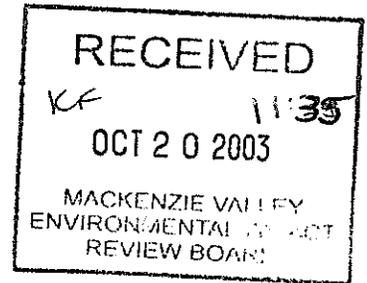


PR



CANADIAN  
PARKS AND  
WILDERNESS  
SOCIETY  
  
NWT CHAPTER



**FAX COVER SHEET**

**Attn:** MVEIRB

**From:** Greg Yeoman  
CPAWS-NWT

Fax Number: (867) 766-7074

No. of Pages (including cover): 25

Date: October 20, 2003

**COMMENT**

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**Re:** Canadian Zinc Corporation, Winter Road Application MV2003J0021

+ ATTACHMENTS

FYI - Forgot to cc this to the MVEIRB last week.

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CPAWS-NWT  
Suite 302, 4921-49<sup>th</sup> St, Box 1934  
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21-



**CANADIAN PARKS AND  
WILDERNESS SOCIETY  
- NWT CHAPTER -**

# Fax

**To:** Stephen Mathyk

**From:** Greg Yeoman  
CPAWS-NWT

**Fax:** (867) 873-6610

**Date:** October 17 2003

**Pages:** (including cover): 11

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**Re: Canadian Zinc Corporation, Winter Road Application MV2003J0021**

Attached is a hard copy of the CPAWS submission regarding the above noted land use permit application, which was previously mailed electronically.

Sincerely,

Greg Yeoman  
Conservation Director  
CPAWS-NWT

---

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**CANADIAN PARKS AND  
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- NWT CHAPTER -**

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October 17, 2003

Stephen Mathyk,  
Regulatory Officer  
Mackenzie Valley Land and Water Board  
Fax: (867) 873-6610  
E-mail: [stephen@mvlwb.com](mailto:stephen@mvlwb.com)

**Re: Canadian Zinc Corporation, Winter Road Application MV2003J0021**

Dear Mr. Mathyk,

Please accept this letter as comments of the Northwest Territories Chapter of the Canadian Parks and Wilderness Society (CPAWS-NWT) on the land use permit application listed above. CPAWS-NWT is part of a national non-profit conservation organization, dedicated to protecting Canada's wilderness.

**Global Significance**

The Prairie Creek mine site is located in an area of globally significant wilderness and natural features, which are recognized and protected by several national and international conservation designations. It is because of the wilderness values and designations of this area that CPAWS is opposing this land use permit application. We believe development of the Prairie Creek mine will put these values at risk, and therefore should not be allowed to proceed.

At the heart of the Nahanni wilderness is Nahanni National Park Reserve (NNPR), a UNESCO World Heritage Site. Canada has a responsibility under the United Nations World Heritage Convention to protect this globally significant wilderness for future generations. Article 4 of the *Convention Concerning the Protection of the World Cultural and Natural Heritage* states that:

*Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end(emphasis added), to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain.*

It is worth noting that the International Council on Mining and Metals, which represents 15 of the largest mining companies in the world, has recently passed a policy committing "not to explore or mine in World Heritage properties, and committed to take all possible steps to ensure that operations are not incompatible with the outstanding universal values of World Heritage properties."

<http://www.icmm.com/news/158ICMMPressRelease-nogoareas-20August03.pdf>

This represents an acknowledgement by the major international mining companies to not only stay out of protected areas, but also to recognize that mining outside protected areas can have a significant impact on neighbouring protected areas. CPAWS submits that the Prairie Creek mine, and a winter road across the karst lands, could have a significant impact on Nahanni National Park Reserve and World Heritage Site and that Canada has an international responsibility to do everything possible to ensure that this does not occur, in accordance with the World Heritage Convention.

A further designation is that the South Nahanni River within the Park Reserve has been designated as a Canadian Heritage River. In addition, the entire South Nahanni watershed and Nahanni karst lands in the Ram Plateau area are being considered for inclusion in an expanded national park, according to a Memorandum of Understanding for expanding Nahanni National Park Reserve, signed by the Deh Cho First Nations and Parks Canada this summer.

The proposed winter road would cross lands within the South Nahanni watershed which were recently granted interim protection from industrial development by the federal government, because of their significant cultural and ecological values, as part of the Deh Cho Process. The lands are also currently under consideration for inclusion in an expanded Nahanni National Park.

It is within the context of globally significant ecological values and protective designations and intentions for this area, that an assessment of this application must be based. The importance of protecting the ecological values of the watershed and NNPR, as well as the status of the SNW and karst lands as a proposed protected area, are the reasons why CPAWS-NWT is requesting this land use permit application be referred to an environmental assessment.

Below we set out specific reasons why this land use permit application should be referred to environmental assessment.

#### **Impact of Roads**

Roads in general are not good for wildlife. Winter roads may have fewer impacts than all-weather roads, but still bring negative impacts. Literature reviews of studies assessing the ecological effects of all types of roads, from primitive logging roads to major highways, have found that roads have multiple, long term cumulative environmental impacts. In "The Ecological Effects of Roads, conservation biologist Reed Noss states:

Nothing is worse for sensitive wildlife than a road. Over the last few decades, studies in a variety of terrestrial and aquatic ecosystems have demonstrated that many of the most

pervasive threats to biological diversity - habitat destruction and fragmentation, *edge* effects, exotic species invasions, pollution, and overhunting - are aggravated by roads. Roads have been implicated as mortality sinks for animals ranging from snakes to wolves, as displacement factors affecting animal distribution and movement patterns, as population fragmenting factors, as sources of sediments that clog streams and destroy fisheries, as sources of deleterious edge effects, and as access corridors that encourage development, logging, and poaching of rare plants and animals. Road-building in National Forests and other public lands threatens the existence of de facto wilderness and species that depend on wilderness (<http://home.pacbell.net/mjvande/roads1.htm>).

