



CSE Open Channel Sewer Moderate Hazard Atmosphere Safe Work Procedure

0180-04 SWP Rev 0 14-12-11

MODERATE HAZRD ATMOSPHERE CSE - OPEN CHANNEL SEWER SYSTEMS - SWP

PURPOSE

The purpose of this procedure is to ensure the safety of City of Kelowna staff when entering into open channel sewers with depths up to 7.5 meters (25 feet) to perform inspections, cleaning, modifications of the wastewater collection system, and, installation, routine maintenance, removal and calibration of temporary flow monitoring instrumentation.

SCOPE

This procedure covers the necessary safety precautions for entering into moderate hazard CSE open channel sewers that do not exceed depths of 7.5 meters (25 feet).

APPLICABILITY

These procedures apply to City of Kelowna Utilities Network Maintenance, Utilities Construction and

PREREQUISITES

You must hold a valid confined space entry ticket to enter into any sewer system.

You must be knowledgeable of the work, associated hazards and approved control methods.

REFERENCE SOURCES:

- City of Kelowna Safety Management System – Confined Space Entry program
- CSE Open channel sewer moderate hazard atmosphere RA and SWP
- WorkSafeBC Regulations – Part 9 Confined Spaces

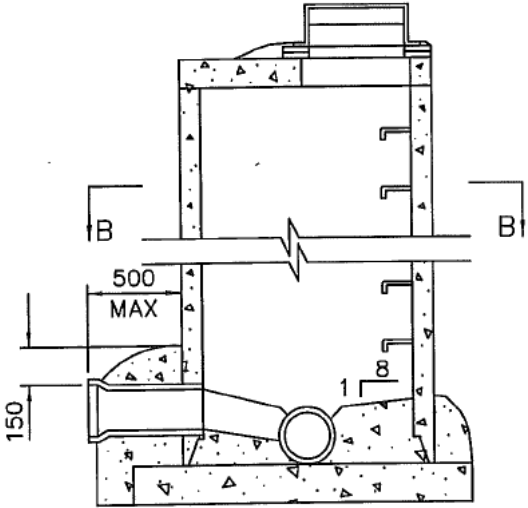
PPE REQUIRED:

- Hard hat (entrant must have chin strap)
- Coveralls/work clothes
- CSA approved steel-toed rubber boots
- Hearing protection (class B as a minimum)
- Appropriate harness (see RA for further detail)
- High-visibility clothing
- Full-faced air purifying respirator (AG/OV/P100 cartridge)

TOOLS AND EQUIPMENT REQUIRED:

- Lighting/head lamp
- Ground fault circuit interrupter (GFCI)
- Ventilation fan (capable of 1500 CFM to 1800 CFM, 12" duct)
- First aid kit
- Tripod with Type 3 SRL
- Sharps container/tongs
- Delineators, barricades, cones (traffic management)
- Decontamination supplies (hand sanitizer, BZK wipes)
- Personal 4-gas detectors

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August 25, 2017	January 24, 2019	Occupational Health & Safety Branch	<i>Nathan Peters CRSP</i>

Description of Space	
	<p>Dimensions and volume:</p> <ul style="list-style-type: none"> • Depth range: up to 7.5 metres • Pipe diameter: up to 3 metres • Barrel diameter: up to 2.6 metres • Volume: up to 30 cubic metres
<p>Access:</p> <ul style="list-style-type: none"> • Fixed vertical ladder (98% of entries) plus connected to tripod, winch and SRL system. • Secured, portable ladder (<2% of entries) plus connected to tripod, winch and SRL system. • Access through standard manhole lids: diameter 0.6 m (24") to 0.5 m (20") 	<p>Function and design:</p> <ul style="list-style-type: none"> • To provide access to wastewater collection system • Sewer pipe running through bottom of space • Underground piping configuration – cylindrical barrel, rectangle box or Boston Horseshoe shape • Piping is not pressurized
<p>Ventilation:</p> <ul style="list-style-type: none"> • No fixed ventilation • Use of portable ventilation is required 	<p>Contents:</p> <ul style="list-style-type: none"> • Raw wastewater • Galvanized steel rungs • Temporary flow meter: velocity depth sensor
<p>Material:</p> <ul style="list-style-type: none"> • Precast or poured-in-place concrete pipe and chambers, reinforced concrete pipe, steel pipe, HDPE (high-density polyethylene) pipe • With or without concrete benching at bottom of barrel 	

Overall atmospheric hazard rating

Moderate: The air inside the space is not clean, respirable air however it is not likely to impair the ability of the worker to escape unaided from the confined space, in the event of the ventilation system or respirator.

