

6-1-2010

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Citation

Weida, Ray. 2010. Regulatory Drivers for the Upper Illinois River and Other Regional Watersheds. Arkansas Water Resources Center, Fayetteville, AR. MSC358. 18
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REGULATORY DRIVERS FOR THE UPPER ILLINOIS
RIVER AND OTHER REGIONAL WATERSHEDS

Funded by Arkansas Natural Resources Commission
and the Walton Family Foundation through the
Illinois River Watershed Partnership
MSC Publication 358 | Arkansas Water Resources Center

Regulatory Drivers for the Upper Illinois River and Other Regional Watersheds

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Environmental regulations are put in place to protect the air, water and land from threat of pollution. Regulatory programs establish pollution limits, determine compliance, and enforce environmental laws and regulations for waterbodies within the watershed based on the designated uses for the individual waterbody. These established regulations make sure that the state’s mandatory standards for clean water and the minimum federal standards are being achieved. Environmental regulations are established on both the federal and state levels. On the federal level, Congress has authorized the U.S. Environmental Protection Agency and other governmental agencies to create and enforce regulations. The EPA delegates authority on the state level to Arkansas Department of Environmental Quality and Arkansas Department of Health to determine appropriate regulations to waters and watersheds. This publication discusses established federal and state regulations, potential pollutant sources including wastewater, drinking water, stormwater, animal feeding operations, and reaches currently impaired by pollutants within the Upper Illinois River Watershed.

Keywords: Regulations, Permits, Water Quality, Illinois River, Watershed Conditions

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FEDERAL REGULATORY DRIVERS

National Pollutant Discharge Elimination System

The Clean Water Act, officially known as the Federal Water Pollution Control Amendments of 1972, is the primary federal law governing water pollution. The Clean Water Act introduced a permit system for regulating point sources of pollution under the National Pollutant Discharge Elimination System (NPDES) program. The Arkansas Department of Environmental Quality (ADEQ) administers the NPDES program in Arkansas. The Arkansas Pollution Control and Ecology Commission (APCEC) oversees ADEQ's administration of the NPDES program on the state level, while the Environmental Protection Agency provides oversight at the federal level. APCEC Regulation No. 6 contains the regulations used by ADEQ to administer the NPDES program.

ADEQ issues NPDES permits to facilities that discharge or have the potential to discharge to waters of the State of Arkansas. These permits are typically issued with an effective term of 5 years and contain limitations on wastewater flow and or pollutants that may be discharged, as well as other conditions and or restrictions on the discharge. Typically, permit limitations are based on effluent guidelines (i.e., technology based) or state water quality standards (i.e., water quality based). NPDES permit writers also have the authority to impose limitations based on best professional judgment (BPJ) for any parameters that may pose a threat to the waters of the State, but for which no established effluent guideline or specific state water quality standard exists. The permit writer is required to provide appropriate justification for any BPJ limitation.

Effluent guidelines for categorical industries have been established in 40 CFR Parts 400 through 699. These limitations represent the type and quantity of pollutants expected to be discharged from a particular industry after the

wastewater has received a specified degree of treatment.

ADEQ is prohibited from issuing NPDES permits with limitations that are less stringent than the effluent guidelines, but may require more stringent limitations if necessary to protect the water quality and beneficial uses of the receiving stream.

State water quality standards (WQS) are established in APCEC Regulation No. 2, and the WQS include designated uses for waterbodies and associated criteria to protect these uses. These standards include the level at which certain pollutants may exist in a receiving waterbody to maintain the water quality and designated uses of that waterbody. The allowable level for a particular pollutant varies across the state due to differences in ecological regions and the physical and chemical properties of the receiving water. Based on the nature of the discharge and receiving stream, ADEQ evaluates whether the discharge has a reasonable potential to cause a violation of a water quality standard. If so, then a permit limitation is determined based on the expected maximum discharge rate from the facility and critical low flow of the receiving stream. The more stringent of the limitations derived from the effluent guidelines or state water quality standards are included in the permit.

If the designated uses of a waterbody become impaired due to a particular pollutant, ADEQ may require a total maximum daily load (TMDL) study to more accurately determine the waterbody's assimilative capacity for that pollutant. That assimilative capacity is then allocated to the individual dischargers within the watershed in the form of permit limitations. Non-point sources of pollution are also included in these studies.

Are regulations ever too stringent? or not stringent enough? In some cases, the state WQS may be more stringent than actually necessary to protect the designated uses of a particular waterbody. Conversely, a WQS may not fully protect all designated uses at a specific stream reach or watershed. In these cases, a Use Attainability Analysis (UAA) may be performed to consider the specific physical, biological, and chemical properties for a waterbody to determine the appropriate designated uses and protective criteria for a particular pollutant. Once a UAA is approved, Regulation No. 2 will be revised by rule making to include the site-specific designated use and or WQS.

Are all regulations based on water chemistry parameters? In addition to pollutant limitations, major dischargers and select minor discharges have biomonitoring requirements included in the NPDES permit. Biomonitoring tests involve the placement of test organisms in varying concentrations of effluent to evaluate toxicity. Based on the ratio of effluent to receiving stream flow at critical conditions (7Q10; i.e., seven-day consecutive low flow with a ten year return frequency; the lowest stream flow for seven consecutive days that would be expected to occur once in ten years), a critical dilution will be determined that represents the minimum concentration at which no toxicity must be observed.

