KANSAS IMPLEMENTATION PROCEDURES

Wastewater Permitting

Prepared by The Kansas Department of Health and Environment

Bureau of Water

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These written procedures provide a uniform mechanism for drafting National Pollutant Discharge Elimination System (NPDES) permits and Kansas Water Pollution Control permits to meet State and Federal laws and regulations.

The Permitting Process

The discharge of pollutants from point sources to waters of the state is controlled via the issuance of discharge permits. These permits are referred to as Kansas Water Pollution Control Permits or National Pollutant Discharge Elimination System (NPDES) permits. These permits are issued jointly by the Kansas Department of Health and Environment (KDHE) and the Environmental Protection Agency (EPA). Wastewater permits for treatment facilities that do not discharge to surface waters of the state are referred to as non-overflowing, or non-Q facilities. These permits are issued solely by KDHE. Both discharge and non-overflowing permits are issued under the authority of K.S.A. 65-164 *et se*q. While discharge permits carry pollutant limitations on the effluent, non-overflowing permits do not, as there is no routine ongoing discharge. Both types of permits may include schedules of compliance and special conditions to prevent or minimize pollution.

Permit limits for the discharge of effluent are based on meeting technology-based or water quality-based limits, as well as on best professional judgment (BPJ). Limits are imposed to protect existing uses, achieve designated uses, and limit degradation of existing quality of the waters of the state. KDHE issues both general and individual permits. General permits are developed to address particular categories of discharges with similar characteristics. Because the discharges have similar characteristics, they require the same effluent limitations, permit conditions, and sampling regimes.

General permits reduce paperwork and permit issuance time due to the fact the general permit is placed on public notice one time. Once the general permit becomes final, an entity files a notice of intent (NOI) to discharge. If the applicant qualifies, the permit is issued without further public notice, with the previously approved conditions.

General permits are currently utilized by KDHE for the following categories of discharges: Concrete Ready-Mix Plants, Stormwater, and Hydrostatic Test Discharges.

For discharges not covered by general permits, individual permits must be developed as follows:

I. Development of Effluent Discharge Limitations

Development of effluent limitations involves a hierarchical process. The first step in the process involves the application of a minimum level of treatment for suspected pollutants or categories of pollutants. These limitations are established for certain categorical industries through effluent guidelines promulgated by EPA in 40 CFR Part 400, Subchapter N. The minimum level of treatment for municipal facilities is referred to as secondary treatment and is promulgated by EPA in 40 CFR Part 133.

The second step in the process involves comparison of the technology-based limits derived from the first step to water quality-based effluent limitations (WQBELs) which may include limits set by Total Maximum Daily Loads (TMDLs). The WQBELs are derived from application of the Kansas Surface Water Quality Standards (KSWQS) and standards promulgated by EPA for the State of Kansas. The more stringent limit between the technology-based limitation and the WQBEL is used in the permit.

In those cases where there are no technology-based standards or applicable water quality criteria, BPJ may be used in establishing permit limitations. The most stringent limit among the technology-based limitations, the WQBEL, or BPJ is used in the permit.

Kansas Statutes and Regulations essentially adopt the 40 CFR Part 125 permitting requirements. In general, the Federal regulations state that technology-based treatment requirements under section 301(b) of the Clean Water Act (Act) represent the minimum level of control, which must be imposed on a permit issued under section 402 of the Act.

A. Effluent Guidelines - Categorical Industrial Facilities

The Effluent Guidelines by EPA as in effect on July 1, 1985 are adopted by reference in K.A.R. 28-16-57a. These regulations prescribe effluent limitations guidelines for existing sources, standards of performance for new sources, and pretreatment standards for new and existing sources pursuant to the Clean Water Act.

Most effluent guidelines are based on production rates. To calculate permit limits, effluent guideline values are multiplied by the facility's production rate. Consideration has to be given as to whether production rates will remain constant over the life of the permit. If not, the tiered permit limits based on projected production levels may have to be incorporated into the permit.

B. Secondary Treatment Requirements - Municipal/Commercial Facilities

1. Mechanical Plants

Secondary treatment limit will be set as a monthly average not to exceed 30 mg/L for the five-day biological oxygen demand (BOD_5) and total suspended solids (TSS). Secondary treatment also requires a pH value of 6.0 to 9.0, unless a permittee demonstrates that inorganic chemicals are not added to the waste stream as a part of the treatment process, and that industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0. A carbonaceous biochemical oxygen demand ($CBOD_5$) of 5 mg/L less than the BOD_5 limit is considered to be equivalent to a BOD_5.

2. Lagoon Systems

Secondary treatment will be set as a monthly average at 30 mg/L for BOD_5 (or 25 mg/L for $CBOD_5$) and 80 mg/L for TSS where treatment is primarily provided by lagoons. *(See Appendix* A).

If a lagoon system is designed to meet the KDHE Minimum Standards of Design - three or more cells with at least 120-day detention or two cells with at least 150-day detention - the lagoon system permit will contain a requirement for monitoring of ammonia and E. coli bacteria. A study conducted by KDHE indicates that lagoon systems treating domestic strength wastewater and meeting the KDHE design criteria consistently produce effluent that meets or is below the criteria for ammonia and bacteria at the discharge pipe prior to mixing. Additionally, data provided by EPA Region VII indicates that 120-day detention lagoons will remove fecal coliform bacteria to less than one colony/100ml, or 200 times less than the former primary contact recreation criterion. Therefore, monitoring will provide trend data indicating the point at which a lagoon system is beginning to fail. Monitoring for ammonia and bacteria is also consistent with EPA Region VII permits issued on tribal lands in Kansas.

If a lagoon system does not meet the KDHE's minimum standards of design, permit limits will be developed for ammonia and E. coli bacteria using the factors described in this section.

BOD_5 limits of 30 mg/l are established for lagoon systems meeting the KDHE design criteria. A study conducted by KDHE indicates that lagoon systems treating domestic strength wastewater and meeting the KDHE design criteria consistently discharge soluble BOD_5 at less than 10 mg/l. Lagoons, by nature, generate algae. Due to algae in the lagoon effluent, EPA has approved total suspended solids limits of 80 mg/L as a monthly average in Kansas.

Algae also exert an oxygen demand in the BOD test due to the fact that BOD incubators are devoid of light. Without light, algae do not produce oxygen via photosynthesis. In the open environment of a surface water, algae would be exposed to sunlight and would produce oxygen to at least partially offset the algal oxygen demand. Streeter and Phelps acknowledged this phenomenon in their classic model used to predict oxygen demand. They were unable, however, to quantify the oxygen production. Furthermore, since algae remain living organisms in the effluent that produce oxygen as well as demand oxygen, the exertion of maximum BOD (thus dissolved oxygen sag) typically will not occur at the same location in a receiving water as it will for soluble BOD. Finally, there is a lack of any monitoring evidence showing that discharge from properly designed lagoon systems have caused in-stream biological impacts due to dissolved oxygen depletion. Therefore, based on facts that: 1) algae add oxygen to a receiving water during daylight hours; 2) maximum oxygen demand occurs at a location in the receiving water that is different from maximum oxygen demand indicated by the BOD test; and 3) there is a lack of monitoring data tying discharge from properly designed lagoons to in-stream biological impacts, a technology-based monthly limit for BOD_5 at 30 mg/L will be used for lagoon systems.

