

GOLD CLAIM AT STURGEON LAKE

Professors Peter C. Bell and Greg Zaric wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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OVERVIEW¹

In February 2009, Andrew McKendry, a freelance geologist, was asked by his friend Grant Murphy for advice regarding two mining claims for his Sturgeon Lake property, near Thunder Bay, Ontario. Murphy wanted to know what he should do with these claims; specifically, whether there was enough gold on the property to pursue an economically feasible mining opportunity.

THE CLAIMS

The claims in question had been held in Murphy's father-in-law's family for decades, and there was limited information available about the property, except for a few old area maps and reports. Murphy's interest in developing the claims had been piqued by recent mining activity around nearby King Bay, located in the southern area of Sturgeon Lake. Conquest Resources Ltd. had begun a drilling program in January 2006, and a press release cited promising assays ranging from 0.96 to 15.2 ounces of gold per tonne of ore. Despite significant uncertainty surrounding figures for the claims, McKendry thought an analytical approach might be appropriate to assess the multiple factors he would need to consider in helping Murphy to arrive at a decision about whether or not to proceed with the mining operation at Sturgeon Lake.

MINING IN NORTHERN ONTARIO

Toronto-based Conquest Resources Ltd. was one of many companies with interests in Northern Ontario gold-mining operations. The King Bay development was situated in an area of heavy mining activity, with adjacent exploration and extraction projects being undertaken by Placer Dome and Goldcorp (see Exhibit 1). Northern Ontario was well known for having some of the richest gold mines in the world, producing over 80 tons of gold annually, which represented 60 per cent of Canada's total. Historically, discoveries and development throughout the 1900s caused significant booms to area economies. For example, after

¹ The authors gratefully acknowledge the help of Tom Rannelli in preparing this case.

gold was discovered in Red Lake in 1926, the local airport had become the world's busiest just 10 years later. Although interest in the area had waned since the 1980s, surging gold prices, combined with advances in prospecting with computerized seismograph technologies, had renewed interest in exploring the area.

INDUSTRY OVERVIEW

As a precious metal, gold was valued for its use in a wide variety of applications, ranging from semiconductor circuitry to jewelry. Since 1968, when gold was first subject to open markets, its price has varied considerably from a high of over US\$850 per ounce in 1980 to a low of US\$253 per ounce in 1999. In recent years, however, the price of gold had risen dramatically, reaching highs of US\$1,011 per ounce in 2008. Exhibit 2 shows historical gold prices.

Because prices fluctuated heavily, and many companies chose to focus solely on gold exploration and extraction, hedging was a popular method to smooth cash flows and reduce risk exposure to market prices. However, some companies such as Goldcorp avoided hedging, electing to remain exposed to both more upside and downside associated with fluctuations in the gold market. Regardless of hedging practices, the capital-intensive and long-term nature of mining operations tended to favour large, multinational companies. Representative of this size was Canada-based Barrick, the world's largest gold mining company with a 2005 net income of US\$401 million on sales of US\$2.35 billion. Barrick acquired sixth-largest Placer Dome in January 2006.

VALUING THE CLAIMS

The volume and quality of the property's gold vein could be estimated by using data on the vein's length, width, depth and grade. Where data on the target property were unavailable, inferences could be made by using estimates based on measurements from surrounding properties (see Exhibits 3 and 4). While there was considerable uncertainty in estimating the dimensions and grade of the vein, a simple formula described its value:

$$\text{Value} = (\text{gold in oz.}) \times (\text{price/oz.})$$

where the amount of gold in ounces was estimated as

$$\begin{aligned} &(\text{gold in ounces}) \\ &= (\text{Volume in ft.}^3) \times .0283\text{m}^3/\text{ft.}^3 \times (\text{Specific Gravity in MT/m}^3) \times (\text{Grade in oz./ST}) \times 1.1 \text{ ST/MT} \end{aligned}$$

