TELKWA PROPERTY

1995 to 1998 GEOLOGICAL ASSESSMENT REPORT

Property Name:	Telkwa Property	N.T.S. 93L/11
Coalfield:	Telkwa Coalfield	
General Nature of Report:	1995 to 1998 Geological Assessment Report	
Specific Licenses Involved:	Telkwa South	
Location (U.T.M.):	6045000/611500 to 6056000/628500	
Owner:	Luscar Limited (formerly Manalta Coal Limited)	
Operator:	Luscar Limited (formerly Manalta Coal Limited)	
Author(s) of the Report:	Mr. Angelo Ledda, B.Sc. Geology	
Date of Performed Work:	Summer and Fall of 1995, 1996, 1997 and 1998	
Report Due Date:	January, 1999	
Report Submission Date:	January, 1999	

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the geological work undertaken to date on the Telkwa coal licenses in west-central British Columbia held by Luscar Ltd. (formerly within the holdings of Manalta Coal Limited). Cumulative work completed during the 1995, 1996, 1997 and 1998 exploration programs is emphasized, detailing the geology, coal reserves and coal quality of affected license areas. Since taking over the Telkwa Property in May of 1992, Manalta Coal Limited has undertaken annual exploration programs. In November, 1998, Luscar Limited acquired Manalta Coal, including the land and license holdings of the Telkwa Property.

1.2 LOCATION AND ACCESS

The Telkwa Coal Property is located in west-central British Columbia approximately 15 kilometers south of the city of Smithers and about 2 kilometers southwest of the community of Telkwa (Enclosure 1), both of which are situated along the Yellowhead Highway (Highway #16) 11 kilometers apart. Smithers, in turn, is located 380 kilometers by rail east of Prince Rupert and the Ridley Island coal handling facilities (Figure 1.1). Smithers is serviced by commercial aircraft on a daily basis.

The Telkwa Property currently consists of 15,166 hectares held under 60 coal license blocks, measuring approximately 20 kilometers in the north-south direction by 14 kilometers east-west. The Telkwa River flows eastward bisecting the property with both halves containing coal measures of economic significance.

Access to the north side of the property is via Smithers along an all-weather public road that approximately parallels the Bulkley and Telkwa Rivers. The south side of the property is accessed from the community of Telkwa, again by an all-weather road. Logging roads are common, especially on the southern half of the property allowing access to more remote locations via four-wheel drive and all-terrain vehicles.

The area is serviced by a 500 KV powerline which bisects the property in an approximate east-west direction, running along the south side of the Telkwa River. In addition, Pacific Northern operates an underground natural gas transmission line which also traverses the property, paralleling the south side of the Telkwa River and branching northward towards Smithers along the eastern license blocks.

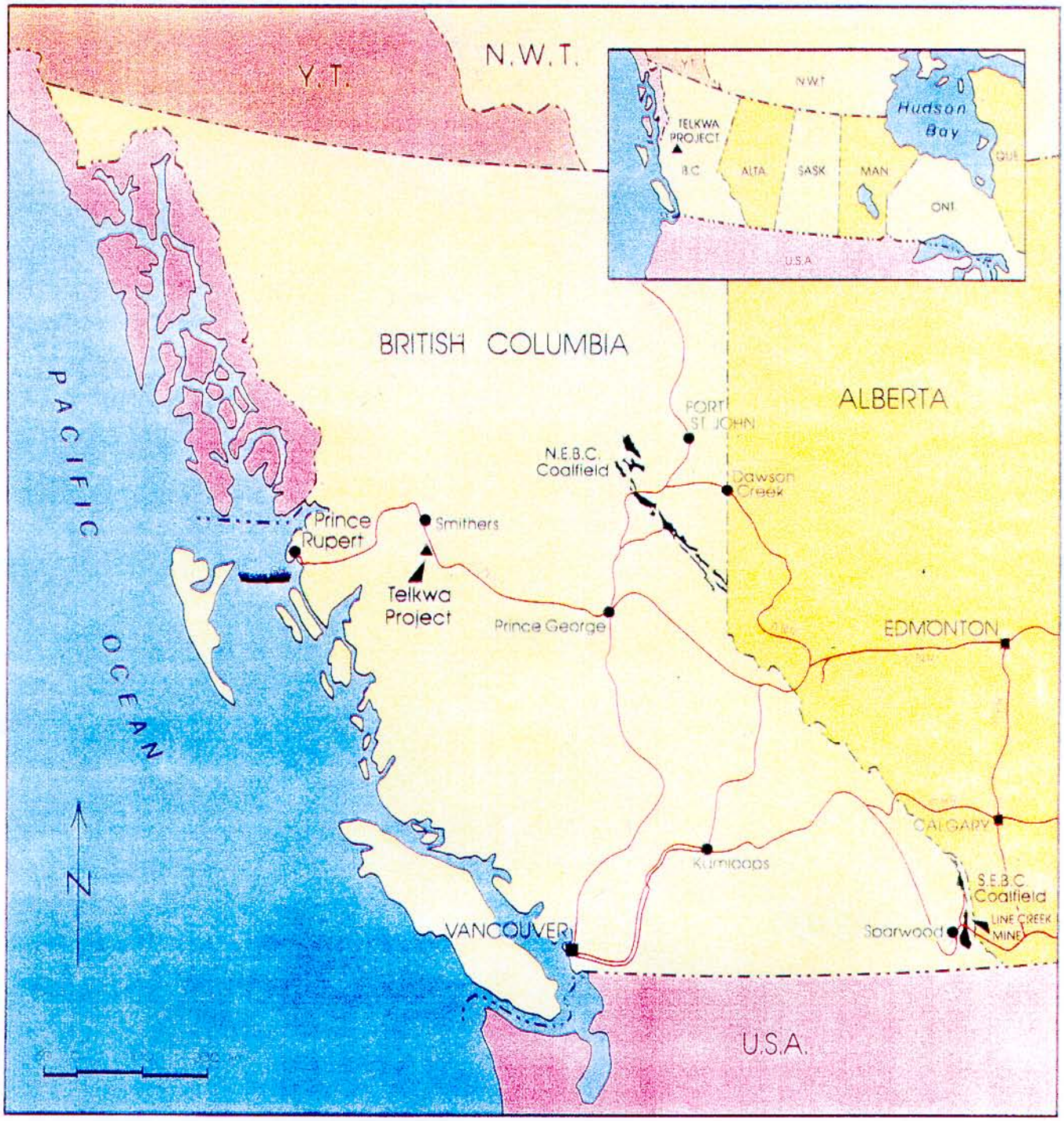


FIGURE 1.1

manalta coal ltd.

TELKWA PROPERTY LOCATION MAP

1.3 PHYSIOGRAPHY

The physiographic setting for the Telkwa property is typically foothills, intermediate to the Bulkley Range of the Hazelton Mountains and the low-lying gently rolling relief of the Nechako Plateau. The Bulkley Range is obvious to the north and west of the property where the landscape is bedrock controlled, while within the property limits and to the east, topography is rounded and covered with widespread glacial drift. Bedrock on the property is usually obscured as glacial sediments form a shallow mantle over much of the area, exceptions occurring sporadically or along sections of deeply eroded river and stream valleys such as Goathorn Creek.

The principal drainage system on the property is the Telkwa River, which flows east across the property until it ultimately drains into the Bulkley River at the community of Telkwa. Major tributaries to the Telkwa River include Pine Creek which drains much of the area on the northern licenses, and Tenas and Goathorn Creeks which drain the south.

Elevations within the property limits range from a low of 530 meters above sea level at the Telkwa River's eastern contact with the property boundary to a high of 1375 meters at the property's southernmost extremity near Cabinet Creek. Most elevations, however, lie within 600 and 900 meters.

Vegetation at lower elevations along watercourses consist mainly of cottonwoods, spruce and shrubs. The tree layer is typically composed of large, widely spaced cottonwoods with scattered hybrid spruce and trembling aspen. The understorey is composed of a rich diversity of shrub species which include high-bush cranberry, red-osier dogwood, alder, prickly rose, snowberry and black twinberry. At higher elevations the predominant vegetational cover consists of lodgepole pine, balsam fir and spruce. Understorey species include alder, willow, black twinberry and prickly rose (TAESCO, 1985). Some of the area has been commercially logged and

a number of areas have been cleared for agricultural purposes.

Pacific Inland Resources Ltd. of Smithers harvests timber within the license area for the production of commercial building products. One of the principal mills in the area is situated on the outskirts of Smithers along the access road to the north side of the property.

Soils in the vicinity vary in thickness and have developed on glacial till, outwash sediments and occasionally on weathered parent material. Parent material generally tends to be represented by either sedimentary sandstones and siltstones of the Skeena Group, or volcanic sediments of the Hazelton Group.

1.4 TENURE

The Telkwa Property currently consists of 15,166 hectares (37,475 acres) held under Crown coal licenses as well as 1,295 hectares (3200 acres) of Freehold land collectively held by Luscar Ltd. (Manalta Coal Limited) (Enclosure 2). Surface ownership rights are held in part by the Crown (approximately 70% of the property surface area), in part by Luscar Ltd. (approximately 8% in the form of Freehold land) and in part by third party landowners. The property coal licenses are summarized on Table 1.1.

TABLE 1.1: TELKWA PROPERTY - COAL LICENSE SUMMARY

24-Mar-99

Lessee	PropertyName	Description	LicenseNo.	LicenseExpiryD	Hectares	AnnualRental
Manalta Coal Ltd.						
		Coal License				
	TELKWA		327828	19991105	140	$980.00
	TELKWA		327829	19990530	130	$1,950.00
	TELKWA		327830	19990530	260	$3,900.00
	TELKWA		327831	19990530	260	$3,900.00
	TELKWA		327832	19990905	259	$3,885.00
	TELKWA		327833	19990905	259	$3,885.00
	TELKWA		327834	19990905	259	$3,885.00
	TELKWA		327836	19990624	130	$1,950.00
	TELKWA		327837	19990920	259	$3,885.00
	TELKWA		327838	19990623	259	$3,885.00
	TELKWA		327839	19990623	259	$3,885.00
	TELKWA		327840	19990623	259	$3,885.00
	TELKWA		327841	20000201	259	$3,885.00
	TELKWA		327842	19991231	259	$3,885.00
	TELKWA		327843	19990623	259	$3,885.00
	TELKWA		327844	19990623	259	$3,885.00
	TELKWA		327845	19990623	259	$3,885.00
	TELKWA		327846	19990623	259	$3,885.00
	TELKWA		327856	19990623	259	$3,885.00
	TELKWA		327860	19990623	259	$3,885.00
	TELKWA		327861	19990901	259	$3,885.00
	TELKWA		327862	19990901	259	$3,885.00
	TELKWA		327863	19990901	259	$3,885.00
	TELKWA		327864	19990901	259	$3,885.00
	TELKWA		327865	19990901	259	$3,885.00
	TELKWA		327866	19990901	259	$3,885.00
	TELKWA		327936	19990901	259	$3,885.00
	TELKWA		327944	19990901	259	$3,885.00
	TELKWA		327945	19990901	259	$3,885.00
	TELKWA		327946	19990901	259	$3,885.00
	TELKWA		327948	19990901	259	$3,885.00
	TELKWA		327949	19990901	259	$3,885.00
	TELKWA		327951	19990901	259	$3,885.00
	TELKWA		327952	19990901	259	$3,885.00
	TELKWA		327953	19990901	259	$3,885.00
	TELKWA		327954	19990901	259	$3,885.00
	TELKWA		327955	19990901	259	$3,885.00
	TELKWA		327956	19990901	259	$3,885.00
	TELKWA		327963	19990901	259	$3,885.00
	TELKWA		327964	19991007	259	$3,885.00
	TELKWA		327965	19991007	259	$3,885.00
	TELKWA		327966	19991007	259	$3,885.00
	TELKWA		327967	19991007	259	$3,885.00

Lessee	PropertyName	Description	LicenseNo.	LicenseExpiryD	Hectares	AnnualRental
	TELKWA		327968	19991007	259	$3,885.00
	TELKWA		327971	19991007	259	$3,885.00
	TELKWA		327972	19990730	259	$2,590.00
	TELKWA		328323	19990730	259	$2,590.00
	TELKWA		328672	19990530	260	$3,900.00
	TELKWA		334059	19990920	259	$3,885.00
	TELKWA		334060	19990530	259	$2,590.00
	TELKWA		353440	19990530	259	$2,590.00
	TELKWA		353441	19991105	259	$1,813.00
	TELKWA		362522	20000206	259	$1,813.00
	TELKWA		362523	19990512	259	$1,813.00
	TELKWA		362524	19990512	259	$1,813.00
	TELKWA		362525	19990512	259	$1,813.00
	TELKWA		362526	19990512	259	$1,813.00
	TELKWA		362527	19990512	259	$1,813.00
	TELKWA		362528	19990512	259	$1,813.00
	TELKWA		366754	19990512	259	$1,813.00
			Coal License Total:		**15166**	**$202,542.00**

1.5 HISTORICAL PERSPECTIVE

Coal was initially discovered in the Telkwa area about 1900, although production did not commence in the Goathorn Creek area until 1918. On the north bank of the Telkwa River the Aveling (Telkole) Mine produced coal from 1921 to 1922 and again from 1940 to 1945. Telkwa Colliery (McNiel Mine) on the south side of the Telkwa River began producing in 1923 (Malott, 1990). Initially production was mainly for local consumption until after 1930 when underground operations were initiated at Bulkley Valley Collieries near Goathorn Creek. Production since that time has been sporadic with underground operations often curtailed by structural complications and inadequate pre-development exploration.