Who monitors dischargers for violations? Permittees are required to perform self-monitoring through routine effluent sampling. Sampling results are reported to ADEQ regularly on discharge monitoring reports (DMRs). In addition to self-monitoring, ADEQ inspectors perform routine compliance inspections of permitted facilities. Enforcement measures, including fines and permit revocation, are

available to ADEQ when addressing non-compliance by dischargers. There are also many other agencies (e.g., state, federal, academic or private consulting) that might have specific monitoring projects focused on permitted discharges.

NPDES—Wastewater Discharged indirectly to surface water

The effluent limitations guidelines (40 CFR 400 through 699) also specify discharge limitations for industries discharging to collection systems for municipal wastewater treatment facilities. In addition, local pretreatment ordinances may impose additional and or more stringent limitations. The following cities within the Illinois River Watershed have pretreatment programs.

- ◆ Fayetteville (Title V, Chapter 51, Article III);
- ◆ Siloam Springs (Municipal Code, Chapter 98, Articles IV and V);
- ◆ Springdale (Code of Ordinances, Chapter 118); and
- ◆ Rogers (Code of Ordinances, Article V).

These cities have established pretreatment programs which require industries to pre-treat their wastewater before releasing it to the municipal wastewater treatment system. These cities issue permits to regulate discharges into their collection system.

Wastewater not discharged to surface water

The Clean Water Act also addresses the regulation of wastewater not discharged to surface water, and ADEQ is responsible for issuing these “no-discharge” permits covering activities such as land application and or subsurface disposal of wastewater, animal waste, and wastewater sludge.

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Table 1. Summary of surface water discharging wastewater treatment plants in the Upper Illinois River Watershed

Treatment Plant	Average Effluent Discharge (MGD)	Receiving Water Body	Effluent P Permit Limit (mg L ⁻¹)	Pretreatment Program?	Sludge Disposal Method
Fayetteville	10	Goose Creek	1.0	Yes	Landfilled
Springdale	12	Spring Creek	1.0	Yes	Landfilled
Rogers	7	Osage Creek	1.0	Yes	Landfilled
Siloam Springs	3	Sager Creek	1.0	Yes	Landfilled
NACA Regional*	4	Osage Creek	1.0		
Gentry	<1	SWEPCO Lake	None	No	
Prairie Grove	<1	Muddy Fork	None	No	Land Applied/ Landfilled
Lincoln	<1	Brush Creek	None	No	Land Applied

* This plant will begin discharging in 2010

Subsurface Disposal. ADEQ and the Arkansas Department of Health (ADH) have shared jurisdiction over subsurface disposal of wastewater. Facilities that utilize subsurface disposal for domestic wastewater only with a flow rate less than 5,000 gallons per day must obtain approval from ADH. Facilities that utilize subsurface disposal for domestic wastewater only with a flow rate greater than 5,000 gallons per day must obtain a permit from ADEQ and approval from ADH. For subsurface disposal of non-domestic wastewater (commercial, industrial, or agricultural in origin, excluding food establishments), a permit from ADEQ is required. Subsurface disposal of combined domestic and non-domestic wastewater requires a permit from ADEQ and approval from ADH.

Individual and Clustered Systems. Like many rural areas that have grown in conjunction with nearby economic and educational population centers, the counties in northwestern Arkansas have seen a marked increase in housing construction, commerce, agricultural production and processing, medical services, and other economic activities over the past 30 years. Several decades ago, prior to the expansion of centralized wastewater collection and treatment, homes and businesses in these rural areas were served by a variety of wastewater

systems sized and assembled according to regulations that did not take into account the urbanization and resulting discharge volumes that would occur today. Arkansas rules adopted in the 1990s addressed the shortcomings of septic tanks made of materials designed to last 7 to 15 years and drain field systems sized for lower gallons capita⁻¹ day⁻¹ water usage. Updates to these regulations, the last of which were established in 2006, have further tightened requirements for system components, design, installation, operation and maintenance.

Current rules define “standard” systems as those with a drain field of perforated pipe surrounded by gravel or other product approved by ADH, with at least two relatively flat trenches no longer than 60 to 100 ft, spaced 6 to 8 ft apart, approximately 24 inches wide, 18 to 24 inches deep, with at least 6 inches of gravel below the distribution piping and 2 inches above. Sizing of the drain field (i.e., soil absorption area) for residential systems is based on the number of bedrooms and soil percolation tests, which determine the rate at which treated effluent can be dispersed into the soil.

Current rules also specify the types of legally acceptable tanks, infiltration system components, and other devices, and provide for

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Table 2. Cluster systems in the Upper Illinois River Watershed permitted by the Arkansas Department of Health and Department of Environmental Quality