In their article published in the peer-reviewed journal *Conservation Biology*, 'Review of the Ecological Effects of Roads' Stephen Trombulak and Christopher Frissell present several relevant findings:

We reviewed the scientific literature on the ecological effects of roads and found support for the general conclusions that they are associated with negative effects on biotic integrity in both terrestrial and aquatic ecosystems.

Roads exert ecological effects on terrestrial and aquatic ecosystems in seven general ways: (1) direct mortality from road construction, (2) direct mortality from collisions with vehicles (i.e., roadkill), (3) modification of animal behavior, (4) alteration of the physical environment, (5) alteration of the chemical environment, (6) spread of exotic species, and (7) increased intensity or spatial extent of human use and alteration of habitats.

Recognition of the tremendous diversity of causal mechanisms by which roads can affect aquatic and terrestrial biota should help put in perspective the disproportionately high value of remaining roadless or near-roadless areas for conservation of biodiversity and other values of natural ecosystems.

We caution that it appears highly unlikely that many of the ecological effects of roads can be successfully mitigated, whether through improvements in design, construction, or remediation. This reality points to the central importance of maintaining the few remaining roadless and near-roadless portions of the landscape in the natural state. Watersheds presently encompassing few roads, for example, are ideal candidates for ecological restoration, given that with the obliteration or decommissioning of a few road segments, a large area of natural habitat can be secured for a wide variety of species. (*Conservation Biology*, Vol. 14, February 2000, <http://conbio.net/scb/Publications/ConsBio/Contents/2-00toc.cfm>).

### **Nahanni Karst**

Canadian Zinc (CZN) does not seem to understand where the significant Nahanni karst features are located, which brings into question their ability to adequately assess the impact of the proposed road on karst features which are very close to the proposed road route (see attached maps).

On page 19 of the Project Description, CZN states that "it should be noted that only subdued appearances of karst features exist in the area of the access road corridor." In fact, the proposed route passes through the heart of the Nahanni karst, and close by (less than one kilometer) specific features such as the assembly of the First, Second and Third Poljes, and within two kilometers of the Raven Lake Sinkhole.

In a paper title "Postscript To The McMaster University 1974 Report On The Nahanni North Karst," November 5, 2001 (attached), Dr. Derek Ford describes the significance of specific features in the Nahanni karst. Several features, including Canal Canyon, Raven Lake Sinkhole, Karst Labyrinth, the assemblage of the First, Second and Third Poljes are described as unique in the world, in that no features of this quality are known to exist anywhere else. Dr. Ford concludes the paper by stating that the Nahanni karst, through which the road travels,

*exhibits many features and assemblages that I judge to be unique at the world scale. It is most strongly recommended that it be incorporated in its hydrologic entirety into South Nahanni National Park in order to preserve it and to advertise it to Canadians and the world (page 6).*

Dr. Ford's paper also notes that water drains underground through the karst formations. This is significant because karst waters flow underground at a much faster rate than water that travels through rock sand or gravel. This means that hazardous materials can spread quickly and without much change to them through the karst aquifers.

Karst drainage is also often much different than surface drainage, so that the drainage pattern described by CZN on page 10 of their Project description is not necessarily true. This means that contaminant spills on the road could travel quickly through the karst and come out in the Park Reserve through Whitespray Spring.

Given the above, more information is needed about the potential impacts of the proposed road on the unique karst landscape.

#### **Likelihood of Spills**

On page 25 of the Project Description, CZN states that the probability of spills is low. Inspection reports from the operation of the previous winter road do not provide much detail about the road, but do seem to indicate that the operator was conscientious in their use and maintenance of the road, even turning back truck drivers who did not have experience driving in mountains. Despite these precautions, there was at least one fuel spill (March 2, 1982 inspection report), which calls into question CZN's assessment that there is a low probability for spills.

The road travels through sensitive wildlife habitat, which could be impacted by spills or erosion. Based on mapping of known habitat use, the Tetcela river valley has high concentrations of wildlife. The Tetcela river extending north from the east end of the Park Reserve provides habitat for Trumpeter swans, Woodland caribou, Dall sheep, moose, grizzly bear and waterfowl. Given that spills could impact important wildlife habitat, more investigation and consideration of these impacts is needed, including the potential impact on fish habitat.

Because the road would pass through karst lands, where much of the drainage occurs underground through karst channels, spills could very quickly impact areas far from the road. In fact, water from parts of the karstlands flows directly into Nahanni National Park Reserve via Whitespray spring, a spring which drains from the karst lands into the

South Nahanni River in First Canyon. This warrants further consideration in an environmental assessment.

Since the winter road was first built in the early 1980s there is much more scientific understanding of the global significance of the Nahanni karst, and the importance to protect it. This area is of exceptional natural value, and should not be compromised by re-building a road across it.

### **Legal Opinion of Exemption From Environmental Assessment**

In its submissions to the Board, CZN has taken the position that the road proposed to service the Prairie Creek Mine is a separate "undertaking" from the mine itself and other undertakings which have recently been licensed, and further argues that this undertaking is grandfathered.

As is set out below, CPAWS-NWT takes the position that road is not a separate undertaking and even if it is, the rehabilitation and use of the road has to be considered as part of the cumulative effects assessment of the Pilot plant and Decline drill environmental assessment. CPAWS-NWT also takes the position that even if the road may properly be considered a separate undertaking, section 157.1 does not exempt the road from environmental assessment because there has been an abandonment.

### **Is the Road a Separate Undertaking?**

The road that is the subject of the permit application is an integral part of the Prairie Creek Mine, and the recently licensed Pilot plant and Decline drill undertakings. As its use is described in the permit application, the Road is required in part to deliver supplies and construction materials to the site in support of ongoing activities.

