AVALON VENTURES LTD.
VSE-AVL

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August 1, 2007

Office of International Corporate Finance
US Securities & Exchange Commission
Mail Stop 3628
100 F Street, N.E.
Washington, D.C 20549.
USA

SUPPL

Attn: Mr.Michael Coco

Re: Avalon Ventures Ltd. (The "Company")-File No 82-4427

Dear Mr. Coco:

Please be advised the attached disclosure documents have been filed by the company in Canada and are being sent to you for filing with the US Securities & Exchange Commission.

1. Unaudited Interim Financial statements and related MD& A for the nine month period ending May 31, 2007 along with officers Certificates.
2. Technical report entitled *Preliminary Economic Assessment on Thor Lake Rare Metals project*, NWT by Wardrop Engineering Inc, June 15,2007
3. Author's consent letters, Wardrop Engineering inc, Thor Lake technical report, June 18, 2007
4. SEDI (System for Electronic Disclosure by Insiders) Report of Insider Transactions Detailed July 31, 2007 for the period of April 26, 2007-July 31, 2007.
5. News releases dated; June 18, June 21, and July 16, 2007
6. Material Change report dated June 25, 2007

There have been a number of share issuances pursuant to exercise of shares purchase options and warrants, bringing the current shares outstanding to 51,930,123

I trust the enclosed documentation is satisfactory but should you have any concerns do not hesitate to contact me.

Regards,
AVALON VENTURES LTD.

Donald S. Bubar,
President

Cc: J. Fraser

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No. 82-4427

Financial Statements

Avalon Ventures Ltd.

For the Nine Months Ended May 31, 2007

Unaudited - See Notice to Reader

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NOTICE TO READER

The accompanying unaudited interim financial statements have been prepared by the Company's management and the Company's independent auditors have not performed a review of these financial statements.

Avalon Ventures Ltd.

Balance Sheets
As at May 31, 2007 and August 31, 2006
Unaudited - See Notice to Reader

	May 31, 2007	August 31, 2006
Assets		
Current Assets		
Cash and cash equivalents	$ 2,791,937	$ 2,023,139
Receivables and prepaid expenses	114,026	81,185
	2,905,963	2,104,324
Investments Available for Sale	12,143	22,143
Resource Properties (note 2)	6,105,161	4,765,999
Property, Plant and Equipment	67,015	38,467
	$ 9,090,282	$ 6,930,933
Liabilities		
Current Liabilities		
Accounts payable	$ 552,635	$ 203,275
Shareholders' Equity		
Share Capital (note 3)	25,683,485	23,517,522
Contributed Surplus (note 4)	844,680	742,970
Deficit	(17,990,518)	(17,532,834)
	8,537,647	6,727,658
	$ 9,090,282	$ 6,930,933

Approved on behalf of the Board

"Donald S. Bubar", Director

"Brian MacEachen", Director

Avalon Ventures Ltd.

Statements of Operations and Deficit
For the Periods Ended May 31
Unaudited - See Notice to Reader

	Nine Months Ended		Three Months Ended	
	May 31, 2007	May 31, 2006	May 31, 2007	May 31, 2006
Revenue				
Interest income	$ 71,380	$ 32,897	$ 28,502	$ 23,512
Foreign exchange	-	33,702	-	-
	71,380	66,599	28,502	23,512
Expenses				
Amortization	12,595	1,631	6,380	764
Consulting fees	15,665	130,184	2,925	42,900
Directors' fees and expenses	10,485	7,500	2,500	2,500
Insurance	31,387	-	10,462	-
Interest and financing costs	46,991	1,002	42,368	338
Office and general	13,894	12,762	7,990	5,231
Professional fees	53,104	65,548	14,034	26,561
Public and investor relations	183,078	111,249	62,118	40,689
Rent and utilities	40,426	11,593	19,962	5,640
Salaries and benefits	211,223	121,507	81,560	76,163
Shareholders' information	38,938	27,669	497	4,276
Stock based compensation	320,347	380,921	60,162	233,506
Transfer and filing fees	28,410	41,194	3,844	6,866
Travel	46,369	22,777	17,554	13,338
	1,052,912	935,537	332,356	458,772
Loss Before the Undernoted Items	(981,532)	(868,938)	(303,854)	(435,260)
Write down of Resource Properties	-	(15,574)	-	(15,574)
Gain on Sale of Investments	35,598	-	-	-
Loss before Income Taxes	(945,934)	(884,512)	(303,854)	(450,834)
Recovery of Future Income Taxes	488,250	-	488,250	-
Net Income (Loss) for the Period	(457,684)	(884,512)	184,396	(450,834)
Deficit - Beginning of Period	(17,532,834)	(16,245,253)	(18,174,914)	(16,678,931)
Deficit - End of Period	$ (17,990,518)	$ (17,129,765)	$ (17,990,518)	$ (17,129,765)
Loss per Share, basic and fully diluted	$ (0.01)	$ (0.02)	$ -	$ (0.01)
Weighted Average Number of Common Shares Outstanding, basic and fully diluted	49,987,237	42,986,184	51,517,786	47,198,794

Avalon Ventures Ltd.

Statements of Comprehensive Income (Loss)
For the Periods Ended May 31
Unaudited - See Notice to Reader

	Nine Months Ended		Three Months Ended	
	May 31, 2007	May 31, 2006	May 31, 2007	May 31, 2006
Net Income (Loss) for the period	$ (457,684)	$ (884,512)	$ 184,396	$ (450,834)
Other Comprehensive Income	-	-	-	-
Comprehensive Income (Loss) for the period	$ (457,684)	$ (884,512)	$ 184,396	$ (450,834)

Avalon Ventures Ltd.

Cash Flow Statements
For the Periods Ended May 31
Unaudited - See Notice to Reader

	Nine Months Ended		Three Months Ended	
	May 31, 2007	May 31, 2006	May 31, 2007	May 31, 2006
Cash Flows from Operating Activities				
Cash paid to suppliers and employees	$ (650,910)	$ (526,689)	$ (286,513)	$ (186,414)
Interest received	71,380	32,897	28,502	23,512
Interest paid	-	(3,440)	-	-
	(579,530)	(497,232)	(258,011)	(162,902)
Cash Flows from Financing Activities				
Share capital	2,204,726	2,685,100	135,250	81,250
Warrants	230,850	476,000	-	-
	2,435,576	3,161,100	135,250	81,250
Cash Flows from Investing Activities				
Resource property expenditures	(1,091,703)	(486,681)	(541,308)	114,693
Proceeds from sale of resource properties	-	12,500	-	-
Proceeds from sale of investments	45,598	-	-	-
Purchase of property, plant, and equipment	(41,143)	(2,936)	(21,312)	(2,936)
	(1,087,248)	(477,117)	(562,620)	111,757
Change in cash and cash equivalents	768,798	2,186,751	(685,381)	30,105
Cash and cash equivalents - beginning of period	2,023,139	431,420	3,477,318	2,588,066
Cash and cash equivalents - end of period	$ 2,791,937	$ 2,618,171	$ 2,791,937	$ 2,618,171

1. Accounting Policies

These interim financial statements have been prepared by the Company in accordance with Canadian generally accepted accounting principles. These financial statements are based on accounting principles and practices consistent with those used in the preparation of the Company's annual financial statements except for the changes made to adopt to the new accounting standards as described in the following paragraph. Certain information and note disclosure normally included in financial statements prepared in accordance with generally accepted accounting principles have been condensed or omitted. These interim financial statements should be read together with the audited financial statements and the accompanying notes included in the Company's 2006 annual report.

On September 1, 2006 the Company adopted the CICA new Handbook Section 3855, "Financial Instruments - Recognition and Measurement", and Section 1530, "Comprehensive Income", on a prospective basis.

Section 3855 establishes standards for the recognition and measurement of all financial instruments, provides a characteristics-based definition of a derivative financial instrument, provides criteria to be used to determine when a financial instrument should be recognized, and provides criteria to be used when a financial instrument is to be extinguished.

Section 1530 establishes standards for reporting comprehensive income. These standards require that an enterprise present comprehensive income and its components in a separate financial statement that is displayed with the same prominence as other financial statements.

2. Resource Properties

	May 31, 2007						
	Separation Rapids Rare Metals	Warren Township Anorthosite Project	Thor Lake Rare Metals Project	U6 Savant Gold Project	Red Hill Copper-Zinc-Silver Project	East Kemptville Rare Metals Project	Total
Acquisition and holding costs	$ -	$ -	$ 15,422	$ -	$ -	$ 447	$ 15,869
Diamond drilling	-	-	2,304	166,601	5,458	-	174,363
Environmental studies/permitting	9,607	17,563	47,764	-	-	-	74,934
Feasibility/engineering studies	-	-	184,719	-	-	-	184,719
Geology	-	-	147,189	-	-	62,648	209,837
Geophysical	-	-	-	-	87,692	1,000	88,692
Metallurgical/market studies	15,331	573,351	2,066	-	-	-	590,748
Other	-	-	-	-	-	-	-
Current expenditures	24,938	590,914	399,464	166,601	93,150	64,095	1,339,162
Balance - August 31, 2006	3,431,049	114,276	678,803	48,173	486,857	6,841	4,765,999
Balance - May 31, 2007	$ 3,455,987	$ 705,190	$ 1,078,267	$ 214,774	$ 580,007	$ 70,936	$ 6,105,161

2. Resource Properties (continued)

	May 31, 2006						
	Separation Rapids Rare Metals	Warren Township Anorthosite Project	Thor Lake Rare Metals Project	U6 Savant Gold Project	Red Hill Copper-Zinc-Silver Project	Other	Total
Acquisition costs	$ -	$ -	$ -	$ -	$ -	$ 5,000	$ 5,000
Diamond drilling	-	-	-	-	191,244	-	191,244
Environmental studies/permitting	11,350	-	6,780	-	2,146	-	20,276
Feasibility/engineering studies	-	-	7,630	-	-	-	7,630
Geology	75	1,068	185,304	14,131	-	16,849	217,427
Geophysical	-	-	-	-	35,165	-	35,165
Metallurgical/market studies	105,689	5,095	5,024	-	-	-	115,808
Other	400	-	8,701	-	12,431	-	21,532
Current expenditures	117,514	6,163	213,439	14,131	240,986	21,849	614,082
Balance - August 31, 2005	3,232,125	106,058	341,698	34,042	88,951	16,713	3,819,587
Write down of resource properties	-	-	-	-	-	(15,574)[1]	(15,574)[1]
Balance - May 31, 2006	$ 3,349,639	$ 112,221	$ 555,137	$ 48,173	$ 329,937	$ 22,988	$ 4,418,095

[1] Resource properties written down during the period consist of the following:

Mussy Lake Nickel- Copper- PGE Project	$ 10,574
General exploration	5,000
	$ 15,574

3. Share Capital

a) Authorized:

25,000,000 preferred shares
Unlimited common shares

b) Issued and Outstanding:

	Number	Amount
Common Shares		
Balance - August 31, 2006	47,602,598	$ 22,980,488
Issued: for private placement	1,500,000	1,344,150
exercise of warrants	1,582,525	739,422
exercise of options	950,000	601,387
Finder's fee paid		(18,900)
Tax effect on issuance of flow-through shares		(488,250)
Balance - May 31, 2007	51,635,123	$ 25,158,297
Warrants		
Balance - August 31, 2006	2,664,650	$ 537,034
Issued: for private placement	750,000	230,850
Exercised	(1,582,525)	(242,696)
Cancelled/Expired	-	-
Balance - May 31, 2007	1,832,125	525,188
		$ 25,683,485

During the nine months ended May 31, 2007, the Company issued:

i) Issued 1,500,000 flow-through units for proceeds of $1,575,000. Each unit consists of one flow-through common share and one-half of one non-transferable share purchase warrant, each whole warrant entitles the holder to purchase one non-flow-through common share at a price of $1.35 per share until December 28, 2007.

In connection with this private placement, the Company paid a finder's fee of $18,900 in cash.

3. Share Capital (continued)

The estimated fair market value of the warrants totalled $230,850 and this amount has been allocated to the warrant component of the units. The fair values of these warrants were estimated at the issuance date based on the Black-Scholes pricing model using the following assumptions:

Expected dividend yield	Nil
Average risk-free interest rate	3.96%
Expected life	2.0 years
Expected volatility	77%

ii) 1,582,525 non-flow-through common shares pursuant to the exercise of an equivalent number of common share purchase warrants for cash proceeds of $496,726. The estimated fair value of these warrants at issuance was $242,696, and this amount had been added to the recorded value of the issued shares.

iii) 950,000 non-flow-through common shares pursuant to the exercise of an equivalent number of stock options for cash proceeds of $382,750. The historical estimated fair value of these options was $218,637, and this amount had been added to the recorded value of the issued shares.

c) Warrants

As at May 31, 2007 the following warrants were issued and outstanding:

i) 1,082,125 non-flow-through warrants entitling the holder to purchase one common share at $0.55 per share, expiring January 21, 2008; and

ii) 750,000 non-flow-through warrants entitling the holder to purchase one common share at $1.35 per share, expiring December 28, 2007.

During the nine months ended May 31, 2007, share purchase warrants were issued, exercised and expired/cancelled as follows:

	Number of Warrants	**Weighted Average Exercise Price**
Balance - August 31, 2006	2,664,650	$ 0.41
Issued	750,000	1.35
Exercised	(1,582,525)	0.32
Expired/Cancelled	-	-
Balance - May 31, 2007	1,832,125	$0.88

3. Share Capital (continued)

d) Stock Option Plan

The shareholders have approved a Stock Option Plan (the "Plan") that provides for the issue of up to 6,000,000 common shares of the Company to eligible employees, directors and service providers of the Company and its affiliates.

The Plan authorizes the granting of options to purchase shares of the Company's common stock at an option price equal to or greater than the average price of the shares for the ten trading days prior to the grant. The options generally partially vest with the recipient at the time of granting, and have a maximum term of 10 years.

During the nine months ended May 31, 2007, stock options were granted, exercised and expired/cancelled as follows:

	Number of Options	Weighted Average Exercise Price
Balance - August 31, 2006	3,075,000	$ 0.43
Granted	1,175,000	1.00
Exercised	(950,000)	0.39
Expired/Cancelled	(275,000)	0.82
Balance - May 31, 2007	3,025,000	$0.63

During the nine months ended May 31, 2007 the Company granted:

i) 300,000 fully vested stock options to an officer. Each option entitles the holder to purchase one share of the Company's common stock at a price of $0.80 per share until October 17, 2011. The estimated fair value of these options was $165,960 and this amount has been expensed as stock-based compensation.

ii) 100,000 stock options to a consultant. Each option entitles the holder to purchase one share of the Company's common stock at a price of $0.80 per share until October 17, 2008. These options will vest at the rate of 25% every three months following October 17, 2006. As at May 31, 2007, 62,500 options had been earned. The estimated fair value of these options totalled $45,323, and this amount has been expensed as stock-based compensation.

iii) Granted 400,000 stock options to an officer of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $0.98 per share until January 8, 2012. These options will vest at the rate of 100,000 per year, with the first 50,000 vesting six months from the date of January 8, 2007. As at May 31, 2007, 39,444 options had been earned. The estimated fair value of these options totalled $26,534, and this amount has been expensed as stock-based compensation.

3. Share Capital (continued)

iv) Granted 250,000 stock options to an officer of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $1.20 per share until January 30, 2012. These options will vest at the rate of 25% every twelve months following January 30, 2007. As at May 31, 2007, 20,833 options had been earned. The estimated fair value of these options totalled $20,002, and this amount has been expensed as stock-based compensation.

v) Granted 25,000 stock options to an employee of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $1.30 per share until February 26, 2012. These options were to vest at the rate of 25% every twelve months following February 26, 2007, and were cancelled during the quarter ended May 31, 2007.

vi) Granted an aggregate of 100,000 stock options to two consultants of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $1.30 per share until February 26, 2009. These options will vest at the rate of 25% every three months following February 26, 2007. As at May 31, 2007, 25,000 options had been earned. The estimated fair value of these options totalled $15,220, and this amount has been expensed as stock-based compensation.

During the nine months ended May 31, 2007, the Company also recorded stock-based compensation expense of $47,308 related to stock options with graded vesting schedules earned during the nine months, related to previous option grants to consultants.

The fair value of stock options to employees, directors and officers was estimated at the grant date and the options to consultants were estimated at the service completion date based on the Black-Scholes pricing model, using the following weighted average assumptions:

Expected dividend yield	Nil
Risk-free interest rate	4.03%
Expected life	4.1 years
Expected volatility	85%

Option pricing models require the input of highly subjective assumptions including the expected price volatility. Changes in the subjective input assumptions can materially affect the fair value estimate, and therefore, the existing models do not necessarily provide a reliable measure of the fair value of the Company's stock options.

3. Share Capital (continued)

As at May 31, 2007 the following options were outstanding:

	Number of Options		Weighted Average
Option Price	**Unvested**	**Vested**	**Remaining Contractual Life**
$ 1.30	75,000	25,000	1.8 years
$ 1.20	250,000	-	4.6 years
$ 1.08	-	150,000	4.0 years
$ 0.98	400,000	-	4.6 years
$ 0.80	50,000	350,000	3.6 years
$ 0.69	-	200,000	3.8 years
$ 0.48	-	425,000	2.0 years
$ 0.40	-	50,000	0.3 years
$ 0.25	-	602,500	1.7 years
$ 0.20	-	447,500	0.9 years
	775,000	2,250,000	

4. Contributed Surplus

Contributed surplus consists of the following components:

Stock Options

Balance - August 31, 2006	$ 715,512
Granted to employees, directors and officers	212,496
Granted to consultants	107,851
Exercised	(218,637)
Expired/Cancelled	(10,918)
Balance - May 31, 2007	$ 806,304

Expired Warrants and Options

Balance - August 31, 2006	$ 27,458
Options expired/cancelled	10,918
Balance - May 31, 2007	$ 38,376
	$ 844,680

5. Related Party Transactions

During the nine months ended May 31, 2007 the Company:

a) incurred consulting fees of $38,625 with an officer and director, which were deferred as resource property costs. As at May 31, 2007, accounts payable included $12,010 payable to this officer and director.

b) incurred accounting fees of $19,193 with an accounting firm in which an officer is the principal. As at May 31, 2007, accounts payable included $25,164 payable to this accounting firm.

6. Subsequent Events

Subsequent to the nine months ended May 31, 2007 the Company:

a) issued 150,000 non-flow-through common shares pursuant to the exercise of an equivalent number of stock options for cash proceeds of $45,000.

b) granted an aggregate of 525,000 stock options to two officers and an employee of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $1.61 per share until June 21, 2012. These options will vest at the rate of 25% every twelve months following June 21, 2007.

c) granted an aggregate of 250,000 stock options to four consultants of the Company. Each option entitles the holder to purchase one common share of the Company's common stock at a price of $1.61 per share until June 21, 2009. These options will vest at the rate of 25% every three months following June 21, 2007.

No. 82-4427

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AVALON VENTURES LTD.

Management Discussion and Analysis of Financial Statements
For the nine months ended May 31, 2007

This Management Discussion and Analysis ("MDA") of Avalon Ventures Ltd. (the "Company") provides analysis of the Company's financial results for the three, and nine months ended May 31, 2007. The following information should be read in conjunction with the accompanying audited financial statements and the notes to the audited financial statements.

This MDA includes certain statements that may be deemed "forward-looking statements". All statements in this discussion, other than statements of historical fact, that address future production, reserve potential, exploration drilling, exploitation activities and events or developments that the Company expects, are forward-looking statements. Although the Company believes the expectations expressed in such forward-looking statements are based on reasonable assumptions, such statements are not guarantees of future performance and actual results or developments may differ materially from those in the forward-looking statements.

Factors that could cause actual results to differ materially from those in forward-looking statements include market prices, exploitation and exploration successes, continued availability of capital and financing and general economic, market or business conditions. Investors are cautioned that any such statements are not guarantees of future performance and that actual results or developments may differ materially from those projected in the forward-looking statements. This report is prepared as of ***July 17, 2007***.

Nature of Business and Overall Performance

Avalon Ventures Ltd. (the "Company") is a Canadian junior mineral exploration and development company listed on the TSX Venture Exchange. The Company operates exclusively in Canada with a primary focus on rare metals and minerals including calcium feldspar, lithium, tantalum, cesium, beryllium, indium, gallium, yttrium and the rare earth elements ("REE's"), and a secondary focus on exploration for copper and gold deposits. By definition, "rare earth elements" refers specifically to the Lanthanide series of elements (atomic numbers 57 – 71), whereas the term "rare metals" is a more general "umbrella" term that includes the rare earth elements as well as other rare metals including those named above.

The Company is in the process of exploring or developing six of its eight mineral resource properties. Three of the six active projects (Red Hill, U6 Savant and East Kemptville) are at an early stage where drilling is required to delineate resources. The other three (Thor Lake, Separation Rapids and Warren Township) are rare minerals or rare metals properties that are at a more advanced stage with defined mineral resources that independent consultants have determined are potentially economic, provided that suitable sales contracts with customers for the mineral products can be arranged.

Bulk sampling programs to supply product samples to potential customers and secure long-term supply contracts are in progress on both the Warren Township and Separation Rapids projects. The scoping study on the Thor Lake project was completed and filed subsequent to the end of the quarter and a detailed drilling program is planned to increase the confidence level on portions of a large *inferred* rare metals resource in one zone (the Lake Zone) to the *indicated* level.

Markets for mineral commodities in general have continued to strengthen over the past three years in response to rising demand from Asia and tightening supplies. Some of the strongest demand growth has been for rare metals such as the rare earth elements for applications created by new technological advances particularly in the automotive and alternative energy fields. This also applies to the Company's lithium mineral product from the Separation Rapids project for which a promising new potential market emerged in 2005 and the Company's calcium feldspar product from Warren Township. The demand for these products is being driven in part by the need for reducing consumption of fossil fuels and lowering greenhouse gas emissions.

Increased media attention on the rare metals and their growing importance in modern society, has helped create new investor interest in companies like Avalon, resulting in continued strength in the Company's share price and improved access to capital to fund exploration and development programs.

Developing the Company's advanced rare minerals and metals minerals projects to production and cash flow remains management's top priority, with Thor Lake being the highest priority project due to the exceptional quality of the REE resource now recognized there. The Company seeks to build shareholder value by becoming a diversified producer of rare metals and minerals and expanding the markets for its mineral products.

Selected Annual Information

Unless otherwise noted, all currency amounts are stated in Canadian dollars.

The following selected financial data for each of the three most recently completed financial years are derived from the audited annual financial statements of the Company, which were prepared in accordance with Canadian generally accepted accounting principles.

For the Years Ending August 31,	**2006**	**2005**	**2004**
	$	$	$
Net revenues	87,588	414	1,478
Loss before discontinued operations and extraordinary items	1,287,581	472,733	1,670,178
Loss before discontinued operations and extraordinary items, per share basic and fully diluted	0.03	0.01	0.06
Net loss	1,287,581	472,733	1,670,178
Net loss, per share basic and fully diluted	0.03	0.01	0.06
Total assets	6,930,933	4,311,718	3,919,123
Total long term liabilities	-	-	-
Cash dividends	-	-	-

The Company has recorded losses in all of the three most recently completed fiscal years and expects to continue to record losses until such time as an economic resource is identified, developed and brought into profitable commercial operation on one or more of the Company's properties or otherwise disposed of at a profit. Since the Company has no revenue from operations, annual operating losses typically represent the sum of business expenses plus any write-offs of mineral properties abandoned during the period. The Company expects to increase its level of business activity in coming years and consequently investors should anticipate that the Company's annual operating losses will also increase until a new operation begins to generate cash flow.

Results of Operations

Exploration and Development Activities

Resource property expenditures for the three months ended May 31, 2007 totalled $659,498 (2006 - $285,914), a marked increase over the level of expenditures in the previous quarter ($347,964) reflecting the acceleration of work programs on the Warren Township and Thor lake projects. Most of these expenditures (80%) were incurred on the Thor Lake rare metals (26%) and Warren Township anorthosite (54%) projects, with the balance being largely incurred on the East Kemptville, Red Hill and Separation Rapids projects. The expenditures on Thor lake, Red Hill and East Kemptville were largely funded from the proceeds of the flow-through private placement financing completed in December, 2006 while the expenditures on Warren Township and Separation Rapids were funded from working capital generated from the exercise of share purchase warrants and incentive stock options over the past 12 months. No properties were abandoned during the quarter and no expenditures were written off.

Resource property expenditures for the nine months ended May 31, 2007 totalled $1,339,162 which was a 118% increase over the $614,082 incurred during the nine months ended May 31, 2006. The acceleration of the work programs on the Warren Township and Thor lake projects are the primary reasons for this increase. No properties were abandoned during the nine months ended May 31, 2007 and no expenditures were written off.

Thor Lake

On the Thor Lake rare metals project, expenditures during the quarter totalled $172,814. Most of these expenditures were incurred in the preparation of the Scoping Study either directly by the independent consulting engineers (Wardrop Engineering) or indirectly by other technical consultants for supporting geological work. Expenditures of $32,121 were incurred for community consultation and other work related to the preparation of a land use permit application and organization for the planned summer drilling program.

Subsequent to the end of the quarter, the Company received the final version of the scoping study prepared by Wardrop Engineering Inc ("Wardrop"). The results of the Preliminary Economic Analysis ("PEA") contained in the study were publicly-disclosed in the Company's news release dated June 18, 2007 and the full report was SEDAR-filed shortly thereafter. Kevin Palmer, P.Geo. was the qualified person from Wardrop responsible for this resource estimation. Tim Maunula, P.Geo. reviewed his work and assisted with the development of the estimation parameters. Paul Franklin, P. Eng. and Peter Broad, P.Eng. were the engineers responsible for the developing the capital and operating cost estimates and the economic models. David L. Trueman, Ph. D., P.Geo., who has direct experience with the project dating back to 1983, reviewed all the data on behalf of the Company and contributed to the interpretation and market analysis where requested by Wardrop.

The highlights of the scoping study were confirmation of rapidly growing demand for REE's from an independent market study prepared by BCC Research and confirmation that the Thor Lake REE project can achieve acceptable returns on invested capital and therefore warrants further investment to advance the project to a pre-feasibility or feasibility level of analysis.

In particular, discounted cash flow analysis of a base case scenario along with two variants reflecting the potential for increased production rates commensurate with the growth in REE demand forecast in the BCC report produced the following results (using a 5% discount rate):

Production Case tonnes per year Y+TREO	ROI	NPV @ 5%	Mine Life (Years)
North T + Lake Zone @ 500 tonnes / year	18.7%	$111,574,000	35
North T + Lake Zone @ 1,000 tonnes / year	21.8%	$159,180,000	18
North T + Lake Zone @ 2,000 tonnes / year	26.7%	$356,104,000	18

Y+TREO = Yttrium oxide plus total rare earth oxides. ROI = return on investment and NPV = net present value

The model assumes initial development of the North T Zone deposit with by-product recovery of beryllium with production transitioning to the much larger Lake Zone deposit in 4-5 years where tantalum and zirconium would also be recovered as valuable by-products to the REE's.

The study recommends further drilling in the Lake Zone to define potential REE-enriched sub-zones in the southern part of the deposit and upgrade the classification for this portion of the resource from Inferred to Indicated. This is now scheduled to begin by July 25, 2007, following the successful identification of a drill contractor and receipt of the requisite land use permit on July 6, 2007. The program will be funded from the proceeds of a flow-through private placement completed in December, 2006 and has a preliminary budget of $1,100,000. Drilling operations will be supervised by J.C. Pedersen, P.Geo. and Dr. D.L. Trueman, P.Geo., under the overall direction of the Company's Vice-President, Exploration, Dr. William Mercer, P.Geo.

In addition, the Company has budgeted a minimum of $170,000 for environmental remediation work related to historical development work at the North T –Zone, as well as ongoing community consultation work, to be funded from working capital. This work will be carried out concurrently with the drilling. A second phase winter drilling program is planned for early 2008.

Warren Township

Expenditures of $356,294 were incurred on the Warren Township anorthosite project during the quarter, related to the large scale bulk sampling program initiated during the previous quarter. This program was designed to deliver a minimum 500 tonne bulk sample of the Company's calcium feldspar product to a major US glass manufacturer for a full-scale furnace trial at one of its U.S. glass manufacturing facilities. A successful trial would lead to a long term supply contract, allowing the Company to develop a quarry, build a production facility and commence commercial production once all operating permits are in place.

During the quarter, a bulk sample totalling approximately 1,000 tonnes of crushed ore was delivered to Aerosion Limited, a toll processing facility in southern Alberta, where it is being further crushed, magnetically-treated, and pulverized to minus 200mesh prior to delivery to the customer. As at the date of this report, this work was approximately 60% complete, and running about 3 months behind schedule. It is now expected that the furnace trials will be completed during the first quarter of fiscal 2008 and, if successful, the Company expects to proceed with quarry development and plant construction sometime in calendar 2008. The project is being managed by Donald Hains, P.Geo., under the direction of Ian London, P.Eng., Vice President, Corporate Development.

The current estimated net cost of the project to the Company is now in the order of $900,000, a variance of approximately $550,000 or 150% over the original preliminary forecast and 50% over the forecast at the start of processing at Aerosion. This was not entirely unanticipated as the bulk sampling program was a prototype process development involving a number of unknown factors and winter work. More specifically, the additional costs consisted of the site preparation and blasting work which were inadvertently excluded from the original project estimate ($50,000), higher crushing/hauling costs related to winter work ($30,000), additional railcar demurrage costs as a result of inclement weather and delays in loading/unloading until the final process was fully operational ($100,000), additional processing requirements because of humidity and moisture in the feed due primarily to winter/spring conditions in Northern Ontario and Calgary ($125,000), and additional process design and quality assurance costs ($125,000).

Efforts to secure operating permits to develop a quarry and process plant were initiated during the second quarter, and additional fieldwork in May (after spring break up) to gather all the environmental information was required to complete the permit application at a cost of $17,562. As at the date of this report, this work had been completed and, the final permit application submitted to the Ontario Ministry of Natural Resources. Community consultation continues. This work is being carried out by Fudge & Associates (D.T. Fudge, P.Eng.) of North Bay, Ontario.

Separation Rapids

During the quarter, the Company incurred $16,440 in expenditures on the Separation Rapids lithium project. These costs were related to updating the environmental baseline study which was initially produced in 1999 ($8,635) and initiation of a research project to investigate the potential application of hydrometallurgical extraction technology to recover a lithium product suitable for the rapidly growing lithium ion battery market ($7,805).

The metallurgical research work is being carried out at SGS Lakefield Research under the supervision of Ian London, P.Eng. Such technology has been successfully applied to other lithium minerals and initial literature research indicates this technology should be effective with the petalite that is the dominant lithium mineral at Separation Rapids. A successful result would lead to a preliminary economic assessment of developing the project as a lithium chemicals producer. The project has a budget of $35,000 and should be completed during the fourth quarter. The Company continues to receive periodic expressions of interest in its lithium minerals product and has delivered several small test samples to potential customers over the past four months.

East Kemptville

During the quarter, the Company incurred expenditures totalling $35,835 on the East Kemptville rare metals project, in Yarmouth Co. Nova Scotia, mainly for geological compilation work. The geological compilation work is being done by Hudgetec Consulting Ltd. (Bruce Hudgins, P.Geo). of Dartmouth, N.S. ("Hudgetec").

To date Hudgetec has entered all the available drilling data in to a new computer database to allow for modeling of tin and rare metals resources present on the Special Licence. Additional assaying for rare metals on historical drill cores had not yet been completed due to delays in developing an assay protocol for the rare metals and securing appropriate standards for indium in particular. This has been resolved as at the date of this report and the assay work is scheduled for completion during the fourth quarter. This new data will allow preparation of a new 43-101 compliant resource estimate for tin and rare metals resources on the Special Licence. Total expenditures to date of $62,648 are sufficient to meet the Company's obligations under the Special Licence to maintain title in good standing until at least August, 2008.

In addition, compilation work has been initiated on the new claims staked to cover additional potential tin-rare metal targets located peripheral to the East Kemptville project special licence. The compilation work has already identified a number of interesting targets which will be followed by ground investigation during the summer. The budget for the combined program has been increased from $50,000 to $125,000 to allow for this expanded scope of work.

Red Hill & U6 Savant

An airborne electro-magnetic survey was completed during the quarter on the Red Hill copper-zinc project at a cost of $87,692, which was funded from the proceeds of the December, 2006 flow-through private placement. Strong conductors were detected in the Red Hill sector peripheral to the area drilled in 2006 and in the southern sector which has never been drilled. No decision has been made on the scope and timing of follow-up work. A 43-101 compliant technical report on the project is in preparation.

The only work carried out on the U6 Savant gold project during the quarter was on the preparation of a 43-101 compliant technical report on the project to be used for marketing purposes. This will be finalized during the fourth quarter. A further $150,000 in expenditures is required on the U6 Savant project before December 31, 2007 in order to maintain the option agreement with Teck Cominco Limited in good standing for another year.

Management continues to look for potential partners to advance both of these projects in order to focus efforts on the Company's priority rare metals projects. Expenditures to date at Red Hill are sufficient to maintain the Company's option agreement with Teck Cominco Limited in good standing until December 31, 2008.

Administration

Administrative expenses incurred during the three months ended May 31, 2007 totalled $332,356, a 27.5% decrease over the amount incurred during the comparable quarter in 2006 the difference being almost entirely attributable to stock-based compensation which totaled $60,162, compared with $233,506 in 2006. The administrative expenses for the three months were very comparable to the previous three month period total of $311,447. For the nine month period, administrative expenses totalled $1,052,912 compared with $935,537 during the comparable period in 2006.

If one excludes stock-based compensation from the totals, they become $272,194 for the current quarter and $225,266 for the comparable quarter in 2006 reflecting a 21% increase in non-stock-based expenditures for administrative expenses. The nine month period shows a 33% increase in non-stock-based expenditures compared to the comparable period in 2006. The major areas of increased expenditures were salaries, rent, insurance, travel and investor relations reflecting increased levels of business activity, the addition of new staff and the move to larger office space. A decrease in consulting fees from $42,900 in 2006 to $2,925 during the quarter is due to the non-recurrence of consulting fees paid in 2006 for new business development in the US. Interest and financing costs of $42,368 relate to tax payable on the unspent portion of flow-through funds after February 28, 2007. Increased cash balances in the Company's bank accounts resulted in increased interest income of $28,502 for the three month period compared with $23,512 for the comparable period in 2006. For the nine month period, interest income was $71,380 compared with $32,897 for the comparable period in 2006.

Expenditures on public and investor relations activities during the quarter totalled $62,118, an amount comparable to the previous quarter, but represent a 53% increase over the amount incurred in 2006 ($40,689). This reflects the expansion of the Company's investor relations programs ("IR") as a part of an overall effort to increase the Company's profile in the marketplace. For the nine month period, IR expenditures total $183,078, a 65% increase over the comparable period in 2006.

The effectiveness of the Company's IR programs are constantly being reviewed by management but no changes were implemented during the three months ended May 31, 2007. The Company's website is being re-designed by Blender Media of Vancouver, BC, to give it a new look and feel and this work had not been completed as at the date of this report. Subsequent to the end of the quarter the Company retained Silverpoint Media Inc. to produce an audio visual animation product on the Thor Lake project for both Investor Relations and community consultation purposes. An initiative to review and update the Company's brand to reflect the stronger emphasis on environmental sustainability and corporate social responsibility themes, was also underway.

During and subsequent to the end of the quarter, the Company continued its marketing efforts to U.S.-based institutional investors through a series of meetings in New York, Boston, Milwaukee, Atlanta and San Francisco arranged by O & M Partners, the Company's U.S. IR consultants. O & M is continuing to arrange such meetings on at least a monthly basis. The response to date has been very encouraging as many investors agree that demand for rare metals in general, and rare earths in particular, is going to increase and that the Company is particularly well-positioned to take advantage of this trend.

In addition, the Company continues to retain Northern Geotech Services on an intermittent basis to provide periodic telephone updates to shareholders and assist with trade show presentations, of which the Company participated in one during the quarter .The Company also hosted a small group of U.S. investors and analysts for a field trip to the Separation Rapids project in early June. A more aggressive media relations program involving TV and radio interviews is planned for the fourth quarter.

During the three months ended May 31, 2007, the Company renounced Canadian exploration expenditures of $1,575,000 to the investors in the flow-through private placement completed in December, 2006. This renunciation resulted in a reduction of the Company's future income tax assets of $488,250 and a corresponding reduction in share capital. However, as the Company has not recognized its future income tax assets, the $488,250 is recorded as a future income tax recovery on the statement of operations.

Summary of Quarterly Results

The following selected financial data is derived from the unaudited interim financial statements of the Company, which were prepared in accordance with Canadian generally accepted accounting principles.

Fiscal Year	2007			2006				2005
For the Quarters Ended	May 31	Feb. 28	Nov. 30	Aug. 31	May 31	Feb. 28	Nov. 30	Aug. 31
	$	$	$	$	$	$	$	$
Net revenues	28,502	24,147	18,731	20,989	23,512	43,060	27	34
Income (loss) before discontinued operations and extraordinary items	184,396	(251,702)	(390,378)	(403,069)	(450,834)	(230,395)	(203,283)	(253,467)
Loss before discontinued operations and extraordinary items, per share, basic and fully diluted	-	-	0.01	0.01	0.01	-	0.01	0.01
Net income (loss)	184,396	(251,702)	(390,378)	(403,069)	(450,834)	(230,395)	(203,283)	(253,467)
Net loss, per share, basic and fully diluted	-	-	0.01	0.01	0.01	-	0.01	0.01

The fluctuation on quarterly net loss is primarily due to stock-based compensation expenses recognized on stock options granted to directors, officers, employees and consultants of the Company and the write-downs of resource properties. The costs of resource properties are written down at the time the properties are abandoned or considered to be impaired in value. The write-downs are usually much more significant in terms of dollar amounts in comparison to the Company's expenses for its ordinary activities.

Liquidity and Capital Resources

In management's view, given the nature of the Company's operations, which consist of the exploration and evaluation of mining properties, the most relevant financial information relates primarily to current liquidity, solvency, and planned property expenditures. The Company's financial success will be dependent on the economic viability of its resource properties and the extent to which it can discover new mineral deposits. Such development may take several years to complete and the amount of resulting income, if any, is difficult to determine. The sales value of any mineralization discovered by the Company is largely dependent on factors beyond the Company's control, including the market value of the metals and minerals to be produced. The Company does not expect to receive significant revenue from any of its properties until late 2007 at the earliest.

As at May 31, 2007, the Company had working capital of $2,365,471 (including investments of $12,143) and cash on hand of $2,791,937. No new financing was carried out during the quarter except for the intermittent exercise of share purchase warrants and incentive stock options.

As at May 31, 2007, there were 2,529,625 in-the-money outstanding common share purchase warrants and incentive stock options expiring within the next 12 months, which if fully exercised, would generate additional funding of $1,813,169. Conditions for accessing additional capital to supplement the Company's current needs are favourable at the present time due to continuing high commodity prices and strong market interest in resource equities.

The Company's current burn rate, excluding expenditures on work programs, is approximately $100,000 per month. As at May 31, 2007, the Company's current planned work program expenditures totaled $1,730,000 consisting of Thor Lake ($1,270,000), Warren Township ($350,000), Separation Rapids ($35,000) and East Kemptville ($75,000).

The Company's present cash resources are sufficient to meet all of its current contractual obligations for at least the next twelve months. The Thor Lake, Warren Township, Separation Rapids and Lilypad Lakes properties are all 100% owned by the Company with minimal holding costs the most significant being annual lease rental fees on Thor Lake of $15,422.

Under the terms of the East Kemptville Special Licence, the Company has optional expenditure obligations totalling $2.5 million over three years of which $50,000 must be incurred by August 1, 2007. The current work program expenditures will easily meet this initial obligation. The Red Hill and U6 Savant properties are held under option from Teck Cominco Limited and both agreements are currently in good standing until December 31, 2007. Further expenditures totalling approximately $325,000 on the two properties combined are required by December 31, to keep the options in good standing for another year. The Company has the funds available to do this if it so desires.

The Company anticipates accessing the capital markets within the next six months. Management will be selective in evaluating new financing proposals in an effort to balance the shareholders' interest in minimizing dilution against future capital requirements. A joint venture with an industry partner or end-user remains an attractive alternative for financing the next stage of development on the Company's three advanced projects at Separation Rapids, Thor Lake and Warren Township projects, where capital requirements are relatively large.

Off Balance Sheet Arrangements

As at May 31, 2007 the Company had no material off balance sheet arrangements such as guaranteed contracts, contingent interests in assets transferred to an entity, derivative instrument obligations or any instruments that could trigger financing, market or credit risk to the Company.

Transactions with Related Parties

All transactions with related parties are in the normal course of business and are measured at the exchange amount. During the nine months ended May 31, 2007, the Company:

a) incurred consulting fees of $38,625 with an officer and director, which were deferred as resource property costs. As at May 31, 2007 accounts payable included $12,010 payable to this officer and director.

b) incurred accounting fees of $19,193 with an accounting firm in which an officer is the principal. As at May 31, 2007 accounts payable included $25,164 payable to this accounting firm.

Proposed Transactions

With six active projects and limited human resources, the Company is not aggressively searching for new project acquisition opportunities at the present time, although there is one new opportunity presently under consideration. However, management is always interested in evaluating potential transactions or business combinations that are of possible long term strategic value. Similarly, expressions of interest in providing equity financing are received from time to time, but no firm plans are in place at this time for an offering of shares from treasury.

Changes in Accounting Policies Including Initial Adoption

On September 1, 2006, the Company adopted the new Handbook Section 3855, "Financial Instruments - Recognition and Measurement, and Section 1530, "Comprehensive Income", on a prospective basis.

Section 3855 establishes standards for the recognition and measurement of all financial instruments, provides a characteristics-based definition of a derivative financial instrument, provides criteria to be used to determine when a financial instrument should be recognized, and provides criteria to be used when a financial instrument is to be extinguished.

Section 1530 establishes standards for reporting comprehensive income. These standards require that an enterprise present comprehensive income and its components in a separate financial statement that is displayed with the same prominence as other financial statements.

The adoption of these new standards did not have any significant effect on the Company's financial statements for the nine months ended May 31, 2007.

Financial Instruments and Other Risk Factors

The Company's financial instruments consist of cash and cash equivalents, investments, other receivables and accounts payable.

Management does not believe these financial instruments expose the Company to any significant interest, currency or credit risks arising from these financial instruments. The fair market values of cash and cash equivalents, other receivables and accounts payable approximate their carrying values.

In conducting its business, the principal risks and uncertainties faced by the Company relate to exploration and development success as well as metal prices and market sentiment to a lesser extent.

Exploration for minerals and development of mining operations involve significant risks, many of which are outside the Company's control. In addition to the normal and usual risks of exploration and mining, the Company often works in remote locations that lack the benefit of infrastructure and easy access.

The prices of metals fluctuate widely and are affected by many factors outside of the Company's control. The relative prices of metals and future expectations for such prices have a significant impact on the market sentiment for investment in mining and mineral exploration companies. The Company relies on equity financing for its long term working capital requirements and to fund its exploration programs. The Company does not have sufficient funds to put any of its resource interests into production from its own financial resources. There is no assurance that such financing will be available to the Company, or that it will be available on acceptable terms.

An additional risk factor that has developed over the past two years is access to adequate human resources to carry out work programs, particularly skilled professionals for which there is currently an industry-wide shortage, which can cause delays completing work programs on schedule and in meeting program budgets.

Internal Control Over Financial Reporting

There has been no change in the Company's internal control over financial reporting during the nine months ended May 31, 2007.

Outstanding Share Data

a) Common and Preferred Shares

The Company is presently authorized to issue an unlimited number of common shares without par value. The Company is also authorized to issue up to 25,000,000 preferred shares without par value, of which none have been issued.

During the nine months ended May 31, 2007, the Company issued:

i) 1,500,000 flow-through units for proceeds of $1,575,000. Each unit consists of one flow-through common share and one-half of one non-transferable share purchase warrant, each whole warrant entitles the holder to purchase one non-flow-through common share at a price of $1.35 per share until December 28, 2007.

In connection with this private placement, the Company paid a finder's fee of $18,900 in cash.

ii) 1,582,525 non-flow-through common shares pursuant to the exercise of an equivalent number of common share purchase warrants for cash proceeds of $496,726.

iii) 950,000 non-flow-through common shares pursuant to the exercise of an equivalent number of stock options for cash proceeds of $382,750.

Subsequent to the nine months ended May 30, 2007, the Company issued:

i) 150,000 non-flow-through common shares pursuant to the exercise of an equivalent number of stock options for cash proceeds of $45,000.

As at the date of this report, the Company had 51,785,123 common shares issued and outstanding.

b) Warrants

As at the date of this report, the Company had an aggregate of 1,832,125 warrants outstanding with a weighted average exercise price of $0.88.

c) Options

As at the date of this report, the Company had an aggregate of 3,650,000 incentive stock options outstanding with a weighted average exercise price of $0.85.

Other Information

Additional information on the Company is available on SEDAR at www.sedar.com and on the Company's website at www.avalonventures.com.

WARDROP

No. 82-4427

June 18th, 2007 0551530201-LTR-R0003-00

British Columbia Securities Commission
Alberta Securities Commission
Ontario Securities Commission

Dear Sir/Madame:

Subject Avalon Ventures Ltd. Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT

I, Peter Broad, P.Eng., of Wardrop Engineering Inc., do hereby consent to the public filing with the above listed commissions and with any other applicable regulatory authorities, of the report entitled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007 (Document No.0551530201-REP-R0001-03) in support of the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" by Avalon Ventures Ltd. dated June 18th, 2007.

I also certify that I have read the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" being filed by Avalon Ventures Ltd. dated June 18th, 2007 and I do not have any reason to believe that there are any misrepresentations in the information derived from the report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT".

Dated this 18th day of June, 2007.

"Original Document, Revision 00 signed and sealed by Peter Broad, P.Eng."
Peter Broad, P.Eng.
Senior Metallurgist
Wardrop Engineering Inc.

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WARDROP

June 18th, 2007 0551530201-LTR-R0005-00

British Columbia Securities Commission
Alberta Securities Commission
Ontario Securities Commission

Dear Sir/Madame:

Subject Avalon Ventures Ltd. Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT

I, Kevin Palmer, P.Geo., on behalf of Wardrop Engineering Inc., do hereby consent to the public filing with the above listed commissions and with any other applicable regulatory authorities, of the report entitled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007 (Document No.0551530201-REP-R0001-03) in support of the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" by Avalon Ventures Ltd. dated June 18th, 2007.

I also certify that I have read the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" being filed by Avalon Ventures Ltd. dated June 18th, 2007 and I do not have any reason to believe that there are any misrepresentations in the information derived from the report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT".

Dated this 18th day of June, 2007.

"Original Document, Revision 00 signed and sealed by Kevin Palmer, P.Geo."
Kevin Palmer, P.Geo.

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Internet: www.wardrop.com

WARDROP

June 18th, 2007 0551530201-LTR-R0004-00

British Columbia Securities Commission
Alberta Securities Commission
Ontario Securities Commission

Dear Sir/Madame:

Subject Avalon Ventures Ltd. Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT

I, Paul Franklin, P.Eng., of Wardrop Engineering Inc., do hereby consent to the public filing with the above listed commissions and with any other applicable regulatory authorities, of the report entitled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007 (Document No.0551530201-REP-R0001-03) in support of the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" by Avalon Ventures Ltd. dated June 18th, 2007.

I also certify that I have read the news release titled "Avalon Announces Results of Scoping Study on Thor Lake REE Resources" being filed by Avalon Ventures Ltd. dated June 18th, 2007 and I do not have any reason to believe that there are any misrepresentations in the information derived from the report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT".

Dated this 18th day of June, 2007.

"Original Document, Revision 00 signed and sealed by Paul Franklin, P.Eng."
Paul Franklin, P.Eng.
Mining Engineer
Wardrop Engineering Inc.

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No. 82-4427

Insider transaction detail - View details for issuer

2007-07-31 11:57 ET

Transactions sorted by : Insider
Issuer name : Avalon (Starts with)
Transaction date range : April 26, 2007 - July 31, 2007

Issuer name: Avalon Ventures Ltd

Legend: O - Original transaction, A - First amendment to transaction, A' - Second amendment to transaction, AP - Amendment to paper filing, etc.

Insider's Relationship to Issuer: 1 - Issuer, 2 - Subsidiary of Issuer, 3 - 10% Security Holder of Issuer, 4 - Director of Issuer, 5 - Senior Officer of Issuer, 6 - Director or Senior Officer of 10% Security Holder, 7 - Director or Senior Officer of Insider or Subsidiary of Issuer (other than in 4,5,6), 8 - Deemed Insider - 6 Months before becoming Insider.

Warning: The closing balance of the " equivalent number or value of underlying securities" reflects the" total number or value of underlying securities" to which the derivative contracts held by the insider relate. This disclosure does not mean and should not be taken to indicate that the underlying securities have, in fact, been acquired or disposed of by the insider.

Transaction ID	Date of transaction YYYY-MM-DD	Date of filing YYYY-MM-DD	Ownership type (and registered holder, if applicable)	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity YYYY-MM-DD	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities

Insider name: Andersen, Robert James

Insider's Relationship to Issuer: 5 - Senior Officer of Issuer

Security designation: Common Shares

1014931	2007-07-17	2007-07-26	Indirect Ownership : Jim Andersen Professional Corporation	10 - Acquisition or disposition in the public market	-700	2.2500	399,300						

	Transaction ID	Date of transaction YYYY-MM-DD	Date of filing YYYY-MM-DD	Ownership type (and registered holder, if applicable)	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity YYYY-MM-DD	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities
	1014932	2007-07-17	2007-07-26	Indirect Ownership : Jim Andersen Professional Corporation	10 - Acquisition or disposition in the public market	-5,000	2.0800	394,300						
	1014933	2007-07-17	2007-07-26	Indirect Ownership : Jim Andersen Professional Corporation	10 - Acquisition or disposition in the public market	-6,900	2.0700	387,400						
	1014934	2007-07-17	2007-07-26	Indirect Ownership : Jim Andersen Professional Corporation	10 - Acquisition or disposition in the public market	-5,000	2.1600	382,400						
	1014935	2007-07-18	2007-07-26	Indirect Ownership : Jim Andersen Professional Corporation	10 - Acquisition or disposition in the public market	-5,600	2.1500	376,800	376,800					

Insider name: Corman, Francis Dale

Insider's Relationship to Issuer: 4 - Director of Issuer

Security designation: Common Shares

	959871	2007-05-07	2007-05-08	Direct Ownership :	47 - Acquisition or disposition by gift	-10,000		340,000						

Insider name: Hu, Xi Hong

Insider's Relationship to Issuer: 5 - Senior Officer of Issuer

Security designation: Options (Common Shares)

O	995992	2007-06-21	2007-06-28	Direct Ownership :	00 - Opening Balance-Initial SEDI Report							Common Shares		
A	995992	2007-06-21	2007-06-28	Direct Ownership :	00 - Opening Balance-Initial SEDI Report							Common Shares		
	996367	2007-06-21	2007-06-28	Direct Ownership :	50 - Grant of options	+100,000		100,000		1.6100	2012-06-21	Common Shares	+100,000	100,000

Transaction ID	Date of transaction YYYY-MM-DD	Date of filing YYYY-MM-DD	Ownership type (and registered holder, if applicable)	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity YYYY-MM-DD	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities

Insider name: Mercer, William

Insider's Relationship to Issuer: 5 - Senior Officer of Issuer

Security designation: Options (Common Shares)

Transaction ID	Date of transaction	Date of filing	Ownership type	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities
1001341	2007-06-21	2007-07-06	Direct Ownership :	00 - Opening Balance-Initial SEDI Report							Common Shares		
1001358	2007-06-21	2007-07-06	Direct Ownership :	50 - Grant of options	+400,000	1.6100	400,000	400,000	1.6100	2012-06-21	Common Shares	+400,000	400,000

Insider name: Page, Lawrence Peter

Insider's Relationship to Issuer: 4 - Director of Issuer

Security designation: Common Shares

Transaction ID	Date of transaction	Date of filing	Ownership type	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities
985403	2007-06-07	2007-06-12	Direct Ownership :	51 - Exercise of options	+100,000	0.2500	100,000						
985404	2007-06-07	2007-06-12	Direct Ownership :	10 - Acquisition or disposition in the public market	-50,000	1.7000	50,000						

Security designation: Options (Common Shares)

Transaction ID	Date of transaction	Date of filing	Ownership type	Nature of transaction	Number or value acquired or disposed of	Unit price or exercise price	Closing balance	Insider's calculated balance	Conversion or exercise price	Date of expiry or maturity	Underlying security designation	Equivalent number or value of underlying securities acquired or disposed of	Closing balance of equivalent number or value of underlying securities
985401	2007-06-07	2007-06-12	Direct Ownership :	51 - Exercise of options	-100,000	0.2500	0			2009-02-16	Common Shares	-100,000	0

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No. 82-4427

NEWS RELEASE

June 18, 2007 **No. 07-06**

Avalon Announces Results of Scoping Study on Thor Lake REE Resources

Avalon Ventures Ltd. TSX-V: AVL (the "Company") is pleased to announce the results of a Scoping Study (or "Preliminary Economic Assessment" in accordance with NI 43-101 terminology), (the "Study") on the rare metal resources delineated on its 100% owned Thor Lake project, located near Yellowknife, NWT. The Study was prepared by independent consultants, Wardrop Engineering Inc. ("Wardrop"). New NI 43-101 compliant mineral resource estimates for two of the six known mineralized zones at Thor Lake (Lake Zone and North T deposits), also prepared by Wardrop, were announced on January 22, 2007 and summary tables are reproduced for convenience at the end of this news release. The Study provides an initial development model and a preliminary economic analysis for the project based on the resource estimates for these two deposits.

