

PROGRAM OF STUDY

SEWER CLEANING 102

Program Description: Sewer Cleaning 102 will provide an overview of basic systems and professional wastewater management. Courses will cover historical contexts as well as current practice. Equipment selections and maintenance techniques will be explored along with best practices. This program of study will incorporate 16 hours of Course time.

1. Course Introduction: Background of Sewer Maintenance and Systems (1 Hour)
2. Production and Cost Issues (1.5 Hours)
3. Pneumatic Plugs (1.5 Hours)
4. High Pressure Sewer Hose (1.5 Hours)
5. High Pressure Water Systems (2.5 Hours)
6. Nozzles (1.5 Hours)
7. Nozzle Capacity Cleaning (2 Hours)
8. Blockage removal: Roots and Grease (2.5 Hours)
9. Vacuum System (2 Hours)

Element: Course Introduction: Background of Sewer Maintenance and Systems

Duration: 1 Hour

Description of Course:

This introductory course will describe the compilation of the experiences of professional sewer maintenance workers and current research and development in the field. These results will be presented through documentation from a wide variety of municipalities and video that will help bring awareness and understanding of best practices in the field.

Course Objectives:

- Students will appreciate the history and background of collections
- Students will understand in-field evaluation and research
- Students will learn about the holistic field

Topics:

- Collections Systems background/history
- Research conducted in field
- Types of evaluations conducted
- How evaluations are conducted
- Types of information gathered in field
- Pertinent information useful to individuals and industry as a whole

Element: Production and Cost Issues

Duration: 1.5 Hours

Description of Course:

This Course will discuss why daily production rates directly affect the cost of performing the services provided. Students will become more aware of their ability to influence the future of the collection system maintenance field. Issues surrounding the increased privatizing of sewer cleaning activities across the country will be discussed.

Course Objectives:

- Students will understand the operationalizing of the field for business purposes
- Students will appreciate the various roles and responsibilities of pre-field preparation

Topics:

- How revenue is generated to fund the sewer maintenance program
- How the cost of sewer maintenance is calculated and how to develop a cost effective maintenance program
- Why cities are privatizing
- Planning and control challenges
- When and how to incorporate evaluation of dirty pipe
- Timing issues of pipe cleaning and how to improve on each procedure to improve use of time
- Daily procedures that affect production

Element: Pneumatic Plugs

Duration: 1.5 Hours

Description of Course:

This course will provide instruction in the proper use and maintenance of Pneumatic plugs. Basic safety issues surrounding the use and care of these types of plugs will be discussed. This course will provide information to the end user that will allow them to properly make choices as to the type of plug to be used in various cleaning situations as well as proper installation and removal procedures.

Course Objectives:

- Students will develop an understanding of the use and maintenance of Pneumatic plugs
- Students will receive a working understanding of the dangers involved with the use of pneumatic plugs

Topics:

- Definition and varieties of sewer cleaning plugs
- Safety related to pneumatic plugs
- The force behind and inside the plug
- Proper inflation methods
- Installation and removal of pneumatic plugs
- Working around plugs
- Maintenance and storage
- Pressure relief regulator
- Securing lines for the plug

Element: High Pressure Sewer Hose

Duration: 1.5 Hours

Description of Course:

This course will provide an overview of the major aspects of high pressure sewer hose employed on sewer jetting equipment. Students will be instructed in the proper use, maintenance, protection and repair of all manufactured hose currently on the market, including the color coding system currently in use that identifies each manufactures hose. This is very important when splicing of hose is performed. Not understanding the coding system has led to injuries and deaths due to hose splice failures.

Course Objectives:

- Students will learn the coding system used in the industry and its importance
- Students will learn how to properly splice hose and how to protect it

Topics:

- The anatomy of the hose
- Safety related to the color coding system
- Hose protection
- Hose splicing procedures
- Coding of splices
- Installing new hose

Element: High Pressure Water Systems

Duration: 2.5 Hours

Description of Course:

This course will explain the mechanical workings of high pressure water pumps that are utilized on various combination sewer cleaning units. The course will address basic mechanical principles and the physics rules involved in how these systems operate along with their associated components within the entire high pressure water system.

