STRATIGRAPHY OF THE PLACERS

IN THE

ATLIN PLACER MINING CAMP, B.C.

by

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&

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for the

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AND PETROLEUM RESOURCES

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*** T A B L E O F C O N T E N T S ***

*** A B S T R A C T ***

Three weeks in August 1976 were spent in the Atlin Placer Camp by Ministry of Mines and Petroleum Resources Geologists, Peter Proudlock and Wendy Proudlock, examining the stratigraphy of the placer deposits. Auriferous channel gravels, with ages between 100,000 years B.C. and 10,000 B.P. occur on McKee, Pine, Spruce, Bull, Birch, Snake, Ruby, Boulder, Otter, Wright and Wilson Creeks, and the O'Donnel River; of these only the first six creeks were being worked in 1976. The gravels are usually fairly well compacted, rest on a very weathered bedrock surface, are capped by a horizon of large boulders and covered to some depth by tills and glaciofluvial sands and gravels. The gold recovered is usually of jewelry quality - small flattened nuggets up to a quarter ounce in weight are common with occasional larger ones; fine gold does not make up a large proportion of the gold recovered. Early glacial history probably played a large role on the distribution of the placers. A single source is not predicted, and many small gold bearing quartz vein systems are known.

The report consists of 69 pages and contains approximately one hundred photographs, two maps, stratigraphic sections and assorted figures and lists.

*** INTRODUCTION ***

During the three weeks of August 6th through August 28th British Columbia Ministry of Mines and Petroleum Resources geologists Peter Proudlock and Wendy Proudlock visited the Atlin Placer Camp. The purpose of the visit was to "report on the stratigraphy of the placers". The last work by the Ministry in the area was done by Jim Black in the early 1950's[1]. His report, compiled after about three years of field work contained information on the Pleistocene glacial history and placer production to that date, as well as an accompanying geological map and glaciology maps at a scale of one inch to one mile. Since only three weeks were allotted to our project, the scope was limited to cataloging the active placer properties and compiling a series of stratigraphic sections of the exposed deposits, where possible, on the properties. No attempt was made to give any economic valuation of the placers. Extensive use of photgraphy, where feasible, has been made to record as much information as possible on this project.

Creeks visited with active placer operations were McKee, Pine, Spruce, Snake, Birch and Bull. Inactive placers on Boulder, Ruby, Wright, Otter and Wilson Creeks, and on the O'Donnel River were also visited. Three current mineral properties were also visited and are reported on for documentation purposes. Transportation for the three weeks in the field was by GMC Jimmy 4X4, and an additional week was spent driving to Atlin from Vancouver and returning to Victoria. Accomodation in Atlin was in Kirkwood Cottages, modern log cabins on the shore of beautiful Atlin Lake (see figures 1-4).

We are indebted to Dr. Maynard M. Miller for use of his library facilities in the Glaciological Institute at Atlin during the final week of our stay, and for allowing us to sit in on some his and other lectures on glaciology of the Atlin area.

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[1] J.M. Black: Atlin Placer Camp, file copy report, British Columbia Ministry of Mines and Petroleum Resources, Victoria; 1953

Figure 1

Wide angle (28 mm) of Atlin Mtn. on Atlin Lk., taken from Atlin on the east shore of the lake. Photo: W. Proudlock, Aug. 25/76.

Figure 2

Telephoto (135 mm) of rock glacier on eastern flank of Atlin Mtn. Debris spalls from cliffs at upper left onto the glacier, which has an ice core. Photo: W. Proudlock, Aug. 25/76.

Figure 3

Accommodation at Atlin, B.C.: Kirkwood Cottages. Our cabin on left. Photo: W. Proudlock, Aug. 6/76.

Figure 4

View of Llewellyn Glacier at the south end of Atlin Lake, taken from look-out, eight miles south of Atlin. Looking south-westerly; small lake in foreground is South Lake. Photo: P. Proudlock, Aug. 6/76.

*** PLACER CREEKS ***

McKEE CREEK

One of the larger operations in the Atlin Placer Camp is owned by John Harvey (see figures 5-20). This operation utilized a D8 cat for stripping and moving auriferous channel gravels into a pit for washing. A monitor was used to break up the clays and to wash the gravels into a sluice. An old cat fitted with a double drum winch which powered a scraper was used to pile the tailings. Two settling ponds catch the suspended sediments. Much of the Harvey claims had been previously hydraulically mined and several of the old underground adits have been relocated. At this site a thick cover of till rests on glaciofluvial deposits which overlay the auriferous channel gravels, the latter two being separated by a layer of large boulders. The underlying bedrock is very weathered and fractured with gold found in fractures to a depth of about four feet. In places, especially in the area of the wash pit, quartz veining is noted. Most of the bedrock surface is "rotten" and weathered orange, but at a depth of only a few feet a green staining was noted in a number of places. It was first assumed to be garnierite or another nickel mineral, but a sample sent for X-ray analysis consisted only of kaolonite, quartz and mica. Some of the green mineral(s) is probably quite soluable but readily reduced(?), as clean steel (cat parts, sluice box, etc.) is quickly oxidized and stained green by the running water in well less than an hour.

Two, and possibly three or more channels are present on the Harvey property at different elevations. The lowest one was being worked in 1976. The auriferous channel gravels exposed in McKee Creek, below its confluence with Eldorado Creek, contain rounded to well rounded boulders with a high proportion of red, and some green radiolarian chert.

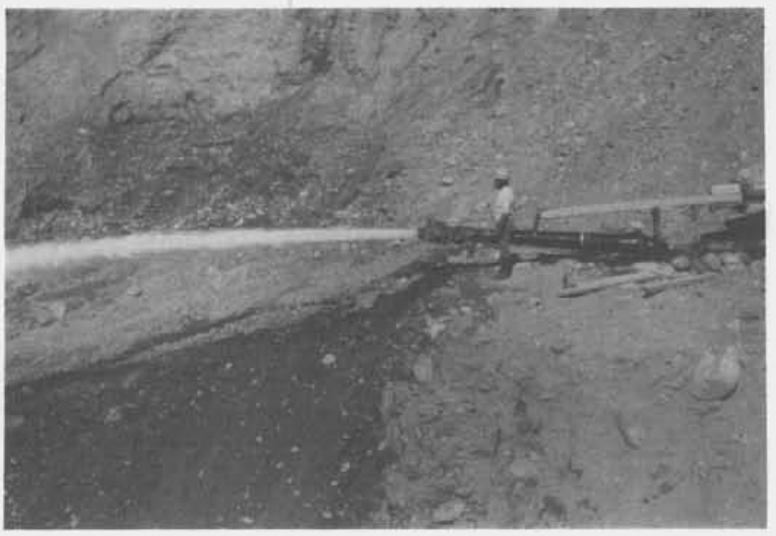


Figure 5

John Harvey operating monitor on his claim on McKee Ck. Looking at north bank. Force of water helps to break up the clays and free the gold from the gravels.
Photo: P. Proudlock, Aug. 6/76.

Figure 6

View of Harvey's monitor pit, with sluice box and wings at upper left. Gravels are pushed into the pit with a cat.
Photo: P. Proudlock, Aug. 6/76.

Figure 7

Looking upstream on McKee Ck.; cut bank shows good section. Gravels were stripped and then pushed by cat into the monitor pit, from where they are washed into the sluice box. About 2 to 4 feet of bedrock is also removed for sluicing.
Photo: P. Proudlock, Aug. 6/76.

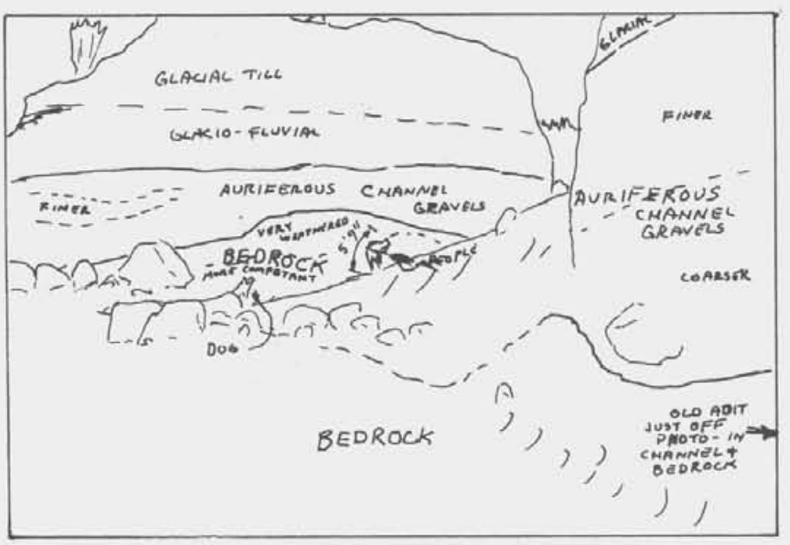


Figure 7, overlay.

Figure 8

John Harvey pointing out auriferous channel gravels lying on top of weathered bedrock, and overlain by boulders and glaciofluvial material (or till?).
Photo: P. Proudlock, Aug. 6/76.

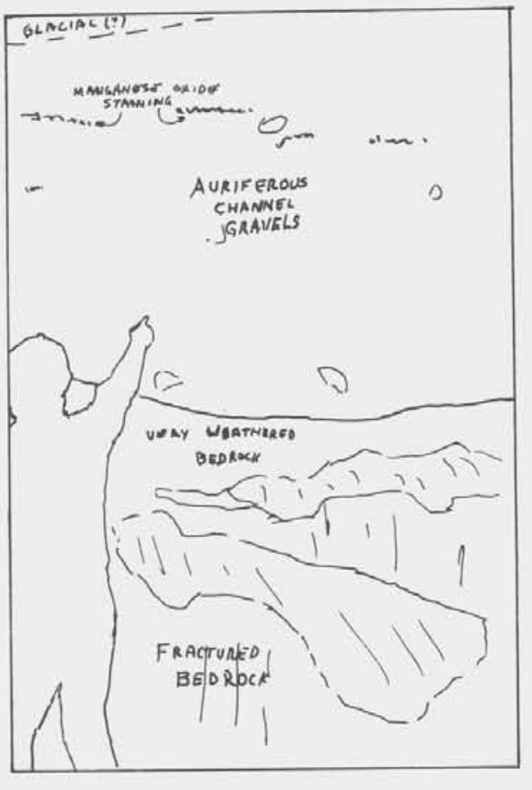


Figure 8, overlay.

Figure 9

Pay channel gravels in uncut bank, on top of which monitor sits, further downstream. Note hammer as scale. About 3 feet of bedrock has been removed. Good gold is recovered from fractures.
Photo: P. Proudlock, Aug. 8/76.

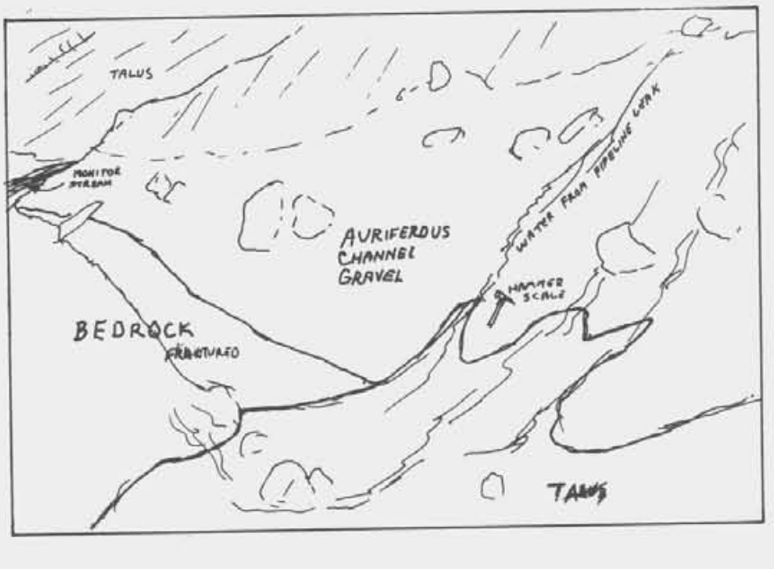


Figure 9, overlay.

Figure 10

Monitor pit, empty for clean-up, but not scoured this time. Last clean-up of the season will see pit floor cleaned to bare bedrock.
Photo: P. Proudlock, Aug. 9/76.

Figure 11

Detail of fracture in weathered bedrock which has filled with auriferous gravel. Manganese oxide gives black stain to pebbles.
Photo: P. Proudlock, Aug. 6/76.

Figure 11, overlay.

Figure 12

Pale green staining (looks bluish in photo) in bedrock fractures, thought to be garnierite or some other Ni mineral, but X-ray identified as kaolinite, quartz and mica.
Photo: P. Proudlock, Aug. 6/76.

Figure 13

North bank of McKee Ck., upstream from monitor pit, showing till overlying channel gravel. The red gravels above John Harvey's head mark another channel above and younger than the pay channel being worked downstream.
Photo: P. Proudlock, Aug. 6/76.

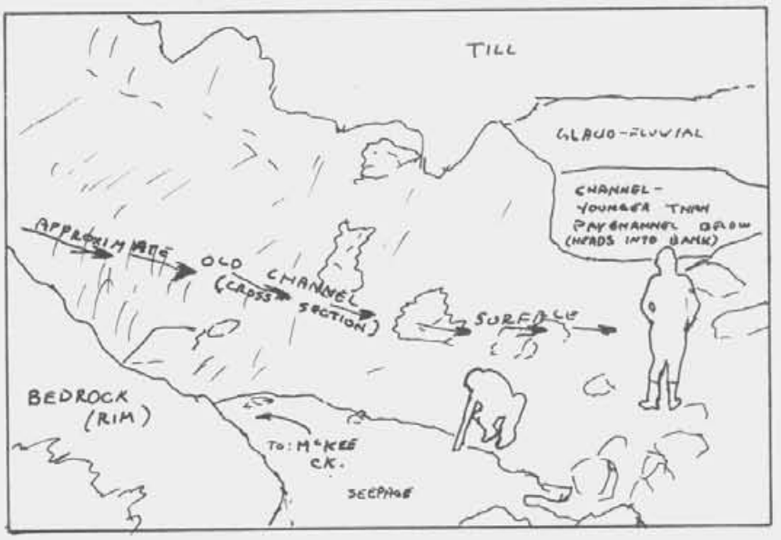


Figure 13, overlay.

Figure 14

View of Harvey's operation on McKee Ck. Tony Vesnaver's claim is situated downstream.
Photo: P. Proudlock, Aug. 6/76.

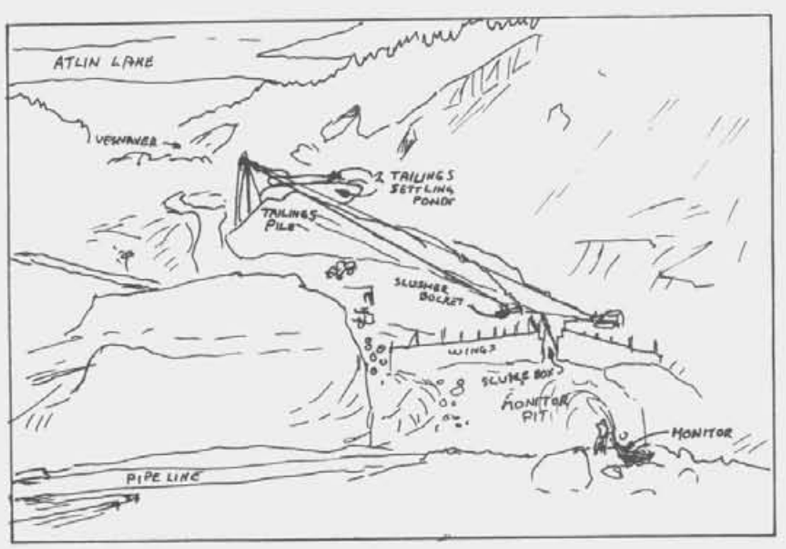


Figure 14, overlay.

Figure 15, above.

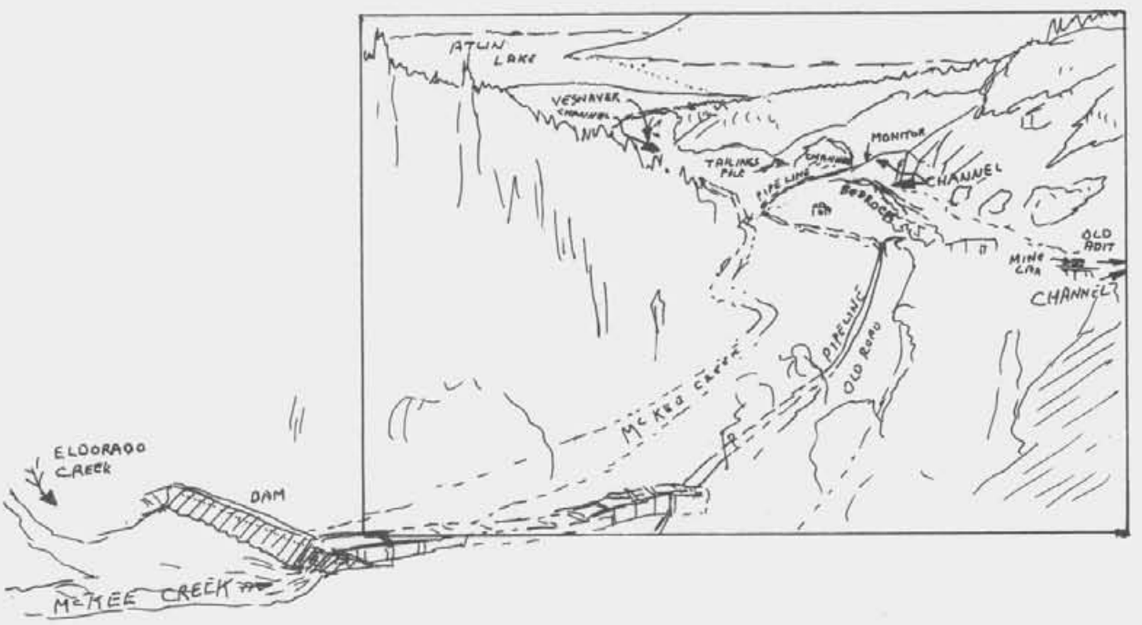
Figure 15, overlay.

North bank, upstream on McKee Ck., just above and across from Eldorado Ck. Here, more angular fragments and less chert are seen in channel fill, than downstream at the current mining site. Aug.6/76.

Figure 16

View looking west, down McKee Ck., from confluence with Eldorado Ck. Monitor pipe runs along north bank of creek. Old channel also lies to right of creek and is exposed in a number of places along the base of the cliffs.
Photo: P. Proudlock, Aug. 6/76.

Figure 16, overlay.



