Vancouver Kimberlite Cluster

Why have investors lost interest in diamond exploration and what will it take to bring them back?

Presented by John Kaiser

November 16, 2022

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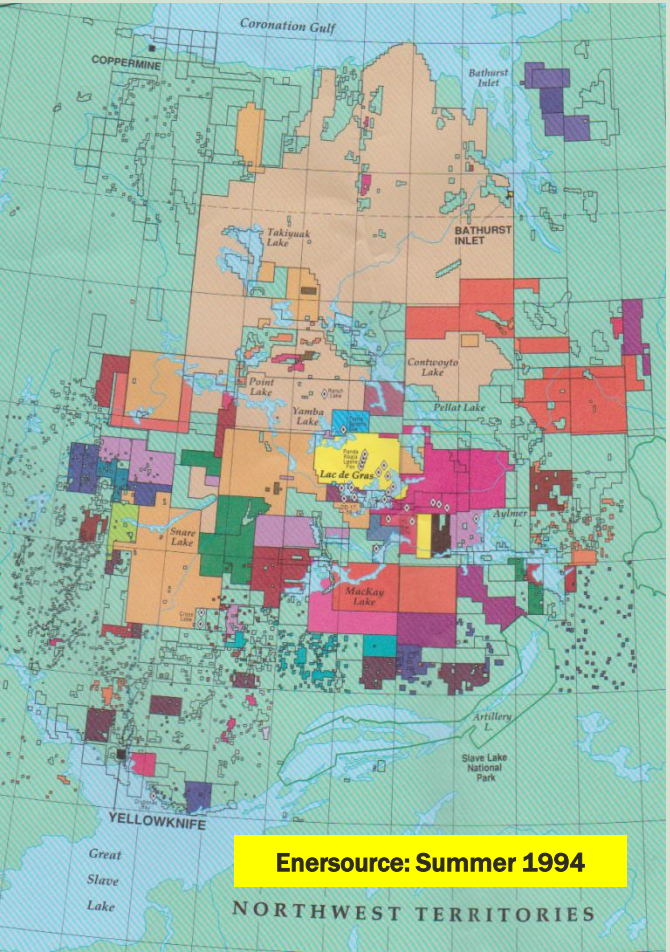
Annual KRO Individual Membership for registered KRO Members: USD $450

Annual KRO Multi-User Corporate Membership: USD $1,000

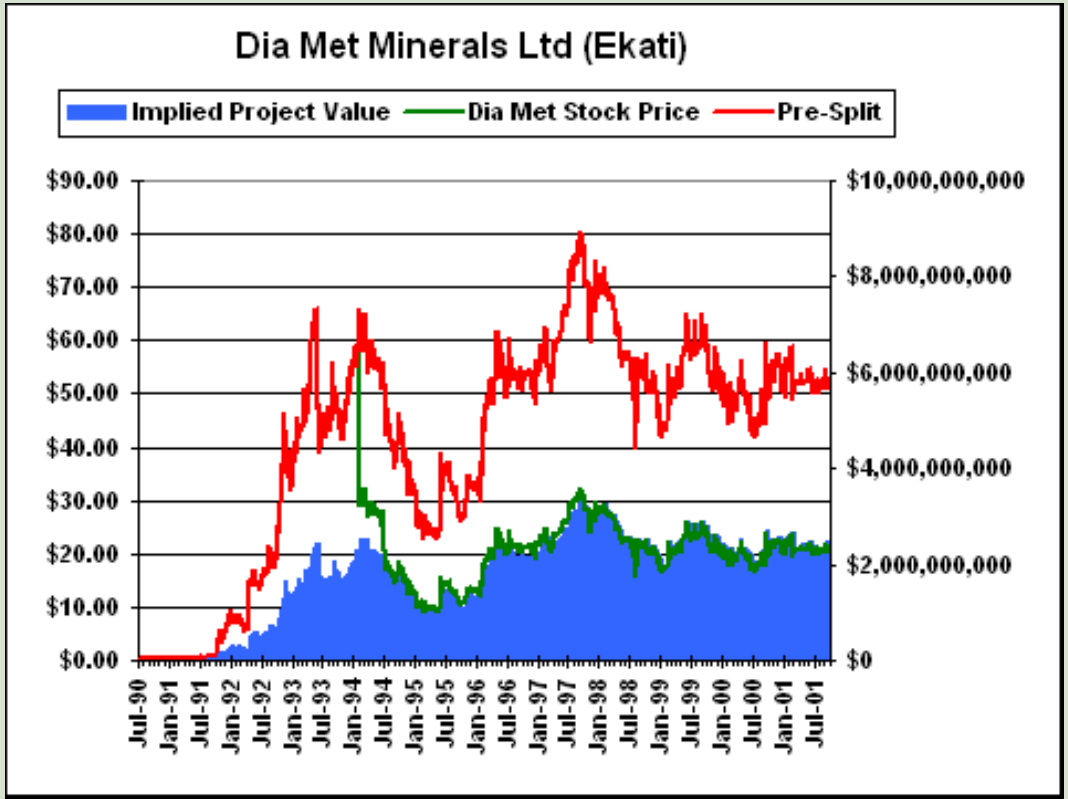
KRO Diamond Resource Center & SDLRC: Free

November 5, 1991 Dia Met Press Release



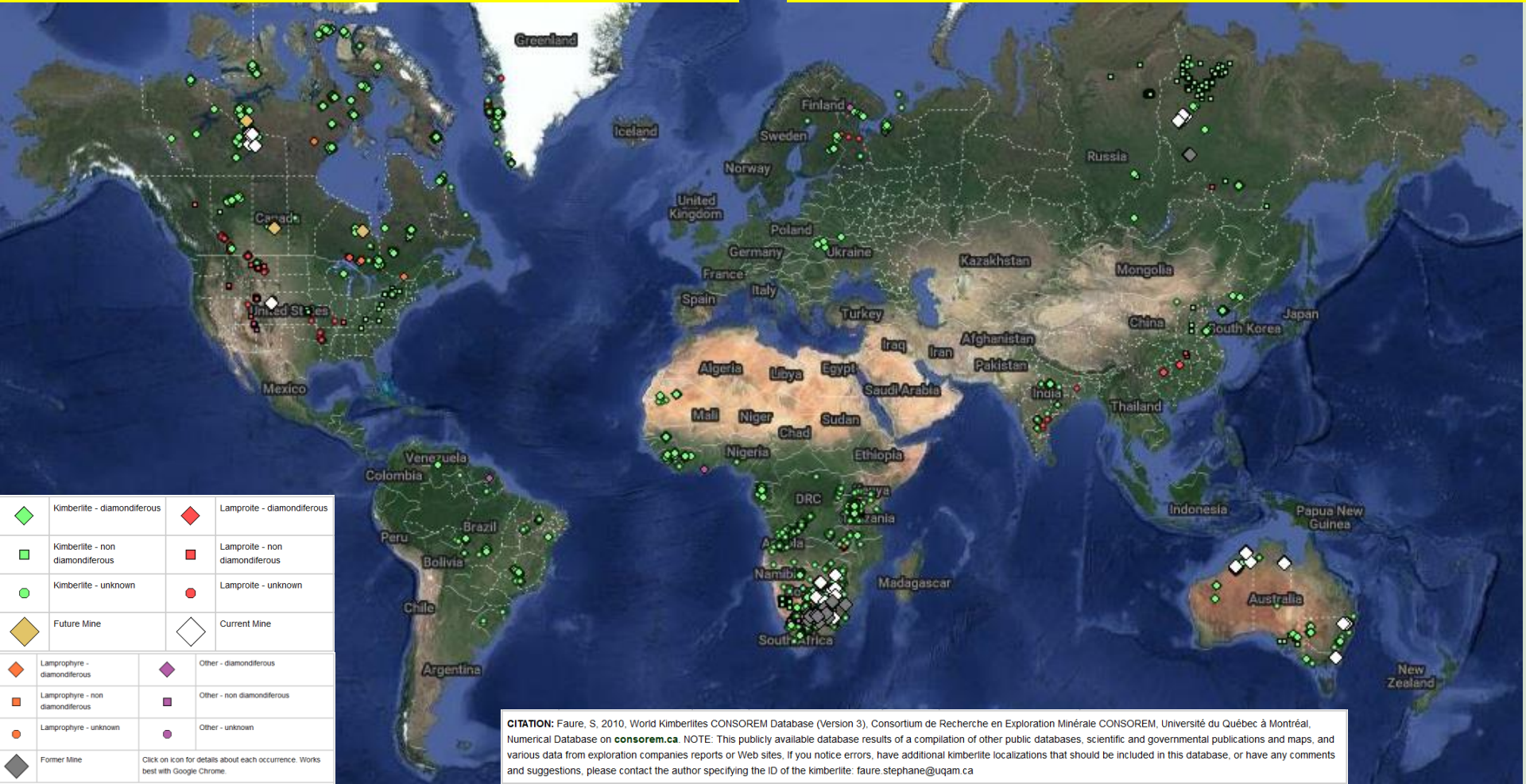
Enersource: Summer 1994

"The BHP-Dia Met diamond exploration joint venture, in the Northwest Territories, announces that core hole PL 91-1 at Point Lake intersected kimberlite from 455 ft to the end of the hole at 920 ft. A 59kg sample of the kimberlite yielded 81 small diamonds, all measuring less than 2mm in diameter. Some of the diamonds are gem quality. These results, at this stage in the development of the property, are considered significant, although they do not demonstrate an economic deposit. The results are sufficiently encouraging that the operator BHP-Utah is planning to add to the exploration program the bulk sampling this winter of 200 tons of the kimberlite. The purpose of the bulk sampling is to test for larger diamonds."



Ekati, coupled with the collapse of the Soviet Union, unleashed a diamond knowledge explosion & global exploration boom!

Hundreds of juniors plunged into diamond exploration. Billions was raised and spent. 30 years later less than a dozen remain.



	Kimberlite - diamondiferous		Lamproite - diamondiferous
	Kimberlite - non diamondiferous		Lamproite - non diamondiferous
	Kimberlite - unknown		Lamproite - unknown
	Future Mine		Current Mine
	Lamprophyre - diamondiferous		Other - diamondiferous
	Lamprophyre - non diamondiferous		Other - non diamondiferous
	Lamprophyre - unknown		Other - unknown
	Former Mine		Click on icon for details about each occurrence. Works best with Google Chrome.

CITATION: Faure, S, 2010, World Kimberlites CONSOREM Database (Version 3), Consortium de Recherche en Exploration Minérale CONSOREM, Université du Québec à Montréal, Numerical Database on **consorem.ca**. NOTE: This publicly available database results of a compilation of other public databases, scientific and governmental publications and maps, and various data from exploration companies reports or Web sites, If you notice errors, have additional kimberlite localizations that should be included in this database, or have any comments and suggestions, please contact the author specifying the ID of the kimberlite: faure.stephane@uqam.ca

THE SHEAHAN LITERATURE SERVICE

Diamonds, Kimberlites, and Related Geology

May 2022 was the last issue of SDLRC - see Letter from Patricia Sheahan

To see why Patricia Sheahan mattered visit the SDLRC Tribute Collection

SDLRC Scientific Articles for all years by Author		All scientific (technical) articles organized alphabetically by author	
SDLRC Media/Corporate References for all years by Name		All media-corporate articles organized alphabetically by company or author/publication name	
SDLRC All Articles Region Index		References organized by the regions to which they relate	
SDLRC Scientific/Media Articles Keyword Index		References organized by the major key words assigned to them	
		SDLRC Technical 2022	SDLRC Media-Corporate 2022
SDLRC Technical 2021	SDLRC Media-Corporate 2021	SDLRC Technical 2020	SDLRC Media-Corporate 2020
SDLRC Technical 2019	SDLRC Media-Corporate 2019	SDLRC Technical 2018	SDLRC Media-Corporate 2018
SDLRC Technical 2017	SDLRC Media-Corporate 2017	SDLRC Technical 2016	SDLRC Media-Corporate 2016
SDLRC 2015	SDLRC 2014	SDLRC 2013	SDLRC 2012
SDLRC 2011	SDLRC 2010	SDLRC 2009	SDLRC 2008
SDLRC 2007	SDLRC 2006	SDLRC 2005	SDLRC 2004
SDLRC 2003	SDLRC 2002	SDLRC 2001	SDLRC 2000
SDLRC 1999	SDLRC 1998	SDLRC 1997	SDLRC 1996
SDLRC 1995	SDLRC 1994	SDLRC 1993	SDLRC 1992
SDLRC 1991	SDLRC 1990	SDLRC 1989	SDLRC 1988
SDLRC 1987	SDLRC 1986	SDLRC 1985	SDLRC 1984
SDLRC 1983	SDLRC 1982	SDLRC 1981	SDLRC 1980
SDLRC 1975-1979	SDLRC 1970-1974	SDLRC 1960-1969	SDLRC 1950-1959
SDLRC 1940-1949	SDLRC 1930-1939	SDLRC 1920-1929	SDLRC 1910-1919
SDLRC 1900-1909	SDLRC 1860-1899	SDLRC pre 1860	

Patricia Sheahan Tribute Collection

SDLC at Kaiser Research Online

- Monthly pdf report with references to technical, media and corporate literature related to diamonds prepared by Patricia Sheahan and emailed to the Diamonderati List – migrated online in 2015
- John Kaiser imports references into a database, hunts down urls and abstracts, and posts to the KRO Diamond Resource Center
- Over 100,000 references dating back to ancient time available as annual batches, with the latest month highlighted
- Divided into technical references with urls and abstracts, and media-corporate references with urls if available
- Technical & media references available by individual authors
- References available on basis of key words – 150
- References available on basis of regions – 144

Technical Reference Example

2021 Technical Reference Compilation

Posted/ Published	Author	Title	Source	Region	Keywords
DS202102-0173 2020	Aulbach, S., Giuliani, A., Fiorentini, M.L., Baumgartner, R.J., Davard, D., Kamenetsky, V.S., Caruso, S., Danyushevsky, L.V., Powell, W., Griffin, W.L.	Siderophile and chalcophile elements in spinels, sulphides and native Ni in strongly metasomatised xenoliths from the Bultfontein kimberlite (South Africa).	Lithos, doi.org/10.1016/ jlithos.2020.105880, 26p. Pdf	Africa, South Africa	deposit - Bultfontein
	Abstract: The metasomatised continental mantle may play a key role in the generation of some ore deposits, in particular mineral systems enriched in platinum-group elements (PGE) and Au. The cratonic lithosphere is the longest-lived potential source for these elements, but the processes that facilitate their pre-concentration in the mantle and their later remobilisation to the crust are not yet well-established. Here, we report new results on the petrography, major-element, and siderophile- and chalcophile-element composition of native Ni, base metal sulphides (BMS), and spinels in a suite of well-characterised, highly metasomatised and weakly serpentinised peridotite xenoliths from the Bultfontein kimberlite in the Kaapvaal Craton, and integrate these data with published analyses. Pentlandite in polymict breccias (failed kimberlite intrusions at mantle depth) has lower trace-element contents (e.g., median total PGE 0.72 ppm) than pentlandite in phlogopite peridotites and Mica-Amphibole-Rutile-Ilmenite-Diopside (MARID) rocks (median 1.6 ppm). Spinel is an insignificant host for all elements except Zn, and BMS and native Ni account for typically <25% of the bulk-rock PGE and Au. High bulk-rock Te/S suggest a role for PGE-bearing tellurides, which, along with other compounds of metasomatic origin, may host the missing As, Ag, Cd, Sb, Te and, in part, Bi that are unaccounted for by the main assemblage. The close spatial relationship between BMS and metasomatic minerals (e.g., phlogopite, ilmenite) indicates that the lithospheric mantle beneath Bultfontein was resulphidised by metasomatism after initial melt depletion during stabilisation of the cratonic lithosphere. Newly-formed BMS are markedly PGE-poor, as total PGE contents are <4.2 ppm in pentlandite from seven samples, compared to >26 ppm in BMS in other peridotite xenoliths from the Kaapvaal craton. This represents a strong dilution of the original PGE abundances at the mineral scale, perhaps starting from precursor PGE alloy and small volumes of residual BMS. The latter may have been the precursor to native Ni, which occurs in an unusual Ni-enriched zone in a harzburgite and displays strongly variable, but overall high PGE abundances (up to 81 ppm). In strongly metasomatised peridotites, Au is enriched relative to Pd, and was probably added along with S. A combination of net introduction of S, Au +/- PGE from the asthenosphere and intra-lithospheric redistribution, in part sourced from subducted materials, during metasomatic events may have led to sulphide precipitation at ~80-120 km beneath Bultfontein. This process locally enhanced the metallogenic fertility of this lithospheric reservoir. Further mobilisation of the metal budget stored in these S-rich domains and upwards transport into the crust may require interaction with sulphide-undersaturated melts that can dissolve sulphides along with the metals they store.				
DS202102-0174 2021	Barry, P.H., Broadley, M.W.	Nitrogen and noble gases reveal a complex history of metasomatism in the Siberian lithospheric mantle.	Earth and Planetary Science Letters, Vol. 556, doi.org/10.1016 /j.epsl.2020. 116707 12p. Pdf	Russia	nitrogen
	Abstract: The Siberian flood basalts (SFB) erupted at the end of the Permian period (~250 Ma) in response to a deep-rooted mantle plume beneath the Siberian Sub-Continental Lithospheric Mantle (SCLM). Plume-lithosphere interaction can lead to significant changes in the structure and chemistry of the SCLM and trigger the release of metasomatic material that was previously stored within the stable craton. Here, we investigate the nature of the Siberian-SCLM (S-SCLM) by measuring nitrogen abundances and isotopes (N) in 11 samples of two petrologically-distinct suites of peridotitic xenoliths recovered from kimberlites which bracket the eruption of the SFB: the 360 Myr old Udachnaya and 160 Myr old Obnazhennaya pipes. Nitrogen isotope (N) values range from -5.85 ± 1.29‰ to +3.94 ± 0.63‰, which encompasses the entire range between depleted Mid-Ocean Ridge Basalt (MORB) mantle (DMM; -5 ± 2‰) and plume-derived (+3 ± 2‰) endmembers. In addition, we present neon (n=7) and argon (n=8) abundance and isotope results for the same two suites of samples. The 20Ne/22Ne and 21Ne/22Ne range from atmospheric-like values of 9.88 up to 11.35 and from 0.0303 to 0.0385, respectively, suggesting an admixture of DMM and plume-derived components. Argon isotopes (40Ar/36Ar) range from 336.7 to 1122 and correlate positively with 40Ar contents. We show that volatile systematics of Siberian xenoliths: (1) exhibit evidence of ancient metasomatic and/or recycled signatures, and (2) show evidence of subsequent plume-like re-fertilization, which we				

Media-Corporate Reference Example

2021 Media and Corporate Reference Compilation

Posted/ Published	Author	Title	Source	Region	Keywords
DM202101-0046 2020	Afrik21	Botswana: DTCB to equip its gabarone factory with a 950 kWp solar power plant.	Afrik21.com, Dec. 10, 1/2p.	Africa, Botswana	News item - DTCB
DC202101-0137 2020	AGD	AGD Diamonds last 2020 auction of rough from V. Grib mine, Russia grossed $ 30 mln.	AGD, Dec. 18, 1/4p.	Russia, Arkangel	News item - AGD
DM202101-0047 2020	Allafrica	Community clashes with diamond mine. Murowa	allafrica.com, Nov. 30	Africa, Zimbabwe	News item - Riozim
DM202102-0240 2021	Allafrica	Diamond cutting, polishing plant to open in 2021.	allafrica.com, Jan. 3, 1/4p.	Africa, Angola	News item - diamond cutting
DM202102-0241 2021	Allafrica	IMF approves US $487.5 million payment for Angola.	allafrica.com, Jan. 12, 1/4p.	Africa, Angola	News item - IMF
DM202102-0242 2021	Allafrica	Army linked Anjin grabs richest diamond claim (Marange)	allafrica.com, https://allafrica.com/ stories/ 202101150292.html	Africa, Zimbabwe	News item - Anjin
DM202102-0243 2021	Allafrica	Endiama now owns 41 % of Catoca. From some of Odebrecht's	allafrica.com, Jan. 21, 1/4p.	Africa, Angola	News item - Endiama
DC202102-0338 2021	Alrosa	Q4 and 12 M operating results.	marketscreen.com, Jan. 21, 2p.	Russia	News item - Alrosa
DM202102-0244 2021	angop	Endiama produced 7.5 mln cts, Catoca.	angop.ao, Jan. 14, 1/4p.	Africa, Angola	News item - Endiama
DC202102-0339 2021	Astro Resources NI	Astro is also owner of a diamond project located near the Argyle region. (mention)	Astro Resources NI, Jan. 7, 1/4p.	Australia	News item - press release
DM202102-0245 2021	Bates, R.	Diamond trader Dan Gertler gets OFAC sanctions reprieve.	jackonline.com, Jan. 26, 1p.	Europe, Israel	News item - legal
DM202101-0048 1992	Bishop, R.	Diamonds: North America: Point Lake and beyond. *** NOTE DATE	https://www.dropbox.com/s/ 7772ea4qfza50zo/ 1992-08_Bishop_Diamonds	Canada, Northwest Territories	News item - history

Reference by Author Example

SDLRC - Scientific Articles all years by Author - Gr+

The Sheahan Diamond Literature Reference Compilation

The Sheahan Diamond Literature Reference Compilation is compiled by **Patricia Sheahan** who publishes on a monthly basis a list of new scientific articles related to diamonds as well as media coverage and corporate announcementscalled the **Sheahan Diamond Literature Service** that is distributed as a free pdf to a list of followers. Pat has kindly agreed to allow her work to be made available as an online digital resource at Kaiser Research Online so that a broader community interested in diamonds and related geology can benefit. The references are for personal use information purposes only; when available a link is provided to an online location where the full article can be accessed or purchased directly. Reproduction of this compilation in part or in whole without permission from the Sheahan Diamond Literature Service is strictly prohibited. **Return to Diamond Resource Center**

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A-An	Ao+	B-Bd	Be-Bk	Bl-Bq	Br+	C-Cg	Ch-Ck	Cl+	D-Dd	De-Dn	Do+	E	F-Fn	Fo+	G-Gh	Gi-Gq	Gr+	H-Hd	He-Hn	Ho+	I	J	K-Kg	Kh-Kn	Ko-Kq	Kr+	L-Lh
Li+	M-Maq	Mar-Mc	Md-Mn	Mo+	N	O	P-Pd	Pe-Pn	Po+	Q	R-Rh	Ri-Rn	Ro+	S-Sd	Se-Sh	Si-Sm	Sn-Ss	St+	T-Th	Ti+	U	V	W-Wg	Wh+	X	Y	Z

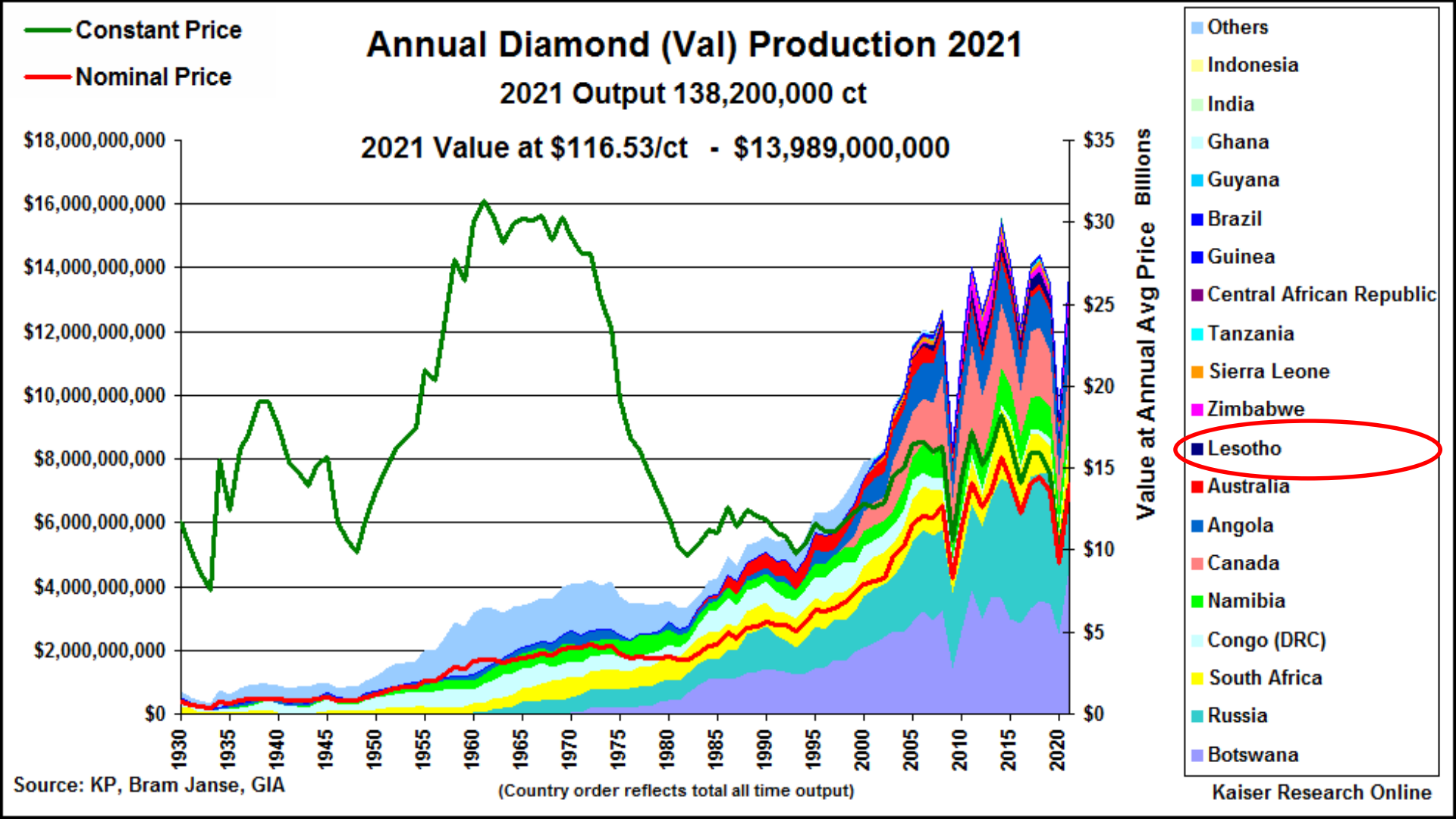
Sheahan Diamond Literature Reference Compilation - Media/Corporate References by Name for all years

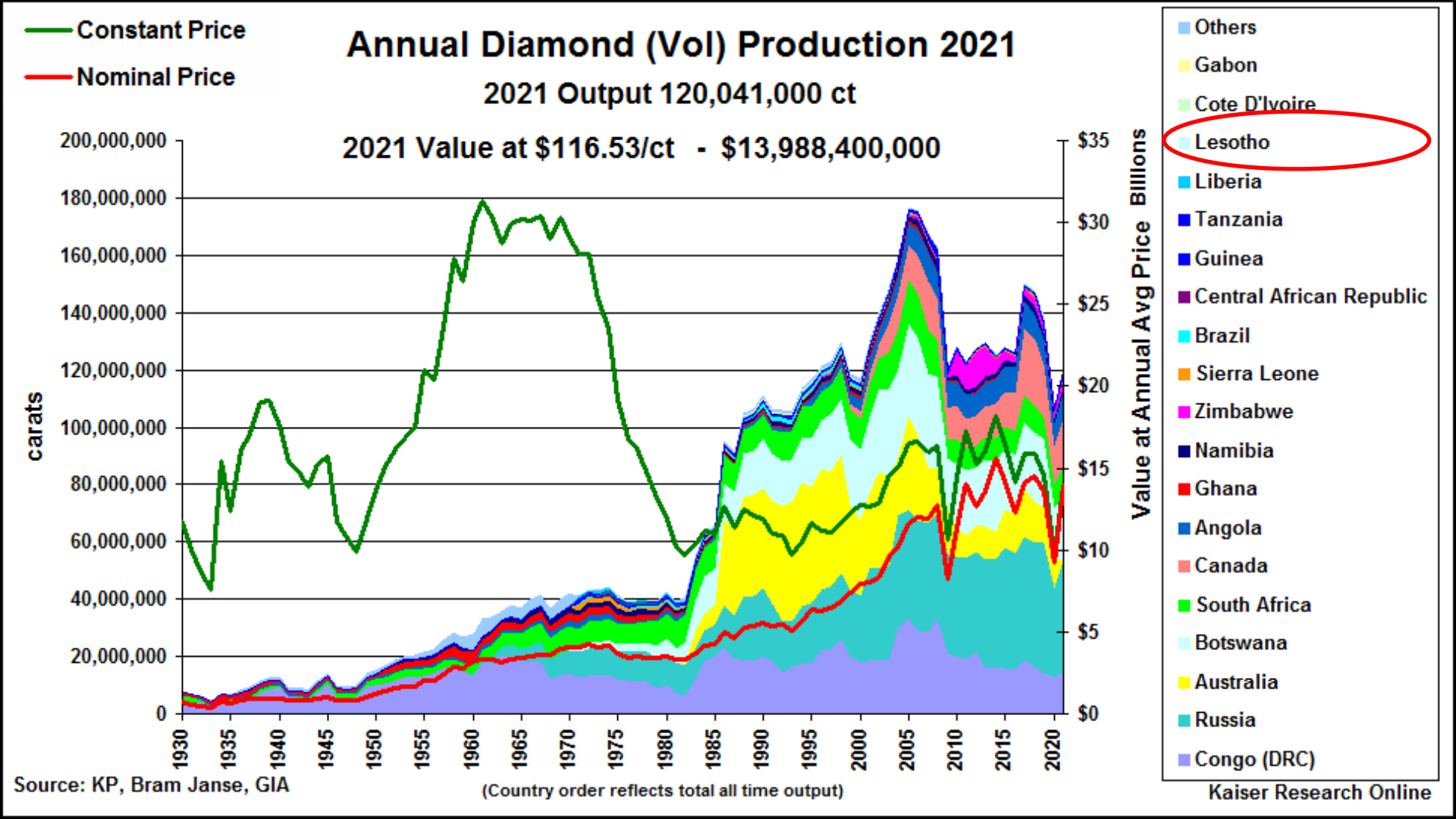
A	B	C	D-Diam	Diamonds	Diamr+	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

