

Wastewater Operator Certification Training Instructor Guide



Module 13: General Administration of Wastewater Treatment Plants

This course includes content developed by the Pennsylvania Department of Environmental Protection (Pa. DEP) in cooperation with the following contractors, subcontractors, or grantees:

The Pennsylvania State Association of Township Supervisors (PSATS)
Gannett Fleming, Inc.
Dering Consulting Group
Penn State Harrisburg Environmental Training Center

A Note to the Instructor

Dear Instructor:

The primary purpose of this course, *General Administration of Wastewater Treatment Plants*, is to provide an overview of the data, reports, skills, and programs required to manage a Wastewater Treatment Plant. This module has been designed to be completed in approximately 3 hours, but the actual course length will depend upon content and/or the delivery modifications and results of course dry runs performed by the Pa. DEP-approved sponsor. The number of contact hours of credit assigned to this course is based upon the contact hours approved under the Pa. DEP course approval process. To help you prepare a personal lesson plan, timeframes have been included in the instructor guide at the Unit level and at the Roman numeral level of the topical outline. You may need to adjust these timeframes as necessary to match course content and delivery modifications made by the sponsor. Please make sure that all teaching points are covered and that the course is delivered as approved by Pa. DEP.

Web site URLs and other references are subject to change, and it is the sponsor's responsibility to keep such references up to date.












Delivery methods to be used for this course include:

- Lecture
- Full group discussion

To present this module, you will need the following materials:

- One workbook per participant
- Extra pens
- Flip Chart
- Flip Chart Markers
- One *Operation of Wastewater Treatment Plants, Volume II* per participant.
- Laptop (loaded with PowerPoint) and an LCD projector **or** Overheads of presentation and an overhead projector
- Screen

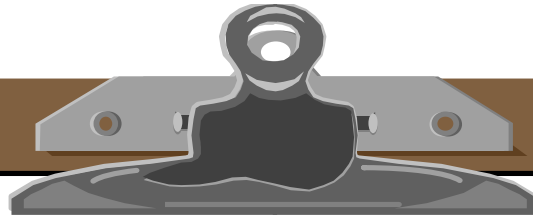
Icons to become familiar with include:

Participant Workbook	Instructor Guide
 Exercise/Activity	Same icons for Participant Workbook apply to the Instructor Guide.
 Case Study	Ans: Answer to exercise, case study, discussion, question, etc.
 Discussion Question	 PowerPoint Slide
 Calculation(s)	 Overhead
 Exercise	 Flip Chart
 Key Definition(s)	 Suggested "Script"
 Key Point(s)	

Instructor text that is meant to be general instructions for the instructor are designated by being written in script font and enclosed in brackets. For example:

[Ask participants if they have any questions on how to read the table. Answer any questions participants may have about how to read the table.]

If your module includes the use of a PowerPoint presentation, below are some helpful controls that you may use within the Slide Show.



PowerPoint Slide Show Controls

You can use the following shortcuts while running your slide show in full-screen mode.

To	Press
Advance to the next slide	N, ENTER, or the SPACEBAR (or click the mouse)
Return to the previous slide	P or BACKSPACE
Go to slide <number>	<number>+ENTER
Display a black screen, or return to the slide show from a black screen	B
Display a white screen, or return to the slide show from a white screen	W
Stop or restart an automatic slide show	S
End a slide show	ESC
Return to the first slide	Both mouse buttons for 2 seconds
Change the pointer to a pen	CTRL+P
Change the pen to a pointer	CTRL+A
Hide the pointer and button temporarily	CTRL+H
Hide the pointer and button always	CTRL+L
Display the shortcut menu	SHIFT+F10 (or right-click)
Erase on-screen annotations	E
Go to next hidden slide	H
Set new timings while rehearsing	T
Use original timings while rehearsing	O
Use mouse-click to advance while rehearsing	M

INSTRUCTOR GUIDE

INTRODUCTION OF MODULE: 10 minutes



Display Slide 1, Module 13: General Administration of Wastewater Treatment Plants. [*This slide can also be displayed as the participants are entering the room to let them know they are in the correct location.*]

[Welcome participants to “Module 13: General Administration of Wastewater Treatment Plants.” Introduce yourself.]

