CN Mile Point 197.4, Rivers Subdivision

Project Update

Southeast of St. Lazare, Manitoba
September 9, 2019

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SUMMARY: CN MP 197.4, RIVERS SUBDIVISION - ENVIRONMENTAL SITE ASSESSMENT

The following information summarizes the Environmental Site Assessment (ESA) activities at CN Mile 197.4 on the Rivers Subdivision near St. Lazare, Manitoba (the Site) from the initial response to August 31, 2019.

EVENT AND SITE DESCRIPTION

At approximately 02:45 on February 16, 2019, a CN freight train derailed at Mile 197.4 of the Rivers Subdivision, located immediately east of an oxbow of the Assiniboine River. A total of 34 cars derailed on-Site, all of which were carrying Cold Lake Dilbit Blend (CLB), and of the 34 cars, 13 cars were ruptured and released approximately 820,000 liters of CLB.

The Site is located approximately 11 km to the south/southeast of St. Lazare, Manitoba. The lands surrounding the Site, beyond the CN Right-of-Way (ROW), are primarily improved pasture owned by a single landowner along with an oxbow on the west side of the rail line. The Assiniboine River mirrors this alignment, approximately 850 m to the west.

From this point forward, directions referenced are in relation to standard railroad practice, which is consistent with nomenclature that has been in place at the Site during the response to date. Site directions herein are based on the convention that the rail line runs east-west and Site north corresponds approximately to true east.

SUMMARY OF ACTIVITIES COMPLETED TO DATE

The immediate emergency response focused on containing the released product visible on the ice and snow of the oxbow. Isolation was achieved through constructing two temporary berms on either side of the visible limits of product sitting on the oxbow. These berms have remained in place to provide a confined monitoring area within the oxbow.

Impacted soils, water, ice and free product were primarily removed from the Site during the emergency response, focusing on areas between the CN track and the oxbow. Impacted sediments were also removed from the base of the oxbow between the two containment berms.

An intrusive investigation to characterize and delineate remaining impacted soils was completed in May 2019 followed by a subsequent remedial excavation for source removal of product remaining within the sub ballast material of the rail bed completed in June 2019.

The following activities have been conducted at the Site to the end of August 2019:

- Initial response and Site remediation including the removal of impacted soils, water, ice and free product;
- Intrusive investigation within the CN rail bed;
- Excavation of residual, accessible soil exceedances;
- Source removal below the CN rail bed;
- Polycyclic aromatic hydrocarbon (PAH) soil sampling;

- Site inspections; and
- Ongoing surface water and Groundwater monitoring and sampling.

FIELD METHODS

Surface Water

Subsequent to the initial response and remediation, a site monitoring and inspection schedule was commenced on March 18, 2019. The timeline encompasses the post-freshet conditions and included three site visits each week to complete the following tasks:

PROJECT TASK(S)	RESPONSIBLE PARTY	SCHEDULE
Monitoring for aquatic life, in-situ water quality and imagery/drone flyovers	HDR/Matrix	Weekly Mondays
Analytical surface water sampling and imagery/drone flyovers	KGS	Weekly Wednesdays
Maintenance of Erosion Controls and/or Booms	Tervita	Weekly Fridays

Monitoring transitioned to one inspection per week on April 19, 2019 with in-situ water quality monitoring and surface water sampling completed on alternating weeks by HDR/Matrix and KGS, respectively. A transition to monthly monitoring and surface water sampling was completed following the source removal below the CN rail bed and surface water and groundwater sample collection on June 26, 2019.

Analytical surface water quality data has been collected from upstream and downstream of the Site, and within the oxbow monitoring area from March 20, 2019 to the most recent monthly sampling conducted on August 21, 2019. The next monthly sampling event is scheduled for September 18, 2019. In-situ water quality parameters including temperature, pH, electrical conductivity (EC) and dissolved oxygen DO were measured at five locations within and beyond the monitoring area as well as individual surface water sampling locations using an YSI multimeter. Samples have been analyzed for BTEX, PHC Fractions F1 to F4, PAHs, routine water quality parameters and total metals.

Initial Response and Soil Sampling

Initial recovery of the CLB was completed in stages: snow and ice removal, removal of trees and woody debris and impacted soils within the vicinity of the recovered product. As part of this process, the ice cover on the oxbow between the constructed containment berms was broken to facilitate removal of residual CLB impacts within ice fractures and to excavate any impacted sediment. The initial extents of this bulk recovery program were determined by aerial imagery. Removal of the CLB was undertaken by:

- Constructing three containment berms (one berm removed and two remaining after the demobilization for freshet on March 18, 2019);
- Employing vacuum trucks and tracked excavators;

- Constructing lined containment cells for staging of impacted material awaiting transfer for off-Site disposal; and
- Removing rail, structural and fencing debris.

