882996 Field Season REPORT CCT //ou. 27/99

1999 END OF FIELD SEASON REPORT MT. MCCUSKER PROJECT by Andrew Legun

Project Statement

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The writer, ably assisted by a UVIC geography co-op student, Pano Skrivanos, completed mapping of the western part of the Mt. McCusker sheet (94G/4W) in July 1999. Mapping was extended southward to the vicinity of the Robb Lake deposit in 94B/13W (see 1998 Fieldwork article by Nelson. et al.) The mapping project, initiated in 1998, is also a component of the multidisciplinary CENTRAL FORELAND NATMAP project led by Mike Cecile of the G.S.C.

The area of mapping lies near the western margin of the late Silurian and Devonian platform in northeastern B.C. The platform edge is host to numerous small showings of Mississippi Valley Type lead-zinc mineralisation. In the area of mapping shale-outs occur not only in the prospective Devonian platform sequence but in older Formations (down to Late Ordovician). A local re-entrant to the basin margin is hypothesized to be present within the area of mapping.

Geographic and NTS location

This area, only accessible by air, lies 80 kilometres due west of the small settlement of Pink Mountain, 151 kilometres north of Fort St. John on Highway 97. The centre of the map area lies 20 kilometres north of the Robb Lake deposit.

Field Season Objectives

-to complete mapping of 94G/4 west half

-to extend mapping into the Robb Lake area, tie-in structure and stratigraphy.

-resolve some problems in shale stratigraphy of rocks exposed immediately west of Robb Lake deposit.

-to assess and integrate geology of assessment reports and theses.

-to interface with G.S.C. mapping efforts to the north and east

-to interface with the University of Victoria regarding biostratigraphic control of basinal shale facies.

-to check for arches of Devonian carbonate rocks that might be exposed in deep valleys cutting Besa River shales to east (toward Mt. Bertha).

-to identify further stratigraphic intervals of economic interest.

-to complete basic prospecting.

-to integrate field sections with previous petroleum and G.S.C. section data.

-to pursue platform to basin transitions-Beaverfoot and Nonda to Road River facies and thickness trends

Accomplishments

-conducted twenty-one traverses, in an area of about 400 sq. km. with helicopter support from G.S.C.

-extended geology south to Robb Lake, also to east, northwest of area mapped in 1998. -provided on request new field sections for conodont sampling for UVIC crew (Chris Barnes et al.).

-filled in many areas which had only sketchy assessment report geology or extrapolations from 1998 mapping. Greatly improved confidence of mapping.

-confirmed structural trends from last year's work (pinned down position and trends of thrusts, related folds and their continuation to Robb Lake).

-traced stratigraphic marker units southward (eg. Silurian marker quartzite, Devonian Dunedin Fm.) confirming their stratigraphic position in Robb Lake geology.

-collected four conodont samples to confirm assignment of shale lithology to stratigraphic unit in two problem areas. Collections by UVIC and generally good stratigraphic control reduced the need for more samples.

-gained further insights in transition of platform facies to basinal shales, particularly Late Ordovician Beaverfoot, basal Silurian, and Nonda rocks from Mt. McCusker to Robb Lake.

-confirmed thickening of basal Silurian shales toward Robb Lake and shale-out of Beaverfoot quartz dolomite unit. Some local facies detail to be worked out.

-Joanne Nelson's "trash breccias" found within few metres of known normal fault of significant displacement. The writer's mapping suggests the normal fault truncates a Laramide thrust and is probably Tertiary in age. The enclosing strata (Dunedin/Stone Formations) are certainly truncated by the fault but the relationship of breccia and fault is not clear. Further work might clarify age relationship here. Smethurst et al. recently suggested Tertiary age for mineralisation in such breccias from paleomag data. -other small normal faults noted in map area.

-found stratabound pyritic zones. One zone is at the Dunedin/Besa River contact and well exposed in a ravine on north side of Sikanni Chief River. A second traceable zone is within Road River shale facies in a valley few km. northwest of Robb Lake deposit. -found some Devonian carbonate arches in areas thought to be underlain by Besa River shale. (along Sikanni River in east).

-provided G.S.C. with assessment report maps for their areas of study. -trained geography student in few basic principles of geologic mapping.

Safety Record

We left for field June 27, arrived at Pink Mountain base June 29, returned from there July 29 and were back in Victoria August 1. We were unable to setup fly camp till July 3. It snowed twice and there were six and a half days of poor (no fly) weather in July. The actual period in fly camp was July 3 to July 28. Given damp conditions, use of cots rather than inflatable mats for sleeping in tents is preferred for the future. There were no accidents, but a tire blew out in leaving airstrip for the Alaska highway.

No unusual incidents, but a young bear which camped out in shrubbery across the valley from our camp was watched closely for a few days by binoculars.

Project Status and Recommendations

-Project will be completed by spring 2000. Final map should cover about 500 sq. km. -The logistical arrangement with G.S.C. worked well. The helicopter out of Pink Mountain would drop off G.S.C. crews east of us, and then set us out from fly camp before returning to Pink Mountain. Similar arrangement in afternoon for pick-ups. -It would be useful to integrate surface geology and subsurface seismic data to help assess petroleum potential in the adjoining area to the east. Ward Kilby, a GSB expert in 3d structural geology may have comments. Mike Cecile indicated some difficulty in negotiating seismic data from petroleum companies last year.

-Field data has been entered using GEODATA at a workstation. There appears to be some problem with running GEODATA on new Seanix systems.

-The writer is in the process of digitising new geologic linework and station data. The Rocky Mountains with their ordered structural elements and stratigraphy are good training ground for student geologists.

Output Planned

-Open File Map at 1:50000 scale ready for Roundup January 2000.

-1999 Fieldwork Report

-Poster Display for Roundup

-proposed NATMAP report and talk

-Short Paper, published in Spring to accompany map and to summarise results of two years work.

Industry Activity

No mineral exploration companies presently active in the immediate area. Relatively recent (1996) oil and gas seismic lines extend into the area from the west (AMOCO).

Budget

STOB 01 3900.00 STOB 02 133.00 STOB 03 1062.00 STOB 10 3438.00 STOB 20 1025.00 STOB 50 6595.00

TOTAL 17145.00

Budget spent, expect no changes to end of year.