[Ask the participants to introduce themselves, including job title and plant location. Note: you may utilize another introductory activity if you desire.]



The title of this module is the General Administration of Wastewater Treatment Plants. Administration can be defined as the management of an institution, either public or private. Management can be defined as the managing, handling, or controlling of something. To manage is to direct or supervise. The administration of a wastewater treatment plant can be thought of as the directing and supervising of the activities of a plant. Effectively managing a facility requires that a wide variety of tasks be performed. In small facilities, the tasks may be carried out by the operator. In larger facilities, the tasks may be distributed among several people. Either way, managing a facility can present many challenges. The purpose of this course is to provide you with an overview of the data, reports, skills, and programs necessary to successfully manage a Wastewater Treatment Plant.

[Review the topical outline for each unit.]



In **Unit 1—Monitoring, Reporting, and Record Keeping**, we will review:

- The types of data to collect and how to collect it.
- The various mathematical tools available for analyzing data.
- The many options for presenting data, as well as the advantages of each method.
- The records that are important for the administration of a wastewater treatment plant.
- The types and frequencies of reports necessary to manage a wastewater treatment plant.

During **Unit 2—Administration of Wastewater Treatment Plants**, we will discuss:

- The responsibilities of a manager.
- How to be successful at communication.
- The key components of a financial management plan.
- Tips for the sound operation and maintenance of a wastewater treatment facility.
- Key components of an Emergency Response and Safety program.



Ask the group if they have any questions before you begin **Unit 1**.

INSTRUCTOR GUIDE

UNIT 1—MONITORING, REPORTING, AND RECORD KEEPING. 85 minutes



Display Slide 2, Unit 1-Monitoring, Reporting, and Record Keeping



Data is usually collected and compiled into records. Records are used to build reports. The records or reports are used to make decisions about plant operations. Examples include:

- At an activated sludge facility, the dissolved oxygen is monitored in the aeration basin. This data is recorded in the operator's log or bench sheet. When the trend of the dissolved oxygen is approaching a set point (extreme range of target – high or low), a decision is made to adjust the aeration rate based on the dissolved oxygen trend report.
- Staff vacation time is monitored (data is kept on how much is earned, how much is taken, and when it is taken). The results are recorded and analyzed. An annual report is prepared to show that additional part-time help is needed to staff the plant during the initial days of hunting season.

In each of these examples, the process starts with data that is gathered by some form of data monitoring. The monitoring might be field measurements, laboratory measurements, invoices, observations, or timesheets. In each case, the data is stored in a useful way in a record, and reports are produced for decision-making. This unit discusses various methods for monitoring, reporting, and keeping records and data.

[Briefly review the learning objectives.]



[Ask if anyone has questions about the learning objectives.]

INSTRUCTOR GUIDE

DATA: 50 minutes

[Review the reasons data is collected and records are kept.]

Data Collection

[Review the information on data collection. Include the following information in your discussion:]



