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Access to Information and Privacy (ATIP) Office
Transport Canada
Place de Ville, Tower C, XMSP
330 Sparks Street
Ottawa ON K1A 0N5

Your File

Our File
A-2015-00302 / MB

Mr. Charles Hatt
1910-777 Bay St.
PO Box 106
Toronto, ON M5G 2C8

FEB 2 2 2019

Dear Mr. Hatt:

This is further to our response of October 20, 2015 and your subsequent complaint submitted to the Office of the Information Commissioner (OIC) concerning the following information:

> **"Any risk assessments provided to Transport Canada by railway companies in response to the requirement to provide such assessments in Section 7 of Transport Canada's Emergency Directive dated April23, 2014, or in response to any subsequent Emergency Directives reiterating this requirement."**

Further to the OIC's investigation, we are disclosing additional records. You will note that certain information has been withheld from disclosure pursuant to sections 19(1), 20(1)(b) and 20(1)(c) of the ATIA. A copy of these sections has been enclosed for your information.

Should you have any questions, you may contact Melanie Belanger at 613-991-6104 or via e-mail at Melanie.Belanger2@tc.gc.ca.

Yours sincerely,

Blair Isaac
Chief,
Access to Information and Privacy

c.c.: OIC (3215-01526 and 3215-01527)

Canada

Access to Information Act

19(1) PERSONAL INFORMATION

19. (1) Subject to subsection (2), the head of a government institution shall refuse to disclose any record requested under this Act that contains personal information as defined in section 3 of the Privacy Act.

20(1)(b) FINANCIAL, COMMERCIAL, SCIENTIFIC OR TECHNICAL INFORMATION GIVEN IN CONFIDENCE TO THE GOVERNMENT AND TREATED IN A CONSISTENTLY IN A CONFIDENTIAL MANNER BY THE THIRD PARTY

(b) financial, commercial, scientific or technical information that is confidential information supplied to a government institution by a third party and is treated consistently in a confidential manner by the third party;

20(1)(c) INFORMATION THAT COULD RESULT IN A FINANCIAL LOSS OR GAIN

(c) information the disclosure of which could reasonably be expected to result in material financial loss or gain to, or could reasonably be expected to prejudice the competitive position of, a third party; or

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Kevin Wilde
General Director,
System Safety

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Laureen Kinney
Assistant Deputy Minister Safety and Security
Transport Canada
427 Laurier Avenue West, 14th Floor
Ottawa, Ontario
K1A ON5, Canada

Re: November 17, 2014, letter furthering the Emergency Directive dated April 23, 2014, and November 23, 2014, directing BNSF Railway to file the risk assessment determining the level of risk associated with each Key Route over which a Key train is operated.

BNSF Railway currently has one Key Route, this operation consists of 21.7 miles of class three signalized main line track between Canada/USA border (mileage 119.6) and Fraser River Junction (mileage 141.3) on the New Westminster Subdivision.

BNSF completed an analysis of the preceding 12 months of train traffic across this section of our railroad utilizing similar criteria as the Rail Corridor Risk Management System (RCRMS) developed by the railroad research foundation in conjunction with the University of Illinois. This software tool analyzes safety and security factors along Key Routes. These factors include: volume of goods, class of track, curvature, environmentally sensitive/significant areas, population density, emergency response capability, areas of consequence along with other criteria identified in MO 14-01. Future changes are addressed during the completion of annual route analysis and supplementary analysis prior to significant increases in regulated traffic. This analysis has determined that there are not any projected increases in business or changes to the operation at this time.

In addition, traffic that moves from the US to Canada on the New Westminster Subdivision traverses our network via various routes and then connects with Bellingham Subdivision immediately before crossing the border. Due to this we also considered the various mitigation factors that are in place on the US side of the border, an example would be our detector network.

As a result of these assessments we have found the New Westminster Subdivision to be the lowest risk option to our Canadian destinations.

Sincerely,
Kevin Wilde

Corridor Risk Assessment
Toronto – Chicago Route
07-March-2014

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Toronto to Chicago corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Toronto - Chicago corridor, and from that review, identified eight focus areas that required additional examination. Additionally, one focus area was identified to the important branch that leads to Buffalo. From that review, the team developed a table of potential initiatives to reduce the risk associated with each of the nine focus areas.

Route Overview

For the purposes of this risk assessment, the Toronto – Chicago corridor has been defined as the trackage making up the primary freight operation route between Toronto MacMillan Yard and Griffith, Indiana (on the outskirts of the Chicago terminal). The route is made up of six different subdivisions. This corridor provides the vital link between eastern Canada and the US Midwest and South. The entire route is operated by Centralized Traffic Control (CTC) rules and signals. The majority of the route is double-tracked. The Dundas and Strathroy Sub portions are shared with numerous VIA Rail Canada passenger trains operating between Toronto, Windsor and Sarnia. Extensive GO Transit commuter operations are conducted on the line segment near Toronto. Amtrak operates between Port Huron and Battle Creek on the US side.

In addition to being a heavily utilized route, the Toronto-Chicago corridor is also one of the most populated corridors on the CN system. Approximately 130 route miles pass through densely populated urban areas. The line also passes through a number of smaller communities and runs adjacent to multiple significant industrial production facilities. The route crosses many streams and rivers. In addition, the route includes the only mainline CN tunnel that lies beneath a major body of water, further complicated by the fact it is located at the US-Canada border.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Mitigation - Existing

Current mitigations on the route include the following:

- WIS locations at approximately twenty mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Toronto, Sarnia and Chicago, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced in certain US urban areas and near significant bridges to protect structures, track curvature and the surrounding populated areas.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across the subdivision.
- The rail is ultrasonically tested for rail defects every twenty days in the winter and every thirty days in the summer.
- The geometry car operates over the corridor approximately five to seven times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended for the Canadian portion of the route

- Add visual automated equipment inspection system
- Two additional wayside detectors to reduce spacing and protect sensitive locations
- Enhanced monitoring of train handling
- Strengthen DG response capability

Corridor Risk Assessment
Toronto - Winnipeg
23-June-2014

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN evaluated the risk associated with CN's operation of dangerous goods on the Toronto to Winnipeg corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Toronto-Winnipeg corridor, and from that review, identified items of vulnerability that required additional examination. Accordingly, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas. The following table summarizes the resultant risk mitigation initiatives and preliminary cost.

Route Overview

For the purposes of this risk assessment, the Toronto – Winnipeg corridor has been defined as the trackage making up the primary freight route across northern Ontario between these cities, plus the Newmarket Sub branch between Washago and North Bay Ontario. The mainline route is made up of five different subdivisions and all of them are under CTC operation. The Newmarket Subdivision branch is operated by OCS rules. This route provides a vital link between eastern and western Canada. The majority of the route is single-tracked, with a limited amount of double track in service near Toronto and Winnipeg. VIA Rail provides intercity passenger train operation on this corridor with long distance service on a 2-3 times weekly basis. No passenger trains are currently operated on the Newmarket Subdivision.

The corridor extends primarily through territory that is highly remote with minimal population, with the exception of the urbanized centres at either end of the line. For the most part there are no roads that parallel the corridor and a very limited number of public road crossings exist between Sudbury and the Manitoba border. Most of the corridor is built in Canadian Shield topography, either on rock or marshy subgrades. The chances of environmental consequences are high as the corridor parallels numerous small lakes and wetlands. There are a limited number of substantial bridges on the route.

A directional running zone is shared with CP between Mile 146 (Boyne) and Mile 247 (St. Cloud) on the Bala Sub. Northbound trains operate on the CP Parry Sound Sub between these points and southbound trains operate on the CN Bala Sub.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures

- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, First Nations lands, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Mitigation - Existing

Current mitigations on the mainline route include the following:

- WIS locations at approximately ten to fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Toronto and Winnipeg, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals of 20 days in the winter and 37 days in the summer.
- The geometry car operates over the corridor approximately four to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended

- Two additional wayside detectors to reduce spacing and protect sensitive locations
- Relocate one wayside detector to protect sensitive location
- Two additional dragging equipment detectors to provide improved protection for sensitive locations
- Add environmental response cache at two locations

Corridor Risk Assessment
Toronto – Montreal Route
15-September-2013

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Toronto to Montreal corridor, specifically the Kingston Subdivision. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Kingston Subdivision, and from that review, identified six focus areas that required additional examination. From that review, the team developed a table of potential initiatives to reduce the risk associated with each of the focus areas.

Route Overview

For the purposes of this risk assessment, the Toronto – Montreal corridor has been defined as the trackage making up the primary freight operation route between Toronto MacMillan Yard and Montreal Taschereau Yard. The route comprises of the Montreal Subdivision between Mile 8 and 11, the Kingston Subdivision between Mile 10 and Mile 313 and the York Subdivision between Mile 0 and Mile 25. This corridor is one of the busiest in Canada, with all but twelve of the route miles made up of multi-track territory. The entire route is operated by Centralized Traffic Control (CTC) rules and signals. The Montreal and Kingston Sub portions are shared with numerous VIA Rail Canada passenger trains operating between Toronto, Ottawa and Montreal.

In addition to being a heavily utilized route, the Toronto-Montreal corridor is also one of the most populated corridors on the CN system. Approximately 70 route miles pass through densely populated urban areas. The line also passes through a number of smaller communities and runs adjacent to several significant industrial production facilities. The route crosses many streams and rivers, and at several locations the line runs parallel and within 1000 feet of Lake Ontario. The railway runs parallel to, and within a few miles of, primary freeway Highway 401/Autoroute 20 for much of the distance between Toronto and Montreal. For these reasons, along with other considerations, this corridor was selected as a pilot project for a risk assessment related to the transport of dangerous goods on the CN system.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Dangerous goods train accident locations since 2003
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – CP trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Mitigation – Existing

Current mitigations on the route include the following:

- WIS locations at approximately fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Toronto and Montreal, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced at the Ottawa River bridges and near the lakeshore at Port Hope to protect structures, track curvature and the surrounding populated areas.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across the subdivision.
- The rail is ultrasonically tested for rail defects every twenty days in the winter and every thirty days in the summer.
- The geometry car operates over the Kingston Subdivision approximately five to seven times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Risk Mitigation Initiatives

As a result of the assessment, the following additional mitigation was recommended for locations within Canada

- Develop train handling procedures for six key focus areas
- Increased monitoring of train handling procedures
- Review response capability

Corridor Risk Assessment
Chicago – Winnipeg Route
03-April-2014

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Chicago to Winnipeg corridor, including major connecting lines within the metropolitan Chicago area. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Chicago - Winnipeg corridor, and from that review, identified items of vulnerability that required additional examination. From that review, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas.

Route Overview

For the purposes of this risk assessment, the Chicago – Winnipeg corridor has been defined as the trackage making up the primary freight operation route between Kirk Yard in Gary, Indiana and Symington Yard in Winnipeg, Manitoba. The route is made up of nine different subdivisions. This corridor provides the vital link between western Canada and the US Midwest and South. All but 60 miles of the route is operated by Centralized Traffic Control (CTC) rules and signals. There is a 60 mile directional running zone between Duluth and Virginia, Minnesota, with no signal protection for trains operating with the current of traffic. The majority of the route is single-tracked. There is no intercity passenger train operation on this corridor. Extensive Metra commuter operations are conducted on the Waukesha Subdivision near Chicago.

In addition to being a heavily utilized route, the Chicago-Winnipeg corridor originates in one of the largest metropolitan areas on the CN network. The first 125 miles from Gary to the Wisconsin state line (north of Antioch) can be considered as densely populated and part of the Chicago metro region. The line also passes through a number of smaller communities although population density is reduced considerably in northern Wisconsin, Minnesota and Manitoba. The northern portion of the route intersects numerous streams, rivers and wetlands. Two significant bridges over the Rainy River are also located at the US/Canada international boundary.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Mitigation - Existing

Current mitigations on the route include the following:

- WIS locations at approximately fifteen to twenty mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Chicago, Fond du Lac, Stevens Point and Winnipeg, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced in certain US urban areas and near significant bridges to protect structures, track curvature and the surrounding populated areas.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals not exceeding every 23 days in the winter and every 37 days in the summer.
- The geometry car operates over the corridor approximately four to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.
- Diamonds are hand tested for rail defects every 30 days within the Chicago area.

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended for locations within Canada

- One additional clearance detector to protect sensitive bridge from damage due to shifted load
- One additional dragging equipment detector to provide improved protection for sensitive locations
- Addition of one DG transfer trailer

Corridor Risk Assessment
Edmonton-Pacific Coast Routes
02-May-2014

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Edmonton to Pacific Coast corridors, including both the Edmonton-Vancouver route and the Jasper-Prince Rupert route. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Edmonton-Pacific Coast corridor, and from that review, identified items of vulnerability that required additional examination. From that review, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, First Nations lands, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Route Overview

For the purposes of this risk assessment, the Edmonton – Pacific Coast corridor has been defined as the trackage making up the two primary freight routes west of Edmonton:

- Edmonton to Vancouver
  - Made up of five different subdivisions
  - All under CTC operation
- Jasper to Prince Rupert
  - Made up of seven different subdivisions
  - All under CTC operation

These routes provide a vital link between western Canada and the ports at Vancouver and Prince Rupert. The majority of both routes are single-tracked. However, the co-production zone with CP between Coho (near Ashcroft) BC and Matsqui (near Vancouver) BC provides a 160 mile double track directional running zone with minimal requirements for train meets. VIA Rail provides intercity passenger train operation on this corridor and Rocky Mountaineer operates seasonal tourist trains west of Jasper.

In addition to being a heavily utilized route, the entire corridor extends through extremely remote territory with minimal population. While highways generally parallel the corridor, track access is limited due to terrain and presence of rivers and lakes. Any incident is likely to have environmental consequences as most of the corridor parallels major rivers and lakes as expected in mountainous territory. A significant number of bridges and tunnels are found on the route as a result of the challenging terrain. The mountainous geography also generates other issues such as slope stability and avalanche/rockfall zones.

Mitigation - Existing

Current mitigations on the route include the following:

- WIS locations at approximately ten to fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Edmonton, Kamloops, Vancouver, Prince George and Prince Rupert, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed is generally less than 45 mph west of Jasper on account of the large amount of curvature present on the line.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals of 18 days in the winter and 26 days in the summer.
- The geometry car operates over the corridor approximately three to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended

- Thirteen additional dragging equipment detectors to provide improved protection for sensitive locations
- Addition of one DG equipment trailer
- Additional cache of environmental response material
- Review capabilities of all contractors used for Environmental response in Western Canada
- Increase culvert inspection frequency at key location
- Inspect wood trestle bridge inspections on feeder line
- Conduct environmental response exercise

Corridor Risk Assessment
Montreal – Halifax
23-June-2014

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN evaluated the risk associated with CN's operation of dangerous goods on the Montreal to Halifax corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Montreal-Halifax corridor, and from that review, identified items of vulnerability that required additional examination. Accordingly, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas.

Route Overview

For the purposes of this risk assessment, the Montreal – Halifax corridor has been defined as the trackage making up the primary freight routes between these cities. The route is made up of eight different subdivisions and all of them are under CTC operation. This route provides a vital link between eastern Canada and the customers and ports located in Atlantic Canada. The majority of the route is single-tracked, with double track in service near Montreal. VIA Rail provides intercity passenger train operation on this corridor with high frequency service between Montreal and Quebec City plus long distance service on 2-3 times weekly basis east of Quebec City to Halifax. No passenger trains are operated on the Pelletier and Napadogan Subdivisions. Three short connecting lines designated as key routes were also reviewed as part of this assessment.

The corridor extends through territory varying from densely populated urban areas to highly remote areas with minimal population. Most of the corridor is paralleled by roadways except for the 180-mile segment of the Napadogan Sub between Moncton and Plaster Rock NB. The chances of environmental consequences are greatest east of Quebec City where the corridor parallels major rivers and numerous other lakes and small water bodies. There are a limited number of substantial bridges on the route, including a major structure spanning the St. Lawrence River near downtown Montreal.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, First Nations lands, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory.

Mitigation – Existing

Current mitigations on the route include the following:

- WIS locations at approximately ten to fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Montreal, Joffre, Moncton, and Halifax, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals of 20-60 days in the winter and 30-90 days in the summer, with the highest frequency of inspection occurring on the Montreal-Quebec City segment where passenger operations are prominent.
- The geometry car operates over the corridor approximately three to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended

- Two additional wayside detectors to reduce spacing
- Relocation of one wayside detector to provide improved protection for sensitive location
- Six additional dragging equipment detectors to provide improved protection for sensitive locations
- Addition of one fire fighting trailer
- Additional cache of environmental response material

Corridor Risk Assessment
Edmonton – Winnipeg Corridor
28 October 2013

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Edmonton to Winnipeg corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods between Edmonton and Winnipeg, and from that review, identified six focus areas that required additional examination. From that review, the team developed a table of potential initiatives to reduce the risk associated with each of the focus areas.

Route Overview

For the purposes of this risk assessment, the Edmonton – Winnipeg corridor has been defined as the trackage making up the primary freight operation route between Edmonton Walker Yard and Winnipeg Symington Yard. The route comprises of the Wainwright, Watrous and Rivers Subdivisions. This corridor is a heavy tonnage freight route and is primarily single track with passing sidings. The entire route is operated by Centralized Traffic Control (CTC) rules and signals. A limited amount of VIA Rail passenger service is operated on the line.

The review also included the secondary route linking Saskatoon, North Battleford, Fort Saskatchewan and Edmonton (also known as the 'Prairie North Line'). This single track corridor is operated under OCS rules at this time. Traffic has been growing on this route as new resource projects come on line. In addition, the following low-density connecting routes that are linked to the Edmonton – Winnipeg corridor were also examined:

- Carberry - Cromer Subdivisions
- Edmonton – Calgary
- Edmonton – Fort McMurray
- Edmonton - McLennan
- Prairie North Line east end between Portage la Prairie and Warman

The corridor is not heavily populated and passes through only three major urban areas (Winnipeg, Saskatoon, Edmonton). The line also passes through a number of smaller communities and runs adjacent to significant agricultural areas. Between Saskatoon and Edmonton several new crude oil rail loading terminals have been constructed during the past three years. The route crosses a number of streams and rivers, and at several locations the line utilizes significantly large bridge and trestle structures to cross wide valleys. The railway runs parallel to, and within a few miles of, a number of secondary highways. For these reasons, along with other considerations, this corridor was selected as the second risk assessment related to the transport of dangerous goods on the CN system.

Risk Assessment Process

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Dangerous goods train accident locations since 2003
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railways, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. The prominent items of vulnerability were also tabulated.

Current Mitigations

Current mitigations on the route include the following:

- WIS locations at approximately fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Winnipeg and Edmonton, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced at certain major bridges protect structures and track curvature.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across the subdivision.
- The rail is ultrasonically tested for rail defects every twenty days in the winter and every thirty days in the summer.
- The geometry car operates over the corridor approximately five to seven times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Mitigation

As a result of the assessment, the following additional mitigation was recommended

- Nine additional wayside detectors to reduce spacing and protect sensitive locations
- Nine additional dragging equipment detectors to provide improved protection for sensitive locations
- Increased RFD on Northern Alberta lines
- Operating bulletin and monitoring of DB usage on Northern Alberta lines
- Addition of one foam trailer
- Addition of one DG transfer trailer
- Review capabilities of all contractors used for Environmental response in Western Canada

Pages 16 to / à 22

are withheld pursuant to sections

sont retenues en vertu des articles

20(1)(b), 20(1)(c)

of the Access to Information Act

de la Loi sur l'accès à l'information

Key Route Analysis and Risk Assessment

Conducted in response to Transport Canada's Emergency Directive issued pursuant to Section 33 of the Railway Safety Act for

Southern Ontario Railway (SOR or RLHH)

prepared by:

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Nashville, TN 37203
(+1) 615-321-4848
www.vrisk.com

October 23, 2014

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Key Route Analysis and Risk Assessment for Southern Ontario Railway (SOR or RLHH)

1. Introduction

1.1. Overview

This report presents the results from a Key Route analysis and risk assessment of the transportation of dangerous goods by rail. This investigation was conducted in response to Transport Canada's Emergency Directive issued pursuant to Section 33 of the *Railway Safety Act* dated April 23, 2014. The Emergency Directive prescribes, among other operational requirements, a risk assessment of all Key Routes over which a Key Train operates. A Key Train is defined as any train that includes (a) at least one loaded tank car carrying a Class 2.3 toxic gas or that is toxic by inhalation subject to Special Provision 23 of the *Transport of Dangerous Goods Regulations* or (b) at least 20 loaded tank cars or intermodal portable tanks containing any dangerous goods as defined in the *Transportation of Dangerous Goods Act, 1992*. A Key Route is any track over which at least 10,000 loaded tank cars or intermodal portable tanks containing dangerous goods are transported.

The assessment, to meet the requirements of the Emergency Directive, identifies the safety and security risks associated with each Key Route, compares the safety and security of each Key Route with any identified alternatives, and considers potential or future operational changes. Additionally, in compliance with Directive requirements, the safety and security assessment considers certain attributes of the track itself (volume of goods, track class, maintenance schedule, and curvature), as well as attributes of the area along the track (environmentally sensitive or significant areas, population density, emergency response capability, and areas of high consequence).

1.2. Applicability of the Key Route Risk Assessment Requirement

Figure 2 outlines the general process needed to determine the applicability of the Key Route risk assessment requirement of the Emergency Directive. The process considers whether the Key Route definition is met based on the number of dangerous goods shipments. If a Key Route exists, then the process considers the definition for a Key Train, based on number of loaded dangerous goods cars or the movement of a single Class 2.3 or inhalation hazard on any train. Only if a Key Train is moved over a Key Route, does the Emergency Directive require a risk assessment for the Key Route.

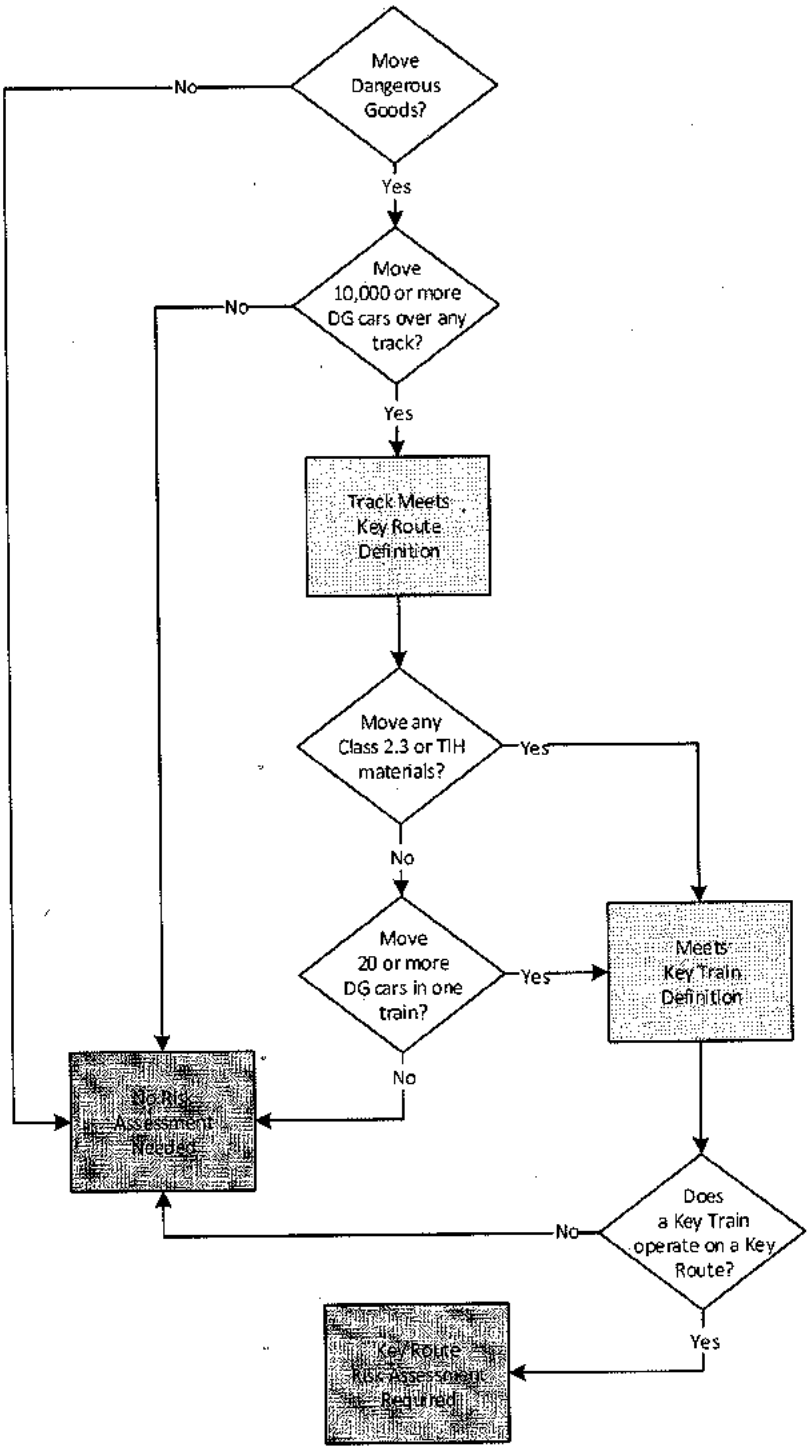


Figure 1: Applicability Determination

2. The SOR Rail Network

The Southern Ontario Railroad (with reporting marks SOR and RLHH) is a subsidiary of Genesee & Wyoming Inc. (GWI), which owns over 100 short line and regional railroads throughout the world. The SOR rail network is comprised of approximately 110 km of track in Ontario, Canada, over which commodities such as steel, agricultural products, fuel, and chemicals are moved. There are seven freight rail stations that define key locations, including termini, along the SOR rail network, as shown in Figure 2. Six primary rail network track segments connect the freight rail stations, and are presented in Table 1 with the segment length and track ownership for each.

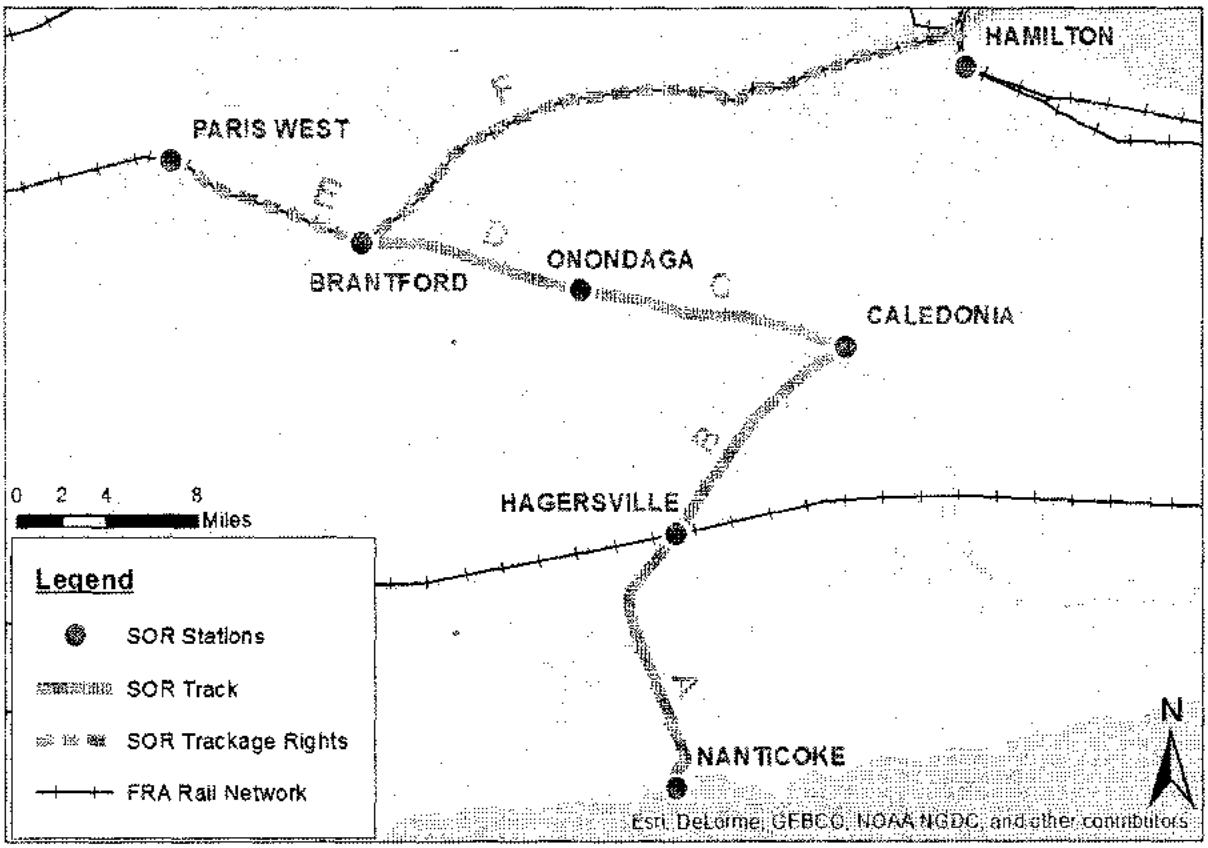


Figure 2: SOR Rail Network

Table 1: SOR Rail Network Segments

Track Segment	Station Reference From	Station Reference To	Segment Length (km)	Track Segment Owner
A	NANTICOKE (MP 0)	HAGERSVILLE (MP 9.0)	19.09	SOR
B	HAGERSVILLE (MP 9.0)	CALEDONIA (MP 18.7)	15.87	SOR
C	CALEDONIA (MP 18.7)	ONONDAGA (MP 27.3)	13.83	SOR
D	ONONDAGA (MP 27.3)	BRANTFORD (MP 35.0)	11.49	SOR
E	BRANTFORD	PARIS WEST	11.21	CN
F	BRANTFORD	HAMILTON	38.32	CN

3. Historical Shipment and Key Route Analysis

The Emergency Directive defines a Key Route as any track over which at least 10,000 loaded tank cars or intermodal portable tanks containing dangerous goods are transported. Historical shipments over calendar year 2013 were used to evaluate whether SOR has any Key Routes.

3.1. Shipment Data

Historical shipment data for this analysis was sourced from a GWI-supplied extract of car-level shipments of dangerous goods in Canada. The data source for the extract was GWI's Transportation Management System (TMS) Equipment History Universe. Using RailConnect business intelligence systems, GWI queried the TMS for the UN Codes associated with dangerous goods, as identified in Schedule 3 of the *Transportation of Dangerous Goods (TDG) Regulations* to identify the relevant car moves of these dangerous goods.

The car-level data queried and exported from GWI's TMS can be described as a collection of documented "equipment move type" events. Each record represents a single movement event for a piece of equipment (rail car) being transported under a specific waybill number with a Standard Transportation Commodity Code (STCC). Viewing and interpreting a sequential collection of these individual equipment move event records, one can identify the physical movement of a specific rail car from the origin, through various locations, to the ultimate destination. The key elements of the data are the "recorded" movement, which is defined as a sequence of freight stations; the equipment/type of the rail car; and the STCC being transported.

3.2. Car Shipment Path Identification and Modeling

The route path definition for each car shipment was constructed by examining the freight station sequence identified in the equipment move event records described above. The route path definition for each car shipment was modeled over a GIS rail network to identify the specific track segments associated with the route. This process produced data listing the track segments traversed for each car shipment of dangerous goods in the calendar year 2013.

Table 2 summarize the dangerous goods car shipment data by track segment. Figure 3 uses line thickness to illustrate the different overall volumes on each track segment and Table 2 shows the number of cars moved across that track segment by both commodity STCC and UN Code.

Note that in examining the route path definitions generated from the raw shipment data during a quality control process, there were some cases (less than 3 percent) where car shipment equipment move event records appeared to be erroneous or misinterpreted as they indicated that a specific loaded car would traverse a single track segment three or more times. Upon confirmation from SOR, these "extra" traversing records were eliminated from the route path definition.

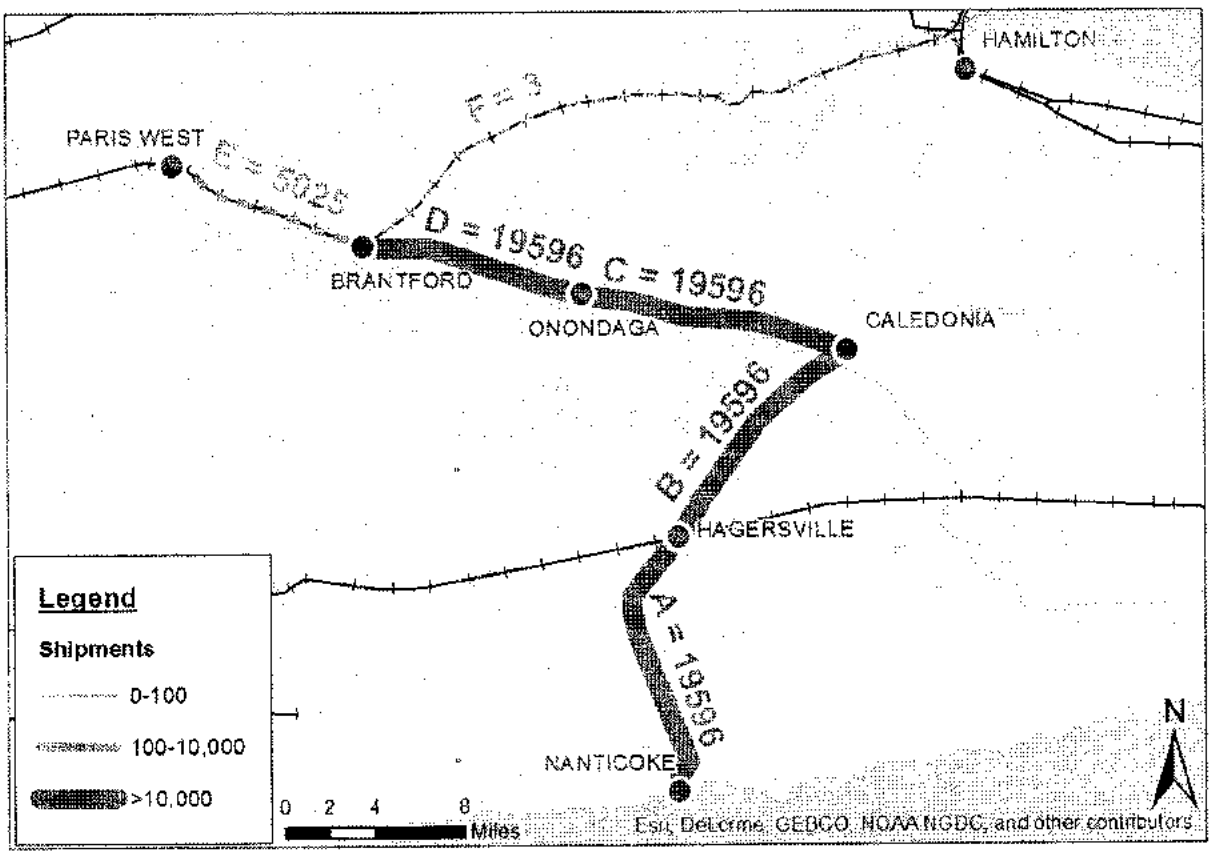


Figure 3: Track Segments with Dangerous Goods Shipment Counts

Table 2: Track Segment Shipment Details by Commodity

Track Segment	UN Code	Commodity Descriptions		Hazard Class	Shipment Counts by		
		STCC	Name		STCC	UN Code	Segment
A	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	10	10	19,596
	UN1017	4920523	CHLORINE	2.3	5	5	
	UN1075	4905421	PROPANE	2.1	210	7,193	
		4905423	BUTANE	2.1	40		
		4905424	BUTANE	2.1	161		
		4905437	LIQUEFIED PETROLEUM GAS	2.1	1,331		
		4905752	PETROLEUM GASES, LIQUEFIED	2.1	5,451		
	UN1077	4905782	PROPYLENE	2.1	10	10	
	UN1114	4908110	BENZENE	3	16	16	
	UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	23	23	
	UN1203	4908175	GASOLINE	3	144	144	
	UN1267	4910165	PETROLEUM CRUDE OIL	3	10,505	10,505	
	UN1402	4916408	CALCIUM CARBIDE	4.3	93	93	
	UN1824	4935240	SODIUM HYDROXIDE SOLUTION	8	20	20	
	UN1830	4930039	SULFURIC ACID	8	3	434	
		4930040	SULFURIC ACID	8	431		
	UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	6	6	
	UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	1,037	1,047	
		4910167	FLAMMABLE LIQUIDS, N.O.S.	3	10		
	UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	90	90	
B	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	10	10	19,596
	UN1017	4920523	CHLORINE	2.3	5	5	
	UN1075	4905421	PROPANE	2.1	210	7,190	
		4905423	BUTANE	2.1	40		
		4905424	BUTANE	2.1	161		
		4905437	LIQUEFIED PETROLEUM GAS	2.1	1,331		
		4905752	PETROLEUM GASES, LIQUEFIED	2.1	5,448		
	UN1077	4905782	PROPYLENE	2.1	10	10	
	UN1114	4908110	BENZENE	3	16	16	
	UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	23	23	
	UN1203	4908175	GASOLINE	3	144	144	
	UN1267	4910165	PETROLEUM CRUDE OIL	3	10,505	10,505	
	UN1402	4916408	CALCIUM CARBIDE	4.3	93	93	
	UN1824	4935240	SODIUM HYDROXIDE SOLUTION	8	20	20	
	UN1830	4930039	SULFURIC ACID	8	3	437	
		4930040	SULFURIC ACID	8	434		
	UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	6	6	
	UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	1,037	1,047	
		4910167	FLAMMABLE LIQUIDS, N.O.S.	3	10		
	UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	90	90	

Track Segment	Commodity Descriptions				Shipment Counts by		
	UN Code	STCC	Name	Hazard Class	STCC	UN Code	Segment
C	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	10	10	19,596
	UN1017	4920523	CHLORINE	2.3	5	5	
	UN1075	4905421	PROPANE	2.1	210	7,190	
		4905423	BUTANE	2.1	40		
		4905424	BUTANE	2.1	161		
		4905437	LIQUEFIED PETROLEUM GAS	2.1	1,331		
		4905752	PETROLEUM GASES, LIQUEFIED	2.1	5,448		
	UN1077	4905782	PROPYLENE	2.1	10	10	
	UN1114	4908110	BENZENE	3	16	16	
	UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	23	23	
	UN1203	4908175	GASOLINE	3	144	144	
	UN1267	4910165	PETROLEUM CRUDE OIL	3	10,505	10,505	
	UN1402	4916408	CALCIUM CARBIDE	4.3	93	93	
	UN1824	4935240	SODIUM HYDROXIDE SOLUTION	8	20	20	
	UN1830	4930039	SULFURIC ACID	8	3	437	
		4930040	SULFURIC ACID	8	434		
	UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	6	6	
	UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	1,037	1,047	
	UN1993	4910167	FLAMMABLE LIQUIDS, N.O.S.	3	10		
	UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	90	90	
D	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	10	10	19,596
	UN1017	4920523	CHLORINE	2.3	5	5	
	UN1075	4905421	PROPANE	2.1	210	7,190	
		4905423	BUTANE	2.1	40		
		4905424	BUTANE	2.1	161		
		4905437	LIQUEFIED PETROLEUM GAS	2.1	1,331		
		4905752	PETROLEUM GASES, LIQUEFIED	2.1	5,448		
	UN1077	4905782	PROPYLENE	2.1	10	10	
	UN1114	4908110	BENZENE	3	16	16	
	UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	23	23	
	UN1203	4908175	GASOLINE	3	144	144	
	UN1267	4910165	PETROLEUM CRUDE OIL	3	10,505	10,505	
	UN1402	4916408	CALCIUM CARBIDE	4.3	93	93	
	UN1824	4935240	SODIUM HYDROXIDE SOLUTION	8	20	20	
	UN1830	4930039	SULFURIC ACID	8	3	437	
	UN1830	4930040	SULFURIC ACID	8	434		
	UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	6	6	
	UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	1,037	1,047	
		4910167	FLAMMABLE LIQUIDS, N.O.S.	3	10		
	UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	90	90	

Track Segment	UN Code	Commodity Descriptions			Shipment Counts by		
		STCC	Name	Hazard Class	STCC	UN Code	Segment
E	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	10	10	5,025
	UN1075	4905421	PROPANE	2.1	103	2,587	
		4905423	BUTANE	2.1	8		
		4905424	BUTANE	2.1	1		
		4905437	LIQUEFIED PETROLEUM GAS	2.1	1,314		
		4905752	PETROLEUM GASES, LIQUEFIED	2.1	1,161		
	UN1077	4905782	PROPYLENE	2.1	10	10	
	UN1114	4908110	BENZENE	3	16	16	
	UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	23	23	
	UN1203	4908175	GASOLINE	3	144	144	
	UN1267	4910165	PETROLEUM CRUDE OIL	3	1,020	1,020	
	UN1402	4916408	CALCIUM CARBIDE	4.3	55	55	
	UN1830	4930039	SULFURIC ACID	8	3	22	
		4930040	SULFURIC ACID	8	19		
	UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	6	6	
	UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	1,032	1,042	
		4910167	FLAMMABLE LIQUIDS, N.O.S.	3	10		
	UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	90	90	
F	UN1005	4920359	AMMONIA, ANHYDROUS	2.3	1	1	3
	UN1075	4905752	PETROLEUM GASES, LIQUEFIED	2.1	2	2	

Table 3 presents the aggregated total car shipment count traversing each track segment over calendar year 2013.

Table 3: Track Segment Shipment Summary

Track Segment	Station Reference	Count of Cars Transporting Dangerous Goods
A	NANTICOKE -to- HAGERSVILLE	19,596
B	HAGERSVILLE -to- CALEDONIA	19,596
C	CALEDONIA -to- ONONDAGA	19,596
D	ONONDAGA -to- BRANTFORD	19,596
E	BRANTFORD -to- PARIS WEST	5,025
F	BRANTFORD -to- HAMILTON	3

It is clear that track segments A, B, C, and D meet the definition of a Key Route because there were more than 10,000 dangerous goods carloads moved across them during the one-year period. Based on the requirements of the Emergency Directive, a risk assessment should be performed on SOR track segments A, B, C, and D.

4. Risk Assessment

For this assessment of the four track segments identified in the previous section as Key Routes, separate safety and security risk assessment evaluations were performed for the rail transport of bulk dangerous goods (in tank cars or intermodal portable tanks). Supplemental analysis of information that was not directly included in the risk measures, such as emergency response capability, was also undertaken. Each of these assessments are defined in the following sections.

The risk assessments are dependent on many track-specific attributes. For each track segment, a data collection process was used to translate required information from sources such as GWI's TMS, SOR infrastructure databases, personal knowledge from SOR personnel, or actual track inspections to the required track-specific attributes. These attributes included, but were not limited to, the volume of goods, track class, maintenance schedule, and curvature.

In addition to infrastructure-specific data, information characterizing the operational environment surrounding the track was required, including environmentally sensitive or significant areas, population density, emergency response capability, and areas of high consequence. The sources for this information are described in the relevant sections below.

4.1. Safety Risk Assessment

Safety risks are based on major accident scenarios, such as derailments and collisions that could result in a dangerous goods release. Risk values are computed for each track segment using a generally accepted three-parameter model:

$$R = F \times P \times C$$

where:

R = Risk value
F = Frequency
P = Probability
C = Consequence

4.1.1. Frequency

The safety risk frequency (F) values for derailment/collision are based on FRA (Federal Railroad Administration) incident data. In particular, the frequency is based on the accident rates for mainline track. Accident rates for each track segment were computed and are expressed in accidents per car kilometer. These enhanced industry average accident rates are a function of track class, method of operation (signaled or dark), and traffic density. The rate values were sourced from the Rail Corridor Risk Management System (RCRMS) available from the Association of American Railroads.

Table 4: Track Segment Accident Likelihood

Track Segment	Length (km)	Track Class	Train Control System	Method of Operation	Traffic Density	Accident Rate (per car-km)	Segment Accident Likelihood
A	12.09	1	Other than main	Dark	> 20MGT	1.458E-07	2.782E-06
	7.00	3	OCS (TWC)				
B	15.87	3	OCS (TWC)	Dark	> 20MGT	7.767E-08	1.233E-06
C	13.83	3	OCS (TWC)	Dark	> 20MGT	7.767E-08	1.074E-06
D	11.49	3	OCS (TWC)	Dark	> 20MGT	7.767E-08	8.923E-06

4.1.2. Probability

The probability (*P*) of a dangerous goods release reflects the likelihood of a release, given that a major accident occurs. This probability is primarily a function of the type of car/container holding the substance of interest and its ability to withstand the accident. Also influencing the probability is the speed at which the car/container will be traveling, which is assumed to be the posted speed of the track.

The RCRMS contains a database of conditional probabilities of a release (CPR) for many rail car types based on accident analysis performed for the rail industry.[1] The car-level historical equipment move event data provided for use in this analysis included each car's DOT container specification. If the DOT specification for the rail car was given and was also found in the RCRMS database, that container was retained as the container of analysis for that shipment. Otherwise, the following process was used to determine an appropriate container specification for the analysis.

1. The STCC for the shipment was used to determine if any other rail cars used to transport that commodity in other shipments were included in the RCRMS database; if so, the container with the greatest CPR was selected. If more than one container had the same CPR, then the most commonly used container was selected.
2. If no rail cars in the RCRMS database had been paired with the commodity's STCC, the UN Number for the commodity was used to determine if any rail cars had been used to transport similar commodities with a matching UN Number in the RCRMS database. If so, the container with the greatest (i.e., most conservative) CPR was selected. If more than one container had the same CPR, then the most commonly used container was selected.
3. Otherwise, the "Other" container type in the RCRMS database was selected.

Once a container was assigned to each shipment, the CPR for each track segment-car-shipment was calculated. This calculation includes an adjustment based on operating speed.

The representative CPR for each track segment was calculated as an average of the container-specific CPR weighted by number of shipments using that container on that track in calendar year 2013. Table 5 shows the surrogate container usage on each track segment, derived from aggregating the car

[1] Rail Corridor Risk Management System Risk Calculation Methodology, Version 11, Railroad Research Foundation, Association of American Railroads, July 20, 2011.

shipments across each track segment. Table 6 shows the weighted average conditional probability of release for each analysis track segment, using the data for the one-year period (calendar year 2013).

Table 5: Containers Moved by Track Segment

DOT Container	Track Segment A	B	C	D
105A300W	15	15	15	15
105A400W	200	200	200	200
105A500W	5	5	5	5
111A100W1	11,736	11,736	11,736	11,736
111A100W2	434	437	437	437
111A100W3	70	70	70	70
112A340W	5,093	5,090	5,090	5,090
112A400W	1,470	1,470	1,470	1,470
112J340W	435	435	435	435
Other	138	138	138	138

Table 6: Track Segment Conditional Probability of Release

Track Segment	Length (km)	Maximum Freight Operating Speed (mph)	Posted/Time Table Speed (mph)	Weighted Average Conditional Probability of Release
A	12.09	10	10	0.2132
	7.00	30	25	
B	15.87	30	25	0.2666
C	13.83	30	25	0.2666
D	11.49	30	25	0.2666

4.1.3. Consequence

Consequences are evaluated in this analysis based on population and environmentally sensitive area exposure.

Population Exposure

Population potentially impacted by a given dangerous goods (commodity) release is assessed for each track segment in the analysis and is taken as the population (as estimated from census data obtained from Statistics Canada) within the exposure zone of an analysis track segment. Figure 4 shows the Canadian Census data by population density along with the SOR rail network.

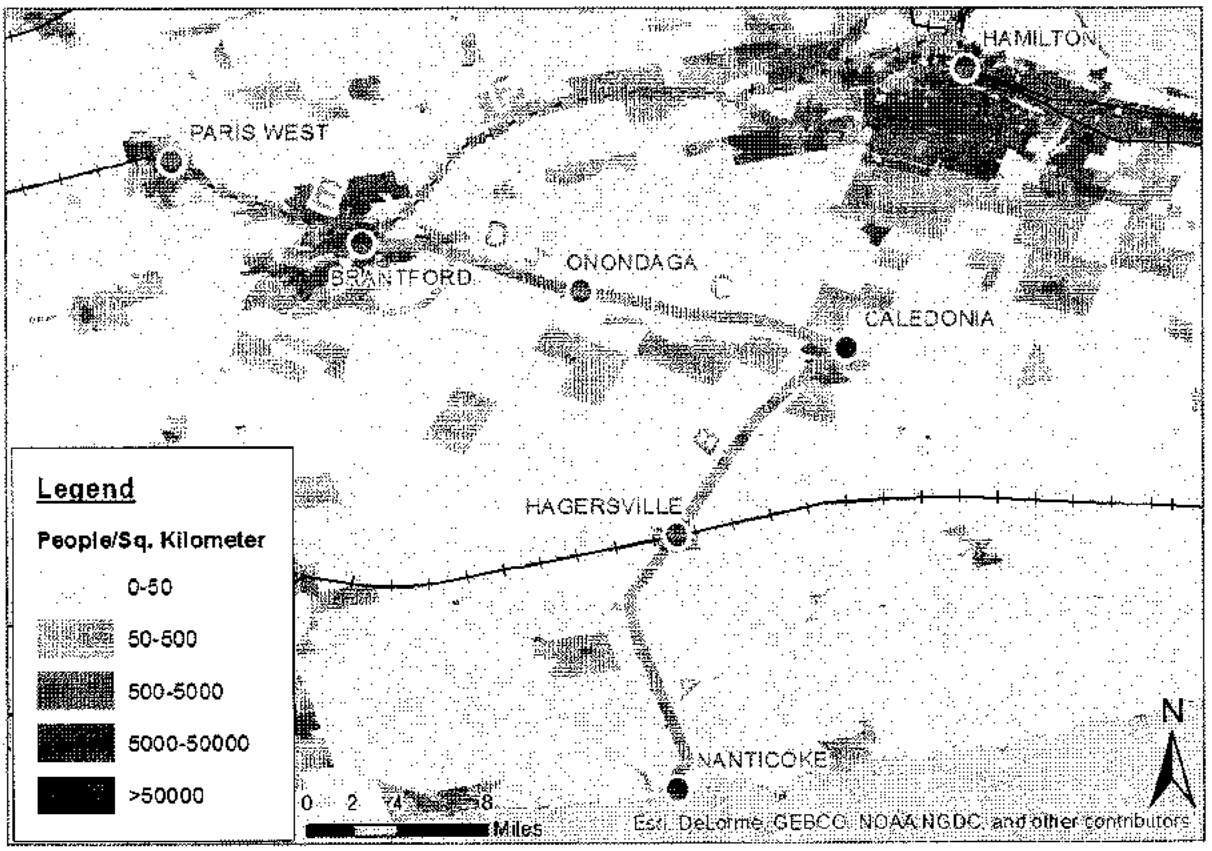


Figure 4: Population Distribution

For each commodity, the exposure distance is taken from the DOT 2012 Emergency Response Guidebook (ERG), based on the UN Number of the material. If the ERG provides a Protective Action Distance[2] for the material, the greater of the material's daytime and nighttime protection distances for large spills is used. Otherwise, the greater of the ERG's evacuation distances for a large spill or fire on of the material is used.

The impact distances for each of the commodities represented in SOR shipments considered for this analysis were compared. Many materials with different properties can have the same impact distance; as a result only four distinct exposure distances are associated with all the SOR shipments considered. These exposure distances are 800, 1,600, 2,000, and 7,900 meters, respectively. In addition to determining the population within each of these exposure distances, the population density within each distance was calculated as well.

Table 7 summarizes the impact distances for each of the commodities by STCC, as well as the number of shipments that involved that commodity. Table 8 lists the number of shipments along each track

[2] These distances are taken from the Table of Initial Isolation and Protective Action Distances in the ERG.

segment that utilize each of the four impact distances. Table 9 provides the total population within each impact distance for each track segment.

Table 7: Exposure Impact Distance

UN Code	STCC	Commodity	Hazard Class	Impact Distance (m)	Shipment Per Track Segment			
					A	B	C	D
UN1005	4920359	AMMONIA, ANHYDROUS	2.3	2,000	10	10	10	10
UN1017	4920523	CHLORINE	2.3	7,900	5	5	5	5
UN1075	4905421	PROPANE	2.1	1,600	210	210	210	210
	4905423	BUTANE	2.1	1,600	40	40	40	40
	4905424	BUTANE	2.1	1,600	161	161	161	161
	4905437	LIQUEFIED PETROLEUM GAS	2.1	1,600	1,331	1,331	1,331	1,331
	4905752	PETROLEUM GASES, LIQUEFIED	2.1	1,600	5,451	5,448	5,448	5,448
UN1077	4905782	PROPYLENE	2.1	1,600	10	10	10	10
UN1114	4908110	BENZENE	3	800	16	16	16	16
UN1136	4910132	COAL TAR DISTILLATES, FLAMMABLE	3	800	23	23	23	23
UN1203	4908175	GASOLINE	3	800	144	144	144	144
UN1267	4910165	PETROLEUM CRUDE OIL	3	800	10,505	10,505	10,505	10,505
UN1402	4916408	CALCIUM CARBIDE	4.3	800	93	93	93	93
UN1824	4935240	SODIUM HYDROXIDE SOLUTION	8	800	20	20	20	20
UN1830	4930039	SULFURIC ACID	8	800	3	3	3	3
	4930040	SULFURIC ACID	8	800	431	434	434	434
UN1951	4904503	ARGON, REFRIGERATED LIQUID	2.2	800	6	6	6	6
UN1993	4908112	FLAMMABLE LIQUIDS, N.O.S.	3	800	1,037	1,037	1,037	1,037
	4910167	FLAMMABLE LIQUIDS, N.O.S.	3	800	10	10	10	10
UN3257	4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	800	90	90	90	90

Table 8: Distribution of Shipments by Exposure Impact Distance

Track Segment	Impact Distance			
	800m	1600m	2000m	7900m
A	12,378	7,203	10	5
B	12,381	7,200	10	5
C	12,381	7,200	10	5
D	12,381	7,200	10	5

Table 9: Population by Exposure Impact Distance

Track Segment	Estimated Population within Impact Distance				Estimated Population Density within Impact Distance			
	800m	1,600m	2,000m	7,900m	800m	1,600m	2,000m	7,900m
A	2,443	3,361	3,718	11,195	76.52	51.72	45.17	27.90
B	7,938	12,952	13,977	23,556	289.66	220.16	183.78	52.74
C	1,721	4,804	6,633	23,876	71.30	91.85	97.73	57.63
D	15,900	27,578	33,887	104,288	779.72	615.55	579.20	276.37

The track segment population consequence measure is calculated as a probability-weighted average of exposed populations. Table 10 shows the weighted average population and population density for each track segment.

Table 10: Population Consequences

Track Segment	Weighted Average Population	Weighted Average Population Density
A	2,782.32	67.38
B	9,786.95	264.01
C	2,861.55	78.86
D	20,221.85	719.17

Environmentally Sensitive Area Exposure

In this assessment, environmentally sensitive areas include rivers, streams, lakes, and reservoirs. The consequence measure for these areas is based on the length of track that is near (within 200 meters) of one of these receptors. Environmentally sensitive area data were derived from hydrography data sourced from National Resources Canada[3]. Figure 5 displays the environmentally sensitive areas along with the SOR rail network.

[3] Downloaded line and polygon hydrography from
ftp://ftp2.cits.rncan.gc.ca/pub/geott/frameworkdata/hydrology/cartographic/on/

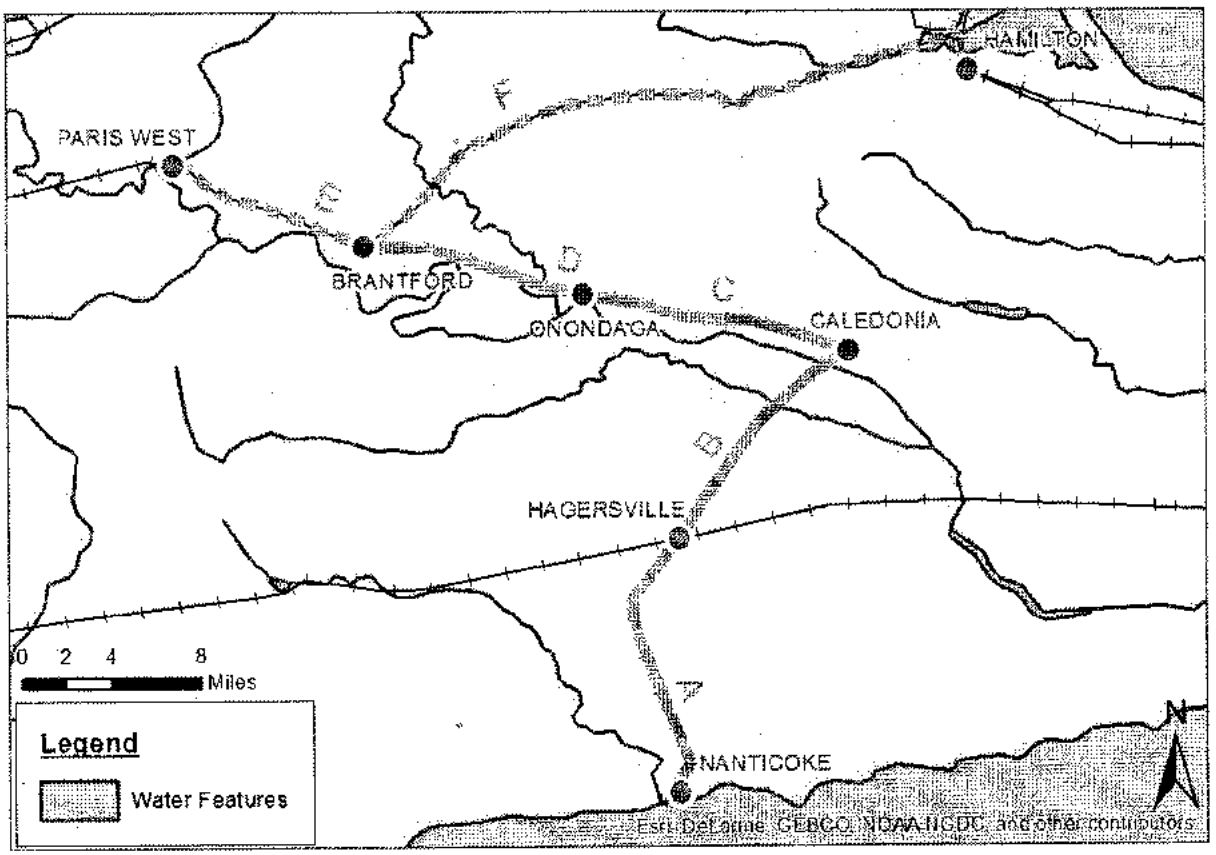


Figure 5: Environmentally Sensitive Areas

Table 11: Environmental Consequences

Track Segment	Segment Length (m)	Within A 200 Meter Buffer of the Track Segment There Are: Stream/River Exposures (Meters)	Lake Area Exposures (Square Meters)	Meters of Track Segment with Water Exposure within 200 Meters
A	19,089.49	-	0	-
B	15,870.85	407.61	0	833.66
C	13,829.47	-	0	-
D	11,488.39	621.69	0	621.69

4.1.4. Key Route Risk Calculation

The two types of consequences (population and environmental) described above yield two distinct safety risk values. First, a safety risk value is computed for population-based exposure. This is the product of the risk components presented in the preceding sections (accident likelihood, CPR, and population exposure). The second explores the amount of track that is within 200 meters of water. Table 12 shows representative weighted average values for the risk components for each track segment. The actual risk calculation takes

place at a car-shipment-track segment level. This risk score is computed for all car-shipment-track segment combinations and then summed for each track segment to provide an aggregate track segment risk value. Therefore, the risk value represents the total risk for all dangerous goods shipments in the entire calendar year 2013.

Table 13 contains the results of the Key Route safety risk calculations. Risk is generally regarded as a unitless value, typically used for relative risk comparisons. For this analysis, the risk value for each track segment can be compared to each other.

Table 12: Safety Risk Calculation – Components

Track Segment	Segment Accident Likelihood	2013 Historical Segment Traffic Influenced (Container) Weighted Average Conditional Probability of Release	(Commodity Impact Distance) Weighted Average Population	Meters of Track Segment with Water Exposure
A	2.782E-06	0.2132	2,782.32	-
B	1.233E-06	0.2666	9,786.95	833.66
C	1.074E-06	0.2666	2,861.55	-
D	8.923E-07	0.2666	20,221.85	621.69

Table 13: Safety Risk Calculation – Actual Results

Track Segment	Segment Length (km)	Population		Water Exposure	
		Risk Value	Risk Per Kilometer	Risk Value	Risk Per Kilometer
A	19.09	1.5927	0.0834	-	-
B	15.87	3.6443	0.2296	0.3383	0.0213
C	13.83	0.9591	0.0694	-	-
D	11.49	7.4395	0.6476	0.2523	0.0220

4.2. Security Risk Assessment

Security risk is generally calculated as the combination of threat, vulnerability, and consequence. Consequence is calculated in a manner similar to consequence for safety risk, though the emphasis is placed exclusively on exposed populations rather than including environmental receptors. As with safety, the assessment uses a generally accepted three-parameter model:

$$R = T \times V \times C$$

where:

R = Risk value
T = Threat
V = Vulnerability
C = Consequence

4.2.1. Threat

Threat is determined from a combination of the volume of dangerous goods shipped, spatial relationship of the track to urban areas, the presence of high-consequence targets, and the presence of comingled passenger traffic. In the risk equation itself, the threat factor, T, is set to 1.0 by default and reduced accordingly, based on the various components. Values for the threat reduction factors were calculated using the RCRMS Risk Calculation Methodology.[4]

For the volume component, since there is daily traffic over the track segments (and the same number of shipments as well), the threat score is not downward adjusted from 1.0. All Track segments are in contact with urbanized areas of greater than 2,500 people according to Stats Canada, so each is given an Urban Adjustment factor of 0.85 (an Urban Adjustment factor of 1.0 is reserved for areas designated as a High Threat Urban Area in the US). No data on high-consequence targets in the area is available, so no additional adjustments are made for this component. There are no passenger trains sharing the SOR track, so the adjustment for this component is 0.95.

The equation for computing the threat factor is:

$T = 1 \times$ Volume adjustment $\times$ Urban adjustment $\times$ Passenger traffic adjustment

Table 14: Threat Factor by Track Segment

Track Segment	Volume Adjustment	Urban Area Adjustment	Passenger Train Adjustment	Threat Factor
A	1.0	0.85	0.95	0.8075
B	1.0	0.85	0.95	0.8075
C	1.0	0.85	0.95	0.8075
D	1.0	0.85	0.95	0.8075

4.2.2. Vulnerability

Vulnerability characterizes the likelihood that an attacker will succeed in achieving their desired effect, given that they begin the attack. The majority of railroads are easily accessible by the general public and it is therefore assumed that the vulnerability value is 1.0, unless there are specific, demonstrated

[4] Rail Corridor Risk Management System Risk Calculation Methodology, Version 11, Railroad Research Foundation, Association of American Railroads, July 20, 2011.

detection and deterrence systems in place, in which case a vulnerability reduction factor is applied. For this assessment, a vulnerability factor of 1.0 is used for all track segments.

4.2.3. Consequence

The consequence factor in the security risk equation is the same as the population exposure factor discussed in Section 4.1.3. Environmental exposure is not considered to be a factor when calculating security risks in this assessment.

4.2.4. Key Route Risk Calculation

Table 15 shows the components and calculation of the security risk scores for each track segment.

Table 15: Security Risk Calculation

Track Segment	Threat Factor	Vulnerability	Weighted Average Population	Risk Value
A	0.8075	1.0	2,782.32	2,246.72
B	0.8075	1.0	9,786.95	7,902.96
C	0.8075	1.0	2,861.55	2,310.70
D	0.8075	1.0	20,221.85	16,329.14

4.3. Supplemental Analysis

In addition to the safety and security risk assessments, additional route information is used to help characterize the risk of transporting dangerous goods over the routes.

4.3.1. Emergency Response Capability

To measure emergency response capability, the proximity of police or fire responders to the track was determined. Each track segment was evaluated for having police or fire stations within distances of 10, 20, and 30 kilometers. Public data available in Google Earth and the Hamilton, ON municipal website were used to define the location of police and fire stations with respect to the track segments. Figure 6 shows the locations for the police and fire stations that are within response distance of the SOR rail network. Table 16 indicates the presence of police and fire stations within 10, 20, and 30 kilometers from each track segment.

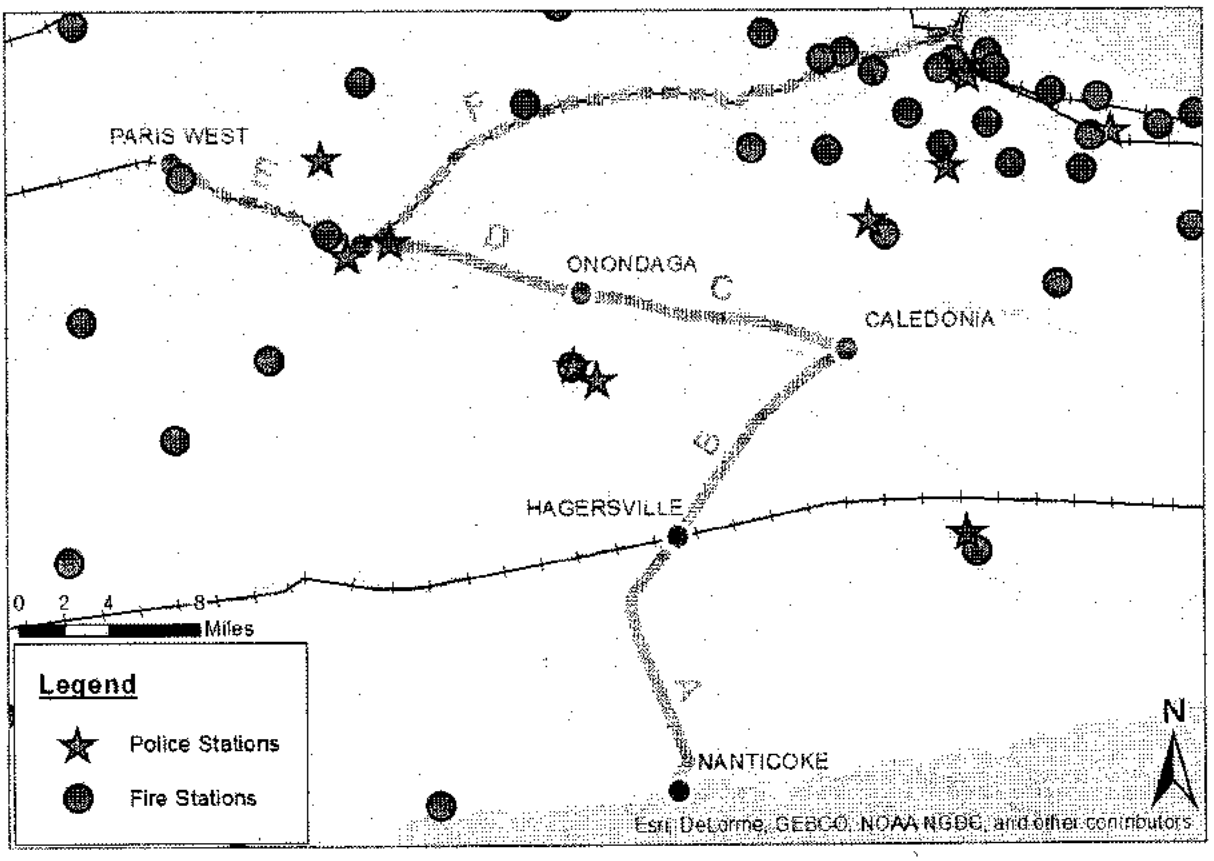


Figure 6: Emergency Responder Locations

Table 16: Emergency Response Metrics

Track Segment	Segment Length (km)	Fire Station Locations are within: 10km	20km	30km	Police Station Locations are within: 10km	20km	30km
A	19.09	-	Yes	Yes	-	Yes	Yes
B	15.87	Yes	Yes	Yes	Yes	Yes	Yes
C	13.83	Yes	Yes	Yes	Yes	Yes	Yes
D	11.49	Yes	Yes	Yes	Yes	Yes	Yes

4.3.2. Track-Related Attributes

Additional track-specific components are required to be identified by the Emergency Directive and considered in the risk assessment. These include track class, maintenance schedule, and curvature. These attributes are shown in Table 17.

Table 17: Track-Related Attributes

Track Segment	Track Class	Length (km)	Maintenance Schedule	Significant Curvature
A	1	12.09	Normal	< 1 degree
A	3	7	Normal	< 1 degree
B	3	15.87	Normal	< 1 degree
C	3	13.83	Normal	< 1 degree
D	3	11.49	Normal	< 1 degree

5. Interpretation of Risk Assessment Results

The track infrastructure characteristics and condition are mostly the same or very similar across SOR track segments. Furthermore, the operational pattern of freight movements over the SOR network means that the total shipment volume is relatively consistent across each Key Route track segment (i.e. a shipment will generally traverse all key route segments in a given journey). Therefore, the consequence component of the risk equation is the dominant driver in the differentiation of the risk scores across the track segments. As would be expected, based on the composition of both the safety and security risk calculations, key route track segments in close proximity to populated areas and sensitive environmental areas will tend to have higher risk scores.

For population safety risk, track segment D scores the highest on an overall and on a per-kilometer basis. The overall risk value for track segment D is more than twice that of the segment with the next highest value, and about three times greater than the segment with the next highest per-kilometer value. For environmental safety risk, track segment B has the greatest overall risk value, but track segment D has a greater risk value on a per-kilometer basis. The per-kilometer values are the preferred metric because they eliminate the bias introduced by arbitrary differences in length between different track segments.

