Confined Space Entry Program

Inventory
Hazard Assessment
and
Safe Work Procedures

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Introduction

Alberni-Clayoquot Regional District (ACRD) is responsible for several water treatment and distribution systems within its jurisdiction. Some are operated by ACRD employees while others are operated by contract employees. These systems include confined spaces that routinely require entry by ACRD employees and contract workers for both planned and unplanned maintenance tasks. Water systems are located as follows:

Table 1: Water systems operated by ACRD

Location	Operation	Maintenance
Bamfield	*Contracted*	*Contracted*
Millstream (Ucluelet)	*Contracted*	*Contracted*
Long Beach Airport	*Contracted*	*Contracted*
Beaver Creek (Port Alberni)	*ACRD*	*Contracted*

Confined space entry by ACRG employees is limited to the Beaver Creek water system. For all other water systems (Millstream, Long Beach, Bamfield), all work requiring entry into any confined space that could require entry by a rescue worker will be contracted out to a suitably trained and equipped contractor. Contractors' procedures, including rescue provisions, will be reviewed by the Program Administrator before the contract is awarded to ensure that it complies with this confined space entry program and any applicable WorkSafeBC requirements.

All confined spaces in each water system are identified in the Confined Space Inventory (see "ACRD Confined Space Inventory and Descriptions"). In order to ensure the health and safety of any worker required to enter a confined space, ACRD has prepared this comprehensive confined space entry program. All work that involves entry into a confined space will conform to the provisions described in this program, without exception. Contractor work procedures will be reviewed by the Program Administrator to ensure they conform to the requirements of the ACRD confined space entry program.

The program is intended to comply with or exceed all applicable WorkSafeBC regulatory requirements. It does not take the place of the WorkSafeBC requirements, which are the minimum standards. Everyone on the job site is expected to comply with this program, and with the WorkSafeBC Regulations. A copy of the WorkSafeBC Regulations is available to workers.

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Occupational Health and Safety Policy

Alberni-Clayoquot Regional District (ACRD) is committed to providing a safe and healthy workplace for all employees and contractors.

We have developed a comprehensive Occupational Health and Safety Program.

We will ensure that everyone follows established procedures and safe work practices.

Regulatory Requirements

Before a worker enters a confined space, WorkSafeBC requires that the employer must prepare and implement a written **confined space entry program** which includes:

- an assignment of responsibilities
- a list of each confined space or group of similar spaces and a hazard assessment of those spaces
- written safe work procedures for entry into and work in the confined space, that address, where applicable:
- identification and entry permits
- lockout and isolation
- verification and testing
- cleaning, purging, venting or inerting
- ventilation
- standby persons
- rescue
- lifelines, harnesses and lifting equipment
- personal protective equipment and other precautions
- coordination of work activities.

WorkSafeBC further requires that a **hazard assessment** must be conducted for each confined space that requires worker entry. This hazard assessment must consider the conditions that may exist prior to entry due to the design, location or use of the confined space, as well as conditions that may develop during work activities inside the confined space. Based on the hazard assessment, **written work procedures** must be developed that specify the means to eliminate or minimize all hazards likely to prevail.

The hazard assessment and written work procedures must be prepared by a qualified person who has adequate training and experience in the recognition, evaluation and control of confined space hazards, and in consultation with the person assigned overall responsibility for administration of the confined space entry program and with the joint committee or the worker health and safety representative, as applicable.

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Provided that the holders of these qualifications have experience in the recognition, evaluation and control of confined space hazards, qualifications which are considered to be acceptable as evidence of adequate training and experience include:

- Certified Industrial Hygienist (CIH)
- Registered Occupational Hygienist (ROH)
- Certified Safety Professional (CSP)
- Canadian Registered Safety Professional (CRSP)
- Professional Engineer (P Eng)
- other combination of education, training and experience acceptable to WorkSafeBC.

Roles and Responsibilities

Management

Alberni-Clayoquot Regional District(ACRD) management will ensure that all work requiring entry into a confined space is conducted safely, in accordance with the procedures detailed in this confined space entry program, and in compliance with all applicable regulatory requirements.

Management will:

- assign overall responsibility for the confined space entry program to a program administrator
- provide appropriate financial, human, and organizational resources to implement the program
- identify and inventory each confined space or group of similar confined spaces
- provide a hazard assessment of those spaces conducted by a qualified person
- provide written safe work procedures for entering and working in those spaces
- ensure that workers are properly trained, instructed and supervised
- eliminate, minimize or appropriately control all confined space hazards.

Program Administration

Overall responsibility for administration of this confined space entry program is assigned to the **Manager of Environmental Services** for the Alberni Clayoquot Regional District. ACRD management will ensure that the program administrator is adequately trained to administer the program. The program administrator is authorized to act as necessary to ensure the program is implemented effectively.

The program administrator will:

- assume overall responsibility for administering the program
- liaise with worker health and safety representatives
- ensure all workers involved in confined space work receive suitable training, instruction and supervision
- maintain program documentation and records

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- ensure contractors follow appropriate confined space entry procedures
- authorize trained persons to act as confined space entry supervisors
- maintain and update an inventory of confined spaces
- provide suitable equipment for confined space work, including testing, ventilation personal protective equipment and rescue equipment and supplies
- ensure that confined space equipment is properly used, calibrated and maintained in accordance with manufacturer's instructions and accepted practice
- evaluate the effectiveness of the program at least annually, or more often when required.

Entry Team

The entry team consists of the following workers:

- the entry supervisor
- one or more entry workers
- one or more standby persons

Each entry team member has specific responsibilities as listed in the following sections. Entry team members will be trained, instructed and supervised as necessary to ensure that they are able to competently perform their duties.

Entry Supervisor

A qualified supervisor will be assigned for every confined space entry. The supervisor will:

- be alert and fit for work at all times
- ensure that entry does not occur unless absolutely necessary
- be familiar with the hazards associated with the work, including the signs, symptoms and consequences of exposure
- ensure that confined space workers are competent and suitably trained to safely perform their duties
- ensure that all precautions and control measures identified in the written safe work procedures are in place and are being followed
- ensure that other precautions not directly related to the confined space entry but required by the Occupational Health and Safety Regulation, such as traffic control, are in place and are being followed
- where required, complete, sign and post the entry permit at the entry to the confined space
- ensure that acceptable conditions are maintained for the duration of the entry
- ensure that rescue services are available and that means for summoning rescue are operable
- assist the rescue team if required
- ensure that only trained, authorized persons are permitted to enter a confined space
- remove workers from the space if changes occur during entry that affect their safety

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- maintain continuity of confined space entry procedures whenever there is a change in responsibility for a confined space entry permit
- terminate the entry, cancel the permit and ensure removal of personnel and equipment at the appropriate time
- review the adequacy of the safe work procedures at least annually or more often when required
- maintain program documentation.

Entry worker

Every worker who is required to enter a confined space has specific duties and responsibilities to ensure their own safety and well-being. Workers will perform their duties in accordance with their training, instruction and supervision. The entry worker will:

- be alert and fit for work at all times
- be familiar with the hazards associated with the work, including the signs, symptoms and consequences of exposure
- be vigilant and recognize hazards during activities associated with the confined space entry
- properly use any equipment required to control hazards
- immediately notify the stand-by person of any emergency or unacceptable condition inside the confined space
- refuse to perform unsafe work
- immediately exit the confined space if unacceptable conditions occur or when directed to do so by a standby person or by the supervisor.

Standby persons

One or more workers will be assigned stand-by duties to monitor the well-being of workers inside the space. Visual checks or other means of monitoring the entry workers are specified as appropriate for the confined space. Stand-by persons will:

- be alert and fit for work at all times
- be familiar with the hazards associated with the work, including the signs, symptoms and consequences of exposure
- be familiar with the safe work procedures to be followed
- be vigilant and recognize hazards during activities associated with the confined space entry
- properly use any equipment required to control hazards
- be stationed immediately outside the point of entry or as otherwise specified in the safe work procedure for the confined space
- prevent the entanglement of lifelines and other equipment where necessary
- maintain two-way communication with the entry worker(s) as specified in the safe work procedure for the confined space
- have a means for two-way communication with the entry supervisor and the rescue team

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- monitor conditions or changes (e.g., with respect to the atmosphere, equipment, or environment) that could adversely affect the health or safety of the entry worker(s)
- record the name of every worker entering or leaving the confined space
- provide assistance as needed for entry workers and rescue workers
- direct entry workers to exit the confined space when any irregularities are observed.

Confined Space Inventory

Within the four water systems, all confined spaces have been identified and are listed in the inventory (see "ACRD Confined Space Inventory and Descriptions"). Every confined space has been assessed by a qualified person. Hazard assessments and written work procedures based on those assessments are contained in the appendices. No other confined space will be entered unless it is similarly assessed by a qualified person.

Hazard Identification and Assessment

Definitions

WorkSafeBC regulation defines the term "confined space" as follows:

> ***"confined space"**, except as otherwise determined by the Board, means an area, other than an underground working, that*
>
> > *(a) is enclosed or partially enclosed,*
> > *(b) is not designed or intended for continuous human occupancy,*
> > *(c) has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service, and*
> > *(d) is large enough and so configured that a worker could enter to perform assigned work.*

Every area considered to be a confined space under this definition is identified in the confined space inventory (see "ACRD Confined Space Inventory and Descriptions"). Because workers may be required to enter any of these confined space to perform work, it is necessary to identify and assess all hazards that may exist prior to entry due to the design, location or use of the confined space, as well as hazards that may develop during work activities inside the confined space.

Based on this assessment, entry into the reservoirs, vaults and similar enclosures considered in this confined space entry program are classified as high hazard, moderate hazard or low hazard. WorkSafeBC defines these risk categories as follows:

> ***"high hazard atmosphere"** means an atmosphere that may expose a worker to risk of death, incapacitation, injury, acute illness or otherwise impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator*

> ***"low hazard atmosphere"*** *means an atmosphere which is shown by pre-entry testing or otherwise known to contain clean respirable air immediately prior to entry to a confined space and which is not likely to change during the work activity, as determined by a qualified person after consideration of the design, construction and use of the confined space, the work activities to be performed, and all engineering controls required by this Regulation*
>
> ***"moderate hazard atmosphere"*** *means an atmosphere that is not clean respirable air but is not likely to impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.*

Confined spaces or groups of similar confined spaces for each water system have been assessed by a qualified person. Each assessment identifies potential hazards associated with entry into the confined space or group of similar confined spaces. Potential hazards include hazards that may exist prior to entry due to the design, location or use of the confined space, as well as conditions that may develop during work activities inside the confined space. These hazard assessments form the basis for the written work procedures for each confined space or group of similar confined spaces.

All confined spaces identified in the ACRD Confined Space Inventory have been identified and assessed by a qualified person. All reservoirs, vaults and similar enclosures considered in this confined space entry program are classified as high hazard, moderate hazard or low hazard. (see "ACRD Confined Space Hazard Identification and Assessment")

Permissible Concentrations of Potential Contaminants

WorkSafeBC regulations specify permissible concentrations for many air contaminants.

Oxygen

Oxygen is essential for life. Normal breathing air at sea level contains about 20.9% oxygen. Even a slight decrease to 19.5% can cause immediately noticeable effects. For healthy workers, coordination and work capacity can be affected at oxygen levels of 15-19 %. Workers with coronary, pulmonary, or circulatory disease may be affected more seriously.

At concentrations of 10 to 12 %, respiration increases, lips turn blue and judgment is impaired. Fainting and unconsciousness occur at 8 to 10 % oxygen. Death occurs in 8 minutes at 6 to 8 % oxygen; recovery is possible after 4 to 5 minutes if oxygen is restored. These values are approximate and may vary greatly depending on an individual's health, physical activity and the specific working environment that they encounter.

Oxygen enrichment occurs when the atmosphere contains more than 20.9% oxygen. Oxygen enrichment increases the risk of fire and explosion.

For work in a confined space, oxygen must be maintained between 19.5% and 23%.

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Hydrogen sulfide

Hydrogen sulfide can be produced by microbial decay of organic matter such as garbage, sewage or plant debris. It can be found in sewage systems, and in stagnant areas in storm drains or underground vaults.

Hydrogen sulfide is a colorless, poisonous and flammable gas with the characteristic foul odour of rotten eggs. It is heavier than air, highly toxic, corrosive, flammable and explosive. It can be detected by smell at very low concentrations ranging from 0.01 – 0.3 parts per million. Detection by odour is not reliable because at high concentrations (e.g. 100 ppm), hydrogen sulfide deadens a person's sense of smell thus making its odour undetectable.

Hydrogen sulfide is very quickly absorbed into the lungs. Short term exposure may cause irritation of nose, throat, eyes and lungs. Higher concentrations can be fatal. The Occupational Exposure Limit in BC is 10 parts per million (ppm), a ceiling limit that is not to be exceeded at any time. The National Institute for Occupational Safety and Health (NIOSH) has determined that a concentration of 100 ppm is Immediately Dangerous to Life and Health (IDLH).

Carbon monoxide

Carbon monoxide, or CO, is an odorless, colorless gas that can cause sudden illness and death.

CO is found in combustion fumes, such as those produced by cars and trucks, small gasoline engines, stoves, lanterns, burning charcoal and wood, and gas ranges and heating systems. CO from these sources can build up in enclosed or semi-enclosed spaces. Workers in these spaces can be poisoned by breathing it.

Red blood cells pick up CO quicker than they pick up oxygen. If there is a lot of CO in the air, the body may replace oxygen in blood with CO. This blocks oxygen from getting into the body, which can damage tissues and result in death. CO can also combine with proteins in tissues, destroying the tissues and causing injury and death.

The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion. High levels of CO inhalation can cause loss of consciousness and death. Unless suspected, CO poisoning can be difficult to diagnose because the symptoms mimic other illnesses.

The Occupational Exposure Limit in BC is 25 ppm as an 8-hour time-weighted average exposure, or 100 ppm as a ceiling limit that is not to be exceeded at any time. WorkSafeBC has assigned an "R" designation for CO, meaning that it has an adverse reproductive effect. The National Institute for Occupational Safety and Health (NIOSH) has determined that a concentration of 1200 ppm is Immediately Dangerous to Life and Health (IDLH).

Flammable gases

Flammable gases are pure gases or mixtures of gases that will burn in the presence of oxygen provided there is a source of ignition. Decaying organic matter can produce methane gas. Gasoline or other flammable liquids can be found in storm drains or underground vaults as a result of inadvertent or intentional disposal.

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Their flammability depends on their concentration. In normal air, low concentrations below the lower explosive limit (LEL) are too lean to ignite. At higher concentrations above the upper explosive limit (UEL), the fuel mixture is too rich to ignite. The range of flammability lies between the LEL and the UEL.

Workers must not be not allowed to enter a confined space under any circumstances when the flammability is greater than 20% of the LEL. It is good practice to prohibit hot work in atmospheres providing a reading on the flammable gas meter above 1%.

Table 2: Permissible concentrations

Contaminant	Maximum	Minimum
Oxygen	*23.0%*	*19.5%*
Hydrogen sulfide	*10 ppm**	
Flammable gases	*Less than 10% LEL*	
Carbon monoxide	*25 ppm***	

*ceiling concentration, not to be exceeded at any time
** 8-hour time-weighted average

Confined Space Entry Permit

A Confined Space Entry Permit is required whenever any person enters a confined space for any reason if that confined space:

- requires isolation or lockout
- has a high hazard atmosphere, or
- presents a risk of engulfment or entrapment.

The entry permit formalizes and records the details of each entry. It provides the employer with confirmation that all required precautions were followed, and informs workers of the conditions and control measures in place before they enter the confined space. The permit is completed and signed by the confined space entry supervisor, and posted conspicuously at the entry to the confined space before any worker is permitted to enter. A copy of the signed permit will be kept on file for at least one year.

The entry permit will identify the confined space and the work activities to which it applies, the workers who are inside the space, the required precautions for the space, and the time of expiration of the permit. The permit is only valid for the date and time shown on the permit.

The permit contains the following additional information:

- air monitoring results, including the tester's initials
- the ventilation equipment and the air flow required
- lockout procedures where required.

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The entry permit will be reviewed and updated as necessary to ensure the ongoing safety of the workers inside the space. The permit will be re-authorized and signed by the responsible entry supervisor if there is a change in the work crew, after each shift change, or after a change of the responsible supervisor. Every worker affected will be informed of an alteration of an entry permit regarding a change in the required precautions or work activity.

Once issued, the information on an entry permit will only be altered by:

- the responsible supervisor who signed the permit, to update it,
- the standby worker, to update the list of workers inside the confined space, or
- the tester, to record test results.

Atmospheric Testing

Before any worker enters a confined space, pre-entry testing and inspection is conducted to verify that the required precautions have been effective at controlling the identified hazards and that it is safe for a worker to enter. ACRD uses Industrial Scientific Ventis (Product # IDS VTS K1232100101)multi-gas detectors for this purpose. The monitors are maintained and calibrated in accordance with the manufacturer's instructions. Calibration is performed by a trained worker using the calibration/bump test station purchased with the monitors. Bump testing is performed daily before use in a confined space or more frequently where recommended by the manufacturer.

Testing is performed before ventilation equipment is engaged. Where possible, initial testing of the confined space atmosphere is performed before opening the manhole cover or access hatch, by placing a tube from the testing device into the space. If there are no abnormal readings the access cover is opened and the sensor is lowered to within one foot of the chamber floor to confirm that conditions are safe before entry. Because some gases can stratify in layers or pockets inside the space, it is important to check all levels.

All test results are recorded in writing, including:

- the location, date and time of the test
- the test readings as displayed on the test instrument
- the name and initials of the worker who performed the test.

Testing is performed prior to entry and after any period of time when the space has been vacated for more than 20 minutes. This retesting is necessary to confirm the air inside the space has not changed during work breaks such as meal breaks.

Table 3 (below) identifies the gases that are measured and recorded. Acceptable concentrations must be verified before a worker enters the space. If unacceptable readings are observed, the confined space entry will be aborted, and the cause of the unacceptable readings will be investigated and remedied before entry is permitted. It may be possible to clean the space from outside. If cleaning from outside is possible to remove contaminants before entering, the space will be retested before any worker enters to verify that cleaning has been effective in restoring the air inside the space to acceptable conditions.

