkey Creek, Center Creek and Spring River.

There are critical habitats within the program area where threatened or endangered species could be found. The species, status and the critical habitat are listed in the following table.

The following subsections outline the best management practices (tasks), measurable goals and implementation schedule for each of the six control measures proposed by the County for the next permit term.

The purpose of the program is to educate and involve the public and other groups (businesses, developers, industrial, educational, and institutional entities) to consider the impact their behavior has on storm water runoff and what the positive benefits are to becoming better stewards of our environment.

CRITICAL HABITATS

SPECIES	STATUS	HABITAT
Gray Bat (Myotis Grisescens)	Endangered	Caves
Arkansas Darter (Etheostoma cragini)	Candidate	Rivers
Neosho Madtom (Noturus Placidus)	Threatened	Rivers
Ozark Cave Fish	Threatened	Caves in the Boone and Burlington formations of the Ozark Mountains

Minimum Control Measure #1: Public Education and Outreach

The county's public education and outreach program uses many different means to inform and educate the public on the steps they can take to reduce pollutants in storm water runoff and the impact that storm water runoff can have on water bodies in the county.

The county works in cooperation with the city of Joplin on press releases, TV interviews, public service announcements, newspaper articles, and other educational materials for distribution to the public.

The city has published several brochures and pamphlets for use by homeowners, developers and businesses which are available to county residents.

Posters and brochures have been placed at the courthouse and the county Health Dept. for people to view and obtain.

The county also maintains a website: www.jaspercounty.org. The health department's webpage contains education information on the various environmental services the county provides.

Table 1.1 lists the pollutants and the various audiences which will be the subjects of the education and outreach program. The county has targeted these in cooperation with the city of Joplin and the other cities in the county.

The county also coordinates its Illicit Discharge Educational Program with the city of Joplin to inform the public on the impact of illicit discharges on water quality.

The county maintains an active stream monitoring program with 21 sampling sites monitoring E Coli levels in the Turkey Creek, Center Creek, and Spring River watersheds. The results of the monitoring program are available for review by the public.

Table 1.2 lists the Public Education and Outreach program tasks (BMP's) with measurable goals.

TABLE 1.1
TARGET AUDIENCE FOR EDUCATIONAL PROGRAM

AUDIENCE	Fertilizers: Nutrients	Pesticides; Herbicides	Yard Wastes	Oils and Grease	Sediment: Construction Debris	Illicit Discharge	Heavy Metals
Homeowners; Citizens	X	X	X	X		X	X
Commercial; Business Owners	X	X	X	X		X	
Developers; Home Builders	X	X		X	X	X	X
Industrial	X	X		X	X	X	
Institutional (Elected Officials; County Staff)	X	X		X	X	X	
Educational (Teachers, students)	X	X	X	X	X	X	X

TABLE 1.2
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Establish / Maintain Storm Water Program on Health Dept. webpage	Establish webpage; track number of hits on webpage	January 31, 2014
Maintain supply of Storm Water brochures at Health Department and Courthouse to distribute to public	Replenish Supply twice a year	Annual
Issue Press Releases concerning Storm Water Issues	Track number of hits on website	Annual
Advertise Disposal of Household Hazardous wastes	Provide link to City of Joplin's Webpage	Annual
Advertise Development of Storm Water Management Program in local Newspaper	Track number of hits on webpage	Annual
Develop questionnaire and conduct on-line survey for testing public's knowledge of storm water issues	Prepare questionnaire; track number of hits on webpage; post results of survey	January 31, 2015

Minimum Control Measure 2: Public Involvement and Participation

The county will encourage public involvement and participation by using methods outlined in the Public Education and Outreach measures to advertise the participation activities.

The public will be encouraged to participate in the development of the storm water management plan by advertising in local newspapers and holding a public hearing at the county commission. The public will be encouraged to review a summary of the plan on the Health Department's webpage.

Table 2.1 lists the Public Involvement and Participation program tasks (BMP's) with measurable goals.

TABLE 2.1
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Illicit Connection / Illegal Dumping Notification system by e-mail or phone calls	Document number of calls; track number of hits on webpage	Annual
Advertise Summary of Storm Water Management Plan	Track number of hits to website	Annual
Advertise Household Hazardous Waste Collection	Track number of hits on webpage	Annual
Participate in local storm water committee	Document number of meetings	Annual

MCM 3: Illicit Discharge Detection and Elimination

The county has developed a storm sewer map showing the location of all outfalls with the names of the receiving stream. The map will be updated on an annual basis.

The county has adopted an ordinance regulating illicit discharges within the program areas of the county (Ordinance 2010-02). The ordinance provides for monitoring for illicit discharges, enforcement actions and addresses non-storm water discharges.

The county will perform dry weather screening of all the outfalls on an annual basis. The personnel will investigate any dry weather flows for potential illicit discharges and investigate evidence of pollution or illegal dumping. The county will also rely on public participation by responding to complaints filed through the online complaint form or by phone or other personal communications.

The county maintains a website: www.jaspercounty.org. The county maintains a countywide GIS map with parcel mapping. The program areas are included as an overlay to make tracking construction activities and plan coordination easier between the different county departments.

Jasper County Health Department webpage on the county's website contains information concerning the environmental services the county provides. An online form for reporting complaints is available for county residents use.

The county maintains an active stream monitoring program with sampling sites monitoring E Coli levels in the Turkey Creek, Center Creek, and Spring River watersheds.

The county works in cooperation with the city of Joplin for providing education materials for addressing illicit discharges and overall goals of the storm water program. The city has prepared brochures and other educational material for distribution. The city also provides training for staff and other interested stakeholders concerning illicit discharges.

The city of Joplin has implemented a recycling program for household hazardous waste which is available to all county residents.

A Storm Water Management Manual was prepared for county health department field staff for use during their normal duties. This manual provides the staff with copies of the county outfall location maps; copies of adopted storm water ordinances; copies of inspection forms and other information needed to implement the county's storm water program.

The county has determined that the following categories of non-storm water discharges (illicit discharges) are not significant pollutants to their program:

Water line flushing	Landscape Irrigation
Diverted stream flows	Rising ground waters
Uncontaminated ground water infiltration (as defined in MOCSR 20-6.200)	
Uncontaminated pumped ground water	Discharges from Potable Water sources
Foundation Drains	Air conditioning condensation
Springs	Water from crawl space pumps
Footing drains	Lawn watering
Flows from riparian habitats and wetlands	Street water wash
Discharges or flows from fire fighting activities	
Non-commercial washing of vehicles	Swimming pools (if de-chlorinated)

Table 3.1 lists the Illicit Discharge Detection and Elimination program tasks (BMP's) with measurable goals.

TABLE 3.1
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Maintain Outfall / Storm Drainage System Map	Maintain and Update Map	Annual
Distribute brochure on proper disposal of waste and hazards of illicit discharges	Track number of hits on webpage; Replenish supply semi-annually	Annual
Issue Building Permits for on-site wastewater treatment systems	Document number of permits issued	Annual
Perform inspections for restaurants and other food service operations	Document number of inspections performed.	Annual

Minimum Control Measure 4: Construction Site Storm Water Runoff Control

The county maintains a countywide GIS map including parcel mapping. The unincorporated urbanized areas regulated by the county Phase 2 program included as an overlay. The map is used by county staff for administrative purposes to track storm water permits and coordinate between the different county agencies.

The County has passed an Erosion and Sediment control ordinance (2007-xx) regulating construction activities for areas of one acre or larger within the unincorporated urbanized areas of the county. As part of the ordinance, the county will review all development plans presented for review and approval.

The County has prepared a Storm Water Management Manual for Health department field staff for use during their normal duties. This manual provides the staff with copies of the county outfall location maps; copies of adopted storm water ordinances; copies of inspection forms and other information needed to implement the county's storm water program.

Table 4.1 lists the Construction Site Storm Water Runoff Control program tasks (BMP's) with measurable goals.

TABLE 4.1
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Review Site Plans and permits for construction Projects	Review all plans	Annual
Conduct inspections of active construction sites within jurisdictions	Inspect all active sites in jurisdiction	Annual
Advertise through webpage for citizens to register complaints concerning construction projects	Track number of hits on webpage; document response to all complaints	Annual
Promote training sessions for developers and staff	Document number of training sessions; document number of participants at sessions	Annual

Minimum Control Measure 5: Post-Construction Storm Water Management

The county maintains a countywide GIS map including parcel mapping. The areas regulated by the county under the storm water ordinance are included as an overlay to make tracking construction activities and plan coordination easier between the different county departments. The map is used for administration and tracking storm water permits, inspections and outfall locations.

The county has passed an ordinance (Ordinance 2010-01) regulating post construction storm water management for site development within the unincorporated urbanized areas of the county.

A Storm Water Management Manual was prepared for county health department field staff for use during their normal duties. This manual provides the staff with copies of the county outfall location maps; copies of adopted storm water ordinances; copies of inspection forms and other information needed to implement the county's storm water program.

Table 5.1 lists the Post Construction Storm Water Management pogram tasks (BMP's) with measurable goals.

TABLE 5.1
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Review site plans for post construction maintenance operations	Review all site plans	Annual
Conduct inspection of developments for post construction operation and maintenance within jurisdiction	Inspect all sites within jurisdiction	Annual
Advertise training sessions with developers and staff for proper post construction operation and maintenance activities	Participate in training sessions; document attendance	Annual

Minimum Control Measure 6: Pollution Prevention/Good Housekeeping

The county continues to work with the city of Joplin for assistance in completing some of the permit obligations for public education, public involvement as well as coordinating training exercises for county employees.

The city also provides training for employees and other interested stakeholders concerning illicit discharges and for good housekeeping activities.

Table 6.1 lists the Pollution Prevention Good Housekeeping tasks (BMP's) with measurable goals.

TABLE 6.1
TASKS AND MEASURABLE GOALS

TASK	MEASURABLE GOALS	IMPLEMENTATION SCHEDULE
Review flood plain development applications for water quality impacts	Review all applications	Annual
Advertise training session for staff on proper methods for pollution prevention	Participate in training session; document attendance	Annual

JASPER COUNTY, MISSOURI
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OUTFALLS

JASPER COUNTY, MISSOURI MS4
STORM WATER OUTFALL INDEX - MAY 2013

Outfall No.	1/4,1/4 Sect.	1/4 Sect.	Section	Township	Range	Latitude	Longitude	Receiving Water	USGS Quad	Description
1	SE	NE	1	28	33	37.178812 N	94.473487 W	Center Creek	Webb City	North Madision Bridge
2	NW	NW	7	28	32	37.168126 N	94.473458 W	Center Creek	Webb City	Inactive
3	NW	NE	20	28	32	37.134167 N	94.444167 W	Center Creek	Webb City	Inactive
4	SE	SW	29	28	32	37.112454 N	94.449233 W	Turkey Creek	Joplin East	Inactive
5	NE	SW	20	28	32	37.131667 N	94.451667 W	Center Creek	Webb City	Inactive
6	SE	SE	20	28	32	37.129722 N	94.438889 W	Center Creek	Webb City	Inactive
7	NW	SE	7	28	32	37.161075 N	94.462328 W	Center Creek	Webb City	Inactive
8	SE	NE	8	28	32	37.164062 N	94.440144 W	Center Creek	Webb City	Inactive
9	SE	SW	32	29	32	37.184729 N	94.450024 W	Center Creek	Webb City	Culvert on Ivy Road;east of Hwy D and Ivy Road intersection
10	NE	NE	1	28	33	37.181317 N	94.473628 W	Center Creek	Webb City	Culvert on railroad; south of Ivy Road
11	SW	SW	10	28	32	37.158381 N	94.419197 W	Center Creek	Webb City	Inactive
12	NW	NE	8	27	32	37.083321 N	94.448538 W	Turkey Creek	Joplin East	Inactive
13	NE	SW	8	27	32	37.076240 N	94.453191 W	Turkey Creek	Joplin East	Culvert on E. 13TH Street; west of Tulip Lane
14	SW	NW	5	27	33	37.095672 N	94.566319 W	Turkey Creek	Joplin West	Culvert on Central City Rd. south of Belle Center Rd.
15	NW	NE	5	27	33	37.100349 N	94.556401 W	Turkey Creek	Joplin West	Culvert on Belle Center Rd.; east of Valve Rd.
16	NE	SW	7	27	33	37.077898 N	94.579011 W	Spring River	Joplin West	Culvert on Junge Ave.; east of Central City Rd.
17	NE	NE	18	27	33	37.070428 N	94.570441 W	Spring River	Joplin West	Culvert on 20TH Street; west of Twin Hills Drive
18	NE	SW	23	28	33	37.135217 N	94.505466 W	Center Creek	Carl Junction	Open Channel; 1/4 mile south & 1/8 mi. east of Elm Street and Bland Ave. intersection
19	NW	NW	34	28	33	37.112758 N	94.525589 W	Turkey Creek	Joplin West	Lone Elm Road bridge
20	SW	SE	28	28	33	37.114513 N	94.535807 W	Turkey Creek	Joplin West	Inactive
21	NW	SW	28	28	33	37.119034 N	94.547409 W	Turkey Creek	Joplin West	Culvert on Peace Church Rd. near Turkey Creek treatment plant
22	SW	NE	9	28	33	37.166383 N	94.535818 W	Center Creek	Carl Junction	Inactive
23	SE	SE	7	28	33	37.158879 N	94.567113 W	Center Creek	Carl Junction	Inactive
24	NE	NE	16	28	33	37.157570 N	94.529102 W	Center Creek	Carl Junction	open channel; west side of Hwy. 171 at Gum Road
25	NW	SE	15	28	33	37.149756 N	94.519308 W	Center Creek	Carl Junction	Culvert on Geneva Drive
26	NW	SW	33	29	31	37.188838 N	94.325486 W	Spring River	Carthage	Civil War Road bridge
27	NW	NE	5	28	31	37.180937 N	94.332532 W	Spring River	Carthage	Inactive
28	SE	NE	6	28	31	37.178980 N	94.345495 W	Spring River	Carthage	Open channel; end of Sandstone Drive; north of Oak Street
29	NE	SE	6	28	31	37.175253 N	94.345674 W	Spring River	Carthage	Culvert on Old 66 Blvd.; Country Club Road and Old 66 Blvd. intersection
30	NE	SW	6	28	31	37.174799 N	94.357414 W	Spring River	Carthage	Inactive
31	NE	SW	6	28	31	37.173319 N	94.359020 W	Spring River	Carthage	Culvert on Old 66 Blvd.; west of CL 166
32	NW	SW	6	28	31	37.173381 N	94.363454 W	Spring River	Carthage	Culvert on Old 66 Blvd.; east of CR 170
33	SW	SW	1	28	32	37.169586 N	94.381228 W	Center Creek	Carthage	Inactive
34	SE	SW	1	28	32	37.169489 N	94.375222 W	Center Creek	Carthage	Inactive
35	NE	NE	12	28	32	37.165784 N	94.366657 W	Center Creek	Carthage	Culvert on Hideaway Road; west of CR 170
36	SW	SE	7	28	31	37.155015 N	94.354571 W	Center Creek	Carthage	Culvert on Fairview Ave. west of CR 164
37	SE	SE	7	28	31	37.154870 N	94.377259 W	Center Creek	Carthage	Culvert on Fairview Ave. west of Country Club Rd.
38	NW	NW	8	28	31	37.166429 N	94.344004 W	Spring River	Carthage	Inactive
39	NE	NW	8	28	31	37.167676 N	94.336858 W	Spring River	Carthage	Culvert on Morgan Heights Rd. east of Piper Lane
40	SW	NE	8	28	31	37.162043 N	94.333211 W	Spring River	Carthage	Open Channel; west of Baker Street and Centennial Rd. intersection
41	NW	NW	16	28	31	37.152588 N	94.324077 W	Center Creek	Carthage	Culvert on Southside Drive; south of Fairview Ave.
42	NE	NE	21	28	31	37.137668 N	94.311549 W	Center Creek	Carthage	Culvert on West Virginia; west of Grand Ave.
43	NE	NW	11	27	34	37.086072 N	94.613447 W	Spring River	Joplin West	Culvert on Old 66 Blvd.
44	SW	SW	17	27	33	37.055831 N	94.563390 W	Shoal Creek	Joplin West	Culvert on 32ND Street east of Catnip Lane
45	NW	SW	17	27	33	37.062540 N	94.562266 W	Shoal Creek	Joplin West	open channel 300 feet south of 26TH Street; west of Calloway Ridge
46	SW	NE	18	27	33	37.064809 N	94.572303 W	Shoal Creek	Joplin West	open channel 300 feet north of Ramsour Lane; west of Country Club Dr.
47	SW	SW	8	27	33	37.073534 N	94.567436 W	Spring River	Joplin West	Black Cat Road bridge
48	SW	NW	8	27	33	37.079983 N	94.567096 W	Spring River	Joplin West	Culvert on Black Cat Rd. north of Carnation Lane

49	NW	SW	5	27	33	37.087985 N	94.566807 W	Spring River	Joplin
50	NW	NW	5	27	33	37.100737 N	94.566108 W	Spring River	Joplin
51	SE	SE	31	28	33	37.102068 N	94.567105 W	Spring River	Joplin
52	NW	NW	33	28	33	37.113967 N	94.543698 W	Turkey Creek	Joplin
53	NW	NW	28	28	33	37.127543 N	94.547736 W	Turkey Creek	Carl J
54	NE	NE	27	28	33	37.128266 N	94.512924 W	Center Creek	Carl J
55	NE	NE	27	28	33	37.128273 N	94.513078 W	Center Creek	Carl J
56	SW	SW	26	28	33	37.117187 N	94.506185 W	Turkey Creek	Joplin
57	SW	SW	26	28	33	37.115663 N	94.510010 W	Turkey Creek	Joplin
58	NE	NE	34	28	33	37.109869 N	94.512867 W	Turkey Creek	Joplin
59	NE	NE	34	28	33	37.110122 N	94.515919 W	Turkey Creek	Joplin
60	NW	NE	34	28	33	37.110837 N	94.518086 W	Turkey Creek	Joplin
61	SW	NE	33	28	33	37.107642 N	94.534902 W	Turkey Creek	Joplin
62	NW	SE	33	28	33	37.105752 N	94.534967 W	Turkey Creek	Joplin
63	SW	SE	33	28	33	37.104494 N	94.535010 W	Turkey Creek	Joplin
64	NE	NW	32	28	32	37.111093 N	94.453173 W	Turkey Creek	Joplin
65	NE	SW	32	28	32	37.103631 N	94.453506 W	Turkey Creek	Joplin
66	SW	SW	32	28	32	37.101493 N	94.450059 W	Turkey Creek	Joplin
67	SW	SW	33	28	32	37.101414 N	94.440136 W	Turkey Creek	Joplin
68	SW	SW	33	28	32	37.098983 N	94.438309 W	Turkey Creek	Joplin
69	SE	SE	33	28	32	37.098843 N	94.426456 W	Turkey Creek	Joplin
70	NW	NE	9	27	32	37.080533 N	94.429432 W	Turkey Creek	Joplin
71	NE	NW	9	27	32	37.079837 N	94.432715 W	Turkey Creek	Joplin
72	SE	NW	9	27	32	37.078752 N	94.436402 W	Turkey Creek	Joplin
73	NW	SW	9	27	32	37.076361 N	94.440467 W	Turkey Creek	Joplin
74	NW	SW	9	27	32	37.076314 N	94.437667 W	Turkey Creek	Joplin
75	NE	SW	9	27	32	37.076229 N	94.432310 W	Turkey Creek	Joplin
76	NE	SE	9	27	32	37.075336 N	94.425944 W	Turkey Creek	Joplin
77	SW	SE	9	27	32	37.072546 N	94.427613 W	Shoal Creek	Joplin
78	SW	NW	16	27	32	37.063592 N	94.437171 W	Turkey Creek	Joplin
79	NW	SW	16	27	32	37.060594 N	94.438055 W	Turkey Creek	Joplin
80	NE	SE	17	27	32	37.059865 N	94.441830 W	Turkey Creek	Joplin
81	NW	SW	17	27	32	37.062802 N	94.457725 W	Shoal Creek	Joplin
82	NW	NE	17	27	32	37.068109 N	94.449464 W	Turkey Creek	Joplin
83	SW	SW	5	27	32	37.085589 N	94.466532 W	Turkey Creek	Joplin
84	SE	SE	6	27	32	37.087413 N	94.456730 W	Turkey Creek	Joplin
85	NW	SW	5	27	32	37.089460 N	94.454324 W	Turkey Creek	Joplin
86	SW	NW	5	27	32	37.092589 N	94.454214 W	Turkey Creek	Joplin
87	NE	NW	12	28	34	37.169314 N	94.599492 W	Turkey Creek	Carl
88	SW	NW	12	28	34	37.170471 N	94.590371 W	Turkey Creek	Carl
89	NE	NE	12	28	34	37.170369 N	94.585358 W	Turkey Creek	Carl
90	NE	NE	12	28	34	37.170284 N	94.581113W	Turkey Creek	Carl
91	NE	NW	17	28	33	37.154925 N	94.556955 W	Turkey Creek	Carl
92	NE	NW	17	28	33	37.157018 N	94.556440 W	Turkey Creek	Carl
93	NE	NE	17	28	33	37.158393 N	94.552229 W	Turkey Creek	Carl
94	NE	NE	21	28	33	37.141711 N	94.532674 W	Center Creek	Carl
95	SE	SE	21	28	33	37.137316 N	94.529122 W	Center Creek	Carl
96	SW	NW	15	28	33	37.154923 N	94.526675 W	Center Creek	Carl
97	NW	NW	15	28	33	37.152297 N	94.525483 W	Center Creek	Carl
98	NW	NE	15	28	33	37.153753 N	94.519335 W	Center Creek	Carl
99	NW	NE	15	28	33	37.157365 N	94.516795 W	Center Creek	Carl
100	NE	SE	10	28	33	37.163784 N	94.511704 W	Center Creek	Carl

101	NE	SE	10	28	33	37.162491N	94.511088 W	Center Creek	Carl
102	SW	SE	12	28	33	37.173486 N	94.500819 W	Center Creek	Carl
103	SW	SW	36	29	33	37.185370 N	94.486807 W	Center Creek	Web
104	SE	SW	36	29	33	37.185318 N	94.484908 W	Center Creek	Web
105	SE	SE	12	28	33	37.157608 N	94.474074 W	Center Creek	Web
106	NE	SW	7	28	32	37.159821 N	94.468952 W	Center Creek	Web
107	SW	NW	7	28	32	37.164028 N	94.470825 W	Center Creek	Web
108	NE	SE	6	28	32	37.174433 N	94.457249 W	Center Creek	Web
109	NE	NE	6	28	32	37.181024 N	94.456989 W	Center Creek	Web
110	NE	NE	6	28	32	37.184000 N	94.456875 W	Center Creek	Web
111	SE	SE	31	29	32	37.185578 N	94.457730 W	Center Creek	Web
112	SW	SE	32	29	32	37.184535 N	94.442553 W	Center Creek	Web
113	SE	SE	32	29	32	37.184499 N	94.441381 W	Center Creek	Web
114	NW	SW	32	29	32	37.190584 N	94.454015 W	Center Creek	Web
115	SW	NW	32	29	32	37.192729 N	94.455180 W	Center Creek	Web
116	SE	NW	32	29	32	37.194629 N	94.450690 W	Center Creek	Web
117	SE	SW	35	29	32	37.197657 N	94.469154 W	Center Creek	Web
118	NW	NE	31	29	32	37.199356 N	94.464153 W	Center Creek	Web
119	SE	NE	30	29	32	37.208443 N	94.457737 W	Center Creek	Web
120	NE	NW	30	29	32	37.210920 N	94.463686 W	Center Creek	Web
121	NW	SW	10	28	32	37.161682 N	94.419322 W	Center Creek	Web
122	SW	SE	2	28	32	37.169254 N	94.391336 W	Center Creek	Web
123	MW	NW	7	28	31	37.166051 N	94.363068 W	Center Creek	Web
124	SE	SE	7	28	31	37.154873 N	94.350340 W	Center Creek	Cart
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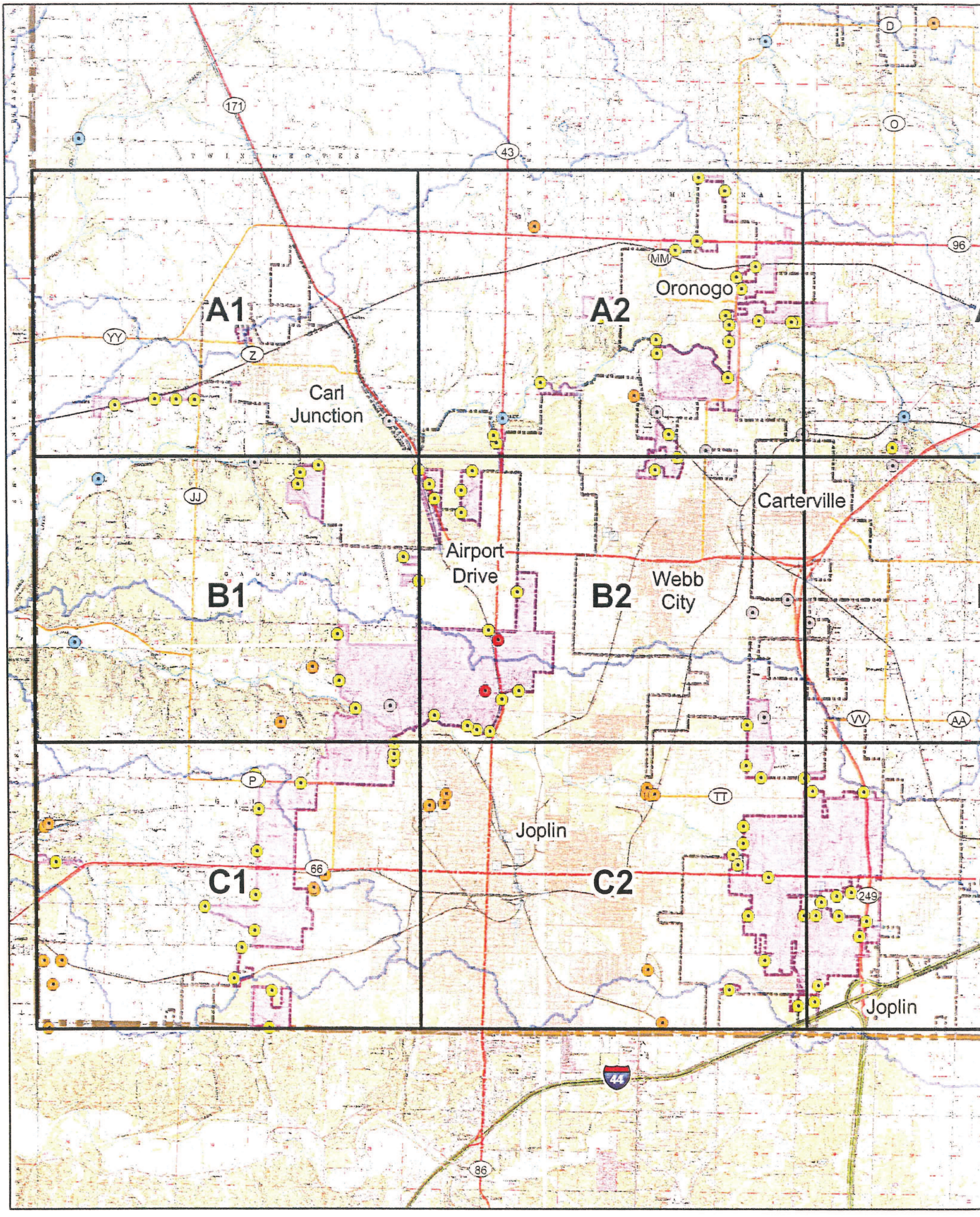
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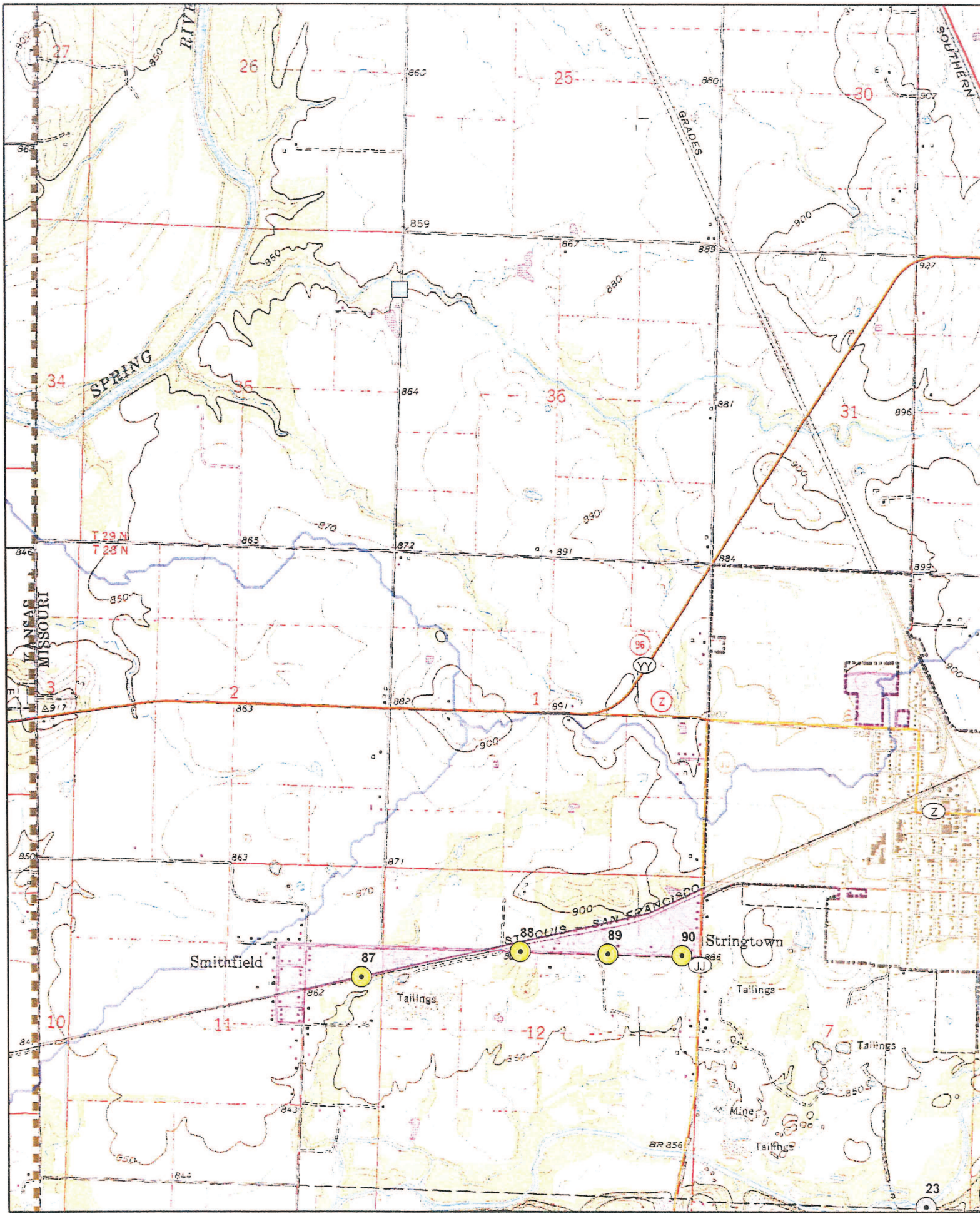

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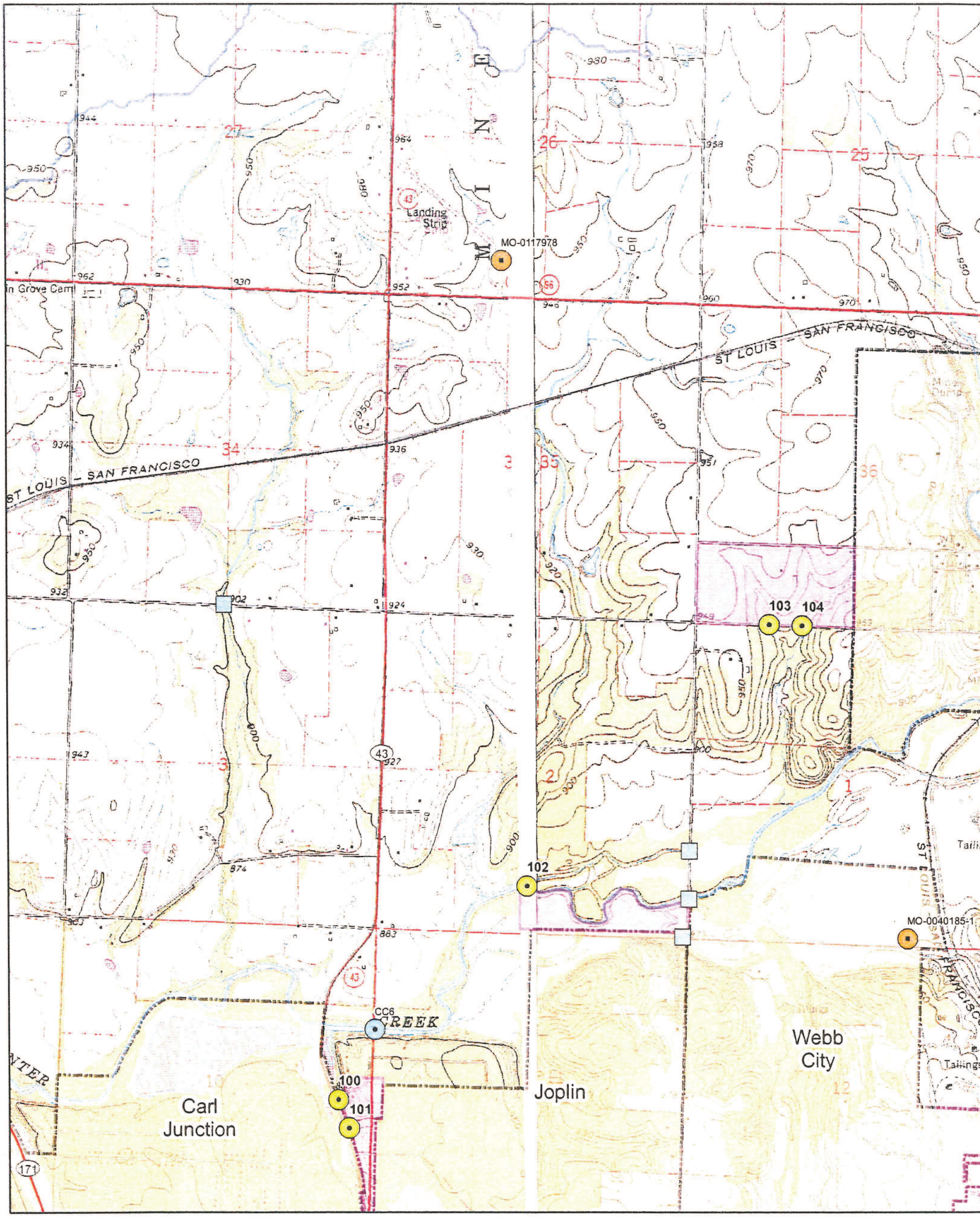
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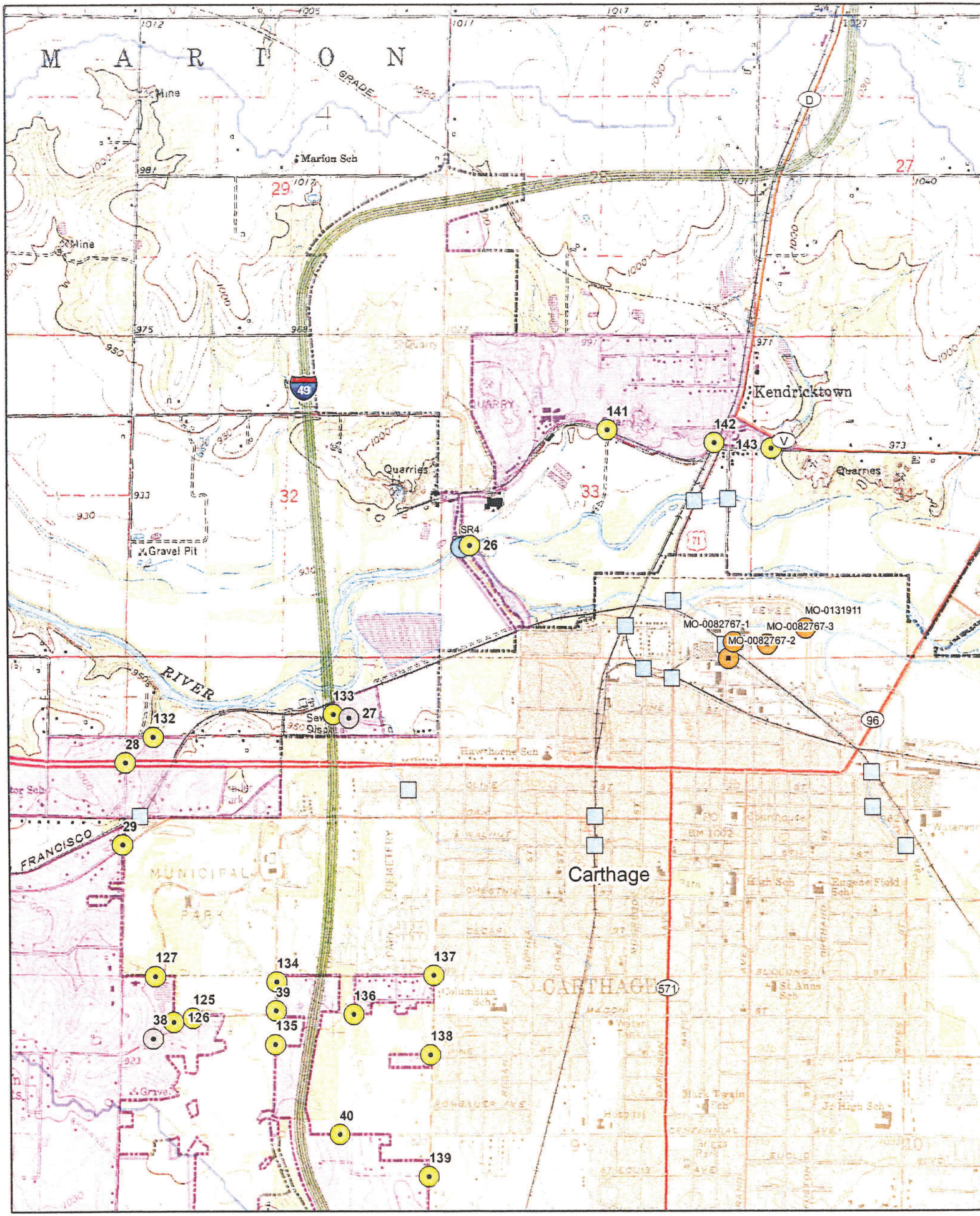

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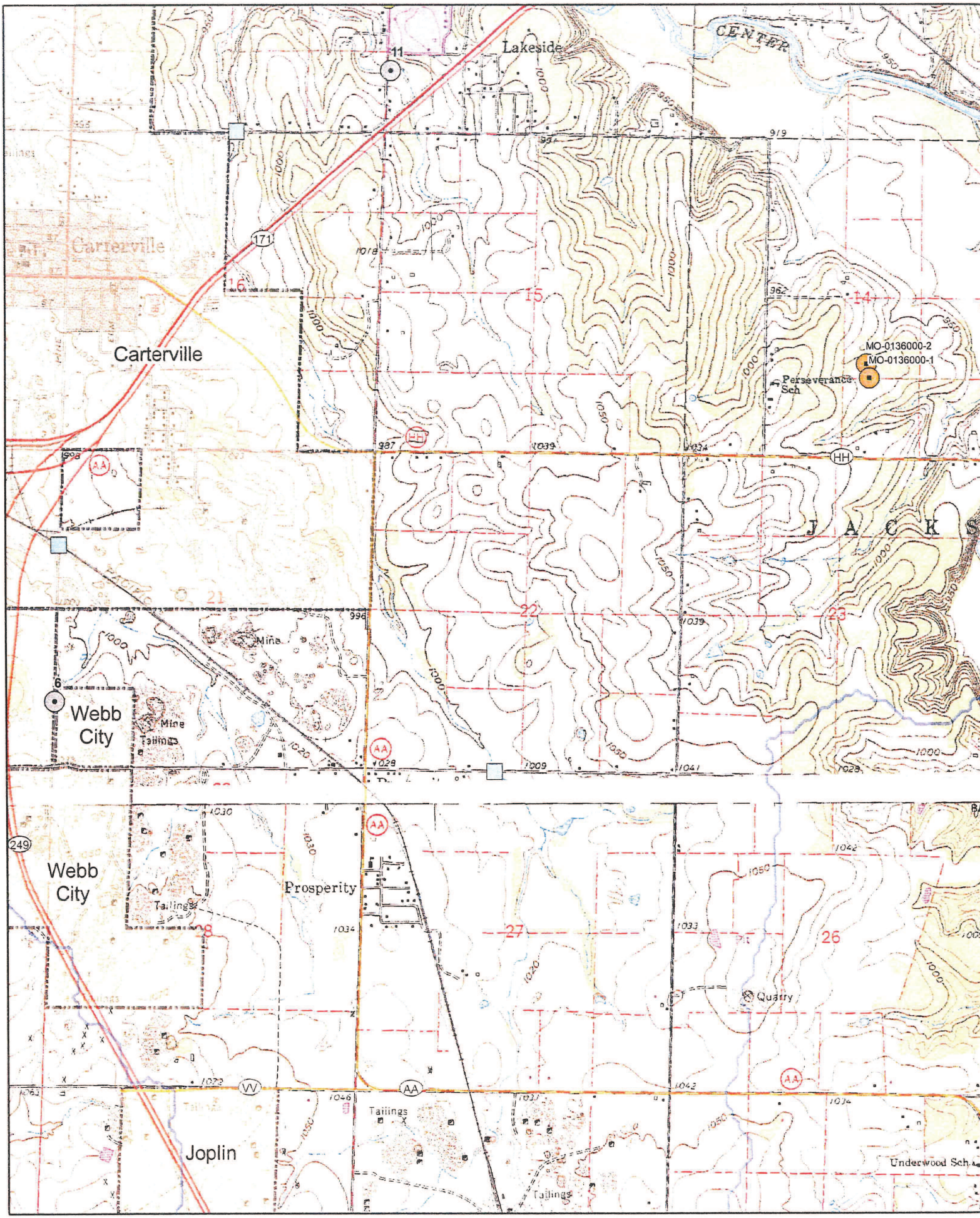
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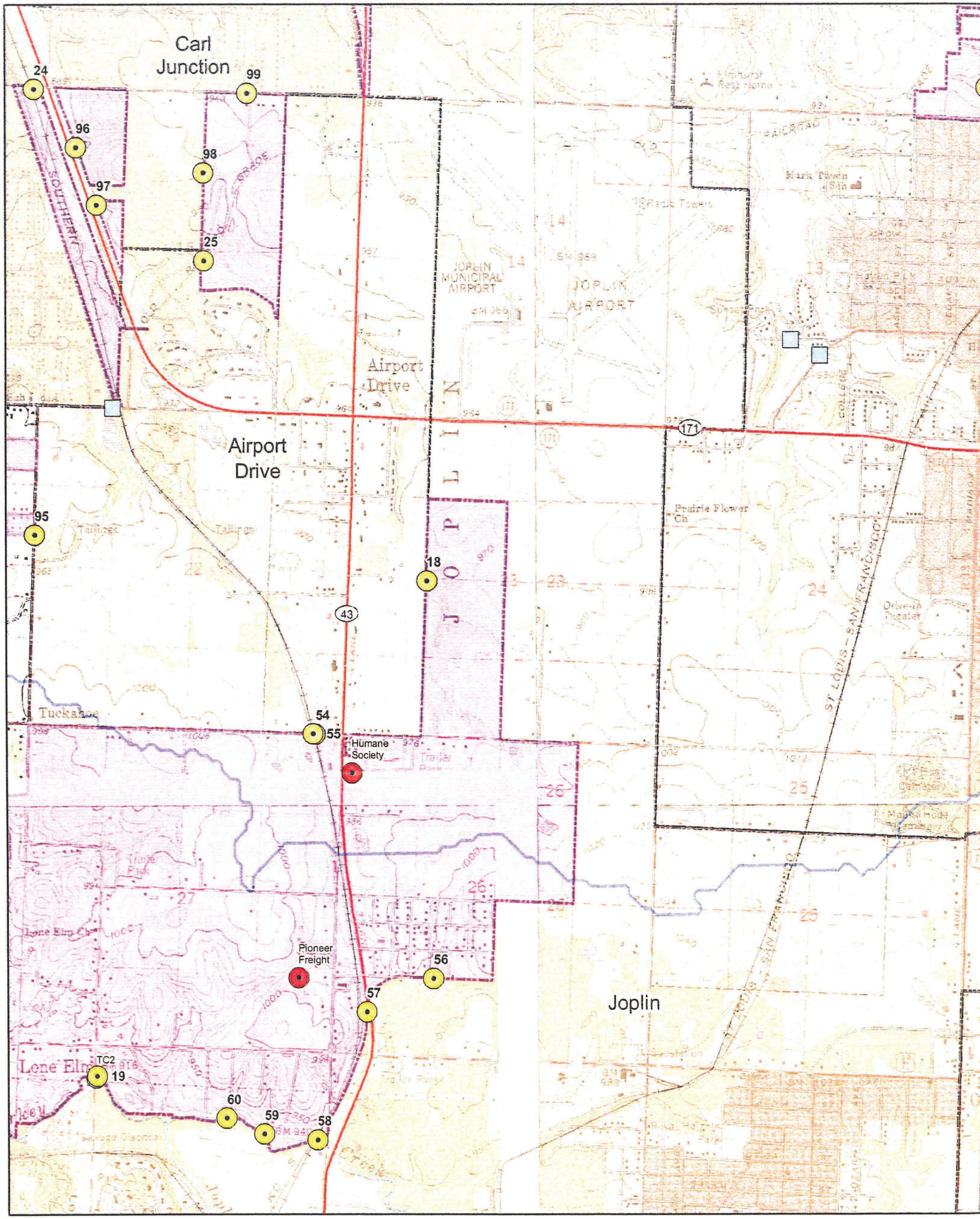
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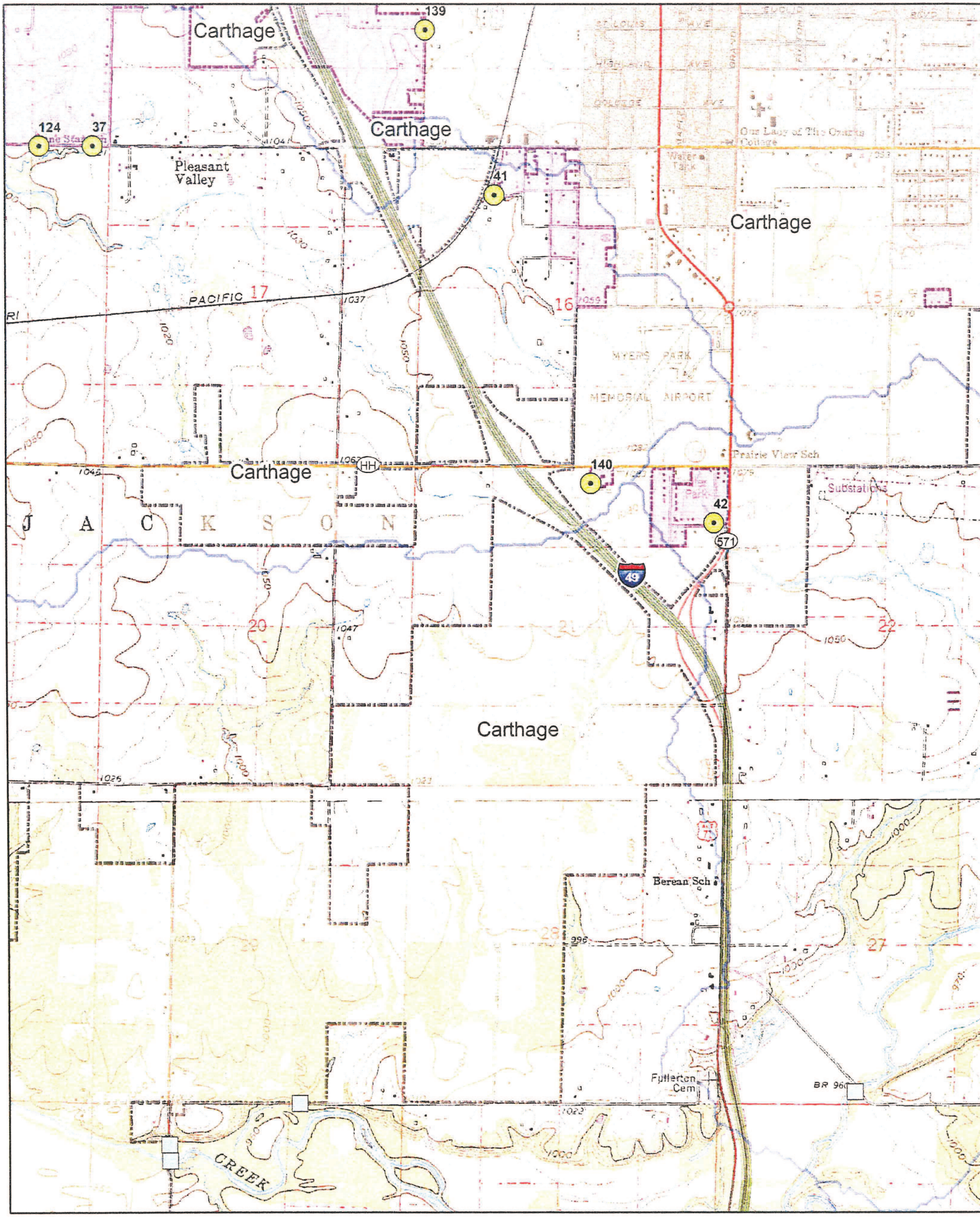