In terms of security risk values, track segment D's score is more than twice that of the segment with the next highest value. Again, population in the consequence component is the primary driver, given the constant values across the other parameters.

In addition to computing Key Route safety and security risk scores, the areas of highest consequence can be identified in two ways. The first way is to identify the track segment with the greatest population exposure, which is D, as seen in Table 15. The second approach is to examine where the high-density Census blocks in Figure 4 intersect the SOR track. This second approach can be accomplished through visual inspection and allows for identification of high-consequence locations at a more granular, sub-track segment level. Track segment D in the vicinity of Brantford appears to be the area of highest consequence from a population exposure perspective.

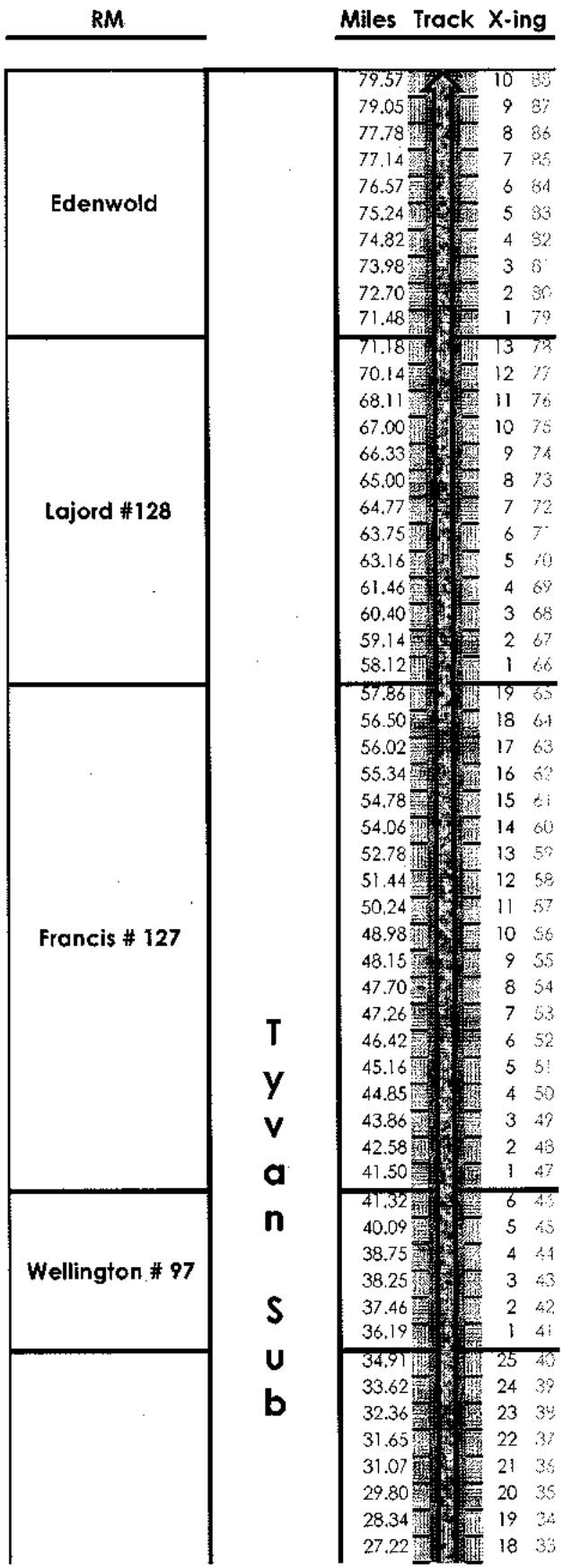
Results for emergency response appear as expected for this type of geographic location. There is general availability of both police and fire to respond to an incident involving dangerous goods anywhere along the SOR rail network.

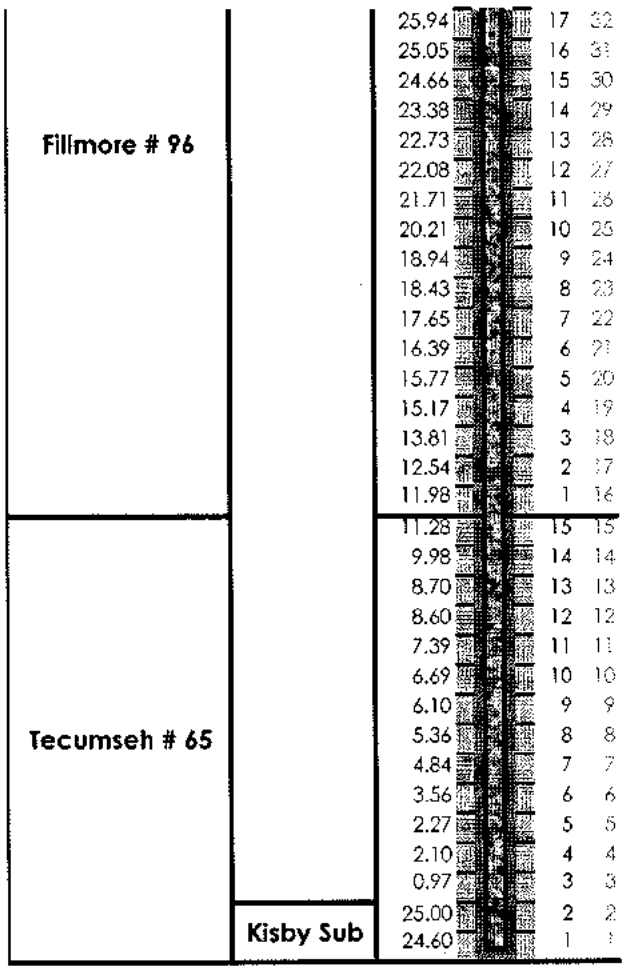
As illustrated in Section 4.3.2, the track-related attributes specified by the Emergency Directive for consideration in the Key Route risk assessment are consistent across the four Key Route track segments. Additionally, the Emergency Directive stipulates that alternative routes to the Key Routes under evaluation be considered. However, there are no viable alternatives to the four Key Routes for which the risk assessment was performed.

Finally, SOR does not foresee any potential or future railway operational changes that would materially alter the analyses or findings presented in this report.

Bridges under SSR Rail Track

#	Mile
1	75.9
2	74.7
3	71.78
4	69.4
5	65.16
6	56.52
7	39.4
8	38.98





Identify			
	Safety and Securily Risks associated with SSR route	Oil and Farms' Traffic at the Public Crossings	Prescribed Crossing and Stop Signs are posted at each single Crossing
			Additional Warning Signs such as "Look both ways & Train runs every day" are also posted at the Crossings
		Grass Fires, Oil Spills	Liaison with the related Fire Managers is maintained; e.g. RMs and Regina Fire Departments, Firemaster Oilfield Services Inc and Day Construction Ltd
	Volume of Goods Moved on SSR route	1,342 Grain Cars + 14,951 Crude Oil Cars were transported during the Fiscal Year Aug 2013 - July14	
	Class of Track on SSR route	Class Two	
	Maintenance Schedule of the Track on SSR route	Daily Hi-Rail Patrol of the entire track	
		Immediate Switch Cleaning	
		Enforcement of Slow Orders when needed	
		Caution Glags' Hoisted when needed	
		Maintenance of Public Crossings in association with the related Rural Municipalities; prioritized according to the safety issues	
		Replacement of Ties, Ballast, Steel, Bolts and Joints, etc., prioritized according to the safety issues	
		Periodical Visual Inspection of the entire track surface, condition of the Crossings, Culverts and Bridges	
		Brush Cutting on and around the track as and when needed	
		Periodical Track Evaluation:-	
		Ultra Sound Inspection	Latest Test Date: October 31, 2012
		Geometrical Measurments	Latest Test Date: October 07, 2013
	Curvature of the Track on SSR route	Straight Run Track all the way from Stoughton to Richardson	
	Environmentally Sensitive or Significant Areas along SSR route	There are Nine (9) Rail Stations, Seven (7) Grain Loading Facilities along the track	
	Population Density along SSR route	The Track passes through Six (6) Rural Municipalities;	

	Emergency Response Capability along SSR route and the areas of high consequence along the route	A Daily Safet Meeting is held every morning in relation to the Tasks of the Day
		Every Train Crew consists of an Engineer and a Conductor
		Valid Certifications for CROR and TDG are maintained up to date for all the Running Trades and the Road Master
		An SMS is enforced together with the ERP promulgated by Crescent Point Energy
		A Permanent Slow Order of 20 MPH is observed
		Additional In-House Slow Orders are generated as and when required
		Firemaster Oilfield Services Inc and Day Construction Ltd; are contracted for "on call" basis
Identify and compare	**Alternative Routes** for safety and security	There is NO "alternative route" possible on SSR Track
Factor	**Potential or Future Railway Operational Changes** such as new customers moving good subject to an Emergency Response Assistance Plan under the *Transportation of Dangerous Goods Act* or municipal changes due to population growth, for routing restrictions	SSR is apt to adjustments and revisions as and when needed, however, the traffic on its track seems to remain limited to the Grains and Crude Oil in the foreseeable future.

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SOUTHWARD ↓	Length of Siding (Feet)	Station Nos.	Mile Post	New Westminster Subdivision MAIN LINE STATIONS	CROR Rule 8	Type of Oper.	Line Segment	Miles to Next Stn.	↑ NORTHWARD
				Adjoining RR: CN					
		15111	141.3	FRASER RIVER JCT		CTC	58	1.8	
	5,800W 6,063E	15109	139.5	BROWNSVILLE				2.6	
		15106	136.9	TOWNSEND				3.4	
	10,539		133.5	OLIVER				2.0	
			131.5	MUD BAY WEST				0.7	
				Between Mud Bay West and Colebrook track dispatched by BCR					
		15100	130.8	COLEBROOK To Roberts Bank BCR 15.5		CTC	56	3.2	
			127.6	BRIDGE 127.6 (Mud Bay Swingspan)	+			7.7	
		15091	119.9	WHITE ROCK				0.3	
			119.6	USA CANADA BORDER				21.7	
				Adjoining Sub: Bellingham					

General Track Bulletins are in effect between MP 119.6 to MP 130.8, and MP 131.5 to MP 141.3.

Radio Call-In		
Radio Channel 066 in service Fraser River Jct to USA Canada Border		
Burnaby - 21 (X)	New Westminster - 31(X)	Blaine - 71(X)
Radio Channel 031 and 028 in service for switching		
New West - 41(X)		
Emergency - Call 911		
RTC X=0, Mechanical Desk X=2, Customer Support X=3, Railroad Police X=4, Detector Desk X=5, Coordinator X=6		

RTC Information
604-520-5203, Fax 604-520-5202

1. Speed Regulations

See Item 1 of the System Special Instructions for additional speed restrictions.

1(A). Speed—Maximum

Main Track	Psgr	Frt	
		Under 100 TOB	100 TOB & Over
MP 141.3 to MP 119.6	60	40	40

Temperature Restrictions
Contact the RTC if in doubt of the temperature. Notify the RTC when the train is restricted.

If the temperature exceeds 100 degrees F the Engineering Department will determine if further restrictions are necessary and issue a Track Bulletin.

Hazardous Material Within Census Metropolitan Area

MP 141.3 to MP 119.6, NWD Key Trains		35*	35*

* Exception: When an alarm message from the detector at MP 110.5 on the Bellingham Sub announces "No Defects", NWD Key Trains may operate at the maximum authorized speed unless otherwise restricted between USA Canada Border and MP 130.5.

When an alarm message from the detector at MP 134.5 announces "No Defects", NWD Key Trains may operate at the maximum authorized speed unless otherwise restricted between MP 134.5 and Fraser River Jct

1(B). Speed—Permanent Restrictions

	Psgr	Frt
MP 141.3 to MP 140.8, Bridge 140.8, Fraser River Bridge	10	10
MP 140.8 to MP 139.0	45	35
MP 139.0 to MP 136.6	50	
MP 134.3 to MP 133.7	50	
MP 132.0 to MP 131.5	40	35
MP 131.5 to MP 129.8	45	35
MP 129.8 to MP 129.3, Bridge 129.3	50	35
MP 129.2 to MP 128.3	60	35
MP 128.3 to MP 127.8	50	35
MP 127.8 to MP 127.6, Bridge 127.6	15	15
MP 127.8 to MP 127.6, Bridge 127.6, cars over 136 tons	10	10
MP 127.6 to MP 124.4	35	35
MP 122.7 to MP 120.9, HER	21	21
MP 120.9 to MP 119.6	50	30

1(C). Speed—Sidings and Main Track Switches and Turnouts
Trains and engines must not exceed 10 MPH through turnouts connected to main track unless otherwise indicated. Trains and engines using sidings must not exceed the siding turnout speed unless otherwise indicated.

	Psgr	Frt	
		Under 100 TOB	100 TOB & Over
MP 133.5, Oliver, siding turnouts	35	35	25
MP 131.5, Mud Bay West, turnouts	35	35	25
MP 130.8, Colebrook, turnouts	35	35	25

1(D). Speed—Other
Trains and engines must not exceed 10 MPH through other than main track turnouts unless otherwise indicated.

2. Bridge and Equipment Weight Restrictions

Maximum Gross Weight of Car
Fraser River Jct to
USA Canada Border..... 143 tons, Restriction D

3. Type of Operation

Main Track	
MP 141.3 to MP 119.6	CTC

Interlockings and Bridges
Movable Bridge 127.6 (Swing)- Mud Bay, MP 127.6- Locally Controlled Interlocking
The swingspan bridge at MP 127.6 is a locally controlled interlocking. When interlocking signals display stop indication, CROR rule 609 applies to movements and CROR rule 808 applies for track work and track units. Maintenance of Way employees and track units who receive verbal authority to enter the interlocking from the signalman will be protected until such time as they report clear of the interlocking limits. If unable to contact the signalman, contact the BNSF New Westminster RTC.

4. **Subdivision Specific Rules Information**
CROR A—In addition to the requirements of General Rule A(ii) and (vii), employees specified below shall also have the following documents accessible while on duty:

Document	Train Crews, Yard Crews, Engine Crews	MW Dept., Signal Dept.	RTC
General Orders & General Notices	X	X	X
System Special Instructions	X	X	X
BNSF Signal Aspects and Indications	X	X	X
Hazardous Material Instructions	X	X	X
Craft-Specific Safety Rules	X	X	X
Air Brake & Train Handling Rules	X	O	X
2008 Emergency Response Guidebook	X	X	X
Train Dispatcher's, Operator's and Control Operator's Manual	O	O	X

Exception: Employees of foreign railroads will be governed by the Air Brake and Train Handling Rules, Safety Rules and Hazardous Material Instructions of their employer.

CROR 13—Passenger trains at passenger station platforms must ring the engine or cab bell when approaching or initiating movement from the platform.

CROR 103.1(d)—Frazier Mills industrial spur–Capilano Way crossing—Stop signs are in place at Capilano Way crossing.

CROR 104.5—Brownsville–Special derails are located on each end of both sidings and Track 5702.

CROR 112—BNSF employees are governed by securement requirements of BNSF ABTH rules 102.1, 102.1.1, 102.1.2, 102.3 and CROR Rule 112 parts f, g, and h. BNSF ABTH 104.14 chart does not apply in Canada. Use the hand brake chart in CROR 112 to determine number of hand brakes to be applied to cars.

CROR 122—Duties of Crew Members, Supplemental Information—Passenger Trains Only—The New Westminster Subdivision is a Crew Focus Zone for passenger trains only. When passing a signal which may require the train to stop at the next signal or pass the next signal at restricted speed, the engineer must make the following radio transmission to a designated member of their crew and receive an acknowledgement:

- Train identification (engine initials, engine number, and timetable direction)
- Signal Name
- Signal/control point location
- Track designation if on multiple main tracks.

If acknowledgment is not received, the engineer must determine, at the next scheduled stop, why the message was not acknowledged. If the engineer fails to control the train movement in accordance with either a wayside signal or other restrictions imposed upon the train, the designated crew member shall at once communicate with and caution the engineer regarding the restriction. If necessary, the designated crew member must take appropriate action to ensure the safety of the train including stopping all movement.

Example of Engineer's Transmission:
"AMTK 503 North approach signal South Oliver, over."

Example of Conductors Transmission:
"AMTK 503 North approach signal South Oliver, FOCUS, out."

Crew Focus Zone requirements continue to apply until the signal indication is more favorable than a signal that requires the train to be prepared to stop at, or pass the next signal at restricted speed. During a Crew Focus Zone condition, crew communication not related to train movement is prohibited.

If a transmission, including one from the train dispatcher, occurs during a Crew Focus Zone condition, the crew must request that the transmitter stand-by until the above information is communicated and acknowledged.

ABTH 102.14.1—ETD or HTD Failure—In the application of ABTH 102.14.1 the following will apply in Canada in the event of an ETD or HTD failure:

When an en route failure occurs on track not listed in the System Special Instructions, the train must not exceed 25 MPH until the failure is corrected or another method of compliance is secured.

5. **Trackside Warning Devices (TWD)**

See System Special Instructions for additional Trackside Warning Device (TWD) information.

MP	Device	Recall Code	Notes
Type A.Locations protecting bridges, tunnels or other structures			
137.3	DED	807	NWD
Type B.Locations			
137.3	DED	807	SWD
134.5		808	

6. **Excepted Track**—None

7. **Special Conditions**
New Westminster—All non-BNSF movements entering Track 11, Sapperton Yard lead and Lake City lead must contact the BNSF RTC for permission to enter these tracks. Three radio controlled (DTMF) switches have been installed at New Westminster. All three switches can be operated using AAR channel 031. The switches must only be lined by radio if the movement is able to see the indication of the switch target and the route to be used is seen to be clear of any conflicting movements.

The BNSF Sapperton Yard lead switch to Track 11:

- Equipment must be greater than 120 feet from the switch.
- Enter DTMF code #810 and wait for the switch to line for the desired route.
- A solid green light indicates the switch is lined for movement on the BNSF Sapperton yard lead; a solid yellow light indicates the switch is lined for movement on Track 11.

The BNSF Sapperton Yard lead switch to the East Track:

- Equipment must be greater than 120 feet from the switch.
- Enter DTMF code #277 and wait for the switch to line for the desired route.
- A solid green light indicates the switch is lined for movement on the BNSF Sapperton Yard lead; a solid yellow light indicates the switch is lined for movement to or from the East Track.

The derail at the south end of BNSF Sapperton yard:

- Equipment must be greater than 60 feet from the derail.
- Enter DTMF code #693 and wait for the derail to move to the non-derailing/derailing position.
- A solid green light indicates the non-derailing position; a solid yellow light indicates the derailing position.
- When operated by radio or push button, the derail automatically restores to the derailing position after movement over the derail; an announcement will be transmitted on AAR channel 31 when the derail has returned to the derailing position.
- When the derail is operated by hand to the non-derailing position, it will not automatically restore to the derailing position regardless of the indication of the light. The derail must be restored to automatic operation immediately after each movement. To restore the derail to automatic operation, it must be moved to the derailing position.
- When equipment has cleared the derail, each time before a subsequent movement is made, ensure the derail has restored to the derailing position, then place the derail in the non-derailing position.

If the switch or derail fails to operate by radio control, unlock the push button latch on the pole next to the switch and attempt to operate it using the manual push button. If either light is flashing, ensure the points are not obstructed. If the light continues to flash, the switch must be operated by hand. To operate the switch by hand, follow the instructions for hand operation located on the switch machine.

New Westminster - Braid Street—Automatic warning devices for the public crossing at Braid Street in the New Westminster yard include integration with the traffic signals. Movements governed by CROR 103.1(b) and CROR 103.1(d) must use the DTMF crossing activator system.

The crossing is activated by a DTMF transmission on either AAR 087 087 or AAR 031 031:
* Track 5614 -- 1450511#
* Track 5611 -- 1450521#

There is a delay of 23 seconds before the warning devices start. The strobe light will illuminate indicating that it is okay for the movement to proceed onto the crossing. The crossing's circuit must be occupied within 3 minutes. If the movement fails to occupy the crossing circuits, the warning devices will deactivate.

Strobe lights are located on the signal bungalows which are located one on the northeast quadrant and one on the southeast quadrant. They will illuminate when the warning devices have been operating for approximately 45 seconds from when the DTMF message is received.

When a movement is delayed, the warning devices are to be deactivated by a DTMF transmission on either AAR channel 087 087 or 031 031:
* Track 5614 -- 1450510#
* Track 5611 -- 1450520#

Brownsville—Obtain permission from the BNSF RTC, New Westminster before fouling or entering the controlled sidings from auxiliary tracks. Notify the BNSF RTC when clear of the controlled siding on auxiliary tracks and the switch is properly lined for the siding.

Tilbury Line Jct. (Townsend)—On Tilbury Line between Tilbury Line Jct. and Tilbury Island Dock, at the 76th Street crossing on the BCDC Lead, crews must provide manual protection before entering the crossing.

Between Brownsville and the USA Canada border—The following BNSF crossings have been identified by the Surrey RCMP as priority crossings:
Elevator Road MP 138.94
Beecher Street MP 127.17
McBride Avenue MP 126.85

If for any reason a train is stopped across any one of these crossings for more than five minutes crew must immediately contact the RTC with an emergency radio call so that the RTC may promptly notify Emergency services of the blockage.

Between Mud Bay West and Colebrook—CTC between MP 131.5 and MP 130.8 is under the jurisdiction of the BC Rail Port Subdivision RTC, AAR Channel 039 (3939*1#), telephone 604-984-5255.

All train and engine movements must contact the BC Rail RTC for permission to enter CTC territory controlled by the BC Rail RTC, regardless of signal indication. When requesting such permission, each train or engine movement must advise the BC Rail RTC if they are handling dimensional shipment(s). Dimensional shipment(s) must not be set out or picked up in CTC territory controlled by the BC Rail RTC unless permission to do so has been obtained from the BC Rail RTC.

Rail Traffic Controllers—The territory between USA Canada Border, MP 119.6 to South Controlled Block Signal Colebrook, MP 130.8 and North Controlled Block Signal Mud Bay West, MP 131.5 to Fraser River Junction, MP 141.3 is under the jurisdiction of the BNSF RTC at New Westminster.

The territory between South Controlled Block Signal Colebrook, MP 130.8 and North Controlled Block Signal Mud Bay West, MP 131.5 is under the jurisdiction of the BC Rail Port Subdivision RTC.

Between MP 120.9 and MP 122.7—All movements must ring engine bell continuously while in motion within these limits to comply with Transport Canada Order

USA Canada Border—Southward trains, engines, and track equipment arriving at White Rock must have permission from U.S. Customs before any portion crosses the USA Canada Border. Southward trains will call Swift and obtain permission to proceed from the USA Canada Border to Swift for inspection.

Southward trains originating in Canada destined to USA:

Must fax from their on duty point a completed U.S. Customs and Border Protection Rail Crew Report to 785-676-4941 and 604-520-5202, both of these numbers are BNSF numbers. Your title, (example: Engineer, Conductor) must be included with your family and given names. This form must also include the train symbol and ETA at the border. The form must be legible.

The RTC will be advising U.S. Customs of your ETA at Swift based on the time your train passed Townsend or your departure time from Roberts Bank, therefore it is critical to report promptly to the RTC anything that would impact your arrival time at Swift promptly to the RTC.

Contact the RTC when approximately 10 minutes away from the USA Canada Border. The RTC will then contact U.S. Border Patrol. Do not cross the border until permission is received from either the RTC of US Customs.

If cars are to be setout before your arrival at VACIS, the RTC or Coordinator will advise which cars are to set out and where to set them out. If U.S. Customs advises of cars to setout when going through VACIS, cars are to be set out at Swift.

All MW on-track equipment before crossing the border must contact Roadmaster to ensure that all required documentation has been submitted and that Roadmaster has contacted the respective Customs and Immigration for permission to cross the border.

Radio Activated Public Crossing Gates—Radio activated public crossing gates (DTMF) are in effect on the New Westminster Subdivision. These gates can be activated by using channel 054 and entering the three digit MP number followed by the pound (#) key. The gates will remain activated for 30 seconds.

MP 140.5 Tannery Rd
MP 139.0 Elevator Rd
MP 137.03 River Rd
MP 127.16 Beecher Ave
MP 0.64 Nordel Way (Tilbury Line)
MP 1.25 Highway 17 Connector (Tilbury Line)
MP 2.70 Aldrich Road (Tilbury Line)
MP 3.65 River Rd (Tilbury Line)

Ruling Grades—The ruling grades for main tracks, sidings and yard tracks at specified locations are as follows:

White Rock—Level
Colebrook—Level
Brownsville—0.2%
Oliver–0.16%
Sapperton Yard—0.7%
Townsend—0.2%
New Westminster (Old Yard)—0.6%

Whistling Ordinances—Whistling is prohibited at grade crossings within Vancouver city limits.

During daylight hours, all trains and engines when entering curves between MP 123.6 and MP 127.0 must sound the engine whistle in accordance with CROR 14(l).

Between the hours of 0600 and 2000, all movements will sound a repetitive succession of short engine whistles (CROR rule 14(f)) between MP 121.0 and MP 123.0 regardless of whether or not there are people or animals on or near the track. CROR Rule 14(l) does not apply on public crossings at grade between MP 121.0 and MP 123.0.

Between the hours of 2000 and 0600 the sounding of the engine whistle between MP 121.0 and MP 123.0 is prohibited except in an emergency.

Exception: CROR whistle signal 14(f) must be used when approaching the crossing at MP 121.2 northward and MP 122.6 southward between the hours of 2000 and 0600.

Between the hours of 2000 and 0600 the engine bell must be rung continuously between MP 121.0 and MP 123.0.

Close/No Clearance Locations

Location	Track Name	Track No.	Obstruction
Vancouver	WR Grace	6354	Buildings, fence
New Westminster	Euro Asia	5140	Loading docks
	Track 14	5614	Fences

Test Mile
MP 128.0 - MP 129.0

Flash Flood Critical Areas
MP 125.11
MP 124.84

8. Line Segments

Road Line Segments

Line Segment	Limits
417	Tilbury Line Jct to Tilbury Island Dock—MP 0.0 to MP 4.1
662	MP 6.44 CP Westminster Sub—MP 1.13 Fraser Mills MP 0.0 to MP 1.13
432	Colebrook—Roberts Bank (BCR)—MP 7.8 to MP 23.3
56	CN Jct to USA Canada Border—MP 155.3 to MP 119.6

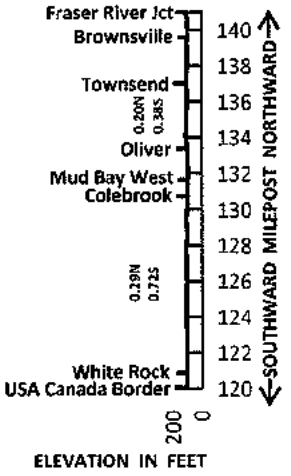
Yard Line Segments

Line Segment	Yard
600	Vancouver, BC
601	Sapperton Yard—Brunette Ave. to North Rd.
602	New Westminster—Brunette Ave. to Fraser River Bridge

9. Other Location Information

Station No.	Name	Mile Post	Capacity in Feet	Switch Opens
15129	Vancouver	155.9	Yard	Both
15114	New Westminster	144.5	Yard	Both
15106	Tilbury Line Jct	137.3	Industrial Lead	North
66504	Tilbury Island Dock (on Spur)	4.4	Yard	Both

10. Grade Chart



RAIL CORRIDOR RISK MANAGEMENT SYSTEM

SENSITIVE SECURITY INFORMATION

Route Risk Analysis Assessment Factors Reports

For Single Route Path And Commodity

RCRMS User:	Emmanuel Gurrola Molina	**Date Processed:**	4/1/2015 12:00:00 AM
Organization:	BNSF Railway	**Report Generated:**	4/1/2015 12:00:00 AM
Route Path:	MP 141.3 - Mp 119.6 Line Segment 56	**User Path ID:**	BELLINGHAMWA-NEWWESTMINBC
Movement Type:	Normal		
Origin:	Border	**Route Length:**	21.7 Miles
Destination:	New Westminster		
First Block:			
Last Block:		**Travel Time:**	0.00

1) Volume of Hazardous Material Transported	
Shipments Transported Between O/D Pair Across All Routes	89730 Jan-Dec 2014
Full Shipments Transported On This Route	48431 Jan-Dec 2014
Residue Shipments Transported On This Route	41299 Jan- Dec 2014
2) Rail Traffic Density	
Route Miles With Unknown MGTs	0.00 Miles
Route Miles With < 5 MGT's	0.00 Miles
Route Miles With ≥ 5 and < 10 MGT's	0.00 Miles
Route Miles With ≥ 10 and < 20 MGT's	4.15 Miles
Route Miles With ≥ 20 and < 40 MGT's	17.55 Miles
Route Miles With ≥ 40 and < 60 MGT's	0.00 Miles
Route Miles With ≥ 60 and < 100 MGT's	0.00 Miles
Route Miles With ≥ 100 MGT's	0.00 Miles
Route Coverage - (Source: FRA Rail Network & Carrier supplied data)	21.7 Miles
3) Trip Length	
Total Route Length	21.7 Miles
Route Miles Risk Analyzed	21.7 Miles
Ownership Length	21.7 Miles
Trackage Rights Length	0.00 Miles

RAIL CORRIDOR RISK MANAGEMENT SYSTEM

SENSITIVE SECURITY INFORMATION

4) Track Type, Class and Maintenance Schedule	
Class X and 1	0.00 Miles
Class 2	Miles
Class 3	21.7 Miles
Class 4	Miles
Class 5 and Greater	0.00 Miles
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
5) Track Grade and Curvature	
Route Miles > 2.5% Grade	0 Miles
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
Number of Curves > 8 Degrees Per Mile	0.00
Route Coverage - (Source: FRA - ATIP geometry car data)	21.7 Miles
6) Presence or Absence of Signals and Train Control Systems (manual vs. signaled territory)	
Manual or Dark	0 Miles
Signaled	21.7 Miles
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
7) Presence or Absence of Hazard Detectors	
Number of Hazard Detectors	2
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
8) Number and Types of Grade Crossings	
Total at Grade Crossings	14
Private at Grade	1
Public at Grade	13
Route Coverage - (Source: FRA Grade Crossings)	21.7 Miles
9) Single versus Double Track Territory	
Single Track	21.7 Miles
Multiple Track	0.00 Miles
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
Route Coverage - (Source: FRA - ATIP geometry car data)	21.7 Miles
10) Proximity to Iconic Targets, Venues, and Other Areas of High Consequence (total count)	
Number of Critical Infrastructure/Key Resource Locations	Mercer Stadium 1.37 Miles
Route Coverage - (Source: FRA supplied)	21.7 Miles

RAIL CORRIDOR RISK MANAGEMENT SYSTEM

SENSITIVE SECURITY INFORMATION

11) Environmentally Sensitive or Significant Areas	
Route Miles Exposing Environmentally Sensitive Area (miles of track within 0.1 miles of a	12.5 Miles
Lake/Reservoir Area (square miles within 0.1 miles of track)	9.9 Miles
Park Area (square miles within 0.1 miles of track)	Square Miles
Stream/River Length (miles of stream/river within 0.1 miles of track)	2.6 Miles
Route Coverage - (Source: USGS National Hydrography)	21.7 Miles
12) Population Density Along Route	
Route Miles With ≥ 20,000 People/Square Mile	0
Route Miles With ≥ 15,000 and < 20,000 People/Square Mile	0
Route Miles With ≥ 10,000 and < 15,000 People/Square Mile	4.5 Miles
Route Miles With ≥ 5,000 and < 10,000 People/Square Mile	4 Miles
Route Miles With ≥ 1,000 and < 5,000 People/Square Mile	13.2 Miles
Route Miles with < 1,000 People/Square Mile	21.7 Miles
13) Venues (stations, events, places or congregation)	
Count of Critical Infrastructure/Key Resources	0.00
Route Coverage - (Source: FRA supplied)	21.7 Miles
14) Emergency Response Capability	
Hazmat contractor Quantum, BNSF responders at Everett WA	
Route Miles Within 5 Miles From a Fire Station	21.7 Miles
Route Miles Within 10 Miles From a Fire Station	Miles
Route Miles Within 15 Miles From a Fire Station	Miles
Route Miles Within 5 Miles From a Police Station	21.02 Miles
Route Miles Within 10 Miles From a Police Station	0.68 Miles
Route Miles Within 15 Miles From a Police Station	Miles
Route Coverage - (Source: Hazus data)	21.7 Miles
15) Areas of High Consequence	
Count of Critical Infrastructure/Key Resources	0.00
Route Coverage - (Source: FRA supplied)	21.7 Miles
16) Presence of Passenger Traffic (miles of shared track)	
Passenger Traffic Possible On Route	Yes
Route Miles with No Passenger Traffic	0.00 Miles
Route Miles Available for Passenger Traffic (indicated on FRA network)	21.7 Miles
Route Miles with Less than 4 Trains per Day	0.00 Miles
Route Miles with More than 4 Trains per Day	21.7 Miles
Route Coverage - (Source: FRA Rail Network & Carrier supplied data)	21.7 Miles

2011 Census (Canada)

tolerance within 1 mile

AM TRAK

RAIL CORRIDOR RISK MANAGEMENT SYSTEM

17) Speed of Train Operations (average miles per hour)	
Actual Average Operation Speed	11.9 Miles Per Hour
Route Coverage Actual Operating Speed - (Source: Carrier supplied data)	21.7 Miles
Average Max Operating Speed	40 Miles Per Hour 35 for DG
Route Coverage Max Operating Speed - (Source: Carrier supplied data)	21.7 Miles
19) Proximity to En-Route Storage or Repair Facilities (total count)	
En-Route Storage and Repair Facilities	0.00
En-Route Storage Facilities	0.00
En-Route Repair Facilities	0.00
Route Coverage - (Source: Carrier supplied data)	21.7 Miles
20) Availability of Alternative Routes	
Number of Alternative Routes	0
21) Past Incidents	
Count of Past Incidents Along Route SMS	2014 Filing 6
Route Coverage - (Source: FRA accident data)	21.7 Miles
22) Earthquake Influence	
High	0.00 Miles
Medium	21.7 Miles
Low	0.00 Miles
Route Coverage - (Source: ABS, NEHRP, USGS)	21.7 Miles
23) Hurricane Influence	
High	0.00 Miles
Medium	0.00 Miles
Low	21.7 Miles
Route Coverage - (Source: ABS, EQECAT, USWIND)	21.7 Miles
24) Straight-Line Winds Influence	
High	0.00 Miles
Medium	0.00 Miles
Low	21.7 Miles
Route Coverage - (Source: ABS, NOAA)	21.7 Miles
25) Tornado Influence	
High	0.00 Miles
Medium	0.00 Miles
Low	21.7 Miles
Route Coverage - (Source: ABS, NOAA)	21.7 Miles

RAIL CORRIDOR RISK MANAGEMENT SYSTEM

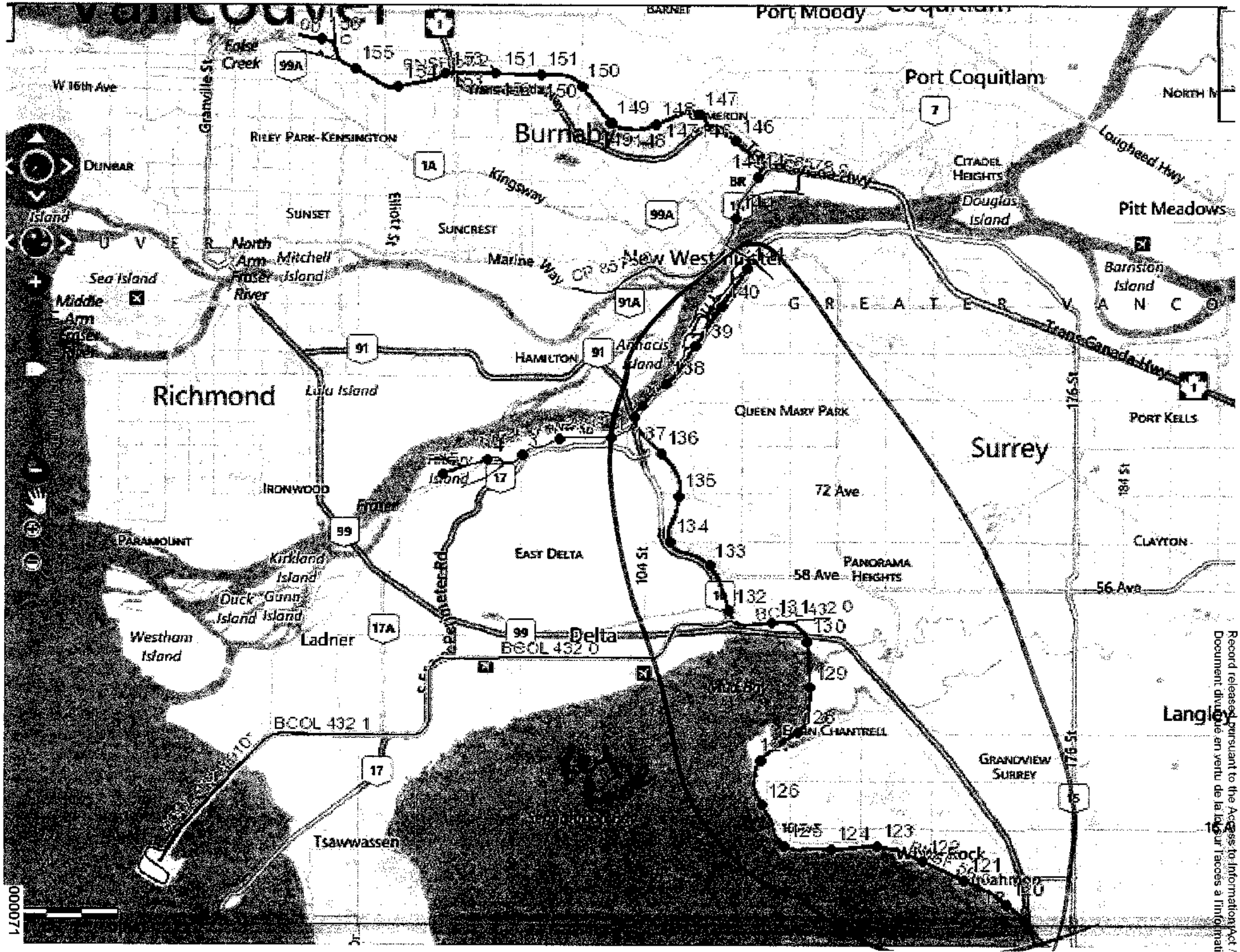
SENSITIVE SECURITY INFORMATION

BNSF_MGT_EAST	BNSF_MGT_WEST	PSNGR_MGT_EAST	PSNGR_MGT_WEST	FGN_MGT_EAST	FGN_MGT_WEST	TOTAL EAST	TOTAL WEST	TOT_MGT_BOTH	TOTAL CARS EAST NOT FOREIGN
5.7221	7.9244	0	0	0	0	5.7221	7.9244	13.6465	72532
11.5002	14.1968	0.0036	0.0036	0	0	11.5038	14.2004	25.7042	119692
10.8076	6.0595	0.0036	0.0036	0	0	10.8112	6.0631	16.8743	94153
10.8269	6.0859	0.0036	0.0036	0	0	10.8305	6.0895	16.92	91854
10.6184	5.9441	0.0036	0.0036	0	0	10.622	5.9477	16.5697	84789
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

TOTAL CARS WEST NOT FOREIGN	TOTAL TRAINS EAST BNSF ONLY	TOTAL TRAINS WEST BNSF ONLY	TOTAL PASSENGER TRAINS EAST	TOTAL PASSENGER TRAINS WEST	PASSENGER SPEED	FREIGHT SPEED	MILES
60382	1023	1023	0	0		40	0.001
144171	1644	1644	0	0	60	40	17.55
96443	1394	1394	0	0	50	35	2.016
96176	1494	1494	0	0	45	25	1.297
93487	1621	1621	0	0	45	25	2.575
0	0	0	0	0	45	30	1.848
0	0	0	0	0	45	30	1.848
0	0	0	0	0	45	30	0.46
0	0	0	0	0	45	30	0.46
0	0	0	0	0	50	30	7.027
0	0	0	0	0	50	30	7.027

690000

DIVISION	SUBDIVISION	LINE_SEG_NBR	TRACK_TYPE	TRACK_SDTK_NBR	RIS1BMP	RIS1EMP	EAST STATION NAME	EAST STATE	WEST STATION NAME	WEST STATE
NORTHWEST	NO TRACK	55	M	0	202.979	202.98	BEGIN SUB	CA	KEDDIE	CA
NORTHWEST	NEW WESTMINSTER	56	M	0	119.6	136.979	BLAINE	BC	TOWNSEND	BC
NORTHWEST	NEW WESTMINSTER	56	M	0	136.979	139.02	TOWNSEND	BC	SOUTH BROWNSVILLE	BC
NORTHWEST	NEW WESTMINSTER	56	M	0	139.02	140.298	SOUTH BROWNSVILLE	BC	NORTH BROWNSVILLE	BC
NORTHWEST	NEW WESTMINSTER	56	M	0	140.298	144.52	NORTH BROWNSVILLE	BC	SPRUCE	BC
NORTHWEST	NEW WESTMINSTER	56	M	1	144.52	146.4	SPRUCE	BC	LAKE CITY	BC
NORTHWEST	NEW WESTMINSTER	56	M	2	144.52	146.4	SPRUCE	BC	LAKE CITY	BC
NORTHWEST	NEW WESTMINSTER	56	M	1	146.4	146.88	LAKE CITY	BC	BURNABY	BC
NORTHWEST	NEW WESTMINSTER	56	M	2	146.4	146.88	LAKE CITY	BC	BURNABY	BC
NORTHWEST	NEW WESTMINSTER	56	M	1	146.88	153.919	BURNABY	BC	WILLINGDON JCT	BC
NORTHWEST	NEW WESTMINSTER	56	M	2	146.88	153.919	BURNABY	BC	WILLINGDON JCT	BC



Environmentally sensitive or significant areas =

Fraser River
Mud Bay
Boundary Bay
Semiahmoo Bay

Population density = According to Statistics Canada's 2006 Census the population of our area of operation is >100 people per sq. Kilometer

Emergency response capability = Hazmat/Environmental Contractors – Quantum. BNSF Hazmat Responders in Everett, WA

Venues- Ex. stadiums, convention centers

			Approximate Distance to New Westminster-White Rock Track
Name	**Address**		***Kilometers***
Mercer Stadium	Sixth St, New Westminster, BC		2.2
Swangaurd Stadium	3883 Imperial St, Burnabay, BC V5J 1A3		8.9
Empire Fields	Hastings-Sunrise, Vancouver, BC		11.8
Playland Amusement Park	2901 E Hastings St, Vancouver, BC V5K 5J1		12.0
PNE Agrodome	2901 E Hastings St, Vancouver, BC V5K 5J1		12.4
Hastings Park	Exhibition Park, Vancouver, BC V5K 3N8		12.4
Pacific Coliseum	Pacific Coliseum, Vancouver, BC V5K 5J1		12.5
Nat Bailey Stadium	4601 Ontario St, Vancouver, BC V5V 3H4		14.9
Rogers Arena	800 Griffiths Way, Vancouver, BC V6B 6G1		16.2
BC Place	777 Pacific Blvd, Vancouver, BC V6B 4Y8		16.3
Vancouver Symphony Orchestra	843 Seymour St #500, Vancouver, BC V6B 0G4		17.0

Our primary hazmat response contractor in BC is Quantum Murray (www.quantummurray.com) with Tervita (www.tervita.com) in Richmond, BC as a back-up.

We also have BNSF Hazmat Responders located in Everett and Seattle.

BNSF's SECURETRAC does show our track New Westminster

Patrick Brady CIH, CSP

General Director

Hazardous Materials Safety

BNSF Railway

4200 Deen Road

Fort Worth, TX 76106

817-740-7358 office

817-740-7250 fax

817-821-1325 cell

Line Segment	From Milepost	To Milepost	Division	Subdivision	Fire Coverage 5 Miles	10 Miles	15 Miles
56	119.59	155.86	NORTHWEST	NEW WESTMINSTER	Yes	Yes	Yes
417	0	4.10056	NORTHWEST	TILBURY ISLAND SPUR	Yes	Yes	Yes
424	0	0.9711	NORTHWEST	BURRARD INLET	Yes	Yes	Yes
432	7.8	20.5283	NORTHWEST	BCHB: NEW WESTMINSTER	Yes	Yes	Yes
977	0	1.173	NORTHWEST	TILBURY INDUSTRIAL	Yes	Yes	Yes

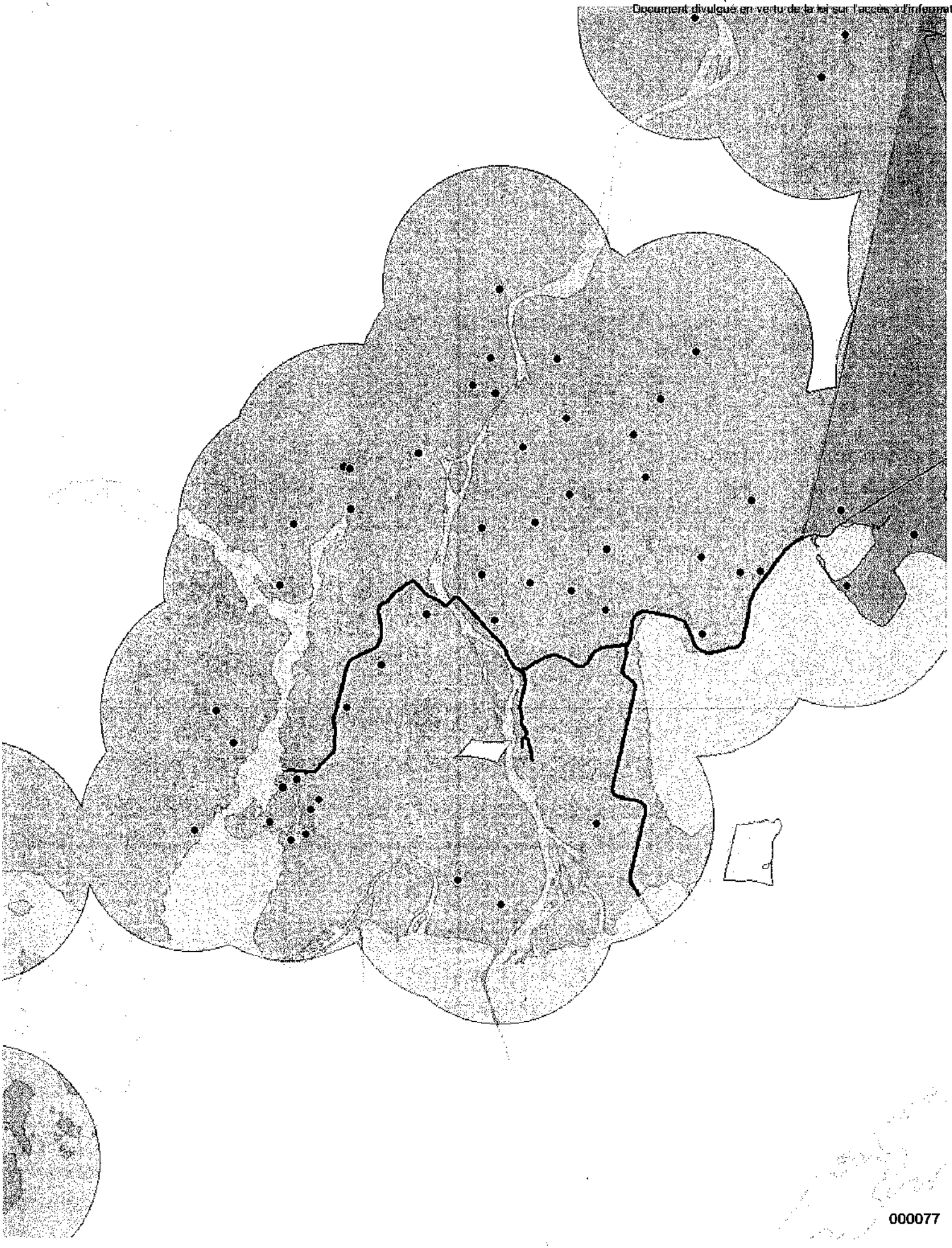
Total Mileage within 5 Mi: 55.24

Haz Mat.
BNSF is leading the train ; supplying where needed the tools
June ! Oct 2014 Train done with

Maple ridge
Surey
white rock

Fire Station			Nearest Network Location				Distance Between Fire Station and Nearest Network
Name	Latitude	Longitude	Line Segment	Milepost	Division	Subdivision	
North Whatcom Fire Rescue Station 61	48.9830793	-122.7247256	56	119.59	NORTHWEST	NEW WESTMINSTER	1.9
North Whatcom Fire Rescue	48.969476	-122.791948	56	119.59	NORTHWEST	NEW WESTMINSTER	2.7
North Whatcom Fire & Rescue	48.935212	-122.730618	56	119.59	NORTHWEST	NEW WESTMINSTER	4.8
North Whatcom Fire Rescue	48.935048	-122.5743036	56	119.59	NORTHWEST	NEW WESTMINSTER	9.2
Whatcom County Fire District 21	48.941134	-122.48139	56	119.59	NORTHWEST	NEW WESTMINSTER	12.6
Lynden Fire Dept	48.944785	-122.453324	56	119.59	NORTHWEST	NEW WESTMINSTER	13.7
Fire Hall #6 Langley	49.092807	-122.6095044	56	119.82492	NORTHWEST	NEW WESTMINSTER	8.9
Surrey Fire Service Hall 14	49.0387796	-122.7346601	56	120.247864	NORTHWEST	NEW WESTMINSTER	2.5
Langley City Fire Rescue Service	49.1077071	-122.6602951	56	120.32908	NORTHWEST	NEW WESTMINSTER	8.2
White Rock Fire Dept	49.0228344	-122.7975158	56	121.7300285	NORTHWEST	NEW WESTMINSTER	0.3
Surrey Fire Service Hall 13	49.0350201	-122.8021207	56	122.2942616	NORTHWEST	NEW WESTMINSTER	0.9
Surrey Fire Service Hall 12	49.0497052	-122.8672308	56	127.4235749	NORTHWEST	NEW WESTMINSTER	0.5
Surrey Fire Service Hall 17	49.0614449	-122.7976027	56	128.5768874	NORTHWEST	NEW WESTMINSTER	2.7
Surrey Fire Service Hall 8	49.1057324	-122.7359263	56	130	NORTHWEST	NEW WESTMINSTER	5.5
Surrey Fire Service Hall 15	49.1192658	-122.6989128	56	130.0281	NORTHWEST	NEW WESTMINSTER	7.2
Surrey Fire Service Hall 9	49.1196622	-122.8100862	56	130.27147	NORTHWEST	NEW WESTMINSTER	3.0
Surrey Fire Service Hall 18	49.1499004	-122.7681988	56	130.32549	NORTHWEST	NEW WESTMINSTER	5.7
Surrey Fire Service Hall 11	49.112141	-122.8660261	56	130.69488	NORTHWEST	NEW WESTMINSTER	1.3
Surrey Fire Service Hall 10	49.1351694	-122.8559603	56	132.94295	NORTHWEST	NEW WESTMINSTER	2.7
Surrey Fire Service Hall 3	49.1774156	-122.8993199	56	139.2195855	NORTHWEST	NEW WESTMINSTER	0.5
Surrey Fire Service Hall 1	49.161814	-122.857623	56	139.2748919	NORTHWEST	NEW WESTMINSTER	2.6
Surrey Fire Service Hall 6	49.1671342	-122.8018268	56	140.9183279	NORTHWEST	NEW WESTMINSTER	4.4
Surrey Fire Service Hall 2	49.191988	-122.8603949	56	141	NORTHWEST	NEW WESTMINSTER	1.4
Surrey Fire Service Hall 7	49.1625939	-122.6981226	56	141.05578	NORTHWEST	NEW WESTMINSTER	8.6
Surrey Fire Service Hall 5	49.1848922	-122.7338328	56	141.0761297	NORTHWEST	NEW WESTMINSTER	6.7
Surrey Fire Service Hall 4	49.1983056	-122.8178648	56	141.0938	NORTHWEST	NEW WESTMINSTER	3.0
Fire Dept Hall 8 Walnut Grove	49.1766082	-122.6457453	56	141.0938	NORTHWEST	NEW WESTMINSTER	10.5

New Westminster Fire Hall 1 & Administration	49.2201966	-122.9083397	56	144.0364967	NORTHWEST	NEW WESTMINSTER	0.7
Pitt Meadows City Of	49.2087312	-122.6903557	56	145.13	NORTHWEST	NEW WESTMINSTER	8.4
Pitt Meadows Fire Dept	49.2243449	-122.6879073	56	145.151	NORTHWEST	NEW WESTMINSTER	8.3
Maple Ridge Fire Hall #3	49.2167789	-122.6589632	56	145.151	NORTHWEST	NEW WESTMINSTER	9.6
Maple Ridge Fire Dept	49.2212091	-122.5930503	56	145.1653131	NORTHWEST	NEW WESTMINSTER	12.4
Port Coquitlam Fire/Rescue	49.247636	-122.7624589	56	145.2125	NORTHWEST	NEW WESTMINSTER	5.2
Coquitlam City Of	49.2877196	-122.7909553	56	145.359	NORTHWEST	NEW WESTMINSTER	5.4
Coquitlam Town Centre Firehall	49.2914007	-122.7906938	56	145.359	NORTHWEST	NEW WESTMINSTER	5.5
Port Moody Fire Dept	49.2810413	-122.8283125	56	145.8661954	NORTHWEST	NEW WESTMINSTER	3.9
Sasamat Fire Dept	49.314146	-122.855052	56	147.04275	NORTHWEST	NEW WESTMINSTER	5.0
Burnaby Fire Dept	49.24057	-122.965174	56	149.0285	NORTHWEST	NEW WESTMINSTER	0.7
Bedwell Bay Road Fire Station	49.3141632	-122.9137114	56	150.23832	NORTHWEST	NEW WESTMINSTER	4.4
Fire Station No. 7	49.25566	-123.0117054	56	152.2631069	NORTHWEST	NEW WESTMINSTER	0.4
Vancouver FireHall 3	49.2599621	-123.1033462	56	155.43162	NORTHWEST	NEW WESTMINSTER	1.2
Fire & Rescue Services	49.2630551	-123.1139742	56	155.86	NORTHWEST	NEW WESTMINSTER	1.5
Vancouver FireHall 4	49.2627891	-123.1377335	56	155.86	NORTHWEST	NEW WESTMINSTER	2.4
Fireforce Apparatus Limited	49.2710615	-123.1466654	56	155.86	NORTHWEST	NEW WESTMINSTER	2.7
Vancouver Fire & Rescue Services	49.2761582	-123.0895665	424	0.5219	NORTHWEST	BURRARD INLET	0.3
North Vancouver District Fire Services	49.334657	-123.043402	424	0.9607	NORTHWEST	BURRARD INLET	4.0
Vancouver Fire Hall 2	49.2834332	-123.0999291	424	0.9711	NORTHWEST	BURRARD INLET	0.7
Fire & Rescue Services	49.2865992	-123.1343182	424	0.9711	NORTHWEST	BURRARD INLET	2.1
North Vancouver City Fire & Rescue	49.319732	-123.069891	424	0.9711	NORTHWEST	BURRARD INLET	2.6
West Vancouver Fire Dept	49.331345	-123.158541	424	0.9711	NORTHWEST	BURRARD INLET	4.6
Lions Bay Vol Fire Dept	49.4596587	-123.235971	424	0.9711	NORTHWEST	BURRARD INLET	13.8
Delta Fire Dept	49.086998	-123.064151	432	15.06066493	NORTHWEST	BCHB: NEW WESTMINS	1.4
Steveston Firehall	49.133328	-123.159362	432	19.71432	NORTHWEST	BCHB: NEW WESTMINS	5.6
Richmond Fire-Rescue	49.163214	-123.146838	977	1.173	NORTHWEST	TILBURY INDUSTRIAL	5.7

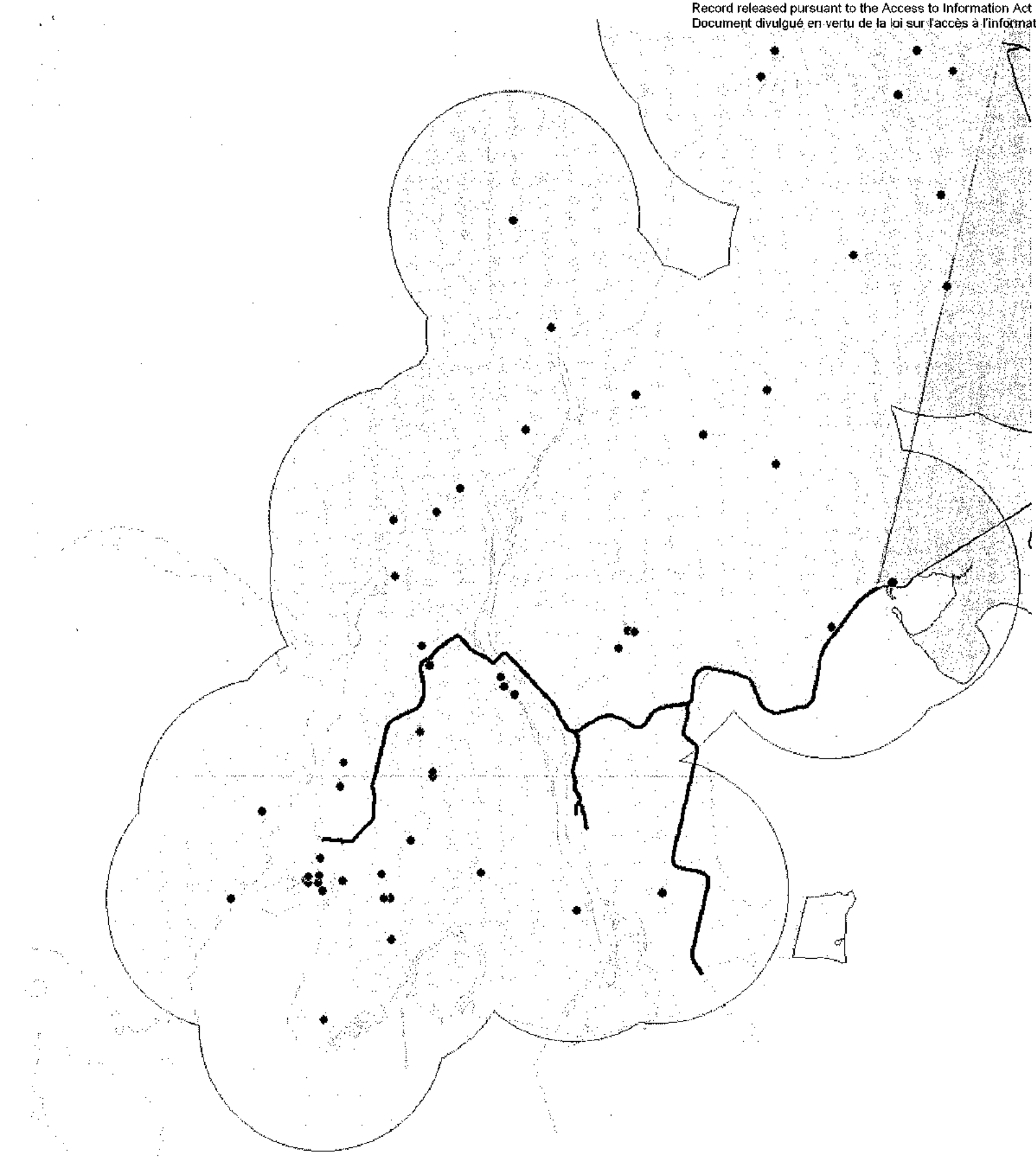


					Police Coverage		
Line Segment	From Milepost	To Milepost	Division	Subdivision	5 Miles	10 Miles	15 Miles
56	119.59	155.86	NORTHWEST	NEW WESTMINSTER	Yes	Yes	Yes
417	0	4.10056	NORTHWEST	TILBURY ISLAND SPUR	Yes	Yes	Yes
424	0	0.9711	NORTHWEST	BURRARD INLET	Yes	Yes	Yes
432	7.8	10.159632	NORTHWEST	BCHB: NEW WESTMINSTER	Yes	Yes	Yes
432	10.159632	10.83674	NORTHWEST	BCHB: NEW WESTMINSTER	NO	Yes	Yes
432	10.83674	20.5283	NORTHWEST	BCHB: NEW WESTMINSTER	Yes	Yes	Yes
977	0	1.173	NORTHWEST	TILBURY INDUSTRIAL	Yes	Yes	Yes

Total Mileage within 5 Mi:	**54.57**
Total Mileage within 10 Mi:	**0.68**

Police Location			Nearest Network Location				Distance Between Police Location and Nearest Network Location (mi)
Name	Latitude	Longitude	Line Seg.	Milepost	Division	Subdivision	
Blaine Police Dept	48.994159	-122.7493963	56	119.59	NORTHWEST	NEW WESTMINSTER	0.7
Cbsa/Asfc Aldergrove Hwy	49.0025866	-122.4850842	56	119.59	NORTHWEST	NEW WESTMINSTER	11.7
Lynden Police Dept	48.940247	-122.481487	56	119.59	NORTHWEST	NEW WESTMINSTER	12.6
Royal Canadian Mounted Police	49.0581837	-122.4769419	56	119.59	NORTHWEST	NEW WESTMINSTER	12.7
Peardonville Community Police Office	49.0170419	-122.4080526	56	119.59	NORTHWEST	NEW WESTMINSTER	15.1
Royal Canadian Mounted Police	49.090112	-122.608773	56	119.82492	NORTHWEST	NEW WESTMINSTER	8.8
Brookswood Community Police Office	49.0754648	-122.6705557	56	119.94461	NORTHWEST	NEW WESTMINSTER	6.2
Gendarmerie Royale Du Canada	49.0231508	-122.7990053	56	121.8018308	NORTHWEST	NEW WESTMINSTER	0.3
Township of Langley	49.12035	-122.659639	56	130	NORTHWEST	NEW WESTMINSTER	8.9
Royal Canadian Mounted Police	49.1632542	-122.6390876	56	130.15039	NORTHWEST	NEW WESTMINSTER	10.8
RCMP of Surrey	49.133526	-122.8427693	56	130.5621	NORTHWEST	NEW WESTMINSTER	2.9
Commission for Public Complaints Against the RCMP	49.1370965	-122.8428495	56	130.5621	NORTHWEST	NEW WESTMINSTER	3.2
Royal Canadian Mounted Police	49.1408068	-122.8594376	56	135.2413	NORTHWEST	NEW WESTMINSTER	2.6
Fisheries & Oceans Canada	49.1932314	-122.9196322	56	139.68475	NORTHWEST	NEW WESTMINSTER	0.8
BC - Cfseu	49.20005	-122.915743	56	140.1692451	NORTHWEST	NEW WESTMINSTER	0.9
New Westminster Police	49.2034241	-122.9077958	56	141.50307	NORTHWEST	NEW WESTMINSTER	0.6
Pitt Meadows Community Police Office	49.2209555	-122.6909271	56	145.151	NORTHWEST	NEW WESTMINSTER	8.2
Royal Canadian Mounted Police	49.2199517	-122.5983226	56	145.151	NORTHWEST	NEW WESTMINSTER	12.2
CSBC - North Fraser Pre-Trial	49.2506005	-122.7535594	56	145.233	NORTHWEST	NEW WESTMINSTER	5.6
Port Coquitlam Community Police Station	49.2614334	-122.7785093	56	145.26	NORTHWEST	NEW WESTMINSTER	4.8
Royal Canadian Mounted Police	49.2845126	-122.7941787	56	145.33425	NORTHWEST	NEW WESTMINSTER	5.1
Port Moody PD	49.2765611	-122.8423574	56	146.0660939	NORTHWEST	NEW WESTMINSTER	3.3
Burnaby RCMP District 2 Office	49.2519819	-122.8968751	56	146.5286206	NORTHWEST	NEW WESTMINSTER	0.5
Royal Canadian	49.245467	-122.911914	56	146.7948416	NORTHWEST	NEW WESTMINSTER	0.2
Burnaby RCMP	49.2419555	-122.9710764	56	149.2280184	NORTHWEST	NEW WESTMINSTER	0.9

BC - Gaming Police & Enforcement	49.229483	-123.002526	56	151.8215354	NORTHWEST	NEW WESTMINSTER	2.2
Burnaby RCMP District 4 Office	49.228768	-123.0060118	56	151.9745463	NORTHWEST	NEW WESTMINSTER	2.3
Burnaby RCMP District 1 Office	49.2812412	-123.0119206	56	152.3168652	NORTHWEST	NEW WESTMINSTER	1.3
Police Services	49.2802906	-123.033593	56	152.95941	NORTHWEST	NEW WESTMINSTER	1.3
South Vancouver Community Policing Centre	49.2331146	-123.0659267	56	154.23185	NORTHWEST	NEW WESTMINSTER	1.8
Vancouver Police Dept	49.245222	-123.101067	56	155.3446	NORTHWEST	NEW WESTMINSTER	1.7
Royal Canadian Mounted Police	49.240505	-123.1210734	56	155.36402	NORTHWEST	NEW WESTMINSTER	2.6
Royal Canadian Mounted Police	49.2373781	-123.1193109	56	155.36402	NORTHWEST	NEW WESTMINSTER	2.7
Kerrisdale Oakridge Marpole Community Policing Centre	49.2312251	-123.1550917	56	155.38344	NORTHWEST	NEW WESTMINSTER	4.1
Vancouver Police Dept	49.2664526	-123.11443	56	155.86	NORTHWEST	NEW WESTMINSTER	1.4
Royal Canadian Mounted Police and Firehall	49.258945	-123.2381443	56	155.86	NORTHWEST	NEW WESTMINSTER	6.7
Canadian Lifeboat Institution	49.189102	-123.079645	417	4.10056	NORTHWEST	TILBURY ISLAND SPUR	4.3
Vancouver Police Dept	49.2819474	-123.0994407	424	0.9711	NORTHWEST	BURRARD INLET	0.6
Consumer Taxation Branch	49.280281	-123.114706	424	0.9711	NORTHWEST	BURRARD INLET	1.3
Regional Headquarters	49.286689	-123.117943	424	0.9711	NORTHWEST	BURRARD INLET	1.5
Det Norske Veritas	49.2876233	-123.1211377	424	0.9711	NORTHWEST	BURRARD INLET	1.6
Granville Downtown Community Police Centre	49.2801366	-123.1216431	424	0.9711	NORTHWEST	BURRARD INLET	1.6
B C Police Commission	49.286824	-123.122256	424	0.9711	NORTHWEST	BURRARD INLET	1.6
C I C	49.2855325	-123.1228687	424	0.9711	NORTHWEST	BURRARD INLET	1.7
Police Services	49.2764938	-123.1272197	424	0.9711	NORTHWEST	BURRARD INLET	1.9
North Vancouver	49.3210301	-123.07131	424	0.9711	NORTHWEST	BURRARD INLET	2.7
West Vancouver Police	49.327375	-123.152448	424	0.9711	NORTHWEST	BURRARD INLET	4.2
Delta Police	49.0837107	-123.0604196	432	15.0931	NORTHWEST	BCHB: NEW WESTMINSTER	1.1
Richmond RCMP	49.1300088	-123.0929418	977	1.173	NORTHWEST	TILBURY INDUSTRIAL	3.1



2014
HAZMAT TRAFFIC
NEW WESTMINSTER

STCC NUMBER	STCC DESCRIPTION	CLASS CODE	RESIDUE CAR COUNT	LOADED CAR COUNT	RESIDUE INTER-MODAL	LOADED INTER-MODAL	TOTAL LOADED COUNT
4807419	WASTE FLAMMABLE LIQUIDS, TOXIC, N.O.S.	3	0	2	0	0	2
4810560	WASTE FLAMMABLE LIQUIDS, N.O.S.	3	6	12	0	0	12
4816321	WASTE ALUMINUM REMELTING BY-PRODUCTS	4.3	0	0	145	0	0
4860107	HAZARDOUS WASTE, SOLID, N.O.S.	9	0	1	0	0	1
4904503	ARGON, REFRIGERATED LIQUID	2.2	90	91	0	0	91
4904509	CARBON DIOXIDE, REFRIGERATED LIQUID	2.2	345	337	0	0	337
4905417	LIQUEFIED PETROLEUM GAS	2.1	9	0	0	0	0
4905419	LIQUEFIED PETROLEUM GAS	2.1	144	181	0	0	181
4905421	LIQUEFIED PETROLEUM GAS	2.1	1755	2001	0	0	2001
4905423	BUTANE	2.1	1104	1333	0	0	1333
4905424	BUTANE	2.1	451	846	0	0	846
4905430	ISOBUTANE	2.1	57	61	0	0	61
4905752	LIQUEFIED PETROLEUM GAS	2.1	4176	3956	0	0	3956
4905753	ISOBUTANE	2.1	9	12	0	0	12
4905780	LIQUEFIED PETROLEUM GAS	2.1	0	1	0	0	1
4905782	PROPYLENE	2.1	4	5	0	0	5
4905789	BUTANE	2.1	56	95	0	0	95
4905791	LIQUEFIED PETROLEUM GAS	2.1	69	197	0	0	197
4907265	STYRENE MONOMER, STABILIZED	3	710	862	0	0	862
4907428	HYDROCARBONS, LIQUID, N.O.S.	3	336	650	0	0	650
4907439	HYDROCARBONS, LIQUID, N.O.S.	3	420	618	0	0	618
4908125	CARBON DISULFIDE	3	14	16	0	0	16
4908175	GASOLINE	3	72	75	0	0	75
4908176	GASOLINE	3	13	0	0	0	0
4908177	GASOLINE	3	19	3	0	0	3
4908178	GASOLINE	3	9	0	0	0	0
4908179	ETHANOL AND GASOLINE MIXTURE	3	95	0	0	0	0
4908180	ETHANOL AND GASOLINE MIXTURE	3	742	713	0	0	713
4908188	OCTANES	3	9	7	0	0	7
4908255	PENTANES	3	3	0	0	0	0
4909152	ALCOHOLS, N.O.S.	3	14	119	0	0	119
4909215	FUEL, AVIATION, TURBINE ENGINE	3	1	0	0	0	0
4909230	METHANOL	3	516	424	0	0	424
4909267	N-PROPANOL	3	1	1	0	0	1
4909382	PETROLEUM DISTILLATES, N.O.S.	3	18	0	0	0	0
4910128	FLAMMABLE LIQUIDS, N.O.S.	3	0	1	0	0	1
4910165	PETROLEUM CRUDE OIL	3	7485	8327	0	0	8327
4910191	PETROLEUM CRUDE OIL	3	9594	11965	0	0	11965
4910242	PETROLEUM DISTILLATES, N.O.S.	3	22	22	0	0	22
4910269	FLAMMABLE LIQUIDS, N.O.S.	3	2	0	0	0	0
4910282	RESIN SOLUTION	3	24	21	0	0	21
4912082	DIESEL FUEL	3	26	91	0	0	91

