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Yukon Energy Corporation
2 Miles Canyon Road
Whitehorse, Yukon Y1A 6S7

Attention: David Morrison
President and CEO

Subject: Exploration of Geothermal Potential at Jarvis River Warm Springs – 2009 Detailed Geology Mapping Program

1.0 INTRODUCTION

EBA Engineering Consultants Ltd. (EBA) is presently conducting a Yukon geothermal exploration program for Yukon Energy Corporation (YEC). In 2008, six survey areas were identified for preliminary exploration and assessment for geothermal potential, including Whitehorse, Shakwak Valley, Volcano Mountain, McArthur, Larson Creek/Beaver River and Nash Creek. This report summarizes work completed in 2009 to assess geology in the Jarvis River area of the Shakwak Valley (Phase 019). Regional geology mapping and geophysical surveys indicate the presence of steep faults, which can be conduits of hot water from deep thermal sources. As a follow-up to encouraging results of the 2008 reconnaissance level assessment, the 2009 program also included geophysical surveys (Phase 017), water and dissolved gas sampling (Phase 022), sampling of warm spring gases (Phase 018), and a diamond drill program (Phase 023).

The study area was initially selected because of the Jarvis River Warm Springs, which are located on the north side of the Jarvis River in the Shakwak Valley. The area is included within the Champagne Aishihik First Nation Settlement Lands and the Kluane Game Sanctuary. Access to the springs is from the Alaska Highway, about 31 kms north of Haines Junction, via an existing four-wheel-drive road and short winter trail. The four-wheel drive road provides access to a mineral claim located about 5 km south of the Jarvis River Warm Springs in volcanics overlain by Dezadeash Group sediments. The mineral deposit includes copper, gold, silver, molybdenum, and mercury mineralization, at the northwest end of a linear, northwest-oriented valley that is parallel with the regional fault trend.

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1.1 PURPOSE AND SCOPE

The key objective of this study was to conduct geology mapping in the Jarvis River Warm Springs area, mainly to collect joint orientation data and lithology to aid in the understanding of structural trends. The scope of this work involved preparatory office activities including geological background review and air photo interpretation, followed by reconnaissance-level fieldwork including geological observations and field measurements. The work was supported by helicopter and completed over three days in conjunction with the fieldwork for some follow-up of winter open-water targets and further sampling at the warm springs. No intrusive fieldwork (e.g., drilling) or geophysics was conducted for this phase of the geothermal exploration program. This report contains all of the findings, results, analysis, discussion, and, conclusions and recommendations for this assignment.

2.0 METHODS

Fieldwork to carry out geology mapping, in conjunction with follow-up on winter open-water targets and additional water and gas sampling at the Jarvis River Warm Springs, was completed by Mr. J. Dennett, Mr. S. Klump, and Ms. L. Menzies of EBA on July 13 to 15, 2009. Helicopter support was provided by Trans North Turbo Air of Haines Junction, Yukon, using a Bell Jet Ranger III helicopter.

2.1 AIR PHOTO INTERPRETATION

EBA carried out a stereoscopic air photo interpretation (API) using colour, 1:20,000-scale photos air photos flown in 1995 that were obtained from the Yukon Government Energy, Mines and Resources Library. The API was used to look for indications of the following:

- Fault traces and morphological lineaments that might indicate underlying geological structures or lithologic contacts;
- Gross features of bedrock lithology and erosion;
- Existing springs or seeps;
- Vegetation lineaments potentially related to underlying structural bedrock;
- Anomalous or dead vegetation areas potentially indicating warm/hot water seeps or springs (or former springs);
- Details useful for accessing and traversing the target areas;
- Areas of potential hazard from natural features or wildlife areas; and,
- Primary and backup helicopter landing zones (for field planning in case of emergency).

These features were marked on air photos and along with blowups of 1:50,000 NTS topographic maps were used for orientation and field navigation.

2.2 GEOLOGICAL GROUND RECONNAISSANCE

The scope of the geological reconnaissance included the following:

- Initial helicopter fly-over for site overview and safety reasons (spotting active wildlife);
- Identify and map any active hydrothermal features found in the target areas (springs or seeps);
- Identify and map rock staining or mineral precipitation potentially related to past hydrothermal activity. This included documenting surface encrustation (e.g., opal or travertine); and,
- Map main rock types, key geological structures and other geological features where exposed to help define the geological setting.

Given the remote location and for efficiency, field programs were carried out with helicopter support. Prior to fieldwork each day, the EBA team held a tailgate-style safety meeting to discuss safety, weather and field logistics issues, including a helicopter safety check with the helicopter pilot.

3.0 GEOLOGY

Regional geology mapping was reviewed and compiled with other sources of geological information (see References). Structural geology from regional mapping was augmented with interpretation of aeromagnetic maps and the result of geophysical surveys completed in 2009 in the Jarvis River Warm Springs area. Foot traverses to collect structural data were completed July 13 to 15, 2009 southwest of the Jarvis River Warm Springs where there is considerable bedrock exposure.

The structural geology setting of the Shakwak Valley presents a significant target for geothermal exploration. It is the most seismically active area in the Yukon and the Denali Fault System on the west side of the valley is a major intercontinental crustal break. Fault movement in relatively recent geological time (Wisconsinan to middle Holocene) is evidenced by scarps in glacial sediments. Direct evidence of local fault movement direction and orientation in the Shakwak Valley are mainly interpretive as bedrock exposure in the valley is masked by thick glacial drift and lacustrine sediments, which may also present a barrier to hot springs reaching the surface. The fault systems in the Shakwak Valley consist of many individual faults and splays with different displacement histories and tectonic styles (Lanphere, 1978).