DS2003-0526 **2003**	**Grutter**	**Gurney, J.L., Baumgartner, M., Anckar, E., Gurney, J.J., Nowicki, T.E., Grutter**	Kimberlite almanac	**8 Ikc Www.venuewest.com/8ikc /program.htm**, Session 8, POSTER abstract	South Africa	Deposit - Finsch
DS200912-0522 **2009**	**Grutter**	**Muller, M.R., Jones, Evans, Grutter, Hatton, Garcia, Hamilton, Miensopust, Cole, Ngwisanyi, Hutchins, Fourie, Jelsma,Aravanis.Pettit, Webb, Wasborg**	Lithospheric structure, evolution and diamond prospectivity of the Rehoboth Terrane and western Kaapvaal Craton, southern Africa: constraints from broadband	**Lithos**, In press - available 57p..	Africa, South Africa, Botswana	Geophysics - broadband magnetotellurics
DS2003-0086 **2003**	**Grutter, H.**	**Baumgartner, M., Ankar, E., Grutter, H.**	Compositional classification of kimberlitic and non-kimberlitic ilmenite with implications	**8 Ikc Www.venuewest.com/8ikc /program.htm**, Session 8, Abstract	Global	Diamond exploration - mineralogy
DS2003-0300 **2003**	**Grutter, H.**	**Creaser, R.A., Grutter, H., Carlson, J., Crawford, B.**	Macrocrystal phlogopite Rb Sr dates for the Ekati Province kimberlites, Slave	**8 Ikc Www.venuewest.com/8ikc /program.htm**, Session 7, Abstract	Northwest Territories	Kimberlite petrogenesis, Geochronology
DS2003-0320 **2003**	**Grutter, H.**	**Davis, W.J., Jones, A.G., Bleeker, W., Grutter, H.**	Lithosphere development in the Slave Craton: a linked crustal and mantle perspective	**Lithos**, Vol. 71, 2-4, pp. 575-589.	Northwest Territories, Nunavut	Tectonics
DS2003-0510 **2003**	**Grutter, H.**	**Grutter, H.**	Advanced indicator mineral chemistry techniques in diamond exploration	**Pdac Abstract 2003**, March 12, 1p.	Global	Technology - indicators
DS2003-0511 **2003**	**Grutter, H.**	**Grutter, H., et al.**	Early-stage assessment of kimberlites using indicator minerals, petrography and	**Quebec Exploration 2003, diamond session**, diamond session, extended abstract, 1 page	Global	core logging, important factors to assess diamond potential
DS2003-0512 **2003**	**Grutter, H.**	**Grutter, H., Gurney, J., Nowicki, T., Moore, R.**	Early stage assessment of kimberlites using indicator minerals, petrography and	**Quebec Exploration Conference**, Nov. 25-27, 1p. abstract	Global	Microdiamonds

Key Word Index Example

Major Keyword	# Sub Keywords	# of References	# New References	Keyword Definition
Aboriginal Issues	10	44	0	**Aboriginal Issues** involve the native groups in Australia and Canada, and are relevant where their jurisdictions overlap with diamond exploration and development.
Accretion	3	41	0	**Accretion** in the geological context relevant to diamond literature refers to the process of adding material to a tectonic plate or landmass either through the collision of plates or through the deposition of sediments along coastlines and riverbanks.
Alkaline Rocks	25	923	1	**Alkaline Rocks** are rocks formed from magmas or fluids enriched with alkalis (potassium oxide and sodium oxide) relative to silica (silicon dioxide). When the magma is under-saturated with alkalis it is called "sub-alkaline". Alkaline rocks can be extrusive or intrusive. Although rare, they form a wide range of minerals. Alkaline rocks are relevant to diamonds because kimberlites and lamproites originate as alkaline magmas. They are especially relevant to rare earth minerals when they occur as carbonatites and syenites.
Alluvials	35	524	1	**Alluvials** as a keyword in the diamond literature refers to both the formation of unconsolidated sedimentary deposits through water transport and the diamonds that end up in such alluvial deposits also known as placer deposits. The keyword includes articles about marine diamond deposits.
Basanites	3	99	0	**Basanites** are an extrusive sub-class of alkaline rocks associated with basalts formed through hotspot volcanism. Basanites are lower in silica and higher in alkalis than basalt. They are not very relevant to diamonds.
Boninites	3	59	0	**Boninites** are an extrusive mafic rock rich in magnesium and silica whose magma is formed in "fore-arc" environments near island arcs where the "mantle wedge" above a subducting plate near the ocean trench undergoes partial melting. Boninites are more relevant to rare earths than diamonds.
Book	112	445	0	Most of the scientific diamond references involve peer reviewed articles published in journals. The key word **Book** refers to a theme based collection of articles by multiple authors or a multi-chapter book by a single author. The references usually include an additional key word that defines the topic of the book. The reference may be about the book itself or a review of the book. The reference usually has an additional keyword that describes the topic.
Boundary	10	135	0	**Boundary** refers to both plate boundaries such as occur in subduction zones as well as the transition between mantle regions such as the earth's solid "inner core" and liquid "outer core".
Carbon	30	238	3	**Carbon** is relevant to diamonds because that is what a pure diamond is made of, namely an octahedral carbon crystal that forms in a combination of pressure and temperature that does not exist at the earth's surface. The diamond form of carbon is the hardest known naturally occurring material, while the hexagonal crystal form of carbon known as graphite is among the softest materials. Articles with the key word "carbon" encompass a wide range of carbon related topics, of which the most relevant to diamond deal with diamond formation, the carbon cycle within the earth as opposed to the gaseous form of carbon dioxide in so far as the inputs for diamond formation are concerned, and the transition between diamond and graphite as defined by the pressure-temperature regime at the center of which is the diamond stability field.
Carbonado	9	91	0	A **Carbonado** is literally a "black diamond", a polycrystalline aggregate found in sedimentary beds in Brazil and the Central African Republic (which at one point were united) whose genesis remains a disputed mystery (high temperature creation from organic carbon within the earth, shock metamorphism from meteor impact, or radiation from natural fission?). Lead isotope analysis suggests formation 3 billion years ago. Carbonados are not associated with kimberlites.
Carbonatite	38	2335	0	**Carbonatite** is a sub-class of alkaline rocks which is dominated by **Carbonate Minerals**, namely minerals with the CO3 carbonate ion. Normally when we hear about "carbonates" we think of sedimentary rocks such as limestone and dolomite which are host to skarn and replacement style mineralization containing metals such as gold, silver, zinc, lead or copper. In the case of a carbonatite we are dealing with an igneous intrusion which may be enriched in rare earths and other critical metals, but never contains diamonds in the manner of a kimberlite. Articles about carbonatites are far more important for rare earths than diamonds.

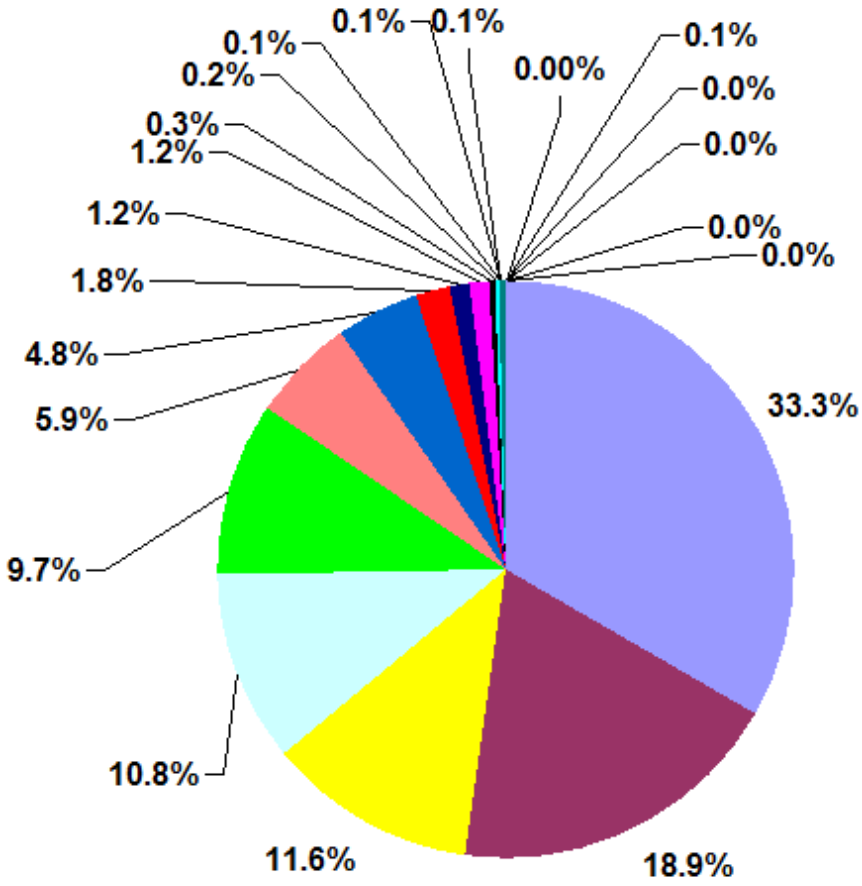

Constant Price
Nominal Price
Annual Diamond (Val) Production 2021
2021 Output 138,200,000 ct
2021 Value at $116.53/ct - $13,989,000,000
$18,000,000,000
$16,000,000,000
$14,000,000,000
$12,000,000,000
$10,000,000,000
$8,000,000,000
$6,000,000,000
$4,000,000,000
$2,000,000,000
$0
$35
$30
$25
$20
$15
$10
$5
$0
Value at Annual Avg Price Billions
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Others
Indonesia
India
Ghana
Guyana
Brazil
Guinea
Central African Republic
Tanzania
Sierra Leone
Zimbabwe
Lesotho
Australia
Angola
Canada
Namibia
Congo (DRC)
South Africa
Russia
Botswana
Source: KP, Bram Janse, GIA
(Country order reflects total all time output)
Kaiser Research Online


Constant Price
Nominal Price
Annual Diamond (Vol) Production 2021
2021 Output 120,041,000 ct
2021 Value at $116.53/ct - $13,988,400,000
carats
200,000,000
180,000,000
160,000,000
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
$35
$30
$25
$20
$15
$10
$5
$0
Value at Annual Avg Price Billions
Others
Gabon
Cote D'Ivoire
Lesotho
Liberia
Tanzania
Guinea
Central African Republic
Brazil
Sierra Leone
Zimbabwe
Namibia
Ghana
Angola
Canada
South Africa
Botswana
Australia
Russia
Congo (DRC)
Source: KP, Bram Janse, GIA
(Country order reflects total all time output)
Kaiser Research Online

Global Diamond (Val) Production 2021

$13,989,000,000

138,200,000 ct



- Botswana
- Russia
- Angola
- Canada
- South Africa
- Namibia
- Zimbabwe
- Lesotho
- Congo
- Sierra Leone
- Brazil
- Tanzania
- Liberia
- Guinea
- Central African Republic
- Guyana
- Ghana
- Cote D'Ivoire
- Cameroon
- Republic of Congo
- Others

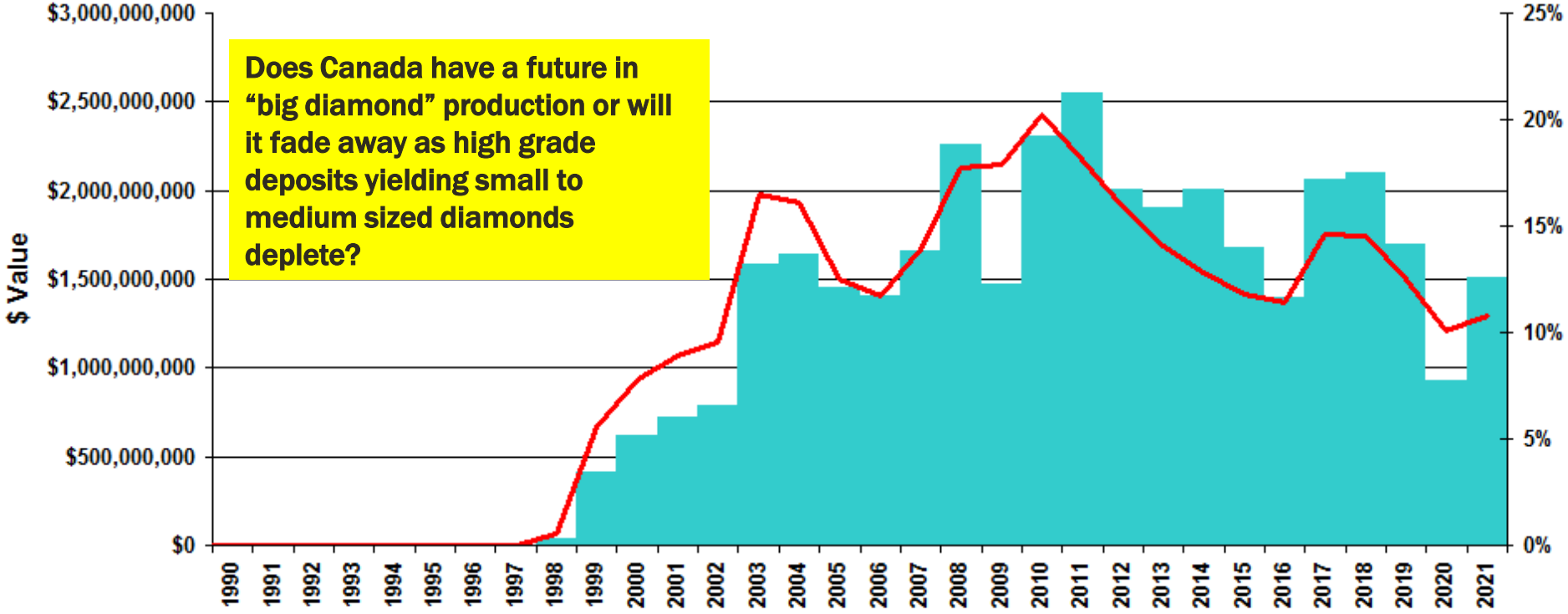
Source: KP, Bram Janse, GIA

Kaiser Research Online

Canada Annual Diamond (Value) Production

2021 Value at $85.84/ct - $1,512,000,000 - 10.81%

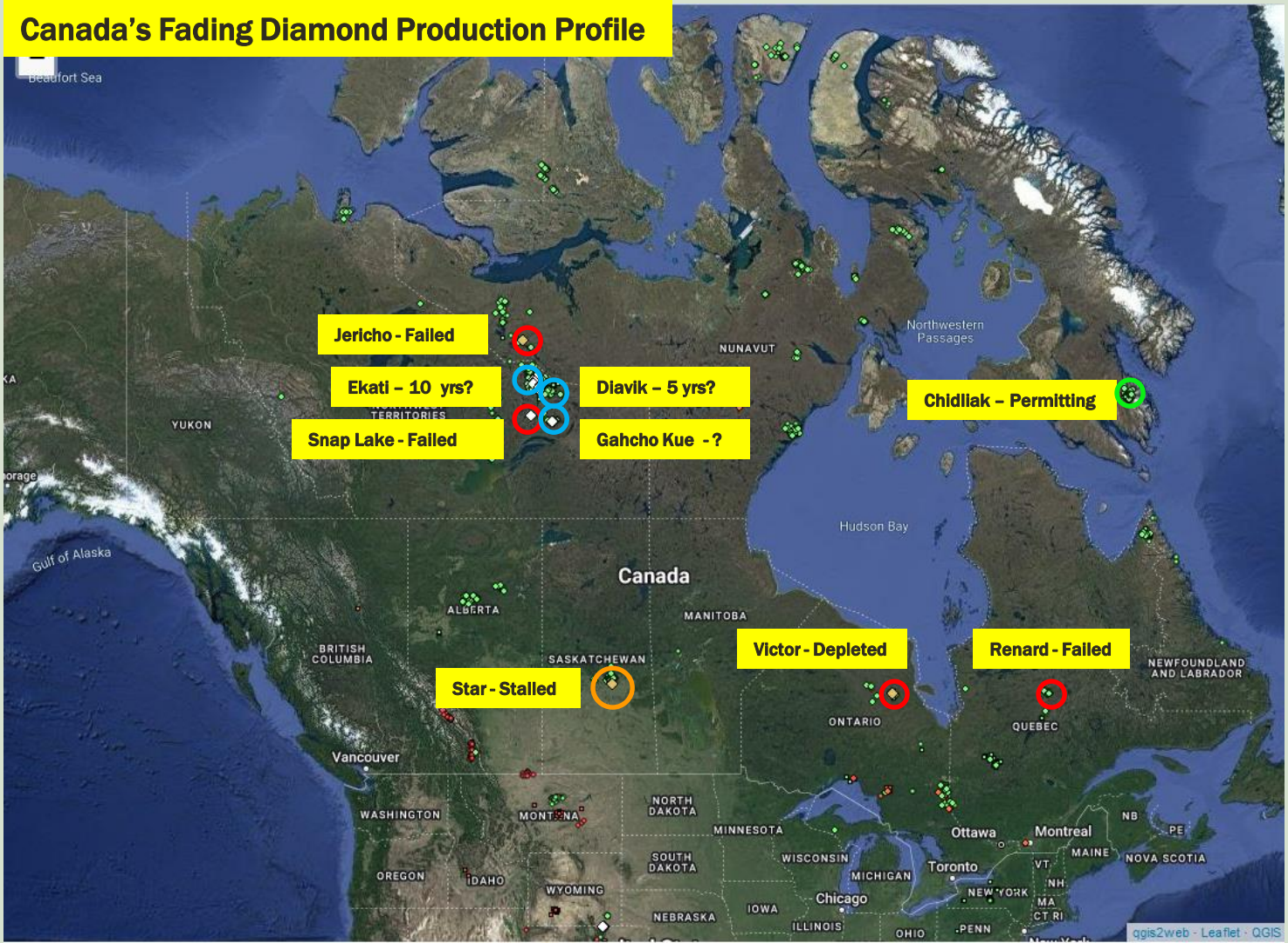
Volume - 17,620,000 carats - 14.67%



Source: KP, Bram Janse, GIA

Kaiser Research Online

Canada's Fading Diamond Production Profile



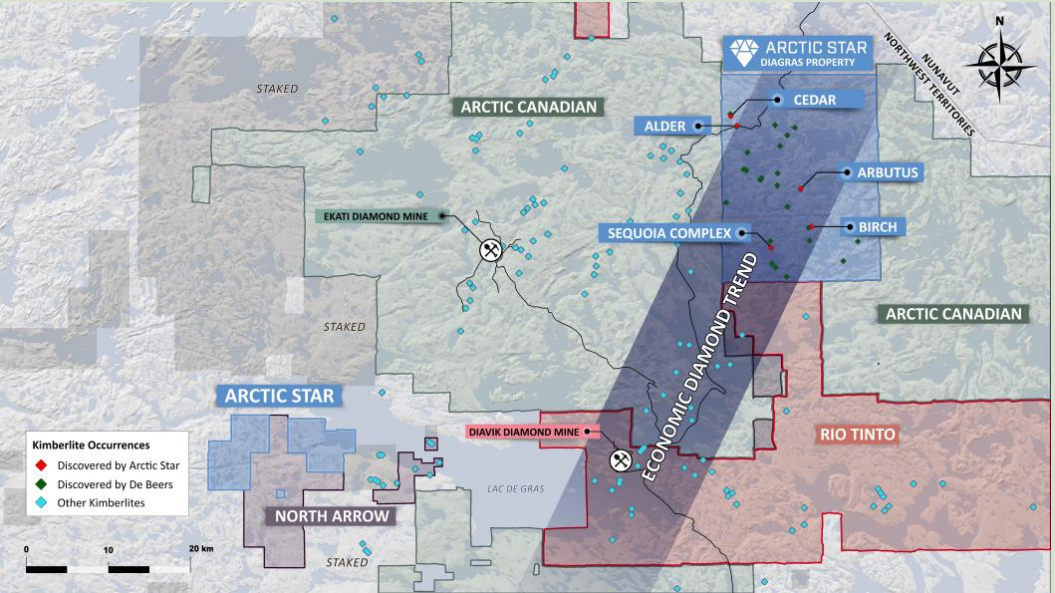
Reasons Investors have lost interest in Diamond Exploration

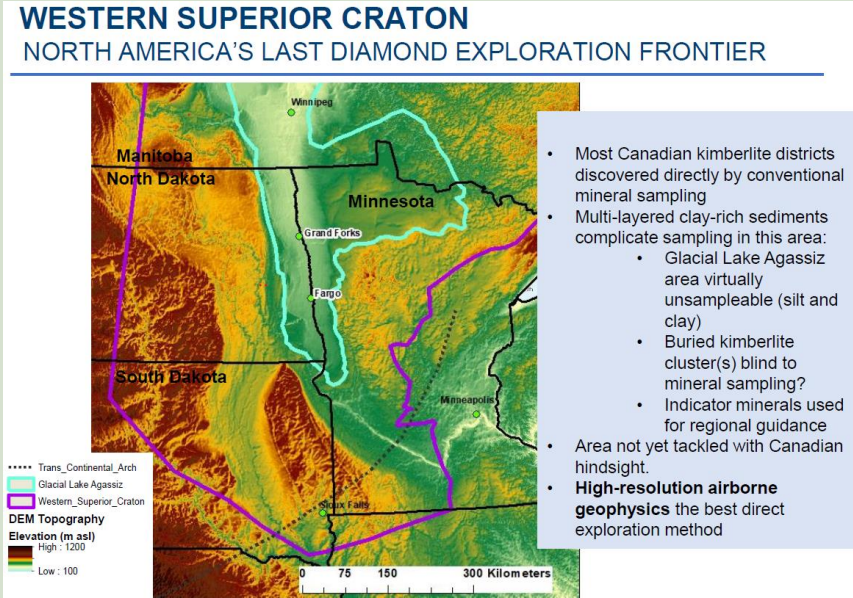
- Limited Story Paths for Rethink Plays
- Long Timelines for Exploration-Development Cycle
- Unreliability of Micro Diamonds & Indicator Mineral Chemistry in assessing target prospectivity
- Delayed outcome visualization & S-Curve: Grade <> Value
- Diminished new field or cluster discovery potential except in difficult covered settings
- Title Risk in Frontiers
- Ethical Concerns: Natural vs Lab Grown

Two Story Paths for Success in Diamond Exploration

Arctic Star (Pat Power/Buddy Doyle): Diagras next door to Ekati/Diavik – rethinking De Beers' former Hardy Lake cluster in terms of overlooked kimberlites & potential high value diamonds in known diamondiferous bodies.

Craton Minerals (Brooke Clements/Bob Lucas): Western Superior Craton – grassroots exploration in a region lacking a sampling medium such as outcrop or glacial till – not quite under cover but heavily reliant on stream sediment sampling and geophysics.





Understanding a Resource Junior Story Path

Arizona Mining Inc – Hermosa-Taylor – Zinc, lead, & silver

Strategies for Success

- Conventional Exploration Methods
- Innovative Expl Method – geochemical
- Innovative Expl Method – geophysical
- New Model Exploration
- Tectonic reconstruction of geology
- Under Cover – post mineral
- Under Cover – swamp, gravel, overburden
- Data compilation & digitization
- Explore deeper, on strike, parallel
- Explore for cluster repetition
- Metal Price Gain or Optionality on it
- New mining approach or process flowsheet

Grassroots Exploration

Frontier without major analogue deposit but conceptual potential never systematically assessed

New Discovery

Discovery junior has time to expand land position to cover relevant geology and declare "got it all" before delineation drilling

Area Play

Area surrounding discovery staked and explored because not enough is known about relevant geology.

Trend

Similar projected geology minimally explored due to cover, mis-mapping, access issues

Major Mining District

Controlled by major mining companies which engage in brownfields exploration

Minor Mining District

Small scale, artisanal, no longer mining, often historical camp, fragmented ownership

Mineralized District

Discovered but never mined due to marginal economics – scale, location, metallurgy, politics

Depletion & Reclamation

Major stops mining due to depletion or declining scale

District Consolidation & Rethink

Junior secures control of district to allow an expansion by exploration or a feasibility demonstration rethink

Existing System Rethink

Feasibility Demonstration – spend money to show existing deposit is economic

Peripheral

Data compilation & better grasp of deposition model indicates larger footprint for prospective geology

Expansion Rethink "Bigger, More, Better"

New Exploration Strategy

Lumina Model

Higher real metal prices make feasible

New Mining Approach

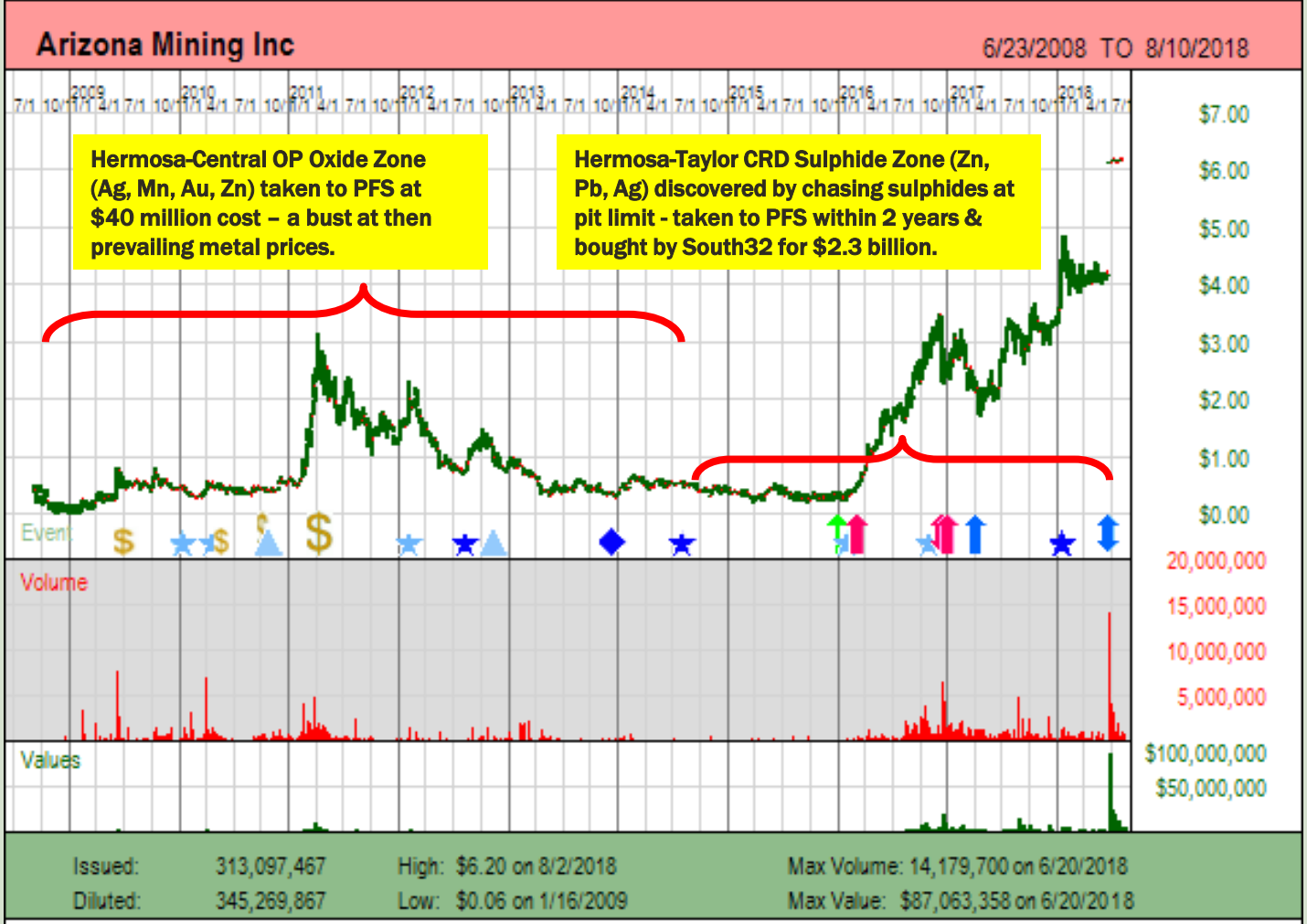
Scale Up, Open Pit or Underground

New Access

Infrastructure, politics, mining law

New Processing Technology

Overcomining metallurgy or grade obstacles


Arizona Mining Inc
6/23/2008 TO 8/10/2018
Hermosa-Central OP Oxide Zone (Ag, Mn, Au, Zn) taken to PFS at $40 million cost – a bust at then prevailing metal prices.
Hermosa-Taylor CRD Sulphide Zone (Zn, Pb, Ag) discovered by chasing sulphides at pit limit - taken to PFS within 2 years & bought by South32 for $2.3 billion.
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Event
Volume
20,000,000
15,000,000
10,000,000
5,000,000
Values
$100,000,000
$50,000,000
Issued: 313,097,467
Diluted: 345,269,867
High: $6.20 on 8/2/2018
Low: $0.06 on 1/16/2009
Max Volume: 14,179,700 on 6/20/2018
Max Value: $87,063,358 on 6/20/2018
KaiserResearch.com
AZ - TSX - Daily - CAD $6.19
Copyright 2018 Kaiser Research

Resource Project Valuation: Discounted Cash Flow Model (DCF)
Curse or Saving Grace for the Resource Juniors?

$$\sum_{n=1}^{m} \frac{\text{Annual Cash Flow}}{(1 + \text{Discount Rate})^n}$$

Minus Capital Cost

= Net Present Value

n = year of cash
m = mine life (years)

	Annual Revenue
less	Operating Costs
=	Pre-Tax Cash Flow
less	Taxes
=	After Tax Cash Flow

Note: if n=0 then the capital cost can be included as an initial negative value in the cash flow series because anything to the power of 0 =1. VBA functions start with n=1.

