Appendix K

Railway Alignment Options Evaluation

Appendix K

Attachment 1

Railway Alignment Options Evaluation

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Railway Alignment Options Evaluation

Kami Iron Ore Project

Prepared for

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1.0 INTRODUCTION

In accordance with the request of Alderon Iron Ore Corp. (Alderon), Stantec Consulting Ltd. (Stantec) is providing a Railway Alignment Evaluation for the proposed railway of the Kami Iron Ore Project. It provides the background information and history of the preferred railway alignment development.

The main track alignment design was undertaken and completed by the Stantec Rail Group Edmonton design office. Design practices of the American Railway Engineering and Maintenance of Way Association (AREMA) were utilized to complete the feasibility design. The track design standards of the QNSL Railway (Normes d'entretien de la voie) and Canadian National (CN) were also consulted for design purposes.

This document is structured to present the original alignment options analysis that was conducted at the scoping and early feasibility levels of the project. It outlines the basis for which the preferred alignment was chosen for inclusion in the Preliminary Economic Assessment (PEA) of the Kami Mine project, dated September 2011. The document goes on to summarize the modifications made to the preferred PEA alignment based on further analysis at the full feasibility level and presents the final alignment recommended for the Kami Feasibility Study.

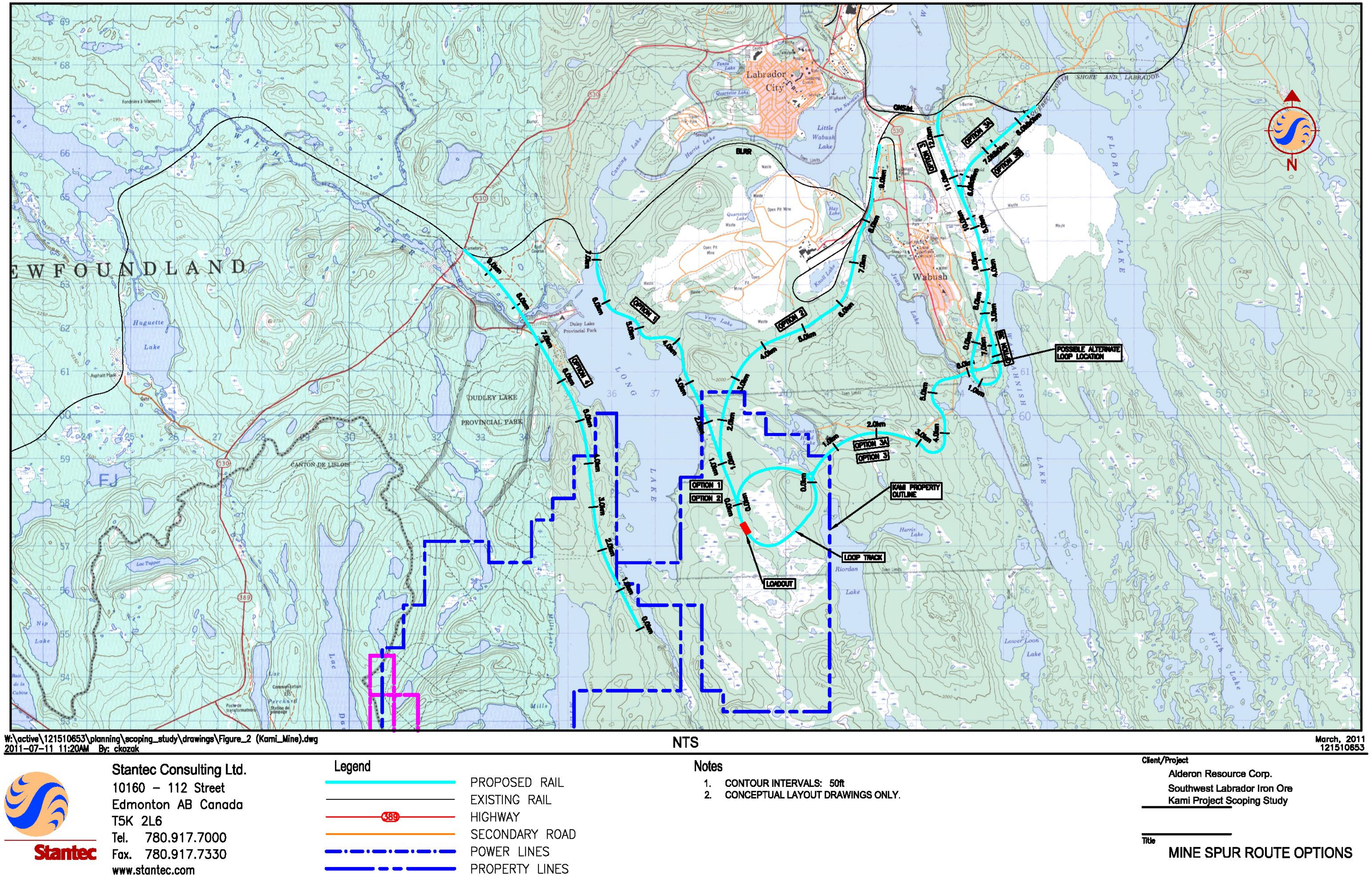
2.0 OPTIONS ANALYSIS

The engineering review of the rail transportation developed for the Preliminary Economic Assessment (PEA) of the Kami Mine project considered four major rail corridors to link the mine to existing trackage, along with two subsets to one of the major corridors for a total of six alternatives. An overview of the six rail route alternatives that have been evaluated are illustrated in Figure 2-1.

In summary, the rail alignment options are as follows:

- Option 1: Requires 7.0 km mine spur from the proposed loop loading track to the existing BLR. From here, trains would travel on the BLR and WLR approximately 9 km to the junction with the QNSL near Labrador City.
- Option 2: Requires 9.5 km mine spur from the proposed loop loading track to the existing WLR. From here, trains would travel on the WLR about 1 km to the junction with the QNSL near Labrador City.
- Option 3: Requires 12.5 km mine spur from the proposed loop loading track to the existing QNSL just east of Wabush Lake Junction near Labrador City.
- Option 3A: Requires 13 km mine spur from the proposed loop loading track to the existing QNSL approximately 3 km east of Wabush Lake Junction, near the north shore of Flora Lake.

Figure 2-1 Overview of Railway Alignment Options



- Option 3B: Modified version of Option 3A with a loop track located south of the Wabush townsite, requiring a conveyor belt system to move iron ore concentrate from mine site to the loop track. Requires 5.5 km mine spur between the loop track and the QNSL junction.
- Option 4: Requires 9.5 km mine spur from a loading area southwest of Long Lake to the existing BLR near the Tamarack golf course. From here, trains would travel on the BLR and WLR approximately 11 km to the junction with the QNSL near Labrador City.

An options matrix summarizing the technical, operational and environmental considerations of each route option is included as Table 2-1. The following text will provide further detail on the aspects of each alignment, leading to the justification for the selection of route Option 3A for further feasibility engineering.

2.1 Mine Spur Option 1

Option 1 links the mine site loop to the BLR by following the east shore of Long Lake, as shown in Figure 2-1. It offers the shortest connection between the mine and an existing railway line.

Technical Aspects

The alignment presents difficult engineering conditions. Wabush Mines open pit operation is located immediately to the east of the Long Lake shoreline and restricts options for placement of track. The geological stability of this alignment for heavy haul train operations is questionable. Mining activities at Wabush Mines may have had significant impact on the geology of the land between the open pit and Long Lake. Waste rock piles are present between the mine and the lake and would need to be partially removed or stabilized in order to construct a railway. Indications of water seepage into the open pit mine at the west side suggest that the ground conditions on which the railway would be built are less than ideal. Cut operations necessary to create a shelf in the side slope above the lake may further harm the geotechnical stability of the land and damage the shoreline. Access for construction would be limited to an approach from the south as there is no road access to the location where the spur would meet the BLR.

On the positive side the alignment provides a very gentle downhill gradient for loaded trains. Cut and fill work would be limited to creating a sufficiently wide shelf in the existing shoreline slope to accommodate a single track.

Operational Aspects

This alignment ties into the BLR, operated by Western Labrador Rail Services (WLRS). WLRS provides rail transport services for the Cliffs (Bloom Lake) operation between the Bloom Lake Mine and the interchange with QNSL at Wabush Lake Junction. Tying into the BLR effectively leaves no operating alternative but to use the rail services provided by WLRS to the Wabush Lake Junction interchange facility, known as Bolger Yard. A further issue involves the requirement of a Wabush Lake Railway pilot to accompany all trains over the approximately 1,000 feet of track owned by Wabush between Bolger Yard and the QNSL junction switch at Wabush Lake Junction. Every train, loaded and empty, requires coordination to ensure that a Wabush pilot employee is on duty and available to oversee movement of the train on WLR.

Further, Alderon and Cliffs (Bloom Lake) trains will need to share the existing Bolger Yard interchange. All of the activities on the BLR will need coordination with Cliffs (Bloom Lake) operations which are in the process of expanding in 2012. Availability of track time, crews and space at the interchange yard will all be reduced in the near future as Bloom Lake Mine increases production. There is limited capability to expand the existing interchange yard to accommodate Cliffs (Bloom Lake) expanding traffic volumes as they ramp to 16 mtpa production rate in addition to Alderon traffic.

The Wabush Mine operation will also have an impact on the ability to operate trains to the Kami Mine. There are already restrictions in effect on BLR traffic passing along the northern edge of Wabush Mines property when mine blasting operations are taking place. It is expected that similar restrictions will also be imposed against rail operations on the mine spur trackage passing along the western side of the Wabush pit. The loss of operational flexibility can create a situation where additional rail rolling stock will be necessary in order to protect against unpredictable main track shutdowns creating erratic train cycle times.

Environmental Aspects

Approximately 5 km of the eastern shoreline of Long Lake would be affected by the construction and operation of alignment Option 1. To maintain suitable gradient for rail traffic the track would be located close to the water's edge. This will result in difficult construction conditions in order to avoid placement of fill material in the water and control of runoff and erosion. Once operations begin, if a derailment were to occur in this area, the likelihood of railway equipment breaching the water is very high. The uphill slope on the east side of the track would naturally force any derailed equipment to fall to rest on the lake side of the track. The aerial view in Figure 2-2 provides some idea of the limited space available to build and operate the railway adjacent to the lake.

Additionally, waste rock piles on Wabush Mine's property may need to be relocated. This creates a need to find another suitable location to deposit this material pending the necessary environmental reviews and protective action that will be required to execute this work.

On the positive side the route has few stream crossings and none that cross significant sized watercourses.

Other Aspects

The vast majority of the land needed to create the railway right-of-way is owned / controlled by Cliffs Resources and their affiliates (Canadian Javelin Ltd.). An agreement to lease or otherwise obtain a right-of-way across their land will be necessary.

Figure 2-2 Aerial View of Long Lake (Option 1 Environmental Aspect)

Option Assessment

The technical and environmental aspects against Option 1 are considerable. It is likely that Long Lake will be impacted during construction, and potentially during operation of the railway. Further, an inefficient train handling process is necessary in order to reach the QNSL main line that could result in unnecessary locomotive idling and redundant train activity in the Wabush area.

On the basis of these points, route Option 1 was not considered suitable for further design.

2.2 Mine Spur Option 2

Option 2 links the mine site loop to the WLR via a route over the ridge between the Kami Mine site and Wabush Mines, as shown in Figure 2-1. It offers the second shortest connection between the mine and an existing railway line.

Technical Aspects

This alignment requires the spur to ascend approximately 30 metres in a two kilometer distance before descending approximately 60 metres over four kilometres in order to minimize the need for significant cut excavation work. The resulting grades are excessively steep (in excess of 1.5%) for both loaded and empty train moves on a technical and economic basis. The alternative to the excess gradient is to construct a cut approximately two kilometres long and up to 30 metres deep. With no significant fill work required on this alignment, most of this material would become waste rock and would require disposal somewhere on the mine site.

The spur would connect with the WLR at a point within the Wabush Industrial Park. This results in the need to add another track in the road grade crossing on the access to the front gate of Wabush Mines. Existing industrial rail spurs serving the industrial park will require adjustment or removal to allow for the construction of the Alderon mine spur.

The existing industrial park land uses do not allow for the construction of any useful interchange facility at the junction with the WLR. An interchange facility will be required for this option as QNSL does not have the right to directly serve customers technically located on the WLR.

Additionally the culvert structure that carries the existing WLR and Wabush Mines entrance road over the watercourse connecting Jean Lake to Little Wabush Lake would need to be expanded to accommodate the new Alderon mine spur.

Operational Aspects

In order to reach the QNSL, Alderon trains will need access to the WLR. All trains will require either a WLR pilot or full WLR crew in order to operate across the short segment of WLR track between the Alderon mine spur switch and Wabush Lake Jct. QNSL crews will not be able to operate directly to the mine site given that the spur branches off WLR property. Therefore trains will need to stop to exchange operating crews in the vicinity of the WLR/Alderon mine spur switch presenting a problematic situation since there is no space to construct an interchange yard facility.

The Wabush Mines entrance road crossing also presents an operational problem as this access cannot be blocked with stopped trains. This will require trains to stop to exchange crews west of the crossing. In this situation, the stopped trains will be occupying the heavy grade which results in difficulties restarting trains going either uphill or downhill. Locating an interchange yard on a heavy grade is a practice to be avoided as it increases safety risks associated with unattended equipment.

Environmental Aspects

The planned right of way crosses lands principally utilized for mining and/or industrial purposes. It does not follow any bodies of water. It crosses a small number of watercourses. However one of the water crossings involves modification and extension to an existing significant culvert structure over the Jean Lake/Little Wabush Lake stream. The required cutting to maintain suitable gradient for train operations may pose an issue to animals that currently wander across this area at will.

Other Aspects

The vast majority of this alignment crosses lands owned/controlled by Cliffs Resources and their affiliates (Canadian Javelin Ltd.). The alignment also ties in directly with the WLR, which is owned by Cliffs. Significant and considerable negotiation will be necessary to obtain the necessary lease for the right-of-way and transportation agreement to make this option workable.

Option Assessment

The technical and operational aspects against Option 1 are considerable. Particularly concerning is the need for an impractical grade or expensive and damaging rock cut in order to route the line through the ridge northeast of the Kami mine site. Further, an inefficient train handling process is necessary in order to reach the QNSL main line that could result in unnecessary locomotive idling and redundant train activity in the Wabush area. However, the route has the least overall environmental impact of all options since it is primarily located on industrial land and there are few water crossings.

The technical and operational challenges are considered more problematic than the relatively positive environmental considerations. On this basis Option 2 was not considered suitable for further design.

2.3 Mine Spur Option 3

Option 3 links the mine site to the QNSL over a route that passes to the east and south of Wabush and over the ridge separating the Wahnahnish and Long Lake drainage areas. This option is one of the longest routes examined however it avoids the requirement for interchange and interaction with both the BLR and WLR. The route is shown in Figure 2-1.

Technical Aspects

The alignment has some technical challenges. The terrain requires the track to pass over the ridge to the east of the Kami Mine site however there is sufficient land available to design an alignment that will maintain the desired gradient. Ground conditions east of Wabush require attention. Surface geology work undertaken for the alignment indicates that conditions can be managed by appropriate final design of the track to avoid the saturated land areas. Further, the junction with the QNSL would be located in the vicinity of the existing turnout and customer spur track serving Shabogamo Mining. Mitigation for this impact would include relocation of the turnout and part of the customer siding to accommodate QNSL business at this location.

The alignment requires crossing the Trans Labrador Highway (TLH) east of the turnoff for Wabush. This segment of the TLH does not experience the same traffic counts as that for the Labrador City-Wabush link where a rail underpass was recently completed as part of the Bloom Lake project. The potential crossing is located approximately one kilometer west of an existing QNSL crossing on the TLH. Since Alderon trains would loop around and occupy both crossings it could be perceived as an annoyance to the public. Further, one of the goals of the Alderon rail component is to minimize the need for public crossings of the alignment.

An existing road culvert structure crossing the Jean Lake rapids would require reconstruction to accommodate a new crossing built to current engineering and environmental standards. The existing structure is unsuitable for expansion or conversion to accommodate the future road and rail needs at this water crossing.

Operational Aspects

Option 3 offers a distinct operations advantage since it does not require Alderon rail traffic to interact with either the BLR or WLR. This offers significant efficiency in rail operations as it permits direct access to the Kami Mine spur by QNSL, removing the uncertainty regarding availability of crews and track space on the other railways. Further the arrangement eliminates the need for lengthy negotiations with BLR and WLR to obtain service contracts. By moving the Alderon-QNSL connection to a point east of Wabush the impact of trains stopping on the local population is reduced. The direct connection also allows for the opportunity to pursue an agreement with QNSL to operate trains direct to the mine site without any stop for interchange procedure, including switching out locomotives, at the junction point. Elimination of unnecessary stops improves the impact of emissions and results in fuel savings for the overall rail operation.

The TLH grade crossing presents the main operational challenge as it cannot be allowed to be blocked by stopped trains. Loaded train movements would require management to ensure that if the train could not enter the QNSL at the junction switch on account of other rail traffic, the train would have to be stopped before passing over the crossing.

Environmental Aspects

The alignment requires a water crossing of the Jean Lake rapids as noted above. This is located in the Jean Lake Rapids Management area. The track alignment would cross the rapids at the existing road crossing in an area already dedicated to transportation. The proposed new crossing would be built to current standards thereby providing an improvement to the environmental impact of the crossing as compared to the existing structure.

The alignment is located through the Wabush protected water supply area. However, the rail impact should be considered as no more of an impact than the road network that is already extant in this area. Wherever possible, the alignment follows existing road infrastructure in this area. In effect, the project will expand the existing transportation infrastructure. The risks and mitigation measures related to crossing of this area are further detailed in Section 2.7.

Other Aspects

As part of the alignment east of Wabush a crossing of the Cliffs Resources tailings pipelines will be necessary. An appropriate agreement will be required in order to secure a crossing of this feature. Some form of culvert or small bridge structure will be necessary to carry the proposed railway over the pipeline.

Portions of the necessary right-of-way are currently held by Cliffs Resources and their affiliates (Canadian Javelin Ltd.). Land lease or other arrangements will be necessary to secure the property necessary to construct the railway.

Option Assessment

The technical and environmental aspects against Option 3 are moderate. The main technical concern is the need for a grade crossing of the TLH in order to access the QNSL. Some environmental concern is associated with crossing the protected water supply area. However the railway is essentially expanding the existing transportation infrastructure on this land – no different than development undertaken elsewhere in similar conditions.

The option has excellent operational aspects that will help to both avoid unnecessary train stops, idling locomotives and impact on the public.

Option 3 was not considered suitable for further review primarily on account of the TLH grade crossing issue. The option was modified in order to eliminate the required TLH grade crossing and is presented as Option 3A (below).

