DIVISION OF ENVIRONMENT
QUALITY MANAGEMENT PLAN

PART III:

COMPLIANCE MONITORING PROGRAM
QUALITY ASSURANCE MANAGEMENT PLAN

Revision 1
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Kansas Department of Health and Environment
Division of Environment
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Section 1

INTRODUCTION

1.1 Purpose of Document

This document establishes the general framework for the Kansas Department of Health and Environment (KDHE) compliance monitoring program. Quality assurance (QA) and quality control (QC) goals, policies, procedures, organizational responsibilities, and program evaluation and reporting requirements are specifically addressed. Standard operating procedures (SOPs), describing sample collection, preservation, transport and analysis methods, equipment maintenance and calibration protocols, and other routine program activities, are provided in the appendices of the plan.

1.2 Historical Background

As a National Pollutant Discharge Elimination System (NPDES) delegated state, Kansas has been issuing NPDES permits and conducting compliance sampling inspections since the mid-1970s. Parameters sampled for analysis are those specified in each individual facility's NPDES permit. Additional parameters such as metals, nutrients, and organic compounds are frequently sampled to obtain additional information regarding effluent characteristics. Whole effluent toxicity samples have also been collected during compliance sampling.

1.3 Contemporary Program Objectives

NPDES permits contain specific and legally enforceable effluent limitations and self-monitoring requirements for flow measurement and sampling. The sampling frequency, the sample type (grab or composite), the parameter limitations, the analytical methods, and the reporting frequency are determined by the permitting agency (KDHE).

The NPDES permit contains specific limitations for various parameters (pH, biochemical oxygen demand, suspended solids, etc.). Limits generally are defined in terms of parameter mass per unit time and/or concentration. Common measurement end points for NPDES permits are daily average, daily maximum, seven consecutive day average, and thirty consecutive day average.

Self-monitoring data are submitted to KDHE by the permit holder at intervals specified in the permit. Generally, the reports are submitted to the permitting agency monthly or quarterly.

Compliance monitoring is required to document the accuracy and completeness of self-monitoring and reporting activities of permit holders and to provide sufficient documentation and verification to justify and support enforcement activities. All compliance monitoring activities are conducted on the premise that they may lead to enforcement action. Compliance monitoring includes all field activities conducted to determine the status of compliance with permit requirements. A compliance sampling inspection is conducted to accomplish one or more of the following objectives:

1. verify compliance with effluent limitations;
2. verify self-monitoring data;
3. verify that parameters specified in the permit are consistent with wastewater characteristics;
4. support permit re-issuance and revision; and
5. support enforcement action.

The scope of the program is statewide. Any NPDES permit holder may be subject to compliance monitoring. Facilities are selected by KDHE Bureau of Water regulatory personnel. The Watershed Planning, Monitoring, and Assessment Section currently monitors 20 to 40 facilities per year.

Section 2

QUALITY ASSURANCE GOALS

The foremost goal of this QA management plan is to ensure that the Kansas compliance monitoring program produces data of known and acceptable quality. "Known quality" means that data precision, accuracy, completeness, comparability and representativeness are documented to the fullest practicable extent. "Acceptable quality" means that the data support, in a scientifically defensible manner, the informational needs and regulatory functions of the Bureau of Water (BOW), the Division of Environment, and the agency. The success of the program in meeting this general goal is judged based on the following QA/QC performance criteria and requirements:

1. Where practicable, the reliability of program data shall be documented in a quantitative fashion. For routine analytical parameters, the precision of the data shall be evaluated using replicate and procedural blank samples.

   The average coefficient of variation among replicate samples shall, for all parameters, be less than twenty percent, and background contaminant levels (determined through the analysis of procedural or "field" blanks) shall constitute, on average, less than ten percent of the reported sample concentrations.

2. Loss of physicochemical and microbiological data due to sample collection, transport or analytical problems, or to the subsequent mishandling of data, shall be limited to less than five percent of the data originally scheduled for generation. Where problems occur, and a substantial quantity of data is lost, an effort shall be made to resample the affected facility (or facilities) to maximize data completeness.

3. Changes in the methods used to obtain and analyze water samples shall be carefully documented through formal revisions to the SOPs appended to this QA management plan. This requirement is intended to help maintain a reasonably consistent database over time, enhance knowledge of the effects of any procedural changes on reported contaminant concentrations, and facilitate the identification and evaluation of long-term trends in wastewater and/or surface water quality.

   Data generated through this program shall be compared with other available monitoring data (e.g., discharge monitoring data reported by NPDES facilities) to examine the representativeness of program findings relative to other reported results. Staff shall attempt to ascertain the probable causes of any discrepancies observed between the various existing databases and describe, in end-of-year program reports, the magnitude and practical significance of such discrepancies.

Section 3

QUALITY ASSURANCE ORGANIZATION

3.1 Administrative Organization

The compliance monitoring program is administered by the Watershed Planning, Monitoring, and Assessment Section in the Bureau of Water (BOW). Administrative support, policy direction, QA oversight, and general guidance for the program are provided by the supervisor, section chief, the BOW quality assurance representative, and the Division of Environment quality assurance officer.

3.2 Staff Responsibilities

This program structure can accommodate two full time staff persons. The organizational framework for these staff is depicted in Figure 1, and responsibilities associate with each position are described below. Currently, the program has one full time staff person.

Program Manager - The manager is directly accountable for project development and implementation, data interpretation, and project QA. He or she assigns day-to-day project priorities and directly supervises all project staff. The manager is also responsible for identifying equipment, personnel and training needs within the program and for communicating those needs to the section chief. The manager is also responsible for monitoring and documenting program QA, for identifying QA needs within the program, and for revising the QA program plan. The program manager ultimately is responsible for ensuring the proper collection, preservation and transportation of compliance samples. He/she also coordinates all sample analyses (working with a contracted lab of his/her choosing), manages and maintains the program database, and works to ensure and enhance the performance and safety of the staff under his/her supervision.

Program Assistant - This individual is responsible for day-to-day compliance monitoring activities, including the scheduling of inspections and the collection, preservation and transport of effluent samples. This individual also performs equipment maintenance and calibration and assists with recording and analysis of data, with report preparation, and with development and refinement of laboratory and field procedures. The Program Assistant participates in the collection, preservation and transportation of samples. This individual also is responsible for maintaining BOW compliance monitoring files, informing Bureau of Water personnel of sampling results, scheduling compliance monitoring activities (with input from Bureau of Water regulatory personnel), and maintaining equipment and vehicles used in the program.

3.3 Staff Qualifications and Training

Minimum technical qualifications for program staff vary by position. The program manager may be an Environmental Specialist or Environmental Compliance and Regulatory Specialist and must hold at least a four-year college degree in environmental chemistry, environmental microbiology, aquatic biology, hydrology or a related scientific field and have substantial experience in the performance of water quality studies and associated data analysis and statistical procedures. The program manager must also understand the basic principles of supervision, program administration and quality control and possess advanced computer skills and written and oral communication skills. Also, pursuant to Part I of the divisional quality management plan (QMP), the program manager must complete formal supervisory training offered by the Kansas Department of Administration and quality assurance training offered by the United States Environmental Protection Agency (EPA). The Program Assistant (and all other employees routinely assisting with this program) must meet qualifications consistent with Environmental Compliance and Regulatory Specialist job class and must command a thorough understanding of the procedures used in the collection, handling and preliminary analysis of surface water and wastewater samples and in the processing of associated paperwork and other documentation.

Individuals routinely participating in this program must possess a valid Kansas driver's license and current certifications in first aid, cardiopulmonary resuscitation (CPR), and the use of automated external defibrillators (AEDs). They must review the program's QA management plan and SOPs prior to assuming field/laboratory duties and repeat this review at least annually (QMP, Part I). All program staff receive in-house training in applicable work procedures and related safety requirements. As funding and other agency resources allow, the Program Manager and Program Assistant are encouraged to participate in technical workshops and seminars dealing with environmental monitoring operations and related field, analytical, data management and statistical procedures.