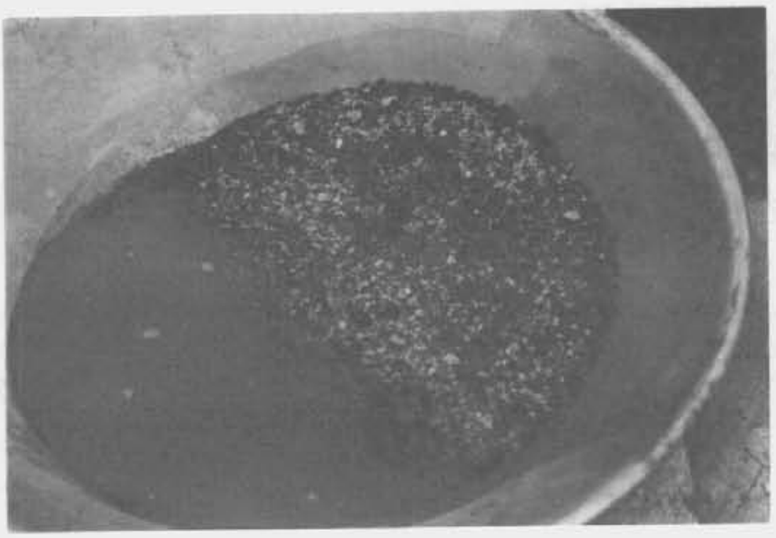


Figure 17

Clean-up results, less nuggets, for John Harvey after about six weeks of sluicing.
Photo: P. Proudlock, Aug. 9/76.

Figure 18

Largest nugget obtained; a fine, jewellery piece quartz nugget.
(0.75 x full scale)
Photo: P. Proudlock, Aug. 9/76.

Figure 19

Different angle of quartz nugget, Fig. 18.
(1.25 x full scale)
Photo: P. Proudlock, Aug. 9/76.

Figure 20

Different angle of quartz nugget, Fig. 18.
(1.5 x full scale)
Photo: P. Proudlock, Aug. 9/76.

The source of these boulders is probably from the ridge to the south-east of McKee, on the same side as Eldorado Creek, where Permian Cache Creek Group rocks, containing abundant chert, have been mapped[2]. Above the confluence of these two creeks the boulders are more angular and contain less chert.

Two possibilities therefore, arise for a preglacial channel location - either Eldorado Creek was considerably larger than today, or the major flow of McKee Creek was in a channel to the north-east and perhaps drained what is now the headwaters of Dominion Creek. The latter theory is held to by John Harvey who was planning to do some seismic work later in 1976 or early in the next year. Gold recovered at John Harvey's operation included a high percentage of nuggets, although most of it was flattened jewelry gold. Some quartz-gold nuggets were also recovered.

Lower down McKee Creek, below John Harvey's is Vesnaver Placer Mining, owned and operated by Tony Vesnaver. This was the only active underground placer operation in British Columbia. (Refer to figures 21-25). Tony's claims are at the lower limit of auriferous channel gravels preserved by an overlay of glaciofluvial sands and gravels, which are much thinner here than upstream[3]. Mining is by drifting into the north bank of the creek at bedrock level into rich channel gravels. The drifts are completely timbered. About one foot of fractures oxidized bedrock is removed, and about five feet of reddish to brownish channel gravel; the back of the drift consists of a layer of large boulders which form the base of the glaciofluvial deposits. Some old drifts were found in the bank where Vesnaver's drifts and cross-cuts intersect them; a medium to coarse sand flows freely into the old workings where the large boulders have collapsed through the timbers. During August, Tony was at work on a new drift a few hundred yards upstream from one approximately 200 feet deep which had been completed during the

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[2] J.D. Aitken: Map 1082A, Geology, Atlin, Cassiar District, B.C. (to accompany Memoir 307); G.S.C., Ottawa, 1959.

[3] Refer to glacial history in Black's report.

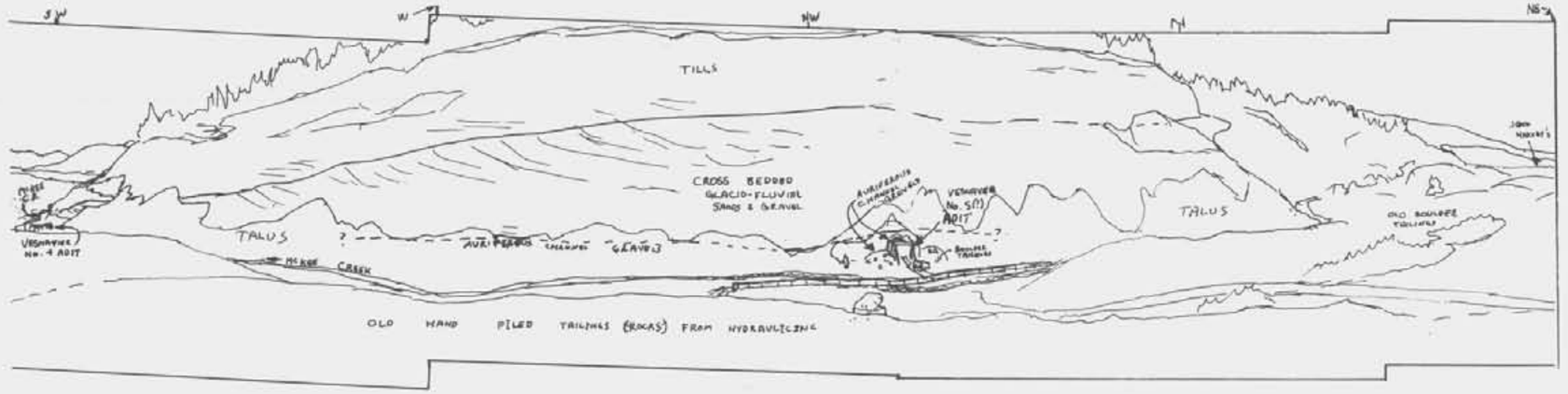

Figure 21

Panorama of McKee Ck., north bank, on Tony Vesnaver's claim. Wide angle (28 mm) shot, with overall angle of view about 240°. Till at top of cliff, with cross-bedded glaciofluvial sands and gravels below--these thin out downstream until at the road bridge, they, and underlying channel gravels are absent, indicating that glaciers travelled upstream, eroding the downstream deposits and then over-riding the glaciofluvial deposits. Channel gravels are present at the base of the cliff, capped by a boulder horizon.

Photos: P. Proudlock, Aug. 7/76.

Figure 22

Tony Vesnaver, McKee Ck.: lower No. 4 adit, downstream from present one. Adit is now boarded up. W. Proudlock, Bill Dudas, Mines Inspector, and Tony Vesnaver.

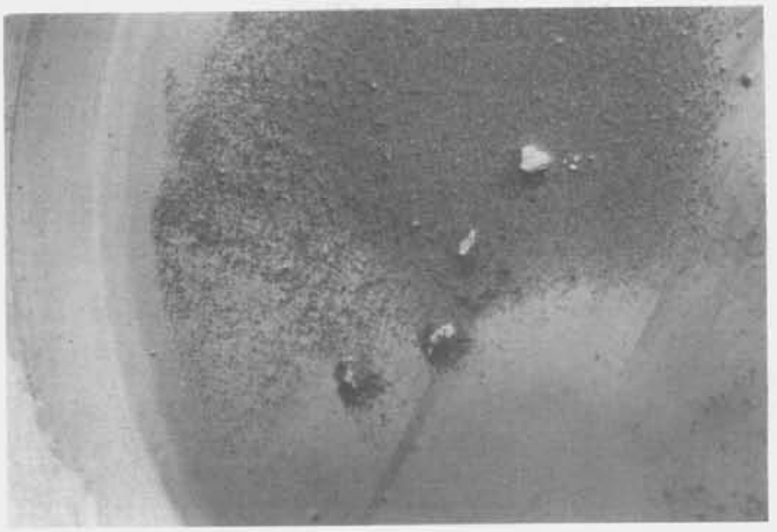

Figure 23

One good pan from auriferous channel on Vesnaver's claim. Largest flake is 0.2" across; photo is full scale.

Figure 24

Sluice outside of Vesnaver's present adit, McKee Ck. The adit extends about 30'-40', and is fully timbered. Tony is panning; Bill Dudas, at right, is determining the stream sediment load. Others from left: Mrs. Dudas, W. Proudlock, and Tony's partner, Lorraine.

Figure 25

Entrance to Vesnaver's property, McKee Ck. Looking at north bank of creek, where a thick till overlies cross-bedded glaciofluvial gravels that are thinner than those upstream (see Fig. 21).

Photos: P. Proudlock, Aug. 7/76.

two previous seasons. The ground is drilled and blasted since the channel gravel is nearly consolidated; the muck is removed and put into a half ton end-dump car with a mucking machine and hand-trammed to a sluice on the creek. Only the rich channel gravels are worked here - figure 23 shows the results of one pan adjacent to the portal of the present adit. Gold recovered includes a high percentage of flakes, as well as nuggets.

Some very large boulders are present in the channel. One red/grey chert boulder, six to eight feet in diameter was encountered while we were in the area, and Tony mentioned that equally large boulders were also encountered in the lower adit.

The ages of the auriferous channels on McKee Creek are not known with certainty, but Dr. M.M. Miller of the Institute of Glaciological and Arctic Sciences[4] has obtained dates of 36,000$^{+}_{-}$ years B.P. from a boulder compacted peat, located below the Vesnaver channel which he has dated at 30-33,000 years B.P. and may represent an older reworked channel. The channel being worked on the Harvey claims has been dated as much greater than 40,000 years B.P. and Miller would place both the lower two auriferous strata on the claims at greater than 60,000 years B.P. (Refer to appendix 1).

PINE CREEK

On the south side of Pine Creek on an old cutoff channel, is Goldrun Creek, a small seepage from a boggy area. A group of claims owned by E.D. Thackuk, J.D. Guild and T. Mattson and operated by Jerry Klein and Jack Guild is the largest placer mine in the area (see figures 26-37). Pits about 300 feet square are being mined to bedrock, a depth of about thirty to fifty feet. The soil removed is saved, and the stripped till is used to fillthe previous pit. Tailings are also put in the previous pit. Transfer of material is done by dragline, fed by a D8 cat, while another cat moves tailings and levels the old pit. A wall of till and gravel is left between pits to stop water from running

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[4] M.M. Miller: personal communication: in Atlin, August 1976.

into the active pit. When a pit is completed the black organic rich soil is spread over the filled pit.

This area had been mined previously just after the turn of the century by shafts and drifts; these are now filled with water. A considerable number of drifts were uncovered during mining. The drifts followed along the channel axis on bedrock, and about six feet of auriferous gravel was removed. In places this accounts for up to 30% of the presently minable ground. By using a ripper on the cat, gold is recovered from fractures in the oxidized bedrock to as deep as eight feet in the very weathered and fractured sections. Bedrock in previous pits was a soft green serpentine, but is now much blacker and harder, and appears to be a hornfelsed argillite although it is locally termed an "andesite". The auriferous gravel is quite sandy with rounded boulders and some clay. Colour of the gravel graded from a reddish brown on the northeast side of the pit to reddish on the southwest side (see sections-figures 30&31). The channel gravels are well compacted and quite impermeable. Water in the pit runs out at the base of the till and down the wall. While mining, a six foot wide dyke was left along the old drifts, which were full of water and were being pumped from one shaft outside the pit. No leakage was seen through the gravel dyke with a six foot head of water. When the timbers were removed they were found to be sound, though quite waterlogged.

The gold is medium to coarse nuggets, being quite chunky in the channel axis and flatter on the channel rims. So far about 1000 feet of channel has been mined. The location of the channel ahead of mining (upstream) is mapped by drilling with an old keystone drill operated by Allan and Tory Mattson of Atlin. Gravel bailed out of the hole is catalogued for the colour (red, brown, yellow), difficulty of drilling and is panned, with the amount and shape of gold being recorded. Measurements of depth to bedrock produce a paleotopography of the channel. We viewed the drill in operation about 1000 or so feet upstream from the pit. The channel seemed to be curving towards the mountains on the south side of the valley. It is not known whether or not the channel curves back towards the Surprise Lake-Pine Creek valley or is from a mountain stream to the south.

Lower on Pine Creek is Karl Seiger's claims - a property not worked in 1976. A large unfilled pit is present right alongside the main road, but slumping on the banks has obscured any stratigraphic information that might be recorded. Some fairly recently mined pits were seen closer to the river and a lot of old boulder piles are present near the creek as well. In this area, Pine Creek occupies a fairly flat wide valley. At the ghost town of Discovery, Bill Weigler owns a claim up on the creek bank against the edge of the mountain. The only recent work on the claim was a test pit, which was still to be deepened; no gold had yet been recovered. Across the road on the creek, but on a bedrock terrace, about 20 feet above the creek level a claim registered to J.M. James has been worked by hand. A thin layer of gravel has been removed by hand and wheelbarrow, and sluiced; a fire hose and pump was used to clean fractures in the bedrock. It is not known if and how much gold was recovered.

SPRUCE CREEK

Spruce Creek is the largest tributary of Pine Creek, and although most of the gold production in the Atlin Placer Camp has in the past come from Spruce Creek, only a few properties were active during 1976.

The lowest claim, at the confluence of Little Spruce Creek with Spruce Creek is owned by John Harvey. Although he was not working this claim, he reports that fairly good gold has been panned. Next upstream, the only major operation on Spruce, owned and run by Enos Kyle and Son (see figures 38-40). Gold was being recovered from channel gravels on bedrock above the present creek level. About eight feet of bedrock and gravel were sluiced. A D6(?) cat was used for stripping, scraping and ripping about three feet of fractured bedrock and for piling tailings. A tractor mounted backhoe was used to feed the sluice; water was pumped from the creek. The Kyles had dug a number

Figure 26

Goldrun, an old channel, south side of Pine Ck. East end of pit, with old workings running across channel at base of east face, plus along length of channel.

Photo: P. Proudlock, Aug. 13/76.

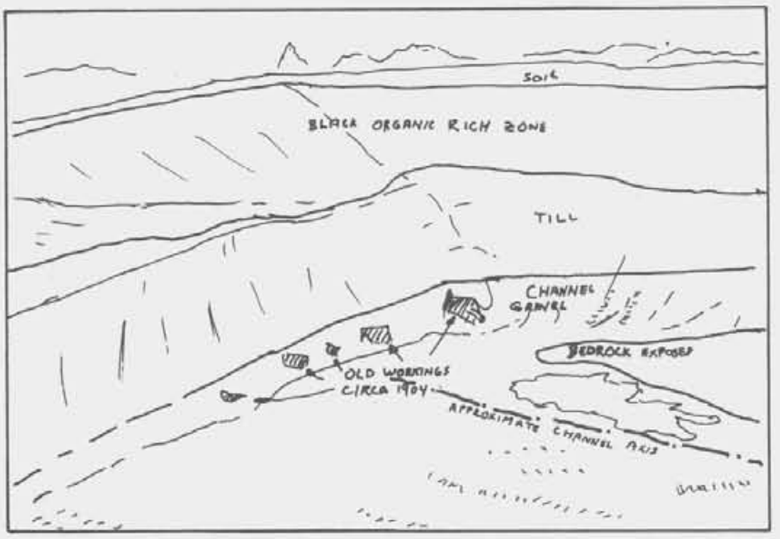

Figure 26, overlay.

Figure 27

Overview of pit, wide angle (28 mm) shot, looking northwest. Old workings and auriferous gravel channel lie across center of pit floor.

Photo: P. Proudlock, Aug. 7/76.

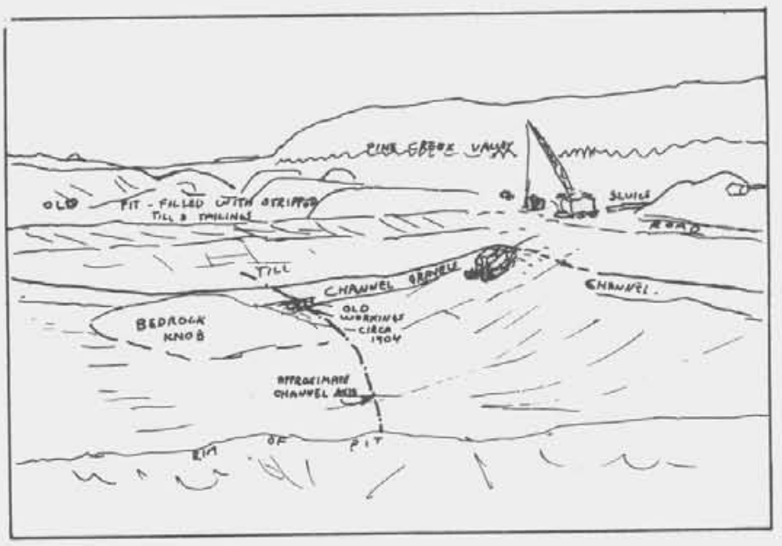

Figure 27, overlay.

Figure 28

Old shaft serving underground workings in channel gravels, situated just east of pit. It is filled with water to within six feet of surface, indicating that the workings are not interconnected.

Photo: P. Proudlock, Aug. 13/76.

Figure 29

Goldrun pit, Pine Ck., looking northwest. Wide angle (28 mm) view of operation, with Jerry Klein drilling blasting holes to clear a bedrock knob, and a D-8 cat feeding the dragline which delivers the muck to a sluice on top.

Photo: P. Proudlock, Aug. 7/76.

Figure 30, overlay below.

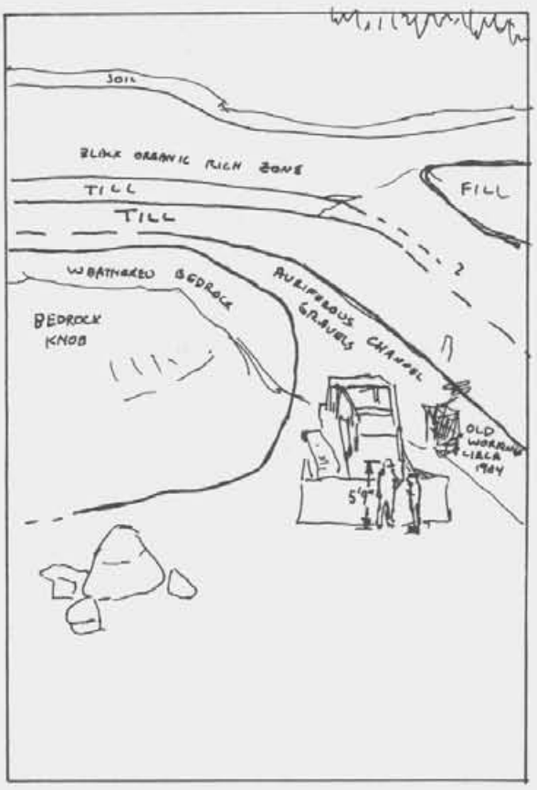

Figure 30, below.

Goldrun, Pine Creek, looking southwest. Old tunnel beside cat in west wall, bedrock knob behind at left. Gold is found in the red channel gravels, and also penetrates the bedrock along fractures to three feet or more.

Photo: P. Proudlock, Aug. 7/76.

Figure 31

Goldrun, Pine Ck., looking at east end of pit, with old timbered workings exposed at base. The tunnels are six feet high and sit on bedrock. Timbers are still sound after more than 70 years.

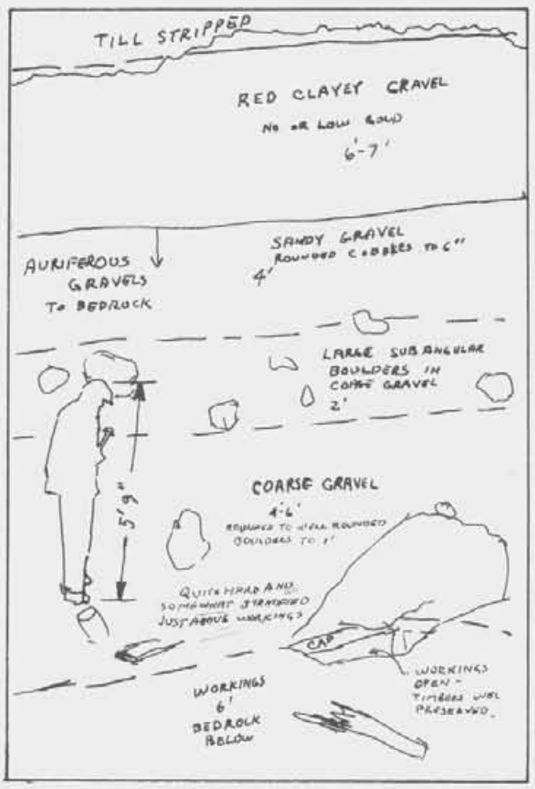

Figure 31, overlay.

