EXPLORING HEAVY MINERALS

July 26, 2017

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Dear Andrew:

Re: Evaluation of the Gold Prospectivity of the Celina Property by Gold Grain Analysis and Heavy Mineral Geochemistry of Till Samples through a Rotasonic Drilling Program, Minnesota

As requested, below please find an interpretive report of the gold grain and heavy mineral geochemical results of the till samples collected during Anglo Gold Ashanti's ("Anglo") 32-hole, rotasonic drilling program for gold from February to April 2017 on the Celina property in northern Minnesota. You and Trevor Burr provided me with: (a) drill hole and property location maps; (b) spreadsheets containing the Actlabs and ALS geochemical analyses; and (c) a spreadsheet containing drill log information including field sample descriptions.

The samples were processed in May and the finalized ODM laboratory data was transmitted on June 5, 2017. Although a brief report was requested, we believe that you will benefit from a more detailed explanation regarding gold grain anomaly and dispersal train recognition.

1. Drill Hole Layout

Most of the rotasonic holes were drilled at 1 x 1 km spacings (Fig. 1). Some holes were positioned to test geophysical and/or structural targets while others appear to have been spotted for general coverage. The hole layout appears to be adequate to test the gold fertility of the property on a regional scale.

2. Till on the Celina Property

The Celina property is overlain by till derived from two separate lobes – Rainy and Wadena – of the Laurentide ice sheet during the Wisconsinan glaciation. The older Rainy Lobe flowed southwest and deposited a lower till that is characterized by a sandy, silty matrix derived from direct erosion of bedrock and is thus ideal for gold grain and heavy mineral exploration. The younger Wadena Lobe flowed southeast and deposited an upper till that was is characterized by a clay-rich matrix and carbonate clasts. This till was derived from distally sourced, glacial Lake Agassiz sediments in Manitoba and usually not directly from eroded bedrock and, as a result, is generally not suitable for mineral exploration. Nonetheless, both till layers were sampled and processed.

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3. Sample Processing Overview

A total of 122 overburden samples were collected during the program and submitted to ODM in three batches. Of the 122 samples, 105 were of till and the remainder comprised sand, silt and/or gravel as classified by ODM.

Before processing the samples, a representative 500 g split (~400 g after drying) was removed from the sample and reserved for geochemical analysis. The remaining bulk sample material was wet screened at 2 mm and a primary table concentrate was prepared from the -2 mm fraction. Geological observations on the character of the sample were made during both the screening and tabling operations.

The concentrates obtained by tabling are purposely large (typically 300-400 g) and of low grade (10-25% heavy minerals) in order to achieve a high, 80-90% recovery rate for every useful indicator mineral of specific gravity ("S.G.") >3.2 irrespective of its grain size. Any contained gold grains, which by nature are mostly silt-sized, are separated from the table concentrates by micropanning and are counted, measured and classified as to degree of wear (i.e. distance of glacial transport; Fig. 2). The relative abundances of any sulphides or similar indicator minerals or metallic contaminants are also estimated and the expected gold assay value of the contained gold grains is calculated.

The heavy mineral concentrates ("HMCs") for each sample were prepared by heavy liquid separation at S.G. 3.2 and undesirable magnetite was removed. The +0.25 mm HMCs for 39 selected samples were further refined for kimberlite indicator mineral logging. Aliquots of all the HMCs were submitted to Actlabs for INA and ICP analysis. Note that the aliquots for the 39 samples selected for KIM logging consisted of the -0.25 mm HMC only. In addition, a representative split of the -0.063 mm raw sample was sieved from the archive split of each sample and submitted to ALS for fire assay and multi-element analysis. Pebble lithology logging was performed on 50 selected samples.

4. Ideal Till Sample Size for Gold Exploration

For surface till programs, a 13 kg field sample roughly screened to -8 mm will normally yield ~10 kg of -2 mm matrix which is the ideal size for indicator mineral testing. On reverse circulation ("RC") and rotasonic drilling programs in areas of thick cover, one should endeavor to also collect samples of this size. Collecting till samples of a consistent weight is preferred to normalizing indicator mineral grain counts obtained from samples of variable size. Specifically, normalizing produces fractional grain counts that superficially seem very precise but are actually imprecise, particularly for undersized samples where (a) even the initial grain counts are imprecise due to the shortfall in sample weight; and (b) adjusting for this shortfall multiplies the uncertainty.

5. Expected Gold Grain Background

The till deposited by the Rainy Lobe contains gold grains. These grains are ubiquitous because: (a) the ice mass crossed a gold-fertile greenstone belt; and (b) rather than breaking down into minute particles during liberation and glacial transport, gold grains are molded to a simpler, more stable form with no loss of mass because gold is malleable (Fig. 2; Averill 2001). Although the till from the Wadena Lobe may contain gold grains, they are of no exploration value because, as previously explained, the till is derived from lake sediments and not direct erosion of bedrock.

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The gold grain background of any area within the Canadian Shield depends mainly on the number of kilometres of fertile greenstone that the ice crossed (Averill 1988). For example, in the till produced by southward ice flow across the 250-km-wide Abitibi belt, the gold background ranges from <5 grains per 10 kg sample in areas such as the Casa Berardi – Burntbush district which are near the northern or up-ice edge of the belt to 20 to 40 grains per sample in the Malartic gold district on the southern edge of the belt (Fig. 3).

6. Essential Properties of a Gold Grain Anomaly

The normal threshold for a gold grain anomaly in till is 2 to 3 times the background level for the survey area. However, samples collected close to a significant gold deposit generally contain >100 and commonly >500 grains (Fig. 3). Furthermore the bottom, unoxidized till sample from a discovery reverse circulation ("RC") drill hole at Casa Berardi in Quebec yielded ~700 grains (Sauerbrei *et al.* 1987).

In addition to being abundant, the gold grains should either be as pristine as when liberated by the ice from their bedrock source or only partly modified by glacial transport because, being malleable, gold grains tend to become fully reshaped after ~1 km of ice transport (Fig. 2). Also, ~90% of the grains should be silt sized, i.e. <0.063 mm or 63 µm wide, as this is the natural crystallization size for gold in bedrock (Averill 2001) and, as previously explained, the grains do not break down during transport. Coarser, sand-sized populations of gold grains are normally indicative of hydraulic sorting and thus of stream transport rather than ice transport. Such grains also tend to be fully reshaped because stream transport is slower and more abrasive than ice transport, resulting in greater grain wear over the same transport distance.

In areas where the till is exposed sufficiently for pit sampling, a single sample is normally collected from each pit, ideally at a depth of 0.5-1 m from the C-horizon (Fig. 4) which in Canada and northern Minnesota typically extends to a depth of only 2 to 4 m. Till in the C-horizon is visibly less oxidized and more compact than that in the overlying, strongly iron-stained B-horizon but most grains of pyrite and other soluble sulphides that were present when the till was deposited are now completely degraded. Their degradation has resulted in the chemical liberation, in situ as physical gold particles, of any resistate gold inclusions that were originally present in the sulphides. All of these chemically liberated gold particles are pristine, regardless of the distance that their sulphide host grains were transported, and most are very small, typically 15 µm or less, but they can be more abundant than physically liberated gold grains derived from the same bedrock source.