The Study was commissioned by the Company in 2006 to evaluate the potential viability of recovering rare earth elements ("REE's") as a primary product from among many rare metals present in the resources known at Thor Lake. This was in response to growing demand for these elements in new environmental applications, especially from the automotive sector, where the REE's are vital to the new technologies developed for more fuel efficient ("hybrid") automobiles. Hybrid cars use rechargeable batteries along with electric motors and generators to power the car at low speeds and while idling, thereby reducing fossil fuel consumption and emissions of greenhouse gases. REE's are used in all three components but are most critical in the high-intensity permanent magnets which are key to making electric motors with the strength and efficiency required to power an automobile. Demand for hybrid cars is growing rapidly.

For an independent analysis of REE markets, complete with supply and demand forecasts, Wardrop relied on a recent research report produced by BCC Research ("BCC"), an industrial research firm based in Connecticut, USA. This report was purchased by the Company early in 2007 and provided to Wardrop as a basic reference. The BCC report forecasts growth in global demand for REE's arising mainly from the automotive sector, at a rate of 10% year over year until 2010 from approximately 100,000 tonnes in 2006 to over 150,000 tonnes by 2010 expressed as "TREO" (Total Rare Earth Oxides or the sum of all 14 REE's plus yttrium). During this period, primary supply sources located mainly in China are not expected to significantly increase production creating a growing supply-demand gap. As discussed below, this is already causing significant price increases for certain REE's such as neodymium, required for the magnet applications. This also creates opportunities for new primary suppliers to enter the market. Wardrop concludes that the REE resources at Thor Lake, while requiring significant further work to bring them to the feasibility level of analysis, represent an attractive potential development opportunity for the Company.

The development model utilized by Wardrop for the Study contemplates initiating production on the more advanced Indicated Resource in the North T deposit, then following depletion of that resource after approximately 4-5 years of operation, transitioning production to the much larger Inferred Resource in the Lake Zone deposit. In accordance with NI43-101, it must be stated that mineral resources that are not mineral reserves do not have demonstrated economic viability.

In the base case scenario, a conservative production rate of 500 tonnes per year (tpy) TREO was forecasted. Discounted cash flow analysis of this scenario using 2006 commodity prices and capital and operating costs as documented below, yields a positive result of a 18.7% return on investment ("ROI") and a net present value (NPV) of $111.5 million at a 5% discount rate and on a pre-tax basis over a mine life of 35 years. With the likelihood of significant growth in demand over the next 3-5 years for REE's as forecast by BCC, two other production scenarios were modeled with longterm production rates of 1000 tpy and 2000 tpy TREO, since the large size of the resource in the Lake Zone deposit could likely support a higher production rate if there is sufficient demand for the product.

At 2000 tpy, economies of scale lead to increased profitability with an ROI of 26.7% and an NPV of $356.1 million as documented below. An 18 year mine life was used in these scenarios to reflect the more rapid depletion of the resource at these production rates, although there is scope for expansion of the resource with further drilling. The economic analysis includes by-product credits for beryllium recovery from the North T deposit (it is not known to occur in the Lake Zone) plus by-product credits for tantalum and zirconium recovery from the Lake Zone (where they occur with the REE's), but does not include other potential rare metals products such as niobium, lithium or gallium.

Production Case tonnes per year Y+TREO	**ROI**	**NPV @ 5%**	**Mine Life (Years)**
North T + Lake Zone @ 500 tonnes / year	18.7%	111,574,000	35
North T + Lake Zone @ 1,000 tonnes / year	21.8%	159,180,000	18
North T + Lake Zone @ 2,000 tonnes / year	26.7%	356,104,000	18

The reader is reminded that in accordance with NI43-101, a preliminary economic assessment such as the foregoing includes Inferred mineral resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that this Preliminary Economic Assessment will be realized. In fact, it will almost certainly change as new information is generated on the mineral resources and processing methodology.

The capital cost estimate for the base case production scenario involving initial development of the North T deposit at a mining rate of 215,000 tpy followed by development of the Lake Zone with a mining rate of 429,000 tpy is $123.2 million spread over an 8 year period. Operating costs for the T Zone ores are estimated at $69.59 per tonne of ore milled, and a preliminary estimate for the Lake Zone ore, for which a flow-sheet has not yet been established, is $134.73 per tonne milled. The model assumes mining by open pit methods and processing of the ore on site to produce mineral concentrates by flotation methods. REE recoveries of 65.7% are assumed based on preliminary bench scale testwork but these have yet to be confirmed. The model further assumes construction of a plant at another site in Alberta with access to lower cost power, to process the REE mineral concentrates to produce individual rare earth oxide products to 99% plus purity levels. Beryllium concentrates would be sold to an existing processor.

The REE resources at Thor Lake are of significant current interest to the market because of their relatively high proportions of contained heavy rare earths such as terbium and dysprosium. These are in growing demand from the automotive sector but typically occur in very low concentrations in the majority of known REE deposits. The Lake Zone contains sub-zones enriched in an yttrium-tantalum-niobium oxide mineral called fergusonite which has high a proportion of heavy rare earth elements plus neodymium, according to the following proportional distribution:

Element	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Oxide %	29.05	0.30	4.40	1.70	15.6	10.4	1.60	14.3	1.80	9.80	1.20	4.10	0.70	4.40	0.7

Y denotes yttrium, La=lanthanum, Ce=cerium, Pr=praseodymium, Nd=neodymium, Sm=samarium, Eu=europium, Gd=gadolinium, Tb=terbium, Dy=dysprosium, Ho=holmium, Er=erbium, Tm=thulium, Yb=ytterbium, and Lu=lutetium.

In the North T deposit, the principal heavy rare earth bearing mineral phase is xenotime, which has the following proportional distribution of REE's.

Element	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Oxide %	55.31	0.10	0.02	0.10	0.20	1.80	0.70	11.6	2.50	15.6	3.10	5.41	0.60	2.20	0.70

The price assumptions used by Wardrop for the REE oxides range from US$2.00 and 1.70/kg for lanthanum and cerium to US$20, $21, $120, and $500/kg for praseodymium, neodymium, dysprosium and terbium respectively, as at December 31, 2006. Recent price quotes for these elements as oxides on an FOB China basis, as reported on May 17, 2007 by Metal-Pages.com, are $1.70 and $1.20/kg for lanthanum and cerium respectively. The elements needed for the magnets including praseodymium, neodymium, dysprosium and terbium were quoted by Metal-Pages at US$29, $30, $85 and $575/kg respectively. Since most REE deposits have a distribution with >80% cerium plus lanthanum, these two REE's are now in oversupply as current REE producers seek to increase production of praseodymium and neodymium to meet the growing demand from magnet manufacturers. This underlines the need for new producers with mineral resources having an REE distribution which is more reflective of current market demand, such as that indicated for the xenotime and fergusonite at Thor Lake. A complete list of price assumptions used is provided in the Study.

The economic model tested by Wardrop envisions a 25% market share capture specifically for yttrium and the heavy rare earth elements such as terbium and dysprosium, an assumption based on the lack of a North American supply source and reduced supply from China (the present supplier of approximately 95% of world market demand) in response to growing domestic demand.

The results of the Study demonstrate that the Thor Lake REE project can achieve acceptable returns on invested capital and therefore warrants further investment to advance the project to a pre-feasibilty or feasibility level of analysis. Increased rates of return are achievable through any combination of higher prices, increased product sales, higher reserve grades or metal recoveries. Wardrop recommends that the Thor Lake project proceed to completion of at least a Pre-feasibility level analysis. The recommended work includes further drilling of the Lake Zone to better define REE resources to an Indicated level of confidence, metallurgical testwork on both the Lake Zone and North T REE mineralization, environmental studies, and continuing community engagement. The estimated minimum cost of this work program is $3.2 million with the work to be conducted in two phases beginning with a $1,200,000 summer drilling program anticipated to start in July, 2007, following receipt of requisite land use permits. Funding for the first part of this program is already in place.

The minimum $2,000,000 Phase II program budget involves further definition drilling of the Lake Zone, metallurgical testwork leading to pilot plant commercial testing, market and environmental studies, community consultation, engineering design and economic modeling. This would begin in January, 2008, subject to positive results from Phase I and arranging additional project financing.

Kevin Palmer, P.Geo. was the qualified person from Wardrop Engineering Inc. responsible for this resource estimation. Tim Maunula, P.Geo. of Wardrop Engineering reviewed his work and assisted with the development of the estimation parameters. Paul Franklin, P. Eng. and Peter Broad, P.Eng. were the engineers responsible for the developing the capital and operating cost estimates and the economic models. David L. Trueman, Ph. D., P.Geo., who has direct experience with the project dating back to 1983, reviewed all the data on behalf of the Company and contributed to the interpretation and market analysis where requested by Wardrop. The full Study will be accessible on SEDAR and the Executive Summary will be available on the Company's website.

North T Zone: Summary of Indicated Mineral Resources

SUBZONE	CUTOFF %	TONNES	TREO + Y2O3%	BeO%	Nb2O5%
C,D,E	0.40 BeO	498,409	0.72	0.98	0.50
F	0.10 Ce2O3	43,877	6.50	0.16	0.01
Y	0.04 Y2O3	593,815	0.45	0.08	0.59
TOTAL		1,136,101	0.71	0.48	0.53

Lake Zone: Summary of Inferred Mineral Resources

CUTOFF%	TONNES	TREO+Y2O3%	Ta2O5%	Nb2O5%	ZrO%
0.10 Y2O3	14,005,000	1.23	0.025	0.33	1.73
0.05 Y2O3	83,224,000	0.99	0.025	0.31	1.96
0.01 Y2O3	375,410,000	0.41	0.014	0.22	1.19

TREO + Y2O3 = the sum of all rare earth oxides plus yttrium oxide

BeO = beryllium oxide, Ta2O5 = tantalum oxide, Nb2O5 = niobium oxide ZrO = zirconium oxide

About Avalon Ventures Ltd.

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The language used in this News Release may contain forward-looking statements that may involve a number of risks and uncertainties. Actual events or results could differ materially from the Company's forward-looking statements and expectations. The TSX Venture Exchange has not reviewed and does not accept responsibility for the adequacy or accuracy of this news release.

No. 82-4427

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NEWS RELEASE

June 21, 2007 **No. 07-07**

Avalon Announces new Executive Appointments and grants of Incentive Stock Options

Avalon Ventures Ltd. TSX-V: AVL (the "Company") is pleased to announce the appointments of Dr. William Mercer, P.Geo. to the position of Vice President, Exploration of the Company and Ms. Cindy Hu, CA, CPA, CGA to the position of Controller. Both appointments are effective immediately. Mr. Mercer's primary responsibility will be to oversee all of the Company's mineral exploration programs. Ms. Hu will be responsible for maintaining the Company's general ledger and for preparation of financial statements.

Dr Mercer spent 24 years with Noranda, then Falconbridge and finally Xstrata holding various positions including Assistant Exploration Manager, Cordilleran District; Director, International Exploration; Director, Geology and Geochemistry and most recently Chief Geologist. Dr. Mercer has also been a very active member of the Prospectors and Developers Association of Canada (PDAC) serving on numerous committees over many years and as PDAC President from 2000 to 2002. During his career both at Noranda-Falconbridge and PDAC, Dr. Mercer has been an advocate for improved environmental, health and safety practice in the mineral exploration industry, and will be in charge of implementing such programs for the all of the Company's projects, consistent with the Company's strategic objectives for sustainable development.

Ms. Hu is a chartered accountant who has been in public accounting practice for over ten years. She is currently Senior Manager for Andersen & Company Professional Corporation and has extensive experience in all aspects of financial reporting issues affecting junior public companies.

Dr. Mercer and Ms. Hu have been granted an aggregate of 500,000 incentive stock options exerciseable at a price of $1.61 for a period of five years from the date of grant of the option. The options will vest at the rate of 25% per year. Any shares issuable on exercise of the options will be subject to a four month hold period beginning on the date of grant of the options. A further 25,000 are granted on the same terms to a new employee.

The Company also announces that it has granted an aggregate of 250,000 incentive stock options exerciseable for two years at a price of $1.61 per share to four consultants, of which 100,000 are being granted to consultants involved in investor relations activities. These options will vest at the rate of 25% every three months following the date of grant of the options and any shares issuable on exercise of the options will be subject to a four month hold period beginning on the date of grant of the options.

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NEWS RELEASE

No. 82-4427

July 16, 2007 | No. 07-08

Avalon Provides Corporate Update and Progress Report Drilling set to commence on Thor Lake Rare Earth Elements Target

Avalon Ventures Ltd. TSX-V: AVL (the "Company") is pleased to provide the following update on its exploration activities and corporate development.

Thor Lake Rare Metals Project: Drilling Program

Following receipt of the requisite Land Use permit from the Mackenzie Valley Land & Water Board, the Company has signed a diamond drilling contract and anticipates that drilling operations on the Lake Zone Rare Earth Elements ("REE") target will commence by July 25, 2007. Crew mobilization and camp construction will commence this week.

This phase of the work program will involve a minimum of 3,000 metres of drilling in 20 holes which are all planned to test targets for high grade REE mineralization in the southern portion of the Lake Zone, as recommended in the recently completed independent scoping study. Historical drilling in this area has produced significant intersections such as a 17 foot interval in hole 81-1 which averaged 0.70% Y_2O_3 and 4.11% TREO ("Total Rare Earth Oxide") having a high proportion of neodymium and the heavy rare earths, as previously disclosed. The drilling program has a budget of $1.1 million which will be largely funded from the proceeds remaining from the $1.55 million flow-through private placement completed in December, 2006. Drilling operations will be supervised by J.C. Pedersen, P.Geo. and D.L. Trueman, P.Geo., under the overall direction of the Company's Vice-President, Exploration, Dr. William Mercer, P.Geo.

In addition, the Company has budgeted a minimum of $170,000 for environmental remediation work related to historical development work at the North T -Zone as well as ongoing community consultation work, to be funded from working capital. This work will be carried out concurrently with the drilling. A second phase winter drilling program is planned for early 2008.

Warren Township Anorthosite Project: Bulk Sampling Program

Processing of the 1000 tonne bulk sample of calcium feldspar ore from the Warren Township property is proceeding steadily after a series of start-up delays at the toll processing facility of Aerosion Limited located near Calgary, Alberta. Approximately 60% of the ore has now been processed with the balance to completed by September, approximately three months behind schedule. The slow progress has resulted in significant cost increases with net program costs now expected to come in at close to $900,000, of which approximately $450,000 has been spent to date.

The Company continues to work closely with the customer, a major U.S. glass manufacturer, and the furnace trial has been re-scheduled for later in the fall. Careful attention to quality control by the Company's staff has successfully ensured that the product meets the desired chemical specifications. A final report on the results of the furnace trial is now expected by December, 2007. The project is being managed by Donald Hains, P.Geo., under the overall direction of Ian London, P.Eng., Vice President, Corporate Development.

Separation Rapids Lithium Project: Hydrometallurgical Testwork

With the growing demand for lithium chemicals from the rapidly expanding lithium ion battery market, the Company has initiated a research project at SGS Lakefield Research Limited to investigate the potential application of hydrometallurgical extraction technology to recover a lithium product suitable for the battery market from the petalite-rich lithium ores at Separation Rapids. Such technology has been successfully applied to other lithium minerals and initial literature research indicates this technology should be effective with petalite. A successful result would lead to a preliminary economic assessment of developing the project as a lithium chemicals producer. The project has a budget of $35,000 and is being supervised by Ian London, P.Eng.

Board Resignation: Lawrence Page, QC

The Company also announces that Mr. Lawrence Page, QC has resigned effective July 12, 2007, as Chairman and as a Director of the Company in order to focus more attention on his many other business ventures. Mr. Page has served the Company as a Director since its formation in 1991. He was responsible for recruiting the President to join the Company in 1995 and supported its subsequent evolution into a growing rare metals and minerals company. On behalf of the Board and management, the President extends thanks to Mr. Page for his contribution to the growth achieved by the Company to date and wishes him every success in his future endeavours.

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Form 51-102F3
Material Change Report

Item 1 Name and Address of Company

Avalon Ventures Ltd. (the "Issuer")
130 Adelaide Street West, Suite 1901
Toronto, Ontario M5H 3P5
Telephone: (416) 364-4938

Item 2 Date of Material Change

June 18, 2007

Item 3 News Release

A press release disclosing the material change was issued in Toronto, Ontario on June 18, 2007 and was disseminated through the facilities of Canada Newswire to its full distribution list and a copy was filed with the TSX Venture Exchange, as well as the B.C., Ontario and Alberta Securities Commissions.

Item 4 Summary of Material Change

<u>Receipt and Filing of Scoping Study (Preliminary Economic Assessment) on the Thor Lake rare metals deposits, Northwest Territories, Canada</u>

The Issuer received a final report from independent consulting engineers, Wardrop Engineering Inc, ("Wardrop") documenting the results of a Preliminary Economic Assessment on the Thor Lake Rare Earth Element ("REE") deposits. The report was based on NI 43-101 compliant mineral resource estimates for two rare metals deposits at Thor Lake, that were disclosed on January 22, 2007. The report concludes that, based on the cost and revenue assumptions used, the Thor Lake REE project can potentially achieve acceptable returns on invested capital and therefore warrants further investment to advance the project to a pre-feasibility or feasibility level of analysis. The economic assessment is based on indicated and inferred mineral resources that are not mineral reserves and therefore do not have demonstrated economic viability.

Item 5 Full Description of Material Change

On June 18, 2007, the Issuer received a final report from independent consulting engineers, Wardrop Engineering Inc, ("Wardrop") documenting the results of a Preliminary Economic Assessment (referred to previously as a scoping study) on the Thor Lake Rare Earth Element ("REE") deposits Northwest Territories, Canada. The Report was based on previously disclosed NI 43-101 compliant mineral resource estimates for two (North T and Lake Zones) of six known rare metals mineralized zones on the property.

The Study was commissioned by the Issuer in 2006 to evaluate the potential viability of recovering rare earth elements ("REE's") as a primary product from among many rare metals present in the resources known at Thor Lake. This was in response to growing demand for these elements in new environmental applications, especially from the automotive sector, where the REE's are vital to the new technologies developed for more fuel efficient ("hybrid") automobiles. Hybrid cars use rechargeable batteries along with electric motors and generators to power the car at low speeds and while idling, thereby reducing fossil fuel consumption and emissions of greenhouse gases. REE's are used in all three components but are most critical in the high-intensity permanent magnets which are key to making electric motors with the strength and efficiency required to power an automobile. Demand for hybrid cars is growing rapidly.

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The development model utilized by Wardrop for the Study contemplates initiating production on the more advanced Indicated Resource in the North T deposit, then following depletion of that resource after approximately 4-5 years of operation, transitioning production to the much larger Inferred Resource in the Lake Zone deposit. In accordance with NI43-101, it must be stated that mineral resources that are not mineral reserves do not have demonstrated economic viability.

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The economic analysis includes by-product credits for beryllium recovery from the North T deposit (it is not known to occur in the Lake Zone) plus by-product credits for tantalum and zirconium recovery from the Lake Zone (where they occur with the REE's), but does not include other potential rare metals products such as niobium, lithium or gallium. The reader is reminded that in accordance with NI43-101, a preliminary economic assessment such as the foregoing includes Inferred mineral resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that this Preliminary Economic Assessment will be realized.

The capital cost estimate for the base case production scenario involving initial development of the North T deposit at a mining rate of 215,000 tpy followed by development of the Lake Zone with a mining rate of 429,000 tpy is $123.2 million spread over an 8 year period. Operating costs for the T Zone ores are estimated at $69.59 per tonne of ore milled, and a preliminary estimate for the Lake Zone ore, for which a flow-sheet has not yet been established, is $134.73 per tonne milled. The model assumes mining by open pit methods and processing of the ore on site to produce mineral concentrates by flotation methods. REE recoveries of 65.7% are assumed based on preliminary bench scale testwork but these have yet to be confirmed. The model further assumes construction of a plant at another site in Alberta with access to lower cost power, to process the REE mineral concentrates to produce individual rare earth oxide products to 99% plus purity levels. Beryllium concentrates would be sold to an existing processor.

The REE resources at Thor Lake are of significant current interest to the market because of their relatively high proportions of contained heavy rare earth elements ("HREE's") such as terbium and dysprosium. These are in growing demand from the automotive sector but typically occur in very low concentrations in the majority of known REE deposits and consequently are attracting relatively high prices. The Lake Zone contains sub-zones enriched in an yttrium-tantalum-niobium oxide mineral called fergusonite which has high a proportion of HREEs plus neodymium, while the North T deposit contains sub-zones enriched in an yttrium phosphate mineral called xenotime which also contains a high proportion of HREE's. These minerals are the priority for recovery and processing.

Wardrop recommends that the Thor Lake project proceed to completion of at least a Pre-feasibility level analysis. The recommended work includes further drilling of the Lake Zone to better define REE resources to an Indicated level of confidence, metallurgical testwork on both the Lake Zone and North T REE mineralization, environmental studies, and continuing community engagement. The estimated minimum cost of this work program is $3.2 million with the work to be conducted in two phases beginning with a $1,200,000 summer drilling program anticipated to start in July, 2007, following receipt of requisite land use permits. Funding for the first part of this program is already in place.

The minimum $2,000,000 Phase II program budget involves further definition drilling of the Lake Zone, metallurgical testwork leading to pilot plant commercial testing, market and environmental studies, community consultation, engineering design and economic modeling. This would begin in January, 2008, subject to positive results from Phase I and arranging additional project financing.

Kevin Palmer, P.Geo. was the qualified person from Wardrop Engineering Inc. responsible for this resource estimation. Tim Maunula, P.Geo. of Wardrop Engineering reviewed his work and assisted with the development of the estimation parameters. Paul Franklin, P. Eng. and Peter Broad, P.Eng. were the engineers responsible for the developing the capital and operating cost estimates and the economic models. David L. Trueman, Ph. D., P.Geo., who has direct experience with the project dating back to 1983, reviewed all the data on behalf of the Company and contributed to the interpretation and market analysis where requested by Wardrop. The full Study has now been filed on SEDAR.

Item 6 Reliance on subsection 7.1(2) or (3) of National Instrument 51-102

Not applicable.

Item 7 Omitted Information

Not applicable.

Item 8 Executive Officer

The Executive Officer of the Issuer who is knowledgeable about the material change and the report is Donald S. Bubar, President & CEO, (416) 364-4938.

Item 9 Date of Report

June 25, 2007.

No. 82-4427

Form 52-109F2 *Certification of Interim Filings*

I, Donald S. Bubar, Chief Executive Officer of Avalon Ventures Ltd., certify that:

1. I have reviewed the interim filings (as this term is defined in Multilateral Instrument 52-109 Certification of Disclosure in Issuers' Annual and Interim Filings) of Avalon Ventures Ltd. (the issuer), for the interim period ending May 31, 2007;

2. Based on my knowledge, the interim filings do not contain any untrue statement of a material fact or omit to state a material fact required to be stated or that is necessary to make a statement not misleading in light of the circumstances under which it was made, with respect to the period covered by the interim filings;

3. Based on my knowledge, the interim financial statements together with the other financial information included in the interim filings fairly present in all material respects the financial condition, results of operations and cash flows of the issuer, as of the date and for the periods presented in the interim filings;

4. The issuer's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures and internal control over financial reporting for the issuer, and we have:

   (a) designed such disclosure controls and procedures, or caused them to be designed under our supervision, to provide reasonable assurance that material information relating to the issuer, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which the interim filings are being prepared; and

   (b) designed such internal control over financial reporting, or caused it to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with the issuer's GAAP; and

5. I have caused the issuer to disclose in the interim MD&A any change in the issuer's internal control over financial reporting that occurred during the issuer's most recent interim period that has materially affected, or is reasonably likely to materially affect, the issuer's internal control over financial reporting.

July 17, 2007

(signed) "Donald S. Bubar"
Donald S. Bubar
Chief Executive Officer

Form 52-109F2 *Certification of Interim Filings*

I, R. James Andersen, Chief Financial Officer of Avalon Ventures Ltd., certify that:

1. I have reviewed the interim filings (as this term is defined in Multilateral Instrument 52-109 Certification of Disclosure in Issuers' Annual and Interim Filings) of Avalon Ventures Ltd. (the issuer), for the interim period ending May 31, 2007;

2. Based on my knowledge, the interim filings do not contain any untrue statement of a material fact or omit to state a material fact required to be stated or that is necessary to make a statement not misleading in light of the circumstances under which it was made, with respect to the period covered by the interim filings;

3. Based on my knowledge, the interim financial statements together with the other financial information included in the interim filings fairly present in all material respects the financial condition, results of operations and cash flows of the issuer, as of the date and for the periods presented in the interim filings;

4. The issuer's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures and internal control over financial reporting for the issuer, and we have:

    (a) designed such disclosure controls and procedures, or caused them to be designed under our supervision, to provide reasonable assurance that material information relating to the issuer, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which the interim filings are being prepared; and

    (b) designed such internal control over financial reporting, or caused it to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with the issuer's GAAP; and

5. I have caused the issuer to disclose in the interim MD&A any change in the issuer's internal control over financial reporting that occurred during the issuer's most recent interim period that has materially affected, or is reasonably likely to materially affect, the issuer's internal control over financial reporting.

July 17, 2007

(signed) "R. James Andersen"
R. James Andersen
Chief Financial Officer

No. 82-4427

Report to:

AVALON VENTURES LTD.

Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT

Document No. 0551530201-REP-R0001-03

Report to:

AVALON VENTURES LTD.

PRELIMINARY ECONOMIC ASSESSMENT ON THE THOR LAKE RARE METALS PROJECT, NWT

MAY 2007

Prepared by	*"Original Document, Revision 03, signed by Kevin Palmer, P.Geo."* Kevin Palmer, P.Geo.	Date	June 15th, 2007
Prepared by	*"Original Document, Revision 03, signed by Peter Broad, P.Eng."* Peter Broad, P.Eng.	Date	June 15th, 2007
Prepared by	*"Original Document, Revision 03, signed by Paul Franklin, P.Eng."* Paul Franklin, P.Eng.	Date	June 15th, 2007
Reviewed by	*"Original Document, Revision 03, signed by Gilles Arseneau, P.Geo."* Gilles Arseneau, P.Geo.	Date	June 15th, 2007
Authorized by	*"Original Document, Revision 03, signed by Tim Maunula, P.Geo."* Tim Maunula, P.Geo.	Date	June 15th, 2007

WARDROP

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REVISION HISTORY

REV. NO	ISSUE DATE	PREPARED BY AND DATE	REVIEWED BY AND DATE	APPROVED BY AND DATE	DESCRIPTION OF REVISION
00					Initial Draft to Client.
01					Client Changes Finalized on SEDAR as Tech Report.
02					Client Changes.
03					Client Changes – Finalized on SEDAR as Preliminary Economic Asssessment.

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1.0 SUMMARY

Avalon Ventures Ltd. (Avalon) is a junior mineral exploration company that has focused on the specialty and rare metals mineral sector over the last 10 years. In that period the company has recognized growing markets for these metals in response to advancing technologies and in 2005 acquired the Thor Lake deposit, Northwest Territories, which contains yttrium (Y), rare earth elements (REEs), beryllium (Be), tantalum (Ta), niobium (Nb) and zirconium (Zr). In 2006 Avalon contracted Wardrop Engineering Ltd. (Wardrop) to undertake a resource estimate for the Thor Lake deposits and provide a Preliminary Economic Assessment (PEA) study of these deposits for an integrated mine to market project.

Avalon's Thor Lake rare metal project is located in Canada's Northwest Territories about five kilometres (km) north of the Hearne Channel of Great Slave Lake and approximately 100 km southeast of the City of Yellowknife.

The property encompasses five contiguous mining leases totalling 10,449 acres (4,249 hectares). The mining leases have a 21-year life and are registered to, and wholly owned by, Avalon. Each lease is renewable in 21-year increments. The property is subject to two underlying royalty agreements entitling the royalty holders to a cumulative 5.5% Net Smelter Return (NSR) royalty.

The mineral deposits at Thor Lake formed from late magmatic, hydrothermal and supercritical phases during the evolution of the Aphebian-age Blatchford Lake Intrusive Complex. A description of the geology of the area has been provided by Davidson (1978) and of the mineral deposits by Trueman, Pederson, de St. Jorre and Smith (1989). Principal rock types in the area include syenites, granites and their altered equivalents, which are intruded into Archean metasedimentary rocks of the Yellowknife Supergroup.

Six deposits or zones having rare metal mineralization of potential economic interest have been identified on the Thor Lake property. These are: the North T, South T, R, S, Fluorite and Lake Zone deposits. The North T and South T deposits are characterized by yttrium plus heavy rare earth* elements (Y+HREE), light rare earth elements (LREE), beryllium, niobium and zirconium, while the Lake Zone deposit contains Y+HREEs, LREEs, tantalum, niobium and zirconium. The other deposits, less well explored, are noted for their Y+HREE contents. Wall rocks mantling the deposits are notably enriched in gallium (Ga).

* The rare earth elements are by convention divided into two subgroups; the Light Rare Earth element subgroup including those elements of atomic numbers 57 (lanthanum) to 62 (samarium), and the Heavy Rare Earth element including atomic numbers 63 (europium) to 71 (lutetium). See also Appendix E.

In the North T deposit, Y+HREEs are found predominantly in the mineral xenotime (Y, REE, PO_4) while in the Lake Zone deposit they occur predominantly in fergusonite (Y, REE, Ta, Nb, O_4). LREEs occur in bastnaesite group minerals (REE, CO_3F), which are particularly enriched in the F sub-zone of the North T deposit and in accessory amounts in the other deposits. In the portions of the Lake Zone deposit, explored to date, the LREEs are principally contained in allanite $[(Ca,REE,Y)_2(Al,Fe)_3(SiO_4)_3(OH)]$ and to a lesser extent in bastnaesite group minerals.

Typically, as in other rare earth element (REE) deposits, the REEs (or lanthanide elements) at Thor Lake occur in fixed proportions in their constituent minerals as shown in Table 1.1 and remain constant in those minerals throughout the deposits. This behaviour, documented in three generations of analytical data from Thor Lake, allows interpolation of the total rare earth element (TREE) content of a given sample on the basis of one or more individual rare earth element analysis. This principal has been applied to the historical analytical data from the North T and Lake Zone deposits in this study.

Table 1.1 Lanthanide Distribution in the Thor Lake REE Minerals[1]

Deposit	North T		Lake	
Mineral Oxide	Xenotime %	Bastnaesite %	Fergusonite %	Allanite %
Lanthanum Oxide (La_2O_3)	0.10	23.44	0.30	27.13
Cerium Oxide (Ce_2O_3)	0.02	46.82	4.40	51.20
Praesodymium Oxide (Pr_2O_3)	0.10	5.58	1.70	5.30
Neodymium Oxide (Nd_2O_3)	0.20	20.23	15.60	15.18
Samarium Oxide (Sm_2O_3)	1.80	2.19	10.40	1.21
Europium Oxide (Eu_2O_3)	0.70	0.19	1.60	
Gadolinium Oxide (Gd_2O_3)	11.60	1.02	14.30	
Terbium Oxide (Tb_2O_3)	2.50	0.06	1.80	
Dysprosium Oxide (Dy_2O_3)	15.61	0.12	9.80	
Holmium Oxide (Ho_2O_3)	3.10	0.02	1.20	
Erbium Oxide (Er_2O_3)	5.41	0.07	4.10	
Thulium Oxide (Tm_2O_3)	0.60		0.70	
Ytterbium Oxide (Yb_2O_3)	2.20	0.01	4.40	
Lutetium Oxide (Lu_2O_3)	0.70		0.70	
Yttrium Oxide (Y_2O_3)	55.31	0.40	29.05	
Total	99.95	100.15	100.00	100.02

(1) After Pinckston, 1989, Mariano, 2006, and Mitchell 2007

The REE distribution in the Lake Zone fergusonite is remarkable for its enrichment in mid-atomic number lanthanides from neodymium to dysprosium which is ideally suited to current market demand from magnet manufacturers serving the automotive sector. This is an important observation as it implies that this material will have a competitive advantage in the marketplace and a clean concentrate would likely command a premium price. Further, unlike xenotime and monazite, fergusonite does *not* have any associated thorium removing the potential for radioactive contamination of the concentrate that might attract a penalty. Instead it is enriched in tantalum, a potentially valuable by-product.

Beryllium mineralization is found in the North and South T Zone deposits where the predominant beryllium mineral is phenacite (Be_2SiO_4). It is notably absent in the other zones. Niobium is ubiquitous in all of the deposits, principally in columbite and is also associated with tantalum in the Lake Zone deposit in the Y+HREE bearing mineral fergusonite. Tantalum is notably absent in both the North and South T deposits. Zirconium is found as zircon in all of the deposits and gallium displays enrichment in albite feldspar wall zones mantling both the T Zone and Lake Zone deposits.

Highwood Resources Ltd. (Highwood) began claim staking at Thor Lake in 1976 and conducted mineral exploration on the property for approximately fourteen years with cumulative expenditures totalling over $12 million. This work included geological mapping, geophysical surveys, sampling, trenching, drilling, metallurgical research, underground bulk sampling and pilot plant scale metallurgical processing.

Six mineral resource estimates were subsequently made by Highwood and various partners. In order to generate a resource estimate compliant with National Instrument 43-101 (NI 43-101) standards for preliminary economic modelling of the deposits, Wardrop has used the historic deposit sub-zone nomenclature from this work and data extracted from a historic MineSight© project for the North T deposit. The results for the North T deposit are compiled in Table 1.2 where drill hole spacing was sufficient to classify the resources as Indicated.

Table 1.2 Summary of Indicated Mineral Resources for the North T Deposit

Sub-zone	Cut-off	Tonnes	TREO[1]+Y_2O_3%	BeO%[1]	Nb_2O_5%[1]
C, D, E	0.40 BeO	498,409	0.72	0.98	0.50
F	0.10 Ce_2O_3	43,877	6.50	0.16	0.01
Y	0.04 Y_2O_3	593,815	0.45	0.08	0.59
Total		1,136,101	0.71	0.48	0.53

[1]BeO – Beryllium Oxide, Nb_2O_5 – Niobium Oxide, TREO – Total Rare Earth Oxides

Wardrop also generated a resource model for the Lake Zone deposit from existing historical drill hole data. The model, computer generated, is based on validated historic analytical data supplemented by new REE assay data, new rock density data and a preliminary geological interpretation. The results are compiled in Table 1.3 for three different Y_2O_3 grades.

Table 1.3 Summary of Inferred Mineral Resource for the Lake Zone Deposit

Cut-off %	Tonnes	$TREO+Y_2O_3$%	Ta_2O_5%[1]	Nb_2O_5%	ZrO%[1]
0.10 Y_2O_3	14,005,000	1.23	0.025	0.33	1.73
0.05 Y_2O_3	83,224,000	0.99	0.025	0.31	1.96
0.01 Y_2O_3	375,410,000	0.41	0.014	0.22	1.19

[1] Ta_2O_5 – Tantalum Oxide, ZrO – Zirconium Oxide

The resources in the Lake Zone deposit are categorized as Inferred due to the relatively wide spacing of the drill holes and absence of drilling in many parts of the deposit. It is evident however, that the Lake Zone is a large, mineralogically zoned body for which further detailed drilling is required to define zonation patterns and delineate Indicated resources.

Froth flotation processes were developed in 1985 by Lakefield Research Ltd. (Lakefield) for the recovery and concentration of beryllium (phenacite) from the T Zone deposits. Flotation technology was also developed for the recovery of the LREEs (bastnaesite) from the F sub-zone. Preliminary attempts were made at that time to recover the Y+HREEs (xenotime) from the tailings of the beryllium process, but the concentrate grades and recoveries were low.

A tantalum flotation process, developed by Lakefield in 2001 for the Lake Zone, produced a bulk concentrate which in addition to the tantalum also concentrated the Y+HREEs, tantalum, niobium, LREEs and zirconium. Recent microscopic analysis of this concentrate has since confirmed that this process successfully recovered the fergusonite mineralization, although this was not recognized at the time. This work was complemented by leach testing of the concentrate at Lakefield in 2002, which demonstrated that the bulk fergusonite enriched concentrate was amenable to solvent extraction and processing for the recovery of the contained individual metals.

Avalon is considering a mining operation at Thor Lake to recover rare earths as a primary mineral product followed by solvent extraction processing of concentrates at another site to recover saleable yttrium and REE derivative products. Some of the potential by-products, such as phenacite (beryllium), could be sold as a mineral concentrates. The scoping study was prepared to model the economics of this potential production scenario and determine if further investment is warranted.

The base case model makes a conservative assumption of annual sales of 500 tonnes per year of refined Y+HREE oxides exiting the solvent extraction plant. This assumes capture of an approximate 50% share of the current North American Y+HREE market and makes no allowance for growth in demand as predicted in the BCC Research Report (Sinton, 2006) and the forecasted supply deficit. Nominal annual product sales for the base case are seen in Table 1.4.

Table 1.4 Annual Concentrate and Refined Production by Zone Utilized in the Scoping Analysis of Thor Lake

Zone	North T Zone (tonnes)	Lake Zone (tonnes)
Y_2O_3	276.5	145.5
Total HREE	223.5	354.5
Total LREE	6,000.0	3650.0
Phenacite	700.0	0.0

To achieve this, a mining requirement of 215,000 tonnes per year is drawn from the North T Zone, rising to 429,000 tonnes per year from the Lake Zone. Both zones are exploited through open pit mining methods. Production of other commodities, such as beryllium concentrates, would exceed current forecasts of annual industry demand and the surplus would be stockpiled for future sales.

Initial production from the North T Zone requires a capital investment of $68.0 million and operating costs approximate $69.59 per tonne of ore milled. Development of the Lake Zone will require an additional expenditure of $55.2 million for a total capital expenditure of $123.2 million over a period of eight years.

Process operating costs for the T Zone approximate $69.59 per tonne of ore milled, and a preliminary, conservative estimate of processing costs for the Lake Zone, for which a flow-sheet has not been established, is approximately $134.73 per tonne milled. The significant cost differences are a result of processing lower grade Lake Zone ores having a differing Y+HREE content from the North T Zone and can be expected to decrease with development of higher grade resources in the Lake Zone.

The results of a discounted cash flow (DCF) analysis for the scoping study using the above cost estimates and current REE prices (unadjusted for future price forecasts) are compiled in Table 1.5.

Table 1.5 Financial Analysis Results

Scenario	Y+HREE Production (tonnes per year)	Mine Life	Return on Investment (ROI)	Net Present Value (NPV) @ 5%
North T only	500		20.6%	$47,555,000
North T + Lake	500	18 years	17.9%	$66,073,000
North T + Lake	500	30 years	18.7%	$111,574,000

A sensitivity analysis was developed for two scenarios involving increased production levels was prepared based on the demand outlook in the BBC Research Report (Sinton, 2006). In these scenarios the process rate for North T Zone was maintained and the process rate from the Lake Zone was increased by factors of two- and four- fold. Current price data were utilized and the modelling results are shown in Table 1.6.

Table 1.6 Financial Analysis Results with Increased Throughput

Scenario	Y+HREE Production (tonnes per year)	Mine Life	ROI	NPV @ 5%
North T + Lake	1,000		21.8%	$151,180,000
North T + Lake	2,000		26.7%	$356.104,000

The financial results in Tables 1.5 and 1.6 confirm that the Thor Lake project warrants further investment to advance the project to a pre-feasibilty level of analysis. To achieve this, Wardrop recommends that the following work be completed:

- Infill and stepout drilling where required in the North and South T Zone deposits to better define the rare earth resources.
- Re-sampling of un-assayed archived drill cores from the South T Zone for REEs and preparation of a new REE resource estimate for the South T deposit.
- Further drilling should be conducted in the Lake Zone deposit to delineate the known areas of fergusonite mineralization and define the higher grade portions of these areas for Y+HREE resources.
- Geotechnical surveys should be undertaken for pit slope stability studies and hydrogeology studies should be completed.
- An analytical protocol should be established for analysis of the light rare earth and heavy rare earth factions for drill core assays and subsequent head grade controls. This should include preparation of reliable analytical standard samples.
- Data entry of the entire Thor Lake drilling database, in particular the South T Zone, using appropriate software and a double entry procedure to rapidly detect corrupt data entry.
- A new process flowsheet should be developed to improve the recoveries and grade for xenotime and these concentrates should be processed through solvent extraction testing.
- Bastnaesite group mineral concentrates from the F sub-zone should be processed through solvent extraction testing.
- Metallurgical work on the Lake Zone deposit should be continued with the benefit of the knowledge that fergusonite is the principal mineral of economic interest. This work should continue through leach testing into solvent extraction processing.
- Gallium extractive metallurgy from feldspar should be examined.
- REE market research and development work should be accelerated to better determine future market requirements so the project can be scaled accordingly.

- Environmental studies should continue and permitting issues addressed for all plantsite locations.
- Development of a framework business plan accommodating local needs and wants should continue

These recommendations should be implemented in a two phase program with execution of the second phase being dependent on positive results from the first phase. The first phase program involving mainly drilling of the Lake Zone and metallurgical testwork has a recommended budget of $1.1 million. The second phase program would involve more drilling, metallurgy and any other work required to complete at least a pre-feasibility analysis of the project, at a total estimated cost of $1.8 million

Advancing of the Thor Lake project shows considerable merit, especially when viewed in the light of burgeoning demand for the heavy rare earths, from the automotive sector in particular, and the lack of supply sources outside of the Peoples' Republic of China, which now controls over 95% of the world's supply. The other rare metals in the deposits at Thor Lake are also experiencing growing demand from high technology and alternative energy applications and warrant further investigation as to their economic potential.

1.1 Budget for Recommended Programs at Thor Lake

The recommendations above need to be addressed as the Thor Lake Project advances. A two phase work program and budget for this work includes:

1. Drilling for the purpose of increasing and delineating higher grade REE resources in the Lake Zone and in a second phase of work, test other areas including potential extensions of the T deposits and the R and S Zones.
2. Development of mineral beneficiation and refining processes for the REE's in fergusonite in the Lake Zone, xenotime in the North T deposit, gallium in the wall zones and tantalum, niobium and zirconium in all zones in all of the zones.
3. Markets for the various possible commodities from Thor Lake have been reviewed and are seen to be undergoing rapid changes in sources of supply, pricing and end use Markets will require more rigorous definitions for specification of the commodities and demonstration material will need to be produced during the metallurgical work.
4. Historical environmental work has been reviewed and the budget includes monies to fund recommendations made by consultants for upgrading to current requirements.
5. Organization and upgrading all of the existing data into a comprehensive electronic database compatible with data to be newly acquired are funded.

6. During the course of the above work, monies are also budgeted for the purpose of community consultation and establishing working relations and agreements with First Nations communities.

Wardrop recommends that the work be conducted in two phases with the second phase being contingent upon a successful Phase 1 program and drill testing in the second phase to be conducted on the ice cover over Thor Lake. The Phase 2 program also includes test drilling of the R and S Zones and large diameter core (PQ) drilling of the T Zone for metallurgical testwork sampling and rock mechanic studies.

The budget required to accomplish these main objectives is shown in Table 1.7

Table 1.7 Thor Lake Budget

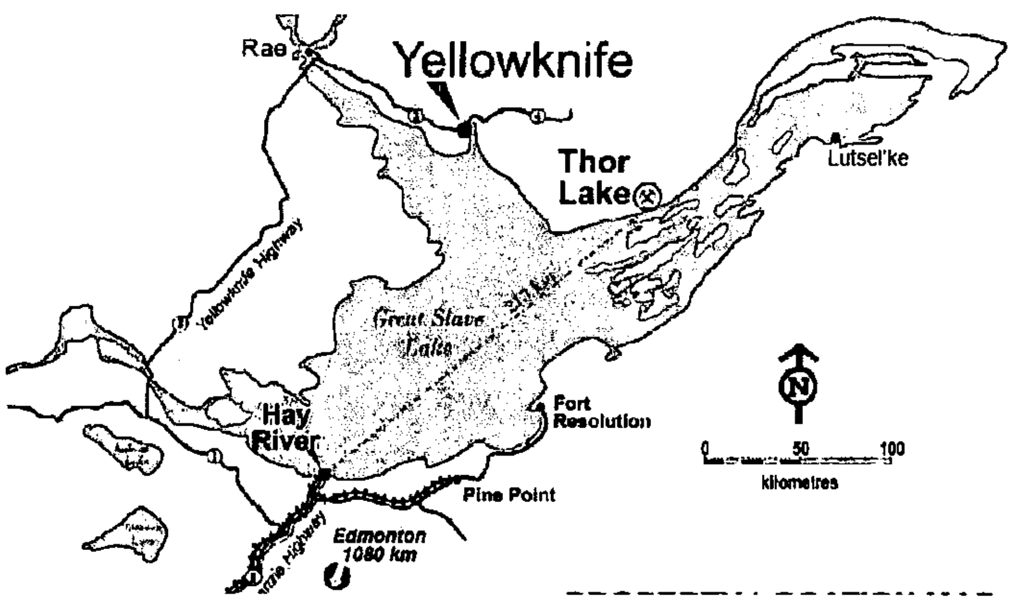
Item	Amount
Phase 1	
Diamond Drilling 3,000 m @ 200/m all in	$600,000
Camp, Office Equipment	$70,000
Metallurgical Research, Mineralogical & Market Studies	$100,000
Environmental Program	$50,000
Community Consultation	$50,000
Data Archiving and Compilation	$100,000
Management and Supervision	$60,000
Contingency	$103,000
Sub-total	**$1,133,000**
Phase 2 (contingent on positive results from Phase 1 program)	
Diamond Drilling 4500m @ 200/m all in	$900,000
Metallurgical Testing	$200,000
Engineering and Feasibility Study	$300,000
Community Consultation	$50,000
Environmental Program	$50,000
Market Research	$100,000
Management and Supervision	$80,000
Contingency	$180,000
Sub-total	**$1,860,000**
Grand Total (Phase 1 and Phase 2)	**$2,993,000**

2.0 INTRODUCTION

The purpose of this report is to support the first time disclosure of an NI 43-101 compliant resource estimate for the Thor Lake Project for Avalon and to provide Avalon a preliminary financial analysis of a model based on the recovery of yttrium, rare earth and other rare metals from the project.

The Thor Lake property encompasses an area of 4,249 hectares (10,449 acres) hosting six rare metal bearing mineral deposits. Located in the Mackenzie Mining District of the Northwest Territories, the Thor Lake property is approximately 100 km southeast of Yellowknife and 5 km north of the Hearne Channel of Great Slave Lake (Figure 2.1).

Figure 2.1 Thor Lake Property Location



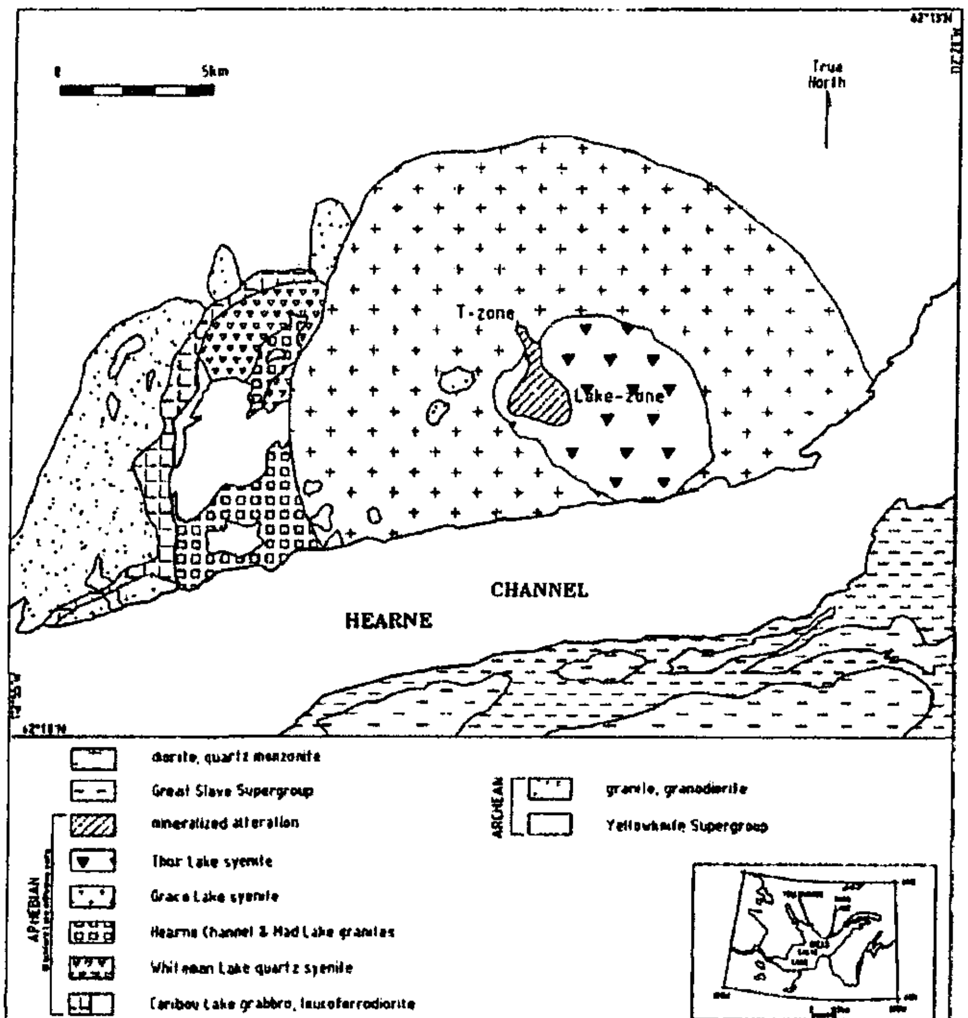
The mineralization at Thor Lake occurs within syenites and granites of the multi-phase Blatchford Lake Intrusive Complex; a series of sub-circular intrusive rocks of Aphebian age that range from gabbro to syenite and granite intrusive into Archean metasedimentary rocks of the Yellowknife Supergroup (Figure 2.2).

The mineral deposits occur in distinct mineralized zones that are variably enriched in yttrium, heavy and light rare earth elements, beryllium, tantalum, niobium, zirconium and gallium (Table 2.1).

