

PRAIRIE CREEK MINE ACCESS ROAD

ROAD OPERATIONS PLAN

May 2012

PREAMBLE

This *Road Operations Plan* is effective from October 1, 2012 and applies to all road operations of the Prairie Creek Mine access road which connects the Mine to the Liard Highway near Nahanni Butte.

The following formal distribution has been made of this plan:

Mackenzie Valley Land and Water Board

Parks Canada

Canadian Zinc Corporation - Prairie Creek Mine Office, Fort Simpson Office

Canadian Zinc Corporation - Vancouver Office

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PLAN OVERVIEW

The guidelines and procedures outlined in the following sections of this Road Operations Plan (the Plan) are designed for all employees, visitors or contractors of Canadian Zinc Corporation (CZN) who use the Prairie Creek Mine access road (the Access Road). It is the Company's policy to insure that proper procedures are implemented and followed at all times to promote the safety of road users and of wildlife in the area.

This Plan further describes policies and procedures intended to reduce the risks of accidents and potential for disturbance of wildlife. The essential elements of the plan are as follows:

- Notification of travel plans and communications while in transit;
- Screening of road users;
- Safe driving guidelines;
- Response procedures; and,
- Unacceptable practices.

Please read each section below thoroughly so as to understand the reasoning and principles underpinning the requirements. While this Plan does address safety issues and response to incidents, the Plan does not address responses to spills. Access Road users are required to read and comply with CZN's *Spill Contingency Plan*, and be able to respond to a spill relevant to their cargo and situation.

This Plan is a working document. Any comments or suggestions for improvements or updates should be directed to one of the following:

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1.0 ROAD DESCRIPTION

The Access Road alignment to the Prairie Creek Mine is shown in Figure 1. From the east, the road starts at the turn off from the Liard Highway (#7) to Nahanni Butte, approximately 131 km north of the BC border. The Liard Transfer Facility (LTF) is approximately 1 km along the Nahanni road from the highway junction. The majority of haulage will be either to or from the LTF. The Tetcela Transfer Facility (TTF) is approximately mid-point along the road, some 86 km from the LTF. The Mine is another 85 km.

Approximately 8 km along the road from the LTF, the access road to the Mine branches off to the north from the Nahanni Butte access road. During road operations, a manned checkpoint will exist on the Mine Access Road near this junction. No other checkpoint will exist until arrival at the Mine. After approximately another 14 km, the road crosses the Liard River via an ice bridge. The road then travels north along the eastern slope of the Nahanni Range to Grainger Gap.

After heading west through Grainger Gap the road swings north along the eastern slope of the Silent Hills, gaining elevation to Wolverine Pass at which point it enters the Nahanni National Park Reserve (NNPR). After the pass, the road descends the slope via broad turns. The next 12 km are across flat lowlands in the Tetcela valley before gaining some elevation and reaching the Tetcela Transfer Facility (TTF).

The next 30 km of the road crosses relatively flat land of the Ram Plateau before dropping into a shallow valley and bridge crossing of Polje Creek. The road then crosses more lowland terrain and side slopes for the next 10 km before reaching Cat Camp and the Sundog Creek valley flanked by limestone cliffs.

The next 11 km is across a relatively flat gravel flood-plain within a box canyon, at the head of which is the chain-up and break check area before the Mackenzie Mountains. Trucks are required to use chains between the chain-up area and the Mine. The arrival at the chain-up area signifies the start of significant mountainous road conditions and gradients from here to the Mine and extra precautions need to be taken. The next section of 11 km gradually ascends the upper Sundog valley up to the high elevation pass across side-slopes, some consisting of talus, including a bridge crossing across a canyon. The road leaves the NNPR at Sundog Pass. The weather conditions at Sundog Pass are known to be extremely variable and extreme caution should be applied on this stretch of the road.

The next 10 km of the road consists of a relatively steep decent down the Funeral Creek valley to Prairie Creek. There are hairpin turns just after the pass and also at 4 km from the pass. Once at Prairie Creek, the last 7 km section of road is relatively flat and follows the eastern bank of the creek to the Mine.

