PROMITHIAN INC.

WIND RIVER COALFIELD ASSESSMENT REPORT

MARCH, 2004

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MINING RECORDER
MAYO, Y.T.
INDIAN & NORTHERN
AFFAIRS

NTS 106 – E

65 15' N 135 00' W

COAL EXPLORATION LICENSES CYM 0011 - 0019

During the 2003 Assessment year Promithian Inc. made significant progress in evaluating, defining, and moving forward its' plan to develop the Coal and Coalbed Methane on its' Coal Exploration Licenses in the Bonnet Plume Basin.

In the spring of 2003 two samples of coal from the Wind River Coalfield were acquired. The two samples were from a depth of 311 meters and 357 meters. Tests on these samples confirmed the accuracy of the earlier tests carried out in the late 1970's. More importantly, the samples allowed an extensive evaluation of various Iron making technologies. The 2002 High Level Evaluation entitled "Promithian Inc." identified a number of Iron making technologies which might be suitable for the purpose of using the Wind River Coal and the Snake River Iron Ore to produce Iron and to provide the necessary energy to power an attached steel mill. The High Level Evaluation identified the COREX (hot metal)/MIDREX (Direct Reduced Iron) combined process as the first alternative. A coal Gasifier and MIDREX (Direct Reduced Iron) combined process was the second alternative. The third possibility was to identify one of a number of alternative Iron making technologies that are currently being developed to replace the large, capital intensive, and highly polluting Blast Furnaces. The COREX process is in fact the first alternative Iron-making technology to be commercialized.

The results of the evaluation carried out on the Wind River Coal samples and the published Snake River Iron Ore concentrate tests (60.7% recovery, 61.9% Fe, .13% P, and 8% SiO2) are as follows:

1. The Fixed Carbon (47% to 52%) is to low, and the Volatile Matter (26% to 33%) and Ash (15%) are to high, for direct feeding of the washed Wind River Coal into the COREX process. COREX requires a 55% Fixed Carbon coal. The Wind River Coal must first be blended with a higher rank coal if this technology is to be used.
2. The silica content of the Snake River Iron Ore could be lowered to a 5% to 6 % level with modern processes. However, this level of silica would still be to high for the Midrex Direct Reduction process. All natural gas Direct Reduction processes, including Midrex, require no higher then 2% silica Iron ore in lump form.
3. The HISMELT process was determined to be the most suitable technology for the Wind River Coal and Snake River Iron Ore. The key features of the HIsmelt process are that it will take fine, high phosphorous (.12 P) Iron ore and High Volatile thermal coal and still produce a low phosphorous Hot Metal Iron product (.02 P). In addition, the High Volatile Wind River Coal can be run through Outokumpu Lurgi Metallurgie's CIRCOCHAR technology to char the coal and preheat the Iron ore prior to both being fed into the HIsmelt process to increase the plants efficiency. The combined Circochar/HIsmelt process will produce large volumes of low BTU synthetic gas. The syngas can be used directly as a heat source and to generate electricity to power an attached steel mill. The first commercial scale HIsmelt plant will come into production in November 2004 in Kwinana, Australia. (Please refer to attachments one and two.)
4. The addition of inexpensive natural gas from a nearby Coalbed Methane field would significantly increase the efficiency of the Circochar/HIsmelt/Steel Mill facility (Circored technology).
5. It was determined that the 9.2 meter thick number 5 seam in the Wind River Deposit, located on the west bank of the Wind River, would produce the best washed High Volatile coal product for the Circochar/HIsmelt technology. The seam is amenable to open pit mining with a low stripping ratio and could produce approximately 40 to 50 million tons over its' life.

This would be enough coal for the complete life of the Promithian Inc. Circochar/HIsmelt/Steel Mill.

6. It has also been determined that a 4 meter thick Ferruginous Sandstone seam exists in the Snake River area and that it may exist in the Proterozoic aged rocks near the southern end of the Bonnet Plume Basin. These Iron rich hemetite sandstone deposits are typically easily processed into a 65% Fe product with simple gravity methods and a 35% recovery rate. The discovery of an easily mined and processed Iron Ore in close proximity to the Wind River Coal and Bonnet Plume Coalbed Methane would significantly reduce the projects capital costs and increase its' long term profitability.

During 2003 Promithian Inc. also consulted with a number of interested parties in an effort to build support for the project. In April, Promithian Inc, the Yukon Oil and Gas Branch, and the Geological Survey of Canada cooperated in a presentation to the second annual Coalbed Methane Symposium in Calgary, Alberta. In April, Promithian Inc. met with Chevron Canada Resources in Calgary, Alberta. In May, Promithian's president, Philip J. Wheelton, consulted with the Chief and Council of the Nacho Nyak Dun First Nation in Mayo, Yukon. In October, Promithian Inc. discussed the project with the Yukon's Minister of Energy Mines and Resources and the Minister of the Environment in Whitehorse, Yukon. In December, Promithian Inc. met with the Korea Resources Corporation in Vancouver, British Columbia. Korea Resources Corporation is a state owned entity charged with finding and developing resources for Korean industry. Natural Resources Canada facilitated the meeting. In early 2004 Promithian Inc. held discussions with the Shandong Tai-an Iron and Steel Company of Laiwu City, Shandong Province, China and the China Metallurgical Import and Export Corporation (CMIEC) based in Beijing, China. CMIEC is a state owned enterprise charged with finding resources for nearly eighty Chinese steel mills.

In January 2002 Promithian Inc. applied for a Land Use Permit to use the Wind River Trail to access the Bonnet Plume Basin and its' Coal Exploration Licenses. Issuance of the permit is anticipated for the spring of 2004 and will allow Promithian Inc. to begin a drill testing and bulk sampling program. Additional drilling and bulk sampling are needed to complete the Promithian Inc. Pre-Feasibility Study begun in 2002 and worked on in 2003.

A Coalbed Methane, or shallow gas, regulatory regime is also expected in 2004. No work can begin on the Bonnet Plume Coalbed Methane until a set of regulations is instituted. Promithian Inc. will be applying for a permit under the new regulations to drill test the Bonnet Plume Coalbed Methane following their implementation by the Government of Yukon.

During 2003 Promithian Inc. spent $ 72, 564.35 Cdn. on its' nine Coal Exploration Licenses (CYM 0011 – 0019). The expense per Coal Exploration License was $ 8,062.71 Cdn.

Sincerely,
Philip J. Wheelton
Promithian Inc.

PROMITHIAN INC.

STATEMENT OF EXPENDITURES – DECEMBER 2003 DECEMBER 2004
Coal Exploration Licenses CYM 0011 – CYM 0019

Consultant's fees associated with preparation of Evaluation and Environmental Report	$18,271.65 Cdn

Sincerely,

Philip J Wheelton

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www.promithian.com
pwheelton@promithian.com
T: 604-715-2274

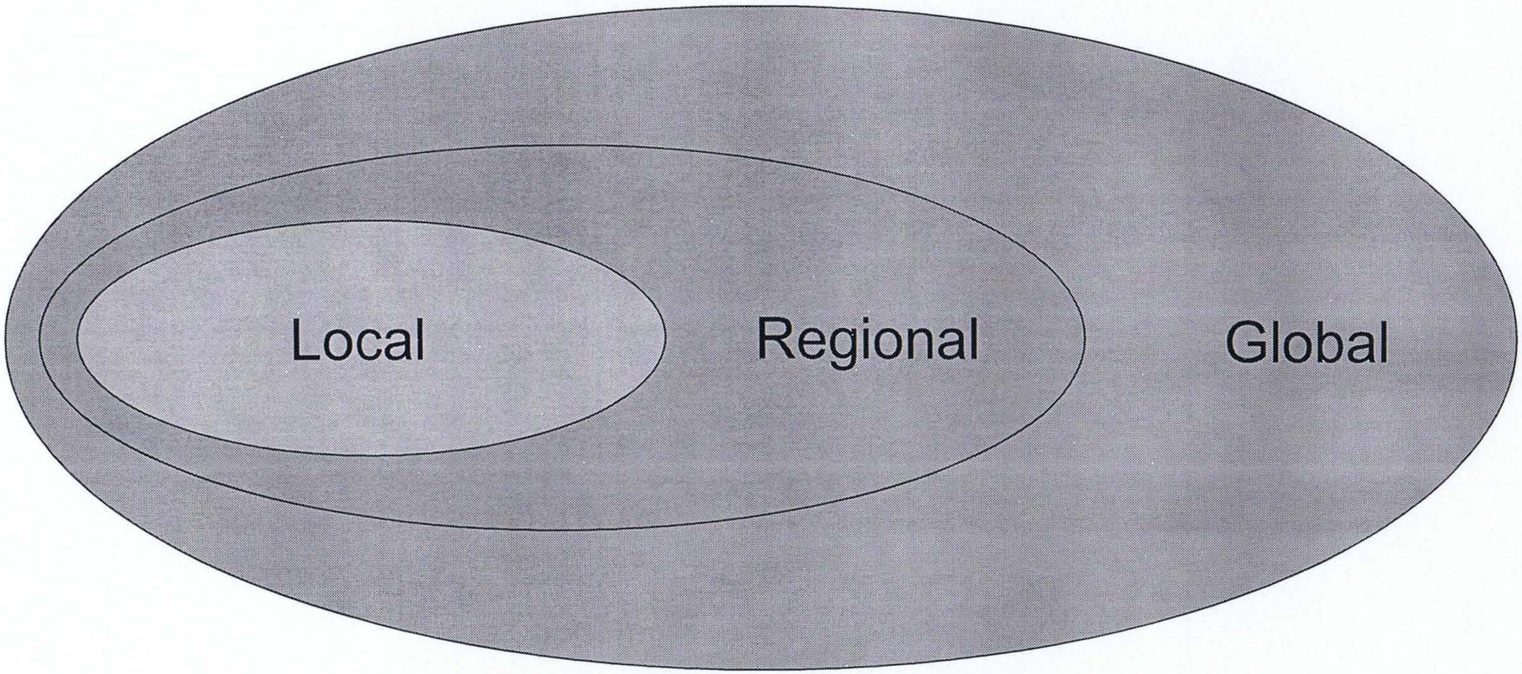
March 10, 2005

HIsmelt® and Sustainability

"Local, Regional and Global"

International Sustainability Conference
Notre Dame University, Fremantle
September 2003

HIsmelt Contributions to Sustainability



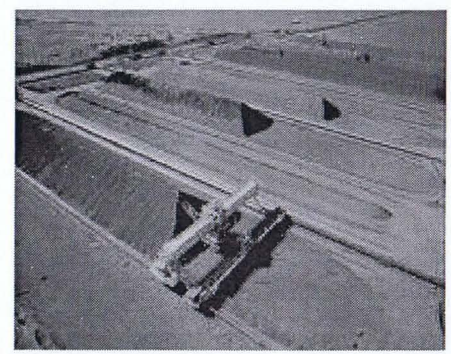
Three level approach to Sustainable Development

Today's Presentation

1. Global – *A New Iron making Technology*
2. Regional – *Mineral Reserves*
3. Local – *The Kwinana Project*

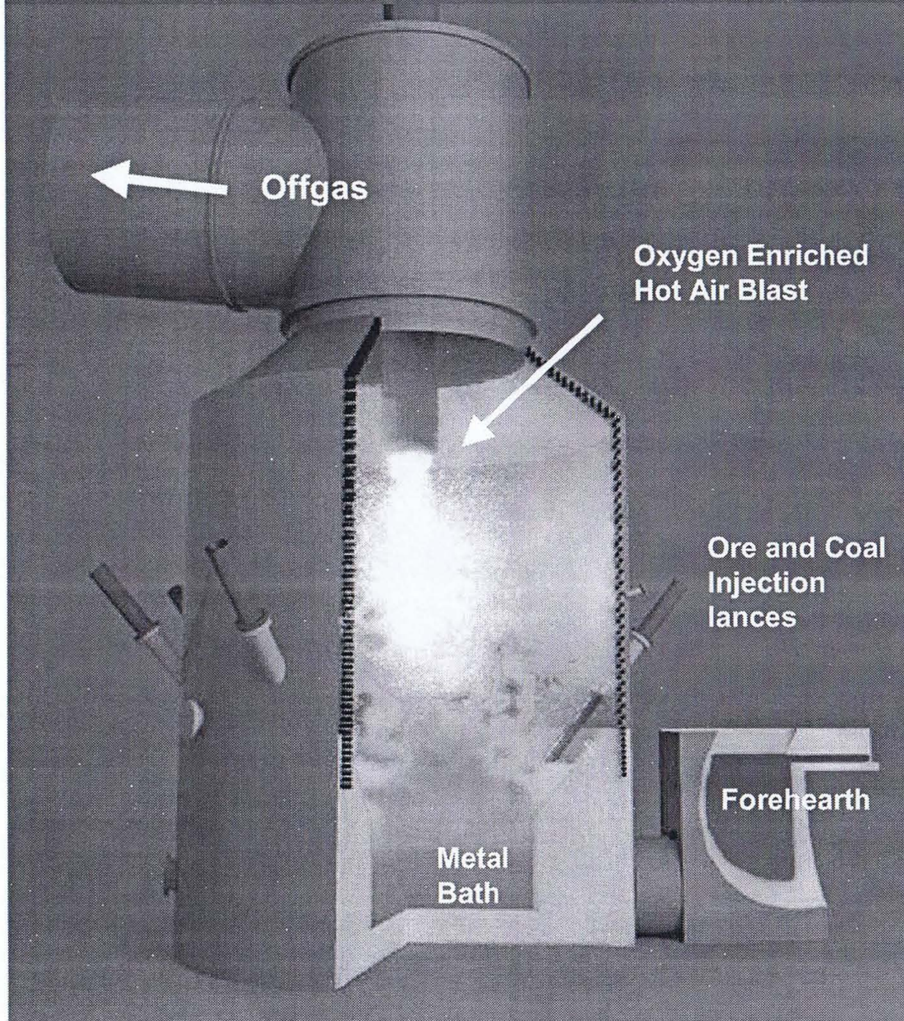
The Drivers

- **Industry drivers:**
  - **Must lower the cost of iron and steel production**
    - Capital intensity
    - Operating cost
  - **Environmental Concerns**
    - Replace coke and sinter plants
    - Reduced solid waste generation
  - **High quality source of metallics required**
    - EAF steel production
- **Rio Tinto's drivers:**
  - **Ore reserve utilisation**
    - High phosphorus reserves
    - Direct reduction processes require ore beneficiation and resulting ore waste



HIsmelt®

HIsmelt direct smelting technology

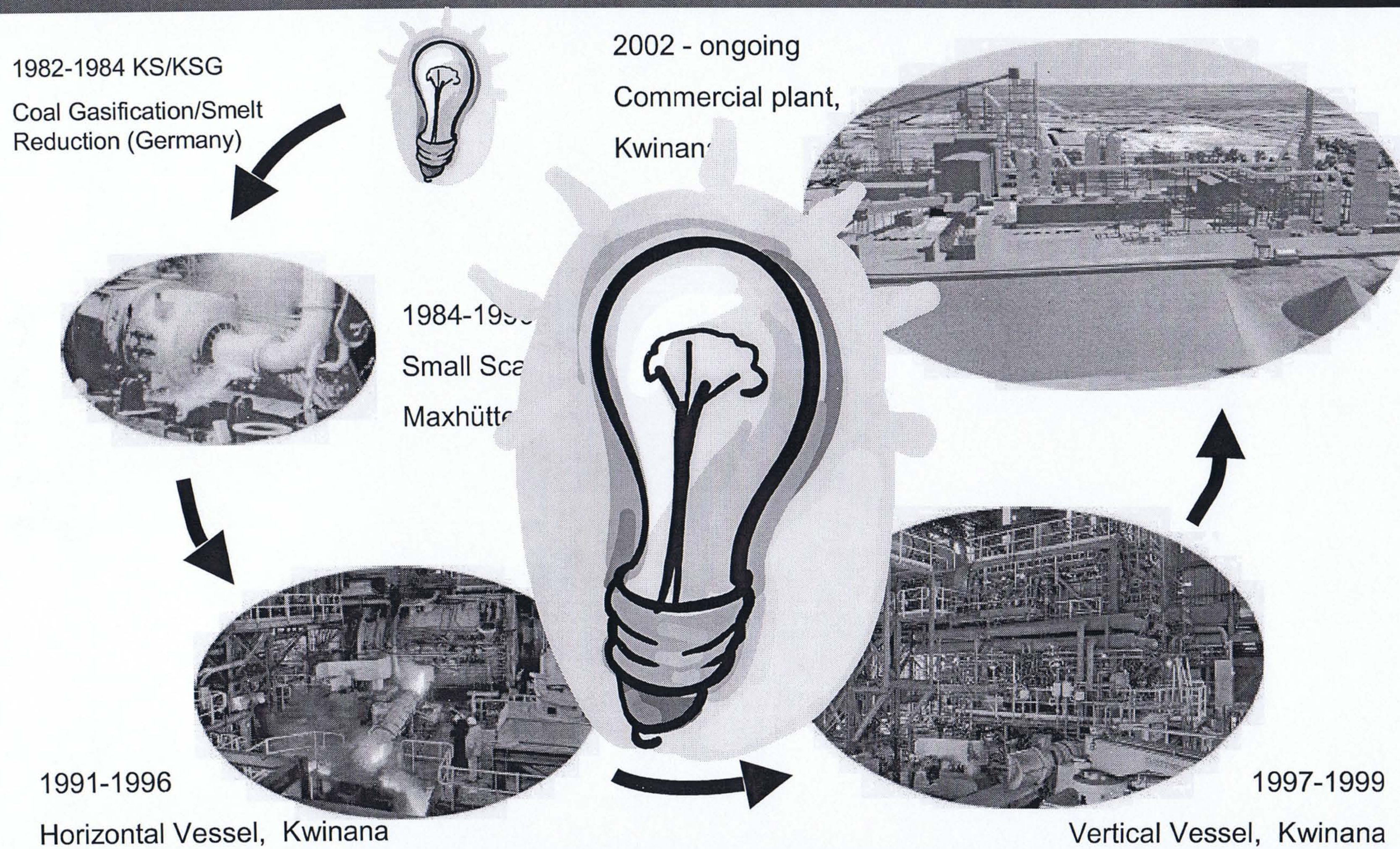


How does it meet the needs ?