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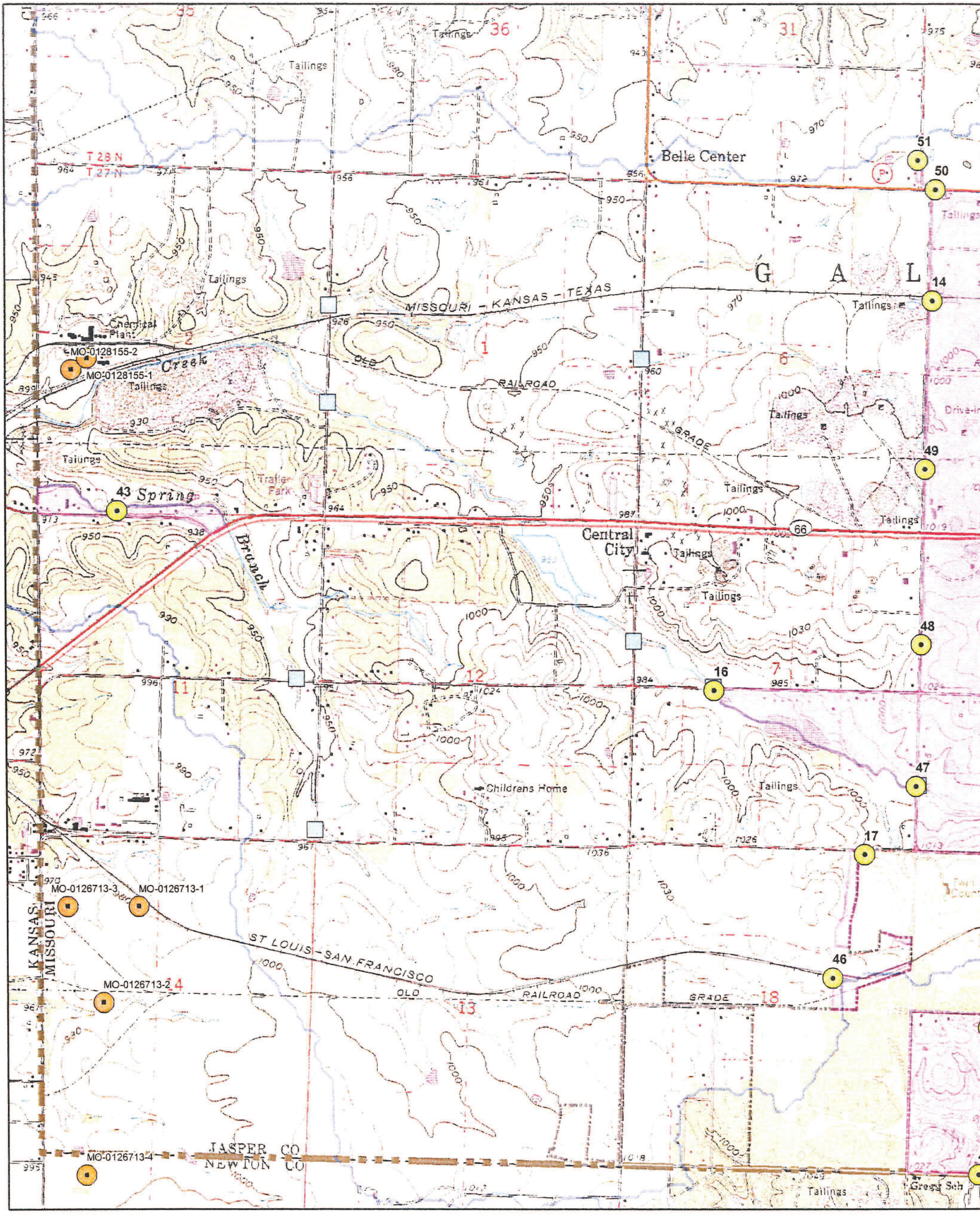
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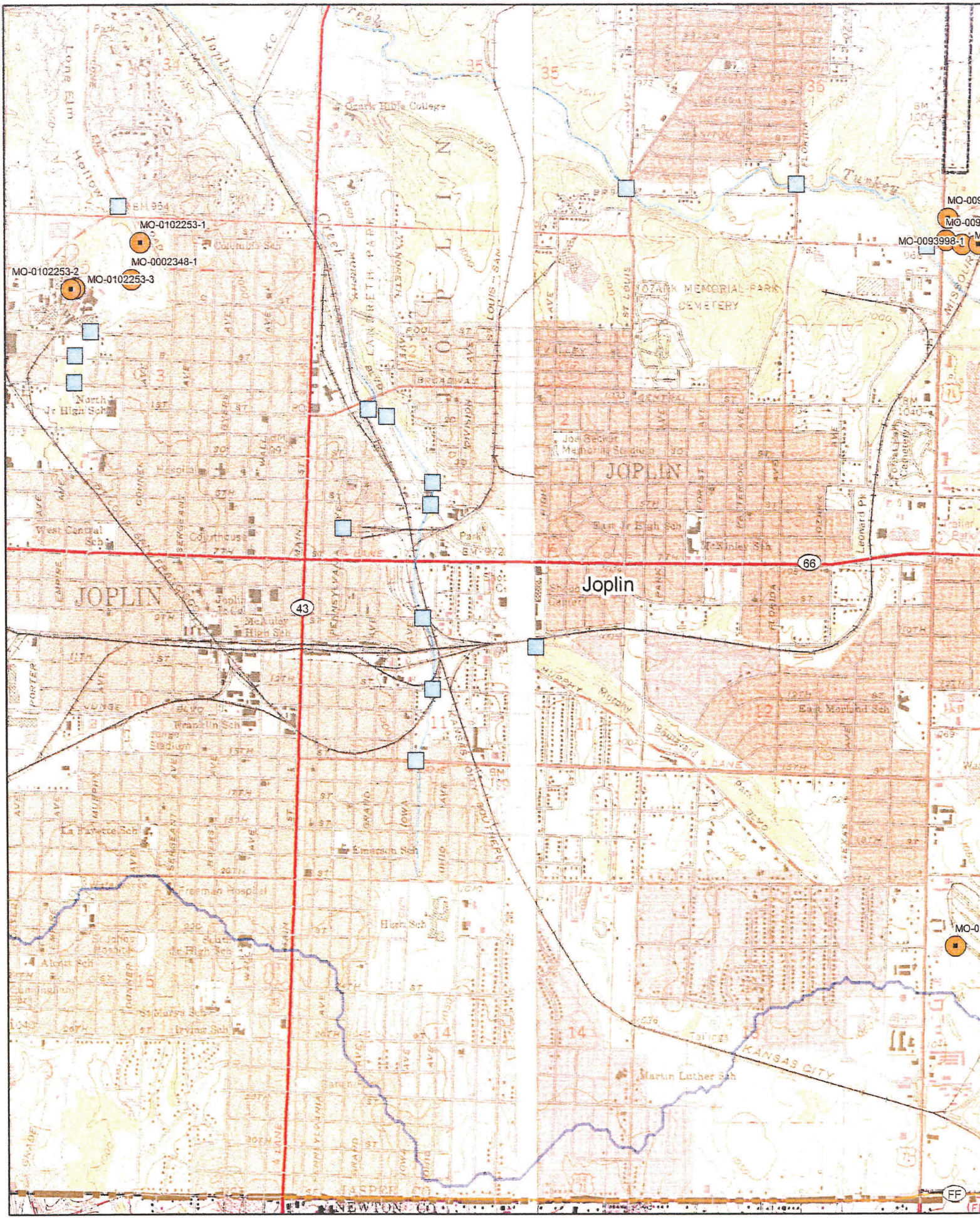

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Martin Luther Sch
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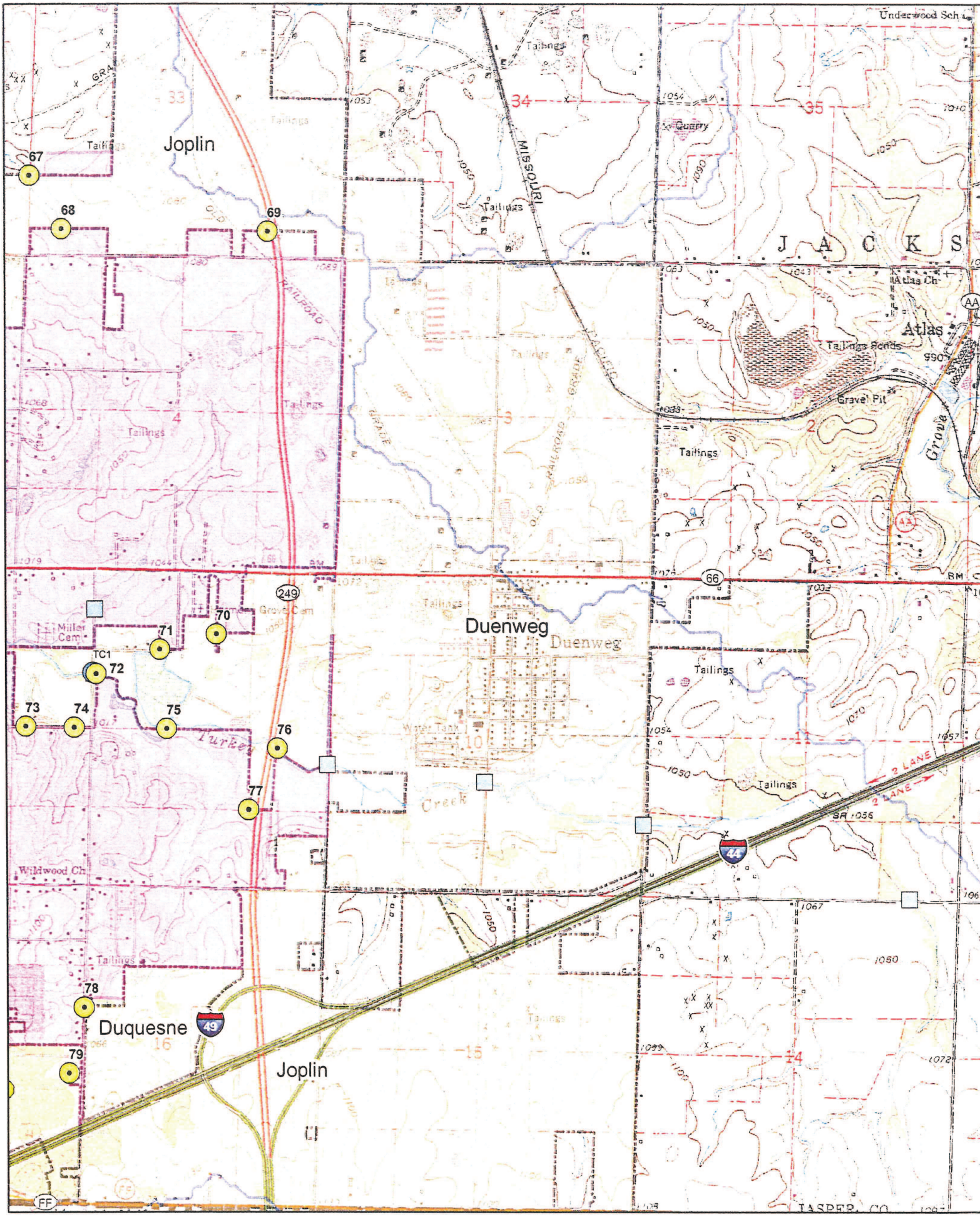

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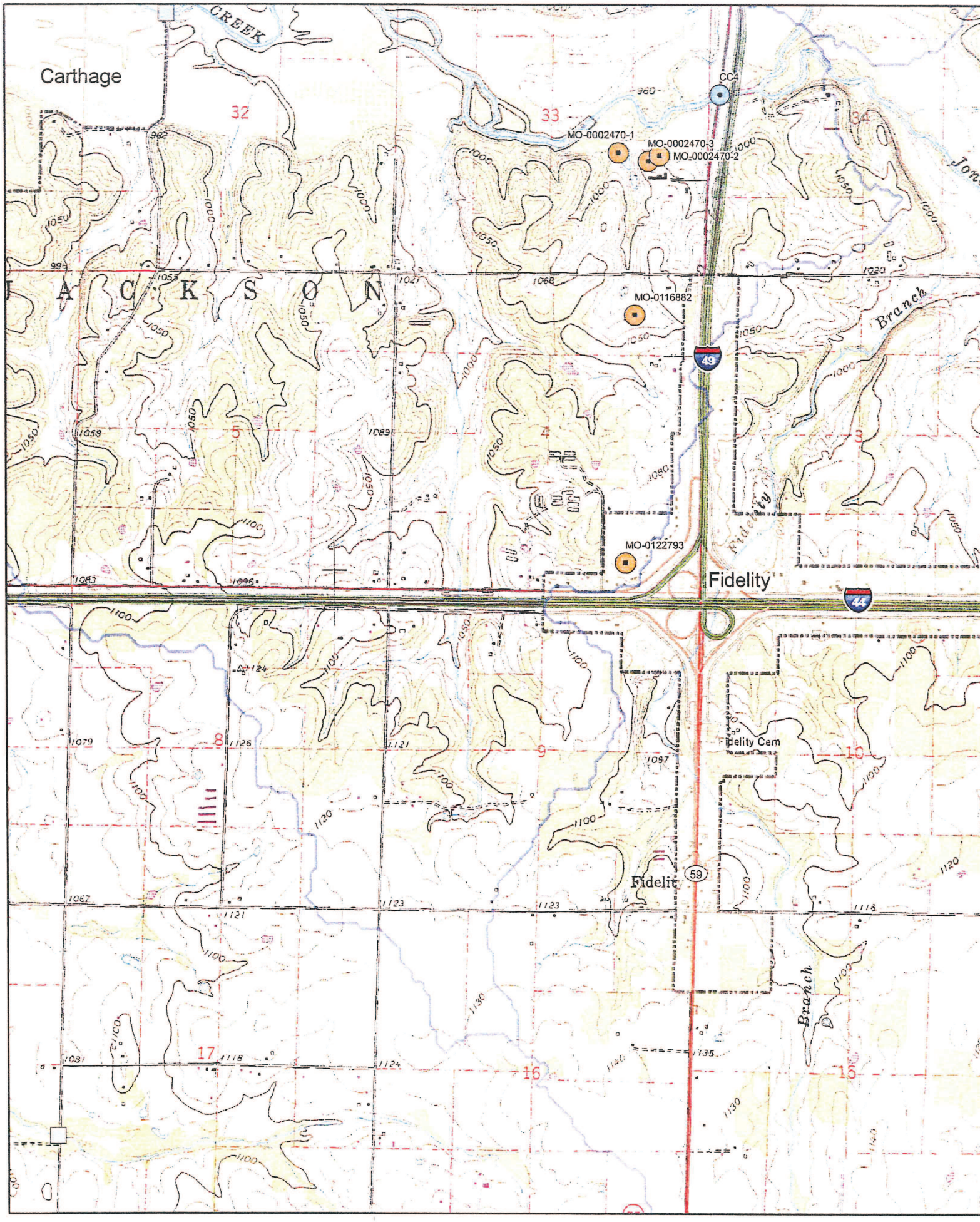

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TICKLER

Jasper County Small MS4 SWMP
Third Permit Term 2013-2018 #MOR040048
Jasper County

Tickler includes:
DVD

This document is located at
T:_SWRO\Jasper\MOR040048_Jasper_County\SWMP\R040048_SWMP_3rd_Permit_Term_2013-2018.pdf

Supporting Documentation is saved in hard file at SWRO:
Jasper County
Jasper Co. Small MS4
SWMP
MOR040048 SWMP 2013-2018

TRI-STATE ENGINEERING, INC
www.tristate-engineering.com

June 28, 2013

RECEIVED
JUL 01 2013
WATER PROTECTION PROGRAM

Water Pollution Control Program
Missouri Department of Natural Resources
1101 Riverside Drive
Jefferson City, Missouri 65102

Re: Storm Water Management Plan
Jasper County, Missouri
NPDES Permit No. MO-040048

Please find attached the Storm Water Management Plan for Jasper County. If you have any questions, please contact me.

Sincerely,
Tri-State Engineering, Inc.

Jerald Norton

Jerald Norton, P.E.
Project Manager

Cc: Mr. John Bartosh, Presiding Commissioner, Jasper County
Mr. Tony Moher, Jasper County Health Dept.
File

P.O. Box 1867, Joplin, MO 64802 • 417-781-0643 608 W. Will Rogers Blvd, Claremore, OK 74017 • 918-923-6

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

GENERAL PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

MO-R04000

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

All Outfalls

Discharges from Regulated Small Municipal Separate Storm Sewer Systems

SIC 9511/NAICS 924110

This permit authorizes only wastewater, including storm waters, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

June 13, 2008
Effective Date

Doyle Childers, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

June 12, 2013
Expiration Date

Edward Galbraith, Director of Staff, Clean Water Commission

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6. Standard Permit Conditions

7. Definitions

1. **Coverage Under this Permit**

1.1 Permit Area

This permit covers all areas served by a municipal separate storm sewer system (MS4) for which the applicant is identified as the continuing authority.

1.2 Eligibility

1.2.1 This permit authorizes discharges of storm water from regulated small MS4s, as defined in 10 CSR 20-6.200. The permittee, or co-permittee, is authorized to discharge under the terms and conditions of this general permit if the permittee:

1.2.1.1 Owns or operates a regulated small MS4 as defined in 10 CSR 20-6.200; located fully or partially within an urbanized area as determined by the latest Decennial Census by the Bureau of Census or designated for permit authorization by the department pursuant to 10 CSR 20-6.200; and

1.2.1.2 Submits a general permit application in accordance with Section 2 of this permit; and

1.2.1.3 Complies with the terms of this general permit.

1.2.2 The following are types of discharges authorized by this permit:

1.2.2.1 *Storm water discharges.* This permit authorizes storm water discharges to waters of the state from the regulated small MS4s identified in Section 1.2.1, except as excluded in Section 1.3.

1.2.2.2 *Non-storm water discharges*. The permittee is authorized to discharge the following non-storm water sources provided that the permitting authority has not determined these sources to be substantial contributors of pollutants to the permittee's MS4 that require a separate permit:

- Landscape irrigation
- Rising ground waters
- Uncontaminated ground water infiltration (infiltration is defined as water other than wastewater that enters a sewer system, including sewer service connections and foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.)
- Uncontaminated pumped ground water
- Discharges from potable water sources
- Foundation drains
- Air conditioning condensate
- Springs
- Water from crawl space pumps
- Footing drains
- Lawn watering
- Flows from riparian habitats and wetlands
- Street wash water
- Discharges or flows from emergency fire fighting activities
- Individual residential car washing
- Dechlorinated residential swimming pool discharges

1.3 Limitations on Coverage

This permit does not authorize:

1.3.1 Discharges that are mixed with sources of non-storm water unless such non-storm water discharges are:

1.3.1.1 In compliance with a separate NPDES permit; or

1.3.1.2 Determined not to be a substantial contributor of pollutants to waters of the state.

1.3.2 Storm water discharges associated with industrial activities requiring separate NPDES permits as defined in 10 CSR 20-6.200.

1.3.3 Storm water discharges associated with construction activities requiring separate NPDES permits as defined in 10 CSR 20-6.200.

1.3.4 Storm water discharges currently covered under another permit.

1.3.5 Discharges that are likely to jeopardize the continued existence of any species that are listed as endangered or threatened under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is designated as critical under the ESA.

1.3.6 Discharges that violate the National Historic Preservation Act.

1.3.7 Discharges that cause or contribute to a violation of instream water quality standards. The permittee's storm water management program and plan (SWMP) document must include a description of the best management practices (BMPs) that the permittee will use to ensure that violations will not occur. The department may require corrective action or an application for a site-specific permit or alternative general permit if an MS4 is determined to cause or create a significant potential for causing an instream exceedance of water quality standards.

1.3.8 Discharges of any pollutant into any water for which a Total Maximum Daily Load (TMDL) has been either established or approved by the EPA unless the permittee's discharge is consistent with that TMDL. This eligibility condition applies at the time the permittee submits an application for coverage. If conditions change after the permittee has permit coverage, the permittee may remain covered by the permit provided the permittee complies with the applicable requirements of Section 3. The permittee shall incorporate any limitations, conditions and requirements required by the TMDL, including monitoring frequency and reporting required, into the SWMP document in order to be eligible for permit coverage. For discharges for which the permittee is responsible but are not eligible for coverage under this permit, the permittee shall apply for and receive a site-specific or other applicable general NPDES permit prior to discharging.

1.4 Obtaining Authorization

1.4.1 To be authorized to discharge storm water from regulated small MS4s, the applicant/permittee shall submit an application and a written description of the permittee's SWMP in accordance with the deadlines presented in Section 2 of this permit.

1.4.2 The permittee shall submit the information required in Section 2 on the latest version of the application form (or photocopy thereof). The permittee's application shall be signed and dated by an authorized signatory.

1.4.3 Where the operator changes, or where a new operator is added after submittal of an application under Section 2, a new application shall be submitted in accordance with Section 2 prior to the change or addition.

2. Application Requirements

2.1 Deadlines for Application

If the MS4 is regulated pursuant to 10 CSR 20-6.200 then the operator is required to seek coverage under the Small MS4 General Permit or a site-specific MS4 permit as follows:

2.1.1 Existing small MS4 permittees shall submit renewal applications 180 days prior to permit expiration unless an extended due date has been granted by the department. If the MS4 permittee is submitting a renewal application for a revised general permit, they may submit the updated SWMP document separately from the application up to 90 days following public notice of the revised permit. If the MS4 is applying for a site-specific permit, the SWMP plan must be included with the application; and

2.1.2 MS4 operators that become subject to 10 CSR 20-6.200 following the 2010 census shall submit permit applications within 180 days following census publication.

2.2 Additional designations after the date of permit issuance

If the small MS4 is specially designated by the department after the date of permit issuance, then the small MS4 is required to:

2.2.1 Submit application for a site-specific MS4 permit or a small general MS4 permit (whichever applies) and a written description of the permittee's SWMP to the department within 180 days of notice.

2.3 Submitting a Late application

The permittee is not prohibited from submitting an application after the dates provided in Section 2.1. The department reserves the right to take appropriate enforcement actions for any unpermitted discharges.

3. **Special Conditions**

3.1 Discharges to Water Quality Impaired Waters

3.1.1 If discharges from the MS4 are upstream from a 303(d) listed (impaired) waterbody, the permittee shall, in consultation with the department:

3.1.1.1 Determine whether storm water discharges from any part of the MS4 significantly contribute pollutants directly or indirectly to a 303(d) listed (i.e., impaired) waterbody. If the permittee has discharges meeting this criteria, the permittee shall comply with Section 3.1.2. If the permittee does not, Section 3.1 does not apply to the permittee.

3.1.1.2 Determine whether a Total Maximum Daily Load (TMDL) has been developed and approved by EPA for the listed waterbody. If there is such a TMDL, the permittee shall comply with both Sections 3.1.2 and 3.1.3. If no TMDL has been finalized, Section 3.1.3 will apply when the TMDL is finalized and approved by EPA.

3.1.2 *Water Quality Controls for Discharges to Impaired Waterbodies*. The permittee's SWMP document required under Section 4 shall include a description of how the permittee's program will control the discharge of measurable pollutants of concern and ensure the permittee's discharges will not cause or contribute to instream exceedances of the water quality standards. This discussion shall specifically identify measures and BMPs that will collectively control the discharge of the pollutants of concern.

3.1.3 *Consistency with TMDL Allocations*. If a TMDL has been finalized and approved by EPA for any waterbody into which the permittee discharges, the permittee, shall:

3.1.3.1 Determine whether the approved TMDL is for a pollutant likely to be found in storm water discharges from the permittee's MS4;

3.1.3.2 Determine whether the TMDL includes a pollutant wasteload allocation (WLA) or other performance requirements specifically for storm water discharge from the permittee's MS4;

3.1.3.3 Determine whether the TMDL addresses a flow regime likely to occur during periods of storm water discharge;

3.1.3.4 After the determinations above have been made and if it is found that the permittee's MS4 shall implement specific WLA provisions of the TMDL, assess whether the WLAs are being met through implementation of existing storm water control measures or if additional control measures are necessary;

3.1.3.5 Document all control measures currently being implemented or planned to be implemented. The permittee shall also include a schedule of implementation for all planned controls and shall document the calculations or other evidence that shows that the WLA will be met;

3.1.3.6 Describe a monitoring program to determine whether the storm water controls are adequate to meet the WLA; and

3.1.3.7 If the evaluation shows that additional or modified controls are necessary, describe the measures to be taken and the schedule for their implementation. The permittee shall continue meeting the requirements of 3.1.3.4 through 3.1.3.7 for this permit duration until the department determines WLAs are being met or that water quality standards are being met.

3.2 Duty to Comply

3.2.1 The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Missouri Clean Water Law and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or for denial of a permit renewal.

3.2.2 This permit authorizes only the activities described in this permit. Compliance with this permit may not be considered a shield from compliance with any local ordinance, State Regulation or State Law.

3.3 Continuation of the Expired General Permit

3.3.1 If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with 10 CSR 20-6.010 (10)(E) and remain in force and effect. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

3.3.1.1 Reissuance or replacement of this permit, at which time the permittee shall comply with the application conditions of the new permit to maintain authorization to discharge; or

3.3.1.2 Notice of Termination; or

3.3.1.3 Issuance of a site-specific permit for your discharges; or

3.3.1.4 A permit decision by the Director not to reissue this general permit, at which time the permittee shall seek coverage under an alternative general permit or a site-specific permit.

3.4 Need to Halt or Reduce Activity Not an Excuse

Actions by the permittee in an enforcement action to halt or reduce the permitted activity does not excuse compliance with this permit or any provision of the Missouri Clean Water Law.

3.5 Permit Transfers

This permit is not transferable to any other legal entity except after notice to the department. The department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary.

3.6 Procedures for Modification or Revocation

3.6.1 If at any time the Missouri Department of Natural Resources determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site-specific permit, the department may require any person to obtain a site-specific operating permit [10 CSR 20-6.010 (13) and 10 CSR 20-6.200(5)].

3.6.2 The department may require the permittee to apply for and obtain a site-specific or different general permit if:

3.6.2.1 The permittee is not in compliance with the conditions of this general permit; or

3.6.2.2. The discharge no longer qualifies for this general permit due to changed site conditions and regulations; or

3.6.2.3 Information becomes available that indicates water quality standards have been or may be violated.

3.6.3 The permittee will be notified in writing of the need to apply for a site-specific permit or an alternative general permit. When a site-specific permit or alternative general permit is issued to the authorized permittee, the applicability of this general permit to the permittee will be terminated upon the effective date of the site-specific or alternative general permit, whichever the case may be. The permittee shall submit the appropriate forms to the department to terminate the permit that has been replaced.

3.7 Requiring a Site-Specific Permit or an Alternative General Permit

3.7.1 *Decision by the department.* The department may require any person authorized by this permit to apply for and/or obtain either a site-specific NPDES permit or an alternative NPDES general permit [10 CSR 20-6.200(6)]. Any interested person may petition the department to require a site-specific permit. Where the department requires the permittee to apply for a site-specific NPDES permit, the department will notify the permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form(s), a statement setting a deadline for the permittee to file the application, and a statement that on the effective date of issuance or denial of the site-specific NPDES permit or the alternative general permit, coverage under this general permit shall automatically terminate in accordance with Section 3.6. The department may grant additional time to submit the application upon request of the applicant. If the permittee fails to submit a site-specific NPDES permit application in a timely manner as required by the department under this paragraph, then the applicability of this permit to the permittee is automatically terminated on the day specified by the department for application submittal.

3.7.2 *Request by permittee.* The permittee may apply for a site-specific permit in lieu of coverage under this general permit. In such cases, the permittee shall submit an application for the alternate permit in accordance with the requirements of 10 CSR 20-6.200, with reasons supporting the request. The request may be granted by issuance of any site-specific permit or an alternative general permit.

4. Storm Water Management Programs and Plans

4.1 Requirements

The permittee shall develop, implement, and enforce a storm water management program and plan (SWMP) designed to reduce the discharge of pollutants from the permittee's regulated small MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Missouri Clean Water Law. The SWMP should include best management practices; control techniques and system, design, and engineering methods; and such other provisions as the permitting authority determines appropriate for the control of such pollutants. The permittee's SWMP document shall include the following information for each of the six minimum control measures described in Section 4.2 of this permit:

4.1.1 A description of the best management practices (BMPs) that the permittee will implement for each of the storm water minimum control measures;

4.1.2 The measurable goals for each of the BMPs including, as appropriate, the months and years in which the permittee will undertake required actions, including interim milestones and the frequency of the action;

4.1.3 The person primarily responsible for the SWMP, and the person(s) responsible for each minimum control measure if different from the primary responsible person; and

4.1.4 The permittee shall implement a program designed to protect water quality in potentially affected waters and ensure that the permitted activities do not cause a violation of the Water Quality Standards:

4.1.4.1 Discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria; and

4.1.4.2 The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

4.1.4.2.1 Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;

4.1.4.2.2 Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;

4.1.4.2.3 Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;

4.1.4.2.4 Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;

4.1.4.2.5 There shall be no significant human health hazard from incidental contact with the water;

4.1.4.2.6 There shall be no acute toxicity to livestock or wildlife watering;

4.1.4.2.7 Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community; and

4.1.4.2.8 Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

4.1.5 For facilities under the control of the permittee good housekeeping practices shall be maintained to keep solid waste from entry into waters of the state to the maximum extent practicable;

4.1.6 All fueling facilities under the control of the permittee shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers, including spill prevention, control and counter measures;

4.1.7 Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that are transported, stored, or used for maintenance, cleaning or repair by the permittee shall be managed according to the provisions of RCRA and CERCLA;

4.1.8 All paint, solvents, petroleum products and petroleum waste products (except fuels) under the control of the permittee shall be stored so that these materials are not exposed to storm water. Sufficient practices of spill prevention, control, and/or management shall be provided to prevent any spills of these pollutants from entering a water of the state. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall also prevent the contamination of groundwater;

4.1.9 In addition to the requirements listed above, the permittee shall document the decision process for each minimum control measure and include rationale statements for each BMP and measurable goal defined;-

4.1.10 The permittee shall inspect any structures that function to prevent pollution of storm water or to remove pollutants from storm water and the facility in general to ensure that all BMPs are continually implemented and effective, and a monitoring schedule shall be specified in the SWMP document;

4.1.11 The SWMP document shall include interim milestones, measurable goals, an implementation schedule and measures for success; and

4.1.12 The permittee shall develop and fully implement each minimum control measure within five (5) years of receipt of its first MS4 permit. At each reissuance of this MS4 permit, the permittee shall comply with new or revised standards as soon as practicable, but no later than 5 years from the date of reissuance.

4.2 Minimum Control Measures

The six (6) minimum control measures that shall be included in the permittee's SWMP document are:

4.2.1 **Public Education and Outreach on Storm Water Impacts**

4.2.1.1 *Permit requirement.* The permittee shall implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and steps the public can take to reduce pollutants in storm water runoff. As part of the SWMP, the public education and outreach program shall include the following information, at a minimum:

4.2.1.1.1 The target pollutant sources the permittee's public education program is designed to address;

4.2.1.1.2 Identification of target audiences for the permittee's education program who are likely to have significant storm water impacts (including commercial, industrial and institutional entities);

4.2.1.1.3 A plan to inform individuals and households about steps they can take to reduce storm water pollution;

4.2.1.1.4 A plan to inform individuals and groups on how to become involved in the SWMP (with activities such as local stream and lake restoration activities);

4.2.1.1.5 The permittee's outreach strategy, including the mechanisms (e.g., printed brochures, newspapers, media, workshops, etc.) to reach target audiences, and how many people expected to be reached over the permit term; and

4.2.1.1.6 A plan to evaluate the success of this minimum control measure.

4.2.2 **Public Involvement/Participation**

4.2.2.1 *Permit requirement.* The permittee shall implement a public involvement/participation program that complies with State and local public notice requirements, and involve the public in the development and oversight of the SWMP , policies and procedures. As part of the SWMP document, the public involvement/participation program shall include the following information, at a minimum:

4.2.2.1.1 How the permittee has involved the public in the development and submittal of the application and SWMP document;

4.2.2.1.2 The target audiences for the permittee's public involvement program, including a description of the types of ethnic and economic groups engaged. The permittee is encouraged to actively involve all potentially affected stakeholder groups, including commercial and industrial businesses, trade associations, environmental groups, homeowners associations, and educational organizations, among others; and

4.2.2.1.3 The types of public involvement activities included in the permittee's program. Where appropriate, the permittee must consider the following types of public involvement activities:

4.2.2.1.3.1 Citizen representatives on a storm water management panel;

4.2.2.1.3.2 Public hearings;

4.2.2.1.3.3 Working with citizen volunteers willing to educate others about the program; and

4.2.2.1.3.4 Volunteer monitoring or stream/lake clean-up activities.

4.2.2.1.4 The permittee's plan to actively involve the public in the development and implementation of their program; and

4.2.2.1.5 The method for evaluating success of this minimum control measure.

4.2.3 **Illicit Discharge Detection and Elimination**

4.2.3.1 *Permit requirement. The permittee* shall develop, implement and enforce a program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200) into the permittee's regulated small MS4. As part of the SWMP document, the permittee's illicit discharge detection and elimination program shall include the development and implementation of, at a minimum;

4.2.3.1.1 A storm sewer map showing the location of all outfalls and the names and location of all receiving waters of the state that receive discharges from those outfalls. The permittee shall describe the sources of information used for the map(s), and how the permittee plans to verify the outfall locations with field surveys. If already completed, the permittee shall describe how the map was developed and how the map will be regularly updated. The permittee shall make the map information available to the department upon request;

4.2.3.1.2 To the extent allowable under State, or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into the permittee's storm sewer system and implement appropriate enforcement procedures and actions. The permittee shall identify the mechanism (ordinance or other regulatory mechanism) the permittee will use to effectively prohibit illicit discharges into the MS4. If the permittee needs to develop this mechanism, describe the permittee's plan and implementation schedule. If the permittee's ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the permittee's program; and

4.2.3.1.3 A plan and implementation schedule to detect and address non-storm water discharges, including discharges from illegal dumping and spills, to the permittee's system. The permittee's plan shall include dry weather field screening for non-storm water flows and field tests of selected chemical parameters as indicators of discharge sources. The plan shall also address on-site sewage disposal systems that flow into the permittee's storm drainage system. The permittee's description shall address the following, at a minimum:

4.2.3.1.3.1 Procedures for locating priority areas which include areas with higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines, for example) or ambient sampling to locate impacted reaches;

4.4.3.1.3.2 Procedures for tracing the source of an illicit discharge, including the specific techniques the permittee will use to detect the location of the source;

4.2.3.1.3.3 Procedures for removing the source of the illicit discharge;

4.2.3.1.3.4 A plan to ensure through appropriate enforcement procedures, including fines, and actions that the permittee's illicit discharge ordinance (or other regulatory mechanism) is implemented;

4.2.3.1.3.5 A plan to inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. The permittee shall describe how this plan will coordinate with their public education minimum measure and the pollution prevention/good housekeeping minimum measure programs; and

4.2.3.1.3.6 Procedures for program evaluation and assessment of this minimum control measure.

4.2.3.1.4 Address the following categories of non-storm water discharges or flows (i.e., illicit discharges) only if the permittee identifies them as significant contributors of pollutants to the permittee's regulated small MS4: landscape irrigation, rising ground waters, uncontaminated ground water infiltration (as defined in 10 CSR 20-6.200), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, springs, water from crawl space pumps, footing drains, lawn watering, flows from riparian habitats and wetlands, and street wash water (discharges or flows from emergency fire fighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are significant sources of pollutants to waters of the state).

4.2.3.1.5 The permittee may also develop a list of other similar occasional incidental non-storm water discharges (e.g. non-commercial or charity car washes, etc.) that will not be addressed as illicit discharges. These non-storm water discharges shall not be reasonably expected (based on information available to the permittees) to be significant sources of pollutants to the MS4, because of either the nature of the discharges or conditions the permittee has established for allowing these discharges to the permittee's MS4 (e.g., a charity car wash with appropriate controls on frequency, proximity to sensitive waterbodies, BMPs on the wash water, etc.). The permittee shall document in their SWMP any local controls or conditions placed on the discharges. The permittee shall include a provision prohibiting any individual non-storm water discharge that is determined to be contributing significant amounts of pollutants to the permittee's MS4.

4.2.3.1.6 The permittee should inventory, inspect and have enforcement authority for industries and commercial enterprises within their boundary that may contribute pollutants via storm water to the MS4.

4.2.4 **Construction Site Storm Water Runoff Control**

4.2.4.1 *Permit requirement.* The permittee shall develop, implement, and enforce a program to reduce pollutants in any storm water runoff to their regulated small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre shall be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. As part of the SWMP, the permittee's construction site storm water runoff control program shall include the development and implementation of, at a minimum:

4.2.4.1.1 An ordinance or other regulatory mechanism:

4.2.4.1.1.1 To require operators to implement erosion and sediment control BMPs at construction sites;

4.2.4.1.1.2 To include sanctions to ensure compliance, to the extent allowable under State or local law; and

4.2.4.1.1.3 If the permittee needs to develop this mechanism, the permittee shall describe the plan and scheduled implementation. If the permittee's ordinance or regulatory mechanism is already developed, the permittee shall include a copy of the relevant sections with the permittee's SWMP.

4.2.4.1.2 Requirements for construction site operators to control construction-site waste that may cause adverse impacts to water quality, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste;

4.2.4.1.3 Procedures for the permittee to consider and review all pre-construction site plans for potential water quality impacts.

4.2.4.1.4 Procedures for the permittee to receive and consider information submitted by the public, including coordination with the permittee's public education program;

4.2.4.1.5 Procedures for the permittee to inspect sites and enforce control measures, including prioritization of site inspections;

4.2.4.1.6 A plan to ensure compliance with the permittee's erosion and sediment control regulatory mechanism, including the sanctions and enforcement mechanisms the permittee will use to ensure compliance and procedures for when certain sanctions will be used. Possible sanctions include non-monetary penalties (such a stop work orders), fines, bonding requirements, and/or permit denials for non-compliance; and

4.2.4.1.7 A description of how the permittee will evaluate the success of this minimum control measure.

4.2.5 **Post-Construction Storm Water Management in New Development and Redevelopment**

4.2.5.1 *Permit requirement.* The permittee shall develop, implement, and enforce a program to address the quality of long-term storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the permittee's regulated small MS4. The permittee's program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts by reasonably mimicking pre-construction runoff conditions on all affected new development projects and by effectively utilizing water quality strategies and technologies on all affected redevelopment projects, to the maximum extent practicable. The permittee shall assess site characteristics at the beginning of the construction design phase to ensure adequate planning for storm water program compliance. The purpose for this approach is to arrive at designs and practices that provide for most effective water quality treatment through infiltration, flow rates and similar site-design opportunities. As part of the SWMP document, the post-construction runoff control program shall include the following information, at a minimum:

4.2.5.1.1 A strategy to minimize water quality impacts, by reasonably mimicking pre-construction runoff conditions in affected new development and incorporating water quality protection in affected redevelopment projects to the maximum extent practicable, and include a combination of structural and/or non-structural BMPs appropriate for the permittee's community;

4.2.5.1.2 An ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, or local law. If the permittee needs to develop a mechanism, the permittee shall describe the plan and a schedule for implementation. If the permittee's ordinance or regulatory mechanism is already developed, the permittee shall include a copy of the relevant sections with the SWMP document;

4.2.5.1.3 A plan to ensure adequate long-term operation and maintenance of selected BMPs, including types of agreements between the permittee and other parties such as the post-development landowners or regional authorities;

4.2.5.1.4 Specific priority areas for this program; and

4.2.5.1.5 Any non-structural BMPs in the permittee's program, including, as appropriate:

4.2.5.1.5.1 Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation;

4.2.5.1.5.2 Policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure, and redevelopment of Brownfield sites or grayfields which may include abandoned malls or similar properties;

4.2.5.1.5.3 Education programs for developers and the public about project designs that minimize water quality impacts; and

4.2.5.1.5.4 Other measures such as minimization of the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, site designs that provide for integration of a variety of infiltration practices and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention.