Oxidation of an auriferous sulphide- or carbonate-bearing pebble in C-horizon till can release large numbers of pristine gold grains, producing a very strong but false anomaly that is not reproducible in other samples collected within a few metres. Such anomalies are rarely encountered in rotasonic and RC drill holes because most of the till samples are obtained below the depth of post-glacial oxidation (Fig. 5). However, a false anomaly can be produced during drilling by physical liberation of gold grains from a mineralized clast by the tricone-style bit that is used on RC drills.

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7. Essential Properties of a Gold Grain Dispersal Train

A gold grain dispersal train is a gold anomaly in which the gold grains are *distributed systematically*, both laterally and vertically, through the host till horizon such that the anomaly is repeatable, in a predictable manner, in adjacent samples and/or drill holes.

Four conditions must be met to show that a gold grain anomaly, once confirmed, is due to the presence of a gold dispersal train of sufficient substance to be worthy of follow-up exploration: (1) the anomalous samples/drill holes must align in a ribbon or apron-shaped pattern consistent with the ice flow direction; (2) the length and width of the anomaly must be sufficient to suggest that the gold source is of a significant size; (3) the strength of the anomaly should increase up-ice to >100 and ideally >500 grains per 10 kg sample; and (4) the Au contents of the anomalous samples from the source-proximal part of the train should be sufficient to suggest that the gold source is of a potentially economic grade.

A one-hole gold grain anomaly normally qualifies as a dispersal train only if: (a) equally anomalous levels of gold grains of a similar pristine or partially modified morphology are present in two or more vertically contiguous samples of a normal 1.5 m length; and (b) a similarly sympathetic relationship is evident in each sample between the HMC Au analyses and those for any pathfinder elements such as As in which the till is anomalous.

It should be noted that a dispersal train will only be restricted to the lowermost or "basal" part of the host till horizon in holes that are drilled very close to the head of the train. This phenomenon occurs because any bedrock or other debris that is eroded and entrained by an ice sheet rises progressively upward within the ice in the down-ice direction and thus becomes increasingly separated from the base of the till horizon that is subsequently deposited by the ice.

If the bedrock beneath the ice slopes steeply downhill, both the thickness of the dispersal train and the separation between the base of the train and bedrock tend to increase rapidly as seen in the Blackwater dispersal train (Fig. 6) in British Columbia (Averill 2017). Just 600 m down-ice from the centre of the Blackwater gold deposit, the train is ~30 m thick and extends to the surface of the host till horizon, leaving its base nearly 20 m above bedrock. The dispersal train from the Sleeping Giant deposit in Quebec has a similar configuration (Averill 1993). Clearly, therefore, the entire section of a till layer that is deemed suitable for indicator mineral exploration should be sampled from top to bottom.

7. Expected Au and As Contents of the Heavy Mineral Fraction of Anomalous Till Samples

The normal threshold for a till HMC Au anomaly from a typical 10 kg till sample is 1000 ppb, assuming that ¾ of the sample, or 7.5 kg, consists of -2 mm matrix particles suitable for heavy mineral extraction and 0.4% of these particles – i.e. 1 in 250, or 30 g – are comprised of heavy minerals of specific gravity >3.32, the density of methylene iodide which is commonly used to refine the Au-bearing HMC prior to geochemical analysis. The Au in the HMC of a sample of unoxidized till collected at depth by rotasonic or RC drilling may occur: (a) entirely as liberated gold grains; (b) entirely bound in sulphide grains, variably chemically or as physical inclusions; or (c) a combination of these two phases. That in the HMC of a shallow pit sample collected from the oxidized C-horizon will lack the chemically bound phase; therefore an anomaly threshold below 1000 ppb may be appropriate on some surface sampling surveys.

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The 1000 ppb HMC Au threshold is based on: (a) the knowledge, gained by ODM from testing ~30 gold grain dispersal trains (Table 1), that the Au content of a typical 30 g HMC from the matrix of a 10 kg sample collected near the head of a dispersal train tends to be approximately the same as the Au grade of the source mineralization; and (b) gold deposits currently requiring a minimum grade of 1000 ppb (1 g/t) to be of economic interest. The sympathetic relationship between the gold content of the proximal part of a dispersal train and the grade of the gold source is useful for evaluating the economic potential of the source and determining how much effort is merited to locate it.

The similarity between the Au content of a till HMC from the source-proximal part of a gold dispersal train and the gold content of the bedrock mineralization is due to the average 1:250 ratio of heavy to low-density minerals in the till being roughly the inverse of the average ~250:1 degree of dilution of glacially liberated gold grains by other minerals in this part of the train. In effect, the gold grain dilution that occurs naturally in till during the glacial erosion and transport of mineralization from a gold zone is offset in the laboratory by extracting the gold grains and other heavy minerals from the till and directly analyzing the HMC. The approximate aggregate Au contribution of any recovered gold grains to the HMC can be calculated because the HMC is weighed and the dimensions of each gold grain are measured. If the entire HMC is analyzed, a large deficit between the calculated Au value of the gold grains and the analyzed Au content of the HMC normally indicates that the HMC contained either (a) grains of auriferous sulphide minerals in addition to the observed gold grains; or (b) an unseen large gold grain or more small grains than those that were observed. ODM has noted that very small concentrates can lead to greatly inflated HMC Au analyses and many false Au anomalies.

Since any sulphide mineral grains in the till are recovered along with the gold grains, HMC analyses for As, Cu and Zn may range up to several hundred ppm even if the only sulphide mineral present in the HMCs is pyrite. Analyses >1000 ppm indicate that: (a) the HMC contained a significant number of grains of arsenopyrite, chalcopyrite or sphalerite, respectively; and (b) if the samples were collected near the head of a dispersal train, the bedrock source mineralization contains >1000 ppm (i.e. >0.1%) As, Cu or Zn, respectively, and may be significant. Thus the normal anomaly threshold for these elements is 1000 ppm.

8. Gold Grain Results and HMC Geochemical Analyses of the Till Samples

A summary of the gold grain counts, calculated HMC gold values, Au analyses and analyses for the other elements that are commonly associated with gold are presented in Table 2. Although Anglo provided some distinction between the upper and lower tills in the field descriptions, all till samples are included in Table 2.

The bulk weights for 122 till samples were highly variable (3.4-37.1 kg) and many contained a significant proportion (up to 68%) of +2 mm clasts. The resulting -2 mm table feed weights were also highly variable ranging from 2.4 to 35.1 kg.

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The gold grain counts for the till samples were consistently low ranging from 0 to 23 grains. Samples that weighed between 8 and 12 kg averaged only 2 grains per sample indicating that the true gold grain background is 0 to 6 grains per 10 kg of till. Only nine samples yielded counts >10 grains per sample and seven of those that exceeded 20 kg of -2 mm table feed which is twice the weight of the ideal sample size. A very high proportion (79%) of all the gold grains exhibited reshaped morphologies, conversely, only 5% of the grains were pristine.