Table 2.1 Mineral Deposit Nomenclature and Elements of Interest

Zone		Sub-Zone	Elements of Interest
T Zone	North T Zone	F	LREE
		E	Be
		D	Y, HREE, LREE, Be, Nb, Zr
		C	Y, HREE, LREE, Be, Nb, Zr
		Y	Y, HREE, LREE
	South T Zone		Y, HREE, LREE, Be, Nb, Zr, Ga
Lake Zone			Y, HREE, LREE, Ta, Nb, Zr, Ga
R Zone			Y, HREE
S Zone			Y, HREE
Fluorite Zone			Y, HREE

Figure 2.2 Generalized Geology of the Thor Lake Area (after Davidson, 1978)

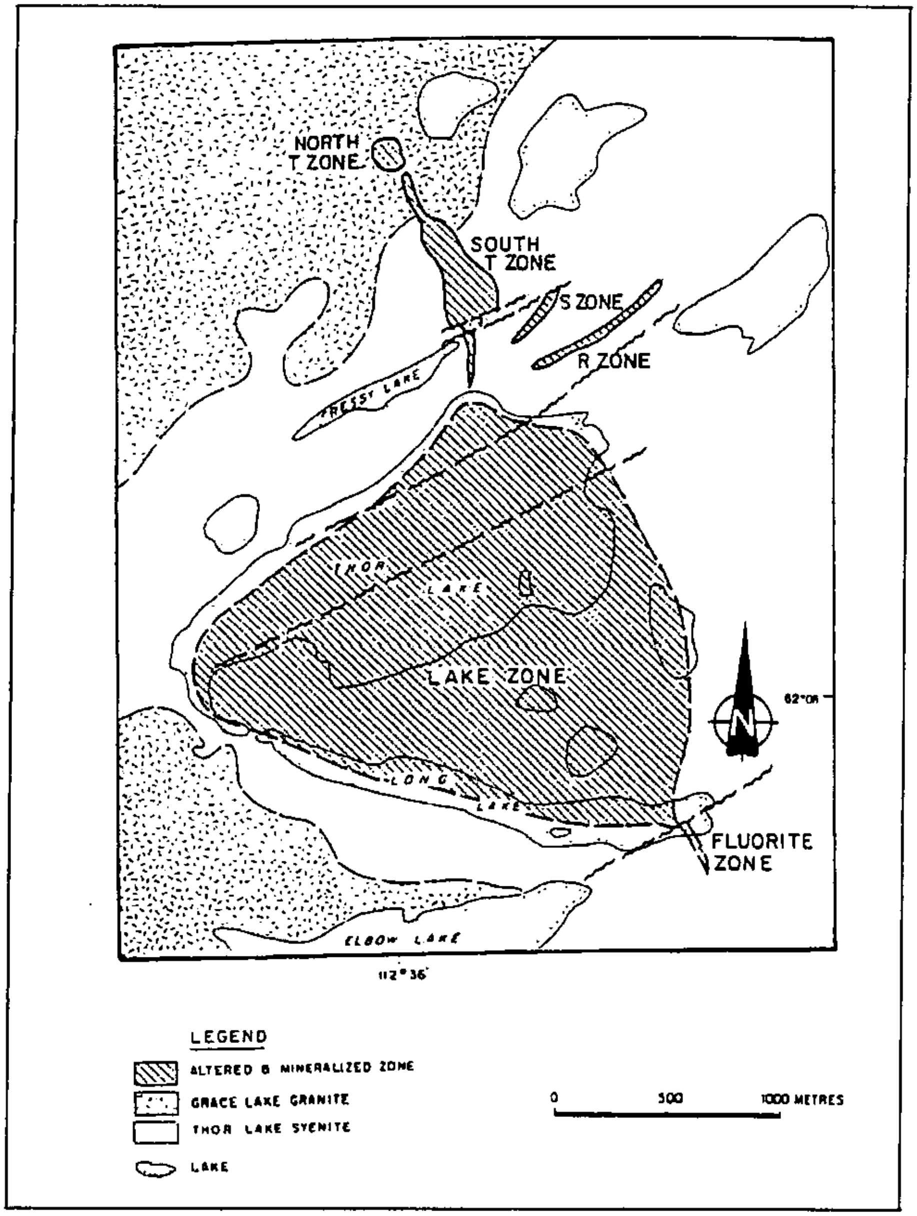


Generalized Geological Map of the Blachford Lake intrusive suite showing the location of the T- and Lake- zones (after Davidson, 1978, 1982)

Two of the zones, the T Zone and the Lake Zone, because of their size, contained elements of interest and their better definition through drill and metallurgical testing form the bases of the present study.

The T Zone extends northwest for about one kilometre from Thor Lake and is the most studied and best understood of the deposits. This zone has been sub-divided into northern (North T Zone) and southern (South T Zone) segments and transects both the Thor Lake syenite and Grace Lake granite (Figure 2.3).

Figure 2.3 Thor Lake Mineralized Zones (after Pedersen et al, 2007)



The principal elements of interest within the T Zone include yttrium, both the light and heavy rare earth elements (see Appendix E) and beryllium. Yttrium closely associates with the HREE in the minerals xenotime and sparse gadolinite and the beryllium is found in phenacite and lesser bertrandite, gadolinite and helvite group minerals (Appendix A). The LREE are found in the fluorocarbonate minerals bastnaesite, synchisite and parasite throughout the North and South T Zones and are in particular enriched in the F sub-zone of the North T Zone deposit. Niobium occurs in the mineral columbite throughout the T Zone deposits with zirconium in zircon. Gallium shows exceptional enrichment in feldspathic wall rocks that mantle the deposits.

The Lake Zone, triangular in shape, defined by drilling and limited exposure crops out over an areal extent of approximately two square kilometres (km^2). Interest in the Lake Zone in past has focused on tantalum, largely thought to be in columbo-tantalite and latterly in yttrium and the HREE. Recent work by Grammatikopoulos (2001) and LeCouteur (2002) and ongoing work by Mariano indicates that the tantalum, yttrium and HREEs are all hosted in the mineral fergusonite. Other minerals hosting the rare earths in the Lake Zone include HREEs in monazite and LREEs in allanite. Niobium is present in ubiquitous ferro-columbite, zirconium in zircon and gallium in wall rock feldspars.

In the past, yttrium and the REEs in the mineralized zones at Thor Lake were only considered as potential by-products of primary beryllium or tantalum production. However, and in view of a strengthened and growing demand for these elements with their concomitant price increases, the yttrium and REE potential at Thor Lake warrants a new consideration.

Accordingly, this report is a PEA, or scoping study, of the Thor Lake Project focused on the yttrium and HREEs. It has been undertaken to quantify the resource at Thor Lake, assess its recovery and determine the marketability of the resulting commodities. The mineral resource and reserves have been generated in compliance with the CIM standards and best practices and the report complies with NI 43-101 standards.

K. J. Palmer, P.Geo, a co-author of this report, visited the Thor Lake site in the company of Dr. D.L. Trueman, P.Geo., J.C. Pedersen, P.Geo, Dr. A. Mariano and Dr. M. Heiligmann, all consultants to Avalon between the 22nd and the 25th of July 2006.

Trueman, Pedersen, and Mariano have variously been involved in work on the Thor Lake deposits since 1979 and Trueman has been closely involved in all aspects of the following assessment.

2.1 TERMS OF REFERENCE

Avalon commissioned Wardrop to prepare an NI 43-101 compliant report on the yttrium and rare earth element development potential of the T and Lake Zone deposits at Thor Lake. This work entailed estimating mineral resources in conformance with the CIM Mineral Resource and Mineral Reserve definitions referred to in the NI 43-101 Standards and Disclosure for Mineral Projects. It also involved the preparation of a technical report as defined in NI 43-101 in compliance with Form 43-101F1 (Technical Reports). The inventory of the resources represents an update to existing historic resource estimates delineated from historical drilling data and the scoping study is based on these findings. The report further provides recommendations to advance the Thor Lake project to a scoping level.

3.0 RELIANCE ON OTHER EXPERTS

The ensuing report finds basis in exploration of the mineral deposits at Thor Lake in metallurgical work undertaken by, or on behalf of the former property owners and in ongoing work by Avalon. In past, the work has been and is presently overseen by qualified professional geological, mining and metallurgical personnel under the definitions of NI 43-101. The results of this work, generated over a period of 29 years, have been tested and where found valid have been utilized extensively in this report.

The variety of metals found at Thor Lake, their metallurgy and their markets are not widely known outside of the mainstream of base or precious metal expertise. Accordingly, Avalon and Wardrop have retained the services of outside, accredited and professional personnel where experience, practice or expertise in a largely specialized field has been required.

Literature sources have also been extensively utilized and where used, are cited accordingly.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 PROPERTY LOCATION

The Thor Lake property is located in Canada's Northwest Territories, 100 km southeast of the capital city of Yellowknife and 5 km north of the Hearne Channel on the East Arm of Great Slave Lake. The property is within the Mackenzie Mining District of the Northwest Territories and Thor Lake is shown on National Topographic System (NTS) map sheet 85I/02 at approximately 62°06'30"N and 112°35'30"W.

4.2 PROPERTY DESCRIPTION

The Thor Lake property comprises five contiguous mineral leases totalling 4,249 hectares (10,449 acres), pertinent data for which are shown in Table 4.1.

Table 4.1 Mining Leases – Thor Lake

Lease Number	Area (Hectares)	Legal Description	Effective Date	Expiration Date
3178	1,053	Lot 1001, 85 I/2	22/05/1985	22/05/2027
3179	939	Lot 1000, 85 I/2	22/05/1985	22/05/2027
3265	367	Lot 1005, 85 I/2	2/3/1987	2/3/2008
3266	850	Lot 1007, 85 I/2	2/3/1987	2/3/2008
3267	1,040	Lot 1006, 85 I/2	2/3/1987	2/3/2008
Total	**4,249**			

The mining leases shown in Table 4.1 have a 21-year life and each lease is renewable in 21-year increments.

Annual payments of $2.47 per hectare ($1.00 per acre) are required to keep the leases in good standing.

Avalon owns 100% of all of the leases subject to various legal agreements described in Section 4.2.1 below.

4.2.1 LEGAL AGREEMENTS, UNDERLYING ROYALTY INTERESTS

Two underlying royalty agreements exist on the Thor Lake property: the Murphy Royalty Agreement and the Calabras/Lutoda Royalty Agreement, both of which originated with Highwood Resources Ltd., the original developer of the property.

The Murphy Royalty Agreement signed in 1977 entitles J. Daniel Murphy to a 2.5% NSR. The Murphy Royalty Agreement applies to the entire Thor Lake property and is an escalating amount indexed to inflation. At present it is estimated to be approximately $800,000.

The Calabras/Lutoda Royalty Agreement signed in 1997 entitles Calabras (Canada) Ltd. (Calabras) to a 2% NSR and Lutoda Holding Ltd. (Lutoda) to a 1% NSR.

4.2.2 Legal Survey

The Thor Lake mineral leases have been legally surveyed and are recorded on a Plan of Survey, Number 69408 M.C. in the Legal Surveys Division of the Federal Department of Energy, Mines and Resources, Ottawa. The perimeter boundaries of the lease lots were surveyed as part of the leasing requirements.

4.2.3 Mineralized Zones

The six areas of mineralization at Thor Lake have been noted above in Section 2.0 and detailed descriptions follow in Sections 7.1 through 9.2 below.

4.2.4 Environmental Liabilities

Highwood held a land use permit that allowed for clean up, maintenance and exploration on the property. The permit expired on October 26, 2002. New permitting has been initiated by Avalon, which will accommodate several changes to the regulatory framework for environmental assessment, land use planning, and resource management that have since been legislated.

In past, the jurisdictional responsibility over certain lands, resources and land and water use had been governed by the Department of Indian Affairs and Northern Development (DIAND), Canada. Under the recently enacted Mackenzie Valley Land and Water Resources Act and Regulations, the Mackenzie Valley Land and Water Board (MVLWB), rather than the Federal Government, now administers land use permits. The Mackenzie Valley Resource Management Act (MVRMA) allows more local and particularly aboriginal input into land and water use permitting. The MVRMA establishes a three part environmental assessment process:

- Preliminary screening.
- Environmental assessment.
- Environmental impact review (panel review).

The Thor Lake Project will probably require environmental assessment, as well as an environmental impact review.

Exploration on the Thor Lake property included underground bulk sampling, drilling and trenching. Accordingly there is little surface disturbance from exploration activities. Apart from a trailer camp, miscellaneous buildings, a 60,000 gallon six tank farm, a tent camp and a core storage area located on the property, there are no other environmental liabilities left by past exploration activities. Some diesel fuel remains in the tank farm and it is Avalon's intent to consume the fuel during future site activities.

Access to the underground workings has been barricaded and the mine workings allowed to flood.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 TOPOGRAPHY, ELEVATION AND VEGETATION

The Thor Lake area is characterized by low relief, between 230 metre (m) and 255 m above sea level and subdued topography. The area is typical boreal forest of the Canadian Shield and is primarily covered by open growths of stunted spruce, birch, poplar and jack pine which mantle isolated, glaciated rocky outcrop. Approximately one third of the property is occupied by lakes and swamps; the largest lake being Thor Lake at 238 m above mean sea level and having a surface area of about 136 hectares.

Permafrost was not encountered during the course of work in the immediate area.

5.2 ACCESSIBILITY

The Thor Lake property is accessible by boat, winter road and seasonally by float or ski-equipped aircraft from either Yellowknife or Hay River located on the southwest shore of Great Slave Lake. The freeze-up and break-up periods preclude ready access to the area and a mining operation at Thor Lake would require a suitably sized permanent airstrip, which would allow for a minimum of Twin-Otter sized aircraft service from Yellowknife throughout the year.

During the summer ice free period, equipment can be barged to a landing site on the Hearne Channel on Great Slave Lake and then transported by existing access road approximately 9 km to the mine site at the North T Zone. During the winter months, heavy equipment and bulk materials can be brought in by winter roads on the ice cover over Great Slave Lake. During the freeze-up and break-up periods extra storage will be necessary for fuel and bulk supplies that cannot be brought in by aircraft.

Dock facilities will need to be constructed on Great Slave Lake to enable the loading and offloading of cargo going to or coming from Hay River. In addition, the access road from the wharf to the site will need to be upgraded and proper access roads will need to be constructed around the site.

5.3 CLIMATE

The climate is typical of Northern Canada with cold, dark winters and a fairly warm, short summer with long daylight hours. Temperatures range from around extremes of -50 degrees Celsius (°C) to +30°C, with normal winter temperatures from mid-November to mid-April of -15°C to -35°C. Temperatures from mid-May to the end of September range from 0°C to about +20°C. Precipitation is light and similar to Yellowknife, which receives 15 centimetres (cm) of rain and 135 cm of snowfall annually.

Most lakes in the area do not freeze to the bottom and process water is readily available year-round. Freeze-up commences in late October and break-up of the majority of the lakes in the area is generally complete by late May. Great Slave Lake freezes later and is ice free later than the smaller lakes.

5.4 INFRASTRUCTURE

Yellowknife, the capital city of the Northwest Territories, is located 100 km northwest of Thor Lake. The economy is centred on mining and mineral exploration and has a strong supporting infrastructure.

The aboriginal community of N'Dilo is located on Latham Island in the northern part of the City of Yellowknife. A second aboriginal community, Detah, is located southeast of Yellowknife, across Yellowknife Bay. Both are readily accessible.

The Town of Hay River is located on the south shore of Great Slave Lake where the Hay River enters the lake, extends south from the lake along the west bank of the river. The largest aboriginal community in the Hay River area is the Hay River Reserve, which is located on the east bank of the Hay River across from the town. Another community, the West Point First Nation, is located on the west end of Vale Island in the Town of Hay River. Hay River is accessible by air, rail and Highway 3 from Edmonton, Alberta.

Fort Resolution is located on the southeast coast of the main body of Great Slave Lake in Resolution Bay. The community is serviced by road from Hay River.

The community of Lutsel K'e is located on Christie Bay on the East Arm of Great Slave Lake and is accessible by air or boat.

Fort Providence is located on the Mackenzie River about 40 km downstream from the outflow of Great Slave Lake. The town is serviced by Highway 3 between Hay River and Yellowknife.

Mining operations in the North have typically drawn personnel from Alberta, Saskatchewan, Yellowknife and local First Nations communities. In an operation at Thor Lake, local First Nations communities may include Dettah N'Dilo, Deninu

Kue, Hay River Reserve, Fort Resolution, and Lutsel K'e as sources of personnel. All of the mining operations in the North (outside of Yellowknife) have implemented policies related to maintaining a certain level of First Nation employment, and Avalon will need to develop hiring and training policies with aboriginal employees.

The closest source of power to Thor Lake is Yellowknife: the distance being such that it would be prohibitively expensive to build a power line to Thor Lake. As in other mining operations in the North, such as Lupin, Ekati and Diavik, it would be necessary to use diesel power generation for any mining operation at Thor Lake.

Fuel can be barged to the site in the summer and trucked to the site in the winter. During the transition periods in the spring and fall, neither barge nor winter road access would be possible and a minimum of four months fuel storage capacity would be considered necessary on site.

Bulk sampling via decline ramp was conducted in the North T Zone of the Thor Lake Property in 1985. Exploration roads, a trailer camp, vehicle sheds, fuel tanks, vehicles and a miner's dry remain from this period of exploration. Necessary infrastructure and access will nevertheless have to be constructed in order to support a larger scale mining operation.

Water supply is available from any one of the surrounding lakes, including Thor Lake or Long Lake. Water tankage may need to be built in the plant area to act as storage and as a reserve for fire protection. All water lines exposed to the elements will need to be insulated and heat traced and it will be necessary to install a satellite communications system.

6.0 HISTORY

The Thor Lake area was first mapped by J.F. Henderson and A.W. Joliffe of the Geological Survey of Canada (GSC) in 1937 and 1938. In 1971, the GSC commissioned an airborne radiometric survey over the Yellowknife region that outlined a radioactivity anomaly over the Thor Lake area (GSC Open File Report 124). Simultaneously, A. Davidson of the GSC initiated mapping of the Blatchford Lake Intrusive Complex.

According to National Mineral Inventory records of the Mineral Policy Sector, Department of Energy, Mines and Resources, the first staking activity at Thor Lake dates from July 1970 when Odin 1-4 claims were staked by K.D. Hannigan. Shortly after, the Odin claims were optioned to Giant Yellowknife Mines Ltd. and subsequently, in 1970 were acquired by Bluemount Minerals Ltd. Four more claims (Mailbox 1-4) were staked in the area in 1973. No description of any work carried out on the claims is available and both the Odin and Mailbox claims were allowed to lapse. No assessment work was filed.

In 1976, Highwood in the course of a regional uranium exploration program discovered niobium and tantalum on the Thor Lake property. The property was staked as the Thor 1-45 claims and the NB claims were added in 1976 to 1977. After preliminary work was completed by Highwood between 1976 and 1979, which included the drilling of 22 diamond drill holes Calabras, a private holding company, acquired a 30% interest in the property through financing further exploration by Highwood. This was done through Lutoda Holdings, a company owned by Calabras

Recognizing a large potential resource at Thor Lake, Placer Development Ltd. (Placer) optioned the property from Highwood in March 1980 to further investigate the tantalum and related mineralization. Placer conducted magnetometer, very low frequency (VLF) electro-magnetic and scintillometer surveys on the Lake Zone, drilling of 17 diamond drill holes and conducted preliminary metallurgical scoping work. Placer relinquished its option in April of 1982.

In 1983 Highwood discovered beryllium mineralization in the T Zone and initiated an extensive drill program (127 drill holes) to delineate the beryllium resource. In 1984 Strathcona Mineral Services (Strathcona) was retained to oversee development of metallurgical processing of the beryllium and subsequently to design and oversee mining of a bulk sample. This work consisted primarily of driving a decline (500 m) in the North T Zone. Bulk samples from the decline were used for metallurgical testing which consisted of bench scale tests followed by a pilot plant program at Lakefield Research Ltd. in Ontario. At approximately the same time, Unocal Canada (Unocal) conducted a detailed evaluation of the property.

In August of 1986, the property was joint-ventured with Hecla Mining Company of Canada Limited (Hecla). By completing a feasibility study and arranging financing to bring the property into production, Hecla could earn a 50% interest in the property. However, in 1990, after completing considerable work on the T Zone, including some limited in-fill drilling, extensive metallurgical testing conducted at Lakefield and Hazen Research Ltd. (Hazen) in Denver, conducting a marketing study on beryllium and exploratory drilling of the Lake Zone for yttrium, Hecla withdrew from the project. In 1990 control of Highwood passed to Mineral Resources International (MRI) and the Thor Lake project remained dormant until 1996.

In 1996, Mountain Minerals Limited, a company controlled by Royal Oak Mines Ltd. (Royal Oak) merged with Highwood, resulting in an extensive re-examination of Thor Lake that included a proposal to extract a bulk sample in 1997. Applications were submitted for permits that would allow for small-scale development of the T Zone deposit, as well as for processing over a four to five year period. In late 1999, the application was withdrawn.

Royal Oak's bankruptcy in 1999 resulted in the acquisition of the control block of Highwood shares by Dynatec Corporation (Dynatec). This ultimately resulted in a change of management, as well as a change in Thor Lake development strategy. In 2000, Highwood initiated metallurgical, marketing and environmental reviews by Dynatec.

In 2001, Navigator Exploration Corp. (Navigator) entered into an option agreement with Highwood. Navigator's efforts were focused on conducting additional metallurgical research at Lakefield in order to define a process for producing a marketable tantalum concentrate. These efforts produced a metallurgical grade tantalum/zirconium/niobium/REE bulk concentrate. The option was dropped in 2004 however in view of falling tantalum prices and low tantalum contents in the bulk concentrate.

Beta Minerals Inc. (Beta) acquired Highwood's interest in the Thor Lake property in November, 2002 under a plan of arrangement with Dynatec. No work was conducted at Thor Lake by Beta and in May of 2005 Avalon purchased full title to the Thor Lake property from Beta.

Avalon has since conducted extensive sampling of archived drill core to further assess the yttrium and HREE resources on the property and this work has been incorporated into the present study.

6.1 HISTORICAL MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

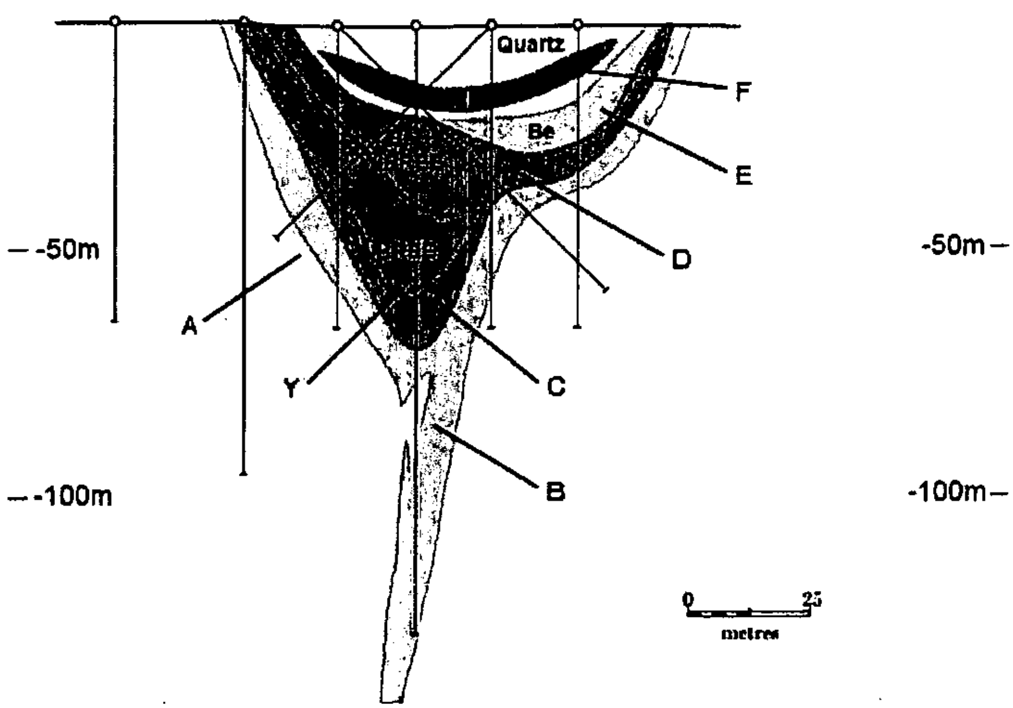
A number of resource estimates have been carried out at Thor Lake. Variously these include the North T Zone, the South T Zone and the Lake Zone. These are described accordingly.

6.1.1 NORTH T ZONE

The North T Zone was nominally drilled on 15 m centers. In the middle of the deposit drill hole spacing in places is as close as 7 m and some of the drill holes were twinned for metallurgical samples. The drilling delineated a bowl-shaped configuration of alteration and mineralization, with a keel-like feeder zone beneath the deposit extending south-easterly to, and underlying the South T Zone.

In the North T Zone, beryllium mineralization appears to stratify into a number of concentric zones which tend to mimic the hemispherical shape of the enclosing alteration. These zones have been labeled the C, D, and E sub-zones (Figure 6.1). The E sub-zone is the uppermost, the D sub-zone is intermediate and the C sub-zone is the lowermost. Within these sub-zones, the beryllium mineralization is strongest in the E sub-zone, weakest in the D sub-zone and intermediate in the C sub-zone. Yttrium and HREE mineralization distribution is the inverse of beryllium distribution. The LREEs are particularly enriched in a distinct zone, the F sub-zone. Niobium mineralization increases downward in the sub-zones and outward from the centre of the hemisphere (i.e. from E toward C).

Figure 6.1 North T Zone Mineralization



The Y sub-zone was not recognized in the historic estimates; the sub-zones which were recognized being predicated on the basis of the beryllium mineralization. The Y sub-zone is recognized as a stand alone entity encompassing Y+HREE mineralization in the Wardrop resource estimates below (Section 17.1).

Beryllium, yttrium and HREE mineralization also occurs in visibly unaltered granite mantling the T Zone and the underlying keel-like feature. The mantling mineralization has been designated the A sub-zone and where identified within the keel has been identified as the B sub-zone.

UNOCAL ESTIMATE – 1985

A historical beryllium-yttrium-niobium resource estimate for the North T Zone was described by Unocal during their evaluation of the property in 1985. This calculation was based on information from surface work, drill holes and the underground workings which were open at the time. A polygonal estimation method was used. The configuration of the zone was based on both assay data and geological interpretation and the calculations were controlled by the following assumptions:

- Cut-off grades: 0.10% Y_2O_3, 0.3% BeO, 0.5% Nb_2O_5.
- Minimum mining width 3 m.
- Maximum allowable width of waste within mineralized zone: 3 m.
- Tonnage blocks projected halfway to next section line (generally 7.6 m).
- Tonnage blocks on two outside sections were assumed to extend 9.1 m and 18.3 m respectively beyond the section lines.

The results of these calculations follow:

- 715,000 tonnes @ 0.91% BeO of which 640,000 tonnes @ 0.93% BeO is above the 100 m level (100 m below surface).
- 485,000 tonnes @ 0.29% Y_2O_3 with 246,000 tonnes @ 0.32% Y_2O_3 in the beryllium sub-zones.
- Approximately 400,000 tonnes @ 1.0% Nb_2O_5 in the beryllium zones although this estimate was based on very limited assay data.

These resource estimates are historical and do not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verifiy this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

LINDSEY ESTIMATE – 1986/1987

Although Highwood and its various partners had made several mineral resource estimates over the years, the most often cited estimate for the North and South T Zone deposits was calculated by Lindsey (1987). This estimate was prepared as part of a pre-feasibility study for Hecla, conducted shortly after Hecla optioned the property.

Ore reserves were estimated on several cross sections. Mineralized zones were configured on the cross sections in a "best-fit" manner, conforming to geological/alteration boundaries. These configurations were compared to the same configurations on five longitudinal sections and with the ore intercept appearing on the mining decline plan map. Configurations were adjusted until a reasonable correlation was achieved between the three data sets.

The assumptions used in Lindsey's calculations were similar to those used in Unocal's historical resource estimates. Lindsey however, was more rigid in the application of his assumptions and had information from additional drilling and the decline. A tonnage factor of 3.02 tonnes per cubic metre (10.6 cubic feet per ton) was used. Mineralized areas of influence were measured around each drill hole with a planimeter for each intercept with grade higher than the cut-off grade over a minimum mining width of 3 m. Lindsey's "probable reserve" involved drill hole projections up to 50 m and his "possible reserve" category included intercepts in some isolated holes. Lindsey considered material to be proven ore if it was within 7 m of an intercept, probable ore between 7 m and 50 m from an intercept and possible ore beyond 50 m but within the limits of the geological boundaries.

Lindsey's reserves are tabulated in Table 6.1. In addition to these reserves, Lindsey calculated 242,500 tonnes of Possible reserves at a grade of 0.7 – 0.8% BeO.

Table 6.1 North T Zone Proven and Probable Reserves

Category	Sub-Zone	Tonnes	BeO %	Y_2O_3 %	Ce_2O_3 %	Nb_2O_5 %
Proven	A/B	109,000	0.74	0.086	0.08	0.39
	C	134,000	1.06	0.193	0.104	1.243
	D	140,500	0.95	0.276	0.213	0.314
	E	77,000	2.02	0.04	0.162	0.154
	Sub-totals	460,000	1.11	0.167	0.141	0.575
Probable	All Sub-Zones	91,000	0.82	0.148	0.119	0.535
	Totals	551,500	1.06	0.164	0.137	0.568

This resource estimate is historical and does not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

HECLA ESTIMATE – 1988

In 1988, Hecla created a database and model for the E sub-zone that was further updated and verified by Royal Oak in 1998. These included a kriged estimate, an inverse distance squared estimate and a polygonal estimate.

In outlining of the beryllium at Thor Lake, all drill core in the North and South T Zones was scanned with a berylometer to select intervals to be sent for assay. This procedure is described in Section 12.1. Intervals with berylometer measurements in excess of 0.2% BeO were sent to Chemex Ltd. (Chemex) for assay; those less than 0.2% BeO were not assayed and have been treated in previous mineral estimates as having zero grade.

In order to accommodate a computer generated block model, Hecla arbitrarily assigned a value of 0.1% BeO to all intervals within the mineralized zone that did not have assay values. However, drill hole intervals that were obviously in unmineralized zones were assigned a value of zero.

Classical statistical analyses were performed, which showed that while the drill hole data is slightly skewed, it was not lognormal and hence, regular interpolation methods could be employed.

Drill holes were composited using 3 m lengths and the block size used was 5 m x 5 m x 3 m high. Because of the variability of the data a co-variogram was used to filter out the high variance data. Results of the variogram modelling showed that the variogram was nested (Table 6.2).

Table 6.2 Variogram Parameters for E Sub-Zone

Direction	Range (Structure 1)	Range (Structure 2)
North-South	25 m	50 m
East-West	18 m	36 m
Vertical	9 m	18 m
Nugget	0.14	
Sill 1	0.4	
Sill 2	0.4	
Total Sill	0.94	

Hecla estimated the mineral resource for the E sub-zone using ordinary kriging, inverse distance squared, and polygonal methods. The results are tabulated in Table 6.3 for various cut-off grades of BeO.

Table 6.3 E Sub-Zone Mineral Inventory by Estimation Method

Cut-off Grade (% BeO)	Kriging		Inverse Distance		Polygonal	
	Tonnes	Grade (% BeO)	Tonnes	Grade (% BeO)	Tonnes	Grade (% BeO)
0.40	103,900	1.33	101,500	1.27	74,300	1.87
0.60	83,100	1.54	79,500	1.49	70,200	1.95
0.80	68,300	1.73	68,700	1.61	57,800	2.21
1.00	60,000	1.85	59,300	1.73	56,200	2.25

As expected, at any particular cut-off grade, kriging and inverse distance tend to smooth grades and as such will create more tonnes at a lower average grade.

This resource estimate is historical *and does not* meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in section 17 of this report. The historical estimate should not be relied upon.

Using some of the kriging methodology that was established for the E sub-zone, Hecla constructed a block model for the C and D sub-zones (Table 6.4).

Table 6.4 C and D Sub-Zone Mineral Inventory

Cut-off Grade (% BeO)	Tonnes	Grade (% BeO)
0.50	267,900	0.82
1.00	55,900	1.29
1.50	10,900	1.76
2.00	1,900	2.24

This resource estimate is historical and does not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

Hecla also constructed a block model for the F sub-zone, which is a LREE (bastnaesite) enriched unit of the Upper Intermediate Zone. It generally occurs in contact with the Quartz Zone and appears to be cut-off by an east-west vertical felsite dike. The beryllium content of this zone is quite low and the main product would be a LREE concentrate with up to 47% of the rare earth credits occurring as Ce_2O_3.

Construction of the block model for the F sub-zone involved utilizing the geological information and drill hole data as for previous models. Accordingly, block dimensions were sized at 5 m x 5 m x 3 m and composites were calculated on three metre lengths. Variograms were constructed for the F sub-zone (Table 6.5).

Table 6.5 F Sub-Zone Variogram Parameters

Direction	Range
Major Axis - N 18°E	20 m
Minor Axis - N 108°E	20 m
Vertical	5 m
Nugget	0.3
Sill	0.65
Total Sill	0.95

The mineral inventory for the F sub-zone was then calculated using the method of ordinary kriging (Table 6.6).

Table 6.6 F Sub-Zone Mineral Inventory

Cut-off Grade (% Ce_2O_3)	Tonnes	Grade (% Ce_2O_3)
0.8	152,900	2.03
1.0	129,200	2.24
1.4	94,700	2.63
1.8	73,300	2.93
2.0	61,000	3.14

This resource estimate is historical and does not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

FRYE AND PROUDFOOT – 2001

In 2001, the database created by Hecla was used for calculations in a computer-based historical resource estimate made by Highwood for the North T Zone. The Frye Historical Resource Estimate (named after the third-party consultant A. Frye), was calculated using Mintec's Medsystem program. This program was used to calculate mineable resources within an optimized pit model.

The assumptions and criteria used in his calculation were as follows:

- Cut-off grade: 0.27% BeO, determined from cost estimates prepared by Dynatec and Proudfoot.
- Drill hole assays composited into 3 m intervals.
- 3 m x 3 m x 3 m blocks.
- Used ordinary kriging.

- Pit wall slopes at 45° and 60°.
- Mining Dilution 50%.

This historical resource calculation was based on drilling at roughly 15 m centers with holes on 7 m centers near the centre of the deposit and data from the decline.

6.1.2 South T Zone

The South T Zone is drilled, in part, on 30 m centres. A historic estimate of the resource was generated by Lindsey (1987) and is tabulated below (Table 6.7).

Table 6.7 Historic Estimate of South T Zone Potential Reserves

Cut-off	Cutting Element	Tonnes	Density	Y_2O_3%	BeO%	Ce_2O_3%	Nb_2O_5%
0.30	% BeO	1,135,499	3.02	<0.1	0.62	<0.1	0.484
0.10	% BeO	1,254,681	3.02	<0.1	0.18	0.152	0.362
Total		2,390,180	3.02	<0.1	0.39	0.104	0.410

This resource estimate is historical and does not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

6.1.3 Lake Zone

Placer Development Ltd generated a mineral resource estimate based on drilling carried out up to and including 1981 (Currie, 2004). A cut-off is not specified.

This resource estimate is historical and does not meet the standard terminology criteria of the NI 43-101 or the CIM Standards on Mineral Resources and Reserves. Wardrop has not done the work necessary to verify this historical estimate. The estimate is no longer relevant as it is replaced by the current estimate prepared by Wardrop outlined in Section 17 of this report. The historical estimate should not be relied upon.

7.0 GEOLOGICAL SETTING

7.1 REGIONAL GEOLOGY

The following section is summarized from Trueman et al. (1988), LeCouteur (2002) and Pedersen et al. (2007).

The Thor Lake mineral deposits occur within the Aphebian Blatchford Lake Complex, which includes Archean Yellowknife Supergroup metasedimentary rocks of the southern Slave geologic province. The complex is of variably alkaline character and intrusive phases vary successively from early pyroxenite and gabbro through leucoferrodiorite, quartz syenite and granite, to a peralkaline granite and a late syenite (Davidson, 1982). There appear to be three sub-circular centers; an early western centre that is truncated by a larger second centre consisting of the Grace Lake Granite and the Thor Lake Syenite. The youngest and smallest centre is a nepheline syenite that intrudes the Thor Lake Syenite on its western edge and is otherwise only known from drilling under Thor Lake.

Davidson (1978) subdivided the Blatchford Lake Complex into six texturally and compositionally distinct plutonic units as follows: Caribou Lake Gabbro, Whiteman Lake quartz Syenite, Hearne Channel Granite, Mad Lake Granite, Grace Lake Granite and Thor Lake Syenite. Based on exposed crosscutting relationships of dykes and main contacts, Davidson recognized a sequence of five intrusive events. The rocks of the last intrusive event, being compositionally and spatially distinct, are subdivided into the Grace Lake Granite and the Thor Lake Syenite although they bear no obvious intrusive relationship to each other to indicate a significant difference in time of emplacement. Davidson and Trueman et al. have further shown that the intrusions were petrochemically related.

Recent dating of the complex supports the view that all the intrusions are related as the main, eastern intrusive and the western intrusive centers exhibit comparable ages. The Hearne Channel Granite has been dated at 2175 ±5 million years, the Whiteman Lake Syenite at 2185 ±5 million years (Bowring et al, 1984) and the Grace Lake Granite at 2176 ±1.3 million years (Sinclair and Richardson, 1994).

Henderson (1985) reports that small dioritic plugs assigned to the Compton Lake Intrusive Suite cut the Grace Lake granite and diabase dykes of the 1.2 billion year old Mackenzie and the 2.0 billion year old Hearne dyke swarm cuts most of the members of the Blatchford Lake Complex.

Gravity modeling by Birkett et al (1994) indicates that the large area of granitic and syenitic rocks of the eastern intrusive centre form a thin tabular body with a maximum thickness of one kilometre. In contrast, the Caribou Lake Gabbro in the western centre is thought to have a deep root.

7.2 LOCAL GEOLOGY

Most of the Thor Lake Property is underlain by the Thor Lake Syentie where it occurs in the centre of the Grace Lake Granite. The T Zone deposits are seen to cross both rock types which are only demarcated by the presence or absence of quartz and the Lake Zone is seen confined solely to the Thor Lake Syenite.

The Grace Lake granite is a coarse-grained, massive, equigranular, riebeckite-perthite granite with about 25% interstitial quartz. Accessories include fluorite, zircon, monazite, apatite, sphene, iron and titanium oxides, astrophyllite, an alkali pyroxene and secondary biotite. Near the contact of the Grace Lake Granite with the Thor Lake Syenite the two units are texturally similar and the contact appears to be gradational over a few metres rather than intrusive. The presence of interstitial quartz is the main distinguishing feature although the granite is also pinker in colour and less readily weathered than the syenite. Because of their textural similarity and gradational contact relations, Davidson suggested that both rock types derive from the same magma.

The Thor Lake Syenite is completely enclosed by the Grace Lake Granite. It has been divided into five subunits, four of which are amphibole (ferrorichterite) syenites that differ mainly in texture. The fifth and most distinctive subunit is a narrow arc of fayalite-pyroxene mafic syenite, which is locally steeply dipping and lies close to the margin of the main amphibole syenite and the Grace Lake Granite. It forms a distinct semi-circular ridge, locally termed the rim syenite that can be traced for a distance of about 8 km and is thought to be a ring dyke.

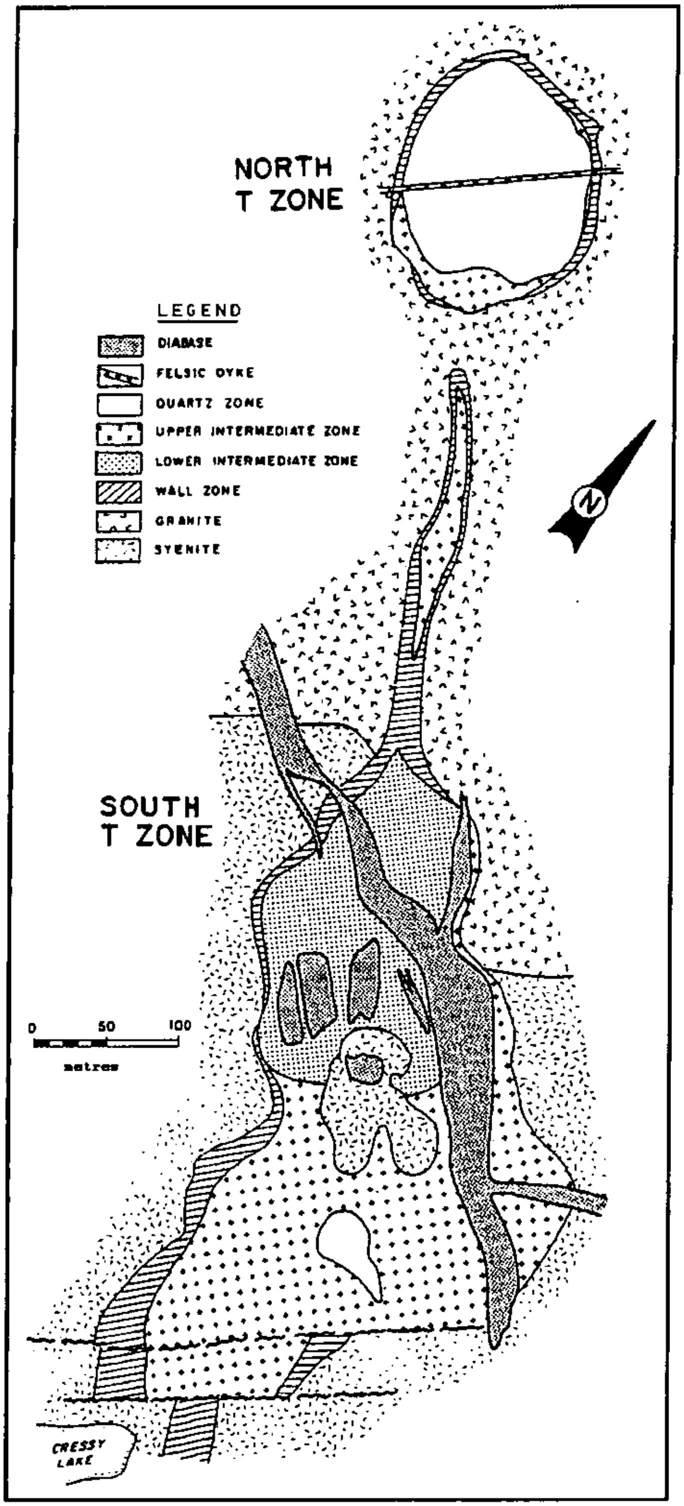
7.3 T ZONE GEOLOGY

In plan view the North T Zone is oval in shape and approximately 200 m by 120 m (Figure 7.1).

In cross-section (see Figure 6.1 above) it is shaped like the lower half of a wine glass, the stem of which is a keel-like dyke, dipping steeply westward. The underlying dyke continues southward from the North T Zone, under the South T Zone and crops out in fault-uplifted segments immediately north of the Lake Zone.

In cross-section the North and South T Zones are concentrically zoned, the rocks forming a succession of shells of distinctive lithologies inward from the granitic or syenitic host rock. From their contacts with the host rocks these have been described using classic pegmatite terminology as a Wall Zone, a Lower Intermediate Zone, an Upper Intermediate Zone, and a Quartz Core.

Figure 7.1 General Geology of the T Zone (after Pedersen et al, 2007)



The Wall Zone is comprised of massive medium- to coarse-grained albite (var. clevelandite) with minor or accessory amounts of quartz, fluorite and columbite. The Lower Intermediate Zone is distinctive in that it has preserved original granitic or syenitic protolith texture obfuscated by alteration assemblages of biotite, unidentified mica polytypes, magnetite, quartz, phenacite, xenotime, thorite, bastnaesite, synchisite, fluorite and locally, patches of sulphides. It is generally massive, fine to coarse grained, brownish to black in colour and locally weakly schistose. Quartz is commonly black, of glassy lustre and metamict.

The Upper Intermediate Zone is a light greenish-buff rock characterized by abundant polylithionite, quartz, albite, fluorite, phenacite, columbite, xenotime, synchisite and rare sulphides. These rocks display subhorizontal banding on decametre scale of mica enrichment interpreted as a result of repeated pressure quenching events and miarolytic cavities are noted up to 1.5 m in size.

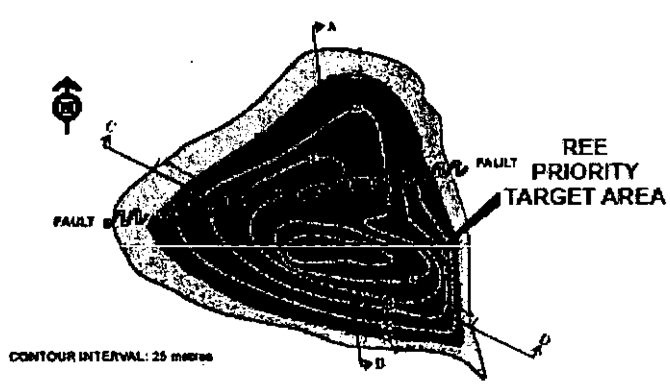
The centre or core of the T Zone is occupied by massive quartz with minor accessory grey, green and purple fluorite and rare bastnaesite, synchisite and parasite. The quartz cuts into the Wall Zone assimilating and brecciating large k-feldspar crystals oriented perpendicularly to the walls. Polylithionite becomes abundant in these areas in near massive amounts with lesser phenacite and clevelandite.

At the base of the quartz core, above the boundary with the Upper Intermediate Zone is a layer of badly brecciated but massive intergrown bastnaesite, synchisite and parasite, with lesser roentgenite, grey to purple fluorite and disseminated sulphides. This unit is termed the F or Bastnaesite Zone. It was not recognized in the drilling programs as a distinctive unit until it was intersected by the underground workings.

7.4 LAKE ZONE GEOLOGY

The Lake Zone is the largest mineralized zone on the property. It is approximately triangular in shape, covers an area of about 2 km^2 and from diamond drilling is upwards of 200 m in thickness (Figure 7.2).

Figure 7.2 Isopach Map of the Lake Zone



The Lake Zone has variously been described as a core of "altered breccia" enveloped by a feldspathic "Wall Zone". The original protolith of the Lake Zone appears to have been Thor Lake Syenite and it appears from limited paragenetic analysis to have suffered successive periods of metasomatism and re-equilibration. It can be divided into several rock types based on constituent lithology, primary textural preservation, degree of alteration and brecciation. It remains difficult however to establish correlations of rock types from drill hole to drill hole, excepting in thicker sections of the Wall Zone and mining of the Lake Zone would be conducted on the basis of assay walls.

Correlations of rock types in the Lake Zone are made further difficult because of north-easterly trending faults running through the deposit and coincidentally a number of Hearne diabase dykes which are parallel to the faulting. This is also the direction of the regional schistosity where developed.

Mineralization in the Lake Zone is generally disseminated and consists primarily of ferrocolumbite, allanite, fergusonite, and zircon. Minor or accessory assemblages include bastnaesite group minerals, monazite, and apatite. The highest grades of niobium and tantalum appear to occur in magnetite rich areas of the zone.

7.5 MINERALOGY OF THE T AND LAKE ZONES

To date, some 83 mineral species have been recognized at Thor Lake (Appendix B). Several remain unidentified and may represent new mineral species. Table 7.1 lists the principal minerals of interest in the T and Lake Zones with the elements or metals of interest.

Thirteen mineralogical studies have described the above mineralogy, in whole or in part, and the reader is referred to the tabulated references accompanying this document for further detail.

Table 7.1 Minerals of Principal Economic Interest at Thor Lake

Element	T-Zone	Lake Zone
Y+HREE	xenotime	fergusonite
Ta		
LREE	bastnaesite, synchisite, parasite	allanite, monazite, bastnaesite, synchisite, parasite
Be	phenacite	
Nb	columbite	columbite, fergusonite
Zr	zircon	zircon
Ga	albite (var. clevelandite)	albite (var. clevelandite)

Alkaline systems and their derived late magmatic phases exhibit little or no fractionation (Cerny, 1991). Accordingly, the compositions of constituent rare earth minerals in such deposits remain essentially constant. This became evident to Highwood personnel in the course of drilling of the T Zone at which time it was found that lanthanum, cerium and neodymium remained in fixed ratios an experience also encountered by Highwood geologists in their sampling of their formerly held Illimausaq, Greenland, rare earth kakortokite and lujavarite prospects over kilometre distances. In routine assaying therefore, only one of the above elements was tested. This behaviour at Thor Lake has since been documented by Mariano (Appendix E) and is shown in chondrite normalized signatures of the rare earths in both mineral samples and whole rock analyses from various zones at Thor Lake. The consistency of such ratios has been further documented at Molycorp's Mountain Pass Mine, California rare earth deposit where the variation has been documented at 0.3% over a 50 year production history and routine assaying is not conducted until concentrates have been made.

The chemistry of the relevant rare earth bearing species from Thor Lake is further described in the following Section 19.6

8.0 DEPOSIT TYPE

The mineral deposits at Thor Lake bear many of the attributes of an apogranite (Beus, et al., 1962) originating in an apical or domal facies of their parental magmas. The deposits are extensively metasomatized and can also be described as a quartz-(topaz)-polylithionite-phenacite-fluorite greisen (Scherba, 1970).

According to Richardson and Birkett (1996), other comparable rare metal deposits associated with peralkaline rocks include:

- Strange Lake, Canada (zircon, yttrium, beryllium, niobium, REE).
- Mann, Canada (beryllium, niobium).
- Illimausaq, Greenland (zircon, yttrium, REE, niobium, uranium, beryllium).
- Motzfeldt, Greenland (niobium, tantalum, zircon).
- Lovozero, Russia (niobium, zircon, tantalum, REE).
- Brockman, Australia (zircon, yttrium, niobium, tantalum).

Richardson and Birkett further comment that some of the characteristics of this type of deposit are:

- Mineralizing processes are associated with peralkaline intrusives, generally within specific phases of multiple-intrusion complexes.
- Elements of economic interest include tantalum, zircon, niobium, beryllium, uranium, thorium, REE, and yttrium; commonly with more than one of these elements in a deposit. Volatiles such as fluorine and carbon dioxide (CO_2) are usually elevated.
- End members may be magmatic or metasomatic, but deposits may show influences of both. Alteration in magmatic types is often deuteric and local, while alteration in metasomatic types can be extensive.
- This type of deposit is usually large, but of low grade. Grades of niobium, tantalum, beryllium, yttrium and REE are usually less than 1%, while the grade of zircon is typically from 1% to 5%.
- There are usually a variety of rare metal minerals in this type of deposit, including oxides, silicates, calcium phosphates and calcium fluorocarbonates. Niobium and tantalum mineralization is typically carried in pyrochlore and less commonly in columbite.
- The preferred genetic model is that of igneous differentiation in closed-system conditions, with the rare earth metals concentrating in residual

magma, aided by depression of the freezing temperature of the magma by fluorine and possibly CO_2.

9.0 MINERALIZATION

9.1 T ZONE

The T Zone, which extends to the northwest for approximately one kilometre from the Lake Zone, transects both the Thor Lake syenite and the Grace Lake granite. In plan view, the T Zone pinches and swells from a few metres up to 240 m (see Figure 7.1 above). The T Zone can also be separated into two distinct portions, the North T Zone and the South T Zone which are divided at surface by a barren granite.

In the plan, the North T Zone deposit occupies a circular area of intense alteration and greisening. In cross and longitudinal sections the deposit is bowl shaped and most of the mineralization occurs as a series of concentric layers or sub-zones stacked within the bowl (see Figure 6.1 above). Underlying the bowl structure is another mineralized alteration zone in the shape of a narrow dyke, which reaches the surface just south of the North T Zone deposit and then trends southeasterly where it widens to form the South T Zone deposit. The North T Zone mineralization occurs over an area of 140 m in length by 100 m in width and is drilled to a maximum vertical depth of approximately 190 m.

The economic mineralization of interest has been divided into five sub-zones: C, D, E, F and Y. These sub-zones are not necessarily confined to individual geological units and may extend to two or more of these units, being defined by assay walls:

- The E sub-zone is at the top of the deposit and has a diameter of 40 m, with an approximate depth of 25 m. It straddles the south end of the Quartz Zone and the Upper Intermediate Zone. Mineralization in the E sub-zone is primarily beryllium in phenacite and it has the highest grades of Be found within the Thor Lake property.
- The F sub-zone is a LREE-enriched unit marked by syntaxial intergrowths of bastnaesite, sychisite and parasite, all fluorocarbonates. It generally occurs as skeins and breccias withing the Quartz core.
- The C and D sub-zones underlie the E sub-zone and extend to a maximum depth below surface of approximately 80 m. The C and D sub-zones are marked by high grade yttrium and heavy rare earth values largely found in xenotime.

- The Y sub-zone, lacking in significant beryllium values, was not identified in previous works as an economic entity. It forms an envelope of HREE enrichment in form of xenotime surrounding the C, D, and E sub-zones.
- Gallium is found in all of the albitic wall rock which mantles the footwalls of the T Zone.

9.2 LAKE ZONE

The Lake Zone is essentially divisible into two lithologies: a wall zone of albitite similar to that mantling the T Zone and a core zone of highly metasomatized and greisenized variants of syenite which, like the Lower Intermediate portions of the T Zone, locally preserve textural evidence of the syenite protolith.

Mineralization in the Lake Zone includes LREE found principally in allanite, yttrium, HREE and tantalum found in fergusonite, niobium found in ferro-columbite, zirconium in zircon, and gallium is found in the feldspathic, albitic wall rocks. Most of the economically interesting minerals in the Lake Zone are found to be fine grained and form intimate admixtures which have in past presented metallurgical difficulties.