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Table 3: Permissible concentrations in a confined space

Contaminant	Maximum allowed	Minimum required
Oxygen	*23.0%*	*19.5%*
Hydrogen sulfide	*10 ppm**	
Flammable gases	*Less than 10% LEL*	
Carbon monoxide	*25 ppm***	

*ceiling concentration, not to be exceeded at any time
** 8-hour time-weighted average

Pre-entry testing will be conducted for all confined spaces considered in this program, regardless of their hazard classification.

Continuous Monitoring

Although continuous monitoring is not specifically required for low hazard confined space atmospheres, WorkSafeBC requirements state that continuous monitoring is required wherever practicable.

Continuous monitoring is practicable during work inside confined spaces within ACRD water systems. Accordingly, continuous monitoring will be conducted for most confined spaces considered in this program, regardless of their hazard classification, with the exception of small meter, air valve and similar chambers that are too small for full-body entry, making continuous monitoring impracticable (see "ACRD Confined Space Hazard Identification and Assessment").

Each worker inside a confined space will carry a 4-gas monitor at all times. Industrial Scientific Ventis (Product # IDS VTS K1232100101)multi-gas detectors are available for this purpose. The monitors are maintained and calibrated in accordance with the manufacturer's instructions. Calibration is performed by a trained worker using the calibration/bump test station purchased with the monitors. Bump testing is performed daily before use in a confined space or more frequently where recommended by the manufacturer.

Continuous monitoring will alert the entry worker when a hazardous condition is detected by the monitor. Monitors will be set to alarm at the following concentrations:

Table 4: Monitor alarm levels

Sensor	Low alarm	High alarm
Oxygen	*19.5%*	*23%*
Hydrogen sulfide	*5 ppm*	*10 ppm*
Flammable gases	*10% LEL*	*20% LEL*
Carbon monoxide	*25 ppm*	*100 ppm*

If a low alarm or high alarm sounds during work in a confined space, the entry workers will immediately leave the space. The cause of the alarm will be investigated and remedied before the work is permitted to resume.

Ventilation

WorkSafeBC requires that every confined space must be ventilated continuously while a worker is inside the space. A confined space containing a low hazard atmosphere is exempt from this requirement if :

- the atmosphere that is continuously monitored and shown to contain clean respirable air
- the space has an internal volume greater than 1.8 m3 (64 cu ft) per occupant
- the space is occupied for less than 15 minutes, and
- the work inside the space generates no contaminants other than exhaled air.

Although most confined spaces identified in this program are considered to be low risk (subject to confirmation by atmospheric testing), work inside them often requires that they be occupied for more than 15 minutes. Therefore continuous mechanical ventilation will be used to provide clean outdoor air inside the space before and during any work requiring entry for all confined spaces considered in this program, regardless of their hazard classification, unless stated otherwise in the written work procedures for each space (see appendices).

General dilution ventilation will be provided by blowing clean outdoor air into all areas of the confined space. Blowers are sized according the volume of air required. It is recommended that mechanical ventilation equipment be sized to provide at least 20 air changes per hour. ACRD selects ventilation equipment to provide at least that amount of air unless the volume of the space makes that amount of ventilation impracticable. Specific ventilation requirements for all confines spaces are described in the work procedures for each confined space or group of confined spaces (see appendices).

Air movers will be placed upwind and away from vehicle exhaust and other sources of contamination, and up-wind of the entrance when used to force air into a confined space. During operation, where possible the discharge end of the air mover hose will be located at waist height inside the space, and within three feet of entry workers.

In the event of failure of ventilation system, entry workers will immediately leave the space. The cause of the failure will be investigated and remedied before the work is permitted to resume.

ACRD ventilation equipment consists of a 1820 CFM capacity Vortex Axial fan with a 25-foot flexible duct. Electrical components are explosion-proof and CSA approved for hazardous locations classified under CSA Standard C22.1-94, Canadian Electrical Code Part 1, as Class 1, Division 2, Groups A, B and C.

Standby Persons

For every confined space entry, at least one worker will be assigned as a standby person, to check on the well-being of workers inside the space by visually observing them or using another method of checking.

The standby person will have a means to summon help in the event of an emergency. Workers inside the space will have means to contact the standby person at any time, either through voice or visual contact. The standby person will be stationed outside the confined space, never inside.

Standby persons are not permitted to enter the space for rescue purposes unless they have rescue training and only if another worker is located outside to render assistance. Roles and responsibilities of the standby person are identified under “Roles and Responsibilities” elsewhere in this program.

A first aid attendant may need to enter a confined space to attend to a worker with injuries such as a laceration or a broken ankle. If the standby person is also the first aid attendant, the standby person will ensure that another fully trained standby person takes over the standby duties before entering the space to provide first aid.

Requirements for standby persons vary depending on the hazard classification of the confined space. For **low hazard confined space entry**, WorkSafeBC requires the following:

- another worker must be assigned as a standby person
- there must be a continuous means of summoning the standby person
- the standby person must check on the well-being of workers inside the space at least every 20 minutes
- the standby person must have a means to immediately summon rescue personnel.

For **moderate hazard confined space entry**, WorkSafeBC requires the following:

- another worker or workers must be assigned as the standby person(s)
- a standby person must be stationed at or near the entrance to the space
- the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes
- there must be a continuous means of summoning the standby person from inside the space
- the standby person must have a means to immediately summon rescue personnel.

For **high hazard confined space entry**, WorkSafeBC requires the following:

- another worker or workers must be assigned as the standby person(s)
- the standby person(s) must be stationed at the entrance to the space and must continuously attend to the standby duties
- the standby person(s) must visually observe or otherwise continuously monitor the well-being of the worker(s) inside the space
- there must be a continuous means of summoning the standby person(s) from inside the space
- the standby person(s) must be equipped and capable of immediately effecting rescue using lifting equipment if required, or otherwise performing the duties of rescue persons
- the standby person(s) must prevent the entanglement of lifelines and other equipment.

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Most confined spaces considered in this confined space entry program are classified as low risk unless testing indicates otherwise. Accordingly, the low hazard standby provisions will be followed in many cases. Moderate hazard standby provisions will be followed where provision of standby and rescue services is more complicated.

The confined space program administrator will ensure that standby persons are assigned accordingly. Standby persons will be adequately trained, instructed and supervised to ensure they are competent to perform their duties.

Rescue and Retrieval Equipment

By definition, confined spaces have limited or restricted access that may make rescue difficult. Studies have shown that over 60% of confined space deaths occur among would-be rescuers. Rescue plans and proper training for rescuers must be in place before any confined space entry. This will prevent well-meaning workers who are untrained in rescue from entering confined spaces to assist workers in distress and themselves becoming victims.

To facilitate removal from a confined space in the event that the entry worker is not able to exit the space without assistance, every entry worker will wear a full body harness attached to a lifeline for entry into all confined spaces, including vertical and horizontal entry configurations, unless the work procedure specifies otherwise (see appendices). The lifeline will be attached to a suitable retrieval device. For vertical entries, the lifeline will be attached to a tripod-mounted winch suitable for lifting the worker and positioned above the entry point.

Harnesses, lifelines and lifting equipment will meet the requirements of acceptable standards. Lifelines must have an ultimate strength of 27 kN (6,000 pounds) and be kept free of knots or splices except at the ends. Only stainless steel lines will be used where hot work is being done.

Rescue Procedures

ACRD will ensure that rescue services are available whenever a worker enters a confined space.

For Beaver Creek only, ACRD will rely on an internal rescue team and the use of lifting devices and harnesses to ensure that workers can be rescued from the confined space without the requirement for any other worker to enter the confined space. If entry is required to effect rescue, the City of Port Alberni Fire Department will provide rescue service including the use of SCBA for entry. A written agreement with the Fire Department is required before any confined space entry is carried out.

For other water systems (Millstream, Long Beach, Bamfield), only contractors will enter any confined space that could require entry by a rescue worker. (Note: some confined spaces such as meter stations and air chambers are shallow, and require the entry worker to lean into the space, not to bodily enter the space - rescue from these spaces would never require entry by a rescue workers). Contractors' procedures, including rescue provisions, will be reviewed by the Program Administrator before the contract is awarded to ensure that it complies with this confined space entry program and any applicable WorkSafeBC requirements.

The standby person will activate the rescue. The rescue team will consist of other workers who have been trained in the use of a tripod and winch system attached to the full body harness.

Rescue workers will make every attempt possible to remove the entry worker from the space without entering the space themselves. If that is not possible, one rescue worker will enter the confined space to perform the rescue, and the other rescue worker will standby at the entrance to the space. In this circumstance, it is assumed that the atmosphere inside the space is unknown, and may contain contaminants at concentrations that are immediately dangerous to life or health.

For this reason, rescue workers will use self-contained breathing apparatus (SCBA) when entering the space. At all times during a rescue requiring entry into the space, a standby rescue worker will remain at the entrance to the space to monitor the entry workers and rescue workers inside the space. The standby rescue worker will be equipped with and wearing (respirator mask at the ready position) SCBA.

Respiratory Protection

Respiratory protection is not normally required for work in the confined spaces considered in this confined space entry program. In most cases, emergency rescue procedures have been developed to allow removal of an unconscious worker using harnesses, lifelines and appropriate lifting equipment (tripods, winches). It is not anticipated that a rescue worker would be required to enter a confined space to effect rescue. In the unlikely event that rescue workers must enter the confined space using SCBA, only workers who are suitably trained in SCBA use will be permitted to carry out the rescue.

Isolation and Control of Harmful Substances

Some confined spaces considered in this program are connected to adjacent piping that normally contains potable water, either untreated or treated with a 1% solution of sodium hypochlorite. No other substances are contained in any piping connected to any confined space unless specified otherwise in the hazard assessment for the specific confined space.

WorkSafeBC Regulation 9.18(3) requires that:

> *(3) Before a worker enters a confined space where adjacent piping contains a substance that is harmful only because of the temperature, pressure or quantity of the substance, the harmful substance must be controlled*
>
> *by either disconnecting the adjacent piping or isolating it using blanks or blinds that meet the requirements of section 9.20 or using a double block and bleed system that meets the requirements of section 9.21,*
>
> *by isolating the adjacent piping in a manner that a professional engineer has certified will make the confined space safe for a worker to carry out the intended work, or*
>
> *if there is no head pressure in the adjacent piping, by de-energizing and locking out each pressure source for the adjacent piping and depressurizing the adjacent piping.*

Specific procedures for isolating each confined space are contained in the written work procedures in the Appendices. Where practicable, double block and bleed isolation is preferred. Where double block and bleed isolation is not practicable, pressure sources will be de-energized and locked out provided that there is no head (gravity) pressure in the lines. Where it is necessary to maintain pressure in water lines that are connected to a confined space (to provide fire protection and water for consumption), the means of isolation will be certified by a professional engineer as being safe for a worker to carry out the intended work.

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Diving

Some maintenance procedures require the use of commercial divers inside a confined space. WorkSafeBC requirements for commercial diving are located in Part 24 of the Occupational Health and Safety Regulation. ACRD will ensure that these requirements are followed for any work that involves underwater diving. For convenience, a copy of these requirements is located in Appendix 10.

Fall Protection

WorkSafeBC requires the use of a fall protection system when work is being done at a place from which a fall of 3 meters (10 feet) or more may occur, or where a fall from a height of less than 3 meters involves a risk of injury greater than the risk of injury from the impact on a flat surface.

Some of the reservoirs considered in this confined space entry program require work to be done at heights greater than 3 meters. Accordingly, a fall protection system is specified in the written work procedures for these confined spaces (see appendices).

Guardrails will be used whenever practicable. If guardrails are not practicable, a fall restraint system will be used. For workers on ladders or equipment, this will consist of a harness with two 2-foot lanyards; each connected on waist clips. One lanyard will always be attached to prevent the worker from falling.

For workers on roofs or elevated platforms without guardrails, the fall restraint system will consist of a lanyard attached to an anchor point a sufficient distance from the edge to prevent the possibility of falling.

If the work cannot be performed using guardrails or a restraint system, a fall arrest system will be put in place.

When work must be performed at heights over 25 feet above grade and workers are not protected by permanent guardrails, a written site-specific fall protection program will be completed and available on site for the workers to follow. In these circumstances, a pre-job meeting will be held with workers to discuss the written site specific fall protection program.

Fire Protection

Workers are not permitted to smoke while working in or around a confined space. Because of the potential for flammable liquids to be present in underground vaults, suitable fire extinguishers will be kept at the entrance points as specified in the written work procedures (see appendices).

Proper closed containers will be used for gasoline and similar fluids. Containers will be plainly marked to indicate their contents (WHMIS labelling requirements apply to these and all other containers of controlled products).

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Duty to Refuse Unsafe Work

Whenever any worker observes what appears to be an unsafe or harmful condition or act the worker will report it as soon as possible to a supervisor or to the employer, and the person receiving the report will investigate the reported unsafe condition or act and will ensure that any necessary corrective action is taken without delay.

If emergency action is required to correct a condition which constitutes an immediate threat to workers only those qualified and properly instructed workers necessary to correct the unsafe condition will be exposed to the hazard, and every possible effort will be made to control the hazard while this is being done.

A worker will not carry out or cause to be carried out any work process or operate or cause to be operated any tool, appliance or equipment if that worker has reasonable cause to believe that to do so would create an undue hazard to the health and safety of any person.

A worker who refuses to carry out a work process or operate a tool, appliance or equipment pursuant to subsection will immediately report the circumstances of the unsafe condition to his or her supervisor or employer.

The supervisor or employer receiving a report of a refusal to perform unsafe work will immediately investigate the matter and ensure that any unsafe condition is remedied without delay. If in the supervisor's opinion the report is not valid, the supervisor will so inform the person who made the report. If the matter is not resolved and the worker continues to refuse to carry out the work process or operate the tool, appliance or equipment, the supervisor or employer will investigate the matter in the presence of the worker who made the report and in the presence of a worker member of the joint committee, a worker who is selected by a trade union representing the worker, or if there is no joint committee or the worker is not represented by a trade union, any other reasonably available worker selected by the worker.

If the investigation does not resolve the matter and the worker continues to refuse to carry out the work process or operate the tool, appliance or equipment, both the supervisor, or the employer, and the worker will immediately notify a WorkSafeBC officer, who will investigate the matter without undue delay and issue whatever orders are deemed necessary.

A worker will not be subject to discriminatory action because the worker has refused to carry out unsafe work or has acted in compliance with an order made by a WorkSafeBC officer. Temporary assignment to alternative work at no loss in pay to the worker until the matter is resolved is deemed not to constitute discriminatory action.

Training and Instruction

Every worker with assigned duties or responsibilities related to entry into a confined space will be adequately trained and instructed in the hazards of the space and the precautions identified in the written procedures to properly and competently perform their duties.

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Entry workers will be trained in:

- the identity of spaces on the confined spaces inventory
- the location of those confined spaces
- the hazards of those confined spaces
- the precautions and control procedures required to safely enter those spaces
- rescue procedures for those confined spaces.

Workers who perform air testing will be trained in the correct use of the air testing equipment, including calibration, bump testing and any maintenance they are expected to perform.

Standby persons and rescue workers will be instructed in their duties and responsibilities to ensure they are competent to carry out their work.

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Beaver Creek Water System

Beaver Creek Confined Space Inventory

There are five work areas located within the Beaver Creek Water System:

- North reservoir compound
- Stamp River reservoir compound
- Kitsuksis reservoir compound
- Strick Road pump house
- Office and maintenance shop, Beaver Creek Road

North reservoir

Constructed in 1996, the north reservoir is a round steel tank approximately 92 feet high and fifteen feet in diameter. Access is through a two-foot diameter round hatch located about four feet above the base of the tank. One additional round hatch on top of the tank is kept open during work inside the tank, but is not used for entry. This reservoir requires interior cleaning about once every three years. The work is contracted out.

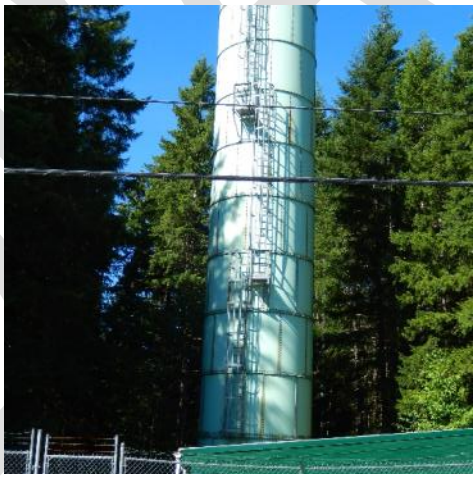

Figure 1: Beaver Creek north reservoir

North Reservoir Chemical Injector Room

The chemical injector room in the North River pump house is accessed by a permanently affixed 3-rung metal ladder on the inside wall of the room extending from the door down to the concrete floor. This ladder limits or restricts entry or exit, and may complicate the provision of first aid, evacuation, rescue or other emergency response service. Accordingly, and in this respect only, the chemical injector room is considered a confined space. Frequent entry is required by ACRD employees to fill the hypochlorite

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barrels and perform routine work. As described in the Hazard Identification and Assessment section, confined space precautions are minimal and are intended to address the provision of first aid, evacuation, rescue or other emergency response service.

Figure 2: Beaver Creek north reservoir chemical injector room

North reservoir air valve chamber

A 22-inch diameter manhole near the North reservoir contains an air valve. The chamber is a concrete cylinder about 3 feet deep with an earth floor and no drain. Although not large enough for bodily entry, its depth may necessitate leaning into the chamber to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. The air valve requires occasional maintenance performed by ACRD employees.