It is critical that in the proposal for the Pilot plant and Decline drill undertakings, CZN stated that the pilot plant and drill equipment required for the undertakings would be delivered to the site by air transport.<sup>1</sup> Pursuant to section 117 of the MVRMA, the Review Board made a determination as to the scope of those projects consistent with the

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<sup>1</sup> In the Project Description, Type "A" Land Use Permit Application, Prairie Creek Mine Underground Decline Development and Exploration Drilling, March 05, 2001, page 2, CZN states:

*The majority of the equipment utilized in support of this program currently exists on-site. The main drive would be drilled by a two-boom air jumbo drill, which would be airlifted into the site. Rock from the underground development would be removed by existing 2-yard scoop trams and transported to stockpile locations by existing loader and truck. All this equipment is currently on-site, along with necessary compressors and fuel.*

Likewise, in the Project Description, Type "B" Water Licence Application, Prairie Creek Mine Metallurgical Pilot Plant Program, March 05, 2001, page 4, CZN states:

*Arrangements have been made to purchase a suitable pilot plant currently available in the United Kingdom. The plant is composed of a number of individual components which will be airlifted into the mine site in sections. The pilot plant will be re-assembled and totally contained within the existing mill building at Prairie Creek.*

original proposals for the Pilot plant and Decline drill. The environmental assessment conducted by the Review Board assessed the environmental impacts of those proposed undertakings on the basis of air transport. The Road application must be considered a modification of those projects, which need to be referred back to the Review Board.

Also, even if the road is considered a separate development or undertaking from those projects, it is clear that the environmental impacts of road use would have to be considered in the environmental assessment for them. In particular, section 117(2)(a) states that a proposed development "*shall include consideration of...any cumulative impact that is likely to result from the development in combination with other developments.*" Thus, the environmental assessment for the Pilot plant and Decline drill should consider the environmental effects of the Road, even if it is considered a separate development.

It is worth noting that it would undercut the environmental assessment process to divide clearly connected physical works into separate projects for the purposes of environmental assessment. Under section 114 of the MVRMA, a primary purpose of environmental assessment is to "ensure that the impact of proposed developments receive careful consideration". Splitting related works for environmental assessment increases the risk that environmental effects of projects will go undetected or that environmental impacts will not be fully appreciated.

This issue was directly considered in the *Labrador Inuit* case where the Newfoundland Court of Appeal quashed the decision that a mine and the road leading to a mine were separate projects. As noted by the Newfoundland Court of Appeal:

*[T]emptation to short cut environmental assessment through the narrow interpretation of the governing legislation was noted by the Newfoundland Court of Appeal in a case which dealt with what constituted a project for the purposes of an environmental assessment of a proposed mine in Newfoundland:*

*Environmental laws must be construed against their commitment to future generations and against a recognition that, in addressing environmental issues, we often have imperfect knowledge as to the potential impact of activities on the environment... The legislation, if it is to do its job, must therefore be applied in a manner that will counteract the ability of immediate collective economic and social forces to set their own environmental agendas. It must be regarded as something more than a mere statement of lofty intent. It must be a blueprint for protective action.*

*Labrador Inuit Assn. v. Newfoundland (Minister of Environment & Labour) 25 C.E.L.R. (N.S.) 232, at p. 236 (Nfld. C.A.)*

In order to ensure full and fair assessment of potential environmental impacts, a number of approaches or guidelines have been developed to determine when related works should be part of the same assessment.

Under the *Canadian Environmental Assessment Act*, the scope of a project must include all aspects of the "principle project" and should include related projects that are interdependent or linked. A project is considered interdependent if the principle project cannot proceed without the undertaking of another physical work or activity. A project is considered linked if the decision to undertake the project makes the decision to undertake related work inevitable.

CPAWS submits that it is clear that the road is either part of the principle project (Pilot plant and Decline drill) or interdependent and linked to them.<sup>2</sup> But is also worth noting that *CEAA* takes a restrained approach to the project scoping due to concerns federal-provincial jurisdictional conflicts.

Under the MVRMA, there is no jurisdictional conflict and a more appropriate model is found under the US *National Environmental Policy Act*, known as the "independent utility" test. Under this test, works must be assessed in the same environmental impact statement if their own work would not be built in the absence of the other. Thus, a road built for the purpose of accessing timber supplies must be considered in the environmental assessment of the logging operations. It is clear in this case that CZN would not be seeking the road application but for the Prairie Creek Mine and the Pilot plant and Decline drill undertakings, which have already been the subject of environmental assessment. CZN's application for the road permit states:

*The need for re-establishing road access is justified based on the large volume and quantity of material requiring transport. Any single proposed project would likely not justify the road development on its own merits. However, by coordinating the above-noted activities the road access takes on a multi-purpose nature, making it more practical. The only alternative to road transport is air, which would be very difficult logistically and prohibitively expensive given the extent and nature of the materials requiring transport (page 4).*

In summary, CPAWS-NWT submits that CZN's intention to use the road to supply materials to the Prairie Creek Mine is a modification to the Pilot plant and Decline drill proposals and must be assessed as such. CZN's proposal should be treated as an application to modify the Pilot plant and Decline drill proposals.

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<sup>2</sup> In the Project Description Report, Existing Winter Access Road Re-Development Prairie Creek Mine, May 23, 2003, Page 4, CZN states that:

*In addition to the forgoing, re-established road access will also provide a more economical means of transporting equipment and supplies necessary in support of the planned advanced exploration activity to be carried out under the previously noted permit applications. This would include such things as the pilot plant for the metallurgical program and the two-boom air jumbo drill to develop the decline, as well as explosives and other supplies.*

Is Environmental Assessment of the Road Precluded by Virtue of section 157.1?