C. Water Quality-Based Effluent Limits (WQBELs) - Municipal and Industrial Facilities

Any discharge to waters of the state must meet limits that assure the Kansas Surface Water Quality Standards (KSWQS) and EPA-promulgated standards will be met. The only exception is in the case of a variance being granted based on widespread socioeconomic impacts. The KSWQS consist of definitions, classification of streams, use designations, narrative criteria, numerical criteria, and antidegradation

policy. Desktop modeling is utilized to develop permit effluent limitations that assure compliance with the KSWQS. Inputs into the modeling process include the following items:

1. Upstream Water Quantity

a. Seven-Day Ten Year Stream Flow (7Q10)
Applicable Regulation: 28-16-28b
28-16-28c
28-16-28e

The critical low flow utilized by KDHE to determine WQBELs is the hydrologically-based 7Q10 flow, or a scientifically-based alternate. Whenever possible, KDHE will assign a 7Q10 flow to a receiving stream on the basis of United States Geological Survey (USGS) stream flow data. KDHE may, at its discretion, modify the assigned 7Q10 value to reflect gains or losses in flow occurring between the discharge of interest and the reference (nearest upstream or downstream) USGS gaging station. In the determination, KDHE may exclude stream flow data measured prior to construction of upstream flow control structures and exclude stream flow data measured prior to guaranteed stream flow rates based on water assurance district agreements. KDHE may also exclude data not representative of current flow conditions (i.e., increased interstate flows). For streams lacking an adequate USGS database, other sources of hydrological data (e.g., runoff yield maps or KDHE stream flow data) may be used by KDHE in the estimation of 7Q10 flow.

As per K.A.R. 28-16-28e, the numeric criteria in "Kansas Surface Water Quality Standards: Tables of Numeric Criteria" shall not apply when:

i. stream flow is less than 0.03 cubic meters per second (1 cubic foot per second) for waters designated as expected aquatic life or restricted aquatic life use; or

ii. stream flow is less than 0.003 cubic meters per second (0.1 cubic feet per second) for waters designated as special aquatic life use.

Therefore, for streams designated for expected or restricted aquatic life use and with a critical low flow less than 0.03 cubic meters per second, permit limits will be developed based on meeting numeric criteria at such times the critical low flows are at, or above 0.03 cubic meters per second. Similarly, for streams designated for special aquatic life use and with a critical low flow less than 0.003 cubic meters per second, permit limits will be developed based on meeting numeric criteria at such times the critical low flows are at, or above 0.003 cubic meters per second.

Regardless of flow, the Department reserves the right to set permit limits which will be protective of downstream designated uses.

b. Alternate Low Flow

Applicable Regulation: 28-16-28b
28-16-28c

An alternate low flow must have a sound basis for its use. Examples include water assurance district guaranteed minimum low flows or flow based on allowable exposure frequencies and durations for species of concern. For instance, the most current available study on ammonia toxicity (EPA 1999) recommends utilizing a 30-day exposure period when determining ammonia limitations. Therefore, a thirty-day, ten-year (30Q10) critical low flow will be used in determining effluent limits for the chronic ammonia criterion.

2. Pollutant Parameters

Effluent limitations are determined for those parameters identified by the permittee or permit writers to have a reasonable potential to be found in the discharge in concentrations exceeding the KSWQS criteria. Background stream concentrations are derived or extrapolated from in-stream data collected through the KDHE stream water monitoring network.

3. Reasonable Potential

Applicable regulation: 28-16-28e

Reasonable Potential means the effluent from the facility normally does not exceed the WQBELs placed in the permit but because of variations in the effluent due to influent and treatment variability, it has a potential to do so.

KDHE uses the attached Reasonable Potential procedure developed by EPA Region VI. *(See Appendix B)*

4. Mixing Zones

a. Streams

Applicable Regulation: 28-16-28c

In cases where the ratio of the receiving stream low flow to effluent discharge design flow listed on the permit is less than 3:1, the default mixing zone consists of 100% of the stream flow and a length of 300 meters. Chronic aquatic life criteria and all other non-aquatic life criteria must be met at this point with the exception of drinking water criteria, which must be met at the point of diversion. Where the ratio of the receiving stream low flow to effluent discharge design flow listed on the permit is greater than or equal to 3:1, the default mixing zone is 300 meters in length and:

i. up to 25% of the stream flow for waters classified as exceptional state waters or designated as special aquatic life use waters, as calculated by a mixing zone modeling system, such as CORMIX-GI v7.0 or higher, or any other equivalent model as determined by the Secretary.

ii. up to 50% of the stream flow for waters designated as expected aquatic life use waters, as calculated by a mixing zone modeling system, such as CORMIX-GI v7.0 or higher, or any other equivalent model as determined by the Secretary.

iii. up to 100% if the stream flow for waters designated as restricted aquatic life use waters, as calculated by a mixing zone modeling system, such as CORMIX-GI v7.0 or higher, or any other equivalent model as determined by the Secretary.

iv. In cases where surface waters with existing discharges are classified as Outstanding National Resource Waters (ONRW), mixing zones will be allowed for those existing discharges for the term of the existing permit. No new discharges will be allowed after the reclassification. At the time of permit renewal or modification for an existing discharge permit, the mixing zone allocation for the existing discharge will be evaluated and the percentage of cross-sectional area or flow may be reduced or eliminated based on the new ONRW classification. The mixing zone evaluation will use available stream data, historical plant data, receiving stream and plant flows, and aquatic community health to determine whether a mixing zone and what size will be allowed in the renewed or modified permit.

For the implementation of the above mixing zone requirements, the mixing zone can be modified based on (1) the proximity of downstream public drinking water intakes, swimming areas, boat ramp areas and mouths of classified stream segments, (2) the overlapping of mixing zones, (3) significant environmental impact or public health concerns from the unmixed effluent using best professional judgment. In these situations, the mixing zone will be reduced.

Mixing zones may also be modified based on the use of alternate low flows, or studies which support the use of a modified mixing zone that may incorporate methods outlined in EPA's Technical Support Document for Water Quality-based Toxics Control.

A zone of initial dilution (ZID) contained within the boundaries of the mixing zone may be granted for some discharges. The ZID can comprise no more than 10% of the volume of the mixing zone immediately below the discharge point. The zone of initial dilution is the area within the mixing zone where both acute and chronic aquatic life criteria may be legally exceeded. Where mixing zones are not allowed, a zone of initial dilution is prohibited. The Department also reserves the right to prohibit a zone of initial dilution, based on site-specific conditions, where a mixing zone has been granted.

b. Lakes

Applicable Regulation: 28-16-28c

Mixing zones within lakes classified as outstanding national resource waters or exceptional state waters defined in K.A.R. 28-16-28b, as well as lakes designated as special aquatic life use waters defined in

K.A.R. 28-16-28d, are prohibited by KDHE. Although mixing zones may be permitted in other classified lakes (expected or restricted aquatic life use waters), KDHE will require permit applicants to comply with the physical limitations for mixing zones set forth in K.A.R. 28-16-28c. Evidence obtained through field studies, dispersion modeling analyses, or other appropriate methods will be considered by KDHE during the permitting procedure.