10.0 EXPLORATION

The Thor Lake Property has been systematically explored for several different metals over a period of 30 years. Exploration focus has shifted as new discoveries such as the beryllium were made or in response to price increases for tantalum, yttrium and HREE or for example, because of improved methods of recovery of tantalum.

The original claims at Thor Lake were staked in 1970 in a search for uranium. A shallow trench was reportedly opened over the main showing in the R Zone, but the claims were eventually allowed to lapse. In 1972, a significant radioactivity anomaly was discovered in the area during in an airborne radiometric survey conducted by the GSC (O.F.R. 124).

In 1976, the property was staked by Highwood for its uranium potential. From 1976 to 1979, exploration programs included geological mapping, sampling, trenching and limited diamond drilling on the Lake, Fluorite, R, S, and T Zones. A total of 13 trenches and 22 diamond drill holes were completed, sampled and assayed. This work resulted in the discovery of significant concentrations of niobium, tantalum, yttrium and REEs. Results also indicated a general paucity of uranium mineralization on the property and showed that the anomalous radioactivity was due to thorium. In 1979, a lake bottom radiometric survey was conducted under Thor Lake and radon gas in soil surveys were conducted. The results were inconclusive.

In 1980 Placer acquired an option on the Thor Lake property for its tantalum and niobium potential. Placer focused its efforts on the Lake Zone, conducting magnetometer, scintillometer and VLF surveys, and drilled 13 drill holes in the Lake Zone. Placer drilled five additional holes in 1981 in the vicinity of Drill Hole 80-5 which had returned the best tantalum and niobium values in the earlier program. Metallurgical work commissioned by Placer noted the refractory nature of the tantalum mineralization and in 1982 Placer dropped its option on the project. Highwood resumed work on the property collecting a bulk sample for further metallurgical testing.

In 1983, a pathfinder geochemical survey was initiated to identify a tool for prospecting for high grade, metallurgically amenable tantalum mineralization in the Lake Zone. The geochemical survey was conducted over the T Zone and resulted in the discovery of significant beryllium mineralization. The discovery was followed by surface mapping of the T Zone with a berylometer; a field portable geophysical tool used in the exploration and examination of beryllium deposits (Brownell, 1959). The berylometer survey indicated that beryllium mineralization occurred throughout the T Zone.

In conjunction with the pathfinder geochemical program, a gravity survey was conducted to delineate the extent of the Lake Zone. A lack of knowledge of overburden thicknesses in the area dictated gravity observations being confined to bedrock outcrop and the survey, although too broadly based for spotting drill targets, gave indication of required drilling depths to the Lake Zone footwall.

In the fall and winter of 1983-1984, more than 70 holes were drilled in T Zone, which delineated beryllium within the North and South T Zone deposits. The drilling program also stimulated interest in yttrium and REE's as potential by-products of beryllium production.

In the summer of 1984, a 25 tonne bulk sample was collected from the outcropping beryllium section of the North T Zone for initial metallurgical testing at Witteck Development Inc. (Witteck). Metallurgical work was subsequently transferred to Lakefield Research and in 1985, Strathcona on behalf of Highwood, contracted Canadian Mine Development Ltd (Canadian Mine) to drive a 500 m decline into the North T Zone. The decline intersected all of the C, D, E, and F sub-zones in order to test their geological continuity and to collect bulk samples for metallurgical testing.

Drilling was continued on both the T Zone and the Lake Zone through 1988 by which time 96 drill holes had been completed on the North T Zone, 35 drill holes on the South T Zone and 51 drill holes on the Lake Zone. The last drilling conducted on the Lake Zone was principally targeted at yttrium mineralization in the southeast corner of the Lake Zone. Further drilling which was targeted to intersect the Fluorite Zone was not successful.

Assay returns from five drill holes in the S Zone were not considered significant and one drill hole under the R Zone failed to intersect mineralization.

In 2005 and 2006, Avalon sampled archived drill cores from the Lake Zone to extend areas of known yttrium and HREEs. Assay data from this work has been entered into modelling of the Lake Zone resource and it will also serve to guide future drilling which is anticipated to commence from the winter ice cover on Thor Lake in 2007.

11.0 DRILLING

No drilling has been carried out by the current owner.

In 1977, five drill holes undercut surface mineralization in the S Zone. Ongoing exploration at this time identified the T Zone and the Lake Zone as larger targets with comparable mineralization and further work on the S Zone was suspended.

Over 4,440 m of diamond drilling in 96 drill holes has been completed on the North T Zone. Drilling was completed with BQ and HQ sized drill core. The HQ drilling twinned earlier holes to acquire metallurgical samples. Drill holes were oriented so that mineralized intersections represented their true thickness as closely as possible and in most cases, the drill holes are vertical. The drilling is closely spaced, nominally on 15 m centres and infill drill holes are spaced as closely as 7.5 m.

In the South T Zone, approximately 3,065 m of diamond drilling has been completed in 37 drill holes. These holes have been mainly drilled at angles of 40° to 50°E and 40° to 50°W, in response to the plunging, "Y" shaped structure of this zone. Drilling has been done on 30 m sections along the deposit, with drilling along the section being between 30 m to 50 m.

A total of 5,648 m have been drilled in 51 holes in the Lake Zone by Highwood and Placer. In 1978 and 1979, Highwood drilled seven BQ holes in the Lake Zone, with hole 79-1 intersecting 0.67% Nb_2O_5 and 0.034% Ta_2O_5 over 24.99 m. In 1980, Placer drilled 13 widely spaced BQ holes and in 1981, drilled another five holes around drill hole 80-5 (43 m grading 0.52% Nb_2O_5 and 0.034% Ta_2O_5) to test the continuity of mineralization around this hole. Placer dropped their option in early 1982, as the fine-grained columbo-tantalite mineralization did not prove amenable to conventional metallurgical extraction. Highwood drilled five diamond drill holes in 1983 and 1984 to test for high grade tantalum-niobium mineralization and to determine zoning and geological continuity. In 1986, two holes were completed at the northeast end of Long Lake, in the vicinity of previous trenching, to evaluate high yttrium and REE values obtained from the trenches. In 1986 and 1987, re-assaying of Lake Zone core was undertaken to determine other areas of high yttrium and REE content. From January to March, 1988 an additional 19 BQ holes were completed in the Lake Zone to further test for yttrium and REE.

One drill hole, 1988R-1, was completed on the R Zone undercutting the main high-grade yttrium showing. No mineralization was intersected and two further proposed holes were not started.

All drill holes were dip tested at the end of the holes. No significant deviation was noted and in the course of underground mining all drill holes were picked up by surveying as predicted. The drill holes and assay values had been used in the initial design of the underground workings.

Archived core is stored at Thor Lake and was last checked in September 2006, when it was found to be in a good condition with little sign of weathering and most markings legible. The core racks were found to be in a reasonable condition and brush considered a fire hazard had been cleared away.

12.0 SAMPLING METHOD AND APPROACH

12.1 DRILL HOLE SAMPLES

Drilling was carried out in all campaigns by experienced contractors such as Titan Diamond Drilling of Yellowknife and Connors Drilling of Kamloops, B.C. Drilling was undertaken with hydraulic, swivelhead equipment manufactured by Boyles Bros. and Longyear. Core drilled is BQ and NQ in size and recoveries were generally in excess of 95%.

The core drilled by Highwood was logged, split, and sampled on site. Placer drill holes were logged on site and the core was then shipped to Vancouver for splitting and sampling. Samples for analysis were otherwise taken in ten foot intervals or to lithologic boundaries where a sample crossed more than one rock type. A concerted effort was made in all programs to limit samples to one rock type to better determine mineralization boundaries and horizons.

To assist in the core logging and determination of sample boundaries, a binocular microscope, a scintillometer and a berylometer were utilized. Segments of the Placer drillcore were also logged with a four channel discriminating spectrometer and with a magnetic susceptibility meter.

Sampling was carried out by experienced geologists and technicians using accepted industry standards. Sample locations and geological observations were controlled by well-established grids and drill hole collars were surveyed by Thomson Underwood McLellan Surveys Ltd. of Yellowknife.

12.2 DECLINE SAMPLES

The 3.0 m by 3.5 m decline was driven for 500 m in the North T Zone in the summer of 1985 under the supervision of Strathcona. Each 3.66 m round produced approximately 100 tonnes of muck.

The decline was geologically mapped and both longitudinal wall chip and rib chip samples were taken for each round with a pneumatic chisel. The muck from each round of advance was stored in a separate, labelled stockpile on surface and composite samples from each pile were taken for assay and comparison with the longitudinal and rib sampling assay results.

In September 1985, approximately 77 tonnes of mineralized material were shipped in one tonne bags to Lakefield for testing. A further 675 tonnes was crushed and shipped to Lakefield in April 1986.

13.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

All samples were sent to independent commercial laboratories for sample preparation and analysis (Table 13.1). Samples were prepared using standard laboratory techniques and the samples were routinely analysed for beryllium, yttrium, niobium and tantalum. Select rare earths were assayed notably cerium and also zirconium.

Sampling by Avalon has been assayed at Lakefield Research and Global Discovery Laboratories (formerly Cominco Research).

Table 13.1 Assay Laboratories used for Thor Lake Samples

Year	Program	Operator	Primary Assay Lab	Check Lab
1977	77-1 to 77-5	Highwood	Bondar Clegg	
1978	78-1 to 78-12	Highwood	Chemex	
1979	79-1	Highwood	Chemex	
1980	80-1 to 80-13	Placer	X-Ray Assay Labs-Ta/Nb Placer-U Neutron Activation Services-Ta	Bondar Clegg Chemex
1981	81-1 to 81-5	Placer	X-Ray Assay Labs-Nb Neutron Activation Services-Ta	
1983	83-1 to 83-44	Highwood	Chemex	Bondar Clegg
1984	84-45 to 84-89 84L-1 to 84l-7	Highwood	Chemex	
1985	85-90 to 85-114 85L-6 Decline	Highwood	Chemex	Lakefield
1986	86-115 to 86-127 86L-7	Highwood	Chemex	
1988	88L-8 to 88L-26	Highwood/Hecla	Cominco Research	

14.0 DATA VERIFICATION

14.1 GENERAL VALIDATION

During the exploration programs at Thor Lake there were no systematic check assay programs. However, in 1985, splits from a number of samples from the North T Zone that were assayed by Chemex were sent to other assay laboratories for check assaying. The result of these checks is listed in Table 14.1 and Table 14.2.

Table 14.1 Check Assays % BeO, 1985

Sample Number	Witteck Development	Chemex Labs	Cabot Corporation
4035.00	3.15	3.32	3.53
4040.00	0.15	0.16	0.15
4045.00	0.47	0.71	0.72
4050.00	0.66	0.73	0.73
4055.00	1.30	1.53	1.51
4060.00	2.37	2.53	2.63
4065.00	0.27	0.36	0.35
4374.00	0.10	0.00	0.08
4745.00	0.48	0.57	0.53
4748.00	4.28	4.63	4.63
85-90-1	2.48	2.64	2.72
85-90-3	1.33	1.49	1.49
85-90-5	0.76	0.86	0.88
85-90-7	0.76	0.80	0.83
85-90-9	0.11	0.11	0.11
85-90-11	1.04	1.22	1.25
85-90-13	0.05	0.05	0.05
Average	**1.16**	**1.28**	**1.31**

The tables indicate that the check assays for beryllium compare well between Cabot and Chemex, with Witteck being approximately 9% lower than Chemex. Chemex returned the highest yttrium grades while Witteck and Molycorp returned the lowest.

Table 14.2 Check Assays % Y_2O_3, 1985

Sample Number	Witteck Development	Chemex Labs	Molycorp	Lakefield Research	Skyline Labs
4035,36	0.013	0.036	0.022	0.024	0.024
4039,40	0.006	0.018	0.013	0.011	0.010
4043,44	0.003	0.015	0.008	0.008	0.007
4051,52	0.128	0.258	0.137	0.230	0.220
4055,56	0.820	0.180	0.780	0.150	0.150
4059,60	0.099	0.223	0.095	0.170	0.170
4061,62	0.033	0.071	0.038	0.063	0.058
4373	0.206	0.339	0.238	0.310	0.290
4742	0.455	0.887	0.357	0.780	0.790
4747	0.293	0.625	0.292	0.520	0.480
4843	0.061	0.152	0.107	0.210	0.190
4844	0.125	0.095	0.067	0.100	0.100
85-90-02	0.012	0.024	0.020	0.019	0.016
85-90-06	0.163	0.213	0.181	0.250	0.230
85-90-10	0.064	0.122	0.062	0.100	0.110
85-91-1	0.100	0.147	0.081	0.170	0.150
85-91-4	0.014	0.027	0.019	0.024	0.020
85-91-8	0.188	0.226	0.141	0.270	0.240
Average	**0.155**	**0.203**	**0.148**	**0.189**	**0.181**

The checks by Lakefield on the Chemex assays from the exploration ramp samples compare well (Table 14.3).

14.2 Collar Positions

During Wardrop's site visit it was possible to positively identify three drill holes based on tags attached to stakes marking the position of the drill holes in the North T area. These collars were surveyed using a handheld Garmin Etrex, at a 7 m level of accuracy, Global Positioning System (GPS). The drill holes show acceptable differences when compared to the collars in the database (Table 14.4).

In general, the Eastings and the Northings were slightly higher for the GPS readings.

The collar positions were compared to the supplied topography file and no significant discrepancies were noted.

Table 14.3 Check Assays, Underground Sampling Program

Sub-Zone	Round	Reference	% BeO Lakefield	Chemex	% Y_2O_3 Lakefield	Chemex
A	U20	6.4 m-9.5 m	0.350	0.352	0.260	0.211
		9.5 m-12.2 m	0.320	0.305	0.200	0.201
	U21	0.0 m-3.2 m	0.210	0.194	0.200	0.169
		3.2 m-6.4 m	0.350	0.339	0.110	0.118
B	T2	77.0 m-81.0 m	0.480	0.483	0.027	0.022
	U24	13.2 m-16.6 m	0.290	0.269	0.028	0.027
		16.6 m-20.0 m	0.480	0.458	0.025	0.025
Average-A/B			**0.354**	**0.343**	**0.121**	**0.110**
C	U30	16.2 m-19.5 m	0.250	0.255	0.076	0.087
		19.5 m-23.2 m	0.540	0.541	0.140	0.125
		23.2 m-26.2 m	1.040	1.016	0.300	0.287
		26.2 m-29.6 m	0.970	1.013	0.220	0.208
	U31	12.8 m-16.5 m	0.450	0.450	0.190	0.170
		20.0 m-23.5 m	0.300	0.286	0.130	0.134
		27.1 m-30.6 m	0.350	0.319	0.210	0.183
		34.1 m-37.6 m	0.250	0.255	0.096	0.110
Average C			**0.519**	**0.517**	**0.170**	**0.163**
D	U14	14.4 m-18.3 m	0.630	0.624	0.500	0.413
		22.2 m-26.1 m	1.560	1.551	0.180	0.158
		29.8 m-33.6 m	0.330	0.339	0.045	0.058
		37.4 m-41.4 m	0.340	0.341	0.067	0.079
	U16	7.1 m-10.7 m	0.330	0.361	0.130	0.109
		14.7 m-18.5 m	0.400	0.389	0.150	0.139
Average D			**0.598**	**0.601**	**0.179**	**0.159**
E	U2	16.0 m-21.0 m	2.740	2.717	0.075	0.082
		21.0 m-25.0 m	2.040	2.076	0.023	0.011
		25.0 m-30.0 m	2.490	2.548	0.026	0.027
		30.0 m-34.0 m	3.160	3.219	0.033	0.042
		34.0 m-39.0 m	1.260	1.232	0.046	0.053
		39.0 m-43.0 m	1.640	1.621	0.043	0.035
		43.0 m-48.0 m	2.530	2.548	0.066	0.079
Average E			**2.266**	**2.280**	**0.045**	**0.047**
F	U5	25.9 m-29.0 m	0.011	0.019	0.019	0.027
		32.6 m-35.2 m	0.021	0.028	0.016	0.018
		40.1 m-43.5 m	0.006	0.014	0.019	0.017
	U6	14.2 m-17.7 m	0.007	0.014	0.015	0.017
Average F			**0.011**	**0.019**	**0.017**	**0.020**

Table 14.4 Comparison of GPS and Survey Collars

BHID	GPS			Survey			Difference		
	Easting	Northing	Elevation	Easting	Northing	Elevation	Easting	Northing	Elevation
83-1	416,552	6,888,488	240	416,545	6,888,479	245	7	9	(5)
83-3	416,524	6,888,532	244	416,519	6,888,523	245	5	9	(1)
84-65	416,534	6,888,519	238	416,527	6,888,510	245	7	9	(7)

14.3 ASSAYS

14.3.1 NORTH T ZONE

A total of 1,915 entries were checked for BeO, Ce_2O_3, Nb_2O_5, Nd_2O_3 and Y_2O_3 grade out of a total database of 11,200 entries. Original assays from Chemex (Vancouver) were compared with the assay table used in the resource estimate. A total of 14 errors were detected (0.73%). The data was corrected prior to carrying out the estimation.

The database does not distinguish between trace values and where no samples were taken.

14.3.2 LAKE ZONE

A total of 1,422 entries were checked for BeO, Ce_2O_3, Ga_2O_5, La_2O_3, Nb_2O_5 Ta_2O_5, uranium (U), Y_2O_3 and zirconium dioxide (ZrO_2). Wardrop was unable to find assay certificates for all of the values. Assay results were found for 1,027 entries. The remaining entries were checked against drill hole log sheets. A total of four errors were detected (0.28%). In the 1988 certificates all of the elements apart from Nb_2O_5 are reported in their elemental form. The factor for converting La to La_2O_3 was incorrectly applied. The data was corrected prior to carrying out the estimation.

The database does not distinguish between trace values and where no samples were taken.

14.4 DOWNHOLE SURVEY REVIEW

Dip tests were carried out at the end of drill holes, however no historic record of these readings has been found and the readings have not been verified. There is no reason to assume that the survey results are not correct.

14.5 INDEPENDENT SAMPLES

A total of 14 samples from muck piles generated during the development of the exploration ramp in the North T Zone, and core samples were submitted to Global Discovery Laboratory as an independent check by Wardrop on the mineralization of the Thor Lake property. The samples were assayed variously for beryllium, cerium, niobium, neodymium and yttrium, and verified the presence of *mineralization (Table 14.5).*

Table 14.5 Independent Sampling Results (parts per million)

Lab No.	Field Number	Be	Ce	Nb	Nd	Y
R0639878	84L-1A-1	<5	1335	1180	564	39
R0639879	84L-1A-2	6	10600	11120	4830	315
R0639880	84L-1A-3	5	8830	17810	4040	3880
R0639881	88-26-1	18	357	1380	166	85
R0639882	88-26-2	<5	922	620	480	84
R0639883	88-26-3	<5	401	690	181	38
R0639884	C48120	12401	256	70	110	108
R0639885	C48121	25530	267	60	124	170
R0639886	C48122	28096	339	20	133	33
R0639887	C48123	53	171,000	120	57800	385
R0639888	C48125	20	167,000	80	57600	394
R0639889	C48126	7	158,500	70	53500	449
R0639890	C48127	11809	4180	2300	2080	226,400

15.0 ADJACENT PROPERTIES

At the time of writing there are no mineral claims or leases adjacent to the Thor Lake leases. All of the known rare metal deposits related to the Blatchford Lake Complex are owned by Avalon.

16.0 MINERAL PROCESSING AND METALLURGICAL TESTING

16.1 INTRODUCTION

Between 1984 and 1989, considerable testwork was done on the North T Zone samples by Witteck, Lakefield, and Hazen which culminated in pilot plant testing programs at Lakefield. The early programs were managed on behalf of the joint venture by Strathcona. The work programs focused on developing a process for the recovery of beryllium and rare earths into separate concentrates; a LREE concentrate comprised of bastnaesite group minerals from the F sub-zone, and an Y+HREE concentrate as a by-product of the beryllium concentration.

16.2 WITTECK DEVELOPMENT LTD.

Witteck undertook a two-phase program in 1984–1985 aimed at developing a metallurgical flowsheet to recover beryllium from the North T Zone ores.

Initially and preparatory to designing a flowsheet for beryllium recovery Witteck developed an assay protocol for analysis of beryllium, undertook mineralogical studies of North T Zone samples and bench scale gravity and flotation testwork.

While recoveries of over 90% were achieved, Witteck was unable to produce a rougher concentrate with a grade above 12% beryllium without a significant loss in recovery. The Witteck work was terminated and the project was taken to Lakefield.

16.3 LAKEFIELD RESEARCH

Lakefield undertook preliminary testing on Thor Lake samples at its own expense in April 1985. It was agreed to let them proceed and Lakefield demonstrated a combination of reagents developed in-house, that produced a beryllium flotation concentrate in the range of 20% beryllium with an 80% recovery. A separate flotation process was developed for LREEs in the F sub-zone which achieved 60% TREO grades with attendant 90% recoveries. Recoveries of Y+HREEs were poor at 60% and a concentrate grade of 3.2% Y_2O_3.

In October 1985, ore samples were received from the four sub-zones C, D, E and F from the underground bulk sampling. Lakefield blended the samples from the beryllium sub-zones to produce composites with grades consistent with the estimated in-situ grades and proceeded to run pilot plant tests of the samples on the basis of their developed flowsheets.

16.3.1 STRATHCONA SUMMARY

Strathcona (1987) summarized the flotation test work as follows:

- The metallurgical investigation for recovery of beryllium concentrate has developed to a point where the design parameters have been determined for the design and construction of a plant to process ore from the three sub-zones of the North T Zone deposit and operating costs can be estimated.
- The metallurgy is complex, but the process has been established. However, many details regarding optimum size for flotation feed and optimum reagent addition must be determined in the operating plant.
- The recovery of bastnaesite from the F sub-zone is well-established.
- The recovery of yttrium from the D sub-zone and yttrium and niobium from the C sub-zone has been made difficult by the low ore grades for these metals, by extreme depressant conditions applied during beryllium flotation, and by the relatively fine intergrowths of these minerals with others.

The basic flow sheet for phenacite concentration is shown in Figure 16.1.

In 2002 Beta sent concentrate samples to Brush Wellman Industries (Brush) in Delta, Utah for analysis and scoping studies for the utilization of Thor Lake phenacite as a feedstock. Several points of entry for Thor Lake concentrates in the Brush circuits were to be examined and this work is ongoing.

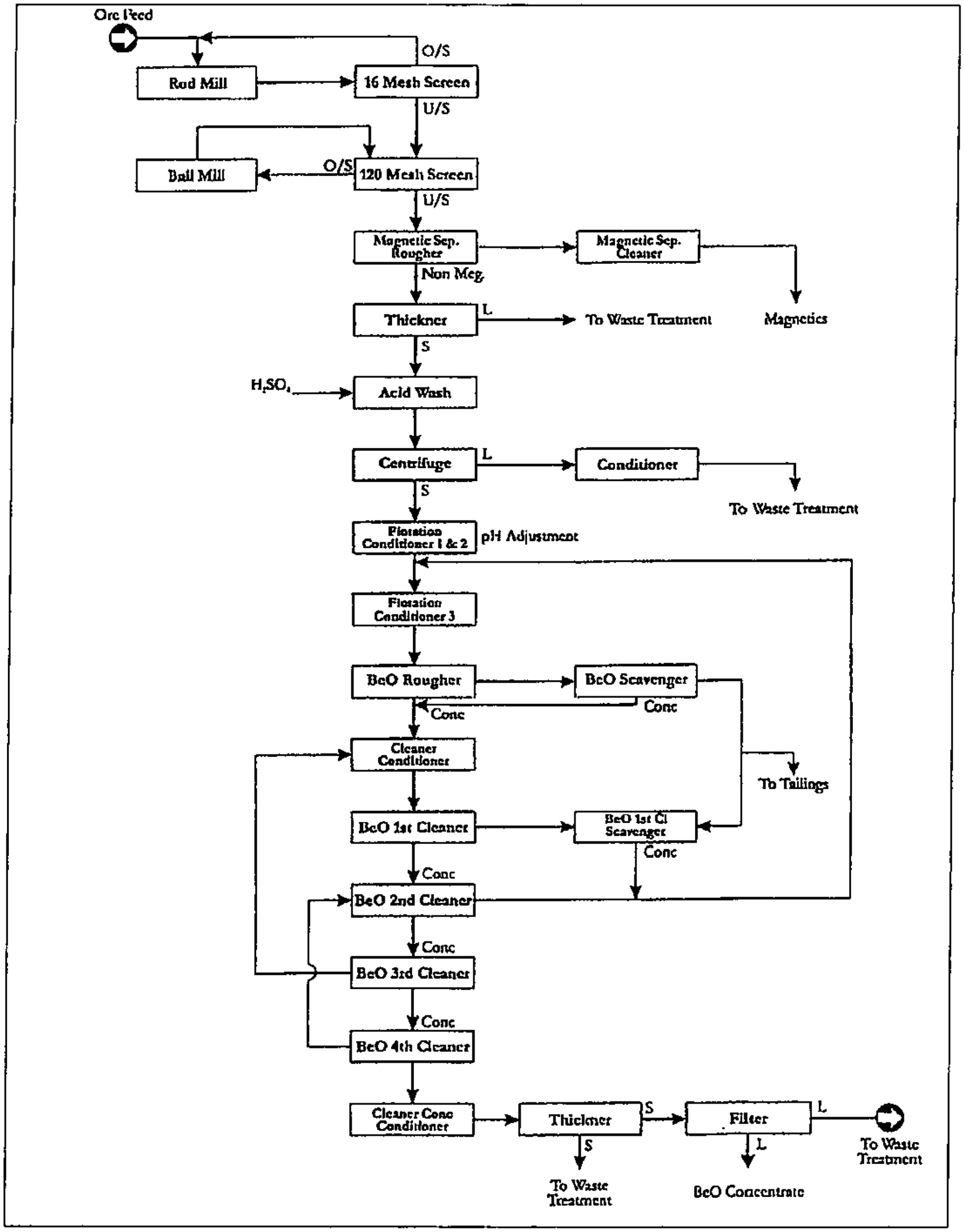
In discussions held between Beta personnel and Brush in April of 2004 (notes on Beta Minerals Summary Report, Avalon company files) Brush indicated concerns with respect to boron, REE contents, potassium, sodium, phosphorous, sulphur, aluminum, fluorine, and silica contents in concentrates from Thor Lake. Some of these concerns had been addressed during the previous hydrometallurgical processing work undertaken at Hazen and Lakefield for Hecla.

16.4 HAZEN RESEARCH HYDROMETALLURGICAL TESTING PROGRAM

In October 1986, Hazen was retained to develop a process for recovering beryllium and yttrium from the Thor Lake flotation concentrates. The objective was to develop a hydrometallurgical process which could efficiently produce beryllium hydroxide and an yttrium product.

In March, 1987, it was decided that the yttrium values were not of sufficiently high enough grade to justify a separate hydrometallurgical circuit. Hazen's work was then directed solely at treating beryllium concentrate, but with provision to recover yttrium and rare earth products.

Figure 16.1 The Basic Flow Sheet for Phenacite Concentration at Thor Lake



Hazen's work identified the refractory nature of the phenacite concentrate and that it required aggressive treatment to dissolve. A number of alternatives were considered before selecting high-temperature acid leaching. Aggressive treatment also dissolves impurities and necessitates a series of purification steps:

the main impurities taken into solution being iron, titanium, thorium, yttrium, rare earths and magnesium.

A flow sheet, developed by Hazen was then tested on a bench scale basis and testing was conducted on 3000 gram (g) batches of concentrate.

16.5 Lakefield Research – Hydrometallurgical Pilot Plant Campaign

It was originally planned to have Hazen do a full-scale hydrometallurgical pilot plant campaign. Hazen however, was unable to obtain licensing and permitting to dispose of the "mixed waste" from the program and it was decided to move the pilot campaign to Lakefield.

The engineering and construction of the hydrometallurgical pilot plant facilities were carried out by Lakefield from July to November 1988. The first phase of the program (acid leaching) commenced in mid-November 1988, while the second phase of the program (purification) commenced in late-January 1989.

The process flowsheet for the hydrometallurgical pilot plant at Lakefield was based on the flowsheet developed at Hazen during 1986 – 1987and is shown in Figure 16.2.

16.5.1 Objectives of the Pilot Plant Program

The purpose of the hydrometallurgical pilot plant campaign at Lakefield was to verify the process criteria of the conceptual flowsheet and to confirm the product quality and metallurgical efficiency of the individual unit operations.

The work at Hazen demonstrated that the hydrometallurgical flowsheet can be divided into two main sections or phases: first, the conversion of the water-insoluble phenacite to water-soluble beryllium sulphate; second, the removal of impurities which were dissolved together with beryllium silicate.

Phase I testing verified the metallurgical performance and design parameters for a commercial plant and established operating protocols for commercial operations.

Phase II testwork on E sub-zone ore yielded a beryllium recovery of 91%, compositions of intermediate and final products of which are shown in Table 16.1.

In August of 2000 the Hydrometallurgical Division of Dynatec performed a technical audit of the work done at Hazen and Lakefield with attendant recommendations.

Figure 16.2 Basic Hydrometallurgical Pilot Plant Flowsheet

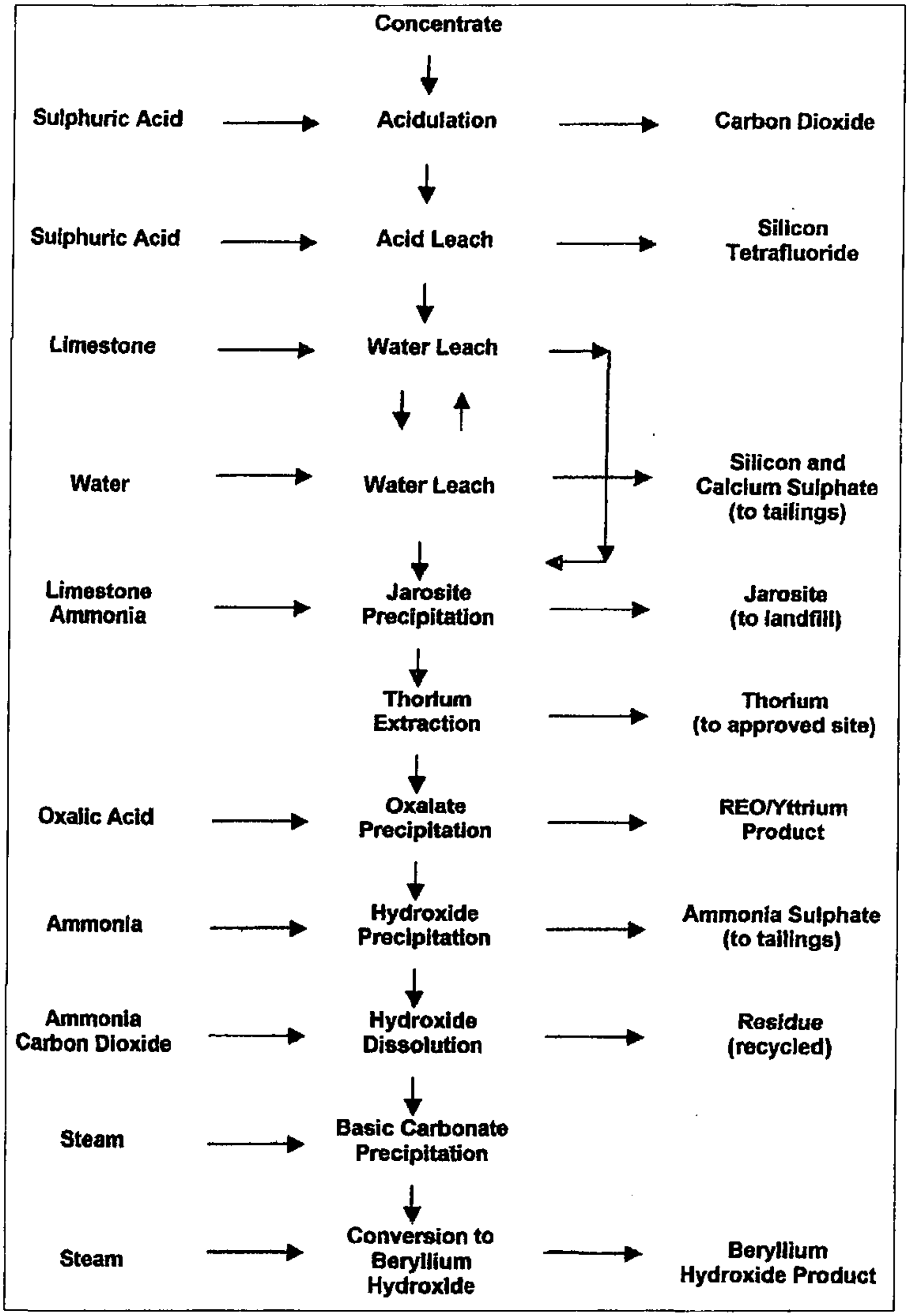


Table 16.1 Chemical Assay of Beryllium Products

Element	Hydrate (ppm)[1]	Calcine (ppm)
Beryllium	130000	328000
Beryllium Oxide	360000	911000
Aluminum	83	220
Silver	<5	8.6
Boron	83	190
Barium	<2	<2
Bismuth	<10	16
Calcium	25	55
Cadmium	<0.5	1.1
Cerium	46	115
Cobalt	<1	2
Chromium	22	52
Copper	<2	<2
Iron	43	80
Potassium	72	261
Lanthanum	40	85
Lithium	<5	<5
Magnesium	3	7
Manganese	<1	2
Molybdenum	<5	<5
Sodium	49	333
Nickel	<2	9
Phosphorus	93	210
Lead	<5	7
Sulphur	467	936
Silicon	139	252
Thorium	<10	15
Titanium	<5	8
Uranium	<50	<50
Vanadium	<5	<5
Yttrium	<5	<5
Zirconium	5	<5

[1]ppm – parts per million

16.6 Summary Results T Zone Metallurgy

Table 16.2 displays results of concentration testwork on the various North T mineralized sub-zones. No testwork has been conducted on what is now identified as the Y sub-zone. The tabulated data are the best results obtained of numerous test runs.

Table 16.2 Concentrate Grade and Recovery Data for the North T Zone

Sub-Zone	BeO% (Grade/Recovery)	Y_2O_3% (Grade/Recovery)	Ce_2O_3% (Grade/ Recovery)
E	25/91	NA*	NA
D	24.6/80.5	3.2/60	NA
C	17.1/80.6	1.6/45.7	NA
F			28.7/93

**N/A – not applicable*

16.7 METALLURGICAL TESTING OF LAKE ZONE SAMPLES

Metallurgical difficulties in the processing of Lake Zone mineralization were first noted by TANCO and subsequently Placer and over a period of about 6 years Highwood retained a number of consultants to develop satisfactory processes for the recovery of tantalum from the Lake Zone.

In 2001 Lakefield, at the request of Navigator, carried out a testing program on a composite drill core sample from the Lake Zone. The composite used in the study assayed 0.56% Nb_2O_5, 0.047% Ta_2O_2, 5.2% ZrO_2, 0.12% Y_2O_3 and 1.55% TREO. Lakefield's mandate was to produce a tantalum concentrate.

The tantalum could not be recovered to a marketable specification and a treatment process was developed in the course of the work which produced a bulk tantalum/niobium/zirconium/yttrium/REE flotation concentrate.

Figure 16.3 shows the grinding and desliming flowsheet used in processing the composite sample and Figure 16.4 shows the flotation circuit developed to produce the bulk concentrate.

Figure 16.3 Grinding and Desliming Flowsheet, Lake Zone

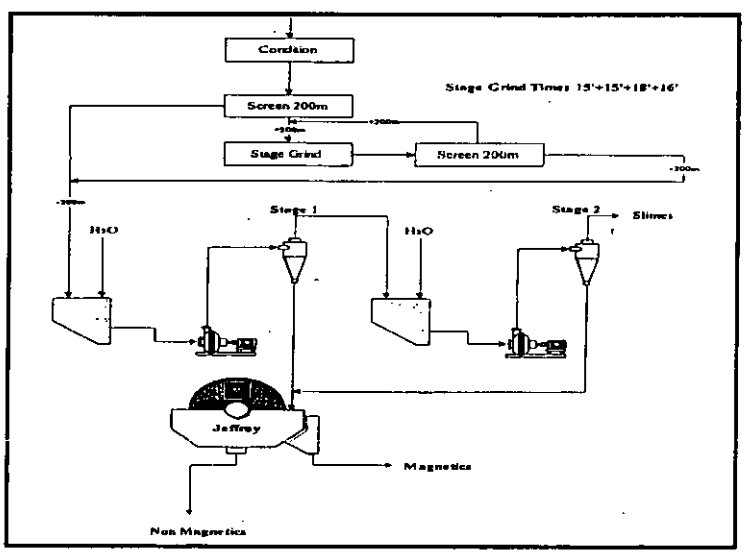
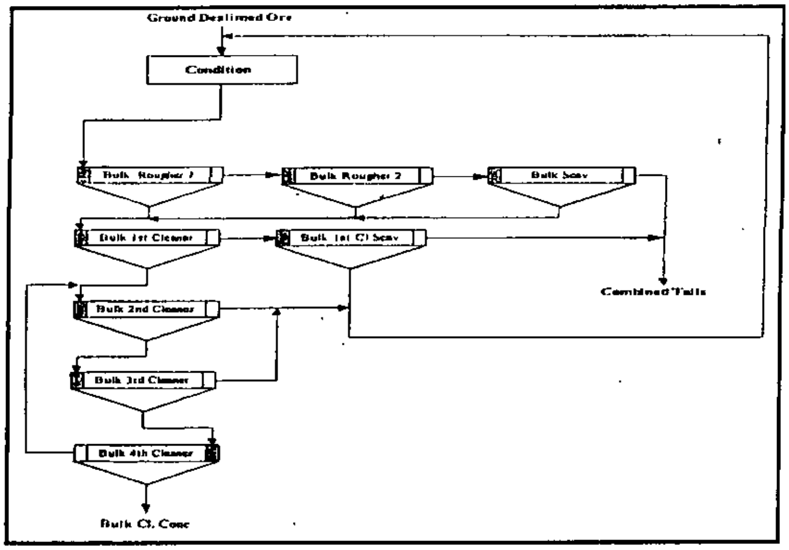


Figure 16.4 Flotation Flowsheet, Lake Zone Bulk Concentrate



The metallurgical results obtained in a locked cycle test are shown in Table 16.3 and analytical results of the bulk concentrate are given in Table 16.4

Table 16.3 Metallurgical Results Obtained in the Locked Cycle Test

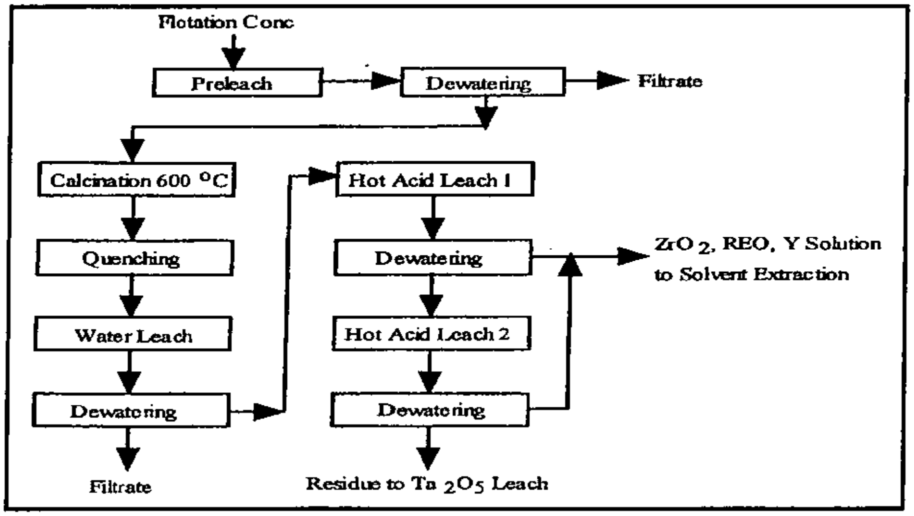
Product	Wt	Assay (%)					Recovery (%)				
	(%)	ZrO_2	Ta_2O_5	Nb_2O_5	TREO	Y_2O_3	ZrO_2	Ta_2O_5	Nb_2O_5	TREO	Y_2O_3
Bulk Cl Conc.	19.70	21.4	0.27	2.01	7.10	0.50	82.8	74.8	65.2	90.2	82.0
Combined Tails	72.50	0.99	0.02	0.23			14.0	20.1	28.8		
Magnetics	2.41	2.02	0.039	0.37			1.0	1.3	1.6		
Slimes	5.31	2.11	0.05	0.48			2.2	3.7	4.4		
Head Calc	99.92	5.02	0.07	0.59			100.0	100.0	100.0		
Head Direct		5.20	0.047	0.56	1.55	0.12					

Table 16.4 Analysis of Lake Zone Bulk Concentrate

Element %	Assays
ZrO_2	20.5
Ta_2O_5	0.25
Nb_2O_5	2.10
Y_2O_3	0.50
Ce_2O_3	3.35
La_2O_3	1.51
REO	7.10
ThO_2	0.048
U_3O_8	0.012

Preliminary hydrometallurgical testing, preparatory to solvent extraction processing, was carried out on the flotation concentrate. The tests included low temperature NaOH calcination followed by water and hot HCl leach (Figure 16.5). Test results indicated that ZrO_2, Y_2O_3 and REO can be dissolved leaving tantalum and niobium in a residue, all of which could be recovered using standard metallurgical techniques.

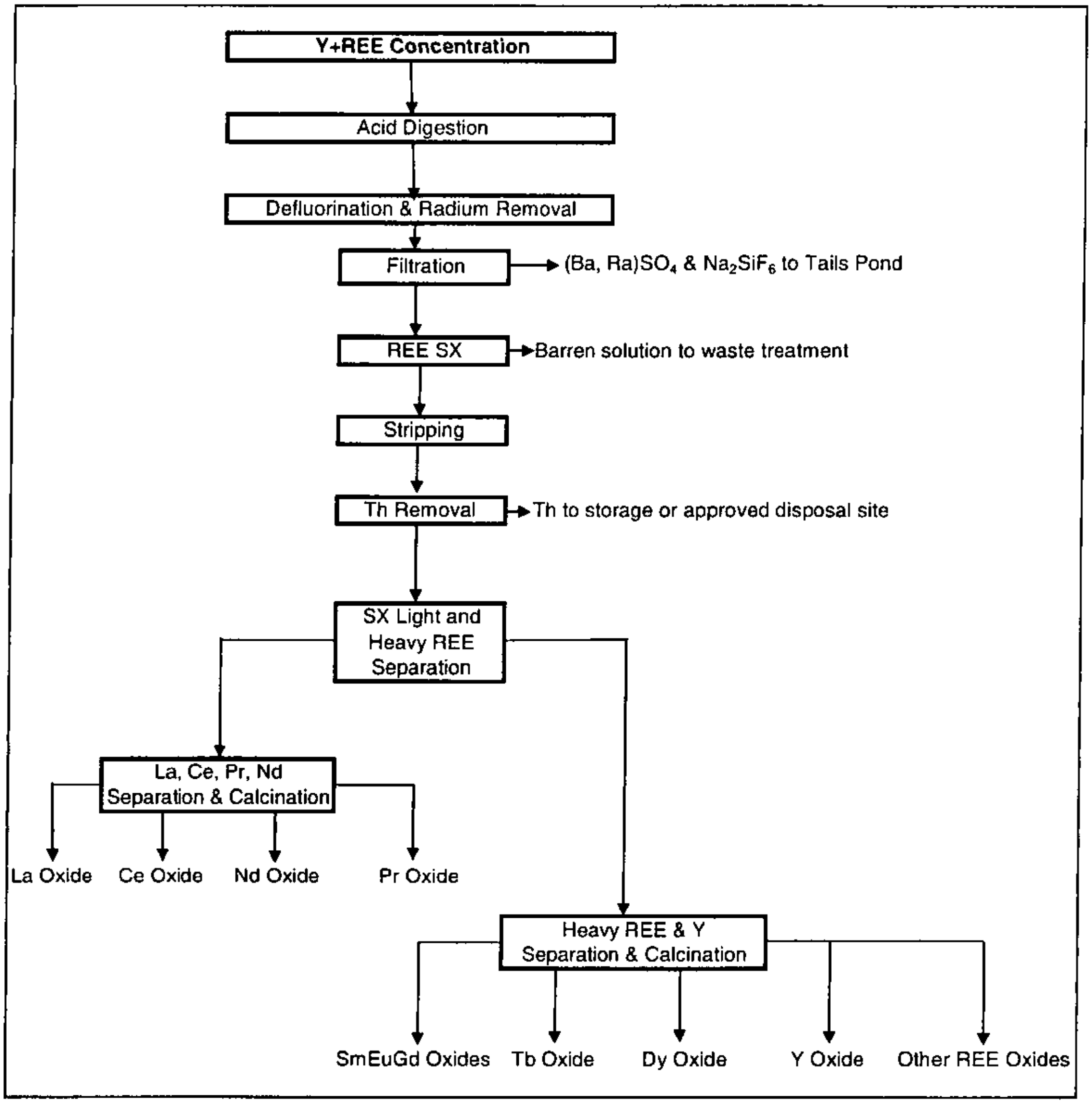
Figure 16.5 Generalized Leaching Flowsheet for Bulk Concentrate



16.8 SOLVENT EXTRACTION PROCESSING

Solvent extraction research was not conducted on the Lake Zone bulk concentrate. Inadequate sample was available and the fall in tantalum prices led to a halt in the research. No consideration was given to the other commodities. For the purposes of economic modelling of the Thor Lake deposits (Section 19.10) a proposed solvent extraction flowsheet was generated on the basis of existing plants for the recovery of Y+REEs and used for the basis of capital and operating costs. The flowsheet is shown in Figure 16.6.

Figure 16.6 Conceptual Flowsheet for Y+REE Concentrate Processing



17.0 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

Datamine Studio 3 software was used by Wardrop to generate the following mineral resource estimates. Estimates were prepared for the North T Zone and the Lake Zone. More data are required for the South T Zone before an estimate could be prepared for it, and the R, S, and Fluorite Zones are considered to be partially explored targets.

17.1 NORTH T ZONE

17.1.1 *INTRODUCTION*

In order to carry out the evaluation of the property a digital database for collars, surveys and assays suitable for importing into Datamine Studio 3 was extracted from a database used for generating a historic resource estimate in MineSight. Historic sectional interpretations drawn in AutoCAD were converted to 3D Datamine strings. These sections were then compared to the drill hole data and the strings were snapped to the drill holes. There is a good correlation between the AutoCAD outlines and the drill hole grades.

The outlines define five sub-zones C, D, E, Y and F.

Examination of the drill holes also indicated the presence of an yttrium halo around the previously defined mineralization. Strings were created around the yttrium mineralization but it was noted that there were some low-grade areas within the envelope. Categorical indicator kriging using a cut-off of 0.04% was carried out to define the high (HY) and low (LY) grade areas of Y_2O_3. The deposit measures approximately 225 m by 115 m by 80 m.

The database used to carry out the resource contains a total of 84 drill holes and 18,062 assay entries for Y_2O_3, La_2O_3, Ce_2O_3, Nd_2O_3, Gd_2O_3, BeO, Nb_2O_5, and Ga_2O_3,in the North T area.

17.1.2 *DATA*

DATABASE

The database, which includes information for both the North T and South T Zones, contains 1,099 data entries of BeO, 1,449 of Ce_2O_3, 108 of Ga_2O_3, 161 of Gd_2O_3, 181 of La_2O_3, 1,357 of Nb_2O_5, 346 of Nd_2O_3 and 1,504 of Y_2O_3 above trace. There is good correlation between Nd_2O_5 and La_2O_3 (0.87) and moderate correlation between Nd_2O_5 and Ce_2O_3 (0.76). Due to the low number of assays above trace for Ga_2O_3, Gd_2O_3 and La_2O_3 these elements were not interpolated into the model.

The extracted database uses the same coding for trace values and if no assay was requested. Both these were set to zero prior to interpolation into the block model. This is likely to lead to a conservative estimate.

BULK DENSITY

In 2006, density measurements were taken for drill hole 83-43 and averaged for each sub-zone (Table 17.1). The average density for each sub-zone has been applied to the model. Historic models used a density of 3.02 grams per cubed centimetre (g/cm^3).

Table 17.1 Bulk Density by Sub-Zone (g/cm^3)

Sub-Zone	Density	Number of Samples
C	2.91	15
D	2.72	16
E	2.66	13
F	2.68	3
Y	2.72	15

17.1.3 GEOLOGICAL INTERPRETATION

The initial interpretation of sub-zones C, D, E and F was based on historic AutoCAD files. These files were converted to Datamine string files and the interpretation was validated against drill hole information. The interpretation correlates to the grades in the drill holes.

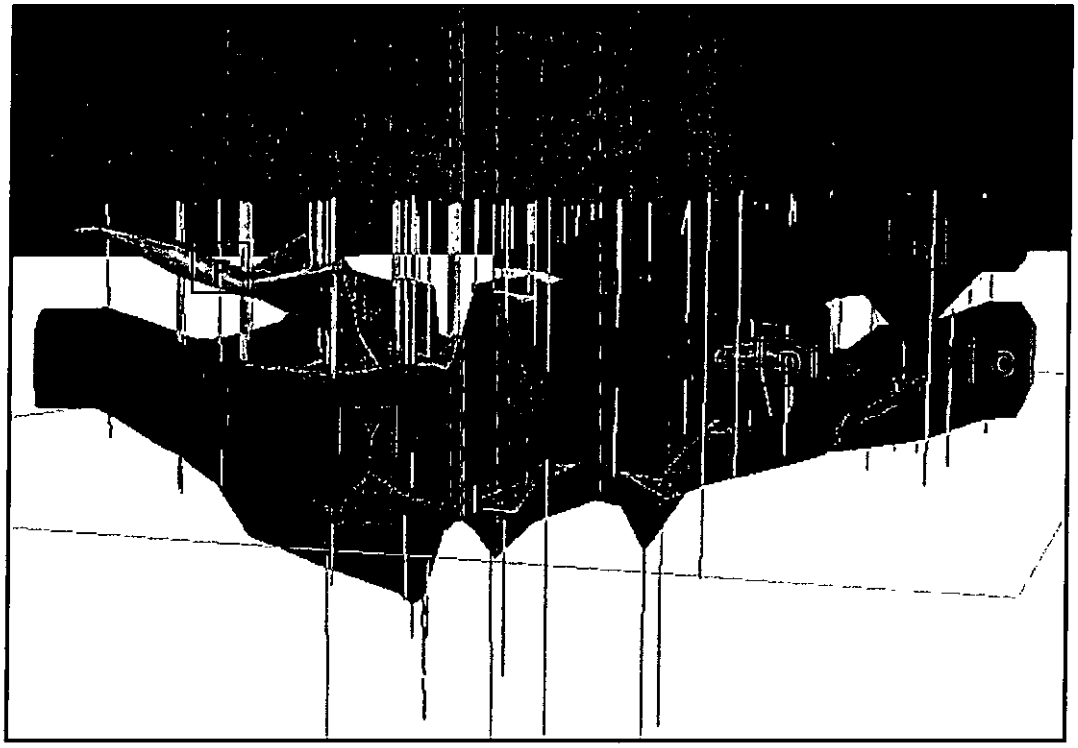
The C, D, E and F sub-zones are enriched in BeO while the F sub-zone is also enriched in Ce_2O_3. In Figure 17.1, the North T Zone, C, D, E, F and Y sub-zones are displayed with drill holes looking north-east the distance from left to right of the deposit is approximately 225 m.

Wireframes were generated from the string files. Review of the wireframes indicated that some of the wireframes intersected. Steps were taken during the block modelling phase to ensure that blocks have not been counted more than once in the resource estimate.

During the validation of the AutoCAD files the presence of an yttrium halo around the previously interpreted zones was noted. Strings were created around the yttrium mineralization (Y sub-zone, Figure 17.1) but it was noted that there was some low-grade areas within the envelope. Categorical indicator kriging using a cut-off of 0.04% was carried out to define the high and low-grade areas of Y_2O_3.

Based on the mineralization it appears that the North T Zone has had two or three stages of mineralization. The initial phase was yttrium bearing followed by beryllium. The fact that the F sub-zone is enriched in both beryllium and cerium suggests that cerium and the LREE were introduced during a third phase of mineralization and in turn, suffered later brecciation.