- ✓ Data can be defined as the facts and figures gathered during the operation of the plant.
- ✓ A manometer is a gauge that reads the difference in pressure. The difference could be in the liquid and the atmosphere or of the same liquid in two parts of the process (pressure loss). The gauges are usually either water or mercury filled.
- ✓ A gauge is an instrument that measures and usually displays information (some gauges now just measure and leave the display or recording of the information to another piece of equipment.)
- ✓ Meniscus is the curved surface of a liquid. In a small tube such as a manometer the curvature is close enough that a hump or depression is formed. In your coffee cup, notice around the edges how the liquid seems to climb the sides of the cup. When the diameter of vessel gets smaller, the ring will close in until it will appear as if there is a depression in the liquid. For accurate and consistent readings of this type of display, always read the point of the curved surface (bottom for water filled and top for mercury filled).
- ✓ Parallax is an apparent change in the direction of an object, caused by a change in observational position that provides a new line of sight. This is most often illustrated with an object in a beaker of water. The straight stirring rod or dowel that is placed in the beaker looks to be bent at the air/water interface. When reading gauges, parallax can affect the accuracy of your measurement. To compensate for parallax, you need to move your head from side to side until the gauge's needle blocks the reflection of itself. A reflective surface is usually placed under the needle by the instrument manufacturer. This reflective surface provides the reflection of the needle that allows you to take the reading from the proper angle. Mirrors, foil, and polished metal have been used. The goal is to obtain a reading that is repeatable, accurate and consistent.

continued



How many have a strip chart?



Strip charts and other chart recorders are common. If they are calibrated properly, they are usually more accurate than a written log that can have errors due to inaccurate recording of numbers. They can be helpful for looking at short term trends but usually require manual manipulation to do long term trends.

More recently, the readouts at the point of measurement are being replaced by Supervisory Control and Data Acquisition (SCADA) systems, which are computer-based systems.



How many have the signals from their gauges going digitally from the gauge to a computer, data warehouse, or Supervisory Control and Data Acquisition (SCADA) system?



Each technology has its place. For a small package plant, gauges, manual logs and chart recorders may be adequate. Mid-sized facilities may need more sophisticated instrumentation and recording devices. Larger facilities will usually have some form of SCADA system.

SCADA has been around for a couple of decades and has gotten more reliable and affordable. The reliability is such that we are now seeing SCADA systems replacing chart recorders. This means that the operator can access data from all plant processes at a control station and be better informed about how the entire plant is functioning. It is still desirable to periodically inspect the plant processes in person to identify problems that might not be apparent when examining the data.

INSTRUCTOR GUIDE

[Continue reviewing the Data Collection section in the workbook. Include the following information in your discussion.]



- ✓ BOD is just one example of a parameter that can give swings in readings. As with any data, if there are abnormalities they should be investigated to determine if there really is a problem or if there was something wrong with the generation of the data point.
- ✓ Some of the data collected will not be about the treatment process but other factors that can have an impact on the treatment:
 - Weather has an impact on the operation of the units at the plant and possibly the amount of flow that the plant will receive.
 - Equipment usage is a factor of plant capacity and the reliability of the processes.
 - Observations by the operator are important as they are real time data about the plant.

Data Analysis



What do the numbers mean that are collected around the plant? Sometimes you will be most interested in the maximum or minimum of a group of numbers, but most times you will be interested in:

- The central tendency or average of the numbers for permit requirements.
- The trends of numbers for operational control.

The following are some of the ways in which the data can be statistically analyzed to make it more meaningful.



[Review the definition of *Mean*.]

[Review the Discharge Report in the workbook. This is an excerpt from a Discharge Monitoring Report (DMR). It is placed here to show the use of averages. It shows that a facility could exceed its weekly limit and still achieve its monthly limit. The month of March was picked to avoid any agency practice of not using full weeks when calculating the loadings.]

INSTRUCTOR GUIDE

[Refer the participants to page 659 of Chapter 18 in Operation of Wastewater Treatment Plants, Volume II. Review examples 1 and 2 as they appear in the book.]

 *[Review the definition of **Range**. Include the following information in your discussion:]*



- The range of a number set is an indication of the precision of the data set or how closely the individual numbers are to each other. If two data sets have an average of 145 you would think that the data sets were similar. However if one data set had an average of 145 with a range of 80 and the other an average of 145 and a range of 20, the data sets may not look alike.

[Refer the participants to page 660 of Chapter 18 in Operation of Wastewater Treatment Plants, Volume II. Review example 3 as it appears in the book.]

