

CONSTRUCTION

Marine Terminal

The Marine Terminal construction is expected to start in late 2016, beginning with modifications to the existing dock. To meet the seismic performance requirements of the facility, significant rehabilitation of the shoreline will be undertaken to allow construction of off-shore mooring structures. Shoreline and underwater habitat will be restored as part of the development. Significant barge activity will occur during the fall and winter seasons, however no significant pile driving is anticipated until 2017.

Most noticeable activity in 2016 and early 2017 will be associated with the removal of unsuitable fill materials and components of the existing dock structure. These materials will be transported off-site. New structures will begin being installed in mid to late 2017.

Fuel Receiving Facility

The project recently received a Project Permit from the Vancouver Fraser Port Authority to commence construction of the Fuel Receiving Facility to be located on Port Authority owned land. This permit was awarded following a technical review and public consultation held in August/September 2015.

The Fuel Receiving Facility construction will begin in spring 2016 and consist of the following two key phases:

First phase

- The first phase will involve site preparation and ground improvement to provide the stability for the tanks to withstand a major seismic event
- This will involve heavy machinery movements and some localized ground vibrations. Some activity at the marine terminal is expected for delivery of bulk materials

Second phase

- In 2016, construction will start on the utilities, foundations and structural steel components of the fuel receiving facility
- Locally supplied materials such as concrete, rebar, mechanical and electrical components will arrive by road, while large-scale tank steel components, pipe, and other bulk materials are expected to arrive through the Marine Terminal

- Tank and foundation construction will take approximately one year and consist mostly of crane work and welding
- The final stage of construction will include perimeter road works, paving, fencing and landscaping, including screening vegetation

Pipeline

The pipeline will be constructed with resilient materials to current seismic design standards. Construction will include extensive use of directional drilling (particularly for water body crossings and intersections) to mitigate potential environmental impacts and avoid disruption of vehicle and marine vessel traffic.

Construction activities will include surveying and staking, preparing the right-of-way, digging the trench in which the pipeline will be placed, preparing the pipeline for installation (fitting it to the terrain) and applying a protective coat, installing the pipeline and associated valves and fittings, covering the pipeline and testing.

Pipeline construction is expected to begin in late 2016 or early 2017.



WHY THE PROJECT IS NEEDED

- The project is needed because the existing fuel delivery system it will replace is unsustainable. It relies on only two sources of fuel – the Chevron Refinery in Burnaby and the BP Cherry Point Refinery in Washington State. If one of these refineries shut down for an extended period, airport and airline operations would be jeopardized.
- Chevron supplies 40% of the airport's needs through the 40-km Kinder Morgan pipeline that originates near Burrard Inlet and crosses Burnaby and north Richmond.
- The pipeline was built at a time when four local refineries were operating. Chevron is the only one still in operation.
- Cherry Point supplies the remaining 60%, of which 40% is shipped via barges to the Westridge Marine Terminal, from where it is offloaded and shipped to the airport through the Kinder Morgan pipeline, and the remaining 20% is via tanker truck deliveries, which can total up to 40 a day.
- The Kinder Morgan pipeline, which is only 150 mm (6 in) diameter, is at capacity and since the late 1990s the tanker truck deliveries have been required to meet YVR's fuel demand.
- Any growth in fuel demand at YVR depends on more cross-border fuel truck shipments. For example, adding just one daily flight to Asia would require an additional 800 trucks a year.

PROJECT BENEFITS

- The project's spill prevention and response strategies for the Fraser River are robust and go well beyond industry standards and best practices, and is described by Environment Canada as the current state-of-the-art for spill modelling and potential incident preparation.
- The project will enhance the response capability on the Fraser River that will benefit all other users on the river.
- The project will have a smaller environmental footprint than the existing fuel delivery system, and will remove all the tanker trucks that carry fuel to YVR (over 1,200 each month) from Washington State through Surrey, Delta and Richmond.
- The project will help ensure that YVR remains a critical part of British Columbia's role as Canada's Pacific Gateway.
- The project will also help is needed to ensure YVR continues to have the fuel capacity to add the new flights.
- The project represents a \$110 million investment and construction jobs in the Lower Mainland.

VANCOUVER AIRPORT FUEL FACILITIES CORPORATION

Vancouver Airport Fuel Facilities Corporation (VAFFC) is a not-for-profit company owned by a consortium of commercial airlines representing most of the domestic and international carriers serving Vancouver International Airport (YVR).

VAFFC owns and operates fuel storage and distribution facilities at YVR. These facilities are shared among the airlines, allowing them to avoid duplication and minimize costs. Similar fuel facility corporations operate at all of the major international airports across Canada and throughout the world.

