Placer depositional settings and their ages along Dominion Creek, Klondike area, Yukon[1]

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ABSTRACT

Dominion Creek and its tributaries (Sulphur and Gold Run creeks) are one of the largest placer gold producing areas in North America. The placer gravel is divided into: (1) Pliocene White Channel gravel, (2) Pleistocene terraces, (3) early Pleistocene incised-valley gravel (Ross gravel), (4) Pleistocene Dominion Creek gravel, and (5) creek and gulch deposits.

Paleomagnetically, the White Channel gravel is normally magnetized at one site, suggesting a pre-Brunhes normal chron (likely recording the Gauss chron, or an earlier sub-chron older than 2.6 million years). These results are broadly similar to those paleomagnetic investigations of the White Channel gravel in the Klondike River drainage. The Ross gravel is magnetically reversed and may be correlated to the Matuyama reversed chron (older than 780,000 years). Furthermore, the Ross gravel has a younger normally magnetized alteration overprint presumably of Brunhes age (younger than 780,000 years). Dominion Creek gravel overlies the Ross gravel in lower Dominion, Sulphur and Gold Run creeks, and at all sites sampled revealed normal polarity, presumably of Brunhes age (younger than 780,000 years). Radiocarbon ages from the Dominion Creek gravel range from older than 47,000 years BP to 6000 years BP, and likely represent a composite unit of fluvial activity over the last several hundred thousand years.

The oldest and volumetrically largest placer deposits are associated with the Ross gravel, and little gold appears to have been subsequently mobilized from bedrock sources during the last 800,000 years. Gold within Dominion Creek deposits is largely flat, rounded and well travelled, suggesting the main source was likely near King Solomon Dome in the headwaters of the basin.

RÉSUMÉ

Le cours d'eau Dominion et ses tributaires (cours d'eau Sulphur et Gold Run) est l'une des régions productrices d'or placérien les plus importantes en Amérique du Nord. Le gravier alluvionnaire est divisé en : (1) gravier de White Channel du Pliocène, (2) terrasses du Pléistocène, (3) gravier d'ancienne vallée fluviale du Pléistocène inférieur (gravier de Ross), (4) gravier du cours d'eau Dominion du Pléistocène et (5) dépôts dans des ruisseaux et ravins.

Sur le plan paléomagnétique, le gravier de White Channel est normalement magnétisé à un endroit, suggérant un chrone polaire normal pre-Brunhes (indiquant vraisemblablement le chrone polaire normal de Gauss ou un sous-chrone antérieur de plus de 2,6 millions d'années). Ces résultats sont largement semblables à ceux d'études paléomagnétiques du gravier de White Channel dans le drainage de la rivière Klondike. Le gravier de Ross est magnétiquement inversé et peut être corrélé au chrone polaire inverse de Matuyama (plus de 780 000 ans). En outre, il est superposé d'une altération normalement magnétisée plus jeune datant probablement de l'époque de Brunhes (moins de 780 000 ans). Le gravier du cours d'eau Dominion couvre le gravier de Ross dans la partie inférieure des cours d'eau Dominion, Sulphur et Gold Run et, à tous les sites échantillonnés, a présenté une polarité normale, probablement de l'époque de Brunhes (moins de 780 000 ans). D'après la datation au C^{14}, le gravier du cours d'eau Dominion remonte à une époque de plus de 47 000 ans B.P. à 6000 ans B.P. et représente probablement une unité composite d'activité fluviale au cours des dernières centaines de milliers d'années.

Les gisements placériens les plus anciens et les plus importants sur le plan volumétrique sont associés au gravier de Ross, et une quantité infime d'or semble avoir été mobilisée par la suite des sources de substratum rocheux durant le 800 000 d'années. L'or dans les dépôts du cours d'eau Dominion est largement plat, arrondi et a été transporté sur de longues distances, suggérant que la source principale se trouve probablement près du dôme de King Solomon dans le cours supérieur du bassin.

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INTRODUCTION

Dominion Creek and its tributaries (principally Sulphur and Gold Run creeks) reported production of roughly 450,000 ounces of raw gold (14 million grams) between 1978 and 1997 (Mining Inspection Division, 1998). This value represents a small fraction of the creek's total production since discovery in 1896, which is likely close to 3 million ounces (80 million grams; Table 1). Despite the economic significance of these deposits, systematic regional surficial mapping, and descriptions and ages of the producing deposits have not yet been completed. During July and August of 2000, as part of the Stewart River NATMAP (National Mapping Program) project, fieldwork was carried out along Dominion Creek and its tributaries to support regional surficial geology mapping. The purpose of this preliminary study is to provide a sedimentologic description of deposits, their paleomagnetism, and document associations between geomorphic and placer gold settings. A more complete account, including the results of additional analytical studies of samples collected in this study, will be included with the final report on the surficial geology of the Klondike Placer District.