 *[Review the definition of **Median** and **Mode**. Include the following information in your discussion:]*



- Median and mode are not frequently used as they define particular aspects of the data set. If the mean, median, and mode are the same number, then the data set could be said to be very homogenous. More likely there will be a variation in the three.

The median and mode will not provide any indication of the range, spread, or variance of the data set.

[Refer the participants to page 660 of Chapter 18 in Operation of Wastewater Treatment Plants, Volume II. Review example 4 as it appears in the book.]

 [Review the definition of **Geometric Mean**. Include the following information in your discussion:]



- While the *Operation of Wastewater Treatment Plants, Volume II* manual talks about finding the number with graph paper, logarithms, and mean tables, the most straight forward method for determining the geometric mean is to let a computer spreadsheet program do the analysis.

[Refer the participants to pages 661-665 of Chapter 18 in *Operation of Wastewater Treatment Plants, Volume II*. Review 18.70, 18.71, 18.72, and 18.73 as they appear in the book. Include the following information in your discussion:]



- ✓ One of the things that the geometric mean does is limit the effect of data points located far from the rest of the data (outliers). Page 663 has 11 numbers, 10 of them in the range of 220 to 300 and one number is 7,200. The geometric mean is computed as 338. Compare that to the mean of 882.

 [Review the definition of **Rolling Average**. Include the following information in your discussion:]



- Rolling averages smooth out trend charts.

[Refer the participants to page 667 of Chapter 18 in *Operation of Wastewater Treatment Plants, Volume II*. Review 18.8 as it appears in the book.]

 [Review the definition of **Spikes**. Include the following information in your discussion:]



- Spikes are data points that should be a concern. They usually cause extra sampling or investigation to explain why they happened.


[Refer the participants to Example 4 on page 660 of Chapter 18 in *Operation of Wastewater Treatment Plants, Volume II*. An example of a spike is 7,200 in the example.]

 [Review the definition of **Trends**. Include the following information in your discussion:]



- Trends are the numbers that usually are best seen in a graph. Trends can be very helpful in keeping a treatment process on track. By watching trends, minor corrects to unit process can avert drastic changes, process upset, or violations.

[Refer the participants to page 667 of Chapter 18 in *Operation of Wastewater Treatment Plants, Volume II*. Trends can be seen on the charts on page 667.]

 [Review the definition for **Standard Deviation and Variance**. Include the following information in your discussion:]



- Standard deviation and variance describe how close a set of data is numerically.

[Refer the participants to pages 674 - 678 of Chapter 18 in *Operation of Wastewater Treatment Plants, Volume II*. Review 18.10 as it appears in the book.]

[The following questions are designed to provide an application of the Data Analysis information:]



Would charting effluent trends be advantageous? Why or why not?

Ans: Yes, it can show deviation in plant product which should correlate with unit process performance.



Would charting unit process trends be advantageous? Why or why not?

Ans: Yes, it provides direct feedback on the health of the plant.



Which would be more helpful—effluent trends or process trends?

Ans: Process trends would be more helpful because it provides more direct feedback on the health of the individual parts of plant.

Data Presentation



We have reviewed what and how data is collected and how data may be analyzed. Let us turn our attention to how data may be presented.

Data can often be difficult to interpret unless it is presented in a meaningful or visually appealing format. Visual formats are often used to present large amounts of data at one time or to give an overview of a data set. The growth of Geographic Information System (GIS) applications and spreadsheets such as Microsoft Excel are examples of the move to visual displays of information. Elements of data around the plant may take on new meaning when put in charts or graphs. Options for effectively presenting data are as follows.



Display Slide 3, Data Presentation, Table: Discharge Report

[Review the paragraph on tables in the workbook.]



Display Slide 4, Data Presentation, Pie Graph: Wastewater Treatment Plant Budget Allocations

[Review the graphs section in the workbook. Include the following information when discussing pie graphs:]



- ✓ Pie graphs are very good at displaying data as pieces of an entire item. The item broken into pieces could be the plant budget, employee overtime, and unit process costs. The pie is divided into pieces by percentages of the whole item. Pie graphs do not do well at showing trends.