The company has more than 20 years of experience in aviation fuel handling activities at YVR.

VAFFC contracts the management, construction and operation of its facilities to qualified organizations, and draws expertise from a network of experienced engineering and environmental consultants specializing in aviation fuel infrastructure.

FOR MORE INFORMATION

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Vancouver Airport
Fuel Facilities Corporation

AN FSM GROUP MANAGED CORPORATION



Vancouver Airport Fuel Delivery Project



ABOUT THE PROJECT

Vancouver Airport Fuel Facilities Corporation (VAFFC) is constructing a new aviation fuel delivery system to serve the airlines at Vancouver International Airport (YVR). It includes a Marine Terminal and Fuel Receiving Facility at existing industrial sites on the South Arm of the Fraser River and an underground pipeline connecting the facility with YVR.

In December 2013, following more than a decade of comprehensive planning, research, review and consultation by VAFFC, the project completed a comprehensive harmonized federal/provincial environmental assessment process, with the BC Environmental Assessment Office (EAO) coordinating the review requirements of both the *Canadian Environmental Assessment Act* and *BC Environmental Assessment Act*.

The assessment included Environment Canada, Transport Canada, Health Canada, Department of Fisheries and Oceans, Canadian Coast Guard, Canadian Wildlife Service, Natural Resources Canada, Canadian Transportation Agency, Port Metro Vancouver, 12 First Nations, Metro Vancouver, City of Richmond, Corporation of Delta, BC Oil & Gas Commission, BC Utilities Commission, BC Ministry of Environment, Ministry of Community, Sport & Culture and Vancouver Airport Authority.

On a stand-alone basis, the risks of this project are few and will be managed to insignificant levels with well understood and proven risk management methods, best practices and technology. On a comparative basis, the risks of this project are far less than the current fuel delivery methods and infrastructure.

PROJECT COMPONENTS

Marine Terminal

The new Marine Terminal will be located on the north shore of the south arm of the Fraser River, at one of the widest and deepest sections of the river. An upgrade of an existing wharf, in an area that is already zoned for heavy industrial use, will be based on best practice designs and incorporate state-of-the-art mooring and offloading technologies.

The marine terminal will be designed to handle small barge shipments and large overseas shipments. These will be short in duration and only a few times a month, based on projected YVR fuel demand. A barge could be expected to deliver fuel once every two weeks with an unloading time around 12 hours, while a Panamax class vessel could be expected once a month with an unloading time of between 24 to 36 hours.



Marine Terminal and Fuel Receiving Facility

Operations:

- Fuel will be transferred from vessels to shore using hydraulically-operated articulated unloading arms
- The unloading arms will be designed with flexibility for tides and ship movement during offloading
- If the movement of the vessel exceeds the safe range, the fuel transfer process will be automatically stopped and the arms will be disconnected using leak-free emergency release couplings
- The terminal will be equipped with pre-deployed permanent booming complete with a pile deflection/protection system and skimmers to collect any fuel spilled

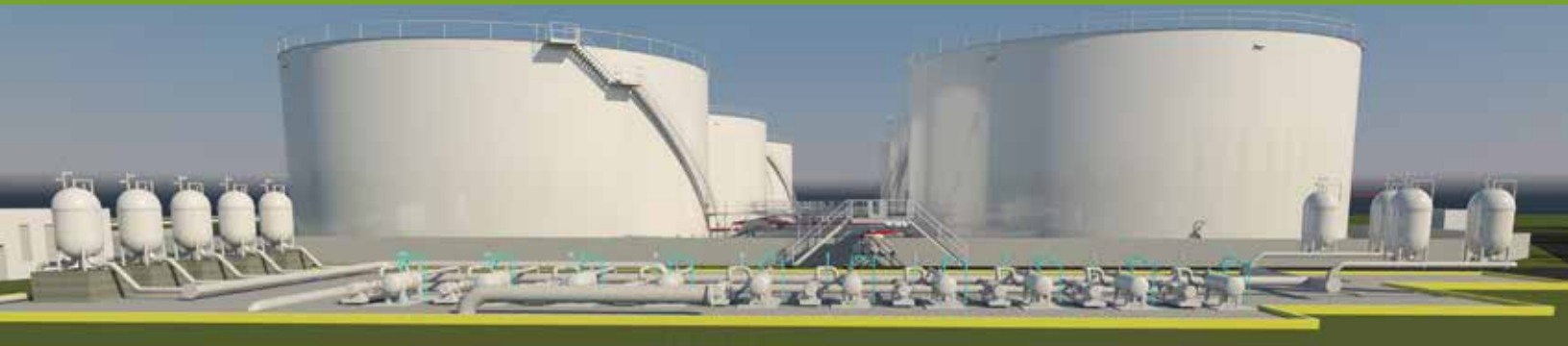
Emergency Preparedness and Response:

