Kansas Department of Health and Environment
Division of Environment

STAGE 1 DISINFECTANTS & DISINFECTION BYPRODUCTS RULE
REGULATORY IMPACT STATEMENT

Pursuant to K.S.A.77-416

PROPOSED NEW REGULATIONS
K.A.R. 28-15a-2;
K.A.R. 28-15a-64 through K.A.R. 28-15a-65;
K.A.R. 28-15a-130 through K.A.R. 28-15a-135;
K.A.R. 28-15a-154.

May 12, 2004

Executive Summary of Proposed New Regulations Necessary to Implement the Stage 1 Disinfectants and Disinfection Byproducts Rule under the Safe Drinking Water Act

Legal Authority

The Safe Drinking Water Act (SDWA - P.L.104-182), title XIV of the Public Health Service Act (P.L. 93-523), is the key federal law for protecting public water systems from harmful contaminants. First enacted in 1974 and substantively amended in 1986 and 1996, the SDWA is administered through regulatory programs that establish standards and treatment requirements for drinking water, control underground injection of wastes that might contaminate water supplies, and protect groundwater. The Environmental Protection Agency (EPA) is the federal agency responsible for administering the provisions of the SDWA.

The 1974 law established the current federal-state arrangement in which states may be delegated primary implementation and enforcement authority for the drinking water program. The Public Water Supply Supervision (PWSS) program and the Drinking Water State Revolving Fund (DWSRF) loan program are the basic federal programs for regulating and financing SDWA requirements to the nations public water systems through state, tribal, and territorial governments. Kansas Statutes Annotated (K.S.A.) 65-171m states in part: "The secretary of health and environment shall adopt rules and regulations for the implementation of this act... The standards established under this section shall be at least as stringent as the national primary drinking water regulations adopted under public law..."

Background

Disinfection of drinking water is one of the major public health advances of the last two centuries; it has been a major factor in reducing disease and is still an essential component of public health protection today. Presently, more than 240 million people in the United States consume water that has been disinfected. It is now known, however, that drinking water disinfectants themselves can react with naturally-occurring substances in source water and distribution systems to form organic and inorganic byproducts which may pose health risks. Over the last 15 years, it has also been determined that some microbial pathogens, such as *Cryptosporidium*, are becoming highly resistant to traditional disinfection practices.

In 1996, Congress amended the SDWA by requiring the EPA to develop rules which balance the risks between microbial pathogens and disinfection byproducts (DBPs) in drinking water. EPA responded to this directive in 1998 by promulgating two companion rules, the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR - regulates disinfectants) and the Interim Enhanced Surface Water

Treatment Rule (IESWTR - regulates microbial contaminants). Both of these rules were published on December 16, 1998 and build on existing regulations in the SDWA; they are intended by EPA to form a parallel basis for sets of progressively more protective regulations in the future.

The Stage 1 DBPR applies to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs) that add a disinfectant to their drinking water during any part of the treatment process (primary or residual), and to some transient non-community water systems (TNCWSs) that use chlorine dioxide. It establishes maximum residual disinfectant level goals (MRDLGs) for three chemical disinfectant residuals, it establishes maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for seven disinfection byproducts, and it prescribes a treatment technique for the removal of disinfection byproducts precursor materials from surface water and groundwater "under the direct influence of surface water" (GWUDI). All of the applicable systems serving more than 10,000 persons must be in compliance with the Stage 1 DBPR requirements by January 1, 2002; all applicable systems serving less than 10,000 persons must be in compliance by January 1, 2004.

Federal law now requires that all applicable water systems comply with these drinking water standards regardless of state or tribal law. Concurrent amendments to Kansas Administrative Regulations, however, are necessary to maintain compliance with the provisions of the SDWA regarding state primacy for administrative and enforcement authority and related state eligibility for federal PWSS program grants and DWSRF program loan capitalization grants. The new proposed regulations recommended as K.A.R. 28-15a-2, K.A.R. 28-15a-64 through K.A.R. 28-15a-65, K.A.R. 28-15a-130 through K.A.R. 28-15a-135, and K.A.R. 28-15a-154 are no more stringent than federal law requires for these purposes. KDHE is not required to adopt, and is not proposing to adopt, any of the MRDLGs or any of the MCLGs which have been established by EPA.

