

Attachment A

Classroom Training Course Outline

(Subject to change depending on results of evaluation)

Element: **Course Introduction: Background of Sewer Cleaning 102 Program of Study**

Duration: **1/4 hour**

Description of Class:

This introduction will discuss how this program of study was created from a compilation of the experiences of professional sewer maintenance workers and research and development. Our research and development practices will be explained. These results will be presented in documentation and video that will help bring clarity as to the best practices of their trade.

Topics covered include:

- Presenter/program developer background/history
- Types of evaluations that have been conducted
- How the evaluations were conducted
- The type of information gathered
- Present findings of pertinent information useful to individuals and industry as a whole
- Research conducted

Element: **Production and Cost Issues**

Duration: **1/2 hour**

Description of Class:

This class will discuss the reasons why daily production rates are important (daily footages (l/f) of pipe cleaned). Daily production rates directly affect the cost of performing the services provided. An increase in daily production reduces overall cost and a reduction in production rate raises the overall cost of the services provided. The attendees will receive valuable information designed to influence the awareness of cost and how they can directly affect the reduction of cost. They will become more aware of the power they have through their actions to influence the future of the collection system maintenance group. We will present the position that NOT keeping the cost of cleaning sewer to a minimum has led to the increased privatizing of sewer cleaning activities across the country. The attendees will receive information on steps that can be taken on how this can be avoided.

Topics covered include:

- How revenue is generated to fund the sewer maintenance program
- How the cost of sewer maintenance is calculated
- Why cities are privatizing
- How can an operator directly affect the reduction of the cost
- Planning and control challenges
- How to develop a cost effective maintenance program
- When does a pipe need to be cleaned?
- What is a dirty pipe?
- How many minutes days are you cleaning pipe?
- Daily procedures that affect production
- How to improve on each procedure to improve use of time

Element: **Pneumatic Plugs**

Duration: **1 hour**

Description of Class:

This class will provide instruction in the proper use and maintenance of Pneumatic plugs. There are a variety of plugs currently in use by municipalities around the country. The intent of this class is to provide a working understanding of the dangers involved with their use. Workers are severely injured and even killed by the improper use of these devices. This class 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.

Topics covered include:

- What is a plug
- Safety
- The force inside the plug
- The force behind the plug
- Proper inflation hose and gauge
- Installation
- Working around plugs
- Removal
- Maintenance and storage
- Pressure relief regulator
- Securing lines for the plug

Element: **Use and Maintenance of High Pressure Sewer Hose**

Duration: **1 hour**

Description of Class:

This class will provide an overview of the major aspects of high pressure sewer hose employed on sewer jetting equipment. Attendees will be instructed in the proper use, maintenance, protection and repair of all manufactured hose currently on the market. They will be informed of 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.

Topics covered include:

- The anatomy of the hose
- Safety
- Color coding
- Hose protection
- Hose splicing procedures
- Splicing tools
- Coding of splices
- Installing new hose

Element: **High Pressure Water Systems**

Duration: **1 hour**

Description of Class:

This class will explain the mechanical workings of high pressure water pumps that are utilized on various combination sewer cleaning units. The class 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.

Topics covered include:

- Mechanical workings of a pump
- Triplex pumps
- 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 hour**

Description of Class:

This class will overview all major aspects of nozzles including selection, orifices, maintenance and proper use. The attendees 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 attendees view of the functionality of the current nozzles on the market. They will be equipped to make better choices as to which nozzle to use in various applications and proper techniques for their use.

Topics covered include:

- Safety
- What is a nozzle?
- How is pressure generated? (Pumps)
- How do nozzles clean pipe
- Changes in pressure
- Angle of jets
- Action of high velocity water
- Flow and turbulence
- Understanding pressures and velocity relationships
- Orifices
- Inlet vs Outlet opening
- Nozzle carrying capacity's
- Choosing the right nozzle for the job
- Nozzle characteristics
- Nozzle extensions

Element: **Nozzle Capacity Cleaning**

Duration: **1/2 hour**

Description of Class:

Through our research we have been able to 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 has led to as much as a 75% reduction in cleaning time.

Topics covered include:

- What is Nozzle Capacity Cleaning?
- How long should the steps be?
- How many steps should you take?
- Nozzle Capacity Cleaning Matrix
- How to determine how dirty is a pipe
- Debris chart
- When is the pipe clean?
- Steps to long
- Reverse cleaning
- Why is Nozzle Capacity Cleaning the most effective way to clean pipe

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

Duration: **1 hour**

Description of Class:

This class will explore the most common types of blockages that form over time in sanitary sewer lines. Attendees 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.

Topics covered include:

- What is grease?
- Why is grease a problem?
- What does grease look like?
- Best method for removing grease
- Force behind a blockage
- Mechanical cutter or spinning nozzle
- How are blockages formed?
- How long does this process take?
- Understanding the functionality of tools designed for root and grease removal
- Centrifugal cutters
- Hydraulic cutter
- Spinning nozzles
- How do roots grow in sewer pipe?
- How do we remove roots?
- What do roots look like?
- Maintenance practices that influence root growth in sewer
- Why are roots a problem?
- Grease removal matrix using a spinning nozzle
- Grease removal procedure
- Root removal procedure
- What happens once the roots are cut?

Element: **Vacuum System**

Duration: **1 hour**

Description of Class:

This class will explain the physics principles involved in use of the vacuum system and all of the components within the vacuum system of a combination sewer cleaning unit. Principles and methodologies involved the removal of debris under water and at great depths (the process of fluidizing) are explained. Fluidizing allows for the removal of material underneath the water without having to continuously bring the suction tube up for air. Supercharging the vacuum system will demonstrated. This procedure assists in creating as much air flow as possible thus reducing the amount of time needed for cleaning of wet wells and other structures.

Topics covered include:

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