One proposed model suggests the potential for a graben structure similar to a recognized geothermal belt in Nevada. Strike-slip movement on the Denali Fault could result in openings on splay faults between the Denali and Shakwak Systems creating a plumbing corridor for deep thermal fluids. (T. Sadlier-Brown, pers. comm.).

The only confirmed thermal spring in the Shakwak Valley at the Jarvis River is sourced from an artesian aquifer in a glaciofluvial stratum. The bedrock source of this thermal anomaly is unknown; however, interpretation of regional aeromagnetic mapping and the results of an electromagnetic ground survey (EBA, 2009) both indicate major fault structures underlying the Jarvis River Warm Springs. To date, exploration has been limited to the immediate area of the warm springs, as regional scale geophysics or drilling programs to investigate the potential for geothermal development are cost-prohibitive.

Detailed geology at Jarvis River Warm Springs is unknown as there area no bedrock outcrops near the site. Bedrock was examined and structure was measured at outcrops located 1 km south to 5 km west of the JRWS. The closest bedrock exposure, located approximately one kilometre south, is greenschist (PMvs-Table 1). Bedrock exposures where surface geological data were collected are likely separated from the area of the Jarvis River Warm Springs by a significant geological structure and are not necessarily indicative of bedrock lithology at the warm springs.

Bedrock underlying the floor of the broad Shakwak Valley is masked by thick deposits of Quaternary sediments, mostly lacustrine silts and glacial drift. Bedrock outcrops closest to the JRWS are found on the valley flanks of the Kluane Range foothills. Three main geological suites mapped in the area immediately southwest of the JRWS, and granodiorite that occurs northwest of the JRWS, are described in Table 1. The dominant structural orientation of jointing measured during the geological mapping field program correlates with the orientation of fault structures indicated by the geophysical surveys.

TABLE 1 : JARVIS RIVER WARM SPRINGS AREA GEOLOGY UNITS

MAP SYMBOL	AGE	DESCRIPTION	OBSERVED IN JARVIS RIVER AREA
PMvs	Paleozoic and / or Mesozoic	greenstone, greenschist, minor argillite, and greywacke; equivalent to PTRvs, but may include older; may include JKD and PTRb, Mb, IKb, or KTb	mainly greenschist; some greenstone
JKD	Upper Jurassic to Lower Cretaceous	Dezadeash Group; interbedded, light to dark buff grey lithic greywacke, sandstone, siltstone, thin, dark grey shale, argillite, and conglomerate; mass flow conglomerate common in middle part; rare light grey tuff	dark grey shale
PTRb	Permian and or Triassic and (?) Cretaceous	medium grey green, massive, medium grained pyroxene gabbro sills, highly variable in thickness; very low to low grade regional metamorphism; albite-epidote-hornfels facies (low grade) to hornblende-hornfels (medium grade) facies contact metamorphism by larger sills;	

TABLE 1 : JARVIS RIVER WARM SPRINGS AREA GEOLOGY UNITS			
MAP SYMBOL	AGE	DESCRIPTION	OBSERVED IN JARVIS RIVER AREA
Pc, Ps, Pv	Carboniferous to Permian	Pc - buff bioclastic limestone, calcarenite; local conglomerate at base; very low grade regional metamorphism;	
		Ps - thin bedded siliceous argillite, siltstone, minor greywacke and conglomerate; locally thin basaltic flows (some pillowed), breccia and tuff;	
		Pv - pred. flows; includes dark green massive porphyritic (augite) basalt to andesite flows (locally pillowed); minor volcanic breccia, rare argillite.	
ETN	Early Tertiary	Ruby Range Batholith - biotite-hornblende granodiorite and related granitic rocks of the.	coarse-grained biotite-hornblende granodiorite

3.1 GEOLOGY FIELD PROGRAM RESULTS

Orientations of joints, foliation and veining in bedrock were measured in the field. In the granodiorite, only joints were measured as no foliation was observed and veining was rare. In total 224 structural measurements were taken; 185 in metamorphic units near the western margin of the Shakwak Valley and 39 in the granodiorite unit east of the Alaska Highway. Field data were compiled and plotted on stereographic projection and rose diagram plots (Figures 2 to 5). Structural elements were plotted separately for the metamorphic and intrusive rock units.

In the metamorphic units (schist and slate) 128 jointing, 51 foliation and 6 vein orientation measurements were taken. Stereographic projection and the Rose Diagram plot of the data from the metamorphic units shows strong structural trends striking about 112^{O} and 128^{O} and dipping steeply to the south-southwest. Two secondary structural trends strike 037^{O} dipping steeply (70^{O} to vertical) to the east-southeast and northwest, and strike 095^{O} with a wide range of southerly dips.

In the granodiorite unit 39 joint orientations were measured at a rock cut on the Alaska Highway (Figures 4 and 5). The dominant structural trend strikes 165^{O}, dipping steeply (about 70^{O}) to the west-southwest. Secondary trends strike 053^{O}, dipping about 30^{O} to the southeast, and 120^{O} dipping about 65^{O} to the north-northeast.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Jarvis River Warm Springs are located in an area with a thick sequence of glacial sediments and depth to bedrock is unknown. There are no bedrock outcrops within one kilometre of the warm springs. Geological information for the site is limited to regional mapping with some detailed structural mapping of bedrock on the west and east sides of the Shakwak Valley. Dominant structural orientations from mapping of bedrock in the area concur with the trends of major structure indicated by regional mapping, aeromagnetic surveys and ground based field magnetic surveys.

