Diamond

Diamond is found all over the world. Australia, Botswana, Russia, South Africa, Angola, Namibia, Brazil, Central African Republic, and Ghana are all major sources of diamond. The newest source that will be a major player in the industry is closer to home; approximately two hundred miles north of Yellowknife in Canada's Northwest Territories. Beneath this barren land a dedicated geologist, Charles Fipke, discovered a huge diamond field. After continuing a search that spanned over a decade and nearly going bankrupt Charles dedication was rewarded by a major discovery that had even eluded DeBeers. His find triggered a massive staking rush that was even greater than the gold rush of the Klondike days. Optimistic prospectors soon claimed an area roughly the size of Texas based on closeology. The Ekati mine was the first but many others will follow; approximately five years later Aber Resources opened the second Canadian mine and went into production.

Unlike other gem materials, diamond is formed in a transitional zone at the base of the Earth' crust and the beginning of the mantle. This area is known as the Mohorovicic discontinuity or Moho. Under very high pressure and extreme temperature, pure carbon crystallizes into diamond. The growth rate of a crystal varies depending on temperature and pressure. Provided the conditions are stable a gem can remain hundreds of miles beneath the surface for years (GIA – Course Book Reference). When surrounded by volatile magma this material is forced up the pipe through tiny cracks in the earths' surface; different gases and water act an as coolant while it rises. This action keeps temperatures low and prevents the diamond from turning to graphite as it passes through the earths' different layers. Because the magma cools as it nears the surface it does not burst out of the earth but instead slowly mounds up into a volcano-like shape. These primary deposits solidify and cool, but the Kimberlite itself is weakened over the years by erosion. Diamond bearing material can be carried to nearby riverbeds where it can collect in pockets and/or behind large boulders. Rivers with a strong current may even carry material out to sea. When India and Brazil were the main sources for diamond the majority of the rough was collected from river gravel (Gemstones – Cathy Hall).

There are many common inclusions that occur in diamond. Crystal inclusions, feathers, pinpoints, and clouds are all typical (Diamond Ring Buying Guide – Renee Newman). In most cases structural phenomena does not affect the final clarity grade of a diamond; however in cases where the phenomena is discolored it is possible for it to be viewed as an inclusion, and as a result lower the clarity grade. Unfortunately as in other gemstones it is not possible to denote origin based on inclusions and/or natural characteristics. I imagine this is an aspect someone will doggedly pursue until they are successful (or run out of money). In the meantime, consider yourself lucky if you see a Garnet inclusion, as they are very rare. Different qualities of rough are found all over the world. Surprisingly the average material coming from the Ekati mine near Yellowknife is VS2 G. With such high-grade material available, most of which is inert, a great deal of interest has been generated in Canadian diamonds.

For many years attempts have been made to change or enhance the appearance of diamond. There are treatments to improve both color and clarity. Irradiation creates a disruption in the crystal lattice, which causes a color change. Different types of diamond lend themselves uniquely to producing a varying range of color. The different results are due to different trace elements that dictate what the color change will be. The results are listed below:

