# Synthesis of Diamond Recoveries from the Fort à la Corne Kimberlite Field, East-central Saskatchewan

*Shawn Harvey*

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## *Abstract*

*The Fort à la Corne kimberlite field, 60 km east of Prince Albert, Saskatchewan, consists of 72 volcaniclastic-dominated "crater-facies", Cretaceous kimberlites. The kimberlites are highly variable in size, complexity, and diamond content. They vary from small, possibly mono-eruptive, kimberlites to very complex, typically large multi-phase kimberlites in which up to six eruptive phases have been recognized. Furthermore, each of those eruptive phases may consist of various facies. The largest kimberlite, at about 675 million tonnes, is comparable to some of the largest in the world. Since their initial discovery in 1988, over 75% of the kimberlites have proven to be diamondiferous and approximately 50% have returned macrodiamonds.*

*This paper presents a summary of microdiamond and macrodiamond data from the Fort à la Corne kimberlite field. The data are compiled from numerous non-confidential mineral assessment files, archived by Saskatchewan Industry and Resources, and news releases. These data will function as a baseline for future exploration, not only in the Fort à la Corne area, but elsewhere in the Province. Assessment of diamond potential, based on microdiamond counts and distributions coupled with macrodiamond recoveries, has revealed that parts of the Fort à la Corne kimberlite field appear more prospective than others. Furthermore, correlation between diamond distribution and kimberlite volcano-stratigraphy has demonstrated that diamond potential of the various kimberlite phases differs. This relationship is an important parameter in the assessment of economic feasibility of the kimberlites.*

**Keywords:** *Fort à la Corne, diamond, microdiamond, macrodiamond, sampling, recovery, Cretaceous, kimberlite, economic, database.*

## 1. Introduction

Diamonds were first reported in Saskatchewan in 1948 although this was never confirmed. The current phase of exploration began in 1988 when what eventually turned out to be a large kimberlite erratic was discovered near Sturgeon Lake, 30 km northwest of Prince Albert (Gent, 1992; Figure 1). Shortly thereafter, Uranerz Exploration and Mining examined federal-provincial regional aeromagnetic maps and delineated several circular magnetic anomalies beneath the Fort à la Corne Provincial Forest. Ground magnetic surveys were followed by drill testing in July 1989, verifying the first *in situ* kimberlite body in Saskatchewan (Lehnert-Thiel *et al*., 1992). Since then, approximately 72 kimberlite bodies have been identified (Table 1).

The Fort à la Corne (FalC) kimberlite field, one of the largest in the world (Scott-Smith, 1995b), is located 60 km east-northeast of Prince Albert (Figure 1). It consists of two kimberlite clusters along with isolated or groups of isolated bodies. The main Fort à la Corne cluster is in a north-northwest–trending zone approximately 35 km long and 10 km wide (Figure 1). Surrounding the main FalC cluster is the Snowden cluster to the northeast, also aligned north-northwest, as well as the Foxford and Birchbark kimberlites to the northwest, and the Weirdale kimberlites to the west. Additionally, there are the Candle Lake kimberlites to the north; however, as their relationship to the FalC kimberlites is unknown, they will not be discussed further here. In total, over 75% of kimberlites in the FalC field have been verified to be diamondiferous and about 50% have returned macrodiamonds. Significantly, Jellicoe *et al*. (1998) reported that close to 70% of the recovered macrodiamonds were considered gem quality.

The bulk of the kimberlites in the FalC field were delineated by the FalC Joint Venture (FalC JV), which currently consists of De Beers Canada Exploration Inc. (42.25% - operator); Kensington Resources Ltd. (42.25%); Cameco Corp. (5.5%) as well as UEM Inc. who has a 10% carried interest. Over the past 14 years, the FalC JV completed detailed work on the FalC, Snowden, Weirdale, Foxford, and Birchbark kimberlites. They recently divested their holdings on the Foxford, Weirdale, and Birchbark kimberlites (Jellicoe, 2004).

About half of the magnetic anomalies thought to be related to kimberlites were drill tested by the FalC JV in the late 1980s and early 1990s. When Kensington Resources joined the joint venture in 1995, they embarked on a program

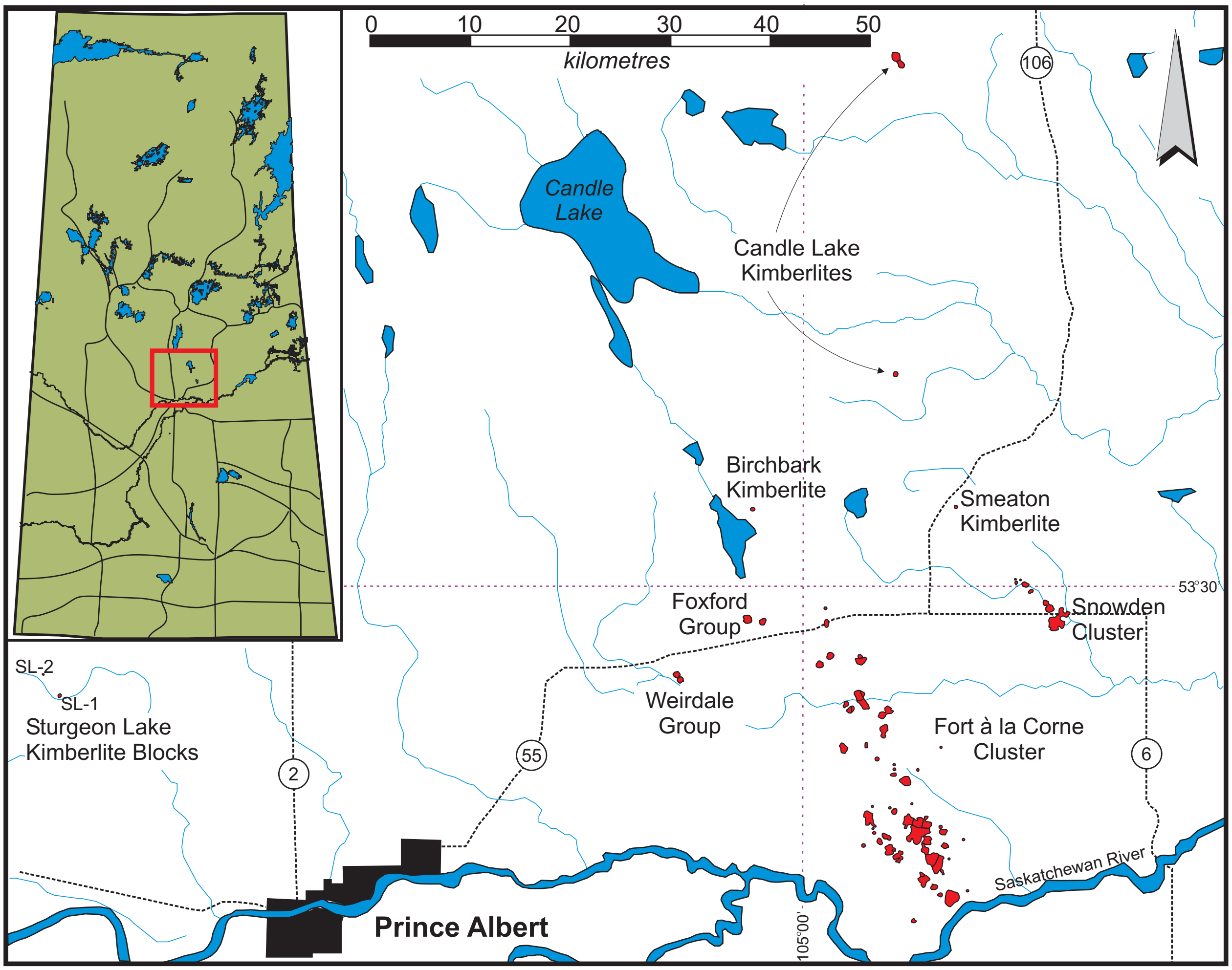


***Figure 1 - Map of central Saskatchewan indicating the location of the various kimberlite clusters, groups, and the ice-rafted (Scott-Smith, 1995a) Sturgeon Lake kimberlite blocks (kimberlites in red; paved highways as dashed black line).***

***Table 1 - Summary of Fort à la Corne area kimberlites indicating those that are diamond-bearing and those from which macrodiamonds (MaD) have been recovered.***

| Group | Number of Kimberlites | Diamond Bearing | % | Macrodiamond bearing | % |
|---|---|---|---|---|---|
| FalC Cluster | 53 | 42 | 79.2 | 31 | 58.5 |
| Snowden | 11 | 8 | 72.7 | 3 | 27.3 |
| Weirdale | 2 | 1 | 50.0 | 0 | 0.0 |
| Foxford | 2 | 0 | 0.0 | 0 | 0.0 |
| Birchbark | 1 | 1 | 100.0 | 0 | 0.0 |
| Smeaton | 1 | 1 | 100.0 | 0 | 0.0 |
| Candle North | 1 | 1 | 100.0 | 1 | 100.0 |
| Candle South | 1 | 1 | 100.0 | 1 | 100.0 |
| **TOTAL** | **72** | **55** | **76.4** | **36** | **50.0** |

to drill test all the remaining geophysical anomalies (1996 and 1997). In addition, two new kimberlites were discovered in 1993 and 1994 in the Candle Lake area (25 and 55 km north of the main Fort à la Corne trend) by Great Western Gold Corporation and War Eagle Mining Company Incorporated (Figure 1). In 1996, drilling by the Saskatchewan Diamond Syndicate, operated by Swannell Minerals Corp., confirmed the presence of another kimberlite body, the Smeaton kimberlite, north of the main Fort à la Corne trend. Also in 1996, Shore Gold Incorporated acquired claims adjacent to the southern end of the FalC JV property. This was followed by an aeromagnetic survey that lead to the discovery of the Star kimberlite. In 2003, re-examination of aeromagnetic data by Forest Gate Resources Inc. resulted in the discovery of the Dizzy kimberlite.

