CONFINED SPACE HAZARD ASSESSMENT

CONFINED SPACE NAME:	ID #	LOCATION:	HA #	3
PRV Stations	N/A	Citywide (11 in total)	DATE:	November 2012

Confined Space?	YES
YES ☒ NO ☐	Enclosed or partially enclosed?
YES ☒ NO ☐	Limited or restricted entry/exit?
YES ☐ NO ☒	Intended for continuous human occupancy?
YES ☒ NO ☐	Large enough that a worker can enter?

SPACE INFORMATION/DETAILS (IN OPERATION):

SPACE DESCRIPTION:
Underground rectangular shaped vaults with fixed ladders inside.

CONTENTS:
Primary and secondary piping (typically 4" Ø and 8" Ø, respectively) with hydraulically-operated pressure reducing valves (PRV) that regulate water pressure inside the piping – low concentration chlorinated water (potable water) exists inside piping. Drains, gate valves, ball valves, flow meters, pressure gauge and strainers exist inside space.

Equipment: Sump pumps, mounted fans (with vents to the outside), electric heaters (120 volt) and lighting.

PROCESS/FUNCTION/USE DESCRIPTION:
Regulates (reduces or increases) water pressure in the city's piping system based on supply and demand.

PHYSICAL CHARACTERISTICS:
Rectangular shaped vault

DIMENSIONS: Average range (in feet –'ft'): 8 ft to 9 ft (L) x 10 ft to 12 ft (W) x 8 ft to 10 ft (D)

VOLUME: Approximate range: 640 ft^3 to 1080 ft^3

SPACE MATERIAL: Precast concrete.

ENTRY CHARACTERISTICS: Hydraulic-powered steel Bilco hatch door or manhole cover lid.

LOCATIONS: 1 per PRV station (on top at grade) **SIZE:** 4 ft x 4 ft or 32" to 42" Ø

SECURING MECHANISM: Locked hinged Bilco hatch doors and gravity/locked manhole lids

ADJACENT VESSELS/SPACES/PIPING:

NAME OF SPACE/PIPE	CONTENTS	TEMPERATURE	PRESSURE
Inlets (4"- 8" average Ø)	Potable water	No concern	130 to 154 psi (max)
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SCOPE OF WORK:

This Hazard Assessment (HA) refers to entry for the purpose of inspection, regular maintenance on piping and PRV's (i.e., flushing) and minor repairs of PRV's with manual tools. Rare and minor patchwork repairs to concrete walls may occur with manual tools and ready mix cement.
Hot work and other atmospheric contaminant generating activities are not included in this Hazard Assessment.

HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)	Moderate	JUSTIFICATION: Potential for CO to be greater than 10% of exposure limits.

COMPLETED BY:	Prepared by: Peter Bergholz, BSc, CIH, AMEC, November 2012 Reviewed by: Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012	INFO. SOURCE:	Paul Elsoff & Dave Cooper

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HAZARDS		UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
ATMOSPHERE	**Oxygen (O_2) Deficiency**	**Yes** Possible if left closed and inactive for extended periods.	No	Monitoring for O_2. Continuous ventilation during entry.
	O_2 Enrichment	No	No	
	Chemical	**Yes** Potential for carbon monoxide (CO) from adjacent vehicular traffic.	No	Monitoring for CO. Continuous ventilation during entry. **General PPE:** Coveralls, safety boots, work gloves, hard hat and safety glasses with side shields.
	Biological	**Yes** Vermin (rats, mice or their excrement) may be present. Sludge or bacteria/fungi/mould growth is possible in spaces that are wet or are not opened for prolonged periods. Needles/sharps (potentially containing bodily fluids) may be present.	No	Rinse space prior to entry if space contains large amounts of sludge or bacteria/fungi/mould growth. Remove objects from outside the space at all times with sucker truck, if feasible.
	Fire/Explosion	No	No	
SAFETY	**Structural Hazard**	No	No	
	Engulfment	**Yes** Spaces can contain water if pipe fails at a sufficient volume to cause engulfment (typical reason to enter PRV is to fix pipe).	No	Space must be emptied prior to entry by sucker truck. See space specific lockout and isolation documents
	Entrapment	No	No	
	Electrical	**Yes** Electrical heaters (120 V), mounted fans and lighting present	No	GFCI for electrical equipment is required. See space specific lockout and isolation documents
	Access/Egress	No	No	
	Fall	**Yes** Spaces are up to 10 feet deep.	No	Fixed ladders exist in spaces**.** Maintain 3 points of contact on the ladder at all times. Use caution upon initial entry (inspect fixed ladder condition). Portable ladders may substitute fixed ladders if the condition of the fixed ladder is unknown or suspect. Fall protection required when climbing up and down ladders. Lifeline attached at all times.

