DIVISION OF ENVIRONMENT
QUALITY MANAGEMENT PLAN

PART III:

WASTEWATER POLLUTION CONTROL PROGRAM
QUALITY ASSURANCE MANAGEMENT PLAN

Revision 16
03/15/2019

Kansas Department of Health and Environment
Division of Environment
Bureau of Water
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3/20/2019 (Date)

Industrial Programs Unit: (Signature, Unit Leader)

2019-03-20 (Date)

Municipal Programs Unit: (Signature, Unit Leader)

3/20/19 (Date)

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3/20/2019 (Date)

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3/20/2019 (Date)

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03/15/2019
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1 INTRODUCTION

1.1 Historical Overview of Program

In 1907, K.S.A. 65-164 was passed. This statute forbade discharges of sewage into the waters of the state and authorized the Kansas State Board of Health (KSBH) to investigate sources of pollution detrimental to the health of the citizens. Since that time, a wastewater pollution control program, in some form, has existed.

Until the early 1970s, there were six KSBH "area engineers" that performed water supply and wastewater treatment plant inspections. One or two engineers in the Topeka central office reviewed plans and specifications for new wastewater treatment facilities and sewer extensions. They served under the Chief of Water Pollution Control.

Municipal wastewater treatment systems were predominantly Imhoff tank-trickling filter systems until the late 1950s. At that time, waste stabilization ponds began to be an accepted form of wastewater treatment. Many wastewater treatment facilities on the larger streams were primary plants, usually consisting only of Imhoff tanks and sludge drying beds. Many communities in Kansas did not have sewer systems and utilized private systems ranging from septic tank systems to cesspools, abandoned wells, and other poorly constructed systems. Municipalities were not required to monitor their discharges and the small wastewater treatment plants, as a general rule, were very poorly operated. Enforceable standards for wastewater effluent quality did not exist.

Industrial wastewater treatment plants served mainly refineries, large industries, meat packing plants, etc. Most of the small cooling water discharges, quarries, and other miscellaneous discharges were uncontrolled.

The federal Clean Water Act was enacted in 1972 and things began to change. The initial thrust of the Clean Water Act was to provide secondary treatment and technology-based effluent limits. Under the Act's National Pollutant Discharge Elimination System (NPDES), municipalities were issued permits renewable every five years. These permits contained requirements for monitoring and had enforceable, categorical, technology-based standards for effluent quality. In 1974 the State of Kansas was conferred primacy for the NPDES program. This program was administered jointly by the Municipal Programs and Industrial Programs sections within KSBH.

At the same time the construction grants program was started, and was administered by the Municipal Program Section. This program provided a 75 percent federal grant requiring a 25 percent local match. Collection systems were not eligible initially but were later funded through this system. Hundreds of small municipal systems had "Step I" studies (facility plans) done by consulting engineers. Many facilities could not meet the United States Environmental Protection Agency (EPA) definition of secondary treatment and upgraded their plants with federal assistance. Most of the antiquated Imhoff tank/trickling filter plants, some of which were built by the Work Progress Administration during the 1930s, were replaced with waste stabilization pond systems. A few years later, collection systems began to be funded through the grant program and many communities had sewage treatment facilities constructed for the first time.

Accompanying these changes was a major reorganization of the agency administering the provisions of the Clean Water Act in Kansas. Specifically, KSBH was abolished and the Kansas Department of Health and Environment (KDHE) was formed in its stead in 1974. The Municipal Programs and Industrial Programs sections became a part of the Bureau of Water Protection. Many new engineers and technicians were hired to administer the Clean Water Act and its various programs. Some of these new positions were allocated to the district offices to assist the "District Engineers" in carrying out their expanded duties under the NPDES program.

Today, all of the municipal wastewater facilities in Kansas meet the definition of secondary treatment and all are required to provide "advanced" treatment of toxic pollutants, and most are in compliance with their NPDES permits. Most industrial facilities meet categorical effluent limitations and are likewise in compliance with their NPDES permits. Emphasis is now moving beyond water quality-based permit limits which protect the designated uses of surface water under the Kansas surface water quality standards (K.A.R. 28-16-28 *et seq.*), and the emphasis is now on implementing waste load allocations from total maximum daily load decisions as approved by EPA. The current emphasis is reduction of the nutrients phosphorus and nitrogen. Many of the treatment plants constructed during the 1970s and early 1980s either have been or are being upgraded to meet the more stringent limits in the latest revision of the water quality standards. Many older plants are being replaced and the new process design facilities are being upgraded with computer controls and operator training. The construction grants program ended in 1990 and has been replaced with the clean water State revolving loan fund program which is administered by the Municipal Programs Unit. This Kansas Water Pollution Control Revolving Fund will now also provide financial support to non-municipal projects to reduced non-point sources of pollution.