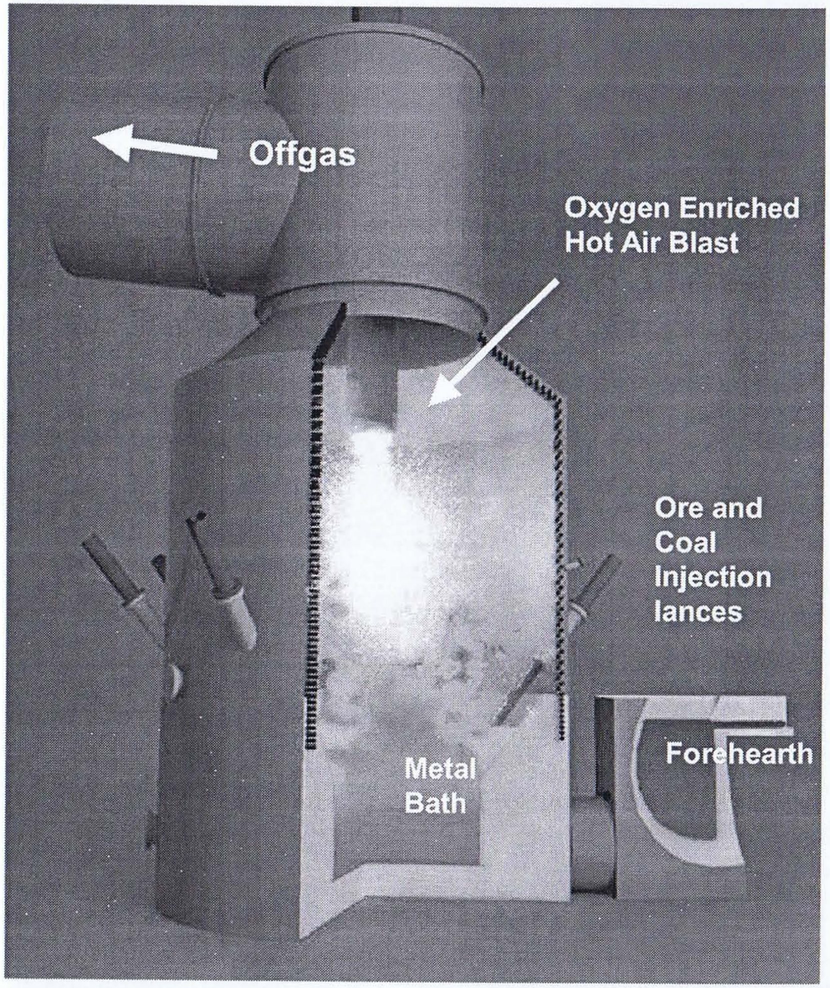
- **Simpler and more flexible iron making**
  - No coke ovens/sinter plants
  - Takes wide range of coals and iron ores directly
  - Iron product has minimal phosphorus content
  - Plant economics not reliant on off-gas credits
- **Highly competitive**
  - Lower capital costs
  - Lower operating costs
  - More flexible scale
- **Eco-efficient technology - reduces**
  - CO_2 by at least 20%
  - SO_X by 90%, NO_X by 40%
  - Dioxins and furans

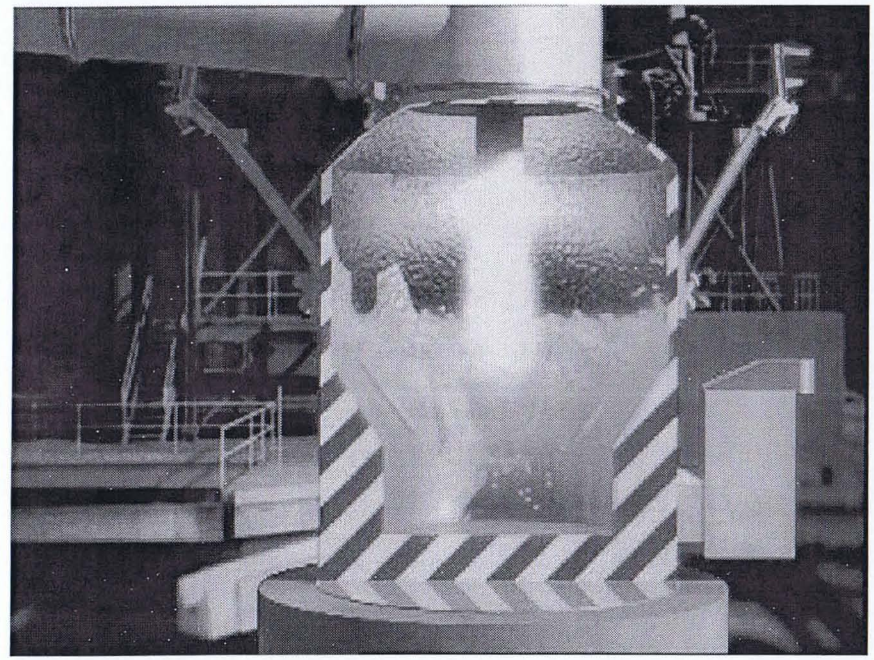
HIsmelt®

From Concept to Commercial

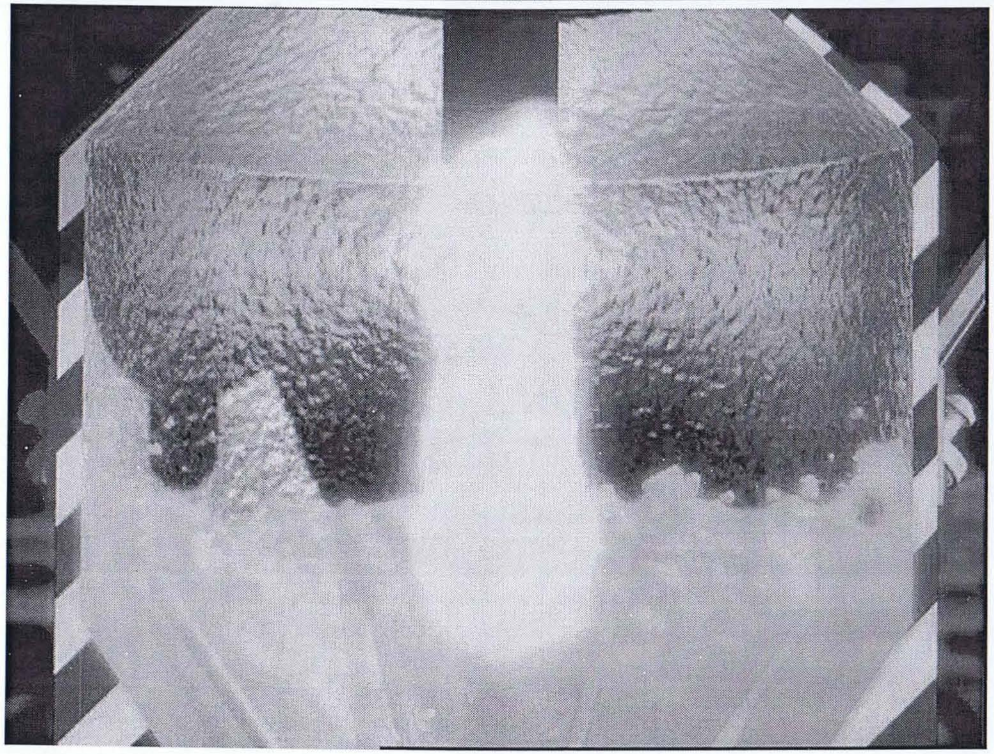


The Core HIsmelt Vessel





How does HIsmelt work?



Ore & coal injected into the melt

- Coal dissolves in molten iron
- Ore smelts rapidly, consumes heat
- Violent CO gas evolution & splash

Hot blast injected in the topspace

- CO burned to CO_2
- Heat transfers to droplets → bath
- Fireball centrally contained

Metal flows out, slag is batch-tapped

- Forehearth like a mini-BF
- Slag is tapped every 2-3 hours

Key Difference: Deep injection of solids

- Excellent fines capture
- Stronger mixing
- Higher heat-to-bath rates.

Today's Presentation

HIsmelt®

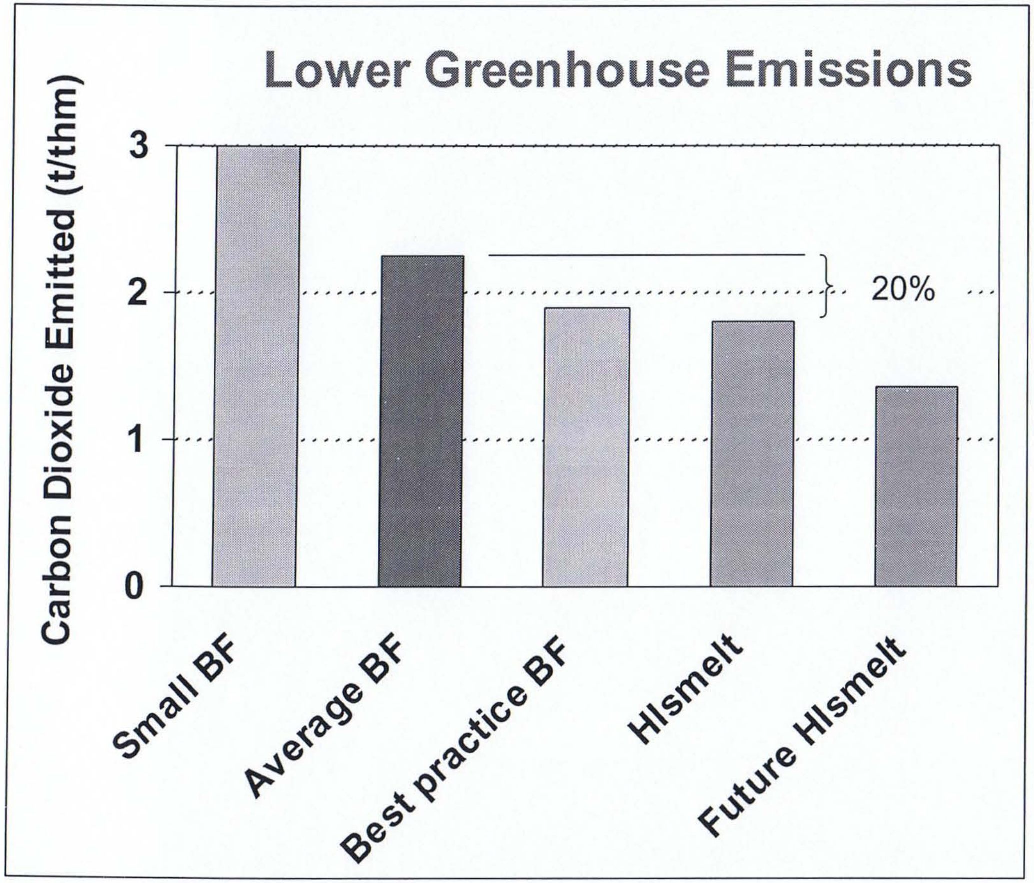
1. **Global – *A New Iron making Technology***
2. Regional – *Mineral Reserves*
3. Local – *The Kwinana Project*

Global Elements

- **Lower levels of Greenhouse gas**
  Decreased CO_2 emissions in the production of pig iron.

HIsmelt®

Lower Greenhouse

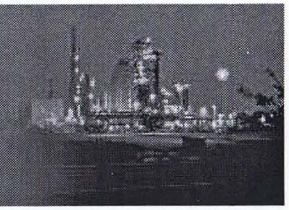


Global Elements

- **Lower levels of Greenhouse gas**
  Decreased CO_2 emissions in the production of pig iron.
- **Elimination of traditional iron making toxic emissions**
  Dioxins, Furans, and other Persistent Organic Pollutants

HIsmelt®

Reducing Steelmaking emissions



Item	Unit	European or Global Emission	HIsmelt
Greenhouse Gas CO_2	t CO2/t pig iron	2.35	1.88 (1.3 future)
Sulphur Dioxide SO_2	g SO2/t pig iron	1700	<200
Nitrous Oxides NO_x	g NOx/t pig iron	1000	600
Dioxins, Furans	ng ITEQ/t pig iron	3-5	Nil
Volatile Organic Compounds (VOC)	g/t pig iron	100	Nil
Polyaromatic hydrocarbons (PAH)	µg/t pig iron	550	Nil
Carbon Monoxide CO	g/t coke	5000	Nil
Benzene	g/t coke	25	Nil
Water	m^3/t pig iron	5.8 (*)	<4.0
Dust in Stack Emissions	g/t pig iron	280	20

* This is for water quench of coke. Dry coke quench reduces the amount.

HIsmelt®

Global Elements

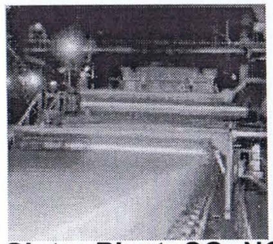
- **Lower levels of Greenhouse gas**
  Decreased CO_2 emissions in the production of pig iron.
- **Elimination of traditional iron making toxic emissions**
  Dioxins, Furans, and other Persistent Organic Pollutants
- **Greater steel recycling**
  Provide capability of production of high quality steel from the EAF sector through supply of virgin iron units.
- **Recycle Steel Plant Wastes**
- **Improved Economics**

Integrated Steelmaking

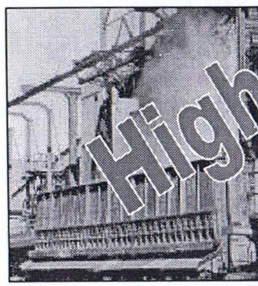
HIsmelt®

Iron Ore →

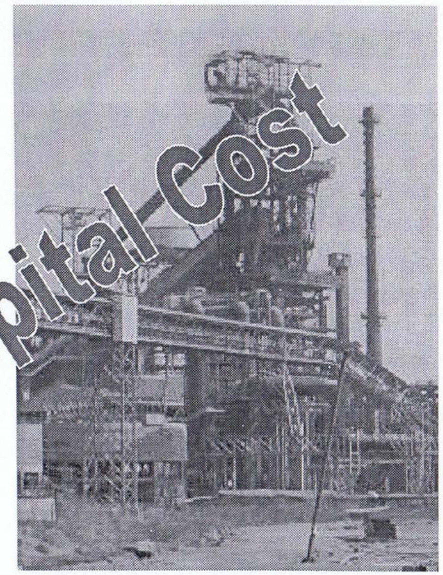
Coal →



Sinter Plant- SO_x,NO_x, Dioxins



Coke Ovens- Tars, Phenols

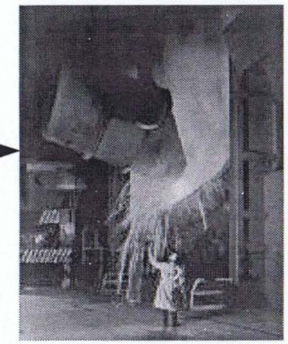


Blast Furnace – Molten Iron

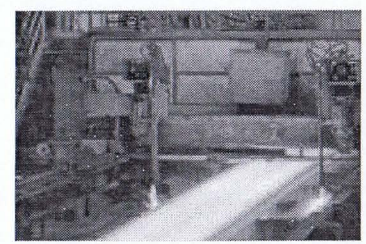
High Capital Cost

→

Basic Oxygen Steelmaking



↓ Molten Steel



Casting

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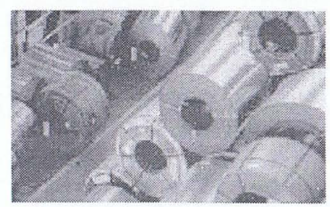

Coils

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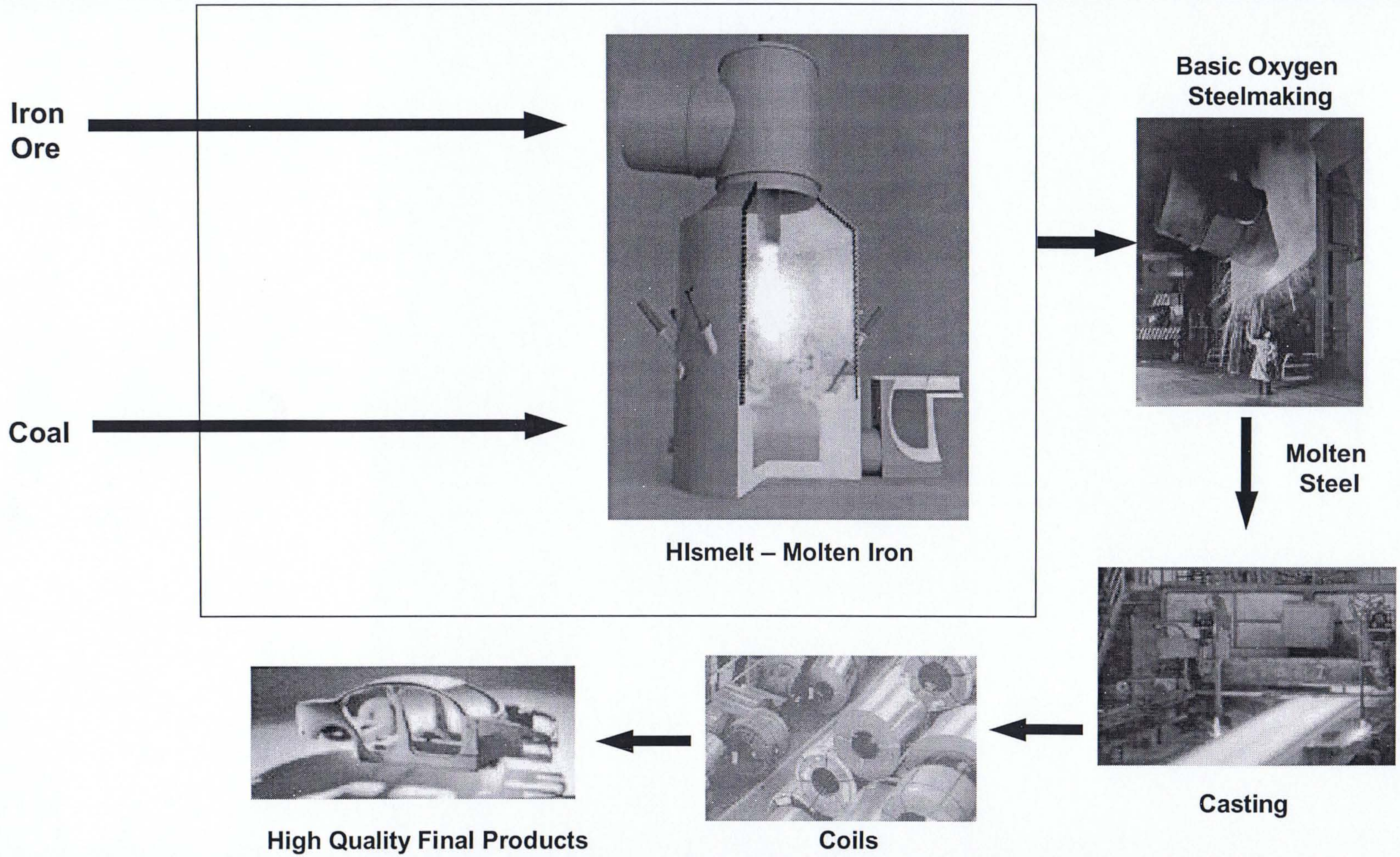
High Quality Final Products