Table 1. *Mining history and placer gold production since discovery on Dominion, Gold Run and Sulphur creeks.*

Hand mining 1896-1906[1]	Estimated production (fine ounces)
Reported production Dominion, Gold Run and Sulphur creeks	**~1 million**
Dredging (1913-1966)[2]	
Dominion Creek dredges	
NW#1, YCGC#1 1921-1938	125,000
NW#2, YCGC#5 1921-1966	315,000
YCGC #10 1939-1964	178,000
YCGC#12 1954-1960, 1963-1965	28,000
Gold Run Creek dredges	
YGC #6 1914-1923	70,000
Sulphur Creek dredges	
YCGC #6 1936-1966	148,000
YCGC #8 1937-1966212 000YCGC #9 1938-1966	113,000
Mechanized mining (1978-present)[3]	
Dominion, Sulphur and Gold Run creeks	~450,000 oz (raw)
TOTAL PRODUCTION	**> 2.6 million oz (> 80 million g)**

[1]Figure reported in McConnell, 1905

[2]Dredge production values estimated from volume and history reported in Green, 1977 using an average grade of 0.01 oz/yd^3 (0.23 g/m^3)

[3]Production provided by Mining Inspection Division (1998) and W. LeBarge (pers. comm., 2000). NW- Northwest Mining Company, YGC- Yukon Gold Corporation, YCGC- Yukon Consolidated Gold Corporation

REGIONAL SETTING

Dominion Creek is the largest tributary of Indian River, and forms the southeastern boundary of the Klondike placer district (Fig. 1). Near the junction with Jensen Creek, Dominion Creek turns sharply to the south, continuing to its confluence with Gold Run and Sulphur creeks. It becomes the Indian River below that point.

The Dominion Creek basin is located within the Yukon-Tanana Terrane and consists largely of metasedimentary and metavolcanic rocks at chlorite-biotite to garnet metamorphic grade (Mortensen, 1990, 1996). Lode gold occurrences are associated with metavolcanic rocks of the Klondike Schist and mesothermal quartz veins (Mortensen et al., 1992). The erosion of mesothermal quartz veins appears to be the main source of the Klondike placer deposits based upon elemental similarities (microprobe geochemistry) between placer and lode gold (Knight et al., 1999b). Erosion of bedrock sources and transport by fluvial processes is supported on Dominion Creek by hydraulic equivalence data amongst gravelly depositional unit grain size and size/weight of gold grains recovered from placer gravel (Christie, 1996).

PREVIOUS WORK

Little systematic work has been completed on the surficial sediments which host the local placer deposits since the pioneering work of R.G. McConnell (1905). Most studies in the Klondike region have focused on the more accessible Hunker and Bonanza creeks. Milner (1976) studied the geomorphology of the Klondike goldfields, interpreted a series of lineaments through the Dominion Creek area and discussed gold fineness values in the district. Lowey (1999) described the sedimentology of some placer deposits on Dominion Creek. Fraser and Burn (1997), and Kotler and Burn (2000) studied valley-bottom, loess-dominated 'mucks' and related permafrost features associated with late Pleistocene deposits in the Klondike, including two sites in upper Dominion Creek (Fig. 1).

Regional Quaternary glacial limit compilations have been completed along the margins of the Dominion Creek drainage by Bostock (1942, 1966), Hughes et al. (1969),

