This is another in a series of educational articles on water/wastewater. This document is intended to cover Wastewater Treatment Plant - Develop an O&M Manual. This generic presentation utilizes my extended number of years of experience working with Wastewater Treatment Plant - Develop an O&M Manual:

Presentation Details:
- Overview
- Applications and Uses
- Conclusion

Overview

An O&M manual should be targeted for operating the plant, especially in situations where time may be decisive. It should be complete and thorough, but comfortable to apply. It should not contain narrative copied from the Facilities Plan or Predesign Reports.

To represent information in the most accessible way, include less narrative and more drawings, schematics, tables, schedules, and checklists. An operator looking for a specific bit of information should not have to read an essay to obtain it. Avoid boilerplate language in favor of information that is specific to the treatment works.

The manual should identify the writer of the manual and any updates. The manual should also admit the date prepared, settled, and dates of any updates.

Format

Paper O&M manuals should be bound in 3-ring binders to accommodate future revisions. All manufacturers’ literature should be bound individually. Sections should have appropriate tabs and labels.

Electronic manuals (e-manuals) use a menu-driven or intuitive “drill down” navigation scheme that allows for fast recovery of data. The user should be able to rapidly and intuitively find the desired data without having to navigate an excessive act of sub-menus or links. One time at the desired information, the drill-down pathway should be easily identifiable.
For installations that are devoted to the electronic O&M manual format, a printed version is unnecessarily redundant and not needed. Notwithstanding, all e-manuals must include:

- Backup capabilities in case of computer failure; and
- A printable user-guide on how to navigate and update the manual is required. The user-guide must describe log-in protection features.
- Manufacturers’ literature in a print-friendly format (for example, pdf)

E-manuals should also:

- Include an ever-present navigation menu with logically labeled tabs, buttons, or menu headings and drop downs. The user should be able to easily identify and return to the homepage with a single click.
- Identify unit processes either graphically or via the menu system.
- Be formatted and protected to easily allow necessary modifications and updates, but only by appropriate personnel. The e-manual should reflect when it was last updated.

**Applications and Uses:**

The pursuit is a recommended O&M manual outline.

**Table of Contents/Homepage**

The table of contents should correspond to the tabs. For e-manuals, the electronic menu system should act as a Table of Contents with tabs on the home page.

**Emergency Operations**

This part should be separately and readily usable in case of emergencies. Emergency phone numbers listed should include the regional Emergency Response System, local, utility, emergency contacts (gas, electric, and water), and the local regulatory Office. This part should include copies of, and/or link to, the emergency and response programs. Describe or reference procedures for chlorine leaks, fires, gas leaks, power outages, and so on.

**General**

a) Historical Background: Provide a narrative on the setting and history of the facility.

b) Overall Process Description: Briefly describe the type of treatment process employed and the various units or processes incorporated into the installation.

c) Plant Layout: Include plan-view diagrams of the plant and outfall, along with the incoming wastewater.

d) Design Data Table: Include design population and flows, design efficiency and effluent quality goals (BOD, TSS, ammonia, nutrients, and others), and design capacity for each process unit.

e) Flow diagrams: Include simple schematics.

f) Hydraulic Profile

g) Utilities: Include or reference a program that indicates how the plant is supplied with water, gas, electricity, telephone, and others as appropriate.

h) Identify Preventative Maintenance & Asset Management Systems.

i) Operator and Management Responsibilities: Include operator certification requirements, plant staffing requirements, and a breakdown of work hours estimated to operate and sustain the facility.

j) Budget: Provide estimated budget costs.

**Operation and Control of Unit Processes**

Each unit process should be under a separate tab. The recommended unit process categories include: Influent Pump Station, Headworks, Primary, Secondary, Tertiary, Disinfection, Recycled Water, Solids Treatment/Storage, and Miscellaneous Equipment.