2.0 ROAD CONSTRUCTION AND OPERATIONS

Annual road construction will commence in the fall from the west (around November 1, depending on the weather). Construction on the eastern portion and the ice bridge over the Liard River will commence when conditions permit, with the goal of opening the whole road by January 15. Road construction approaches and details are given in Appendix A.

The transport of mineral concentrates from the Mine, and the annual re-supply of the Mine with fuel and operating supplies on the back-haul, will have a sequence of events as follows:

- The western portion of the road from the Mine to the TTF will be opened first on around December 1. The CZN truck fleet, located at the Mine, will then commence concentrate haulage from the Mine site to the TTF.
- By January 15, with the opening of the Liard Ice bridge, the entire Access Road will be open and the CZN fleet will begin concentrate haulage from the Mine all the way to the LTF, and will back-haul operating supplies and fuel without stopping at the TTF in either direction. The Contractor fleet, accessing from the LTF location, will collect concentrate from the TTF and deliver it to the LTF. When the Contractor fleet has removed all of the concentrate from the TTF, the Contractor fleet will join the CZN fleet in moving the remainder of the concentrate from the Mine site to the LTF, with a target completion by March 31. However, the haul will continue into April for as long as possible.

All dates and operations are subject to weather and road conditions, and the conditions specified in operating permits.

The goal of transportation operations is to deliver all the necessary cargo to the destination without mishap, spillage or the loss of any product in the form of dust. The largest volume of outbound cargo will be the bagged mineral concentrates. The intent of the bagging operation is to avoid concentrate dust on the outside of the bags, and to avoid tears. Drivers who suspect the presence of concentrate dust outside of the bags, or who observe a ripped bag, are to inform the Journey Management System (JMS) Coordinator) immediately. Advice will be provided as to the appropriate course of action. Ripped bags will be double-bagged and an inspection will be made for any spillage. Any spilled material will need to be immediately cleaned up. Inbound chemicals will also be transported and stored in approved containers. Any suspicion of inappropriate transport or storage, or container leakage, is also to be reported immediately.

At the end of the road operating season, the south-eastern end near the junction with the Nahanni Butte access road will be naturally blocked by the ablation of the ice bridge and can be blocked at specific locations with gates, berms, pits and/or boulders to discourage use, as necessary. A blockage will also be placed in Wolverine Pass to discourage access to the NNPR.

3.0 NOTIFICATION OF TRAVEL/COMMUNICATIONS

CZN will adopt a journey management system (JMS) which will be overseen by a JMS Coordinator (JMSC). All users of the Access Road will be required to check in with the JMS Coordinator prior to using the Access Road. The JMSC will ensure that any user of the Access Road is fully briefed on rules and regulations, is qualified and receives an update on the current status of the Access Road. The JMS will comprise, but not be limited to, the following:

- All vehicles are serviceable and carry a first aid kit, fire extinguisher, survival kit, spill kit, global positioning system beacon, and have working communications. Those in the vehicle must all have suitable winter clothing;
- All drivers are trained and briefed on the route, road conditions, existing and forecast weather conditions, problem areas, any observations of wildlife, and are instructed on and given a copy of the communications protocols;
- All drivers have a copy of, and have read and understood, the Spill Contingency Plan for the Prairie Creek Mine Access Road;
- A journey plan is kept by the JMSC which includes the name of all persons in the vehicle, the assigned radio call sign, ETD and ETA, destination, type and quantity of the cargo and confirmation of vehicle fuel level;
- The plan is opened by radio upon departure and closed by radio upon arrival at destination with the JMSC;
- Progress is monitored by the JMSC and radio check-ins may be required at predetermined intervals:
- The JMSC will track all traffic and will initiate a radio call if a vehicle check in is overdue. A response is initiated if traffic passing through the area within a very short period of time cannot confirm the non-reporter has radio problems or other valid reason for missing a check in.

For CZN trucks, their 'journey' will start and end at the Mine (Km 0). For Contractor trucks, their journey will start and end at the LTF (Km M180). There will be a check-in and check-out process.