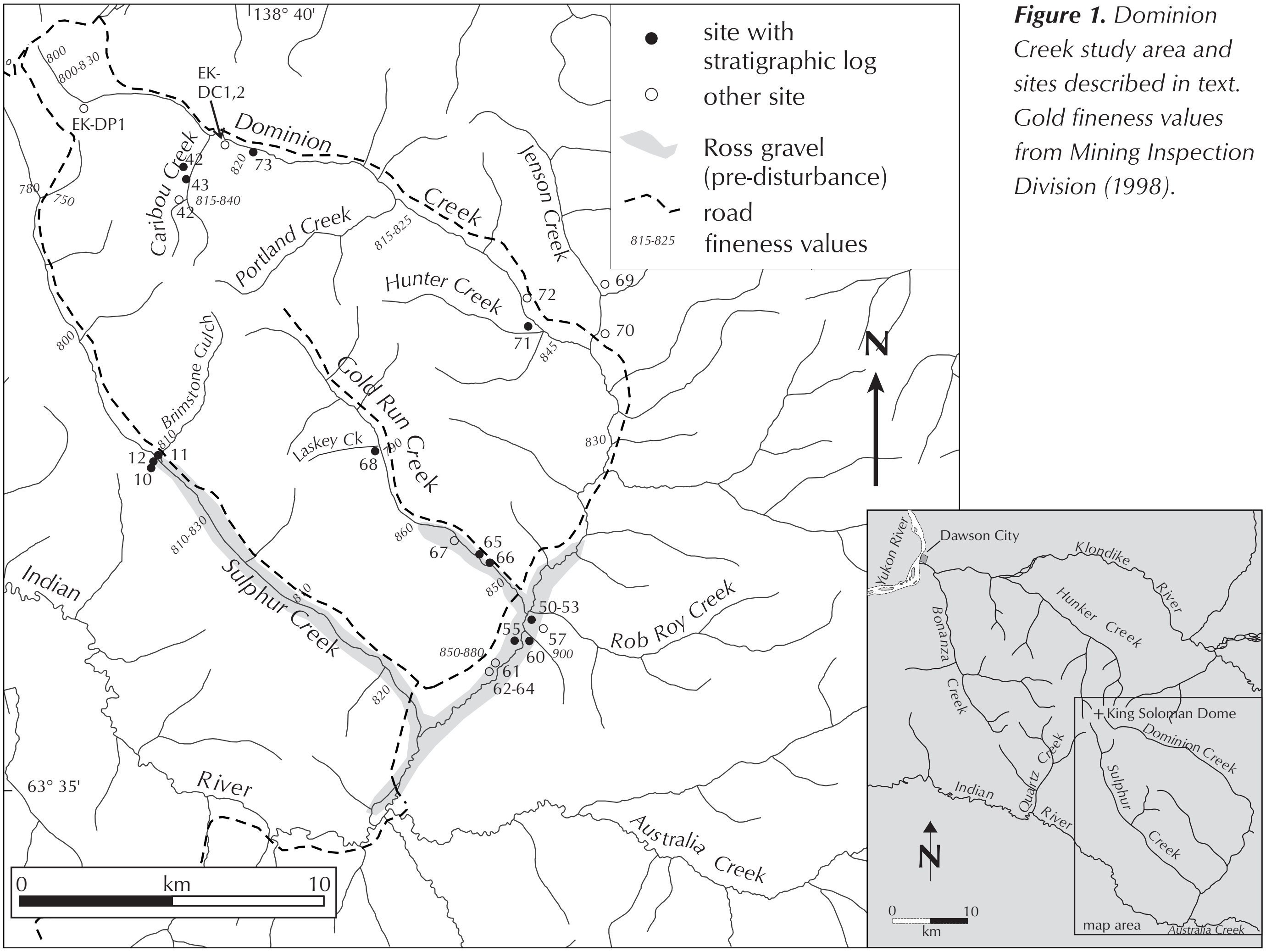

Figure 1. *Dominion Creek study area and sites described in text. Gold fineness values from Mining Inspection Division (1998).*

and most recently by Duk-Rodkin (1999). These studies and more recent chronology (Froese et al., 2000) indicate that late Pliocene glaciers advanced in Tintina Trench, north of Dominion Creek, to the headwaters of Jensen Creek and may have deposited meltwater down this tributary to Dominion Creek (Fig. 1). However, no erratics were found on Jensen Creek. A likely coeval meltwater discharge event from ice over-topping the divide between the Stewart River and Australia Creek deposited extensive outwash down the Indian River, below Dominion Creek.

METHODS

Most sites were visited in the study area during July and August, 2000 in the course of surficial geology mapping. A few additional sites were described by the first author between 1997 and 1999 (Froese, 1997; Froese et al., 1999). Thirteen sites were the subject of detailed sedimentologic descriptions. Exposures were cleaned with shovels and trowels, then photographed, documented and sampled. Detailed vertical lithostratigraphic logs were measured on a bed-by-bed basis, and where exposures allowed, horizontal sedimentary logs were collected noting lateral variation and facies changes within units. Sections were initially subdivided into stratigraphic units on the basis of sediment type, and general sedimentologic features. Orientation of gravelly cross-beds and clast imbrication was measured with a Brunton compass. Samples were collected from representative units for grain size, heavy minerals, gold content, pebble lithology, tephra and macrofossil (bone material and paleoecology) identification. As well, oriented paleomagnetic samples were collected from fine-grained (clay to fine sand) deposits to establish chronology (methods described in paleomagnetism section below). Heavy mineral and tephra identifications are not yet complete, and only preliminary paleomagnetic results are available. Results of the analytical work will be included in the final report.

GRAVEL STRATIGRAPHY

Dominion Creek fluvial deposits are divided into (1) Pliocene terraces (equivalent to White Channel gravel), (2) Pleistocene terraces, (3) incised-valley-fill gravel (Ross gravel), (4) Dominion Creek gravel, and (5) gulch and stream deposits. These relations are shown in Figure 2 and lithostratigraphic logs from sites described during fieldwork in Figure 3.

PLIOCENE TERRACES (WHITE CHANNEL GRAVEL EQUIVALENT)

Pliocene terraces of Dominion Creek and its tributaries are generally poorly preserved. These terraces are assumed to be correlative to the White Channel gravel that is well established on the Klondike River side of King Solomon Dome (Morison, 1985; Froese et al., 2000). In the drainages of Bonanza and Hunker creeks, the White Channel gravel is early to mid-Pliocene (>2.6 Ma) and is dominated by pre-glacial pollen assemblages (Schweger et al., in review).

Exposures from suspected White Channel-equivalent gravel on Dominion Creek are found along middle Caribou Creek (Fig. 1, site 41), and in exploration trenches on a series of high bench gravel deposits along lower Dominion Creek (Fig. 1, site 57). The Caribou Creek site (Fig. 1, site 43) is ~20 m above the modern valley bottom and consists of 2 m of poorly sorted, sand-matrix-filled cobbly gravel. Weak cross-bedding in the gravel suggests this was a braided-river system with abundant contributions of sediment from local hillslopes. A 5-cm-thick tephra was sampled from overbank sediment within the gravel, indicating a period of exposure in which the tephra was deposited on the bar surface. Identification of the tephra later this year should allow a better estimate of the Caribou Creek terrace age.

