Natural Resources in Vancouver Harbour Cruise 2017

A collaboration between MineralsEd and North Shore Waterfront Industrial Association members in support of the professional development of teachers.
October 20th, 2017

Faciliated by

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and

Roxie Giles, North Shore Waterfront Industrial Association

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Mineral Resources Education Program of BC

Contents

Introduction

Welcome to the 2017 *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!

- Tim Ayling, Director of Sales and Marketing, Kinder Morgan Vancouver Wharves
- Dax Perrault, Logistics, SAAM SMIT Towage
- Brenda Stretch, General Manager, Cargill
- Scott Jones, VP Engineering, Taseko Mines
- Chris Poskitt, Lab Technician, Chemtrade Electrochem
- Glenn Dempster, Project Manager, Fibreco
- Lisa Dooling, Director of Community & Stakeholder Engagement, Neptune Terminals
- John Parker-Jervis, Supervisor, Corporate Communications, Port of Vancouver
- Lisa Fox, Educational Outreach Assistant, Community and Aboriginal Affairs, Port of Vancouver
- Stephanie Snider, Stakeholder Management and Communications, Trans Mountain (Kinder Morgan Westridge)
- Michael Lowry, Manager Communications, Western Canada Marine Response

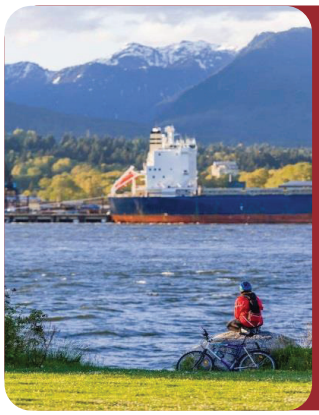
Thank-you also to our partner-teachers, Bruce Kiloh, Patty Kiloh, and Roxie Giles who have guided this program and have facilitated this unique professional development event. We hope you have an enjoyable learning experience.

Sheila Stenzel, Director
MineralsEd

C. Port of Vancouver

PORT of vancouver

About Us



Vancouver Fraser Port Authority

The Vancouver Fraser Port Authority is responsible for the stewardship of federal port lands in and around Vancouver, British Columbia.

Like all Canadian port authorities the port authority was established by the Government of Canada pursuant to the *Canada Marine Act*, and is accountable to the federal Minister of Transport. Our mandate is to facilitate Canada's trade objectives, ensuring goods are moved safely, while protecting the environment and considering local communities.

Jurisdiction

From Roberts Bank and the Fraser River up to Burrard Inlet, our jurisdiction borders 16 municipalities and interests the asserted and established territories and treaty lands of several Coast Salish First Nations. We are responsible for managing over 16,000 hectares of water, over 1,000 hectares of land and assets along hundreds of kilometres of shoreline.

16 municipalities

Our roles and responsibilities

In fulfilling our mandate under the *Canada Marine Act*, we carry out a variety of duties:

- **Safety and security** of all land and waters, in collaboration with other agencies, using technology and land and water patrols.
- **Permitting** of all projects proposed for the use of federal port lands.
- **Environmental reviews** under the *Canadian Environmental Assessment Act*, 2012, for projects on port lands.
- **Planning** including general future use of port lands, long-term economic forecasting, strategic plans and performance evaluation.
- **Real estate management** including negotiation of all tenant leases and purchase and sale of holdings.
- **Transportation** operations in collaboration with all terminal operators, railroads and shippers to ensure efficient goods movement throughout port lands and waters.
- **Infrastructure development** to support growth and efficient operations, including collaboration with government and others on projects beyond port lands.
- **Customer services** with trade partners around the world, demonstrating Port Metro Vancouver's competitive advantage.
- **Communication and collaboration** with port stakeholders including local, provincial, federal and international governments, local communities, trade partners, Aboriginal groups and the general public.

C. Port of Vancouver

Port overview

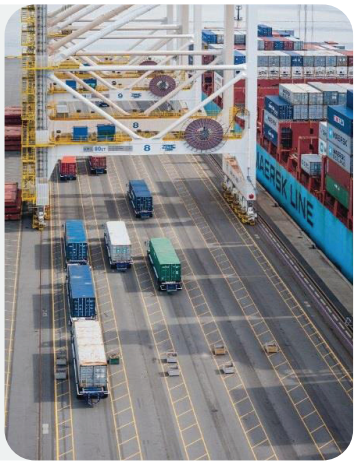
The Port of Vancouver is Canada's largest port, and offers the broadest range of cargo-handling options of any port in North America.

- The most diversified port in North America, operating across five business sectors: automobiles, breakbulk, bulk, container and cruise.
- Third largest port in North America in terms of total tonnage moved in and out of the port.
- Almost 95 per cent of the port's total volume serves Canadian import and export markets.
- Home to 27 major marine cargo terminals, three Class 1 railways, and a full range of facilities and services to the international shipping community.

Economic benefits

According to the Port of Vancouver 2016 Economic Impact Study, operations directly related to the port creates:

- 115,300 Canadian jobs
- $11.9 billion in gross domestic product (GDP)
- $24.2 billion in economic output
- $7 billion in wages
- $67,000 average wage for direct job compared to the $44,000 average wage in Canada
- $1.4 billion per year in tax revenues



Contact: http://www.portvancouver.com/contact-us/
Vancouver Fraser Port Authority, Head office: 100 The Pointe, 999 Canada Place, Vancouver, BC V6C 3T4
Phone: 604.665.9000 Fax: 1.866.284.4271 | **Delta Community Office**, Trenant Park Shopping Centre, 5225A Ladner Trunk Road, Delta, BC V4K 1W4, Phone: 604.665.9635

A. Kinder Morgan Vancouver Wharves

VANCOUVER WHARVES FACT SHEET

September 2014

KINDER MORGAN

FACILITY DESCRIPTION

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

In operation since 1959, the 125-acre terminal handles over four million tonnes of inbound and outbound cargo products annually. The facility consists of five vessel berths capable of handling Panamax size vessels, with significant rail infrastructure, dry bulk and liquid storage, and material handling systems. It has a storage capacity of one million tonnes of bulk cargo and 250,000 barrels of petroleum products.

Vancouver Wharves handles mineral concentrates, sulphur, agricultural products and liquids. By revenue, concentrates and sulphur comprise the largest share, followed by agri-products, liquids, and other commodities.

SITE IMPROVEMENTS & EXPANSION

Since 2007, Vancouver Wharves has been part of Kinder Morgan. Kinder Morgan Canada Terminals (KMCT) has a long term lease on the property and acquired the Vancouver Wharves assets from BC Rail Corporation. Since its purchase, KMCT has completed $150 million worth of facility expansion and environmental improvements at the site. These improvements include removing assets from the Pacific Environmental Centre sublease lands, constructing an indoor mineral concentrate rail car handling system and installing a new, state-of-the-art concentrate ship loader.

Other recent infrastructure improvements include the reactivation of liquid products facilities that provide access by ship, rail, and truck for diesel and jet fuel.

Mineral concentrate ship loader

A. Kinder Morgan Vancouver Wharves

VANCOUVER WHARVES FACT SHEET

Vancouver Wharves is well positioned for further expansion. The facility is ideally located to take advantage of growing trade with international markets. Future potential projects include additional liquids and bulk expansion.

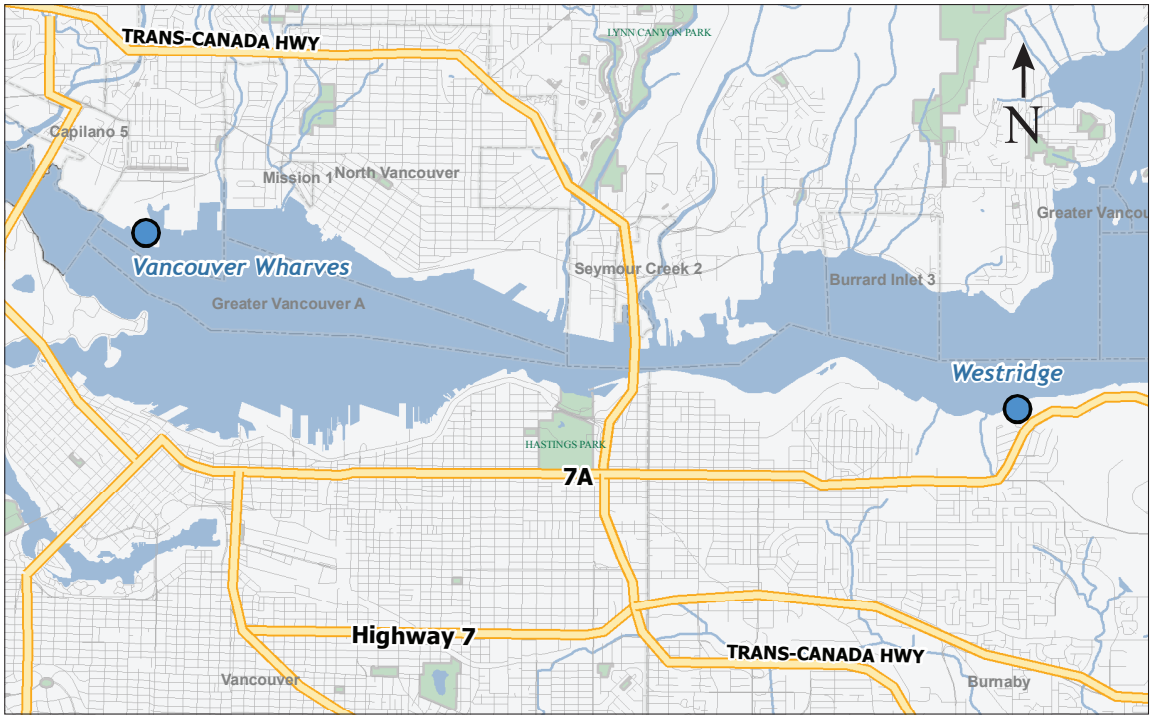
COMPANY BACKGROUND

Kinder Morgan is the largest independent bulk terminal operator in North America, transporting a variety of products for its customers through marine and pipeline networks throughout North America. *For more information about Kinder Morgan, visit www.kindermorgan.com.*

Vancouver Wharves is one of two Kinder Morgan facilities on Burrard Inlet. Kinder Morgan also handles inbound and outbound petroleum products at its Westridge Marine Terminal on the south shore of Burrard Inlet in Burnaby.

Port Metro Vancouver has 16 bulk terminals in the Vancouver, BC area and is the third busiest port in North America.

For more information about Vancouver Wharves, contact Tim Ayling at (604) 904-7206 or tim_ayling@kindermorgan.com



KINDER MORGAN

A. Kinder Morgan Vancouver Wharves

B. Fibreco

Fibreco Export Inc. is a leading global supplier of wood chips and the largest bio mass wood pellet terminal in the world. The Vancouver terminal ships, handles, stores and trades wood chips, providing quality products and strategic advantages in competitive markets in B.C., the U.S., Asia and Europe.

Fibreco was founded in 1977 by a group of over thirty sawmill companies to export surplus B.C. wood chips to overseas pulp and paper manufacturing markets.

Now, Fibreco provides our customers with a low cost, efficient supply chain from source to vessel. Our coordination of the logistics of rail delivery, fibre storage, and loading of barges and deep sea vessels is a key part of our business and provides a high level of value added service to ensure delivery and quality. This allows Fibreco and its wood pellet and wood chip handling customers to efficiently deliver quality products to domestic and international customers.

Our location is integral in our success. B.C. sustainably manages its forest resources, ensuring long-term supply of a wide range of products. Efficient rail transportation is nearby, and allows Fibreco to receive and handle wood products from all parts of B.C. The port also provides us with some of the fastest access to Asian markets from North America, with sailing times between 13 and 15 days.