Integrated Steelmaking



HIsmelt®

Today's Presentation

1. Global – *A New Iron making Technology*
2. **Regional – *Mineral Reserves***
3. Local – *The Kwinana Project*

Regional Perspective

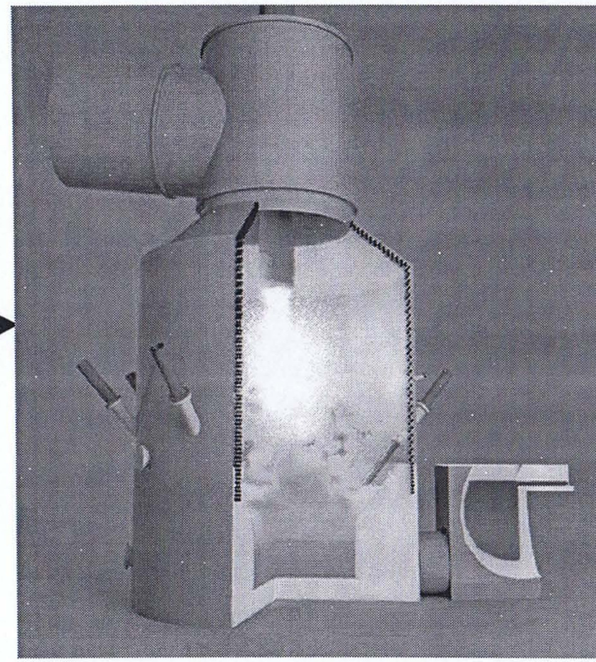
- **Iron Ore Fines**
  - Proliferation of the technology increases the market for fines
  - Will lead to greater longevity of mine operation
- **High Phosphorus Ore**
  - HIsmelt Plants can tolerate higher levels of phosphorus in ore
  - Currently unsaleable, potentially doubling WA's iron ore resources
- **Longevity and increased activity in remote communities**
- **No Beneficiation & Tailings**
  - Smelting technology separates gangue materials
- **Wider Range of Coals**
  - Expands resources applicable to the steel industry

HIsmelt application is flexible

HIsmelt®

Feed	Production Enhancing Technology	Productivity (Mtpa) 6m SRV	Productivity (Mtpa) 8m SRV
Ore	COLD ORE	0.5 – 0.7	1.0 – 1.5
Ore	PREHEATER (Lurgi Metallurgie)	0.7 – 1.0	1.7 – 2.3
Ore + Coal	CIRCOFER* (Lurgi Metallurgie)	2.0 – 2.6	4.0 – 5.0
Ore + Coal	CIRCOCHAR* (Lurgi Metallurgie)	0.8 – 1.5	2.0 – 3.0
Coal	CARBONISER* (Lurgi Metallurgie)	0.7 – 0.9	1.5 – 2.0
Ore + Gas	CIRCORED (Lurgi Metallurgie)	1.0 – 1.5	2.0 – 3.0

SRV



Requires further development

* Suitable for higher volatile coals

Today's Presentation

1. Global – *A New Iron making Technology*
2. Regional – *Mineral Reserves*
3. **Local – *The Kwinana Project***

Local Communities

- Extensive community consultation during the Public Environmental Review process
- Local focus
  - Encouraging suppliers to source locally
  - Encouraging suppliers to construct locally
- Naragebup
  - Education Officer funding
  - Partnership formalised by signing of MOU
- City - Country relationships
- Committed to ongoing consultation with the Community

People – In the community and in the workplace

Kwinana Industries Council

- Environmental Management Committee
- Kwinana Industries Public Safety Group
- Community and Industries Forum
- Community Relations Advisory Committee
- Kwinana Industries Education Partnership

Workplace Health, Safety and Environmental Management

- Committed to Best Practice HS&E management
- Impart our safety values, culture and systems to the contractors
- Behavioural Observations
- Deconstruction Zero LTI's
- Over 500,000 man-hours without a LTI for the Project

HIsmelt®

Local Synergies

Process water from Kwinana Water Recycling Plant

- HIsmelt involvement provided the 'critical mass' to allow project to gain Water Corporation Board approval.
- HIsmelt will take ~50% of the plant's output.
- Significant environmental benefits.

By-product synergies

- Lime kiln fines → Gypsum → Cement
- Explore use of iron rich or carbonaceous waste streams once technology is proven;

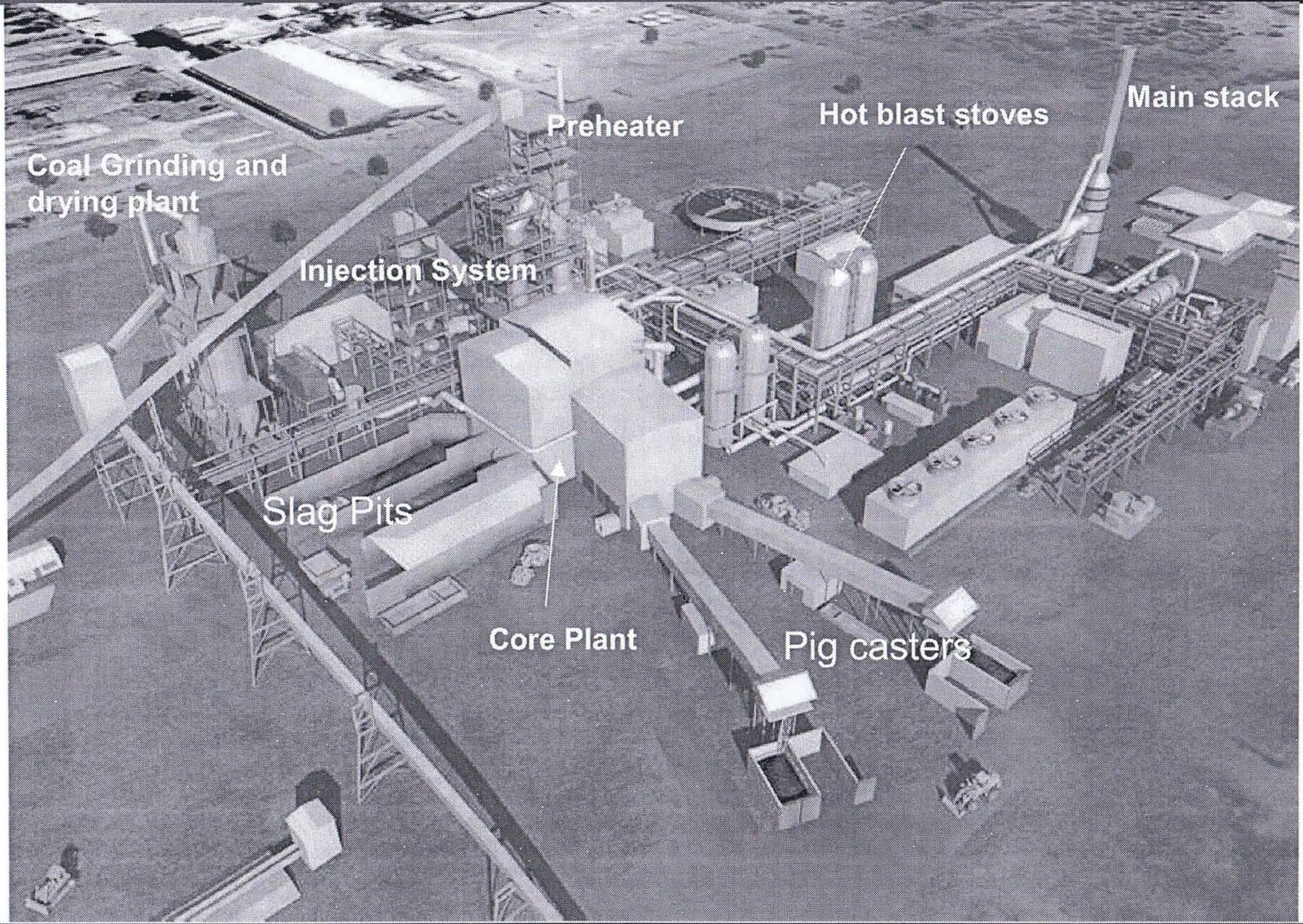
By-product Utilisation

- Slag
- Steam
- Residues

The HIsmelt Team

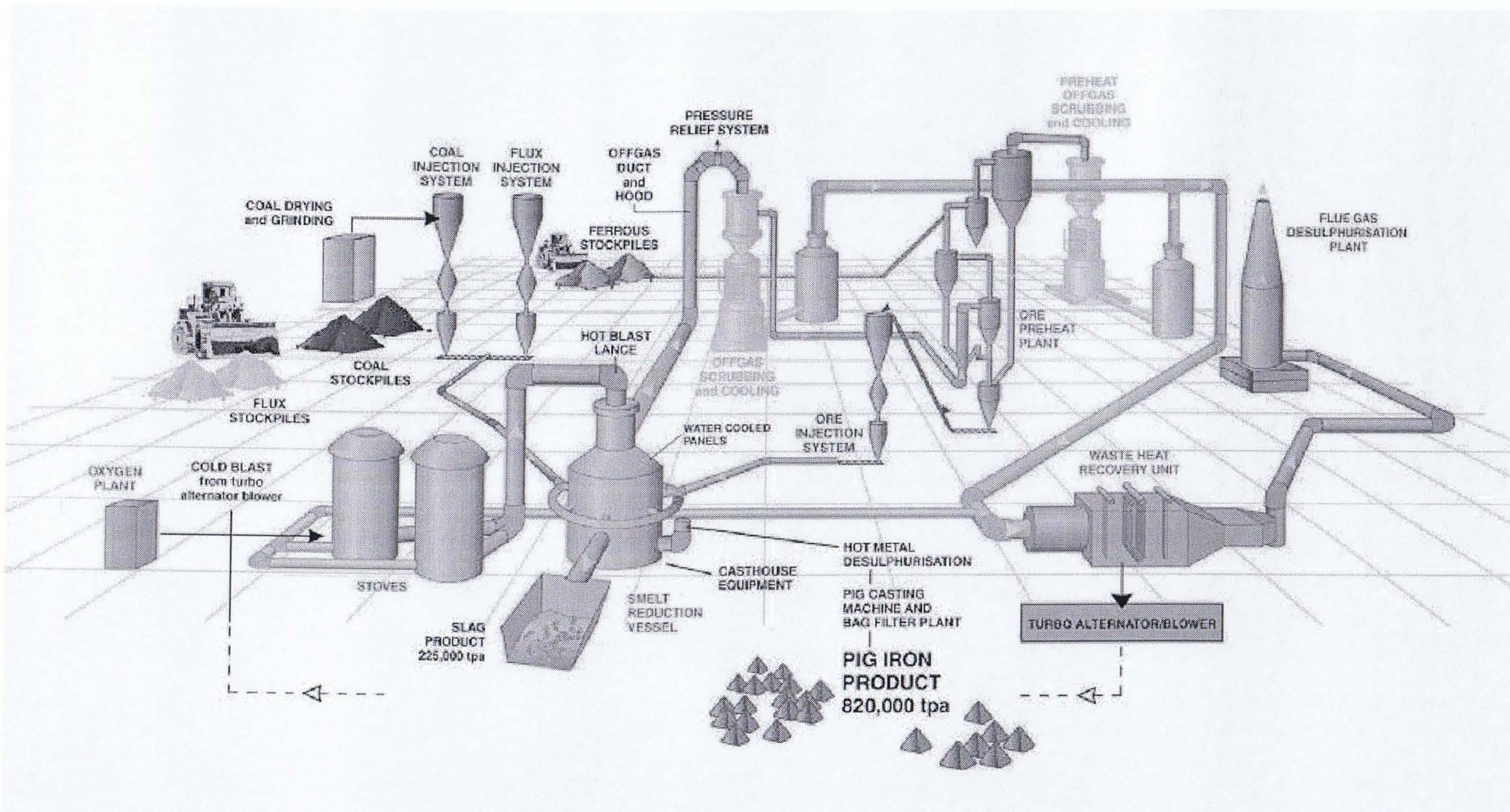
The Kwinana Plant

HIsmelt®



HIsmelt®

The HIsmelt Facility



PROMITHIAN INC. - WIND RIVER COALFIELD ASSESSMENT REPORT

COAL AND NATURAL GAS FROM COAL AS A FUEL AND REDUCTION AGENT: AN EVALUATION AND ENVIRONMENTAL REPORT

MARCH, 2005

NTS 106-E
MAYO MINING DISTRICT

65°15' N 135°00' W

COAL EXPLORATION LICENSES CYM 0011 – 0019
REGISTERED IN THE NAME: PHILIP J. WHEELTON

FOR THE PERIOD
DECEMBER 2003 – DECEMBER 2004

TABLE OF CONTENTS

I. INTRODUCTION

In 2001, Promithian Inc. acquired a number of Coal Exploration Licenses in the southern Bonnet Plume Basin. The occurrence of thick coal seams within the Bonnet Plume Basin has been known for well over 100 years. Bituminous coal was discovered in the southwest corner of the basin in 1977. Significant work was carried out from 1977 through 1983 by Pan Ocean Oil Ltd. Fifty-three drill holes producing 10,700 meters of diamond drill core enabled Pan Ocean Oil to confirm that approximately 660 million tonnes of low sulphur, high volatile Bituminous C thermal coal existed in seven widely spaced deposits. Three years of environmental baseline information collection was also carried out between 1980 and 1983. Promithian Inc. is prepared to carry out further exploration work, as well as baseline environmental collection, on one of those seven deposits: the Deslaurier coal deposit located on the west side of the Wind River adjacent to the Wind River Trail (Yukon Minfile 106E/037). The deposit is located between UTM 7,255,500 N and 7,261,500 N as well as between 478,500 E and 481,000 E. The Wind River Trail passes within 25 meters of the Deslaurier deposit on its west side. The Wind River runs along the east side of the deposit. The Deslaurier deposit is a hill approximately 180 meters in height, measuring approximately six kilometers north/south and 2 kilometers east/west with numerous coal seams cutting through it. The 105-million-tonne deposit had three diamond drill holes, 79-1, 79-6 and 80-8 drilled into it in 1979 and 1980. The Basin's number 3, 4 and 5 coal seams are present in the deposit. Cumulative coal thickness varies from 24 to 28 meters. The number 5 seam, the deepest of the three, is approximately 9.6 meters thick and is exposed the entire 360 degrees of the deposit. A multi-phased testing program involving up to 34-diamond drill holes and a channel-sampling program are both part of the future exploration work Promithian Inc. intends to carry out. Further baseline environmental data collection will also be carried out at the same time as the exploration program.

The Deslaurier Deposit is located within the Traditional Territory of the Na-Cho Nyak Dun First Nation. The Traditional Territory of the Tetlit Gwichin begins north of were any contemplated work by Promithian Inc. would be carried out. However, the First Nation has expressed a strong interest in any development work in the area. Promithian Inc. has thus consulted with both First Nations and will continue to do so.

The Peel Watershed Planning Commission has also recently been established. The Commission has a mandate to carry out land use planning activities within the entire Peel River watershed. Promithian Inc. will utilize information from the Commission as it is made available to better define our activities and associated impacts.

A. Project Proponent

The management team of Promithian Inc. is described below:

President – Philip J. Wheelton, Economist
Director – Stephen Mooney, P. Eng. (pending), PMP
Director – Cynthia Groves, LLB
Director – David Kunz, B. Eng.
Director – Graeme A. Bethell, M.Sc., QEP
Director – Craig Cyr, B. Eng

Promithian Inc. is a Delaware corporation. The majority of the company's shareholders are Yukoners.

Promithian Inc. has business relationships with China National Overseas Engineering Corporation (www.covec.com), Tercon Construction Ltd. (www.tercon.bc.ca), Access Consulting Group (www.accessconsulting.ca) and Yukon Engineering Services (www.yes.yk.ca).

The corporation's auditor is Steingarten Schechter & Co.

Promithian Inc. may be contacted through its president at:

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B. Introduction to Coal

Over 23% of the world's primary energy requirements are met by coal. Thirty-nine percent of global electricity is generated by coal. In 2001, Canada consumed 54,143,700 tonnes of thermal coal to generate electricity. In fact, coal is used as an electricity-generating fuel across North America. Coal generates approximately 65% of the electricity used in Alberta. Coal is used to generate a majority of the electricity in Saskatchewan. In addition, coal is also the principle fuel for generating electricity in the United States, accounting for approximately 55% of electricity production. Usibelli Coal provides coal to generate electricity and heat in Fairbanks, Alaska.