City	Project Name	Permitted	Description
Bethel Heights	Lexington Addition Water & Sewer Bethel Heights	3/11/2003	Part of Bethel Heights municipal system
Bethel Heights	Courtyard 3 Springdale Water & Bethel Heights Step Sewer	12/2/2004	Part of Bethel Heights municipal system
Bethel Heights	Logan Heights	7/5/2005	28 Lots, STEP System, Connection to Bethel Heights
Bethel Heights	Great Meadows Subdivision Water & Sewer Bethel Heights	2/22/2005	Part of Bethel Heights municipal system
Bethel Heights	Chantel Subdivision Water & Sewer	6/9/2004	Part of Bethel Heights municipal system
Cave Springs	Legacy Subdivision Water & Sewer Improvements	5/19/2004	205 lots, Cave Springs water, Cave Springs sewer, 260 GPD Lot ⁻¹ design flow plus 4,500 GDP commercial, Advantex AX100 treatment units loaded at 38.5 GPD ft ⁻² preceding drip irrigation, 0.38 GPD ft ⁻² loading rate
Cave Springs	Mandalea Subdivision Water & Sewer	4/8/2005	134 lots at 260 GPD design flow. Lotus treatment units design flow 35,250 GPD. Drip irrigation with 0.4 GPD ft ⁻² loading rate
Lowell	The Meadowlands		44 lots, STEP collection Advantex AX100 treatment units drip disposal at a loading rate of 0.11 GPD ft ² . City of Lowell operation. Proposed design flow of 60 GPCD at 2.6 pop lot ⁻¹ .
Centerton	Cowger Property		64 lots, STEP system, 16,000 GPD design flow, Bioclere treatment, chlorination, dechlorination. Drip disposal loading rate of 0.160 GPD ft ⁻² . Operation by Tom Bartlett/Greenfield Development.
Springdale	Southeast Elementary School	4/21/2005	Non-subdivision
Springdale	Steel Creek Subdivision Water & Sewer	10/14/2004	36 lots with STEP collection. Bioclere with design flow of 8,250 GPD. Drip irrigation with a loading rate of 0.22 GPD ft ⁻² .
Fayetteville	Sloan Estates	5/5/2005	61 lots at design flow of 260 GPD. STEP collection system, Bioclere treatment plant preceding drip irrigation with a loading rate of 0.39 GPD ft ⁻² . Private sewer system operation.
Fayetteville	Cherry Hills Subdivision		198 lots, gravity collection, 50,000 GPD flow, lotus treatment, drip disposal at a loading rate of 2.52 GPD ft ⁻² . Operated by Fayetteville water.

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evaluation of the installation site, training and licensing of service providers, and the management of systems that serve multiple homes or other facilities. Individual home onsite wastewater treatment systems in Arkansas are regulated by ADH if they discharge to the soil in the system owner’s property. Systems that discharge offsite, to a surface waterbody, or carry flows greater than 5,000 gallons per day are regulated by ADEQ under its NPDES discharge permit and other programs. In general, ADH will approve individual home systems with septic tanks and soil absorption fields if adequate space is available, soils are suitable (i.e., acceptable percolation rate), and setbacks can be met from groundwater tables, wells, public water supply intakes, streams, lakes, ponds, property lines, etc. Drain fields are sized in accordance with soil percolation rates: the slower the percolation rate, the larger the required drain field.

Arkansas Department of Health (ADH) allows a defined set of “alternative” and “experimental” wastewater treatment systems for individual residences which can be approved for some sites that do not meet the sizing, soils, or other requirements for standard septic tank/soil absorption systems. These system designs compensate for poor site conditions by increasing the level of treatment prior to discharge to the soil, the ground surface, or surface waterbodies. The 1993 ADH Alternative Systems Manual provides guidance for the

design, construction/installation, and operation of alternative and experimental sewage treatment systems, defined as “a non-standard individual sewage disposal system or treatment system which is classified as experimental in order to evaluate its potential effectiveness” (ADH, 1994). The ADH reserves these system types to sites that do not meet criteria for conventional septic tank/soil absorption systems (ADH, 1993).

Surface Discharging Systems. Arkansas Department of Health permits surface discharging systems under certain conditions. Most of these systems are now subject to NPDES permitting by ADEQ, and most now require disinfection. Past practice allowed treated effluent to be discharged to the ground surface without NPDES permit coverage if the discharges remained on the owner’s property. However, new rules adopted in 2006 reportedly tightened siting, design, and permit requirements for these systems, and fewer are being installed statewide (see table below). They are categorically banned in subdivisions. It is not clear, however, how some surface discharging systems are being permitted under NPDES because the state general permit (No. ARG550000), which covers discharges from individual treatment facilities with daily design flows up to 1,000 gallons per day, specifically excludes from permit coverage “(c)losed or no discharge systems, or systems where treated wastewater is confined to the individual owner’s property (onsite).”

Table 3. Maximum Pollutant Levels for Surface Discharging Systems

Effluent Characteristics	Effluent Limitations		Monitoring Requirements	
	30-Day Average	Daily Maximum	Measurement Frequency	Sample Type
Flow	Monitor	1,000 GPD	Twice a year	Estimate
5-Day Biochemical Oxygen Demand (BOD)	20 (mg L ⁻¹)	30 (mg L ⁻¹)	Twice a year	Grab
Total Suspended Solids (TSS)	20 (mg L ⁻¹)	20 (mg L ⁻¹)	Twice a year	Grab
Fecal Coliform (Colonies per 100 mL)	200	400	Twice a year	Grab
pH	6.0 to 9.0	6.0 to 9.0	Twice a year	Grab

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Most of these systems are mechanized aerobic treatment units, which feature mixing/aeration tanks, clarifiers (settling tanks), chlorinators, and discharge piping through a soil drainage area, terminating to ground level to facilitate ground surface discharge during saturated conditions.

There are requirements for maintenance agreements with the system vendor or other qualified contractor to ensure performance, along with biannual grab samples and testing for flow, 5-day biochemical oxygen demand, total suspended solids, fecal coliform, and pH (ADH, 1993; see Section 2.1.4.1).

Arkansas Department of Health specifies that the homeowner is responsible for maintaining the systems and ensuring effluent limits are met. As noted, however, owners of aerobic treatment plants are required to maintain a valid service contract with an ADH certified individual or company. The ADH publishes a list of approved aerobic treatment plants, and requires them to meet the same permitting and discharge requirements as other treatment schemes. In addition, the agency policy states that the sewage discharges into lakes used as a primary or secondary water supply or bodies of water used for body contact recreation are not acceptable and will not be permitted. As noted above, these systems are also limited to a narrowly defined range of sites. The ADH will consider an individual home treatment scheme with a surface discharge “when the permeability of the ground strata is such that subsurface disposal by a conventional septic tank system is absolutely unacceptable” (ADH, 1993). However, agency guidance states that sewage discharges “may not be approved in subdivisions, built-up areas, or other critical high-use areas” (ADH, 1993). Only sites “demonstrating sufficient isolation from the populace and providing an acceptable location for a surface discharge will be considered. For proposed or newly constructed residences, a

minimum lot size of three (3) acres is required” (ADH, 1993).