Within KDHE, the NPDES program is administered jointly by the Municipal Programs Unit, the Industrial Programs Unit, and the Technical Services Unit within the Water Permitting and Compliance Section, and The Livestock Waste Management Section within the Bureau of Field Services. The Municipal Programs Unit is involved in the design, financing, construction, onsite operator training contracts, and permitting of municipal wastewater treatment facilities as well as MS4 stormwater facility permits in Kansas. The Industrial Programs Unit has evolved to include industrial and construction stormwater control and pretreatment programs, in addition to the plan review and permitting functions with respect to industrial wastewater treatment plants. The Livestock Waste Management Section (LWMS) within the Bureau of Environmental Field Services administers state and federal (NPDES) regulations for Livestock Waste Management (LWMS) and other agricultural related waste control permits. Duties include handling registrations, plan and specification reviews, technical assistance, and Nutrient Management Plan (NMP) review and permit development. The Technical Services Unit provides the administrative function of the permitting process, including compliance monitoring and enforcement. Previously under the Technical Services Unit, operator training and certification has now become a responsibility under the Public Water Supply Section. Municipal, industrial, stormwater, and livestock inspections are routinely conducted by staff of the Bureau of Environmental Field Services (BEFS) field offices. The Technical Services Unit provides guidance to BEFS relating to these inspections. Municipal/Industrial pretreatment inspections are routinely conducted by the Industrial Program Unit staff.

On July 1, 2012, with the exception of domestic wastewater treatment lagoon sludge land application administered by the Municipal Programs Unit, KDHE returned the day-to-day oversight of the 40 CFR Part 503 sludge program back to the EPA.

1.2 Quality Assurance/Control Objectives

Quality assurance (QA) and quality control (QC) activities conducted within KDHE'.s water pollution control program are intended to ensure that all monitoring and analytical data are scientifically valid, defensible and of known and acceptable precision and accuracy. The remainder of this document describes the procedural QA/QC criteria developed to meet these objectives.

Standard Operating Procedures (SOPs) are described in the appendices of this program management plan.

2 QUALITY ASSURANCE/CONTROL ORGANIZATION

2.1 Administrative Organization

The organizational framework for the sections involved with the Bureau of Water's water pollution control program can be found at http://kdhenet/appnet/ops/orgchart/

2.2 Staff Responsibilities

The following summarizes the primary functions and responsibilities of the sections and units comprising this large program.

- BOW Administration - This group consists of the Bureau Director and administrative support staff.

- Water Permitting and Compliance Section – This section within the Bureau of Water consists of the following units that contribute to this program:

  - Municipal Programs Unit - This unit consists of only two program efforts responsible for drafting permits, reviewing plans and specifications, administrating the Kansas Water Pollution Control Revolving Fund including bond issuance and EPA grants, administering KWPCRF projects including project payments, and related duties.
  - Industrial Programs Unit - This unit administers the federal pretreatment program. This unit monitors 18 cities having local pretreatment programs and many industries discharging into smaller publicly owned treatment facilities. The Industrial Programs Unit also administers the NPDES program for industries which discharge to waters of the state. Duties include plan and specification review, technical assistance and development of NPDES and Kansas Water Pollution Control permits. The Industrial Programs Unit also administers NPDES construction and industrial stormwater permitting activities, issues stormwater permits and provides outreach and program information.
  - Technical Services Unit - Technical Services Unit provides permitting, compliance and enforcement guidance.

- Livestock Waste Management Section – This section within the Bureau of Environmental Field Services consists of the following units that contribute to this program:

  - The Office Administration Unit is responsible for providing clerical support services for all program areas of the livestock waste management section.
  - The Technical Review Unit mission is to address design review problems encountered in the permitting process, prepare technical bulletins to transfer new technologies to district staff and the public, maintain low plan review backlog and assist in maintenance of the design standards and regulation.

- The Permitting Unit mission is to develop and maintain program guidance manuals that provide clear and concise direction on programmatic and permitting issues, conduct in-field training for new employees, ensure consistent program implementation across the state, conduct training and out reach programs and maintain low permit backlog.
- The Nutrient Management Unit mission is to review nutrient management plans submitted by NPDES permitted facilities, review nutrient utilization plans, develop technical guidance regarding nutrient management, develop and administer the groundwater monitoring program and assisting the permitting unit with conducting training and out reach programs for internal and external customers on multiple program issues.

3 QUALITY CONTROL CRITERIA AND PROCEDURES

3.1 Monitoring Site Selection Criteria

The selection of field monitoring sites is based on several factors including type and purpose of sample, representativeness, ability to document or relocate the sampling site, prevention of sample contamination, accessibility, and safety. Selection criteria vary depending upon the type of medium being sampled, as described in the following paragraphs.

3.1.1 Streams Receiving Wastewater Discharges

Map reconnaissance shall be conducted prior to arrival in the general area of the site. Field staff should, prior to the trip, establish point(s) of contact with municipalities, industries, livestock operators, or landowners as the case may require. Field staff shall familiarize themselves with general terrain, major waterways, road networks, unique topographical features, and other man-made objects or natural features that may influence the representativeness of the samples gathered from the site. Based on the map review, a detailed field observation shall take place to verify map information. Upon completion of these steps, and supplied with the project goals and objectives, monitoring site selection may proceed. Factors which may influence site selection include: accessibility, relationship to known or suspected sources of pollution, relationship to other influencing contaminated locations, availability of media to sample, and potential safety hazards.