Rational Speculation Model – Uncertainty Ladder for Metal Projects

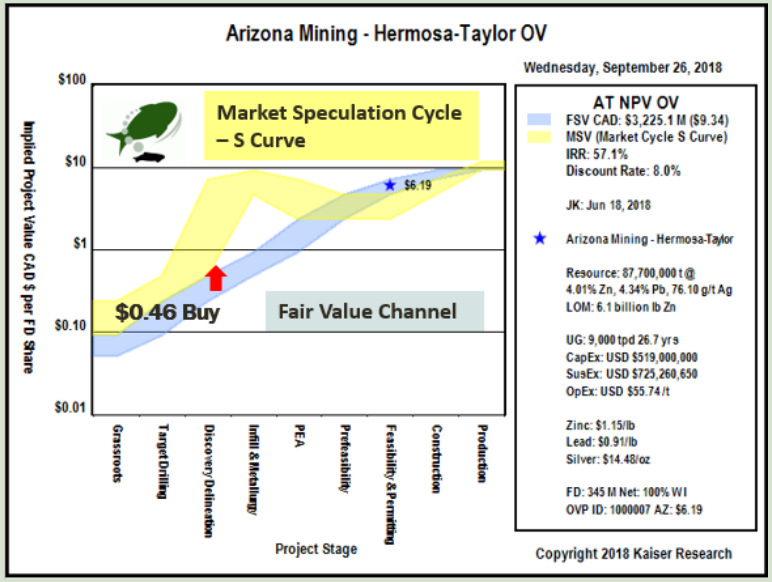
	Exploration Cycle Stages	Success Probability		Outcome Target Fair Value Channels ($ Millions)		
		Certainty	Leverage	$100	$500	$2,000
1	Grassroots	0.5-1%	100-200	<$1	$2.5-5	$10-20
2	Target Drilling	1-2.5%	40-100	$1-2.5	$5-12.5	$20-50
3	Discovery Delineation	2.5-5%	20-40	$2.5-5	$12.5-25	$50-100
4	Infill Drilling & Metallurgy	5-10%	10-20	$5-10	$25-50	$100-200
5	PEA	10-25%	4-10	$10-25	$50-125	$200-500
6	Prefeasibility	25-50%	2-4	$25-50	$125-250	$500-1,000
7	Permitting, Marketing & Feasibility	50-75%	1.3-2	$50-75	$250-375	$1,000-1,500
8	Construction	75-100%	1	$75-100	$375-500	$1,500-2,000
9	Production	100%		$100	$500	$2,000

Note: the fair value range in each exploration stage row for each outcome target column is calculated by multiplying the target value by the success chance. ie stage 4 target $500: 0.05 x $500 = $25, 0.1 x $500 = $50

Economic Geology: the Size of the Prize

Key Concepts

- Discounted Cash Flow Model
- Fair Value: Certainty times Prize
- Uncertainty Ladder for Resource Projects



Understanding a Resource Junior Story Path

Dia Met Minerals Ltd – Ekati - Diamonds

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- Long Timelines for Exploration-Development Cycle
- Unreliability of Micro Diamonds & Indicator Mineral Chemistry in assessing target prospectivity
- Delayed outcome visualization & S-Curve: Grade <> Value
- Diminished new field or cluster discovery potential except in difficult covered settings
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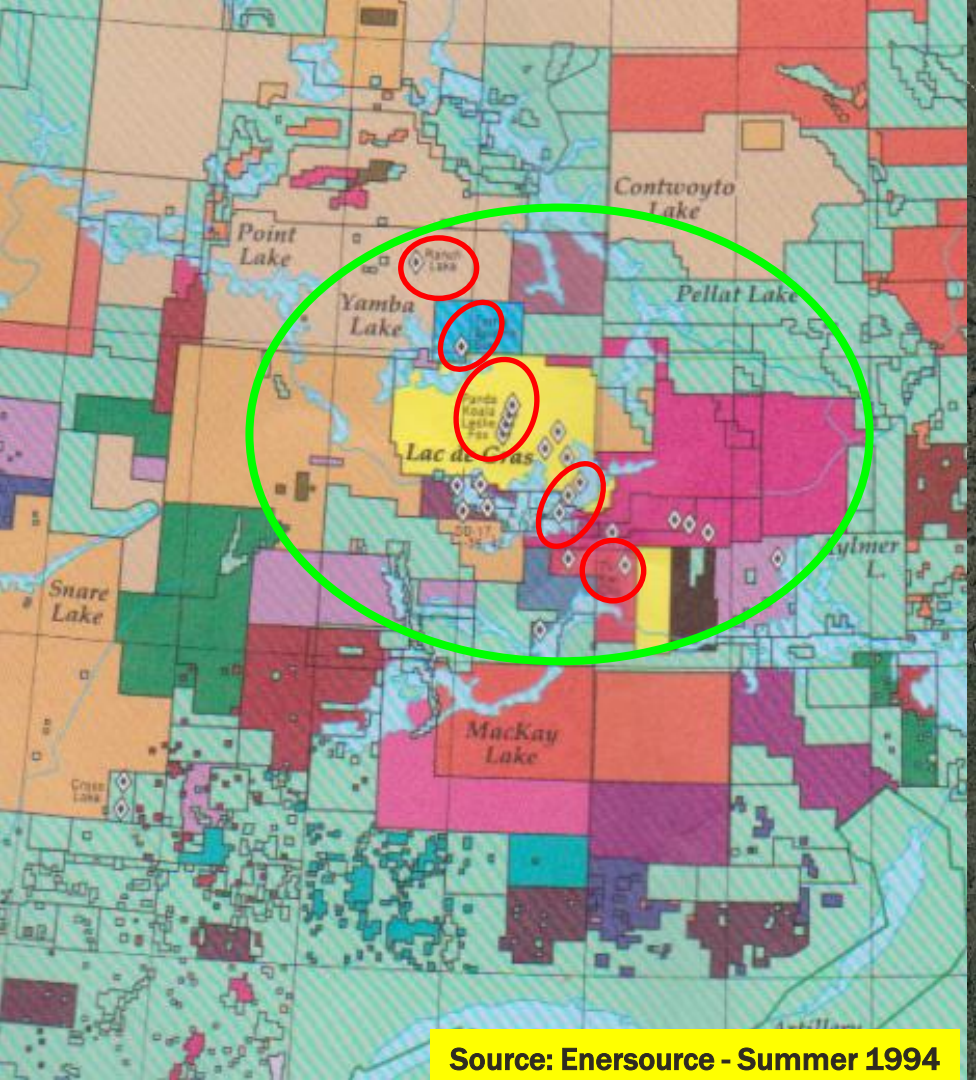
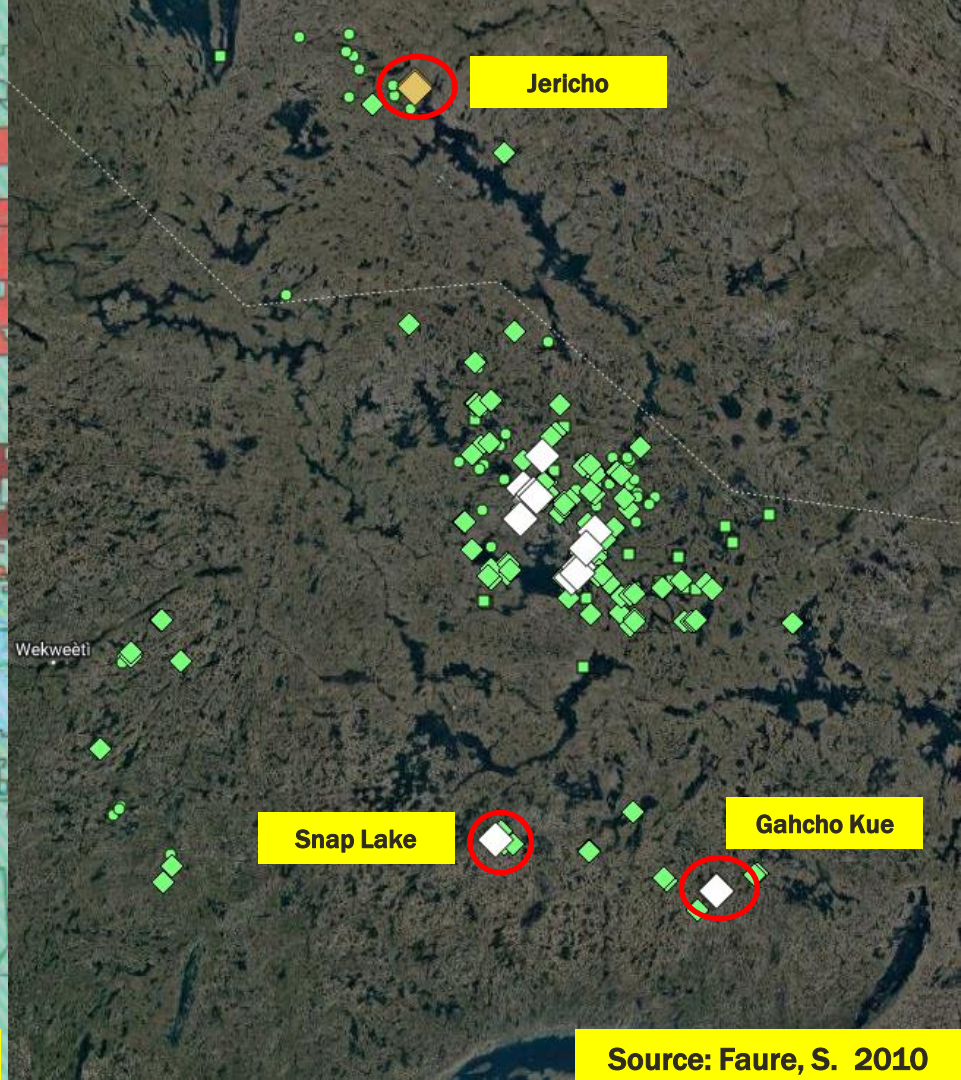
- Ethical Concerns: Natural vs Lab Grown

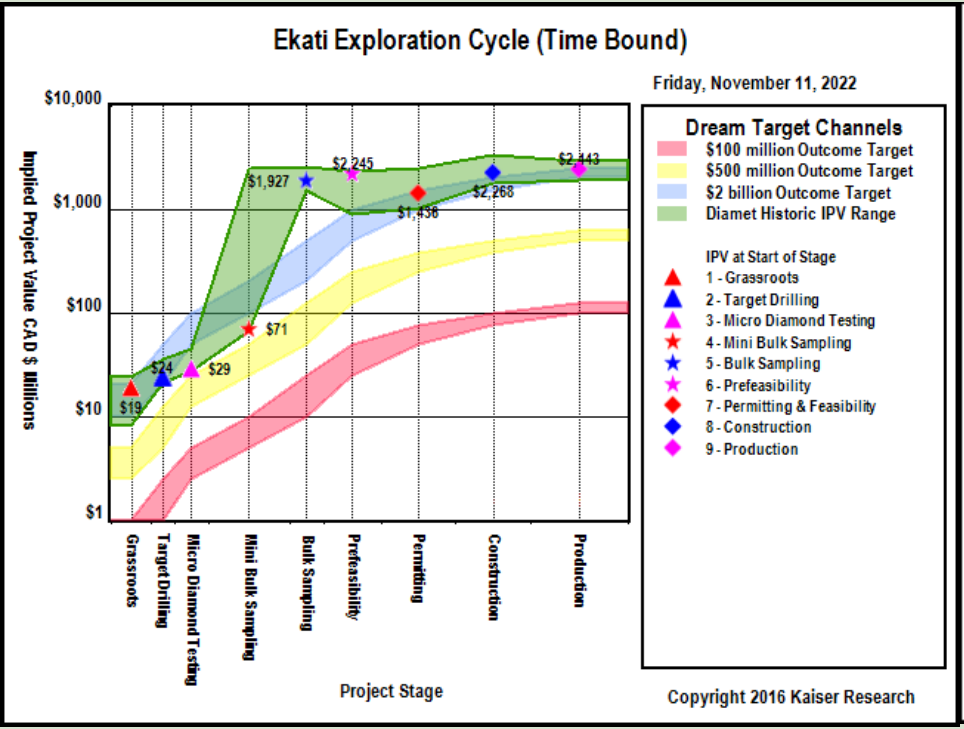


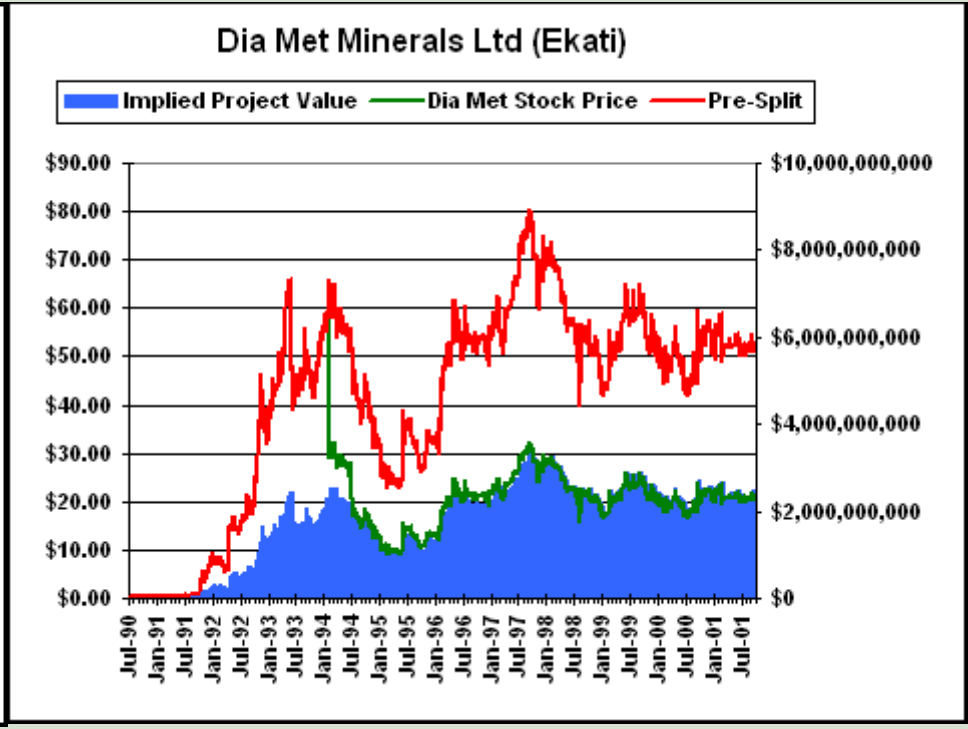
Source: Enersource - Summer 1994



Source: Faure, S. 2010

Ekati was unusual in that it took only 8 years from the BHP JV to commercial production, Dia Met's implied project stayed in the upper part of the S-Curve throughout feasibility demonstration, and was bought out at the $2.3 billion S-Curve peak valuation within 3 years of production startup. Chuck Fipke and Stu Blusson's diamond discovery inspired 2 decades of resource junior diamond exploration involving hundreds of companies.





Ekati Diamond Exploration to Production Cycle for Dia Met Minerals Ltd

Exploration Cycle Stage	Date range for stage		Days	% of 8 yr cycle	Low IPV	High IPV	IPV at Start
1 - Grassroots	Sep 06, 1990	Aug 31, 1991	359	12%	$8,000,000	$24,000,000	$19,000,000
2 - Target Drilling	Sep 01, 1991	Sep 17, 1991	16	1%	$21,000,000	$36,000,000	$24,000,000
3 - Micro Diamond Testing	Sep 18, 1991	Nov 05, 1991	48	2%	$27,000,000	$45,000,000	$29,000,000
4 - Mini Bulk Sampling	Nov 06, 1991	Sep 21, 1993	685	23%	$66,000,000	$2,435,000,000	$71,000,000
5 - Bulk Sampling - PEA	Sep 22, 1993	May 05, 1994	225	8%	$1,526,000,000	$2,545,000,000	$1,927,000,000
6 - Prefeasibility	May 06, 1994	Jul 23, 1995	443	15%	$904,000,000	$2,322,000,000	$2,245,000,000
7 - Feasibility-Permitting	Jul 24, 1995	Feb 03, 1997	560	19%	$1,028,000,000	$2,459,000,000	$1,436,000,000
8 - Construction	Feb 04, 1997	Oct 13, 1998	616	20%	$1,766,000,000	$3,323,000,000	$2,268,000,000
9 - Production	Oct 14, 1998	Nov 01, 2001	1,114		$1,877,000,000	$2,914,000,000	$2,443,000,000

Notes

1) IPV = "implied project value" (Dia Met fully diluted x closing price / net interest)

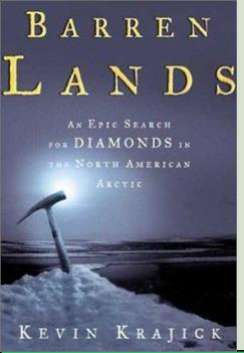
2) Dia Met's net interest is 29% as of September 6, 1990 BHP farmout announcement

3) Date range is the time spent during the stage until results prompt a decision to move to the next stage

4) Dia Met hit Point Lake kimberlite within 2 weeks of starting drilling and found numerous more pipes

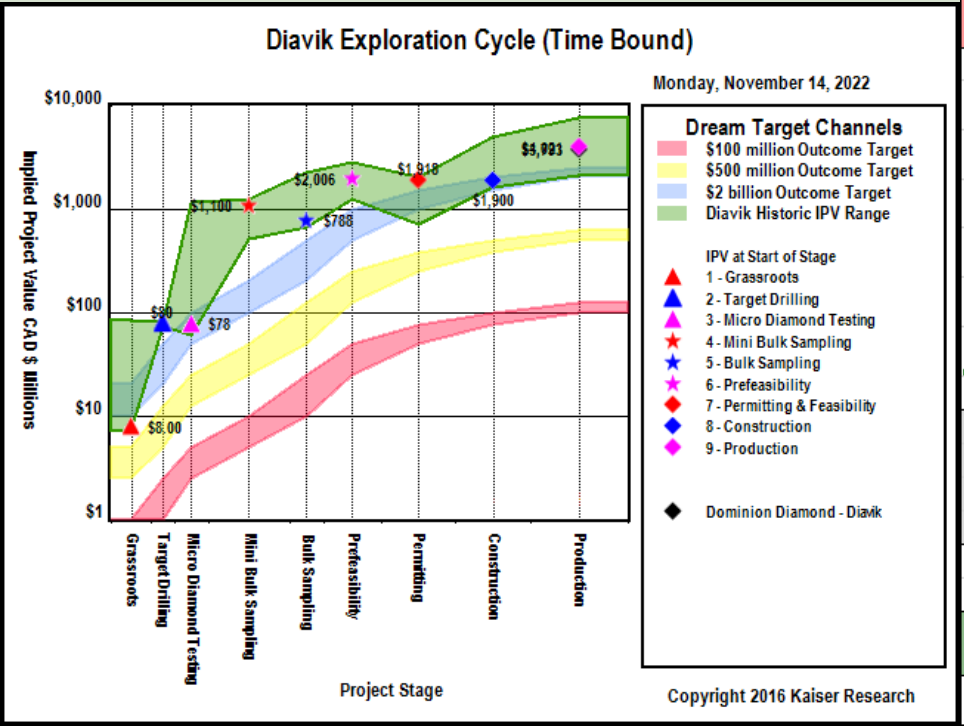
5) It took 8 years from the BHP JV to commercial production

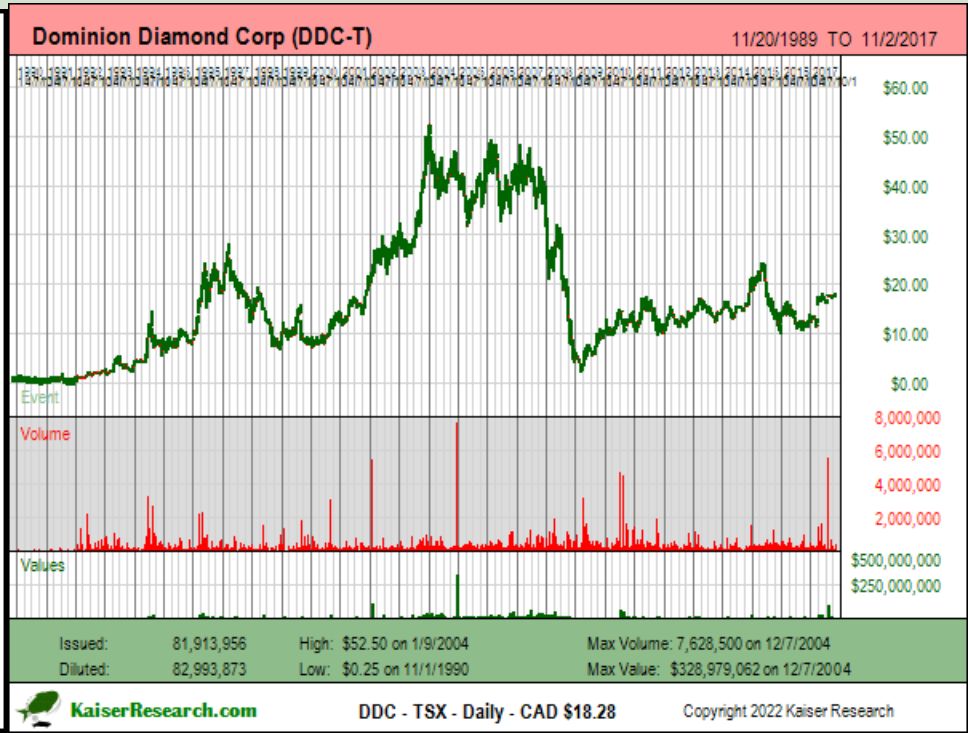
6) Dia Met was taken over by BHP on Nov 1, 2001 by a $21 per share cash offer that valued Ekati at $2.3 billion



Sadly, their subsequent track record was not inspiring. Chuck Fipke and Stu Blusson retained 10% carried interests in Ekati whose discovery as described in the Kevin Krajick's *Barren Lands* was NOT an exercise in disciplined exploration method. It was an exercise in chaotic persistence blessed with luck whose reward cannot be begrudged, but whose legacy proved not fruitful for investors in Chuck's Metalex and Stu's Archon during the ensuing quarter century.

Aber, 40% partner with Rio Tinto, was quick to convert geophysical targets into kimberlites which proved near barren, but it took 12 years to deliver mine. In early 1994 the Diavik cluster with “visible diamond” in core was discovered, redeeming the juniors in the wake of the Tli Kwi Cho Bust which wiped out $1 billion in market cap, including Dia Met and Aber, though both recovered. Although Aber funded its share of CapEx and Diavik was a success when production started in 2003, Aber never evolved as Canada’s diamond champion, aggregating other juniors or supporting them. The 2013 purchase of BHP’s Ekati stake signaled a possible shift, but Dominion Diamonds was bought by the Washington Group in 2017 and went bankrupt.





Diavik Diamond Exploration to Production Cycle for Aber Diamonds Ltd

Exploration Cycle Stage	Date range for stage		Days	% of 12 yr cycle	Low IPV	High IPV	IPV at Start
1 - Grassroots	Dec 10, 1991	Sep 21, 1992	286	7%	$7,000,000	$84,000,000	$8,000,000
2 - Target Drilling	Sep 22, 1992	Sep 30, 1992	8	1%	$72,000,000	$82,000,000	$80,000,000
3 - Micro Diamond Testing	Oct 01, 1992	Jul 27, 1994	664	16%	$60,000,000	$1,142,000,000	$78,000,000
4 - Mini Bulk Sampling	Jul 28, 1994	Jun 28, 2005	334	8%	$516,000,000	$1,252,000,000	$1,100,000,000
5 - Bulk Sampling & PEA	Jun 29, 2005	Jan 20, 1997	572	13%	$673,000,000	$2,217,000,000	$788,000,000
6 - Prefeasibility	Jan 21, 1997	Mar 06, 1998	408	10%	$1,238,000,000	$2,853,000,000	$2,006,000,000
7 - Feasibility-Permitting	Mar 07, 1998	Dec 19, 2000	1,018	24%	$702,000,000	$2,011,000,000	$1,918,000,000
8 - Construction	Dec 20, 2000	Jul 31, 2003	954	21%	$1,611,000,000	$4,857,000,000	$1,900,000,000
9 - Production	Aug 01, 2003	Nov 2, 2017	5,207		$4,690,000,000	$7,612,000,000	$4,021,000,000

Notes

1) IPV = "implied project value" (Aber fully diluted x closing price / net interest

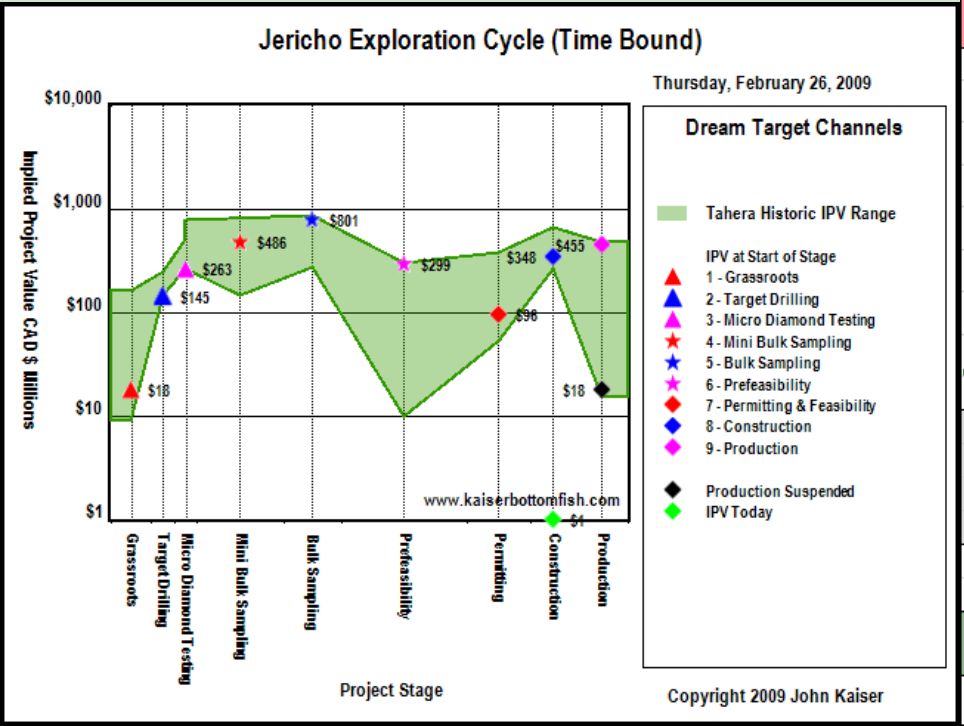
2) Aber's net interest is 100% until June 2, 1992 when farmout to Kennecott reduces it to 40%

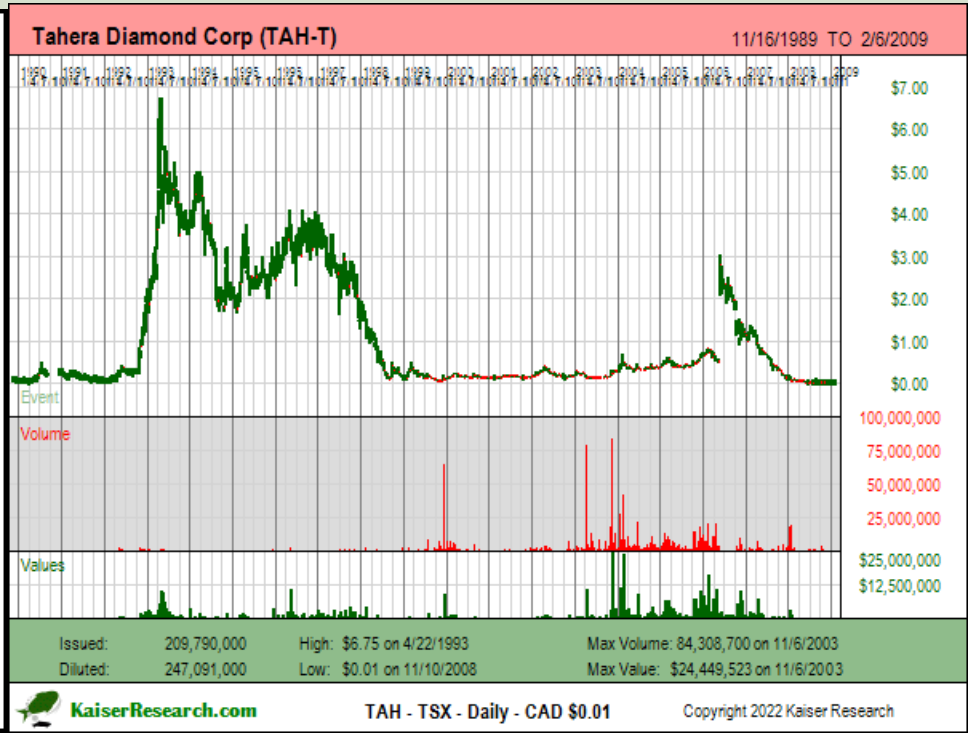
3) Date range is the time spent during the stage until results prompt a decision to move to the next stage

4) Aber hit kimberlite within 1 week of starting drilling and intersected numerous pipes before finding A154 in 1994

5) Diavik operated 14 years until Aber, first renamed Harry Winston and then Dominion Diamonds, was bought by the Washington group on Nov 2, 2017 for US $14.50 per share for US $12. billion reflecting 40% of Diavik and 89% of Ekati acquired in 2013 for US $553 million. Diavik is still operating.

