

Natural Resources in Vancouver Harbour Cruise 2019



A collaboration between MineralsEd and North Shore Waterfront Industrial Association members in support of the professional development of teachers.

October 25th, 2019

Facilitated by
Sheila Stenzel and Wanda Pickell, MineralsEd
and
Roxie Giles, North Shore Waterfront Industrial Association

Sponsored by



Contents

Introduction	page 3
Vancouver Fraser Port Authority (Canada Place)	page 4
Kinder Morgan Vancouver Wharves	page 8
Taseko	page 13
Fibreco	page 15
Cargill	page 18
Neptune Terminals	page 23
Chemtrade	page 31
Western Canada Marine Response	page 34
Transmountain (Kinder Morgan Westridge)	page 41
SAAM SMIT Towage	page 50
DP World	page 51
Mining Builds Community Posters.....	page 53
Vancouver Harbour Port Operations Legend	inside back cover
Vancouver Harbour Port Operations Location Map	back cover

Introduction

Welcome to the 2019 *Natural Resources in Vancouver Harbour Cruise!*

Vancouver is a port city in which the natural resource industries are major economic drivers. When we live in urban areas, and mining, logging, farming and ranching are “out of sight”, it is hard to grasp just how important these sectors are, in terms of what they provide to the world, the value of these goods, and the economic activity surrounding their transportation, handling and delivery to market. We also know that our stores are packed with everyday items that come from “somewhere”, and we typically don’t know where they come from or how they got to Vancouver. The people who actually know all about this “big picture” are the people who work in and around the port.

We are pleased to host you on a tour of Vancouver’s harbour for the opportunity to see and learn through the activities in this large and dynamic port, how this important part of our world works. Telling these stories and painting the big picture are guest speakers from many port operations. We are grateful for their time and for sharing their knowledge of their business, and what it means to us, their employees, our community and province. Thank-you!

- Lisa Fox, Community Outreach Coordinator, Port of Vancouver
- Tim Ayling, Director of Sales and Marketing, Kinder Morgan Vancouver Wharves
- Richard Weymark, Chief Engineer, Taseko Mines
- Glenn Dempster, Project Manager, Fibreco
- Brenda Stretch, Vancouver Terminal Director, Cargill
- Amina El mantari, People & Culture Specialist, Neptune Terminals
- Sheldon Leeder, Supervisor Port Operations, Teck Resources
- Claudia Severin, Quality Systems Manager, Chemtrade Electrochem
- Michael Lowry, Manager Communications, Western Canada Marine Response
- Stephanie Snider, Stakeholder Management and Communications & Carol Greaves, Westridge Community Liaison, Trans Mountain (Kinder Morgan Westridge)
- Dax Perrault, Logistics, SAAM SMIT Towage
- Sergei Smirnov, Superintendent, Operations Planning, DP World
- Marianne Quat, Physical Scientist & Shashi Kapoor, Sr Client Services Officer, NRCAN Geological Survey of Canada

Thank-you also to our partner-teachers, Roxie Giles, who has taken the lead on this cruise, and Wanda Pickell, who has cheerfully provided logistical support again this year. We all hope that you have enjoyed and learned many new things during this unique professional development program.

Sheila Stenzel, Director
MineralsEd

C. Port of Vancouver



The mandate of Canada Port Authorities as outlined in the *Canada Marine Act*, is to facilitate Canada's trade objectives, ensuring goods are moved safely, while protecting the environment and considering local communities.

Canada Port Authorities manage federal lands and waters on behalf of Canadians and in support of national trade objectives.



We are required to provide marine infrastructure and ensure safe and efficient movement of marine traffic and cargo within the port.

We ensure operations are secure, reliable and sustainable with consideration for the quality of life of our neighbours.

We conduct project and environmental reviews of works and projects proposed for port lands and waters.

C. Port of Vancouver

Canada Port Authorities are not financed by tax dollars.

We receive revenues from terminal and tenant leases as well as harbour dues and fees charged to shipping companies that call at the port.



Earnings beyond operating costs are reinvested in port-related infrastructure and improvements, and an annual stipend is paid to the federal government.

The Vancouver Fraser Port Authority oversees the Port of Vancouver, Canada's largest port.

Port of Vancouver activities support:

-  **\$1 of every \$3** of Canada's trade in goods outside of North America
-  **115,300 jobs** in Canada
-  **\$11.9 billion** in GDP



C. Port of Vancouver

Port lands, waters, infrastructure, and services
together open Canada to the world and connect people with economic potential.



Facilitating trade
with more than
170 world economies



Top 5 trading partners
China, Japan, South Korea,
United States, India



Vessel calls
Approximately 3,200
each year



More than \$615 million
worth of export and import
cargo each day

As the most diversified port in North America,
Port of Vancouver terminals can handle trade across five business sectors.



Container



Automobiles



Breakbulk



Bulk



Cruise

The Vancouver Fraser Port Authority is responsible for more than 16,000 hectares of water, over 1,000 hectares of federal land and assets along hundreds of kilometres of shoreline that make up the Port of Vancouver.



C. Port of Vancouver

From Roberts Bank and the Fraser River up to Burrard Inlet,

our jurisdiction borders 16 municipalities and intersects the asserted and established traditional territories and treaty lands of several Coast Salish First Nations.

Charting a course toward a sustainable future

As the port authority responsible for Canada's largest port, we carefully and constantly balance multiple priorities and interests.

We are guided by our vision to be the world's most sustainable port.



Our definition of sustainability is structured around 3 pillars and 10 areas of focus:



Economic prosperity through trade

- Competitive business
- Effective workforce
- Strategic investment and asset management

Thriving communities

- Good neighbour
- Community connections
- Aboriginal relationships
- Safety and security

Healthy environment

- Healthy ecosystems
- Climate action
- Responsible practices



To learn more, visit
portvancouver.com
 #MyPortCity

Vancouver Fraser Port Authority
 100 The Pointe, 999 Canada Place
 Vancouver, B.C. Canada V6C 3T4

phone: 1.604.665.9000
 email: info@portvancouver.com



A. Kinder Morgan Vancouver Wharves



Kinder Morgan – Vancouver Wharves Terminal



Terminal Specifications

Size	139 acres
Storage Capacity	<p>Bulk – 1 million tons</p> <ul style="list-style-type: none">– Mineral storage; enclosed storage for over 500,000 tons of concentrate, multiple separations; 7 warehouses, some with multiple separations– Pulp/paper storage; 35,000 sq. meters covered storage on wide apron dock area– Sulfur storage of approx. 175,000 tons– Agri-products storage includes 10 bins that hold approx. 25,000 tons in total. <p>Liquids – 248,000 barrels (4 tanks)</p> <p><i>Available land for expansion</i></p>
No. of Ship Docks	<p>4 deep-sea berths: Draft varies from 37 – 45 ft, each berth with approximate length of 900 ft.</p> <p>Accommodates deep draft ships; up to and including Panamax vessels</p>

A. Kinder Morgan Vancouver Wharves



Kinder Morgan – Vancouver Wharves Terminal

Terminal Specifications

Commodities Handled *Bulk:* Mineral concentrates (copper, zinc, & lead), sulfur, specialty agriculture products (peas, malt barley, etc.), wood pellets and break bulk cargo handling

Liquids: Petroleum products

Transportation Modes

Servicing Body of Water Burrard Inlet, Pacific Ocean

Servicing Railroads CN Rail; Interchanges from CP and Burlington Northern Santa Fe

Major Features

- Strategically located in the Port of Vancouver
- 4 berths

Contact Information

Terminal Address

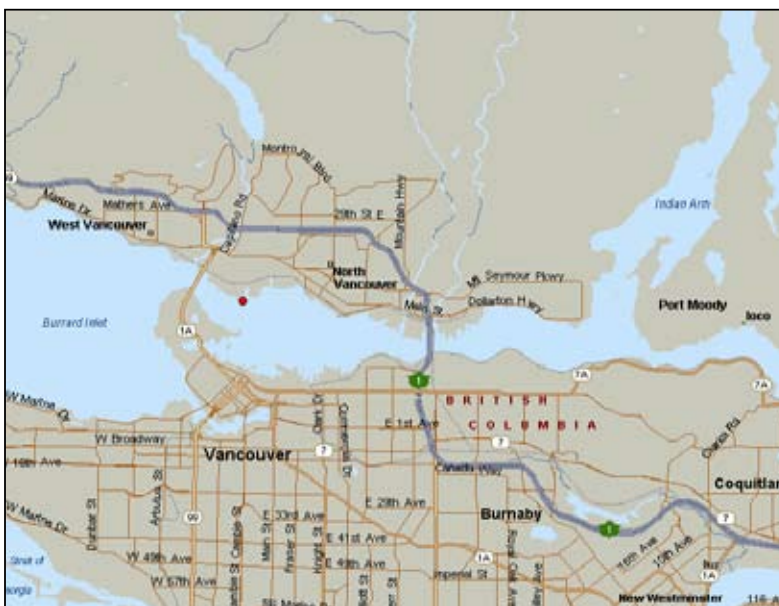
1995 West First Street
North Vancouver, BC V7P 1A8
Canada
604-985-3177
604-980-8602 Fax

Terminal Manager

Alex Goid

Business Address

101 E. Eighth Street, Suite 260
Vancouver, WA 98660
800-997-3731
360-906-0237 Fax



A. Kinder Morgan Vancouver Wharves



Kinder Morgan – Vancouver Wharves Terminal

Terminal Services

Sulfur / Dry Bulk

- Railcar dumper: can receive rotary gondolas or bottom-dump hopper cars
 - Multiple loop tracks: means no breaking the trains – cars stay together as a unit
 - Fast unloading: sulfur units (104 cars) are unloaded in less than five hours; fertilizer units in less than a shift
 - Fast loading: two quadrant shiploaders rated at up to 3500 tph each
-

Minerals

- Environmental care is first and foremost at Vancouver Wharves. Our concentrates facilities are fully enclosed to ensure the cleanest handling possible.
 - Additionally, we collect and treat all the water used on our site, including even rainfall. The water is cleaned in sophisticated, modern treatment facilities before being released back into the ocean.
 - The terminal boasts the only permanent unloading crane in the Port of Vancouver, and we have enclosed facilities for both loading and unloading railcars. We can also receive product by truck.
 - Loading equipment: traveling gantry shiploader
 - Unloading equipment: grab bucket unloading crane
-

Agri-Products

- Rail, handling systems and berth are totally dedicated to agriproducts
- Surge (storage) capacity protects product quality; currently 25,000 tons with room to add more
- 100-car unit trains can be brought onto the loop track and unloaded with only one break in the train
- Totally enclosed variable-speed belts provide gentle handling – there are no bucket elevators anywhere in the system
- Airveyor belts ride on a layer of air (instead of rollers) for smooth, clean handling
- Certified weighing and sampling are possible both on receipt and shipping
- Individual car weights can be provided on receipt
- Fully enclosed track shed unloads over 50 cars/shift
- Powerful dust-control and brush/vacuum systems allow for quick product change
- Fast loading system designed for 1500 tons per hour from storage
- Cascade" shiploader flows product into the bottom of the hold, for gentle dust-free vessel loading
- Fully licensed by the Canadian Grain Commission – a government regulatory agency responsible for maintaining the consistent high quality of Canada's grain supply