Limitations

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This procedure is primarily for **vertical entries** into the below-grade piping system. As such, horizontal travel is limited to 2 metres in either direction. The worker must remain within verbal communication and in view of the standby person at all times.

PRE – Work Procedure	
Responsibility	Activity
Supervisor	<ul style="list-style-type: none"> Ensure workers are fit-tested annually. Workers must be clean-shaven prior to entering into space to allow for a proper seal of their full-face air-purifying respirator.
Crew	<ul style="list-style-type: none"> Prior to leaving to the job-site, ensure the 4-head gas monitors are calibrated. Monitors must be bump tested on the day of entry, prior to use. Clear peaks and zero monitor in fresh air prior to use. Alarm settings on the gas monitors are as follows: <ul style="list-style-type: none"> CO: 25 ppm LEL: Low alarm = 1%; high alarm = 2% H₂S: 5 ppm O₂: low alarm = 19.5%; high alarm = 23%
Crew and/or TCP	<ul style="list-style-type: none"> Secure work area as per Traffic Control Plan. Ensure high visibility (hi-vis) clothing is worn when near roadway.
Crew	<ul style="list-style-type: none"> Ensure vehicles are positioned away from fan air intake, turn engine off if possible.
Crew	<ul style="list-style-type: none"> Use Ground Fault Circuit Interrupter (GFCI) with any electrically powered equipment. Check all power cords and equipment for damage prior to use.
Crew	<ul style="list-style-type: none"> Conduct a tailgate meeting with all involved workers prior to entering into space. The following must be reviewed: <ol style="list-style-type: none"> Procedure prior to entry The scope of work and staging of tasks to be performed on-site and in the space Communication – ensure verbal and visual cues are understood by all Testing and verification – ensure all PPE and equipment is in good working order Work area surroundings – scan area for any changes in conditions or obstructions in area Discuss the rescue plan Ensure all rescue equipment is set-up and ready-to-go as
Crew	<ul style="list-style-type: none"> Start the confined space entry permit and ensure all documents are on-site (procedure, risk assessment, tailgate meeting etc.)
Crew	<ul style="list-style-type: none"> Ensure good housekeeping is maintained near the access point and in the space throughout the entry.

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Crew	<ul style="list-style-type: none"> Confirm ventilation fan specification/output (review label) matches the requirement in the <i>Tools and Equipment Required</i> section. Set-up the ventilation system, positioning the fan intake upwind and away from any vehicle or equipment exhausts and traffic. Position the end of the duct close to the bottom of the space for pre-ventilation and as close to the worker as possible during entry. Only push air into the space, <i>do not draw air out of the space</i>. Ensure the space is ventilated for 20 minutes prior to person entry.
Crew	<ul style="list-style-type: none"> Set-up the tripod, mechanical winch and Type 3 SRL over the access point (manhole). When entering into a space with fixed ladder access, the entrant must wear a full-body harness with a dorsal D-ring during entry and remain connected to the lifeline/fall protection system during entire entry. Always maintain 3-points of contact while using access ladder. When entries must occur into manholes without fixed ladder access (< 2% of all manholes), the crew must set-up and secure a portable ladder for entry. Entrants must remain connected to the lifeline/fall protection system during entire entry.
Crew	<ul style="list-style-type: none"> Pre-entry test the atmosphere to bottom of space (all areas of space) – use built-in pump with tubing. Allow two seconds per foot of tubing to allow for the sample to travel from the far end to the monitor's sensors.
Crew	<ul style="list-style-type: none"> Visually inspect concrete rungs for signs of deterioration prior to entry. If significant structural deterioration is observed, do not enter. Report deficiencies to supervisor.
Entrant	<ul style="list-style-type: none"> A fit-tested full-face air-purifying respirator equipped with organic vapour/acid gas/HEPA cartridge as the minimum required respiratory protection for this entry. If entrant travels outside line of sight, horizontally upstream or downstream in the pipe, ventilation must be re-positioned to ensure continuous supply of air is directed to the entrant. Conduct a positive and negative seal/fit check before entry. Ensure all PPE as per the <i>PPE Required</i> section is in good repair and is worn prior to entry.