2.4 Mine Spur Option 3A

Option 3A links the mine site to the QNSL over a route that passes to the east and south of Wabush and over the ridge separating the Wahnahnish and Long Lake drainage areas. This option is the longest route examined however it improves upon the elements of Option 3 through elimination of the TLH grade crossing. The route is shown in Figure 2-1.

Technical Aspects

The alignment has some technical challenges. The terrain requires the track to pass over the ridge to the east of the Kami Mine site however there is sufficient land available to design an alignment that will maintain the desired gradient. Ground conditions east of Wabush require attention. Surface geology work undertaken for the alignment indicates that conditions can be managed by appropriate final design of the track to avoid the saturated land areas.

The alignment crosses an inlet of Flora Lake that leads to Loon Pond, created recently as part of work related to Cliffs tailings impoundment area modifications. Preliminary review of the site indicates that a clear span bridge or culvert type alternatives could be constructed to carry the railway over this water crossing.

An existing road culvert structure crossing the Jean Lake rapids would require reconstruction to accommodate a new crossing built to current engineering and environmental standards. The existing structure is unsuitable for expansion or conversion to accommodate the future road and rail needs at this water crossing.

During the PEA process, QNSL was contacted regarding their position regarding a new junction switch being constructed at Mile 34 Northernland Sub to access the Kami Mine spur. QNSL indicated that they agreed with the concept in principle and would be willing to develop this junction point in association with Alderon as the project progresses.

Operational Aspects

Option 3A offers a distinct operations advantage similar to Option 3 since it does not require Alderon rail traffic to interact with either the BLR or WLR. This offers significant efficiency in rail operations as it permits direct access to the Kami Mine spur by QNSL, removing the uncertainty regarding availability of crews and track space on the other railways. Further the arrangement eliminates the need for lengthy negotiations with BLR and WLR to obtain service contracts. By moving the Alderon-QNSL connection to a point east of Wabush the impact of trains stopping on the local population is reduced. The direct connection also allows for the opportunity to pursue an agreement with QNSL to operate trains direct to the mine site without any stop for interchange procedure, including switching out locomotives, at the junction point. Elimination of unnecessary stops improves the impact of emissions and results in fuel savings for the overall rail operation.

Option 3A also offers an additional operations advantage by situating the junction point with QNSL at a location approximately 3 km east of the existing Wabush Lake Jct. interchange between QNSL and WLR. Each day, trains brought north by QNSL destined to either WLR or BLR will stop at Wabush Lake Jct. to carry out interchange activities unique to their operations, including locomotive changeouts and train crew exchanges. While this occurs, the stopped train occupies nearly 3 km of track stretching east from Wabush Lake Jct. The Alderon-QNSL junction switch will be situated at a point clear of the area where trains stop to undertake interchange activities at Wabush Lake Jct. As a result, the planned switch location further reduces the potential requirement for Alderon trains to stop at the QNSL junction, reducing train congestion along with a potential reduction in locomotive idling and fuel consumption.

Environmental Aspects

The alignment requires a water crossing of the Jean Lake rapids as noted above. This is located in the Jean Lake Rapids Management area. The track alignment would cross the rapids at the existing road crossing in an area already dedicated to transportation. The proposed new crossing would be built to current standards thereby providing an improvement to the environmental impact of the crossing as compared to the existing structure.

The alignment requires a water crossing of an inlet of Flora Lake that leads to Loon Pond. This area was only recently flooded as a result of planned work associated with Cliffs tailings impoundment. As noted above, preliminary review indicates that a clear span bridge may provide the necessary crossing without impact on the newly flooded area at this point.

The alignment is located through the Wabush protected water supply area. However, the rail impact should be considered as no more of an impact than the road network that is already extant in this area. Wherever possible, the alignment follows existing road infrastructure in this area. In effect, the project will expand the existing transportation infrastructure. The risks and mitigation measures related to crossing of this area are further detailed in Section 2.7.

Other Aspects

As part of the alignment east of Wabush a crossing of the Cliffs Resources tailings pipelines will be necessary. An appropriate agreement will be required in order to secure a crossing of this feature. Some form of culvert or small bridge structure will be necessary to carry the proposed railway over the pipeline.

Portions of the necessary right-of-way are currently held by Cliffs Resources and their affiliates (Canadian Javelin Ltd.). Land lease or other arrangements will be necessary to secure the property necessary to construct the railway.

Option Assessment

The environmental aspects against Option 3A are moderate. Some environmental concern is associated with crossing the protected water supply area however the railway is essentially expanding the existing transportation infrastructure on this land – no different than development undertaken elsewhere in similar conditions. The need for a clear span bridge to cross the inlet of Flora Lake has been taken into account to avoid disturbance to fish habitat.

There are some limited technical challenges, all of which appear to have reasonable solutions.

The option has excellent operational aspects that will help to both avoid unnecessary train stops, idling locomotives and impact on the public.

On the basis of these points, Option 3A has been selected as suitable for further design review. During the PEA process the option was further reviewed to see if a combination rail-conveyor belt system might yield better environmental aspects. This modified alignment, Option 3B, is presented below.

2.5 Mine Spur Option 3B

Option 3B links a loop track location just south of Wabush to the QNSL. It represents a shortened version of Option 3A in that the railway is not required to cross Jean Lake Rapids and extend to the mine site. A loop track and loading tower would be located just south of Wabush. A conveyor belt system would be needed to transport concentrate from the mine site to the rail loading loop. This alignment has the shortest rail alignment length of all the options reviewed. The route is shown in Figure 2-1.

Technical Aspects

Despite being a shortened version of Option 3A, the alignment still has some technical challenges. Ground conditions east of Wabush require attention. Surface geology work undertaken for the alignment indicates that conditions can be managed by appropriate final design of the track to avoid the saturated land areas.

The alignment crosses an inlet of Flora Lake, created recently by the alteration of water level in that lake to enhance fish habitat. Preliminary review of the site indicates that a clear span

bridge or a culvert type structure could be constructed to carry the railway over this water crossing.

During the PEA process, QNSL was contacted regarding their position regarding a new junction switch being constructed at Mile 34 Northernland Sub to access the Kami Mine spur. QNSL indicated that they agreed with the concept in principle and would be willing to develop this junction point in association with Alderon as the project progresses.

In order to construct an appropriate loop track at the loading tower, a significant cut would be required through the ridge located south of Wabush. The cut width would need to be wider than a standard rock cut on account of the poor slope stability characteristics of the sandy material present in this area.

In addition to the rail design technical challenges, a conveyor belt system must also be constructed from the mine site, across the rocky highland east of the mine and across Jean Lake Rapids to reach the rail loading area. The system would require additional electrical power above and beyond that required to operate the mine, a resource that is in short supply in the region.

Operational Aspects

Option 3B offers a distinct rail operations advantage similar to Options 3 and 3A since it does not require Alderon rail traffic to interact with either the BLR or WLR. This offers significant efficiency in rail operations as it permits direct access to the Kami Mine spur by QNSL, removing the uncertainty regarding availability of crews and track space on the other railways. Further the arrangement eliminates the need for lengthy negotiations with BLR and WLR to obtain service contracts. By moving the Alderon-QNSL connection to a point east of Wabush the impact on the local population created by stopped trains is reduced. The direct connection also allows for the opportunity to pursue an agreement with QNSL to operate trains direct to the mine site without any stop for interchange procedure, including switching out locomotives, at the junction point. Elimination of unnecessary stops improves the impact of emissions and results in fuel savings for the overall rail operation.

Option 3B offers the same additional operations advantage as Option 3A by situating the junction point with QNSL at a location approximately 3 km east of the existing Wabush Lake Jct. interchange between QNSL and WLR. Each day, trains brought north by QNSL destined to either WLR or BLR will stop at Wabush Lake Jct. to carry out interchange activities unique to their operations, including locomotive changeouts and train crew exchanges. While this occurs, the stopped train occupies nearly 3 km of track stretching east from Wabush Lake Jct. The Alderon-QNSL junction switch will be situated at a point clear of the area where trains stop to undertake interchange activities at Wabush Lake Jct. As a result, the planned switch location further reduces the potential requirement for Alderon trains to stop at the QNSL junction, reducing train congestion along with a potential reduction in locomotive idling and fuel consumption.

Environmental Aspects

The alignment requires a water crossing of an inlet of Flora Lake. As noted above, preliminary review indicates that a clear span bridge may provide the necessary crossing without impact on the newly flooded area at this point.

While the Option 3B alignment eliminates the rail crossing of Jean Lake Rapids, it requires the construction of the rail loading loop, loading tower, and related infrastructure clearly within the limits of the Wabush protected water supply area. The loop is located on the only portion of land that provides the necessary space to provide the required rail curvature and adequate soil conditions to support a loading operation. The related loading tower infrastructure could be outfitted with dust control and material spillage containment but it is likely that some concentrate material may still escape to the surrounding landscape. The impact of locating the loading facilities on the water supply area is considered far from ideal, and outweighs any positive impact obtained by avoiding a rail crossing of Jean Lake Rapids.

Furthermore, the Jean Lake Rapids (and the terrain to the west) must be crossed by the conveyor belt system that would feed the loading tower. The conveyor system would have to be a trestle-type structure that would be highly visible to the public. Additionally it will provide a continuous source of low level noise across the length of the structure regardless of how well any enclosure is built to encase the conveyor apparatus.

Other Aspects

As part of the alignment east of Wabush a crossing of the Cliffs Resources tailings pipelines will be necessary. An appropriate agreement will be required in order to secure a crossing of this feature. Some form of culvert or small bridge structure will be necessary to carry the proposed railway over the pipeline.

Portions of the necessary right-of-way are currently held by Cliffs Resources and their affiliates (Canadian Javelin Ltd.). Land lease or other arrangements will be necessary to secure the property necessary to construct the railway.

Rail delivery of fuel direct to the mine site is not possible in Option 3B. Fuel will need to be transported by truck from Labrador City through the center of Wabush in order to access the road to reach the mine site. Alternatively, transload of fuel from railcar to truck would be required at the rail loading loop site. Neither option is attractive from the view point of public nuisance and environmental impact.

Option Assessment

The environmental aspects against Option 3B are significant. The option requires the construction and operation of an iron ore concentrate rail loading facility on the protected water supply area. A conveyor system must still cross waterways to the west of the loading area and will create visual and audible concerns.

There are some technical challenges, all of which appear to have reasonable solutions except for the potential lack of additional power required to run the conveyor system.

The option has excellent operational aspects that will help to both avoid unnecessary train stops, idling locomotives and impact on the public.

Option 3B was therefore was not considered suitable for further design primarily as a result of its significant environmental impact.

2.6 Mine Spur Option 4

Option 4 extends between the Kami Mine site and a junction with the BLR west of the Tamarack golf course. This alignment has the shortest length of all the options reviewed. The route is shown in Figure 2-1.

Technical Aspects

Option 4 includes an alignment that runs basically parallel, but not adjacent to, the west shoreline of Long Lake. The alignment can be designed to provide a fairly flat gradient suitable for operation of the operation of ore trains. The route requires a significant bridge structure, likely with multiple spans, to carry the railway over the Walsh River. A grade crossing would be required for the public road that accesses both Duley Lake Provincial Park and the residences located along the west shoreline of Long Lake. The railway would pass alongside a number of the existing residences at Long Lake.

At the mine site, this alignment does not permit the layout of a train loading loop track on account of the topography to the south of Long Lake. Significant cut and fill work would be necessary to construct an adequate sized loading loop. Instead, a stub-end yard configuration would be required with resultant operational issues (as outlined below). Furthermore the alignment must cross mine site lands identified for future exploration.

Operational Aspects

Option 4 is similar to Option 1 in that the alignment ties into the BLR. Tying into the BLR effectively leaves no operating alternative but to use the rail services provided by BLR to the Wabush Lake Junction interchange facility, known as Bolger Yard. A further issue involves the requirement of a Wabush Lake Railway pilot to accompany all trains over the approximately 1,000 feet of track owned by Wabush between Bolger Yard and the QNSL junction switch at Wabush Lake Junction. Every train, loaded and empty, requires coordination to ensure that a Wabush pilot employee is on duty and available to oversee movement of the train on WLR. Further, Alderon and Cliffs (Bloom Lake) trains will need to share the existing Bolger Yard interchange. All of the activities on the BLR will need coordination with Cliffs (Bloom Lake) operations which are in the process of expanding in 2012. Availability of track time, crews and importantly space at the interchange yard will all be reduced in the near future as Bloom Lake Mine increases production. There is limited capability to expand the existing interchange yard to accommodate Cliffs (Bloom Lake) expanding traffic volumes as they ramp to 16 mtpa production rate in addition to Alderon traffic.

At the mine, a loading loop track is not practical given the terrain where Option 4 terminates. A stub-end yard will be required, meaning that every train will need to have the locomotives uncouple from one end and be relocated to the other end of the train upon each arrival at the mine. This can be problematic in the severe cold weather conditions experienced in this region. The air brake system preferably should remain charged by the locomotives at all times in order to avoid complications restoring adequate air pressure if the engines are removed for any significant length of time. The need to move the engines from one end of the train to the other adds unnecessary time and potential delays to the overall rail loading process cycle.

Environmental Aspects

Significant environmental and public impact issues are associated with Option 4. The alignment must cross the Duley Lake Provincial Park lands. There is no option to route the trackage around the park since the parkland extends from the Long Lake shoreline well inland to the west, at elevations far above a practical height for appropriate rail gradients. Furthermore the railway must cross the Walsh River in the park grounds, in an area that is highly visible to the public. The bridge would likely require at least two spans requiring pier construction midstream.

The alignment will likely create noise and vibration concerns with the residences that are located along the west shoreline of Long Lake immediately south of the provincial park. Option 4 is the only alignment studied that requires track to be constructed in close proximity to a large concentration of existing residences. It is highly unlikely that the alignment will be regarded favorably by the occupants of these residences or by the approving railway regulatory authority.

Other Aspects

Option 4 is the only alignment that does not cross lands owned or controlled by Cliffs Resources. This may reduce the complications necessary to obtain the right-of-way for the railway.

Nearly half of the alignment required is located on property designated for the Kami Mine operation. As a result, current and future access to the railway could be highly controlled.

Option 4 Assessment

The technical, environmental and operational aspects against Option 4 are significant. The option requires the construction and operation of a new railway across an existing provincial park and adjacent to existing residences. The operation requires agreements with BLR and WLR to provide rail service to access the QNSL interchange at a time when their capacity will be diminished thanks to expansion of the Bloom Lake Mine. The topography only allows for a relatively inefficient stub-end loading yard arrangement instead of a loading loop, which can introduce problems and delays whenever the locomotives are removed from the train in cold weather conditions.

The option has a benefit in that negotiation with a competing mining company is not required in order to obtain a right-of-way for the proposed railway. This small benefit alone cannot outweigh the negative technical, environmental and operational aspects.

On account of the numerous challenges in all review aspects Option 4 was not considered suitable for further design efforts.

2.7 Opportunity to Avoid Construction of Mine Spur

At the scoping study level a review of an opportunity to avoid the construction of the mine rail spur in Labrador was undertaken. The results of that assessment as presented in Stassinu Stantec Limited scoping study report entitled "Railway Components Study, Kami Iron Ore Project", dated July 28, 2011 are presented in the following paragraphs.

As an alternative to construction of any rail infrastructure, so as to avoid potential HADD and CEAA environmental processes, consideration was given to the possibility of routing the mine conveyor system to the existing Wabush Lake Railway loop at the Wabush Mine. This would require trains to load on the same track as the current loading facility used by Wabush. Train loading would need to be coordinated so that there are no conflicts between trains loading for Alderon and trains loading for Wabush. The element of flexibility with respect to time of day when Alderon trains may be loaded is eliminated in this situation. Consolidated Thompson originally considered a similar operating plan at Pointe Noire. Initially they had planned on using the Wabush loop track at Pointe Noire as a route to access the Consolidated Thompson unloading facility. That concept was ultimately shelved at a critical point in the project account the inability to agree on access to the loop track. That decision came with the price of having to build a considerable rock cut to reach their unloading facility. There is no reason for competing mining firm Cliffs to ensure Alderon has a guaranteed access time to the loop to meet the Alderon shipping schedule. If Alderon incurs a problem during the loading process, creating a delay that impacts Wabush, there is risk that Wabush will pursue Alderon for the lost time or costs. The loading process would become a procedure that would require constant managerial attention to ensure it was functioning in a suitable fashion. Further, the Wabush Lake Railway would be the operating railway providing train service and this enterprise operates at a higher cost than a contracted rail operator account an existing collective agreement structure for train service employees plus requirements established under its federal regulation regime. However, in discussions with Wabush, it was determined that they would be willing to discuss the possibility of joint use of their loading facility and would participate in a feasibility study to review this opportunity. Therefore this option could be considered as a back-up strategy in event efforts to construct an exclusive Alderon Mine Spur become impractical.

The other possibility is to construct a conveyor to a point on the Bloom Lake Railway, where a loading loop could be built at a location that does not impact a waterbody. Two possible options exist; by routing a conveyor over the rail alignments proposed as Mine Spur Option 1 or Mine Spur Option 4. Unfortunately insufficient land exists to locate a loop track where Option 1 intersects the Bloom Lake Railway. Option 4 requires construction of the conveyor past residences and through the Dudley Lake Provincial Park, neither of which are favorable.

Therefore, at this time there does not appear to be a practical solution to avoid construction of the Mine Spur railway account operational/management considerations, lack of suitable land for an alternative loop track and impact on parkland and residences.

2.8 Mine Spur Recommendation

On the basis of the foregoing alternatives assessment, route alignment Option 3A provides the most suitable balance of technical, operational, environmental and other aspects and was carried as the chosen alignment for publication of the PEA and for further engineering review at the feasibility level.

The potential impact to the Wabush protected water supply as a result of the implementation of Option 3A has been identified as an area for further examination. The review of these impacts and an assessment is included in the following section.

2.9 Wabush Protected Water Supply Area Rail Impact and Risk Review

Several concerns have been raised concerning the installation of a railway through the water supply area. Some of the concerns include:

- Effect of haulage of fuel supply by tank car through the area
- Implications involving a train derailment in the area
- Impact of normal train operations in the area

The water supply area currently already features several minor roads and some associated infrastructure (including an unpaved parking lot). The area currently includes transportation infrastructure, all of which is apparently unpaved and currently features no provision for storm water runoff management. The rail alignment in this area is planned to follow the existing road infrastructure through the area where possible, using the alignment of the road to Elephant Head Lake for a portion of the route. Water crossings in the water supply area are planned to be installed at locations of existing crossings used by the road infrastructure.

In order to assess the impacts of the rail infrastructure, and indicate how such risks are mitigated, a tabular review procedure has been followed typical of railway risk assessment practice. Table 2-2, attached, contains the results of the assessment.