The restriction on surface discharging systems in subdivisions appears in ADH’s *General Policy Regarding Alternate Sewage Disposal System Construction*, which is published in the *Alternate Systems Manual* (1993). This section of the manual bans alternative systems in developed areas with lots less than 3 acres. It states that “(a)ll alternative systems are considered to be experimental and will not be approved as a uniform plan of development in any municipality, community, subdivision, or other developed area.” In a later section of the manual (p. 8), this point is given further emphasis: “(a)lternative/experimental systems are not intended and will not be approved as a uniform plan of development in any subdivision, residential area, or any developed or high use areas. Only sites demonstrating sufficient isolation from the populous will be considered.” The definition of a “subdivision” in the *ADH Rules and Regulations* (1994) is “(l)and divided or proposed to be divided for predominantly residential purposes into such parcels as required by local ordinances, or in the absence of local ordinances, subdivision means any land which is divided or proposed to be divided by a common owner or owners for predominantly residential purposes into three or more lots or parcels, any of which contains less than 3 acres, or into platted or unplatted units any of which contains less than 3 acres, as a part of a uniform plan of development.”

Arkansas Department of Health requires effluent from all surface-discharging systems under its jurisdiction, i.e., those that do not discharge offsite, to be disinfected prior to the point of discharge. Approved disinfection methods include positive contact dry-feed chlorinators (mostly tablets), hypochlorinators, ozone units, and ultraviolet light units.

In June of 2003, new reporting requirements were instituted for discharging systems in an

attempt to reduce the malfunction rate and improve performance. Discussions with ADH staff, however, revealed that owners of many systems are still not conducting the required semi-annual effluent sampling and submitting the two required system performance reports after the initial two-year maintenance contract with system installers expires. In addition, there are no sampling requirements for phosphorus – one of the primary pollutants of concern for discharges received by inland fresh surface waters – either in the National Sanitation Federation (NSF) performance standards (2000), which must be met by mechanized treatment units installed in Arkansas, or the ADEQ effluent limits for surface discharging systems (ADH, 1993).

Land Application. Arkansas Department of Environmental Quality issues permits for land application of animal waste, industrial process waste, and wastewater treatment biosolids.

Under APCEC Regulation No. 5, all confined animal operations, regardless of size, that utilize a liquid waste management system in Arkansas are required to obtain a permit from ADEQ. The permit requires the facility to develop and implement a waste management plan detailing the expected waste production, waste application rates, and application sites, including all applicable buffer zones.

ADEQ also issues permits for land application of industrial process wastes in cases where the industrial process waste provides an agronomic benefit to the application site. The agronomic benefit may be nutrient content, soil conditioning, irrigation, or some other benefit. The most common types of beneficial industrial process wastes are grease trap wastes, wastewater treatment biosolids, water treatment residuals, wastewater treatment effluent, water-based drilling fluids from oil and gas well activities, and food processing wastes. A waste management plan is also required for these operations including expected annual waste

production, application rates, and maps of application areas and all applicable buffer zones.

Land application of wastewater treatment biosolids is subject to requirements contained in 40 CFR Part 503; however, ADEQ has the authority to establish more stringent policies.

NPDES Stormwater Management

Industrial Stormwater. Certain industrial and municipal facilities are required to obtain permit coverage for discharges of “stormwater associated with industrial activity” which is defined in 40 CFR 122.26(b)(14). ADEQ has issued a general permit to cover all discharges of stormwater associated with industrial activity throughout the State. Facilities that require coverage for stormwater discharges must complete a Notice of Intent (NOI) to obtain coverage under the general permit or submit an application for an individual NPDES permit. Monitoring and reporting may or may not be required under the general permit depending on the type of industry. The general permit does not contain limitations (with minor exceptions) on pollutant discharges, but rather benchmark concentrations that permittees should endeavor to comply with through the use of best management practices (BMPs). Permittees are required to develop a Stormwater Pollution Prevention Plan (SWPPP) to detail the BMPs to be utilized and to perform routine inspections of the BMPs to ensure they are maintained properly.

Construction Stormwater. State and federal regulations require permit coverage for construction activities with disturbed areas equal to or greater than 1 acre. ADEQ has issued a general permit to cover all discharges of stormwater associated with construction activity throughout the State. A site where construction activities will result in a disturbance of either more than 1 acre but less than 5 acres, or less than 1 acre and is part of a

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larger development that will disturb less than 5 acres, is considered a “small construction site”. Permit coverage for small construction sites is automatic; no NOI or permit fee is required. Permit compliance is required including the development of a SWPPP to detail the BMPs to be utilized and routine inspection of the BMPs to ensure they are maintained properly.

A site where construction activities will result in a disturbance of 5 acres or more, or less than 5 acres if part of a larger development that will disturb more than 5 acres, is considered a “large construction site”. Permit coverage for large construction sites is not automatic. A NOI and permit fee must be submitted to ADEQ to obtain coverage under the general permit. Large construction sites must also submit the SWPPP to ADEQ for review and approval.

Multiple Separate Storm Sewer Systems.