COMMODITIES

WOOD PELLETS

- Wood by-product that is burned for heat and energy as biomass fuel
- Clean, renewable energy resource
- High density and uniform shape
- Switching from coal to wood pellets reduces greenhouse gas emissions

WOOD CHIPS

- By-product of sawmills or produced by whole log chippers
- Contain less than 1% bark
- Contain less than 1% rot by green weight
- Currently offer three different types of wood chips from B.C.'s coastal and interior regions: SPF, Lodgepole Pine and Douglas Fir

B. Fibreco


PRODUCTS & SERVICES
Fibreco started shipments of wood chips in 1977 to Europe and Japan, and continues to ship internationally today. We manage the supply and distribution of wood chips, as well as wood pellets.
Besides the export business, Fibreco sells wood chips to domestic pulp mills and provides custom handling of customers' own wood chips on a fee for service basis. Fibreco also specializes in the sale, marketing and trading of wood chips by providing competitive markets for our suppliers.
In 2005, Fibreco entered the wood pellet terminal handling business and is now the largest terminal handler of export wood pellets in the world. Fibreco has expanded wood pellet silos to accommodate new business and storage and is part of a growing industry that is providing jobs and environmental benefits.
TERMINAL OPERATIONS
BULK FACILITY
23 ACRES LAND
14.3 ACRES WATERLOT
STORING CAPACITY
50K BDMTS OF WOOD CHIP STORAGE
45K TONNES OF WOOD PELLET STORAGE
SHIP BERTH
HANDLE VESSELS UP TO 200M LONG WITH 12.5M DRAFT
LOADED UNDER PNEUMATIC PRESSURE AT
1000 MTPH WOOD CHIPS
1650 MTPH WOOD PELLETS
RAIL CAPACITY
EFFICIENT RAIL TRANSPORTATION ALLOWS FIBRECO TO RECEIVE AND HANDLE PRODUCTS FROM ALL OVER CANADA AND U.S.
CN RAIL PICKS UP LOADED CARS AT THE SAWMILL SITE AND TRANSPORTS THEM TO OUR TERMINAL
EQUIPMENT
3 KOMATSU D375A BULLDOZERS
3 CAT 980H FRONT END LOADERS/ RAILCAR MOVER
1 TEREX TXL 400 FRONT END LOADER
1 BOBCAT

B. Fibreco


OUR FACILITY
Fibreco's North Vancouver location receives wood chip and wood pellet shipments from both rail and ship to provide products for local and international customers. With expanded storage silos, and expansive land and water space, Fibreco provides customers with ample storage options.
WOOD PELLET SHIP AT LOADING DOCK
SHIPLOADER
WOOD CHIP PILES
CONVEYORS/SLINGERS
WOOD CHIP BARGE LOADER/OFF LOADER
WOOD CHIP/WOOD PELLET DUMPER
WOOD PELLET STORAGE SHED CAPACITY: 18,000 TONNES
PELLET STORAGE SILOS CAPACITY: 27,000 TONNES
RAIL CARS BRINGING WOOD CHIPS AND WOOD PELLETS: 10 TRACKS & 114 CARS
FIBRECO
1209 McKeen Avenue, North Vancouver, B.C.
t. 604.980.6543
f. 604.984.2593

J. Cargill

Cargill at a glance

143,000 employees

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 nearly 150 years of experience. We have 145,000 employees in 67 countries who are committed to feeding the world in a responsible way, reducing environmental impact and improving the communities where we live and work.

Working in **67** countries

150 years of experience

AGRICULTURE

We buy, process and distribute grain, oilseeds and other commodities to makers of food and animal nutrition products. We also provide crop and livestock producers with farm services and products.

FOOD

We provide food and beverage manufacturers, foodservice companies and retailers with high-quality ingredients, meat and poultry products, and health-promoting ingredients.

INDUSTRIAL

Cargill serves industrial users of energy, salt, starch and steel products. We also develop and market sustainable products made from agricultural feedstocks.

FINANCIAL

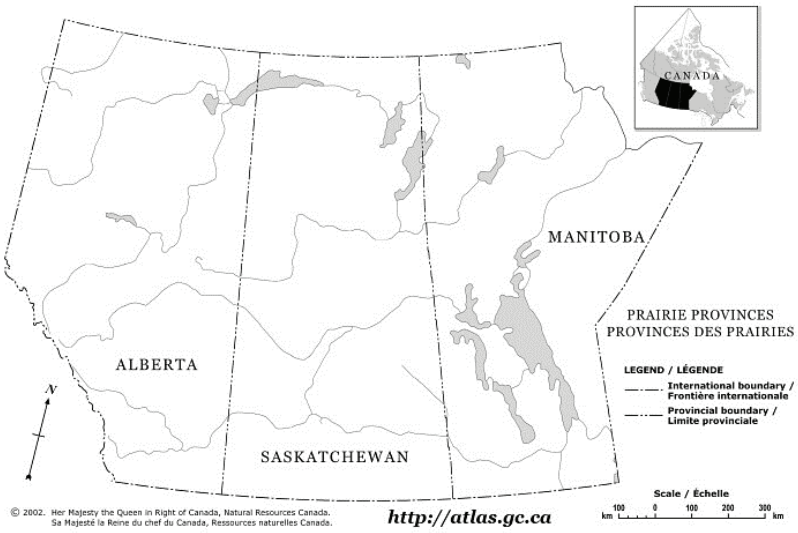
We provide our agricultural, food, financial and energy customers around the world with risk management and financial solutions.

Business's in Canada

- Protein
- Canola Oil processing
- Animal feed (Purina)
- Chocolate
- Salt
- Flour processing
- Grain handling

J. Cargill

Where do we grow the grain?



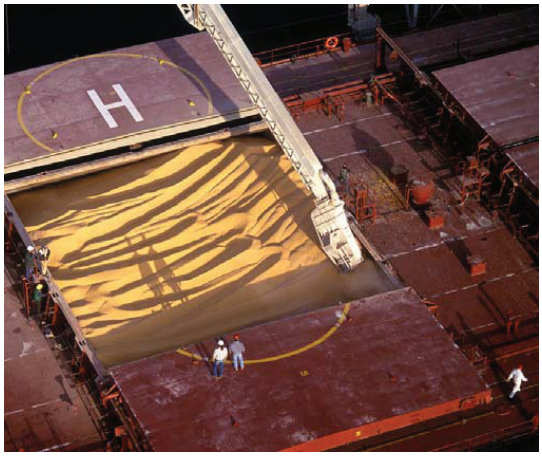
J. Cargill

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

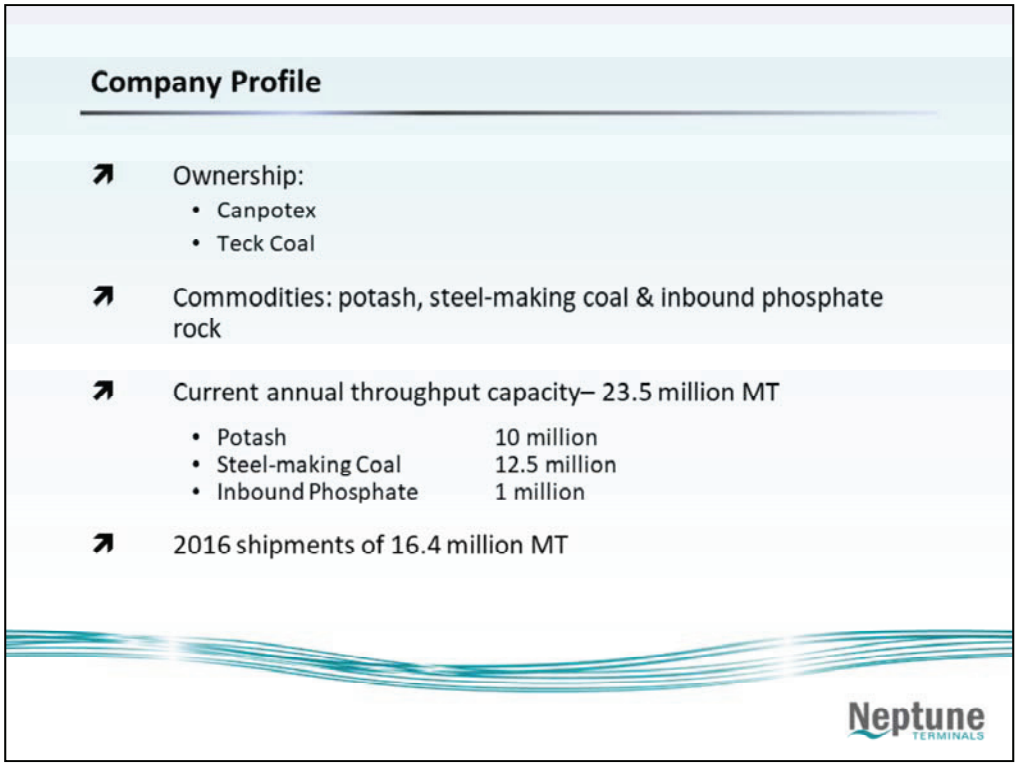
L. Neptune Terminals

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

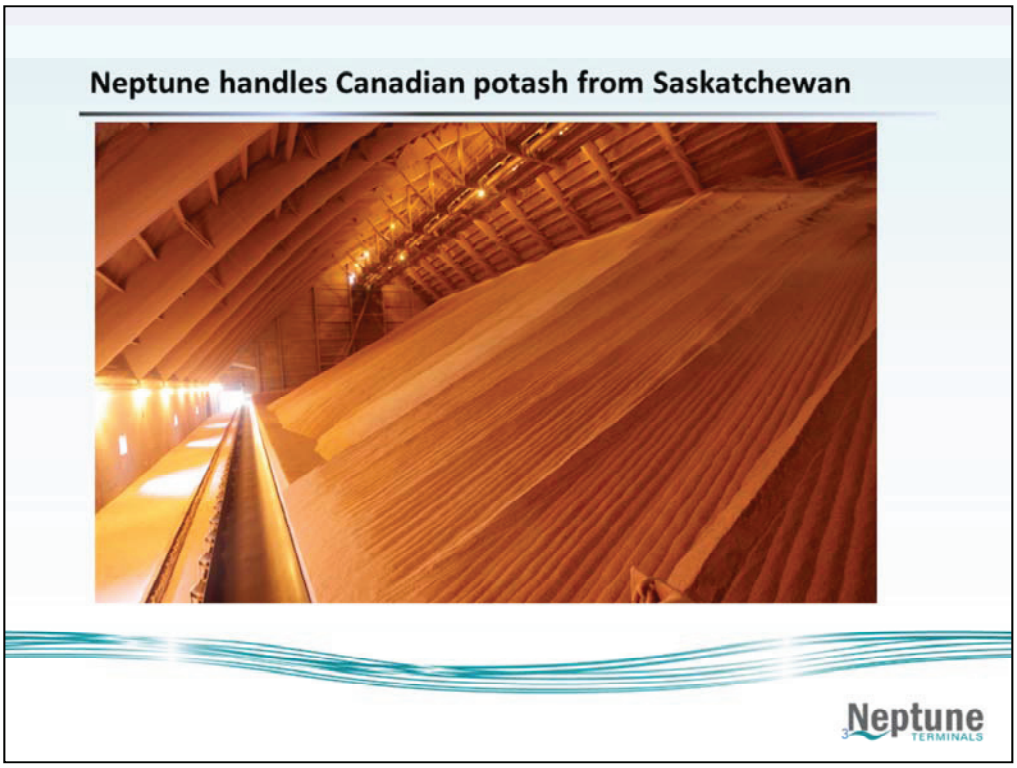
We are located in North Vancouver, on a 74 acre site leased from the Port of Vancouver.

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.



L. Neptune Terminals

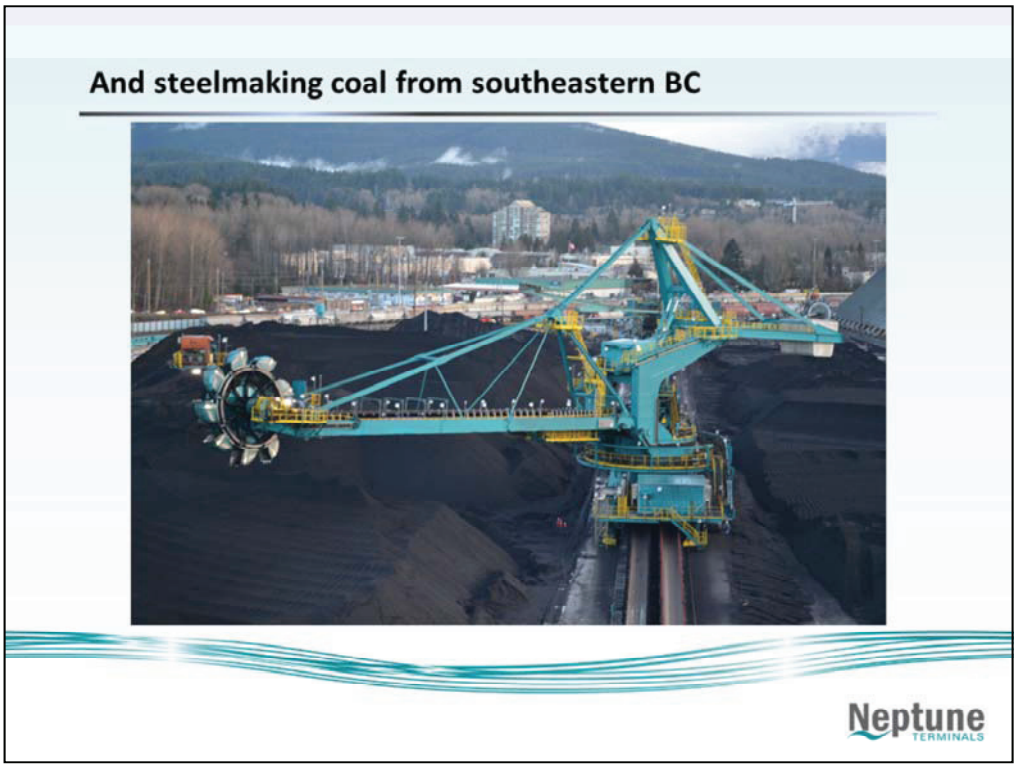


Potash is mined by PotashCorp, Mosaic and Agrium in Saskatchewan, which has about ¼ of the world's supply.