A. Kinder Morgan Vancouver Wharves



Kinder Morgan – Vancouver Wharves Terminal

Terminal Services

Liquids

- Vancouver Wharves four tanks available – 2 100,000 bbl tanks and 2 25,000 bbl tanks. Two separate outbound handling and shipping systems offer flexibility required to handle and store two different products.
 - Two separate systems: each with their own receiving, storing and shipping capabilities
 - Railcar Unloading stations: five on one system, ten on the other
 - Loading arm: services ships at rates of up to 900 tonnes per hour
 - Stainless steel shipping line: services ships at rates of up to 700 tons per hour
-

Pulp/Paper

- Significant features of our facility include weather-protected unloading areas, enclosed cement-floor warehouses, weather-protected trailer-loading stations, and the closest warehouse proximity to vessel of any export facility in the Lower Mainland.
 - With both railcar and truck unloading ramps, a full-depth berth, and ample storage, we're able to provide our customers with the flexibility they require.
 - Vancouver Wharves has a complete array of modern efficient handling equipment to protect pulp quality. We were the first deep-sea pulp terminal in Canada to attain independent recognition by the ISO quality assurance program.
 - Three covered/enclosed railcar-unloading areas
 - Three truck-unloading ramps
 - Loading equipment: a complete array of up-to-date mobile equipment including surf-boards, clamp-style lift trucks, stainless-steel decked trailers and custom loading platforms for optimum cargo protection
 - Advanced computerized pulp-inventory-management system
 - Compressed-air stations to ensure product care
-

Terminal Addresses

Terminal Address

1995 West First Street
North Vancouver, BC V7P 1A8
Canada

604-985-3177
604-980-8602 Fax

Business Address

101 E. Eighth Street, Suite 260
Vancouver, WA 98660

800-997-3731
360-906-0237 Fax

A. Kinder Morgan Vancouver Wharves



Vancouver Wharves
a bulk marine terminal located east of the Lions Gate Bridge on the north shore of Burrard Inlet in Greater Vancouver's Port Metro Vancouver

Handles over **4 million tonnes** of cargo annually

Storage capacity of **one million tonnes** of bulk cargo

and **250,000 barrels** of petroleum products

Products: mineral concentrates, sulphur, agricultural products and liquids

KINDER MORGAN

Ships Copper Concentrate from Van Wharves



Taseko is a mining company that seeks to create long-term shareholder value by acquiring, developing, and operating large tonnage mineral deposits. Taseko is the owner (75%) and operator of the Gibraltar Mine, one of the largest open pit copper-molybdenum mines in North America, and the Florence Copper Project, which is rapidly advancing towards production (targeting 2021). The Company also owns the advanced-stage Aley Niobium and Yellowhead Copper-Gold projects, both providing longer-term growth opportunities. With a growing production base and solid balance sheet, Taseko is well positioned to capitalize on strengthening copper prices.



TSX: **TKO**
NYSE American: **TBG**

A mining company focused on the operation and development of mines in North America

Our Commitment

At Taseko our employees operate in a responsible and sustainable manner and our Health & Safety, Aboriginal, and Environmental track record reflects this commitment.

Community & Our Employees

Taseko is committed to the establishment of mutually beneficial relationships with the local communities.

Taseko's Gibraltar investment has had a profoundly beneficial impact on the City of Williams Lake and communities throughout British Columbia's central interior. Since reopening in 2004, Gibraltar's workforce has grown from 10 to currently near 700. The mine spends approximately \$1 million every day purchasing services and supplies and paying salaries and benefits. Our employees in-turn are raising their families, buying homes, and spending money locally which adds significantly to the economic and social strength of the region.

Health and safety is our top priority. Nothing is more important than the well-being of our employees, contractors and the families that depend on them. We work tirelessly at continual improvement in safety performance and occupational health.



To find out more, visit tasekomines.com    

Ships Copper Concentrate from Van Wharves



Taseko is the owner (75%) and operator of the Gibraltar copper-molybdenum mine, located in south-central British Columbia, the second largest open-pit copper mine in Canada and the largest employer in the Cariboo region.

Gibraltar

Copper - Molybdenum Mine

In 1999, Taseko bought Gibraltar which was on “care and maintenance” at the time. Taseko recognized the value of the deposit and infrastructure of the property. The common perception was that the mine, a source of copper and molybdenum for 26 years, had reached the end of its mine life; however, Taseko believed otherwise.

A skeleton crew of just 10 employees provided the necessary maintenance and service to preserve the integrity of the infrastructure and prevent equipment deterioration.

In 2006, the Company initiated new investment in the property. By the end of 2012, the Company had invested ~\$700 million to modernize and expand mining and milling operations. As a result the mine’s processing capacity was increased to 85,000 tons per day with an average annual production of 140 million lbs of copper and 2.6 million lbs of molybdenum, a level of production which is expected to be maintained throughout its remaining 21 year mine life.



The Florence Copper Project is an advanced-stage project that is expected to provide the Company near-term production growth.

Florence

Copper Project

Taseko’s wholly owned Florence Copper, an in-situ copper recovery project, is located midway between Phoenix and Tucson near the community of Florence, Arizona.

In late 2017 construction of the Phase 1 facility, which includes 24 injection, recovery and monitoring wells and an SX/EW plant, was underway and by the third quarter of 2018 construction was completed, on-time and on-budget.

Wellfield operations commenced in December 2018 and in April 2019 copper cathode was produced.

Successful operation of the Phase 1 wellfield and processing plant is a major milestone in advancing and realizing the full value of the Project.

Yellowhead

Copper Project

The Yellowhead Project has the potential to be a world-class, long-life, low cost mine.

Yellowhead is located in the Thompson-Nicola area of British Columbia, approximately 150km north-east of Kamloops near Vavenby. A 2014 Feasibility Study proposed a 70,000 tonne-per-day open pit copper mine with a 28-year mine life.

Taseko is initiating the provincial and federal review process, with a significant amount of technical and environmental work already completed.

Aley

Niobium Project

The relatively low capital cost, strong operating margins and favourable operating jurisdiction make Aley an ideal growth project for Taseko.

Taseko’s wholly-owned Aley Niobium Project is located in northern British Columbia, 140 km north of Mackenzie. The site covers approximately 433 square kilometers and consists of 104 mineral claims.

Taseko acquired the project in 2007 for ~\$5 million. Based on the 2014 Pre-Feasibility study, the project has an \$860 million pre-tax net present value (NPV).

Note: Content contained within this brochure was reviewed by Richard Weymark P.Eng., Chief Engineer, and a Qualified Person under National Instrument 43-101.

B. Fibreco



1209 McKean Avenue,
North Vancouver, B.C.
Canada V7P 3HP

Phone: (604) 980-6543
Fax: (604) 984-2593
feedback @fibreco.com

About Fibreco

BC owned and operated, Fibreco Export Inc. is one of the largest wood biomass handling terminals in the world and we are enhancing our terminal to accommodate the export of agricultural products to Europe and Asia. Fibreco's efficient rail delivery logistics, coordination, dry bulk storage and loading are integral to our business, providing a high level of value added service for our customers to ensure a low cost and efficient supply chain from source to vessel. Our strategic location on the north shore of Burrard Inlet in North Vancouver, BC, provides our clients with the advantage of efficient rail access within Canada and convenient marine access to international markets.



B. Fibreco

Our Services - Fibreco's export terminal provides bulk handling on a fee for service basis for B.C.'s wood pellet producers and is expanding to serve agricultural producers.

Our Commitment - Is to provide a safe environment for our workers and provide value added services to our customers and stakeholders. Fibreco is one of only two terminals that handle wood pellets in B.C. and we have over 12 years of experience doing so. We have built solid relationships with the railway, which provides us guaranteed switches as well as with vessel owners and agents to ensure vessel operations are conducted seamlessly.

Safety is our top priority - We have a comprehensive safety-training program to ensure we maintain a safe work environment. We meet or exceed all safety requirements mandated by regulatory agencies, and more importantly, we understand that implementing strong safety principles is the right thing to do.

It is the responsibility of all employees to understand and comply with all health and safety regulations and immediately report any activities or conditions that are potential code violations

Our customers expect Fibreco to operate in a safe and sustainable manner that allows for the continuous operation of our facility, providing reliable and timely service.

Our Mission - To be responsible and profitable, enabling our people to provide world-class service in a safe and environmentally friendly manner to our valued customers, while optimizing our shareholders' return on investment.

Our Vision - To be an innovative and safe, world-class facility, with value added services for all customers and stakeholders.

Our Values

We believe in the four tenets of safety, reliability, sustainability and relationships

1. **Safety** – Creating an environment that allows all employees to operate in a manner that does not compromise safety.
2. **Reliability** – We do what we say we'll do, when we say we'll do it. Everything is reliable, including the equipment, our people, and partners.
3. **Sustainability** – We will operate in such a way that the site can be used indefinitely.
4. **Relationships** – We value and take time to develop and maintain solid relationships with customers, stakeholders, owners, each other, and the entire community.



B. Fibreco

Terminal Enhancement Project

Fibreco has successfully served the western Canadian forest industry by moving wood chips and wood pellets to customers throughout the world for over 40 years. After phasing out handling wood chips in 2017 to provide longer-term sustainability and full terminal utilization, Fibreco began upgrading its facility to allow product diversification to include handling food ingredients for the international agricultural trade (grain and pulses).

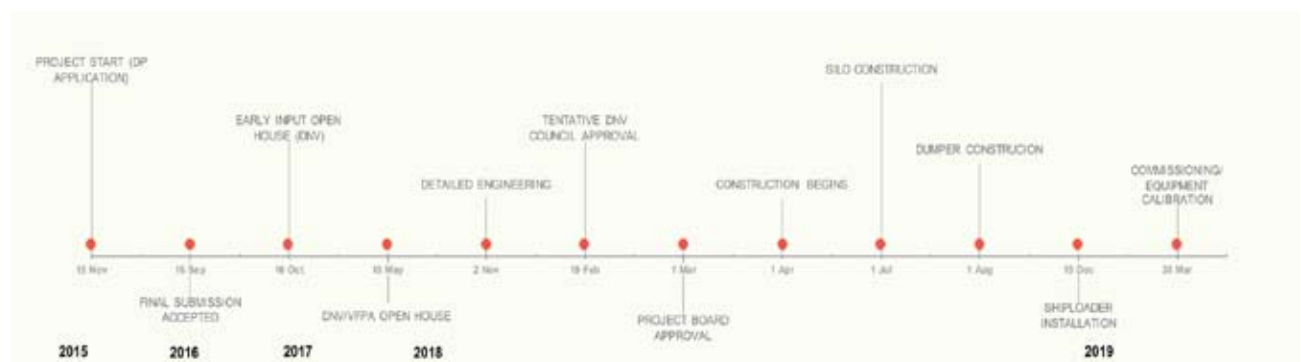
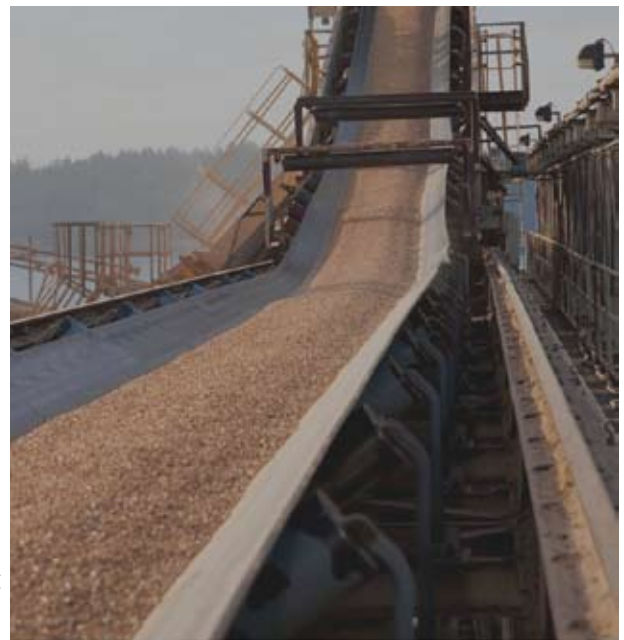
Fibreco has received Development Permit approval from the District of North Vancouver and Project Permit approval from the Vancouver Fraser Port Authority for the Fibreco Terminal Enhancement Project.