4912185	DIESEL FUEL		3	3	0	0	0	0
4912186	DIESEL FUEL		3	178	62	0	0	62
4912210	DIESEL FUEL		3	53	36	0	0	36
4912228	FLAMMABLE LIQUIDS, N.O.S.		3	1	0	0	0	0
4912259	FLAMMABLE LIQUIDS, N.O.S.		3	3	0	0	0	0
4912294	KEROSENE		3	1	0	0	0	0
4912498	DIESEL FUEL		3	17	0	0	0	0
4913102	COMBUSTIBLE LIQUID,N.O.S.	CL		6	7	0	0	7
4914109	COMBUSTIBLE LIQUID,N.O.S.	CL		117	114	0	0	114
4914110	GAS OIL	CL		1528	3577	0	0	3577
4914131	DIESEL FUEL	CL		11	0	0	0	0
4914164	FUEL OIL	CL		61	1	0	0	1
4914166	DIESEL FUEL	CL		77	1	0	0	1
4914168	FUEL OIL	CL		147	225	0	0	225
4914851	FUEL OIL	CL		1	0	0	0	0
4915378	COMBUSTIBLE LIQUID, N.O.S.	CL		601	525	0	0	525
4915399	COMBUSTIBLE LIQUID,N.O.S.	CL		9	5	0	0	5
4916321	ALUMINUM RESMELTING BY-PRODUCTS		4.3	0	0	12	155	155
4917403	SULFUR, MOLTEN		4.1	12	0	0	0	0
4918310	AMMONIUM NITRATE BASED FERTILIZER		5.1	1	0	0	0	0
4918311	AMMONIUM NITRATE		5.1	149	142	0	0	142
4918335	HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS, ST		5.1	160	152	0	0	152
4918723	SODIUM CHLORATE		5.1	229	254	0	0	254
4918775	HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS		5.1	38	38	0	0	38
4920359	AMMONIA, ANHYDROUS		2.3	4	0	0	0	0
4920508	SULFUR DIOXIDE		2.3	35	28	0	0	28
4920523	CHLORINE		2.3	857	817	0	0	817
4921575	TOLUENE DIISOCYANATE		6.1	3	3	0	0	3
4921598	PHENOL, MOLTEN		6.1	20	22	0	0	22
4930040	SULFURIC ACID		8	290	319	0	0	319
4930228	HYDROCHLORIC ACID		8	1316	1440	0	0	1440
4930247	PHOSPHORIC ACID SOLUTION		8	0	1	0	0	1
4931257	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.		8	8	5	0	0	5
4931497	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.		8	1	0	0	0	0
4932022	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.		8	2	2	0	0	2
4932050	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.		8	2	0	0	0	0
4932329	FERROUS CHLORIDE,SOLUTION		8	0	1	0	0	1
4935204	CORROSIVE LIQUIDS, TOXIC, N.O.S.		8	99	93	0	0	93
4935240	SODIUM HYDROXIDE SOLUTION		8	407	504	0	0	504
4935251	SODIUM HYDROXIDE SOLUTION		8	104	0	0	0	0
4935284	SODIUM BOROHYDRIDE AND SODIUM HYDROXID		8	39	37	0	0	37
4936601	CORROSIVE LIQUIDS, FLAMMABLE, N.O.S.		8	15	22	0	0	22
4936653	CORROSIVE LIQUIDS, N.O.S.		8	2	0	0	0	0
4945770	SULFUR, MOLTEN		9	667	651	0	0	651
4960142	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, L		9	19	19	0	0	19
4960196	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, L		9	19	24	0	0	24
4961605	ELEVATED TEMPERATURE LIQUID, N.O.S.		9	968	1088	0	0	1088
4961609	ELEVATED TEMPERATURE LIQUID, N.O.S.		9	9	13	0	0	13
4961619	ELEVATED TEMPERATURE LIQUID, N.O.S.		9	298	314	0	0	314

4961620	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	2	0	0	0	0
4962124	ASBESTOS	9	0	0	0	7	7
4962137	OTHER REGULATED SUBSTANCES, LIQUID, N.O.S.	9	2	0	0	0	0
4963101	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, S	9	104	139	0	0	139
4963102	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, S	9	3770	4274	0	0	4274
4966109	OTHER REGULATED SUBSTANCES, LIQUID, N.O.S.	9	22	27	0	0	27
4966998	ELEVATED TEMPERATURE LIQUID, N.O.S.	9	235	241	0	0	241
	TOTALS		41142	48269	157	162	48431

T residue 41299 T cars 89730

Water Feature Name	Water Feature Type	Division	Subdivision	Line Segment	Beginning MP	Ending MP
Snake River	Stream or Other Linear Feature	NORTHWEST	BURBANK	450	2.983945	3.54608
Columbia River	Stream or Other Linear Feature	NORTHWEST	BURBANK	450	7.958798	9.156598
Snake River	Stream or Other Linear Feature	NORTHWEST	BURBANK	47	233.532	235
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1515.43358	1515.65575
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1531.422713	1533.20744
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1533.244113	1533.880455
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1534.149993	1535.036423
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1535.07615	1536.13385
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1536.1853	1538.40962
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1538.90022	1539.180365
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1539.23115	1540.353255
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1540.626043	1540.852198
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1540.89697	1543.424458
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1544.027058	1545.577258
Coal Creek (WA)	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1547.318433	1548.37911
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1553.8708	1555.35656
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1555.910295	1556.773635
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1556.806363	1560.235155
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1561.073118	1561.30184
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1561.340863	1562.382455
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1562.81156	1563.00759
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1563.597288	1564.290235
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1564.47159	1565.996225
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1566.36188	1566.713468
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1566.784928	1567.01825
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1570.555815	1571.881943
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1576.210468	1576.449135
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1576.56006	1577.206035
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1577.893748	1578.089025
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1580.671615	1580.859883
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1584.635793	1584.853938
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1585.87521	1586.098638
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1586.532673	1589.206878
Crab Creek	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1589.582323	1589.8176
Columbia River	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1636.033448	1636.59747
Columbia River	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1640.83452	1641.82125
Columbia River	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1641.883758	1643.251638
Columbia River	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1645.059563	1647.583273
Columbia River	Stream or Other Linear Feature	NORTHWEST	COLUMBIA RIVER	37	1648.361063	1650.17268
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	8.603573	9.027463
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	9.210393	9.9363
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	23.097323	24.02283
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	49.881565	52.427705
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	52.830355	54.155978

Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	62.331858	62.893908
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	66.1347	67.66847
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	78.55153	79.508645
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	80.051973	81.282043
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	83.475503	84.898268
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	90.385278	90.888928
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	90.9174	91.671408
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	91.706305	93.080565
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	93.278545	94.397988
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	98.5167	99.35265
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	120.344103	121.15358
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	129.372215	129.701795
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	130.830688	131.379885
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	141.576533	141.60094
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	195.70584	196.06563
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	197.317315	212.516353
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	215.059158	217.903828
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	218.024545	218.653953
Columbia River	Stream or Other Linear Feature	NORTHWEST	FALLBRIDGE	47	229.654958	229.666
Wolf Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	182.433543	185.878683
Wolf Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	187.811393	188.230158
Wolf Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	188.354658	189.09622
Wolf Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	192.335443	192.47936
Indian Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	192.398435	194.011923
Indian Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	196.168145	198.287568
Indian Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	198.567098	198.772915
Indian Creek (CA)	Stream or Other Linear Feature	NORTHWEST	GATEWAY	55	199.598838	200.31303
Dragoon Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	18.451845	18.524283
Dragoon Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	18.594225	20.529773
Dragoon Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	20.606328	20.939433
Dragoon Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	27.102738	27.35127
Loon Lake	Lake	NORTHWEST	KETTLE FALLS	376	35.473958	35.892865
Loon Lake	Lake	NORTHWEST	KETTLE FALLS	376	36.124388	36.633585
Loon Lake	Lake	NORTHWEST	KETTLE FALLS	376	36.647203	37.260638
Loon Lake	Lake	NORTHWEST	KETTLE FALLS	376	37.268233	37.811343
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	41.606648	41.99791
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	42.21859	43.009665
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	43.09822	43.298198
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	43.424165	43.696853
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	43.710918	43.903223
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	43.971235	44.643875
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	44.749998	45.380735
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	45.41258	45.726718
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	45.73429	45.906058
Sheep Creek	Stream or Other Linear Feature	NORTHWEST	KETTLE FALLS	376	47.560455	47.767263
Lake Pend Oreille	Lake	NORTHWEST	KOOTENAI RIVER	45	3.341235	5.935935
Cocolalla Lake	Lake	NORTHWEST	KOOTENAI RIVER	45	14.373638	14.692438

Cocolalla Lake	Lake	NORTHWEST	KOOTENAI RIVER	45	15.604105	16.426253
Cocolalla Creek	Stream or Other Linear Feature	NORTHWEST	KOOTENAI RIVER	45	16.85845	17.069405
Cocolalla Creek	Stream or Other Linear Feature	NORTHWEST	KOOTENAI RIVER	45	19.815048	21.762643
Hangman Creek	Stream or Other Linear Feature	NORTHWEST	LAKESIDE	46	2.230635	2.850033
Hangman Creek	Stream or Other Linear Feature	NORTHWEST	LAKESIDE	46	3.06454	3.157353
Hangman Creek	Stream or Other Linear Feature	NORTHWEST	LAKESIDE	46	3.184768	3.407118
Sprague Lake	Lake	NORTHWEST	LAKESIDE	46	43.745858	44.77853
Sprague Lake	Lake	NORTHWEST	LAKESIDE	46	45.084305	46.820153
Sprague Lake	Lake	NORTHWEST	LAKESIDE	46	47.01733	47.295988
Sprague Lake	Lake	NORTHWEST	LAKESIDE	46	48.168513	48.20744
Columbia River	Stream or Other Linear Feature	NORTHWEST	LAKESIDE	46	146.78329	147.59
Boundary Bay	Lake	NORTHWEST	NEW WESTMINSTEI	50	119.46317	126.85913
Boundary Bay	Lake	NORTHWEST	NEW WESTMINSTEI	56	127.32590	127.95304
Boundary Bay	Lake	NORTHWEST	NEW WESTMINSTEI	56	128.06320	129.94321
Fraser River	Stream or Other Linear Feature	NORTHWEST	NEW WESTMINSTEI	56	137.04084	138.23145
Fraser River	Stream or Other Linear Feature	NORTHWEST	NEW WESTMINSTEI	56	141.29200	144.13547
Columbia River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	0.28861	0.772743
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	12.775168	13.047863
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	13.081953	13.13159
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	15.0518	15.624058
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	17.202805	17.416415
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	17.46903	17.583408
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	22.453033	22.501553
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	24.9797	25.01701
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	25.60667	26.132565
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	27.967745	28.108433
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	31.36877	31.422858
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	33.128648	33.226485
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	34.178763	34.250173
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	35.121845	35.186063
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	35.343915	35.354095
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	35.552568	35.63312
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	37.244665	37.317235
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	38.623778	38.71123
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	38.981565	39.087845
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	43.359453	43.759348
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	43.84496	44.083265
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	44.10563	44.24078
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	44.898025	45.015615
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	45.423983	45.872308
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	46.330655	46.568608
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	51.719663	51.808658
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	52.274115	52.555523
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	54.339148	55.162795
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	56.374243	56.514493
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	56.74735	56.9107
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	58.325398	58.773603

Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	59.04523	59.061008
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	59.592508	59.815173
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	62.146003	62.301488
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	71.941313	72.0325
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	74.198985	74.453193
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	74.54671	74.849815
Deschutes River	Stream or Other Linear Feature	NORTHWEST	OREGON TRUNK	53	80.775733	81.006393
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1655.33463	1655.543
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1656.49909	1656.770593
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1657.06149	1658.224783
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1658.451328	1659.917943
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1661.391615	1662.876565
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1663.30711	1663.505368
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1664.240503	1664.488265
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1665.2086	1665.416755
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1666.02427	1666.213383
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1666.505158	1667.227333
Wenatchee River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1680.960223	1681.150478
Nason Creek	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1690.33446	1693.743955
Nason Creek	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1694.068825	1694.296968
Nason Creek	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1696.375403	1698.799405
Nason Creek	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1699.665273	1700.34677
South Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1731.33045	1733.576415
South Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1733.739158	1735.4507
South Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1743.317055	1743.54324
South Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1743.92754	1744.23397
North Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1745.487648	1745.602348
North Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1746.10621	1746.334198
North Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1747.47342	1748.482795
Skykomish River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1748.369148	1749.509435
South Fork Skykomish	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1748.38365	1748.46708
Skykomish River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1749.652	1751.057873
Skykomish River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1753.25004	1753.422938
Skykomish River	Stream or Other Linear Feature	NORTHWEST	SCENIC	37	1760.972315	1761.7659
Green River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	51	17.263423	17.473335
Skookumchuck River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	47.323893	47.611398
Skookumchuck River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	48.377715	50.028518
Skookumchuck River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	52.143985	52.432963
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	70.44285	70.81643
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	71.240978	71.901198
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	73.857395	74.140473
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	74.795855	75.308103
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	76.064075	76.527895
Olequa Creek	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	78.03933	78.477065
Cowlitz River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	81.416875	81.767488
Cowlitz River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	94.351778	94.442475
Cowlitz River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	95.476023	97.840938

Cowlitz River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	99.971	100.19069
Vancouver Lake	Lake	NORTHWEST	SEATTLE	52	130.791405	131.078033
Vancouver Lake	Lake	NORTHWEST	SEATTLE	52	131.236763	131.324143
Vancouver Lake	Lake	NORTHWEST	SEATTLE	52	131.581305	132.233135
Vancouver Lake	Lake	NORTHWEST	SEATTLE	52	132.907885	133.227805
Columbia River	Stream or Other Linear Feature	NORTHWEST	SEATTLE	52	136.420285	136.48
Hangman Creek	Stream or Other Linear Feature	NORTHWEST	SPOKANE	37	1481.40531	1481.592913
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	6.282438	6.48896
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	10.005978	10.192965
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	11.11228	11.231055
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	30.559165	30.752385
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	39.539043	39.628105
Yakima River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	40.027835	40.454263
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	56.31237	56.502203
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	58.813263	59.0674
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	60.564465	60.854578
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	64.78005	64.9794
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	71.276158	71.520768
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	71.54644	71.749703
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	81.425415	81.665753
Big Soos Creek	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	95.706273	97.298953
Green River	Stream or Other Linear Feature	NORTHWEST	STAMPEDE	49	99.99476	100.183565
Fraser River	Stream or Other Linear Feature	NORTHWEST	TILBURY ISLAND SPI	417	0.00000	0.27478
Columbia River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	1.886	1.900378
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	25.99875	26.022725
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	26.106748	26.88205
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	26.938343	27.267785
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	27.723785	29.154293
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	30.1319	31.060385
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	34.933168	35.110203
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	35.670638	35.73701
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	39.555595	40.128045
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	40.946573	41.560013
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	84.495618	84.727223
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	92.052518	92.508938
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	96.46515	96.779083
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	102.515985	104.594013
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	104.84051	105.456303
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	105.742928	108.660218
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	109.164145	109.34297
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	110.03001	112.656578
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	112.780833	117.960788
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	118.13289	119.789428
Yakima River	Stream or Other Linear Feature	NORTHWEST	YAKIMA VALLEY	48	119.803928	120.010233

Water Feature Name	Water Feature Type	Miles of Track Intersected
Abo Arroyo	Stream or Other Linear Feature	5.1
Alkali Creek	Stream or Other Linear Feature	4.4
Andrews Creek	Stream or Other Linear Feature	1.7
Arkansas River	Stream or Other Linear Feature	1.9
Armells Creek	Stream or Other Linear Feature	3.3
Badwater Creek	Stream or Other Linear Feature	2.2
Bear Creek	Stream or Other Linear Feature	5.0
Beaver Creek (AL)	Stream or Other Linear Feature	1.6
Beaver Creek (MT; *East*)	Stream or Other Linear Feature	1.0
Beaver Creek (MT; *West*)	Stream or Other Linear Feature	1.5
Beaver Creek (NE)	Stream or Other Linear Feature	1.3
Big Blue River	Stream or Other Linear Feature	2.0
Big Muddy Creek	Stream or Other Linear Feature	2.7
Big Otter Creek	Stream or Other Linear Feature	8.7
Big Sioux River	Stream or Other Linear Feature	1.8
Big Soos Creek	Stream or Other Linear Feature	1.6
Bighorn River	Stream or Other Linear Feature	3.5
Blue River	Stream or Other Linear Feature	1.2
Boundary Bay	Lake	9.9
Boxelder Creek	Stream or Other Linear Feature	1.7
Brush Creek	Stream or Other Linear Feature	1.1
Cambridge Canal	Stream or Other Linear Feature	3.8
Canadian River	Stream or Other Linear Feature	4.3
Careless Creek	Stream or Other Linear Feature	2.4
Carlyle Lake	Lake	4.1
Casper Creek	Stream or Other Linear Feature	2.4
Cedar Creek (IA)	Stream or Other Linear Feature	7.6
Cedar Creek (MO)	Stream or Other Linear Feature	1.5
Chapman Creek	Stream or Other Linear Feature	1.2
Chicago Sanitary And Ship Canal	Stream or Other Linear Feature	1.4
Chugwater Creek	Stream or Other Linear Feature	10.0
Cimarron River	Stream or Other Linear Feature	1.1
Clark Fork	Stream or Other Linear Feature	1.6
Coal Creek (SD)	Stream or Other Linear Feature	2.4
Coal Creek (WA)	Stream or Other Linear Feature	13.4
Cocolalla Creek	Stream or Other Linear Feature	2.2
Cocolalla Lake	Lake	1.1
Columbia River	Stream or Other Linear Feature	46.8
Cottonwood Creek (TX)	Stream or Other Linear Feature	1.1
Cottonwood Creek (WY)	Stream or Other Linear Feature	2.2
Cottonwood River	Stream or Other Linear Feature	1.2
Cow Creek	Stream or Other Linear Feature	1.1
Cowlitz River	Stream or Other Linear Feature	3.0
Crab Creek	Stream or Other Linear Feature	16.2
Crow Creek (IL)	Stream or Other Linear Feature	1.4
Crow Creek (WY)	Stream or Other Linear Feature	2.5
Deep Creek	Stream or Other Linear Feature	3.9
Des Moines River	Stream or Other Linear Feature	1.1
Des Plaines River	Stream or Other Linear Feature	5.4
Deschutes River	Stream or Other Linear Feature	7.4
Donkey Creek	Stream or Other Linear Feature	1.3
Dragoon Creek	Stream or Other Linear Feature	2.6
Dry Fork Marias River	Stream or Other Linear Feature	2.5
East Fork Roberts Creek	Stream or Other Linear Feature	5.3

East Nodaway River	Stream or Other Linear Feature	2.5
East Plum Creek	Stream or Other Linear Feature	1.8
El Dorado Lake	Lake	1.2
Elm Creek	Stream or Other Linear Feature	2.6
Fisher River	Stream or Other Linear Feature	3.2
Flat Creek	Stream or Other Linear Feature	1.8
Fly Creek	Stream or Other Linear Feature	1.2
Fountain Creek	Stream or Other Linear Feature	1.1
Fraser River	Stream or Other Linear Feature	2.6
Glendive Creek	Stream or Other Linear Feature	1.6
Goose Creek	Stream or Other Linear Feature	1.3
Green River	Stream or Other Linear Feature	2.0
Guernsey Reservoir	Lake	1.8
Haines Branch	Stream or Other Linear Feature	1.2

YR	MNTH	MILES	HOURS	TRAIN_MPH
2008	1	3,589	210	17.1
2008	2	3,664	191	19.2
2008	3	3,951	262	15.1
2008	4	4,260	270	15.8
2008	5	4,777	323	14.8
2008	6	4,814	405	11.9
2008	7	4,049	269	15.1
2008	8	4,011	275	14.6
2008	9	4,415	305	14.5
2008	10	5,695	371	15.3
2008	11	4,633	323	14.4
2008	12	3,886	308	12.6
2009	1	4,410	348	12.7
2009	2	3,667	246	14.9
2009	3	4,011	289	13.9
2009	4	3,525	247	14.3
2009	5	3,337	221	15.1
2009	6	3,527	236	14.9
2009	7	2,753	226	12.2
2009	8	2,865	196	14.6
2009	9	2,772	207	13.4
2009	10	3,135	288	10.9
2009	11	3,653	307	11.9
2009	12	3,383	228	14.8
2010	1	3,844	258	14.9
2010	2	3,983	275	14.5
2010	3	4,780	364	13.1
2010	4	4,204	356	11.8
2010	5	4,580	290	15.8
2010	6	5,087	358	14.2
2010	7	5,238	334	15.7
2010	8	5,281	354	14.9
2010	9	5,178	362	14.3
2010	10	4,998	376	13.3
2010	11	4,792	372	12.9
2010	12	5,093	407	12.5
2011	1	5,267	305	17.3
2011	2	5,472	330	16.6
2011	3	5,205	521	10.0
2011	4	6,425	519	12.4
2011	5	6,420	415	15.5
2011	6	6,532	513	12.7
2011	7	6,930	486	14.3
2011	8	7,351	481	15.3
2011	9	6,716	1,343	5.0
2011	10	7,147	463	15.4
2011	11	6,324	586	10.8

Row Labels	Sum of MILES	Sum of HOURS	AVG_MPH
2008	51,744	3,512	14.7
2009	41,038	3,038	13.5
2010	57,058	4,106	13.9
2011	76,113	6,523	11.7
2012	76,195	8,207	9.3
2013	80,786	8,189	9.9
2014	113,480	9,537	11.9
2015	22,930	1,859	12.3
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Total	**519,344**	**44,971**	**11.5**

2011	12	6,324	561	11.3
2012	1	6,269	646	9.7
2012	2	6,214	506	12.3
2012	3	6,678	613	10.9
2012	4	6,966	557	12.5
2012	5	7,818	1,143	6.8
2012	6	7,539	517	14.6
2012	7	7,179	584	12.3
2012	8	6,629	476	13.9
2012	9	5,973	440	13.6
2012	10	4,729	408	11.6
2012	11	4,730	358	13.2
2012	12	5,471	1,960	2.8
2013	1	4,926	2,032	2.4
2013	2	5,911	439	13.5
2013	3	6,850	655	10.5
2013	4	7,372	602	12.3
2013	5	7,362	521	14.1
2013	6	6,745	567	11.9
2013	7	6,872	558	12.3
2013	8	7,216	519	13.9
2013	9	7,154	563	12.7
2013	10	7,369	567	13.0
2013	11	6,475	520	12.5
2013	12	6,534	645	10.1
2014	1	7,110	581	12.2
2014	2	5,877	488	12.1
2014	3	7,403	670	11.1
2014	4	7,335	545	13.5
2014	5	8,149	689	11.8
2014	6	7,530	723	10.4
2014	7	12,364	812	15.2
2014	8	11,865	875	13.6
2014	9	12,091	1,098	11.0
2014	10	11,655	1,262	9.2
2014	11	10,017	929	10.8
2014	12	12,084	865	14.0
2015	1	7,939	716	11.1
2015	2	7,349	549	13.4
2015	3	7,642	594	12.9

Track Chart
New Westminster Subdivision

Vancouver, BC to US \ CA Border

MP 141.3 to MP 119.6

See each page for latest revised date.

Forward all corrections and changes to
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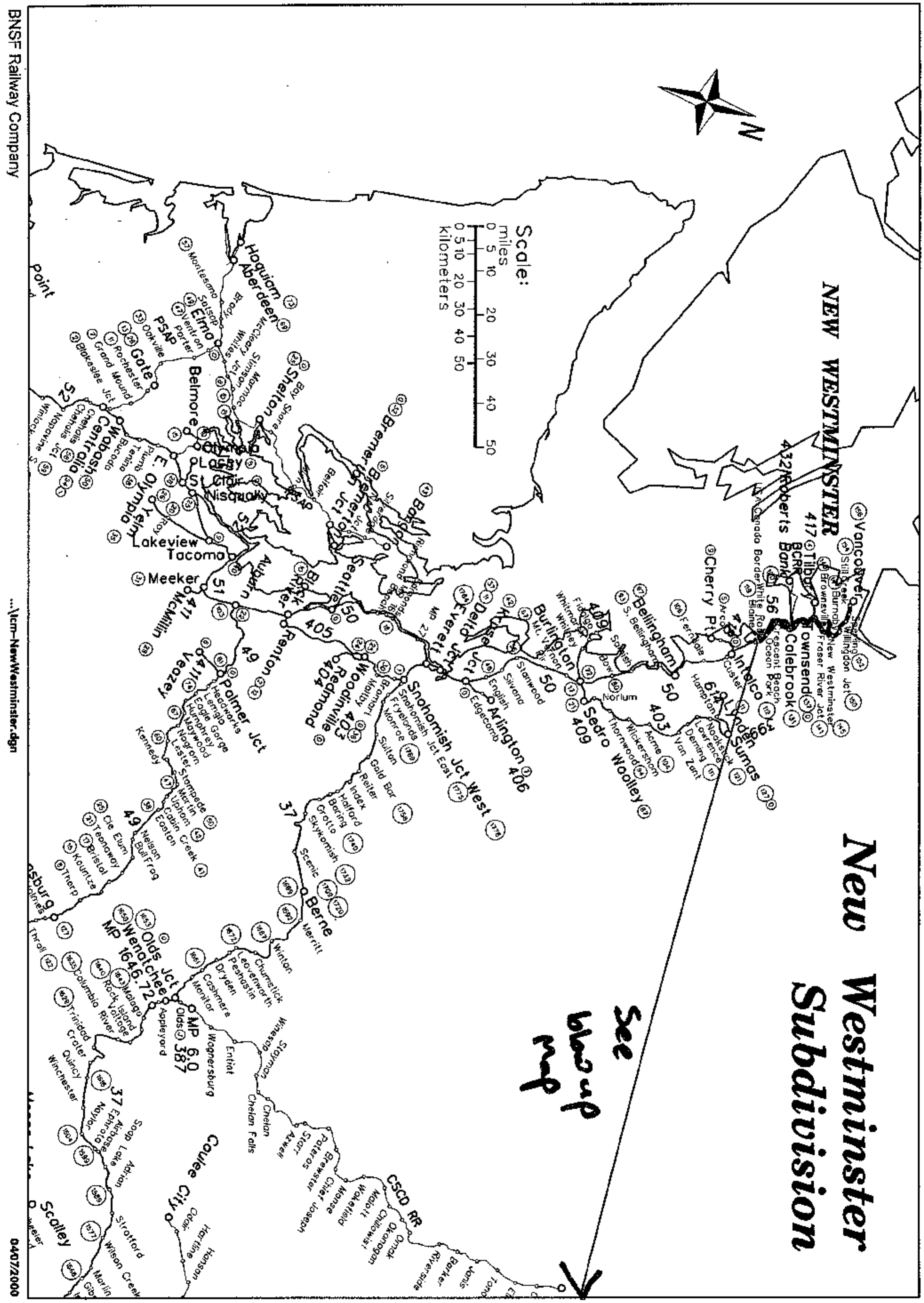
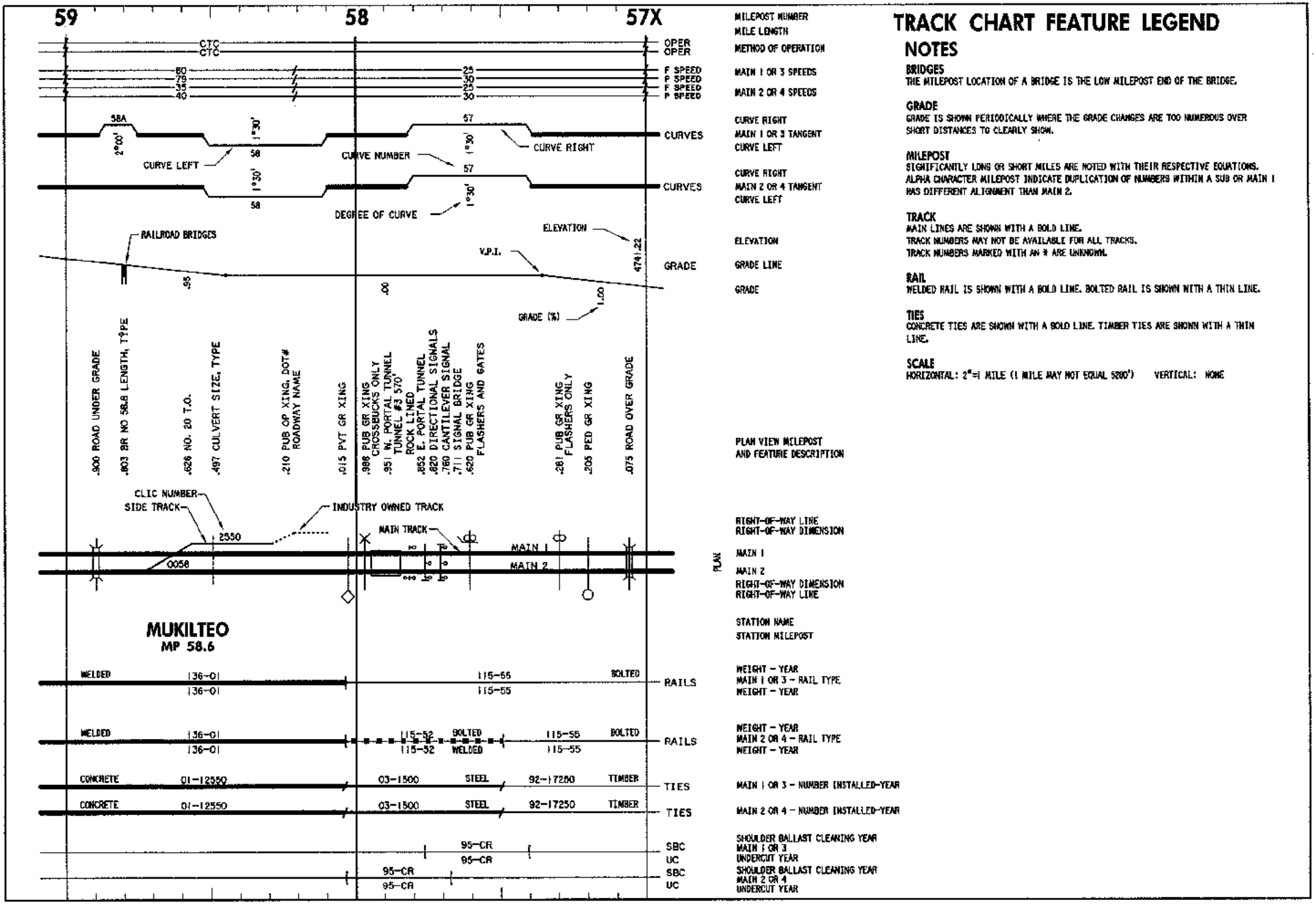
FAX to (913)-551-4285

BNSF System Maintenance and Planning





MILEPOST NUMBER
MILE LENGTH
METHOD OF OPERATION
MAIN 1 OR 3 SPEEDS
MAIN 2 OR 4 SPEEDS
CURVE RIGHT
MAIN 1 OR 3 TANGENT
CURVE LEFT
CURVE RIGHT
MAIN 2 OR 4 TANGENT
CURVE LEFT
ELEVATION
GRADE LINE
GRADE
PLAN VIEW MILEPOST
AND FEATURE DESCRIPTION
RIGHT-OF-WAY LINE
RIGHT-OF-WAY DIMENSION
MAIN 1
MAIN 2
RIGHT-OF-WAY DIMENSION
RIGHT-OF-WAY LINE
STATION NAME
STATION MILEPOST
WEIGHT - YEAR
MAIN 1 OR 3 - RAIL TYPE
WEIGHT - YEAR
WEIGHT - YEAR
MAIN 2 OR 4 - RAIL TYPE
WEIGHT - YEAR
MAIN 1 OR 3 - NUMBER INSTALLED-YEAR
MAIN 2 OR 4 - NUMBER INSTALLED-YEAR
SHOULDER BALLAST CLEANING YEAR
MAIN 1 OR 3
UNDERCUT YEAR
SHOULDER BALLAST CLEANING YEAR
MAIN 2 OR 4
UNDERCUT YEAR

TRACK CHART FEATURE LEGEND

NOTES

BRIDGES
THE MILEPOST LOCATION OF A BRIDGE IS THE LOW MILEPOST END OF THE BRIDGE.

GRADE
GRADE IS SHOWN PERIODICALLY WHERE THE GRADE CHANGES ARE TOO NUMEROUS OVER SHORT DISTANCES TO CLEARLY SHOW.

MILEPOST
SIGNIFICANTLY LONG OR SHORT MILES ARE NOTED WITH THEIR RESPECTIVE EQUATIONS.
ALPHA CHARACTER MILEPOST INDICATE DUPLICATION OF NUMBERS WITHIN A SUB OR MAIN 1 HAS DIFFERENT ALIGNMENT THAN MAIN 2.

TRACK
MAIN LINES ARE SHOWN WITH A BOLD LINE.
TRACK NUMBERS MAY NOT BE AVAILABLE FOR ALL TRACKS.
TRACK NUMBERS MARKED WITH AN * ARE UNKNOWN.

RAIL
WELDED RAIL IS SHOWN WITH A BOLD LINE. BOLTED RAIL IS SHOWN WITH A THIN LINE.

TIES
CONCRETE TIES ARE SHOWN WITH A BOLD LINE. TIMBER TIES ARE SHOWN WITH A THIN LINE.

SCALE
HORIZONTAL: 2"=1 MILE (1 MILE MAY NOT EQUAL 5280') VERTICAL: NONE

960000

Track Chart Abbreviations

Track and Signal

ABD	ACOUSTIC BEARING DETECTOR
ABS	AUTOMATIC BLOCK SIGNAL SYSTEM
AEI	AUTOMATIC EQUIPMENT IDENTIFICATION DETECTOR
ATS	AUTOMATIC TRAIN STOPS
BFD	BROKEN FLANGE DETECTOR
BR SIG	BRIDGE SIGNAL
CANT SIG	CANTILEVER SIGNAL
CTC	CENTRALIZED TRAFFIC CONTROL
DED	DRAGGING EQUIPMENT DETECTOR
DESLTD	DRAGGING EQUIP. & SHIFTED LOAD W/ TOP DETECTOR
F	FREIGHT (SPEED)
F/G	FLASHING SIGNAL WITH AUTOMATIC GATES
FL	FLASHING SIGNAL
HBD	HOT BEARING DETECTOR
HWD	HIGH WATER DETECTOR
I TOWER	INTERLOCKING TOWER
INTLK	INTERLOCKING
LS	LINE SEGMENT
MP	MILEPOST
NO	NUMBER
OCS	OCCUPANCY CONTROL SYSTEM
OH	OVERHEAD
OOS	OUT OF SERVICE
P	PASSENGER (SPEED)
RES LIM	RESTRICTED LIMITS
RL	RAIL LUBRICATOR
S SW	SPRING SWITCH
SBC	SHOULDER BALLAST CLEANING
SIGS	SIGNALS
SLD	SHIFTED LOAD DETECTOR
SLTD	SHIFTED LOAD WITH TOP DETECTOR
TO	TURNOUT
TRK	TRACK
TWC	TRACK WARRANT CONTROL
UC	UNDERCUT
WILD	WHEEL IMPACT LOAD DETECTOR
YL	YARD LIMIT

Miscellaneous

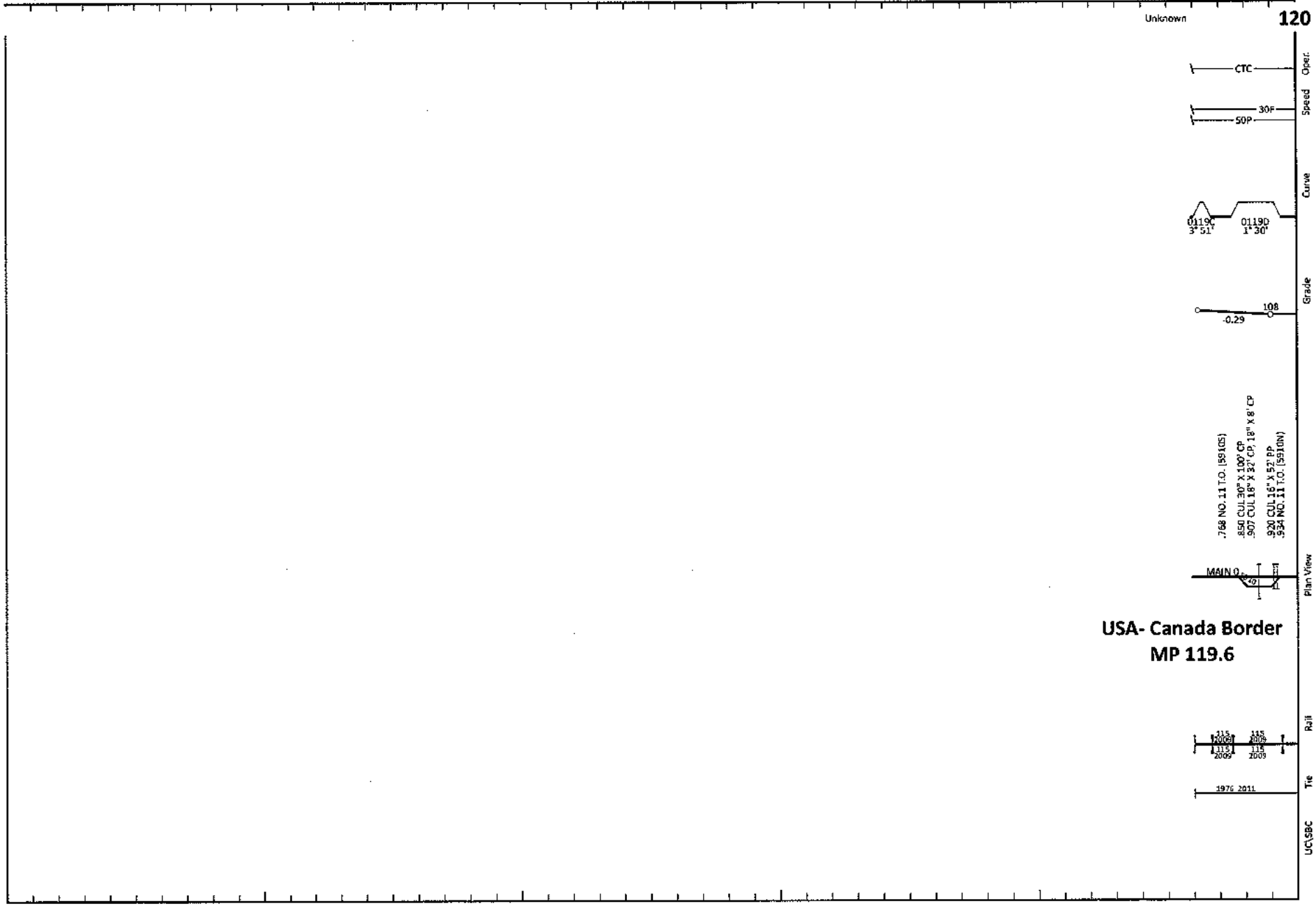
AVE	AVENUE
BLVD	BOULEVARD
CO	COUNTY
CONN	CONNECTION
CONST	CONSTRUCTED
CR	CREEK OR CRUSHED ROCK
DBL	DOUBLE
DIV	DIVISION
DR	DRIVE
E	EAST
EL	ELEVATION
F LT P	FLOOD LIGHT POLE
F LT T	FLOOD LIGHT TOWER
FRT	FREIGHT
GR	AT GRADE
HO	HOUSE
HWY	HIGHWAY
IND	INDUSTRY
JCT	JUNCTION
JT	JOINT
LT	LEFT
MAX	MAXIMUM
MIN	MINIMUM
MTCE	MAINTENANCE
NO	NORTH
OH	OVERHEAD
OP	OVERPASS
PED	PEDESTRIAN
PK	PARKWAY
PO	POWER
PSGR	PASSENGER
PUB	PUBLIC
PVT	PRIVATE
RD	ROAD
Riv	RIVER
RR	RAILROAD
RT	RIGHT
RW	RIGHT OF WAY
RY	RAILWAY
SEC	SECTION
SO	SOUTH
ST	STREET
STA	STATION
SUB	SUBDIVISION
TPL	TRIPLE
UP	UNDERPASS
W	WEST
XBUCKS	CROSSBUCKS
XING	CROSSING
YD	YARD

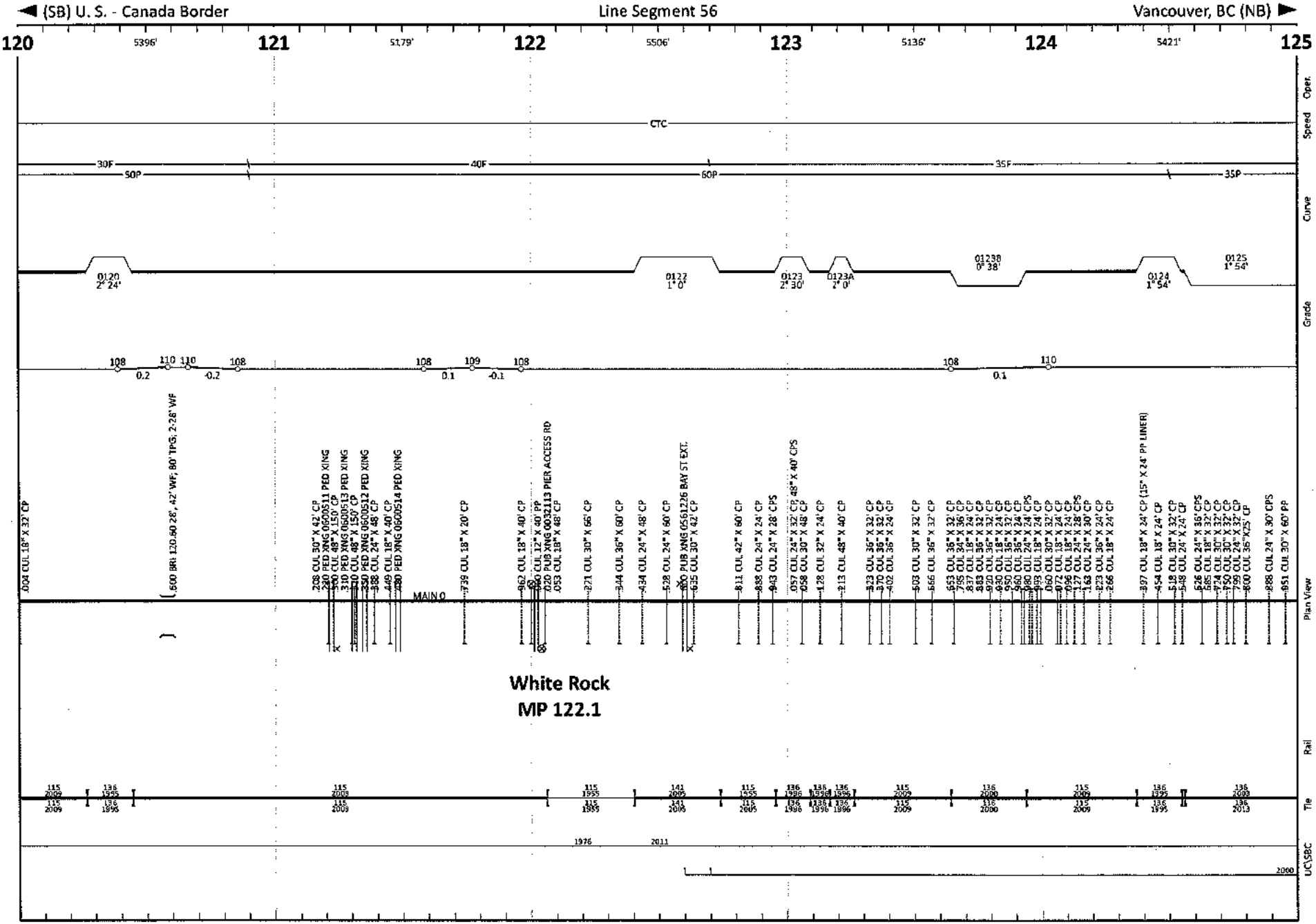
Bridges

BASC	BASCULE
BD	BALLAST DECK
BDPT	BALLAST DECK PILE TRESTLE - TIMBER
BM	BEAM SPAN
BPT	BALLAST DECK TIMBER TRESTLE
BR	BRIDGE
CA	CONCRETE ARCH
CEBM	BEAM SPAN CONCRETE ENCASED
CIP	CAST IRON PIPE
CP	CONCRETE PIPE
CUL	CULVERT
DBOX	PRESTRESSED DOUBLE CELL CONCRETE BOX GIRDER
DBXS	PRESTRESSED THRU VOID, DBL. CELL, CONC. BOX GIRDER, SLOPED CURBS
DPCT	DECK PLATE CONNECTED TRUSS
DPCT	DECK TRUSS PIN CONNECTED
DPG	DECK PLATE GIRDER
DPLG	DECK PLATE LATTICE GIRDER
DRT	DECK RIVETED TRUSS
DS	SWING SPAN
EGIR	MISC. POST-TENSIONED CONCRETE GIRDER
EXT	EXTENSION
LS	LIFT SPAN
MA	MASONRY ARCH
MGIR	MISC. CONCRETE GIRDER
OD	OPEN DECK
OPT	OPEN DECK TIMBER TRESTLE
PCT	PRESTRESSED CONCRETE TRESTLE SLAB
PGIR	PRESTRESSED MISC. CONCRETE GIRDER
PPCT	PONY TRUSS PIN CONNECTED
PRT	PONY RIVETED TRUSS
PTT	PONY TRUSS TIMBER
RAIL	RAIL STRINGER
RCT	REINFORCED CONCRETE TRESTLE
SA	STEEL ARCH
SBG	STEEL BOX GIRDER
SBOX	PRESTRESSED SINGLE CELL CONCRETE BEAM OR GIRDER
SGIR	MISC. STEEL GIRDER
STEE	PRESTRESSED THRU VOIDED CONCRETE SUPER TEE GIRDER
TDBX	THRU VOID, DBL CELL PRES. CONC. BEAM OR GIRDER
TDBX	PRESTRESSED THRU VOID, DBL. CELL, CONC. BOX GIRDER
TEE	PRESTRESSED CONCRETE TEE GIRDER
THT	THRU TIMBER TRUSS
TIM	MISC. TIMBER SPAN
TPCT	THRU PLATE CONNECTED TRUSS
TPG	THRU PLATE GIRDER
TPLG	THRU PLATE LATTICE GIRDER
TRT	THRU RIVETED TRUSS
TSBX	PRESTRESSED THRU VOID, SINGLE CELL, CONC. BEAM OR GIRDER
VTEE	PRESTRESSED THRU VOIDED CONCRETE TEE GIRDER

Culverts

BXC	CONCRETE BOX
BXC2	CONCRETE DOUBLE BOX
BXC3	CONCRETE TRIPLE BOX
BXCM	CONCRETE MULTI-OPENING BOX
BXM	MASONRY BOX
BXM2	MASONRY DOUBLE BOX
BXMM	MASONRY MULTI-OPENING BOX
BXT	TIMBER BOX
BXT2	TIMBER DOUBLE BOX
BXTM	TIMBER MULTI-OPENING BOX
CAPA	CORRUGATED ARCH PIPE, ALUMINUM
CAPS	CORRUGATED ARCH PIPE, STEEL
CIP	CAST IRON PIPE
CP	CONCRETE PIPE
CPA	CORRUGATED PIPE, ALUMINUM
CPP	CORRUGATED PIPE, PLASTIC
CPS	CORRUGATED PIPE, STEEL
EPC	ELLIPTICAL PIPE, CONCRETE
MP	MASONRY PIPE
PAC	CONCRETE ARCH PIPE
PL	CLAY TILE PIPE
PP	PLASTIC PIPE, SMOOTH WALL
PS	STEEL PIPE, SMOOTH WALL
PSAP	STRUCTURAL STEEL ARCH PLATE PIPE
PSP	STRUCTURAL STEEL PLATE PIPE
PV	VITREOUS PIPE, SMOOTH WALL

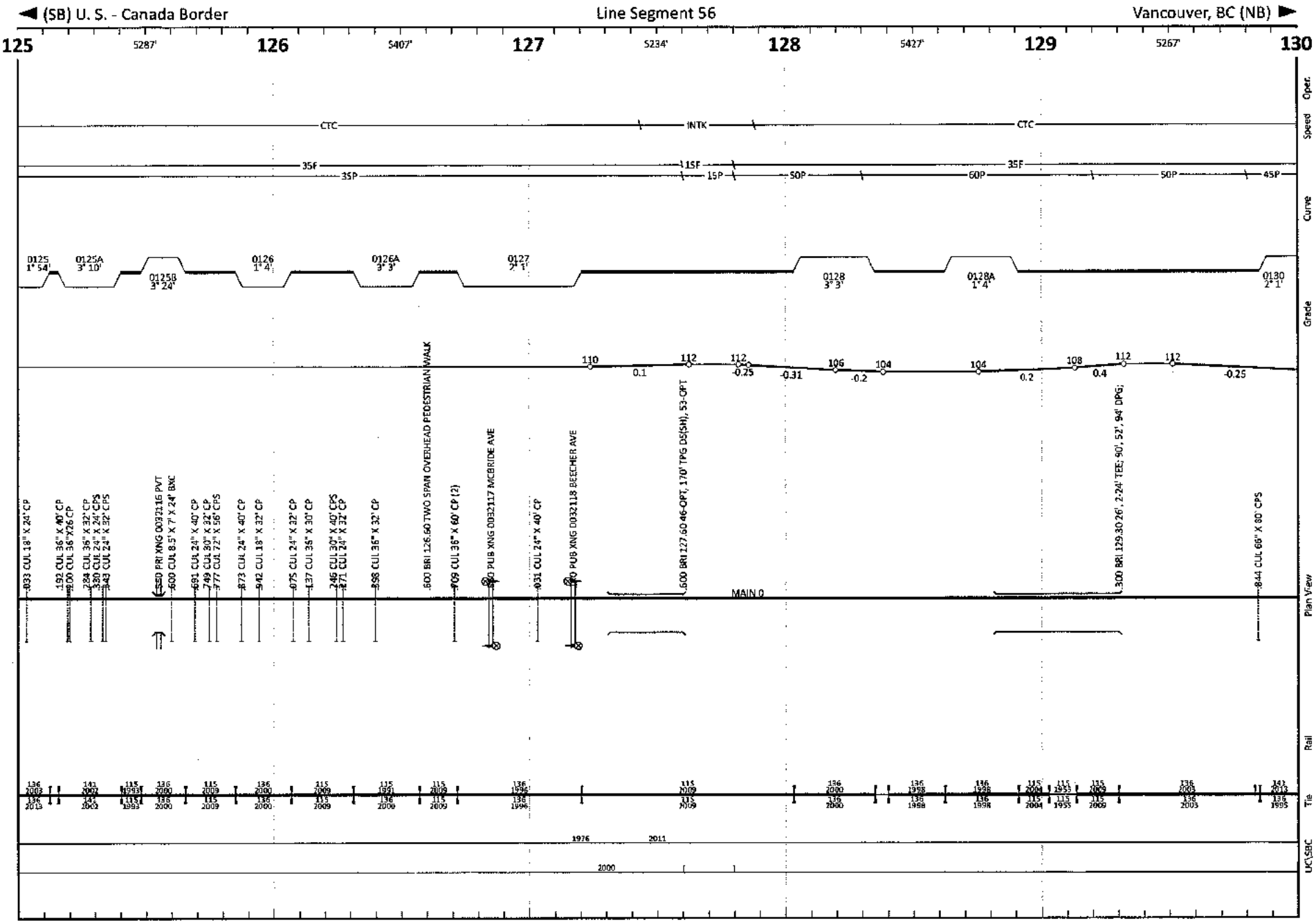




BNSF RAILWAY
System Maintenance and Planning

New Westminster Subdivision
Northwest Operating Division
Northwest North Engineering Division

Engineering Track Chart
Standard Maintenance Version
Revised to May 21, 2014 Page 6 of 22

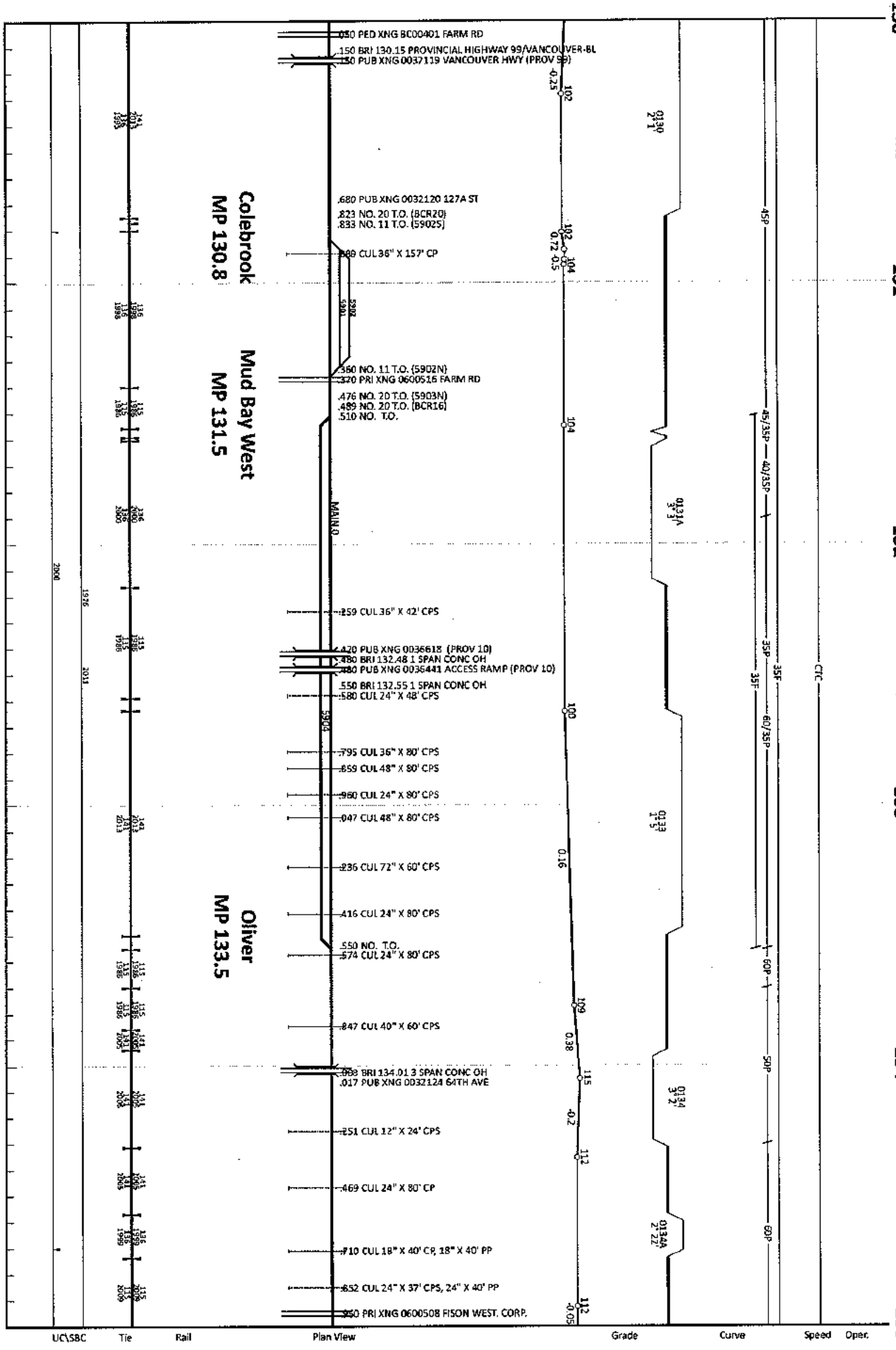


BNSF RAILWAY
System Maintenance and Planning

New Westminster Subdivision
Northwest Operating Division
Northwest North Engineering Division

Engineering Track Chart
Standard Maintenance Version
Revised to May 21, 2014 Page 7 of 22

000100



New Westminster Subdivision
Northwest Operating Division
Northwest North Engineering Division

Engineering Track Chart
Standard Maintenance Version
Revised to May 21, 2014 Page 8 of 22

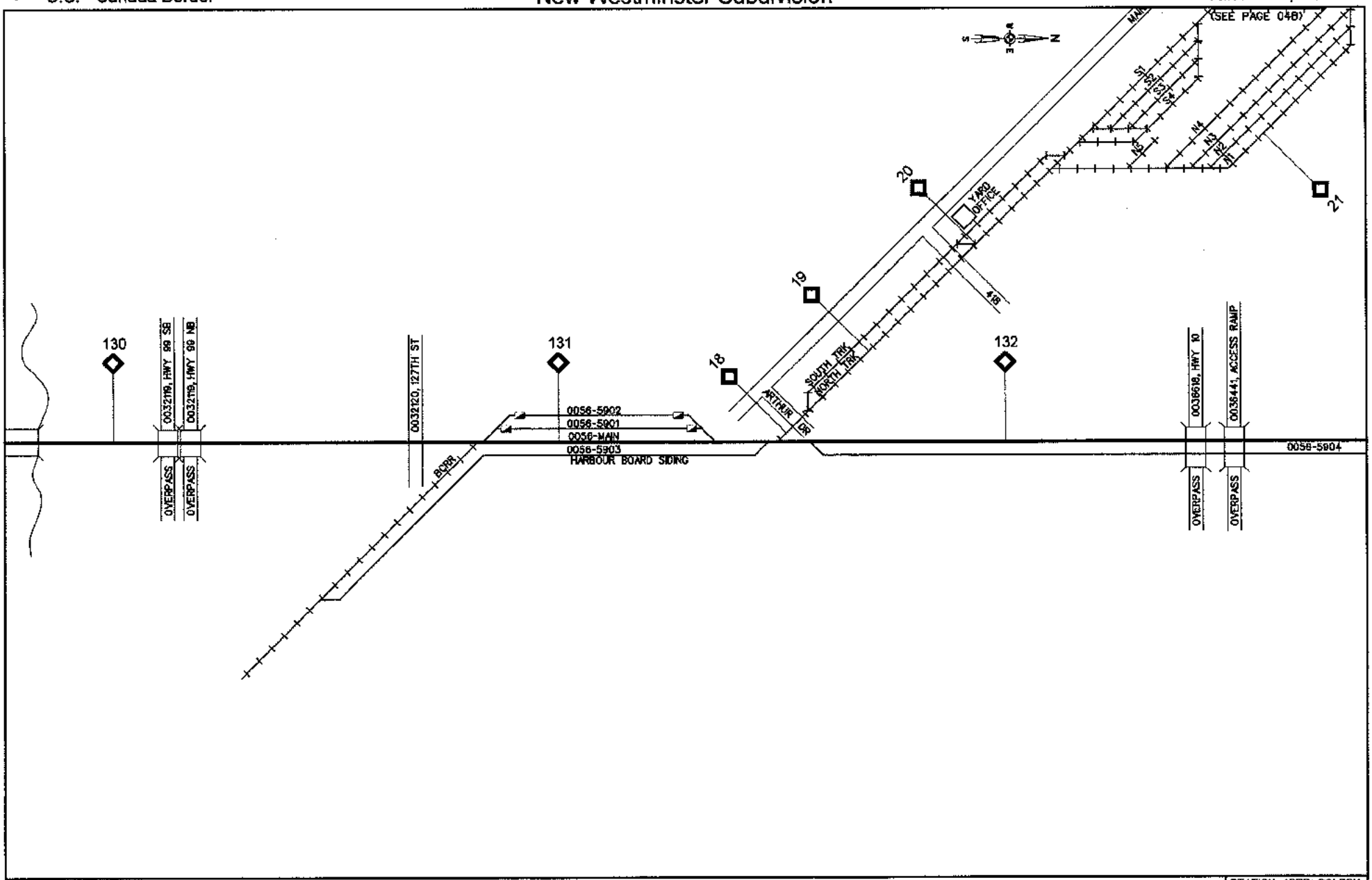
BNSF RAILWAY
System Maintenance and Planning

COLE BROOK, BC

New Westminster Subdivision

← U.S. - Canada Border

Vancouver, BC →



BNSF RAILWAY

TRACK NUMBERS:
4 DIGIT NUMBER IS A CLIC (1234)
8 DIGIT NUMBER IS A LINE SEGMENT FOLLOWED BY A CLIC (0001-1234)
- UNKNOWN TRACK NUMBER

BNSF OWNED & MAINT
INDUSTRY OWNED & BNSF MAINT
IND OWNED & MAINT
INDUSTRY MAINT & BNSF OWNED (LEASE)
NO CLEARANCE - RESTRICTIONS APPLY FOR RIDING EQUIPMENT
DERAIL
IF PURPLE OTHERS MAINTAIN (NOT BNSF)
IF RED MAINTENANCE BILLABLE TO INDUSTRY

JOINT FACILITIES
TRACKAGE RIGHTS
FOREIGN TRACK

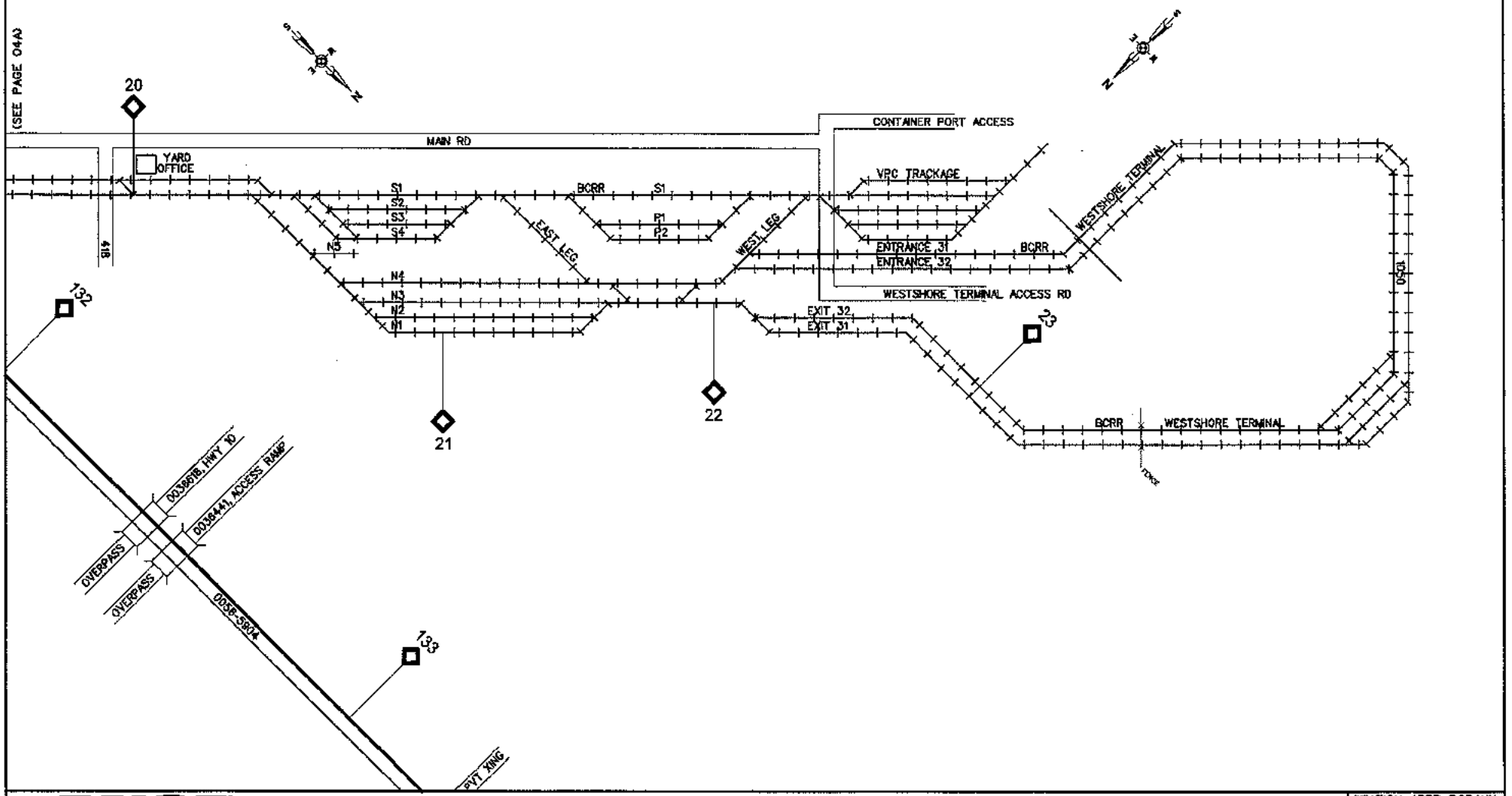
REFER TO DIVISION TIMETABLE FOR:
SPECIFIC RADIO FREQUENCIES
SPECIAL CONDITIONS (ITEM #7)
FOR ADDITIONAL QUESTIONS ON PHYSICAL CHARACTERISTICS, CONTACT A LOCAL DIVISION MANAGER
EMPLOYEES MUST BE FAMILIAR AND COMPLY WITH ALL GENERAL NOTICES ON TERRITORY WHICH THEY ARE PERFORMING DUTY

STATION ABBR: COLBRK
FSAC: 15100
REVISED: 6/3/2013
TEAM: COLE59005.DGN
TRK CHT: NEW004A.DGN
TEAM PG 005

ROBERTS BANK, BC
New Westminster Subdivision

← U.S. - Canada Border

(SEE PAGE 04A)



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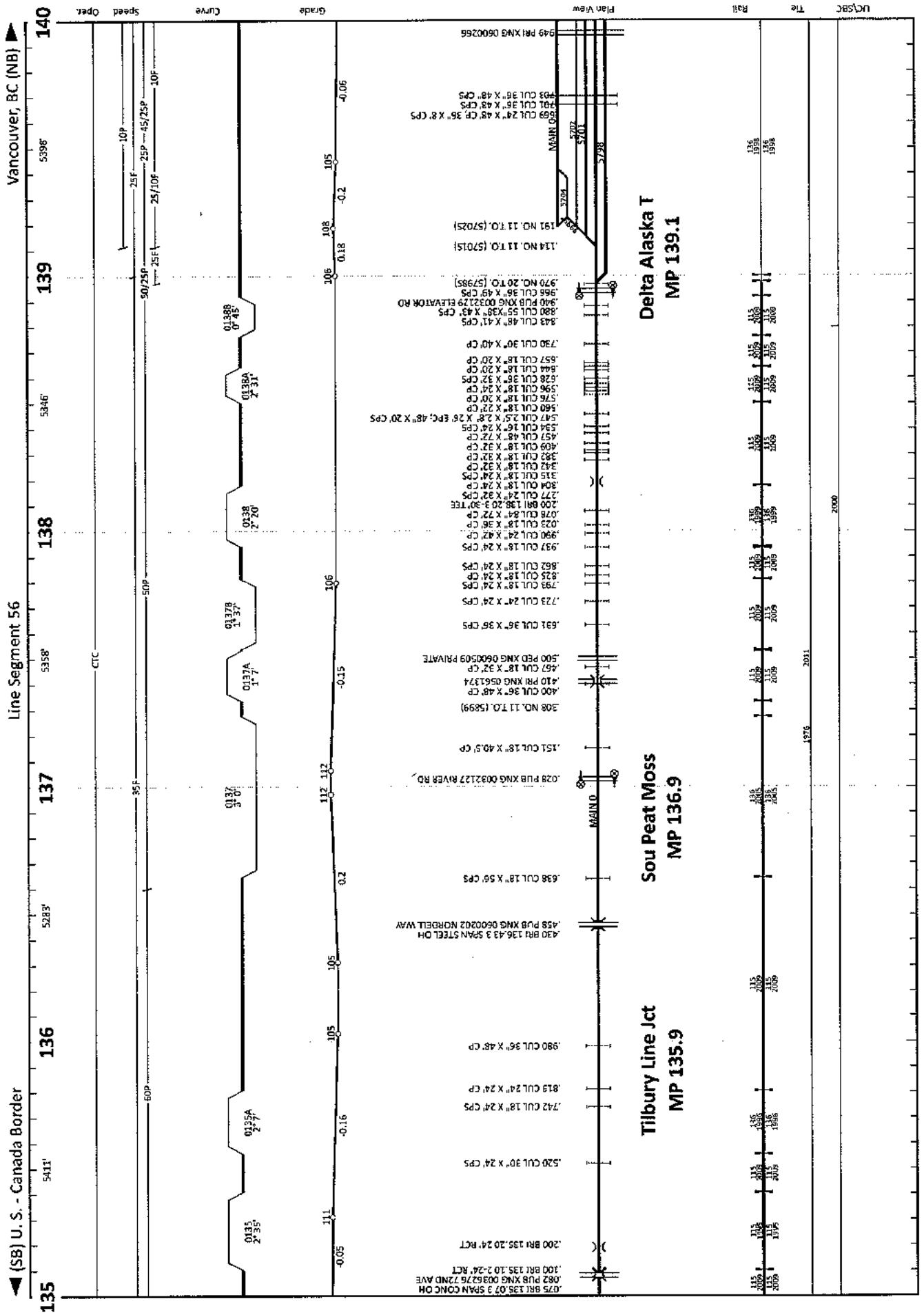
- BNSF OWNED & MAINT
- INDUSTRY OWNED & BNSF MAINT
- IND OWNED & MAINT
- INDUSTRY MAINT & BNSF OWNED (LEASE)
- NO CLEARANCE - RESTRICTIONS APPLY FOR RIDING EQUIPMENT
- DERAIL
- JOINT FACILITIES
- TRACKAGE RIGHTS
- FOREIGN TRACK
- IF PURPLE OTHERS MAINTAIN (NOT BNSF)
- IF RED MAINTENANCE BILLABLE TO INDUSTRY