Most potash is used as a water soluble crop nutrient that is crucial to agriculture worldwide. It is also 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

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.

We have invested over $400 million in the last five years in terminal improvements.

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

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

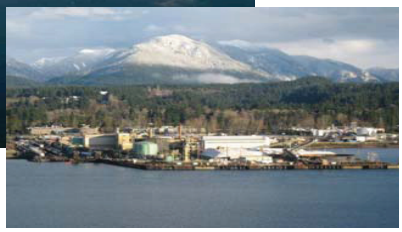
Office: 604-983-4407

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

S. Chemtrade

CHEMTRADE

North Vancouver Plant

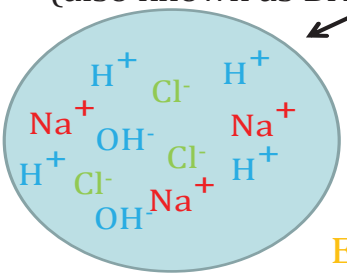


CHEMTRADE

We mix Salt ($NaCl$)

1

and Water (H_2O) to make...Salt Water (also known as Brine)



2

We Add Electricity

And we make!

- $NaOH$ (Sodium Hydroxide)
- Cl_2 (Chlorine)
- H_2 (Hydrogen)

3

S. Chemtrade

Uses…

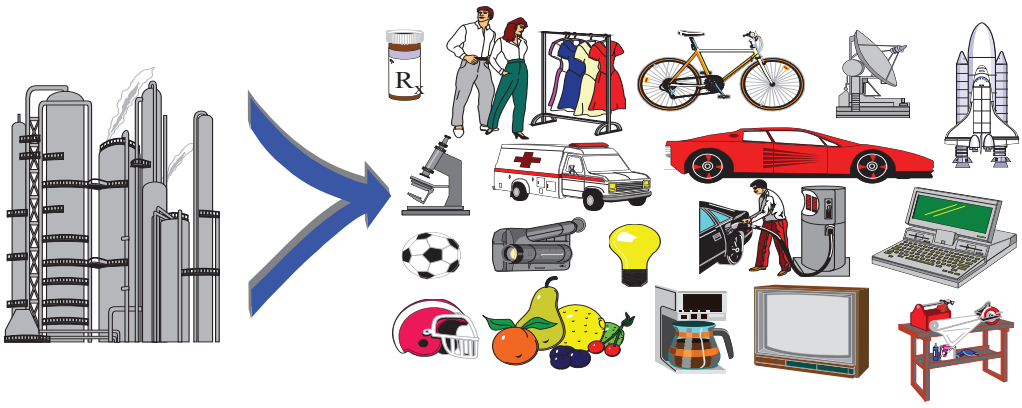
Chlorine has a huge variety of uses; as a disinfectant and purifier, in plastics and polymers, bleach, solvents, agrochemicals and pharmaceuticals, as well as an intermediate in manufacturing other substances where it is not contained in the final product. Chlorine is used worldwide to purify water supply 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.

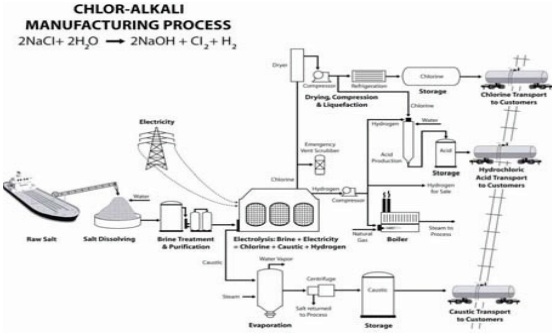
Sodium hydroxide is used in many industries, mostly as a strong chemical base in the manufacture of pulp, paper, textiles, drinking water, soaps and detergents, and as a drain cleaner. Sodium hydroxide is soluble in water, ethanol and methanol. This alkali will absorb relatively large amounts of water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

CHEMTRADE & Responsible Care

Chemicals: Essential To Modern Life

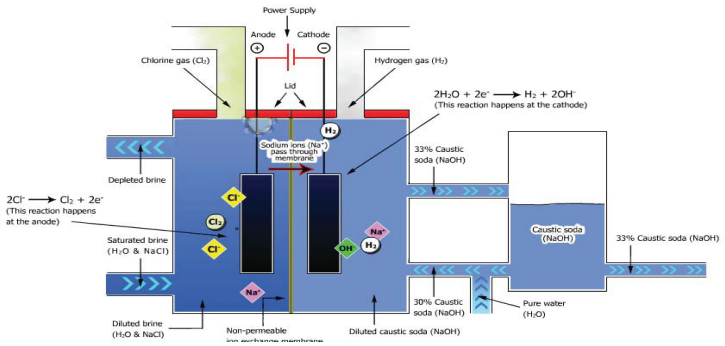


S. Chemtrade



CHEMTRADE

Membrane Cell



CHEMTRADE

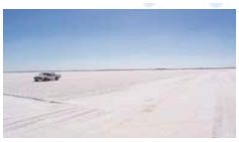
Salt

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

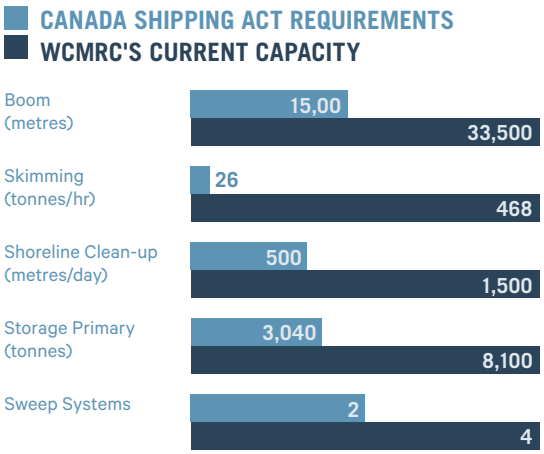
Western Canada Marine Response Corporation (WCMRC) is a Transport Canada certified organization that protects the coastal waters of British Columbia from oil spills. We're the only certified spill response organization on Canada's West Coast.

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



01

*. 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*

02

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.

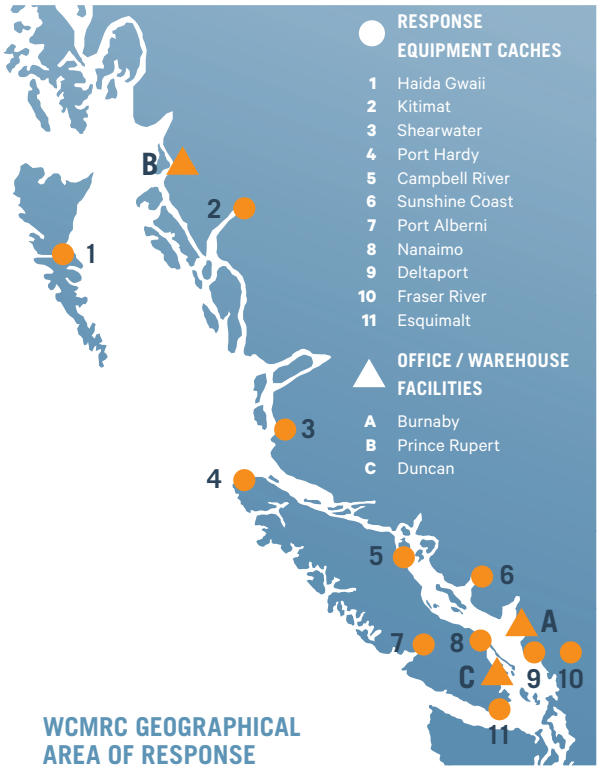
- ***3 equipment warehouses*** *in Burnaby, Duncan and Prince Rupert*
- ***11 equipment caches*** *strategically located along B.C.'s coastline*
- ***17 response vessels*** *stationed around Burrard Inlet*
- ***8 response vessels*** *stationed on Vancouver Island*
- ***6 response vessels*** *stationed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



WCMRC GEOGRAPHICAL AREA OF RESPONSE

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.

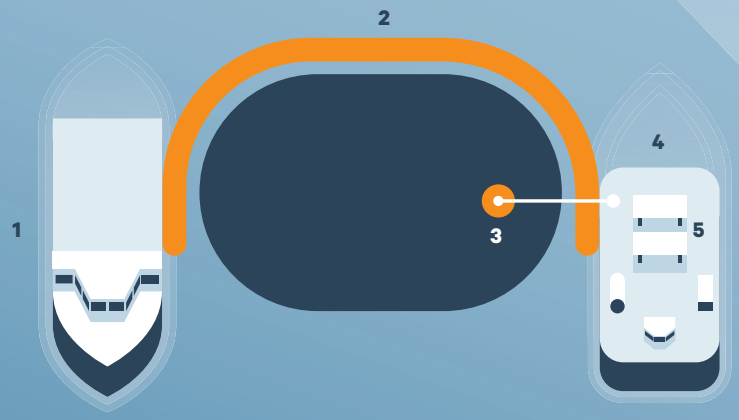
THE ANATOMY OF A SPILL RESPONSE

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 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.

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

CONTROL **CONTAIN** **RECOVER**

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.

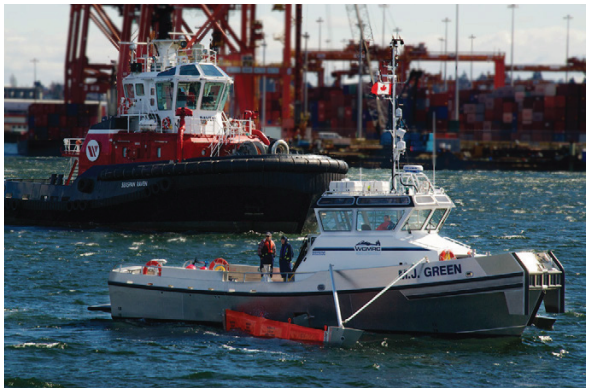
Controlled In-Situ Burning

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.



05

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 (Kinder Morgan Westridge)