Each unit process should contain the following information:

a) Description of Unit Processes:

i) Describe each unit mechanically, including each unit component and its purpose.

b) Control of Unit Processes:

i) Describe thoroughly and in detail how each unit process is to be operated and how to manage the unit process.

ii) Include forms for recording startup and shutdown conditions.
c) Common Operating and Control Problems:
   i) Include handling common operating problems.

d) Alternate Operational Modes
   i) Specify, if applicable, alternative operational modes.

e) Emergency Operations and Failsafe Modes
   i) Insure all applicable failsafe features or features incorporated into the plan.

f) Start Up and Shutdown Procedures
   i) Include preparation for start-up and shutdown for each particular unit in respect to mechanical operation and unit operation.

g) Equipment Maintenance Summary
   i) Include a completed spreadsheet of the electronic maintenance scheduling system to be employed. To pull these details from the manufacturer's O&M information provided with each item of equipment. Review any draft of this part before it is settled. This should list all equipment suppliers and service reps telephone numbers and contact information.

   ii) Include a list of critical replacement components that may or may not cause longer delivery times associated with them. Usually the equipment manufacturers can make helpful recommendations. Show where the spares are to be laid in.

h) Safety
   i) Keep Safety Data Shee, (SDS) available and up to date. Reference their location.

Operation and Control of Other Mechanical Systems

Such arrangements may include alarms, telemetry, emergency power and fuel transport systems, landscaping, irrigation, chemical feeders, HVAC, seal water, level controls, current meters, samplers, and thus alone. Offer data on how these systems operate, and their operation and upkeep requirements. Supplement with appropriate diagrams as necessary. Whatever these may be sufficiently complex to warrant a separate section in the manual.

Conclusion:

An O&M manual should be targeted for operating the plant, especially in situations where time may be decisive. It should be complete and thorough, but comfortable to apply. It should not contain narrative copied from the Facilities Plan or Predesign Reports. And then hopefully you are ready to examine now, your developed Wastewater Treatment Plant; O&M Manual. However, beforehand or in the process, feel free to reach out to me with your Wastewater Treatment Plant; O&M Manual or any other Wastewater questions.

About the Author

Daniel L. Theobald is “Wastewater Dan,” proprietor of Environmental Services. He is a professional wastewater and safety consultant/trainer with more than 24 years of hands-on industry experience operating many variants of wastewater treatment processing units and is eager to share with others his knowledge about water conservation. Wastewater Dan can be reached at TheWastewaterWiz01@gmail.com or www.Conserve-On-Water.com
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Sustainable Water Management In Mining: A Case Study From NLC

By Pradip Kumar Mishra

India (537.6 million tons) is the fourth largest producer of coal in the world after China (3,874 Mt), USA (906.9 Mt) and the Australia (644 Mt). India’s industrial journey was built upon indigenous coal. Around 55% of energy production generated from coal compared to around 3% from nuclear energy (CIL report, 2015). With a population of 1.25 billion, driven by the rising population and expanding economy and a quest for improved quality of life, the per capita energy consumption was 624 kgoe/year (data extracted from World Bank, 2012). Considering the limited reserve potentiality of petroleum & natural gas, eco-conservation restriction on hydroelectric project and geo-political perception of nuclear power, coal will continue as up front choice to meet India’s energy scenario.

Current Water Management Scenarios in the Indian Mining Industry

Coal mining and its associated activities not only extracts water but also affects the hydrological regime of the region and often affects the water quality. Large and deep opencast mines usually have great impact on the hydrologic regime of the region. The major hydrological impact of a large and deep opencast mine is on the ground water regime of the region. The extracted/seepage water during drilling and blasting used to collect in the mine sump where partly used in the mining activities and the excess amount is discharged into the surface drainage system. The water used for spraying on haul roads, conveyors, at loading and unloading points, bunkers etc. and the rest amount lost by evaporation. The minimal quantity of water used for the green belts and surrounding plantation areas. Many areas of the country are faced with the problem of over exploitation of ground water resources resulting in alarming lowering of water table. Therefore a lot of care has to be taken in estimating the water need and the mines of future are likely to be subjected to a lot of constraints on water use and discharge (Singh, 2005)

Breakthrough Initiative

The Neyveli Lignite Township in Tamil Nadu’s Cuddalore district is a golden example of sustainable development in the fields of water management and land reclamation.

Prior to 2005, the company employees residing in the township had to depend on water supply from a community borewell for...