Knowledge of the geological structure at the site is key to evaluation of the geothermal potential at the Jarvis River Warm Springs. Geophysical surveys completed in 2009 (Phase 017 – report under separate cover) and interpretation of regional aeromagnetic mapping indicates a major fault structure underlying the site. Sub-surface bedrock data and structural geology in the Jarvis River Warm Springs area is critical to understanding the thermal gradient and ultimate source of the thermal springs, and to advance the assessment of geothermal development potential. Determination of the geothermal gradient in this area is recommended to advance the exploration program at the Jarvis River Warm Springs. Drilling a 300 m borehole is recommended to achieve this end, and will also advance the understanding of subsurface geology. EBA recommends that a drilling program be planned for the fall of 2010, with equipment designed to drill through the underlying aquifer and control artesian flows.

We trust that the foregoing information meets your present requirements. If you have any questions or require further information, please contact the undersigned.

EBA Engineering Consultants Ltd.

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5.0 REFERENCES

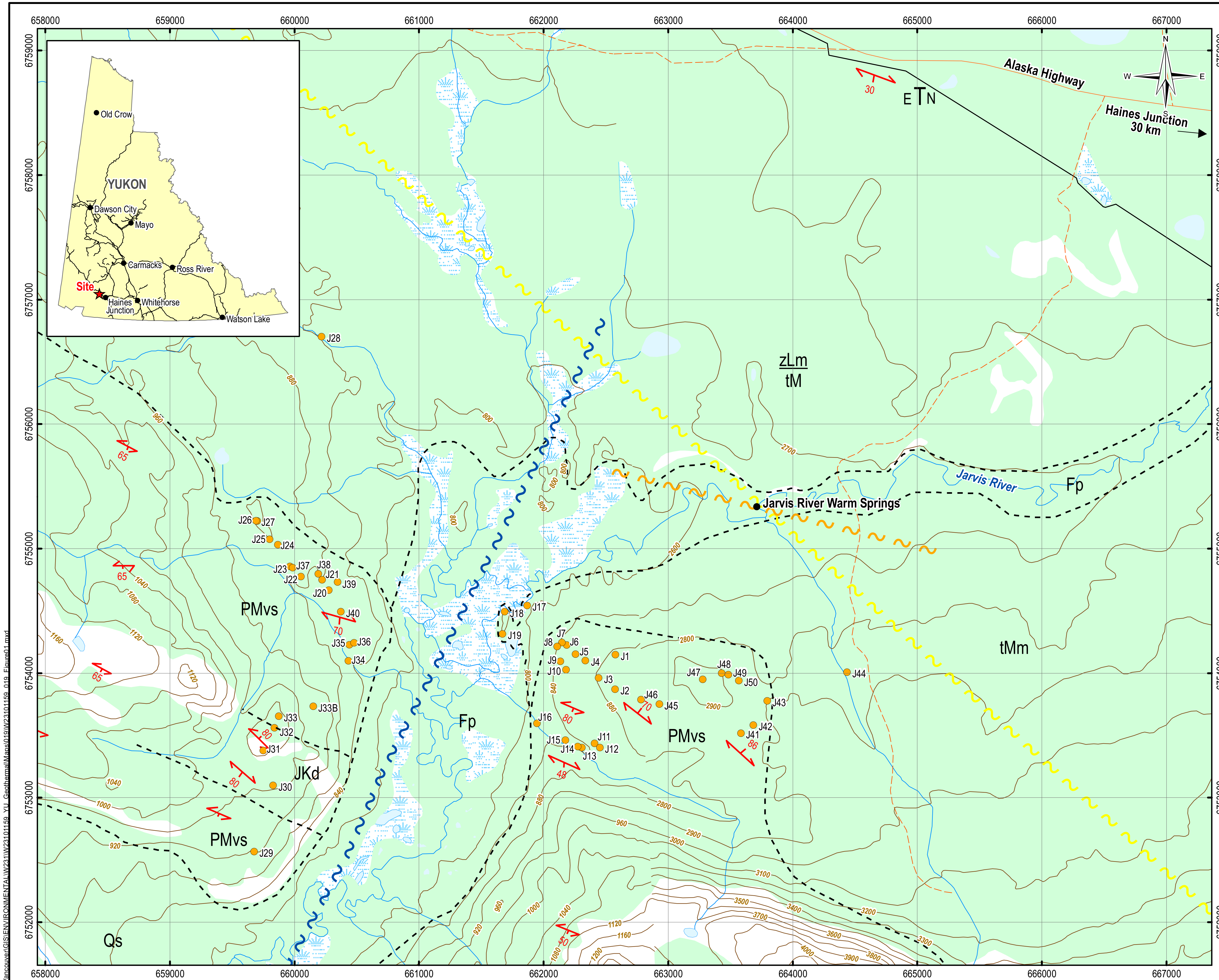
Bostock, H.S. Geology of Northwest Shakwak Valley, Yukon Territory; Geological Survey of Canada Memoir 267. 54 p. 1952

Clague, J.J. the Denali Fault System in Southwest Yukon Territory- A Geologic Hazard?; in Current Research, Part A , Geological Survey of Canada, Paper 79-1A, p. 169-178. 1979.

Geological Survey of Canada. Geology, S.W. Dezadeash Map Area (115A) Yukon Territory. Open File 831. 1983.

Lanphere, M.A. Displacement History of the Denali Fault System, Alaska and Canada. Canadian Journal of Earth Sciences, v.15, p. 817 - 822. 1978.