3.0 FEASIBILITY STUDY ALIGNMENT – OPTION 5

Initial feasibility design efforts utilized the preferred alignment identified in the PEA study previously referred to as “Option 3A”, as above. The “Option 3A” alignment was examined in much greater detail through the feasibility process. LIDAR survey data obtained for the surface geology work was also used to develop a 3-dimensional terrain model for the projected alignment. Using the Stantec HD-Map system multiple variations of the rail alignment were plotted to evaluate their relative suitability based on earthwork requirements, overall disruption to the existing environment and route length.

It was quickly determined that the alignment identified during the PEA would require significant cut and fill work to maintain the rail alignment close to the existing roadway extending between Jean Lake Rapids and Elephant Head Lake. The LIDAR survey data confirmed that the ridge in

this area is higher and steeper in slope than that predicted through topographic map review undertaken during the PEA. An alternative alignment was sought to find relief from the excessive earthwork.

The alignment design process ultimately identified an alignment that will generate reasonable quantities of earthwork by extending the length of the main track. This final alignment that was carried forward into the feasibility design report has been referred to as the "Feasibility Study Alignment" or "Option 5".

Figure 3-1 demonstrates the major difference in alignment between the previous route and the preferred feasibility route. Table 3-1 provides a comparative summary of the main technical components of the two alignments.

Table 3-1 Rail Alignment Technical Comparison

Design Element	PEA "Option 3A" Alignment	Feasibility Design Alignment
Overall Main Track Length	16.5 km	20 km
Earthwork Volumes	Cut = 2.6 million m3 Fill = 1.4 million m3 * 1.2 million m3 of material to be disposed of elsewhere	Cut = 0.64 million m3 Fill = 0.91 million m3 * 0.38 million m3 of borrow rock (bulk volume) from mine can be used up in railway fill
Cut/Fill Depths	Maximum Cut = 25 m Maximum Fill = 20 m	Maximum Cut = less than 10 m Maximum Fill = less than 10 m

The two alignments were also compared on the basis of environmental impact and relative cost.

Comparison of Impact to Environment

The reduction in cut and fill size through application of the revised alignment provides an improved impact on the landscape. Excessive cut and fill work could be considered unsightly. The deep cut may accumulate large volumes of snow in the winter which would be difficult to remove and affect train performance. The cut may cause animals to be trapped by oncoming trains and result in unnecessary wildlife kills. Surface waters might drain into the cut and create excessive waterflow issues through ditches alongside the track which could impact the railway stability and surface water quality.

The revised alignment yields very low cuts and is better aligned with the natural contours of the surface topography in the region. The cut work will also not extend for considerable lengths, with the longest at approximately 500 m long. The original alignment required long cuts, with one approximately 2.4 km in length.

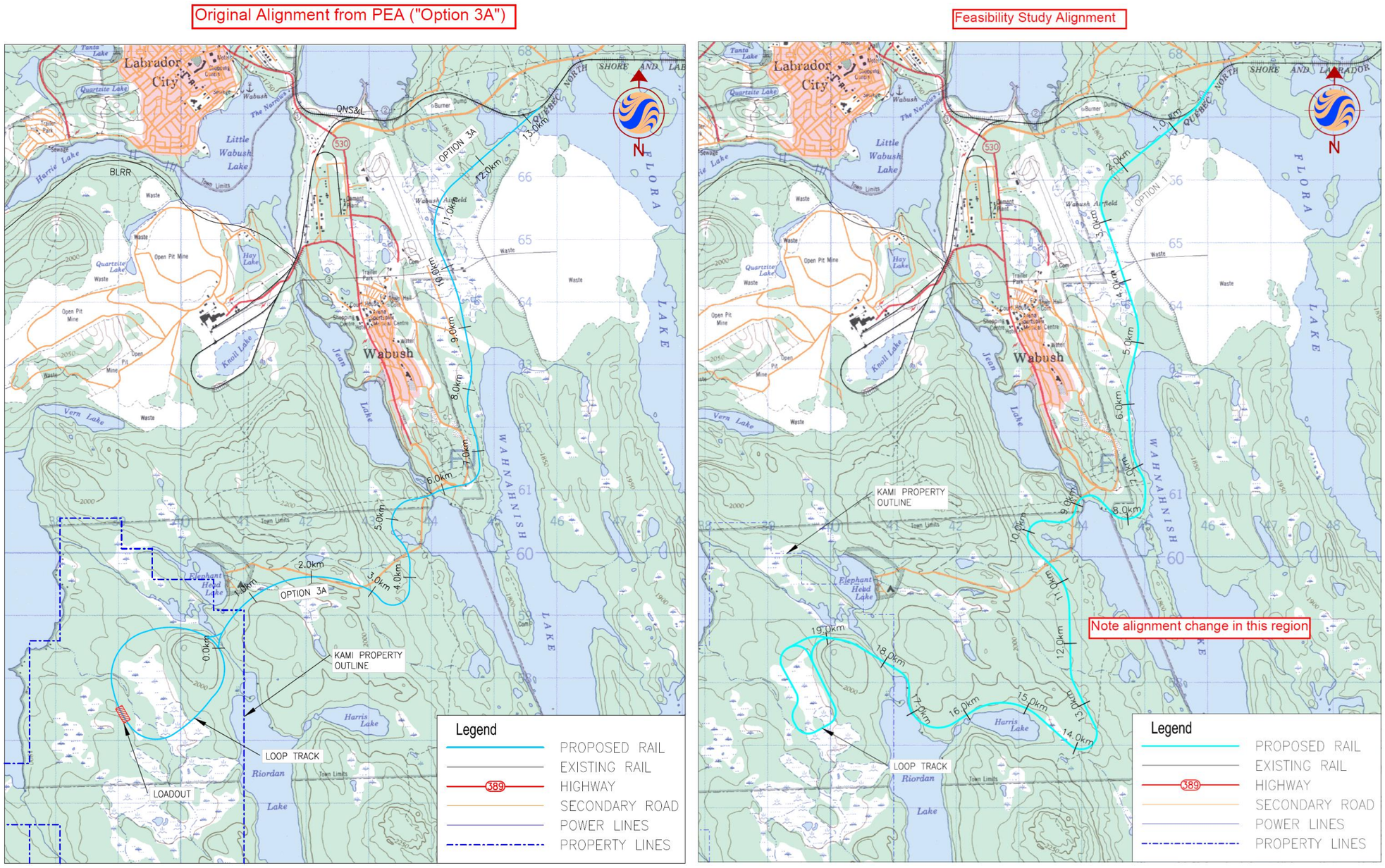
Comparison of Cost

The reduced earthwork volume and associated costs of the revised route should lead to a lower overall construction cost for the revised alignment. Although the original alignment is shorter than the revised alignment, resulting in a lower cost for track materials (rail, ties, etc.), it requires

considerably more earthwork, which is a cost that can be much more unpredictable due to the nature of dealing with ground material and the environmental conditions (moisture, temperature) that must be dealt with during construction.

The two alignments were examined during a site visit on April 20, 2012. As a result of the comparative analysis above, plus the site visit, it was concluded jointly with Alderon representatives that the Feasibility Alignment should be frozen for the purpose of route selection. Furthermore, the Feasibility Alignment will form the basis for development of other infrastructure (e.g. access road, power lines) and to secure the necessary permits and permission for further geotechnical and environmental study in 2012.

Figure 3-1 Comparison of PEA "Option 3A" and Feasibility Alignments



4.0 CLOSURE

We trust that the information provided in this report meets your requirements. If you have any questions or we can be of further assistance, please contact us at your convenience.

Respectfully submitted,

STANTEC CONSULTING LTD.

Paul Deering, P.Eng., P.Geo.
Principal
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ATTACHMENTS

Table 1 Summary Description of Alderon Kami Mine Spur Route Options

Table 2 Impact Assessment of Rail Alignment Option 3A on Water Supply Area

Table 1 - Summary Description of Alderon Kami Mine Spur Route Options

Route Option	Length (excluding loading loop) (km)	General Description	Technical Complexity	Environmental Issues	Railway Service Contract Needs and Implications	Other Business Arrangements	Risks and Advantages	Rail Operations Complexity
1	7	Follow east shore of Long Lake to Bloom Lake Railway (BLRR)	Difficult geotechnical conditions between lake and Scully Mine. Must built on rocky steep slopes. Potentially unsuitable subsurface geology for rail loading	Impact to much of the east shoreline of Long Lake. Complicated construction to avoid disturbance to water.	Require operator for spur; require haulage contract with BLRR; require agreement with WLR - complicated ongoing operating costs and procedures	Portion of route between Scully Mine and Long Lake is part of Cliffs land - will need some form of agreement to cross.	High probability of environmental opposition account impact to lake shoreline. Geology questionable for rail loading. Difficult railway negotiations required.	High
2	9.5	Connection to Wabush Lake Railway (WLR) in Wabush Industrial Park	Moderate grading. Steep descent into Wabush Industrial Park. Interferes with existing railway spur serving industrial park. Requires crossing Scully Mine main entrance roadway.	Does not impact any major waterbodies, route goes through existing industrial area.	Require operator for spur; require haulage contract with WLR - may have higher opex than BLRR connection account WLR labour contracts	Most of alignment crosses Cliffs lands. Likely multiple landowners to negotiate with in industrial park.	Low environmental opposition. High probability Cliffs will disagree with crossing Scully Mine main entrance road. WLR is a high cost rail operator (increased yearly operating cost). Steep descending gradient may not allow for operation of 240-car trains.	High
3	12.5	Route east of Wabush town and airport and cross Trans Labrador Highway to QNSL	Moderate to heavy cut and fill work leaving Kami Mine site. Soft ground conditions to resolve east of airport. Requires crossing TLH. Impacts QNSL track serving Shabogamo Mining	Crossing of Jean Lake rapids at existing road crossing may cause concern.	Require operator for spur only - efficient long term operating concept and costs	Alignment crosses Cliffs tailings pipeline/access road and will require agreement. Arrangements will be necessary to rearrange Shabogamo Mining access to QNSL.	Potential environmental opposition account Jean Lake rapids. High probability of concern from Ministry of Transport regarding crossing TLH - may require overpass (capex at left includes signals for standard RR xing only). Streamlined rail negotiation and provides opportunity to allow QNSL to operate direct to mine site.	Moderate
3A	13	East of Wabush town without crossing highway to QNSL	Moderate to heavy cut and fill work leaving Kami Mine site. Soft ground conditions to resolve east of airport. Requires clear span bridge across arm of Flora Lake.	Crossing of Jean Lake rapids at existing road crossing may cause concern. Recently raised Flora Lake will require clear span bridge near QNSL junction (fish habitat issues?).	Require operator for spur only - efficient long term operating concept and costs	Alignment crosses Cliffs tailings pipeline/access road and will require agreement.	Potential environmental opposition account Jean Lake rapids. Streamlined rail negotiation and provides opportunity to allow QNSL to operate direct to mine site. Avoids rail traffic congestion associated with Wabush Lake Jct./Lab City terminal	Low
3B	5.5	Loading loop immediately south of Wabush town with direct connection to QNSL	Soft ground conditions to resolve east of airport. Requires clear span bridge across arm of Flora Lake. Requires conveyor belt system from Kami Mine to loading loop east of Jean Lake rapids.	Recently raised Flora Lake will require clear span bridge near QNSL junction (fish habitat issues?). Conveyor belt system may create other environmental concerns (must cross Jean Lake rapids). Transload adjacent to lake and town water supply. Transload highly visible to public.	Require operator for spur only - efficient long term operating concept and costs	Alignment crosses Cliffs tailings pipeline/access road and will require agreement.	High to Moderate environmental opposition. Streamlined rail negotiation and provides opportunity to allow QNSL to operate direct to mine site. Avoids rail traffic congestion associated with Wabush Lake Jct.	Low
4	9.5	Follow west shore of Long Lake to Bloom Lake Railway near golf course	Relatively flat routing but no space for loading loop. Sigificant bridge required.	Must cross Dudley Lake Provincial Park lands; requires multiple span bridge at Walsh River	Require operator for spur; require haulage contract with BLRR; require agreement with WLR - complicated ongoing operating costs and procedures	Alignment cuts across Kami lands identified for future potential mining; impacts cabins/dwellings adjacent to Long Lake	High probability of public and governmental opposition account impact to cabins, provincial park lands, bridge requirement. Difficult railway negotiations required.	High

Notes
Based on results of Scoping Study undertaken in 2011. Spur lengths subject to change during feasibility engineering.

Issue & Hazards		Hazard Probability	Consequences	Initial Risk Level	Risk Control Actions	Residual Risk Level
Issue	Potential Hazard					
Broken rail derailment	Train derails on previously broken rail, or rail breaks under train.	O	C	H	Rail breaks normally related to cold weather conditions. Multiple visual and electronic inspection procedures/technologies will be employed to detect broken rails. Planned main track speed is 25 mph or less which will reduce magnitude of derailment (should one occur). Main track broken rail derailments typically occur behind locomotive consist, reducing chances that locomotives will be involved in incident.	M
Ice, packed snow, or mud in grade crossing flangeway	Train derails due to buildup of ice, snow or mud at grade crossing.	S	Cr	M	Typically occurs on trackage that is relatively inactive (less than daily operations) where road traffic is heavy. Mine Spur will see daily train activity and grade crossings will have very low road traffic volumes.	
Washout	Train strikes area of washed out track account rainfall event or excessive snow melt.	S	C	H	Typically associated with relatively high fill areas surrounding culverts. Alignment in water supply area has low fills and only one major culvert location.	M
Rock or mud slide	Train strikes rock or mud deposited on track by natural causes.	S	C	H	No planned rock cuts in water supply area; no planned significant earth cuts (deeper than 10 m) in water supply area.	L
Tornado	Train is struck by a tornado while in motion. Likelihood of these simultaneous events occuring in this climatic region is low.	U	C	M	Trains not to operate in event of such extreme weather condition.	
Forest fire	Train required to operate through area with fire adjacent to track. Low risk of fire given proximity to town and nearby lakes/wetlands.	S	M	M	Rules apply for handling of dangerous commodities that cover this situation.	
Bridge fire	Bridge catches fire while train operating over same. Likelihood remote as planned bridge structures to be steel/concrete structures. Awareness of bridge on fire would result in cessation of train movement activity until bridge inspected.	U	C	M	No plans to construct and use timber bridges. Structural components to be made of concrete and steel. No planned bridge structures in water supply area.	
Locomotive fire	Locomotive catches fire in engine compartment, with potential to spread to other cars on train.	S	C	H	Availability of two locomotives on front of trains will allow suitable available power to separate and move away from train if required (unlikely both locomotives will catch fire).	M
Tank car fire	Tank car catches fire from any source.	U	C	M	Tank cars will have no components capable of burning. Locomotives can be used to isolate and remove car from sensitive areas if required. Tank car safety appliances designed to prevent fire accessing liquids contained inside shell.	
Sabotage or vandalism	Action taken against rail rolling stock or infrastructure that could jeopardize safety of movements.	U	C	M	Trains to be held in secure area (mine site) when unattended. Regular track inspections will identify unusual conditions related to infrastructure.	
Earthquake	Train operates through area experiencing earthquake. Likelihood of occurance and causing significant damage remote given limited train movements and infrequent nature of earthquake events.	U	C	M	Operations to be shut down in event of notification of earthquake event.	
Thermal track misalignment (track buckle)	Track geometry problem related to high air temperatures results in derailment. Climate in region typically does not provide the high temperatures necessary to induce track buckles.	S	C	H	Inspection standards/procedures to identify track geometry issues that may lead to heat induced track buckle. New track installation with latest standards for anchoring and restraint further mitigate the issue.	M
Operation through damaged turnout	Movement operates through a turnout damaged by improper usage that leads to derailment. Typically associated with yard and slow speed operations.	U	M	L	No turnouts planned for installation in water supply area.	
Broken turnout or track component	Broken turnout or other component causes derailment and breach of rolling stock shell. Normally associated with high speed derailments.	S	C	H	No turnouts planned for installation in water supply area. Track speed to be relatively low to mitigate impact of a potential derailment.	L
Track geometry	Track geometry problem leads to derailment of train.	S	C	H	Inspection standards/procedures to identify and address track geometry issues that may lead to derailment. New track installation with latest standards for construction and materials further mitigate the issue.	L
Vehicle strikes train at crossing	Train is struck by a vehicle at public or private crossing.	O	C	H	Minimal number of public crossings planned, none on major roads with high posted speeds. Crossing warning devices provide awareness for motorists. Rolling stock to be equipped with current standard application of reflective material. Tank car applicances reinforced against impact by vehicles.	M
Vehicle strikes train (not apparent to employees)	Train is struck by a vehicle at crossing at a point in the train not visible to operating crew. Relatively uncommon occurance as compared to collision with head end portion of train.	O	C	H	Minimal number of public crossings planned, none on major roads with high posted speeds. Crossing warning devices provide awareness for motorists. Rolling stock to be equipped with current standard application of reflective material. Tank car applicances reinforced against impact by vehicles.	M
Derailment - tank car or locomotive fuel mixes with other chemicals	Train derails and tank car or locomotive liquids contents spill and mix.	S	Cr	M	No chemicals other than diesel fuel are expected to be transported on the railway. Other lubricants on locomotive are water or oil based and are not likely to cause unusual chemical reaction or mixture.	
Load prone to shift mashalled next to tank car	Load shifts on car adjacent to tank car, causing load to penetrate tank car.	U	Cr	L	Train marshalling rules prohibit ability to marshall load prone to shift adjacent to tank car. Requirement to handle loads prone to shift will be very limited.	