Jericho emerged from a massive land position staked north of Ekati and bankrolled by Ned Goodman. Tahera, initially named Lytton, played a regional statistics game of till sampling and geophysical target testing. The first pipe it discovered was the large Ranch Lake pipe north of Ekati which became an early example of the Canadian diamond curse: it has large tonnage, high grade and high carat value, but never all three together. An early lament from BHP's Hugo Dummett was that a world class pipe like Botswana's Jwaneng seems to have eluded Canada. Jericho was unusual among the Slave kimberlites in that it had an eclogitic paragenesis. The mine downfall appears to have been a failure to understand the liberation requirements for the xenolith rich kimberlite. Shear tried to revive Jericho after Tahera's bankruptcy but also failed.





Jericho Diamond Exploration to Production Cycle for Tahera Diamond Corp

Exploration Cycle Stage	Date range for stage		Days	% of 14 yr cycle	Low IPV	High IPV	IPV at Start
1 - Grassroots	Apr 23, 1992	Jan 12, 1993	264	5%	$9,000,000	$160,000,000	$18,000,000
2 - Target Drilling	Jan 13, 1993	Mar 21, 1993	67	2%	$144,000,000	$244,000,000	$145,000,000
3 - Micro Diamond Testing	Mar 22, 1993	Apr 28, 1993	37	1%	$260,000,000	$515,000,000	$263,000,000
4 - Mini Bulk Sampling	Apr 29, 1993	Apr 28, 1996	1,095	21%	$147,000,000	$782,000,000	$486,000,000
5 - Bulk Sampling & PEA	Apr 29, 1996	Mar 11, 1998	681	13%	$274,000,000	$871,000,000	$801,000,000
6 - Prefeasibility	Mar 12, 1998	Feb 05, 2003	1,791	35%	$10,000,000	$300,000,000	$299,000,000
7 - Feasibility-Permitting	Feb 06, 2003	Feb 10, 2005	735	14%	$52,000,000	$373,000,000	$96,000,000
8 - Construction	Feb 11, 2005	May 03, 2006	446	9%	$262,000,000	$662,000,000	$348,000,000
9 - Production	May 04, 2006	Jan 23, 2008	629		$15,000,000	$480,000,000	$455,000,000

Notes

1) IPV = "implied project value" (Dia Met fully diluted x closing price / net interest

2) On Feb 13, 1995 focus shifts from 100% owned ground to 50% owned Jericho play, merger on Mar 2, 1999 brings to 100%

3) Date range is the time spent during the stage until results prompt a decision to move to the next stage

4) Tahera (Lytton) hit Ranch Lake kimberlite 3 weeks after drill start and received micro diamond data within 5 weeks

5) It took 14 years from the Benachee acquisition in 1992 to achieve production which lasted less than 2 years.

6) On January 23, 2008 Tahera suspended production due to losses and recovery problems, and delisted in 2009.

Reasons Investors have lost interest in Diamond Exploration

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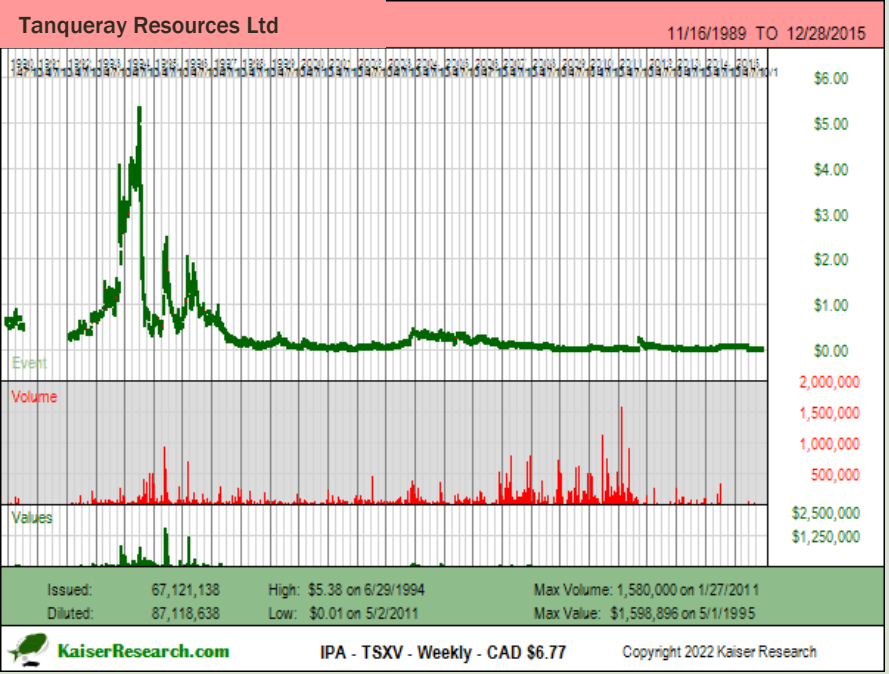
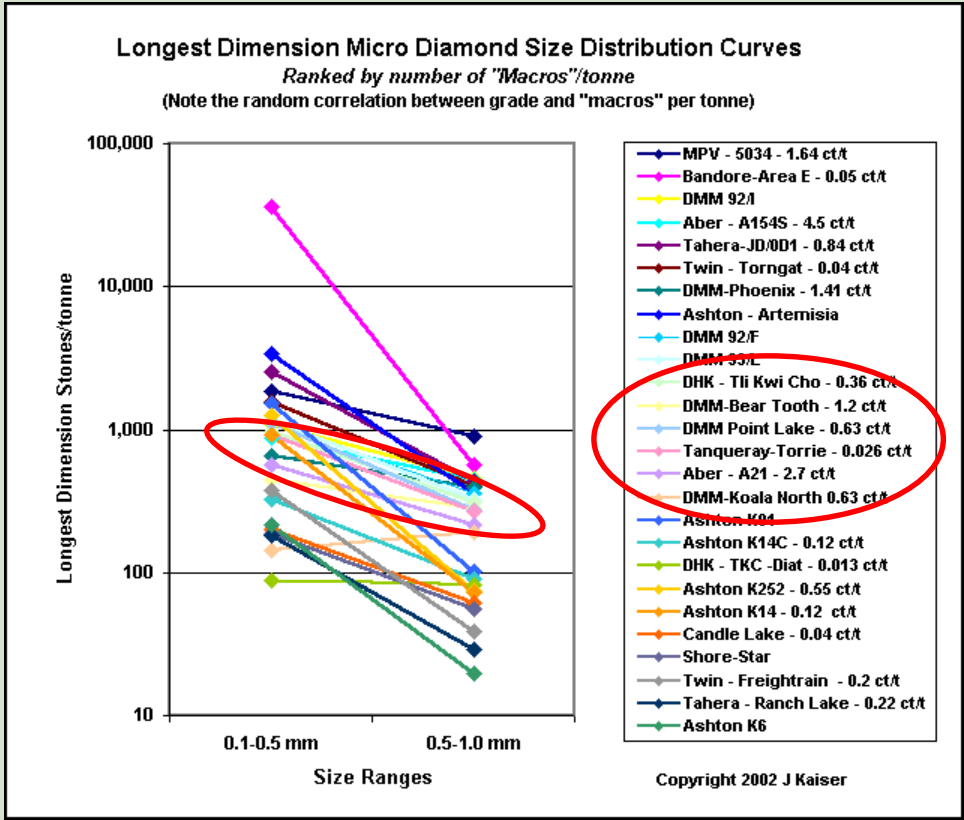


Macro-Micro Distinction defined by > or < than 0.5 mm in the longest dimension: a nonsense reporting method invented by Dia Met to which BHP acquiesced.

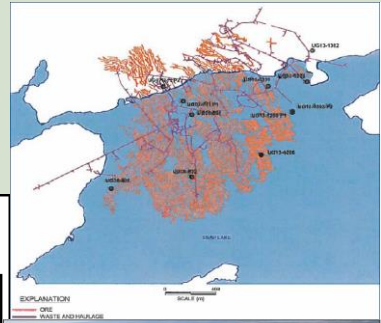


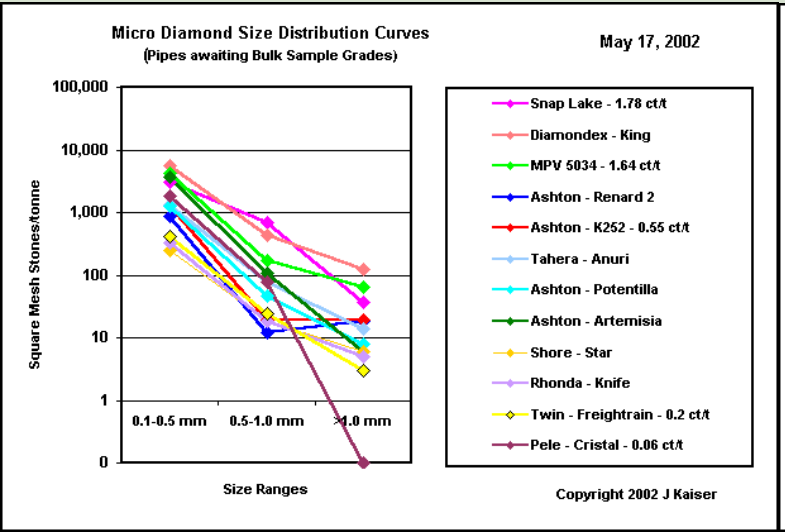
- Oct 19, 1993: Torrie Pipe at Yamba Lake yields 152 micros and 39 macros from 161.6 kg
- May 6, 1994: 24.5 tonne mini bulk sample collected
- July 18, 1994: De Beers options 51% & processes bulk sample at Fort Collins
- Aug 26, 1994: De Beers 19 diamonds weighing 0.635 carats recovered for indicated grade of 2.6 cpht
- Low grade blamed on too many fragments qualifying as “macros”. Stock had already collapsed on Aug 5 bulk sample results for DO27.

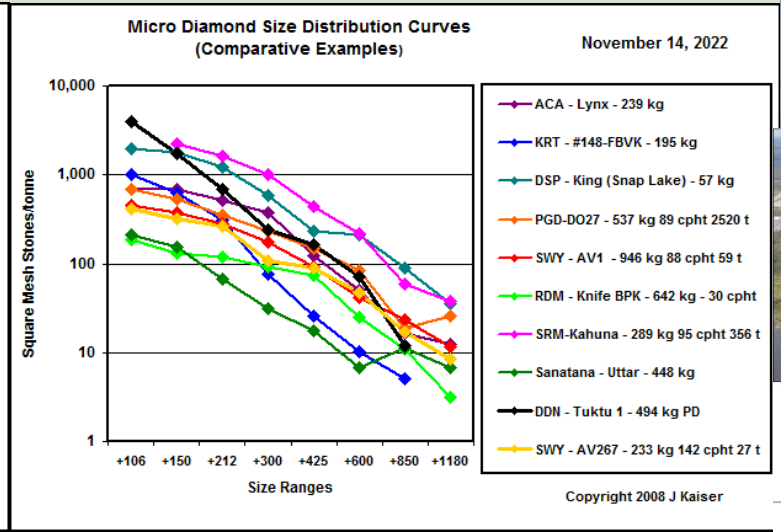
Snap Lake: Discovered 1997, bought by De Beers for $500 million in 2000, mining started 2008 & stopped in 2015.

June 15, 1998: *For both samples, a total of 199.7 dry tonnes were processed for the recovery of 228.9 carats. This yields an average grade of 1.14 carats per dry tonne ...* ***The three largest stones recovered weigh 10.87, 8.43, and 6.03 carats, respectively. All are of gem quality.*** *In addition, a further 18 diamonds were recovered that are more than one carat in weight. There is no significant difference in the diamond populations of the two samples.*

June 18, 1999: *Processing of 3,003.9 dry tonnes of kimberlite from Pit 4 on the NW dike at Snap Lake, Haywood project, Camsell property, has recovered 5,542.27 carats of diamonds valued at $98.42 (U.S.) per carat. A total of 88 stones in the parcel exceeds three carats in weight. The largest diamond recovered weighs 14.3 carats.* Grade (carats per tonne) - 1.845, Value per carat - $98.42 (U.S.), Value per tonne - $181.58 (U.S.)







SNAP LAKE MINE

Final Closure and Reclamation Plan

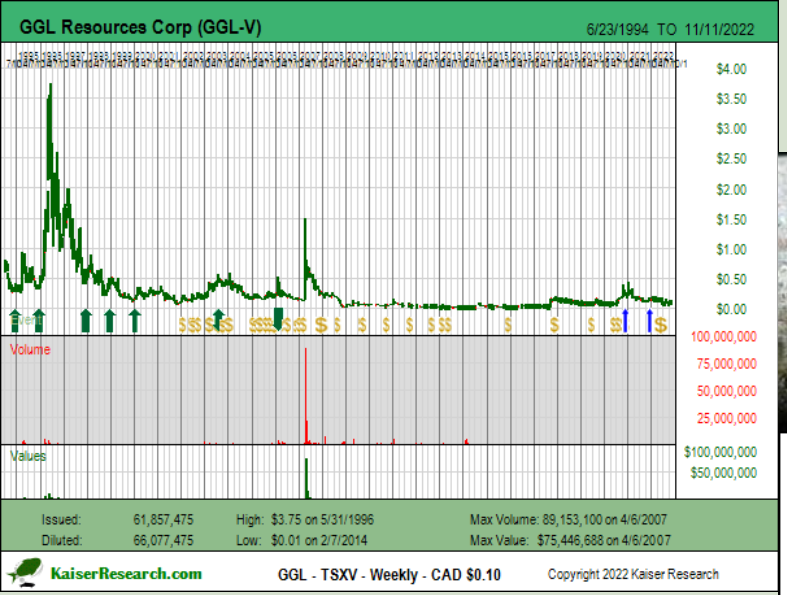
March 2019

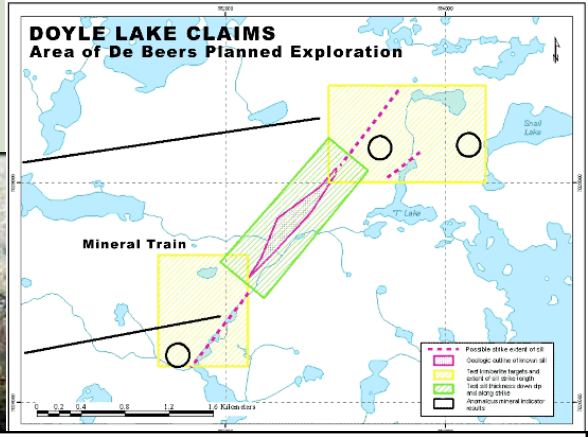
Guidelines for the Reporting of Diamond Exploration Results – January 1, 2003

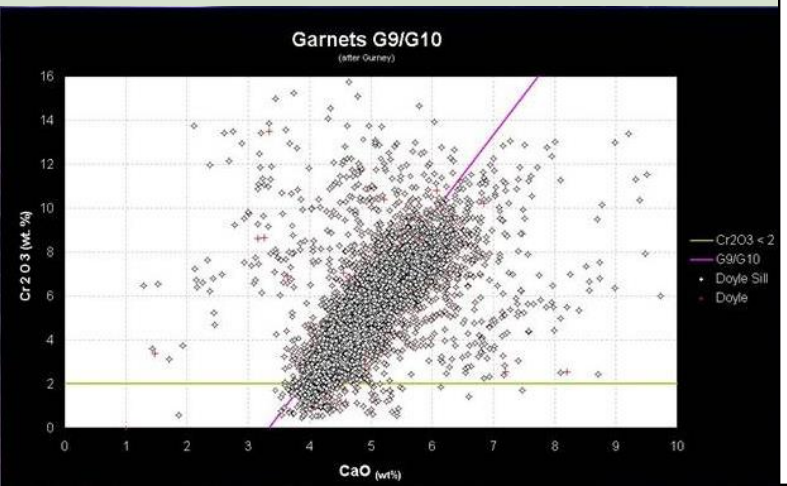
Processing of Samples Using Total Liberation Laboratory Techniques	
Sample Description	
Source	Outcrop, boulders, drill core, reverse circulation drill cuttings, gravel, stream sediment, soil
Type	Chip, channel, grab, full core, split core, riffled split of drill cuttings. Description should include customary information such as recovery percentages etc.
Interval	centimetre, metre, square metre
Rock Type	Geological description by a Qualified Person.
Sample Weight	Calculated as dry metric tonnes (t). or kilograms (kg)
Sample Treatment	
Laboratory Name	The name of the processing laboratory should be disclosed and the company should be in possession of written confirmation of the results from a responsible person representing the laboratory.
ISO Compliance	The company should disclose whether the samples have been treated by a laboratory accredited to the ISO/IEC Guide 17025
Chain of Custody	The company should confirm that industry standards have been followed to ensure that the "Chain of Custody" has been maintained
Method	Caustic dissolution, hydrofluoric acid, attrition milling etc.
Recovery Lower Cut-Off Size	mm square mesh of the lower cut-off size using an Endecott or Tyler woven wire mesh sieve
Sample Results	
Diamond Count	Number of diamonds per size class using a root-two progression of square mesh woven wire Endecott or Tyler sieves
Diamond Weight	Weight, in carats, of diamonds per size class using a root-two progression of square mesh woven wire Endecott or Tyler sieves
Diamond Size Distribution	The distinction between "micro" and "macro" diamond has been deliberately dropped from these reporting guidelines on the basis that there is no natural boundary in the continuum of diamond sizes present in a diamond bearing host rock. A complete set of sieve data using a standard progression of sieve sizes provides superior data to the public. The table below should be used as the standard reporting format.
Sample "Grade"	Most of the diamonds liberated and recovered by total dissolution methods would not be recovered in a commercial treatment process. To eliminate confusion with the potentially commercial grades generated by a pilot plant, usage of the word "grade" for the results from total dissolution should be avoided.

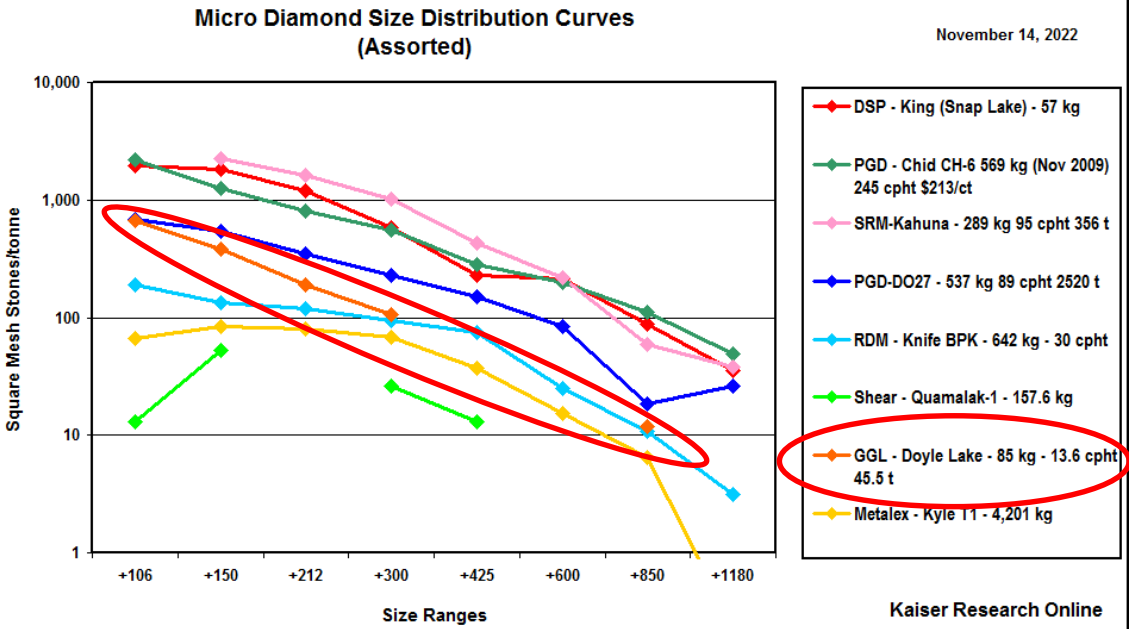
Sieve size (mm square mesh)	Number of diamonds	Weight of diamonds (carats)
> 9.50	Report individually	
6.70 to 9.50		
4.75 to 6.70		
3.35 to 4.75		
2.36 to 3.35		
1.70 to 2.36		
1.18 to 1.70		
0.85 to 1.18		
0.600 to 0.850		
0.425 to 0.600		
0.300 to 0.425		
0.212 to 0.300		
0.150 to 0.212		
0.105 to 0.150		
Total		
Total > 0.85 mm		