Whenever possible, estimates of lake volume at conservation pool will be based on data provided by the official lake planning or administrative authority (e.g., U.S. Army Corps of Engineers, Bureau of Reclamation, Natural Resources Conservation Service, Kansas Department of Wildlife, Parks, and Tourism). When lake volumetric data are unavailable or of questionable accuracy, the permit applicant will be encouraged to conduct appropriate morphometric and hydrological surveys to provide KDHE with a scientifically defensible estimate of conservation pool volume. A mixing zone within a classified lake will not exceed more than one percent of the lake conservation pool volume.

c. Wetlands

Applicable Regulation: 28-16-28c

Mixing zones within classified lacustrine or palustrine wetlands are prohibited by KDHE due to the relatively slow circulation and limited mixing of these waters. At a minimum, effluent discharged into a classified wetland must meet all applicable aquatic life support, water supply, food procurement, and recreational criteria, prior to contact with the receiving water unless the wetlands are utilized as part of a wastewater treatment process or site-specific criteria apply.

d. Ponds

Applicable Regulation: 28-16-28c

Mixing zones within classified ponds are prohibited by KDHE.

5. Permit Limit Derivation

Applicable Regulation: 28-16-28c
28-16-28d
28-16-28e
28-16-28f

a. Disinfection

In areas of downstream high population density (urban streams), KDHE will use the best professional judgment limits, based on best available technology and the authority of Kansas Statute 65-171(d) and K.A.R. 28-16-28c, to routinely require continuous (year-round) disinfection for public health protection.

In surface waters where downstream primary contact recreation is one of the designated uses, or in urban streams, the discharger shall be required to meet primary contact recreation criteria for E. Coli at the end-of-pipe.

Where chlorine or any other halogen is used as the disinfectant, dechlorination (dehalogenation) will be required. In some cases, the water quality-based effluent limitations for chlorine are not quantifiable using EPA approved analytical methods. KDHE has determined the current acceptable quantification level for total residual chlorine in treated wastewater to be 100 ug/L. The permitee will conduct the analyses in accordance with the method specified and will utilize a standard equivalent to the minimum detection level. For reporting purposes, actual analytical values will be reported. Measured values above the quantification limit or the permit limit, whichever is higher, will be considered violations of the permit. Values below the quantification limit will be considered to be in compliance with the permit limitation and as zero (0) when utilized in any subsequent calculations. The quantification threshold does not authorize the discharge of chlorine in excess of the water quality-based effluent limits stated in the permit.

b. Metals

Applicable regulation: Kansas Surface Water Quality Standards: Tables of Numeric Criteria – Tables 1a and 1b

Tables 1a and 1b of the referenced regulation provide in-stream water quality-based limits for certain metals based upon the surface water designated use categories. KDHE routinely conducts compliance monitoring studies on the effluent from discharging wastewater treatment facilities at a frequency based upon the size and nature of the wastewater treatment facility, the type of industrial contributors to the facility, and the characteristics and designated uses of the receiving stream. Major discharging wastewater treatment facilities (≥1 MGD) and minor discharging wastewater treatment facilities (<1 MGD) with pretreatment contributors are generally monitored once a year. Part of this compliance monitoring involves determining the concentrations of the pollutant metals listed in Tables 1a and 1b of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria" in the wastewater treatment plant effluents.

Upon request, or during the permit renewal period, KDHE will calculate an allowable concentration in the wastewater treatment facility effluent for each of the metals listed in Tables 1a and 1b of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria". Permit limits will be expressed as Total Recoverable Metals.

Parameters are:

i. Metal Limits in the receiving stream: Use Table 1a or equations in Table 1b as appropriate in "Kansas Surface Water Quality Standards: Tables of Numeric Criteria".

ii. Hardness (as CaCO3): Use the 90th percentile stream values as measured. If insufficient, use data from similar streams and near the subject location.

iii. Stream Flow: Use critical low flow.

iv. Effluent Flow: Use design flow from the NPDES permit, or flow as requested on the permit application.

v. Receiving Stream Background Metals Data: Use the 50th percentile of measured stream values. Use zero for all values reported below the minimum detection limit.

vi. Effluent Metals Data: Use measured data. Use zero on all values reported below the minimum detection limit.

The effluent metals limits as calculated are compared with metal concentrations determined during compliance monitoring using the Reasonable Potential procedure discussed in Appendix B.

c. Five-day Biochemical Oxygen Demand (BOD_5)
Applicable regulation: Kansas Surface Water Quality Standards: Tables of Numeric Criteria - Table 1g

Five-day Biochemical Oxygen Demand (BOD_5) is calculated utilizing a modified Streeter-Phelps equation. The calculations are performed in an iterative manner until the effluent BOD_5 of a discharge produces an in-stream dissolved oxygen concentration of not less than 5.0 mg/L.

d. Ammonia
Applicable regulation: Kansas Surface Water Quality Standards: Tables of Numeric Criteria - Tables 1c, 1d, 1e, and 1f

Chronic and acute ammonia criteria will be determined using the in-stream pH below the chronic mixing zone after complete mixing with the wastewater effluent has occurred. Average monthly in-stream temperatures will also be used to determine chronic and acute ammonia criteria.

In accordance with EPA's *1999 Update of Ambient Water Quality Criteria for Ammoni*a, the Department has determined that early life stages (ELS) absent criteria, provided in Table 1e of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria", can be routinely applied on an ecoregional and seasonal basis in Kansas. Early life stages of fish species are not expected to occur in Kansas surface waters

during the months of November through February for most parts of the State. Because early life stages are expected to occur in certain segments of the lower Kansas River and the Missouri River, ELS absent criteria will not be applied in those segments shown in Table 1f of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria". Application of the ELS absent criteria outside of the months February through November, or in surface water segments listed in Table 1f of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria", will require a site-specific literature and field examination of the fisheries community to establish the absence of early life stages. A thorough literature review for those fish species expected to occur in the surface water must be conducted to analyze historic fisheries information, expected spawning periods, spawning habitat requirements, residence times of early life stages, and other factors contributing to fish ELS absence. A thorough field examination of the fisheries community will also be required. A minimum of six seasonally based fish sampling events that include the time of year where ELS absent criteria is being requested, will be required to establish the absence of ELS. Fish sampling methodologies, identification methodologies, and use of historic fisheries data must be approved by KDHE prior to initiating sampling.

e. Other parameters

Limitations for other pollutant parameters are developed utilizing steady state dilution modeling. For modeling purposes, actual background concentrations for the parameters in question are utilized where available.

6. Whole Effluent Toxicity

a. Species

Acute and chronic toxicity testing of discharges will use invertebrate and vertebrate species. Acute invertebrate toxicity testing will be conducted on any of the following daphnid species:

Daphnia Pulex
Daphnia magna
Ceriodaphnia dubia

Chronic invertebrate toxicity testing will be conducted on *Ceriodaphnia dubia* unless an alternate species is approved by KDHE.