As stated above, CPAWS-NWT believes that it is improper to consider the road as a separate undertaking from the Pilot Plant and Decline Drill. However, even if the works may be considered as separate undertakings, CPAWS-NWT submits that section 157.1 does not exempt the re-establishment of road access from environmental assessment.

CPAWS-NWT has reviewed the Searle opinion submitted by CZN. CPAWS-NWT does not dispute that *North American Tungsten decision* indicated that the consideration under section 157.1 should focus on the undertaking rather than licences related to the undertaking. However, it is still necessary to consider whether that undertaking has been abandoned or modified. CPAWS-NWT believes that the undertaking – the road – has been abandoned.

CZN's application is for the "re-establishment" of road access. Where a road has been allowed to deteriorate to the point where current use is no longer possible, it has been "abandoned" for the purposes of environmental assessment. In the case of *McKinnion v. Canada*, decided under the *BC Environmental Assessment Act*, the Court considered whether proposed work on a previously build road was "maintenance" (exempt from assessment) or the restoration of road access:

*In my opinion, the Plaintiffs are not proposing a "repair of an existing road". The easement by way of proprietary estoppel is over an abandoned road which is currently being used for hiking and biking. A regular four-wheeled vehicle would not be able to travel along the easement route from Highway 23 North up to the trail leading off to the Plaintiffs' property. As mentioned in the Reasons for Judgment, there is a pile of dirt and rocks across the Lower Park Highway and this pile prevents travel by four-wheeled vehicles. It is not a road in current use which the Plaintiffs propose to repair but, rather, it is an abandoned road which the Plaintiffs propose to restore. Hence, the Plaintiffs' proposed construction is not exempted from the requirement for an environmental assessment as provided by the Environmental Assessment Act. (2002 BCSC 1765)*

The road the CZN seeks a permit for is not currently used and is not capable of use over its entirety without restoration work. It is CPAWS-NWT's position that this failure to maintain use and the usability of the road is determinative of the fact that there has been an abandonment.

Other factors also show that an abandonment has occurred. Aside from use close to the mine site (CZN states the road was used from the minesite up to km 17 for exploration activity as recently as 1994, under a land use permit N95C373) the majority of road has fallen into disrepair and is not passable. No permit for using the entire road has been issued since it was abandoned at the end of the 1982 season.

Since that time, the majority of land which the road crosses has been withdrawn from disposal through Order In Council 2003-1230 in order to facilitate the settlement of the Deh Cho First Nations Final Agreement.

The land is also under consideration for inclusion in an expansion of Nahanni National Park Reserve, as set out in a Memorandum Of Understanding signed by the Deh Cho First Nations and Parks Canada.

It is also important to note that when a previous application was submitted in 1994 for the use of the road, it was determined that the application was subject to environmental assessment under *CEAA* (which was never completed and permits were never issued). It was decided that the application for an all-weather road was to be assessed as part of the entire Prairie Creek Mine project, not as an individual undertaking.<sup>3</sup>

In fact, one aspect of the *North American Tungsten* case referred to in the Searle opinion actually stands for the principle that section 157.1 of the *MVRMA* had the same grandfathering intent as *CEAA*.

*The approach taken under the MVRMA is complementary to that taken under CEAA and intended to be so. Both Acts exempt projects which pre-date the same date, namely June 22, 1984. That is the date on which the Environmental Assessment and Review Process Guidelines Order, SOR/84-467, the predecessor to CEAA, came into effect. The selection of this common date under both CEAA and the MVRMA reflects Parliament's continuing intention that projects which pre-date June 22, 1984 (as defined under both statutes) are to be subjected to a full scale environmental assessment as prescribed under the applicable legislation only if they depart significantly from their approved mode of operation and engage in, for example, decommissioning, abandonment or significant alteration of the project.*

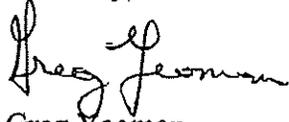
In other words, if previous applications regarding the road were subject to *CEAA* assessment (i.e., not grandfathered), then the *North American Tungsten* case requires the same result under the *MVRMA*.

It is for all of the above reasons that we contend that this permit application should be referred for environmental assessment.

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<sup>3</sup> May 18, 1995 letter from Brenda J. Kuzyk, Chair, Regional Environmental Review Committee to David Algie, President, San Andreas Resources Corporation.

Sincerely,



Greg Yeoman  
Conservation Director,  
CPAWS-NWT

**POSTSCRIPT TO THE MCMASTER UNIVERSITY 1974 REPORT ON  
THE NAHANNI NORTH KARST**

**5 November 2001**

**Introduction**

It is now 27 years since George Brook and I prepared the McMaster University report of 1974 on the North Karst region. During that time the importance of karst has come to be recognised worldwide. The number of researchers has increased approximately tenfold, many books and some hundreds of scientific papers are published annually. Particularly important has been the opening up to western visitors of China, which has the greatest tropical and temperate karstlands, and of Russia, the only nation besides Canada with large expanses of karst rocks in sub-arctic and arctic settings. I have had the opportunity of travelling, studying and consulting extensively in both of those countries, including parts of the northern Russian and Siberian terrains. I have also conducted or directed karst research projects throughout Canada, the U.S.A, Caribbean, Mexico, Brazil, most European nations, Turkey, Iran, Malaysia, Australia and New Zealand.

The purpose of this Postscript is to comment upon the North Karst from the perspective granted by this worldwide experience, evaluating its features in comparison with those seen at other places. Numbers (e.g. #33) cited below refer to numbered geographic locations placed on 1:50,000 topographic maps covering this area during a meeting with Claude Mondor, Parks Canada, that took place in Ottawa on November 1 2001.

**Karst drainage basins as basic areal units for conservation and control.**

The distinctive groundwater hydrology of karst terrains has become the most important subfield within global karst research today. This is because of its immense applied importance – more than one billion people are partly to entirely dependent on water stored in natural karst cavities.