Safe Work Procedure	
Responsibility	Activity
Crew	<ul style="list-style-type: none"> Because isolation and lockout of the system is not possible, follow the requirements of the approved terms of acceptance from WorkSafeBC. The flow depth must be less than 1 metre. In the extremely rare occasion that the observed flow exceeds 1 metre in depth, do not enter. Report to supervisor and perform task at different time (lower flow).
Standby person	<ul style="list-style-type: none"> A standby person must be stationed at the entrance of the space. They are responsible for: <ul style="list-style-type: none"> Continuously monitoring the atmosphere of the space the entire time the worker is in the space. Record readings on CSE permit every 20 minutes while worker is inside the space, at a minimum.

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	<ul style="list-style-type: none"> ○ Visually observe and check on the well-being of the worker in the space every 20 minutes (minimum) ○ Have a cell phone as a means to communicate to 9-1-1, if need be.
Entrant	<ul style="list-style-type: none"> • Enter into the space to carry out work <i>only if</i> all pre-entry requirements are met and a trained standby person is in place. Ensure the following occurs while in space: <ul style="list-style-type: none"> ○ Always be aware of your surroundings. Visually inspect the space for any changing/unforeseen hazards. Report them to standby person. ○ Use an intrinsically safe headlamp or flashlight as secondary source of light (as required). ○ Ensure you wear a personal 4-gas monitor. If any alarms sound, exit space and investigate. ○ Monitor sewage visually for any unusual contaminants. ○ Communicate effectively with standby person (hand signals, verbal cues/direction) ○ Avoid working in awkward positions for long durations. Take frequent micro breaks (ex. every 30 minutes) when long duration tasks are required. Stretch when possible and maintain good body positioning (limit unnecessary twisting or reaching) ○ In case of accidental contact with sewage, exit space and decontaminate. Report to first aid.
Standby person	<ul style="list-style-type: none"> • Repeat pre-entry testing before re-entry if a worker vacates the space for any reason. Record on CSE permit. • If the monitor alarms at any time, immediately exit the space and investigate why monitor went into alarm mode, ensure the following occurs: <ul style="list-style-type: none"> ○ Reassess the position of the ventilation fan to ensure it isn't drawing in any contaminants (ex. proximity to traffic, exhaust etc.) and continue with ventilation ○ Reassess that the monitor is working properly; confirm readings in the space with a back-up monitor. ○ Only re-enter space after the alarm has been investigated and the readings return to acceptable ranges • If monitor continues to alarm, contact the qualified person (ex. Safety Advisor, Utilities Network Maintenance Supervisor etc.). • Raise and lower tools and equipment in a secure manner (ie. using bucket, canvas bag). • Ensure good housekeeping around openings and within space. •
Crew	<ul style="list-style-type: none"> • The space must be continuously ventilated while workers are inside the space. The ventilation ducting may be removed temporarily from the manhole to allow for access, however it must be replaced immediately once the worker(s) is(are) inside the space. • If the ventilation fails, workers must exit space immediately. Only re-enter after it is checked (atmospheric monitor) and re-established.

POST – House keeping

Responsibility	Activity		
Crew	<ul style="list-style-type: none">Upon exiting space, decontaminate all tools, equipment and PPE. Be sure to wash hands and face to reduce the likelihood of cross-contamination (ex. with food).		
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Crew

- Report any issues (ex. incidents, near misses, injuries) to the appropriate personnel at earliest convenience (ex. supervisor, first aid, safety department).

Written by:	Nathan Peters, CRSP	Title:	Safety Advisor	Dept.	Risk Management
	Sarah Josefson		Safety Coordinator		Risk Management
	Mike Murrell		Utilities Network Maintenance Supervisor		Utility - Water

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