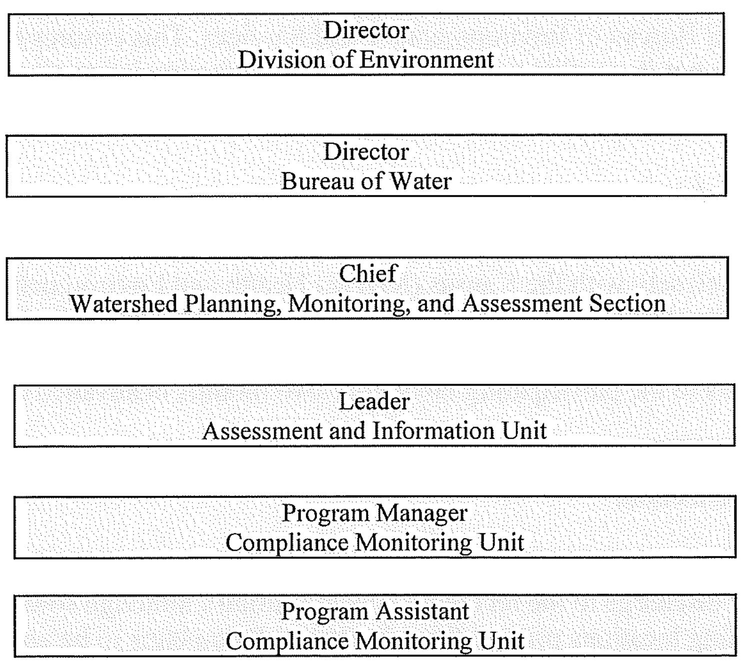

Figure 1. Compliance monitoring program organizational hierarchy.

Section 4

QUALITY ASSURANCE PROCEDURES

4.1 Monitoring Site Selection Criteria

In general, facilities are scheduled for compliance monitoring if they:

1. discharge effluent to water bodies identified on the 304(l) list (Water Quality Act of 1987; Public Law 100-4) as having probable toxic impacts;
2. are scheduled for an upcoming permit renewal;
3. represent NPDES "major" facilities not yet assessed;
4. are known or suspected to contribute to ambient water quality problems or NPDES permit compliance problems; or
5. are otherwise recommended for compliance monitoring by KDHE Bureau of Water's Water Permitting and Compliance Section.

Annual work plans are established in collaboration with the BOW Water Permitting and Compliance Section. Scheduling for site visits are coordinated with appropriate District Office staff from the KDHE Bureau of Environmental Field Services. This ensures that compliance monitoring visits are not in conflict with scheduled routine facility inspections.

4.2 Field Protocols

4.2.1 Sample Collection

Program staff work closely with the Kansas (KDHE) Health and Environmental Laboratory (KHEL) or private contractual laboratories to schedule sampling runs well ahead of time and ensure the participating laboratory is prepared to receive incoming samples. Typically, staff submit work requests to the participating laboratory two months in advance of a sampling run.

Upon arrival at a monitoring site, program personnel identify themselves to the facility operator and begin sample collection.

The effluent sampling point at each facility is specified in the NPDES discharge permit. It is usually the point of discharge to the receiving stream (outfall), although some permits may specify other sampling locations prior to final discharge. Parameters to be analyzed are also those specified in the NPDES permit. Effluent samples are collected either as grab samples or as 24-hour composite samples, depending on permit requirements. Grab samples are taken at a single point in time, whereas composite samples are collected automatically by sampling machines (ISCO samplers) programmed to take equal aliquots of effluent hourly over a 24-hour period.

The ISCO samplers are set up at sampling sites with the following considerations:

1. The intake tubing must be long enough to allow for fluctuations in the liquid level that may occur at the sampling site while the equipment is unattended.
2. The sample volume pumped by the sampler must be adequate to fill, but not overfill, the sample bottles.
3. Ice must be placed in the sampler body surrounding the collection container. Ice must not be allowed to enter the collection container.
4. The ISCO sampler should be stabilized in a vertical position and secured against tippage caused by wind gusts or other causes.
5. The intake tubing must uniformly run in a downward fashion to allow for complete purging during the purge cycle.

Prior to initiation of sampling, a determination should be made whether the permit holder wishes to obtain split samples, thereby allowing personnel to obtain adequate sample volumes. Split samples for comparative analyses are encouraged and serve as useful indicators of the quality of permit holder analytical data.

All samples are transferred to the sampling vehicle, where preliminary measurements are performed, and the samples are fractionated and preserved prior to delivery to the participating laboratories (sections 4.2.2, 4.2.3 and 4.2.4).

4.2.2 Sample Containers

Several types of samples are gathered by program staff, and each is transported and stored in its own specific kind of container (Appendix B). A standard glass bottle is used for dissolved oxygen (DO) measurement. All other parameters will have sample containers supplied by the participating laboratory completing the analyses.

Each of these containers is filled from a stainless steel pail (for grab samples) or poured directly from the ISCO sampler (for composite samples). The remaining portion of the sample provides water for pH and temperature field measurements as well as mineral and heavy metal laboratory analyses. Oil and grease samples and phenol samples are collected in their own specific sample containers and are filled directly from the waste stream (using purpose-built container holders and a rope, where necessary). Pesticide samples are transferred from the stainless steel pail to a one-gallon dark glass bottle with a Teflon-lined plastic cap. Radiological samples are transferred to a one-gallon polyethylene jug.

4.2.3 Sample Preservation

Methods employed in the preservation of compliance monitoring samples are described in detail in Appendix B. In summary, mineral, nutrient, heavy metal, pesticide and bacteriological samples are stored in the dark, on ice, pending transfer to the participating laboratories. Heavy metal sample bottles are pre-acidified with nitric acid, whereas nutrient sample bottles are preacidified with sulfuric acid. Dissolved oxygen (DO) samples are analyzed using the Winkler titration technique. All DO samples must be preserved at the time of collection using appropriate additions of manganous sulfate, alkaline potassium iodide azide, and concentrated sulfuric acid (APHA 1992). Once the sulfuric acid is added, the DO samples are stored in the dark pending Winkler titration (SCMP-005, Appendix B).

4.2.4 Preliminary Measurements

Temperature is measured to the nearest 1 °C using a Fisher model #15-0778 stainless steel dial scale thermometer, which is placed directly in the sampling bucket following transfer of the sample to the van. A portable pH meter is used to measure pH in a 50-ml sample aliquot . All measurements are recorded on the field recording sheet along with other pertinent information (Appendix C)

4.3 Sample Transport and Chain-of-Custody

All samples must be handled and stored in a fashion which minimizes contamination, leakage and damage during transport. Samples collected during sampling runs are delivered or shipped to the participating laboratory that same day, prior to the close of business, or early the next morning.

Only samples collected during two-day runs and submitted for DO, biochemical oxygen demand (BOD), bacteria, nitrite and/or ortho-phosphate analysis generally exceed maximum holding times.

Standardized sample submission (chain-of-custody) forms are completed for all samples submitted to the participating laboratories. These forms identify sampling location, date and time of sample collection, personnel involved in the collection of the sample, and analytical parameters of interest; they also assign to individual samples a unique identification number for future reference.

4.4 Laboratory Procedures

Analytical methods employed in this program and associated parameter reporting limits are summarized in Table 4.4-1, below.

TABLE 4.4-1 ROUTINE BACTERIOLOGICAL PARAMETERS

Parameter	Reporting Limit	Reporting Unit	Analytical Method
Escherichia coli	1	colonies/100 ml	SM 9223-B

TABLE 4.4-2 ROUTINE COMPOSITE AND INORGANIC CHEMICAL PARAMETERS

Parameter	Reporting Limit	Reporting Unit	Analytical Method
Ammonia (N)	0.10	mg/L	EPA 350.1
Biochemical oxygen demand	5.0	mg/L	SM 5210B
Bromide	0.01	mg/L	EPA 300.0
Chemical oxygen demand	10.0	mg/L	SM 5220D
Chloride	5.0	mg/L	EPA 300.0
Dissolved oxygen	0.1	mg/L	EPA 360.1
Fluoride	0.10	mg/L	EPA 300.0
Nitrate (N)	1.0	mg/L	EPA 300.0
Nitrite (N)	1.0	mg/L	EPA 300.0
Oil and grease (HEM)	5.0	mg/L	EPA1664A
Phenolic Compounds	0.05	mg/L	SM 5530 C/D
Sulfate	5.0	mg/L	EPA 300.0
Sulfide	0.10	mg/L	SM 4500S2-D
Total Kjeldahl Nitrogen (N)	0.50	mg/L	EPA 351.2
Total phosphorus (P)	0.10	mg/L	EPA 365.4
Total residual chlorine	0.02	mg/L	EPA 330.5
Total suspended solids	5.0	mg/L	SM 2540D

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

4.5.1 In-house Audits

The section chief or unit leader conducts annual audits of field and laboratory equipment and procedures. Each audit is comprised of (1) a system audit, consisting of a qualitative, onsite review of QA systems and physical facilities for monitoring, measurement and calibration, and (2) a performance audit, in which a quantitative assessment is made of the bias (accuracy) and variability (precision) of analytical measurements.