Figure 32

Goldrun, Pine Ck., about 1000 feet east of pit. Keystone Drill is run by Allan (left) and Tory Mattson. They are drilling for the old channel under till, with holes averaging fifty feet deep.

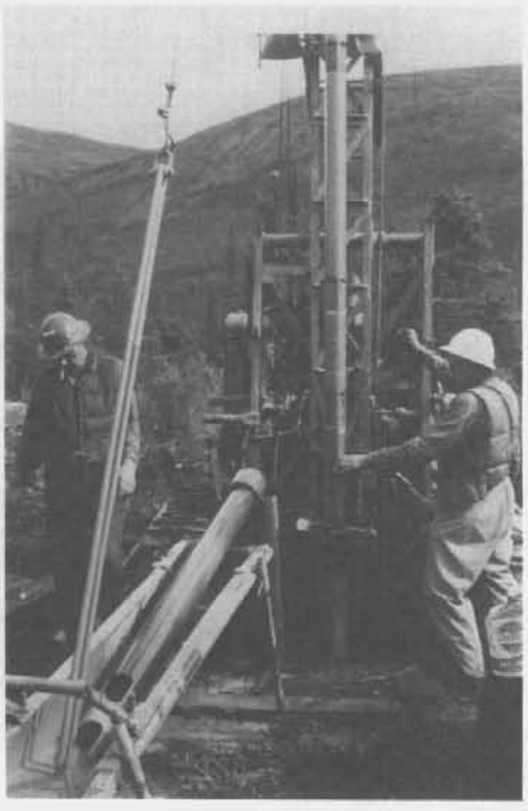

Figure 33

Goldrun, Pine Ck.: Allan (left) and Tory Mattson, emptying bailer of Keystone Drill into trough, and placing solid steel drilling tool back into hole.

Photos: P. Proudlock, Aug. 13/76.

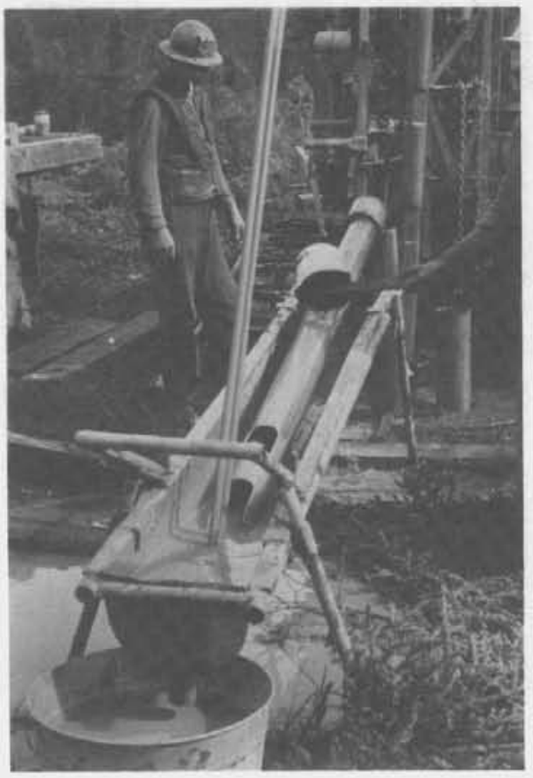

Figure 34

Goldrun, Pine Ck.: Tory Mattson washing off bailer. Mud and gravel slurry empties into washtub under trough. Allan Mattson then washes the mud away and pans the gravel, testing for gold and logging the hole at the same time.

Figure 35

Goldrun, Pine Ck. Tory Mattson welding an additional length of casing, preparatory to further drilling, using a home-made clamp to obtain perfect alignment in the casing.

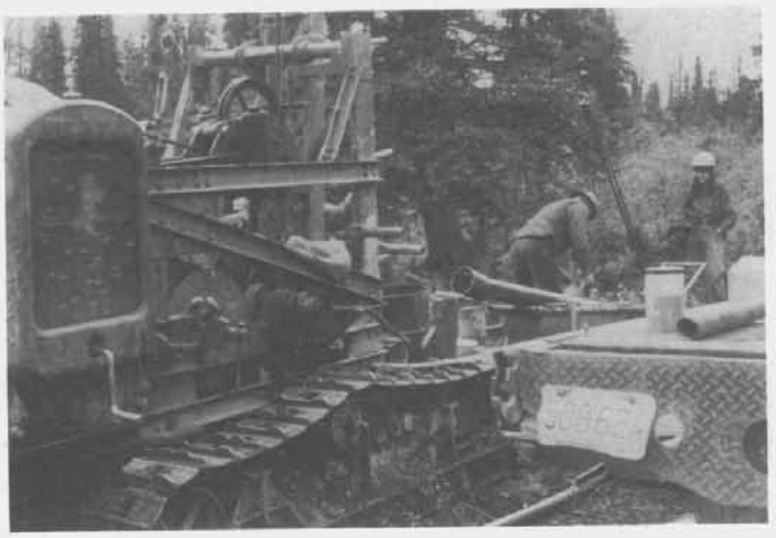

Figure 36

Goldrun, Pine Ck.; side view of drill, showing engine, cable reel and rocker. While Allan Mattson washes the gravel Tory continues to drill. W. Proudlock at right.

Photos: P. Proudlock, Aug. 13/76.

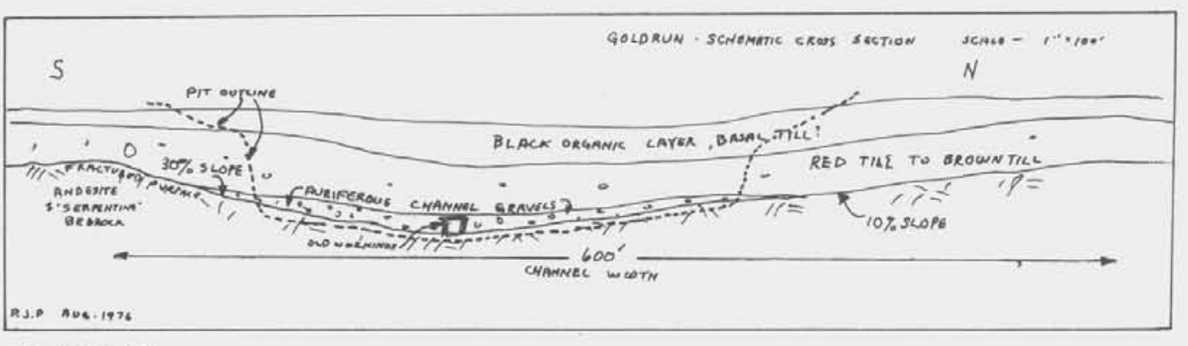

Figure 37

Schematic cross-section, compiled from old and recent drilling on the property, shown to the authors courtesy of Jack Guild.

Figure 38

Enos Kyle's property on Spruce Ck., looking south. Cat and backhoe are working into weathered red bedrock on a "bench". Old workings are known in the far bank, and it is supposed that an old channel exists buried deep under the bank.

Figure 39

Section in test pit on west side of Spruce Ck., Enos Kyle's property. Two feet of fractured bedrock (?) overly about two feet of a gold-bearing green clay (?), which in turn overlies the same bedrock. The bedrock here was exposed during early hydraulic mining.

Figure 40

Detail of green material from test pit. X-ray identification gives composition as siderite, quartz, and possibly some clay. The material may be decomposed bedrock, alteration being due to a long trapped watertable.

Photos: P. Proudlock, Aug. 9/76.

of test pits, on both sides of the creek. One about ten feet deep was dug near the cabin on the north side of the creek, but was being filled in when we visited. Some gravel, soil and sand, about two feet thick, were on top; then completely weathered yellow-red bedrock which got harder for six to eight feet; then almost massive, but fractured rusty bedrock which apparently graded into white bedrock at the bottom. Gold was recovered by panning, but the layers were not segregated. A shallower pit on the south side of the creek encountered a layer of completely weathered green bedrock between more competent layers of bedrock; good gold was reported panned. High gravel banks slump down to the south side of the creek. The upper gravel is probably glaciofluvial but at what depth till is found could not be determined. The whole area had been previously hydrauliced in an attempt to expose a buried channel supposed to have once existed to the south of the creek (see figures 41 & 42). Above Enos Kyle's claim the creek makes a large "S" shaped bend through the old bedrock rim; being incised in a bedrock canyon for a few hundred feet. The creek has high gravel banks at each end of the canyon.

Above Enos Kyle, a claim held by Tony West had been worked earlier in the season, but not while we were there. This claim had been worked extensively in the early years of placer mining in the Atlin area - the creek bottom is filled with piles of tailings (figure 43). The West claim was worked by hand with muck removed from small adit in the northeast bank of Spruce Creek. Next, up Spruce Creek, Orst Curninski works a claim using a small suction dredge to remove gravel from cracks and crevices in bedrock along the creek bottom. He was only working his own claim in the evenings so recovery was not great. The only other recent placer work on the creek was some minor adit digging in a bank of talus on the northeast side of the creek, about two claims below Noland Mines' old shaft at Dennison. The Noland Mine is the only mine in the Atlin Camp to recover gold from hard rock (see figures 44-46). It might be possible that this is the lone source of the placers on some of Spruce Creek, but it does not seem likely that

Figure 41

Above Enos Kyle's property on Spruce Ck., looking northwest down an old, glacial-filled channel (?) towards Atlin Mountain.

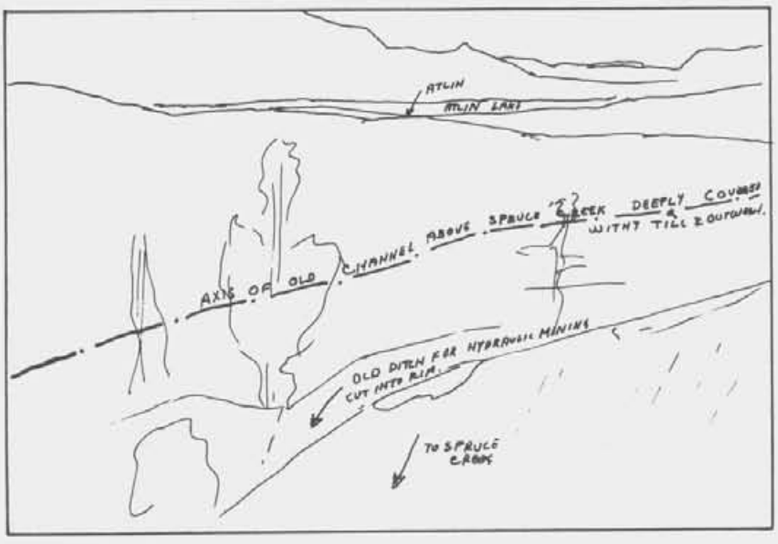

Figure 41, overlay.

Figure 42

Above Enos Kyle's property on Spruce Ck., looking south-southeasterly across an old channel deep below till. Flow in channel would have been to the right (west, or northwest). The lower portion of the creek has been post-glacially cut into the old rim. Tony West's claim at lower left in photo.

Photos: P. Proudlock, Aug. 9/76.

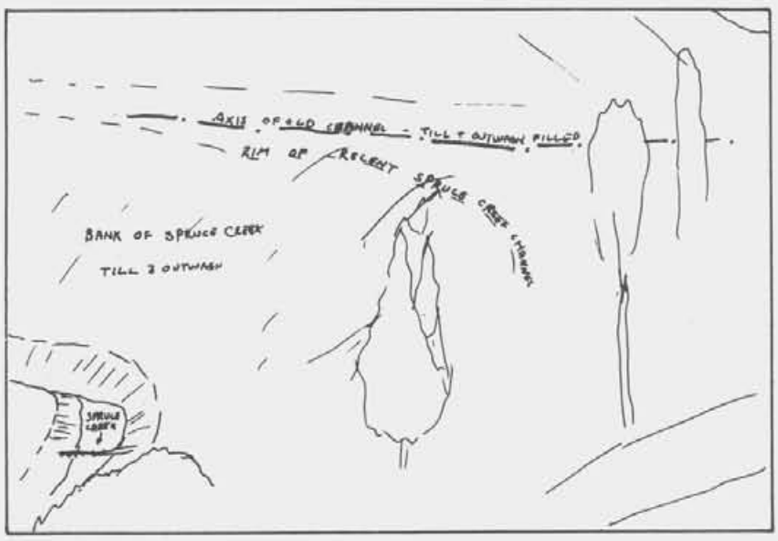

Figure 42, overlay.

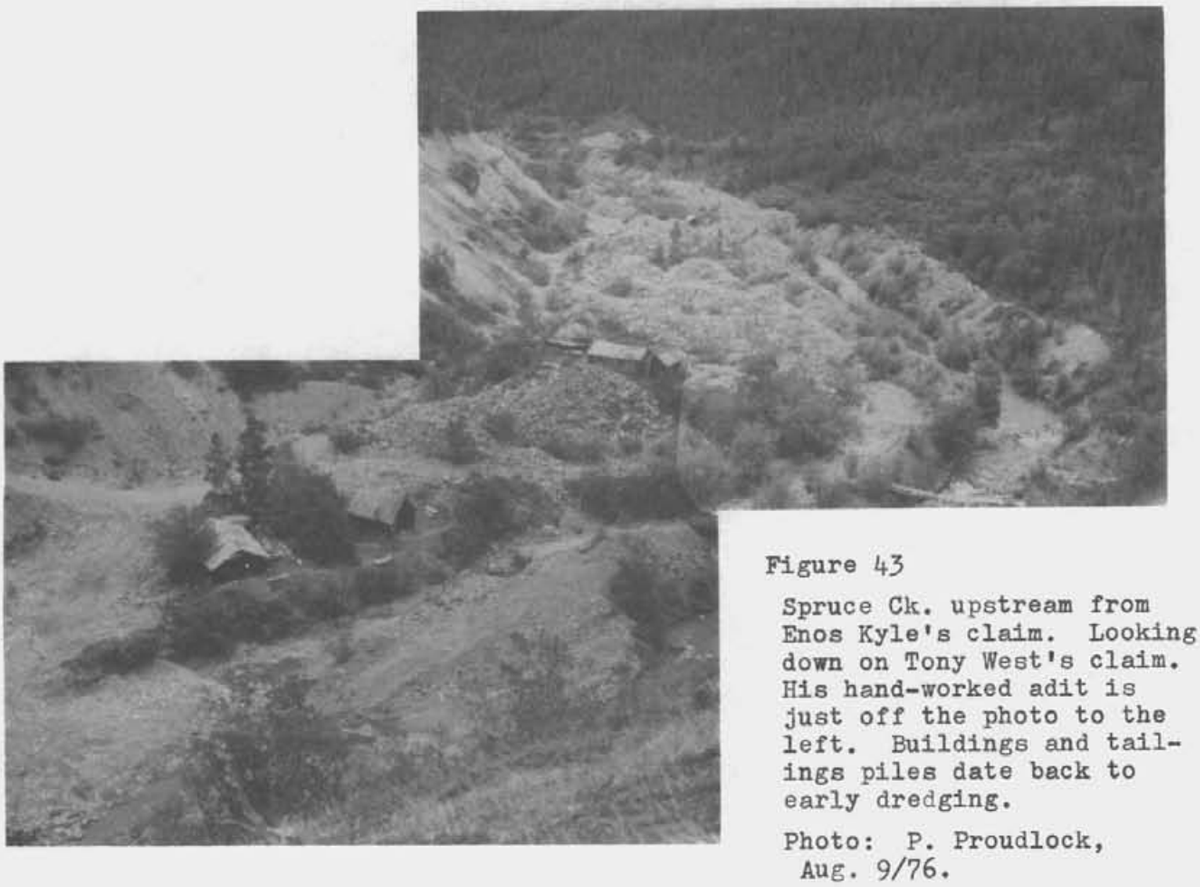

Figure 43

Spruce Ck. upstream from Enos Kyle's claim. Looking down on Tony West's claim. His hand-worked adit is just off the photo to the left. Buildings and tailings piles date back to early dredging.

Photo: P. Proudlock, Aug. 9/76.

Figure 44

Looking south at Dominion, an abandoned settlement on Spruce Ck. at the mouth of Dominion Ck. Property is owned by Noland and produced some of the richest gold in the Atlin area, but from underground workings.

Photo: W. Proudlock, Aug. 10/76.

Figure 45

Headframe at Dominion, Spruce Ck.

Photo: W. Proudlock, Aug. 10/76.

Figure 46
Old shovel below Dominion on Spruce Ck.

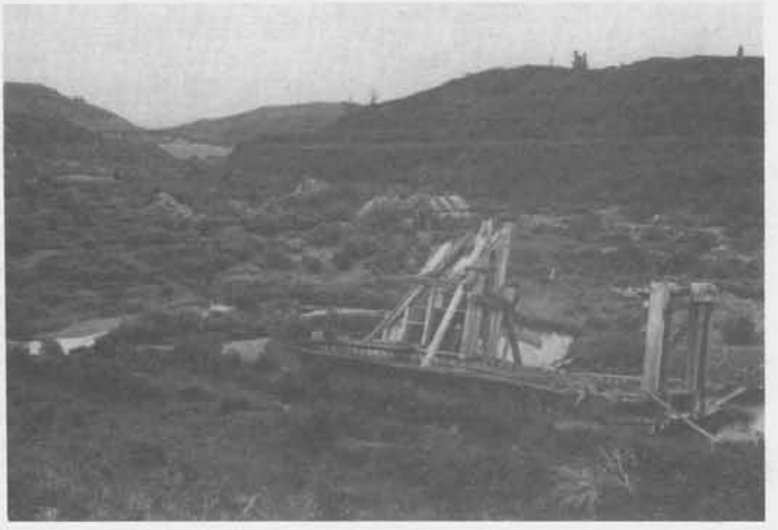

Figure 47
Remains of old gold dredge near headwaters of Spruce Ck., Atlin area. Dredge was operated about one year then shut down, having produced little gold. Looking southeast.

Figure 48
"Road" running into Bull Ck. travels along top of a 20-30' high esker near Spruce and Slate Ck. headwaters. Looking east towards O'Donnel R. and Bull Ck.
Photos: P. Proudlock, Aug. 10/76.

this source could account for gold up Pine Creek and to the north of Pine, and on McKee Creek. A number of old buildings exist at the ghost town of Dominion apart from those buildings that belong to the mine itself; most of those are located downstream on Spruce Creek below the confluence with Dominion Creek.

The road up Spruce Creek was built to service claims worked some time ago. A large dredge once used recovered very little gold from Upper Spruce Creek. Figure 47 shows the remains of it. The valley from here to the headwaters becomes very wide and shallow, with eskers and terraces still largely un-eroded (figure 48). The road over the headwaters, down Slate Creek, across the O'Donnel River and over to Bull Creek is an almost impassible trail by 4X4.