Vertebrate toxicity testing will be conducted on the fathead minnow *Pimephales promela*s.

b. Toxicity testing

i. All KDHE-defined major discharging wastewater treatment facilities, except those facilities classified as majors because of non-contact cooling water, will be required to conduct, at a minimum, an annual acute or chronic toxicity monitoring test on a representative sample of the wastewater effluent. KDHE will utilize best professional judgment to determine if additional or more frequent toxicity testing is appropriate.

ii. KDHE will utilize best professional judgment to determine when other wastewater treatment facilities will be required to conduct acute or chronic toxicity monitoring. In this determination, KDHE will consider the size and type of industrial contributions to the wastewater system, previous toxicity testing results, the potential causes for the toxicity, the relative size and use designation of the receiving surface water body, and information from stream studies.

c. Acute toxicity

Procedures for toxicity testing will be in conformance with the EPA publication titled "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms", fifth edition, October 2002. Monitoring and effluent limitations for acute toxicity as defined in K.A.R. 28-16-28b, will be included in permits using the following criteria:

i. When the allowable median lethal concentration calculated at the edge of the zone of initial dilution is 100% or less, an acute toxicity test will be utilized. This can occur when the stream mixing dilution zone is large as compared to the facility design volume, such as on the Missouri River.

ii. KDHE may also use the acute toxicity test to determine potential toxicity from a new discharger or an existing discharge with substantially changed quantity or quality of effluent.

iii. Whenever results from two consecutive or any two of four consecutive acute toxicity tests indicate the effluent is more toxic than levels established in the permit, and the cause for the toxicity is not apparent, the permittee will be required to conduct additional acute toxicity tests. Results from KDHE labs, EPA labs, and KDHE certified labs are acceptable. If the results of additional toxicity tests indicate no acute toxicity at the edge of the zone of initial dilution, the testing frequency will be returned to previous levels. If acute toxicity continues, additional testing will continue and the permittee will be required to conduct a Toxicity Inventory Evaluation (TIE) in accordance with EPA guidance to attempt to determine the source and type of toxicity being discharged. KDHE may require a toxicity inventory evaluation at any time during the additional testing. The toxicity will need to be eliminated through a Toxicity Reduction Evaluation (TRE).

d. Chronic Toxicity

Procedures for chronic toxicity testing will be in conformance with the EPA publication titled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", fourth edition, October 2002.

Monitoring and permit limit requirements for chronic toxicity, as defined in K.A.R. 28-16-28b, may be included in permits using the following criteria:

i. When the allowable median lethal concentration calculated at the edge of the zone of initial dilution exceeds 100%, a chronic toxicity test will be utilized. This situation occurs on almost all Kansas streams except the Missouri River.

ii. When significant environmental damage is determined through in-stream bioassessment procedures in a classified surface water flowing at or above low flow conditions as defined in K.A.R. 28-16-28c, and the damages are believed to be caused by a wastewater discharge, even though no acute toxicity is detected in the wastewater effluent, a chronic toxicity test may be utilized.

iii. Whenever results from two consecutive or any two of four consecutive chronic toxicity tests indicate the effluent is more toxic than levels established in the permit, and the cause for the toxicity

is not apparent, the permittee will be required to conduct additional chronic toxicity tests. Results from KDHE labs, EPA labs, and KDHE certified labs are acceptable. If the results of additional toxicity tests indicate no chronic toxicity at the edge of the mixing zone, the testing frequency will be returned to previous levels. If chronic toxicity continues, additional testing will continue and the permittee will be required to conduct a Toxicity Inventory Evaluation (TIE) in accordance with EPA guidance to attempt to determine the source and type of toxicity being discharged. KDHE may require a toxicity inventory evaluation at any time during the additional testing. The toxicity will need to be eliminated through a Toxicity Reduction Evaluation (TRE).

D. Best Professional Judgment

For pollutants where there are no effluent guidelines, or where there are no water quality criteria, best professional judgment may be used in developing permit limitations.

II. Administrative Permit Issuance

A. Certification Procedure

Applicable regulation: 28-16-28f

KDHE will issue a water quality certification for any actions taken by the department as described in K.A.R. 28-16-28f. The certification process is outlined in Appendix C.

For major wastewater treatment facilities required to have federal licenses or permits pursuant to the federal clean water act, the department will certify the actions via Fact Sheets and the permits. The Fact Sheet will contain the certification statement and summarize the supporting documents used to develop the permit limits and conditions. For minor wastewater treatment facilities required to have federal licenses or permits pursuant to the federal clean water act, the department will certify the actions via the Statements of Basis form and the permits. The Statement of Basis form will contain the certification statement and summarize the supporting documents used to develop the permit limits and conditions.

For other minor treatment facilities required to have State permits but not federal licenses or permits, KDHE will certify the actions via KDHE Review Checklists and Kansas Water Pollution Control permits.

For other actions taken by the department as described in K.A.R. 28-16-28f, KDHE will issue a water quality certification within the documents approving the action.

B. Parameter Monitoring, Limits, and Frequency

Applicable regulation: 28-16-28e
28-16-28f

1. Parameter Monitoring

The Kansas Surface Water Quality Standards (KSWQS) provide a list of parameters with in-stream water quality numeric criteria. In addition, the general narrative criteria state that surface waters will be free from the harmful effects of substances that originate from artificial sources of pollution and produce any public health hazard, nuisance condition, or impairment of designated use.

Many of the potential pollutants listed in the tables of the KSWQS are used almost exclusively in specialized industries and are generally attributed to those industries. Other potential pollutants are easily volatilized, treated, chemically bound, or eliminated from the water. Still others, such as toxaphene and DDT, are banned from production and use; and only "leftover" quantities appear infrequently in the influents to wastewater treatment facilities. Therefore, it is neither cost effective nor necessary to measure for every regulated parameter listed in the KSWQS numeric criteria tables. KDHE places in each permit requirements to monitor certain parameters based upon the likelihood that the parameters are present in concentrations exceeding the KSWQS numeric criteria. KDHE may require pollutant scans and/or whole effluent toxicity testing to determine the presence of a class of pollutants or the overall effect of the effluent on aquatic life. In determining if whole effluent toxicity testing or pollutant scan requirements are needed in the permit, KDHE will evaluate the type of service area and treatment plant, plant design flows and actual flows, the ratio of a receiving stream flow rate relative to the effluent flow rate, stream designated uses, pollutant characteristics, the industrial contribution, and the pre-treatment practices of the contributing industry.

2. Parameter Limits

Parameter limits are generally set by technology-based criteria, categorical standards criteria, or Water Quality Standards criteria. The limits are based upon the receiving stream's designated uses, plant design flow, water quality assessment effluent flow, receiving stream flow, historical plant and receiving stream data, and employment of modeling formulas with these data. However, in an increasing number of cases, the permit limits, as calculated, are below the minimum detection limit (MDL) of the approved methods outlined in 40 CFR Part 136. In these cases, KDHE will place the limit, as calculated, in the permit with a notation similar to:

> *Permittee shall conduct testing for "parameter" according to the methods prescribed in 40 CFR Part 136. The currently acceptable quantification level (lowest level an accurate measurement can be achieved for "parameter" in wastewater) is (Minimum Reportable Level)(units). Test results above the (Minimum Reportable Level) are violations of this permit. Permittee shall use test equipment and procedures to achieve the Minimum Reportable Level.*

3. Parameter Testing Frequency

The frequency for which a parameter is tested is dependent upon many factors, such as the flow rate and type of treatment facility, the receiving stream designated uses, the receiving stream flow rate relative to the effluent flow rate, the toxicity and likely presence of the parameter, potential for episodic flows with higher than normal concentrations of the parameter, operating history of the facility, amount and quality of available data, as well as amount and type of industrial contributors to the collection system. A suggested testing frequency follows:

Facility Flow Rate	General Testing Frequency
Quarries & Similar	Monthly to Semi-Annual
Small 120-Day Lagoons	Quarterly

Mechanical Plants and Large Lagoons

Up to 1.0 MGD	Monthly
1.0 to 2.5 MGD	Twice Monthly
2.5 to 10.0 MGD	Four Times Monthly
10.0 to 30.0 MGD	Twice Weekly
Above 30.0 MGD	Three Times Weekly

Suggested testing frequency is for routine parameters. The permit writer may use best professional judgment to appropriately increase or decrease the testing frequency as necessary to satisfy the regulatory requirements for each permit.