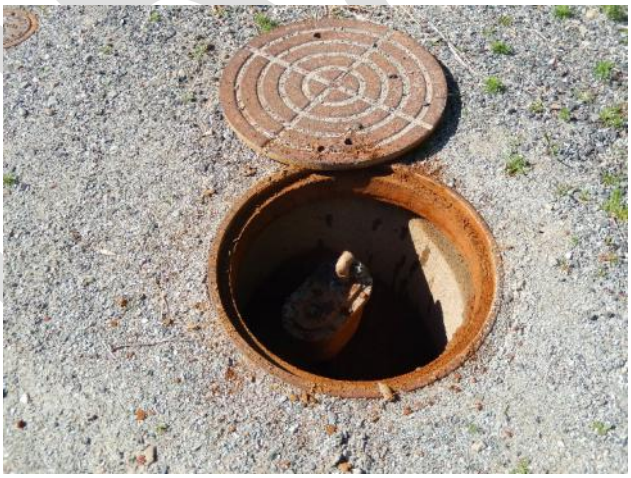

Figure 3: Beaver Creek north reservoir air valve chamber

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Stamp River pump house wet well

The Stamp River pump house reservoir is a concrete wet-well beneath the pump house floor measuring 12 feet by 10 feet and 23 feet deep. Access is through a 22 inch diameter manhole in the pump house floor (the top of the tank). A permanently affixed metal ladder on the inside wall of the tank extends from the entry hatch to the bottom of the reservoir. This reservoir requires interior cleaning about once every three years. This work is contracted out.

Figure 4: Stamp River pump house reservoir

Stamp River meter chamber

The Stamp River pump house meter pit is a rectangular concrete structure covered by a steel plate and located just outside the main pump house. It is below grade, 7 feet deep, and measures 3.5 feet by 4 feet. A sealed water pipe equipped with a valve and a pressure gauge passes through the vault at the bottom of the structure. Entry is required to repair the meter from time to time, generally every three years. The work is performed by ACRD employees.

Figure 5: Stamp River meter chamber

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Stamp River air valve chamber

A 22-inch diameter manhole near next to the Stamp River pump house contains an air valve. The chamber is a concrete cylinder about 3 feet deep with an earth floor and no drain. Although not large enough for bodily entry, its depth may necessitate leaning into the chamber to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. The air valve requires occasional maintenance performed by ACRD employees.

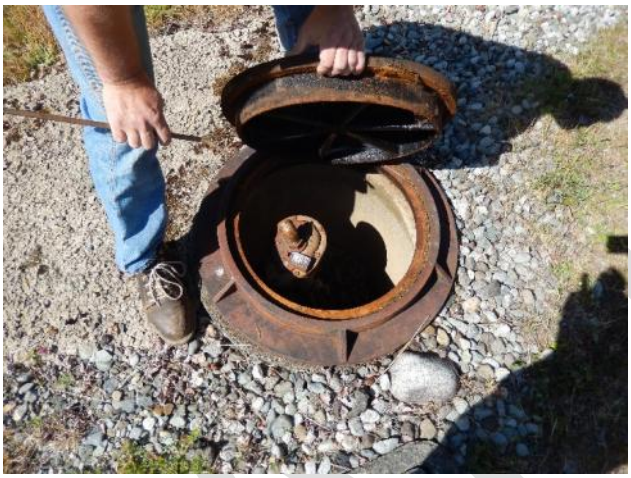

Figure 6: Stamp River air valve chamber

Concrete Kitsuksis reservoir

The concrete Kitsuksis reservoir, constructed in the 1950's, is an above-ground concrete tank measuring 20 feet by 75 feet and 25 feet high. Vertical entry is through one of two 4-foot square hatches on the top of the tank. A permanently affixed metal ladder on the inside wall of the tank extends from the entry hatch to the bottom of the structure. Because this permanent ladder is corroded, a portable ladder is used for entry. Entry is required periodically for cleaning. The work is contracted out.

Figure 7: Old Kitsuksis reservoir

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Steel Kitsuksis Reservoir

The new cylindrical steel tank constructed in 2013 measures 28-feet to the top landing Horizontal access is through a round 22-inch diameter hatch about 3 feet above grade. Two additional 4-foot square steel hatches on the tank top are not used for entry, but they are open during work inside the tank, and one is used for ventilation. Entry is required periodically for cleaning. The work is contracted out.

Figure 8: New Kitsuksis Reservoir

Kitsuksis meter chamber

The Kitsuksis reservoir meter chamber is a rectangular concrete structure located beside the old reservoir. It is below grade, 6-feet 9-inches deep, and measures about 3 feet by 3.5 feet. A sealed water pipe passes through the bottom of the chamber and a steel grate covers a floor drain. The pipe is equipped with a valve and a pressure gauge. The meter pit requires regular entry for service once or twice each month. This work is performed by ACRD employees.

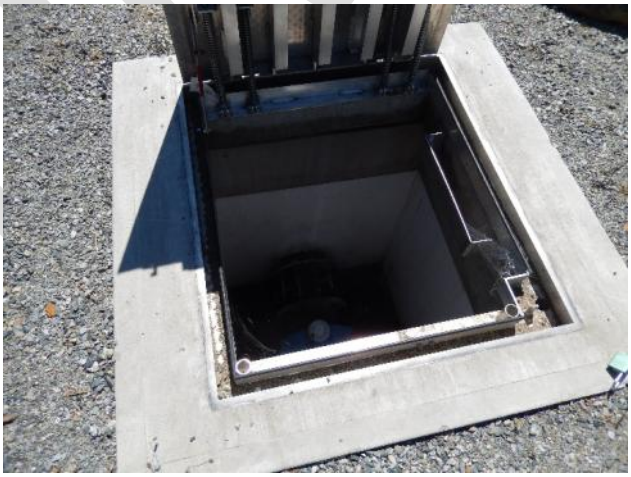

Figure 9: Kitsuksis meter chamber

Kitsuksis air (altitude) valve chamber

The Kitsuksis altitude valve chamber is a large rectangular structure adjacent to the old Kitsuksis reservoir. It is below grade, 7 feet 3-inches deep, and measures 6 feet 8-inches wide by 10-feet 3-inches long. Three sealed water pipes pass through the chamber, along with their associated air valves, pressure sensors and relays. A steel grate covers a floor drain in the chamber. The equipment inside the chamber requires periodic maintenance performed by ACRD employees.

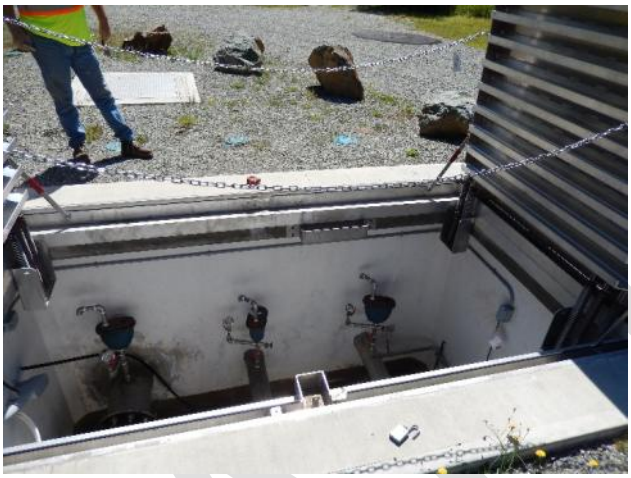

Figure 10: Kitsuksis air (altitude) valve chamber

Kitsuksis perimeter drain line manholes

There are four 22-inch manholes accessing a perimeter drain line connecting the reservoirs, meter pit and altitude valve chamber to an adjacent ditch where dechlorination pucks are added prior to surface discharge. All are cylindrical concrete chambers containing drain water and open drain lines. Depths range from 2 feet to more than 6 feet. The use of hydro vac equipment to clear a plugged line avoids any need to enter these manholes.

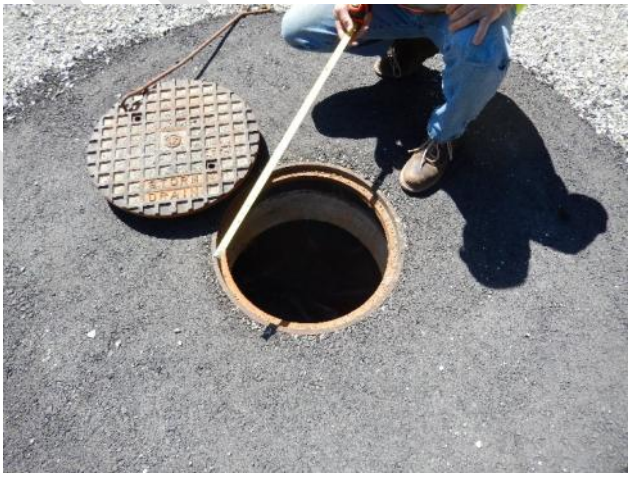

Figure 11: Kitsuksis drain line manhole

Strick Road pump station meter chamber

A meter chamber is located below floor level inside the Strick Road pump station, covered by a steel grill. The chamber is 39 inches deep, and the top opening measures 7 feet by 4 feet. A sealed water pipe equipped with a flow meter passes through the chamber. A sealed plastic hypochlorite injection line supplies diluted hypochlorite solution from the hypochlorite pump to the water pipe injector assembly. The chamber has a floor drain connected to the drain pit outside the door to the building. Entry into the meter chamber is required from time to time to service the meter. This work is performed by ACRD employees.

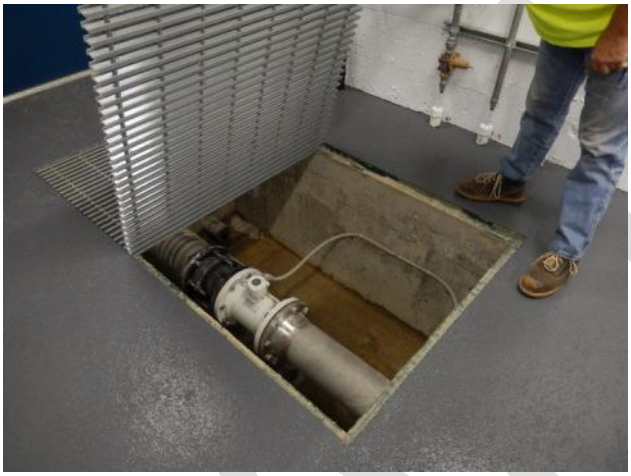

Figure 12: Strick Road pump station meter chamber

Strick Road drain pit

Outside the door to the building, a shallow cylindrical concrete drain pit covered by a 22 inch drainage manhole collects overflow from the pump house and meter chamber. The use of hydro vac or similar equipment to clear any obstruction avoids the need to enter this manhole.

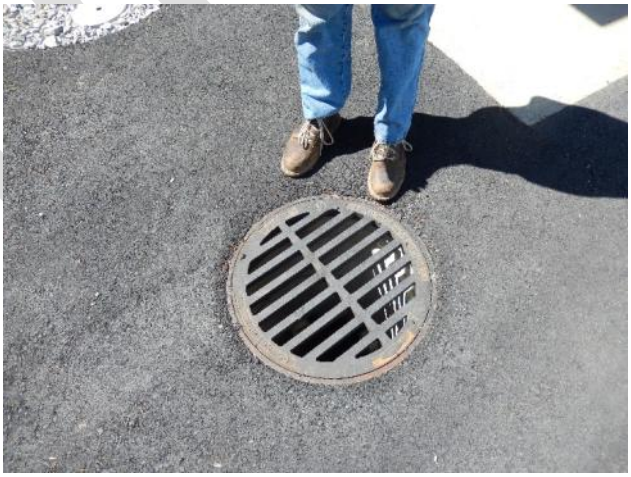

Figure 13: Strick Road drain pit

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Office and maintenance building septic tank

Three manholes behind the maintenance building provide access to the septic tank that services the building. Two 22-inch manholes access the first and second chambers of the septic tank, while the third manhole accesses piping and a clean-out plug. The septic tank requires pumping out annually. This work does not require entry. Because of the high level of hazard, ACRD prohibits entry into this septic tank.

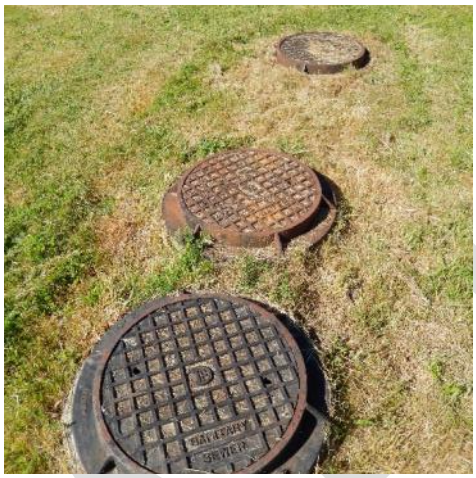

Figure 14: Office and maintenance building septic tank

Air valve chambers

There are about 50 air valves located throughout the distribution system in addition to the air valves identified at the North reservoir, Stamp River and Kitsuksis pump houses. They are typically contained in shallow below-grade pits, less than 24 inches deep, housed in small concrete or plastic enclosures. About 15 of the air valve chambers are deeper than 24 inches. Although not large enough for bodily entry, the depth of these chambers necessitates leaning into the chamber to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. Air valves require occasional maintenance performed by ACRD employees.

Service connection meter chambers

There are more than 1,000 service connections in the Beaver Creek water distribution system, most or all of which are equipped with a meter housed in a small, shallow plastic or concrete chamber below grade near the property line. Because these meter chambers are not large enough for a worker to enter to perform work, and do not require leaning into the chamber to service or read the meters, they are not considered to be confined spaces.

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Beaver Creek Confined Space Hazard Identification and Assessment

Beaver Creek Reservoirs

The three reservoirs (North reservoir, Kitsuksis steel reservoir, Kitsuksis concrete reservoir) present similar hazards. Although there are differences in the required isolation procedures and entry points, the precautions are otherwise identical. All three reservoirs normally contain potable water sourced from either the Stamp River or the City of Port Alberni water system. Water is treated by chlorine (Stamp River) or sodium hypochlorite (Kitsuksis, Strick Road) water disinfection systems at the pump houses.

The three reservoirs are therefore considered be a group of confined spaces that share similar characteristics.

Hazards prior to entry

In preparation for entry by workers, the reservoirs are drained of water and adjacent connected piping is controlled as described under the specific work procedures (see appendices). All reservoirs are located in locked, fenced compounds secured against unauthorized access, and pipes connected to the reservoirs contain only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of draining the reservoirs will cause outdoor ambient air to be drawn into the reservoirs through air vents. There are no sources of contamination or other concerns about ambient air quality and the reservoirs are not normally left in a drained state for more than a few days before entry by workers. Accordingly, it is anticipated that the reservoirs will contain only clean respirable air prior to entry.

Residual water may remain in the bottom of the reservoirs after draining, resulting in a potential slipping hazard due to the wet interior bottom surface. There are no materials inside or outside the reservoirs that could create a hazard of engulfment or entrapment. There are no structures inside the reservoirs that could create a hazard of a striking contact or lifeline entanglement.

Hazards during occupancy

Work inside the reservoirs consists of inspection and cleaning using water supplied through pressure washing equipment. This hazard identification and assessment is limited to pressure washing using water. Any work inside the reservoirs that requires a process using a substance other than water will require re-evaluation by a qualified person before that work is performed.

Hazard classification

All three reservoirs are expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoirs is considered to be low hazard unless pre-entry testing determines otherwise.

Stamp River pump house wet well

The Stamp River wet well requires cleaning about once every three years. The water level in the wet well is lowered prior to commencing this work, but it cannot be emptied. For this reason, divers are contracted to enter the well and perform the work.

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Hazards prior to entry

The wet well is housed in a locked building secured against unauthorized entry. The access manhole is normally covered, and pipes connected to the wet well contain only potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of partially draining the wet well will cause outdoor ambient air and indoor air from the pump house to be drawn into the well. There are no sources of contamination or other concerns about outdoor ambient air quality. The pump house contains chlorine cylinders as part of the chlorine disinfection system. Chlorine gas in not normally present in the pump house air, and a sensor and alarm system monitors the air inside the chlorine room. There would be no entry if chlorine gas was present in the pump house. Accordingly, it is anticipated that the wet well will contain only clean respirable air prior to entry.

Hazards during occupancy

No chemical products are used during the work. There are hazards associated with Scuba diving. Water depth is limited to less than 23-feet. WorkSafeBC requirements for commercial diving contained in Part 24 of the Occupational Health and Safety Regulation. See Appendix 6.

Hazard classification

The Stamp River wet well is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoirs is considered to be low hazard unless pre-entry testing determines otherwise. Additional precautions are required to address hazards associated with Scuba diving inside the wet well.

North Reservoir Chemical Injector Room

The chemical injector room in the North River pump house is accessed by a permanently affixed 3-rung metal ladder on the inside wall of the room extending from the door down to the concrete floor. This ladder limits or restricts entry or exit, and may complicate the provision of first aid, evacuation, rescue or other emergency response service.

Hazards prior to entry

The injector room is continuously ventilated. Barrels of 1% sodium hypochlorite are located in the room to feed the injector system. There are no other known sources of potential air contaminants. Accordingly, there are no atmospheric or other hazards anticipated prior to entry. WorkSafeBC requirements state:

> **9.*25(7) Testing the atmosphere***
>
> *Pre-entry atmospheric testing is not required in a confined space with a low hazard atmosphere if*
>
> *(a) the location and control of the space ensures that a more hazardous atmosphere could not inadvertently develop,*
>
> *(b) such testing is not required to verify the effectiveness of an isolation or other pre-entry control,*

(c) prior representative sampling has demonstrated that the atmosphere within the space or group of similar spaces meets the low hazard atmosphere definition, and

(d) the written entry procedures do not require such testing.

The location and control of the North reservoir chemical injector room ensures that a hazardous atmosphere cannot develop prior to entry, and testing is not needed to verify the effectiveness of any isolation procedure or other pre-entry control. Representative sampling will be conducted to demonstrate that the atmosphere within the injector room contains only clean respirable air. Accordingly, pre-entry air testing and continuous monitoring will not be required subject to confirmation by the representative sampling.

Hazards during occupancy

Frequent entry by ACRD employees is required to fill the hypochlorite barrels and perform routine work. No hazards are anticipated to be created by the work performed. Because ladder restricts entry or exit, and may complicate the provision of first aid, evacuation, rescue or other emergency response service, precautions are minimal and are intended to address the provision of first aid, evacuation, rescue or other emergency response service.

Hazard classification

The North reservoir chemical injector room is expected to contain only clean respirable air prior to entry. This will be verified by representative sampling. Accordingly, entry into the injector room is considered to be low hazard unless representative sampling determines otherwise.