For general safety and traffic management, it is imperative that the JMSC knows what vehicle traffic is using the road at all times. There will be a check-point to monitor road use at the junction of the Access Road with the Nahanni Butte access road, manned by Nahanni Butte members. Signs will warn road users of the presence of high frequency truck traffic. All west-bound traffic will be flagged down to confirm identity and intentions. Unauthorized traffic will be noted, advised of the road operations in progress and associated dangers, and will be discouraged from using the road for any purpose. There will also be traffic and wildlife monitors on the road with radios. The monitors will observe and record unauthorized road use, as well as any hunting, fishing, camping or firewood harvesting activities.

Frequent communication by all users and monitors is expected to track progress and forewarn drivers of on-coming traffic. The latter is not only to limit the potential for accidents, but also to facilitate passing for those sections of the road that are one-lane only. The ability to

communicate in transit will also provide the means to notify control points in the event of breakdown or an accident, and to advise wildlife sightings that differ from those given at the journey outset.

Communication requirements will be determined prior to each trip.



4.0 SCREENING OF TRUCKS AND DRIVERS

Maintenance and checking of the CZN truck fleet will be undertaken at the Mine. CZN's contract with a Contractor truck fleet will specify that trucks are to be in suitable condition (properly maintained and free of leaks) for use on the road. In addition, Contractor trucks will be inspected at the LTF to ensure suitability, and this will include steering and brake checks and the availability of chains for the road section over the Mackenzie Mountains. Drip pans are to be used for vehicles stationary for any period.

All drivers will be required to provide verification that they have a suitable driving licence and suitable driving experience. Verification checks will include confirmation that all drivers have read and understood the contents of this *Road Operations Plan* and the *Spill Contingency Plan*.

All drivers will be required to attend a classroom briefing, by a qualified CZN road and safety representative (such as the JMSC) who will present an overview of the Access Road, safety regulations, locations of equipment/spill caches and any other protocols when using the Access Road. For those drivers who are not able to read and/or understand the ROP, this classroom session will be arranged to provide the necessary instruction. Checks will also be made to ensure drivers do not exceed the allowed number of driving hours per described period without rest.

Regarding drugs and alcohol, CZN is committed to the safety and well-being of employees and contractors, and protection of the environment. The use of illicit drugs and the misuse of alcohol or other drugs can limit a driver's ability to properly perform their job, and can have serious negative impacts and consequences on the health and safety of themselves and others. Drugs of concern include illegal and illicit drugs, alcohol, inhalants, medications or any other substances which inhibit or may inhibit an individual's ability to perform their job safely and productively. For all employees, contract workers, and authorized visitors using the road, CZN prohibits:

- Anyone being unfit to drive because of the use or after effects of alcohol or drug use;
- The misuse of medications, either prescribed or over the counter;
- The use, possession, distribution, offering or sale of alcoholic beverages;
- The use, possession, distribution, offering of sale of illicit or illegal drugs, drug paraphernalia or the presence in the body of illicit or illegal drugs;
- Drivers having a blood alcohol concentration exceeding 0.04% (0.04 grams/100ml) while in transit.

CZN reserves the right to conduct searches, and to perform drug and alcohol testing. The verification step before a driver and vehicle is allowed to proceed with a journey may include questioning to confirm that a driver is in a fit state to work.

ANY PERSON FOUND TO BE IN BREACH OF THE DRUG AND ALCOHOL CONDITIONS LISTED ABOVE WILL BE TERMINATED IMMEDIATELY

5.0 DRIVING GUIDELINES

Safe speed limits will be posted as necessary to account for grades, curvature and sight-lines. Lower limits may also be posted for potential wildlife conflict areas. Drivers are advised to adjust their speed according to conditions at all times, both for road conditions and visibility. Specific speed limits may also be set for certain cargo and specific road sections.

The Access Road will have posted kilometre markers (Km) along its entire length and they will be of sufficient size and shape for easy recognition by drivers for reference. In addition, the edges of the prepared roadway will be flagged or reflector marked as deemed appropriate. Drivers should ensure they stay well within the flagged boundaries to avoid serious implications. The boundaries should always be clearly visible at the speed being driven. From time to time, whiteout conditions may occur where markers are barely visible. In this case, drivers should slow to a crawl or even stop, until conditions improve.

