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**Minimum Information Required for an
Operation and Maintenance Manual**

The minimum information required for all operation and maintenance (O&M) manuals is listed below. NDEP's Bureau of Water Pollution Control (BWPC) requires O&M manuals as a compliance item in most of its Discharge Permits. The extent of the information will vary for different O&M manuals depending upon the complexity of the Discharge Permit. Larger projects may have separate documents for some of the requirements herein. For those projects it is acceptable to refer to the separate document and indicate in which binder it is located. The O&M manual must be bound in a three ring binder and must include at least:

- 1) Table of Contents - A table of contents with page numbers for the different chapters and lists of all graphs and figures.
- 2) Introduction - Describe the purpose of the O&M manual and how to use it. Provide a brief description of the operation of the facility, summarize emergency procedures and provide a summary of each chapter. Establish the operator's responsibilities.
- 3) Description of the Operation of the Facility - Describe the operation of the facility. Some facilities obviously will have more complex operations than others. Describe the operations of the facility in sufficient detail that another operator, technician or engineer could understand the operation of the facility. Describe the functions of the individual plant units, if applicable, and the operational procedures for each unit. Include a flow diagram with all critical valves and provide a list of the principal design criteria. Include a discussion of all the Discharge Permit requirements which must be satisfied along with a program to satisfy all the requirements. A copy of the Discharge Permit should also be included in the appendix. If applicable, describe the treated effluent sludge disposal and all critical elements of the disposal system.
- 4) Collection System Description, Operation and Maintenance (For wastewater treatment facilities only) - Describe the sewage collection system including pipe size, material and lengths of various pipe sizes. Discuss the infiltration/inflow in the collection system. Provide a location for all lift stations. Include an O&M discussion for each lift station with procedures for establishing wet well levels. Provide an inspection schedule and a sample of the record keeping log sheet with a description of how to complete the record. List the equipment and personnel available to maintain the collection system along with a maintenance schedule.

Provide a description for the O&M of the sanitary sewers including a discussion of

methods to clean sewers and a schedule for periodic maintenance. Also, describe the procedure to clear a blocked sewer line.

Provide a discussion of the type of industry and commerce which discharge to the sewers and provide a characterization of the wastewater. Provide a discussion of all existing controls for industrial/commercial discharge such as grease interceptors, industrial waste control programs, pretreatment requirements etc.

- 5) Treatment Operations - Provide a detailed discussion of the operation and control of each unit of treatment including sludge processing. The parameters for operation must be included. Include a schematic of major units with valves. Discuss all automatic controls and the procedures used to set those controls. Discuss any special features of each unit and the relationship between the units. Discuss common operating problems, how to recognize them, how to avoid them and what to do when they occur. Provide an inspection schedule, sampling schedule and a sample of the record keeping log sheet with a description of how to complete the record.

Provide a discussion of the electrical power source and alternative energy. Include a schematic of the power distribution system and the control system. Describe the preventive maintenance for the electrical system.

- 6) Maintenance - Provide a schedule for maintenance of all equipment, including mobile equipment, all buildings and all ancillary equipment. Include a sample maintenance report and control system with a description of how to use the system. Provide a list of appropriate spare parts to have available on site. List all equipment with appropriate data along with the name, address and telephone number for parts, replacement and repair. Indicate where all shop drawings, manufacturer's manuals, test data and "as-built" construction drawings are stored.

Describe the flow measuring system. Provide a detailed discussion of the procedure to calibrate the flow measuring devices.

- 7) Liner Maintenance – Provide a liner inspection process (if applicable) in the manual. Items such as visual inspection of clay-lined ponds for cracking, burrowing animal issues, and vegetation needs to be provided. For membrane liners, an examination schedule to verify secure anchor fastening, liner conditions, seepage, and other concerns. Since the liner surface can be slick when wet, the operator needs to take care when working around or on top of the liner surface. An emergency egress system should be incorporated (e.g., knotted ropes, corner escape steps/ladders and life buoys).

- 8) Monitoring - Discuss all monitoring that is necessary for process control a schedule for that monitoring and describe the reasons for it. Discuss all monitoring required for the discharge permit, the schedule and where to file the report. Also explain in detail the procedure to accurately complete the discharge monitoring report. Explain how to collect samples and to preserve them if necessary. Provide the procedures for laboratory analysis or make reference to a proper methods manual and where the manual is located. Provide a list of equipment, supplies and chemicals required for the laboratory. Provide a sample of a record keeping log sheet with a description of how to complete the record. Discuss the significance of various parameters that are monitored. In addition, a liner inspection checklist is to be added for any relevant components that use a liner system.

- 9) Budget - Establish the manpower requirements, qualifications, level of certification and salary costs. List all required utilities with estimate of the annual costs. List all required chemicals, amount, grade of chemicals, suppliers with telephone numbers/addresses and annual cost. Include with the list of chemicals the proper handling procedures, description of use, hazards and how to provide proper controls. Provide a list of maintenance materials such as spare parts, paint, grease and oil with proper grade, annual amount, suppliers and annual cost. Include all additional annual expenses and provide a total estimated annual cost. Provide a sample form for preparation of an annual budget for operation and maintenance.

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- 10) Emergency - Develop an analysis of the vulnerability of the plant to emergencies. List all alarms at the plant, describe their function and where the alarm will be displayed. List the emergencies and develop procedures to be followed. Provide 24 hour telephone numbers for the notification of all appropriate health, safety and/or regulatory agencies. Also list with telephone numbers emergency sources of assistance.
- 11) Safety - Develop a plan for continuing safe operation and maintenance. Highlight areas of potential hazards and methods to avoid danger. Discuss personnel hygiene and inoculations for wastewater plant workers. Discuss proper housekeeping necessary for a safe working environment.
- 12) Appendix - Include all appropriate items that have not been included elsewhere. This would be items like:

- Major engineering design parameters
- Discharge Permit
- Sample Discharge Monitoring Report
- Sample operation and maintenance reports
- List of References
- Sewer Ordinance
- Piping color code
- Suppliers
- Effluent Management Plan (if appropriate)
- Superintendents letter of approval of the manual

As a general comment the manual must be written in easily understandable English. It should be written in a positive manner and emphasis the benefit to the community from well operated and maintained facilities. The manual should make a strong effort to instill pride in the plant workers for their work.

For new and expanded wastewater treatment facilities a draft manual must be available prior to start up. The final manual must be available within six months of startup.