Since 1950 the Telkwa Coalfield has been actively prospected by a variety of companies. Table 1.2 provides a summary of the exploration activities completed on the property since that time, while a descriptive summary of the area's exploration activities follows. A map illustrating the regional geology, annual exploration drill-holes, and identified resource areas of the Telkwa Property is found within Enclosure 3.

- **1951 - The Government of Canada** conducted a regional survey, much of which included the Telkwa license area.

- **1969 - Canex Aerial Limited** completed a drilling program of approximately 20 boreholes on the Telkwa North licenses.

- **1977 to 1978 - Cyprus Anvil Mining** completed a rotary drilling program within the Telkwa South licenses.

Table 1.2

Telkwa Property; Exploration History

Year	Total Drill-holes (Rotary + Core)	Rotary	Core	ARD cores	Total Trenches	ARD TRCs	Surficial Gly Bore-holes	Piezometers (piezos@sites)	Surface Geophysics (kms)	Bulk Sample (Res'rce area)	Prospector	Total Expenditures
1969	20	20?	0?	-	-	-	-	-	-	-	Canex Aerial Ltd.	
1977/78	10?	10?	0?	-	-	-	-	-	-	-	Cyprus Anvil Mining	
1979	13	13	-	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1980	-	-	-	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1981	12	11	1	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1982	72	7	65	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1983	69	-	69	-	-	-	-	-	-	Pit #3 (219 t)	Crowsnest Resources Ltd. (CNRL)	
1984	44	-	44	5	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1985	4	-	4	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1986	4	-	4	-	-	-	-	1/1	-	-	Crowsnest Resources Ltd. (CNRL)	
1987	-	-	-	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1988	14	-	14	2	-	-	-	-	3.5	-	Crowsnest Resources Ltd. (CNRL)	
1989	40	18	22	-	16	-	-	5/4	20.3	Pit #7 (6" core)	CNRL / Coal Mining Research Co. / GSC	
1990	-	-	-	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1991	-	-	-	-	-	-	-	-	-	-	Crowsnest Resources Ltd. (CNRL)	
1992	43	20	23	6	5	5	-	-	3.6	-	Manalta Coal Ltd.	$503,100.00
1993	53	33	20	6	-	-	10	7/5	19.0	-	Manalta Coal Ltd.	$627,362.00
1994	56	48	8	2	-	-	-	-	-	-	Manalta Coal Ltd.	$1,266,595.00
1995	83	71	12	3	5	4	-	4/4	-	-	Manalta Coal Ltd.	$1,997,000.00
1996	155	136	19	13	10	4	18	15/13	-	Tenas (80 t)	Manalta Coal Ltd.	$2,035,000.00
1997	121	113	8	8	27	16	7	25/18	-	-	Manalta Coal Ltd.	$1,388,440.00
1998	45	37	8	4	32	19	0	2/2	-	Tenas (6" core)	Manalta Coal Ltd.	$560,000.00
	828	507	321	49	95	48	35	59/47	46.4			$8,376,497.00

Total drill-holes to date (1979 - 1998): 828
Rotary component: 507
Core component: 321

Surface geophysics (kms): 46.4
Surficial geology drill-holes: 35
ARD cores: 49
ARD trenches: 48
Piezometres: 59 piezometers at 47 sites

- **1979 - Shell Canada/Crowsnest Resources Ltd.** completed 13 rotary drill-holes, 4 of which were located on Telkwa South licenses, and the remaining 9 situated on the north side of the Telkwa River. Chip samples were not recovered for analytical testing.

- **1981 - Shell Canada/Crowsnest Resources Ltd.** completed a mapping and exploration drilling program which consisted of 11 rotary holes and one diamond drill-hole, all of which were spaced randomly throughout the Telkwa property. Coal samples were recovered from 4 of the rotary holes as well as the diamond drill-hole for analyses.

- **1982 - Shell Canada/Crowsnest Resources Ltd.** drilled 72 boreholes on the property, the majority of which were located on the south side of the Telkwa River. Of the 72 holes, 7 were rotary drill-holes and 65 were diamond drill-holes. Coal samples were collected and analyzed from all holes that intersected significant coal units.

- **1983 - Shell Canada/Crowsnest Resources Ltd.** completed 69 diamond drill-holes on the Telkwa South licenses, most of which were located within what has been designated as the Goathorn East (Pit #3) resource area. Included within the program were a small number of large-diameter core-holes which, along with all other drill-holes that intersected significant coal units, were sampled and had coal analyses performed. Of the 69 boreholes completed, 11 were situated within the proposed Pit #3 test-pit limits providing a preview of the pit development.

  Based upon drill-hole information a 219 tonne bulk sample from 7 seams was subsequently extracted from a test-pit located within the Pit #3 area. A full suite of coal quality analyses was performed, including

testing on various simulated washplant products.

- **1984 - Shell Canada/Crowsnest Resources Ltd.** completed 44 diamond drill-holes, the majority of which were located within the Pit #3 resource area on the south side of the Telkwa River. Less than 10% of the holes were drilled on the Telkwa North coal licenses. All significant coal units were sampled and analyzed.

- **1985 - Shell Canada/Crowsnest Resources Ltd.** completed 4 diamond drill-holes, all of which were located north of the Telkwa River. All significant coals were sampled and analyzed.

- **1986 - Shell Canada/Crowsnest Resources Ltd.** completed 4 diamond drill-holes, again located on the Telkwa North coal licenses within an area that was designated as the Pits #7 and #8 Resource Area. Coal analyses were performed on all significant seams.

- **1988 - Shell Canada/Crowsnest Resources Ltd.** completed an exploration program exclusive to the Telkwa North licenses which consisted of initially completing approximately 3.5 kilometers of surface geophysics to highlight potential target locations. The area was subsequently drilled with 14 diamond drill-holes from which coal samples were collected and analyzed.

- **1989 - Shell Canada/Crowsnest Resources Ltd.** completed an exploration program consisting of drilling, trenching and surface geophysics on the Telkwa North coal licenses, and reflection seismic exploration within the Pit #3 area of the Telkwa South licenses. In addition a large-diameter coring program was undertaken specifically targeted at obtaining a bulk sample from the Pit #7 resource area.

The conventional exploration drilling program included 31 bore-holes, 18 of which were rotary drill-holes, and the remaining 13 continuous core diamond drill-holes. Coal samples for analyses were collected from all holes that intersected significant coal units, although only cored bore-holes were provided a full analyses. Analytical results from recovered rotary chip samples were not considered representative.

At proposed waste dump and tailings pond locations, 16 trenches were completed to evaluate the characteristics of the surficial lithologies. The Telkwa North surface geophysics included approximately 15.4 kilometers of geophysics shared between the Pit #7 resource area, the Pit #8 proposed waste dump area and the proposed infrastructure facilities location.

Upon completion of the conventional exploration program four previously drilled sites in the Pit #7 area were selected as locations for large-diameter (6-inch) core-holes. A cumulative bulk sample from 7 seams was extracted and a complete analysis run.

As part of a joint investigation managed by the Coal Mining Research Company of Devon, Alberta, 4 seismic lines totaling 4.9 kilometers were laid out and a reflection seismic exploration program completed. The area chosen for the investigation was within the Pit #3 resource area where reasonable drill-hole control had previously been established.

- **1989 - The Geological Survey of Canada**, as part of a province-wide study of coal quality, drilled 9 core-holes for a combined total length of 280 meters in the vicinity of the old Bulkley Valley Collieries site near Goathorn Creek. Two of the holes were drilled in the vicinity of the

historic Aveling Mine. All coal intersections were sampled and subsequently analyzed.

- **1992 - Manalta Coal Ltd.** of Calgary, Alberta acquired the Telkwa Property coal licenses on May 1st, 1992 from Shell Canada/Crowsnest Resources Ltd.. Later that same year Manalta Coal conducted an exploration program that included 3.6 kilometers of surface geophysics, a regional airborne magnetic survey review, 5 track-hoe trenches and 43 drill-holes. The surface geophysics, trenches and 39 of the 43 holes drilled were located on the Telkwa North licenses, while the remaining 4 drill-holes were completed on the south side of the Telkwa River in the vicinity of Tenas Creek.

  Of the 43 bore-holes completed, 19 were diamond core-holes, 3 were rotary core-holes and 21 were drilled utilizing conventional rotary drilling techniques. Three of the 4 holes completed in the Tenas Creek area were rotary drilled, and one was rotary cored through the coal measures. All significant coal seam intersections from cored drill-holes were sampled and analyzed.

  Representatives from the British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR), and the Institute of Sedimentary and Petroleum Geology (ISPG) were on site to conduct coalbed methane desorption tests on selected Telkwa coal samples coincidental with the exploration drilling program. The study conducted by the MEMPR and the ISPG was part of a regional study of methane desorption in British Columbia coalfields.

- **1993 - Manalta Coal Ltd.** completed an exploration program consisting of 53 drill-holes shared between the Telkwa North and Telkwa South

coal licenses. A geotechnical and surficial geology program was also completed by Piteau Engineering on behalf of Manalta Coal Ltd. It included rock strength testing on selected cores, approximately 19 kilometers of surface geophysics and 10 till sample sites. All surface geology studies were completed within a proposed tailings pond investigation area located near the Pit #7 and #8 resource areas.

The Tenas Creek exploration area on the south side of the Telkwa River was the focus of 26 drill-holes, targeted at obtaining additional coal quality information and further delineation of the field's limits. Also 5 core-holes were completed within the Pit #3 Telkwa South coal licenses resource area to obtain additional coal quality information.

Exploration completed on the Telkwa North coal licenses consisted of 2 drill-holes within the limits of the Pit #8 resource area, 11 drill-holes delineating the coal trend beyond current Pit #8 limits, and 9 reconnaissance drill-holes completed proximal to the Pits #7 and #8 resource areas.

Of the 53 bore-holes completed in 1993, 11 were diamond drilled core-holes, 10 were rotary core-holes (including one 1993 core-hole on a site utilized the previous year) and 33 were drilled with conventional rotary techniques. All significant coal seam intersections from cored drill-holes were sampled and analyzed.

- **1994 - Manalta Coal Ltd.** completed their third annual exploration program, consisting of geological surface mapping and the completion of 56 rotary drill-holes, 8 of which were partially cored. Work was undertaken on both sides of the Telkwa River, although dominated slightly by drilling activities on the southern coal licenses where 32 drill-

holes were completed.

Of the 32 drill-holes completed on the Telkwa South coal licenses 13 were dedicated to further exploration of the Tenas resource area, while 19 exploratory drill-holes were completed to evaluate the coal-bearing potential of the Tenas West coal licenses. Drilling on the Telkwa North licenses included 14 exploratory drill-holes within the MCL (Whalen) Freehold Block, 8 within tentative waste dump areas between Pit #8 and the Whalen Block, and 3 drill-holes completed proximal to the Pit #7 resource area. All cored coal seam intersections were sampled and subsequently analyzed.

- **1995 - Manalta Coal Ltd.** completed a summer exploration program, limited exclusively to the Telkwa South coal licenses. A cumulative total of 83 drill-holes totaling approximately 9600 meters, and 5 track-hoe trenches were completed. Of the 83 drill-holes, 3 were continuously cored using a heliportable diamond drilling rig in environmentally sensitive areas near Cabinet Creek, while 9 additional core-holes within the Tenas resource area were completed using conventional coring methods. Coal samples were collected from all cored holes where coal measures were intersected, while rock samples were collected from 3 of the Tenas core-holes. Coal samples were analyzed for their coal quality properties while host rock samples were evaluated for their acid generating potential.

  As in some previous years, a geotechnical and hydrogeological program was carried out coincidentally with exploration activities, supported by Piteau Engineering Consultants. Four piezometer installations were completed to monitor groundwater flows in the Tenas area, and 5 track-hoe trenches, also in the Tenas area, were completed

to investigate the surficial lithologies of potential waste dump sites. The lithologic units intersected by these trenches were sampled and analyzed to evaluate their acid generating potential.

- **1996 – Manalta Coal Ltd.** conducted an extensive exploration program on the Telkwa South coal licenses, which included the completion of 155 rotary drill-holes, 10 trenches, 18 shallow surficial drill-holes and the extraction of an 80 tonne bulk coal sample. Drilling activities were restricted mainly to the Tenas and Goathorn East resource areas, while the bulk sample was collected from two small pits dug near the western subcrop edge of the Tenas resource area.