Coal Characteristics

Coal is ranked into a number of categories and sub-categories:

Peat	Brown, light, easily falls apart
Lignite	Brown to brownish-black, plant residue is still visible
Sub-bituminous C }	Brownish-black to black
Sub-bituminous B }	
Sub-bituminous A }	

Bituminous C }	Black, dense, brittle; plant residue can be seen with a microscope
Bituminous B }	
Bituminous A }	
Anthracite	Black, hard, glossy

The heat value of coal generally rises with rank – from peat to anthracite. Peat is very high in hydrogen and low in carbon. The ratio of hydrogen to carbon changes as the rank of coal increases. Anthracite is very high in carbon and low in hydrogen. Anthracite is often so high in carbon it does not burn, as is the case with Whitehorse Coal.

Different categories of coal are used to generate electricity. For instance, Alberta mines and burns sub-bituminous coal. Saskatchewan uses its lignite to generate electricity. Alaska is using sub-bituminous coal. The eastern United States has traditionally burned its high heat value, high sulphur, bituminous coal, but is increasingly using low sulphur, low BTU coal from the Powder River Basin.

Typically, coal quality analyses use the following abbreviations:

M = moisture
A = ash (any non-coal material in the coal)
VM = volatile matter (volatiles)
FC = fixed carbon
CV = calorific value
S = sulphur

All of these qualities are expressed as a percentage (%) of the coal, except for calorific value. Calorific Value – or heat content – is usually expressed as British Thermal Units per pound (Btu/lb.) or Megajoules per Kilogram (MJ/kg).

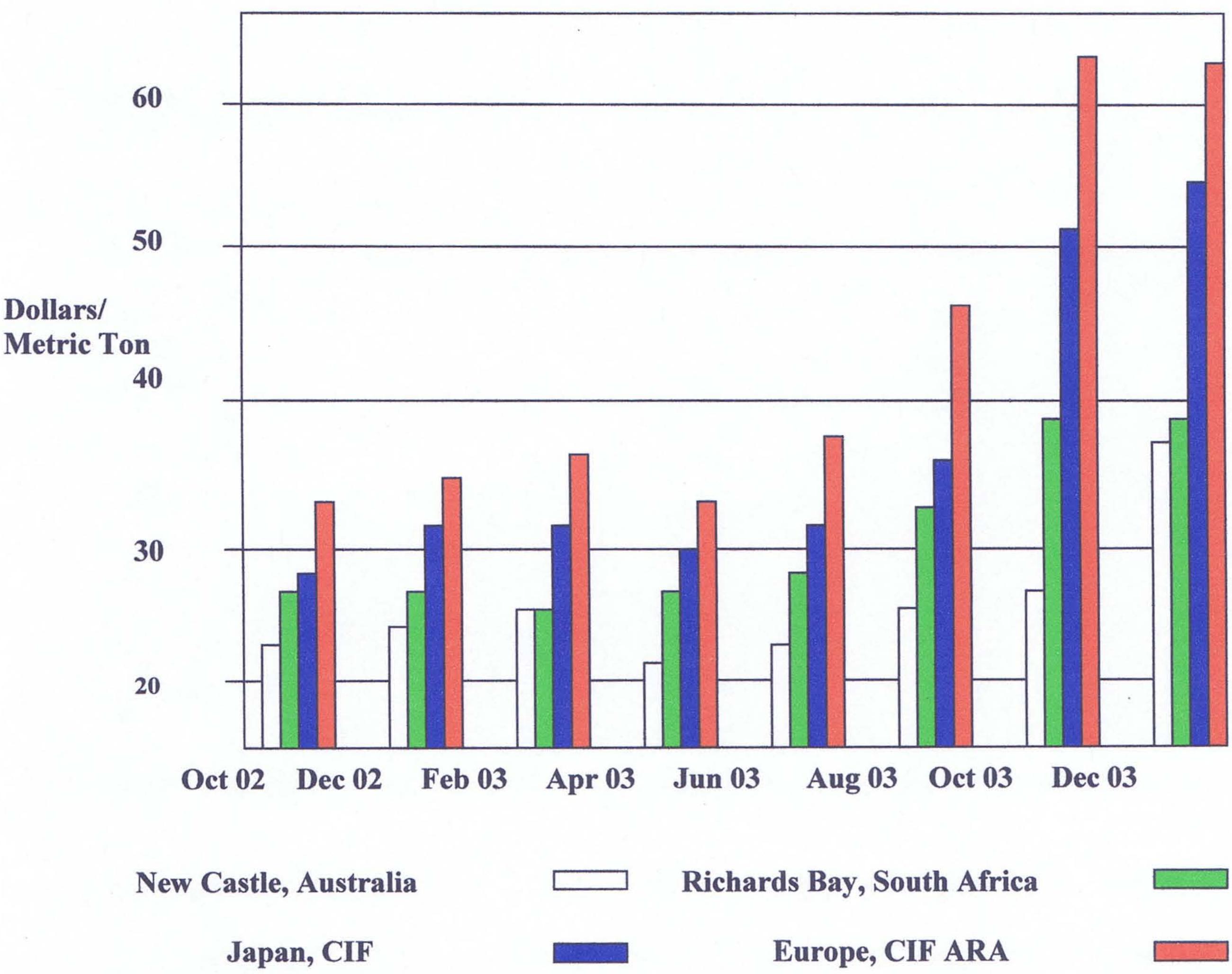
The New York Mercantile Exchange (NYMEX) offers a coal futures contract, the Central Appalachian Contract, that is helpful in understanding what to look for in a thermal coal used to generate electricity:

Trading Unit	1,550 tons (short-2000 lbs.) of coal
Price	US dollars and cents per ton
Delivery	Freight-On-Board buyers barge at seller's delivery facility
Moisture	10% maximum with no tolerance above
Ash	13.50% maximum by weight with no tolerance above
VM	30% minimum with no tolerance below
CV	12,000 BTU's per pound, tolerance of 250 BTU's per lb.
S	1.00% with tolerance of 0.05% above
Hardness/grindability	41 minimum with a 3 point tolerance

A hardness index is used to measure how difficult it is to pulverize the coal for injection into the boiler flame. If coal is too soft it is difficult to handle and generates a lot of dust, which might self-combust. If the coal is too hard it will require too much energy to grind. High volatile coal (>30%) is used as thermal or steam coal to generate heat and power. Ash, sulphur, and BTU/lb. levels are important. Low volatile coal is used as metallurgical coal. Fixed carbon levels are important with metallurgical coal. For example, British Columbia has low volatile, high fixed carbon, bituminous coals which are exported for metallurgical purposes.

At the end of December 2004, the NYMEX contract price was $62.25 a ton. Variances from the NYMEX standards will cause a change in the price of the coal.

The following chart shows recent rises in coal prices in various world markets:



(Data from Platts.com.)

Price/quality coal contracts have traditionally been long term agreements with prices negotiated once a year (using the NYMEX price, or some other price, as a reference). Historically, utility companies using a particular technology to generate electricity maintained a long-term relationship with a nearby coal mine. However, in recent times, changing environmental requirements, the privatization of public utilities, and the long-term decline of transportation costs have created a vibrant and growing coal marketplace. The following table shows North American sources of thermal coal and their quality:

NORTH AMERICAN SOURCES

U.S. BASIN	ORIGIN	BTU/LB.	SULPHUR %
Northern Appalachian			
	Pittsburgh seam	13,000	3.0
		13,000	4.0
	Upper Ohio River	12,500	6.0 +
Central Appalachian			
	NYMEX look-alike	12,000	1.67
	Big Sandy River	12,500	1.5
		12,500	1.2
	Thacker/Kenova	12,500	1.5
		12,500	1.2
	Big Sandy/Ohio R.	12,000	1.2
Illinois Basin		11,800	5.0
		11,500	2.5
		11,000	5.0
		10,500	6 +
Powder River Basin		8,800	0.80
		8,400	0.80
Rocky Mountain	Colorado	11,700	0.80
		11,000	0.80
	Utah	11,500	0.80

The following table shows world sources of thermal coal and their quality:

WORLD SOURCES

NATION/REGION	PORT	BTU/LB.	SULPHUR %	ASH %
Atlantic Market:				
ARA CIF – Europe		10,800	1.0	16
Columbia	Bolivar	11,600	1.0	9
		11,300	0.8	9
Poland	Baltic	11,300	0.8	15
Russia	Baltic	11,500	1.0	16
South Africa	Richards Bay	11,200	1.0	16
United States	Hampton Roads	12,500	1.0	10
	Baltimore	12,500	2.5	12
Venezuela	Maracaibo	12,600	0.8	7
Pacific Market:				
Australia	Gladstone	11,700	0.6	12
	Newcastle	11,340	0.8	13
China	Qinhuangdao	11,200	0.8	10
Indonesia	Kalimantan	11,300	1.0	10
		9,400	0.1	1
Russia	Pacific	11,300	0.4	15

World seaborne trade in thermal coal is currently over 400 million tonnes and on the rise. For instance, in 2003, Australia exported 213 million tonnes of coal (metallurgical and thermal). Indonesia exported 100 million tonnes of thermal coal. China exported 93 million tonnes with 72 million tonnes being thermal coal. South Africa exported 69 million tonnes of thermal coal during that same year, and 65.93 million in 2004. Columbia and Venezuela exported 45 million tonnes and 8.2 million tonnes, respectively, in 2003. China is both the world's largest producer of thermal coal and the largest user of thermal coal. Japan imported 100 million tonnes of coal in 2003. South Korea, Taiwan, and the Philippines accounted for the bulk of world imports during 2003. A spot market exists in the North Pacific, and all importers, led by Japan, are increasingly using it to purchase thermal coal. Utility companies issue short-term contracts for bid by suppliers with excess production capacity. Coal from different suppliers around the world is now routinely blended before being fed into the boilers of utility companies.

In the United States, low sulphur coal from the Powder River Basin (PRB) is increasingly used all over the country in an effort by utility companies to meet environmental requirements. PRB coal is being burned as fuel in Fairbanks Alaska. Thirty years ago, PRB coal consumption for electrical generation was about 10 million tons-per-year. Today, the U.S. uses nearly 400 million tons-a-year of the low sulphur, sub-bituminous fuel. This accounts for about 35% of the U.S. power industry's coal usage. The principle factor driving the switch from high BTU/lb. bituminous, high sulphur, coal from the eastern United States to PRB (8,000 BTU/lb., low sulphur) coals is the mandate to cut SO_2 emissions from coal-fired power plants (1990 Clean Air Act amendments). Privatized utility companies found it was cheaper to transport the lower heating-value coal thousands of miles rather than make the significant capital investment in plant environmental improvements. Since 1976, SO_2 emissions by U.S. power plants have been nearly cut in half. While at the same time, the amount of coal being burnt to generate electricity has gone up by 300%.

A number of significant Powder River Basin coal mining operations and a description of their coal are as follows:

POWDER RIVER BASIN

MINES	QUANTITY (tons/year)	BTU/LB.	SULPHUR %
Caballo	26 million	8,490	0.84
Coal Creek	7.1 million	8,316	0.80
Jacobs Ranch	29.3 million	8,699	1.02
Belle Ayr	22.5 million	8,538	0.64
Cordero Rojo	37.0 million	8,413	0.81
Black Thunder	42.7 million	8,774	0.80

Many different technologies exist for converting coal to electricity. Each has its own benefits and drawbacks. Coal quality, the scale of the power plant, environmental constraints, location and other economic considerations will determine the most suitable technology. Any attempt to design a coal-fired power plant must necessarily begin with an analysis of the fuel to be used. For instance, a twenty-megawatt thermal power facility will require approximately one hundred thousand (100,000) tonnes of coal per year. Assuming a 30-year life for the power plant, a deposit of approximately three million tonnes will be required to supply the necessary coal.

II. COAL IN THE BONNET PLUME BASIN

The Yukon has over 100 known coal occurrences (Hunt, 1994). Coal is found in a number of geological sequences, which underlie as much as 37,000 square kilometers of the Yukon (Long, 1985). Very little of this vast area of potential coal-bearing rocks has been examined in any detail and the extent of coal deposits is largely unknown.

Coal occurrences are known to occur in seven geographic areas:

1. Kluane
2. Whitehorse Trough—Whitehorse, Division Mountain, Carmacks
3. Tintina Trench—Watson Lake, Ross River, Pelly River, Dawson
4. Indian River Area
5. Rock River Basin
6. Bonnet Plume Basin
7. Northern Yukon

Minor coal is also known to occur in the Snake River area, in the northern Richardson Mountains, in the northernmost Yukon, and within the Mackenzie Delta area.

Historically, coal was mined in the Dawson City and Carmacks areas, as far back as the Klondike gold rush. Coal has been used to heat buildings, power the paddle wheelers, and to dry concentrate in Keno. Coal from Ross River and Carmacks was also used to dry concentrate at the Faro mine during its first operational phase (approximately 20,000 tonnes a year).

The low sulfur, high volatile, bituminous, thermal coal deposits of the Bonnet Plume Basin located in the Wind River drainage basin – the Wind River Coalfield - are the subject of this paper.

A. Wind River Coalfield

The Bonnet Plume Basin, the center of which is located at 65°30’N latitude, 135°00’W longitude, covers much of the central part of the Wind River map sheet (NTS106/E), in northeastern Yukon Territory.

The Basin is a physiographic and structural depression, approximately one million acres in area, surrounded by upland terrain. It lies at the southern end of the Richardson Mountains, and is bounded on the west and south by the Wernecke Mountains and on the east by the Trevor and Knorr Ranges of the Mackenzie Mountains.

The Bonnet Plume Basin contains the Wind River Coalfield which is the largest coal field in the Yukon with 660 million tonnes of drill tested, high volatile, bituminous C coal present in the lower Bonnet Plume Formation. An estimated 1.4 billion tonnes of sub-bituminous and lignite coal exists in the northern part of the Basin along the Wind and Peel Rivers.

Coal in the Bonnet Plume Basin occurs in the Upper Cretaceous-Tertiary Bonnet Plume Formation. The Upper Cretaceous, lower Bonnet Plume Formation hosts high volatile bituminous C coal, which is exposed in the southwest corner of the Basin. The Tertiary (younger), upper Bonnet Plume Formation contains sub-bituminous and lignite coal which is exposed in the northern part of the Basin in particular where the Wind, Peel, and Bonnet Plume Rivers have cut down into the formation.

Access is presently only by floatplane or helicopter. Kiwi Lake, just south of the Basin, has been used as an exploration camp, on and off, for many years. Several other lakes throughout the Basin, little Wind, Margaret, and Chappie lakes, are also of sufficient size and depth to allow floatplane access. There is also a 200-kilometer winter road from the Keno Hill area into the west side of the Basin. The trail follows the west side of the Wind River valley for the majority of its route. The Dempster Highway lies 130 km to the west of the Basin. Rivers in the area flow north so access from the Dempster involves multiple large river crossings. The Wind River Trail was the preferred route to the Mackenzie Delta prior to the building of the Dempster Highway.

Coal-bearing, sedimentary rocks along the banks of the Wind, Peel, and Bonnet Plume Rivers were first reported in 1893 by Count V.E. de Sainville (Camsell, 1906). However, the first detailed description of the coal seams was not given until Camsell did so in 1906. Camsell described the area along the south bank of the Peel River between the mouths of the Wind and Bonnet Plume Rivers and noted the presence of thick (approximately 13m) coal seams.

In 1946, MacKay (1947) visited the coal occurrences along the Peel River as part of a larger program to document the coal resources of Canada. In 1949, Bostock (1950) visited the area to study the coal resources as part of a program to assess the mineral resource potential of the Yukon.

The geology of part of the Bonnet Plume Basin has been studied by Bostock (1961), Hume (1954), Douglas and MacLearn (1963) and Norris et al., (1963); however, the most comprehensive report on the geology of the Bonnet Plume Basin is provided by Norris and Hopkins (1977). The stratigraphy and sedimentation of the Basin has been studied by Mountjoy (1967) and Long (1978) with palynological support provided by Rouse and Srivastava (1972) and Sweet (1978, 1979, 1980). Mountjoy (1967) gave the name Bonnet Plume Formation to the sedimentary sequence. He suggested that as much as 1,525 m of sediment and coal are present, consisting mainly of sandstones, with minor amounts of siltstone, conglomerate, and lignite, including three lignite seams more than five feet thick in the upper Bonnet Plume Formation on the Peel River.

Norris et al. (1963) produced a geological map of NTS 106E, which covered the entire Bonnet Plume Basin. They divided the Bonnet Plume Formation into an Upper Tertiary (younger) age portion and a Lower Cretaceous age portion. Geological mapping on a scale of 1:250,000 was published in 1975 (Norris, 1975).

Interest in the area for its economic potential commenced during World War II when Imperial Oil mapped the Basin. The area was part of the Canol project to identify possible sources of oil for use by the U.S. military. Subsequent exploration by several other companies was focused on the Basin's potential for oil. Exploration consisted of geological mapping, and one gravity survey across the width of the Bonnet Plume Basin at approximately 65° 36" 00'. No oil wells were drilled in the Basin; however, one unsuccessful well was drilled along the Peel River 2,000 m east of the Bonnet Plume River. The well was dry.

In 1972, Chevron Minerals/Crest Exploration acquired at least seven samples of the coal along the banks of the Wind and Peel Rivers at the most northern part of the Basin. The samples were acquired to determine the coal's suitability for reducing the Snake River Iron Formation. The Coal samples, taken from two seams with a thickness of 50 feet, were determined to be a sub-bituminous C coal with the following characteristics:

M	12.39%
Ash	14.08%
VM	36.66%
FC	36.87%
CV	9,783 BTU/lb.
S	0.26%

Chevron identified an area of approximately 40 miles by 15 miles that could, potentially, contain the two coal seams under approximately 100 feet of glacial till.

Cyprus Anvil acquired two coal exploration licenses in 1976, covering the lignite, sub-bituminous coal occurrences along the Peel River and carried out a reconnaissance study on the licenses in 1977 (Hill, 1978).