STATION ABBR: ROBANK	
FSAC: 66565	
REVISED: 6/3/2013	
TEAM: ••••••••.DGN	
TRK CHT: NEW004B.DGN	
TEAM PG ***	

000103

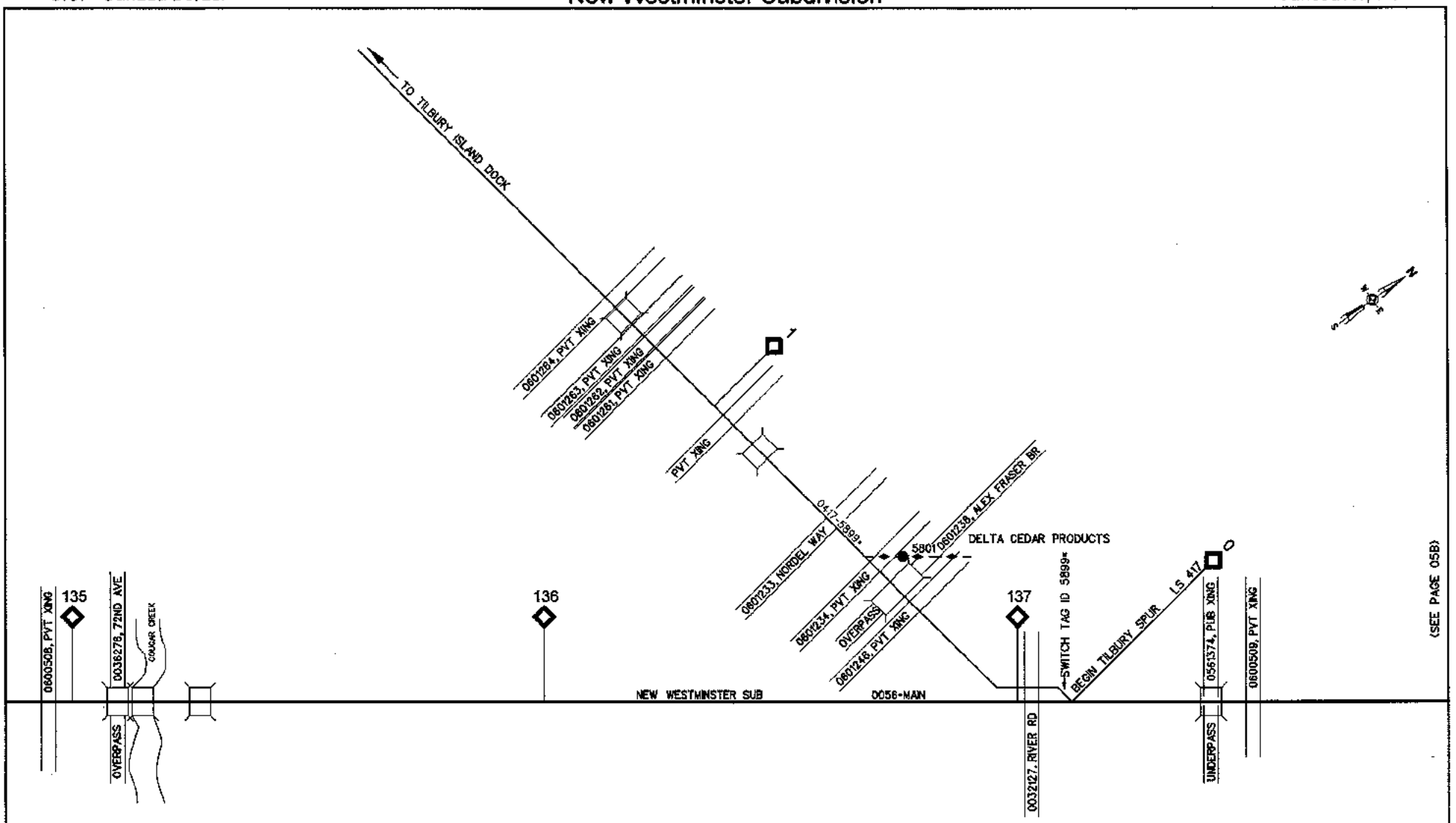


TOWNSEND, BC

← U.S. - Canada Border

New Westminster Subdivision

Vancouver, BC →



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IND OWNED & MAINT
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DERAIL
JOINT FACILITIES
TRACKAGE RIGHTS
FOREIGN TRACK
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IF RED MAINTENANCE BILLABLE TO INDUSTRY

STATION ABBR:	TOWNSE
FSAC:	15100
REVISED:	6/3/2013
TEAM:	TOWN58007.DGN
TRK CHT:	NEW005A.DGN
TEAM PG	007

000105

BROWNSVILLE, BC

New Westminster Subdivision

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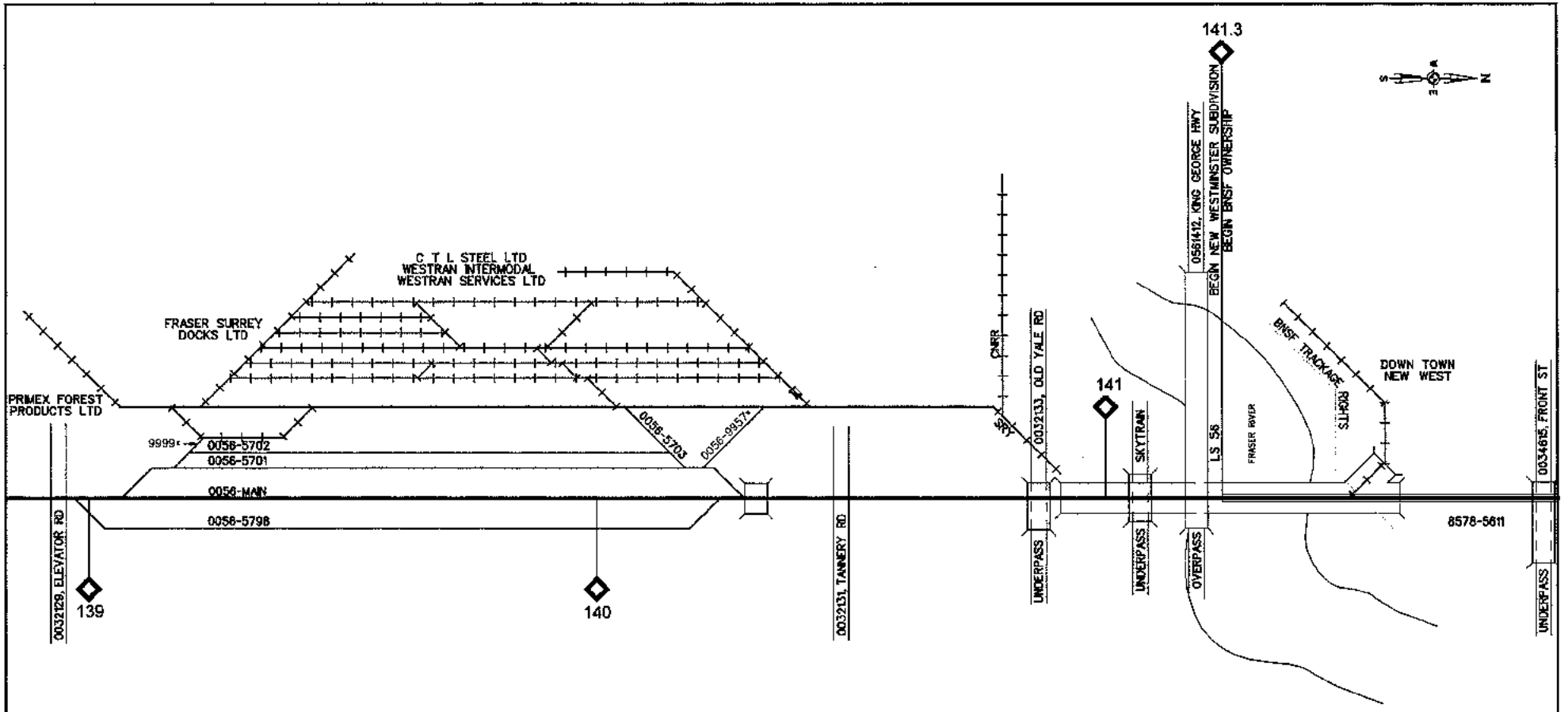
Vancouver, BC →



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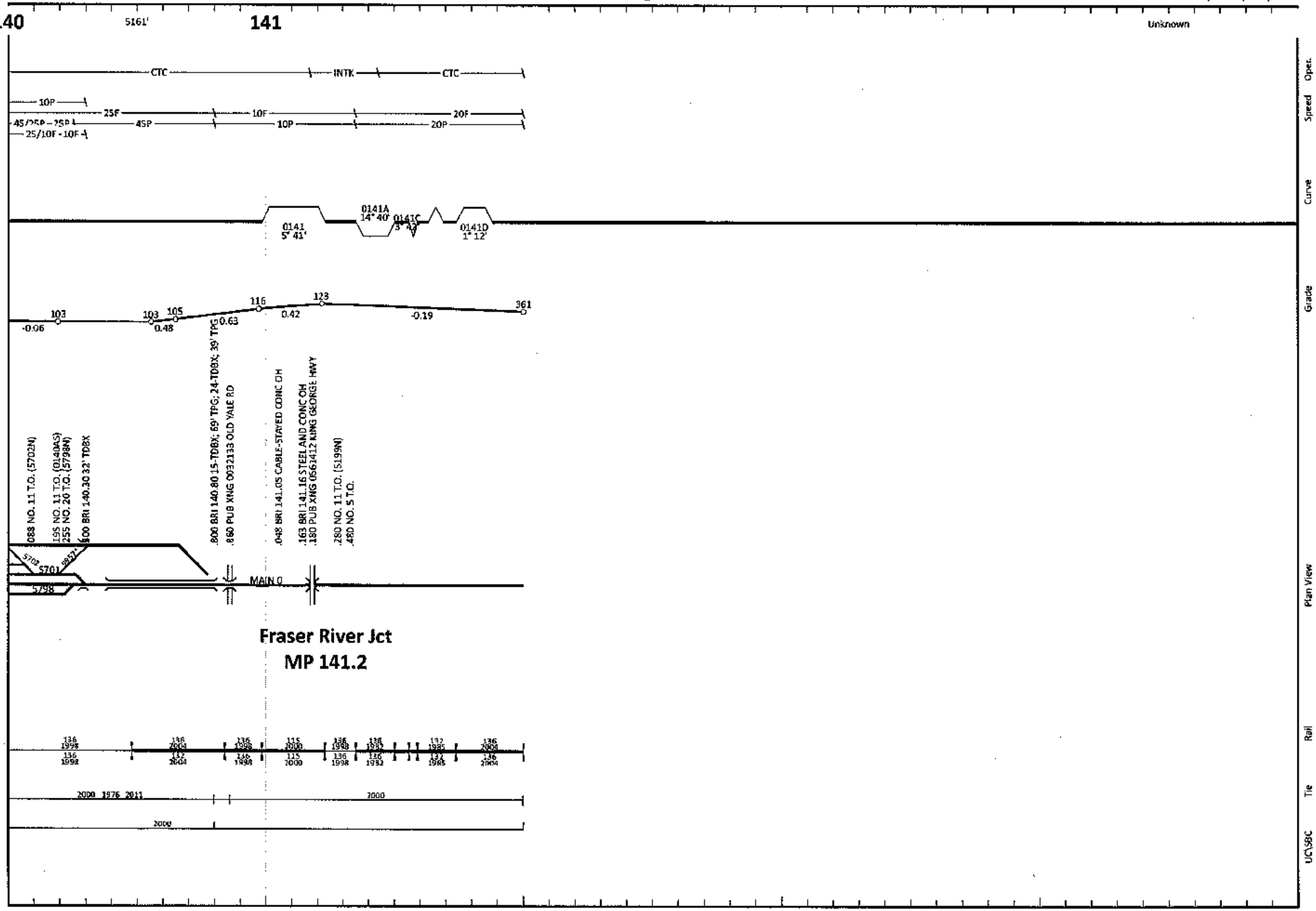
STATION ABBR: BROWNS
FSAC: 15109
REVISED: 6/3/2013
TEAM: BROW57009.DGN
TRK CHT: NEW005B.DGN
TEAM PG 009

000106

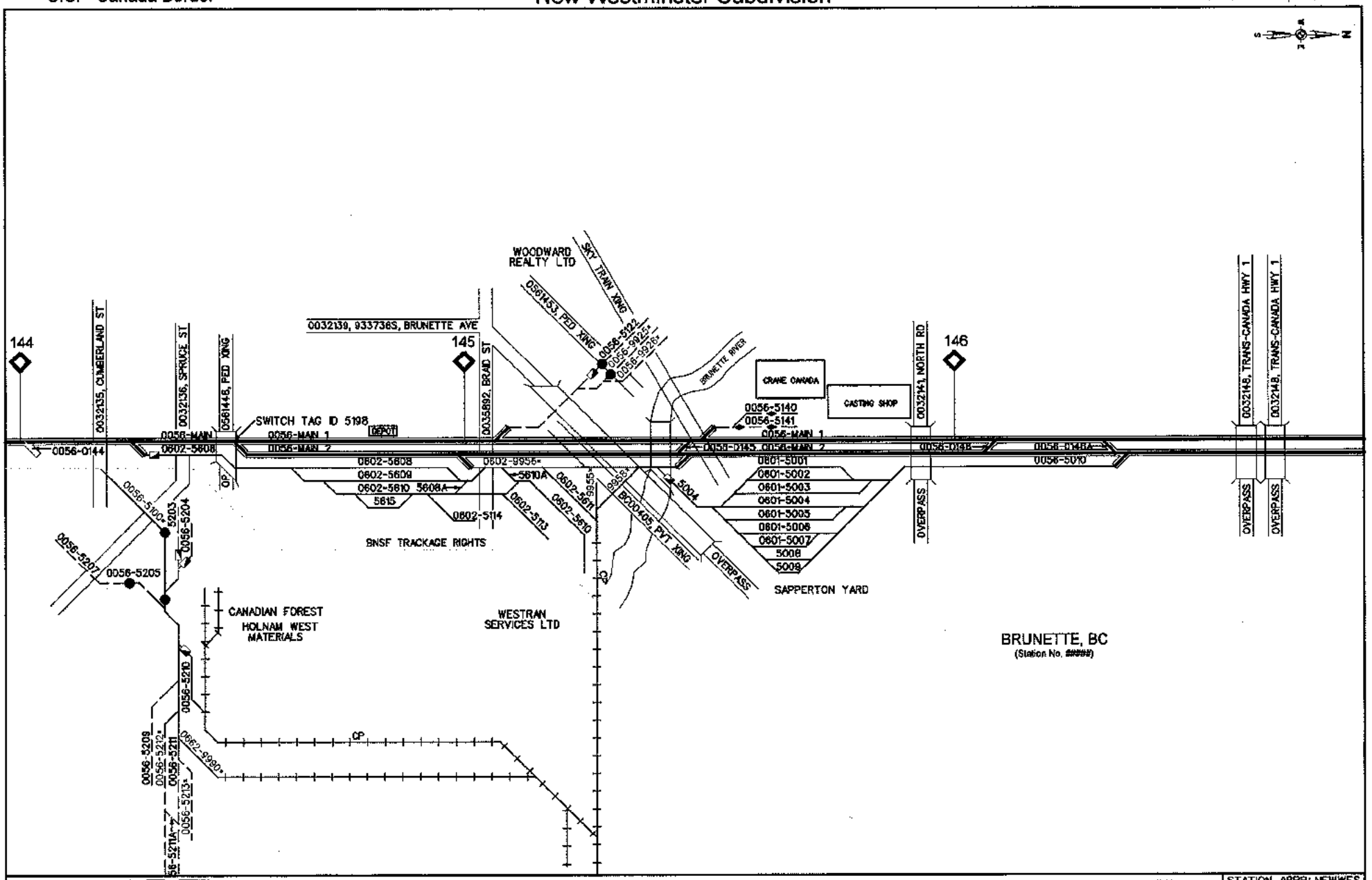


NEW WESTMINSTER, BC

New Westminster Subdivision

← U.S. - Canada Border

Vancouver, BC →



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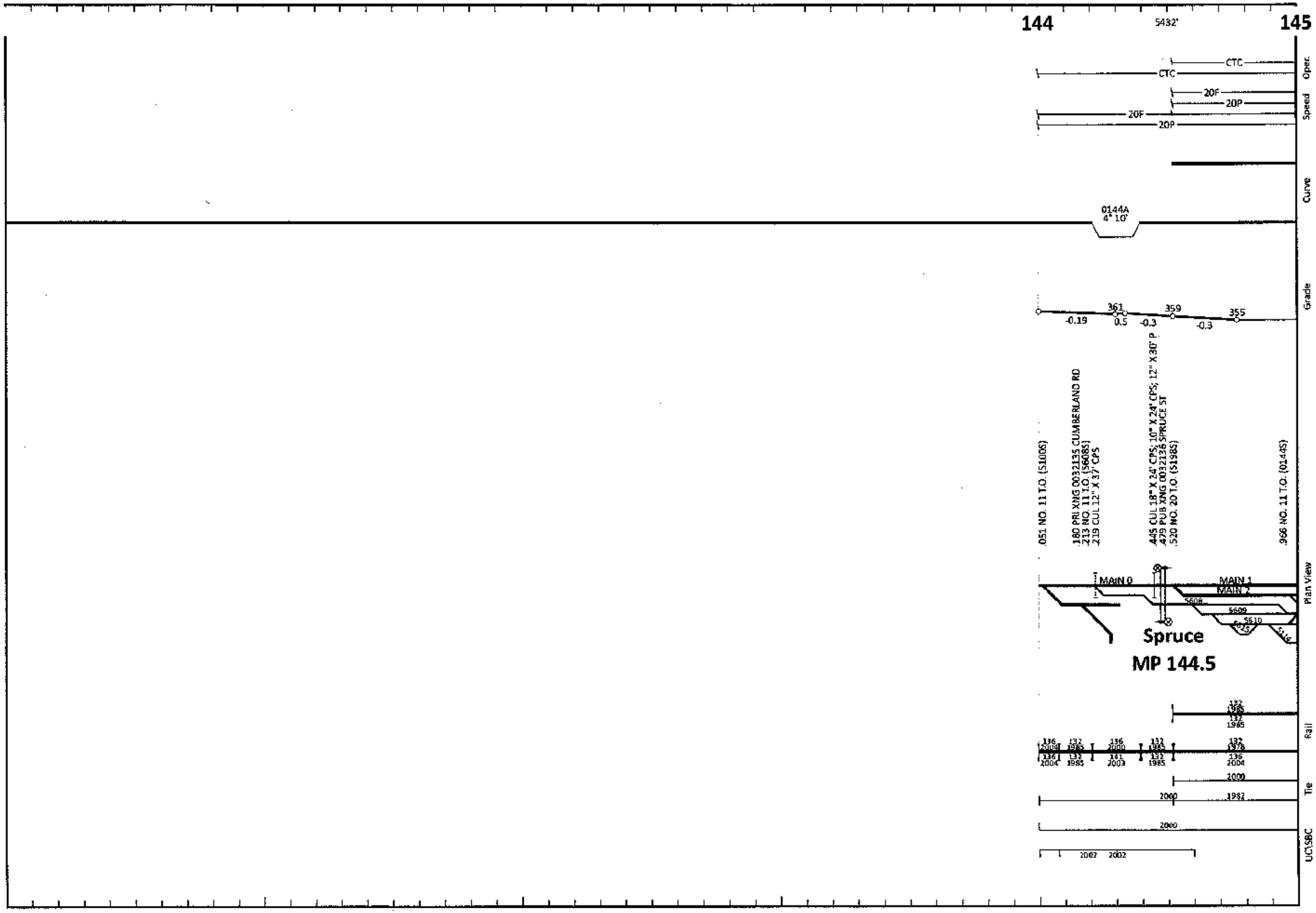
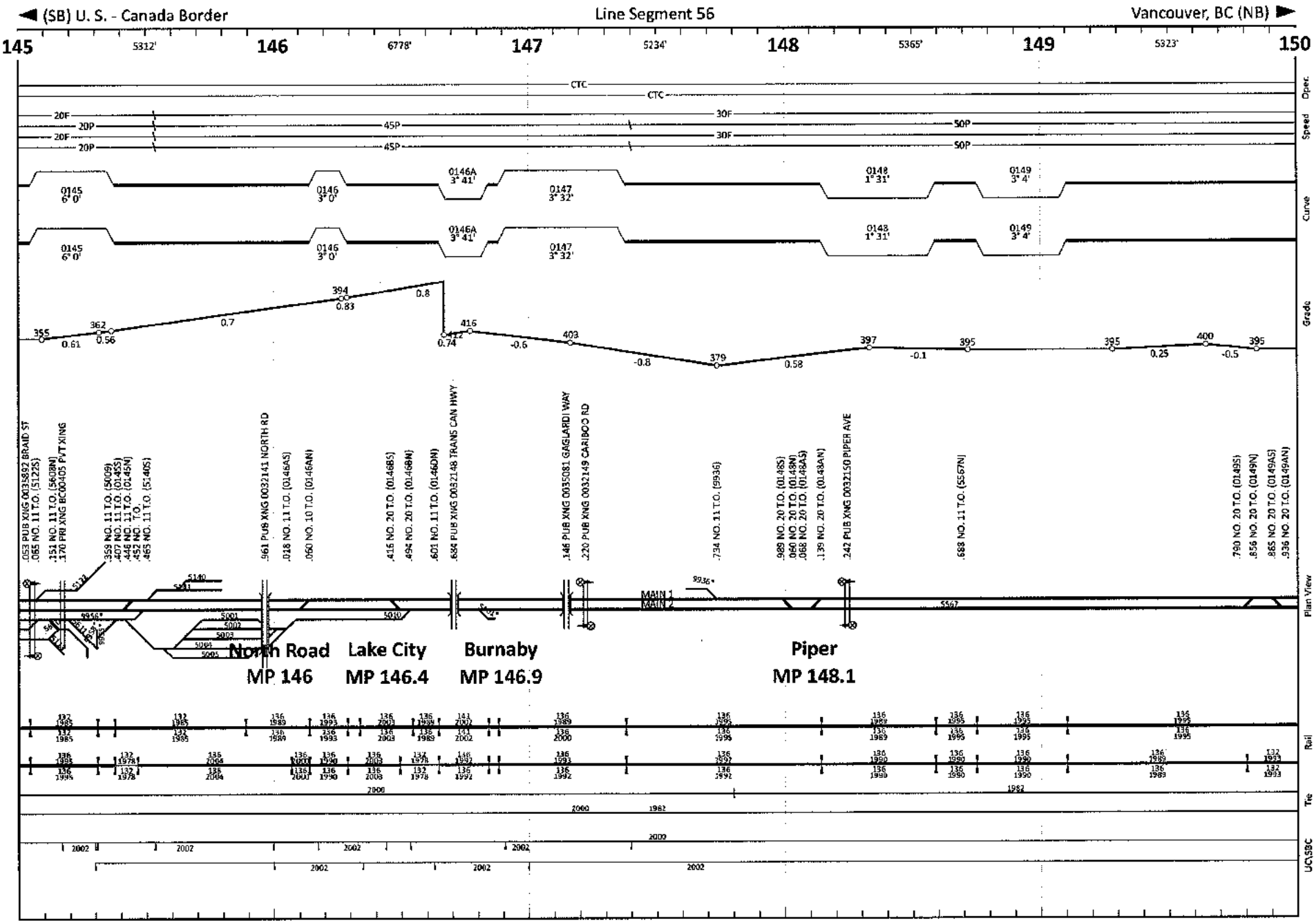
STATION ABBR: NEWWES
FSAC: 15114
REVISED: 6/3/2013
TEAM: NEWW50011.DGN
TRK CHT: NEW006A.DGN
TEAM PG 011

000108





STILL CREEK, BC

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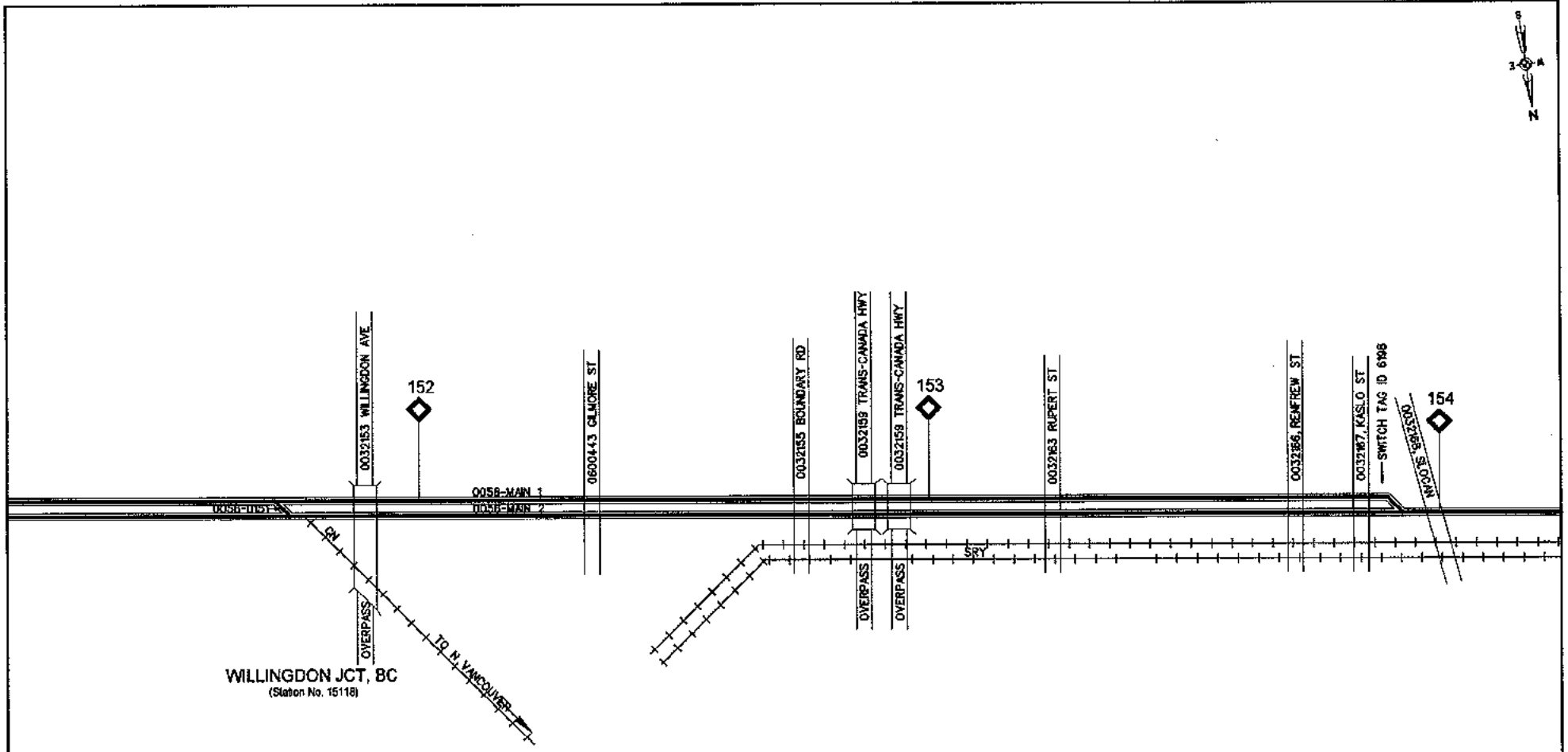

BNSF RAILWAY

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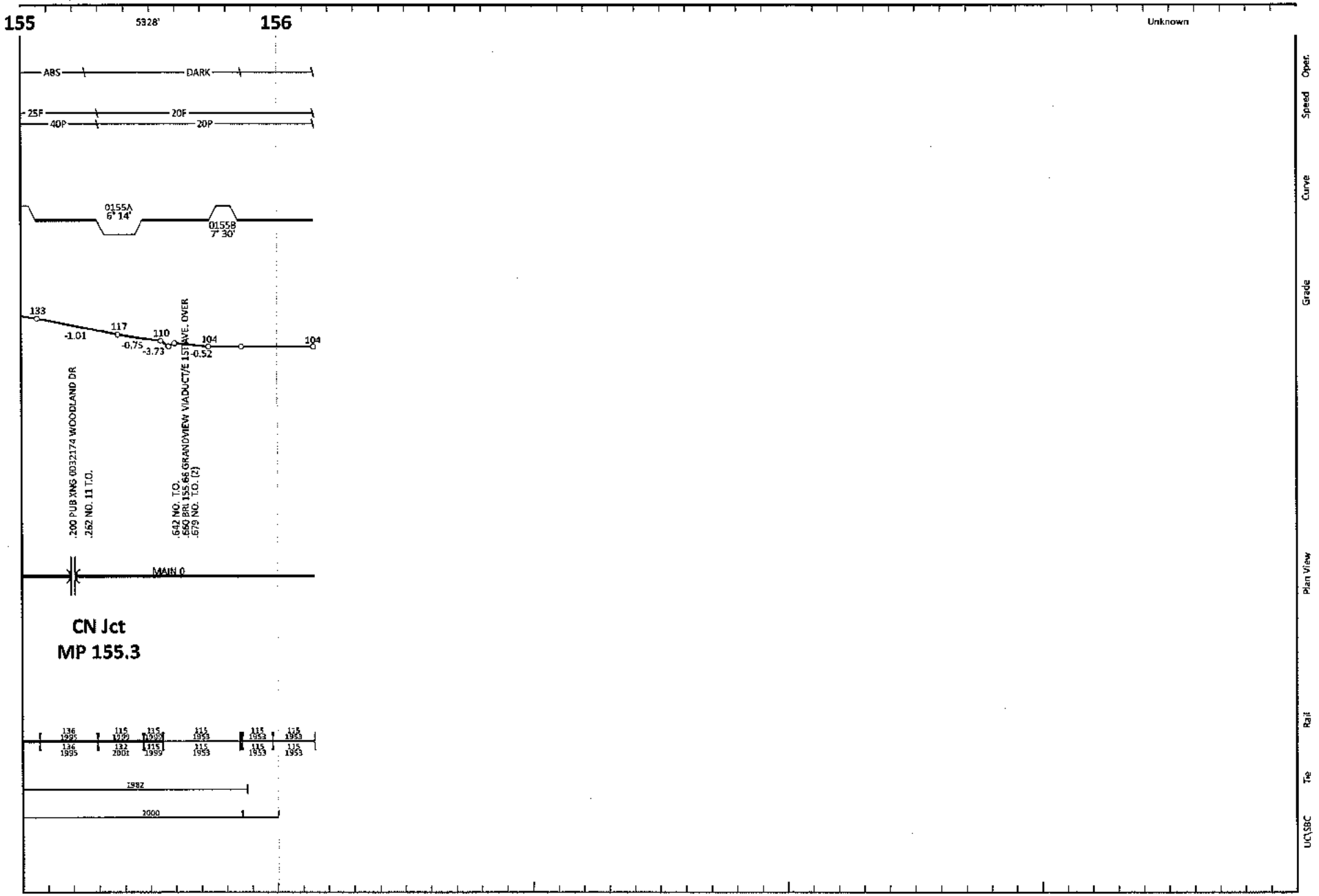
JOINT FACILITIES
TRACKAGE RIGHTS
FOREIGN TRACK
IF PURPLE OTHERS MAINTAIN (NOT BNSF)
IF RED MAINTENANCE BILLABLE TO INDUSTRY

STATION ABBR:	NEWWES
FSAC:	15125
REVISED:	6/3/2013
TEAM:	STIL61015.DGN
TRK CHT:	NEW008A.DGN
	TEAM PG 015

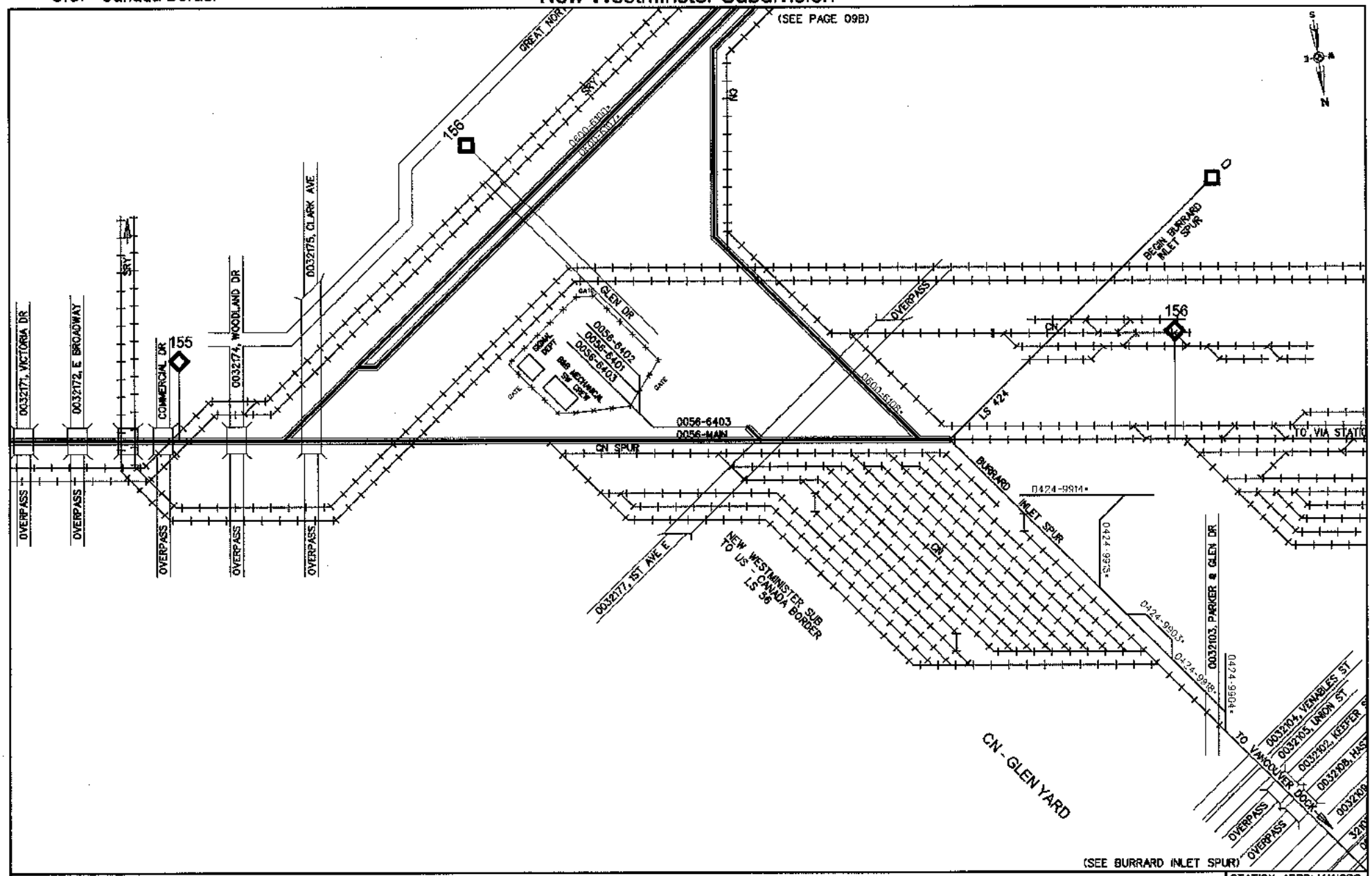


VANCOUVER, BC

New Westminster Subdivision

← U.S. - Canada Border

End Station →



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IF RED MAINTENANCE BILLABLE TO INDUSTRY

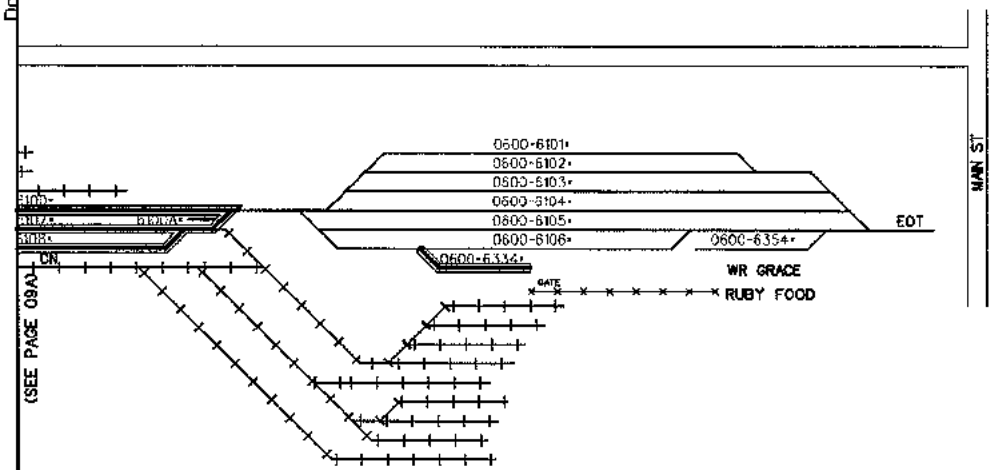
STATION ABBR: VANCBC
FSAC: 15129
REVISED: 6/3/2013
TEAM: VANC61017.DGN
TRK CHT: NEWO09A.DGN
TEAM PG 017

VANCOUVER, BC
New Westminster Subdivision

9B

000115

← U.S. - Canada Border



BNSF RAILWAY

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INDUSTRY OWNED & BNSF MAINT
IND OWNED & MAINT
INDUSTRY MAINT & BNSF OWNED (LEASE)
NO CLEARANCE - RESTRICTIONS APPLY FOR RIDING EQUIPMENT
DERAIL
JOINT FACILITIES
TRACKAGE RIGHTS
FOREIGN TRACK
IF PURPLE OTHERS MAINTAIN (NOT BNSF)
IF RED MAINTENANCE BILLABLE TO INDUSTRY

STATION ABBR: VANCBC
FSAC: 15129
REVISED: 6/3/2013
TEAM: VANC61019.DGN
TRK CHT: NEW009B.DGN
TEAM PG 019

s.19(1)

Liston, Wendy

From: Carlson, Walter
Sent: Monday, December 01, 2014 11:51 AM
To: Archer, Susan; Grife, Gwen
Cc: Allard, Claude; Carpentier, Annick; Dreika, Bryan; Goulet, Marie-Josée; Lafontaine, Daniel; Lui, Rachel; Lepage, Paul; Provost, Daniele
Subject: FW: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Attachments: Corridor Risk Assessment summary - Edm - Wpg.pdf; Corridor Risk Assessment summary - Mtl-Hal.pdf; Corridor Risk Assessment summary - Edm -Pacific.pdf; Corridor Risk Assessment summary - Wpg - Chicago.pdf; Corridor Risk Assessment summary - Tor - Mtl.pdf; Corridor Risk Assessment summary Tor - Wpg.pdf; Corridor Risk Assessment summary - Tor - Chicago.pdf

Importance: High

Here is the CN filing, merci

From: [redacted]cn.ca]
Sent: Monday, December 01, 2014 11:27 AM
To: RailSafety
Cc: Carlson, Walter
Subject: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

Further to the Order issued to CN on November 17, 2014 under Section 36 of the Railway Safety Act, CN hereby files copies of the summary documents for the key route risk assessments that the railway has performed in accordance with item 7 of the April 23, 2014 Emergency Directive.

Please note that these documents contain sensitive information and should be treated with strict confidence.

Thanks - Don

Sr. Manager Regulatory Affairs
935 de la Gauchetiere St. W., Floor 3
Montreal, Quebec H3B 2M9
Tel: [redacted] Fax: 514-399-7899
Email: watts@cn.ca <mailto:[redacted]@cn.ca>

From: Grife, Gwen [mailto:gwen.grife@tc.gc.ca]

Sent: Monday, November 17, 2014 4:41 PM
Cc: Bourdon, Luc; Archer, Susan; Madaire-Poisson, Suzanne; Carlson, Walter
Subject: Section 36/Risk Assessments / l'article 36, Évaluation des risques

Hello. I hope you are fine.

On behalf of Ms. Laureen Kinney, Assistant Deputy Minister please find enclosed a Section 36 Order concerning Risk Assessments. Please note the hard copy is in the mail.

Thank you.

Bonjour. J'espère que vous allez bien.

Au nom de Mme. Laureen Kinney, sous-ministre adjointe, veuillez trouver svp. ci-joint un ordre de l'article 36 au sujet des évaluations des risques. Veuillez noter svp. l'imprimé est dans le courrier.

Merci.

Gwen

Gwen Grife
Senior Advisor, Regulatory Affairs (ASRR)/

Conseillère principale aux Affaires

réglementaires (ASRR)

Rail Safety/Sécurité ferroviaire
Transport(s) Canada
Ottawa, Ontario (Canada) K1A 0N5
(613) 990-7749

E-mail/courriel gwen.grife@tc.gc.ca <mailto:gwen.grife@tc.gc.ca>

P Whenever possible, please print on both sides.Lorsque c'est possible, svp imprimez sur les deux côtés.

Pages 118 to / à 131

are duplicates

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s.19(1)

Liston, Wendy

From: Raitt, Blair
Sent: Friday, November 17, 2017 3:43 PM
To: Marshall, Cherilyn
Subject: FW: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques

Importance: High

Cherilyn

As requested

Blair Raitt

A/Regional Director, Surface
Prairie and Northern Region
Transport Canada / Government of Canada
blair.raitt@tc.gc.ca / Tel: (204) 983-2991 /
Cel: (204) 791-5639 / TTY (613) 990 - 4500

I/Directeur régional, Surface
Région des Prairies et du Nord
Transports Canada / Gouvernement du Canada
blair.raitt@tc.gc.ca / Tél : (204) 983-2991 /
Tél. cell. (204) 791-5639 / ATS (613) 990 - 4500

From: Marshall, Cherilyn
Sent: Friday, March 20, 2015 7:37 AM
To: Raitt, Blair <blair.raitt@tc.gc.ca>
Subject: FW: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

This email has the full risk assessments. My caution is the dates on some of the RAs are prior to the date of the Emergency Directive.

From: Carlson, Walter
Sent: Tuesday, March 03, 2015 8:59 AM
To: Raitt, Blair; Marshall, Cherilyn
Cc: Lines, Stephanie; Bourdon, Luc
Subject: FW: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

In case you didn't have these, these are the full risk assessments CN sent subsequent to the industry meetings at RSSMC

From: @cn.ca]
Sent: Wednesday, January 14, 2015 1:55 PM
To: Diogo, Brigitte
Cc: Carlson, Walter; Allard, Claude;
Subject: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

s.19(1)

Brigitte –

This is further to your discussion with Sam Berrada and Michael Farkouh of CN yesterday concerning the key route risk assessment documents that were filed with TC by CN on December 1, 2014. It my understanding that there was concern expressed by Transport Canada that the assessments were deemed to be insufficient with regards to the requirements of the Emergency Directive.

It should be noted that the documents filed by CN were simply summaries of the various risk assessments and not the entire assessment report. It was CN's understanding that this would be acceptable based on discussions with Transport Canada and in light of concerns regarding the very sensitive information in the full assessment documents and the need for strict confidentiality.

To demonstrate the full level of detail in the risk assessments and to provide you with the necessary assurance that CN has more than met the requirements of the Emergency Directive, I am attaching the actual route risk assessment documents to this email.

As noted above, these must be held in the strictest of confidentiality as their disclosure could threaten the safety and security of Canadians. We understand that members of your staff have already been in discussions with your ATIP officers to ensure that these documents would be considered protected.

I trust that this will address any concerns that you had.

Sr. Manager Regulatory Affairs
935 de la Gauchetiere St. W., Floor 3
Montreal, Quebec H3B 2M9
Tel:) Fax: 514-399-7899
Email: @cn.ca

From:
Sent: Monday, December 01, 2014 11:27 AM
To: 'RailSafety'
Cc: Carlson, Walter
Subject: CN Filing re Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

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Please note that these documents contain sensitive information and should be treated with strict confidence.

Thanks -

Sr. Manager Regulatory Affairs
935 de la Gauchetiere St. W., Floor 3
Montreal, Quebec H3B 2M9
Tel: Fax: 514-399-7899
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From: Grife, Gwen [mailto:gwen.grife@tc.gc.ca]
Sent: Monday, November 17, 2014 4:41 PM
Cc: Bourdon, Luc; Archer, Susan; Madaire-Poisson, Suzanne; Carlson, Walter
Subject: Section 36/Risk Assessments / l'article 36, Évaluation des risques

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On behalf of Ms. Laureen Kinney, Assistant Deputy Minister please find enclosed a Section 36 Order concerning Risk Assessments. Please note the hard copy is in the mail.

Thank you.

Bonjour. J'espère que vous allez bien.

Au nom de Mme. Laureen Kinney, sous-ministre adjointe, veuillez trouver svp. ci-joint un ordre de l'article 36 au sujet des évaluations des risques. Veuillez noter svp. l'imprimé est dans le courrier.

Merci.

Gwen

Gwen Grife
Senior Advisor, Regulatory Affairs (ASRR)/
Conseillère principale aux Affaires
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Corridor Risk Assessment
Chicago – Winnipeg Route
03-April-2014

Summary

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Chicago to Winnipeg corridor, including major connecting lines within the metropolitan Chicago area. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Chicago - Winnipeg corridor, and from that review, identified items of vulnerability that required additional examination. From that review, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas. The following table summarizes the resultant risk mitigation initiatives and preliminary cost.

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Joliet	19	Willow Springs	DED Site (2-track)	$50k	Current lack of detection in environmentally sensitive area with DG carloading	1
Chicago	10	Grand Crossing	DED Site (2-track)	$50k	Protect Grand Crossing overpasses, downtown Chicago and Calumet River bridge	1
Sprague	142	East of Navin	DED Site (1-track)	$30k	Protect Red River Floodway and adjacent multiple highway overpasses (Ring Road/Trans Canada Highway)	1
Rainy	11 to 70	Nopeming Jct - Virginia	Signal Protection	-	Assess merits of implementing CTC on 59 miles Virginia-Nopeming Jct for broken rail protection, unauthorized movement, etc.	1A
Leithton	4	Crest Hill	DED Site (2-track)	$50k	Protect Illinois River lift bridge	2
Neenah	225	Near Sheridan WI	WIS Site	$100k	Reduce existing 21 mile spacing, protect Waupaca west side (town >1000 population)	2
Fort Frances	140	Rainy River	Clearance Detector	$200k	Protect Rainy River through truss bridge from strike by shifted load (part of LPS mitigation strategy)	2
-	-	Fond du Lac	Cache of environmental response equipment (trailer)	$40k	Provide response to incidents near Lake Winnebago	2
-	-	Duluth	Cache of environmental response equipment (trailer)	$40k	Provide response to incidents near Lake Superior inflow rivers (e.g. St. Louis River)	2
-	-	Duluth	DG Transfer Trailer	$220k	Provide DG transfer capability at incidents	2
-	-	Winnipeg	DG Transfer Trailer	$220k	Provide DG transfer capability at incidents	2
-	-	Chicago	Foam Trailer	$137k	Mitigate flammable goods fires in Chicago	2
-	-	Stevens Point	Foam Trailer	$137k	Mitigate flammable goods fires in Wisconsin	2

Introduction

For the purposes of this risk assessment, the Chicago – Winnipeg corridor has been defined as the trackage making up the primary freight operation route between Kirk Yard in Gary, Indiana and Symington Yard in Winnipeg, Manitoba. The route is made up of nine different subdivisions. This corridor provides the vital link between western Canada and the US Midwest and South. All but 60 miles of the route is operated by Centralized Traffic Control (CTC) rules and signals. There is a 60 mile directional running zone between Duluth and Virginia, Minnesota, with no signal protection for trains operating with the current of traffic. The majority of the route is single-tracked. There is no intercity passenger train operation on this corridor. Extensive Metra commuter operations are conducted on the Waukesha Subdivision near Chicago.

In addition to being a heavily utilized route, the Chicago-Winnipeg corridor originates in one of the largest metropolitan areas on the CN network. The first 125 miles from Gary to the Wisconsin state line (north of Antioch) can be considered as densely populated and part of the Chicago metro region. The line also passes through a number of smaller communities although population density is reduced considerably in northern Wisconsin, Minnesota and Manitoba. The northern portion of the route intersects numerous streams, rivers and wetlands. Two significant bridges over the Rainy River are also located at the US/Canada international boundary.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. GIS maps of the corridor used during the review are included in Appendix 1. The prominent items of vulnerability were tabulated and are found in Appendix 2.

Current mitigations on the route include the following:

- WIS locations at approximately fifteen to twenty mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Chicago, Fond du Lac, Stevens Point and Winnipeg, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced in certain US urban areas and near significant bridges to protect structures, track curvature and the surrounding populated areas.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals not exceeding every 23 days in the winter and every 37 days in the summer.
- The geometry car operates over the corridor approximately four to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.
- Diamonds are hand tested for rail defects every 30 days within the Chicago area.

Risk Review

A review of GIS mapping and aerial photography generated a master table of risk and vulnerability features (see Appendix 2). The results of the mapping review were summarized by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Table 1 provides a summary of vulnerability ranking points by mileage group and the resulting focus areas.

Table 1 – Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Chicago to Winnipeg Main Line Corridor																
Matteson Sub																
0	1		1	1	2	1	1			1		1		2	10	
10	2		1			1	1		1						6	
20	2		3		1	4	3	1				1	1	2	18	
30	3		3		1	3	2					1	1	2	16	
40	2		1		2	6	8				1	1		2	23	
																Chicago
Leithton Sub																Metro
0	1		2		1	2	3			1					10	Area
10	4		2		1		1		2	2			1	1	14	
20	5		1	1	1	1	2		4	1					16	
30	2	1	1			2	1		3	1	1	1		1	14	
40	1	2	1	1	2	1	1		3	1				2	15	
50	3		3			1			4	3				1	15	
Waukesha Sub																
40	1		3		1	1		3	2	2				1	14	
50	6	2	2					3	3						16	
60	3	1													4	
70	4	1	1		1		3		1						11	
80	3	1			1		1		1						7	
90	3	1	1				1		2	1					9	
100	2		2		1	2	3							2	12	
110	3		1												4	
120		1				2						1		2	6	
130	5	1											1		7	
140	2	1			1								1	1	6	
150	5		1		1		6					1			14	
Neenah Sub																
160			1						1						2	
170	3	2	1				1		2		1				10	Oshkosh
180	1		1		1		1		1			1	1	1	8	
190	3		1		2		2								8	
200		1							1				1		3	
210	3	1					1								5	
220	1	1											1		3	
230	1				2		1		1				1		6	
240			1		2		1						1		5	
Superior Sub																
250	4		1				2					1			8	
260					2	1								1	4	
270					1		1								2	
280		1			1				1			1		1	5	
290	1	1							1						3	
300	3														3	
310	3				1		2								6	
320	4														4	
330	4														4	
340	4						1								5	
350	4	1					1		1						7	
360	5						2								7	
370	4				1								1		6	
380	3														3	
390	4														4	
400	3					1	2								6	
410	2													1	3	
420	6				1		2		1					1	11	
430	2				1		1								4	
440	4				2		1								7	
450												1			1	
460	3	1			1	1	6					2			14	Duluth
470	2				1		2								5	
480	1														1	

Table 1 – Vulnerability Ranking by Mileage Group (*Continued*)

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Missabe Sub																
10						1	1								2	
20	3				6		1		1						11	
30	3					1									4	
40	3				1		1								5	
50					1										1	
60	6						1								7	
																Directional
Rainy Sub																Running
10	1						1								2	Area
20	5				1	1	2						1		10	
30	5				1		1								7	
40	4						1								5	
50	6				2		1								9	
60	1					1	1							1	4	
70	3	1			2	1								1	8	
80	3								1						4	
90	4						2								6	
100	4				1				1						6	
110	4				1				1						6	
120	1				1										2	
130	3				1										4	
140	1														1	
150	2				1		2								5	
160	2	2					1		1			1		1	8	
Fort Frances Sub																
90		1							1	1		1			4	
100	1														1	
110	1	1			2										4	
120	1				1										2	
130	1				1		1								3	
140		1													1	
Sprague Sub																
0	2	1			1		1				1			1	7	
10					1										1	
20	3				1										4	
30					1										1	
40	4	1			2		1		1		1		1	1	12	Rainy Lake
50	2				1										3	
60	1						1								2	
70	3	1			1										5	
80	3				1										4	
90	2														2	
100	3				1										4	
110	2	1			2								1		6	
120	2						2								4	
130		1			3		1						1		6	Winnipeg
140	1			1	2		3		1			1			9	Metro

As a result of the complicated nature of the risk factors along this corridor, each subdivision was examined in detail using the vulnerability ranking above and comparing to existing mitigation features such as detector sites, track inspection procedures and incident response capability. In addition to the main corridor, the following important feeder routes in Chicago were also reviewed for potential risks:

1. Freeport Subdivision (16th Street Mile 2 to Munger Mile 35)
2. Joliet Subdivision (Bridgeport Mile 3 to Joliet Mile 37)
3. Chicago Subdivision (16th Street Mile 1 to Matteson Mile 29)
4. Waukesha Subdivision (Tower B-12 Mile 15 to Leithton Mile 37)

The specific items of interest along with a localized risk review for each of the subdivisions is included in the appendix. To provide an example of the subdivision review results, the following tables provide the focus issues and risk mitigations specific to the Leithton Subdivision.

Table 2 – Leithton Subdivision Risk Factors and Mitigations

Leithton Sub	
Reason	100k annual DG carloads (29k crude oil), high public visibility, multiple intersecting railroads and highways, significant river crossing (Illinois River at Joliet)
Existing WIS Sites	WIS at Mile 8, 19, 33, 46, 55 and WILD at Mile 8 and 46, DED at Mile 1, 25.5, 35.7, 41.9, 52.3, 63.3 (DEDs installed 2012)
Detection Enhancement	Consider DED for west side of Illinois River bridge (Mile 4)
Track/Structures Inspection Enhancement	In place: UFRD 18 tests/year (18 day winter, 30 day summer), TG twice/year, diamonds hand tested every 30 days
Emergency Response	1. Contractor available for pressure & non-pressure 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago 4. Extensive outreach with Aurora, Naperville, Warrenville, West Chicago, Elgin, Lake Zurich, Vernon Hills 2013 5. Training renewal every 2-3 years; all EJE communities have had Pueblo training
Environmental	1. Sensitive habitat mapping completed for EJE integration 2. Outreach completed with local municipalities 3. Purchase river boom/skirt boom to protect Illinois River in event of spill - estimate $20k for boom & storage (environmental budget)
Other	Visibility of Illinois River lift bridge for vessel traffic - follow-up action: Devin Sprinkle to pursue with Alan Craine (requires external discussion with Coast Guard)

Risk Mitigation

Overall, it was determined that the corridor has generally good wayside inspection system spacing except for a limited number of areas where supplemental dragging equipment detection is proposed to protect vulnerable structures, either in populated areas of Chicago or near waterways. Track inspection is being undertaken at better than minimum intervals and track geometry measurements are typically supplemented as the equipment moves to/from its home in Chicago to various points on the network.

Some further mitigation is required in the areas of dangerous goods and environmental response. The addition of foam trailers at Chicago and Stevens Point is recommended to assist in the suppression of flammable goods fires and to reduce dependency on 'borrowing' equipment from other railroads. Dangerous goods transfer trailers are recommended for positioning in Duluth and Winnipeg as no such equipment exists close to this area for response to the need to transload an intact dangerous load involved in an incident. Caches of environmental response equipment in Fond du Lac and Duluth are recommended to provide immediate response in event of an incident in the vicinity of the numerous waterways intersecting and adjacent to the corridor in these areas.

The directional running area identified between Duluth and Virginia, Minnesota, has its own unique vulnerability. The paired single track former DW&P Rainy Sub and DM&IR Missabe Sub main lines have been operated in a directional method for several years. Southbound trains currently operate on the Rainy Sub while northbound trains operate on the Missabe Sub. However, trains operating on these lines are managed by Track Authority (written) permission, with no signal system in service on the Rainy Sub and a mixture of non-signalled, ABS and CTC systems in place on the Missabe Sub. The end result is that trains handling loaded crude oil cars and LPG cars are operating southward over the Rainy Sub with no signal protection and no immediate visibility of location for the RTC. Both crews and the RTC have no knowledge of broken rails and/or unauthorized equipment on the Rainy Sub in the same way they would

have in CTC territory. Only manual inspection by engineering forces can identify broken rail defects before trains encounter such issues. This situation was identified for further review of methods of mitigation, as full CTC is not necessarily warranted for the method of operation but no other readily available solutions are available for broken rail and/or unauthorized equipment detection on main line track.

Summary of Proposed Opportunities and Category Ranking

While there are many risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities, including enhanced response in event of an incident, across the corridor. The risk mitigation opportunities are presented below in Table 3.

Each mitigation item has been given a category rank. For the purpose of this risk assessment, the categories have been defined as follows.

- Category 1
  - Recommended for immediate implementation (high risk and/or modest cost)
- Category 1A
  - Recommended for immediate additional investigation
- Category 2
  - Recommended for funding and implementation if additional funding identified in 2014, otherwise top priority for funding in 2015

Table 3 – Proposed Risk Mitigation Strategies

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Joliet	19	Willow Springs	DED Site (2-track)	$50k	Current lack of detection in environmentally sensitive area with DG carloading	1
Chicago	10	Grand Crossing	DED Site (2-track)	$50k	Protect Grand Crossing overpasses, downtown Chicago and Calumet River bridge	1
Sprague	142	East of Navin	DED Site (1-track)	$30k	Protect Red River Floodway and adjacent multiple highway overpasses (Ring Road/Trans Canada Highway)	1
Rainy	11 to 70	Nopeming Jct - Virginia	Signal Protection	-	Assess merits of implementing CTC on 50 miles Virginia-Nopeming Jct for broken rail protection, unauthorized movement, etc.	1A
Leithton	4	Crest Hill	DED Site (2-track)	$50k	Protect Illinois River lift bridge	2
Neenah	225	Near Sheridan WI	WIS Site	$100k	Reduce existing 21 mile spacing, protect Waupaca west side (town >1000 population)	2
Fort Frances	140	Rainy River	Clearance Detector	$200k	Protect Rainy River through truss bridge from strike by shifted load (part of LPS mitigation strategy)	2
-	-	Fond du Lac	Cache of environmental response equipment (trailer)	$40k	Provide response to incidents near Lake Winnebago	2
-	-	Duluth	Cache of environmental response equipment (trailer)	$40k	Provide response to incidents near Lake Superior inflow rivers (e.g. St. Louis River)	2
-	-	Duluth	DG Transfer Trailer	$220k	Provide DG transfer capability at incidents	2
-	-	Winnipeg	DG Transfer Trailer	$220k	Provide DG transfer capability at incidents	2
-	-	Chicago	Foam Trailer	$137k	Mitigate flammable goods fires in Chicago	2
-	-	Stevens Point	Foam Trailer	$137k	Mitigate flammable goods fires in Wisconsin	2

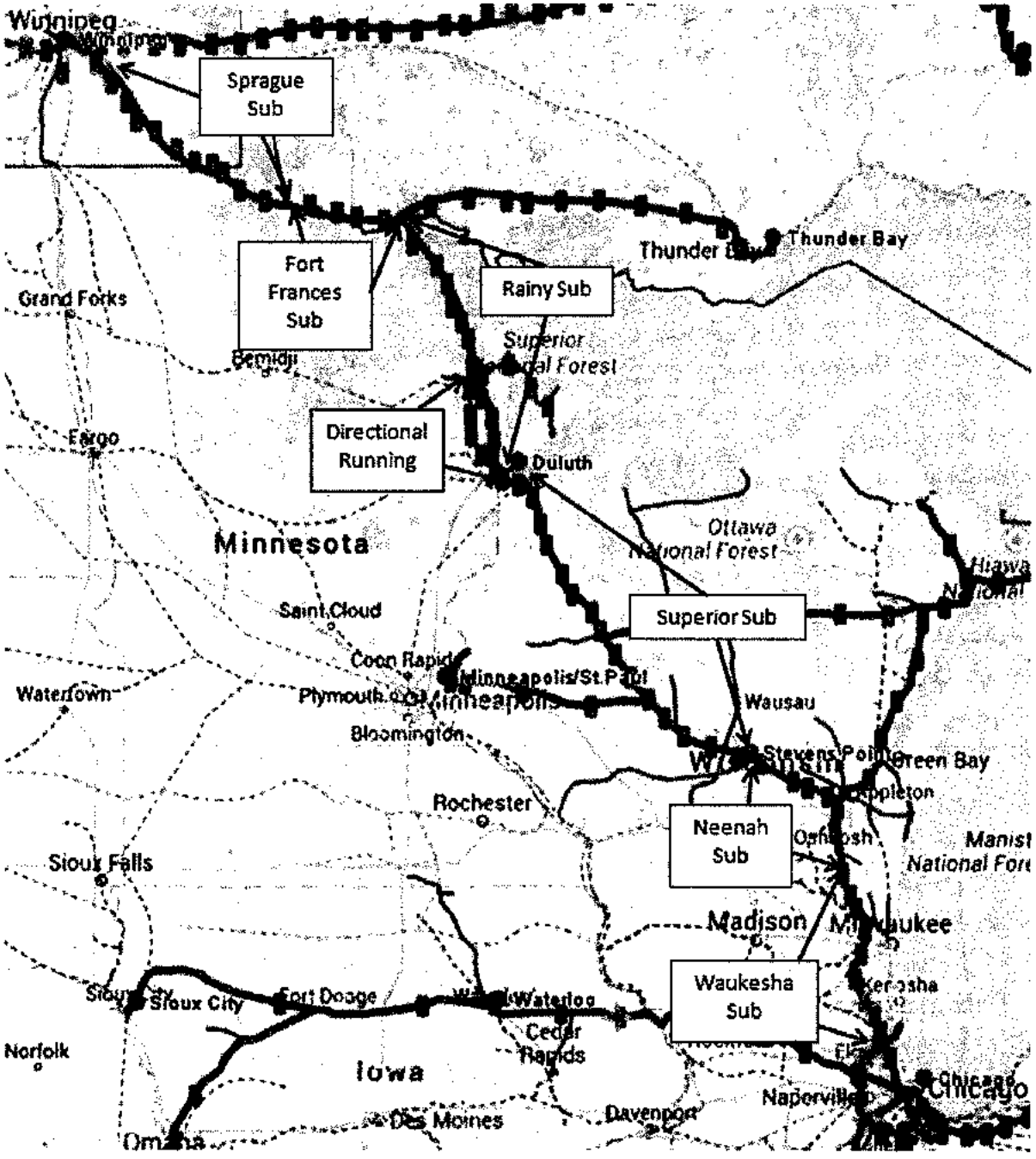
The immediate 'category 1' mitigation items consist of three dragging equipment detector sites representing an approximately expenditure of $130,000. This cost can be managed by locating these features at existing signal sites with electrical power readily available. The emergency response and environmental initiatives will help to control CN's exposure in the event an incident was to occur. At this time, there does not appear to be any high capital cost solutions (i.e. track relocation) that will provide a higher probability of risk reduction than the solutions noted above.

Appendix Material

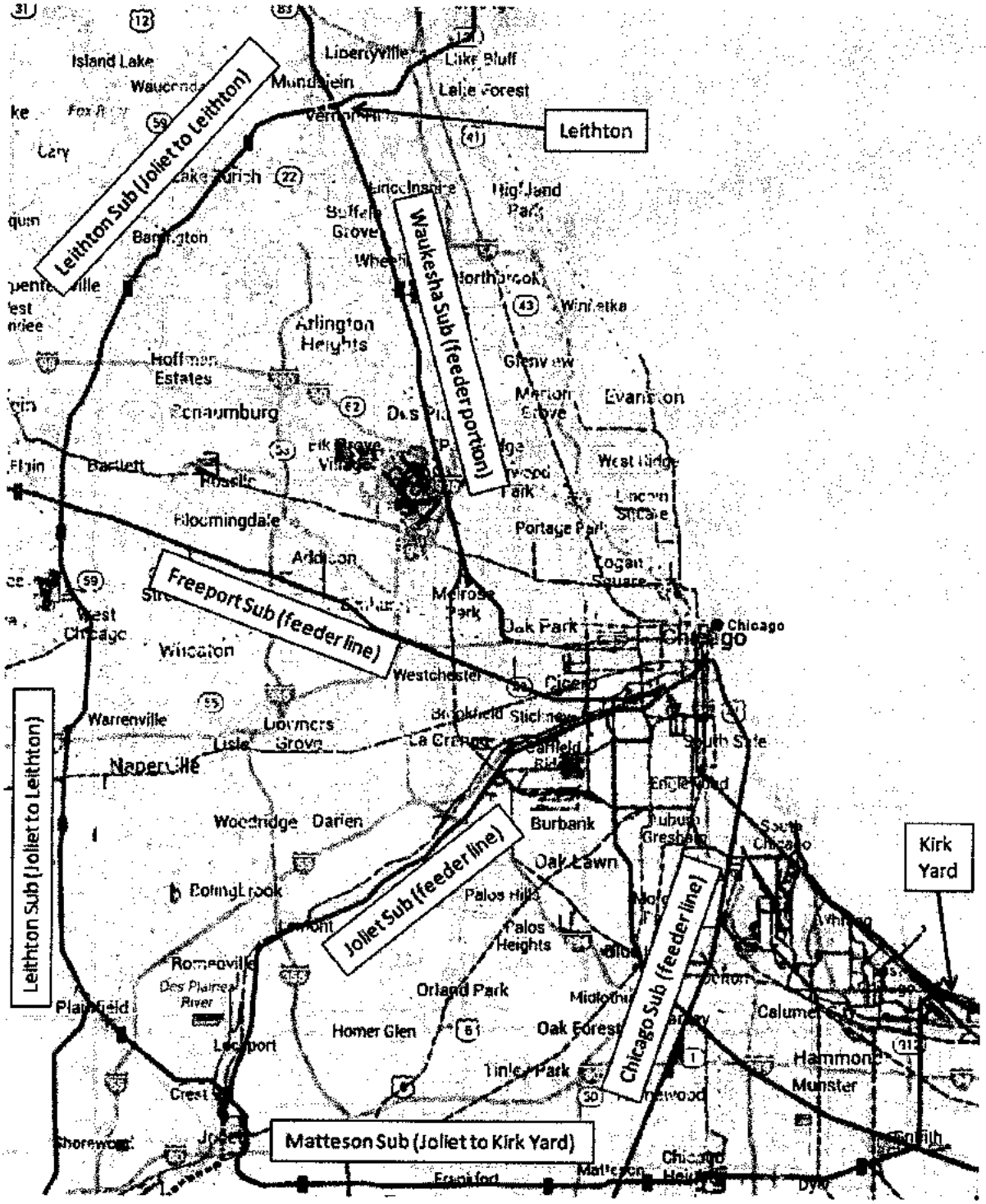
- Map of Chicago – Winnipeg Corridor and Focus Areas
- Vulnerability Details Table
- Subdivision Risk Review Tables
- Additional Commentary: Rainy Sub/Missabe Sub traffic control between Duluth and Virginia

Appendix 1 – Maps of Chicago-Winnipeg Corridor

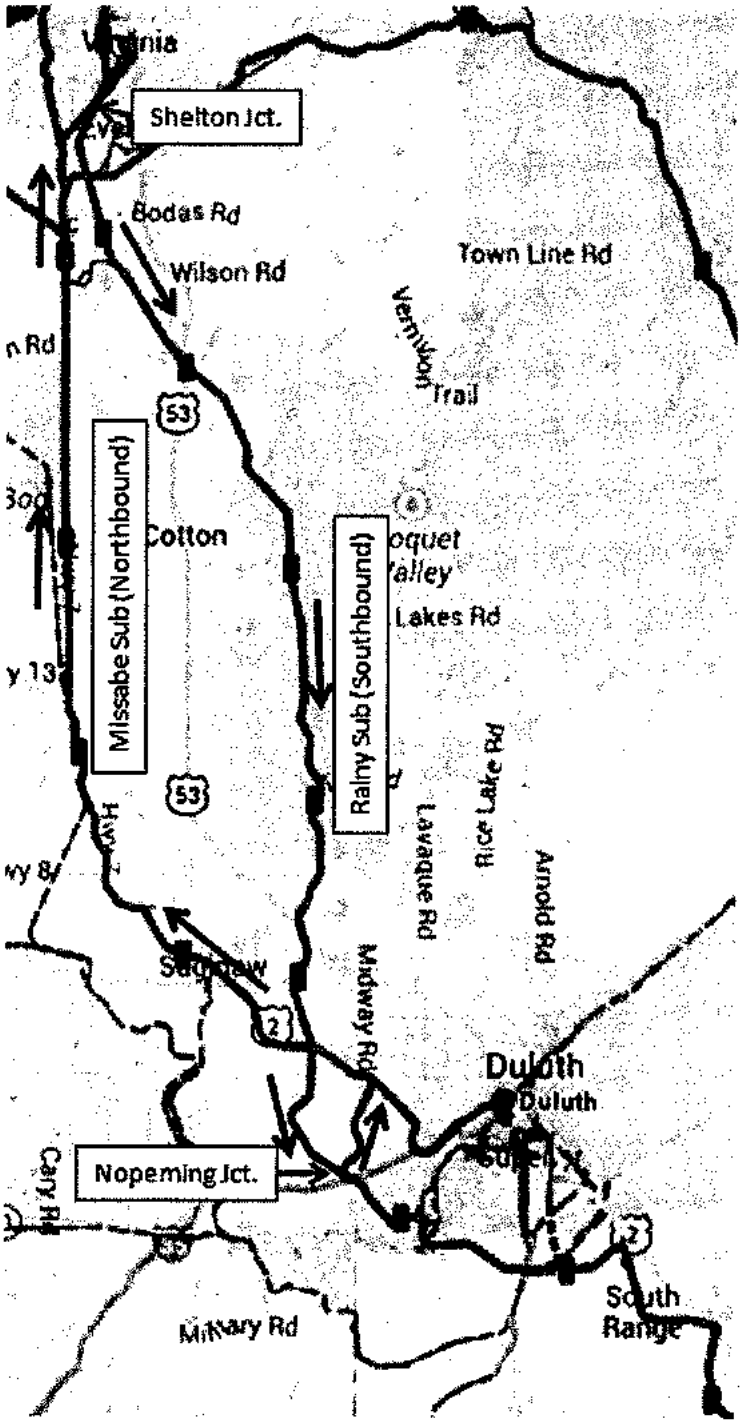
Map 1 – Corridor Overview



Map 2 – Chicago Metropolitan Area Detail



Map 3 – Directional Running Area Detail



Appendix 2 – Vulnerability Details Table

The following eleven (11) pages contain the tables of risk areas and vulnerable structures that were obtained through an overall map and aerial photography review of the Chicago-Winnipeg corridor. Each risk item was categorized by type and areas with the greatest number of risks (shaded in grey) became focus areas for further review of detection, operations procedures and emergency response.