Vehicles will be able to pass safely along most of the road. However, certain sections will be single lane only, particularly the sections with significant gradient. The journey plan provided at the outset of the trip will provide details on the sections that are single lane, and the procedures that are to be followed for passing. Sight-lines over most of the road are good, but there are a number of blind corners, particularly along the Funeral Creek section, that will require greater care. Radio communications will be used to coordinate passing locations. Vehicles may be asked to travel in convoy to reduce radio workloads. CZN is also investigating an approaching vehicle warning system which would be fitted to all vehicles.

There is a potential for wildlife occurrence along the Access Road. Minimizing the potential for collisions is clearly desirable, both between vehicles and with wildlife. All road users should be aware of the potential for wildlife presence, and to use common sense and take appropriate precautions to avoid incidents. Wildlife have priority at all times. If any Species at Risk (SAR, e.g. woodland caribou) are on the road, vehicles are to stop until the animals have moved a safe distance away or are no longer visible. The use of engine retarders is discouraged to avoid wildlife disturbance.

6.0 EMERGENCY RESPONSE PROCEDURES

IN THE EVENT OF AN ACCIDENT OF ANY KIND, THE DRIVER INVOLVED IN THE ACCIDENT, OR THE NEXT DRIVER ARRIVING ON THE SCENE, IS TO RENDER FIRST AID IF NEEDED URGENTLY, AND THEN CONTACT THE JMSC AT THE FIRST OPPORTUNITY TO PROVIDE THE FOLLOWING INFORMATION:

- Location of accident
- Nature of accident
- Whether any injuries were sustained or a spill occurred, and what responses have been taken

After notifying the relevant people, appropriate responses may then be undertaken based on advice from the JMSC and medical personnel who will be called if there are injuries.

ALL ROAD USERS WILL CARRY BASIC FIRST AID AND SPILL RESPONSE EQUIPMENT, AND WILL BE PREPARED TO USE THEM APPROPRIATELY.

The general steps for emergency response are as follows:

- 1. Ensure your health and safety first.
- 2. If there is an injury, make the person as comfortable as possible. Provide warmth if necessary. **DO NOT MOVE PATIENT** unless it is essential to prevent further injury to the victim or other personnel.
- 3. Contact medic immediately (JMS Coordinator to do this) via radio or in person and tell them the following:
 - ✓ Location of injured persons
 - ✓ number of injured persons
 - \checkmark type (s) of injury
- 4. Administer first aid until medic arrives on scene.
- 5. Prepare/assist any and all equipment needed to assist in rescue/extraction of injured worker.
- 6. If medivac is required, designate someone (likely the JMSC or the medic) to phone the ambulance service and give all information required as outlined below.
- 7. The medic will examine the injured person (s) to determine the full extent of injury. The medic will continue to provide treatment as needed until passed on to a person with a higher level of certification, or a hospital has been reached.

8. In the event that the medic must accompany the injured worker during transport, a person with proper medical training or certification will remain on site.

The following emergency numbers may be used in the event of an accident:

250 774 2344
250 774 6916
867 695 7000
867 695 3232
867 695 3111
250 774 2072
867 695 2263
250 774 6171
867 695 2326
867 873 7468
867 669 4729
867 669 4729

When calling the agencies listed above, be sure to give the following information to whom you speak with;

- your name
- location
- type of emergency
- injuries? how many and what type
- special equipment or personnel needed
- what is being done already
- weather conditions and landing area if flight required

7.0 UNACCEPTABLE PRACTICES

The following practices are considered unacceptable:

HUNTING

FISHING

WILDLIFE HARASSMENT

FIRES OR INAPPROPRIATE DISCARD OF IGNITION SOURCES

LITTERING

LEAVING VEHICLES UNATTENDED

STOPPING IN SINGLE LANE LOCATIONS WITHOUT GOOD REASON

TOILET STOPS IN UNAUTHORIZED LOCATIONS

USE OF ALCOHOL WITHIN 24 HOURS OF AND DURING ROAD USE

USE OF THE ROAD IF UNDER THE INFLUENCE OF DRUGS

At no time during road operations are CZN employees or it's contractors allowed to use the road to facilitate hunting or fishing. CZN is a firm supporter of fish and wildlife issues in the area.