Trans Mountain Pipeline and Marine Terminal

MineralsEd
October 20, 2017

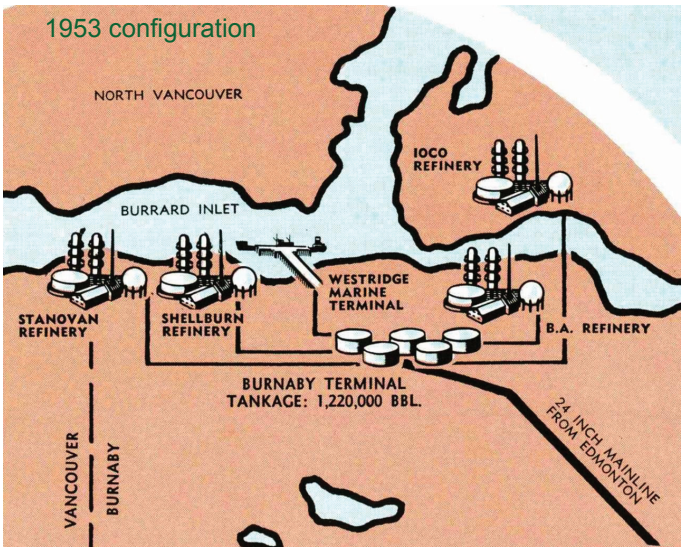
TRANSMOUNTAIN

KINDER MORGAN CANADA LIMITED

1

History of Oil Trade in Burrard Inlet

TRANSMOUNTAIN

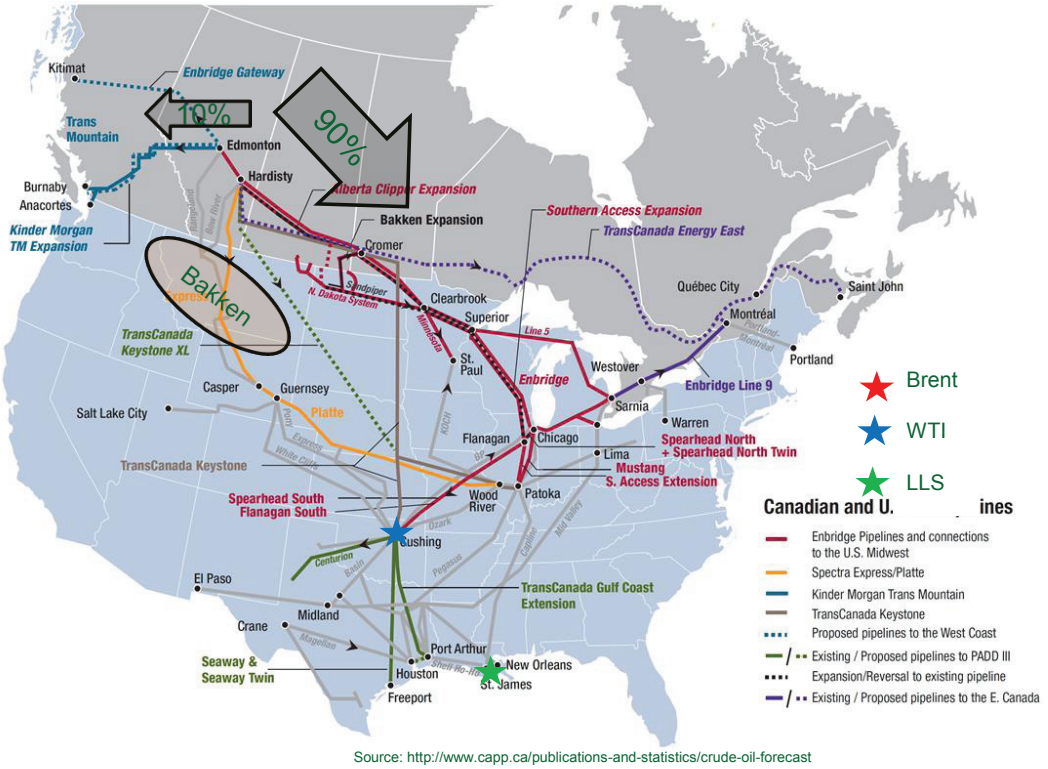


Four refineries, only one still operational as a refinery:

- Stanovan, now Chevron still 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 (Kinder Morgan Westridge)

Crude Oil Pipelines



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

Crude Oil Markets

PADD V

Most of the crude arrives by tanker from Alaska and elsewhere.

Alaskan production is declining:

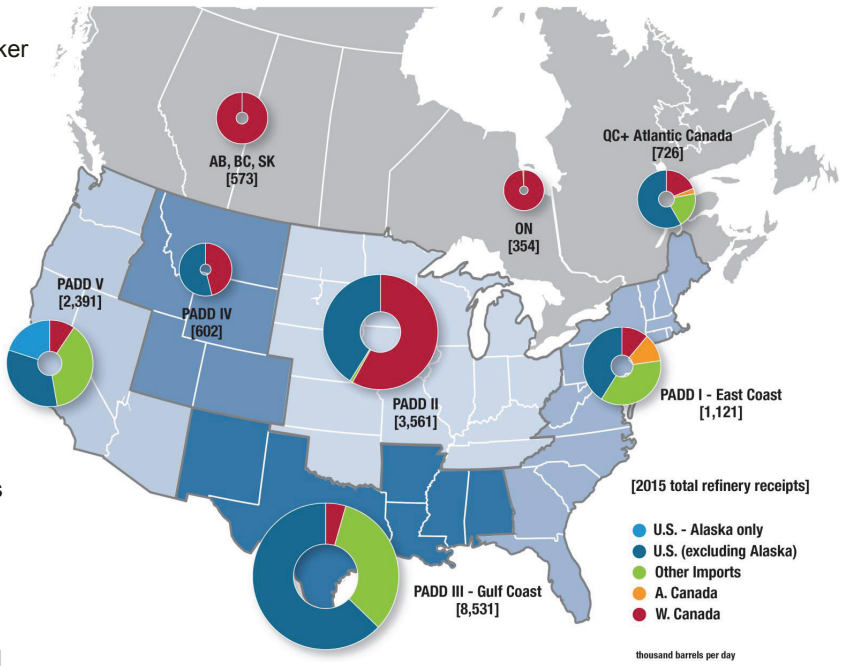
- 1988 - 2,000,000 b/d
- 2015 - 482,800 b/d

Washington

- 5 refineries
- Refining capacity - 634,000 b/d.
- Primary destination for Cdn crude are the Ferndale/Anacortes complexes.
- Cdn crude accounts for less than 25% of total supply to WA.

California

- 16 refineries
- Refining capacity 1,900 b/d
- Cdn crude is not currently a significant source of supply



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

W. Trans Mountain (Kinder Morgan Westridge)

Trans Mountain Pipeline

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

Proposed Expansion

Construction and operation of an expanded pipeline system

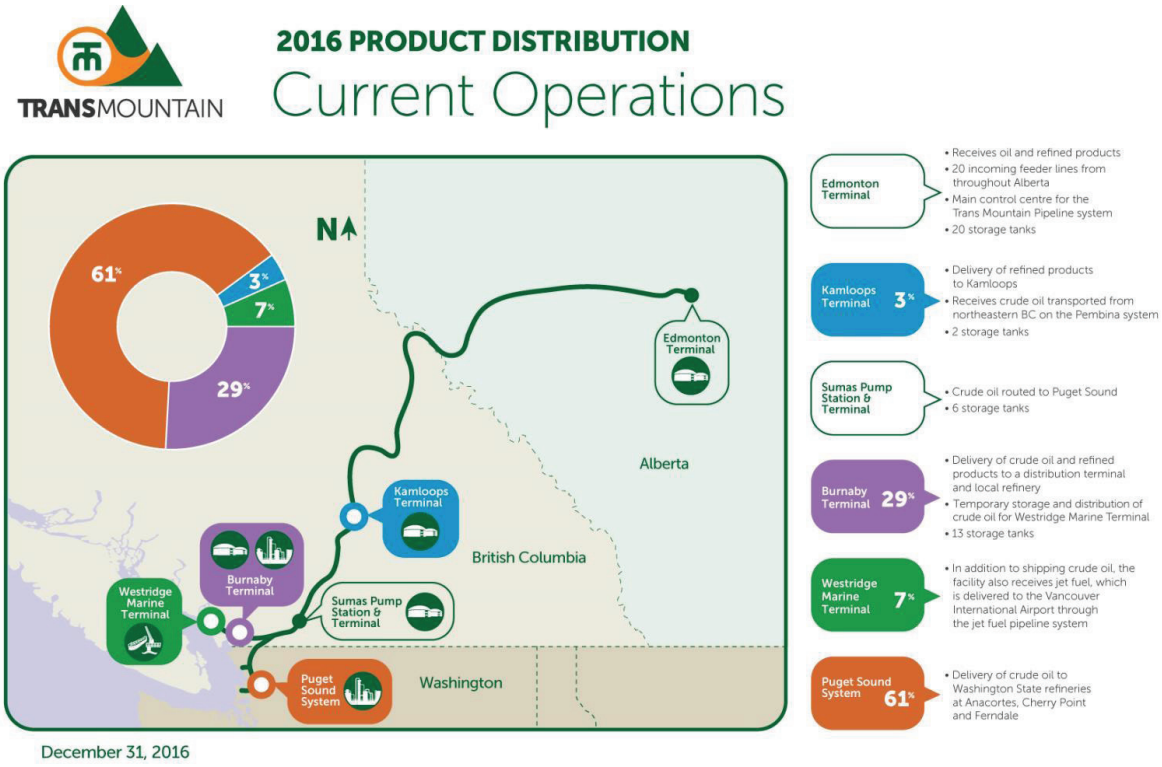
- $7.4 billion capital cost
- Expand capacity to 890,000 bpd
- Twin remaining 980 km of pipeline
- 193 km of reactivated pipeline
- 12 new pump stations
- 19 new storage tanks
- Three new tanker berths
- Increase in tanker traffic – not tanker size
- Must meet 157 NEB Conditions, 37 BCEAO Conditions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

Supply

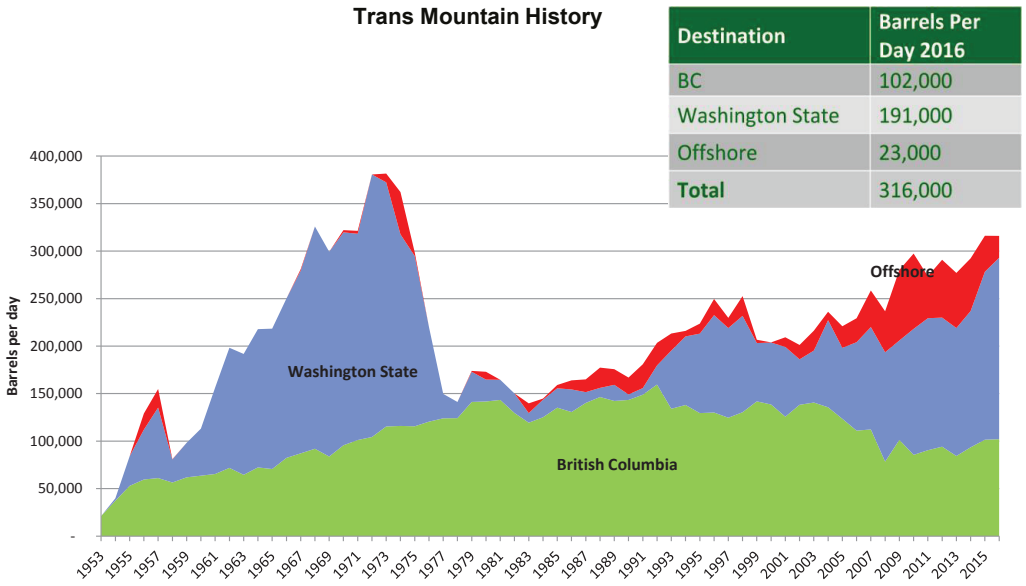
- Current capacity 47.7 million litres or 300,000 barrels capacity per day

- 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:

W. Trans Mountain (Kinder Morgan Westridge)



Trans Mountain Markets



W. Trans Mountain (Kinder Morgan Westridge)

Westridge Marine Terminal Concept

TRANSMOUNTAIN

Proposed dock incorporates within its design:
- Highest level of navigational safety
- Compact footprint to minimize impact on other users
- Controls that minimize disturbances to nearby residents

- Three berths to load Aframax-size vessels
- Each berth with its own spill containment boom
- One new berth for utility vessels

KINDER MORGAN CANADA INC.

9

Marine Traffic

TRANSMOUNTAIN

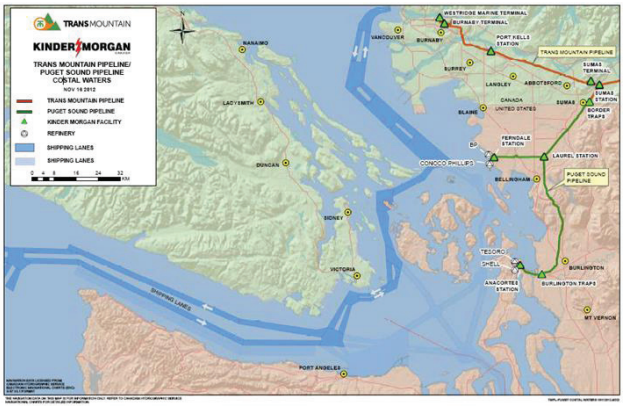
W. Trans Mountain (Kinder Morgan Westridge)

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

Shipping Lanes

- Transit follows established traffic separation scheme (CCG and USCG)
- Traffic is monitored by vessel traffic services (CCG and USGC)
- Aids to navigation maintained by CCG and USCG
- VFPA and Transport Canada rules and regulations in place



- BC Coast Pilots (certified by Pacific Pilotage Authority) onboard between Victoria and Terminal
  - Two Pilots during loaded transit
- Tug escort arrangements using tethered tugs during harbor transit (loaded and ballast)
  - Up to four tugs during departure
- Tethered escort tug through Haro Straits and Boundary Pass (loaded)

KINDER MORGAN CANADA LIMITED

W. Trans Mountain (Kinder Morgan Westridge)

Proposed Marine Safety Enhancements

- In its Facilities Application, Trans Mountain has recommended a number of enhancements to marine safety and spill response including:
  - Extending tug escorts
  - Increased Situational Awareness for tankers
  - Improvements to the oil spill response regime

Western Canada Marine Response Corporation (WCMRC)

Canada Shipping Act – primary legislation

- Establishes marine spill Response Organizations (RO)
- Requires all ships (including tankers) and Oil Handling Facilities to have a membership with an RO
- Approval mechanism for RO fees

WCMRC is the RO for the west coast

- 200 mile limit, south of 60, inland BC waters
- Response equipment and personnel to meet responsible party's needs

Live, 24/7 response management:

- Training and guiding of personnel involved in response
- Fill Incident Command System (ICS) organizational requirements as needed.
- Support in incident management roles and in the on-water recovery.