3.1.2 Treated Effluent

Samples for compliance monitoring (grab or composite) must be collected at a point downstream from the last treatment or disinfection process. The collection point is often defined in the NPDES permit and may be at an outfall weir, effluent weir launder, or at the end of the outfall pipe. The point selected must preclude excessive aeration of the sample or collection of solids not representative of the effluent. The point must be reasonably accessible, therefore some outfall pipe locations do not constitute acceptable sampling points. The point of collection must be easily described, as federal and state regulations require the sample collector to document the precise location of sample collection. Locations for composite samplers must follow the same general selection criteria, in that the samples must be representative of the final effluent and the sampling location must be reasonably accessible and at a location which can be documented. Additional requirements include a shelter for the sampler, electrical outlets for permanently installed samplers, or wiring for temporarily installed collectors that meets all applicable safety codes. To minimize vandalism and other concerns, composite sampling should be conducted at locations where public access is infrequent or restricted.

3.1.3 Raw Sewage/Wastewater

Samples of raw sewage or industrial wastewater entering a treatment facility shall be collected at a point where the influent is well mixed. Samples high in total suspended solids separate rapidly; therefore, samples from open channels, basins, etc. may be very unrepresentative of the wastewater entering the plant. Samples collected at a point where the samples are aerated or vigorously mixed, for instance an aerated grit chamber, tend to be more representative as far as solids are concerned.

Collection from deep wet wells or other areas with poor accessibility, potentially dangerous atmospheres, steep stairs or ladders, etc. must be avoided for safety reasons. Internal sampling points used for operational control shall meet guidelines for safety and accessibility and shall be located where representative samples can be collected.

3.1.4 Sludge

Municipal wastewater sludge samples must be collected to monitor compliance with 40 CFR Part 503, the federal sludge regulations. Sludge samples must be collected and analyzed for nutrients, metals, bacteria, and specific oxygen uptake rate (optional). Liquid samples for compliance with this regulation must be collected at the point of entry into the sludge hauling vehicle, as the vehicle is being filled. In this manner the sample is truly representative of what is being applied to the fields. Solid samples (dried sludge, vacuum filtered sludge or sludge stockpiles) must be collected from representative points in the drying beds, windrow, or stockpile. The approved method is to take several samples from various portions of the dried sludge and combine or composite these smaller portions so that the sample is truly representative.

Sludge samples for process control are very important in controlling the sludge digestion process but are not used for compliance purposes. Samples are typically analyzed for pH, alkalinity, volatile acids, total solids, percent solids and volatile solids. These samples may be collected at test cocks located at various levels within an anaerobic digester or at the inspection box atop the digester. If possible, recirculation flow (digester mixing and heating) and raw sludge flow should be sampled from inspection boxes. Safety concerns include ladders and catwalks, slippery surfaces, and prohibitions against smoking or open flame.

3.1.5 Soils

Federal regulations require application of sludge at agronomic rates with regard to nutrients (40 CFR 503). Soil tests are required annually prior to sludge application. Parameters include available nitrate-nitrogen, phosphate, potassium and pH. Samples shall be collected from representative areas of each land application site and composited according to the standard operating procedures (WPCP-002) in Appendix C.

3.2 <u>Sampling Procedures and Sample Custody</u>

3.2.1 Stream Samples

Grab samples shall be collected from streams in accordance with the appropriate SOP, which accompanies the QA management plan for the BOW/Watershed Planning, Monitoring and Assessment Section's (WPMAS) stream chemistry monitoring program.

3.2.2 Wastewater Samples

Regulated entities required to sample effluent as a condition of their NPDES permit shall abide by the procedures set forth in their permit. Samples to be analyzed in an onsite laboratory shall be collected in an appropriate sample container, and transported immediately to the laboratory where custody will be transferred to the laboratory analyst or other designated employee. Collection, preservation, storage, and analysis shall be in accordance with 40 CFR 136 and the appropriate SOP, which accompanies the QA management plan for the BOW/Watershed Planning, Monitoring and Assessment Section's stream chemistry monitoring program. The sample collector shall log the date, time, name, and the exact location of sample collection as per K.A.R. 28-16-63.

The samples shall be analyzed using laboratory techniques approved by EPA and the State of Kansas. The analyst shall record the dates the analyses were performed, who performed the analyses, analytical techniques/methods used, and the results of such analyses. The discharger shall maintain the records for a period of three years.

Samples to be transported to an offsite laboratory shall be preserved and iced as per 40 CFR Part 136.3, Table II. Custody may be retained by the sample collector and transferred to the laboratory, transferred to a transporter, or the sample may be mailed directly to the laboratory, provided holding times will not be exceeded. Ultimately, the sample chain of custody will be transferred to the laboratory in accordance with the laboratory QA/QC protocols.

3.2.3 Sludge Samples

Municipal wastewater sludge and soil samples must be collected to monitor compliance with 40 CFR Part 503, the federal sludge regulations.