  From the bulk sample test-pits the 3 mineable Tenas seams (c-seam, 1U-seam and 1-seam), as well as proportional amounts of host roof and floor rocks, were individually sampled. The 1U-seam, 1-seam and associated host lithologies were collected from the main pit, while the c-seam and related host rocks were collected from the 2nd, smaller pit. A complete suite of coal quality analytical tests were subsequently performed, including testing on various simulated proposed products.

  Of the 155 rotary drill-holes completed, 19 were partially cored. Six of the core-holes were completed within the proposed bulk sample test-pit area prior to pit development to determine seam oxidation levels and to evaluate the suitability of the site for the collection of a representative bulk sample. The 13 other core-holes, completed within the Tenas (10) and Goathorn East (3) resource areas, were continuously cored for acid base accounting and coal quality.

  The 18 shallow drill-holes were completed to investigate the surface geology of potential tailings pond and waste dump locations.

Piezometers were installed within near surface lithologies of 7 of the bore-holes, while an additional 8 piezometers were installed within the coal seams at 6 conventional drill-sites. Piezometers were also installed within the coal horizons of the 2 test pits prior to backfilling in order to collect groundwater samples and monitor its flow.

Of the 10 trenches completed in 1996, 6 were completed within the confines of the Tenas test-pits for the purpose of channel sample collection. All of the remaining trenches were completed randomly in the Tenas resource area for the purposes of investigating the regional surficial lithologies, and collecting acid base accounting data.

- **1997 – Manalta Coal Ltd.** conducted an exploration drilling program, again limited exclusively to the Telkwa South coal licenses. Completed within the scope of the program were 121 geology drill-holes and 3 geotechnical bore-holes. Twenty-seven trenches, targeted at further investigating the near surface lithologies of the plantsite, tailings pond and Goathorn East resource areas, were also completed.

  Included within the conventional drilling component of the program were 72 drill-holes within the Goathorn East (Pit #3) area, 43 within the Tenas area and 6 within the Goathorn West (Pit #6) area. The surficial bore-holes were completed within potential wastedump locations of Tenas and Goathorn areas, while the 3 geotechnical holes were completed within the 1983 Pit #3 test-pit reclamation area.

  Of the 121 conventional drill-holes completed during the 1997 program, 8 were continuously cored and sampled for coal and rock sample collection purposes. All coal samples were subsequently analyzed for seam quality determinations, while rock samples were tested for their

acid generating potential. Sixteen of the trenches and each of the reclamation pit drill-holes were also sampled and analyzed for their acid generating potential.

Piezometers were installed in conventional drill-holes at 11 locations, including 4 nested sites where multiple stratigraphic horizons were investigated. Each of the 3 reclamation pit drill-holes, and all of the shallow overburden bore-holes, had piezometers installed to monitor groundwater flow characteristics.

- **1998 – Manalta Coal Ltd.** conducted an exploration program restricted locally to the Telkwa South coal licenses. The program included 37 drill-holes, 8 core-holes, and 32 track-hoe trenches. Of the 8 core-holes, 5 were large-diameter from which bulk samples of the Tenas main mineable seams were collected. For control purposes, each of these bulk sample holes was cored at a previously drilled site. In addition, 3 conventional continuous core-holes were completed for acid base accounting purposes and to collect coal samples for seam quality determinations.

  The trenching component of the exploration program was supported by Piteau Engineering Consultants of Calgary, and was targeted at investigating the surficial lithologies of the proposed plantsite, tailings pond, loadout and haul route corridors. Host rock samples were collected from 19 trench locations and subsequently analyzed for their acid generating potential.

  Included within the conventional drilling component of the program were 20 drill-holes within the Goathorn East (Pit #3) area, 8 within Tenas area, 9 within the proposed tailings pond location and 3 within

the Goathorn West (Pit #6) area. Continuous cores were collected from among the Tenas, Goathorn East and tailings pond areas. Piezometers were ultimately installed within drill-holes of the Goathorn East and West resource areas.

1.6 ACKNOWLEDGEMENTS

The work undertaken for the Telkwa geological investigation between 1995 and 1998 was conducted by various contractors and consultants under the management and supervision of Manalta Coal Ltd. Staff. This report was prepared by Mr. A. Ledda of Manalta Coal Ltd. with input from the following groups:

- Birtley Labs (GWIL industries) for bulk sample coal quality analyses.
- Chemex Labs Ltd. for geochemical analyses.
- Dr. Barry Ryan of the British Columbia Ministry of Employment and Investment (MEI).
- Loring Laboratories Ltd. for coal quality analyses.
- Norecol, Dames and Moore for geochemistry technical support.
- Piteau Engineering Ltd. for geotechnical and hydrogeological studies.

Mr. Angelo Ledda of Manalta Coal Ltd. received a Bachelor of Science Degree in Geology (1986) from the University of Calgary as well as a Diploma in Petroleum Technology; Geology (1982) from the Southern Alberta Institute of Technology (S.A.I.T.). Since university graduation he has been employed as an exploration and development geologist with Gulf Canada Resources Ltd., taught evening classes in the Petroleum Technology; Geology program at S.A.I.T., and was employed as the Chief Geologist with Manalta Coal Ltd.

Mr. Angelo Ledda is a Professional Geologist, registered with the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA). His 12 years of work experience as a geologist includes some work within the oil and gas industry although the majority of his experience has been within the coal industry on deposits situated throughout western Canada. Much of his coal experience lies within studies conducted in the Bowser Basin including the Klappan, Groundhog and Telkwa Coalfields.

2.0 GEOLOGICAL WORK

On the basis of geological work carried out in previous years by Manalta Coal Ltd. and various other groups, the exploration programs conducted between 1995 and 1998 were designed to further delineate high potential mining targets and to initiate reconnaissance exploration of other areas. They were also intended to provide additional data on the geology, reserves and coal quality of those potential mining targets.

2.1 SCOPE OF WORK

All exploration work undertaken between 1995 and 1998 was conducted on the Telkwa South coal licenses, spread between infill drilling within established resource areas and, to a lesser degree, reconnaissance exploration drilling in yet unexplored areas. Over the span of the four exploration programs a cumulative total of 404 exploration drill-holes, 22 shallow surficial bore-holes, 3 geotechnical drill-holes and 74 trenches were completed. In addition, from the Tenas resource area, an 80 tonne bulk sample was recovered in 1996 and, in 1998, 5 large-diameter core bulk samples were also collected and analyzed.

Of the 404 completed conventional drill-holes, 46 were cored for acid base accounting and coal quality purposes. Most of this coring was undertaken within the Tenas resource area, although Goathorn East, Goathorn West, Cabinet Creek and proposed infrastructure areas were also targeted. The same areas were also targeted with conventional infill and exploration drilling, while wide-spaced reconnaissance drilling was undertaken within the corridor between the Tenas Creek and Goathorn Creek drainages.

The shallow bore-hole drilling undertaken during the programs was geotechnical in nature, designed to investigate the surficial lithologies of potential infrastructure and

wastedump locations. This geotechnical component was supported by Piteau Engineering Consultants of Calgary who conducted investigations to determine the suitability of the site substrates for wastedump and infrastructure locations. Three holes within the reclaimed Goathorn East 1983 testpit were drilled in 1997 to provide groundwater samples via piezometers, and to collect rock samples to test their potential for generating acid effluent.

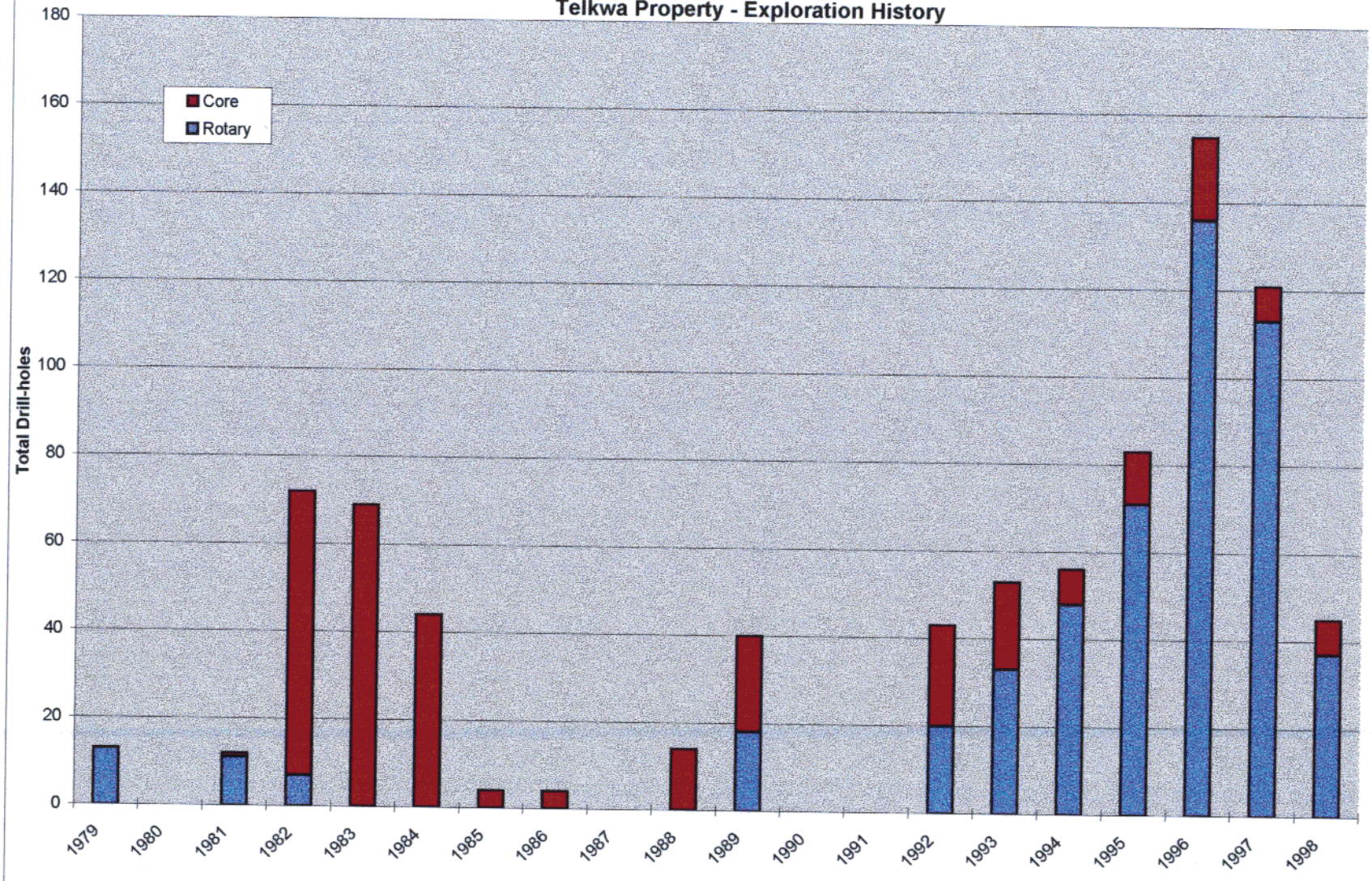
Much of the trenching was also geotechnical in nature, specifically those completed during the 1997 and 1998 calendar years. Besides providing lithology and substrate information, many of the trenches also yielded samples for analysis to increase the areas' acid base accounting database.

In most instances, exploration activities were conducted during the summer and fall months, normally reaching completion by late October. Reclamation efforts took place coincidentally with drilling activities and continued until adverse weather conditions prevailed.

2.1.1 Drilling

A cumulative total of 404 exploration drill-holes, 22 shallow surficial bore-holes, 3 geotechnical drill-holes and 74 trenches were completed over the span of exploration between 1995 and 1998. Each of the drill-holes was geophysically logged upon completion and surveyed prior to site reclamation. Exploration summaries for each of these years is provided within Enclosure 4, while Figure 2.1 compares drilling completed during annual exploration programs.

Figure 2.1
Telkwa Property - Exploration History



To date, as detailed on Figure 2.1 and Table 1.2, a cumulative total of 828 drill-holes have been completed on the Telkwa Property since 1979. Of those, 507 were drilled using conventional rotary methods, while 321 were cored. A complete drill-hole listing of all drilling completed to date is provided within Enclosure 5. Within 47 of the drill-holes 59 piezometers were selectively installed at various stratigraphic levels. Thirty-five surficial bore-holes and 88 mechanical trenches have also been completed to date on the property.

Wireline as well as conventional coring techniques were employed during each of the exploration programs undertaken between 1995 and 1998. Diamond drill-holes, utilized for the 1995 heli-portable drilling program in environmentally sensitive areas of Cabinet Creek, were continuously cored extracting 3.80 centimeter diameter core from the top of competent strata throughout the entire length of the hole. More commonly, however, rotary wire-line techniques were employed to extract cores from the Telkwa property. Where continuous coring was not required a conventional rotary pilot hole was drilled initially at the site location and subsequently a second adjacent hole was drilled, where selected coal units were cored. Commonly rock units between core intervals were conventionally drilled. At rotary core locations 10.0 centimeter diameter core was typically recovered. Core recoveries from both coring methods were good, although notably better on the larger diameter cores. Core recoveries on the larger core normally ranged from 80% to 100%.