FIGURES



LEGEND

- Geological Field Data (2009)
- Limit of Bedrock / Contact (approximate)
- Dominant Jointing with Dip

Faults

- From Regional Mapping
- Interpreted from Aeromagnetic Maps
- Interpreted from Electromagnetic Ground Geophysics Survey
- Alaska Highway
- Limited-use Road
- Pipeline Right of Way
- Contour (40m/100ft)
- Watercourse
- Waterbody
- Wetland
- Vegetation

Bedrock Geology

PMvs (Paleozoic and /or Mesozoic): greenstone, greenschist, minor argillite, and greywacke.

JKd (Upper Jurassic to Lower Cretaceous); greywacke, sandstone, siltstone, shale, argillite, conglomerate.

ETN (Early Tertiary) biotite-hornblende granodiorite and related granitic rocks of the Ruby Range Batholith

Surficial Geology

Fp fluvial plain (silt; fine sand)

zLm glaciolacustrine, mostly silt, rolling

tMm till, sandy silt with trace to some gravel, rolling

Qs Quaternary sediments, undivided

NOTES

Base data source:
NTS 1:50,000

ISSUED FOR USE

YUKON-WIDE GEOTHERMAL EXPLORATION PROGRAM

Geology - Jarvis River Warm Springs Area

PROJECTION	DATUM
UTM Zone 8	NAD83

Scale: 1:30,000

FILE NO. W23101159_019_Figure01.mxd

PROJECT NO.	DWN	CKD	REV
W23101159.019	MEZ	JD	0

OFFICE	DATE
EBA-VANC	April 26, 2010

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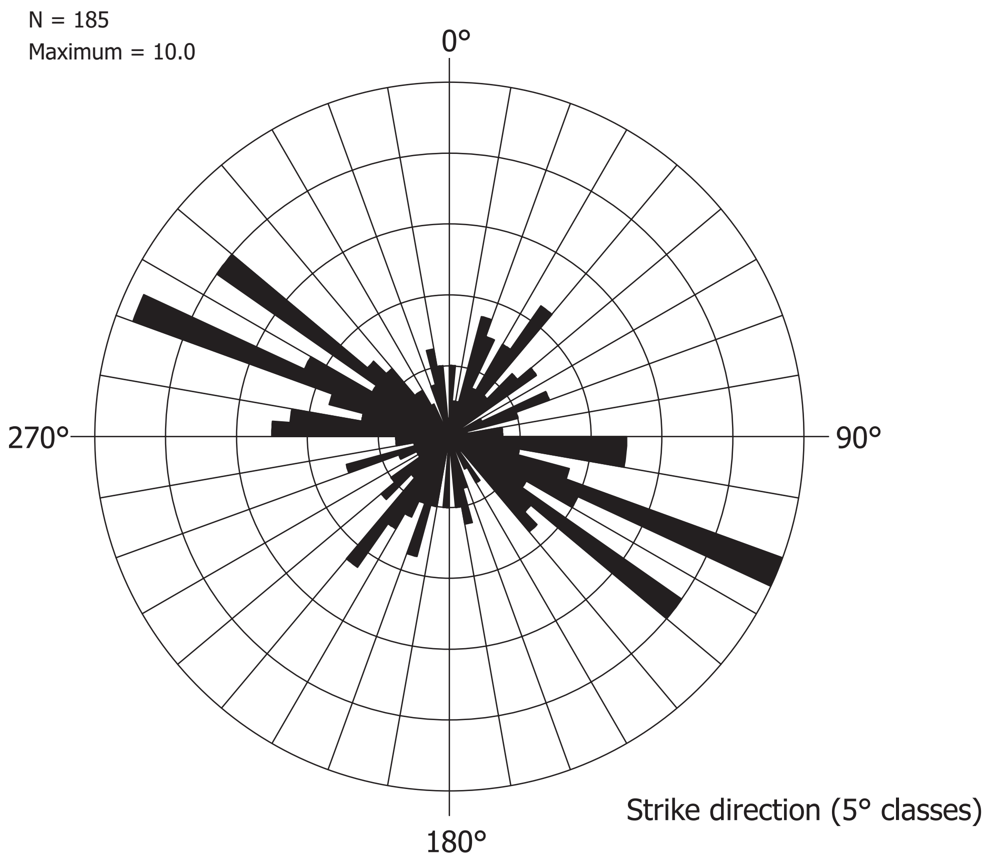
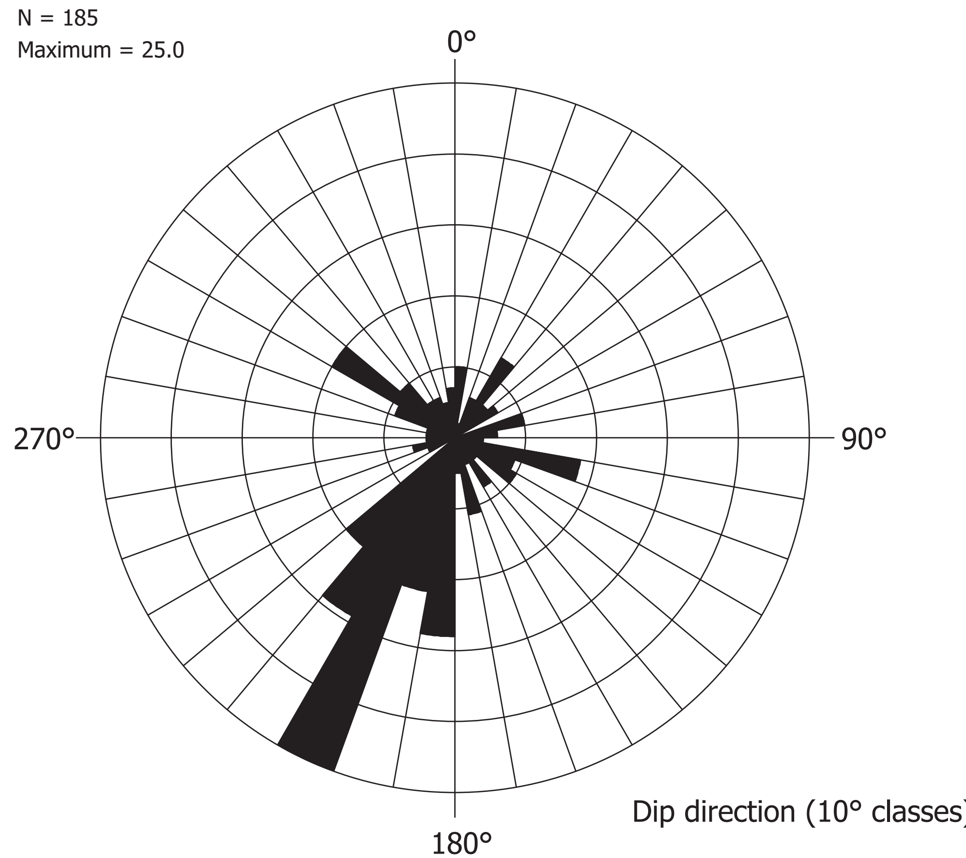
Figure 1