As codified under 40 C.F.R. 141, recent federal revisions summarized as the Stage 1 DBPR which now require concurrent amendments to Kansas Administrative Regulations are summarized in their constituent articles, as follows:

Stage 1 Disinfectants and Disinfection Byproducts Rule

Part 141 - National Primary Drinking Water Regulations

Subpart A - General

§ 141.2 Definitions.

Subpart B - Maximum Contaminant Levels

§ 141.12 Maximum contaminant levels for total trihalomethanes.

Subpart C - Monitoring and Analytical Requirements

§ 141.30 Total trihalomethanes sampling, analytical, and other requirements.

Subpart D - Reporting, Public Notification and Recordkeeping

§ 141.32 Public notification.

Subpart F - Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals

§ 141.53 Maximum contaminant level goals for disinfection byproducts.
§ 141.54 Maximum residual disinfectant level goals for disinfectants.

Subpart G - National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels

§ 141.64 Maximum contaminant levels for disinfection byproducts.
§ 141.65 Maximum residual disinfectant levels.

Subpart L - Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors

§ 141.130 General requirements.
§ 141.131 Analytical requirements.
§ 141.132 Monitoring requirements.
§ 141.133 Compliance requirements.
§ 141.134 Reporting and recordkeeping requirements.
§ 141.135 Treatment technique for control of disinfection byproduct (DBP) precursors.

Subpart O - Consumer Confidence Reports

§ 141.154 Required additional health information.

The new proposed regulations recommended as K.A.R. 28-15a-2,K.A.R. 28-15a-64 through K.A.R. 28-15a-65, K.A.R. 28-15a-130 through K.A.R. 28-15a-135, and K.A.R. 28-15a-154 will effectively adopt the federal language of these appurtenant National Primary Drinking Water Regulations by reference.

(K.A.R. 28-15a-12, K.A.R. 28-15a-30, K.A.R. 28-15a-32, and K.A.R. 28-15a-53 through K.A.R. 28-15a-54 are proposed to be reserved.)

Environmental Benefit Statement

1. Need for proposed amendments and environmental benefit likely to accrue.

a. Need

All of the changes are needed to retain approval of KDHE's PWSS program and DWSRF loan program by EPA. The SDWA requires state programs to meet federal primacy requirements for administering and enforcing the SDWA, or they must forfeit their PWSS program grants (approximately $11 million to Kansas in FY2004) and DWSRF program loan capitalization grants (approximately $9.5 million to Kansas in FY2004).

The federal requirements established in the Stage 1 DBPR apply to all CWSs and NTNCWSs that add a disinfectant to the drinking water during any part of the treatment process, and to all TNCWSs that use chlorine dioxide in their treatment process.

b. Environmental benefit

Studies considered by EPA have indicated that exposure to high levels of disinfectants, i.e. chlorine, over long periods of time is associated with blood, liver, and kidney impairments. DBPs are suspected of causing bladder cancer and are associated with other reproductive and developmental disorders; EPA suspects they may also be associated with other types of cancers. Adoption of the proposed regulations is expected to provide an increased level of health protection to the general public through the improved safety of drinking water supplies.

No other direct benefits to the extended environment are anticipated.

2. When applicable, a summary of the research or data indicating the level of risk to the public health or the environment being removed or controlled by the proposed regulations or amendments.

EPA utilized five cost-benefit analysis methodologies to quantify the level of risk being controlled by the Stage 1 DBPR regulations. While none of them individually indicated a definitive cost-benefit effectiveness for the requirements, EPA believes that collectively the studies do justify the costs in relation to the savings in risk. (EPA believes it is appropriate and prudent to err on the side of public health protection when there are indications that exposure to a contaminant may present risks to public health, rather than take no action until risks are unequivocally proven.) Studies based on epidemiological data indicate the number of new bladder cancer cases caused by DBPs in the United States to be between 1,100 and 9,300 per year. Studies using toxicological data, however, indicate a much lower level of incidence - between 2 and 100 cases per year. It was estimated that the average value per statistical life

saved for fatal bladder cancers was about $5.6 million in the United States. EPA estimates that the benefits associated with reducing these bladder cancer cases is $4 billion, which does not include potential benefits from reducing other health effects such as colon / rectal cancers and reproductive problems.