The FalC kimberlites are classified as Group I kimberlites, characterized by two generations of olivine in a groundmass of monticellite, spinel, perovskite, serpentine, and carbonate (Lehnert-Thiel *et al.*, 1992; Scott-Smith *et al.*, 1994; Jellicoe *et al.*, 1998). Most of the kimberlites contain mantle-derived (peridotitic and eclogitic) xenoliths and xenocrysts (*e.g*., garnet, chromite), along with xenoliths of Precambrian basement and a variety of Phanerozoic sedimentary rocks. The FalC kimberlites are different from most kimberlites worldwide in that they are dominantly composed of 'crater facies' volcaniclastic rocks (Lehnert-Thiel *et al.*, 1992; Scott-Smith *et al.*, 1994), which include pyroclastic lapilli- and olivine-dominated rocks, local debris flows, and reworked volcaniclastic kimberlite (Kjarsgaard *et al*., 1995; Leckie *et al*., 1997; Jellicoe *et al.*, 1998). In larger kimberlites, distinct kimberlite eruptive phases have been recognized (Leckie *et al*., 1997; Jellicoe *et al*., 1998; Berryman *et al*., 2003; Harvey *et al*., 2003; Kjarsgaard *et al*., 2003). Near the margins, kimberlite is typically interstratified with Cretaceous sedimentary rocks, allowing the assignment of particular kimberlite phases to specific time-stratigraphic intervals (*e.g*., Zonneveld *et al.,* 2003, 2004). The kimberlite phases are typically distinct in terms of mineralogy, grain size, magnetic response, and geochemical signature (Harvey *et al*., 2003). The FalC kimberlites vary in footprint area from less than 3 hectares to 250 hectares with an estimated mass of as much as 675 million tonnes (Jellicoe *et al.,* 1998).

This paper presents a compilation and brief summary of the significance of diamond recovery data from the Fort à la Corne kimberlites [1]. Most of the diamond data, which include all information in the public domain as of October 2004, are from kimberlites in the main Fort à la Corne cluster; the remainder are from the outlying kimberlites. Diamond recovery practices varied and caution must be exercised when interpreting the data. Sample weights and the number of drill holes that sampled each kimberlite differed, resulting in a highly variable number of diamonds recovered. Processing practices also varied and many of the kimberlite bodies are very large and composite, thus data from one drill hole may not be representative. Most importantly, the definition of what constituted a macrodiamond varied not only between companies but also, in some cases, between exploration campaigns by the same operators. Nonetheless, within the Saskatchewan Industry and Resources assessment files is a considerable quantity of microdiamond and macrodiamond data (Table 2). In addition, recent macrodiamond, and to a lesser extent microdiamond, recovery data has been compiled from industry news releases. This report presents a summary of these public-domain and news release data.

## 2. Sampling Techniques and Diamond Recovery from 1989 to 2004

In 1989, seven rotary drill holes confirmed that the circular magnetic anomalies were caused by kimberlite. The recovered kimberlite samples subsequently were shown to be diamond bearing. Since then, a variety of drilling methods have been employed (Figure 2). In 1990 and 1991, small diameter (5″ to 6.5″) reverse circulation (RC) drilling was utilized. In a subset of drill holes this was followed by 11″ under-reaming. From 1992 to 1995, the FalC JV employed 10 to 12 inch RCA (reverse circulation airlift) drilling and HQ core hole drilling. In 1996 and 1997, rotary drilling on the FalC JV property was focused on sampling all remaining non-confirmed geophysical targets in the claim block. The discovery holes on the Star and Smeaton kimberlites in 1996 were drilled with core rigs. In 2000 and 2001, Shore Gold Inc. drilled 23 core holes into the Star kimberlite for delineating geology and microdiamond sampling. This was followed in 2001 by a 24″ RCA hole to a total depth of 295 m. In 2000, the drilling strategy of the FalC JV underwent a distinct change. Mini-bulk sampling of high-priority kimberlites became the norm and 24″ RCA holes were drilled into kimberlites 122 and 141 to recover macrodiamonds. In 2001 and 2002, the complexity of the kimberlites was recognized, and as such, two-phase drill programs were used. These consisted of NQ (1.875″) core drilling, to develop a better understanding of the internal kimberlite geology, followed by spatially associated large diameter (24″ or 36″) RCA drill holes. In 2003, the most recent kimberlite discovery, the Dizzy kimberlite was intersected by core drilling.

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*Table 2 - Summary of Saskatchewan assessment files containing microdiamond and macrodiamond data referred to in this paper.*

| Body | SIR Assessment File No. | Body | SIR Assessment File No. |
|---|---|---|---|
| **101** | 73H7-0012 | **170** | 73H-0008; 73H-0009 |
| **116** | 73H7-SW-0023 | **174** | 73H7-0012; 73H7-0015 |
| **118** | 73H-0003, -0008; 73H7-0012, -0015 | **175** | 73H7-0015; 73H-0008 |
| **119** | 73H-0001; 73H7-SW-0011, -0023 | **176** | 73H-0008; 73H7-0026 |
| **120** | 73H-0002, -0003, -0008; 73H7-0012, -0015; 73H7-SW-0030 | **177** | 73H-0008 |
| **121** | 73H-0001, -0003; 73H7-SW-0011; 73H7-0014; 73H-0008 | **179** | 73H6-NE-0008 |
| **122** | 73H-0001, -0003, -0008; 73H7-0012, -0015; 73H7-SW-0019, -0023, -0030 | **180** | 73H-0002 |
| **123** | 73H7-0015; 73H-0008 | **181** | 73H11-SE-0001 |
| **126** | 73H7-SW-0023 | **216** | 73H-0002 |
| **133** | 73H7-SW-0023 | **218** | 73H7-SW-0019; 73H-0008 |
| **134** | 73H-0008 | **219** | 73H-0001; 73H-0003; 73H7-SW-0011; 73H7-0014 |
| **135** | 73H-0008; 73H-0009 | **220** | 73H-0008; 73H7-0026; 73H-0009 |
| **140** | 73H7-0014; 73H7-SW-0011, -0021; 73H7-SW-0023; 73H-0008 | **221** | 73H-0008 |
| **141** | 73H7-SW-0011; 73H7-SW-0021; 73H-0008; 73H7-SW-0030 | **223** | 73H-0008 |
| **144** | 73H-0008; 73H-0009 | **226** | 73H7-0015 |
| **145** | 73H7-0014; 73H7-SW-0011, -0021, -0023; 73H-0008 | **265** | 73H-0008 |
| **147** | 73H-0003; 73H7-SW-0011; 73H7-SW-0023; 73H-0009 | **269** | 73H-0008 |
| **148** | 73H-0003; 73H7-SW-0011; 73H7-0014; 73H-0009; 73H7-SW-0030 | **326** | 73H7-SW-0021 |
| **150** | 73H-0003, -0008; 73H7-0012, -0026; 73H7-SW-0019, -0021, -0030 | **426** | 73H-0002 |
| **152** | 73H7-0015 | **501** | 73H6-NE-0009 |
| **154** | 73H-0008; 73H-0009 | **502** | 73H-0001; 73H-0008; 73H-0009 |
| **155** | 73H-0008 | **601** | 73H-0001; 73H-0008; 73H-0009 |
| **156** | 73H-0008 | **602** | |
| **157** | 73H-0008 | **603** | 73H7-NE-0020 |
| **158** | 73H-0003 | **604** | 73H7-NE-0016 |
| **159** | 73H-0008 | **605** | 73H7-0026 |
| **160** | 73H-0008 | **606** | |
| **161** | 73H-0008 | **611** | 73H-0002 |
| **162** | 73H7-0015 | **612** | 73H7-0026 |
| **163** | 73H7-SW-0023 | **613** | 73H-0001; 73H-0008 |
| **164** | 73H-0008 | **614** | 73H7-NE-0020; 73H-0008; 73H-0009 |
| **165** | 73H-0008 | **615** | 73H-0008 |
| **166** | 73H-0008 | **Star** | 73H02-NE-0004; 73H02-NW-0006; 73H02-NW-0008 |
| **167** | 73H7-0014 | **137** | 73H02-NE-0004 |
| **168** | 73H7-SW-0021 | **Smeaton** | 73H10-SW-0003 |
| **169** | 73H-0002, -0003; 73H7-0012, -0015; 73H-0008; 73H7-SW-0030 | | |

## a) Microdiamond Recovery

There are challenges to cost-effectively evaluate the economic potential of diamondiferous kimberlites. Mini-bulk samples, to recover quantities of commercial-sized diamonds, are usually large (tens to hundreds of tonnes) and costly both to recover and to process. Many of these samples are required to assess the spatial variation in grade, particularly in large tonnage multi-phased kimberlites. Furthermore, if the kimberlites are covered by more than 80 m of glacial deposits and Cretaceous sediments, as in the case at FalC, the expense of recovering a sample increases. To alleviate these substantial costs, during the evaluation stage, microdiamond contents, which can be determined from a much smaller sample, are commonly used as a gauge to the grade of commercial-sized diamonds (Rombouts, 1995).

Microdiamonds are defined as diamonds that pass through a 0.5 mm square mesh screen. They are not of economic importance, and are typically not recovered during normal diamond mining operations. In primary diamondiferous kimberlite deposits, diamond-size distributions tend to follow a lognormal distribution (Rombouts, 1995). That is, the number of *in situ* diamond particles will usually increase, as the diamond size gets smaller. As microdiamonds are generally thought to form a part of that continuum, the recovery of these diamonds can provide critical information about diamond-size distribution, specifically for larger macrodiamonds. Estimates of grade using microdiamonds usually have wide confidence limits. Additionally, grades that represent realistic recovery for commercial mining must be estimated using a bottom cutoff (*e.g.*, 1 or 1.5 mm).