Table 2 - Impact assessment of Rail Alignment Option 3A on Water Supply Area

Issue & Hazards		Hazard Probability	Consequences	Initial Risk Level	Risk Control Actions	Residual Risk Level
Issue	Potential Hazard					
Broken knuckle/coupler component	Broken coupler causes train separation, resulting emergency stop may damage or derail equipment.	O	M	M	New equipment to be deployed in service, built to latest rail car construction standards. Equipment captive to Alderon service, subject to consistent forces. Rail alignment design to minimize in-train action that leads to broken couplers	
Burned off journal on ore car	Derailment of ore car, potential overturning and emptying of product on ground. Burnt journal is a rare event, lines of defence such as train inspection at mine site in place to detect possible failure.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route.	
Burned off journal on tank car	Derailment of tank car, potential overturning and emptying of product on ground. Burnt journal is a rare event, lines of defence such as train inspection at mine site in place to detect possible failure.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route.	
Burned off journal on locomotive	Derailment of locomotive, potential overturning and emptying of fuel or other lubricants on ground. Burnt journal is a rare event, lines of defence such as train inspection at mine site in place to detect possible failure.	U	Cr	L	Trains inspected at mine and port each trip and by wayside defect detectors en route. New locomotives built to latest crash standards for fuel tank containment.	
Broken wheel on ore car	Derailment of ore car, potential overturning and emptying of product on ground.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route.	
Broken wheel on tank car	Derailment of tank car, potential overturning and emptying of product on ground.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route.	
Broken wheel on locomotive	Derailment of locomotive, potential overturning and emptying of fuel and other lubricants on ground. Broken wheels on locomotives are an extremely rare event.	U	Cr	L	Trains inspected at mine and port each trip and by wayside defect detectors en route. New locomotives built to latest crash standards for fuel tank containment.	
Broken axle suspension bearing on locomotive	Derailment of one or more locomotives. Extremely rare event, not likely to occur.	U	Cr	L	Traction motor/wheelset replacements likely to occur before suspension bearing will break.	
Broken axle on ore car	Derailment of ore car, potential overturning and emptying of product on ground. Broken axles on cars is a rare event.	U	Cr	L	Wheelset replacement likely to occur before axle will break.	
Broken axle on tank car	Derailment of tank car, potential overturning and emptying of product on ground. Broken axles on cars is a rare event.	U	Cr	L	Wheelset replacement likely to occur before axle will break.	
Brake beam on ore car fails and drops under car wheels	Failure of the brake beam underneath the carbody may fall down and cause derailment. Not a typical derailment cause.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route for dragging equipment.	
Brake beam on tank car fails and drops under car wheels	Failure of the brake beam underneath the carbody may fall down and cause derailment. Not a typical derailment cause.	S	Cr	M	Trains inspected at mine and port each trip and by wayside defect detectors en route for dragging equipment.	
Coupler pin drops from drawbar on ore car, allowing for train separation	Failure of coupler pin rare, failure does not guarantee couplers will open and separate. If separation occurs, train stops in emergency, potential damage or derailment as train runs in.	S	M	M	During safety inspection, car couplers will be examined for missing coupler pins. If pin is missing, car to be repaired or removed from service.	
Coupler pin drops from drawbar on tank car, allowing for train separation	Failure of coupler pin rare, failure does not guarantee couplers will open and separate. If separation occurs, train stops in emergency, potential damage or derailment as train runs in.	S	M	M	During safety inspection, car couplers will be examined for missing coupler pins. If pin is missing, car to be repaired or removed from service.	
Gear case drops off of locomotive	Gear case falls off locomotive, falls under wheels of trailing car causing it to derail. Infrequent event, typically caused by previous damage to locomotive.	U	Cr	L	Locomotive inspections require examination of undercarriage every 90 days to identify gear case issues.	
Locked pinion on locomotive traction motor	Pinion on traction motor seizes. New locomotives feature onboard sensors and alarms to detect this condition. Typically derailment does not occur - wheelset locks and skids causing wheel damage, no release of fuel onto ground	U	C	M	Not likely to contaminate water. Train will likely be stopped without derailment.	
Derailment on high degree curve - ore cars	Ore car derails while travelling through high degree curve. Typically occurs at low speeds on industrial/yard trackage.	U	Cr	L	No yard/industrial trackage located in water supply area. New track built to mainline standards with moderate curvature in area.	
Derailment on high degree curve - tank cars	Tank car derails while travelling through high degree curve. Typically occurs at low speeds on industrial/yard trackage.	U	Cr	L	No yard/industrial trackage located in water supply area. New track built to mainline standards with moderate curvature in area.	
Derailment adjacent to water - ore cars	Ore car derails on track near waterbody.	S	Cr	M	Short length and high mass of ore cars likely to contain derailment of cars close to track centerline. Less than 15% of route near waterbodies. Track in these areas generally tangent to further reduce potential damage from derailment.	
Derailment adjacent to water - tank cars	Tank car derails on track near waterbody.	S	Cr	M	Moderate length and mass of tank cars helps to contain derailment of cars close to track centerline. Less than 15% of route near waterbodies. Track in these areas generally tangent to further reduce potential damage from derailment.	
Locomotive or car derails over marked derailer	Locomotive or car moves over derail set to derailing position.	U	M	L	No derails to be installed on track in water supply area.	

Issue & Hazards		Hazard Probability	Consequences	Initial Risk Level	Risk Control Actions	Residual Risk Level
Issue	Potential Hazard					
Rollover of tank car during derailment	Tank car derails and rolls over.	U	C	M	Reinforced tank car design to mitigate impacts if car rolls over. Tank car safety appliances reinforced to resist damage in derailment.	
Rollover of locomotive during derailment	Locomotive derails and rolls over.	U	C	M	Fuel tank reinforced for derailment situations. Other lubricants on board typically contained within carbody or result in small volume leakage.	
Override of equipment onto tank car	Train derailment where cars following tank car are forced to ride up and over tank car.	U	C	M	Reinforced tank car design to mitigate impacts if struck/overridden by other equipment. Safety appliances reinforced to resist derailment damage. Low track speed to reduce forces and likelihood of derailment featuring car override.	
Tank car fatigue failure	Tank body fails due to fatigue resulting in catastrophic loss of contents. Relatively unusual occurance for low pressure tank equipment in diesel fuel service.	U	C	M	Cars will receive regular inspections at loading and unloading points. Dedicated pool of cars on confined and relatively short operational circuit limits time between inspections.	
Locomotive fatigue failure	Locomotive fuel tank or frame fails due to fatigue resulting in catastrophic loss of fuel. Locomotive fatigue failure extremely rare.	U	C	M	Locomotives to receive regular inspections and servicing. Frames and fuel tanks typically outlast the serviceable life of the overall locomotive.	
Tank car derails and breaches in water	Derailment results in tank car coming to rest in body of water. Limited number of locations where such a derailment result is possible. Relatively infrequent tank car movements make such an occurance additionally remote.	U	C	M	Reinforced tank car design to mitigate impacts if derailed and breached in water body. Safety appliances reinforced to resist derailment damage. Low track speed to reduce forces and likelihood of derailment into water bodies.	
Locomotive derails and breaches in water	Derailment results in locomotive coming to rest in body of water. Limited number of locations where such a derailment result is possible.	U	C	M	Fuel tank reinforced for derailment situations. Other lubricants on board typically contained within carbody or result in small volume leakage. Low track speed to reduce forces and likelihood of derailment into water bodies.	
Internal notification for events involving tank cars	If incident occurs, must ensure regulators and emergency response are advised appropriately.	O	C	H	Reporting protocol in effect for existing rail operations in area, same protocol to be adapted to Mine Spur operation.	M
Awareness of external emergency responder of tank cars	Responders must be aware of tank car product.	O	C	H	Utilize the standard rail industry reporting protocols. Existing familiarity with transport of fuel by rail for the other mining operations in the surrounding region.	M
Fire on right-of-way	Train must operate where there is fire on the right-of-way grounds. Likelihood of train passing as fire starts is remote. Unless tank car is leaking, risk to product or car is low.	S	M	M	Transportation of dangerous goods regulations provide guidance for operation in this situation. Train operations to cease while fire fighting operation is underway.	
Securement of unattended equipment	Train crew must leave train unattended (e.g. crew relieved of duty but no crew available to continue with the train immediately). Possibility of unsecured equipment running away and causing collision or derailment.	U	C	M	Securement of rolling stock governed by CROR and railway operator procedures. No plans to regularly leave equipment unattended in water supply area. Unattended equipment at mine site cannot runaway and reach water supply area due to uphill track gradient leaving mine.	
Visibility of rail equipment by public at crossings	Rail equipment visibility necessary to help prevent road vehicles coming into contact with the side of a train at crossing.	L	Cr	H	Latest standards in reflective material application for rail rolling stock to be applied when equipment constructed.	M
Locomotive crankcase explosion	The crankcase on a locomotive explodes resulting in engine shutdown. Will not impact surrounding environment, explosion contained within locomotive engine block.	S	N	L	Loss of pulling power will result in slower train speed. No leakage of liquids expected. Regular inspections and maintenance mitigate the occurance of such explosions.	
Failed locomotive power assembly	Power assembly in engine experiences catastrophic failure. Event contained within engine component.	S	N	L	Loss of pulling power will result in slower train speed. No leakage of liquids expected. Regular inspections and maintenance mitigate the occurance of such explosions.	
Failed locomotive turbocharger	Turbocharger on locomotive experiences catastrophic failure. Event contained within locomotive carbody.	S	N	L	Loss of pulling power will result in slower train speed. No leakage of liquids expected. Regular inspections and maintenance mitigate the occurance of such explosions.	
Head on collision between trains	Train is involved in a head-on collision with another train with resulting derailment. Head-on collisions extremely rare.	U	C	M	Train traffic to be governed by existing operating and safety rules to provide protection against such collisions. Initial operations will feature only a single train making a round trip over the railway each day. Future operations will be managed to avoid simulatenous occupancy of the mine spur main track by two trains. Signal protection at junction with QNSL offers additional protection.	
Tail end collision between trains	Train is involved in a tail-end collision with another train with resulting derailment.	S	C	H	Train traffic to be governed by existing operating and safety rules to provide protection against such collisions. Initial operations will feature only a single train making a round trip over the railway each day. Future operations will be managed to provide adequate following protection if necessary to operate two trains following each other. Reflectorization on last car will mitigate visibility of equipment at night.	L
Collision with equipment foul of the track	Train collides with vehicle or machinery on right-of-way causing derailment. Such collisions and derailments occur less frequently than standard crossing collision without derailment.	S	C	H	Limited access to right-of-way by vehicles. Low train speed to reduce forces and severity in event of derailment. Locomotive fuel tanks and tank cars reinforced against derailment forces.	L
Collision with a portion of equipment foul of the track	Train collides with a part of a vehicle or machinery on right-of-way. Such collisions occur less frequently than standard crossing collision.	U	C	M	Limited access to right-of-way by vehicles. Low train speed to reduce forces and severity of contact. Locomotives likely to strike protruding object and clear it from train's path, avoiding impact with trailing rail cars.	

Issue & Hazards		Hazard Probability	Consequences	Initial Risk Level	Risk Control Actions	Residual Risk Level
Issue	Potential Hazard					
Strike object on track	Train may hit object on track causing it to be deflected and impact rolling stock.	U	Cr	L	Locomotive fuel tanks reinforced for impacts from objects. Tank car bodies reinforced for derailments and impacts. Low track speed will reduce impact forces and severity.	
Strike wildlife on track	Train could hit wildlife on track causing it to be lodged under equipment. Derailment in this situation is rare.	O	M	M	Snowplow pilot on front of locomotive typically pushes wildlife out of way of train. Locomotive fuel tank and tank cars suitably reinforced against impact from wildlife remains. Low train speed will reduce occurance and severity of wildlife impacts.	
Leak of contents from ore car	Concentrate spills from ore car onto right-of-way. Material will typically accumulate within track ballast. Not likely to be washed out of ballast into water.	S	N	L	Cars inspected at mine for body damage that could result in leaks - cars with damage set aside for repair.	
Leak of contents from tank car	Fuel leak from tank car onto right-of-way. Typically result of improperly shut or defective valves. Development of such a problem during short timeframe train passes through water supply area is remote.	S	M	M	Tank cars examined after loading at Sept Iles for leaks. Cars subsequently receive inspection at meet points with other trains on journey from Sept Iles to Wabush. Cars identified as leaking en route will be set off before arriving at the Kami Mine Spur. Tank cars leaving mine for return to Sept Iles will be empty.	
Excessive train buff forces cause train jacknifing	Trainhandling or some unusual train action causes excessive compressive forces within train, causing train to jacknife and derail.	S	Cr	M	Locomotive operator training designed to teach train crews proper train handling technique to avoid excess buff forces in train. Planned train size and type is very similar to existing trains crews are accustomed to handling on QNSL.	
Failure to remove handbrake on railcars	Handbrake is left on railcar resulting in skidded and damaged wheels.	S	N	L	Minimal damage to wheels could occur if handbrake left on at mine site. Unlikely trains will arrive from QNSL with handbrakes on - will have been identified by one of the many defect detector systems on their property. Wheel defect in this case unlikely to cause derailment, damage or puncture to rolling stock.	
Undesired emergency brake application	Train brakes apply in emergency account problem with a railcar air brake control valve causing sudden stop and potential derailment. Typically associated with trains made up of widely varying car construction dates, control valve types and suppliers.	S	M	M	Trainsets to be built new by a single manufacturer within a one year period using identical components on each car. Low track speed will mitigate severity of force in event of sudden emergency stop.	
Operation of train through water	Train operates over track that has been covered by water. Water can must be below the level of the axle mounted traction motors on locomotive otherwise train will become immobilized.	U	Cr	L	Track inspection will be required if high water conditions might be possible. Train operations to be ceased in event water rises above rail until inspection completed. New alignment design will be designed to avoid areas of potential high water conditions.	
Lightning strike	Tank car could be struck by lightning while train in motion. Combination of lightning strike on rail alignment through supply area at the time infrequent fuel movements are made is remote possibility.	U	M	L	Tank car design will preclude breach by lightning.	
High impact wheel defect	Wheel with defect causing high impact with rail could damage rail, equipment leading to derailment.	S	M	M	QNSL Wheel Impact Load Detector (WILD) system in service three miles east of proposed Kami Mine spur junction will scan all trains heading to Alderon for impact defects. Problem cars will be identified, train will be slowed down to reduce impact. Cars with defects will be removed from train before loading at mine and wheels replaced.	
Iron ore concentrate spill on ground	Significant quantity of iron ore concentrate deposited on right-of-way following derailment.	S	Cr	M	Material likely to remain in place where it is deposited account high density. Material is not considered to be a hazardous commodity. Cleanup of material easily facilitated using earthmoving equipment and/or hand shoveling.	
Diesel fuel spill on ground	Significant quantity of diesel fuel deposited on right-of-way following derailment.	U	Cr	L	Spill containment to be deployed in accordance with current emergency response plans for the region. Contaminated soils to be removed and replaced.	
Alternative truck transport of fuel to mine	Road to access Kami Mine crosses water supply area, therefore alternative truck delivery still results in fuel transported across watershed. Accident rates higher for truck transport versus rail transport. Winter road surface conditions create significant hazard to truck transport whereas impact to rail is negligible. Truck haul also exposes downtown area of Wabush to fuel transport.	O	C	H	Few methods to mitigate the additional negative aspects of truck haulage as compared to rail haulage.	

Risk Assessment Legend Tables

Hazard Probability Level	Frequency of Occurrence
Frequent (F)	Occurs often, continuously experienced or >1/100; can happen immediately
Likely (L)	Occurs several times or >1/1000; can happen in the medium term
Occasional (O)	Occurs sporadically or >1/10,000 times; can happen in the long term
Seldom (S)	Unlikely, but could occur at some time or >1/100,000; can happen in the long term
Unlikely (U)	Can assume it will not occur or >1/1,000,000; will practically never happen

Consequences	Consequences Definition
Catastrophic "(C)"	Multiple death or permanent disability, major property damage, not able to continue the operation
Critical (Cr)	Death, permanent disability, temporary total disability in excess of 3 months, major damages that significantly affect the operation
Marginal (M)	Minor injury, lost workday accident, minor property damage and some degradation of the operation
Negligible (N)	First aid or minor medical treatment, minor or no impact to the operation

Risk Levels	Action
Extremely High (E)	This level is unacceptable and requires immediate changes
High (H)	This level identifies potentially serious problems requiring changes
Moderate (M)	This level is not expected to cause serious problems however changes should be made if they are technically and economically feasible
Low (L)	While changes are not required at this level to reduce risk, changes may still be recommended to improve functionality

Hazard / Consequence / Risk Rating Cross Reference

	Hazard Probability				
Consequence Description	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic "(C)"	E	E	H	H	M
Critical (Cr)	E	H	H	M	L
Marginal (M)	H	H	M	M	L
Negligible (N)	M	L	L	L	L

Appendix K

Attachment 2

Kami Rail Line – Fuel Delivery

WorleyParsons
resources & energy

EcoNomics

ALDERON IRON ORE CORPORATION

Kami Iron Ore Project

Kami Rail Line - Fuel Delivery

207040-00108 – Document No Kami-WPO-REP-K410-00001

24 January 2013

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Disclaimer

PROJECT 207040-00108 - KAMI IRON ORE PROJECT

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	A. Thompson	J. Jaroszeski	W. McPhee	10 Jan 2013		
B		A. Thompson	J. Jaroszeski	W. McPhee	14 Jan 2013		
C		B. Kartuz	J. Jaroszeski	W. McPhee	16 Jan 2013		
				W. McPhee			

CONTENTS

Appendices

1 INTRODUCTION

The Kami Iron Ore Project (project) is located in the Labrador Trough adjacent to the Towns of Wabush and Labrador City, NL, Canada. The project consists of developing a facility to produce 8 million tonnes per annum (mtpa) of iron ore concentrate, with an expansion to 16 mtpa. The project includes the mining site, processing facility, tailings management, utilities and infrastructure.

The iron ore concentrate from the project will be shipped 450 kilometres by rail to a new terminal in Sept-Iles, QC, Canada. Most of the transit will occur on existing rail infrastructure on the Quebec North Shore and Labrador Railway (QSN&L) and the Chemin de Fer Arnaud Railway (CFA). However, a new 19 kilometre rail line will be required between the project's processing facility and the QSN&L main line. Preliminary alignments for the selected option have been provided in Appendix 1 for reference.

Fuel deliveries to the Kami Mine will be accomplished by rail. This would involve two fuel trains weekly (one loaded and one empty) equipped with tank cars to travel the Kami Rail Line. Each train will consist of two sets of six to nine tank cars. The Kami Rail Line passes through the Wabush Protected Water Supply Area (PWSA). The Town of Wabush and environmental regulators have expressed concern that a release of fuel from these tank cars in this area could contaminate the Town's water supply.

The objective of this report is to discuss the safety of fuel delivery along the Kami Rail Line within the watershed area. This will be done through the assessment of:

- Kami Rail Line Overview
- Proposed Fuel Train Operations
- Track Maintenance.
- Tank Car Design
- Canadian Railway Safety Statistics

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2 KAMI RAIL LINE OVERVIEW

2.1 Kami Rail Line- QNSL Northernland to Mine Loop Overview

The planned Kami Rail spur and loading loop developed through the feasibility process was originally based on the alignment proposed in the PEA document and referred to as “Option 3A”.

The rail alignment branches off from Mile 34 of the QNSL Northernland Subdivision near Flora Lake. The alignment then runs parallel to and west of Wahnahnish Lake for approximately four kilometres before turning west to cross Jean Lake Rapids at km 8+850 (8.85 km from the start of the rail line) while passing through the Wabush PWSA.

From this point, the alignment turns to the west of the small pond, just west of Wahnahnish Lake, and follows the natural terrain incline of approximately 1% until km14+200. The alignment returns to a westerly direction at km 13+600 heading and reaches the grade summit point along the north shore of Harris Lake at km14+700.

From km16+500 to km18+200 the track will descend at a decline of 0.35% past the north side of Riordan Lake before reaching the start of the mine loading loop. The details of the rail line between QNSL and Kami mine rail loop is presented in Table 2.1.

Section 2.2.2 provides a description of the rail line within Wabush PWSA.