As expected for samples with low gold grain counts, the calculated HMC Au values were also low with only two samples– Nos. 863534 and 863584 – from separate holes returning values that exceed the 1000 ppb anomaly threshold. In both cases, one or two large, reshaped gold grains account for >99% of the value and, therefore, the anomalies are not considered significant.

The INA Au analyses were consistently higher than the calculated values which is to be expected for unoxidized till samples that contain sulphides, however, the aliquot sizes were highly variable. Seven samples returned Au analyses exceeding the 1000 ppb anomaly threshold. The strongest anomaly, in the bottom sample (No. 863651) of Hole 31, was 42,200 ppb Au. Only four, silt-sized gold grains were observed in this sample and do not account for this anomaly. Furthermore, the anomaly is neither supported by the till sample above it nor by other metal analyses. The anomaly was likely caused by the chance presence of one or two large gold grains that were not observed during micropanning.

Only one of the remaining six samples that returned Au analyses >1000 ppb was corroborated by the gold grains. Sample 863543 yielded 18 gold grains including three with a diameter of 100 µm or greater. A HMC Au value of 489 was calculated based on a larger than normal 101.6 g HMC weight. The large HMC was the result of the sample weighing 25.4 kg or 2.5 times the ideal sample size.

Four As analyses were >100 ppm but much less than the 1000 ppm anomaly threshold and they lack a gold association. The other As analyses are generally low and not significant.

According the Anglo's field logs, the basalt bedrock intersected in Hole 16 was overlain by saprolite. From our work in the Rainy River area, ODM has shown that this 'saprolite' contains supergene heavy minerals (Mn-siderite, native Cu and marcasite) that were deposited from oxidized brines in a formerly overlying Jurassic redbed sandstone basin. The analyses for the bottom four till samples (Nos. 863523 to 863526) in Hole 16 have elevated to anomalous levels of Cu and Mn, including a 21,000 ppm Mn analysis in the bottom sample, No. 863526. Abundant marcasite and a single grain of native copper were present in the pan concentrates of the four samples that were reported on the detailed gold grain data sheet. As at Rainy River, there is no gold associated with this alteration.

The analyses for the other elements that are commonly associated with gold are not considered significant.

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5. Conclusions and Recommendations

The gold grain background of the Celina property is 0 to 6 grains per 10 kg till sample. No gold grain anomalies or dispersal trains were identified.

The 42,200 ppb Au analysis in the bottom sample (No. 863651) in Hole 31 was most likely due to the presence of one or two large gold grains that were not observed during micropanning and is not considered significant. Furthermore, the anomaly was not supported by the sample above it nor by any of the elements that are commonly associated with gold. However, two options are available to definitively confirm this conclusion: (1) Sample 863651 contained 17.2 g of excess HMC that is presently stored at ODM and can be submitted for INA analysis; or (2) the original INA aliquot can be split into two with the two splits re-analyzed for Au by fire assay.

A major issue with the sampling on the present drilling program was the inconsistent sample sizes. The variable sizes led to inconsistent gold grain counts and HMC sizes which has an impact on the Au analyses, both of which should not be subjected to statistical normalization. On your future drilling programs, we recommend that Anglo collect consistent samples sizes regardless of the sampling interval. Normally, a 1 m interval of 4" diameter core will provide ~20 kg of material. A~15 kg bulk sample, with the +2.5 cm pebbles and cobbles removed by hand, would be expected to produce the ideal sample size of ~10 kg of -2 mm material. Thin intervals of till can be supplemented by twinning holes if the interval is shallow. We further recommend sampling only the lower silt/sandy till derived from the Rainy Lobe.

I hope this information is helpful and please contact me if you have any questions.

Sincerely,

Mike Michaud, P.Geo.
Vice-President

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Year	Train Name	Country	Sediment Type	Survey Description
A. Gold grain dispersal trains				
Casa-Berardi:				
1984	Golden Pond	Canada	Till	Orientation
1984	Golden Pond East	Canada	Till	Exploration discovery
1984	Golden Pond West	Canada	Till	Exploration discovery
1984	Cooke	Canada	Till	Orientation
1984	EP	Canada	Till	Exploration discovery
1985	Selbaie 10-2	Canada	Till	Exploration discovery
1985	Orenada	Canada	Till	Orientation
1986	Chimo	Canada	Till	Orientation
1986	101 Boundary	Canada	Till	Exploration discovery
1987	Kiena South	Canada	Till	Exploration discovery
1987	Kiena S-50	Canada	Till	Orientation
1992	Ferderber	Canada	Till	Orientation
1992	Dumont	Canada	Till	Orientation
1992	Lac Herbin	Canada	Till	Exploration discovery
1993	Sleeping Giant	Canada	Till	Orientation
1993	Ridge Zone	Canada	Till	Exploration discovery
1995	Barry 1	Canada	Till	Orientation
1996	Planet	Canada	Till	Exploration discovery
1997	Mesplet	Canada	Till	Exploration discovery
2007	Rambler South	Canada	Till	Exploration discovery
Rainy River:				
1994	17 Zone	Canada	Till	Exploration discovery
1998	433 Zone	Canada	Till	Exploration discovery
2006	ODM Zone	Canada	Till	Exploration discovery
2006	Beaver Pond Zone	Canada	Till	Exploration discovery
2007	South Zone	Canada	Till	Exploration discovery
2010	TPK	Canada	Till	Exploration discovery
2012	Blackwater	Canada	Till	Orientation
2012	Capoose	Canada	Till	Orientation
2015	Vickers	Canada	Till	Orientation
2015	Howitzer	Canada	Till	Exploration discovery
2016	Naartok	Canada	Till	Orientation
B. Base metal indicator mineral trains				
1975	Matagami	Canada	Till	Orientation
1984	Selbaie B	Canada	Till	Orientation
2002	Polo Sur	Chile	Alluvium	Orientation
2003	Quebrada Blanca	Chile	Alluvium	Orientation
C. Uranium indcator mineral trains				
1976	Collins Bay A	Canada	Till	Orientation
1977	Collins Bay B	Canada	Till	Exploration discovery
1977	Raven	Canada	Till	Orientation
1978	Eagle Point	Canada	Till	Exploration discovery
D. Kimberlite indicator mineral trains				
2006	Morin	Canada	Till	Exploration discovery
2007	Honorat	Canada	Till	Exploration discovery

Table 1 – Indicator mineral dispersal trains discovered and/or delineated on sampling programs designed and executed by Overburden Drilling Management Limited. Excludes programs for which only advisory or laboratory services were provided.