BULL CREEK

We were able to visit Roy Smith's claim on Bull Creek by helicopter (see figures 49-52). The present Bull Creek has been diverted by eskers, to a spot on the rim of the old channel, but still well within the walls of the old valley (figure 52). Roy Smith has been using a cat to open a pit in the old channel, and scrape the auriferous gravel into the sluice. The gold recovered at Bull Creek is a lot finer and also flatter than that of the main Atlin camp. The largest nugget so far recovered here is one fourth of an ounce. Two distinct layers of till are seen; a grey till overlies a yellow till which in turn overlies clean slightly stratified channel gravels. The bedrock is argillite, which grades from well fractured with good gold in fractures to a hard, poorly fractured, probably more metamorphosed rocks, with poor gold recovery. The present pit is west of the creek where channel gravels are two to four feet thick and thicken to the east where the pit will eventually be extended. The channel axis lies between the pit and Bull Creek, as Bull Creek now has bedrock rims higher than the pit where it passes the claim.

Figure 49

Bull Ck., Roy Smith's claim. Looking at northwest bank of excavation, showing section. Bull Ck. runs from right to left, behind photographer.

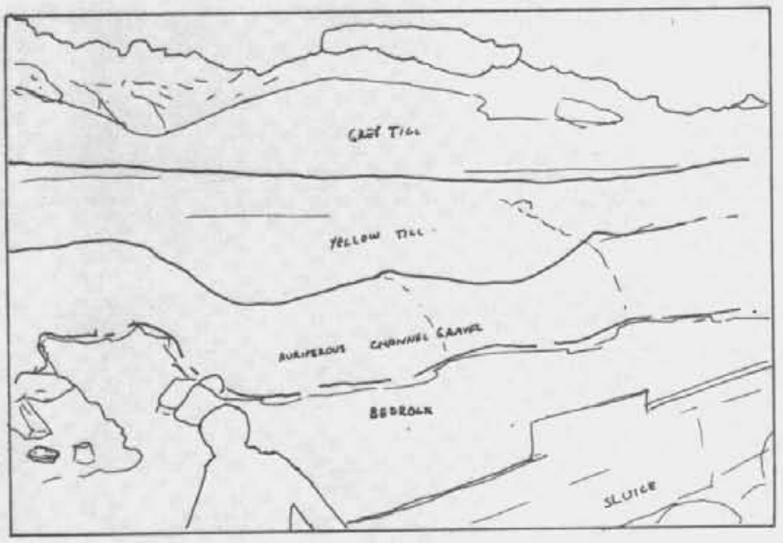

Figure 49, overlay.

Figure 50

Bull Creek, Roy Smith's claim. Detail of section, showing auriferous channel gravels.

Photos: P. Proudlock, Aug. 25/76.

Figure 51

Aerial view of Roy Smith's operation on Bull Ck., looking west.

Photo: P. Proudlock, Aug. 25/76.

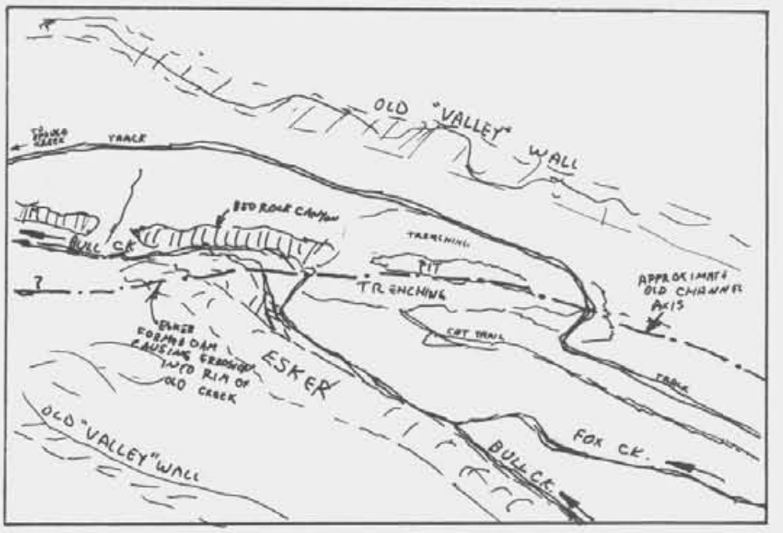

Figure 51, overlay.

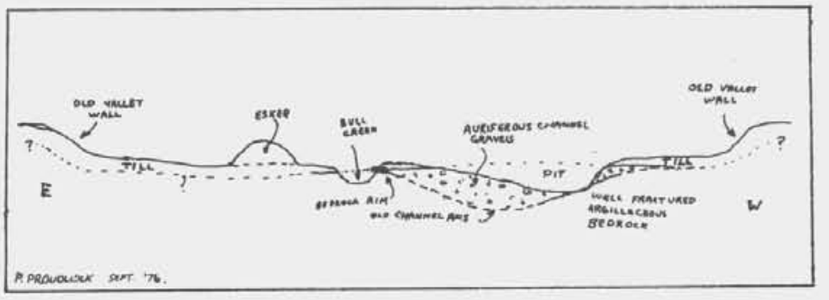

Figure 52

Schematic section through Bull Ck. and pit.

O'DONNEL RIVER

No placer mining was done on the O'Donnel River in 1976. Some work had been done to the west of where the road comes down to the river (see figures 53-55). The bank had been dug into and sluiced. Tailings from the last and possibly previous operations have been allowed to spread out on the river terrace - an old head frame and water wheel have been half buried. In the north bank closer to the road there are a number of adits: three levels, one directly above the other. An old boarded over shaft was found near the river as well.

Slumping along the banks has covered exposures for stratigraphic sections. No gold was found in a few pans along the bank. We attempted to get up Wilson Creek to claims on it, but the road is now impassable through muskeg. No recent placer work has apparently been done on the creek, however.

SNAKE CREEK

Snake Creek is a small mountain stream flowing roughly parallel to Otter Creek, but which flows into Pine Creek. Bill Weigler has a claim he has been working by hand (figures 56-59). No gold has been previously reported recovered from this creek, although some remnantx of old mining equipment were seen. Bill has been digging into the east bank where a clayey till covers six to eight feet of channel gravels in three layers - all auriferous. The bedrock is a fractured slate, with gold in fractures. A small test pit in the west bank produced some gold.

OTTER CREEK

No current mining was done on Otter Creek (figures 60-63). A 4X4 road goes up on the east side of Otter Creek, about halfway, to an old earth fill dam on a wide, low gradient section. The dam, which once

Figure 53

O'Donnell R., adit into north bank. Three adit levels were seen in the bank, which had also been hydraulicked at one time; old channel gravels are probably 15-20' thick.

Figure 54

O'Donnell R., looking northwest to an old (?) shaft, situated 100-200 yards from bank, and a similar distance from the river.

Figure 55

O'Donnell R.; old pipehead box above north bank, about half a mile west of the workings.

Photos: P. Proudlock, Aug. 8/76.

Figure 56

Bill Weigler's claim on Snake Creek, south of Surprise Lk. Hand pit in northeast bank shown. Good colour is obtained in the overlying gravels, plus in the fractured shale bedrock.

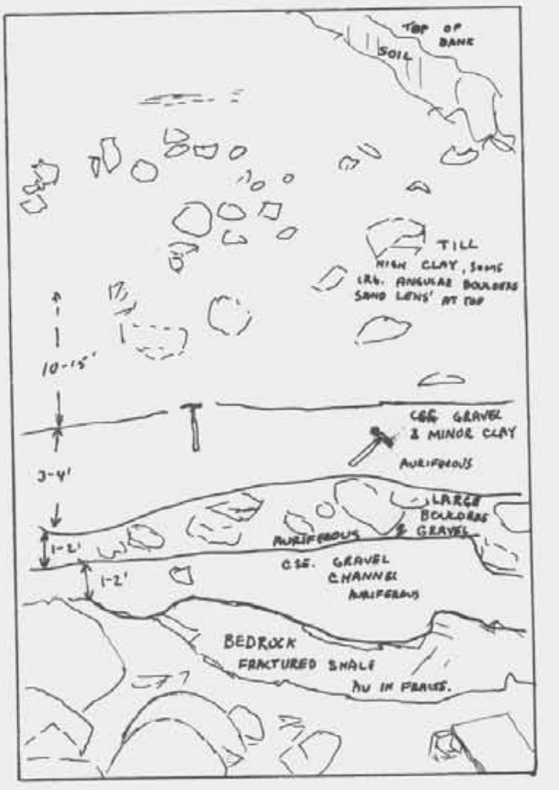

Figure 56, overlay.

Figure 57

Detail of auriferous channel and bedrock contact in Weigler's northeast bank pit.

Photos: P. Proudlock, Aug. 14/76.

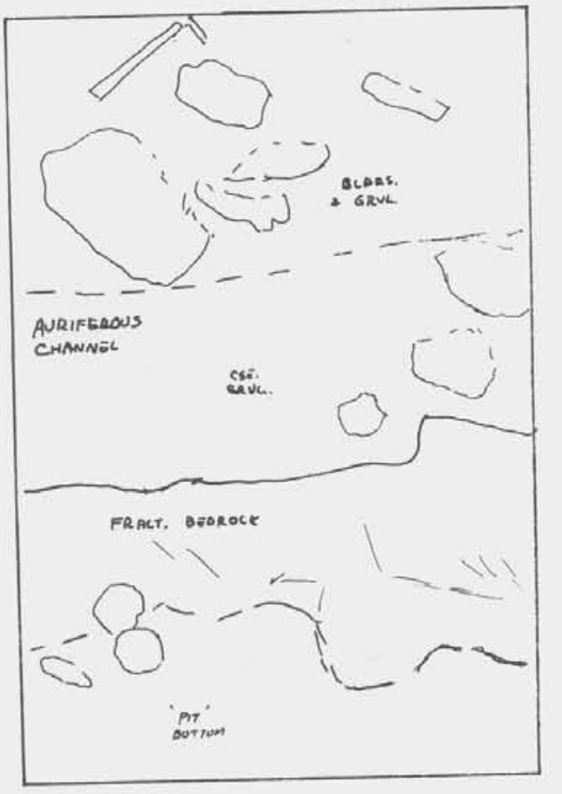

Figure 57, overlay.

Figure 58

Bill Weigler on his Snake Ck. claim, showing hand pit in southwest bank of creek and the sluice box.

Photo: P. Proudlock, Aug. 14/76.

Figure 59

Looking north to Surprise Lake and Ruby Mountain from Snake Ck.

Photo: P. Proudlock, Aug. 14/76.

Figure 60

Otter Ck., east of Atlin. Broken earth dam on upper creek once supplied hydraulicking on lower creek. Water was also diverted to this man-made lake from Snake, Wright, Casino and Union Cks. Surrounding area is fairly well glaciated. Aug. 12/76.

supplied water for extensive hydraulic mining on lower Otter Creek has now been washed out in the middle. Since there was often a shortage of water, a long aquaduct was constructed from Union and Casino Creeks across Wright Creek to Otter Creek. Remnants may still be seen in many places. Water may also have been brought from Snake Creek. Lower on Otter Creek where the extensive hydraulic mining was, high cliffs of gravel have been left. A thick cover of till and cross bedded and stratified glaciofluvial gravels cover clayey channel deposits. Bedrock is greenstone. Our panning produced no colour on the west side of the creek, though enough good gold must have been present to warrant the extensive hydraulicing which produced a large fan delta of tailings well out into Surprise Lake. Recent sluicing had been done, perhaps in 1975, on an old channel between Otter and Wright Creeks (see figure 63). Piles of tailings are present; also a large sluice and monitor. A pipe line is installed to Otter Creek and some equipment is still on the site. We were unable to view a decent section due to extensive workings and some slumping covering possible exposures.

WRIGHT CREEK

Lower Wright Creek does not appear to have been extensively mined. An old shaft, sunk in the 1930's at a widening in the creek valley probably was not successful in recovering much gold as little tailings are present. Higher up, the valley is "V" shaped and not well glaciated. Some minor cat work and sluicing had been done a few years ago (figures 64 & 65).

BIRCH CREEK

Birch Creek is the most active placer creek in the Atlin camp, and flows into the north side of Pine Creek. The first active claim on Birch Creek is Norm Bentley's (figures 66-70). A number of old

Figure 61

Lower part of Otter Ck., eastern hydraulicked bank. Greenstone bedrock is exposed with very clayey auriferous (?) channel deposits overlying; these were protected by the stratified and cross-bedded glacio-fluvial sands and gravels, which in turn are blanketed by till (and perhaps later glacial outwash). Our panning produced no colour.

Photo: P. Proudlock, Aug 12/76.

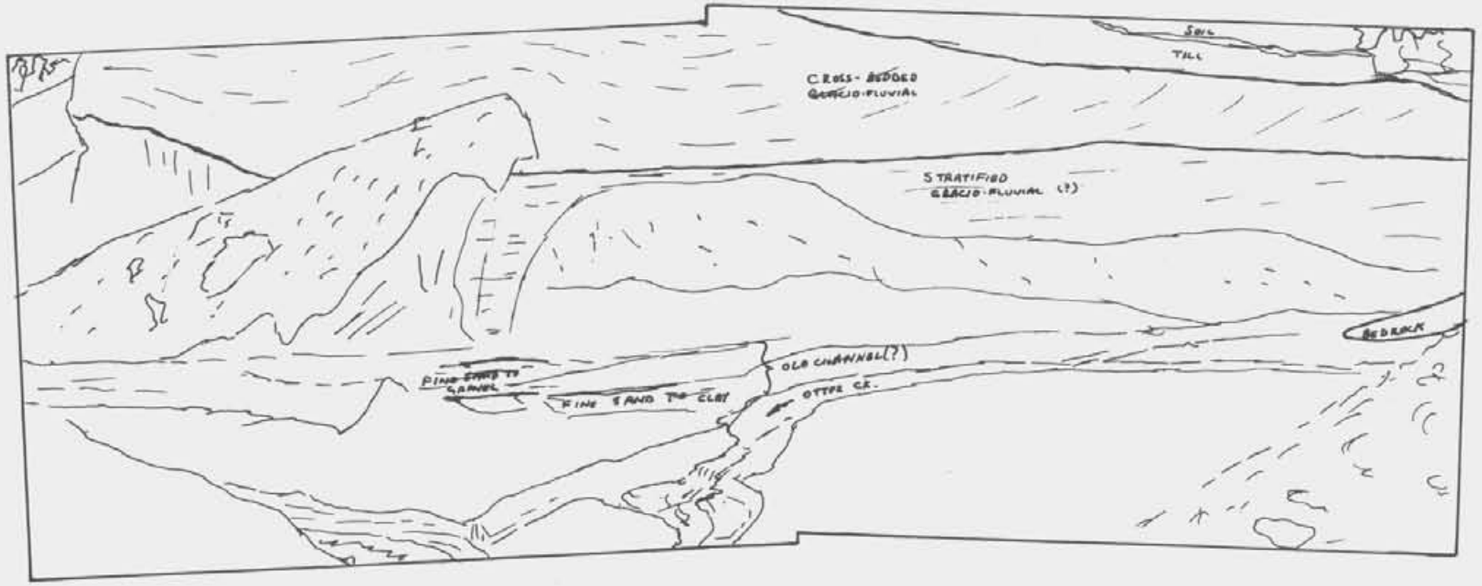

Figure 61, overlay.

Figure 62

Otter Ck. delta into the western end of Surprise Lake, looking east. Present delta is made up entirely of hydraulicked tailings.

Figure 63

Old Otter Ck. channel excavated midway between two present stream beds. Operation here, as recent as one year old, was mechanical, using a monitor pit and cat; the monitor had been washing part of the cliff.

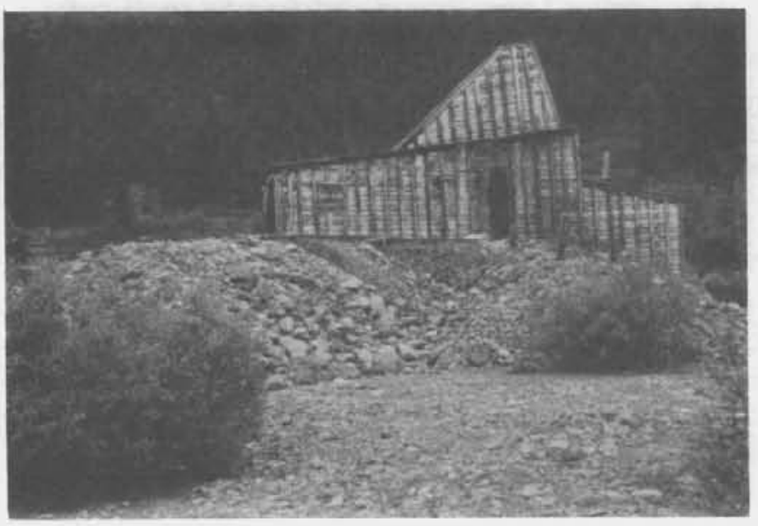

Figure 64

Old shaft, sunk during '30's, on Wright Ck. at point where creek widens. There was ice in the shaft, approximately forty feet down.

Figure 65

Looking up from forks on Wright Ck.; dragline piles on left. Valley is distinctly V-shaped, not nearly as well glaciated as Otter Ck. valley.

Photos: P. Proudlock, Aug. 12/76.

Figure 66

Norm Bentley's claim on lower Birch Ck. The old channel lies in the west bank, about ten feet up above the present creek channel. This test pit exposes four feet plus of unconsolidated gravel that hardens towards the bottom of the pit, and bedrock. Good gold is found in the gravel and in fractured bedrock.

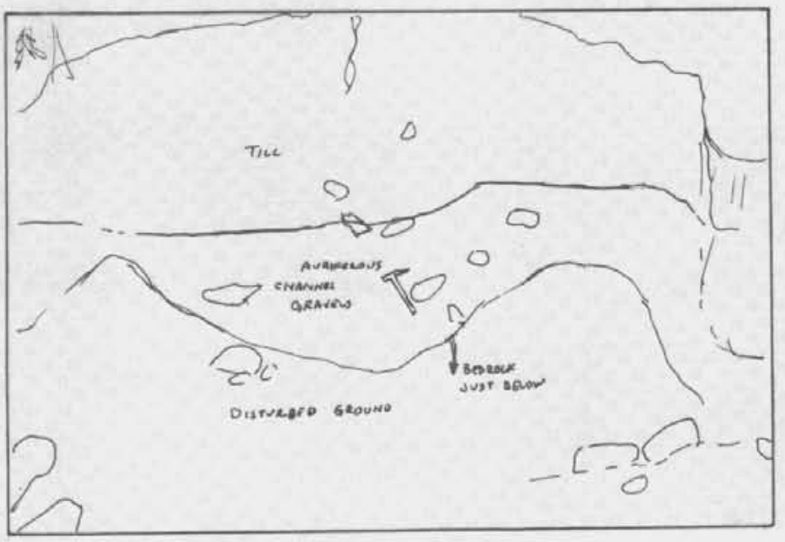

Figure 66, overlay.

Figure 67

Detail of Norm Bentley's west bank test pit on Birch Creek.

Photos: P. Proudlock, Aug. 11/76.