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NOTES

Rose Diagrams are a form of bar graph showing the number of measurements that fall within a certain range of strike or dip direction.
There is a major trend visible in both the strike and dip directions. The major strike directions are 112°/128° and the major dip direction is south-southwest

CLIENT

YUKON ENERGY CORPORATION

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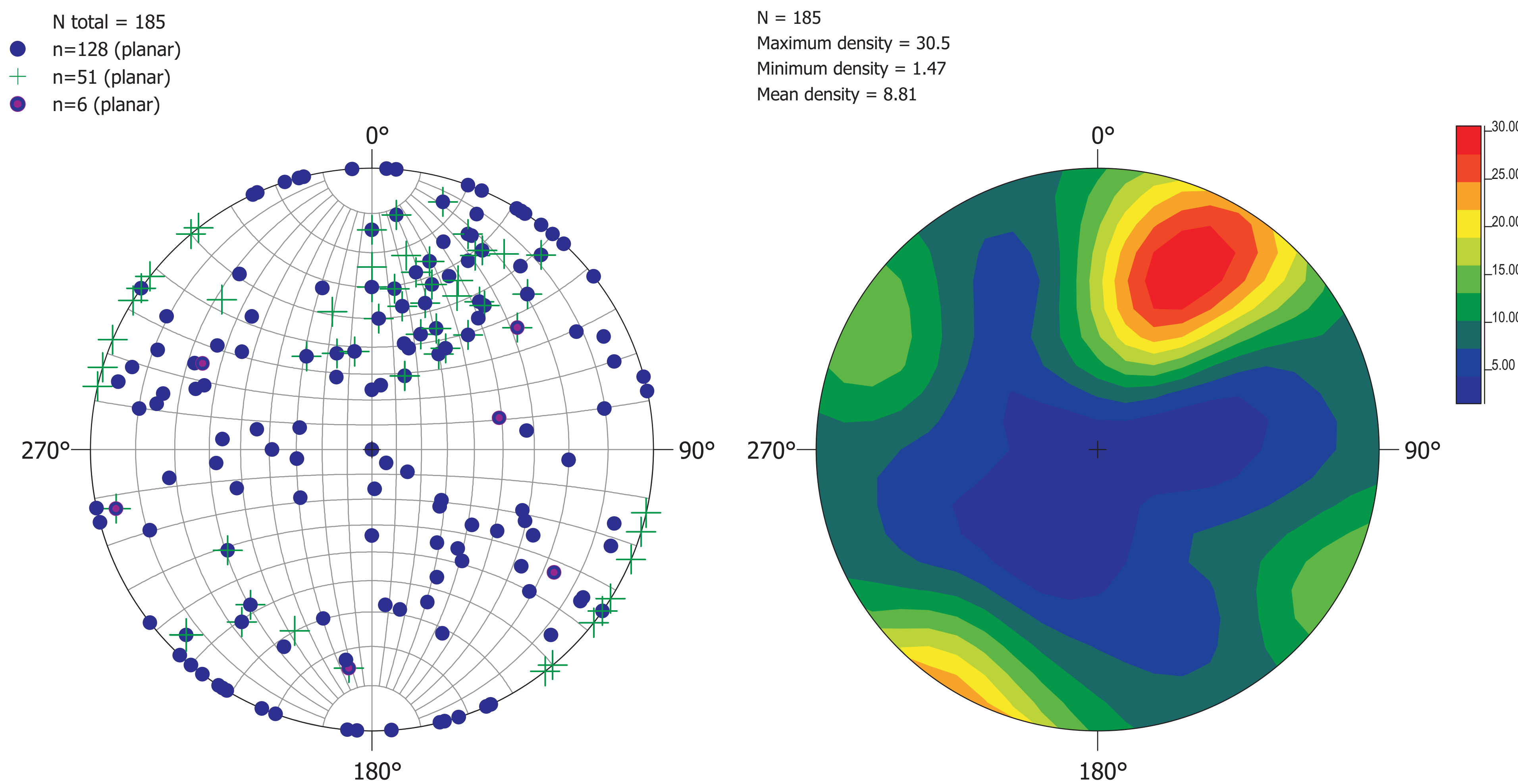
2009 GEOTHERMAL EXPLORATION PROGRAM
SHAKWAK VALLEY, YUKON

Rose Diagram - Structural Trends
Metamorphic Units (PMvs)

PROJECT NO.	DWN	CKD	REV
W23101159.029	SKS	JTD	0
OFFICE	DATE		
EBA-WHSE	October 2009		

Figure 2



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NOTES

Equal area projection, lower hemisphere

The dots in the left plot represent poles of joints (dots) and foliation (crosses) projected into the equatorial plane of a sphere. The density plot on the right shows clusters of poles with similar spatial orientation.
The cluster of poles in the northeastern part of the stereographic projection (red area in the density plot on the right) corresponds to joints that dip steeply to a southwesterly direction.