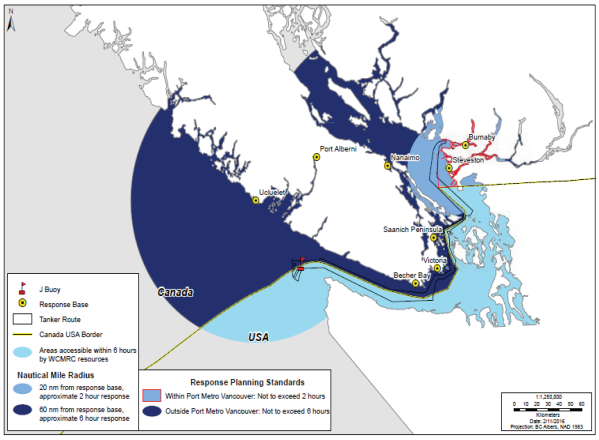
~50 full-time staff with 500 available trained responders

- Located on Shellburn refinery property next to Westridge terminal
- www.wcmrc.com

W. Trans Mountain (Kinder Morgan Westridge)

Enhanced Oil Spill Response

- >$150 million investment in WCMRC
- Doubling of mandated capacity (20,000 tonnes) – more than CWC
- Half response time for large spills (36 hour)
- 2,500 tonnes x 6-hour initial response in entire shipping route
- Five new bases, 100 jobs
- Strong FN support (e.g., Beecher Bay)
- WCMRC resident capacity in Salish Sea will be comparable to WA State requirement for WCD



- WCMRC's enhanced response plans shall comprehensively address all aspects of oil spill response in accordance with TMEP Proposal (Vol 8A, Table 5.5.3)
- Will be verified by Lloyds Register Shipping

15

Economic Benefits

- The Conference Board of Canada estimates the Project would generate more than 800,000 person-years of employment and $46.7 billion in revenues for federal and provincial governments during construction and the first 20 years of operations
- The vast majority of the economic and fiscal impacts for Canada and its regions occur after the Project is built
- Most economic benefits are generated because producers would obtain world oil prices and the benefits would circulate through the economy into higher employment and tax revenues

W. Trans Mountain (Kinder Morgan Westridge)

Economic Benefits

TRANSMOUNTAIN

$7.4 Billion
Construction spending to build the line to 2019

Canada will earn approximately
$3.7 Billion
more a year for our oil as a result of selling it to international markets

The vast majority of the economic impacts will occur after the Project is built

*Actual project costs may change

Benefits to Governments

TRANSMOUNTAIN

Estimated Tax Revenue and Royalties from Construction and 20 Years of Operation, Higher Producer Revenues and Additional Tanker Traffic

$530 Million

Local
from increased property taxes during operations

BC: $23.2 Million Annually (101% increase)

Alberta: $3.4 Million Annually (116% increase)

Revenues for 20 local governments, 24 Aboriginal communities reach $52 million

$46.7 Billion

Provincial/Federal

BC: $5.7 Billion

Alberta: $19.4 Billion

Rest of Canada: $21.6 Billion

P. SAAM SMIT Towage

CANADA

SAAM SMIT TOWAGE

ABOUT US

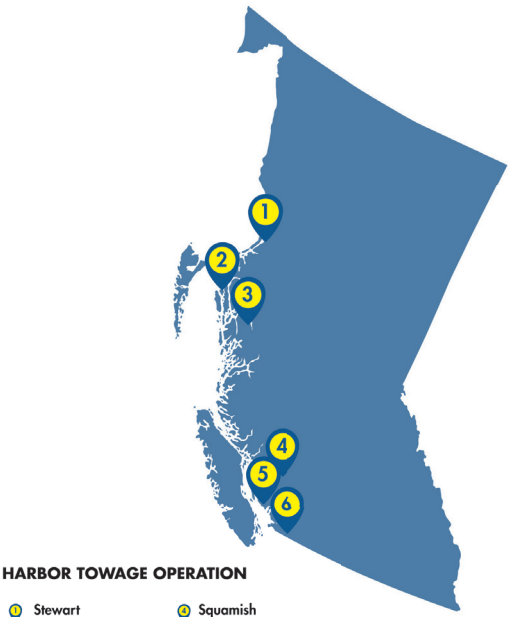
Saam Smit Towage Canada has long-standing roots in British Columbia, having operated along the Pacific coast for over 70 years. Originally known as Rivtow, a family owned coastal and harbour towage company, Saam Smit Towage focuses on harbour towage and tanker escorts.

Serving seven ports – Vancouver, New Westminster, Prince Rupert, Kitimat, Stewart, Squamish and Port Mellon – Saam Smit Towage Canada operates 23 tugs of up to 85 tons of bollard pull from five locations.

Thanks to a diverse fleet, Saam Smit Towage Canada can provide 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 long-standing 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.



HARBOR TOWAGE OPERATION

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

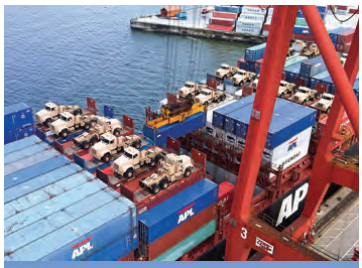
CANADA
TIGER SUN - Vancouver Port.

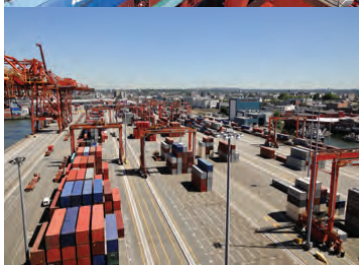
COMMERCIAL CONTACTS

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

Appendix

D. DP World Vancouver (Centerm)





ABOUT DP WORLD VANCOUVER CONTAINER TERMINAL

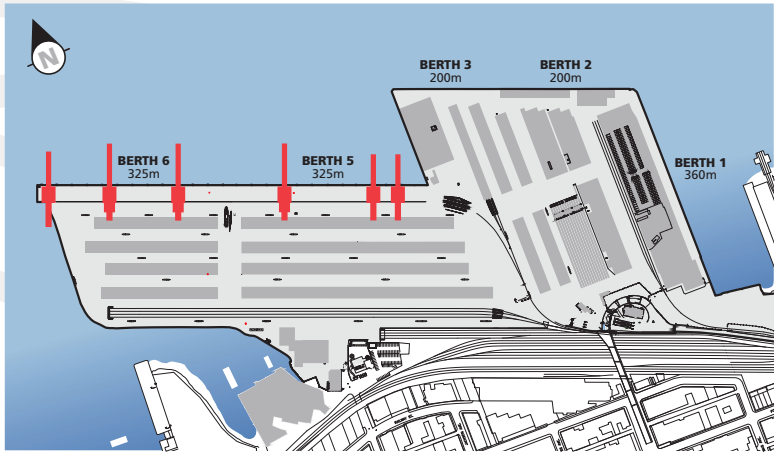
DP WORLD VANCOUVER IS A SUBSIDIARY OF DP WORLD, one of the largest marine terminal operators in the world, which operates in more than 60 ports across six continents. Container handling generates around 80% of its revenue, and 11 new developments and major expansions are underway in 10 countries. DP World employs a dedicated, experienced and professional team of more than 30,000 people to serve customers in some of the most dynamic economies in the world.

DP World Vancouver Container Terminal Division is one of the two container terminals in Vancouver's inner harbour. DP World Vancouver Container Terminal is a virtually new 72 acre terminal that boasts investments of over 155 million dollars in infrastructure, equipment and operating systems to improve capacity, efficiency and customer service.

DP WORLD
Vancouver

D. DP World Vancouver (Centerm)

AN IDEAL LOCATION



THE TERMINAL IS IDEALLY LOCATED ON THE SOUTH SHORE OF VANCOUVER'S INNER HARBOUR, with unsurpassed ground transportation links. Rail service is provided by CN Rail and CP Rail, and trucks are only 10 minutes away from the Trans-Canada Highway, while the US border and Interstate 5 are less than an hour away.

D. DP World Vancouver (Centerm)

EQUIPMENT AND FACILITIES

TERMINAL BERTHS

- Six deep-sea berths, with a total length of 1,590 metres.

QUAY CRANES

- Six quay cranes
- 3 ZPMC Super post-panamax, 22 wide, twin 20 capable
- 1 Fantuzzi post-panamax, 18 wide
- 2 MGM, 17 wide

GATE OPERATIONS

- Automated truck gate
- 12 incoming and 4 outgoing truck lanes
- Full appointment system and a sophisticated operating system (NAVIS) that tracks cargo in real time

RTG's

- 19 one-over-five RTG's
- 16 manufactured by NOELL, 3 by ZPMC

DP WORLD
Vancouver

D. DP World Vancouver (Centerm)

TOP PICKS AND EMPTY LOADERS

- Top picks and lift trucks with various capacities and attachments
- 8 top picks
- 1 empty container handler

TERMINAL TRACTORS

- 45 terminal tractors
- 20' to 53' container capacity

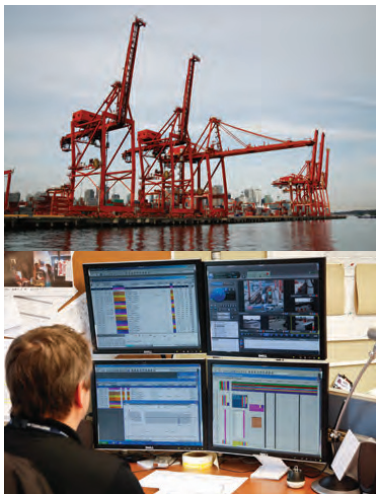
RAIL OPERATIONS

- On-dock intermodal rails with 4 tracks totalling 8,000 feet
- Services by CN Rail and CP Rail
- Exceptional unloading capacity for railcars
- Allows fast, uncongested receiving and shipping to ground, road and rail

REEFER PLUGS

- 546 reefer points
- 440V capability

D. DP World Vancouver (Centerm)



A SAFE AND SECURE TERMINAL

COR SAFETY CERTIFIED IN HEALTH AND SAFETY AND INJURY MANAGEMENT – this is awarded to employers who implement and maintain an occupational health and safety management system that exceeds regulatory requirements and meets a set of audit standards.

DP World Vancouver is also ISO/PAS 28000 certified for Supply Chain Security Management and has been accredited with the Lloyd's Register Quality Assurance (LRQA) since February 2007.

CUTTING EDGE TECHNOLOGY

WHEN IT COMES TO CARGO CARE EFFICIENCY, no one outperforms DP World Vancouver. We handle our terminal operations with networked real-time NAVIS software, part of DP World Vancouver's wide-ranging commitment to the complex North American container system. It allows us to track your container every step of the way, and is just one of the many tools we use to ensure your cargo arrives intact and on time. For perishable cargo, we have the most sophisticated refrigeration systems in use today and provide constant monitoring to ensure contents are maintained at proper temperatures.

DP WORLD
Vancouver

D. DP World Vancouver (Centerm)

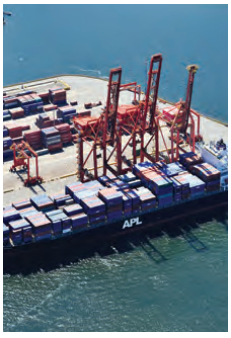
ENVIRONMENTALLY FRIENDLY

WE ARE TAKING PROACTIVE STEPS TO DESIGN, develop, operate and maintain the most advanced and environmentally sensitive facilities possible. It is a responsibility we take very seriously as corporate citizens, and as members of every community.

A NEW ERA FOR SHORT-SEA CONTAINER SHIPPING

BASED ON DP WORLD'S EXPERIENCE AS A TRUE GLOBAL TERMINAL OPERATOR, we are able to use our expertise to not only grow and diversify the variety of commodities currently handled but also to develop a short sea shipping service that is more efficient, more cost-effective and better for the environment than any other service currently available.

With the recently signed agreement that awards DP World Vancouver the right to operate the Port of Nanaimo's facilities, including the general cargo Duke Point facility and Assembly Wharf, we have opened the door for an exciting opportunity to offer Vancouver Island's first load-on/load-off container service to Vancouver. The new short sea shipping service from Vancouver Island to Vancouver is generating enormous interest from island companies with limited options for getting their exports to worldwide markets.