- Spill response vessels will be deployed upon arrival of a vessel in the river, and will accompany the vessel to the terminal
- Before a vessel is offloaded, booms and skimmers will be positioned around the vessel to contain a spill in the unlikely event of an accidental release of product onto water, and to recover the product as quickly as possible
- The response boats would be on standby to deploy containment and absorbent booms in the water if required

The Marine Terminal site will be protected by perimeter fencing and landscape barriers along the dyke trail. The dyke trail will connect users in the Waterstone Pier area with existing and future trail systems further upstream.

Vessels:

- All vessels will be double-hulled for optimal safety
- All vessel movements will be guided by tugboats and government-certified marine pilots on the river and at the Marine Terminal
- All vessels calling on the terminal will be pre-screened and vetted through a tanker acceptance program
- All vessels will have a Shipboard Oil Pollution Emergency Plan, and required to carry pollution liability insurance



Rendering of Fuel Receiving Facility – view looking north

Fuel Receiving Facility

The Fuel Receiving Facility will include six above-ground vertical carbon steel single wall tanks, each approximately 33.5 metres in diameter and 14.6 metres high, with an overall height of 21 metres above sea level. The tanks will provide a combined total capacity of approximately 80 million litres.

Operations:

- The Fuel Receiving Facility will operate quietly with little noticeable activity
- Fuel will be moved through contained systems from pipes to tanks with pumps that will be housed to reduce operating noise levels
- Tank systems will be equipped to reduce vapour emissions during fuel transfers and will be only locally noticeable
- Lighting and security of the facility will use state-of-the-art LED and motion detection to reduce the ambient level of light during night-time operation
- Noise, air quality and traffic will be mitigated through our comprehensive Operations Environmental Management Plan which will include a telephone information line

Emergency Preparedness and Response:

The Fuel Receiving Facility will be constructed to the National Building Code and the B.C. Building Code.

The facility will feature state-of-the-art fire detection and suppression systems including:

- Early detection systems inside tanks and in the piping/process area
- Automatic fire valves on tanks in the process area
- Foam suppression system inside each fuel storage tank
- Foam/water monitors and tank cooling system
- Fire hydrants at strategic and perimeter locations for access and operation by Richmond Fire Rescue
- Auxiliary and portable fire-fighting equipment

Environmental protection measures will include:

- Secondary containment and under-tank leak detection
- Redundant high level control to prevent tank overflow
- SCADA process monitoring system
- Emergency shut-down devices and emergency shut-down valves
- Process equipment located on concrete pads, with all drainage connected to an oil/water separator
- Drainage detection system to prevent a product release to ditches
- 24/7 monitoring by operations staff, with on-site spill response equipment, including portable spill response kits, spill response trailer and a vacuum truck



The tanks will have impermeably lined secondary containment areas

Pipeline

Modern pipeline systems have the benefit of precise locating technologies, new materials and coatings, and high-tech installation techniques to reduce disturbances during construction.

The pipeline will be about 14 kilometres long, 355.6 millimetres in diameter and buried for its entire length approximately 2.5 metres underground.

The pipeline will consist of specialty steel pipe and will be installed to meet a minimum Canadian Standards Association (CSA) Standard Z245.1 Grade 359 for Oil and Gas Pipeline Systems. The pipeline installation and operation will be regulated by the BC Oil and Gas Commission.

Prior to commissioning, the pipeline will be thoroughly tested and cleaned in accordance with construction and operational requirements, and clearly marked along its entire length. Similar to all other utility installation, location information will be provided to the City of Richmond and locator services.

Operations:

- The pipeline will be controlled and monitored by operations personnel during all fuel transfer activities
- It will be pressurized only during fuel transfer operations between the Fuel Receiving Facility and YVR (it will not operate 24/7)

Emergency Preparedness and Response:

- Prior to construction, an emergency response plan will be developed in conjunction with other municipal and regional emergency response plans
- The pipeline will include state-of-the-art corrosion protection and leak detection technologies
- The pipeline will be equipped automatic emergency shutdown devices, and pressure and flow monitors that will transmit data to a Control Centre
- Any abnormalities in pressure or flow will trigger an alarm or shutdown
- If the unlikely event that an abnormal condition exists or a release of product occurs, the Control Room Operator will take the appropriate actions, such as shutting down or isolating the affected pipeline segment, depressurizing the pipeline, and mobilizing a response team