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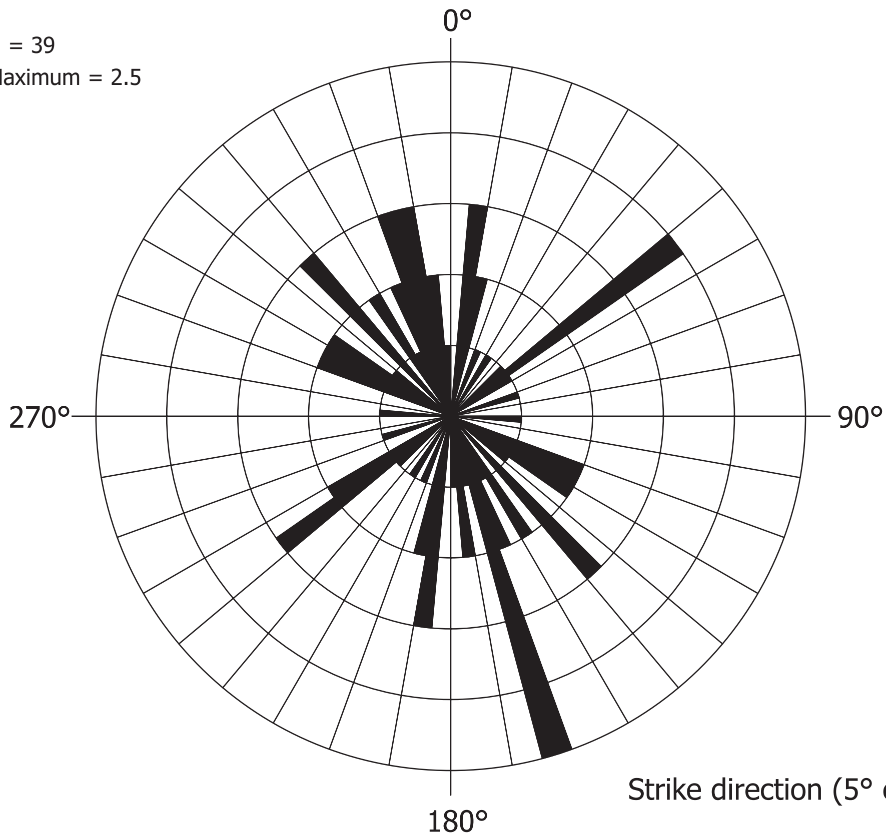
2009 GEOTHERMAL EXPLORATION PROGRAM SHAKWAK VALLEY, YUKON

Stereographic Projection of Structural Data Metamorphic Units (PMvs)

PROJECT NO.	DWN	CKD	REV
W23101159.029	SKS	JTD	0
OFFICE	DATE		
EBA-WHSE	October 2009		

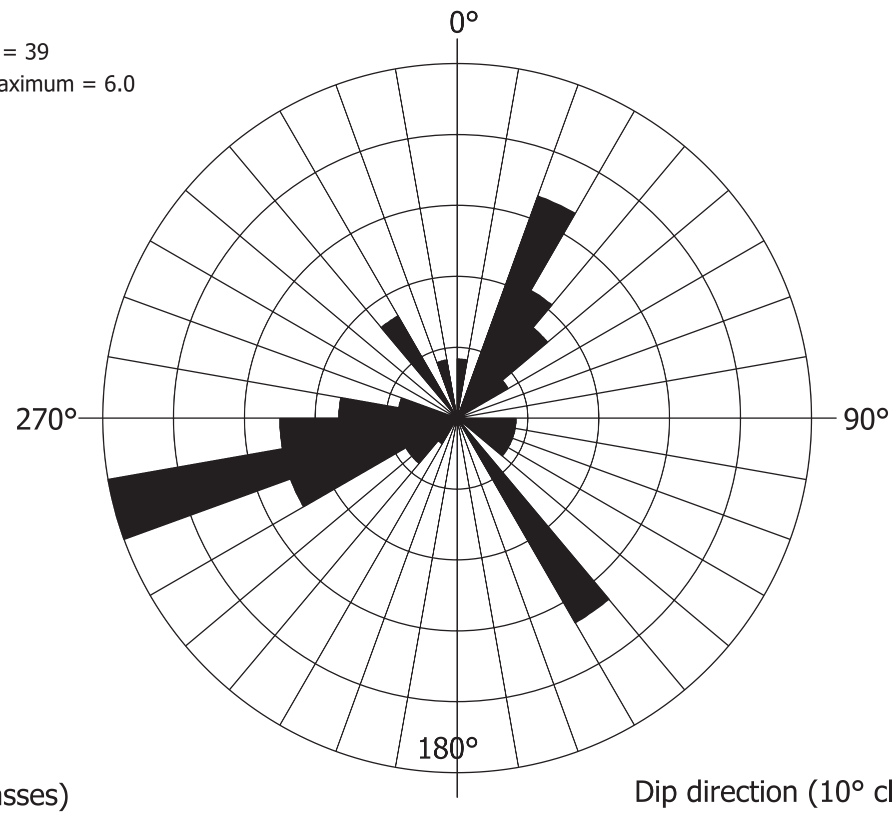
Figure 3

N = 39
Maximum = 2.5



Strike direction (5° classes)

N = 39
Maximum = 6.0



Dip direction (10° classes)

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NOTES

Rose Diagrams are a form of bar graph showing the number of measurements that fall within a certain range of strike or dip direction.
Shown here are rose diagrams of both strike and dip direction. The trends seen in these graphs indicate three major dip directions and a minor striking trend of about 165°.

