

Municipalities using Kansas Public Water Supply Loan Fund money for projects are required to submit a final operation and maintenance manual prior to 90% construction completion. The operations and maintenance manual must include, but is not limited to, a description of the operation and managerial responsibility, detailed operation and controls, operators and personnel classification and requirements, operational testing, equipment maintenance schedule, operational records, and emergency operating and shutdown procedures. Below is general format that can be used. All items in the outline may not be applicable to the project.

OPERATION AND MAINTENANCE MANUAL FORMAT

For Water Towers, Wells, and Pump Stations

This Operation and Maintenance Manual Format is presented for use in the Kansas Public Water Supply Loan Fund program in conformance with K.A.R. 28-15-61(b)(4). The following subjects and topics, applicable to the actual Loan project being constructed, must be addressed in the text of the O&M Manual.

- I. Title – Name and list type of infrastructure, brief description of what the Manual is to be used for.
- II. Location – Describe location using Section Township and Range, Highways, Longitude and Latitude, or show location on map.
- III. Personnel – Describe operator’s classification requirements and managerial responsibility associated with the operation of the infrastructure.
- IV. General Operation – Describe how infrastructure interacts with entire water system, where it receives water from, where it transports water to, etc. Describe how the infrastructure is controlled.
- V. Infrastructure Description – Describe capacity and component information For water storage include type (ground, standpipe, or elevated), overflow elevation, distances from foundation to overflow and to the bottom of the storage volume for elevated storage, diameter of standpipe/tank for ground storage and riser pipe and storage volume for elevated storage, interior/exterior coating system, etc. For pump stations include number of pumps, model #'s, capacity, electrical requirements, pump and motor manufacturers, and any treatment facilities (e.g., disinfection, fluoridation, sequestration, etc.) included as part of the project. For wells include well type (line shaft turbine, pitless, horizontal collector, etc.), bore and depth, depth to first screen, yield (capacity) and pump information. Where applicable include well house dimensions, a description of any equipment within including ventilation, and a brief discussion of treatment facilities (e.g., disinfection, fluoridation, sequestration, etc.) included as part of the project.

- VI.** Operation and Maintenance – Outline daily, weekly, monthly, semi annual, annual, and or biennial, etc., testing, maintenance, and operation duties. Describe valve operation system and specific configurations to achieve specific results. Describe telemetry system operation. Describe operation of system during water conservation or emergency conditions.
- VII.** Access – Describe any special requirements to access the infrastructure.
- VIII.** Records – List location of construction records, outline what information should be retained for records of maintenance, repair, and testing, and how they should be stored.
- IX.** Safety – Describe any safety issues and requirements associated with the infrastructure, include ventilation system description, particularly if disinfection treatment is included.
- X.** Contacts – List emergency contact information, equipment manufacturer and dealer contact information, regulatory contact information, etc.
- XI.** Appendix. Items in the appendix do not need to be submitted to KDHE for O&M manual approval. Suggested items include water system map, sample forms, as-built drawings, construction photos, warranty information, maintenance agreements, specifications, electrical schematics, equipment manuals, copy of KDHE permit, copy of emergency plan, etc.

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I. INTRODUCTION - Manual User Guide

A. Operation and Managerial Responsibility

1. Operator responsibilities defined
2. Manager responsibilities
3. List of available training
4. List of recommended publications
5. List of publications furnished facility

B. Process Type Description

1. Type of treatment process
 - a) Brief description of major process
 - b) Brief description of individual units
2. Flow pattern with diagram

II. PERMITS AND STANDARDS

A. Treatment requirements/effluent limitations

B. List of permits affecting facility (including NPDES, Corps of Engineers Section 10/404, etc.)

1. Permit number and renewal date
2. Permit requirements/regulations of permitting agency
3. Reporting procedure for spills

III. DESCRIPTION, OPERATION, AND CONTROL OF PROJECT FACILITIES

A. For each unit process, general coverage of the following:

1. Description, function, flow routing and design process removal efficiency
2. Listing of major components and mechanical equipment
3. Relationship to adjacent units
4. Methods of control
5. Discussion of common operating problems and control
6. Start-up procedures
7. Emergency shut-down procedures