Stormwater discharges for large- and medium-sized communities are controlled by the federal NPDES regulations, but administered and enforced by ADEQ. This program regulates all major discharges of stormwater to surface waters. The purpose of the NPDES permits is to reduce pollutants in stormwater runoff from certain municipal separate storm sewer systems (MS4s) and industrial activities by requiring the development and implementation of stormwater management measures.

Arkansas Department of Environmental Quality has designated certain communities as MS4 communities and issued a general permit (No. AR040000) with stormwater management conditions that all MS4 communities must meet by 2008, including:

- ◆ Public education
- ◆ Public involvement / participation
- ◆ Illicit discharge detection and elimination

- ◆ Construction site runoff control plan
- ◆ Post-construction stormwater management program
- ◆ Pollution prevention / good housekeeping

Designation as an MS4 community is based on population and/or population density, or a “physical interconnection” to a designated MS4 community. In the Upper Illinois River Watershed, MS4 communities include Benton County, Washington County, Fayetteville, Greenland, Lowell, Rogers, Springdale, Bentonville, Bethel Heights, Elm Springs, Farmington, Johnson, Little Flock, and the University of Arkansas. These MS4 communities have contracted with the University of Arkansas Cooperative Extension Service to develop and administer a Northwest Arkansas Regional Stormwater Education Program covering Benton and Washington counties or the “Fayetteville – Springdale” urbanized area. This program is designated to address the public education and involvement requirements of the MS4 permits through development of educational materials for the general public and schools (fact sheets, brochures, and posters), conducting public outreach and youth education, and hosting workshops and training events.

Based on the latest annual reports from the MS4s, several of the MS4s have met the 2008 deadline for adopting a construction site runoff control ordinance or plan and an ordinance or plan for controlling post-construction runoff. However, a number of communities have not begun or have just begun to work on developing the programs and ordinances that are due this year. It appears that the largest gap in meeting the 2008 requirements is development of the Illicit Discharge Detection and Elimination Plan and the Pollution Prevention Plan. Local governments were not provided additional resources to develop and implement these new

Table 4. Regulated MS4 Communities and Status* of Permit Requirements

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	Public Education	Public Involvement	Illicit Discharge Plan	Construction Site Control	Post-Construction Control	Pollution Prevention Plan
Bentonville	●	●	◐	Ordinance ●	○	○
Fayetteville	●	●	◐	Ordinance ●	Ordinance ●	◐
Farmington	●	●	○	Plan ◐	○	○
Johnson	●	●	○	Ordinance ●	○	○
Little Flock	●	●	○	○	○	○
Greenland	●	●	○	○	○	○
Lowell	●	●	○	Plan ●	○	○
Elm Springs	●	●	○	○	○	○
Rogers	●	●	◐	Ordinance ●	Ordinance ●	○
Springdale	●	●	◐	Ordinance ●	○	○
Bethel Heights	●	●	tbd	tbd	tbd	tbd
Benton Co.	●	●	◐	Plan ◐	○	○
Washington Co.	●	●	○	Plan ●	Program ●	○

*○ 0 to 20% complete, ◐ 40% to 60% complete, ● 100% complete or fully meeting requirements

stormwater program requirements, and find it challenging to meet the deadlines. The table below summarizes the status of the MS4 requirements for the different jurisdictions. Section 5.1 provides more details on the current local ordinances for managing stormwater runoff from construction sites and after construction has been completed (called post-construction runoff).

It is important to note that federal stormwater regulations require that all construction sites disturbing more than 1 acre, regardless of their location, have sedimentation and erosion controls. If this land disturbance falls outside of a designated MS4 community, the state of Arkansas is required to administer and enforce the requirements unless a local government voluntarily enacts an ordinance. However, the state does not have adequate resources to fully enforce these requirements. An assessment of the level of compliance with sedimentation and erosion control requirements would be useful for developing management strategies.

CONCENTRATED ANIMAL FEEDING OPERATIONS

Livestock operations consist of either of confinement or pasture systems. Permitting is

based on number of animals units (AU) in confinement where an AU is defined as one mature cow of approximately 1000 lbs and a calf up to weaning, usually 6 months of age or their equivalent. Equivalentents are provided in Table X. If a confined operation is greater than 1,000 AUs or is determined to threaten water quality, the operation is required to obtain a federal Concentrated Animal Feeding Operation (CAFO) permit under the Clean Water Act's NPDES. CAFOs are required to develop a nutrient management plan (NMP) as a part of the CAFO permitting process. The CAFO NMP consists of manure management strategies that minimize the release of excessive nutrients into the surface and groundwater. The CAFO NMPs are based on Natural Resource Conservation Service (NRCS) defined standards and technical expertise. Each NMP varies according to the type of operation and site-specific conditions. According to ADEQ, there are no permitted CAFOs in Arkansas; however, this may change with EPA's final revisions to the CAFO requirements made in October 2008.

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Table 5. Animal units as defined by U.S. Department of Agriculture

Animal	Number of Animals per Animal Unit (AU)
Fattened Cows	1.14
Milk Cows	0.74
Breeding Hogs	2.67
Hogs for Slaughter	9.09
Chicken Layers	250
Chicken Broilers	455
Pullets	250
Turkeys for Breeding	50
Turkeys for Slaughter	67

Section 303(d) Listings and Total Maximum Daily Loads

Section 303(d) of the Clean Water Act requires states to identify waters that do not support their classified uses and to prioritize the impaired waters. The state then must develop a Total Maximum Daily Load (TMDL) for each pollutant causing the impairment. TMDLs are the maximum amount of a given pollutant that a waterbody can assimilate and still maintain its classified uses. A plan to implement the requirements of the TMDL also must be developed.