Doyle Lake – Excellent chemistry but a low grade sill

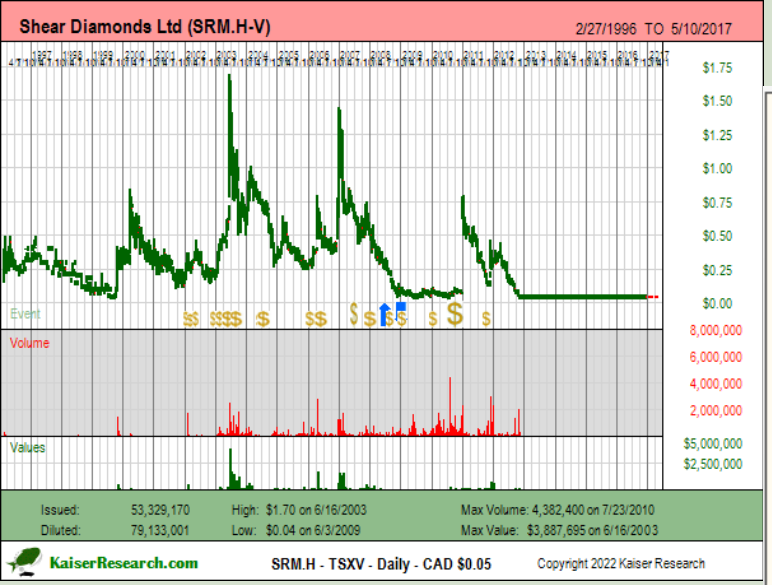


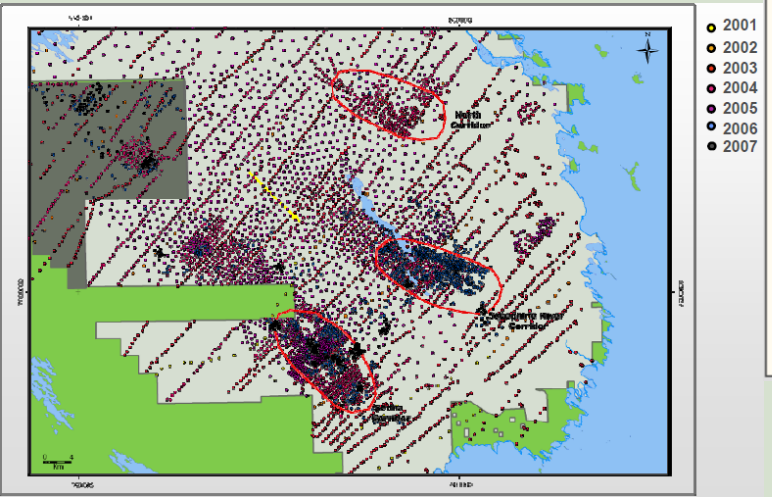


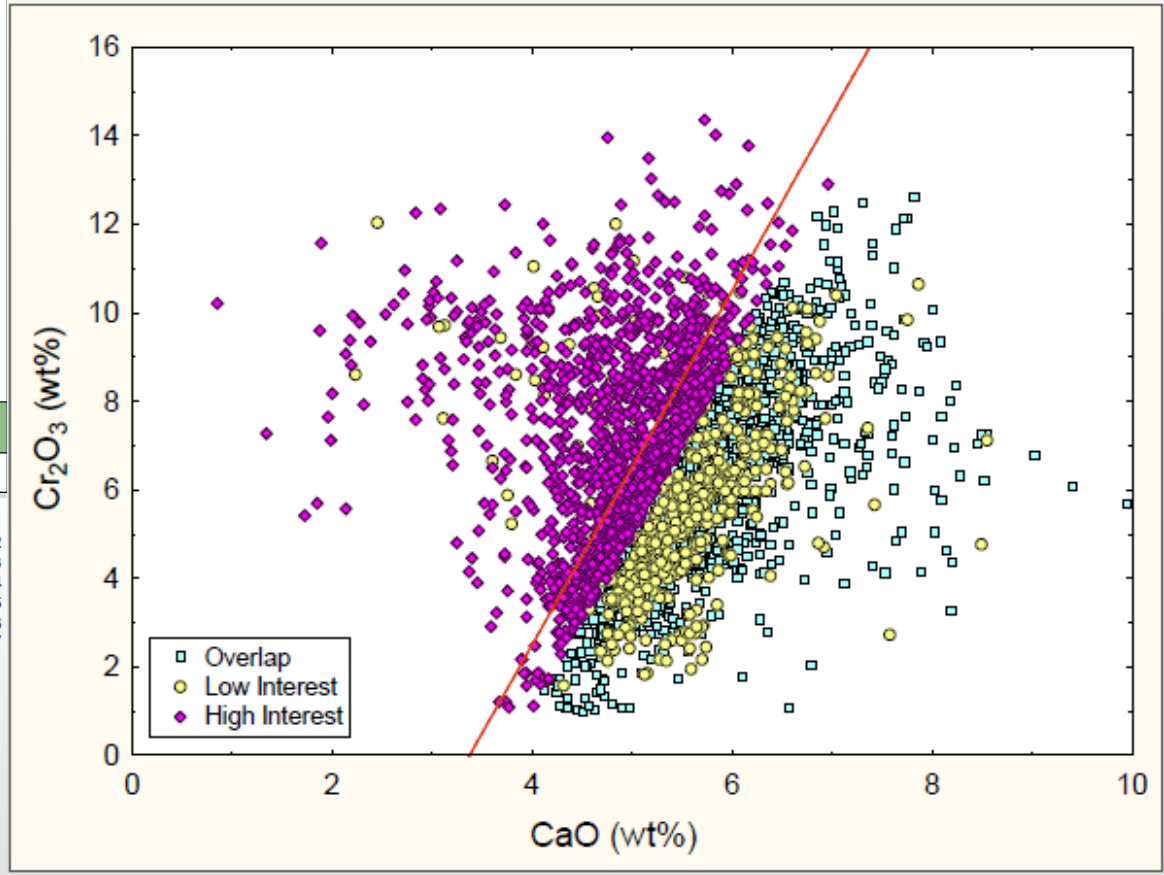




Churchill – the Not So Big Kahuna

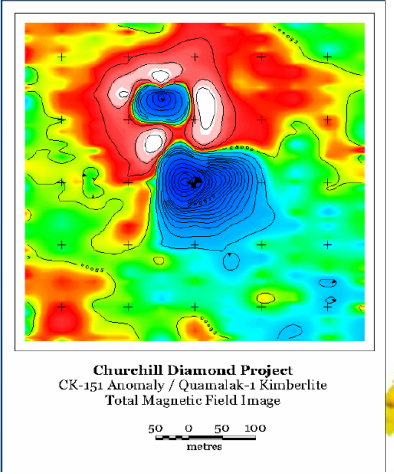


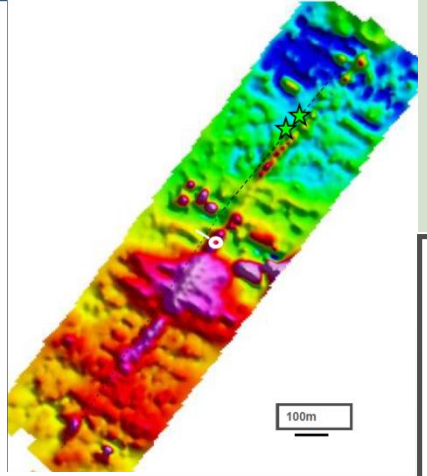


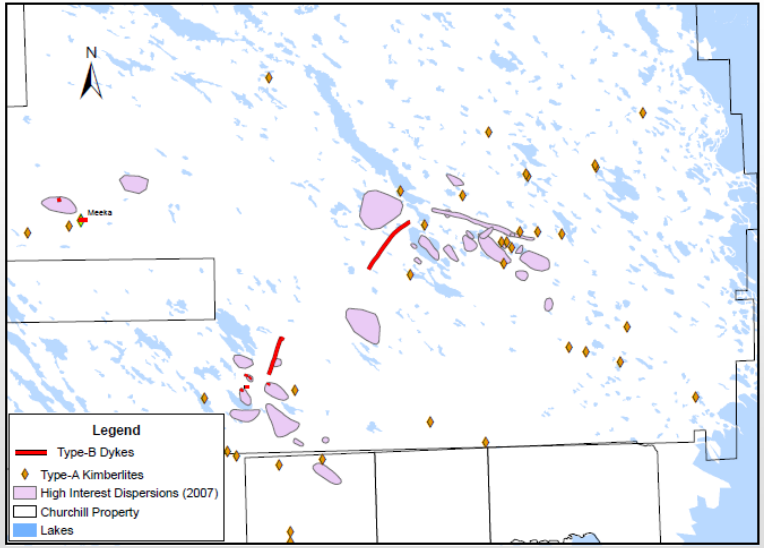


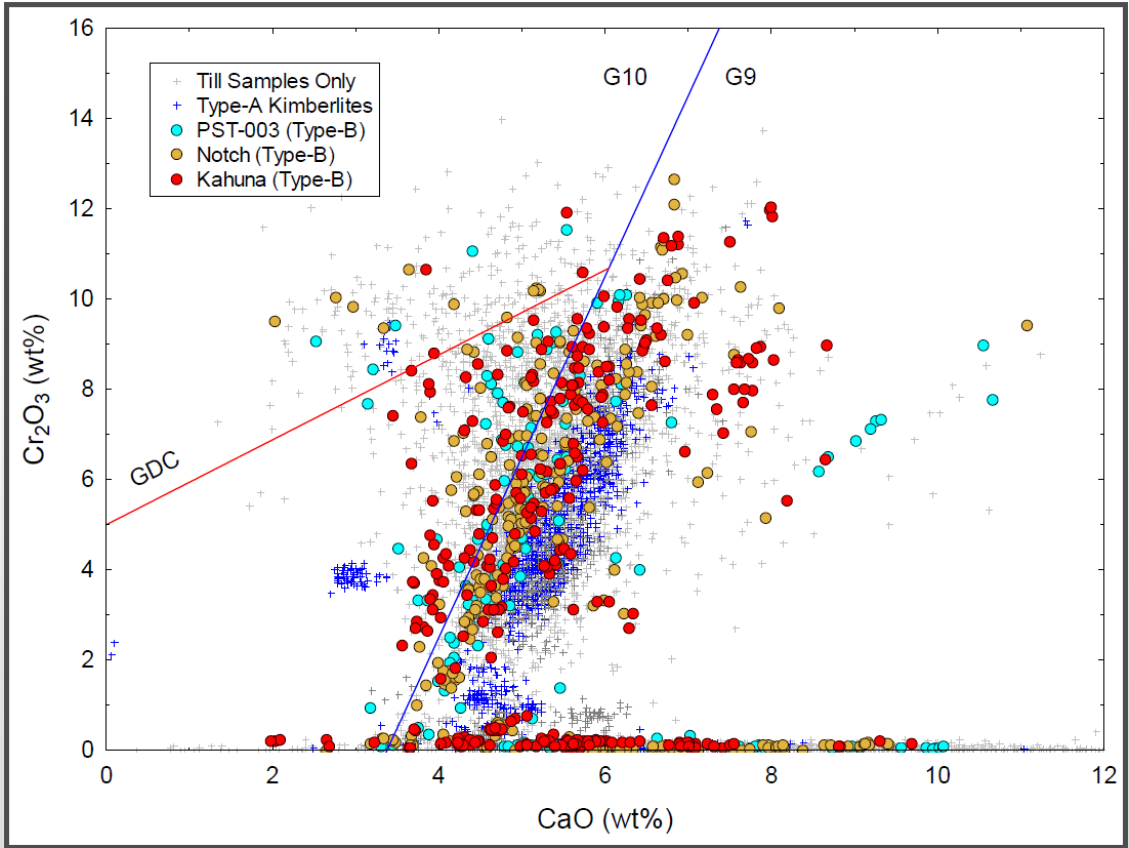
Source: PDAC Presentation March 3, 2008

Rapid success testing geophysical mag high-low targets 2003-2005 but Type-A kimberlites yield weak chemistry & micro diamond results, 2006-2008 focus shifts to Type B dykes which yield chemistry & grade





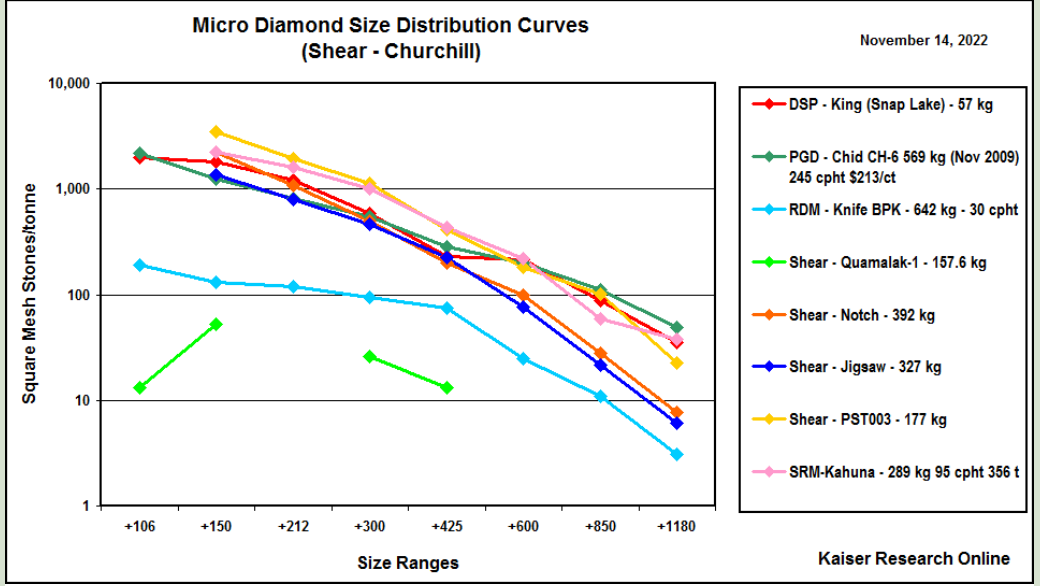




MINERAL SERVICES

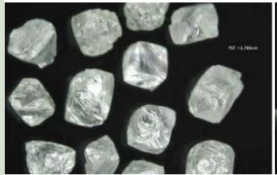
Type A & B Microdiamond Counts

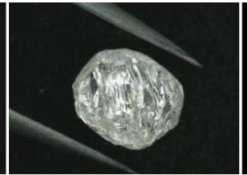
Kimberlite	Sample Weight (kg)	0.150 mm Sieve	0.212 mm Sieve	0.300 mm Sieve	0.425 mm Sieve	0.600 mm Sieve	0.850 mm Sieve	1.180 mm Sieve	1.700 mm Sieve	2.360 mm Sieve	Microdiamonds	Micro/kg
PST003	195.86	672	370	206	74	32	18	3	1	0	1,293	6.6
Notch	397.6	875	427	197	81	36	14	2	1	0	1,544	4
Jigsaw	327.0	441	260	153	74	25	7	2	0	0	903	3
Kahuna	203.8	369	249	171	75	33	8	3	0	1	834	4
KD 24	2.2	82	49	30	12	9	5	2	0	0	189	85
KD 308	160	6	4	0	0	1	0	0	0	0	21	<1
KD 900	128.3	4	4	2	0	1	0	0	0	0	12	<1



Type B - Macrodiamond Sample Grades

Sample Number	Sample Weight Dry (tonnes)	Sample Grade Carats per tonne (+0.85mm)	Weight of Diamonds Recovered (carats) (>+0.85mm)	Number of stones >0.85 mm	0.85 mm Sieve	1.18 mm Sieve	1.70 mm Sieve	2.36 mm Sieve	3.35 mm Sieve
PST003	3.55	2.18	7.72	235	127	77	24	6	1
Kahuna	3.13	1.11	3.48	180	132	40	6	2	0
Notch	4.93	0.82	4.03	153	84	54	14	1	0
Notch North	0.5	0.8	0.40	23	15	7	1	0	0
Jigsaw	5.15	0.49	2.53	78	50	18	8	1	1

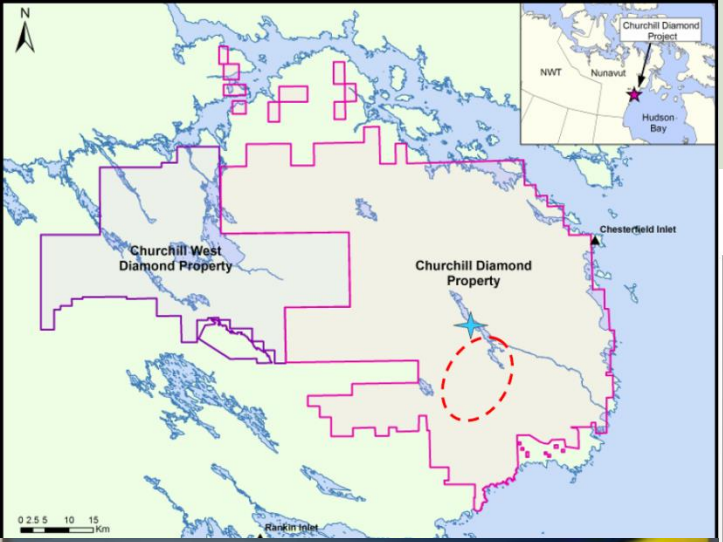




Type B – Macrodiamond Sample Grades (con't)

Kahuna Sample Number	Sample Weight Dry (tonnes)	Diamond Recovery Carats per tonne (+0.85mm)	Weight of Diamonds Recovered (carats) (+0.85mm)	Number of stones +0.850 mm	0.850 mm Sieve	1.180 mm Sieve	1.700 mm Sieve	2.360 mm Sieve	3.350 mm Sieve	4.750 mm Sieve	6.700 mm Sieve
Kahuna – Sample 1[1]	98.13	1.03	100.80	3,582	1,737	1,528	263	48	6	0	0
Kahuna – Sample 3[2]	151.63	0.94	142.35	4,267	2,015	1,850	302	76	20	3	1
Kahuna – Sample 2[3]	106.57	0.88	93.54	3,239	1,609	1,374	203	40	13	0	0
Total Kahuna	356.33	0.95	336.69	11,088	5,499	4,772	773	165	39	3	1

[1] Largest diamond 0.98 carats
[2] Largest diamonds 5.44, 2.05, 1.54, 1.44, and 1.32 carats; as reported in November 14, 2007 news release
[3] Largest diamonds 1.39, 1.19 and 0.73 carats; as reported in September 8, 2007 news release



Final Verdict – tonnage & diamond quality too low

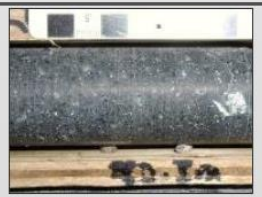
Two Types of Kimberlite Exist at Churchill

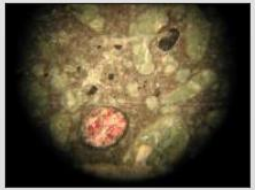
Type A (170-225 Ma)

- Strong magnetic signatures
- Fine-grained
- Dominantly magmatic textures
- Large olivine phenocrysts
- Low indicator mineral abundances with rare garnet, abundant ilmenite
- Poor mineral chemistry and geotherm
- Generally Low Diamond Carrying Capacity
- 71 kimberlite pipes and dykes identified to date

Type B (232 Ma)

- Subtle magnetic signature
- Medium Grained
- Two generations of olivine including macrocrysts
- High indicator mineral counts
- Good mineral chemistry
- Cold geotherm
- Common pyrope garnet and less common Ilmenite
- Moderate- High Diamond Carrying Capacity
- Eight Kimberlite Dykes Identified including Kahuna, Notch, PST, Jigsaw, Meeka





Reasons Investors have lost interest in Diamond Exploration

- Limited Story Paths for Rethink Plays
- Long Timelines for Exploration-Development Cycle
- Unreliability of Micro Diamonds & Indicator Mineral Chemistry in assessing target prospectivity
- Delayed outcome visualization & S-Curve: Grade <> Value
- Diminished new field or cluster discovery potential except in difficult covered settings
- Title Risk in Frontiers
- Ethical Concerns: Natural vs Lab Grown

Tli Kwi Cho Bust #1

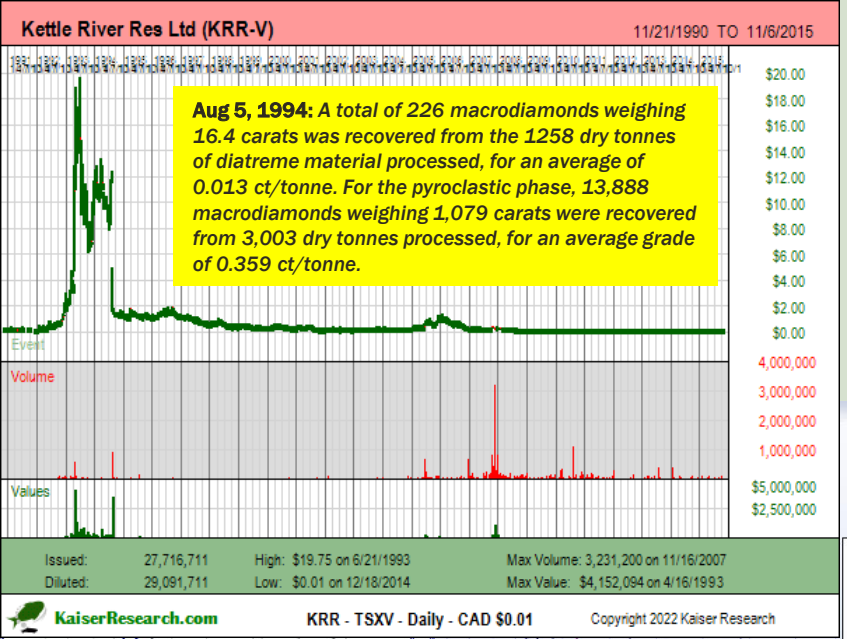
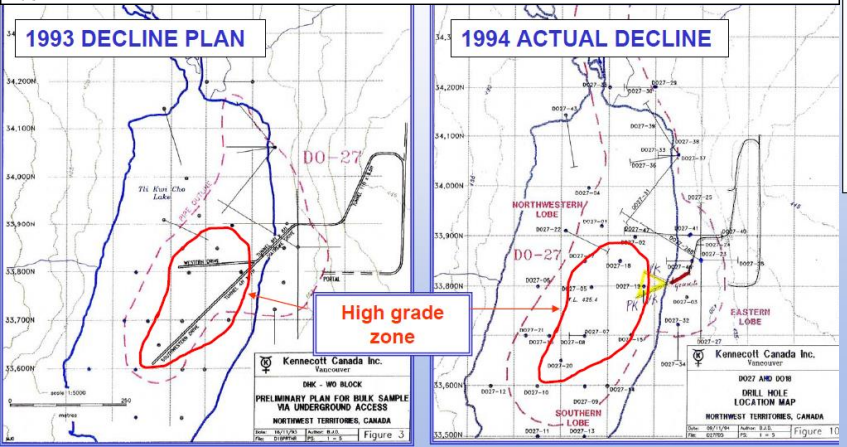


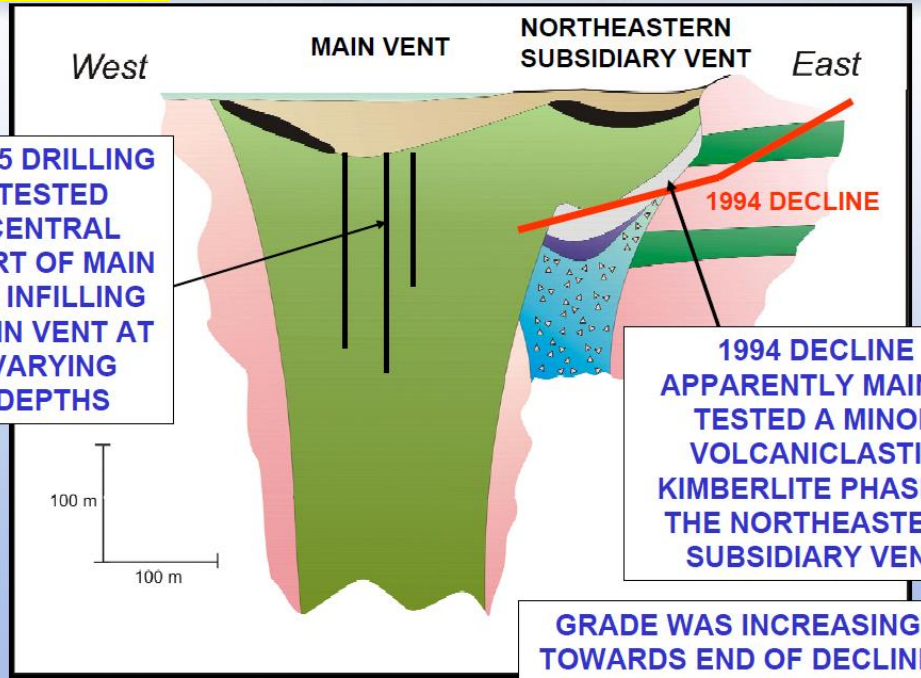
Table 16-3: Preliminary Summary of 2006 and 2007 Sample Grades

Year	Lithology	Tonnes	Carats	CPHT(1)
2006 AND 2007 NORMALIZED GRADES				
2006	Main Lobe PK	32.80	3,296.55	89.11
2006	NE Lobe PK	20.05	14.81	73.87
2007	Main Lobe PK	1,616.01	1,440.34	89.13
2007	NE Lobe PK	322.86	253.05	78.38
Combined	NE Lobe PK	342.91	267.86	78.11
2007	Main +NE PK	1,938.87	1,693.39	87.34
All	All combined	2,291.72	2,004.75	87.48

(1) CPHT equals carats per hundred dry tonnes

Table from Peregrine Diamonds Ltd, News Release, Sept. 18, 2007.





2005 DRILLING TESTED CENTRAL PART OF MAIN PK INFILLING MAIN VENT AT VARYING DEPTHS

1994 DECLINE APPARENTLY MAINLY TESTED A MINOR VOLCANICLASTIC KIMBERLITE PHASE IN THE NORTHEASTERN SUBSIDIARY VENT

GRADE WAS INCREASING TOWARDS END OF DECLINE

Table 1-1: DO-27 Mineral Resources

Tli Kwi Cho Bust #2

	Tonnes (1,000,000's)	Carats (1,000,000's)	Grade (cpt)
Indicated Resource	19.5	18.2	0.94

Table 1-2: Summary of WWW Diamond Valuations for DO-27

Bulk Sampling Program	Weight Of Valuation Sample (Carats)[1]	Largest Diamonds (Carats)	"Base Case" Diamond Price Model (US$/Carat)[2]	"High" Diamond Price Model (US$/Carat)[2]	"Low" Diamond Price Model (US$/Carat)[2]
2007	1,566	9.45, 7.03, 6.03, 5.17, 4.84, 4.35, 4.19	$52	$72	$39
2006/2005	509[3]	7.11, 3.91, 2.34	$46	$62	$41
Combined	2,075[4]		$51	$70	$43

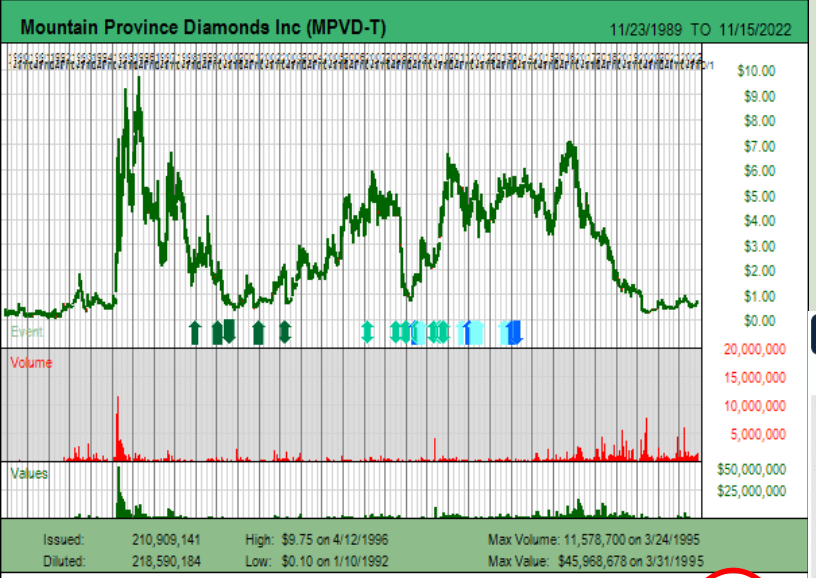
[1] Sample weights represent the total carat weight of diamonds presented for valuation following the combination of individual sub-samples and after acid cleaning.

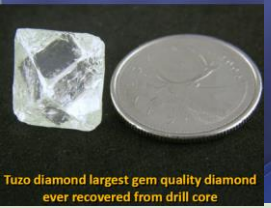
[2] As determined by WWW International Diamond Consultants Ltd.

[3] Values from the WWW October, 2006 price book, as reported by Peregrine on November 6, 2006.

[4] The combined sample was re-valued and modelled based on the WWW October 31, 2007 price book.

Gahcho Kue: 22 years from discovery in 1995 to mine in 2017 results in carat value disappointment!





25.14 carat Tuzo diamond valued at $17,000 per carat

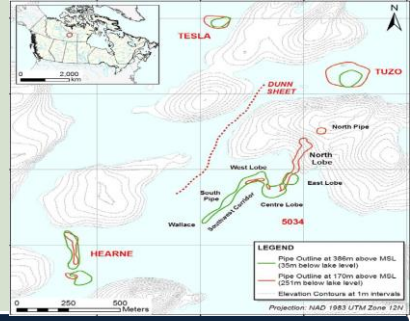
Tuzo diamond largest gem quality diamond ever recovered from drill core

Kimberlite	Carats	Dollars	$ per Carat
5034	3,133.02	381,080	122
Tuzo	2,155.70	542,431	252
Hearne	2,906.45	179,032	62
Total	8,195.17	1,102,543	135

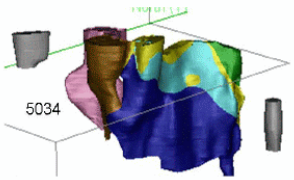
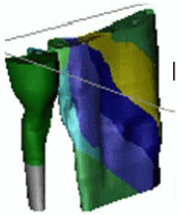
WWW International Diamond Consultants
October 2008

Table 23.51: Diamond Value by Pit

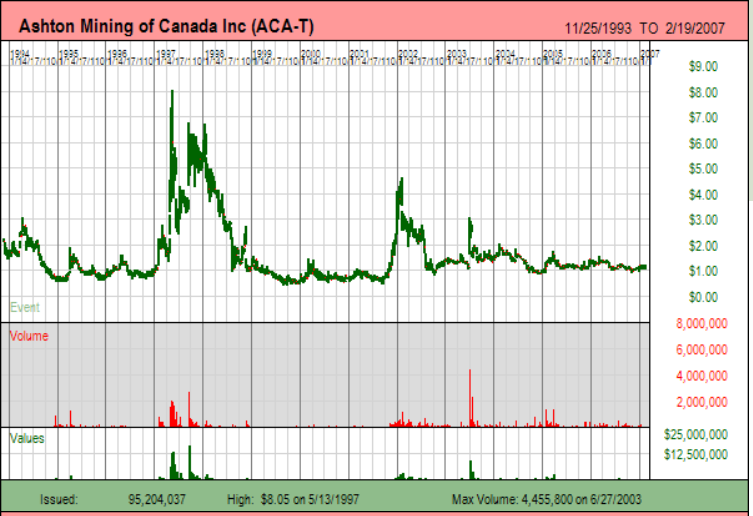
By Pit	Carats Recovered (M)	Realized Value (RV) Escalated (US$/ct)	Realized Value (RV) Un-Escalated (US$/ct)
5034	23.3	115.48	90.51
Hearne	11.5	89.00	62.40
Tuzo	14.2	92.03	58.08
Avg. (total for carats)	49.0	102.48	74.52

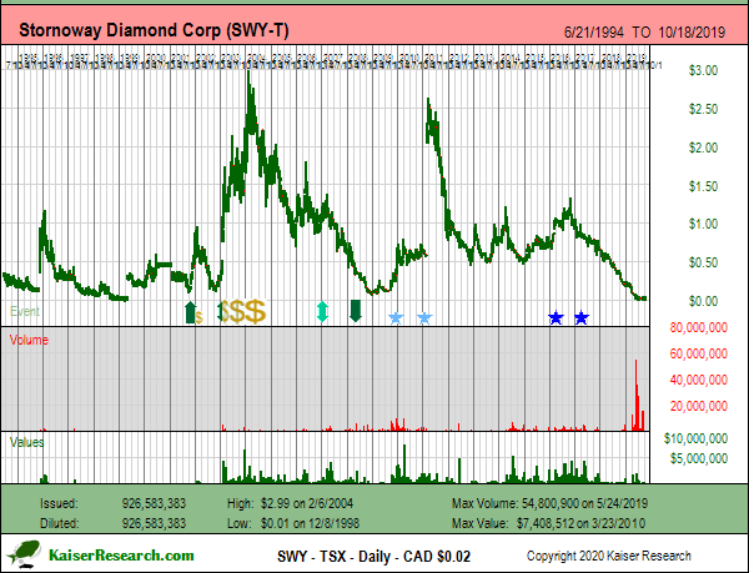


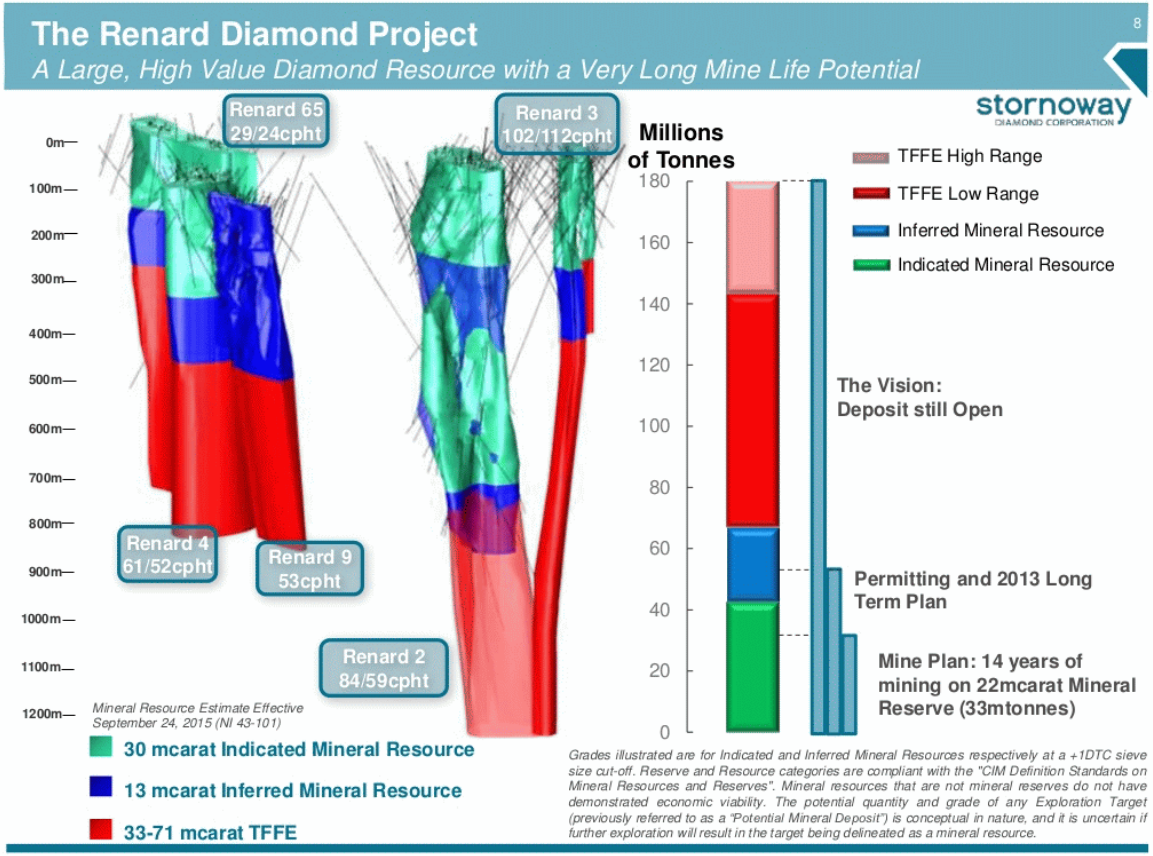
Mine Plan Summary – By Zone

	5034 pipe	Hearne pipe	Tuzo pipe
Vertical profile			
Description	■ Under and adjacent to Kennady Lake ■ The first kimberlite discovered at Kennady Lake ■ Abundant with Hypabyssal Kimberlite ■ Subdivided on the basis of internal geology into four lobes	■ Consists of a northern and southern lobe ■ Hearne South is a roughly circular pipe abundant with Tuffisitic Kimberlite Breccia ■ Hearne North is a narrow elongate pipe abundant with Hypabyssal Kimberlite and Tuffisitic Kimberlite Breccia	■ Abundant with Tuffisitic Kimberlite Breccia ■ Three zones heading to a depth of 300m ■ Potential to further develop Tuzo Deep to extend the mine life
NI 43-101[1] Grade (cpt)	■ 1.74	■ 2.07	■ 1.25
NI 43-101[1] Production (Mct)	■ 22.3	■ 11.7	■ 20.6
Life of mine	Life of mine: 2016 to 2028		

Renard: 15 years from discovery in 2001 to mine in 2016 to bankruptcy in 2019.