SUMMARY STATISTICS

2nd year of NATMAP bedrock mapping project

2 man flycamp

21 traverses with G.S.C. helicopter support, July 3 to July 28,1999 ground survey of 400 sq. km. within 94G/4w, part of 94B/13w lower Ordovician to mid Devonian stratigraphy budgetted 17145 dollars, spent 17145.



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INTRUSION-RELATED GOLD DEPOSITS PROJECT 06569

SUMMARY STATICS

Area mapped: Reconnaissance scale around Baldy Batholith (900 km²) covering 82M/05, 04 and 92P/08, 1:50,000 scale along southeast margin (200 km²) and 1:10,000 in the vicinity of the Cam Gloria showing (25 km²) covering 82M/05 and 04.

Reconnaissance scale of the Mount Skelly Pluton (225 km²) covering 82F/07, 1:50,000 scale of the satellite body and mineralization located north of Sanca Creek (35 km²) also 82F/07. In addition, property visits to selected showings included the Bizar, Bayonne Mine, McPhee property, Reno Mine and Emerald Tungsten.

This was not a traditional regional mapping project and as such square kilometerage mapped is not applicable. This years work focused on assessing the Intrusion-Related Gold deposit model in two areas of SE BC. Both areas had been identified as permissive to host gold mineralization of this type by Lefebure et al. (1999).

The 1999 summer field season was safe and productive.

Assistant: Richard Mann

Richard is a self motivated, hard working individual. His organizational skills, confidence and ability to work independently made him an invaluable asset to the project. He made important observations and contributed to the understanding of the geology over the course of the summer.

Budgeted: 35,800.00 Spent or committed: 35,670.00

OBJECTIVES

Assess and promote the potential for Intrusion-Related Gold deposits in SE BC by:

- ground-truthing compiled geology in each of the two study areas;
- ground-truthing airborne magnetic signature of individual intrusive phases (magnetic susceptibility meter);
- map, sample and characterize the distribution, lithochemistry and age of the Cretaceous intrusive phases, and related mineral occurrences;
- establish and compare the metal associations of known mineral occurrences with those for the I-RGD type;
- determine the tectonic setting and, in particular, the age and characteristics of the host intrusions;
- identify new areas permissive to host this style of mineralization.

ACCOMPLISHMENTS

- Safely completed the 1999-field season.
- Mapped and sampled two Mid-Cretaceous intrusive bodies located in SE BC.

The Mount Skelly Pluton hosted in late Proterozoic miogeoclinal sedimentary rocks of ancestral North American and the Baldy Batholith hosted in Late Proterozoic to Mid Paleozoic rocks of the Kootenay Terrane. The intrusions were mapped, magnetic susceptibility measured and samples collected to facilitate petrographic, chemical and geochronologic characterization of the different intrusive phases.

- Recognized a retrograded contact metamorphic mineral assemblage in metapelite adjacent to the Mount Skelly Pluton which may constrain its depth of emplacement.
- Mineral occurrences, prospects and alteration zones were sampled for geochemical analysis.

SAMPLE STATISTICS

geochem/assay	=	89	Ar/Ar = 35	whole rock =	39
thin sections	=	47	galena Pb = 5		

MINERAL OCCURRENCES VISITED

Mineral occurrences visited include those related to plutons intruding; Ancestral North America in the Kootenay Lake area (**Bayonne Batholith** - Govt/Valpraiso, German Basin, ELMO, Lost Mine, Imperial, Bayonne Mine; **Salmo area** Emerald Tungsten, **Sheep Creek camp**, Reno Mine, Motherlode Mill, Queen shaft); the Kootenay terrane in the Shuswap area (**Baldy Batholith** - Cam Gloria, San, Wind Pass/Sweet Home, Bizar and Samotosum) and Quesnellia in the area west of Salmo (**Bonnington Pluton** - McPhee property/ Maud S).



Intrusion-Related Gold deposit - Project areas showing mineral occurrences visited

SAFETY RECORD

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- 37 days in field for Mann; 50 days for Logan, total of 87 days.
- zero days lost to accidents.
- Richard hit left index finger with sledge hammer in course of collecting a rock sample. Temporary swelling, stiffness and minor pain.

BUDGE	T 1999/00				
01	Wages	7,671	30 Courier	400	
03 Benefits 10 Travel Expense		1,611	50 Fixed & Rotary	2,400	
		8,040	50 Operating Costs	3,061	
20	Contracts	12,622	68 Computer	0	
	······		TOTAL	35,805	
COMM	ITTED AND EXPENDED 1999/00				
STOB					
01	YEP (Field associate) Salary			7,422.00	
02	Supplementary salary			249.00	
03	Employee benefits			1,611.00	
				Subtotal =	9,282.00 (ALL)
10	TRAVEL EXPENSES				
	Party leader, Senior			Subtotal -	0 0 4 0 0 0 (A T T ±)
		+		Subtotal =	0,040.00 (ALL+)
20	PROFESSIONAL SERVICES	, ,			
	Engineering and scientific				
	Thin sections (47 @ \$12 ea	ch)		564.00	
	Chemical analyses (39 @ \$	75.60, 89 @	\$30.00)	7,431.00	
	Pb/Pb (5 @ \$300)			1,500.00	
	Geochronometry (10 Ar-Ar)		6,000.00	
				Subtotal =	15,495.00 (+2873)
30	SUPPLIES				
	Courier			400.00	
				Subtotal =	400.00 (ALL)
50	UTILITIES, MATERIALS, SUI AND MAINTENANCE	PPLIES, VE	HICLE OPERATION		
05	Helicopter (3 @ \$800/hr)			0.00	
18	Field equipment Film and	l processing	, radios, etc.	400.00	
25	Maps and air photos			2,000.00	
				Subtotal =	2,400.00 (-3000)
		•• •		ΤΟΤΑ	AL = 35,670.00

PROJECT STATUS AND RECOMMENDATIONS

The 1999 field season initiated mapping and deposit studies in the vicinity of the Baldy Batholith (Shuswap) and the Bayonne Batholith (Kootenay Lake) areas of southeast British Columbia. These areas were selected from a subset of prospective areas recognized as favorable to host Intrusion-Related Gold-Tungsten-Bismuth Veins by Lefebure et al. (1999). Their criteria included; intrusive age, Au-W-Bi ± Sn metal signatures for veins, sheeted veins and/or stockworks, the occurrence of placer deposits (Au±W) and Regional Geochemical Survey (RGS) anomalies of these three elements. Digitizing and map preparation is underway for two Open Files.