From the management and conservation perspective there are two particularly important differences between karst aquifers and others. The first is that karst waters are collected and discharged through well integrated systems of solutionally enlarged fissures and caves. The waters flow underground tens to thousands of times more rapidly than they do in aquifers in insoluble rocks or in unconsolidated sands, gravels, etc. One consequence is that hazardous contaminants can spread quickly and with negligible degradation in karst aquifers. For example, in the Walkerton, Ontario, disaster of May 2000, lethal concentrations of *E.coli* are believed to have traveled from source to groundwater well within 48 hours via karst cavities, whereas in a standard insoluble rock aquifer with the same hydraulic gradients travel time would have been ~120 days: the *E. coli* bacterium

decomposes after about 30 days underground. Because of the very responsive, fragile character of karstic aquifers, karst hydrogeologists throughout the world are now agreed that the basic areal unit for aquifer management should be the entire karst drainage basin and, where there are tributary streams draining into it from non-karst rocks, those tributary basins also. In the Nahanni North Karst context, this implies that all terrain draining to the two principal springs, Bubbling Springs (map ref #19, SW flank of Ram Plateau) and White Spray (First Canyon) should be included within the expanded Park.

The second important difference between karstic and other groundwater basins is that, very often, the boundaries of karst basins do not coincide with topographic divides. If a divide is in karst rock such as the limestone and dolostone of Nahanni, water may pass underneath it via solutional caves. For example, at many places in Crownsnest Pass water sinks underground on the B.C side of the Continental Divide and resurges at springs in Alberta. To establish the precise limits of karst groundwater basins requires substantial programmes of groundwater tracing with special dyes which, in the Nahanni case, would be a very expensive undertaking. However, basin boundaries can often be reasonably approximated by considering the combination of local topography, structural geology, karst spring responses to heavy rains, and the findings of partial tracing programmes. I consider that the boundaries for groundwater drainage to Bubbling Springs and White Spray that were set out in the 1974 McMaster report are of sufficient accuracy for general planning purposes. Most of the significant landforms in the North Karst are within these boundaries. The exceptions are two karst canyons on the SW side of Ram Plateau, which will also be protected if the Plateau is included in the Park expansion.

#### **The distinctiveness of the North Karst drainage, caves and surface landforms.**

Here I evaluate both (a) individual landforms such as particular sinkholes and (b) genetic groupings of features in a given area within the North Karst, for example, Cenote Col and its sinkholes. They are placed within the following three categories of distinction:-

- (1) common or unexceptional features by world standards;
- (2) outstandingly good examples of features that are common to rare elsewhere, i.e. "textbook examples".
- (3) Unique - no features as good as these (or closely similar) are known to me or clearly described in the literature elsewhere.

#### **The Karst Basin Hydrogeologic Organisation.**

I give this a Category 2 "textbook example" rating for its simplicity and elegance. The North Karst is developed in 200 m of limestones and ~1000 m of dolostones underlying them. The dolostone is much less soluble here and does not display good karst landforms or (at the current level of exploration) caves of enterable size. However, it does drain karstically, via caves that are probably too small for human entry. The limestone is overlain by >80 m of black shales which are impermeable and serve as a roof prohibiting lengthy groundwater flow paths underneath them.

The beauty of the pattern of underground drainage here is that it is organised to flow to just two principal springs, at the northern and southern extremities of the karst belt respectively; (there are some much smaller springs within the karst where flow emerges, only to sink underground again after short distances and join the flow to the principals). In the North, Bubblings Springs are compelled to rise where they do because immediately to the N of them the limestone passes underneath the shale roof, which is dipping down under Sundog Creek. This spring is thus at the stratigraphic top of the karst strata. In contrast, the South spring, White Spray, is at the deepest point that South Nahanni River is entrenched into the dolostone in the eastern half of First Canyon. This is approximately 450 m below the top of the dolostone or 650 m below the shale roof. At the current stage of River entrenchment, there is no stratigraphically lower point at which the water could resurge to the open surface: (it probably emerged a few tens of metres lower at the White Spray position in the past but was raised when the Canyon was aggraded by glacial lake sediments).

The basic hydrogeologic organisation here is thus:- one North spring at the stratigraphic upper limit for spring emergence; one South spring at the topo-stratigraphic lower limit for spring emergence. Such simple organisation is very rare, especially over such a large area of underground drainage, and serves as an excellent teaching example.

#### The Caves.

Grotte Valerie (First Canyon, already in the Park) has classic dendritic passage organisation and Category 2 morphology. Recent developments in U series speleothem dating (a McMaster specialty) lead me to hope that we can now date the main phases of speleothem deposition in the cave, which I believe lie just beyond the 400,000 years B.P. range of older techniques; we shall use samples collected in 1973. This will make a major contribution to understanding the Ice Ages in Canada. This cave is quite the best example of cold cave climate diversity that is known anywhere in the world. I have wowed audiences in many countries with illustrations of it - an emphatic Category 3 rating!

The Grotte Louise- Grotte Mickey cave complex on the First Canyon/Lafferty Creek shoulder has been very well studied by Professor Jacques Schroeder, Universite de Quebec a Montreal. It is a multi-level (-sequence) system of a fairly common type but with a wealth of unusual sedimentary fills analysed by Schroeder - Category 2.

Grotte Andre (map ref# 39) lies just outside the present Park boundary. Its morphological features are similar to those of Grotte Valerie but less diversified. It contains a substantial spread of large hexagonal ice crystals that are perennial (and very fragile). Fewer than 20 other ice crystal caves of this type are known - Category 2.