Figure 17.1 North T-Zone, C, D, E, F and Y Sub-Zones with Drill Holes



17.1.4 EXPLORATORY DATA ANALYSIS

ASSAYS

The North T Zone was sampled by 84 drill holes. The basic statistics for the samples for total area by sub-zone are listed in Table 17.2 through to Table 17.6.

Sub-zone OUT refers to the samples not lying within sub-zones C, D, E, F, HY and LY.

Table 17.2 North T Zone Assay Statistics, BeO

BeO	All	C	D	E	F	HY	LY	Out
Valid cases	662	113	125	119	4	106	30	165
Mean	7387.64	8853.98	9187.20	14869.75	11150.00	2826.60	2513.33	3349.09
Std. Error of Mean	339.96	833.46	655.07	1095.05	1178.63	517.38	551.79	275.69
Variance	76510770.52	78496077.75	53638867.10	142695856.72	5556666.67	28373803.57	9134298.84	12540563.19
Std. Deviation	8747.04	8859.80	7323.86	11945.54	2357.26	5326.71	3022.30	3541.27
Variation Coefficient	1.18	1.00	0.80	0.80	0.21	1.88	1.20	1.06
Rel. V. Coefficient (%)	4.60	9.41	7.13	7.36	10.57	18.30	21.95	8.23
Skew	2.53	2.97	1.60	1.36	-0.10	7.17	3.87	2.77
Minimum	0.00	800.00	300.00	1000.00	8300.00	0.00	300.00	100.00
Maximum	63800.00	59000.00	41100.00	63800.00	13900.00	50000.00	16800.00	21800.00
Range	63800.00	58200.00	40800.00	FALSE	5600.00	50000.00	16500.00	21700.00
1st Percentile	100.00	856.00	378.00	1080.00	----	7.00	----	100.00
5th Percentile	515.00	1640.00	2500.00	2900.00	----	300.00	300.00	230.00
10th Percentile	1000.00	3040.00	3000.00	3700.00	----	400.00	430.00	500.00
25th Percentile	2100.00	3900.00	4150.00	6000.00	8850.00	1000.00	1050.00	1250.00
50th Percentile	4400.00	5800.00	6000.00	9600.00	11200.00	1900.00	1850.00	2300.00
75th Percentile	8900.00	10000.00	11850.00	23400.00	13400.00	2600.00	2900.00	4300.00
90th Percentile	19300.00	19180.00	19940.00	31800.00	----	4720.00	4600.00	6980.00
95th Percentile	26070.00	26490.00	22110.00	38200.00	----	9270.00	10310.00	10110.00
99th Percentile	42099.00	57222.00	38630.00	61660.00	----	47879.00	----	21602.00

Table 17.3 North T Zone Assay Statistics, Nb_2O_5

Nb_2O_5	ALL	C	D	E	F	HY	LY	OUT
Valid cases	1063	108	126	78	11	259	101	380
Mean	5643.58	11025.37	3460.16	2081.79	364.55	6024.29	7315.84	5017.97
Std. Error of Mean	302.06	1722.80	579.69	370.57	82.16	554.02	1027.63	424.22
Variance	96991557.29	320549686.74	42340687.98	10711064.27	74247.27	79498212.19	106658468.53	68385758.68
Std. Deviation	9848.43	17903.90	6506.97	3272.78	272.48	8916.18	10327.56	8269.57
Variation Coefficient	1.75	1.62	1.88	1.57	0.75	1.48	1.41	1.65
Rel. V. Coefficient (%)	5.35	15.63	16.75	17.80	22.54	9.20	14.05	8.45
Skew	5.74	5.08	6.19	2.40	0.59	4.12	3.58	3.98
Minimum	0.00	200.00	40.00	0.00	60.00	270.00	70.00	0.00
Maximum	150900.00	150900.00	53900.00	14000.00	820.00	63100.00	61300.00	64900.00
Range	150900.00	150700.00	53860.00	14000.00	760.00	62830.00	61230.00	64900.00
1st Percentile	30.00	202.70	72.40	----	----	314.00	75.20	30.00
5th Percentile	272.00	904.50	297.00	0.00	----	500.00	820.00	200.50
10th Percentile	390.00	1218.00	414.00	39.00	68.00	740.00	1408.00	330.00
25th Percentile	1000.00	2552.50	1080.00	315.00	100.00	1630.00	2100.00	660.00
50th Percentile	2600.00	5265.00	2180.00	920.00	300.00	3620.00	4240.00	1915.00
75th Percentile	6300.00	13330.00	3600.00	1915.00	680.00	6700.00	7330.00	6137.50
90th Percentile	13260.00	24680.00	6400.00	8800.00	800.00	12100.00	14380.00	13490.00
95th Percentile	18760.00	44665.00	9985.50	11345.00	----	20500.00	28830.00	16395.00
99th Percentile	55236.00	142305.00	51767.00	----	----	57420.00	61260.00	52391.00

Table 17.4 North T Zone Assay Statistics Ce_2O_3

Ce_2O_3	ALL	C	D	E	F	HY	LY	OUT
Valid cases	1189	115	130	122	26	269	108	419
Mean	1885.77	1348.35	1853.23	1225.90	34427.69	980.15	831.48	1069.36
Std. Error of Mean	205.50	94.41	215.73	258.38	5836.69	59.48	92.02	200.36
Variance	50210756.81	1024936.72	6050380.18	8144573.15	885741955.08	951769.38	914444.51	16821205.56
Std. Deviation	7085.95	1012.39	2459.75	2853.87	29761.42	975.59	956.27	4101.37
Variation Coefficient	3.76	0.75	1.33	2.33	0.86	1.00	1.15	3.84
Rel. V. Coefficient (%)	10.90	7.00	11.64	21.08	16.95	6.07	11.07	18.74
Skew	8.83	1.09	3.21	4.47	0.50	3.16	2.96	12.64
Minimum	10.00	60.00	100.00	50.00	170.00	20.00	30.00	10.00
Maximum	93000.00	5540.00	15100.00	21080.00	93000.00	8750.00	5410.00	66000.00
Range	92990.00	5480.00	15000.00	21030.00	92830.00	8730.00	5380.00	65990.00
1st Percentile	50.00	60.00	106.20	52.30	----	47.00	31.80	42.00
5th Percentile	100.00	142.00	175.50	80.00	954.00	150.00	164.50	90.00
10th Percentile	160.00	210.00	261.00	110.00	2963.00	190.00	216.00	120.00
25th Percentile	275.00	480.00	565.00	160.00	5470.00	335.00	310.00	220.00
50th Percentile	600.00	1300.00	1090.00	215.00	30950.00	720.00	520.00	420.00
75th Percentile	1310.00	1850.00	2312.50	935.00	56750.00	1300.00	880.00	940.00
90th Percentile	2620.00	2674.00	3841.00	3683.00	80510.00	1960.00	1795.00	1640.00
95th Percentile	4305.00	3198.00	7557.50	5660.00	90270.00	2565.00	2870.00	2880.00
99th Percentile	43540.00	5290.40	14108.00	19405.60	----	4704.00	5380.30	10928.00

Table 17.5 North T Zone Assay Statistics, Nd_2O_3

Nd_2O_3	ALL	C	D	E	F	HY	LY	OUT
Valid cases	307	56	35	24	19	44	29	100
Mean	2096.03	530.54	1011.43	347.92	21832.63	536.14	264.48	1239.40
Std. Error of Mean	418.04	42.82	207.69	109.06	4409.24	62.79	39.95	422.29
Variance	53651438.41	102685.16	1509677.31	285434.60	369386331.58	173480.07	46289.90	17833011.76
Std. Deviation	7324.71	320.45	1228.69	534.26	19219.43	416.51	215.15	4222.92
Variation Coefficient	3.49	0.60	1.21	1.54	0.88	0.78	0.81	3.41
Rel V. Coefficient (%)	19.94	8.07	20.53	31.35	20.20	11.71	15.11	34.07
Skew	6.27	0.32	2.26	2.23	1.47	2.69	2.01	6.32
Minimum	10.00	60.00	30.00	20.00	1700.00	10.00	10.00	10.00
Maximum	79500.00	1160.00	5030.00	2160.00	79500.00	2540.00	1060.00	33600.00
Range	79490.00	1100.00	5000.00	2140.00	77800.00	2530.00	1050.00	33590.00
1st Percentile	10.80	----	----	----	----	----	----	10.40
5th Percentile	60.00	80.00	70.00	20.00	1700.00	92.50	20.00	80.00
10th Percentile	90.00	120.00	102.00	25.00	3280.00	125.00	60.00	90.00
25th Percentile	160.00	217.50	250.00	50.00	5740.00	272.50	140.00	140.00
50th Percentile	370.00	485.00	620.00	105.00	20100.00	510.00	210.00	270.00
75th Percentile	800.00	777.50	1340.00	427.50	35500.00	710.00	340.00	635.00
90th Percentile	2566.00	1040.00	2670.00	1215.00	38900.00	840.00	560.00	1700.00
95th Percentile	8228.00	1134.50	5030.00	1925.00	79500.00	1200.00	820.00	4317.50
99th Percentile	36492.00	----	----	----	----	----	----	33503.00

Table 17.6 North T Zone Assay Statistics, Y_2O_3

Y_2O_3	ALL	C	D	E	F	HY	LY	OUT
Valid cases	1191	115	132	122	26	271	108	417
Mean	905.16	1205.57	2509.70	276.64	731.15	1517.60	280.74	272.85
Std. Error of Mean	52.44	168.78	330.01	29.49	206.15	102.95	23.23	25.09
Variance	3275459.11	3275835.43	14376025.86	106078.70	1104970.62	2872242.74	58270.48	262533.90
Std. Deviation	1809.82	1809.93	3791.57	325.70	1051.18	1694.77	241.39	512.38
Variation Coefficient	2.00	1.50	1.51	1.18	1.44	1.12	0.86	1.88
Rel. V. Coefficient (%)	5.79	14.00	13.15	10.66	28.20	6.78	8.27	9.20
Skew	6.80	2.53	4.37	3.91	3.12	3.08	2.57	5.72
Minimum	0.00	50.00	60.00	10.00	90.00	0.00	30.00	0.00
Maximum	31600.00	9490.00	31600.00	2120.00	4990.00	13550.00	1640.00	4480.00
Range	31600.00	9440.00	31540.00	2110.00	4900.00	13550.00	1610.00	4480.00
1st Percentile	0.00	50.00	63.30	14.60	----	87.20	30.00	0.00
5th Percentile	30.00	106.00	146.00	41.50	97.00	310.00	49.00	0.00
10th Percentile	60.00	130.00	200.00	60.00	117.00	420.00	70.00	30.00
25th Percentile	140.00	200.00	415.00	145.00	245.00	580.00	122.50	70.00
50th Percentile	310.00	400.00	1025.00	215.00	345.00	950.00	230.00	140.00
75th Percentile	840.00	1520.00	3657.50	282.50	737.50	1730.00	340.00	280.00
90th Percentile	2318.00	3578.00	5985.00	397.00	2124.00	3390.00	564.00	492.00
95th Percentile	4004.00	6268.00	8508.00	729.50	4129.00	5410.00	772.00	870.00
99th Percentile	7877.20	9230.80	27079.00	2069.40	----	8310.00	1584.20	3864.40

The majority of the histograms suggest that the elements in each sub-zone approximate a lognormal distribution. This is supported by the fact that nearly all of the elements in each sub-zone are positively skewed (mean value greater than median). Due to the small number of data points in the F sub-zone, the histograms were not clearly defined. In sub-zones C and D there appears to be two lognormal populations of Y_2O_3.

The statistics for the samples not contained within the solid (OUT) show that there are high values for Ce_2O_3 (6.6%), Nb_2O_5 (6.5%) and Nd_2O_3 (3.4%) that are not contained in the solid. There is also evidence of Y_2O_3 values greater than 0.04% occurring below the solids. This sub-zone is characterized by relatively high coefficients of variation (CV). This is probably due to the samples coming from several domains that have not as yet been identified.

The remainder of the sections deal with the statistics of the elements contained within the solids.

Sub-zones C, D, E and F are relatively enriched in BeO. The F sub-zone has the highest median value (1.1%) and E the highest mean (1.5%). All of the sub-zones are positively skewed except for F. The CV is lower than or equal to all sub-zones apart from HY (1.88).

The majority of the Ce_2O_3 mineralization is contained in the F sub-zone, which has a median value of 3.0% (mean 3.4%). The CV ranges from 0.75 to 2.33. Sub-zone E has a relatively high CV of 2.33.

The F sub-zone is significantly lower in Nb_2O_5 when compared to the other sub-zones. Sub-zone C contains the highest values with a median value of 0.5% (mean 1.1%). The CV ranges from 0.75 Y_2O_3 to a high in sub-zone E of 1.88.

The highest Y_2O3 value is contained within sub-zone D with a median value of 0.1% (mean 0.3%). The statistics also indicate that the categorical indicator method used to separate out the lower and higher grades in the yttrium was successful. Both sub-zone C and D have relatively CV of around 1.50. This may be due to there being two populations of yttrium within the defined solids as indicated by the histograms.

Box plots for the each element by sub-zone are contained in Appendix B.

CAPPING

All data sets with a coefficient of variation greater than 1.2, more than 40% of metal in the top decile or where the top decile had more than 2.3 times the amount of metal than the previous decile were investigated using statistics and rank disintegration techniques, to determine the potential risk of grade distortion from high-grade assays. Outliers (anomalously high values) were defined as values lying outside four standard deviations and having a P-value (statistical probability) of less than 5%. Capping levels and the effects of capping are shown in Table 17.7.

Table 17.7 Summary Statistics Showing Capping

Sub-Zone	Element	Metal % Last Decile	Decile Ratio	CV	Top Cut	Capping Level	Number Capped	Metal % Last Decile	Decile Ratio	CV
C	BeO	35	2.25	1.00	N			35	2.25	1.00
	Ce_2O_3	28	1.72	0.75	N			28	1.72	0.75
	Nb_2O_5	47	3.33	1.62	Y	63,710	1	44	2.86	1.24
	Nd_2O_3	22	1.49	0.60	N			22	1.49	0.60
	Y_2O_3	51	2.63	1.50	Y	9,051	1	51	2.61	1.49
D	BeO	28	1.38	0.79	N			28	1.38	0.79
	Ce_2O_3	45	3.01	1.33	Y	11,063	4	44	2.78	1.24
	Nb_2O_5	45	3.66	1.90	Y	20,815	2	35	2.14	1.16
	Nd_2O_3	44	2.69	1.20	Y	3,071	2	38	2.08	0.98
	Y_2O_3	42	2.02	1.51	Y	14,674	2	40	1.79	1.22
E	BeO	27	1.37	0.80	N			27	1.37	0.80
	Ce_2O_3	69	5.10	2.32	Y	8,269	4	62	3.65	1.81
	Nb_2O_5	55	3.89	1.49	Y	None Applied		55	3.89	1.49
	Nd_2O_3	53	2.19	1.50	Y	1,403	1	49	1.83	1.35
	Y_2O_3	38	2.92	1.17	N			38	2.92	1.17
F	BeO	21	0.66	NA	N			21	0.66	NA
	Ce_2O_3	36	2.74	0.85	N			36	2.74	0.85
	Nb_2O_5	36	1.62	0.71	N			36	1.62	0.71
	Nd_2O_3	26	1.13	0.86	N			26	1.13	0.86
	Y_2O_3	53	3.75	1.41	Y	2,910	1	46	2.81	1.13
HY	BeO	40	3.32	1.86	Y	22,655	1	38	3.15	1.26
	Ce_2O_3	33	2.01	0.99	N			33	2.01	0.99
	Nb_2O_5	47	3.36	1.51	Y	36,800	6	43	2.83	1.22
	Nd_2O_3	25	1.43	0.75	N			25	1.43	0.75
	Y_2O_3	37	2.24	1.11	N			37	2.24	1.11
LY	BeO	37	1.93	1.19	N			37	1.93	1.19
	Ce_2O_3	41	2.65	1.14	Y	None Applied		41	2.65	1.14
	Nb_2O_5	44	2.73	1.39	Y	41,400	3	41	2.43	1.21
	Nd_2O_3	28	1.59	0.79	N			28	1.59	0.79
	Y_2O_3	28	1.76	0.85	N			28	1.76	0.85

A total of 28 values were cut. In the majority of sub-zones contained within the solids the cutting was able to reduce the CV to close to 1.2. This was however not the case for sub-zone E.

Composites

Assays were composited to 3.05 m lengths based on the raw statistics for Length (Table 17.8). The minimum composite length allowed is 0.25. The compositing method chosen in Datamine is the one whereby all samples are included in one of the composites. This is achieved by adjusting the composite length but trying to keep the length as close as possible to the 3.05 m.

Compositing was controlled by the sub-zone codes assigned to the drill hole file (See Appendix A).

Table 17.8 North T Zone Raw Statistics of Sample Length by Sub-Zone

Length	All	C	D	E	F	HY	LY	OUT
Valid cases	1537	116	134	128	28	276	126	729
Mean	3.61	2.68	2.40	2.31	3.00	2.67	3.17	4.66
Standard Error of Mean	0.13	0.06	0.07	0.08	0.37	0.05	0.12	0.26
Variance	24.83	0.49	0.63	0.73	3.79	0.69	1.72	49.17
Standard Deviation	4.98	0.70	0.79	0.85	1.95	0.83	1.31	7.01
Variation Coefficient	1.38	0.26	0.33	0.37	0.65	0.31	0.41	1.50
rel. V. coefficient (%)	3.52	2.42	2.84	3.26	12.29	1.87	3.69	5.57
Skew	7.37	-0.90	-0.15	0.43	2.49	0.20	3.17	5.13
Minimum	0.20	0.92	0.91	0.61	0.92	0.91	0.92	0.20
Maximum	64.92	3.97	4.27	5.49	10.52	6.40	11.28	64.92
Range	64.72	3.05	3.36	4.88	9.60	5.49	10.36	64.72
1st Percentile	0.91	0.97	0.91	0.70	----	0.91	0.96	0.90
5th Percentile	1.46	1.52	1.22	1.52	0.98	1.22	1.52	1.22
10th Percentile	1.52	1.52	1.52	1.52	1.20	1.52	1.53	1.53
25th Percentile	2.13	2.14	1.53	1.52	1.87	2.13	3.04	2.42
50th Percentile	3.05	3.05	2.74	2.14	2.67	3.04	3.05	3.05
75th Percentile	3.05	3.05	3.05	3.05	3.51	3.05	3.05	3.36
90th Percentile	4.00	3.05	3.05	3.05	4.82	3.35	3.96	7.32
95th Percentile	7.35	3.36	3.35	3.22	8.96	3.71	5.77	17.24
99th Percentile	26.87	3.97	4.27	5.14	----	5.29	10.70	41.96

17.1.5 SPATIAL ANALYSIS

Variography, using Sage2001 software, was completed for a grade indicator (YIND) and for BeO, Ce_2O_3, Nb_2O_5, Nd_2O_3 and Y_2O_3 in the low- and high-grade zones within the Y_2O_3 halo. The software was also used to compute correlograms for the same oxides in sub-zones C, D, E and F.

Downhole correlograms were used to determine nugget effect and then correlograms were modelled to determine spatial continuity of the grade indicator and oxides.

A two structure spherical model was used to model the correlograms. Tables 17.9 and 17.10 summarize the results of the variography. Sage was not able to define correlograms for all of the oxides in each sub-zone. In these instances, the correlograms from an adjacent sub-zone were used.

Table 17.9 Correlogram Parameters for Indicator and Sub-Zones C, D and E

Sub-Zone	Unit	Direction	Azimuth	Dip	Nugget	Sill C_1	Range A_1(m)	Sill C_2	Range A_2(m)
Y	YIND	1	312	69	0.30	0.54	13	0.16	89
	YIND	2	045	-17	0.30	0.54	20	0.16	54
	YIND	3	010	69	0.30	0.54	4	0.16	16
C	BeO	1	356	00	0.10	0.47	106.4	0.43	361.2
	BeO	2	261	87	0.10	0.47	6.9	0.43	37.2
	BeO	3	086	03	0.10	0.47	15.5	0.43	12.5
	Ce_2O_3	1	329	-18	0.15	0.46	21	0.39	209
	Ce_2O_3	2	323	72	0.15	0.46	9	0.39	37
	Ce_2O_3	3	059	02	0.15	0.46	17	0.39	22
	Nb_2O_5	1	311	02	0.00	0.50	64	0.51	243
	Nb_2O_5	2	042	35	0.00	0.50	6	0.51	82
	Nb_2O_5	3	039	-55	0.00	0.50	32	0.51	32
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	357	-07	0.00	0.80	34	0.20	644
	Y_2O_3	2	342	82	0.00	0.80	9	0.20	138
	Y_2O_3	3	087	02	0.00	0.80	28	0.20	47
D	BeO	1	330	00	0.10	0.77	13	0.14	42
	BeO	2	060	00	0.10	0.77	16	0.14	16
	BeO	3	090	90	0.10	0.77	13	0.14	13
	Ce_2O_3	1	023	25	0.05	0.62	17	0.33	89
	Ce_2O_3	2	298	-10	0.05	0.62	63	0.33	63
	Ce_2O_3	3	049	63	0.05	0.62	20	0.33	20
	Nb_2O_5	1	090	90	0.25	0.37	18	0.38	40
	Nb_2O_5	2	330	00	0.25	0.37	17	0.38	26
	Nb_2O_5	3	060	00	0.25	0.37	15	0.38	18
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	330	00	0.55	0.27	15	0.18	46
	Y_2O_3	2	060	00	0.55	0.27	41	0.18	41
	Y_2O_3	3	090	90	0.55	0.27	14	0.18	29
E	BeO	1	152	-51	0.35	0.37	25	0.28	198
	BeO	2	151	39	0.35	0.37	49	0.28	50
	BeO	3	062	00	0.35	0.37	6	0.28	26
	Ce_2O_3	1	043	-54	0.00	0.21	10	0.79	144
	Ce_2O_3	2	054	36	0.00	0.21	10	0.79	53
	Ce_2O_3	3	320	05	0.00	0.21	18	0.79	18
	Nb_2O_5	1	309	-34	0.00	0.10	5	0.90	130
	Nb_2O_5	2	048	-14	0.00	0.10	14	0.90	118
	Nb_2O_5	3	337	53	0.00	0.10	8	0.90	8
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	093	-15	0.60	0.18	36	0.22	249
	Y_2O_3	2	007	14	0.60	0.18	122	0.22	122
	Y_2O_3	3	318	-70	0.60	0.18	5	0.22	31

Table 17.10 Correlogram Parameters for Sub-Zones F, HY and LY

Sub-Zone	Unit	Direction	Azimuth	Dip	Nugget	Sill C_1	Range A_1(m)	Sill C_2	Range A_2(m)
F	BeO	1	330	00	0.10	0.77	13	0.14	42
	BeO	2	060	00	0.10	0.77	16	0.14	16
	BeO	3	090	90	0.10	0.77	13	0.14	13
	Ce_2O_3	1	043	-54	0.00	0.21	10	0.79	144
	Ce_2O_3	2	054	36	0.00	0.21	10	0.79	53
	Ce_2O_3	3	320	05	0.00	0.21	18	0.79	18
	Nb_2O_5	1	090	90	0.25	0.37	18	0.38	40
	Nb_2O_5	2	330	00	0.25	0.37	17	0.38	26
	Nb_2O_5	3	060	00	0.25	0.37	15	0.38	18
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	009	-10	0.40	0.49	40	0.11	152
	Y_2O_3	2	297	62	0.40	0.49	2	0.11	69
	Y_2O_3	3	094	26	0.40	0.49	38	0.11	38
HY	BeO	1	359	04	0.60	0.02	20	0.38	250
	BeO	2	210	86	0.60	0.02	102	0.38	102
	BeO	3	089	02	0.60	0.02	49	0.38	49
	Ce_2O_3	1	311	02	0.20	0.60	47	0.20	133
	Ce_2O_3	2	044	55	0.20	0.60	7	0.20	63
	Ce_2O_3	3	219	35	0.20	0.60	13	0.20	36
	Nb_2O_5	1	352	-03	0.10	0.54	43	0.36	307
	Nb_2O_5	2	081	07	0.10	0.54	30	0.36	152
	Nb_2O_5	3	282	82	0.10	0.54	11	0.36	27
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	009	-10	0.40	0.49	40	0.11	152
	Y_2O_3	2	297	62	0.40	0.49	2	0.11	69
	Y_2O_3	3	094	26	0.40	0.49	38	0.11	38
LY	BeO	1	330	00	0.10	0.77	13	0.14	42
	BeO	2	060	00	0.10	0.77	16	0.14	16
	BeO	3	090	90	0.10	0.77	13	0.14	13
	Ce_2O_3	1	045	05	0.30	0.29	44	0.41	104
	Ce_2O_3	2	296	73	0.30	0.29	6	0.41	62
	Ce_2O_3	3	136	16	0.30	0.29	16	0.41	16
	Nb_2O_5	1	016	04	0.00	0.20	13	0.80	101
	Nb_2O_5	2	106	04	0.00	0.20	10	0.80	25
	Nb_2O_5	3	243	85	0.00	0.20	10	0.80	17
	Nd_2O_3	1	332	-06	0.45	0.02	41	0.53	42
	Nd_2O_3	2	242	01	0.45	0.02	16	0.53	33
	Nd_2O_3	3	339	84	0.45	0.02	10	0.53	17
	Y_2O_3	1	009	-10	0.40	0.49	40	0.11	152
	Y_2O_3	2	297	62	0.40	0.49	2	0.11	69
	Y_2O_3	3	094	26	0.40	0.49	38	0.11	38

The correlograms correspond reasonably well to the geology. There does appear to be a minor down hole effect in some of the correlograms.

The inverse distance models used search radii that were based on the modelled correlograms of the sub-zones.

17.1.6 Block Model

Block models were established in Datamine for sub-zones C, D, E, F and Y. The block model for each sub-zone was sequentially added to obtain the correct block coding for the model and to ensure that there is no duplication of blocks. The block model has been cut to ensure that only blocks below the topography have been included. All areas used the same protomodel.

Block Size

A standard block size of 5 x 5 x 3 m (Easting x Northing x Elevation) was used for the interpolation. This was based on the average sample spacing on the property. The block size is also the same as that used in the historic estimates. Sub-celling was allowed in order to improve the fill of the interpreted solids. The minimum cell sizes allowed were one metre in the X and Z directions and infinite splitting in the Y direction.

Interpolation Plan

A two-pass system was also used for the categorical indicator and grade interpolation grades into the sub-zones. The first was at the sill range and the second at twice the sill range. The grade interpolation plan is summarized in Table 17.11.

Table 17.11 Indicator and Grade Interpolation Plan

Parameter	Pass 1	Pass 2
Minimum Samples	4	3
Maximum Samples	12	12
Maximum per Hole	3	3
Search Distance		Pass 1*2
Search Type	Ellipsoidal	Ellipsoidal
Octant Search On/Off	Off	Off
Anistrophy	ZYZ Rotation	ZYZ Rotation
Discretisation	5 x 5 x 3	5 x 5 x 3
Negative Weight	Set to Zero	Set to Zero

Three methods of interpolation were used for grade estimation: ordinary kriging, inverse distance squared and nearest neighbour.

Mineral Resource Classification

Several factors are considered in the definition of a resource classification:

- CIM requirements and guidelines.
- Experience with similar deposits.
- Spatial continuity.
- Confidence limit analysis.

Mineral resources were classified according to a number of criteria. Table 17.12 summarizes those classification parameters.

In the block model, the sill range of the BeO correlogram model was used as one of the criteria to classify the Measured and Indicated in the C, D and E sub-zones. The range of the Ce_2O_3 model was used for the F sub-zone and Y_2O_3 was used for the Y sub-zone. Based on classification reported in Table 17.12, approximately 96.6% of the tonnes estimated in the North T Zone model are Indicated Mineral Resources.

Table 17.12 Resource Classification Criteria

Indicated	Inferred
The range at sill elevation	Minimum of three composites
Minimum of two drill holes	Greater than range at sill elevation
Minimum of four composites	

MINERAL RESOURCE TABULATION

The Indicated and Inferred Mineral Resources are summarized in Table 17.13 to Table 17.16.

Table 17.13 North T Zone Indicated Mineral Resources at Various Cut-offs

Cut-off	Cutting Element	Sub-Zone	Tonnes	Density	$\%Y_2O_3$	%BeO	$\%Ce_2O_3$	$\%Nb_2O_5$	$\%Nd_2O_3$
0.20	%BeO	C	213,037	2.91	0.13	0.85	0.14	0.95	0.027
0.40	%BeO	C	200,352	2.91	0.14	0.88	0.14	0.96	0.027
0.60	%BeO	C	124,376	2.91	0.17	1.11	0.15	1.05	0.028
0.80	%BeO	C	81,633	2.91	0.20	1.32	0.16	1.05	0.030
0.20	%BeO	D	159,754	2.72	0.22	0.86	0.18	0.29	0.019
0.40	%BeO	D	155,108	2.72	0.23	0.87	0.18	0.29	0.020
0.60	%BeO	D	128,451	2.72	0.24	0.95	0.19	0.29	0.022
0.80	%BeO	D	83,241	2.72	0.25	1.08	0.17	0.28	0.027
0.20	%BeO	E	142,949	2.66	0.03	1.23	0.09	0.10	0.004
0.40	%BeO	E	142,949	2.66	0.03	1.23	0.09	0.10	0.004
0.60	%BeO	E	131,440	2.66	0.03	1.29	0.09	0.11	0.004
0.80	%BeO	E	88,619	2.66	0.03	1.57	0.13	0.13	0.006
0.05	$\%Ce_2O_3$	F	43,877	2.68	0.06	0.16	3.14	0.01	1.552
0.10	$\%Ce_2O_3$	F	43,877	2.68	0.06	0.16	3.14	0.01	1.552
0.15	$\%Ce_2O_3$	F	43,877	2.68	0.06	0.16	3.14	0.01	1.552
0.20	$\%Ce_2O_3$	F	43,877	2.68	0.06	0.16	3.14	0.01	1.552
0.02	$\%Y_2O_3$	Y	730,332	2.72	0.12	0.07	0.09	0.62	0.007
0.04	$\%Y_2O_3$	Y	593,815	2.72	0.15	0.08	0.09	0.59	0.008
0.06	$\%Y_2O_3$	Y	591,361	2.72	0.15	0.08	0.09	0.59	0.007
0.08	$\%Y_2O_3$	Y	554,979	2.72	0.15	0.08	0.09	0.56	0.007

Table 17.14 North T Zone Indicated Mineral Resources at Recommended Cut-offs

Cut-off	Cutting Element	Sub-Zone	Tonnes	Density	$\%Y_2O_3$	%BeO	$\%Ce_2O_3$	$\%Nb_2O5$	%Nd2O3
0.40	%BeO	C	200,352	2.91	0.14	0.88	0.14	0.96	0.027
0.40	%BeO	D	155,108	2.72	0.23	0.87	0.18	0.29	0.020
0.40	%BeO	E	142,949	2.66	0.03	1.23	0.09	0.10	0.004
0.10	$\%Ce_2O_3$	F	43,877	2.68	0.06	0.16	3.14	0.01	1.552
0.04	$\%Y_2O_3$	Y	593,815	2.72	0.15	0.08	0.09	0.59	0.008
Total			1,136,101	2.74	0.14	0.48	0.23	0.53	0.07

Table 17.15 North T Zone Inferred Mineral Resources at Various Cut-offs

Cut-off	Cutting Element	Sub-Zone	Tonnes	Density	$\%Y_2O_3$	%BeO	$\%Ce_2O_3$	$\%Nb_2O_5$	$\%Nd_2O_3$
0.20	%BeO	D	2,906	2.72	0.37	0.70	0.19	0.41	0.001
0.40	%BeO	D	2,906	2.72	0.37	0.70	0.19	0.41	0.001
0.60	%BeO	D	2,311	2.72	0.40	0.74	0.18	0.40	0.001
0.80	%BeO	D	671	2.72	0.70	0.87	0.11	0.37	0.001
0.20	%BeO	E	2	2.66	0.03	0.81	0.04	0.00	0.000
0.40	%BeO	E	2	2.66	0.03	0.81	0.04	0.00	0.000
0.60	%BeO	E	2	2.66	0.03	0.81	0.04	0.00	0.000
0.80	%BeO	E	2	2.66	0.03	0.81	0.04	0.00	0.000
0.05	$\%Ce^2O^3$	F	1,338	2.68	0.06	0.16	2.41	0.03	0.558
0.10	$\%Ce^2O^3$	F	1,338	2.68	0.06	0.16	2.41	0.03	0.558
0.15	$\%Ce^2O^3$	F	1,338	2.68	0.06	0.16	2.41	0.03	0.558
0.20	$\%Ce^2O^3$	F	1,338	2.68	0.06	0.16	2.41	0.03	0.558

Table 17.16 North T Zone Inferred Mineral Resources at Recommended Cut-offs

Cut-off	Cutting Element	Sub-Zone	Tonnes	Density	$\%Y_2O_3$	%BeO	$\%Ce_2O_3$	$\%Nb_2O_5$	$\%Nd_2O_3$
0.40	%BeO	D	2,906	2.72	0.37	0.70	0.19	0.41	0.001
0.40	%BeO	E	2	2.66	0.03	0.81	0.04	0.00	0.000
0.10	$\%Ce_2O_3$	F	1,338	2.68	0.06	0.16	2.41	0.03	0.558
Total			4,247	2.71	0.27	0.53	0.89	0.29	0.177

No known environmental, permitting, legal, title, taxation, socio-economic, marketing or other relevant issues are known to the writers that may affect the estimate of mineral resources.

A portion of the resources on the property has been categorized as Inferred. Due to the uncertainty of Inferred Mineral Resources it cannot be assumed that all or any part of this resource will be upgraded to an Indicated or Measured Resource as a result of continued exploration.

17.1.7 *Model Validation*

The North T Zone grade interpolation plan and model was validated using six methods:

- Visual comparison of search ellipses generated in Datamine to those output by Sage.
- Comparison of block model volumes to volumes within solids.
- Visual comparison of colour-coded block model grades with drill hole grades on section and plan plots.
- Comparison of the global mean block grades for ordinary kriging, nearest neighbour and inverse distance squared methods.
- Comparison of block model grades and drill hole grades using swath plots.
- Comparison of block model grades to historic estimates.

VISUAL COMPARISON OF SEARCH ELLIPSES

Sage generates 3-D views of the estimated search ellipses. These plots have compared to slices through the search ellipse made in Datamine to ensure that the correct rotation and dimensions have been inputted for grade interpolation.

BLOCK VOLUME/SOLID VOLUME COMPARISON

The block model volumes were compared to the volume within the interpreted mineralized envelopes. The results are shown by sub-zone in Table 17.17. Only minor differences were noted.

Table 17.17 Comparison of Block Model and Solid Volumes

Sub-Zone	Model Vol	Solid Vol	% Diff
C	73,599	74,035	-0.59
D	60,335	61,453	-1.82
E	53,790	53,806	-0.03
F	16,876	16,862	0.08
Y	385,251	385,236	0.00

VISUAL VALIDATION OF SECTIONS

The visual comparisons of block model grades with composite grades for the five veins show a reasonable correlation between the values. No significant discrepancies were apparent from the sections and plans reviewed. Appendix C contains representative plans and sections through the veins.

GLOBAL COMPARISONS

The global block grade statistics for the ordinary kriging model are compared to the declustered means for each sub-zone (Table 17.18). Percentage differences of greater than 10% have been highlighted. The higher differences are in general associated with low numbers of samples.

Table 17.18 Comparison of Top Cut Declustered Drill Holes with Ordinary Kriged Grades (g/t)

Sub-Zone	Data	BeO	Ce_2O_3	NB_2O_5	ND_2O_3	Y_2O_3
C	Drill Hole	8,078	1,329	9,865	237	1,212
	Model	8,489	1,398	9,512	267	1,313
% Difference		-5%	-5%	4%	-11%	-8%
D	Drill Hole	8,500	1,742	2,925	177	2,160
	Model	8,524	1,817	2,894	189	2,241
% Difference		0%	-4%	1%	-6%	-4%
E	Drill Hole	13,321	1,040	1,192	41	252
	Model	12,323	872	1,047	38	251
% Difference		8%	19%	14%	8%	1%
F	Drill Hole	1,087	28,994	126	13,418	483
	Model	1,572	31,221	136	15,222	620
% Difference		-31%	-7%	-7%	-12%	-22%
HY	Drill Hole	884	939	5,395	79	1,457
	Model	774	896	5,874	75	1,466
% Difference		14%	5%	-8%	6%	-1%
LY	Drill Hole	417	643	5,485	63	208
	Model	444	663	6,490	53	222
% Difference		-6%	-3%	-15%	19%	-6%

A further check was carried out on the interpolation where the ordinary kriged (OK) grades were compared to the nearest neighbour (NN) and inverse distance squared (ID^2) interpolation (Table 17.19). In general, there is agreement between the ordinary kriged model, inverse distance and nearest neighbour models for the elements. Only the F sub-zone shows consistent differences. This is probably due to the few samples in this sub-zone.

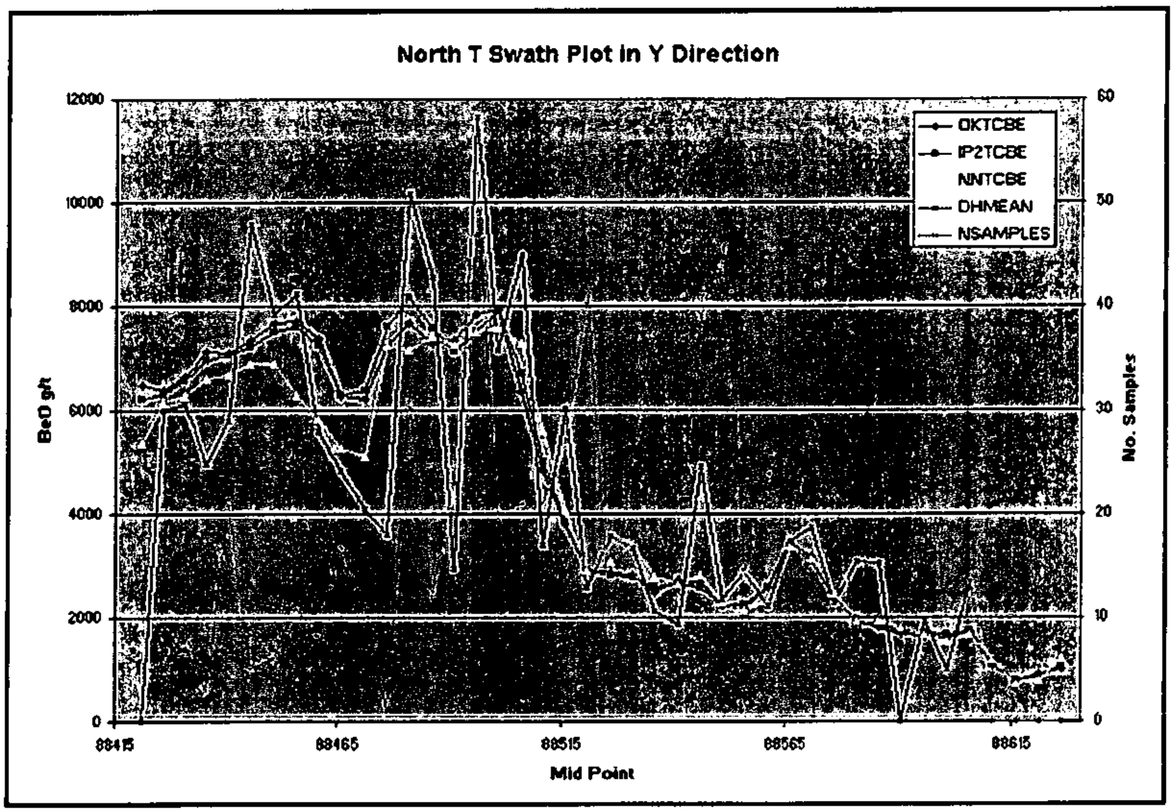
SWATH PLOTS

Swath plots have been generated for ordinary kriged, inverse distance and nearest neighbour for the total model. An example of a swath plot is present below (Figure 17.2). Appendix D contains swath plots for all of the interpolated elements.

Table 17.19 Comparison of Interpolation for Ordinary Kriging

Sub-Zone	Field	BeO	Ce_2O_3	Nb_2O_5	Nd_2O_3	Y_2O_3	% OK BeO	%OK Ce_2O_3	%OK Nb_2O_5	%OK Nd_2O_3	%OK Y_2O_3
C	OK	8,489	1,397	9,512	267	1,313					
C	ID2	8,316	1,422	9,998	279	1,290	-2%	2%	5%	4%	-2%
C	NN	8,699	1,359	9,560	269	1,454	2%	-3%	1%	1%	11%
D	OK	8,524	1,817	2,894	189	2,241					
D	ID2	8,623	1,805	2,921	96	2,203	1%	-1%	1%	4%	-2%
D	NN	8,823	1,811	2,730	177	2,279	4%	0%	-6%	-6%	2%
E	OK	12,323	872	1,047	38	250					
E	ID2	12,556	893	970	39	246	2%	2%	-7%	4%	-2%
E	NN	11,189	804	921	35	243	-9%	-8%	-12%	-7%	-3%
F	OK	1,572	31,220	136	15,222	620					
F	ID2	1,797	29,623	135	14,597	627	14%	-5%	-1%	-4%	1%
F	NN	1,296	30,287	147	15,553	560	-18%	-3%	7%	2%	-10%
HY	OK	774	896	5,874	75	1,466					
HY	ID2	779	897	5,876	71	1,444	1%	0%	0%	-5%	-2%
HY	NN	828	914	6,110	72	1,451	7%	2%	4%	-4%	-1%
LY	OK	444	663	6,490	53	222					
LY	ID2	437	685	6,010	51	222	-1%	3%	-7%	-4%	0%
LY	NN	382	673	6,560	50	237	-14%	2%	1%	-6%	7%

Figure 17.2 BeO Swath Plot in Y Direction



17.2 LAKE ZONE

17.2.1 INTRODUCTION

In order to carry out the evaluation on the property, a digital database for collars, surveys and assays was imported into Datamine Studio 3 from Excel databases supplied by Avalon. The geomorphology of Hoidas Lake, lithological data and Y_2O_3 assays were used to define the overall geometry of the mineralized zone. The interpretation was reviewed by Dr D. Trueman. The deposit is triangular in shape and measures approximately 2 km by 2 km with a maximum thickness of 200 m and covers an area of 2.3 km^2.

The database used to carry out the resource contains a total of 52 drill holes and 9,150 assay entries above trace for BeO, Ce_2O_3, Ga_2O_3, La_2O_3, Nb_2O_5, Ta_2O_5, U, Y_2O_3, and ZrO_2.

17.2.2 DATA

DATABASE

In 2006, six drill holes were assayed for the majority of REEs. The assay results for Ce_2O_3, La_2O_3 and Y_2O_3 were added to the initial database where they were coded as missing or trace. The final Lake Zone database contains 699 data entries of BeO, 1,641 of Ce_2O_3, 48 of Ga_2O_3, 371 of La_2O_3, 1,701 of Nb_2O_5, 1,615 of Ta_2O_5, 174 of U, 1,642 of Y_2O_3, and 1,289 of ZrO_2 above trace. There is a good correlation between Ce_2O_5 and La_2O_3 (0.94) and moderate correlation between Ta_2O_5, Nb_2O_5 and ZrO_2 (0.79 to 0.85). Due to the low number of assays above trace for Ga_2O_3 and U these oxide/elements have not been reported.

The supplied database uses the same coding for trace values and if no assay was requested. Both of these were set to zero prior to interpolation into the block model. This is likely to lead to a conservative estimate.

17.2.3 GEOLOGICAL INTERPRETATION

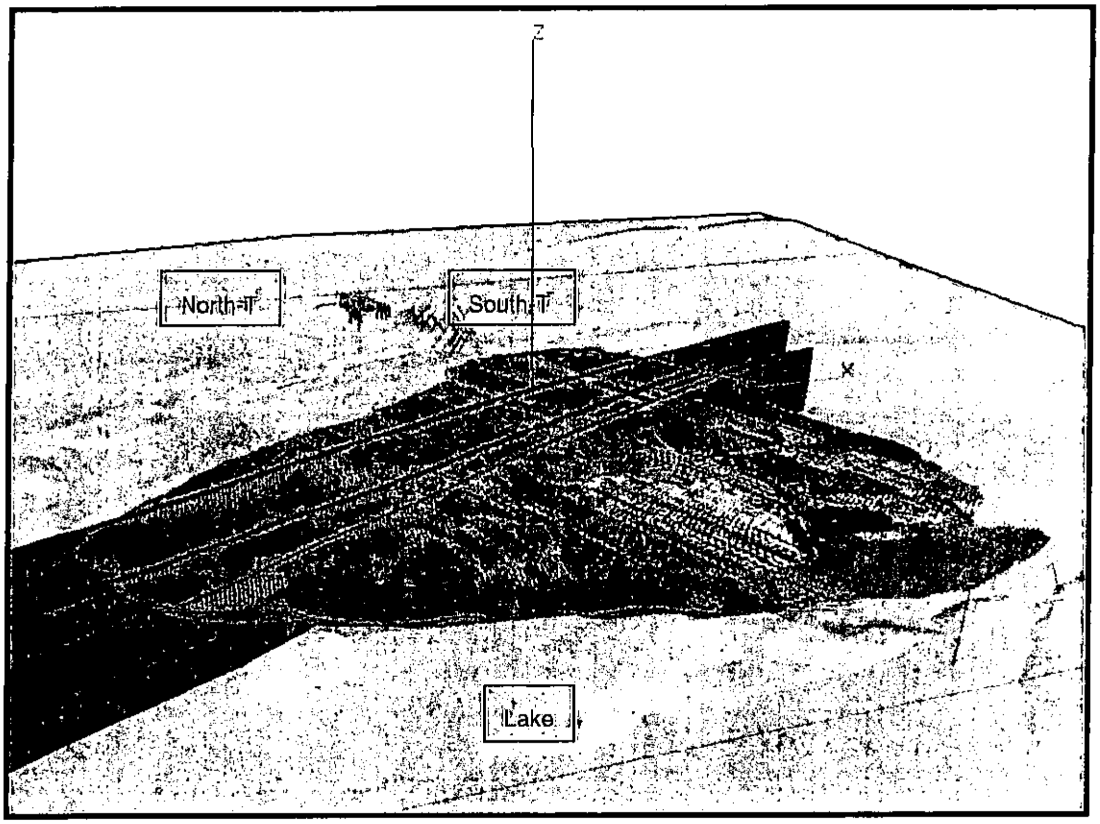
The geomorphology of Hoidas Lake, lithological data and Y_2O_3 assays were used to define the overall geometry of the deposit. A cut-off of 0.04% Y_2O_3 was used. Three dikes trending southwest-northeast have been intersected in the drill holes. The interpretation was reviewed by Dr D. Trueman.

The drill holes in the area defined by the interpretation contained mineralization below 0.04% Y_2O_3 (low grade). Categorical indicator kriging using a cut-off of 0.04% was carried out to define the high (MM) and low (LM) grade areas of Y_2O_3. The indicator model is shown below (Figure 17.3). Red indicates a high probability (>0.6) of the grade being above 0.04% Y_2O_3 while dark blue indicates a low probability (<0.4). The other colours reflect a range of between 0.4 and 0.6.

17.2.4 BULK DENSITY

In 2006, 214 density measurements were calculated for core taken from drill holes 80-06, 80-09, 81-01, 88L-15 and 88L-25. These densities were used to calculate densities for the sampled lithologies. A density of 2.80 g/cm^3 was used for diorite and syenite. The average bulk density was then calculated for the LM and MM categories. A density of 2.79 g/cm^3 was applied to the LM and 2.84 g/cm^3 to MM.

Figure 17.3 Lake Zone Indicator Model and Topography with Drill Holes



17.2.5 EXPLORATORY DATA ANALYSIS

ASSAYS

The Lake Zone was sampled by 52 drill holes. Table 17.20 lists the lithologies and their abbreviations. The basic statistics for the samples for total area by lithology are shown in Table 17.21 to Table 17.26.

The raw statistics by rock type show more samples than in the assay database. This would be due to samples being taken across lithological boundaries.