Table 2.1: Evaluation of (Stantec) Kami Mine Rail line alignment

Rail Section	Terrain/elevation (above mean sea level)	Rail characteristics	Vertical gradient	Top of Rail elev. (by Stantec)	Earthworks
0+000 to 1+050	Flat terrain/ 540m to 543m	Runs south-west through curve 1 and then through tangent section	0.0%	543m	1m to 4m fill
1+050 to 1+550	Relatively flat terrain/ 542m to 546m	Continues on tangent in south-west direction	0.624% in empty train direction	542m to 546m	1m to 2 m fill and 1m to 3 m depth cut

ALDERON IRON ORE CORPORATION
KAMI IRON ORE PROJECT
KAMI RAIL LINE - FUEL DELIVERY

Rail Section	Terrain/elevation (above mean sea level)	Rail characteristics	Vertical gradient	Top of Rail elev. (by Stantec)	Earthworks
1+550 to 2+900	Runs through low rocky hills till km2+050 then through relatively flat terrain/ 546m to 540m	Continues on tangent then turns south at km 2+500	0.35% in loaded train direction	546m to 542m	1m to 5 m cut then 1m to 2 m fill
2+900 to 3+650	Plain terrain/ 542m to 550m	Continues South	0.847% in empty train direction	542m to 547m	1m to 2m cut
3+650 to 5+100	Plain terrain/ 542m to 548m	Continues on tangent then turns south-west at km 4+400 to by-pass Wahnahnish lake on its west bank	0.2% - 0.35% in loaded train direction; 0% om 4+900 to 5+100	543m to 544m	1m to 5 m cut or fill
5+100 to 9+200	Refer to Section 2.2.2				
9+200 to 14+200	Runs through rocky hills/ 566m to 601m	Turns south at km 10+600, then turns west toward mine at km 13+600	1.0% in empty train direction	558m to 597m	1m to 8 m cut and 1m to 6 m fill
14+200 to 16+500	Flat terrain/ 597m to 603m	Continues west toward mine through three horizontal curves then turns North-West at km 16+300	0.089% in loaded train direction	597m to 594m	1m to 10 m cut
16+500 to 18+200 (loop start)	Runs through low rocky hills/ 595m to 592m	Continues North-West toward mine through multiple	0.35% in loaded train direction	594 m to 588m	1m to 7 m cut

Rail Section	Terrain/elevation (above mean sea level)	Rail characteristics	Vertical gradient	Top of Rail elev. (by Stantec)	Earthworks
		curves			
18+200 to 18+700 (loop)	Flat terrain/ 595m to 584m	Continues West toward mine on curve	0.0%	585m	1m to 8m fill and 1m to 2 m fill

2.2 Kami Rail Line-Wabush Protected Water Supply Area

2.2.1 Basis of Design

The objective of the design is to develop the Kami mine rail and road corridor using best practices for the construction and operation of a transportation corridor in order to minimize the risk that a potential derailment of fuel cars would have a negative impact on Wahnahnish Lake and the water supply of the Town of Wabush. The design is based on minimizing the risk of a derailment or spill,and to contain any spilled fuel from entering Wahnahnish Lake to minimize the risk to compromising water quality.

The following outlines the basis of design of the section of Kami mine rail line located within Wabush Protected water supply area between km 5+100 and km 9+200:

- The centerline of the alignment represents the eastern edge of the formation of the alignment;
- The Alignment of the transportation corridor (alignment) runs parallel to Wahnahnish lake with a minimum distance (offset) of 50m from Wahnahnish lake to the eastern edge of earthworks;
- The proposed vertical gradient of the alignment on the curved section of rail line between km 6+900 and km 8+500 is very flat (0.0% to 0.10%) to mitigate risk of potential derailment of iron ore or fuel trains;
- The rail and road routes are combined into a single transportation corridor in order to establish an effective combined storm water and fuel spill containment system. Drawing 207040-00108-00-CI-DRD-1010 (refer to Appendix 2) provides a cross-section of the proposed spill management system along Wahnahnish Lake;
- Stormwater runoff is separated from spilled fuel so that it does not come in contact with fuel, will not require treatment and can be discharged directly to Wahnahnish Lake.

- The design proposes two lined ditches on both sides on the alignment. Any accidently released or spilled fuel and any contaminated stormwater runoff will be will be captured in ditches along the alignment:
- The combined capacity of the two ditches is sufficient to capture the entire volume of the all of the rail cars. For example, a typical fuel train with 9 tank cars and a locomotive is approximately 186m long and the entire volume can be captured in less than 99m of spill containment ditch.

2.2.2 Wabush Protected Water Supply Area Section Overview

The rail line section that passes through the Wahnahnish PWSA extends from approximately km 5+100 to km 13+700 The location and design constraints are discussed for sub-section of the rail line within the PWSA below.

Section 5+1000 to 7+200

At about km 5+100, the rail line enters the PWSA of Wahnahnish Lake and runs through a region of low rocky hills until about km 7+200. The approximate natural ground elevation in this section is 542m to 546m rising up in a southernly direction. The proposed gradient of the rail line on this section is 0.10% on empty ore train direction (from the QNSL mainline to the mine site) and the estimated top of rail is 542m to 543.6m. This section will primarily be in a 1m to 2 m deep cut into the slope of the hill along Wahnahnish Lake. The alignment runs parallel to Wahnahnish lake at a distance of 50m to 70m from the Lake. In order to move the rail line further away from the Lake, a deep cut would need to be made into the hill along Wahnahnish which would create a canyon with a depth of up to 10m which would interfere with access, wildlife and level crossings in the area.

Section 7+200 to 8+850

Heading further, the route on this sections traverses around the rocky hills south east of Wabush and requires moderate cut into the slope, until km 8+850. The approximate natural ground elevation in this section is 544m to 552m and continues to rise in the southern direction. At km 7+600 the alignment turns west traversing through a broad curve towards the Jean Lake Crossing. The proposed gradient of the rail line on this curved section of rail is very flat (0.0%) to further mitigate the risk of potential derailment of iron ore or fuel trains. The section is predominantly within a 1m to 6m deep cut.

The first portion of this section crosses the Wahnahnish lake peninsula and is located outside of the 150m buffer zone. As the rail line approaches the Jean Lake Crossing at approximately 8+100 km, the rail line gets closer to Lake Wahnahnish with a minimum distance of 50m from the Lake until the rail line reaches the Jean Lake Crossing. The location of the rail line along this portion of the route is limited by the hills located to the north of the rail line and the approach to the Jean Lake Crossing.

Jean Lake Crossing (km8 + 850 to km 8+900)

Heading south-west toward the mine the route then crosses the Jean Lake rapids water course linking Wahnahnish Lake to Jean Lake at approximately km 8+850.

It is proposed to provide a single span bridge structure with a width of approximately 26m to carry both the rail line and the mine access road. The proposed top of formation (bridge deck) is 544.5m. The approximate natural ground elevation is 543m. The proposed gradient of the alignment on this section is 0.20% in the empty ore train direction.

Section 8+900 to 9+200

The remainder of the rail route that is located in the PWSA traverses through a region of rocky hills slopping gently south-west toward the mine. The approximate natural ground elevation in this section ranges from 547 to 601m.

The proposed gradient of the rail line on this section ranges from 0.20% to 1.0% in empty ore train direction. The section has section of both cut (1m to 8m deep) and fill (1 to 6m). This section west away from Wahnahnish lake with offsets from Wahnahnish Lake and other water bodies within the PWSA of over 150m.

2.3 Spill Containment

The spill containment approach developed for the potential derailment of fuel cars in the Wabush PWSA is based on separating storm water runoff and spilled/derailed fuel/chemical to minimize the risk to water quality in Wahnahnish Lake. Stormwater runoff which does not come in contact with fuel/chemical will not require treatment and can be discharged directly to Wahnahnish Lake. Any spilled fuel or chemicals and any contaminated stormwater runoff will be captured in ditches along the rail route, collected, pumped out and transported offsite for disposal.

To provide rapid spill response, the high rail vehicle that will lead the fuel cars to the mine site, will be staffed with emergency response personnel and will contain a spill kit to facilitate immediate first response in the event of a spill due to derailment or tank leak. Spill kits will also be provided along the rail route at regular intervals to allow rapid spill response. They will contain the appropriate type, size and quantity of equipment for the volume/type of product being transported or stored.

In addition to the spill response material, various hand held tools including shovels and a variety of mobile heavy equipment including excavators, front-end loaders, bull-dozers, haul trucks, and vacuum truck will be available and can be quickly mobilized from the mine site to aid in spill response as required.

2.4 Fuel or Chemical Spill Containment

In the case of derailment, the spilled fuel will be collected in ditches along both sides of the railway/access road. It is proposed that a trapezoidal ditch (0.5 m bottom width, 2.5:1 Side Slope, 1 m minimum depth) be constructed along both sides of the railway/access road corridor. These ditches will be lined with an impermeable geotextile to prevent any seepage of fuel into groundwater. Reinforced Concrete Pipe (RCP) culverts (600 mm min.) are proposed at one kilometre intervals along the rail line to convey spillage on the west side of the rail line to the containment ditch and oil/water separator (OWS) system on the east side. The east ditch will have a cut-off trench with drainage rock and geo-membrane liner for containing groundwater flow. The OWS proposed on the east ditch will also collect minor spills and nuisance runoff. Flow into the OWS will be controlled through sluice gates, which can be operated manually or controlled through a telemetric system. The operational procedure will be such that the gates will closed prior to shipment of fuel along the rail corridor. With the gates closed the ditches will operate as a linear pond and any derailed fuel will collect in the ditch and can be pumped out and transported to a secure site. The gates will be re- opened after fuel shipments are completed to allow normal drainage of storm water but still collect minor spills and nuisance runoff in the OWS. Drawings of the proposed spill containment system are provided in Appendix 2.

2.5 Mitigating Risks to PWSA during the Construction Stage

Any work performed within the PWSA will be subject to an approved Permit for a Development in a Protected Public Water Supply Area, which will provide guidelines and procedures for the protection of the PWSA during construction activities.

An Environmental Protection Plan (EPP) for any construction within the Protected Public Water Supply Area will be developed as part of the overall Environmental Management System and Sustainability Management Framework for the project.

The EPP will include mitigation measures to protect Wahnahnish Lake from impacts from construction activities including silt fences to control dust and sediment from entering the lake, storm water management at drainage locations to minimize flow disruptions caused by the construction and spill prevention protocols that will include inspecting vehicles and hydraulics on daily basis for leaks or damage that could cause minor spills and rapid spill response to contain any minor spills so they cannot the Lake. The use of environmentally friendly hydraulic and engine oils will be utilized in construction equipment where ever possible. Storage of all fuels, oils and lubricants will not be permitted within the PWSA. Maintenance and refueling of all equipment both planned and unplanned will not be permitted within the PWSA.

Machinery on site will be limited to the quantity necessary to perform the work and after hours storage of machines and equipment will be limited to controlled areas where containment of potential spills can be provided.

3 PROPOSED FUEL TRAIN OPERATIONS

3.1 Kami Railway Line Fuel Train Operation Scenarios

It is projected that operation of the Alderon mine will require approximately 180,000 gallons of diesel fuel and fuel oil per week for operations. The demand for 180,000 gallons of diesel and fuel oil would equate to the ownership and operation of 12 to 18 railway tanks cars operating to the mine. These tank cars will operate in two separate blocks of six to nine cars. The variation in the number of cars is dependent on the type and capacity of tank cars that is selected for run the Alderon operations.

Based upon the current rail line design and the proximity to the watershed areas the following railway operating procedures are proposed for the safe movement of diesel fuel and fuel oil to the Alderon mine site. In order to safely manage the transportation of fuel, the tank cars destined to and from the Alderon mine location will be run in a dedicated train service. This means fuel tank cars will not run in conjunction with loaded or empty 240 car iron ore trains.

Loaded fuel tank cars are planned to depart the QNS&L Yard at Labrador City with five buffer iron ore cars next to the locomotive that are required to meet national rail safety guidelines. The fuel tank cars will be dedicated to the Kami Mine and will be procured as new thus their design will be resistant to withstand certain derailments and maintain the integrity of the railcar shell thus containing release of contents of the tank car. Specifications are provided in Appendix 3.

To reduce the risk of derailment the speed of the fuel car movement through the PWSA will be restricted to 16 – 24 km/h or slower based upon environmental constraints. Restricted speed is defined as the ability to safely stop the train within half the range of vision of the operator. Any speed reduction would minimize the risk of a potential derailment and or release of diesel fuel or fuel oil into the watershed area. Fuel trains will only move through the PWSA during daylight hours so that any track issues can be identified and spill response can be completed effectively. Fuel trains are projected to operate only once per week.

When the fuel train arrives at the Kami Rail Line it will be met by a hi-rail vehicle. This hi-rail vehicle will have already traversed the Kami Rail Line inspecting all structures, tracks and the right of way spill containment systems looking for any issues that could lead to a possible derailment of the fuel train. Inspection of the locomotive, iron ore buffer cars and tank cars will occur at this interchange point. After these requirements are complete the hi rail vehicle will lead the fuel train at a specified distance in

advance to inspect the railway again prior to the fuel train traveling through the PWSA. Communication with the high rail vehicle and the dedicated fuel train will be via radio, train dispatcher and or cell phone. Any irregularities along the rail line will be communicated by the hi rail vehicle to the fuel train crew well in advance of the train approaching potential hazards. This will provide adequate time for the fuel train to come to a safe stop and mitigates the risk of a fuel oil spill in the PWSA.

Empty tank cars from the Alderon mine location would operate in the reverse manner of the loaded tank cars inbound to the mine site.

4 KAMI RAILWAY LINE MAINTENANCE

The Kami Rail Line Maintenance Plan is designed to help reduce the frequency and magnitude of maintenance activities of the track and maximize the safe handling of all commodities. However a track maintenance plan is required to fulfill regulatory requirements.

The most frequent of these required track activities will be track inspections. Track inspection requirements are prescribed by the Track Safety Rules (TSR), (Transport Canada document # TC E-54). This document has been provided in Appendix 4 for reference. The Kami Railway Line is considered a Class 2 track with a maximum speed of 25 mph or approximately 40.4 km/h. This requires inspections as follows:

- Required Class 2 Inspections,
- Visual inspection of track and switches – twice weekly,
- Electronic geometry inspection – once yearly at 8 mtpa using a heavy geometry inspection vehicle,
- Rail flaw inspection – once yearly,
- Walking inspections – monthly for turnouts only.

The Kami mine loop track, fuel unloading and car repair track will be designated as Class 1 yard track. Transport Canada requires the following inspections on Class 1 yard track:

- Required Class 1 Inspections,
- Visual inspection of track and switches – twice monthly,
- Electronic geometry inspection – once yearly,
- Rail flaw inspection – once yearly,
- Walking inspections – twice monthly for turnouts only.

In order to maximize safe handling of fuel tank cars on the Kami Rail Line and add additional protection to the PWSA, four additional visual inspections per week of tracks, ties, bridges, culverts and structures will be conducted above and beyond what is required by regulatory law. Inspections will be completed prior to the operation of any fuel cars on the route. These inspections will be conducted on foot or by hi-rail vehicle.

5 TANK CAR DESIGN & INSPECTIONS

5.1.1 Typical Tank Car

Alderon is proposing to procure and utilize railway tank cars (fuel cars) that meet or exceed standards set by the Railway Association of Canada, American Association of Railway, and Transport Canada Rules and Regulations. A typical tank car structure and its associated components, proposed for the project, are included in Appendix 3.

Railway engineering, design, simulation and modelling indicate that tank cars with an internal capacity of approximately 29,000 gallons can be used. Typical tank car bodies are generally constructed with double walled steel construction with a layer of insulation between the walls. The thickness of this steel can vary from 25 to 50 mm based upon the car type and manufacturer. The A and B ends of the tank (the round ends) are re-enforced to prevent potential rupture from normal train movements and switching.

Emergency shutoff valves are installed as a safety device in fluid lines and are designed to close when the normal flow rate of that line is exceeded due to breakage or damage. These valves will also protect the integrity of the tanks if lines are damaged due to derailment.

Tank car design, approval and modification are governed by National Standard of Canada document "Construction, Modification, Qualification, Maintenance and Selection and Use of Means of Containment for the Handling, Offering Transport, or Transporting of Dangerous Goods by Rail." (Document # CAN/CGSB-43.147-2005). This document has not been included as it is not a public document. Some major safety requirements in this document include:

- Specifications for welding types, pressure relief devices, type and quality of material used, coupler load ratings, minimum tank thickness and pressure rating.
- All tank car designs must pass a dynamic longitudinal impact test.
- Detailed drawings for the design, construction and modification of tank cars must be submitted to the Executive Director of Tank Safety for the AAR for approval.
- Any facility that builds maintains and modifies tank cars must be certified by the Transport Canada.

- All tank cars must be qualified prior to being put into use. A rigorous inspection of the tank car is carried out during the qualification process. The tests done during the qualification process must be redone every 10 years.

5.1.2 Rolling Stock Inspections

Locomotive and car maintenance inspections are required by regulation to be conducted quarterly as well as annually. Inspections are also required after loading or unloading. Alderon and the QNS&L will add an additional joint inspection to motive power and empty tank cars prior to departure from the mine fuel decant facility. Alderon will inspect the locomotive and loaded fuel tanks cars upon arrival at the Kami Railway Line junction prior to departing for the 19 kilometre trip to the mine fuel unloading facility. The requirements and objectives of the inspection process are set out in the Railway Freight Car Inspection and Safety Rules published by Transport Canada (Document # TC 0-6-1). This document has been provided in Appendix 5 for reference.

6 CANADIAN RAILWAY SAFETY STATISTICS

6.1 Data Sources

Railway safety statistics were available from the following organizations:

- Railway Association of Canada.
- Transportation Safety Board of Canada.
- Transportation of Dangerous Goods Directorate, Transport Canada (Available through the Statistics Canada CANSIM database).

The relevant tables and reports from the sources listed above have been included in Appendix 6 for reference.

6.2 Fuel Oil Safety

Transporting fuel oil by rail has an excellent safety record in Canada. There have only been 23 reportable accidents involving fuel oil within the last decade. There has been a noticeable decrease in the number of accidents, with the five year average down to 0.6 reportable accidents per year from the ten year average of 2.3 reportable accidents per year. In 2010 and 2011, the last two years of available data, not a single reportable accident involving fuel oil has occurred. Overall, the transportation of fuel oil by rail is safe and very few serious incidents involving fuel oil have been recorded in Canada. The number reportable accidents is shown in Figure A below.