D. DP World Vancouver (Centerm)

DP WORLD
Vancouver

DP WORLD Vancouver
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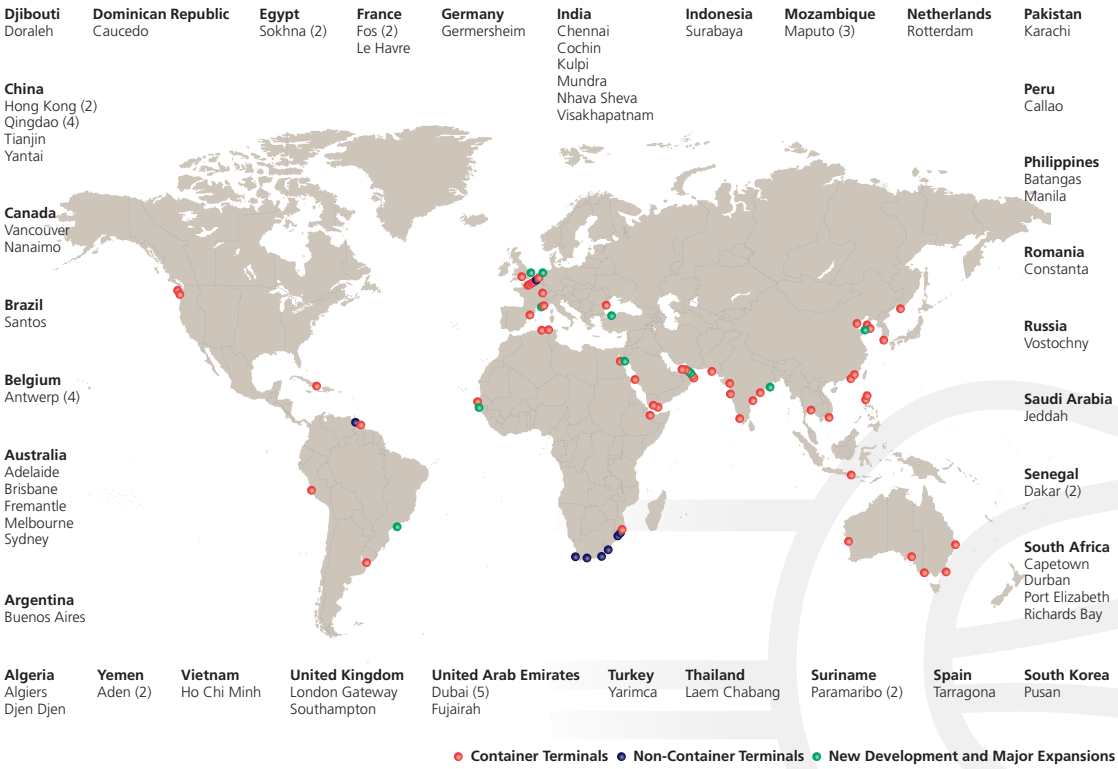
Canada



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F: 604-252-2494

www.dpworld.com

E. Seaspan

seaspan
VANCOUVER SHIPYARDS

Passionately Delivering the Best Marine Solutions

Since 1902 Vancouver Shipyards has forged a solid reputation for the design, construction, maintenance and repair of all types of vessels. Repair services are centered on a SyncoLift marine elevator of 1200 tonnes capacity. The yard's facilities include a major steel forming, a large fabrication and assembly hall and a 20,000 square foot, totally enclosed paint facility where entire vessels are sheltered for external painting. The yard also has the capability to drydock up to 15 vessels simultaneously.

Proudly Canadian

FACILITIES

DOCKING
- Syncrolift (270 ft x 70 ft) - 1,150 ton capacity
- Marine Rail System (8 berths)
- 850 ft. of Water Berth

MODULE & FABRICATION SHOP
- 52,000 sq.ft. (506 ft. x 94 ft.) Area
- Two (2) 25-ton cranes and Three (3) 10-ton cranes
- 26 ft. (8 m wide) ESAB Plasma Cutting/Marking/Beveling Machine

STEEL FORMING SHOP
- 23,000 sq. ft. Covered Shop
- One 25-ton crane and Two (2) 10-ton cranes
- 1,000-ton Brake Press
- Roll Bender to 40 ft x 3/4 inch Plate
- Frame Bender to 440 tons

PAINT FACILITIES
- 22,500 sq. ft. Fully Enclosed Paint Shed
- 13,000 sq. ft. Covered Paint Shed

MACHINE SHOP
- 18,750 sq. ft. Area
- 2 Shaft lathes
- One up to 26'
- One up to 40'
- 3 Smaller Engine Lathes
- Up to 12'
- 1 Horizontal Milling Machine
- 2 Vertical Milling Machines

RIGGING SHOP
- Towline installation, repairs and maintenance
- All types of wire cable installations
- Hand splicing and socketing
- Lifting device testing.
- On board ship testing of davits, slings, cables etc.

50 Pemberton Avenue, North Vancouver, BC V7P 2R2
Phone 604.988.6361 Fax 604.990.3290

www.seaspan.com

E. Seaspan

seaspan
VANCOUVER DRYDOCK

PASSIONATELY DELIVERING THE BEST MARINE SOLUTIONS

Vancouver Drydock Company Ltd. is strategically located on the West Coast of North America, just north of the Canada-US border, and on the north shore of the sheltered deep water Port of Vancouver. The yard provides a full range of quality repair services and understands the importance of delivering vessels on time and on budget.

PROUDLY CANADIAN

FACILITIES

Included are two Lloyds registered floating drydocks, a heavy machine shop with two 40 tonne overhead traveling cranes and lathes capable of handling shafts up to 14 metres (47 feet).

DRYDOCKS

- Panamax drydock: 36,000 tonne lift capacity; 221m (over aprons) x 204m (over 5 pontoons) x 59m beam overall x 45.8m inside x 8.8m depth (over blocks)
- Self-contained drydock: Seaspan Careen 30,000 tonne lift capacity, 131m (over single pontoon) x 48.8m beam overall x 33.5m inside

OUTFITTING/REPAIR PIER

- 210 metre deep water pier (10.5 meter water depth) fully serviced with 85 tonne crane

MACHINE SHOP

- 1,740 square meters (18,750 square feet)
- Two 40-tonne overheard cranes
- 4 lathes up to 14 metres (47 feet) long with 1.2 meter (4 feet) diameter turning capacity
- 2 boring mills up to 1.1 metre (99 inch) capacity
- 2 milling machines

STEEL FORMING

- 21,000 square foot covered shop
- Brake presses up to 1,000 tonnes
- Roll bender up to 17 metres x 2 centimeters (40 feet x ¾ inch) plate
- Frame bender up to 440 tonnes

Pier 94 – 203 East Esplanade, North Vancouver, BC V7L 1A1
Phone 604.988.7444 Fax 604.990.5099

www.seaspan.com

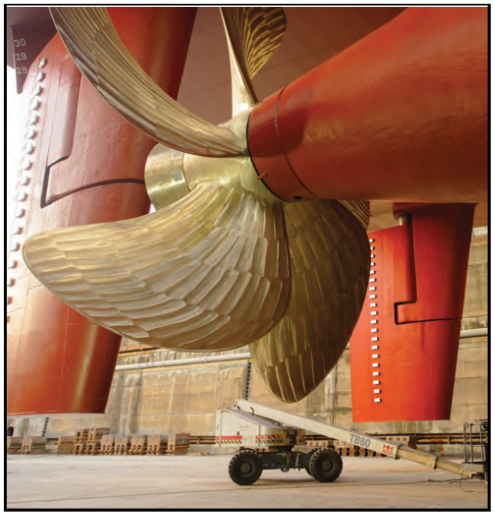
E. Seaspan

seaspan SHIPYARDS

www.seaspan.com

Our yards specialize in vessel design, new construction, conversion, refit, maintenance, repair, life-cycle extension, and refurbishment projects on all types and sizes of vessels including commercial vessels, cruise ships, deep sea vessels, containerships, ferries, yachts, Coast Guard, research and Arctic vessels, barges, tugs and fishing vessels.

Conveniently located to serve the Pacific Northwest's marine industry, our full-service shipyards in Vancouver and Victoria, British Columbia are committed to the highest customer service and safety standards. With over 100 years of shipbuilding experience, our yards provide reliable service, quality craftsmanship and quick turnaround. Seaspan Shipyards are certified to ISO 9001:2008 for quality, ISO 14001:2004 for environment and OHSAS 18001:2007 for safety by Lloyd's Register.



VANCOUVER DRYDOCK COMPANY LTD.	604.988.7444
VANCOUVER SHIPYARDS CO. LTD.	604.988.6361
VICTORIA SHIPYARDS CO. LTD.	250.380.1602

M. West Coast Reductions

WEST COAST REDUCTION

105 North Commercial Drive,
Vancouver, British Columbia
Canada V5L 4V7

tel 604.255.9301
fax 604.255.1803

www.wrcl.com

WEST COAST REDUCTION LTD.

1 Raw Materials 2 Transportation 3 Process 4 Finished Products

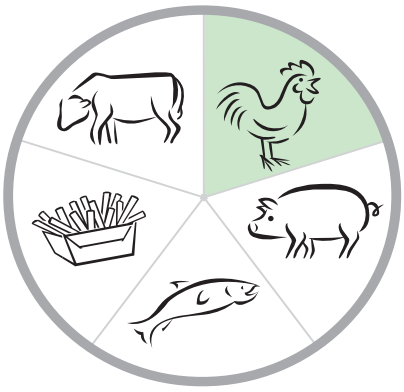
We only render RAW MATERIAL from licensed suppliers.

M. West Coast Reductions

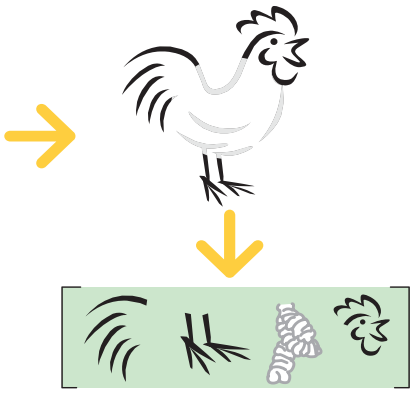
WEST COAST REDUCTION LTD.

1 Raw Materials | 2 Transportation | 3 Process | 4 Finished Products

Popular Foods



Not all parts of the animals we consume are edible.



These inedible parts are our raw materials

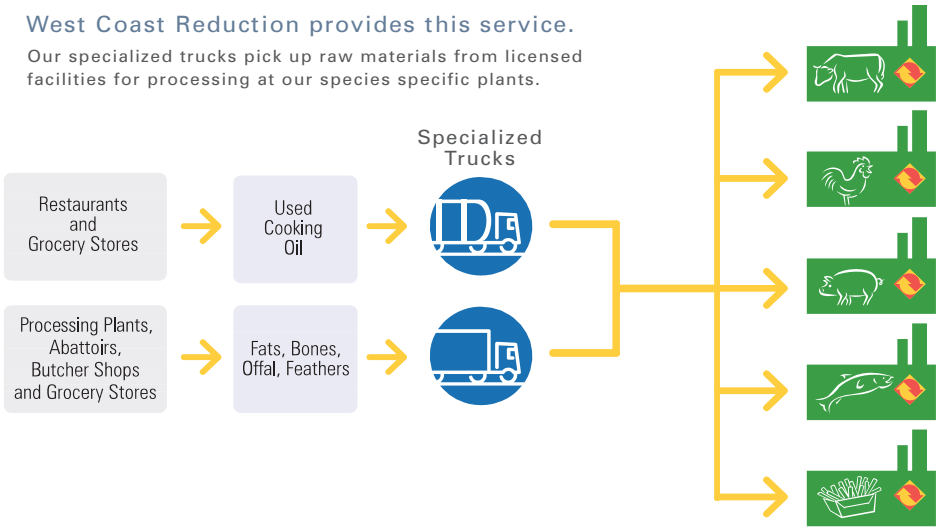
105 North Commercial Drive,Vancouver, British Columbia, Canada V5L 4V7 tel 604.255.9301 | fax 604.255.1803 | www.wrcl.com

WEST COAST REDUCTION LTD.

1 Raw Materials | 2 Transportation | 3 Process | 4 Finished Products

West Coast Reduction provides this service.

Our specialized trucks pick up raw materials from licensed facilities for processing at our species specific plants.



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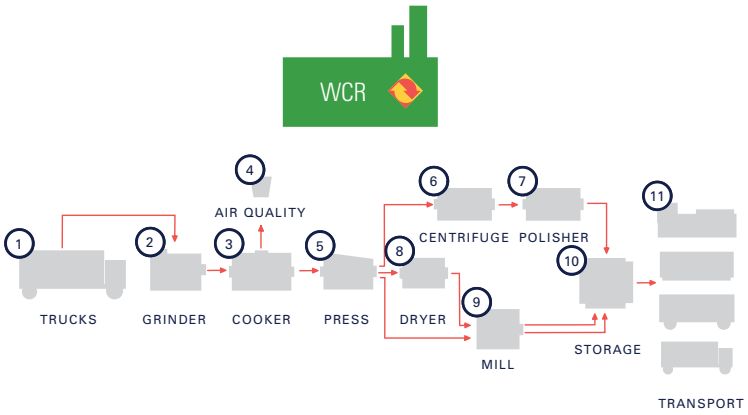
M. West Coast Reductions

WEST COAST REDUCTION LTD.