Stamp River meter chamber

Hazards prior to entry

The sealed water pipe and associated valve and gauge passes through the vault at the bottom of the structure. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The meter chamber is normally covered and has concrete floor with no drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The meter chamber located on private land, but is not in a fenced enclosure secured against unauthorized access. Accordingly, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and

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retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Stamp River meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Kitsuksis meter chamber

Hazards prior to entry

A sealed water pipe passes through the bottom of the chamber and a steel grate covers a floor drain. The pipe is equipped with a valve and a pressure gauge. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The meter chamber is normally covered and has concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The meter chamber is located in a locked, fenced compound secured against unauthorized access, and piping connected to the chamber contains only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Kitsuksis meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

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Kitsuksis air (altitude) valve chamber

Hazards prior to entry

Three sealed water pipes pass through the chamber, along with their associated air valves, pressure sensors and relays. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The altitude valve chamber is normally covered and has concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The chamber is located in a locked, fenced compound secured against unauthorized access, and piping connected to the chamber contains only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

Hazards during occupancy

If any work in the altitude valve chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Kitsuksis air (altitude) valve chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Kitsuksis perimeter drain line manholes

The use of hydro vac equipment to clear a plugged line avoids any need to enter these manholes. Accordingly, no worker will enter these manholes.

Strick Road pump station meter chamber

A meter chamber is located below floor level inside the Strick Road pump station, covered by a steel grill. The chamber is 39 inches deep, and the top opening measures 7 feet by 4 feet. A sealed water pipe equipped with a flow meter passes through the chamber. A sealed plastic hypochlorite injection line supplies diluted hypochlorite solution from the hypochlorite pump to the water pipe injector assembly. The chamber has a floor drain connected to the drain pit outside the door to the building. Entry into the meter chamber is required from time to time to service the meter. This work is performed by ACRD employees.

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The Strick Road pump station is continuously ventilated. Barrels of 1% and 12% sodium hypochlorite are located in the room to feed the injector system. There are no other known sources of potential air contaminants. Accordingly, there are no atmospheric or other hazards anticipated prior to entry.

WorkSafeBC requirements state:

> ***9.25(7) Testing the atmosphere***
>
> *Pre-entry atmospheric testing is not required in a confined space with a low hazard atmosphere if*
>
> *(a) the location and control of the space ensures that a more hazardous atmosphere could not inadvertently develop,*
>
> *(b) such testing is not required to verify the effectiveness of an isolation or other pre-entry control,*
>
> *(c) prior representative sampling has demonstrated that the atmosphere within the space or group of similar spaces meets the low hazard atmosphere definition, and*
>
> *(d) the written entry procedures do not require such testing.*

The location and control of the Strick Road pump station room ensures that a hazardous atmosphere cannot develop prior to entry, and testing is not needed to verify the effectiveness of any isolation procedure or other pre-entry control. Representative sampling will be conducted to demonstrate that the atmosphere within the injector room contains only clean respirable air. Accordingly, pre-entry air testing and continuous monitoring will not be required subject to confirmation by the representative sampling.

Hazards prior to entry

A sealed water pipe passes through the bottom of the chamber and a steel grate covers a floor drain. The pipe is equipped with a valve and a pressure gauge. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The Strick Road pump station meter chamber is located inside the pump station and is normally covered by a steel grate that permits free air exchange between the chamber and the pump room. Hypochlorination equipment is present in the pump station, including buckets that contain 12% sodium hypochlorite and mix tanks containing 1% sodium hypochlorite. No incompatible chemicals are stored in the pump station. There are no other known sources of potential air contaminants. Accordingly, there are no atmospheric or other hazards anticipated prior to entry.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the

chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Strick Road pump station meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Strick Road drain pit

The use of hydro vac or similar equipment to clear any obstruction avoids the need to enter this manhole. Accordingly, no worker will enter this manhole.

Air valve chambers

Air valve chambers identified at the North reservoir and the Stamp River pump house are virtually identical, as are approximately 15 of the air valve chamber located throughout the distribution system. These 15 air valve chambers are deeper than 24-inches, requiring the worker to lean into the chamber to perform work. When the worker's breathing zone crosses the plane of the opening to the air valve chamber, entry into a confined space has occurred. These air valve chambers are considered to be a group of confined spaces that share similar characteristics.

The remainder of the air valve chambers (about 35) are less than 24 inches deep and are not considered to be confined spaces.

Hazards prior to entry

The chambers are normally covered and typically have an earth floor with no drain. It is possible that oxygen deficiency can develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). Because some of the air valve chambers are not located in a secured area, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

Each chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

DRAFT

Hazard classification

All air valve chambers are expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into an air valve chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Office and maintenance building septic tank

Two manholes provide access to the two septic tank chambers and a third manhole accesses piping and a clean-out plug. Entering a septic tank is highly dangerous and should be avoided. In the event that entry is required, high hazard precautions are required. Accordingly, ACRD prohibits any worker from entering this septic tank.

Service connection meter chambers

Service connection meter chambers are not large enough for a worker to enter to perform work, and do not require leaning into the chamber to service or read the meters. Accordingly, they are not considered to be confined spaces.

DRAFT

DRAFT

Millstream Confined Space Inventory

The small Millstream water system serves fewer than 50 homes. There are two work locations; the Millstream reservoir on Mavis Avenue, and the Millstream pump house on Karn Street.

Millstream reservoir

The Millstream reservoir is a cylindrical steel structure was constructed in 1991, and measures 72 feet high and 18 feet in diameter. There is one 24-inch diameter hatch at ground level, as well as one 24-inch square hatch and one 30-inch diameter vent on the top of the tank. Occasional entry is required for cleaning and maintenance about every three years. The work is contracted out.

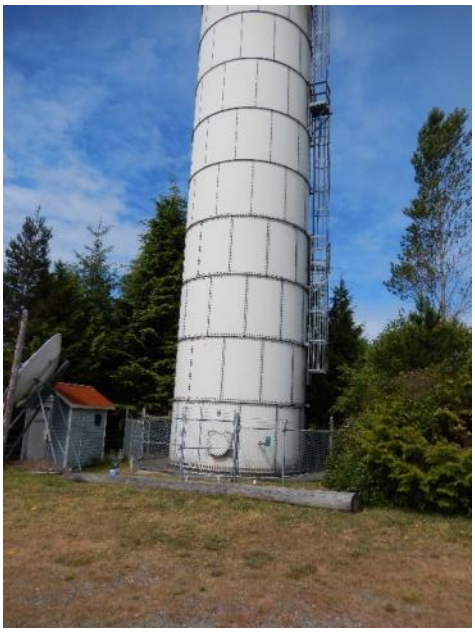

Figure 15: Millstream reservoir

Karn Street pump house sump #1

Sump #1 at the Karn Street pump house is covered by a 22-inch diameter manhole lid secured with six steel bolts. The manhole leads to a 17-foot deep sump chamber measuring 5-feet in diameter. Entry into the sump is required occasionally to service or replace equipment such as the foot valve. The work is contracted out.

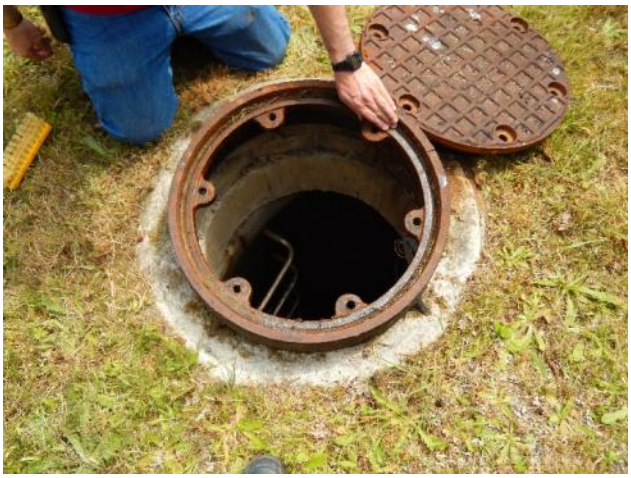

Figure 16: Karn Street pump house sump #1

Karn Street pump house sump #2

A second sump at the Karn Street pump house is currently not in service and does not require entry.

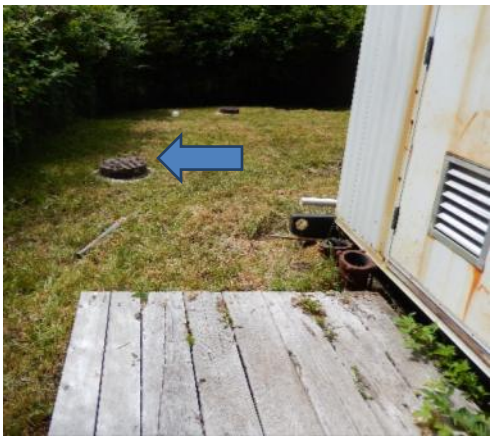

Figure 17: Karn Street pump house sump #2

Karn Street air valve chamber

There is a 22-inch diameter manhole on Karn Street adjacent to the path leading to the pump house. This manhole is a 42-inch deep concrete cylinder with an earth bottom, and contains an air valve. The valve is up to 37-inches below grade, and its top bolts are 22-inches below grade. Although not large enough for bodily entry, its depth may necessitate leaning into the chamber to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. The air valve requires occasional maintenance performed by the system operator.

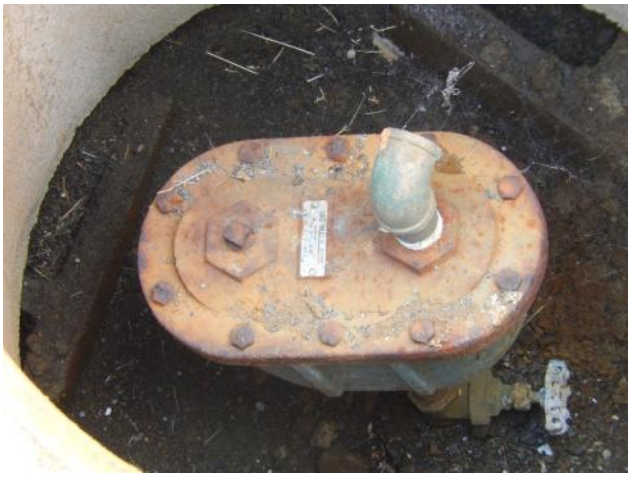

Figure 18: Karn Street air valve chamber

Millstream Confined Space Hazard Identification and Assessment

Millstream Reservoir

Hazards prior to entry

In preparation for entry by workers, the reservoir is drained of water and adjacent connected piping is controlled as described under the specific work procedures (see appendices). The reservoir is located in a locked, fenced compound secured against unauthorized access, and pipes connected to the reservoir contain only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of draining the reservoir will cause outdoor ambient air to be drawn into the reservoir through air vents. There are no sources of contamination or other concerns about ambient air quality and the reservoir is not normally left in a drained state for more than a few days before entry by workers. Accordingly, it is anticipated that the reservoir will contain only clean respirable air prior to entry.

Residual water may remain in the bottom of the reservoir after draining, resulting in a potential slipping hazard due to the wet interior bottom surface. There are no materials inside or outside the reservoir that could create a hazard of engulfment or entrapment. There are no structures inside the reservoir that could create a hazard of a striking contact or lifeline entanglement.

Hazards during occupancy

Work inside the reservoir consists of inspection and cleaning using water supplied through pressure washing equipment. This hazard identification and assessment is limited to pressure washing using water. Any work inside the reservoir that requires a process using a substance other than water will require re-evaluation by a qualified person before that work is performed.

Hazard classification

The Millstream reservoir is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoir is considered to be low hazard unless pre-entry testing determines otherwise.

Karn Street pump house sump #1

Sump #1 at the Karn Street pump house is covered by a 22-inch diameter manhole lid secured with six steel bolts. The manhole leads to a 17-foot deep sump chamber measuring 5-feet in diameter. Entry into the sump is required occasionally to service or replace equipment such as the foot valve.

Hazards prior to entry

In preparation for entry by workers, the sump chamber is pumped out to remove water and adjacent connected piping is controlled as described under the specific work procedures (see appendices). The sump is located in a locked, fenced compound secured against unauthorized access, and pipes connected to the sump contain only untreated potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of draining the sump will cause outdoor ambient air to be drawn into the sump chamber through air vents. There are no sources of contamination or other concerns about ambient air quality and the sump is not normally left in a drained state for more than a few days before entry by workers. Accordingly, it is anticipated that the sump will contain only clean respirable air prior to entry.

Residual water may remain in the bottom of the sump after it is pumped out, resulting in a potential slipping hazard due to the wet interior bottom surface. There are no materials inside or outside the sump that could create a hazard of engulfment or entrapment. There are no structures inside the sump that could create a hazard of a striking contact or lifeline entanglement.

Hazards during occupancy

Work inside the sump consists will consist of inspection and maintenance using only hand-powered tools. Any work inside the sump that requires a process using a substance other than water will require re-evaluation by a qualified person before that work is performed.

The sump will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the sump will be cleaned, ventilated, and retested. Once the sump has been tested and shown to contain clean respirable air, work inside the sump chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Karn Street pump house sump #1 is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoirs is considered to be low hazard unless pre-entry testing determines otherwise.

Karn Street pump house sump #2

A second sump at the Karn Street pump house is currently not in service and does not require entry. Accordingly, no worker will enter this manhole.

Karn Street air valve chamber

This single air valve chamber in the Millstream system is a 42-inch deep concrete cylinder with an earth bottom and no drain. The valve is up to 37-inches below grade, and its top bolts are 22-inches below grade. The depth of the chamber requires the worker to lean into the chamber to perform work. When the worker's breathing zone crosses the plane of the opening to the air valve chamber, entry into a confined space has occurred.

Hazards prior to entry

The chamber is normally covered and has an earth floor with no drain. It is possible that oxygen deficiency can develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). Because the air valve chamber is not located in a secured area, there is a potential for accidental or intentional discharge of potentially harmful materials into the chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

Hazard classification

The Karn Street air valve chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the air valve chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Long Beach Confined Space Inventory

The Long Beach Airport water system serves fewer than 400 customers, including the Esowista reserve, the golf course and the airport. There is one main work location at the pump house off Airport Road. An abandoned reservoir is located in an overgrown area north of the airport. Five meter chambers are located within the distribution system.

Well #1

The original well head adjacent to the access road leading to the pump house is a capped 8-inch pipe extending about 2-feet above grade. It is used as a backup source only. The well head is not enclosed and cannot be entered. It is therefore not considered to be a confined space.

Figure 19: Original (#1) well head

Well #2

The main well head is adjacent to the access road leading to the pump house. The 8-inch pipe extending above grade is enclosed in a capped concrete cylinder about 3-feet deep. There is no entry required for this enclosure.

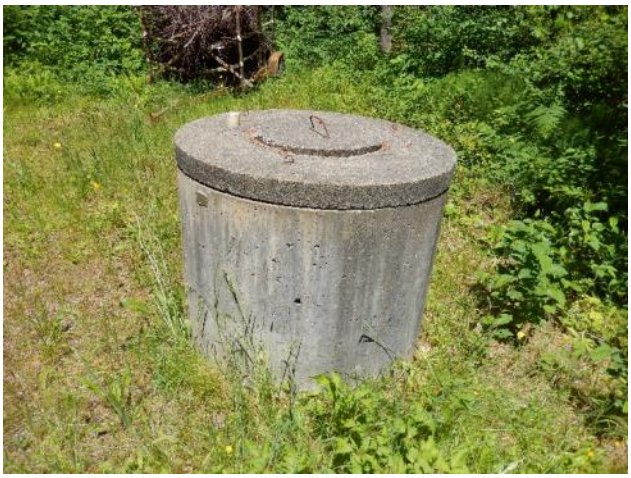

Figure 20: Main (#2) well head

Test wells

Two test wells consist of capped 8-inch pipes extending about 2-feet above grade. The test well heads are not enclosed and cannot be entered. They are therefore not considered to be confined spaces.

Reservoir

The reservoir is a large below-grade concrete structure measuring 75-feet square and 12-feet deep. There are six access structures as indicated on the drawing and described below.

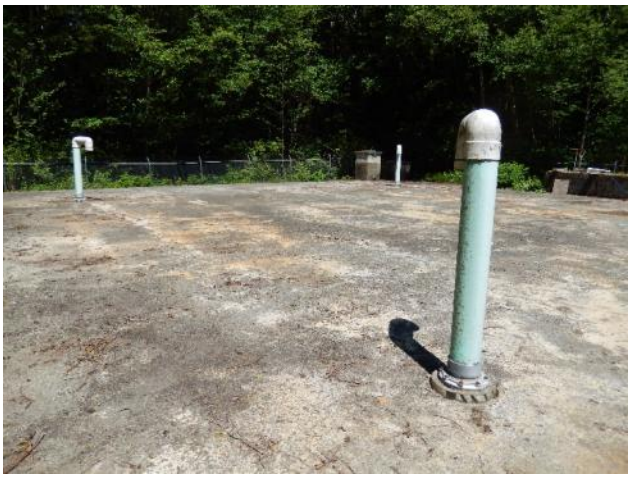

Figure 21: Reservoir

Reservoir main hatch (1)

The main hatch at the south-west corner of the reservoir is a 24-inch square opening on top of a raised 4-foot square concrete-block structure, covered by a concrete plate bolted in place. A fixed ladder descends from the opening to the reservoir below. Entry is required on occasion to service or replace equipment such as floats. Entry work is contracted out.

Figure 22: Reservoir main hatch

Reservoir dead-end (2)

This hatch located at the south-east corner of the reservoir is a 4-foot square concrete structure covered by 4x8 wooden slabs. The chamber is a dead-end, and no entry is required.