In this paper, microdiamond results refer to stones recovered from kimberlite samples subjected to acid digestion or caustic fusion. Strictly speaking, these results may contain both microdiamonds and macrodiamonds by the traditional definition. The microdiamond treatment process involves dissolving the kimberlite and recovering any

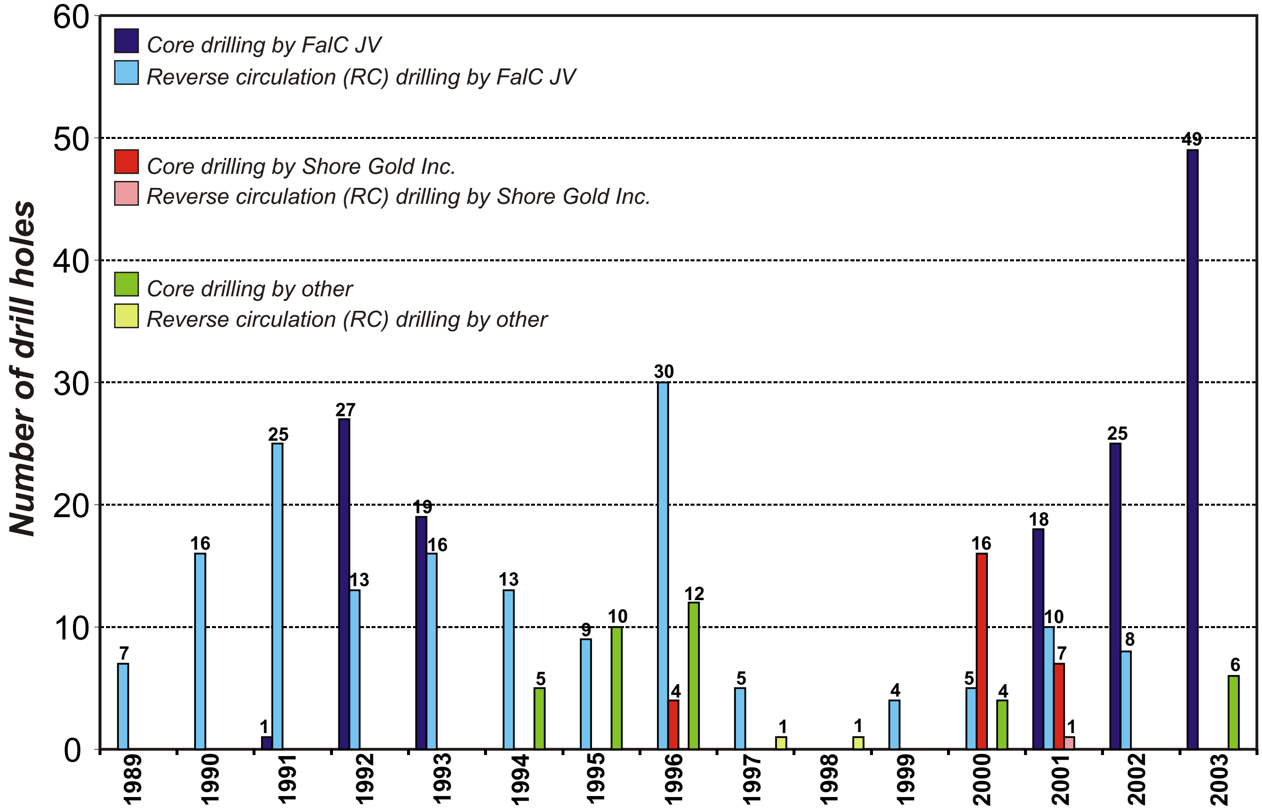


*Figure 2 - Chronological summary of drilling completed in the Fort à la Corne kimberlites.*

diamonds released above a specified minimum screen size (*e.g.*, 75 or 100 µm). In this paper, macrodiamond results refers to those stones recovered from mini-bulk drill hole sampling or bulk sampling and a treatment process that involves crushing, screening, and separation by DMS techniques.

Every drill-confirmed kimberlite at Fort à la Corne has been sampled for microdiamonds, at various degrees of thoroughness, by caustic fusion and more rarely, by jigging methods. Since 1989 over 23 000 kg of kimberlite have been processed for total diamond recovery. Diamonds have been recovered from 75% of the FalC kimberlites. Total sample size for individual kimberlites ranges from 18 kg to over 6000 kg. Based on initial results, certain kimberlites were considered more prospective. Consequently, these kimberlites were re-sampled such that, at present, nine kimberlites account for over 80% of the sample mass. Microdiamond counts for all kimberlites are summarized in Table 3 and in Figure 3.

Stone 'density' or number of stones in a given mass of kimberlite is commonly reported as stones/tonne. Average stone counts for individual kimberlites vary from zero to greater than 2000 stones/tonne. Nine of the 10 highest average stones/tonne counts are from kimberlites in the southeastern part of the main FalC cluster (Figure 3). These comprise a group of 14 kimberlites including the Star kimberlite and the FalC JV 140/141, 121, 145, 219, 148, 147, 220, and 120 kimberlites. These kimberlites all have >400 stones/tonne. The highest reported average count, 2783 stones/tonne, was recovered from the 148 kimberlite.

In an individual kimberlite complex there are, in some cases, considerable differences in stone counts between drill holes. For example, in the 141 part of the 140/141 kimberlite complex, samples from drill hole 141-03 returned 477 stones/tonne; 100 m to the southeast, only 13 stones/tonne were recovered from samples of core from hole 141-02. Diamond drill hole 141-02 cut a young kimberlite phase that is distinct from that sampled by 141-03 (SIR Assessment File 73H7-SW-0011; Harvey *et al.*, 2003).

In individual boreholes, stone counts are highly variable with no apparent pattern over the interval sampled. Rarely, however, there were distinct changes in stone counts with depth. For example, in drill hole 123-01 there is a distinct change in stone counts at a depth of 133 m (Figure 4). Above that depth the stones/tonne ranged from 739 to 1952 with an average of 1403 stones/tonne. Below 133 m the stone counts ranged from 0 to 500 and averaged 163 stones/tonne. The contrasting microdiamond counts correspond to a change in the stratigraphy of kimberlite 123 at a depth of 133 m (SIR Assessment File 73H7-0015). Similarly, in drill hole 121-04 there is a notable change

*Table 3 - Summary of microdiamond and macrodiamond recoveries from Fort à la Corne kimberlites. Note that grade calculations from macrodiamond recoveries from such small data sets have very low confidence limits (cpht, carats per hundred tonne; MiD, microdiamond; and MaD, macrodiamond).*