Shuswap

The Baldy Batholith is a W-trending mid to Late Cretaceous post accretionary intrusive. It intrudes Proterozoic to mid Paleozoic Kootenay terrane metasedimentary and metavolcanic rocks. The country rocks host a variety of mineral deposits which predate (mafic VMS, bimodal felsic VMS, disseminated Cu-Mo and stratabound Ag-Pb-Zn) intrusion of the batholith and a wide variety of mineral deposits which may be related to its intrusion (polymetallic base metal yeins, porphyry Mo, Au-po veins, Au quartz veins and W veins). The intrusion is multiphase consisting (from oldest to voungest) of a K-spar megacrystic hornblende-biotite quartz monzonite, biotite monzogranite to granite and a biotitemuscovite granite. A satellite body at the southeast corner of the batholith hosting the Cam Gloria vein consists of a biotite-hornblende-epidote quartz monzonite. Coarse grained biotite-muscovite pegmatite and fine grained feldspar-qtz aplite dikes cut all of these phases.

Kootenay Lake

The Mount Skelly Pluton is a mid to Late Cretaceous post accretionary intrusive. It is one of a group of Cretaceous and Jurassic intrusions which comprise the Bayonne Granitic Suite, which intrude Proterozoic to Early Paleozoic metasedimentary and metavolcanic rocks of ancestral North America affinity in SE BC. The Mount Skelly Pluton, located 30 km north of Creston on the east side of Kootenay Lake trends northeasterly across the structural fabric of Proterozoic Purcell and Windermere supergroup rocks. The pluton consists of four different intrusive phases differentiated on the basis of mineralogy, texture and grain size, and magnetic signature. From oldest to youngest, these include a K-spar megacrystic hornblende-biotite quartz monzonite, a coarse or fine grained biotite quartz monzonite, a coarse grained biotite monzogranite and a biotite plagioclase porphyritic leucogranite. Fine to medium grained quartzfeldspar-garnet aplite dikes, quartz veins and less commonly coarse grained pegmatite dikes occur primarily near the margins of the intrusive phases. Mineral prospects are hosted within (Au quartz veins, W veins, Mo greisen veins) and adjacent to the multiphase intrusive (polymetallic base metal veins). Past production of gold is recorded from workings on the Government and Valpraiso crown grants which are hosted in a satellite body of coarse grained biotite monzogranite located between Sanca and Akokli creeks, two kilometers east of Kootenay Lake. In the Shuswap, the Baldy

Recommendations

The 2000 field program should be designed to allow follow-up of anomalous samples/areas from this years work and continue the sampling and lithogeochemical characterization of Cretaceous plutonic rocks and associated mineralization elsewhere. This data will be compiled into a lithogeochemical database for BC researchers and explorationists.

OUTPUT PLANNED

- Overview Geological compilation maps at 1:100,000 scale, 1 for each area
- Fieldwork article introducing project and accomplishments
- Talk and paper for Tintina Gold Belt Special Session Cordilleran Round Up 2000
- Poster display at Round Up 2000

CLIENT INTERACTIONS

Alaska/Yukon Fieldtrip (June 27-July 5)

Thor Bergstrom - Kinross Gold Ryan Lode

Peggy Young - Kinross Gold Fort Knox Gold Mine Rick Diment - Viceroy Resources Ltd. Brewery Creek Mike Burke - Yukon Geology Program Dublin Gulch, Wayne, Scheelite Dome, Keno Hill & Clear Ck.

Brian Flanigan - Avalon Resources Moira Smith - Teck's - POGO property Craig Hart - Yukon Geology Program

Field work - SE BC (July 8-Aug 22)

Doug Archibald - Queen's UniversitySean Bailey - Ancient Pacific Margin NATMAP.Mike Cathro (Kamloops), Paul Wilton (South Central)- Regional GeologistsLinda Dandy - Sultan Minerals Inc.Randy Farmer - Teck Exploration Ltd.Linda Dandy - Sultan Minerals Inc.Leo Lindinger - PA granteeKelly Stousknoff- prospectorAllan Hilton- Wind Pass- Sweet HomeKelly Stousknoff- prospector

EXPLORATION ACTIVITY

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Exploration activities in the Shuswap area included work around Baldy Batholith at Cam Gloria, where Teck Exploration Ltd. surveyed in a small grid (4.7 line km) over the main quartz vein showing. The N30E trending vein is exposed in a logging landing for approximately 125 m. EM magnetic geophysics survey was conducted over the grid, trenching is to begin late September and drilling is scheduled for early October.

North of Cam Gloria, near Blue River Leo Lindinger continued prospecting on and around the Bizar property (Cassidy Gold Corp) located immediately west of Tumtum Lake.

In the Kootenays no current exploration activity was evident in either Sanca or Akokli creek areas during the month of August. There were claims staked in the Sanca Creek valley, in the first week of August, after we had started working in the area.

At the Emerald Tungsten exploration over 2 large zinc targets - the Jersey extension and one known as Wilson Creek. A geophysical survey was carried out over these late August.

END OF FIELD SEASON REPORT 1999

DEVONO-MISSIPPIAN VMS PROJECT J. NELSON

Introduction

This project is part of an ongoing investigation of pericratonic terranes in northern B.C. that may be equivalent to those hosting polymetallic volcanogenic massive sulphide bodies in the Finlayson Lake district of southern Yukon.

This summer work was done in two separate areas: 104O/1 (the Cottonwood River area west of Cassiar townsite) and 104O/11, 12, 13, 14 and 1044N/9, 16 (from Teslin Lake to Swan Lake and from the Yukon border to the Jennings River). In the first, I operated with one assistant from mid-June to mid-July. In the second, I was part of a joint mapping party with Mitch Mihalynuk and Charley Roots of the GSC: see Mitch Mihalynuk's report for details.