During system audits, staff responsible for sample collection and field operations are required to demonstrate a proper understanding of the requirements imposed by the QA management plan and accompanying SOPs.

During performance audits, staff are required to conduct field measurements in the presence of the section chief and to report measured values for temperature and pH that fall within five percent of the values established by the section chief. Should these values fall outside control limits, the section chief and field worker initiate corrective actions as described in section 4.11.1.

The auditor is responsible for summarizing audit results in annual QA reports to the Division of Environment's quality assurance officer (section 4.12).

4.5.2 Instrument Calibration and Standardization

Sampling and analytical equipment frequently used in the compliance monitoring program include:

ISCO composite samplers, model 3710
pH meter, Cole Parmer model 5996-70
thermometer, Fisher model 15077B
chlorine meter, Hach model 46700-00

Written calibration and care instructions for these devices are provided by the manufacturers and are strictly adhered to by program staff. Calibration and performance logs for each instrument are maintained on file.

Periodic inspection of sampling and analytical equipment and routine maintenance of equipment is necessary to minimize malfunctions which could result in the loss of data or disrupt program activities. Field instrumentation must be inspected and tested prior to each sampling trip and calibrated at intervals recommended by the manufacturer. Equipment maintenance logs shall be maintained for all meters. ISCO samplers shall be thoroughly cleaned with phosphorous free detergent and thoroughly rinsed following each use.

Vehicles used for field activities must be maintained in a reliable condition and kept free of trash, debris or other materials that could significantly increase the risk of sample contamination. Entries must be made in the vehicle log upon completion of each field trip. Instrument and vehicle malfunctions shall be reported to the program manager as soon as possible to expedite necessary repairs or the acquisition of new equipment.

At annual intervals, the performance of all thermometers used in the field is checked against a reference thermometer traceable to the National Bureau of Standards (NBS). Before leaving for the field, monitoring staff are expected to calibrate the pH meter and test the instrument for normal operation.

The pH meter is standardized using NBS-traceable pH buffer solutions (Appendix B). This instrument must meet all manufacturer performance specifications. Should the meter be found to drift significantly, more frequent calibrations are performed, or corrective action procedures are invoked (section 4.8).

4.5.3 Procedural Blanks

The possibility of sample contamination during sample preparation, storage and analysis is assessed using procedural blanks, prepared with ASTM Type-I quality water and subjected to the same treatment as compliance monitoring samples. Contamination is an especially important consideration when sampling for trace metals, as concentrations of these parameters in surface water are frequently less than 1.0 ug/L, and sample concentrations may be greatly augmented through exposure to airborne particulate matter, etc.

Blank samples shall be collected from at least 10 percent of the facilities visited during the sampling season. On a sampling run, a complete set of sample containers shall be selected at random, filled with ASTM Type-I quality water under field conditions, and sealed, transported, stored and analyzed along with the other field samples. If the QA/QC limits of section 2, paragraph 1, are exceeded, corrective action procedures are implemented in accordance with section 4.10.1.

4.5.4 Duplicate Samples and Spiked Samples

Quality control measures in the compliance monitoring program also shall include the use of duplicate samples. Duplicate samples shall be collected from a minimum of 10 percent of facilities sampled. If the QA/QC limits of section 2, paragraph 1, are exceeded, corrective action procedures are implemented in accordance with section 4.10.1.

Field spikes are performed if and when capacity is available. At least once each sampling season, a water sample is spiked with known concentrations of selected parameters and submitted for analysis. These samples are purchased from appropriate commercial sources. The corrective action procedures of section 4.7 are invoked if the precision or accuracy of the data falls outside the control limits established in section 2.

4.5.5 Split Samples

Operators at all sampled facilities are questioned regarding their desire to "split" samples from the composite sampler, allowing them the opportunity to perform their own analysis on the same samples of water taken by the CM program staff. CM staff can also provide facility operators with duplicate grab samples.

Sample analyses obtained from the CM program's contracting laboratory are compared to analytical results obtained by the participating monitored facilities to determine potential problems in precision or accuracy.

4.5.6 Safety Protocols (Field)

Safety should be a constant concern of any staff involved in field work. Among other considerations, incapacitation of personnel due to injuries may have a substantial negative impact on reaching program goals. Safety protocols can be generalized into two basic categories, those concerns imposed by nature and those related to staff actions and equipment.

Natural safety hazards include weather conditions, problems related to local terrain, and biological hazards. No field sampling should take place if weather conditions impose an immediate threat, whether it be wind, lightning, hail, flood, or extreme temperature. Field staff must use best judgment when adverse weather conditions are encountered. If weather conditions are not threatening, but might impair the representativeness of samples that are being collected, field staff should postpone sampling operations pending the return of normal weather conditions.

Many forms of terrain present safety concerns to field staff. In some areas of the state, sink holes and subsidence create a hazard for falling. Likewise, loose gravel, steep embankments, algae coated rocks, etc., create poor footing. Field staff should avoid entering environments and situations that pose a markedly elevated risk of injury.

Field staff may also encounter organisms that produce irritating, or harmful, biochemical compounds. These may include various plants (poison ivy, nettles, blue-green algae), vertebrate animals (skunks, snakes), or invertebrate animals (wasps, scorpions, etc.). While most encounters can be avoided by careful observation or precautions, many such encounters can be sudden and unanticipated. Again, cultivating good judgment is the primary defense for field staff. Besides honing one's level of awareness and judgment in the field, first-aid training becomes essential. All program staff must be currently certified in basic first aid, cardiopulmonary resuscitation (CPR) skills, and automated external defibrillator (AED) by either the American Red Cross or the American Heart Association.

Sampling devices that could cause personal injury should not be used until field staff have been initiated to the activity by other staff that are proficient in using the equipment. Even after such training, accidents are possible if the operator does not use good judgment. The same applies to the handling of glassware and chemicals that are to be used in the field (KDHE 2014).

Field chemicals include manganous sulfate (an eye and mucous membrane irritant), alkaline potassium azide-iodide (may be toxic if ingested), concentrated sulfuric acid (a strong acid and oxidizer), dilute sulfuric acid (an irritant to skin and eyes), nitric acid (a strong acid and oxidizer used as preservative in heavy metal sample bottles), and pH buffer solutions (eye and mucous membrane irritants).

Field staff must use good judgment in handling and applying these chemicals. For instance, field staff should consider when using these chemicals whether the terrain makes firm footing a problem. If so, staff should move to a more level area before preserving samples. If the wind is blowing, chemicals should not be applied to samples while holding the bottle upwind of one's face and eyes. In summary, most safety measures incorporate forethought and common sense as their primary ingredients.

Sanitary sewage may contain pathogenic organisms. Industrial effluents may contain toxic or corrosive materials. Disposable rubber gloves should always be worn while handling or sampling effluents. Hands and other bodily parts that may come into contact with wastewater must be washed thoroughly and as soon as practicable with disinfectant.

Chlorine and hydrogen sulfide gases may be used or otherwise present at the treatment facilities being sampled. Confined spaces may lack adequate oxygen or pose other risks to human health, such as UV lights used in disinfection. Sampling personnel must observe and follow any posted warning signs at facilities being monitored.

All vehicles used in the compliance monitoring program must be maintained in proper operating condition and equipped with first aid kits, fire extinguishers, spare tires and tire changing equipment, rain gear, road reflectors and/or flares, and operable flashlights. Monitoring staff are to be assigned a mobile smartphone to carry during field activities. The use of a smart phone, with capability to make calls, check weather radar, etc., is especially desirable when traveling alone or traveling during periods of potentially severe weather.

Sampling equipment also should be periodically inspected for defects and problems that could relate to staff safety. When problems are identified, they should be repaired or corrected in a timely fashion. Serious safety issues must be reported to the program manager or higher-level supervisor immediately.

4.6 External Procedure for Assessing Date Precision, Accuracy, Representativeness and Comparability

At the discretion of the unit leader, section chief, bureau QA representative, bureau director, or divisional QA officer, the compliance monitoring program may, from time to time, participate in independent performance/system audits or in cooperative, interlaboratory sample comparison programs or reference sample programs. Participation in such activities promotes scientific peer review and enhances the technical integrity and overall credibility of the program.