When the Project is complete our storage capacity will grow, which means we can store a wider variety of products, to better serve our customers as their needs change. Our annual throughput will grow over time. We will do this with fewer rail deliveries per year using longer unit trains.


Key Anticipated Project Benefits

- Sustainability for a local business and job security for B.C. workers through diversification and reduced reliance on wood products.
- Local economic benefits include an injection to the local economy, and anticipated annual indirect contributions.
- Improved safety for workers and the community with modern handling equipment.
- Improved air and noise emissions from rail unloading and from other plant operations.
- More attractive site with physical improvements, newer equipment set back to best maintain existing viewsapes and reduced light impacts.
- National agri-trade benefits with improved customer service through better turnaround times and by providing relief to Canadian agricultural producers and railroads with an additional outlet to export agricultural and food ingredient products to emerging Asia-Pacific markets.



J. Cargill


CARGILL BY THE NUMBERS



8000+
EMPLOYEES

OVER
100

LOCATIONS FROM
BRITISH COLUMBIA TO QUEBEC



11
BUSINESSES IN CANADA

\$500,000+
in financial support and product donations to organizations dedicated to ending hunger in Canada

~968 MILLION invested in assets (net book) in Canada over past five years


THE CARGILL COMMITMENT

Cargill provides food, agriculture, financial and industrial products and services to the world.

TOGETHER WITH FARMERS, CUSTOMERS, GOVERNMENTS AND COMMUNITIES, WE

HELP PEOPLE THRIVE

BY APPLYING OUR INSIGHTS AND **150** YEARS OF EXPERIENCE.



Each year, Cargill supports local and national charitable organizations in the areas of food security, nutrition and sustainability.


CARGILL IS A PROUD SUPPORTER OF


FOOD BANKS CANADA

AGRICULTURE IN THE CLASSROOM

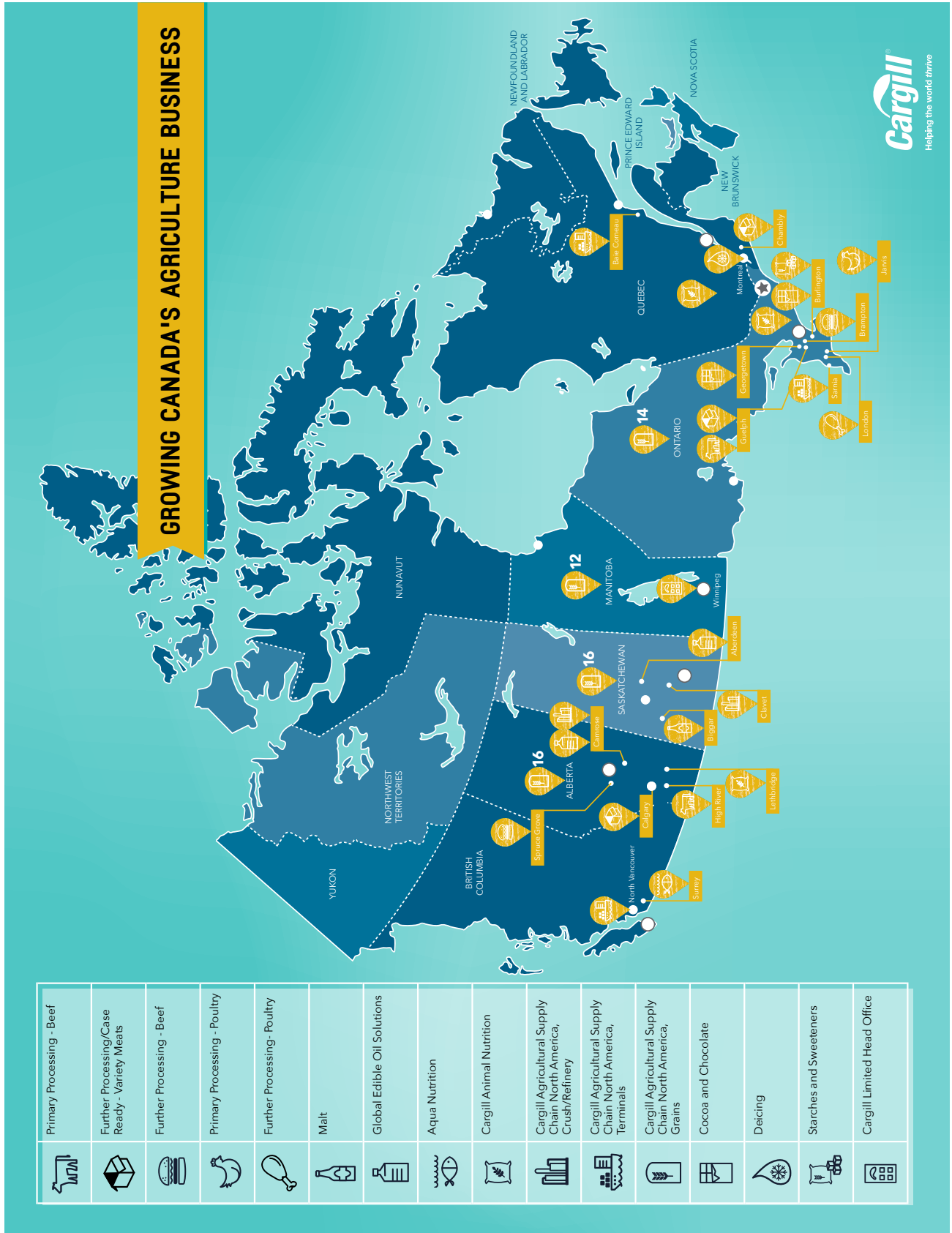
FARM AND FOOD CARE CANADA

AND DUCKS UNLIMITED



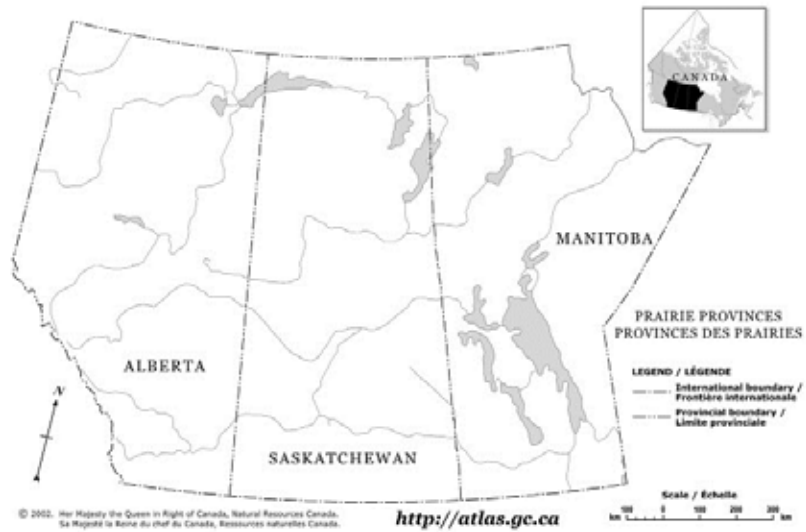


CARGILL IS COMMITTED TO BEING A LEADER IN NOURISHING THE WORLD IN A SAFE, RESPONSIBLE AND SUSTAINABLE WAY.

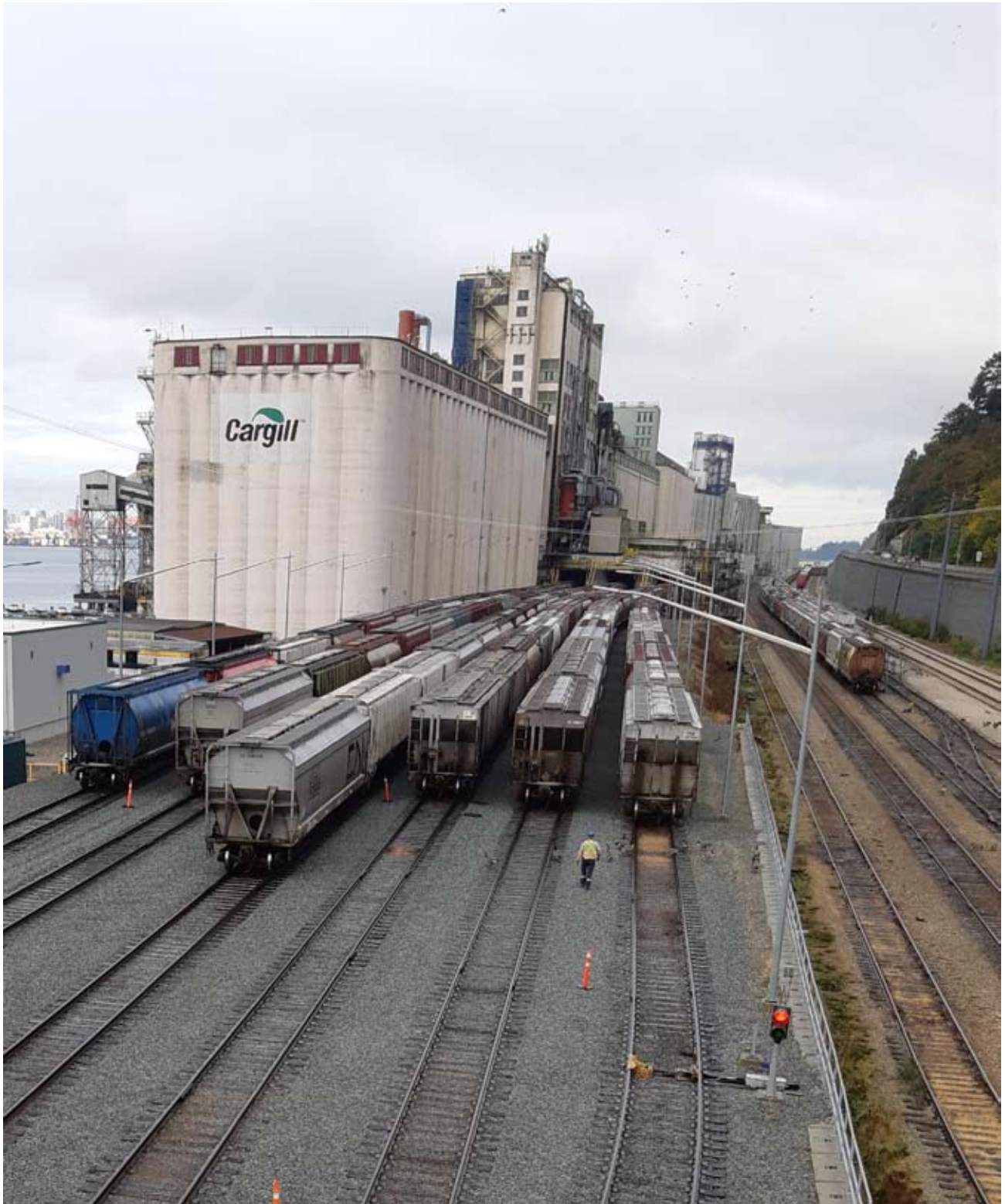


J. Cargill

Where do we grow the grain?