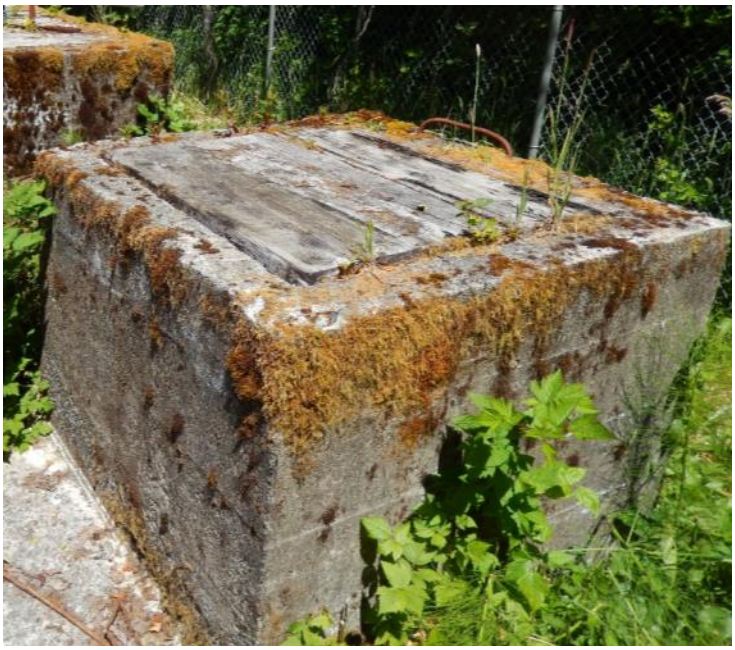

Figure 23: Reservoir dead-end

Reservoir valve chamber (3)

The valve chamber located on the east side of the reservoir contains three valves within the 10-foot by 3-foot concrete structure covered by 4x8 wooden slabs. The chamber is 18 feet deep, and is part of the old intake system. A pump functions to maintain a low water level within the chamber to avoid cross-contamination with the reservoir water. It is necessary to enter this chamber to clean out sediment and too inspect it for cross-contamination sources. The work is contracted out.

Figure 24: Reservoir valve chamber

Reservoir inlet chamber (4)

The inlet chamber located at the north-east corner of the reservoir is a 4-foot square concrete structure covered by a concrete plate bolted in place. Permanent metal ladder rungs extend from the hatch opening down the inside wall of the reservoir. The water inlet within this chamber sprays water from the pump house into the reservoir. Entry is required periodically to service the water jet. This work is contracted out.

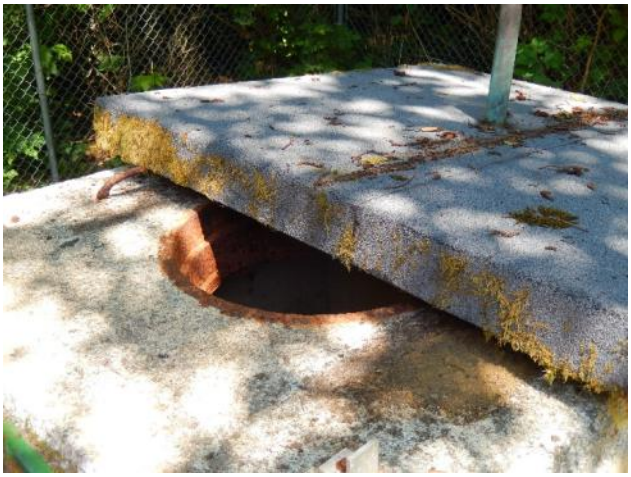

Figure 25: Reservoir inlet chamber

Reservoir old meter chamber (5)

This concrete structure on the north side of the reservoir is covered by a concrete plate bolted in place and contains an 8-inch cast iron pipe through the floor of the chamber own to the reservoir below. It is part of the old reservoir metering system and is no longer used. There is no entry required into this chamber.

Figure 26: Reservoir old meter chamber

Reservoir drain valve chamber (6)

The drain valve chamber is a 4-foot square concrete structure covered by 4x8 wooden slabs. The chamber extends from the opening down about 17-feet to the bottom. About 5-feet below the top of the structure there is a 12-inch square opening from the reservoir that provides an overflow outlet from the reservoir to the drain valve chamber. A drain line extends from the bottom of the drain valve chamber to a surface discharge point down an embankment adjacent to the reservoir. The drain line is equipped with a valve that is controlled by a key that extends above the chamber. Entry is rarely required, but there is a current need to enter the drain valve chamber to install a screen over the opening between the reservoir and the drain valve chamber. This work is contracted out.

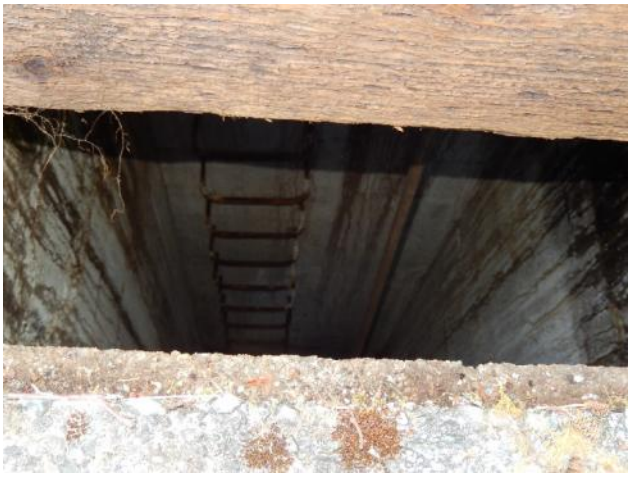

Figure 27: Reservoir drain valve chamber

Manhole below salt storage area

A defunct manhole under the salt storage area adjacent to the pump house covers a 5-foot deep chamber that is part of the old drain system. This chamber contains no equipment, and there is no need to enter.

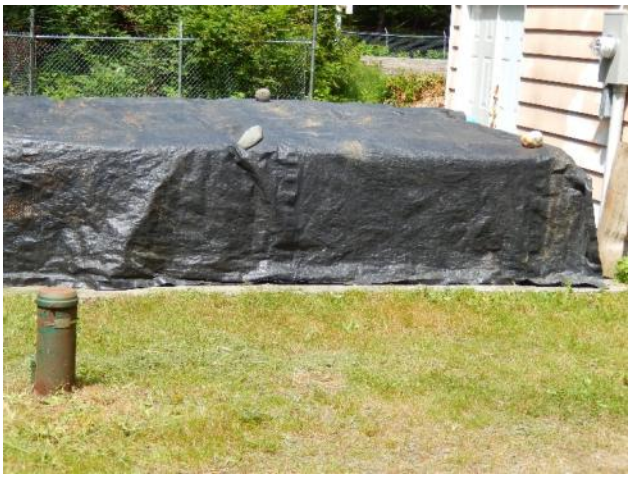

Figure 28: Manhole below salt storage area

Meter stations

Four of the five meter stations within the distribution system are very similar below-grade 11-inch by 18-inch concrete or plastic chambers 12-inches deep. Because these meter chambers are not large enough for a worker to enter to perform work, and do not require leaning into the chamber to service or read the meters, they are not considered to be confined spaces.

One meter chamber servicing the Esowista reserve is located off Highway 4 across from the subdivision. This gravel-bottom concrete chamber is 34-inches by 18-inches and 45-inches deep. Although not large enough for bodily entry, the depth of this chamber necessitates leaning in to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. Entry is required occasionally to replace or service the meter. The work is performed by the system operator.

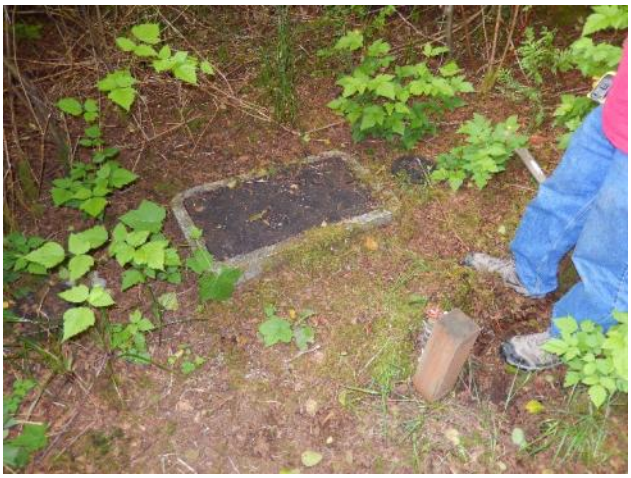

Figure 29: Esowista meter chamber

Old reservoir

The old reservoir is a below-grade concrete structure about 75-feet square. It is no longer in service, and the area where the reservoir is located is overgrown and difficult to access. There is no need to enter the old reservoir.

Figure 30: Old reservoir

Long Beach Confined Space Hazard Identification and Assessment

Long Beach Airport Reservoirs

The old reservoir is abandoned, and there is to be no entry.

There are six separate access points to the main reservoir and associated chambers within the reservoir structure (see descriptions under "ACRD Confined Space Inventory"). Two of these, the reservoir dead-end and the reservoir old meter chamber, do not require entry.

The other four access points to the main reservoir and associated chambers present similar hazards. Although there are differences in the required isolation procedures, the precautions are otherwise identical. All four reservoir access points to be entered normally contain potable water that is treated by the sodium hypochlorite water disinfection system at the pump house.

The four access points to the main reservoir and associated chambers are therefore considered be a group of similar confined spaces.

Hazards prior to entry

In preparation for entry by workers, the reservoir is drained of water and adjacent connected piping is controlled as described under the specific work procedures (see appendices). The reservoir is located in a locked, fenced compound secured against unauthorized access, and pipes connected to the reservoir contain only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of draining the reservoir will cause outdoor ambient air to be drawn into the reservoir through air vents. There are no sources of contamination or other concerns about ambient air quality and the reservoir is not normally left in a drained state for more than a few days before entry by workers. Accordingly, it is anticipated that the reservoir will contain only clean respirable air prior to entry.

Residual water may remain in the bottom of the reservoir after draining, resulting in a potential slipping hazard due to the wet interior bottom surface. There are no materials inside or outside the reservoir that could create a hazard of engulfment or entrapment. There are no structures inside the reservoirs that could create a hazard of a striking contact or lifeline entanglement.

Hazards during occupancy

Work inside the reservoir and associated chambers will consist of inspection and cleaning using water supplied through pressure washing equipment. Any work inside the reservoirs that requires a process using a substance other than water will require re-evaluation by a qualified person before that work is performed.

Additional work is expected to consist of using hand-powered tools to:

- service or replace the water inlet spray jet in the reservoir inlet chamber,
- install a screen inside the drain valve chamber over the opening between the drain valve chamber and the reservoir, and
- service or replace equipment in the reservoir main hatch.

Hazard classification

All four reservoir access points are expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoir and associated chambers is considered to be low hazard unless pre-entry testing determines otherwise.

Well #1 (original well head)

The original well head adjacent to the access road leading to the pump house is a capped 8-inch pipe extending about 2-feet above grade. It is used as a backup source only. The well head is not enclosed and cannot be entered. It is therefore not considered to be a confined space.

Well #2 (main well head)

The main well head is adjacent to the access road leading to the pump house. The 8-inch pipe extending above grade is enclosed in a capped concrete cylinder about 3-feet deep. There is no entry required for this enclosure.

Test wells

The two test well heads are not enclosed and cannot be entered. They are therefore not considered to be confined spaces.

Manhole below salt storage area

A defunct manhole under the salt storage area adjacent to the pump house covers a 5-foot deep chamber that is part of the old drain system. This chamber contains no equipment, and there is no need to enter.

Meter stations

Four of the five meter stations within the distribution system are not large enough for a worker to enter to perform work, and do not require leaning into the chamber to service or read the meters. Accordingly, they are not considered to be confined spaces.

Esowista Meter station

The Esowista meter chamber is 45-inches deep. Although not large enough for bodily entry, the depth of the chamber requires the worker to lean into the chamber to perform work. When the worker's breathing zone crosses the plane of the opening to the air valve chamber, entry into a confined space has occurred.

Hazards prior to entry

The Esowista meter chamber is normally covered and has a gravel floor with no drain. It is possible that oxygen deficiency can develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). Because the Esowista meter chamber is not located in a secured area, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will

be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

Hazard classification

The Esowista meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the meter chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Bamfield Confined Space Inventory

The Bamfield water system serves about 200 customers. There are two main work locations; the pump house compound on Grappler Road and the reservoir compound on Binnacle Road.

Old (#1) reservoir

The old reservoir, constructed in 1981, is a cylindrical steel tank about 26-feet in diameter and 24 feet high. A 22-inch diameter hatch provides access at 3-feet above grade. One hatch on the top of the reservoir measures 24-inches square. Entry into reservoirs is required periodically for cleaning and maintenance. The work is contracted out.

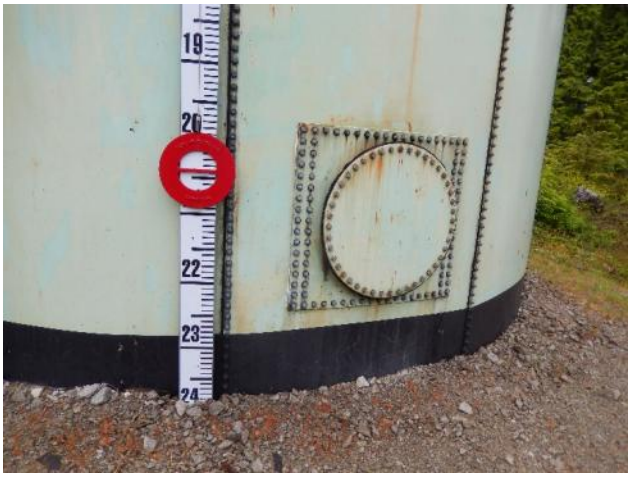

Figure 31: Old (#1) reservoir

New (#2) reservoir

The new reservoir, constructed in 1999, is a cylindrical steel tank about 26-feet in diameter and 24 feet high. A rectangular opening measuring 32-inches by 48-inches on the side of the tank provides entry to the reservoir a few feet above grade. One hatch on the top of the reservoir measures 24-inches square. Entry into reservoirs is required periodically for cleaning and maintenance. The work is contracted out.

Figure 32: New (#2) reservoir

Meter chamber, reservoir compound

A 22-inch manhole covers a meter chamber adjacent to the reservoirs. The chamber is 5-feet deep and contains a sealed water pipe with associated metering equipment. Three metal rungs provide access into the chamber. Entry is required occasionally to service or replace the meter. This work is contracted out.

Figure 33: Meter chamber, reservoir compound

Rechlorination chamber, reservoir compound

A 5-foot deep concrete chamber similar to the meter chamber contains a sealed water pipe and a rechlorination line from the hypochlorite pump. Entry is occasionally required to service or replace the hypochlorite injector assembly. This work is contracted out.

Figure 34: Rechlorination chamber, reservoir compound

Chlorine injector vault (Grappler Road)

A 4-foot 10-inch concrete chamber east of the Grappler Road pump house contains a sealed water pipe and a hypochlorite injector line. Entry is through a 22-inch diameter manhole at grade level, with three permanently affixed metal rungs. A drain at the bottom of the chamber discharges off the side of the road. Entry is occasionally required to service or replace the hypochlorite injector assembly. This work is contracted out.

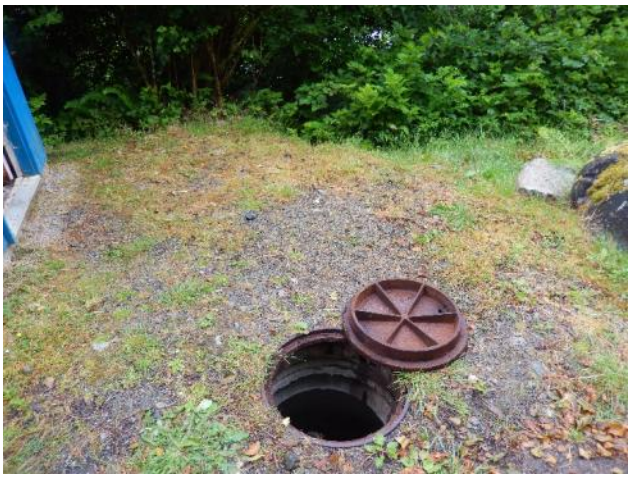

Figure 35: Chlorine injector vault (Grappler Road)

School meter chamber

Two steel plates cover a 44-inch deep below-grade meter vault at the school on Nuthatch Road. The 40-inch by 80-inch chamber consists of 4-inch by 4-inch wood frame structure with an earth floor and no drain. The meter can be read from outside the chamber, but entry may be required to replace pipes or associated equipment. The work would be contracted out.

Figure 36: School meter chamber

Hospital meter chamber

One steel plate covers a 32-inch deep below-grade meter vault on the hospital grounds adjacent to the helicopter landing area. The 18-inch by 28-inch chamber consists of concrete walls with an earth floor and no drain. The meter can be read from outside the chamber. Excavation would be required if piping had to be replaced. There is no need to enter the chamber.

Figure 37: Hospital meter chamber

Parks Canada meter chamber

A 3-foot deep plastic chamber measuring 10-inches by 16-inches contains a sealed water pipe and meter. The meter can be read from outside the chamber. Excavation would be required if piping had to be replaced. There is no need to enter the chamber.

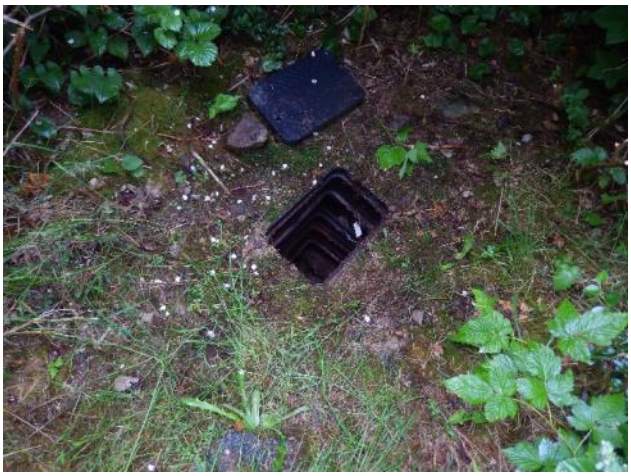

Figure 38: Parks Canada meter chamber

Coast Guard meter chamber

Two large steel plates cover a 90-inch deep concrete meter chamber with an opening measuring 78-inches by 44-inches. The chamber is equipped with a floor drain and contains a sealed water pipe and associated metering apparatus. The meter provides remote sensing, so entry is not required unless the meter requires service or repair. The work would be contracted out.

