State of Oregon

Department of Environmental Quality Guidelines

Guidelines for Writing Pump Station O&M Manuals

GENERAL

An operations and maintenance manual should aid understanding in situations where time may be critical. For example:

1. To present information in the most accessible manner possible, include less narrative and more drawings, schematics, tables, schedules, and checklists. An operator looking for a specific piece of information should not have to read an essay to find it.

2. Avoid boilerplate language in favor of information that is specific to the pump station. A manual should be complete and thorough, but not too bulky. All of the manufacturers' literature should be bound separately.

FORMAT

Use labelled tabs to separate various sections of the manual, and bind it in a 3-ring binder to accommodate future revisions. Provide a spine label. One copy needs to be slipped into a large plastic envelope or baggie for storage at the pump station.

CONTENTS

1. Table of Contents. This should correspond to the tabs, in case the tabs get torn out, and to save time in reference.

2. Introduction and Use of Manual. Provide a brief narrative on the background and history on the facility. The level of description in DEQ's approval letter for the station is a minimum.

3. General Description. Include plan-view diagrams of the station and force main, indicating locations of the discharge manhole and the wetwell overflow point. Show location of power drop, backflow preventer, and any auxiliary equipment. Include the design data in tabular form.

Design data may normally be copied directly from the schedule of data that was printed in the approved plans. The attached design data "EXAMPLE" generally indicates the level of detail and items to be covered for both plans and manuals. The actual items listed should be tailored to fit the situation.

4. Diagrams. Include a sufficient number of diagrams to illustrate the electrical controls and circuits, and also the mechanical controls. These may include valves, meters, seal water, compressors, and so on. Manufacturer's standard diagrams are seldom sufficient to provide enough pertinent information. The engineer will normally have to develop some customized operational drawings for each station, in addition to the design drawings.

5. Pump Operation and Control. Provide a troubleshooting guide for the electrical and mechanical features of the pump station. Often manufacturers have developed general guides,

which can easily be adapted to a particular station. This section should also include the pump curve showing actual impeller trim and motor HP installed.

Either this section or an appendix should also include forms for recording startup conditions. Forms may be developed by the engineer or adapted from the manufacturer's standard forms. The shutoff head, discharge head, and suction head should be measured and recorded to create a basis for maintenance and also to estimate the actual pumping rate. A copy of the engineer's theoretical system-head design curve should be included in this section, with actual measured operating points entered at the time of start-up.

Initial vibration levels should also be measured, diagrammed, and recorded. Power draws for each pump at startup should be measured and recorded, including normal and shutoff, for future reference.

6. Operation and Control of Other Mechanical Systems. Such systems may include alarms, telemetry, emergency power, landscaping irrigation, sulfide controls, HVAC, seal water, level controls, and so on. Provide information on how these systems work, and their operation and maintenance requirements. Supplement with appropriate diagrams as necessary. Any of these may be sufficiently complex to warrant a separate section in the manual.

7. Utilities. Include or reference a plan that shows how the station is served with water, electricity, phone, etc. The map should show the location of isolation valves, access points and other pertinent features.

8. Safety Requirements. The manual should make reference to hazards and safe practices throughout. There should also be a separate section in the manual on safety. As a minimum, the safety section should include information on specific hazards with electrical switchgear and confined spaces at the station, and should refer to the safety training program and standard safety procedures handbook followed by the sewer utility.

9. Emergencies. This is a separate section listing emergency phone numbers, including the DEQ Regional Office to be called to report any sewage overflow.

10. Maintenance of Equipment Provide schedules that list periodic maintenance requirements for the various pieces of equipment. Include record-keeping forms as necessary. The engineer must normally extract these items from the manufacturer's O&M information provided with each item of equipment.

11. Storeroom and Spare Parts Inventory. Include a list of critical replacement parts that may have long delivery times associated with them. Normally the manufacturers of various equipment in the station can make helpful recommendations. Indicate where the spares are to be stored.

12. Manufacturer's O&M Literature. In the manual, only provide a list of manufacturers/suppliers and phone contacts for ordering equipment and spare parts. Provide a pump curve. Other cut-sheets and manufacturer's literature should be contained in a separate binder. Do not send them to DEQ for review.

SUBMITTALS

Submit a complete draft O&M manual to the sewer utility and to DEQ for review well in advance of scheduled start-up (at least 60 days). Sewer utilities are not authorized to accept or use a pump station without an approved manual, per OAR 340-52. Late submittal may delay start-up.

INQUIRIES

Inquiries about these guidelines should be directed to DEQ regional water-quality plan review engineers.

Attachment: Design Data "Example"

SEWAGE PUMP STATION DESIGN DATA EXAMPLE

In plans and reports, print a tabulation of the following items for all sewage pump stations:

PUMP STATION	**Location @ ?**
Type	Duplex self-priming? Submersible?
Pump Type	Constant-speed non-clog? VS?
Capacity	?? gpm @ ?? ft Total Dynamic Head
Pump HP (each)	?? HP
Level Control Type	Bubbler w/ duplex compressors??
Overflow Point	Overflow elevation and location
Overflow Discharge	Trout Creek? Playground? Sinkhole?
Avg. Time to Overflow	?? hours @ zz gpm design avg Q
Auxiliary Power Type	Portable diesel generator?
Location	City Shops? STP?
Output	?? KW?
Fuel Tank Capacity	? hours ?
Transfer Switch	Auto? Manual?
Alarm Telemetry Type	Autodialer ? Radio telemetry?
EPA Reliability Class	I ? or II (if no back-up)?

FORCE MAIN

Length, Type	x00' of ?" PVC?
Profile	Continuously Ascending & z%?
Discharge Manhole	28th and Nobby?
Air Release Valves	None?

Vacuum Release Valves	One at high point, 28th & Annie???
*Average Detention	xy? min @ start-up, yz min @ ult.
Sulfide Control System	Backdrainage? Aeration? None?

AIR INJECTION SULFIDE CONTROL SYSTEM (only if any)

Compressor HP, Type	4.5 HP receiver-mounted reciprocating?
Standard Injection Rate	8 SCFM?
Actual Air Rate	3.2 SCFM @ 50' TDH?
Air Flowmeter Capacity	0.5 - 5 CFM? 30 - 300 CFH?

CHEMICAL FEED SULDFIDE CONTROL SYSTEM SYSTEM (if any)

Type	50% Peroxide? Permanganate?
	12% Hypochlorite?
Pump Type	VS Diaphragm?
Capacity	x gph?
Reaction time	y minutes available
Dose control	meter? stroke counter?

BACKDRAINAGE SULFIDE CONTROL SYSTEM (only if any)

Control Valve Type	Pneumatic Pinch? Knife-gate?
Valve Size	4"?

*If average detention in the main exceeds 25 to 30 minutes between pump cycles at start-up, sulfide controls are probably be needed. (Calculation: detention time, minutes = average gpm daily flow tributary to station / total volume contained in force main, gallons.)

DSM:OPSMAN.PS

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