J. Cargill



Where does the grain go after it is harvested?

How does the grain get to Vancouver?

J. Cargill

Examples of Grain vessels



Cargill Terminal – North Vancouver



L. Neptune Terminals



Neptune is one of the largest multi-product bulk terminals in North America.

We are located in North Vancouver, on a 74 acre site leased from the Port of Vancouver.

Our job is to handle Canadian steelmaking coal and potash for export to world markets. We also handle imported phosphate rock, which is shipped to Alberta.

We handle approximately 5% of total Canadian offshore exports, and we're proud to be a key part of the Pacific Gateway, helping get Canadian goods to market.

Terminal Operations Overview

- Private company, owned by Teck Coal and Canpotex
- Current throughput capacity (MT/yr)
 - ✓ Potash 10 million
 - ✓ Coal 12.5 million
 - ✓ Phosrock 1 million
- 15.6 million MT shipped in 2017
- 24/7 operations
- 430 FTE positions in 2017
- 330 vessels per year



Neptune
TERMINALS

L. Neptune Terminals

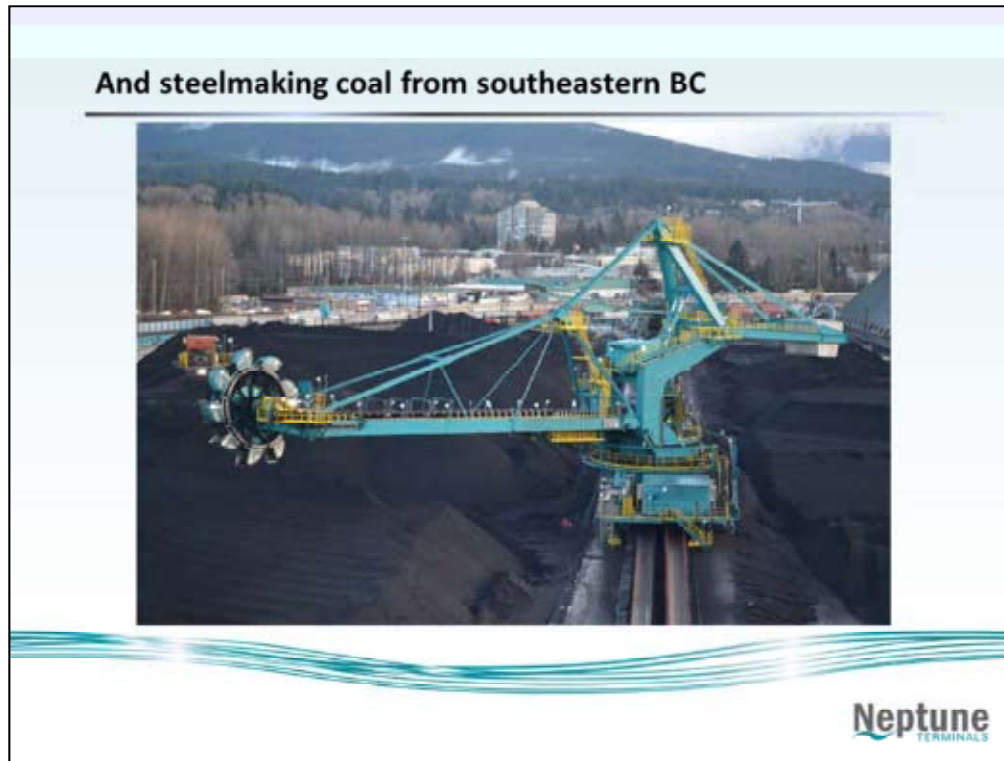


Potash is mined by PotashCorp, Mosaic and Agrium in Saskatchewan, which has about ¼ of the world's supply.

Most potash is used as a water soluble crop nutrient that is crucial to agriculture worldwide. It is also a major ingredient in commercial fertilizers, which typically contain potassium (from potash), nitrogen and phosphorous.

Neptune exports Canadian potash to nations with large and growing populations to feed, such as Brazil, China, India and Indonesia

L. Neptune Terminals



Steelmaking coal comes from Teck's mines in BC and Alberta.

It is a key ingredient in the production of steel, which is needed to make things like buildings, bridges, cars and rapid transit systems, wind turbines and solar panels as well as everyday items like household appliances, cell phones, tablets and more.

30,000 tonnes of steelmaking coal was needed to build the Canada Line skytrain from Vancouver to Richmond.

Neptune exports coal to large steel mills in countries like China, Japan, Korea, Germany and others.

For more information on BC coal and its uses, visit <http://coalalliance.ca/>.

L. Neptune Terminals



Neptune is a key part of our shareholder companies' supply chains.

We contribute to the economies of Canada, BC and North Vancouver, as well as the many communities along the journey from mine site to terminal.



Neptune has three deep sea berths and is located in the sheltered harbour of Burrard Inlet.

We handle approximately 330 ships every year.


L. Neptune Terminals

Neptune's Values



Safety & Environment
Community
Employees

8



As we grow, we invest in upgrading our terminal

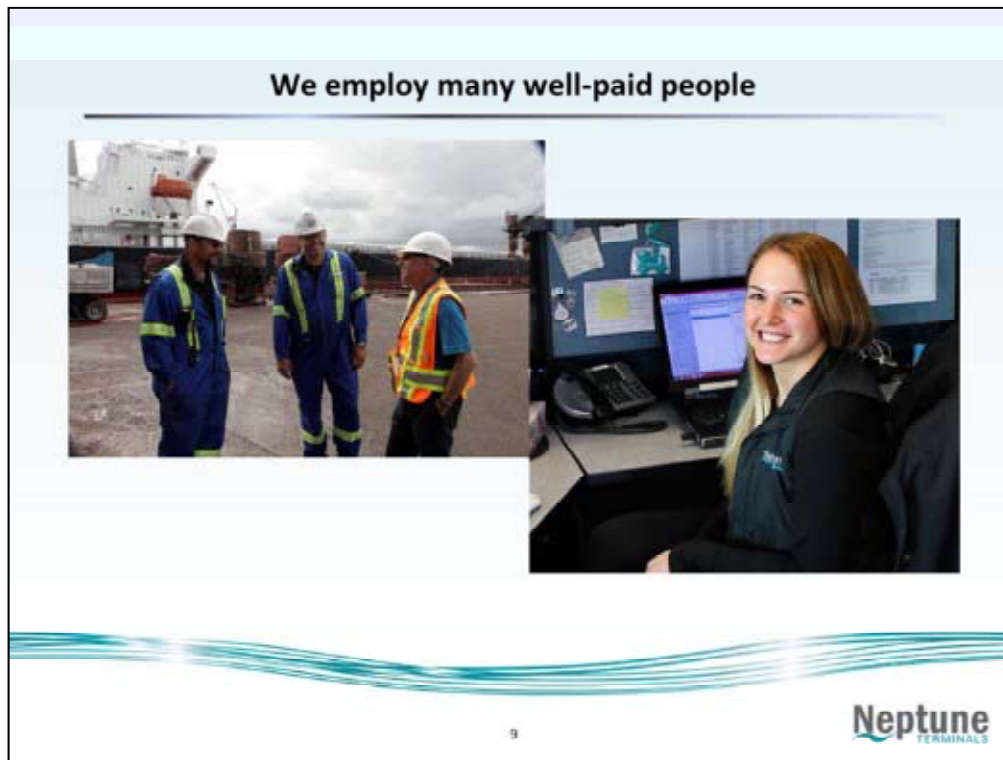


7



We continue to upgrade our terminal to ensure we are enhancing our environmental performance, the safety of our employees and the well-being of our community.

L. Neptune Terminals



Neptune employs 360 people in a variety of roles:

- Administrative and accounting staff
- Communications and community engagement
- Engineers
- Environmental specialists
- Tradespeople including electricians and heavy duty mechanics
- Longshoremen
- And many more...

We operate 3 shifts each day, operating the terminal 24/7, 362 days a year. As our business grows, so do the number of well-paying jobs we provide in North Vancouver.

L. Neptune Terminals



Protecting air and water quality, and minimizing the impact of our operations on the community are very important to us.

Our environmental systems include:

- Spray poles and other equipment that applies water to the steelmaking coal stockpile to keep it damp
- Air monitors on our site and at several locations in our neighbouring community
- Noise monitors
- Rail track lubrication to minimize train noise from our site
- Ultra-low noise, low emission Enviro-locomotives that move potash cars onsite.
- An electro-mechanical indexer to move steelmaking coal trains onsite.
- Separate water treatment systems for the coal and potash water.

Neptune is proud to be a member of Green Marine and Climate Smart, external organizations that help us measure and continuously improve our environmental performance.

For more information visit: <http://www.neptuneterminals.com/safety-and-the-environment/environmental-protection-and-green-marine/>

L. Neptune Terminals

We work hard to be a good neighbour

- Supporting local community organizations
- Hosting tours and an annual Open House
- Knowing our neighbours and local government
- Buying approx. \$20 million of products and services locally each year



Neptune
TERMINALS

Neptune supports many local events and organizations that make North Van a healthy and vibrant community for everyone who lives and works here.

We have a focus on programs for seniors and youth at risk, as well as local environmental initiatives such as salmon enhancement.

We host an annual day each year on which we invite the community to come for a tour of our terminal and learn about our operations.

For more information visit <http://www.neptuneterminals.com/in-the-community/>

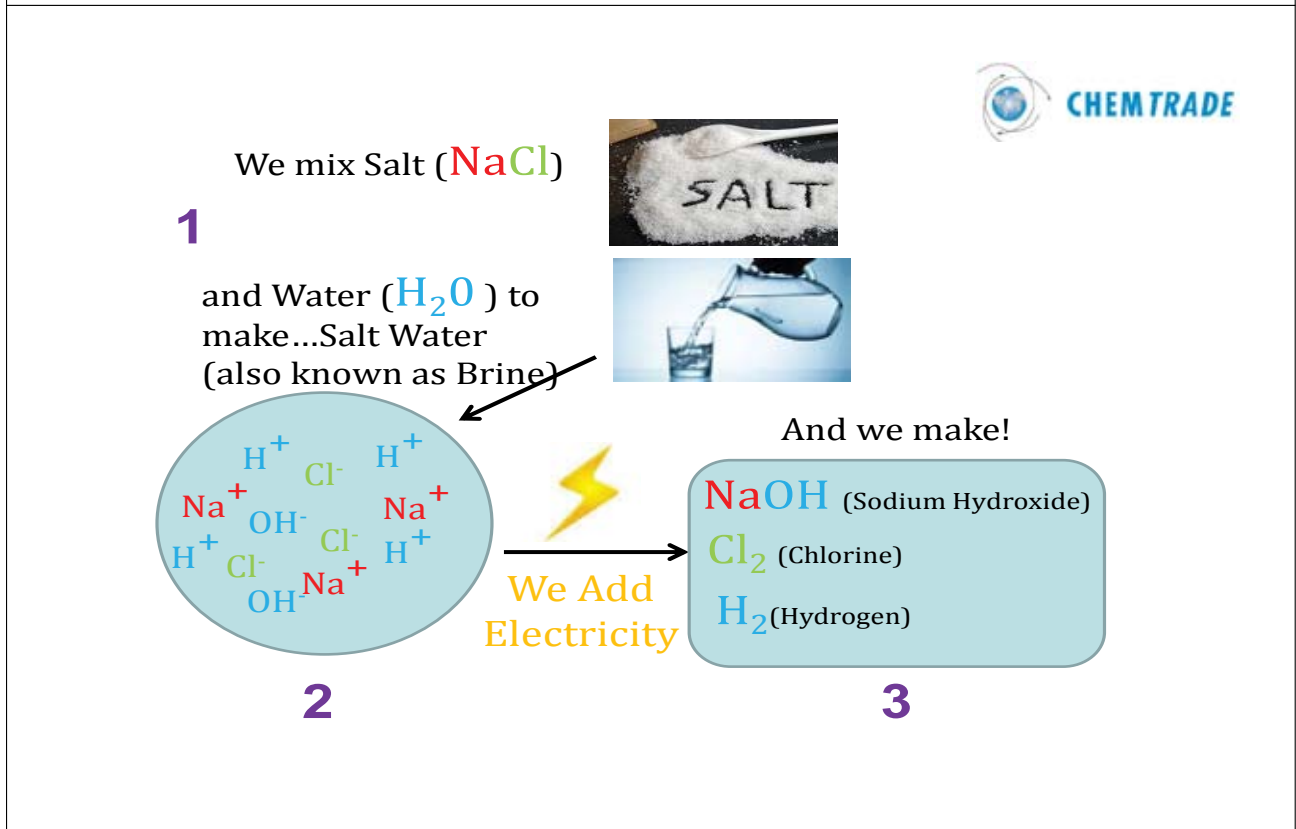
Please contact Lisa Dooling, Director of Community & Stakeholder Engagement with any questions or information requests.