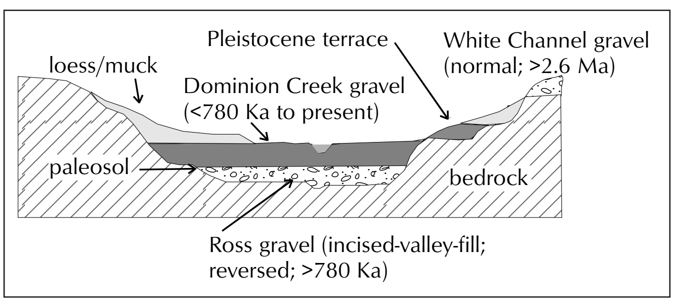

Figure 2. *Generalized section across terrace gravel of Dominion Creek near the mouth of Gold Run Creek. Normal and reverse refer to remanent polarity recorded in sediments.*

Christie (1992) completed assessment work on the Gyppo and Eagle benches (surfaces 45 m above the modern creek) along the east side of Dominion Creek (Fig. 1, site 57). During the course of that work he excavated a series of test-trenches and backhoe holes to determine the depth and distribution of the placer gold deposit and its potential. From the assessment report we can establish a gravel thickness of at least 7.5 m with a clay-rich surface (soil-weathering zone) of up to 1.7 m (Christie, 1992). This depth of clay development is characteristic of the Wounded Moose soil that is of similar depth on the White Channel gravel on lower Bonanza Creek (Smith et al., 1986). Unfortunately, the holes were back-filled and no exposures remain of the trenches, but we were able to establish that pebble lithology from surface tailings was 80% quartz (based on 200 clasts) with the remaining being a variety of locally derived schists. Clast size in the deposit is variable, and boulders up to 70 cm across (smallest axis) are common.

PLEISTOCENE TERRACES

Pleistocene fluvial terraces, intermediate in elevation between the Pliocene terraces and the modern valley bottom (>10 m above the modern creek levels), are poorly preserved. Terraces were only identified from airphoto interpretation, and no exposures were located.

ROSS GRAVEL (INCISED-VALLEY GRAVEL)

Ross gravel, as it is defined here, is volumetrically the most significant source for placer deposits on Dominion Creek. Locally, it has been called 'White Channel gravel' due to its bleached appearance and similarity to Pliocene White Channel gravel on Bonanza and Hunker creeks (McConnell, 1905). However, stratigraphic work in this paper indicates Ross gravel is significantly younger than 'White Channel gravel' as it is known north of King Solomon Dome. On Dominion Creek, Ross Gravel is incised up to 40 m into the White Channel Terrace. Therefore, we propose the name 'Ross gravel' after the Ross Mining camp where it is well exposed and mined on Dominion Creek.