EPA estimates that implementation of the Stage 1 DBPR will provide increased national protection from DBPs to as many as 140 million people, including 20 million who have never been previously covered by rules for DBPs. KDHE estimates that these rule revisions will effect 90% of all public water supply systems in Kansas, or about 2.5 million people.

Further, EPA believes that it will result in a 24% national average reduction of total trihalomethane levels in drinking water supplies and will provide first-time public health protection from exposure to chlorite and bromate. In addition, the implementation of the enhanced softening / enhanced coagulation treatment technique will reduce overall exposure to a broad range of other, non-specified DBPs.

3. If specific contaminants are to be controlled by the proposed regulation or amendment, a description indicating the level at which the contaminants are considered harmful according to current available research.

EPA has set a non-regulatory, non-enforceable limit, or "goal", for each of the subject contaminants and disinfection residuals to establish the levels at which no adverse health effects are anticipated or are known to occur - MCLGs and MRDLGs - which are separate and distinct from the regulatory limits on MCLs and MRDLs. MCLs and MRDLs represent enforceable limits for the maximum feasible levels at which current treatment methodology can reduce disinfectants and disinfection byproducts in drinking water.

MRDLGs, MRDLs, MCLGs, and MCLs
for Stage 1 Disinfectants and Disinfection Byproducts Rule

DISINFECTANT RESIDUAL	MRDLG (mg/L)	MRDL (mg/L)	COMPLIANCE BASED ON
Chlorine	4.0 (as CL_2)	4.0 (as CL_2)	Annual Average
Chloramine	4.0 (as CL_2)	4.0 (as CL_2)	Annual Average
Chlorine Dioxide	0.8 (as ClO_2)	0.8 (as ClO_2)	Daily Samples
DISINFECTION BYPRODUCTS	**MCLG (mg/L)**	**MCL (mg/L)**	**COMPLIANCE BASED ON**
TOTAL TRIHALOMETHANES - Chloroform - Bromodichloromethane - Dibromochloromethane - Bromoform	N/A N/A 0 0.06 0	0.080	 Annual Average
HALOACETIC ACIDS - Dichloracetic acid - Trichloracetic acid	N/A 0 0.3	0.060	Annual Average
Chlorite	0.8	1.0	Monthly Average
Bromate	0	0.010	Annual Average

Public water supplies (PWSs) that use surface water or GWUDI and use conventional filtration treatment are required to remove specified percentages of organic materials, measured as total organic carbon (TOC), that may react with disinfectants to form DBPs. Removal of TOCs must be achieved through a treatment technique, i.e. enhanced coagulation or enhanced softening, unless a system meets alternative criteria.

Required Removal of Total Organic Carbon by Enhanced Coagulation
and Enhanced Softening for Subpart H Systems Using Conventional Treatment

Source Water TOC (mg/L)	Source Water Alkalinity (mg/L as $CaCO_3$)		
	0 - 60	>60 - 120	>120
>2.0 - 4.0	35.0%	25.0%	15.0%
>4.0 - 8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%

Economic Impact Statement

1. Are the proposed regulations or amendments mandated by federal law as a requirement for participating in or implementing a federally subsidized or assisted program?

Yes. Federal law now requires that all CWSs and NTNCWSs that add a chemical disinfectant during any part of their treatment process, and all TNCWSs using chlorine dioxide in their treatment process, must comply with these drinking water standards regardless of state or tribal law. The new proposed regulations recommended as K.A.R. 28-15a-2, K.A.R. 28-15a-64 through K.A.R. 28-15a-65, K.A.R. 28-15a-130 through K.A.R. 28-15a-135, and K.A.R. 28-15a-154 are necessary to maintain compliance with the provisions of the SDWA regarding state primacy for administrative and enforcement authority and related state eligibility for federal PWSS program grants and DWSRF program loan capitalization grants.

2. Do the proposed regulations or amendments exceed the requirements of applicable federal law?

No. The concurrent amendments and proposals recommended are no more stringent than federal law requires for these purposes. KDHE is not required to adopt, and is not proposing to adopt, any of the MRDLGs or MCLGs which have been established by EPA.

3. Description of costs to agencies, to the general public, and to persons who are effected by, or subject to, the regulations.