		Number of Visible Gold Grains				Calculated PPB Visible Gold in HMC	Nonmag HMC Weight (g)*	Selected Geochemical Analyses from the -63 µm Fraction											
								INA			ICP								
Hole ID	Sample Number	Total	Reshaped	Modified	Pristine			Au ppb	As ppm	Mass g	Ag ppm	Cu ppm	Zn ppm	Pb ppm	Cd ppm	Ni ppm	Mn ppm	Mo ppm	S %
CR0018	863501	3	2	1	0	5	77.2	98	43	27.3	< 0.2	56	92	49	< 0.5	31	661	< 2	2.54
CR0018	863502	7	5	2	0	13	84.0	66	25	31.0	< 0.2	75	30	27	< 0.5	60	999	< 2	2.35
CR0018	863503	4	4	0	0	138	42.8	139	36	24.8	< 0.2	61	37	28	1.1	59	954	< 2	2.24
CR0018	863504	1	0	0	1	<1	49.2	23	20	38.8	0.3	148	39	32	< 0.5	164	1650	< 2	4.64
CR0018	863505	1	0	0	1	3	56.0	38	29	35.5	< 0.2	174	41	28	< 0.5	139	1440	< 2	4.62
	863510	0	0	0	0	0	33.2	24	< 2	56.0	< 0.2	32	39	< 2	< 0.5	20	992	< 2	0.05
CR0027	863511	12	11	1	0	13	117.2	85	36	33.7	< 0.2	78	46	29	< 0.5	42	665	< 2	3.06
CR0027	863512	6	5	1	0	7	76.8	134	26	12.5	< 0.2	84	39	28	< 0.5	46	856	< 2	2.44
CR0027	863513	1	1	0	0	3	70.0	138	32	6.1	< 0.2	100	55	36	0.7	59	969	< 2	3.24
CR0027	863514	1	1	0	0	<1	42.8	193	26	4.3	< 0.2	189	68	39	< 0.5	136	2790	< 2	4.09
CR0027	863515	2	2	0	0	28	58.0	170	36	21.2	0.2	616	167	35	0.6	120	2670	4	4.18
CR0016	863517	3	3	0	0	<1	82.8	60	51	16.4	< 0.2	67	42	28	< 0.5	53	872	3	2.77
CR0016	863518	0	0	0	0	0	78.0	< 5	29	8.1	0.2	127	64	37	< 0.5	139	1690	< 2	4.9
CR0016	863519	0	0	0	0	0	87.2	178	51	6.0	0.5	144	105	34	1.2	130	1630	< 2	4.48
CR0016	863522	0	0	0	0	0	18.8	< 5	37	6.1	0.3	186	136	39	0.5	145	2740	< 2	5.04
CR0016	863523	0	0	0	0	0	16.8	55	50	5.9	1.1	2090	56	30	< 0.5	155	6510	< 2	> 10.0
CR0016	863524	0	0	0	0	0	21.2	29	35	11.9	1.1	1920	32	21	1	185	7810	< 2	> 10.0
CR0016	863525	0	0	0	0	0	10.8	7	43	10.9	1.4	3040	36	27	1.7	161	5980	< 2	> 10.0
CR0016	863526	0	0	0	0	0	24.4	< 5	10	12.7	2.9	1420	45	15	2.8	68	21000	< 2	2.04
	863531	5	4	1	0	10	39.2	80	37	29.2	0.6	1360	88	33	0.7	161	2640	< 2	5.62
CR0002	863534	1	1	0	0	2188	18.0	< 5	49	4.7	0.5	192	324	38	0.8	253	3800	5	6.68
CR0003	863536	0	0	0	0	0	10.8	< 5	37	3.1	0.6	172	61	36	< 0.5	221	4270	< 2	6.7
CR0003	863537	0	0	0	0	0	12.4	10	76	1.2	1.4	719	66	36	< 0.5	198	2940	12	> 10.0
CR0004	863539	0	0	0	0	0	76.8	42	30	31.4	0.2	118	80	28	0.6	83	1350	< 2	3.29
CR0004	863541	3	3	0	0	3	128.0	< 5	11	60.0	< 0.2	128	76	25	< 0.5	121	2940	< 2	2.53
CR0004	863543	18	17	0	1	489	101.6	1100	46	61.7	0.8	539	290	57	1.4	196	1340	< 2	> 10.0
CR0004	863544	6	2	3	1	21	40.4	105	131	8.8	2.4	813	501	259	2.4	510	854	9	> 10.0
CR0005	863546	3	3	0	0	11	112.4	89	22	60.0	0.5	195	72	38	< 0.5	194	3000	< 2	6.76
CR0005	863547	8	5	3	0	74	70.4	423	56	26.2	0.6	275	84	46	0.8	249	2210	< 2	9.44
CR0005	863548	4	3	1	0	28	58.0	149	52	27.3	1.2	506	45	63	5.1	206	2120	6	7.11
CR0006	863550	1	0	1	0	3	61.2	< 5	41	8.7	0.3	110	48	50	0.6	80	1110	3	4.44
CR0006	863551	1	1	0	0	4	36.8	< 5	63	20.6	0.5	272	100	41	< 0.5	222	3840	3	8.13
CR0006	863552	1	0	1	0	44	34.4	185	81	16.7	0.6	303	153	50	1.2	235	3730	3	9.65
CR0007	863554	2	2	0	0	5	73.6	308	40	38.6	0.4	209	99	48	0.5	196	2010	< 2	6.64
CR0007	863555	8	7	1	0	9	126.4	17	25	60.0	1.8	197	79	34	0.9	193	1990	< 2	6.37
CR0007	863556	6	5	0	1	336	45.2	236	30	47.9	0.5	292	115	39	0.5	152	2170	< 2	5.8
CR0007	863557	2	2	0	0	4	38.4	2050	35	12.2	0.6	346	103	43	< 0.5	227	1280	< 2	8.45
	863558	2	2	0	0	18	9.6	< 5	39	4.3	1.5	379	147	183	0.5	147	1850	< 2	5.9
CR0009	863560	3	3	0	0	28	76.8	60	28	11.1	0.3	129	73	34	1.1	79	1500	3	3.84
CR0009	863561	2	2	0	0	5	55.2	235	30	35.2	0.3	589	89	25	< 0.5	123	2030	< 2	5.14
CR0009A	863563	10	9	1	0	8	78.0	63	38	10.6	0.2	118	97	38	< 0.5	68	1250	3	3.62
CR0010	863565	3	3	0	0	684	62.0	269	11	46.0	< 0.2	90	20	20	< 0.5	14	738	< 2	0.1
CR0010	863566	0	0	0	0	0	11.2	56	21	4.8	0.2	501	23	21	0.5	27	808	< 2	0.81
CR0011	863568	4	4	0	0	15	82.4	< 5	29	15.5	0.2	116	46	37	< 0.5	61	1200	< 2	3.43
	863569	2	2	0	0	2	90.8	82	52	18.0	8.5	131	90	30	< 0.5	68	1130	< 2	3.22
CR0011	863570	2	1	1	0	6	102.0	307	20	60.0	0.5	504	62	26	0.9	108	1440	< 2	5.81
CR0011	863571	5	5	0	0	177	46.0	48	27	36.8	0.3	687	38	22	< 0.5	139	1490	< 2	4.71
CR0011	863572	6	3	2	1	44	19.2	136	65	19.2	1.3	931	29	21	< 0.5	109	1470	< 2	7.35
CR0012	863575	17	14	3	0	19	95.2	45	16	60.0	0.3	178	56	32	< 0.5	119	3080	< 2	4.44
CR0013	863576	2	2	0	0	17	22.4	106	42	10.0	0.5	274	107	49	< 0.5	234	5120	< 2	8.11
CR0013	863577	5	2	0	3	3	79.6	954	33	60.0	3.6	212	94	50	< 0.5	204	5520	< 2	7.62
CR0013	863578	2	2	0	0	1	88.4	< 5	40	23.5	< 0.2	103	54	34	< 0.5	79	1390	< 2	2.98
CR0017	863579	6	6	0	0	43	65.2	38	55	60.0	0.5	179	99	40	< 0.5	156	2510	< 2	7.71

Table 2 – Summary of gold grain and geochemical data obtained from the till samples.