Table 17.20 Lithology Abbreviations Used in the Lake Zone

Lithology	Abbreviation
Altered Syenite	AS
Diabase Dyke	D
Lower Intermediate Zone	LIZ
Olivine-Pyroxene Syenite	OPS
Syenite	S
Wall Zone	WZ

Table 17.21 Lake Zone Assay Statistics by Lithology, Y_2O_3

Y_2O_3	All	AS	D	LIZ	OPS	S	WZ
Valid cases	1828	398	51	911	212	64	171
Mean	400.76	397.53	63.30	498.35	258.02	184.71	269.33
Std. Error of Mean	14.10	25.13	15.02	23.81	23.57	39.97	35.24
Variance	363245.89	251262.50	11501.15	516465.22	117769.92	102230.57	212374.42
Std. Deviation	602.70	501.26	107.24	718.66	343.18	319.74	460.84
Variation Coefficient	1.50	1.26	1.69	1.44	1.33	1.73	1.71
Rel. V. Coefficient (%)	3.52	6.32	23.72	4.78	9.13	21.64	13.08
Skew	5.09	4.20	4.23	4.71	2.97	3.96	5.94
Minimum	5.00	5.00	12.70	5.00	12.70	20.00	5.00
Maximum	7163.73	4909.59	655.29	7163.73	2594.49	2036.98	4665.76
Range	7158.73	4904.59	642.59	7158.73	2581.79	2016.98	4660.76
1st Percentile	10.08	12.70	----	12.70	12.70	----	5.00
5th Percentile	12.70	50.00	12.70	12.70	12.70	20.00	10.00
10th Percentile	33.02	72.39	12.70	40.64	12.70	30.00	12.70
25th Percentile	90.00	123.18	12.70	120.64	70.91	51.15	40.64
50th Percentile	220.00	241.29	40.64	299.71	140.00	75.56	150.00
75th Percentile	505.44	491.00	54.61	609.57	277.80	145.00	308.60
90th Percentile	895.82	887.31	112.55	1032.46	703.29	569.06	657.57
95th Percentile	1174.69	1139.01	331.45	1492.69	1004.52	749.26	941.28
99th Percentile	3121.13	2767.22	----	4113.18	1597.40	----	2684.35

Table 17.22 Lake Zone Assay Statistics by Lithology, La_2O_3

La_2O_3	All	AS	D	LIZ	OPS	S	WZ
Valid cases	423	114	0	203	53	2	46
Mean	1347.88	906.24	----	1844.64	1007.39	80.00	758.76
Std. Error of Mean	71.71	89.99	----	121.18	131.55	0.00	173.18
Variance	2175486.26	923166.31	----	2981044.81	917131.01	0.00	1379581.05
Std. Deviation	1474.95	960.82	----	1726.57	957.67	0.00	1174.56
Variation Coefficient	1.09	1.06	----	0.94	0.95	0.00	1.55
Rel. V. coefficient (%)	5.32	9.93	----	6.57	13.06	0.00	22.82
Skew	1.77	2.19	----	1.15	1.12	----	4.93
Minimum	11.73	73.20	----	11.73	11.73	80.00	36.95
Maximum	8562.90	5689.05	----	8562.90	3542.46	80.00	7741.80
Range	8551.17	5615.85	----	8551.17	3530.73	0.00	7704.85
1st Percentile	13.71	78.74	----	12.06	----	----	----
5th Percentile	80.02	124.63	----	70.49	40.46	----	73.37
10th Percentile	129.97	178.00	----	121.74	103.81	----	94.65
25th Percentile	266.27	262.17	----	323.75	255.13	----	232.69
50th Percentile	723.74	526.09	----	1501.44	709.67	80.00	381.81
75th Percentile	2146.59	1182.09	----	2862.12	1562.25	----	995.00
90th Percentile	3333.67	2205.24	----	4194.65	2587.64	----	1354.82
95th Percentile	4358.87	3105.52	----	5222.20	3137.78	----	2250.40
99th Percentile	6869.56	5444.48	----	7708.49	----	----	----

Table 17.23 Lake Zone Assay Statistics by Lithology, Ce_2O_3

Ce_2O_3	All	AS	D	LIZ	OPS	S	WZ
Valid cases	1827	398	51	912	212	64	169
Mean	2386.31	2045.12	300.98	3023.70	1651.96	583.24	1966.40
Std. Error of Mean	55.43	96.79	118.05	82.85	158.34	125.43	152.36
Variance	5612624.46	3728683.75	710751.95	6260040.61	5315230.18	1006813.92	3923158.56
Std. Deviation	2369.10	1930.98	843.06	2502.01	2305.48	1003.40	1980.70
Variation Coefficient	0.99	0.94	2.80	0.83	1.40	1.72	1.01
Rel. V. Coefficient (%)	2.32	4.73	39.22	2.74	9.59	21.50	7.75
Skew	1.95	2.19	3.93	1.45	4.69	2.87	1.63
Minimum	10.00	10.00	11.71	10.00	110.00	60.00	10.00
Maximum	22861.04	13224.92	4724.94	22861.04	19520.00	4589.08	9345.64
Range	22851.04	13214.92	4713.23	22851.04	19410.00	4529.08	9335.64
1^{st} Percentile	23.75	119.90	----	121.30	120.69	----	17.00
5^{th} Percentile	140.00	241.22	11.71	260.02	169.37	75.00	110.00
10^{th} Percentile	245.73	342.37	11.71	368.37	235.98	100.00	200.00
25^{th} Percentile	531.76	650.92	24.60	860.31	452.11	155.00	498.26
50^{th} Percentile	1672.59	1429.21	37.48	2644.16	770.12	230.00	1398.51
75^{th} Percentile	3500.96	2985.59	70.28	4642.35	2307.89	342.50	2656.46
90^{th} Percentile	5631.75	4310.08	1102.41	6482.64	3855.03	2106.55	4495.37
95^{th} Percentile	6977.52	5208.45	2553.39	7497.50	4675.28	3243.57	6377.03
99^{th} Percentile	9396.24	10726.45	----	9742.79	17664.00	----	9215.69

Table 17.24 Lake Zone Assay Statistics by Lithology, Nb_2O_5

Nb_2O_5	All	AS	D	LIZ	OPS	S	WZ
Valid cases	1901	401	33	978	225	65	177
Mean	2118.06	1405.16	339.94	2765.98	1513.77	554.64	1930.07
Std. Error of Mean	43.24	59.01	145.34	63.92	112.65	127.75	132.98
Variance	3554809.12	1396482.01	697061.44	3996472.43	2855355.69	1060859.27	3129918.81
Std. Deviation	1885.42	1181.73	834.90	1999.12	1689.78	1029.98	1769.16
Variation Coefficient	0.89	0.84	2.46	0.72	1.12	1.86	0.92
Rel. V. Coefficient (%)	2.04	4.20	42.75	2.31	7.44	23.03	6.89
Skew	1.36	1.61	3.22	1.02	1.87	2.68	1.97
Minimum	5.00	50.00	5.00	5.00	82.00	30.00	39.00
Maximum	12300.00	7400.00	4000.00	12300.00	8400.00	4700.00	10800.00
Range	12295.00	7350.00	3995.00	12295.00	8318.00	4670.00	10761.00
1^{st} Percentile	5.00	70.60	----	100.00	100.00	----	51.48
5^{th} Percentile	120.40	179.10	5.00	300.00	100.00	40.00	200.00
10^{th} Percentile	268.20	264.80	5.00	400.00	222.80	66.00	300.00
25^{th} Percentile	566.50	490.50	5.00	1074.75	300.00	110.00	600.00
50^{th} Percentile	1670.00	1098.00	5.00	2507.00	800.00	190.00	1486.00
75^{th} Percentile	3200.00	1974.00	14.31	3945.80	2000.00	319.00	2646.50
90^{th} Percentile	4600.00	2949.80	1420.00	5300.00	4100.00	2460.00	4300.00
95^{th} Percentile	5700.00	3477.50	2684.03	6405.11	5007.00	3480.00	5360.00
99^{th} Percentile	8200.00	6476.80	----	8621.00	8148.00	----	9396.00

Table 17.25 Lake Zone Assay Statistics by Lithology, ZrO_2

ZrO_2	All	AS	D	LIZ	OPS	S	WZ
Valid cases	1438	329	50	767	143	15	121
Mean	15851.32	11682.86	1849.14	20332.98	9078.26	12529.66	13314.07
Std. Error of Mean	400.34	591.04	894.78	602.87	777.99	3120.13	1283.83
Variance	230475418.82	114929612.71	40031388.80	278769384.52	86553465.58	146027895.46	199435447.92
Std. Deviation	15181.42	10720.52	6327.04	16696.39	9303.41	12084.20	14122.16
Variation Coefficient	0.96	0.92	3.42	0.82	1.02	0.96	1.06
Rel. V. Coefficient (%)	2.53	5.06	48.39	2.96	8.57	24.90	9.64
Skew	1.66	2.17	4.23	1.39	1.74	0.54	1.51
Minimum	43.23	349.86	43.23	341.75	317.44	490.34	140.48
Maximum	102444.67	95171.97	33380.97	102444.67	51487.09	31869.42	61231.77
Range	102401.44	94822.11	33337.74	102102.92	51169.65	31379.08	61091.29
1st Percentile	111.82	497.77	----	441.06	338.24	----	146.13
5th Percentile	520.13	838.17	64.37	1415.10	889.37	----	332.43
10th Percentile	1357.96	1500.74	92.12	2355.80	1427.53	524.38	590.03
25th Percentile	3578.27	3083.88	106.38	7347.00	2551.66	883.42	2326.08
50th Percentile	12791.40	9077.38	164.12	16729.66	5184.37	11368.33	8967.96
75th Percentile	22902.81	16786.39	232.34	29025.99	13063.59	21761.39	17488.81
90th Percentile	35539.55	26875.52	3562.33	41603.02	22452.19	31571.98	39608.42
95th Percentile	45113.48	31401.38	20418.83	51030.52	29609.81	----	44550.74
99th Percentile	69192.22	43405.12	----	78509.85	47126.33	----	60925.68

Table 17.26 Lake Zone Assay Statistics by Lithology, Ta_2O_5

Ta_2O_5	All	AS	D	LIZ	OPS	S	WZ
Valid cases	1808	391	23	951	185	65	173
Mean	145.54	110.66	32.00	180.51	101.95	51.32	134.05
Std. Error of Mean	3.64	5.74	9.33	5.43	9.41	13.42	12.48
Variance	23965.24	12904.51	2001.36	28023.03	16396.86	11710.96	26934.83
Std. Deviation	154.81	113.60	44.74	167.40	128.05	108.22	164.12
Variation Coefficient	1.06	1.03	1.40	0.93	1.26	2.11	1.22
Rel. V. Coefficient (%)	2.50	5.19	29.15	3.01	9.23	26.15	9.31
Skew	2.33	2.23	1.66	2.19	2.34	3.21	2.63
Minimum	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Maximum	1590.00	930.44	160.00	1590.00	830.00	510.00	1130.00
Range	1585.00	925.44	155.00	1585.00	825.00	505.00	1125.00
1^{st} Percentile	5.00	5.00	----	5.00	5.00	----	5.00
5^{th} Percentile	10.00	12.21	5.00	10.00	10.00	5.00	10.00
10^{th} Percentile	10.00	12.21	5.00	12.21	10.00	5.00	10.00
25^{th} Percentile	30.00	28.08	5.00	60.00	20.00	10.00	20.00
50^{th} Percentile	100.13	80.00	10.00	139.20	50.00	12.21	80.00
75^{th} Percentile	208.49	150.00	50.00	251.54	130.00	30.00	155.00
90^{th} Percentile	339.51	255.93	100.00	380.00	270.00	162.00	362.00
95^{th} Percentile	430.00	331.39	148.00	496.72	361.00	403.00	525.00
99^{th} Percentile	681.44	504.00	----	771.60	615.00	----	878.40

The LIZ has the highest mean for all of the oxides. The diorite dykes for the known oxides contain the lowest.

The categorical indicator kriging appears to have successfully separated out the samples above and below 0.04% Y_2O_3 based on the coefficient of variation as can be seen in the box plots in Appendix B.

The majority of the histograms suggest that that the elements in each zone approximate a lognormal distribution. Apart from Y_2O_3 and La_2O_3 there appears to be two populations in the oxides in the LM sub-zone.

CAPPING

All data sets with a coefficient of variation greater than 1.2 were investigated using statistics and rank disintegration techniques, to determine the potential risk of grade distortion from high-grade assays. Outliers (anomalously high values) were defined as values lying outside four standard deviations and having a P-value (statistical probability) of less than 5%.

A total of seven values were cut, all in the LM Zone. The cutting was able to reduce the CV to either below or close to 1.2.

COMPOSITES

Assays were composited to 3.05 m lengths based on the raw statistics for Length (Figure 17.5). The minimum composite length allowed is 0.25. The compositing method chosen in Datamine is the one whereby all samples are included in one of the composites. This is achieved by adjusting the composite length but trying to keep the length as close as possible to the 3.05 m.

Compositing was controlled by the sub-zone codes assigned to the drill hole file (See Appendix A).

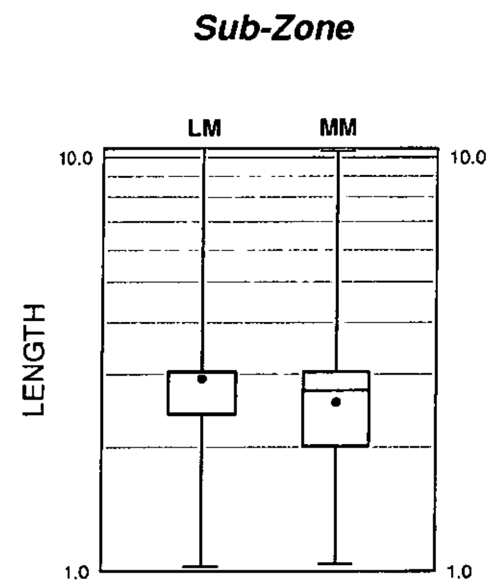
Although the YIND correlogram indicates a strong down dip continuity this is largely irrelevant due to the zone being only 200 m deep. The direction of the intermediate corresponds to the overall geometry of the deposits. This can be readily observed in Figure 17.4.

The inverse distance models used search radii that were based on the modelled correlograms of the sub-zones.

Table 17.27 Correlogram Parameters for Indicator and Sub-Zones LM and MM

	Sub-Zone	Direction	Azimuth	Dip	Nugget	Sill C1	Range A1(m)	Sill C2	Range A2 (m)
YIND		1	075	43	0.30	0.40	123	0.30	404
YIND		2	160	-06	0.30	0.40	35	0.30	123
YIND		3	244	47	0.30	0.40	6	0.30	41
BeO	LM	1	195	-01	0.10	0.90	25	0.00	279
BeO	LM	2	276	83	0.10	0.90	15	0.00	275
BeO	LM	3	285	-07	0.10	0.90	50	0.00	50
Ce_2O_3	LM	1	054	84	0.10	0.52	12	0.38	208
Ce_2O_3	LM	2	011	-04	0.10	0.52	72	0.38	73
Ce_2O_3	LM	3	101	-04	0.10	0.52	23	0.38	23
La_2O_3	LM	1	005	05	0.00	0.89	14	0.11	201
La_2O_3	LM	2	157	85	0.00	0.89	19	0.11	128
La_2O_3	LM	3	095	-02	0.00	0.89	9	0.11	17
Nb_2O_5	LM	1	067	-01	0.05	0.82	12	0.14	1021
Nb_2O_5	LM	2	157	01	0.05	0.82	16	0.14	338
Nb_2O_5	LM	3	012	88	0.05	0.82	22	0.14	246
Ta_2O_5	LM	1	033	36	0.15	0.67	15	0.18	480
Ta_2O_5	LM	2	091	-36	0.15	0.67	19	0.18	250
Ta_2O_5	LM	3	152	34	0.15	0.67	14	0.18	14
Y_2O_3	LM	1	301	84	0.15	0.83	12	0.02	649
Y_2O_3	LM	2	057	03	0.15	0.83	11	0.02	437
Y_2O_3	LM	3	147	05	0.15	0.83	61	0.02	196
ZrO_2	LM	1	060	07	0.05	0.89	357	0.06	580
ZrO_2	LM	2	101	-81	0.05	0.89	18	0.06	234
ZrO_2	LM	3	151	06	0.05	0.89	12	0.06	231
BeO	MM	1	097	02	0.10	0.71	12	0.19	316
BeO	MM	2	005	29	0.10	0.71	12	0.19	216
BeO	MM	3	190	61	0.10	0.71	10	0.19	13
Ce_2O_3	MM	1	342	-21	0.00	0.66	64	0.34	667
Ce_2O_3	MM	2	048	46	0.00	0.66	5	0.34	79
Ce_2O_3	MM	3	088	-36	0.00	0.66	18	0.34	37
La_2O_3	MM	1	326	89	0.05	0.47	11	0.48	53
La_2O_3	MM	2	348	00	0.05	0.47	10	0.48	35
La_2O_3	MM	3	078	00	0.05	0.47	16	0.48	32
Nb_2O_5	MM	1	047	03	0.05	0.66	44	0.30	838
Nb_2O_5	MM	2	227	87	0.05	0.66	11	0.30	128
Nb_2O_5	MM	3	137	00	0.05	0.66	26	0.30	26
Ta_2O_5	MM	1	337	13	0.05	0.78	18	0.17	1120
Ta_2O_5	MM	2	195	74	0.05	0.78	14	0.17	193
Ta_2O_5	MM	3	069	09	0.05	0.78	131	0.17	131
Y_2O_3	MM	1	294	06	0.10	0.69	21	0.21	860
Y_2O_3	MM	2	094	83	0.10	0.69	5	0.21	116
Y_2O_3	MM	3	024	-02	0.10	0.69	18	0.21	81
ZrO_2	MM	1	203	10	0.05	0.95	137	0.00	351
ZrO_2	MM	2	001	79	0.05	0.95	12	0.00	189
ZrO_2	MM	3	112	04	0.05	0.95	28	0.00	169

Figure 17.4 Boxplot of Lake Zone Sample Lengths by Sub-Zone



	LM	MM	
Number of data	992	475	Number of data
Mean	2.925	2.571	Mean
Maximum	15.5	10.363	Maximum
Upper quartile	3.048	3.048	Upper quartile
Median	3.048	2.743	Median
Lower quartile	2.4	2.006	Lower quartile
Minimum	1.025	1.042	Minimum
Variance	1.6712	0.5807	Variance
CV	0.442	0.296	CV
Skewness	4.276	1.936	Skewness

17.2.6 BLOCK MODEL

A block model for grade was constructed for the area lying between the topography and the base of the interpreted zone. Block models were also created from the dyke. These dyke blocks were then removed from the grade block model prior to interpolation.

BLOCK SIZE

A standard block size of 10 x 10 x 10 m (Easting x Northing x Elevation) was used for the interpolation. This was based on the minimum sample spacing on the property and to reflect the possible bench height as it is probable that this deposit would be mined using open cast methods. Sub-celling was allowed in order to improve the fill of the interpreted solids. The minimum cell sizes allowed were one metre in the X and Z directions and infinite splitting in the Y direction.

INTERPOLATION PLAN

A two-pass system was also used for the categorical indicator and grade interpolation grades into the sub-zones. The first was at the sill range and the second at twice the sill range. The grade interpolation plan is summarized in Table 17.28 and Table 17.29.

Table 17.28 Indicator Interpolation Plan

Parameter	Pass 1	Pass 2	Pass 3
Minimum Samples	2	2	1
Maximum Samples	6	12	12
Maximum per Hole	3	3	3
Search Distance		Pass 1*5	Pass 1*15
Search Type	Ellipsiodal	Ellipsiodal	Ellipsiodal
Octant Search On/Off	Off	Off	Off
Anistrophy	ZXZ Rotation	ZXZ Rotation	ZXZ Rotation
Discretisation	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2
Negative Weight	Set to Zero	Set to Zero	Set to Zero

Table 17.29 Grade Interpolation Plan

Parameter	Pass 1	Pass 2	Pass 3
Minimum Samples	4	4	3
Maximum Samples	12	12	12
Maximum per Hole	3	3	3
Search Distance		Pass 1*5	Pass 1*10, 12, 20 or 22
Search Type	Ellipsiodal	Ellipsiodal	Ellipsiodal
Octant Search On/Off	Off	Off	Off
Anistrophy	ZXZ Rotation	ZXZ Rotation	ZXZ Rotation
Discretisation	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2
Negative Weight	Set to Zero	Set to Zero	Set to Zero

Three methods of interpolation were used for grade estimation: ordinary kriging, inverse distance squared and nearest neighbour.

Mineral Resource Classification

Several factors are considered in the definition of a resource classification:

- CIM requirements and guidelines
- Experience with similar deposits
- Spatial continuity
- Confidence limit analysis

Mineral resources were classified as an Inferred Mineral Resource if the block was within a radius of 200 m of a drill hole. This approximately doubles the distance of the intermediate range of the indicator.

Mineral Resource Tabulation

The Inferred Mineral Resources are summarized in Table 17.30 to Table 17.31.

Table 17.30 Lake Zone Inferred Mineral Resources at Various Cut-offs

Cut-off	Cutting Element	Tonnes	Density	$\%Y_2O_3$	$\%Ce_2O_3$	$\%La_2O_3$	$\%Nb_2O_5$	$\%Ta_2O_5$	$\%ZrO_2$
0.01	$\%Y_2O_3$	375,410,000	2.79	0.03	0.19	0.03	0.22	0.014	1.19
0.02	$\%Y_2O_3$	212,120,000	2.80	0.05	0.25	0.03	0.24	0.017	1.51
0.03	$\%Y_2O_3$	127,030,000	2.82	0.07	0.32	0.05	0.28	0.021	1.77
0.04	$\%Y_2O_3$	103,660,000	2.84	0.07	0.37	0.05	0.30	0.023	1.89
0.05	$\%Y_2O_3$	83,224,000	2.84	0.08	0.40	0.06	0.31	0.025	1.96
0.06	$\%Y_2O_3$	58,700,000	2.84	0.09	0.40	0.07	0.32	0.026	1.99
0.07	$\%Y_2O_3$	39,257,000	2.84	0.10	0.40	0.07	0.32	0.026	1.95
0.08	$\%Y_2O_3$	27,265,000	2.84	0.12	0.41	0.07	0.33	0.026	1.91
0.09	$\%Y_2O_3$	18,326,000	2.84	0.13	0.42	0.08	0.33	0.025	1.81
0.10	$\%Y_2O_3$	14,005,000	2.84	0.14	0.43	0.08	0.33	0.025	1.73

Table 17.31 Lake Zone Inferred Mineral Resources at Recommended Cut-offs

Cut-off	Cutting Element	Tonnes	Density	$\%Y_2O_3$	$\%Ce_2O_3$	$\%La_2O_3$	$\%Nb_2O_5$	$\%Ta_2O_5$	$\%ZrO_2$
0.04	$\%Y_2O_3$	103,660,000	2.83	0.07	0.37	0.05	0.30	0.023	1.89

No known environmental, permitting, legal, title, taxation, socio-economic, marketing or other relevant issues are known to the writers that may affect the estimate of mineral resources.

The resources on the Lake Zone have been categorized as Inferred. Due to the uncertainty of Inferred Mineral Resources it cannot be assumed that all or any part of this resource will be upgraded to an Indicated or Measured Resource as a result of continued exploration.

17.2.7 *Model Validation*

The Lake Zone grade interpolation plan and model was validated using six methods:

- Visual comparison of search ellipses generated in Datamine to those output by Sage.
- Visual comparison of colour-coded block model grades with drill hole grades on section and plan plots.
- Comparison of the global mean block grades for ordinary kriging, nearest neighbour and inverse distance squared methods.
- Comparison of block model grades and drill hole grades using swath plots.
- Comparison of block model grades to historic estimates.

Visual Comparison of Search Ellipses

Sage generates 3-D views of the estimated search ellipses. These plots have compared to slices through the search ellipse made in Datamine to ensure that the correct rotation and dimensions have been input for grade interpolation.

Visual Validation of Sections

The visual comparisons of block model grades with composite grades for the five veins show a reasonable correlation between the values. No significant discrepancies were apparent from the sections and plans reviewed. Appendix C contains representative plans and sections.

Global and Inferred Comparisons

The global block grade statistics for the ordinary kriging model are compared to the declustered means for each sub-zone (Table 17.32). Percentage differences of greater than 10% have been highlighted.

The higher differences are associated with Y_2O_3 and Ce_2O_3 in the low-grade sub-zone. The fact that the drill hole average is higher than the model implies that the model may be conservative for these elements in this zone. Closer spaced drilling, which would permit an improved geological interpretation, will probably resolve this issue.

Table 17.32 Comparison of Top Cut Declustered Drill holes with Ordinary Kriged Grades (g/t)

Sub-Zone	Data	Y_2O_3	Ce_2O_3	La_2O_3	Nb_2O_5	ZrO_2
MM	Drill Hole	769	4,044	567	3,157	21,499
	Model	759	4,019	587	3,227	21,093
% Difference		1%	1%	-3%	-2%	2%
LM	Drill Hole	188	1,580	169	1,856	7,261
	Model	155	1,020	163	1,918	7,470
% Difference		22%	55%	3%	-3%	-3%

A further check was carried out on the interpolation where the ordinary kriged (OK) grades were compared to the nearest neighbour (NN) and inverse distance squared (ID^2) interpolation (Table 17.33) for blocks classified as an Inferred Mineral Resource. Differences of greater than 15% have been highlighted. In general, there is agreement between the ordinary kriged model, inverse distance and nearest neighbour models for the oxides. In general the results for OK compare favourably to the ID2 method. The poor comparison between OK and NN is believed to be due to the location of the drill holes for Y_2O_3 and La_2O_3.

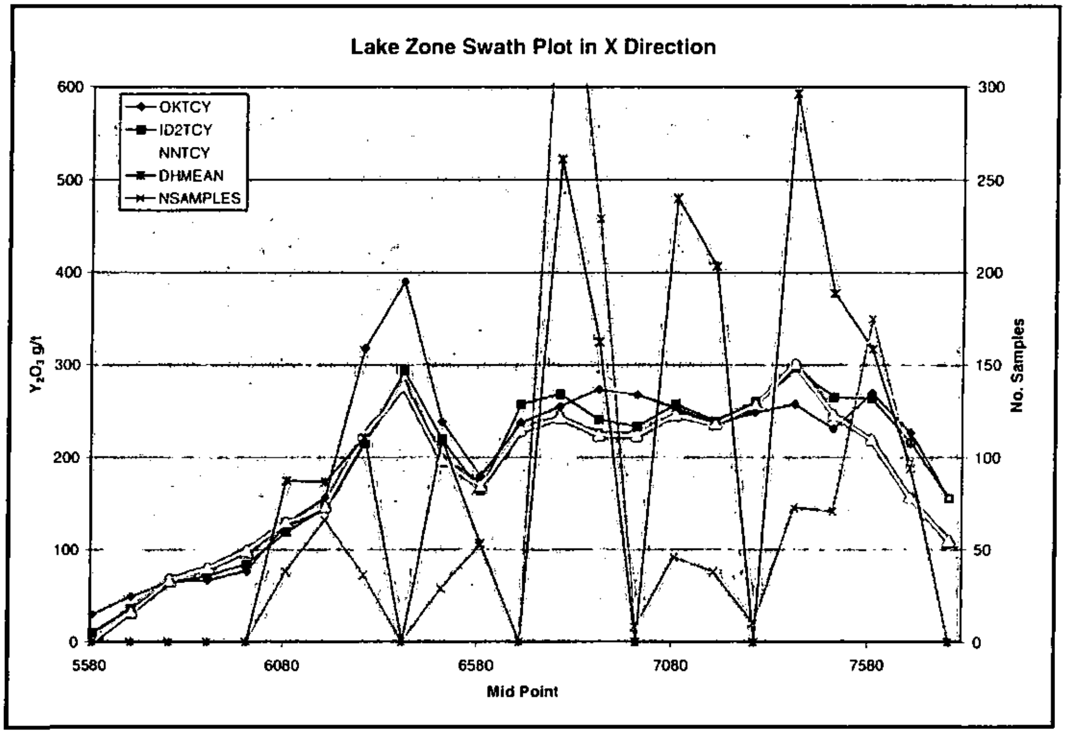
Table 17.33 Comparison of Interpolation for Ordinary Kriging

Sub-Zone	Method	Y_2O_3	Ce_2O_3	La_2O_3	Nb_2O_5	ZrO_2	%OK Y_2O_3	%OK Ce_2O_3	%OK La_2O_3	%OK Nb_2O_5	%OK ZrO_2
MM	OK	766	4,176	590	3,250	20,086					
MM	ID2	674	4,205	671	3,296	19,908	-12%	1%	14%	1%	-1%
MM	NN	555	3,645	662	3,126	17,635	-28%	-13%	12%	-4%	-12%
LM	OK	147	968	200	1,860	7,313					
LM	ID2	151	989	213	1,898	7,343	3%	2%	6%	2%	0%
LM	NN	156	852	305	1,889	7,801	6%	-12%	53%	2%	7%

SWATH PLOTS

Swath plots have been generated for ordinary kriged, inverse distance and nearest neighbour for the total model. An example of a swath plot is present below (Figure 17.5). Appendix D contains swath plots for all of the interpolated oxides.

Figure 17.5 Y_2O_3 Swath Plot in X Direction



18.0 OTHER DATA AND INFORMATION

18.1 RECONCILIATION

Not applicable.

19.0 MINING OPERATIONS

19.1 MINING OPERATIONS NORTH T ZONE

This PEA examined the potential for mining the North T Zone resource by open pit methods as the mineralization occurs at and near surface. The potential for extension of the mineralization at depth requires further investigation.

No attempt was made to optimize equipment or methods for this preliminary evaluation. Typical unit operating costs for a remote seasonal mining operation were used to evaluate the resource. The mine operation assumed that a contractor would conduct the mining of the ore and waste on a summer seasonal basis. A unit mining cost of CDN$4.21 per tonne (t), was used for both ore and waste in this evaluation.

19.1.1 BLOCK MODEL

A block model was created for the North T Zone for pit optimization using SURPAC software.

Dimensions of the North T model are 230 m North by 150 m East by 186 m depth. The block size is 5 m x 5 m x 3 m. Table 19.1 shows a summary of the North T block model.

Table 19.1 Block Model Summary North T Zone

Local Co-ordinates	Y	X	Z
Minimum Co-ordinates	88,400	6,440	75
Maximum Co-ordinates	88,630	6,590	261
Block Size (m)	5	5	3
Length (m)	230	150	186
Number of Blocks in Direction	46	30	62
Total Number of Blocks	85,560		

Eight attributes have been defined for each block. A block value in situ has been calculated for each block and put in an attribute named "grade_value". Table 19.2 describes the attributes of the block model.

19.1.2 PIT OPTIMIZATION

The block model was produced and represents a recovery of 80% for REEs. A recovery of 69% was used for beryllium (see Table 19.3).

Table 19.2 Attributes of the North T Zone Block Model

Attribute	Description
grade_value	Calculation of the in-situ value of the mineralization after losses
classification	Rock type
density	Specific gravity
oktcbe	Beryllium oxide grade in grams per tonne
oktcce	Cerium oxide grade in grams per tonne
oktcnb	Niobium oxide grade in grams per tonne
oktcnd	Neodymium oxide grade in grams per tonne
oktcy	Yttrium oxide grade in grams per tonne

INPUT

A calculated block value (grade_value) has been used for pit optimization. Recoveries were deducted in this equation because different recoveries are forecast for the beryllium versus the other metals (Table 19.3).

The grades in grams per tonne (g/t) within the block model were multiplied by the value in CDN$/gram (g) to yield the value of the resource in-situ for each block. The recoveries in SURPAC then became 100%.

The metal prices used are shown in Table 19.3. The conversion from US$ to CDN$ was $0.87. Niobium was given a value of $0.00 due to marketing concerns.

Table 19.3 Metal Prices Used in Pit Optimization for the North T Zone

Metal Oxide	Sales Price (US$)	Unit	Recovery	CDN$/g
BeO	$20	lb[(1)]	69%	$0.034970
La_2O_3	$2,000	t	80%	not included
Ce_2O_3	$1,700	t	80%	$0.001563
Pr_2O_3	$20,000	t	80%	not included
Nd_2O_3	$21,000	t	80%	$0.019402
Sm_2O_3	$3,000	t	80%	
Eu_2O_3	$240,000	t	80%	
Gd_2O_3	$5,100	t	80%	
Tb_2O_3	$500,000	t	80%	
Dy_2O_3	$120,000	t	80%	
Ho_2O_3	$440,000	t	80%	
Er_2O_3	$21,700	t	80%	
Tm_2O_3	$2,300,000	t	80%	
Yb_2O_3	$340,000	t	80%	
Lu_2O_3	$3,500,000	t	80%	
Y_2O_3	$4,000	t	80%	$0.003678
Nb_2O_5	$0	lb	80%	$0.000000

(1) lb – pound

Table 19.4 shows the operating costs that have been used for pit optimization.

Table 19.4 Operating Cost Description for the Thor Lake *Project* North T Zone

Cost Description	Unit	Cost
Mining Cost	$/t mined	$4.21
Milling and other Costs	$/t milled	$69.59

Due to the absence of a geotechnical study to determine the pit slopes, a conservative pit slope of 45° was assumed for both cases.

The pit optimization results are shown in Table 19.5 and Figures 19.1 to 19.3 illustrate the block model, the optimized pit and the block grades.

Table 19.5 Pit Tonnages – Breakdown by Bench Case North T Zone

Bench	Potential Ore			Waste		Stripping Ratio
	BCM	Tonnes	Block Value	BCM	Tonnes	
246-249	0	0	0.00	6,000	16,260	100.00
243-246	7,800	20,864	309.30	131,700	356,907	16.88
240-243	13,800	36,907	300.19	123,300	334,143	8.93
237-240	16,500	44,096	328.59	113,400	307,314	6.87
234-237	21,300	56,988	319.87	101,700	275,607	4.77
231-234	24,000	64,232	327.53	92,400	250,404	3.85
228-231	24,600	65,865	361.43	84,900	230,079	3.45
225-228	26,400	70,859	304.72	75,900	205,697	2.88
222-225	22,800	61,288	242.46	72,900	197,600	3.20
219-222	17,400	47,012	160.29	72,900	197,648	4.19
216-219	14,700	40,053	110.72	69,000	187,131	4.69
213-216	15,300	42,083	149.29	62,400	169,316	4.08
210-213	21,300	58,761	205.04	51,600	140,079	2.42
207-210	31,200	85,856	208.94	35,400	96,145	1.13
204-207	30,300	83,522	197.97	31,200	84,752	1.03
201-204	32,400	89,555	180.17	25,500	69,270.	0.79
198-201	25,500	70,995	158.30	26,700	72,554	1.05
195-198	16,500	46,509	168.48	30,600	83,173	1.85
192-195	14,100	40,170	223.88	27,600	75,029	1.96
189-192	12,600	36,108	234.74	23,700	64,426	1.88
186-189	12,900	36,587	160.04	18,600	50,567	1.44
183-186	9,600	26,973	175.74	14,100	38,341	1.47
180-183	8,700	24,335	204.21	9,000	24,474	1.03
177-180	12,000	33,530	173.30	3,900	10,607	0.33
174-177	9,600	26,966	165.79	3,000	8,159	0.31
171-174	7,500	21,173	204.31	1,200	3,264	0.16
168-171	5,700	16,022	213.24	300	816	0.05
165-168	3,600	9,986	132.94	0	0	0.00
162-165	1,200	3,275	53.37	0	0	0.00
Grand Total	459,300	1,260,569	226.35	1,308,900	3,549,759	2.85

These optimization results were used as input to the financial analyses of Section 19.10.

Figure 19.1 Pit and Ore Values, North T Zone Oblique View Looking SW

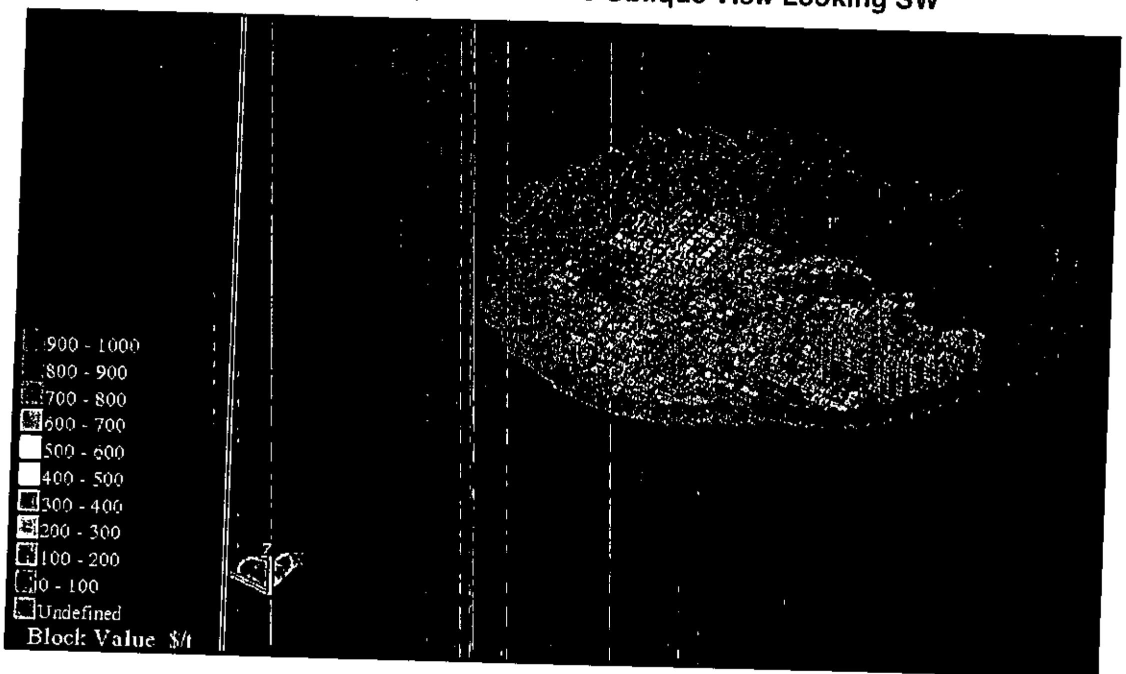


Figure 19.2 Block Values in Plan (north is down)

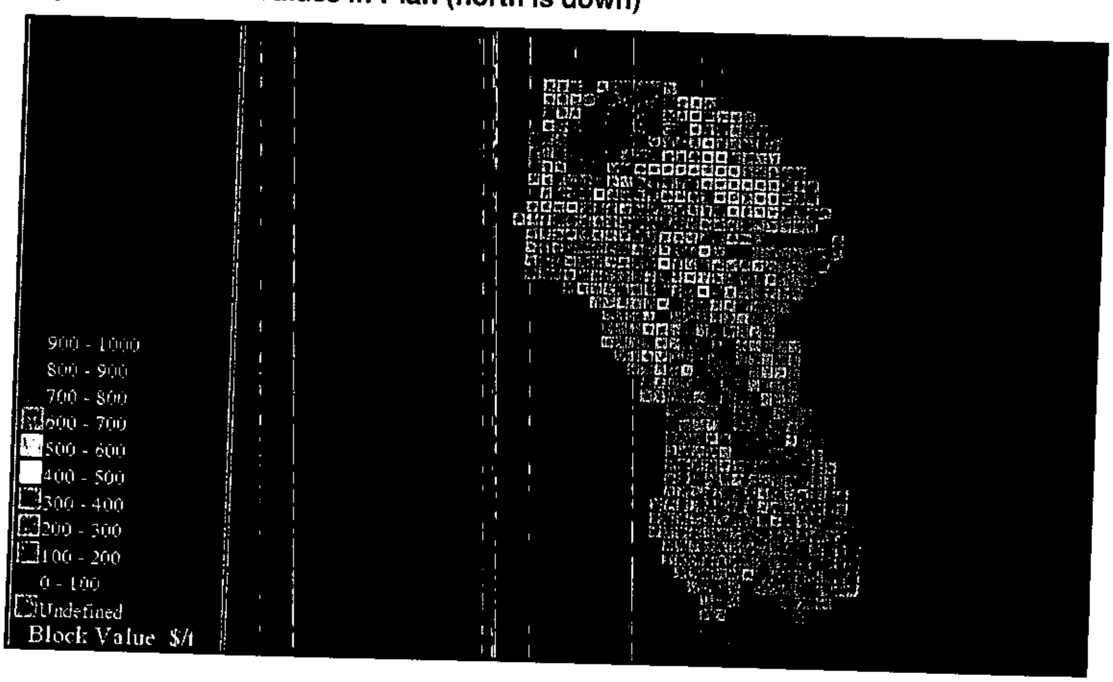
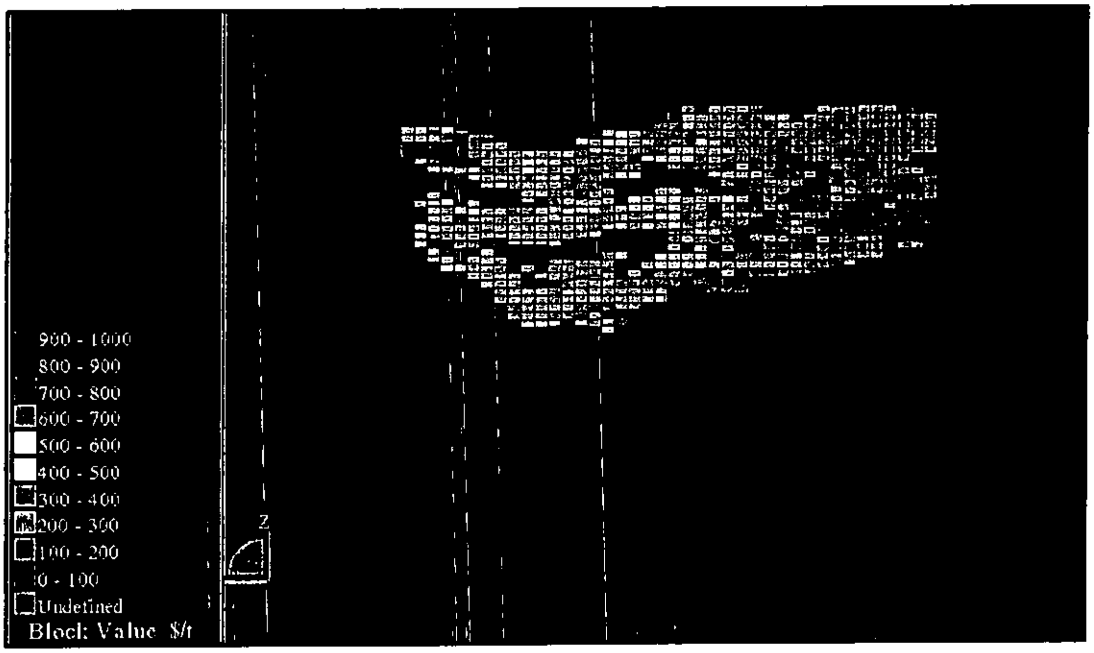


Figure 19.3 Block Values in Elevation View Looking West



19.2 MINING OPERATIONS LAKE ZONE

The PEA also examined the potential for mining the Lake Zone resource after the North T Zone.

This evaluation assessed the potential value of eight elements within the Lake Zone resource and applied a calculated factor to estimate the value of all of the rare metals present in the Lake Zone.

19.2.1 BLOCK MODEL

A block model was created for the Lake Zone for pit optimization using SURPAC software. Dimensions of the Lake Zone model are 3620 m north by 2620 m east by 470 m depth. The block size is 10 m x 10 m x 3 m. Table 19.6 shows a summary of the Lake Zone block model.

Table 19.6 Block Model Summary Lake Zone

Local Co-ordinates	Y	X	Z
Minimum Co-ordinates	85,390	5,400	-180
Maximum Co-ordinates	89,010	8,020	290
Block Size (m)	10	10	3
Length (m)	3620	2620	470
Number of Blocks in Direction	362	262	47
Total Number of Blocks	725,870		

Eight attributes have been defined for each block. A block value in situ has been calculated for each block and put in an attribute named "grade_value". Table 19.7 describes the attributes of the block model.

Table 19.7 Attributes of the Lake Zone Block Model

Attribute	Description
grade_value	Calculation of the in-situ value of the mineralization after losses
density	Specific gravity
oktcbe	Beryllium oxide grade in grams per tonne
oktcce	Cerium oxide grade in grams per tonne
oktcga	Gallium oxide grade in grams per tonne
oktcla	Lanthanum oxide grade in grams per tonne
oktcnb	Niobium oxide grade in grams per tonne
oktcta	Tantalum oxide grade in grams per tonne
oktcy	Yttrium oxide grade in grams per tonne
oktczr	Zirconium oxide grade in grams per tonne

19.2.2 PIT OPTIMIZATION

The block model was produced and an optimization case was conducted.

INPUT

The calculated block value (grade_value) has been used for pit optimization. Recoveries were deducted in this equation because different recoveries from those of the T Zone were forecast for the various rare metals (Table 19.8).

Table 19.8 Metal Prices used in the Pit Optimization for the Lake Zone

Metal Oxide	Sales Price US$	Unit	Recovery	CDN$/g
Ce_2O_3	$1,700	Mt(1)	66%	$0.001283
La_2O_3	$2,150	Mt	66%	$0.001623
Ta_2O_5	$85.00	lb	54%	$0.117282
Y_2O_3+HREE factor	$92.18	kg(2)	60%	$0.063255
Zr_2O_3	$7.60	kg	60%	$0.005266

(1)Mt – millions of tonnes

(2)kg - kilograms

The grades in g/t within the block model were multiplied by the value in CDN$/g to yield the value of the resource in-situ for each block. The recoveries in SURPAC then became 100%. Table 19.9 shows the operating costs that have been used for pit optimization. The mining operating costs are lower due to the higher tonnages mined and processed.

Table 19.9 Operating Cost Description for the Thor Lake Project Lake Zone

Cost Description	Unit	Cost
Mining Cost	$/t mined	$3.77
Milling and other Costs	$/t milled	$134.73

Due to the absence of a geotechnical study to determine the pit slopes, a conservative pit slope of 45° was assumed.

Pit Optimization Results

Table 19.10 Pit Tonnages – Breakdown by Bench Lake Zone

Bench	Potential Ore			Waste		Stripping Ratio
	BCM	Tonnes	Block Value	BCM	Tonnes	
240–250	18,000	15,138	155.83	663,000	1,847,583	36.83
230–240	865,000	2,452,929	184.36	8,596,000	23,920,461	9.94
220–230	1,130,000	3,199,746	187.83	7,535,000	20,964,333	6.67
210–220	1,361,000	3,844,857	184.87	6,518,000	18,138,322	4.79
200–210	1,580,000	4,458,252	178.50	5,498,000	15,303,088	3.48
190-200	1,615.000	4,558,767	178.99	4,696,000	13,070,750	2.91
180-190	1,521,000	4,303,737	182.32	4,048,000	11,262,691	2.66
170-180	1,381,000	3,913,845	185.63	3,484,000	9,694,016	2.52
160-170	1,286,000	3,648,846	183.40	2,906,000	8,086,568	2.26
150-160	1,145,000	3,251,217	180.98	2,360,000	6,568,697	2.06
140-150	1,059,000	3,008,457	180.14	1,829,000	5,093,978	1.73
130-140	990,000	2,812,518	183.13	1,358,000	3,782,526	1.37
120-130	1,029,000	2,922,957	195.18	830,000	2,307,893	0.81
110-120	922,000	2,616,810	214.38	496,000	1,377,705	0.54
100-110	748,000	2,123,340	225.12	273,000	758,169	0.36
90-100	441,000	1,251,873	242.07	54,000	149,598	0.12
80-90	89,000	252,777	221.78	2,000	5,610	0.02
70-80	2,000	5,682	165.34	0	0	0
Grand Total	17,182,000	48,677,766	188.57	51,146,000	142,331,988	2.98

Figures 19.4 and 19.5 illustrate the block model, the optimized pits and the block grades for the Lake Zone.

These optimization results were used to build a financial model for North T plus the Lake Zone in section 19.10.

19.3 Process Metal Recoveries

Actual metallurgical process recoveries in concentrate production have been described above in Section 16.6 and 16.7. Recovery data have not been generated for solvent extraction processing, but as a generalization the process is very efficient and upwards of 99% recoveries can be considered in the course of modelling Thor Lake.

Figure 19.4 Lake Zone Pit and Ore Values in Oblique View Looking SW

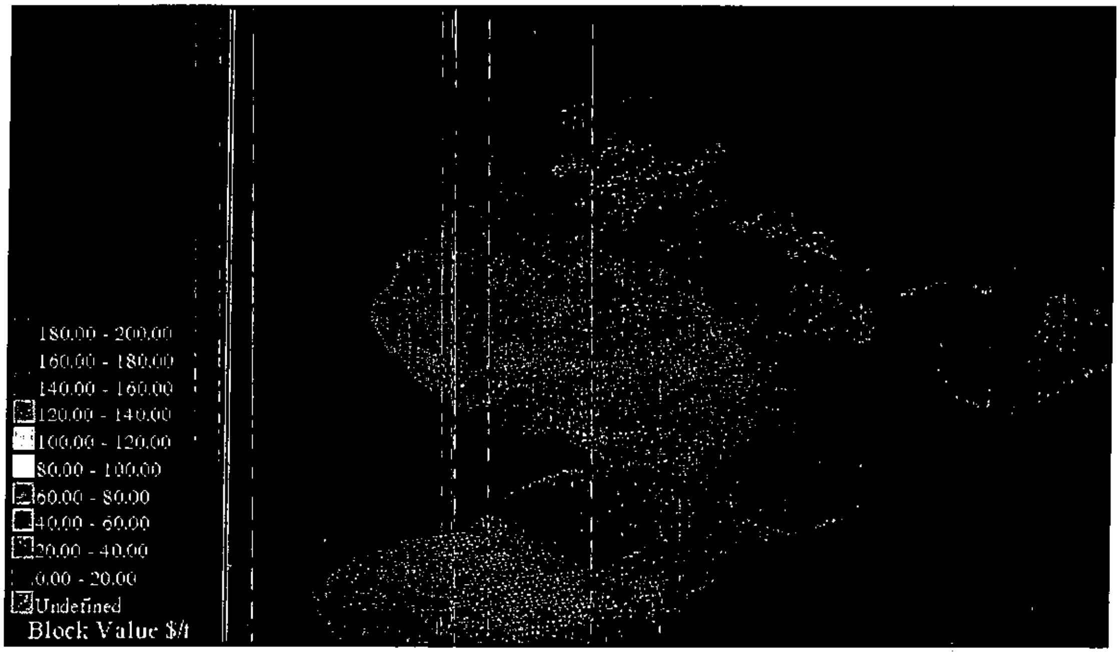
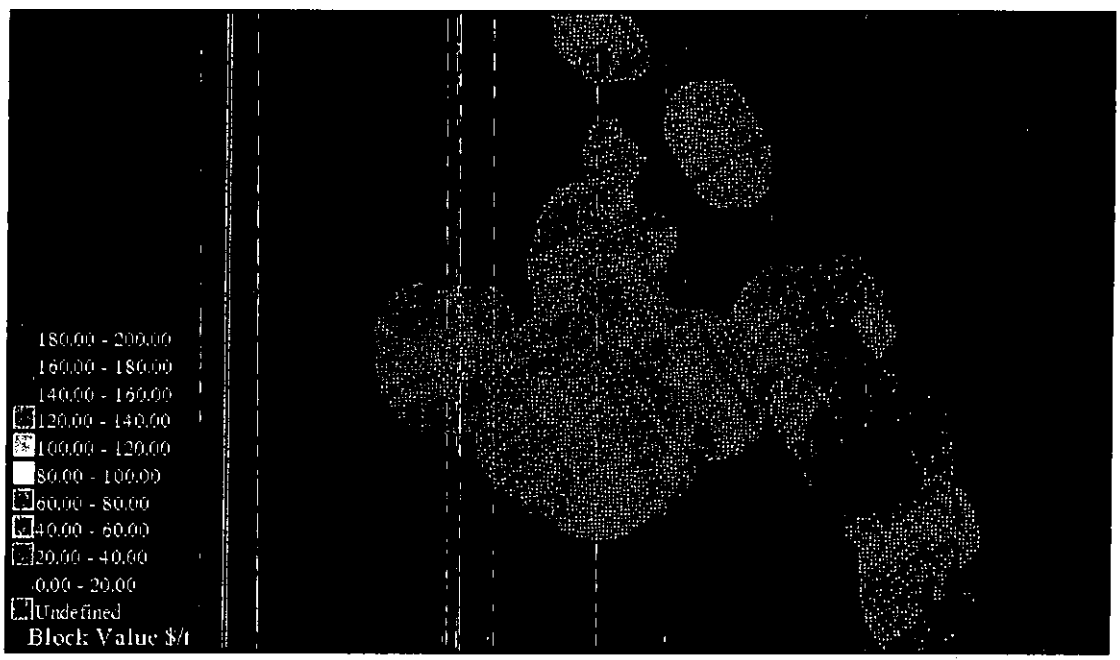


Figure 19.5 Lake Zone Block Values in Plan View



19.4 MARKETS

There are eight metals or groups of metals which could be produced in mineral concentrate form or value added, refined products from Thor Lake. These include: beryllium, yttrium, heavy rare earths, light rare earths, zirconium, tantalum, niobium, and gallium. Avalon presently contemplates making heavy rare earths plus yttrium primary products with by-product production of light rare earths, beryllium and possibly tantalum.

The following examination of markets is based on statistics largely drawn from the United States Geological Survey (USGS) while pricing has been drawn from Metal Pages.com and other published sources, professional research reports, market experience and outside expertise has been consulted. Market sizes were examined for the past ten year period, for global and domestic (North America) consumption and for concentrate and refined products in which Avalon is considering downstream processing. For future supply demand trends for the rare earth elements, the study relies on a recent professional market research report produced by BCC Research of Norwalk, CT in October 2006 and authored by Dr. C. W. Sinton. The summary from this report is reproduced below. Other public companies involved in REE project development, such as Lynas Corp. of Sydney, Australia, also cite the BCC Research report data in their public disclosure.

Where market and price data have been seen to conflict the most recent information is cited. Spot market prices where included are noted. All dollar values used below are US dollars, unless otherwise noted. USGS dollar amounts are expressed in 1998 dollars.

In contrast to base and precious metals, market prices for rare metals are usually quoted in terms of oxide equivalent of the commodity. Price data can become further complicated because of different reporting practices. For example in the case of beryllium, contained beryllium in a concentrate can be reported or beryllia, a beryllium oxide ceramic. Zircon is similarly complicated, commonly being quoted as zircon, ZrO_2 contained, or zirconia as the oxide or oxide contained in a chemical form, or as a ceramic. Conversion factors from metal to oxide are given in Appendix E.

Additionally, rare earth element values for concentrate are commonly presented as the percentage or proportion of an individual rare earth to the total of the rare earths present in a commodity. This is common practice and is utilized herein to evaluate and compare Thor Lake mineral concentrates with other products in the marketplace.

The following is the Summary on rare earth markets from Sinton, 2006, reproduced verbatim:

> *The rare earths are a group of 15 metallic elements that have unique properties which make them indispensable for many technological applications. Rare earths already play a critical role in the electronics, automotive, environmental protection and petrochemical sectors. As these industries grow and as research around the world*

continues to develop applications for rare earths, demand for these materials is expected to continually increase.

The rare earths are not actually rare, but they are found in different degrees of abundance. The more abundant cerium and lanthanum are as common as copper whereas others, such as terbium are not particularly abundant. This leads to differing supply and, when coupled with different demand characteristics, differences in price. For instance, cerium oxide is $1.6 per kg while terbium oxide is over $400 per kg.

Global demand for rare earths was 95,000 metric tons rare earth oxide (REO) equivalents in 2005 and is expected to grow on average annually by 10% to over 150,000 metric tons REO in 2010. The use of rare earths is expected to grow in permanent magnets, consumer electronics and automotive catalytic converters. In particular demand growth will be seen in the automotive industry as more electric components replace hydraulic systems and NiMH rechargeable batteries are used in hybrid vehicles. Rare earth markets will require higher purity mixed and separated rare earth products to meet growing demand for the elements in demand. Strong demand is expected for cerium in automotive catalysts, lanthanum in NiMH batteries, and those elements used in Neo magnets (neodymium, praseodymium, dysprosium, and terbium).

Global reserves of rare earths are greater that 100 million metric tons REO, according to published sources. However, when uneconomic resources are subtracted and the recovery rates for current processes are taken into account, the global net recoverable reserves that can be economically extracted (including Australian Mt. Weld deposit) are 6.2 million metric tons REO. However, if prices continue to increase, these reserves will increase as well.