Sludge samples must be collected and analyzed for nutrients, metals, bacteria, and specific oxygen uptake rate (optional) as per Standard Operating Procedures WPCP-002 in Appendix C. Liquid samples for compliance with this regulation must be collected at the point of entry into the sludge hauling vehicle, as the vehicle is being filled. In this manner the sample is truly representative of what is being applied to the fields. Solid samples (dried sludge, vacuum filtered sludge or sludge stockpiles) must be collected from representative points in the drying beds, windrow, or stockpile. The approved method is to take several samples from various portions of the dried sludge and combine or composite these smaller portions so that the sample is truly representative.

3.2.4 Soil Samples

Regulations require application of sludge at agronomic rates with regard to nutrients. Soil tests are required annually prior to sludge application. Parameters include plant available nitrogen (N)), phosphorus (P), potassium (K) and pH. Samples shall be collected from representative areas of each land application site and composited according to the Standard Operating Procedures WPCP-002 in Appendix C.

3.3 Analytical Procedures

Analytical procedures to be discussed in this section are generally field laboratory tests, either performed in the field with portable test kits and reagents or in a wastewater laboratory. The analytical procedures can be grouped as titrations, gravimetric, potentiometric or colorimetric analyses. The tests performed by WPMAS and/or BEFS field staff are for investigations of stream quality problems and diagnosis of treatment plant problems. Samples for compliance monitoring and evidentiary samples (except for those field tests which must be done on-site) shall be collected and transported to the KDHE laboratory or an approved commercial laboratory according to chain of custody protocols.

Safety procedures shall be followed precisely when handling reagents used in the test procedures, particularly the strong acids and bases used in dissolved oxygen sample preparation and titration. Procedures for the field analyses are described in the Appendix C.

3.4 Internal Procedures for Assessing Data Precision, Accuracy, Representativeness and Comparability

3.4.1 Instrument Calibration and Standardization

Dissolved oxygen (DO). DO meters are to be calibrated before each use. There are two main procedures for this calibration: (1), the air calibration procedure outlined in the manufacturer's manual and imprinted on the instrument case and (2), calibration by the Winkler method. For plant operational control, the air calibration procedure is of sufficient accuracy; for stream monitoring required by an NPDES permit or for BOD analyses, calibration by the Winkler method is required. The DO meters in the BEFS or BOW offices may have long periods of little or no use. In these situations it is necessary to check the meters at least monthly to make sure the batteries are charged and that the meter will "red line." Membranes for the probe must be replaced in accordance with manufacturer's recommendations.

pH. Measurements for pH may be made by any of two methods depending upon the degree of accuracy required. These methods involve use of a pH meter or a colorimetric indicator. pH meters must be calibrated pursuant to manufacturer's specifications and standardized before each use with chemical buffer solutions traceable to the National Bureau of Standards (NBS). Buffer solutions must be replaced at intervals recommended by the manufacturer; aliquots of buffer removed from the original container must not be reused or poured back into the container. Meters at district offices and at the central office may have prolonged periods of little or no use; hence, it is important that these meters be periodically calibrated and checked to ensure readiness. In particular, meters must be checked for drift or slow response which are usually indicators of problems with the probe(s). Meters also should be checked for linearity as per manufacturer's recommendation. Ideally, pH readings of a given sample can be compared to a reading by the KDHE laboratory on the same sample. Buffers must be replaced at least annually or per manufacturer's recommendations. Probes must be checked before each use to ensure they contain the proper amount of electrolyte (KCl) solution.

Colorimetric pH readings are subject to many interferences and must not be used in cases of fishkills, water pollution investigations of an evidentiary nature, or NPDES compliance monitoring purposes. The colorimetric readings are satisfactory for screening purposes or as an indicator of potential plant process problems.

Chlorine. Chlorine residual tests typically are conducted using a colorimetric test kit or via amperometric titration. The colorimetric test kit is the most commonly used method due to its portability. The amperometric titrator is more accurate and can serve many different purposes but is primarily for laboratory use due to its lack of portability. Inaccuracy of chlorine residual test kits can be caused by deterioration of the permanent color standards due to heat, sunlight or age. Color comparison standards must be replaced in accordance with manufacturer's recommendations. Readings should be compared with readings from an amperometric titrator or test kit of known accuracy at least on a quarterly basis. Reagents have a finite shelf life and deteriorate rapidly in conditions of sustained high temperatures or if exposed to sunlight. Reagents for chlorine test kits should be replaced with new reagents on a yearly basis. It shall be the duty of the section chief or program manager to check the test kits and reagents and ascertain accuracy.

Amperometric titrators are subject to inaccuracy from problems with the probe, battery and electrical circuits, and deterioration of reagents. At least quarterly, they must be checked to ensure the batteries will hold a charge, the probe cleaned, and the titrant checked for deterioration. Titrant and buffers must be replaced at intervals stipulated by the manufacturer or yearly, whichever is less. The ammeter and circuitry also must be checked per manufacturer's instructions to assure the proper degree of responsiveness. Each time the titrator is checked a duplicate sample shall be analyzed by another titrator of known accuracy to ascertain accuracy.