Type 1A > Yellow to Amber color

Type 1B > Brownish Red to Brownish Purple

Type 11A > Intense Blue

Type 11B > Intense Blue-Green

Currently there are two methods being utilized to enhance the clarity of diamond. The older of the two is Laser Drilling. This method is best utilized when a diamond is reasonably clean, with the exception of one or two obvious inclusions. A microscopic laser beam drills into the diamond burning out the inclusion. If that doesn't substantially reduce the appearance of the inclusion, it will then be bleached out or chemically dissolved by sulphuric acid and saltpeter. To fill voids left by the laser beam, a highly refractive wax or synthetic resin is poured into the channel and sealed. This also prevents a build-up of dirt and oil within the diamond. The newer method, developed in September 1987, is better suited to diamond with large fractures and/or surface reaching inclusions. Under high temperature in a vacuum-like atmosphere a highly refractive liquid is forced into the cracks filling the inclusion(s). This process makes them transparent and far less noticeable. Spotting this kind of treatment is very easy when one knows what to look for; the flash effect. Light refracting off of this liquid produces a rainbow-like iridescence. So when tilting the diamond to catch the light one can see, under ten-power magnification, this telltale sign very easily. The four C's decide the value of a diamond (Gemstones of the World – Walter Shumann). The four C's of course are color, clarity, cut, and carat. While clarity and color have a big impact on the value of a diamond, the most important factor is the quality of the cut. With any shape a good make is important, but this is especially true for round brilliants. One must start with a piece of rough that is two to three times larger than the finished weight. This enables the cutter to achieve proper angles and proportions for ideal light reflection and refraction. When one compares a very well cut stone to a swindled one it is obvious how sacrificing the cut of a diamond affects the brilliance and overall look of the gem. If cut to ideal proportions, it is very apparent how much more brilliant a diamond is; in fact, this even partially helps to camouflage the color slightly because of the greater amount of light that is returned to the eye. Two other contributing factors to value are size and supply. When dealing with larger premiere pieces the value can be increased purely by demand when it outweighs supply.

Diamond is not used as a simulant for anything, but many materials are used to simulate diamond. Some simulants are gemstones themselves, however they are not as highly regarded as diamond. Synthetic White Sapphire, Zircon, Spinel, glass, Y.A.G. – Yttrium Aluminum Garnet, G.G.G. – Gadolinium Gallium Garnet, C.Z. – Cubic Zirconia, Strontium Titanate and Moissonite are all used as diamond simulants; some more commonly than others. Each simulant has its own characteristics that makes it a suitable alternative; unfortunately these traits are also usually dead-giveaways to its true identity. Zircon, Synthetic White Sapphire, and Moissonite are all doubly refractive. More than likely a glass simulant will have gas bubbles in it. Cubic Zirconia and Strontium Titanate both have significantly higher dispersion rates than diamond. Y.A.G. and G.G.G. are good examples of the read through effect. With those facts in mind it becomes impossible to mistake one of these materials for diamond when conducting investigative gemological tests.

Companies in many countries commonly synthesize diamond for different purposes. The technique used differs depending on the intended use for the end product. Japan, the U.S.S.R. and the People's Republic of China are only able to produce industrial grade grit-sized material. General Electric, Sumitomo Industries and even DeBeers have produced larger material. Fortunately G.E. and Sumitomo's processes are too costly to make their material commercially available and DeBeers production is for research only.

Over time the diamond market has changed. During recent years people's views of diamonds have shifted. When informed of situations in South Africa, of child labor horror stories and trade involving weapons and ammunition which are then utilized by rebels to create civil unrest, the conscientious consumer does not want to purchase these 'conflict diamonds' and support such violent behavior. Unfortunately this practice was brought very close to home and reinforced with the September 11th attacks. Many people were outraged when it was made known that Osama Bin Laden used diamonds as his primary capital because they are easily transported and very difficult to trace. When giving a piece of diamond jewelry people associated this token with love not blood. Now there is a choice. Diamonds mined and superbly cut in Canada under realistic working conditions where there are proper labor laws in place to protect the general workforce now offer an alternative and fill a void in the market. People can feel good about their purchase(s) knowing they are providing well-educated adults with careers which supporting the local economy. This is the beginning of a bright future for the Canadian diamond industry and a wake-up call for all others. On January 1, 2003, the Kimberley Process Certification program for international trade in rough diamonds was implemented. This is a step in the right direction with more work to follow. Through all of this touted as the most enduring symbol of love, by DeBeers, diamonds still appear to be a girl's best friend.

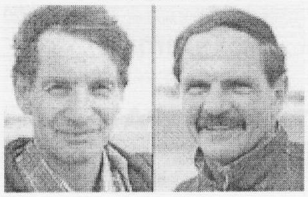
Kristen Lewis

Canadian Diamond Timeline

1991

Fall

> Charles Fipke and Stewart Blusson source out a rich diamond field near Point Lake N.W.T.



1993

Fall

> Broken Hill Proprietary – now BHP Billiton - opens an office in Yellowknife as well as Koala Camp north of Lac de Gras.
> A Diavik project office is established in Yellowknife by Aber Resources Ltd. And Kennecott Canada Exploration.

