

BC'S CAPITAL REGIONAL DISTRICT TACKLES EMERGENCY WATER DISTRIBUTION AND SEISMIC PREPAREDNESS

By David Stewart Jones

It's midnight on Vancouver Island—on any day or week in the possible future—when a severe earthquake jolts the British Columbia coastal region and instantly wreaks community devastation and widespread disruption of essential infrastructure services to residents living in the provincial capital of Victoria and surrounding areas.

“People shaken awake in the middle of the night across the entire region and discovering no water is flowing through their taps will be anxiously thinking: ‘What are we going to do?’” says Shayne Irg, senior manager of the Capital Regional District's (CRD) Water Infrastructure Operations.

Serving approximately 430,000 people across 13 municipalities in southern Vancouver Island and the Gulf Islands with water services, the CRD's emergency preparedness plan identifies the regional district's Greater Victoria area as having the highest “seismic susceptibility” risk. A major challenge in the aftermath of a natural disaster, where the local water infrastructure has been crippled or destroyed, involves somehow providing vital drinking water to thousands of people in need.

“Our emergency preparedness plan will already be swinging into action immediately following a seismic event. It includes a series of shutdown and isolation procedures involving our large-diameter steel water transmission mains, and deploying critical spare parts and specialized repair couplings that we keep warehoused specifically for our critical watermains,” says Irg.

“Our emergency response now includes new custom-built emergency water-distribution units capable of distributing drinking water to large numbers of people located anywhere across our region,



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and delivering that life-sustaining water within hours,” adds Irg.

EMERGENCY WATER DISTRIBUTION UNITS

The CRD's new emergency water distribution units (EWDUs) are self-contained, location deployable mobile water distribution stations designed to dispense bagged drinking water to the public during an emergency. The EWDUs, two separate models designed and manufactured for CRD by SCG Process, were purpose-built to a standard mobile-unit specification and a separate stationary-unit specification, both equipped identically inside the units.

The mobile EWDU features large side-panel openings to accommodate high-volume public engagement, sim-

ilar to a mobile lunch wagon when deployed. This enables a trained crew operating inside to rapidly fill and dispense CRD-provided five-litre bags of drinking water to people queued in front. Trailer-based, the mobile EWDU is capable of being towed by a pickup truck, or emergency vehicle. This allows for rapid relocation to impacted areas and quick deployment to meet local emergency water demand.

Custom-built to CRD's specifications, the stationary-unit EWDU model is based on a highly modified intermodal shipping container. It features the same water-dispensing equipment and public side-access design as the standard mobile EWDU model, but offers an expandable design with more interior space. The shipping container-based

EWDU is considered “semi-permanent”, but is transportable when loaded aboard a flat-deck truck trailer.

“We spent a lot of time brainstorming, improving, and refining the details of the EWDU designs with the SCG Process design and manufacturing team,” says Irg. “Every emergency is different, so our EWDU designs are flexible, modular, fully equipped, and self-contained.”

Everything the EWDU crew will need to deploy it, operate it, and maintain it during an emergency is included inside. This includes everything from hoses, fittings, pumps, and pipeline connection equipment, to high-vis safety vests and special gloves for operators, to exterior lights, signs, and traffic cones for public safety.

“The EWDUs can be connected to any of our water transmission mains or a water tanker, enabling it to operate without being restricted to specific connections. It is designed to make it deployable everywhere, anytime,” Irg says. “All we need to do is grab a mobile EWDU and go.”

“The CRD asked us to design and build these stationary and mobile EWDUs to deliver operational simplicity, rugged reliability, rapid mobile deployment, and ergonomic usability for efficient operation, especially under the stress of distributing drinking water to crowds of anxious people during and after emergencies,” says Brian Mergelas, SCG Process executive VP.

“We drew on our half-century of experience engineering and building everything ranging from chemical feed systems to filtration systems for large municipal treatment plants to small and remote systems. As a result, experienced water treatment operators will discover our EWDUs share much of the same equipment and operational approaches found at water treatment plants and in the field,” added Mergelas.

INNOVATIVE EWDU CAPABILITIES

The CRD’s emergency preparedness plan includes long-term infrastructure damage mitigation and prevention measures involving major upgrades and system redundancies designed to make their entire water infrastructure “seismic resilient.” Among the upgrades are spe-



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cial “blue hydrants,” blue-painted seismic-resilient hydrants installed in critical locations to enable reliable access to large-diameter steel water transmission mains, which are expected to perform well during an earthquake event.