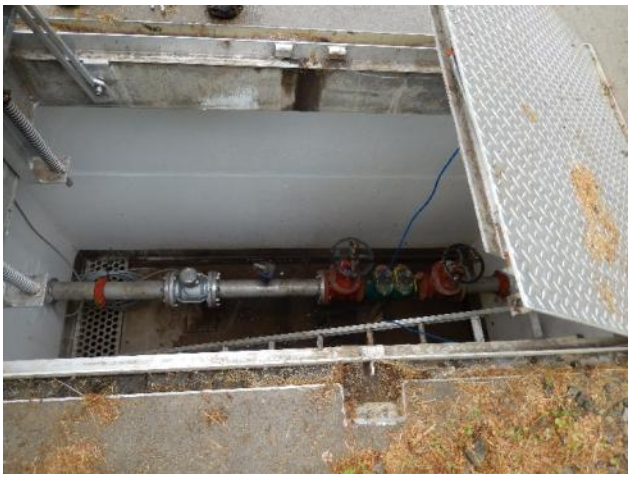

Figure 39: Coast Guard meter chamber

Air valve chambers

There are about 10 air valve chambers within the distribution system, none deeper than 35-inches. Access is through 22-inch diameter manholes. The air valve chambers consist of concrete rings, earth floor and no drains. Although not large enough for bodily entry, the depth of some of these chambers necessitates leaning in to reach any equipment requiring service. WorkSafeBC considers that a worker has entered a confined space when the worker's breathing zone crosses the plane of access to the space. Air valves require occasional maintenance performed by the system operator.

Bamfield Confined Space Hazard Identification and Assessment

Bamfield Reservoirs

The two reservoirs present similar hazards. Although there are differences in the required isolation procedures and entry points, the precautions are otherwise identical. Both reservoirs normally contain potable water treated by sodium hypochlorite water disinfection systems at the Grappler road injection vault and the reservoir compound rechlorination chamber.

The two reservoirs are therefore considered be a group of confined spaces which share similar characteristics.

Reservoir hazards prior to entry

In preparation for entry by workers, the reservoirs are drained of water and adjacent connected piping is controlled as described under the specific work procedures (see appendices). Both reservoirs are located in a locked, fenced compound secured against unauthorized access, and pipes connected to the reservoirs contain only treated potable water. Therefore no hazardous substances are anticipated prior to entry.

The process of draining the reservoirs will cause outdoor ambient air to be drawn into the reservoirs through air vents. There are no sources of contamination or other concerns about ambient air quality and the reservoirs are not normally left in a drained state for more than a few days before entry by workers. Accordingly, it is anticipated that the reservoirs will contain only clean respirable air prior to entry.

Residual water may remain in the bottom of the reservoirs after draining, resulting in a potential slipping hazard due to the wet interior bottom surface. There are no materials inside or outside the reservoirs that could create a hazard of engulfment or entrapment. There are no structures inside the reservoirs that could create a hazard of a striking contact or lifeline entanglement.

Reservoir hazards during occupancy

Work inside the reservoirs consists of inspection and cleaning using water supplied through pressure washing equipment. This hazard identification and assessment is limited to pressure washing using water. Any work inside the reservoirs that requires a process using a substance other than water will require re-evaluation by a qualified person before that work is performed.

Reservoir hazard classification

Both reservoirs are expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the reservoirs is considered to be low hazard unless pre-entry testing determines otherwise.

Meter chambers

The water system contains five meter stations as follows:

- Reservoir compound
- school
- hospital
- Parks Canada
- Coast guard

The hospital and Parks Canada meter chambers do not require entry.

Meter chamber, reservoir compound

Hazards prior to entry

A sealed water pipe and associated valve and gauge passes through the vault at the bottom of the structure. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The meter chamber is normally covered and has concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The chamber is located in a locked, fenced compound secured against unauthorized access, and piping connected to the chamber contains only treated potable water. Therefore no hazardous substances are anticipated prior to entry. Hazards during occupancy

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The meter chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Reservoir compound meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the meter chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Rechlorination chamber, reservoir compound

Hazards prior to entry

A sealed water pipe and associated valve and gauge passes through the vault at the bottom of the structure. In addition, a hypochlorination line from the hypochlorite mixing room is connected to the hypochlorite injection assembly. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the lines will not cause leakage.

The rechlorination chamber is normally covered and has concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The chamber is located in a locked, fenced compound secured against unauthorized access, and piping connected to the chamber contains only treated potable water and 1% sodium hypochlorite disinfectant. Therefore no hazardous substances are anticipated prior to entry.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The rechlorination chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The Reservoir compound rechlorination chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the meter chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Chlorine injector chamber (Grappler Road)

Hazards prior to entry

A sealed water pipe passes through the chamber at the bottom of the vault. In addition, a hypochlorination line from the hypochlorite mixing room is connected to the hypochlorite injection assembly. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the lines will not cause leakage.

The chlorine injector chamber is normally covered and has concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). Because the chamber is not located in a secured area, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chlorine injector chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

Hazard classification

The chlorine injector chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

School meter chamber

Hazards prior to entry

The sealed water pipe and associated valve and gauge passes through the vault at the bottom of the structure. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The meter chamber is normally covered and has an earth floor with no drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The meter chamber located on private land, but is not in a fenced enclosure secured against unauthorized access. Accordingly, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated.

Hazard classification

The school meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Coast Guard meter chamber

Hazards prior to entry

The sealed water pipe and associated valve and gauge passes through the vault at the bottom of the structure. This piping is designed and maintained so that there are no openings or other locations in the piping where leakage could occur, and work on or around the piping will not cause leakage.

The meter chamber is normally covered and has a concrete floor with a drain. It is possible that oxygen deficiency could develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). The meter chamber located on private land, but is not in a fenced enclosure secured against unauthorized access. Accordingly, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

The chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

Hazard classification

The Coast Guard meter chamber is expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into the chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Air valve chambers

There are about 10 air valve chambers within the Bamfield distribution system, none deeper than 35-inches. The chambers are very similar, consisting of concrete rings, earth floors and no drains. The air valve chambers that are deeper than 24-inches require the worker to lean into the chamber to perform work. When the worker's breathing zone crosses the plane of the opening to the air valve chamber, entry into a confined space has occurred. These air valve chambers are considered to be a group of confined spaces that share similar characteristics.

Any air valve chambers that are less than 24 inches deep are not considered to be confined spaces.

Hazards prior to entry

The chambers are normally covered and typically have an earth floor with no drain. It is possible that oxygen deficiency can develop, likely over an extended period of time, due to oxidative rusting of metal valve components or due to microbial decomposition of organic matter (micro-organisms can consume oxygen and produce flammable methane gas that can displace oxygen). Because some of the air valve chambers are not located in a secured area, there is a potential for accidental or intentional discharge of potentially harmful materials into a chamber. These materials could include fuels, oils, paints, thinners and similar liquids.

Hazards during occupancy

If any work in the meter chamber would result in leakage of water (for example during a repair to a piping connection or replacement of a valve stem gland), workers would be exposed to a risk of water immersion unless the piping is suitably isolated.

Each chamber will be tested prior to entry. If air test results indicate anything other than clean respirable air, the cause of the adverse reading will be investigated and the chamber will be cleaned, ventilated, and retested. Once the chamber has been tested and shown to contain clean respirable air, work inside the chamber will consist of the use of hand-powered tools only. No solvents or other chemical products will be used inside the chamber. Vehicles will not be left idling near the chamber. No other sources of air contaminants are anticipated. Vehicle traffic will be controlled to ensure the safety of the entry workers.

Hazard classification

All air valve chambers are expected to contain only clean respirable air prior to entry. This will be verified by pre-entry atmosphere testing. Accordingly, entry into an air valve chamber is considered to be low hazard unless pre-entry testing determines otherwise.

Appendix 1: Confined Space Hazard Assessments

Written work procedures for the following confined spaces have been prepared by a qualified person.

Beaver Creek Water System

The following confined spaces have been assessed by a qualified person.

- North reservoir
- Kitsuksis concrete reservoir
- Kitsuksis steel reservoir
- Stamp River pump house wet well
- North reservoir chemical injector room, Beaver Creek Road
- Stamp River meter chamber
- Kitsuksis meter chamber
- Kitsuksis air (altitude) valve chamber
- Strick Road pump station meter chamber
- Air valve chambers:
    - North reservoir
    - Stamp River
    - Distribution system air valves more than 24-inches deep

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*North reservoir* *Kitsuksis concrete reservoir* *Kitsuksis steel reservoir*			
Purpose of entry:	Inspection and cleaning by ACRD employees or contractors			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise		X		Pressure washing equipment may generate excessive noise during operation. Hearing protection required if noise levels exceed 85 dBA
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Pressure washing requires care to avoid contact with water sprayed under pressure
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation		X		Fall protection system required when accessing the top of the reservoirs. North reservoir: permanent guardrails Kitsuksis concrete reservoir Kitsuksis steel reservoir

Falling objects		X		Objects can fall through the open hatch on top of reservoir striking workers inside. Keep objects away from top hatch.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected
Hazardous processes (list)	Low	Moderate	High	Comments
Pressure washing	X			Follow all precautions identified by pressure washer manufacturer. Use of any product other than water will require risk assessment by a qualified person

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Stamp River pump house wet well*			
Purpose of entry:	Cleaning and inspection by contractors			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected. Reassess if noisy equipment will be used
Heat Stress	X			Not expected
Cold stress	X			Not expected
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected. Reassess if mechanical equipment is to be used.
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment to be used in the wet well
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)			X	Scuba diving is expected. Scuba diving precautions are required. Refer to OHS Regulation Part 24
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects		x		Objects can fall through the open hatch on top of wet well striking workers inside. Keep objects away from top hatch.
Visibility	x			Not expected
Pressure differentials	x			Not expected
Hot or cold surfaces	x			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected
Hazardous processes (list)	**Low**	**Moderate**	**High**	**Comments**

Scuba diving			X	Refer to OHS Regulation Part 24

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*North reservoir chemical injector room, Beaver Creek Road*			
Purpose of entry:	Fill hypochlorite tanks, service equipment			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Pursuant to OHS Regulation 9.25(7), pre-entry air testing and continuous monitoring will not be required subject to confirmation by the representative sampling
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected
Cold stress	X			Not expected
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected

Hazardous processes (list)	Low	Moderate	High	Comments
Restricted access is the only confined space hazard	x			Call-in procedure when entering the compound. Provision of first aid to take into account the ladder access.

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Stamp River meter chamber*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected
Abrasion	X			Hand contact with metal surfaces

Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Kitsuksis meter chamber*			
Purpose of entry:	Regular entry for meter reading, inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated if work involves opening lines
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation	X			Not expected
Falling objects		X		Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Kitsuksis air (altitude) valve chamber*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated if work involves opening lines
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation	X			Not expected
Falling objects		X		Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Strick Road pump station meter chamber*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Pursuant to OHS Regulation 9.25(7), pre-entry air testing and continuous monitoring will not be required subject to confirmation by the representative sampling
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected
Cold stress	X			Not expected
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected

Hazardous processes (list)	Low	Moderate	High	Comments
Restricted access is the only confined space hazard	x			Call in procedure when entering the building. Provision of first aid to take into account the ladder access.

Confined Space Hazard Assessment: Beaver Creek Water System				
Confined spaces assessed:	*Air valve chambers* • North reservoir • Stamp River • Distribution system air valves more than 24-inches deep			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from air valve chambers
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme

Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	X			Traffic control as required for distribution system manholes
Hazardous processes (list)	Low	Moderate	High	Comments

None	x			

Appendix 2: Confined Space Hazard Assessments

Written work procedures for the following confined spaces have been prepared by a qualified person.

Millstream Water System

The following confined spaces have been assessed by a qualified person.

- Millstream reservoir, Mavis Avenue
- Karn Street pump house sump #1
- Karn Street air valve chamber

Confined Space Hazard Assessment: Millstream Water System				
Confined spaces assessed:	*Millstream reservoir, Mavis Avenue*			
Purpose of entry:	Inspection and cleaning by contractors			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise		X		Pressure washing equipment may generate excessive noise during operation. Hearing protection required if noise levels exceed 85 dBA
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Pressure washing requires care to avoid contact with water sprayed under pressure
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation		X		Fall protection system required when accessing the top of the reservoirs
Falling objects		X		Objects can fall through the open hatch on top of reservoir striking workers inside the reservoir. Keep objects away from top hatch.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Vehicular traffic	X			Not expected

Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Pressure washing	X			Follow all precautions identified by pressure washer manufacturer. Use of any product other than water will require risk assessment by a qualified person

Confined Space Hazard Assessment: Millstream Water System				
Confined spaces assessed:	*Karn Street pump house sump #1*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry manhole
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	x			Not expected. Reassess if noisy equipment will be used
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found. Crickets in drain valve chamber do not present a hazard to workers.
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Water lines are to be isolated. Water in-seepage from perc field will gradually raise water level in sump - exercise caution, exit the confined space if water level is excessive. If sump is not drained, personal flotation device (PFD) or lifejacket with sufficient buoyancy to keep the worker's head above water is required
Slip/trip/fall	x			Slipping hazard due to wet floor inside sump. Tripping hazard due to lifelines. Exercise caution
Fall from elevation	X			Not expected
Falling objects		X		Objects can fall through open manhole on top, striking workers inside the sump. Keep objects away from opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed

Vehicular traffic	x			Not expected
Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Millstream Water System				
Confined spaces assessed:	*Karn Street air valve chamber*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from air valve chambers
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	X			Traffic control as required
Hazardous processes (list)	Low	Moderate	High	Comments
None	x			

Appendix 3: Confined Space Hazard Assessments

Written work procedures for the following confined spaces have been prepared by a qualified person.

Long Beach Airport Water System

The following confined spaces have been assessed by a qualified person.

- Long Beach Airport reservoir, in compound off Airport Road
- Esowista meter chamber

Confined Space Hazard Assessment: Long Beach Airport Water System				
Confined spaces assessed:	*Long Beach Airport reservoir, in compound off Airport Road*			
Purpose of entry:	Inspection, cleaning and maintenance by contractors			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise		X		Pressure washing equipment may generate excessive noise during operation. Hearing protection required if noise levels exceed 85 dBA
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found. Crickets in drain valve chamber do not present a hazard to workers.
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Pressure washing requires care to avoid contact with water sprayed under pressure
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated. If reservoir is not drained, personal flotation device (PFD) or lifejacket with sufficient buoyancy to keep the worker's head above water is required
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation	X			Not expected
Falling objects		X		Objects can fall through open hatch on top of reservoir striking workers inside the reservoir. Keep objects away from hatches.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold	X			Not expected, no hot work to be performed

surfaces				
Vehicular traffic	x			Not expected
Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Pressure washing	X			Follow all precautions identified by pressure washer manufacturer. Use of any product other than water will require risk assessment by a qualified person

Confined Space Hazard Assessment: Long Beach Airport Water System				
Confined spaces assessed:	*Esowista meter chamber*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area.
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	X			Traffic control as required
Hazardous processes (list)	Low	Moderate	High	Comments
None	x			

Appendix 4: Confined Space Hazard Assessments

Written work procedures for the following confined spaces have been prepared by a qualified person.

Bamfield Water System

The following confined spaces have been assessed by a qualified person.

- Old and new reservoirs, Binnacle Road
- Meter chamber, Bamfield reservoir compound
- Rechlorination chamber, Bamfield reservoir compound
- Chlorine injector chamber (Grappler Road)
- Bamfield School meter chamber
- Bamfield Coast Guard meter chamber
- Bamfield air valve chambers

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Old and new reservoirs, Binnacle Road*			
Purpose of entry:	Inspection and cleaning by contractors			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Vehicle/equipment exhaust to be discharged downwind away from entry hatch
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Potable water pipes to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise		X		Pressure washing equipment may generate excessive noise during operation. Hearing protection required if noise levels exceed 85 dBA
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments

Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Pressure washing requires care to avoid contact with water sprayed under pressure
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. Water lines are isolated
Slip/trip/fall		X		Slipping hazard due to wet floor inside tank. Tripping hazard due to lifelines. Exercise caution
Fall from elevation		X		Fall protection system required when accessing the top of the reservoirs
Falling objects		X		Objects can fall through the open hatch on top of reservoir striking workers inside the reservoir. Keep objects away from top hatch.
Visibility	X			Not expected

Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Vehicular traffic	x			Not expected
Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Pressure washing	X			Follow all precautions identified by pressure washer manufacturer. Use of any product other than water will require risk assessment by a qualified person

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Meter chamber, Bamfield reservoir compound*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected

Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Rechlorination chamber, Bamfield reservoir compound*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected

Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Chlorine injector chamber (Grappler Road)*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Traffic control as required

Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Bamfield School meter chamber*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Not expected

Abrasion	X			Hand contact with metal surfaces
Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Bamfield Coast Guard meter chamber*			
Purpose of entry:	Meter service and repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from meter chamber
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected

Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected
Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	**Low**	**Moderate**	**High**	**Comments**
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	**Low**	**Moderate**	**High**	**Comments**
Electrical	X			Not expected. No electrical equipment used
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Objects can fall through the top opening striking workers inside. Keep objects away from top opening.
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected, no hot work to be performed
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	x			Traffic control as required

Hazardous processes (list)	Low	Moderate	High	Comments
Vertical entry	x			Harness, lifeline, winch and tripod required

Confined Space Hazard Assessment: Bamfield Water System				
Confined spaces assessed:	*Bamfield air valve chambers*			
Purpose of entry:	Inspection, service or repair			
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC			
Atmospheric hazards	Low	Moderate	High	Comments
Air Quality	X			Low hazard if verified by testing
Fire or Explosion	X			Not expected
Other Chemicals/Solids	X			Not expected
Vehicle/Equipment Exhaust	X			Not expected. No vehicle idling in the area. Any equipment exhaust to be discharged downwind away from air valve chambers
Chemical Hazards	Low	Moderate	High	Comments
Process Liquids	X			Not expected. If work involves opening water lines, all lines to be isolated from space prior to entry. Specific isolation methods to be determined
Skin Contact	X			Not expected
Ingestion	X			Not expected
Physical Hazards	Low	Moderate	High	Comments
Noise	X			Not expected
Heat Stress	X			Not expected. Assess if ambient temperatures are extreme
Cold stress	X			Not expected. Assess if ambient temperatures are extreme
Radiation	X			Not expected
Biological Hazards	Low	Moderate	High	Comments
Bacteria	X			Not expected

Fungi	X			Not expected
Insects	X			Not expected. Reassess if insect infestation is found
Mechanical Hazards	Low	Moderate	High	Comments
Mechanical equipment	X			Not expected
Hydraulic equipment	X			Not expected
Pneumatic equipment	X			Not expected
Safety Hazards	Low	Moderate	High	Comments
Electrical	X			Not expected
Entrapment	X			Not expected
Engulfment	X			Not expected
Immersion (water)	X			Not expected
Slip/trip/fall	X			Not expected
Fall from elevation	X			Not expected
Falling objects	X			Not expected
Visibility	X			Not expected
Pressure differentials	X			Not expected
Hot or cold surfaces	X			Not expected
Abrasion	X			Hand contact with metal surfaces
Vehicular traffic	X			Traffic control as required
Hazardous processes (list)	Low	Moderate	High	Comments
None	x			

Appendix 5: Confined Space Work Procedures

Written work procedures for the following confined spaces have been prepared by a qualified person.