Canadian Aran Petroleum Ltd. acquired three coal exploration licenses in the northwestern central portion of the Basin during 1977.

In 1977, Pan Ocean Oil Ltd. discovered bituminous coal in the south and western part of the Bonnet Plume Basin, along Illtyd Creek and the Wind River (McKinney, 1978). The company subsequently acquired 21 coal exploration licenses covering 339,144 hectares (838,014 acres).

Pan Ocean Oil Ltd. located twelve areas containing bituminous coal during 1977 (McKinney, 1978, 1979) as follows:

1. Wernecke (Yukon Minfile 106E/21)
2. Spaceship Creek (Yukon Minfile 106E/38)
3. Illtyd Creek Southwest

4. Illtyd Creek Northwest
5. Illtyd Creek East (Yukon Minfile 106E/35)
6. Koubasa Lake
7. Garlic Ring Lakes (Yukon Minfile 106E/32)
8. Wind River/Deslaurier (Yukon Minfile 106E/37)
9. Wind River Southeast
10. Wind River Northeast
11. Upper Wind River
12. Lower Illtyd Creek

In 1978, two of the areas were drill tested, which established, indicated, and inferred in situ coal resources of greater than 96 million tons. Four diamond drill holes were drilled for a total of 457 meters (1,500 ft). In November 1978, three licenses held by Aran Oil and Gas were transferred to Pan Ocean Oil Ltd. increasing Pan Ocean's control to 24 licenses encompassing 387,308 hectares (957,024 acres). In 1979, Pan Ocean continued their mapping program and did drill testing on five of the coal areas.

In 1980, all twelve areas defined by Pan Ocean in 1977 were drill tested. In total, Pan Ocean drilled 10,700 meters in 53 drill holes. Seven of the twelve areas contain what are considered to be potential mineable resources (Pan Ocean, 1981): the Illtyd, West Illtyd, Wernecke, Spaceship, Airstrip, Garlic Ring, and Wind/Deslaurier deposits. Each of these deposits, on its own merits, would rank above every other coal deposit in the Yukon in terms of size, coal quality, and ease of mining.

Reserves were calculated for the seven drilled and mineable coal deposits (millions of tonnes):

Illtyd	Measured 120.93	Indicated 29.21	Inferred 33.50	Total 183.64
Wernecke		Indicated 104.65	Inferred 28.93	Total 133.58
Airstrip			Inferred 18.40	
Wind		Indicated 60.83	Inferred 43.80	Total 104.63
West Illtyd			Inferred 47.56	
Garlic Ring		Indicated 8.69	Inferred 5.55	Total 14.15
Spaceship			Inferred 157.95	
Total: 660 million tonnes				

The presence of at least 5 coal horizons, occurring in a 250-meter interval within the middle unit of the lower Bonnet Plume Formation, is indicated from drilling. All are considered to have economic potential. The coal horizons are numbered in sequence from youngest to oldest reflecting the order in which they were encountered in drilling (top to bottom).

The No. 1 Seam occurs throughout the southern end of the Basin. The horizon varies from a maximum thickness of 8.0 m in the Wernecke deposit to 2.0 m in the Garlic Ring Deposit. The horizon contains several shale and carbonaceous shale partings, which collectively result in a weighted average (tonnage) raw ash content of 36.5%. Gravity washing easily separates much of this ash but this reduces expected yield.

The No. 2 Seam horizon lies from 10 to 40 m below the No. 1 Seam horizon and is persistent throughout the southern end of the Basin. This horizon varies in thickness from a maximum of 10 m in the Spaceship Deposit to 2.0 m in the Garlic Ring Deposit. In the Wernecke, Spaceship and southern end of the Illtyd Deposit, the horizon splits into two seams – seam 2A (upper) and 2B (lower), 2B shales out rapidly north of the hole BP-79-14 in the Illtyd Deposit. Only a single seam occurs n the Garlic Ring Deposit. The horizon contains shale and carbonaceous shale partings, which collectively result in a weighted average (tonnage) raw ash content of 24%. Gravity washing easily separates much of this ash but this, again, reduces expected yield.

The No. 3 Seam horizon correlation of the horizon throughout the property is difficult; however, a persistent coal horizon below the No. 2 seam is present in several of the deposit areas. The No. 3 seam horizon lies from 10 to 50 m below the No. 2 seam horizon and varies in thickness and in character. In the Wernecke, West Illtyd and Spaceship deposits the horizon consists of two seams having thicknesses averaging 2.85 m (upper) and 2.17 m (lower) separated by an average of 5.46 m of mudstone. In the Airstrip and Deslaurier deposits, the horizon consists of one seam with an average thickness of 5.5 m. In the Illtyd deposit, the horizon consists of one seam with an average thickness of 2.4 m. The horizon is not present in the Garlic Ring Deposit.

Correlation of the No. 4 seam horizon throughout the property is questionable; however, a persistent horizon is present between the No. 3 and No. 5 seam horizons in all deposit areas except the Garlic Ring Deposit. The No. 4 seam horizon varies in thickness and in character, attaining a maximum development (5.45 m) in the Airstrip, Deslaurier and Spaceship deposits. The horizon appears to shale out in the northern Illtyd Deposit.

The No.5 Seam horizon is present in the Deslaurier, Wernecke, West Illtyd and Spaceship deposits. The horizon varies in thickness from a maximum of 9.0 m in the Wind/Deslaurier Deposit to 2.3 m in the West Illtyd deposit. A weighted average clean coal ash content of approximately 8 to 10% can be achieved after grinding and washing of the seam with a fairly high yield: > 80%.

Cumulatively, the five seams average 22 meters in thickness, with a maximum of 30 meters. The seams dip at approximately 5° to 20° to the east and northeast and appear to flatten out at depth (400 to 600 meters ?).

Generally speaking, as you move from the number one through number five seams, youngest to oldest, the raw ash content drops while the fixed carbon, calorific value, and yield rise.

The center of the Bonnet Plume Basin has been covered by glacial till which precluded the drilling of any holes by Pan Ocean Oil in this area.

In 1978, the "Yukon Thermal Power Generating Study" was prepared by Monenco Consultants Limited for Pan Ocean Oil Ltd. This study provides an order of magnitude cost estimate of generated power associated with a proposed thermal plant in the Illtyd Creek area. In the study, the capital, operating and maintenance costs are estimated for a mine mouth 3 x 70 MW coal-fired generating station including two possible routes and two transmission line voltages to transmit power from the Illtyd Creek site to Carmacks.

In 1979, Pan Ocean Oil prepared a report on "Economic, Environmental and Socio-Economic Considerations" for the Bonnet Plume Coal project (Nutter 1979).

In 1980, five environmental programs were undertaken:

1. LGL Limited (Taylor, 1981), an environmental consultant, completed an initial overview of the fisheries, wildlife and vegetation of the property which included recommendations for a variety of future studies;

2. The Yukon Territorial Government began a three year study of the caribou of the Wernecke Mountains, and included the Bonnet Plume license area within their study region;

3. The Department of Indian Affairs and Northern Development installed a recording water level meter on Illtyd Creek;

4. Pan Ocean set up a weather station at Kiwi Lake;

5. Pan Ocean started a water-quality sampling program on Illtyd Creek and the Wind and Peel Rivers.

Russell and Farnell (1981) of the Yukon Wildlife Branch produced a report for Pan Ocean Oil Ltd. on the caribou of the Wernecke Mountains. In 1982, Brown and Stephen produced a report summarizing environmental programs completed in 1981, and outlining projects planned for 1982. Aberford Resources Ltd. (Brown, 1982) produced a report summarizing the results of the water chemistry program. This program was carried out to provide baseline pre-development data describing seasonal variations in the natural constituents of the water bodies of the projected area. In 1983, Aberford Resources Ltd. (Brown, 1983) produced a report summarizing environmental programs conducted in 1982, including studies of: wildlife, weather station, stream hydrology, water chemistry, precipitation, acidity and limnology; plus projected programs for 1983.

A preliminary Feasibility Mining Study was produced by Wright Engineers Limited in 1981 for the Illtyd Creek Deposit (65° 16' 02" N 135° 00' 10" W). The study outlined a 30-year mining plan requiring approximately 180 to 230 persons depending on the amount of coal mined (500,000 or 750,000 tonnes) per year.

In 2002, the Government of Yukon and the Government of Canada completed a regional geophysical, air-magnetic, survey of the entire Bonnet Plume Basin. The survey highlights an area of approximately 25 kilometers wide (E-W) by 65 kilometers high (N-S), which could be underlain by the same bituminous coals already drill tested in the southwestern corner of the Bonnet Plume Basin. This is the area covered by glacial till and the most prospective area for Coal Mine Methane.

In 2002 Promithian Inc. released a "High Level Evaluation" report written by Hatch and Associates, which examined the potential of using the Wind River coal as a source of energy and as a reduction agent to reduce the Snake River Iron Formation.

B. Coal Quality

The coal within the Wind River Coalfield is ranked as a high volatile, bituminous C thermal coal. A weighted average proximate analysis of the coal found within the No. 1 and 2 seams of the Illtyd Deposit on a clean coal basis (reconstituted sample of ¼" x 28 mesh fraction at –1.90 S.G. and the 29 mesh x 0 size fraction on a raw basis) is:

Yield	76.9%
M	5.2%
Ash	14.3%
VM	33.0%,
FC	47.4%
CV	10,016 BTU/lb. - (23.3 MJ/kg)
S	0.33%

Ash – The coal can be cleaned and blended to produce a product having no higher than a 15% ash content.

Calorific Value – The BTUs/lb. are variable but, by blending, the heat value can be maintained at >9,700 BTU/lb.

Ash Fusion – The temperatures are variable; however, the ash is considered high melting. Initial deformation temperature under reducing conditions is generally greater than 2200°F and averages 2450°F.

Grindability – The grindability of the coal, as defined by the Hardgrove Index, varies from 36-55 with an average of 42.

Alkalinity – From limited analysis, the sodium content of the coal generally is less than 0.9%. The base-to-acid ratio (B/A) is an indication of slagging potential; the B/A ration is 0.19. A B/A ratio less than 0.5 indicates that the probability of slagging is remote.

Nitrogen Content – Ultimate analysis indicates that the nitrogen content is less than 0.8%.

Sulphur – The sulphur content of the coal is extremely low at 0.33%. In rare cases sulphur exceeds 1% over narrow intervals within the seams.

Fuel Ratio – The fuel ratio of the coal is good at a maximum of 1.60, and an average of 1.43.

The 105-million tonne Deslaurier Deposit (65°26'12"N, 135°26'00"W) occurs on the west bank of the Wind River adjacent to the Wind River Trail. The deposit area occurs as a hill with a local relief of about 180 meters and extends along the Wind River for a distance of about 6 kilometers. The No. 5 seam has a thickness of approximately 9.2 to 9.6 meters and dips at approximately 5° to the East. The deposit allows the opportunity to "high grade" a small portion of the coalfield.

Proximate analysis of the clean coal from the No. 5 seam is:

Yield	81.6%
M	3.7%
Ash	7.9%
VM	34.3%
FC	53.9%
CV	11,168 BTU/lb. (25.97 MJ/kg)
S	0.46 %

As these values indicate, this coal compares very competitively with other coals from the Pacific Market (See Page 9).

Pan Ocean Ltd's exploration program in the late 1970's and early 1980's proved that the Bonnet Plume Basin contains a coalfield of major proportions. Measured, indicated, and inferred in situ resources of approximately 660 million tonnes are located in seven widely-separated deposits (Pan Ocean Oil, 1981). Total coal resources in the Bonnet Plume Basin, within 600-800 meters of surface would most likely be in the range of 15 billion tonnes. Sufficient surface mineable coal is available to provide 10 to 15 million tonnes per year for export, if transportation infrastructure were present, in addition to fuel for the then-proposed 210-megawatt mine-mouth thermal power plant for three decades. The Basin could support a thermal power plant of up to 2000 megawatts if electrical transmission lines were in place to move the power to a load center.

Even though substantial quantities of good quality, low sulphur, thermal coal are present within the Bonnet Plume Basin, this area is relatively inaccessible and is remote from potential markets in Alaska, southeast Yukon, the west coast of North America and the North Pacific. In the absence of a major investment in transportation infrastructure, the most likely development scenario would be to use the coal locally. Since 2001, Promithian Inc. has been investigating the possibility of using the bituminous coals within the Basin to reduce the iron ore contained within the Rapitan Iron Formation - which lies just east of the Basin. A number of alternative Ironmaking technologies, Corex, Finex and HIsmelt, have recently been developed which allow thermal coal to be used to reduce iron ore to iron. The company is focussing its activities on the highest rank coal found within the Basin: the No. 5 seam within the Deslaurier Deposit located on the west side of the Wind River adjacent to the Wind River Trail. The Deslaurier Deposit contains an expected 105 million tonnes. The No. 5 Seam, the most mature and highest rank in the Basin, is approximately 9.5 meters thick in this location, and can be easily mined with a contour (open pit) mining method. The nearby presence of the Rapitan Iron Formation (from 20 to 100 billion tonnes of medium grade, 43-46%, iron ore) offers a unique opportunity for the Yukon.

Significant work is still required before it is possible to say whether a viable coal mine could exist in the Bonnet Plume Basin. More drilling is required to provide a definitive estimate of the coal resources within the Deslaurier Deposit and the No. 5 seam. An Economic Feasibility study will be required in order to obtain an accurate estimate of coal mining and preparation (crushing and washing) costs. Finally, environmental data collection and impact studies of a coal mine in this area will have to be continued and completed.

Theoretical NYMEX-based, December 2004, price of Wind/Deslaurier No. 5 seam coal - FOB Stewart Crossing, Yukon: $78.55 CDN per metric tonne. Pig Iron presently sells for close to $400 US a tonne. Carbon steel slabs sell for approximately $700.00 US a tonne.

III. TRANSPORTATION

A. Trucking

Trucking one tonne of product 300-kilometers costs approximately $20.00 CDN in the Yukon. It would cost approximately $55.00 CDN to truck pig iron or coal to a port in Skagway. This transportation cost precludes moving the coal itself to any north Pacific market by truck. However, the possible development of a number of other mines in the Yukon may require a distributed generation strategy whereby electricity is generated at the mine site. A high quality coal from the Deslaurier deposit could compete, at present prices, with diesel fuel or propane from southern Canada. As previously stated, a 20-megawatt electricity generation facility would require one hundred thousand tonnes of coal per year. This demand while not be sufficient to justify the opening of new coal mine in itself would be a welcome secondary market. This amount of coal would necessitate two hundred round trips by truck per month, or 6.6 trucks per day, from Promithian's mine site to the generation plant. It should be noted that approximately a 15% reduction in trucking costs could be achieved if a locally available fuel such as Compressed Natural Gas or Liquified Natural Gas was used to power the trucks engines.

B. Rail

Rail costs are typically approximately 40% of trucking costs. In British Columbia, Pine Valley Coal pays approximately $18.00 CDN to rail a tonne of coal from Chetwyn in northeast BC to North Vancouver – a distance of over 800-kilometers. The construction of new rail bed costs approximately the same as building a new 7-meter wide road: $150,000 CDN per kilometer. As an example of total rail construction, the recently completed Alice Springs-Darwin Rail Line in Australia cost approximately $1,000,000 AUS per kilometer. The construction of this railway was a massive logistical exercise that overcame the difficulties associated with building a new railway across some of the most inhospitable terrain in the world. This figure should therefore be considered a very high-end cost for the construction of a new railway and running equipment in the Yukon. Five Hundred thousand dollars a kilometer would be a conservative estimate of railway construction and running equipment purchase costs in the Yukon. It should also be noted that a further significant reduction in per tonne transportation costs could also be achieved when locally available natural gas or electricity (rather than expensive diesel) powers a railroad.

C. Slurry Pipeline

Slurry pipelines are now used around the world to transport coal, iron ore, and other commodity type products. The cost of building and operating a slurry pipeline varies widely. However, construction and operating costs are typically one-third to one-half of a comparable rail transportation system. Slurry pipelines are typically built, and buried, beside a roadway for servicing. Power is required along the route to drive the pumps, which force the slurry up and over obstacles. Minerals are transported in slurry because of economics and end-use customer requirements. If the product can be used in a slurry form at the end of the pipeline the project's feasibility is significantly enhanced.

D. Transportation Conclusion

The most likely transportation scenario is a rail/highway intermodal transportation option. A new railway capable of hauling 1-1.5 million tonnes of pig iron should be built at the northern end of the 870-kilometer route from the Deslaurier Deposit to Skagway, Alaska. The railway should run from the north side of the Stewart Crossing Bridge to the west-side of the Deslaurier Coal Deposit. This route would eliminate any major river, or highway, crossings by the new railway. This would entail the construction of approximately 330 kilometers of a relatively light duty railway. The rail bed would be significantly narrower then any possible highway needed to haul the stated amount of product. A privately owned railway would also limit access to the Bonnet Plume Basin and thus reduce the entire projects environmental impact. Pig Iron could be off loaded onto trucks at Stewart Crossing and moved over the Yukon's existing, high quality, highway system from there. Given the terrain and environmental considerations associated with the Wind River Trail this option if the likely one to be financed and permitted. Partnering with an experienced and low cost company capable of designing and building such a railway has been Promithian Inc.'s highest priority during 2004. China National Overseas Engineering Corporation will be carrying out engineering work on the route during the summer of 2005.

IV. GASIFICATION

A. Generation of Heat and Power

The state-of-the-art in coal-fired generation of electricity facilities is to gasify the coal and then use the resulting synthetic natural gas "Syngas" to power a combined cycle (gas turbine/steam turbine) power plant. An Integrated Gasification Combined Cycle power generation configuration is referred to as an IGCC facility.