Bulk removal of CLB impacted soils were be based on visual staining. All impacted soils were removed from third party and CN-owned lands with the following exceptions:

- Impacted soils within the rail bed and in close proximity of the rail line that CN's on-Site geotechnical subcontractor determined could not be removed without affecting the stability and safe operation of the rail line;
- Impacted soils in culvert areas that required immediate backfilling due to stability and safe operation of the rail line; and
- Marginal exceedances within the oxbow that could not be removed safely due to groundwater infiltration and saturated ground conditions.

The soil samples were submitted for analysis of BTEX, PHC Fractions F1 to F4 and select samples for salinity. Following removal of soil impacts, impacted lands were backfilled, graded and re-contoured.

Intrusive Investigation – Borehole Drilling and Soil Sample Collection

A total of 24 boreholes (BH19-1 to BH19-18 and MW19-1 to MW19-6) were drilled from May 1 to 7, 2019. The boreholes were advanced using a track mounted drill rig equipped with 0.2 m (8 inch) diameter hollow stem augers, continuous core barrels and split spoon sampling equipment. The boreholes were advanced with the purpose of delineating the extent of the CLB contamination below the railbed. Directional boreholes were advanced, 11 locations on the south embankment and two locations on the north embankment, to investigation the track bed. The directional boreholes were completed at angles the ranging from 19 to 49 degrees from horizontal and advanced to vertical depths between 1.5 to 8.8 m below ground surface (mbgs). Three vertical boreholes were completed from the top of the rail bed to delineate observed impacts in directional borehole BH19-1 and were advanced to 3 mbgs. Ten vertical boreholes were advanced ranging in depths between 5.7 to 8.8 mbgs, six of the boreholes were completed with monitoring wells.

Directional boreholes were backfilled with a bentonite slurry from the bottom of the borehole using a tremmie pipe with the exception of BH19-14 and BH19-15 that were backfilled through the auger casings with coated bentonite pellets and bentonite chips due to the close proximity to the rail line. Boreholes drilled from the top of the track bed were backfilled with bentonite chips.

Soil samples were collected at regular intervals or where the soil lithology changed. Soil conditions were recorded on standard borehole logs along with field observations (i.e., odours, staining). The soil was logged consistently with the Unified Soil Classification System. Each soil sample was split into two sub-samples. One of the sub-samples was placed into laboratory-supplied sample jars and placed into a chilled cooler for potential chemical analysis. The second sub-sample was placed into a laboratory-supplied re-sealable plastic bag for measurement of soil vapour concentrations. Vapour concentrations were measured in the soil samples using a RKI Eagle II calibrated to hexane.

Based on field observations (i.e., visual contamination), depth of samples, and the results of soil vapour screening. Each soil sample was placed in laboratory-supplied glass jars for potential chemical analysis of Grain size, BTEX, PHC Fraction F1 to F4 and PAHs.

Monitoring Well Installation

Groundwater monitoring wells were installed in six of the boreholes (MW19-1 through MW19-6) ranging in depths from 6.6 to 8.8 mbgs. The monitoring wells were constructed of 50 mm diameter, Schedule 40 polyvinyl chloride (PVC) screen and solid casing. All monitoring wells included a screen between 2.1 and 3.1 m of 0.010" slot screen and solid riser from the screen to surface. The well annulus surrounding the screen was backfilled with 10/20 silica filter sand. Above the sand pack, the annulus was backfilled with hydrated bentonite chips to surface. The well screen and casing connections were threaded, and no glues or solvents were used in the construction of the monitoring wells. All monitoring wells were completed with locked above-ground metal protective casings.

Groundwater Monitoring and Sampling

Monitoring wells were monitored for depth to groundwater, total well depth and thickness of light and dense non-aqueous phase liquids (if present). In order to prevent cross-contamination, the interface probe was washed with lab-grade detergent (Liquinox) and rinsed with de-ionized water between monitoring wells. As part of groundwater monitoring, organic vapour concentrations within the well annulus were measured using and RKI Eagle II calibrated to hexane.

Approximately two weeks following installation, the monitoring wells were developed with dedicated disposable bailers. The static water column was measured and the well volume was calculated. Each well was developed until one of the following conditions was met: purged water was visibly clear of sediment and at least three well volumes (i.e., casing volume + filter pack volume) had been removed; or, until the well went dry. If a monitoring well went dry, the well was allowed to recover prior to collecting a sample.

Where water yields were sufficient, monitoring wells were sampled with dedicated disposable bailers. During purging field parameters (temperature, pH, EC and DO) were measured every well volume using an YSI multimeter. Samples were collected when field parameters became stable (i.e., within 10%) and at least three well volumes were purged.

Field equipment was calibrated or bumped at the start of each day, to ensure the accuracy of the field data. All probes and meters were cleaned between each location to minimize cross contamination. Where consumable items were required, such as a bailer, it was dedicated to the sample location.

Samples have been analyzed for BTEX, PHC Fractions F1 to F4, PAHs, routine water quality parameters and dissolved metals. Well purge water was drummed and temporarily stored on-Site and later disposed off-Site.

Source Removal

On June 2, 2019, previous soil exceedances identified by laboratory results on the landowner's property located along the south side of the CN ROW adjacent to the fence line were excavated.