ldooling@neptuneterminals.com

Office: 604-983-4407

Or visit our website at <http://www.neptuneterminals.com/>

S. Chemtrade



S. Chemtrade

Uses...



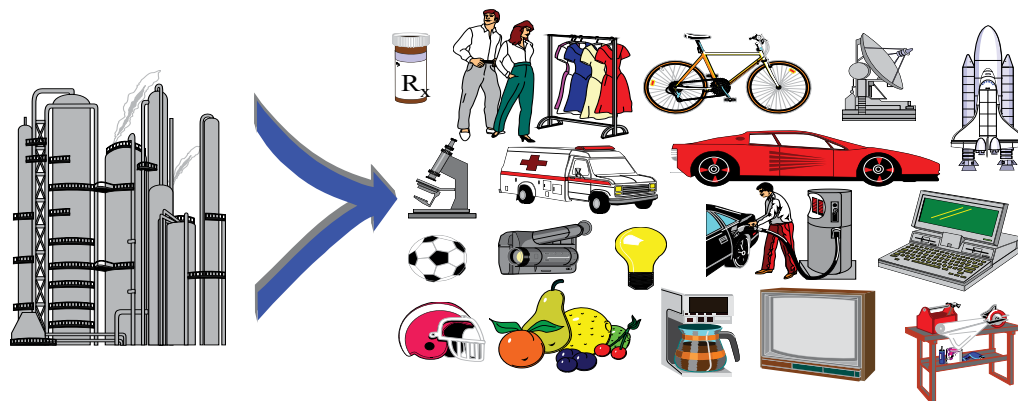
Chlorine has a huge variety of uses; as a disinfectant and purifier, in plastics and polymers, bleach, solvents, agrochemicals and pharmaceuticals, as well as an intermediate in manufacturing other substances where it is not contained in the final product. Chlorine is used worldwide to purify water supply as the ultimate defense against waterborne microbiological infection. When you buy a gallon of bleach at the grocery store, what you are buying is the chemical sodium hypochlorite mixed with water in a 5.25-percent solution. You're buying salt water that has been changed slightly by electricity.

Hydrochloric acid is used in the chemical industry as a chemical "reagent" in the large-scale production of vinyl chloride for PVC plastic, and in manufacturing other products. It has numerous smaller-scale applications, including household cleaning, production of gelatin and other food additives, de-scaling and leather processing. It is a highly corrosive, strong mineral acid with many industrial uses. Hydrochloric acid is found naturally in gastric acid... in your stomach.

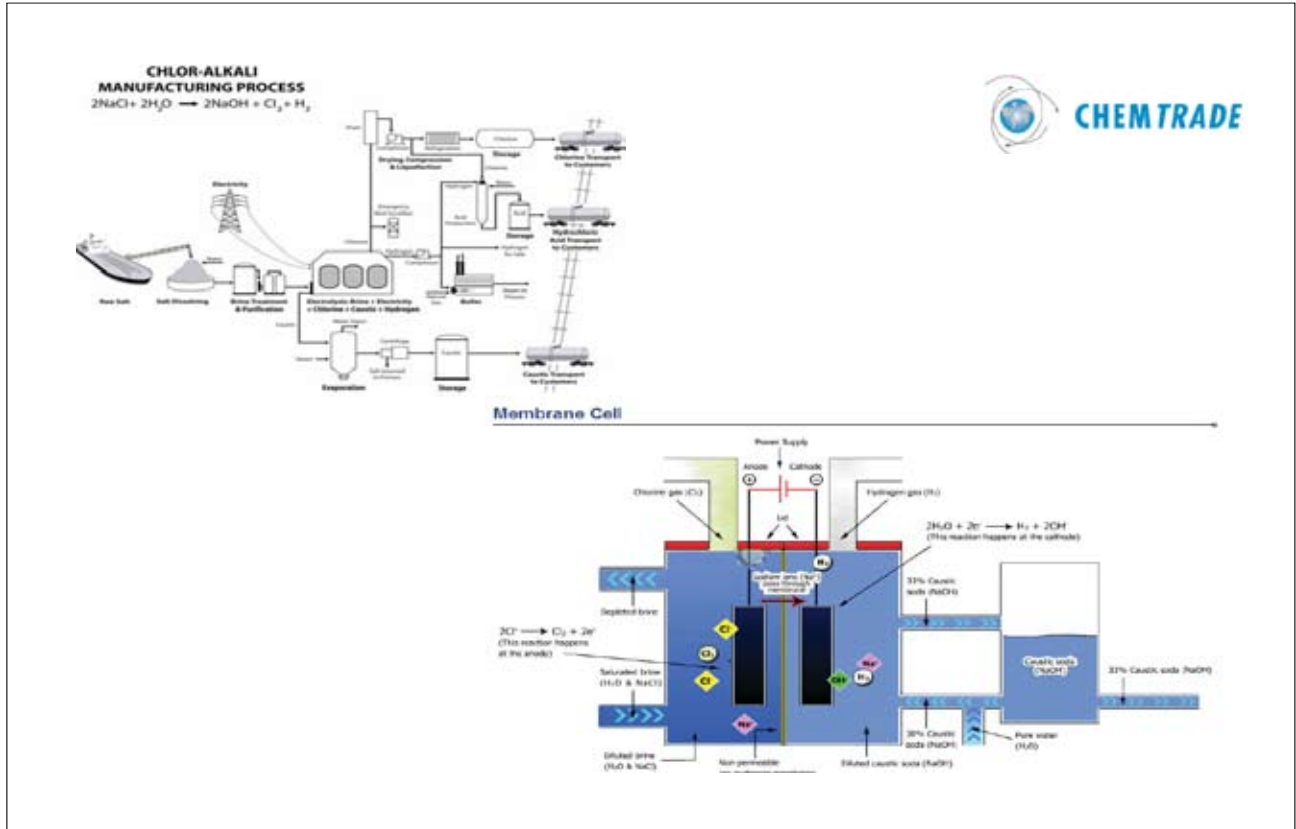
Sodium hydroxide is used in many industries, mostly as a strong chemical base in the manufacture of pulp, paper, textiles, drinking water, soaps and detergents, and as a drain cleaner. Sodium hydroxide is soluble in water, ethanol and methanol. This alkali will absorb relatively large amounts of water from the atmosphere if exposed to it, forming a liquid solution and readily absorbs moisture and carbon dioxide in air.



Chemicals: Essential To Modern Life



S. Chemtrade



Salt

Salt is supplied from the Pacific Ocean, evaporated in Mexico

Over two years seawater flows through concentration ponds, evaporating by sun and wind power to reach sodium chloride saturation

Salt is loaded for the voyage to Vancouver. Unloading 50,000 MT takes 3-4 days working 24 hours/day.

Salt is unloaded from the ship and a bulldozers pushes the salt to distribute it across the salt pad.

*. Western Canada Marine Response Corp.

CANADA'S FIRST SPILL RESPONSE ORGANIZATION

Western Canada Marine Response Corporation (WCMRC) is a Transport Canada certified organization that protects the coastal waters of British Columbia from oil spills. We're the only certified spill response organization on Canada's West Coast.

WCMRC has successfully responded to oil spills for nearly 40 years. We began operations in 1976 as an industry co-op under the name Burrard Clean and became Canada's first certified response organization under the amended Canada Shipping Act in 1995.

THE SPILL RESPONSE REGIME

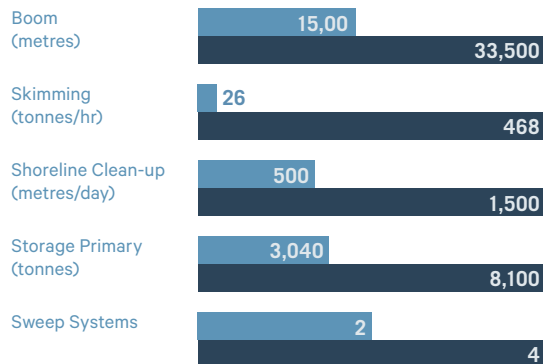
Transport Canada regulates the transportation of oil within our borders and sets the planning standards for spill response. WCMRC surpasses these standards. The standards for the entire regime are described in the Canada Shipping Act.

- **Oil volume:** Response organizations in Canada are required to have equipment to handle a 10,000-tonne spill. WCMRC has 2.6 times as much equipment in place
- **Response times:** The Canada Shipping Act also sets the upper limits for response times depending on the location and size of the spill. While our actual response times are typically less, the Canada Shipping Act standards vary from six hours inside Port Metro Vancouver's boundary to 72 hours plus travel time outside of our core response area
- **Response duration:** Response organizations are required to remove all oil from the water within 10 days of a spill. They must also be able to clean up 500 metres of shoreline per day



CANADA SHIPPING ACT REQUIREMENTS

WCMRC'S CURRENT CAPACITY



*. Western Canada Marine Response Corp.



STATE OF PREPAREDNESS

We are continually expanding our capacity and improving our ability to respond to spills:

Responders at the ready:

WCMRC trains on average 150 to 200 contractors a year

- **Core response force:** Our full-time spill responders train and drill regularly
- **Auxiliary:** WCMRC's auxiliary responders include fishermen, First Nations and marine contractors

Roles in a spill

During a spill, industry and government perform clear and specific roles managed by an Incident Command System under the authority of a Unified Command.

- **Responsible Party (Polluter):** Leads the overall response
- **Canadian Coast Guard:** Federal Monitoring Officer; has authority to take command if Responsible Party is unable or unwilling
- **Environment Canada/Ministry of Environment/Department of Fisheries and Oceans:** Provide environmental advice; assist in identifying environmental, cultural and economic priorities
- **Response Organization:** Executes the operational spill response

WCMRC's average response time in the Lower Mainland over the last 10 years is approximately 60 minutes.