Raw Materials 1 | Transportation 2 | Process 3 | Finished Products 4



1. **TRUCKS**: All trucks are sanitized before and after collection. All raw material collected is processed within 24 hours.

2. **GRINDER**: Raw material is put into a grinder where it will be brought to a consistent particle size so that it can be conveyed to a cooker.

3. **COOKER**: The cooker sterilizes raw material through heat. This is a closed vessel where water is removed, and fat is released from protein. It is at this stage where bacterial, viruses and parasites are inactivated.

4. **AIR QUALITY**: All of our plants use air scrubbers throughout the cooking process. Charcoal filters and high temperatures are used to burn off odours and maintain air quality for ourselves and our neighbours.

5. **PRESS**: After cooking, the raw material is pressed to separate the solids from the liquids. The fat is removed and sent to a centrifuge and the solids are sent to the dryer.

6. **CENTRIFUGE**: Fat sent to the centrifuge is spun at a high speed to remove any remaining solids.

7. **POLISHER**: Fats can be further refined in the polisher to create different grades of tallow an grease. Tallow or grease containing less than 0.15% insoluble impurities is considered protein-free tallow and is safe for use in any industrial or agricultural application.

8. **DRYER**: Solids from the press are brought to the dryer where most water is removed extending the shelf life of the final protein meal.

9. **MILL**: Protein meal is hammered in the mill where it is turned into a flour-like consistency.

10. **STORAGE**: Giant tanks on the opposite side of the processing facility house the fat and protein meal. All modern rendering facilities separate finished product from raw material processing so that finished product does not come into contact with any potential pathogen from raw material.

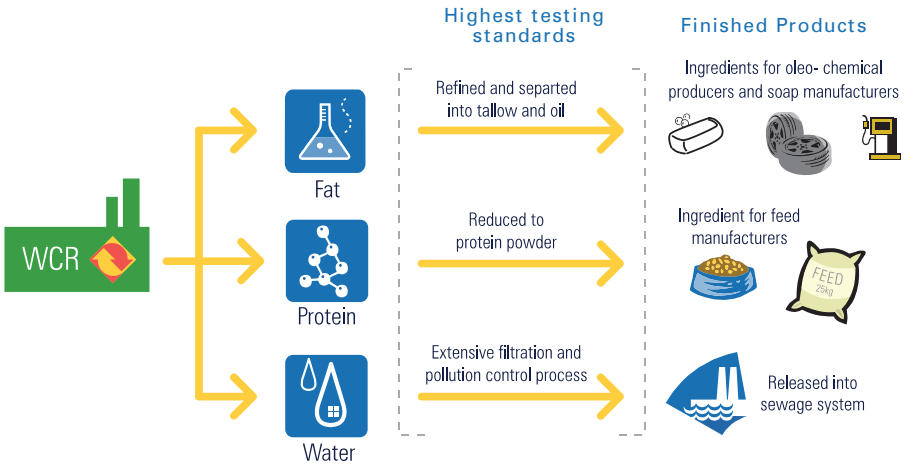
11. **TRANSPORT**: Protein meals, fats and oils are delivered world wide via truck, rail, ontainer or ships.

105 North Commercial Drive,Vancouver, British Columbia, Canada V5L 4V7
tel 604.255.9301 | fax 604.255.1803 | www.wrcl.com

WEST COAST REDUCTION LTD.

Raw Materials 1 | Transportation 2 | Process 3 | Finished Products 4

Through a process of grinding, time, temperature and pressure, the raw materials are reduced and separated into Fat, Protein and Water.



105 North Commercial Drive,Vancouver, British Columbia, Canada V5L 4V7 tel 604.255.9301 | fax 604.255.1803 | www.wrcl.com

N. Pacific Elevators & R. Cascadia (Viterra)

PORT OPERATIONS
VANCOUVER, BRITISH COLUMBIA

Cascadia Terminal

- Operating in the port of Vancouver for over 86 Years
- Commodities Include: Wheat, Durum Barley, Canola
- Volume: Over 5 million metric tonnes handled annually

Pacific Elevators

- Operating in the Port of Vancouver for over 96 years
- Commodities Include: Peas, Lentil, Soybeans, Canola, Flax
- Volumes: Over 2 million metric tonnes handled annually

Viterra facilities account for 40% of the agriculture (grain) exports through the Port of Vancouver to destinations around the world.

Employment: 238 staff directly employed by Viterra Terminals in the Port of Vancouver.

- Indirect Employment: Over 700 businesses supported in the local and British Columbia economy.
- Viterra receives services from 5 major employers in the Port of Vancouver.

Canadian agriculture is a modern, highly complex, integrated, internationally competitive and growing part of the Canadian Economy

- Modernization and Upgrade Project: $142 million dollars will be spent on Cascadia & Pacific over the next 5 years.
- The Canadian economy depends on exports in the agri sector which continue to play an important role in federal and provincial economies. Canada is renowned globally for producing safe, high quality agri products; customer and end users depend on this continuous and reliable supply chain.
- In addition to Canada's already established trade partnerships, Canadian agriculture look to developing countries where economic growth represents expanding opportunities.
- As a major wheat producing nation, nearly 52,000 Canadian farms grow wheat on more than 22.8 million acres. The majority of Canadian wheat is produced in Western Canada.
- Canada was the 3rd largest exporter of grain in 2013. Canada exports to countries around the world. The top five major importers of Canadian wheat include Mexico, Japan, Iraq, United States, and Colombia. Canada's annual wheat export revenues are close to $5.4 billion.
- The agriculture and agri-food industry contributes $100 billion annually to Canada's gross domestic product (GDP).

From the Canadian farm in the prairies to our export Terminals in Vancouver, Viterra is an important contributor to the Canadian economy, families and their livelihood.

O. Western Stevedoring (Lynnterm)

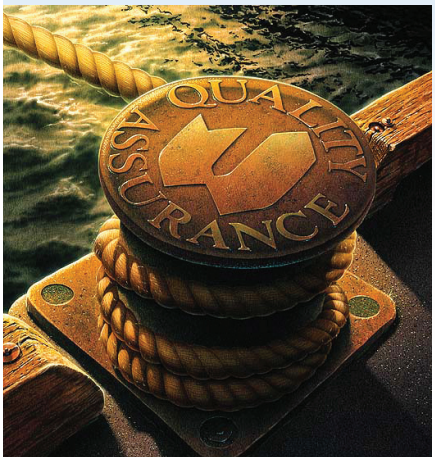
Heavy Lift Oversized Cargo at Lynnterm

Western Stevedoring

LYNNTERM EAST GATE
Main Office
15 Mountain Highway

LYNNTERM WEST GATE
95 Brooksbank Avenue

North Vancouver, BC
Phone: (604) 904-2800
Fax: (604) 904-2801
Email: info@westeve.com
www.westeve.com



What goes on at Western Stevedoring?

Western Stevedoring's operations are referred to as 'break-bulk'. What is break-bulk, you may ask? Break-bulk is a term used for many types of cargo that are not in a container or poured into a ship such as coal, grain, potash, etc. The term relates to anything that is loaded or discharged under the hook of a ship; generally loose or unitized cargo loaded using a ship's cranes.

Lynnterm handles approximately 2 million metric tonnes of cargo annually. We load up to 1.5 million metric tonnes of wood pulp (est. value of $1 billion) on vessels each year. This wood pulp is used to produce various types of paper products including tissue paper, newsprint, cardboard boxes, diapers and writing paper – items that many households consume on a daily basis.

Lynnterm is a vital part of the transportation supply chain for many of Canada's largest forestry companies. This facility supports the Canadian economy by handling Canadian exports and supporting mill towns throughout BC and Alberta.

Imported products handled at Lynnterm also support many key projects and industries in Canada. Some examples of this are:

- Skytrain RAV Line cars
- Roof girders for BC Place Stadium
- Steel pipe and rebar for the Port Mann Bridge
- Transformer for Cypress Mountain
- Aircraft parts for Bombardier Dash-8 airplanes
- Rebar, pipe, steel coils, beams and other products for many different construction projects.

Western is a very diverse company in the shipping community. In addition to our North Vancouver based operations, we also own and/or operate the following facilities and operations:

Coast 2000 Terminals in Richmond is the largest inland trans-load terminal in BC where forest products are loaded into containers. Coast2000 also operates an empty container depot, which matches up empty containers from adjacent import facilities with export products, thereby reducing the number of truck trips on our roads.

Victoria Cruise Ship Terminal at Ogden Point – Western operates the cruise terminal in Victoria on behalf of the Greater Victoria Harbour Authority. In 2013, Western serviced 220 cruise ships and over 500,000 passengers at Ogden Point.

CVS Cruise Victoria is a bus company owned by Western and offers tours and sight-seeing excursions to cruise ship passengers and bus charter services in BC and Washington.

Ship Stevedoring Services – Western loads and unloads break-bulk vessels in ports throughout BC from as far north as Stewart, BC to all across Vancouver Island. Western handles some of the most challenging and complex break-bulk cargoes in ports throughout BC.

Western is continually looking for ways to diversify our business to keep up with the demands of Canadian exporters and importers. With an excellent reputation, knowledgeable staff and experience in handling a diverse and challenging cargo mix, Western offers quality, reliable services to world-wide shipping companies and customers.

For more information on the products and services offered by Western, please visit our website at www.westeve.com

Thinking Globally
Acting Locally

U. Chevron (Stanovan)

(Stanovan) Chevron
Burnaby Refinery

From : http://www.chevron.ca/our-businesses/burnaby-refinery

Located on the shores of Burrard Inlet near Vancouver, the Chevron Burnaby refinery produces petroleum products from Canadian oil and gas. We're committed to producing the finest petroleum products possible while maintaining the highest environmental and safety standards. We are also aware of our responsibilities within our community and strive to be a good neighbour in the community that has grown up around us - more than17,000 people in the Burnaby Heights area, in a city of about 220,000 people - and a respected corporate citizen.

Raw product arrives at the refinery from northern British Columbia, Alberta, and Saskatchewan via the 1,200-kilometre Kinder Morgan Pipeline, with supplemental deliveries coming by rail and by truck. Here, using the most modern refinery technology, crude and synthetic oils, condensate and butanes are transformed into up to 57,000 barrels of motor gasolines, diesel and jet fuels, asphalts, heating fuels, heavy fuel oils, butanes and propane every day.

The products we make help move people and goods throughout British Columbia. We fuel commercial jets, long-haul trucks, forestry and mining operations, ferries, tugboats, and of course, buses and automobiles.

The Burnaby Refinery is part of a global energy company. Chevron Canada Limited is a wholly owned subsidiary of Chevron Corporation, one of the world's largest integrated petroleum companies. The corporation is involved in every aspect of the industry, from exploration and production, to transportation, refining and retail marketing.

What We Do

How Does an Oil Refinery Work?

Chevron has refining capacities worldwide of over two million barrels per day. Chevron's North American refining network includes five gasoline-producing "factories" in the United States and another in Burnaby, British Columbia, Canada.

A refinery is a factory that takes a raw material — crude oil — and transforms it into gasoline and many other useful products. A typical large refinery costs billions of dollars to build, and millions more to maintain and upgrade. It runs around the clock, 365 days a year and employs hundreds of people.

Refining breaks crude oil down into its various components, which then are selectively reconfigured into new products. This process takes place inside a maze of hardware that one observer has likened to "a metal spaghetti factory." Employees regulate refinery operations from within highly automated control rooms. Because so much activity happens out of sight, refineries are surprisingly quiet places. The only sound most visitors hear is the constant, low hum of heavy equipment.

The complexity of this equipment varies from one refinery to the next. In general, the more sophisticated a refinery, the better its ability to upgrade crude oil into high-value products. Whether simple or complex, however, all refineries perform three basic steps: separation, conversion and treatment.

U. Chevron (Stanovan)

(Stanovan) Chevron Burnaby Refinery

Separation: Heavy on the bottom, light on the top

Modern separation involves piping oil through hot furnaces. The resulting liquids and vapours are discharged into distillation towers — the tall, narrow columns that give refineries their distinctive skylines.

Inside the towers, the liquids and vapours separate into components or fractions according to weight and boiling point. The lightest fractions, including gasoline and liquid petroleum gas (LPG), vapourize and rise to the top of the tower, where they condense back to liquids. Medium weight liquids, including kerosene and diesel oil distillates, stay in the middle. Heavier liquids, called gas oils, separate lower down, while the heaviest fractions with the highest boiling points settle at the bottom. These tarlike fractions, called residuum, are literally the “bottom of the barrel.”