The core components of KDHE's PWSS program and DWSRF loan program have already been developed and maintained for many years. However, KDHE must continually upgrade its regulations to conform with EPA's regulations to maintain primacy under the SDWA. The regulations will only be minimally revised as it regards the required amendments for the Stage 1 DBPR. There will be costs to the agency and to the general public associated with the amendments which will be significantly offset by EPA grants to KDHE for the PWSS program and the DWSRF loan program.

a. Capital and annual costs of compliance with the proposed regulations or amendments and the persons who will bear those costs.

The primary costs associated with these proposed regulations will be borne by the PWSs who are required to conduct the required sampling, analysis, and monitoring, and in those cases where standards are exceeded, to provide treatment for the removal of contaminants and residuals to achieve the standards. As with KDHE, the core components of compliance with the SDWA for the majority of these subject public water systems have already been developed and maintained for many years. These activities will, however, require additional time, labor, and/or financial resources by these entities to generate, maintain,

retain, disclose, and/or provide information to the regulating party as well as developing and maintaining additional technological infrastructure.

EPA estimates that, assuming a 7% cost of capital in1998 dollars under a 20 year amortization period, the total annualized cost in the United States for implementing the Stage 1 DBPR is $701 million for the 72,050 systems which will be regulated. This includes:

- treatment upgrade costs to utilities of $593 million.
- start-up and monitoring costs to utilities of $91.7 million.
- start-up and monitoring costs to states of $17.3 million.

It is expected that the cost of implementing these proposed regulations will ultimately be passed through to the public water supply customers. EPA estimates that:

- 95% of households will incur an increase of less than $1 per month;
- 4% of households will incur an increase of $1 to $10 per month;
- and less than 1% of households will incur an increase between $10 and $30 per month.

KDHE does not expect water systems using groundwater as their source to have difficulty meeting these new regulations. Water systems using surface water as their source will generally need to modify their treatment processes to comply.

There are many different treatment options available for surface water systems which will be required to comply with this new rule. Treatment options vary from constructing a new treatment plant or upgrading an existing treatment plant, to simply making a change in chemicals used to treat the water. For many water systems, treatment options are also influenced by other rules such as the IESWTR or LT1ESWTR. The actual costs of compliance won't be known until communities evaluate their options, and the costs associated with these treatment process upgrades are expected to be extremely variable depending on the current system size and age, and on the present system process configuration.

"Average" or "typical" system costs for new rule compliance can be masked by several factors. With ever-changing and more complex drinking water regulations, some water systems benefit by making costly improvements to address more than one new rule or regulation at once. In some cases, water systems are also replacing infrastructure which is already very old, outdated, and badly in need of repair. Other systems may find that it is entirely more cost-effective to discontinue primary treatment operations and opt to purchase and pipe water from other nearby systems.

For example, in order to comply with all of the new rules, the City of Burlington opted to construct a totally new water treatment plant at a cost of $5.8 million. The City of Baxter Springs recently upgraded their existing water treatment plant to comply with all of the new rules and regulations at a cost of $2.6 million. The City of Coffeyville completed modifications to comply with just the Stage 1 DBPR and IESWTR at a cost of $1.7 million. Woodson Rural Water District No. 1 recently decided to just purchase water from Yates Center and completed a new 10 mile water transmission line at a cost of $942,431.

Following is a summary of monitoring requirements and cost estimates expected to be experienced by CWSs and NTCWSs in Kansas which are subject to the Stage 1 DBPR. These costs have been estimated by multiplying the total number of samples required for various classifications of CWSs and NTCWSs by the current KDHE lab price of analysis for each of the disinfection byproduct constituents required to be monitored.

Stage 1 Disinfectants and Disinfection Byproduct Rule
Monitoring Requirements and Costs

Applies to all sizes of Community Water Systems and Non-Transient Non-Community Water Systems which add disinfectant (659 Systems)

Source and Population Served	TTHM	Cost Per Sample	Cost Per Year	HAA5	Cost Per Sample	Cost Per Year	TOC & Alkalinity	Cost Per Sample	Cost Per Year	Total Annual Cost
Surface Water or GWUDI ≥ 10,000	4/plant/ quarter	$40.00	**$640**	4/plant/ quarter	$125.00	**$2,000**	2/plant/ month	$16.00	**$384**	**$3,024**
Surface Water or GWUDI 500 - 9,999	1/plant/ quarter	$40.00	**$160**	1/plant/ quarter	$125.00	**$500**	2/plant/ month	$16.00	**$384**	**$1,044**
Surface Water or GWUDI < 500	1/plant/ year	$40.00	**$40**	1/plant /year	$125.00	**$125**	2/plant/ month	$16.00	**$384**	**$549**
Ground Water ≥ 10,000	1/plant/ quarter	$40.00	**$160**	1/plant/ quarter	$125.00	**$500**	N/A	N/A	N/A	**$660**
Ground Water < 10,000	1/plant/ year	$40.00	**$40**	1/plant/ year	$125.00	**$125**	N/A	N/A	N/A	**$165**