Igloo Cave and other, shorter caves discovered in the North Karst and mapped and described in the 1974 report are not so remarkable - Category 1. I have seen many similar caves in north Norway, Russia, the Alps and Canadian Rockies. However, it must be pointed out that our explorations there in the summers of 1972 and 1973 were incomplete, due to lack of time, money and people. Hard campaigns using new types of

equipment developed since 1973 would undoubtedly extend the discoveries. In particular we were never able to locate and penetrate the large caves with rivers flowing in them that must exist under the karst.

### The Limestone Pavements.

These are extensive surfaces indented with karren, the smallest scale solution features found in surface karst. Pit and gutter forms are most common. Pavements are common where glacial scour removes rubble, as in the North Karst. Because they are very quickly drained, distinctive droughty ecological assemblages may be found on them – “alvars”.

Development on the Nahanni pavements is quite limited due to severe cold, similar to many areas on the northern Russian Platform - Category 1. Pavements in Newfoundland, Quebec, Ontario and Manitoba are more significant from the morphologic perspective. The alvar ecology may be more interesting because of cold climate limitations, especially if it includes the type of laminated algal calcites recently discovered in an Old Crow karst by Professors Lauriol and Clark, University of Ottawa.

### The Karst Canyons.

These are regular canyons entrenched by surface rivers that now lose most or all of their flow into sinkholes feeding cave systems. Such canyons are common in most mountain karst terrains in arctic and alpine, temperate and tropical environments. The many examples in the North Karst, from Lafferty Canyon in the south to Ram Plateau (#17, 18) in the north are all morphologically attractive. I would single out Lafferty for an example where underground capture of the water is still at a quite early stage – there is surface overflow and renewed river entrenchment during heavy rains several times each summer season although for 340+ days (?) of the year there is 100% abstraction underground. Its morphological change from an open v-form cross-section upstream in dolostone where the limestone has been stripped off to a narrow slot with vertical walls where the limestone is fully preserved at the downstream end is striking. It is a Category 2 feature, fully comparable to the famous limestone gorges of the Tarn and Lot in the Perigord district of France in my opinion.

Canal Canyon (#35) has the largest catchment of the Nahanni dry canyons. Its downstream sector and mouth are fully impounded by glacial sediments. All drainage passes underground, probably passing under the south wall to flow to White Spray spring. Its form, glacial and periglacial deposits are all most attractive, adding up to a unique assemblage – Category 3.

### The Impounded Lakes.

These features (#28-31) originated as shallow box canyons that became impounded by glacial deposition at their mouths, creating lakes that developed karstic drainage into the canyon walls. It is believed that all of them discharge into the groundwater system

supplying Bubbling Springs but there has been no definitive dye trace experiment to show this.

There are similar features at a few places in the Rockies and further north in the Franklin and Mackenzie Mountains around Norman Wells, and in the European Alps, etc. – Category 1.

### Sinkholes.

There are two major types in the North Karst – very steep-walled sinkholes of mixed solution and collapse origin in limestone (including the large, squared “platea” of our 1974 report), and covered karst or suffosion sinkholes developed in thin veneers of the shale or of glacial sediments resting on the limestone.

Sinkholes are the diagnostic surface karst landform. I have seen thousands of striking examples in many different parts of the globe. Those in the North Karst are by no means the largest, deepest or most dynamic known to me but their morphologic form is always very clearcut. Many are Category 2.

The Raven Lake sinkhole (#23) with its large size, elegant elliptical form, depth and verticality, flanking cols and caves, and 70+ m oscillation of water level during the hydrologic year, adds up to an assemblage that is unique in my experience – another emphatic Category 3. The same is true of Cenote Col and its sinkholes (see 1974 report).

### The Karst Labyrinth.

The main labyrinth lies between First Polje (#22) and Insel Tower (#25) in the North Karst. It includes the principal karst solution corridors or bogaz (termed “streets” in the 1974 report because of some features unknown in other corridor karst areas at the time), the Raven Lake, Cenote Col and other sinkhole groups. The individual corridors are not exceptionally long or deep by world standards but their assemblage and genetic association with the sinkholes and platea are unique in my experience. No other karst I have visited (including glaciated karst lands in Russia and in many alpine regions) displays such a rich variety and complexity of form and origin. There is a problematic relationship with glacial scabland formation that we did not fully resolve in our work and which is of great interest to geomorphologists. I note with pleasure that adventure outfitters have recently discovered the Labyrinth and are conducting walking tours in it. It is another Category 3 assemblage.

### The Poljes.

In karst studies, a polje (a Serbo-Croat word meaning “field”) describes a flat-floored closed depression that is seasonally inundated. The flat surface may be due to corrosion operating along the sides of the depression to widen it, or to alluvial deposition. A combination of the two processes is common. The greatest poljes are found in former Yugoslavia where some are several hundred square kilometres in area.

The three North Karst poljes are all very small by world standards but are textbook examples of the morphology and hydrologic behaviour of these landforms. Together they constitute an ideal sample of polje types and form – Category 2 individually, Category 3 as an assemblage that can be easily viewed in one day's walking.

First Polje is created by a shallow and symmetrical downfolding (syncline) in the stratigraphic top of the limestone. I have never seen a better example of this most simple kind of structural ("tectonic") polje.

Second Polje is exceptional because of its dissolutional benching and sharply defined high water line that is controlled by an overflow cave in its north wall, and by the dissection of its eastern (downstream) wall by drainage from the adjacent shale slopes.

Third Polje lies immediately south of Bubbling Springs. At low water its residual pond drains away at its south end and (presumably) the water flows back northwards underneath it in a cave. In high water it backs up progressively northwards at the surface until it is able to overspill as a short creek that submerges the Springs themselves. This is a unique pattern of behaviour in polje hydrology. The dissolutional notch or undercut at the high water level is the best I have seen in any polje.