Strategic positioning:

Vessels, equipment and personnel are placed at intervals along B.C.'s coastline, enabling us to respond quickly wherever a spill occurs.

- **3 equipment warehouses** in Burnaby, Duncan and Prince Rupert
- **11 equipment caches** strategically located along B.C.'s coastline
- **17 response vessels** stationed around Burrard Inlet
- **8 response vessels** stationed on Vancouver Island
- **6 response vessels** stationed in Prince Rupert

24/7 notification system:

WCMRC's responders are on-call around the clock and trained to respond to a spill at any time of day or night.

Fast boats:

- Our average response time in the Lower Mainland over the last 10 years is approximately 60 minutes
- Our latest high-speed response vessels have a top speed of 26 knots and can be anywhere within Burrard Inlet in less than 15 minutes

*. Western Canada Marine Response Corp.



The Canadian government has introduced measures that will see the creation of a response regime based on risk.

RISK-BASED RESPONSE PLANNING

Recent changes to the Canadian government’s tanker safety and spill response regime introduced measures that will see the creation of a response system based on risk, which takes the area’s geography, environmental sensitivities and oil tanker traffic volumes into consideration. The government has proposed developing new area response plans for regions with current or projected high levels of tanker traffic, including the southern tip of Vancouver Island.

THE DIGITAL GEOGRAPHIC RESPONSE PLANNING TOOL

As part of the move towards a risk-based regime, WCMRC is developing a digital Geographic Response Planning Tool to coordinate our response activities. The award-winning application is shared and accessible to all WCMRC responders, allowing us to coordinate and map the locations of our available vessels, equipment and personnel.

The app displays data in real time so that we can quickly identify priority areas that may require a protection strategy based on potential sensitivities, topography, surrounding infrastructure and

known threats and hazards. It also houses a database of site specific response plans, which provide information on booming strategies and staging points.

No spill is the same

How much oil is recovered in a spill? It is not possible to provide a standard estimate of the percentage of oil recovered from a spill. The size of the spill, oil type, response methods and the environmental conditions at the time of the incident all affect how much oil is recovered. Depending on the type of product a significant portion is lost to evaporation. Typically, mechanical systems recover about five to 25 per cent of a spill in open water conditions. WCMRC has experienced mechanical recovery rates as high as 94 per cent in sheltered water.

*. Western Canada Marine Response Corp.

THE ANATOMY OF A SPILL RESPONSE

Containment boom, support vessels, mechanical skimmers, storage and sorbents represent the fundamental equipment for on-water spill countermeasures.

1 Support vessels perform a wide variety of functions from deploying boom to transporting personnel and equipment.

2 Booms are used to limit the spread of oil, deflect oil away from sensitive areas and contain the oil for recovery. Different booms are used for different operating environments and conditions.

3 Mechanical skimmers recover spilled oil from the water's surface and pump it into a storage vessel. WCMRC uses a range of oil skimmers to recover heavy crude oils (including dilbit) and lighter petroleum products.

4 Storage Barge: WCMRC employs a number of different storage strategies including barges and floating bladders.

5 Sorbents are materials used to recover liquids through absorption. Any oil that is removed from sorbent materials must also be properly disposed of or recycled.

HOW WE RESPOND TO A SPILL

Spill response regimes worldwide are designed around a system that is scalable, allowing resources to be cascaded in from other regions and from mutual aid partners if required. Spill response follows universal and established protocols:

- **Control** the source of the spill
- **Contain** the spill with a boom while protecting environmentally, culturally and economically sensitive areas along the shoreline
- **Recover** the oil and transfer it to secure storage

MECHANICAL RECOVERY

Mechanical recovery and containment is the primary line of defense against oil spills. Recovery and containment equipment includes a variety of booms and skimmers, as well as natural and synthetic sorbent materials.

NON-MECHANICAL RECOVERY

Unlike other spill response regimes around the world, non-mechanical containment methods, such as dispersants and controlled in-situ burning, are currently not preapproved for use in Canada. The federal

Mechanical recovery and containment is the primary line of defense against oil spills.



government has proposed amending legislation to allow the use of alternate response measures and to clarify the Canadian Coast Guard's authority to use and to authorize these measures when appropriate.

Dispersants

Dispersants are chemicals that break petroleum oil into small droplets, which disperse into the water column where natural processes break them down further. The use of dispersants offshore is recognized as an efficient way of rapidly treating large areas of spilled oil, preventing the oil from reaching shorelines, birds and marine mammals. Dispersants can be applied via fixed-wing aircraft, helicopters and vessels.

Controlled In-Situ Burning

Oil can be disposed of quickly, efficiently and safely by controlled burning. This technique works most effectively on thick oil layers when the oil is contained by fire-resistant booms. In-situ burning is an effective way to rapidly remove large volumes of oil.

*. Western Canada Marine Response Corp.



WHO PAYS FOR OIL SPILL RESPONSE?

As required by law under the Canada Shipping Act, WCMRC's operations and equipment are funded by bulk oil cargo fees and by membership fees from shipping and oil handling companies that operate along the West Coast. Any vessel larger than 400 tonnes calling on a B.C. port is required to have a membership with WCMRC. Any oil transporting vessel over 150 tonnes is also required to pay membership fees, this includes barges and refueling vessels. In total, we have nearly 2,200 members.



In the event of a spill, the responsible party is required by law to pay 100% of WCMRC's cleanup costs.

In the event of a spill, the responsible party is required by law to pay 100 per cent of WCMRC's cleanup costs. All ships are required by law to have insurance that will cover these costs.

Does dilbit sink?

Bitumen from Alberta's oil sands is too thick to flow through pipelines, so it is thinned with a light petroleum product called diluent. The resulting product is known as diluted bitumen (dilbit). Because it weighs less than water, it floats and is recoverable using oil skimmers. WCMRC has successfully recovered dilbit using our existing brush skimmers.

Recent federal government tests revealed that dilbit behaves similarly to conventional crude oil. Both can sink if given the opportunity to mix with sediment. Recovering the oil before it has a chance to mix with sediment has become a critical component of our response planning.

***. Western Canada Marine Response Corp.**



INTERNATIONAL COOPERATION

If a spill were to occur in or near a trans-boundary area, a response from two countries would be required by the agencies of the two nations.

THE JOINT MARINE POLLUTION CONTINGENCY PLAN

Joint spill response between Canada and the U.S. is governed by the Joint Marine Pollution Contingency Plan treaty. Together, the United States Coast Guard and the Canadian Coast Guard manage the implementation and maintenance of the treaty, exercising response strategies every two years.

MUTUAL AID AGREEMENTS

WCMRC also maintains mutual aid agreements with response organizations in Canada and the U.S. These mutual aid agreements are formal contracts between response organizations to lend assistance across jurisdictional boundaries when required. We have mutual aid agreements with NRC, SEAPRO and the Association of Petroleum Industry Cooperative Managers (APICOM), as well an operational agreement with Eastern Canada Response Corporation (ECRC).

*. Western Canada Marine Response Corp.



W. Trans Mountain Westridge Terminal



Trans Mountain Pipeline and Marine Terminal

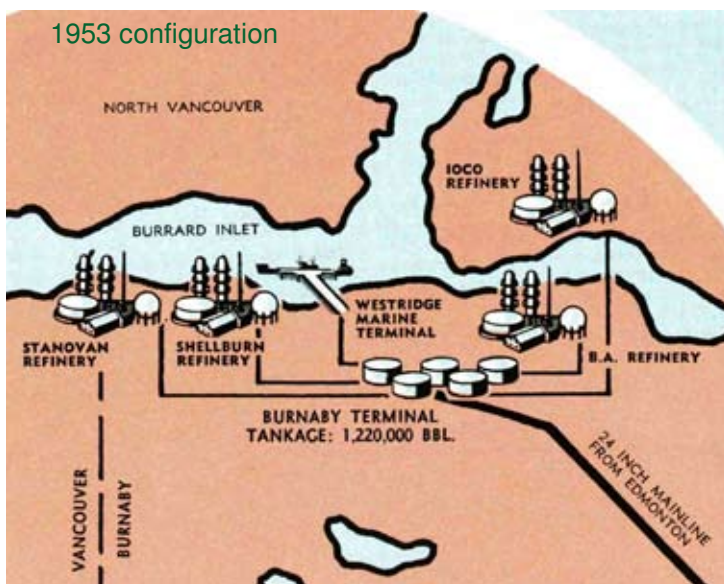
Stephanie Snider & Carol Greaves

October 25, 2019

Minerals Ed - Natural Resources Tour in Vancouver



History of Oil Trade in Burrard Inlet

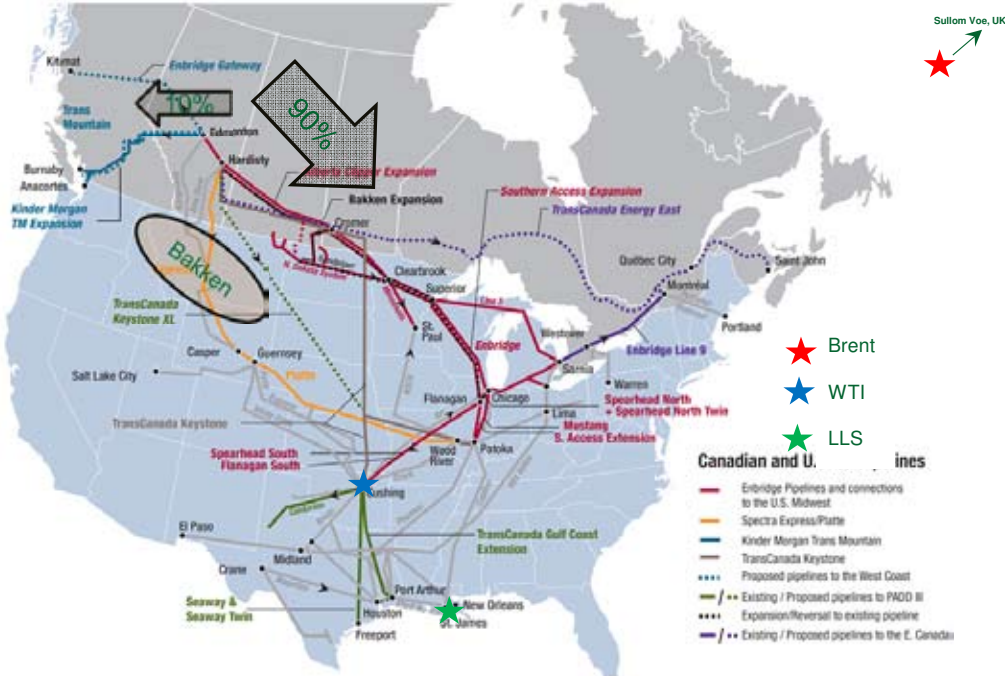


Four refineries, only one still operational as a refinery:

- Stanovan, now Parkland, still a refinery
- Shellburn, now Shell and only a terminal
- Ioco Refinery, now Imperial and only a terminal
- British American Oil Company Refinery, now Suncor and only a terminal