Field Season Objectives

To extend map coverage of the eastern Dorsey Terrane south to the southern border of 104O To do check traverses and ready the part previously mapped for open file release To put myself at Mitch' disposal so that his area could be completed and readied for open file release

Accomplishments

new area mapped (104O/1, 180 km²) (see also Mihalynuk report) samples collected (4 U-Pb; 10 assay; 15 whole-rock) mineral occurrences visited: Caribou (S. Yukon); Silvertip advances in geological understanding :

- 1. The units mapped in the eastern Dorsey Terrane in 1997-8 extend southwards into 104O/1, including the Ram Creek Assemblage, which hosts felsic, quartz-sericite schists
- 2. Rocks of Dorsey Assemblage (lower crustal, pre-360 Ma) are now recognized on both sides of the Klinkit/Swift River Assemblages (upper crustal, late Paleozoic), suggesting that Dorsey is basement to Klinkit/Swift River
- 3. P. Erdmer has found two more excellent eclogite occurrences in the Dorsey and agrees that the whole package probably underwent high P/T metamorphism as a coherent sheet
- 4. The Swift River Dorsey contact has finally been seen. Favored interpretation has it a late top-down (normal-sense) shear zone superimposed on an unconformity

student training: was going well until interruption by student's illness

Client interactions

- Brett Resources shared camp (they were working on optioned ground of Fairfield Minerals two claims with VMS potential just north of the Yukon border in equivalent stratigarphy to that which we were mapping
- 2) Terry Tucker one day field tour of Fairfield properties. Terry has become intrigued with our ideas and would like to establish a foothold in the Big Salmon area (see letter attached).
- 3) Steve Robertson (Imperial Metals); one day talk and tour of Silvertip property. At the time of my visit, August 25, they were halfway through the first hole of a 3 hole deep drilling program aimed at locating the chimney source of the mantos. The second hole hit 30 metres of massive sulphide at 300 g Ag, 12% combined Pb-Zn, making this a signally successful program!

4) Fairfield Minerals - Ed Balon, Wojtek Jakubowski - one day tour in Big Salmon Complex. Their discoveries in this area have been based solely on geochemistry, but now they are becoming increasingly interested in the regional geology - in large part due to our activities. Last summer I "trained" Wojtek to recognize the piedmontite-bearing metamorphosed exhalite that forms a regional marker and indicator of VMS activity. This year he responded by taking us to a new locality of this key unit that he had discovered.

Safety Record

- days in field per crew member: J. Nelson: 69 K. Wahl: 37
- number of days lost to accidents: K. Wahl: 32

- short summary of any accident:

On July 13 K. Wahl, YEP student, reported stomach upset along with "sulphur" burps. This developed into a severe case of giardiasis, which eventually led us to send her home. No one else was affected. - Suggestions for improving crew safety next year: In future we should probably make water filters available to assistants on a voluntary basis. I don't want to push this too hard because they are a pain to use, and as a group we have had no history of water problems over many field seasons in many areas of the province. Added hint for crew chiefs: Although there are a myriad of mild stomach upsets, giardiasis is uniquely identified by the sulphur taste in the victim's mouth. Immediate medical attention is recommended, because the only cure is a week-long course of very strong antibiotics.

Output Planned

- product and proposed date of publication: Fieldwork article, January 2000. Geology of parts of 104O/7, 8, 9, 10 Open File January 2000.

Industry Activity

- companies active in the region: Brett Resources, Imperial Metals

- work on specific properties: Brett is entirely working north of the Yukon border for political reasons. Imperial is developing the Silvertip project. This year they are doing deep drilling on geophysical (CSAMT) targets, looking for chimneys in the manto system.

<u>Budget</u>

- budget: \$66,000

- summary of expenditures to date by STOB: Expended plus committed and projected: \$54,000

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- estimate of probable budget status at end of fiscal year (surplus)

Project Status and Recommendations

- Coverage of the Dorsey Terrane is nearing completion.
- One further field season will allow production of a second 1:50K sheet of parts of 104O/1 and 2; as well as continuing interaction with Roots as he enters his second summer of mapping in 104/O



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FIELD SEASON SUMMARY REPORT

Ingenika Project

Project Leader: Filippo Ferri Assistant: Patrick Johnstone

Introduction

The Ingenika Project is focused on the Big Creek Group, a part of the Earn Assemblage which regionally hosts numerous sedex and lesser volcanogenic massive sulphide deposits. The project has two main objectives: 1) Examination and propertyscale mapping of the Omineca Queen bedded barite occurrence together with delineation of the enclosing Big Creek shales and surrounding lithologies; 2) Northern extension of the Big Creek Group and associated felsic volcanics in the McConnell Creek map area.

The Ingenika Project is located in the north-central part of the province (Figure 1). There are two main project areas: In the southeastern part of the Manson River map area (93N/8 & 9; Figure 2) and on the border between the Mesilinka River and McConnell Creek map sheets (94C/12, 94D/9 & 16).

Field Season Objectives

- Property-scale map of the Omineca Queen bedded barite occurrence in hopes of deducing its relative position within Big Creek stratigraphy and whether it is associated with known felsic volcanics.
- Regional mapping around the Omineca Queen occurrence showing the distribution and extent of the Big Creek Group and nearby units.
- Northwestward extension of the Big Creek Group in the McConnell Creek area, beginning from the western limit of mapping during the Aiken Lake project.
- Focus on the internal stratigraphy of the Big Creek Group in hopes of extending northward a package of felsic volcanics recognized to the south.
- Sampling of the felsic volcanics in hopes of better constraining their age and geochemical signature.

Accomplishments

The two proposed areas were mapped. A region encompassing some 80 km^2 was mapped in the area around the Omineca Queen. In the north, a belt covering approximately 300 km^2 followed the northwestward trace of the Big Creek Group (figures 2 and 3).

Numerous samples were obtained during the field season. Five U/Pb geochronology samples were collected from felsic volcanics within the Big Creek Group and nearby Lay Range Assemblage. Eleven whole rock geochemical samples were taken of volcanics within the Big Creek Group and Lay Range Assemblage. Five carbonate conodont samples were also collected from within the Big Creek Group and Lay Range Assemblage. Two samples from possibly mineralized sections of the Big Creek Group

were also collected. Two chip samples across massive barite of the Omineca Queen occurrence were obtained.

The only mineral locality visited was the Omineca Queen bedded barite occurrence.

There were no interactions with any exploration company this summer. I was hoping to talk to geologists from Phelps Dodge, but the excess amount of snow this summer forced them to delay their project in the Carruthers Pass area. They were mobilizing in for this program the day after we left the Johanson Lake area.