| **MICRODIAMOND RECOVERY** | | | | | | **MACRODIAMOND RECOVERY** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kimberlite Body** | **Sample Weight (kg)** | **Total Stones (n)** | **Stone Density (st/tonne)** | **Total Carats** | **MiD Grade (cpht)** | **Theoretical Weight (tonnes)*** | **Total MaD (n)** | **MaD density (st/tonne)** | **Total MaD (carats)** | **Avg. MaD size (ct/st)** | **MaD Grade (cpht)** |
| **101** | 234.0 | 1 | 4.27 | 0.0000645 | 0.03 | | | | | | |
| **116** | 73.0 | 0 | 0 | 0 | 0 | 26.494 | 0 | 0 | 0 | 0 | 0 |
| **118** | 410.4 | 81 | 197.37 | 0.0269257 | 6.56 | 8.743 | 2 | 0.2287544 | 0.02 | 0.01 | 0.23 |
| **119** | 347.1 | 8 | 23.05 | 0.0012175 | 0.35 | 34.106 | 0 | 0 | 0 | 0 | 0 |
| **120** | 1104.7 | 734 | 664.45 | 0.1664583 | 15.07 | 205.354 | 151 | 0.7353156 | 5.393 | 0.03572 | 2.63 |
| **121** | 934.4 | 390 | 417.40 | 0.1793876 | 19.20 | 61.05 | 64 | 1.048321 | 2.344 | 0.03663 | 3.84 |
| **122** | 660.0 | 211 | 319.70 | 0.064369 | 9.75 | 380.538 | 293 | 0.7699625 | 23.135 | 0.07896 | 6.08 |
| **123** | 300.3 | 153 | 509.49 | 0.292075 | 97.26 | 17.7826 | 7 | 0.3936432 | 0.132 | 0.01886 | 0.74 |
| **126** | 113.0 | 0 | 0 | 0 | 0 | 36.984 | 1 | 0.0270387 | 0.13 | 0.13 | 0.35 |
| **133** | 152.0 | 42 | 276.32 | 0.000874 | 0.58 | 40.992 | 1 | 0.024395 | 0.045 | 0.045 | 0.11 |
| **134** | 84.9 | 11 | 129.56 | 0.0007434 | 0.88 | 2.8297 | 1 | 0.3533944 | 0.01 | 0.01 | 0.35 |
| **135** | 128.3 | 5 | 38.97 | 0.000479 | 0.37 | | | | | | |
| **140** | 1143.6 | 1552 | 1357.12 | 0.1241025 | 10.85 | 438.417 | 210 | 0.478996 | 30.305 | 0.14431 | 6.91 |
| **141** | 1105.4 | 527 | 476.75 | 0.184756 | 16.71 | 1933.25 | 1217 | 0.6295076 | 129.22 | 0.10618 | 6.68 |
| **144** | 209.0 | 11 | 52.63 | 0.0054125 | 2.59 | | | | | | |
| **145** | 1016.4 | 490 | 482.08 | 0.2271137 | 22.34 | 48.245 | 32 | 0.6632812 | 0.908 | 0.02838 | 1.88 |
| **147** | 292.0 | 497 | 1702.05 | 0.1039799 | 35.61 | 74.9082 | 122 | 1.6286601 | 4.355 | 0.0357 | 5.81 |
| **148** | 1033.0 | 2448 | 2370.90 | 0.196508 | 19.03 | 122.808 | 70 | 0.5699954 | 2.369 | 0.03384 | 1.93 |
| **150** | 647.3 | 176 | 271.88 | 0.0995078 | 15.37 | 235.985 | 72 | 0.3051036 | 6.02 | 0.08361 | 2.55 |
| **151** | 57.2 | 13 | 227.27 | 0.00825 | 14.42 | 5.542 | 4 | 0.7217611 | 0.46 | 0.115 | 8.30 |
| **152** | 166.0 | 47 | 283.13 | 0.006975 | 4.20 | 0.223 | 0 | 0 | 0 | 0 | 0 |
| **154** | 178.6 | 10 | 55.99 | 0.012866 | 7.20 | | | | | | |
| **155** | 105.6 | 12 | 113.64 | 0.0109358 | 10.36 | 3.6442 | 7 | 1.9208605 | 0.08 | 0.01143 | 2.20 |
| **156** | 140.8 | 11 | 78.13 | 0.0020962 | 1.49 | 5.1774 | 0 | 0 | 0 | 0 | 0 |
| **157** | 58.7 | 3 | 51.07 | 0.0001919 | 0.33 | | | | | | |
| **158** | 69.0 | 3 | 43.49 | 0.00025 | 0.36 | 4.75 | 0 | 0 | 0 | 0 | 0 |
| **159** | 52.8 | 2 | 37.88 | 0.0000424 | 0.08 | | | | | | |
| **160** | 52.3 | 0 | 0 | 0 | 0 | | | | | | |
| **161** | 43.5 | 0 | 0 | 0 | 0 | | | | | | |
| **162** | 234.0 | 33 | 141.03 | 0.0026295 | 1.12 | 17.607 | 3 | 0.1703868 | 0.12 | 0.04 | 0.68 |
| **163** | 98.0 | 0 | 0 | 0 | 0 | 26.575 | 0 | 0 | 0 | 0 | 0 |
| **164** | 34.5 | 0 | 0 | 0 | 0 | | | | | | |
| **165** | 44.0 | 0 | 0 | 0 | 0 | | | | | | |
| **166** | 88.0 | 19 | 215.91 | 0.0017976 | 2.04 | 2.5986 | 3 | 1.1544678 | 0.042 | 0.014 | 1.62 |
| **167** | 252.0 | 30 | 119.05 | 0.0005 | 0.20 | 15.117 | 8 | 0.5292055 | 0.315 | 0.03938 | 2.08 |
| **168** | 59.0 | 1 | 16.95 | 0.0000145 | 0.02 | 30.607 | 5 | 0.1633613 | 0.215 | 0.043 | 0.70 |
| **169** | 789.8 | 150 | 189.92 | 0.0501164 | 6.35 | 73.738 | 47 | 0.6373918 | 4.075 | 0.0867 | 5.53 |
| **170** | 191.3 | 40 | 209.10 | 0.012166 | 6.36 | 4.267 | 7 | 1.6404968 | 0.099 | 0.01414 | 2.32 |
| **174** | 296.8 | 112 | 377.36 | 0.096327 | 32.46 | 11.1 | 2 | 0.1801802 | 0.035 | 0.0175 | 0.32 |
| **175** | 251.6 | 47 | 186.79 | 0.0006275 | 0.25 | 9.764 | 5 | 0.5120852 | 0.29 | 0.058 | 2.97 |
| **176** | 301.3 | 192 | 637.15 | 0.1618758 | 53.72 | 48.0646 | 17 | 0.3536907 | 0.966 | 0.05682 | 2.01 |
| **177** | 24.6 | 0 | 0 | 0 | 0 | | | | | | |
| **Foxford 179** | 18.0 | 0 | 0 | 0 | 0 | 13.991 | 0 | 0 | 0 | 0 | 0 |
| **Foxford 180** | 132.7 | 0 | 0 | 0 | 0 | 6.829 | 0 | 0 | 0 | 0 | 0 |
| **Birchbark 181** | 339.6 | 2 | 5.89 | 0.0001775 | 0.05 | 30.262 | 0 | 0 | 0 | 0 | 0 |
| **216** | 67.2 | 1 | 14.88 | 0.00025 | 0.37 | 9.812 | 0 | 0 | 0 | 0 | 0 |
| **218** | 82.0 | 5 | 60.98 | 0.000084 | 0.10 | 17.839 | 2 | 0.1121139 | 0.18 | 0.09 | 1.01 |
| **219** | 306.3 | 125 | 408.12 | 0.0450295 | 14.70 | 40.308 | 6 | 0.1488538 | 0.192 | 0.032 | 0.48 |
| **220** | 293.7 | 258 | 878.36 | 0.0924974 | 31.49 | 67.7162 | 69 | 1.0189585 | 3.133 | 0.04541 | 4.63 |
| **221** | 274.7 | 74 | 269.37 | 0.0781664 | 28.45 | 4.6563 | 21 | 4.5100187 | 0.342 | 0.01629 | 7.34 |
| **223** | 67.9 | 10 | 147.25 | 0.0022744 | 3.35 | 2.032 | 2 | 0.984252 | 0.123 | 0 | 6.05 |
| **226** | 180.6 | 0 | 0 | 0 | 0 | 22.3059 | 0 | 0 | 0 | 0 | 0 |
| **265** | 17.6 | 0 | 0 | 0 | 0 | | | | | | |
| **269** | 8.3 | 3 | 361.45 | 0.0000988 | 1.19 | | | | | | |
| **326** | 37.0 | 0 | 0 | 0 | 0 | 10.567 | 2 | 0.1892685 | 0.06 | 0.03 | 0.56 |
| **426** | 53.7 | 0 | 0 | 0 | 0 | 20.894 | 0 | 0 | 0 | 0 | 0 |
| **Weirdale 501** | 20.0 | 0 | 0 | 0 | 0 | 7.083 | 0 | 0 | 0 | 0 | 0 |
| **Weirdale 502** | 171.3 | 1 | 5.84 | 0.000281 | 0.16 | 0.506 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 601** | 252.1 | 44 | 174.53 | 0.0030512 | 1.21 | 5.4221 | 1 | 0.1844304 | 0.008 | 0 | 0.15 |
| **Snowden 602** | 234.0 | 4 | 17.09 | 0.000362 | 0.15 | 1.609 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 603** | 74.0 | 1 | 13.51 | 0.0000485 | 0.07 | 35.753 | 1 | 0.0279697 | 0.27 | 0.27 | 0.76 |
| **Snowden 604** | 205.6 | 0 | 0 | 0 | 0.00 | 0.237 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 605** | 44.2 | 9 | 203.80 | 0.0010346 | 2.34 | 3.855 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 606** | 213.0 | 21 | 98.59 | 0.0022955 | 1.08 | 3.501 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 611** | 57.3 | 1 | 17.45 | 0.00001 | 0.02 | 2.944 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 612** | 12.3 | 0 | 0 | 0 | 0 | 1.8341 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 613** | 75.6 | 0 | 0 | 0 | 0 | 1.175 | 0 | 0 | 0 | 0 | 0 |
| **Snowden 614** | 157.0 | 1 | 6.37 | 0.000009 | 0.01 | 25.138 | 17 | 0.676267 | 1.425 | 0.08382 | 5.67 |
| **Snowden 615** | 68.6 | 3 | 43.76 | 0.0000463 | 0.07 | | | | | | |
| **137** | 552 | 5 | 9.1 | .000156 | 0.03 | | | | | | |
| **Star** | 6150.0 | 2515 | 408.94 | 1.6817238 | 27.35 | 127 | 184 | 1.4603175 | 8.52 | 0.0463 | 6.70 |
| **TOTAL** | **23 744.6** | **11 145** | **469.4** | **3.95** | **16.6** | **4389.5** | **2656** | **0.61** | **225.34** | **0.08** | **5.13** |
| **AVERAGE** | **334.4** | **157** | **217.2** | **0.06** | **7.43** | **78.38** | **47** | **0.44** | **4.02** | **0.04** | **1.83** |

* Theoretical sample weight: for reverse circulation holes = theoretical weight of borehole (volume*density) and for core holes = measured mass of sample.

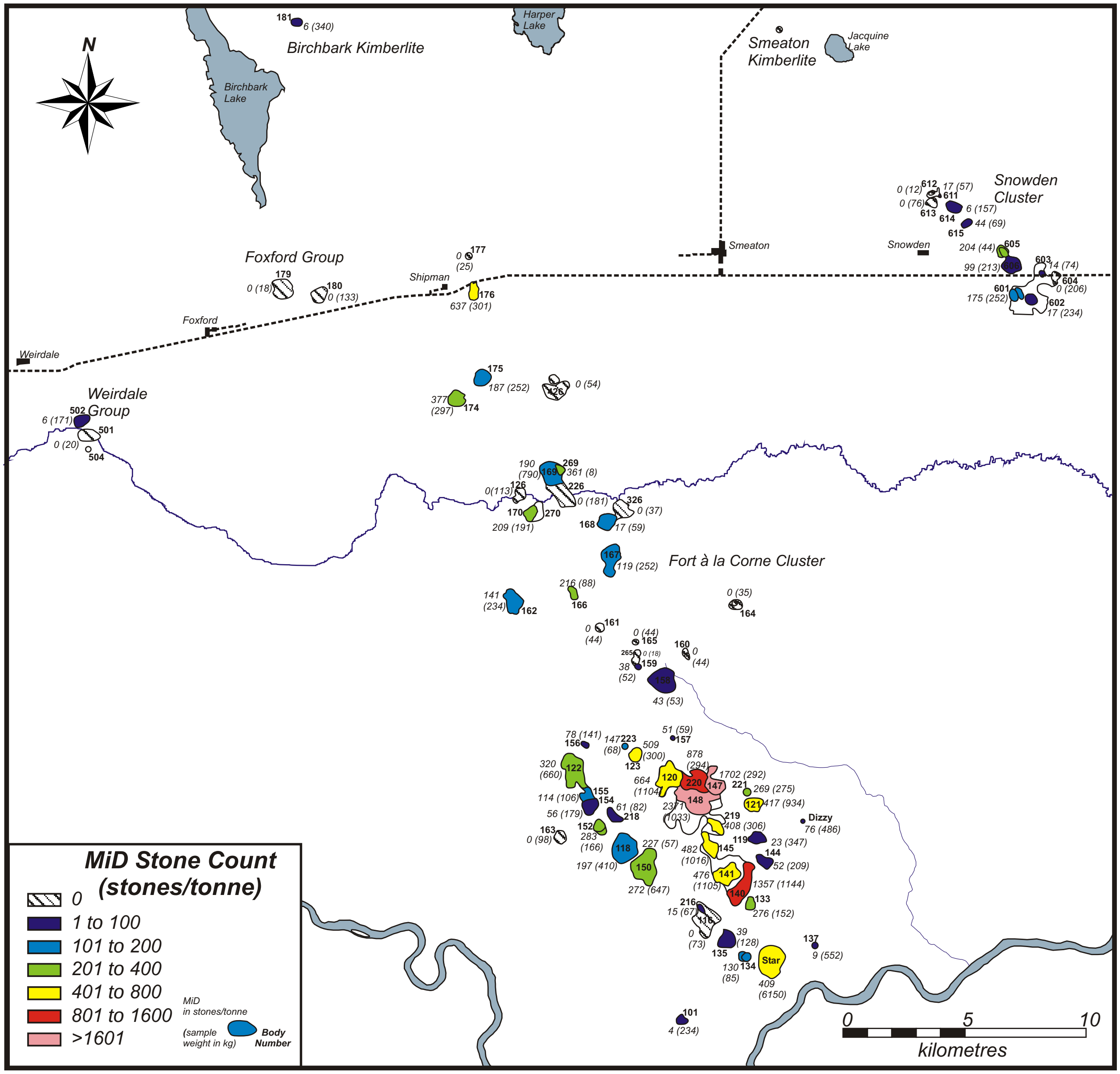


***Figure 3 - Map showing the combined average microdiamond (MiD) stone counts (stones/tonne) for each Fort à la Corne kimberlite.***

in stone counts at about 150 m (Figure 5). Above that depth the stones/tonne count was 560 to 580, however, below 150 m it decreases with depth from about 200 to 100 stones/tonne. Another example is drill hole 140-05 where there appears to be a marked change at about 270 m deep (Figure 6). Above 270 m the average stone count was 449 stones/tonne; in contrast, below 270 m the average is 945 stones/tonne.