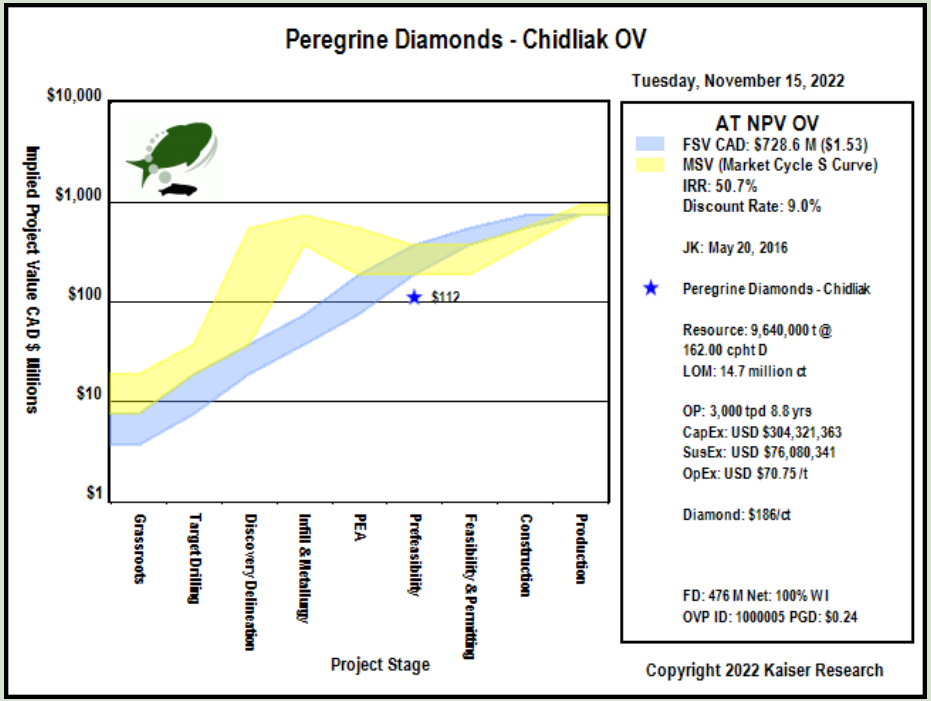


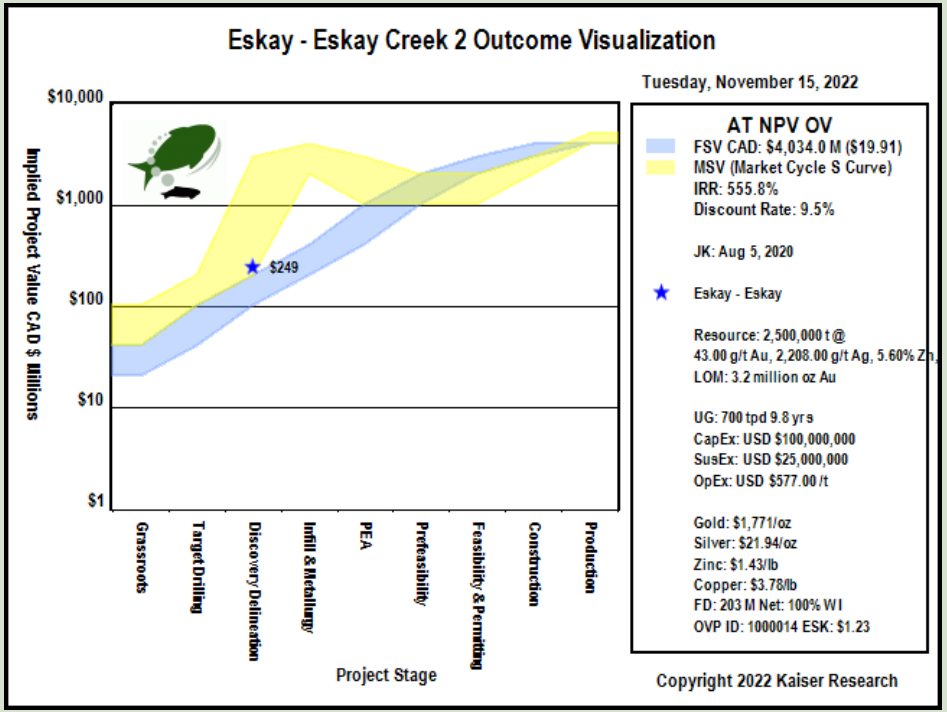


Too much time & money needed before S-Curve speculation erupts with a diamond discovery

	Stage	Exploration Cycle Stage	Objective	Time Required
	1	Grassroots	Land acquisition, target generation through indicator mineral sampling and geophysical surveys	1 year
	2	Target Drilling	Testing for kimberlite by drilling geophysical targets ideally supported by indicator mineral anomalies	1-2 years
Diamond S-Curve 1990s	3	Micro Diamond Testing & Tonnage Delineation vs Discovery Delineation	Caustic fusion of samples < 1,000 kg for micro diamonds to assess macro grade potential through size distribution curves, tonnage delineation drilling	1-2 years
	4	Mini Bulk Sampling for Grade vs Infill Drilling & Metallurgy	Delineate internal geometry and establish macro grade (diamonds > 0.85 mm) by processing samples >1 tonne with dense media separation	1-2 years
Diamond S-Curve 2022	5	Bulk Sampling for Value & PEA vs PEA	Establish carat value by collecting a sample large enough to yield a parcel suitable for valuation, create DCF for PEA	1 year
	6	Prefeasibility	Establish grade-value of internal geology, produce a mineable reserve, a mining plan and associated costs	1-2 years
	7	Feasibility & Permitting	Secure social licenses, regulatory approval & make a production decision	1-3 years
	8	Construction	Build the mine and establish marketing strategy	1-3 years
	9	Production	Mining cash flow	10-20 years

Diamond discovery exploration cannot compete with other metal discovery exploration because on the basis of initial drill holes you cannot eyeball tonnage, assign grade and calculate rock value by looking up the metal price, and then run a DCF based outcome visualization to define a potential outcome value.





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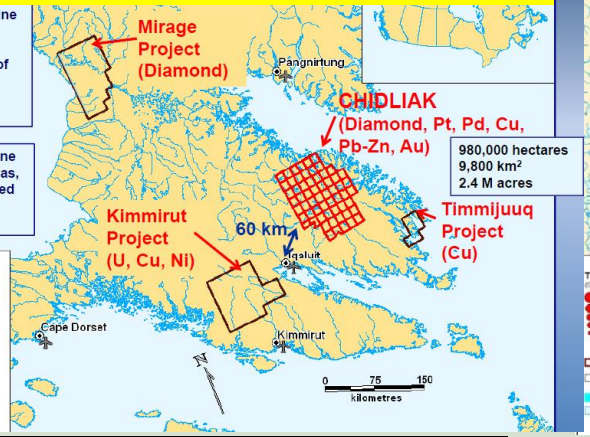
- Title Risk in Frontiers
- Ethical Concerns: Natural vs Lab Grown

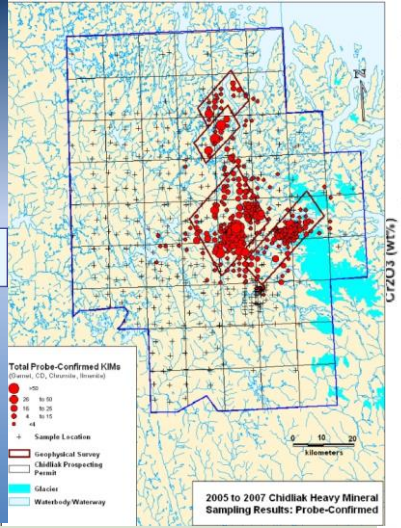
The Chidliak Redemption

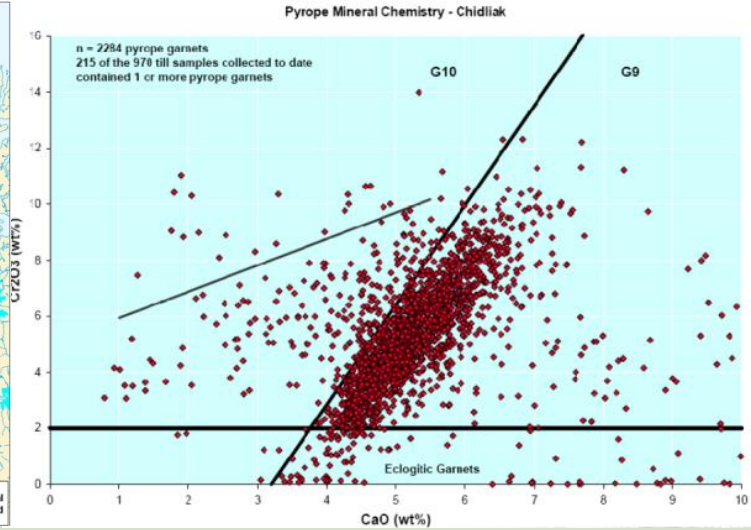
In 2005, BHP Billiton and Peregrine co-funded a regional reconnaissance till sampling program over the southern half of Baffin Island

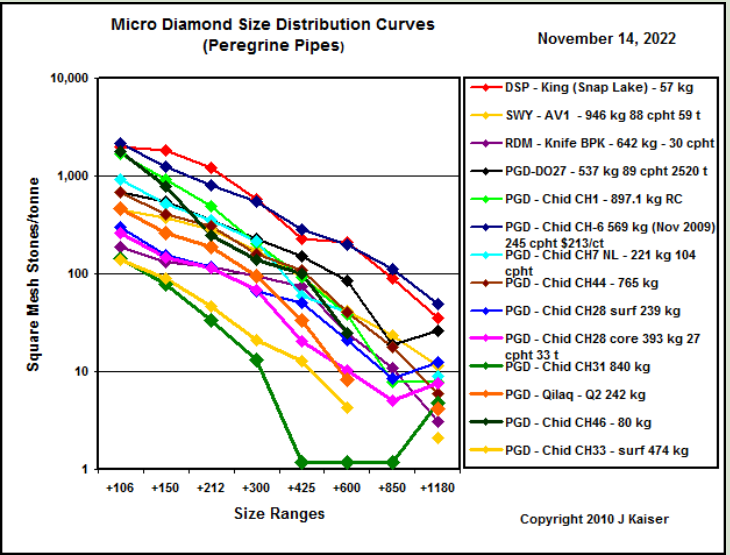
BHP Billiton was operator

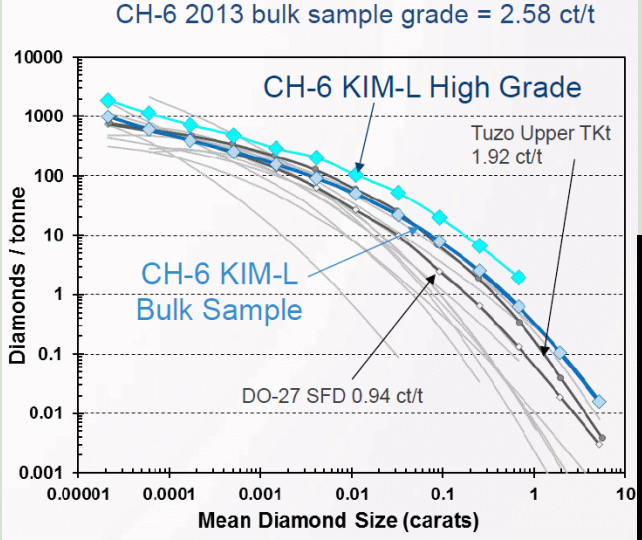
Between 2006 and 2008, Peregrine acquired permits in 5 project areas, 100%-owned, operated and funded by Peregrine, subject to BHP Billiton earn-in rights



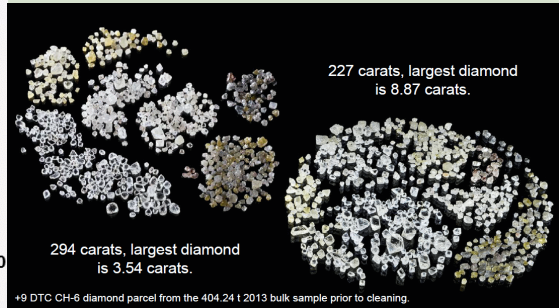




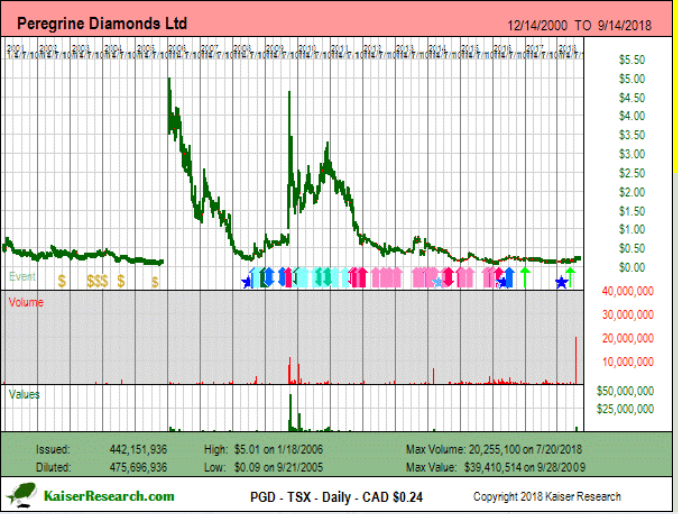




Everything done right with high grade high carat value result!



+9 DTC CH-6 diamond parcel from the 404.24 t 2013 bulk sample prior to cleaning.

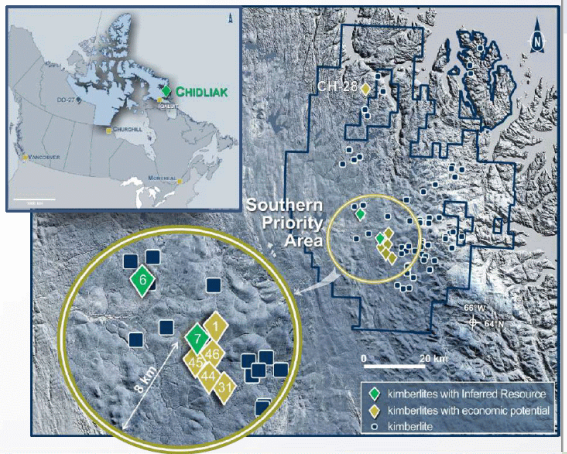


The Chidliak Heartbreak

Chidliak PEA indicates $471 million after-tax NPV but De Beers buys Peregrine for $110 million, a bit more than sunk cost.

CHIDLIAK OVERVIEW

- ~ 120 km ENE of Iqaluit, the capital of Nunavut
- 74 kimberlites discovered
- 2016 Phase One Inferred Resource:
  - Total: 15.62 Mcts
- 2016 Phase One Preliminary Economic Assessment (PEA) highlights include:
  - After-tax $NPV_{(7.5)}$ of C$471 M
  - After-tax IRR of 29.8%
  - CapEx of C$435 M
  - 10-year mine life
- 2018 Inferred Resource update:
  - Total: 22.19 Mcts
- Significant near-term resource expansion potential in the Southern Priority Area

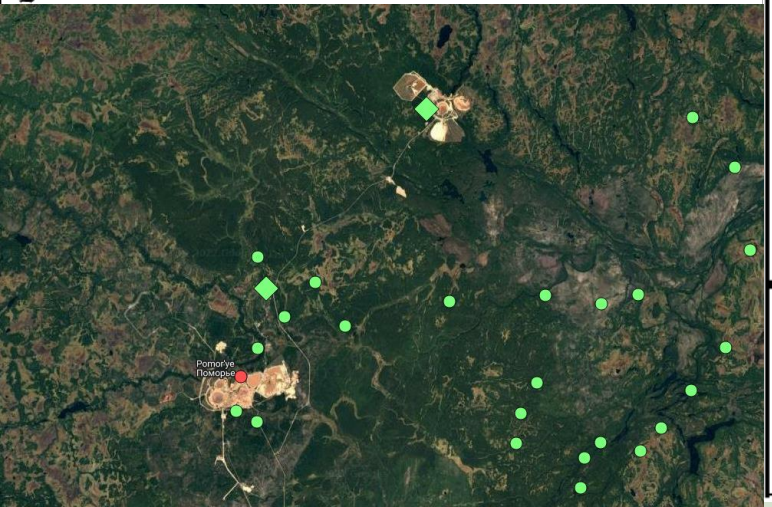


HOW DOES CHIDLIAK COMPARE?

Parameter	Units	Chidliak* 2016 PEA	Jay[1,2] 2016 FS	Renard[4] 2013 Opt	Gahcho Kue[5] 2014 FS	Back River[6] 2015 FS
Post Tax IRR	%	**29.8**	15.6	16.3	32.6	24.2
Post Tax NPV	C$M	**471$_{(7.5)}$**	510$_{(7)}$	391$_{(7)}$	1,005$_{(10)}$	480
Pre-Production CapEx	C$M	**435**	829	752	859	415
Payback	years	**2**	NA	4.8	1.8	2.9
Operating Margin	%	**72**	29[3]	67	67	NA
LOM Average Price	US$ / ct	**CH-6 - 178 CH-7 - 153**	62[3]	155	150	NA
OPEX	C$/t processed	**94.4**	77	56.2	72.51	114.58 (OP/UG)
OPEX	C$/carat	**57.7**	44	84.37	48	NA
LOM Average Head Grade	carats/tonne	**1.67$_{(1.18)}$**	1.8$_{(1.0)}$	OP - .44$_{(.85)}$ UG - .75$_{(.85)}$	1.52$_{(1.0)}$	6.3 g/t
Life of Mine	years	**10**	13	14	12	12
LOM carats	Mcarats	**11.6**	78.6	22.3	53.4	2.32Moz

Reasons Investors have lost interest in Diamond Exploration

- Limited Story Paths for Rethink Plays
- Long Timelines for Exploration-Development Cycle
- Unreliability of Micro Diamonds & Indicator Mineral Chemistry in assessing target prospectivity
- Delayed outcome visualization & S-Curve: Grade <> Value
- Diminished new field or cluster discovery potential except in difficult covered settings
- Title Risk in Frontiers
- Ethical Concerns: Natural vs Lab Grown



Grib Pipe 43-101 Resource: June 4, 2008 by Johann Ferreira & Wolf Skulblak

Table 1 Mineral resource statement

SUMMARY OF MINERAL RESOURCE - UNFACTORISED						
Litho-facies	Volume m3	Tonnes	Average SG	Carats	Carats / 100t	US$ / carat
INDICATED RESOURCE to 618m depth (-510m elevation)						
TK	16,716,900	39,464,400	2.36	50,192,000	127	105
INFERRED RESOURCE to 618m depth (-510m elevation)						
CFU1	4,629,500	9,856,200	2.13	4,410,200	45	128
CFU2	8,434,500	17,219,100	2.04	1,847,800	11	117
CFU3	643,900	1,372,600	2.13	549,000	40	113
CFU4	336,900	716,300	2.13	71,600	10	127
XTB	11,913,100	27,419,300	2.30	10,365,100	38	125
	25,957,900	56,583,500	2.18	17,243,700	30	125
INFERRED RESOURCE from 618m depth to 774m depth (-510m to -666m elevation)						
TK	2,452,600	6,090,600	2.48	7,009,800	115	105

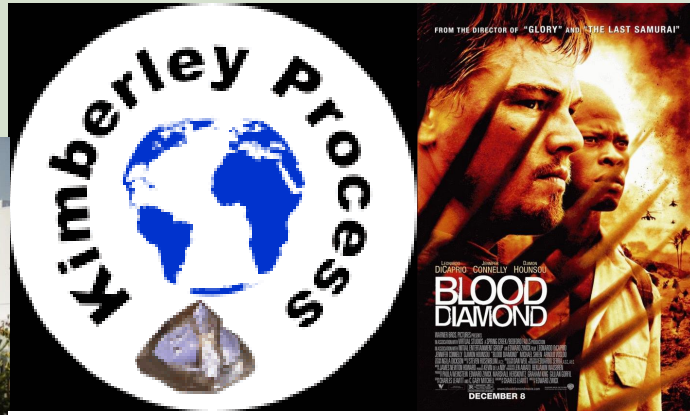
Reasons Investors have lost interest in Diamond Exploration

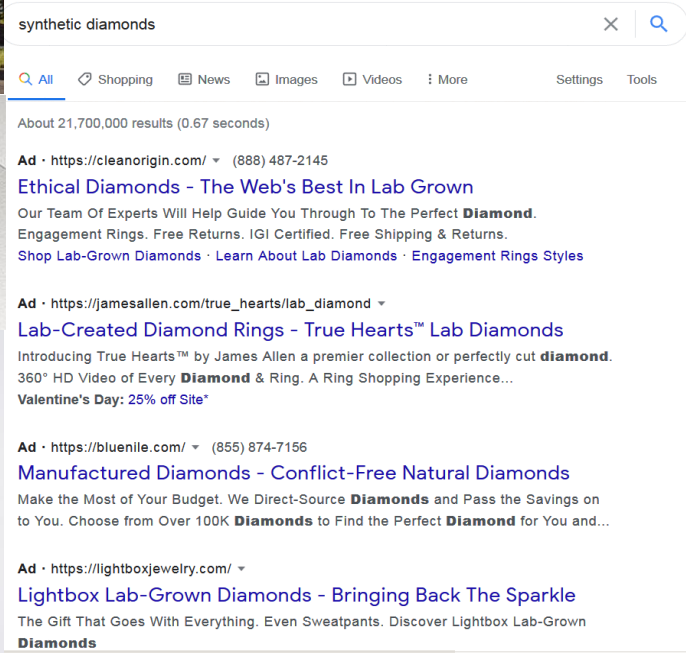
- Limited Story Paths for Rethink Plays
- Long Timelines for Exploration-Development Cycle
- Unreliability of Micro Diamonds & Indicator Mineral Chemistry in assessing target prospectivity
- Delayed outcome visualization & S-Curve: Grade <> Value
- Diminished new field or cluster discovery potential except in difficult covered settings
- Title Risk in Frontiers
- Ethical Concerns: Natural vs Lab Grown

Natural vs Lab Grown

- Blood Diamonds and the Kimberley Process – real problem's solution pre-empting a future technology problem
- HPHT and CVD lab grown diamonds: going beyond industrial diamonds to make gems and striving to poach the De Beers marketing mystique
- Consumer disposable vs collectible: the paradox of "diamonds are forever" and its obsolescence
- LightBox: De Beers competes with lab grown diamonds by making its own and selling as such at cost plus
- Sarine: branding natural diamonds as collectibles through ID technology
- Diamond Standard: using blockchain to turn ordinary diamonds into a fungible commodity – will liberating a $1.2 trillion above ground diamond stock help or hurt?

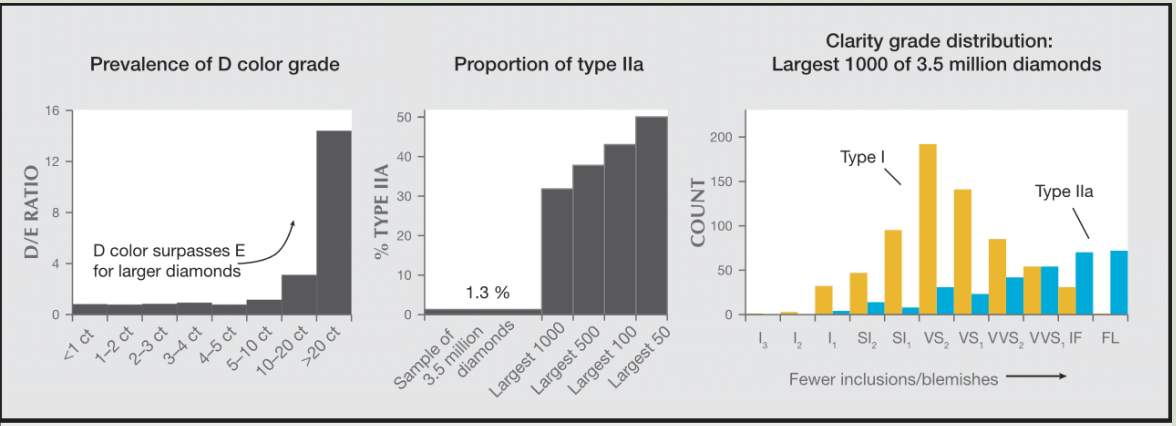
Collectible vs Disposable?

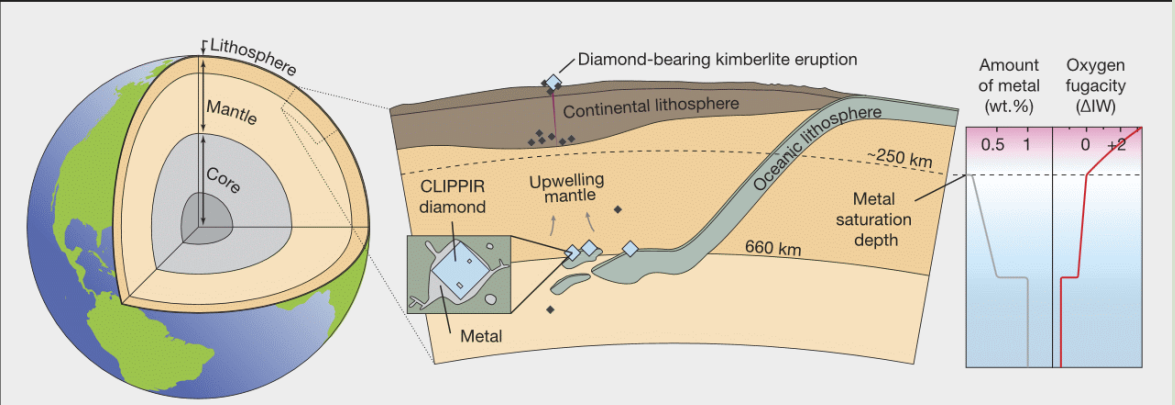




Wherein lies the future of diamond exploration?