3.4.2 Procedural Blanks, Duplicate Measurements and Spiked Samples

The possibility of sample contamination during sample preparation, storage and analysis is assessed through the use of procedural blanks, prepared with ASTM Type I-quality water and subjected to the same treatment as the rest of the samples collected as a result of the investigation or project. Under this protocol blanks are utilized in the following manner:

(a) Should the blank concentration exceed the sample concentration, a corrected concentration normally is not included in the data file; however, should the sample concentration be less than the minimum detection limit (MDL) of the analytical method, the concentration is recorded as such regardless of the blank concentration.

(b) Should the blank concentration be less than the MDL, the sample concentration is recorded without modification.

In the event a blank level exceeds the MDL, the level is not deducted from the reported sample concentration; rather, a sequence of corrective action procedures is initiated in accordance with section 3.6.

The possibility of sample contamination from sample containers is assessed through the analysis of container blanks. Five percent of the sample collection containers are selected at random, partially filled with ASTM Type I-quality water, sealed, and stored for a 48-hour interval. The resulting container blank is analyzed to determine levels of impurities leached from the container walls. If detectable concentrations of impurities are observed, a sequence of corrective action procedures is initiated.

In the case of a special monitoring program, one of the sampling sites in the network shall be equipped with two composite samplers, located side-by-side to facilitate the collection of duplicate samples. The alternative is to collect two grab samples at a selected station each time. Data generated by the duplicate sampling effort is used to assess the chemical variability of the sampling and analysis activities. In the case of a special investigation or fishkill, a duplicate sample shall be collected at one of the sampling points. This data provides a basis for quantifying the statistical uncertainty inherent in sample collection.

For water samples related to NPDES or special investigations, fishkills or other projects, it is important that the magnitude and variability of contamination be reduced as much as possible. For metals analyses, for instance, a blank level greater than one-half the respective sample concentration initiates corrective action. This action may include decontamination of containers used for collection and storage of the samples and related equipment. Should contamination problems persist the section chief performs an unscheduled system audit of field performance . If necessary the section chief works with the Kansas Health and Environmental Laboratory (KHEL) to identify any contributing sources of contamination. The scope and magnitude of any sample contamination problem, as well as all corrective action implemented to resolve the problem, are documented in the annual QA reports to the Division QA director (see section 3.8, below).

At the discretion of the Section Chief, the Bureau Director, or the Division QA Officer, blind reference samples, spiked with known concentrations of one or more parameters, may be submitted to KHEL and used as a general indicator of the overall accuracy of the data reported by the laboratory.

3.4.3 Preventative Maintenance

The WPMAS and BEFS field staffs maintain a preventive maintenance program to ensure that all field sampling and laboratory equipment is maintained in good condition and is in a state of readiness.

3.4.4 Safety Procedures

Safety procedures for handling field sampling and laboratory equipment must be followed carefully. Safety hazards include handling strong acids, strong bases, and toxic reagents. Materials to be sampled also present safety concerns, particularly sewage with its potential for infection.

3.5 External Procedures for Assessing Data Precision, Accuracy, Representativeness and Comparability

3.5.1 Onsite Audits

BOW/WPMAS monitoring programs may, at the discretion of the Division QA Officer, or the granting agency, be required to participate in periodic QA/QC audits conducted by an independent third party. Audit findings, and corrective actions implemented in response to such findings, shall be reported to the bureau director and Division QA director and addressed in detail within the annual program evaluation.

3.5.2 Interlaboratory Sample Comparison Programs

Whenever possible, samples shall be split between the permittee or other entity and KDHE and the samples sent to the respective laboratories. Comparison between laboratory results shall be reviewed by the program manager or unit chief and passed on to the section chief for inclusion in the annual QA report. Consistent finding of disparities greater than 10% shall be cause for implementation of corrective action procedures.

3.6 Corrective Action Procedures

3.6.1 Equipment Malfunction

Field equipment under BOW control is subject to corrective action procedures detailed in the respective standard operating procedures. Any deficiency in performance discovered during routine use or during an internal or external performance audit is recorded in the appropriate logbook and reported to the program manager. The program manager is responsible for appraising the scope and seriousness of the problem. Within manufacturer's guidelines, he/she may elect to service the instrument or return the instrument to the manufacturer for repair or replacement, using a back-up unit in the interim.

3.6.2 Sample Contamination

The discovery of sample contamination as outlined in section 3.4.3 will lead to corrective action procedures should the contamination exceed the reporting limit. Possible sources of contamination could include impure sample preservative, the wrong preservative, improper handling, or improper storage. The section chief or program manager will investigate and take the necessary steps for correction. The steps taken will be recorded for inclusion in the annual QA report.

3.6.3 Staff Performance Problems

Should a member of the project or field staff have difficulty with a given work procedure (e.g. as determined during an internal performance audit) an effort is made by the section chief to identify the scope and seriousness of the problem, identify any data affected by the problem, and recommend an appropriate course of corrective action. All effected data are either deleted from the file or flagged within the file, at the discretion of the section chief. Possible corrective actions include further in-house or external training for the employee, a reassignment of work duties, or modification of the work procedure.