Please do not harass <u>ANY</u> animals encountered. Respect for the area is to be adhered to at all times. All wildlife fatalities must be reported immediately, accidental or otherwise. If wildlife is spotted ahead near the road, users are advised to stop and wait for the animals to move on. If the animals do not move, users should approach very slowly until they do so in order to not cause the animals to flee suddenly expending energy.

Garbage should not be discarded at any time. <u>NO</u> litter should be left where animals and birds could be exposed to it. If you see garbage, pick it up and dispose of it properly.

IF YOU SEE ANY ENVIRONMENTAL ISSUE YOU FEEL SHOULD BE ADDRESSED, PLEASE CONTACT THE JMS COORDINATOR AS SOON AS POSSIBLE.

GRIZZLY BEARS ARE PRESENT IN THE AREA. WHILE THEY SHOULD BE IN HIBERNATION, YOU MUST BE AWARE OF THE POSSIBILITY OF AN ENCOUNTER AT ALL TIMES. APPROPRIATE MEASURES MUST BE TAKEN TO AVOID SUCH ENCOUNTERS. STAY IN YOUR VEHICLE AT ALL TIMES UNLESS THERE IS AN ACCIDENT OR BREAKDOWN. IF YOU ARE OUT OF YOUR VEHICLE AND A BEAR IS SPOTTED, RETURN TO YOUR VEHICLE IF IT IS CLOSE ENOUGH, AND IF NOT, BACK-UP SLOWLY. IN THE EVENT AN ENCOUNTER CANNOT BE AVOIDED, TAKE ALL POSSIBLE MEASURES TO INSURE YOUR SAFETY! USE AVAILABLE EQUIPMENT TO MAKE A LOT OF NOISE, CLIMB A TREE. IN A WORST CASE SCENARIO, LAY FACE DOWN AND COVER YOUR NECK AND HEAD WITH YOUR ARMS. DO NOT RUN.

APPENDIX A ROAD CONSTRUCTION APPROACHES AND DETAILS

The following general approaches will be used to construct the access road:

- Kledo's general approach to road construction will be adopted with modifications as necessary (although CZN is not committed to use Kledo).
- The erection of a guard rail-type barrier on the outer edge of the road from Km 11-16 will be evaluated to reduce the risk of spills along this section where the grade is steep and a tributary of Funeral Creek exists below.
- Suitable locations for the construction of run-away lanes will be investigated for sections Km 11-16 and 19-22.
- The road bed from the Mine to Cat Camp is composed of predominantly gravel. However, salt will not be used to maintain the gravel surface. Gravel may be added for vehicle traction, as required.
- High snow banks will be avoided to maintain sightlines and to allow wildlife to escape the alignment. Gaps in snow banks may also be left for the latter purpose.
- Side hill cuts and fills will generally be avoided if possible, except where the evidence is that the ground is free of ice rich permafrost. Cut material will be used if appropriate, or used elsewhere, but not discarded downslope.
- The Polje re-alignment will include fill placement, but gaps/swales will be left so natural runoff flow directions are not significantly modified.
- All new road alignments will retain the organic layer as much as possible to insulate the underlying soil and limit the potential for permafrost thaw. Adequate drainage will also be provided to avoid unstable slopes.
- A level road bed will be created using dozers with shoes fitted on the bottom of the blades. This will minimize disturbance of the organic layer.
- Regarding the accumulation of debris on the existing road from upslope, the information will be used to plan the road location with respect to the toe of the slope (in active debris areas).
- Construction and maintenance activities will be continually overseen by supervisors who will ensure appropriate techniques are used such that sediment will not be produced during periods of thaw. This will also apply to seasonal road closure activities, including snow-fill removal.
- Temporary crossing structures and snow-fills will be removed at break-up to avoid blockage and erosion.
- A stable road bed will be constructed adjacent to creeks and provide for runoff control and minimize the dispersal of sediment during precipitation events.
- Re-vegetation of riparian areas will be promoted to further reduce the potential for sediment dispersal.
- The road will be regularly inspected and maintained during the operating season to ensure optimal performance and minimize risks from poor road bed conditions.
- Road monitoring will occur during both construction and operation. During construction, monitoring will be daily to assess how recently constructed portions are performing, and

to determine requirements for portions being constructed. During operations, monitoring would initially be daily, with a reduction in frequency as road performance becomes better defined. Drivers will report on road conditions and any areas of difficulty or requiring repair. Snow accumulations will also be monitored to assess the potential for avalanches.