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	Slip/Trip	**Yes** Interior of space, ladder rungs and floor surface may be wet and slippery.	**Yes** Water flushing tasks will create a wet and slippery floor surface. Sump/drain located in corner of space.	Wear **General PPE** (safety boots) and work with care. Be aware of sump/drain location and identify it (if possible) with temporary marker (pylon).
	Visibility/Light Level	**Yes** Insufficient lighting exists if space lockout documents are required to lockout fixed lighting systems.	No	Portable lighting (flashlight or portable light with GFCI) required.
	Baffles/Internal Arrangement	No	No	
	Floor Openings in Space	No	No	
PHYSICAL	**Noise/Vibration**	No	No	
PHYSICAL	**Temperature**	**Yes** Entry into space may occur during hot/cold weather conditions (spaces are located outside).	No	Wear **General PPE** and dress appropriate for outside weather conditions. Provide heat stress awareness sessions to work crews if working during hot summer days.
PHYSICAL	**Non/Ionizing Radiation**	No	No	
PHYSICAL	**Laser**	No	No	
OTHERS	**Ingestion/Skin Contact Hazard**	No	**Yes** **Concrete wall repair:** If required (rare), short duration concrete wall repair tasks will involve minor surface patchwork with ready-mix cement products and manual tools – MSDSs for ready cement mixes typically contain portland cement and potentially silica and the dusts are potential eye/skin irritations. No concrete removal (i.e., jackhammering) is expected.	**Concrete Wall Repair:** wear **General PPE** and work with care. Minor concrete wall repair tasks (short duration) will involve mixing ready-mix cement products outside the space with water. Minimal dust (portland cement dust and silica dust) is expected during mixing with water and the wet cement product will be applied inside the space – no portland cement dust or silica dust is expected inside the space. No concrete removal (i.e., jackhammering) is expected only patchwork of minor cracks in concrete walls. If mixing large amounts of cement product is necessary (outside the space), monogoggles and a disposable dust mask is recommended (e.g., N95 type).
OTHERS	**Mechanical Hazard**	**Yes** Sump pumps present	No	Sump pumps must be locked out .

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HAZARDS	UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
Traffic Hazard	**Yes** Spaces exist at street locations	No	Entrance to space must be physically isolated from vehicular and pedestrian traffic. Standby person or designated road-traffic crew must monitor traffic in the area.
Hydraulic/ Pneumatic Hazard	No	No	

CONTROL MEASURES REQUIRED:	
Confined Space Permit:	Yes
Atmospheric Testing:	Gas monitor with sensors for O_2, LEL, CO & H_2S.
Ventilation Requirements:	Provide mechanical ventilation (minimum 360 CFM) through the opening. Minimum ventilation requirements are based on achieving 20 air changes per hour. Fan specifications for fixed ventilation systems are not known.
PPE Requirements:	**General PPE:** Coveralls, safety boots, work gloves, hard hat and safety glasses with side shields. **Concrete Wall Repair:** wear **General PPE**. Minor concrete wall repair tasks (short duration) will involve mixing ready-mix cement products outside the space with water. Minimal dust (Portland cement dust and silica dust) is expected during mixing with water and the wet cement product will be applied inside the space – no Portland cement dust or silica dust is expected inside the space. No concrete removal (i.e., jack hammering) is expected only patchwork of minor cracks in concrete walls. If mixing large amounts of cement product is necessary (outside the space), monogoggles and a disposable dust mask are recommended (e.g., N95 type). **Note:** minimum respirator requirements are recommended in the absence of exposure monitoring data.
Lockout/Isolation:	Space must be isolated and locked-out. If required, space must be emptied prior to entry by sucker truck.
Standby Person:	Yes, at or near entrance.
Communication Procedures:	Radio, voice
Rescue Procedures:	Standby person calls 911 and calls Entry Supervisor. Entry Supervisor will respond to scene. Self rescue (if possible) or removal by Standby Person (from outside space) using winch.
Required Rescue and Safety Equipment	Two-way radio, cellular telephone, harness (must be worn), tripod, winch, lifeline (attached at all times).
Other:	Rinse space prior to entry if space contains large amounts of sludge or bacteria/fungi/mould growth. Remove objects from outside the space at all times with sucker truck, if feasible. GFCI for electrical equipment is required. Fixed ladders exist in spaces**.** Maintain 3 points of contact on the ladder at all times. Use caution upon initial entry (inspect fixed ladder condition). Portable ladders may substitute fixed ladders if the condition of the fixed ladder is unknown or suspect. Fall protection required when climbing up and down ladders. Lifeline attached at all times. Be aware of sump/drain location and identify it (if possible) with temporary marker (pylon). Portable lighting (flashlight or portable light with GFCI) required. Wear **General PPE** and dress appropriate for outside weather conditions. Provide heat stress awareness sessions to work crews if working during hot summer days. Entrance to space must be physically isolated from vehicular and pedestrian traffic. Standby person or designated road-traffic crew must monitor traffic in the area.

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