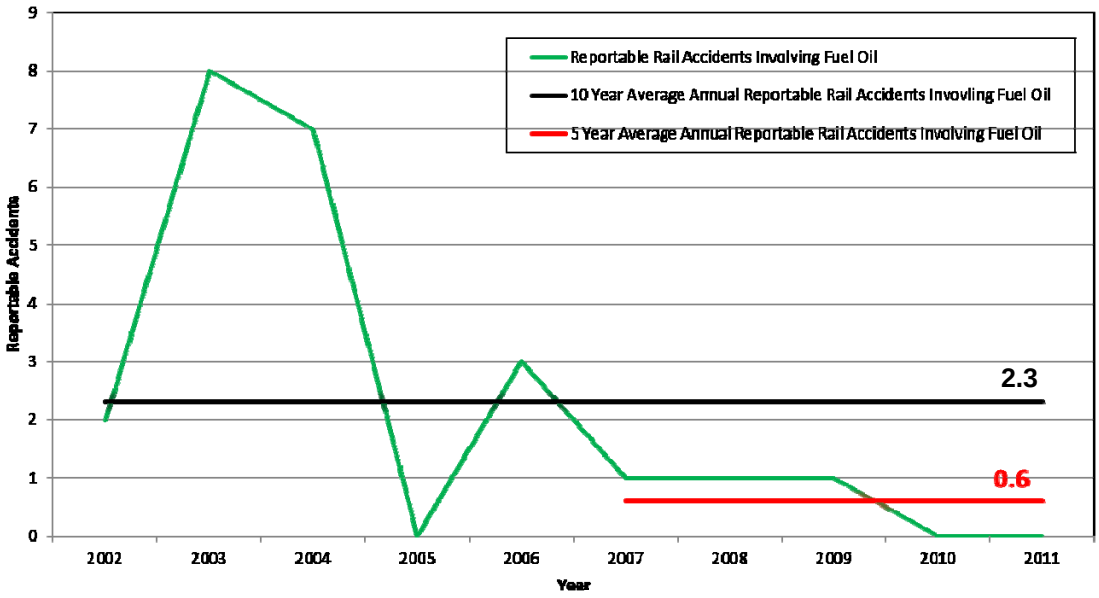


Figure A Fuel Oil Rail Reportable Accidents (CANSIM Database, *Table 409-0005)*.

6.3 Comparison with Alternate Transportation Methods

An alternative to shipping fuel by rail to the Kami Mine is to transport fuel to the mine by road. Figure B shows reportable accidents for both road and rail for all dangerous goods as well as Class 3 dangerous goods. During the last decade, an average of 139.3 road reportable accidents occur per year whereas only an average of 19.5 reportable rail accidents occur per year. Though road transport is more commonly used, with 2.9 times more dangerous goods being shipped by road, the accident rate per ton shipped is lower for rail. Dangerous goods are 2.46 times more likely to be involved in a reportable accident when transported by road than when transported by rail.

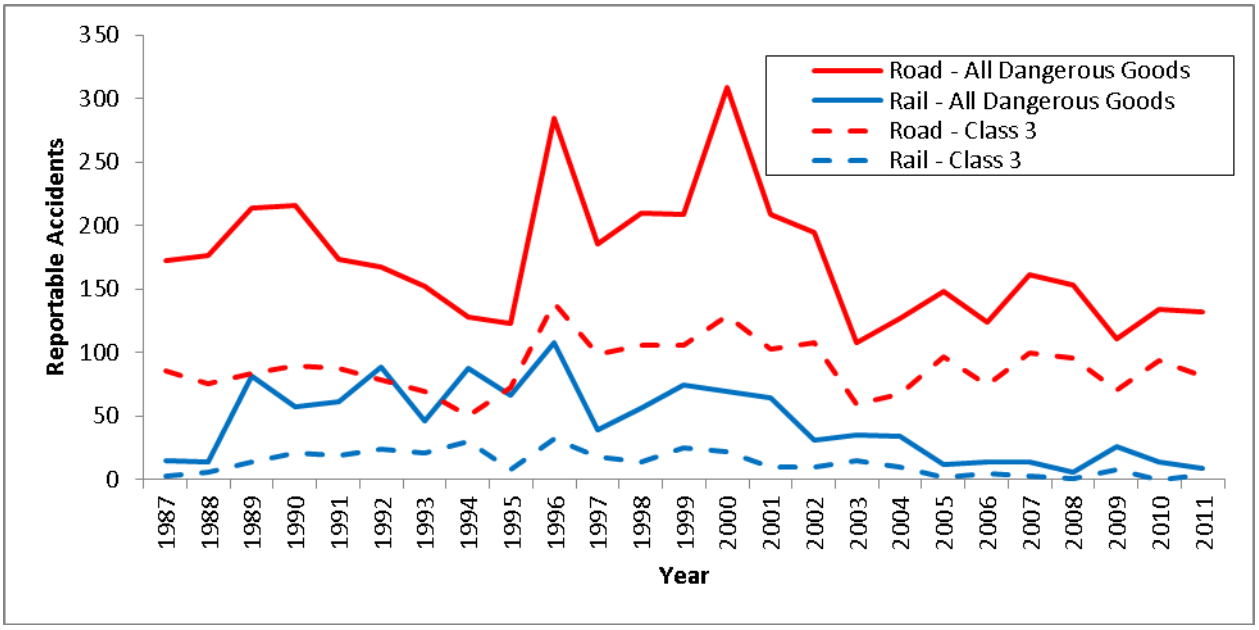


Figure B Dangerous Goods Reportable Accidents. *CANSIM Database, Table 409-0005.*

6.4 Assessment of Accident Probability

6.4.1 Freight Train Accident Rates

Canadian freight train accident rates are generally low and continue to improve. In 2010, there were 1,170 freight railway accidents, which equated to an accident rate of 2.6 per billion gross ton-miles (bgtm) (Canadian Association of Railways, 2011). This is a decrease from 2.8 bgtm in 2009, 3.6 bgtm in 2005 and 4.6 btgm in 2002. An accident rate of freight trains between 2002 and 2010 is provided in Figure C.

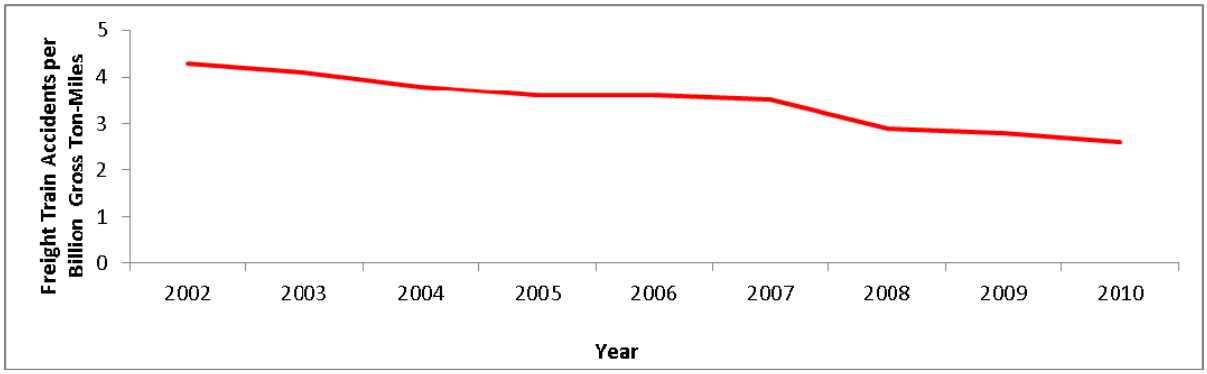


Figure C Freight Train Accidents per Billon Gross Ton-Miles. (Canadian Association of Railways. *Railway Trends 2011.*)

6.4.2 Dangerous Goods Accidents

Rail accidents involving dangerous goods are summarized in Table A. Based on all accidents between 2006 and 2011, only 3.87% of accidents involving dangerous goods were reportable accidents and occurred in transit. Most of the accidents involving dangerous goods occurred during loading, unloading or movement within rail yards.

Table A Rail Accidents

Year	2006	2007	2008	2009	2010	2011	Total
Accidents Involving Dangerous Goods[1]	185	190	153	133	141	118	920
Reportable Accidents In Transit[2]	4	9	6	5	5	6	35

(1) Transportation Safety Board of Canada. *Statistical Railway Occurrences, 2011*.

(2) CANSIM Database*, Table 409-0005.*

6.4.3 Accident Probability on the Kami Rail Line

To apply this specifically to analyze the Kami Rail Line, the following assumptions were made about fuel train operations:

- Tank Cars with a gross weight of 286,000 pounds (143 short tons)
- 18 Tank Cars Per Train
- Rail line length of 12.4 miles (20 kilometres)

Based on the above assumptions, each fuel train delivery along the Kami Rail Line will consist of approximately 31,917 gross ton-miles. Therefore, based on the 2010 accident freight train accident rate, the probability of an accident occurring on the Kami Rail Line is 0.0083% or one in every 12,050 shipments. Assuming a weekly fuel delivery schedule, this would equate to an accident once every 231 years.

Based on the statistics listed in Section 6.4.2, the probability of a reportable accident (a release of over 200 L of fuel oil) in transit is significantly lower, at approximately 0.00032% or one in every 311,370 shipments. Therefore, on average, a reportable accident of a fuel train in transit would occur on the Kami Rail Line once every 5,987 years.

6.5 Reducing the Probability of an Accident

Table B lists the contributing factors associated with all dangerous goods reportable accidents. The contributing factors are also presented graphically in Figure D for all reportable accidents between 2002 and 2011. The leading factors for reportable accidents during this period were:

- Infrastructure (49%)
- Human (21%)
- Equipment (19%)
- Mechanical (6%)

Together these factors contributed in 96% of all reportable accidents.

Therefore, the probability of an accident can greatly be reduced by:

- Proper track design and maintenance.
- Proper car inspection and maintenance.
- Adequate employee training and operating procedures.

Table B Total Accidents, Contributing Factors (CANSIM (database). *Table 409-0005 – Dangerous Goods Reportable Accidents, annual.*

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Human factor	7	0	2	2	0	2	2	0	0	0	**1.5**
Mechanical factor	0	1	1	2	0	0	0	0	0	0	**0.4**
Equipment factor	3	0	0	0	1	2	3	3	1	0	**1.3**
Packaging factor	0	0	0	0	0	1	0	0	0	0	**0.1**
Infrastructure factor	5	4	5	4	3	4	1	2	3	3	**3.4**
Weather factor	0	0	1	0	0	0	0	0	1	0	**0.2**
Other factors	1	0	0	0	0	0	0	0	0	0	**0.1**

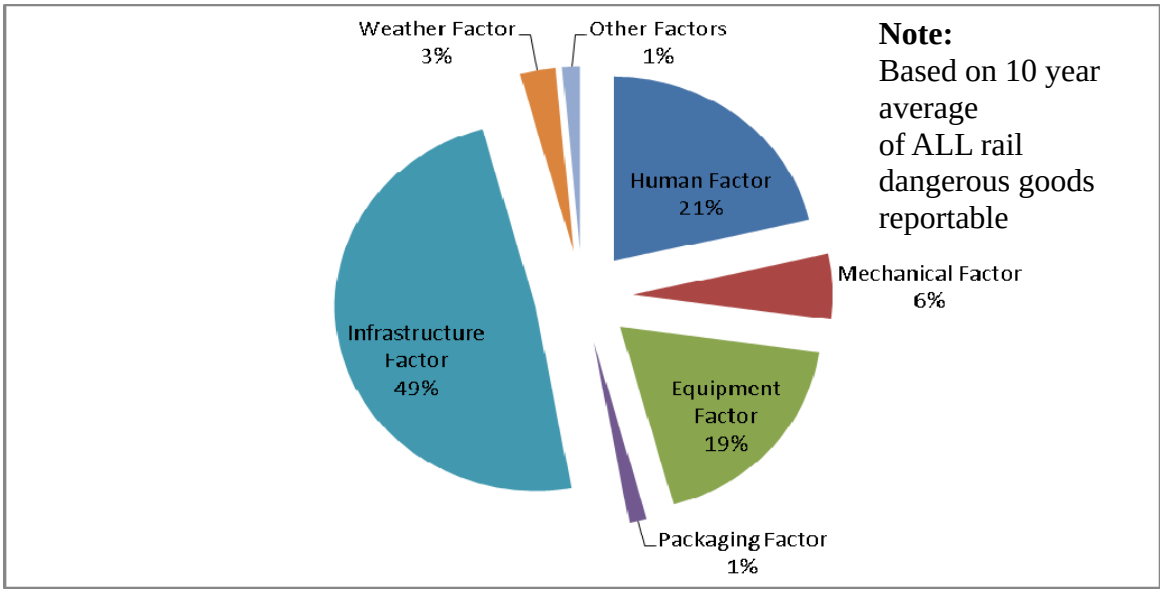


Figure D Contributing Factors, 2002-2011 Reportable Accidents (CANSIM (database). ***Table 409-0005 – Dangerous Goods Reportable Accidents, annual.***

6.6 Summary

Rail in Canada has an excellent safety record, which has been improving over the last three decades. Throughout Canada, there have been very few reportable accidents involving the transport of fuel oil. Shipping dangerous goods by rail is safer than transporting dangerous goods by road, with approximately 2.46 times fewer reportable accidents per ton shipped. Adequate track design and maintenance, tank car inspection and maintenance, and safe operating procedures will greatly reduce the risk of an accident occurring.

7 DEFINITIONS

Class 3 Dangerous Good: Flammable or Combustible Liquid, such as Fuel Oil.

Gross Ton-Mile: The sum of ton-miles handled, calculated using the total weight of the trailing tonnage (both loaded and empty cars). It excludes the weight of the locomotives pulling the trains. (Ref: *Canadian Association of Railways*, 2011).

Reportable Accident: A dangerous good accident where a substance is released in amounts greater than what is outlined in *Part 8* of the *Transportation of Dangerous Goods Act*. In accordance with *Part 8*, these accidents must be reported.

8 REFERENCES

Canadian General Standards Board, 2005. *Construction, Modification, Qualification, Maintenance, and Selection and Use of Means of Containment for the Handling, Offering for Transport, or Transporting of Dangerous Goods by Rail (CAN/CGSB-41.147-2005).*

CANSIM Database, 2013. *Table 409-0005 – Dangerous Goods, Reportable Accidents, Annual.* http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=4090005&tabMode=dataTable&srchLan=-1&p1=-1&p2=9

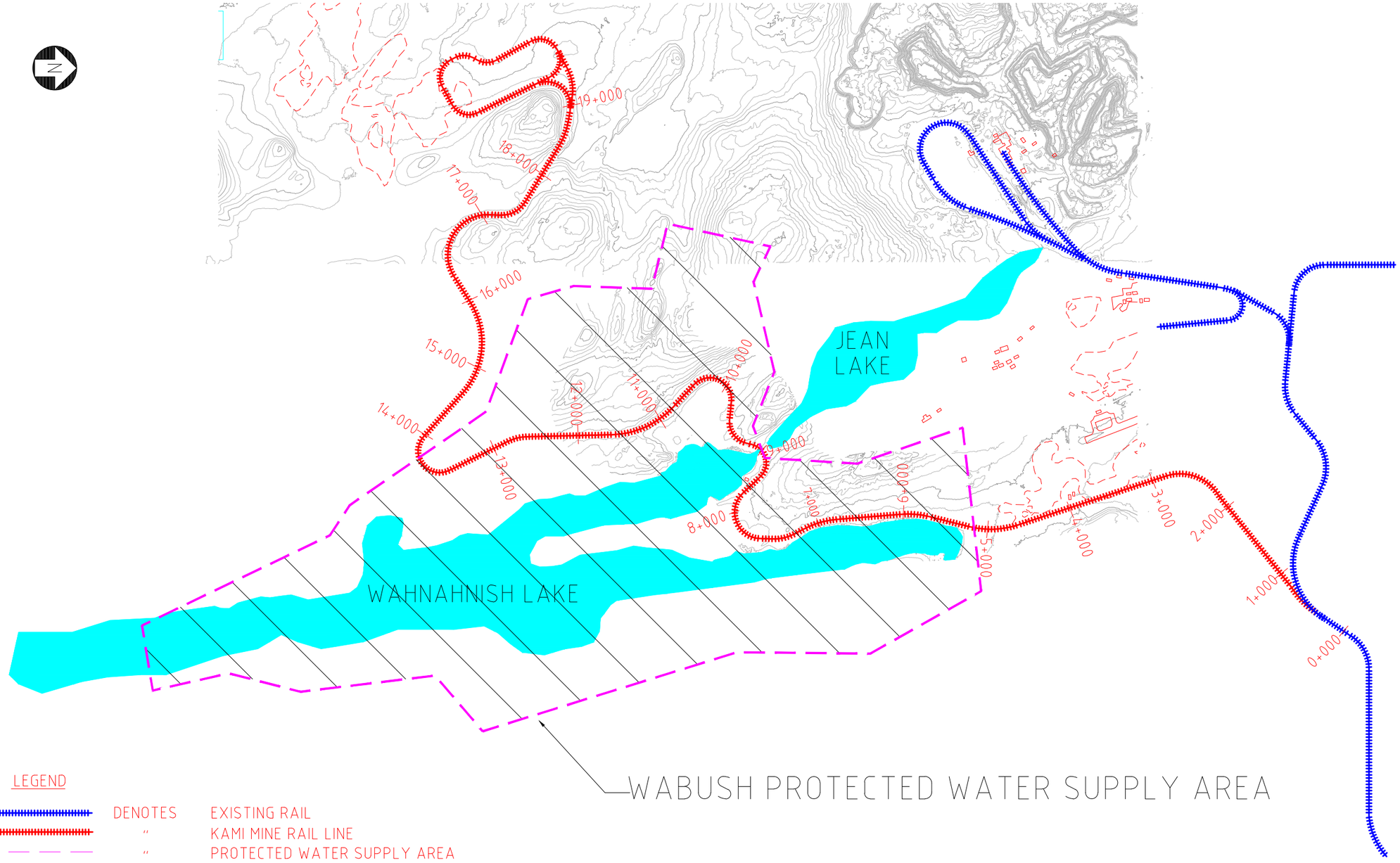
Railway Association of Canada, 2012. *Rail Trends 2011.* http://www.railcan.ca/assets/images/publications/2011_Trends/2011_RAC_TrendsEng.pdf

Transport Canada, 2012. *Rules Respecting Track Safety (TC E-54).* http://www.tc.gc.ca/eng/railsafety/rules-tce54-830.htm

Transport Canada, 1994. *Railway Freight Car Inspection and Safety Rules (TC O-0-6.1).* http://www.tc.gc.ca/eng/railsafety/rules-tco61-330.htm

Transportation Safety Board of Canada, 2012. *Statistical Summary Railway Occurrences, 2011*. , http://www.tsb.gc.ca/eng/stats/rail/2011/ss11.asp

Appendix 1 Kami Rail Line Rail Alignments



LEGEND

DENOTES EXISTING RAIL

" KAMI MINE RAIL LINE

" PROTECTED WATER SUPPLY AREA

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ALDERON IRON ORE KAMI PROJECT
QNSL JUNCTION TO KAMI MINE TRAIN LOADOUT RAIL LINE
WABUSH PROTECTED WATER SUPPLY AREA
KEY PLAN