Testing frequency may also be increased or decreased based on historical performance of the treatment facilities.

C. Background Concentrations

Applicable regulation: 28-16-28b
28-16-28e

In surface waters where naturally occurring concentrations of parameters such as chloride or sulfate exceed the numeric criteria given in Tables 1a, 1b, and 1c of "Kansas Surface Water Quality Standards: Tables of Numeric Criteria", the newly established background concentration will be applied as the numeric criteria in the receiving water. Background concentrations applied as criteria will be determined only for those substances that are released into surface waters from geologic deposits and formations as a result of erosion processes or groundwater intrusions. Once established, criteria based on background pollutant concentrations will be used to develop permit effluent limitations.

D. Compliance Schedules

Applicable regulation: 28-16-28f

Compliance schedules are placed in permits when the permittee is unable to comply with water quality requirements or special conditions. Interim and final limits are placed in the permit with monitoring normally required for the parameters for which the compliance schedule was developed.

E. Narrative Criteria

Applicable regulation: 28-16-28e

Narrative criteria are implemented through the application of standard languages for individual pollutants and Whole Effluent Toxicity testing for combinations of unidentified toxic substances.

F. Site-Specific Criteria

Applicable regulation: 28-16-28f

A site-specific criteria determination can change the water quality aquatic life criteria for parameters in a given stream segment. A change in criteria based on a site-specific determination will not be granted to allow technology-based limits to be exceeded. Site-specific criteria must be put on public notice, prior to adoption. Once site-specific criteria are adopted, they will be used to develop permit effluent limitations.

G. Variances

Applicable regulations: 28-16-28f

A variance is a mechanism that allows a delay in compliance for the stream segment and specific water quality parameters for which the variance is granted. A variance does not change the receiving stream designations or the level of protection to be afforded to the stream. A variance will be granted only when compliance with a water quality criterion will have substantial and widespread socioeconomic impact. A variance cannot be granted which would result in effluent limitations above technology-based limits. A variance is granted at a maximum for the time period of the NPDES permit and can be renewed. A

variance allows effluent limitations for certain pollutants, and parameters above the water quality-based limitations necessary to satisfy the criteria set via K.A.R. 28-16-28e and 28-16-28g.

The person requesting a variance from the criteria set via K.A.R. 28-16-28e must specifically state, in writing to KDHE, the parameter(s) for which a variance is being sought. The request must also include the scope, content, and time frame for a study justifying the variance. KDHE approval of the scope, content, and time frame of the study is required. The study must be conducted by a person or persons skilled in developing the types of information required in a variance study. Such skills will include appropriate financial knowledge, engineering cost estimating, and user charge development.

The variance procedure shall follow the EPA Guidance Document titled “Interim Economic Guidance for Water Quality Standards, March 1995" (EPA-823-b-95-002).

The decision and appropriate permit modifications shall be public noticed and both the decision and the modified permit shall be subject to review and appeal. If the variance is not granted, the permit will be modified with a schedule of compliance.

H. Public Notice

Public notice and hearings on actions concerning these regulations shall be in accordance with K.A.R. 28-16-61, which adopts 40 CFR Part 124.10(c)(1)(i), (ii), (iii), and (iv) requiring notification of pertinent government agencies in regards to proposals for draft NPDES permits. KDHE sends copies of all public notice documents to all agencies identified in the Water Projects Environmental Coordination Act (K.S.A. 82a-326).

Public notice of state-wide concerns is published in the Kansas Register and major daily newspapers across the state. Regional and local issues are public noticed in the Kansas Register, as well as regional and/or local daily and/or weekly newspapers based upon circulation of the newspaper and/or status as the official newspaper for the entity.

I. Permitting Issuance

The permitting process used by the Bureau of Water is shown in the flow schematic in Appendix D. The two primary categories of permits are the National Pollutant Discharge Elimination System (NPDES) permits which are joint federal/state permits for overflowing (discharging) facilities, and Kansas Water Pollution Control permits which are Kansas-only permits for non-overflowing (total retention) facilities. Both types of permits are given state permit identification numbers. The joint federal/state permits have federal identification numbers. The Kansas-only permits have federal tracking numbers allowing them to be tracked in the federal database system if desired by KDHE. All wastewater treatment facility permit numbers are assigned by KDHE.

For federal/state facilities required to have federal licenses or permits pursuant to the federal clean water act, the initiating KDHE section will request water quality assessments from the appropriate KDHE section via the Water Quality Assessment forms. Comments and data provided on or with the WQA form, the available stream data, current regulations, and other applicable standards will be reviewed to determine appropriate parameters and limitations for the effluent from the wastewater treatment facility. The initiating section will review the calculated parameters and limitations to determine, based upon characteristics of the effluent, the parameters which are likely to be present, and if a Reasonable Potential to exceed the proposed limits exists. If the parameters have technology-based or categorical limits and Reasonable Potential exists, parameter limits will be placed in the permit. If Reasonable Potential does not exist, limits on that parameter will not be placed in the permit. If insufficient data is available to conduct a reliable Reasonable Potential calculation, monitoring for the parameter will be required. Such circumstances are discussed in the Reasonable Potential section of these Implementation Procedures.

After permits have gone through the approval process, they are dated (effective date and expiration date) and signed by the Secretary of the Kansas Department of Health and Environment.

Permits can be effective for up to five years. Permits are currently being assigned to expire in certain years, according to the drainage basin to which they discharge or, for a non-overflowing facility, where they are located. If the water quality standards are exceeded and the exceedances are caused by artificial sources, the sources will be identified and a wasteload allocation to each source (point and/or non-point) shall be assigned to reduce the pollutants to meet the water quality standards.

The Department may require a shorter permit effective time where pollutants of concern are expected but data is not adequate to determine Reasonable Potential and/or if there is a need to upgrade the treatment process.

In general, the effective and expiration dates shall be at or near the end or beginning of a month so as to avoid confusion when changes occur between the old and new permit. Quarterly monitoring schedules shall be the standard calendar quarters of January-March, April-June, July-September, and October-December, with quarterly reports due by the 28th day of April, July, October, and January for the previous monitoring quarters.

A flow schematic of the permitting process is included in Appendix D.

Appendix A
Lagoon Solids Limits

[6560-01-M]

ENVIRONMENTAL PROTECTION AGENCY

[FRL-10064]

SECONDARY TREATMENT INFORMATION REGULATION

Suspended Solids Limitations for Wastewater Treatment Ponds

On October 7, 1977, the Environmental Protection Agency (EPA) published in the FEDERAL REGISTER (42 FR 54666) a final amendment to the secondary treatment information regulation applicable to the suspended solids limitations for certain municipal wastewater treatment ponds. The secondary treatment information regulation, 40 CFR 133, contains effluent limitations in terms of biochemical oxygen demand, suspended solids and pH which must be achieved by municipal wastewater treatment plants.