4.7 Data Analysis, Validation, Storage, Transfer and Reporting

4.7.1 Data Analysis

Program staff will compile the final chemical analytical results and compare these results to available discharge monitoring report (DMR) data and applicable NPDES permit limits. Computer databases and paper files will be maintained on each facility sampled by program staff. Summary findings will also be routed to NPDES permitting personnel in the Bureau of Water.

4.7.2 Data Handling and Management

All field- and laboratory-generated data on effluent water quality are handled in an orderly and consistent manner. Time and date of sample collection, compliance monitoring station identification number, and other basic information are recorded on standardized laboratory sample submission forms provided by the participating laboratory. Copies of the forms are retained by sampling staff and routed to the unit chief for filing; original forms are submitted to the participating laboratory along with the samples.

Hard copies of all water chemistry and bacteriological data generated by the participating laboratories are stored in the program's files. These data are carefully reviewed for obvious errors or omissions. Information derived from QC samples (duplicates, blanks, etc.) are subjected to particularly thorough review. With the approval of the section chief, data that are deemed inaccurate, or grossly unrepresentative, are purged from the electronic database. Similarly, field data for temperature and pH are loaded onto electronic spreadsheets and checked for obvious errors or omissions. Redundant forms of data storage and backup are used to ensure the long-term integrity and availability of the program data.

4.7.3 Data Reporting

Within 30 days of receipt of the laboratory results the Program Manager (or manager's designee) will prepare a summary report for forwarding to the appropriate section chief in the Bureau of Water. A copy of this report also will be forwarded to the appropriate KDHE district environmental administrator.

4.8 Corrective Action Procedures

4.8.1 Sample Contamination Problems

Blank concentrations outside the control limits established in section 2, paragraph (1), detract from the quality and credibility of the compliance monitoring data and must be resolved in a timely manner. In instances where the source of the contamination is unknown, the program manager shall initiate an investigation to determine whether the problem is of likely field or laboratory origin. Field contamination problems may result, for example, from improper sample collection technique or exposure to contamination sources at the sampling site or within the vehicle used to transport the samples. Laboratory problems may include contaminated water supply or reagents, contaminated glassware, or some less conspicuous problem. Program staff shall work closely with laboratory personnel to identify and eliminate contamination sources. Persistent problems may trigger a program audit by the section chief and ultimately may result in the removal of questionable data from the compliance monitoring database.

4.8.2 Data Precision/Accuracy Problems

Should compliance monitoring data fail to meet the precision and accuracy requirements of section 2, paragraph (1), the program manager shall initiate an investigation to determine the cause of the problem. The program manager shall work closely with laboratory staff to identify the cause of the problem and implement appropriate corrective measures. Persistent problems may trigger a program audit by the section chief, result in the disqualification of a substantial amount of compliance monitoring water quality data, or invoke other remedial measures (e.g., independent audit).

Data precision is primarily evaluated by comparison of results from duplicate samples. Each sample collected in the field follows identical methodology. If each sample also meets the laboratory QA/QC expectations, then it would be expected that duplicate samples closely match in value. The determination of whether problems were present in either the field or the laboratory may be ascertained by examining multiple parameter data derived from a given sample. For example, if all heavy metals were analyzed from one container of water, but only two metals show poor precision between duplicate samples, then the problem is more likely to have occurred in the laboratory. If all or most of the metals show poor precision between duplicate samples, then the problem might lie either with field contamination or contaminated sample bottles. Parameter values that show poor precision may be deleted from the database after comparison to available past data.

4.8.3 Equipment Malfunction

In case of an equipment malfunction, staff of the compliance monitoring program may attempt to repair the equipment in the field, adjust the scale of the survey to accommodate the failed equipment, or reschedule the survey. If equipment cannot be repaired by staff, it should be replaced or sent back to the manufacturer for repair. Backup equipment is normally available to accommodate equipment downtime. Data affected by equipment problems may be flagged within, or deleted from the electronic database.

To minimize concerns related to the contamination of sampling equipment, program staff must thoroughly wash, rinse, and dry the equipment prior to the beginning of each field season. Should equipment contamination become a concern during the field season, program staff must disassemble and clean the affected sampling devices or other equipment. The use of sampling and container blanks may be helpful in identifying the sources of contamination.

4.8.4 Staff Performance Problems

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

4.9 QA Reporting Requirements and Frequencies

End-of-year program evaluations shall be conducted by the unit leader or section chief, and a written report submitted by the program manager to the bureau QA representative, bureau director, and divisional QA officer by March 15 of the following year. The program manager shall cooperate fully in the evaluation of QA/QC performance and shall make available all records pertaining to the precision, accuracy, representativeness and comparability of the monitoring data gathered during the evaluation period. Program evaluations submitted through the section chief must indicate when, how, and by whom the evaluation was conducted, the specific aspects of the program subjected to review, a summary of significant findings, and technical recommendations for necessary corrective actions. The section chief shall discuss the reported findings with the program manager and other program staff.

Section 5

REVIEW AND REVISION OF PLAN

To ensure that QA and QC activities meet the evolving needs of the compliance monitoring program and support the primary goal established in section 2, all portions of this plan and appended SOPs are reviewed by the program manager and program staff on at least an annual basis. Revisions to the plan and SOPs require the approval of the program manager, unit leader, section chief and bureau QA representative prior to implementation. Although review activities normally occur after the completion and submission of the annual program evaluation in March, revisions to the plan and SOPs may be considered at any time based on urgency of need or staff workload considerations.

Original approved versions of the QA management plan and appended SOPs, and all original historical versions of these documents, are maintained by the bureau QA representative or his/her designee. The bureau QA representative also maintains an updated electronic version of the plan and SOPs on the KDHE internet server in a "read only" PDF format.

APPENDIX A

INVENTORY OF FIELD AND LABORATORY EQUIPMENT

I. VEHICLE

A. Full sized cargo van

II. GENERAL FIELD EQUIPMENT AND SUPPLIES

A. Stainless steel self-filling sampling bucket (1 gal)

B. Stainless steel pail (1 gal)

C. Stainless steel funnel

D. Rope, cotton fiber, 75-ft length with snap swivel

E. Coleman ice chests (100-qt capacity)

F. Fluorescent orange safety vests

G. First aid kit

H. AED

I. Fire extinguisher

J. Road reflectors and/or flares

K. Flashlight

L. Cellular Phone

M. Rain coats

N. Hand sanitizer solution

O. Digital Camera

P. Plastic sample storage tubs

Q. Wooden sample storage crates

R. Clipboards (for maps, field recording sheets, etc.)

S. Glass beakers (100 ml)

T. Polycarbonate Erlenmeyer flask (500 ml)

U. GPS unit, windshield mount, and power cord

V. Disposable sanitary gloves

W. Oil and grease sample bottle holder

X. Tool kit

III. MEASUREMENT AND SAMPLING APPARATUS

A. Fisher model #15-0778 stainless steel dial scale thermometer (-10 to +110 °C)

B. Cole-Parmer model #5996-70 analog pH meter (or equivalent), with instruction manual, carrying case, pH probe, and pH 4, 7 and 10 buffer solutions

C. Deionized water (squeeze bottle) for rinsing pH probe and beakers

D. Winkler dissolved oxygen kit with reagents # "1, 2, 3" in 250 ml Nalgene plastic bottles with 2 ml plastic dispensing pipette

E Hach colorimetric chlorine meter

F. ISCO 3710 composite samplers and batteries

G. Intake tubing and strainers for ISCO samplers

H. Padlocks and securing devices for ISCO samplers

I. Sample containers (as assigned by laboratory)

J. Railroad spikes and duct tape to weight strainers in high flow

APPENDIX B

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE FOR COMPLIANCE SAMPLING INSPECTION: GENERAL OVERVIEW (CMP-001)

I. INTRODUCTION

A. Purpose

The purpose of this standard operating procedure (SOP) is to establish uniform procedures for conducting and reporting the results of compliance sampling inspections at industrial, municipal and other wastewater treatment facilities permitted under the National Discharge Pollutant Elimination System (NPDES) established pursuant to the Clean Water Act.

B. Minimum Staff Qualifications

Personnel implementing this SOP should meet the minimum classification requirements for Environmental Compliance and Regulatory Specialist published by the Kansas Department of Administration.

C. General Guidelines

1. Compliance sampling inspections entail the collection of treated wastewater samples for use in determining a given facility's compliance with effluent limitations.