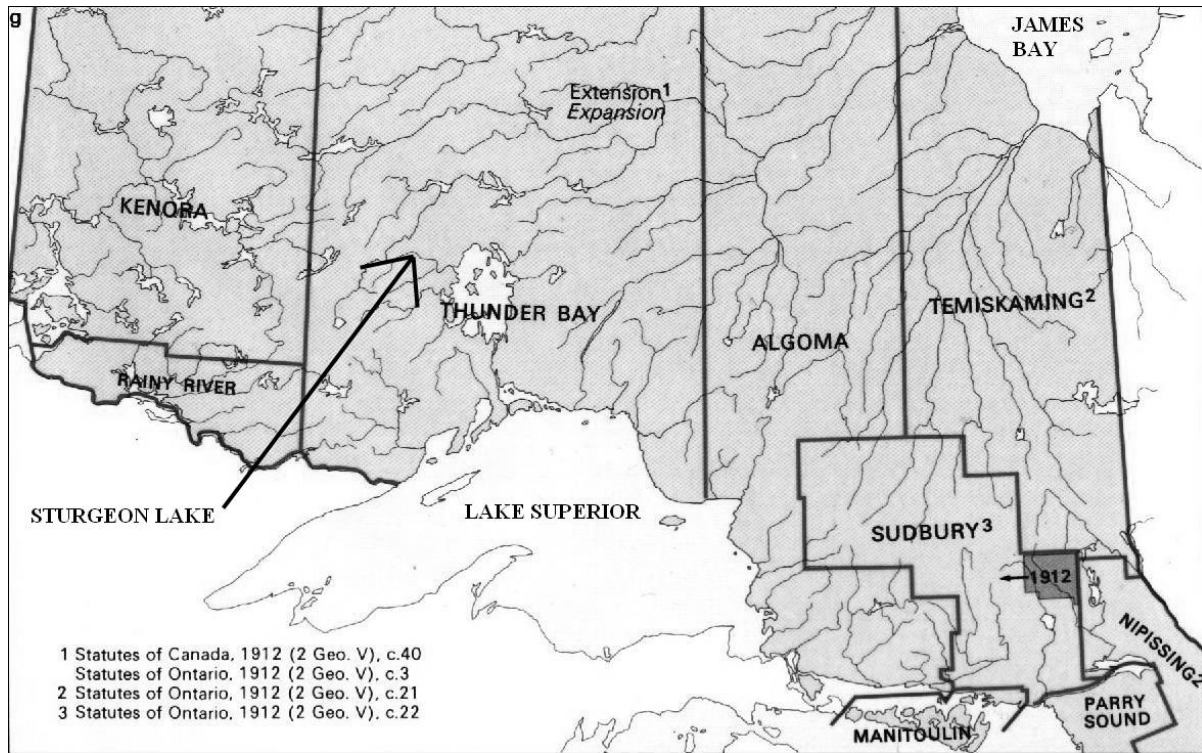
In the above equation, "Volume" is the volume of the vein, given by volume = length × width × depth; "Grade" was a measure of the gold quantity expected in the vein, in ounces (oz.) per short ton (ST); and "Specific gravity" was a measure of the gold's elemental density, ranging from 3.40 to 4.80 metric tonnes (MT) of gold per cubic metre. The constants .0283 and 1.1 were required to convert between cubic feet and cubic metres, and between short tons (ST) and metric tonnes (MT), respectively.

DEVELOPMENT COSTS

As yet, Murphy had not spent any money developing the claims. Prior to mining the property Murphy would need to build a permanent road and conduct an exploratory diamond drilling operation. Exploratory drilling is called “diamond drilling” because it uses a diamond (or synthetic diamond) drill bit on a hollow drill pipe to extract a solid cylinder sample of the rock core. Exploratory drilling could be a success or a failure, but if it was a success it would determine the overall location and shape of the gold vein, as well as the grade of gold within the vein. Failure would indicate that the gold vein was in a position where it could not be reached economically. To access the property for diamond drilling, Murphy could use a temporary ice road or he could first build a permanent road. If Murphy ultimately decides to develop the mine, a permanent road would be required to make the site accessible to commercial mining equipment. It may not be possible to build a permanent road because of topographical considerations that would make road construction impossible. If building a road was possible, then Murphy estimated that it would take approximately one year to build a suitable permanent road.