INSTRUCTOR GUIDE



Display Slide 5, Data Presentation, Bar Graph: Salary History

[Review the bar graph section in the workbook. Point out that the bar graph shows the salary increase much better than the table of raw data.]

[Note: In the table of Employee Raw Data, the notes column on the right includes when the employee implemented a cost savings idea at the plant, passed licensing exams, and had disciplinary actions taken.]

INSTRUCTOR GUIDE

[Ask participants to look at the Flow vs. Rain Fall Raw Data table. Point out how difficult it is to see relevant trends in the data.]

[Ask participants to turn the page.]



Display Slide 6, Data Presentation, Line Graph: Flow vs. Rainfall



The line graph is very good at presenting large amounts of data and identifying trends. By plotting several data sets against a common variable (date), the possible impact of rain events can be observed much better than the raw numbers shown on the previous page.

[Review the Charts section of the workbook. Include the following information in your discussion:]



- ✓ A parshall flume is a device used to measure gravity flow. It consists of four main sections which provide a known flow regime and cross-section in which to gauge the flow. The sections are sometimes called: approach, constriction, acceleration, and tail. Throat widths in the acceleration section range from 1 inch to 50 feet. Measurable flow rates range from 4.5 gpm to 1940 MGD. Developed in 1922, this is one of several popular flume types.
- ✓ Most of the conversion charts listed are linear, but they do not have to be. For example, the depth of liquid would be linear for basins of uniform dimensions but would not be linear for basins with conical bottoms. Charts that would not have a linear curve would include:
 - The pump curve for a centrifugal pump.
 - Air movement charts.
 - Power usage.
 - Compound interest.

[Refer the participants to pages 672 - 674 of Chapter 18 in Operation of Wastewater Treatment Plants, Volume II. Review 18.93 as it appears in the book.]

Records



Once data is collected, it is usually maintained and stored in some form of organized manner. Record is the name we give to the documents or files used to collect and store data.



[Ask the participants how many keep their records in paper logs.]



[Ask the participants how many keep their records in electronic format.]

How many levels of backup do you have?

Have you manipulated the data to arrive at plant correlations?



More data is being kept today in electronic formats than ever before. That is to say more routine data is being stored electronically and the amount of data kept has increased.

[Review the records section in the workbook.]

INSTRUCTOR GUIDE

[Continue to review the records section of the workbook.]



Ask the participants what other records they feel are important. Facilitate a discussion around each item as appropriate. You may want to have the participant explain the record, why it is important, the consequences of not keeping the record, etc.

Ans: May include: work schedules, leave schedules, complaint files, loaned equipment, easements, service agreements, work orders, and contracts.



[Record the participant's responses on a flipchart.]

REPORTS: 35 minutes

Frequency of Reports



Once we have data stored in various records, we will use the data to produce reports. The frequency of report generation will depend on the type of data and the need to update and review the results. Reports are usually produced at the following intervals.

[Include the following information when discussing report generation intervals:]



- ✓ **Daily.** Sometimes there is little distinction between a record and a report at this level. If a manager wants a utility usage report on a daily basis, the difference in the meter readings could be both the record and the report. The chlorine usage record could be used in a report to determine when a new cylinder needs to be connected to the system—these can also be thought of as reports to a larger record. An example is the continuous chlorine reading values (average, minimum and maximum) being recorded in the bench sheet.
- ✓ **Monthly.** At this level most of the reports will be summaries of daily reports. Examples of monthly reports include: Discharge Monitoring Report (DMR), budget report, progress reports, operation reports and accomplishments.
- ✓ **Annual.** Annual reports are the compilation of monthly reports as well as stand-alone data. Examples include: total flow treated, deposition of solids (sludge), utility usage, and budget. Annual reports will often show what has happened in the past year and what is expected to happen in the upcoming year.
- ✓ **Ad Hoc.** Ad hoc reports are created for a particular purpose which may or may not be re-occurring.