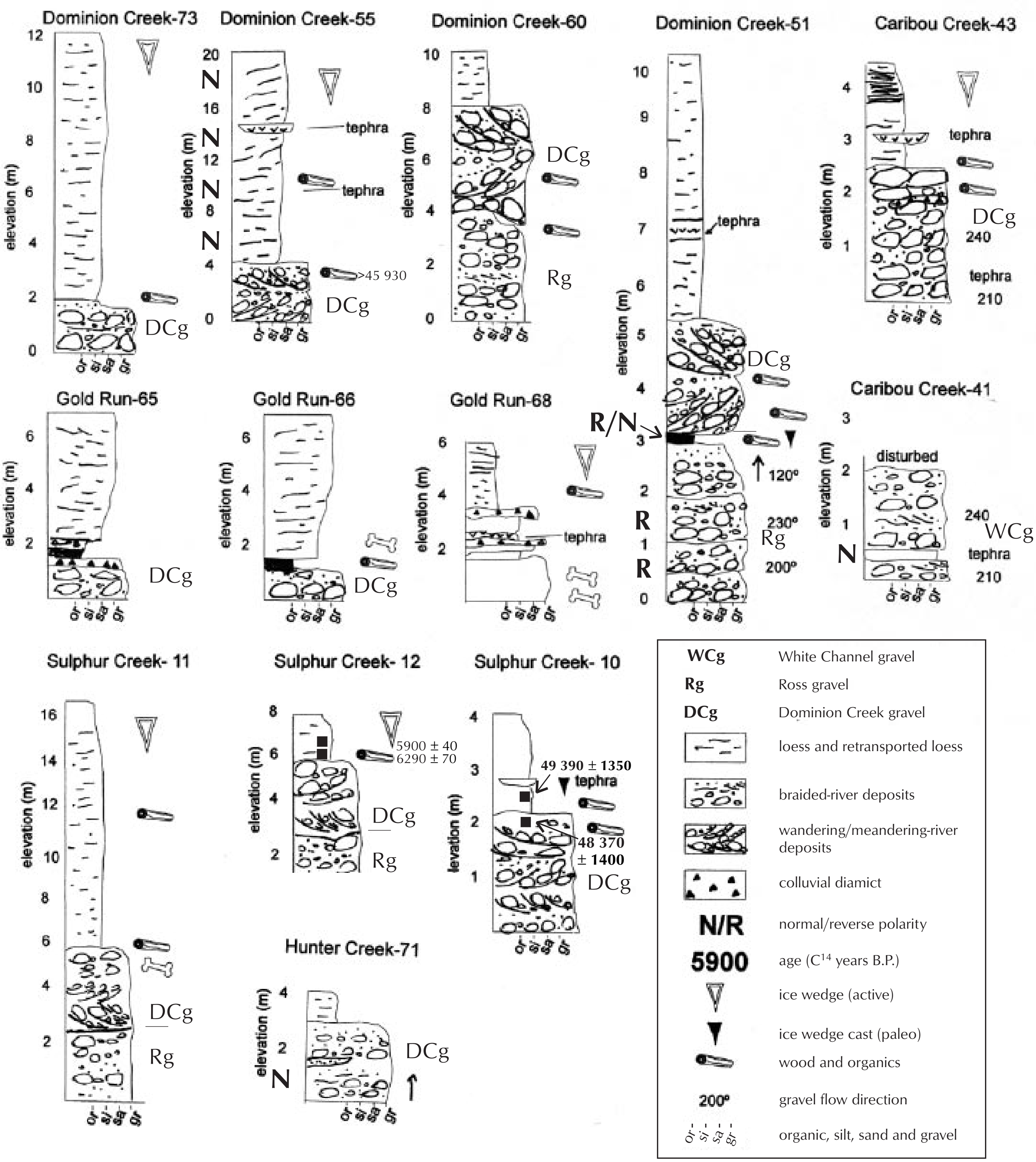

Figure 3. *Lithostratigraphic logs (generalized) at sites with detailed sedimentologic descriptions. Some sites were sampled for paleomagnetism. All lithostratigraphic logs rest on bedrock. See Figure 1 for site locations.*

Ross gravel is a characteristically light grey to white, quartz-rich gravel that occurs below the modern (prior to mining disturbance) creek level on Dominion, Sulphur and Gold Run creeks (Fig. 3). On Dominion Creek, this gravel can be observed in mining exposures between the mouths of Sulphur and Jensen creeks (Fig. 1) and probably extends further down-valley. Drill records and mining reports (G. Klein pers. comm., 2000) indicate a likely equivalent, quartz-rich white gravel extended up Sulphur Creek to at least Brimstone Gulch and Gold Run Creek to just below Laskey Creek (Fig. 1).

Pebble counts of Ross gravel on Dominion Creek are roughly 80% vein quartz with remaining lithologies consisting of locally derived schists and metavolcanic rocks. Sedimentologically, the Ross gravel consists mainly of massive and imbricate matrix-filled gravel with secondary occurrences of matrix-filled and normal-grading, crudely-stratified gravel. The upper boundary of the Ross gravel is a well defined floodplain soil (Fig. 4) that accumulated on the surface of the ancestral Dominion Creek floodplain, however at some sites, the surface soil is not present, having been eroded by the Dominion Creek gravel.

The massive gravel is interpreted as channel and bar deposits in a system with abundant bedload. The crude stratification and normal grading of the gravel likely