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Chicago to Winnipeg Main Line Corridor																
Matteson Sub																
0	0												X			Joliet yard
0	0				X											City of Joliet
0	0.1														X	Silver Cross Hospital immediately east of yard
0	0.7						X								X	Metra Joliet Sub District 2-track/2-track diamond
0	0.8	X														Hickory Creek
0	1.7					X		X								I-80 overpass
0	3-4					X										US 52 parallel (Manhattan Rd)
5	6										X					Large school (high school?) north side
10	8.2						X	X								Metra Southwest Sub District overpass
10	11	X								X						Pond parallel in park by residential area
15	13.4			X												Town of Frankfort
15	16.7	X														Stream flowing through "high value" residential area
20	19.4	X														Wetland/pond south side
20	19.5					X		X								I-57 overpass
20	21	X														Wetlands
20	21.6						X	X	X						X	CN Chicago Subdivision and Metra University Park Sub District overpass + Matteson connection
20	21.7			X												Town of Matteson
25	23			X												Town of Park Forest
25	25			X												Town of Chicago Heights
25	25.2						X								X	UP Villa Grove Subdivision 2-track/2-track diamond
25	25.4													X		Industrial facility (north side)
25	25.7						X	X								CHTT Railroad bridge
25	26												X			CHTT Interchange yard
25	26.5-30						X									Norfolk Southern former Hartsdale industrial parallel
30	28.2					X		X								Route 394 overpass
30	28.3			X												Town of Sauk Village
30	30	X														Wetlands
30	31			X												Town of Dyer
30	31.3						X								X	CSXT Monon Subdivision diamond
30	31.4	X														Hart's Ditch bridge and pond
35	33	X														Wetlands
35	34.1						X	X								Norfolk Southern Kankakee Line overpass
35	35												X	X		Griffith yard and adjacent oil/gas tank farm facility
35	36.2						X								X	South Bend Subdivision diamond 2-track/2-track
35	36.5			X												Town of Griffith
40	39.2	X						X								Little Calumet River and surrounding wetlands
40	39.8					X	X	X							X	I-80/I-94 overpass and Norfolk Southern Chicago District diamond below the underpass
40	40-45			X												Gary urban area
40	41.7						X								X	CSXT Porter Subdivision and IHB Main Line diamonds
40	42.4						X	X								CSSB main line overpass
45	42.5					X		X								I-90 Indiana Tollroad overpasses
45	42.6	X						X								Grand Calumet River bridges
45	43.3											X				Gary Airport - tracks adjacent to end of Runway 12
45	44						X	X								CSXT industrial trackage bridge
45	44.1						X	X								Norfolk Southern industrial trackage bridge
45	44.3						X	X								Multi-span bridge over CSXT Barr Subdivision and Norfolk Southern Chicago Line
45	45.2												X			Kirk Yard

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Leithton Sub																
0	0-1.7			X												City of Joliet urban area
0	1.5						X	X								Bridge over CN Joliet Sub (passenger corridor)
0	1.7	X					X	X								Des Plaines River lift bridge and bridge over BNSF Chillicothe Sub
5	1.7-7			X												Crest Hill / Richland urban area (west of Joliet)
5	4.3										X					Richland School and Joliet Montessori School
5	7					X		X								I-55 overpass
10	7.6	X								X						Plainfield Fishing Resort and ponds
10	8	X														Lily Cache Creek
10	8.4	X								X						Lake Renwick and adjacent parkland
10	9-13			X												Town of Plainfield
10	9.8	X						X								Du Page River bridge
10	10.5													X		Walker Industrial park area - multiple industries adjacent
10	11.4										X					Walkers Grove School
10	12-13					X										US 30 parallel
15	14			X												Normantown (new housing area)
15	15.5										X					Peterson School
15	16.3														X	Major electrical substation adjacent
20	17-21				X											Aurora urban area
20	18.3	X														Stormwater or fire pond
20	18.9	X														Wetland
20	19.6	X								X						South Spring Lake and park
20	21.3						X	X								BNSF Chicago Sub bridge
20	22									X	X					Metea Valley High School and sports park
25	23					X		X								I-88 bridge
25	25									X						Summer Lakes Park
25	25-26			X												Warrenville urban area
25	25.5	X								X						Forest preserve/ponds west side
25	26	X														Pond adjacent to housing development
30	27.6-30			X												West Chicago urban area
30	27.7	X														wetlands
30	28.6									X	X					High School and sports park
30	28.9						X								X	UP Geneva Sub diamond (3-track crossing)
30	29.4												X			CN-UP West Chicago interchange yard
30	29.6									X						Reed-Kepler Park
30	31.6											X				West Chicago airport
35	34-35									X						Pratts Wayne Woods forest preserve
35	35	X														Forest preserve ponds
35	35.2						X	X								CN Freeport Sub bridge
35	36-38		X													Spaulding urban area
40	37.6						X								X	CP Elgin Sub diamond (3-track crossing)
40	38									X						Rileys Run park
40	38-41				X											Elgin urban area
40	39.7	X														Poplar Creek
40	40.8									X						Shoe Factory Woods preserve
40	41									X	X					Kelley Park and Timber Trails school
40	41-42			X												Hoffman Estates urban area
40	42.4					X		X								I-90 overpass
45	42.6														X	Significant shopping centers both sides
45	42-46		X													South Barrington urban area
45	44.5-45.8					X										IL Route 59 parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential OG facility adjacent	Other Special Feature	Notes
Leithton Sub (continued)																
45	46-49		X													Barrington Hills urban area
50	48.3	X														Hawthorne Lake
50	49-51			X												Barrington urban area
50	49.5						X								X	UP Harvard Sub diamond (2-track crossing)
50	50										X					Barrington school
50	50.5	X								X						Park and ponds at Lake Zurich Road
50	51									X						Cuba Marsh Forest Preserve
50	51.6	X														Ponds near Cuba Road
50	51-57			X												Lake Zurich urban area
55	53.8									X	X					Lake Zurich high school
55	55.6									X						Hawthorn Woods Community Park
55	57-60			X												Mundelein urban area
55	59.7										X					Mundelein Montessori school
Waukesha Sub																
40	38-42			X												Mundelein urban area
40	39.6								X							Metra Mundelein station
40	40.4-42					X										US 45 parallel
40	40.5	X														Loch Lomond
40	40.6										X					University of St. Mary (east side)
40	42-43			X												Libertyville urban area
45	43									X						Lake County Fairgrounds
45	43.1								X							Metra Prairie Crossing station
45	44						X								X	CP Fox Lake Sub diamond
45	44-48			X												Grays Lake urban area
45	45									X						Jaycee Park
45	46.6								X							Metra Grays Lake station
45	47										X					Meadowview School
50	48-50			X												Round Lake Beach urban area
50	48.5								X							Metra Round Lake Beach station
50	48.7	X								X						Silver Oaks Park and ponds
50	50	X														Wetlands
50	50-53		X													Lake Villa urban area
50	51								X							Metra Lake Villa station
50	51.4	X														Cedar Lake
50	52.3	X								X						Sun Lake Forest Preserve
55	53-56.5			X												Antioch urban area
55	53.5	X														East Loon Lake
55	54.8									X						Sports park
55	55.4								X							Metra Antioch station
55	56.5	X														Wetlands
55	56.5-60		X													Trevor (Salem) urban area
60	59.8	X														Camp Lake
60	60-63.6		X													Silver Lake urban area
60	61.1	X														Silver Lake
65	67	X														Fox River parallel
70	69.6	X						X								Fox River bridge
70	70.7					X		X								WI 36/11/83 overpass
70	70.8	X														Fox River parallel
70	70.7-74			X												Burlington urban area

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Waukesha Sub (continued)																
75	72.5	X						X		X						Echo Lake bridge and short causeway
75	72.6														X	Grain elevator at Burlington
75	74.1	X														Honey Creek parallel
75	75.5		X													Village of Rochester
80	79	X														Honey Creek parallel
80	81	X														Honey Creek parallel
85	84.6					X		X								I-43 overpass
85	85-87.5		X													Mukwonago urban area
85	85.2	X														Mukwonago River
85	85.4									X						Sports park
90	87.5	X						X								Fox River bridge and adjacent significant wetlands
90	91		X													Village of Vernon
90	91.8	X														Pebble Brook parallel and crosses 3 times
95	93.6	X														Pebble Brook and wetland
95	94-100			X												City of Waukesha
95	96.7									X						Sports park
95	97.1									X	X					Carroll College and sports stadium
100	98.5									X						Frame Park
100	99	X														Fox River parallel
100	100-105			X												Pewaukee (Duplainville) urban area
100	100.4	X						X								Fox River bridge
100	100.5					X		X								I-94 overpass
100	102.4						X								X	CP Watertown Sub diamond (2-track crossing)
105	105-109			X												Sussex urban area
105	105.4														X	Vulcan Materials quarries and overhead conveyors
105	107						X	X								UP Adams Sub overpass
110	111.5	X														Bark River wetland area
110	112.2	X														Bark River
115	113	X														Bark River and nearby Bark Lake
115	113.3			X												Richfield Village
120	117-122.5						X									WSOR parallel
120	121												X			Ackerville interchange yard with WSOR
120	122.4		X													Village of Slinger
125	122.5						X								X	WSOR junction/crossover with CN
125	126.5														X	Sand/gravel quarrying operation adjacent
130	128	X														Rock River wetland area
130	129.5		X											X		Village of Addison, grain/fertilizer facility adjacent
130	130	X														Rock River wetland area
130	132	X														Rock River wetland area
135	132.6	X														Rock River bridge
135	133.8	X														Rock River bridge
140	136	X														Rock River bridge
140	139	X														Various ponds adjacent
145	142.5		X													Village of Lomira
145	145														X	Quad Graphics plant
145	145.1					X										US 41 parallel
145	147													X		Byron grain/fertilizer facility
155	152-158			X												Fond du Lac urban area
155	154.1					X		X								US 41 bridge
155	155.7	X						X								Fond du Lac River bridge

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Waukesha Sub (continued)																
155	156.2	X						X								Fond du Lac River bridge
155	156.4	X						X								East Branch Fond du Lac River bridge
155	157.1	X						X								Fond du Lac River bridge
155	157.8	X						X								Supple Marsh bridge
155	158												X			Fond du Lac ("Shops") Yard
Neenah Sub																
160	158-160			X												Fond du Lac urban area
165	164.7									X						Van Dyne Lions Park
170	169		X													Village of Black Wolf
170	170		X													Village of Nekimi
170	171-179			X												Oshkosh urban area
170	171.7											X				Wittman Regional Airport to the west
170	171.8-173	X														Lake Winnebago parallel
175	173.0									X						Waterfront park and marina
175	173.2	X						X								Fox River draw bridge
175	173.3									X						Municipal park and outdoor concert area
175	176.5	X														Stream that drains directly to residential marina neighborhood and Lake Winnebago
180	178.0									X						Winnebago County Community Park
180	178.5														X	Mental Health Institution to the east
180	182-183.3					X										US 41 parallel
185	182-186			X												Neenah urban area
185	184.6													X		Industriel facility
185	185.2												X			Neenah yard
185	186.7	X						X								Little Lake Butte des Morts adjacent and inlet bridge
190	187.6					X		X								US 41 overpass
190	188-191			X												Menesha urban area
195	193.1					X		X								US 10 overpass
195	193.2	X														Ponds
195	194.5	X														Wetlands
195	195.7	X														Rat River and wetlands
200	199.4		X							X						Village of Dale, Daufen Memorial Park
205	204.0													X		Major feed/fertilizer facility (Readefeld)
210	208-210	X														Templeton Bayou wetland area
210	210.0	X						X								Wolf River multi span bridge
210	212.0	X														Waupaca River parallel
215	213.2		X													Village of Weyauwega
220	220.0		X											X		Village of Waupaca, industrial facilities
220	221.2	X														Pond on west side of village
230	228-230.5					X										US 10 parallel
235	232.5													X		Grain/fertilizer facility
235	233.0	X								X						Tomorrow River, park
235	235.8					X		X								US 10 overpass
240	236-241.6					X										US 10 parallel
245	243.3													X		Grain/fertilizer facility
245	246-247			X												Stevens Point urban area
245	246.4					X		X								I-39 overpass

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Superior Sub																
250	247-251			X												Stevens Point urban area
250	247.5	X						X								River River bridge multi-track
250	248												X			Stevens Point yard
250	249.8	X						X								Wisconsin River bridge multiple spans
255	253.3	X														Lake Wisconsin wetland/backwaters
255	256.7	X														Mill Creek
260	260.1						X								X	Diamond with Valley Sub
260	260.3-262.3					X										WI 34 parallel
265	262.3-273.3					X										Old US 10 parallel
270	268.4					X		X								US 10 overpass
280	278.5-284.5		X													Marshfield urban area
280	279.5												X		X	Marshfield yard and adjacent industry
280	280.7-289.8					X										WI 13 parallel
280	281.5									X						Miller Recreation Area
290	289.4		X													Village of Spencer
290	290									X						Spencer Arc Park
295	295.5	X														Wetlands
300	298.6	X														Small river and wetlands
305	306.5	X														Wetlands
305	307.1	X														Popple River and wetlands
310	307.9					X		X								WI 29 overpass
310	309	X														Brick Creek/pond parallel
310	309.8	X														Brick Creek
315	314.7	X						X								Black River bridge multi-spans
320	319	X														Wetlands
320	321	X														Wetlands
325	324.8	X														Hay Creek and wetland
325	326.5	X														Hay Creek and wetland
330	327.9	X														Yellow River bridge
335	332.8	X														Sotak Flowage wetland
335	334.8	X														Fisher Creek
335	336.2	X														Fisher Creek and wetland
340	339.5	X														Shoulder Creek
340	340	X						X								Jump River bridge multi-span
340	342.3	X														Little Jump River
345	346.9	X														Main Creek
350	349.7	X														Small river and wetlands
350	351	X														Stream and ponds
350	352.3	X						X								Flambeau River bridge multi-span
355	352.8	X								X						OJ Falge Park and pond/wetland
355	353		X													Town of Ladysmith
360	357.5	X						X								Thornapple River bridge
360	359	X														Wetlands
360	359.2	X														Little Thornapple River bridge
360	360.6	X														Wetlands
365	363.1	X						X								Chippewa River through truss bridge
370	368.9													X		Village of Exeland, feed/fertilizer facility
370	369-370					X										WI 48 parallel
370	372	X														Small river and wetlands
375	373	X														Small river and wetlands

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Superior Sub (continued)																
375	374	X														Weirgor Lake parallel
375	376.7	X														Wetlands
380	378.2	X														Beverly Lake and wetlands
380	381	X														Wetlands
385	383.4	X														Wetlands
390	388	X														Small river and wetlands
390	389.2	X														Stone Lake parallel
390	391	X														Wetlands
395	396	X														King Lake wetland
400	401						X	X								Bridge over Hayward Spur
400	401.1	X						X								Namakagon River bridge
405	402.5	X														Stanberry creek
405	405-407	X														Wetlands
410	411.5	X														Frog Creek
415	413.9														X	Pipeline pumping station adjacent
415	414.2	X														Totogatic River
420	419	X														Wetlands
420	420.3									X						Gordon village park
420	421.1	X						X								Eau Claire River bridge
420	421.4	X						X								St. Croix River bridge
425	423	X													X	Wetlands and special marshland farming
425	424.5-426	X														St. Croix River parallel
425	427	X														St. Croix River parallel
426	427-429					X										Old US 53 parallel
430	432.1					X		X								US 53 overpass
435	434.6	X														Wetlands/ponds
435	437	X														Wetlands/ponds
440	439.1	X														Middle River
440	440.3	X														Wetlands/ponds
440	442.4	X														Ponds
445	445-446					X										Western Road parallel
445	446.1	X						X								Amnicon River bridge
445	446.2-447.2					X										City Hwy E parallel
455	454												X			Parkland interchange sidings with UP
460	459.1	X						X								Nemadji River bridge - 570' multiple span steel trestle
460	460.5						X	X								BNSF Lakes Sub overpass
460	460.6	X						X								Multi span steel trestle over valley/small river
460	462												X			Pokegama Yard
465	463.4							X								421' multi span steel trestle
465	465.4	X				X		X								St. Louis River bridge - 1935' multi span steel trestle with public road on lower deck
465	465.8							X								380' multi span steel trestle
465	466.4		X													Village of Fond du Lac-Gary-New Duluth
465	466.6												X			Steelton yard
470	468							X								270' multi span steel trestle
470	471.9					X		X								I-35 bridge - 510' multi span structure
475	476.3	X														Midway River
475	477.2	X														Midway River/wetland parallel
480	480	X														Wetlands

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Missabe Sub (Mile 13-68)																
15	14						X	X								CN Rainy Sub overpass
20	19					X										US 2 parallel
20	20.3-22.5					X										County Road 46 parallel
20	22					X		X								MN 33 overpass
25	23.5	X														Wetlands
25	23.6-26					X										County Road 694 parallel
25	25.5	X				X										Cloquet River bridge
25	25.6									X						Burnett Park
25	26-27.5					X										MN 7 parallel
25	27	X														Wetlands
30	30-32	X														Artichoke River parallel
30	32.3	X														Artichoke River bridge
35	32.5-38						X									BNSF Casco Sub parallel
35	34	X														Wetlands
40	38-45					X										MN 7 parallel
40	40.1	X														Stream/wetlands
45	44.7	X						X								Whiteface River bridge
45	46.3	X														Stream/wetlands
50	47-55.7					X										MN 7 parallel
60	58	X														Missabe Lake parallel
60	59.5	X						X								St. Louis River bridge
60	62	X														Wetlands
65	63	X														Streams/wetlands
65	64.5	X														Elbow Lake and wetlands
65	66.5	X														Wetlands
Rainy Sub																
15	13.1	X						X								Midway River bridge
20	18	X														Farm ponds
20	18.8						X	X								CN Missabe Sub bridge
20	19.4	X														Ponds
20	20.5	X														Wetlands/ponds
20	22.2	X														Sand mining ponds
25	23.7	X														Wetlands/ponds
25	24.2													X		Twig propane facility
25	24.3					X		X								US 53 overpass
30	28	X														Fish Lake Wetlands
30	29.9	X						X								Cloquet River bridge - 418' multi-span
30	32					X										County 15 Munger Shaw Rd parallel
30	32-33	X														Stream/wetland parallel
35	34-35	X														Rush Creek parallel and crossed twice
35	36-38.5	X														Rush Creek parallel and crossed twice
40	40.9	X														Wetlands/ponds
40	41.4	X														Bug Creek
45	43.8	X														Pioneer Lake parallel
45	46.4	X						X								Whiteface River bridge
50	48-49	X														Wetlands
50	49.5-52.4					X										County 59 parallel
50	49.6	X														Dinham Lake

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Rainy Sub (continued)																
50	51.1	X														Paleface Creek
50	52.3	X														Paleface Creek
55	56	X														Ponds
55	56.1					X		X								US 53 overpass
55	57	X														Murphy Lake
65	62.8	X						X								St. Louis River bridge
65	66.8						X								X	CN Iron Range Sub diamond
70	68.5	X														Wetlands
70	69.8	X														Wetlands/ponds
70	70.8						X								X	CN Missabe Sub diamond
70	71	X														Wetlands/ponds
75	72.5		X													Town of Virginia
75	74					X										US 53 parallel
75	77.2-79					X										US 53 parallel
80	79-99									X						Superior National Forest
80	81.7	X														Sand River
85	84	X														Wetlands/ponds
85	86	X														Rice River parallel/crosses
90	88.5	X														Wetlands/multiple stream crossings
90	91.3	X														Wetlands/ponds
95	94.1	X						X								Rice River bridge
95	96.2	X						X								Rice River bridge
100	99					X										MN 1 / US 53 parallel
100	99.2									X						Doug Johnson Park
100	99.8	X														Little Fork River bridge
105	102.7	X														Flint Creek and wetland
105	104	X														Wetlands/ponds
105	104.8	X														Wetlands/ponds
110	108	X														Wetlands
115	114.3	X														Pelican River
115	114.3-116.7					X										US 53 parallel
115	116.5	X								X						Village of Orr, town parkland, Pelican Lake
115	117.4	X														Sucker Creek and wetlands of Pelican Lake
120	119-127					X										US 53 parallel
125	123.6	X														Lost River wetland
130	128	X														Wetlands
130	128.5	X														Ash Lake parallel
130	128.6-131					X										US 53 parallel
135	135.7	X														Kinmount Creek and wetland
140	141.5	X														Wetlands
150	150-156.3					X										US 53 parallel
155	156.4	X						X								Rat Root River inlet bridge
155	156.9	X						X								Rat Root River bridge
160	158	X														Wetlands
165	164.2												X			Ranier yard
165	165		X													Town of Ranier/International Falls
165	165.4	X						X							X	Rainy River drawbridge and multi span structure, US/Canada border
165	165.5									X						Waterfront park
165	165.5-167		X													Fort Frances urban area

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Fort Frances Sub (Duluth Jct to Rainy River)																
90	88.1-90.1		X													Fort Frances urban area
90	89												X			Fort Frances yard
90	90									X	X					School and park adjacent
105	102.5	X														Stream/wetlands
110	108.5					X										Highway 602 parallel
110	109		X													Village of Emo
110	110	X				X										Inlet to Rainy River; Highway 11 parallel
120	118.5	X														Stream leading to Rainy River
120	119-121					X										Highway 11 parallel
130	130-131					X										Highway 11 parallel
130	131.6	X						X								Pinewood river
140	135-143															Highway 11 parallel
145	143		X													Town of Rainy River
Sprague Sub																
0	1	X						X							X	Rainy River bridge - multi-span through truss, US/Canada border
0	1.1		X													Village of Baudette
0	1.2											X				Baudette International Airport to north
0	2-37					X										MN 11 parallel Baudette-Warroad
5	6	X														Winter Road River
20	18.5	X														Williams Creek
20	20.5	X														Wetlands
25	24.8	X														Wetlands/stream
40	37.8	X						X								Warroad River bridge multi-span
40	38		X													Town of Warroad
40	38.4									X						Warroad park/sports center
40	38.8													X		Industrial plant, various tanks near ROW, overhead conveyor
40	39.5-44.5					X										MN 313 parallel
40	40											X				Warroad Airport
40	40.5	X														Warroad Estates community ponds
40	42	X														Wetlands
45	44.5	X													X	Wetlands, Canada/US border
45	44.5-47.5					X										MB 12 parallel
50	47.5-55					X										Morden-Sprague Road parallel
55	54	X														Wetlands
55	57	X														Sprague creek
60	58	X						X								Sprague River bridge
70	69		X													Village of Vassar
70	70.5	X														Wetlands
70	71.5	X														Wetlands
75	72-75					X										Secondary Road parallel
75	73	X														Wetlands
80	79	X														Wetlands
80	80.6	X														Wetlands/stream
80	82-84					X										Secondary Road parallel
85	84.2	X														Wetlands/stream
95	92.5	X														Wetlands/stream
95	93.2	X														Wetlands/stream
100	102	X														Wetlands

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Sprague Sub (continued)																
105	106.5	X														Marchand creek
105	106.8-110					X										Twin Rivers Road parallel
105	107	X														Marchand creek parallel and crosses
110	110.8	X														Marchand creek
110	111-113					X										MB 210 parallel
115	113		X													Village of La Broquerie
115	113.1													X		Fertilizer dealer adjacent
115	115-120.5					X										MB 210 parallel
115	115.5	X														Wetlands
125	127	X						X								Seine River irrigation channel
125	127.3	X						X								Seine River bridge
130	128		X													Village of Ste. Anne
130	128.2					X		X								MB 12 overpass
130	128.2-129					X										MB 207 parallel
130	130													X		Grain/feed elevator
135	131-146					X										Trans Canada Highway 1 parallel
145	143-147				X											Winnipeg urban area
145	144.4	X						X		X						Spillway Channel bridge - multi span and park/trail
145	144.5					X		X								MB 100 Perimeter Highway overpass
145	146					X		X								Trans Canada Highway 1 overpass
145	146.5												X			Symington Yard

Appendix 3 – Subdivision Risk Review Tables

Main Corridor – Kirk Yard to Stevens Point

Matteson Sub		CATEGORY
Issues of Concern	DG volume - 152k carloads (30k crude oil), high population density, intersecting roads/railroads, yard facilities	
Existing WIS Sites	Mile 6, 18, 22, 35 plus one WILD Mile 28 (Torrence) -- DED at 38 and 42	
Detection Enhancement	Existing sufficient	
Track/Structures Inspection Enhancement	In place: UFRD 16 tests/year (18 day winter, 30 day summer), TG twice/year, diamonds hand tested every 30 days	
Emergency Response	1. Contractor available for pressure & non-pressure (close to Kirk Yard) 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago 4. Extensive outreach with Gary FD, other localities, complete 2012; Chicago Heights 2013 plus MABAS division 5. Training renewal every 2-3 years; all EJE communities have had Pueblo training	
Environmental	1. Sensitive habitat mapping completed for EJE integration 2. Outreach completed with local municipalities	

Leithton Sub		CATEGORY
Issues of Concern	DG volume - 100k carloads (29k crude oil), high public visibility, multiple intersecting railroads and highways, significant river crossing (Illinois River at Joliet)	
Existing WIS Sites	WIS at Mile 8, 19, 33, 46, 55 and WILD at Mile 8 and 48, DED at Mile 1, 25.5, 35.7, 41.9, 52.3, 63.3 (DEDs installed 2012)	
Detection Enhancement	Consider DED for west side of Illinois River bridge (Mile 4)	2
Track/Structures Inspection Enhancement	In place: UFRD 16 tests/year (18 day winter, 30 day summer), TG twice/year, diamonds hand tested every 30 days	
Emergency Response	1. Contractor available for pressure & non-pressure 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago 4. Extensive outreach with Aurora, Naperville, Warrenville, West Chicago, Elgin, Lake Zurich, Vernon Hills 2013 5. Training renewal every 2-3 years; all EJE communities have had Pueblo training	
Environmental	1. Sensitive habitat mapping completed for EJE integration 2. Outreach completed with local municipalities 3. Purchase river boom/skirt boom to protect Illinois River in event of spill - estimate $20k for boom & storage (environmental budget)	
Other	Visibility of Illinois River lift bridge for vessel traffic - follow-up action: Devin Sprinkle to pursue with Alan Craine (requires external discussion with Coast Guard)	

Waukesha Sub (Leithton to Fond du Lac)		CATEGORY
Issues of Concern	DG volume - 87k carloads (20k crude oil), core route, Metra commuter operation/population density Leithton to Antioch	
Existing WIS Sites	WIS spacing approx 14-16 miles, DED at Mile 49, WILD at Mile 62	
Detection Enhancement	Existing spacing adequate	
Track/Structures Inspection Enhancement	1. In place: UFRD 16 tests/year (20 day winter, 30 day summer), TG 4 times/year 2. Capex: 2011 = $4.8 M, 2012 = $12.6 M, 2013 = $8.9 M, 2014 Plan = $4.8 M	
Emergency Response	1. Closest contractor Chicago or Germantown WI or Twin Cities MN 2. Extensive community outreach including Fond du Lac, Milwaukee 3. Closest DGO in Stevens Point 4. Propose to station foam trailer at Stevens Point - estimate $137k	2
Environmental	Some coverage gaps for contractors/material/equipment currently under evaluation - ETA = Q-2	

Neenah Sub		CATEGORY
Issues of Concern	DG volume - 87k carloads (20k crude oil), proximity to water (Lake Winnebago), highly visible alignment in Oshkosh and Neenah	
Existing WIS Sites	WIS generally 15-20 miles except one gap; no WILD, some DED	
Detection Enhancement	Plan to reduce WIS spacing (21 mile) between 213 and 237 detectors (enhance protection for eastbound trains approaching Town of Waupaca) - note BOJ derailment occured at Mile 235 in 2012	2
Track/Structures Inspection Enhancement	1. In place: UFRD 16 tests/year (20 day winter, 30 day summer), TG 4 times/year 2. Capex: 2011 = $2.5 M, 2012 = $5.7 M, 2013 = $8.7 M, 2014 Plan = $6.0 M	
Emergency Response	1. Closest contractors Chicago, Germantown WI (Green Bay) or Twin Cities MN 2. Extensive community outreach including Fond du Lac, Neenah 3. Closest DGO in Stevens Point 4. GAP analysis complete 5. Propose to station foam trailer at Stevens Point - estimate $137k	2
Environmental	Cache of equipment for response at Fond du Lac (trailer or storage container) - $40k estimated	2

Main Corridor – Stevens Point to Fort Frances

Superior Sub		CATEGORY
Issues of Concern	DG volume - 98k carloads (29k crude oil), proximity to water, significant grades, population (near Duluth), adjacent roadways	
Existing WIS Sites	WIS sites at 12-17 mile intervals, no WILD, stand-alone DED both sides of Oliver Bridge (Mile 465)	
Detection Enhancement	Planned WILD site for Ladysmith (2014) (funding separately)	
Track/Structures Inspection Enhancement	1. In place: UFRD 16 tests/year (20 day winter, 30 day summer), TG 4 times/year 2. Capex: 2011 = $12.1 M, 2012 = $14.5 M, 2013 = $10.1 M, 2014 Plan = $15.7 M	
Train Handling/Monitoring/Marshalling	1. SLE group to implement focused plan to monitor/assess trainhandling for grade braking issues - tie in to LEPP or RTBI 2. Select number of spot-checks to be taken monthly via download or LEPP	
Emergency Response	1. Closest contractor Twin Cities MN - in progress to complete contract 2. Extensive community outreach including Duluth, Superior 3. Closest DGO in Stevens Point 4. GAP analysis complete 5. Propose to station transfer trailer at Duluth (estimate $220k) - request for funds in progress elsewhere	2
Environmental	Cache of equipment for response at Duluth Docks (trailer or storage container) - $40k estimated	2
Other	Proposed double-tracking of Steelton Hill may create questionable issues for trainhandling (single track gap at I-35) - require further review with North Division	

Missabe / Rainy Subs Directional Running Area		CATEGORY
Issues of Concern	DG volume - 97k carloads (29k crude oil), core route portion with no signal protection (60 miles Rainy Sub Virginia-Nopeming Jct)	
Existing WIS Sites	Missabe Sub – WIS every 12-14 miles; similar for Rainy Sub; no WILD; no DED	
Detection Enhancement	Existing sites sufficient	
Track/Structures Inspection Enhancement	1. In place: UFRD 16 tests/year (20 day winter, 30 day summer), TG 4 times/year 2. Capex (Missabe): 2011 = $4.8 M, 2012 = $16.6 M, 2013 = $7.6 M, 2014 Plan = $3.9 M	
Emergency Response	1. Closest contractor Twin Cities MN - in progress to complete contract 2. Extensive community outreach including (location?) 3. Closest DGO in Stevens Point 4. GAP analysis complete 5. Propose to station transfer trailer at Duluth (estimate $220k) - request for funds in progress elsewhere	
Environmental	See commentary for Superior Sub environmental	
Other	Assess merits of implementing CTC on 50 miles Virginia-Nopeming Jct for broken rail protection, unauthorized movement, etc.	1A

Rainy Sub (Virginia to Fort Frances)		CATEGORY
Issues of Concern	DG volume - 97k carloads (29k crude oil), proximity to water, border crossing on significant bridge	
Existing WIS Sites	12-17 mile WIS spacing; 23 mile gap last Rainy Sub WIS Mile 155 to first Fort Frances Sub WIS (crew change inspection at Mile 164); DED at Mile 166.4	
Detection Enhancement	Existing sites sufficient	
Track/Structures Inspection Enhancement	1. In place: UFRD 16 tests/year (20 day winter, 30 day summer), TG 4 times/year 2. Capex: 2011 = $16.1 M, 2012 = $6.8 M, 2013 = $14 M, 2014 Plan = $18.9 M	
Emergency Response	1. Closest contractor Twin Cities MN - in progress to complete contract 2. Extensive community outreach including (location?) 3. Closest DGO in Stevens Point 4. GAP analysis complete 5. Propose to station transfer trailer at Duluth (estimate $220k) - request for funds in progress elsewhere	
Environmental	Cache of response equipment (storage container) located at Fort Frances	

Main Corridor – Fort Frances to Symington Yard

Fort Frances Sub (Duluth Jct. to Rainy River)		CATEGORY
Issues of Concern	DG volume - 97k carloads (29k crude oil), proximity to Rainy River, border crossing on significant bridge	
Existing WIS Sites	WIS 10-17 mile spacing, then 23 miles from Fort Frances to Sprague Sub; no WILD; DED at Mile 142	
Detection Enhancement	Existing sites sufficient	
Track/Structures Inspection Enhancement	1. In place: UFRD 13 tests/year (23 day winter, 37 day summer), TG 4 times/year (risk review indicates fewer in-service rail failures on Fort Frances as compared to Rainy Sub) 2. Capex: 2011 = $1.6 M, 2012 = $2.7 M, 2013 = $2.5 M, 2014 Plan = $12.6 M	
Emergency Response	1. Closest contractor Winnipeg 2. Extensive community outreach per SCEP 3. Closest DGO in Winnipeg 4. GAP analysis complete 5. Propose transfer trailer stationed at Winnipeg - estimate $220k (asked for funding elsewhere) 6. Canadian Pacific foam trailer accessible in Winnipeg	2
Environmental	Confirm contractor coverage, materials, supplies (info by end of week). Cache of response equipment (container) located at Fort Frances.	
Other	Consider clearance detector for Rainy River bridge (east side) Mile 140 - estimate $200k (to prevent LPS damage to Rainy River bridge)	2

Sprague Sub		CATEGORY
Reason	DG volume - 97k carloads (29k crude oil), proximity to Lake of the Woods	
Existing WIS Sites	WIS at 10-17 mile spacing, WILD at Mile 127, DED at Mile 2.6 for Rainy River bridge, 34 & 40 for Warroad River	
Detection Enhancement	Consider DED for Mile 142 (westbounds approaching Floodway and highways/parks)	1
Track/Structures Inspection Enhancement	1. In place: UFRD 13 tests/year (23 day winter, 37 day summer), TG 4 times/year 2. Capex: 2011 = $9 M, 2012 = $7.2 M, 2013 = $5.1 M, 2014 Plan = $6.6 M	
Emergency Response	1. Closest contractor Winnipeg 2. Extensive community outreach per SCEP 3. Closest DGO in Winnipeg 4. GAP analysis complete 5. Propose transfer trailer stationed at Winnipeg - estimate $220k (asked for funding elsewhere) 6. CP foam trailer accessible in Winnipeg	
Environmental	Confirm preparations, contractor coverage, materials, supplies (info by end of week). Cache of response equipment (container) located at Fort Frances.	
Other		

Key Feeder Routes – Chicago Metropolitan Area

Freeport Sub (Munger to downtown)		CATEGORY
Issues of Concern	DG volume - 113k carloads (38k ethanol, 20k crude oil) routed east of Munger	
Existing WIS Sites	None east of former EJE, approx 38 miles with no wayside detection within city	
Detection Enhancement	Plans updated to add WIS Mile 8 (2015), Mile 23 (2014) - already budgeted	
Track/Structures Inspection Enhancement	In place: UFRD Oct-Mar every 30 days, 8 inspection/year; TG twice/year; diamonds hand tested every 30 days (all of Chicago)	
Emergency Response	1. Contractor available for pressure & non-pressure incidents 2. Gap analysis completed for ERP equipment and personnel 3. Propose foam trailer equipment ($137k per trailer) (critical to mitigate flammable product fires)	2
Environmental	1. Spill trailer located at Bartlett (or vicinity) (from EJE mitigation plan) (2014) 2. Community outreach completed 3. Environmental mapping excercise completed	

Joliet Sub (Joliet to downtown)		CATEGORY
Issues of Concern	Online DG customers, adjacent Illinois River and canals, sensitive habitat present, Metra/Amtrak services	
Existing WIS Sites	None	
Detection Enhancement	Plan future capital for DED at Mile 19	1
Track/Structures Inspection Enhancement	In place: UFRD 6 tests/year, TG twice/year, diamonds hand tested every 30 days	
Emergency Response	1. Contractor available for pressure & non-pressure incidents 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago	
Environmental	No additional actions required	

Chicago Sub (Homewood to downtown)		CATEGORY
Issues of Concern	DG volume - 46k carloads including TIH/PIH, heavy population density, railroad grade separations, Amtrak service, adjacent Metra Electric and South Shore commuter operation	
Existing WIS Sites	None	
Detection Enhancement	Plan future capital for DED around Mile 10 (highway and railroad overpass)	1
Track/Structures Inspection Enhancement	In place: UFRD 15 tests/year (20 day winter, 30 day summer), TG twice/year	
Emergency Response	1. Contractor available for pressure & non-pressure incidents 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago 4. Hands-on ER training with City of Chicago Fire Department, Homewood & Markham Fire Depts (2013)	
Environmental	1. No additional actions required 2. Tree planting community project for public relations/goodwill underway	

Waukesha Sub (Schiller Park to Leithton)		CATEGORY
Issues of Concern	Metra corridor, high population density, proximity to O'Hare Airport	
Existing WIS Sites	DED at Mile 10.9, 14.1, 39, WIS at Mile 28, 44	
Detection Enhancement	Existing sites sufficient	
Track/Structures Inspection Enhancement	In place: UFRD 16 tests/year (18 day winter, 30 day summer), TG twice/year, diamonds hand tested every 30 days	
Emergency Response	1. Contractor available for pressure & non-pressure incidents 2. Gap analysis completed for ERP equipment and personnel 3. Foam trailer covered on Freeport Sub will serve all of Chicago 4. Hands-on ER training with City of Northbrook Fire Dept (2013), MABAS division, Vernon Hills, Wheaton.	
Environmental	No additional actions required	

Appendix 4 – Additional Commentary: Rainy Sub/Missabe Sub Traffic Control between Duluth and Virginia

The current operation on 60 miles of core main line between Nopeming Jct. (near Duluth) and Shelton Jct. (near Virginia) Minnesota uses a pair of subdivisions to provide directional running. The arrangement is similar to a double-track railroad although there is no provision to cross-over between the two tracks at any point. The directional running arrangement allows for the through Winnipeg-Chicago traffic to operate without making meets and has allowed for the avoidance of cost to construct long sidings in this area.

However, this core main line segment does not feature CTC signalling. It has now become the only substantial segment of track outside of a yard where CTC is not employed to direct and supervise railroad operations on the core main line portion of the CN network. Trains and other movements are governed as follows:

- Northbound Trains
    - Operate via Superior Sub (Nopeming Jct – Adolph) and Missabe Sub (Adolph-Shelton Jct.)
        - CTC utilized on the Superior Sub and at select siding turnout locations plus 10 miles from Fairlane to Shelton Jct. on the Missabe Sub
        - Written Track Authority required for remainder of territory between siding locations
        - Northbound trains do not have signal protection for following trains or broken rail notification

- Southbound Trains
    - Operate via Rainy Sub (Shelton Jct. – Nopeming Jct.)
        - Written Track Authority required for all movements on this territory
        - No signal protection for following movements or broken rail notification
        - Switch position indicator signals at siding locations only

All trains carrying loaded crude oil tank cars and loaded LPG tank cars are operating in the southbound direction. This means that this type of DG traffic is operating on non-signalled track for 60 miles between Virginia and Duluth. The RTC has no indication to tell them where exactly a train is located, if it is moving, or if it is causing broken rails and/or the train may encounter a track condition that is creating a track circuit problem. Similarly, a train crew operating on this track has no knowledge of any issue that would ordinarily cause signals to revert to 'stop' or 'proceed at restricted speed' such as a broken rail.

This issue has been flagged for further review for the following reasons:

- 2013 statistics indicate 97,000 carloads of dangerous goods operated on this territory, with 29,000 carloads of crude oil alone operating southbound on the Rainy Sub
- High profile traffic is now operating extensively on a territory with no visibility and no continuous notification of potential defective track
- CTC is not necessarily warranted for traffic management of meets, etc., however it is the only system that provides crew and RTC warning of potential track issues at a given moment in time
- Potential high cost to install CTC

While the operational advantages of the directional running in this area are substantial the lack of signal protection on such a high tonnage (and further growing) corridor needs careful consideration. At a minimum some sort of broken rail detection and crew notification is highly recommended if this corridor will remain prominent as a growth area for crude oil (and other dangerous commodity) business.

Corridor Risk Assessment
Montreal – Halifax
23-June-2014

Summary

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN evaluated the risk associated with CN's operation of dangerous goods on the Montreal to Halifax corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Montreal-Halifax corridor, and from that review, identified items of vulnerability that required additional examination. Accordingly, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas. The following table summarizes the resultant risk mitigation initiatives and preliminary cost.

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
St. Laurent	143	St. Laurent	WIS	$100k	Reduce existing 23-mile gap for loaded crude train inspections between Mile 17 Kingston Sub and RDP	1
Drummondville	13	Trudel	WIS	$100k	Reduce existing 30-mile gap for loaded crude train inspections between Mile 22 Drummondville Sub and Mile 102 Montmagny Sub	2
Drummondville	78	St. Leonard	DED	$30k	Protect east side of Nicolet River bridge	2
St. Hyacinthe	44	St. Hyacinthe	DED	$30k	Protect west side of city and Yamaska River bridge	2
		Moncton	Fire fighting trailer	$135k	Existing trailer located in Toronto - Improve response time for incidents east of Quebec City	2
Bedford	12	Bedford	DED	$30k	Protect bridge over Bedford Basin inlet and local streets	3
Bedford	61.3	Truro (East)	WIS	$100k	Relocate existing WIS 61.3 to Mile 59 (move to provide better protection for Town of Truro east side)	3
Springhill	80	Sackville	DED	$30k	Protect east side of sensitive Tantramar Marshes	3
Springhill	89.5	Sackville	DED	$30k	Protect west side of sensitive Tantramar Marshes	3
Pelletier	80	Riviere du Loup bridge	DED	$30k	Protect east side of significant bridge	3
		Edmundston	Environmental cache	$50k	Provide response for Napadogan and Pelletier Subs	3

Introduction

For the purposes of this risk assessment, the Montreal – Halifax corridor has been defined as the trackage making up the primary freight routes between these cities. The route is made up of eight different subdivisions and all of them are under CTC operation. This route provides a vital link between eastern Canada and the customers and ports located in Atlantic Canada. The majority of the route is single-tracked, with double track in service near Montreal. VIA Rail provides intercity passenger train operation on this corridor with high frequency service between Montreal and Quebec City plus long distance service on 2-3 times weekly basis east of Quebec City to Halifax. No passenger trains are operated on the Pelletier and Napadogan Subdivisions.

The corridor extends through territory varying from densely populated urban areas to highly remote areas with minimal population. Most of the corridor is paralleled by roadways except for the 180-mile segment of the Napadogan Sub between Moncton and Plaster Rock NB. The chances of environmental consequences are greatest east of Quebec City where the corridor parallels major rivers and numerous other lakes and small water bodies. There are a limited number of substantial bridges on the route, including a major structure spanning the St. Lawrence River near downtown Montreal.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, First Nations lands, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. GIS maps of the corridor used during the review are included in Appendix 1. The prominent items of vulnerability were tabulated and are found in Appendix 2.

Current mitigations on the route include the following:

- WIS locations at approximately ten to fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Montreal, Joffre, Moncton, and Halifax, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals of 20-60 days in the winter and 30-90 days in the summer, with the highest frequency of inspection occurring on the Montreal-Quebec City segment where passenger operations are prominent.
- The geometry car operates over the corridor approximately three to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Risk Review

A review of GIS mapping and aerial photography generated a master table of risk and vulnerability features (see Appendix 2). The results of the mapping review were summarized by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Table 1 provides a summary of vulnerability ranking points by mileage group and the resulting areas of interest.

Table 1 – Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Halifax to Montreal Main Line Corridor																
Bedford Sub																
0	2			1	2		1	1	4			2		3	16	Halifax
10	4				2		2								8	
20	7						3								10	
30	2	1			1		2								6	
40	4	2			3		1								10	
50	1	2			1		1								5	
60	1		1		1			1					1	2	7	
Springhill Sub																
0	3				1		4						1	1	10	
10	2				1		2								5	
20	1				1										2	
30	3						1								4	
40	3				1		2								6	
50															0	
60	3						1								4	
70	2	1			2		2	1							8	Sackville
80	5	1			3		3	1							13	Marshes
90	1														1	
100	1	2													3	
110	3				2		2								7	
120	1		1		4		5	1						1	13	Moncton
130					1		1							1	3	
Napadogan Sub																
0	1														1	
10	1						1								2	
20	1														1	
30															0	
40	3	1					1								5	
50	1						1								2	
60															0	
70	2						1								3	
80	1														1	
90															0	
100	2														2	
110	4						1							1	6	
120	2						1								3	
130															0	
140															0	
150	1	1					1							1	4	
160	2				1										3	
170	3						3								6	
180	1	1			3		2								7	
190	4	1					1		1		1			1	9	St. John
200	4				2		2								8	River
210	8		1		2		4					1		1	17	Valley
Pelletier Sub																
0	1				1										2	
10	4				1		1							1	7	
20	4				2									1	7	
30	5				1										6	
40	1	1			1		1								4	
50	2	1			2		2							2	9	
60	3				1		1								5	
70	2						1		1						4	
80	1						1								2	
Montmagny Sub																
0	1		1					1						1	4	
10		1													1	
20	2	1					1								4	
30	1						1						1		3	
40		1			1			1							3	
50	1				1		1								3	
60	2						1								3	
70															0	
80	2		1		1		3	1							8	
90					1										1	
100	1	1			1		1								4	
110	1			1	1		2					1			7	Joffre

Table 1 – Vulnerability Ranking by Mileage Group (*Continued*)

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Drummondville Sub																
10	2			1	2		3	1	1						10	Joffre
20		1													1	
30	1	1			2		1								5	
40	2				2		2								6	
50	3														3	
60	1						1								2	
70	1				1		1					1			4	
80	2	1					2		1				1		7	
90	1		1		1		1								4	
100	4				1		3	1						1	10	
110	1	1													2	
120	1		1		2										4	
St. Hyacinthe Sub																
40	1		1		2		2	1			1	1	1		10	
50	2	3	2		3		3	2				1			16	
60			2	1	1		2	3			1			1	11	
70	2				4	1	4	1				2		3	17	
Montreal Sub																Montreal
0	1			1	4	1	9		3					2	21	Metro
10					2	1	1	2			1				7	Area
St. Laurent Sub																
130				1	3		5	2	4			1	2	1	19	
140					3	3	5	2	2			1		1	17	

As a result of the complicated nature of the risk factors along this corridor, each subdivision was examined in detail using the vulnerability ranking above and comparing to existing mitigation features such as detector sites, track inspection procedures and incident response capability. In addition to the main corridor, the following important feeder route was also reviewed for potential risks:

- St. Laurent Sub between Taschereau Yard and Rivieres-des-Prairies in Montreal

The specific items of interest along with a localized risk review for each of the subdivisions is included in Appendix 3. To provide an example of the subdivision review results, the following tables provide the focus issues and risk mitigations specific to the Drummondville Subdivision.

Table 2 – Drummondville Subdivision Risk Factors and Mitigations

Drummondville Sub		CATEGORY
Issues of Concern	1. DG volume - 90000 loads (diesel, jet fuel, gasoline, LPG)	
Existing WIS Sites	1. Existing DED Mile 90.89 (St Cyrille), Mile 99.1 (Drummondville W.) 2. WILD at Mile 117.2 3. 15 mile spacing for WIS	
Detection Enhancement	1. Proposed DED Mile 78 (Nicolet River bridge east) 2. Propose WIS Mile 13 (cut down 30 mile spacing for oil trains if not stopping at Joffre)	2
Track/Structures Inspection Enhancement	URFD - every 40 days summer, 30 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), CP trailer in Toronto	
Environmental	1. Equipment Cache: Montreal 2. E2MS mapping not completed 3. Personnel - Toronto (2) (one current, one planned), Montreal (2) (one current, one planned) 4. Evaluate contractor coverage and audit (from Quebec) 5. Federal responders (on-water) ECRC in Matane	

Risk Mitigation

Overall, it was determined that the corridor has generally good wayside inspection system spacing. There are certain areas where supplemental dragging equipment detection is proposed to protect vulnerable bridges and alignments near waterways. Track inspection is being undertaken at better than minimum intervals and track geometry measurements are completed at the required frequency.

Two WIS locations have been proposed to accommodate the new unit train flows of crude oil that bypass certain yards. These sites are:

- Mile 143 St. Laurent Sub
    - Protects unit crude oil trains that bypass Taschereau Yard and currently operate approximately 25 miles without wayside electronic inspection
- Mile 13 Drummondville Sub
    - Protects unit crude oil trains that bypass Joffre Yard and currently operate approximately 29 miles without wayside electronic inspection

Some further mitigation is required in the areas of dangerous goods and environmental response. The addition of a firefighting trailer at Moncton is recommended to assist in the suppression of flammable goods fires and to reduce the existing response time of 12 or more hours for incidents in New Brunswick and Nova Scotia. A cache of environmental response equipment is recommended for installation at Edmundston.

Summary of Proposed Opportunities and Category Ranking

While there are many risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities, including enhanced response in event of an incident, across the corridor. The risk mitigation opportunities are presented below in Table 3.

Each mitigation item has been given a category rank. For the purpose of this risk assessment, the categories have been defined as follows.

- Category 1
    - Recommended for immediate implementation (high risk and/or modest cost)
- Category 2
    - Recommended for funding and implementation if additional funding identified in 2014, otherwise top priority for funding in 2015
- Category 3
    - Recommended for future implementation in 2016 or later.

Table 3 – Proposed Risk Mitigation Strategies

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
St. Laurent	143	St. Laurent	WIS	$100k	Reduce existing 23-mile gap for loaded crude train inspections between Mile 17 Kingston Sub and RDP	1
Drummondville	13	Trudel	WIS	$100k	Reduce existing 30-mile gap for loaded crude train inspections between Mile 22 Drummondville Sub and Mile 102 Montmagny Sub	2
Drummondville	78	St. Leonard	DED	$30k	Protect east side of Nicolet River bridge	2
St. Hyacinthe	44	St. Hyacinthe	DED	$30k	Protect west side of city and Yamaska River bridge	2
		Moncton	Fire fighting trailer	$135k	Existing trailer located in Toronto - improve response time for incidents east of Quebec City	2
Bedford	12	Bedford	DED	$30k	Protect bridge over Bedford Basin inlet and local streets	3
Bedford	61.3	Truro (East)	WIS	$100k	Relocate existing WIS 61.3 to Mile 59 (move to provide better protection for Town of Truro east side)	3
Springhill	80	Sackville	DED	$30k	Protect east side of sensitive Tantramar Marshes	3
Springhill	89.5	Sackville	DED	$30k	Protect west side of sensitive Tantramar Marshes	3
Pelletier	80	Riviere du Loup bridge	DED	$30k	Protect east side of significant bridge	3
		Edmundston	Environmental cache	$50k	Provide response for Napadogan and Pelletier Subs	3

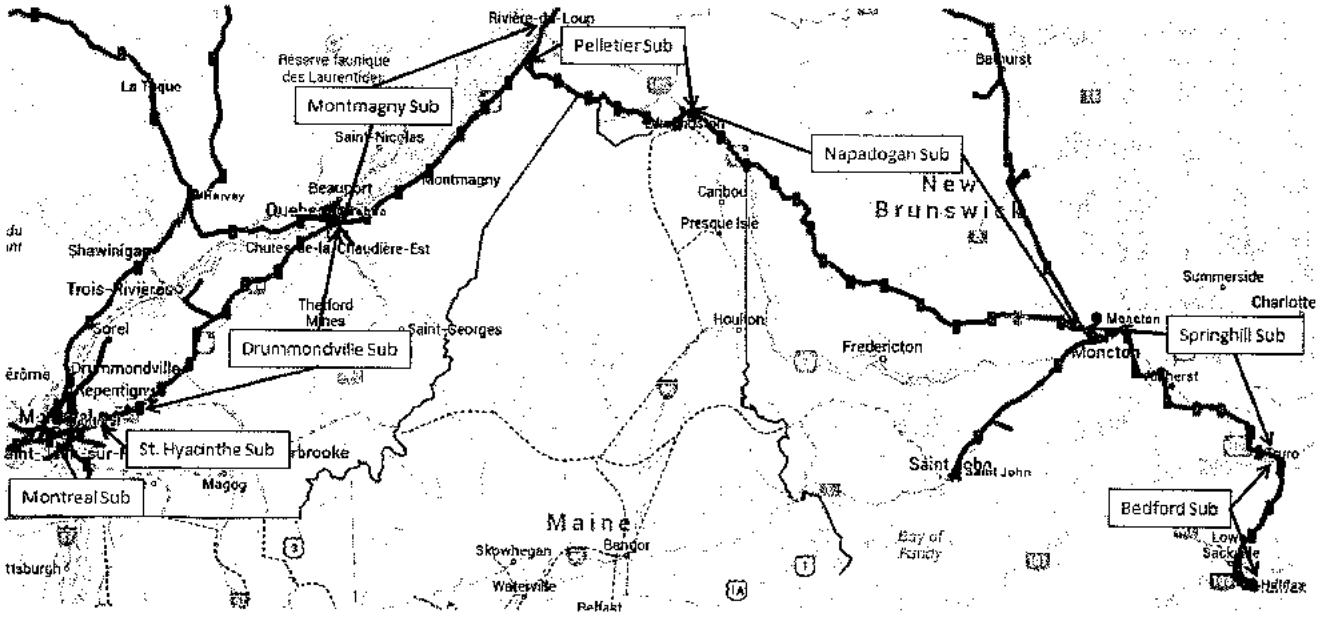
The immediate 'category 1' mitigation item consists of one WIS representing an approximate expenditure of $100,000. This cost can be managed by locating this equipment near existing signal sites with electrical power readily available. The emergency response and environmental initiatives will help to control CN's exposure in the event an incident was to occur. At this time, there does not appear to be any high capital cost solutions (i.e. track relocation) that will provide a higher probability of risk reduction than the solutions noted above.

Appendix Material

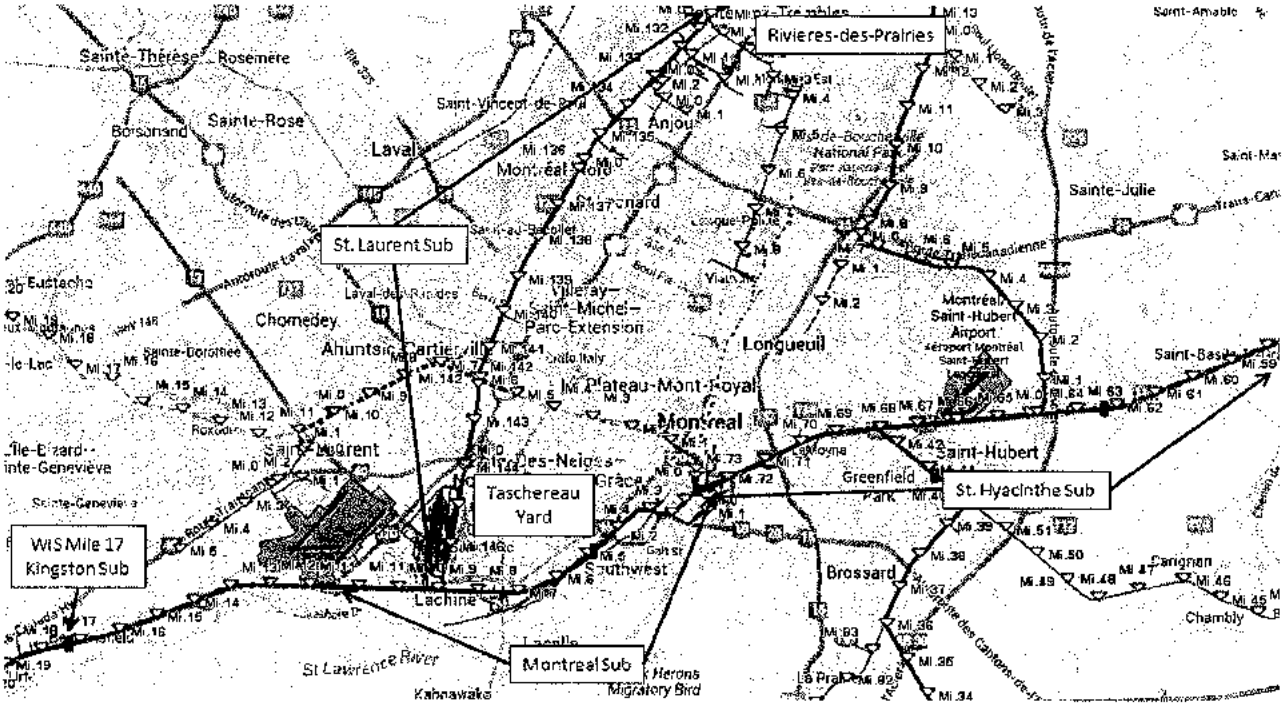
- Maps of Montreal – Halifax corridor
- Vulnerability Details Table
- Subdivision Risk Review Tables

Appendix 1 – Maps of Montreal-Halifax Corridor

Map 1 – Corridor Overview



Map 2 – Montreal Area Detail



Appendix 2 – Vulnerability Details Table

The following seven (7) pages contain the tables of risk areas and vulnerable structures that were obtained through an overall map and aerial photography review of the Montreal-Halifax corridor. Each risk item was categorized by type and areas with the greatest number of risks became focus areas for further review of detection, operations procedures and emergency response.