. The following types of inspections are designated for use with this SOP:

a. Compliance Sampling Inspection (CSI). This is the most basic type of sampling inspection. As a minimum, samples are collected for all permit parameters. This does not preclude the collection of additional samples for other parameters. This type of inspection may be performed in conjunction with intensive or special studies.

b. Bioscreen Sampling Inspection (CSIB). This type of inspection consists of collecting samples for determining acute or chronic toxicity as well as for permit parameters.

c. Toxics Sampling Inspection (CSIT). This type of inspection consists of collecting samples for the analysis of priority pollutants as well as the permit parameters.

2. For clarification, the term "permit parameters" refers to the set of specific parameters that comprise the effluent limitations and monitoring requirements of the NPDES permit. Since the effluent limitations for each parameter are based on the analysis of a specific type of sample, the

minimum requirements for any compliance sampling inspection are (a) the collection of representative samples from all discharges and/or waste streams and (b), the analysis of these samples for all permit parameters – (except where laboratory-assigned holding times for specific parameters cannot be met).

To provide a basis for comparing the analytical results obtained from the collected samples to the effluent limitations, the type of sample collected for each permit parameter is the same as that specified in the permit conditions. This does not preclude the collection of additional samples that are dependent on the objectives of the inspection.

3. The following publication provides the bulk of the information on how to perform compliance sampling inspections and, therefore, is adopted by reference and should be used in conjunction with this SOP:

   NPDES Compliance Inspection Manual, U.S. EPA, Office of Compliance, EPA 305-K-17-001, January 2017.

4. The referenced publication provides detailed guidance and information on the objectives of the procedures for conducting compliance sampling inspections and is not reproduced in this SOP. However, if conflicts occur between this SOP and the cited publication regarding specific policies or procedures, the policies and procedures contained in this SOP must be followed.

5. Inspectors must conduct themselves in a professional and responsible manner at all times consistent with the guidelines provided in the referenced publication.

6. Unless otherwise directed or specified in the KDHE compliance monitoring program, all inspections are unannounced; i.e., no notifications are provided to the permit holder prior to the inspection.

7. All compliance sampling inspections are performed with the understanding that enforcement actions could result from the inspections.

II. SELECTION AND COORDINATION

1. Facilities are selected for NPDES sampling inspections pursuant to permitting and sampling priorities established by the Bureau of Water, Division of Environment, KDHE.

   The specific candidates to be inspected are communicated to the compliance monitoring program, Watershed Planning, Monitoring, and Assessment Section.

2. Coordination for scheduling and conducting the actual inspections is accomplished by the compliance monitoring program. A provisional annual sampling plan is prepared by program personnel near the beginning of the calendar year but is not shared widely. Compliance inspection plans are not to be shared with facility operators.

3. A crew chief is assigned to perform the necessary coordination and to conduct or oversee each monitoring operation.

III. PREPARATION FOR INSPECTION

1. Project personnel should review all the applicable permitting files to become thoroughly familiar with the facility to be monitored and to plan for the appropriate sampling parameters and associated protocols.

    a. A copy of the current NPDES permit should be obtained and reviewed in detail, since the conditions of the permit form the basis for determining where to sample, the required type of samples, and the parameters of interest.

    b. Additional source information can be obtained from the files maintained in BOW Water Permitting and Compliance Section.

2. The sampler should determine if there are any specific issues and/or problems that need to be addressed, any specific information that needs to be obtained, and specific sampling needs to be accomplished during the monitoring.

3. Final preparation for the actual monitoring operation should include:

    a. Procurement of appropriate personal safety equipment (hard hat, safety glasses, etc.), inspection tools (credentials, camera, inspection forms, etc.), reference material (NPDES permit, facility files, etc.), sampling equipment (automatic samplers, sample containers, chemical fixatives, buckets, etc.) and field equipment (pH meters, staff gauges, etc.).

        (1) The sampler should refer to applicable SOP for determining equipment and supply needs such as sample containers and sample preservation agents (Appendix A).

        (2) A checklist is included as Appendix A to assist the activity leader in determining what equipment is needed for the field operation.

    b. Preparation of field sheets and sample tags for documentation and identification of the samples to be collected during the inspection.

    c. Determination of how samples will be shipped or transported from the field location to the laboratory for analysis, and prior notification of the participating laboratory.

IV. OVERVIEW OF MONITORING PROCEDURES

1. Guidance for conducting inspections is provided in the referenced publications. Only those procedures that are of special significance or importance, or are different from those provided in the references, are detailed herein.

2. All sampling visits will commence at a reasonable time (i.e., during normal working hours) and will be performed in a timely manner to minimize disruption to the facilities being inspected.

3. During each visit the samplers will initially contact the responsible official; i.e., owner, operator or agent in charge.

   a. Official KDHE credentials will be presented to the responsible official even if no identification is requested.

      No waiver, indemnification or secrecy agreement will be signed to gain entry. It is permissible to sign a "headcount sheet" or visitor's register provided it contains only name, agency, time of visit, purpose of visit and contact.

   c. If entry is denied, the sampler should immediately notify his or her supervisor and follow the instructions received from them.

   d. For industrial facilities, the samplers should be prepared to discuss the provisions of the Freedom of Information Act (FOIA) as it relates to information obtained during the inspection and the rights of the facility to make claims of confidential business information (CBI).

4. Effluent sampling entails the collection of representative samples from all discharging outfalls and any other points specified in the NPDES permit.

   a. As a minimum, sampling includes the collection of effluent samples for parameters specified in the permit.

      (1) Depending on the objectives of the monitoring, additional samples may be collected for analyses of other than permit parameters. These samples may be of a different type (i.e., grab versus composite or vice versa) than that required for permit parameters. They also may be collected from other points in the wastewater stream (influent, intermediate treatment unit, etc.) as necessary.

      (2) Prior to initiation of sampling, a determination should be made as

to whether the facility wants to obtain split and/or replicate samples. This allows planning for obtaining adequate sample volumes to provide for sample splitting. Split samples for comparative analyses are encouraged and serve as useful indicators of the quality of permit holder analytical data.

c. All sample collection, preservation, holding, and shipping/transporting actions must comply with this SOP or other applicable and approved SOPs.

d. Chain-of-custody must be maintained on all collected samples following approved procedures (refer to SOP No. KDHE 2014 SCMP-4.3).

5. To support any possible follow-up enforcement action, Field notes, photographs and photocopies of documents associated with compliance monitoring activities should be obtained by program personnel.

V. POST SAMPLING PROCEDURES

1. Upon completing sample collection, program personnel must ship or transport the collected samples to the appropriate analytical laboratories in the most secure and expeditious manner possible.

2. Project personnel are expected to transmit results of chemical and/or biological testing in a timely manner (usually within 2 weeks) to the Bureau of Water for regulatory follow-up.

3. All the documents (i.e., field notes, pre-inspection information, photographs, inspection reports, etc.) generated during the inspection process must be archived and maintained in the appropriate program files.

VI. SAFETY

All relevant safety SOPs are to be followed during collection of wastewater samples.

VII. REFERENCE

1. NPDES Compliance Inspection Manual, USEPA, Office of Compliance, EPA 305-K-17-001, 2017.

STANDARD OPERATING PROCEDURE FOR COLLECTION OF WASTEWATER SAMPLES (CMP-002)

I. INTRODUCTION

A. Purpose

The purpose of this standard operating procedure (SOP) is to establish uniform procedures for the collection of wastewater samples at industrial, municipal and other wastewater treatment facilities permitted under the National Pollutant Discharge Elimination System (NPDES) established pursuant to the Clean Water Act.

B. Minimum Staff Qualifications

Personnel implementing this SOP should meet the minimum classification requirements for Environmental Compliance and Regulatory Specialist published by the Kansas Department of Administration.

C. GENERAL GUIDELINES

Due to variability of wastewater characteristics and conditions encountered in the field, it is difficult to establish procedures that are applicable in every situation. The sampler may be required to make decisions based on experience in collecting representative samples in certain instances.

The guidelines contained in this SOP provide a basis for making these decisions. Some important guidelines applicable to the collection of representative samples of wastewater are provided below:

1. The sample should be collected where the wastewater is well mixed. If automatic samplers are employed, the shortest suction line length consistent with the height of head being pumped should be used.

2. If automatic samplers are used, the sample should be collected in the center of the channel at 0.4 to 0.6 depth, where the flow velocity is average or above average and the chance of solids settling is minimal. The intake strainer should be suspended vertically.