4.2.5.1.6 Any structural BMPs in the permittee's program, including, as appropriate:

4.2.5.1.6.1 Practices that provide infiltration, evapotranspiration or re-use such as grassed swales, bioretention cells, cisterns and green roofs; and

4.2.5.1.6.2 Redevelopment practices such as planter boxes, street retrofits, parking-lot infiltration and green roofs.

4.2.5.1.7 How the permittee will evaluate the success of this minimum measure.

4.2.6 **Pollution Prevention/Good Housekeeping for Municipal Operations**

4.2.6.1 *Permit requirement.* The permittee shall develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. As part of the SWMP, the pollution prevention/good housekeeping program shall include the following information, at a minimum:

4.2.6.1.1 A list of all municipal operations that are impacted by this operation and maintenance program. The permittee shall also include a list of industrial facilities the permittee owns or operates that are subject to NPDES permits for discharges of storm water associated with industrial activity that ultimately discharge to the permittee's MS4. The permittee shall include the permit number or a copy of the industrial application form for each facility;

4.2.6.1.2 Maintenance BMPs, maintenance schedules, and long-term inspection procedures for controls to reduce floatables and other pollutants to the permittee's regulated small MS4;

4.2.6.1.3 Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas the permittee operates;

4.2.6.1.4 Controls described in Sections 4.1.5 through 4.1.8 of this permit;

4.2.6.1.5 Procedures for the proper disposal of waste removed from the permittee's MS4 and area of jurisdiction, including dredged material, accumulated sediments, floatables, and other debris;

4.2.6.1.6 Procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices;

4.2.6.1.7 A government employee training program to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance. The permittee shall describe any existing, available materials the permittee plans to use such as those available from EPA, State or other organizations. The permittee shall describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure; and

4.2.6.1.8 How the permittee will evaluate the success of this minimum control measure.

4.3 Sharing Responsibility

Implementation of one or more of the minimum measures may be shared with another entity, or another entity assume responsibility for the measure if:

4.3.1 The other entity, in fact, implements the control measure;

4.3.2 The particular control measure, or component of that measure, is at least as stringent as the corresponding permit requirement; and

4.3.3 The other entity agrees to implement the control measure on permittee's behalf. Written acceptance of this obligation is required. This obligation shall be maintained as part of the documented description of the permittee's storm water management program. If the other entity agrees to report on the minimum measure, the permittee shall supply the other entity with the reporting requirements contained in Section 5.3 of this permit. If the other entity fails to implement the control measure on the permittee's behalf, then the permittee remains liable for any discharges due to that failure to implement.

4.4 Reviewing and Updating Storm Water Management Programs and Plans

4.4.1 *Storm Water Management Program and Written Plan (SWMP) Review:* The permittee shall do an annual review of the permittee's SWMP in conjunction with preparation of the annual report required under Section 5.3; and

4.4.2 *SWMP Update:* The permittee may change the SWMP during the life of the permit in accordance with the following procedures:

4.4.2.1 Changes adding (but not subtracting or replacing) components, controls, or requirements to the SWMP may be made at any time upon written notification to the department; and

4.4.2.2 Changes replacing an ineffective or unfeasible BMP specifically identified in the SWMP with an alternate BMP may be requested at any time. Unless denied by the department, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented 60 days from submittal of the request. If request is denied, the department will send the permittee a written response giving a reason for the decision. The permittee's modification requests shall include the following:

4.4.2.2.1 An analysis of why the BMP is ineffective or infeasible (including cost prohibitive);

4.4.2.2.2 Expectations on the effectiveness of the replacement BMP; and

4.4.2.2.3 An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

4.4.2.3 Change requests or notifications must be made in writing and signed in accordance with Section 6.

4.4.3 *SWMP Updates Required by the Department*: Changes requested by the department must be made in writing, set forth the time schedule for the permittee to develop the changes, and offer the permittee the opportunity to propose alternative program changes to meet the objective of the requested modification. All changes required by the department will be made in accordance with 10 CSR 20-6.200. The department may require changes to the SWMP as needed to:

4.4.3.1 Address impacts on receiving water quality caused or affected by discharges from the Municipal Separate Storm Sewer System;

4.4.3.2 Include more stringent requirements necessary to comply with new federal or state statutory or regulatory requirements; or

4.4.3.3 Include such other conditions deemed necessary by the department to comply with the goals and requirements of the Missouri Clean Water Law.

4.4.4 *Transfer of Ownership, Continuing Authority, or Responsibility for SWMP Implementation:* The permittee shall implement the SWMP on all new areas added to the permittee's portion of the municipal separate storm sewer system (or for which the permittee becomes responsible for implementation of storm water quality controls) as expeditiously as practicable, but not later than one year from addition of the new areas. Implementation may be accomplished in a phased manner to allow additional time for controls that cannot be implemented immediately.

4.4.4.1 Within 90 days of a transfer of ownership, continuing authority, or responsibility for SWMP implementation, the permittee shall submit a revised plan, if necessary, for implementing the revised SWMP on all affected areas. The plan shall include revised schedules for implementation. Information on all new annexed areas and any resulting updates required to the SWMP shall be included in the annual report.

4.4.4.2 Only those portions of the SWMP specifically required as permit conditions shall be subject to the modification requirements of 10 CSR 20-6.200. Addition of components, controls, or requirements by the permittee(s) and replacement of an ineffective or infeasible BMP implementing a required component of the SWMP with an alternate BMP expected to achieve the goals of the original BMP shall be considered minor changes to the SWMP and not modifications to the permit.

5. Monitoring, Recordkeeping, and Reporting

5.1 Monitoring

5.1.1 The permittee shall evaluate program compliance, the appropriateness of identified best management practices, and progress toward achieving identified measurable goals. If the permittee discharges to a water for which a TMDL has been approved, the permittee will likely have additional monitoring requirements under Section 3.1.3.6.

5.1.2 When the permittee conducts monitoring at the permittee's regulated small MS4, the permittee is required to comply with the following:

5.1.2.1 *Representative monitoring.* Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity;

5.1.2.2 *Test Procedures.* Monitoring shall be conducted according to test procedures approved under 10 CSR 20-7.015(9)(A).

5.1.3 Records of monitoring information shall include:

5.1.3.1 The date, exact place, and time of sampling or measurements;

5.1.3.2 The names(s) of the individual(s) who performed the sampling or measurements;

5.1.3.3 The date(s) analyses were performed;

5.1.3.4 The names of the individuals who performed the analyses;

5.1.3.5 The analytical techniques or methods used; and

5.1.3.6 The results of such analyses.

5.1.4 *Discharge Monitoring Report.* TMDL monitoring results shall be reported to the department on a Discharge Monitoring Report form (DMR). Monitoring results collected as part of the routine illicit discharge detection and elimination program shall be documented, retained on site and made available upon request by EPA, DNR and the public.

5.2 Recordkeeping

5.2.1 The permittee shall retain records of all activities requiring recordkeeping by the SWMP and monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of Discharge Monitoring Reports (DMRs), a copy of the NPDES permit, a copy of all ordinances, policies and formal procedures for all six minimum control measures and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application, or for the term of this permit, whichever is longer; and

5.2.2 The permittee shall submit the permittee's records to the department only when specifically asked to do so. The permittee shall retain a written description of the SWMP required by this permit (including a copy of the permit language) at a location accessible to the department. The permittee shall make the permittee's records, including the application and the description of the SWMP, available to the public if requested to do so in writing.

5.3 Reporting

The permittee shall submit annual reports, using the annual report form provided by the department, to the Director by July 28 of each year of the permit term. The report shall include:

5.3.1 The status of the permittee's compliance with permit conditions, an assessment of the appropriateness of the identified best management practices, progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and the measurable goals for each of the minimum control measures;

5.3.2 Results of information collected and analyzed, if any, during the reporting period, including monitoring data used to assess the success of the program at reducing the discharge of pollutants to the MEP;

5.3.3 A summary of the storm water activities the permittee plans to undertake during the next reporting cycle (including an implementation schedule);

5.3.4 Proposed changes to the permittee's SWMP, including changes to any BMPs or any identified measurable goals that apply to the program elements; and

5.3.5 Notice that the permittee is relying on another government entity to satisfy some of the permittee's permit obligations (if applicable).

6. **Standard Permit Conditions**

This permit includes Standard Permit Conditions attached as Part 1 to this permit.

7. **Definitions**

All definitions contained in 10 CSR 20-6.200 shall apply to this permit and are incorporated herein by reference. For convenience, simplified explanations of some regulatory/statutory definitions have been provided, but in the event of a conflict, the definition found in the regulation takes precedence.

Control Measure as used in this permit, refers to any Best Management Practice or other method used to prevent or reduce the discharge of pollutants to waters of the United States.

Director refers to the Director of Staff, Water Protection Program, Department of Natural Resources.

Discharge when used without a qualifier, refers to "discharge of a pollutant" as defined at 40 CFR 122.2.

Illicit Connection means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer.

Illicit Discharge refers to any discharge to a municipal separate storm sewer that is not entirely composed of storm water, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from emergency fire fighting activities.

Maximum Extent Practicable refers to the technology-based discharge standard for Municipal Separate Storm Sewer Systems to reduce pollutants in storm water discharges that was established by CWA §402(p). A discussion of how it applies to regulated small MS4s is found at 40 CFR 122.34.

MS4 is an acronym for "Municipal Separate Storm Sewer System" and is used to refer to either a Large, Medium, or Small Municipal Separate Storm Sewer System (e.g. "the Springfield MS4").

Permittee, as used in this permit refers to the holder of this general permit.

Site-specific permit, also means individual permit.

Storm Water, means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm Water Management Program and Plan (SWMP) refers to a comprehensive documented program and plan to manage the quality of storm water discharged from the municipal separate storm sewer system.

Missouri Department of Natural Resources
Fact Sheet – Master General Permit Renewal for Small MS4s

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of storm water from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Permits in Missouri are issued by the Director of the Missouri Department of Natural Resources (department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). NPDES operating permits are issued for a period of five (5) years unless otherwise specified.

A Fact Sheet gives pertinent information regarding the applicable regulations, rational for the development of the NPDES Missouri State Operating Permit (operating permit), and the public participation process for operating permit listed below.

A Fact Sheet is not an enforceable part of an operating permit.

This Fact Sheet is for a Major ☐, Minor ☐, Industrial Facility ☐; Variance ☐;
Master General Permit ☒; and/or permit with widespread public interest ☐.

Part I - Facility Information

The following Facility Information shall appear on the coverage document issued to a General Permit Covered Facility.

NPDES #:
Facility Name:
Facility Address:
Owner's Name:
Owner's Address:

Facility Region:
Facility County:

Facility Type:
Facility SIC Code: 9511
Facility NAICS Code: 924110

Facility Description: Discharges from Regulated Small Municipal Separate Storm Sewer Systems

Comments: _____

Part II - Outfalls

It is adequate to submit a representative subset of outfall information with the application. Specifically, outfalls needed for the application should be representative of discharges nearest the MS4's jurisdictional boundaries or nearest the receiving classified waters running through the MS4's jurisdiction. The more comprehensive outfall information and maps required for the MS4's illicit discharge program shall be retained on site and made available to EPA, DNR and the public upon request.

A full description of the representative outfalls in the application shall appear on the coverage document issued to a General Permit Covered Facility. The following information is required for each outfall.

Outfall #001
Legal Description: ¼, ¼, Section, Township, Range, Direction
Latitude/Longitude: +0000000/-0000000 (Degrees, Minutes, Seconds)
Receiving Stream: Name & Classification
First Classified Stream and ID: Name, Class, Water Body ID – currently provided by the Department
USGS Basin & Sub-watershed No.: (# – #) [14 digit USGS Hydrologic Unit Code (HUC)]

This permit allows regulated MS4s to discharge storm water to the following waters, depending on location of the regulated MS4.

Missouri or Mississippi River, lakes or reservoirs, losing streams, metropolitan no-discharge waters, special streams, subsurface waters and other waters of the state.

10 CSR 20-7.031 Missouri Water Quality Standards, the department defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses."

Part III - Rationale and Derivation of Effluent Limitations & Permit Conditions

INTRODUCTION:
This is a municipal storm water discharge permit which authorizes the discharge of storm water from regulated small municipal separate storm sewer systems (MS4s). The permit also authorizes the discharges or flows from emergency fire fighting activities. The permit does **not** authorize any additional non-storm water discharges, such as: process wastewater, storm water discharges that are mixed with process wastewater, or storm water associated with industrial activity, as defined in 10 CSR 20-6.200 or other discharges identified in Section 1.3 of the permit.

The permit is intended to authorize discharge of storm water even as jurisdictional boundaries change through the life of the permit. This rationale will explain which entities are covered under this permit, how to apply for coverage, and what the basic permit requirements are, including the general requirement of a storm water management program and written plan (SWMP.)

This permit authorizes only the activities described in this permit. Compliance with this permit may not be considered a shield from compliance with any local ordinance, State Regulation or State Law.

TYPES OF ENTITIES COVERED UNDER THIS PERMIT:
This permit is intended to cover new or existing discharges composed entirely of storm water from small MS4s required by State regulation to obtain a permit. This permit is not intended to cover the discharge of storm water from MS4s that have been designated by the department as requiring coverage under an alternative general permit or a site-specific permit.

The criteria for permit coverage are contained in the Missouri Storm Water Regulations 10 CSR 20-6.200. In general, this includes any municipality, and federal or state facility/organization that owns or operates a regulated small MS4 as defined in 10 CSR 20-6.200 (i.e. serving a population of 1,000 or greater and located fully or partially within an urbanized area as determined by the latest Decennial Census by the Bureau of Census, or having a population of 10,000 or greater if outside an urbanized area.) MS4s discharging entirely to combined sewer systems are exempt based on their coverage under NPDES wastewater permits.

APPLICATION REQUIREMENTS:
The regulated small MS4 is required to seek coverage under the Small MS4 General Permit or a site-specific permit by submitting completed application forms (Forms M & K if an individual applicant or Forms M & L if applying as a co-permittee), a jurisdictional boundary map showing perimeter outfall locations and a written description of the operator's SWMP. Note: If the small MS4 is seeking renewal of the revised general permit, they may submit the updated SWMP document separately up to 90 days following public notice of the general permit. Note: Form M is currently being revised to include additional information for site-specific small MS4s. (The regulated medium or large MS4 must submit new or renewal applications according to requirements identified in 10 CSR 20-6.200.) MS4 operators that become subject to 10 CSR 20-6.200 following the 2010 census shall submit permit applications within 180 days following census publication. MS4 operators specially designated by the department shall submit permit applications within 180 days following notice by the department.

STORM WATER MANAGEMENT PROGRAM (SWMP):
A docuemented and implementable plan to schedule activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state.

This permit in accordance with 10 CSR 20-6.200 and 40 CFR Parts 9, 122, 123, and 124, requires the permittee to develop and implement a SWMP. The SWMP shall address the six minimum control measures - public education and outreach, public involvement/participation process, illicit discharge detection and elimination, construction site storm water runoff control, post-construction storm water management and pollution prevention/good housekeeping for municipal operations. The SWMP shall include, but not limited to, best management practices, pertinent local regulations, interim milestones, measurable goals, measures of success and responsible persons for each of the measurable goals.

ORDINANCES:
To the extent allowable under State or local law, ordinances (or other regulatory mechanisms) are required to be developed, implemented and enforced within five years of initial permit issuance under the following sections:

1. Illicit discharge detection and elimination – to prohibit non-storm water discharges into the storm sewer system, and implement appropriate enforcement procedures and actions
2. Construction site storm water runoff control – to require erosion and sediment controls at construction sites, as well as sanctions to ensure compliance

3. Post-construction – to address post-construction runoff from new development and redevelopment projects, and sanctions to ensure compliance

SWMP UPDATES REQUIRED BY THE DEPARTMENT:
Changes requested by the department must be made in writing, set forth the time schedule for the permittee to develop the changes, and offer the permittee the opportunity to propose alternative program changes to meet the objective of the requested modification. All changes required by the department will be made in accordance with 10 CSR 20-6.200. The department may require changes to the SWMP as needed to: include components deemed necessary by the department to comply with the goals and requirements of the permit and Missouri Clean Water Law; address impacts on receiving water quality caused or affected by discharges from the MS4; or include more stringent requirements necessary to comply with new federal or state statutory or regulatory requirements.

The permittee may also change the SWMP during the life of the permit in accordance with procedures described in Section 4.4 of the permit.

ANNUAL REPORTING:
The permittee is expected to annually review and provide a written report on their SWMP in accordance with Sections 4.4 and 5.3 of the permit. The permittee shall submit the report by July 28 of each year utilizing the department's annual report form MO 78-1846 or latest version.

MONITORING:
Sampling and testing of storm water for specific parameters is not required on a routine basis under this permit. However, the department reserves the right to require sampling and testing, on a case-by-case basis. As per [10 CSR 20-2.010(78)], a wasteload allocation is the amount of pollutants each discharger is allowed by the department to release into a given stream after the department has determined to total amount of pollutant that may be discharged into that stream without endangering its water quality.

Usually wasteload allocations are not calculated. All permittees are subject to the Maximum Extent Practicable per [10 CSR 20-6.200] & [40 CFR 122]. However, if a storm water-based TMDL and WLA have been put into place for any waterbody into which the permittee discharges, monitoring may be required for discharges affecting that waterbed. Regulated MS4s must have procedures in place to investigate findings of illicit discharges further, also potentially resulting in monitoring. In such cases, the permittee shall follow regulations in 10 CSR 20 Chapter 6 and monitoring requirements set forth in the permit.

303(d) LIST, TOTAL MAXIMUM DAILY LOAD (TMDL) AND WASTELOAD ALLOCATIONS
Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

PERMIT REQUIREMENTS:
The permit includes additional requirements that apply if a Total Maximum Daily Load (TMDL) has been approved for any waterbody into which the permittee discharges (Section 3.1. of the permit). In general, these requirements do not, in themselves, dictate additional measures that must be taken by the permittee. Instead, the permit requires the permittee to comply with any requirements included in a TMDL that address storm water discharges covered in the permit. New requirements affecting the permittee's discharges could be in the form of additional narrative requirements for implementation of BMPs, or in the form of a Waste Load Allocation (WLA) that prescribes a specific quantitative limit for pollution from a specific source.

The permittee may maintain coverage under the general permit provided they comply with the applicable requirements outlined above. The Department reserves the right to require site-specific or alternate general permit coverage.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); CFR §122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

All limits, requirements, and/or conditions in this Fact Sheet are at least as protective as those previously established; therefore, backsliding does not apply.

ANTIDEGRADATION:
Policies which ensure protection of water quality for a particular water body where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as outstanding natural resource waters. Antidegradation plans are adopted by each State to minimize adverse effects on water.

As per [10 CSR 20-7.031(2)(D)], the three (3) levels of protection provided by the antidegradation policy in subsections (A), (B), and (C) of this section shall be implemented according to procedures developed by the department. On April 20, 2007, the Missouri Clean Water Commission approved *Missouri Antidegradation Rule and Implementation Procedure* (Antidegradation Rule), which is applicable to new or upgraded/expanded facilities. The implementation of the Antidegradation Rule will be implemented upon promulgation, which is tentatively scheduled for August 2008.

COMPLIANCE AND ENFORCEMENT:
Action taken by the department to resolve violations of the Missouri Clean Water Law, its implementing regulations, and/or any terms and condition of an operating permit.

Dischargers of storm water from regulated small MS4s, as defined in the Missouri Storm Water Regulations (10 CSR 20-6.200) who do not obtain coverage under this or other Missouri general permits, or under a site-specific NPDES permit, will be in violation of the Missouri Clean Water Law and its implementing regulations and subject to civil penalties of up to $10,000 per violation per day. For entities covered under a NPDES permit, failure to comply with any NPDES permit requirement also constitutes a violation of the Missouri Clean Water Law and its implementing regulations.

Part IV - Administrative Requirements

PUBLIC NOTICE AND COVERAGE FOR AN INDIVIDUAL ENTITY:
As per the Missouri Clean Water Law, the Missouri Clean Water Commission, and the federal Clean Water Act, persons wishing to comment on Missouri State Operating Permits are directed to do so by a department-approved Public Notice coversheet. This Public Notice coversheet is attached to a Missouri State Operating Permit during the Public Notice period.

The need for an individual public notification process shall be determined and identified in the general permit. [10 CSR 20-6.020(1)(C)5.]

Applicable ☒;
Issuance of coverage to an individual facility under this Master General Permit shall be placed on Public Notice for 30 days in accordance with 10 CSR 20-6.020(1)(B) & (C).

Not Applicable ☐;
Public Notice is not required for issuance of coverage under this Master General Permit to individual facilities for the first time.

The Public Notice period for this operating permit is tentatively schedule to begin on January 11, 2008.

Date of Fact Sheet: March 20, 2008

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JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

STORM WATER ILLICIT DISCHARGE AND CONNECTION ORDINANCE

Ordinance 2010-02

Stormwater Illicit Discharge and Connection Ordinance

SECTION 1. PURPOSE/INTENT.

The purpose of this ordinance is to provide for the health, safety, and general welfare of the citizens of Jasper County, Missouri through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:

(1) To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by storm water discharges by any user

(2) To prohibit illicit connections and discharges to the municipal separate storm sewer system

(3) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

SECTION 2. DEFINITIONS.

For the purposes of this ordinance, the following shall mean:

Authorized Enforcement Agency: employees or designees of the director of the county agency designated to enforce this ordinance.

Best Management Practices (BMPs): schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to storm water, receiving waters, or storm water conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act. The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity. Activities subject to NPDES Construction Permits. NPDES Storm Water Phase II permits will be required for construction projects resulting in land disturbance of 1 acre or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Discharge. Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section 7 of this ordinance.

Illicit Connections. An illicit connection is defined as either of the following:

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by the County or,

Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by the County.

Industrial Activity. Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).

National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit. means a permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Non-Storm Water Discharge. Any discharge to the storm drain system that is not composed entirely of storm water.

Person. means any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.

Pollutant. Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

Premises. Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Storm Drainage System. Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

Storm Water. Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

Storm Water Pollution Prevention Plan. A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable.

Wastewater means any water or other liquid, other than uncontaminated storm water, discharged from a facility.

SECTION 3. APPLICABILITY.

This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by the County. Areas outside of the unincorporated urbanized area of Jasper County, Missouri are exempt from this ordinance. The unincorporated urbanized area of Jasper County is determined by the 2000 census and a map of the area is available for review at the Jasper County Health Department.

SECTION4. RESPONSIBILITY FOR ADMINISTRATION.

The County shall administer, implement, and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the County may be delegated in writing by the County Commission of the County to persons or entities acting in the beneficial interest of or in the employ of the agency.

SECTION 5. SEVERABILITY.

The provisions of this ordinance are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Ordinance or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Ordinance.

SECTION 6. ULTIMATE RESPONSIBILITY.

The standards set forth herein and promulgated pursuant to this ordinance are minimum standards; therefore this ordinance does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants.

SECTION 7. DISCHARGE PROHIBITIONS.

Prohibition of Illegal Discharges.
No person shall discharge or cause to be discharged into the storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

The following discharges are exempt from discharge prohibitions established by this ordinance: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted

stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wet-land flows, swimming pools (if dechlorinated - typically less than one PPM chlorine), fire fighting activities, and any other water source not containing Pollutants.

Discharges specified in writing by the County as being necessary to protect public health and safety.

Dye testing is an allowable discharge, but requires a verbal notification to the County prior to the time of the test.

The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

Prohibition of Illicit Connections.

(a) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.

(b) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

(c) A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

SECTION 8. SUSPENSION OF MS4 ACCESS.

Suspension due to Illicit Discharges in Emergency Situations

The County may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the County may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

Suspension due to the Detection of Illicit Discharge

Any person discharging to the MS4 in violation of this ordinance may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The County will notify a violator of the proposed termination of its MS4 access. The violator may petition the County for a reconsideration and hearing.

A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the County.

SECTION 9. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the County prior to the allowing of discharges to the MS4.

SECTION 10. MONITORING OF DISCHARGES.

A. Applicability.

This section applies to all facilities that have storm water discharges associated with industrial activity, including construction activity.

B. Access to Facilities.

(a) The County shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the County.

(b) Facility operators shall allow the County ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.

(c) The County shall have the right to set up on any permitted facility such devices as are necessary in the opinion of the County to conduct monitoring and/or sampling of the facility's storm water discharge.

(d) The County has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure storm water flow and quality shall be calibrated to ensure their accuracy.

(e) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the County and shall not be replaced. The costs of clearing such access shall be borne by the operator.

(f) Unreasonable delays in allowing the County access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the County reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.

(g) If the County has been refused access to any part of the premises from which storm water is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the County may seek issuance of a search warrant from any court of competent jurisdiction.

SECTION 11. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORMWATER POLLUTANTS BY THE USE OF BEST MANAGEMENT PRACTICES.

The County will adopt requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a storm water pollution prevention plan (SWPP) as necessary for compliance with requirements of the NPDES permit.

SECTION12. WATERCOURSE PROTECTION.

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

SECTION 13. NOTIFICATION OF SPILLS.

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the County in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the County within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner

or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 14. ENFORCEMENT.

A. Notice of Violation.

Whenever the County finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the County may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

(a) The performance of monitoring, analyses, and reporting;

(b) The elimination of illicit connections or discharges;

(c) That violating discharges, practices, or operations shall cease and desist;

(d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and

(e) Payment of a fine to cover administrative and remediation costs; and

(f) The implementation of source control or treatment BMPs.

If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

SECTION 15. APPEAL OF NOTICE OF VIOLATION.

Any person receiving a Notice of Violation may appeal the determination of the County. The notice of appeal must be received within 10 days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 15 days from the date of receipt of the notice of appeal. The decision of the authority or their designee shall be final.

SECTION 16. ENFORCEMENT MEASURES AFTER APPEAL.

If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or, in the event of an appeal, within 30 days of the decision of the authority upholding the decision of the County, then representatives of the County shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.

SECTION 17. COST OF ABATEMENT OF THE VIOLATION.

Within 30 days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment within 10 days. If the amount due is not paid within a timely manner as determined by the decision of the authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment. Any person violating any of the provisions of this article shall become liable to the County by reason of such violation.

SECTION 18. INJUNCTIVE RELIEF.

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Ordinance. If a person has violated or continues to violate the provisions of this ordinance, the County may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

SECTION 19. COMPENSATORY ACTION.

In lieu of enforcement proceedings, penalties, and remedies authorized by this Ordinance, the County may impose upon violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc.

SECTION 20. VIOLATIONS DEEMED A PUBLIC NUISANCE.

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

SECTION 21. CRIMINAL PROSECUTION.

Any person that has violated or continues to violate this ordinance shall be liable to criminal prosecution to the fullest extent of the law. The County may recover all attorney's fees court costs and other expenses associated with enforcement of this ordinance, including sampling and monitoring expenses.

SECTION 22. REMEDIES NOT EXCLUSIVE.

The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the County to seek cumulative remedies.

SECTION 23. CERTIFICATE OF ADOPTION

This Stormwater Illicit Discharge and Connection Ordinance for JASPER COUNTY, MISSOURI, ADOPTED AND APPROVED by the Governing Body of JASPER COUNTY, MISSOURI.

This 16 day of November, 2010.

Bonnie Earl

Place Seal Here

Presiding Commissioner (Signature)

Eastern District Commissioner (Signature)

Western District Commissioner (Signature)

JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

EROSION AND SEDIMENT CONTROL ORDINANCE

JASPER COUNTY, MISSOURI
STORMWATER MANAGEMENT

EROSION AND SEDIMENT CONTROL ORDINANCE (MS4)

Section I. Introduction/ Purpose

During the construction process, soil is vulnerable to erosion by wind and water. Eroded soil endangers natural resources by reducing water quality, and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates repair of sewers and ditches, and the dredging of lakes. In addition, clearing and grading during construction causes the loss of native vegetation necessary for terrestrial and aquatic habitat, and to provide a healthy living environment for citizens Jasper County.

As a result, the purpose of this ordinance is to safeguard persons, protect property, prevent damage to the environment and promote the public welfare by guiding, regulating, and controlling the design, construction, use and maintenance of any development or other activity which disturbs or breaks the topsoil or results in the movement of earth on land in Jasper County.

Section II. Definitions

Inspector	An individual who has received training and is employed by Jasper County to inspect erosion and sediment control practices.
Clearing	Any activity which removes the vegetative surface cover.
Drainage Way	Any channel that conveys surface runoff throughout the site.
Erosion Control	Measures that prevent erosion.
Erosion and Sediment Control Plan	A plan or set of plans prepared by or under the direction of a licensed professional engineer indicating the specific measures and sequencing to be used controlling sediment and erosion on a development site both before, during and after construction.
Grading	Excavation or fill of material, including the resulting conditions thereof.
Perimeter Control	A barrier that prevents sediment from leaving a site either by filtering sediment-laden runoff, or diverting it to a sediment trap or basin.
Phasing	Clearing a parcel of land in distinct phases, with the

	stabilization of each phase before the clearing of the next.
Sediment Control Site	Measures that prevent eroded sediment from leaving the site. A parcel of land, or a contiguous combination thereof, where grading work is performed as a single unified operation.
Site Development Permit	A permit issued by Jasper County for which the construction or alteration of ground improvements and structures for the control of erosion, runoff and grading.
Stabilization	The use of practices that prevent exposed soil from eroding.
Start of Construction	The first land-disturbing activity associated with a development, including land preparation such as clearing, grading and filling; installation of streets and walkways; excavation for basements, footings, piers or foundations; erection of temporary forms; and installation of accessory buildings such as garages.
Watercourse	Any body of water, including, but not limited to lakes, ponds, rivers, streams, and bodies of water delineated by the Jasper County
Waterway	A channel that directs surface runoff to a watercourse, or to the public storm drain.

Section III. Permits

1. No person shall be granted a site development or building permit for land-disturbing activity which would require the uncovering of 1 Acre or more without the approval of an Erosion and Sediment Control Plan by Jasper County.

2. No Jasper County site development permit is required for the following activities or areas:

    a. Any emergency activity which is immediately necessary for the protection of life, property or natural resources.

    b. Existing nursery and agricultural operations conducted as a permitted main or accessory use.

    c. Areas outside of the unincorporated urbanized area of Jasper County, Missouri. This area is determined by the 2000 census and a map of the area is available for review at the Jasper County Health Department. (see Missouri Department of Natural Resources regulations for land disturbance permit requirements in areas outside of the unincorporated urbanized areas

of Jasper County, Missouri.

3. Each application shall bear the name(s) and address(es) of the owner or developer of the site, and of any consulting firm retained by the applicant together with the name of the applicants principal contact at such firm.

4. Each application shall include a statement that any land clearing, construction, or development involving the movement of earth shall be in accordance with the Erosion and Sediment Control Plan, and that an Inspector shall be allowed on site on all days where construction or grading activity takes place.

5. Person constructing a single structure must comply with all the requirements of the developers MDNR Land Disturbance permit and Storm Water Pollution Prevention Plan issued by the Missouri Department of Natural Resources. The developers MDNR Land Disturbance Permit number will be required for all single structures within a common development.

Section IV. Review and Approval

1. Jasper County will review each application for a site development permit to determine its conformance with the provisions of this local regulation. Within thirty (30) days after receiving an application, and a Missouri Department of Natural Resources Land Disturbance Permit, Jasper County shall, in writing either:

    a. approve the permit application;

    b. approve the permit application subject to such reasonable conditions as may be necessary to secure substantially the objectives of this regulation, and issue the permit subject to these conditions; or

    c. disapprove the permit application, indicating the deficiencies and the procedure for submitting a revised application and/or submission.

2. Failure of Jasper County to act on original or revised applications within thirty (30) days of receipt shall authorize the applicant to proceed in accordance with the plans as filed unless such time is extended by agreement between the applicant and Jasper County. Pending preparation and approval of a revised plan, development activities shall be allowed to proceed in accordance with conditions established by Jasper County.

Section V. Erosion and Sediment Control Plan

1. The Erosion and Sediment Control Plan shall include:

    a. A sequence of construction of the development site, including stripping and clearing, rough grading, construction of utilities, infrastructure, buildings, final

grading and landscaping. Sequencing shall identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, and the sequence of clearing, installation of temporary erosion and sediment measures, and establishment of permanent vegetation.

b. All erosion and sediment control measures necessary to meet the objectives of this local regulation throughout all phases of construction and permanently, after completion of development of the site. Depending upon the complexity of the project, the drafting of intermediate plans may be required at the close of each season.

c. Seeding mixtures and rates, types of sod, method of seedbed preparation, expected seeding dates, type and rate of lime and fertilizer application, and kind and quantity of mulching for both temporary and permanent vegetative control measures.

d. Provisions for maintenance of control facilities.

e. An approved Missouri Department of Natural Resources Land Disturbance Permit.

2. Modifications to the plan

a. Major amendments of the erosion and sediment control plan shall be submitted to the Jasper County and shall be processed and approved, or disapproved, in the same manner as the original plans.

b. Field modifications of a minor nature may be authorized by Jasper County by verbal authorization to the permitee.

Section VI. Design Requirements

1. Grading, erosion control practices, sediment control practices, and waterway crossings shall meet the design criteria set forth in the most recent version of the Jasper County's Erosion and Sediment Control Guidelines, and shall be adequate to prevent transportation of sediment from the site to the satisfaction of the Jasper County

2. Phasing shall be required on all sites disturbing greater than five acres, with the size of each phase to be established at plan review and as approved by Jasper County. Sedimentation control shall be established before work on each phase, or for the complete site in the first phase.

3. Clearing, except that necessary to establish sediment control devices, shall not begin until all sediment control devices have been installed and have been stabilized.

JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

PERMIT APPLICATION – THIRD TERM

MISSOURI DEPARTMENT OF NATURAL RESOURCED
WATER PROTECTION PROGRAM, WTER POLLUTION BRANCH
PO BOX 176, JEFFERSON CITY, MO 65102
FORM K – APPLICATION FOR INDIVIDUAL SMALL MS4 GENERAL PERMIT (FORM M MUST ALSO BE SUBMITTED)

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED	FEE SUBMITTED

THIS IS FOR A STORMWATER ONLY DISCHARGE PERMIT.

1.00
- [x] a. This municipality/area is now operating a separate storm sewer system under Missouri Operating Permit Number (NPDES) MO – _____ or R040048
- [ ] b. This is a new permit;

2.00 NAME OF MUNICIPALITY/AREA MS4
Jasper County Missouri MS4

2.10 ADDRESS (HEADQUARTERS PHYSICAL LOCATION) STREET	CITY	STATE	ZIP CODE
Room 101 Jasper County Courthouse	Carthage	Mo.	64836

3.00 OWNER

NAME	TELEPHONE NUMBER
Jasper County Missouri	417-358-0421

ADDRESS STREET	CITY	STATE	ZIP CODE
Room 101 Jasper County Courthouse	Carthage	Mo.	64836

4.00 CONTINUING AUTHORITY

NAME	TELEPHONE NUMBER
Jasper County Missouri	417-358-0421

ADDRESS STREET	CITY	STATE	ZIP CODE
Room 101 Jasper County Courthouse	Carthage	Mo.	64836

5.00 MUNICIPALITY/ AREA CONTACT

NAME	PHONE 417-358-0481
Anthony Moehr, 105 Lincoln Carthage, Mo. 64836	FAX 417-358-0494

TITLE
Administrator, Jasper County Health Dept.

6.00 FOR EACH KNOWN STORMWATER OUTLET GIVE LEGAL DESCRIPTION (ATTACH ADDITIONAL SHEETS AS NECESSARY)
Stormwater Outlet Number ___ ¼ ___ ¼ ___ Sec. ___ T ___ R ___ County _____ See Attached Sheets
Lat _____, Long _____

6.10 FOR EACH KNOWN STORMWATER OUTLET LIST THE NAME OF THE RECEIVING WATER
Outlet Number _____ Receiving Water _____
Outlet Number _____ Receiving Water _____ See Attached Sheets
Outlet Number _____ Receiving Water _____

7.00 ATTACH A USGS 1" – 2000' SCALE MAP SHOWING THE LOCATION OF THE MUNICIPALITY/AREA IN RELATION TO THE LOCAL ROAD SYSTEM. INDICATE ON THE MAP THE MUNICIPALITY/AREA BOUNDARIES, THE RECEIVING STREAM(S); ALL KNOWN STORMWATER OUTLETS; AND THE MAP SECTION, TOWNSHIP, AND RANGE.

8.00 I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THE APPLICATION, THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE, AND IF GRANTED THIS PERMIT, I AGREE TO ABIDE BY MISSOURI CLEAN WATER LAW AND ALL RULES, REGULATIONS, ORDERS AND DECISIONS, SUBJECT TO ANY LEGITIMATE APPEAL AVAILABLE TO AN APPLICANT UNDER THE MISSOURI CLEAN WATER LAW OF THE MISSOURI CLEAN WATER COMMISSION.

NAME AND OFFICIAL TITLE (TYPE OR PRINT)	PHONE
John Bartosh, Presiding Commissioner	417-358-0421
SIGNATURE John Bartosh	DATE SIGNED 5/9/13

MO 780-1302 (6-04)

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION BRANCH
PO BOX 176 JEFFERSON CITY, MO 65102

FORM M – APPLICATION FOR STORM WATER PERMIT (FORM K OR L MUST BE INCLUDED) UNDER THE GENERAL PERMIT: SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

1. NAME OF MUNICIPALITY/AREA(S) TO BE COVERED BY THIS PERMIT

Jasper County Missouri Unincorporated Urbanized Areas (approximately 8690 acres)

2. PHYSICAL LOCATION OF MUNICIPALITY/AREA(S) (ADDRESS ASSIGNED)

Room 101 Jasper County Courthouse Carthage Mo. 64836

3. TOTAL AREA OF MUNICIPALITY/AREA (S) 869(ACRES OR 13.6 SQUARE MILES.

4. A STORM WATER MANAGEMENT PROGRAM (SWMP) MUST BE DEVELOPED FOR THIS MUNICIPALITY/AREA. (THIS PROGRAM MUST BE DEVELOPED IN ACCORDANCE WITH REQUIREMENTS & GUIDELINES SPECIFIED WITHIN THE GENERAL PERMIT FOR STORM WATER DISCHARGES FROM MS4 ACTIVITIES. THE APPLICATION WILL BE CONSIDERED INCOMPLETE IF THE SWMP HAS NOT BEEN DEVELOPED IN ACCORDANCE WITH THE TERMS OF THE GENERAL PERMIT. **A COPY OF THE SWMP MUST BE SUBMITTED ALONG WITH THIS APPLICATION.**)

5. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR PUBLIC EDUCATION AND OUTREACH. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See attached Sheets

6. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR PUBLIC INVOLVEMENT AND PARTICIPATION. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See attached Sheets

7. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR ILLICIT DISCHARGE DETECTION AND ELIMINATION. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See Attached Sheets

8. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR CONSTRUCTION SITE STORM WATER RUNOFF CONTROL. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See attached Sheets

9. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR POST CONSTRUCTION STORM WATER MANAGEMENT. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See Attached Sheets

10. SUMMARIZE THE MEASURES FROM THE SWMP THAT WILL BE USED FOR POLLUTION PREVENTION AND GOOD HOUSEKEEPING. (ATTACH ADDITIONAL SHEETS IF NECESSARY)

See attached Sheets

11. THE MUNICIPALITY/AREA(S) IS WITHIN 100 FEET OF: (CHECK EACH THAT APPLIES) FOR THOSE IDENTIFIED AS PRESENT, PLEASE IDENTIFY THEIR LOCATION IN AN ATTACHMENT.

☐ WATER CLASSIFIED IN CSR 20-7.031 WATER QUALITY STANDARD AS A PUBLIC DRINKING WATER SUPPLY LAKE (L1), OUTSTANDING NATIONAL OR STATE RESOURCE WATERS, OR STREAMS DESIGNATED FOR COLD-WATER SPORT FISHERY;

☑ STREAMS, LAKES, OR RESERVOIRS IDENTIFIED AS CRITICAL HABITAT FOR ENDANGERED SPECIES AS DETERMINED BY THE MISSOURI DEPARTMENT OF CONSERVATION AND/OR THE US FISH AND WILDLIFE SERVICE; OR

12. IS THE DISCHARGE FROM THE MS4 WITHIN 100 FEET OF WATERS CLASSIFIED AS MAJOR RESERVOIRS (L2) OR PERMANENT FLOW STREAMS (P), EXCEPT THE MISSOURI AND MISSISSIPPI RIVERS, OR WITHIN TWO STREAM MILES UPSTREAM OF BIOCRITERIA REFERENCE LOCATIONS AS DEFINED IN 10 CSR 20, CHAPTER 7?

☐ YES ☐ NO

IF YES, PLEASE LIST THESE RECEIVING WATERS IN AN ATTACHMENT.

13. IS ANY PART OF THE AREA(S) DEFINED AS WETLAND?

☐ YES ☐ NO There Are No Known Wetland within the unincorporated urbanized areas

NOTE: A CLEAN WATER ACT, SECTION 404 PERMIT MAY BE REQUIRED FOR THE DEVELOPMENT IN WETLAND AREA(S) FROM THE US ARMY CORPS OF ENGINEERS.

14. DOES ANY OF THE STORM WATER DISCHARGE TO A SINKHOLE, LOSING STREAM, OR ANY OTHER TOPOGRAPHICAL FEATURE THAT WOULD BE A DIRECT CONDUIT TO GROUND WATER?

☐ YES ☐ NO

IF YES, PLEASE IDENTIFY THE LOCATION(S) OF THESE GEOLOGIC FEATURES IN AN ATTACHMENT.

There are no known sinkholes, losing streams or direct conduits within the unincorporated urbanized areas

15. I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS APPLICATION, THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE, AND IF GRANTED THIS PERMIT, I AGREE TO ABIDE BY MISSOURI CLEAN WATER LAW AND ALL RULES, REGULATIONS, ORDERS AND DECISIONS, SUBJECT TO ANY LEGITIMATE APPEAL AVAILABLE TO AN APPLICANT UNDER THE MISSOURI CLEAL WATER LAW OF THE MISSOURI CLEAN WATER COMMISSION (ATTACH ADDITIONAL PAGES IF ADDITIONAL SIGNATURES ARE REQUIRED FOR A CO-PERMIT).

NAME(S) AND OFFICIAL TITLE(S)	TELEPHONE NUMBER(S)
John Bartosh, Presiding Commissioner	417-358-0421
SIGNATURE(S) John Bartosh	DATE SIGNED 5/9/13

MC 780-1800 (5-07)

Form M Attachment
General Storm Water Permit Application
Jasper County, Missouri Permit MO-R040048
Third Permit Term 2013 - 2018

5. Summarize the measures from the SWMP that will be used for Public Education and Outreach.

The county will establish and maintain a Storm Water Program page on the Jasper County Health Department's webpage (which is part of Jasper County's website.) The county, in partnership with other communities, will use public meetings, websites, brochures, and news releases to inform the public regarding storm water issues.

6. Summarize the measures from the SWMP that will be used for public involvement and participation.

The county will maintain the illicit connection/illegal dumping notification system for the public's use by e-mail or phone calls. The county will encourage public participation in development of the storm water management plan. The county, in partnership with other communities, will encourage involvement by the public.

7. Summarize the measures from the SWMP that will be used for illicit discharge detection and elimination.

The county has adopted a storm water illicit discharge and connection ordinance. The county will maintain the illicit connection/illegal dumping notification system by e-mail or phone calls. The county will maintain the outfall/storm drainage system map. The county in partnership with other communities will use public meetings, websites, and brochures to inform the public concerning illicit discharges.

8. Summarize the measures from the SWMP that will be used for construction site storm water runoff control.

The county has adopted an erosion and sediment control ordinance and erosion and sediment control guidelines for controlling active construction sites. The county will review site plans and issue permits for construction projects. The county will maintain the illicit connection/illegal dumping notification system by e-mail or phone calls. The county will conduct inspections of active construction sites within jurisdiction. The county in partnership with other communities will promote training for developers and county staff for construction activities.

9. Summarize the measures from the SWMP that will be used for post construction storm water management.

The county has adopted a post construction storm water management ordinance for regulating post construction storm water management practices for development. The county will review development plans for inclusion of post construction maintenance and operation activities. The county will conduct inspections of development sites for operation and maintenance of post construction best management practices. The county in partnership with other communities will promote training for developer and county staff for post construction development maintenance and operation practices.

10. Summarize the measures from the SWMP that will be used for Pollution Prevention and Good Housekeeping.

The county will review all flood plain development applications for water quality impacts. The county in partnership with other communities will promote training for county staff for pollution prevention and good housekeeping practices.

JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

STATE OPERATING PERMIT

4. Cut and fill slopes shall be no greater than 4:1, except as approved by Jasper County to meet other community or environmental objectives.

5. Erosion Control requirements shall include the following:

    a. Should continuous work on-site be suspended for a period of greater than 14 days, soil must be stabilized within the following 7 days.

    b. If vegetative erosion control methods, such as seeding, have not become established within 30 days, the Jasper County may require that the site be reseeded, or that a non-vegetative option be employed.

    c. On steep slopes or in drainage ways, special techniques that meet the design criteria outlined in the Jasper County Sediment and Erosion Control Guidelines shall be used to ensure stabilization.

    d. Soil stockpiles must be stabilized or covered at the end of each work day. Stabilization shall be by either tarping or installing silt fencing around the entire pile.

    e. Techniques shall be employed to prevent the blowing of dust or sediment from the site.

    f. Techniques that divert upland runoff past disturbed slopes shall be employed.

6. Sediment Controls

    a. Sediment controls shall be provided in the form of settling basins or sediment traps or tanks, and perimeter controls.

    b. Adjacent properties shall be protected by the use of a vegetated buffer strip, in combination with perimeter controls.

7. Waterways and Watercourses

    a. When a wet watercourse must be crossed regularly during construction, a temporary stream crossing shall be provided, and an approval obtained from the Jasper County and all other necessary local, state and federal interests.

    b. When in-channel work is conducted, the channel shall be stabilized before, during and after work.

    c. Stabilization adequate to prevent erosion must be provided at the outlets of all pipes, flumes and paved channels.

8. Construction Site Access

   a. A stabilized construction entrance road shall be provided at all sites.

   b. Other measures may be required at the discretion of Jasper County in order to ensure that sediment is not tracked onto public streets by construction vehicles, or washed into storm drains.

   c. Public streets adjacent to the site access shall be scraped and swept daily by the contractor to the Inspector's satisfaction.

Section VII. Inspection

Jasper County shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permitee wherein the work fails to comply with the erosion and sediment control plan as approved.

Section VIII. Enforcement

1. Stop-Work Order; Revocation of Permit: In the event that any person holding a site development permit pursuant to this ordinance violates the terms of the permit, or implements site development in such a manner as to materially adversely affect the health, welfare, or safety or persons residing or working in the neighborhood or development site so as to be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood, Jasper County may suspend or revoke the building permit.