Course Objectives:

- Students will learn proper operation and maintenance of the high pressure water system and its components
- Students will learn how to trouble shoot low pressure issues

Topics:

- Mechanical workings of a pump
- Triplex and Quadruplex pumps
- Single piston double action pumps
- Mechanically driven pumps
- Hydraulically driven pumps
- Review all components and their functions within the high pressure water system
- How high water pressure is created
- Troubleshooting and identifying low pressure issues
- Required system maintenance procedures
- Dynamic filling

Element: **Nozzles**

Duration: **1.5 Hours**

Description of Course:

This Course will review all major aspects of nozzles including selection, orifices, maintenance and proper use. Students will view video of various nozzles in use during the cleaning process. Research performed on the various aspects of nozzles will be presented that will challenge the students view of the functionality of the current nozzles on the market.

Course Objectives:

- Students will be equipped to make better choices as to which nozzle to use in various applications and proper techniques for their use

Topics:

- Safety related to nozzles
- How pressure is generated
- Changes in pressure
- Angle of jets
- Action of high velocity water
- Flow and turbulence
- Understanding pressures and velocity relationships
- Relationship of orifices to nozzles
- Inlet vs Outlet opening
- Nozzle carrying capacity's
- Choosing the right nozzle for the job
- Nozzle characteristics and extensions

Element: **Nozzle Capacity Cleaning**

Duration: **2 Hours**

Description of Course:

This course will help students understand and determine that nozzles have the capacity to carry a certain amount of material as they travel through the pipe. Understanding these carrying capacities and adjusting the cleaning technique to this understanding can improve many aspects of the sewer cleaning process.

Course Objectives:

- Students will gain knowledge that will lead to increases in daily production rates
- Students should realize increases in the quality of their pipe cleaning abilities

Topics:

- Nozzle Capacity Cleaning
- Process of Capacity Cleaning
- Nozzle Capacity Cleaning Matrix
- How to determine how dirty is a pipe
- Debris chart
- Determining when the pipe is clean
- Reverse cleaning
- Why Nozzle Capacity Cleaning is the most effective way to clean pipe

Element: **Blockage Removal: Roots and Grease**

Duration: **2.5 Hours**

Description of Course:

This course will explore the most common types of blockages that form over time in sanitary sewer lines. Students will learn about a variety of tools available and the best method for using them safely to completely remove a blockage in the shortest amount of time.

Course Objectives:

- Students will gain information that will help them make better choices of which nozzle to use in a variety of situations
- Students will learn techniques that will allow for quicker blockage removal

Topics:

- How blockages are formed
- Force behind a blockage
- Grease blockages: how to identify and locate
- Best method for removing grease
- Mechanical cutter or spinning nozzle
- Understanding the functionality of tools designed for root and grease removal
- Centrifugal cutters
- Hydraulic cutter
- Spinning nozzles
- Root blockages: how to identify and locate
- How roots grow into sewer pipe
- Removal of roots
- Maintenance practices that influence root growth in sewer
- Grease removal matrix using a spinning nozzle
- Grease removal procedure
- Root removal procedure

Element: **Vacuum Systems**

Duration: **2 Hours**

Description of Course:

This course will explain the physics principles involved in the use of the vacuum systems and all of the components within the vacuum system of a combination sewer cleaning unit. Principles and methodologies involve the removal of debris under water and at great depths (the process of fluidizing) are explained. Supercharging the vacuum system will be demonstrated, which assists in creating as much air flow as possible thus reducing the amount of time needed for cleaning of wet wells and other structures.

Course Objectives:

- Students will gain information that will allow them to utilize the vacuum system to its fullest potential

Topics:

- Theory of vacuum
- Theories of lift and air movement
- Components of the vacuum system
- Positive displacement pumps (PD)
- Centrifugal compressors (Fan)
- Air flow pattern within the system
- Understanding how to maximize air flow
- Air filtration
- Limitations of different air moving designs
- Supercharging the vacuum system
- Wet well cleaning
- Modification of suction tubes
- Fluidizing
- Trouble shooting low vacuum issues