The amendment added a new paragraph (c) to § 133.103 of 40 CFR 133. This allows a case-by-case adjustment in suspended solids limitations for publicly owned waste stabilization ponds, if: The pond has a design capacity of 2 million gallons per day or less; ponds are the sole process for secondary treatment; and, the pond meets the biochemical oxygen demand limitations as prescribed by 40 CFR 133.102(a). Ponds that are not eligible for this adjustment include: Basins or ponds used as a final polishing step for other secondary treatment systems, and ponds which include complete-mix aeration and sludge recycle or return since these systems are in essence a variation of the activated sludge process. Aerated ponds without sludge recycle, however, are eligible for adjustments provided the other specific requirements are met.

The amended suspended solids limitations were determined by statistical analysis of available data. The acceptable limit was defined as that concentration achieved 90 percent of the time by waste stabilization ponds that are achieving the biochemical oxygen demand limitations of 40 CFR 133.102(a). Each State was considered separately as well as appropriate contiguous geographic areas within a State or group of States. The analysis was done by the States or the applicable EPA regional office in cooperation with the States.

A considerable amount of latitude was allowed in developing these values to account for varying conditions affecting pond use and performance across the country. Categorizations within States based on factors such as geographic location, seasonal variation and the type of pond were permitted. In some instances, the values presented below reflect these factors.

In accordance with the amended regulation, a single value corresponding to the concentration achievable 90 percent of the time may be used to establish the suspended solids limitations for ponds within a State. The concentration achievable 90 percent of the time has been generally accepted as corresponding to a 30 consecutive day average (or an average value over the period of discharge when entire duration of the discharge is less than 30 days). This interpretation is consistent with the analysis which was used as the basis for the other suspended solids and biochemical oxygen demand limitations contained in 40 CFR 133.

For this reason, a single suspended solid concentration has been listed below for ponds (or subcategory of ponds) within a State. In some cases, however, the States and EPA regional offices have agreed upon additional values, such as weekly averages or daily maximums, which will be used for compliance monitoring purposes within those States.

In some cases the data base for the analysis was quite limited and in all cases additional data are being collected. A periodic reevaluation of this expanding data base will be conducted and could result in further changes in the suspended solids limitations listed below. Several EPA regional offices have already indicated their intent to conduct a reevaluation within 2 years or less. Even though publication of these values is not a formal rulemaking procedure, public comments are welcome and will be considered in any revisions. Comments should be submitted to Director, Municipal Construction Division (WH-547), Environmental Protection Agency, Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Sherwood Reed or Alan Hais, Municipal Construction Division (WH-547), Office of Water Program Operations, Environmental Protection Agency, Washington, D.C. 20460, 202-426-8976.

Dated October 27, 1978.

THOMAS C. JORLING,
Assistant Administrator for Water and Waste Management.

ENVIRONMENTAL PROTECTION AGENCY

SUSPENDED SOLIDS LIMITATIONS FOR WASTEWATER TREATMENT PONDS**

*Location and Suspended Solids Limit * (mg/l)*

Alabama—90.
Alaska—70.
Arizona—90.
Arkansas—90.
California—95.
Colorado
Aerated ponds—75.
All others—105.
Connecticut—N.C.
Delaware—N.C.
District of Columbia—N.C.
Florida—N.C.
Georgia—90.
Guam—N.C.
Hawaii—N.C.
Idaho—N.C.
Illinois—37.
Indiana—70.
Iowa

Controlled Discharge, 3 Cell and Case-by-Case but not Greater Than 80

All others—80.
Kansas—80.
Kentucky—N.C.
Louisiana—90.
Maine—45.
Maryland—90.
Massachusetts—N.C.
Michigan
Controlled seasonal discharge
Summer—70.
Winter—40.
Minnesota—N.C.
Mississippi—90.
Missouri—80.
Montana—100.
Nebraske—80.
North Carolina—90.
North Dakota.
North and east of Missouri River—60.
South and west of Missouri River—100.
Nevada—90.
New Hampshire—45.
New Jersey—N.C.
New Mexico—90.
New York—70.
Ohio—65.
Oklahoma—90.
Oregon
East of Cascade Mountains—85.
West of Cascade Mountains—50.
Pennsylvania—N.C.
Puerto Rico—N.C.
Rhode Island—45.
South Carolina—90.
South Dakota—110.
Tennessee—100.
Texas—90.
Utah—N.C.
Vermont—55.
Virgina
East of Blue Ridge Mountains—60.
West of Blue Ridge Mountains—78.
Eastern Slope Counties: Loudoun, Fauquier, Rappahannock, Madison, Green, Albemarle, Nelson Amherst, Bedford, Franklin, Patrick and, *Case-by-Case application of 60/78 Limits*
Virgin Islands—N.C.
Washington—75.
West Virginia—80.
Wisconsin—60.
Wyoming—100.
Trust Territories and North Marianas—N.C.

NOTES.—N.C.—No change from existing criteria.

** The values set for Iowa and Virginia incorporate a specific case-by-case provisions; however, in accordance with 40 CFR 133.133.103(c), adjustments of the suspended solids limitations for individual ponds in all States are to be authorized on a case-by-case basis.

[FR Doc. 78-32022 Filed 11-14-78; 8:45 am]

Appendix B
Reasonable Potential Methodology

Determining Reasonable Potential

Kansas has adopted a procedure, developed by EPA Region VI, to extrapolate limited data sets to better evaluate the potential for the higher effluent concentrations to exceed the State's water quality standard. The method yields an estimate of a selected upper percentile value. The most statistically valid estimate of an upper percentile value is a maximum likelihood estimator which is proportional to the population geometric mean. If one assumes the population of effluent concentrations to fit a lognormal distribution, this relationship is given by:

Cp =Cmean * exp (Zp * s - 0.5 * s 2)

where: Zp = normal distribution factor at p th percentile

s 2 = ln (CV 2 + 1)

To calculate the maximum likelihood estimator of the 95th percentile, the specific relationship becomes:

C95 = Cmean * exp (1.646 * s - 0.5 * s 2)

if CV is assumed = 0.6, then s 2 = 0.307.

The ratio of the estimated 95th percentile value to the mean (C95/Cmean) is calculated:

C95/Cmean = 2.13

A single effluent value or the geomentric mean of a group of values is multiplied by the ratio to yield the estimate of the 95th percentile value.

The following table shows the ratio of the upper percentile to the mean for the 90th , 95th , and 99th percentiles

Ratio of Upper Percentiles to Geometric Mean

Percentile	Z	Cp/Cmean
90	1.283	1.74
95	1.645	2.13
99	2.386	3.11

EXAMPLE FOR DETERMINING REASONABLE POTENTIAL

The outcome of this approach is illustrated in the following example:

Assume a discharger has reported 3 effluent concentrations of cadmium [9 µg/l, 12 µg/l, and 15 µg/l]. The discharge flow is 3 MGD, the receiving stream critical flow is 6.4 MGD. The ambient chronic standard for cadmium is 6µg/l as total recoverable metal. Assume 100% mix at the point of discharge and that the upstream concentration of cadmium is nondetectable. Evaluate the potential of the discharge to exceed water quality standards by assessing the impact of the 95th percentile effluent cadmium concentration.

1. Estimations of 95th percentile (regional approach)

The geometric mean effluent concentration of 12 µg/l is used as a parameter to estimate the 95th percentile value, assuming a lognormal distribution and a coefficient of variation of 0.6.