Fourteen stream segments in the Upper Illinois River Watershed are listed as “impaired” on the Arkansas 303(d) list (2008). Eight of the stream segments were listed by EPA for bacteria related impairments with a high priority for TMDLs or other remedial actions. Four segments were listed by EPA for impairments resulting from elevated total phosphorus concentrations with a low priority for TMDLs or other remedial actions. Two segments were listed by ADEQ as impaired due to siltation, but stated that additional data is needed to verify the impairment.

Section 404 Dredge and Fill Permits and Section 401 Water Quality Certification

Wetlands help maintain water quality by filtering pollutants, help store floodwaters, and provide habitat for wildlife. Sections 404 and 401 of the Clean Water Act control the placement of dredge or fill materials into wetlands and/or other waters of the US. Section 10 regulates impacts to navigable waters of the US. Section 404 regulates dredge and fill activities and is enforced by the US Army Corps of Engineers. Section 401, enforced by ADEQ, requires certification that a project requiring a permit – such as a Clean Water Act Section 404 permit – will not violate the state’s water quality standards. These sections of the Clean Water Act require that impacts to wetlands be avoided or minimized where possible; and where not possible, mitigation may be required. Qualifying waterbodies include any “Other Waters of the US”. The basic definition for these other waters of the US, for the purpose of Section 404, is any water that displays an ordinary high water mark (OHWM). This includes lakes and ponds that have a hydrological connection to a qualifying water and perennial, intermittent, or ephemeral stream channels which exhibit an OHWM.

The two common types of permits issued under Section 404 by the Corps are Individual Permits and Nationwide Permits (NWP). Individual Permits are required when 1) impacts to wetlands exceed 0.5 acre, and/or 2) greater than 300 linear feet of a qualifying waterbody is to be impacted. This Individual Permit includes a period of public review, and processing generally takes between 60 and 120 days. The processing time can be greater if public hearings or environmental statements are required, or if all required information on the permit application form is not provided. NWPs are general permits typically used when minor impacts are necessary to wetlands (less than

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Table 5. 303(d) listed stream segments within the Upper Illinois River Watershed (as reviewed by ADEQ)

Stream Name	Reach	Length (miles)	Pollutant	Category	Priority
Illinois River	020	1.6	Siltation	5d ¹	Low
Illinois River	024	2.5	Siltation	5d ¹	Low
Clear Creek	029	13.5	Pathogen	5d ¹	Low
Sager Creek	932	8.0	Nitrate	5e ²	Low
Baron Fork	013	10.0	Pathogen	5g ³	Low
Illinois River	023	8.1	Pathogen	5g ³	Low
Illinois River	024	2.5	Pathogen	5g ³	Low
Muddy Fork	025	3.2	Pathogen	5g ³	Low
Muddy Fork	025	3.2	Total Phosphorus	5g ³	Low
Illinois River	028	19.9	Pathogen	5g ³	Low
Osage Creek	030	15.0	Total Phosphorus	5g ³	Low
Osage Creek	030	15.0	Pathogen	5g ³	Low
Osage Creek	930	10.2	Total Phosphorus	5g ³	Low
Little Osage Creek	933	10.2	Pathogen	5g ³	Low
Spring Creek	931	8.4	Total Phosphorus	5g ³	Low
Swepeco Lake	Lake	NA	Unknown	5g ³	Low

¹Waters which need data verification to confirm use impairment (additional sampling, biological assessment) before a TMDL or other corrective action(s) is scheduled;

²Waters which are impaired by point source discharges and future permit restrictions are expected to correct the problem;

³Waterbodies that were added to ADEQ’s list of Impaired Waterbodies by EPA.

0.5 acre) or a qualifying waterbody (any impacts less than 300 linear feet). Processing time is generally less and no public review period is necessary.

Mitigation for both wetland losses or stream function and value losses may be required by the Corps for a project authorized under either an individual or nationwide permit. The extent of the mitigation is dependent upon the size, quality, and functionality of the wetland or waterbody to be impacted.

Federal Safe Drinking Water Act

All drinking water systems serving 25 people or more are considered public drinking water systems and are subject to regulation by EPA under the Safe Drinking Water Act. The ADH administers and enforces the drinking water regulations. The majority of drinking water supplies in the watershed come from Beaver Lake. The Arkansas portion of the Upper Illinois River Watershed contains no active, publicly-owned water supply reservoirs. However, some

communities do rely on surface water supplies. Notably, Siloam Springs, Arkansas, draws its supply from the Illinois River.

Below are the key regulatory drivers for the Upper Illinois under the state Drinking Water Act:

Enhanced Surface Water Treatment Rule. This rule established standards for water treatment processes to remove disease-causing organisms found in water supplies, especially parasites such as *Cryptosporidium* and *Girardia*. The rule requires that turbidity in finished filtered water be ≤ 0.3 nephelometric turbidity units (NTU).

Disinfection Byproducts Rule. This rule establishes standards for disinfection levels and limits on the concentrations of chemical compounds that are carcinogenic by-products of disinfection. The rule addresses the levels of disinfectant residuals that must be maintained in the water systems, and regulates two groups of disinfection by-products that are known or suspected carcinogens: total trihalomethanes

(TTHMs) and haloacetic acids (HAA). The concentration limit for each of these groups of compounds is less than 1 milligram of contaminant per liter of water. The compounds must be monitored at least quarterly.

The disinfection by-products rule also regulates total organic carbon (TOC), requiring water treatment systems to keep their annual running average (calculated quarterly) concentration of TOC under 2 milligrams per liter in the finished or treated drinking water.