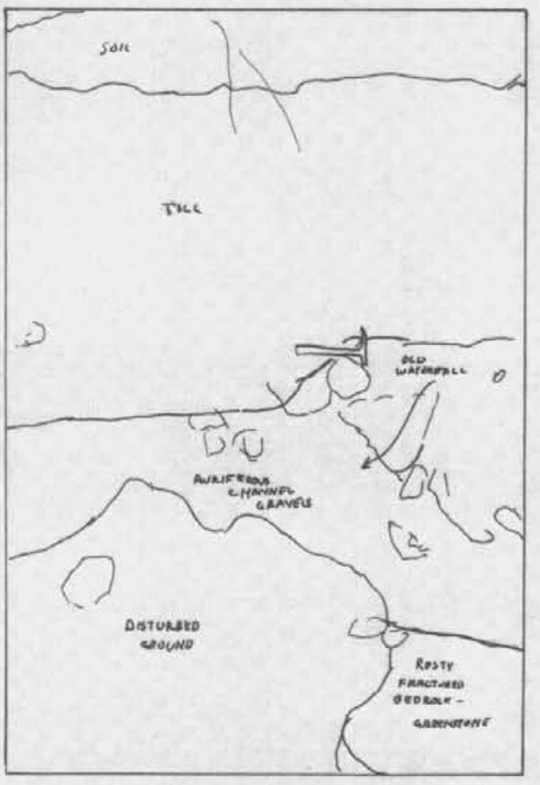

Figure 67, overlay.

Figure 68

Norm Bentley, lower Birch Creek. Same west bank as in Figs. 66, 67, after new road was dozed in, and bank was stripped to expose channel gravels. Hammer handle is about 2½ feet long. Aug. 22/76.

Figure 69

Norm Bentley, lower Birch Ck. Old workings on east bank; hand piled boulders from drifts.

Photo: P. Proudlock, Aug. 11/76.

Figure 70

Norm Bentley's house and garden on Birch Ck. road, up above claim. Best garden around, on southerly facing slope and watered by a small spring. Aug. 11/76.

workings and adits into the east bank of the creek are present. Norm is now working a small channel well in the west bank using a combination backhoe-loader and sluice. He contracts out any heavy stripping. He has uncovered this small channel in a number of places along the creek and has recovered good gold. Since only one side of the channel has been exposed it is not known how wide it is, and since exposure is along a steep creek bank the depth of till cover is not known. Bedrock is a rusty, fractured greenstone which has gold in the fractures; it slopes into the bank indicating that the channel is more extensive than so far exposed.

Above Bentley's is Joe Holtzer's claim, operated by himself and his wife, with one man sometimes hired (see figures 71-75). Although the heavy stripping is contracted, Joe does most of his own work with a small loader equipped with a ripper. Bedrock is faulted and broken marble/limestone and argillite. Faulting, which is near vertical and trending parallel to the creek, predates placer deposition as no gold was recovered from gouge. The channel gravels here are largely centrally located in the creek bottom, although gold recovery has been sporadic with the best gold recovered against the east bank. Joe mentioned that the gold that comes from the limestone is very clean - "It looks like it's just been minted". Joe has also been recovering a lot of mercury with the gold, as have others on the creek. This may be from early placer operations where it was used in the sluice for recovering fine gold, although there is the possibility that cinnabar is present.

Irvine Haines operation, next up the creek (see figures 76-78) is a larger one, running a dragline and cat loader. He has been removing a wide strip along the west bank. Till, varying from four to ten feet thick caps six feet of channel gravels with discontinuous layers of clay which rest on very fractured, rusty bedrock. Pyrite is fairly abundant. Bedrock has been ripped six to eight feet with good gold values recovered.

Figure 71

Joe Holtzer's claim, situated upstream from Norm Bentley, Birch Ck. Wall of pit on east side of creek, up on rim of old channel, showing argillites conformably over limestone, dipping steeply into bank.

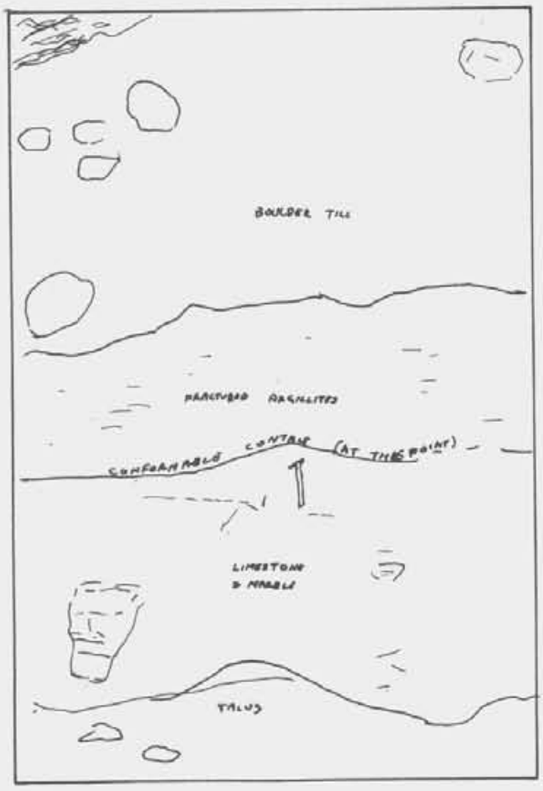

Figure 71, overlay.

Figure 72

Joe Holtzer, Birch Ck. Detail of gouge in a fault (135°/80°NE). Some quartz rodding noted.

Photos: P. Proudlock, Aug. 11/76.

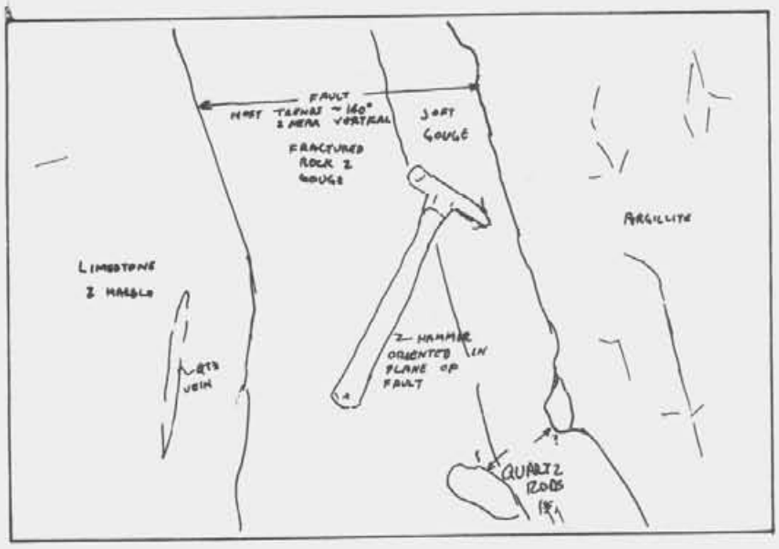

Figure 72, overlay.

Figure 73

Joe Holtzer, Birch Ck. View looking north. Joe Holtzer operating loader, Orst Curniski in yellow slickers by sluice, and a friend of Joe's in the sweater. Pit into marble and argillite bedrock behind.

Photo: P. Proudlock, Aug. 11/76.

Figure 74

Closer view of hillock to left of pit in Fig. 73. Till overlies the channel gravel, which rest on top of argillites and limestone. The best gold comes from gravels nearest the bedrock, plus the bedrock itself.

Photo: P. Proudlock, Aug. 17/76.

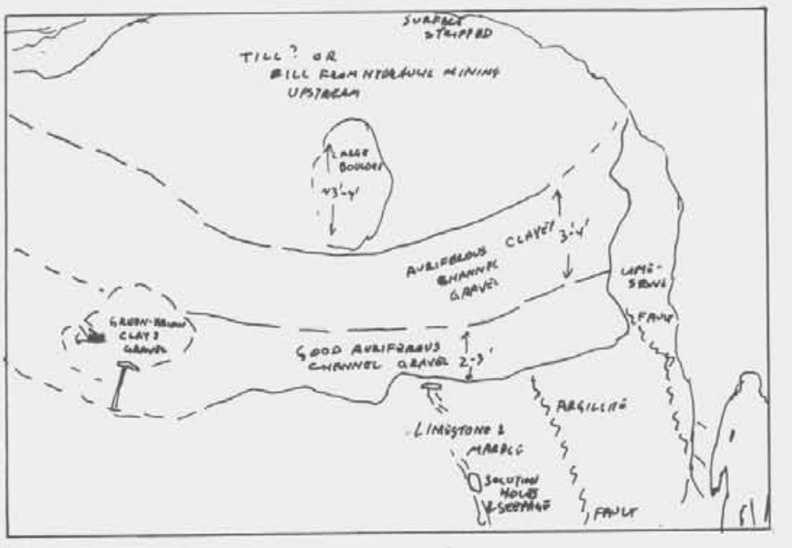

Figure 74, overlay.

Figure 75

Detail of H_2O solution cavity in marble near base of hillock, Joe Holtzer's claim. Marble impurities leave brittle black web throughout cavity. Argillite is faulted.

Photo: P. Proudlock, Aug. 17/76.

Figure 76

North view of Irvin Haines property, upstream from Joe Holtzer, Birch Ck. Loader works from west bank of creek, feeding into a spring-mounted grizzly over the sluice. Here, the dragline is clearing and piling the tailings from the mouth of the sluice. Stripping and bank cutting are done by the cat.

Figure 77

Section of west bank of Birch Ck., slightly downstream from Irvin Haines dragline and sluice. Auriferous channel gravels rest on a fractured bedrock. A glacial clay layer with a gravel lens is seen above the channel.

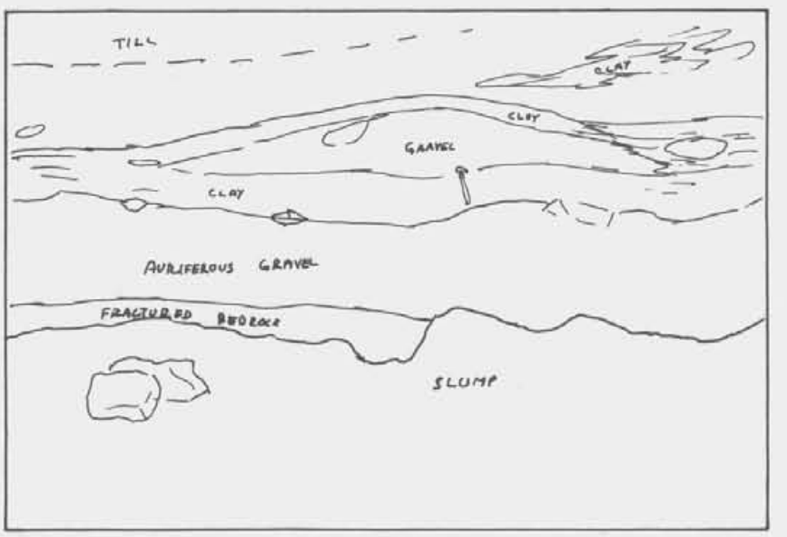

Figure 77, overlay.

Figure 78

Irvin Haines'property, Birch Ck.; view of west pit wall. Channel gravels and about six feet of bedrock have been stripped and sluiced. The bedrock is pyrite-rich and very fractured, with good gold well into the fractures.

Photos: P. Proudlock, Aug. 11/76.

Above Haines' is Lawrence Goulding's claim. Little work was done the claim in 1976, as his cat was often on contract, but gold has been recovered from the creek bottom in the past. The claim is situated on the bend in Birch Creek, at a fork with an unnamed creek. A pit on the first claim up the unnamed creek owned by Miles Carrey, reportedly shows gold as well. Above Goulding are two claims owned by Irvine Haines. The lower of the two was being worked by hand by two brothers, Paul and Max Fricker, to prove it out for Haines. Some gold was being recovered from small channels in the creek bottom. Some evidence of old workings was seen. About half a claim above Haines is a claim owned by John Dobrovitz Sr. (see figure 79). During 1976, he packed materials for small cabin on his claim from the end of the road at Gouldings, about a mile and a half. The claim is located near the head of Birch Creek in the bottom of a cirque and is heavily glaciated. John has been doing a lot of hand sluicing from a number of test pits along the creek, but gravel is almost non-existent and mostly talus has been sluiced. Only pyrite has been recovered. Bedrock is heavily fractured and pyritized greenstone and argillite. It would appear that placer gold will not be found on Birch Creek above Haines' middle claim and certainly not above his upper claim.

BOULDER CREEK

Boulder Creek flows into the north side of Surprise Lake at the east end. The lower part has been mined hydraulically and a large wooden dam built to provide water can be seen on upper Boulder Creek. Only one claim on Boulder, owned by Ted Coe, has seen any recent activity, a hand operation in the creek bottom. Two tungsten showings are known in the cirques of upper Boulder Creek.

RUBY CREEK

Ruby Creek flows around Ruby Mountain, a Recent volcano, and south into Surprise Lake (figures 81-89). On lower Ruby Creek, a claim owned by Andrew Savoy was last worked in 1975. Two sets of workings are present; one a monitor used to work creek gravels, and the second, an inclined shaft into channel gravels beneath cliffs of Recent columnar basalt. Some sources say a till is also present beneath the flows, but we were able to document only that unconsolidated gravel of unknown origin is present (see figures 86-89). Intrusive bedrock in the creek bottom is seen just downstream from the workings. The creek has had some earlier hydraulic mining below this point. The inclined shaft also dates back a few years and the shaft house encloses a water wheel which once powered the hoist. Two claim lengths above Savoy's is an old shaft (figure 85), on a claim owned by J.E. Wallis, but no recent mining appears to have been done. The headframe houses one large water wheel which powered the hoist, pump and inclined tailings dump, while another smaller wheel powered a ventilation blower. The tailings consist mainly of orange granitic intrusive, but the shaft reputedly encountered channel gravels beneath basalt flows and resting on the intrusive.

NOTE: Dr. M. Miller indicated that the whole rock K/Ar age date of this thick multiple flow on Ruby Creek is at least 100,000 B.P. It has not been possible to date the underlying boulder till and auriferous gravels as yet.

Ruby Creek has derived its name from the fact that small gem quality rubies were recovered from the auriferous gravels under the flow along with abundant micrometeorites, and a variety of other heavy minerals. The source of the rubies has not been found and no other creek has been known to produce the gem.

Figure 79

John Dobrovitz walking along south bank of upper Birch Ck. Creek has very little gravel; heavy cirque glaciation is in evidence. No gold but plenty of pyrite is being recovered from the fractured and weathered surface of argillites and greenstone. He has been hand sluicing from small test pits along the creek.

Aug. 15/76

Figure 80

Large wooden dam near top of Boulder Ck. View of downstream side, looking northeast. Dam was built to provide water for early hydraulic mining.

Aug. 13/76.

Figure 81

Looking southeast at upstream side of wooden dam on Boulder Ck.

Aug. 13/76.

Figure 82

Looking northeast across Ruby Ck. at a small cinder cone in Cracker Ck. Pass, opposite Ruby Mtn. Assymmetry is due to prevailing westerly winds at time of eruption

Aug. 27/76.

Photos: P. Proudlock.

Figure 83

Ruby Mountain, a volcano east of Atlin, north of Surprise Lake and west of Ruby Ck. Looking west up a large slide from the southeast side of the peak, one of the sources of the brown scoria which blankets Ruby Ck. and the nearby columnar basalt flows.

Aug. 27/76.

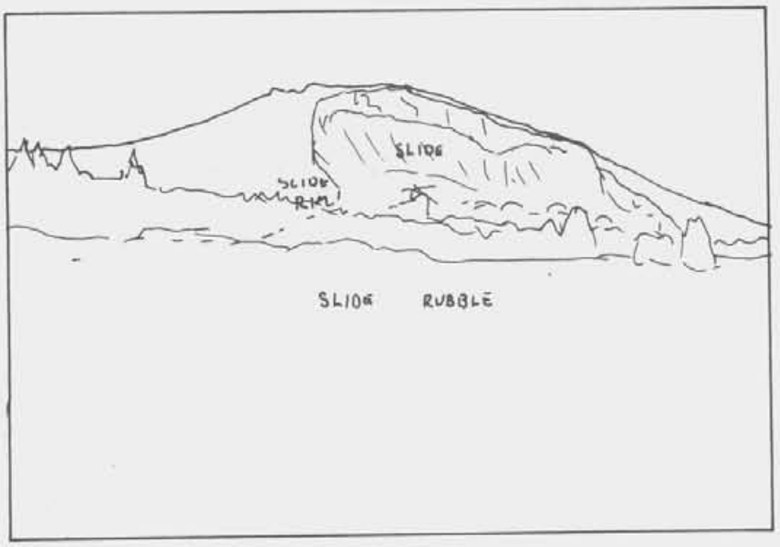

Figure 83, overlay.

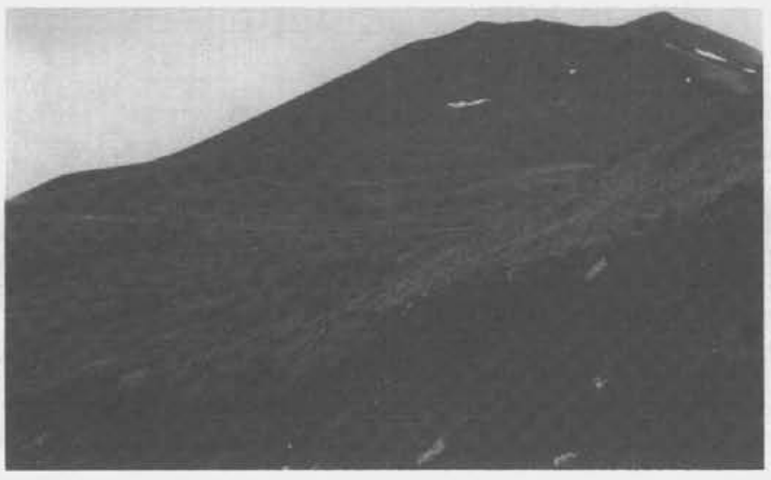

Figure 84

Ruby Mountain, near the Adanac molybdenum property. View looking south across a slide on the northeasterly side of the peak. Levies on the side of the slide are distinct. Scoria here is mostly jet black, and red.

Aug. 7/76.

Photos: P. Proudlock.

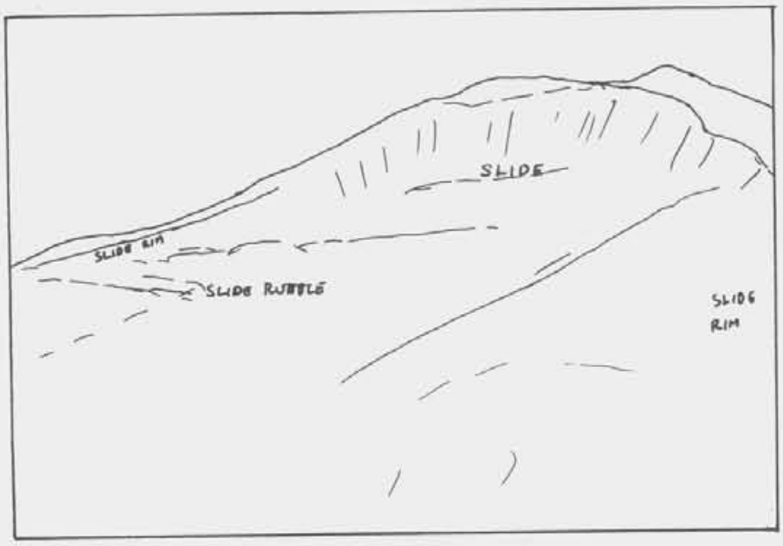

Figure 84,overlay.

Figure 85

Old shaft for underground workings on Ruby Ck. Shaft penetrated the intrusives which lay beneath the columnar basalt flows. Flows reputedly covered a layer of gold-bearing gravel, which lay on the intrusives(?). Aug. 7/76.