Mapping on the Omineca Queen property proved to be somewhat of a disappointment. Descriptions of the occurrence suggested very good exposures, either natural or in trenches. Although this may have been the case 30 years ago, subsequent forest growth and slumpage has essentially obliterated the relationships described the original GEM reports. We were able to locate bedded barite, but it took us several days. The exposed sections of barite are much thinner than previously recorded due to slumpage. Even with these problems we were able to map the distribution of the barite beds and map their association with lithologies of the Big Creek Group. Felsic volcanics described in earlier assessment reports turned out to be Late Cretaceous or Early Tertiary sub-volcanic felsic intrusions. Felsic volcanics within the Big Creek Group were located in the immediate area (approximately 4 kilometres along strike with the Omineca Queen occurrence) and were sampled for geochronology and geochemistry. Rocks of the Big Creek were extended to the southwest, to the boundary of the Manson River (93N) sheet. No other mineralized sections were found.

Mapping in the McConnell Creek area also focused on the Big Creek Group, a package of dark, graphitic slates, sandstones and volcanics of Late Devonian to Early Mississippian (or younger) age. Since in this area no mineral deposits are known within this package, mapping focused on determining if this sequence extends to the northwest together with delineation of volcanic sections within it and their potential to host mineralization. Mapping in the McConnell Creek area was a technical success. We were able to extend the Big Creek Group to the northern end of our mapping corridor (just south of the Ingenika River; Figure 3). This probably represents the northern end for reasonably good exposure of this unit within the McConnell Creek map sheet. North of the Ingenika River, the unit appears to be found within broad creek valleys suggesting little or no exposure until well north of Kemess mine site. In addition the steep southwest dip of rocks in the map area results in a very narrow outcrop area for the Big Creek Group.

Sections of mafic and felsic volcanics from 5 to 20 metres thick were found within the Big Creek Group in the McConnell Creek area. The felsic volcanics are very similar to those encountered to the south where they are termed the Gilliland Tuff. The mafic volcanics were a bit of a surprise as none have been described within the Big Creek Group. They appear to be at the same stratigraphic level as the Gilliland Tuff. They look like basalts, are usually massive, although locally pillowed. Gabbro or diorite can be associated with them and may represent intrusive equivalents. Some pyritic sections were found within the Big Creek Group in this area and these were sampled for their mineral content. Besides this, no mineralization was encountered within the map area. The recent RGS release for this area shows that several of the drainages within the southern part of the map area are very anomalous with respect to Pb-Zn-Ba. These still have to be explained.

In addition to the volcanics, the upper part of the Big Creek Group contains 1 to 10 metre sections of coarse, polymict black clastics. These are typically sandstones or wackes, although they locally approach granule conglomerate. The origin of these clastics is quite controversial. Some believe they are related to extensional tectonics whereas others think they are part of a contractional event.

Adjoining rocks of the Ingenika Group (to the east) and Lay Range Assemblage (to the west) were also mapped. The Big Creek Group appears to be down dropped against the Ingenika Group along a persistent normal fault extending along the entire length of the map area. This fault occurs in the upper part of the Stelkuz Formation (upper Ingenika Group) and removes carbonates and siliciclastics of the Atan, Razorback Mountain, Echo Lake, and Otter Lake groups. To the west rocks of the Lay Range Assemblage occur along a steep to moderately southwest dipping surface. Mapping to the southwest indicates this is a northeasterly directed thrust fault with Lay Range rocks emplaced over those of the Big Creek Group. No kinematic indicators could be seen in the present map area. In fact the contact was never exposed during our traverses. Cleavage within rocks of the Lay Range becomes more intense close to this contact.

Mapping of the Lay Range Assemblage delineated the two-fold subdivision recognized to the southwest: a lower mixed sedimentary and volcanic sequence followed by a thick section of mafic volcaniclastics and flows. A carbonate from less than 1 to over 50 metres in thickness usually separates the two sequences. In the Wrede Creek area, a quartz-bearing felsic tuff unit was found within the "Upper Mafic Tuff Division" of the Lay Range Assemblage. This is significant in that it may provide further age constraints on this poorly dated sequence. In addition it may indicate a shift toward more felsic volcanism within the northern part of this Paleozoic arc sequence.

Output Planned

- 1. Field work article
- 2. Roundup poster
- 3. Possible presentation of data at other geoscience forums (eg. Whitehorse Forum, GAC, Tectonics Workshop).

Budget

The original budget estimate was \$46,000 (see accompanying table). Money spent or committed to date totals approximately \$40,000 (see other table). Taking into consideration the 2.5% cut (\$1,150) incurred during the summer, this leaves \$11,550. I originally budgeted \$16,000 for helicopter expenses. Since I left late for the field, I had one less fly camp and the helicopter bases were closer than planned, resulting in an excess in helicopter funds. I have set aside \$10,000 for U/Pb analysis.

Project Status

- Finished field work
- Field compilation maps must be put into a more formal format suitable for publication (Fieldwork)
- Samples must be submitted
- Start work on Fieldwork Article
- Digitize field notes

Recommendations

Considering the poor indicators of mineralization within the Big Creek Group, the relatively narrow extent of this unit together with its recessive nature, a continuation of a focused mapping program is not warranted. The northwestward delineation of the unit should be done, and should be part of a broader regional program which fills the unmapped corridor between work by Larry Diakow and Andrew Legun in the McConnell Creek area and mapping by the author in the Mesilinka River area. This consists of approximately 1.5 1:50 000 map sheets.

Safety Record

39 days were spent in the field with no days lost to accidents.



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INGENIKA PROJECT - SPENT OR COMMITTED MONEY

STOB 1	
Junior assistant for 8 weeks (5.4X1060.85)	\$5,729
Vacation (6% salary)	\$344
Со-ор	\$4,500
Co-op Vacation	\$150
Subtotal	\$10,722
STOB2	
	\$200
Со-ор	\$150
Subtotal	\$350
STOB3	······
	\$2,327
Со-ор	\$980
Subtotal	\$3,307
Travel	
Per diem travel up and down (39x2x38)	\$2,964
Miscellaneous (motels, Roundup etc.)	\$650
Subtotal	\$3,614
STOB 20	
Lithogeochem (4 @ 35)	\$140
Whole Rock (11@100)	\$1,100
U/Pb - 5 samples	\$10,000
Conodonts (5@160)	\$800
Thin sections (25@\$12)	\$300
Subtotal	\$12,340
STOB 30	
Subtotal	
STOB 67	
ACAD MAP Upgrade	
STOB 50	
Helicopter (10hrs@\$800/hr)	\$8,000
Maps + Reproduction	\$1,000
Miscellaneous Gear	\$750
Subtotal	\$9,750
GRAND TOTAL	\$40,083

Tom 5.