Federal Food Security Act (Farm Bill). Beginning in 1985 with the passage of the Food Security Act, or Farm Bill, all farm operators in the US were required by law to meet specific soil erosion control standards. Compliance with these standards (including the sodbuster and swampbuster provisions) is now prerequisite for participation in most federal farm programs.

Subsequent Farm Bills in 1990 and 1996 enhanced the water quality benefits of the program by retiring highly erodible lands from production and adding new incentive programs, such as the Wetlands Reserve Program, encouraging farmers to restore farmed wetlands to their natural condition.

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treatment systems to keep their annual running average (calculated quarterly) concentration of TOC under 2 milligrams per liter in the finished or treated drinking water.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a federal non-regulatory program that can provide some water quality protection by restricting development in the floodplain. The NFIP, which is administered by FEMA, makes federally-backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. The program generally includes identifying flood prone areas, elevating buildings above the base flood, and relocating structures out of the floodplain. Local governments may go beyond the minimum FEMA requirements to provide added protection.

STATE REGULATORY DRIVERS

Most of the federal programs highlighted above are administered and enforced by state agencies such as ADEQ and ADH. In addition to the federal regulations, the states of Arkansas and Oklahoma have a number of other programs that affect water quality.

State of Arkansas

AHTD Construction Projects and Completed Facilities. The Arkansas Highway and Transportation Department (AHTD) construction projects and certain facilities and roadway drainage systems managed by AHTD must comply with the federal and state stormwater permitting and management regulations discussed in the previous sections. In Arkansas, ADEQ administers the Clean Water Act Stormwater NPDES permit program. Roads, ditches, and drainage facilities on public property managed by AHTD are considered to be MS4s under the stormwater permitting program. Arkansas Highway and Transportation

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Department construction activities with a disturbed area of 1 acre or more and AHTD facilities (e.g., equipment and materials storage yards) draining to other municipal MS4 – such as those owned and managed by cities and/or counties – are regulated by the ADEQ MS4 permit and the ADEQ General Construction permit. The MS4 stormwater regulations require the following:

- ◆ Development and implementation of an ordinance requiring erosion and sedimentation controls with sanctions necessary to ensure compliance;
- ◆ Implementation of appropriate erosion and sediment control best management practices;
- ◆ Control of waste materials that may adversely impact water quality such as building materials, truck washout, chemicals, litter, and sanitary waste;
- ◆ Site plan reviews that consider water quality impacts of project activities;
- ◆ Communication with the public; and
- ◆ Site inspections and enforcement of control measures.

The ADEQ General Construction permit requires that construction sites disturbing 1 acre or more develop and implement a SWPPP, which must be maintained until site stabilization is complete. Projects disturbing more than five acres must obtain a general construction permit for the project.

The SWPPP required by the ADEQ General Construction permit is based on guidance documents developed by AHTD including the AHTD Erosion and Sediment Control Design and Construction Manual and the AHTD Stormwater Management Plan. In addition, the SWPPP must include the following:

- ◆ Reference to the AHTD Standard Specifications for Highway Construction to provide guidance to contractors regarding the pro-

tection of water quality and wetlands, the use of temporary erosion and sediment control devices, and installation of permanent stormwater control devices;

- ◆ Inclusion in the construction plans of temporary and permanent erosion controls and permanent stormwater control devices as well as standard drawings for each;
- ◆ Contract documents with project specifications and special provisions;
- ◆ Project records including SWPPP inspection reports, daily work reports, pay quantity documentation, and details concerning the timing, placement, and special instructions for installation and maintenance of erosion and sediment controls.

Following construction within an MS4 area, the AHTD is required to meet NPDES permit requirements for completed projects with storm drains serving any AHTD highway, property, facility, or activity connected to a MS4 regulated under the NPDES stormwater permit program. Most AHTD stormwater discharges are regulated under ADEQ's General Small MS4 permit (No. ARRO40000). The general Small MS4 permit then requires AHTD to develop, implement, and evaluate a Stormwater Management Plan (SWMP) to meet the surface water quality standards within each MS4 area. The requirements of the MS4 permit were discussed in Section 4.2.4.3.

Arkansas Highway and Transportation Department has developed a statewide SWMP to meet the requirements of the MS4 permit. This plan describes the minimum procedures and practices used to reduce pollutant loading to storm drain systems and covers all project phases including planning, construction, implementation, maintenance, monitoring, and reporting.

Arkansas Nutrient Surplus Area. The Upper Illinois River Watershed (HUC 11110103) has been designated as a Nutrient Surplus Area under Arkansas Acts 1059 and 1061, as implemented by Title XXII of the Arkansas Natural

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Resources Commission *Rules Governing the Arkansas Soil Nutrient and Poultry Litter Application and Management Program*, effective January 2006. The purpose of these rules is to maintain the benefits derived from the wise use of poultry litter and other soil nutrients while avoiding undesirable effects from excess nutrient applications on the waters of the State. Among other provisions, these rules state that persons applying nutrients from poultry litter to soils or associated crops on land areas greater than 2.5 acres within a Nutrient Surplus Area must apply in compliance with a nutrient management plan (NMP) or poultry litter management plan. Requirements for soil testing, record keeping, placement and timing of litter application and other elements of NMPs are specified in the rules (see next section). Although the rules require the maintenance of records for 5 years and require their availability for inspection by Commission or Conservation District employees, there appear to be no provisions for enforcement or compliance monitoring in the rules.