Global supply has experienced significant changes in the past decade. China has become the dominant supplier of ores (with over 90% of the total supply capacity) as well as the dominant processor and user of refined compounds. This has occurred as processors in the rest of the world have transferred production in China. However, recent government regulations will reduce the amount of rare earths extracted from China. ***Supply of high demand elements cannot be met solely by China and will require the exploitation of other sources.***

With demand for most of the rare earths expected to grow over the next 5 years at 10% per annum on average, as well as supply to be limited within China to lower than current production levels, it is expected that the price for most of these elements will increase.

The fact that rare earths are co-produced creates a situation where one or two elements that are in particular demand require that other elements be mined as well. The co-produced elements will then potentially create a glut in supply, that is, they will be produced in amounts that exceed demand. Neodymium is one element that appears to create this situation, due to its use in Neo magnets and its presence in *some of the less-processed mixed element products (such as those used in catalyst and glass applications). With neodymium averaging approximately 16% of the total REO content of the majority of the ores, its demand would require an annual total REO production of approximately 155,000 metric tons in 2010. This demand cannot be met by the current supply sources.*

Global Rare Earth Market Forecast by Application, Through 2010
(Metric Tons_REO Equivalent)

Applications	***2004***	***2005***	***AAGR% 2004-2005***	***2010***	***AAGR%[1] 2005-2010***
Permanent magnets	*14,509*	*18,093*	*24.7*	*32,178*	*12.2*
NiMH batteries	*6,099*	*7,077*	*16.0*	*26,775*	*30.5*
Auto catalysts	*5,541*	*5,831*	*5.2*	*7,573*	*5.4*
Fluid cracking catalysts	*15,000*	*15,500*	*3.5*	*18,400*	*3.5*
Phosphors	*3,652*	*4,006*	*9.7*	*7,512*	*13.4*
Glass and ceramics	*16,200*	*16,490*	*1.8*	*17,800*	*1.5*
Metallurgy	*9,400*	*10,660*	*13.4*	*16,725*	*9.4*
Polishing compounds	*14,100*	*15,150*	*7.4*	*23,500*	*9.2*
Other	*3,215*	*3,355*	*4.4*	*4,325*	*5.2*
Total	***87,716***	***96,162***	***9.7***	***154,788***	***10.1***

[1]AAGR – Average Annual Growth Rate

Yttrium and the heavy rare earth markets are considered together below, as both occur in essentially the same minerals to be concentrated at Thor Lake. Light rare earths are treated as a commodity separately from the heavy rare earths as they occur largely in different minerals and zones.

19.4.1 YTTRIUM AND HEAVY RARE EARTHS

Yttrium and heavy rare earths are present in all of the zones at Thor Lake. In the T Zone they are found mainly in the mineral xenotime and to a lesser extent in gadolinite. In the Lake Zone they are found principally in fergusonite and minor amounts in monazite. It is Avalon's intention to process the yttrium and HREE bearing minerals to value added REE oxide products. The process route envisions production of a concentrate or intermediate at Thor Lake, and further refinement of the individual elements to oxide form offsite.

Global yttrium and heavy rare earths markets are dominated by production from the People's Republic of China (PRC) more specifically, from South China ion exchange clays. The ion adsorption clays are very low grade, containing less than 0.2% Y+TREEs (Gupta and Krishnamurthy, 2005). Notwithstanding their low grades, the ion adsorption clays have usurped the yttrium and heavy rare earth markets from its former principal mineral feedstocks, xenotime and monazite, because of the inexpensive solution mining methods employed and the ease of beneficiation of the rare earths from the concentrates.

Historic yttrium and HREE market data are presented in Table 19.11. Of significance is the absence of a xenotime concentrate quote during the past ten years when the ion adsorption clays became the least expensive source of yttrium and the REEs. Monazite prices have remained essentially unchanged largely owing to the presence of thorium in monazite which requires subsequent disposal or retention by potential yttrium and rare earth processors.

Table 19.11 Yttrium and HREE Market Data 1996 – 2005

Year	Xenotime $/kg 60% Y_2O_3 Basis	Monazite $/kg 55-60% TREO Basis	Ion Adsorption Clay $/kg 60% Y_2O_3 Basis	Global Production in Contained Tonnes HREO
1972[(1)]		0.10 – 0.22		
1985	46.00			
1992[(2)]	32 – 33.00			730
1995		0.44		1450
1996		0.48		1600
1997		0.73		2370
1998		0.73		2400
1999		0.73		2400
2000		0.73		2400
2001		0.73		2400
2002		0.73		2400
2003		0.73		2400
2004		0.73		2400
2005		0.73		2400
2006			18.30[(3)]	

(1) 1972 dollars

(2) Last published quote USGS

(3) As at October, 2006 – Avalon unpublished internal document

In addition to what is being described as an extremely short supply situation (Machida, 2006) a recent development of importance to Avalon is a government-decreed restriction on production of the ion adsorption clays and due to environmental concerns and Chinese government-imposed export quotas on rare earths in general.

19.4.2 HREE T AND R ZONES

The PRC ion adsorption clays are the dominant source of heavy rare earths in the global market. Research by Mariano has established a near identical rare earth distribution for xenotime from Thor Lake's T and R Zones with that of the ion exchange clays and former Malaysian xenotime concentrates.

The principal difference between the HREE mineralization at Thor Lake and that of the ion adsorption clays is grade. Whereas analyses of the clays show values less than 0.2% Y_2O_3+TREOs per tonne in the ore, the T Zone mineralization at Thor Lake mineralization averages 0.71% Y_2O_3+TREOs and the R Zone contains varied amounts of up to 17% Y_2O_3+TREO in samples. In a perfect concentrate from Thor Lake the Y_2O_3 content would approximate 55% and HREOs 45%.

Table 19.12 presents Y+REE and assay data for the T and R Zones at Thor Lake and for comparative purposes the same data for PRC clays as mined.

Table 19.12 Comparative Assay Data for T Zone, R Zone and PRC Clay Samples (%TREO)

Element	38782*	38783	38784	38771	38772	38773	Longnan	Xunwu
La_2O_3	12.65	9.11	8.50	0.91	5.26	1.68	25.22	20.16
CeO_2	30.81	20.51	21.85	3.57	13.76	5.28	31.51	14.80
Pr_6O_{11}	5.18	3.42	3.80	0.91	2.02	1.07	5.60	3.90
Nd_2O_3	17.84	12.30	13.62	4.48	7.85	4.44	19.61	13.50
Sm_2O_3	5.51	4.10	4.43	3.64	3.32	3.06	3.24	3.00
Eu_2O_3	0.84	0.68	0.85	0.83	0.74	0.77	0.40	0.24
Gd_2O_3	6.16	7.29	7.60	9.10	7.04	7.65	2.47	3.73
Tb_4O_7	1.07	1.78	1.61	2.96	2.02	2.30	0.31	0.91
Dy_2O_3	4.87	9.11	8.23	15.93	10.52	12.55	1.52	4.93
Ho_2O_3	0.71	1.55	1.36	2.81	1.86	2.30	0.27	0.91
Er_2O_3	1.36	3.24	2.94	5.31	3.56	4.44	0.82	2.48
Tm_2O_3	0.16	0.38	0.35	0.53	0.38	0.52	0.11	0.40
Yb_2O_3	0.71	1.69	1.49	0.20	0.16	0.21	0.64	2.14
Lu_2O_3	0.10	0.23	0.19	0.26	0.20	0.24	0.09	0.28
Y_2O_3	12.00	24.61	23.12	50.88	41.29	53.57	8.19	28.60
Total	**99.97**	**100.00**	**99.94**	**101.77**	**99.98**	**100.00**	**100.00**	**100.00**
Assay (ppm)	**30,831**	**21,944**	**31,581**	**131,810**	**123,530**	**65,340**	**1,050.61**	**885.74**

**38782 Grab sample C-Zone muckpile*
38783 Grab sample C-Zone muckpile
38784 Grab sample C-Zone muckpile
38771 Grab sample R-Zone outcrop
38772 Grab sample R-Zone outcrop
38773 Grab sample R-Zone outcrop

Longnan as collected, Wi Chengu
Xunwu as collected, A.N. Mariano

Of particular note in Table 19.12 are the high contents of the heavy rare earths terbium (Tb), dysprosium (Dy) and gadolinium (Gd) which compare favourably with, or exceed those of the PRC feedstocks which set the benchmark prices for these elements. These elements are among the most expensive of the heavy rare earths because of their relative scarcity and the current high demand from magnet manufacturers.

Additionally, it is noted that grades of mineralization in situ in the T and R Zones can exceed those of the PRC clays by factors as high as 148 times. Drill hole intersections from the C Zone have returned, for example, a 6.09 m assay interval of 8,190 ppm Y_2O_3 or approximately ten fold the tabulated grade of the Xunwu ore.

Mariano has also demonstrated that the xenotime from the T and R Zones have near identical REE distributions and is compared in Table 19.13 with xenotime from Malaysia and Guangdong Province, PRC and with high-yttrium Longnan and low-yttrium clays.

Table 19.13 Y+HREE Proportions of Thor Lake Xenotime & Other Commercial Sources (%TREO)

Element	Thor Lake xenotime(1)	Malaysia xenotime(2)	Guangdong xenotime(2)	Longnan high-Y clay(2)	Longnan high-Y clay(3)	Xunwu low-Y clay(3)
La_2O_3	0.10	0.5	1.20	2.18	1.82	43.4
CeO_2	0.02	5.0	3.00	<1.09	0.4	2.40
Pr_6O_{11}	0.10	0.7	0.60	1.08	0.7	9.00
Nd_2O_3	0.20	2.2	3.50	3.47	3.00	31.7
Sm_2O_3	1.80	1.9	2.20	2.34	2.80	3.9
Eu_2O_3	0.70	0.2	<0.20	0.10	0.1	0.5
Gd_2O_3	11.60	4.0	5.00	5.69	6.9	3.0
Tb_4O_7	2.50	1.0	1.20	1.13	1.3	Tr
Dy_2O_3	15.61	8.7	9.10	7.48	6.70	Tr
Ho_2O_3	3.10	5.4	5.60	4.26	1.60	Tr
Er_2O_3	5.41	2.1	2.60	1.60	4.90	Tr
Tm_2O_3	0.60	0.9	1.30	0.60	0.7	Tr
Yb_2O_3	2.20	6.2	6.00	3.34	2.5	0.3
Lu_2O_3	0.70	0.4	1.80	0.47	0.4	0.1
Y_2O_3	55.31	60.8	59.30	64.1	65.00	8.00
Total	**99.95**	**100.0**	**<102.4**	**<98.93**	**98.82**	**102.2**

(1)EPMA by P.L. Roeder

(2)from Machida, 2006

(3)from J. Hedrick, USGS

In Table 19.13, it can be seen that the Y+HREE distributions of the Thor Lake xenotime compare favourably with those of other xenotime deposits and the PRC clays. However it should be noted that xenotime, like monazite tends to be associated with thorium while the PRC clays lack significant thorium enrichment. Thorium can be difficult to completely separate and remove from the concentrate and even low levels of contained radioactivity are detrimental to its value.

19.4.3 *HREE LAKE ZONE*

HREE+Yttrium mineralization is also present in the much larger Lake Zone deposit and four mineral species have been identified as hosting these elements. These are fergusonite, allanite, monazite and bastnaesite, but may also include zircon, fluorite and complex species such as aeschynite. The most abundant HREE bearing mineral species is the Lake Zone based on current information is an yttrium-niobium-tantalum oxide mineral called fergusonite.

Because of its unusual rare earth distribution mainly consisting of the mid-atomic number lanthanides from neodymium to dysprosium, fergusonite is of particular interest to end-users as this distribution coincided closely with the current market demand in magent applications. An analysis of fergusonite is presented in Table 19.14 with analyses of xenotime and PRC clays for comparison.

Table 19.14 Comparative Analytical Data for Fergusonite, Xenotime & Ion Exchange Clays

Element	Fergusonite Wt%[1]	Fergusonite REE+Y Distribution[2] %TREO	Xenotime REE+Y Distribution[3] %TREO	High-Y Clay REE+Y Distribution[3] %TREO
La_2O_3	0.15	0.30	0.10	1.82
CeO_2	1.90	4.40	0.02	0.4
Pr_6O_{11}	0.72	1.70	0.30	0.7
Nd_2O_3	6.71	15.6	0.20	3.00
Sm_2O_3	4.44	10.4	1.80	2.80
Eu_2O_3	0.70	1.60	0.70	0.1
Gd_2O_3	6.13	14.3	11.6	6.9
Tb_4O_7	0.76	1.80	2.50	1.3
Dy_2O_3	4.19	9.80	15.61	0.70
Ho_2O_3	0.52	1.20	3.10	1.60
Er_2O_3	1.74	4.10	5.41	4.90
Tm_2O_3	0.28	0.70	0.60	0.7
Yb_2O_3	1.90	4.40	2.20	2.5
Lu_2O_3	0.29	0.70	0.70	0.4
Y_2O_3	12.46	29.05	55.31	65.00
Total	**42.89[2]**	**100.00**	**99.95**	**98.82**

[1]As reported by Pinkston (1989)

[2]Stoichiometric fergusonite 45.93% Y_2O_3+REO

[3]From Table 18.13

There is no known currently available rare earth mineral concentrate that can offer consumers the kind of REE distribution contained in the Lake Zone fergusonite and this distribution appears to be ideally-suited to current market demand from magnet manufacturers serving the automotive sector. This is an extremely important observation as it implies that this material will have a distinct competitive advantage in the marketplace and a clean concentrate would likely command a premium price. Further, unlike xenotime and monazite, the fergusonite does not have any associated thorium removing the potential for radioactive contamination of the concentrate that might attract a penalty. Instead it is enriched in tantalum, a potentially valuable by-product.

Although the fergusonite mineralogy was not recognized at the time, metallurgical work done by Lakefield in 2001 successfully concentrated the HREE and tantalum (fergusonite) mineralization (Section 16.0) and this concentrate is amenable to solvent extraction processing. No attempts were made to optimize this process at that time, but it provides an encouraging starting point for further work. Evidence exists that there are sub-zones in the Lake Zone containing high concentrations of fergusonite which should be the target of further exploration. For example, a drill section in drill hole 81-1 returned an 11.1 m interval assaying 8,127 ppm Y_2O_3 and an additional 2,625 ppm Ta_2O_5. The tantalum, if sold as an intermediate, would have a value in excess of US$65.00/kg.

19.4.4 BERYLLIUM

Beryllium mineralization occurs at Thor Lake predominantly in the North and South T Zone deposits as the mineral phenacite. There is no currently known phenacite production in the beryllium marketplace. Historic production is noted from Kazakhstan where it was processed for consumption in the former USSR. Beryllium continues to be produced in Kazakhstan from beryl and through re-cycling. Two plants produce beryllium in PRC. The PRC feedstock is most likely beryl, although in past the PRC has shipped quantities of helvite group minerals. The PRC has also sold beryllium hydroxide that was considered by industry to be of a low quality (Gaines Pers. Com.; Paulsen, Pers. Com.).

Beryl concentrates are produced by hand-cobbing of coarse ores. They have been produced using flotation in the PRC, but the economics are such that the reagent requirement costs are in excess of the contained beryllium value. Accordingly, most beryl concentrates have historically come from underdeveloped countries where labour is inexpensive.

North American production of beryllium ores and intermediate products of beryllium is centered in Brush Wellman Industries' (Brush) operations at Spor Mountain and Delta, Utah. Further processing to metal alloys, and ceramic is undertaken by Brush in Elmore, Ohio and by Brush and NGK Metals (NGK) in Boyertown, Pennsylvania. Brush is viewed essentially as a monopoly player in the beryllium business but does have a symbiotic relationship with NGK.

At Delta, Brush has two process streams leading to the production of the intermediate, beryllium hydroxide (BeOH). The first stream is fed by bertrandite mined from Brush's Spor Mountain open pit mines. The second stream is fed beryl concentrates.

Until 1965 the principal source of beryllium was the mineral beryl. In 1969, Brush started production of beryllium from their large, low-grade resource of the mineral bertrandite. Existing beryl circuits were re-established at Delta and fed beryl. Beryl was purchased globally by the "beryl buying network" organized by Kawecki Berylco Industries of Pennsylvania. Kawecki was subsequently purchased by Cabot Corporation and subsequently NGK. Beryl purchased by these successor companies was processed through the Brush plant at Delta; the beryl being fritted, dissolved and merged into the bertrandite circuit to produce beryllium hydroxide. The beryl buying network was reported to have been dissolved (Gaines, Pers. Com.) and this may account for several large beryl purchases from the U.S. National Defense Stockpile and from Brazil in the past ten years.

Beryllium is used primarily as beryllium-copper alloys, beryllium oxide ceramics and beryllium metal in a wide variety of applications that take advantage of its light weight, high strength, high melting point, excellent thermal conductivity amongst other unique physical properties. These are used in aerospace, automotive, computers, defence hardware, electronics, heavy machinery, instrumentation and medical and nuclear applications. Demand for beryllium is growing in the nuclear industry along with the growth in demand for nuclear power generation facilities where beryllium is used in moderators and reflectors in reactors. A future application is in nuclear fusion reactors. In 2007, Brush Wellman is delivering 4.4 tonnes of beryllium, to the Joint European Torus (JET), the largest experimental nuclear fusion reactor in the world.

Beryllium is considered a strategic commodity and statistics are found in part, incompletely reported, estimated, or withheld for proprietary reasons, and in some cases flawed.

Table 19.15 presents a compilation of estimated domestic and world production of beryllium in beryl equivalents. The data were compiled by the USGS over the ten year period from 1996 to 2005. Beryl contracts specify that concentrates must average 11% over a one-year period and cannot be less than 10% contained BeO.

Additionally purchasers have paid a premium of $0.25 for each 0.1% BeO contained over the 11% average value.

Table 19.15 World Beryllium Production in Tonnes of Beryl Equivalent or 4% Be

Year	US Production	World Production	US$/kg BeO in Concentrate	US$/kg Be metal(2)
1996	5,260	6,380	4.00	385.00
1997	5,770	6,910	4.00	385.00
1998	6,080	7,220	4.00	385.00
1999	5,070	6,220	4.00	385.00
2000	4,510	5,650	4.00	421.00
2001	2,480	2,990	(1)	350-400
2002	1,970	2,540		350-400
2003	2,100	2,690		350-400
2004	2,210	2,770		NA
2005	2,780	3,440		NA

(1)Posted prices no longer continued

(2)Be metal powder @ 99% purity

The price of beryllium concentrates has remained essentially steady over the past ten years and price quotations are usually dropped after a period of years unless some change is noted. Using the former price schemes, one could value the price of a concentrate from Thor Lake on the basis of $80.00 per short ton unit (STU or 20 lbs per ton) or $4.00/lb. contained at an 11% BeO grade. With addition of the premium of $0.25 per 0.10% of BeO the price of a 20% BeO concentrate from Thor Lake should approach $58.43/kg of contained BeO. This exceeds, by approximately $14.33/kg, the conservative price assumption of $44.10/kg suggested by Merivale (2006) who assumed that attractive pricing would be required to achieve initial market penetration.

At present, Brush is studying concentrates from Thor Lake as a replacement for beryl or other feedstock at Delta, Utah. Alternate consumers for phenacite concentrate, such as the Republic of Kazakhstan with an installed capacity, may also be potential customers.

With a demonstrated ability to produce downstream beryllium products from Thor Lake (Section 16 above), Avalon is also in a position to investigate relationships with other metal and alloy producers.

19.4.5 LIGHT RARE EARTHS

Light rare earth fluorocarbonates are found in all of the mineralized zones at Thor Lake, and achieve significant abundance in the North T F sub-zone where bastnaesite is in syntaxial intergrowth with the fluorocarbonates parasite and synchisite.

A metallurgical process for the concentration of these minerals was developed at Lakefield in 1985 and readily produced concentrates grading 55-60% TREO with in excess of 90% recoveries. The concentrate grades match or exceed the saleable grades posted by the PRC, and domestic (US) sources and exceed the Bayun Obo concentrate grades by approximately 12% contained REOs.

Price and production data for light rare earth concentrates are presented in Table 19.16. Table 19.17 compares the F Zone fluorocarbonates with the REE concentrates from Mountain Pass, California and those of the Bayun Obo deposit in the PRC.

Table 19.16 Light Rare Earth Pricing and Production Data (60% TREO Basis)

Year	Bastnaesite Concentrate Price (kg basis)	Global Annual Production – Tonnes of Contained Metal in Concentrate
1996	2.87	79,700
1997	3.53	68,300
1998	4.19	77,100
1999	4.85	86,600
2000	4.08[(1)]	90,900
2001	4.08	94,500
2002	4.08	98,200
2003	4.08	97,100
2004	4.08	101,000
2005	4.08	105,000

[(1)]Two sources of USGS data show differing values from 2000 to 2005. One value is $5.51/kg, and the second is $4.08/kg. The lower or conservative value should be used for pricing.

Examination of Table 19.17 shows increased amounts of praseodymium, neodymium, samarium and gadolinium in F sub-zone bastnaesite (with a concomitant decrease in lanthanum and cerium) over commercially available concentrates. This may be a desirable feedstock for those companies tailoring a product and can be interested in purchase and sale of the more abundant of the LREEs.

As concentrates prepared from Thor Lake compare favourably with the benchmark Mt. Pass concentrates, the pricing data above can be used directly for a Thor Lake concentrate.

Table 19.17 Comparison of LREE Concentrates and F-Zone Bastnaesite

Element	Thor Lake Bastnaesite(1)	Mt. Pass Concentrate(2)	Bayun Obo Concentrate(3)
La_2O_3	23.44	33.2	26.50
CeO_2	46.82	49.1	50.8
Pr_6O_{11}	5.58	4.3	4.96
Nd_2O_3	20.23	12.0	15.40
Sm_2O_3	2.19	0.8	1.1
Eu_2O_3	0.19	0.12	0.21
Gd_2O_3	1.02	0.17	0.6
Tb_4O_7	0.06	0.02	0.03
Dy_2O_3	0.12	0.03	0.1
Ho_2O_3	0.02	0.005	Tr
Er_2O_3	0.07	0.004	Tr
Tm_2O_3	Tr	Tr	Tr
Yb_2O_3	0.01	Tr	Tr
Lu_2O_3	Tr	Tr	Tr
Y_2O_3	0.40	0.10	0.2
Total	**100.15**	**100.00**	**100**

(1)F-Zone bastnaesite T-708T

(2)Molycorp

(3)USGS Baotou concentrate

19.4.6 TANTALUM

Globally tantalum is recovered from several mineral species: tantalite (a member of the iso-morphous series columbo-tantalite), microlite, tapiolite, xiolite and others found in lode and alluvial types of deposits. Historically, it has also been recovered through processing of tin slags. As tantalum mineral species generally have a high specific gravity, concentrates are usually produced through gravity methods and concentrates must attain specific minimum grades (12% Ta_2O_5) to be economical to process to metal. The process consumes hydrofluoric acid and it is the cost of the acid which dictates concentrate grade.

Tantalum concentrate production is small, amounting to about 2,000 tonnes of concentrate per annum and is dominated by newly won tantalum produced by Greenbushes Tin (NPL) in Australia and TANCO in Canada. Concentrate prices can be sensitive to demand or perceived demand and with rising prices, swing production emerges from third world countries. In the past twenty-five years tantalum prices have on occasion risen substantially for brief periods when new applications created a sudden surge in demand that outstripped supplies. One such event in the late 1970's when tantalum prices exceeded $112/lb was contrived, and in the early 2000's prices reached $400/lb in response to a temporary shortfall of supply for miniaturized electronic capacitor applications Electronic capacitors remain the largest single application for tantalum.

Salient tantalum statistics are presented below in Table 19.18.

Table 19.18 Tantalum production statistics 1996-2005 (tonnes)

Year	World concentrate production - tonnes	Value $/kg Ta_2O_5	Spot market price $/kg
1996	436	72.75-77.16	
1997	562	72.75-77.16	
1998	779	72.75-77.16	
1999	656	72.75-77.16	99.21
2000	1.070	72.75-77.16	507.05
2001	1,180	81.57	661.37
2002	1,470	68.34	110.23
2003	1,280	61.73	88.18
2004	1,510	67.90	88.18
2005	1,910	76.06	88.18

At Thor Lake tantalum is found in the Lake Zone to the near exclusion of occurrence in any other of the known Zones. It predominantly occurs in columbo-tantalite and less abundantly in fergusonite, a tantalum-niobium, rare earth, yttrium mineral. Considerable metallurgical scoping work has been performed on the Lake Zone mineralization, but because of its fine grained nature the columbo-tantalite has been found refractory to conventional metallurgy. The test-work done to date has shown merit in tantalum extraction from a bulk concentrate in that tantalum has shown enrichment in the concentration process and has been shown to be amenable to solvent extraction processing. Accordingly, it has a possible market value as an intermediate IE: potassium fluorotantalate in Japan. Complete processing to tantalum metal may need to be considered to enter the market place.

19.4.7 *Niobium*

Global niobium production is almost monopolized by Brazil which produces approximately 80% of the world's supply. Canada follows second, producing about 10% of the world's supply. It is widely considered that the Canadian production is encouraged by Brazil to provide appearance of a competitive market and avoid being characterized as a monopoly. All of the Brazilian and Canadian niobium production is further processed to ferro-niobium and a market for niobium concentrates essentially does not exist.

Small scale niobium and REE production comes from Russian loparite niobium, REE concentrates which are processed in Estonia. As niobium is commonly found in association with tantalum, recent activities in the tantalum markets has witnessed increased niobium availability of production in form of concentrates from third world countries, but tantalum concentrate processors do not recover the contained niobium.

Relevant data for ferro-niobium production is given in Table 19.19.

Table 19.19 Ferro-niobium statistics from 1996 – 2005 in tonnes

Year	Canada	Rest of World-Brazil	US$/lb.
1996		16,200	
1997		20,500	6.75 –7.00
1998		26,200	6.88
1999		24,600	6.88
2000		24,800	6.88
2001		31,100	6.88
2002		32,700	6.60
2003		32,800	6.58
2004	3,450	29,900	6.56
2005	3,400	29,900	6.58

The metallurgical testwork that resulted in a bulk concentrate from the Lake Zone demonstrated an enrichment of niobium with tantalum, and that the tantalum and niobium remained in the leach residue preparatory to solvent extraction of the other metals. Analysis of markets of the contained commodities in the bulk concentrate suggests that either the yttrium and heavy rare earths or tantalum would dictate a mining rate for the Lake Zone. Extraction of the latter would leave a residue of niobium which could be recovered conventionally through nitric acid dissolution. It is not known if a niobium intermediate could be produced, or if the value thereof would withstand transportation costs to a consumer given an existing market for the same.

It is likely that any niobium production from Thor Lake would have to be advanced to ferro-niobium to be marketed and this would likely involve a carbo-thermic type of process.

19.4.8 *ZIRCON AND ZIRCONIA*

Zircon is ubiquitous in significant amounts in all of the zones at Thor Lake. No attempt has been made to recover zircon from the T Zone however and its recovery from the Lake Zone was to a bulk concentrate consisting of the mineral zircon and the various species hosting tantalum, niobium, yttrium, and the rare earths. The zircon in the bulk concentrate was subsequently taken into solution in a start point for solvent extraction (see Section 16.0) from which it could be precipitated in a chemical form.

There are essentially two markets for zirconium, one being zircon and its variants, the other being a chemical market. The zircon market is very large (see Table 19.20) and its end-use is largely in abrasives and refactories. The chemical market is considerably smaller and segmented geographically. Most of the collective market of zirconium is filled by production of zircon from heavy mineral sands. The chemical market in North America has been filled by zircon processing and in past in Europe has been filled by processing of baddeleyite ores in South Africa. European chemical zirconium consumption has been in the range of 10-15,000 tonnes per annum and in the US about 3,000 tonnes.

Depending on the zone being mined at Thor Lake, and its attendant processing, either of zircon or zirconia or both could be produced. Both markets are shown in Table 19.20.

Table 19.20 Market data for Zircon

Year	World production tonnes Zircon	US imports in tonnes Zircon	Import price US$/tonne Zircon	US Zirconia production tonnes ZrO_2
1996	857,000	60,100	411	5,240
1997	926,000	40,600	400	4,220
1998	814,000	58,200	355	3,900[3]
1999	940,000	37,500	311	3,140
2000	1,040,000	42,400	396	3,950
2001[1]	900,000	39,400	356	2,950
2002	830,000	22,900	400	2,900
2003	860,000	24,300	396	2,350
2004	850,000	22,900	477	3,960
2005	870,000[2]	19,400[2]	673[2]	3,190[2]

[1]Cessation of South African baddeleyite production

[2]USGS estimated. Metal Pages Dec. 1, 2006 spot price is US$725-825.

[3]Data to 2005 are obfuscated by inclusion of other elements which are considered a very minor component and hence data are considered a good approximation

Zircon is an end member of the isomorphous series zircon-hafnon and typically carries some hafnium content. The Thor Lake zircon typically runs Zr/Hf ratios of 60/1. Hafnium is, in some applications deleterious and where it has been recovered is largely dedicated to confined space nuclear applications such as in nuclear submarines. The market for hafnium is not large.

19.4.9 GALLIUM

Gallium is found in both the T Zone and Lake Zone at Thor Lake in significant abundance with concentrations in the range of 250 to 500 ppm. These levels are upwards of 10 times greater than those of bauxite deposits from which gallium is recovered as a by-product. At Thor Lake it is found in substitution for aluminum in the mineral clevelandite, a low temperature variant of albite feldspar, and could be selectively mined or pit-sorted from the various zones.

Extraction of gallium from clevelandite has not been researched and it is thought that it will require a vigorous, hot caustic or acid leach.

World production data cited below (Table 19.21) are USGS estimates. There are unpublished sources that indicate world production may be twice that shown above; a figure that closely approximates world production capacity. Because of the exceptionally high purities required in electronic applications (99.9999+ %) there exists a very large recycle component in the marketplace and as much as 90% of purity is sent to recycle. Normally a large recycle market has the effect of ameliorating price swings.

Table 19.21 Gallium Statistics 1996 – 2005 in tonnes

Year	US Production	World Production	US Imports	$ Value/lb 99.99% purity
1996	0	54.0	30.0	
1997	0	74.5	19.1	
1998	0	93.3	26.3	
1999	0	75.0	24.1	
2000	0	100.0[1]	39.4[1]	
2001	0	81.0	27.1	290.00
2002	0	61.0	13.1	240.00
2003	0	70.0	14.3	186.00
2004	0	60.0	19.4	224.00
2005	0	63.0[1]	16.0[1]	232.00

[1]estimated

As can also be seen from Table 19.21, gallium production and consumption figures can be erratic. Historically, gallium prices were seen to halve when germanium was recently substituted for gallium in faster transistors. Considerable research continues on applications of gallium and could be expected to have considerable effect on the markets. For example, the neutrino laboratory in Sudbury, before electing to use heavy water in its detectors, would have exclusively consumed several years of world production of gallium and would have had significant impact on markets and prices accordingly.

A recent paper presented by Malcolm Harrower of Mining & Chemical Products Ltd. (Harrower, 2006) reported total world gallium demand in 2006 at 230 million tonnes, with primary production of gallium comprising 103 million tonnes and the balance being met by re-cycling. Demand is forecast to grow to 400 million tonnes over the next three to five years due to growth in markets for electronic products where it is used, including mobile phones, solar energy panels, data storage devices and LED lighting. Gallium is key in a number of so-called "green technologies", which with increasing concerns about environmental issues, are likely to continue to grow in demand.

19.5 CONTRACTS

No contracts exist for the sale of any product from Thor Lake.

19.6 ENVIRONMENTAL CONSIDERATIONS

THOR LAKE

The Mackenzie Valley Management Act replaced the Canadian Environment Assessment Act in 1999. This new act establishes a three-part environmental assessment process that requires preliminary (baseline) screening, Environmental Assessment, and Assessment Review (local community panel).

- Permitting will be required to obtain water for processing and other uses.

- Fuel storage permits will be required.
- A closure plan and bond posting will be needed (but costs can be reduced by maintaining stage-wise rehabilitation).
- A permit to dispose of mine waste and process tailings will be required. Given that this is an oxide orebody the risk of acid mine drainage is minimal, but confirmation testing will be required.
- The reactions of rare earth in the soil and water are largely unknown and this will require extensive studies to prove elimination of risk (There may be some opportunity to off-set a part of such costs through research grants).

There is a considerable body of research available on health and exposure to the rare earths which show the rare earths to be essentially benign. In the PRC the abundant light rare earths are used as fertilizers and have documented beneficial results. Processing of the rare earths is not expected to be an issue.

The cost of permitting was estimated by Jacques Whitford in October, 2003 as being between $1.3 and 3.0 million. Based on inflation at 2.5% these costs have probably increased 20%.

REFINERY

As the ore has a "complex metallurgy" and requires complex extraction the option of complete processing at the mine site using semi-skilled operators may not be viable. Operation of a refinery may be feasible in the Fort Saskatchewan area where the off-gasses can be captured and contained as well as the correct storage and containment of elements such as thorium. Minor process fluctuations can create materials that are hard to separate, resulting in the blinding of filters. Thus a well constructed and operated facility is required. Previous test-work was mainly at a bench scale level and a pilot plant operation should be undertaken to fine tune the operating parameters.

- All the products have a high solubility in water (92-99%) so the internal and external water systems must be independent of each other. A 100% capture and treatment of liquid effluent will be required, which will include heavy metal and phosphate removal.
- Recovery and recycling of process chemicals will have significant cost saving benefits, as well as reducing waste treatment costs.
- Water use and effluent permits will be in addition to those in NWT.

Given that a standard environmental baseline assessment often requires two years to demonstrate reproducible values it will be imperative to begin this as early as possible. Such an assessment will have to be in accordance with those requirements where a refinery is ultimately domiciled.

19.7 TAXES

Current levels of annual federal and territorial taxation which would affect production from Thor Lake are:

- Federal Income tax is 38% of taxable income.
- Federal Corporate Surtax is 4% of the above federal tax after allowable deductions.
- Territorial Income tax is 11.5% of taxable income.
- Territorial mining royalty is 12.5% of the net value of the mine output after all expenses.
- Territorial additional mining royalty is a graduated scale from 0 to 14% based on the value.
- Of the mine output with 14% applying to $45 million and up.

The project specific 5.5% NSR has been deducted in the financial analysis (Section 19.11 below) as a cost. No other taxes or royalties, either Federal or Territorial were factored into the financial analysis.

19.8 CAPITAL AND OPERATING COST ESTIMATES

Two scenarios are explored below. The first explores development of the North T Zone (Section 19.8.1), and the second explores an initial development of the T Zone with a staged development to exploit the Lake Zone (Section 19.8.2). Both scenarios are predicated on an approximate global market penetration of 25% or about 500 tonnes per year of combined Y+HREE. Section 19.8.3 also explores increased mining and plant throughputs to address 1,000 and 2,000 tonnes of combined Y+HREE output per year on the basis of projected market demands.

Mine operating costs have been developed for this project taking into consideration the remote location and assumes the mining would be contracted out. The detailed estimates are presented in Appendix F. The mine capital requirements are significantly reduced because the mining is assumed to be contracted out and allowances are made in the unit costs of mining for fleet depreciation.

Dewatering requirements are an unknown at this juncture. However, the North T pit is a relatively small and relatively shallow pit and hence it is assumed that in-pit sumps would accommodate water inflow.

The capital estimates and allowances are also listed in the financial analyses (Appendix F).

19.8.1 NORTH T ZONE

In order to assess the economics of the North T deposit for recovering the beryllium and Y+REE, capital and operating costs for the processing facilities were estimated based on the following development concept.

> The beryllium in the ore will be recovered into a phenacite concentrate. The rare earths and yttrium will be first floated into a bulk concentrate followed by digestion and solvent extraction to produce separate rare earth and yttrium oxides. The flotation plant will be built at Thor Lake site and the solvent extraction plant will be located at Fort

Saskatchewan. There are no testing data on a composite sample representative of the whole North T deposit including the newly defined Y sub-zone.

A 78% recovery of rare earths and yttrium recovery was selected. The flotation recovery of beryllium was assumed to be 70%.

The flotation plant will have an annual throughput of 215,000 tonnes and operate 330 days per year. This study also assumes that the rare earth concentrate will assay 28.3% Ce_2O_3 and the yttrium will be recovered into the same concentrate.

The flotation capital cost was based on the flotation plant model in Mining Cost Service (2004) by Western Mine Engineering Inc and escalated to current Canadian dollars at 2.5% over five years.

The operating cost of the flotation plant was based on the reagent consumption data from SGS Lakefield tests on the samples of the North T Zone. The maintenance supplies and grinding steel consumption were based on industry averages. The salary level is based on Kemess Mine's salary statistic of January 2007.

The capital cost of the solvent extraction (SX) plant for separation of rare earths is based on the capital cost of a Chinese plant built in 2000. The capital investment was escalated at 10% per year to current value and converted to Canadian dollars. A 5% allowance was added to account for the shipment of equipment from overseas. A 30% indirect cost was allowed for the currently high engineering and construction labour costs of a project in Canada. A 25% contingency was considered for the capital estimate.

The operating cost of the SX plant was based on the chemical reagent price of North America chemical market and the reagent consumptions in similar Chinese operations.

The rare earth flotation concentrate transportation cost is based on a quote from B&R Eckel's Transportation Ltd. A load of 40 tonnes will cost $3,430 plus 20% fuel surcharge, which equals to $4,116 per load or $103 per tonne from Hay River to Fort Saskatchewan. It is also envisaged that the beryllium concentrate will be delivered to consumers from Fort Saskatchewan and the transportation cost of the concentrate from the flotation facility to Fort Saskatchewan was also included in the operating cost estimation. A summary of the capital and operating costs and overall metal recoveries is presented in Table 19.22.

The staffing requirement and labour cost of the flotation and extraction plants are shown in Tables 19.23 and 19.24. The capital and operating costs are detailed in tables 19.23 and 19.24. The staffing requirement and labour cost of the flotation and extraction plants are shown in Tables 19.25 and 19.26.

Table 19.22 Capital and Operating Costs Summary

Be Overall Recovery (%)	BeO Grade In Final Product (%)	REE Overall Recovery (%)	REO Grade in Final Products (%)	Plants Capital Cost (CDN$)	Plants Operating Cost (CDN$/tonne)
69	20	78	99	$68,045,748	$69.59

Table 19.23 Capital Cost

Flotation Plant Capital Cost	Cost
Direct	
Equipment	$6,464,247
Installation labor	$4,396,277
Concrete	$563,904
Piping	$1,793,543
Structural Steel	$653,085
Instrumentation	$420,767
Insulation	$179,322
Electrical	$751,873
Coatings &Sealants	$78,614
Mill Building	$925,751
Tailings Embankment	$1,505,667
Working Capital	$1,848,657
Permanent Camp	$1,063,677
Diesel Power Station	$2,970,603
Fuel Tank Farm	$495,100
Airstrip	$250,000
Sub-total Direct	$24,361,088
Indirect @ 30% of Direct	$7,308,326
Contingency @ 25%	$6,090,272
Sub-total Flotation Plant	**$37,759,686**
Project Capital Cost	
Flotation Plant	$37,759,686
SX Plant	$30,286,062
Flotation Plant + SX plant	**$68,045,748**

Table 19.24 Operating Cost

Flotation Plant Operating Cost			
Variable	**Tonnage/Year**	**Cost/tonne (CDN$)**	**Annual Cost (CDN$)**
Salary	215,000	9.09	1,955,327
Grinding Media and Maintenance Supplies	215,000	2.30	494,500
Power	215,000	5.70	1,225,500
Rare Earth Flotation Reagent	215,000	15.79	3,394,850
Be Flotation Reagent	215,000	15.45	3,321,750
Sub-total		**48.33**	**10,391,927**
Concentrate Transport			
Be Concentrate	2,993	103	308,311
RE Concentrate	1,766	103	181,924
Sub-total			**490,235**
REE Chemical & SX Plant Operating Cost			
Salary	1,766	562.46	993,441
Power	1,766	20.00	35,325
Chemicals	1,766	300.00	529,877
Sub-total			**1,558,642**
Fixed Cost			
G&A @ 4% of variable			497,632
Marketing @ 5% of variable			622,040
Camp Operation at $35/man day			114,975
Transportation Yellowknife ↔ Site @ 500 per one way trip			52,000
Plant Insurance			200,000
Freight of supplies @ 40 per tonne			183,530
Winter Road Yellowknife and Hay River to Site			300,000
Outside Travel			50,000
Head Office Cost			500,000
Sub-total			**2,520,177**
Flotation + SX Plants Operating Cost	215,000	**69.59**	**14,960,981**

Table 19.25 Staffing Requirement and Labour Cost for the Flotation Plant

Position	Number of Positions Filled	Annual Salary (CDN$)	Total Annual Cost (CDN$)
Hourly Personnel			
Crusher Operators	2	68,391	136,782
Grinding Operators	4	71,959	287,836
Flotation Operators	4	73,465	293,860
Laborers	2	54,332	108,664
Mechanics	2	68,074	136,148
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Plant Foreman	2	107,100	214,200
Metallurgist	1	107,100	107,100
Sub-total	18		1,448,390
35% Burden			506,937
Total			**1,955,327**

Table 19.26 Staffing Requirement and Labour Cost for the Solvent Extraction Plant

Position	Number of Positions Filled	Annual Salary (CDN$)	Total Annual Cost (CDN$)
Hourly Personnel			
Operators	6	73,465	440,790
Laborers	1	54,332	54,332
Mechanics	1	76,960	76,960
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Sub-total	9		735,882
35% Burden			257,559
Total			**993,441**

The flotation plant with a throughput of 215,000 tonnes per year will cost $37.8 million to build and will require 18 employees to operate. The operating cost of the flotation plant is $45.14/tonne feed, 69% of this cost is the cost of flotation reagents.

The solvent extraction plant cost is $30.3 million. The major costs for operating the extraction plant are salary and chemical costs.

19.8.2 *NORTH T WITH LAKE ZONE*

In order to assess the economics of the Thor Lake property as a whole for recovering the valuable elements, capital and operating costs for the processing facilities were estimated based on the following development concept.

The North T Zone will be mined first and the mining operation will switch to the Lake Zone after the ore in the North T Zone is exhausted. The mining rate of North T Zone will be 215,000 tonnes a year and the mining rate of the Lake Zone will be increased to 429,000 tonnes a year. A flotation plant is to be built at a capacity of 652 tonnes per day first for processing the North T ore and will be expanded to 1300 tonnes per day for processing Lake Zone ore at Thor Lake site. A SX plant will be built at Fort Saskatchewan first to process the rare earth concentrate into separate rare earth oxides and will be later expanded to also recover tantalum and zirconium oxides when the Lake Zone is mined.

For the North T ore, the beryllium in the ore will be recovered into a phenacite concentrate and transported to Fort Saskatchewan for sale. The rare earths and yttrium will be first floated into a bulk concentrate followed by digestion and solvent extraction to produce separate rare earth and yttrium oxides. Since there are no test data on a composite sample representative of the whole North T deposit, including the newly defined Y sub-zone, an 80% flotation recovery of rare earths and yttrium was assumed. A flotation recovery of 70% was assumed for beryllium. Future metallurgical testing on a representative composite sample is necessary for a more reliable assessment.

As in section 19.10.1, the flotation plant operates 330 days per year. This study also assumes that the rare earth concentrate from the North T Zone will assay 28.3% Ce_2O_3 and the yttrium will be recovered into the same concentrate. The beryllium concentrate will contain 20% BeO.

The valuable components in the Lake Zone will be first floated into a tantalum/niobium/zircon/Y+REE concentrate. The concentrate will be transported to the SX plant at Fort Saskatchewan for further processing to recover tantalum, zirconium and rare earth element oxides. The concentrate grade and metal recoveries in Table 19.27 were assumed based on preliminary testing results at SGS Lakefield on a composite sample from Lake Zone which has higher head grade than the updated resource. A comprehensive test program, especially hydrometallurgical testing, on a composite representative of the updated resource should be carried out to confirm these assumptions.

Table 19.27 Lake Zone Ore Flotation Concentrate Grade and Processing Recovery

Components	ZrO_2	Ta_2O_5	Nb_2O_5	REO	Y_2O_3
Flotation Concentrate Grade (%)	18.00	0.20	2.25	8.09	0.66
Flotation Recovery (%)	66.24	59.84	52.16	72.16	65.6
Leach/SX Recovery (%)	91.00	91.00	91.00	91.00	91.00
Overall Processing Recovery (%)	60.28	54.45	47.47	65.67	59.70

The flotation plant capital cost was based on the flotation plant model in Mining Cost Service by Western Mine Engineering Inc. The plant will first be built at a capacity of 652 tonnes per day in a larger building with room for expansion and a second series of equipment will be added for processing of Lake Zone ore.

The capital cost of the solvent extraction plant for production of zirconium and Ta oxides is factored from the capital cost of a hydrometallurgical plant for the same property by Currie and converted to current Canadian dollars (Currie, 2004).

The operating cost of the flotation plant was based on the reagent consumption data from SGS Lakefield tests on a composite sample of the Lake Zone. Maintenance supplies and grinding steel consumption were based on industry average.

The operating cost of the chemical and solvent extraction plant for production of Zr and Ta oxides was based on the chemical reagent price and consumption of Table 9.13 in Currie's report and escalated to current Canadian dollars (Currie, 2004).

A summary of the capital requirement for the processing facilities and plant sites infrastructure is presented in Table 19.28.

Table 19.28 Summary of Capital Costs for the Processing Facilities and Site Infrastructure

Cost Items	Capital Cost (CDN$xMillion)							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Feasibility for Lake Zone			5.00	1.50	1.00	1.00		
Flotation Plant + Infrastructure	18.88	18.88					22.99	5.75
RE SX plant	15.14	15.14					5.00	
Zr-Ta Chemical and SX plant							12.92	
Total = 123.2 Millions CND$	34.02	34.02	5.00	1.50	1.00	1.00	40.91	5.75

The capital cost of a feasibility study for the Lake Zone is detailed in Table 19.29. Since only limited geological information is available for the Lake Zone, more drilling is essential to better define the deposit. In the financial analysis, $7.5 million was considered historic because it will be expanded before a development decision is made.

Table 19.29 Capital Cost of a Feasibility Study for the Lake Zone

Items	Descriptions	Cost$
Drilling for Reserve delineation	50,000 m @ $100/m	5,000,000
Metallurgical Testing	Process optimization	500,000
Pilot Plant	200 tonne sample	1,000,000
Bankable feasibility		1,000,000
Environmental study and permits		1,000,000
Total		**8,500,000**

The capital costs of the flotation plant, in two phases of construction are illustrated in Table 19.30. A five million dollar allowance is made for the necessary expansion and modification of the rare earth solvent extraction plant at year seven to suit the feed from Lake Zone ore flotation.

The capital cost for the hydrometallurgical plant for recovery of Zr and Ta oxides from the flotation concentrate is shown in Table 19.31.

The operating cost of the processing facilities is summarized in Table 19.32. The major costs come from the costs of the sodium hydroxide and hydrochloric acid for zirconium leaching.

The staffing requirement and labour cost for the flotation and SX plants are shown in Table 19.33.

Table 19.30 Capital Cost of the Flotation Plant

Flotation Plant Capital Cost	Cost in Year 1 & 2	Cost in Year 7 & 8
Direct		
Equipment	6,464,247	6,464,247
Installation labor	4,396,277	4,396,277
Concrete	563,904	563,904
Piping	1,793,543	1,793,543
Structural Steel	653,085	544,238
Instrumentation	420,767	420,767
Insulation	179,322	143,458
Electrical	751,873	751,873
Coatings &Sealants	157,227	
Mill Building	1,851,502	
Tailings Embankment	1,505,667	
Working Capital	1,848,657	
Permanent camp	1,063,677	
Diesel power station	2,970,603	2,970,603
Fuel tank farm	495,100	495,100
Airstrip	250,000	
Subtotal Direct	**24,361,088**	**18,544,010**
Indirect @ 30% of Direct	7,308,326	5,563,203
Contingency @ 25%	6,090,272	4,636,003
Total	**37,759,686**	**28,743,216**

Table 19.31 Capital Cost for Zirconium and Tantalum Leaching and SX Plant ($)*

Area	Equipment	Material	Labour	Total Cost
Purchase Land	497,200			497,200
Site Preparation	49,720		24,860	74,580
Concentrate Storage	24,860	74,580	49,720	149,160
Coal Storage	12,430	49,720	37,290	99,440
Roller Mill	24,860	49,720	24,860	99,440
Storage Bin	12,430	49,720	49,720	111,870
Rotary Kiln	1,491,600	1,243,000	994,400	3,729,000
HCL Leach	248,600	248,600	99,440	596,640
Zr Solvent Extraction	124,300	124,300	74,580	323,180
Zr Precipitation/ Dewatering	99,440	49,720	49,720	198,880
Zr Calcination & Bagging	497,200	248,600	248,600	994,400
HF Leach	124,300	124,300	49,720	298,320
Ta Solvent Extraction	74,580	74,580	37,290	186,450
Ta Precipitation	49,720	24,860	24,860	99,440
Ta Calcination & Bagging	74,580	49,720	49,720	174,020
Assay Laboratory	99,440	49,720	37,290	186,450
Electrical Distribution	49,720	24,860	49,720	124,300
Piping	24,860	24,860	49,720	99,440
Plant Building	124,300	497,200	372,900	994,400
Reagent Storage	124,300	497,200	124,300	745,800
First Fills		497,200		497,200
Neutralization	124,300	124,300	124,300	372,900
Solution Ponds	24,860	49,720	49,720	124,300
Mobil Equipment	231,198			231,198
Total	4,208,798	4,176,480	2,622,730	**11,008,008**
To Current Dollars				**12,924,503**

**Derived from Currie, 2004*

Table 19.32 Operating Cost of Processing Facilities

Flotation Plant Operating Cost			
Variable	**Tonnage/Year**	**Cost/Tonne (CDN$)**	**Annual Cost (CDN$)**
Salary	429,000	6.33	2,716,494
Grinding Media and Maintenance Supplies	429,000	2.30	986,700
Power	429,000	5.70	2,445,300
Flotation Reagent	429,000	6.89	2,955,928
Tails Disposal	429,000	1.00	429,000
Sub-total		**22.22**	**9,533,423**
Concentrate Transport			
Flotation Concentrate	29,838	103	3,073,294
Sub-total			**3,073,294**
Chemical & SX Plant Operating Cost			
Salary	29,838	112.11	3,344,969
Consumable	29,838	11.18	333,570
Chemicals	29,838	1,184	35,334,283
Sub-total			**39,012,823**
Fixed Cost			
G&A @ 4% of variable			2,064,782
Marketing @ 5% of variable			2,580,977
Camp Operation at $35/man day			166,075
Transportation Yellowknife ↔ Site @ 500 per one way trip			52,000
Plant Insurance			400,000
Freight of supplies @ 40 per tonne			66,804
Winter Road Yellowknife and Hay River to Site			300,000
Outside Travel			50,000
Head Office Cost			500,000
Sub-total			**6,180,637**
Over All Process Operating Cost	**429,000**	**134.73**	**57,800,177**

Table 19.33 Flotation Plant Reagent Costs

Reagents	**Function**	**Dosage (kg/t)**	**Price ($/t)**	**Tonnage**	**Annual Costs (CDN$)**
H_2SiF_6	Modifier	0.55	1,200	236	283,140
Citric Acid	Modifier	0.8	2,600	343	892,320
Acidified Sodium Silicate	Modifier	0.5	1,000	215	214,500
PL512	Collector	0.75	3,800	322	1,222,650
Total in 2002 Canadian Dollars				**1115**	**2,612,610**
Escalated to Current Canadian Dollars					**2,955,928**

Table 19.34 Flotation Plant Other Consumable Costs

Items	Function	Consumption (kg/t)	Price ($/t)	Tonnage	Annual Costs (CDN$)
Grinding Steel	Grinding ball	1.08	1,080	463	500385.60
Mill liners		0.2	5,830	86	500214.00
Maintenance Supplies		0.013	5,320	6	29669.64
Total				**555**	**1,030,269.00**

Table 19.35 Zirconium, Tantalum Leach and SX Operation Reagent Costs

Reagents	Function	Dosage (kg/t)	Price ($/t)	Annual Tonnage	Annual Costs (CDN$)
NaOH	Cracking	1,000	180	29,838	5,370,805
HCl (12N)	Leach	5,600	90	167,092	15,038,255
Alamine 336	Extractant		8,500	1.13	9,605
Isopar M	Diluent		3,500	1.13	3,955
$NaCO_3$	Precipitant	3.80	390	113.4	44,226
HF(70%)	Leach	589	900	11,954	10,758,420
MIBK	Extractant		3,000	0.567	1,701
NH_3(70%)	Precipitant		100	33.9	3,390
Total in 2002 Canadian Dollars					**31,230,358**
Escalated to Current Canadian Dollars					**35,334,283**

Table 19.36 Zirconium, Tantalum Leach and SX Operation Other Consumables Costs

Items	Function	Cost/tonne feed ($/t)	Tonnes Feed	Annual Costs (CDN$)
Rollers	Roller mill	0.25	29,838	7,460
Kiln Liner	for cracking	2	29,838	59,676
Coal	for kiln	5	29,838	149,190
Zr leach/SX		0.2	29,838	5,968
Kiln Liner	Zr Calcination	2	4,887	9,775
Coal	Zr Calcination	5	4,887	24,437
Ta/Nb Leah/SX		0.3	12,748	3,824
Propane	Ta Calcination			1,135
Power				28,363
Misc. Supplies				5,000
Total in 2002 Canadian Dollars				**294,828**
Escalated to Current Canadian Dollars				**333,570**

Table 19.37 Staffing and Labour Costs of Processing Facilities

Flotation Plant Manpower			
Position	**No of Position Filled**	**Annual Salary (CDN$)**	**Total Annual Cost (CDN$)**
Hourly Personnel			
Crusher Operators	2	68,391	136,782
Grinding Operators	4	71,959	287,836
Flotation Operators	4	73,465	293,860
Sampler/Assayer	4	60,912	243,648
Laborers	2	54,332	108,664
Mechanics	2	68,074	136,148
Electrician	2	80,045	160,090
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Plant Foreman	2	107,100	214,200
Process Technician	1	80,045	80,045
Instrument Technician	1	80,045	80,045
Metallurgist	1	107,100	107,100
Subtotal - Flotation	**26**		2,012,218
35% Burden			704,276
Flotation with burden			**2,716,494**
RE SX Plant Manpower			
Hourly Personnel			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Mechanics	1	68,074	68,074
Zr-Ta SX Plant Manpower			
Hourly Personnel			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Electrician	1	80,045	80,045
Sampler/Assayer	4	60,912	243,648
Mechanics	3	68,074	204,222
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Metallurgist	1	107,100	107,100
Shift Foreman	4	107,100	428,400
Process Technician	1	80,045	80,045
Instrument technician	1	80,045	80,045
Sub-total - Chemical	**33**		2,477,755
35% Burden			867,214
Leach and SX Plants with Burden			**3,344,969**

The total processing facility for the project will cost $123.2 million; $68.04 million is required to bring the North T Zone into production. Another $55.16 million is required to expand the flotation and SX plant for Lake Zone operation. The operating cost for the Lake Zone is estimated at $135/tonne milled; 64% of this operating cost is the cost of chemicals in the SX plant.