9/14/99

Big Salmon Complex & French Range Projects: end of season report 1999 Submitted to: Internal Management Team Submitted by: Mitch Mihalynuk

Big Salmon Project -

principal 1999 component, Ancient Pacific Margins NATMAP Program

&

French Range Project -

contribution to SNORCLE

End of season report 1999

Summary Statistics

Area Mapped

1:50K geological mapping was conducted over a six week period between July 9 and August 19. Five weeks were devoted to the Late Paleozoic Big Salmon complex in the northeast Atlin and northwest Jennings Lake 1:250K quadrangles, and one week to the Permo-Triassic Cache Creek-Kutcho stratigraphy in the eastern Dease Lake quadrangle (Table 1, Figure 1).

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Area	NTS Mapsheet	Sheet Name	person weeks
Teslin Lake	104N/9	Goodwin Creek	6
	104N/16	Gladys River	2
Jennings River	1040/12	unamed	8
Jennings River	1040/13	Smart River	4
	104O/14W	Swan Lake	2
French Range	104J/9	Little Dease Lake.	4

In all, an area equivalent to $3.5\ 1:50 \mathrm{K}$ sheets were covered at $1:50 \mathrm{K}$ detail.

Assistant

Name Tom Gleeson 102 - 1310 Hillside Street Victoria, BC V8T 2B3 (250) 382-7162
 Term
 # of days

 June 15, 1999 to
 Aug 25, 1999

 52

Assistant performance

Tom Gleeson

Tom is a bright, good-natured, motivated and dependable field assistant. He grasps mapping skills quickly and is comfortable under adverse conditions. He has the potential to become a very good mapper if he pursues such a career path. However, Tom needs to work on ensuring that his field notes are complete and legible.

Budget Sept 2, 1999 (see appendix I)

Big Salmon Complex		French Range Project
Budgeted (\$63,000-2.5%) \$61,425	\$3500
Spent/committed 09/01	\$61,070	\$3519
Balance 09/01	\$355	-\$19

Background:

Big Salmon Project

Recent discoveries of volcanogenic massive sulphide (VMS) deposits in Yukon-Tanana Terrane (YTT) rocks of the southern Yukon *(e.g.* Kudz Ze Kayah, Wolverine, Fyre Lake) has focused attention on the VMS potential of the proposed southern extensions of they Yukon-Tanana Terrane within British Columbia. The Big Salmon project was initiated in 1997 with the aim of determining the tectonic affiliation of the Big Salmon Complex (BSC), a polymetamorphosed rock package just south of the Yukon border and east of Teslin Lake (see Figure 2). These rocks had historically been considered part of the oceanic Slide Mountain Terrane (Wheeler et al., 1992), but preliminary investigations by J. Nelson in 1996 revealed their quartz-rich nature and probable pericratonic terrane affiliation.

Reconnaissance mapping was begun in 1997 to test the Yukon-Tanana Terrane correlation. Advances in our understanding of the lithostratigraphy, isotopic age, geochemical signature and structural architecture of the BSC that arose from the 1997 field mapping program enabled conclusive correlation with the YTT. The BSC includes orthogneisses dated as Early Mississippian and volcanic rocks broadly correlative with VMS-bearing units in the Yukon.

Work on the BSC project was postponed in 1998 with the aim of continuing the project under the auspices of the Ancient Pacific Margin NATMAP program planned to commence in 1999. In this way the BSC project could benefit from infrastructure and expertise through affiliation with NATMAP.

Map coverage planned for 1999 was completion of the two 1:50K sheets: 104O/13, 104N/16 (east of Teslin Lake) and small portions of adjacent areas including 104N/9 and 104O/11. However, the availability of a contract helicopter at reduced rates permitted extension of the coverage to include 104N/9 (east of Teslin Lake), all of 104O/12 and most of 104O/14W, a total of 3.5 mapsheets. This area extends for 70km from the western shore of Teslin Lake as far east as the community of Swift River. It extends from the British Columbia-YT border to the south, about 56 kilometres (Figures 1 and 2). In standard units of area measurement, the map area is nearly 2750km².

French Range Project

Regional 1:50K mapping and lithogeochemical sampling were conducted in the French Range in 1996 (Figure 1) to evaluate the potential of the French Range volcanics and associated strata as hosts for Kutcho Creek style mineralization. In 1999 a successful LITHOPROBE supporting geoscience grant application (P. Erdmer (U of Alberta), principal investigator; and E. Ghent (U of Calgary), coinvestigator) proposed the collection of data which bears on regional structure and tectonic history of the French Range, particularly blueschist formation (see NSERC Application on file). BCGS involvement included an expanded investigation for felsic volcanic horizons such as the one discovered in 1996, their structural and stratigraphic setting and geochemical sampling.

Geoscience data from the French Range directly contribute to the southern SNORCLE transect which runs along the east shore of Dease Lake. In total, Big Salmon Complex & French Range Projects: end of season report 1999 Submitted to: Internal Management Team Submitted by: Mitch Mihalynuk

9/14/99

about 0.25 1:50K was mapped at 1:20K scale and structural relationships were established.



Figure 1: Big Salmon Complex & French Range location showing BC Road and Community Infrastructure

Field Season Objectives

Big Salmon Complex

- map area in sufficient detail to permit creation of high quality 1:50K scale geological maps
- test the Big Salmon Complex stratigraphy as proposed in 1997.
- identify geological environments prospective for the discovery of VMS deposits
- test structural interpretations

Big Salmon Complex & French Range Projects: end of season report 1999 Submitted to: Internal Management Team Submitted by: Mitch Mihalynuk

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Big SalmonAnomalous RGS:Areas Mapped:PlutonsSb, As, Au, Ba, Co, Cu1996/7 reconPASSb, Au, W1999 1:50K

Figure 2: Big Salmon Complex distribution as suspected in 1997 showing limits of 1996/97 reconnaissance mapping and coverage at the end of the 1999 field season. PAS is Protected Area Strategy study area.