3.7 Data Management

Completed sample analysis reports from KHEL are delivered by inside mail to the Technical Support Unit Leader and then routed to the appropriate project staff or program manager for data reduction and validation. The data are checked for conspicuous oversights or dubious results. Should problems be noted in the data reports, corrective action procedures are initiated in accordance with section 3.6.

Each analysis report is electronically filed at the laboratory; hard copies are filed in the appropriate BOW file. Copies of NPDES monitoring reports are kept on file for a minimum of three years. Analysis reports pertaining to the 40 CFR 503 sludge regulations must be stored a minimum of five years.

3.8 Quality Assurance/Control Reporting Procedures

The section chief is responsible for informing the Bureau QA Representative of project QA/QC status and of any QA/QC needs within the wastewater pollution control program. He/She is also responsible for maintaining adequate communication with KHEL with regard to program QA/QC concerns.

In addition to these routine communication requirements, the bureau quality assurance representative prepares an annual program QA/QC status report which is routed through the bureau director to the Division QA director. This report contains the following types of information:

(a) status of QA project plans;

(b) description of data accuracy, precision, completeness, representativeness and comparability;

(c) discussion of significant QA/QC problems, corrective actions, progress, needs, plans and recommendations;

(d) results of internal and any external system or performance audits;

(e) summary of QA/QC-related training performed since the last QA/QC status report; and

(f) any other pertinent information specifically requested by the bureau director or the Division QA director.

APPENDIX A

INVENTORY OF PROGRAM FIELD AND LABORATORY EQUIPMENT

Archived 12/21/12

APPENDIX B

STANDARD OPERATING PROCEDURE WPCP-001

EQUIPMENT CALIBRATION, STANDARDIZATION AND PREVENTATIVE MAINTENANCE

Archived 12/21/12

APPENDIX C

STANDARD OPERATING PROCEDURE WPCP-002

SAMPLE COLLECTION, PRESERVATION AND HANDLING

APPENDIX C

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I. SAMPLING AND ANALYSIS

A. Wastewater Plants

The basis for any plant monitoring program and for compliance with the NPDES permit rests upon information obtained by sampling. Decisions based on incorrect data may be made if sampling is performed in a careless or thoughtless manner. Obtaining good results depends on the following factors: 1. Ensuring that samples are truly representative, 2. Using proper sampling techniques, and 3. Protecting and preserving the samples until they are analyzed.

The greatest errors produced are usually caused by improper sampling, poor preservation, or a lack of enough mixing during compositing and testing. Samples at wastewater plants may be defined as grab samples or composite samples. Grab samples are indicated when the composition of the wastewater being sampled is fairly uniform <u>or</u> if it is desired to measure a very strong or unrepresentative waste that would be mitigated substantially by compositing.

Composite samples are indicated when the quality and quantity of wastewater flow varies widely throughout the day; a composite sample will provide an average. The drawback is that slugs of high strength or toxic wastes may be missed or diluted down as a result of compositing. Dissolved gasses such as DO, ammonia, pH, temperature, and residual chlorine are not amenable to composite samples due to microbial action, changes in temperature, and changes in the equilibrium of these parameters with time.

Appropriate BOW/WPMAS SOP's should be utilized for collecting and preserving samples.

B. Samples for Municipal Sludge Program

40 CFR Part 503 outlines management practices and criteria for the land application of municipal sludge. Sludge must be applied at agronomic rates with respect to nutrients, particularly nitrogen, and heavy metals. The sludge must also meet bacteriological requirements and requirements for reduction of vector attraction. To ensure that municipal sludges meet all the requirements of the regulations it is necessary that sludge samples for bacteriological quality, heavy metals and nutrients be collected and analyzed. It is also necessary to perform soil sampling at land application sites to determine the correct sludge application rate with respect to nutrients. Following are the correct sampling procedures:

Soil Samples: Testing soil for plant available nitrogen (N), phosphorus (P), potassium (K) and pH (required annually just prior to sludge application)

1. Determine the sites used for land application of sludge. Usually it will be necessary to interview the operator of the municipal treatment plant in question to determine these locations. Information may also be available in the GIS system, particularly the major dischargers. **Soil samples should be collected prior to land application.**

2. Determine the soil type if possible. This can be with the assistance of county soil maps or visual indications.

3. For uniform type soil:

   Take at least ten-6 inch deep core samples* from each land application site and composite all cores from that site into one sample. From the same core holes, take a second sample (6 inch to 24 inch deep or as deep as you can go but no more than 24 inches) and composite these cores into one sample. Test the top core sample for nitrate-nitrogen, Mehlich III phosphorus, ammonium acetate extractable potassium and pH. Test the bottom core sample for nitrate-nitrogen. These samples should be collected in a clean plastic container.

*If the sludge is injected into the soil, the top composited soil samples should be from cores the same depth as the sludge is injected plus 2 inches.

4. For non-uniform soil types:

   Divide the site into two or more areas with similar soil types in each area. Sample and test the soil from each area as noted in (3) above, keeping each composited sample separate.