$C95 = Cmean * \exp (1.283 * s – 0.5 * s\ 2)$

$s\ 2 = \ln (CV\ 2 +1)$

$C95 = Cmean = 2.13$

12 µg/l * 2.13 = 25.6 µg/l

The 95th percentile effluent value is used to calculate the Instream Waste Concentration:

2. Determination of Instream Waste Concentration

$Cd = [(Qr * Ca) + (Qe * Ce)]/ (Qr + Qe)$

where
Cd = ambient concentration of cadmium after mix (Instream Waste Concentration)
Qr = river flow
Qe = effluent flow
Ca = upstream concentration of cadmium
Ce = maximum effluent concentration of cadmium
Cd = [(6.4 * 0) + (3MGD * 26 µg/l)]/(6.4 MGD + 3 MGD)
= 8.2 µg/l

The Instream Waste Concentration of 8.2 µg/l exceeds the ambient standard of 6.0 µg/l, a limit would be placed in the permit.

Use of other Upper Percentiles

The 90th percentile effluent value would be estimated as follows:

12 µg/l * 1.74 = 21 µg/l cadmium

The Instream Waste Concentration would be calculated:

[(6.4 *0) + (3MGD * 21 µg/l)] / (6.4 MGD + 3 MGD)

= 6.6 µg/l cadmium

The 99th percentile effluent value would be estimated as follows:

12 µg/l * 3.11 = 37 µg/l cadmium

The Instream Waste Concentration would be calculated:

[(6.4 *0) + (3MGD * 37 µg/l)] / (6.4 MGD + 3 MGD)

= 12 µg/l cadmium

As one selects more extreme tail values at which to evaluate potential water quality exceedances, the reported effluent concentrations must decrease to conclude that the potential to exceed the standard is not present.

Dealing with Highly Variable Data Sets

The example above assumes that the coefficient of variation, defined as the ratio of the standard deviation to the mean is 0.6. If multiple effluent concentrations are reported which exhibit a large range between the highest and lowest values, the statistical variance of this population of numbers may well be greater than 0.6.

The geometric mean of a group of numbers can be calculated as follows:

1. Take the logarithm of each pollutant value.

2. Sum the logarithmically transformed values.

3. Divide the sum of transformed data by the number of measurements.

4. Express the geometric mean pollutant value by determining the antilog of the average of the logarithmically transformed values.

Dealing with Large Data Sets

When a larger data set of pollutant measurements is available, one may not need to statistically estimate the upper range or 95th percentile as described above. It is suggested that the 95th percentile be determined from the data and compared to the statistical estimation, the larger of these values should be assumed as the reasonably potential concentration of the discharge.

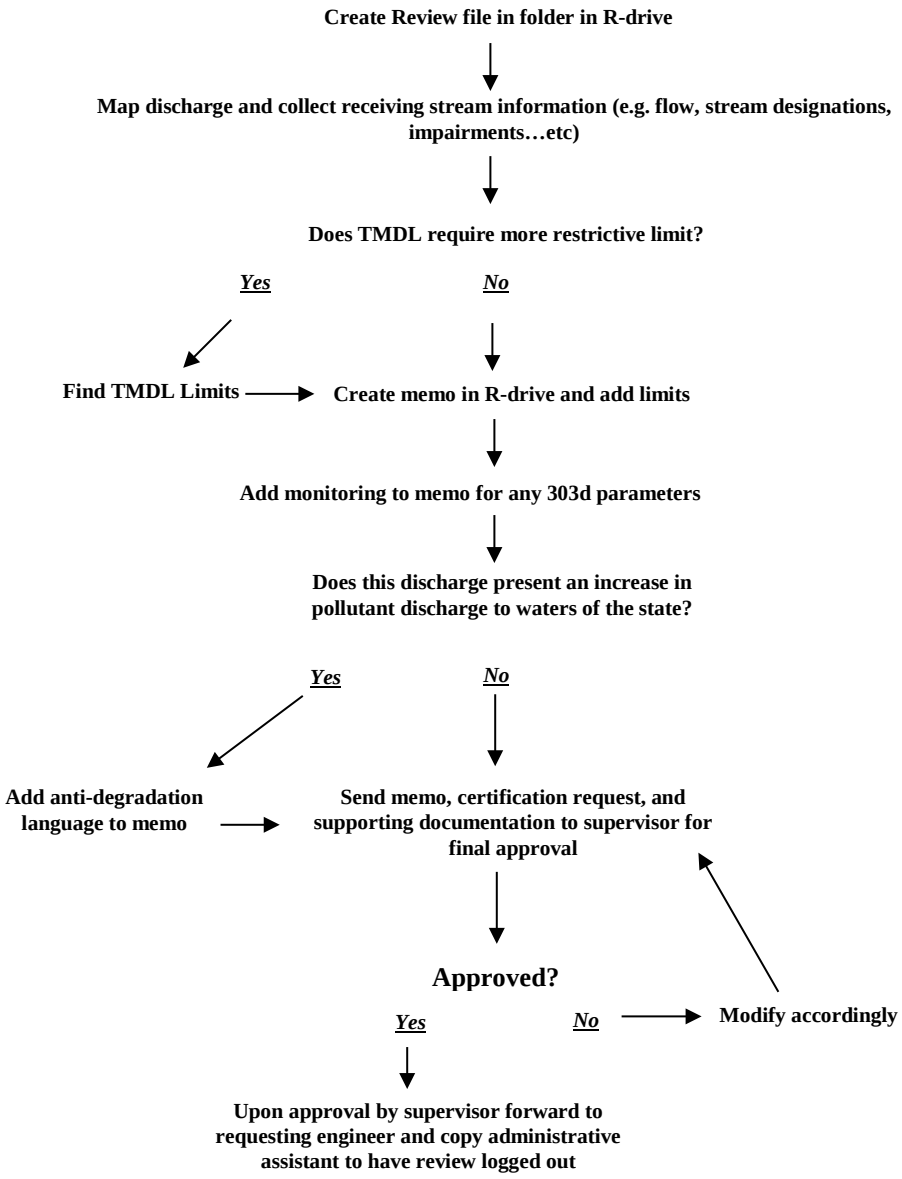
Appendix C
Certification Process

Water Quality Certification Process

3 cell 120 day or 2 cell 150 day lagoon? If yes, go to sheet 2 (page 32)
Quarry? If yes, go to sheet 3 (page 33)

