HIGH PRESSURE WATER JETTING - ARE YOU OPERATING SAFELY?

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Presentation Outline
High Pressure Water Jetting (HPWJ)

- Australian Standards
- HPWJ Hazards & Incidents
- HPWJ Controls
- HPWJ Training
- Sydney Water Case Study
Background of Water Jetting

- High pressure water jetting is a process using a stream of pressurised water to remove material, coatings or contamination and debris from the surface of a work piece, material substrate or for cleaning blockages inside pipes.

- High pressure water jetting systems consist of an energy source such as an electric motor or internal combustion engine, a pump, control mechanism, hoses, pipes, nozzles and other components necessary for the equipment to function safely as a system eg. emergency stop (E-Stop).
Principal documents which provide national standards for high pressure water jetting (HPWJ) operations in Australia include:

- AS/NZS 4233.2 - 2013 High Pressure Water Jetting Systems, Part 2 Construction & Performance
- Guide for Managing Risks from High Pressure Water Jetting, Dec 2013 (Safe Work Australia)

“The objective of the standard is to provide users of water jetting systems with requirements and guidance concerning safe operating practices to protect and safeguard equipment users and other persons who may be in the vicinity of high pressure water jetting operations.”
“This guide provides practical guidance for persons conducting a business or undertaking on how to manage work, health and safety risks associated with high pressure water jetting operations. It aims to provide users of water jetting systems with guidance on safe operating practices to protect workers and other people who are near water jetting operations.”
High Pressure Water Jetting Equipment

- The manufacture, maintenance and use of all High Pressure Water Jetting equipment is governed by the Australia/New Zealand Standard - AS/NZ 4233 Parts 1 and 2.

- There are two classes within the standards, **Class A** (Low Pressure) & **Class B** (High Pressure).

- **Class A**: The output capacity produced by the system is between 800 bar litres/minute and 5,600 bar litres/minute.

- **Class B**: the output capacity produced by the system exceeds 5,600 bar litres/minute.
Pressure Flow Diagram

AS/NZS 4233.1:2013

Max pressure (bar) x Max flow (L/min) = “a bar litres/min”

276 x 80 = 22,000 bar litres/min
Class B systems exceed 5,600 bar litres/min

Sewer Jetting Units;
Max Pressure: 4,000psi
Max Flow: 80L/min
HPWJ Drain Cleaning Hazards

HPWJ Drain cleaning is inherently hazardous because the high pressure nozzle is attached to a flexible hose which reduces the operators control of the nozzle, drain cleaning hazards can include:

- High Pressure Water Jetting (HPWJ) Equipment
- HPWJ Injury eg. water jet piercing the skin
- Unauthorised people coming into the work area
- Root cuttings operations
- Respiratory & eye hazards
- Exposure to hazardous biological & chemical agents
- Material make up of sewer pipes eg. asbestos
- Needles and infections
- Electrical safety
HPWJ Incidents

Incidents involving high pressure water jetting reported to AUSJET can be grouped into the following causes:

- Being struck by a water jet,
- Eye or face injuries from flying debris,
- Injury from materials being cleaned including chemicals, and
- Injuries caused by malfunctioning or out of control equipment

However it is very likely that HPWJ injuries and near miss incidents are being under reported in many industries, including the water industry.

The absence of reported injuries does not lessen the inherently dangerous nature of these HPWJ drain cleaning activities to both operators and the general public.
A HPWJ injury is very similar to a gunshot wound as the internal damage caused cannot be easily determined by the extent of the external wound.

High pressure water can enter even a very small puncture wound at an extremely fast rate.

Micro-organisms and sewer debris can be injected into the body to become deeply embedded in the internal wound.

All high pressure water jet injuries must be reported and medical treatment is required immediately.

The urgency of patient transfer is of the same degree as would be required for an amputation injury.

With rapid, effective and educated medical treatment there is a reduced risk of amputation or loss of function of the limb.
All HPWJ operators shall carry and have access to a Medical Alert Card.

The Medical Alert Card provides information for medical staff to inform them:

- The possible nature of injuries and post-incident infections that can be caused by HPWJ, and
- Provide details of immediate first-aid treatments and medical referrals.
Managing Drain Cleaning Hazards

Control methods for managing hazards include:

- SWMS/JSEA/SoPs/Medical Advice Card
- HPWJ PPE
- Using a leader hose
- Using tiger tails to protect HP hose
- Using a starter bar on nozzles
- Using manhole grate cover & hose roller
- Using a gas detector around manholes
- Standing up wind of sewage mist
- Having access to sewer plans & DBYD
- Barriers to define work area
- Displaying HPWJ warning signs onsite
- Trained HPWJ Operators
Training & Competency (AS/NZS 4233.1: 2013 Section 7.3)

- Only competent/capable personnel shall supervise and operate HPWJ systems (AS4233.1:2013 Section 7.1)

- MSMSS00005 - Operate a Drain Cleaning System (2015) has been developed as a national qualification of competency (AS4233.1:2013 Section 7.3.2)

- Refresher training and verification of competency for Drain Cleaning is to be undertaken at periods of no more than 2 years (AS4233.1:2013 Section 7.4)
Sydney Water HPWJ Case Study

- Sydney Water has been using Sewer Jetter machines since 2003
- We introduced an in house training and assessment program for their use
- In 2015 Sydney water identified the need for recognised HPWJ training
- In 2016 we engaged Trainright to customise a program for our field staff (approx. 200) that took into account our training and assessment program
- Training commenced in 2017 and was universally commended by attending staff
- The training complimented the training/skill already completed by Sydney Water staff but gave greater emphasis on the risks of working with high pressure water
- Our staff now have a much greater understanding of the risks and are more likely to follow all the safety measures and ignore any ‘shortcuts’
- The training also gives our staff a greater understanding of the risks when using our vacuum excavator vehicles
The Evolution of our Jetting Vehicles

Our Original Jetters

Our Current Jetters (18 off)

Our New 4 x 4 Jetter (4 off)

Our Large Jetters (3 off)
Sydney Water Asbestos Pipe Issues

- In 2017 the SW’s safety team identified the use of HPWJ systems on asbestos cement (AC) pipe contravenes WHS Regulations Chapter 8, Part 8.5, Division 3, Section 446.
- Although SW’s wastewater network has only a small percentage of AC pipes, to continue to perform jetting on these pipes, SW would require an exemption from SafeWork NSW.
- SW then engaged an asbestos specialist to test the effects of HPWJ upon AC pipes.
- The initial test was encouraging and SW will be conducting further testing in 2018 and seek to develop a safe work practice when using HPWJ on AC pipes.
- In the meantime, all clearing work on AC pipe is completed using the rodding process only.
HPWJ Recommendations

- Ensure that your High Pressure Water Jetting Equipment, Systems & Work Processes are compliant with AS/NZS 4233 - 2013

- Trained HPWJ Operators - MSMSS00005 Operate a Drain Cleaning System

- Medical Alert Cards are carried by all HPWJ Operators

- The development of a code of practice covering all water related HPWJ activities including; drain cleaning, and non-destructive excavations, to provide best practice industry guidance on these work activities and the protection of assets and infrastructure.
Please Remember....

High Pressure Water Jetting is dangerous work, we need to ensure that our work teams are competent at all times.

Thank You & Questions