5. Take core samples using a core sampler up to 24" depth. Test the top core sample for nitrate-nitrogen, Mehlich III phosphorus, ammonium acetate extractable potassium and pH. Test the bottom core sample for nitrate-nitrogen.

6. Samples should be sent to a laboratory qualified to do soil analyses.

7. Field sample collection sheets must be filled out at the site where samples are collected. Data should include the permittee name, site identification information such as section/township/range or lat/long. If the site has been located by GPS it may be given a number, name or other designator. The name of the sample collector, date and time, and specific sample information or observations should be noted. The chain of custody information should also be filled out correctly.

Sludge Samples

Samples of sludge must be collected annually for analysis of fecal coliform bacteria and heavy metals, and for any tests needed to ascertain whether or not the sludge meets vector attraction requirements. Sludge samples for compliance purposes must be collected at least once every twelve month period.

Following are the steps in taking sludge samples:

1. For fecal coliform analysis, collect seven (7) samples of sludge before land application. The best location is at the end of the discharge pipe before entering the tank truck or trailer. The samples shall be collected in clean plastic containers provided by KDHE or the commercial laboratory. Each of the samples should be analyzed and geometrically averaged to determine compliance.

2. At the same time a sample should be collected for metals and nutrients. A container supplied by the laboratory or other clean plastic container should be satisfactory for this purpose.

3. The sample collector shall fill out a field sampling sheet on each sample collected. The information needed includes the sampler's name, date, permittee name, the parameters needed and the exact location where the sample was collected.

C. Stream Samples

Stream samples shall be collected in accordance with the BOW/WPMAS Stream Chemistry Monitoring Program QMP Part III.

D. Stormwater Samples

Stormwater samples shall be collected, preserved, and transported in accordance with NPDES Storm Water Sampling Guidance Document, USEPA, Office of Water, July 1992.

II. FIELD ANALYSES

Purpose

The purpose of the field analyses is two-fold: to diagnose perceived problems in operation of the wastewater plant and to verify proper operation. As such, the field analyses can also serve as screening tests, to determine where problems exist.

A. pH

The pH readings serve several purposes in a wastewater treatment plant: detecting industrial wastes in the plant influent, detecting upsets in the biological sludge digestion process, detecting biological upsets and the onset of nitrification in treatment process such as waste stabilization ponds, and for NPDES compliance. The standard operating procedure for pH analysis can be found in the BOW/WPMAS Stream Chemistry Monitoring Program's QMP Part III, Appendix B, Procedure SCMP-003, Operational and Maintenance Procedures for Field Analytical Equipment.

B. Chlorine Residuals.

Chlorine residuals may be measured at a plant effluent to confirm compliance with effluent limitations, or, may be used to control the chlorination-dechlorination process. For compliance purposes, the method used must conform to the methods approved in 40 CFR Part 136. Due to the very low permit limits, the minimum detection level must be as low as possible. For these reasons amperometric titration is the method of choice. For process control the color comparator is sufficiently accurate. The standard operating procedure for chlorine residual can be found in the BOW/Public Water Supply Program's QMP Part III, Appendix B, Procedure PWS-002, Standard Operating Procedure for Chlorine Residual Tests.

APPENDIX D

STANDARD OPERATING PROCEDURE WPCP-003

MANAGEMENT AND REPORTING OF DATA

APPENDIX D

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I. DATA CUSTODY

The purpose of this standard operating procedure (SOP) is to establish uniform policies and procedures for maintaining an accurate written record of a sample from the time it is collected through its introduction as evidence into litigation proceedings and to insure that a sample has not been tampered with or altered throughout the process.

A. Definition

The sample by definition is in custody if:

1. It is in actual physical possession of the sample collector.

2. It is in view of the sample collector after being in the collector's physical possession.

3. It is locked up after being in the sample collector's physical possession.

4. It is placed in a designated secure area.

B. FIELD PROCEDURES

1. Chain-of-Custody procedures will be followed for all tests deemed to be of importance for compliance with statutes and regulations and for those which could become evidence in litigation. Samples for plant process control, field screening analyses, or other samples collected for a technical or information purposes will not need to follow chain of custody procedures. In general, those samples submitted to the KDHE laboratory <u>will</u> be subject to chain of custody procedures.

2. In order to insure adequate control and documentation of collected samples, the number of personnel handling the samples should be minimized.

3. A unique number shall be assigned to each sample for identification purposes. If a sample consists of several bottles for analysis of different parameters from the same sample, the same sample number is used for each portion of the original sample.

4. If the samples are to be shipped to other laboratories for analysis a sample label is attached to each sample container at the time of collection.

5. Record all field measurements and other pertinent data on the field sheet.

6. Custody of the sample is initiated at the time of sample collection by insuring that the sample is in the sample collector's physical possession or view at all times, or is stored in a locked place where there could be no reasonable possibility of tampering. The sample collector is responsible for the collected samples until they are received by the laboratory or have been appropriately shipped to the lab. The chain of custody record is initiated at the time of sample collection and a copy accompanies the samples. The chain of custody record is at the bottom of the KDHE laboratory sheet. Signatures and dates on the sample custody sheet shall be signed in indelible ink. The sample shall make sure the name, date, time, exact location, sample identifiers and parameters for analysis are listed before signing off. The person assuming custody shall sign and date the custody section of the sheet in the sample collector's presence. An exception is samples delivered after hours; these must be placed in the designated sample storage area of the KDHE laboratory by the individual having custody.