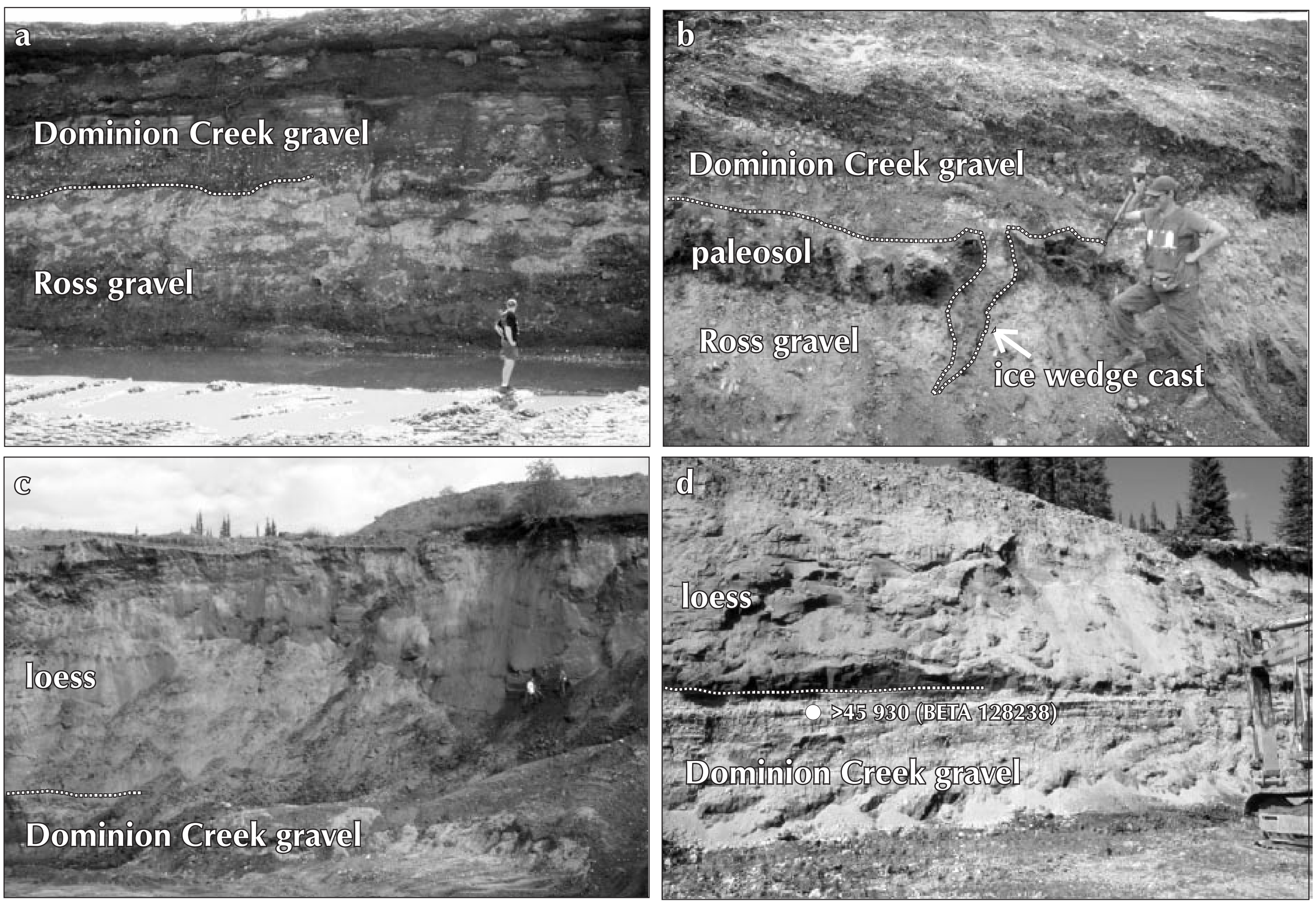

Figure 4. *(a) Ross gravel and Dominion Creek gravel exposed in 1995 at site 59. The Ross gravel has a bleached appearance due to post-depositional fluid flow. (b) Ross gravel with soil and ice-wedge cast cutting paleosol at site 51. Paleomagnetism of the Ross gravel indicates a primary reverse with a secondary normal (overprint) associated with post-depositional fluid migration through the gravel. The primary reverse indicates an age of >780,000 years. (c) Dominion Creek gravel with normally magnetized loess (site 55). (d) Dominion Creek gravel at site 55 where wood collected within the upper gravel yielded a C^{14} age of >45,930 years (BETA 128238).*

represents the distal end of hyper-concentrated flows. The enrichment of quartz at the expense of weaker lithologies suggests a system with abundant sediment inputs from both fluvial and local hillslopes that were incised and reconcentrated over an extended period of time (perhaps several hundred thousand years). Ice-wedge casts cross-cutting the soil indicate continuous permafrost conditions were present, at least locally, following soil development.

DOMINION CREEK GRAVEL

Dominion Creek gravel refers to the gravelly deposits of Dominion, Gold Run and Sulphur creeks overlying the Ross gravel, and occupying main valleys of these creeks. In some examples (Hunter Creek - site 71, and Sulphur Creek - site 10, Fig. 1), the gravel is related to a more recent aggradation of the valleys (in perhaps the last 50 Ka or less). However, since they are difficult to trace much beyond local sites, these deposits are included with Dominion Creek gravel. At some sites, Dominion Creek gravel is overlain by massive and retransported silt, which accumulated from deposition and retransportation of regional loess. Loess thickness is greatest at tributary junctions.

Near tributary junctions, Dominion Creek gravel consists of massive to weakly stratified gravel and may include matrix-supported deposits. In main valley settings, particularly below Gold Run Creek, where it overlies Ross gravel, Dominion Creek gravel consists largely of stratified lateral accretion facies, indicating a meandering to wandering gravelly stream during deposition.

CREEK AND GULCH DEPOSITS

Creek and gulch deposits occur in the upper 1-5 km of the main valley and low-order tributaries to Dominion Creek. These areas have limited run-off, which contributes to more poorly sorted, massive deposits with greater concentrations of material derived from local slopes compared with main valley deposits. This results in massive, poorly sorted cobble gravel, frequently interbedded with hillslope deposits, and generally overlain by irregular thicknesses (up to 15 m) of retransported loess and organic material (locally ‘muck’). Fraser and Burn (1997) indicate these deposits began accumulating during the late Wisconsin climate interval (last glaciation ca. 30 Ka B.P.), but may in fact have accumulated during multiple episodes in the past (Kotler and Burn, 2000), and some remnants may be >200 Ka (Preece et al., 2000).

PALEOMAGNETISM

Oriented samples were collected within fine-grained overbank sediments in gravel deposits, while loess deposits were sampled with a minimum vertical interval of 20 cm. Where contacts with adjacent facies were sharp, as in the case of overbank deposits, additional samples were collected horizontally to obtain at least seven samples from units to determine polarity. Sediments were collected by cleaning the exposure to a vertical face and inserting plastic cylinders (2.5 cm diameter) horizontally. Sample azimuths were measured using a magnetic compass. Remanence measurements were made on an AGICO JR-5A spinner magnetometer. Stepwise alternating field demagnetization was carried out using a Schonstedt GSD-5 with peak fields up to 100 mT. Samples were demagnetized using 5-10 steps and directions determined by principal component analysis (Kirschvink, 1980).

SUMMARY OF MAGNETOSTRATIGRAPHY

Table 2 provides a summary of sampling sites and polarity data by site and stratigraphic unit. Lithostratigraphic logs of sections and sampling locations are shown graphically in Figure 3.