- evaluate potential for magmatic related Au deposits like those in the Alaska and Yukon (Ft. Knox, Pogo, Dublin Gulch, and others of the Tombstone suite).
- collect samples of Logtung intrusions to date it. Presumably it is coeval with mineralization dated at 109 Ma (similar to the old 107Ma intrusions at Pogo) and the regional geochemical expression of this environment is right (W, Au, As, Sb; identified by Lefebure as one of the province's best bets for magmatic-related Au deposit). Sample blue-green beryl ("aquamarine") at the Logtung deposit.

• evaluate potential for other deposit types in the map area (e.g. manto, skarn).

French Range

- map extent of felsic volcanic horizon and search for others
- determine the extent of coherent crustal blocks
- develop a clear understanding of the deformational history and structural style to aid both in future exploration and interpretation of LITHOPROBE deep seismic survey

Accomplishments

BIG SALMON COMPLEX:

- stratigraphy developed in 1997 holds up to testing (except that, based upon isotopic age data, the strata are upside down)
- structural history developed in 1997 holds true except that E-W trending late folds are more prominent than previously recognized.
- the tripartite stratigraphic marker succession is apparently very persistent; present in Little Salmon Lake area, YT (Maurice Colpron's area), 250km north of the BSC study area
- established that Klinkit Assemblage and Big Salmon Complex are equivalent in part; thereby upgrading the mineral potential of areas underlain by Klinkit Assemblage
- discovered two new copper showings in crinkle chert unit
- discovered pyrite-rich dacite tuff (staked before, but apparently not recorded)
- established closure of regional scale nappe-like structure and discover crinkle chert where it was predicted to be on western limb
- discovered outcrop exposure of Teslin Fault which at this latitude is the terrane boundary between Yukon-Tanana terrane and Cache Creek Terrane

DEASE LAKE AREA

- established that the French Range is comprised of essentially coherent crustal blocks which have experienced wholesale blueschist metamorphism.
- evidence of polyphase deformation -two early isoclinal folding events are pervasively overprinted by subhorizontal crenulation cleavage probably related to a late regional scale fold.
- numerous new blueschist localities discovered.
- chert with relatively undeformed radiolaria was collected at several localities (12 samples collected)

Project Status and Recommendations

Big Salmon Complex

Big Salmon Complex fieldwork in 1999 exceeded the objectives set forth in the project proposal. Thanks in large part to the generosity of Charlie Roots whose principal objective was to complete mapping (where needed) of inaccessible areas within the southern Wolf Lake 1:250K sheet, Yukon. With Charlie's allocation of helicopter time as well as field assistance our planned map coverage was achieved and further extended by nearly one and a half full 1:50K sheets. Nearly all key outcrop belts have been investigated. Several exceptions are notable: 1 in each of 104N/9 and N/16, three in 104O/12 (due to forest fires and weather) and four in 104O/14W. Futhermore, a tight time frame prevented confirmation of structural interpretation established in 1997 in the region of the Arsenault deposit, the principal developed prospect in the BSC of British Columbia.

A short, very low budget field season may be justified for the BSC project in 2000 (borrowed field assistant). Most of the known holes in the mapping could be filled from either lakes or roads, and if a helicopter is available in or near the map area, holes in 104O/12 could also be plugged. Other field check requirements may emerge as map compilation nears completion or interesting assay/RGS results are received. Furthermore, our contribution to the Pacific Margins NATMAP is key. We should consider maintaining our involvement through cooperative field mapping efforts of perhaps a week duration with both Maurice Colpron and Steve Gordey, both of whom have expressed interest in this type of relationship.

French Range

Felsic volcanism in the French Range is more extensive than currently known. Indicators include block-sized dacitic bombs in intermediate to mafic tuff and tuffite and reference to a quartz-phyric volcanic unit in Monger (1968). However, known felsic units lack any indication of significant mineralization. Other parts of the French Range may warrant further mapping, particularly in consideration of deposit models other than those which focus on VMS-style mineralization (e.g. magmatic related Au; pressure-cooker porphyries). In the mean time, further BCGS expenditures the French Range rocks mapped to date are not warranted on the basis of high potential for the discovery of VMS mineralization. However, the area is of key scientific interest, and with further study offers to significantly improve our understanding of the tectonic processes that shaped the Intermontane superterrane.

Output Planned1999/2000

Refereed Publications

Published in last 2 months

- Mihalynuk, M.G., Nelson, J., Murphy, D.C., Brew, D.A., and Erdmer, P. (1999): Structural and kinematic evolution of the Yukon-Tanana upland tectonites, east-central Alaska: A record of late Paleozoic to Mesozoic crustal assembly - Comment; *Geological Society of America Bulletin*.
- Johnston, S.T., Mihalynuk, M.G., Brew, D.A., Hart, C.J.R., Erdmer, P., and Gehrels, G.E. (1999): Paleozoic and Mesozoic rocks of Stikinia exposed
 - in northwestern British Columbia: Implications for correlations in the northern Cordillera. Discussion; Geological Society of America Bulletin.

In Prep.

- Mihalynuk, Friedman, Gabites: Age, Chemical Characterization and Distribution of Widespread Sloko Group volcanics in Northwestern BC.
- December 1999 Teslin Fault Exposed, de Keijzer, Mihalynuk and Johnston; plan to submit to *Tectonics*

Internal Publications

Geological Fieldwork & Current Research articles

- September 1999 Current Research paper: de Keijzer, Mihalynuk and Johnston; Kinematic evolution of the Teslin Fault (prelim draft completed in field)
- November 1999 Geological Fieldwork paper: Big Salmon Complex update; Mihalynuk and host of others
- November 1999 French Range update: Mihalynuk, Erdmer, Ghent and Cordey (prelim draft completed in field)

Geoscience Series Maps at 1:50,000

February 2000	Open File Map 104O/13
March 2000	Open File Map 104N/16
Nov 2000	Open File Map 105B/4 (Yukon -coauthor with Roots et al.)
Jan 2001	Open File Map 105B/3 (Yukon -coauthor with Roots et al.)
Feb 2001	Open File Map 104O/12
March 2001	Open File Map 104O/14W

Summary Reports

Tulsequah Bulletin

- resume writing in late November 1999
- 1:100K compilation map: polygons digitized completely, needs structural data and surround/legend.