Types of Reports

[Review the types of reports section in the workbook. Include the following information:]



- ✓ The types of reports can also be broken down into internal and external reports. Many of the external reports are subsets of internal reports. The DMR is an external report that is a subset of the internal operation report. The operation report contains much more data than what is reported on the DMR. Most permit-required reports will follow this pattern.
- ✓ Plant performance reports will usually be internal reports shared within the facility.

INSTRUCTOR GUIDE

[Continue to review the types of reports section in the workbook. Include the following information:]



- ✓ Management reports may include: budget reports, staff optimization, facility utilization, permit compliance and other items impacting the operation of the facility.

[At some point in the discussion you may want to encourage participants to review the reports that are being kept and the data that is being collected. Data is often collected and reports generated that are no longer useful. A humorous illustration you may choose to use is the "Fly Report."]



- ✓ Some time ago there was an expedition into a rain forest. After a few months, most of the work had been completed and all but one of the explorers returned home. The remaining explorer did not have a lot to do but he needed to remain behind to monitor the longer-term experiments and send observations back to the home office in weekly mailings. At some point, he started counting the number of flies that entered and exited his tent during his lunch breaks. For fun, he decided to include this data as a report with his weekly mailing. After a few months he stopped sending the "fly report" because he found other things to do during his lunch break. Two weeks after the last "fly report," someone from the home office showed up at his tent to find out what had happened to the "fly report." Interestingly enough, no one was really using the report, but it was thought to be required!



Ask the participants what reports they feel are important. Facilitate a discussion around each item as appropriate. You may want to have the participant explain the report, why it is important, the consequences of not producing the report, etc.



Record the participant's responses on a flipchart.

[Review Key Points]

INSTRUCTOR GUIDE

UNIT 2—ADMINISTRATION OF WASTEWATER TREATMENT PLANTS. 75 minutes



Display Slide 7 – Unit 2 – Administration of Wastewater Treatment Plants.



No matter how good the physical facility, it will not function properly if managed poorly. There must be enough management oversight to track each piece of the process.



On this page are the learning objectives for **Unit 2—Administration of Wastewater Treatment Plants**.

[Briefly review the learning objectives.]



Ask how many participants have **only** manager responsibilities. If there is anyone, ask how large their staff is. Ask how many places they had worked previously where management was just an additional job responsibility.

INSTRUCTOR GUIDE

ADMINISTRATION: 30 minutes

Management



Welcome to management. You thought that you were doing everything before you were promoted to “manager,” guess what, now everything that happens at the plant rests on your shoulders. It is your responsibility even if you are not there. How do you stay out of hot water?

[Review the management section in the workbook. Include the following information:]



- ✓ Plan ahead as much as you can. Being proactive is much better than being reactive. Develop and review policies, procedures, standards, goals, budget projections, equipment records, facility expansion plans, staffing plans, and organizational structure.
- ✓ Organize in ways to carry out the mission of the facility. This includes plant staffing and the overall municipal structure. Do you have plant mechanics being pulled to plow streets or read meters? Do you have access to staff or equipment from other departments?

INSTRUCTOR GUIDE

[Continue to review the management section in the workbook. Include the following information:]



- ✓ Most of these items can be placed in a personnel handbook for ease of reference. If your handbook is more than 15 years old it may be a good time to review it and bring it up to current standards.
- ✓ Disciplinary procedures need to be spelled out so that all parties in a dispute know where they stand. For the manager, this determines the level of documentation required should further action be needed.
- ✓ Sexual harassment policies need to be documented. It is a good idea to document when the policies are presented in training to the staff, both for the first time and as refreshers.
- ✓ Accident procedures should be reviewed with the staff so that they know what forms to use for the situation.
- ✓ Probation timeframes and compensation levels should be consistent for each level of the organization.
- ✓ Documenting the expected level of training and required certificates shows perspective employees the required qualifications for a position.
- ✓ Performance evaluations are a large part of managing your staff. Developing the requirements and tracking an individual's work habits can be time consuming but rewarding.