2. Violation of the provisions of this article or failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with granting of variances) shall constitute a misdemeanor. Any person who violates this article or fails to comply with any of its requirements shall, upon conviction thereof, be punished in accordance with County Code. Each day such violation continues shall be considered a separate offense. Nothing herein contained shall prevent the county or other appropriate authority from taking such other lawful action as is necessary to prevent or remedy any violation.

Section IX. Separability

The provisions and sections of this ordinance shall be deemed to be separable, and the invalidity of any portion of this ordinance shall not affect the validity of the remainder.

JASPER COUNTY, MISSOURI EROSION AND SEDIMENT CONTROL GUIDELINES

October 2007

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INTRODUCTION

These guidelines are intended to provide the designer, contractor and builder with design criteria and minimum standards for the installation of erosion and sediment controls to comply with the Jasper County's Erosion and Sediment Control Regulations. The regulations were enacted to protect the health, safety, and property of the citizens of Jasper County and to help protect area water resources from pollution due to erosion and transportation of sediment. The regulations are applicable to all land development and land disturbance activity within the unincorporated urbanized areas of Jasper County (As defined by the 2000 Census) where the area of disturbance is greater than 1.0 Acres. The regulations requiree that no person cause or allow sediment to be deposited in any public street, public land, or on any property not under their control as a result of land disturbance of more than 1.0 Acres resulting from construction activities.

You can comply with the regulations by meeting the following objectives:

a. Minimize the area disturbed by construction and development;

b. Provide for containment of sediment until areas are stabilized;

c. Stabilize disturbed areas as soon as practical after project completion; and

d. Provide permanent erosion, drainage, and detention controls.

GENERAL DESIGN GUIDELINES

Erosion is a natural process where soil and rock are loosened and removed. Natural erosion normally occurs at a very slow pace, but when land is disturbed on a construction site, the erosion rate often increases dramatically. When erosion occurs on a construction site and runoff carries sediment off the site, there is often a negative impact on downstream drainage systems and water quality.

The purposes of erosion and sediment controls are to minimize the amount of erosion that occurs as a result of construction activity and to prevent the sediment that is produced from leaving the property. Effective erosion and sediment control requires that the soil surface be protected from the erosive forces of wind, rain, and runoff and that the eroded soil be captured and retained onsite. The following principles are effective when they are integrated into a system of control practices and management techniques to control erosion and prevent sedimentation offsite.

When designing sediment and erosion controls, it is necessary to determine whether there is sheet flow or concentrated flow of stormwater on the property. Sheet flow occurs on gently sloping land without defined drainage ways. The stormwater tends to disperse evenly across the property, although the drainage may be in one direction due to the overall slope of the property. Concentrated flow occurs on property where there are defined drainage ways that may range from gentle swales to clearly defined

waterways. It is possible to have a combination of sheet flow and concentrated flow on the same property.

Erosion Protection

Proper planning will help identify potential erosion problems, particularly highly susceptible areas, such as areas of concentrated flow. Removing the vegetative cover and altering the soil structure by clearing, grading, and compacting the surface increases an area's susceptibility to erosion. Scheduling can be a very effective means of reducing erosion. Schedule construction activities to minimize the exposed area and the duration of exposure. Apply stabilizing measures as soon as possible after the land is disturbed. Plan and implement temporary or permanent vegetation, mulches, or other protective practices to correspond with construction activities. Protect channels from erosion forces by using protective linings and the appropriate channel design. Consider possible future repairs and maintenance of these practices in the design. In scheduling, take into account the season and the weather forecast.

Clearing existing vegetation reduces the surface roughness and infiltration rate and increases runoff velocities and volumes. This is particularly a concern in areas of concentrated flow. Use measures that break the slopes to reduce the problems associated with concentrated flow volumes and runoff velocities. Practical ways to reduce velocities include conveying stormwater runoff away from steep slopes to stabilized outlets, preserving natural vegetation where possible, and mulching and vegetating exposed areas immediately after construction.

Sediment Containment

Even with careful planning some erosion is unavoidable, and the resulting sediment must be trapped on the site. In areas where runoff occurs primarily as sheet flow, containment of sediment is relatively simple. In these areas, temporary containment devices may be sufficient. Where concentrations of flow occur, containment of sediment becomes more difficult as the rate and volume of flow increase. In these areas, more extensive or permanent control devices need to be provided. Areas of steep topography and cut or fill slopes need to be given special consideration. Due to the environmental sensitivity of streams, rivers, losing streams, sinkholes, and mining features, special consideration also needs to be given to these areas. Plan the location where sediment deposition will occur and maintain access for periodic removal of accumulated sediment. Protect low points below disturbed areas by building barriers to reduce sediment loss. Sediment traps and basins should be constructed before other land-disturbing activities.

Temporary Versus Permanent Controls

Temporary controls, such as straw or hay bale dikes, silt fences, erosion control blankets, etc., are provided for the purpose of controlling erosion and containing sediment until construction is complete. Temporary controls are not needed after the area is stabilized.

Permanent controls consist of riprap, concrete trickle channels, detention basins, etc., which will remain in place through the life of the development. It is possible for the same facility to serve both a temporary and permanent purpose.

Maintenance

Inspection and maintenance are vital to the performance of erosion and sedimentation control measures. If not properly maintained, some practices may cause more damage than they prevent. Always evaluate the consequences of a measure failing when considering which control measure to use, since failure of a practice may be hazardous or damaging to both people and property. For example, a large sediment basin failure can have disastrous results, and low points in dikes can cause major gullies to form on a fill slope. It is essential to inspect all practices to determine that they are working properly and to ensure that problems are corrected as soon as they develop.

DESIGN STANDARDS AND CRITERIA

Following are erosion and sediment control practices to consider for each project as needed. Other methods that achieve the ordinance requirements are encouraged. It is important to coordinate the temporary erosion control measures with the permanent control features to assure economical, effective, and continuous erosion control. Sufficient land area and/or easements must be available for the construction and maintenance of all erosion and sediment control devices to be used during construction.

Erosion Protection

Grading

Prior to grading, topsoil should be stripped from the site and stockpiled for reuse. To minimize the potential for future erosion, the maximum grades of cut or fill slopes should not exceed 33 percent (3:1). Cut or fill slopes should also not exceed 15 feet in vertical height unless a horizontal bench area at least five feet in width is provided for each 15 feet of vertical height. To provide for flow of stormwater over grassed areas the minimum slope should not be less than one percent (100:1).

Cut and Fill Slopes

Cut and fill slopes need to be protected from erosion by constructing bale dikes, silt fences, diversion berms, or swales along the top of the slope. Where drainage must be carried down the slopes, pipe drains, concrete flumes, riprap chutes, or other nonerosive surfaces need to be provided. Suitable erosion control measures, such as riprap silting basins, should be provided at the bottom of the slope. Diversions should be maintained until permanent growth is firmly established on the slopes. Typical diversion details for swales and dikes are shown in Figures 1 and 2, respectively. For proper drainage, a minimum one percent (100:1) grade must be provided for the swale or along

the up-slope side of the dike. The dike must be compacted to a density equal to the adjoining area.

Figure 1. Diversion Swale

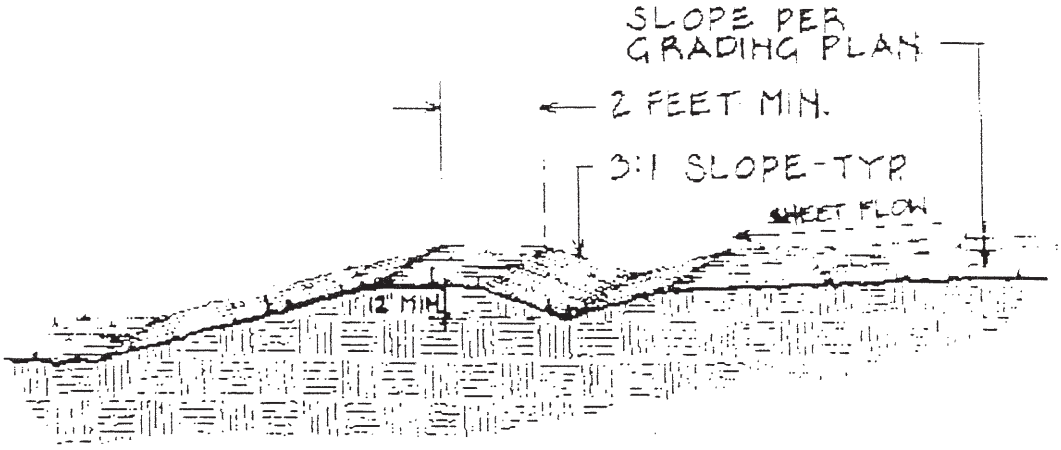
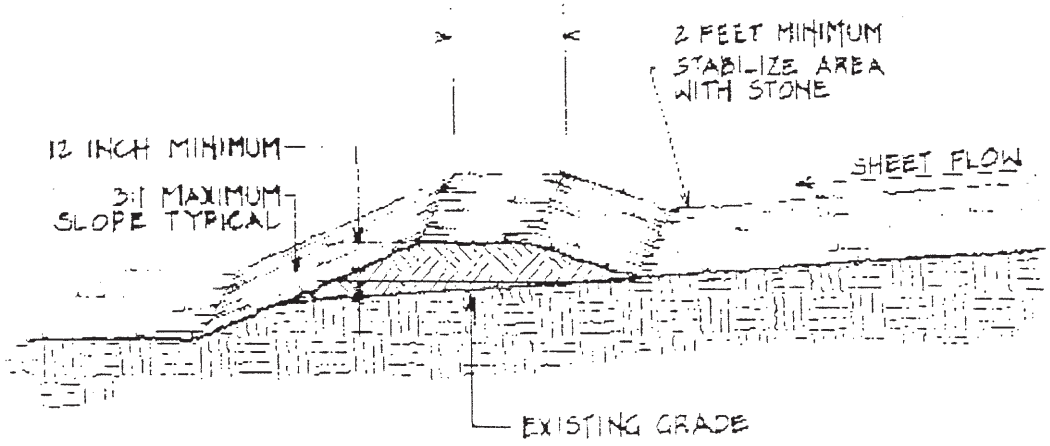


Figure 2. Diversion Dike



Channels and Swales

Permanent channels and swales should be provided with a stabilized invert (bottom of the channel or swale) consisting of sod, erosion control blankets or a non-erosive lining. A channel can be lined with sod where the average velocity of flow is five feet per second or less and there is no base flow. For channels with a bottom width less than 15 feet, sod should extend up the side slope to a minimum height of six inches above the toe (Figure 3). Channels with a bottom width of fifteen feet or greater should be graded

as shown in Figure 4, and a low flow area 15 feet in width should be lined with sod. Commercial erosion control blankets may be used in lieu of sod. The remainder of the channel slopes should be seeded and mulched as provided above.

Figure 3. Channel (Bottom < 15 ft Wide)

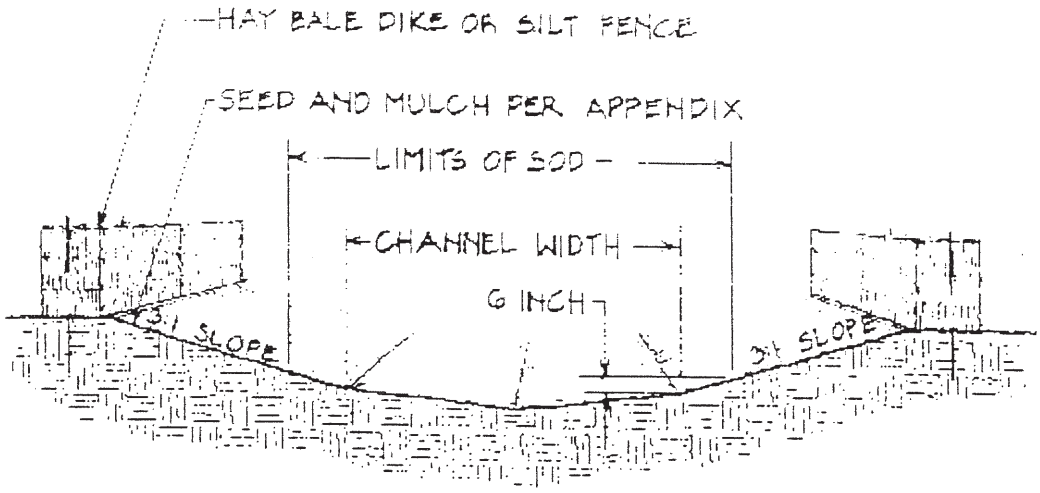
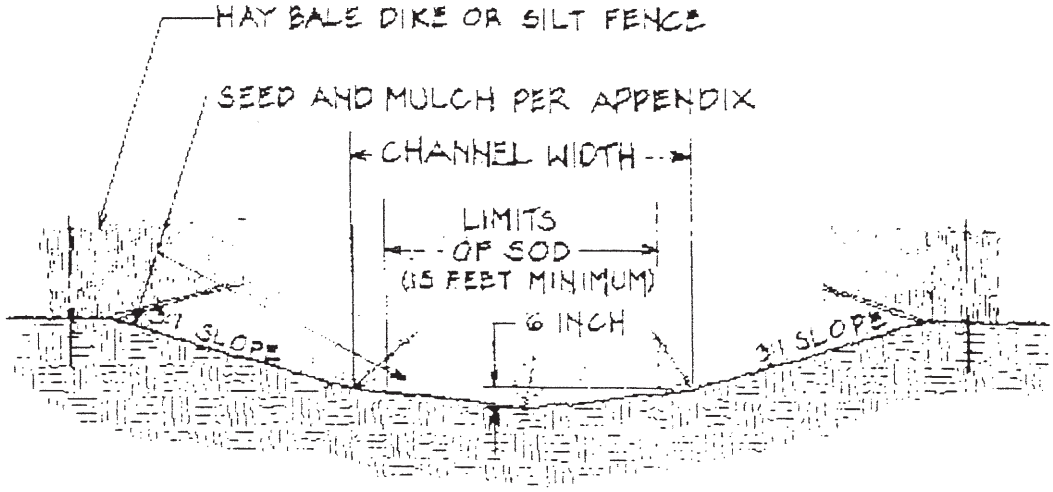


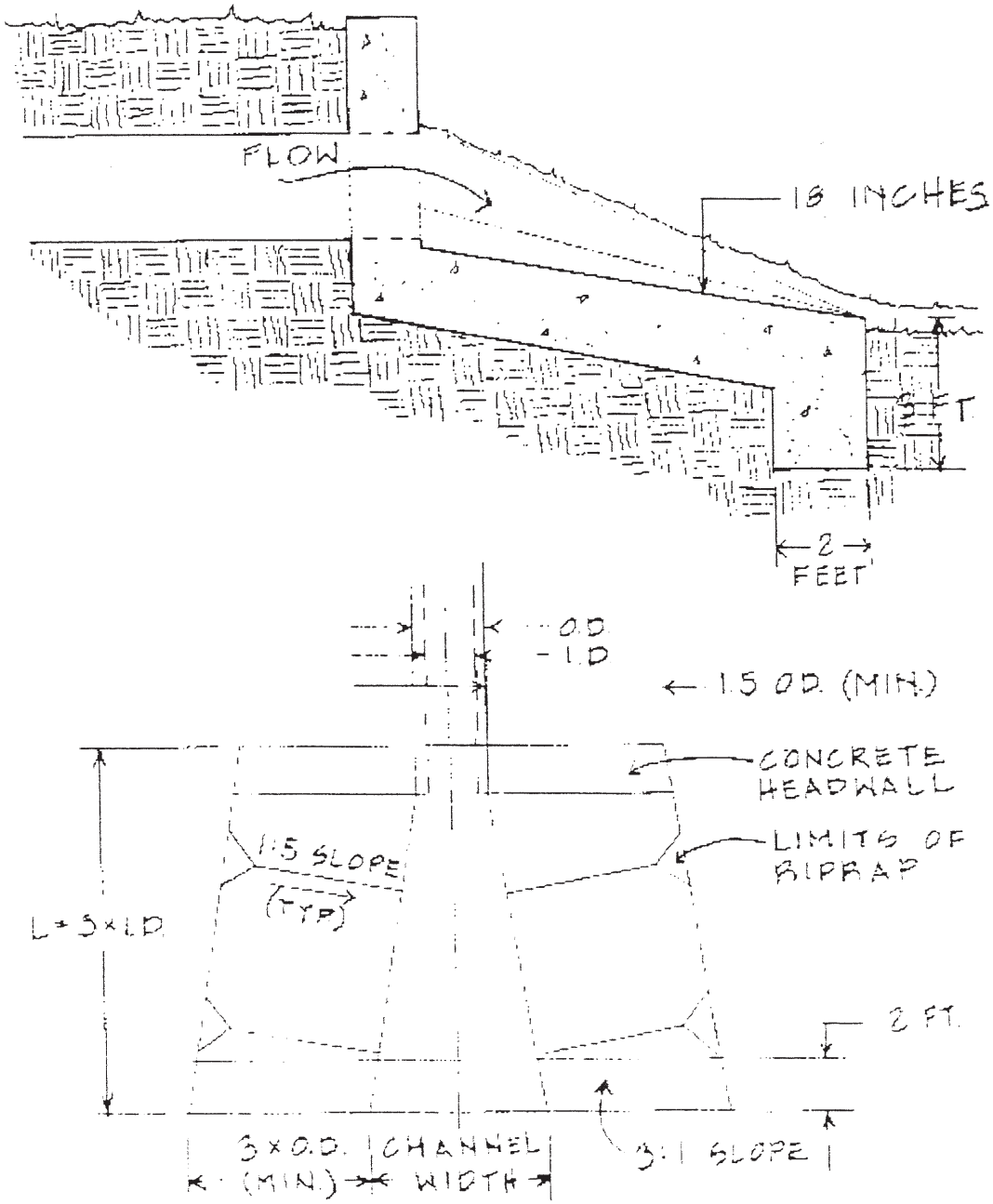
Figure 4. Channel (Bottom > 15 ft Wide)



In grass channels where base flow occurs, a nonerosive low-flow channel of riprap or concrete should be provided. Low flow channels should have a minimum capacity of five cubic feet per second. For channels with an average velocity of five feet per second or greater, a non-erosive lining of riprap, concrete, or other approved material should be provided.

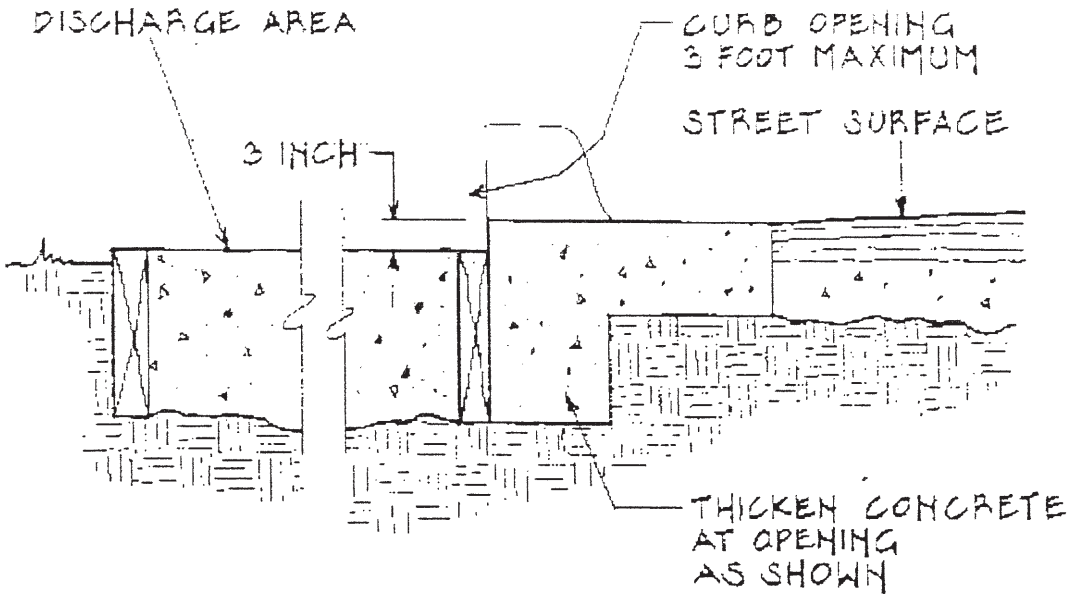
Erosion protection should be provided at storm sewer and culvert outlets. Minimum erosion protection should typically consist of a flared end section or a concrete headwall and a non-erosive lining. Non-erosive lining should consist of riprap or a suitable substitute. Field stone, gabions, or riprap should extend to the point at which average channel velocity for the peak flow rate from the minor (2 year) storm has decreased to five feet per second maximum. The length of protective lining to be provided should be as shown in Figure 5 for average outlet velocities up to ten feet. For average outlet velocities greater than ten feet per second, the Missouri Department of Transportation

Figure 5. Outlet Protection



standard energy dissipater headwall or other suitable substitute should be used. The height of erosion protection should not be less than the top of the pipe. Toewalls should be provided at the down-stream end of all headwalls and flared end sections. Toewalls should typically extend a minimum of 18 inches below channel grade.

Figure 6. Curb Opening Erosion Protection



Where drainage flows from paved areas to grass areas through curb openings, erosion protection should be provided as shown in Figure 6. The riprap discharge area should be a minimum of 5 feet on a side and one-foot deep with a border of 2-inch by 12-inch CCA boards.

In grass channels, grades and velocities may be controlled by use of grade checks and drop structures. Grade checks should be placed in natural channels where average velocity for the peak flow rate from the minor storm exceeds five feet per second for post-development conditions.

Erosion protection should be provided at spillways and outlet structures for detention ponds. Erosion protection should extend to the point where flow has been stabilized and average velocity in the outlet channel does not exceed the erosive velocity of that channel.

Seeding and Mulching

As soon as practical, disturbed areas should be seeded and mulched to reduce the potential for further erosion. Seeding may be permanent if all work in the disturbed area is complete or temporary if the area is to be disturbed again at a later date. Proper seedbed preparation, selection of appropriate species, and use of quality seed are

important. Failure to carefully follow established guidelines and recommendations, below or provide by suppliers, can result in an inadequate or short-lived stand of vegetation that will not control erosion.

Seedbed Preparation. Good seedbed preparation is essential to successful plant establishment. Before preparing seedbeds, complete grading and install all necessary erosion control practices, such as dikes, waterways, and basins. Steep slopes should be minimized because they make seedbed preparation difficult and increase the erosion hazard. If soils become compacted during grading, loosen them to a depth of 6-8 inches using a ripper, harrow, or chisel plow. If recent tillage operations have resulted in a loose surface, additional roughening may not be required except to break up large clods. If rainfall causes the surface to become sealed or crusted, loosen it just prior to seeding by discing, raking, harrowing, or other suitable methods. Slopes steeper than 33 percent (3:1) grade should be grooved or furrowed on the contour before seeding. A good seedbed is well pulverized, loose, and uniform. Prior to permanent seeding, a minimum depth of two inches of loose topsoil should be spread on areas to be seeded. Where hydro-seeding methods are used, the surface may be left with a more irregular surface of large clods and stones.

Lime should be applied according to soil test recommendations. If the pH (acidity) of the soil is not known, an application of ground agricultural limestone at the rate of two tons/acre is usually sufficient. Lime should be applied uniformly and incorporated into the top 4-6 inches of soil. Soils with a pH of six or higher need not be limed.

Fertilizer should also be applied based on soil tests. When these are not possible, apply a 10-10-10 grade fertilizer at 700-1,000 lbs. per acre. Fertilizer should also be incorporated into the top 4-6 inches of soil.

Seeding. Disturbed areas that will not be brought to final grade for a period of more than 14 working days need to be temporarily stabilized by planting rapid-growing annual plants, which sprout and grow rapidly and survive for only one season, are suitable for establishing initial or temporary vegetative cover. Annual rye grass, wheat, or oats should be used for temporary seeding. Temporary seeding controls runoff and erosion until permanent vegetation or other erosion control measures can be established. Temporary seeding also preserves the integrity of earthen sediment control structures such as dikes, diversions, and the banks of dams and sediment basins. It can also reduce the amount of maintenance associated with these devices. For example, the frequency that sediment basins will have to be cleaned out will be reduced if watershed areas, outside the active construction zone, are stabilized. In addition, it provides residue for soil protection and seedbed preparation and reduces problems of mud and dust production from bare soil surfaces during construction. Applications of this practice include diversions, dams, temporary sediment basins, temporary road banks, topsoil stockpiles and completed areas not ready for permanent seeding.

Temporary seeding provides protection for no more than one year, during which time permanent stabilization should be initiated. Permanent seeding should be applied based on your supplier's recommendation or as follows.

SEED	BROADCAST RATES	DRILLED SODDED RATES
Tall Fescue	30 LB/acre	25 LB/acre solid
Kentucky Bluegrass	3 LB/acre	2 LB/acre solid
Red Fescue	10 LB/acre	7 LB/acre
Wheat or Rye	120 LB/acre	100 LB/acre
Annual Ryegrass	100 LB/acre	100 LB/acre

Evenly apply seed using a cyclone seeder (broadcast), drill, cultipacker seeder, or hydro-seeder. Broadcast seeding and hydro-seeding are appropriate for steep slopes where equipment cannot be driven. Distributing seed by hand is not recommended because of the difficulty in achieving a uniform distribution.

Small grains should be planted no more than one inch deep, and grasses and legumes no more than 1/2 inch. Broadcast seed must be covered by raking or chain dragging, and then lightly firmed with a roller or cultipacker. Hydro-seeded mixtures should include wood fiber (cellulose) mulch.

Seeded areas should be maintained for one year following permanent seeding to ensure a healthy lawn.

Mulching. The use of appropriate mulch will help ensure the vegetation is established under normal conditions and is essential to seeding success under harsh site conditions. Harsh site conditions include:

a. Seeding in fall or winter cover (wood fiber mulches are not considered adequate for this use);

b. Slopes steeper than 33 percent (3:1) grade;

c. Excessively hot or dry weather;

d. Adverse soils (shallow, rocky, or high in clay or sand; and

e. Areas receiving concentrated flow.

Mulching is not necessary but recommended where slopes are less than five percent (20:1) grade. Where slopes are less than 25 percent (4:1) grade, cereal grain mulch can be applied at the rate of 100 pounds per 1,000 square feet (4,500 LB/acre). Where slopes are 25 percent (4:1) or greater grade, Type 3 mulch should be used. If the area to be mulched is subject to concentrated water flow, as in channels, anchor mulch with netting.

Sediment Containment

Sediment must be contained whenever grading or removal of existing vegetation disturbs land.

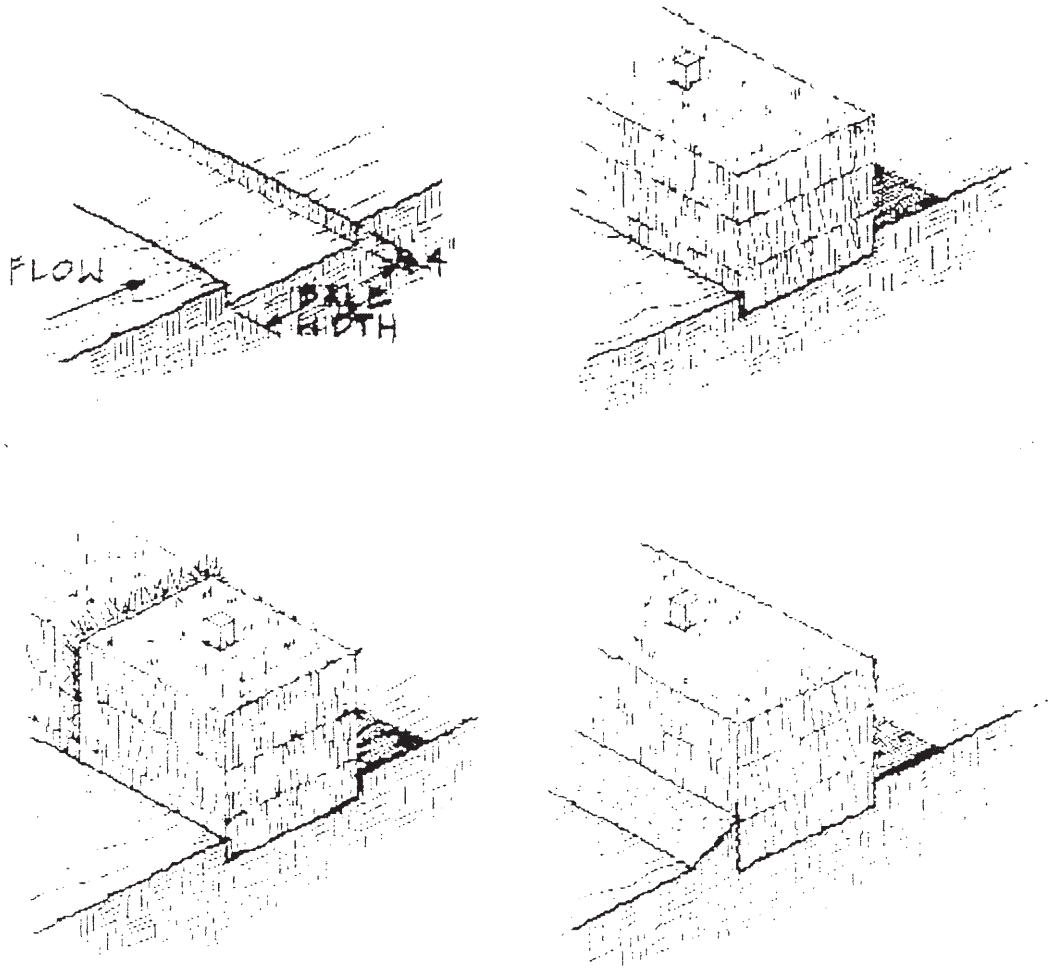
Existing Vegetation

Existing vegetation can be an effective means to filter and contain sediment in areas where sheet flow occurs and the existing vegetative growth is of sufficient density and in sufficiently good condition to provide for filtration of sediment. An area of existing vegetation a minimum of twenty-five feet in width should be maintained between the area to be graded and a property line, water course, or mining feature. The existing ground slope should not exceed a twenty percent (5:1) grade. If existing vegetation does not prove to be effective, bale dikes or silt fences should be installed.

Bale Dikes

Hay and straw bale dikes should be used for temporary containment only when control will be required for three months or less. The area draining to the barriers should be 1/2 acre, or less, with no concentration of water in a channel above the barrier (sheet flow). The maximum slope length above the barrier should not exceed 100 feet and the grade

Figure 7. Bale Dike Construction



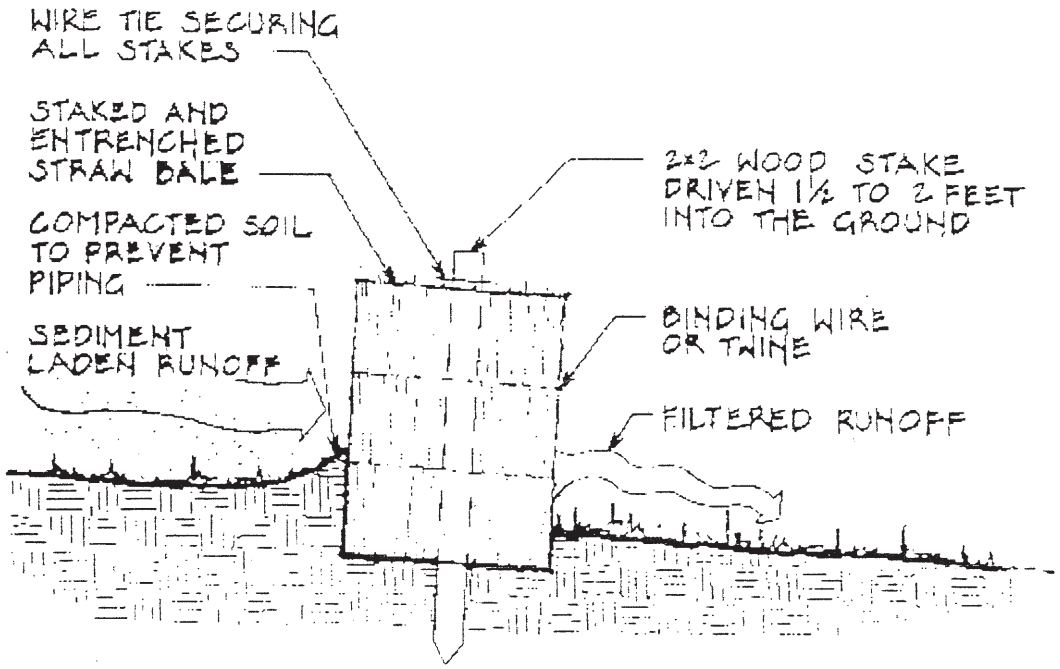
above the barrier should not exceed two percent (50:1). When placed across a small-swale, the maximum flow is one cubic foot per second.

Bale dikes should not be used on high sediment producing areas, above "high risk" areas, where water concentrates, or where there would be a possibility of a washout. Either cereal grain straw or hay can be used for bale dikes. Straw/hay bale dikes should be constructed as shown in Figures 7 & 8. The following guidelines apply for sheet flow applications.

a. Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

b. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales.

Figure 8. Bale Dike Construction



c. The barrier should be entrenched and back-filled. The trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of four inches. After the bales are staked and chinked, the excavated soil should be back-filled against the barrier. Back-fill soil should

conform to the ground level on the downhill side and should be built up to four inches against the uphill side of the barrier.

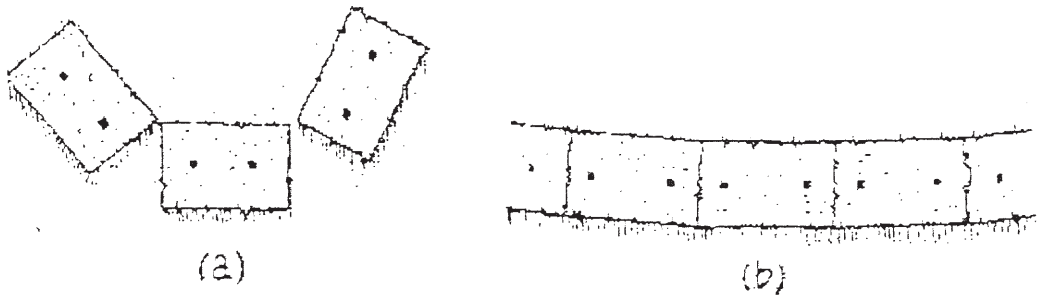
d. At least two stakes or rebars driven through the bale should securely anchor each bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or rebars should be driven deep enough into the ground to securely anchor the bales.

e. The gaps between bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw should be scattered over the area immediately uphill from a straw bale barrier to increase the barrier efficiency.

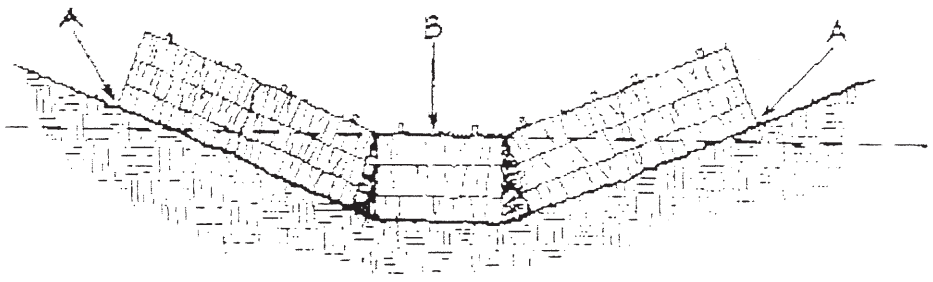
f. Bale dikes should be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

If the dike will be constructed in a shallow swale, the above construction needs to be modified. Bales should be placed in a single row, lengthwise, oriented perpendicular to the contour, with ends of adjacent bales tightly abutting one another. The barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the dike but not around it (Figure 9).

Figure 9. Bale Dike Construction



(a) INCORRECT AND (b) CORRECT ABUTMENT OF STRAW BALES IN A TRENCH



POINTS A SHOULD BE HIGHER THAN B

Bale dikes should be inspected immediately after each rainfall and at least daily during prolonged rainfall. Close attention should be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales should be done promptly. Sediment deposits should be removed after each rainfall and in no event should accumulated silt be allowed to exceed a depth of one-half the height of the barrier. Remove the barrier and unstable deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

Silt Fences

Silt fences may be used in lieu of hay or straw bales and are preferred because they last longer if properly installed. Silt fences are temporary sediment barriers consisting of filter fabric buried at the bottom, stretched, and supported by posts. They are intended to intercept and detain small amounts of sediment from disturbed areas during construction operations by reducing the velocity of sheet flows and low-to-moderate level channel flows. They are applicable in ditch lines, around drop inlets, and at temporary locations where continuous construction changes the earth contour. Filter barriers should have an expected usable life of six months.

The area draining to the silt fence should not exceed one acre, or 1/4 acre per 100 feet of fence, with no concentration of water in a channel above the barrier (sheet flow). The maximum slope length above the barrier should not exceed 100 feet and the grade above the barrier should not exceed twenty percent (5:1). When placed across a small-swale, the maximum flow should be one cubic foot per second. The sediment fence should be constructed to store runoff without damaging the fence or the submerged area behind the fence.

Silt fences should be constructed as shown in Figure 10. Use a synthetic filter fabric which:

a. Contains ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F;

b. Has an equivalent opening size of a U.S. standard sieve of 70; and

c. The tensile strength at 20 percent elongation is 30 pounds/lineal inches.

Where flows do not exceeding one cubic foot per second, silt fences can be constructed as follows.

a. The height of a filter barrier should be a minimum of 15 inches and a maximum of 18 inches.

b. Posts should be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of five feet. Steel posts should have projections for

fastening wire to them. The posts should be spaced a maximum of three feet apart at the barrier location and driven securely into the ground (minimum of eight inches).

c. A trench should be excavated approximately four inches wide and four inches deep along the line of stakes and upslope from the barrier.

d. The filter material should be wired to metal posts or stapled to wooden posts using at least 1/2-inch long staples. Filter material should not be stapled to existing trees. The filter fabric should be installed in a continuous sheet the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed. Eight inches of the fabric should be extended into the trench.

e. If wire fence reinforcement is used, it should be 36 inches high, 14-gauge, and a maximum mesh spacing of 6 inches. The fence should be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire should extend into the trench a minimum of two inches.

f. The trench should be back-filled and the soil compacted over the filter material.

If a silt fence is to be constructed across a ditch line or swale, the barrier should be of sufficient length to eliminate end flow, and the configuration should resemble an arc or horseshoe with the ends oriented upslope.

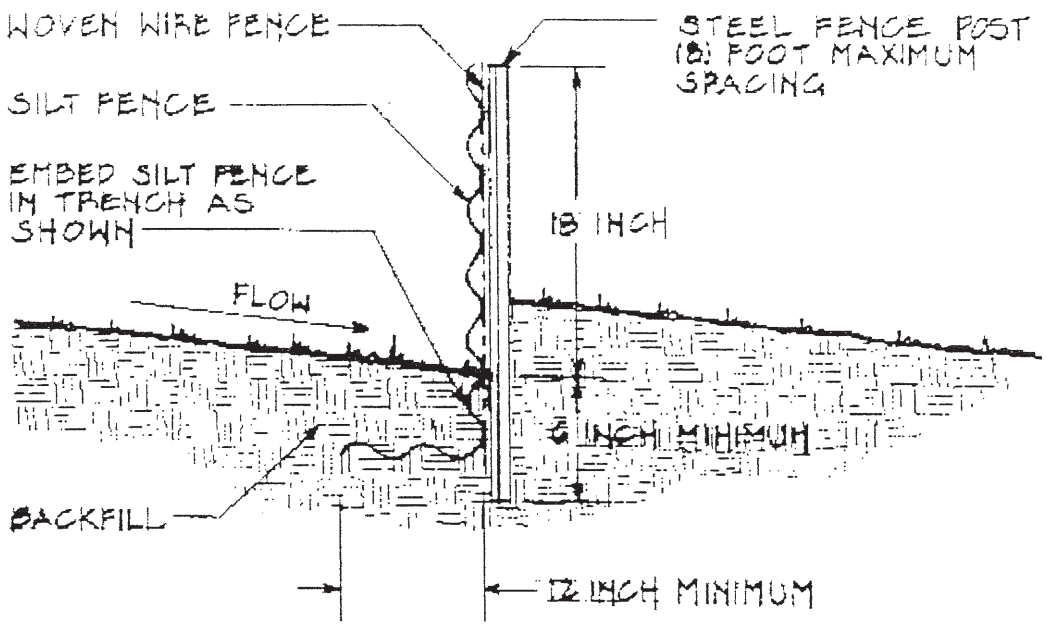
Where only sheet flows are expected, the silt fences can be constructed as described above except, the height of a silt fence can be increased to a maximum of 36 inches (higher fences may impound volumes of water sufficient to cause failure of the structure). The posts should be spaced a maximum of ten feet apart at the barrier location and driven securely into the ground (minimum of 18 inches) when used with the wire support fence, otherwise, post spacing should not exceed three feet.

A riprap splash pad or other outlet protection device should be provided for any point where flow may overtop the sediment fence, such as natural depressions or swales. Ensure that the maximum height of the fence at a protected, reinforced outlet does not exceed one foot and that support post spacing does not exceed three feet.

All silt fences should be inspected at least once a week and after each rainfall. Make any required repairs immediately. Should the fabric of a sediment fence collapse, tear, decompose, or become ineffective, replace it promptly. Remove sediment deposits as necessary after each storm to provide adequate storage volume for the next rain and to reduce pressure on the fence. Care needs to be taken to avoid undermining the fence when removing sediment.

All fencing materials and unstable sediment deposits should be removed and the area brought up to grade and stabilized after the contributing drainage area has been properly stabilized.

Figure 10. Silt Fence Construction



Temporary Sediment Basins

Temporary sediment basins should be provided for areas where concentrated flow from areas greater than one acre occurs. They are small temporary ponding areas formed by excavation, an embankment or a combination across a drainageway. Temporary sediment basins are designed to detain sediment-laden runoff from small disturbed areas for a period of time to allow sediment to settle reducing sediment deposits and runoff turbidity downstream.

Sediment trapping is achieved primarily by settling within a pool. Sediment-trapping efficiency is a function of surface area and geometry of the basin and inflow rate. Therefore, maximize the surface area in the design. Installations that provide pools with large length to width ratios reduce short circuiting and allow more of the pool surface area for settling.

Locations for sediment basins need to be selected during site evaluation. Note natural drainage divides and select basin sites so that runoff from potential sediment-producing

areas can be easily diverted into the basins. The drainage areas for each basin should not exceed five acres. Basins should be readily accessible for periodic sediment removal and other necessary maintenance. Plan locations for sediment disposal as part of basin site selection. In preparing plans for sediment basins, it is important to consider provisions to protect the embankment from failure from storm runoff that exceeds the design capacity. Consider non-erosive emergency bypass areas, particularly if there could be severe consequences from failure. If a bypass is not possible and failure would have severe consequences, consider alternative sites. Because well-planned sediment basins are key measures to preventing offsite sedimentation, they should be installed in the first stages of project development.

Temporary containment berms should be designed to contain a volume of 1,800 cubic feet per acre of drainage area (Figure 11). Measure volume below the crest elevation of the outlet. The volume of a natural sediment trap may be satisfactorily approximated by the equation:

volume (ft3) = 0.4 x surface area (ft2) x max. pool depth (ft)

Each end of the berm should turn upslope and extend until the ground surface rises to the top of the berm elevation. Berms for temporary sediment traps should not exceed five feet in height measured at the center line from the original ground surface to the top of the berm. Additional freeboard may be added to the berm height to allow flow through a designated bypass location. Construct berms with a minimum top width of five feet and side slopes of 2:1 or flatter. Where sediment pools are formed or enlarged by excavation, also keep side slopes at 2:1 or flatter for safety. Clear, grub, and strip the area under the embankment of all vegetation and root mat. Remove all surface soil containing high amounts of organic matter and stockpile or dispose of it properly. Ensure that fill material for the embankment is free of roots, woody vegetation, organic matter, and other objectionable material. Place the fill in lifts not to exceed nine inches and machine compact it. Over fill the embankment six inches to allow for settlement.

Temporary containment berms should have a perforated PVC pipe outlet (Figure 12) or equivalent. The perforated pipe should have holes sized and spaced to provide adequate detention time for settling. The height of the pipe (H) should be level with the top of the berm. The solid PVC pipe should be bedded in clean gravel.

An alternative is to construct an outlet using a stone section of embankment located at the low point in the basin (Figure 13). The stone section serves two purposes:

a. The top section serves as a non-erosive spillway outlet for flood flows; and

b. The bottom section provides a means of de-watering the basin between runoff events.