Clippir Diamonds: Cullinan-like, Large, Inclusion-Poor, Pure, Irregular, Resorbed





Source: Gems & Gemology, Winter 2017, Vol. 53, No.4, E. Smith et al

- Type I diamonds have nitrogen > 5 ppm – source of yellow color, lithosphere origin 150-200 km
- Type II a false distinction for micro diamonds based on historical detection limits
- Type IIa – super deep 450-650 km origin based on evidence of marjorite & ringwoodite garnets
- GIA non-invasive study by Evan Smith showed "graphite" inclusions are molten Fe-Ni alloy
- No layer by layer octahedral growth patterns, absence of dodecahedral shapes argues against resorption as cause of irregular shape, maybe due to spontaneous exsolving from metallic-carbide melt?
- Ocean floor subduction origin for carbon (C13/C12)
- How do CLIPPIR diamonds end up as part of kimberlite magma that entrains Type I lithospheric diamonds?
- Could a kimberlite that appears sub-economic based on its lithospheric diamond population be economic based on its less abundant type IIa population
- Where might Type IIa diamonds have been available to become part of a kimberlite's diamond population?

Karowe – discovered by De Beers and "discarded" due to low grade and modest size compared to nearby Orapa. Is the rethink of apparent low grade kimberlites as potential producers of "big gem diamonds" sold as collectibles the path forward for diamond exploration by resource juniors?

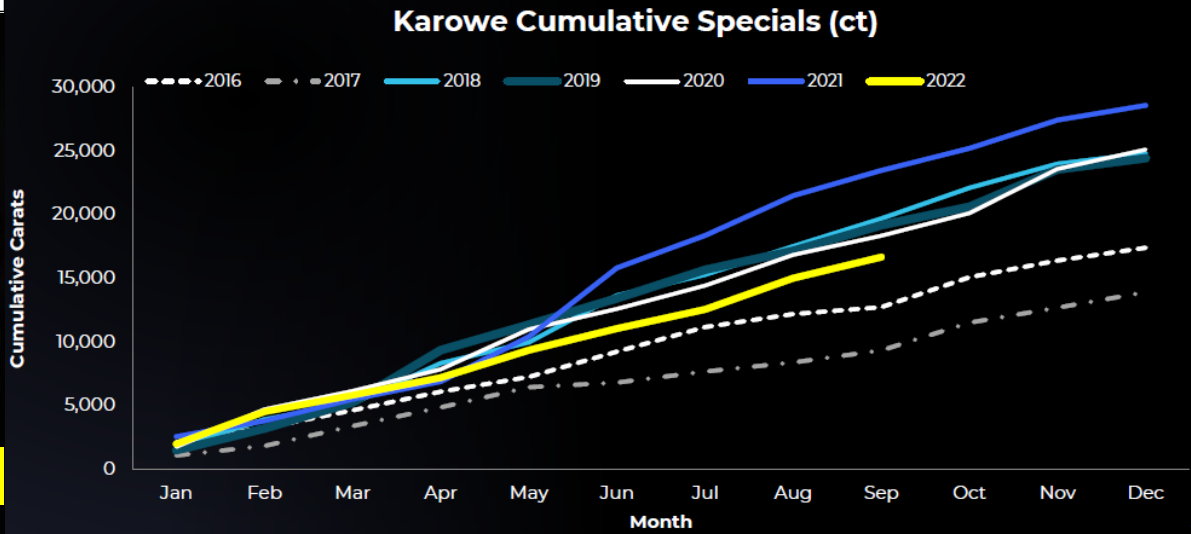
Q3 2022 Recoveries

183 specials, 7.1 wt.% of production. 6 diamonds> 100cts

Since 2012: 27 diamonds in excess of 300 carats have been recovered, including 3 diamonds > 1,000ct

11 diamonds sold for > US$ 10 million each (not included in resource value models)

Lasedi la Rona – 1,109 ct



Project Resource Estimate - Star-Orion - Star

Nov 9, 2015	NI 43-101	Peter Ravenscroft, FAusIMM, of Burgundy Mining Advisors Ltd.	Cutoff:

Note: Modeled values based on Oct 21, 2015 diamond prices ranged USD $161-$333 for both Star and Orion South.

Resource Category	Tonnage	Total Rock Value	Metal	Grade	Recovery	Contained Metal	% of GMV
Indicated Resources	193,010,000	$24/t	Diamond	15.0 cpht	100.0%	28,951,500 ct	100%
Inferred Mineral Resources	56,949,000	$18/t	Diamond	11.0 cpht	100.0%	6,264,390 ct	100%
All Categories Spot	**249,959,000**	**$23/t**	**Diamond**	**14.1 cpht**		**35,215,890 ct**	**100%**

Spot Gross Metal Value	Market Cap as % of Net GMV	Spot Prices Used
$5,669,758,290	3.1%	Diamond $161.00/ct

Project Resource Estimate - Star-Orion - Orion South

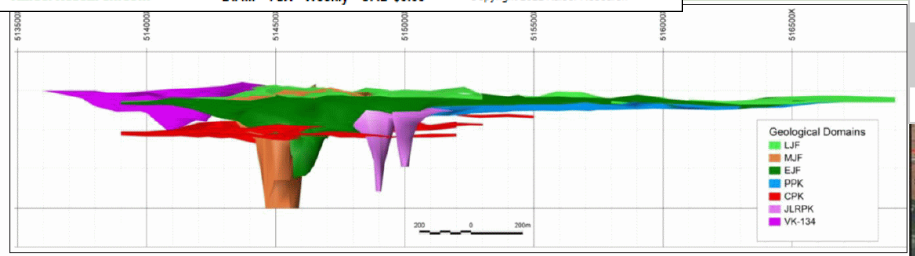
Nov 9, 2015	NI 43-101	Peter Ravenscroft, FAusIMM, of Burgundy Mining Advisors Ltd.	Cutoff:

Note: Modeled values based on Oct 21, 2015 diamond prices ranged USD $161-$333 for both Star and Orion South.

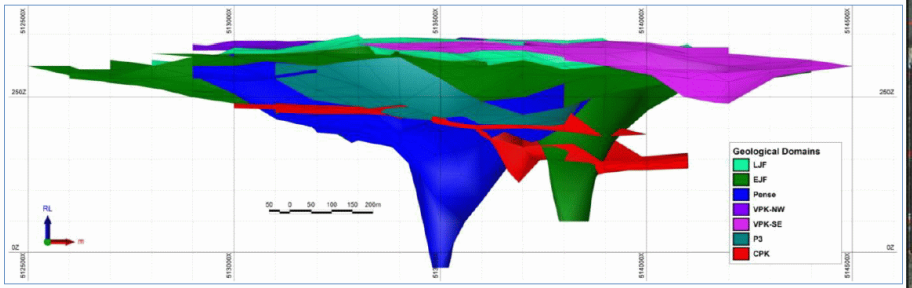
Resource Category	Tonnage	Total Rock Value	Metal	Grade	Recovery	Contained Metal	% of GMV
Indicated Resources	200,160,000	$23/t	Diamond	14.0 cpht	100.0%	28,022,400 ct	100%
Inferred Mineral Resources	72,080,000	$11/t	Diamond	7.0 cpht	100.0%	5,045,600 ct	100%
All Categories Spot	**272,240,000**	**$20/t**	**Diamond**	**12.1 cpht**		**33,068,000 ct**	**100%**

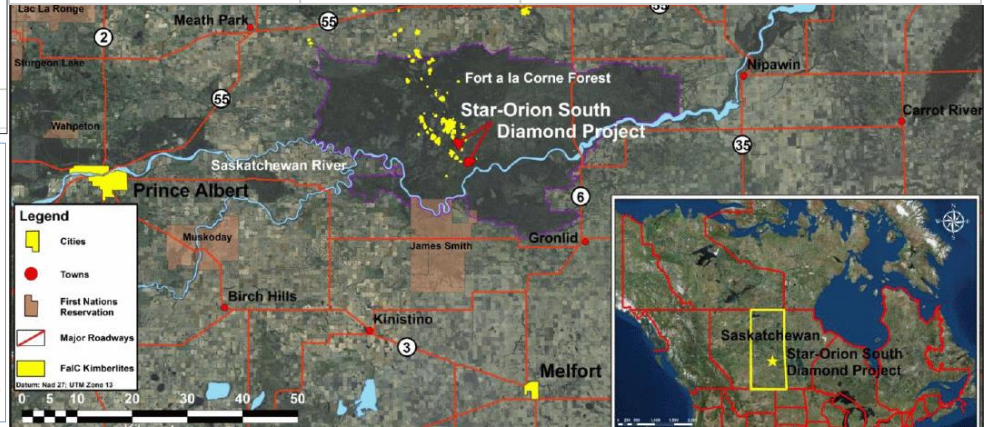
Spot Gross Metal Value	Market Cap as % of Net GMV	Spot Prices Used
$5,323,948,000	3.3%	Diamond $161.00/ct

Star Deposit



Orion South Deposit





- Bulk samples have delivered excellent results:
  - Star: over 75,000 tonnes of ore yielded nearly 11,000 carats, including a 49-carat stone
  - Orion South: over 23,000 tonnes of ore yielded 2,300 carats, including a 45-carat stone
- Star and Orion South diamond populations have coarse size frequency distributions: potential for the recovery of large stones in future production
- Unusually high proportion of valuable Type IIa stones, which are rare and account for less that 1.3% of global production
- High average diamond price (more than double the world average) driven by quality, colour, shape and size

WEIGHTED AVERAGE PRICE
(Per Carat USD)

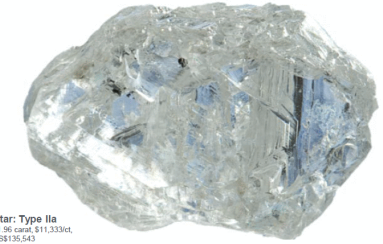
Star:
$210

Orion South:
$169

Star & Orion South:
$190

Valuation April 2018 WWW International Diamond Consultants

- Type IIa diamonds:
  - contain no nitrogen or boron impurities
  - usually top white or brown and can also be pink
  - rare and account for less than 1.3 % of annual world production



Star: Type IIa
11.96 carat, $11,333/ct, US$135,543

Star and Orion South Kimberlites - Type IIa Diamond Statistics
(Diamonds +11 DTC (0.32 carats) to >10.8 carats)

Kimberlite Unit	Geological Unit	Diamonds Typed	Type IIa Diamonds
Star	Early Joli Fou (EJF) UG	3,713	986 / **26.6%**
	Pense (PPK) UG	722	205 / **28.4%**
	Cantuar (CPK) UG	961	240 / **25.0%**
Orion South	Early Joli Fou (EJF) UG	1,118	125 / **11.2%**
	Early Joli Fou (EJF) LDD	445	66 / **14.8%**
	Pense (P2) UG	309	43 / **13.9%**

UG (Underground Sample); LDD (Large Diameter Drill Sample)

Primary Diamond Companies - Market Activity for November 11, 2022

Company	Free	Volume	Value	High	Low	Close	Chg
Archon Minerals Ltd (ACS-V)		0	$0	$0.000	$0.000	$0.270	$0.000
Arctic Star Exploration Corp (ADD-V)		16,500	$825	$0.050	$0.050	$0.050	$0.000
Burgundy Diamond Mines Ltd (BDM-ASX)		528,949	$121,658	$0.240	$0.220	$0.240	$0.030
Canterra Minerals Corp (CTM-V)		3,000	$135	$0.045	$0.045	$0.045	$0.000
Diamcor Mining Inc (DMI-V)		19,000	$3,705	$0.200	$0.190	$0.190	$0.000
GGL Resources Corp (GGL-V)		0	$0	$0.000	$0.000	$0.100	$0.000
Lucapa Diamond Company Ltd (LOM-ASX)		312,056	$16,695	$0.054	$0.053	$0.054	$0.002
Lucara Diamond Corp (LUC-T)		36,500	$19,071	$0.550	$0.495	$0.520	($0.010)
Margaret Lake Diamonds Inc (DIA-V)		0	$0	$0.000	$0.000	$0.060	$0.000
Metalex Ventures Ltd (MTX-V)		12,000	$600	$0.050	$0.050	$0.050	$0.000
Mountain Province Diamonds Inc (MPVD-T)		325,900	$211,835	$0.680	$0.620	$0.640	($0.030)
Newfield Resources Ltd (NWF-ASX)		75,500	$30,200	$0.400	$0.400	$0.400	$0.000
North Arrow Minerals Inc (NAR-V)		264,300	$11,233	$0.045	$0.040	$0.040	$0.000
Olivut Resources Ltd (OLV-V)		0	$0	$0.000	$0.000	$0.025	$0.000
Pangolin Diamonds Corp (PAN-V)		0	$0	$0.000	$0.000	$0.005	$0.000
RJK Explorations Ltd (RJX.A-V)		1,000	$60	$0.060	$0.060	$0.060	($0.005)
Southstone Minerals Ltd (SML-V)		0	$0	$0.000	$0.000	$0.020	$0.000
Star Diamond Corp (DIAM-T)		288,000	$25,200	$0.090	$0.085	$0.085	$0.000
Talmora Diamond Inc (TAI-CSE)		100	$1	$0.010	$0.010	$0.010	$0.000
Tsodilo Resources Ltd (TSD-V)		0	$0	$0.000	$0.000	$0.290	$0.000

Where is there still diamond exploration potential for juniors outside Canada?

Are there any kimberlite fields or clusters left to be found not hidden under sediment platform?

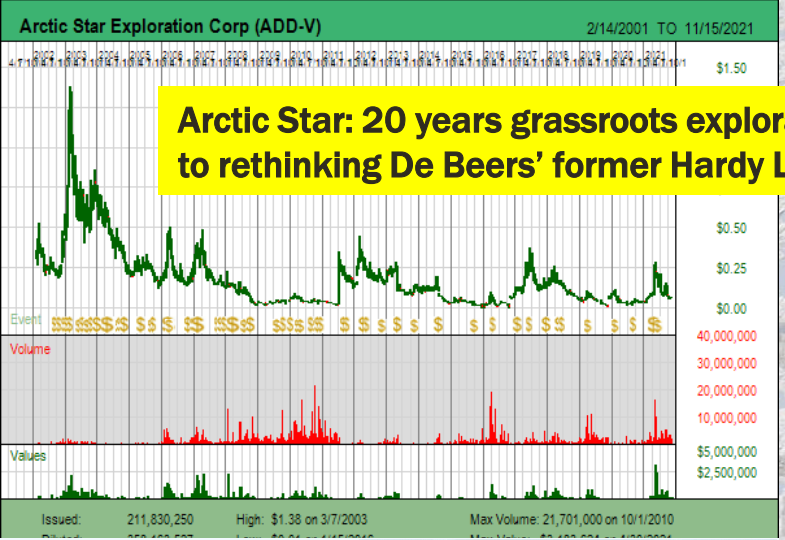
Are there any new kimberlites left to be found within known fields?

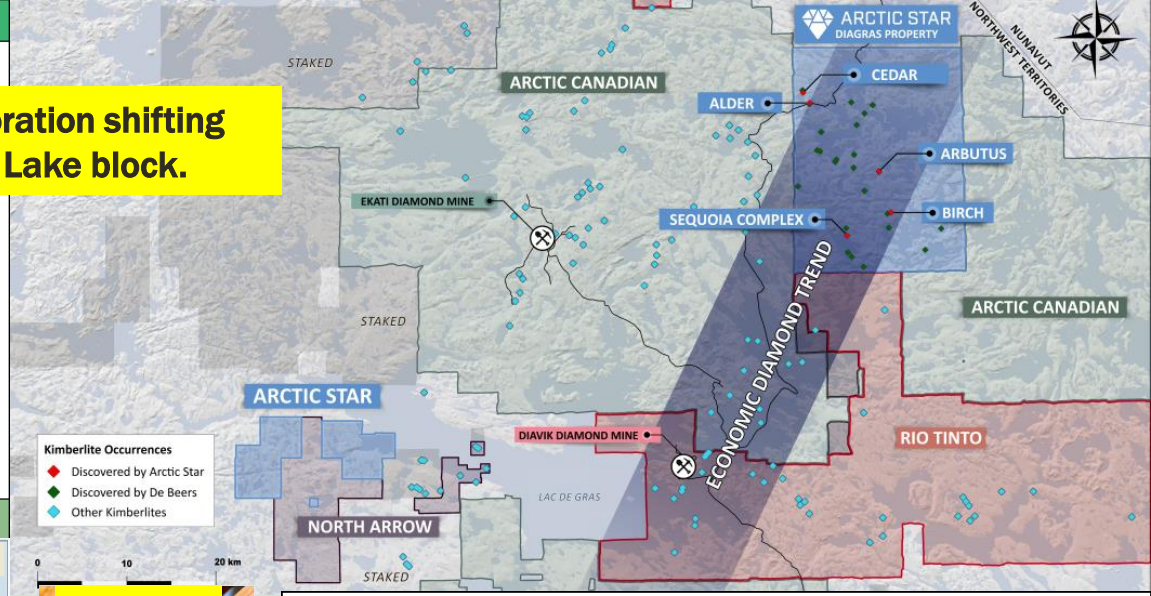
If North America has CLIPPIR potential, where might that be and why?

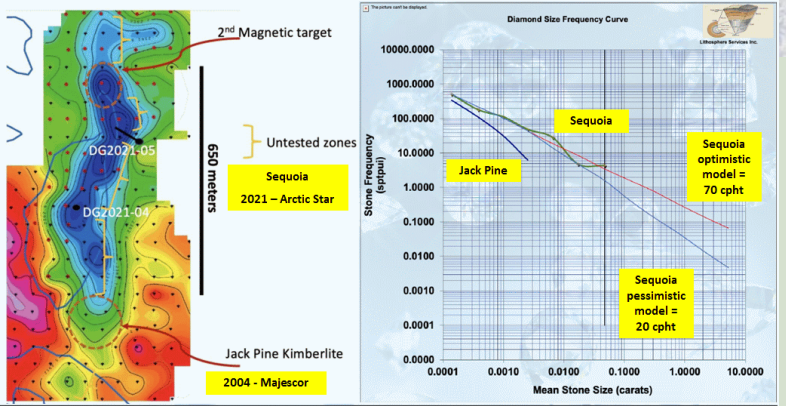
Does it make sense to rethink low grade kimberlites as potential high value?

Should we explore under cover? Is it possible?

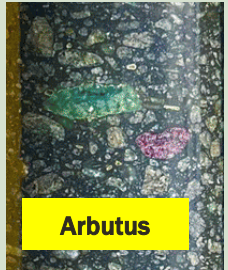
Arctic Star: 20 years grassroots exploration shifting to rethinking De Beers' former Hardy Lake block.

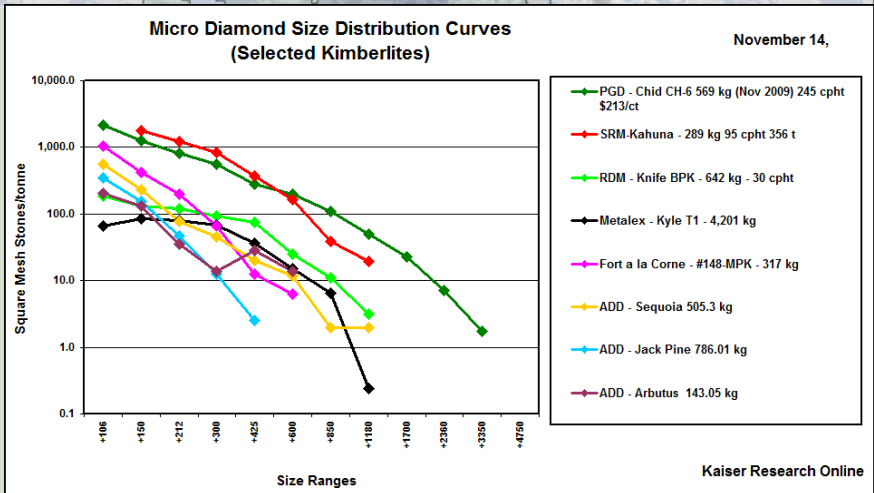




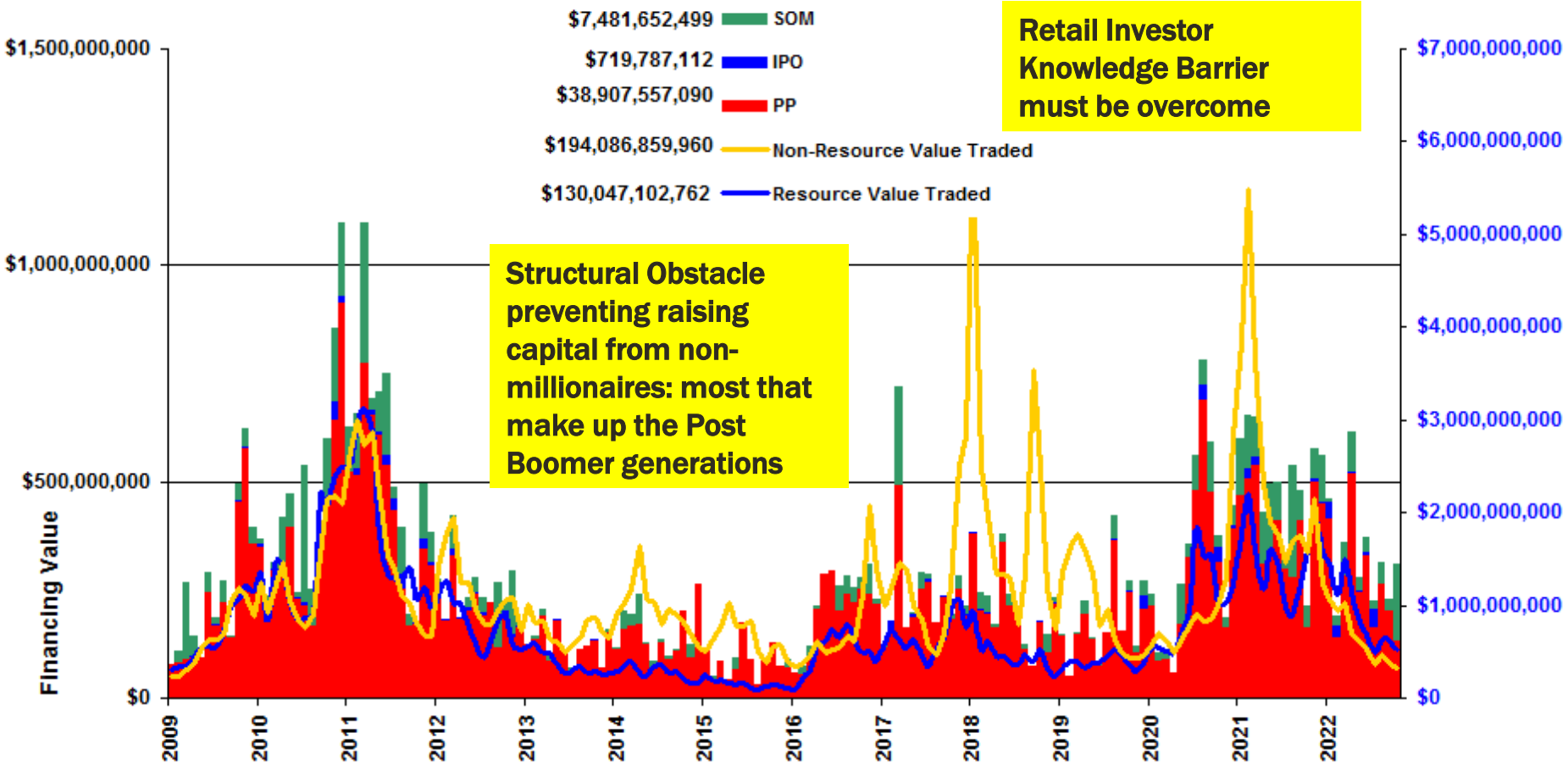


Name	Wt. kg	0.104 mm	0.15 mm	0.212 mm	0.3 mm	0.425 mm	0.6 mm	0.85 mm	1.18 mm	Total Stones	Stones /100kg
Sequoia	505.3	282	117	39	23	10	6	1	1	499	100
Jack Pine	786.01	275	122	37	10	2	-	-	-	446	57





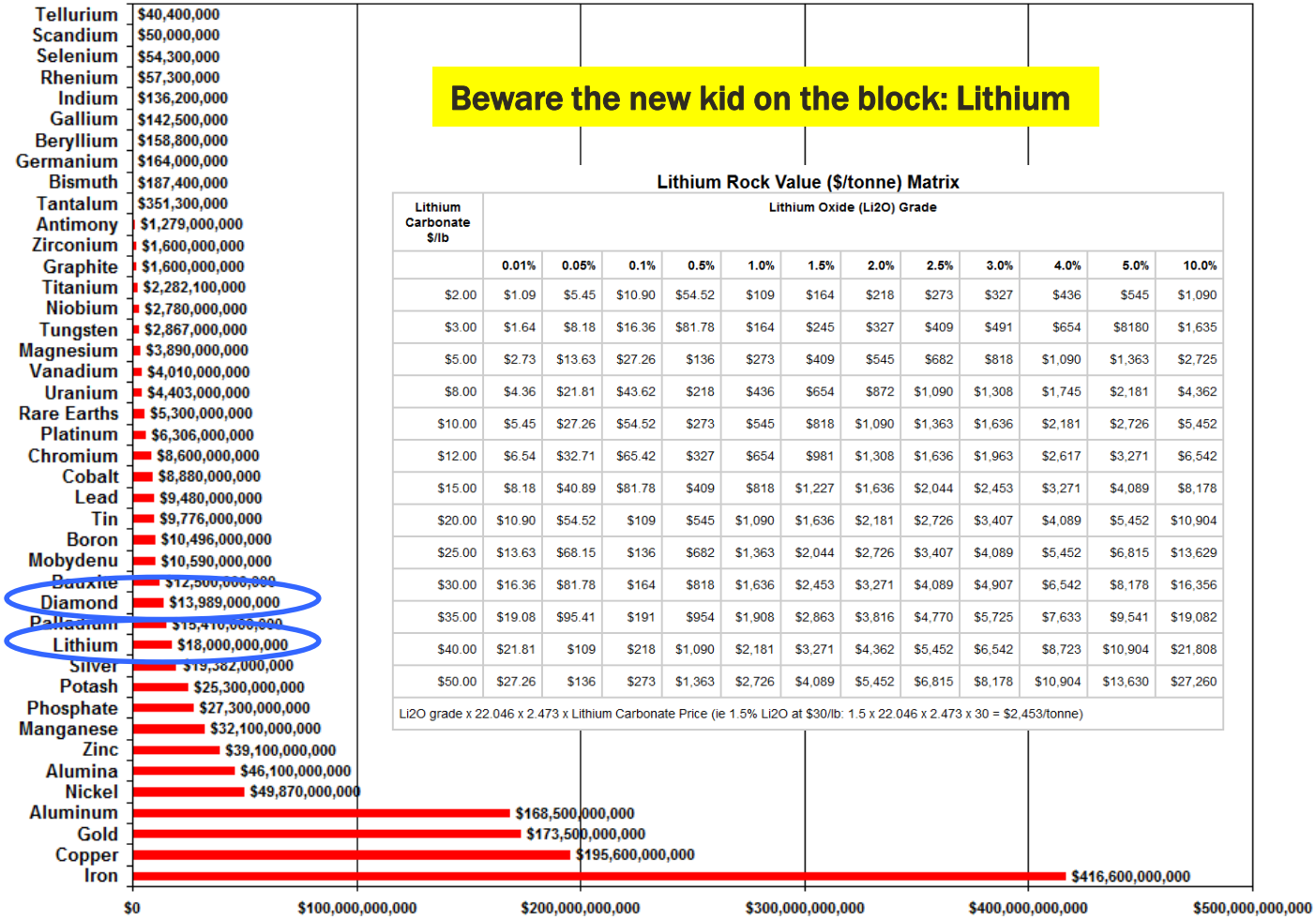
Monthly Value of Resource Sector TSXV Financings 2009-2022