For each of the exploration programs conducted between 1995 and 1998 Failing 1250 and Ingersol Rand TH60 truck-mounted drilling rigs were used to complete the rotary component of the program while an Acker Diamond Drilling Rig completed all diamond drill-holes. McAuley Drilling Co. of Spruce Grove, Alberta, SDS Drilling of Calgary, Alberta and Cora Lynn

Drilling of Strathmore, Alberta completed the rotary component of the programs. J.T. Thomas Diamond Drilling of Smithers, British Columbia completed all diamond drilling requirements. Mechanical equipment and rig support was provided by Bruce Kerr Contracting of Smithers, British Columbia.

2.1.1.1 Drill-hole Numbering

Drill-holes completed on the Telkwa Property between 1979 and 1989 were not numbered utilizing a common numbering scheme. As a result, in 1992, all drill-holes completed on the property to date were renamed to reflect a common numbering system. The original numerical component of the name was retained to avoid confusion but prefixes denoting the year drilled and the type of drill-hole were made consistent. An example of the adopted system would be T85D-502 where:

- T - denotes it as a Telkwa Property drill-hole; TOB as a Telkwa Surficial bore-hole and TRC as a trench.
- 85 - categorizes it as being drilled in 1985.
- D - denotes it as a diamond drill-hole; R as a rotary.
- 502 - is its original numerical component.

For rotary core-holes a C would follow the numerical component. A complete drill-hole listing is provided within Enclosure 5.

2.1.1.2 Geophysical Logging

When possible all exploration drill-holes were geophysically open-hole logged shortly after completion of drilling. Where poor downhole conditions were encountered, a slim-line gamma-density tool was lowered through the drillstem to obtain at least one complete geophysical log of the hole. Detailed logging (1:20 Scale) was undertaken only over significant coal seam intervals. Surficial geology test-holes were not normally geophysically logged due to their shallow completion depths.

Electronic copies of geophysical logs for boreholes completed between 1995 and 1998 are stored on a CD disk (Enclosure 6). The text of these files may be viewed with Microsoft 'NOTEPAD' or graphically displayed using the software program 'VIEWLOG'. In most cases downhole conditions were satisfactory and the following open-hole geophysical log responses were obtained:

Gamma Ray General	1:100 Scale
Long Spaced Density General	1:100 Scale
Dipmeter General	1:100 (on selected holes)
Caliper	
Deviation	
Gamma Ray Detail	1:20 Scale
Long Spaced Density Detail	1:20 Scale
Bed Resolution Density Detail	1:20 Scale

2.1.1.3 Drill-hole Logging, Sampling and Analysis

All cores collected between 1995 and 1998 were logged in detail

(Enclosure 7) by geologists on site. Once described and measured, the coals and selected host rock samples were bagged and labeled for subsequent analysis. In 1995 a total of 154 coal ply samples were collected, 263 in 1996 (plus 39 from trenches), 145 in 1997, and in 1998 there were 189 coal samples recovered. Additionally, during each exploration season, rock samples from representative core-holes were also collected for subsequent analyses to determine potential acid rock drainage (ARD) characteristics. A cumulative total of 936 rock samples were collected from 28 continuous cores between 1995 and 1998. Additionally 37 samples were collected via rotary chip sampling, and 129 from trench sampling. Cuttings descriptions from all rotary drill-holes, as described in the field, are found within Enclosure 8. Specific details of analyses conducted and test results are discussed in Section 4.0.

2.1.2 Bulk Samples

Bulk samples have contributed considerably to the understanding of the quality characteristics of the Telkwa coals and have been extracted from three of the main resource areas. On each, a complete suite of coal quality analyses was performed, including testing on a variety of simulated washplant products. In 1983 a 219 tonne bulk sample was collected from 7 major seams within the Goathorn East (Pit #3) area. In 1989 a bulk sample was extracted from the Bowser (Pit #7) area via large-diameter coring and, on two occasions bulk samples were collected from the 3 mineable seams of the Tenas area.

Bulk samples were collected from the Tenas resource area on two

occasions, initially in 1996 through the excavation of a pair of testpits, and again in 1998 via large-diameter coring techniques. In 1996 an 80 tonne bulk sample was collected from 2 adjacent testpits located along the western subcrop edge of the 1/1U-seam and c-seam respectively. The first, and largest of these testpits exploited the 1U and 1-seams. Combined these seams form approximately 80% of the identified mineable Tenas reserve. The second, smaller testpit was targeted at collecting a sample of c-seam, which lies approximately 13 meters stratigraphically above the 1U-seam.

A complete suite of analytical testing was conducted on the sample including individual seam analysis, product testing, complete washabilities and a burn test. Washplant and process design work was also conducted, based upon the analytical results. Most of the analytical testing was conducted by Birtley Labs of Calgary, while the test burn and resultant analytical work was performed by Canmet in Ottawa. All process design work was completed by H.A. Simons of Calgary.

2.1.3 Reclamation

Reclamation was undertaken in areas disturbed by current exploration activities, as well as those areas from previous years that required additional work. All disturbed areas were recontoured, reseeded and fertilized using Forestry approved mixtures. Access trails on sloping ground were water barred for erosion control, and additional topsoil was added to areas that inhibited new plant growth. All work was carried out in accordance with the regulations and guidelines of B.C. Forestry. Areas that were not reclaimed in the disturbance year due to the onset of adverse weather were completed the following spring.

3.0 GEOLOGY

3.1 REGIONAL GEOLOGIC SETTING

During Jurassic and Cretaceous time much of the western portion of British Columbia was formed as the result of several terranes that moved slowly toward and eventually collided with the North American craton. The Telkwa Coalfield is the product of sedimentation that occurred as one such terrane, the Stikine Terrane, pushed eastward to eventually become sutured to the North American landmass (Richards, 1988).

Successor basins, which formed in response to the approaching terrane, were the focus of rapid sedimentation, subsidence and increased tectonic activity. One such successor basin, the Bowser Basin, had developed during Middle Jurassic time near the present-day location of Smithers. It was a center of deposition, bounded on the north by the Stikine Arch, on the south by the Skeena Arch and on the east by the early uplifting of the Columbian Orogeny. The Telkwa Coalfield developed along the northern flank of the Skeena Arch near the southern limit of sedimentary rocks in the Bowser Basin (Figure 3.1) (Palsgrove and Bustin, 1991).

Deposition of the coal-bearing sediments in the Telkwa area was initiated into the Bowser Basin during the Lower Cretaceous, following uplift and erosion of the Skeena Arch. Although this sedimentation initially came from the south and west, an eastern provenance soon dominated, a response to the increased uplift of the Columbian Orogeny. The result in the Telkwa area is represented by more than 500 meters of coal-bearing strata referred to as the Lower Cretaceous Skeena Group. In the Telkwa Coalfield Skeena Group sediments unconformably overlie Jurassic Hazelton volcanics.

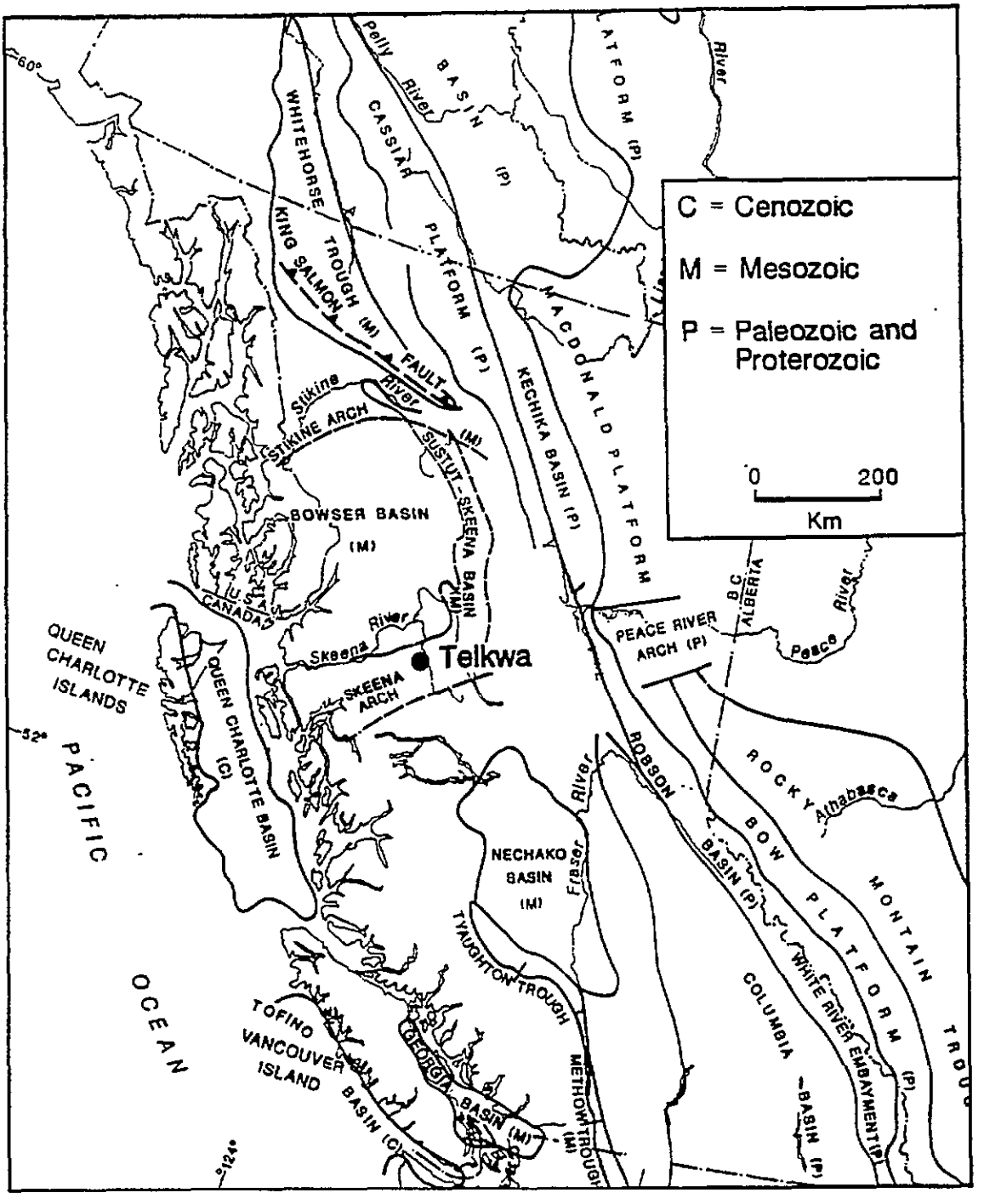


Figure 3.1. Tectonic Elements of British Columbia (R.J. Palsgrove, 1990).

3.2 STRATIGRAPHY

Sedimentation of Skeena Group sediments occurred throughout the Lower Cretaceous, during which time deposition was influenced by two regressive / transgressive episodes. As a result the stratigraphic sequence (Enclosure 9) is divisible into four lithostratigraphic units (Palsgrove and Bustin, 1989) further described in the text which follows. Porphyritic Tertiary and Cretaceous intrusive dykes and sills commonly disrupt local stratigraphy as does a large Tertiary granodiorite plug identified on the northern coal licenses.

3.2.1 Unit I

The basal unit, Unit I, was deposited in a fluvial environment on an eroded Hazelton volcanic basement of Jurassic age. In the Telkwa area Unit I may be in excess of 100 meters in thickness and consists mainly of conglomerate, sandstone, mudstone and coal. Sands and gravels were typically deposited in braided channels and bars while mudstones accumulated in floodplains. Coals within this unit, collectively referred to as Coal Zone 1, formed in poorly drained backswamps and are characterized by lateral variation throughout the study area. Deposition of Unit I ended with a marine transgression and deposition of Unit II.

3.2.2 Unit II

Unit II was deposited within a deltaic / shallow marine environment and consists of up to 140 meters of sandstone, silty mudstone and occasional thin coaly mudstone. Sands were deposited in distributary channels and mouth-bars while mudstones and silty mudstones accumulated in

interdistributary bays. Thin discontinuous peat beds, none of which are of economic significance, accumulated in local salt marshes.

3.2.3 Unit III

Unit III is indicative of the second regressive episode for the area and represents the deposition of the main coal-bearing stratigraphic sequence. The unit averages 85 meters in thickness and comprises of sandstone, siltstone, carbonaceous mudstone and thick, laterally extensive coal seams. Restricted nearshore marine, tidal flat and coastal swamp environments persisted throughout much of the deposition of Unit III. Sandstone units were deposited within tidal channels while interbedded sandstones and siltstones were deposited nearshore within intertidal environments. Mudstones are representative of tidal flat deposits. Indications are that there was significant marine influence during deposition of the entire unit.