In 2003, the FalC JV implemented a 49-hole core drilling program that tested four high priority targets. Microdiamond recoveries included some of the highest stone counts from the FalC kimberlite field. Samples from kimberlite 148 consisted of 739.8 kg, with an average diamond count of 2783 stones/tonne (Table 4). Results for discrete kimberlite phases were highly variable, ranging from 1542 to 3635 stones/tonne. Stone counts for individual phases from 140/141 ranged from 122 to 2266 stones/tonne. Notably, a clear, colourless, 0.77 carat diamond was found while slabbing HQ core from drill hole 140-34 at a depth of 118 m (Figure 7). In contrast to kimberlites 140/141 and 148, the 122 kimberlite samples had a lower average diamond count of 792 stones/tonne, with individual geological phases ranging from 236.7 to 978.3 stones/tonne. Close examination of Table 4 reveals that a considerable proportion of the stones recovered from 122 fell into the larger sieve sizes (*e.g.*, >0.425 mm), particularly in two of the six defined phases. This suggests the potential for large stones.

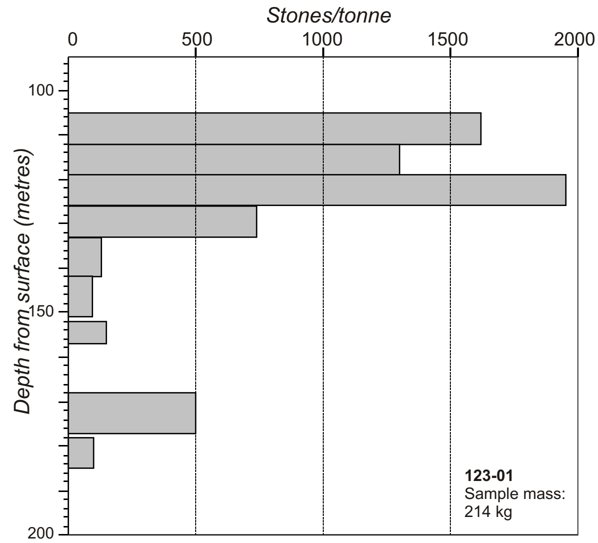


***Figure 4 - Stone counts from the 123-01 borehole. Note the significant change in microdiamond content at 133 m.***

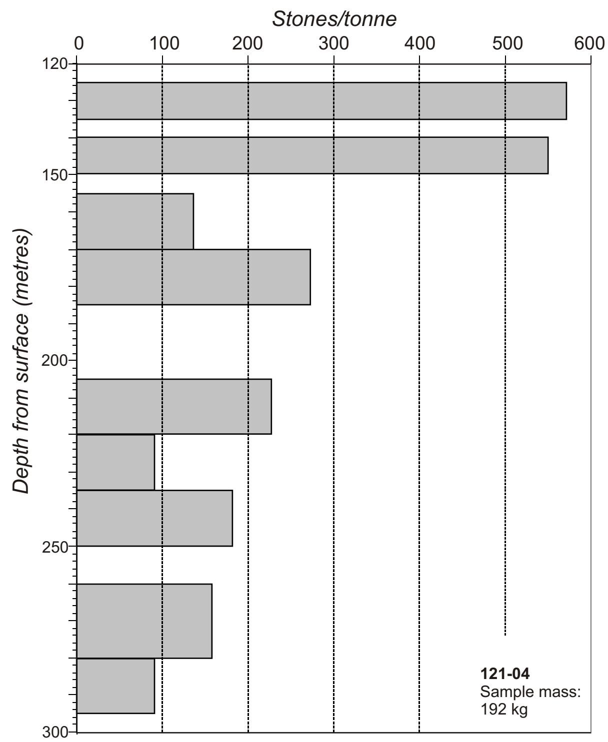


***Figure 5 - Stone counts from the 121-04 borehole. Note the significant change in microdiamond content at 150 m.***

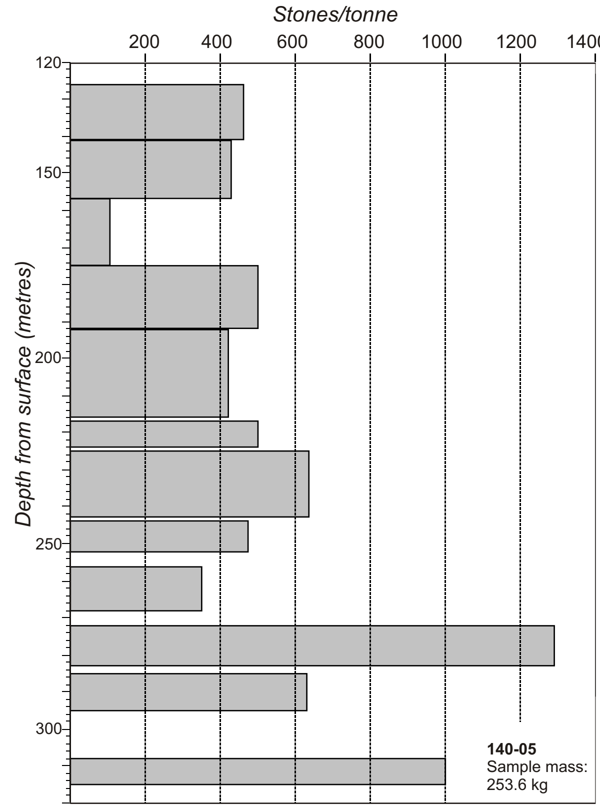


***Figure 6 - Stone counts from the 140-05 borehole. Note the marked increase in microdiamonds at approximately 270 m.***

## b) Macrodiamond Recovery

Two techniques have been used in the FalC field for macrodiamond recovery, mini-bulk sampling via drilling –particularly RC drilling, and underground sampling. The RC drilling method has been utilized by the FalC JV and by Shore Gold Inc. Currently, Shore Gold Inc., who recently sunk a shaft into the Star kimberlite, is collecting a 25 000 tonne bulk sample from underground.

During FalC JV sampling programs, various definitions have been used for the term "macrodiamond". From 1989 to 1993, macrodiamonds were defined by the FalC JV as those stones not passing a bottom screen cut-off of 0.85 mm. Between 1994 and 2001, the FalC JV defined a macrodiamond as a stone captured by a 1.0 mm screen. Since 2001, the cutoff has been increased to 1.5 mm. The only other mini-bulk, large diameter drill hole was completed by Shore Gold Inc in 2001. The 24″ RC hole kimberlite sample was split. Half the sample went to Lakefield for processing with macrodiamonds defined as those not passing through a 1.18 mm square mesh sieve. The other half of the sample went to the De Beers processing facility in Grande Prairie, were a standard Class 1 diamond sieve (equivalent to approximately 1.1 mm square mesh) was utilized (Patrick and Leroux, 2004).

Between 1989 and 1999, a total weight of 39 carats of macrodiamonds was recovered from the FalC kimberlites. Notably, in 1999, the FalC JV recovered a significant number of low luminescent diamonds in X-ray tailings. Consequently, the JV re-examined available concentrate from 1990 and 1991 when the X-ray recovery system was used as the primary recovery tool. Although an additional recovery of diamonds represented an increase of 32%

over original stone recovery, the JV considered that the additional diamonds had a minor effect on actual diamond grades and did not materially effect modeled grade forecasts (SIR Assessment File 73H7-SW-0030; Kensington Resources Ltd. News Release, November 1, 2000).

Since 2000, macrodiamond recovery has significantly increased with the use of 24″ and 36″ diameter RCA drilling to attain mini-bulk samples from high priority bodies. Kimberlite recovery ranged from 0.35 to 0.52 tonnes per metre for 24″ drill holes and 0.58 to 0.64 tonnes per metre for 36″ drill holes. To date, the FalC JV has processed over 4200 tonnes of kimberlite for macrodiamond recovery, with the 140/141 kimberlite complex accounting for over 50% of that mass. Between 2000 and 2002, 185 carats of macrodiamonds have been recovered, with the 140/141 kimberlite being the focus of sampling.

Currently, 56 kimberlites have been sampled for macrodiamond recovery. Over 2600 macrodiamonds have been recovered at a composite weight of 225 carats (Table 3). The 140/141 kimberlite accounts for 70% of the macrodiamond carat weight recovered. Consequently, as more than 100 tonnes of kimberlite have been sampled from only seven kimberlites and 33 kimberlites are represented by less than 25 tonnes, there are low confidence levels for grade calculations for most kimberlites (Table 3 and Figure 8).