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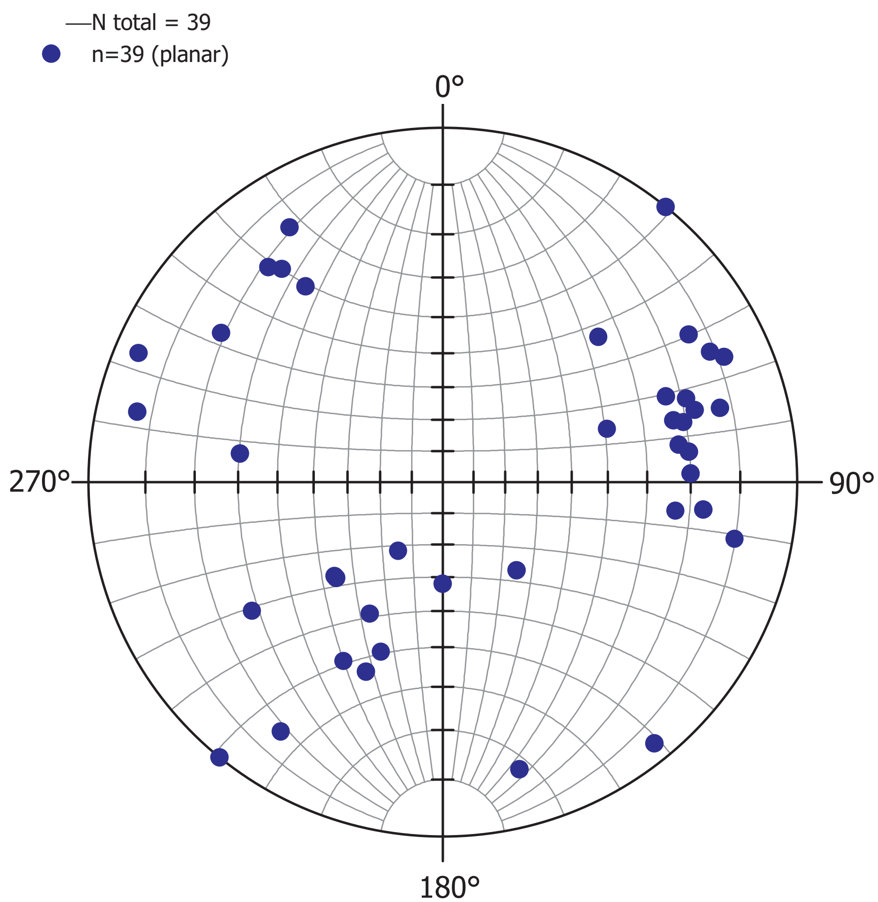
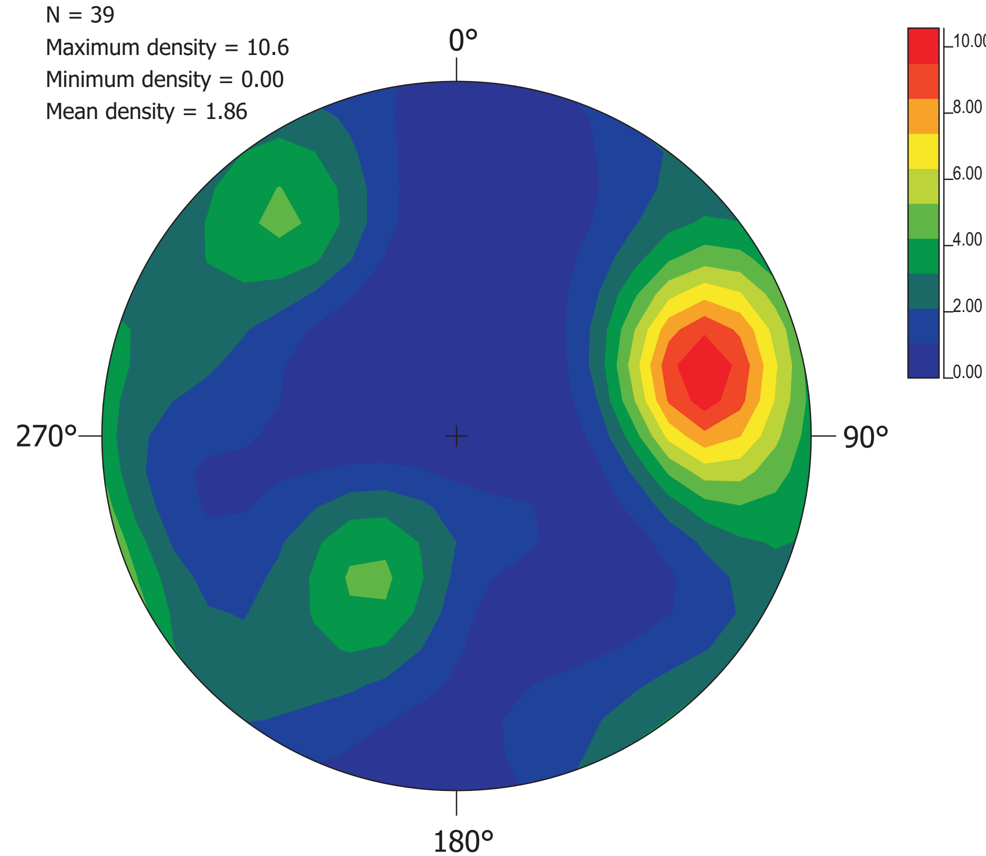
2009 GEOTHERMAL EXPLORATION PROGRAM SHAKWAK VALLEY, YUKON