Communication



The effective management of a facility requires good communication. This involves management being able to effectively communicate:

- What needs to be done.
- Who should do it.
- When it should be completed.

It also involves setting up a communication system that allows employees to communicate their concerns, as well as their suggestions for improving the operation of the facility.

[Review the communication section in the workbook.]



In the space provided to the right of each meeting, ask the participants to indicate whether the meeting is formal or informal.

Ans:

Internal meetings include:	External meetings include:
❖ Staff meetings <u>usually formal, could be informal</u>	❖ City, town or council meetings <u>formal (be prepared to deal with issues that are not on the agenda)</u>
❖ Training sessions <u>formal</u>	❖ Civic group meetings <u>formal and informal (there will usually be a structured portion, but the question and answer session can wander)</u>
❖ Safety meetings <u>formal</u>	❖ Regulatory personnel meetings <u>formal</u>
❖ Change of operator information meetings (should be conducted at the beginning of each shift). <u>informal</u>	❖ Contractor meetings <u>informal</u>
	❖ Supplier meetings <u>informal</u>



One very important form of communication is reporting on the financial health of a wastewater treatment facility. Most facilities are part of a public body to which the manager has to communicate the financial condition of the operation. Because of this public oversight, financial records need to be in good order and managers need to be able to keep the facility financially healthy. Let's take a look at financial management of a wastewater treatment facility.

Financial Management

[Review the financial management section of the workbook. Include the following information:]

- ✓ Managers need to account for the cost of operation and find the funds to accomplish the proper operation of the facility.
- ✓ Budgets are spending plans that are setup to help account for monies spent or to be spent. Managers will need to develop budgets that will allow the facility to operate under normal conditions and allow for some unexpected events. Once the costs to run the facility are determined, facility improvements identified and a reserve account established; the manager knows the cost side of the budget. The other side of the budget is the revenue side. For most utilities, the revenue side is what drives user rate charges. There can be some off-set if the utility can turn a waste stream into a money generation enterprise, but this is not often the case nor is it a large percentage of the revenue stream.
- ✓ Most of the funding is derived from the rate-paying customer. Because the rates charged to customers (usually your neighbors and other town folk) are usually set for long periods of time and require a municipality's approval to change, plant managers must carefully track and control expenses. Managers must usually live with the budget developed last year while either assuring the council that next years budget will not increase, or lobbying the council for an increase.
- ✓ One of the ways to enhance revenues from the wastewater generators is to set up a pretreatment program. With a pretreatment program, you can levy surcharges for waste that exceeds certain thresholds (flow, BOD, TSS). The identified dischargers can either pay the extra charge and have you treat the waste or install treatment facilities at their site to bring the waste stream into normal ranges.
- ✓ For expansions of the plant or distribution system, there might be other sources of funds. These other sources are often for upgrading the plant to meet new standards or to correct problems at the plant. Some of the funding sources look favorably on projects that extend service to areas that do not have adequate capacity. Some of the funding sources are grants or low interest loans. However, when considering low interest loans, be sure to verify that you are receiving a loan that is better than what you could obtain from other financial sources.

Bonds can be used for system expansion. Bond monies can also be used for collection system improvements.



Operation and maintenance activities are a central part of an administrator's job. They need to see that the facility is working efficiently, permit limits are met, and the plant is meeting its goals. Much of this requires money to make it happen. We just discussed financial responsibilities; now let's discuss plant operations and maintenance.

OPERATIONS AND MAINTENANCE: 25 minutes

Operations and Maintenance

[Review the operations and maintenance section in the workbook.]



Since good preventative maintenance is so important to a facility, ask the participants what preventative maintenance tips they would like to share with the group.



Record the participant's responses on a flipchart.