***Table 4 - Summary of the 2003 microdiamond sampling program completed on FalC JV kimberlites 148, 140/141, and 122 (compiled from Kensington Resources News Release, February 20, 2004; March 22, 2004; and May 21, 2004).***

**Microdiamond Sieve Analysis from the 148 kimberlite**

| Kimberlite Type | Sample (kg) | Stones (n) | Stones/ tonne | +0.075 mm | +0.106 mm | +0.150 mm | +0.212 mm | +0.300 mm | +0.425 mm | +0.600 mm | +0.850 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FBVK | 194.75 | 708 | 3635.4 | 310 | 195 | 121 | 60 | 15 | 5 | 2 | 0 |
| MPK | 316.95 | 983 | 3101.4 | 422 | 336 | 135 | 63 | 21 | 4 | 2 | 0 |
| WS-FE | 40.7 | 79 | 1941.0 | 29 | 22 | 12 | 10 | 3 | 2 | 0 | 1 |
| OPK | 146.55 | 226 | 1542.1 | 116 | 53 | 30 | 18 | 5 | 1 | 2 | 1 |
| MPK-B | 40.85 | 63 | 1542.2 | 26 | 20 | 9 | 7 | 0 | 1 | 0 | 0 |
| | **739.8** | **2,059** | **2,783.2** | | | | | | | | |
| | | | **Total (n)** | **903** | **626** | **307** | **158** | **44** | **13** | **6** | **2** |
| | | | *% of n* | *43.9* | *30.4* | *14.9* | *7.7* | *2.1* | *0.6* | *0.3* | *0.1* |
| | | | **St/tonne** | **1220.6** | **846.17** | **414.98** | **213.57** | **59.48** | **17.57** | **8.11** | **2.70** |

**Note:** MPK, medium- to coarse-grained olivine pyroclastic kimberlite; MPK-B, xenolith-rich breccia beds; FBVK, finely bedded volcaniclastic kimberlite; OPK, other pyroclastic kimberlite units; and WS-FE: well sorted–fines-enriched pyroclastic kimberlite.

**Microdiamond Sieve Analysis for the 140/141 kimberlite**

| Kimberlite Type | Sample (kg) | Stones (n) | Stones/ tonne | +0.075 mm | +0.106 mm | +0.15 0mm | +0.212 mm | +0.300 mm | +0.425 mm | +0.600 mm | +0.850 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Repeated beds | 142.55 | 323 | 2265.9 | 176 | 94 | 30 | 17 | 3 | 1 | 0 | 2 |
| Breccia beds | 274.9 | 593 | 2157.1 | 309 | 159 | 87 | 26 | 9 | 1 | 2 | 0 |
| other | 68 | 109 | 1602.9 | 58 | 34 | 10 | 5 | 2 | 0 | 0 | 0 |
| Speckled | 109.7 | 134 | 1221.5 | 66 | 40 | 20 | 6 | 2 | 0 | 0 | 0 |
| | **595.15** | **1159** | **1,947.4** | | | | | | | | |
| | | | **Total (n)** | **609** | **327** | **147** | **54** | **16** | **2** | **2** | **2** |
| | | | *% of n* | *52.5* | *28.2* | *12.7* | *4.7* | *1.4* | *0.2* | *0.2* | *0.2* |
| | | | **St/tonne** | **1023.3** | **549.44** | **247.0** | **90.73** | **26.88** | **3.36** | **3.36** | **3.36** |

**Microdiamond Sieve Analysis from the 122 kimberlite**

| Kimberlite Type | Sample (kg) | Stones (n) | Stones/ tonne | +0.075 mm | +0.106 mm | +0.150 mm | +0.212 mm | +0.300 mm | +0.425 mm | +0.600 mm | +0.850 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MPK-N | 117.55 | 115 | 978.3 | 50 | 30 | 19 | 8 | 4 | 3 | 0 | 1 |
| UCSK-N | 23.95 | 18 | 751.6 | 4 | 7 | 4 | 2 | 0 | 1 | 0 | 0 |
| North Crater | 141.5 | 133 | 939.9 | 54 | 37 | 23 | 10 | 4 | 4 | 0 | 1 |
| MPK-S | 222.65 | 163 | 732.1 | 61 | 48 | 26 | 16 | 5 | 3 | 4 | 0 |
| UCSK-S | 7.75 | 3 | 387.1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| OPK-S1 | 32.4 | 26 | 802.5 | 8 | 4 | 6 | 7 | 1 | 0 | 0 | 0 |
| South Crater | 262.8 | 192 | 730.6 | 69 | 55 | 32 | 23 | 6 | 3 | 4 | 0 |
| SAK | 8.45 | 2 | 236.7 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | **412.75** | **327** | **792.2** | | | | | | | | |
| | | | **Total (n)** | **124** | **92** | **56** | **33** | **10** | **7** | **4** | **1** |
| | | | *% of n* | *37.9* | *28.1* | *17.1* | *10.1* | *3.1* | *2.1* | *1.2* | *0.3* |
| | | | **St/tonne** | **300.53** | **222.98** | **135.72** | **79.98** | **24.24** | **16.97** | **9.69** | **2.42** |

**Note:** MPK, massive to graded beds of olivine/lapilli pyroclastic kimberlite; UCSK, interbedded sediments, resedimented kimberlite, and kimberlite; OPK, other pyroclastic kimberlite; and SAK, interbedded sediments and kimberlite.

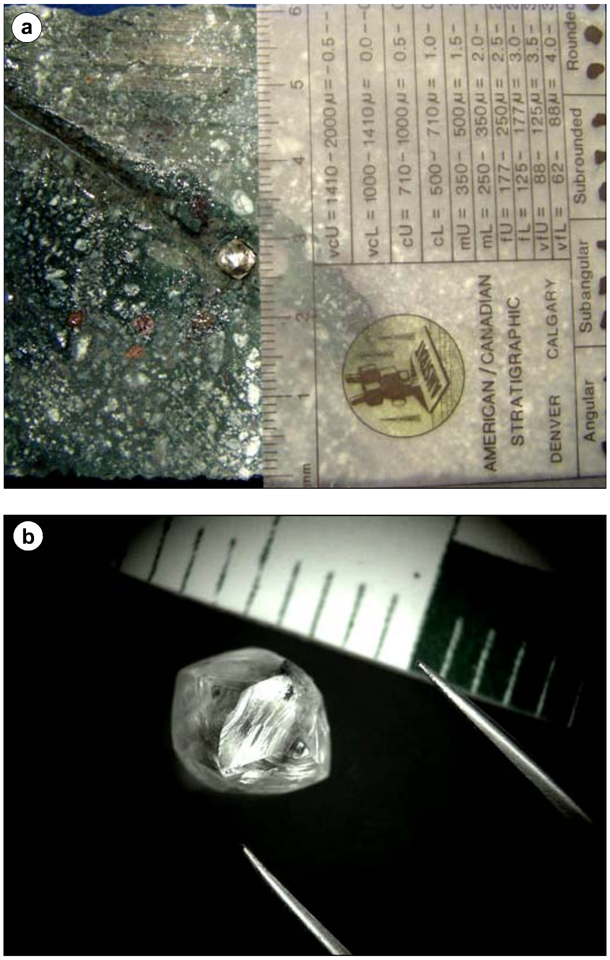


***Figure 7 - a) Slabbed HQ core, from 118 m in drill hole 140-34, containing a 0.77 carat diamond exposed when the core was cut. The diamond was described as a clear, colourless, octahedroid with etched trigons and hillocks; and b) close-up of the diamond (from Kensington Resources website: www.kensington-resources.com).***

Inspection of Figure 8 reveals some apparent trends with respect to diamond distribution. The kimberlites with higher macrodiamond grades are in the southern part of the main FalC cluster. In detail, some of the highest macrodiamond grades are in the string of kimberlites that include Star, 140/141, 147, 220, and 120. In particular, based on one 24″ RCA drill hole, the Star kimberlite has a recovered macrodiamond grade of 6.7 carats per hundred tonne (cpht). The 140/141 kimberlite complex has an overall macrodiamond grade of 6.7 cpht, while the 220 and 147 kimberlites' macrodiamond grades are 4.6 and 5.8 cpht, respectively. Also in the southern part of the main cluster are two other kimberlites with notable macrodiamond grades. The 122 and 150 kimberlites have grades of 6.1 and 2.6 cpht, respectively. Also apparent in Figure 8 is that the central part of the main FalC cluster appears to have low macrodiamond grades, although it is recognized these kimberlites have been subjected to very limited sampling for macrodiamonds At the northern end of the main FalC cluster, kimberlites 169 and 175 exhibit moderate macrodiamond grades of 5.5 and 3.0 cpht, respectively, although sample size for the latter is limited. It is also noteworthy that there is a lack of recovered macrodiamonds from the majority of the kimberlites in the satellite clusters (*i.e.*, Snowden, Weirdale, Birchbark, and Foxford). Snowden 614 is the exception with a relatively moderate macrodiamond grade of 5.7 cpht.

Macrodiamond grades for individual FalC kimberlite bodies ranged from 0 to 8.3 cpht. Individual drill holes have highly variable grades, with the highest having a grade of 23 cpht for drill hole 169-10. The relationship between drill holes within a kimberlite is also highly variable. For example in the 122 kimberlite, drill holes 122-08 and 122-07, which are 140 m apart have vastly different macrodiamond grades of 1.04 and 11.65 cpht, respectively.

Macrodiamond grades, like microdiamond counts, commonly vary with depth, especially in multiphase kimberlite complexes. A good example of this is shown by the macrodiamond recovery from the exploration shaft on the Star kimberlite (Figure 9; Shore Gold Inc. News Release, June 22, 2004; July 9, 2004; August 31, 2004). Diamond grades in the upper part of the shaft range from 1.58 to 4.95 cpht. In contrast, below approximately 190 m, diamond grades range from 9.73 to 15.93 cpht. The variation in diamond grade corresponds with the boundary between two kimberlite eruptive phases (Kjarsgaard *et al*., 2003; Shore Gold Inc. News Release, July 29, 2004). For the entire bulk sample project, as of October 19, 2004, Shore Gold had processed 14 576 tonnes of dry kimberlite with an average grade of 12.44 cpht. The lower phase of kimberlite comprises 69% of the sampled mass and has an average grade of 16.14 cpht. The Star bulk sample has yielded a 19.71 carat diamond, the largest recovered to date from the Fort à la Corne area.

## c) Combined Microdiamond and Macrodiamond Evaluation

By combining microdiamond and macrodiamond data, an estimate of diamond distribution within the kimberlites can be inferred. For example, kimberlites 123 and 176 have moderate to high stone counts of 509 and 637 stones/tonne, respectively, and also have low macrodiamond grades of 0.74 and 2.0 cpht. These relationships may indicate an abundance of smaller stones and a scarcity of larger ones.