The gasification process converts any carbon-containing material into a synthetic gas composed primarily of carbon monoxide and hydrogen (85% or more). Coal, natural gas, crude oil, high sulphur fuel oil, petroleum coke, other refinery residuals, byproduct gases, and other materials that would otherwise be disposed of as waste, are used as feedstock material. Gasification adds value to low, or negative, value feedstocks by converting them into marketable fuels and products. Syngas can be used as a fuel to generate electricity or steam; or used as a basic chemical feed stock for a large number of uses in the petrochemical and refining industries. The Syngas can be processed using commercially available technologies to produce a wide range of products, fuels, chemicals, fertilizer or industrial gases. Some facilities are designed to produce both power and products from the Syngas, depending on the site-specific market conditions.

A historical note: from the early 19th century to the 1940's, nearly all gas distributed for residential and commercial use was from the gasification of coal. It was referred to as "Town Gas". It powered London's streetlights when most of the world's cities were still in darkness.

Gasification technologies differ in many ways but share certain general production characteristics. The feedstock is prepared and fed to the gasifier in either dry or slurried form. If coal is used as feedstock, it reacts in the gasifier with steam and oxygen at high temperature and pressure in reducing, oxygen starved, atmosphere. This process produces the Syngas - carbon monoxide and hydrogen - and minor quantities of carbon dioxide and methane. The high temperature in the gasifier converts the inorganic materials in the coal, such as ash and metals, into a vitrified material resembling coarse sand. This material, usually referred to as slag, is inert and has a variety of uses in the construction and building industries. Gas treatment facilities refine or clean up the raw gas using proven commercially available technologies that are most often an integral part of the gasification plant.

A number of companies manufacture gasifiers. Most of the gasifiers are of a size that is too large for any Yukon-scale, distributed generation strategy. Lurgi (Germany), Foster Wheeler, Outokumpu (Finland), FERCO (USA), Energy Products of Idaho, EPI (USA), and Genoray (USA) all manufacture smaller-sized gasifiers. For example, Genoray advertises a Fluidized Bed Gasification model that produces 1.5 million BTU's per hour – 1.58 gigajoules a year. The Yukon has a 10,000 BTU-per-hour gasifier, not in operation, that operates on wood chips located at Yukon College. The gasifier is attached to, and the Syngas powers, a gas-fired boiler used to heat the college.

An IGCC power configuration is the cleanest, most efficient means of producing electricity from coal. The combined cycle system has two basic components. The first component is a high efficiency gas turbine. The gas turbine is widely used in power generation today. It burns the clean Syngas to produce electricity. Most importantly, gas-fired turbines are available in sizes that suit the Yukon's needs. Kawasaki dominates the market for small gas-fired turbines between one and ten megawatts. Exhaust heat from the gas turbine is then used, in an IGCC configuration, to power a traditional high efficiency steam turbine. Kawasaki offers a GPB D 180 model, which can be, configured in a combined cycle (gas/steam) mode from 7.5 to 49 megawatts. Kawasaki high efficiency gas fired turbines require a minimum 500 Btu/cubic foot natural gas to power them.

The amount of heat energy available from a coal fired thermal power plant is usually twice the amount of electric energy produced by the facility, as a rule of thumb. For example, a twenty-megawatt facility (non-IGCC) would produce the equivalent in waste heat of 30 million litres of diesel fuel or 30 million cubic meters of natural gas. IGCC facilities use this heat, through a high efficiency steam turbine, to generate more electricity and thus increase the efficiency of the entire facility. In Promithian's case this heat could be used for a regional heating system and to dry iron ore concentrate transported via slurry pipeline. Faro used 20,000 tons of coal to dry concentrate. Any new mine site will have a camp or a town site attached. The heating of residential and industrial buildings, as well as concentrate drying, could be accomplished with the waste heat from the high efficiency gas turbine rather than, or in conjunction with, the heat being fed into a high efficiency steam turbine.

B. Reduction of Iron Ore with Thermal Coal

The reduction of iron ore with thermal coal operates much the same way as gasification. Corex, HIsmelt, Finex and other technologies not only reduce iron ore to iron but all produce large volumes of lower quality synthetic gas. Approximately 45% of the energy fed into the plants in the form of coal is released as a synthetic gas. For example, the export gas from the Corex plants is a low Btu (200 – 250 Btu/cubic foot) synthetic gas. The higher the Volatile Matter of the coal the more synthetic gas will be produced. At just under 35% VM the Deslaurier coal will at the high limit of the VM allowed. The COREX C-2000 plant produces one million tonnes a year of pig iron and 451 MWth of low quality syngas. The COREX C-3000 model produces one million four hundred thousand tonnes a year of pig Iron and 568 MWth syngas. If mixed with a higher quality natural gas (CMM) this syngas could be used to generate heat and electricity to power other parts of the Promithian mining and manufacturing processes. Typical gas fired turbines require a 500 Btu/cubic foot natural gas as a feedgas.

V. NATURAL GAS FROM COAL (COAL MINE METHANE) IN THE BONNET PLUME BASIN

Very little is known of the Bonnet Plume Basin's potential for natural gas from Coal. Natural gas from coal is also referred to as Coal Bed Methane (CBM) and Coal Mine Methane (CMM). CBM is typically the term used when natural gas exploration and development companies are engaged in the business of drilling vertical wells and extracting the methane for the purpose of selling it into a pipeline system. CMM is the phrase used by coal mining companies when they remove the methane from the coal prior to their mining of the coal. In this case, methane removal is either through horizontal wells drilled from underground tunnels or from vertical wells drilled from the surface. The methane is used to generate electricity, and heat, which is then used in coal mining operations.

Methane released during coal mining operations is a significant Green House Gas and can be a major safety hazard.

Typically, Coal Mine Methane is extracted from the coal seams as a very high quality natural gas which is ready to be used:

Methane	98.6%
Carbon Dioxide	1.1%
Nitrogen	0.1%
Hydrogen	0.1%
Ethane	0.1%
BTU/cu ft.	994

The methane can be put into a pipeline collection system if one is available or burned in a reciprocating engine, a gas-fired turbine, a combined cycle system, or just used to generate heat.

The Bonnet Plume Basin has an expected 8.6 trillion cubic feet of methane in its coal. If one-or-more of the Basin's coal seams contain significant amounts of methane Promithian Inc. will be required by Health and Safety regulations and Environmental laws to deal with the gas. Methane gas removal, prior to underground mining, typically takes five years or more. Higher quality and more mature coal seams should be expected to carry more methane gas then lower quality, higher ash, coal seams.

VI. TRANSPORTATION OF NATURAL GAS FROM COAL (COAL MINE METHANE)

By lowering the temperature of natural gas to a sufficiently low temperature, methane gas (coal mine methane) condenses to a liquid form called Liquified Natural Gas (LNG). LNG is a compact energy carrier that is relatively easy to transport independent of a natural gas pipeline system. LNG has been in practical use for more than fifty years in Japan and the United States. Approximately 22% of the worldwide cross-border trade in natural gas is in the form of LNG. It is expected that trade in LNG will at least double by the end of the decade.

At atmospheric pressure, LNG is formed at minus 162° Celsius. The LNG represents a volume reduction of approximately 600 times. This corresponds to an energy density that is 600 times higher than natural gas at atmospheric pressure. The specific weight of LNG is 45% of water. LNG is simple to re-gasify in order to deliver almost pure methane at the end-use site.

LNG has approximately 60% the energy density of diesel. The following table shows the relative energy densities of various fuels and gases:

FUEL	MJ/kg	MJ/l
Diesel	42.5	37.7
Gasoline	42.5	32.7
LPG (propane)	48.0	24.4
Methane	50.0	0.035
CNG, Gaseous methane at 248 bar	50.0	8.7
LNG, Liquid methane at -162° C	50.0	21.6
Hydrogen at 248 bar	120.0	2.5
Hydrogen at -250° C	120.0	8.5
Wind/Deslaurier #5 seam	25.97	

LNG is colourless, non-toxic, and non-carcinogenic. Leak detection requires special instrumentation since LNG has no odour. In its vaporized state, mixed with air, LNG can only ignite if the concentration of methane gas is in the range of 5 to 15%. Neither vaporized LNG, nor LNG itself, can explode in the environment.

Modern large-scale LNG plants have production capacities of up to 5 million tonnes of LNG per annum or about 15,000 tonnes a day. The plants are normally in operation 365 days a year. They receive the natural gas from a well stream, or a pipeline, and deliver LNG in bulk tanks – usually ships. The processing equipment varies from plant to plant depending on the quality of the feed gas. Typically the elements of an LNG plant are:

Receiving Facility
Mercury Removal
CO2 cleaning
Dehydration
Fractionation
Liquefaction
LNG storage
Loading facility into transportation tanks

Heat exchangers and refrigerants are at the heart of every LNG facility. The heat exchanger is normally the most expensive part of a large LNG plant. A capital cost breakdown of a modern LNG plant would look like the following:

Heat exchanger - 50%
Gas pre-treatment – 6%
Utilities – 16%
Storage – 18%
Loading facilities – 10%

In general, the capital costs of a large LNG plant are very high. To obtain a high efficiency level complex refrigeration processes with specialized equipment are used. However, because of the large production levels and the efficient but complex refrigeration processes, the cost per produced unit are very low.

Small-scale LNG production facilities are viable at certain production levels and distances from the facility to the end user. A small-scale LNG plant is economically viable when the supply volume of the facility is below 2.5 million standard cubic meters a day or 600,000 to 700,000 tonnes a year. In addition, when the facility is within approximately 500 kilometers from the end user the plant appears to be viable. The high energy density of LNG is responsible for creating this economic viability of small-scale supply plants.

Small-scale methane liquifiers have been, and are being, developed primarily for the LNG vehicle market. A number of companies make small-scale LNG plants. Air Products and Chemicals Inc. (USA), Chart Industries Inc. (USA), Cryogenics (USA), Linde (Germany), Black and Veatch Pritchard (USA), Kryopack Inc. (USA), CH-IV Cryogenics (USA), and Chicago Bridge and Iron Company (USA) are just a few. Each company's product and technology is slightly different in terms of the heat exchanger and refrigerant used as well as plant capacity. Plants can also be either turbine-driven or driven by electric motors. Turbine-driven plants generally cost more than similar electric motor driven plants. The quality of the input gas and the requirements for storage capacity, before send-out, will also change the required capital investment. The relative plant cost rises, per produced unit, as the plant size gets smaller. A small LNG facility to suit the Yukon's distributed generation needs (20-MW) would likely cost in the range of $ 20 to 35 million US dollars.

The following chart highlights likely capital and operating costs:

Size	300 ton/day		300 ton/day	
Storage	100,000 cubic meters		7,000 cubic meters	
Send-out	4000 tonnes/day		600 tonnes/day	
Operation	200 day/year		350 day/year	
Drives	Motor	Turbine	Motor	Turbine
Power, ¢/kwh	3	5	3	5
Fuel, USD/mill.kj	3	2	3	2
Capital, million USD	39	43	23	27
Operating cost, USD/20 kg	0.47	0.39	0.47	0.39
Capital, USD/20 kg	1.56	1.72	0.51	0.60
LNG to tank, USD/20kg	2.03	2.11	0.98	0.99

Chart Industries manufactures a 50,000 gallon per day, 36 tons per day, liquefier that uses a standard mixed refrigerant that is recycled for $ 6,250,000 US.

Storage of LNG is in specially designed cryogenic tanks. Transport is also carried out with specially designed containers, which can be moved by road, rail or sea. Any Yukon based LNG production strategy would require a larger tank at the liquefaction site, transport by truck to the end-use site, and storage in a smaller tank before vaporization and use as a fuel in a power plant.

Large-scale LNG storage tanks can be constructed as freestanding tanks, membrane tanks or buried tanks. The diameter of these tanks is usually 65-85 meters, with a dome-height of up to 48 meters and a 37-38 meter jacket height. These tanks are usually built by one of a few construction companies that are involved in the worldwide construction of such tanks. The construction is a specialized project. The tanks usually involve a freestanding inner tank with a bottom of 9% nickel steel. All penetrations are in the tank roof. The insulation is usually perlite. Three tank design principles are prevalent: single containment, double containment, full containment. Single containment tanks involve a carbon steel outer vapor and insulation container tank. They have a carbon steel dome roof with an external deluge system. Secondary containment is provided by a composite sand core and crushed rock dikes which are designed to handle 110% of the tank storage capacity. Double containment tanks have a carbon steel outer vapor and insulation container tank with a carbon steel dome roof with external deluge system. Secondary containment is provided by a post-tensioned concrete outer retaining tank wall which is integrally attached to the concrete base slab and designed to handle 110% of the tanks maximum storage. Full containment tanks have a pre-stressed concrete outer container with a steel liner. They have a concrete covered steel roof and an outer concrete wall limits the liquid spill area. Normal operating pressure is up to 250 mbar. The cost of a full containment tank is likely to-be in excess of $ 1,000 CDN per cubic meter. These tanks are normally in the tens-of-thousands to hundreds-of-thousands (200,000 maximum) of cubic meter size range. A significantly smaller main storage tank would be required for a small scale LNG facility producing a liquid fuel to power mining equipment, locomotives, or a trucking fleet.

Tanks for road transportation of LNG are double-walled vacuum insulated, thermos bottle-like, containers. LNG can be stored for up to three days without any loss of the LNG in these containers. The piping and inner tank is made of stainless steel with a low-heat-absorbing super-insulation with a high performance vacuum. The tanks normally hold 50 cubic meters of LNG. The LNG is transferred by pressure, which is built up by an external heater or cryogenic pump. The LNG tanks are made to withstand the vast majority of accidents that could possibly occur during transport. These units sell for $ 300,000 to 400,000 CDN each.

Engineered vertical and horizontal stationary storage tanks, which would be used at the site the LNG is used, are usually designed for a capacity range of 50 to 500 cubic meters. They have a maximum allowable working pressure of up to 24 bar for long-term storage of LNG. The innermost liner of the tank is in stainless steel. The tanks are insulated with a vacuum and perlite insulation and have a molecular sieve adsorber in order to minimize the loss of stored LNG. The engineered tanks can be supplied with an external vaporizer, vacuum insulated pipelines and other cryogenic parts that are required for a complete end user installation. The outer part of the tank is designed for transport, easy lifting and erection. The piping is made of stainless steel. Pricing should be in the $ 1,500 to 4,500 CDN a cubic meter range. The smaller the tank the higher the per cubic meter price.

VII. CONCLUSION – COAL MINE METHANE

Generation of electricity and heat with Coal Mine Methane would be accomplished by using standard reciprocating engines, or high efficiency gas fired turbines, or a combined cycle – gas and steam – turbine configuration. The high quality methane gas derived from the coal mine methane extraction, liquefaction process to LNG, transportation of the LNG, and the vaporization of the LNG back into methane produces a usable fuel product that is simply natural gas. This fuel could be used in mining equipment, locomotives to move finished product over the new railway, and by the trucks which would haul the pig iron to port in Skagway.

VIII. DESLAURIER COAL DEPOSIT EXPLORATION PROGRAM

The purpose of the exploration program is to begin the process of turning the Deslaurier coal deposit into a producing coal mine. A 750,000 tonne a year mine should meet the requirements of a modern thermal coal based reduction plant. The coal mine will supply a reduction agent for the Rapitan iron ore as well as supply any potential Yukon and Alaskan markets with a high quality coal for heat and energy production. A long contour coal mining operation is contemplated along the south, west, and north sides of the Deslaurier coal deposit. The exploration program is designed to determine whether a crushed, washed and dried coal with the following characteristics can be produced:

M	< 5%
Ash	5-12%
VM	< 35%
FC	55%
S	< 0.5%
FC/Ash	> 5
CV	> 11,150 Btu/lb

A. Deslaurier Deposit Exploration Project Description

Promithian Inc. intends to carry out a multi-pronged exploration program on the Deslaurier Coal Deposit. The exploration program will involve moving the entire 105 million tonnes of Bituminous coal from the indicated and inferred category to the PROVEN category through the combination of a 34-hole diamond drill program and a channel sampling program.

It is contemplated the work will be performed between June 1, 2005 and September 15, 2005.

The Deslaurier deposit has had three drill holes completed in the past:

1. Hole 79-1; core size HQ, depth 80.77 meters, elevation 469.4 meters.

2. Hole 79-6; core size HE, depth 199.64 meters, elevation 564 meters.

3. Hole 80-8; core size HQ and NQ, depth 331.32 meters, elevation 457.2 meters.

Promithian Inc. is proposing 34 new diamond drill holes on a 500-meter grid basis. A Hydracore 2000 man-portable drill will be used to drill the holes. This drill can be broken down into pieces and moved by hand. The drill program will involve a camp for a four-man crew and the use of two four-wheel ATV's for personnel movement. Fuel and supplies will be flown in to the site. The location of the drill holes is as follows (NTW core – 3"):

1. 479,000 E 7,256,000 N
2. 479,500 E 7,256,000 N
3. 478,500 E 7,256,500 N
4. 479,000 E 7,256,500 N
5. 479,500 E 7,256,500 N
6. 480,000 E 7,256,500 N
7. 478,500 E 7,257,000 N
8. 479,000 E 7,257,000 N
9. 480,000 E 7,257,000 N
10. 480,500 E 7,257,000 N
11. 479,000 E 7,257,500 N
12. 479,500 E 7,257,500 N
13. 480,500 E 7,257,500 N
14. 479,000 E 7,258,000 N
15. 479,500 E 7,258,000 N
16. 480,000 E 7,258,000 N
17. 480,500 E 7,258,000 N
18. 479,000 E 7,258,500 N
19. 479,500 E 7,258,500 N
20. 480,000 E 7,258,500 N
21. 480,500 E 7,258,500 N
22. 479,000 E 7,259,000 N
23. 479,500 E 7,259,000 N
24. 480,000 E 7,259,000 N
25. 480,500 E 7,259,000 N
26. 481,000 E 7,259,000 N
27. 479,500 E 7,259,500 N
28. 480,000 E 7,259,500 N
29. 480,500 E 7,259,500 N
30. 481,000 E 7,259,500 N
31. 480,000 E 7,260,000 N
32. 481,000 E 7,260,000 N
33. 480,500 E 7,260,500 N
34. 480,500 E 7,261,000 N

Each drill pad will be 4 meters by 4.5 meters. Drilling will require 7 to 9 gallons of water per minute. A class three water permit has been acquired to allow Promithian Inc. to pump the water from a creek located on the west of the Deslaurier deposit. Waste run off from drilling activities will be sent through a settling pond, which will be dug by hand.