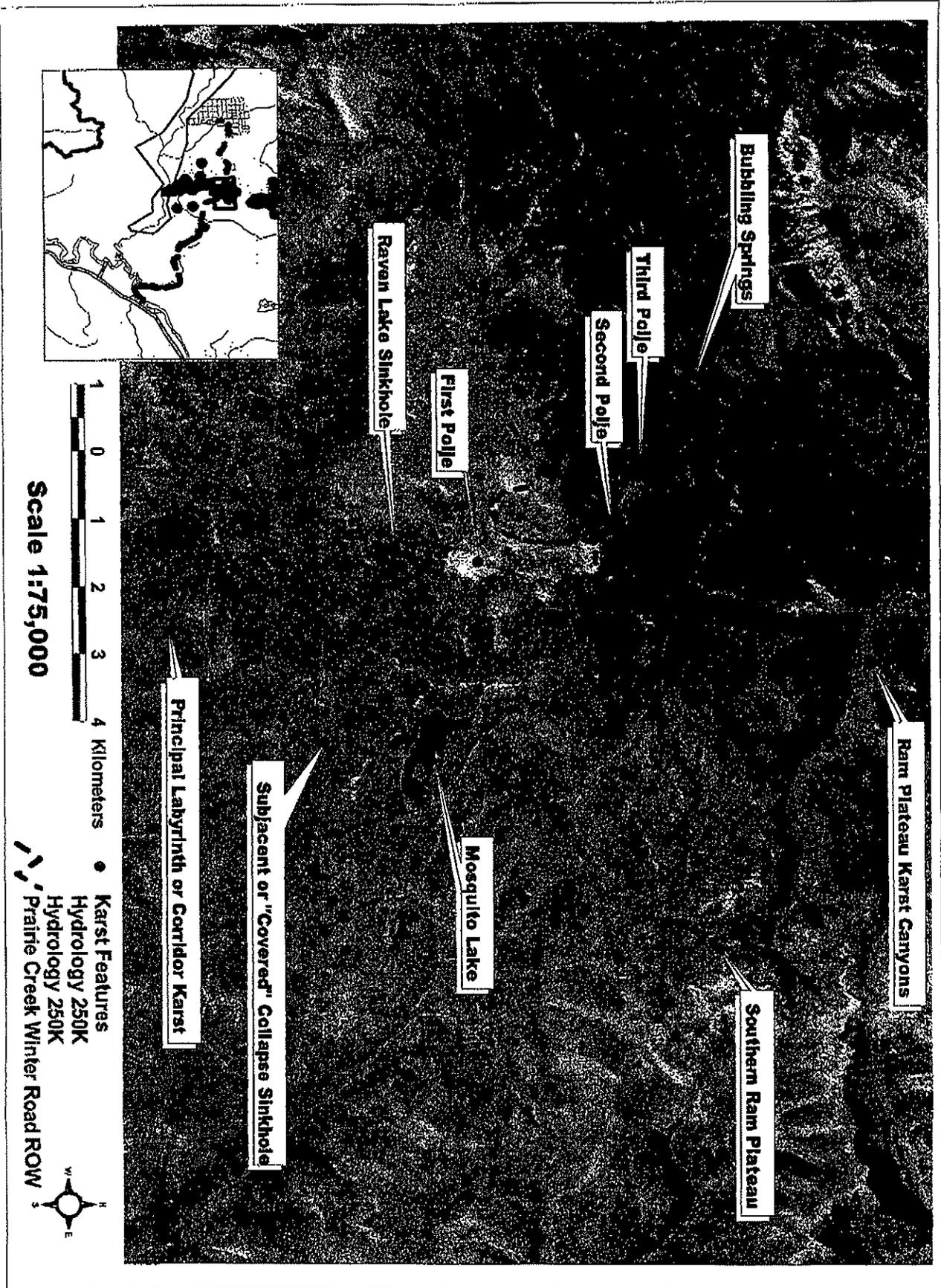
#### Conclusion.

In the past 25 years I have studied karst in all the provinces and territories except PEI (which hasn't any) and Yukon. The Nahanni North Karst is the most striking and interesting karst terrain of them all. It exhibits many features and assemblages that I judge to be unique at the world scale. It is most strongly recommended that it be incorporated in its hydrologic entirety into South Nahanni National Park in order to preserve it and to advertise it to Canadians and the world.

Derek Ford, DPhil., FRSC,  
Emeritus Professor of Geography and Geology, McMaster University.  
Adjunct Professor of Hydrogeology, University of Waterloo.



# Karst Features Near Prairie Creek Winter Road R.O.W.



## REPORT ON CADILLAC EXPLORATION LTD.

LAND USE PERMITS N80D248, N80F249

INSPECTION OF MARCH 2, 1982

Minesite:

**Tailings Pond:** Work continues on the bottom, excavating to final depth. Liners placement on North East end of tailing pond wall is almost completed. Area of slump is completely restored and they were working on pump out area.

Drilling and blasting of North West corner appears the only method that works satisfactorily with frozen clay.

**Garbage Disposal:**

No change from last report.

**Fuel Storage:**

All tanks are completed, tested and now hold fuel. 1,123,000 gallons of fuel has been hauled and the balance of 400,000 should be completed by March 20, 1982. Permanent electricians remain to be installed and this will probably be carried out after break-up.

**Harrison Creek Diversion:**

Creek is excavated and the work is progressing quite well, with the leveling and preparation. Gabion baskets will be placed in area very shortly.

**Camp Dyke:**

Rip Rap materials are presently dumped near dyke on a snow and ice road built along dyke wall. Some rip rap materials have been placed in position on the Prairie Creek side of the dyke with a crane and loaders. Work is continuing on the build up of dyke with the placement of fines coming from the crushing of waste rocks and from excavation, of tailings pond. The large culverts are completed and will be installed in the dyke for Harrison Creek drainage very shortly.