3. If the channel is too shallow to allow the weighted strainer to be placed in a vertical position, the strainer may be placed horizontally on the channel floor. If this position is used, actuate the pump for approximately one minute to remove loose sediments before commencing sampling.

4. If conditions require the addition of weights to the strainer (e.g. excessively turbulent flow), the weight should be taped to the sampler tubing at a location

sufficiently distant from the strainer to minimize the likelihood of sample contamination.

5. If samples are collected from a faucet, valve or similar line tap device, sufficient flushing must be allowed before collection of the sample to ensure a representative sample. Personnel collecting samples should consult the facility operator for guidance regarding adequate flushing time.

6. The measurement of flow in conjunction with wastewater sampling is an essential consideration when selecting the sampling location. As an example, when sampling below a weir with a high volume of flow, entrained air will be pumped with the samples and the volume of samples may vary.

II. SELECTION OF SAMPLING LOCATION

1. The objective of the sampling activity dictates which wastewater streams should be sampled at a particular facility. The actual point at which samples are collected is determined upon initiation of the inspection and is subject to the following considerations:

   a. When performing compliance monitoring inspections of permitted facilities, the wastewater samples should be collected at the locations specified in the NPDES permit to assess compliance with effluent limitations; and

   b. When performing operation and maintenance inspections and other investigations or studies, samples should be collected at those locations required to meet the objectives of the sampling activity.

2. Effluent wastewater samples should be collected at the most representative site downstream of all entering waste streams and treatment units but prior to discharge to the receiving water body.

   Preferable effluent sampling points are:

   a. end of outfall pipe;

   b. manhole in outfall sewer line;

   c. outlet from last treatment unit, such as a final clarifier or chlorine contact basin; or

   d. throat of a Parshall flume or similar flow measuring device following the last treatment unit.

III. TYPES OF SAMPLES

1. When sampling a permitted facility to assess compliance with effluent limitations, the types of samples specified in the NPDES permit should be collected.

2. In certain cases, the specific parameters to be analyzed will determine the type of samples to be collected, as certain parameters can only be collected as grab samples (e.g. *E. coli*, pH, volatile organic compounds, oil and grease).

IV. PARAMETERS TO BE ANALYZED

1. The objectives of the investigation or study will determine the specific parameters for which samples are collected and analyzed.

2. When sampling, all parameters identified in the NPDES permit should be targeted. Additional parameters may be sampled based on the needs of the requesting party.

3. When monitoring a facility to evaluate the efficiency of a process or treatment unit, samples should be collected for those parameters of concern. For instance, when evaluating a biological process, the most commonly analyzed parameters BOD_5, suspended solids, and pH.

V. METHOD OF SAMPLING

1. The type of sample to be collected normally determines the method of sampling; i.e., grab samples normally are collected manually whereas composite samples are collected either manually or using an automatic sampler.

2. Field conditions may dictate that the samples be collected manually rather than using an automatic sampler. In addition, when flow proportional samples are required, the use of an automatic sampler may not be possible in certain cases.

3. The best method of sample collection is to collect the sample directly into the sample container. Direct collection minimizes the likelihood of sample contamination.

4. If sample collection devices (e.g., buckets) are used to collect the samples, the material of the device must be compatible with the material requirements of the parameters to be analyzed. Stainless steel buckets and funnels are used for this purpose. Buckets and funnels must be rinsed with wastewater from the collection point prior to use in collecting and pouring the sample.

5. When pouring portions from a single sample into separate containers (e.g., individual sample containers) care should be taken to agitate the sample before each pouring to insure an adequately mixed sample.

6. After completing composite sampling, swirl the 5-gallon composite container well with the opening aimed in a safe direction and pour into individual sample containers. When splitting samples, pour the sample into containers in 1/3 increments, swirling the composite container each time before pouring.

7. In cases where both a composite and a grab sample are to be taken, the grab sample may be taken either on the first visit (when the auto sampler is deployed) or on the second visit (when the composite sample is collected).

VI. SAFETY

All relevant safety SOPs are to be followed during collection of wastewater samples.

VII. REFERENCE

1. NPDES Compliance Inspection Manual, USEPA, Office of Compliance, EPA 305-K-17-001, 2017.

2. ISCO sampler instruction manuals.

STREAM CHEMISTRY MONITORING PROGRAM PROTOCOLS (CMP-003)

The following protocols have been adopted from the stream chemistry program by reference (SCMP, KDHE 2014). Follow compliance monitoring program protocols in the event of any instances of conflicting procedures and practices.

1. GLOBAL POSITIONING SYSTEM (GPS) PROCEDURES FOR DETERMINATION OF GEOGRAPHICAL LOCATION OF STREAM CHEMISTRY MONITORING STATIONS (SCMP-001)

2. VEHICLE SAFETY AND MAINTENANCE PROCEDURES (SCMP-002)

3. CALIBRATION AND MAINTENANCE PROCEDURES FOR FIELD ANALYTICAL EQUIPMENT (SCMP-003)

4. PROCEDURES FOR FIELD ANALYTICAL MEASUREMENTS (SCMP-004)

5. PROCEDURES FOR COLLECTING, PRESERVING AND TRANSPORTING STREAM WATER SAMPLES (SCMP-005)

6. FIELD CHAIN-OF-CUSTODY PROCEDURES FOR STREAM WATER SAMPLES (SCMP-006)

7. PROCEDURES FOR FIELD BLANK SAMPLES (SCMP-007)

8. PROCEDURES FOR FIELD DUPLICATE SAMPLES (SCMP-008)

9. PROCEDURES FOR FIELD SPIKED SAMPLES (SCMP-009)

10. PROCEDURES FOR CONTAINER BLANK SAMPLES (SCMP-010)

APPENDIX C: Field Form Template. A custom form is built for each field trip, based on this template.

Sampler name: ____________________

Collection Site	Setup Time	ISCO Sampler #	Battery #	Date	Sample Time	Flow (mgd)	Temp (C)	pH	DO Bottle #	DO (mg/L)	Notes

APPENDIX D

REFERENCES CITED

APHA, AWWA, and WEF. 1992. Standard Methods for the Examination of Water and Wastewater. (Use the most current, accepted edition.) American Public Health Association, American Water Works Association, and Water Pollution Control Federation, Washington.

CFR. 1978. Code of federal regulations, protection of environment, 40 CFR Part 36 and CFR 141.2. Office of Federal Register, National Archives and Records Administration, Washington.

EPA. 1982. Methods for organic chemical analysis of municipal and industrial wastewater. EPA 600/4-82-057. EMSL-CIN, Cincinnati, Ohio.

EPA. 1983. Methods for chemical analysis of water and waste. EPA 600/4-79-020. Revised March 1983 and 1979. EMSL-CIN, Cincinnati, Ohio.

EPA. 2017. NPDES Compliance Inspection Manual, U.S. EPA, Office of Compliance, Washington, D.C., EPA 305-K-17-001.

KDHE 2014. Kansas stream chemistry monitoring program quality assurance management plan. Bureau of Water, Division of Environment, Kansas Department of Health and Environment, Topeka, Kansas.

Teledyne Isco. 2017. 3710 Portable Samplers Installation and Operation Guide. Revision AA.

APPENDIX E

GLOSSARY OF TERMS

24-hour composite sample: either a flow or time-proportioned mixture of a certain number of discrete aliquots over a period of 24 hours

accuracy: the extent to which a measured value actually represents the condition being measured. Accuracy is influenced by the degree of random error (precision) and systematic error (bias) inherent in the measurement operation (e.g., environmental sampling and analytical operations).

activity: an all-inclusive term describing a specific set of operations or related tasks to be performed, either serially or in parallel (e.g., research and development, field sampling, analytical operations), that in total result in a product or service.

aliquot: a discrete sample used for analysis.