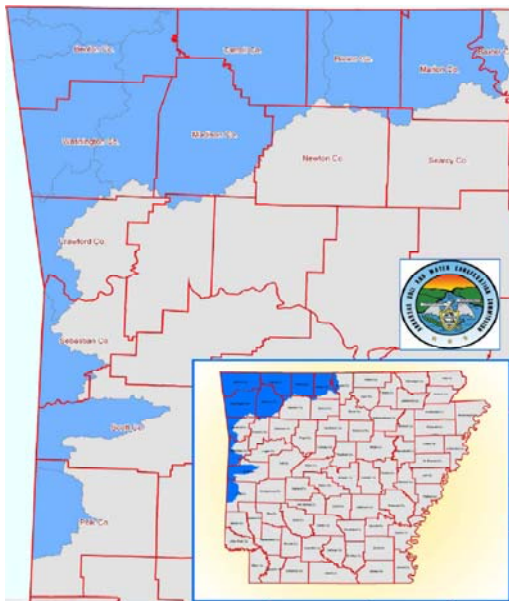


Figure 1. Nutrient surplus areas in Arkansas

Act 1061: An Act to Require Proper Application of Nutrients and Utilization of Poultry Litter in Nutrient Surplus Areas requires that:

- ◆ All nutrient applications on land exceeding 2.5 acres in a Nutrient Surplus Area must be done according to a Nutrient Management Plan;
- ◆ Applications within a Nutrient Surplus Area on residential lands of 2.5 acres or less shall be applied at a rate not to exceed a protective rate (as defined in Title XXII);
- ◆ Nutrients may be applied only by a certified nutrient applicator within Nutrient Surplus Areas;
- ◆ The landowner is responsible for maintaining documentation of the nutrient application in accordance with their plan;
- ◆ Poultry feeding operations within a Nutrient Surplus Area shall develop and implement a poultry litter management plan acceptable to the Arkansas Natural Resources Commission (ANRC); and
- ◆ The poultry litter management planner shall have obtained certification from ANRC in planning.

Additional legislation supports Act 1061, including:

Act 1059: Arkansas Soil Nutrient Management Planner and Applicator Certification Act, requiring the certification of persons to properly develop NMPs or to properly supply soil nutrients and requiring ANRC to develop and implement a nutrient management education, training, and certification program.

Act 1060: An Act to Register Poultry Feeding Operations, establishing annual registration with ANRC of poultry feeding operations where more than 2,500 poultry are housed or maintained.

As described in Section 2.1.4.2, NMPs for poultry litter in the UIRW are currently est-

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imated using the Arkansas P index, which is a risk assessment tool for evaluating phosphorus runoff potential from pastures fertilized with animal manure. The assessment is based on soil, manure and field characteristics as well as management practices within each field. The index is used by NMP writers for determining maximum manure application rates on pastures. More restrictive requirements on poultry litter application have been imposed in the adjacent Eucha-Spavinaw watershed since 2004, based on a watershed specific P index—the Eucha-Spavinaw P Index (ESPI).

Forestry BMP implementation is voluntary in most states, including Arkansas. The Arkansas Forestry Commission publishes BMP guidelines and conducts a BMP implementation survey every 2 years to monitor implementation. The major types of forestry BMPs in the AFC guidance are (1) harvesting, (2) regeneration, (3) roads, and (4) streamside management zones.

History of Phosphorus Issues in the Illinois River

As discussed in Section 2, the State of Oklahoma has long been concerned with the impact of phosphorus loading on Tenkiller Ferry Lake (Lake Tenkiller), an impoundment of the Illinois River, and has listed 6,450 acres of Lake Tenkiller as an impaired water due to low dissolved oxygen and elevated total phosphorus loadings. When the city of Fayetteville, Arkansas, diverted a portion of its wastewater discharge from the White River into the Illinois River Watershed, Oklahoma became concerned about the increased phosphorus loading to Lake Tenkiller and, in 1986, sued to stop Fayetteville's discharge. The dispute reached the U.S. Supreme Court in 1992, which ruled that the downstream state's (i.e., Oklahoma) water quality regulations must be met. After this court ruling, nutrient removal was established in the Fayetteville discharge. Springdale's phosphorus load remained high, but in 2003 the cities of Fayetteville, Springdale, Rogers, Ben-

tonville, and Siloam Springs entered into an agreement with the State of Oklahoma to limit the municipalities' wastewater effluent concentrations of phosphorus to 1 mg L^{-1} (Soerens 2003). The new effluent limit spurred a round of wastewater treatment plant upgrades in northwest Arkansas that will continue until at least 2009.

Oklahoma has contended that the point source agreement alone was not sufficient to ensure attainment of water quality standards in Lake Tenkiller, and that nonpoint loads must also be addressed through the development of a TMDL. In 1997, the states of Arkansas and Oklahoma agreed to a goal of a 40 percent reduction of the 1980 through 1993 average annual total phosphorus loads to Lake Tenkiller (Soerens 2003).

In 2001, Oklahoma and EPA Region 6 developed a draft TMDL for Tenkiller Ferry Lake and the Illinois River watershed, which proposed reductions of 31 to 35 percent in phosphorus loads present in 1990 through 1995. The TMDL analysis identified application of poultry litter to pastures as a major source of phosphorus loading, and the allocations in the draft TMDL called for reductions in phosphorus loading of from 31 to 55 percent from this source. This TMDL has not been finalized. Instead, Oklahoma has adopted another course of action.

The Illinois River was designated by the State of Oklahoma as a Scenic River in 1969. In 2002, the State of Oklahoma adopted a numerical water quality criterion for phosphorus in Scenic Rivers. The regulation stipulates, "The thirty day geometric mean total phosphorus concentration in waters designated "Scenic River" in Appendix A of this Chapter shall not exceed 0.037 mg L^{-1} " (Soerens 2003).

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