							Nonmag	Selected Geochemical Analyses from the -63 µm Fraction											
						Calculated PPB	HMC	INA			ICP								
	Sample	Number of Visible Gold Grains				Visible Gold in	Weight	Au	As	Mass	Ag	Cu	Zn	Pb	Cd	Ni	Mn	Mo	S
Hole ID	Number	Total	Reshaped	Modified	Pristine	HMC	(g)*	ppb	ppm	g	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
CR0017A	863580	3	3	0	0	44	89.6	67	24	13.0	0.3	142	48	33	0.6	110	1950	4	3.88
CR0017A	863581	6	6	0	0	30	98.8	20	25	60.0	0.5	234	113	65	0.7	210	1800	< 2	5.65
CR0019	863583	4	2	2	0	4	82.0	71	27	41.3	< 0.2	82	46	28	< 0.5	67	1520	< 2	2.47
CR0019	863584	6	5	1	0	2638	68.4	71	40	40.3	0.5	191	60	70	0.6	233	1890	< 2	9.79
CR0020	863586	2	2	0	0	4	111.6	73	45	19.1	< 0.2	132	59	29	< 0.5	75	1810	< 2	3.68
CR0020	863587	0	0	0	0	0	99.6	129	23	14.8	0.2	213	98	35	< 0.5	176	2050	2	5.19
CR0020	863588	3	1	1	1	9	63.2	28	56	32.9	0.8	228	130	95	< 0.5	272	1880	3	> 10.0
CR0020	863589	1	1	0	0	1	38.0	57	51	50.0	0.6	188	49	38	0.8	245	1860	2	8.79
CR0020	863591	2	1	1	0	4	32.8	< 5	53	10.9	2.1	468	113	72	< 0.5	178	3920	6	5.65
	863592	0	0	0	0	0	34.4	1070	239	4.0	29	6410	65	406	3	496	963	3	> 10.0
CR0021	863595	2	2	0	0	4	92.8	88	47	20.2	0.3	242	55	29	< 0.5	89	1410	< 2	4.83
CR0021	863596	1	1	0	0	19	10.0	95	69	6.5	0.7	1060	101	27	1	190	1450	< 2	> 10.0
CR0021	863597	0	0	0	0	0	38.4	144	86	23.3	0.6	1650	95	9	< 0.5	199	615	3	> 10.0
CR0022	863599	3	3	0	0	15	59.6	64	62	17.1	0.6	421	67	36	1.1	214	1630	2	7.93
CR0022	863600	2	0	1	1	1	33.6	64	24	41.6	0.7	1030	49	14	< 0.5	117	1110	< 2	6.83
CR0023	863602	1	1	0	0	8	78.4	82	45	8.0	0.3	179	92	32	1.1	78	1300	< 2	4.45
CR0023	863603	2	2	0	0	206	118.8	463	51	60.0	1.3	220	146	47	< 0.5	157	3780	< 2	7.82
CR0023	863604	6	4	2	0	672	74.4	649	62	48.9	0.5	217	84	55	0.6	149	4060	< 2	9.32
CR0023	863605	0	0	0	0	0	16.0	48	74	10.6	0.8	372	123	43	4.5	209	2290	< 2	> 10.0
CR0025	863606	5	4	1	0	12	95.2	43	33	38.8	< 0.2	100	53	29	< 0.5	75	1380	< 2	2.72
	863607	4	3	1	0	56	92.4	127	22	40.1	< 0.2	152	39	31	< 0.5	84	1450	< 2	2.78
CR0025	863612	3	3	0	0	5	52.0	16	20	15.6	< 0.2	175	48	24	< 0.5	92	2180	< 2	2.69
CR0025	863613	1	1	0	0	10	36.0	46	26	15.0	0.3	127	83	46	< 0.5	135	5050	3	3.41
CR0026	863614	1	1	0	0	2	97.2	103	29	9.0	1.4	162	67	31	0.7	115	1920	< 2	3.1
CR0026	863615	1	1	0	0	15	68.0	40	27	60.0	1.2	221	74	36	0.6	203	1600	2	6.45
CR0026	863616	2	2	0	0	55	62.0	228	23	51.2	< 0.2	122	36	31	0.7	106	2910	< 2	3.52
CR0026	863617	1	1	0	0	9	67.6	117	24	63.3	0.5	102	27	39	< 0.5	109	2770	< 2	4
	863618	12	10	2	0	59	67.6	89	19	60.0	< 0.2	53	22	24	< 0.5	70	2800	< 2	2.57
CR0026	863619	17	14	0	3	49	110.8	80	28	60.0	< 0.2	66	22	23	< 0.5	75	2490	< 2	2.57
CR0026	863620	5	4	1	0	207	10.4	1780	207	5.0	< 0.2	200	37	16	< 0.5	66	8650	< 2	2.07
CR0028	863623	13	10	2	1	6	116.4	77	29	60.0	1	233	90	56	1.6	201	1720	6	6.62
CR0028	863624	11	9	2	0	72	87.2	235	23	53.6	0.3	198	83	32	2	98	3930	3	4.02
CR0028	863625	3	3	0	0	5	34.8	7	46	33.0	0.6	282	181	27	3.9	194	4640	5	> 10.0
CR0028	863626	1	1	0	0	284	39.6	455	44	37.1	0.2	118	60	24	0.6	98	4380	< 2	4.5
CR0028	863628	2	1	1	0	22	64.8	210	20	40.4	< 0.2	98	87	27	< 0.5	75	5630	< 2	2.88
CR0029	863630	1	1	0	0	25	76.4	273	45	10.1	0.3	180	52	42	< 0.5	73	1200	2	4.74
CR0029	863631	5	4	1	0	28	119.6	950	36	60.0	0.3	159	83	27	< 0.5	124	2840	< 2	5.69
CR0029	863632	8	5	1	2	256	103.2	1210	32	44.3	0.4	270	37	25	< 0.5	143	2520	3	7.33
CR0029	863634	2	2	0	0	108	49.2	303	499	41.0	0.3	425	39	23	< 0.5	406	2140	6	7.17
CR0029	863636	1	1	0	0	8	70.0	65	18	51.8	0.5	806	50	10	4.5	172	1070	6	> 10.0
CR0029	863637	0	0	0	0	23	80.0	123	17	43.3	0.4	903	39	8	< 0.5	160	974	3	> 10.0
CR0029	863638	0	0	0	0	0	77.2	< 5	9	33.3	0.4	992	34	9	< 0.5	376	1030	10	9.92
CR0029	863639	2	2	0	0	26	61.2	< 5	< 2	60.0	0.2	722	27	< 2	< 0.5	51	232	< 2	7.93
CR0030	863642	5	3	2	0	31	97.2	14	74	19.4	0.3	82	24	38	< 0.5	53	880	3	3.96
CR0030	863643	2	1	1	0	1	99.2	1010	25	46.6	< 0.2	126	38	36	< 0.5	118	1350	2	3.86
CR0030	863644	6	4	2	0	105	58.0	989	33	38.9	1.3	340	35	12	< 0.5	113	2290	2	7.57
CR0031	863646	5	3	2	0	6	90.4	175	36	11.7	0.3	121	41	36	< 0.5	71	1430	< 2	4.02
CR0031	863647	23	17	4	2	34	103.6	76	10	60.0	< 0.2	26	22	27	< 0.5	26	1060	< 2	0.37
CR0031	863648	2	2	0	0	2	113.6	52	3	53.3	< 0.2	28	20	28	< 0.5	22	891	< 2	0.14
CR0031	863649	2	1	1	0	6	116.0	264	10	60.0	< 0.2	21	19	34	< 0.5	20	1000	< 2	0.03
CR0031	863650	7	5	2	0	14	140.4	218	9	60.0	< 0.2	28	20	25	< 0.5	24	1030	< 2	0.4
CR0031	863651	4	1	3	0	3	39.2	42200	20	60.0	< 0.2	226	22	17	< 0.5	75	2420	< 2	5.19