Up to 2000 meters of diamond drilling will be carried out.

A channel-sampling program will also be carried out. A mini hydraulic excavator (Cat model 301.8-17.4 hp) will be used to expose, from top to bottom, the coal seams were they come to surface. The south, west and north facing sides of the Deslaurier deposit will be channel tested on a 500-meter interval basis. The approximate location of the channels will be were the 3, 4, and in particular the number 5 seam intersect the following UTM lines:

South Side of Deposit

478,500 E
479,000 E
479,500 E
480,000 E

West Side of Deposit

7,256,500 N
7,257,000 N
7,257,500 N
7,258,000 N
7,258,500 N
7,259,000 N
7,259,500 N
7,260,000 N
7,260,500 N
7,261,000 N

North Side of Deposit

479,000 E
479,500 E
480,000 E
480,500 E
481,000 E

IX. ENVIRONMENTAL ASSESSMENT

A. Regulatory and Environmental Assessment Policy Context

The Deslaurier coal deposit is located within the traditional territory of the Nacho Nyak Dun.

The Peel Watershed Planning Commission is presently working on a land use plan for the entire Peel River Watershed.

A land use permit under the Territorial Lands (Yukon) Act will be required for the exploration program.

A Class-three water license has been acquired so that water may be removed, for drilling purposes, from a small creek on the west side of the Deslaurier coal deposit.

B. Environmental Assessment Scope

In order to assess the feasibility of developing a coal mine and associated facilities and to predict the general types of environmental impacts that are likely to occur during exploration and mine development, operation and final decommissioning, a Preliminary Baseline Environmental Assessment study was undertaken with the following objectives:

1. Review the existing relevant biological information pertaining to the Deslaurier Coal Deposit study area.

2. Supplement this information with recent information from studies conducted by the Yukon and Federal Governments.

3. Identify information gaps which affect the impact assessment.

4. Identify impacts on wildlife and fish resources that are likely to result from exploration, construction, operation and decommissioning of the coal mine and ancillary facilities.

5. Recommend appropriate field and monitoring studies to up-date the baseline inventories and reassess the environmental impacts as required by regulatory authorities.

At this stage of development (detailed exploration and mine feasibility) specific plans for mine development have not been prepared and recommendations for environmental mitigation and compensation are deemed to be premature. As mine facilities develop and our understanding of the environmental issues improves, measures for habitat rehabilitation and resource compensation will be prepared and presented to the regulatory authorities for approval to be implemented. Monitoring programs will accompany implementation plans for mitigation and compensation measures.

C. Project Alternatives

Mine Site Alternatives

Pan Ocean Oil's exploration program in the late 1970's and early 1980's proved that the Bonnet Plume Basin contains a coalfield of major proportions. Measured, indicated, and inferred in situ resources of approximately 660 million tonnes are located in seven deposits. The presence of at least 5 coal seams is indicated from drilling. The coal horizons are numbered in sequence from youngest to oldest reflecting the order in which they are encountered during drilling (top to bottom). The number 5 seam, the most mature and highest rank within the Basin, is approximately 9.6 meters thick, and dips approximately 5° to the east, in the Deslaurier deposit. The deposit offers the opportunity to "high grade" a small portion of the Wind River Coalfield.

A weighted average proximate analysis of the coal found within the No. 1 and 2 seams of the Illtyd Deposit on a clean coal basis is as follows:

Yield	76.9%
Moisture	5.2%
Ash	15.4%
Volatile Matter	34%
Fixed Carbon	45.1%
Calorific Value	9,700 BTU/lb.
Sulphur	0.5%

Proximate analysis of the clean coal from the No. 5 seam in the Deslaurier deposit is as follows:

Yield	81.6%
Moisture	3.7%
Ash	7.9%
Volatile Matter	34.3%
Fixed Carbon	53.9%
Calorific Value	11,168 BTU/lb. (25.97 MJ/kg)
Sulphur	0.46%

The 105-million-tonne Deslaurier coal deposit is also located approximately 25 meters from the Wind River Trail – the areas access route. Mining of this deposit will negate the requirement for a bridge over the Wind River. The Wind River Trail is located on the west side of the Wind River while five of the seven deposits within the Wind River Coalfield are located on the east side of the Wind River.

D. Access Options

All personnel, equipment and supplies will be flown in to the work site in an effort to reduce the environmental impact of the Promithian Inc. Deslaurier exploration project. Core and channel samples will be flown out.

Equipment List

EQUIPMENT	SIZE	PROPOSED USE
Hydracore man portable diamond drill	Model 2000 – 100 hp	Diamond drilling on a 500 m grid
Two 4-wheel ATV	Honda	Personnel movement
Mini hydraulic excavator	Cat 301.8, 17.4 hp	Channel sampling
Wall Tents (2)	8 ft by 12 ft	Four man camp facility
Water pump	3 inch	Water pumping for drilling
NTW drill rod (3 inch)	150 metres	Diamond drilling
Water hose	3000 ft	Moving water to drill

E. Public Participation

First Nations Consultations

In the spring of 2003 Promithian Inc. met with the chief and council of the Na-Cho Nyak Dun to explain our interest in developing the Wind River Coalfield and listen to their concerns. The NND Lands Department was present at the meeting.

In the summer of 2002 Promithian Inc. met with the NND Lands Department and the Mayo District Renewable Resources Council. Numerous copies of the June 2002 PROMITHIAN INC. engineering report were left with the participants of the meeting.

During the summer of 2002 the Gwich'in Tribal Council Lands Department and the Gwich'in Tribal Council Development Corporation were contacted and provided with all relevant assessment reports and copies of the 2002 PROMITHIAN INC. report.

In the spring of 2002 Promithian Inc. met with the Na-Cho Nyak Dun Lands Department to discuss our project. A copy of all relevant assessment reports of previous work on the coal deposits was provided to the Lands Department at that time.

During the winter and spring of 2002 Promithian Inc. worked closely with the Na-Cho Nyak Dun Development Corporation. The NND-DC was a co-sponsor of the June 2002 PROMITHIAN INC. report along with Energy, Mines and Resources, Yukon and Promithian Inc.

A public meeting should be held in both Mayo and Fort McPherson before the exploration and environmental work is carried out.

F. Existing Environment

1. Air: Atmospheric Conditions

Regional Climate

The regional climate is largely influenced by the Arctic Ocean resulting in low winter temperatures and relatively small amounts of precipitation.

Charles, (1965) described the climate of the interior of Yukon in the Bonnet Plume Range area as cold with light precipitation and extreme temperature drops at times. The summer season is from mid-May to mid-October and is free of serious freezing. During summer day light hours are long and favourable to work two 10-hour shifts.

The winters can reach 50°C or more degrees below freezing.

Ambient Air Quality

There is no specific information available for the ambient air quality for the study area at this time.

For the coal exploration program scheduled for 2005 the potential to generate adverse atmospheric conditions from dust and combustion fumes is extremely low and no further assessment is contemplated on this matter until the mine feasibility is complete and site plans and engineering designs are developed for the construction of a full mine site.

It is proposed that air quality monitoring will be conducted over the next few years as activity increases at the proposed mine site to establish the baseline air quality conditions. These baseline conditions will be used in future assessments and evaluations as mine activity increases.

2. Land: Geology and Terrestrial Ecology

Geology, Terrain and Soils

Bonnet Plume Area - Coal in the Bonnet Plume Basin occurs in the Upper Cretaceous – Tertiary Bonnet Plume Formation. The Upper Cretaceous, lower Bonnet Plume Formation hosts high volatile bituminous C coal and is exposed in the southern part of the basin while the Tertiary upper Bonnet Plume Formation contains sub-bituminous and lignite coals and is exposed in the northern part of the basin.

The Bonnet Plume Basin contains the largest coal deposit known in the Yukon with 660 million tones of high volatile bituminous C coal, present in the lower Bonnet Plume Formation which is the focus of this assessment. The basin is about 200 square miles in area and is centered at approximately 65°30'N latitude, 135°00'W longitude (Figures 1.1 and 1.2). It lies at the southern end of the Richardson Mountains and is bounded on the west and south by the Wernecke Mountains and on the east by the Trevor and Knorr Ranges of the McKenzie Mountains. The basin is underlain by sedimentary rocks of the tertiary age containing lignitic coals in the north and sedimentary rocks of the Cretaceous age containing bituminous coals in the south.

Access to the area is presently by plane, helicopter or by winter road along the Wind River Trail. There is an airstrip at Kiwi Lake Camp which was used by Pan Ocean Oil Ltd., and several lakes throughout the basin are of sufficient length and depth to allow float plane access. In the past a 165 km winter road has been built from the Keno Hill area onto the west side of the property along the Wind River Valley. The Dempster Highway lies 135 km to the west of the property.

The Wind River/Deslaurier Coal Deposit is located at Latitude 65°26'12"N, Longitude 135°26'00"W in NTS 106E/6. The Deslaurier Deposit occurs on the west bank of the Wind River about 27 kms north of the Werneke Mountains and about 5.5 kms south of the confluence with Illtyd Creek. The deposit area occurs as a hill with a local relief of 180 m, extending along the river for a distance of about 6 kms.

There is approximately 105 million tonnes of high volatile bituminous C non-coking coal available in the deposit.

As noted above the Deslaurier coal deposit is located in the Lower Bonnet Plume Formation and consists of sedimentary rocks of the Createceous age containing bituminous coals. It is a thick (1500 m+), predominantly clastic sequence of the Cretaceous age. The whole of the basin forms a single broad northerly trending syncline, the structure of which is dominated by a series of, still active, north-northwest trending faults.

Palynological evidence indicates that there are three well-defined palynomorph assemblage zones: the lowest is mid-late Albian, zone two is Maastrichtian and zone three is Paleocene. The Lower basin including the Deslaurier Deposit rests uncomfortably on Permian or older rocks within the basin and is separated from the Upper Basin by a structural unconformity.

The basic structure of the deposit is a monocline which dips gently to the northeast and east. The area is divided into two blocks by an east-west fault, with the northern block displaced downwards relative to the southern block. The overall Deslaurier Deposit is delimited in an areal extent by the interpreted subcrop traces of coal seams, by the Wind River and to the north by a break in topographic expression. Several coal occurrences adjacent to the north of the outlined area indicate increased potential in that direction.

There are 5 distinct coal horizons (or seams) within the middle unit of the Lower Bonnet Plume Formation and are numbered in sequence from youngest to oldest reflecting the order in which they are located from the surface. Horizons (seams) 3, 4 and 5 are present in the Deslaurier Deposit and all are considered to have economic potential. No. 3 Seam consists of one seam with an average thickness of 5.5 m. The No. 4 Seam varies in thickness and character, attaining maximum development (5.45 m) in the Deslaurier deposit. The No. 5 seam is persistent throughout the Deslaurier deposit and has a maximum thickness of about 9.6 m at this location.

The coal is a high quality thermal product ranked as high volatile C bituminous. It has a relatively high raw ash content at 14.3% due to discrete bentonite bands which can be removed by a simple washing technique to produce coal with a fixed carbon of 55% and calorific value of >11,000 BTU/lb. It has a very low sulphur content of <0.50%.

Vegetation

The following summary of vegetation has been extracted from LGL's 1981 overview study of the Bonnet Plume Lease area held by Pan Ocean Oil Ltd. of Calgary, Alberta. LGL report that the general vegetation of the area reflects the northern climate. The tree line extends to about 750 m and major vegetation types include tundra and forest tundra.

The vegetation of the Deslaurier Coal Mine area is characterized by closed to transitional open forests of black spruce, white spruce and larch in most lowland areas. Although mixtures of these species occur, white spruce is best developed along river and streams in alluvial habitats or upland habitats with good drainage. While black spruce and larch are most common in poorly drained habitats such as bog forests areas. Other tree species present in the area are aspen, paper birch and balsam poplar or cottonwood. Aspen and birch, present as successional species, have localized occurrences usually on warmer south facing slopes that have experienced fire in the past. Balsam poplar associated with willow thickets are present as early successional species on river bars and margins of the active floodplain.

With increasing elevation from the lowlands, forest cover thins, dwarf birch appears as an understory species and may form dense thickets on well to moderately drained soils. Dwarf birch is a common component of the sub-alpine vegetation and may occur mixed with laborador tea, blueberry, crowberry and lingenberry. At upper elevations of the sub-alpine areas dwarf birch may almost totally replace isolated trees to form extensive pure thickets. At elevations above 1000 m ASL, alpine tundra vegetation replaces sub-alpine species. This change in vegetation may occur at lower elevations on northerly exposed slopes.

The mosaic patterns of vegetation seen within the areas capable of supporting tree growth differ in physiognomy, composition and successional development depending upon the localized hydrological regime and soil conditions as well as fire history. Soils with poor drainage usually support a peat or sedge-tussock ground cover with stunted black spruce that is darkened by epiphytic lichens. While well drained shallow soils of rock outcrops have a ground cover dominated by lichens and heath or dwarf shrub species including dwarf birch.

Wildlife

The following summary of wildlife has been predominantly extracted from LGL's 1981 overview study of the Bonnet Plume Lease area held by Pan Ocean Oil Ltd. of Calgary, Alberta. LGL reported on caribou, moose, thinhorn sheep, grizzly bear, waterfowl and raptors. Other species were speculated to be within the mine area.

Caribou: LGL (1981) reported that a portion of the Porcupine Caribou Herd of barren-ground caribou may make use of the Wind River valley in the area of the Deslaurier coal deposit during winter. They migrate further north during the spring and summer months.

Farnell and Russell, (1984), report that there are two mountain caribou herds in the study area. The larger Bonnet Plume Herd (5000 animals) is located primarily in the Bear River to upper Snake River basin in the eastern area of the Wernecke Mountains and the smaller Hart River Herd (1200 animals) is located in the Hart River Basin in the western area of the Wernecke Mountains. Range overlaps between the two herds often occur in the summer but winter ranges are generally isolated. Winter range overlap, however, apparently occurs between the much larger Porcupine Herd and the Hart River Herd.

Farnell and Russell (1984) indicate that winter range is greatly dependent on snow distribution within each home range and although traditional areas are consistently utilized by a herd, there does not appear to be any particular loyalty to a particular winter range.

Calving areas for mountain caribou are not well defined. They are typically well dispersed throughout the home range and are found primarily in steep rugged terrain. Individual cows will return to the same calving site for several years in a row. Calving is still synchronized with all cows birthing their calves within a week. Mountain Caribou typically calve approximately 12-14 days earlier than the Porcupine Herd.

Northward movement to summer ranges was seen for the Hart River Herd but not for the Bonnet Plume Herd which summer fed in their calving areas.

Moose: Information on moose in the study area comes from surveys conducted in 1980. It appears that moose are distributed throughout the study area (LGL, 1981). LGL could not delineate the distribution or the abundance of moose due to a lack of relevant information.

Thinhorn Sheep: Thinhorn sheep were surveyed on the Knorr range in 1971. LGL (1981) observed sheep on the Knorr range, Illtyd Range, Wind River Valley and on the north face of the Wernecke Mountains between June, August and October in 1980. From the presence of trails on ridges other than those where sheep were seen, it is evident that many other mountain slopes in the study area are occupied by sheep. The frequency of use, duration of use and movement patterns between ranges is entirely unknown (LGL). It was concluded that the study area supports a relatively large sheep population.

Grizzly Bear: LGL (1981) saw two grizzly bears in 1980, several more were seen by workers during the summer. Most sightings were seen in treeless areas in the southern portion of the study area. Grizzly bears use alpine areas primarily during spring and fall and move into subalpine areas in late summer to feed on berries as they ripen.

Other Mammals: LGL report that trappers take beavers, muskrats, mink, martens, red squirrels, red foxes and wolverines from the Bonnet Plume area. LGL also observed pikas and arctic ground squirrels. In addition, coyotes, wolves, black bears, ermine, least weasels, river otters, lynx, four species of shrews, rabbits and hares and rodents may also be found in the study area.

Waterfowl: LGL (1981) reported seeing waterfowl on 20% of the lakes surveyed in the study area with an average of about 8 birds per lake. Chappie lake was possibly seen as a staging lake for migrating birds and LGL report that rare trumpeter swans may be present in the study area.

Raptors: The Yukon Game Branch has plotted raptor nests in this general area. LGL (1981) observed 10 different species of raptors and considerable numbers during their aerial surveys. The potential for raptor nests exists in any location in the study area.

Other Birds: A large number of other birds were observed by LGL in 1981, but their significance was not assessed due to limited information at the time.

3. Water Quality and Fresh Water Ecology

Surface Water Quality

LGL (1981) indicated that the water quality of the Illtyd Creek and Wind River are very similar and indicative of pristine waters. The pH was alkaline in both watercourses with field measurements ranging between 7.23 and 8.01. Carbonate alkalinity ranged between 107 mg/L to 139 mg/L $CaCO_3$. Although not a direct indicator of buffering capacity of these watercourses, nevertheless, the capacity is expected to be moderately high. Water hardness, which stems from the presence of calcium and magnesium ions, is also moderately high. Calcium which contributes most to hardness, ranged between 26 mg/L to 44 mg/L. Magnesium ranged from 9 mg/L to 15 mg/L.

Concentrations of sodium, potassium, sulphates, chloride, suspended solids, total organic carbon and nutrients were very low (LGL, 1981). This is indicative of clean water with very little organic or nutrient content. A little fluctuation for total organic carbon was reflected in samples taken in July (range 2 – 16 mg/L) compared to those collected in September (range <1 to 1 mg/L). This is likely due to higher productivity during the summer season.

It is likely that during spring freshets water quality changes with increased levels of suspended solids, dissolved solids, turbidity and nutrient levels increase dramatically especially following higher than average warm springs and early summers.