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Cadillac Exploration Ltd.,  
N80D248, N80F249  
March 2, 1982

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**Rip Rap Source:** The access road to rip rap source is in and the Company were unable to build the road on side hill as very large boulders had frozen together and areas of bed rock were encountered. It was therefore decided to build up a snow fill road on the banks of Prairie Creek following creek contours.

A large switch back was constructed to obtain the maximum area of rip rap materials, about 400 feet and landings were made below this. The idea is to roll rip rap materials down to these landings and collect them there. The area would be back sloped and all excavations contoured.

The access is certainly the least of two evils as very little terrain damage occurred and will be easily restored. The switch back was the only alternative as Cats were unable to walk across these boulders.

**Wash Plant Area:** Gravel is stock piled on top of old culverts and the culverts are then filled with fire wood and lit to warm up the gravel for concrete in mill construction. Gravel is hauled to mill for batch plant on site.

**Gravel Pit South of Wash Plant:** Restoration work is carried out in areas exhausted of gravel materials and the work is progressing in a very satisfactory manner. The best gravel is found on South end of pit and so far they have gone down 12 feet before encountering water.

**General:** The campsite is in a very untidy state now with materials scattered all over the place. This however is hopefully a temporary situation. I understand the problems, trucks are coming in all the time and it is difficult to place everything in its right place as a lot of materials are used up on a daily basis.

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Cadillac Explorations Ltd  
N80D248, N80F249  
March 2, 1982

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Access Road: 24 tanker trucks and low boys were observed going or coming plus 3 graders, 1 cat and 1 A-frame truck on winter access road. This is not counting light vehicles hauling propane and servicing.

Approximately 350 loads were hauled to date on the winter road and Mr. Fast is advising everyone that March 15 is the deadline date. Mr. Fast is patrolling the road on a daily basis advising truckers of bad situations, maintaining road equipment, even turning back drivers with no mountain experience. The road is in very good condition with little overflow problems on day of Inspection.

The oil spill was checked and although severe attempts were made to burn it off, all failed. The fuel is saturated almost completely with crystalized snow. Several methods were discussed and these were talked over with Water Resources. No clear-cut method is approved to date; a discussion will be forthcoming very shortly. In the meantime however, the fuel saturated snow and soil will not go away and there is no problem of further contamination.

The clean-up and abandoning of the winter road was discussed and a joint inspection will be carried out prior to spring break up and all areas of erosion control will be covered.

B.J.J. Gauthier,  
District Manager

cc: Land Use, YK  
Water Resources, Andy Cullen  
John McQueen

BG/6m

Indian and Northern  
Affairs CanadaAffaires indiennes  
et du Nord CanadaP.O. Box 1500  
Yellowknife, NT X1A 2R3CANADA REMEMBERS  
LE CANADA SE SOUVIEN

Your file Votre référence

Our file Notre référence

June 22, 1995

David Elgee, President  
San Andreas Resources Corporation  
Suite 900  
595 Howe Street  
Vancouver, B.C. V6C 2T5**RE: ENVIRONMENTAL ASSESSMENT OF THE PRAIRIE CREEK PROJECT**

Dear Mr Elgee:

As per our conversation of June 14, 1995, during your brief stopover in Yellowknife, I would like to take this opportunity to follow-up with a Regional Environmental Review Committee (RERC) request for additional information specifically regarding the all weather access road.

As you know, under the Canadian Environmental Assessment Act (CEAA), there are two possible self assessment streams that the Prairie Creek Project could fit into: a screening or a comprehensive study. As a federal authority under CEAA, and as the lead responsible authority for this project, the Department of Indian Affairs and Northern Development (DIAND) has a responsibility to coordinate the environmental assessment of this project with other responsible authorities (RAs) including the Department of Fisheries and Oceans (DFO), Transport Canada (Coast Guard), and DIAND Water Resources and Land Administration Divisions. Other federal authorities involved in the process are the Departments of Environment and Heritage Canada. Jointly, the responsible authorities must decide on the most appropriate environmental assessment stream for this project.

For the Prairie Creek project, the only possible trigger described in the comprehensive study regulation is s.s. 29 (b) the proposed construction of an all season public highway more than 50 km in length on a new right of way, as indicated in the. Presently an insufficient amount of information is available regarding the proposed all weather access road. In order for responsible authorities to determine whether or not the Prairie Creek project would be assessed under the comprehensive study regulation, the following information is required:

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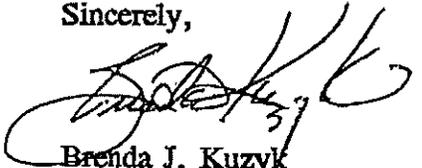
- a) any additional information regarding the proposed alignment, including any stream crossings;
- b) the estimated road dimensions;
- c) engineering specifications (i.e. terrain analysis, weight requirements);
- d) proposed operation of the road (i.e. hours of operation, type of haul trucks);
- e) proposed methods of controlling public access, if any;
- f) proposed maintenance requirements;
- g) requirement for public funds to build the road, if applicable;
- h) justification for an all weather access road.

DIAND has drafted guidelines for an **Environmental Assessment Report (EA Report)** under CEAA, (formerly referred to as an **Initial Environmental Evaluation (IEE)** under the **Environmental Assessment Review Process Guidelines Order**) for the **Prairie Creek** project. Since the information required under the different streams of assessment is slightly different, the process needs to be determined prior to finalizing these guidelines.

Please provide the information to DIAND at your earliest convenience, to enable us to continue with the environmental assessment of this project. If you have any questions, or require clarification, please call Ranjit Soniassy, Environmental Scientist, at (403) 920-8246.

I look forward to working with San Andreas Corporation throughout the assessment of the **Prairie Creek Project**.

Sincerely,



Brenda J. Kuzyk

Chair, Regional Environmental Review Committee

cc RERC Members.