Table 2 – Summary of gold grain and geochemical data obtained from the till samples.

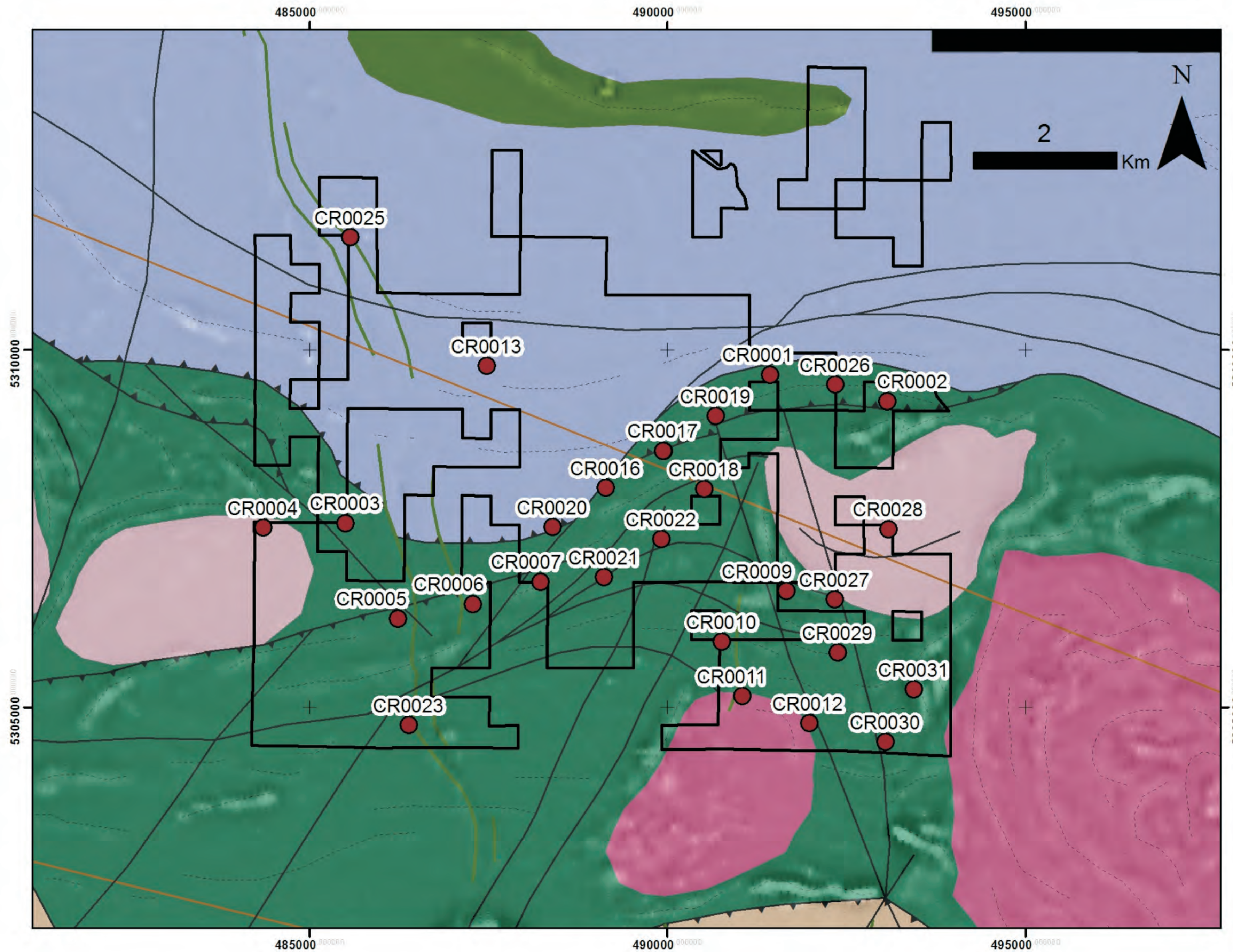

Figure 1 - Rotasonic drill hole locations and property boundaries on interpreted regional magnetics. Source: Anglo Gold Ashanti.