In contrast, the opposite relationship has also been noted. In those cases, kimberlites with low to moderate microdiamond counts in stones/tonne coupled with moderate to high macrodiamond grades may indicate the potential for larger stones. This is apparently the case in the 122, 151, 169, 221, and 223 kimberlites; although this correlation is qualified by the recognition there are very limited datasets for the 151, 221, and 223 bodies. For

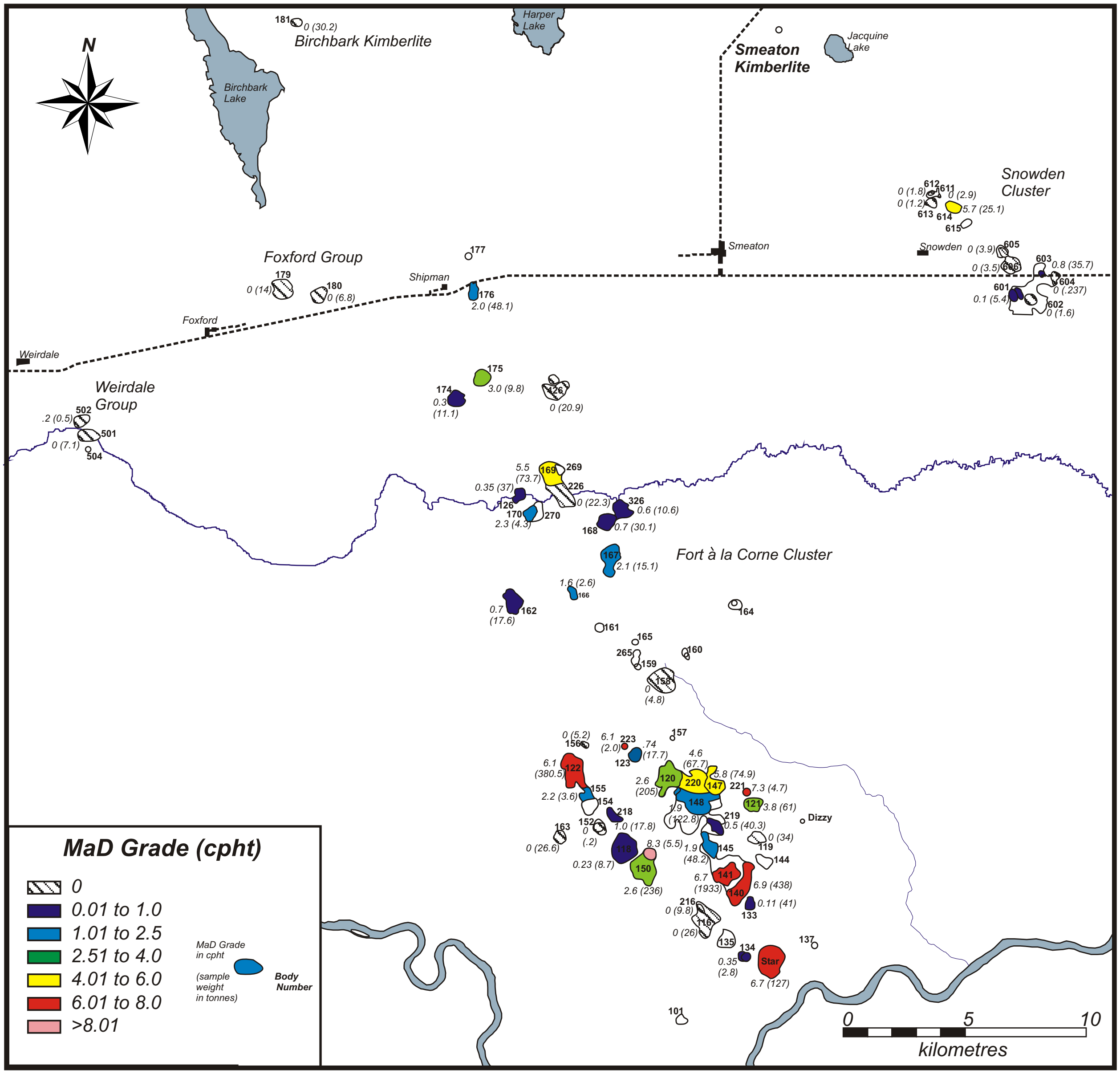


*Figure 8 - Map depicting average macrodiamond grades for kimberlites in the Fort à la Corne area (due to the low sample weights for most of the FalC kimberlites, the macrodiamond grade calculations need to be viewed with caution).*

example, kimberlite 122 has a moderate average microdiamond count of 320 stones/tonne and a relatively high macrodiamond grade of 6.1 cpht. As there are relatively few stones/tonne and the grade is relatively high, this tends to indicate that the diamond distribution is characterized by a higher proportion of larger stones. For 122, this is supported by microdiamond sieve analysis (Figure 10 and Table 4). Although the 122 kimberlite has a much lower stone/tonne count than the 148 kimberlite (792.2 *versus* 2783 stones/tonne), the shallow curve of the stone count and coincidence of stones/tonne in the coarser sieve sizes (≥0.425 mm) between kimberlites 148 and 122 may suggest that 122 could have a high proportion of larger stones. Sieve analysis revealed that in kimberlite 122, 3.67% of the stones are greater than 0.425 mm in contrast to 1.02% in 148. As a result, the two have very similar stones/tonne counts for the larger sieve sizes (≥0.425 mm; Table 4) and consequently may have similar contents of larger stones.

Ideally, kimberlites with high stone counts (stones/tonne) and high macrodiamond grades should indicate the best potential for abundant, commercial-sized diamonds. This appears to be the relationship with the 140/141, 147, and Star kimberlites, and to a lesser extent the 120, 150, and 121 kimberlites. For example, the combined 140/141 kimberlite complex has an average stone density of 924 stones/tonne coupled with an average macrodiamond grade

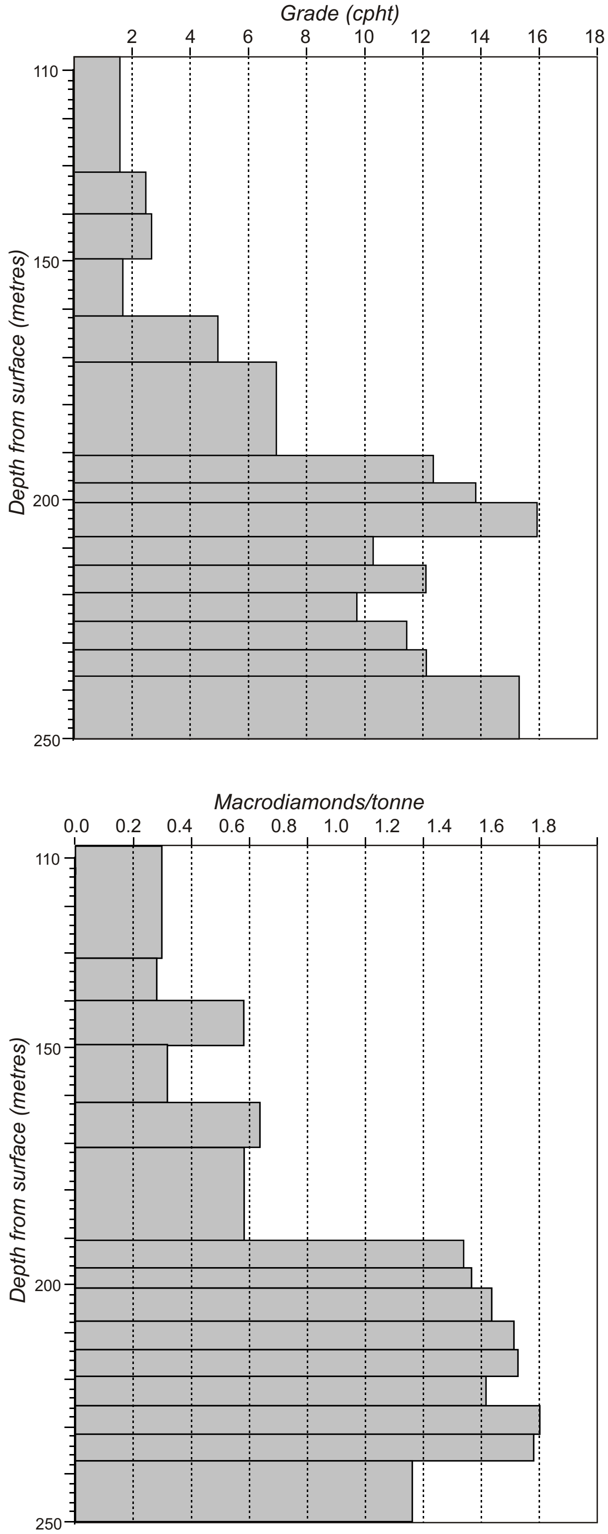


***Figure 9 - Diamond grade and diamond counts from kimberlite cut by the exploration shaft in the Star kimberlite (depths are from surface which is taken as zero metres).***

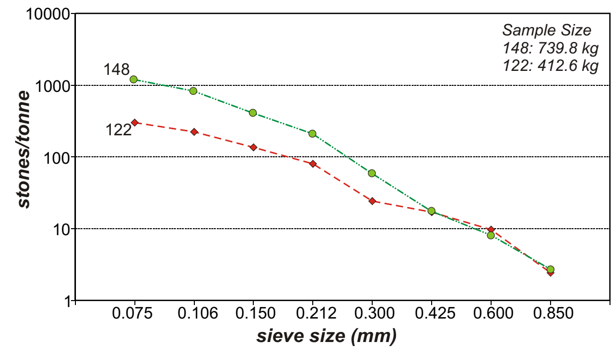


***Figure 10 - Microdiamond sieve size distribution for the FalC JV kimberlites 122 and 148 (based on data from Table 4).***

of 6.7 cpht. Likewise, 147 has a microdiamond count of 1702 stones/tonne coupled with an average macrodiamond grade of 5.8 cpht. Both appear to have the potential for quantities of larger stones.