The fractions now are ready for piping to the next station or plant within the refinery. Some components require relatively little additional processing to become asphalt base or jet fuel. However, most molecules that are destined to become high-value products require much more processing.

Conversion: Cracking and rearranging molecules to add value

Conversion is where fractions from the distillation towers are transformed into streams (intermediate components) that eventually become finished products. This also is where a refinery makes money, because only through conversion can most low-value fractions become gasoline.

The most widely used conversion method is called cracking because it uses heat and pressure to “crack” heavy hydrocarbon molecules into lighter ones. A cracking unit consists of one or more tall, thick-walled, bullet-shaped reactors and a network of furnaces, heat exchangers and other vessels.

Fluid catalytic cracking, or “cat cracking,” is the basic gasoline-making process. Using intense heat (about 538 degrees Celsius), low pressure and a powdered catalyst (a substance that accelerates chemical reactions), the cat cracker can convert most relatively heavy fractions into smaller gasoline molecules.

Hydrocracking, although not used at the Burnaby Refinery, applies the same principles but uses a different catalyst, slightly lower temperatures, much greater pressure and hydrogen to obtain chemical reactions. Although not all refineries employ hydrocracking, Chevron is an industry leader in using this technology to cost-effectively convert medium to heavyweight gas oils into high-value streams. The company’s patented hydrocracking process, which takes place in the Isocracker unit, produces mostly gasoline and jet fuel.

Some Chevron refineries (not Burnaby) also have cokers, which use heat and moderate pressure to turn residuum into lighter products and a hard, coal-like substance that is used as an industrial fuel. Cokers are among the more peculiar-looking refinery structures. They resemble a series of giant drums with metal derricks on top.

Cracking and coking are not the only forms of conversion. Other refinery processes, instead of splitting molecules, rearrange them to add value. Alkylation, for example, makes gasoline components by combining some of the gaseous byproducts of cracking. The process, which essentially is cracking in reverse, takes place in a series of large, horizontal vessels and tall, skinny towers that loom above other refinery structures.

U. Chevron (Stanovan)

(Stanovan) Chevron
Burnaby Refinery

Hydro-treating is the process used at the Burnaby Refinery. It is critical for producing low sulphur products, by forcing hydrogen into molecules thus displacing sulphur. The Naphtha Hydro-treater (NHT) and Gasoline Hydro-treater (GHT) remove sulphur from the gasoline blend stocks and the Diesel Hydro-treater removes sulphur from diesel and jet fuel.

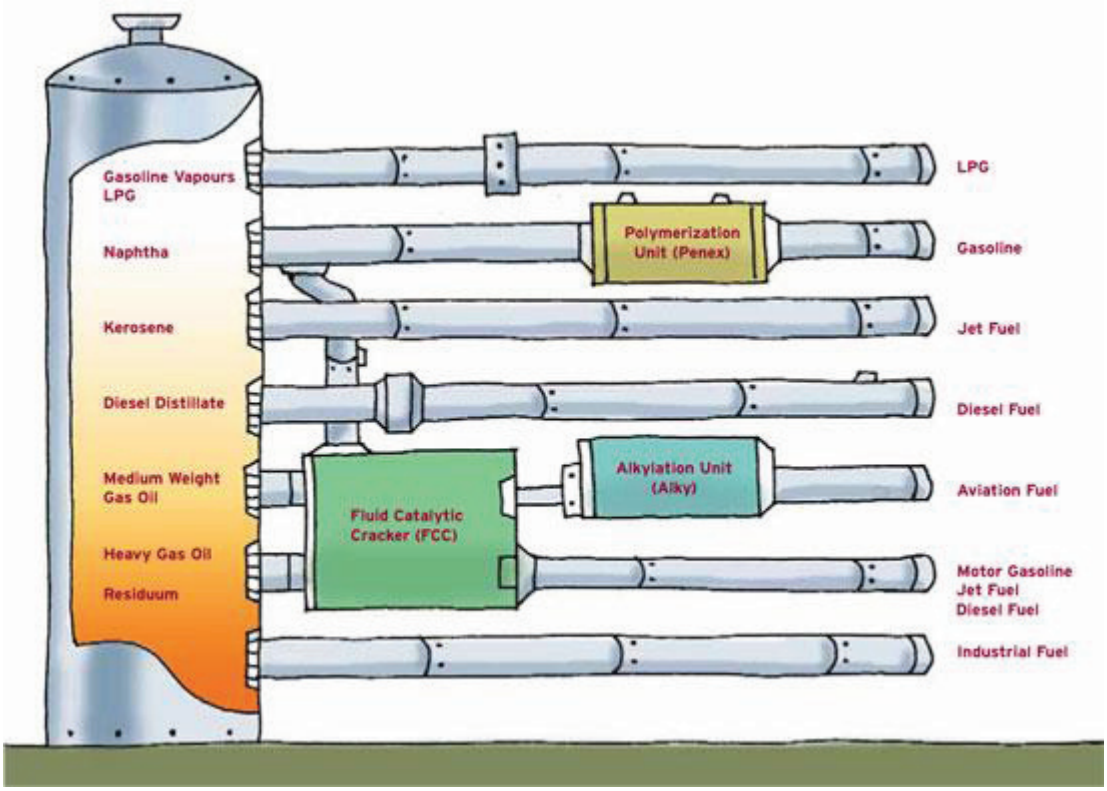
Reforming uses heat, moderate pressure and catalysts to turn naphtha, a light, relatively low-value fraction, into high-octane gasoline components. Chevron's patented reforming process is called Rheniforming for the rheniumplatinum catalyst used.

Treatment: The Finishing Touch

Today, a major portion of refining involves blending, purifying, fine-tuning and otherwise improving products to meet these requirements.

To make Chevron gasoline, refinery technicians carefully combine a variety of streams from the processing units. Among the variables that determine the blend are octane level, vapour pressure ratings and special considerations, such as whether the gasoline will be used at high altitudes. Technicians also add Techron, Chevron's patented performance additive.

By the time a gallon of gasoline is pumped into a car's tank, it contains more than 200 hydrocarbons and additives. All that changing of molecules pays off in a product that ensures smooth, high-performance driving.



Natural Resources Canada

Natural Resources Canada: Forest Products and Applications
http://www.nrcan.gc.ca/forests/industry/products-applications/13317

Forest products and applications

The U.S. and Western Europe have long been the major markets for Canadian forest products. In recent years, however, Canada has been transforming its export markets by building on the strength of the sector's traditional high quality wood fibre products. Today, for example, China and other Asian countries have become increasingly significant new markets for these products. This has helped offset the declines seen in traditional markets over recent years.

Natural Resources Canada, through its Expanding Market Opportunities Program and the North American Wood First Program, is helping the country's producers diversify and expand into emerging markets in Asia and Europe as well as into non-traditional markets in North America

Key exports

Canada's forest products exports contribute $17.1 billion in net trade. Approximately 47% of total forest product export value is from the following three key products, each of which faces a different set of challenges and opportunities in today's global markets.

- **Northern bleached softwood kraft pulp (NBSK)** – Canada has the largest share of the global NBSK market. That share represents almost one-third of world production and three-quarters of total NBSK capacity in North America.
  This is a healthy position to have within the pulp market, as NBSK is an increasingly important pulp grade for paper and tissue production. However, the value of the Canadian dollar has a major impact on performance, given the global nature of this market.
- **Newsprint** – World production of newsprint is approximately 32 million tonnes, and Canada is the single largest producer. It has a current production capacity of about 4 million tonnes, or 12% of the world total. However, demand for newsprint in North America has fallen by 65% since 2000. This collapse is the result of major structural changes in the marketplace, with electronic media having drastically reduced the demand for print advertising.
  At the same time, the rising dollar has shifted Canadian mills from being the lowest cost producers in North America to being among the highest cost producers. Demand is not expected to recover to its previous high levels, but instead will likely stabilize over time at lower levels.
- **Softwood lumber** – Canada is one of the world's largest producers and exporters of softwood lumber. Softwood lumber accounts for 20% of the value of Canada's forest product exports. The largest export market for Canada is the U.S., where softwood lumber is used to build houses. When the U.S. housing bubble burst in 2006, demand for softwood lumber plummeted. High housing inventories, foreclosures and unemployment will continue to depress U.S. housing starts, and softwood lumber demand may not return to the normal levels of the past until 2015.

Key destinations for forest products

- **Domestic**: The recent recession affected demand for solid wood products within Canada. However, Canada's housing construction market has fared much better than that of many other countries, and is expected to remain an important source of demand for Canada's forest sector.
- **United States**: The U.S. remains the most important market for Canada's forest sector despite the impact of the housing market collapse and economic downturn in that country.
- **China**: Lumber exports to China have grown remarkably in recent years and are beginning to expand beyond low-grade timber to higher value products. Forest products associations and provincial agencies have partnered with the Canada Wood Export Program to develop Chinese demand for higher grade lumber. China's demand for Canadian pulp has also been growing steadily since 2000, and now makes up 34% of total Canadian pulp exports.

Natural Resources Canada

Natural Resources Canada: Forest Products and Applications

http://www.nrcan.gc.ca/forests/industry/products-applications/13317

- **Japan**: Japan is an important market for Canada. It is a significant consumer of high value wood products and of structural lumber for use in housing. Japanese demand for Canada's products has weakened in recent years as a result of stagnant population growth and economy.

Indicator: Exports

Why is this indicator important?

Forest product exports contribute substantially to the Canadian economy and significantly improve Canada's balance of trade. By value, Canada is the world's fourth-largest forest product exporter, but the world's leading exporter of softwood lumber and newsprint.

What has changed and why?

In 2015, the value of Canada's forest product exports increased by 6.3% over 2014, rising to $32.7 billion from $30.8 billion.

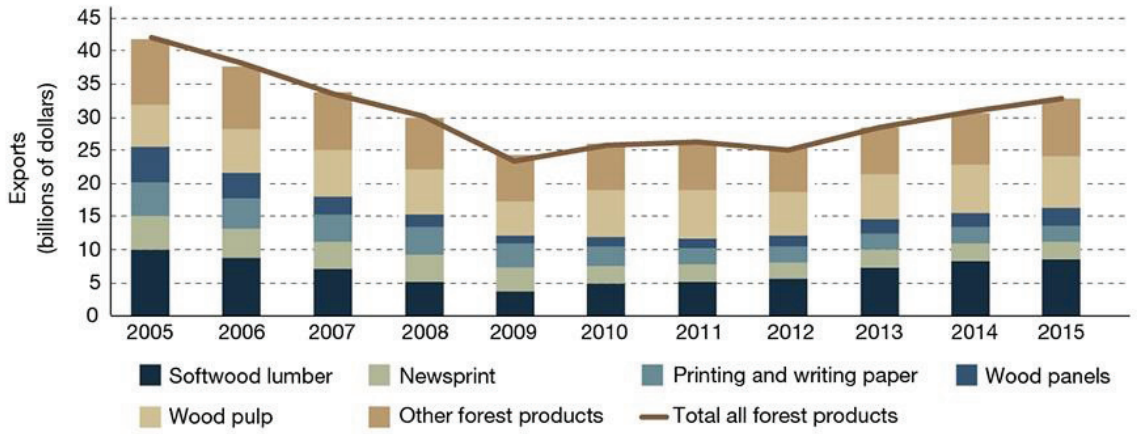
On the wood product side, the U.S. housing recovery continued to drive Canadian softwood lumber exports. In 2015, softwood lumber exports totalled $8.6 billion, a 3% increase over 2014. The value of wood panel exports increased by 18%, to $2.68 billion, with significant increases in all panel types, especially plywood (29%) and fibreboard (28%).

As for pulp and paper, wood pulp exports increased 6.5% over 2014 levels, to $7.7 billion. In 2015, exports of printing and writing paper barely grew (by 1%), while newsprint exports fell 10% from the previous year.

What is the outlook?

Newsprint and printing and writing paper exports are in long-term decline, resulting from the rise of electronic media, but a weaker Canadian dollar continues to support Canadian producers, especially in the U.S. market.

Exports of Canadian forest products, 2005-2015



NOTES

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Vancouver Harbour Port Operations Legend

Map	Terminal	Type	Products
A	Kinder Morgan Vancouver Wharves	Bulk	mineral concentrate liquids, sulphur, fertilizer, specialty agri-products, dry bulk commodities
B	Fibreco	Bulk	woodchips, wood 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	Kinder Morgan Westridge (Trans Mountain)	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	Ioco	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.portmetrovancouver.com.

Vancouver Harbour Port Operations Location Map