B. For each unit process, specific coverage of the following:

1. Normal operation (valve positions, sludge depths, etc.)
2. Alternate operation modes
3. Emergency operations/failsafe features

- C. Sludge Hauling and Application Equipment
- D. Sludge Disposal Method and Final Disposal Location

IV. PERSONNEL

- A. Staffing And Training Plan
 - 1. Supervision
 - 2. Administration
 - 3. Operation
 - 4. Maintenance
 - 5. Total personnel
 - 6. Annual training
 - 7. Laboratory training needs
- B. Qualifications
 - 1. Training
 - 2. Skills required
 - 3. Experience
 - 4. Certification required
- C. Certification
 - 1. Copy State rules and regulations
 - 2. Certification requirements, this facility

V. LABORATORY TESTING

- A. Outline of sampling and testing program, discussion of purpose
- B. Discussion of laboratory results, expected ranges and process control adjustments from test results
- C. Provision of sample laboratory worksheet, instructions, and test results forms
- D. Recommended list of laboratory references
- E. Laboratory equipment, supplies and chemicals inventory

VI. RECORDS

- A. General - importance of record keeping
- B. Facility construction records
- C. Sample, daily operating log of process operations, instructions
- D. Sample, monthly operating report to State Agency, instructions
- E. Sample, annual report format
- F. Operating cost record keeping system recommendations
- G. Personnel record system recommendations
- H. Emergency conditions; bypass reports, permit violations, etc.
- I. Maintenance and laboratory, if not provided elsewhere

VII. MAINTENANCE

- A. Conceptual Description of Maintenance Program
- B. Equipment Record System
 - 1. Equipment numbering system
 - 2. Equipment catalog (configuration list)
 - 3. Maintenance record cards, instructions
 - 4. Nameplate data cards, all major equipment
 - 5. List of warranted equipment, warranty provisions
- C. Miscellaneous Maintenance Records

- D. Planning and Scheduling
 - 1. Normal preventive maintenance schedule provided
 - 2. Lubrication schedule, lubricant list
 - 3. Emergency, corrective maintenance
 - 4. Work order system and sample forms
- E. Storeroom and Inventory System
 - 1. Recommended list of spare parts
 - 2. Procedures; stockroom inventory, sample forms and records
- F. Special tool list, tool room control
- G. Maintenance personnel staffing requirements
- H. System for cost accounting and budgeting
- I. Recommended list outside contract maintenance tasks, firms

VIII. EMERGENCY OPERATING AND RESPONSE PLAN

- A. Objectives
- B. Vulnerability analysis
- C. Mutual aid list
- D. Emergency equipment list
- E. Records preservation
- F. List of industrial sources (including monitoring and response system)
- G. Police/fire coordination
- H. Personnel assignment in detail
- I. Readiness/emergency response center
- J. Emergency/operating plan

IX. SAFETY

- A. Importance of safety program
- B. Content
 - 1. Emergency phone list
 - 2. Safety equipment list
 - 3. Sewer hazards
 - 4. Electrical hazards
 - 5. Mechanical equipment hazards
 - 6. Explosion and fire hazards
 - 7. Bacterial infection
 - 8. Chlorine hazards
 - 9. Oxygen deficiency/gases
 - 10. Laboratory hazards
 - 11. Process chemicals handling
 - 12. List of references
- C. Periodic safety program review
- D. Accident report form

X. UTILITIES

- A. List of utility suppliers
 - 1. Electricity

2. Telephone
3. Natural gas
4. Water
5. Fuel oil

B. Capacities, limitation, responsibility coordination

XI. ELECTRICAL SYSTEM

- A. Power source description
- B. Distribution system
- C. Control and monitoring system
- D. Emergency procedures

XII. APPENDIX

- A. Schematics
- B. Valve indices
- C. Sample forms
- D. Process chemicals/source
- E. Detailed design criteria
- F. Equipment suppliers
- G. Manufacturer's manuals
- H. Sources; service & parts
- I. As-built drawings
- J. Approved shop drawings
- K. Dimension prints
- L. Construction photos
- M. Warranties, bonds
- N. State O&M inspection form
- O. EPA Form 7500-5
- P. Industrial; ordinance/control
- Q. Pretreatment controls/ordinances
- R. Piping color code
- S. Protective coating list
- T. Recommended references