Figure 86, overlay, below.

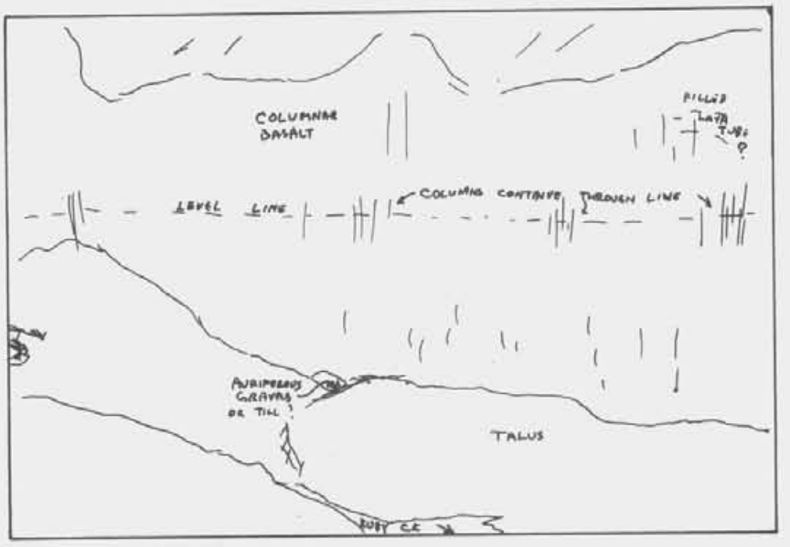

Figure 86

Columnar basalt in Ruby Ck., forming east bank. Origin of level line unknown; columns are seen to be continuous across the line. The base of the flow is near the center of the photo, at the column-talus line, where it overlies till(?).

Aug. 27/76.

Photos: P. Proudlock.

Figure 87

Columnar basalt cliffs, on Ruby Ck., and the monitor for working the gold-bearing channel gravels plus till which reportedly lie beneath the flow. Base of flow visible at bottom right of photo.

Figure 88

Detail of base of flow. Large granodiorite(?) boulder at right from either a boulder till(?) or channel gravel. Some gold was panned from cavity at left. Exfoliation on top of boulder is due to weakening caused by the heat of the flow. Talus in foreground is fallen basalt columns.

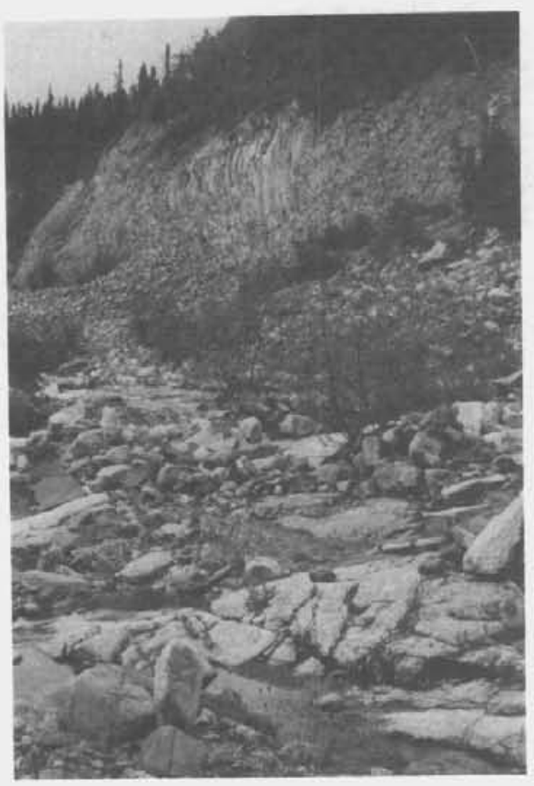

Figure 89

Looking north up Ruby Ck. from just below workings. The stream flows over intrusive bedrock, with gravels and till(?) at its margins, covered with columnar basalt. The boulder in Fig. 88 is possibly a scoured chunk of this bedrock, deposited in auriferous channel gravels and not necessarily a till, as other sources note.

Photos: P. Proudlock, Aug. 20/76.

MICROMETEORITES

Pinhead sized meteorites, are found in many of the Atlin placers. These fragments are related to a shower across the southern Yukon and northern British Columbia into Alberta. They were originally discovered in 1954 by E.W. Grove who was conducting a detailed mineralogical study of the heavy minerals in the Atlin placers. Mostly they are stoney meteorites, though some are iron magnetic, and the occasional glassy one was seen. Probably, they are in all the area's placers, but they have been definitely recovered on Ruby, Birch, Goldrun, Lower Spruce and McKee Creeks.

GLACIOLOGY

Appendix 2 is a chart of glacial advances in northwest British Columbia, Yukon and southeast Alaska, as well as central and western North America[5]. It shows three distinct intraglacial periods in the Atlin area.

The following glacial history of the Atlin area is abstracted from James Hugh Anderson's PhD thesis[6]. His data was gathered from bogs in the area.

Zone IX: 11,000-10,500 years B.P.; shrub tundra, cooler/drier, still stand at late Wisconsin maximum. Jake's corner area free from ice miles 16, 47, 52 (Atlin Road) covered; Wilson and Jasper Creeks exposed; ice in Atlin Valley to 3000 feet thick - 800 feet above lake level, and terminus near north end of lake. Represents last 500 years of Wisconsinan Age of Pleistocene Epoc in Atlin area.

Zone VIII: 10,500 (Holocen boundary)-10,000 B.P.; spruce woodland, *cool/dry, retreat. Terminus of glacier retreated* 10-15 miles south.

Zone VII: 10,000-9,000 years B.P.; shrub tundra, cooler/drier, still stand. Standstill of retreat or perhaps a slight re-advance; the large kame terrace lying along the valley side between Little Atlin and Atlin Lakes provice a clue for this interpretation.

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[5] M.M. Miller; reprint from: Mountain and Glacier Terrain Study and Related Investigations in the Juneau Icefield Region, Alaska-Canada; Foundation for Glacier and Environmental Research, Pacific Science Center, Seattle, Washington, 1975.

[6] James Hugh Anderson; A Geobotanical Study in the Atlin Region, Northwestern B.C., and South Central Yukon Territory; PhD Thesis, Michigan State Univeristy, 1970, Abstract and pp. 310-317.

Zone VI: 9,000-8,000 years B.P.; spruce woodland, cool/dry, intermittent retreat. Closely spaces recessional moraines near northern end of Atlin Lake; Mile 47 and 52 first exposed; Mile 16 site probably exposed but large ice block not melted to create kettle; Mile 47 close to edge of glacier terminus 20-25 miles north.

Zone V: 8,000-5,500 years B.P.; spruce forest, warm/wet; general retreat Temperatures near present level; marks beginning of thermal maximum-lasted about 5,000 years; 11"-12" per year precipitation; terminus oscillated but by end of period may have reached a point near the present Llewelyn Glacier terminus.

Zone IV: 5,500-3,250 years B.P.; spruce forest with alder, warmer/wetter, maximum retreat. Holocene temperatures and precipitation attained maximum; mean July temperatures as high 56°F and precipitation several inches higher than now; glaciers shrunk to post-Wisconsinan minimum; main Atlin Valley glacier shrunk well within present Valley of Llewelyn; ultimate retreat that began 7,000 years earlier (IX time).

Zone III: 3,250-2,500 years B.P.; spruce forest with fir, a warm/wet. High precipitation; mean July temperatures 54°F (same as present); represents end of thermal maximum; less storminess, therefore less precipitation during growing season.

Zone II: 2,500-750 years B.P.; spruce forest with pine, cool/dry, Neoglacial advances. Forest fires in dry pine forests; out of phase with Alaskan coast.

Zone I: 750-0 years B.P.; spruce forest with pine, warm/wet, minor retreat. General minor warming trend up to the temperatures of the past several hundred years.

Although Anderson's study covers only the last 11,000 years and postdates the majority, if not all, of the Atlin placers, it does provide a background for studying the tills of the area and may be of help in understanding any reworking of the placers during this period.

As shown by Miller's[7] and by Anderson's work, the Jasper Creek Bog (near the mouth of the O'Donnel River) has maximum dates $\geq$ 11,000 years B.P., and the Mile 16 Bog (near Snafu Creek, Y.T.) dates 8,000 years B.P. Miller concluded that $\leq$ 9,500 years B.P. most of the Atlin Valley was deglaciated. More specifically in McKee Creek three tills are exposed while in Spruce, Pine and Boulder Creeks two tills are well exposed. The second oldest till, which is basal in Pine

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[7] M.M. Miller; Alaska Glacier Commemorative Project, Phase IV: Pleistocene Sequences in the Alaska-Canada Boundary Range; Nat. Geog. Soc., Research Reports - 1967 Projects, 1967, pp. 204-207.

and Boulder, intermediate in McKee, is much more altered by weathering than the lowest till-like member of the Gastineau Formation[8]. Miller correlates the upper McKee Creek till with the Lower Gastineau and found a genetic relation between the lower Pine and Boulder Creeks deposits and oxidized high level moraines above timberline. A correlation is also found with the two-fold kame/moraine complexes on intermediate and upper McKee and Fourth of July Creeks. We would suggest this would probably also apply to upper Spruce Creek as pictures in figures 47 and 48. Upper ice existed as recently as 8,000 B.P. as shown by carbon 14 dating in the esker complexes, and most of the lower ice did not melt much prior to 10,000 years B.P. On the coast of Southeastern Alaska[9], opposite the Atlin area, the uppermost till, an indurated blue grey boulder clay diamicton is situated on top of the Gastineau Channel Formation; this rests on an older till, a diamicton with zones of colluvium and glaciofluvial facies and is mild weathering and not well sorted. Perhaps part of this lower period would correspond to the glaciofluvial deposits on McKee Creek.

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[8]Miller; 1975, pp. 128-129.

[9]M.M. Miller, et al.; Manual of Glaciology and the Sciences of Arctic Mountain Environments; Glaciological and Arctic Sciences Institute., University of Idaho, not dated, from chapter: Quarternary Erosional and Stratigraphic Sequences in the Alaska-Canada Boundary Range, not dated.

*** M I N E R A L D E P O S I T S ***

ADANAC MOLYBDENUM

The Adanac molybdenum property is located on upper Ruby Creek between Ruby Mountain and Mount Leonard. Access to the property is by a good road up the west side of Ruby Creek. Low grade molybdenum is disseminated as a porphyry in a granitic intrusive. About three stages (?) of intrusive are present ranging from fine to coarse grained. The rock is pinkish to orangeish coloured and is probably a monzonite to quartz monzonite. Very little molybdenum mineralization can be found in place. Some was found below Ruby Lake and also just above South Ruby Creek across from the test mill. A pyrite halo probably exists, though from the cirque only bright pyrite gossan zones are seen above the property. A camp and a good sized test mill, still in fairly good condition are situated on the property at about 4,500-5,000 feet on South Ruby Creek. The visit to the property was to record it by photos for the Ministry - these are included as figures 90-94.

JOHNS MANVILLE"S LINE LAKE PROPERTY

A helicopter was chartered for one day to visit Canadian Johns Manville's Line Lake Property, about 30 miles (50 kilometres) east of Atlin, and other showings in the area (see figures 95-98). The helicopter was also used to visit Bull Creek.

The Line Lake Property (the name is arbitrary), is on the northeast flank of a group of claims on Mount Sanford, east of Line Lake. The showing is near the 4,500 to 5,000 foot level in a small, steep creek cut, and the southerly of two creeks flowing westerly out of a small cirque. When we arrived a three man crew was conducting magnetometer and I.P. surveys on a grid over the showing, and preparing

Figure 90

Adanac molybdenum property, east of Atlin on Ruby Ck. Looking N70°E down the pass over the claim group. Test mill for bulk moly samples in the distance, with camp beyond that.

Figure 91

Adanac molybdenum property, Ruby Ck. Mount Leonard in background, looking S80°W across Ruby Lake, located just above mill.

Figure 92

Adanac molybdenum, Ruby Ck. Looking S10°E from above mill at a gossan stain in cirque. Boulder Ck. and a tungsten property are just over the peak.

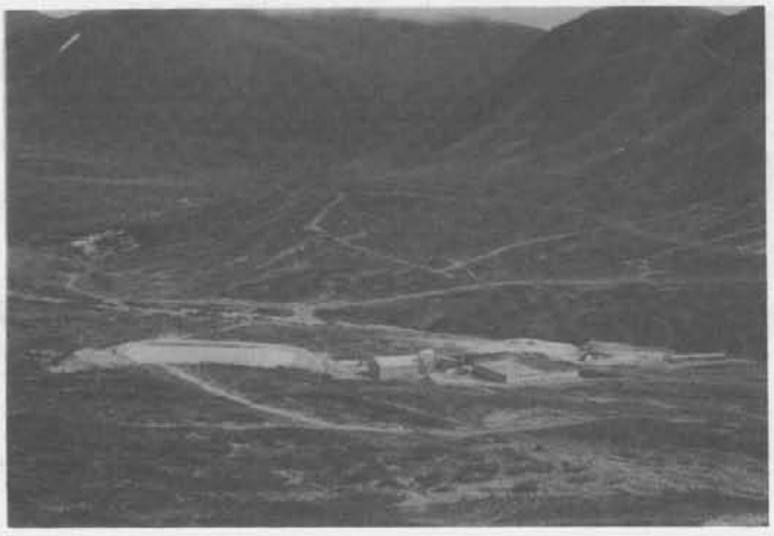

Figure 93

Adanac molybdenum, Ruby Ck. Test mill in lower center, camp at left; looking east. Ruby Ck. flows from right to left, then curves around mountain back to right.

Photos: P. Proudlock, Aug. 23/76.

Figure 94

Panorama of Adanac molybdenum property; angle of view about 130°, taken from road into property. Black "paving" on roads is scoria from slide on Ruby Mtn. (fig. 84). Mt. Leonard is situated directly above mill in photo.

Photo: P. Proudlock, Aug. 27/76.

Figure 95

Looking northeast over Ruby Ck. to Cracker Ck. valley from helicopter.

Figure 96

Trench in granitic intrusives on south side of Cracker Ck., north of Surprise Lk. Mineralization is reportedly uranium; this was not tested.

Figure 97

Recessional moraine at northeast end of Surprise Lk. View from helicopter looking south.

Photos: P. Proudlock, Aug. 25/76.

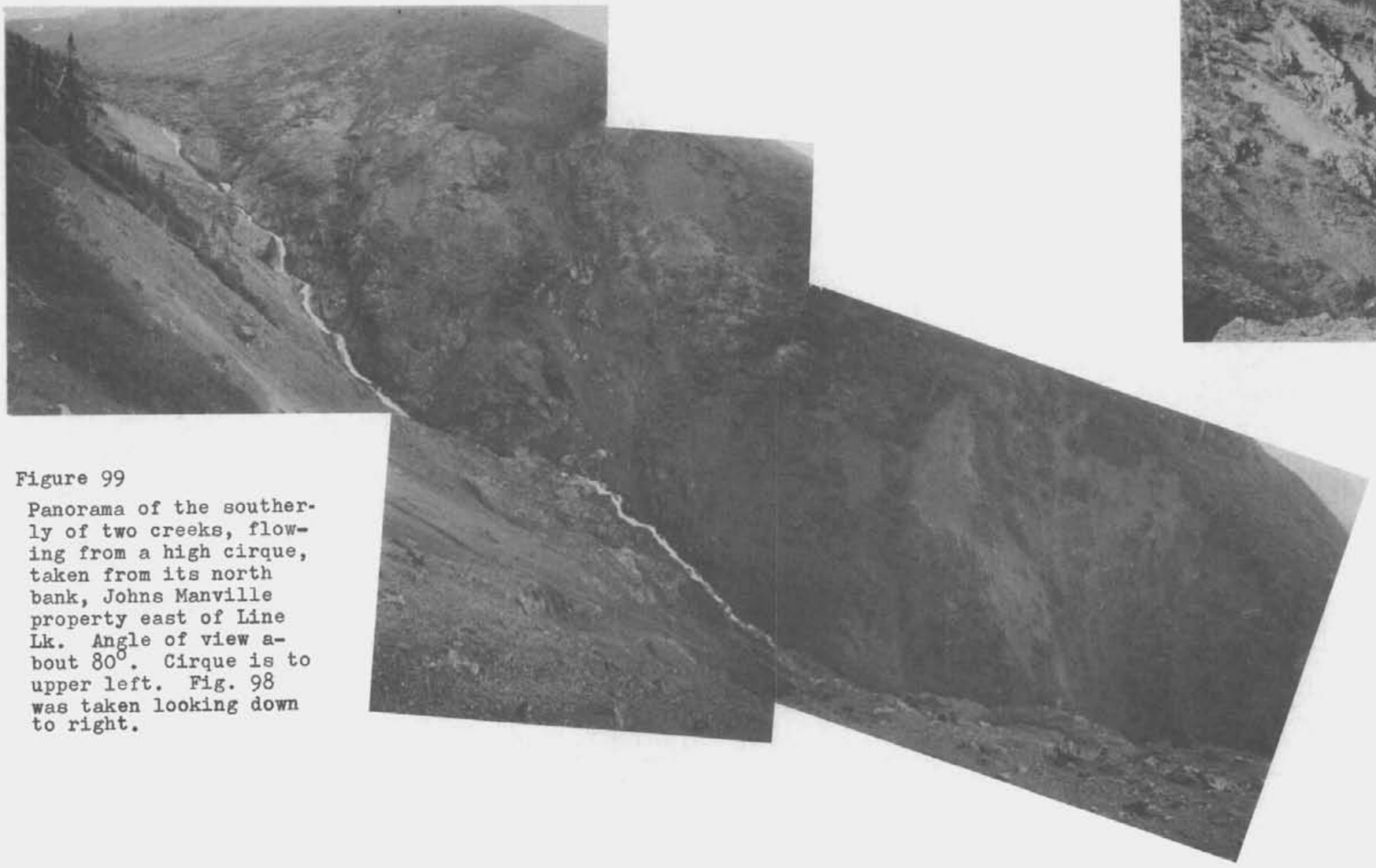

Figure 99

Panorama of the southerly of two creeks, flowing from a high cirque, taken from its north bank, Johns Manville property east of Line Lk. Angle of view about 80°. Cirque is to upper left. Fig. 98 was taken looking down to right.

Figure 98, above.

Johns Manville property east of Line Lk., along the Gladys River chain of lakes. View looking down south creek to the showing situated in photo center. Abundant pyrite, some arsenopyrite, and possibly chalcopyrite, bornite, and chalcocite.

Photos: P. Proudlock, Aug. 25/76.

detailed geological maps. In talking with the crew it was learned that the magnetometer readings ranged from a minimum of 700 to a maximum of 800. There is common copper mineralization and assays apparently show 0.1% tin in limestone. The rock at the showing is mainly a grey chert with limestone. Arsenopyrite is abundant being disseminated through the chert. There are zones of pyrite staining in the creek cut. The main showing consists of heavy metallic nodules in grey chert, which certain pyrite, arsenopyrite and probably both chalcopyrite and bornite. The rock is well fractured and small fault zones 6" to 12" thick were seen.

Pyrite was noted on the south side of Mount Weir, at the 5,600 foot level, and on the north side of Mount Edmund, east of Consolation Creek at about the 5,000 foot level. Trenching east of headwaters of Cracker Creek in coarse grained granitic intrusive was done apparently for uranium but no mineralization was noted. A small trench at the 4,400 foot level between Birch and Boulder Creeks may be the gold occurence shown on Black's map.