There was considerable uncertainty surrounding costs for diamond drilling and for building a permanent road (see Exhibit 5). Murphy wondered whether he should build a permanent road before doing the diamond drilling so that he could begin commercial operations immediately if the diamond drilling was a success or if he should use an ice road for the exploratory drilling. If the gold vein is economically accessible and with the permanent road in place, Murphy could begin mining the property, which would physically extract ore from the site. Murphy assumed that it would take 10 years to extract all the gold from the site and that the total amount of gold in the mine would be extracted at an even rate over the 10-year period. Mining was assumed to cost \$30 per ounce. Murphy used a discount rate of 20 per cent before taxes when evaluating projects.

EXHIBIT 1: MAP OF NORTHERN ONTARIO



Source: Company files.

EXHIBIT 2: HISTORICAL GOLD PRICES

	Yearly	Yearly	Yearly
Year	Low†	High†	Average‡
1980	474	850	613
1981	391	599	460
1982	297	489	376
1983	374	512	424
1984	303	407	360
1985	284	341	317
1986	326	443	368
1987	390	503	446
1988	389	485	437
1989	359	417	381
1990	346	424	384
1991	344	403	362
1992	330	360	344
1993	326	407	360
1994	370	398	384
1995	372	397	384
1996	367	416	388
1997	283	368	331
1998	273	315	294
1999	253	324	279
2000	264	326	279
2001	257	291	271
2002	278	343	310
2003	320	417	363
2004	375	454	410
2005	411	537	445
2006	525	725	603
2007	608	841	695
2008	713	1011	872

† Source: www.onlygold.com.‡ Source: www.kitco.com.