19.8.3 *Cost Estimation for North T with Lake Zone at Elevated Lake Zone Mining Rate*

A rare earth market study conducted by BCC Research indicated that the consumption of rare earths would increase by more than 10% from 2005 to 2010 (Sinton, 2006). Considering the forecasted rare earth metals' consumption growth rate and limitation of Chinese mills' production in the future, BBC forecasted a 12,500 tonnes gap between rare earths demands and supply by the year 2010.

The Lake Zone deposit of the Thor Lake property is a huge deposit and could support many decades operation at a much higher mining rate than the rate selected in section 19.8.2 provided that there is a market demand for the products. In order to evaluate the economics of the Lake Zone property at elevated mining rates, the capital and operating costs of the processing facility were estimated at mining rates of 858,000 and 1,716,000 tonnes per year respectively and presented in the following sections.

Cost Estimation for Lake Zone Annual Mining Rate of 858,000 Tonnes per Year

The development concept and design assumptions are the same as stated in section 19.8.2 except that the mining rate of the Lake Zone deposit is increased. The North T Zone will be mined first at an annual mining rate of 215,000 tonnes and the mining operation will switch to the Lake Zone after the ore in the North T Zone is exhausted. The mining rate of Lake Zone is 858,000 tonnes per year for the cost estimation presented in this section.

A summary of the capital requirement for the processing facilities and plant sites infrastructure at a Lake Zone mining rate of 858,000 tonnes per year is presented in Table 19.38.

Table 19.38 Summary of Capital Costs for the Processing Facilities and Site Infrastructure for a Lake Zone Mining Rate of 858,000 Tonnes per Year

Cost Items	Capital Costs (CDN$ x Million)							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Feasibility for Lake Zone			5.00	1.50	1.00	1.00		
Flotation Plant + Infrastructure	18.88	18.88					50.96	12.74
RE SX plant	15.14	15.14					8.00	2.00
Zr-Ta Chemical and SX plant							16.45	4.11
Total = 170.8 Millions CDN$	**34.02**	**34.02**	**5.00**	**1.50**	**1.00**	**1.00**	**75.41**	**18.85**

The capital costs of a feasibility study for the Lake Zone are the same as estimated in section 19.8.2. Please refer to Table 19.29 for details.

Table 19.40 Capital Costs for Zirconium and Tantalum Leaching and SX Plant for Lake Zone Mining Rate of 858,000 Tonnes per Year (CND$)

Area	Equipment	Material	Labour	Total Costs
Purchase Land	791,024			791,024
Site Preparation	79,102		39,551	118,654
Concentrate Storage	39,551	118,654	79,102	237,307
Coal Storage	19,776	79,102	59,327	158,205
Roller Mill	39,551	79,102	39,551	158,205
Storage Bin	19,776	79,102	79,102	177,980
Rotary Kiln	2,373,072	1,977,560	1,582,048	5,932,680
HCL Leach	395,512	395,512	158,205	949,229
Zr Solvent Extraction	197,756	197,756	118,654	514,166
Zr Precipitation/ Dewatering	158,205	79,102	79,102	316,410
Zr Calcination & Bagging	791,024	395,512	395,512	1,582,048
HF Leach	197,756	197,756	79,102	474,614
Ta Solvent Extraction	118,654	118,654	59,327	296,634
Ta Precipitation	79,102	39,551	39,551	158,205
Ta Calcination & Bagging	118,654	79,102	79,102	276,858
Assay Laboratory	158,205	79,102	59,327	296,634
Electrical Distribution	79,102	39,551	79,102	197,756
Piping	39,551	39,551	79,102	158,205
Plant Building	197,756	791,024	593,268	1,582,048
Reagent Storage	197,756	791,024	197,756	1,186,536
First Fills		791,024		791,024
Neutralization	197,756	197,756	197,756	593,268
Solution Ponds	39,551	79,102	79,102	197,756
Mobil Equipment	367,826			367,826
Total in 2002 Dollars	**6,696,018**	**6,644,602**	**4,172,652**	**17,513,271**
To Current Dollars				**20,562,334**

Table 19.41 Operating Costs of Processing Facilities for Lake Zone Mining Rate of 858,000 Tonnes per Year

Flotation Plant Operating Cost			
Variable	**Tonnage per Year**	**Cost/Tonne ($/t)**	**Annual Cost (CDN$)**
Salary	858,000	4.35	3,732,872
Grinding Media and Maintenance Supplies	858,000	2.40	2,060,538
Power	858,000	5.70	4,890,600
Flotation Reagent	858,000	6.89	5,911,857
Tails Disposal	858,000	1.00	858,000
Sub-total		**20.34**	**17,453,867**
Concentrate Transport			
Flotation Concentrate	59,676	103	6,146,588
Sub-total			**6,146,588**
Chemical & SX Plant Operating Cost			
Salary	59,676	65.73	3,922,592
Consumable	59,676	11.71	698,823
Chemicals	59,676	1,184.21	70,668,552
Sub-total			**75,289,967**
Fixed Cost			
G&A @ 4% of variable			3,955,617
Marketing @ 5% of variable			4,944,521
Camp Operation at $35/man day			229,950
Transportation Yellowknife ↔ Site @ 500 per one way trip			52,000
Plant Insurance			400,000
Freight of supplies @ 40 per tonne			133,608
Winter Road Yellowknife and Hay River to Site			300,000
Outside Travel			50,000
Head Office Cost			500,000
Sub-total			**10,565,696**
Over All Process Operating Cost	**858,000**	**127.57**	**109,456,118**

Table 19.42 Flotation Plant Reagent Costs for Lake Zone Mining Rate of 858,000 Tonnes per Year

Reagents	**Function**	**Dosage (kg/t)**	**Price ($/t)**	**Tonnage (tonne)**	**Annual Costs (CDN$)**
H_2SiF_6	Modifier	0.55	1200	472	566,280
Citric Acid	Modifier	0.8	2600	686	1,784,640
Acidified Sodium Silicate	Modifier	0.5	1000	429	429,000
PL512	Collector	0.75	3800	644	2,445,300
Total in 2002 Canadian Dollars				**2231**	**5,225,220**
Escalated to Current Canadian Dollars					**5,911,857**

Table 19.43 Flotation Plant Other Consumables Costs for Lake Zone Mining Rate of 858,000 Tonnes per Year

Items	Function	Consumption (kg/t)	Price ($/t)	Tonnage (tonne)	Annual Costs (CDN$)
Grinding Steel	grinding ball	1.08	1080	927	1,000,771
Mill liners		0.2	5830	172	1,000,428
Maintenance Supplies		0.013	5320	11	59,339
Total				**1,109**	**2,060,538**

Table 19.44 Zr, Ta Leach and SX Operation Reagent Costs for Lake Zone Mining Rate of 858,000 Tonnes per Year

Reagents	Function	Dosage (kg/t)	Price ($/t)	Annual Tonnage (tonne)	Annual Costs (CDN$)
NaOH	Cracking	1000	180	59676	10,741,611
HCl (12N)	Leach	5600	90	334183	30,076,510
Alamine 336	Extractant		8500	2.26	19,210
Isopar M	Diluent		3500	2.26	7,910
$NaCO_3$	Precipitant	3.80	390	227	88,439
HF(70%)	Leach		900	23908	21,516,840
MIBK	Extractant		3000	1.13	3,402
NH_3 (70%)	Precipitant		100	68	6,780
Total in 2002 Canadian Dollars					**62,460,703**
Escalated to Current Canadian Dollars					**70,668,552**

Table 19.45 Zr, Ta Leach and SX Operation Other Consumables Costs for Lake Zone Mining Rate of 858,000 Tonnes per Year

Items	Function	Cost per tonne feed ($/t)	Tonnes Feed	Annual Costs (CDN$)
Rollers	Roller Mill	0.25	59,676	14,919
Kiln Liner	For Cracking	2	59,676	119,351
Coal	For Kiln	5	59,676	298,378
Zr leach/SX		0.2	59,676	11,935
Kiln Liner	Zr Calcination	2	9,775	19,550
Coal	Zr Calcination	5	9,775	48,874
Ta/Nb Leah/SX		0.3	25,496	7,649
Propane	Ta Calcination			4,719
Power				76,902
Miscellaneous Supplies				15,380
Total in 2002 Canadian Dollars				**617,657**
Escalated to Current Canadian Dollars				**698,823**

Table 19.46 Staffing and Labour Costs of the Processing Facilities for Lake Zone Mining Rate of 858,000 Tonnes per Year

Position	Number of Positions Filled	Annual Salary (CDN$)	Total Annual Cost (CDN$)
Hourly Personnel			
Crusher Operators	2	68,391	136,782
Grinding Operators	4	71,959	287,836
Flotation Operators	4	73,465	293,860
Filter Operators	4	73,465	293,860
Sampler/Assayer	4	60,912	243,648
Laborers	4	54,332	217,328
Mechanics	4	68,074	272,296
Electrician	2	80,045	160,090
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Plant Foreman	4	107,100	428,400
Process Technician	1	80,045	80,045
Instrument Technician	1	80,045	80,045
Metallurgist	1	107,100	107,100
Sub-total - Flotation	**36**		2,765,090
35% Burden			967,782
Flotation with Burden			**3,732,872**
RE SX Plant Manpower			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Packing Operators	4	71,959	287,836
Mechanics	1	68,074	68,074
Zr-Ta SX Plant Manpower			
Hourly Personnel			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Electrician	1	80,045	80,045
Sampler/Assayer	4	60,912	243,648
Mechanics	4	68,074	272,296
Packing Operators	1	71,959	71,959
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Metallurgist	1	107,100	107,100
Shift Foreman	4	107,100	428,400
Process Technician	1	80,045	80,045
Instrument technician	1	80,045	80,045
Sub-total - Chemical	**39**		2,905,624
35% Burden			1,016,968
Leach and SX Plants with Burden			**3,922,592**

In summary, the project requires an investment of 170.8 millions over a period of 8 years for the processing facilities and process site infrastructure. 52.7% percents of this investment is required in years 7 and 8 for the flotation and rare earth SX plants expansions and for the construction of a hydrometallurgical plant for Ta and Zr recovery. A ten million dollar allowance is made for the necessary expansion and modification of the rare earth solvent extraction plant at the years seven and eight to suit the feed from Lake Zone ore flotation.

The processing facilities and related infrastructures need 106.8 millions a year to operate, of which 71.8% is the costs of chemicals. Leach and solvent extraction chemicals account for 66.2% and flotation reagents account for 5.6% of the operating cost.

COST ESTIMATION FOR LAKE ZONE ANNUAL MINING RATE OF 1,716,000 TONNES PER YEAR

As stated in the section above, the cost estimation in this section was based on the same development concept and assumptions as outlined in section 19.8.2 except the mining rate of Lake Zone was expanded to 1,716,000 tonnes per year.

A summary of the capital requirement for the processing facilities and plant sites infrastructure for a Lake Zone mining rate of 1,716,000 tonnes per year is presented in Table 19.48.

Table 19.47 Summary of Capital Costs for the Processing Facilities and Site Infrastructure for a Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Cost Items	**Capital Costs (CDN$ x Million)**							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Feasibility for Lake Zone			5.00	1.50	1.00	1.00		
Flotation Plant + Infrastructure	18.88	18.88					89.73	22.43
RE SX plant	15.14	15.14					12.00	3.00
Zr-Ta Chemical and SX plant							26.17	6.54
Total = 236.4 Millions CDN$	**34.02**	**34.02**	**5.00**	**1.50**	**1.00**	**1.00**	**127.90**	**31.97**

The capital costs of a feasibility study for the Lake Zone are the same as estimated in section 19.8.2. Please refer to table 19.29 for details.

The capacity of the flotation plant needs to be expanded to eight times of its original capacity in the Phase Two construction. The capital costs of the flotation plant in two phase constructions are illustrated in Table 19.48. A fifteen million dollar allowance is made for the necessary expansion and modification of the rare earth solvent extraction plant at years seven and eight to suit the feed from Lake Zone ore flotation.

The capital costs for the hydrometallurgical plant for recovery of Zr and Ta oxides from the flotation concentrate are shown in Table 19.49

The operating costs of the processing facility are summarized in Table 19.50. The major operating costs come from the sodium hydroxide and hydrochloric acid used in the recovery of zirconium.

The reagent and consumable costs for the flotation plant and zirconium and tantalum recovery facility are shown in Tables 19.51 to 19.54.

The staffing requirement and labour costs for the processing facilities are shown in Table 19.55.

Table 19.48 Capital Costs of the Flotation Plant for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Flotation Plant Capital Costs	Costs in Year 1 & 2 (CDN$)	Costs in Year 7 & 8 (CDN$)
Direct		
Equipment	6,464,247	23,808,589
Installation labor	4,396,277	16,192,011
Concrete	563,904	2,076,927
Piping	1,793,543	6,605,831
Structural Steel	653,085	2,004,492
Instrumentation	420,767	1,549,734
Insulation	179,322	528,372
Electrical	751,873	2,769,236
Coatings &Sealants	78,614	289,543
Mill Building	925,751	3,409,651
Tailings Embankment	1,505,667	
Working Capital	1,848,657	
Permanent camp	1,063,677	360,562
Diesel power station	2,970,603	10,941,081
Fuel tank farm	495,100	1,823,514
Airstrip	250,000	250,000
Sub-total Direct	**24,361,088**	**72,359,543**
Indirect @ 30% of Direct	7,308,326	21,707,863
Contingency @ 25%	6,090,272	18,089,886
Total	**37,759,686**	**12,157,292**

Table 19.49 Capital Costs for Zirconium and Tantalum Leaching and SX Plant for Lake Zone Mining Rate of 1,716,000 Tonnes per Year (CDN$)

Area	Equipment	Material	Labour	Total Costs
Purchase Land	1,258,577			1,258,577
Site Preparation	125,858		62,929	188,787
Concentrate Storage	62,929	188,787	125,858	377,573
Coal Storage	31,464	125,858	94,393	251,715
Roller Mill	62,929	125,858	62,929	251,715
Storage Bin	31,464	125,858	125,858	283,180
Rotary Kiln	3,775,731	3,146,442	2,517,154	9,439,327
HCL Leach	629,288	629,288	251,715	1,510,292
Zr Solvent Extraction	314,644	314,644	188,787	818,075
Zr Precipitation/Dewatering	251,715	125,858	125,858	503,431
Zr Calcination & Bagging	1,258,577	629,288	629,288	2,517,154
HF Leach	314,644	314,644	125,858	755,146
Ta Solvent Extraction	188,787	188,787	94,393	471,966
Ta Precipitation	125,858	62,929	62,929	251,715
Ta Calcination & Bagging	188,787	125,858	125,858	440,502
Assay Laboratory	251,715	125,858	94,393	471,966
Electrical Distribution	125,858	62,929	125,858	314,644
Piping	62,929	62,929	125,858	251,715
Plant Building	314,644	1,258,577	943,933	2,517,154
Reagent Storage	314,644	1,258,577	314,644	1,887,865
First Fills		1,258,577		1,258,577
Neutralization	314,644	314,644	314,644	943,933
Solution Ponds	62,929	125,858	125,858	314,644
Mobil Equipment	585,238			585,238
Total in 2002 Dollars	10,653,854	10,572,046	6,638,993	**27,864,893**
Total Current Dollars				**32,716,173**

Table 19.50 Operating Costs of Processing Facilities for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Flotation Plant Operating Cost			
Variable	**Tonnage/Year**	**Cost/Tonne (CDN$)**	**Annual Cost (CDN$)**
Salary	1,716,000	2.30	3,948,993
Grinding Media and Maintenance Supplies	1,716,000	2.40	4,121,077
Power	1,716,000	5.70	9,781,200
Flotation Reagent	1,716,000	6.89	11,823,714
Tails Disposal	1,716,000	1.00	1,716,000
Sub-total		**18.29**	**31,390,984**
Concentrate Transport			
Flotation Concentrate	119,351	103	12,293,177
Sub-total			**12,293,177**
Chemical & SX Plant Operating Cost			
Salary	119,351	34.81	4,154,448
Consumable	119,351	11.71	1,397,645
Chemicals	119,351	1,184.21	141,337,104
Sub-total			**146,889,197**
Fixed Cost			
G&A @ 4% of variable			7,622,934
Marketing @ 5% of variable			9,528,668
Camp Operation at $35/man day			242,725
Transportation Yellowknife ↔ Site @ 500 per one way trip			52,000
Plant Insurance			400,000
Freight of supplies @ 40 per tonne			267,216
Winter Road Yellowknife and Hay River to Site			300,000
Outside Travel			50,000
Head Office Cost			500,000
Sub-total			**18,963,543**
Over All Process Operating Cost	**1,716,000**	**122.11**	**209,536,900**

Table 19.51 Flotation Plant Reagent Costs for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Reagent	Function	Dosage (kg/t)	Price ($/t)	Tonnage (tonne)	Annual Costs (CDN$)
H2SiF6	Modifier	0.55	1200	944	1,132,560
Citric Acid	Modifier	0.8	2600	1373	3,569,280
Acidified Sodium Silicate	Modifier	0.5	1000	858	858,000
PL512	Collector	0.75	3800	1287	4,890,600
Total in 2002 Canadian Dollars				**4462**	**10,450,440**
Escalated to Current Canadian Dollars					**11,823,714**

Table 19.52 Flotation Plant Other Consumables Costs for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Items	Function	Consumption (kg/t)	Price ($/t)	Tonnage (tonne)	Annual Costs (CDN$)
Grinding Steel	grinding ball	1.08	1080	1,853	2,001,542
Mill liners		0.2	5830	343	2,000,856
Maintenance Supplies		0.013	5320	22	118,678
Total				**2,219**	**4,121,077**

Table 19.53 Zr, Ta Leach and SX Operation Reagent Costs for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Reagents	Function	Dosage (kg/t)	Price ($/t)	Annual Tonnage (tonne)	Annual Costs (CDN$)
NaOH	Cracking	1000	180	119,351	21,483,222
HCl (12N)	Leach	5600	90	668,367	60,153,021
Alamine 336	Extractant		8500	4.52	38,420
Isopar M	Diluent		3500	4.52	15,820
$NaCO_3$	Precipitant	3.80	390	454	176,879
HF(70%)	Leach		900	47,815	43,033,680
MIBK	Extractant		3000	2.268	6,804
NH_3(70%)	Precipitant		100	135.6	13,560
Total in 2002 Canadian Dollars					**124,921,405**
Escalated to Current Canadian Dollars					**141,337,104**

Table 19.54 Zr, Ta Leach and SX Operation Other Consumables Costs for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Items	Function	Cost per Tonne Feed ($/t)	Feed Amount (tonne)	Annual Costs (CDN$)
Rollers	roller mill	0.25	119,351	29,838
Kiln Liner	for cracking	2	119,351	238,702
Coal	for kiln	5	119,351	596,756
Zr leach/SX		0.2	119,351	23,870
Kiln Liner	Zr Calcination	2	19,550	39,099
Coal	Zr Calcination	5	19,550	97,749
Ta/Nb Leah/SX		0.3	50,993	15,298
Propane	Ta Calcination			9,438
Power				153,804
Misc. Supplies				30,760
Total in 2002 Canadian Dollars				**1,235,315**
Escalated to Current Canadian Dollars				**1,397,645**

Table 19.55 Staffing and Labour Costs of the Processing facilities for Lake Zone Mining Rate of 1,716,000 Tonnes per Year

Position	No of Position Filled	Annual Salary (CDN$)	Total Annual Cost (CDN$)
Hourly Personnel			
Crusher Operators	2	68,391	136,782
Grinding Operators	4	71,959	287,836
Flotation Operators	4	73,465	293,860
Filter Operators	4	73,465	293,860
Sampler/Assayer	4	60,912	243,648
Laborers	4	54,332	217,328
Mechanics	4	68,074	272,296
Electrician	2	80,045	160,090
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Plant Foreman	4	107,100	428,400
Process Technician	2	80,045	160,090
Instrument Technician	2	80,045	160,090
Metallurgist	1	107,100	107,100
Sub-total - Flotation	**38**		2,925,180
35% Burden			1,023,813
Flotation with Burden			**3,948,993**
RE SX Plant Manpower			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Packing Operators	4	71,959	287,836
Mechanics	1	68,074	68,074
Zr-Ta SX Plant Manpower			
Hourly Personnel			
Operators	4	73,465	293,860
Laborers	4	54,332	217,328
Electrician	1	80,045	80,045
Sampler/Assayer	4	60,912	243,648
Packing Operators	1	68,074	68,074
Mechanics	4	71,959	287,836
Salaried Personnel			
Mill Superintendent	1	163,800	163,800
Metallurgist	1	107,100	107,100
Shift Foreman	4	107,100	428,400
Process Technician	2	80,045	160,090
Instrument technician	2	80,045	160,090
Sub-total - Chemical	**41**		3,077,369
35% Burden			1,077,079
Leach and SX Plants with Burden			**4,154,448**

In summary, the project requires an investment of $236.4 million over a period of eight years for the processing facilities and process site infrastructure. In years 7 and 8, 67.6% percent of this investment is required in years 7 and 8 for the flotation and rare earth SX plants expansions and for the construction of a hydrometallurgical plant for Ta and Zr recovery. A ten million dollar allowance is made for the necessary expansion and modification of the rare earth solvent extraction plant at the years seven and eight to suit the feed from Lake Zone ore flotation.

The processing facilities and related infrastructures require $206.8 million a year to operate, of which 74.1% is the costs of chemicals. Leach and solvent extraction chemicals account for 68.3% and flotation reagents account for 5.7% of the operating cost.

19.9 Economic Analysis

19.9.1 *North T Financial Analysis on a Stand Alone Basis*

The Net Present Value (NPV) and Return on Investment (ROI) results for the North T Zone are summarized in Table 19.34.

Table 19.56 Financial Analysis Results North T

ROI	NPV @ 5%
20.6%	$47.5 million

These financial analyses do not include the costs of financing, Territorial royalties or taxes. The project specific 5.5% Net Smelter Royalty has been deducted as a cost in the financial analyses.

The financial analysis reports are presented in Appendix F.

19.9.2 *North T and Lake Zone Combined*

The addition of the Lake Zone to the project model, with mining and processing to follow the depletion of the North T, is represented in a financial analysis report also included in Appendix F.

The addition of the Lake Zone, which has a lower value per tonne and higher processing costs, does result in an increase in the NPV of the project. The ROI, which equates to the discount rate at which the NPV is zero, actually drops.

This model was first calculated over an 18 year mine life, and then extended to a 30 year mine life. At the current processing rate, the potential of the Lake Zone suggests an even longer life, but due to the nature of the calculations, later years do not produce a significant increase to the ROI or the discounted NPV. The constant dollar or 0% NPV does continue to increase by an equal amount with each year added as expected.

The results of these runs are summarized in Table 19.35.

Table 19.57 Financial Analysis Results North T and Lake Zone Combined

Case	ROI	NPV @ 5%
18 Year Life	17.9%	$66.1 million
30 Year Life	18.7%	$111.6 million

Table 19.36 summarizes the financial results of the escalation to 1,000 and 2,000 tonnes per year of Y+HREE output. The Mine life was remaining as the resource was not depleted.

Table 19.58 Financial Analysis Results North T and Lake Zone Combined at Escalated Outputs.

Case (tonnes/year)	ROI	NPV @ 5%
1,000	21.8%	$159.2 million
2,000	26.7%	$356.1 million

19.10 MINE LIFE

At the production rates used in this study, the North T Zone has an anticipated mine life of 5.9 years. Development of the Lake Zone would significantly extend the life of the project. Based on the resource extrapolation of this study, which were limited to the areas around existing drill holes, the mine life would be 34 years.

The Lake Zone drilling has not closed out the limits of this resource and it remains open to expansion with further drilling. Hence the potential exists for significant increases to the anticipated mine life.

The capacity of the flotation plant needs to be quadrupled in years seven and eight to handle the feed from Lake Zone mining operation. The capital costs of the flotation plant in two phase constructions are illustrated in Table 19.39.

Table 19.39 Costs of the Flotation Plant for Lake Zone Mining Rate of 858,000 Tonnes per Year

Flotation Plant Capital Costs (Direct)	Costs in Year 1 & 2 (CDN$)	Costs in Year 7 & 8 (CDN$)
Equipment	6,464,247	13,495,507
Installation labor	4,396,277	9,178,175
Concrete	563,904	1,177,272
Piping	1,793,543	3,744,407
Structural Steel	653,085	1,136,213
Instrumentation	420,767	878,441
Insulation	179,322	299,499
Electrical	751,873	1,569,696
Coatings &Sealants	78,614	164,123
Mill Building	925,751	1,932,705
Tailings Embankment	1,505,667	
Working Capital	1,848,657	
Permanent camp	1,063,677	288,454
Diesel power station	2,970,603	6,201,772
Fuel tank farm	495,100	1,033,629
Airstrip	250,000	250,000
Subtotal Direct	24,361,088	41,099,893
Indirect @ 30% of Direct	7,308,326	12,329,968
Contingency @ 25%	6,090,272	10,274,973
Total	**37,759,686**	**63,704,834**

The capital costs for the hydrometallurgical plant for recovery of zirconium and tantalum oxides from the flotation concentrate are shown in Table 19.40.

The operating costs of the processing facility are summarized in Table 19.41. The major operating costs come from the sodium hydroxide and hydrochloric acid used in the recovery of zirconium.

The reagent and consumable costs for the flotation plant and zirconium and tantalum recovery facility are shown in Table 19.42 to 19.45.

The staffing requirement and labour costs for the processing facilities are shown in Table 19.46.

20.0 INTERPRETATIONS AND CONCLUSIONS

Five areas must be addressed before Avalon's Thor Lake Project can be advanced to a pre-feasibility level of study. These concern resources, reserves and further exploration, metallurgy, markets, environmental concerns and data management.

20.1 RESOURCES AND RESERVES

Whereas resources have been defined in the North T and Lake Zones, there is considerable room to expand and upgrade the resources in the Lake Zone and possibly delineate a resource in the R Zone. Both of these zones remain largely untested.

The Lake Zone, to the extent that it has been drilled, shows areas of higher grade REE mineralization which could be expanded by stepout drilling. There are indications from the resource modeling of the Lake Zone that there may also be higher grade areas parallel to the strike of the T Zone and lying west of its projection under Thor Lake. Additionally, there is a relatively large, untested area in the south central part of the Lake Zone, which is proximal to several old drill holes containing elevated REE values. There also remain many broad areas of the Lake Zone in which drill hole spacing exceeds ½ km distances and these areas could be considered unexplored. For example, one such isolated hole in the northeast corner of the Lake Zone (88L-26) produced some of highest documented REE values found to date in the deposit.

Grades of Y+HREEs in surface samples from the R Zone are some of the highest encountered to date at Thor Lake. The one drill hole on this zone failed to intersect the zone, and may either indicate a lens-like nature to the zone similar to that of the S Zone, or that the hole was drilled down-dip in the footwall to the alteration. Historical resources for beryllium have also been generated for the South T deposit, which should be re-compiled in to a new computer database for audit and evaluation of additional opportunities.

All intersections that lie within the estimated pit shells should be sampled and analyzed for all economic elements. There are indications from some drill holes that there is mineralization present below the established zones. This should be investigated to establish the extent of the mineralization.

Bulk density measurements determined in 2006 are approximately 10% lower than the 3.02 g/cm^3 that was used historically. The 2006 information for the North T Zone was obtained from one drill hole. This should be expanded. New analytical standards should be produced from available historical samples especially for the rare earth elements to use in future analytical programs. Consideration should also be given to systematically collecting magnetic and radiometric data from the drill core.

A portion of the resources at Thor Lake have been categorized as Inferred. Due to the uncertainty of Inferred Mineral Resources it cannot be assumed that all or any part of this resource will be upgraded to an Indicated or Measured Resource as a result of continued exploration. To justify an upgrading of the mineral resource demonstrated economic viability is required.

20.2 METALLURGY

Efficient metallurgical processes for the concentration of phenacite from the North T Zone ores by froth flotation techniques were established by previous workers at Thor Lake. Downstream processes have also been developed for processing the concentrates into forms of beryllium that can be utilized for producing metal, alloys and ceramic. A flotation process for recovering bastnaesite from the F sub-zone is also well defined and exceeds performance of conventional beneficiation processes.

Results of historical process testwork for yttrium and the HREEs in the T Zone xenotime mineralization exhibited poor recoveries and concentration (60% recovery % and just 3.2 weight %Y_2O_3 concentrate grade). Initially the poor recoveries were attributed to the effects of conditioners used for phenacite flotation. Subsequent work attributed the poor recovery to sliming through overgrinding. More tests are required to investigate if xenotime can be recovered by magnetic or gravity methods prior to phenacite flotation.

Petrographic work since has shown that xenotime is closely associated with thorite a radioactive thorium oxide mineral. A process needs to be defined to efficiently separate and remove the thorite from xenotime concentrates to ensure marketability of the product. The metallurgical process developed for the Lake Zone should be tested on the North T ores to determine if it can produce a similar bulk concentrate of Y+REE.

Historical metallurgical process testwork on the Lake Zone ores was focused on tantalum recovery. Tantalum contained in columbite-tantalite frustrated early efforts due to its very fine grained nature. More recent work by Navigator in 2001 focused on the higher grade tantalum sub-zones where the tantalum appears to be predominantly hosted in fergusonite. Although preliminary in nature this work appears to have successfully concentrated the fergusonite indicating a potentially viable process for recovery of tantalum, zirconium and rare earths. Although Y+HREEs were not of interest at that time, their enrichment to a bulk concentrate and their subsequent amenability to hydro-metallurgical processing was demonstrated. This provides a starting point for further research work.

To assess the economics of the Thor Lake property, costs for the processing and infrastructure facilities were based on the development concept that the North T Zone will be mined first and the mining operation will transition to the Lake Zone after the ore in the North T Zone is exhausted. The mining rate assumed for the North T Zone is 215,000 tonnes per year while the mining rate for the Lake Zone will be increased to 429,000 tonnes per year.

The processing and infrastructure facilities at a capacity of 215,000 tonnes per year (to be used initially for the North T deposit) would require a capital investment of $68.0 million and operating costs are estimated at $69.59 per tonne of ore milled. The processing facilities for the Lake Zone are estimated to require an additional investment of $123.2 million over a period of eight years and the processing cost for the Lake Zone ore is estimated on a very preliminary basis at $134.75 per tonne milled. These cost estimates have lower confidence at this stage, as a process flowsheet and mineable reserve have not yet been defined for the Lake Zone.

Limited testing has been conducted on the Lake Zone samples and detailed testing work, especially hydrometallurgical leaching tests of the flotation concentrate is required for a more accurate assessment. Initiation of further metallurgical research on the Lake Zone should be balanced with indications of a mineable resource.

20.3 MARKETS

Rare metals are not large volume commodities and typically are marketed under contract by producers to end-users. Transactional prices are not always disclosed so determination of product values and market opportunities requires considerably more research than traditional base metal or precious metal commodities. As documented in the market research report obtained by Avalon from BCC Research (Sinton, 2006), the world market for TREO currently stands at just 100,000 metric tonnes per annum although this market is forecast to grow at the rate of 10% per annum year-over-year for the next five years as current markets expand and new markets are developed. REE demand is expected to increase because materials science technology is continually defining new commercial applications for these elements

Accordingly, whereas Avalon may have sufficient resources in place to achieve a high rate of production, overproduction of some of the potential secondary rare metals products could occur leading to stockpiling of inventory. If production rates are primarily driven by growing heavy rare earth markets, then it is evident that by-product phenacite production from the North T deposit would exceed current North American demand. Potentially the surplus phenacite production would have to be stockpiled with all attendant costs, if overseas markets are not identified.

The rare earth elements present an unusual marketing situation in that they always occur together and therefore must be co-produced in the proportions in which they occur in the mineral concentrate. Since market demand does not necessarily conveniently reflect the primary REE distribution, this means mining for one high-demand rare earth will create an oversupply of others that are in less demand.

The permanent magnet market, with its high demand for neodymium and certain other heavy rare earths such as dysprosium and terbium, has created just such a situation. Increased production of neodymium from light rare rich concentrates results in over-supply of the light rare earths cerium and lanthanum creating downward pressure on their prices. This situation has created new demand for REE mineral concentrates containing higher proportions of the specific rare earths used for magnets. The unusual distribution of rare earths in the fergusonite found in the Lake Zone appear to be well-suited to serve this new demand and therefore, if clean concentrates can be produced, there should be a ready market from magnet makers for most of the rare earths it contains, primarily neodymium, samarium, europium, gadolinium dysprosium and terbium.

Some of the other HREE's such as Ho, Tm, Yb and Lu have less demand at present, and consequently may have to be stock-piled. However, it is possible that because of their increased availabilities, their consumption might rise. In addition to availability, pricing must also be considered as a factor in the demand equation. Current high prices for some of the HREE's, because of their relative scarcity in light rare earth deposits, discourages increased use. Increased availability from a new source such as Thor Lake could bring prices down leading to an expansion of markets. Clearly, further dedicated market research is essential to evaluating development opportunities.

There are several other rare metal commodities that have been considered in the present modeling of Thor Lake. These include tantalum, niobium, zirconium, and gallium. Other mineral commodities include zircon, mica, and feldspar. Whereas niobium is seen to respond to metallurgical processing, its value, even if upgraded to ferro-niobium is low and it is not certain that it could be economically produced given current demand.

The bulk concentrate for the Lake Zone could produce chemical zirconia or zirconium metal, which have small markets in contrast to zircon, as an industrial mineral with application in refractories. At this time, it is uncertain if any zirconium product could be transported to markets competitively. The potential to produce a saleable gallium product from Thor Lake is unknown. Gallium occurs in sodium feldspar where it substitutes for aluminium. Gallium grades at Thor Lake, ranging up to 500ppm Ga on a whole rock basis, are amongst the highest documented globally. The size of the gallium resource at Thor Lake has yet to be quantified. No extractive metallurgical testwork has been conducted to determine if it can be economically-recovered, but such work should be considered, especially to evaluate the potential application of hydrometallurgical techniques.

20.4 ENVIRONMENTAL

Numerous baseline studies were conducted for Highwood in the past to identify any potential environmental concerns and this work was reviewed most recently by Jacques Whitford Environmental Ltd. in their letter report of October, 2003 with attendant recommendations.

In addition to drainage issues which could potentially result in a contamination of area waters, radioactivity in the mineralization and potential health hazards from beryllium processing represent the most significant environmental concerns.

A study commissioned by Highwood concluded that workers at a Thor Lake minesite would receive radiation doses well below average dose limits for radiation workers and within the guidelines for Naturally Occurring Radioactive Materials (NORMs). The procedures and processes anticipated during mining or concentrate production at Thor Lake were also designed to minimize radiation doses to workers and the release of effluents containing elevated radionucleides to the environment.

Beryllium health issues have never been identified with the mining of beryllium minerals; species of which include the gemstones emerald, aquamarine, chrysoberyl, and morganite. The health hazards arise from exposure to fine dust forms generated during processing of mineral concentrates to their chemical derivative forms.

The current development plan only contemplates recovery of beryllium mineral concentrate for sale to established beryllium processors. Unlike the development scenario previously proposed by Highwood Resources, processing of beryllium minerals into their hazardous chemical forms will not be undertaken at Thor Lake.

In the past, jurisdictional responsibility over certain lands, resources and water use had been governed by the Department of Indian Affairs and Northern Development (DIAND), Canada. Under the recently-enacted Mackenzie Valley Land and Water Resources Act and Regulations, the Mackenzie Valley Land and Water Board (MVLWB), rather than the federal government, now administers land use permits. The Mackenzie Valley Resource Management Act (MVRMA) allows more local and particularly aboriginal community input into land and water use permitting. The MVMRA establishes a three-part environmental assessment process:

- Preliminary screening.
- Environmental assessment.
- Environmental impact review (panel review).

The Thor Lake Project will probably require environmental assessment as well as an environmental impact review.

Other considerations are:

- Permitting will be required to obtain water for processing and other uses.
- Fuel storage permits will be required.
- A permit to dispose of mine waste and process tailings. Given that this is an oxide orebody the risk of acid mine drainage is minimal, but confirmation testing will be required.
- A closure plan and bond posting will be needed (but costs can be reduced by maintaining stage-wise rehabilitation)

Regular consultation with local community leaders and the permitting agencies should be carried out throughout the exploration and development process to keep key decision makers well-informed and involved as the project advances.

Although no site selection has been made for a process plant for the rare earths, ongoing work for the Thor Lake project should recognize a need for environmental permitting issues that will need to be considered at such a site.

20.5 DATA MANAGEMENT

During the importing of historic assays into an Excel database no distinction was made between trace values and unsampled core. Unsampled core intervals were assigned a zero grade. The assay certificates from drill core assays date from 1977 through to 2006. They have been generated by a number of different laboratories and the reporting of values on the certificates varies from laboratory to laboratory and is also dependent on the method used for analysis. Initial exploration concentrated on BeO, Y_2O_3, Ce_2O_3, Ta_2O_5 and ZrO_2.

In order to improve the database and to find out which sections of the drill holes have been sampled, Wardrop recommends that the data from the original assay certificates be put into recognized database software, preferably one that has been designed for assays or exploration such as *acQuire®* and *Datashed®*. A double entry system is recommended. Completion of this process would give Avalon an indication of what should be re-analyzed and for which particular elements.

During the importation of North T drill holes, it was noted that there are 12 fewer drill holes in the MineSight© database than there were reported by Currie (2004). The authors believe that the twinned holes were removed from the MineSight© database. In order to resolve this issue it is further recommended that the drill logs should be re-entered into a secure database. Adding additional information such as core size and recovery would permit the development of a more robust model.

In general, all the historical data from Thor Lake needs to be properly archived and stored in a computer database to facilitate future retrieval and use in resource estimates.

21.0 RECOMMENDATIONS

21.1 RESOURCES AND RESERVES

Prior to any further economic evaluation of the property, it is recommended that the entire drill hole and analytical database be reconstructed from primary data sources. A double entry procedure is recommended.

All intersections that lie within the estimated pit for the North T deposit should be sampled and analyzed for all economic elements. There are indications from some drill holes that there is mineralization present below the established zones in the North T deposit. This should be investigated to establish the extent of the mineralization.

The Lake Zone deposit requires extensive further drilling to define the higher grade (fergusonite-rich) REE sub-zones and upgrade a portion of existing resources from inferred to Indicated. At this time, a minimum of 3500 m of drilling in 20-30 holes is recommended to delineate the prospective area south of Thor Lake, in the SW part of the deposit. A minimum of 100 m hole spacings is recommended to define indicated REE resources.

A second phase program is recommended for the winter to test targets under the lake such as the area around hole 88L-26 and follow-up on areas of interest defined from the first phase program south of the lake. This would ideally involve another 25-35 holes totalling approximately 4000 m.

It is further recommended that the large diameter core be drilled (either NQ or HQ) to obtain sufficient material for conducting metallurgical testwork.

Historic resource estimates have been carried out on the South T Zone and the South T drill holes have been preserved digitally in MineSight©. There are no indications of digital outlines in the supplied data. On completion of the new database, a current mineral resource estimate should be carried out for this zone.

Adjacent to the South T deposit there are two little drilled rare earth occurrences; the R and S Zones. These deserve further drilling in view of the high yttrium and REE values recorded from both recent and historical grab samples.

During the course of further drilling, consideration should be given to condemnation drilling while a drill is onsite and geotechnical and RQD data should be systematically collected for all holes.

21.2 MINING

The financial analyses of operations at Thor Lake made assumptions regarding the safe pit slope angles and dewatering requirements. It is recommended that geotechnical studies be conducted to evaluate these two factors in greater detail and determine appropriate criteria. Future core-logging should also include systematic collection of RQD data for pit engineering purposes.

21.3 METALLURGY

Wardrop recommends the following testwork to update and better define the extractive metallurgy to be applied to recover rare earths and other potential rare metal products from the property.

- Testing a representative North T Zone sample to obtain separate beryllium, REE and yttrium concentrates.
- Testing a representative Lake Zone sample for a better concentrate grade and for a separate zircon concentrate to improve the flexibility of the project on down stream processing and marketing requirements.
- Systematic hydrometallurgical testing on the flotation concentrate of Lake Zone to develop a suitable and economic flow sheet for the concentrate.
- A comprehensive crushability, grindability, SAG Power Index (SPI) and abrasion test program for understanding of the distribution of the grindability in the North T and Lake Zones for selection of a suitable grinding circuit using a Comminution Economic Evaluation Test (CEET).
- The following tests are required in a pre-feasibility study for correct sizing of equipment and ore storages: Bulk density, angle of repose and angle of discharge of fine crushed ore and final concentrates, concentrate settling, filtration, drying and hygroscopic tests, rheology tests for potential slurry pump feeds (grinding discharge, concentrates and tailings).

Wardrop also recommends the following testing program to improve the metallurgical performance and therefore the economics of the project.

- A testing program to investigate sulphonation roasting of the flotation concentrates, which is less expensive relative to sodium hydroxide cracking and is the common approach in Chinese rare earth processing facilities.
- A testing program on the North T Zone samples to produce a REE concentrate by magnetic or gravity separation first at a coarser grind followed by regrinding and flotation of beryllium. The fine grinding required by beryllium flotation resulted in sliming of the rare earth minerals, especially the sliming of yttrium minerals.

21.4 MARKETS

There is significant possible value to potential by-products from Thor Lake. Some data are available for some of these, for example zircon. Market analyses are available on a commercial basis and it is recommended that appropriate studies be purchased. Where little or no data are available, contractors could be retained for further and in depth analyses for example, for gallium.

21.5 ENVIRONMENTAL STUDIES

Environmental Study recommendations have been made by Avalon's consultant Jacques Whitford in going forward with developments at Thor Lake and permitting issues regarding development are also being addressed. Because of their experience with other northern developments, the consultant is also guiding Avalon through the process of community consultation.

This relationship should be maintained and Jacques Whitford should be consulted where appropriate in metallurgical and effluent analysis, sequestration of hazardous materials, toxicological studies and drilling for geotechnical purposes.

21.6 DATA MANAGEMENT

Software for historic data entry and future work have been described and recommended above. Hardware, at least for fieldwork and field data input will need to be acquired. It will also be necessary to provide a communication system at Thor Lake for handling of e-mail, digital information, facsimile and voice transmission, at least for short term application and may require significant upgrade with further development of the property.

21.7 FINANCIAL ANALYSIS

Further research is required into the markets for rare earth elements in terms of future demand and pricing as markets are evolving rapidly and forecasting the economics of the project is reliant on reasonably accurate market information. A number of scenarios should be considered in this evaluation.

It is also recognized that production of one commodity from Thor Lake may result in an oversupply in other commodities. Further analysis of markets is recommended to optimize economic returns by applying sensitivity analyses to what might be considered a driving commodity.

The financial analysis for the North T Zone did not include zirconium or gallium. It is recommended that the potential for recovery of other possible rare metals products be further evaluated, particularly gallium which is contained in feldspars of the Wall Zone that is presently being treated as a waste material. Similarly, the value of gallium was not used in any of the modelling of the Lake Zone where it is also documented to occur.

The financial modelling operations at Thor Lake presumed campaign and contract mining. At larger scales of operation modelling should analyze mining capital and operating costs by Avalon.

21.8 Budget For Recommended Program at Thor Lake

The recommendations above need to be addressed as the Thor Lake Project advances. A two phase work program and budget for this work includes:

1. Drilling for the purpose of increasing and delineating higher grade REE resources in the Lake Zone and in a second phase of work, test other areas including potential extensions of the T deposits and the R and S Zones.
2. Development of mineral beneficiation and refining processes for the REE's in fergusonite in the Lake Zone, xenotime in the North T deposit, gallium in the wall zones and tantalum, niobium and zirconium in all zones in all of the zones.
3. Markets for the various possible commodities from Thor Lake have been reviewed and are seen to be undergoing rapid changes in sources of supply, pricing and end use Markets will require more rigorous definitions for specification of the commodities and demonstration material will need to be produced during the metallurgical work.
4. Historical environmental work has been reviewed and the budget includes monies to fund recommendations made by consultants for upgrading to current requirements.
5. Organization and upgrading all of the existing data into a comprehensive electronic database compatible with data to be newly acquired are funded.
6. During the course of the above work, monies are also budgeted for the purpose of community consultation and establishing working relations and agreements with First Nations communities.

Wardrop recommends that the work be conducted in two phases with the second phase being contingent upon a successful Phase 1 program and drill testing in the second phase to be conducted on the ice cover over Thor Lake. The Phase 2 program also includes test drilling of the R and S Zones and large diameter core (PQ) drilling of the T Zone for metallurgical testwork sampling and rock mechanic studies.

The budget required to accomplish these main objectives is shown in Table 21.1

Figure 21.1 Thor Lake Budget

Item	Amount
Phase 1	
Diamond Drilling 3,000 m @ 200/m all in	$600,000
Camp, Office Equipment	$70,000
Metallurgical Research, Mineralogical & Market Studies	$100,000
Environmental Program	$50,000
Community Consultation	$50,000
Data Archiving and Compilation	$100,000
Management and Supervision	$60,000
Contingency	$103,000
Sub-total	**$1,133,000**
Phase 2 (contingent on positive results from Phase 1 program)	
Diamond Drilling 4500m @ 200/m all in	$900,000
Metallurgical Testing	$200,000
Engineering and Feasibility Study	$300,000
Community Consultation	$50,000
Environmental Program	$50,000
Market Research	$100,000
Management and Supervision	$80,000
Contingency	$180,000
Sub-total	**$1,860,000**
Grand Total (Phase 1 and Phase 2)	**$2,993,000**

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23.0 STATEMENT OF QUALIFIED PERSONS

23.1 STATEMENT OF QUALIFICATIONS FOR KEVIN PALMER

I, Kevin Palmer, of Nanaimo, British Columbia do hereby certify that as one of the authors of this Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT, dated June 15th, 2007, I hereby make the following statements:

- At the date this report was prepared I was a Senior Geologist with Wardrop Engineering Inc. with a business address at 55 West Hastings Street, Vancouver, British Columbia, V6B 1M1.
- I am a graduate of the University of the Witwatersrand, Johannesburg, South Africa (B.Sc. (Honours) Geology, 1984).
- I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (License #30020).
- I am a member in good standing of The South African Council for Natural Scientific Professions (4000320/04).
- I have practiced my profession continuously since graduation.
- I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.
- My relevant experience with respect to this report includes over 21 years in both exploration, mining geology and grade estimation in Canada and southern Africa. Over the last three years I have carried out mineral resource estimates following CIM guidelines on a number of projects including the Great Western Minerals, Hoidas Lake REE project.
- I am responsible for the preparation of portions of section 1.0 and all of sections 2.0 to 15.0, 17.0, 20.1, 20.5, 21.1 and 21.6 of this report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- As of the date of this Certificate, to my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
- I am independent of the Issuer as defined by Section 1.4 of the Instrument.

- I have read National Instrument 43-101 and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

Signed and dated this 15th day of June, 2007 at Vancouver, British Columbia.

"Original Document, Revision 03, signed and sealed by Kevin Palmer, P.Geo."

Signature

23.2 STATEMENT OF QUALIFICATIONS FOR PAUL R. FRANKLIN

I, Paul R. Franklin, of Saskatoon, Saskatchewan do hereby certify that as the author of this Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT, dated June 15th, 2007, I hereby make the following statements:

- I am a Professional Engineer with Wardrop Engineering Inc. with a business address at 1400-410 22nd Street East, Saskatoon, Saskatchewan, S7K 5T6.
- I am a graduate of the University of Saskatchewan, (Bachelor of Engineering, 1974).
- I am a member in good standing of the Association of Professional Engineers and Geoscientists of Saskatchewan (License #4998).
- I have practiced my profession for 20 years.
- I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.
- My relevant experience with respect to this report includes the Pinehouse Limestone Pre-feasibility Study, 2005, the Box Mine Feasibility Study, 1995, the Cameco Corporation - Nine years completing Preliminary Economic Assessments, Pre-feasibility Studies and Feasibility Studies, the Ultimate pit design Rabbit Lake Mine, 1977, the Ultimate pit design Redman No. 3 Mine, 1975.
- I am responsible for the preparation of portions of section 1.0 and all of sections 19.1, 19.2, 19.7, 19.9, 19.10, 21.2, and 21.7 of this report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- As of the date of this Certificate, to my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
- I am independent of the Issuer as defined by Section 1.4 of the Instrument.
- I have read National Instrument 43-101 and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

Signed and dated this 15th day of June, 2007 at Saskatoon, Saskatchewan.

"Original Document, Revision 03, signed and sealed by Paul Franklin, P.Eng."

Signature

23.3 STATEMENT OF QUALIFICATIONS FOR PETER BROAD

I, Peter Broad, of London, Ontario do hereby certify that as one of the authors of this Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT, dated June 15th, 2007, I hereby make the following statements:

- I am a Senior Metallurgical Engineer/Metallurgist with Wardrop Engineering Inc with a business address at 604-330 Bay Street, Toronto, Ontario, M5H 2S8.
- I am a graduate of The Victoria University of Manchester, United Kingdom (B.Sc. (Honours) Metallurgy, 1969).
- I am a member in good standing of the Association of Professional Engineers of Ontario (License #90344227).
- I have practiced my profession continuously since graduation.
- I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.
- My relevant experience with respect to this report includes the flotation recovery of metallic ores, the hydrometallurgy of leaching metallic oxides, to extract pure metals, and the environmental issues necessary to avoid untreated waste from entering the local water systems. This experience comes from 30 years of process knowledge, and honed as a licensed professional in Northern Canada for the past 20 years.
- I am responsible for the preparation of portions of section 1.0 and all of sections 16.0, 19.3 to 19.6, 19.8, 20.2 to 20.4 and 21.3 to 21.5 of this report titled "Preliminary Economic Assessment on the Thor Lake Rare Metals Project, NWT", dated June 15th, 2007.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- As of the date of this Certificate, to my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
- I am independent of the Issuer as defined by Section 1.4 of the Instrument.
- I have read National Instrument 43-101 and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

Signed and dated this 15th day of June, 2007 at Toronto, Ontario.

"Original Document, Revision 03, signed and sealed by Peter Broad, P.Eng."

Signature

END