As noted previously, kimberlites in the main FalC cluster can apparently be sub-divided into geographic groupings based on microdiamond counts and macrodiamond grades from samples recovered from drill holes. The most notable grouping encompasses kimberlites from the Star in the southeast to 120 in the northwest and includes the 140/141, 148, 147, and 220 bodies. These kimberlites have moderate to very high microdiamond counts ranging from 276 to 2371 stones/tonne, coupled with some of the highest drill hole-based macrodiamond grades in the FalC cluster, with average grades per kimberlite ranging up to 6.9 cpht. In contrast, a distinct group, in the middle of the main FalC cluster, encompassing those kimberlites from the 158 in the south to the 126 in the north, have both low microdiamond counts (<225 stones/tonne) coupled with low macrodiamond grades ranging between 0 and 2.3 cpht. The kimberlite groups and isolated bodies surrounding the main FalC cluster (*i.e.*, the Snowden cluster, the Foxford, Weirdale, and Birchbark kimberlites) also have relatively low stone counts and low macrodiamond grades indicating an apparently low potential for commercial-sized diamonds. The exception to this is Snowden 614 which, although it has low microdiamond stone counts, has a relatively high macrodiamond grade. Once more, it should be stressed that macrodiamond grade estimates on small sample parcels must be viewed with a cautionary note, particularly with the recognition of the complex, multi-phased nature of some of the kimberlites.

## 3. Grade and Revenue Modeling

Utilizing statistical evaluation of all microdiamond and macrodiamond data, the FalC JV has produced diamond grade forecasts to predict the expected commercial-sized diamond distribution for a potential production scenario. These forecasts are commonly different from the actual sample grade which is simply a measure of the recovered carat weight divided by the theoretical [2] sample mass (tonnes). Similarly, average diamond values, measured in US$/carat, are modeled based on diamond values extrapolated upwards to include recoveries modeled in the larger diamond sieve classes. Again note that confidence levels are commensurate with the size of the macrodiamond sample sets.

At the beginning of 2000, the De Beers' Mineral Resource Evaluation Department (MINRED) reviewed all available macrodiamond and microdiamond data on FalC JV property and re-prioritized the kimberlites. Priority targets 122 and 141 were selected for bulk sampling by large-diameter (24″) reverse circulation drilling in the 2000 program. Two hundred and twelve macrodiamonds were recovered from body 122 and body 141 yielded 275 macrodiamonds. Using a 1 mm cutoff size, De Beers employed a statistical treatment of the results from the samples to forecast macrodiamond grades between 8 and 13 cpht for body 122, and 19 cpht for body 141 (Table 5; Kensington Resources News Release, April 25, 2001). In addition, the 2000 drill program recovered sufficient stones to permit preliminary value modeling. Modelled *in situ* value estimates were expressed by utilizing conservative, best fit, and optimistic models. Values ranged from US$90 to US$178/carat (>1.5 mm) corresponding to *in situ* ore value estimates from US$16 to $32/tonne for the 141 body. Similar modeling for stones greater than 1.5 mm for the 122 kimberlite yielded modeled values up to US$147/carat with ore value estimates up to US$18/tonne.

The recognition of discrete kimberlite eruptive phases has helped to clarify the variation in diamond recoveries from and between individual boreholes. In response, the 2002 FalC JV program involved drilling 25 NQ core holes into the 140/141 kimberlite complex to develop a better understanding of its volcano-stratigraphy. Based on these core holes, eight large diameter RCA drill holes were completed to provide additional diamonds to increase confidence in grade forecasts, valuation, and revenue modeling. Three 36″ LDDH holes were drilled in close-proximity in the 141 body area, where higher stone recoveries were expected. Five additional 24″ LDDH holes were drilled in poorly sampled parts of the kimberlite, mostly in the 140 area.

Results were presented by drill hole with the dominant kimberlite phase intersected in each borehole noted (Kensington Resources News Release, June 17, 2003). In total, 664 diamonds were recovered (>1.5 mm). The stones had an aggregate weight of 93.06 carats from a theoretical mass of 1271.9 tonnes; this equates to an actual macrodiamond grade of 7.3 cpht. In detail, actual grades per drill hole ranged between 1.7 and 17.0 cpht. Included in this sample set was the discovery of the largest diamond recovered from the FalC JV property: a 10.23 carat dodecahedral aggregate stone with two dimensions of 14 and 10.5 mm. It was also apparent that there are distinct grade differences for the various phases that comprise the 140/141 kimberlite. The "mega-graded bed" unit from the 141 part, sampled by three closely spaced 36″ diameter RCA drill holes, had a consistent actual grade of about 6.6 cpht. In contrast, a distinctive breccia phase intersected in two drill holes in the 140 part of the 140/141 complex had actual grades of 9.5 and 17.0 cpht with more large diamonds compared to the other phases.

***Table 5 - Summary of preliminary grade forecasts and value modeling for Fort à la Corne kimberlites 122 and 141 (from Kensington Resources News Release, April 25, 2001).***

| Body | Grade Forecast (cpht) | Model Value (Standard Selling Value) (US$/carat) | Model Revenue (Standard Selling Value) (US$/tonne) | Model Description |
|---|---|---|---|---|
| | **(>1mm)** | **(>1mm)** | **(>1mm)** | |
| **122** | **8** | **133** | **11** | **Best Fit** |
| 122 | 13 | 136 | 18 | Optimistic |
| 141 | 19 | 88 | 17 | Conservative |
| **141** | **19** | **148** | **28** | **Best Fit** |
| 141 | 19 | 173 | 33 | Optimistic |
| | **(>1.5mm)** | **(>1.5mm)** | **(>1.5mm)** | |
| **122** | **7.5** | **144** | **11** | **Best Fit** |
| 122 | 12 | 147 | 18 | Optimistic |
| 141 | 18 | 90 | 16 | Conservative |
| **141** | **18** | **153** | **28** | **Best Fit** |
| 141 | 18 | 178 | 32 | Optimistic |

[2] Theoretical sample weight represents 100% of the calculated volume of the borehole multiplied by the density of the rock. In contrast, recovered sample mass is the mass of kimberlite captured by a specified screen size (*e.g.*, 1.5 mm screen; *i.e.*, kimberlite falling through the screen is not recovered).

A technical report that summarized the total diamond recovery from the 140/141 kimberlite further sub-divided the kimberlite into geological phases and detailed diamond recoveries, actual grades, grade forecasts, and modeled values (Kensington Resources, 2003a) (Table 6). There was a large degree of variability in diamond recoveries from the various geologically defined kimberlite phases. Actual grades ranged from 2.7 and 18.6 cpht, and grade forecasts were 7 and 15 cpht. Modeled values were also calculated, based on very few stones, with values for stones greater than 1.5 mm between US$67 and US$97/carat. A kimberlite breccia phase, which had only been intersected in two 24″ RCA drill holes in 2002 (and thus had a very small sample size), had the highest modeled grade of 15 cpht and modeled value of US$97/carat.

In June of 2004, the FalC JV revised its exploration strategy. Prior to then, programs had focused on assessing individual kimberlites as a whole. The recognition that discrete phases within a kimberlite body have higher grade and value potential, however, led to a new strategy that will focus on higher grade units within proximal kimberlite bodies and consider these in combination. This approach is thought to have the advantage of increasing the size of the potential resource and may permit a significant economy of scale to be achieved for a large-scale mining operation (Kensington Resources, 2003b). Also in June of 2004, the FalC JV released a preliminary summary of information from a detailed MINRED report on geological modeling and grade forecasting for high-interest phases in kimberlites 140/141, 148, and 122 (Table 7). Taken as a whole, the high-interest zones have an average grade of 10 cpht (>1.5 mm) and a total estimated tonnage of 369 million tonnes. In detail, the combined units of higher interest in 140/141 have an estimated mass of 134 million tonnes with a grade forecast of 11 cpht with a modeled average value of US$115/carat. Likewise, the higher grade part of the 122 kimberlite has a combined tonnage of 79 million tonnes at an average grade of 13 cpht.

## 4. Conclusions

A synthesis of publicly available diamond recovery data for the Cretaceous Fort à la Corne kimberlites indicates that they vary not only in size and complexity, but also in economic potential. The kimberlites range from 3 to 250 ha in footprint area and from 3 to 675 million tonnes in mass, comparable to some with the biggest in the world. The kimberlites vary from simple mono-eruptive kimberlites to very complex, multi-phased bodies. Based on microdiamond and macrodiamond data sets, it is clear that there is a large degree of variation not only between, but

***Table 6 - Actual and modeled diamond grade forecasts of kimberlite phases in the 140/141 kimberlite complex (from Kensington Resources, 2003a).***

| Geological Unit | Sample Tonnage | Stone Counts: Micro-diamond | Stone Counts: Macro-diamond | Carats: Total | Carats: >1.5 mm | Actual Grade (cpht) (>1.5 mm) | Modeled Grade (cpht) (>1.5 mm) | Modeled Value ($US/carat) (>1.5 mm) |
|---|---|---|---|---|---|---|---|---|
| MGB Coarse | 1,048.90 | 311 | 888 | 95.8 | 88.6 | 8.4 | 12 | 97 |
| MGB Fine | 371.1 | 226 | 86 | 10.9 | 10 | 2.7 | 7 | 71 |
| MGB- Repeated | 254.9 | 180 | 155 | 13.6 | 12.7 | 5.0 | 8 | 75 |
| Fine Kimberlite (vent) | 176.5 | 171 | 43 | 16.5 | 16.5 | 9.3 | 5 | 93 |
| Speckled Kimberlite | 93.9 | 126 | 45 | 4.6 | 4.3 | 4.5 | 9 | 67 |
| Kimberlite Breccia | 74 | 183 | 67 | 14.3 | 13.7 | 18.6 | 15 | 97 |

***Table 7 - Summary table of modeled grade forecasts for units of higher interest from the 140/141, 148, and 122 kimberlites (from Kensington Resources, 2003b).***

| Body | Size (ha) | Unit of Interest | Tonnage (million tonnes) | Modeled Grade (>1.5 mm) |
|---|---|---|---|---|
| 140/141 | 250 | Coarse MGB | 105 | 9 |
| | | Breccia Beds | 29 | 16 |
| 148 | 239 | Main PK unit | 156 | 7 |
| 122 | 126 | Main S. PK unit – upper | 45 | 14 |
| | | Main S. PK unit – lower | 34 | 12 |
| **TOTALS** | | | **369** | **10** |

also within, some of the more complex kimberlites. Some are barren or essentially barren; in contrast, others have high microdiamond stone counts, coupled with the high macrodiamond grades and the potential for large stones. Geographically, it is apparent that the kimberlites with the best potential are in the southeastern part of the main FalC cluster. Many of those kimberlites apparently have phases that are of potentially high grade and value.

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