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Stucture	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Halifax to Montreal Corridor																
Bedford Sub																
0	0-16				X											Halifax Metro area
0	0	X							X	X			X			VIA Halifax station, adjacent to Bedford Basin, historical district, yard trackage
0	0.5														X	Halifax Ocean Terminal container port and grain facilities
5	2.5									X						Parkland both sides
5	3									X						Parkland both sides
5	3.5														X	Major shopping mall adjacent
5	4.8					X		X								Bedford Highway overpass
5	4.9														X	CERES container port adjacent
5	5-10.7	X														Bedford Basin parallel
5	5.0-8.2					X										Bedford Highway parallel
5	5.5												X			Rockingham yard
6	6.8-7.0									X						Parkland both sides
10	10.7	X						X								Sackville River and Shore Drive bridge
15	12.5	X														Lily Lake parallel
15	13-14	X														Rocky Lake parallel
15	14.7					X		X								NS 102 highway overpasses
15	16-17.3					X										Windsor Jct. Road parallel
15	16.3	X														Third Lake parallel
20	18-20	X														Kinsac Lake parallel
20	20.2	X						X								Beaverbank River bridge
20	21.5	X						X								Rawdon River bridge
20	22.4	X						X								Shubenacadie Stream bridge
25	24.5-25.9	X														Shubenacadie Grand Lake parallel
25	26-26.6	X														Shubenacadie Grand Lake parallel
25	27.2	X														Shubenacadie Grand Lake parallel
30	29.4	X				X		X								Shubenacadie Stream bridge with NS 102 highway overpass above
30	31		X													Village of Elmsdale
30	32.4	X						X								Nine Mile River
40	38.4		X													Village of Milford
40	38.9	X														Shubenacadie River parallel
40	39.5	X														Shubenacadie River parallel
40	41-42.5					X										Road 2 parallel
45	42.5	X						X								Shubenacadie River (multi span)
45	43	X														Shubenacadie River (multi span)
45	43-46.3					X										Road 2 parallel
45	44					X										NS 102 parallel
45	47		X													Village of Stewiacke
50	48.7	X						X								Stewiacke River bridge (multi span)
50	51.2		X													Village of Alton
55	56		X													Village of Brookfield
55	56.8-58					X										Road 2 parallel
60	59-60					X										Road 2 parallel
60	60	X														Series of small bridges over Lyda River
65	63													X	X	Industrial facilities adjacent - feed and propane suppliers
65	64			X					X						X	Town of Truro, VIA station, adjacent shopping centres
Springhill Sub																
0	0.5	X						X								Salomon River bridge
0	1														X	Racetrack adjacent
0	1.1													X		Stella Jones creosoting plant adjacent
0	2.0	X						X								North River bridge
6	3.2					X		X								NS 104 highway overpasses

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Springhill Sub (continued)																
5	7.3	X						X								Belmont River bridge
10	11.4	X						X								Debert River bridge
15	14.5	X				X		X								Folly River bridge (steel trestle multi span) and NS 4 highway
25	23.5	X														Folly Lake parallel
25	23.5-26					X										NS 4 parallel
35	34.3	X						X								Westchester River bridge
36	35	X														Wetlands/streams adjacent
35	37-38	X														Wetlands/streams adjacent
40	39.2					X		X								NS 104 highway overpasses
40	40-41	X														Wetlands/streams adjacent
45	45	X														Wetlands/streams adjacent
45	47.1	X						X								Philips River bridge
60	57.5	X														Wetlands/streams adjacent
65	62.9	X						X								Little Forks River bridge
65	67.2	X														Wetlands/streams adjacent
70	67.5-69.1					X										NS 302 road parallel
70	70	X														Maccan River parallel
75	72.8	X						X								Napan River bridge
75	75					X		X								NS 104 highway overpasses
75	76.8		X						X							Town of Amherst, VIA passenger station
80	77.5-78.3					X										Old Trans Canada parallel
80	77.7	X														Laplanche River
80	78.3					X		X								NS 104 highway overpasses
80	80.1	X						X								Missiquash River bridge
80	82	X														Wetlands
85	83-85.6	X														Tantramar Tidal marshes/wetlands
85	83-85.5					X										NB 104 parallel
85	85.6	X						X								Tantramar River bridge (multi span through truss)
85	86.7		X						X							Town of Sackville, VIA passenger station
95	96.3	X														Palmer Pond causeway
100	100-101	X														Tidal marshes/wetlands
105	103.5		X													Village of Dorchester
105	105.6		X													Village of Memramcook
110	108	X														Memramcook River parallel
110	108.6					X		X								NB 2 Trans Canada highway overpasses
110	109-111.2	X														Memramcook River parallel
110	111.2							X								Memramcook River bridge
115	114-116					X										NB 2 Trans Canada highway parallel
115	116.8	X														Wetlands
120	117-131			X												Moncton urban area
120	117.5					X		X								NB 15 overpasses
120	119.3					X		X								NB 2 Trans Canada highway parallel
125	123.7	X						X								Hells Brook bridge
126	123.8					X		X								Wheeler Blvd. Bridge
126	124.5														X	Downtown Moncton immediately adjacent
125	125								X							VIA passenger station
125	126.9					X		X								Bridges over Causeway Traffic Circle
130	128-129														X	Industrial parks adjacent
135	132.7					X		X								NB 2 Trans Canada highway overpasses

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Napadogan Sub																
5	2.5	X														Wetlands
10	10.9	X						X								Canoan River bridge
20	19	X														Wetlands
40	38.8	X														Wetlands
40	41.3	X														Wetlands
45	46		X													Village of Chipman
45	46.2	X						X								Salmon River bridge (multi span deck truss)
55	58.4	X						X								Newcastle Brook bridge (multi span steel trestle)
70	69	X														Wetlands
70	70.9	X						X								Cains River bridge
80	81.2	X														Stream/wetlands
105	106	X														Wetlands
105	107	X														Napadogan Lake parallel
110	112	X														Wetlands
115	113.8	X						X								Miramichi River bridge
115	114.8														X	Irving Deersdale lumber mill adjacent
115	115.1	X														Miramichi River parallel
115	117-118.2	X														Miramichi River parallel
120	122.1	X						X								Miramichi River bridge
125	123.2	X														Juniper Brook and wetlands
150	149-152														X	Forest Service Road parallel (private road)
155	154.1	X						X								Tobique River bridge (multi span deck truss)
155	154.7		X													Village of Plaster Rock
160	159-161.6					X										NB 385 Road parallel
165	163.4	X														Small river crossing
165	166.5	X														Blue Bell pond causeway
170	169.2	X						X								Graham Brook bridge
170	170.5	X						X								Cantin Brook bridge (multi span steel trestle)
175	173.2	X						X								Little Salmon River bridge (3580' multi span steel trestle) also over road
180	180.5	X						X								Little River bridge (multi span steel trestle)
180	181.7-183					X										Waddell Road parallel
185	182.5		X													Town of Grand Falls
185	183.5					X		X								NB 2 Trans Canada highway bridge
185	189-191					X										NB 144 (Old Trans Canada highway) parallel
195	193	X														St. John River parallel
195	194.1		X							X	X				X	Village of St. Leonard, riverfront park adjacent, Canada border xing office adjacent
195	194.2	X														St. John River parallel
195	196.1	X						X								Grand River bridge
195	197-198	X														St. John River parallel
200	198.5	X						X								Siegas River bridge
200	200-202					X										NB 144 (old Trans Canada highway) parallel
200	200-203	X														St. John River parallel
200	202.4	X						X								Quisibis River bridge
205	203-208.5					X										NB 144 (old Trans Canada highway) parallel
205	205-208	X														St. John River parallel
210	208.5	X						X								Green River bridge
210	210	X														St. John River parallel
210	211-213.5					X										NB 144 (old Trans Canada highway) parallel
215	212.5	X														St. John River parallel
215	214.5	X														St. John River parallel
215	216	X														Wetlands
215	216.5	X						X								Iroquois River bridge
215	217-218.4	X														St. John River parallel
215	218.8	X						X								Madawaska River bridge
215	219.3					X		X							X	International Road Bridge overhead, Canada border xing office adjacent
215	219.4			X									X			Town of Edmundston, yard

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Pelletier Sub																
0	0-5	X														St. John River parallel
5	7-11					X										NB 120 parallel
10	7.5	X														St. John River parallel
10	10	X														St. John River parallel
10	10.6														X	Bowater lumber mill adjacent
10	11.2	X														St. John River parallel
15	12.9	X						X								Baker Brook bridge
15	12.5-14					X										NB 120 parallel
20	19.5	X														Lac Caron parallel
20	20.5-25.5					X										NB 120 parallel
20	20.6	X														Baker Lake village pond adjacent
20	21-25	X													X	Baker Lake parallel, significant number of summer homes in area
25	25-27	X														Ponds/wetlands
25	27-28					X										QC 289 parallel
30	27.8	X														Ponds/wetlands
30	29.0	X														Ponds/wetlands
30	30.0	X														Ponds/wetlands
35	32-35	X														Lac Long parallel
35	34.5-42					X										QC 289 parallel
35	37-41	X														Lac Long parallel
45	43.5					X										QC 289 parallel
45	46.0		X													Village of Riviere-Bleue
45	48.3	X						X								Riviere-Bleue bridge
50	50-51.5					X										QC 289 parallel
50	52.1	X						X								Ruisseau Nigger bridge
55	53.5-55.6					X										QC 289 parallel
55	56.0		X													Village of Estcourt
55	55.4	X						X								Riviere St Francois bridge
55	55.4-55.7														X	USA-Canada border along south edge of ROW
55	56.0														X	Irving lumber mill adjacent
60	62.0	X						X								Riviere Boucanes bridge (multi span steel trestle) (DEDs each side)
65	64.9	X														Ponds/wetlands
65	65.5	X														Ponds/wetlands
65	65-68					X										QC 289 parallel
70	69-77									X						Quebec provincial park
70	69.7	X														Riviere Rocheuse crossing
75	73.8	X						X								Riviere Fourchue bridge
85	82.9	X						X								Riviere du Loup bridge (multi span steel trestle)
Montmagny Sub																
0	0	X		X					X						X	Town of Riviere-du-Loup, RDL river parallel, VIA station, paper mill adjacent
10	11.6		X													Village of St-Alexandre
25	24.3	X														Stream/wetlands
25	25.4		X													Village of St-Pascal
25	28.6	X						X								Riviere Kamouraska bridge (river parallels track before flowing thru bridge)
30	31													X		Co-op feed/fertilizer facility adjacent
35	36.6	X						X								Riviere Ouelle bridge
40	37.9-38.4					X										QC 230 parallel
40	41		X						X							Village of La Pocatiere, VIA station
50	49.9	X														Stream/wetlands
55	55.1							X								Autoroute 20 bridge
55	55.1-63					X										Autoroute 20 parallel
60	59.5	X						X								Riviere Trois-Saumons bridge
65	63.6	X														Riviere la Tortue crossing
80	77.5	X						X								Riviere Bras St-Nicolas bridge

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Montmagny Sub (continued)																
80	77.6	X						X								Rivière du Sud bridge (multi-span)
80	78.1			X					X							Town of Montmagny, VIA passenger station (DEDs either side of town)
80	78.9					X		X								Autoroute 20 overpass
90	88-91					X										Autoroute 20 parallel
100	97.5	X						X								Rivière Boyer bridge
100	100.1					X										QC 218 parallel
100	101		X													Village of St-Charles
110	109					X		X								QC 173 overpass
110	111	X						X								Rivière Etchemin bridge (multi-span)
115	114-118				X											City of Levis metro area
115	115-118												X			Jeffro yard and related facilities
115	117									X						City park adjacent
Drummondville Sub																
10	8-10				X											City of Levis metro area
10	8.1								X							VIA Charny passenger station
10	8.7					X		X								Autoroute 73 bridge
10	9	X						X								Rivière Chaudière bridge (multi span deck truss)
10	9.1									X						Park / Baseball field adjacent
15	10-28.8					X										Autoroute 20 parallel
15	15.8	X						X								Rivière Aulneuse bridge
20	21		X													Town of St-Apollinaire
30	28.5		X													Village of Launer
30	30-31					X										Autoroute 20 parallel
35	36	X						X								Rivière Henri bridge
35	37-39.9					X										3rd Rang Road parallel
40	39.9	X						X								Rivière du Chene bridge
40	40.5-41.5					X										Rue d'Eglise parallel
40	42-43	X														Wetlands
45	44.1					X		X								Autoroute 20 overpass
50	47.5	X														Irrigation ponds adjacent
50	49-50	X														Wetlands
50	52.4	X														Petite Rivière du Chene crossing
65	66.8	X						X								Rivière Becancour bridge (multi span)
70	72.4												X			Aston Jct. yard and loco tie-up location
75	75.5	X														Stream/wetlands
75	78.6					X		X								Autoroute 55 overpass
80	80		X													Town of St-Leonard d'Aston
80	80.1									X						Baseball park adjacent
80	80.4	X						X								Rivière Nicolet bridge (multi span steel trestle)
85	86.1	X						X								Rivière Nicolet West bridge (multi span)
85	87.2													X		NutriExpert feed/fertilizer facility adjacent
90	89.9					X		X								Autoroute 20 overpass
90	91.7	X														Stream/wetlands
95	96-100.5			X												City of Drummondville
100	97.8	X						X								Rivière St-Francois bridge (multi span)
100	99.3								X						X	VIA Drummondville station, downtown area adjacent
100	100.5					X		X								Autoroute 55 overpass
100	101.6	X						X								Riviere St-Germaine bridge
105	103.4	X														Irrigation ponds adjacent
105	107	X														Irrigation ponds adjacent
110	107.6	X														Irrigation ponds adjacent
115	114.4		X													Village of Bagot
120	119-121					X										Autoroute 20 parallel
120	121-124					X										QC 116 parallel
120	122.4	X														Rivière Delorme crossing
120	124-125			X												City of St-Hyacinthe (St-Rosalie area)

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
St. Hyacinthe Sub																
40	38.7													X		Co-op feed/fertilizer facilities adjacent
40	38-42			X												City of St-Hyacinthe
40	39-40.4					X										QC 116 parallel
40	40.4							X								QC 116 bridge
40	40.5	X						X								Riviere Yamaska bridge (multi span with central through truss)
40	40.7												X			St-Hyacinthe yard
40	40.9								X							VIA St-Hyacinthe station
45	44											X				St-Hyacinthe airport
45	46.5-52					X										QC 116 parallel
50	48		X													Village of Ste-Madeleine
50	49	X														Rivière des Hurons crossing
50	51												X			AMT commuter train yard
50	52-54			X												Town of St-Hilaire
50	52.3					X		X								Grande Allee overpass
60	62.4								X							AMT St-Hilaire station
65	53.8					X		X								QC 116 bridge
65	54-55.2		X													Town of Otterburn Park
65	56.2	X						X								Riviere Richelieu bridge (multi span deck truss)
65	55.2-56			X												Town of Beloeil
65	56-58					X										QC 116 parallel
55	56.6		X						X							Town of McMasterville, AMT station
60	58.2														X	Hydro Quebec substation adjacent
60	60.2			X					X							Town of St-Basile le Grand, AMT station
60	61.4							X								QC 116 overpass
65	63.5					X		X								Autoroute 30 bridge
65	63.8			X					X							Town of St-Bruno de Montarville, AMT station
65	64-74				X											Montreal metro area (includes St-Hubert and St-Lambert)
65	66											X				St-Hubert airport
65	66.4								X							St-Hubert AMT station
70	68.4												X			Southwark yard
70	69.1					X		X								Taschereau Boulevard overpass
70	70.2								X							VIA and AMT St-Lambert stations
70	70.5					X		X								Autoroute 15 bridge
70	70.8	X						X							X	Lift Bridge at St. Lawrence Seaway channel
70	70.8-72.6	X				X		X								Victoria Bridge (St. Lawrence River) (multi span through trusses) including roadway on either side
70	71.7														X	Diversion track junction switches on bridge and roadway overpass
70	72					X										Bonaventure Expressway bridge
70	72.3						X								X	Diamond with VIA MMC yard lead (on freight connection tracks to Montreal Sub)
70	72.4												X			Pointe St. Charles yard
Montreal Sub																
0	0-11				X											Montreal urban area
0	1.7							X								Wellington Street bridge at junction switches
5	2.5									X						Park/baseball diamond adjacent
5	2.6							X								Atwater Street bridge
5	2.65					X										Autoroute 20 parallel
5	2.8	X						X		X						Lachine Canal bridge and parks corridor
5	3.2							X								Notre Dame Street bridge
5	4.23					X		X							X	Turcot Autoroute interchange tunnel and bridge structure
5	4.2-6.2					X										Autoroute 20 parallel (trackage in median)
5	5.6							X								Boulevard Agrignon overpass/interchange
5	6.3					X		X							X	QC 138 tunnel/overpass structure
5	6.7							X								St Jacques overpass
5	7.3									X						Local park adjacent
5	7.4						X	X								CP Adirondack Subdivision overpass
10	8-11					X										Autoroute 20 parallel
10	9.3					X		X								Autoroute 15 bridges
10	9.9-11						X									CP Vaudreuil Sub parallel
10	10								X							AMT Lachine commuter station adjacent on CP
10	11.6								X			X				VIA Dorval passenger station; AMT Dorval commuter station/bus terminal adjacent on CP; Trudeau Airport nearby

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
St Lazarent Sub																
130	127.6-145				X											
130	127.8									X						Montreal urban area
130	128-129									X						Sports complex and green space parkland
130	129					X		X								Green space parkland
130	130.1														X	Autoroute 40 bridge
130	130.5													X		Correctional facility adjacent
130	131.6													X		Shell Canada petroleum storage tank facility
130	132.4									X						Sanimax chemical plant adjacent
135	132.8												X			Parkland north side
135	132.9									X						Rivieres des Prairies yard
135	133.6							X								Sports park adjacent
135	134.2								X							Boulevard Armand Bombardier overpass
135	134.3					X		X								AMT commuter station (opening 2015)
135	134.8							X								Autoroute 25 bridge
135	135.6								X							Henri Bourassa concrete box bridge
135	136.3-137					X										AMT commuter station (opening 2015)
135	137-141							X								Boulevard industrial parallel
140	138.3									X						11 bridges over various major streets
140	139.9														X	Parc Gabrielle-Lalement / sports field
140	139.5								X							Hydro Quebec substation
140	140								X	X						VIA Ahuntsic passenger stop
140	140.7						X	X								AMT commuter station (opening 2015), Parc Henri-Julien
140	141.2					X		X								CP Parc Subdivision bridge
140	141.8						X	X								Autoroute 15 bridge
145	143.1					X		X								AMT Deux Montagnes Subdivision bridge
145	143.6					X		X								CC 117 (Marcel-Laurin) bridge
145	144.2-147												X			Autoroute 40 (Metropolitan) and service roads overpasses
145	145-147						X									Taschereau Yard facilities
																CP St. Luc Yard parallel

Appendix 3 – Subdivision Risk Review Tables

Bedford Sub		CATEGORY
Issues of Concern	1. DG volume - 9600 loads (mixed loads, flammable liquids) 2. Proximity to Bedford Basin (outlet to Atlantic Ocean/Halifax Harbour) (5 miles of main track plus Rockingham Yard)	
Existing WIS Sites	1. No Existing DED sites 2. No WILD sites 3. WIS at 15 mile spacing	
Detection Enhancement	1. Proposed DEDs at Mile 12 (Bedford bridge) 2. Consider relocation of WIS Mile 61.3 to Mile 59 (current site within Town of Truro)	3
Track/Structures Inspection Enhancement	URFD - every 90 days summer, 60 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in St. John NB (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal (8-9 hours response in good weather) 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), Irving (St. John) 6. Cache of basic DG reponse tools in Moncton (PPE and hand tools)	
Environmental	1. Equipment Caches: Moncton and Halifax 2. E2MS mapping not completed 3. Personnel - Halifax (1), Toronto (2) (one current, one planned) 4. Evaluate contractor coverage and audit 5. Federal responders (on-water) ECRC in Halifax	

Springhill Sub		CATEGORY
Issues of Concern	1. DG volume - 33800 loads (flammable liquids, flammable compressed gas, mixed loads) 2. Location of track adjacent to Bay of Fundy marshes near Sackville	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. 15 mile spacing for WIS	
Detection Enhancement	Proposed DEDs at: Mile 80 and Mile 89.5 (by intermediate signals) for Sackville/Tantramar Marshes	3
Track/Structures Inspection Enhancement	URFD - every 90 days summer, 45 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in St. John NB (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal (8-9 hours response in good weather) 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), Irving (St. John) 6. Cache of basic DG reponse tools in Moncton (PPE and hand tools)	
Environmental	1. Equipment Caches: Moncton and Halifax 2. E2MS mapping not completed 3. Personnel - Halifax (1), Toronto (2) (one current, one planned) 4. Evaluate contractor coverage and audit 5. Federal responders (on-water) ECRC in Halifax	
Other	Review any potential train handling issues with 1.1% descending grades	

Napadogan Sub		CATEGORY
Issues of Concern	1. DG volume - 33100 loads (crude oil, gasoline, LPG) 2. Substantial bridges Mile 170-180	
Existing WIS Sites	1. Existing DED Mile 170.9/175.3 (Salmon R. Trestle) 2. WILD at Mile 26.8 3. 15-20 mile spacing for WIS	
Detection Enhancement	None	
Track/Structures Inspection Enhancement	URFD - every 90 days summer, 45 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in Montreal QC and St. John NB (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal (8-9 hours response in good weather) 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), Irving (St. John) 6. Cache of basic DG reponse tools in Moncton (PPE and hand tools)	
Environmental	1. Equipment Caches: Moncton, review need for cache in Edmundston 2. E2MS mapping not completed 3. Personnel - Halifax (1), Toronto (2) (one current, one planned) 4. Evaluate contractor coverage and audit and ability to handle international boundary situation along St. John River 5. Federal responders (on-water) ECRC in Matane	3
Other	Slope detector Mile 204 monitors for potential instability near St. John River	

Pelletier Sub		CATEGORY
Issues of Concern	1. DG volume - 33100 loads (crude oil, gasoline, LPG)	
Existing WIS Sites	1. Existing DED Mile 80.6/84.9 (R. Boucanee trestle) 2. No WILD sites 3. 15-20 mile spacing for WIS	
Detection Enhancement	Proposed DED at Mile 80 intermediate signals (westbound to Riviere du Loup bridge)	3
Track/Structures Inspection Enhancement	URFD - every 90 days summer, 60 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in Montreal QC and St. John NB (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), Irving (St. John) 6. Cache of basic DG reponse tools in Moncton (PPE and hand tools)	
Environmental	1. Equipment Caches: Moncton, Levis, review need for cache in Edmundston 2 E2MS mapping not completed 3. Personnel - Toronto (2) (one current, one planned), Montreal (2) (one current, one planned) 4 Evaluate contractor coverage and audit and ability to handle international boundary situations Mile 47-57 or on-water capability for lakes Mile 20-40 (from Quebec or Riviere du Loup) 5. Federal responders (on-water) ECRC in Matane	3
Other	Review any potential train handling issues with 1.1% descending grades	

Montmagny Sub		CATEGORY
Issues of Concern	1. DG volume - 77000 loads (diesel, jet fuel, gasoline, LPG)	
Existing WIS Sites	1. Existing DED Mile 75.0/81.5 (Town of Montmagny / Rivere du Sud bridge) 2. No WILD sites 3. 15-20 mile spacing for WIS	
Detection Enhancement	None	
Track/Structures Inspection Enhancement	URFD - every 60 days summer, 30 days winter, TG - 4 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City)	
Environmental	1. Equipment Caches: Levis or Riviere du Loup 2 E2MS mapping not completed 3. Personnel - Toronto (2) (one current, one planned), Montreal (2) (one current, one planned) 4 Evaluate contractor coverage and audit (from Quebec or Riviere du Loup) 5. Federal responders (on-water) ECRC in Matane	

Drummondville Sub		CATEGORY
Issues of Concern	1. DG volume - 90000 loads (diesel, jet fuel, gasoline, LPG)	
Existing WIS Sites	1. Existing DED Mile 90.89 (St Cyrille), Mile 99.1 (Drummondville W.) 2. WILD at Mile 117.2 3. 15 mile spacing for WIS	
Detection Enhancement	1. Proposed DED Mile 79 (Nicolet River bridge east) 2. Propose WIS Mile 13 (cut down 30 mile spacing for oil trains if not stopping at Joffre)	2
Track/Structures Inspection Enhancement	URFD - every 40 days summer, 30 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), CP trailer in Toronto	
Environmental	1. Equipment Cache: Montreal 2. E2MS mapping not completed 3. Personnel - Toronto (2) (one current, one planned) Montreal (2) (one current, one planned) 4 Evaluate contractor coverage and audit (from Quebec) 5. Federal responders (on-water) ECRC in Matane	

St. Hyacinthe Sub		CATEGORY
Issues of Concern	1. DG volume - 96200 loads (diesel, jet fuel, gasoline, LPG) 2. Crossing of St. Lawrence River 3. Montreal metropolitan area	
Existing WIS Sites	1. Existing DED at Mile 57.5 (Beloeil bridge); 68.2 / 73.1 (Pt St Charles freight tracks) for Victoria Bridge 2. No WILD sites 3. 15 mile spacing for WIS	
Detection Enhancement	Proposed DED Mile 44 (St. Hyacinthe west)	2
Track/Structures Inspection Enhancement	URFD - every 40 days summer, 20 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), CP trailer in Toronto	
Environmental	1. Equipment Cache: Montreal 2. E2MS mapping not completed 3. Personnel: Montreal (2) (one current, one planned) 4. Evaluate contractor coverage 5. Review on water capability St. Lawrence River crossing 6. Existence of ERAP for Montreal area (confirm) 7. Federal responders (on-water) ECRC in Montreal	

Montreal Sub		CATEGORY
Issues of Concern	1. DG volume - 96200 loads (diesel, jet fuel, gasoline, LPG) 2. Montreal metropolitan area	
Existing WIS Sites	1. Existing DED Mile 1.75 2. No WILD sites 3. One WIS Mile 5	
Detection Enhancement	None	
Track/Structures Inspection Enhancement	URFD - every 30 days summer, 20 days winter, TG - 6 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability - Valero (Quebec City), CP trailer in Toronto	
Environmental	1. Equipment Cache: Montreal 2. E2MS mapping not completed 3. Personnel: Montreal (2) (one current, one planned) 4. Evaluate contractor coverage 5. Review on water capability St. Lawrence River crossing 6. Existence of ERAP for Montreal area (confirm) 7. Federal responders (on-water) ECRC in Montreal	

St. Laurent Sub		CATEGORY
Issues of Concern	1. DG volume - 57900 loads (LPG, sodium hydroxide, diesel fuel) 2. Montreal metropolitan area	
Existing WIS Sites	1. No existing DEDs 2. No WILD sites 3. No WIS between Taschereau Yard and RDP	
Detection Enhancement	Proposed WIS Mile 145 for RDP loaded crude trains (23-mile gap without detection Woodland-RDP)	1
Track/Structures Inspection Enhancement	URFD - every 46 days summer, 26 days winter, TG - 3 times annually	
Emergency Response	1. Contractors in Montreal (static liquid & low hazard gases) 2. Gap Analysis completed for equipment needs 3. Closest DGO in Montreal 4. Industrial fire teams must be deployed from US 5. Foam availability – Valero (Quebec City), CP trailer in Toronto	
Environmental	1. Equipment Cache: Montreal 2. E2MS mapping not completed 3. Personnel: Montreal (2) (one current, one planned) 4. Evaluate contractor coverage 5. Confirm existence of ERAP for Montreal area 6. Federal responders (on-water) ECRC in Montreal	

Corridor Risk Assessment
Edmonton – Winnipeg Corridor
28 October 2013
(Revised 28 November 2014)

Mission Statement

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Edmonton to Winnipeg corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods between Edmonton and Winnipeg, and from that review, identified six focus areas that required additional examination. From that review, the team developed a table of potential initiatives to reduce the risk associated with each of the focus areas.

Introduction

For the purposes of this risk assessment, the Edmonton – Winnipeg corridor has been defined as the trackage making up the primary freight operation route between Edmonton Walker Yard and Winnipeg Symington Yard. The route comprises of the Wainwright, Watrous and Rivers Subdivisions. This corridor is a heavy tonnage freight route and is primarily single track with passing sidings. The entire route is operated by Centralized Traffic Control (CTC) rules and signals. A limited amount of VIA Rail passenger service is operated on the line.

The review also included the secondary route linking Saskatoon, North Battleford, Fort Saskatchewan and Edmonton (also known as the 'Prairie North Line'). This single track corridor is operated under OCS rules at this time. Traffic has been growing on this route as new resource projects come on line. In addition, the following low-density connecting routes that are linked to the Edmonton – Winnipeg corridor were also examined:

- Carberry - Cromer Subdivisions
- Edmonton – Calgary
- Edmonton – Fort McMurray
- Prairie North Line east end between Portage la Prairie and Warman

The corridor is not heavily populated and passes through only three major urban areas (Winnipeg, Saskatoon, Edmonton). The line also passes through a number of smaller communities and runs adjacent to significant agricultural areas. Between Saskatoon and Edmonton several new crude oil rail loading terminals have been constructed during the past three years. The route crosses a number of streams and rivers, and at several locations the line utilizes significantly large bridge and trestle structures to cross wide valleys. The railway runs parallel to, and within a few miles of, a number of secondary highways. For these reasons, along with other considerations, this corridor was selected as the second risk assessment related to the transport of dangerous goods on the CN system.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Dangerous goods train accident locations since 2003
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railways, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. The prominent items of vulnerability were also tabulated and are included in the Appendix.

Current mitigations on the route include the following:

- WIS locations at approximately fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Winnipeg and Edmonton, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced at certain major bridges protect structures and track curvature.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across the subdivision.
- The rail is ultrasonically tested for rail defects every twenty days in the winter and every thirty days in the summer.
- The geometry car operates over the corridor approximately five to seven times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Risk Review

By visually plotting the various risk variables on a GIS map, a corridor-based risk review master table was produced (see Appendix "Vulnerability Details Table"). The results of the mapping review were summarized by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Table 1 provides a summary of vulnerability ranking points by mileage group and the resulting focus areas.

Table 1 – Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Focus Area Point Count
Rivers Sub																
0	2			1	2	1	2	1	4			1			14	
10					1	2			2						5	Winnipeg
20						1			1						2	21
30	1				1		1								3	
40		1							1						2	
50	1		1		1	1	1	1							6	
60	1				1		1						1		4	
70															0	
80															0	
90	1				1										2	
100															0	
110	2														2	
120	2														2	
130	2				1		1	1							5	
140	1	1			1		1	1				1			6	
150															0	
160	1												1		2	
170													1		1	
180							1							1	2	
190	4						1								5	
200	1						1								2	St Lazare
210														1	1	10
220															0	
230	4					1	1					1			7	
240	1														1	
250															0	
260	1												1		2	
270	1														1	
280		1						1				1			3	
Walrous Sub																
0	1	1			2		1	1				1			7	
10															0	
20															0	
30	1										1		1		3	
40	1				1										2	
50	2												1		3	
60	2														2	
70	1				1										2	
80	1				1								2		4	
90													1		1	
100	2				1	1	1								5	
110	2						1								3	
120	1														1	
130		1			1			1				1			4	
140					1										1	
150	2														2	
160	2														2	
170	2				2										4	
180	2				1										3	Saskatoon
190	3			1	2		1	1	2			1			11	14
200	5				2										7	
210	4														4	
220	2														2	
230						1									1	
240	3	1						1			1	1	1		8	
Wainwright Sub																
0	2	1						1			1	1	1		7	
10	1				1										2	
20	1				1					1					3	
30	1														1	
40															0	
50	3				1								1		5	Unity
60	3					2		1		1	1		1		10	15
70	2														2	
80	2														2	
90	1														1	
100	4														4	
110	2				2				1						5	
120	2						1						1		4	
130	2				1		1								4	
140		1			2			1	1			1	1	2	8	Wainwright
150	2				1		1								4	13
160	2				1										3	
170	4				1		1								6	
180	3	1			1			1	1				1		8	
190	3				1										4	
200	3				1				1	1					6	
210	1				1								1		3	
220	1	1			1				1		1				5	
230	1														1	
240	1				1				1					1	4	
250			1		2		2		1						7	Edmonton
260	1			1	1	2	1		2		1	2	2		13	24

Table 1 – Vulnerability Ranking by Mileage Group *(continued)*

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Focus Area Point Count
PNL Route Saskatoon-Edmonton																
Warman Sub																
0				1	3	1	2						1		8	
10					2		1						1		4	
Aberdean Sub																
60		1										1			2	
70	1	1													2	
80	1	1												1	3	
90	1				2		2								5	
100					1										1	
110	1				1										2	
120	1				1										2	
130					1										1	
140					1								1		2	
150			1		1							1	1		4	
Blackfoot Sub																
0	2		1				1					1	1	1	7	
10					1										1	
20					1										1	
30					1										1	
40					1										1	
50		1			1						1				3	
60					1							1	1		3	
70					1										1	
80			1		1	1	1		1			1	2		8	
90	1				1										2	
100										1			1		2	
110	2				1										3	
120	1	1			1		1		1	1		1	1		8	
Vegreville Sub																
0		1			1		1		1	1		1	1		7	
10					1								1		2	
20					1										1	
30					1										1	
40	1				1								1		3	
50	2				1		1								4	
60		1			2				1				1		5	
70					1										1	
80															0	
90		1							1				2		4	
100		1			1	2						1	2		7	
110	1				1		2						1		5	
120	1			1		1			1					1	5	
Carberry - Cromer Connecting Route																
Carberry Sub																
0					1							1			2	
10		1			1	1							1		4	
20	1	1												1	3	
30	2		1				1					1			5	
Cromer Sub																
0			1											3	4	
10	1					1									2	
20															0	
30	1														1	
40	3														3	
50															0	
60	1						1						1		3	
70	2														2	
80	1				1								1		3	
90	1														1	
100	1														1	
110													2		2	
120	2	1													3	

Table 1 – Vulnerability Ranking by Mileage Group *(continued)*

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Focus Area Point Count
Edmonton - Calgary Connecting Route																
Camrose Sub																
0				1	4	1	4		1				5	1	17	
10	1				2		2					1			6	
20															0	
30					1										1	
40											1				1	
50	6		1				10		1	1				1	20	
60					2										2	
70	1														1	
80	1				1				1					1	4	
90												1			1	
Three Hills Sub																
0	2				1		1							1	5	
10	4						1								5	
20	5				1										6	
30	3						1								4	
40	2						1								3	
50		1			1		1		1				2	1	7	
60	1	1					1						1		4	
70									1						1	
80	3						1								4	
90	2						1		1				2		6	
100	1	1			1					1					4	
110	2									1		1			4	
120	1			1	2		2		2	1		1			10	
Edmonton - Fort McMurray Connecting Route																
Coronado Sub																
0					2		2		1			1		2	8	
10		1			1		1		2					1	6	
20	1						1								2	
30	1	1					1							1	4	
Lac la Biche Sub																
30															0	
40	1	1			1				1					1	5	
50									1						1	
60	1														1	
70					1							1		2	4	
80	2														2	
90	1				1										2	
100	1														1	
110		1								1					2	
120	3						1								4	
130															0	
140	1														1	
150	1														1	
160	3						1								4	
170	1														1	
180	2														2	
190	1												1		2	
200	2						2								4	
210	3						3								6	
220	1														1	
230	1						1						1		3	
240	1						1						1		3	
250	4						2								6	
260	1						1								2	
270	1						1					1	1	1	5	
PNL Route Portage la Prairie - Warman																
Gladstone Sub																
0	1		1				1								3	
10														1	1	
20															0	
30	3					1	2	1				1		3	11	
40															0	
50	2							1							3	
60								1						1	2	
70	1						1								2	
80					1			1	1					1	4	
90	1						1	1	1						4	
100														1	1	
110	1						1	1							3	
120	1	1					1	1						2	6	

Table 1 – Vulnerability Ranking by Mileage Group *(continued)*

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Focus Area Point Count
Togo Sub																
0	1	1					1					1			4	
10	1						1								2	
20					1			1	1					1	4	
30	1						1	1	2						5	
40	2						1								3	
50	3				1		2								6	
60	5							1							6	
70	1						1								2	
80	1				1			1							3	
90	4				1		1								6	
100	2	1			2		1	1						2	9	
110					1			1							2	
120	1	1					1	2							5	
Margo Sub																
0					1							1		1	3	
10	2				1										3	
20					1				1						2	
30					1										1	
40	2				1										3	
50					1										1	
60		1			1	1								1	4	
70	2				1										3	
80	3				1									1	5	
90	2				1	1							1	1	6	
100	2				1										3	
110	3				1									1	5	
120	2	1												1	4	
Aberdeen Sub (Humboldt-Warman)																
0	2				1				1			1		2	7	
10	4														4	
20	2														2	
30	3														3	
40	2				1										3	
50	3				1									1	5	
60	3				1		2							1	7	

Based on a review of the risk variables on the corridor map, a set of six focus areas on the main line were identified for further review. The team examined the specific risks associated with each focus area and developed appropriate localized mitigation factors. The six focus areas are as follows:

1. Winnipeg
2. St. Lazare valley
3. Saskatoon
4. Unity
5. Wainwright
6. Edmonton

Additionally the following secondary connecting routes were also reviewed as areas of overall focus:

a. Prairie North Line (Saskatoon to Edmonton – west end)
b. Carberry-Cromer Subdivisions
c. Edmonton-Calgary
d. Edmonton-Fort McMurray
e. Prairie North Line (Portage la Prairie to Warman – east end)

The specific items of interest along with a localized risk review for each of the focus areas is included in the appendix. To provide an example of the localized review results, Table 2 provides the focus issues and risk mitigations specific to the Saskatoon focus area.

Table 2 – Saskatoon Focus Issues

Saskatoon (Watrous 180-200)	
Reason	High population area, proximity to waterway and industry
Existing WIS Sites	Miles 175.8, 187.2, 201.9
Detection Enhancement	Add brittle bar Mile 192.0 (Saskatoon Yard on main track) to protect west side of S. Saskatchewan R. Bridge
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Low frequency of train separations. Generalized train handling procedures in place.

Risk Mitigation

While there are many risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities, including an enhanced response in event of an incident, across the corridor. The risk mitigation opportunities are presented below in Table 3. Mitigation opportunities are grouped into the following categories:

- Category 1 – Recommended for immediate implementation (high risk and/or modest cost)
- Category 2 – Recommended for funding and implementation if additional funds identified in 2014, otherwise top priority for funding in 2015

Table 3 – Proposed Risk Mitigation Strategies

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Rivers	203.6	St. Lazare	DED Site	$30k	Protect St. Lazare through truss bridge	1
Wainwright	151	Fabyan	DED Site	$30k	Protect Battle River bridge	1
Blackfoot		Lashburn	WIS Site	$100k	Protect town of Lashburn, reduce WIS spacing	1
Blackfoot		Lloydminster	2 WIS Sites	$200k	Protect either side of City of Lloydminster	1
Vegreville		Bruderheim	2 WIS Sites	$200k	Protect either side of town/industrial area at Bruderheim	1
Rivers	188.2	Uno	DED Site	$30k	Protect Uno bridge	2
Watrous	192	Saskatoon	DED Site	$30k	Protect S Saskatchewan River bridge	2
Wainwright	262	Edmonton	DED Site (2-track)	$50k	Protect N Saskatchewan River bridge	2
Aberdeen		Borden	DED Site	$30k	Protect N Saskatchewan River bridge	2
Blackfoot		North Battleford	DED Site	$30k	Protect N Saskatchewan River bridge	2
Vegreville		Scotford	2 DED Sites	$60k	Protect either side of N Saskatchewan River bridge	2
-	-	Winnipeg	DG Transfer Trailer	$220k	Provide DG transfer capability at incidents	2
-	-	Winnipeg	Foam Trailer	$137k	Mitigate flammable goods fires	2
-	-	Entire Territory	Environmental Contractor Capability Evaluation		Review capabilities of all contractors used for environmental response in western Canada	2
		Saskatoon	New Hire DGO	$200k	Current DGOs in Edmonton and Winnipeg, reduce response time to incidents in mid-section of corridor	2

In addition, the existing infrastructure of WIS sites was upgraded in 2014 on the following secondary connecting routes:

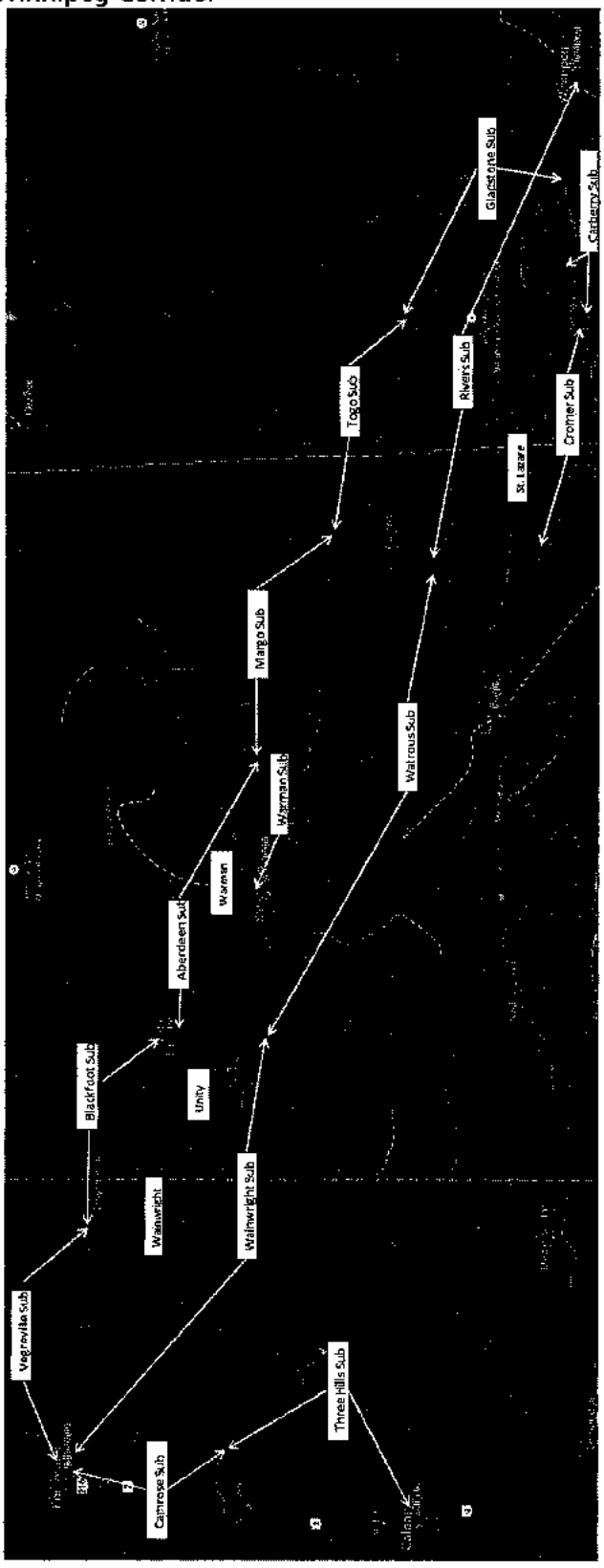
- Carberry-Cromer Subdivisions – 2 additional WIS sites (in service Q-4 2014)
- Edmonton-Fort McMurray – 2 additional WIS sites (in service Q-4 2014)

A number of the opportunities involve adjustment to existing policies or procedures that will involve little to no up-front cost but may create some additional operating issues and/or cost over time. The dragging equipment detector sites do require a relatively modest initial capital expenditure, but this cost can be managed by locating these features at existing signal sites with electrical power readily available. Emergency response initiatives will help to control the exposure involved if an incident were to occur. At this time, there does not appear to be any high capital cost solutions (i.e. track relocation) that will provide a higher probability of risk reduction than the solutions noted above.

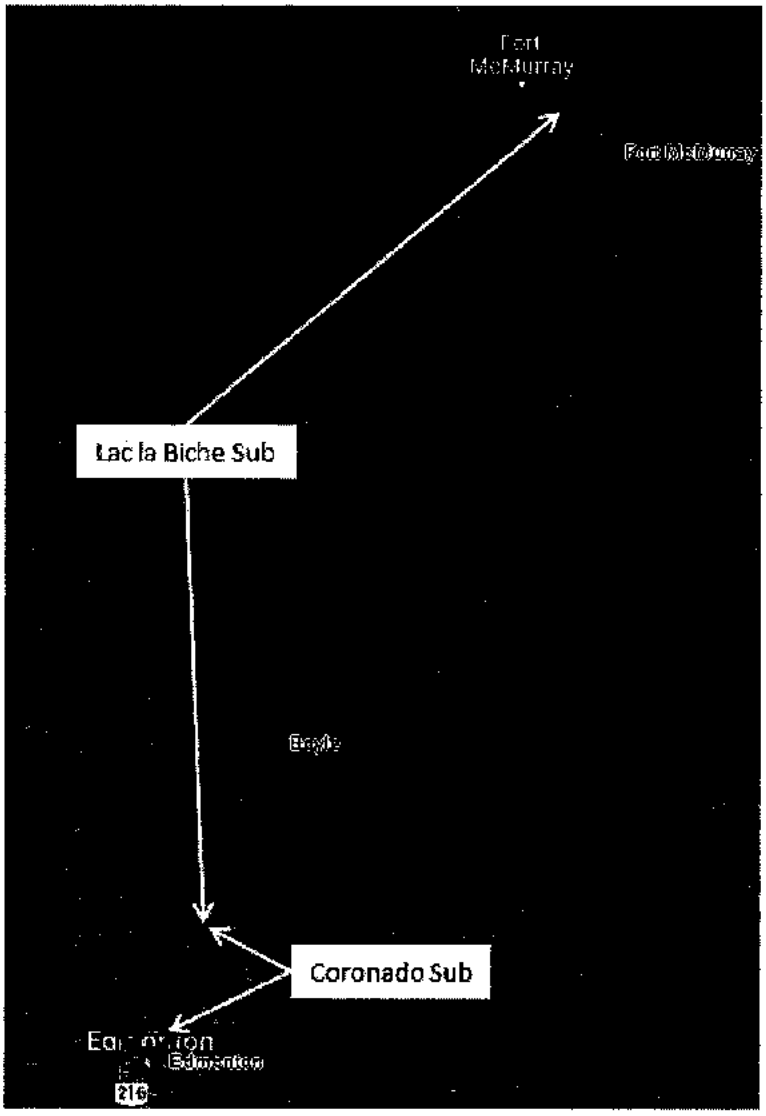
Appendix Material

- Map 1 – Edmonton – Winnipeg Corridor
- Map 2 – Edmonton – Fort McMurray Corridor
- Vulnerability Details Table
- Focus Area Risk Review Tables

Map 1 – Edmonton – Winnipeg Corridor



Map 2 – Edmonton – Fort McMurray Corridor



Vulnerability Details Table

The following ten (10) pages contain the tables of risk areas and vulnerable structures that were obtained through an overall map and aerial photography review of the Montreal-Halifax corridor. Each risk item was categorized by type and areas with the greatest number of risks became focus areas for further review of detection, operations procedures and emergency response.

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential OG facility adjacent	Other Special Feature	Notes
Rivers Sub																
0	0-11				X											Winnipeg urban area
0	0								X	X						Winnipeg VIA depot and "The Forks" parkland adjacent
0	0.22	X						X								Assiniboine River bridge
0	0.44					X		X								Main Street/Stradbrook Ave intersection significant underpass (rail over road)
0	0.45-0.6	X								X						Red River adjacent and parkland
0	2												X			Fort Rouge Yard adjacent
5	4.8						X									Diamond with CP La Riviere Sub, junction with BNML trackage
5	5-20					X										Wilkes Avenue (MB Highway 427) parallel
5	5									X						Shindleman Park adjacent
5	5.5									X						Assiniboine Forest parkland north of tracks
10	8									X						Marj Edey park adjacent
10	8.35						X									Junction with CEMR Carman Sub (hand throw interchange switch)
10	9.5									X						Charleswood Park adjacent
10	10					X										Winnipeg Perimeter Highway overpass
15	14.3						X									Diamond with CP Glenboro Sub
20	18									X						Beaudry Provincial Park adjacent to north
30	30.6	X						X								Bridge over stream in village of Elie
35	36					X										Trans Canada Highway adjacent
40	41.6		X							X						Village of Oakville, Morrison Sports Park adjacent
50	50.4	X						X								Assiniboine River bridge
55	52.5					X										Trans Canada Highway overpass
55	54-57			X												Portage la Prairie
55	54-56.5						X									CP Carberry Sub adjacent (diamond at Mile 56.5)
55	55.3								X							Portage la Prairie VIA depot
60	57-76					X										Trans Canada Highway parallel to south
60	58	X						X								Irrigation canal bridge
65	64.3													X		Agrium Bloom fertilizer plant adjacent
95	91-92					X										MB Highway 352 parallel
85	84	X														Wetland area at foot of escarpment (Pirdale hill) - crossed on a significant earth fill roadbed
110	110.5	X														Pond/wetland adjacent
115	115	X														Ponds/wetland adjacent
120	121.5	X														Pond/reservoir north of track
125	126	X														Pond/wetland adjacent
130	128.8								X							Brandon North VIA depot
130	128.8	X				X		X								Bridge over MB Highway 10 and stream
130	129.5	X														Causeway/fill across pond
140	142.2	X						X								Steel Trestle 643' long, 90' high over small river and road
145	143.2		X						X				X			Village of Rivers; VIA depot; yard
145	144					X										MB Highway 25 parallel through Rivers
150	156-172	X														Numerous small ponds adjacent to track, some crossed on fills
160	159.4													X		Cargill Oakner elevator facilities adjacent
170	171.7													X		Quadra elevator facilities adjacent
185	181-191														X	Roadbed descends sideslope of Assiniboine River valley
185	185.7							X								Steel Trestle 1627' long, 116' high over side valley and stream from Assiniboine River main valley (Equipped with Wind Detector)
190	187.5	X														Pond/wetland adjacent
190	188	X														Pond/wetland adjacent
190	191	X						X								Bridge (287' long x 56' high) over side stream from Assiniboine River
195	191-205	X														Track parallel to Assiniboine River and related tributaries
205	206	X						X								Through Truss Bridge (259' long) over Assiniboine River
210	207-217														X	Roadbed descends sideslope of Assiniboine River branch valley
230	229	X														Pond/wetland adjacent
230	230	X														Pond/wetland adjacent
235	233.8	X						X								Steel trestle 1150' long, 135' high over valley and stream (Equipped with Wind Detector)
235	234.5	X														Pond/wetland adjacent
235	235												X			Cutarm support yard for potash facility
235	237.2						X									Diamond with CP Yarbo Sub
245	241-246	X														Numerous small ponds adjacent to track
260	259-264	X														Numerous small ponds adjacent to track
265	264													X		Waldron elevator complex adjacent
275	273-280	X														Numerous small ponds adjacent to track
280	280.3		X						X				X			Melville - village, VIA depot, major yard facility

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Watrous Sub																
0	0		X						X				X			Melville - village, VIA depot, major yard facility
0	0.5					X		X								SK Highway 10 overpass
0	1-34					X										SK Highway 15 parallel
5	5-27	X														Numerous small ponds adjacent to track
30	32											X				Ituna airfield
30	32-34	X														Small ponds adjacent to track
30	33													X		Ituna elevator complex adjacent
40	36-46	X														Numerous small ponds adjacent to track
45	42-50					X										SK Highway 15 parallel
50	49-50	X														Small ponds adjacent to track
50	52													X		Canada Malting Leross elevator complex adjacent
55	54-58	X														Numerous small ponds adjacent to track
60	60-61	X														Small ponds adjacent to track
65	64	X														Touchwood Lake adjacent
70	66-72	X														Numerous small ponds adjacent to track
70	72					X										SK Highway 15 adjacent
80	78	X														Small ponds adjacent to track
80	81-83					X										SK Highway 15 parallel
85	83													X		Cargill Raymore elevator facility adjacent
85	87													X		Booth terminal elevator facility adjacent
95	93													X		Semans fertilizer/elevator facility adjacent
100	100.9	X						X								Peter Lake causeway/bridge
105	105-106					X										SK Highway 20 parallel
105	106.5						X									CP Lanigan Subdivision diamond
105	107-109	X														Numerous small ponds adjacent to track
115	116	X														Mitt Lake fill
115	117.2	X						X								Boulder Lake causeway/bridge
125	123	X														Pond adjacent to track
130	127-143					X										SK Highway 2 parallel
130	129		X						X				X			Watrous - village, yard facilities, VIA depot
145	143-159					X										SK Highway 763 parallel
150	151	X														Causeway through small pond
155	157	X														Pond/wetland adjacent
165	164	X														Pond/wetland adjacent
165	164.5	X														Brackell Reservoir lake adjacent
170	166-168					X										SK Highway 763 parallel
170	172	X														Pond/wetland adjacent
175	174-176					X										SK Highway 16 parallel
175	177	X														Pond/wetland adjacent
180	180	X														Causeway through small pond
180	181	X														Causeway through small pond
185	185					X										SK Highway 11 overpass
190	186-194				X											Saskatoon Metro Area
190	189									X						Saskatoon golf club/park adjacent
190	189-191					X										Saskatoon Circle Drive parallel
190	189.5	X						X								Steel Deck Truss Bridge (1475' long, 78' high) over South Saskatchewan River
190	190									X						Holiday Park adjacent
190	191-193								X				X			Saskatoon yard facilities, VIA depot
195	193	X														Large pond adjacent to north side of Saskatoon yard
195	193.5					X										SK Highway 7 overpass
195	196	X														Causeway through small pond
200	197.6	X					X									CP Duval Spur diamond and pond/wetland adjacent
200	198	X														Causeway through small pond
200	201.5	X														Pond/wetland adjacent
205	204	X														Causeway through small pond
205	204.9						X									CP Commco Spur diamond
205	206.5	X														Causeway through small pond
210	208	X														Causeway through small lake
210	209.5	X														Causeway through small pond
215	212.5	X														Causeway through small pond
215	213.5	X														Causeway through small pond
225	223.5	X														Pond/wetland adjacent
225	226	X														Pond/wetland adjacent
235	235-238						X									CP Watrous Subdivision parallel (Rule 102)
240	239	X														Pond/wetland adjacent
240	240.5	X														Pond/wetland adjacent
240	241-245	X														Numerous small ponds and streams adjacent to track
245	247.3		X						X			X	X	X		Biggar - village, VIA depot, yard facilities, airfield. Prairie Malt plant adjacent to track

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Wainwright Sub																
0	0		X						X			X	X	X		Biggar - village, VIA depot, yard facilities, airfield, Prairie Malt plant adjacent to track
5	4.5	X														Castlewood Lake causeway and adjacent
5	6.5	X														Causeway through small pond
10	9-21					X										SK Highway 14 parallel
15	13	X														Pond/wetlands adjacent
25	23										X					Landis school adjacent
25	25	X														Landis Lake/wetland adjacent
25	25-36					X										SK Highway 14 parallel
30	31	X														Pond/wetland adjacent
50	53-54	X														Ponds/wetlands adjacent
55	55	X														Causeway through small lake
55	56	X														Causeway through small lake
55	57													X		Richardson Terminal grain elevator complex adjacent
55	57.2					X										Dual Public Crossings with SK Highway 21 and 14
60	57.8		X						X		X	X		X		Unity - village, VIA stop, school, airfield adjacent; Altex crude oil loading rack adjacent to track in village
60	59-61						X									CP Hardisty Subdivision parallel
60	59.5	X														Gordon Lake adjacent
60	61.3						X									CP Hardisty Subdivision overpass (CP above)
65	64.5	X														Akerlund Lake adjacent
65	67	X														Lonely Lake adjacent
70	68	X														Henry Lake adjacent
75	74	X														Clare Lake adjacent
80	82	X														Witches Lake adjacent
85	83	X														wetlands adjacent
95	94	X														Pond/wetland adjacent
100	99	X														Reflex Lake adjacent
100	100	X														Pond/wetland adjacent
105	104	X														Cipher Lake adjacent
105	104.6	X														Colette Lake adjacent
110	109-111					X										AB Highway 610 parallel
110	110	X														Pond/wetland adjacent
110	111	X														causeway through small wetland
115	115-120									X						Ribstone Creek Heritage Natural Rangeland (parkland)
115	117-121					X										AB Highway 610 parallel
120	121.1													X		Edgerton elevator complex adjacent
125	123.4	X						X								Bridge over stream (12' high)
125	126.5	X														Pond/wetland adjacent
130	129	X														Pond/wetland adjacent
130	131.1	X						X								Bridge over stream (41' high)
130	132-134					X										TWP Road 442 adjacent
140	139.5									X						Wainwright Rail Park adjacent
140	140		X						X				X	X	X	Wainwright - village, yard facilities, VIA depot, Canadian Forces Base facilities nearby, Altex crude oil loading facility at yard
140	141					X										1st Street Overpass (entrance to CFB Wainwright)
140	142-144					X										AB Highway 14 parallel
145	147-156														X	Roadbed located on sidestopes of Battle River Valley
150	149.3	X						X								Steel Trestle 2770' long, 189' high over Battle River (Wind Detector being installed)
150	150-156	X														Wetlands/stream parallel in valley
155	158-159					X										AB Highway 14 parallel
160	158.8	X														Pond/wetland adjacent
165	162-224					X										AB Highway 14 parallel
165	164	X														Small ponds/wetlands adjacent
170	170	X														Pond/wetland adjacent
175	172.5	X														Pond/wetland causeway
175	173					X		X								AB Highway 14 overpass
175	175	X														Pond/wetlands adjacent
175	177	X														Pond/wetlands adjacent
180	179-180	X														numerous pond/wetlands adjacent
185	184.5		X						X	X				X		Viking - village, VIA stop, parkland, terminal grain elevator and fertilizer facility adjacent
185	185	X														Pond/wetland adjacent
185	186.5	X														Pond/wetland adjacent
190	189	X														Pond/wetland adjacent
190	192	X														Pond/wetland adjacent
195	196.7	X														Pond/wetland adjacent
200	199	X														Pond/wetland adjacent

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
205	205	X														Pond/wetland adjacent
205	206	X								X						Pond adjacent in Holden village park
205	206.2										X					Holden School north of track
210	209.4	X														Waskwei Creek/pond adjacent
215	215													X		Viterra fertilizer facility adjacent
220	220	X														Bridge over small creek
225	226.1		X							X						Tofield village - parkland north of tracks
225	227											X				Tofield airfield
230	232	X														Ponds/wetlands adjacent (visible to homes)
240	237-246					X										AB Highway 630 parallel
240	242	X														Pond/wetland adjacent
245	242.5									X						North Cooking Lake Natural Area parkland surrounds track
245	244														X	Railway in vicinity of multiple acreage-type residences (population less than 1000) (Uncas)
250	250														X	Railway in vicinity of multiple acreage-type residences (population less than 1000) (Ardrossan)
250	250.2									X						Ardrossan Recreation Complex/park adjacent
255	254-259			X												Sherwood Park urban area
255	254.8					X		X								AB Highway 21 underpass (4-lane highway)
255	255.5					X		X								AB Highway 16 (Yellowhead Highway) underpass (4-lane highway)
260	257.6						X									CP Scotford Subdivision diamond
260	259												X			Clover Bar Yard facility
260	259.5													X		Chemical plants adjacent (both sides)
260	260-267				X	X										Edmonton Metro urban area - AB Highway 16 (Yellowhead Trail) parallel
260	260.2	X						X		X						Steel Trestle 1655' long, 139' high over North Saskatchewan River, with parkland in valley
265	265.1						X									Edmonton LRT trackage passes underneath
265	266									X		X	X	X		Walker Yard facilities, with airport and parklands adjacent, Alberta Terminals Elevators adjacent
0																
PNL Route Saskatoon - Edmonton																
Warman Sub																
0	0-7				X											Saskatoon metro area
0	0.8					X	X	X								CP Wilkie Subdivision diamond on bridge over Circle Drive
5	1-6					X										Circle Drive parallel
5	6					X		X								SK Highway 16 overpass
5	7													X		Various industrial plants adjacent
10	11.5					X		X								SK Highway 11 overpass
10	12													X		Terminal elevator facilities
10	12-17					X										SK Highway 11 parallel
Aberdeen Sub (Warman-N Battleford)																
65	65.4		X										X			Town of Warman - includes small yard
75	74.3		X													Village of Dalmeny
75	75-81	X														Numerous small ponds/wetlands adjacent
80	82		X													Village of Langham
85	85.93	X													X	Roadbed on side slopes of Saskatchewan River valley
90	90	X						X								North Saskatchewan River bridge
90	91					X		X								SK Highway 16 overpass
95	93-147					X										SK Highway 16 parallel
110	108	X														Large pond/wetland adjacent
120	120.5	X														Large pond/wetland adjacent
140	141.6													X		Terminal elevator facility adjacent
150	147.7			X									X	X		North Battleford town, yard, industries
Blackfoot Sub																
0	0			X									X	X		North Battleford town, yard, industries
5	1-10	X													X	Roadbed on side slopes of Saskatchewan River valley
5	5	X						X								North Saskatchewan River bridge
10	10-31					X										SK Highway 16 parallel
50	49.9		X									X				Village of Maidstone and airfield
65	64.3												X	X		Storage yard and crude oil loading facility
80	82													X		Husky oil upgrader facility adjacent
85	82.8						X	X								CP Lloydminster Subdivision overhead
85	84.4			X						X			X	X		City of Lloydminster - plus yard, adjacent parkland, various major industrial sites
90	91	X														Ponds/wetlands adjacent
95	92-101					X										AB Highway 16 parallel
100	99.3										X			X		Kitscoty Elementary School/Arena and elevator facilities adjacent
110	109.5	X														Pond/wetland adjacent in Islay village
110	111.5	X														Small lake adjacent
115	116					X										AB Highway 16 adjacent
120	119	X														Ponds/wetlands adjacent
125	124.4		X			X		X		X	X		X	X		Town of Vermilion - yard, adjacent elevator/fertilizer facilities, school/parkland, AB Highway 41 overpass

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Vegreville Sub																
0	0		X			X		X		X	X		X	X		Town of Vermilion - yard, adjacent elevator/fertilizer facilities, school/parkland, AB Highway 41 overpass
10	11-14					X										AB Highway 16 parallel
15	14.6													X		Manmville crude oil loading facility
20	19-22					X										AB Highway 16 parallel
30	26-29					X										AB Highway 16 parallel
40	40	X														Filled roadbed across pond in Ranfurly
45	41-51					X										AB Highway 16 parallel
45	46													X		Ag Pro terminal elevator facilities
50	49	X														Filled roadbed across pond west of Lavoy
55	55					X										AB Highway 16 adjacent
55	56	X						X								Vermilion River bridge (small span)
60	57.9		X			X				X				X		Vegreville - AB Highway 16A parallel, parkland, elevator/fertilizer terminal facilities
65	61-67					X										AB Highway 16 parallel
75	71-84					X										AB Highway 16 parallel
90	92		X							X						Village of Lamont - recreation center/park adjacent
95	93.5													X		LamontTerminal elevator facilities
95	97													X		Major oil/chemical facilities adjacent (south side)
100	97.9						X									CP Wilmington Subdivision diamond
100	98													X		Chemical industry facilities (north side)
100	99.2		X													Bruderheim village
100	101.6						X									CP Scotford Subdivision diamond
100	102													X		Gaudin terminal elevator facilities
105	105-108					X										AB Highway 15 parallel
105	106												X			Scotford Yard
110	110													X		Chemical industry facilities (south side)
110	110.5	X						X								North Saskatchewan River bridge
115	115					X		X								Highway 15 bridge
120	122-128				X											Edmonton metro area
120	122	X													X	Substantial fill across ravine and stream
125	124.5									X						Kinsmess Park adjacent
125	126-127						X									Edmonton LRT trackage parallel
Carberry - Cromer Connecting Route																
Carberry Sub																
0	0.9												X			Petrel Jct yard
5	5.6					X										Public Grade Crossing with MB 1 Trans Canada Highway (4-lane divided highway)
10	8.7		X													Town of Carberry
10	9.1						X									Diamond with CP Carberry Sub
10	9.6													X		Terminal elevator facility
10	11-13					X										MB 5 parallel
20	18.3	X														Wetland/stream crossing
20	19-27														X	CFB Shilo grounds
25	25.8		X													CFB Shilo community
35	33.4	X						X								Assiniboine River bridge - multi span with through truss
35	35	X														Wetlands
35	36-39.7			X												City of Brandon urban area
35	38.8												X			Brandon yard
Cromer Sub																
0	0-3			X												City of Brandon urban area
0	0														X	Brandon Regional Health Centre (Hospital) north side
0	1.1														X	Keystone Centre Sports/Agriculture Fair complex south side
5	3.1														X	Electrical transformer station south side
10	11.3						X									Diamond with CP Estevan Sub
15	13.6	X														Pond/wetland adjacent
35	37	X														Pond/wetland adjacent
40	42	X														Pond/wetland adjacent
45	43	X														Pond/wetland adjacent
45	45	X														Pond/wetland adjacent
60	58													X		Turk crude oil loading facility
60	59.8	X						X								Pipestone Creek bridge
70	70	X														Pond/wetland adjacent
75	77.2	X														Pond/wetland adjacent
80	78-84					X										SK 48 parallel
85	83.9	X														Pond/wetland adjacent
85	84													X		Terminal elevator facility
95	93	X														Pond/wetland adjacent
100	101.3	X														Pond/wetland adjacent
115	113.1													X		Langbank terminal elevator adjacent

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Cromer Sub (continued)																
115	114													X		Oil or gas pipeline pumping station adjacent
120	121.5	X														Pond/wetland adjacent
120	122.3	X														Pond/wetland adjacent
125	126.6		X													Town of Kipling
Edmonton - Calgary Connecting Route																
Camrose Sub																
0	0-8				X											Edmonton / Sherwood Park urban area
0	0.2					X		X								AB 16 Yellowhead Highway bridges
0	0.3-1.7									X						Strathcona Science Provincial Park west side
0	1.1													X		Chemical loading facility east side
0	1.5													X		Oil/gas loading facility east side
0	2													X		Strathcona Refinery
0	2.4					X		X								Baseline Road overpass
5	2.6						X									Diamond with CP Scotford Sub
5	2.7													X		Crude oil loading facility east side (under construction 2014)
5	3														X	AltaSteel steel mill west side
5	4					X		X								Sherwood Park Freeway overpasses
5	5.2													X		Chemical storage facility east side
5	6.6					X		X								Whitemud Drive overpass
10	8.9					X		X								AB 216 Anthony Henday Drive overpasses
10	9.2					X		X								AB 216/AB 14 interchange overpasses
10	10												X			Tank car storage yard
15	13.3	X														Pond/wetland adjacent
35	32.0-37.4					X										AB 21 parallel
45	46											X				Camrose Airport west side
50	48.1			X												Town of Camrose
50	48.5										X					University of Alberta Augustana Campus west side
50	49-50.5									X						Camrose Valley park
50	49.7	X						X								Camrose Creek bridge - 347' wood trestle
50	49.8							X							X	133' wood trestle over slide area
50	50.4							X								225' wood trestle over ravine
50	50.7							X								136' wood trestle over ravine
50	51.9	X						X								Camrose Creek bridge - 256' wood trestle
50	52.4	X						X								Camrose Creek bridge - 159' wood trestle
55	52.6							X								141' wood trestle over ravine
55	52.9	X						X								Camrose Creek bridge - 144' wood trestle
55	53.3	X						X								Camrose Creek bridge - 143' wood trestle
55	54.3	X						X								Battle River bridge - 146' plate girder and trestle structure
60	60.5-61.5					X										AB 21 parallel
65	67-68.2					X										AB 21 parallel
70	69.71	X														Little Beaver Lake parallel
80	81-82	X														Ponds/wetlands adjacent
85	84.1														X	Bashaw agricultural loading facility
85	84.8									X						Bashaw fairgrounds and ball parks east side
85	86-93					X										AB 21 parallel
95	96.1												X			Mirror yard
Three Hills Sub																
0	0.2	X														Ponds/wetlands adjacent
5	4.2	X														Ponds/wetlands adjacent
5	5.8					X		X								AB 12 overpass
5	5.9														X	Wescan Malting Terminal elevators east side
10	8.8	X														Ponds/wetlands adjacent
10	9.8	X														Horseshoe Lake west side
15	12.9	X						X								Red Deer River bridge - 1505' multi-span deck truss and trestle
15	17	X														Ponds/wetlands adjacent
20	18.8	X														Ponds/wetlands adjacent
20	19.2					X										AB 21 parallel
25	23.8	X														Ponds/wetlands adjacent
25	24.2	X														Ponds/wetlands adjacent
25	25	X														Ponds/wetlands adjacent
25	26-27	X														Ponds/wetlands adjacent
30	30.3	X						X								Pond Bridge - 478' wood trestle
30	32	X														Gosequill Lake east side
35	33	X														Ponds/wetlands adjacent
40	38.1	X														Ponds/wetlands adjacent
45	46.9	X						X								Ghost Pine Creek bridge - 103' wood trestle
50	50									X						Trochu ball park

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Three Hills Sub (continued)																
50	50.4		X													Town of Trochu
50	51														X	St. Marys Health Care Centre Hospital east side
50	52													X		Trochu terminal elevator facility
55	53.9					X		X								AB 21 overpass
55	57.2													X		Three Hills terminal elevator facility
60	60.2		X													Town of Three Hills
60	60.5													X		Agricultural fertilizer / storage facilities
65	65.9	X						X								Three Hills Creek bridge - 342' multi-span structure
75	73.2									X						Swalwell village ball park
80	78.6	X						X								Knee Hills Creek bridge - 567' multi-span structure
85	84.7	X														Ponds/wetlands adjacent
85	86.8	X														Ponds/wetlands adjacent
90	87.8	X														Ponds/wetlands adjacent
90	91.1													X		Beisacker grain/fertilizer facility
90	91.2									X						Beisaker ball park west side
90	91.3													X		Grain storage facility east side
95	95.2	X						X								Rosebud River bridge - 133' multi-span structure
100	97.5		X													Town of Irricana
105	104					X										AB 9 parallel
105	105	X														Ponds/wetlands adjacent
105	106										X					Kathryn School east side
115	114	X														Ponds/wetlands adjacent
115	116												X			Calgary Logistics Park intermodal terminal and rail yard
115	117.3	X														Ponds/wetlands adjacent
115	117.4										X					Khalsa School west side
120	117.9	X														Ponds/wetlands adjacent
120	120-126				X											Calgary urban area
120	120.3					X		X								AB 1 Trans Canada Highway overpasses
120	121.2					X		X								AB 201 Stoney Trail overpasses
120	122.3									X						Mountview Park east side
125	122.8									X						Penbrooke Park west side
125	124.5										X					Harold W Riley Elementary School west side
125	126												X			Calgary Sarcee Yard
Edmonton - Fort McMurray Connecting Route																
Coronado Sub																
0	0.8					X		X								AB 216 Anthony Henday Drive overpasses
0	1.1														X	Alberta Hospital Edmonton east side
0	2.3					X		X								AB 15 Manning Drive overpasses
5	5.8									X						Alberta Railway Museum park west side
5	7.2														X	Dusgin - Alberta Oats elevator complex west side
5	7.3												X			On-Track Rail Services yard and car repair facility east side
15	15.5														X	Gibbons agricultural storage facility
15	15.6		X													Town of Gibbons
15	15.7									X						Echo Glen Park west side
15	15.8									X						Jack Hogg Sports Grounds east side
15	16.3					X		X								AB 28A bridge
20	17.7	X						X								Sturgeon River bridge - 1066' wood trestle
30	29.6		X													Town of Redwater
30	30.2														X	Water treatment facility west side
30	31.8	X						X								Redwater Creek bridge - 359' wood trestle
Lac la Biche Sub																
40	38.8		X							X					X	Village of Thorhild, agricultural/fertilizer facility, fairgrounds/park east side
40	41.7	X														Ponds/wetlands adjacent
45	46.0-49.2					X										AB 63 parallel
55	52.8									X						Newbrook fairgrounds east side
65	63.5	X														Ponds/wetlands adjacent
70	72														X	Lumber mill west side
70	72-73					X										AB 63 parallel
75	72.5												X			Boyle yard
75	76-78														X	Numerous residences west side along Skeleton Lake
80	80.5-81.5	X														Amisk Lake parallel
85	83.0-83.5	X														Amisk River parallel
90	88.2	X														Ponds/wetlands adjacent
95	97-100					X										AB 663 parallel
100	101-102	X														Tawakwato Lake parallel
115	112.8										X					JA Williams High School east side
115	113.1		X													Town of Lac la Biche

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Lac la Biche Sub (continued)																
120	120.2	X						X								Lac la Biche tributary bridge - 197' wood trestle
120	121	X														Lac la Biche parallel
125	126.8	X														Small lake parallel
145	143	X														Ponds/wetlands adjacent
155	156	X														Ponds/wetlands adjacent
165	163.4	X														Ponds/wetlands adjacent
165	164.2	X														Ponds/wetlands adjacent
165	166	X						X								Stream crossing - 218' structure
170	172	X														Small lake parallel
180	178.5	X														Glover Lake parallel
180	179.5-180.2	X														Edwards Lake parallel
195	197													X		Windell Crude oil loading facility
195	197.3	X														Jackfish River parallel
200	198.3	X						X								Jackfish River tributary bridge - 131' wood trestle
200	199	X						X								Jackfish River tributary bridge - 306' structure
210	208.5	X						X								Stream crossing - 243' structure
215	215.1	X						X								Stream crossing - 146' structure
215	215.7	X						X								Stream crossing - 102' structure
220	219.9	X														Ponds/wetlands adjacent
230	230.9													X		Barr molten sulphur loading facility
235	234.8	X						X								Stream crossing - 102' structure
245	246.6	X						X								Stream crossing - 131' structure
245	247.1													X		Cheecham tarroil loading facility
250	251	X														51 Lake parallel
255	253.1	X						X								Stream crossing - 73' structure
255	255.2	X														Ponds/wetlands adjacent
255	255.9	X						X								Stream crossing - 102' structure
265	263.5	X						X								692' wood trestle over wetlands
275	275	X						X								Stream crossing - 218' structure
275	275.6												X	X	X	Fort McMurray Terminal - yard facility, molten sulphur and petroleum loading facilities, transload facilities
PNL Route Portage la Prairie - Warman																
Gladstone Sub																
0	0.0-1.5			X												Portage la Prairie urban area
5	3.8	X						X								Irrigation Canal bridge - 409' multi-span structure
10	10														X	Rignold agricultural/fertilizer facility
30	31												X		X	Golden Stream limestone loading yard & transload facility
35	32.9	X						X								Dead Lake bridge - 221' trestle
35	35.6	X														Water treatment ponds south side
35	36.1														X	Gladstone agricultural elevator
35	36.3-37.4						X									CP Minnedosa Sub parallel
35	36.5								X							VIA Rail passenger stop (Gladstone)
35	37.2	X						X								Whitemud River bridge - 136' structure
35	37.4														X	Diamond with CP Minnedosa Sub
50	50.2	X														Jordan Creek / pond south side
50	50.9								X							VIA Rail passenger stop (Plumas)
55	57	X														Agricultural irrigation ponds north side
65	63.7								X						X	Glenella agricultural elevator, VIA Rail passenger stop
75	77.6							X								Irrigation Canal bridge - 201' structure
75	77.6-78.2	X														Irrigation Canal parallel
85	83					X										MB 5 parallel
85	83.8								X						X	McCreary agricultural elevator, VIA Rail passenger stop
85	84									X						McCreary fairground/park north side
95	92.5								X							VIA Rail passenger stop (Laurier)
95	92.8									X						Laurier fairground/park south side
95	95.3	X						X								Irrigation Canal bridge - 100' structure
100	100.8														X	Makinak agricultural elevator
110	108.1								X							VIA Rail passenger stop (Ochre River)
110	108.3	X						X								Ochre River bridge - 130' structure
120	119.1	X						X								Edwards Creek Drain bridge - 351' structure
120	120														X	Terminal elevator facility
120	120.9														X	Terminal elevator facility
120	121.7		X						X							Town of Dauphin, VIA Rail passenger station
Togo Sub																
0	0		X													Town of Dauphin
0	0.2	X						X								Vermillion River bridge - 65' multi-span structure
0	1												X			Dauphin yard
10	8.8	X						X								Wilson River bridge - 271' multi-span structure

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Togo Sub (continued)																
20	17-29					X										MB 5 parallel
20	20								X	X						Gilbert Plains village park north side, VIA Rail passenger stop
25	24														X	Terminal elevator facility
30	29.5								X	X						Grandview village park north side, VIA Rail passenger stop
30	29.9									X						Grandview ball park/sports complex/campground north side
30	30.1	X						X								Valley River bridge - 338' wood trestle
40	42	X						X								Valley River bridge - 179' multi span structure
45	44.46	X														Stream/wetland parallel
50	52.3					X		X								MB 5 overpass
55	54.5	X						X								Shell River bridge - 110' multi span structure
55	54.9-55.4	X														Shell River parallel
55	55.9	X														Shell River parallel
60	57.6	X														Ponds/wetlands adjacent
60	59.7	X														Ponds/wetlands adjacent
60	61.0-61.3	X														Ponds/wetlands adjacent
60	61.8	X														Ponds/wetlands adjacent
60	62.0-62.2	X														Goose Lake fill
65	62.6								X							VIA Rail passenger station (Robsin)
70	70.2	X						X								Big Boggy Creek bridge - 160' multi-span structure
80	79.7								X							VIA Rail passenger stop (Togo)
80	79.8-80.6					X										SK 5 parallel
80	87.8	X														Ponds/wetlands adjacent
90	87.9					X		X								SK 5 overpass
90	89.3	X														Ponds/wetlands adjacent
90	89.8-90.0	X														Stream/wetland parallel
95	93.5	X														Stream/wetland crossing on large fill
95	97.0-97.5	X														Assiniboine River parallel
100	100.1														X	Kamsack agricultural elevator
100	100.2-101.0					X										SK 8 parallel
100	100.9		X						X							Town of Kamsack, VIA Rail passenger stop
100	101.2														X	Agricultural storage facilities
100	101.5	X						X								Assiniboine River bridge - 152' through truss
100	102.2	X														Ponds/wetlands adjacent
105	104-108					X										SK 5 parallel
110	110.2-121.5					X										SK 5 parallel
110	109								X							VIA Rail passenger stop (Veregin)
120	117.5								X							VIA Rail passenger stop (Mikado)
120	122	X						X								Whitesand River bridge - 354' multi-span structure
125	124.9		X						X							Town of Canora, VIA Rail passenger station
Margo Sub																
0	0.3														X	Diamond with Yorkton-Assiniboine Sub connecting track
0	1												X			Canora yard
5	2.1-13.0					X										SK 5 parallel
10	12.4	X														Ponds/wetlands adjacent
15	15.0-24.8					X										SK 5 parallel
15	16.3	X														Ponds/wetlands adjacent
25	25.5									X						Rama village recreation park north side
25	26.5-36.4					X										SK 5 parallel
40	38.4	X														Stream/wetland crossing
45	46.9	X														Stream/wetland crossing
60	61.9						X								X	Diamond with CP Tisdale Sub
65	62.7		X													Town of Wadena
70	70.8	X														Stream/wetland crossing
75	76.5	X														Stream/wetland crossing
80	79.8	X														Stream/wetland crossing
80	80.1	X														Stream/wetland crossing
85	83														X	Quill Lake Terminal elevator facility
85	83.8	X														Stream/wetland crossing
90	89.9	X														Stream/wetland crossing
95	93.1													X		Agrium liquid fertilizer distribution/storage facility
95	96.5						X								X	Diamond with CP Melfort Sub
95	96.6	X														Stream/wetland crossing
100	97.0-116.1					X										SK 5 parallel
100	102.4	X														Stream/wetland crossing
105	104.1	X														Ponds/wetlands adjacent
110	109.1	X														Stream/wetland crossing
110	109.7														X	McGregor agricultural storage/elevator facilities
110	111.5	X														Ponds/wetlands adjacent

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Margo Sub (continued)																
110	112.4	X														Ponds/wetlands adjacent
120	118.8														X	Terminal elevator facility
120	120.2	X														Ponds/wetlands adjacent
120	120.4	X														Ponds/wetlands adjacent
120	122.4		X													Town of Humboldt
Aberdeen Sub (Humboldt-Warman)																
0	0.1												X			Humboldt yard
0	0.6									X						Humboldt Uniplex sports centre, arena, ball parks
5	2.7-4.0					X										SK 5 parallel
5	3	X														Ponds/wetlands adjacent
5	4.2														X	Dixon Terminal elevator facility
5	5.9	X														Ponds/wetlands adjacent
5	6.5														X	Duncan Terminal elevator facility
10	7.9	X														Ponds/wetlands adjacent
10	11	X														Ponds/wetlands adjacent
15	14	X														Ponds/wetlands adjacent
15	15.5	X														Ponds/wetlands adjacent
20	17.7	X														Agricultural irrigation ponds adjacent
20	18.9	X														Bruno Pond fill
30	31.5	X														Ponds/wetlands adjacent
35	34.3	X														Ponds/wetlands adjacent
35	35.7	X														Prudhomme village pond adjacent
45	43.2	X														Ponds/wetlands adjacent
45	45.0-46.0					X										SK 27 parallel
45	46	X														Ponds/wetlands adjacent
50	48.5-50.7					X										SK 27 parallel
50	49.5	X														Ponds/wetlands adjacent
50	51.7	X														Ponds/wetlands adjacent
50	52														X	Aberdeen agricultural elevators
55	54	X														Ponds/wetlands adjacent
60	58.4	X														Ponds/wetlands adjacent
60	60.9	X						X								South Saskatchewan River bridge - 1464' multi-span deck truss and trestle
65	64.1	X														Agricultural irrigation ponds adjacent
65	65.1					X		X								SK 11 overpasses
65	65.3														X	Diamond with Warman Sub

Focus Area Risk Review Tables

Mainline Route (Rivers/Watrous/Wainwright Sudivisions)

Winnipeg (Rivers 0-20)	
Reason	High population area, proximity to parkland, industry, waterways
Existing WIS Sites	Miles 10.3, 20.4, 34.9
Detection Enhancement	Existing equipment adequate
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Very low frequency of train separations. Generalized train handling procedures in place.