Between June 4 and 6, 2019, two excavations and two slot trenches were conducted in order to complete source removal within the CN rail bed. Residual CLB observed within the granular sub-ballast material was removed. The base and walls of the two remedial excavations were sampling on an approximate 5 m by 10 m grid.

A total volume of approximately 1,507 m^3 of soil was removed from the excavation areas on the south side of the rail line, EX1, EX2, Slot1 and Slot2 for off-Site disposal as non-hazardous waste at the Virden Landfill.

PAH soil sampling

An additional PAH soil sampling program was conducted on June 9, 2019, were collected from the CN ROW south of the rail line and the oxbow monitoring area. At each sampling location, two soil samples were collected; one from the surface and one from surface to 0.15 mbgs using a shovel and were submitted to BV Laboratories in Winnipeg, MB, for analysis of PAH.

Background Soil Sampling

A background PAH soil sampling program was conducted on June 9, 2109, to determine the chemical characteristics of the native soils in the vicinity of the Site. Six background locations (BG-1 through BG-6) were selected from areas beyond where Site activities occurred. At each sampling location, two soil samples were collected; one from the surface and one from surface to 0.15 mbgs using a shovel and were submitted for analysis of PAHs.

Site Inspections

Weekly, bi-weekly and monthly Site inspections have been conducted at the Site to the end of August 2019. Site inspections included but were not limited to:

- collection of drone imagery;
- checking equipment;
- documenting wildlife sightings;
- inspecting the CN ROW and berms;
- observing surface water in the oxbow inside and beyond the berms;
- inspecting and repair, if required, erosion controls;
- monitoring in-situ surface water quality;
- collecting surface water and groundwater samples;
- cleaning the seepage that had adhered to the inside of the east culvert; and
- removing residual product observed on the ground surface for off-Site disposal.

Location and Elevation Survey

Assessment and sampling locations have been surveyed using a Real Time Kinematic (RTK) survey by KGS Group Consulting Engineers since the initial response including the survey of the monitoring well locations to assist in establishing the local ground and groundwater elevations.

ASSESSMENT GUIDELINE FRAMEWORK

The Contaminated Sites Remediation Regulation administered by Manitoba Sustainable Development (MSD) specifies standards to be applied to contaminated sites in Manitoba as follows:

1.1(2) For the purpose of clause 3.1(a) of the Act, the following standards are adopted, as amended from time to time:

Primary standards
Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, 1999

Canadian Council of Ministers of the Environment, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, 2008

Health Canada, Guidelines for Canadian Drinking Water Quality — Summary Table, 2012

Secondary standard
Ontario Ministry of the Environment, Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, 2011

Tertiary standard
Government of Alberta, Alberta Tier 1 Soil and Groundwater Remediation Guidelines 2010

1.1(3) The following rules are to be applied to determine which standard set out in subsection (2) is to be used:

Rule 1 If a standard for a contaminant in relation to the applicable site conditions is provided in a primary standard, that is the standard to be used.

Rule 2 If a contaminant is not listed in a primary standard or if none of the primary standards address the applicable site conditions, the secondary standard is to be used if the secondary standard addresses the specific contaminant and the applicable site conditions.

Rule 3 If a contaminant is not listed in the primary or secondary standards or if the primary and secondary standards do not address the applicable site conditions, the tertiary standard is to be used if the tertiary standard addresses the specific contaminant and the applicable site conditions.

As such, the Canadian Council of Ministers of the Environment (CCME) industrial land use guidelines have been applied to sample data collected on CN property, in this case, the CN ROW. Assessment beyond CN-owned lands for the surrounding agricultural lands and within the oxbow has and will continue to emphasize comparison with CCME agricultural land use guidelines and the freshwater aquatic life guidelines, respectively.

CURRENT STATUS OF THE SITE

Monitoring is ongoing at the Site with surface water and groundwater sampling completed monthly.

As a result of the two berms remaining in-place and the changing conditions on-Site, fish salvage has been required within the monitoring area. Given the high numbers of fish captured between the two berms, weekly visits are being completed to monitor conditions and determine when and if additional fish occurring between the berms may need to be relocated to prevent mortalities.

At this writing, as the two berms are no longer required to support site remediation or restoration, a Request for Review (RFR) is being prepared for DFO's review. The RFR will describe the project including detailed information on existing fish and fish habitat conditions, the nature and scope of work, how the work will be completed, and how the Site will be restored upon the removal of the berms. The information for the RFR was collected between August 13 and 16, 2019.

Plans for Site reclamation are currently being developed for the Site.

CLOSING

In response to the Letter of Designation issued by Manitoba Sustainable Development (MSD) on February 21, 2019 for the Site described as “SW 13-16-28 W, Rural Municipality (RM) of Ellice-Archie, Manitoba”, and as a component outlined in the Remedial Action Plan for the Site, an ESA Report will be completed for the Site following the implementation of the long-term monitoring plan. This report will include a comprehensive summary of the remedial activities completed at the Site including all analytical results and supporting documentation. The ESA Report will clearly outline the conditions of the Site.