Benthic Macroinvertebrates

LGL (1981) identified major taxa of macroinvertebrates within the study area. The densities of macroinvertebrates was extremely low throughout the study area. Mayflies (Ephemeroptera) were the most abundant. Dipteran larvae and oligochaetes comprised the majority part in most samples. The classes observed included:

- Ephemeroptera
- Plecoptera
- Diptera
- Acarina
- Gastropoda
- Bivalvia
- Oligochaeta

Fish and Fish Habitat

Fish Habitat: Fish habitats in the Illtyd Creek and Wind River are similar both displaying characteristics of moderately high energy streams. Both watercourses contain numerous braided areas interspersed with confined, irregularly meandering sections (LGL, 1981). Swift currents and clean, predominantly gravel substrates were characteristic of most channels. A little sedimentation was observed in deeper pools and side channels.

Large gravel bars were seen in both stream channels. Pools were common in both braided and meandering reaches. The wide flood plains of both watercourses precluded shading by vegetation. Only in one location did spruce trees provide partial shading (LGL). This is an important element for rearing and feeding habitat.

Arctic grayling, slimy sculpin and Dolly Varden were observed in both streams. Pike and whitefish may also be found in the lower reaches of the Wind River. Young–of-the-year grayling were captured in both streams in gravelly riffle areas where the gravels possibly provide suitable spawning and backwater areas provide suitable rearing sites. Stomach contents of mature grayling include nymphs, larvae, pupae, adult insect and plant material, indicating a wide variety of foods are used by this species.

G. Land Use Planning

As noted earlier the Peel Watershed Planning Commission has recently been established. The Commission has a mandate to carry out land use planning activities within the entire Peel River watershed. We will utilize information from the Commission as it is made available to better define our activities and associated impacts.

H. Summary of Valued Environmental Components

It is quite obvious that this is as near to a pristine environment that can be found anywhere across Canada. At this time it is completely undeveloped. The site is remote from any human development although it has received sporadic assessment and exploration by mining companies off-and-on over the past 25 years. Also, as noted above, the Deslaurier Coal Deposit is located within the Traditional Territory of the Na-Cho Nyak Dun First Nation whose main village is located at Mayo. The Traditional Territory of the Tetlit Gwich'in (Fort McPherson) begins north of where any contemplated work by Promithian Inc. would be carried out.

The following list of Valued Environmental Components is based on available information and our understanding of the environment at the site.

Ambient Air Quality and Noise: As noted there is no development in the area and the ambient air is expected to be exceptionally clean.

There are no sources of noise besides those from wildlife and natural events.

Vegetation: Wildlife habitat is a valued Environmental Component and although mine development is concentrated over a relatively small area there may be a low risk to vegetation from mine emissions. Although this will not become evident until the mine is operating. However, modern mining processes address such emissions and they are not expected to cause significant effects.

Wildlife: All of the wildlife species identified in this report (mammals and birds) are considered to be Valued Environmental Components and there exists some potential to impact them in some capacity. LGL reported that there were no recorded rare and/or endangered species in the area although the potential existed. However, due to human safety issues certain significant species such as the grizzly bear, moose and wolves may be killed around the immediate area of the mine site as human activity increases. Human activity may influence sensitive areas for raptors and other bird species as well.

Water Quality: The baseline information shows that the river and creek water quality is pristine and therefore it is a Valued Environmental Component. Mine development has the potential to impact water quality locally over short durations as development occurs but with proper water management strategies and best management practices long term impacts can be properly eliminated.

Fish and Fish Habitat: Local fish resources are a Valued Environmental Component. There is likely to exist balanced macroinvertebrate and fish inventories in the study area as studies in similar areas of the Bonnet Plume area show diversity and natural abundances for these aquatic resources. Baseline conditions for fish habitats are typically stable.

I. Environmental Effects and Mitigation

Potential Environmental Implications

The following impact assessment section describes the potential environmental effects as well as the possible mitigative measures one can employ for the project. There are a number of environmental documents to guide mine exploration and development, and there are well recognized mitigative measures, best management practices and regulatory agency input and the experience of the author with the environmental impact study process and of construction in developed and undeveloped areas. Mitigative measures have been considered in the overall assessment of the potential effects of the project on environmental resources in the area. Mitigation is defined as "the elimination, reduction or control of the adverse effect of the project and includes restitution for damages to the environment caused by the project through replacement, restoration, compensation or any other solution implemented to address potential adverse effects" (CEAA, 1992).

The valued environmental components (VECs) are intended to represent the range of species and features in the study area based on ecological, cultural and potential sensitivity to land disturbance. These elements are used in this section as the basis for identifying and evaluating potential impacts. As well, they are used to set mitigation targets to reduce potential effects.

Considering that the first phase of the ultimate mining project (the exploration and feasibility assessment) lies within an undeveloped and pristine setting far removed from existing communities the potential for environmental impacts is considered to be insignificant. Potential impacts are expected to be primarily associated with hydraulic excavation and reclamation. There maybe localized disturbances associated with the bulk sampling which will likely last and be overtaken by the full development of the coal mine. Therefore, we do not anticipate a lot of reclamation at the exploration phase but we will consider best management practices (and mitigative measures) to minimize impacts at this time.

Assessment Approach

The following environmental assessment describes the potential issues and associated effects of the exploration phase. Obviously, predicted issues and associated effects will change as additional field work is completed and construction plans finalized. The potential environmental effects were identified from the following sources:

- Consultation with government and regulatory agencies; and
- Project Team knowledge of the environment and the interaction with project components and the potential effects.

Based on this approach, the effects assessment was performed by compiling a list of environmental; components, potential environmental issues that may arise during exploration activities and mitigative measures intended to prevent, reduce or control potential adverse effects. Evaluation of the potential effects considers the current state of the environment and the incremental changes that will occur as a result of the exploration activities.

As field work is completed our capability to intensify the assessment will increase as habitat types are better defined along with land use patterns and the ecological significance of the actual mine site will be better understood. This will occur over the next several years as the project planning develops from feasibility assessment through to actual mine development with all of its associated construction.

General Impacts and Mitigative Measures

Based on the linkage between project activities and environmental features, the proposed exploration program has the potential to result in disturbances to environmental components. The linkage does not, however, automatically indicate that a negative or positive effect will occur. The purpose of the following assessment is to evaluate the nature and extent of theoretical potential effects to the environmental features identified in previous sections.

This early project planning and subsequent field reconnaissance and sampling programs will allow the environmental issues to be considered in concert with the engineering, geological and mine planning requirements as they are developed. Further, early field work will allow Promithian Inc., to develop recommendations with respect to final mine development in a manner that avoids, reduces and mitigates disturbances that result in adverse environmental effects.

The preventative and mitigative measures of this environmental assessment will be shared with all site workers commencing with the proposed exploration program. This is intended to set an example of the approach we will take for all future activity at the proposed mine site. All future contracts will be accompanied by environmental specifications to protect the environment, manage all wastes according to the best management practices possible and meet or exceed the conditions specified in permits and approvals provided by the regulatory agencies.

The assessment of the VECs identified above is described in the following sections.

Air Quality and Noise

Climate and Local Weather

The impacts from the proposed exploration program on the regional climatic conditions are not considered to be significant and no further assessment will be made of this issue at this time.

Ambient Air Quality

Promithian Inc. intends to carry out a multi-pronged exploration program on the Deslaurier Coal Deposit. The exploration program will consist of a 34-hole diamond drill program and a channel sampling program on a 500 m grid pattern over the target area. It is proposed that the work will be performed between June 1, 2005 and September 15, 2005.

The equipment will consist of a Hydracore 2000 man-portable drill. The drill can be broken down into pieces and moved by hand. The drill program will involve a camp for a four-man crew and the use of two four-wheel ATV's for personnel movement. Fuel and supplies will be flown in to the site.

The impacts from this proposed exploration program on the ambient air quality are not considered to be significant and no further assessment will be made of this issue at this time.

Noise

The impacts from the proposed exploration program regarding noise issues for wildlife and the nearest community are not considered to be significant and no further assessment will be made of this issue at this time.

Terrain and Soils

No disturbance to terrain will occur and only minor disturbance to soils is likely during the exploration program. The equipment is light, the drilling equipment is easily disassembled and transported to test locations sample collection. As noted above 34 drill holes will be developed based on a 500 m grid of the proposed mine site. Each drill site measures approximately 4 m x 4.5 m in area. This is very small in comparison to traditional exploration processes.

The exploration drilling sites will be reclaimed as much as possible at the completion of the test drilling by hand.

The potential for significant effects on the terrain and soil stability from the exploration program would appear to be minimal.

Vegetation

With minimal impacts to the site terrain and soils it follows that impacts on vegetation would also be minimal. The whole area covered during the exploration program is approximately 12

km^2 which is a very small area in comparison to the whole region and any specific site clearance of vegetation is insignificant on this scale.

Wildlife

The Wind River Valley and the Bonnet Plume area have not been shown to have rare, sensitive ecosystem that provide special habitats for wildlife species to such a degree that it would cause significant issues during a minimal impact mining exploration program as proposed herein by Promithian Inc.

The four man camp for 14 weeks during the summer and the use of all terrain vehicles are not likely to cause major disturbances to wildlife in the region. This is especially true for large ungulates, sheep, bears, and other species that can easily move out of the area but there is some potential that it could impact sensitive activities such as nesting raptors and other nesting birds. These issues will be studied during the exploration program to better understand what ecological conditions exist at the site.

Obviously, as the mine develops wildlife issues will be more significant as habitat loss from the construction of mine facilities, roads, airstrips, camp facilities, coal storage areas and if needed tailings ponds occur. Because mine development will result in the complete removal of vegetation and the associated human disturbance it must be considered that these areas will become primarily uninhabitable for most wildlife species. Not until the actual design for the coal mine will the environmental assessment be able to be completed as underground mining verses open pit mining bring vastly different outcomes. The mining process determines the resulting impacts which will need to be assessed on an area by area basis to fully assess the impacts at the future mine site.

Coal dust may become a local problem for herbivores and changes in local drainage may have ecological implications beyond the boundary of the mine. These issues do not factor into the present assessment but will be addressed as the mine development proceeds.

The presence of a human population will also affect wildlife populations unaccustomed to such activity. Noise, vehicular traffic affects the behaviour of wildlife by causing wildlife to avoid the area. Disturbances also occur from mine equipment, service aircraft and human harassment. Most caribou are known to avoid areas with high levels of human activity and the same can be said about moose, bears, wolves and sheep as well (LGL, 1981). This is true for most species although some are quite adaptable such as foxes and martens. Birds may abandon nest sites.

Wetlands

There is no specific information on wetlands on the proposed mine site, however, the potential for significant impacts during the exploration program are very remote. The exploration Team will simply go around and avoid established wetlands.

The issue is not as simple once a mine is developed as roads are constructed and mine facilities built. Permanent and semi-permanent wetlands are extremely valuable habitat from an ecological perspective. Field studies will document wetlands on the proposed mine site and the region as a whole to better understand the significance of those present. Mitigation measures and possible compensation will be developed for wetlands that are impacted during mine development as per the Federal Policy on Wetland Conservation (1991).

Aquatic Resources

Hydrology

There is no available information to provide a proper assessment of hydrological issues at this time. However, we will be conducting a hydrological study of the proposed mine site this summer and specific issues will be assessed and included in future reports.

The low intensity of the 2005 exploration program has no foreseeable significant impacts that might arise during field activities.

Surface Water Quality

Drilling will require 7 to 9 gallons of water per minute. Waste run off from exploration drilling activities will be sent through a settling pond, which will be dug by hand for each drill site. These facilities will be decommissioned at the completion of each drill test sampling.

In the future when mine development occurs soil erosion becomes a significant issue for water quality and particularly so in the north where land stabilization takes a much longer period than further south. Issues such as sedimentation, acid mine drainage, waste disposal, chemical spills and changes in groundwater chemistry become much more significant. These issues will be addressed through field studies and water quality testing programs over the next few years. Typically though increased silt loads resulting from soil disturbances and coal dust will likely be the major impacts from an operating mine. The intensive coal extraction activities and vehicular movement plus coal dust dispersal from stock piles, coal handling at transfer points and conveyor equipment will potentially create silt issues for nearby water courses.

The severity of these potential impacts varies considerably with the timing and quality of silt released into the waterbody, the duration of the disturbance and the affected habitat.

Fish and Benthic Macroinvertebrates

Potential impacts on aquatic species such as macroinvertabrates and fish are considered to be insignificant during the exploration phase. However, again this will likely change with a producing coal mine as described below. The key issues are siltation in waterbodies caused by erosion of unstable soils and fugitive dust from coal stockpiles and handling procedures.

Potential impacts include reduced light penetration and hence photosynthesis, lowering primary production of algae and macrophytes. Many invertebrates are sensitive to siltation and die if loads are too high. Increased silt loads may damage gill membranes of macroinvertebrates such as mayflies and lead to death if prolonged. All life history stages of fish may also be affected by siltation either directly or indirectly. At high levels silts may also affect oxygen levels in the water as well as render spawning and nursery areas unsuitable for use.

A variety of other impacts may also affect aquatic species including improper culvert installations during road construction. Debris may block water courses at culverts and bridges thereby preventing fish migration.

Accidental fuel and other chemical spills can also adversely affect water quality and killing aquatic species in large numbers.

J. Socio-Cultural Effects

First Nations and Cultural Heritage

Review of available reports and interviews of First Nations Groups to be carried out in 2005.

Population and Community Distribution

Summaries to be complied in 2005.

Employment, Income and Housing

Summaries to be compiled in 2005.

Land Use and Tenure

To be summarized in 2005.

Land Use Planning

To be summarized in 2005.

Protected Areas

To be mapped in 2005.

Recreation and Community Amenities

To be summarized in 2005.

K. Summary of Predicted Effects

Overall the potential for adverse effects occurring during the exploration program are very low. The environmental issues arise from a four person camp site, the use of all terrain vehicles for transportation and wastewater run off from exploration drilling activities. Solid waste management at the camp will be buried or transported out of the site according to regulatory agency requirements and wastewater management includes hand dug settling ponds which will be decommissioned at the completion of test sampling.

Due to the small size of these activities, these activities are not likely to cause significant environmental effects.

As the mine site develops it is realistic to expect that a majority of the impacts will result in disruption or alienation of habitat. The severity of these impacts will need to be assessed based on duration, seasonal timing, area affected and the number of species and individuals potentially affected. In general, when an impact results in a reduction of the carrying capacity for a particular ecosystem or increases the carrying capacity for the same area or if it reduces the overall carrying capacity it is considered to be negative (LGL, 1981).

Potential impacts may be of short or long duration and directly or indirectly affecting wildlife populations. Disturbances result from various construction and operational activities and are generally extremely difficult to quantify and thus assess. However, the assessment process becomes more accurate and better defined as more and more field data is used in the analysis.

L. Effects of Accidents and Malfunctions

The potential for significant accidents and malfunctions during the proposed exploration program are assessed to be negligible. The only activity that could pose a concern would be spills during refueling the ATVs or if the 45 gallon fuel drums themselves fell over and ruptured spilling their contents. Even then, the spill would be limited to a single drum. Fuel drums will be located approximately 100 m from any nearby water course.

Field crews will be trained in fuel containment and subsequent bioremediation. In the event of a tank leak, the tank is safely emptied of its remaining contents, the soil is contained and any contaminated soils are bio-remediated on-site. Any spills of potentially harmful substances/quantities including sediment releases that can affect fish will be immediately reported to DFO.

M. Cumulative Effects

Since this is the first project developed in the area there are no other projects to include in a cumulative assessment. No assessment of cumulative effects will be carried out.

N. Effects of the Environment on the Project

The possible effects of the environment on the project includes the following:

- Spring and summer bird breeding seasons that affects site construction activities;
- Freshette and spring runoff that could affect site construction;
- Spring and summer spawning by fish that affect water crossings;
- Earth quakes that cause major damages during construction and operation of the mine; and
- Climate change that could affect permafrost conditions during and after construction.

These items will be addressed as the project progresses to full development.

O. Conclusions and Recommendations

Summary of Residual Effects

The total residual effects from the proposed 2005 exploration program includes short term evidence of the 14 week, four person camp and the rehabilitated test drilling sites and settling ponds. The residual effects from these activities are not expected to be significant provided general rehabilitation of disturbed soils has been carried out before departing the area. All that should be left at the site are minor soil disturbance at the test drilling sites.

Significance of Residual Effects

Residual effects are not expected to be significant during the proposed 2005 exploration program.

Further Study and Monitoring

Clearly there are major data gaps for all of the VECs identified in this report as the available data is typically from the late 1970's and early 1980's.

We are proposing field studies to accompany the coal exploration of the site and where possible along the Wind River Trail in 2005 for the following components:

- Water quality sampling in the Wind River, Little Wind River and other water courses on the Deslaurier coal deposit;
- Fish surveys in the Wind and Little Wind Rivers and water courses on the Deslaurier coal deposit site.
- Wildlife studies for caribou, bear, moose, sheep, wolf, fir bearers, raptors, waterfowl and birds in general along the Wind River Valley and the Deslaurier coal deposit;
- Vegetation surveys along the Wind River Valley and at the Deslaurier coal deposit.
- Socio-economic studies with the First nations groups with an interest in the area as well as other stakeholders

We will coordinate the scope and approach to these studies with the regulatory agencies to ensure that we are collecting pertinent field data and are also building on the information base that already exists with the Government.

Closure

Clearly the 2005 coal exploration program has a very low potential to have significant effects on the environment under most normal situations. It will leave minimal residual effects but it is the start of a process to develop a coal mine and ultimately an Iron making/steel mill near the Deslaurier coal deposit.

Although the amount of available environmental data is quite limited at this time it will change over time. As the development schedule progresses more detailed environmental surveys and investigations of the deposit and surrounding areas will be undertaken. These will be carried out to ensure that we have all of the data needed to fully address environmental and social issues concerning development of the coal mine and future Iron making/steel mill.

There would appear to be no reason why Promithian Inc's exploration program for the Deslaurier coal deposit should not be permitted and proceed this year.

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