Beaver Creek Water System

- North reservoir
- Kitsuksis concrete reservoir
- Kitsuksis steel reservoir
- Stamp River pump house wet well
- North reservoir chemical injector room, Beaver Creek Road
- Stamp River meter chamber
- Kitsuksis meter chamber
- Kitsuksis air (altitude) valve chamber
- Strick Road pump station meter chamber
- Air valve chambers:
    - North reservoir
    - Stamp River
    - Distribution system air valves more than 24-inches deep

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*North reservoir* *Main pump-house reservoir* *Kitsuksis reservoir*
Purpose of entry:	Inspection and cleaning by ACRD employees or contractors
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	To be determined prior to entry North reservoir Main pump house reservoir Kitsuksis reservoir
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous	Entry workers to wear continuous monitor while inside the confined space:

monitoring	Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	For vertical entry: • Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue For horizontal entry: • Entry workers equipped with full body harness and lifeline to facilitate horizontal rescue
Fall protection system	All reservoirs: Fall protection system required for work on top of reservoir (guardrails preferred)
Personal protective equipment	Hardhats, safety footwear, gloves, hearing protection, safety glasses with side shields
Fire protection	Fire extinguisher on site
Other precautions	Work area around top hatches to be kept clear to prevent materials falling through the open hatch. Follow manufacturer's safety precautions when operating pressure washing equipment.

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Stamp River pump house wet well*
Purpose of entry:	Cleaning and inspection by contractors
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	To be determined prior to entry
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere

Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide Not applicable for Scuba divers
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves, safety glasses with side shields. Additional protective equipment required for Scuba diving
Fire protection	Fire extinguisher on site
Other precautions	Precautions required for Scuba diving. See Appendix 4

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*North reservoir chemical injector room*
Purpose of entry:	Fill hypochlorite tanks, service equipment
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Not required
Isolation/lockout	Not required
Verification	Not required
Testing	Pursuant to OHS Regulation 9.25(7), pre-entry air testing and continuous monitoring will not be required subject to confirmation by the representative sampling
Cleaning/purging	Not required
Continuous monitoring	Not required
Ventilation	Existing room ventilation to be operated prior to and during entry

Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out of the North reservoir compound.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Not required. Provision of first aid to take into account the ladder access
Fall protection system	Not required
Personal protective equipment	Safety footwear
Fire protection	Fire extinguisher on site
Other precautions	Representative air sampling required to establish compliance with OHS Regulation 9.25(7)

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Stamp River meter chamber*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Kitsuksis meter chamber*
Purpose of entry:	Regular entry for meter reading, inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Kitsuksis air (altitude) valve chamber*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Strick Road pump station meter chamber*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Floor grate allows free exchange with room air. Existing room ventilation to be operated prior to and during entry
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out of the building.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, the City of Port Alberni Fire Department will be dispatched to effect rescue using suitable equipment including SCBA (Prior written agreement is required)
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Beaver Creek Water System	
Confined spaces assessed:	*Beaver Creek air valve chambers*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Not required
Permit	Not required
Isolation/lockout	Not required
Verification	Entry supervisor to verify in supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded, in the operator's log: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Not required
Ventilation	Not required
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers

	inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue to be effected without entering the confined space.
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	Traffic control as required

Appendix 6: Confined Space Work Procedures

Written work procedures for the following confined spaces have been prepared by a qualified person.

Millstream Water System

- Millstream reservoir, Mavis Avenue
- Karn Street pump house sump #1
- Karn Street air valve chamber

Confined Space Work Procedures: Millstream Water System	
Confined spaces assessed:	*Millstream reservoir*
Purpose of entry:	Inspection and cleaning by ACRD employees or contractors
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry hatch (See Appendix 3)
Isolation/lockout	To be determined prior to entry
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere

Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	For vertical entry: • Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue For horizontal entry: • Entry workers equipped with full body harness and lifeline to facilitate horizontal rescue
Fall protection system	Fall protection system required for work on top of reservoir (guardrails preferred)
Personal protective equipment	Hardhats, safety footwear, gloves, hearing protection, safety glasses with side shields
Fire protection	Fire extinguisher on site
Other precautions	Work area around top hatches to be kept clear to prevent materials falling through the open hatch. Follow manufacturer's safety precautions when operating pressure washing equipment.

Confined Space Work Procedures: Millstream Water System	
Confined spaces assessed:	*Karn Street pump house sump #1*

Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	To be determined prior to entry
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere

Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Millstream Water System	
Confined spaces assessed:	*Karn Street air valve chamber*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Not required
Permit	Not required
Isolation/lockout	Not required
Verification	Entry supervisor to verify in supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded, in the operator's log: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Not required
Ventilation	Not required
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers

	inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue to be effected without entering the confined space.
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	Traffic control as required

Appendix 7: Confined Space Work Procedures

Written work procedures for the following confined spaces have been prepared by a qualified person.

Long Beach Airport Water System

- Long Beach Airport reservoir, in compound off Airport Road
- Esowista meter chamber

Confined Space Work Procedures: Long Beach Airport Water System	
Confined spaces assessed:	*Long Beach Airport reservoir*
Purpose of entry:	Inspection and cleaning by contractors
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	To be determined prior to entry
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere

Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	For vertical entry: • Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue
Fall protection system	Required for entry into the drain valve chamber due to the risk of falling
Personal protective equipment	Hardhats, safety footwear, gloves, hearing protection, safety glasses with side shields
Fire protection	Fire extinguisher on site
Other precautions	Work area around top hatches to be kept clear to prevent materials falling through the open hatch. Follow manufacturer's safety precautions when operating pressure washing equipment.

Confined Space Work Procedures: Long Beach Airport Water System

Confined spaces assessed:	*Esowista meter chamber*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Not required
Permit	Not required
Isolation/lockout	Not required
Verification	Entry supervisor to verify in supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded, in the operator's log: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Not required
Ventilation	Not required
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon

	rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue to be effected without entering the confined space.
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	Traffic control as required

Appendix 8: Confined Space Work Procedures

Written work procedures for the following confined spaces have been prepared by a qualified person.

Bamfield Water System

- Old and new reservoirs, Binnacle Road
- Meter chamber, Bamfield reservoir compound
- Rechlorination chamber, Bamfield reservoir compound
- Chlorine injector chamber (Grappler Road)
- Bamfield School meter chamber
- Bamfield Coast Guard meter chamber
- Bamfield air valve chambers

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Bamfield reservoirs*
Purpose of entry:	Inspection and cleaning by contractors
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	To be determined prior to entry
Verification	Entry supervisor to verify on permit that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded on permit: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere

Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Moderate hazard** standby provisions required: • one standby person must be stationed at or near the entrance to the space • the standby person must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but at least every 20 minutes • there must be a continuous means of summoning the standby person from inside the space • the standby person must have a means to immediately summon rescue personnel
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	For vertical entry: • Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue For horizontal entry: • Entry workers equipped with full body harness and lifeline to facilitate horizontal rescue
Fall protection system	Fall protection system required for work on top of reservoir (guardrails preferred)
Personal protective equipment	Hardhats, safety footwear, gloves, hearing protection, safety glasses with side shields
Fire protection	Fire extinguisher on site
Other precautions	Work area around top hatches to be kept clear to prevent materials falling through the open hatch. Follow manufacturer's safety precautions when operating pressure washing equipment.

Confined Space Work Procedures: Bamfield Water System

Confined spaces assessed:	*Meter chamber, Bamfield reservoir compound*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	None anticipated

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Rechlorination chamber, Bamfield reservoir compound*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	None anticipated

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Chlorine injector chamber (Grappler Road)*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	Traffic control as required

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Bamfield School meter chamber*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	None anticipated

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Bamfield Coast Guard meter chamber*
Purpose of entry:	Meter service and repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Each point of access which is not secured against entry must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers
Permit	Permit is required only if water lines are to be opened, a due to isolation requirements. To be completed and signed by the entry supervisor, and posted at the entry (See Appendix 3)
Isolation/lockout	Required only if water lines are to be opened. Specific isolation required will be determined prior to entry
Verification	Entry supervisor to verify on permit (where required) or supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded (on permit if a permit is required, or in the operator's log): Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide

Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Entry workers to wear continuous monitor while inside the confined space: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Ventilation	Continuous mechanical ventilation required: 1820 CFM Axial fan with 10-inch diameter 25-foor flexible duct
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue workers to remove injured worker without entry if possible. If rescue requires entry, only trained rescue workers to effect rescue using suitable equipment including SCBA.
Lifelines, harnesses, lifting equipment	Entry workers equipped with full body harness and lifeline attached to tripod-mounted winch to facilitate vertical rescue.
Fall protection system	Not required
Personal protective equipment	Hardhats, safety footwear, gloves
Fire protection	Fire extinguisher on site
Other precautions	Traffic control as required

Confined Space Work Procedures: Bamfield Water System	
Confined spaces assessed:	*Bamfield air valve chambers*
Purpose of entry:	Inspection, service or repair
Date of assessment: June 6, 2014	Assessed by: Peter Gilmour, BSc, CRSP, CIH Advanced OHS Solutions Qualicum Beach, BC
Program Administration	
Program Administrator	Manager of Environmental Services Alberni Clayoquot Regional District (250) 720-2713
Entry Supervisor	To be assigned
Required procedures	
Identification	Not required
Permit	Not required
Isolation/lockout	Not required
Verification	Entry supervisor to verify in supervisor's log that all precautions have been taken and are effective prior to entry by any worker
Testing	Pre-entry air tests to be conducted and readings recorded, in the operator's log: Oxygen Flammable vapours Carbon monoxide Hydrogen sulfide
Cleaning/purging	Not expected to be necessary if pre-entry testing indicates low hazard atmosphere
Continuous monitoring	Not required
Ventilation	Not required
Standby persons	**Low hazard** standby requirements apply: • another worker must be assigned as a standby person • there must be a continuous means of summoning the standby person • the standby person must check on the well-being of workers

	inside the space at least every 20 minutes • the standby person must have a means to immediately summon rescue personnel. Cell phone communication with the ACRD office to be used to check in and out.
Rescue plan	Rescue to be effected without entering the confined space.
Lifelines, harnesses, lifting equipment	Not required
Fall protection system	Not required
Personal protective equipment	Safety footwear, gloves
Fire protection	Fire extinguisher in vehicle
Other precautions	Traffic control as required

Appendix 9: Confined Space Work Permit

A Confined Space Entry Permit is required whenever any person enters a confined space for any reason if that confined space:

- requires isolation or lockout
- has a high hazard atmosphere, or
- presents a risk of engulfment or entrapment.

The entry permit formalizes and records the details of each entry. It provides the employer with confirmation that all required precautions were followed, and informs workers of the conditions and control measures in place before they enter the confined space. The permit is completed and signed by the confined space entry supervisor, and posted conspicuously at the entry to the confined space before any worker is permitted to enter. A copy of the signed permit will be kept on file for at least one year.

The entry permit will identify the confined space and the work activities to which it applies, the workers who are inside the space, the required precautions for the space, and the time of expiration of the permit. The permit is only valid for the date and time shown on the permit.

The permit contains the following additional information:

- air monitoring results, including the tester's initials
- the ventilation equipment and the air flow required
- lockout procedures where required.

The entry permit will be reviewed and updated as necessary to ensure the ongoing safety of the workers inside the space. The permit will be re-authorized and signed by the responsible entry supervisor if there is a change in the work crew, after each shift change, or after a change of the responsible supervisor. Every worker affected will be informed of an alteration of an entry permit regarding a change in the required precautions or work activity.

Once issued, the information on an entry permit will only be altered by:

- the responsible supervisor who signed the permit, to update it,
- the standby worker, to update the list of workers inside the confined space, or
- the tester, to record test results.

The ACRD Confined Space Work Permit shown on the following two pages will be used for this purpose.

Confined Space Work Permit - Page 1

(Permit expires at end of shift)

Date of Entry: _____ Time of Entry:_____ Time of Expiry: _____
Name of Entry Supervisor: _____

Location/Identity of Space:	
Purpose of Entry:	
Describe Work To Be Done	

Confined Space Entry Permit must be completed, signed and posted at the entrance when any of the following occur:

- Lockout is required prior to entry
- Blanking or blinding is required to isolate the space prior to entry
- The space has piping coming into it which cannot be blanked or blinded
- There is risk of entrapment or of being buried/drowned
- Air quality would prevent self rescue if ventilation or other equipment failed
- Ventilation is not provided or is not measured
- Ventilation cannot keep contaminants below permissible concentrations

Mechanical Ventilation:

Capacity of Blower_____cfm Location of blower_____
Location of duct_____

Pre-Entry Air Testing:

Gas Test Monitor Calibrated (date and time)_____
Bump tested before use Yes ☐ No ☐
Gas test results:

Contaminant	Time:	Time:	Time:	Time:
O2 (%)				
CO (ppm)				
H2S (ppm)				
LEL (%)				

(Name of tester)_____(Signature of tester)_____

Confined Space Work Permit – Page 2

Entry restrictions:

- No entry allowed if:
- Flammables greater than 20% of lower explosive limit (LEL)
- Oxygen less than 19.5 %or greater than 23.5
- Hydrogen Sulfide greater than 5ppm
- Carbon monoxide greater than 25 ppm
- Flammables greater than 10% of LEL
- Ventilation not supplied
- Risk of entrapment or being buried/drowned

Identification of Workers Entering Space:

Note: No worker to enter space until permit completed and signed.

Legend: Write an E in the boxes under Status each time the named worker has ENTERED the confined space (E)

Write an X each time the named worker has EXITED the Confined Space (X) i.e. for coffee lunch or other break

Name of Worker												

PRECAUTIONS TO REDUCE OR ELIMINATE RISK (check all that apply):

Ventilation	Isolation	GFI's	
Cleaning/purging	Lifting equipment	Other (list)	
Low voltage lights	Lockout		
Fall protection	Fire extinguisher		

PERSONAL PROTECTIVE EQUIPMENT:

Hardhats ☐ Eye Protection ☐ Face Protection ☐ Hearing Protection ☐ Footwear ☐
Gloves ☐ Respiratory Protection ☐ Full Body Harness ☐

Respiratory protection (if required):

Dust mask ☐ Dual cartridge ☐ Full-face cartridge ☐ Supplied air ☐ SCBA ☐
Type of filter/cartridge:_____
Fit test within the last 12 months: Yes ☐ No ☐
Clean-shaven: Yes ☐ No ☐

Authorized by:_____

Signature:_____ Date:_____

Appendix 10: WorkSafeBC Requirements for Diving

WorkSafeBC requirements for commercial diving apply in circumstances where maintenance procedures require the use of underwater divers. The requirements are reproduced in this appendix as a convenience.

Occupational Health and Safety Regulation
Diving Operations

General Requirements

24.7 Application

Sections 24.7 to 24.68 apply to all persons involved in any occupational diving operation.

24.8 Supervisor's responsibility

Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

** See section 117 of the Workers Compensation Act.*

24.9 Notice of project

(1) The employer must submit a notice of project for diving activity, or notify the Board by telephone, at least 24 hours before commencing a diving operation which involves

(a) construction diving,
(b) engineering inspection diving,
(c) diving in a contaminated environment,
(d) diving under ice, under or between nets, or into other areas of potential entrapment,
(e) exceeding the no-decompression limit, or
(f) the use of mixed gas other than nitrox as a breathing medium.

(2) The notice of project must indicate the date, the location, the diving equipment to be used and the scope of the diving operation.

(3) Before diving commences, a copy of the notice of project must be posted at the worksite, or if notification is provided by telephone, a written summary of that notification that contains the information required by subsection (2) must be posted at the worksite.

(4) If in an emergency it is not practicable to notify the Board prior to the start of a diving operation, the Board must be notified as soon as possible, but no later than 24 hours after the diving operation has begun.

[Amended by B.C. Reg. 253/2001, effective January 28, 2002.]

24.10 Medical certification

(1) The employer must ensure that each diver has current medical certification, from a physician knowledgeable and competent in diving medicine, before commencing diving operations.

(2) A diver's medical certification must be

(a) established prior to entry into any commercial diving activity,
(b) renewed every 2 years up to age 39 and annually from age 40 onwards,
(c) renewed more frequently than required by paragraph (b) if clinically indicated, and
(d) re-evaluated by a physician knowledgeable and competent in diving medicine if the diver is subjected to an event or has a physical condition which may affect the diver's medical status.

(3) A copy of each diver's medical certification must be kept at the dive site.

***Note:** The Workers' Compensation Board maintains a list of physicians knowledgeable and competent in diving medicine.*

24.11 Diver's fitness

(1) A diver must not dive if, in the opinion of the diving supervisor, the diver is incapable of functioning safely underwater.

(2) A diver must be medically re-examined, as required by the diving supervisor, to ensure that the diver is fit to dive.

(3) Divers, standby divers and divers' tenders must not participate in any diving operation if they are physically or emotionally fatigued or if they have consumed drugs or alcohol which would impair their ability to work safely.

24.12 Training

(1) A diver must not dive unless the diver has been thoroughly trained in the theory and use of the diving apparatus that the diver will be using.

(2) The training required by subsection (1) must be provided by a person or agency acceptable to the Board.

(3) All divers, diving supervisors and divers' tenders must be trained in CPR, oxygen (O_2) therapy, and diving accident management.