Kaiser Research Online

October 31, 2022

2021 Value based on Average Price

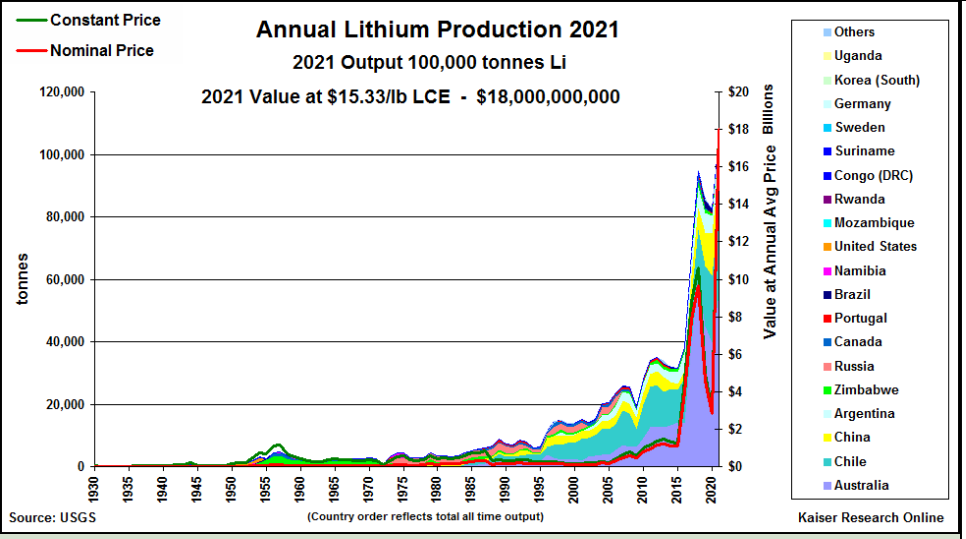


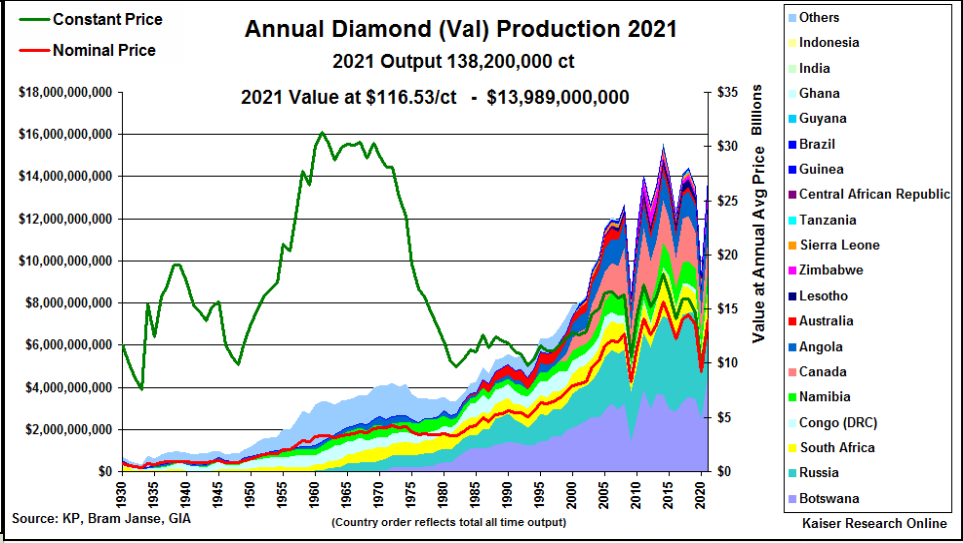
Beware the new kid on the block: Lithium

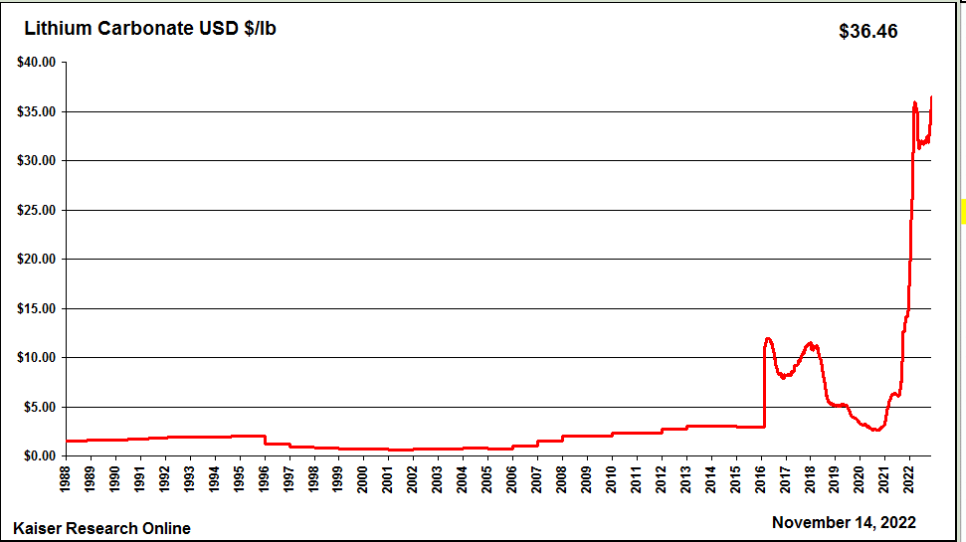
Lithium Rock Value ($/tonne) Matrix

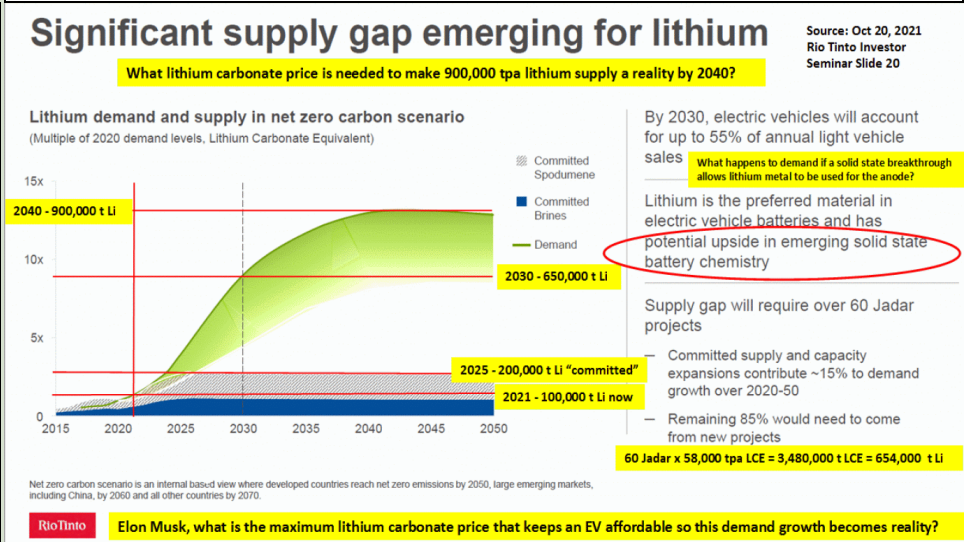
Lithium Carbonate $/lb	Lithium Oxide (Li2O) Grade											
	0.01%	0.05%	0.1%	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	4.0%	5.0%	10.0%
$2.00	$1.09	$5.45	$10.90	$54.52	$109	$164	$218	$273	$327	$436	$545	$1,090
$3.00	$1.64	$8.18	$16.36	$81.78	$164	$245	$327	$409	$491	$654	$8180	$1,635
$5.00	$2.73	$13.63	$27.26	$136	$273	$409	$545	$682	$818	$1,090	$1,363	$2,725
$8.00	$4.36	$21.81	$43.62	$218	$436	$654	$872	$1,090	$1,308	$1,745	$2,181	$4,362
$10.00	$5.45	$27.26	$54.52	$273	$545	$818	$1,090	$1,363	$1,636	$2,181	$2,726	$5,452
$12.00	$6.54	$32.71	$65.42	$327	$654	$981	$1,308	$1,636	$1,963	$2,617	$3,271	$6,542
$15.00	$8.18	$40.89	$81.78	$409	$818	$1,227	$1,636	$2,044	$2,453	$3,271	$4,089	$8,178
$20.00	$10.90	$54.52	$109	$545	$1,090	$1,636	$2,181	$2,726	$3,407	$4,089	$5,452	$10,904
$25.00	$13.63	$68.15	$136	$682	$1,363	$2,044	$2,726	$3,407	$4,089	$5,452	$6,815	$13,629
$30.00	$16.36	$81.78	$164	$818	$1,636	$2,453	$3,271	$4,089	$4,907	$6,542	$8,178	$16,356
$35.00	$19.08	$95.41	$191	$954	$1,908	$2,863	$3,816	$4,770	$5,725	$7,633	$9,541	$19,082
$40.00	$21.81	$109	$218	$1,090	$2,181	$3,271	$4,362	$5,452	$6,542	$8,723	$10,904	$21,808
$50.00	$27.26	$136	$273	$1,363	$2,726	$4,089	$5,452	$6,815	$8,178	$10,904	$13,630	$27,260

Li2O grade x 22.046 x 2.473 x Lithium Carbonate Price (ie 1.5% Li2O at $30/lb: 1.5 x 22.046 x 2.473 x 30 = $2,453/tonne)


Constant Price
Nominal Price
Annual Lithium Production 2021
2021 Output 100,000 tonnes Li
2021 Value at $15.33/lb LCE - $18,000,000,000
tonnes
Value at Annual Avg Price Billions
Others
Uganda
Korea (South)
Germany
Sweden
Suriname
Congo (DRC)
Rwanda
Mozambique
United States
Namibia
Brazil
Portugal
Canada
Russia
Zimbabwe
Argentina
China
Chile
Australia
Source: USGS
(Country order reflects total all time output)
Kaiser Research Online

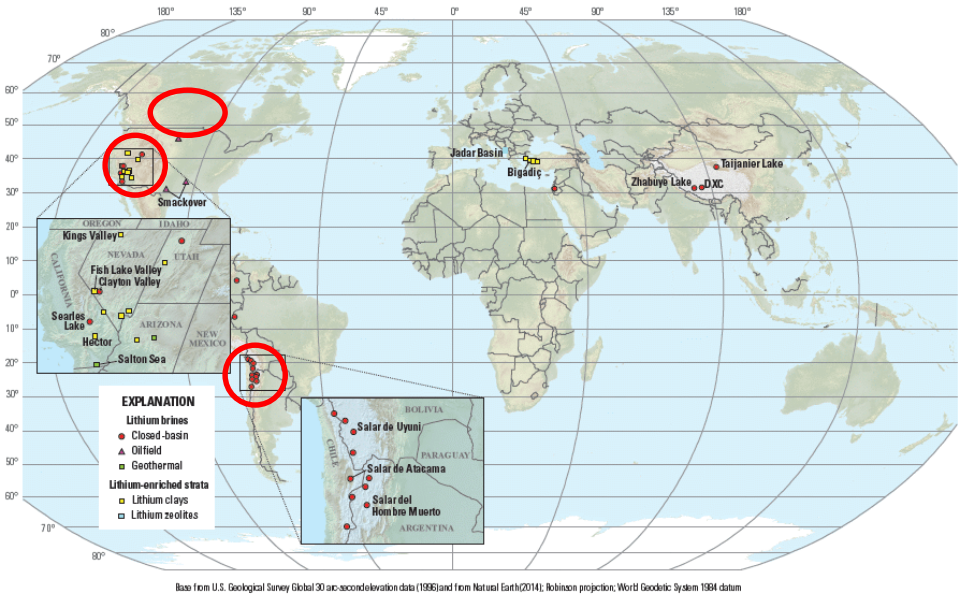

Constant Price
Nominal Price
Annual Diamond (Val) Production 2021
2021 Output 138,200,000 ct
2021 Value at $116.53/ct - $13,989,000,000
Value at Annual Avg Price Billions
Others
Indonesia
India
Ghana
Guyana
Brazil
Guinea
Central African Republic
Tanzania
Sierra Leone
Zimbabwe
Lesotho
Australia
Angola
Canada
Namibia
Congo (DRC)
South Africa
Russia
Botswana
Source: KP, Bram Janse, GIA
(Country order reflects total all time output)
Kaiser Research Online


Lithium Carbonate USD $/lb
$36.46
Kaiser Research Online
November 14, 2022


Significant supply gap emerging for lithium
Source: Oct 20, 2021 Rio Tinto Investor Seminar Slide 20
What lithium carbonate price is needed to make 900,000 tpa lithium supply a reality by 2040?
Lithium demand and supply in net zero carbon scenario
(Multiple of 2020 demand levels, Lithium Carbonate Equivalent)
Committed Spodumene
Committed Brines
Demand
2040 - 900,000 t Li
2030 - 650,000 t Li
2025 - 200,000 t Li "committed"
2021 - 100,000 t Li now
By 2030, electric vehicles will account for up to 55% of annual light vehicle sales
What happens to demand if a solid state breakthrough allows lithium metal to be used for the anode?
Lithium is the preferred material in electric vehicle batteries and has potential upside in emerging solid state battery chemistry
Supply gap will require over 60 Jadar projects
Committed supply and capacity expansions contribute ~15% to demand growth over 2020-50
Remaining 85% would need to come from new projects
60 Jadar x 58,000 tpa LCE = 3,480,000 t LCE = 654,000 t Li
Net zero carbon scenario is an internal based view where developed countries reach net zero emissions by 2050, large emerging markets, including China, by 2060 and all other countries by 2070.
RioTinto
Elon Musk, what is the maximum lithium carbonate price that keeps an EV affordable so this demand growth becomes reality?

Lithium Supply from Four Potential Sources

Brines via Evaporation, Direct Lithium Extraction, or Claystone Mining

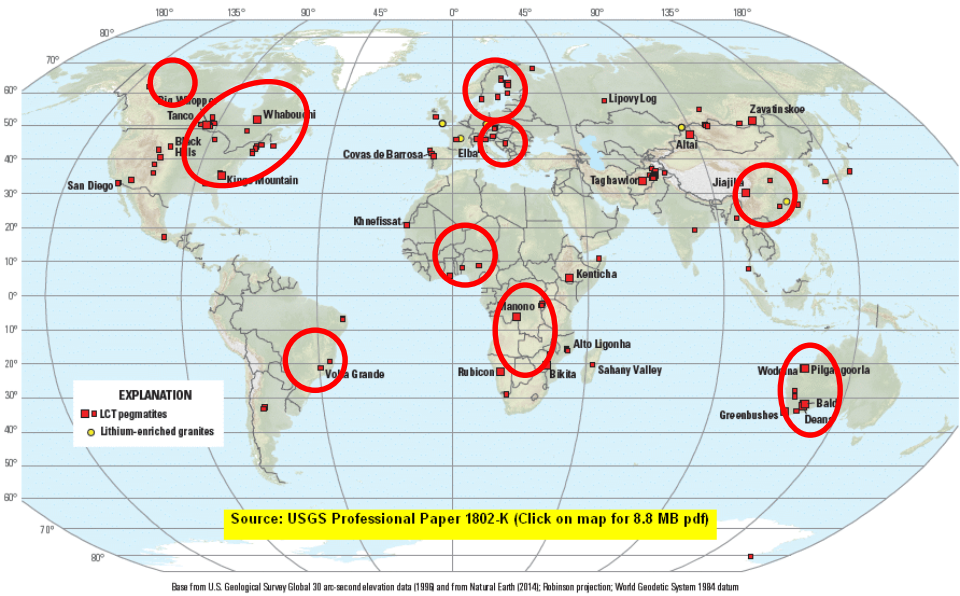


Base from U.S. Geological Survey Global 30 arc-second elevation data (1996)and from Natural Earth(2014); Robinson projection; World Geodetic System 1984 datum

Source: USGS Professional Paper 1802-K (Click on map for 8.8 MB pdf)

Figure K5. World map showing locations of selected closed-basin lithium-brine, lithium-enriched oilfield brine, geothermal brine, lithium-clay, and lithium-zeolite deposits. The locations of the closed-basin brines are from a tabulation by Munk and others (2016).

LCT type Pegmatite Open Pit Mining Potential



Base from U.S. Geological Survey Global 30 arc-second elevation data (1996) and from Natural Earth (2014); Robinson projection; World Geodetic System 1984 datum

Source: USGS Professional Paper 1802-K (Click on map for 8.8 MB pdf)

Figure K4. World map showing locations of selected lithium-cesium-tantalum (LCT) pegmatites and lithium granites. The larger red squares indicate pegmatites containing major lithium and (or) tantalum resources. Adapted from Bradley and others (2016).

The Pegmatite Hunt Overlaps with Cratonic Diamond Hunt Settings

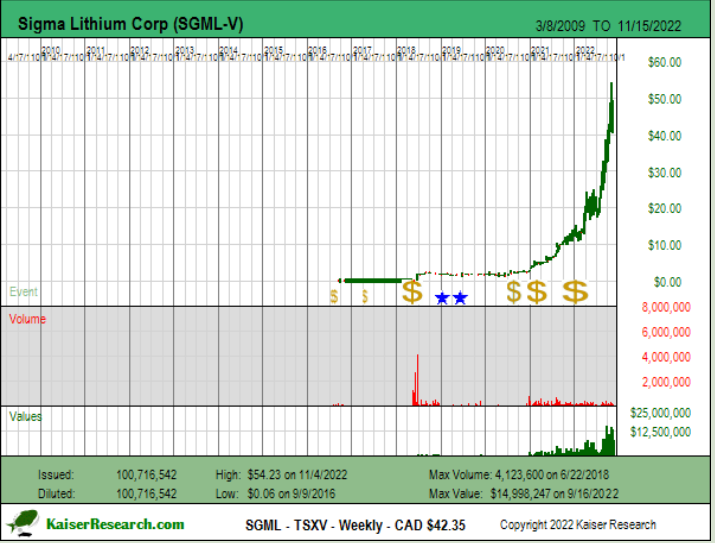
Reasons Investors will flock to Lithium Exploration

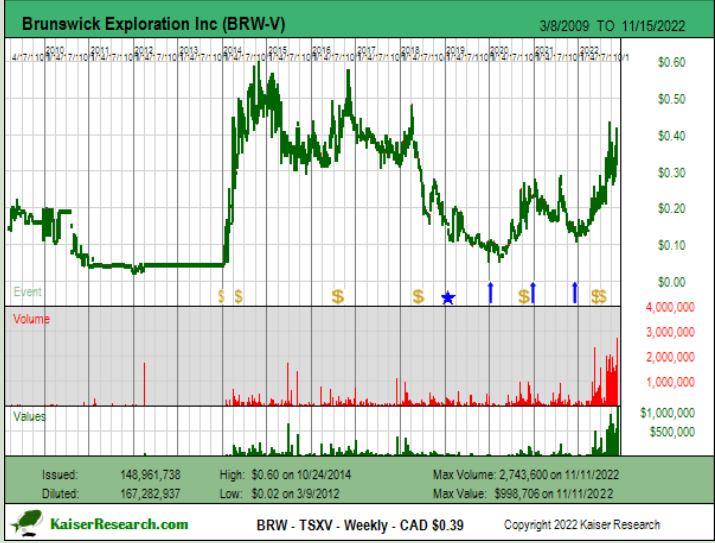
- All Story Paths from Grassroots to Rethink Plays are available
- Short Timelines for Exploration-Development Cycle
- Field confirmation of LCT pegmatites fast, lithium carbonate prices visible, assay conversion to rock value not easy but possible, drilling to delineate tonnage and geometry key discovery tool
- Outcome visualization & S-Curve waiting for discovery
- Cratonic settings with many documented pegmatites and lots left to find in Australia, Canada, Scandinavia, Brazil and Africa.
- Prime exploration jurisdictions have minimal title risk
- Ethical Concerns: EV replacement of ICE won’t happen without Lithium Mania 2.0
- Overcoming knowledge barrier to mobilize retail investors straightfoward

Companies focused on lithium - Market Activity for November 14, 2022

Company	Free	Volume	Value	High	Low	Close	Chg
ACME Lithium Inc (ACME-V)		8,200	$4,797	$0.600	$0.570	$0.590	$0.010
Allkem Limited (AKE-T)		53,500	$781,100	$14.870	$14.330	$14.520	($0.130)
ALX Resources Corp (AL-V)		397,800	$15,912	$0.045	$0.035	$0.045	$0.010
American Lithium Corp (LI-V)		321,500	$725,786	$2.315	$2.200	$2.260	$0.030
Ameriwest Lithium Inc (AWLI-CSE)		123,900	$44,294	$0.365	$0.350	$0.360	($0.020)
Arena Minerals Inc (AN-V)		266,900	$131,448	$0.500	$0.485	$0.490	($0.010)
Argentina Lithium & Energy Corp (LIT-V)		32,300	$9,852	$0.310	$0.300	$0.310	$0.005
Avalon Advanced Materials Inc (AVL-T)		156,700	$19,979	$0.130	$0.125	$0.130	$0.002
AVZ Minerals Ltd (AVZ-ASX)		0	$0	$0.000	$0.000	$0.780	$0.000
Brunswick Exploration Inc (BRW-V)		437,100	$174,840	$0.415	$0.385	$0.400	$0.000
Capella Minerals Ltd (CMIL-V)		0	$0	$0.000	$0.000	$0.070	$0.000
Clear Sky Lithium Corp (POWR-CSE)		281,200	$178,562	$0.690	$0.580	$0.630	$0.000
Coloured Ties Capital Inc (TIE-V)		164,500	$65,800	$0.400	$0.400	$0.400	$0.010
Core Lithium Ltd (CXO-ASX)		71,177,805	$127,052,382	$1.875	$1.695	$1.865	$0.195
Critical Elements Lithium Corp (CRE-V)		807,500	$1,877,438	$2.380	$2.270	$2.320	$0.010
Cygnus Gold Limited (CY5-ASX)		537,499	$309,062	$0.600	$0.550	$0.600	$0.010
Cypress Development Corp (CYP-V)		42,300	$46,424	$1.135	$1.060	$1.120	$0.040
E3 Lithium Corp (ETL-V)		42,200	$89,253	$2.150	$2.080	$2.140	$0.040
Essential Metals Limited (ESS-ASX)		2,004,150	$956,982	$0.485	$0.470	$0.475	$0.005
European Lithium Ltdd (EUR-ASX)		4,077,313	$393,461	$0.098	$0.095	$0.095	($0.001)
Foremost Lithium Res & Tech Ltd (FAT-CSE)		229,500	$40,163	$0.180	$0.170	$0.180	$0.005
Frontier Lithium Inc (FL-V)		212,200	$429,175	$2.075	$1.970	$2.000	($0.020)
Green Technology Metals Ltd (GT1-ASX)		890,645	$961,897	$1.125	$1.035	$1.100	$0.050
Grid Metals Corp (GRDM-V)		253,500	$49,433	$0.200	$0.190	$0.195	$0.000
Heliosx Lithium & Technologies Corp (HX-V)		1,500	$855	$0.570	$0.570	$0.570	$0.010
Iconic Minerals Ltd (ICM-V)		474,800	$45,106	$0.105	$0.085	$0.090	($0.015)
Imagine Lithium Inc (ILI-V)		523,400	$43,181	$0.085	$0.080	$0.080	$0.005
Jindalee Resources Ltd (JRL-ASX)		18,595	$43,698	$2.390	$2.310	$2.390	$0.010
Jourdan Resources Inc (JOR-V)		2,142,700	$214,270	$0.105	$0.095	$0.105	$0.010
Lake Resources NL (LKE-ASX)		22,900,329	$26,564,382	$1.195	$1.125	$1.175	$0.055
Lake Winn Resources Corp (LWR.H-V)		95,100	$5,944	$0.065	$0.060	$0.065	($0.005)
Li-FT Power Ltd (LIFT-CSE)		11,300	$104,243	$9.400	$9.050	$9.400	$0.150

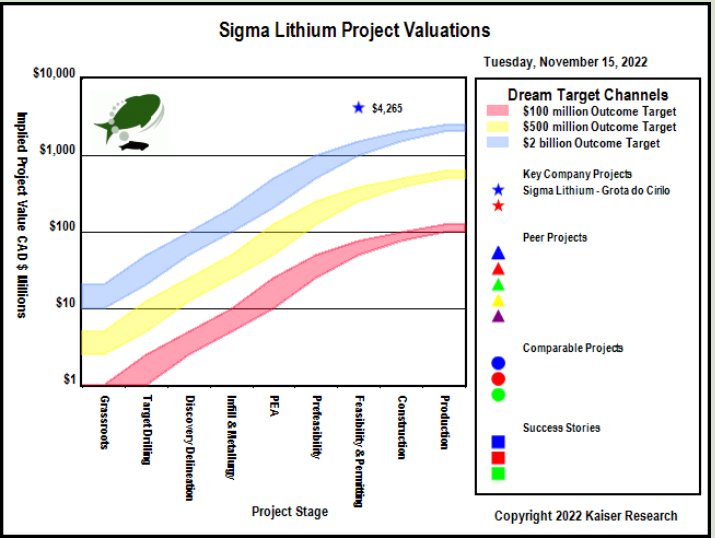
Company	Free	Volume	Value	High	Low	Close	Chg
Lake Winn Resources Corp (LWR.H-V)		95,100	$5,944	$0.065	$0.060	$0.065	($0.005)
Li-FT Power Ltd (LIFT-CSE)		11,300	$104,243	$9.400	$9.050	$9.400	$0.150
Liontown Resources Ltd (LTR-ASX)		19,402,209	$41,811,760	$2.220	$2.090	$2.200	$0.140
Lithium Americas Corp (LAC-T)		798,400	$29,165,552	$37.410	$35.650	$36.460	($1.110)
Lithium Chile Inc (LITH-V)		24,500	$15,680	$0.650	$0.630	$0.650	$0.025
Lithium Ionic Corp (LTH-V)		773,500	$1,446,445	$1.940	$1.800	$1.920	$0.120
Lithium One Metals Inc (LONE-V)		8,500	$2,975	$0.350	$0.350	$0.350	$0.000
Lithium South Development Corp (LIS-V)		104,900	$51,926	$0.500	$0.490	$0.500	$0.005
LithiumBank Resources Corp (LBNK-V)		26,300	$21,172	$0.810	$0.800	$0.810	$0.010
Manning Ventures Inc (MANN-CSE)		234,600	$7,625	$0.035	$0.030	$0.035	$0.000
Medaro Mining Corp (MEDA-CSE)		76,700	$26,845	$0.380	$0.320	$0.360	$0.065
Nevada Lithium Resources Inc (NVLH-CSE)		21,600	$2,916	$0.140	$0.130	$0.140	$0.005
Nevada Sunrise Metals Corp (NEV-V)		98,100	$24,280	$0.260	$0.235	$0.250	$0.010
New Age Metals Inc (NAM-V)		126,000	$7,875	$0.065	$0.060	$0.060	$0.000
Noram Lithium Inc (NRM-V)		18,000	$8,100	$0.455	$0.445	$0.445	($0.035)
Origen Resources In (ORGN-CSE)		0	$0	$0.000	$0.000	$0.185	$0.000
Patriot Battery Metals Corp (PMET-V)		139,400	$747,881	$5.530	$5.200	$5.200	($0.040)
Piedmont Lithium Ltd (PLL-ASX)		7,523,627	$7,316,727	$0.995	$0.950	$0.995	$0.055
Pilbara Minerals Ltd (PLS-ASX)		25,666,689	$139,498,455	$5.600	$5.270	$5.290	($0.080)
Power Metals Corp (PWM-V)		171,500	$41,160	$0.250	$0.230	$0.240	$0.010
Rock Tech Lithium Inc (RCK-V)		29,200	$91,980	$3.200	$3.100	$3.150	$0.000
Sayona Mining Ltd (SYA-ASX)		97,287,648	$24,808,350	$0.265	$0.245	$0.260	$0.015
Sigma Lithium Corp (SGML-V)		27,600	$1,248,900	$46.620	$43.880	$46.620	$0.430
Silverton Metals Corp (SVTN-V)		0	$0	$0.000	$0.000	$0.090	$0.000
Snow Lake Resources Ltd (LITM-Q)		495,800	$1,722,905	$3.700	$3.250	$3.610	$0.180
Standard Lithium Ltd (SLI-V)		335,900	$2,067,465	$6.540	$5.770	$6.270	$0.660
Stria Lithium Inc (SRA-V)		19,300	$5,308	$0.275	$0.275	$0.275	($0.060)
Ultra Lithium Inc (ULT-V)		88,100	$10,352	$0.120	$0.115	$0.115	$0.000
United Lithium Corp (ULTH-CSE)		14,800	$3,478	$0.250	$0.220	$0.250	$0.020
Vision Lithium Inc (VLI-V)		202,000	$32,320	$0.165	$0.155	$0.155	($0.005)
Winsome Resources Ltd (WR1-ASX)		0	$0	$0.000	$0.000	$0.840	$0.000

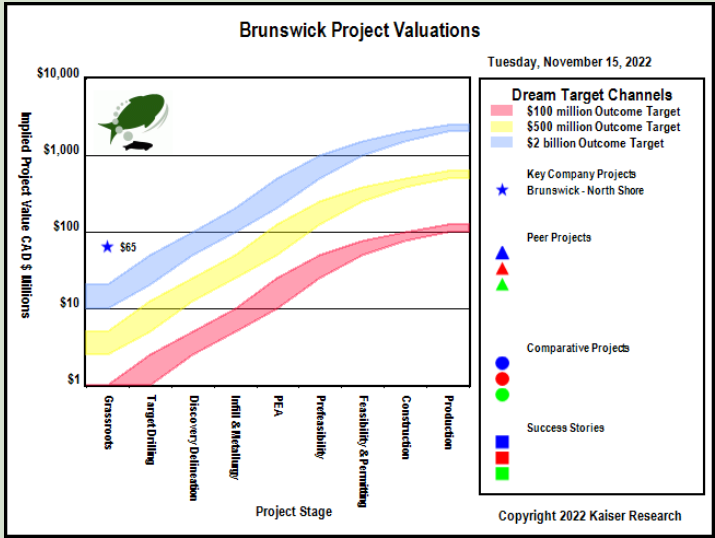




What Ekati did for diamond exploration in the 1990s will be done by Tesla for lithium pegmatite exploration in the 2020s

Thank You!





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