Normal operation and maintenance activities should cover most day-to-day requirements and minimize unexpected operation disruptions; however, there will be those emergencies that inevitably occur. Although the staff can not be prepared and drilled for all possible events, having some form of predetermined response to many situations can go a long way in minimizing damage and harm under adverse situations.

INSTRUCTOR GUIDE

EMERGENCY RESPONSE AND SAFETY: 20 minutes

Emergency Response



Display Slide 8, Emergency Response

[Review the emergency response section in the workbook. Include the following information:]

- ✓ An emergency can be thought of as an event that has serious consequences and is outside of the plant's normal routine. These events could be life-threatening emergencies, or instances where the plant needs to continue operations during a natural disaster such as a flood, tornado, or hurricane. In most cases, the best defense against an incident turning into a disaster is the training and preparedness of the staff.

Safety



Display Slide 9, Safety

[Review the safety section in the workbook. Include the following information in your discussion:]

- **Operator participation:** Operators need to buy into the program and you need to document that they were trained.
- **Process safety information:** Each unit process may have safety concerns that are unique to that process. Therefore, each process should be reviewed for safety recommendations and requirements.
- **Chlorine and sulfur dioxide hazards:** These two chemical hazards are pointed out because all plants disinfect and most are having to lower their final effluent disinfectant residual.
- **Process technology:** Some techniques are safer than others. For example, we are seeing a trend away from chlorine gas and toward hypo chlorite solutions for disinfection.
- **Equipment information:** Some equipment has hidden hazards, or hazards to a select group of people.
- **Process hazard analysis:** Some processes may need to be changed. If a sample collection requires balancing on a board to reach the flow, maybe a sampling pump and line should be installed to eliminate the hazard.
- **Operating procedures**
- **Training:** Training is central to plant safety.
- **Contractor work:** To some degree, the safety of a contractor working on your site is the responsibility of the contractor, but your facility still has some responsibility.
- **Pre-start-up safety review:** New facilities often bring new items of risk and danger to the plant. Training on those risks is a way to avoid those dangers.
- **Mechanical integrity:** If the mechanical integrity of equipment or structures diminishes, the consequences and dangers may be serious and unpredictable.
- **Hot work:** Welding needs to be supervised. The welder cannot always observe the impact of his welding.
- **Management of change:** When things change there is a break in routine.
- **Incident investigation**
- **Emergency planning and response**
- **Compliance audits**

INSTRUCTOR GUIDE



[Ask the participants what other topics they feel should be included in a safety program. Facilitate a discussion around each item as appropriate. What is included in the topic, why is it important, examples or experiences, etc.]



[Record the participant's responses on a flipchart.]

Education

[Review the education section in the workbook.]



[Ask the participants what topics they feel should be included in safety training. Facilitate a discussion around each item as appropriate. What is included in the topic, why is it important, examples or experiences, etc.]



[Record the participant's responses on a flipchart.]

INSTRUCTOR GUIDE

Regulations

[Review the regulations section in the workbook. Point out that OSHA regulations can be found on-line at www.osha.gov.]

Reporting

[Review the reporting section in the workbook.]

[Refer the participants to pages 759 - 760 of Chapter 20 in Operation of Wastewater Treatment Plants, Volume II. Page 759 is an example of a supervisor's accident report. Page 760 is an example of an accident report that would be completed by someone that has been injured.]



[Ask the participants how these reports differ from the reports that they use.]

[Review the Key Points]

INSTRUCTOR GUIDE

References



This brings us to the conclusion of both Unit 2 and Module 13.



Does anyone have any questions on the material covered in this Unit or throughout the Module?



This course has touched on a number of areas that are required for the effective administration of a wastewater treatment facility. While not making you an expert, if you explore and learn about each of the areas we discussed, you will be well on your way to becoming an effective manager.

[Thank attendees for their participation. Offer additional words of encouragement. Remind participants that both the participant workbook from this class and the "Operation of Wastewater Treatment Plants, Volume II" textbook, will serve as good references in preparation for the state test.]