- The route east of Km 85 will be visually reviewed annually before the following winter. After the first winter of road operations, drainage management at and west of Wolverine Pass will be reviewed, as will the route west of Km 85 to assess the function of cross-road drainage.
- After the first year of construction, and following extreme rainfall events at any time, the re-alignments will be checked for areas of instability, specifically the creek crossings, areas of fill placement, and the switch-backs in the Silent Hills. Low over-flights of these areas are initially proposed to allow for inspection. If problem areas are suspected, follow-up inspections will be made by helicopter, and will include set-downs and the use of small tools (e.g. shovels) and readily transportable materials (e.g. silt fence), as necessary. More significant remedial work would be undertaken during construction in the subsequent road season.
- Potentially unstable areas and karst features within 200 m of the access road will be inspected at a frequency dependent on observed conditions and changes or lack thereof of those conditions.

TABLE 1: CARGO FOR ROAD HAUL

MATERIAL	FORM	PACKAGE	CONTENTS	TONNES	UNITS PER	NO.	TOTAL			
				PER LOAD	LOAD (max)	LOADS	LOADS			
Outbound										
Mineral concentrates	Solid	bag (kg)	3,000		10	4000				
Hazardous waste	Various	drum (litres)	205	10	49	5				
Inbound							1133			
Fuel and Oil										
Diesel	Liquid	Tanker (litres)	10,000		1	800				
Mineral Oil (Explosives)	Liquid	Tanker (litres)	10,000		1	3.5				
Petroleum fluids	Liquid	drum (litres)	205	20	98	4	807			
Mill Supplies and Reagents										
Jaw Crusher Liners	Solid	Pallets (Kg)	250	15	60	0.6				
Cone Crusher Liners	Solid	Pallets (Kg)	250	15	60	1.2				
Ball Mill Liners	Solid	Pallets (Kg)	250	15	60	0.9				
Grinding Balls	Solid	drum (litres)	250	15	60	6.9				
Ferro Silicon	Solid	bag (kg)	1000	20	20	7.2				
Glycol	Liquid	drum (litres)	205	20	98	1.0				
Flocculant	Solid	bag (kg)	200	10	50	0.1				
DF067	Liquid	drum (litres)	205	20	98	0.4				
SIBX	Solid	bag (kg)	1000	20	20	1.6				
MIBC	Liquid	drum (litres)	205	20	98	0.0				
Soda ash	Solid	bag (kg)	1000	20	20	21.1				
P82	Solid	bag (kg)	1000	20	20	1.9				
AQ4	Solid	bag (kg)	1000	20	20	7.3				
Copper sulphate	Solid	bag (kg)	1000	20	20	19.0				
3894	Liquid	drum (litres)	205	20	98	0.2				
RTR3	Solid	bag (kg)	1000	20	20	0.2				
SIL N	Solid	bag (kg)	1000	20	20	5.0				
Sodium sulphide	Solid	bag (kg)	1000	20	20	8.7				
Backfill Cement	Solid	bag (kg)	1000	30	30	170.7	254			
Water Treatment Reagents										
Sulphuric acid	Liquid	Tanker (litres)	20,000	20	1	21.6				
Sodium sulphide	Solid	bag (kg)	1000	0	0	2				
Ferric sulphate (Ferix 3)	Solid	bag (kg)	1000	20	20	3				
Lime	Solid	bag (kg)	1000	20	20	12	39			
Mine Supplies										
Mine operating supplies	Solid	Pallets (Kg)	500	15	30	33.3	33			
Explosives Components										
Sensitizer	Solid	boxes (Kg)	152	10	66	6				
Sodium nitrate	Solid	bag (kg)	25	15	600	6				
Ammonium nitrate	Solid	bag (kg)	1000	30	30	10.5	23			