24.13 Evidence of competency

(1) The employer and diving supervisor must ensure that all divers

(a) meet the minimum requirements of CSA Standard Z275.4-97 Competency Standard for Diving Operations, and
(b) are competent to use the diving equipment that will be used in the diving operation.

(2) A certified copy of competency documents for each diver must be available for inspection on site by an officer.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

** See also section 4.4 of the OHS Regulation.*

24.14 Diving logs

(1) Each diver must have, and keep for 2 years after the last entry, a personal log containing a record of all

(a) dives carried out, and

(b) medical recompressions and other exposures to a compressed air/mixed gas environment.

(2) The records in a diver's personal log must be in chronological order and each dive must be verified and initialled by the diving supervisor.

(3) The records for each dive must include

(a) the type of diving apparatus used and the gas medium breathed,

(b) the times the diver left the surface, reached and left the bottom, and returned to the surface,

(c) the maximum depth attained,

(d) the surface interval, if a repetitive dive,

(e) the decompression tables that were used,

(f) the date the dive was undertaken, and

(g) remarks (such as name of employer, unusual incidents).

(4) The diving supervisor must keep a separate log of the diving operation containing the information required by subsection (3).

(5) The diving supervisor's log must be filed with the employer upon completion of the operation.

(6) All current logs must be available at the dive site for inspection by an officer.

24.15 Dive site equipment

When diving is in progress, the dive site must be provided with

(a) a current list of facilities with hyperbaric chambers capable of providing emergency treatment,

(b) the locations and phone numbers of the nearest hospital and available emergency assistance,

(c) if the no-decompression limit is to be exceeded, a 16 mm (5/8 in) synthetic line, marked at appropriate intervals for decompression stops, weighted and of sufficient length to reach the maximum depth for the dive,

(d) a first aid kit and an oxygen (O_2) therapy unit with sufficient capacity to reach emergency medical services,

(e) one complete set of acceptable dive tables and one copy of this Regulation,

(f) an appropriate means for entering and leaving the water, including a means for rescuing an incapacitated diver,

(g) equipment to provide voice communication with emergency services personnel, and

(h) other equipment as may be required by the Board.

[Amended by B.C. Reg. 348/2003, effective March 30, 2004.]

24.16 Lifelines

Divers tended on a lifeline must wear a suitable diver's harness and lifelines must be

(a) securely fastened to the diver's harness, but not attached to the diver's weight belt,

(b) free of knots and splices,

(c) secured to a permanent fixture at the surface, and

(d) tended at all times by a diver's tender.

24.17 Safe diving procedures

(1) Every employer engaged in diving operations must prepare and publish a set of safe diving procedures which include

(a) safe procedures and health requirements for each type of diving in which workers may be involved,

(b) all the procedures to meet the applicable requirements of this Regulation, and

(c) emergency, evacuation, and rescue procedures.

(2) The safe diving procedures must be kept at the dive site, readily available to all workers, and available for inspection by an officer.

24.18 Diving supervisor's worksite duties

(1) Each diving operation must be directed by a diving supervisor whose duties include

(a) evaluating the hazards,

(b) planning the dive,

(c) briefing the crew,

(d) ensuring that all needed equipment is available and in good working condition, and

(e) controlling the entire diving operation.

(f) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

** See section 117 of the Workers Compensation Act.*

(2) The diving supervisor must prepare a detailed plan of the diving operations which must be given to the worksite employer before diving commences.

(3) The diving supervisor must

(a) remain in the dive area during diving operations,

(b) delegate the supervisory responsibilities to another diving supervisor, if required to enter the water, and

(c) suspend diving operations if conditions become unsafe.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

24.19 Crew briefing

Immediately before each dive, the diving supervisor must brief all persons involved in the diving operations about

(a) the hazards which may be encountered during the dive,

(b) the intended duration of the dive and the maximum depth to be reached,

(c) decompression procedures to be followed,

(d) the location of other divers,

(e) the work to be done,

(f) specific recall signals, and

(g) emergency procedures to be followed.

24.20 Diver's responsibilities

(1) Each diver must satisfy the diving supervisor that he or she fully understands the signals and procedures in use.

(2) Except in the case of accidental or unavoidable circumstances, a diver must not remain or be permitted to remain at any depth longer than the maximum time planned for that dive.

(3) In any diving operation the diver must inform the tender or diving partner and must proceed to the surface under any of the following conditions:

(a) if any malfunction in diving gear occurs;
(b) on receipt of any signal which cannot be understood;
(c) at the onset of any symptoms of physical or psychological distress;
(d) on receipt of a recall signal;
(e) when the main air supply is near depletion;
(f) if the emergency apparatus/air supply is being used;
(g) in the event of excessive leakage to a dry type of diving suit which may affect the diver's buoyancy.

24.21 Diving tables

(1) Diving operations, repetitive dives, and treatment of divers, must be carried out in strict accordance with tables and procedures published or approved by the Defense and Civil Institute of Environmental Medicine (Canada).

(2) Sport diving tables must not be used.

(3) Diving computers must not be used in place of primary diving tables.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

** See also section 4.4 of the OHS Regulation.*

24.22 Decompression procedures

(1) During diving operations which require decompression, a reserve breathing supply with sufficient reserve to bring divers to the surface with appropriate decompression stops must be available and ready for immediate use.

(2) Whenever planned dives will exceed the no-decompression limit

(a) the divers must be equipped with a bailout bottle containing a minimum 1.4 m^3(50 ft^3) of breathing medium,
(b) an approved double lock hyperbaric chamber in operable condition with overriding outside controls and appropriate air facilities must be located so that travel time by available transport will not exceed 30 minutes,
(c) if the planned decompression time will exceed 15 minutes the hyperbaric chamber must be on the dive site, and
(d) a chamber operator must be available on the surface at the dive site or at the hyperbaric chamber.

(3) A dive must not exceed the no-decompression limit if the hyperbaric chamber is occupied.

24.23 Diver care and transportation

(1) The diving supervisor must ensure that on completion of decompression, the diver remains under observation in the general area of the hyperbaric chamber for a period of time to ensure the well-being of the diver.

(2) If a diver shows signs of pressure related illness or requires therapeutic recompression, the diving supervisor must ensure that treatment is initiated immediately and a physician knowledgeable in hyperbaric medicine is notified.

(3) If it is necessary to transport a diver suffering a diving ailment by air, provision must be made to furnish the patient with oxygen and the flight altitude must be prescribed by the attending physician or the diving supervisor.

24.24 Medical alert tag

A diver must wear a medical alert tag or bracelet stating the diver's status and indicating the possibility of decompression sickness or other diving illness, for at least 24 hours after completion of diving.

24.25 Hyperbaric chambers

Hyperbaric chambers must conform to standards acceptable to the Board and must be provided with

(a) a means of extinguishing a fire,
(b) an oxygen monitoring device,
(c) an oxygen delivery system with a built-in breathing system (BIBS), and
(d) an adequate supply of air, including an emergency reserve supply to complete any decompression and treatment procedures.

24.26 Breathing mediums

(1) If air is used as the respirable medium in diving operations it must meet the requirements of CSA Standard CAN/CSA-Z275.2-92, Occupational Safety Code for Diving Operations, with the exception of the water vapour standard.

(2) The air supplied by compressors for breathing air in diving operations must be tested at least annually to ensure that it meets the requirements of subsection (1).

(3) If mixed gases in other than the normal proportions of respirable air are used for breathing by divers, the diving supervisor must ensure that

(a) the diving procedures and schedules of work, and decompression are in accordance with the recommendations of a competent authority, and
(b) prior written authorization has been received from the Board to use mixed gases other than nitrox and that the authorization is kept on the dive site, available for inspection by an officer.

(4) The following requirements apply to operations using nitrox mixes:

(a) procedures and mixes must be acceptable to the Board;
(b) all workers involved with nitrox diving must be trained in the procedures to a standard acceptable to the Board;
(c) proof of training and a copy of the operating procedures must be readily available at each dive site.

24.27 Breathing apparatus

(1) All breathing apparatus and associated delivery systems must be correctly installed and tested for function before each use.

(2) The breathing apparatus, accessories and applicable service records must be available for inspection by an officer, and service records must be available to workers on the dive site.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

** See also section 4.3 of the OHS Regulation.*

24.28 Compressor intake

The compressor intake must be located so that the breathing medium will not be contaminated by gasoline vapours, engine exhausts, or other objectionable impurities.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

** See also section 4.3 of the OHS Regulation.*

24.29 Gauges and meters

(1) Gauges and meter equipment must be tested every 6 months or whenever a malfunction is detected, and errors found must be corrected without delay.

(2) If the equipment is removed from service, the specific problem with the equipment must be identified.

24.30 Warning devices

When any diving activity is taking place, warning devices must be displayed as follows:

(a) marker buoys must be used to display warning devices (flags, lights, lamps, or flares) to define the limits of the diving area, and boats other than those connected with the diving activity must be kept clear of the diving area;

(b) in navigable waters the recognized diver's flag must be flown or prominently displayed;

(c) flags and signals used for work site identification must only be displayed during active diving operations.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

***Note:** The recognized diver's flag is a red square with a white diagonal stripe from the upper hoist to the lower fly.*

24.31 Rescue boat

If divers are operating from floating equipment, a suitable power boat, ready for immediate use, must be available on the dive site, for rescue or escape.

24.32 Hoists

(1) If a hoisting device is required to lower or raise the diver it must not be used for any other purpose until the diver has been recovered.

(2) All directions to the hoist operator must be given by either the diver, the diver's tender or the diving supervisor.

24.33 Standby diver

(1) A standby diver must be

(a) on the dive site and able to render assistance at all times when diving operations are in progress,

(b) trained and equipped to operate at the depths and circumstances of the dive, and

(c) able to enter the water in one minute.

(2) A standby diver on the surface may also perform other duties provided such duties do not compromise the standby diver's ability to promptly render emergency assistance to the divers.

(3) When the diving supervisor can assure that the depth of the dive will not exceed 18 m (60 ft) and no hazards are present, 2 divers in the water may act as standby for each other provided that

(a) each diver is free swimming,

(b) the no-decompression limit is not exceeded,

(c) each diver has been trained to effectively rescue a diver in trouble and has demonstrated this ability to the diving supervisor's satisfaction,

(d) the divers are in close proximity to each other at all times so as to be able to effect rescue, and

(e) the divers are in constant audio communication with each other and the surface, or when using scuba they maintain constant physical or visual contact with each other.

(4) In subsection (3) ***"no hazards are present"*** *includes but is not limited to a dive made in good weather conditions, where there are no appreciable currents, where there is good underwater visibility, no possibility of entanglement with underwater objects, and good access and egress to and from the dive site.*

24.34 Dangerous occurrence reports

(1) An incident investigation report meeting the requirements of Part 3 of theWorkers Compensation Act and Part 3 of this Regulation (Rights and Responsibilities) must be submitted to the Board as soon as possible if any of the following occurs during a diving operation:

(a) injury or death;

(b) convulsions or serious impairment of consciousness during or after a dive;

(c) decompression illness;

(d) lung overpressurization;

(e) any serious mishap, even though the diver escapes actual injury, or a series of events which render equipment or procedures suspect, before, during, or after the diving operation.

(2) The facts must be recorded as soon after the incident as possible, and the report must include the dive profile and all relevant details.

(3) In the event of any diving incident,

(a) the Board reserves the right to take temporary possession of and investigate all equipment related to the diving operation, and

(b) the equipment must not be tampered with or altered in any manner until authorization has been received from the Board.

Scuba Diving

24.35 Communication

Each diver using scuba must

(a) employ the buddy system whereby 2 divers remain, at all times, in constant visual or physical contact and both surface immediately if they lose that contact,
(b) be tended on a lifeline by a diver's tender,
(c) be in constant audio communication with the surface, or
(d) be tethered, with a minimum 10 mm (3/8 in) diameter synthetic line or equivalent, to an identifiable float located on the surface that is constantly visually monitored from a location that allows immediate assistance to be rendered in case of emergency.

24.36 Minimum crew

(1) A minimum crew of 3 workers must be present on each dive site if the dive will
(a) not exceed 18 m (60 ft) in depth, and
(b) remain within the no-decompression limit, and
(c) be made where it is known there is no hazard of entrapment.

(2) When using the buddy system, a minimum of 2 divers must be present, and a third person must stay on the surface as a supervisor/tender.

(3) When using lifelines, floats or audio communication with the surface,
(a) a standby diver and a supervisor/tender must be on the surface, and
(b) a tender must tend only one scuba diver unless the divers are on floats, or have lifelines and effective 3-way voice communication, in which case the tender may tend 2 divers.

(4) When a dive does not meet the requirements of subsection (1), then
(a) a standby diver and a supervisor/tender must stay on the surface, and
(b) if not using the buddy system, a single diver must be tethered and carry a bailout bottle.

24.37 Restrictions on scuba

(1) Scuba must not be used in underwater construction, burning, welding, salvage operations, demolition, jetting and suction dredging or other diving operations in which the diver
(a) may be entrapped,
(b) does not have free access to the surface,
(c) may be exposed to a contaminated environment, or
(d) could be adversely affected by hazardous underwater or surface work activities or conditions which could be alleviated if the diver were using surface supplied air.

(2) Divers using scuba must use open circuit apparatus providing a breathing medium by an automatic demand flow system.

(3) Recirculating apparatus may only be used with prior permission of the Board.

(4) Divers using scuba must not dive to depths greater than 40 m (130 ft) unless prior authorization has been received from the Board.

24.38 Equipment

(1) Each diver using scuba must use all of the following equipment appropriate to the diving conditions and as specified by the diving supervisor:
(a) a scuba unit complete with a quick release harness and a submersible pressure gauge;
(b) a face mask and swimming fins;
(c) a suitable knife and a depth gauge;

(d) an exposure suit and an inflatable buoyancy device;
(e) a weight belt with quick release buckle;
(f) an underwater watch with elapsed time indicator;
(g) an underwater light when night diving;
(h) other equipment as may be required by the Board.

(2) If a risk of entrapment is present, one complete spare set of underwater breathing apparatus with fully charged cylinders must be assembled at the dive site.

(3) When diving in open water, each free swimming diver must carry an audible or visual locating device such as a whistle, flare, or strobe light.

24.39 Testing cylinders

(1) Each scuba cylinder must be hydrostatically tested at least once every 5 years and visually inspected internally at least once a year.

(2) The hydrostatic test date must be affixed to the cylinder and entered into the maintenance log.

(3) The visual inspection date must be entered in the maintenance log.

Surface Supply Diving

24.40 Minimum crew

(1) For each diving operation where planned dives do not exceed 40 m (130 ft) or the no-decompression limits, and where there are no hazards present, a minimum dive crew of 3 workers must be present, one of whom must be a diver's supervisor/tender, one a diver and one a standby diver on the surface unless the standby is permitted by section 24.33(3) to serve as a standby in the water.

(2) If the planned dive exceeds 40 m (130 ft), or the no- decompression limits, or there are hazards present, the dive crew must consist of a minimum of 4 workers: a diving supervisor, a diver's tender and 2 divers, one of whom must be a standby diver on the surface.

24.41 Diver's tender

(1) Each surface supplied diver must be tended, hands on, by a separate diver's tender.

(2) If audio communications are used, one tender may monitor 2 divers.

24.42 Diver's equipment

(1) Diver's boots must be patterned, constructed, and fastened to prevent their loss underwater.

(2) Every diver must wear a separate weight belt outside the diving dress, which
- *(a) if released must result in the diver achieving positive buoyancy, and*
- *(b) must be inspected daily before commencing a diving operation.*

(3) Non-return valves must be
- *(a) fitted to all surface supplied diving helmets, masks, and hookah diving systems, and*
- *(b) checked before commencing a diving operation.*

(4) Each diver must wear a bailout system and carry a suitable knife.

(5) When divers use a stage to carry out decompression diving, the stage must have an independent source of emergency breathing gases sufficient to complete any needed decompression of the diver.

24.43 Compressors

Compressors used to supply air to divers must be
- *(a) capable of maintaining a supply of air equal to at least double the volume of air required,*
- *(b) capable of developing pressure at least 25% greater than the anticipated pressure requirement, and*
- *(c) automatic in operation.*

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

** See also section 24.28 of the OHS Regulation.*

24.44 Volume tanks

Air from a low pressure compressor must be discharged into a volume tank of at least 100 litres (22 imp gal) capacity, fitted with

(a) a no-return valve on the inlet side,
(b) a pressure gauge,
(c) an over pressure relief valve, and
(d) a drain cock capable of draining any fluids.

24.45 Breathing air filters

Air supplied from a volume tank must be passed through a filtration system consisting of at least a water trap, a particulate filter and a chemical vapour absorbent.

24.46 Manifolds and fittings

(1) The manifold system must be provided with

(a) a primary and a reserve air supply capable of being isolated from each other, and
(b) piping of a diameter which ensures an adequate flow of gas to the diver(s).

(2) The reserve supply must provide a sufficient quantity of breathing mixture to enable the diver to return to the surface and undergo all "in water" decompression.

(3) If there is no voice communication with the diver, each surface supplied air system must be equipped with an audible low pressure alarm situated so that it can be heard by the diving supervisor and the diver's tender.

24.47 Breathing gas lines

(1) All stationary breathing air or mixed gas lines must be guarded against damage or interference.

(2) Each diver's air or mixed gas line must be fitted with a valve that is

(a) readily accessible,
(b) guarded against interference,
(c) clearly marked to identify the diver it services, and
(d) under the care and control of the diver's supervisor or diver's tender.

(3) Each diver's air or mixed gas line must be fitted with a pressure gauge to indicate the pressure being delivered to the diver, and the gauge must be located downstream of the diver's supply valve so that the dial and figures are clearly visible to the diver's tender.

(4) All hoses, pipes, couplings and other fittings used in any air or mixed gas line for divers must be designed and suitable for their intended use.

(5) Hoses must be protected from kinking and be capable of sustaining the required flow rates and pressures for the system used.

(6) Every umbilical must incorporate a lifeline to prevent stress on the hose or diver's helmet, and the umbilical and lifeline must be attached to a suitable diver's harness.

(7) The standby diver's umbilical and lifeline must be of sufficient length to reach the operating diver.