Rose Diagram - Structural Data Granodiorite (ETN)

PROJECT NO.	DWN	CKD	REV
W23101159.029	SKS	JTD	0
OFFICE	DATE		
EBA-WHSE	October 2009		

Figure 4





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NOTES

Equal area projection, lower hemisphere

The dots in the left plot represent poles of joints projected into the equatorial plane of a sphere. The density plot on the right shows clusters of poles with similar spatial orientation.
For example, the cluster of poles in the eastern part of the stereographic projection (red area in the density plot on the right) corresponds to joints that dip steeply to a westerly direction.
Furthermore, the light green areas in the density plot on the right indicate two other dipping trends in northeasterly and southeasterly directions.

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YUKON ENERGY CORPORATION

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2009 GEOTHERMAL EXPLORATION PROGRAM
SHAKWAK VALLEY, YUKON

Stereographic Projection of Structural Data Granodiorite (ETN)

PROJECT NO.	DWN	CKD	REV
W23101159.029	SKS	JTD	1
OFFICE	DATE		
EBA-WHSE	OCTOBER 2009		

Figure 5

TABLES

TABLE 2: GEOLOGY FIELD STATIONS				
STATION NO.	NORTHING	EASTING	ZONE	DESCRIPTION
H09-J 13-1	6754147	662577	7	greenschist
H09-J 13-2	6753870	662574	7	greenschist
H09-J 13-3	6753962	662443	7	greenschist (chlorite schist)
H09-J 13-4	6754101	662337	7	greenschist (chlorite schist)
H09-J 13-5	6754151	662256	7	greenschist (chlorite schist)
H09-J 13-6	6754224	662186	7	greenschist (chlorite schist)
H09-J 13-7	6754246	662149	7	greenschist
H09-J 13-8	6754213	662110	7	chlorite schist
H09-J 13-9	6754094	662135	7	chlorite schist
H09-J 13-10	6754026	662180	7	chlorite schist
H09-J 13-11	6753436	662409	7	med. gn. chlorite-muscovite schist
H09-J 13-12	6753402	662452	7	chlorite schist
H09-J 13-13	6753403	662307	7	platy, lt. gn. chlorite-muscovite schist
H09-J 13-14	6753410	662275	7	platy, lt. gn. chlorite-muscovite schist
H09-J 13-15	6753460	662175	7	greenschist
H09-J 13-16	6753594	661948	7	platy, lt. gn. chlorite-muscovite schist
H09-J 13-17	6754543	661869	7	siliceous, dk gn msv choritic schist
H09-J 13-18	6754491	661689	7	siliceous, dk gn msv chorite-qz schist
H09-J 13-19	6754315	661670	7	chlorite schist
H09-J 14-20	6754664	660276	7	greenschist (chlorite schist)
H09-J 14-21	6754748	660222	7	greenschist; bull qz vns
H09-J 14-22	6754775	660053	7	greenschist; fine qz vns
H09-J 14-23	6754856	659963	7	greenschist
H09-J 14-24	6755031	659866	7	greenschist
H09-J 14-25	6755074	659800	7	greenschist
H09-J 14-26	6755221	659702	7	greenschist
H09-J 14-27	6755224	659691	7	LG
H09-J 14-28	6756702	660218	7	no o/c
H09-J 14-29	6752567	659676	7	greenschist
H09-J 14-30	6753098	659829	7	black slate w/ qz augnes
H09-J 14-31	6753377	659749	7	fissile, dk gy shale
H09-J 14-32	6753559	659839	7	fissile, dk gy shale
H09-J 14-33	6753653	659873	7	greenschist
H09-J 14-33B	6753733	660150	7	dk gn, mod silic greenschist
H09-J 14-34	6754098	660433	7	greenschist
H09-J 14-35	6754228	660440	7	greenschist
H09-J 14-36	6754243	660478	7	greenschist
H09-J 14-37	6754846	659985	7	greenschist
H09-J 14-38	6754797	660191	7	greenschist
H09-J 14-39	6754731	660346	7	greenschist
H09-J 14-40	6754492	660373	7	greenschist
H09-J 15-41	6753446	337955	8	garnetiferous greenschist
H09-J 15-42	6753502	338061	8	greenschist
H09-J 15-43	6753685	338189	8	coarse-crystalline, h/b-chlrt-musc-schist
H09-J 15-44	6753857	338849	8	Mb (at stream)
H09-J 15-45	6753738	337324	8	greenschist
H09-J 15-46	6753787	662782	7	greenschist
H09-J 15-47	6753903	337690	8	msv, chlrt-qz-musc-h/b-epidote?-grnt? Greenschist w/ bull qz
H09-J 15-48	6753940	337845	8	cs-crystalline, blu-gn, chl-musc-garnet? Schist
H09-J 15-49	6753922	337898	8	greenschist
H09-J 15-50	6753867	337978	8	greenschist
H09-J 15-51	6761682	660356	7	granodiorite

APPENDIX

APPENDIX A EBA'S GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

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2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.