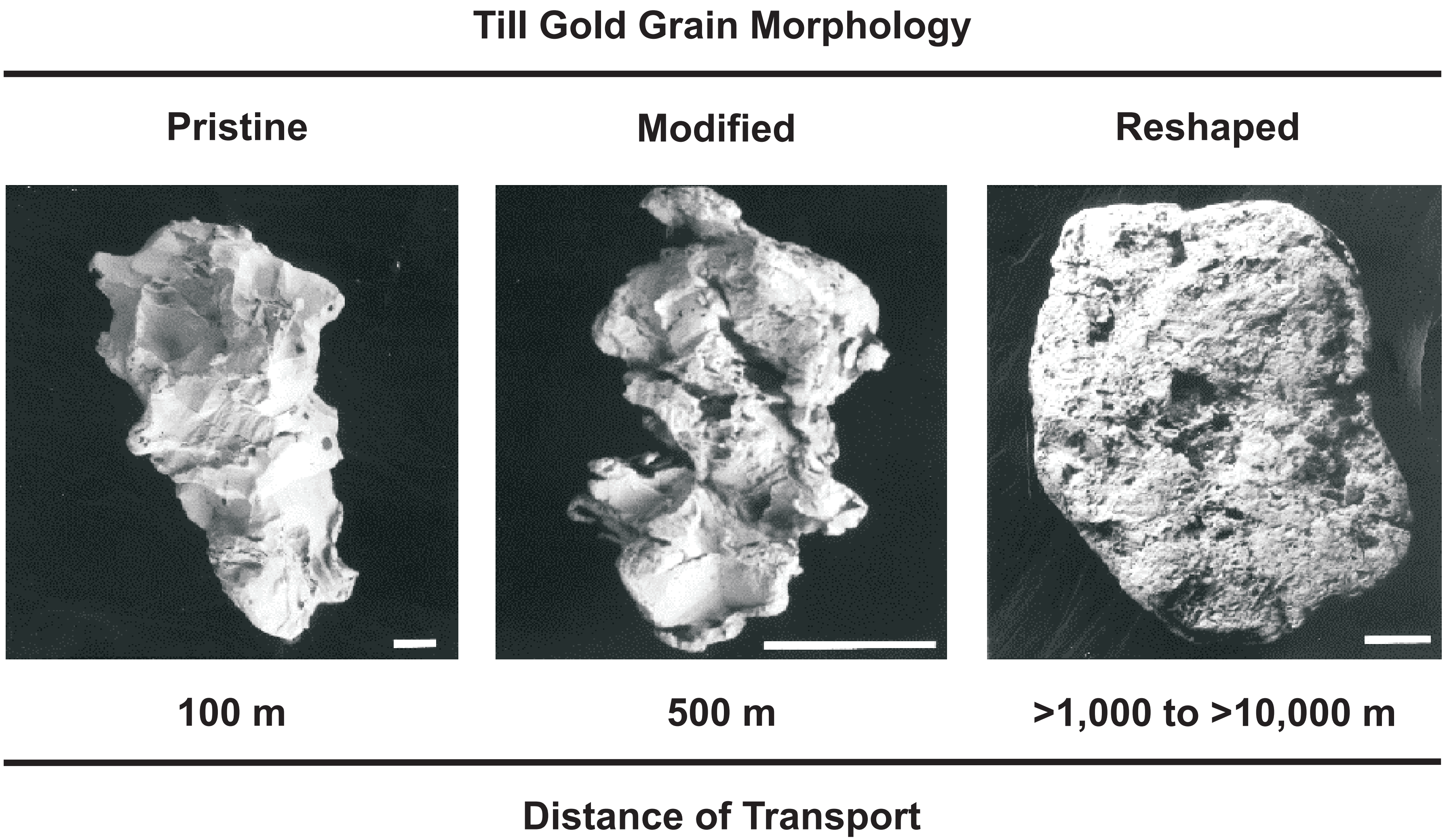

Figure 2 - Backscatter electron images of gold grains from till illustrating the relationship between grain wear and distance of transport. The wear processes are compressional (infolding and compaction) and do not reduce the mass of the gold grain. Scale bars = 10 µm. Source: Averill (2001).

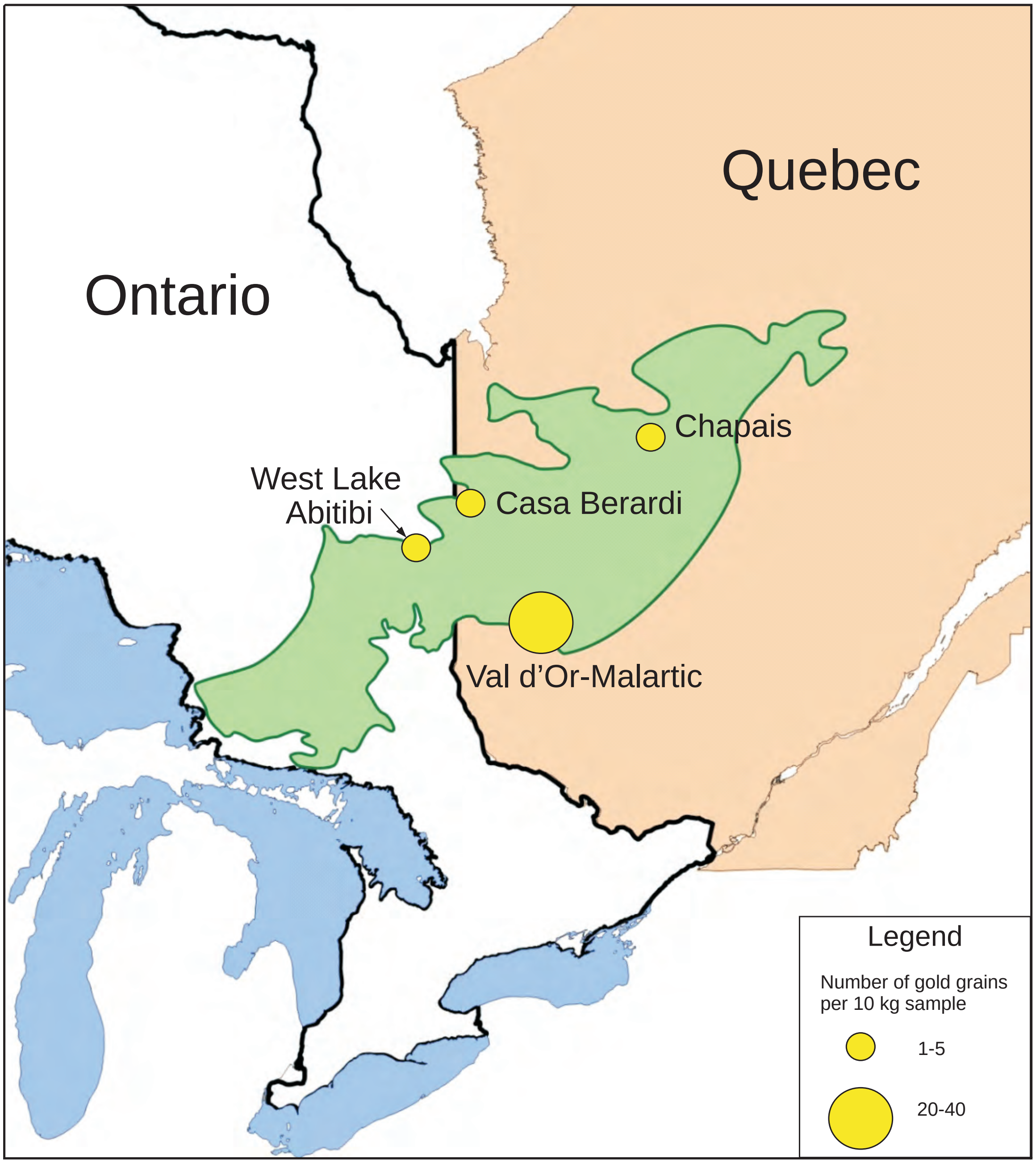

Figure 3 – Variation in gold grain abundance in till over the Abitibi Greenstone Belt.

Figure 4 - (A) Typical till sample pit in non-permafrost terrain. The sample is normally collected at a depth of 0.5 to 1 m from the C-horizon of the soil profile which is less oxidized than the overlying B-horizon but still depleted of sulphide minerals as illustrated by the extracted heavy mineral concentrate (B). At this site, duplicate 10 kg samples of sieved till matrix were taken for quality control. Source: ODM archives.