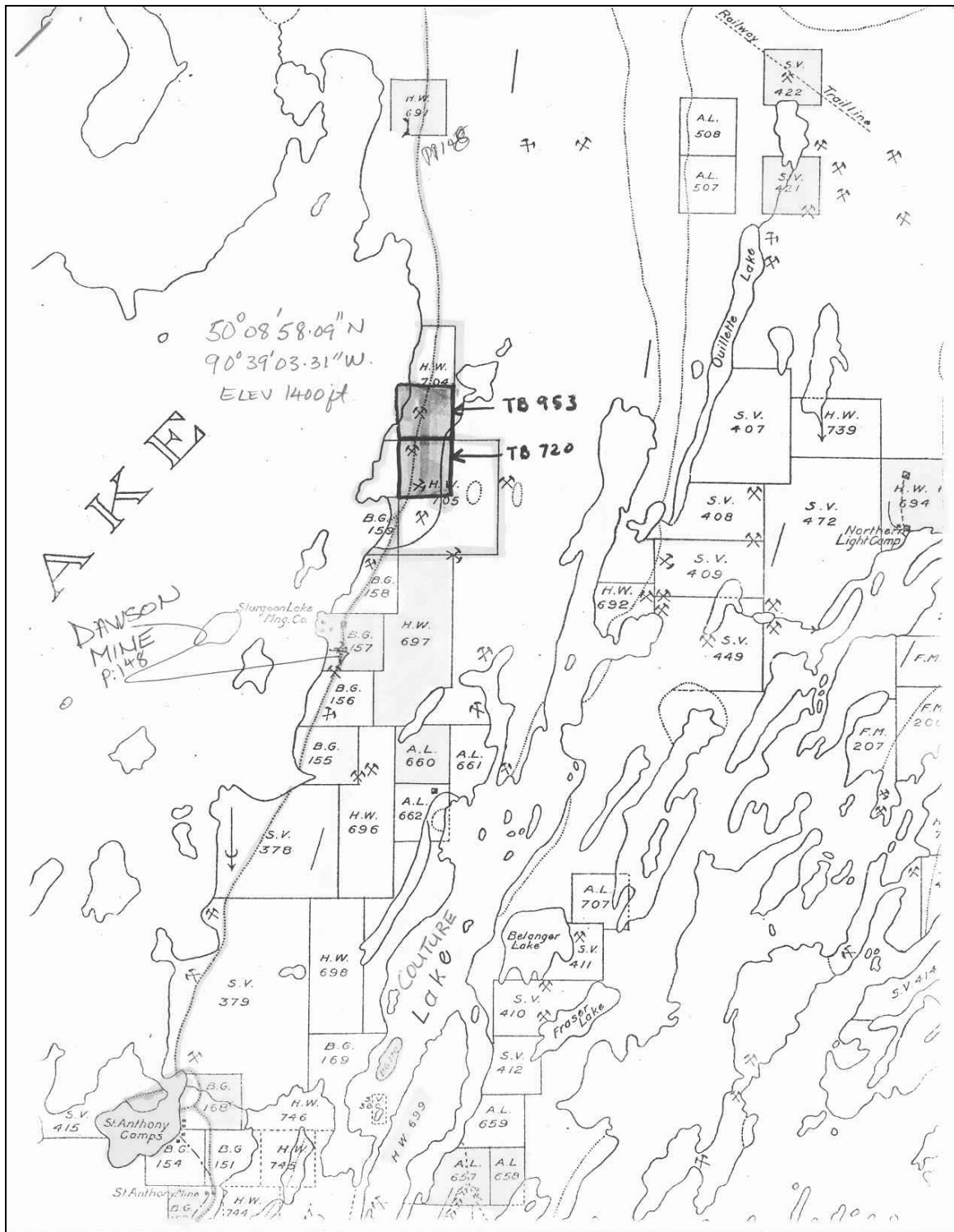
EXHIBIT 3: MEASUREMENT DETAIL FOR TARGET PROPERTY AND SURROUNDING LAND PLOTS

Property	Width		Depth		Length		Grade	
	Min	Max	Min	Max	Min	Max	Min	Max
Target Property			36	53			0.83	1.77
Similar Properties Near the Target Property								
AL 367, AL 368			60	100				
Conquest Resources, King Bay Project							0.11	16.75
BG 136								
AL 499			20	30				
BG 139,BG 138			15	22				
AL 497	8	10	9	21	40	60	0.22	0.41
BG 151, 152, 154, 168	10	25	34	46	270	330		
BG 151, 152, 154, 168			88	112			3.14	5.83
BG 151, 152, 154, 168			88	112			0.44	0.82
BG 157	5	6	0	10	60	80		
HW704			42	54				
HW 691			47	60	15	20		
HW 697	10	20						
HW 699							1.93	3.58
AL 656, AL 657	7	9	70	80				
AL662	2	3	14	26				
SV 421	3	10	0	13	10	20		
SV 422	8	14						
AL 701	0	2	19	31				
P.7	0	2	22	73				
Ruby Property			4	30				
TB 953, TB 720	6	8					0.02	2.05
HW 704	10	20	24	36			0.63	1.17

Width, Depth and Length figures are in linear feet.
Grade is in ounces per short ton.

Source: These figures had been estimated by compiling data, mostly from the 1911 report “20th annual report of the Bureau of Mines—Ontario.” Some minima and maxima came directly from the report, and others were estimated with help from report data. The grade figures, appearing above in ounces per short ton, were converted from the report’s original units of dollars per tonne at a price of \$18.95 (which was the average price of gold from 1890 to 1911, with a standard deviation of \$0.0225).

EXHIBIT 4: MINING CLAIMS WITH DATA



Source: Company files.

EXHIBIT 5: DEVELOPMENT COST ESTIMATES FOR STURGEON LAKE CLAIMS

Step	Estimate	+/- Range	Cost Estimate	+/- Range	Probability of Success	+/- Range
Permanent Access Road	5 km	50%	\$10,000/km	40%	70%	30%
Diamond Drilling	5000 m	50%	\$30/m	30%	80%	60%

Source: Company files.