II. DATA MANAGEMENT

Data received from the laboratory shall be forwarded to the Leader of the Technical Services Unit, Administrative Section, Bureau of Water, or a designated project manager. The data will be examined and any unusually high values or values considered to be unreasonable will be noted and brought to the attention of the laboratory and the appropriate section or unit chief. High values for a given contaminant or parameter may indicate a real problem, but occasionally occur as a result of a decimal error, a missed dilution at a permittee laboratory, sample collection at the wrong location or other error. Such errors should be corroborated and noted and initialed on the data reporting sheet prior to passing the information along or filing.

Significant figures must be checked to ascertain that no unusual degree of accuracy is implied by the result. For instance, BOD values expressed to thousandth of a milligram per liter.

The laboratory results shall then be forwarded to the appropriate section or project manager. The copy distribution list shall be reviewed to make sure the information is distributed to all who need it. A copy is routed to the appropriate file and/or electronic data base.

APPENDIX E

STANDARD OPERATING PROCEDURE WPCP-004

EVALUATION OF DATA QUALITY

QUALITY CONTROL AND STATISTICAL EVALUATION OF DATA

Accuracy is a measure of how closely the analytical result or the average of a set of analytical tests approaches the true value of a parameter. Two types of error affect accuracy: systematic error and random error. An example of systematic error would be inaccuracy in a piece of laboratory equipment, for example a laboratory balance that consistently under-weighs. Random error is error from a variety of sources which cannot be totally controlled. Errors in the use of pipettes, graduated cylinders, or other laboratory equipment are examples. Random error is controlled by averaging a series of replicate analyses of a sample.

Precision measures how closely a series of replicate measurements approaches the average. It is a measure of how well results can be reproduced. A laboratory may have a high degree of precision on a given test but be inaccurate. It is necessary to control both precision and accuracy to achieve a consistency of data quality.

A number of methods are available for evaluating both accuracy and precision. However, these measures do not account for errors in sampling and handling that occur prior to laboratory analysis.

A. Wastewater Laboratories

Wastewater laboratories and commercial laboratories providing effluent quality data to the bureau for compliance purposes shall be certified by the Kansas Department of Health and Environment and shall follow the Laboratory Certification Section guidelines for data evaluation and quality.

B. Contract laboratories analyzing samples for a bureau project must conform to the following general guidelines for data quality and evaluation:

1. At least 10% of a given number of samples should be for quality control purposes. At least one blank, one spike sample and one set of duplicates shall be analyzed with each sample set.

2. For accuracy determinations spiked samples shall be used. The use of spikes is preferable to the use of analysis of known standards as the spikes more nearly approach the true range of values encountered in analyzing the samples. The procedure involves the addition of a known quantity of standard to a known volume of unknown sample. Replicate analyses of both the known and the unknown sample are run and the results are compared to generate a percent recovery. Ideally, the result should be 100% but results between 90% and 110% are acceptable. The procedure for calculating percent recovery is as follows:

a. Determine the unknown sample concentration by averaging the results of replicate analyses.

b. Calculate the theoretical concentration of the spiked sample. (See Wastewater Sampling for Process and Quality Control, Water Environment Federation, 1979, p64.

c. Determine the spiked sample concentration by averaging the results of the duplicate analyses.

d. Divide the spiked sample concentration by the theoretical concentration. Multiply the result by 100. The result is the percent recovery.

3. For measurement of precision it is necessary to measure a series of replicate samples. The degree of precision required shall be determined at the outset of the project and incorporated onto the project QA/QC Plan. The determination of precision shall be through the use of average deviation, variance and standard deviation.

C. Stream Sampling

The BOW/WPMAS Steam Chemistry Monitoring Program QMP Part III will be used to determine data quality for stream samples.

D. Compliance Monitoring at POTWs

Quality control and statistical analysis of data generated from compliance monitoring at POTWs (Publicly Owned Treatment Works) will be performed by the laboratory performing the requested analysis according to the requirements of the KDHE Environmental Laboratory Certification Program.

E. Municipal Sludge Samples

Samples collected for compliance with 40 CFR part 503 shall conform to the following QC policy:

1. Approximately 10% of the cities sampling annually for fecal coliform, heavy metals and nutrients will be targeted for duplicate samples to be analyzed in the KDHE laboratory. Split samples will be collected, one portion going to the permittee's contract laboratory and one part going to the KDHE laboratory.

2. Samples analyzed in the KDHE laboratory will be analyzed in conformance with the KHEL quality control procedures.

3. Sample values differing by more than 10% shall be cause for concern and additional samples and/or laboratory evaluation procedures will be initiated at laboratories where consistent quality control problems seem to exist.

APPENDIX F

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