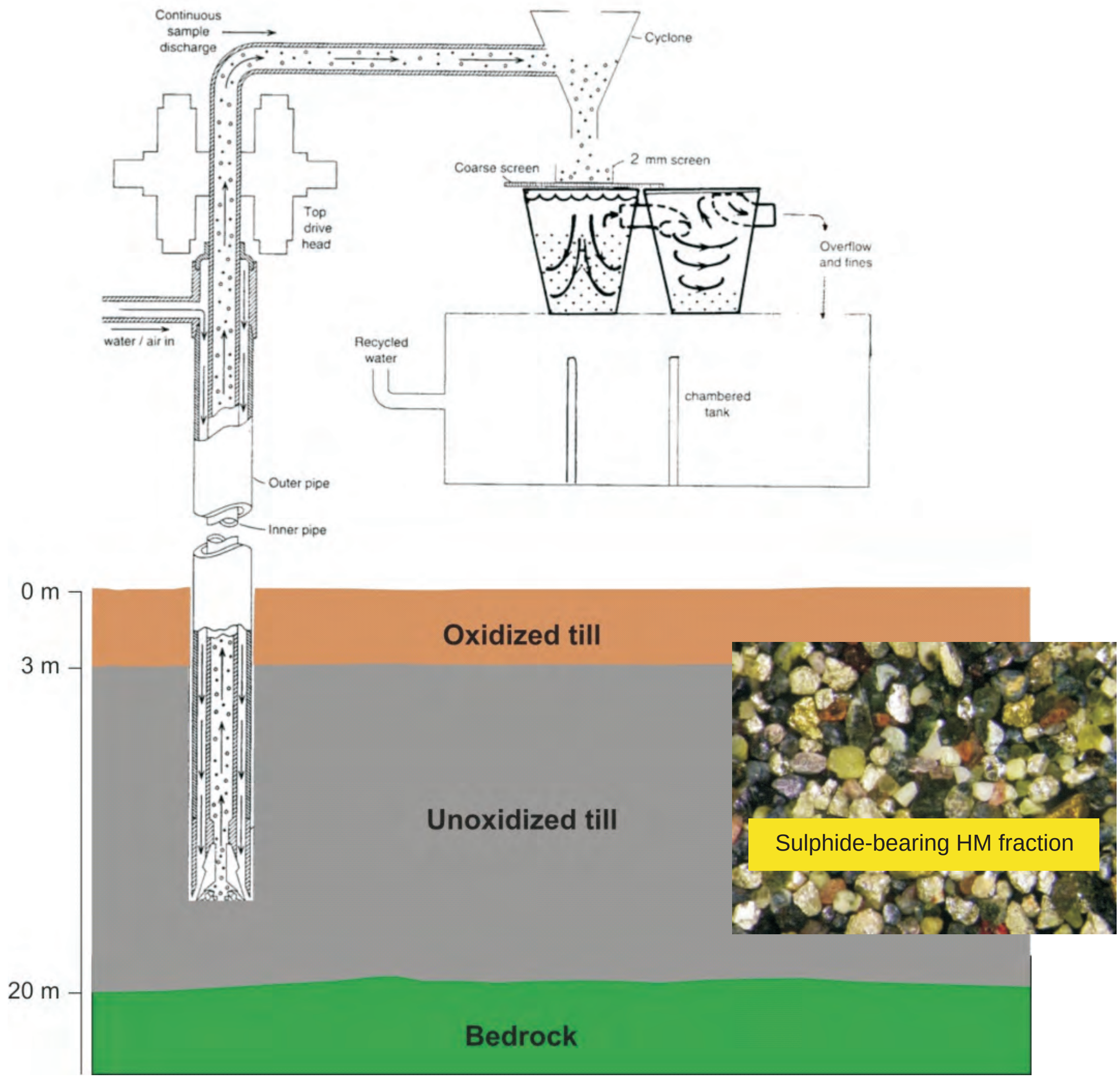

Figure 5 – Schematic cross section of a RC drill rig sampling till. Note that the till below 3 m is unoxidized; therefore any sulphide mineral grains that were entrained during glaciation are preserved.

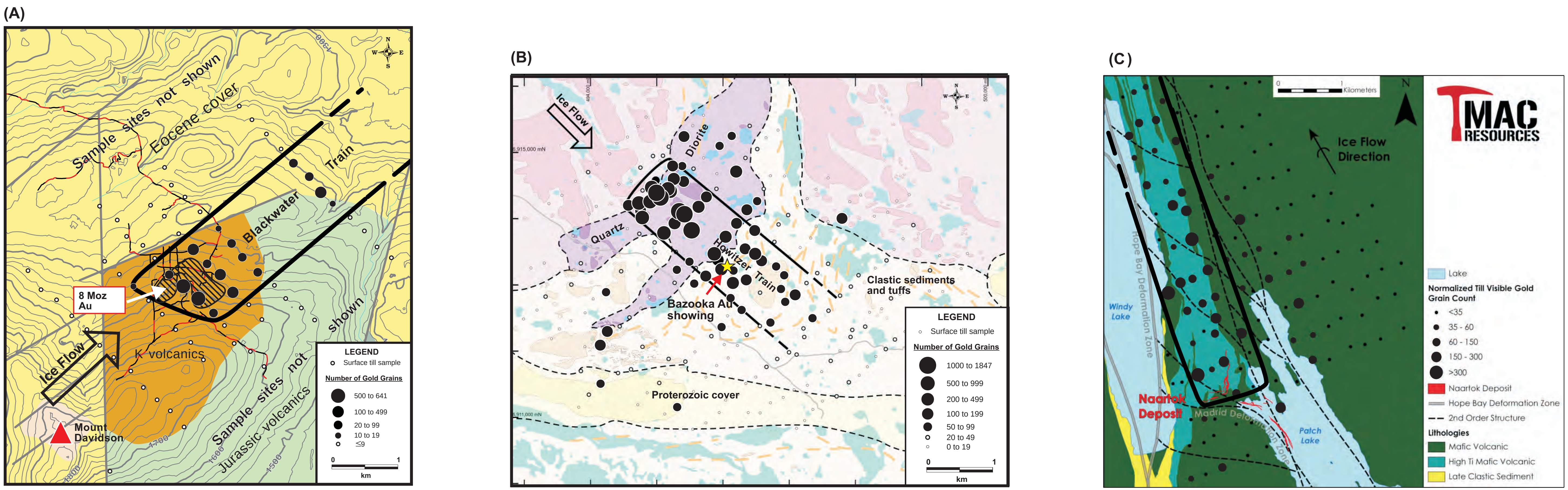

Figure 6 - Examples of large, well defined gold grain dispersal trains in till: (A) Blackwater, British Columbia; (B) Howitzer, Nunavut; and (C) Naartok, Nunavut. Sources: (A) Averill 2017; (B) North 2015; (C) TMAC Resources Ltd 2016.