ATLIN SILVER

We visited Atlin Silver, up Fourth of July Creek (see figures 100-106), and were given a tour of the new mill by manager, Gene Larabie and met president, Claud Dancy. The mill, with a capacity of 100 tons of ore per day was scheduled to go into full production the following week at 50 tons per day. A few test runs had been put through the mill to locate and fix any 'bugs'. Run of the mill ore was 18 ounces per ton silver with assays up to 50 ounces per ton. The zinc concentrate made is 40% to 50% zinc with 2% lead and 20-30 ounces per ton silver; the lead concentrate is 50% lead with 150-170 ounces per ton silver, but has 12% to 15% iron as well.

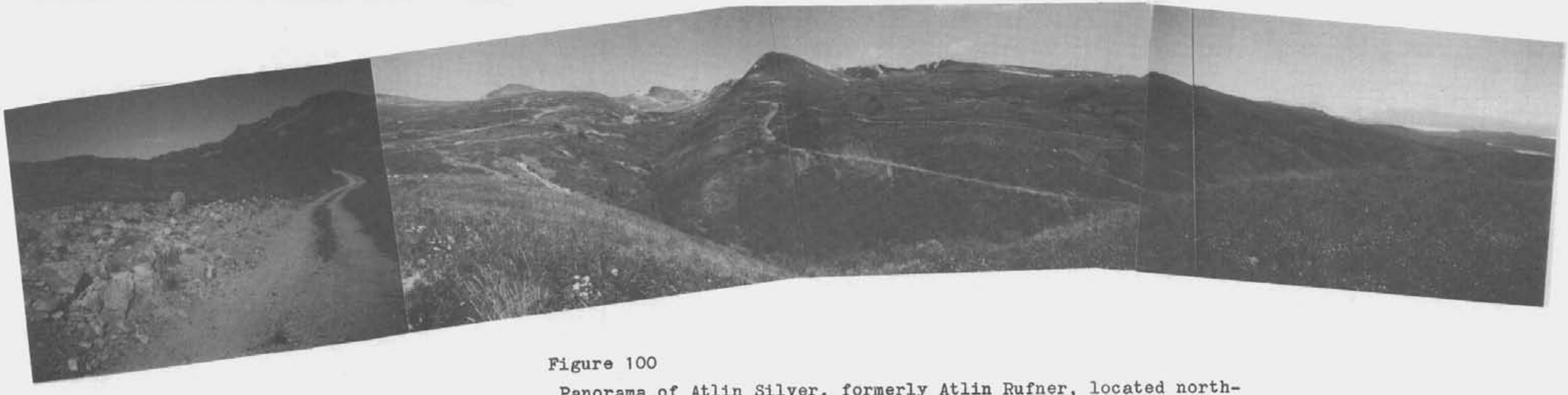

Figure 100

Panorama of Atlin Silver, formerly Atlin Rufner, located north-east of Atlin on the west flank of Mt. Leonard. Angle of view about 240°.

Photo: P. Proudlock, Aug. 17/76.

Figure 101

Atlin Silver, lower of upper two adits visited.

Figure 102

Atlin Silver, northeast of Atlin. Granitic wall rock and lamphyre dyke with galena-quartz stringers and some sphalerite in the upper of the two adits.

Figure 103

Atlin Silver, northeast of Atlin. Trenching and draw-point at caved, upper adit portal in a high grade vein.

Photos: P. Proudlock, Aug. 17/76.

Figure 104

Chunk of high grade ore in vein at upper adit, Atlin Silver. Stringers of galena, separated by quartz crystal layers with which black sphalerite occurs.

Figure 105

Atlin Silver mill, to run eventually at 500 t.p.d. with a capacity of 1000 t.p.d. Consists of two crushing stages, one grinding stage, plus flotation cells. Two concentrates are produced, lead and zinc, with most of the silver coming out in the lead concentrate.

Figure 106

Atlin Silver coarse ore bin on the hill above the mill. A pan feeder at the bottom leads to a jaw crusher.

Photos: P. Proudlock, Aug. 17/76.

The ore is mainly galena in lamprophyre dykes within granite or granodiorite wallrock. Sphalerite is more common in ore near surface. The ore is in stringers two feet to six feet thick, and some as thin as six inches. The dykes are up to fifty feet wide, but usually ten to twenty feet. Generally ore occurs as a foot wall vein, but sometimes three veins are present, striking 080° and dipping 60° to 85° north. Pyrrhotite, pyrite and arsenopyrite can be as high as 20% to 25% in the ore, accounting for the high iron in the lead concentrate.

Ore was being mined from a caving portal of an upper adit and removed through a drawpoint and out the lower adit at the mill.

*** M I S C E L L A N E O U S ***

CENTERVILLE PLACERS

On the return trip to Vancouver we stopped in at George Zimmick's Centerville Placers just north of Cassiar. Gold recovery from creeks in the Cassiar-McDame area dates back as far as in the Atlin area. George has been recovering gold for a few years, from six to eight feet of old channel gravels resting on bedrock. He uses a cat to scrape the gravel and a foot or so of fractured argillite and slatey bedrock into a pit where he washes it through a sluice with one of two monitors. A scraper removes and piles tailings. George recovers placer jade and the occasional "Alaska black diamond" as well, and turns it into some very beautiful, well made jewelry right at his own place.

CONCLUSIONS AND RECOMMENDATIONS

First it must be stated that with only three weeks of field work in the Atlin Placer Camp it is difficult to make definite conclusions as to depositional history, sources of the placers, extent of the placers, value of the placers or correlation of the placers. Most of the gold in the Atlin Placer Camp is flattened. The flattening may be due to a mechanical similarity of depositional environments, or may be due to a genetic similarity, such as thin fissure veins in the source rocks, thereby affording correlation of the placers to one type of source or even one source altogether. We would favour a regional type of source, perhaps a stockwork in a fracture system. This is a real possibility as Black's map shows a large syncline around the placer area, which is flanked by intrusives to the north and east. Perhaps there are associations with the lode at Dominion, but it seems unlikely

Figure 107

Centerville, B.C., north of Cassiar and a few hundred miles east of Atlin: George Zimmick's placer operation. One of two monitors is seen here on top of old channel gravels, 8-10 feet thick, which rest on fractured shaley bedrock.

Figure 108

Centerville, B.C., sluice and cat; bedrock is seen in foreground.

Photos: P. Proudlock, Aug. 28/76.

that the Dominion lode itself could have been the source for the entire Camp. Where then, are the outcrops of lode gold? Perhaps buried under tills? The questions do outweigh answers. Occasional quartz-gold nuggets are found with very little mechanical flattening and appearing so fresh as to suspect a source very near to the placer. Perhaps glacial history prior to the 60,000 years B.P. date Miller gives to the lower McKee Creek placer gravels or the $\geq$ 100,000 years B.P. date he gives to the Ruby Creek flows would provide a vastly different picture of stream and glacier transport that we see in the present picture. Any evidence of very old mechanisms of transport have been removed by the extensive recent glaciation. It does seem likely, however, that since answers as to where the placers come from have not been forthcoming from the evidence and information we now have from the past 60,000 years, then the placers greatly predate the 60,000 years of the lower McKee channel, and that all we see today are completely reworked placers. This, too, may give a reason for the flatness of the gold but does not explain why some very fresh nuggets are found.

Once some answers as to the sources of the placers have been found, then the extent of the placers beyond those presently known, and also then, the ultimate value might be calculated.

Three possible extentions of channels have been postuated, and perhaps a fourth - all of these lie beneath thick till cover. One, is an extention northerly from the Harvey claims on McKee Creek, into the headwaters of Dominion Creek. Two, is the Little Spruce Creek cutoff extending westerly from the West claim on Spruce, and possibly from the Kyle claim as well, going south of Spruce Creek to join it further down or directly into lower Pine Creek. Three, is the extention of the Goldrun channel being traced westerly from the Klein-Guild claims. Does it curve into the foot of the mountain or back towards Pine Creek and Surprise Lake? The fourth, though so far,

a start sought and not found channel, being a glacial cutoff channel for Pine Creek going westerly from behind Discovery and through the gulch towards Fourth of July Creek. And just to keep things in uncertainty - how about sources to, or further channels from Birch Creek to the low ground northwest of the Creek?

To summarize what we know of the placers: All are well defined channel deposits, all rest on fractured and weathered bedrock, the gold extends a few feet into the bedrock in the fractures, the gold has a high proportion of nuggets, little fines and is flattened, the gravels are a compacted, heterogeneous rounded boulder gravel with a high clay content and are from a few feet to less than ten feet thick, most are capped by a horizon of large boulders, and are covered by glacial deposits of variable thickness.

In making recommendations, about the most sensible statement would be "more work". Some X-ray fluorescence examination of samples of each of the different placers might show up differences that fineness assays do not, and enable "fingerprinting" of each placer, if in fact there is a difference. Completa analyses of the gravels in each placer could be done, so as to identify source rocks and sorting characteristics. Time is also needed to compile all published data and records on the placers; the old timers have a heap of knowledge and trade secrets on the area.

About half a million dollars a year are now being spent on recovering the gold[10], and most of it by individuals who know little geology and who often possess little mining know-how, just to be able to trace their own bit of placer channel. We feel there is sufficient work to be done, and interest in the area to warrant a full field season in the area.

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[10] B.M. Dudas; Report on Placer Mining - 1975, Inspection District 1; Inspector's Report, British Columbia Ministry of Mines and Petroleum Resources, Prince Rupert, 1975.

The scope of this report was to "report on the stratigraphy of the placers". To a major degree it has met this objective, and has provided some documentation of the present active placers. Many of the foregoing comments, however, have been made beyond the scope of the report, but it is felt there is some justification in extending them to make note of additional observations and shortcomings in the field work done. It is hoped that they will be considered with this in mind.

BIBLIOGRAPHY

Aitken, J.D. Map 1082A, Geology, Atlin Cassiar District, B.C., (to accompany Memoir 307). Geological Survey of Canada, Ottawa 1959.

Anderson, J.H. A Geobotanical Study in the Atlin Region, Northwestern B.C., and South-central Yukon Territory. Ph.D. Thesis, Michigan State University, 1970.

Black, J.M. Atlin Placer Camp. File copy report, British Columbia Ministry of Mines and Petroleum Resources, Victoria, 1953.

Dudas, B.M. Report on Placer Mining - 1975, Inspection District 1. Inspector's Report, British Columbia Ministry of Mines and Petroleum Resources, Prince Rupert, 1975.

Miller, M.M. Alaska Glacier Commemorative Project, Phase IV: Pleistocene Sequences in the Alaska-Canada Boundary Range. National Geographic Society, Research Reports - 1967 Projects, Washington, D.C., 1967.

Miller, M.M. et al. Manual of Glaciology and the Sciences of Arctic Mountain Environments. Glaciological and Arctic Sciences Institute, University of Idaho, not dated.

Miller, M.M. Reprint from: Mountain and Glacier Terrain Study and Related Investigations in the Juneau Icefield Region, Alaska-Canada. Foundation for Glacier and Environmental Research, Pacific Science Center, Seattle, Washington, 1975.

(APPENDIX 1)

LIST OF CLAIMS VISITED

O'DONNEL RIVER

1691 J.M. James
1694 J.M. James
1817 J.M. James

BULL CREEK

1775 Roy Smith

McKEE CREEK

1655 John Harvey
1690 John Harvey
1791 John Harvey
1796 John Harvey
1689 Tony Vesnaver
1802 Tony Vesnaver

SPRUCE CREEK

1712 John Harvey
283 Enos Kyle
1609 Enos Kyle (?)
1734 Tony West
1677 Orst Curninski (?)

PINE CREEK

1683 J.M. James
1800 D. James - not visited
1766 W.J. Weigler
706 P. Gabrie - not visited
1475 A. Mattson
1620 Karl Seiger
1476 Karl Seiger
1919 Karl Seiger
1777 Karl Seiger

(APPENDIX 1)

continued

PINE CREEK - GOLDRUN

1710 E.D. Thachuk
1354 E.D. Thachuk
1355 ?
1356 T. Mattson
1888 J.D. Guild
1902 M.A.L. Thachuk
1903 E.D. Thachuk

SNAKE CREEK

1767 W.J. Weigler

BIRCH CREEK

1639 Norm Bentley
1657 Joe Holzer
1678 Lawrence Goulding
1716 Irvine Haines
1717 Irvine Haines
208 John Dobrovitz

UNNAMED OFF OF BIRCH

1904 Miles Carrey

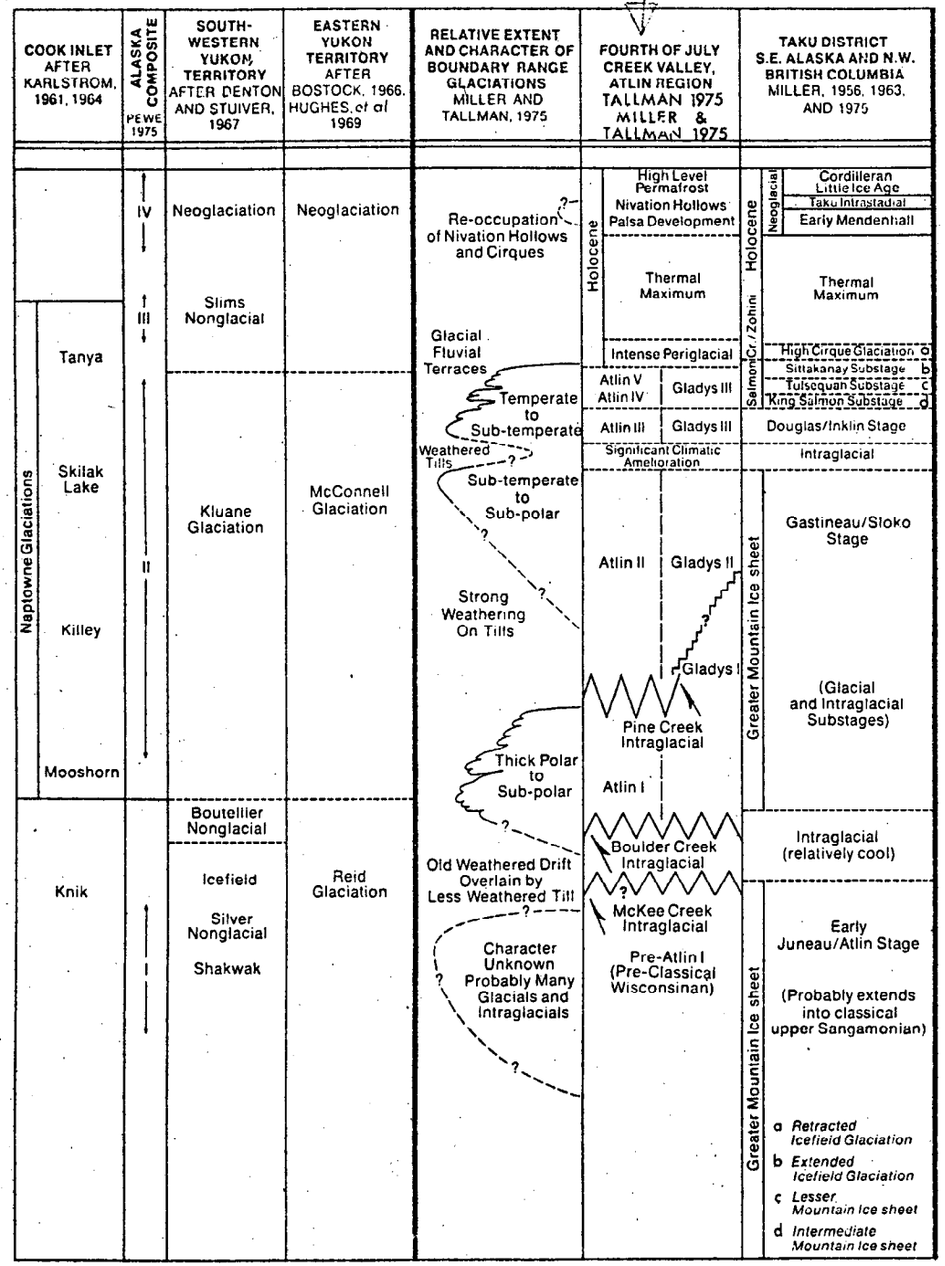
BOULDER CREEK

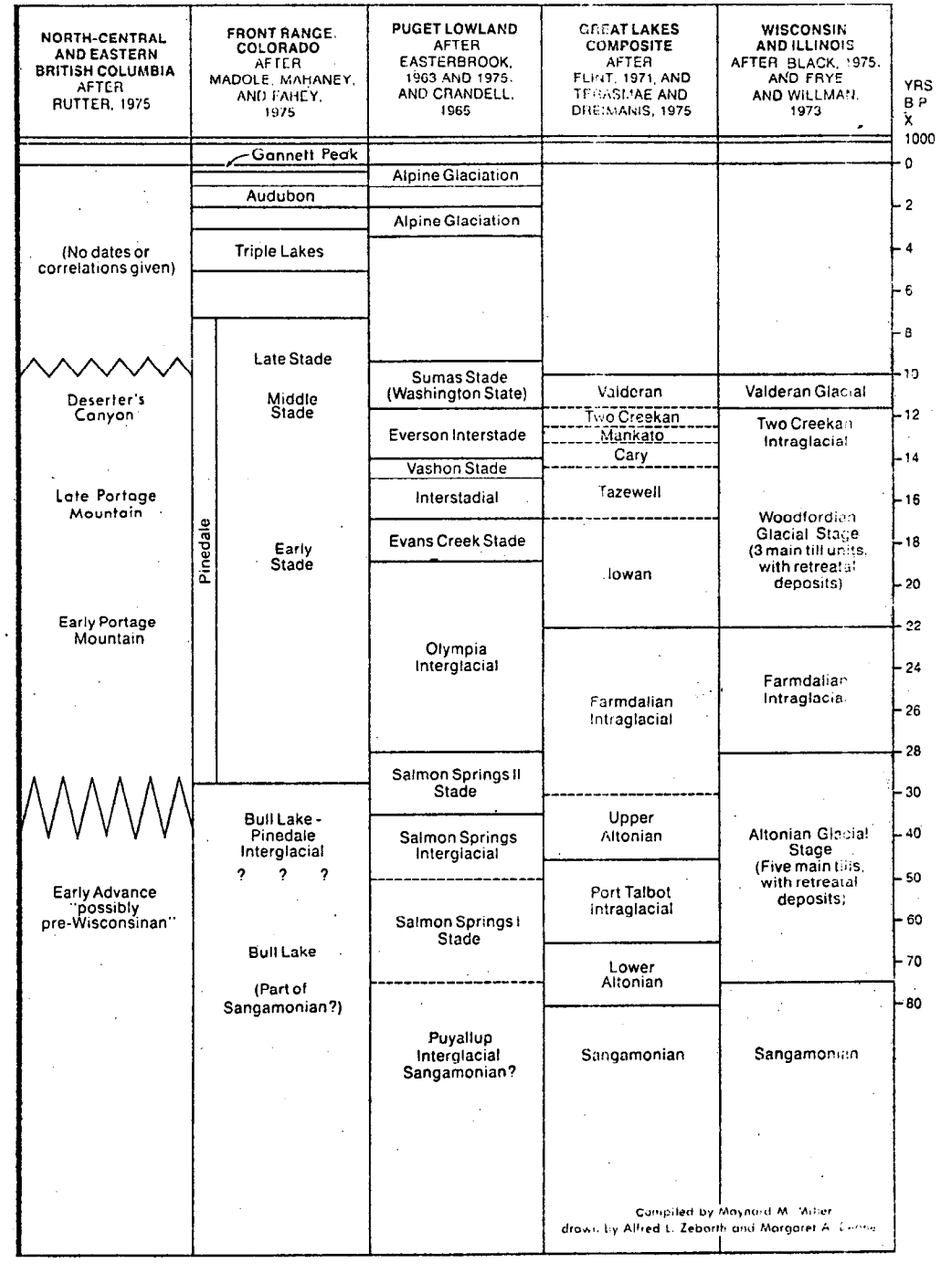
1721 Ted Coe

RUBY CREEK

1891 Andrew Savoy

APPENDIX 3 - CHART OF GLACIAL ADVANCES IN NORTHERN B.C. AND IN CENTRAL AND WESTERN NORTH AMERICA





Reprint from: MOUNTAIN GLACIER RESEARCH SERIES 2 REPORTS OF INVESTIGATIONS IN THE JUNEAU ICEFIELD REGION, ALASKA-CANADA; M.M. MILLER, FOUNDATION FOR GLACIER & ENVIRONMENTAL RESEARCH, PACIFIC SCIENCE CENTER, SEATTLE, WASHINGTON, 1975.