Coal Zones 2 through 11 are represented in Unit III, collectively consisting of up to 17 coal seams of economic significance. The coal zones were likely formed in freshwater peat swamps, located landward of the tidal flat, somewhat isolated from influxes of brackish water. The presence of sulphur in some of the coal seams suggests, however, that the peat was infiltrated periodically by marine water. Thus, the major coal seams are interpreted to have formed from peat accumulated in a freshwater marsh that was proximal to a brackish environment. The Snuggedy Swamp of South Carolina is considered a modern analog for the paleoenvironment in which Unit III was deposited.

3.2.4 Unit IV

Unit IV overlies the coal measures and represents a marine transgression that terminated coal deposition over the study area. The unit exceeds 150 meters in thickness and consists of sandstone overlain by silty mudstone. The basal sandstone is a transgressive lag deposit while the remainder represents deposition within a near-shore, shallow marine environment.

3.3 STRUCTURAL GEOLOGY

Since deposition of the Skeena Group sediments during the Lower Cretaceous the Telkwa area has undergone at least two episodes of structural significance. The Upper Cretaceous of the Bowser Basin reflects a time of deformation, when high angle faulting and plutonic intrusions were occurring eastward within the Omineca Crystalline Belt, and increasing uplift was occurring to the west. This was a result of the suturing of the Stikine Terrane to the North American craton and also the effects of additional terranes approaching from the west. Although folding in the Telkwa area was not as significant as in other portions of the basin, high angle faulting roughly trending in a north-south direction are apparent in the Telkwa Coalfield, especially on the south side of the Telkwa River. Porphyritic Late Cretaceous dykes and sills also occur locally within the coal measures.

During the Tertiary much of the area on the north side of the Telkwa River was intruded by a large granodiorite and quartz monzonite intrusion. The igneous body, which vertically intruded the Skeena sediments, complicated the structural geology of the area further. This is particularly apparent at close proximities to the intrusive body on the northern coal licenses. Structural repercussions in the Skeena sediments appear to be represented by high angle faulting, establishing a mosaic

of structural blocks that have been rotated and tilted into a variety of orientations. No well defined fault orientation has been observed although faults in concentric geometries are apparent near the intrusive body and also appear to crudely radiate from the intrusive edge. Fault displacements have been observed to range from only a few meters to more than 150 meters.

Although bedding orientations within the Telkwa Property resource areas tend to be controlled by fault blocks. each with independent orientations, dips normally range from 10 to 30 degrees. In the fault blocks associated with the Pit #3 resource area dips are typically 20 degrees to the east, while within the blocks of Pit #7 & #8 they average 17 degrees to the east and northeast respectively. In the Northwest Area, block orientations are to the southeast and southwest, with dips ranging from 10 to 35 degrees. In the Tenas area the west limb of the Tenas syncline normally dips from 9 to 22 degrees, while the east limb dips much steeper, up to 50 degrees. Within the MCL Whalen Block orientations vary but typically range from 15 to 25 degrees to the east/southeast.

3.4 DETAILED GEOLOGY

All exploration work completed by Manalta Coal between 1995 and 1998 was conducted on the Telkwa South coal licenses. The majority of this work occurred within the Tenas and Goathorn East (Pit #3) resource areas, which represent those fields where mining will initially proceed under the proposed mine plan. Reconnaissance exploration drilling, limited to the 1995 and 1996 exploration seasons, typically took place along the corridor between Tenas and Goathorn Creeks, and on selected coal licenses near Hubert and Helps Creeks. Geotechnical and surficial lithology investigations were typically targeted at proposed infrastructure and haul route locations.

The economic coals found represented within the Pits #7, #8, Northwest area and most of Goathorn resource area are those of lithostratigraphic Unit III (Seams #2 - 11). In contrast, in the Tenas, Cabinet, Whalen areas, and a small block of Goathorn East the main seams of interest are those of the 1-seam coal sequence of Unit I.

The stratigraphic columns for each of the main resource areas (Enclosure 9) clearly illustrate the typical stratigraphy found within each of the resource areas. It also depicts some of the regional variations and trends that occur within seam and interseam lithologies throughout the Telkwa Coalfield.

3.4.1 Unit I Coal Stratigraphy

The coal seams within lithostratigraphic Unit I, collectively referred to as the 1-seam package, are separated from the overlying coals of Unit III by sediments up to 140 meters thick of shallow marine origin. Unit I coal horizons have been drilled extensively since 1992 in the Tenas resource area. Unit I has also been occasionally identified in the fault blocks of Goathorn East. Its coal sequence remains consistently thick although has, to date, been encountered only near maximum mineable cutoff depths. Where encountered in the Cabinet and Whalen resource areas the Unit I coals are notably thinner. Correlation of the Unit I seams within Cabinet and Whalen areas remains sketchy. Additional information is required to further determine the lateral continuity of individual seams. Intersections of the #1 seams within the MCL Whalen Block indicate that the seam, at least in this area, is considerably variable, a result of erosional forces by fluvial systems.

In the Tenas resource area the Unit I coals are represented by up to 13 coal seams spread over a 45 meter stratigraphic section. Most of these seams

are not of sufficient thickness to be considered mineable. Some of the more notable trends identified within the main mineable seams, labeled c, 1U and 1 in descending order, are described as follows:

- c-seam, the uppermost and thinnest of the mineable Tenas seams, averages 1.49 meters in thickness and is separated from the underlying 1U-seam by approximately 13 meters. The c-seam, like many of the thinner Tenas seams, is well developed throughout most of the Tenas area but is subject to local variations in thickness, presumably a result of depositional factors and erosional forces by fluvial systems. It is locally absent from parts of the Tenas field, most notably the deepest part of the basin formed by the Tenas syncline. In the Pit #3 area, where the Unit I stratigraphy is identified, the c-seam is typically absent from the local stratigraphy.

- The 1U-seam in the Tenas and Goathorn areas is a very well developed and laterally consistent seam, averaging 1.77 meters in thickness. Its sulphur content does not display the same uniformity, fluctuating in the Tenas area, often over short lateral distances. The seam has not been studied sufficiently to draw such conclusions for the Goathorn area. In the Tenas area the 1U-seam is typically separated from the underlying 1-seam by a siltstone parting that ranges from 0.0 to 2.5 meters in thickness. Typically, the parting is absent in the south-central part of the field, increasing progressively in thickness northwesterly across the deposit.

- The 1-seam is the thickest and most consistent seam of the Unit I coal measures. It averaging 4.12 meters in thickness in the Tenas area, and slightly less in the Goathorn area. Where identified in the Cabinet area it thins substantially, averaging 2.02 meters in thickness. Laterally

consistent in the Tenas area, 1-seam is normally absent of significant partings and consists of up to 5 individual seam plies. The 1-seam is consistently and predictably low in sulphur content and comprises greater than 50% of the Tenas deposit's reserve base. The 1-seam plies are occasionally undefined due to local thinning or nondeposition.

3.4.2 Unit III Coal Stratigraphy

Up to 17 coal seams represented in lithostratigraphic Unit III collectively contribute 20.5 meters of coal to the Unit's 85.0 meter average thickness. Unit III coals are found within the Goathorn East, Goathorn West, Northwest, Pit #7 and Pit #8 resource areas. The main coal zones of Unit III, typically labeled Seams #2 to #11 in ascending order, display some lateral variability. Some of the more notable seams and seam trends are described as follows.

- Seam #2 remains consistent throughout much of the property although thin partings are apparent within the Pit #3 and Pit#7 resource areas. The seam does, however, exhibit some thickness variability over short distances especially within the northwest portion of Pit #8. Seam #2 Upper, which overlies Seam #2, is thin and developed only within the eastern resource areas north of the Telkwa River. Seam #2 Lower, which directly underlies Seam #2, also occurs on the northern side of the river but remains significant only within the western resource areas.

- Seam #3 remains one of the most consistent seams in the stratigraphic sequence of Unit III. It is found throughout the resource areas which exploit Unit III, and is consistently split into Seams #3 Lower and Upper by a mudstone parting which rarely exceeds one meter in thickness.

- Seam #4 is normally well developed throughout each of the resource areas but is locally absent from a small area in the southeast portion of Pit #8. Seam #4 Upper, which overlies the #4 Seam, is absent from Pit #7 and the eastern half of Pit #8, but occurs throughout the western part of Pit #8, the Northwest Area, and Pit #3. The parting thickness between Seam #4 and #4 Upper increases progressively in a northwesterly direction attaining a maximum thickness of more than 7.0 meters in the Northwest Area.

- Seam #5, a very well developed seam, is found throughout the property. It splits, however, midway through Pit #8 where it is represented in the Northwest area and the west half of Pit #8 as Seams #5 Lower and #5 Upper.

- Seam #5ex is undeveloped throughout most of the property but progressively develops within the Pit #8 resource area, becoming increasingly apparent on the west half of Pit #8. Within the Northwest Area the seam continues to thicken and represents one of the thickest and best developed seams of the area.

- Seam #6 is considerably variable between resource areas, splitting from a single seam in Pit #3 to as many as 3 seams in Pit #7. Throughout Pit #7, Pit #8 and Northwest Area the seam is represented as #6 Lower and #6 Upper, separated by a parting normally averaging one meter in thickness. In the Pit #7 area Seam #6 Lower is further split by another parting normally not exceeding 0.50 meters in thickness.

- Although generally thin and considered uneconomic throughout most of the resource areas Seam #7 is laterally continuous and shows little

variability throughout the coalfield. The exception is within Pit #7 where the seam is absent from the sequence.

- Seam #8, although present throughout most of the resource areas, exhibits considerable variation in seam thickness, often over short lateral distances. Seam #8, and those seams which overly it, are not well represented within the Pit #7 area since most of the upper portion of the Unit III sequence was eroded from that area prior to glaciation.

- Seam #9, due to its inconsistent thickness and poor quality characteristics, is rarely considered of economic significance. The seam is characterized by visible pyrite banding and as a result has higher than average raw sulphur values in comparison to other seams. Like underlying Seam #8 it often exhibits seam thickness variability and lateral discontinuity.

- Seam #10 is a relatively consistent seam, present throughout most of the Pit #3, Pit #8 and Northwest areas. The seam varies in thickness, however, often over short lateral distances.

- Seam #11, the roof of which forms the top of lithostratigraphic Unit III, is found throughout the Telkwa North resource areas where it is usually a consistent, continuous seam. It does, however, exhibit some regional thinning within the northeast segment of Pit #8.

Host rock lithologies between seams are dominated by siltstones and fine grained sandstones, with lesser amounts of mudstone and carbonaceous mudstone. Four notable sandstone units identified within or proximal to the Unit III stratigraphy are described as follows:

- The #2 Sandstone, which underlies the #2 and #2 Lower seams represents the thickest, most consistent and predictable sandstone unit of the four. Forming the top of lithostratigraphic Unit II, it is a massive sandstone in excess of 10 meters in thickness which has been observed to commonly contain pelecypod shells or shell fragment horizons within it. The sandstone unit is most strongly developed on the north side of the Telkwa River.

- The #3 Sandstone, stratigraphically located in Unit III between Seams #3 Upper and #4, is present throughout all of the resource areas but remains thickest and best developed within the Pit #3 area south of the Telkwa River. The sandstone unit thins considerably in Pit #7 and continues to thin, becoming finer-grained westward into Pit #8 and Northwest Area.

- The #7 Sandstone is situated stratigraphically within Unit III between Seam #7 and #8 and is laterally continuous throughout the resource areas on both sides of the Telkwa River, although is most strongly developed in the Pit #3 area. The unit commonly is interbedded with finer-grained lithologies, most apparent on the north side of the Telkwa River.

- The #11 Sandstone, or Unit IV Sandstone as it is referred to, represents the base of lithostratigraphic Unit IV and usually directly overlies Seam #11. This marine sandstone is regionally correlatable across the resource areas, displaying only minor variability. The unit does, however, tend to be slightly thinner in Pit #3 than within Pit #8 and Northwest Area.

3.5 RESOURCE AREAS; TELKWA NORTH

No additional work has been performed on the Telkwa North licenses since 1994. As such, the latest model update for the Pit #7 and #8 resource areas was completed in 1993 and 1994 respectively utilizing the Lynx Mine Modeling System. The resultant models are considered to be an accurate representation of the geological information obtained to date. The Northwest Area and Whalen Block have not been computer modeled to date, as additional drilling is considered necessary to accurately determine their geometries. The reader is referred to the 1993/94 Assessment report for additional detail on the geology of the Pit #7, Pit #8, Whalen and Northwest resource areas.

3.5.1 Pit #7 Resource Area

To date 19 drill-holes have intersected the Unit III coal measures (Seams #2 - 11) within the Pit #7 area (Enclosure 10). The drill-hole spacing for the area is currently approximately 125 meters. Enclosure 11 presents a summary of all seam intersections and average seam thicknesses encountered within the Pit #7 resource area to date. Individual drill-hole details and seam intersection data is provided within Enclosure 12.