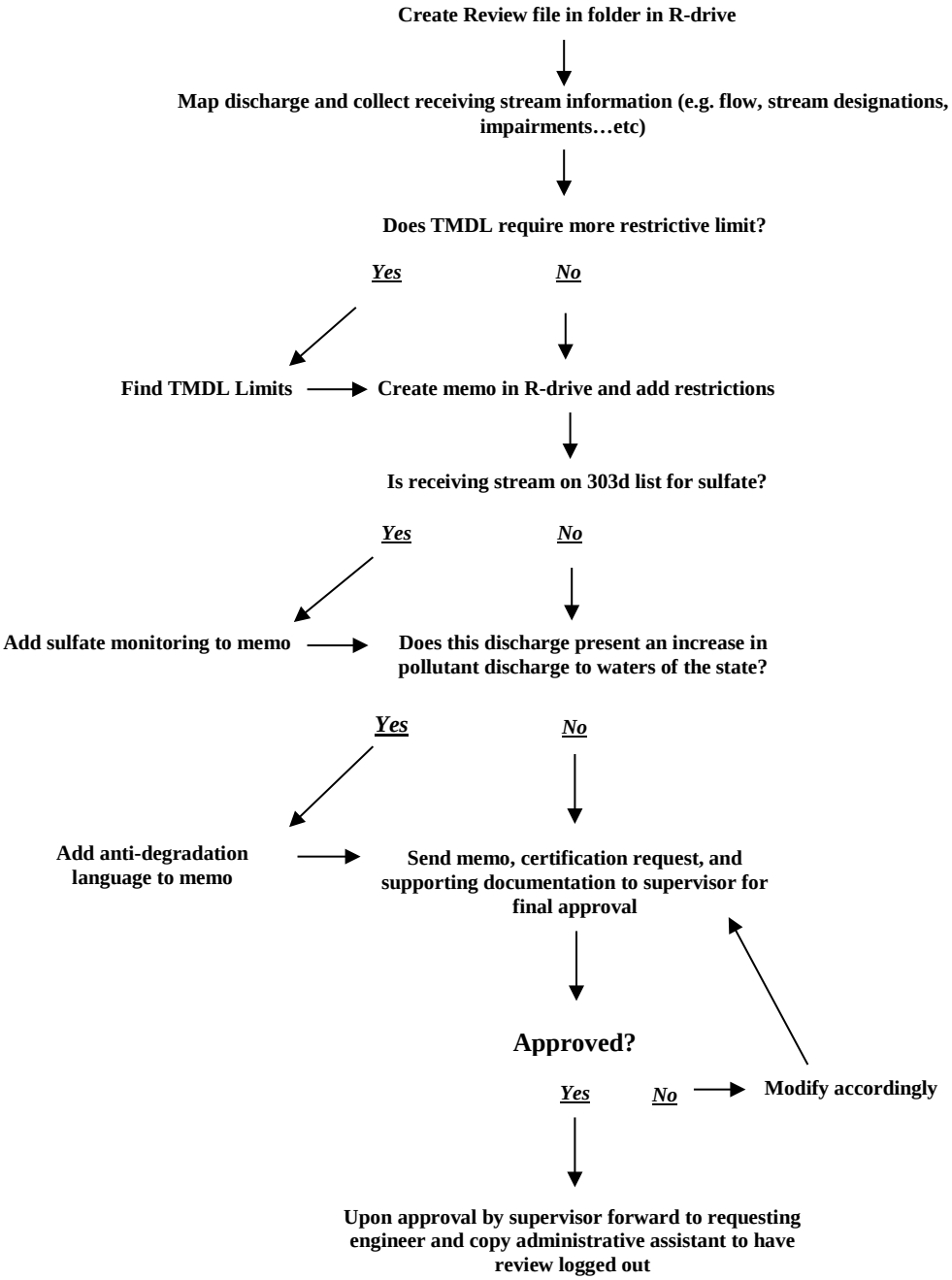
Water Quality Certification Process

Lagoons with proper detention time
(sheet 2)

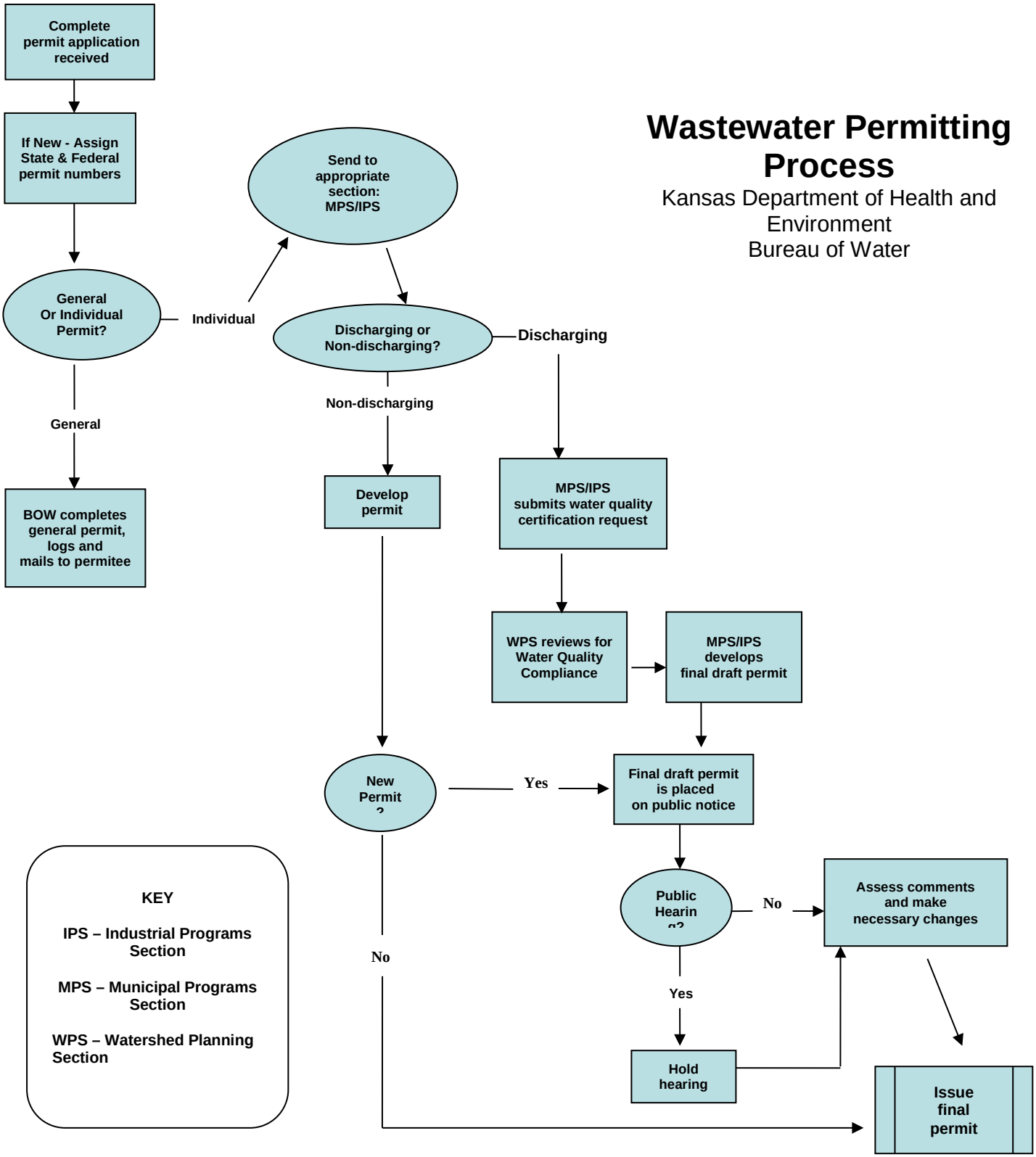


Water Quality Certification Process

Quarries (sheet 3)



Appendix D
Permitting Process


Wastewater Permitting Process
Kansas Department of Health and Environment
Bureau of Water
Complete permit application received
If New - Assign State & Federal permit numbers
General Or Individual Permit?
Individual
Send to appropriate section: MPS/IPS
Discharging or Non-discharging?
Discharging
Non-discharging
General
BOW completes general permit, logs and mails to permitee
Develop permit
MPS/IPS submits water quality certification request
WPS reviews for Water Quality Compliance
MPS/IPS develops final draft permit
New Permit ?
Yes
Final draft permit is placed on public notice
Public Hearin g?
No
Assess comments and make necessary changes
Yes
Hold hearing
No
Issue final permit
KEY
IPS – Industrial Programs Section
MPS – Municipal Programs Section
WPS – Watershed Planning Section