These costs have been projected as applicable to the Kansas CWSs and NTCWSs to derive an estimated total cost for all systems, as follows:

Stage 1 Disinfectants and Disinfection Byproduct Rule Monitoring Costs

Source and Population Served	Approximate Number of Systems Affected in Kansas	Total Annual Cost Per System	Total Annual Cost for All Systems
Surface Water or GWUDI ≥ 10,000	19	$3,024.00	$57,456.00
Surface Water or GWUDI 500 - 9,999	68	$1,044.00	$70,992.00
Surface Water or GWUDI < 500	14	$549.00	$7,686.00
Ground Water ≥ 10,000	14	$660.00	$9,240.00
Ground Water < 10,000	544	$165.00	$89,760.00
			$235,134.00
Estimates do not include 323 CWS & NTNCWS which purchase		**Average Annual Cost per System**	**$356.80**

These costs will be incurred by the public water suppliers and their customers even if Kansas does not adopt the proposed regulations because EPA will still be enforcing the Stage 1 DBPR. Some systems may wish to consider other cost / compliance alternatives to investing in new or upgraded facilities such as purchasing water from other sources or consolidating with other systems.

b. Initial and annual costs of implementing and enforcing the proposed regulations or amendments, including the estimated amount of paperwork, and the state agencies, other governmental agencies or other persons who will bear the costs.

KDHE has adopted a new laboratory analysis fee schedule in anticipation of these increased costs to the agency.

KDHE added four additional positions to implement the Stage 1 DBPR, and two additional rules, the Interim Enhanced Surface Water Treatment Rule and the Long Term 1 Enhanced Surface Water Treatment Rule. These positions are an environmental engineer, two environmental scientists, and a clerical position. Salary, benefits, and other costs are an estimated $203,000 annually. These costs are funded with a grant from the EPA.

No other state agencies, governmental agencies, persons, or entities are anticipated to incur or bear any of the costs associated with these proposed regulations.

c. Costs which would likely accrue if the proposed regulations or amendments are not adopted, the persons who will bear the costs and those who will be effected by the failure to adopt the regulations.

The SDWA requires state programs to meet federal primacy requirements for administration and enforcement authority in order to qualify for the PWSS program grants and DWSRF program loan capitalization grants. Failure to amend these regulations would result in KDHE losing approximately $1.1 million to Kansas program grants in FY2004 and DWSRF program loan capitalization grants of approximately $9.5 million to Kansas in FY2004. This would in turn negatively impact the public water suppliers and their customers who would not be eligible for state financial assistance but must still comply with EPA requirements.

d. A detailed statement of the data and methodology used in estimating the costs used in the statement.

The data and methodology used in preparing this regulatory impact statement were primarily obtained from EPA references, documents, and publications on the Final Stage 1 Disinfectants and Disinfection Byproducts Rule as published in the *Federal Register* on December 16, 1998. Where supportable, some general inferences were made to relate national level data to the State of Kansas and KDHE. Representative cost figures for Kansas systems were also obtained from the KDHE DWSRF loan program data.

e. Description of any less costly or less intrusive methods that were considered by the agency and why such methods were rejected in favor of the proposed regulation.

There are no less intrusive or less costly methods that were available for consideration by KDHE to achieve the purposes of the proposed amendments.

f. Consultation with the League of Kansas Municipalities, Kansas Association of Counties, and Kansas Association of School Boards.

KDHE anticipates that the proposed amendments will have a direct and substantial fiscal impact on the constituency of the League of Kansas Municipalities. There may be a very minimal direct impact to a small constituency of the Kansas Association of School Boards. No direct impact is anticipated on the constituency of the Kansas Association of Counties. A copy of this regulatory impact statement was sent to each of these organizations on May 12, 2004.