The coal measures trend in a north-south direction and dip east to northeastward until they terminate against a northeast-southwest trending near vertical fault. This normal fault exhibits considerable displacement (approximately 150 meters) juxtaposing thin coal seams possibly of the #1 seams against the Unit III coal seams found in Pit #7. The coal measures also abruptly terminate to the north where Skeena sediments have been intruded by a large Tertiary granodiorite plug. The intrusive truncates the sediments at nearly 90 degrees to bedding and extends beyond Pit #7,

further disrupting the coal measures of Pit #8 and Northwest Area. Small-scale faulting has been identified at close proximities to the intrusive contact in other areas and is suspected in Pit #7 as well. The coal seams subcrop to the west and south, as illustrated on cross-sections 7A and 7C (Enclosure 13). Cross-section locations are referenced on the Telkwa North Geology Map, Enclosure 10.

3.5.2 Pit #8 Resource Area

Current exploration for the Pit #8 resource area is such that 55 drill-holes intersect the coal measures of the #2 to #11 seam package of Unit III, providing a drill-hole spacing of approximately 150 meters or less. Drill-hole data has identified that the area consists of two main parallel-trending fault blocks which present a repetition of the Unit III coal-bearing sequence (Enclosure 10). Displacement on the normal fault separating the two blocks ranges from 40 meters, near its southeastern end, to 80 meters at its northwestern limit, terminated by the Tertiary intrusive body. Further normal faulting, identified within the southeast portion of Pit #8, trend approximately perpendicular to the regional strike of the area and have displacements ranging from 20 to 80 meters. They are known to break and juxtapose the #2 to #11 coal seam package into a series of smaller fault blocks. Several smaller-scale displacement faults have also been identified, normally occurring at close proximities to the intrusive body.

The coal seams subcrop to the southwest and are constrained on the northeast by the granodiorite intrusive. An area of intense faulting and the absence of coal-bearing sediments terminates the Pit #8 resource area to the northwest. Although displaced by normal faulting the coal trend continues to the southeast, and may continue as far south as the Telkwa

River, where it is presumed fault terminated. Indications are that the coals historically exploited by the Aveling Mine are extensions of the same seam package, suggesting that additional normal faulting may occur beyond the current limits of drill-hole control. Additional exploration is required to further determine the coal structure in proximity to the Telkwa River.

Bedding orientations throughout the resource area are generally to the northeast as indicated by area cross-sections 8B, 8D, 8F, 8H and 8J (Enclosure 16). Cross-section locations are referenced on the Telkwa North Geology Map, Enclosure 10. Seam intersection data has been summarized within Enclosure 14 while specific drill-hole details and coal quality information are found within Enclosure 15.

3.5.3 Whalen Block Resource Area

To date within the Whalen Block, 24 exploration drill-holes have been completed. The coals found there include representations from both the Unit I and Unit III stratigraphic coal zones. The area is, however, structurally complex and requires additional exploration to fully evaluate the seam geometries. The Telkwa North Geology Map, Enclosure 10, illustrates the approximate subcrop position of the #1 Seam based upon findings to date. Specific drill-hole details for the Whalen Block are provided within Enclosure 17.

3.5.4 Northwest Resource Area

The most recent geological work conducted on the Northwest area coal licenses was completed during the 1992 exploration season. To date, 15

drill-holes have been completed in the area, targeted at the coal measures of the Unit III stratigraphy. The Northwest Area geology is included on the Telkwa North Geology Map, Enclosure 10, while a drill-hole summary is provided within Enclosure 18.

3.6 RESOURCE AREAS; TELKWA SOUTH

All exploration activities undertaken between 1995 and 1998 on the Telkwa property were completed on the Telkwa South coal licenses, with particular emphasis on the Tenas and Goathorn resource areas, and proposed infrastructure and facility locations. Some exploration drilling was dedicated to Cabinet area, while reconnaissance drilling in 1996 near Helps and Hubert Creeks has led to the identification of an additional resource area, known locally as Helps area.

3.6.1 Goathorn East (Pit #3) Resource Area

Between 1979 and 1984 the Goathorn East resource area had been extensively explored resulting in considerable information accumulated on the area's Unit III coal measure stratigraphy. Occasional exploration took place periodically thereafter until 1995 when considerable drilling was conducted, further developing the field's limits and providing additional insight on the numerous faults that transect the area. Between 1995 and 1998, 123 drill-holes were completed in the Pit #3 area and an additional 19 were completed further north within the proposed tailings pond and plantsite areas. To date approximately 300 drill-holes, 8.4 kilometers of surface geophysics, and the removal of a 219 tonne bulk sample have been completed on the Goathorn East coal licenses.

The Goathorn East area is typically characterized by an east-dipping stratigraphy, repeatedly broken by a series of north/south trending normal faults. Regional dips range from 10 to 35 degrees, averaging 20 degrees, while normal fault displacements typically range up to 20 meters. Large displacement thrust faults are also known to disrupt the local stratigraphy, most commonly occurring along the southeast edge of the deposit, trending in a north/south direction. Typical geological cross-sections, referenced on the Goathorn Geology Map, Enclosure 19, are presented in Enclosure 20.

On occasion the Goathorn East thrust faulting has resulted in horst structural features which have transported Unit I coal measures within proximity of the Unit III stratigraphy. The resultant uplifted wedge is correlatable to the Unit I coal measures found in Tenas and Cabinet Creeks.

The dominant seam stratigraphy in the area, the #2 - #11 seam package, subcrops along the west side of the deposit, roughly paralleling the Goathorn Creek valley. Most of the seams deteriorate southeasterly, becoming thinner and poorly developed suggesting that locally, during deposition, a restricted nearshore marine environment persisted to the east (Palsgrove, 1990).

The most recent geological model for Goathorn East resource area was generated late in 1997 using Medsystem mine modeling software upon which detailed engineering work was initiated and resources calculated. After completion of 1998 exploration activities the model was partially updated to reflect the major changes resultant to the new exploration. The area affected by the model update was the north part of the resource area where most of the 1998 drilling was conducted.

3.6.2 Goathorn West (Pit # 6) Resource Area

The coal measures identified on the west side of Goathorn Creek, and illustrated on the Goathorn Geology Map, Enclosure 19, represent the Goathorn West (Pit #6) resource area. Both the Unit I and Unit III coals are represented within identified fault blocks, separated by normal faults with displacements of up to 120 meters. Some of the Goathorn West resource area was mined during the 1940s and early 1950s by the underground mining activities of Bulkley Valley Collieries, #2 Mine. Underground shafts were collared in outcrops found along the banks of the Four and Goathorn Creeks, and driven northwest following seam bedding planes (particularly the #2 seam).

Relative to other resource areas identified on Telkwa Property, the Goathorn West resource area is small in comparison and to date, 30 drill-holes have been completed in the area. These include 18 core-holes, one of which was continuously cored and rock samples recovered for ARD studies. A drill-hole spacing of 150 to 200 meters is currently established in the area.

Like the Goathorn East area, the local stratigraphy of Goathorn West is disrupted by numerous faults, resulting in a series of structural blocks tilted at different orientations. Bedding orientations throughout the area are random, ranging from less than 5 degrees to greater than 45 degrees. Enclosure 21 illustrates typical cross-sections through the area. The cross-sections, as well as underground mine workings, fault traces and all drill-hole locations, are referenced on the Goathorn Geology Map, Enclosure 19.

In 1997 the Goathorn West area was modeled as part of the complete

Goathorn Medsystem geological model, upon which detailed engineering work was completed and resources calculated. All geological information collected to yearend 1997 was utilized in the construction of the model.

3.6.3 Tenas Creek Resource Area

The coal measures of Tenas Creek Resource area (Enclosure 22) are representative of the #1 Coal Zone of Unit I and are presumed correlatable, although fault displaced, to seams found in the vicinity of Cabinet Creek. To date a drill-hole spacing of less than 150 meters has been established at Tenas Creek and 207 drill-holes have intersected the seam sequence. Of the 207 drill-holes 44 were cored, including 5 large-diameter cores, yielding seam quality information. Twenty of the core-holes were continuously cored throughout the entire length of the hole and their host rock analyzed for acid base accounting purposes. Exploration between 1995 and 1998 has established field limits for the deposit and provided a detailed understanding of the seam quality and host rock characteristics. A summary of drill-holes and seam intersection data in the Tenas Creek area is provided within Enclosure 23. Specific drill-hole details and coal quality are presented within Enclosure 24.

The Tenas Creek resource area was drilled extensively between 1995 and 1998, and was initially modeled via Mincom Mine Modeling software in 1995. The geological model was subsequently updated early in 1997, and is currently pending a further update to include most recent drilling. Exploration conducted after the last model update has not altered the geological interpretation for the area, but has provided additional geological control.

Compressional forces directed from the southwest have shaped the Tenas resource area into a closed synclinal structure that today lies as an erosional remnant of Units I and II stratigraphy. The local strike of the stratigraphy is approximately 145 degrees, with the syncline axis trending roughly parallel to regional strike. The syncline axis plunges gently from both directions into the interior of the field, forming a basin bound on all sides by subcrop. Bedding dips on the west limb of the syncline range from 9 to 22 degrees east/northeast, gradually increasing towards the southern limits of control in the resource area. Dips along the steeper, east limb range up to 50 degrees to the southwest. Tenas Creek coal-bearing sediments lie unconformably over Jurassic Hazelton volcanic rocks.

Unlike many of the Telkwa resource areas the Tenas area is not affected by major faulting. Small-scale normal faulting is identified along the west side of the field, where a portion of the coal-bearing stratigraphy has been repeated. The presence of small-scale faulting is also suspected within the Tenas Syncline axis.

Except for areas affected by nondeposition or erosion, the Unit I coal measures are laterally continuous throughout their range. Erosional channeling is interpreted in some areas where complete and partial seams have been affected, although additional exploration is required to fully evaluate the paleochannel mechanisms.

At the field's northern limits poorly consolidated Quaternary sediments, presumably associated with the glacial paleochannel of the Tenas Creek drainage, overlie the local coal measures stratigraphy. These sediments become increasingly thicker in a northerly direction. Within the confines of the paleochannel, the thickly interbedded sand, silt and gravel blanket is in excess of 85 meters.

The typical stratigraphic column for the Tenas Creek area is included within Enclosure 9. Although several seams occur within the Unit I stratigraphy of Tenas Creek most are thin and not of economic significance. Three seams however, currently identified as c-seam, 1-Upper seam, and 1-seam, are consistent in nature and form the mineable component of the Tenas Creek resource. Cross-sections through the area, as referenced on the area geology map (Enclosure 22), are included as Enclosure 25. Seam thickness maps for each of the main mineable seams are presented in Enclosure 26.

3.6.4 Cabinet Creek Resource Area

The Unit I coal trend identified in the Tenas syncline continues, although fault displaced, southeastward into the Cabinet area. Drilling and field mapping completed to date on the Cabinet resource area indicate that coal occurrences in the area are sporadic and discontinuous. To date, field mapping and 20 drill-holes have been completed within area boundaries, 3 of which were cored. All but 4 of the drill-holes, including the core-holes, were completed during the 1995 and 1996 exploration seasons. Much of the area, particularly the southern half of the resource area, is capped by thick accumulations of Quaternary gravels. Where coal measures have been intersected the stratigraphy has been subjected to considerable structural stresses, as faulting and variability in structural orientation is apparent.

3.6.5 Helps Resource Area

The Helps area, identified by reconnaissance exploration drilling in 1996, has been interpreted to hold coal measures of the Unit III stratigraphic sequence. To date a drill-hole spacing of 650 to 1200 meters is established for the area. A total of 5 drill-holes, none of which were cored, intersect the sequence. Drilling has indicating that the area likely contains some faulting, as bedding orientations are variable between drill-holes. Enclosure 27, which details the Helps resource area and Mine Access Corridor, illustrates the area geology and all drill-holes completed in the area to date.

4.0 COAL QUALITY

Coal in the Telkwa Coalfield varies from High Volatile A bituminous to semi-anthracite by the ASTM classification of coal rank. The vast majority of the area coals, however, are a High Volatile A bituminous product with RoMax vitrinite values generally ranging from 0.80 to 1.00 percent. Within the coal measures of the Skeena Group sediments, observations are that, coal rank generally tends to decrease slightly for coal units situated higher in the stratigraphic column. As such, ranks of the coals situated within Unit I are typically slightly higher than those found within Unit III. Localized occurrences of medium-volatile and semi-anthracite coals are thought to have resulted from either post-Cretaceous heat sources, deeper burial and subsequent uplift of some coal-bearing units, or from localized higher heat flux from the pre-Cretaceous basement (Ryan, B.D., 1992). Increases in coal rank have been observed in coals situated at close proximities to the Tertiary intrusive on the northern resource areas as well as some coals within the Cabinet Creek area.