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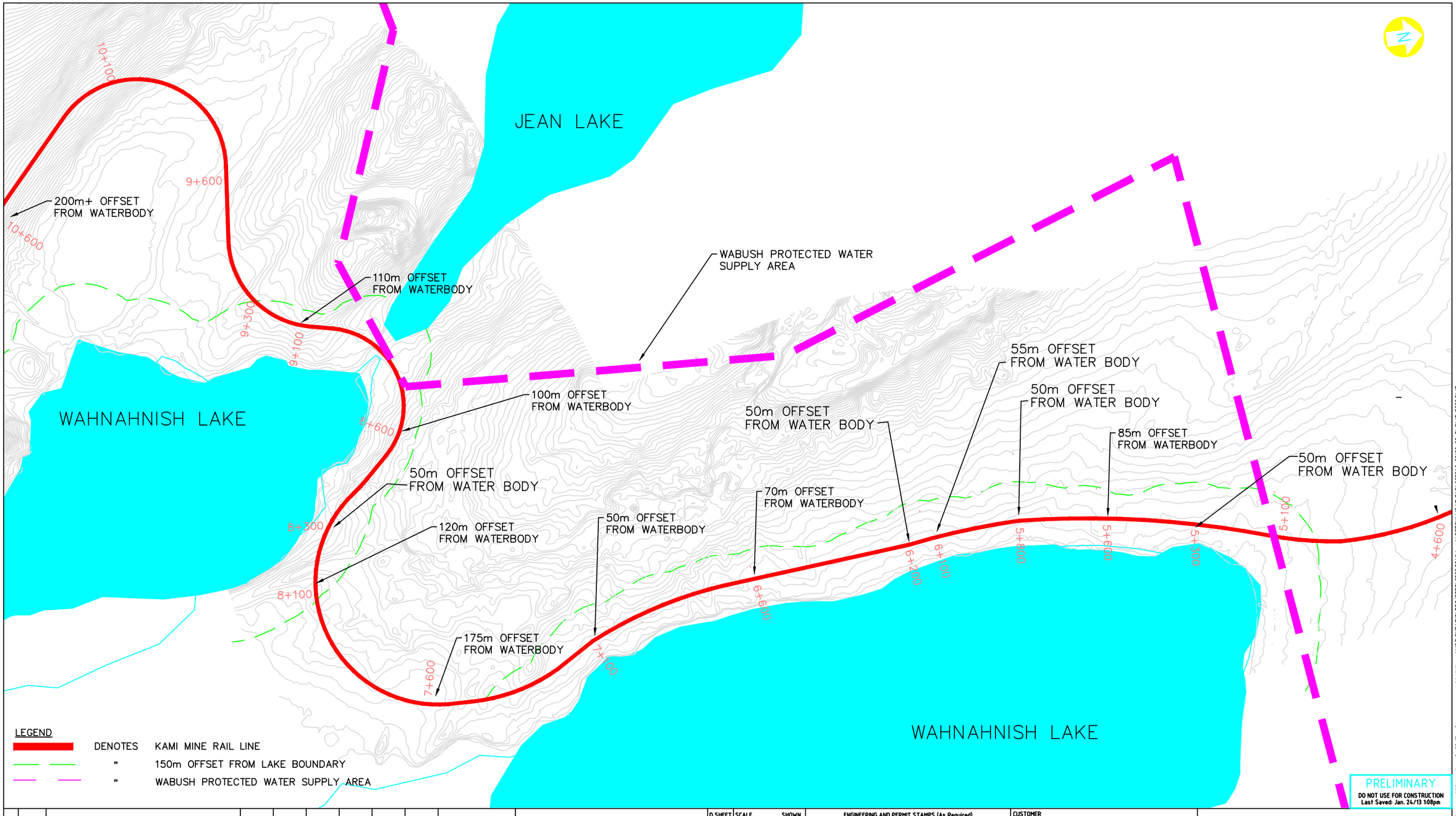

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KAMI IRON ORE PROJECT
KAMI MINE RAIL LINE
WABUSH PROTECTED WATER SUPPLY AREA

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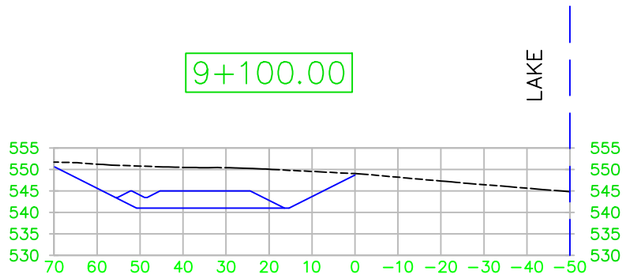

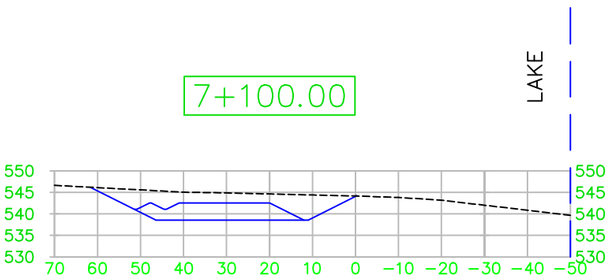

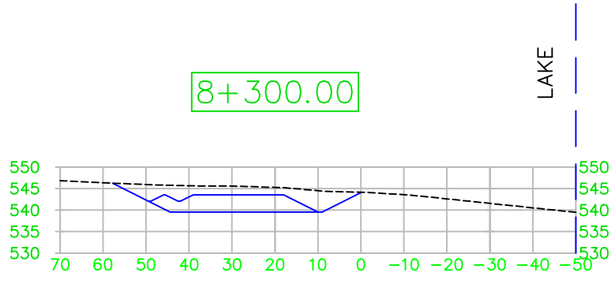

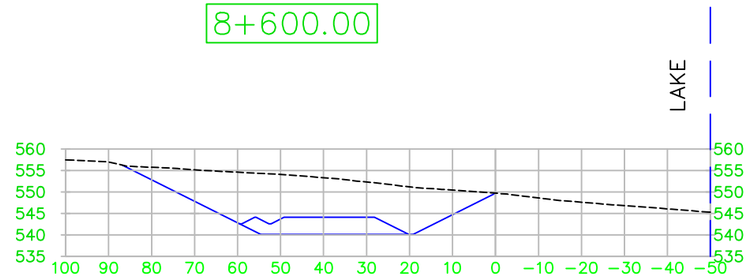

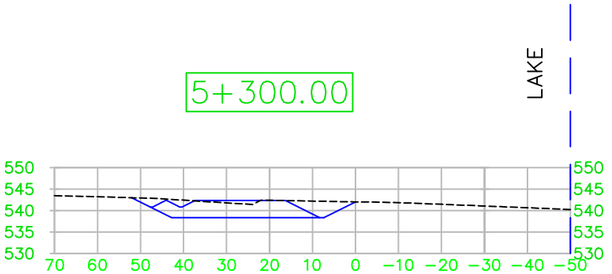

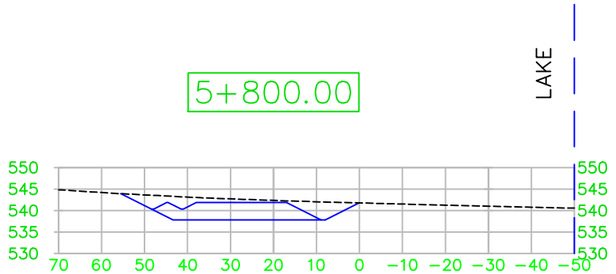

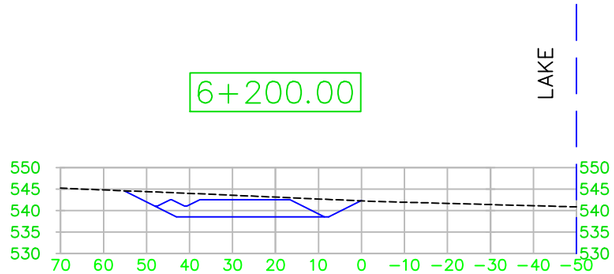

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ALDERON IRON ORE PROJECT
KAMI MINE RAIL ROUTE
WABUSH PROTECTED WATER SUPPLY AREA
CROSS-SECTIONS

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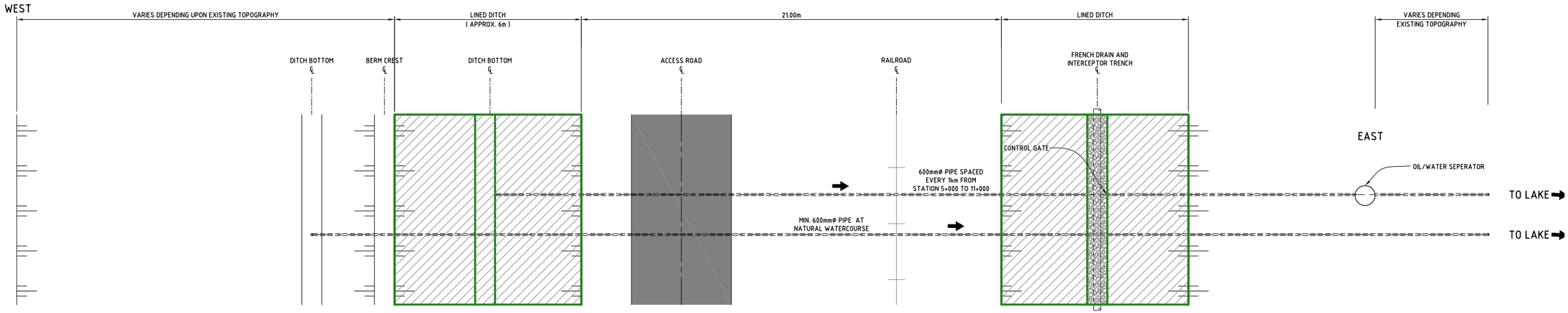
Appendix 2 Spill Containment System



LAKE WAHNAHNISH SPILL CONTAINMENT -TYPICAL PLAN

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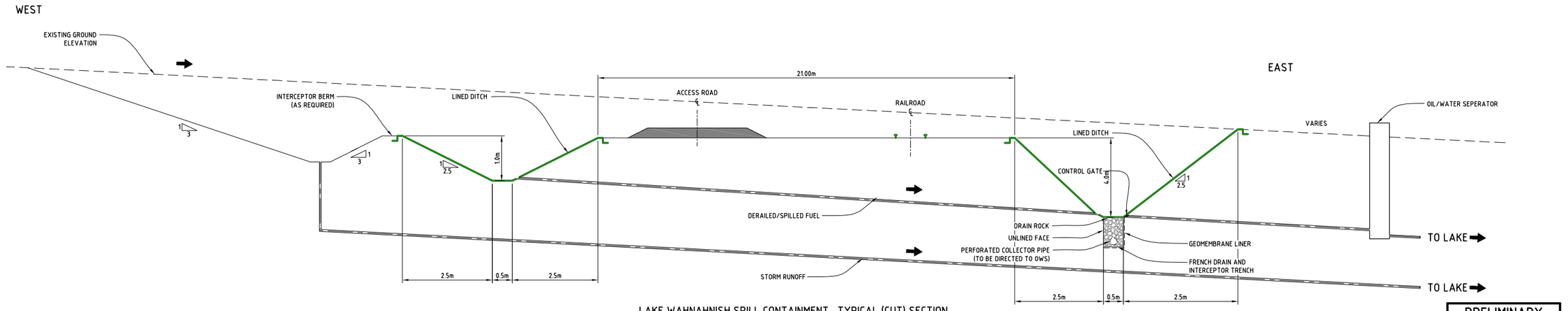

LAKE WAHNAHNISH SPILL CONTAINMENT -TYPICAL (CUT) SECTION

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QNSL JUNCTION TO KAMI MINE TRAIN LOADOUT RAIL LINE
WABUSH PROTECTED WATER SUPPLY AREA
SPILL CONTAINMENT DETAILS AND SECTIONS (STA 4+400 - 10+000)

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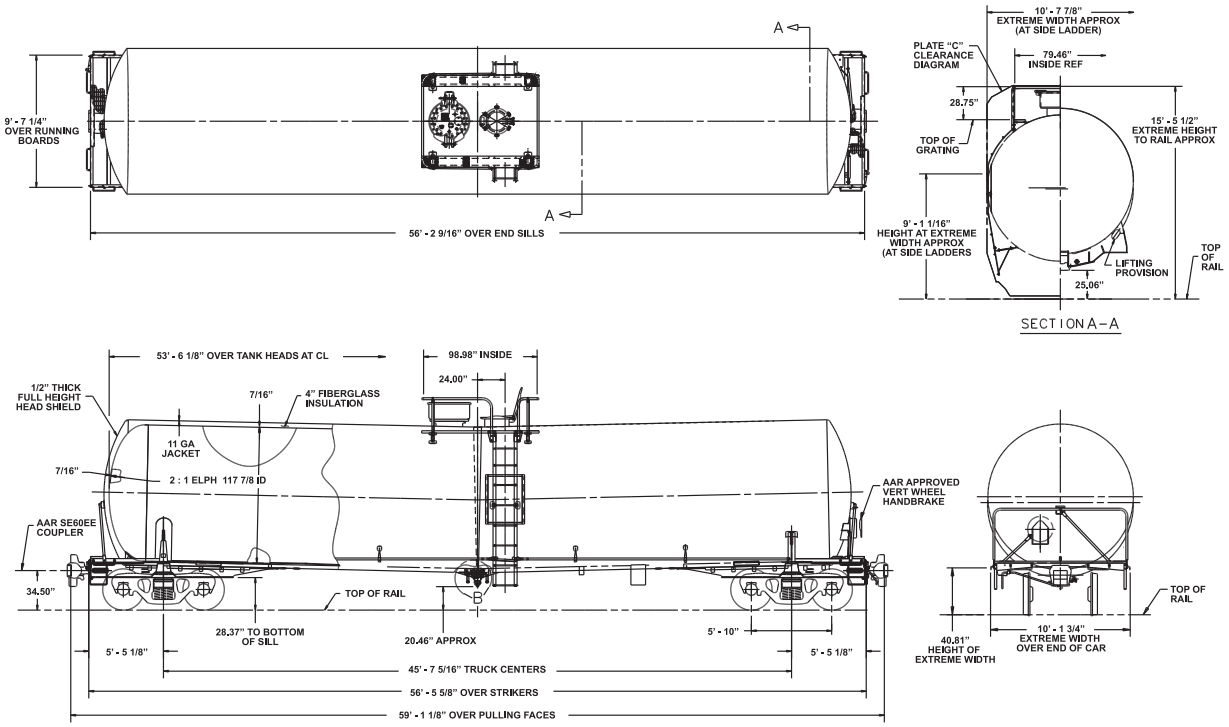
Appendix 3 Tank Car Drawings and Specifications

29,000 GALLON GENERAL SERVICE TANK CAR

- Manufactured for 286,000 lb. capacity
- Meets AAR roll-over protection requirements for 49 CFR, Part 172, Packaging Groups I, II and III
- Equipped with full height head-shields
- Engineered with normalized steel plate
- Standard ARI 1108, 75 psi safety valve
- Standard 4" full port, low profile, ARI 2040A bottom outlet valve
- 12 Line Exterior Coiled Heating System
- 4" Insulation
- ARI 1626A Vacuum relief valve
- Top fittings arrangement with provisions for:
  - 2" Air Valve
  - 3" Product Valve
  - Thermowell
  - Sample Line
  - Gauging Device

ARI's 29,000 gallon, coiled and insulated tank car is engineered to meet diverse customer requirements for the transportation of fuel oils.

General Arrangement



GENERAL DATA

Specification Stenciled	DOT 111S100W1
Shell Full Capacity	29,000 Gallons
Gross Rail Load	286,000 lbs.
Estimated Lightweight	83,900 lbs.
Length Over Pulling Face	59' 1-1/8"
Truck Centers	45' 7-5/16"
Height, Extreme	15' 5-1/2"
Width, Extreme	10' 7-7/8"

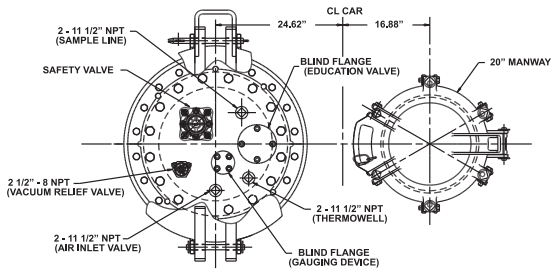
TANK

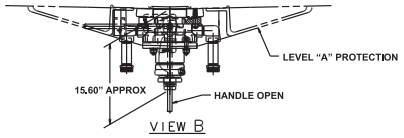
Class	DOT 111A100W1
Inside Diameter	117-7/8"
Tank Plate, Normalized	7/16"
Tank Slope	1/4" per foot

TANK FITTINGS

Manway Cover	Cast Steel, Gr. B, 6-bolt
Manway Nozzle	20"
Top Unloading Nozzle	AAR 10.2 Rollover Protection
Bottom Outlet Valve(s)	ARI 2040A Ball Valve or ARI 1585 Bottom Operated Clapper

Manway and Fittings Arrangement





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09/12

Appendix 4 Track Inspection Requirements

RULES RESPECTING TRACK SAFETY

November 25, 2011
Effective: May 25, 2012

INDEX

SUBPART D - TRACK STRUCTURE

SUBPART E - TRACK APPLIANCES AND TRACK RELATED DEVICES

SUBPART F - INSPECTION

Appendix 5 Railway Freight Car Inspection Rules

Railway Freight Car Inspection & Safety Rules

October 25th, 1994 (TC O-06-1)

Transport Canada Transports Canada

Canada

RAILWAY FREIGHT CAR INSPECTION AND SAFETY RULES

Part I – General

Part II – Freight Car Components

Appendix 6 Canadian Railway Safety Statistics

Table of Contents

Appendix K

Attachment 3

Transportation Spill Response Plan

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ALDERON IRON ORE CORP

ALDERON IRON ORE CORP.

Kami Iron Ore Project

Transportation Spill Response Plan

KAMI-WPO-EN-PLN-G000-00001

18 January 2013

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PROJECT: KAMI IRON ORE PROJECT

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	D. Pinto	W. McPhee	N/A	4 Dec 2012	N/A	
B	Issued	D. Pinto	W.McPhee		17 Jan 2013	F. Pittman	17 Jan 2013

CONTENTS

1 INTRODUCTION

1.1 Purpose and Scope

Human health and safety and environmental protection are paramount considerations by Alderon in the planning and design of the Kami Iron Ore Project (the Project). The following Transportation Spill Response Plan outlines procedures and measures to prevent, minimize, mitigate, and remediate any effects to the environment in the unlikely event of a fuel and/or chemical spill during transport of materials by rail or truck to and from the Project site. This plan ensures that in the event of an incident, there is an immediate, coordinated response to deal with the situation quickly, safely and effectively.

This plan is preliminary and has been prepared during the Project planning stage (before construction and Project start-up). The plan will be revised upon completion of the detailed engineering of the site and will be updated periodically to reflect the proposed Project and the specific response procedures, equipment, team and management contact information, once established. This plan will form a portion of a larger emergency response plan that will be developed for the construction and operation of the Kami mine.