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

assessment: the evaluation process used to measure the performance or effectiveness of a system and its elements. As used in this program QA management plan, "assessment" is an all-inclusive term used to denote audits, performance evaluations, management system reviews, internal reviews and related actions.

audit: a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

authorized program or authorized State: a State, Territorial, Tribal, or interstate NPDES program which has been approved or authorized by EPA under 40 CFR Part 123.

average monthly discharge limitation: the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during that month divided by the number of days on which monitoring was performed (except in the case of fecal coliform).

average weekly discharge limitation: the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

bias: the systematic or persistent distortion of a measurement process which causes errors in one direction (i.e., the degree to which the expected sample measurement is different from the true sample value).

biochemical oxygen demand (BOD): a measurement of the amount of oxygen utilized by the decomposition of organic material, over a specified time period (usually 5 days) in a wastewater sample; it is used as a measurement of the readily decomposable organic content of a wastewater.

bypass: the intentional diversion of waste streams from any portion of a treatment (or pretreatment) facility.

calibration: a comparison of a measurement standard, instrument, or item with a standard, instrument or item of higher accuracy to detect, quantify and report inaccuracies and to eliminate these inaccuracies through adjustments.

censored data: a dataset containing data points whose measured properties are not present in an amount that can be reliably quantified and therefore accorded a specific code.

chain-of-custody: an unbroken trail of accountability that ensures the physical security of samples, data and records.

chemical oxygen demand (COD): a measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater. COD is expressed as the amount of oxygen consumed in mg/l. Results do not necessarily correlate to the biochemical oxygen demand(BOD) because the chemical oxidant may react with substances that bacteria do not stabilize.

chlorinator: a device for adding chlorine gas to sewage to kill infectious germs.

Clean Water Act (CWA): an act passed by the U.S. Congress to control water pollution. It was formerly referred to as the Federal Water Pollution Control Act of 1972 or Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), 33 U.S.C. 1251 et. seq., as amended by: Public Law 96-483; Public Law 97-117; Public Laws 95-217, 97-117, 97-440, and 100-04.

Clean Water Act Section 402(p) [33 USC 1342(p)]: the federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Code of Federal Regulations (CFR): a codification of the final rules published daily in the Federal Register. Title 40 of the CFR contains the environmental regulations.

comparability: a measure of the confidence with which one item (e.g., data set) can be compared to another.

completeness: a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

compliance schedule: a schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (for example, actions, operations, or milestone events) that lead to compliance with the CWA and regulations.

composite sample: sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

concurrent duplicate: a surface water quality sample that is arbitrarily split by filling separate sample containers concurrently from the same sampling device to assess sample homogeneity in the sample collection process.

confined space: an enclosed space that an employee can bodily enter and perform assigned work, that has limited means of exit and entry.

container blank: a clean water sample (e.g., distilled water) transferred directly to a randomly selected sample container in order to assess or monitor contamination resulting from sample containment.

control authority: the POTW, if it has an approved pretreatment program; in the absence of such a program, the NPDES State, if it has an approved pretreatment program or EPA, if the State does not have an approved pretreatment program.

conventional pollutants: pollutants typical of municipal sewage, and for which municipal secondary treatment plants are typically designed; defined by Federal Regulation [40 CFR§401.16] as BOD, TSS, fecal coliform bacteria, oil and grease, and pH.

conventional systems: systems that have been traditionally used to collect municipal wastewater in gravity sewers and convey it to a central primary or secondary treatment plant prior to discharge to surface waters.

conveyance: a channel or passage that conducts or carries water including any pipe, ditch, channel, tunnel, conduit, well, or container.

corrective action: any measure taken to rectify a condition adverse to quality and, if possible, to preclude its recurrence.

criteria: the numeric values and the narrative standards that represent contaminant concentrations that are not to be exceeded in the receiving environmental media (surface water, ground water, sediment) to protect beneficial uses.

daily discharge: the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

daily maximum limit: the maximum allowable discharge of pollutant during a calendar day. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.

data performance criteria: qualitative and quantitative statements that define the appropriate type of data and/or specify tolerable levels of potential decision errors. These criteria establish the quality and quantity of data needed to support decisions.

data quality assessment: a scientific and statistical evaluation of a set of environmental data to determine the adequacy of the data for its intended use.

deficiency: an unauthorized deviation from acceptable procedures or practices.

designated uses: those uses specified in water quality standards for each water body or segment whether or not they are being attained.

detection limit: the lowest concentration of a target analyte that a given method or instrument can reliably ascertain and report as greater than zero.

Director: the Regional Administrator or State Director, as the context requires, or an authorized representative. When there is no approved State program, and there is an EPA administered program, Director means the Regional Administrator. When there is an approved State program, "Director" normally means the State Director.

discharge: any addition of any pollutant to waters of the state from any conveyance.

discharge monitoring report (DMR): the form used (including any subsequent additions, revisions, or modifications) to report self-monitoring results by NPDES permittees. DMRs must be used by approved States as well as by EPA.

document: any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures or results.

duplicate samples: paired samples collected at essentially the same time from the same site and carried through all assessment and analytical procedures in an identical manner. Duplicate samples are used to measure natural variability as well as the precision of a method, monitoring instrument, and/or analyst. More than two such samples are referred to as replicate samples.

effluent: the liquid that comes out of a treatment plant after completion of the treatment process.

effluent limitation: any restriction established by the Administrator on quantities, rates, and concentrations of chemical, physical, biological and other constituents which are discharged from point sources, other than new sources, into navigable waters, the water of the contiguous zone or the ocean.

environmental data: the description of a physical medium (e.g., air, water, soil, sediment) or biological system expressed in terms of some measurable physical, chemical, radiological or biological characteristic or set of characteristics.

environmental monitoring program: a planned and systematic operation for characterizing an environmental process or condition. For the purposes of this document, the term "program" refers to a major, ongoing or longer term environmental monitoring operation.

environmental monitoring project: a planned and systematic operation for characterizing an environmental process or condition. For the purposes of this document, the term "project" refers to a smaller scale or shorter term environmental monitoring operation.

field blank: a clean sample (e.g., distilled water) that is treated the same as samples collected in the field. Field blanks are submitted to the analyst along with other samples and are used to detect and quantify contamination incurred during sample collection, transport, storage, and analysis.

flow-weighted composite sample: a composite sample consisting of a mixture of aliquots collected at a constant time interval, where the volume of each aliquot is proportional to the flow rate of the discharge.

flow-proportional composite sample: a composite sample that combines discrete aliquots of a sample collected over time, based on the flow of the waste stream being sampled. There are two methods used to collect this type of sample. One collects a constant sample volume at time intervals which vary based on stream flow. The other collects varying sample volumes based on stream flow, at constant time intervals.

flume: a specially shaped open channel flow section providing a change in the channel area and/or slope which results in an increased velocity and change in the level of the liquid flowing through the flume. A flume normally consists of three sections: (1) a converging section; (2) a throat section; and (3) a diverging section. The flow rate through the flume is a function of the liquid level at some point in the flume.

grab sample: a sample which is taken from a waste stream on a one-time basis without consideration of the flow rate of the waste stream and without consideration of time.

head of liquid: depth of flow.

holding time: an agreed upon, maximum interval of time in which a sample can be held under prescribed preservation methods.

independent assessment: a quality assessment of an environmental monitoring program, project or system performed by a qualified individual, group, or organization that is not part of the program, project or system.

infiltration: water other than wastewater that enters a wastewater system and building sewers from the ground through such means as defective pipes, pipe joints, connections, and manholes. (Infiltration does not include inflow.)

infiltration and inflow (I&I): the total quantity of water from both infiltration and inflow.

infiltration/percolation: a land application technique where large volumes of wastewater are applied to land, allowed to penetrate the surface and percolate through the underlying soil.

inflow: water other than wastewater that enters a wastewater system and building sewers from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm drains and sanitary sewers, catch basins, cooling towers, storm waters, surface runoff, street wash waters, and drainage. (Inflow does not include infiltration.)

influent: water, wastewater, or other liquid flowing into a reservoir, basin or treatment plant, or any unit thereof.

inspection: examination or measurement of an activity to verify conformance with specific requirements.

internal assessment: any quality assessment of the work performed by an individual, group, or organization, conducted by those overseeing and/or performing the work.

major facility: any NPDES facility or activity classified as such by the Regional Administrator, or in the case of approved State programs, the Regional Administrator in conjunction with the State Director. Major municipal dischargers include all facilities with design flows of greater than one million gallons per day and facilities with EPA/State approved industrial pretreatment programs. Major industrial facilities are determined based on specific ratings criteria developed by EPA/State.

mass-based standard: a discharge limit that is measured in a mass unit such as pounds per day.

maximum daily discharge limitation: the highest allowable daily discharge.

method: a body of procedures for performing an activity in a systematic and repeatable manner.

method detection limit (MDL): defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

method reporting limit (MRL): a minimum concentration of an analyte that can be measured within laboratory specified limits of precision and accuracy (cf., reporting limit).

million gallons per day (mgd): a unit of flow commonly used for wastewater discharges. One mgd is equivalent to 1.547 cubic feet per second.

municipality: a city, town, borough, county, parish, district, association, or other public body created by or under state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of CWA.