Figure 11. Temporary Containment Berm

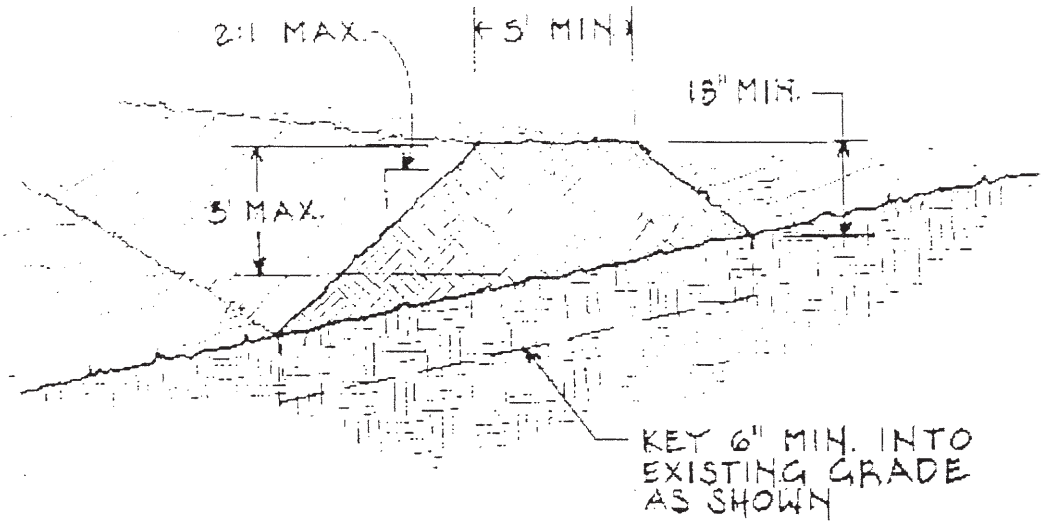
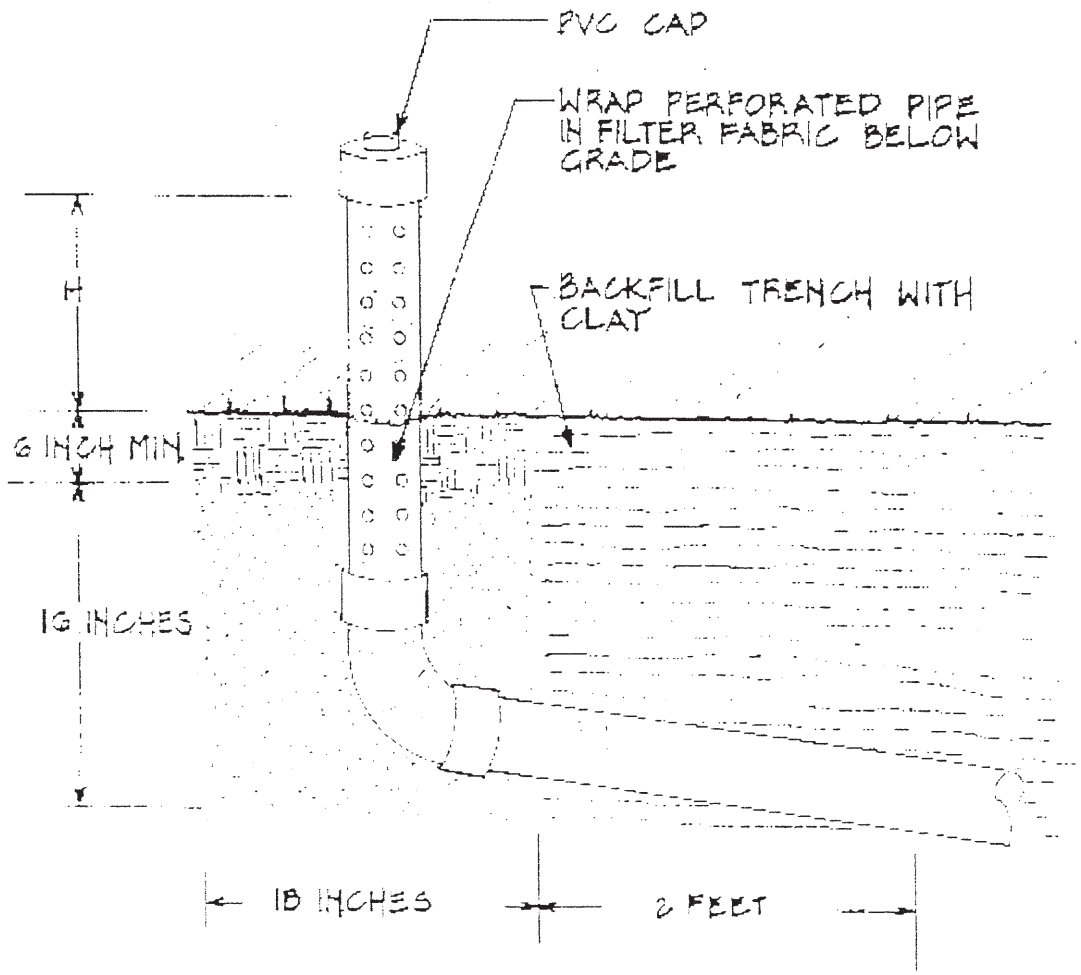


Figure 12. PVC Outlet Pipe



The outlet is constructed using material such as riprap. A one-foot thick layer of 1/2 to 3/4-inch aggregate should be placed on the inside face to reduce drainage flow rate. Keep the side slopes of the spillway section at 2:1 or flatter. To protect the embankment, the sides of the spillway need to be at least 21 inches thick. Keep the crest of the spillway outlet a minimum of 1.5 feet below the settled top of the embankment. Filter cloth should be placed on the foundation below the riprap to prevent piping. An alternative is to excavate a keyway trench across the riprap foundation and up the sides to the height of the dam. The spillway weir needs to be at least four feet long and sized to pass the peak discharge of the 10-year storm. There should be a maximum flow depth of one foot, a minimum freeboard of 0.5 foot, and maximum side slopes of 2:1.

The outlet section is constructed in the embankment. The connection between the riprap and the soil from piping should be protected by using filter fabric or a keyway cutoff trench between the riprap structure and the soil.

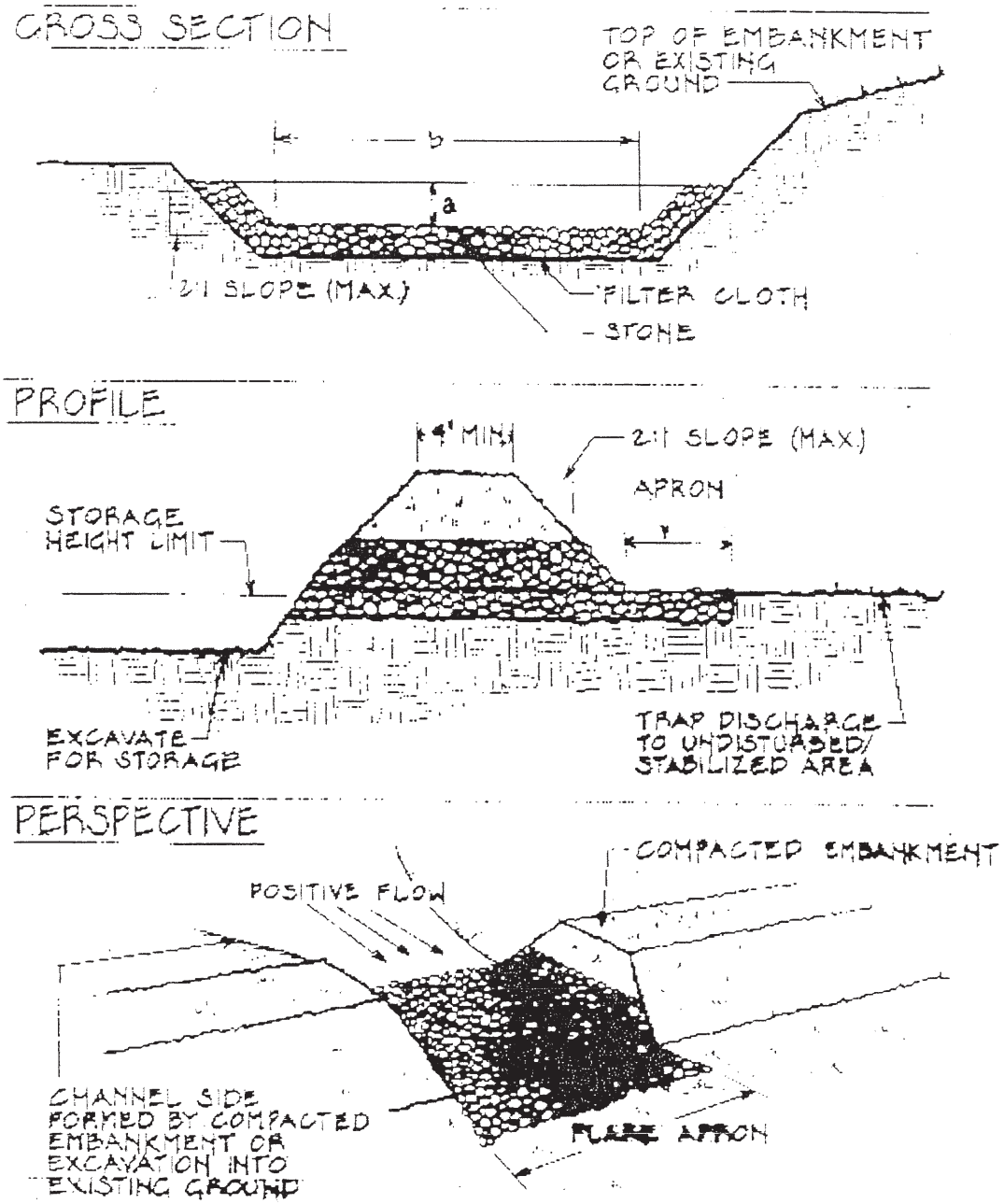
a. Place the filter fabric between the riprap and soil. Extend the fabric across the spillway foundation and sides to the top of the dam; or

b. Excavate a keyway trench along the centerline of the spillway foundation extending up the sides to the height of the dam. The trench should be at least two-foot deep and two-foot wide with 1:1 side slopes.

The pond area below the elevation of the crest of the spillway should to be cleared to facilitate removal of sediment. Ensure that the stone (drainage) section of the embankment has a minimum bottom width of three feet and maximum side slopes of 1:1 that extend to the bottom of the spillway section. Construct the minimum finished stone spillway bottom width with 2:1 side slopes extending to the top of the over filled embankment. The thickness of the sides of the spillway outlet structure should be a minimum of 21 inches. The weir must be level and constructed to grade to assure design capacity. Ensure that the stone spillway outlet section extends downstream past the toe of the embankment until stable conditions are reached and outlet velocity is acceptable for the receiving stream. The edges of the stone outlet section should be flush with the surrounding ground and the center shaped to confine the outflow stream. Direct emergency bypass to natural, stable areas. Locate bypass outlets so that flow will not damage the embankment. Stabilize the embankment and all disturbed areas above the sediment pool and downstream from the basin immediately after construction.

Temporary sediment basins should be inspected after each period of significant rainfall. When the sediment has accumulated to more than 6 inches in depth, remove sediment and restore the trap to its original dimensions. The contaminated part of the gravel facing needs to be replaced. Also check the structure for damage from erosion or piping and the depth of the spillway to ensure it is a minimum of 1.5 feet below the low point of the embankment. Immediately fill any settlement of the embankment to slightly above design grade. Any riprap displaced from the spillway must be replaced immediately. After all sediment-producing areas have been permanently stabilized, remove the structure and all unstable sediment. Smooth the area to blend with the adjoining areas and stabilize properly.

Figure 13. Stone Outlet



Storm Drain Inlet Protection

Storm sewers that are made operational before their drainage area is stabilized can convey large amounts of sediment to downstream drainageways. In case of extreme sediment loading, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets. This practice allows use of permanent storm water conveyance at

an early stage of site development. Storm drain drop inlets or curb inlets need to be protected by sediment filters or temporary containment areas that trap sediment at the approach to the storm drainage systems. This method of inlet protection applies to both drop inlets and curb inlets where heavy flows are expected and an overflow capacity is necessary to prevent excessive ponding around the structure

There are several types of inlet filters and traps that have different applications dependent upon site conditions and type of inlet. Other innovative techniques for accomplishing the same purpose may be considered.

The following examples of inlet protection devices are for drainage areas of less than one acre. They are intended to keep sediment out of the storm drain, and they do not have a large sediment storage area. Excavating an area around the inlet for deposition of sediment will improve the capture rate, reduce frequency of maintenance, and allow the device to serve an area larger than one acre. The inlet protection device should be constructed in such a manner that will facilitate clean-out and disposal of trapped sediment and minimize interference with construction activities. The devices should also be constructed in such a manner that any resultant ponding or stormwater will not cause excessive inconvenience or damage to adjacent areas or structures. Shallow temporary flooding after rainfall should be expected.

None of these methods are applicable in public streets or rights-of-way. Sediment must be trapped before stormwater enters a public right-of-way.

Bale and Filter Fabric Filters

These methods of inlet protection are applicable where the inlet drains slopes with a five percent (20.1) grade or less and flows do not exceed 0.5 cubic feet per second. These methods should not be used for inlets receiving concentrated flows. Design is similar to other applications (Figures 14 & 15).

a. Bales should be either wire-bound or string-tied with the bindings oriented around the sides rather than over and under the bales.

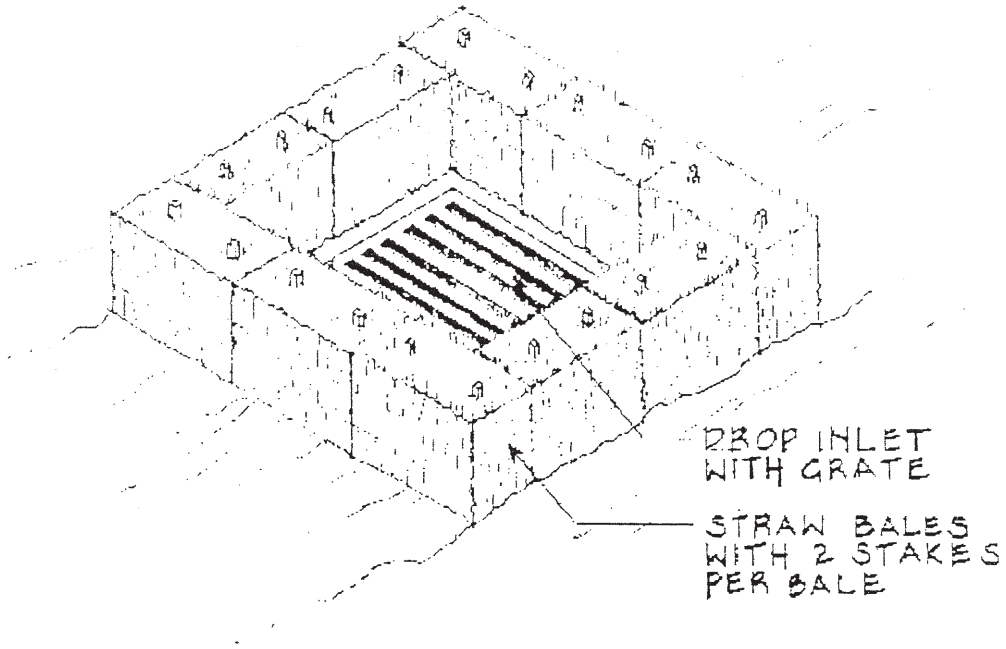
b. Bales should be placed lengthwise in a single row surrounding the inlet, with the ends of adjacent bales pressed together.

c. The barrier should be entrenched and back-filled. A trench should be excavated around the inlet the width of a bale to a minimum depth of four inches. After the bales are staked, the excavated soil should be back-filled and compacted against the filter barrier.

d. Each bale should be securely anchored and held in place by at least two stakes or rebars driven through the bale.

e. Loose straw should be wedged between bales to prevent water from entering between bales.

Figure 14. Bale Inlet Protection



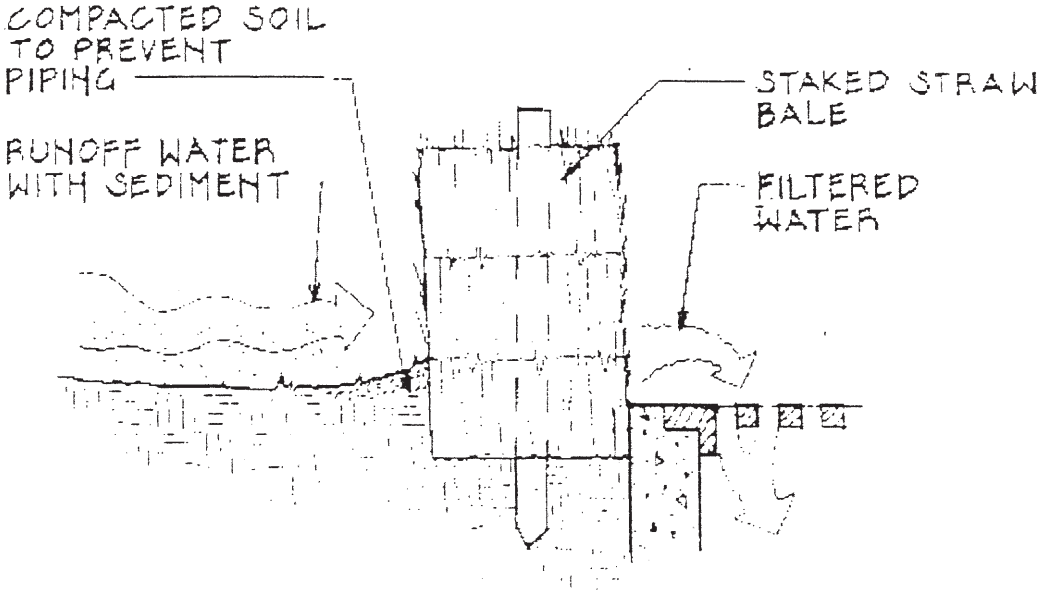
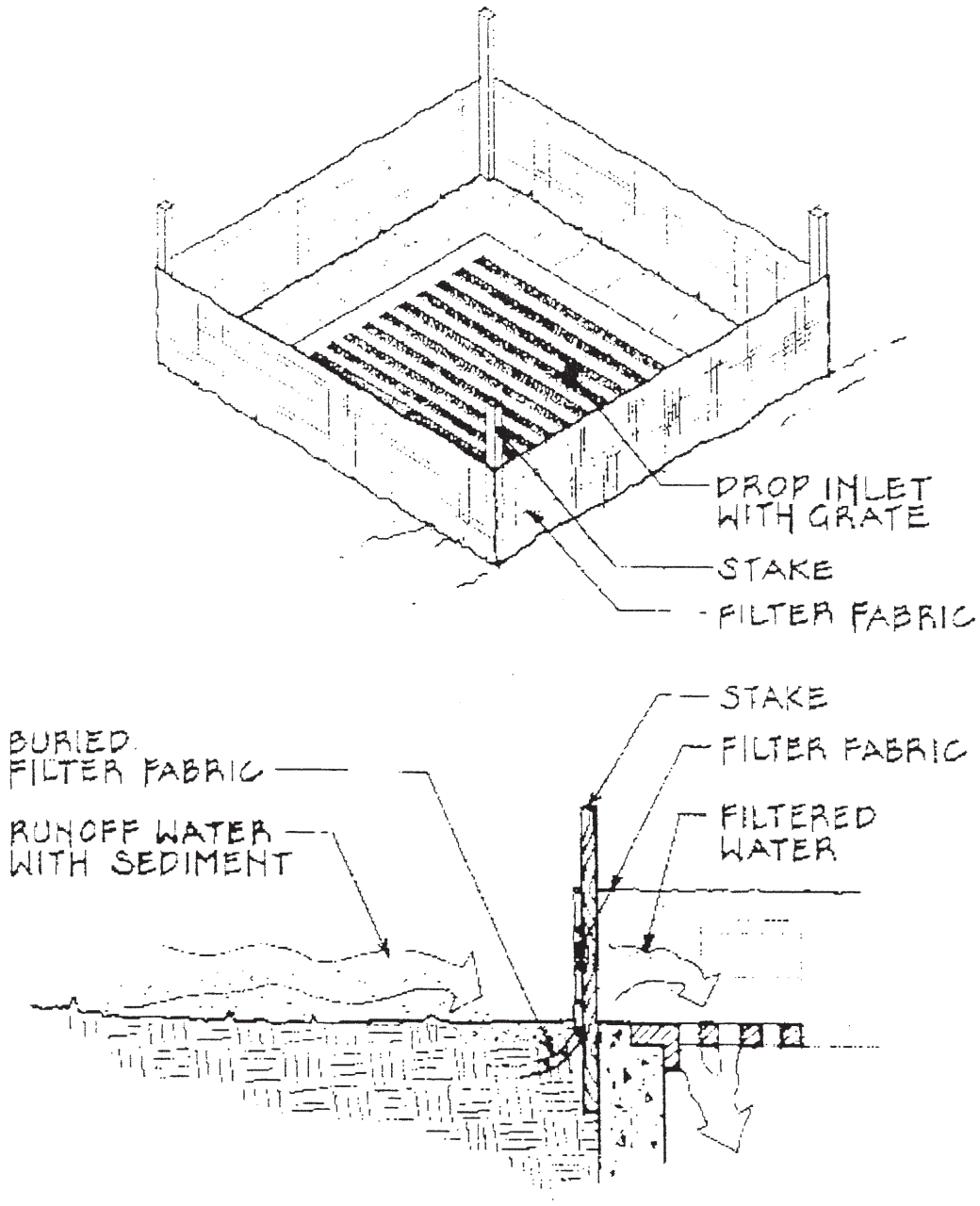


Figure 15. Silt Fence Inlet Protection



Gravel And Wire Mesh Sediment Filters

This method is effective where very concentrated flows are expected but not where ponding around the structure might cause excessive inconvenience or damage to adjacent structures or unprotected areas.

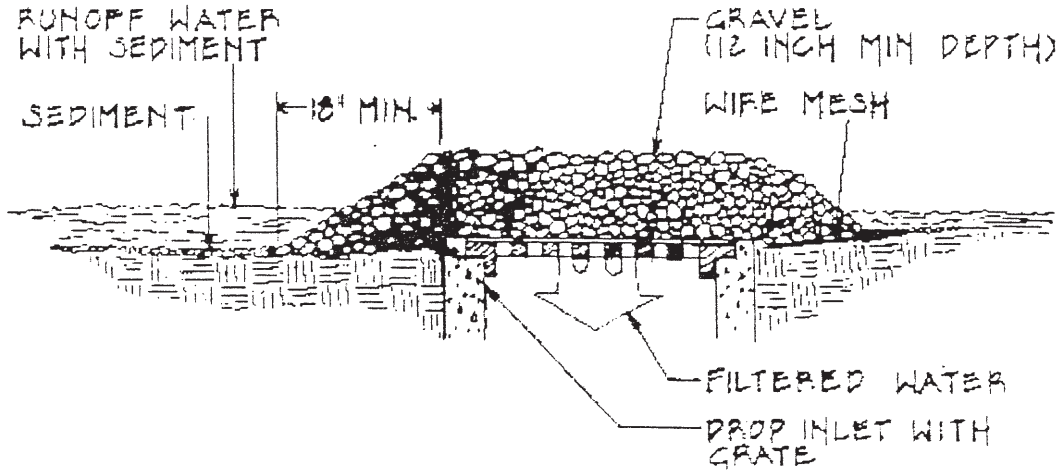
a. Wire mesh should be laid over the drop inlet so that the wire extends a minimum of one foot beyond each side of the inlet structure. Hardware cloth or comparable wire mesh with 1/2-inch openings should be used. If more than one strip of mesh is necessary, the strips should be overlapped.

b. One to two-inch clean aggregate should be placed over the wire mesh as indicated on Figure 16. The depth of stone should be at least 12 inches over the entire inlet opening. The stone should extend beyond the inlet opening at least 18 inches on all sides.

c. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and replaced.

This filtering device has no overflow mechanism; therefore, ponding is likely, especially if sediment is not removed regularly. This type of device must never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc.

Figure 16. Gravel and Wire Mesh Sediment Filter



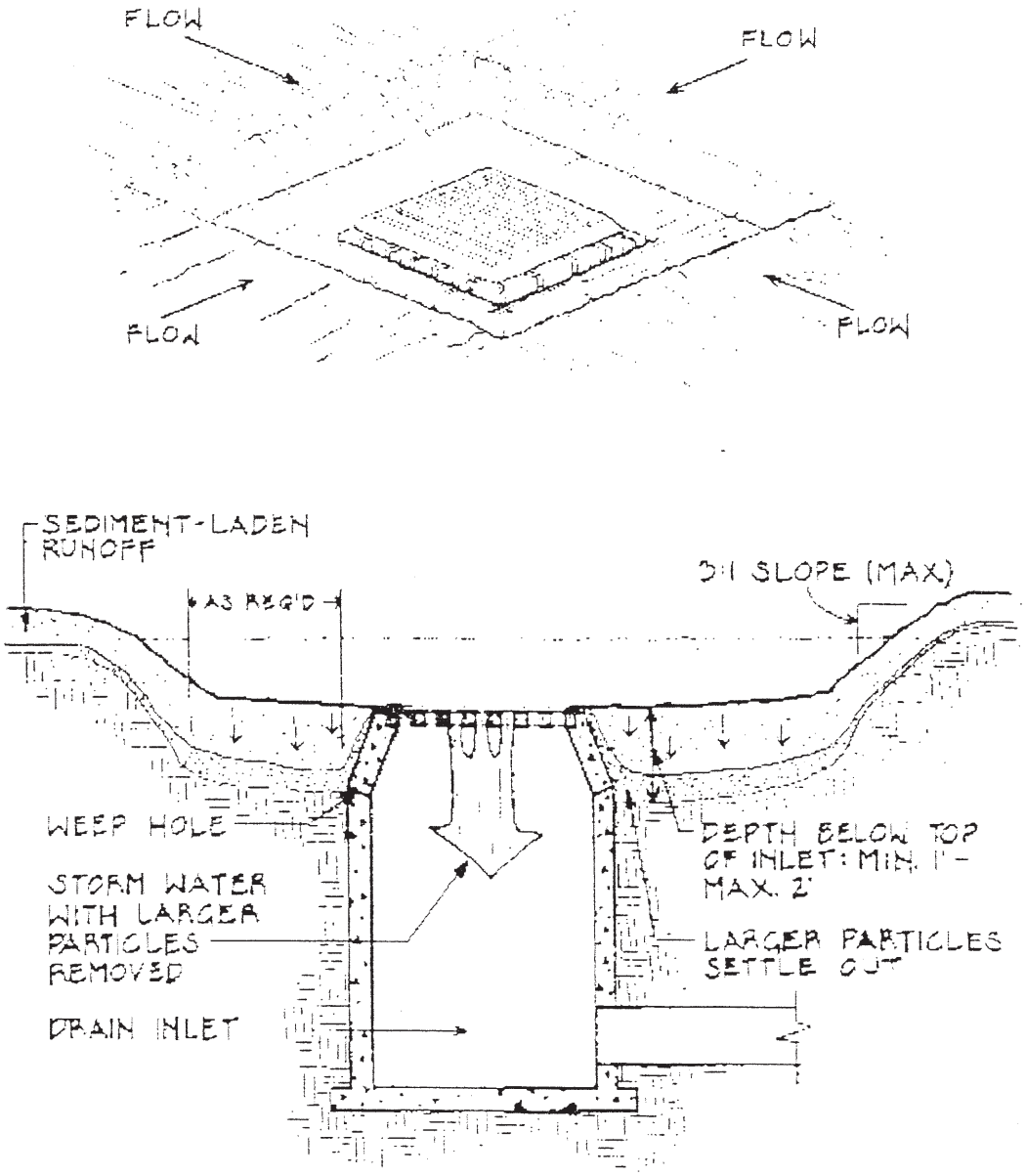
Excavated Drop Inlet Sediment Trap

This method is applicable where heavy flows are expected and where overflow capacity and ease of maintenance are desired (Figure 17).

a. The excavated trap should be sized to provide a minimum storage capacity calculated at the rate of 67 cubic yards for one acre of drainage area. A trap should be no less than one foot nor more than two feet deep measured from the top of the inlet structure. Side slopes should not be steeper than a 33 percent (3:1) grade.

b. The slope of the basin may vary to fit the drainage area and terrain. Observations must be made to check trap efficiency and modifications should be made as necessary to insure satisfactory trapping of sediment. Where an inlet is located to receive concentrated flows it is recommended that the basin have a rectangular shape in 2:1 ratio, with the length oriented in the direction of the flow.

Figure 17. Excavated Drop Inlet Sediment Trap



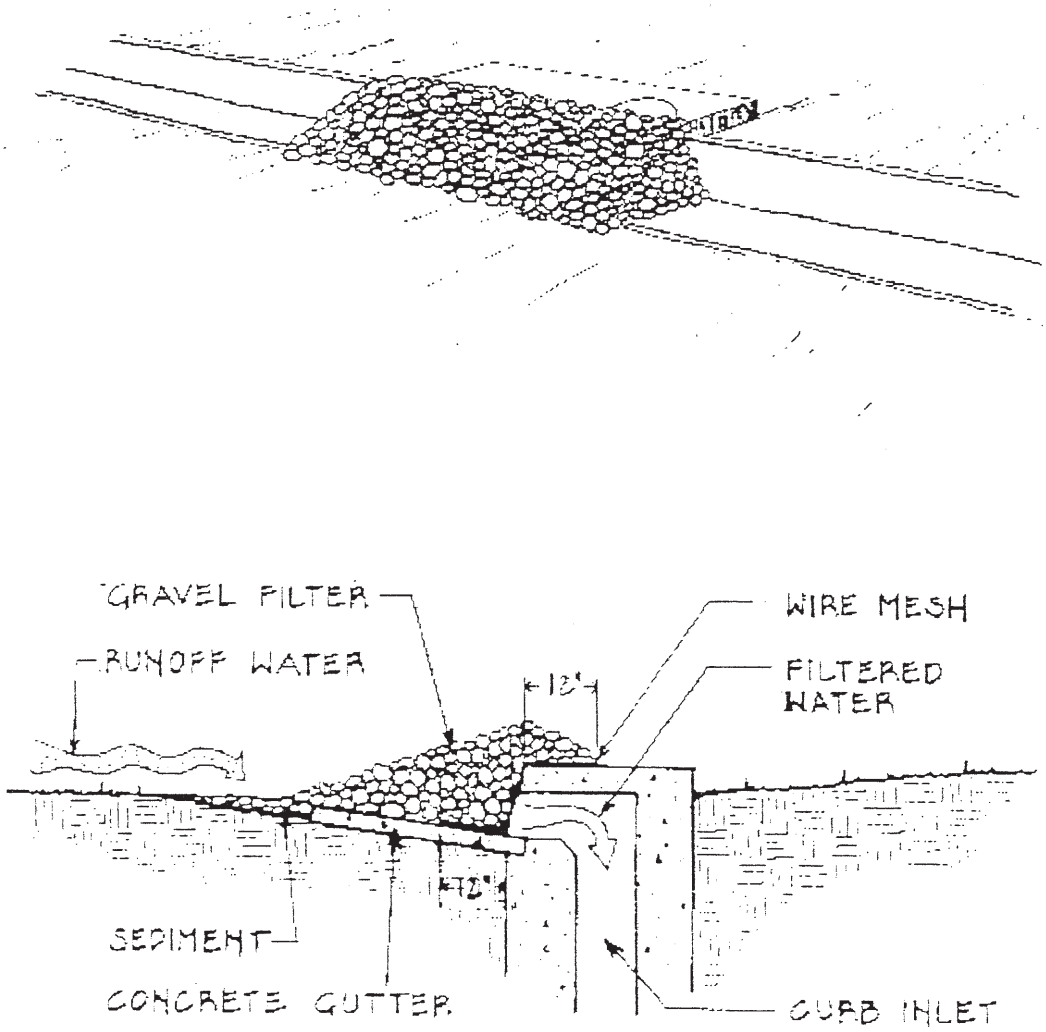
c. Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to 6 inches. Removed sediment should be deposited in a suitable area and in a manner such that it will not erode.

Gravel Curb Inlet Sediment Filter

This method can be used where ponding in front of the structure will not cause inconvenience or damage to adjacent structures and unprotected areas (Figure 18).

a. Hardware cloth or comparable wire mesh with 1/2-inch openings should be placed over the curb inlet opening so that at least 12 inches of wire extends across the inlet cover and at least 12 inches of wire extends across the concrete gutter from the inlet opening.

Figure 18. Gravel Curb Inlet Sediment Filter



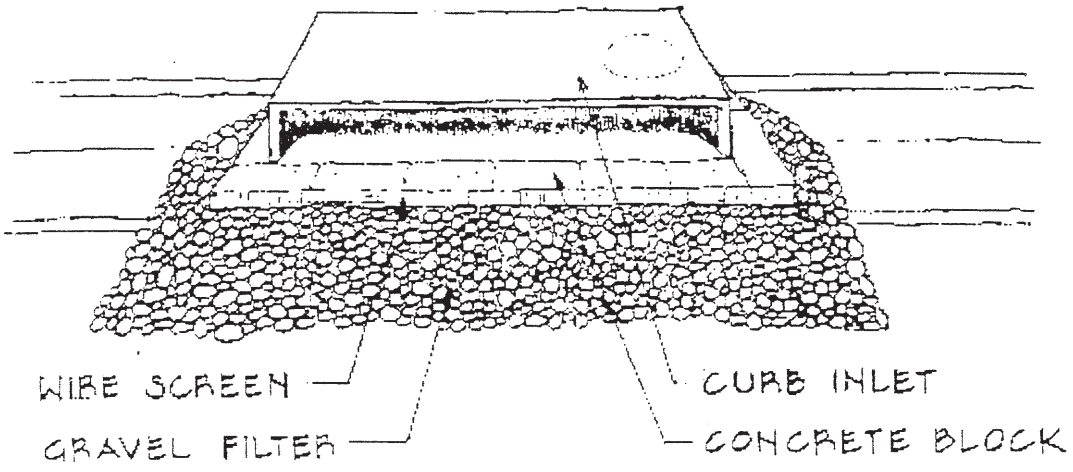
b. Stone should be piled against the wire so as to anchor it against the gutter and inlet cover and to cover the inlet opening completely. One to two-inch clean aggregate should be used.

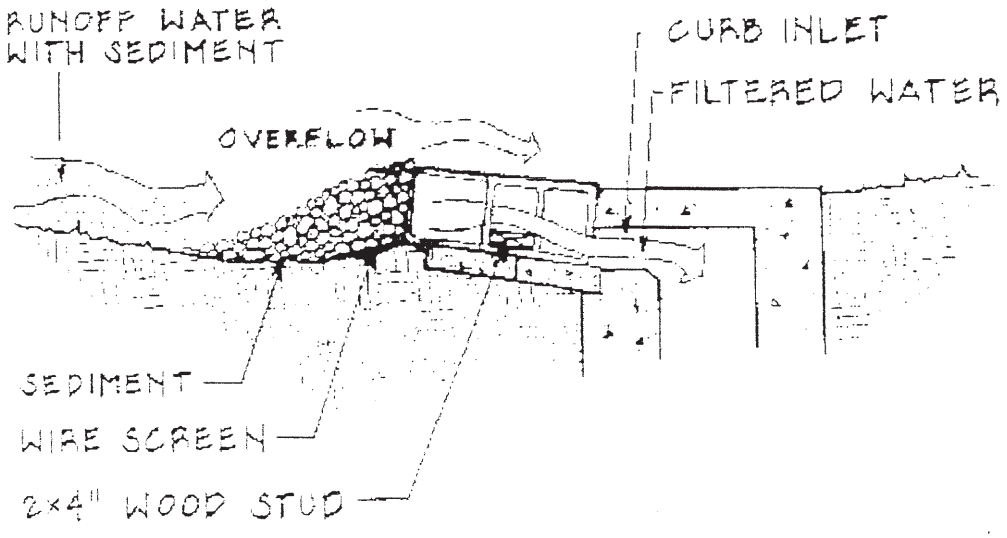
c. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, clean, and replaced.

Block and Gravel Curb Inlet Sediment Filter

This method can be used where an overflow capability is necessary to prevent excessive ponding in front of the structure (Figure 19).

Figure 19. Block and Gravel Curb Inlet Sediment Filter





a. Two concrete blocks should be placed on their sides abutting the curb at either side of the inlet opening.

b. A two-inch by four-inch stud should be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.

c. Concrete blocks should be placed on their sides across the front of the inlet and abutting the spacer blocks.

d. Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Chicken wire or hardware cloth with 1/2-inch openings should be used.

e. One to two-inch clean aggregate should be piled against the wire to the top of the barrier as shown in Plat 9.

f. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, cleaned, and replaced.

All sediment traps should be inspected after each rain and repairs made as needed. Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to 6 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode. Structures should be removed, and the area stabilized when the remaining drainage area has been properly stabilized.

SEDIMENT ON PUBLIC STREETS

Jasper County regulations require that mud, dirt or other foreign matter not be deposited on County roads. Areas graded for construction vehicle transport and parking purposes are especially susceptible to erosion. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires, which generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable. Immediate stabilization of such areas with stone may cost money at the outset, but it may actually save money in the long run by increasing the usefulness of the road during wet weather. Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative, the early application of stone may solve potential erosion and stability problems and eliminate later re-grading costs. In certain cases, the stone will also remain in place for use as part of the base course of the road.

Temporary construction entrances should be constructed of two- to three-inch clean crushed limestone. The entrances should be a minimum of twelve feet wide and fifty feet long. Entrances to residential sites may be a minimum of 10 feet wide and 30 feet long. Minimum thickness of the crushed limestone surface shall be six inches.

Additional lifts of crushed limestone should be added if the surface of the initial drive deteriorates or becomes too muddy to be effective. In locations where an existing drive or street extends at least fifty feet into the site, the existing drive may serve as the construction entrance, and construction of a new gravel entrance is not necessary unless warranted by job conditions. Vehicle wheels should be cleaned to remove mud prior to entrance on to public rights-of-way. When washing is required, it should be done on an area, stabilized with crushed stone, which drains into a sediment trap. Streets adjacent to the site are required by ordinance to be completely cleaned of sediment and debris daily.

JASPER COUNTY, MISSOURI
SITE DEVELOPMENT PERMIT

In order to insure EPA's Phase II regulations are met and to comply with the County's ordinance, no person, corporation, firm or entity shall commence grading and earth movement activities without first obtaining a site development permit from the County.

Plans and specifications shall be prepared and signed by a professional engineer licensed in the State of Missouri.

Please list the name(s) and address(es) of the Owner or Developer of the site and sign after the statement listed.

OWNER NAME(s): _____

OWNER ADDRESS(es): _____

_____

_____

CONSULTANT'S NAME: _____

CONSULTANT'S ADDRESS: _____

_____

_____

MDNR LAND DISTURBANCE PERMIT NO.: _____

I, _____, do hereby certify that the movement of earth shall be in accordance with the erosion and sediment control plan; and an inspector shall be allowed on site on all days when construction or grading activity takes place.

_____ _____

OWNER/DEVELOPER

PERMIT FEE: _____

JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

POST CONSTRUCTION STORM WATER MANAGEMENT ORDINANCE

Ordinance 2010-01

Post Construction Storm Water Management Ordinance

Section 1 General Provisions

1.1. Findings of Fact

It is hereby determined that:

Land development projects and associated increases in impervious cover alter the hydrologic response of local watersheds and increase storm water runoff rates and volumes, flooding, stream channel erosion, and sediment transport and deposition;

This storm water runoff contributes to increased quantities of water-borne pollutants, and;

Storm water runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of storm water runoff from development sites.

Therefore, Jasper County, Missouri establishes this set of water quality and quantity policies applicable to all surface waters to provide reasonable guidance for the regulation of storm water runoff for the purpose of protecting local water resources from degradation. It is determined that the regulation of storm water runoff discharges from land development projects and other construction activities in order to control and minimize increases in storm water runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with storm water runoff is in the public interest and will prevent threats to public health and safety.

1.2. Purpose

The purpose of this ordinance is to establish minimum storm water management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing in watersheds within this jurisdiction. This ordinance seeks to meet that purpose through the following objectives:

(1). minimize increases in storm water runoff from any development in order to reduce flooding, siltation, increases in stream temperature, and stream bank erosion and maintain the integrity of stream channels;

(2). minimize increases in nonpoint source pollution caused by storm water runoff from development which would otherwise degrade local water quality

(3). minimize the total annual volume of surface water runoff which flows from any specific site during and following development to not exceed the pre-development hydrologic regime to the maximum extent practicable.

(4). reduce storm water runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through storm water management controls and to ensure that these management controls are properly maintained and pose no threat to public safety.

1.3. Applicability

This ordinance shall be applicable to all subdivision or site plan applications, unless eligible for an exemption or granted a waiver by the County under the specifications of Section 4 of this ordinance. The ordinance also applies to land development activities that are smaller than the minimum applicability criteria if such activities are part of a larger common plan of development that meets the following applicability criteria, even though multiple separate and distinct land development activities may take place at different times on different schedules.

These standards apply to any construction activity disturbing one acre or more of land. The following activities may be exempt from these storm water performance criteria:

1. Any logging and agricultural activity which is consistent with an approved soil conservation plan or a timber management plan prepared or approved by the appropriate state agency, as applicable.

2. Additions or modifications to existing single family structures

3. Developments that disturb less than one acre of land, provided they are not part of a larger common development plan;

4. Repairs to any storm water treatment practice deemed necessary by the County.

Final authorization of all redevelopment projects will be determined after a review by the County.

1.4. Compatibility with Other Permit and Ordinance Requirements

This ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, stature, or other provision of law. The requirements of this ordinance should be considered minimum requirements, and where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher protective standards for human health or the environment shall be considered to take precedence.

1.5. Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this ordinance.

1.6. Development of a Storm water management design manual

The County may furnish additional policy, criteria and information including specifications and standards, for the proper implementation of the requirements of this ordinance and may provide such information in the form of a Storm water management design manual.

This manual will include a list of acceptable storm water treatment practices, including the specific design criteria and operation and maintenance requirements for each storm water practice. The manual may be updated and expanded from time to time, at the discretion of the County based on improvements in engineering, science, monitoring and local maintenance experience.

Section 2. Definitions

"Accelerated Erosion" means erosion caused by development activities that exceeds the natural processes by which the surface of the land is worn away by the action of water, wind, or chemical action.

"Applicant" means a property owner or agent of a property owner who has filed an application for a storm water management permit.

"Building" means any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.

"**Channel**" means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

"**Dedication**" means the deliberate appropriation of property by its owner for general public use.

"**Detention**" means the temporary storage of storm runoff in a storm water management practice with the goals of controlling peak discharge rates and providing gravity settling of pollutants.

"**Detention Facility**" means a detention basin or alternative structure designed for the purpose of temporary storage of stream flow or surface runoff and gradual release of stored water at controlled rates.

"**Developer**" means a person who undertakes land disturbance activities.

"**Drainage Easement**" means a legal right granted by a landowner to a grantee allowing the use of private land for storm water management purposes.

"**Erosion and Sediment Control Plan**" means a plan that is designed to minimize the accelerated erosion and sediment runoff at a site during construction activities.

"**Fee in Lieu**" means a payment of money in place of meeting all or part of the storm water performance standards required by this ordinance.

"**Hotspot**" means an area where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in storm water.

"**Hydrologic Soil Group (HSG)**" means a Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from A soils, with high permeability and little runoff production, to D soils, which have low permeability rates and produce much more runoff.

"**Impervious Cover**" means those surfaces that cannot effectively infiltrate rainfall (e.g., building rooftops, pavement, sidewalks, driveways, etc).

"**Industrial Storm water Permit**" means an National Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial storm water discharges or specifies on-site pollution control strategies.

"**Infiltration**" means the process of percolating storm water into the subsoil.

"**Infiltration Facility**" means any structure or device designed to infiltrate retained water to the subsurface. These facilities may be above grade or below grade.

"**Jurisdictional Wetland**" means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

"**Land Disturbance Activity**" means any activity which changes the volume or peak flow discharge rate of rainfall runoff from the land surface. This may include the grading, digging, cutting, scraping, or excavating of

soil, placement of fill materials, paving, construction, substantial removal of vegetation,, or any activity which bares soil or rock or involves the diversion or piping of any natural or man-made watercourse.

"**Landowner**" means the legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

"**Maintenance Agreement**" means a legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of storm water management practices.

"**Nonpoint Source Pollution**" means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

"**Offset Fee**" means a monetary compensation paid to a local government for failure to meet pollutant load reduction targets.

"**Off-Site Facility**" means a storm water management measure located outside the subject property boundary described in the permit application for land development activity.

"**On-Site Facility**" means a storm water management measure located within the subject property boundary described in the permit application for land development activity.

"**Recharge**" means the replenishment of underground water reserves.

"**Redevelopment**" means any construction, alteration or improvement exceeding ____ square feet in areas where existing land use is high density commercial, industrial, institutional or multi-family residential.

"**Stop Work Order**" means an order issued which requires that all construction activity on a site be stopped.

"**Storm Water Management**" means the use of structural or non-structural practices that are designed to reduce storm water runoff pollutant loads, discharge volumes, peak flow discharge rates and detrimental changes in stream temperature that affect water quality and habitat.

"**Storm Water Retrofit**" means a storm water management practice designed for an existing development site that previously had either no storm water management practice in place or a practice inadequate to meet the storm water management requirements of the site.

"**Storm water Runoff**" means flow on the surface of the ground, resulting from precipitation.

"**Storm water Treatment Practices (STPs)**" means measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing or reducing point source or nonpoint source pollution inputs to storm water runoff and water bodies.

"**Water Quality Volume (WQ_v)**" means the storage needed to capture and treat 90% of the average annual storm water runoff volume. Numerically (WQ_v) will vary as a function of long term rainfall statistical data.

"**Watercourse**" means a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

Section 3. Permit Procedures and Requirements

3.1. Permit Required.

No land owner or land operator shall receive any of the building, grading or other land development permits required for land disturbance activities without first meeting the requirements of this ordinance prior to commencing the proposed activity.