The evaluation of coal quality for the 1995 to 1998 exploration programs is based upon the analytical results of core obtained from drill-holes, and from bulk samples collected from the Tenas area in 1996 and 1998. The primary purpose of the coring programs was to obtain sufficient samples of significant coal seams for reliable determinations of the raw and clean quality characteristics of the Telkwa Coalfield. In 1996 an 80 tonne bulk sample recovered from the Tenas field provided sufficient size and quantity of delivered coal to simulate raw feed operations and perform the testing necessary to conduct a complete processing plant design. The large-diameter coring program completed in 1998 provided small-scale bulk samples from 5 additional Tenas locations such that comparisons could be drawn between different locations, and also from between the large-diameter and conventional cores.

Typically, specific lab analyses on core samples were performed by Loring Laboratories Ltd. of Calgary, Alberta. Most samples collected were representative of selected coal units, although seam roof, floor and parting lithologies were also collected regularly and

analyzed. Bulk sample analyses were typically completed by Birtley Labs, also of Calgary.

4.1 QUALITY CHARACTERISTICS

Coal quality parameters have been determined from core samples recovered since 1979 from each of the resource areas identified thus far in the Telkwa Coalfield. The results presented in this report represent a compilation of all analytical results thus far accumulated within the resource areas identified on the Telkwa North and Telkwa South coal licenses. No seam quality information is available for the Helps area since no coring has been done to date.

Analytical results from all ply samples recovered between 1995 and 1998 are presented for each year within Enclosure 28. In turn, the analytical results for seam composites are compiled for the Tenas Creek, Goathorn East, Pit #7, Pit #8 and Northwest resource areas within Enclosure 29. Table 4.1 summarizes the average coal quality for each of the main resource areas found within the Telkwa coalfield.

While the majority of Telkwa coals are relatively consistent with respect to raw calorific value, volatile matter and fixed carbon values, variations in raw ash and sulphur values occur between seams. Sulphur content variations between some seams is attributed to periodic infiltrations of marine water into the developing peat swamp, while inundations are thought to have terminated development of some of the coal seams.

Table 4.1

Telkwa Evaluation

to yearend, **1997**

Clean Coal Quality Summary; Core Washabilities

Reported on a **Dry Basis**

Resource Area:	Seams	Seam Quality Characteristics						
		Ash (%)	Sulphur (%)	Specific Gravity (A.D.)	Calorific Value (kcal/kg)	Volatile Matter (%)	Fixed Carbon (%)	F.S.I. (Range; Avg)
Goathorn East (Pit #3):	**2 - 10**	10.20	1.04	1.37	7393	29.43	60.38	1.7
Goathorn West (Pit #6):	**2 - 10**	10.34	1.24	1.38	7220	27.12	62.54	—
Bowser East (Pit #7):	**2 - 6U**	9.22	0.90	1.36	7567	28.96	61.94	0.5 - 6.5; 2.5
Bowser West (Pit #8):	**2 - 11**	12.61	0.99	1.40	7273	27.32	59.72	0.5 - 7.5; 2.1
Tenas:	**c, 1U, 1**	11.04	1.02	1.38	7588	25.38	65.56	1.0 - 4.0; 2.0

5.0 COAL RESOURCES

Coal volumes prepared for this report have been classified according to the Standardized Coal Resource/Reserve Reporting System for Canada compiled by the Geological Survey of Canada (1989). Due to the nature of the Telkwa deposit, the resource areas identified thus far within the coalfield have been classified as geologically *complex*.

Resources are coal quantities that because of a favorable combination of thickness, depth, quality and location are considered to be of immediate interest for possible exploitation. *Reserves* are coal quantities that are anticipated to be mineable and have undergone a feasibility study using current economic conditions and existing technology. In this report the reserve volumes listed are not included in the resource figures.

Quantities of in-situ coal listed in this report have been determined from information of drill-hole seam intersections gathered between 1979 and 1998. Specific areas have been identified, each of representing an independent deposit within the limits of the Telkwa Coalfield. Each possesses unique characteristics with respect to deposit geometries and all target the coal measures of either Unit I or Unit III.

Within the immediate proximity of the proposed mining areas of the Telkwa property there is a calculated 30,593,000 *proven* clean metric tonnes of mineable reserve plus an additional 3,066,000 *probable* clean metric tonnes. The overall strip ratio is 8.36:1 bcm/clean tonne.

There are additional recoverable coal resources in the Telkwa project area which to-date have not been economically assessed, but have sufficient data to reasonably interpret the extent and structure of the coal seams. Within the assurance-of-existence classification of *measured* there is a calculated 750,000 in-situ raw metric tonnes (RMT), plus an additional 8,532,000 RMT of *indicated* and 31,462,000 RMT of *inferred* coal.

Outside these reserve/resource limits but still within the Telkwa property boundary limits exist further coal resources, however due to lack of detailed analysis a volume estimate has not been reported at this time.

5.1 RESERVE / RESOURCE CRITERIA

Coal volume estimates have been prepared based upon drill-hole seam intercept information established from geophysical log signatures. Areas for which geological computer models were generated include Goathorn, both Bowser blocks and Tenas. As such, total in-situ *reserves* were determined for these areas via computer modeling software. For the Northwest, Cabinet, Whalen and Helps areas, *resource* estimates are based upon simpler, more direct measurement methods. In-situ geological resource and reserve figures for the Telkwa property are tabulated in Table 5.1.

The criteria utilized to conduct coal volume estimates varies between areas due to such factors as structural complexity, drill-hole density and seam stratigraphy. For both Bowser blocks and the Goathorn areas, criteria for seam selection is based primarily upon seam thickness. Generally seams which exhibit thicknesses of 0.50 meters or greater (1.0 meter or greater for Goathorn) were included in the*resource* calculations. Partings with thicknesses exceeding 0.30 meters (0.50 meter for Goathorn) were considered separable and were not included. Similarly for the Northwest, Whalen Block, Cabinet and Helps areas only those seams which were of technically recoverable thickness (0.50 meter or greater) were included. Depth of burial was not a considered factor.

Reserve volumes reported in the 1.2 million tonnes per year mine plan for the Tenas and Goathorn areas were calculated using a minimum cutoff thickness for economically recoverable coal of 0.5 meters, and a separable parting thickness of 0.5 meters or greater.

For the Cabinet, Whalen, Northwest and Helps areas resource calculations are based upon direct measurement methods. Average seam thickness values were calculated and subsequently the surface area that each seam occupied was measured. The resultant resource estimates are based upon the following formula:

$$R = A \times Th \times SG$$

Where: R = Coal Resource (tonnes).

A = Area occupied by a particular seam (m^2).

Th = average seam thickness for a particular resource area (m).

SG = the Specific Gravity of a particular seam ($g/cm^3 = t/m^3$).

Table 5.1

Telkwa Property: Surface Reserves

(REPORTED IN CLEAN METRIC TONNES)

Pit/Area	Proven Coal (000 tonnes)	Probable Coal (000 tonnes)	Possible Coal (000 tonnes)	Total Coal (000 tonnes)	Strip Ratio (BCM/CMT)
Tenas	16,667			16,667	8.57
Goathorn East (Pit #3)	6,476	2,159		8,635	8.14
Bowser East (Pit #7)	2,862			2,862	7.43
Bowser West (Pit #8 Extension)	4,588			4,588	8.69
Goathorn West Satellite Pits	0	907		907	8.01
Pit Totals:	30,593	3,066	0	33,660	8.36

Telkwa Reserves: **33,660 (000) clean tonnes**

Telkwa Property: Surface Resources

(REPORTED IN RAW METRIC TONNES)

Pit/Area	Measured Coal (000 tonnes)	Indicated Coal (000 tonnes)	Inferred Coal (000 tonnes)	Total Coal (000 tonnes)
Helps Pit			7,310	7,310
Whalen Block			8,634	8,634
Cabinet Creek			3,708	3,708
Northwest			11,060	11,060
Bowser West (Pit #8 Extension)		5,032		5,032
Goathorn East (Pit #3)	750	3,500	750	5,000
Pit Totals:	750	8,532	31,462	40,744

Telkwa Property Resource: **40,744 (000) insitu raw tonnes**

5.1.1 Goathorn East (Pit #3) Reserve

The Pit #3 resource area was computer modeled via Medsystem Mine Modeling software in 1997 by Manalta Coal Ltd. It was subsequently partially updated in 1998 to include some of the drilling completed during the 1998 exploration program. Based upon the 1997 geological model in-situ resource estimates are currently estimated at 5,000,000 raw tonnes. A coal reserve of 8,635,000 clean tonnes is included within the current mineplan, at a strip ratio of 8.14:1 bcm/clean tonne.

5.1.2 Goathorn West (Pit #6) Reserve

The Goathorn West area was modeled via Medsystem mine modeling software consecutively with the Goathorn East area in late 1997. Based upon the model the coal reserve identified for the area is 907,000 clean tonnes at a strip ratio of 8.01:1 bcm/clean tonne. No resource figures have been calculated.

5.1.3 Pit #7 Reserve

A computer model was generated for the Pit #7 resource area via the Lynx Mine Modeling System in 1993 by Manalta Coal Ltd.. An additional drill-hole, completed in 1994, did not alter the deposit significantly and, as such, did not immediately warrant a model update.

Only those seams that attained potentially mineable thickness were modeled, and thus ultimately considered within the reserve calculations of the Pit #7 resource block. Seams overlying the #6 coal package were not

considered as they were intersected only by one drill-hole and are not adequately represented within the field. The reserve currently included within the mineplan totals 2,862,000 clean tonnes at a strip ratio of 7.43:1 bcm/clean tonne. No resource figures are calculated.

5.1.4 Pit #8 Reserve

Like the Pit #7 area the Pit #8 resource area was modeled via the Lynx Mine Modeling System in 1993. The Pit #8 model, however, was further updated in 1994.

Pit #8 represents a more complex geological deposit than Pit #7, consisting of two main fault blocks and several smaller fault zones that exhibit minor displacement. In addition the Pit #8 resource area is considerably larger, within which the entire Unit III coal package is well represented.

The reserve estimates are inclusive of all modeled coal seams within the current limits of geological control. Seam extrapolations extend southeastward as far as the Telkwa River valley where they are believed to fault terminate. The total in-situ coal resource established to date for the complete Pit #8 resource area is 5,032,000 raw tonnes. A coal reserve of 4,588,000 clean tonnes is included in the current mineplan, at a strip ratio of 8.69:1 bcm/clean tonne.

5.1.5 Tenas Creek Reserve

The Tenas resource area was most recently modeled in 1997 via Mincom Mine Modeling software and is currently pending a further update to reflect most recent additional drilling in the area. Based upon the latest geological model the total in-situ coal reserve identified for Tenas Creek Area is 16,667,000 clean tonnes, at a strip ratio of 8.57:1 bcm/clean tonne. This is based upon the 3 potentially mineable seams found in the Tenas deposit, the c-seam, 1U-seam and 1-seam.

5.1.6 Whalen Reserve

The total in-situ coal resource for the current explored limits of the Whalen resource area has been estimated at 8,634,000 raw tonnes for all seams considered mineable. Additional work is necessary to further delineate field limits, deposit geometry and ultimately bring the coal reserve to a measured level.

5.1.7 Northwest Reserve

The Northwest area has not been computer modeled to date nor has its coal measures been included within any detailed mineplans. An in-situ coal resource for the Northwest area has been established at 11,060,000 raw tonnes.

5.1.8 Cabinet Creek Reserve

An in-situ coal resource of 3,708,000 raw tonnes has been established for the Cabinet Creek resource area. Additional work is required to fully evaluate the complexity of the deposit.

5.1.9 Helps Reserve

The Helps resource area has not been modeled to date nor is there a coal quality database established for the deposit. Based upon manual methods, an in-situ coal resource of 7,310,000 raw tonnes is established for the Helps area.

6.0 COSTS INCURRED

Details of costs incurred for work conducted between the 1995 to 1998 expbration programs is provided within the Cost Summary Report (Enclosure 30). The summary presented represents the total expenditures to date relating to the Telkwa Project exploration activities.

7.0 SUMMARY

The Skeena Group sediments of the Telkwa Coalfield are an erosional remnant of Lower Cretaceous sedimentary rock deposited along the southern flank of the Bowser Basin. Throughout the Lower Cretaceous sedimentation occurred during which time deposition was influenced by two regressive / transgressive episodes. As a result the stratigraphic sequence is divisible into four lithostratigraphic units, Units I through IV. The lithologies within Units I and III are representative of the regressive episodes and, in turn, the periods of significant peat development in the Telkwa area. The coals within Unit I, collectively referred to as Coal Zone 1 are separated from the Unit III coals by as much as 140 meters of predominantly marine sediment. Coal seams #2 through #11, represented in Unit III, collectively contribute 20.5 meters of coal to the Unit's 85.0 meter average thickness.