The purpose of this transportation spill response plan is as follows:

- to comply with Alderon's Environmental Policy;
- to identify the organization, responsibilities, and reporting procedures in the event of a spill;
- to comply with all applicable laws, regulations, and requirements from federal, provincial and local authorities pertaining to the preparation of spill contingency plans and notification requirements;
- to promote safe and effective recovery of spilled materials;
- to minimize environmental impacts of spills to water, ice, snow or land; and,
- to provide information on training, equipment and clean up procedures to spill crews, management, and government agencies in the event of a spill.

The following regulations are applicable to this plan:

- Canadian Environmental Protection Act
- Fisheries Act
- Transportation of Dangerous Goods Act and Regulations
- Environmental Protection Act, 8 – Newfoundland/Labrador
- Provincial Water Resources Act
- National Fire Code 1995

Spills of pollutants, including hydrocarbons, chemicals or other materials deemed to be deleterious to the environment, shall be classified as a spill if any of the following criteria is met:

- Spill enters directly into the natural environment,
- Spill is not fully contained by the secondary containment, allowing it to come into contact with the natural environment, or
- Spill enters either storm drainage or natural drainage system and is discharged to the natural environment before being adequately treated.

1.2 Environmental Policy

Alderon is committed to developing the Project in an environmentally sustainably manner as is reflect in the environmental policy.

Alderon engages in the exploration discovery, development, production and distribution of iron ore and its associated products.

Alderon believes that our opportunities to contribute to and thrive in the economies in which we operate must be earned through a demonstrated commitment to sustainable development.

Accordingly, Alderon's actions will demonstrate a responsible approach to social, economic and environmental performance that is aligned with the evolving priorities of our communities of interest. Our actions must reflect a broad spectrum of values that we share with our employees and communities of interest and they must underscore our ongoing efforts to protect our employees, communities, customers and the natural environment.

Alderon is committed to continually improve its environmental performance through monitoring and adaptive management. In order to achieve this, we will establish, document and maintain environmental management systems which will be integrated into all aspects of our activities. Contractors and suppliers will be required to demonstrate they adhere to our environmental policy and practices as part of our selection process and throughout Project activities.

Alderon gives high priority to minimizing the impact of activities on the environment. Reclamation of disturbed areas as a result of exploration, development or operation activities is ongoing. Alderon will ensure the establishment of a sustainable ecosystem which supports wildlife after mine closure.

In addition, Alderon has committed to the following guiding principles for development of the Project:

Provision of a safe and healthy work place;

- *Minimize water crossings, and impact to rivers and lakes;*
- *Minimum footprint for all infrastructure;*
- *Minimize water consumption;*

- *Implement progressive reclamation; and*
- *Provide opportunities for training and employment of area residents.*

1.3 Project Overview

The Project involves the construction and operations of the Kami mine site near the Town of Wabush in Labrador, Newfoundland and associated infrastructure, including new facilities at the Port of Sept-Iles in Pointe Noire, Quebec. Transportation infrastructure that will be designed and constructed includes:

- The Kami Rail Line;
- Access Road to Kami Mine Property;
- On-Site Mine Road Work; and
- Port infrastructure at the Port of Sept Iles in Pointe Noire, Quebec.

2 ASSESSMENT OF POTENTIAL HAZARDS

The transportation of diesel, fuel oil, lubricants and other chemicals via rail, as well as by truck creates a potential risk for hydrocarbon release to the environment.

Fuel will be transported along the rail line to the Project site and ore concentrate will be transported from the Project site to the QNS&L railway. The rail line will cross the Town of Wabush's Protected Water Supply Area (PWSA), following the existing road infrastructure through the area where possible. Water crossings in the PWSA are planned to be installed at locations of existing crossings used by the road infrastructure.

It is projected that operation of the Alderon mine will require approximately 180,000 gallons of diesel fuel and fuel oil per week for operations. The demand for 180,000 gallons of diesel and fuel oil would equate to the ownership and operation of 12 to 18 railway tank cars operating from the port to the mine. These tank cars will operate in two blocks of 6 to 9 rail cars that will be kept separate from the primary movement of iron ore cars. The variation in the number of rail cars is dependent on the type and capacity of tank car that is selected for mine operations.

The potential for a spill exists in the event of a rail accident, truck accident, a leak from the rail tank cars, or a leak from a vehicle. The proposed rail route to the Kami mine travels near several lakes that are used for recreation and water supply. One specific concern regarding the proposed rail route is the potential for a derailment resulting in a spill that affects the Town of Wabush's PWSA.

Depending on the nature and volume of a spill, there could be a significant adverse environmental effect on the PWSA. Additionally, depending on the extent, location, and time of year of a spill, the effects to: fish and fish habitat; soil; and plant and/or animal species of conservation concern could also be significant. A derailment involving a fuel spill would also expose fuel to the open air, releasing volatile organic compounds, which could affect air quality.

3 SPILL PREVENTION AND CONTAINMENT

3.1 Spill Prevention Measures

To reduce the risk of derailment the speed of the fuel car movement through the PWSA will be restricted to less than 25 km/h. Restricted speed is defined as the ability to safely stop your train within one half your range of vision. Any speed reduction would minimize the risk of a potential derailment and or release of diesel fuel or fuel oil into the watershed area. Fuel trains will only move through the PWSA during daylight hours so that any track issues can be identified and spill response can be completed effectively.

When the fuel train arrives at the Kami Railway Line, it will be met by a hi-rail vehicle (i.e. a pick-up truck with a set of rail wheels that can travel on the rail track) which will lead the fuel train at a specified distance in advance to inspect the railway prior to the train traveling through the PWSA to inspect the line for broken rails, damage, obstructions, wash-out, ice/snow build-up, etc. Communication with the hi-rail vehicle and the dedicated fuel train will be via radio, train dispatcher and/or cell phone.

Empty tank cars from the Alderon mine location would operate in the reverse manner of the loaded tank cars inbound to the mine site.

3.2 Spill Containment Equipment

The spill containment approach developed for the potential derailment of fuel cars in the Wabush PWSA is based on separating storm water runoff and spilled/derailed fuel/chemical to minimize the risk to water quality in Wahnahnish Lake. Stormwater runoff which does not come in contact with fuel/chemical will not require treatment and can be discharged directly to Wahnahnish Lake. Any spilled fuel or chemicals and any contaminated stormwater runoff will be captured in ditches along the rail route, collected, pumped out and transported offsite for disposal.

To provide rapid spill response, the hi-rail vehicle that will lead the fuel cars to the mine site, will be staffed with emergency response personnel and will contain a spill kit to facilitate immediate first response in the event of a spill due to derailment or tank leak. Spill kits will also be provided along the rail route at regular intervals to allow for rapid spill response. They will contain the appropriate type, size and quantity of equipment for the volume/type of product being transported or stored.

A typical Spill Kit would include:

- tyvek splash suits
- 4 pairs of chemical master gloves
- respirators

- 10 large bags with ties for temporary use
- 2 oil only booms (5" x 10')
- 50 oil only mats (16" x 20")
- 5 sorbent socks
- 10 sorbent pads
- 2 large tarps
- 1 roll duct tape
- 1 utility knife
- 1 field notebook and pencil
- 1 rake
- 1 pick axe
- 3 aluminium scoop shovels
- 1 instruction binder

In addition to the spill response material, various hand held tools including shovels and a variety of mobile heavy equipment including excavators, front-end loaders, bull-dozers, haul trucks, and vacuum truck will be available and can be quickly mobilized from the mine site to aid in spill response as required.

The following equipment will also be stored in each hi-rail vehicle for immediate response and traffic control, if required:

- Fire Extinguisher
- Emergency Wind Sock
- First aid kit
- Glow sticks
- Traffic cones
- DOT approved reflective triangles
- Flashlight

4 RESPONSE ORGANIZATION

This section defines the roles and responsibilities of all personnel responsible for the response to and clean-up of any spills occurring during the transport of fuels and/or other chemicals to and from site.

4.1 First Responders

A team of two trained emergency responders operating a hi-rail vehicle will be responsible for checking the track for any hazards ahead of the rail cars during transportation of fuel and chemicals to the mine site. In the event of a derailment, the rail locomotive will immediately notify the team of first responders in the hi-rail vehicle.

The first responders will:

- Ensure site and personnel safety;
- Assess the preliminary severity and source of the spill;
- Stop the spill, if it is safe to do so;
- Identify and contain the spill if possible;
- Immediately report to mine dispatch and to the Town of Wabush (Department of Public Works);
- Control traffic if required to maintain a safe environment; and
- Participate in spill response as a member of the cleanup crew.

4.2 Mine Dispatch

Upon notification of a spill or incident, the mine dispatch will:

- Immediately notify and inform the Kami Emergency Response Supervisor and mobilize the Emergency Response Team;
- Provide information, including directions and or/updates as appropriate to various stakeholders; and
- Provide ongoing information and support to the Kami Emergency Response Supervisor, Mine manager, Environmental manager, and others as required.

4.3 Kami Emergency Response Supervisor

The Kami Emergency Response Supervisor will:

- Assume complete authority over cleanup personnel and the spill scene;
- Evaluate the initial situation and assess the magnitude of the problem;
- Determine whether a third party spill response contractor is required;
- Record the time of the spill incident, sources of information and details on location, magnitude, type of any medical emergencies, and any other information relevant for follow up reporting including a spill report form;

- Notify the mine manager, environmental manager and any key external contacts;
  Work closely with the Town of Wabush Department of Public Works manager during the entire spill response process;
- Ensure that any spill over 70 L in volume on land or of any volume in water or within 100 meters of a water body, well or area frequented by people is reported to the Canadian Coast Guard without delay (The Canadian Coast Guard then notifies other government agencies as required);
- Follow directions from the Canadian Coast Guard or other government authorities as required;
- Assess the requirements for people, equipment, materials and tools to contain the spill;
- Ensure that the response team is provided with proper personal protective equipment (PPE)
- Ensure that all response team personnel have received adequate training to fulfill their responsibilities as part of the spill response team;
- Ensure expeditious response and cleanup of spill site and impacted areas;
- Oversee the cleanup operation until it is satisfactorily completed;
- Ensure that the spill is documented with field notes, volumes and weights of material used, and photographs;
- Provide reports of the spill to government agencies, as required; and
- May act as a spokesperson with the public, media and government agencies with the aid of the HSE manager.

4.4 Kami Emergency Response Team

The Kami Emergency Response Team will:

- Respond to any spills, medical and/or fire emergencies;
- Conduct cleanup of spills under direction of emergency response supervisor;
- Deploy booms, sorbents and other equipment and materials as required; and
- Continue cleanup as directed by supervisor or until relieved.

4.5 HSE manager

The mine Health Safety and Environment (HSE) Manager will:

- Liaise with government agencies as required;
- Oversee completion and distribution of Spill Report;
- Ensure investigation identifies measures to prevent similar spills;
- If required, work jointly with government authorities to develop remediation plan for the site;
- Ensure that there are follow up incident reports prepared and appropriately distributed as required on the spill, clean up, remediation efforts and any environmental impacts and takes action, as necessary, to prevent recurrence;
- Oversee disposal of waste and remediation activities; and
- Implement follow up and monitoring program as appropriate.

4.6 Mine manager

The Mine Manager will

- Assist the Emergency Response Supervisor and spill team as needed, particularly in obtaining any additional resources not available on-site for spill response and cleanup; and
- Provide liaison with Alderon's corporate team (including the manager of public relations) keeping them informed of cleanup activities as required.

4.7 Third Party Spill Response Contractor

In the event that a spill requiring considerable resources over an extended period occurs, the engagement of an approved and licensed third-party spill response contractor shall be utilized.

5 ACTION PLAN

ENSURE SAFETY OF YOURSELF AND OTHERS

The first responder must:

- Ensure personal and site safety;
- Assess hazards and attend to injured; and
- Secure the site and close the road if required

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IDENTIFY AND CONTAIN

The first responder must:

- Stop the spill if safe to do so; and
- Identify and contain the spill if possible

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REPORT TO DISPATCH AND TOWN

The first responder must:

- Report the spill to mine dispatch and to the Town of Wabush's Public Works Department

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ALERT

Mine Dispatch must:

- Contact Emergency Response Supervisor and mobilize the Emergency Response Team to cleanup spill

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NOTIFY

The Emergency Response Supervisor must:

- Immediately contact the **Canadian Coast Guard 1-800-563-9089** for spills over 70 L in volume on land or for spills of any volume into a water body or within 100 meters of a water body, well or area frequented by people.
- Notify the Town of Wabush Works Department

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RECORD THE FACTS OF THE SPILL

The Emergency Response Supervisor must:

- Complete spill and incident report forms; and
- Document the event including photographs

5.1 Notification

Once a spill has been identified, timely notification of response personnel, management and external agencies will be critical. In some cases, notification may include a written report.

The Town of Wabush's Department of Public Works (water department) will be immediately notified in the event of a spill in the PWSA.

The Canadian Coast Guard acts as the main dispatcher for all reportable spills in Newfoundland and are therefore the primary contact in the event of a reportable spill (≥ 70 L on land or any volume in water). They can be reached at 1-800-563-9089 or 709-772-2083.

5.2 Specific Response Procedures

Spills may occur on land, snow, ice or water or a combination of one or more depending on the conditions at the time of the spill. Various proven methods of containment and recovery are well documented for use in northern climates and are summarized below.

In all cases, a third party contractor may be contacted for spills that cannot be managed by the response team due to either safety hazards, or quantity.

5.2.1 On Land

- Block entry into waterways by building a berm or trench
- Do not flush into ditches or drainage systems that lead to water
- Contain with earth berm or other barrier
- Capture minor spills with appropriate sorbent pads
- Recover large spills with pumps or vacuum equipment

5.2.2 On Snow or Ice

- All possible attempts should be made to prevent spills from entering ice covered waters
- Block entry into waterways and contain with snow berm or other barrier
- Trench or ditch to intercept or contain fuel on snow, where feasible
- Compact the snow around the outside perimeter of the spill area

- Construct a berm with snow, either manually or with shovels or heavy equipment such as graders and dozers where available
- Contain or collect contaminated snow
- Use synthetic liners to contain on site if feasible
- Recover minor spills with appropriate sorbent pads or snow, remaining contaminated ice/slush can be scraped and shoveled into a plastic bag or barrel.
- If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to that on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water.
- Dykes can be used to contain fuel spills on ice. By collecting surrounding snow, compacting it and mounding it to form a dyke down slope of the spill, a barrier is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel can then be pumped into barrels or collected with sorbent materials.
- For significant spills on ice, trenches can be cut into the ice surrounding and/or down slope of the spill such that fuel is allowed to pool in the trench. It can then be removed via pump into barrels, collected with sorbent materials, or mixed with snow and shoveled into barrels or bags

5.2.3 On Water

- Contain spill as close to release point as possible
- Use spill containment boom to concentrate slicks for recovery
- Protection (diversionary) booming using sorbent booms could be deployed to deflect slicks from nearby intakes or other sensitive areas
- On small spills, recover using appropriate sorbent pads
- Do not use sorbent booms/pads in fast currents and turbulent water
- Intercept moving slicks in quiet areas using sorbent booms

5.3 Reporting Spills

All spills will be documented by the Emergency Response Supervisor using a spill report form and will be submitted to the HSE manager within 24 hours of the spill. The preliminary report must include the date, time, location, volume, material(s) involved, specific gravity information, clean-up actions taken, root cause analysis and corrective actions to prevent future occurrence. Photographs will be included as part of the report together with records of notifications, decisions made and information on any required sampling and sample analysis.

6 SPILL CLEAN-UP

6.1 Disposal of waste

Once a spill is contained the spilled materials and affected area will be cleaned up immediately. This will prevent any contamination of soil, surface water and groundwater in the area. This may include the following actions:

- If necessary, a vacuum truck may be used to remove excess fuel
- Transfer spilled substance to appropriately labeled tanks, drums, or intermediate bulk containers (IBCs)
- Transfer contaminated soil and water to appropriately labeled drums, or IBCs
- Transfer used absorbents to appropriately labeled drums or IBCs
- Do not dispose of any tools or materials into general waste
- All traces of contaminated material must be cleaned for every spill

All waste materials from a spill clean-up such as used absorbent materials, contaminated protective clothing, contaminated soil or water, will be removed and stored in a designated hazardous waste storage area. All materials will be placed in appropriate containers and clearly labeled. The HSE manager will make arrangements for offsite transport and disposal with an approved contractor. All hazardous waste shall be removed from site by use of a licensed hazardous waste contractor.

Copies of all shipping documents and disposal certificates related to the spilled material and subsequent clean-up will be kept by the HSE manager.

6.2 Remediation

In the event of a hazardous material or diesel spill, the soil and groundwater will be remediated to meet regulatory standards and requirements. In the event of a spill of concentrate or other solid material, the area will be cleaned up through recovery activities, preventing damage to the surface organic layer.

6.3 Clean-up reporting

The HSE manager will prepare and distribute a report as required detailing the spill, clean up, remediation efforts, any environmental impacts and the follow up and monitoring program going forward.

6.4 Follow-up and monitoring

Following a spill, Environmental Effects Monitoring (EEM) program will be established and undertaken under the direction of the HSE manager. Specifics of the monitoring will be planned proportionate to the seriousness and likelihood of the event.

Monitoring will establish:

- Effectiveness of spill containment (Product located in sites remote from the original spill, habitat and wildlife effects, unforeseen spill trajectory or effects)
- Effectiveness of spill remediation (restoration of spill site, status of area immediately surrounding site, follow-up of contaminated material removal)
- Effectiveness of spill investigation and change implementation (local situation that could produce a similar spill, managing and planning for prevention)

7 TRAINING

All employees and contractors will be required to have basic first aid training, as well as WHMIS training, before working on the site. Training on emergency spill response procedures will be conducted for all Project personnel (i.e., Alderon employees, contractors, and suppliers) during site orientation. Managers will be required to have advanced level first aid training, as well as Transportation of Dangerous Goods Training.

Emergency Response Team members will be aware of all potential environmentally hazardous substances on site or in transport, and will be trained to handle and contain them in the event of a spill. They will also be required to have Transportation of Dangerous Goods Training. The names and contact information for key people of the Emergency Response Team will be posted at key locations at the site.

Specific training sessions, including mock spill exercises, will be scheduled for individuals on the Emergency Response Team, managers, mine dispatch, and those directly involved in handling hazardous materials to ensure they know all steps to be undertaken in handling these materials, as well as the steps involved in the event of a spill, including the proper use of spill kits.

In case of a spill or after a drill, this plan will be reviewed and revised as necessary to adapt it to the changing condition of the site. Input on the effectiveness of drills, and procedures from all site personnel will be encouraged. Leading and lagging indicators will be used to track performance and identify weaknesses in the Environmental Program in general. Document updates, additional training exercises, and changes in communication may be developed as a result of the findings.