White Channel gravel

Paleomagnetic samples from Caribou Creek were collected 3 m above bedrock in an overbank sandy-silt

Table 2. *Summary of paleomagnetic remanence directions.*

Site	n	D (°)	I (°)	k	α_{95}	Polarity
Dominion Creek gravel						
Hunter Creek	6	28	82.2	79	7.6	N
Site 55 (loess)	5	11.1	76.4	24.1	15.9	N
Site 55 (loess)	3	66.2	67.0	112.4	11.7	N
Site 55 (loess)	10	316.5	67.1	54.8	6.6	N
Site 55 (loess)	3	282.5	39.1	42.7	19.1	N
Ross gravel						
Ross gravel (overprint)	15	63.8	80.9	15.7	10.1	N
Ross gravel	10	171.2	-39.1	4	28.6	R
White Channel gravel						
Caribou Creek	5	106.8	68.6	4.1	34.0	N

Note: n, number of samples; D and I, declination and inclination (respectively) of the mean remanence direction; k, precision parameter; α_{95}, circle of confidence (p=0.05); N and R, normal and reverse magnetization (respectively).

adjacent to a prominent tephra. The samples are normally magnetized, indicating deposition during a pre-Brunhes normal interval, likely the Gauss chron (>2.6 Ma).

Ross gravel

Thirty samples were collected within the Ross gravel at site 51 (Fig. 1). Ten samples were collected from an overbank sandy-silt lens about 1 m above bedrock, and ten additional samples were collected from a similar sandy-silt unit 2 m above bedrock. A further ten samples were collected within a floodplain soil near the contact with Dominion Creek gravel. The paleomagnetic samples show a complex magnetization indicating a primary (detrital) reverse magnetization within the gravel with a secondary normal overprint. The secondary overprint is a chemical remanence, which is most strongly recorded within the soil unit, but also extends to samples collected within the underlying gravel. Thus the Ross gravel is interpreted to have been deposited by at least the late Matuyama chron (>780 ka), and subsequently affected by an alteration event during the Brunhes chron (normal <780 ka).

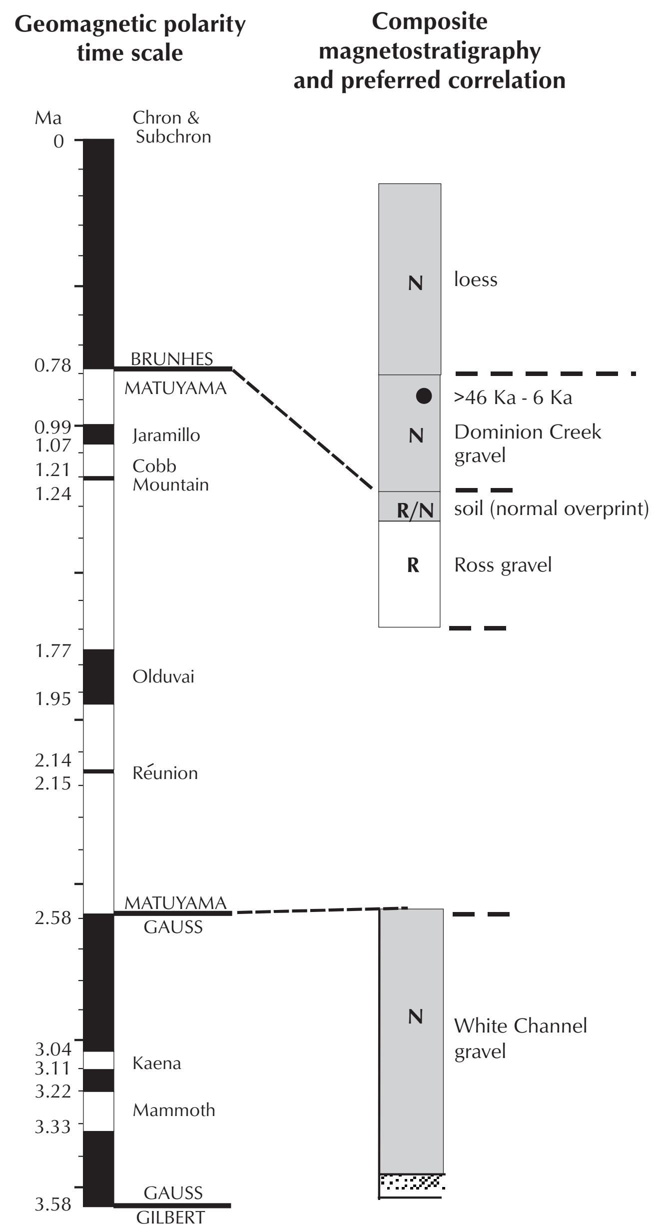

Figure 5. *Preferred correlation of Dominion Creek stratigraphy to the geomagnetic polarity time scale of Cande and Kent (1995).*

Dominion Creek gravel

Dominion Creek gravel was sampled within an overbank lens at Hunter Creek where it occurs as a low terrace approximately 5 m above the valley bottom. Six samples from the site determined a normal polarity. At site 55, loess overlying Dominion Creek gravel, was sampled continuously at 15-20 cm intervals and determined a characteristic normal polarity (Table 2). The samples show considerable inter-horizon variability with intra-horizon consistency suggesting that paleo-secular variation was recorded adding confidence that the polarity determined is primary.