3.2. Application Requirements

Unless specifically excluded by this ordinance, any land owner or operator desiring a permit for a land disturbance activity shall submit to the County a permit application on a form provided for that purpose. Unless otherwise excepted by this ordinance, a permit application must be accompanied by the following in order that the permit application be considered: a storm water management concept plan; a maintenance agreement; and a non-refundable permit review fee. The storm water management plan shall be prepared to meet the requirements of Sec. 5 of this ordinance, the maintenance agreement shall be prepared to meet the requirements of Sec. 9 of this ordinance, and fees shall be those established by the County.

3.3. Application Review Fees

The fee for review of any land development application shall be based on the amount of land to be disturbed at the site, and the fee structure shall be established by the County. All of the monetary contributions shall be credited to a local budgetary category to support local plan review, inspection and program administration, and shall be made prior to the issuance of any building permit for the development.

3.4. Application Procedure

1. Applications for land disturbance activity permits must be filed with the County on any regular business day.

2. A copy of this permit application shall be forwarded to County for review.

3. Permit applications shall include the following: two copies of the storm water management concept plan, two copies of the maintenance agreement, and any required review fees.

4. Within 30 business days of the receipt of a complete permit application, including all documents as required by this ordinance, the County shall inform the applicant whether the application, plan and maintenance agreement are approved or disapproved.

5. If the permit application, storm water management plan or maintenance agreement are disapproved, the applicant may revise the storm water management plan or agreement. If additional information is submitted, the County shall have 15 business days from the date the additional information is received to inform the applicant that the plan and maintenance agreement are either approved or disapproved.

6. If the permit application, final storm water management plan and maintenance agreement are approved by the County, all appropriate land disturbance activity permits shall be issued.

3.5. Permit Duration

Permits issued under this section shall be valid from the date of issuance through the date the County notifies the permit holder that all storm water management practices have passed the final inspection required under permit condition.

Section 4. Waivers to Storm water Management Requirements

This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by the County. Areas outside of the unincorporated urbanized area of Jasper County, Missouri are exempt from this ordinance. The unincorporated urbanized area of Jasper County is determined by the 2000 census and a map of the area is available for review at the Jasper County Health Department.

4.1. Waivers for Providing Storm water Management

Every applicant shall provide for storm water management as required by this ordinance, unless a written request is filed to waive this requirement. Requests to waive the storm water management plan requirements shall be submitted to the County for approval. The minimum requirements for storm water management may be waived in whole or in part upon written request of the applicant, provided that at least one of the following conditions applies:

1. It can be demonstrated that the proposed development is not likely to impair attainment of the objectives of this ordinance.

2. Alternative minimum requirements for on-site management of storm water discharges have been established in a storm water management plan that has been approved by the County and the implementation of the plan is required by local ordinance.

3. Provisions are made to manage storm water by an off-site facility. The off-site facility is required to be in place, to be designed and adequately sized to provide a level of storm water control that is equal to or greater than that which would be afforded by on-site practices and there is a legally obligated entity responsible for long-term operation and maintenance of the storm water practice.

4. The County finds that meeting the minimum on-site management requirements is not feasible due to the natural or existing physical characteristics of a site.

5. Non-structural practices will be used on the site that reduce: a) the generation of storm water from the site, b) the size and cost of storm water storage and c) the pollutants generated at the site. These non-structural practices are explained in detail in the current design manual and the amount of credit available for using such practices shall be determined by the County.

In instances where one of the conditions above applies, the County may grant a waiver from strict compliance with these storm water management provisions, as long as acceptable mitigation measures are provided. However, to be eligible for a variance, the applicant must demonstrate to the satisfaction of the County that the variance will not result in the following impacts to downstream waterways:

Deterioration of existing culverts, bridges, dams, and other structures;
Degradation of biological functions or habitat;
Accelerated streambank or streambed erosion or siltation;
Increased threat of flood damage to public health, life, property .

Furthermore, where compliance with minimum requirements for storm water management is waived, the applicant will satisfy the minimum requirements by meeting one of the mitigation measures selected by the jurisdictional storm water authority. Mitigation measures may include, but are not limited to, the following:

1. The purchase and donation of privately owned lands, or the grant of an easement to be dedicated for preservation and/or reforestation. These lands should be located adjacent to the stream corridor in order to provide permanent buffer areas to protect water quality and aquatic habitat,

2.The creation of a storm water management facility or other drainage improvements on previously developed properties, public or private, that currently lack storm water management facilities designed and constructed in accordance with the purposes and standards of this ordinance,

Section 5. General Performance Criteria for Storm water Management

Unless judged by the County to be exempt or granted a waiver, the following performance criteria shall be addressed for storm water management at all sites:

(A). All site designs shall establish storm water management practices to control the peak flow rates of storm water discharge associated with specified design storms and reduce the generation of storm water. These practices should seek to utilize pervious areas for storm water treatment and to infiltrate storm water runoff from driveways, sidewalks, rooftops, parking lots, and landscaped areas to the maximum extent practical to provide treatment for both water quality and quantity.

(B). All storm water runoff generated from new development shall not discharge untreated storm water directly into a jurisdictional wetland or local water body without adequate treatment. Where such discharges are proposed, the impact of the proposal on wetland functional values shall be assessed using a method acceptable to the County In no case shall the impact on functional values be any less than allowed by the Army Corp of Engineers (ACE) or the Missouri Department of Natural Resources responsible for natural resources.

(C). Annual groundwater recharge rates shall be maintained, by promoting infiltration through the use of structural and non-structural methods. At a minimum, annual recharge from the post development site shall mimic the annual recharge from pre-development site conditions.

(D). To protect stream channels from degradation, a specific channel protection criteria shall be provided as prescribed in the current storm water manual.

(E). Storm water discharges to critical areas with sensitive resources (i.e., cold water fisheries, shellfish beds, swimming beaches, recharge areas, water supply reservoirs) may be subject to additional performance criteria, or may need to utilize or restrict certain storm water management practices.

(G). Certain industrial sites are required to prepare and implement a storm water pollution prevention plan, and shall file a notice of intent (NOI) under the provisions of the National Pollutant Discharge Elimination System (NPDES) general permit. The storm water pollution prevention plan requirement applies to both existing and new industrial sites.

(H). Storm water discharges from land uses or activities with higher potential pollutant loadings, known as "hotspots", may require the use of specific structural STPs and pollution prevention practices.

(I). Prior to design, applicants are required to consult with the County to determine if they are subject to additional storm water design requirements.

(J). The calculations for determining peak flows as found in the Storm water management design manual shall be used for sizing all storm water management practices.

Section 6 Basic Storm water Management Design Criteria

6.1. Minimum Control Requirements

All storm water management practices will be designed so that the specific storm frequency storage volumes (e.g., recharge, water quality, channel protection, 10 year, 100 year) as identified in the current storm water management design manual are met, unless the County grants the applicant a waiver or the applicant is exempt from such requirements. In addition, if hydrologic or topographic conditions warrant greater control than that provided by the minimum control requirements, the County reserves the right to impose any and all additional requirements deemed necessary to control the volume, timing, and rate of runoff.

6.2 Site Design Feasibility

Storm water management practices for a site shall be chosen based on the physical conditions of the site. Among the factors that should be considered:

1. Topography
2. Maximum Drainage Area
3. Depth to Water Table
4. Soils
5. Slopes
6. Terrain
7. Head
8. Location in relation to environmentally sensitive features or ultra-urban areas

Applicants shall consult the Storm water management design manual for guidance on the factors that determine site design feasibility when selecting a storm water management practice.

6.3. Conveyance Issues

All storm water management practices shall be designed to convey storm water to allow for the maximum removal of pollutants and reduction in flow velocities. This shall include, but not be limited to:

1. Maximizing of flowpaths from inflow points to outflow points
2. Protection of inlet and outfall structures
3. Elimination of erosive flow velocities
4. Providing of underdrain systems, where applicable

The Storm water management design manual shall provide detailed guidance on the requirements for conveyance for each of the approved storm water management practices.

6.4. Pretreatment Requirements

Every storm water treatment practice shall have an acceptable form of water quality pretreatment, in accordance with the pretreatment requirements found in the current storm water management design manual. Certain storm water treatment practices, as specified in the Storm water management design manual, are prohibited even with pretreatment in the following circumstances:

A. Storm water is generated from highly contaminated source areas known as "hotspots"

B. Storm water is carried in a conveyance system that also carries contaminated, non- storm water discharges

C. Storm water is being managed in a designated groundwater recharge area.

D. Certain geologic conditions exist (e g., karst) that prohibit the proper pretreatment of storm water.

6.5. Treatment/Geometry Conditions

All storm water management practices shall be designed to capture and treat storm water runoff according to the specifications outlined in the Storm water management design manual. These specifications will designate the water quantity and quality treatment criteria that apply to an approved storm water management practice.

6.6. Maintenance Agreements

All storm water treatment practices shall have an enforceable operation and maintenance agreement to ensure the system functions as designed. This agreement will include any and all maintenance easements required to access and inspect the storm water treatment practices, and to perform routine maintenance as necessary to ensure proper functioning of the storm water treatment practice. In addition, a legally binding covenant specifying the parties responsible for the proper maintenance of all storm water treatment practices shall be secured prior to issuance of any permits for land disturbance activities.

6.7. Non-Structural Storm water Practices

The use of non-structural storm water treatment practices is encouraged in order to minimize the reliance on structural practices. Credit in the form of reductions in the amount of storm water that must be managed can be earned through the use of non-structural practices that reduce the generation of storm water from the site. These non-structural practices are explained in detail in the current design manual and applicants wishing to obtain credit for use of non-structural practices must ensure that these practices are documented and remain unaltered by subsequent property owners.

Section 7. Requirements for Storm water Management Plan Approval

7.1. Storm water Management Plan Required for All Developments.

No application for development will be approved unless it includes a storm water management plan detailing in concept how runoff and associated water quality impacts resulting from the development will be controlled or managed. This plan must be prepared by an individual approved by the County and must indicate whether storm water will be managed on-site or off-site and, if on-site, the general location and type of practices. The storm water management plan(s) shall be referred for comment to all other interested agencies, and any comments must be addressed in a final storm water management plan. This final plan must be signed by a licensed professional engineer (PE), who will verify that the design of all storm water management practices meet the submittal requirements outlined in the Submittal Checklist found in the storm water management design manual. No building, grading, or sediment control permit shall be issued until a satisfactory final storm water management plan, or a waiver thereof, shall have undergone a review and been approved by the County after determining that the plan or waiver is consistent with the requirements of this ordinance.

7.2. Storm water Management Concept Plan Requirements

A storm water management concept plan shall be required with all permit applications and will include sufficient information (e.g., maps, hydrologic calculations, etc) to evaluate the environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing storm water generated at the project site. The intent of this conceptual planning process is to determine the type of storm water management measures necessary for the proposed project, and ensure adequate planning for management of storm water runoff from future development. To accomplish this goal the following information shall be included in the concept plan:

1. A map (or maps) indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural storm water management and sediment control facilities. The map(s) will also clearly show proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads and easements; the limits of clearing and grading; A written description of the site plan and justification of proposed changes in natural conditions may also be required.

2. Sufficient engineering analysis to show that the proposed storm water management measures are capable of controlling runoff from the site in compliance with this ordinance and the specifications of the Storm water management design manual.

3. A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project and a description of the watershed and its relation to the project site. This description should include a discussion of soil conditions, forest cover, topography, wetlands, and other native vegetative areas on the site. Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for development.

4. A written description of the required maintenance burden for any proposed storm water management facility.

5. The County may also require a concept plan to consider the maximum development potential of a site under existing zoning, regardless of whether the applicant presently intends to develop the site to its maximum potential.

For development or redevelopment occurring on a previously developed site, an applicant shall be required to include within the storm water concept plan measures for controlling existing storm water runoff discharges from the site in accordance with the standards of this Ordinance to the maximum extent practicable.

7.3. Final Storm water Management Plan Requirements

After review of the storm water management concept plan, and modifications to that plan as deemed necessary by the County, a final storm water management plan must be submitted for approval. The final storm water management plan, in addition to the information from the concept plan, shall include all of the information required in the Final Storm water Management Plan checklist found in the Storm water management design manual. This includes:

1. Contact Information

   The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected.

2. Topographic Base Map

   A topographic base map of the site which extends a minimum of 100 feet beyond the limits of the proposed development and indicates existing surface water drainage including streams, ponds, culverts, ditches, and wetlands; current land use including all existing structures; locations of utilities, roads, and easements; and significant natural and manmade features not otherwise shown.

3 Calculations

   Hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in this ordinance. Such calculations shall include (i) description of the design storm frequency, intensity and duration, (ii) time of concentration, (iii) Soil Curve Numbers or runoff coefficients, (iv) peak runoff rates and total runoff volumes for each watershed area, (v) infiltration rates, where applicable, (vi) culvert capacities, (vii) flow velocities, (viii) data on the increase in rate and volume of runoff for the design storms referenced in the Storm water

management design manual, and (ix) documentation of sources for all computation methods and field test results.

4. Soils Information

If a storm water management control measure depends on the hydrologic properties of soils (e.g., infiltration basins) then a soils report shall be submitted. The soils report shall be based on on-site boring logs or soil pit profiles. The number and location of required soil borings or soil sits shall be determined based on what is needed to determine the suitability and distribution of soil types present at the location of the control measure.

5. Maintenance and Repair Plan

The design and planning of all storm water management facilities shall include detailed maintenance and repair procedures to ensure their continued function. These plans will identify the parts or components of a storm water management facility that need to be maintained and the equipment and skills or training necessary. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan.

6. Landscaping plan

The applicant must present a detailed plan for management of vegetation at the site after construction is finished, including who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. This plan must be prepared by a registered landscape architect or by the soil conservation district.

7. Maintenance Easements

The applicant must ensure access to all storm water treatment practices at the site for the purpose of inspection and repair by securing all the maintenance easements needed on a permanent basis. These easements will be recorded with the plan and will remain in effect even with transfer of title to the property.

8. Maintenance Agreement

The applicant must execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by na on-site storm water management measure in accordance with the specifications of this ordinance.

9. Erosion and Sediment Control Plans for Construction of Storm water Management Measures

The applicant must prepare an erosion and sediment control plan for all construction activities related to implementing any on-site storm water management practices.

10. Other Environmental Permits

The applicant shall assure that all other applicable environmental permits have been acquired for the site prior to approval of the final storm water design plan.

7.4. Performance Bond/Security

The County may, at its discretion, require the submittal of a performance security or bond prior to issuance of a permit in order to insure that the storm water practices are installed by the permit holder as required by the approved storm water management plan. The amount of the installation performance security shall be the total estimated construction cost of the storm water management practices approved under the permit, plus 25%. The performance security shall contain forfeiture provisions for failure to complete work specified in the storm water management plan. The installation performance security shall be released in full only upon submission of "as built plans" and written certification by a registered professional engineer that the storm water practice

has been installed in accordance with the approved plan and other applicable provisions of this ordinance. The County will make a final inspection of the storm water practice to ensure that it is in compliance with the approved plan and the provisions of this ordinance. Provisions for a partial pro-rata release of the performance security based on the completion of various development stages can be done at the discretion of the County.

Section 8. Construction Inspection

8.1. Notice of Construction Commencement

The applicant must notify the County in advance before the commencement of construction. Regular inspections of the storm water management system construction shall be conducted by the staff of the County or certified by a professional engineer or their designee who has been approved by the jurisdictional storm water authority. All inspections shall be documented and written reports prepared that contain the following information:

1. The date and location of the inspection;
2. Whether construction is in compliance with the approved storm water management plan
3. Variations from the approved construction specifications
4. Any violations that exist

If any violations are found, the property owner shall be notified in writing of the nature of the violation and the required corrective actions. No added work shall proceed until any violations are corrected and all work previously completed has received approval by the County.

8.2. Construction Record Plans

All applicants are required to submit actual construction record plans for any storm water management practices located on-site after final construction is completed. The plan must show the final design specifications for all storm water management facilities and must be certified by a professional engineer. A final inspection by the County is required before the release of any performance securities can occur.

8.3. Landscaping and Stabilization Requirements

Any area of land from which the natural vegetative cover has been either partially or wholly cleared or removed by development activities shall be revegetated within ten (10) days from the substantial completion of such clearing and construction. The following criteria shall apply to revegetation efforts:

Reseeding must be done with an annual or perennial cover crop accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until such time as the cover crop is established over ninety percent (90%) of the seeded area.

Replanting with native woody and herbaceous vegetation must be accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until the plantings are established and are capable of controlling erosion.

Any area of revegetation must exhibit survival of a minimum of seventy-five percent (75%) of the cover crop throughout the year immediately following revegetation. Revegetation must be repeated in successive years until the minimum seventy-five percent (75%) survival for one (1) year is achieved.

In addition to the above requirements, a landscaping plan must be submitted with the final design describing the vegetative stabilization and management techniques to be used at a site after construction is completed. This plan will explain not only how the site will be stabilized after construction, but who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate

vegetative cover is preserved. This plan must be prepared by a registered landscape architect or by the soil conservation district, and must be approved prior to receiving a permit.

Section 9. Maintenance and Repair of Storm water Facilities

9.1. Maintenance Easement

Prior to the issuance of any permit that has an storm water management facility as one of the requirements of the permit, the applicant or owner of the site must execute a maintenance easement agreement that shall be binding on all subsequent owners of land served by the storm water management facility. The agreement shall provide for access to the facility at reasonable times for periodic inspection by the County, or their contractor or agent, and for regular or special assessments of property owners to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this ordinance. The easement agreement shall be recorded by the County in the land records.

9.2. Maintenance Covenants

Maintenance of all storm water management facilities shall be ensured through the creation of a formal maintenance covenant that must be approved by the County and recorded into the land record prior to final plan approval. As part of the covenant, a schedule shall be developed for when and how often maintenance will occur to ensure proper function of the storm water management facility. The covenant shall also include plans for periodic inspections to ensure proper performance of the facility between scheduled cleanouts. The County, in lieu of an maintenance covenant, may accept dedication of any existing or future storm water management facility for maintenance, provided such facility meets all the requirements of this chapter and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

9.3. Requirements for Maintenance Covenants

All storm water management facilities must undergo, at the minimum, an annual inspection to document maintenance and repair needs and ensure compliance with the requirements of this ordinance and accomplishment of its purposes. These needs may include; removal of silt, litter and other debris from all catch basins, inlets and drainage pipes, grass cutting and vegetation removal, and necessary replacement of landscape vegetation. Any maintenance needs found must be addressed in a timely manner, as determined by the County, and the inspection and maintenance requirement may be increased as deemed necessary to ensure proper functioning of the storm water management facility.

9.4. Inspection of Storm water Facilities

Inspection programs may be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the NPDES storm water permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other storm water treatment practices.

9.5. Right-of-Entry for Inspection

When any new drainage control facility is installed on private property, or when any new connection is made between private property and a public drainage control system, sanitary sewer or combined sewer, the property owner shall grant to the County the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. This includes the right to enter a property when it has a

reasonable basis to believe that a violation of this ordinance is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a violation of this ordinance.

9.6. Records of Installation and Maintenance Activities.

Parties responsible for the operation and maintenance of a storm water management facility shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least three (3) years. These records shall be made available to the County during inspection of the facility and at other reasonable times upon request.

9.7 Failure to Maintain Practices

If a responsible party fails or refuses to meet the requirements of the maintenance covenant, the County, after reasonable notice, may correct a violation of the design standards or maintenance needs by performing all necessary work to place the facility in proper working condition. In the event that the storm water management facility becomes a danger to public safety or public health, the County shall notify the party responsible for maintenance of the storm water management facility in writing. Upon receipt of that notice, the responsible person shall have thirty (30) days to effect maintenance and repair of the facility in an approved manner. After proper notice, the County may assess the owner(s) of the facility for the cost of repair work and any penalties; and the cost of the work shall be a lien on the property, or prorated against the beneficial users of the property, and may be placed on the tax bill and collected as ordinary taxes by the county.

Section 10. Enforcement and Penalties.

10.1. Violations

Any development activity that is commenced or is conducted contrary to this Ordinance, may be restrained by injunction or otherwise abated in a manner provided by law.

10.2. Notice of Violation.

When the County determines that an activity is not being carried out in accordance with the requirements of this Ordinance, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain :

(1) the name and address of the owner or applicant;

(2) the address when available or a description of the building, structure or land upon which the violation is occurring;

(3) a statement specifying the nature of the violation;

(4) a description of the remedial measures necessary to bring the development activity into compliance with this Ordinance and a time schedule for the completion of such remedial action;

(5) a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;

(6) a statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

10.3. Stop Work Orders

Persons receiving a notice of violation will be required to halt all construction activities. This "stop work order" will be in effect until the County confirms that the development activity is in compliance and the violation has

been satisfactorily addressed. Failure to address a notice of violation in a timely manner can result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this ordinance.

10.4. Civil and Criminal Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this Ordinance shall be subject to civil and/or criminal penalties. Such person shall be guilty of a separate offense for each day during which the violation occurs or continues.

10.4. Restoration of lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the County may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

10.5. Holds on Occupation Permits

Occupation permits will not be granted until corrections to all storm water practices have been made and accepted by the County.

SECTION 11. CERTIFICATE OF ADOPTION

This Storm Water Management Ordinance for JASPER COUNTY, MISSOURI, ADOPTED AND APPROVED by the Governing Body of JASPER COUNTY, MISSOURI.

This 16 day of November, 2010.

Place Seal Here

Bonnie Ewall

Presiding Commissioner (Signature)

Eastern District Commissioner (Signature)

Western District Commissioner (Signature)

JASPER COUNTY, MISSOURI
STORM WATER MANAGEMENT PLAN
SMALL SM4 PERMIT NO. MO-R40048
THIRD PERMIT TERM 2013 - 2018

TMDL INFORMATION SHEETS – CENTER CREEK AND TURKEY CREEK

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Center Creek

Water Body Segment at a Glance:

State map showing location of watershed

County: Jasper
Nearby City: Joplin
Length of impaired segment: 26 miles
Length of impairment within segment: 12.8 miles
Pollutants: Cadmium (S,W)[1], Lead (S) and Zinc (S)
Source: Mill Tailings (Abandoned)
Water Body ID: 3203

Schedule for TMDL development: 2012

Prior TMDL: A TMDL for zinc (W) was approved in 2006

Description of the Problem

Designated beneficial uses of Center Creek

- Livestock and Wildlife Watering
- Protection of Warm-Water Aquatic Life
- Human Health Protection (Fish Consumption)
- Cool-Water Fishery
- Whole Body Contact Recreation
- Secondary Contact Recreation
- Irrigation
- Industrial

Uses that are impaired

- Protection of Warm-Water Aquatic Life
- General Criteria

Standards that apply

- Missouri Water Quality Standards found in 10 CSR 20-7.031(4)(B)1 state:

  Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic

[1] (S) = in sediment/soil; (W) = in water as dissolved metal

organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded.

- Table A of the Water Quality Standards contains dissolved metals criteria for the protection of aquatic life designated use. These criteria are hardness dependent and limits are calculated from the formulas shown below:

  Dissolved Cadmium (DCd)
  Acute[2] = $e^{(1.0166*\ln(\text{hardness})-3.062490)}*(1.136672-(\ln(\text{hardness})*0.041838))$ = µg/L, or micrograms per liter
  Chronic = $e^{(0.7409*\ln(\text{hardness})-4.719948)}*(1.101672-(\ln(\text{hardness})*0.041838))$ = µg/L

- Missouri streams are also protected by the general criteria found at 10 CSR 20-7.031(3). The particular general criteria that apply to Center Creek include:

  (D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.
  (G) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.

- Missouri has no numeric criteria for metals in sediment. Likewise, the U.S. Environmental Protection Agency, or EPA, has not yet established federal guidelines for toxic chemicals in stream or lake sediments. In lieu of such criteria, Probable Effect Concentrations, or PECs, suggested by McDonald, et al.[3], are used. PECs are the concentrations at which some toxic effect on aquatic life is likely.

Background information and water quality data
Center Creek flows through the Tri-State Historic Mining District in southwest Missouri. Joplin is located near the center of this district. Mining for lead and zinc began in 1848 and lasted until 1957. Between 1848 and 1945, 50 percent of the zinc and 10 percent of the lead mined worldwide came from the Tri-State district.

Mine drainage, both in the form of surface flows and resurgence of groundwater from flooded mines, contributes significant amounts of metals to Center Creek. In addition to dissolved metals in the water column, studies by the U.S. Geological Survey (USGS) also indicated that at some locations pore water, water within the sediment on the bottom of Center Creek, was toxic to aquatic life.

Information relating to approved TMDL: dissolved zinc
In the case of zinc, the average dissolved zinc concentration in Center Creek upstream of the mining district (near Fidelity) is 7 µg/L. At the Highway HH bridge, which is just within the upstream

[2] Acute criteria apply to short exposures to toxic conditions that aquatic creatures can survive without harm. Chronic criteria apply to conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic criteria are much lower than the acute criteria.
[3] *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000. USGS

portion of the mining district, it is 124 µg/L and rises to 366 µg/L within the mining area at Smithfield.

Most of the zinc in Center Creek comes from dissolution of zinc minerals lying on the land surface or in the walls of flooded mines. As these surfaces continue to weather, less available zinc minerals remain to be dissolved. As a result, the long-term levels of zinc in runoff, groundwater and Center Creek should decline. This trend is shown in Figure 1 below that plots dissolved zinc levels in Center Creek near Smithfield from 1970 to 2002.

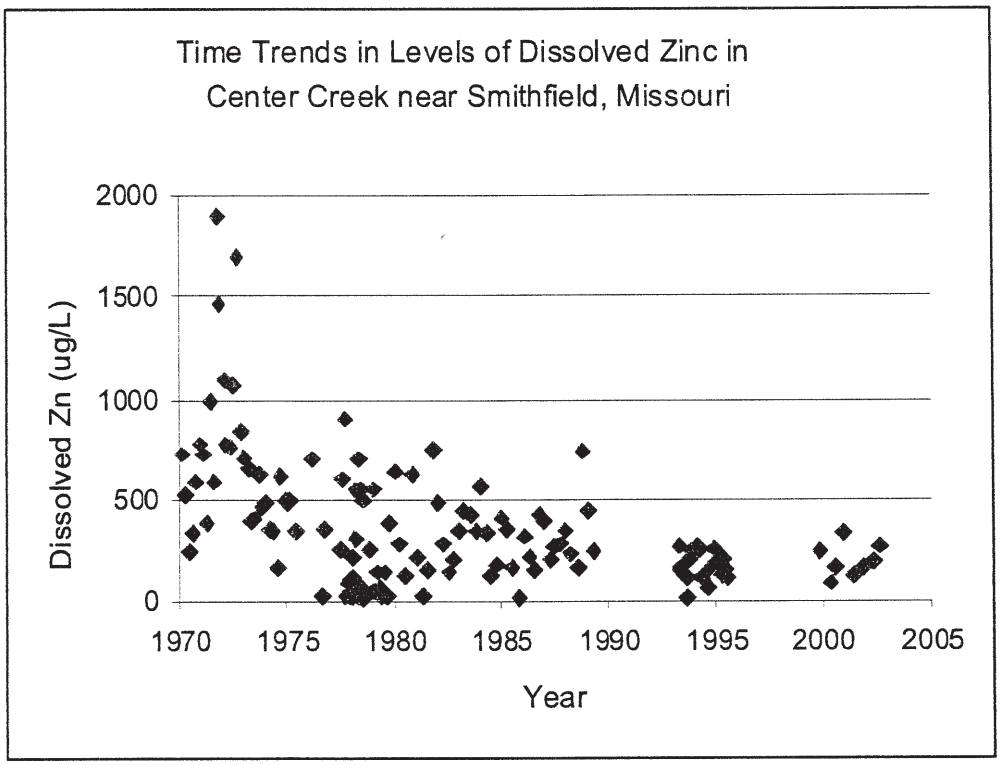


Figure 1

Center Creek and nearby Turkey Creek in Jasper County flow across the state line into the Spring River in Kansas. Kansas has completed a TMDL study on the Spring River. The two creeks are major sources of metals pollution in the Spring River. As a result, Missouri chose to include Kansas' WQS in the zinc targets for these TMDLs, which were approved by the EPA on October 25, 2006.

For more information, see the Turkey Creek Information Sheet. The approved 2006 TMDL for dissolved zinc is available online at www.dnr.mo.gov/env/wpp/tmdl/3203-center-3216-3217-turkey-cks-tmdl.pdf.

Toxicity of lead and cadmium

New data shows that Center Creek is also contaminated by dissolved cadmium in the water column and cadmium, lead and zinc in the sediment. The toxicity of zinc is detailed in the Turkey Creek

Information Sheet. It is already known that lead bioaccumulates in the bodies of aquatic creatures, which has been documented in the levels of lead in fish in Big River, another water body in Missouri that is contaminated with mine tailings. New studies done in the Big River are showing that the lead and other metals in these tailings are toxic to mussels, crayfish and other small invertebrates that inhabit the bottom of the river. These conclusions may be transferrable to Center Creek. Lastly, cadmium is a minor component in most lead ores and therefore is a by-product of lead production. It is known to be highly toxic and carcinogenic.

Dissolved cadmium

The chronic and acute water quality standards for protection of aquatic life for cadmium and zinc are based on the 25th percentile hardness level of the water. A water body is judged to be impaired if chronic or acute numeric criteria are exceeded on more than one occasion during the last three years for which data is available. The chronic criterion for cadmium was exceeded four times on Center Creek during this time period (Figure 2). Therefore, the portion of this water body below the abandoned tailings piles is judged to be impaired by dissolved cadmium.

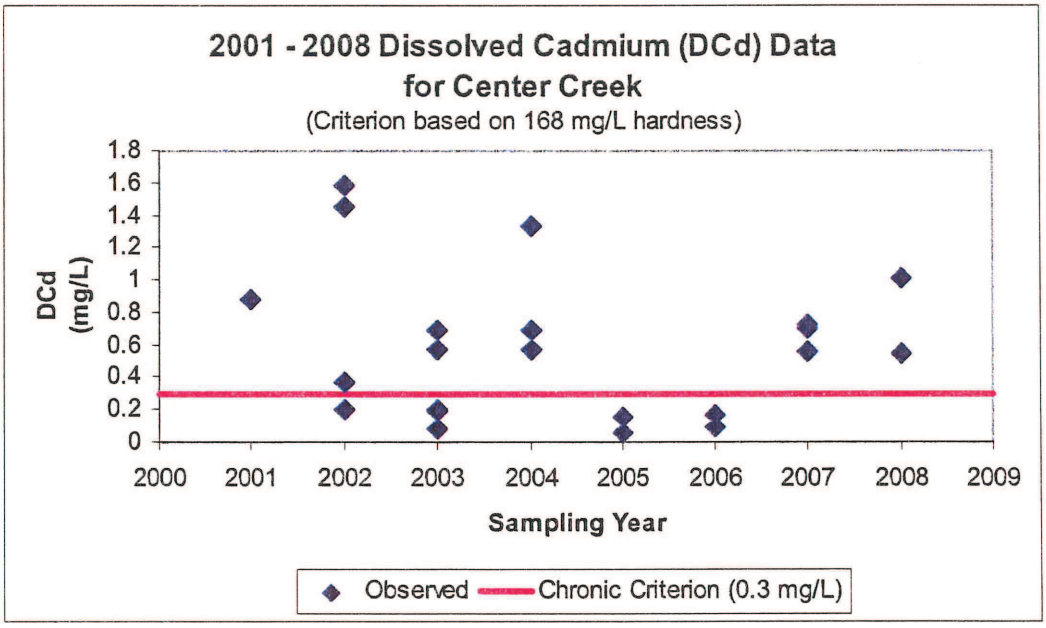


Figure 2

Cadmium, lead and zinc in sediment

The sediment in Center Creek eroded from formerly huge chat piles created by mining lead and zinc. Chat is the crushed limestone and other ore rock left over after the lead and zinc were extracted. As previously noted, the sediment in Center Creek is contaminated by cadmium, lead and zinc (see Figures 3-5). The relationship between the amount of a toxicant in sediment and the strength of the toxicity it exerts on aquatic life is not simple or straightforward. While neither Missouri nor EPA has standards or guidelines for sediment toxicity, the U.S. Geological Survey, or USGS, has reviewed a large number of research papers on the subject. Based on this review, the USGS suggests numeric guidelines that could be used to judge the potential for toxicity to aquatic life. These are the PECs mentioned in the discussion of "standards that apply".

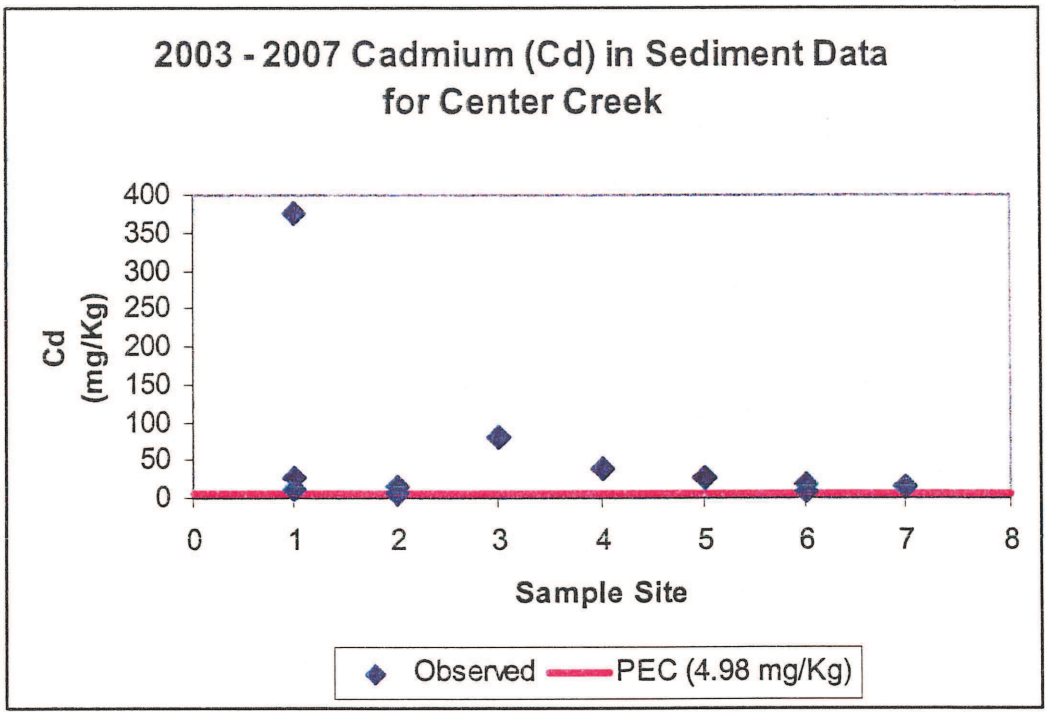


Figure 3

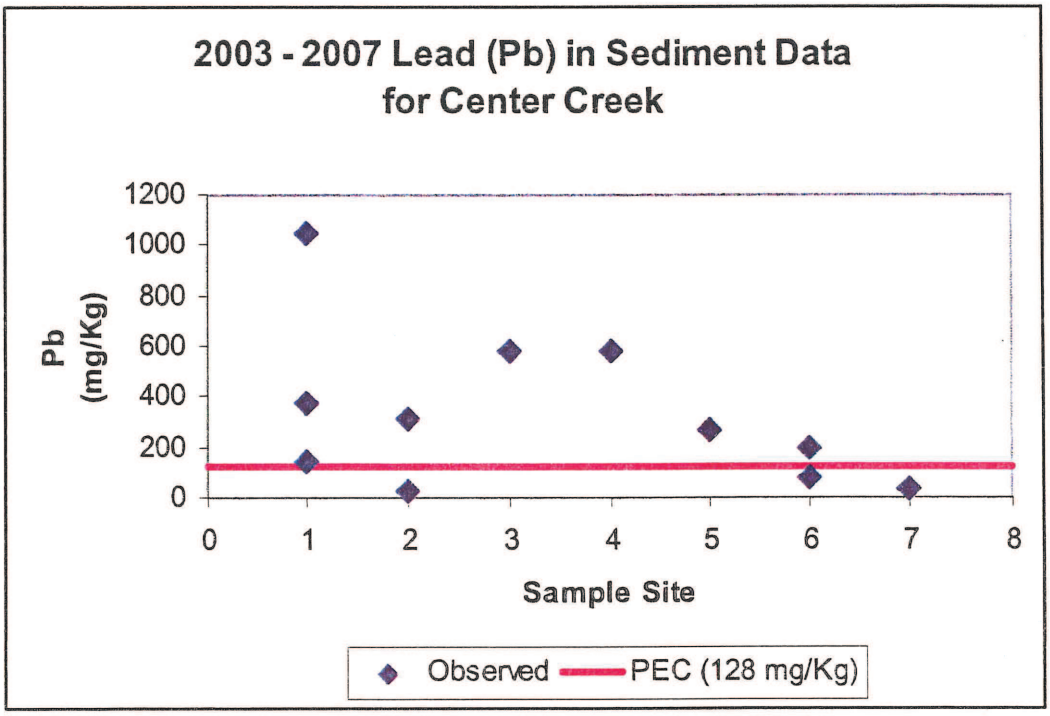


Figure 4

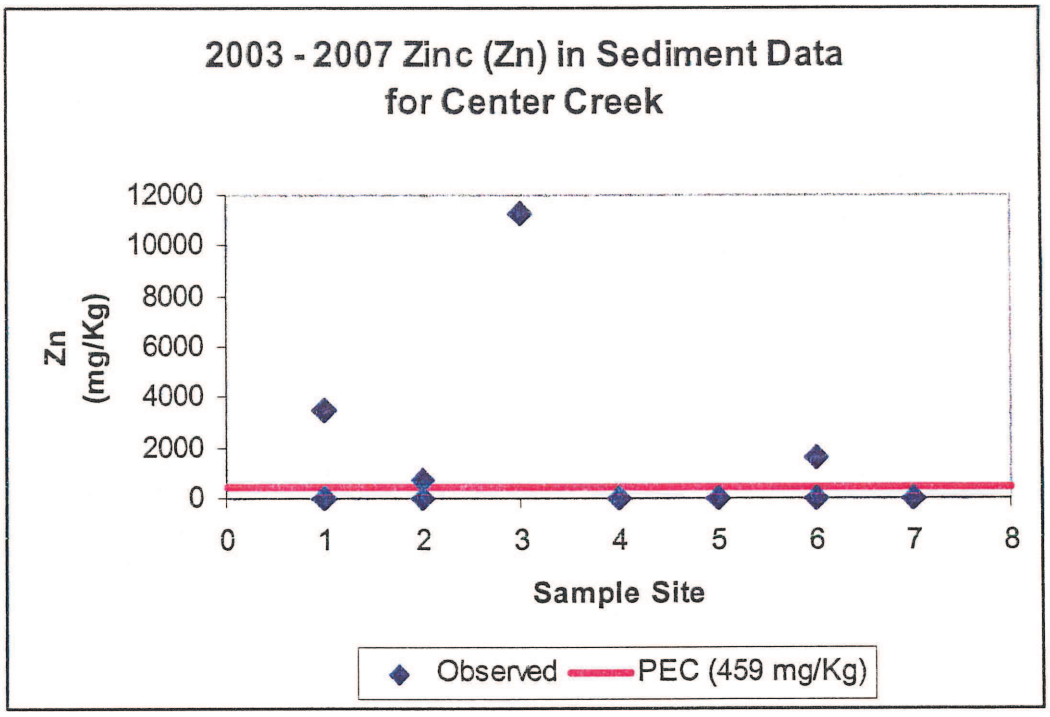
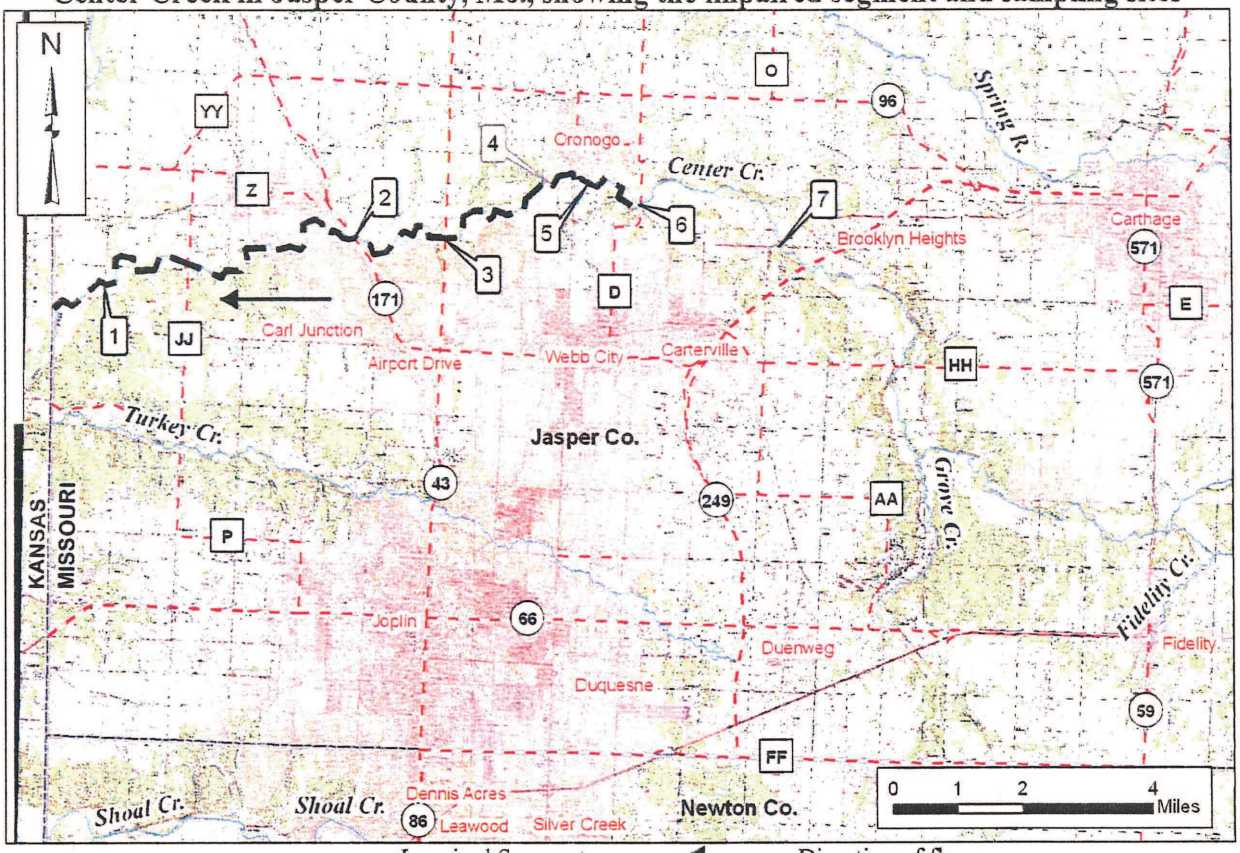


Figure 5

The department conducted sediment monitoring in 2003 and 2007. The mean, or average, level of cadmium in the sediments for Center Creek is 56.2 mg/kg, or milligrams per kilogram, which is the same as parts per million. This is more than 11 times the PEC. The mean level of lead in the sediments for Center Creek is 332.7 mg/kg. This is more than two and a half times the PEC. The mean level of zinc in the sediments for Center Creek is 1556.8 mg/kg. This is more than three times the PEC. Based on the location of sediment sampling sites and known or suspected sources of metals, 3.5 miles of the creek were judged to be impaired by cadmium, lead and zinc in the sediment.

Center Creek in Jasper County, Mo., showing the impaired segment and sampling sites



Impaired Segment ← Direction of flow

Sample Sites

1 – Center Cr. near Carl Junction at County Road 303
2 – Center Cr. at State Highway 171
3 – Center Cr. at State Highway 43
4 – Center Cr. downstream of County Road 23
5 – Center Cr. upstream of County Road 23
6 – Center Cr. at State Highway D (Main Street)
7 – Center Cr. at Hyacinth Road

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176
Jefferson City, MO 65102-0176
1-800-361-4827 or 573-751-1300 office
573-522-9920 fax
Program Home Page: dnr.mo.gov/env/wpp/index.html

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Turkey Creek

Water Body Segment at a Glance:

State map showing location of watershed

County: Jasper
Nearby City: Joplin
Water Body ID: 3216
Length of impaired segment: 7 miles
Water Body ID: 3217
Length of impaired segment: 5 miles
Pollutants: Cadmium, Lead and Zinc (S)[1]
Cadmium (W) [WBID 3216 only]
Source: Mill Tailings (Abandoned)

Scheduled for TMDL development: 2012

Prior TMDL: A TMDL for zinc (W) was approved in 2006

Description of the Problem

Designated beneficial uses of Turkey Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)
- Whole Body Contact Recreation

Uses that are impaired

- Protection of Warm-Water Aquatic Life
- General Criteria (WBID 3217)

Standards that apply

- Missouri Water Quality Standards found in 10 CSR 20-7.031(4)(B)1 state:

  Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded.

[1] (S) = in sediment/soil; (W) = in water as dissolved metal

- Table A of the Water Quality Standards contains dissolved metals criteria for the protection of aquatic life designated use. These criteria are hardness dependent and limits for cadmium are calculated from the formulas shown below:

  Dissolved Cadmium (DCd)
  Acute[2] = $e^{(1.0166*\ln(\text{hardness})-3.062490)}*(1.136672-(\ln(\text{hardness})*0.041838))$ = µg/L
  Chronic = $e^{(0.7409*\ln(\text{hardness})-4.719948)}*(1.101672-(\ln(\text{hardness})*0.041838))$ = µg/L

- Missouri streams are also protected by the general criteria found at 10 CSR 20-7.031(3). The particular general criteria that apply to Center Creek include:

  (D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.
  (G) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.