“The blue hydrants are the EWDU’s go-to connections for potable water after a seismic event,” says Irg. “However, distance-limitations of the blue hydrants require deploying EWDUs within 100 metres of them. In the absence of a nearby blue hydrant connection, EWDUs can also be supplied by storage from the municipal systems, water-tank trucks, or large expandable “pillow tanks” providing temporary local water storage. Likewise, the EWDU’s lights, pumps, tools, and equipment can be operated using available shore-power, but each is equipped with an on-board generator.”

The public-access sides of the EWDUs are designed to accommodate public “bag fill,” featuring multiple push-button/auto shut-off spigot stations dispensing precisely five litres of water into one of 10,000 reusable five litre water bags stored inside the unit for people to cap and take away.

They can also accommodate manually filling of any size water container. A pressure-reducing valve reduces water

pressure to manageable levels, and a backflow preventer valve prevents re-contamination of the system caused by water back-flowed from a contaminated source. This also protects the system from unauthorized people attempting to manipulate the taps.

“The EWDU features a self-dosing water-dispensing system,” says Irg. “The operator activates a tap, pushes a button selecting the level of required chlorine residual dosing, and the system consistently maintains that residual dosing level. It’s automated and foolproof.”

Considered a “re-chlorinating” process and not a water-treatment process, the EWDU’s chlorine-injection monitoring and metering system is designed to maintain chlorine residuals, ensuring the water distribution system remains clean during extended operations. This also preserves the cleanliness of pre-treated water as it is transported by people returning home or carried to other locations.

REGIONAL COLLABORATION AND TRAINING

The CRD is training all 40 of their certified water operators on staff to deploy and operate the EWDUs. It has also initiated a “technical working group” out-

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reach focusing on collaborating and sharing the latest emergency preparedness advancements, knowledge, and skills with other technical and operational-oriented staffers working with municipalities, agencies, and First Nations governments located in the Saanich Peninsula area of Vancouver Island.

This year, the CRD will offer to train more than nine other municipalities and First Nations governments, including Pauquachin, Tsawout, Tsartlip, and Tseycum First Nations, the Victoria Airport authority, and BC Ferries, which provides all major passenger and vehicle ferry services for coastal and island communities in British Columbia.

“This is the first time we’ve done this, and it has been very well received,” Irg says. “We will jointly discuss emergency response best-practices, share resources, and provide training using realistic emergency scenarios. Emergency preparedness is a very hot topic, and everyone wants to be involved. When an emergency does eventually occur, we will all be ready to share resources, staffing, and emergency equipment.”

WHAT’S NEXT?

The CRD has recently ordered an additional EWDU mobile unit and is evaluating plans to acquire more. In the meantime, the EWDU project has become an inspiration for other CRD emergency-response projects. One is custom-designed mobile emergency equipment that is intended for rapid transport and replacement of failed pipeline infrastructure components vital to maintaining water distribution service during any kind of emergency.

Another involves making vital water storage tanks seismic resistant. The CRD is designing and installing special “seismic valves” into dual-cell concrete and steel water storage tanks. The seismic valve installed in one of the water storage tank cells can detect when an earthquake occurs, and automatically close the valve to prevent water from being lost from the storage tank.

The CRD’s current design of seismic valve requires a technician to physically go to the storage tank and open the valve after it’s been tripped and closed by an earthquake, Irg explains. “But the

seismic valve will ensure water stored in the tank does not get drained because of a broken watermain.”

The CRD is actively performing “seismic upgrades” to ensure their facilities and water infrastructure are still standing after a catastrophic earthquake event. They include a program that involves performing engineering evaluations of the district’s watershed, lakes, and dams to determine their ability to resist earthquakes, and upgrades to enhance their seismic resistance as needed.

“The experts tell us that we are overdue for a large earthquake. So, it’s not ‘if,’ it’s ‘when’ it is going to happen,” says Irg. “Achieving preparedness, redundancy, and survivability at CRD’s Water Infrastructure Operations ensures that when the fateful day does come, everybody is going to sleep a lot better.” ■

David Stewart Jones is a writer with BusinessWrite Inc. For more information, or to contact SCG Process, email: mstadnyckyj@scgprocess.com