CHRONOLOGY

The paleomagnetic data presented in this study does not provide a unique age model for the Dominion Creek deposits, but rather a broad outline of their ages relative

Table 3. *Radiocarbon ages associated with Dominion Creek gravel. Locations plotted on lithostratigraphic logs in Figure 3.*

Lab no.	Material	C^{14} yrs BP ± 1σ	Significance
BETA-128238	wood	>45,390	wood within DCg on Dominion Creek
TO-7943	twigs	49,390 ± 1350	twigs immediately overlying DCg on Sulphur Creek
BETA-128237	wood	48,370 ± 1400	wood within DCg on Sulphur Creek
GSC-6478	wood	6290 ± 70	wood immediately overlying DCg on Sulphur Creek
BETA-136518	wood	5900 ± 40	*in-situ* stump 1.5 m above DCg on Sulphur Creek

to the geomagnetic polarity time scale. These ages will certainly be refined with the identification and dating of tephra beds found during this study.

Figure 5 is a preferred correlation of the gravel units to the geomagnetic polarity time scale of Cande and Kent (1995). From this correlation we can conclude that the White Channel gravel was deposited during a pre-Brunhes normal polarity chron or sub-chron. Sandhu et al. (this volume) have provided a minimum age for the White Channel gravel on Quartz Creek at 3 Ma, which is consistent with the normal polarity (Gauss 2.6-3.6 Ma). The most surprising aspect of this study, however, is the recognition of the reversed magnetic polarity of the Ross gravel indicating an age of at least 780 Ka for this unit, inferring incision of the Dominion Creek valley to its present position at least by this time.

Dominion Creek gravel sampled at the mouth of Hunter Creek is 5 m above the present valley bottom and is likely mid-late Pleistocene in age, representing a minor aggradation of the valley, post-dating the Ross gravel. Radiocarbon ages from wood collected within the Dominion Creek gravel indicate a wide range from >46 Ka through to 6 Ka (Table 3). Given the position of the modern Dominion and Sulphur creeks (prior to mining) at the level of the Dominion Creek gravel, it is likely this unit spans much of the last several hundred thousand years.

Figure 6. *Typical gold recovered on Dominion Creek near the mouth of Gold Run Creek. Gold tends to be fine grained (majority <2 mm), flat and well rounded, suggesting transport by fluvial process from the headwaters of Dominion and Sulphur creeks in the King Solomon Dome area. Fineness of recovered gold tends to be high (>800) which is consistent with high fineness lode deposits known from the King Solomon Dome area (McConnell, 1905; Knight et al., 1999b).*

PLACER SETTINGS AND GOLD CHARACTER

Fineness values on Dominion Creek (plotted from Mining Inspection Division 1998; Fig. 1) show considerable similarity on each of Sulphur (750-830), Gold Run (790-850) and main Dominion creeks (800-900), and generally increase down-valley, as has been noted previously in the Klondike region (Hester ,1970; Knight et al., 1999b). The increase in down-valley fineness likely reflects prolonged mechanical weathering of gold grains, thus increasing high-fineness rims. Gold morphology data, presented by Knight et al. (1999a), suggests that flat, well rounded gold nuggets, like the majority of those recovered on Dominion and Sulphur creeks, were transported 10-15 km, indicating a major source in the area of King Solomon Dome. A high fineness lode source is well known on King Solomon Dome (McConnell, 1905; Milner, 1976; Knight et al., 1999b).

The majority of gold produced on Dominion, Gold Run and Sulphur creeks in the last century has been from Ross gravel. On Dominion Creek, Ross gravel is at least 800 Ka, suggesting little gold has been eroded or concentrated in the last 800 Ka in this area. This contrasts with the majority of gold produced on Bonanza and Hunker creeks in the Klondike drainage, where deposits are largely of late Pleistocene and Holocene age (valley-bottom gravel/muck ages reported in Fraser and Burn, 1997 and Froese, 1997).

Placer gold recovered on Dominion Creek is generally fine grained (<2 mm), flat and well rounded with few exceptions (Fig. 6). At the mouth of Brimstone Gulch on Sulphur Creek, considerable coarse gold was recovered from mining operations in 1996 with a fineness of 810 (Mining Inspection Division, 1998). Interestingly, not far to the east on Gold Run Creek, considerable coarse gold was recovered near the mouth of Laskey Creek in the summer of 2000. A considerable pay stream below the mouth of Laskey Creek is reported by Nordale (1942) and old-timers thought Laskey Creek was the main source, or at least a very important source for Gold Run Creek (Nordale, 1942).

CONCLUSIONS

1. Stratigraphy and paleomagnetic chronology on Dominion Creek and its tributaries indicates White Channel gravel occurs on high terraces 20-40 m above the present valley bottom.
2. The Dominion Creek valley was incised to its bedrock floor at least 800 Ka during, or preceding, deposition of Ross gravel.
3. The majority of gold on Dominion Creek has been (or is currently) produced from Ross gravel, suggesting little placer formation in the area over the last 800 Ka.

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