National Pollutant Discharge Elimination System (NPDES): the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA.

nonconventional pollutants: all pollutants that are not included in the list of conventional or toxic pollutants in 40 CFR Part 401. Includes pollutants such as chemical oxygen demand (COD), total organic carbon (TOC), nitrogen, and phosphorus.

nonparametric statistics: procedures for organizing and interpreting numerical data that are free of any assumptions about the data distribution and do not require estimation of the variance, mean or other population parameters.

numeric effluent limitations: the typical method by which effluent limits are prescribed for pollutants in waste discharge requirements implementing the federal NPDES regulations. When numeric effluent limits are met at the "end-of-pipe," the effluent discharge generally will not cause water quality standards to be exceeded in the receiving waters.

outfall: point source where an effluent is discharged into receiving waters.

oxidation pond: a man-made lake or body of water in which wastes are consumed by bacteria. It is used most frequently with other waste treatment processes. An oxidation pond is basically the same as a sewage lagoon.

parametric statistics: procedures for organizing and interpreting numerical data that employ certain assumptions about the data distribution and require estimation of a least one population parameter.

pathogen: an organism that is capable of producing an infection or disease in a susceptible host.

peak flow: the maximum flow that occurs over a specific length of time (e.g. daily, hourly, instantaneous).

peer review: a critical review of a finding or document conducted by qualified individuals other than those who produced the finding or document but collectively equivalent in technical expertise.

performance evaluation: a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of a technician, analyst or laboratory.

permittee: any "person," as defined at 40 CFR §122.2, authorized by an NPDES Permit to discharge to waters of the state.

pH: a measure of the hydrogen ion concentration of water or wastewater; expressed as the negative log of the hydrogen ion concentration in mg/l. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic.

point source: any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged.

pollutant: dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

precision: the level of agreement among individual measurements of the same property, conducted under identical or similar conditions.

pretreatment: the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a publicly owned treatment works [40 CFR §403.3(q)] cultural waste discharged into water.

primary treatment: the practice of removing some portion of the suspended solids and organic matter in a wastewater through sedimentation. Common usage of this term also includes preliminary treatment to remove wastewater constituents that may cause maintenance or operational problems in the system (i.e., grit removal, screening for rags and debris, oil and grease removal, etc.).

priority pollutants: those pollutants considered to be of principal importance for control under the CWA based on the NRDC consent decree settlement [(NRDC et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D.D.C. 1979)]; a list of these pollutants is provided as Appendix A to 40 CFR Part 423.

process wastewater: any water which, during manufacturing or processing, comes into direct contact with, or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly Owned Treatment Works (POTW): : a treatment works, as defined by Section 212 of the CWA, that is owned by the State or municipality, including any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature and sewers, pipes, and other conveyances only if they convey wastewater to a POTW treatment plant [40 CFR §403.3].

pump: a mechanical device for causing flow, raising or lifting water or other fluid, or applying pressure to fluids.

qualified data: data that have been modified, adjusted or flagged in a database following data validation procedures.

quality: those features of a product or service that bear on its ability to meet the stated or implied needs and expectations of the user.

quality assurance (QA): an integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item or service is of the type and quality needed and expected by the user.

quality control (QC): the overall system of technical activities that measures the attributes and performance of a process, item or service against defined standards to verify that the process, item or service meets the stated requirements of the user.

quality management plan (QMP): a formal document that describes a quality management system in terms of the organizational structure, functional responsibilities, and planning, implementation and assessment of work.

receiving water: the waters of the state which includes both surface and groundwaters.

record: a document or portion thereof furnishing evidence of the quality of an item or activity, validated and authenticated as technically complete and correct. Records may include reports, photographs, drawings, and data stored on electronic, magnetic, optical or other recording media.

relative percent difference (RPD: a value calculated by subtracting the lower of two duplicate analyses form the higher, then dividing this difference by the average of the two analyses and multiplying the result by 100 to convert to percent difference.

replicate sample: see duplicate sample.

reporting limit: the lowest (or highest) concentration (or level) of a parameter that can be reliably reported by an individual analyst or laboratory based on the applied analytical method and instrumentation, the ability of the analyst or laboratory, and the effort devoted to the analytical determination.

representativeness: a measure of the degree to which data accurately and precisely represent a selected characteristic of a monitored system.

reproducibility: a measure of the degree to which sequential or repeated measurements of the same system vary from one another, independently of any actual change in the system.

sanitary sewer: a pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the POTW.

sanitary sewer overflows (SSOs): untreated or partially treated sewage overflows from a sanitary sewer collection system.

secondary treatment: technology-based requirements for direct discharging municipal sewage treatment facilities. Standard is based on a combination of physical and biological processes typical for the treatment of pollutants in municipal sewage. Standards are expressed as a minimum level of effluent quality in terms of: BOD 5, suspended solids (SS), and pH (except as provided for special considerations and treatment equivalent to secondary treatment).

self-monitoring: sampling and analyses performed by a facility to determine compliance with a permit or other regulatory requirements.

sensitivity: a measure of the capacity of an analytical method or instrument to discriminate between different levels of a variable of interest.

sequential duplicate: a sequence of separate surface water quality samples (usually two) collected within minutes of each other at a specified location to assess variability among samples resulting from collection, processing transport, and laboratory preparation and procedures.

sewer: a system of pipes that collects and delivers wastewater to treatment plants or receiving streams.

standard operating procedure (SOP): a written, formally approved document that comprehensively and sequentially describes the methods employed in a routine operation, analysis or action.

storm sewer: a separate system of pipes that carries only runoffs from buildings and land during a storm.

storm water: discharges generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events that often contain pollutants in quantities that could adversely affect water quality. Most storm water discharges are considered point sources and require coverage by an NPDES permit.

structural controls: physical facilities or controls which may include secondary containment, treatment measures, (e.g. first flush diversion, detention/retention basins, and oil/grease separators), run-off controls (e.g., grass swales, infiltration trenches/basins, etc.), and engineering and design modification of existing structures.

suspended solids: the small particles of solid pollutants which are present in sewage and which resist separation from the water by conventional means.

technical review: a critical review of an operation by independent reviewers collectively equivalent in technical expertise to those performing the operation (cf., peer review).

technology-based effluent limit: a permit limit for a pollutant that is based on the capability of a treatment method to reduce the pollutant to a certain concentration.

time composite sample: a composite sample prepared by collecting fixed volume aliquots at specified time intervals, which are combined into a single sample for analysis.

total dissolved solids (TDS): the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR part 136.

total organic carbon (TOC): the amount of organic carbon in water.

total suspended solids (TSS): a measure of the filterable solids present in a sample, as determined by the method specified in 40 CFR Part 136.

toxic pollutants: pollutants or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring. Toxic pollutants include those pollutants listed by the Administrator under CWA Section 307(a)(1) or any pollutant listed under Section 405(d) which relates to sludge management.

toxicity: adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

trickling filter: a support medium for bacterial growth, usually a bed of rocks or stones. The sewage is trickled over the bed so the bacteria can break down the organic wastes.

turbidity: the capability of light to pass through water.

upset: an exceptional incident in which there is unintentional and temporary noncompliance with the permit limit because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

use attainability analysis (UAA): a structured scientific assessment of the factors affecting the attainment of a designated use, such as physical, chemical, biological, and economic factors as described in §131.10(g).

validation: the establishment of a conclusion based on detailed evidence or by demonstration. This term is often used in conjunction with formal legal or official actions.

variance: any mechanism or provision under Sections 301 or 316 of the CWA or under 40 CFR Part 125, or in the applicable "effluent limitations guidelines" which allows modification to or waiver of the generally applicable effluent limitations requirements or time deadlines of the CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors.

waste treatment plant: a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

water quality-based effluent limit (WQBEL): a value determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (e.g., aquatic life, human health, and wildlife) for a specific point source to a specific receiving water for a given pollutant.

water quality criteria: comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

water quality standards (WQS): a law or regulation that consists of the beneficial use or uses of a water body, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular water body, and an antidegradation statement.

waters of the state: all surface and subsurface waters occurring within the borders of the state, or forming part of the border between Kansas and one of the adjoining states.

weir: a device used to gauge the flow rate of liquid through a channel; is essentially a dam built across an open channel over which the liquid flows, usually through some type of notch.