- Missouri has no standards for metals in sediment. Likewise, the U.S. Environmental Protection Agency has not yet established federal guidelines for toxic chemicals in stream or lake sediments. In lieu of such criteria, Probable Effect Concentrations, or PECs, suggested by McDonald, et. al[3], are used. PECs are the concentrations at which some toxic effect on aquatic life is likely.

Background information and water quality data
Two segments of Turkey Creek are on the 2008 303(d) List for high levels of metals in both the water column and the stream sediment. Several abandoned mine lands, or AMLs, provide metals to Turkey Creek, with the Duenweg mining area being the most significant contributor in the upper Turkey Creek watershed. In the middle portion of the watershed, the Lone Elm Hollow (around site #4) and Leadville Hollow areas are the most significant sources. See below for graphs summarizing the data and a map of the area (last page).

Turkey and Center[4] creeks in Jasper County flow across the state line into the Spring River in Kansas. Kansas has completed a TMDL study on the Spring River and these two creeks are major sources of metals pollution in the Spring River. The department worked with Kansas in developing the TMDLs, choosing to include Kansas' WQS in the zinc targets.

The U.S. Environmental Protection Agency, or EPA, approved Missouri's TMDLs for dissolved zinc in both Turkey and Center creeks on October 25, 2006. For more information, see the Center Creek Information Sheet. The approved 2006 TMDL for dissolved zinc is available online at www.dnr.mo.gov/env/wpp/tmdl/3203-center-3216-3217-turkey-cks-tmdl.pdf.

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[2] Acute criteria apply to short exposures to toxic conditions that aquatic creatures can survive without harm. Chronic criteria apply to conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic criteria are much lower than the acute criteria.
[3] *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000. USGS
[4] Center Creek is included in the Center and Turkey Creeks TMDL. It is impaired for the same suite of metals.

Toxicity of cadmium, lead and zinc

Lead-zinc AMLs produce runoff with high levels of dissolved zinc. Zinc is one of the most mobile of all heavy metals. Because compounds of zinc dissolve easily, zinc is carried into waterways during rain events. Zinc is an essential nutrient to aquatic and terrestrial organisms, but in excess it can be very toxic and has a tendency to bio-accumulate (build up) in aquatic organisms. The hardness of the water, the amount of dissolved oxygen and temperature all affect the toxicity of zinc to aquatic life[5]. Synergistic effects can also occur to increase the toxicity of the zinc. This means when several compounds are combined, the result is more toxic than what would be expected from just adding the components together.

New data shows that Turkey Creek is also contaminated by dissolved cadmium in the water column and cadmium, lead and zinc in the sediment. It is already known that lead bioaccumulates in the bodies of aquatic creatures, which has been documented in the levels of lead in fish in Big River, another water body in Missouri that is contaminated with mine tailings. New studies done in the Big River are showing that the lead and other metals in these tailings are toxic to mussels, crayfish and other small invertebrates that inhabit the bottom of the river. These conclusions may be transferrable to Turkey Creek. Lastly, cadmium is a minor component in most lead ores and therefore is a by-product of lead production. It is known to be highly toxic and carcinogenic.

Dissolved cadmium

This impairment is based on data gathered by the US Geological Survey, or USGS, in 2001-2008. The chronic and acute water quality standards (see footnote 2) for protection of aquatic life for cadmium are based on the 25th percentile of all the hardness data for that water body. A water body is judged to be impaired if chronic or acute numeric criteria are exceeded on more than one occasion during the last three years for which data is available. The chronic criterion for cadmium was exceeded ten times in Turkey Creek during that time period. All of the data were gathered at one site, Highway P (#1), so only WBID 3216 is judged to be impaired by dissolved cadmium. See Figure 1 below.

[5] Upper Sacramento River TMDL for Metals, California Environmental Protection Agency, 9/25/01. www.swrcb.ca.gov/rwqcb5/TMDL/upperSacCdCuZn.html

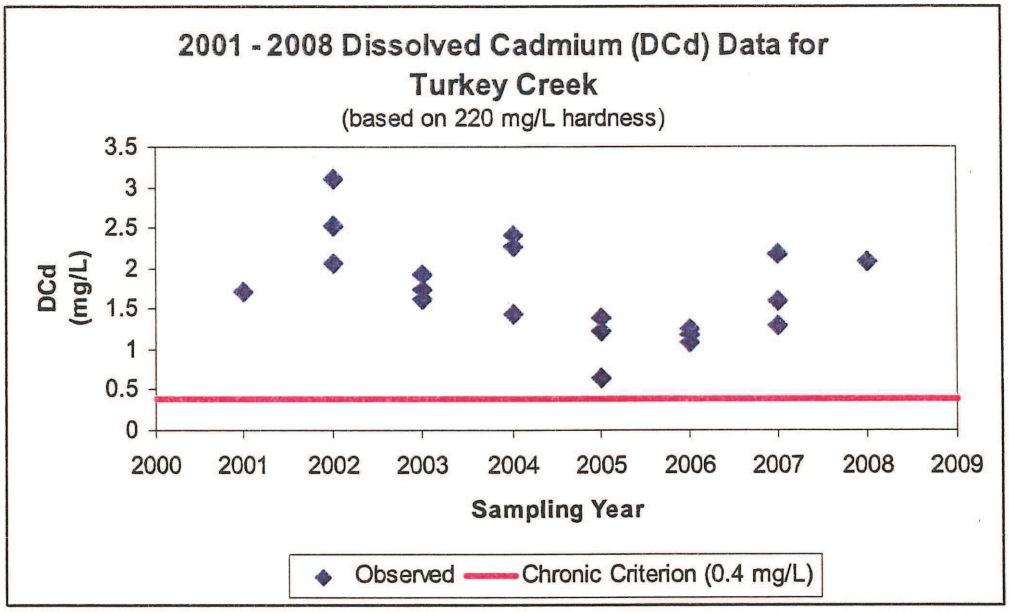


Figure 1

Cadmium, lead and zinc in sediment

As in Center Creek, the sediment in Turkey Creek eroded from formerly huge chat piles created by mining lead and zinc. Chat is the crushed limestone and other ore rock left over after the lead and zinc were extracted. As previously noted, this sediment (the chat) is contaminated by cadmium, lead and zinc. The relationship between the amount of a toxicant in sediment and the strength of the toxicity it exerts on aquatic life is not simple or straightforward. While neither Missouri nor EPA has standards or guidelines for sediment toxicity, the USGS has reviewed of a large number of research papers on the subject. Based on this review, the USGS suggests numeric guidelines that could be used to judge the potential for toxicity to aquatic life. These are the PECs discussed in "standards that apply". The department conducted sediment monitoring in Turkey Creek in 2003, 2007 and 2008 and an EPA contractor gathered sediment data in 1995. In Figures 2-4 below, Sites 1-4 are on WBID 3216 and Sites 5-7 are on WBID 3217.

WBID 3216

The mean, or average, level of cadmium in the sediments for Turkey Creek WBID 3216 is 19.9 mg/kg, or milligrams per kilogram, which is the same as parts per million. This is four times the PEC, the concentration at which some toxic effect on aquatic life is likely. The mean level of lead in the sediments for Turkey Creek is 303 mg/kg, two times the PEC, and the mean level of zinc is 4050 mg/kg, eight times the PEC. Based on the location of sediment sampling sites and known or suspected sources of metals, all of WBID 3216 is judged to be impaired by cadmium, lead and zinc in the sediment. As previously noted, WBID 3216 is also impaired by dissolved cadmium.

WBID 3217

In WBID 3217 of Turkey Creek, the mean level of cadmium, lead and zinc are 29 mg/kg, 387 mg/kg and 3377 mg/kg exceeding the PEC by five times, three times and seven times respectively. Again, based on the location of sediment sampling sites and known or suspected sources of metals, all of WBID 3217 is also judged to be impaired by these three metals.

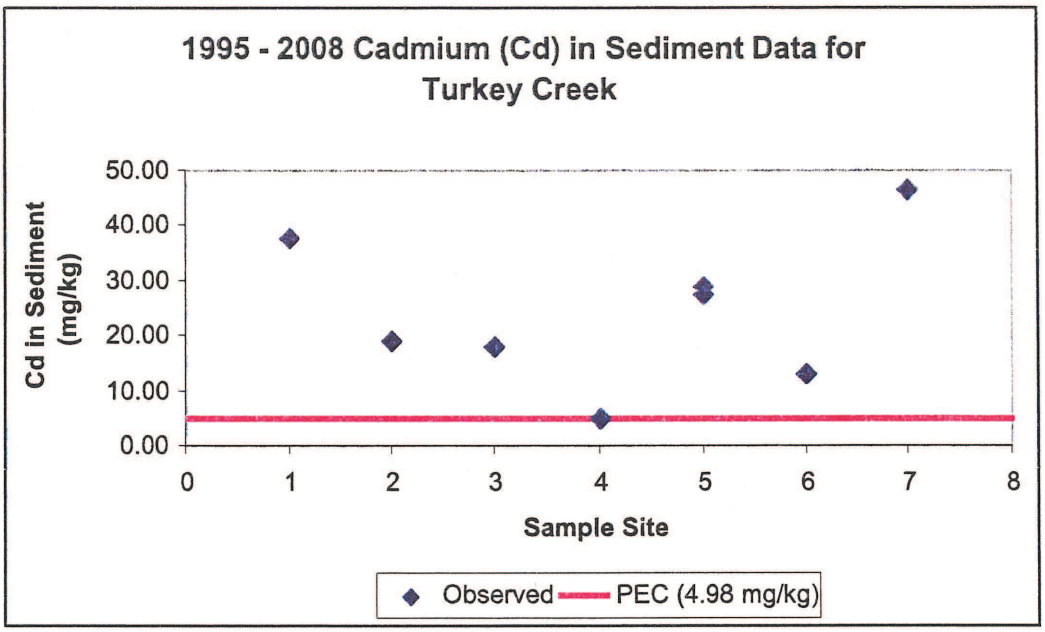


Figure 2

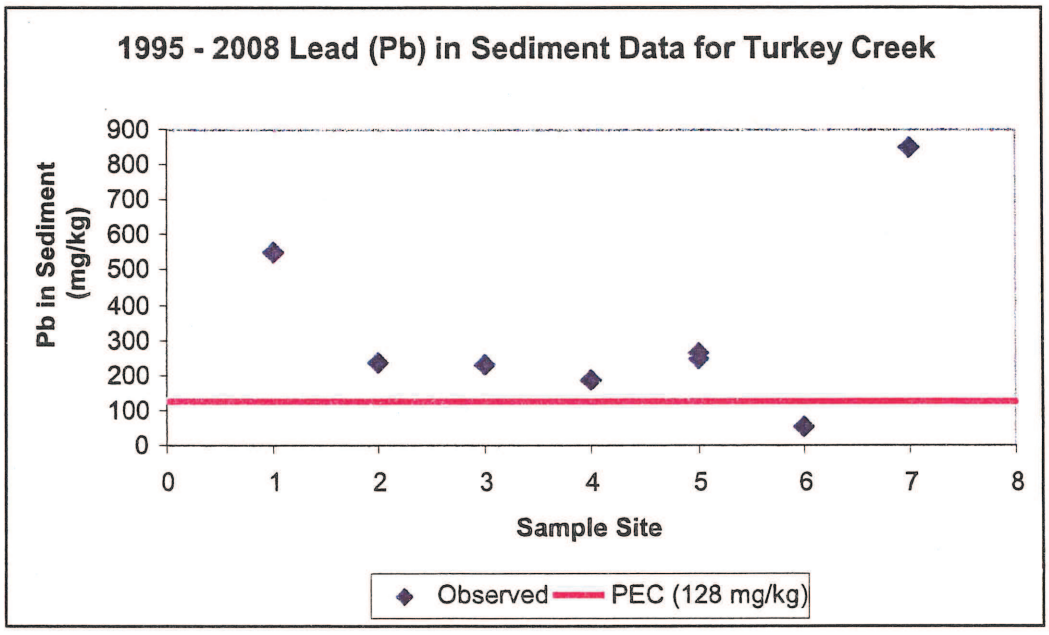


Figure 3

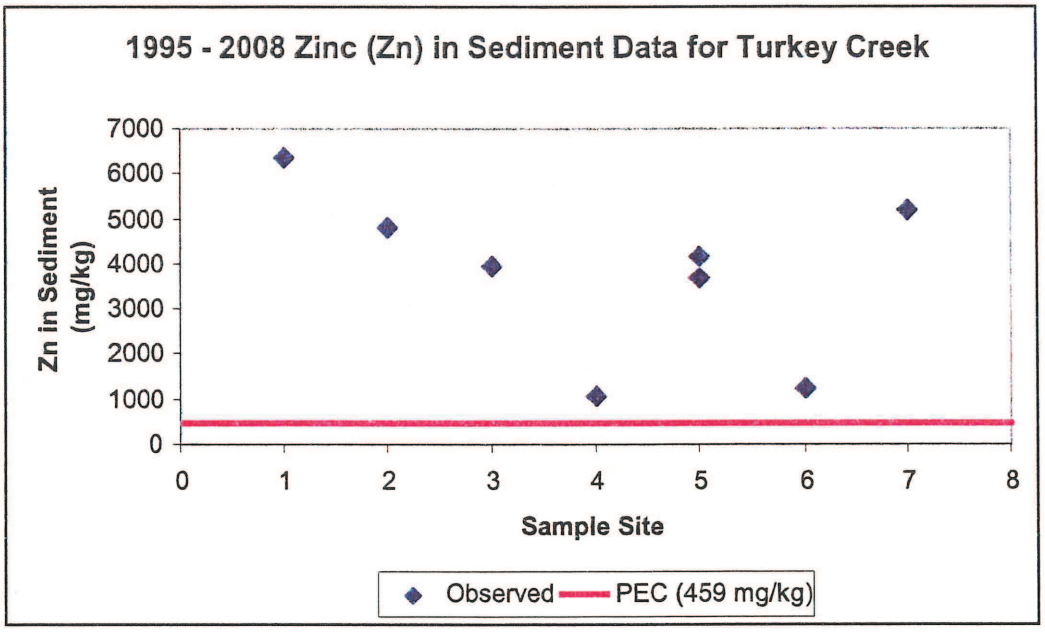


Figure 4

Remedial actions

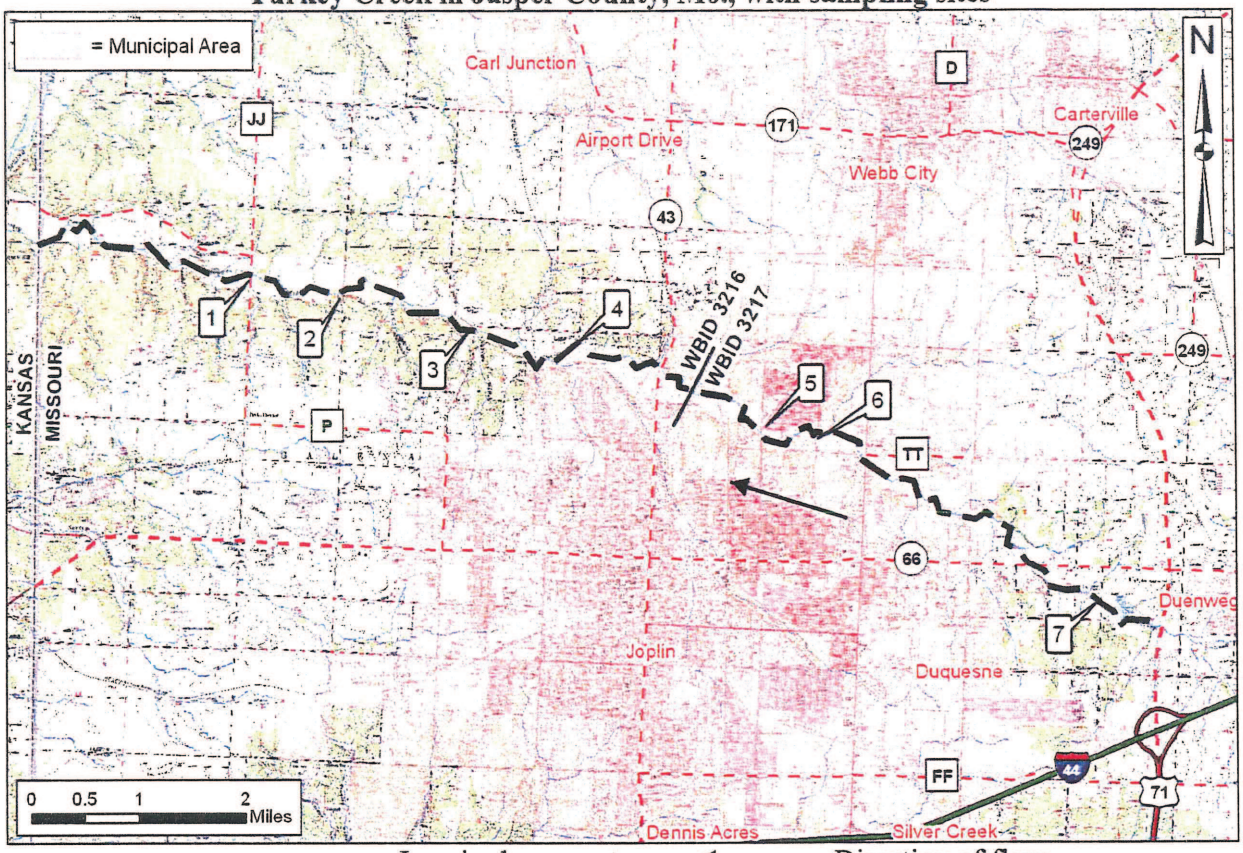
The old lead mining area in Jasper County, where Turkey Creek is located, has been designated as a Superfund Site[6]. Restoration methods for addressing the huge chat piles were evaluated through pilot projects in the watershed. The potential responsible parties, the EPA and the Missouri Department of Natural Resources funded these efforts. Remediation activities have included closing shafts, returning mined materials to the subsurface (subaqueous disposal) and preventing erosion by grading and revegetating chat piles. Water quality monitoring continues on a regular basis.

These actions are steps towards improving the water quality in both Turkey and Center creeks. One major problem that has not been addressed is the contaminated sediment already present in the two streams. A strategy being considered is to completely dredge the streams. Dredging is usually not an option in this size of a water body as it causes major harm to aquatic habitats. However, due to the extent of the damage already present in these streams, dredging could provide positive changes.

A map of Turkey Creek showing the impaired segments and sampling site is on the next page.

[6] Superfund is the common name used to refer to the federal environmental program established to address abandoned hazardous waste sites. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, or CERCLA.

Turkey Creek in Jasper County, Mo., with sampling sites



Sample Site Index

1 – Turkey Creek at State Highway JJ
2 – Turkey Creek at Blackcat Road
3 – Turkey Creek at Schifferdecker Ave
4 – Turkey Creek at Lone Elm Road
5 – Turkey Creek at St. Louis Ave
6 – Turkey Creek at Florida Ave
7 – Turkey Creek at Kenser Road (Hwy P)

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or 573-751-1300 office
573-522-9920 fax
Program Home Page: dnr.mo.gov/env/wpp/index.html

2012 EPA Approved 303(d) List

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2012	2188.00	Antire Cr.	P	1.9	1.9	1.9	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	712454	4264477	710077	4264450	St. Louis	Antire Cr.	1
2012	2188.00	Antire Cr.	P	1.9	1.9	1.9	Mi.	pH	Source Unknown	AQL	LWW, WBC B	712454	4264477	710077	4264450	St. Louis	Antire Cr.	1
2012	752.00	Bass Cr.	C	4.4	4.4	4.4	Mi	Escherichia coli	Source Unknown	WBC A	AQL, LWW	565032	4297418	561523	4298649	Boone	Bass Cr.	1
2012	3240.00	Baynham Br.	P	4	4	4	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	379681	4092596	374809	4091661	Newton	Baynham Br.	1
2012	3265.00	Beaver Br.	P	2	2.0	2.0	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	371102	4059675	371030	4056963	McDonald	Beaver Br.	1
2006	2760.00	Bee Fk.	C	1.4	8.7	8.7	Mi.	Lead	Fletcher Lead Mine/Mill	AQL	CLF, LWW, WBC A	668832	4145688	678196	4147796	Reynolds	Bee Fk.	1
2008	3966.00	Bee Fk.	U	0.8	n/a	n/a	Mi.	Lead (S)	Fletcher Lead Mine/Mill	GEN		667504	4145795	668836	4145688	Reynolds	Bee Fk.	1,5
2006	7365.00	Belcher Branch Lake	L3	55	55	55	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B			351274	4382886	Buchanan	Belcher Branch Lake	1
2006	444.00	Big Cr.	P	1	22	22	Mi	Ammonia, Total	Bethany WWTP	AQL	DWS, LWW, WBC B	410564	4457922	405532	4431091	Harrison	Big Cr.	1
2006	444.00	Big Cr.	P	6	22	22	Mi	Oxygen, Dissolved	Bethany WWTP	AQL	DWS, LWW, WBC B	410564	4457922	405532	4431091	Harrison	Big Cr.	1
2012	1250.00	Big Cr.	P	70.5	70.5	70.5	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	384118	4301049	422204	4249326	Jackson/Henry	Big Cr.	1
2012	2673.00	Big Cr.	P	28.7	28.7	28.7	Mi.	Oxygen, Dissolved	Source Unknown	AQL	CLF, LWW, WBC B	602877	4121486	623387	4141670	Texas/Shannon	Big Cr.	1
2010	2916.00	Big Cr.	P	1.8	34.1	34.1	Mi.	Cadmium (S)	Glover smelter	AQL	CLF, LWW, SCR, WBC A	704350	4156086	721134	4123934	Iron	Big Cr.	1
2010	2916.00	Big Cr.	P	1.8	34.1	34.1	Mi.	Lead (S)	Glover smelter	AQL	CLF, LWW, SCR, WBC A	704350	4156086	721134	4123934	Iron	Big Cr.	1
2010	1578.00	Big Piney R.	P	4	8	8	Mi.	Oxygen, Dissolved	Source Unknown	AQL	DWS, LWW, SCR, WBC A	579840	4108439	585281	4116805	Texas	Big Piney R.	1
2006	2080.00	Big R.	P	18.6	68	68	Mi.	Cadmium (S)	Old Lead Belt tailings	AQL	IND, LWW, WBC A	686672	4181275	701036	4226038	St. Francois	Big R.	1
2006	2080.00	Big R.	P	18.6	68	68	Mi.	Zinc (S)	Old Lead Belt tailings	AQL	IND, LWW, WBC A	686672	4181275	701036	4226038	St. Francois	Big R.	1
2012	111.00	Black Cr.	C	19.4	19.4	19.4	Mi.	Escherichia coli	Shelbyville WWTF, Nonpoint Source	WBC B	AQL, LWW	581883	4405278	593138	4393283	Shelby	Black Cr.	1
2012	111.00	Black Cr.	C	19.4	19.4	19.4	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	581883	4405278	593138	4393283	Shelby	Black Cr.	1
2012	3825.00	Black Cr.	P	1.6	1.6	1.6	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR, WBC B	731266	4278180	732023	4276834	St. Louis	Black Cr.	1
2012	3825.00	Black Cr.	P	1.6	1.6	1.6	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	SCR, WBC B	AQL, LWW, WBC B	731266	4278180	732023	4276834	St. Louis	Black Cr.	1
2002	2769.00	Black R.	P	47.1	47.1	47.1	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, DWS, IRR, LWW, SCR, WBC A	729886	4078610	729372	4042276	Butler	Black R.	1
2008	2784.00	Black R.	P	39	39.0	39.0	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, DWS, IRR, LWW, SCR, WBC A	697890	4112203	729886	4078610	Wayne/Butler	Black R.	1
2006	3184.00	Blackberry Cr.	C	3.5	6.5	6.5	Mi.	Chloride	Asbury Power Plant	AQL	LWW, WBC B	360861	4132404	362347	4123848	Jasper	Blackberry Cr.	1
2008	3184.00	Blackberry Cr.	C	3.5	6.5	6.5	Mi.	Sulfate + Chloride	Asbury Power Plant	AQL	LWW, WBC B	360861	4132404	362347	4123848	Jasper	Blackberry Cr.	1
2006	417.00	Blue R.	P	4	4	4	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, IND, LWW	371184	4329015	373047	4332253	Jackson	Blue R.	2
2006	418.00	Blue R.	P	9	9	9	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, IND, LWW, SCR	368400	4319633	371184	4329015	Jackson	Blue R.	1
2006	419.00	Blue R.	P	9	9	9	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC A	AQL, LWW, SCR	364588	4312669	368400	4319633	Jackson	Blue R.	1
2006	421.00	Blue R.	C	11	11	11	Mi.	Escherichia coli	Runoff from Forest/Grassland/Parkland, Rural, Residential Areas, Urban Runoff/Storm Sewers	WBC B	AQL, LWW, SCR	360459	4301385	364588	4312669	Jackson	Blue R.	1
2012	1701.00	Bonhomme Cr.	C	2.5	2.5	2.5	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	709512	4282258	711491	4284301	St. Louis	Bonhomme Cr.	1
2012	1701.00	Bonhomme Cr.	C	2.5	2.5	2.5	Mi.	pH	Source Unknown	AQL	LWW, WBC B	709512	4282258	711491	4284301	St. Louis	Bonhomme Cr.	1
2006	750.00	Bonne Femme Cr.	P	7.8	7.8	7.8	Mi	Escherichia coli	Source Unknown	WBC A	AQL, LWW	560346	4298772	553749	4294435	Boone	Bonne Femme Cr.	1
2012	753.00	Bonne Femme Cr.	C	7	7	7	Mi	Escherichia coli	Source Unknown	WBC B	AQL, LWW	565633	4303361	560346	4298772	Boone	Bonne Femme Cr.	1
2002	2034.00	Bourbeuse R.	P	136.7	136.7	136.7	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, DWS, IRR, LWW, SCR, WBC A	622849	4221417	684343	4252206	Phelps/Franklin	Bourbeuse R.	1
2012	7003.00	Bowling Green (Old) Lake	L1	28.2*	28.2*	28.2*	Ac.	Nitrogen, Total	Nonpoint Source	AQL	DWS, LWW, WBC B			658502	4356562	Pike	Bowling Green (Old) Lake	1
2012	7003.00	Bowling Green (Old) Lake	L1	28.2*	28.2*	28.2*	Ac.	Phosphorus, Total	Nonpoint Source	AQL	DWS, LWW, WBC B			658502	4356562	Pike	Bowling Green (Old) Lake	1
2012	1796.00	Brazeau Cr.	C	10.8	10.8	10.8	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	798229	4172491	807335	4172833	Perry	Brazeau Cr.	1
2002	1371.00	Brush Cr.	P	4	4	4	Mi.	Oxygen, Dissolved	Humansville WWTP	AQL	LWW, WBC B	448632	4182404	444769	4187320	Polk/St. Clair	Brush Cr.	1
2012	3273.00	Buffalo Cr.	P	8	8	8	Mi.	Fishes Bioassessments	Source Unknown	AQL	CLF, IRR, LWW, SCR, WBC A	369204	4075685	363942	4068061	Newton/McDonald	Buffalo Cr.	1
2006	1865.00	Burgher Branch	C	2	2	2	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	610212	4200283	611960	4199017	Phelps	Burgher Branch	1
2012	968.00	Burris Fork	P	13.2	13.2	13.2	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC A	528329	4260804	539733	4270189	Moniteau	Burris Fork	1
2006	7057.00	Busch Lake #35	L3	51	51	51	Ac	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			697821	4288225	St. Charles	Busch Lake #35	1
2010	7627.00	Busch Lake #37		34	34	34	Ac	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	GEN				691967	4287291	St. Charles	Busch Lake #37	1
2006	3234.00	Capps Cr.	P	5	5	5	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CDF, IRR, LWW, SCR	408562	4082428	402563	4083044	Barry	Capps Cr.	1
2010	2288.00	Castor R.	P	7.5	7.5	7.5	Mi	Escherichia coli	Rural NPS	WBC A	AQL, IRR, LWW, SCR	760131	4115294	766484	4110895	Bollinger	Castor River	1
2008	737.00	Cedar Cr.	C	7.9	37.4	37.4	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, SCR, WBC B	575155	4324241	571598	4289794	Boone	Cedar Cr.	1
2010	1344.00	Cedar Cr.	P	10	31	31	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	IRR, LWW, SCR, WBC A	419820	4170283	427580	4189524	Cedar	Cedar Cr.	1
2008	1344.00	Cedar Cr.	P	10	31	31	Mi.	Oxygen, Dissolved	Source Unknown	AQL	IRR, LWW, SCR, WBC A	419820	4170283	427580	4189524	Cedar	Cedar Cr.	1
2010	1357.00	Cedar Cr.	C	16.2	16.2	16.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	412791	4154079	419820	4170283	Cedar	Cedar Cr.	1
2008	1357.00	Cedar Cr.	C	16.2	16.2	16.2	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	412791	4154079	419820	4170283	Cedar	Cedar Cr.	1
2006	3203.00	Center Cr.	P	19	26.8	26.8	Mi.	Cadmium (S)	Tri-State Mining District	AQL	CLF, IND, IRR, LWW, SCR, WBC A	383685	4107350	356376	4112852	Jasper	Center Cr.	1
2006	3203.00	Center Cr.	P	19	26.8	26.8	Mi.	Cadmium	Tri-State Mining District	AQL	CLF, IND, IRR, LWW, SCR, WBC A	383685	4107350	356376	4112852	Jasper	Center Cr.	1
2006	3203.00	Center Cr.	P	19	26.8	26.8	Mi.	Lead (S)	Tri-State Mining District	AQL	CLF, IND, IRR, LWW, SCR, WBC A	383685	4107350	356376	4112852	Jasper	Center Cr.	1
2006	3203.00	Center Cr.	P	19	26.8	26.8	Mi.	Zinc (S)	Tri-State Mining District	AQL	CLF, IND, IRR, LWW, SCR, WBC A	383685	4107350	356376	4112852	Jasper	Center Cr.	1
2008	3210.00	Center Cr.	P	21	21	21	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, IND, IRR, LWW, SCR	404365	4099517	383685	4107350	Newton/Jasper	Center Cr.	1
2010	3214.00	Center Cr.	P	4.9	4.9	4.9	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CDF, IND, IRR, LWW, SCR	410298	4100642	404365	4099517	Lawrence/Newton	Center Cr.	1
2006	3168.00	Chat Cr.	C	2.1	2.1	2.1	Mi.	Cadmium	Baldwin Park Mine	AQL	LWW, SCR, WBC B	436448	4092363	432983	4092649	Lawrence	Chat Cr.	1
2012	1781.00	Cinque Hommes Cr.	C	8.3	17.1	17.1	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	779350	4178434	793643	4183954	Perry	Cinque Hommes Cr.	1
2006	1333.00	Clear Cr.	P	15.5	15.5	15.5	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC A	402340	4186711	417795	4205727	Vernon/St.Clair	Clear Cr.	1
2006	1336.00	Clear Cr.	C	15	15	15	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	391921	4172771	402340	4186711	Vernon	Clear Cr.	1
2006	3238.00	Clear Cr.	P	11.1	11.1	11.1	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	410980	4088931	397639	4088317	Barry/Newton	Clear Cr.	1
2002	3239.00	Clear Cr.	C	3.5	3.5	3.5	Mi.	Nutrient/Eutrophication Biological Indicators	Monett WWTP	AQL	LWW, WBC B	415495	4086458	410980	4088931	Barry/Newton	Clear Cr.	1
2002	3239.00	Clear Cr.	C	3.5	3.5	3.5	Mi.	Oxygen, Dissolved	Monett WWTP	AQL	LWW, WBC B	415495	4086458	410980	4088931	Barry/Newton	Clear Cr.	1
2002	7326.00	Clearwater Lake	L2	1635	1635	1635	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC A			697889	4112199	Reynolds/Wayne	Clearwater Lake	1

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2006	1706.00	Coldwater Cr.	C	5.5	5.5	5.5	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	IND, LWW, WBC B	735014	4299849	741449	4301962	St. Louis	Coldwater Cr.	1
2008	1706.00	Coldwater Cr.	C	5.5	5.5	5.5	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, IND, LWW	735014	4299849	741449	4301962	St. Louis	Coldwater Cr.	1
2006	1706.00	Coldwater Cr.	C	5.5	5.5	5.5	Mi.	Oxygen, Dissolved	Source Unknown	AQL	IND, LWW, WBC B	735014	4299849	741449	4301962	St. Louis	Coldwater Cr.	1
2012	2177.00	Coonville Cr.	C	1.3	1.3	1.3	Mi.	Lead	Source Unknown	AQL	LWW, WBC B	717474	4206559	716589	4204963	St. Francois	Coonville Cr.	1
2006	1943.00	Courtois Cr.	P	2.6	32	32	Mi.	Lead (S)	Doe Run Viburnum Division Lead mine	AQL	CLF, LWW, SCR, WBC A	670500	4180050	656941	4210294	Washington	Courtois Cr.	1
2006	1943.00	Courtois Cr.	P	2.6	32	32	Mi.	Zinc (S)	Doe Run Viburnum Division Lead mine	AQL	CLF, LWW, SCR, WBC A	670500	4180050	656941	4210294	Washington	Courtois Cr.	1
2012	2382.00	Crane Cr.	P	13.2	13.2	13.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	CDF, LWW, SCR, WBC A	445954	4088238	456895	4081483	Stone	Crane Cr.	1
2012	2816.00	Craven Ditch	C	11.6	11.6	11.6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	IRR, LWW	730995	4068609	730730	4052473	Butler	Craven Ditch	1
2006	1703.00	Creve Coeur Cr.	C	2	2	2	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	718172	4283167	718455	4287491	St. Louis	Creve Coeur Cr.	1
2006	1703.00	Creve Coeur Cr.	C	2	2	2	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	718172	4283167	718455	4287491	St. Louis	Creve Coeur Cr.	1
2010	1703.00	Creve Coeur Cr.	C	2	2	2	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	718172	4283167	718455	4287491	St. Louis	Creve Coeur Cr.	1
2006	1928.00	Crooked Cr.	P	3.5	3.5	3.5	Mi.	Cadmium (S)	Buick Lead Smelter	AQL	CLF, LWW, WBC A	662216	4173989	658201	4175646	Dent/Crawford	Crooked Cr.	2
2006	1928.00	Crooked Cr.	P	3.5	3.5	3.5	Mi.	Cadmium	Buick Lead Smelter	AQL	CLF, LWW, WBC A	662216	4173989	658201	4175646	Dent/Crawford	Crooked Cr.	1
2006	1928.00	Crooked Cr.	P	3.5	3.5	3.5	Mi.	Lead (S)	Buick Lead Smelter	AQL	CLF, LWW, WBC A	662216	4173989	658201	4175646	Dent/Crawford	Crooked Cr.	2
2008	3961.00	Crooked Cr.	U	5.2	n/a	n/a	Mi.	Cadmium	Doe Run Buick Lead Smelter	GEN		665048	4167501	662236	4174014	Iron/Dent	Crooked Cr.	1
2010	3961.00	Crooked Cr.	U	5.2	n/a	n/a	Mi.	Copper	Doe Run Buick Lead Smelter	GEN		665048	4167501	662236	4174014	Iron/Dent	Crooked Cr.	1
2006	2636.00	Current R.	P	124	124	124	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, IRR, LWW, SCR, WBC A	628633	4137638	696834	4041519	Shannon/Ripley	Current R.	1
2006	219.00	Dardenne Cr.	P1	7	7	7	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	708078	4300264	713786	4304316	St. Charles	Dardenne Cr.	1
2010	221.00	Dardenne Cr.	P	15	15	15	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	692485	4289827	708078	4300264	St. Charles	Dardenne Cr.	1
2006	222.00	Dardenne Cr.	C	6	6	6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	683270	4288804	692485	4289827	St. Charles	Dardenne Cr.	1
2006	221.00	Dardenne Cr.	P	15	15	15	Mi.	Inorganic Sediment	Source Unknown	AQL	LWW, SCR, WBC B	692485	4289827	708078	4300264	St. Charles	Dardenne Cr.	3
2002	221.00	Dardenne Cr.	P	15	15	15	Mi.	Unknown	Source Unknown	AQL	LWW, SCR, WBC B	692485	4289827	708078	4300264	St. Charles	Dardenne Cr.	3
2006	690.00	Dark Cr.	C	9.1	9.1	9.1	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	535636	4374111	531829	4365642	Randolph	Dark Cr.	1
2012	3826.00	Deer Cr.	P	1.6	1.6	1.6	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR, WBC B	732023	4276834	733741	4275807	St. Louis	Deer Cr.	1
2012	3826.00	Deer Cr.	P	1.6	1.6	1.6	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	SCR, WBC B	AQL, LWW, WBC B	732023	4276834	733741	4275807	St. Louis	Deer Cr.	1
2002	7015.00	Deer Ridge Lake	L3	48	48	48	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B			692465	4289831	Lewis	Deer Ridge Lake	1
2008	36.00	Des Moines R.	P	29	29.0	29.0	Mi.	Escherichia coli	Upstream/Downstream Source	WBC A	AQL, LWW, SCR	607478	4496675	633915	4471240	Clark	Des Moines R.	1
2006	3109.00	Ditch # 36	P	7	7	7	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	770137	4018408	767863	4007224	Dunklin	Ditch # 36	1
2006	3810.00	Douger Branch	C	3.1	3.1	3.1	Mi.	Lead (S)	Aurora lead mining district	AQL	LWW	432983	4092649	428971	4092384	Lawrence	Douger Branch	1
2006	3810.00	Douger Branch	C	3.1	3.1	3.1	Mi.	Zinc (S)	Aurora lead mining district	AQL	LWW	432983	4092649	428971	4092384	Lawrence	Douger Branch	1
2006	1180.00	Dousinbury Cr.	P	3.5	3.5	3.5	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	506028	4158604	501716	4160952	Dallas	Dousinbury Cr.	1
2012	3178.00	Dry Fork	C	3.4	3.4	3.4	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	420017	4116479	420475	4111828	Lawrence	Dry Fork	1
2008	3189.00	Dry Fork	C	10.2	10.2	10.2	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, LWW	391617	4123451	379518	4128240	Jasper	Dry Fork	1
2012	1314.00	Drywood Cr.	P	3.8	29.9	29.9	Mi.	Sulfate + Chloride	Acid Mine Drainage	AQL	LWW, WBC B	361691	4158071	369320	4189862	Barton	Drywood Cr.	1
2006	3569.00	Dutro Carter Cr.	P	0.6	1.5	1.5	Mi.	Oxygen, Dissolved	Rolla SE WWTP	AQL	LWW, WBC B	610611	4198782	612773	4199008	Phelps	Dutro Carter Cr.	1
2010	372.00	East Fk. Crooked R.	P	14	14	14	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	418043	4367620	423049	4349970	Ray	East Fk. Crooked R.	1
2006	457.00	East Fk. Grand R.	P	25	25	25	Mi	Escherichia coli	Nonpoint Source	WBC A	AQL, DWS, IRR, LWW, SCR	388817	4483394	384234	4450462	Worth/Gentry	East Fk. Grand R.	2
2008	608.00	East Fk. Locust Cr.	P	13	13	13	Mi	Escherichia coli	Municipal Point Source Discharges, Nonpoint Source	WBC B	AQL, LWW	490788	4450893	485177	4432656	Sullivan	East Fk. Locust Cr.	1
2008	610.00	East Fk. Locust Cr	C	0.4	13	13	Mi	Escherichia coli	Municipal Point Source Discharges, Nonpoint Source	WBC B	AQL, LWW	492641	4468112	490788	4450893	Sullivan	East Fk. Locust Cr.	1
2008	610.00	East Fk. Locust Cr.	C	12.6	13	13	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	492641	4468112	490788	4450893	Sullivan	East Fk. Locust Cr.	1
2006	1282.00	East Fk. Tebo Cr.	C	10.4	14.5	14.5	Mi.	Oxygen, Dissolved	Windsor SW WWTP	AQL	LWW, WBC B	452766	4267493	446906	4257221	Henry	East Fk. Tebo Cr.	1
2006	2166.00	Eaton Branch	C	0.9	1.2	1.2	Mi.	Cadmium (S)	Leadwood tailings pond	AQL	LWW, WBC B	710945	4193695	712097	4194409	St. Francois	Eaton Branch	1
2006	2166.00	Eaton Branch	C	0.9	1.2	1.2	Mi.	Cadmium	Leadwood tailings pond	AQL	LWW, WBC B	710945	4193695	712097	4194409	St. Francois	Eaton Branch	1
2006	2166.00	Eaton Branch	C	0.9	1.2	1.2	Mi.	Lead (S)	Leadwood tailings pond	AQL	LWW, WBC B	710945	4193695	712097	4194409	St. Francois	Eaton Branch	1
2006	2166.00	Eaton Branch	C	0.9	1.2	1.2	Mi.	Zinc (S)	Leadwood tailings pond	AQL	LWW, WBC B	710945	4193695	712097	4194409	St. Francois	Eaton Branch	1
2006	2166.00	Eaton Branch	C	0.9	1.2	1.2	Mi.	Zinc	Leadwood tailings pond	AQL	LWW, WBC B	710945	4193695	712097	4194409	St. Francois	Eaton Branch	1
2002	2593.00	Eleven Point R.	P	22.7	22.7	22.7	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, IRR, LWW, SCR, WBC A	658823	4067446	663687	4040687	Oregon	Eleven Point R.	1
2006	2597.00	Eleven Point R.	P	11.4	11.4	11.4	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CDF, LWW, SCR, WBC A	648216	4073792	658823	4067446	Oregon	Eleven Point R.	1
2008	2601.00	Eleven Point R.	P	22.3	22.3	22.3	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, LWW, SCR, WBC A	626147	4076649	648216	4073792	Oregon	Eleven Point R.	1
2006	1283.00	Elm Branch	C	3	3	3	Mi.	Oxygen, Dissolved	Windsor SE WWTP	AQL	LWW, SCR, WBC B	455758	4264046	453816	4261489	Henry	Elm Branch	1
2012	1704.00	Fee Fee (new) Cr.	P	1.5	1.5	1.5	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	720613	4290506	718639	4290795	St. Louis	Fee Fee (new) Cr.	1
2012	1704.00	Fee Fee (new) Cr.	P	1.5	1.5	1.5	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	720613	4290506	718639	4290795	St. Louis	Fee Fee (new) Cr.	1
2012	7237.00	Fellows Lake	L1	800	800	800	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	DWS, LWW, SCR, WBC A			479590	4129881	Greene	Fellows Lake	1
2012	3595.00	Fenton Cr.	P	0.5	0.5	0.5	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	723865	4265429	724629	4265304	St. Louis	Fenton Cr.	1
2012	2186.00	Fishpot Cr.	P	2	2	2	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	715611	4270777	718256	4269401	St. Louis	Fishpot Cr.	1
2008	2186.00	Fishpot Cr.	P	2	2	2	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	715611	4270777	718256	4269401	St. Louis	Fishpot Cr.	1
2010	2168.00	Flat River Cr.	C	5	9	9	Mi.	Cadmium	Old Lead Belt tailings	AQL	LWW, WBC B	711080	4188129	719846	4196774	St. Francois	Flat River Cr.	1
2010	7151.00	Forest Lake	L1	573	573	573	Ac.	Chlorophyll-a	Source Unknown	AQL	DWS, LWW, WBC A			529115	4446668	Adair	Forest Lake	1
2010	7151.00	Forest Lake	L1	573	573	573	Ac.	Nitrogen, Total	Source Unknown	AQL	DWS, LWW, WBC A			529115	4446668	Adair	Forest Lake	1
2010	7151.00	Forest Lake	L1	573	573	573	Ac.	Phosphorus, Total	Source Unknown	AQL	DWS, LWW, WBC A			529115	4446668	Adair	Forest Lake	1
2006	747.00	Fowler Cr.	C	6	6	6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	567705	4291358	568085	4285215	Boone	Fowler Cr.	1
2012	1842.00	Fox Cr.	P	7.2	7.2	7.2	Mi.	Unknown	Source Unknown	AQL	LWW, WBC B	698956	4266805	702113	4258893	St. Louis	Fox Cr.	1
2008	38.00	Fox R.	P	42	42.0	42.0	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW, SCR	591716	4495662	619844	4469932	Clark	Fox R.	1
2010	7008.00	Fox Valley Lake	L3	89	89	89	Ac.	Phosphorus, Total	Rural NPS	AQL	LWW, SCR, WBC B			604598	4483661	Clark	Fox Valley Lake	1
2010	7382.00	Foxboro Lake	L3	22	22	22	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B			644963	4249580	Franklin	Foxboro Lake	1
2002	7280.00	Frisco Lake	L3	5	5	5	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			608340	4201511	Phelps	Frisco Lake	1
2012	1004.00	Gans Cr.	C	5.5	5.5	5.5	Mi.	Escherichia coli	Source Unknown	WBC A	AQL, LWW	562859	4305362	558288	4303469	Boone	Gans Cr.	1
2002	1455.00	Gasconade R.	P	249	249	249	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	CLF, DWS, LWW, SCR, WBC A	543608	4120607	626331	4281831	Gascon./Wright	Gasconade R.	1
2006	2184.00	Grand Glaize Cr.	C	4	4	4	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	720447	4272244	721056	4270200	St. Louis	Grand Glaize Cr.	1
2010	2184.00	Grand Glaize Cr.	C	4	4	4	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B	720447	4272244	721056	4270200	St. Louis	Grand Glaize Cr.	1
2002	2184.00	Grand Glaize Cr.	C	4	4	4	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	720447	4272244	721056	4270200	St. Louis	Grand Glaize Cr.	1
2006	593.00	Grand R.	P	60	60	60	Mi	Escherichia coli	Rural NPS	SCR, WBC B	AQL, DWS, IRR, LWW, WBC A	454151	4399076	490791	4359355	Livin./Chariton	Grand R.	1
2008	1712.00	Gravois Cr.	P	2	2	2	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	735408	4269269	737783	4270129	St. Louis	Gravois Cr.	1
2006	1712.00	Gravois Cr.	P	2	2	2	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	735408	4269269	737783	4270129	St. Louis	Gravois Cr.	2