St. Lazare (Rivers 180-220)	
Reason	Significant structures, proximity to waterways and environmentally sensitive
Existing WIS Sites	Miles 177.0, 183.2, 196.0, 208.2, 222.8, 232.4
Detection Enhancement	Add brittle bars Mile 188.2 (Uno) and Mile 203.6 (St. Lazare) to protect sides of major bridges currently lacking immediate detector sites
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Moderate train separation activity at Mile 210 (end of double track). Review for specific trainhandling procedures for eastbounds (braking) at this location & monitor.

Saskatoon (Watrous 180-200)	
Reason	High population area, proximity to waterway and industry
Existing WIS Sites	Miles 175.8, 187.2, 201.9
Detection Enhancement	Add brittle bar Mile 192.0 (Saskatoon Yard on main track) to protect west side of S. Saskatchewan R. Bridge
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Low frequency of train separations. Generalized train handling procedures in place.

Unity (Wainwright 50-70)	
Reason	Oil loading, population and proximity to other railways
Existing WIS Sites	Miles 45.2, 55.3, 67.2, 79.0
Detection Enhancement	Existing adequate
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Low frequency of train separations. Specific instructions for DP asynchronous operation to control slack in place.

Wainwright (140-160)	
Reason	Oil loading, population, significant structures, proximity to waterway and environmentally sensitive
Existing WIS Sites	Miles 132.5, 147.6, 162.0
Detection Enhancement	Add brittle bar Mile 151.0 (new intermediate signal 1510) to protect west side of Battle River trestle
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Existing high frequency train separation area. DP asynchronous instructions in place to control slack. Develop enhanced eastbound trainhandling instructions for braking and monitor.

Greater Edmonton (240-265)	
Reason	High population and heavily industrialized area, proximity to waterway
Existing WIS Sites	Miles 233.7, 246.2, 255.1
Detection Enhancement	Add brittle bar on two tracks Mile 262.4 (intermediate signal 2624N/S) to protect west side of N Saskatchewan R bridge
Track/Structures Inspection Enhancement	Maintain existing procedures
Train Handling/Monitoring/Marshalling	Existing moderate frequency train separation area. Develop enhanced westbound trainhandling instructions (braking) and monitor.

Prairie North Alternate Route (Saskatoon-Edmonton)

Reason	New crude oil loading facilities, proximity to main Yellowhead Highway, population centers, new use as alternate mainline route
Existing WIS Sites	Based on minimum 60 miles between inspections for caboose less trains - not ideally located for current points of interest
Detection Enhancement - Full WIS	Lashburn - Require WIS east of town (reduce distance from 48 miles to 5 miles)
	Lloydminster - Add WIS east of town, add WIS west of town, move existing WIS Mile 97 westward
	Bruderheim - Add WIS east and west of town
	Total 5 new WIS locations
Detection Enhancement - Dragging Equipment Detectors	1 @ Borden Bridge (Mile 91 Aberdeen); 1 @ North Battleford Bridge (Mile 5 Blackfoot); 2 @ Scotford Bridge (Mile 110 Vegreville)
	Total 6 new brittle bars
Track/Structures Inspection Enhancement	To be increased as tonnage further develops
Train Handling/Monitoring/Marshalling	Generalized train handling procedures in place. Low frequency of train separations on existing operation.

Carberry-Cromer Subs Connecting Route

Reason	New crude oil loading facilities
Existing WIS Sites	Based on minimum 60 miles between inspections for caboose less trains - not ideally located for current points of interest
Detection Enhancement - Full WIS	Carberry Sub - Mile 22.5 (installed October 2014) - provides max 24 mile spacing east of Brandon
	Cromer Sub - Mile 10.0 (installed October 2014) - protects approach to Brandon west side
	Total 2 new WIS locations
Detection Enhancement - Dragging Equipment Detectors	None planned - no significant features require further protection
Track/Structures Inspection Enhancement	To be increased as tonnage further develops
Train Handling/Monitoring/Marshalling	Generalized train handling procedures in place. Very low frequency of train separations on existing operation.

Edmonton-Calgary Connecting Route

Reason	General increase in volume, high DG volume between Edmonton and Mirror (Camrose Sub)
Existing WIS Sites	30 mile spacing on heavy DG volume line segment Camrose Sub; 50 mile spacing Mirror-Calgary on Three Hills Sub
Detection Enhancement - Full WIS	Camrose Sub - none planned
	Three Hills Sub - none planned
Detection Enhancement - Dragging Equipment Detectors	None planned - no significant features require further protection
Track/Structures Inspection Enhancement	To be increased as tonnage further develops
Train Handling/Monitoring/Marshalling	Generalized train handling procedures in place. Low frequency of train separations on existing operation.

Edmonton-Fort McMurray Connecting Route

Reason	New petroleum products loading facilities, general increase in all traffic volumes
Existing WIS Sites	45 mile spacing on Coronado Sub and 30 mile spacing on Lac la Biche Sub
Detection Enhancement - Full WIS	Coronado Sub - Mile 28.7 (installed October 2014) - provides max 25 mile spacing
	Lac la Biche Sub - Mile 62.8 (installed October 2014) - protects approach to Boyle south side
	Total 2 new WIS locations
Detection Enhancement - Dragging Equipment Detectors	None planned - no significant features require further protection
Track/Structures Inspection Enhancement	To be increased as tonnage further develops
Train Handling/Monitoring/Marshalling	Generalized train handling procedures in place. Very low frequency of train separations on existing operation.

Prairie North Route Portage la Prairie-Warman

Reason	General increase in volume
Existing WIS Sites	30-50 mile spacing
Detection Enhancement - Full WIS	Gladstone Sub - none planned
	Togo Sub - none planned
	Margo Sub - none planned
	Aberdeen Sub (Humboldt-Warman) - none planned
Detection Enhancement - Dragging Equipment Detectors	None planned - no significant features require further protection
Track/Structures Inspection Enhancement	To be increased as tonnage further develops
Train Handling/Monitoring/Marshalling	Generalized train handling procedures in place. Low frequency of train separations on existing operation.

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Corridor Risk Assessment
Pilot Project
Toronto – Montreal Route
15-September-2013

Mission Statement

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Toronto to Montreal corridor, specifically the Kingston Subdivision. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Kingston Subdivision, and from that review, identified six focus areas that required additional examination. From that review, the team developed a table of potential initiatives to reduce the risk associated with each of the focus areas.

Introduction

For the purposes of this risk assessment, the Toronto – Montreal corridor has been defined as the trackage making up the primary freight operation route between Toronto MacMillan Yard and Montreal Taschereau Yard. The route comprises of the Montreal Subdivision between Mile 8 and 11, the Kingston Subdivision between Mile 10 and Mile 313 and the York Subdivision between Mile 0 and Mile 25. This corridor is one of the busiest in Canada, with all but twelve of the route miles made up of multi-track territory. The entire route is operated by Centralized Traffic Control (CTC) rules and signals. The Montreal and Kingston Sub portions are shared with numerous VIA Rail Canada passenger trains operating between Toronto, Ottawa and Montreal.

In addition to being a heavily utilized route, the Toronto-Montreal corridor is also one of the most populated corridors on the CN system. Approximately 70 route miles pass through densely populated urban areas. The line also passes through a number of smaller communities and runs adjacent to several significant industrial production facilities. The route crosses many streams and rivers, and at several locations the line runs parallel and within 1000 feet of Lake Ontario. The railway runs parallel to, and within a few miles of, primary freeway Highway 401/Autoroute 20 for much of the distance between Toronto and Montreal. For these reasons, along with other considerations, this corridor was selected as a pilot project for a risk assessment related to the transport of dangerous goods on the CN system.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Dangerous goods train accident locations since 2003
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – CP trackage, highways, airports, etc.
- Passenger train stations

- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. The prominent items of vulnerability were also tabulated and are included in the Appendix. The resulting corridor risk profile map is included in the Appendix as Map 1.

Current mitigations on the route include the following:

- WIS locations at approximately fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Toronto and Montreal, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed has been reduced at the Ottawa River bridges and near the lakeshore at Port Hope to protect structures, track curvature and the surrounding populated areas.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across the subdivision.
- The rail is ultrasonically tested for rail defects every twenty days in the winter and every thirty days in the summer.
- The geometry car operates over the Kingston Subdivision approximately five to seven times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Additional Risk Mitigation Initiatives

By visually plotting the various risk variables on the map, a corridor-based risk review was produced and tabulated below in Table 1. This table provides an overview of various operational risks over the length of the corridor and identifies initiatives that require review and implementation at the regional or headquarters level.

Table 1 – Risk Mitigation Initiatives for Toronto – Montreal Corridor

Item Number	Issue	Proposed Initiative	Cost	Impact on Risk Reduction	Initiative Status	Notes	Further Details
1	Train Separations	Develop specific trainhandling procedures for the six key focus areas - breakdown by manifest and bulk DG commodity train types	Minimal	Medium	New		
2	LEPP monitoring	Enhanced monitoring of train handling procedures in accordance with guidelines specifically developed for the focus areas	Low	Medium	In Place		
3	Efficiency Testing	Additional testing for operating and engineering employees working on/through focus areas, particularly in relation to train speed, securement, limits of authority, proper flagging etc.	Low	Medium	In Place		
4	Train Speed in Critical Areas	Train speed already reduced well below zone speed at Port Hope (Lake Ontario) and at Montreal (Ottawa River crossings). Remainder of corridor generally posted for 60 mph based on TC track class and curvature. Potential to reduce speed at other focus areas (but may have impact on in-train forces and separations during deceleration/acceleration). Impact on overall velocity likely low but reduced speed will lower severity of any incident.	Low	Low	In Place	Acceleration/deceleration will likely be detrimental to train separations - uniform train speeds preferred Recent OT-55 adoption in Canada requires that trains with dangerous goods be restricted to 50 mph.	
5	Train Makeup Strategies	Where volumes exist, operate dedicated DG trains between Toronto and specific eastern points (Montreal, Joffre) to consolidate DG traffic into limited number of trains, to reduce probability of incident occurance by train start.	Medium	Low	New	Requires additional switching, reduces multiple trains handling DGs to limited number, may drive additional train starts	
6	Adjust train marshalling requirements	After train marshalling to reduce potential and severity of train separations (and possible derailment). Use Modified Rule 2A (10 head end loads) as initial phase.	Medium	Medium	New		
7	Detector Spacings	Detectors are not spaced evenly either side of the six focus areas (spacing based on 15 mile intervals), particularly for the populated area of each. Install additional dragging equipment detection systems ("brittle bars") within three miles of the populated area	Medium	High	New	Additional Hot bearing/hot wheel systems not likely of high value - existing HBD spacing is working to maintain low frequency of wheel/axle related issues	Further details on potential new brittle bar locations in Focus Area tables
8	Roll By Inspections	All trains departing Toronto and Montreal receive visual inspection by mechanical forces on departure. This facilitates the capture of handbrake applications and hot wheel problems.	Low	High	In Place		
9	Wheel Impacts	Two WILD sites in operation (Cedars and Clarke) near heaviest population areas. Maintain threshold force at 90 kips year round at these locations.	Medium	Low	In Place	May increase quantity of wheel changeouts, particularly in winter.	Implementation requires caution to ensure unmanagable quantities of wheel changeouts are not generated.
10	Track Inspections	Existing track inspections based on high speed passenger operation and are of sufficient frequency. Defects noted with existing TG and RFD inspections. Further enhance inspection frequency in the six focus areas.	Medium	Low	In Place		Recent risk analysis completed on RFD testing to narrow in on proper frequency levels for the Kingston Sub.
11	Track Integrity Monitoring	Currently employ 10 units equipped with V/Ti technology. Data received from one VIA locomotive which operates on Kingston Sub periodically. Request VIA to prioritize assignment of locomotive to Toronto-Montreal service.	Low	Low	In Place		
12	Track Defect Repair	Prioritize repair of track defects identified in the six key focus areas using TIS or other programs.	Medium	Medium	New		
13	Plant Investment	Continued use of TC Class 5 track standard maintenance procedures throughout corridor. Consider accelerated rail/tie/ballast replacement schedule for focus areas.	High	High	In Place	Engineering Capital Spending on the Kingston Sub: 2011 - $26.48M, 2012 - $18.56M, 2013 - $16.06M and 2014 Plan - $14.88M	Plant details in Focus Area tabs
14	Rail Line Relocation	Selective relocation of high risk (eg. Near water) portions of track in the focus areas	High	Low	New	Impractical at Port Hope and Kingston account surrounding land use. Further blocked by CP Belleville Sub mainline at Port Hope. Derailment history does not suggest relocation would result in reduced incidents at these locations.	Further explanations in Focus Area tables
15	Proximity to Waterways	Limited number of locations where rail line is immediately adjacent (or direct flow path exists) to Lake Ontario. In advance of these locations install additional "brittle bar" dragging equipment detectors as another means of early detection of dragging/derailed equipment. Ensure adequate spill response material and resources to properly deploy and manage a large on-water incident. Consider working with local municipality regarding placement of a response trailer or material cache.	Low	High	New		Further details on specific waterway issues in Focus Area tables
16	Strengthen Response Capability - DG and Environment	Ensure availability of adequate spill response materials near critical areas such as Toronto, Belleville and Montreal. Ensure reputable contractors are available for large incident and on-water response and that CN is a 'key' client. Complete E2MS mapping with Environment Canada to identify critical natural resources, access points, boat launch areas, etc. Share E2MS information with local municipalities, community services and responders. Identify back-up emergency response contractors and material suppliers.	Medium	Low	New		Does not reduce risk of a train derailment
17	Engagement and outreach for external stakeholders	Maintain open line of communication between Public Affairs and local municipalities along route. Ensure that E2MS information is communicated in any outreach programs.	Low	Low	In Place	Does not reduce risk of a train derailment but does mitigate co-operative efforts during incident management and cleanup	

Further to the results in Table 1, the corridor map (Map 1) clearly illustrates locations where multiple risk variables considered in the analysis are clustered in specific areas. Further examination of these areas was conducted by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Mileage segments with the greatest number of vulnerability ranking points were grouped into focus areas. Table 2 provides a summary of vulnerability ranking points by mileage group and the resulting focus areas.

Table 2 – Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Focus Area Point Count
Kingston Sub																
10				1	2	2		6		1	1	1			14	Montreal
20	3			1	1	1	3	6		1					16	30
30	2						2								4	
40	1	2					1	1				1			6	
50	1						1								2	
60			1					1				1			3	
70															0	
80					1										1	
90															0	
100												1			1	
110		1										1			2	Brockville
120		1	1				1	1				4	3		11	11
130					1										1	
140															0	
150	1						1	1							3	
160					1										1	Kingston
170	2			1	1		1	1	2						8	11
180									1			1			2	
190															0	
200	1		1				1	1	1						5	
210	1					1	2				1				5	Belleville
220	2		2				2	2	1			1			10	15
230						1									1	
240			1			1									2	
250						1									1	
260			1			1	1	1				1			5	Port Hope
270	2		1			1	1	1	1				1		8	13
280						1									1	
290	1						1		1					1	4	
300	1			1	2	2	1	2	1			1		3	14	Toronto
310			1					2						1	4	48
York Sub																
0	1		1	1	1	1	3								8	
10	1			2	2	2	4								11	
20	1			1	2	3	3					1			11	

Based on a review of the risk variables on the corridor map, a set of six focus areas were identified for further review. The team assessed the specific risks associated with each focus area and developed appropriate localized mitigation factors. The six focus areas are as follows:

1. Montreal (Mile 10 to 30)
2. Brockville (Mile 120 to 130)
3. Kingston (Mile 160 to 185)
4. Belleville (Mile 210 to 230)
5. Port Hope (Mile 260 to 280)
6. Toronto (Mile 295 to 313, Mile 0 to 25 York Sub)

The specific items of interest along with a localized risk review for each of the focus areas is included in the appendix. To provide an example of the localized review results, the following tables provide the focus issues and risk mitigations specific to the Kingston focus area.

Table 3 – Kingston Focus Issues

Mile From	160
Mile To	185
Populated Mile Limits	171-184
Urban Characterization	Small city (population 123000), with significant urban development in populated limits
Waterways	Line runs adjacent to Cataraqui River (bay outlet to Lake Ontario) and Collins Bay (Lake Ontario). Bridge over Cataraqui River/Rideau Canal.
Other Issues	Heavily used VIA station. Highway 401 adjacent east of city. Parklands and other roads adjacent in city.
Wayside Inspection Systems	Mile 163.3, 179.6, 194.1
Yard Inspection	n/a (no yard facilities)
Dragging Equipment ("Brittle Bar") Detectors	None

Table 4 – Kingston Focus Area Risk Mitigations

Issue	Proposed Initiative	Cost	Risk Reduction Impact	Comments
Detector spacings	Brittle bar DED at Mile 170 for westward trains approaching city and waterways. Brittle Bar DED at Mile 185 for eastward trains. Both locations at intermediate signals.	Medium	Medium	WIS sites located ideally for 15-mile interval.
Wheel impacts	No WILD sites nearby	n/a	n/a	
Proximity to Water	Brittle bars would help\ protect waterways plus additional protection from existing WIS site Mile 179. Add absorbent materials and emergency response cache of equipment in or near Kingston. Complete E2MS with Environment Canada to evaluate other critical natural resources.	Medium	Medium	
Train Speed	Current maximum freight speed 55 mph through curves Mile 171-174, otherwise 65 mph.	n/a	n/a	OT-55 now limits trains with dangerous goods to 50 mph.
Strengthen Response Capability	Ensure adequate emergency response equipment and materials located at Tachereau Yard and Mac Yard. Ensure contractor and material resources are adequate for large spill or on-water response and that CN is a "key" client. Determine secondary resources for spill response materials and contractors. Train with local responders. Consider equipment/material cache in or near Kingston.	Medium	Low	
Plant Investment	Continue to renew rail/ties/ballast in accordance with TC Class 5 or better standards	High	Medium	Engineering Capital Spending - 2011 - $2.58M, 2012 - $796K, 2013 - $1.24M and 2014 Plan - $37K
Rail Line Relocation	Realignment would require significant detour to the north of the city, would also involve major waterway crossings rock construction.	High	Low	

Map 2 (see Appendix) provides a visual perspective of the issues in the Kingston focus area, with five-mile increments plotted on each page. This scale provides a more detailed view of the vulnerabilities and existing risk mitigation features as compared to the corridor map.

Ranking Opportunities to Mitigate Risk

While there are many risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities, including an enhanced response in event of an incident, across the corridor. The risk mitigation opportunities are presented below in Table 5, with highest ranking given to the proposal with the lowest cost and highest risk reduction potential. Mitigation opportunities are also grouped into three categories – low cost with a medium or high benefit, low cost with low benefit and medium/high cost options.

Table 5 – Ranking of Risk Mitigation Opportunities

Initiative Number	Opportunity	Location	Cost	Risk Reduction Impact	Accountability	Timeline to Implement	Comment
Group 1 - Low Cost, Medium to High Benefit							
1	Roll by Inspections	Toronto, Montreal	Low	High	Mechanical	Immediate	In place for manifest trains departing MacMillan Yard and Taschereau Yard, ensure any bypass manifest trains also inspected.
2	Additional LEPP monitoring	Entire Corridor	Low	Medium	Transportation	Immediate	Heightened monitoring to identify trainhandling problems that may lead to separations and/or derailments
3	Additional efficiency testing	Entire Corridor	Low	Medium	Transportation	Immediate	Additional focus on train securement, speed, limits of authority
4	Specific trainhandling procedures for solid bulk DG trains and manifest trains	Entire Corridor	Low	Medium	Transportation	6 months	Continuation of program to develop trainhandling guides for all CN territory. Develop a best practice (or 'script') of preferred throttle/brake action for trains in the six key focus areas.
Group 2 - Low Cost, Low Benefit							
5	V/TI track integrity monitoring equipment on locomotives	Entire Corridor	Low	Low	Engineering-Track	Immediate	Enhancement requires VIA Rail to dedicate the instrumented locomotive to Toronto-Montreal service
6	Reduce train speed in critical areas	6 focus areas	Low	Low	Transportation	Immediate	Some areas already have restrictions, blanket OT-55 restriction now in place, additional PSOs may trigger in-train force issues and separations
7	Complete E2MS strategy with Environment Canada	Entire Corridor	Low	Low	Environmental	1 year	Share results with communities through outreach programs; identify any further areas of vulnerability
8	Engagement and outreach to local municipalities	Entire Corridor	Low	Low	Public Affairs	Immediate	Continued education and mutual feedback to address concerns
9	Ensure response contractor resources prepared and CN considered to be "key" client	Entire Corridor	Low	Low	Risk Management	1 month	Continued cooperative business relations with qualified contractors who can demonstrate ability to adequately respond to a CN incident, even if working for another client at the time
Group 3 - Medium to High Cost							
10	Additional dragging equipment "brittle bar" detectors near vulnerable locations	8 locations	Medium	High	Engineering-S&C	6 months	Minimize installation cost by locating at existing intermediate signals
11	Alter train marshalling to improve separation rate - apply Marshalling Rule 2A	Entire Corridor	Medium	Medium	Transportation	3 months	Rule 2A successful in Winnipeg-Chicago pilot project
12	Install cache of incident response and spill equipment near vulnerable waterways	5 locations	Medium	Medium	Environmental	6 months	Strategic storage locations near areas where track crosses or runs parallel to significant water bodies
13	Accelerated plant investment/renewal	Entire Corridor	High	Medium	Engineering-Track	Continuous	Renew infrastructure at intervals tailored for high speed/high tonnage operation
14	Enhanced track inspections	Entire Corridor	Medium	Low	Engineering-Track	Immediate	Existing Class 5 inspection procedure already highly effective and rigorous
15	Consolidate DG traffic onto dedicated trains	Entire Corridor	Medium	Low	Transportation	6 months	Will likely drive additional train starts and switching
16	Enhanced incident response resources and forces	Entire Corridor	Medium	Low	Risk Management	6 months	Ensure reputable contractors available for immediate response; coordination with local fire departments
17	Ensure adequate incident response equipment and material available	Montreal, Toronto	Medium	Low	Environmental	6 months	Evaluate availability of emergency response equipment and materials, as well as secondary sources in the event of a large or catastrophic incident
18	Maintain WILD force threshold at 90 kips year-round	Cedars, Clarke	Medium	Low	Mechanical	Immediate	Will likely flag more wheels for replacement - monitor to ensure this does not exceed system wheelset changeout capacity

A number of the opportunities involve adjustment to existing policies or procedures that will involve little to no up-front cost but may create some additional operating issues and/or cost over time. The brittle bar dragging equipment detector sites do require a relatively modest initial capital expenditure, but this cost can be managed by locating these features at existing signal sites with electrical power readily available. Emergency response initiatives will help to control the exposure involved if an incident were to occur. At this time, there does not

appear to be any high capital cost solutions that will provide a higher probability of risk reduction than the solutions noted above.

Appendix Material

- Map 1 – Toronto – Montreal Corridor
- Map 2 – Kingston Focus Area
- Vulnerability Details Table
- Montreal Focus Tables
- Brockville Focus Tables
- Kingston Focus Tables
- Belleville Focus Tables
- Port Hope Focus Tables
- Toronto Focus Tables

Corridor Risk Assessment
Edmonton-Pacific Coast Routes
02-May-2014

Summary

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Edmonton to Pacific Coast corridors, including both the Edmonton-Vancouver route and the Jasper-Prince Rupert route. The team reviewed a number of variables that contribute to the risk of operating dangerous goods on the Edmonton-Pacific Coast corridor, and from that review, identified items of vulnerability that required additional examination. From that review, the team developed a series of initiatives to reduce the risk associated with each of the vulnerable areas. The following table summarizes the resultant risk mitigation initiatives and preliminary cost.

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Edson	41.6	Lake Wabamun east	DED Site (2 track)	$50k	Protect Lake Wabamun bridge for westbound trains.	1
Edson	196	Athabasca River west	DED Site	$30k	Protect Athabasca River bridge for eastbound trains.	1
Edson	223	Henry House east	DED Site	$30k	Protect Henry House bridge for westbound trains.	1
Albreda	34	Moose Lake east	DED Site (2 track)	$50k	Protect Moose Lake & Hwy 16 overpass for westbound trains.	1
Fraser	59	Fraser River west	DED Site	$30k	Protect Fraser River bridge Mile 56 for eastbound trains.	1
Fraser	100	Fraser River west (Hansard)	DED Site	$30k	Protect Fraser River bridge Mile 99 for eastbound trains.	1
Telkwa	21	Burns Lake	DED Site	$30k	Enhanced protection Burns Lake (east).	1
Telkwa	32	Burns Lake	DED Site	$30k	Enhanced protection Burns Lake (central).	1
Telkwa	46	Decker Lake	DED Site	$30k	Enhanced protection Decker Lake (west).	1
Telkwa	89	Bulkley River	DED Site	$30k	Protect Bulkley River bridge Mile 93 for westbound trains.	1
Bulkley	9.5	Lake Kathlyn	DED Site	$30k	Protect Lake Kathlyn area for eastbound trains.	1
Bulkley	38	Bulkley Canyon	DED Site	$30k	Protect bridges & tunnels in Bulkley Canyon area.	1
Bulkley	59	Skeena River east	DED Site	$30k	Protect Skeena River bridge for westbound trains.	1
Fraser	146	Prince George	DG Equipment trailers (transfer trailer ($200k) plus foam/firefighting ($135k))	$335k	Coverage for Redpass - Prince Rupert (currently no DG mitigation equipment in vicinity) Reduce equipment on scene time PG 10-12 hr to 0 hr, Prince Rupert from 20 hr to 7 hr.	1
Fraser	146	Prince George	New Hire DGO	$200k	Current closest DGO is either Vancouver or Edmonton. Reduce on scene time at PG from 8 hr to 0 hr; Prince Rupert 19 hr to 7 hr.	1
		Entire Territory	Environmental Equipment Cache Needs (3 locations)	$300k	Enhanced equipment cache design specific for water response, located at Smithers, Ashcroft, Terrace.	2
		Entire Territory	Environment Personnel Staffing	$200k	Manager to establish response programs, training, excercises, equipment and planning (could handle all Canadian operations). Also will manage ER mapping, maintain equipment, and provide point of contact for industry, suppliers and regulators.	2
		Edmonton-Vancouver Jasper - Prince George	E2MS Mapping Requirements	$200k	Identify access to waterways, locations for control points, staging areas, observation points.	2
		Entire Territory	Environmental Training	$75k annually	3-4 sessions for water response, proposed for Prince George, Kamloops and Hinton.	2
		Entire Territory	Environmental Response Excercises	$30k annually	3 excercises annually, proposed for Kitimat, Ashcroft and Prince George.	2
		Entire Territory	Environmental Contractor Capability Evaluation		Review capabilities of all contractors used for environmental response in western Canada.	2
		Entire Territory	Increased culvert inspection frequency		Mitigate potential washouts due to clogged culverts; may require additional manpower. Increase inspections for culverts less than 36" diameter.	2
North Shore Industrial Line		Thornton & Lonsdale Tunnels	Risk Assessment of ventilation systems and maintenance		Review procedures and practices for these high profile tunnels underneath urbanized areas of Vancouver.	2
Kitimat			Bridge inspections		Increase inspection frequency for wood trestle structures as business increases.	2
Kitimat			Track and Rail Inspection		Increase inspection frequency as part of plans for new business.	3
Kitimat		TBD	WIS Site		Future 2016 if traffic develops.	3

Introduction

For the purposes of this risk assessment, the Edmonton – Pacific Coast corridor has been defined as the trackage making up the two primary freight routes west of Edmonton:

- Edmonton to Vancouver
  - Made up of five different subdivisions
  - All under CTC operation
- Jasper to Prince Rupert
  - Made up of seven different subdivisions
  - All under CTC operation

These routes provide a vital link between western Canada and the ports at Vancouver and Prince Rupert. The majority of both routes are single-tracked. However, the co-production zone with CP between Coho (near Ashcroft) BC and Matsqui (near Vancouver) BC provides a 160 mile double track directional running zone with minimal requirements for train meets. VIA Rail provides intercity passenger train operation on this corridor and Rocky Mountaineer operates seasonal tourist trains west of Jasper.

In addition to being a heavily utilized route, the entire corridor extends through extremely remote territory with minimal population. While highways generally parallel the corridor, track access is limited due to terrain and presence of rivers and lakes. Any incident is likely to have environmental consequences as most of the corridor parallels major rivers and lakes as expected in mountainous territory. A significant number of bridges and tunnels are found on the route as a result of the challenging terrain. The mountainous geography also generates other issues such as slope stability and avalanche/rockfall zones.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and reviewing same using a map of the corridor:

- Dangerous goods train accident locations since 2004
- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railway's trackage, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, First Nations lands, etc.)
- Wayside Inspection System (WIS) and dragging equipment detector (DED) locations

The information was sourced from accident history, track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. GIS maps of the corridor used during the review are included in Appendix 1. The prominent items of vulnerability were tabulated and are found in Appendix 2.

Current mitigations on the route include the following:

- WIS locations at approximately ten to fifteen mile intervals that assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents.
- Trains receive roll by inspections on departure from CN yards in Edmonton, Kamloops, Vancouver, Prince George and Prince Rupert, which identify issues such as hot wheels caused by failure to release hand brakes in the terminals.
- Freight train speed is generally less than 45 mph west of Jasper on account of the large amount of curvature present on the line.
- Special dangerous commodities and dangerous commodities have specific speed restrictions in certain locations, and OT-55 regulation adoption has reduced the maximum speed of dangerous commodities to 50 mph across the corridor.
- The frequency of trains is such that movements are viewed by other employees multiple times during their journey across each subdivision.
- The rail is ultrasonically tested for rail defects at intervals of 18 days in the winter and 26 days in the summer.
- The geometry car operates over the corridor approximately three to six times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Risk Review

A review of GIS mapping and aerial photography generated a master table of risk and vulnerability features (see Appendix 2). The results of the mapping review were summarized by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Table 1 provides a summary of vulnerability ranking points by mileage group and the resulting areas of interest.

Table 1 – Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Edmonton to Vancouver Main Line Corridor																
Edson Sub																
0				1								1	3		5	Edmonton
10					4		4						1		9	Metro
20			2						1						3	
30	2								1						3	
40	2				1		1							1	5	
50	2				1									2	5	
60	3				1		3								7	
70					1										1	
80	3				2										5	
90	2														2	
100	2				1										3	
110	2														2	
120	3				1		2								6	
130	3	1			2		1	1				1	1	1	11	
140					2										2	
150	2				1										3	
160	1				2		1								4	
170														1	1	
180		1			3			1							5	
190	6						2								8	
200	4						1		1			1		1	8	
210	6						1								7	Jasper
220	3				1		1								5	National
230	1								1			1		1	4	Park

Table 1 – Vulnerability Ranking by Mileage Group (*Continued*)

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Alberdz Sub																
0	2								1					1	4	**Jasper**
10	6				2		1								9	**Park**
20	5								1						6	
30	4				3		3								10	
40	3						1								4	
50	4					1	4							3	12	
60															0	
70	1	1			1	1		1	1						6	
80	1				1		1						1		4	
90	4				2		1								7	
100	4				1		1								6	
110	7						3		1						11	
120	5				1		4								10	
130	3							1	1		1	1			7	
Clearwater Sub																
0	4				1		1								6	
10	3						1							1	5	
20	2				2		1							3	8	
30	4						2								6	
40	2				1		1								4	
50	4												1		5	
60	6				2		2								10	
70	3	1			2			1							7	
80	3						1								4	
90	4				2		1								7	
100	5	1			2		3								11	
110	5				3										8	
120	4				1			1							5	
130	2		1		2			1				1		2	9	
																Kamloops
Ashcroft Sub																
0	1		1		2		1				1		1		7	
10	5						1							5	11	
20	3				1		1		1					1	7	
30	6						3		1						10	
40	4					1	2		1					1	9	
50	2	1				1	2	1						4	11	
60	2				1		1		1					3	8	
70	2				2		1							2	7	
80	1													6	7	
90	2						3							14	19	**White**
100	4				2	1	3							2	12	**Canyon**
110	4				1		2							3	10	
120	4				1		2	1				1		2	11	
Yale Sub																
0	2				2		1		1					5	11	
10	3				2		2		1					8	16	
20	3						1		1					10	15	
30	5						4							1	10	
40	6	1			5		4								16	
50	5				1		1		1						8	
60	3				1		2			1					7	
70	4		1		2		3					1	1		12	
80	4				1		3							1	7	
90	3				1	2	1							1	8	**Vancouver**
100	5			1	1		1		2		1				11	**Metro**
110	2			1	3		1		1			2	1	1	12	
Redpass to Prince Rupert Main Line Corridor																
Robson Sub																
0	3						1		1						5	
10	4						4							4	12	
20					3	1	2		2					1	9	
Tete Jaune Sub																
0	3				1		3							1	8	
10	2						1								3	
20															0	
30	4						2								6	
40	2				1		2	1				1			7	

Table 1 – Vulnerability Ranking by Mileage Group (*Continued*)

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Fraser Sub																
0	1				2		4		1					1	9	
10	8						3							1	12	**Fraser**
20	8						3							1	12	**River**
30	5														5	**Area**
40	8						3							1	13	
50	5						2								7	
60															0	
70	1														1	
80					1										1	
90	3				1		1								5	
100	2				1		1							1	5	
110	2				1										3	
120	5						1					1		1	8	
130	4						1								5	
140	3		1			1	2	1	1			1	1	1	12	
																Prince George
Nechako Sub																
0	3				2		3				1				9	
10	4						1								5	
20	2														2	
30	5				1									1	7	
40	1														1	
50	8						1								9	
60	6						1								7	
70	3	1			1		1	1						2	9	
80	1				1		1							1	4	
90	2				2		2		1						7	
100	3				1				1					1	6	
110	2	1			1		2		1			1		1	9	
Telkwa Sub																
0	2				1		1								4	
10	5				1		7								13	
20	4				3		2							1	10	
30	6	1			2		1	1					1	1	12	**Burns & Decker L.**
40	3				2		1							1	7	
50	3						1				1				5	
60	4						5								9	
70	4				1		2								7	
80	4	1			2		3	1	1						12	**Bulkley River**
90	6						5								11	
100	6														6	
110	5	1			1		1		1						9	
120	2	1			1			1	1			1		2	9	
Bulkley Sub																
0	2														2	
10	2				1		1							1	5	
20	3				1		3								7	
30	3				4		5								12	
40	2				1		3							3	9	
50	3				1		3								7	
60	4						1								5	
70	4						1								5	
80	2													1	3	
90	4						3							1	8	
100	6						2								8	
110	8						4								12	
120	6						2							4	12	
130	1		1		1		1	1	1			1	1	1	9	
																Terrace
Skeena Sub																
0	4				2		3							1	10	
10	4				3		1								8	
20	4				3									2	9	
30	2						1		1						4	**Skeena River Area**
40	6						2							2	9	
50	2						2		1					1	6	
60	5						4								10	
70	4						3								7	
80	1				1		1							3	9	**Prince Rupert**
90	2		1		1		1	1	1			3		3	13	

As a result of the complicated nature of the risk factors along this corridor, each subdivision was examined in detail using the vulnerability ranking above and comparing to existing

mitigation features such as detector sites, track inspection procedures and incident response capability. In addition to the main corridor, the following important feeder routes were also reviewed for potential risks:

1. North Shore Industrial Line in Vancouver
2. Kitimat Subdivision between Terrace and Kitimat

The specific items of interest along with a localized risk review for each of the subdivisions is included in Appendix 3. To provide an example of the subdivision review results, the following tables provide the focus issues and risk mitigations specific to the Edson Subdivision.

Table 2 – Edson Subdivision Risk Factors and Mitigations

Edson Sub		CATEGORY
Issues of Concern	1. DG volume - 74641 carloads (diesel, crude oil top commodities) 2. Proximity of water (especially Hinton-Jasper segment)	
Existing WIS Sites	1. Existing DED Mile 58, 65 (Magnolia/Entwistle bridges), 120/121/124 (Wolf Creek bridges), DEDs 204/205 for Brule Tunnel 2. WILD at Stony Plain and Snaring 3. FACTIS wheel inspection system at Stony Plain	
Detection Enhancement	Proposed DEDs at: - Mile 41.6 (east side Wabamun Lake bridge) - Mile 196 (west side Athasbasca bridge) - Mile 223 (east side Henry House bridge)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Edmonton 4. No fire protection outside muncipal areas (private contractors required from US) 5. CP foam trailer available in Calgary	
Environmental	2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Environmental training for water incident response at Hinton	2
Other	1. Review for increased culvert inspections (particularly Mile 154-155) 2. Plans for equalization culverts at Big Eddy fill (Mile 136)	2

Risk Mitigation

Overall, it was determined that the corridor has generally good wayside inspection system spacing. There are certain areas where supplemental dragging equipment detection is proposed to protect vulnerable bridges and alignments near waterways. Track inspection is being undertaken at better than minimum intervals and track geometry measurements are completed at the required frequency.

Some further mitigation is required in the areas of dangerous goods and environmental response. The addition of a transfer trailer and a foam/firefighting trailer at Prince George is recommended to assist in the suppression of flammable goods fires and to reduce the existing response time of 12 or more hours for incidents between Jasper and Prince Rupert. Caches of environmental response equipment specific for incidents in water are recommended for installation at Terrace, Smithers and Ashcroft. This equipment is intended to provide immediate response in event of an incident in the vicinity of the numerous waterways intersecting and adjacent to the corridor in these sensitive areas.

A specific risk assessment is recommended for the Thornton Tunnel and Lonsdale Tunnel on the North Shore Industrial Line in Vancouver. Both tunnels are located directly beneath heavily populated areas. The Lonsdale Tunnel is located directly beneath The Esplanade, the main business district area of North Vancouver. The Thornton Tunnel features a ventilation shaft that draws in air directly from a residential area east of downtown Vancouver. Procedures, practices, maintenance plans and projected capital plans should all be reviewed in this process to evaluate if any upgrades or changes are required to maintain the integrity of these highly important items of infrastructure.

Increased culvert inspections are recommended throughout the corridor as this infrastructure ages and becomes fouled with debris (plus ice in the winter/spring transition). Additional inspections for timber trestle structures should be incorporated into any plan to increase traffic on the Kitimat Subdivision. Recent customer marketing requests suggest that future DG traffic growth is likely between Terrace and Kitimat thus this line segment may be subject to a future more in-depth review as plans become more firm.

Summary of Proposed Opportunities and Category Ranking

While there are many risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities, including enhanced response in event of an incident, across the corridor. The risk mitigation opportunities are presented below in Table 3.

Each mitigation item has been given a category rank. For the purpose of this risk assessment, the categories have been defined as follows.

- Category 1
  - Recommended for immediate implementation (high risk and/or modest cost)
- Category 2
  - Recommended for funding and implementation if additional funding identified in 2014, otherwise top priority for funding in 2015
- Category 3
  - Recommended for future implementation in 2016 or later.

Table 3 – Proposed Risk Mitigation Strategies

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Edson	41.6	Lake Wabamun east	DED Site (2 track)	$50k	Protect Lake Wabamun bridge for westbound trains.	1
Edson	196	Athabasca River west	DED Site	$30k	Protect Athabasca River bridge for eastbound trains.	1
Edson	223	Henry House east	DED Site	$30k	Protect Henry House bridge for westbound trains.	1
Albreda	34	Moose Lake east	DED Site (2 track)	$50k	Protect Moose Lake & Hwy 16 overpass for westbound trains.	1
Fraser	59	Fraser River west	DED Site	$30k	Protect Fraser River bridge Mile 56 for eastbound trains.	1
Fraser	100	Fraser River west (Hansard)	DED Site	$30k	Protect Fraser River bridge Mile 99 for eastbound trains.	1
Telkwa	21	Burns Lake	DED Site	$30k	Enhanced protection Burns Lake (east).	1
Telkwa	32	Burns Lake	DED Site	$30k	Enhanced protection Burns Lake (central).	1
Telkwa	46	Decker Lake	DED Site	$30k	Enhanced protection Decker Lake (west).	1
Telkwa	89	Bulkley River	DED Site	$30k	Protect Bulkley River bridge Mile 93 for westbound trains.	1
Bulkley	9.5	Lake Kathlyn	DED Site	$30k	Protect Lake Kathlyn area for eastbound trains.	1
Bulkley	38	Bulkley Canyon	DED Site	$30k	Protect bridges & tunnels in Bulkley Canyon area.	1
Bulkley	59	Skeena River east	DED Site	$30k	Protect Skeena River bridge for westbound trains.	1
Fraser	146	Prince George	DG Equipment trailers (transfer trailer ($200k) plus foam/firefighting ($135k))	$335k	Coverage for Redpass - Prince Rupert (currently no DG mitigation equipment in vicinity) Reduce equipment on scene time PG 10-12 hr to 0 hr, Prince Rupert from 20 hr to 7 hr.	1
Fraser	146	Prince George	New Hire DGO	$200k	Current closest DGO is either Vancouver or Edmonton. Reduce on scene time at PG from 8 hr to 0 hr; Prince Rupert 19 hr to 7 hr.	1
		Entire Territory	Environmental Equipment Cache Needs (3 locations)	$300k	Enhanced equipment cache design specific for water response, located at Smithers, Ashcroft, Terrace.	2
		Entire Territory	Environment Personnel Staffing	$200k	Manager to establish response programs, training, excercises, equipment and planning (could handle all Canadian operations). Also will manage ER mapping, maintain equipment, and provide point of contact for industry, suppliers and regulators.	2
		Edmonton-Vancouver Jasper - Prince George	E2MS Mapping Requirements	$200k	Identify access to waterways, locations for control points, staging areas, observation points.	2
		Entire Territory	Environmental Training	$75k annually	3-4 sessions for water response, proposed for Prince George, Kamloops and Hinton.	2
		Entire Territory	Environmental Response Excercises	$30k annually	3 excercises annually, proposed for Kitimat, Ashcroft and Prince George.	2
		Entire Territory	Environmental Contractor Capability Evaluation		Review capabilities of all contractors used for environmental response in western Canada.	2
		Entire Territory	Increased culvert inspection frequency		Mitigate potential washouts due to clogged culverts; may require additional manpower. Increase inspections for culverts less than 36" diameter.	2
North Shore Industrial Line		Thornton & Lonsdale Tunnels	Risk Assessment of ventilation systems and maintenance		Review procedures and practices for these high profile tunnels underneath urbanized areas of Vancouver.	2
Kitimat			Bridge inspections		Increase inspection frequency for wood trestle structures as business increases.	2
Kitimat			Track and Rail Inspection		Increase inspection frequency as part of plans for new business.	3
Kitimat		TBD	WIS Site		Future 2016 if traffic develops.	3

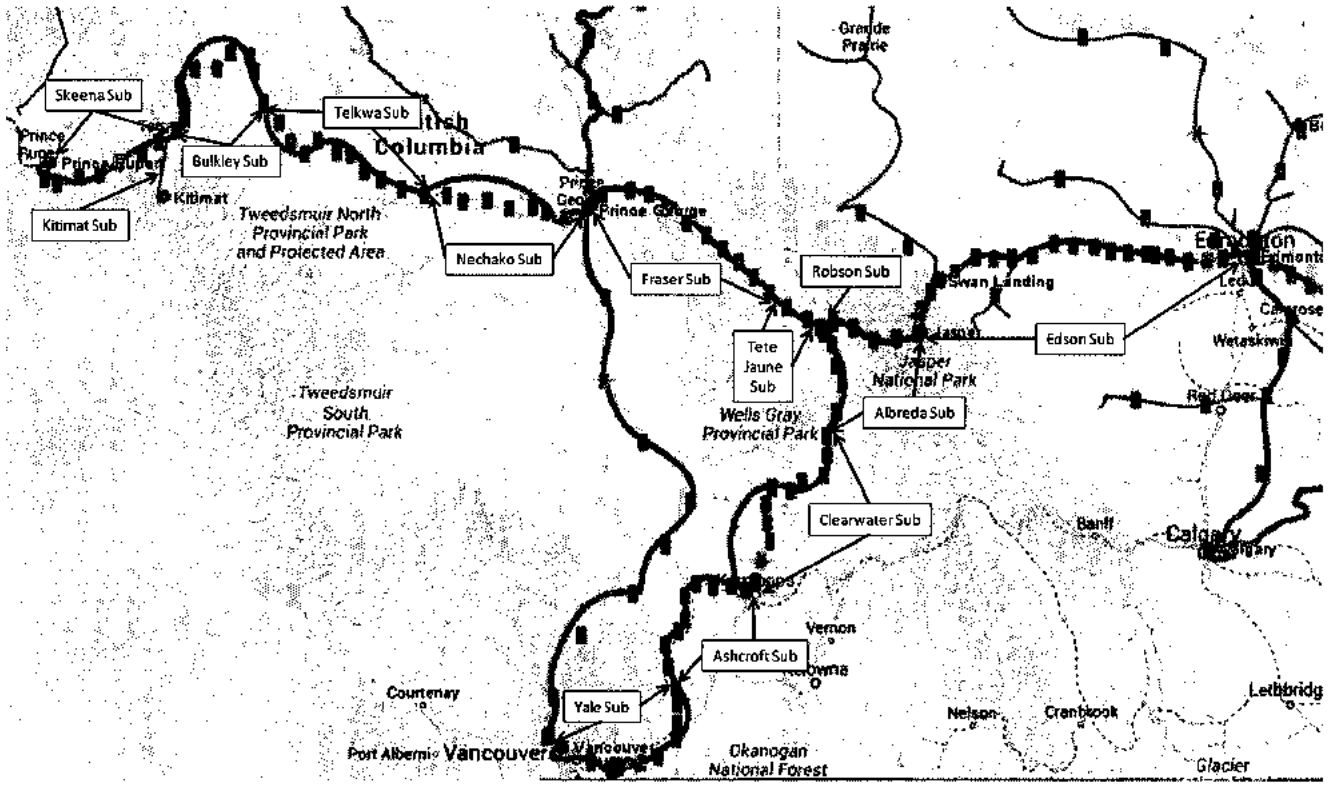
The immediate 'category 1' mitigation items consist of 13 dragging equipment detector sites representing an approximately expenditure of $430,000. This cost can be managed by locating these features at existing signal sites with electrical power readily available. The emergency response and environmental initiatives will help to control CN's exposure in the event an incident was to occur. At this time, there does not appear to be any high capital cost solutions (i.e. track relocation) that will provide a higher probability of risk reduction than the solutions noted above.

Appendix Material

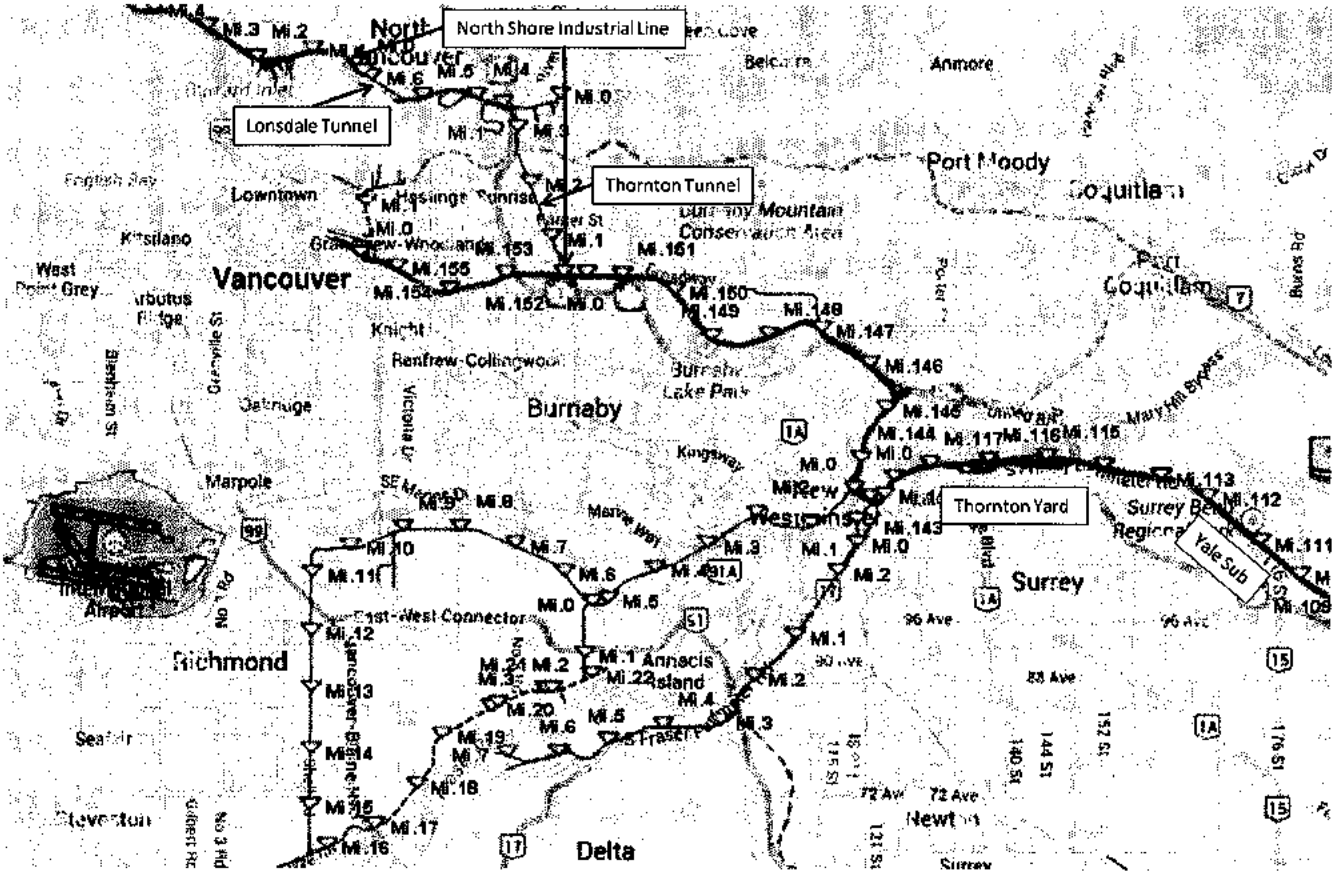
- Maps of Edmonton – Pacific Coast corridor
- Vulnerability Details Table
- Subdivision Risk Review Tables

Appendix 1 – Maps of Edmonton-Pacific Coast Corridor

Map 1 – Corridor Overview



Map 2 – Vancouver Metropolitan Area Detail



Appendix 2 – Vulnerability Details Table

The following seventeen (17) pages contain the tables of risk areas and vulnerable structures that were obtained through an overall map and aerial photography review of the Edmonton-Pacific Coast corridor. Each risk item was categorized by type and areas with the greatest number of risks became focus areas for further review of detection, operations procedures and emergency response.

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Edmonton to Vancouver Main Line Corridor																
Edson Sub																
5	4												X			Walker Yard, and related heavy mechanical facilities
5	4-12				X											City of Edmonton urban area
5	4.5													X		Alberta Terminal grain elevators / storage facility
5	6.2													X		Chemical plant adjacent
5	7													X		Lafarge cement kiln and plant adjacent
10	7.9					X		X								170th Street overpass
10	8.2					X		X								Alberta 16 Yellowhead Highway overpass
10	9.2					X		X								Alberta 216 Anthony Henday Freeway bridge
15	14													X		Acheson terminal grain elevator
15	17					X		X								Alberta 16A overpass
20	19-20					X										Alberta 16A parallel
20	19.9			X												Town of Spruce Grove
25	23									X						Stony Plain parkland/golf course
25	24			X												Town of Stony Plain
35	33.5	X								X					X	Mink Lake and campground parallel, slope stability issue area
35	35.5	X														Johnnys Lake parallel
40	41.5	X														Ponds/wetlands
45	44-51					X										Wabamun township road parallel
45	44	X						X								Lake Wabamun bridge
45	45														X	Wabamun power plant
50	47-51	X													X	Lake Wabamun parallel, multiple cabins/dwellings adjacent
50	52-55	X													X	Lake Wabamun parallel, multiple cabins/dwellings adjacent
55	57-58					X										Alberta 16 Yellowhead Highway parallel
60	61	X				X		X								Trestle structure across Alberta 16, Alberta 757 and creek
65	65	X						X								Trestle structure across valley and creek
65	67.2	X						X								Pembina River bridge (steel trestle)
70	67-77					X										Alberta 16 Yellowhead Highway parallel
80	79-82					X										Alberta 16 Yellowhead Highway parallel
80	80	X														Chip Lake adjacent
85	84.5	X														Chip Lake adjacent
85	84.5-88					X										Alberta 16 Yellowhead Highway parallel
85	86	X														Chip Lake adjacent
90	89	X														Stream adjacent
95	94	X														Stream crossing
100	100.5	X														Small river crossing
105	104-105					X										Township road parallel
105	105.5	X														Stream crossing
110	108	X														Wetlands
110	109	X														Stream crossing
120	122	X						X								Wolf Creek bridge (steel trestle)
125	122.5	X						X								McLeod River bridge (steel trestle)
125	125.5	X														Stream crossing
125	126-127					X										Alberta 748 parallel
130	128														X	Major sawmill adjacent
130	128.6					X		X								Alberta 16 Yellowhead Highway overpass
130	129.6		X						X				X			Town of Edson, yard, VIA passenger stop
130	130	X														Stream crossing (leads to town park)
130	131					X										Alberta 16 Yellowhead Highway parallel
130	132	X														Lambert Pond adjacent
135	135.5													X		Ansell gas/sulphur plant adjacent
135	136	X														Stream crossing & Big Eddy curve (McLeod River parallel)
145	142-145					X										Township road parallel
145	145-150					X										Alberta 16 Yellowhead Highway parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Edson Sub (continued)																
150	148	X														McLeod River parallel
150	151	X														McLeod River parallel
155	152-155					X										Alberta 16 Yellowhead Highway parallel
160	159	X														Ponds/wetlands
160	161-164					X										Alberta 16 Yellowhead Highway parallel
165	164					X		X								Alberta 16 Yellowhead Highway overpass (tunnel-type structure)
170	171														X	Obed Mine coal loadout parallel
180	179					X										Alberta 16 Yellowhead Highway parallel
180	180-181					X										Alberta 16 Yellowhead Highway parallel
185	184-185					X										Alberta 16 Yellowhead Highway parallel
185	184.6		X						X							Town of Hinton, VIA passenger stop
190	187.5	X						X								Prairie Creek bridge (steel trestle)
190	188	X														Athabasca River parallel
195	190.5-197.5	X														Athabasca River parallel
195	193.5	X						X								Athabasca River bridge
195	197	X														Stream crossing
195	197.5-198	X														Causeway across Brule Lake arm
200	198-206	X														Brule Lake parallel
200	198.5												X			Swan Landing yard
205	204	X						X								Outflow from mountain
205	204.9														X	Brule Tunnel
205	205-235									X						Jasper National Park
205	206.5	X														Ponds/wetlands
205	207	X														Various outflows from mountains
210	208.9	X														Athabasca River channel crossing
210	209.5	X														Athabasca River channel crossing
210	210-211	X														Athabasca River parallel and channel crossings
210	211.5	X														Outflow from mountain
210	212	X						X								Snake Indian River bridge
215	215-219	X														Athabasca River (Jasper Lake) parallel
220	221	X														Ponds/wetlands
225	224-233					X										Alberta 16 Yellowhead Highway parallel
225	225.5	X						X								Henry House river crossing (multi span through truss bridge)
225	226	X														Small lake adjacent
230	231														X	Jasper National Park maintenance offices/garages/facilities
235	235.7		X							X			X			Town of Jasper, yard facilities, parkland surrounding ROW, VIA/Rocky Mountaineer passenger station
Alberta Sub																
5	0-17									X						Jasper National Park
5	3	X														Ponds/wetlands
5	4-8	X														Miette River parallel
5	6-8														X	Slide fence area - prone to avalanche
5	6.5															Tunnel
10	7.8	X						X								Miette River bridge
10	8.5-12					X										Alberta 16 Yellowhead Highway parallel
10	10	X														Miette River parallel
10	10.5	X														Outflow from mountain
10	10.6	X														Miette River parallel
10	12.0	X														Ponds/wetlands
15	13	X														Miette River parallel
15	13-16					X										Alberta 16 Yellowhead Highway parallel
20	17-50									X						Mount Robson Provincial Park
20	18.5	X														Ponds/wetlands
20	19	X														Ponds/wetlands

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Alberda Sub (continued)																
20	20-23	X														Yellowhead Lake parallel
25	24	X														Fraser River parallel
25	27	X														Fraser River parallel
30	27-30					X										BC 16 Yellowhead Highway parallel
30	31	X						X								Outflow from mountain
35	32-34					X										BC 16 Yellowhead Highway parallel
35	34	X						X								Outflow from mountain
35	35	X														Ponds/wetlands
35	36-41					X										BC 16 Yellowhead Highway parallel
35	36-43	X														Moose Lake parallel
35	37							X								BC 16 Yellowhead Highway overpass
45	44	X						X								Fraser River bridge (multiple spans)
45	44-45	X														Fraser River parallel
45	46	X														Fraser River parallel
50	47-61						X									Robson Sub parallel and lower in elevation
50	48														X	Tunnel
50	50.5	X						X								Outflow from mountain
50	52	X						X								Outflow from mountain
55	53-56														X	Slide fence area - prone to avalanche
55	54	X						X								Outflow from mountain
55	54.5	X						X								Outflow from mountain
55	55														X	Snowshed - avalanche path
70	71						X									Robson Sub parallel
75	73-76					X										Whiskey Fill Road parallel
75	73.9	X														Valemount Creek crossing
75	74.5		X						X	X						Village of Valemount, VIA passenger stop, local road parallel
80	78													X		Cedarside sawmill adjacent
80	79					X										BC 5 overpass
80	80.5	X						X								Canoe River bridge (steel trestle)
90	88-89	X														Stream parallel
90	90	X														Ponds/wetlands
90	90.5-91					X										BC 5 parallel
90	92	X														Ponds/wetlands
95	92.5	X														Ponds/wetlands
95	93-97					X										BC 5 parallel
95	95							X								BC 5 skewed overpass
100	97.7	X														Thompson River tributary
100	101.5	X						X								Thompson River tributary
105	102.7	X														Thompson River tributary
105	104-105	X														Thompson River parallel
105	106-108					X										BC 5 parallel (at lower elevation)
110	108-109	X														Thompson River parallel
110	110	X														Thompson River parallel
110	110.5	X						X								Thompson River tributary
110	112-113	X														Thompson River parallel
115	113.5	X						X		X						Pyramid Creek bridge, adjacent provincial park/scenic feature (waterfall)
115	114-119	X														Thompson River parallel
115	116.3	X						X								Thompson River tributary
120	121	X						X								Thompson River tributary
125	123	X						X								Thompson River bridge (multi span)
125	123.3	X						X								Thompson River tributary
125	123.5-131					X										BC 5 parallel
125	124-128	X														Thompson River parallel
125	126.4	X						X								Thompson River tributary
130	128.5	X														Wetlands
130	131											X				Blue River Airport parallel
130	131.5	X														Thompson River tributary
135	132								X	X			X			Blue River yard, VIA passenger stop, village pond/park (note population less than 1000)

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Clearwater Sub																
0	1	X														Ponds/wetlands
5	1.5-6.4					X										BC 5 parallel
5	3	X														Ponds/wetlands
5	3.9	X														Thompson River parallel
5	5.8-12.0	X														Thompson River parallel
5	6.4							X								BC 5 skewed overpass
10	8.6	X						X								Thompson River tributary
10	11.5	X														Thompson River tributary
10	12.4														X	Tunnel
10	12.5-13.3	X														Thompson River parallel
20	17.6														X	Slide Fence - rockfall path
20	19.1														X	Slide Fence - rockfall path
20	20.1														X	Slide Fence - rockfall path
25	24	X														Thompson River parallel
25	24.3					X		X								BC 5 overpass
25	25.5-31					X										BC 5 parallel
25	27-28	X														Thompson River parallel
30	30.4-32.3	X														Thompson River parallel
30	32.3	X						X								Thompson River bridge (multi-span)
35	32.3-43.9	X														Thompson River parallel
35	33.4	X						X								Thompson River tributary
45	43.9	X						X								Thompson River bridge (multi-span deck truss with curvature)
45	44					X										BC 5 parallel
45	45	X														Thompson River parallel
50	48	X														Thompson River parallel
50	50	X														Thompson River parallel
50	51.5-52.6	X														Thompson River parallel
55	53.3													X		Vavenby sawmill adjacent
55	56-57	X														Thompson River parallel
60	58					X										BC 5 parallel
60	59	X						X								Thompson River bridge (multi-span)
60	59.5	X						X								Thompson River tributary and Thompson River parallel
60	60-61.8					X										Birch Island Road parallel
60	62	X														Thompson River parallel
65	63	X														Thompson River parallel
65	64	X														Ponds/wetlands
65	65-67.5	X														Thompson River parallel
70	67.7		X						X							Village of Clearwater, VIA passenger stop
70	68.4-72.5	X														Thompson River parallel
75	73	X														Thompson River parallel
70	71-74					X										Dunn Lake Road parallel
75	75	X														Thompson River parallel
75	75.5-77					X										Auldgrith Road parallel
80	78.5-81.5	X														Thompson River parallel
80	82.2	X						X								Thompson River tributary
85	83.5-85.5	X														Thompson River parallel
90	87-90.2	X														Thompson River parallel
90	91.2	X						X								Thompson River tributary (2-track bridge main + Chu Chua sdg)
95	93.7-94.5	X														Thompson River parallel
95	93.7-94					X										Dunn Lake Road parallel
95	95.2	X														Thompson River parallel
95	97.3-99.5					X										Dunn Lake Road parallel
100	99-103	X														Thompson River parallel
105	102.6					X		X								BC 5 overpass
105	104.4		X													Village of Barriere

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Clearwater Sub (continued)																
105	103.9	X						X								Thompson River tributary (2-track bridge main + Barriere sdg)
105	104.5	X														Thompson River parallel
105	105.5-107.5					X										BC 5 parallel
105	105.6-108.5	X														Thompson River parallel
105	107	X						X								Thompson River tributary
110	107.6	X														Thompson River parallel
110	108.5-110	X														Thompson River parallel
110	108.6					X										BC 5 parallel
110	109-110	X														Thompson River parallel
110	111.2-113	X														Thompson River parallel
110	111.2-113					X										BC 5 parallel
115	114-116.5					X										BC 5 parallel
115	116.6	X														Thompson River parallel
120	118.2-120	X														Thompson River parallel
120	122-122.5	X														Thompson River parallel
125	124.8-125.1	X														Thompson River parallel
125	126-128.7	X														Thompson River parallel
125	126-129.8					X										BC 5 parallel
130	129.9														X	Sawmill adjacent
130	131.6														X	Prison adjacent
130	131.7					X										BC 5 parallel
130	132-132.5	X														Thompson River parallel
130	132-135.7					X										BC 5 parallel
135	133-139			X												Kamloops urban area
135	134.5-135.7	X														Thompson River parallel
135	135.7-139												X			Kamloops yard
135	139.4								X							Kamloops VIA station
Ashcroft Sub																
0	0-4			X												Kamloops urban area
0	0.44	X						X								Thompson River bridge (multi span)
0	1.3-2					X										Parkcrest Ave parallel
5	3.8													X		Oil storage terminal adjacent
5	3.8-8					X										Tranquille Road parallel
5	4.0											X				Kamloops Airport (south of oil storage terminal)
10	8.2	X														Outflow from mountain
10	9.0														X	Tunnel (south track only)
10	9-9.8	X														Kamloops Lake parallel
10	9.6														X	Slide Fence (rockfall path)
10	9.8-10.4														X	Tunnel
10	10.4	X						X								Outflow from mountain
10	10.4-20.2	X														Kamloops Lake parallel
10	10.5														X	Slide Fence (rockfall path)
10	11.8														X	Slide Fence (rockfall path)
15	17.0	X														Outflow from mountain
20	20.0									X						Painted Bluffs Provincial Park
20	20.3														X	Tunnel
20	20.4-22	X														Kamloops Lake parallel
25	22.3-26	X														Kamloops Lake parallel
25	26-28.8	X														Thompson River parallel
25	26.1					X		X								BC 1 Trans Canada Highway overpass
30	28.5	X						X								Outflow from mountain
30	28.8	X						X								Thompson River bridge (multi span, compound curves)
30	29.0									X						Walhachin Oxbows Provincial Park
30	29.3	X														Fill across Walhachin oxbow

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Ashcroft Sub (continued)																
30	29.9	X														Fill across Walhachin oxbow
30	30.1-32.5	X														Thompson River parallel
35	33-37.3	X														Thompson River parallel
35	34.0							X								Thompson River bridge (multi span)
40	38.0									X						Juniper Beach Provincial Park
40	38.3-39	X														Thompson River parallel
40	38.5														X	Slide Fence (rockfall path)
40	40.5-41.5	X														Thompson River parallel
40	42-45.8	X														Thompson River parallel
45	45.8							X								Thompson River bridge (multi span, compound curves)
45	45.9						X									CP Thompson Sub parallel
45	47-57.7	X														Thompson River parallel
45	47.3							X								Thompson River bridge (multi span, curve west end)
50	47.8														X	Slide Fence (rockfall path)
50	47.8	X						X								Thompson River tributary
50	48.7		X						X							Village of Ashcroft, VIA passenger stop
50	51.6														X	Tunnel
50	51.7-52.8														X	Slide Fences (rockfall path)
55	54.8														X	Tunnel
55	55.0							X								Thompson River bridge (through truss)
55	55.2-59.5						X									CP Thompson Sub parallel
55	59-59.6	X														Thompson River parallel
60	59.5							X								Thompson River bridge (multi span)
60	60.2-62	X														Thompson River parallel
60	61.0														X	Slide Fence (rockfall path)
65	62.5									X						Epsom Provincial Park
65	63-67.5	X														Thompson River parallel
65	64.5														X	Slide Fence (rockfall path)
65	64.5-67.4					X										BC 1 Trans Canada Highway parallel (at higher elevation)
65	67.4														X	Tunnel
70	67.5														X	Tunnel
70	68.5-73.5	X														Thompson River parallel
70	69.2-70.5					X										BC 1 Trans Canada Highway parallel (at higher elevation)
75	74-75.9	X														Thompson River parallel
75	74.5														X	Village of Spences Bridge (various homes near track, less than 1000 population)
75	75.0					X		X								BC 1 Trans Canada Highway overpass
80	76.3-97.3	X														Thompson River parallel
80	80.1-80.6														X	Slide Fences (rockfall path)
80	80.1														X	Tunnel
80	80.2														X	Rockshed
80	80.3														X	Tunnel
80	80.4														X	Tunnel
85	86.5-87.2														X	Slide Fences (rockfall path)
90	90.2	X						X								Outflow from mountain
90	90.8	X						X								Outflow from mountain
90	91.3														X	Tunnel
95	93.0														X	Tunnel
95	93.1														X	Water Chute above track
95	93.1-93.7														X	Slide Fences (rockfall path)
95	93.7														X	Rockshed
95	93.8														X	Rockshed
95	93.9														X	Rockshed
95	94.0														X	Tunnel
95	94-94.7														X	Slide Fences (rockfall path)
95	94.3														X	Rockshed
95	94.4														X	Rockshed