Big Salmon Complex

- NO BULLETIN; contributions to comprehensive write-up to be completed by Charlie Roots.
- external publication(s) on Big Salmon Complex age, structure, stratig.

Presentations

Sept 99 - coauthored abstract at TERRANES conference with Steve Johnston.

Nov 99 - Whitehorse Geoscience Forum: Regional Mapping update in the Big Salmon Complex: new twists in regional metallogeny.

Jan 2000 - Poster session at RoundUp with Roots et al.

Jan 2000 -Cordilleran Roundup poster

Feb 2000 - LITHOPROBE 2000 Transect Meeting: Results from the French Range Project (participation obligatory).

Feb 2000 - Coauthor BSC Talk at Cordilleran Tectonics Workshop by C. Roots

Exploration Activity

Big Salmon Complex in BC

Tanana Exploration is the only mining venture currently active in the British Columbia portion of the BSC. On August 13 I accompanied Steve Traynor of Tanana Res. and Alan McNutt of Rio Algom for a property visit to the Arsenault as a prelude to a potential option agreement. As Steve was unable to locate his "new"showing, the visit was not as successful as it could have been. I am unaware of the outcome of the trip.

Big Salmon Complex in YT

Exploration companies still seem much more comfortable about spending their exploration dollars outside of British Columbia. This is blatantly obvious in the case of Brett Resources and Fairfield Minerals, both of which are actively engaged in mineral exploration of Big Salmon Complex rocks immediately north of the BC-YT border.

French Range

There is no sign of exploration work past or present in the French Range where mapped.

Client Interactions

Brett Resources - as the Brett Resources field crew was sharing our base camp for two weeks in July it provided ample opportunity for interaction. On several occasions I was consulted on lithologic identification and stratigraphic setting. Project head was Jeff Bradshaw. Followed up with a copy of our 1998 Geological Fieldwork paper sent Sept 1/99.

Fairfield Minerals - Fairfield Minerals geologists visited our camp on two occasions. Ed Balon, party leader, continues to follow our BSC work with interest, but insists that he cannot raise capital for projects in British Columbia.

Tanana Exploration / Rio Algom - accompanied Steve Traynor president of Tanana Exploration and Alan McNutt of Rio Algom on visit of Arsenault property (see Exploration Activity above).

Cominco - discussed the merits of both the Big Salmon Complex VMS and northern Cache Creek terrane for gold-rich porphyry deposits with Paul McRobbie. Followed up with an information package sent Sept 1/99.

Safety Report

Serious incidents

Zero hours of work were lost due to serious incidents this year.

Days in field: Mitch Mihalynuk = 46

Tom Gleeson = 42

Samples collected

Geochron	4 UBC contract
	i-Teslin zone syenite
	ii-Mount Charlie Cole
	iii-Mount Hazel orthogneiss
	iv-Klinkit gabbro

2 UBC Friedman contract i-Teslin Fault granite sill ii-Teslin Fault quartz diorite

2 U of	A contract i-Longtongue pluton ii-Logtung porphyry iii-Klinkit porphyry		
Assay	26		
Whole rock oxides	8		
REE/whole rock ox	ides 6		
Conodont	7		
Radiolaria	12		

Appendix I Budget Summary

1999-2000 French Range		
Project	Budget	Expenditures
Air Charters		\$4,514
	Transfer to Erdmer	-\$995
TOTAL	\$3,500	\$3,519
	Balance	-\$19

9/14/99

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1999-2000 budget Big Salmon project

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	Proposal	В	E	xpenditures
STOB 1 SALARIES	•			-
Junior assistants				
number	1		1	
biweekly pay periods	4		4	
cost per pay period	\$1,125		\$1,125	
total salaries		\$4,498		\$4,498
overtime				
overtime days	9		12	
cost per day	\$225	60 00 4		* 0 - <i>1</i> / /
		\$2,024 \$6,522		₽Z,044 \$7.040
		40,522		\$7,0 4 2
\$37 10 biweekly		\$148		\$148
SUBTOTAL		\$148		\$148
STOR 3 BENEFITS		•1		• 140
217 X STOB 1		\$1,415		\$1.528
SUBTOTAL		\$1,415		\$1,528
Total STOB01, 02, 03		\$8,086		\$8,719
STOB 10 TRAVEL				\$4,801
Per diems				
number of crew	2			
number of days	47			
perdiem rate	\$38			
total per diems		\$3,572		
Hotels		\$300		
Airlines		\$0		\$1,530
Conference travel		\$2,000		\$2,000
SUBTUTAL		\$5,872		3 8,331
STOR 20 CONTRACTS/SERVICES				
Zircon radiometric dates @2000	4	\$8,000	4	\$8,000
Trace Element geochem @\$100	15	\$1,500	6	\$600
Maior oxide geochem @\$25			14	\$350
Conodonts @\$160	12	\$1,920	7	\$1,120
Radiolaria @ \$250			12	\$3,000
Thin sections @\$15	50	\$750	50	\$750
Assays @\$25	50	\$1,250	26	\$650
Contracts		\$0		\$1,200
SUBTOTAL		\$13,420		\$15,670
STOB 30 SUPPLIES				
Page charges				\$373
TRIM maps, airphotos		\$1,000		\$3,491
Binders, Pens and mylar		* 4 000		\$585
SUBTOTAL STOR FOULELICORTER		\$1,000		\$4,449
TRUCKSEOLIR)				
Traverse days: # ave set out/in hrs	21	1		
Fly Campe: # bre to set out	3	2		
Helicopter hours	34	-		
Helicopter rate	•••			
Helicopter (#hours X rate)		\$28,900		\$23,007
Misc Equip				\$493
Truck rental -last year \$2500/month		\$2,500		
Truck fuel		\$1,500		
Truck repairs		\$1,000		
Shipping		\$500		£00 504
SUBTUTAL		\$34,400		\$23,501
		# 400		£ 400
SUBTOTAL		\$400 ¢400		₽400 €400
TOTAL STOR 10-67		\$55.092		\$52,351
ΤΟΤΔΙ		\$63 179		\$61.070
Revised Budget \$63000 with 2.5%		403,170		\$01,07U
cut		\$61 425		
		WO 1,720	Balance	\$355

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