Since deposition the Skeena Group sedimentary package has been modified by faulting and minor folding resultant from continental stresses that persisted throughout much of the Upper Cretaceous and Tertiary Periods. In addition, during the Eocene Epoch, an igneous body intruded the Skeena sediments, further disrupting and faulting the sedimentary package. As a result, much of the area is characterized by high angle faulting. This breaks the area into a mosaic of structural blocks that have been rotated and tilted into a variety of orientations. Each of the resource areas identified to date are representations of such fault blocks.

Several resource prospects have been identified in the Telkwa area and since the early 1900s have been sporadically mined, exploiting the Unit I and Unit III coals. It was not until the late 1960s, however, that drilling as a means of identifying potential resource areas was utilized. Between 1979 and 1989 Shell Canada/Crowsnest Resources completed several exploration programs, completing 263 drill-holes and highlighting several resource areas, most of which were located on the south side of the Telkwa River.

The Telkwa Property coal licenses were held by Manalta Coal Limited from May 1992 until

November 1998, at which time Luscar Limited acquired the operations of Manalta Coal, including the land and license holdings of the Telkwa Property. Between 1995 and 1998 Manalta focused exploration activities on the Telkwa South resource areas. Coal samples were collected from all cored drill-holes for subsequent analysis as were rock samples from representative cores for ARD testing.

The vast majority of the Telkwa area coals explored to date are a High Volatile A bituminous product by ASTM classification of coal rank. Medium Volatile bituminous as well as occurrences of semi-Anthracite coal are also known to exist. While the majority of Telkwa coals are relatively consistent with respect to raw calorific value, volatile matter and fixed carbon values, variations in raw ash and sulphur values occur between seams. Sulphur content variations between some seams is attributed to periodic infiltrations of marine water into the developing peat swamp, while inundations are thought to have terminated development of some of the coal seams.

Coal volumes calculated for the main Telkwa resource areas by Manalta Coal Limited were completed using computer models constructed via the Lynx, Mincom and Medsystem Mine Modeling systems. For other resource areas manual methods for resource estimates were utilized. Estimated in-situ geological coal *reserves* for the main resource areas detailed in this report total 33.66 million clean tonnes. In-situ *resources* for resource areas identified thus far within the Telkwa Property limits are estimated at 40.74 million raw tonnes.

8.0 CONCLUSIONS

Significant reserves of High Volatile A bituminous coal have been identified within the Telkwa Coal Property limits currently held by Luscar Limited (formerly Manalta Coal Ltd.). While the primary value of Telkwa coal is as a thermal product, some of its properties allow it consideration as a low grade coking coal. The coal reserve identified thus far within the property licenses is represented by the coals associated with Unit I and Unit III, most of which has been identified within the Goathorn, Pit #7, Pit #8, Northwest Area and Tenas Creek resource areas.

The coal reserve identified to date is known to lie within individual fault blocks, or resource areas, each with independent field limits and deposit geometries. Results from the 1995 to 1998 exploration programs have aided in further definition of the geology of the Tenas and Goathorn resource areas, providing additional coal quality information and better understanding of deposit geometries. In 1996 another resource area, the Helps area, was identified although additional exploration in this area is required to evaluate its resource potential.

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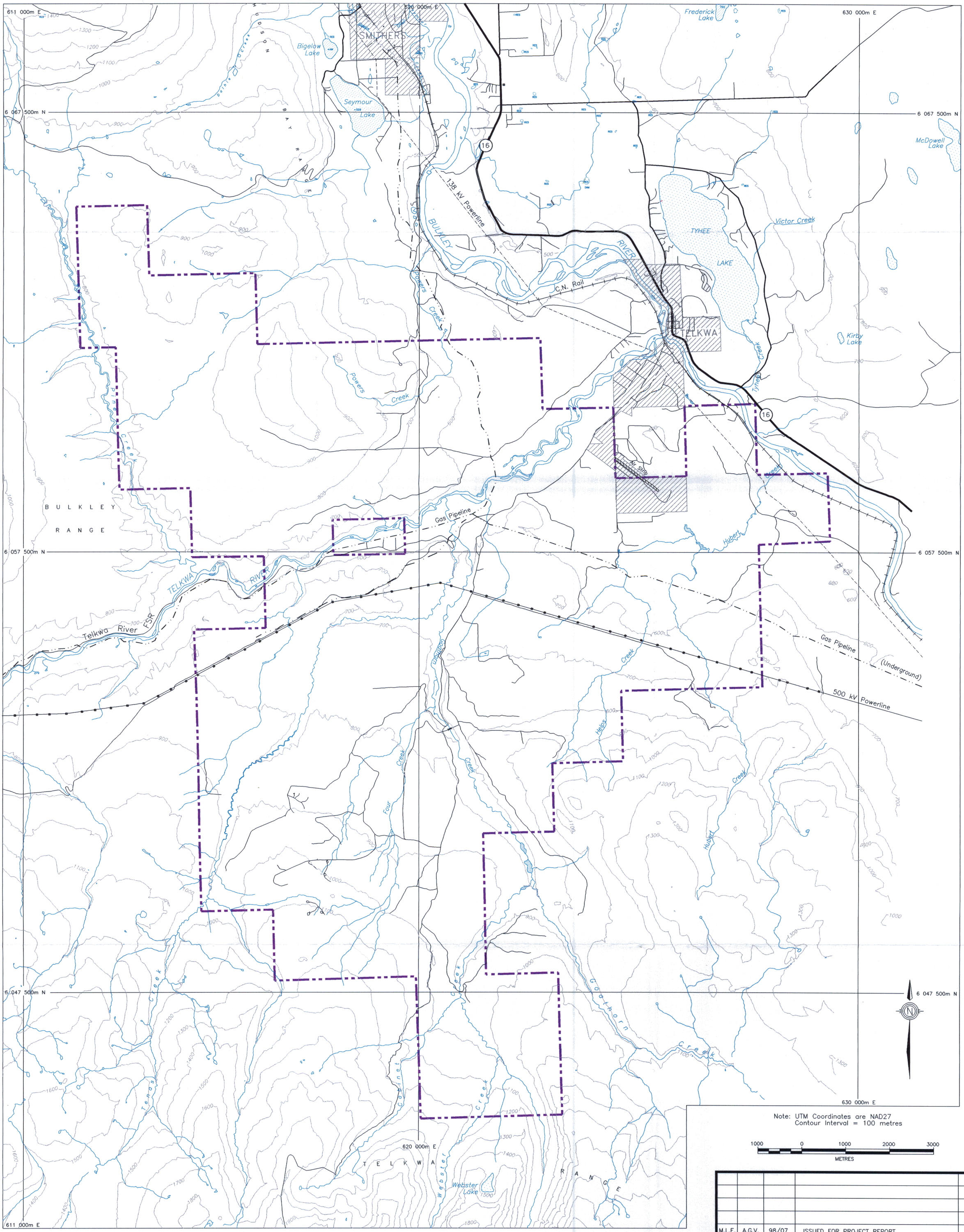

LEGEND:

- COAL LICENCE BOUNDARY
- HIGHWAY (16)
- PAVED ROAD
- POWERLINE
- GAS PIPELINE (UNDERGROUND)
- SECONDARY ROAD

By	Approv'd	Date	Revision Description	No.
M.L.E.	A.G.V.	98/07	ISSUED FOR PROJECT REPORT	1

manalta coal ltd.

TELKWA COAL PROJECT

LOCATION MAP

Dwn. by:	M.L.E.	Date:	APRIL 1998
Chk'd by:	A.G.V.	File no:	42074 A

611 000m E

620 000m E

630 000m E

6 067 500m N

6 057 500m N

6 047 500m N

SMITHERS

TELKWA

Bigelow Lake

Seymour Lake

Frederick Lake

McDowell Lake

Victor Creek

TYHEE LAKE

Kirby Lake

Webster Lake

Bulkley River

Telkwa River

Pine Creek

Powers Creek

Goathorn Creek

Hubert Creek

Four Creek

Tyhee Creek

Helps Creek

Cabin Creek

Tenas Creek

C.L. 327829

C.L. 327828

C.L. 327833

C.L. 327956

C.L. 327832

C.L. 327954

C.L. 334060

C.L. 334059

C.L. 327830

C.L. 328323

C.L. 327831

C.L. 327953

C.L. 327952

C.L. 327951

C.L. 327949

C.L. 327948

C.L. 327968

C.L. 362522

C.L. 366754

C.L. 327834

C.L. 327946

C.L. 327967

C.L. 327966

C.L. 362527

C.L. 362523

C.L. 327842

C.L. 327841

C.L. 327945

C.L. 327964

C.L. 327965

C.L. 362528

C.L. 327843

C.L. 327844

C.L. 353441

C.L. 327836

C.L. 327944

C.L. 327936

C.L. 327856

C.L. 327963

C.L. 362526

C.L. 362524

C.L. 327866

C.L. 328672

C.L. 327838

C.L. 362525

C.L. 353440

C.L. 327865

C.L. 327837

C.L. 327839

C.L. 327971

C.L. 327840

C.L. 327845

C.L. 327846

C.L. 327972

C.L. 327864

C.L. 327863

C.L. 327862

C.L. 327861

C.L. 327955

C.L. 327860

LUSCAR FREEHOLD

SEC 2

SEC 3

SEC 4

SEC 5

SEC 6

SEC 24

SEC 25

SEC 26

SEC 30

SEC 31

SEC 32

SEC 33

SEC 34

SEC 35

SEC 19

Tp.6 SEC 7

L256

L257

L4263

L4262

L1142

L1143

L1144

L1145

L1146

L241 L242 L243 L244 L247 L250

L236 L235 L238 L237 L234 L249

L231 L232 L229 L230 L233 L245

L226 L227 L228 L221 L224 L225 L246

L222 L223 L248 L401 L400 L402 L403 L404 L405

L398 L399 L397

L389 L388 L387 L386 L385

L391 L390 L392 L393 L394 L395 L396

L416 L417 L418 L412 L413 L414

L410 L411 L409 L408 L407 L406

L379 L380 L381 L382 L383 L384

L624 L625 L626 L627 L628 L629 L630 L631

L1 5517

LEGEND:

COAL LICENCE BOUNDARY

C.L. 327963 COAL LICENCE NO.

L407 SURFACE RIGHTS LOT NUMBER

Note: UTM Coordinates are NAD27

1000 0 1000 2000 3000

METRES

M.L.E.	A.G.V.	98/07	ISSUED FOR PROJECT REPORT	1
By	Approv'd	Date	Revision Description	No.

manalta coal ltd.

TELKWA COAL PROJECT

COAL LICENSE MAP

Dwn. by:	M.L.E.	Date:	APRIL 1998
Chk'd by:	A.G.V.	File no:	6564 C

611 000m E

620 000m E

630 000m E

6 067 500m N

6 047 500m N

Hudson Bay Mtn. Road

Ski Hill Road

Bigelow Lake

Seymour Lake

Babine Lake Road

Telkwa High Rd

Frederick Lake

McDowell Lake

16

138 kV Powerline

Victor Creek

TYHEE LAKE

Kirby Lake

Woodmere Road

Chapman Road

Lawson Road

Coalmine Road

Skillhorn Road

Mr. Strip

Gas Pipeline

500 kV Powerline

C.N. Rail

Tatlow Road

1800 Road

2000 Road

Telkwa River FSR

Pine Creek

Powers Creek

Four Creek

Goathorn Creek

Tenas Creek

Cabinet Creek

Webster Lake

Hubert Creek

Helps Creek

Tyhee Creek

Kirby Creek

BULKLEY RIVER

SMITHERS

TELKWA

NORTHWEST AREA

BOWSER AREA

MCL WHALEN BLOCK

GOATHORN AREA

HELPS AREA

CABINET AREA

TENAS AREA

SHOP AND WASHPLANT

TAILINGS POND

LOAD OUT

GOATHORN EAST BULK SAMPLE LOCATION

TENAS RESOURCE AREA BULK SAMPLE LOCATION

MCL FREEHOLD

Note: UTM Coordinates are NAD27

1000 0 1000 2000 3000

METRES

LEGEND:

- COAL LICENCE BOUNDARY
- PROJECT BOUNDARY
- PROJECT R.O.W.
- HIGHWAY (16)
- PAVED ROAD
- SECONDARY ROAD
- POWERLINE
- GAS PIPELINE
- EXPLORATION DRILL HOLE
- L407 SURFACE RIGHTS LOT NUMBER
- C.L. 327963 COAL LICENCE NO.
- OLD MINE WORKINGS
- TERTIARY INTRUSIVE
- HAZELTON VOLCANICS
- NORMAL FAULT
- THRUST FAULT
- PLUNGING SYNCLINE AXIS
- SUBCROP
- RESOURCE AREA – REGION

By	Approv'd	Date	Revision Description	No.
M.L.E.	A.L.	08/98	Issued for Project Report	1

manalta coal ltd.

TELKWA COAL PROJECT

REGIONAL GEOLOGY MAP

Dwn. by:	M.L.E.	Date:	APRIL 1998
Chk'd by:	A.G.V.	File no:	6564 E