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Ashcroft Sub (continued)																
95	94.7														X	Tunnel
95	95-96.5														X	Slide Fences (rockfall path)
95	97.3							X							X	Thompson River bridge (multi span deck truss with compound curvature), with BC 12 overpass skewed over west end
100	97.5														X	Village of Lytton (various homes near track, less than 1000 population)
100	98.3	X						X								Fraser River bridge (multi span deck truss)
100	98.8	X						X								Outflow from mountain
100	99-102	X														Fraser River parallel
105	103-106	X														Fraser River parallel
105	103.7							X								Fraser River bridge (multi span with deck arch and curvature)
105	103.8						X									Bridge over CP Thompson Sub
105	104-105					X										BC 1 Trans Canada Highway parallel
105	105.5-106.4					X										BC 1 Trans Canada Highway parallel
105	106.0														X	Washout detector (historically unstable ground)
110	107-108	X														Fraser River parallel
110	107.5														X	Slide Fences (rockfall path)
110	109-114	X														Fraser River parallel
110	109-109.5														X	Slide Fences (rockfall path)
110	109.2	X						X								Outflow from mountain
110	109.3														X	Tunnel
110	109.4	X						X								Outflow from mountain
110	111-112.5					X										BC 1 Trans Canada Highway parallel
120	118-120	X														Fraser River parallel
120	119.0														X	Slide Fence (rockfall path)
120	120.0														X	Tunnel
120	120.1	X						X								Outflow from mountain (curved steel trestle)
120	121-123	X														Fraser River parallel
120	123-125					X										BC 1 Trans Canada Highway parallel
125	123.6							X								Steel trestle multi span over dry valley (west track only, east track on fill)
125	124-125	X														Fraser River parallel
125	125.5								X				X			Boston Bar yard, VIA passenger stop (surrounding village less than 1000 population)
Yale Sub																
0	0.5														X	Conveyor overpass (sawmill)
0	1.3-2					X										BC 1 Trans Canada Highway parallel
0	2.1	X						X								Anderson Creek bridge (multi span curved steel trestle)
5	2.5-12.3	X														Fraser River parallel
5	3-4					X										BC 1 Trans Canada Highway parallel
5	5.4														X	Slide Fence (rockfall path)
5	5.5														X	Tunnel
5	7														X	Slide Fence (rockfall path)
5	7.1														X	Tunnel
5	7.2									X						Hell's Gate Park/Tourist Attraction
10	8-9														X	Multiple Slide Fences
10	8.4														X	Tunnel
10	8.7														X	Tunnel
10	9														X	Tunnel
10	9.1														X	Tunnel
10	11.3														X	Slide Fence (rockfall path)
10	11.4														X	Tunnel
10	12-13.3					X										BC 1 Trans Canada Highway parallel
10	12.4														X	Tunnel
15	13-13.2	X														Fraser River parallel
15	13.4									X						Alexandra Provincial Park
15	13.6-23.8	X														Fraser River parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Yale Sub (continued)																
15	13.7					X		X								BC 1 Trans Canada Highway overpass
15	16.7	X						X								Outflow from mountain
20	17.5														X	Tunnel
20	18.7														X	Tunnel
20	19.8														X	Tunnel
20	20.2	X														Outflow from mountain
20	20.6														X	Slide Fence (rockfall path)
20	21.5														X	Slide Fence (rockfall path)
20	21.8														X	Tunnel
25	22.8														X	Slide Fence (rockfall path)
25	23.2														X	Tunnel
25	23.4	X						X								Outflow from mountain
25	23.8														X	Slide Fence (rockfall path)
25	24.5									X						Yale-Garry Oak Ecological Reserve
25	25.9														X	Tunnel
25	27-30.7	X														Fraser River parallel
30	30.7	X						X								Outflow from mountain
35	32.8	X						X								Outflow from mountain
35	32.8-35.2	X														Fraser River parallel
35	34.2	X						X								Outflow from mountain
35	35														X	Tunnel
35	37.3	X						X								Outflow from mountain
40	38-38.2	X														Fraser River parallel
40	39.7	X						X								Coquihalla River bridge (through truss)
40	40.2		X													Town of Hope
40	40.5					X		X								BC 1 Trans Canada Highway overpass
40	40.5-40.6	X														Fraser River parallel
40	40.6-41.2					X										BC 1 Trans Canada Highway parallel
40	41.8	X						X								Outflow from mountain (through truss)
40	42-43.5					X										Old Yale Road parallel (north side)
45	43-44.4					X										Flood-Hope Road parallel (south side)
45	44.4-54.5					X										BC 1 Trans Canada Highway parallel
45	44.4-46.9	X														Fraser River parallel
45	46.9	X						X								Outflow from mountain
50	50.4-50.5	X														Fraser River parallel
50	50.5	X						X								Outflow from mountain
50	51.2									X						FH Barber Provincial Park
50	51.2-52	X														Fraser River parallel
50	52.2	X														Pond/wetland
55	52.7-57	X														Fraser River parallel
55	56-59					X										BC 1 Trans Canada Highway parallel
60	57.9	X						X								Outflow from mountain
60	58.5-59	X														Fraser River parallel
60	61.1-62	X														Fraser River parallel
65	63.9					X		X								BC 9 overpass
65	65.5										X					Rosedale school
70	70.4					X										Prest Road parallel
70	71.8			X									X	X		Town of Chilliwack, SRY interchange yard, feed/ag mill adjacent
75	73.5	X						X								Chilliwack River crossing
75	73.7	X						X								Atchelitz Creek crossing
75	73.9	X						X								Pond crossing
75	75.2-77.1					X										BC 1 Trans Canada Highway parallel
75	77.5-78.7	X														Wetlands
80	78.7	X						X								Sumas River bridge (multi span with through truss)
80	78.7-80	X														Sumas River parallel
80	80-82	X														Fraser River parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Yale Sub (continued)																
80	82.4														X	Gravel quarry overhead conveyor
85	83.2-84.4	X														Fraser River parallel
85	84.5-86					X										Page Road parallel
90	88.1					X	X	X							X	CP Mission Sub diamond, BC 11 overpass above diamond
90	88.3-89.8						X									CP Page Sub parallel
90	90.4	X														Fraser River tributary
90	90.9-94.3	X														Fraser River parallel
95	93.7	X														Fraser River tributary
100	97.8	X														Fraser River tributary (multi culvert crossing)
100	98.7	X														Fraser River tributary
100	100-102					X										88 Ave/River Road parallel
100	100.7	X														Fraser River tributary
100	100.7-101	X														Fraser River parallel
100	101-117				X											Vancouver urban area
100	101.3											X				Fort Langley airport parallel
105	102.9									X						Fort Langley National Historic Site
105	103.8	X														Fraser River tributary
105	105.3									X						Derby Hills Park
105	107							X								Golden Ears Way overpass
110	107-109					X									X	Golden Ears Way parallel on bridge structure, various industries adjacent
110	109.2-109.4	X														Fraser River parallel
110	110.8-112.5												X			Vancouver Intermodal Terminal parallel
110	111.5									X						Surrey Bend Regional Park
110	112-115					X										South Fraser Perimeter Road parallel
115	112.5-115	X														Fraser River parallel
115	112.5-116												X			Thornton Yard
115	114.3					X		X								Port Mann bridge overhead
115	116-117													X		Various sawmills/industries adjacent

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Redpass to Prince Rupert Main Line Corridor																
Robson Sub																
0	0-10									X						Mount Robson Provincial Park
0	0-1	X														Fraser River parallel
0	1.4-2.4	X														Fraser River parallel
0	2.4							X								Fraser River bridge (through truss)
5	4	X														Fraser River parallel
10	8	X						X								Fraser River tributary
10	10.1	X						X								Fraser River tributary
10	10.3-10.3														X	Slump detector (unstable slopes)
10	10.4-10.7														X	Slump detector (unstable slopes)
10	10.5	X						X								Outflow from moutain
10	11.1-11.3														X	Slump detector (unstable slopes)
10	11.3	X						X								Outflow from moutain
10	12.2														X	Slide Fences (rockfall path)
20	18									X						Rearguard Falls provincial park
20	19.8														X	Tunnel
20	20.9					X		X								BC 5 bridge
20	21.3						X									North Connecting track parallel
25	22-26					X										Blackman Road parallel
25	23									X						Jackman Flats provincial park
25	28.9					X		X								BC 5 bridge
Tete Jaune Sub																
0	1.1					X		X								BC 5 bridge
0	2.3	X						X								Fraser River tributary
5	2.5														X	Sawmill adjacent
5	2.9	X						X								Fraser River tributary (through truss bridge)
5	5.5-7.9	X														Fraser River parallel
10	8.3-9	X														Fraser River parallel
10	9.3	X						X								Fraser River tributary (through truss bridge)
35	32.6	X						X								Fraser River tributary (1000' long steel trestle)
35	33.1	X														Fraser River parallel
35	35.7	X						X								Fraser River tributary (through truss bridge on curve)
35	35.8	X														Tributary river 90 degree bend against roadbed fill
40	39	X						X								Fraser River tributary (572' long steel trestle on curve)
40	39.9	X						X								Fraser River tributary (homes adjacent)
40	40-42.5					X										Eddy Road parallel
45	43.4								X				X			McBride yard, VIA passenger stop (village less than 1000 population)
Fraser Sub																
0	0.4									X						Town park adjacent
0	0.5-1.7					X										BC 16 Yellowhead Highway parallel
0	1.7							X								BC 16 Yellowhead Highway overpass
0	1.7-2.7					X										Museum Road parallel (sawmill access)
5	2.5	X						X								Fraser River tributary (through truss bridge)
5	2.6														X	Large sawmill adjacent
5	6.4							X								Trestle over side valley
5	6.6							X								Trestle over side valley
10	7.9							X							X	Trestle over side valley, slope stability warning system
10	7.9-9.9	X														Fraser River parallel
10	9.1	X						X								Fraser River tributary
10	10.5	X														Fraser River parallel
10	11.8	X														Fraser River parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Fraser Sub (continued)																
15	12.7	X														Fraser River parallel
15	13.5	X														Fraser River parallel
15	15.5	X														Fraser River parallel
15	16.5	X						X								Fraser River tributary (multi span bridge)
20	17.5	X														Fraser River parallel
20	18.1														X	Tunnel
20	18.4							X								Numerous small bridges over side slope
20	18.5	X														Fraser River parallel
20	21	X														Fraser River parallel
20	22.1	X														Fraser River parallel
25	23.4	X						X								Fraser River tributary
25	24.2	X														Fraser River parallel
25	25-25.5	X														Fraser River parallel
25	25.7	X						X								Goat River bridge (through truss)
30	28.3-28.8	X														Fraser River parallel
30	30-30.8	X														Fraser River parallel
35	33.4-34.8	X														Fraser River parallel
35	35.2-35.8	X														Fraser River parallel
35	36.6	X														Fraser River parallel
40	38.6	X						X								Fraser River tributary
40	39	X														Fraser River parallel
40	39.8-40.5	X														Fraser River parallel
40	40.6	X						X								Fraser River tributary
40	41.5	X														Fraser River parallel
45	43.2-44.5	X														Fraser River parallel
45	45.4-46.4	X														Fraser River parallel
45	45.6														X	Slope stability warning system
45	46.8	X						X								Fraser River tributary
45	47.2	X														Fraser River tributary parallel
50	48-48.5	X														Fraser River parallel
50	49.5-50.3	X														Fraser River parallel
55	55.6	X						X								Fraser River tributary
55	56.2	X						X								Fraser River bridge (580' multi span)
55	56.8-59.7	X														Fraser River parallel
70	68	X														Fraser River parallel
85	81-88					X										Upper Fraser Road parallel
90	91	X														Fraser River parallel
95	93.1	X						X								Fraser River tributary
95	93.2					X										Upper Fraser Road parallel
95	96.6-97.8	X														Fraser River parallel
100	99	X						X								Fraser River bridge (958' through truss 4 spans)
100	100.4-104					X										Upper Fraser Road parallel
105	104														X	Upper Fraser sawmill adjacent
105	106.5-109	X														Hansard Lake parallel
110	108-114					X										Upper Fraser Road parallel
110	109.5	X														Aleza Lake parallel
115	115	X														Wetlands
120	117-122	X														Eaglet Lake parallel
120	122												X		X	Giscome rock quarry and ballast loading yard
125	122.6	X														Eaglet stream parallel
125	125.2	X						X								Eaglet stream bridge
125	125.3	X														Willow River parallel
125	126.3	X														Willow River parallel
130	127.8	X						X								Willow River bridge (through truss)
130	129.5-132.5	X														Fraser River parallel
135	133.8-134.6	X														Fraser River parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Fraser Sub (continued)																
135	137	X														Wetlands
140	138.5-139	X														Fraser River parallel
145	142-144	X														Fraser River parallel
145	143.8						X	X								Chetwynd Sub overpass
145	145	X						X								Fraser River bridge (2659' multi span through truss)
145	146.1			X					X	X			X	X	X	City of Prince George, yard, VIA passenger station, intermodal terminal, fuel distribution facilities, park/museum along north side
Nechako Sub																
0	1							X								Cameron Street overpass and related street interchange
0	1.1-2.2	X														Nechako River parallel
0	1 6					X		X								BC 97 Cariboo Highway overpass
5	2.6-9.6					X										Ospika Blvd / Otway Road / Mitworth Road parallel
5	3	X														Nechako River parallel
5	3.8							X								Foothills Blvd bridge
5	4	X														Nechako River parallel
5	4.2											X				Heli-port adjacent
10	12.2-13.2	X														Nechako River parallel
15	14.8	X						X								Nechako River tributary (multi span bridge)
15	15.5-16	X														Nechako River parallel
15	17.2	X														Nechako River parallel
20	19.9	X														Nechako River parallel
20	21.5	X														Nechako River parallel
30	29.1	X														Nechako River parallel
30	29.5														X	Takla sawmill adjacent
30	30.6	X														Nechako River parallel
30	31-33					X										Isle Pierre Road parallel
30	31.7	X														Nechako River parallel
35	34	X														Nechako River parallel
35	37	X														Nechako River parallel
40	39-40	X														Nechako River parallel
50	48	X														Nechako River parallel
50	49	X														Nechako River parallel
50	50	X														Nechako River parallel
50	51.1	X						X								Nechako River tributary (bridge on curve)
50	51.5-52.5	X														Nechako River parallel
55	53.4-54.5	X														Nechako River parallel
55	55.5	X														Nechako River parallel
55	57-57.9	X														Nechako River parallel
60	58.7-59.5	X														Nechako River parallel
60	60.7-61.5	X														Nechako River parallel
60	61.3	X						X								Nechako River tributary (bridge on curve)
60	62.1	X														Nechako River parallel
65	64-65.4	X														Nechako River parallel
65	66	X														Nechako River parallel
70	67.5-68.2	X														Nechako River parallel
70	69.4		X						X							Town of Vanderhoof, VIA passenger stop
70	70.2	X														Nechako River tributary (multi culvert crossing)
70	71														X	Sawmill / wood pellet plant adjacent
70	72.3	X														Nechako River parallel
70	72.4														X	Sawmill adjacent
75	74.7					X		X								BC 27 Stuart Highway overpass
85	83.6					X		X								BC 16 Yellowhead Highway overpass
85	84														X	Large Sawmill adjacent
85	87.3	X														Marten Lake parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Nechako Sub (continued)																
95	93-94					X										Telegraph Road parallel
95	95	X						X								Nechako River bridge (through truss)
95	96	X														McLean Lake parallel
95	96.8									X						Beaumont provincial park
95	96.9					X		X								BC 16 Yellowhead Highway overpass
100	97.5-101	X														Fraser Lake parallel
100	98.2									X						Pipers Glen resort park & boat launch area
105	103.1														X	West Fraser sawmill adjacent
105	104	X														Fraser Lake parallel
105	104.5-108.5	X														Fraser Lake parallel
105	105.3					X										BC 16 Yellowhead Highway parallel
110	107.5		X							X						Village of Fraser Lake, lakefront park
110	109.2	X						X								Fraser Lake tributary (through truss bridge)
110	110							X								BC 16 Yellowhead Highway overpass
110	110-115.4					X										BC 16 Yellowhead Highway parallel
115	113	X														Fraser Lake tributary parallel
115	115.4												X		X	Endako yard and crew change facility
Telkwa Sub																
0	2.4	X														Stream/wetland parallel
5	2.5					X		X								BC 16 Yellowhead Highway overpass (in curve)
5	4	X														Stream/wetland parallel
10	7.8-10.9	X														Stream/wetland parallel
10	10.9							X								Bridge over stream/wetland
10	11.5							X								Bridge over stream/wetland
10	11.5-11.9	X														Stream/wetland parallel
10	11.9							X								Bridge over stream/wetland
15	12.7-13.1	X														Stream/wetland parallel
15	12.8							X								Bridge over stream/wetland
15	13.1							X								Bridge over stream/wetland
15	15.2	X						X								Bridge over stream/wetland
15	15.4	X														Martin Lake parallel
16	16.5					X		X								BC 16 Yellowhead Highway overpass
20	18					X										BC 16 Yellowhead Highway parallel
20	20.7-21.6	X														Stream/wetland parallel
20	21.1							X								Bridge over stream/wetland
20	21.6							X								Bridge over stream/wetland
20	22.2														X	Tibbets sawmill adjacent
25	23-23.8	X														Tintagel Lake parallel
25	24					X										BC 16 Yellowhead Highway parallel
25	25.5	X														Tintagel Lake parallel
25	25.8-28.8					X										BC 16 Yellowhead Highway parallel
25	26	X														Tintagel Lake parallel
30	27.6-28.3	X														Tintagel Lake parallel
30	28.8	X														Tintagel Lake parallel
30	29.1	X														Fill through arm of Tintagel Lake
30	30.1-33.7	X														Burns Lake parallel
35	32.5														X	Significant curved fill through lake
35	34.6					X		X								BC 35 overpass
35	35		X						X							Village of Burns Lake, VIA passenger stop
35	36.5													X		Petroleum/fuel tank farm adjacent
35	36.5-38.7					X										BC 16 Yellowhead Highway parallel
35	38.8	X														Decker Lake parallel
40	40	X														Decker Lake parallel
40	40-40.6					X										BC 16 Yellowhead Highway parallel

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Telkwa Sub (continued)																
40	41.8-43.2					X										BC 16 Yellowhead Highway parallel
40	42	X														Decker Lake parallel
45	45.5														X	Pelling sawmill adjacent
45	46.8	X						X								Bridge over stream/wetland
50	48.8											X				Private airport parallel
50	49.7	X														Ponds parallel
50	51	X														Rose Lake parallel
55	52.8-55.9	X														Broman Lake parallel
55	55.9							X								Broman Lake outlet crossing
60	58.3	X						X								Broman Lake outlet crossing
60	60.8	X						X								Broman Lake outlet crossing
60	62.2	X						X								Broman Lake outlet crossing
65	62.8-66.3	X														Stream/wetland parallel
65	64.6							X								Bridge over stream/wetland
65	65.3							X								Bridge over stream/wetland
70	68-69	X														Stream/wetland parallel
70	70.1	X						X								Bridge over stream/wetland
70	71.7	X						X								Bridge over stream/wetland
75	73.2-79.5					X										BC 16 Yellowhead Highway parallel
75	74.2-75.7	X														Stream/wetland parallel
80	78	X														Stream/wetland parallel
80	79.5-82.5	X														Stream/wetland parallel intermittenly
85	84.3	X						X								Bulkley River bridge
85	84.69					X		X								BC 16 Yellowhead Highway overpass
85	85.1		X						X	X						Village of Houston, VIA passenger stop, town park parallel
85	85.2	X						X								Bulkley River tributary
85	85.3-88					X										BC 16 Yellowhead Highway parallel
90	87.9	X														Bulkley River parallel
90	88							X								BC 16 Yellowhead Highway overpass
90	88.3	X						X								Bulkley River bridge (through truss)
90	92.3	X														Bulkley River backwater parallel
95	93.3	X						X								Bulkley River bridge (364' multi span)
95	93.8	X						X								Bulkley River tributary
95	94.9	X						X								Bulkley River tributary
100	99.3-99.8	X														Bulkley River parallel
100	102-102.3	X														Bulkley River parallel
105	103-103.5	X														Bulkley River parallel
105	103.9-104.2	X														Bulkley River parallel
105	105.4-105.7	X														Bulkley River parallel
105	107.3	X														Bulkley River parallel
110	109.1	X														Bulkley River parallel
110	110-111.8	X														Bulkley River parallel
115	114	X														Bulkley River parallel
115	114-115.5					X										Lawson Road parallel
115	115.2	X														Bulkley River parallel
115	115.9		X							X						Village of Telkwa, park/fairgrounds adjacent
115	116.1	X						X								Bulkley River tributary (through truss)
120	118.8	X														Bulkley River parallel
120	119.6-120.5	X														Bulkley River parallel
120	122-123.4					X										Tallow Road parallel
125	123.5														X	Sawmills adjacent
125	125.2		X						X	X			X		X	Town of Smithers, yard/crew change/offices, VIA passenger station, sports park, sawmills

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Bulkley Sub																
5	3.5	X														Lake Kathlyn parallel
5	5.5	X														Ponds/wetlands
10	7.7	X														Toboggan Lake parallel
10	9-11.8					X										Johnson Road parallel
15	13.3	X						X								Bulkley River tributary/side valley (320' steel trestle)
15	13.4														X	Tunnel
20	19.3	X						X								Bulkley River tributary (multi span bridge)
20	20.7	X														Large pond adjacent
20	21.5	X						X								Bulkley River tributary
20	22					X		X								BC 16 Yellowhead Highway overpass
30	28.3	X						X								Bulkley River tributary/side valley (840' steel trestle)
30	28.8					X		X								BC 16 Yellowhead Highway overpass
30	30.8					X										BC 16 Yellowhead Highway parallel
30	31.2	X						X								Bulkley River tributary/side valley (840' steel trestle on curve)
30	31.5-32.7					X										BC 16 Yellowhead Highway parallel
35	36.1					X		X								BC 16 Yellowhead Highway overpass
35	36.4	X						X								Bulkley River tributary/side valley (580' steel trestle)
40	40.7														X	Tunnel
40	42														X	Tunnel
45	43.1	X						X								Bulkley River tributary
45	43.4	X						X								Bulkley River tributary
45	43.5														X	Tunnel
45	46.4					X		X								BC 16 Yellowhead Highway overpass
50	48	X														Wetlands
50	48.8					X		X								BC 16 Yellowhead Highway overpass
50	50	X						X								Skeena River tributary
50	50.4	X						X								Skeena River tributary/side valley (870' steel trestle on curve)
60	62.3	X						X								Skeena River bridge (944' multiple deck truss)
65	63-63.4	X														Skeena River parallel
65	66	X														Skeena River parallel
65	67.1	X														Skeena River parallel
70	69.5-72.5	X														Skeena River parallel
75	74.1	X						X								Skeena River tributary (through truss)
75	74.8-75.9	X														Skeena River parallel
75	77-78.5	X														Skeena River parallel
80	78.6														X	Tunnel
80	79.2-80	X														Skeena River parallel
85	82.6-91.7	X														Skeena River parallel
90	88.6	X						X								Skeena River tributary
90	90.8														X	Tunnel
95	92.3-96.8	X														Skeena River parallel
95	92.9	X						X								Skeena River tributary
95	97.2	X						X								Skeena River tributary
100	97.8-98.4	X														Skeena River parallel
100	99.4	X						X								Skeena River tributary
100	101.4	X						X								Skeena River backwater bridge
100	101.4-102.3	X														Skeena River parallel
105	103.5-105	X														Skeena River parallel
105	107.5-108.8	X														Skeena River parallel
110	110.4-111.1	X														Skeena River parallel
110	110.6	X						X								Skeena River tributary
110	111.2	X						X								Skeena River tributary
115	112.9	X														Skeena River parallel
115	113.1	X						X								Skeena River tributary
115	113.5-115.4	X														Skeena River parallel

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Bulkley Sub (continued)																
115	116.3	X						X								Skeena River tributary (bridge on curve)
115	116.3-117.6	X														Skeena River parallel
120	118.5	X						X								Skeena River tributary
120	118.5-118.9	X														Skeena River parallel
120	119.7-121.8	X														Skeena River parallel
120	121.9														X	Tunnel
120	122														X	Tunnel
120	122.2														X	Tunnel
125	122.5														X	Tunnel
125	123-124.2	X														Skeena River parallel
125	124.2	X						X								Skeena River tributary
125	126.8-127	X														Skeena River parallel
130	129.8-130.9	X														Skeena River parallel
130	130.9					X		X								Lakelse Avenue overpass
130	131.9			X					X	X			X	X	X	Town of Terrace, yard, VIA station, park, petroleum/fuel storage tank facility, sawmills
Skeena Sub																
0	0.5					X		X								BC 16 Yellowhead Highway overpass
0	0.5-7					X										BC 16 Yellowhead Highway parallel
0	2														X	Sawmills adjacent
0	2.4-3.1	X														Skeena River parallel
5	3.1	X						X								Kitsumkalum River bridge (through truss multi span)
5	3.7-11.2	X														Skeena River parallel
5	7.4	X						X								Skeena River tributary (through truss)
10	10.4-11.2					X										BC 16 Yellowhead Highway parallel
15	12.8					X										BC 16 Yellowhead Highway parallel
15	12.8-14.2	X														Skeena River parallel
15	13.1	X														Outflow from mountain
15	15.5	X						X								Outflow from mountain
15	15.5-18.5					X										BC 16 Yellowhead Highway parallel
15	16.2-20	X														Skeena River parallel
20	20							X								BC 16 Yellowhead Highway overpass
20	20.4	X														Outflow from mountain
20	20.7-67.4															BC 16 Yellowhead Highway parallel
25	22.6	X						X								Skeena River tributary
25	25.3	X						X								Outflow from mountain
25	27.4														X	BC 16 Yellowhead Highway grade crossing
25	27.4-31.5	X														Skeena River parallel
25	27.8-28.1														X	Avalanche zone with hazard warning system
35	33.8-35.5	X														Skeena River parallel
35	33.9									X						Exchamsiks River provincial park
35	34.2	X						X								Exchamsiks River bridge (through truss)
40	37.7-38.9	X														Skeena River parallel
40	38.9							X								BC 16 Yellowhead Highway overpass
40	39.1	X														Skeena River tributary bridge (through truss)
40	39.5-47														X	Avalanche zone with hazard warning system
40	39.8														X	Tunnel
40	40.5	X														Outflow from mountain
40	40.6-41.3	X														Skeena River backwater parallel
45	45.6	X						X								Outflow from mountain
50	48.6	X						X								Outflow from mountain
50	49-53														X	Avalanche zone with hazard warning system
50	49.2	X						X								Outflow from mountain
55	53.6									X						Telegraph Point park/tourist point
60	60	X														Outflow from mountain

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Skeena Sub (continued)																
60	60.8	X						X								Skeena River tributary bridge (through truss)
60	62	X														Wetlands
65	62.9	X						X								Outflow from wetlands
65	63.4	X														Outflow from mountain
65	65.9	X						X								Outflow from mountain
65	67.4							X								BC 16 Yellowhead Highway overpass
70	67.4-87.5	X														Skeena River parallel
70	69	X						X								Skeena River tributary bridge (multi span)
75	73.2	X						X								Outflow from mountain
75	74.1	X						X								Outflow from mountain
80	80-85.5					X										Skeena Drive parallel
80	82														X	North Pacific Historic Fishing village museum adjacent
85	86														X	Marinas/canneries/multiple accesses across tracks
85	86.5														X	Watson Island industrial area
85	87.2	X						X								Zanardi Rapids bridge (558' multiple span through truss)
90	87.8												X			Prince Rupert Grain/RTI yard
90	88	X														Wetlands
90	88.6					X		X								Ridley Island Terminals Road overpass
90	88.7-94.6	X														Prince Rupert Inner Harbour parallel
90	90														X	Slide Fence (rockfall path)
90	92.3												X			Prince Rupert Container port
95	93														X	Prince Rupert road ferry facilities
95	93.3														X	Railcar ferry facility
95	94.6			X					X	X			X			Town of Prince Rupert, VIA passenger station, waterfront park, yard facility

Appendix 3 – Subdivision Risk Review Tables

Edmonton – Vancouver Route

Edson Sub		CATEGORY
Issues of Concern	1. DG volume - 74641 carloads (diesel, crude oil top commodities) 2. Proximity of water (especially Hinton-Jasper segment)	
Existing WIS Sites	1. Existing DED Mile 58, 65 (Magnolia/Entwistle bridges), 120/121/124 (Wolf Creek bridges), DEDs 204/205 for Brule Tunnel 2. WILD at Stony Plain and Snaring 3. FACTIS wheel inspection system at Stony Plain	
Detection Enhancement	Proposed DEDs at: - Mile 41.6 (east side Wabamun Lake bridge) - Mile 196 (west side Athasbasca bridge) - Mile 223 (east side Henry House bridge)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Edmonton 4. No fire protection outside muncipal areas (private contractors required from US) 5. CP foam trailer available in Calgary	
Environmental	2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Environmental training for water incident response at Hinton	2
Other	1. Review for increased culvert inspections (particularly Mile 154-155) 2. Plans for equalization culverts at Big Eddy fill (Mile 136)	2

Albreda Sub		CATEGORY
Issues of Concern	1. Vancouver corridor DG - 50174 carloads (diesel, sodium hydroxide top commodities), remainder to Rupert corridor 2. Mile 40-63 built on north side slope of mountain prone to avalanche	
Existing WIS Sites	Existing DED 79 & 82 for Canoe River bridge, various DED sites between WIS locations, DEDs at 125/129 near major bridges	
Detection Enhancement	Proposed DED Mile 34 (east of Moose Lake)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Edmonton 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location	
Environmental	1. Equipment Caches: container in Jasper and Valemount 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	
Other	Review for increased culvert inspections Mile 44-63 (approx 10/mile in this segment) also Mile 103-105	2

Clearwater Sub		CATEGORY
Issues of Concern	DG - 40449 carloads (diesel, sodium hydroxide, LPG top commodities)	
Existing WIS Sites	WIS spacing good, numerous (16) DED sites spaced between WIS locations WILD at Vinsulla	
Detection Enhancement	None required	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Vancouver available for pressure and non-pressure (except poison gas) (note - min 4.5-5 hrs to reach Kamloops) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location	
Environmental	1. Environmental Caches: trailer in Kamloops 2. E2MS planning needs to be completed. 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Environmental training for water incident reponse at Kamloops	2
Other	Review for increased culvert inspections across sub due to numerous crossflows to Thompson River	2

Edmonton – Vancouver Route

Ashcroft Sub		CATEGORY
Issues of Concern	1. DG - 37047 carloads (sodium hydroxide, diesel, LPG top commodities) 2. Virtually entire sub parallel to Thompson River or Fraser River 3. Unstable slopes of rock/sand throughout subdivision	
Existing WIS Sites	DEDs Mile 2, 9, 21, 30.5 (Kamloops/lake) plus multiple sites between WIS locations elsewhere	
Detection Enhancement	None requried	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually, track inspection 3x weekly	
Emergency Response	1. Contractor in Vancouver available for pressure and non-pressure (except poison gas) (note - min 4.5-5 hrs to reach Kamloops) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location	
Environmental	1. Environmental Caches: Trailer in Kamloops, container in Lytton 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Establish annual response excercise at Ashcroft	2
Other	Review for increased culvert inspections across sub due to numerous crossflows to Thompson River CP co-pro trains - ensuring proper documentation is available for all movements	2

Yale Sub		CATEGORY
Issues of Concern	1. DG - 37047 carloads (sodium hydroxide, petroleum, LPG top commodities) 2. Virtually entire sub parallel to Fraser River 3. Some unstable slope areas between Mile 0 and 40 and near Glen Valley	
Existing WIS Sites	Longest gap Mile 39-58 but it has two DED sites, typically DEDs between each WIS location	
Detection Enhancement	None requried	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually, track inspection 3x weekly	
Emergency Response	1. Contractor in Vancouver available for pressure and non-pressure (except poison gas) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues (Boston Bar-Hope) - all equipment typically needs to be loaded & hi-railed to location 6. CP foam trailer available in Abbotsford	
Environmental	1. Environmental Caches: Trailer in Vancouver (Thornton Yard), container in Hope 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	
Other	Review for increased culvert inspections across sub due to numerous crossflows to Fraser River CP co-pro trains - ensuring proper documentation is available for all movements	2

Vancouver		CATEGORY
Issues of Concern	Thornton Tunnel and Lonsdale Tunnel on North Shore Industrial Line	
Emergency Response	Environmental Cache: Container in North Vancouver	
Other	Thornton Tunnel has mechanical ventilation pulls air in from shaft mid-tunnel. Need to ensure system can be commanded to shut down in event of DG incident, who has access to system. Maintenance, capital expenditure needs review. Lonsdale Tunnel beneath downtown street (Esplanade) in North Vancouver - no ventilation. Needs review for maintenance, capital, planning for incident.	2

Jasper – Prince Rupert Route

Robson Sub		CATEGORY
Issues of Concern	First 20 miles built on north side slope of mountain with areas prone to avalanche	
Existing WIS Sites	WIS spacing less than 15 miles	
Detection Enhancement	None planned	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location	
Environmental	1. Environmental Caches: Container in Jasper and Valemount 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	
Other	Review for increased culvert inspections Mile 4-20 (approx 10/mile in this segment)	2

Tete Jaune Sub		CATEGORY
Issues of Concern	DG - 26591 carloads (diesel fuel, sodium hydroxide, mixed intermodal top commodities)	
Existing WIS Sites	WIS spacing less than 15 miles, DED at 8.2, 34.1 spaced between WIS locations	
Detection Enhancement	None planned	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location	
Environmental	1. Environmental Caches: Container in Jasper and Valemount 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	

Fraser Sub		CATEGORY
Issues of Concern	DG - 26591 carloads (diesel fuel, sodium hydroxide, mixed intermodal top commodities)	
Existing WIS Sites	WIS spacing less than 15 miles, DED at 45.6, 143.7 (bridges)	
Detection Enhancement	Proposed DEDs: - Mile 59 (west side MP 56 Fraser Bridge) - Mile 100 (west side Hansard bridge)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford 7. Proposed: DGO and equipment trailers (transfer trailer and foam/firefighting trailer) at Prince George for Jasper-Prince Rupert	1
Environmental	1. Environmental Caches: Trailer in Prince George 2. E2MS planning needs to be completed 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Environmental training for water incident response at Prince George 6. Establish annual response excercise at Prince George	2
Other	Review for increased culvert inspections (high density of crossflows particularly where line parallels Fraser River)	2

Jasper – Prince Rupert Route

Nechako Sub		CATEGORY
Issues of Concern	DG - 3989 carloads (diesel fuel, methanol top commodities)	
Existing WIS Sites	WIS spacing less than 15 miles, DED at 92, 97 for Nechako River bridge Fort Fraser WILD at Mile 15 (Nechako)	
Detection Enhancement	None planned	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford	
Environmental	1. Environmental Caches: Trailer in Prince George 2. E2MS planning **completed** 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	
Other	Review for increased culvert inspections (high density of crossflows)	2

Telkwa Sub		CATEGORY
Issues of Concern	DG - 3989 carloads (diesel fuel, methanol top commodities)	
Existing WIS Sites	WIS spacing less than 15 miles	
Detection Enhancement	Proposed DEDs: - Mile 21 to protect Burns Lake area - Mile 32 to protect Burns Lake area - Mile 46 to protect Decker Lake area - Mile 89 for Bulkley River bridge (westbound)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford	
Environmental	1. Environmental Caches: Container in Burns Lake and Smithers 2. E2MS planning **completed** 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	
Other	Review for increased culvert inspections (high density of crossflows near Burns Lake/Decker Lake)	

Bulkley Sub		CATEGORY
Issues of Concern	DG - 3959 carloads (diesel fuel, methanol top commodities)	
Existing WIS Sites	WIS spacing less than 15 miles, DED at 120.3	
Detection Enhancement	Proposed DEDs: - Mile 9.5 for Lake Kathlyn area (eastbound) - Mile 38 for Mile 36 bridge and Mile 40 tunnels - Mile 59 for Skeena River bridge (westbound)	1
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford	
Environmental	1. Environmental Caches: Container in Smithers and Terrace 2. E2MS planning **completed** 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	

Jasper – Prince Rupert Route

Skeena Sub		CATEGORY
Issues of Concern	1. DG - 2146 carloads (methanol, diesel fuel, LPG top commodities) 2. Entire subdivision parallel to Skeena River and its eventual opening to Pacific Ocean inlet	
Existing WIS Sites	WIS spacing less than 15 miles	
Detection Enhancement	None planned	
Track/Structures Inspection Enhancement	UFRD - every 26 days summer, 18 days winter, TG - 3-6 times annually	
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford	
Environmental	1. Environmental Caches: Container in Terrace 2. E2MS planning **completed** 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage	

Kitimat Sub		CATEGORY
Issues of Concern	Future development area for export port facilities for DGs or other commodities	
Existing WIS Sites	None	
Detection Enhancement	Consider WIS for 2016 (or as part of implementation of a customer project)	3
Track/Structures Inspection Enhancement	Additional inspection requirements to be identified as part of new traffic development plans in future	3
Emergency Response	1. Contractor in Edmonton or Vancouver available for pressure and non-pressure (except poison gas transfers) 2. Gap Analysis completed for ER equipment and personnel 3. Closest DGO in Vancouver 4. No fire protection outside muncipal areas (private contractors required from US) 5. Access issues - all equipment typically needs to be loaded & hi-railed to location 6. Closest foam trailer is available at CP in Abbotsford	
Environmental	1. Environmental Caches: Container in Terrace 2. E2MS planning **completed** 3. Manager for all western Canada environmental response planning/training/coordination required 4. Evaluate contractor coverage 5. Establish annual response excercise at Kitimat	2
Other	Review for increased culvert inspections (high density of crossflows) and wood trestle bridge inspections	2

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Corridor Risk Assessment
Edmonton – Hay River Corridor
26 November 2014

Mission Statement

In line with our efforts to drive risk reduction, a multifunctional team representing all departments at CN was formed to evaluate the risk associated with CN's operation of dangerous goods on the Edmonton to Hay River corridor. The team reviewed a number of variables that contribute to the risk of operating dangerous goods between Edmonton and Hay River, and from that review, identified four focus areas that required additional examination. From that review, the team developed a table of potential initiatives to reduce the risk associated within each of the focus areas.

Introduction

For the purposes of this risk assessment, the Edmonton – Hay River corridor has been defined as the trackage making up the primary freight operation route between Edmonton Walker Yard and Hay River. The route comprises of Westlock, Slave Lake, Peace River, Manning and Meander River Subdivisions. This corridor is a moderate to light tonnage freight route and is single track with passing sidings. The entire route is operated under OCS rules. There is no passenger service operated on the line.

Only the Westlock and Slave Lake subdivisions are currently considered "key routes" under Transport Canada's definition (10,000 loads of DGs per year), and in both cases the level of DG traffic is just over the 10,000 mark.

The corridor is not heavily populated and passes through only one major urban area (Edmonton). The line also passes through a number of smaller communities. There are a number of crude oil rail loading terminals located along the line. The route crosses a number of wetland areas, streams and rivers, and at several locations the line utilizes large bridge and trestle structures to cross wide valleys. The railway runs parallel to, and within a few miles of, a number of secondary highways.

Risk Profile Mapping and Current Mitigations

The multifunctional team developed focused risk areas for review along the route by obtaining the following information and plotting it on a map of the corridor:

- Locations of populated areas
- Significant water crossings or line segments parallel to water bodies
- Major bridges and structures
- Adjacent transportation facilities – other railways, highways, airports, etc.
- Passenger train stations
- Adjacent cultural facilities (parklands, schools, etc.)
- Wayside Inspection System (WIS) locations

The information was sourced from track profiles, CN GIS mapping data and direct experience by team members and other CN employees with knowledge of the territory. The prominent items of vulnerability were also tabulated and are included in Table 1 in the Appendix.

Current mitigations on the route include the following:

- WIS locations at 20- 50 mile spacing assist in maintaining a low incidence of hot bearing/hot wheel or dragging equipment related incidents. Additional WIS sites have been installed in 2014 or are planned for 2015
- Trains receive roll by inspections on departure from CN yards in Edmonton and cars added to train are inspected by the train crew which identify mechanical issues
- Low speed territory with maximum speeds of 25 – 35 mph and PSOs protecting a number of areas
- The rail is ultrasonically tested for rail defects approximately 16 times per year on the all but the Meander River subdivision (5 times on that sub)
- The geometry car operates over the corridor 2-3 times per year identifying track exceptions.
- The track is visually inspected a minimum of twice per week by a qualified track inspector.

Risk Review

By visually plotting the various risk variables on a GIS map, a corridor-based risk review master table was produced (see Appendix Table 1 "Vulnerability Details Table"). The results of the mapping review were summarized by grouping potential vulnerabilities into 10-mile increments in order to quantify areas with greatest risk. Table 2 provides a summary of vulnerability ranking points by mileage group and the resulting focus areas.

Based on a review of the risk variables on the corridor map, a set of four focus areas on the main line were identified for further review. The four focus areas are as follows:

1. Edmonton
2. Slave Lake
3. Peace River
4. Hay River

The team examined the specific risks associated with each focus area and the subdivisions in general and developed appropriate mitigation factors. The specific items of interest along with a risk review for each subdivision is included in the appendix as Table 3.

Risk Mitigation

While there are risk mitigating procedures/technologies in place today, this assessment has identified some additional mitigation opportunities. The risk mitigation opportunities are presented in the Appendix as Table 4. Alls mitigation opportunities were deemed to be Category 2 – Recommended for funding and implementation if additional funds identified in 2014, otherwise top priority for funding in 2015.

Table 1 - Potential Vulnerability Features on Edmonton to Hay River Corridor

Mile Group	Mile	Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG facility adjacent	Other Special Feature	Notes
Edmonton to Hay River Corridor																
Westlock Sub																
0	0-8				X											Edmonton & St. Albert Metro area
0	1												X			Dunvegan storage yard
0	1.1														X	Shopping Centre, 'Cineplex' theatre parallel
0	1.2					X		X								137 Avenue bridge
5	3.1														X	North Pointe Community Church east side
5	3.3					X		X								AB 216 Anthony Henday Drive overpasses
5	5.5									X						Riverlot Natural Area park west side
10	9.7	X						X								Sturgeon River bridge - wood trestle
10	11.1					X		X								AB Highway 37 bridge
20	20													X		Fertilizer facility adjacent
20	20.1		X													Town of Morinville
20	20.9					X		X								AB Highway 2 overpasses
20	21	X								X						Public Campground and pond east side
20	22														X	Terminal grain elevator facilities
30	32.3	X														Wetlands parallel
35	35									X						Busby village ball park
45	47-48					X										AB Highway 44 parallel
50	51.5									X						Westlock Fairgrounds & ball park east side
50	52		X													Town of Westlock
50	52.1														X	Grain elevator facilities west side
50	52.6-55.2					X										AB Highway 44 parallel
55	52.9									X						Westlock Community Centre and sports centre east side
65	65.9														X	Dapp private grain elevator east side
65	66.2	X														Irish Creek crossing and parallel
75	73.9	X														Pembina River parallel
75	74									X						Jarvie park/sports facility
80	77.5-81.2					X										AB Highway 44 parallel
80	81.7	X						X								Frenchman's Creek bridge - wood trestle
100	102	X														Wetlands parallel
110	107.7	X														Wetlands parallel
110	108.5	X														Wetlands/stream crossing
120	117.8	X														Wetlands/stream crossing
120	119.3	X														Wetlands/stream crossing
125	124.1	X														Wetlands/stream crossing
125	126	X														Pond east side
130	130.1														X	Smith water treatment facility east side
130	130.9												X			Smith yard
Slave Lake Sub																
130	131.5	X						X								**Athabasca River bridge - 395' multi-span truss structure**
135	132.8	X														Lesser Slave River parallel
140	140-141	X														Wetland/bog conditions
140	141.7	X						X								Sauteaux River bridge - 125' truss structutre
150	147.7	X						X								Otauwau River bridge - 125' truss structure
150	151														X	Mitsue Slave Lake Paper pulp mills both sides
155	155.5	X														Mitsue Lake south side
155	155.6														X	Mitsue Lake Industrial Park / lumber mills north side
160	159-160	X														Wetland/bog conditions
160	162.1										X					Roland Michener Secondary School south side
160	162.4	X						X								Sawridge Creek bridge - trstle and plate girder structure
165	162.9		X													Town of Slave Lake

165	163.1									X						Slave Lake Slowpitch park
165	164.1	X														Wetland/bog conditions
165	165-168.5					X										AB Highway 2 parallel
165	167.0	X														Wetland/bog conditions
170	168.3	X														Wetland/bog conditions
170	168.6-172	X														Lesser Slave Lake parallel
175	173.1-178	X													X	Lesser Slave Lake parallel and multiple lakefront homes
185	184-188	X														Wetland/bog conditions
190	190.4	X						X								**Swan River bridge - 250' multi-span truss structure**
190	191.8														X	Kinuso water treatment facility
195	196.7	X						X								Strawberry Creek bridge - wood trestle
205	206	X						X								Driftpile River bridge - 125' truss structure
205	206.1					X										AB Highway 2 parallel
215	212-226					X										AB Highway 2 parallel
215	215.5	X														Wetland/bog conditions
220	220	X														Wetland/bog conditions
225	223.5	X														Wetland/bog conditions
230	228-233					X										AB Highway 2 parallel
230	228.1	X						X								East Prairie River bridge - trestle and truss structure
230	231												X			Crude oil loading facility south side
235	234.2		X													Town of High Prairie
235	234.5	X						X								West Prairie River bridge - trestle and plate girder structure
235	234.6														X	Sawmill south side
240	238.2	X														Wetland/bog conditions
240	240.3-241.3	X														Wetland/bog conditions
250	244.2-258.2					X										AB Highway 2 parallel
260	261.9											X				McLennan yard
260	262.7														X	Sacred Heart Community Health Centre north side
260	263-263.5					X										AB Highway 2 parallel
Peace River Sub																
15	14-17	X														Wetland/bog conditions
25	24												X			Reno crude oil loading facility
25	27.1	X														Stream/wetland parallel
30	28.1	X														Wetland/bog conditions
30	30.7														X	Nampa terminal grain elevator
30	31												X			Nampa crude oil loading facility
35	33														X	Sawmill west side
40	37.7							X								Wood trestle structure over wetland
45	42-49														X	Judah Hill 2.4% descending northward
45	43.8							X								Trestle structure over side ravine
45	44.7							X								Trestle structure over side ravine
45	46.1														X	Significant retaining wall structure on low side of embankment
50	47-53		X													Town of Peace River developed area
50	47.7	X						X								**Heart River bridge - 600' Steel trestle and truss/girder structure**
50	47.8									X						Ball park west side
50	47.9-49					X										AB Highway 2 parallel
50	49	X						X								**Peace River bridge - 1700' multi-span truss structure**
50	49-57														X	Peace River hill 2.0% descending southward
50	50.5					X		X								AB Highway 2 overpass
50	51.7									X						Ball park adjacent
50	51.8					X		X								AB Highway 2 bridge
55	52.9														X	Peace River Community Health Centre east side
60	59.5	X						X								Strong Creek bridge - Wood trestle structure
Manning Sub																
0	1											X	X			Roma Jct. yard, Ammonia transload facility
0	1.5					X		X								AB Highway 2 overpass
5	4.3	X														Wetlands

10	8.8	X													Wetland/bog conditions
10	10.5	X													Wetland/bog conditions
15	13.8	X													Wetland/bog conditions
20	17.5	X						X							Cardinal Creek bridge - Wood trestle structure
20	20.4	X						X							Whitemud River bridge - 210' plate girder and pile trestle structure
25	25.2	X													Wetland/bog conditions
25	26	X													Wetland/bog conditions
30	29.5	X						X							Wood trestle structure over watercourse
40	37.8	X													Wetland/bog conditions
50	48.8	X													Wetland/bog conditions
50	50.5	X						X							Buchanan Creek bridge - Wood trestle structure
55	54.7	X						X							Wood trestle structure over watercourse
55	57.3	X						X							**Notikewin River bridge - 446' plate girder and trestle structure**
60	59.8	X						X							Stowe Creek bridge - wood trestle structure
65	66.3	X						X							**Hotchkiss River bridge - 431' plate girder and trestle structure**
70	69													X	Hotchkiss sawmills west side
75	73.9	X						X							**Meikle River bridge - 1900' multi-span steel viaduct**
80	79	X													Slims Creek bridge - wood trestle structure
80	81.8	X						X							Gravina Creek bridge - wood trestle structure
85	84.5													X	Hawk Hills grain elevator
105	103	X													Wetland/bog conditions
105	107	X													Wetland/bog conditions
110	110.7	X						X							**Kemp River bridge - 700' wood trestle structure**
110	111.8												X		Oil/gas storage facility west side
120	120	X													Wetland/bog conditions
125	125.3	X						X							Smeaton Creek bridge - wood trestle structure
125	126.8	X						X							Keg River bridge - 200' trestle structure
135	135	X													Wetland/bog conditions
140	137.5	X													Boyer River bridge - 100' trestle structure
140	139.1	X													Wetland/bog conditions
145	143	X													Wetland/bog conditions
150	148-149	X													Wetland/bog conditions
150	151-153	X													Wetland/bog conditions
160	159-161	X													Wetland/bog conditions
160	162-164	X													Wetland/bog conditions
170	168-174	X													Wetland/bog conditions
175	176.3	X						X							Meito Creek bridge - 100' trestle structure
180	178											X		X	High Level pulp mill and yard
180	182											X			High Level yard
185	182.5													X	Grain elevators and sawmills adjacent
185	182.9		X												Town of High Level
Meander River Sub															
185	186	X						X							Bushe River bridge - 150' trestle structure
190	189-197						X								AB Highway 35 parallel
190	191.5										X				High Level Airport west side
195	194.8	X													Wetland/bog conditions
200	198	X													Wetland/bog conditions
205	204.1	X													Wetland/bog conditions
205	207.1	X													Wetland/bog conditions
215	215-220						X								AB Highway 35 parallel
220	221-223	X													Wetland/bog conditions
225	226.7	X													Wetland/bog conditions
230	230.5	X													Wetland/bog conditions
235	233-234						X								AB Highway 35 parallel
235	234.8	X						X							Hay River bridge - 100' multi span structure
235	236-251						X								AB Highway 35 parallel
255	255-268						X								AB Highway 35 parallel
255	256.9	X						X							**Lutose Creek bridge - 300' girder and trestle structure**
260	259-260	X													Wetland/bog conditions

270	269.5-270.1	X												River parallel
270	270.1						X							**Steen River bridge - 350' girder and trestle structure**
270	270.8											X		Gas storage/pipeline facility west side
270	271-272				X									AB Highway 35 parallel
275	273.5	X												Wetland/bog conditions
275	275-289				X									AB Highway 35 parallel
280	277.5	X					X							Jackpot Creek bridge - 150' trestle structure
280	282	X												Wetland/bog conditions
285	283.8	X					X							Creek bridge - 130' trestle structure
285	284	X												Wetland/bog conditions
290	288.8	X												Wetland/bog conditions
290	290	X												Wetland/bog conditions
295	292-301				X									AB Highway 35 parallel
295	292-293	X												Wetland/bog conditions
295	295	X												Wetland/bog conditions
300	299-300	X												Wetland/bog conditions
300	302.2	X												Wetland/bog conditions
305	303-304.5				X									NWT Highway 1 parallel
305	307-309				X									NWT Highway 1 parallel
310	311-312.5				X									NWT Highway 1 parallel
310	312	X												Wetland/bog conditions
315	316.5	X												Wetland/bog conditions
315	318-319				X									NWT Highway 1 parallel
325	324.8	X												Wetland/bog conditions
330	330-331				X									NWT Highway 1 parallel
335	335-336				X									NWT Highway 1 parallel
340	341-344				X									NWT Highway 1 parallel
345	346.7	X												Wetland/bog conditions
345	347-348				X									NWT Highway 1 parallel
350	349.5	X												Enterprise water treatment pond
360	357.7	X												Wetland/bog conditions
360	360.5	X												Wetland/bog conditions
365	366	X												Water storage pond east side
365	367	X												Wetland/bog conditions
370	368	X												Wetland/bog conditions
375	372-377				X									NWT Highway 2 parallel
375	372-378		X											Hay River developed area
375	373.3									X				Diamond Jennes Secondary School east side
375	374.7	X					X							Hay River West Channel bridge - multi-span thru truss structure
375	375										X			Hay River Airport west side
375	376											X		Hay River yard
375	376.1	X												Wetland/bog conditions
375	376.8												X	Fuel transload and storage facilities

Table 2 - Vulnerability Ranking by Mileage Group

Mile Group	Significant Wetland Waterway	Population 1000-10000	Population 10000-100000	Population 100000+	Adjacent Highway	Adjacent Railway	Significant Bridge Structure	Passenger Station	Adjacent Parkland	Adjacent School	Adjacent Airport	Yard Facilities	Potential DG plant adjacent	Other Special Feature	Mile Group Point Count	Area of Interest
Edmonton to Hay River Corridor																
Westlock Sub																
0				1	2		2		1			1		2	9	Edmonton
10	1				1		2								4	
20	1	1			1		1		1				1	1	7	
30	1								1						2	
40					1										1	
50		1			1				2					1	5	
60	1													1	2	
70	1								1						2	
80	1				1		1								3	
90															0	
100	1														1	
110	2														2	
120	4														4	
130												1		1	2	
Slave Lake Sub																
130	2						1								3	
140	2						1								3	
150	2						1							2	5	
160	4	1			1		1		1	1					9	Slave Lake
170	3													1	4	
180	1														1	
190	2						2							1	5	
200	1				1		1								3	
210	1				1										2	
220	2														2	
230	2	1			1		2						1	1	8	
240	2														2	
250					1										1	
260					1							1		1	3	
Peace River Sub																
0															0	
10	1														1	
20	1												1		2	
30	1												1	1	3	

40							3						2	5	
50	2	1			3		4	2					2	14	Peace River
60	1						1							2	
Manning Sub															
0	1				1		1				1	1		5	
10	3													3	
20	4						2							6	
30	1						1							2	
40	1													1	
50	4						3							7	
60	2						2							4	
70	1						1						1	3	
80	2						1						1	4	
90														0	
100	2													2	
110	1						1					1		3	
120	3						2							5	
130	1													1	
140	3													3	
150	2													2	
160	2													2	
170	2						1							3	
180		1									2		2	5	
Meander River Sub															
180	1						1							2	
190	1				1					1				3	
200	3													3	
210					1									1	
220	2													2	
230	2				2		1							5	
240														0	
250	1				1		1							3	
260	1													1	
270	2				2		1					1		6	
280	4						2							6	
290	4				1									5	
300	2				2									4	
310	2				2									4	
320	1													1	
330					2									2	
340	1				2									3	
350	1													1	
360	4													4	

370	3	1			1		1			1	1	1	1		10	Hay River

Table 3 -Edmonton to Hay River Corridor
Subdivision Risk Review, Existing Mitigating Factors and Proposed Enhancements

Westlock Sub		CATEGORY
Issues of Concern	1. DG volume - 10600 loads (types crude oil, gasoline, diesel, LPG) 2. Track conditions	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. WIS at 20-40 mile spacing	
Detection Enhancement	1. No Proposed DEDs 2. Add WIS site at Mile 122.9 (installation underway Nov 2014)	
Track/Structures Inspection Enhancement	1. Rail Flaw Dectection - 16 inspections annually (starting 2014) 2. Track Geometry - 2 inspections annually	
Emergency Response	1. Contractors in Edmonton 2. Closest DGO in Edmonton 3. Industrial fire teams must be deployed from US 4. Foam availability - CP trailer in Calgary	
Environmental	1. Equipment Caches: Trailer in Edmonton 2. E2MS mapping to be completed 3. Contractor coverage to be evaluated	
Other		

Slave Lake Sub		CATEGORY
Issues of Concern	1. DG volume - 10600 loads (types crude oil, gasoline, diesel, LPG) 2. Track conditions	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. WIS at 20-60 mile spacing	
Detection Enhancement	1. No Proposed DEDs 2. New WIS sites at Mile 236 and 258 (in service Oct 2014)	
Track/Structures Inspection Enhancement	1. Rail Flaw Dectection - 16 inspections annually (starting 2014) 2. Track Geometry - 2 inspections annually	
Emergency Response	1. Contractors in Edmonton 2. Closest DGO in Edmonton 3. Industrial fire teams must be deployed from US 4. Foam availability - CP trailer in Calgary	
Environmental	1. Equipment Caches: Trailer in Edmonton 2. E2MS mapping to be completed 3. Contractor coverage to be evaluated	
Other		

Peace River Sub		CATEGORY
Issues of Concern	1. DG volume - less than 10000 loads 2. Track conditions	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. No WIS sites	
Detection Enhancement	1 No Proposed DEDs 2. New WIS sites at Mile 26.48 and 60.00 (in service Oct 2014)	
Track/Structures Inspection Enhancement	1. Rail Flaw Dectection - 16 inspections annually (starting 2014) 2. Track Geometry - 2 inspections annually	

Emergency Response	1. Contractors in Edmonton 2. Closest DGO in Edmonton 3. Industrial fire teams must be deployed from US 4. Foam availability - CP trailer in Calgary	
Environmental	1. Equipment Caches: Trailer in Edmonton 2. E2MS mapping to be completed 3. Contractor coverage to be evaluated	
Other		

Manning Sub		CATEGORY
Issues of Concern	1. DG volume - less than 10000 loads 2. Track conditions	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. WIS at 40-60 mile spacing	
Detection Enhancement	1. No Proposed DEDs 2. New WIS site at Mile 108.92 (in service Nov 2014) 3. Planned WIS site Mile 13.33 (2015)	2
Track/Structures Inspection Enhancement	1. Rail Flaw Dectection - 16 inspections annually (starting 2014) 2. Track Geometry - 2 inspections annually	
Emergency Response	1. Contractors in Edmonton 2. Closest DGO in Edmonton 3. Industrial fire teams must be deployed from US 4. Foam availability - CP trailer in Calgary	
Environmental	1. Equipment Caches: Trailer in Edmonton 2. E2MS mapping to be completed 3. Contractor coverage to be evaluated	
Other		

Meander River Sub		CATEGORY
Issues of Concern	1. DG volume - less than 10000 loads 2. Track conditions	
Existing WIS Sites	1. No existing DED sites 2. No WILD sites 3. WIS at 50-60 mile spacing	
Detection Enhancement	1. No Proposed DEDs 2. Planned WIS sites Mile 185, 264, 324 (2015)	2
Track/Structures Inspection Enhancement	1. Rail Flaw Dectection - 5 inspections annually (starting 2014) 2. Track Geometry - 3 inspections annually	
Emergency Response	1. Contractors in Edmonton 2. Closest DGO in Edmonton 3. Industrial fire teams must be deployed from US 4. Foam availability - CP trailer in Calgary	
Environmental	1. Equipment Caches: Trailer in Edmonton 2. E2MS mapping to be completed 3. Contractor coverage to be evaluated	
Other		

Table 4 - Edmonton to Hay River Corridor Risk Assessment
Summary of Proposed Enhancements

Subdivision	Mile	Location	Risk Mitigation Item	Cost Estimate	Purpose	Category
Manning	13.33	Leddy	WIS Site	$125k	Reduce WIS spacing	2
Meander River	185	Gateway	WIS Site	$130k	Protect north side of High Level	2
Meander River	264	Lutose	WIS Site	$220k	Reduce WIS spacing	2
Meander River	324	Alexandra Falls	WIS Site	$220k	Reduce WIS spacing	2
		Entire Territory	E2MS Mapping Requirements		Identify access to waterways, locations for control points, staging areas, observation points.	2
		Entire Territory	Environmental Contractor Capability Evaluation		Review capabilities of all contractors used for environmental response in western Canada.	2

Liston, Wendy

From: Muldoon, Anne Marie
Sent: Tuesday, June 19, 2018 2:00 PM
To: Liston, Wendy
Subject: FW: SOR - Key Route Analyses and Risk Assessments

This appears to be the email that was sent.

From: @gwrr.com]
Sent: Friday, October 24, 2014 6:01 PM
To: Bourdon, Luc <luc.bourdon@tc.gc.ca>
Cc: @gwrr.com>; @gwrr.com>; @gwrr.com>; @gwrr.com>; @gwrr.com>; @gwrr.com>; Carlson, Walter <walter.carlson@tc.gc.ca>; Grite, Gwen <gwen.grife@tc.gc.ca>
Subject: SOR - Key Route Analyses and Risk Assessments

Dear Mr Bourdon,

Please find attached GWCI-SOR's Risk Assessment required by the Emergency Directive issued on April 23, 2014.

Original will be sent by mail. Please ensure appropriate classification handling is applied to this document for security reasons.

Do not hesitate to contact me should you have any question.

Stéphane

Directeur principal, Sécurité et sûreté
Senior Director Safety and Security
Genesee & Wyoming Canada
9001 boul. de l'Acadie, Bureau 600, Montréal QC, H4N 3H5
T : F (514) 948-6988

Liston, Wendy

From: l@ssrailway.com>
Sent: Thursday, December 04, 2014 4:38 PM
To: RailSafety; Emard, Robin; Grife, Gwen
Cc: Blair Stewart;
Subject: RE: Section 36/Risk Assessments / l'article 36, Evaluation des risques
Attachments: Identify Safety Risks - TC. a.pdf; 5. Public Crossings on SSR Rail Track.pdf; 6. Bridges under SSR Rail Track.pdf

Sent on behalf of Mr. Blair Stewart (CEO - Stewart Southern Railway Inc)

Dear Sirs

Please find enclosed the files relevant to the Safety and Risks along the SSR Track and the Management Practices adopted.

These submissions may please be viewed in relation with the following:-

Fundamental Track Facts:-

1. The Railway Track {The Track} owned by Stewart Southern Railway Inc {SSR} runs from Stoughton to Richardson with an additional access to CP Yard in Regina.

2. It is 79.8 Miles in length and is all the way straight without any curvatures.

3. There are Eighty Eight (88) Public Crossings on it and Eight (8) Bridges under it.

4. The Entire Track is Patrolled every day.

We sincerely hope that you find it in order.

Thank You.

From: Emard, Robin [mailto:robin.emard@tc.gc.ca]
Sent: Tuesday, December 02, 2014 7:45 AM
To:

Cc: Blair Stewart
Subject: FW: Section 36/Risk Assessments / l'article 36, Évaluation des risques
Importance: High

I'm following up concerning this required submission on Risk Assessments for your railway company – Stewart Southern Railway.

Could you provide an update on this submission as soon as possible as the deadline was yesterday December 1, 2014.

Thank you.

Robin Emard | Regulatory Project Officer / Agent de projet, Règlements
(613) 990-1883 | facsimile / télécopieur (613) 990-7767 | TTY / ATS (613) 990-4500
<mailto:robin.emard@tc.gc.ca> mailto:robin.emard@tc.gc.ca
Transport Canada | 427 Laurier Street, 14th Floor, Suite 1410, Ottawa, Ontario, K1A 0N5
Government of Canada | Gouvernement du Canada

From: Grife, Gwen
Sent: Monday, November 17, 2014 4:41 PM
Cc: Bourdon, Luc; Archer, Susan; Madaire-Poisson, Suzanne; Carlson, Walter
Subject: Section 36/Risk Assessments / l'article 36, Évaluation des risques

Hello. I hope you are fine.

On behalf of Ms. Laureen Kinney, Assistant Deputy Minister please find enclosed a Section 36 Order concerning Risk Assessments. Please note the hard copy is in the mail.

Thank you.

Bonjour. J'espère que vous allez bien.

Au nom de Mme. Laureen Kinney, sous-ministre adjointe, veuillez trouver svp. ci-joint un ordre de l'article 36 au sujet des évaluations des risques. Veuillez noter svp. l'imprimé est dans le courrier.

Merci.

Gwen

Gwen Grife
Senior Advisor, Regulatory Affairs (ASRR)/

Conseillère principale aux Affaires

réglementaires (ASRR)

Rail Safety/Sécurité ferroviaire
Transport(s) Canada
Ottawa, Ontario (Canada) K1A 0N5
(613) 990-7749

E-mail/courriel gwen.grife@tc.gc.ca <mailto:gwen.grife@tc.gc.ca>

P Whenever possible, please print on both sides.Lorsque c'est possible, svp imprimez sur les deux côtés.

Reply all | Delete Junk | •••

RE: Media request: 2014 risk assessments for MB (Tues 5ET deadline)

JA

Jonathan Abecassis <Jonathan.Abecassis@cn.ca>
Yesterday, 6:10 PM
Robertson, Dylan

Reply all

Inbox

Dangerous goods are materials used every day in the goods and products we consume, in our water treatment plants, in our automobiles and other common products. Rail keeps large volumes of these commodities off the roads and highways. In fact, incidents involving the release of dangerous goods are quite infrequent. In 2018, only two incidents occurred resulting in the release of dangerous goods on CN track.

The volume of dangerous goods and the routes they move on are in constant fluctuation based on many factors, mostly customer demand and also operational requirements. As a result, traffic patterns are not fixed and detailed traffic data from 2014 is not something that necessarily holds much validity today. A lot has changed in the last few years and will continue to change constantly. For those reasons, CN's emergency response plan must be designed and maintained to be applicable to any emergency incident at any location on our network. CN's Dangerous Goods Team regularly reviews the types and quantities of dangerous goods traffic transported across each Province and conducts an analysis of the response measures required and resources available to respond everywhere at any time. When our analysis reveals an area where we can improve, our teams work quickly to address the issue, as they did in the examples you mentioned. You can find more information about our Emergency response measures as well as a map of our Emergency Response Resources here. Please note that both the dangerous goods transfer trailer and the foam trailer have been deployed in accordance with the suggestions found in the risk assessments.

Along with making the network Emergency Response Plan available to first responders and regulators, we encourage the use of the AskRail app, a safety tool that provides first responders immediate access to accurate, timely data about what type of materials a railcar is carrying so they can make an informed decision about how to respond to a rail emergency. This application, developed in collaboration between Association of American Railroads and first responders has been recognized as a significant step to facilitate the quick and efficient interventions in case of emergencies. CN also makes available to the public on our website a report of the top 10 dangerous goods that we transport through each Province in Canada, including a summary of the percentage of shipments that are dangerous goods in the Province.

Some of the information you seek is purposefully kept confidential by the railways to minimize the risks associated with its dissemination. Public safety demands that details respecting dangerous goods routing and volumes shipped per route need to be secure and used only for emergency preparedness and response purposes and only by those mandated to be involved.

Finally, the amount of barrels per carload is subject to many technical factors so no single number can be used as a reference.

Jonathan Abecassis
T: 514-399-7956
C: 514-755-7956

1) Page 160 says the Sprague subdivision has "DG volume - 97k carloads (29k crude oil)" Does this mean that as of April 2014 the annual amount of DG was 97,000 carloads and 29,000 of that was crude?

2) What is CN's definition of the amount of goods by carload? I realize that might fluctuate based on goods, but I'm trying to get at whether one could say that there was roughly 20 million barrels of crude (29,000 x the AAR benchmark of 691 barrels per carload = 20,039,000 barrels).

3) What amount DG and of crude oil (separately) was transported along on the Sprague and Rivers subdivisions (separately) in 2018? And for the Rivers subdivision in 2014?

4) Page 139 is dated April 2014 and it talks about the need for dangerous-goods transfer trailer in Winnipeg "as no such equipment exists close ot this area for response to the need to transload an intact dangerous load involved in an accident." Page 140 is also dated April 2014 and it estimates this cost to be $220,000 and notes "asked for funding elsewhere". Page 190 is dated November 2014 and it brings up this idea again. Did CN proceeded with this; if so when was this completed?

5) Page 140 is dated April 2014 and notes that the Sprague division mile 142, east of Navin, notes as Priority 1 a DED site for $30,000 to "protect Red River Floodway and adjacent multiple highway overpasses (Ring Road/Trans Canada highway)

6) Page 190 also calls for a $137,000 foam trailer to mitigate flammable-goods fires in Winnipeg, and for a DED/brittle bars at Rivers miles 203.6 (St. Lazare) and 188.2 (Uno). The St. Lazare truss bridge is marked as Priority 1 and on Page 260 it notes that there is "moderate train separation activity at Mile 210 (end of double track)." Has CN proceeded with any of these? When were they completed?

7) How does CN feel about all this information being divulged? We see between pages 116 and 133 that Transport Canada pushed CN to pass over more information, and that CN had concerns about ATIP officers passing along info that "could threaten the safety and security of Canadians".

RE: How much is in a carload? (5ET deadline)

VS

Victoria Savoy <vsavoy@RAILCAN.CA>
Tue 03-12, 3:47 PM
Robertson, Dylan

Reply all

Inbox

Action Items

Hi Dylan,

Please review the carload to barrel figures available in the public domain:

> AAR: In 2017, the average carload of crude oil originated in the United States carried 691 barrels of oil. Using that, the 128,967 carloads of crude oil originated by U.S.
> Source: https://www.aar.org/wp-content/uploads/2018/07/AAR-US-Rail-Crude-Oil-Traffic.pdf
>
> CAPP: 500 to 700 depending on the type of crude (Table 3-2)
> Source: www.capp.ca/~/media/capp/customer-portal/documents/242427.pdf

Best,
Victoria

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