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2006	1713.00	Gravois Cr.	C	4	4	4	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	731101	4269870	735408	4269269	St. Louis	Gravois Cr.	1
2006	1713.00	Gravois Cr.	C	4	4	4	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	731101	4269870	735408	4269269	St. Louis	Gravois Cr.	2
2006	1009.00	Grindstone Cr.	C	1.5	1.5	1.5	Mi.	Escherichia coli	Runoff from Forest/Grassland/Parkland, Rural, Residential Areas, Urban Runoff/Storm Sewers	WBC A	AQL, LWW	561330	4309115	558769	4308985	Boone	Grindstone Cr.	1
2012	97.00	Hays Cr.	C	2	2	2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	629827	4365293	630116	4368021	Ralls	Hays Cr.	1
2010	7152.00	Hazel Creek Lake	L1	151	151	151	Ac.	Chlorophyll-a	Rural NPS	AQL	DWS, LWW, WBC B			531549	4461110	Adair	Hazel Creek Lake	1
2008	7152.00	Hazel Creek Lake	L1	151	151	151	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	DWS, LWW, WBC B			531549	4461110	Adair	Hazel Creek Lake	1
2008	848.00	Heath's Cr.	P	21	21.0	21.0	Mi.	Oxygen, Dissolved	Source Unknown	AQL	WBC B, LWW	481311	4306305	498383	4308084	Pettis	Heath's Cr.	1
2006	3226.00	Hickory Cr.	P	4.9	4.9	4.9	Mi.	Escherichia coli	Source Unknown	WBC A	AQL, LWW	381782	4079307	377855	4083987	Newton	Hickory Cr.	1
2006	1008.00	Hinkson Cr.	C	18	18	18	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW, SCR	567735	4324925	557334	4308969	Boone	Hinkson Cr.	1
2012	1011.00	Hominy Br.	C	1	1.0	1.0	Mi.	Escherichia coli	Runoff from Forest/Grassland/Parkland, Rural, Residential Areas, Urban Runoff/Storm Sewers	WBC B	AQL, LWW, SCR	561244	4310832	560154	4310816	Boone	Hominy Br.	1
2010	3169.00	Honey Cr.	P	16.5	16.5	16.5	Mi.	Escherichia coli	Rural NPS runoff	WBC B	AQL, LWW	441810	4098909	423404	4104004	Lawrence	Honey Cr.	1
2010	3170.00	Honey Cr.	C	2.7	2.7	2.7	Mi.	Escherichia coli	Rural NPS runoff	WBC B	AQL, LWW	443610	4095816	441810	4098909	Lawrence	Honey Cr.	1
2008	1348.00	Horse Cr.	P	27.7	27.7	27.7	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	IRR, LWW, WBC B	405029	4166750	422134	4180183	Cedar	Horse Cr.	1
2010	1348.00	Horse Cr.	P	27.7	27.7	27.7	Mi.	Oxygen, Dissolved	Source Unknown	AQL	IRR, LWW, WBC B	405029	4166750	422134	4180183	Cedar	Horse Cr.	1
2002	7388.00	Hough Park Lake	L3	7	7	7	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			571190	4266070	Cole	Hough Park Lake	1
2012	7029.00	Hunnewell Lake	L3	228	228	228	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B			597510	4395781	Shelby	Hunnewell Lake	1
2010	420.00	Indian Cr.	C	3	3	3	Mi.	Chloride	Road/Bridge Runoff, Non-construction	AQL	IND, LWW, WBC A	360621	4311182	364588	4312669	Jackson	Indian Cr.	1
2002	420.00	Indian Cr.	C	3	3	3	Mi.	Escherichia coli	Leawood, KS WWTP, Urban Runoff/Storm Sewers	WBC A	AQL, IND, LWW	360621	4311182	364588	4312669	Jackson	Indian Cr.	1
2012	1946.00	Indian Cr.	P	1.9	1.9	1.9	Mi.	Lead (S)	Doe Run Viburnum Division Lead mine	AQL	LWW, WBC B	668798	4178896	669872	4181483	Washington	Indian Cr.	1
2012	1946.00	Indian Cr.	P	1.9	1.9	1.9	Mi.	Zinc (S)	Doe Run Viburnum Division Lead mine	AQL	LWW, WBC B	668798	4178896	669872	4181483	Washington	Indian Cr.	1
2006	3256.00	Indian Cr.	P	9.7	30.8	30.8	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, IRR, LWW, SCR	390081	4072821	370244	4049428	Newton/McDonald	Indian Cr.	1
2008	7389.00	Indian Creek Lake	L3	192	192	192	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B			440543	4416535	Livingston	Indian Creek Lake	1
2012	3223.00	Jacobs Br.	P	1.6	1.6	1.6	Mi.	Zinc	Tri-State Mining District	AQL	LWW, WBC B	365485	4095641	365862	4097358	Newton	Jacobs Br.	1
2012	3207.00	Jenkins Cr.	P	2.8	2.8	2.8	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, LWW	389303	4103152	386194	4105401	Newton/Jasper	Jenkins Cr.	1
2012	3205.00	Jones Cr.	P	7.5	7.5	7.5	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, LWW	388104	4099353	383685	4107350	Newton/Jasper	Jones Cr.	1
2012	3592.00	Kiefer Cr.	P	1.2	1.2	1.2	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	713475	4270033	714845	4269588	St. Louis	Kiefer Cr.	1
2010	3592.00	Kiefer Cr.	P	1.2	1.2	1.2	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	713475	4270033	714845	4269588	St. Louis	Kiefer Cr.	1
2002	7196.00	Knob Knoster St. Park Lakes**	L3	10	10	10	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			449403	4289099	Johnson	Knob Knoster St. Park Lakes (Lake Bueto)	1
2012	2171.00	Koen Cr.	C	1	1	1	Mi.	Fishes Bioassessments	Source Unknown	AQL	LWW	720089	4193029	719760	4194283	St. Francois	Koen Cr.	1
2002	7436.00	Lake of the Woods	L3	3	3	3	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			565549	4314857	Boone	Lake of the Woods	1
2008	7629.00	Lake of the Woods	U	7	7	7	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	GEN				368318	4317421	Jackson	Lake of the Woods	1
2010	7054.00	Lake St. Louis	L3	525	525	525	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	WBC B, LWW			694070	4297116	St. Charles	Lake St. Louis	1
2010	7212.00	Lake Winnebago	L3	350	350	350	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC A			382262	4297476	Cass	Lake Winnebago	1
2006	847.00	Lamine R.	P	54	54	54	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, IRR, LWW, SCR	504073	4279987	513022	4314616	Morgan/Cooper	Lamine R.	1
1998	3105.00	Lat. #2 Main Ditch	P	11.5	11.5	11.5	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	774316	4075750	773639	4058046	Stoddard	Lat. #2 Main Ditch	2
2008	3105.00	Lat. #2 Main Ditch	P	11.5	11.5	11.5	Mi.	Temperature, water	Channelization	AQL	LWW, WBC B	774316	4075750	773639	4058046	Stoddard	Lat. #2 Main Ditch	1
2012	3137.00	Lee Rowe Ditch	C	2.3	6	6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	824366	4076900	824243	4068035	Mississippi	Lee Rowe Ditch	1
2002	7020.00	Lewistown Lake	L1	29	29	29	Ac.	Atrazine	Agriculture	DWS	AQL			600674	4439277	Lewis	Lewistown Lake	3
2012	3575.00	Line Cr.	C	7	7	7	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	358975	4343373	360133	4335563	Platte	Line Cr.	1
2008	1529.00	Little Beaver Cr.	C	3.4	3.5	3.5	Mi.	Sedimentation/Siltation (S)	Smith Sand and Gravel	AQL	LWW, WBC A	602527	4199503	600308	4195828	Phelps	Little Beaver Cr.	1
2012	422.00	Little Blue R.	P	35.1	35.1	35.1	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW, SCR	372712	4309259	394916	4340608	Jackson	Little Blue R.	1
2012	1003.00	Little Bonne Femme Cr.	P	9	9	9	Mi.	Escherichia coli	Source Unknown	WBC B	AQL, LWW	558288	4303469	553242	4296685	Boone	Little Bonne Femme Cr.	1
2006	1863.00	Little Dry Fk.	P	1	5	5	Mi.	Oxygen, Dissolved	Rolla SE WWTP	AQL	LWW, SCR, WBC B	612773	4199008	618873	4198236	Phelps	Little Dry Fk.	1
2006	1864.00	Little Dry Fk.	C	0.6	4.5	4.5	Mi.	Oxygen, Dissolved	Rolla SE WWTP	AQL	LWW, WBC B	613005	4192817	612773	4199008	Phelps	Little Dry Fk.	1
2008	1864.00	Little Dry Fk.	C	3.9	4.5	4.5	Mi.	Oxygen, Dissolved	Unknown	AQL	LWW, WBC B	613005	4192817	612773	4199008	Phelps	Little Dry Fk.	1
2006	1325.00	Little Drywood Cr.	P	17	17	17	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	376904	4174682	376740	4191482	Vernon	Little Drywood Cr.	1
2010	1326.00	Little Drywood Cr.	C	10	10	10	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	379798	4162808	376904	4174682	Barton/Vernon	Little Drywood Cr.	1
2010	3279.00	Little Lost Cr.	P	5.8	5.8	5.8	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	362556	4080613	355717	4078288	Newton	Little Lost Cr.	1
2006	623.00	Little Medicine Cr.	P	40	40	40	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	464025	4492224	467988	4439145	Mercer/Grundy	Little Medicine Cr.	1
2006	623.00	Little Medicine Cr.	P	20	40	40	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	464025	4492224	467988	4439145	Mercer/Grundy	Little Medicine Cr.	1
2006	1189.00	Little Niangua R.	P	20	43	43	Mi.	Oxygen, Dissolved	Source Unknown	AQL	CLF, LWW, SCR, WBC A	499864	4188139	508561	4212655	Dallas/Camden	Little Niangua R.	1
2008	3652.00	Little Osage R.	C	16	16	16	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	358279	4206140	378073	4204995	Vernon	Little Osage R.	2
2012	2229.00	Little Whitewater R.	P	24.2	24.2	24.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC A	759234	4159953	782136	4144237	Cape G/Bollinger	Little Whitewater Cr.	1
2006	606.00	Locust Cr.	P	36.4	84	84	Mi.	Escherichia coli	Rural NPS	SCR, WBC B	AQL, DWS, LWW, WBC B	488062	4492445	475478	4390818	Putnam/Sullivan	Locust Cr.	1
2012	2763.00	Logan Cr.	P	6.1	36.0	36.0	Mi.	Lead (S)	Sweetwater Lead Mine/Mill	AQL	LWW, SCR, WBC A	666297	4135279	693973	4115642	Reynolds	Logan Cr.	1
2006	696.00	Long Branch Cr.	C	2	13	13	Mi.	Oxygen, Dissolved	Atlanta WWTP	AQL	LWW, SCR, WBC B	541793	4427514	542604	4408569	Macon	Long Branch Cr.	1
2002	7097.00	Longview Lake	L2	930	930	930	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC A			372708	4309235	Jackson	Longview Lake	1
2006	3278.00	Lost Cr.	P	8.5	8.5	8.5	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, LWW, SCR	365739	4083856	355717	4078288	Newton	Lost Cr.	1
2006	2814.00	Main Ditch	C	13	13.0	13.0	Mi.	pH	Poplar Bluff WWTP	AQL	IRR, LWW, WBC B	732529	4068029	728374	4048617	Butler	Main Ditch	1
2006	2814.00	Main Ditch	C	13	13.0	13.0	Mi.	Temperature, water	Channelization	AQL	IRR, LWW, WBC B	732529	4068029	728374	4048617	Butler	Main Ditch	1
2012	1709.00	Maline Cr.	C	0.6	0.6	0.6	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR, WBC B	741069	4291198	741513	4290475	St. Louis	Maline Cr.	1
2012	1709.00	Maline Cr.	C	0.6	0.6	0.6	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	SCR, WBC B	AQL, LWW, WBC B	741069	4291198	741513	4290475	St. Louis	Maline Cr.	1
2012	3839.00	Maline Cr.	C	0.5	0.5	0.5	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR	741513	4290475	743767	4287000	St. Louis	Maline Cr.	1
2012	3839.00	Maline Cr.	C	0.5	0.5	0.5	Mi.	pH	Source Unknown	AQL	LWW, SCR	741513	4290475	743767	4287000	St. Louis	Maline Cr.	1
2010	3140.00	Maple Slough Ditch	C	16	16	16	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	820609	4090553	816878	4062805	Miss/New Madrid	Maple Slough Ditch	1
2002	7033.00	Mark Twain Lake	L2	18600	18600	18600	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	DWS, LWW, SCR, WBC A			616549	4375850	Monroe/Ralls	Mark Twain Lake	1
2006	619.00	Medicine Cr.	P	36	36	36	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	471740	4492250	467988	4439145	Putnam/Grundy	Medicine Cr.	1
2010	2183.00	Meramec R.	P	22	22	22	Mi.	Escherichia coli	Municipal Point Source Discharges, Nonpoint Source	WBC A	AQL, DWS, IND, LWW, SCR	718256	4269401	732150	4252184	St. Louis	Meramec R.	1
2008	2183.00	Meramec R.	P	22	22	22	Mi.	Lead (S)	Old Lead belt tailings	AQL	DWS, IND, LWW, SCR, WBC A	718256	4269401	732150	4252184	St. Louis	Meramec R.	1
2008	2185.00	Meramec R.	P	15.7	26	26	Mi.	Lead (S)	Old Lead Belt tailings	AQL	CLF, DWS, IND, LWW, SCR, WBC A	707821	4260833	718256	4269401	St. Louis	Meramec R.	1
1994	1299.00	Miami Cr.	P	18	18	18	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	372360	4240637	383003	4222753	Bates	Miami Cr.	1

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2012	2744.00	Middle Fk. Black R.	P	2.5	21	21	Mi.	Aquatic Macroinvertebrate Bioassessments	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC A	676243	4167324	690022	4146556	Reynolds	Middle Fk. Black R.	1
2006	468.00	Middle Fk. Grand R.	P	25	25	25	Mi	Escherichia coli	Rural NPS	WBC A	AQL, IRR, LWW, SCR	385572	4488578	381803	4452419	Worth/Gentry	Middle Fk. Grand R.	1
2010	3262.00	Middle Indian Cr.	C	3.5	3.5	3.5	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	400092	4074869	395454	4074061	Newton	Middle Indian Cr.	1
2008	3263.00	Middle Indian Cr.	P	2.2	2.2	2.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	395454	4074061	392652	4075387	Newton	Middle Indian Cr.	1
2010	3263.00	Middle Indian Cr.	P	2.2	2.2	2.2	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	395454	4074061	392652	4075387	Newton	Middle Indian Cr.	1
2010	226.00	Missouri R.	P	179	179	179	Mi.	Escherichia coli	Mult. Pt.& NPS	SCR, WBC B	AQL, DWS, IND, IRR, LWW, WBC B	265899	4496416	361019	4330707	Atchison/Jackson	Missouri R.	1
2012	356.00	Missouri R.	P	129	129	129	Mi.	Escherichia coli	Mult. Pt.& NPS	SCR, WBC B	AQL, DWS, IND, IRR, LWW, WBC B	361019	4330707	503487	4351401	Jackson/Saline	Missouri R.	1
2008	1604.00	Missouri R.	P	100	100	100	Mi.	Escherichia coli	Mult. Pt.& NPS	WBC B	AQL, DWS, IND, IRR, LWW, SCR	626331	4281831	750287	4299152	Gasconade/St. Charles	Missouri R.	1
2010	7402.00	Mozingo Lake	L1	1000	1000	1000	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	DWS, LWW, SCR, WBC B, GEN			348772	4467994	Nodaway	Mozingo Lake	1
2006	853.00	Muddy Cr.	P	1.8	62.2	62.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	458149	4281754	495127	4299752	Pettis	Muddy Cr.	1
2008	853.00	Muddy Cr.	P	62.2	62.2	62.2	Mi.	Chloride	Sedalia Central WWTP	AQL	LWW, WBC B	458149	4281754	495127	4299752	Pettis	Muddy Cr.	1
2006	674.00	Mussel Fork Cr.	C	29	29	29	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, DWS, LWW	509539	4450637	513872	4410410	Sullivan/Macon	Mussel Fork	1
2006	1170.00	Niangua R.	P	51	51	51	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, LWW, SCR	507117	4144345	512225	4176338	Webster/Dallas	Niangua R.	1
2006	550.00	No Cr.	P	22.5	22.5	22.5	Mi	Escherichia coli	Rural NPS	WBC B	AQL, LWW	461790	4446877	451131	4415226	Grundy/Livin.	No Cr.	1
2010	550.00	No Cr.	P	22.5	22.5	22.5	Mi	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	461790	4446877	451131	4415226	Grundy/Livin.	No Cr.	1
2002	7316.00	Noblett Lake	L3	26	26	26	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC A			579891	4085042	Douglas	Noblett Lake	1
2010	279.00	Nodaway R.	P	60	60	60	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, IRR, LWW, SCR	328881	4493666	331916	4418596	Nodaway	Nodaway R.	1
2010	7109.00	North Bethany Lake	L3	78	78	78	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC A			412397	4463019	Harrison	North Bethany Lake	1
2006	170.00	North Fk. Cuivre R.	C	8	8	8	Mi.	Fecal Coliform	Source Unknown	WBC B	AQL, LWW	651658	4345253	656791	4337025	Pike	North Fk. Cuivre R.	1
2006	170.00	North Fk. Cuivre R.	C	8	8	8	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	651658	4345253	656791	4337025	Pike	North Fk. Cuivre R.	1
2008	3186.00	North Fk. Spring R.	P	17.4	17.4	17.4	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW, SCR	379518	4128240	363884	4125753	Barton	North Fk. Spring R.	1
2006	3188.00	North Fk. Spring R.	C	1.1	55.9	55.9	Mi.	Ammonia, Total	Lamar WWTP	AQL	LWW, SCR, WBC B	408705	4131497	379518	4128240	Barton	North Fk. Spring R.	1
2008	3188.00	North Fk. Spring R.	C	55.9	55.9	55.9	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW, SCR	408705	4131497	379518	4128240	Dade/Jasper	North Fk. Spring R.	1
2006	3188.00	North Fk. Spring R.	C	55.9	55.9	55.9	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	408705	4131497	379518	4128240	Dade/Jasper	North Fk. Spring R.	1
2008	3260.00	North Indian Cr.	P	5.2	5.2	5.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC B	395488	4077540	390081	4072821	Newton	North Indian Cr.	1
2008	3260.00	North Indian Cr.	P	5.2	5.2	5.2	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	395488	4077540	390081	4072821	Newton	North Indian Cr.	1
2010	1293.00	Osage R.	P	39.3	39.3	39.3	Mi.	Oxygen, Dissolved	Source Unknown	***	***	453701	4183192	444285	4187603	Vernon/St.Clair	Osage R.	1
2006	1373.00	Panther Cr.	C	7.8	7.8	7.8	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	453742	4183206	444279	4187593	St.Clair/Polk	Panther Cr.	1
2006	2373.00	Pearson Cr.	P	8	8	8	Mi.	Escherichia coli	Livestock,Grazing or Feeding Operations, Urban Runoff/Storm Sewers	WBC A	AQL, LWW	486612	4121328	482571	4113045	Greene	Pearson Cr.	1
2008	7628.00	Perry Phillips Lake	U	32	32	32	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	GEN				561277	4305658	Boone	Perry Phillips Lake	1
2012	215.00	Peruque Cr.	P1	9.6	9.6	9.6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	700317	4301742	705352	4308025	St. Charles	Peruque Cr.	1
2012	216.00	Peruque Cr.	P	0.3	10.3	10.3	Mi.	Unknown	Lake St. Louis Dam	AQL	LWW, SCR, WBC B	693920	4297084	700317	4301742	St. Charles	Peruque Cr.	1
2006	217.00	Peruque Cr.	P	9.6	9.6	9.6	Mi.	Inorganic Sediment	Source Unknown	AQL	LWW, SCR, WBC B	686322	4296816	690798	4295430	St. Charles	Peruque Creek	3
2006	218.00	Peruque Cr.	P	0.3	10.3	10.3	mi.	Inorganic Sediment	Source Unknown	AQL	LWW, SCR, WBC B	674302	4297979	686322	4296816	St. Charles	Peruque Creek	3
2006	1755.00	Pickle Cr.	P	7	7	7	Mi.	pH	Atmospheric Deposition - Acidity	AQL	LWW, WBC B	738455	4187974	746104	4191429	Ste. Genevieve	Pickle Cr.	1
2010	2815.00	Pike Cr.	C	6	6.0	6.0	Mi.	Oxygen, Dissolved	Source Unknown	AQL	IRR, LWW	727556	4074154	732529	4068029	Butler	Pike Cr.	1
2010	312.00	Platte R.	P	138	138	138	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, DWS, IRR, LWW, SCR	370620	4492569	341432	4347540	Worth/Platte	Platte R.	1
2012	1327.00	Pleasant Run Cr.	C	7.6	7.6	7.6	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	381362	4169529	376904	4174682	Vernon	Pleasant Run Cr.	1
2006	3120.00	Pole Cat Slough	P	12	12	12	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	763796	4013691	755748	3998563	Dunklin	Pole Cat Slough	1
2006	2038.00	Red Oak Cr.	C	10	10	10	Mi.	Oxygen, Dissolved	Owensville WWTP	AQL	LWW, WBC B	631423	4239850	642015	4246717	Gasconade	Red Oak Cr.	1
2006	1710.00	River des Peres	C	2.6	2.6	2.6	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR	736562	4271521	738968	4268398	St. Louis	River des Peres	1,5
2012	1710.00	River des Peres	C	2.6	2.6	2.6	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	SCR	AQL, LWW	736562	4271521	738968	4268398	St. Louis	River des Peres	1,5
2012	3827.00	River des Peres	P	3.7	3.7	3.7	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR	733741	4275807	736562	4271521	St. Louis	River des Peres	1,6
2012	3827.00	River des Peres	P	3.7	3.7	3.7	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	SCR	AQL, LWW	733741	4275807	736562	4271521	St. Louis	River des Peres	1,6
2012	3972.00	River des Peres	U	6.5	6.5	6.5	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, SCR	733742	4275819	736561	4271521	St. Louis	River des Peres	1
2010	594.00	Salt Cr.	C	14	14.0	14.0	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	491540	4377934	485852	4365132	Livin./Chariton	Salt Cr.	1
2012	2113.00	Salt Pine Cr.	C	1.2	1.2	1.2	Mi.	Aquatic Macroinvertebrate Bioassessments	Barite tailings pond	AQL	LWW, WBC B	698656	4214467	697844	4216050	St. Francois	Salt Pine Cr.	1
2008	91.00	Salt R.	P	29	29	29	Mi.	Oxygen, Dissolved	Mark Twain Lake re-regulation dam	AQL	DWS, IRR, LWW, SCR, WBC A	622770	4380470	654484	4376225	Ralls/Pike	Salt R.	1
2002	103.00	Salt R.	P1	9.3	9.3	9.3	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	DWS, IRR, LWW, SCR, WBC A	616554	4375853	622770	4380500	Ralls	Salt R.	1,7
2006	2170.00	Shaw Branch	C	2	2	2	Mi.	Cadmium (S)	Federal tailings pond	AQL	LWW, WBC B	718506	4190246	718459	4191845	St. Francois	Shaw Branch	1
2008	3222.00	Shoal Cr.	P	41.1	41.1	41.1	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, DWS, IND, IRR, LWW, SCR	401984	4083455	356098	4099733	Newton	Shoal Cr.	1
2006	399.00	Sni-a-bar Cr.	P	32	32	32	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	398859	4311016	416463	4333103	Jackson/Lafayette	Sni-a-bar Cr.	1
2006	655.00	South Blackbird Cr.	C	5	13	13	Mi.	Ammonia, Un-ionized	Source Unknown	AQL	LWW, WBC B	503682	4475363	518712	4469745	Putnam	South Blackbird Cr.	2
2010	71.00	South Fabius R.	P	80.6	80.6	80.6	Mi.	Escherichia coli	Nonpoint Source	WBC B	AQL, IRR, LWW	572794	4444457	627750	4417637	Knox/Marion	South Fabius R.	1
1994	142.00	South Fk. Salt R.	C	20.1	32	32	Mi.	Oxygen, Dissolved	Mexico WWTP, Source Unknown	AQL	LWW, SCR, WBC B	600363	4322879	601283	4355209	Callaway/Audrain	South Fk. Salt R.	1
2006	1249.00	South Grand R.	P	62.5	62.5	62.5	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW, SCR	366728	4281000	429978	4242884	Cass/Henry	South Grand R.	1
2012	3259.00	South Indian Cr.	P	8.7	8.7	8.7	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	CDF, LWW, WBC B	399208	4067538	390081	4072821	McDonald/Newton	South Indian Cr.	1
2008	3259.00	South Indian Cr.	P	8.7	8.7	8.7	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, CDF, LWW	399208	4067538	390081	4072821	Newton/McDonald	South Indian Cr.	1
2012	224.00	Spencer Cr.	C	1.5	1.5	1.5	Mi.	Chloride	St. Peters WWTP, Urban Runoff/Storm Sewers	AQL	LWW	708205	4298105	709432	4300121	St. Charles	Spencer Cr.	1
2006	3160.00	Spring R.	C	61.7	61.7	61.7	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CLF, IND, IRR, LWW, SCR	420405	4108691	356380	4117694	Lawrence/Jasper	Spring R.	1
2010	3164.00	Spring R.	P	8.8	8.8	8.8	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CDF, IND, IRR, LWW, SCR	425936	4100897	420405	4108691	Lawrence	Spring R.	1
2010	3165.00	Spring R.	P	11.9	11.9	11.9	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, LWW, SCR	430983	4088423	425936	4100897	Lawrence	Spring R.	1
2012	2835.00	St. Francis R.	P	8.4	93.1	93.1	Mi.	Temperature, water	Source Unknown	CLF	AQL, IRR, LWW, SCR, WBC A	712410	4180045	726667	4108428	St. Francois	St. Francis R.	1

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2006	3138.00	St. John's Ditch	P	15.3	15.3	15.3	Mi.	Escherichia coli	Rural NPS, Urban Runoff/Storm Sewers	WBC B	AQL, LWW, SCR	807943	4079163	817828	4057590	New Madrid	St. John's Ditch	1
2006	3138.00	St. John's Ditch	P	15.3	15.3	15.3	Mi.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC B	807943	4079163	817828	4057590	New Madrid	St. John's Ditch	1
2006	3135.00	Stevenson Bayou	C	14	14	14	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	833337	4094443	831489	4086239	Mississippi	Stevenson Bayou	1
2006	959.00	Straight Fk.	C	2.5	6	6	Mi.	Oxygen, Dissolved	Versailles WWTP	AQL	LWW, WBC B	513048	4255154	514134	4262987	Morgan	Straight Fk.	1
2006	959.00	Straight Fk.	C	2.5	6	6	Mi.	Chloride	Versailles WWTP	AQL	LWW, WBC B	513048	4255154	514134	4262987	Morgan	Straight Fk.	3
2008	2751.00	Strother Cr.	P	6	6.0	6.0	Mi.	Lead (S)	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC B	672401	4162649	680292	4163603	Iron	Strother Cr.	1
2010	2751.00	Strother Cr.	P	6	6.0	6.0	Mi.	Lead	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC B	672401	4162649	680292	4163603	Iron	Strother Cr.	1
2008	2751.00	Strother Cr.	P	6	6.0	6.0	Mi.	Nickel (S)	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC B	672401	4162649	680292	4163603	Iron	Strother Cr.	1
2006	2751.00	Strother Cr.	P	6	6.0	6.0	Mi.	Zinc (S)	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC B	672401	4162649	680292	4163603	Iron	Strother Cr.	1
2010	2751.00	Strother Cr.	P	6	6.0	6.0	Mi.	Zinc	Buick Lead Mine/Mill	AQL	CLF, LWW, WBC B	672401	4162649	680292	4163603	Iron	Strother Cr.	1
2008	3965.00	Strother Cr.	U	0.9	n/a	n/a	Mi.	Arsenic (S)	Buick Lead Mine/Mill	GEN		671138	4161740	672405	4162651	Reynolds/Iron	Strother Cr.	1
2008	3965.00	Strother Cr.	U	0.9	n/a	n/a	Mi.	Lead (S)	Buick Lead Mine/Mill	GEN		671138	4161740	672405	4162651	Reynolds/Iron	Strother Cr.	1
2008	3965.00	Strother Cr.	U	0.9	n/a	n/a	Mi.	Nickel (S)	Buick Lead Mine/Mill	GEN		671138	4161740	672405	4162651	Reynolds/Iron	Strother Cr.	1
2006	3965.00	Strother Cr.	U	0.9	n/a	n/a	Mi.	Zinc (S)	Buick Lead Mine/Mill	GEN		671138	4161740	672405	4162651	Reynolds/Iron	Strother Cr.	1
2012	3965.00	Strother Cr.	U	0.9	n/a	n/a	Mi.	Zinc	Buick Lead Mine/Mill	GEN		671138	4161740	672405	4162651	Reynolds/Iron	Strother Cr.	1
2006	686.00	Sugar Cr.	P	6.8	6.8	6.8	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	544656	4369584	538213	4368067	Randolph	Sugar Cr.	1
2006	7399.00	Sunset Lake	L3	6	6	6	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, WBC B			569912	4268414	Cole	Sunset Lake	1
2002	7313.00	Table Rock Lake, James, Kings and Long Cr. Arms	L2	24507	24507	24507	Ac.	Nutrient/Eutrophication Biological Indicators	Mult. Pt.& NPS	AQL	WBC B,LWW,SCR			472162	4050084	Barry/Taney	Table Rock Lake, James, Kings and Long Cr. Arms	2
2010	7313.00	Table Rock Lake, White River Arm	L2	17240	17240	17240	Ac.	Chlorophyll	Mult. Pt.& NPS	AQL	WBC B,LWW,SCR			472162	4050084	Barry/Taney	Table Rock Lake, James, Kings and Long Cr. Arms	1
2010	7313.00	Table Rock Lake, White River Arm	L2	17240	17240	17240	Ac.	Nitrogen	Mult. Pt.& NPS	AQL	WBC B,LWW,SCR			472162	4050084	Barry/Taney	Table Rock Lake, James, Kings and Long Cr. Arms	1
2010	7297.00	Terre Du Lac Lakes****	L3	103	103	103	Ac.	Chlorophyll-a	Terre du Lac Subdivision	AQL	LWW, SCR, WBC A			708556	4197147	St. Francois	Terre Du Lac Lakes (Lac Capri)	1
2010	7297.00	Terre Du Lac Lakes****	L3	103	103	103	Ac.	Nitrogen, Total	Terre du Lac Subdivision	AQL	LWW, SCR, WBC A			708556	4197147	St. Francois	Terre Du Lac Lakes (Lac Capri)	1
2008	549.00	Thompson R.	P	5	65	65	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, DWS, IRR, LWW	432171	4492131	447462	4401719	Harrison	Thompson R.	1
2012	3243.00	Thurman Cr.	P	3	3	3	Mi.	Escherichia coli	Rural and suburban NPS	WBC B	AQL, LWW,	369319	4099003	367458	4097252	Newton	Thurman Cr.	1
2012	3763.00	Tiff Cr.	P	2.1	2.1	2.1	Mi.	Fishes Bioassessments	Source Unknown	AQL	LWW, WBC B	710826	4212440	708985	4214913	Jefferson	Tiff Cr.	1
2006	1225.00	Trib. To Big Otter Cr.	C	1	1	1	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	437073	4228823	436270	4229863	Henry	Trib. To Big Otter Cr.	1
2012	3963.00	Trib. To Chat Cr.	U	0.9	0.9	0.9	Mi.	Cadmium	Baldwin Park mine	GEN		437568	4092534	436376	4092428	Lawrence	Trib. To Chat Cr.	1
2010	3963.00	Trib. To Chat Cr.	U	0.9	0.9	0.9	Mi.	Zinc	Baldwin Park mine	GEN		437568	4092534	436376	4092428	Lawrence	Trib. To Chat Cr.	1
2010	133.00	Trib. To Coon Cr.	C	1	1	1	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	552198	4364074	554325	4364132	Randolph	Trib. To Coon Cr.	2
2010	3938.00	Trib. To Flat River Cr.	U	0.3	0.3	0.3	Mi.	Zinc	Mill tailings (Aban.)	AQL		717159	4191123	717606	4190862	St. Francois	Trib. To Flat River Cr.	1
2008	3943.00	Trib. To Foster Br.	U	0.7	2.0	2.0	Mi.	Ammonia, Un-Ionized	Ashland WWTP	GEN		564699	4290776	656255	4290007	Boone	Trib. To Foster Br.	1
2010	1420.00	Trib. To Goose Cr.	C	3	3.0	3.0	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	437166	4110190	440767	4112989	Lawrence	Trib. To Goose Cr.	1
2006	3490.00	Trib. To Little Muddy Cr.	C	1	1.0	1.0	Mi.	Chloride	Tyson Foods	AQL	LWW, WBC B	473618	4290951	474708	4291640	Pettis	Trib. To Little Muddy Cr.	1
2010	2114.00	Trib. To Old Mines Cr.	C	1.5	1.5	1.5	Mi.	Sedimentation/Siltation (S)	Barite tailings pond	GEN	AQL, LWW, WBC B	699696	4215163	698452	4216961	St. Francois	Trib. To Old Mines Cr.	1
2006	3360.00	Trib. To Red Oak Cr.	C	0.5	0.5	0.5	Mi.	Oxygen, Dissolved	Owensville WWTP	AQL	LWW, WBC B	635575	4245150	636297	4244762	Gasconade	Trib. To Red Oak Cr.	1
2006	3361.00	Trib. To Red Oak Cr.	C	1.1	1.9	1.9	Mi.	Oxygen, Dissolved	Nonpoint Source	AQL	LWW	632983	4245771	635575	4245150	Gasconade	Trib. To Red Oak Cr.	1
2006	3361.00	Trib. To Red Oak Cr.	C	0.8	1.9	1.9	Mi.	Oxygen, Dissolved	Owensville WWTP	AQL	LWW	632983	4245771	635575	4245150	Gasconade	Trib. To Red Oak Cr.	1
2006	956.00	Trib. To Willow Fk.	C	0.5	0.5	0.5	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW	520018	4276045	520577	4275439	Moniteau	Trib. To Willow Fk.	1
2006	3589.00	Trib. To Wolf Cr.	C	1.5	1.5	1.5	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	727181	4185394	729121	4184284	St. Francois	Trib. To Wolf Cr.	2
2006	74.00	Troublesome Cr.	C	6.1	41.3	41.3	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, SCR, WBC B	581617	4441608	613693	4417997	Knox	Troublesome Cr.	1
2006	74.00	Troublesome Cr.	C	35.3	41.3	41.3	Mi.	Unknown	Source Unknown	AQL	WBC B,LWW	581617	4441608	613693	4417997	Knox/Marion	Troublesome Cr.	1
2010	3175.00	Truitt Cr.	C	6.4	6.4	6.4	Mi.	Bacteria	Rural NPS	WBC A	AQL, LWW	429512	4115867	424213	4108968	Lawrence	Truitt Creek	3
2012	751.00	Turkey Cr.	C	6.3	6.3	6.3	Mi	Escherichia coli	Source Unknown	WBC A	AQL, LWW	565489	4300829	560346	4298772	Boone	Turkey Cr.	1
2006	3216.00	Turkey Cr.	P	7.7	7.7	7.7	Mi.	Cadmium (S)	Tri-State Mining District	AQL	LWW, WBC B	366144	4107717	356267	4109959	Jasper	Turkey Cr.	1
2006	3216.00	Turkey Cr.	P	7.7	7.7	7.7	Mi.	Cadmium	Tri-State Mining District	AQL	LWW, WBC B	366144	4107717	356267	4109959	Jasper	Turkey Cr.	1
2006	3216.00	Turkey Cr.	P	7.7	7.7	7.7	Mi.	Escherichia coli	Rural and suburban NPS	WBC B	AQL, LWW	366144	4107717	356267	4109959	Jasper	Turkey Cr.	1
2008	3216.00	Turkey Cr.	P	7.7	7.7	7.7	Mi.	Lead (S)	Tri-State Mining District	AQL	LWW, WBC B	366144	4107717	356267	4109959	Jasper	Turkey Cr.	1
2008	3216.00	Turkey Cr.	P	7.7	7.7	7.7	Mi.	Zinc (S)	Tri-State Mining District	AQL	LWW, WBC B	366144	4107717	356267	4109959	Jasper	Turkey Cr.	1
2008	3217.00	Turkey Cr.	P	6.1	6.1	6.1	Mi.	Cadmium (S)	Tri-State Mining District	AQL	LWW, WBC A	373143	4104208	366144	4107717	Jasper	Turkey Cr.	1
2008	3217.00	Turkey Cr.	P	6.1	6.1	6.1	Mi.	Escherichia coli	Rural and suburban NPS	WBC A	AQL, LWW	373143	4104208	366144	4107717	Jasper	Turkey Cr.	1
2008	3217.00	Turkey Cr.	P	6.1	6.1	6.1	Mi.	Lead (S)	Tri-State Mining District	AQL	LWW, WBC A	373143	4104208	366144	4107717	Jasper	Turkey Cr.	1
2008	3217.00	Turkey Cr.	P	6.1	6.1	6.1	Mi.	Zinc (S)	Tri-State Mining District	AQL	LWW, WBC A	373143	4104208	366144	4107717	Jasper	Turkey Cr.	1
2006	3282.00	Turkey Cr.	P	2.4	2.4	2.4	Mi.	Cadmium	Bonne Terre chat pile	AQL	LWW, WBC B	715493	4200128	714636	4203638	St. Francois	Turkey Cr.	1
2006	3282.00	Turkey Cr.	P	2.4	2.4	2.4	Mi.	Lead	Bonne Terre chat pile	AQL	LWW, WBC B	715493	4200128	714636	4203638	St. Francois	Turkey Cr.	1
2006	3282.00	Turkey Cr.	P	1.2	2.4	2.4	Mi.	Zinc	Bonne Terre chat pile	AQL	LWW, WBC B	715493	4200128	714636	4203638	St. Francois	Turkey Cr.	1
2010	1414.00	Turnback Cr.	P	14	14.0	14.0	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CDF, LWW, SCR	445684	4108548	432264	4127720	Lawrence/Dade	Turnback Cr.	1
2006	2579.00	Warm Fk. Spring R.	P	13.8	13.8	13.8	Mi.	Fecal Coliform	Source Unknown	WBC A	AQL, IRR, LWW, SCR	627789	4054485	631878	4040300	Oregon	Warm Fk. Spring R.	1
2006	1708.00	Watkins Cr.	C	3.5	3.5	3.5	Mi.	Chloride	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	744084	4294764	745936	4294861	St. Louis	Watkins Cr.	1
2006	1708.00	Watkins Cr.	C	3.5	3.5	3.5	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	744084	4294764	745936	4294861	St. Louis	Watkins Cr.	1
2012	1708.00	Watkins Cr.	C	3.5	3.5	3.5	Mi.	pH	Urban Runoff/Storm Sewers	AQL	LWW, WBC B	744084	4294764	745936	4294861	St. Louis	Watkins Cr.	1
2010	7071.00	Weatherby Lake	L3	194	194	194	Ac.	Chlorophyll-a	Urban Runoff/Storm Sewers	AQL	LWW, SCR, WBC A			363437	4175258	Platte	Weatherby Lake	1
2010	7071.00	Weatherby Lake	L3	194	194	194	Ac.	Mercury In Fish Tissue (T)	Atmospheric Deposition - Toxics	AQL	LWW, SCR, WBC A			363437	4175258	Platte	Weatherby Lake	1
2010	7071.00	Weatherby Lake	L3	194	194	194	Ac.	Nitrogen, Total	Urban Runoff/Storm Sewers	AQL	LWW, SCR, WBC A			363437	4175258	Platte	Weatherby Lake	1
2006	560.00	Weldon R.	P	42	42	42	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	448318	4492214	444714	4439341	Mercer/Grundy	Weldon R.	1
2008	2755.00	West Fk. Black R.	P	2.1	32.3	32.3	Mi.	Lead (S)	West Fork Mine	AQL	CLF, LWW, WBC A	656850	4154383	690022	4146556	Reynolds	West Fk. Black R.	1
2008	2755.00	West Fk. Black R.	P	2.1	32.3	32.3	Mi.	Nickel (S)	West Fork Lead Mine/Mill	AQL	CLF, LWW, WBC A	656850	4154383	690022	4146556	Reynolds	West Fk. Black R.	1
2006	1317.00	West Fk. Drywood Cr.	C	8.1	8.1	8.1	Mi.	Oxygen, Dissolved	Source Unknown	AQL	LWW, WBC B	357350	4172196	363431	4175252	Vernon	West Fk. Drywood Cr.	1
2008	1504.00	Whetstone Cr.	P	12.2	12.2	12.2	Mi.	Oxygen, Dissolved	Livestock,Grazing or Feeding Operations	AQL	CLF, LWW, WBC B	556418	4116032	553965	4129663	Wright	Whetstone Cr.	1
2010	3964.00	Whetstone Cr.	U	0.6	n/a	n/a	Mi.	Ammonia, Total	Mountain Grove Lagoon	GEN		565106	4111076	564339	4111470	Wright	Whetstone Cr.	3
2010	3182.00	White Oak Cr.	C	18	18	18	Mi.	Escherichia coli	Rural NPS runoff	WBC A	AQL, IRR, LWW	415932	4124150	396440	4113581	Lawrence/Jasper	White Oak Cr.	1
2012	1700.00	Wildhorse Cr.	C	3.9	3.9	3.9	Mi.	Escherichia coli	Runoff from Forest/Grassland/Parkland, Rural, Residential Areas	WBC B	AQL, LWW	699002	4276141	699384	4279922	St. Louis	Wildhorse Cr.	1
2010	3171.00	Williams Cr.	P	1	1	1	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, CDF, LWW	421759	4107281	420777	4107593	Lawrence	Williams Cr.	1
2010	3172.00	Williams Cr.	P	8.5	8.5	8.5	Mi.	Aquatic Macroinvertebrate Bioassessments	Source Unknown	AQL	LWW, WBC A	432044	4105526	421759	4107281	Lawrence	Williams Cr.	1
2010	3172.00	Williams Cr.	P	8.5	8.5	8.5	Mi.	Escherichia coli	Rural NPS	WBC A	AQL, LWW	432044	4105526	421759	4107281	Lawrence	Williams Cr.	1
2012	3594.00	Williams Cr.	P	1	1.0	1.0	Mi.	Escherichia coli	Urban Runoff/Storm Sewers	WBC B	AQL, LWW	716804	4268162	716672	4269382	St. Louis	Williams Cr.	1
2012	3594.00	Williams Cr.	P	1	1.0	1.0	Mi.	pH	Source Unknown	AQL	LWW, WBC B	716804	4268162	716672	4269382	St. Louis	Williams Cr.	1
2010	3280.00	Willow Br.	P	2.2	2.2	2.2	Mi.	Escherichia coli	Rural NPS	WBC B	AQL, LWW	366154	4086266	364028	4084114	Newton	Willow Br.	1
2006	955.00	Willow Fk.	C	6.5	6.5	6.5	Mi.	Oxygen, Dissolved	Tipton WWTP, Source Unknown	AQL	LWW, WBC B	515565	4276527	522997	4273676	Moniteau	Willow Fk.	1

Year*	WBID	Water Body Name**	Class	MDNR Proposed Impairment Size	MDNR Water Body Size	EPA Approved Impairment Size	Size Units*	Pollutant	Source*	Impaired Uses*	Other (Unimpaired) Uses*	Upstream X*	Upstream Y*	Downstream X*	Downstream Y*	County Upstream/ Downstream	EPA Approved Water Body Name	Comment*
2006	2375.00	Wilsons Cr.	P	11.9	14	14	Mi.	Escherichia coli	Nonpoint Source	WBC B	AQL, LWW	471023	4115738	464366	4102525	Greene/Christian	Wilsons Cr.	1

Comment
s:

1: 2012 Assessment indicates impairment
2: Insufficient cause to delist
3: Assessed as unimpaired; expected to be retained by EPA
5: Previously listed as WBID 1711
6: Previously listed as WBID 1711U
7: Previously listed erroneously as WBID 0091

Uses: AQL = Aq. Life Protection, WBC A & WBC B=WBC Recreation, DWS= Public Drinking Water Supply, LWW= Livestock and Wildlife Watering, SCR= Secondary Contact Recreation
IRR= Irrigation, IND= Industrial Uses
Upstream X = X coordinate of upstream end of impaired water body (in UTMs)
Upstream Y = Y coordinate of upstream end of impaired water body (in UTMs)
Downstream X = X coordinate of downstream end of impaired water body (in UTMs)
Downstream Y = Y coordinate of downstream end of impaired water body (in UTMs)

* Misidentified in WQ Standards as Bowling Green New Lake. Acres shown on list are the actual acres.
** Lake Buteo is the only one of the Knob Noster S.P. Lakes on this list
*** This section of the Osage River inadvertently left out of WQ Standards, thus there are no designated beneficial uses.
**** Lac Capri is the only one of the Terre du Lac lakes on the list

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