1996

> Aber Resources Ltd. And Winspear Resources Ltd. Discover the Snap Lake diamond deposit.

Fall

> The BHP project is given final approval by:
-Northern Development
-Premier of the Northwest Territories
-The Minister of the Development of Indian Affairs

> The Northwest Territories Government gives it full support to the project.

Winter

>The Head Office of Diavik Diamond Mines is opened in Yellowknife.

1998

Winter

> Winspear Resources conducts bulk samples at Snap Lake which reveal high grade, gem quality diamond.

Spring

> The federal government completes a formal environment assessment on Diavik's project description.
> An agreement is reached with BHP and GNWT with regards to the construction of a sorting and valuation facility in Yellowknife. It is also agreed that BHP will aid the sales of rough for cutting and polishing in NWT by qualified northern manufacturers.

Summer

> A government program is put in the works to certify diamonds being mined and cut in NWT.

Fall

> Ekati is officially open.

1999
Winter

>The Diamond High Council, ECE and Aurora College make available pre-employment programs including:
-Introduction to Diamonds
-Introduction to Jewelry

> The BHP sorting and valuation facility opens for business: construction is completed.

Spring

> DeBeers and BHP sign a Memorandum of Understanding in agreement for the sales of 35% run-of-mine.
> In April Ekati produces its first one million carats of rough

Summer

> Sirius Diamonds Ltd. opens a state of the art cutting and polishing facility in Yellowknife, NWT.
> GNWT negotiates a Memorandum of Understanding with Diavik in regards to rough for manufacturing.

Fall

> The Diavik project is allowed to proceed through through the next phases of permitting as the federal government completes its review of the environmental assessment.

> Arslanian Cutting Works NWT Ltd. signs a monitoring agreement with the GNWT.

2000

Spring

> Diavik enters its construction phase.
> Deton' Cho Diamonds Inc. opens a cutting and polishing facility in Yellowknife.
> Under the Apprenticeship, Trade and Occupations Certification Act, the GNWT releases the Diamond Polisher Occupational Standards.
>Pre-feasibility study is completed on Snap Lake.

Summer

> Deton' Cho Diamonds Inc. signs a monitoring agreement with the GNWT.
> Winspear Resources is approached by DeBeers with a hostile takeover bid for all the common shares; one month later DeBeers acquires Winspear.

Fall

> GNWT certifies the first Canadian Arctic Diamond.
> Diavik receives final approvals.

Winter

> Arslanian Cutting Works NWT Ltd. opens a cutting and polishing factory in Yellowknife.

2001

> DeBeers submits projections for Snap Lake.

Summer

> BHP Billiton purchases Dia Met bringing BHPs' ownership of Ekati to eighty percent.

2002

> A new logo is launched by the GNWT representing Canadian Arctic diamonds and the governments certification program for diamonds that are mined, cut, and polished in NWT.

> Tiffany & Co. begin construction of a cutting and polishing facility in Yellowknife, Nt.

Winter

> DeBeers Canada Mining Inc. agrees to make rough accessable for local manufacturing through a Socio-economic Agreement with the GNWT.

2003

Winter

> The Diavik diamond mine begins production in February
> Deton' Cho Diamonds Inc. and Schachter & Namdar enter a partnership to form Canada Dene Diamonds.

World Diamond Production by Country, 2003

Producer Country	Carats (000)	Average Price $ per Carat	US $ Market Value
Angola	3.000	200	600
Australia	30.00	12	360
Botswana	21.300	84.5	1.800
Brazil	2.000	100	200
C.A.R.	800	175	140
Canada	2.300	165	380
Congo (Dem Rep)	16.000	40.6	650
Guinea	600	140	84
Namibia	1.6000	256	410
Russia	1.6000	100	1.600
Sierra Leone	150	240	36
South Africa	9.800	82	800
Tanzania	230	145.70	34
Venezuela	800	75	60
Other	1.200	70	84
	Total: 105.780cts	$68.4/ct	$7.238 Billion