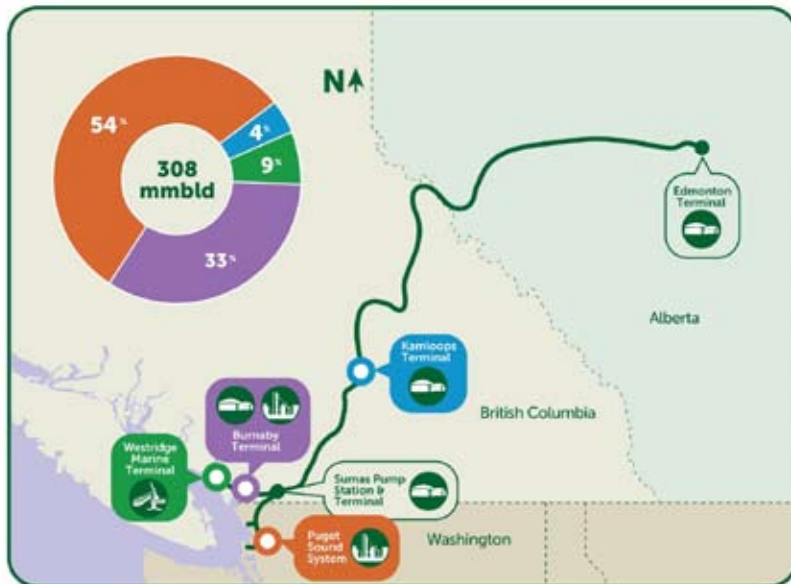
W. Trans Mountain Westridge Terminal

Crude Oil Pipelines



Source: <http://www.capp.ca/publications-and-statistics/crude-oil-forecast>

2017 Product Distribution – Current Operations



December 31, 2017

- Edmonton:**
 - Receives oil and refined products from feeder pipelines throughout Alberta
 - Control centre for the Trans Mountain Pipeline system
 - 20 storage tanks
- Kamloops:**
 - Delivery of refined products to Kamloops
 - 2 storage tanks
- Sumas:**
 - Crude oil routed to the Washington State Puget Sound pipeline
 - 6 storage tanks
- Burnaby:**
 - Delivery of crude oil and refined products to a distribution terminal and local refinery
 - Temporary storage and distribution of crude oil for Westridge Marine Terminal
 - 13 storage tanks

Westridge: In addition to shipping crude oil, the Westridge facility also receives jet fuel, which is delivered to the Vancouver International Airport through the jet fuel pipeline system

Washington: Delivery of crude oil to Washington State refineries at Anacortes, Cherry Point and Ferndale

W. Trans Mountain Westridge Terminal



Supply

- Current capacity 47.7 million litres or 300,000 barrels capacity per day



- Equivalent to a tanker truck leaving Edmonton for Vancouver every minute (34,000 litres per truck)
- Ability to transport multiple products in batches up to 350 km long travelling at 5 km/hr:



Trans Mountain Pipeline Expansion



Proposed Expansion

- Construction and operation of an expanded pipeline system
- \$7.4 billion* capital cost
- Expand capacity to 890,000 bpd
- Twin remaining 980 km of pipeline
- 193 km of reactivated pipeline
- 12 new pump stations
- 19 new storage tanks
- Three new tanker berths
- Increase in tanker traffic – not tanker size
- Must meet 157 NEB Conditions, 37 BCEAO Conditions and 57 VFPA Conditions for Westridge Marine Terminal

*Actual Project costs may change

Current Operations

- Operating since 1953
- Capacity: 300,000 bpd
- 1,150 km between Edmonton and Burnaby
- TMPL also services Ferndale and Anacortes
- Transports refined products, heavy and light crude oils including dilbit



W. Trans Mountain Westridge Terminal



Vessel Traffic

- Currently at Westridge Marine Terminal: five tankers per month
- Tanker traffic consists of a mix of Panamax and Aframax vessels
- The largest vessels calling at Westridge Marine Terminal are and will be Aframax tankers



7



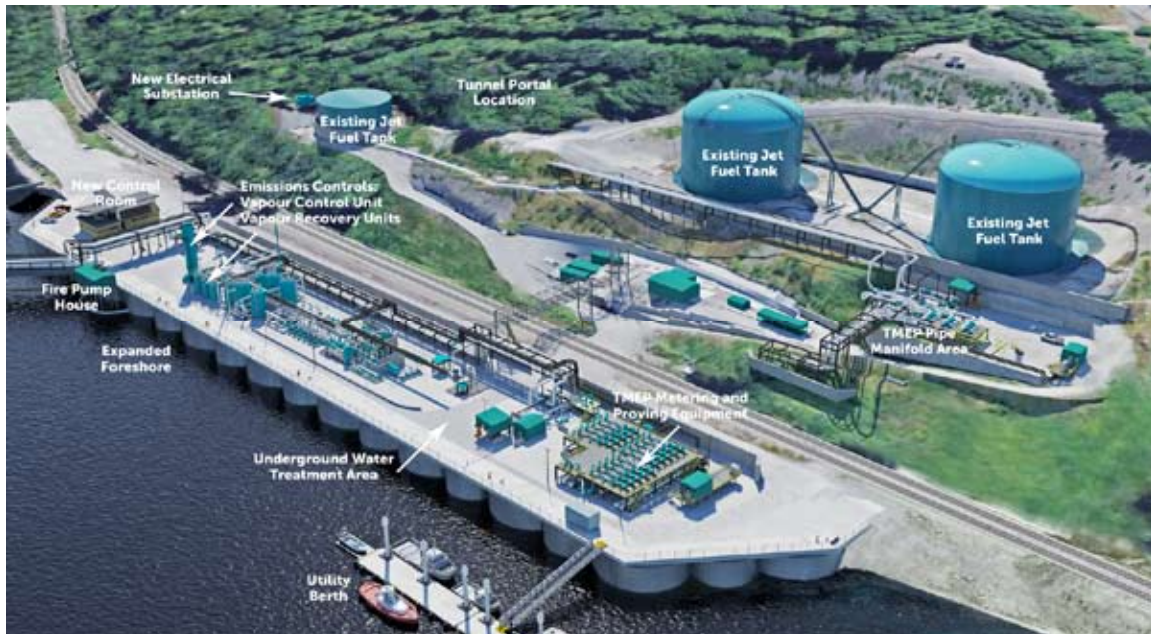
Burrard Inlet



8

W. Trans Mountain Westridge Terminal

Westridge Marine Terminal Concept



Future Westridge Marine Terminal



W. Trans Mountain Westridge Terminal

Construction Progress



March 2018

August 2018

11

Construction Progress - Foreshore



April 2018 – new firewater line



Circular Sheet Pile Cells – for Cofferdam, September 2019



Marine construction safety zone – September 2019

12

W. Trans Mountain Westridge Terminal



Construction Progress - Portal



April 2018



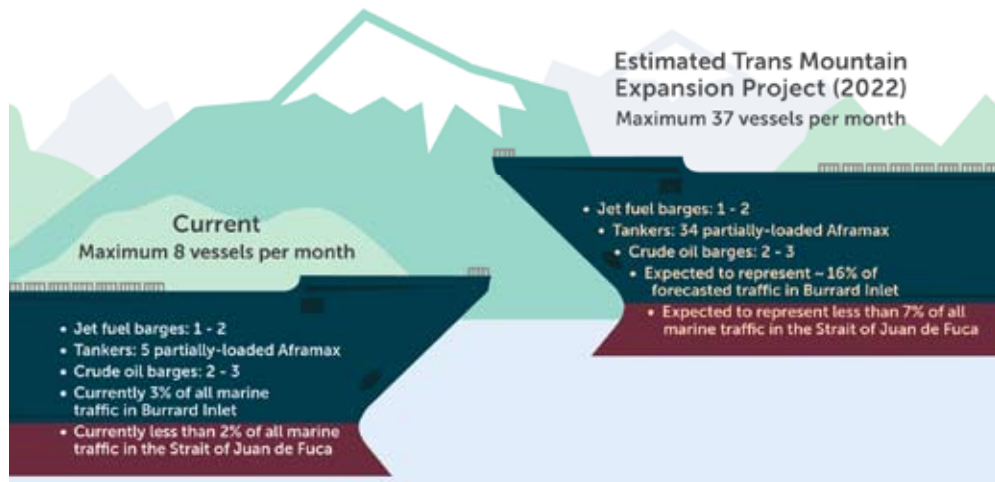
April 2018

13

Marine Traffic



Increase in vessel traffic related to Westridge Marine Terminal operations



W. Trans Mountain Westridge Terminal

Shipping Lanes



Marine Safety Enhancements



- Trans Mountain will undertake a number of enhancements to marine safety and spill response including:
 - Extending tug escorts
 - Implementing a Moving Safety Zone around laden tankers
 - Improvements to the oil spill response regime



W. Trans Mountain Westridge Terminal

Enhanced Spill Response



P. SAAM SMIT Towage



SAAM SMIT TOWAGE CANADA

CANADA



HARBOR TOWAGE OPERATION

- 1 Stewart
Served with tugs from Prince Rupert
- 2 Squamish
01 Tugboat
- 3 Vancouver
09 tugboats
- 4 Prince Rupert
07 tugboats
- 5 Fraser River
04 tugboats
- 6 Kitimat
02 Tugboats

ABOUT US

Saam Smit Towage Canada has longstanding roots in River Columbia, having operated along the Pacific coast for over 70 years. Originally known as Skookumchilly, a family owned coastal and harbour towage company, Saam Smit Towage has evolved into a multi-divisional enterprise.

Serving seven ports – Vancouver, New Westminster, Prince Rupert, Kitimat, Stewart, Squamish and Port Mellon – Saam Smit towage operates over 100 tugboats and bollard pull from five locations.

Thanks to a fleet of 100, Saam Smit Towage Canada is responsible for the required power to service a variety of vessels and continues to invest in fleet modernization to meet increased demands for tug power. For example, two new vessels are currently under construction.

With a reputation for service and reliability, Saam Smit Towage Canada invests in continual training and development of its employees. Staff are encouraged to train and develop from within, which is a testament to the company's longstanding and loyal employees. As a tribute to its family roots, regular social events are held to allow staff an opportunity team build and create memories.

To effectively establish a culture of continuous improvement in the field of health, environment, quality, and safety, Saam Smit Towage Canada maintains ISO, OHSAS and ISM certification.



CANADA
TUGER S.M. - Vancouver Port

SAAM SMIT TOWAGE CANADA

COMMERCIAL CONTACTS

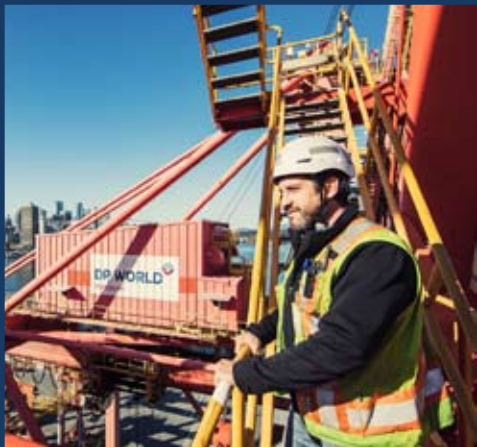
T.: +604 255 1133
 E.: towage.canada@saamsmit.com
 W.: www.saamsmit.com

D. DP World Vancouver (Centerm)

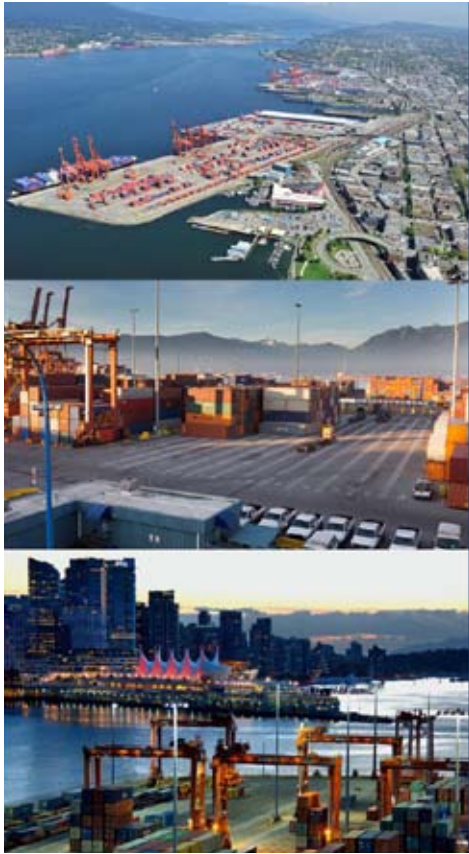


Strategically located on the south shore of the Burrard Inlet in downtown Vancouver, **DP World Vancouver** is Western Canada's premier container terminal operator and stevedore, handling a wide range of cargoes such as containers, breakbulk, yachts, roll-on roll-off and forest products. Ideally positioned for global trade, DP World Vancouver is a key gateway for trans-Pacific trade between Asia and North America. The 72 acre terminal is a multi-modal transport hub which offers excellent intermodal connections via two rail networks, CN Rail and CP Rail, as well as direct road links.