APPENDIX 4 - LABORATORY ANALYSES

OFFICE OF THE CHIEF ANALYST AND ASSAYER

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF MINES AND PETROLEUM RESOURCES
VICTORIA

SAMPLE RECEIVED FROM P. PROUDLOCK

ADDRESS c/o E. W. Grove, Geological Division

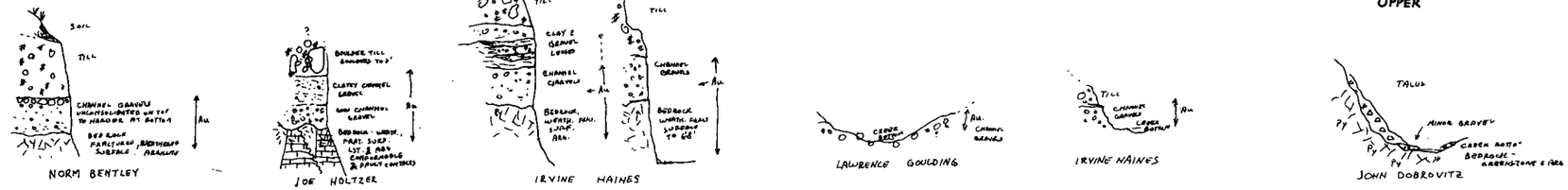
LABORATORY No.	SUBMITTER'S MARK	LABORATORY REPORT
17031M	P-John HARVEY-W	pH 7.88 Ni - <0.02 ppm Cu - <0.01 ppm X-ray Identification
17032M	P-John HARVEY-R1	Kaolinite, Quartz and Mica
17033M	P-ENOS KYLE	Siderite, Quartz and possibly some Clay.

THIS DOCUMENT, OR ANY PART THEREOF, MAY NOT BE REPRODUCED FOR PROMOTIONAL OR ADVERTISING PURPOSES.

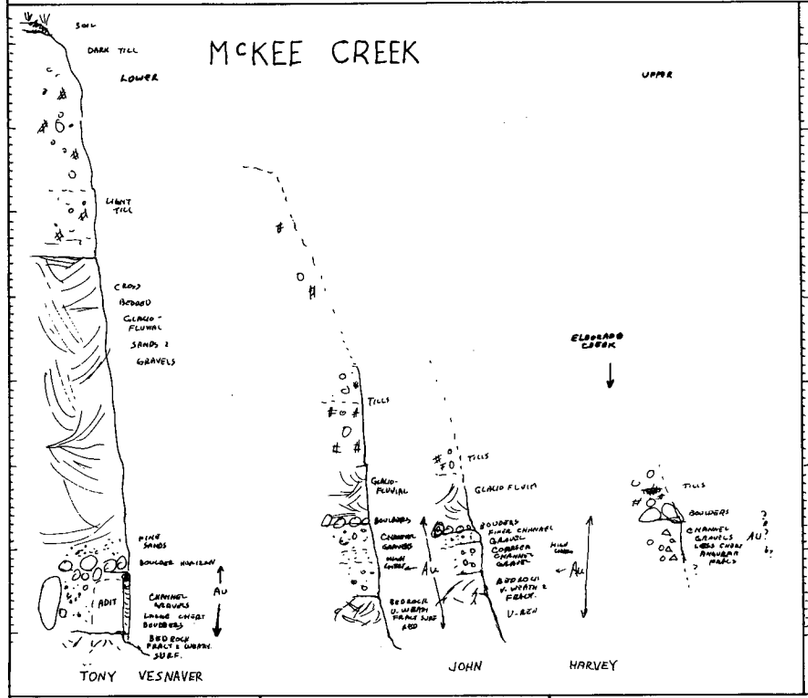
DATE September 8, 1976

W. R. Johnson
CHIEF ANALYST AND ASSAYER

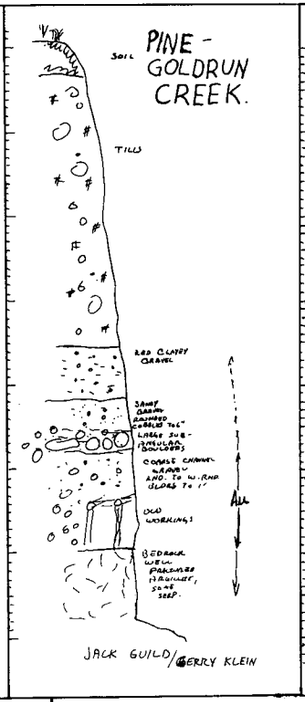
BIRCH CREEK



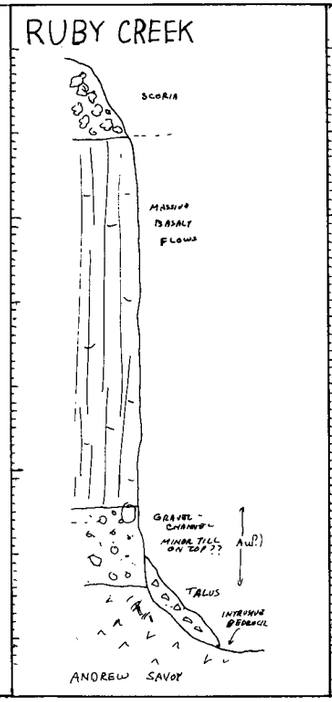
McKEE CREEK



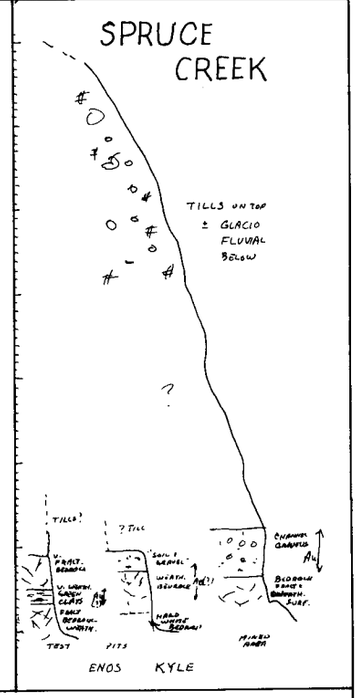
PINE - GOLDRUN CREEK.



RUBY CREEK



SPRUCE CREEK



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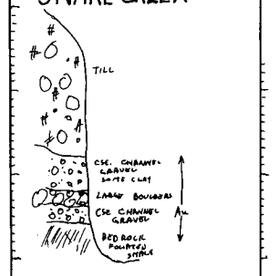
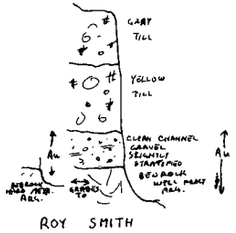
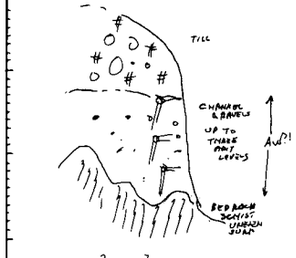


BULL CREEK



O'DONNEL RIVER

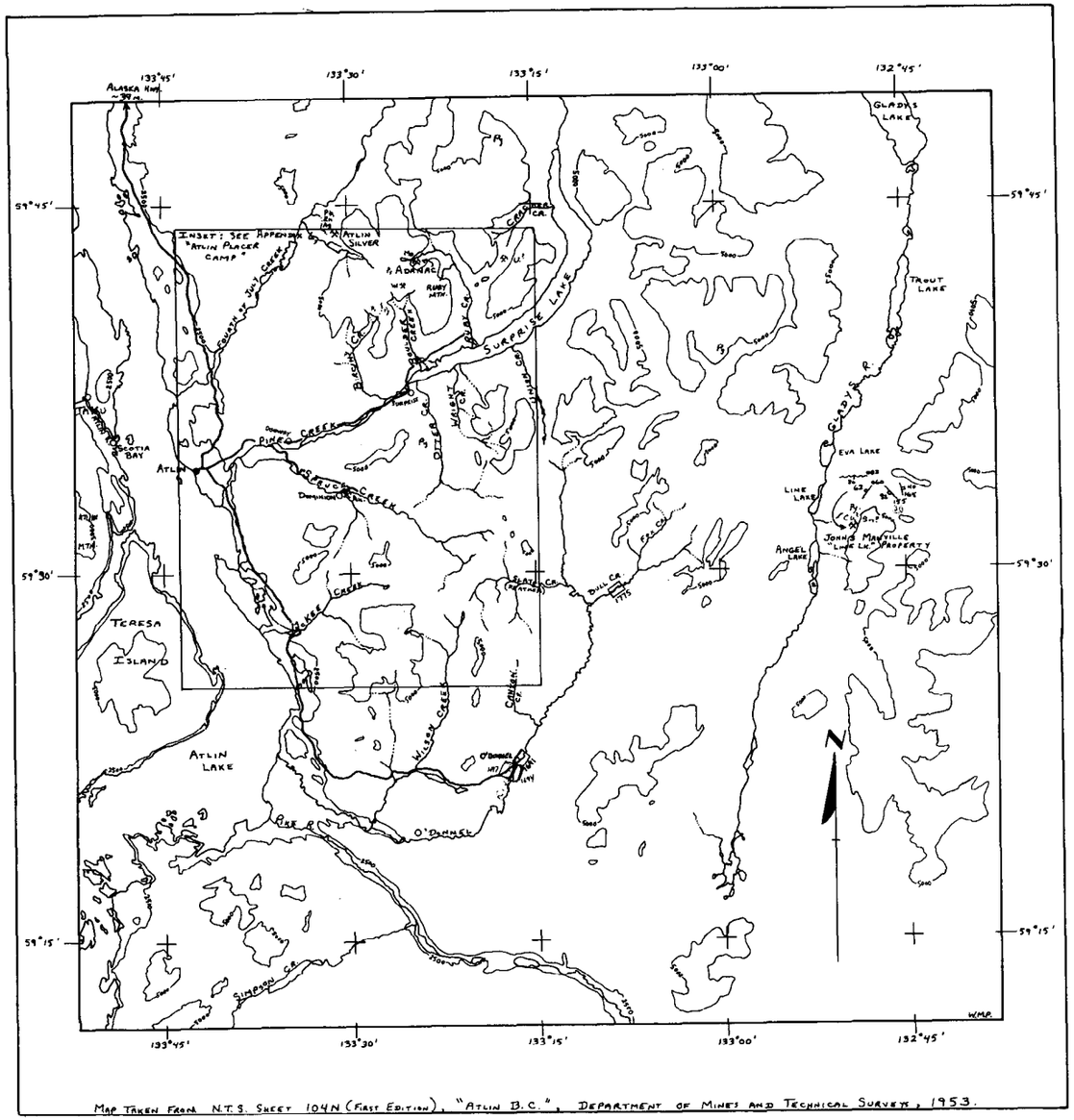


APPENDIX 2
STRATIGRAPHIC SECTIONS
ATLIN PLACER CAMP

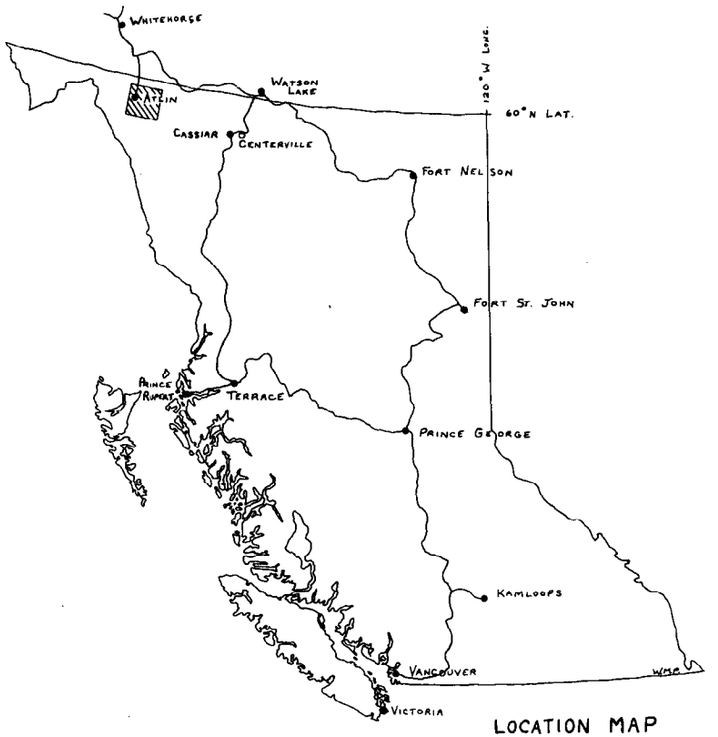
FIELD WORK BY P.J. & W.M. PROUDLOCK
B.C. DEPT. OF MINES AND PETROLEUM RESOURCES
AUGUST 1976.

VERTICAL SCALE — 1" = 10'

P.J.P.



Map Taken From N.T.S. Sheet 104N (First Edition), "Atlin B.C.", Department of Mines and Technical Surveys, 1953.



LOCATION MAP

APPENDIX 5

ATLIN AND SURROUNDING AREA

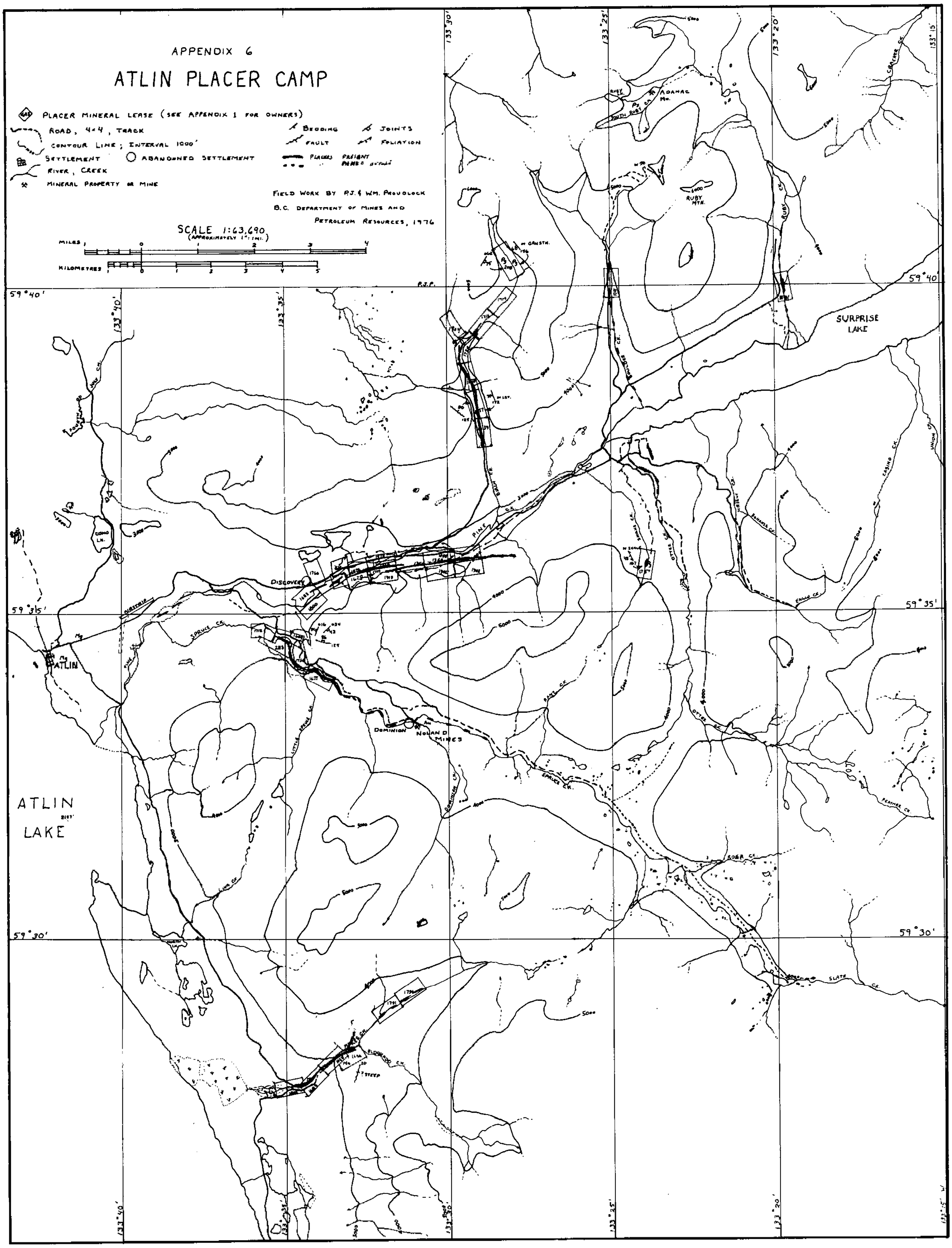
FIELD WORK BY
P.J. & W.M. PROUDLOCK, 1976

ROAD · SETTLEMENT · ABANDONED SETTLEMENT
PLACER MINERAL LEASE · MINERAL PROPERTY OR MINE
CONTOUR LINE; INTERVAL 250' · CREEKS AND RIVERS
JOINTS · FAULT

SCALE 1:250,000

MILES 5 0 5 10
KILOMETRES 0 5 10 15

B.C. DEPARTMENT OF MINES AND PETROLEUM RESOURCES, 1976



APPENDIX 6
ATLIN PLACER CAMP
PLACER MINERAL LEASE (SEE APPENDIX 1 FOR OWNERS)
ROAD, 4×4, TRACK
CONTOUR LINE; INTERVAL 1000'
SETTLEMENT
ABANDONED SETTLEMENT
RIVER, CREEK
MINERAL PROPERTY OR MINE
BEDDING
JOINTS
FAULT
FOLIATION
PLACERS
FIELD WORK BY P.J. & W.M. PROUDLOCK
B.C. DEPARTMENT OF MINES AND
PETROLEUM RESOURCES, 1976
SCALE 1:63,690
MILES
KILOMETRES
133°30'
133°25'
133°20'
133°15'
133°40'
133°35'
59°40'
59°35'
59°30'
RUBY MTN.
SURPRISE LAKE
PINE CR.
DISCOVERY
ATLIN
SPRUCE CR.
DOMINION
NOLAN D MINES
ATLIN LAKE
OTTER CR.
SLATE CR.