DP World is one of the largest terminal operators in the world with a portfolio of 78 marine and inland terminals supported by over 50 related businesses across six continents. With over 36,500 employees from 103 countries, DP World cultivates long-standing relationships with governments, shipping lines, importers and exporters, communities and many other important constituents of the global supply chain to add value and provide quality services today and tomorrow.



D. DP World Vancouver (Centerm)



2 container berths

With 15.5 and 15.0 meter depth, and 647 meters of total length



72 acres of terminal area

With direct connections to rail and road (12 incoming truck lanes/4 outgoing lanes)



8,000 feet of on-dock rail

Direct connection to Canadian and US markets via two rail networks



546 reefer plugs

To ensure perishable cargoes are maintained at proper temperatures



7 quay cranes

To handle the largest container ships, three Panamax cranes, 22 wide, twin 20 capable, a Fantuzzi post Panamax crane, 18 wide, and two MGM, 17 wide cranes



19 RTGs

19 one-over-five Rubber Tire Gantries for fast, flexible container handling over the rail and in the yard

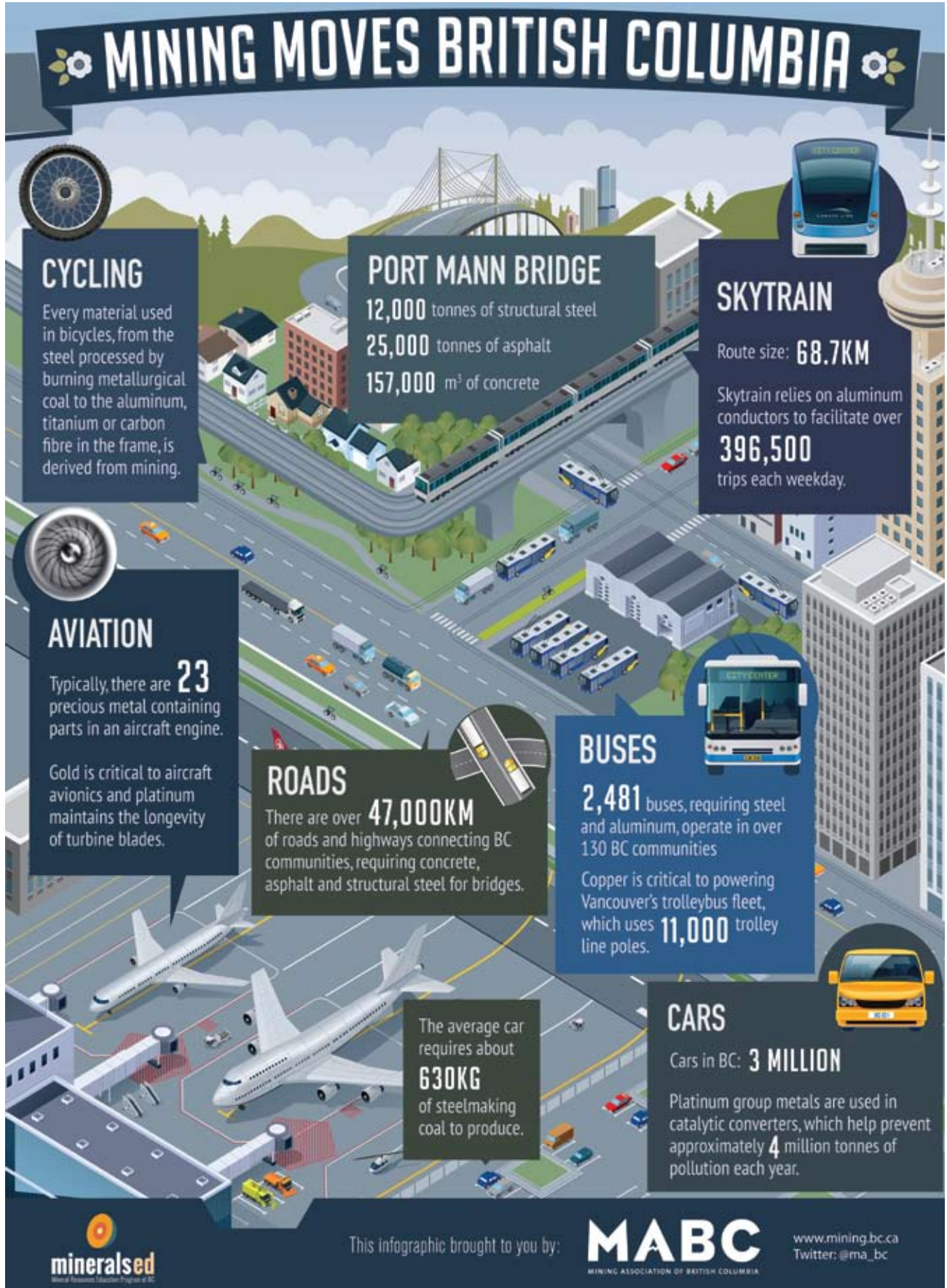
We simplify trade.

As a new world takes shape and supply chains become more complex, we simplify trade. Yes, we have modern, strategically positioned marine terminals and logistics parks — but what sets us apart is our team of experts and our unceasing commitment to excellence. We improve efficiency, we solve problems, we look ahead, and we continuously look for ways to make your world a simpler one. For us, going beyond is a brand of service that has made us a leader the world over.



DP World Vancouver

Tabare Dominguez
 777 Centennial Road
 Vancouver, BC V6A 1A3
 T. 604-252-2486
 E. Tabare.Dominguez@dpworld.ca
 www.dpworld.ca



Mining Association of British Columbia

MINING ENTERTAINS BRITISH COLUMBIA

PEAK 2 PEAK

For Whistler's Peak 2 Peak gondola, 4,000 cubic meters of concrete was used for the footings, platforms, masts, and columns.

36,610,439 TONNES of construction aggregates, like sand and stone, were produced in B.C. during 2012.

SKATING

To glide across the ice, hockey players and recreational skaters skate on steel.

The steel in hockey blades is formed from metallurgical coal, which represents **MORE THAN 90%** of the coal produced in B.C.

MUSIC

Most metal acoustic guitar strings are typically wound using bronze. Bronze is an alloy consisting primarily of copper.

Copper generated revenues of **\$1.8B** in B.C. (2012)

GOLFING

Titanium and its alloys are used for manufacturing wood golf heads for its lightweight and high-strength characteristics.

CAMPING

Tent poles are often made up of tubes of fiberglass, which comprises of silica, limestone, kaolin clay, fluorspar, colemanite, and dolomite.

Industrial and construction minerals like these generated nearly **\$700M** in revenue. (2012)

FISHING

Graphite is the most popular choice for fishing rods because of its lightweight and ability to offer further and more accurate casts.

mineralsed
Mineral Resources Education Program of BC

This infographic brought to you by: **MABC**
MINING ASSOCIATION OF BRITISH COLUMBIA

www.mining.bc.ca
Twitter: @ma_bc

Natural Resources in Vancouver Harbour Cruise

NOTES

Natural Resources in Vancouver Harbour Cruise

NOTES

Natural Resources in Vancouver Harbour Cruise

NOTES

Vancouver Harbour Port Operations Legend

Map	Terminal	Type	Products
A	Kinder Morgan Canada Vancouver Wharves	Bulk	mineral concentrate liquids, sulphur, fertilizer, specialty agri-products, dry bulk commodities
B	Fibreco Export	Bulk	wood pellets, canola pellets
C	Canada Place	Cruise	Vancouver Fraser Port Authority
D	DP World (Centerm)	Container	cargo, forest products
E	Seaspan	Ship Yard	coastal and deep-sea transportation, bunkering, ship repair and shipbuilding services
F	Ballantyne Pier	Cruise	
G	Lantic Inc. (Rogers)	Bulk	raw & sugar imports
H	Richardson International	Bulk	canola, cereal grains (wheat, barley, rye, flax), grain feed products
I	Alliance Grain Terminal	Bulk	farmer-directed-agri-business: grain, grain products
J	Cargill	Bulk	wheat, durum, canola, barley, grain by-products
K	Vanterm	Container	cargo, project cargo, bulk oils
L	Neptune Bulk Terminals	Bulk	metallurgical coal, potash and phosphate rock
M	West Coast Reduction	Bulk	rendering plants of fat & oil products, inedible tallow, feather meal, poultry meal, blood meal, fish meal, canola oil, fish oil
N	Pacific Elevators (Viterra)	Bulk	canola, flax, peas, agri-forage & by-products
O	Western Stevedoring (Lynnterm)	Breakbulk	consolidation centre for forest products, steel breakbulk, wood pulp, paper, lumber, panel products, logs, steel products, project cargo, machinery
P	SAAM SMIT Towage	Towing	tugboats, harbour towage, terminal services, salvage, transport & heavy lift & subsea
Q	Univar Canada Terminal	Bulk	chemical distributor: caustic soda, ethylene glycol
R	Cascadia Elevator (Viterra)	Bulk	wheat, durum, canola, barley, rye, oats, by-products
S	Chemtrade Electrochem Inc.	Bulk	imports sea salt, exports caustic soda, sodium chlorate (for bleaching process in paper manufacturing)
T	Allied Shipbuilders	Ship Yard	shipbuilding, ship repair, marine engineering
U	Chevron (Stanovan)	Bulk	petroleum products
V	Shellburn	Bulk	petroleum products
W	Trans Mountain Westridge Marine Terminal	Bulk	imports/stores aviation turbine fuel for YVR (transports it via jet fuel pipeline), crude petroleum petroleum products
X	Petro-Canada (Suncor)	Bulk	petroleum products
Y	loco	Bulk	heavy fuel oil, intermediate fuel oil, marine gas fuel
Z	Pacific Coast Terminals	Bulk	Sultran sulphur, ethylene glycol
*	Western Canada Marine Response Corp.	Warehouse & Barge	Equipment and personnel to respond to and mitigate oil and propulsion fuel spills in marine waters

All the operations in this guidebook are denoted by a letter that corresponds to this table and the labels on the map.

Map and Table modified from www.portmetrovancover.com.

Vancouver Harbour Port Operations Location Map

