DIAMOND DRILLING REPORT

ON THE

KNIPPLE LAKE PROPERTY

KL 1 to 4, Treaty 12 Claims

Skeena Mining Division

N.T.S. 104 A/05 W

NORANDA EXPLORATION COMPANY, LIMITED
(no personal liability)

REPORT BY: MIKE SAVELL
FRASER STEWART

OCTOBER, 1991

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1.0 SUMMARY

The Knipple Lake Property comprises the KL-1, KL-2, KL-3, KL-4, and TREATY-12 mineral claims in the Skeena Mining Division, approximately 60 kilometres north of Stewart, B.C. The KL claims were staked by Noranda in 1988, and the TREATY-12 claim by Ross Resources in 1989. The TREATY-12 claim was optioned by Noranda in 1990. A detailed mapping program and approximately 9 km of induced polarization was completed in 1991 that covered the most likely source areas of the mineralized boulders of quartz-calcite-sulfide vein and breccia material from which assays up to 17.9 gm/t Au, 17.1 gm/t Ag, 0.14% Cu, 3.03% Pb, and 9.02% Zn were obtained.

The property is underlain by volcanic rocks of the Jurassic Hazelton Group. Two packages of volcanics are present, an extensive sequence of interbedded andesitic flows, tuffs and agglomerates (Betty Creek Formation) and a less dominant unit of variably silicified and quartz veined felsic tuffs and flows (Mt. Dilworth Formation). Alteration is not extensive but includes silicification of felsic rocks, chloritization of andesitic rocks, and quartz-sericite-pyrite alteration of felsic porphyritic intrusive rocks found immediately southeast of the KL-3 claim.

Quartz-calcite vein and breccia material containing variable amounts of coarse sphalerite, galena, chalcopyrite and pyrite has been found in subrounded to subangular boulders up to 100 centimetres in diameter scattered over a 100 by 500 metre area at the northwest corner of the KL-3 claim. Economic gold values have been detected in a significant number of these boulders. The source has yet to be located, but is believed to be upslope and/or up ice within the grid surveyed area.

A diamond drilling program consisting of 346.6 metres in six holes tested a variety of geophysical and geochemical targets located upslope and up ice from the mineralized boulder field. The program was hampered by poor drilling conditions. Three of the weak to moderate chargeability anomalies, a geochemical anomaly, and a VLF anomaly were tested. No significant mineralization was detected.

The source of the mineralized boulder field was not located. No further work is recommended at this time and the Treaty 12 claim should be returned to the vendor.

2.0 INTRODUCTION

The Knipple Lake Property comprises the KL-1, KL-2, KL-3, KL-4 and the Treaty-12 mineral claims in the Skeena Mining Division in the Bowser River area, north of Stewart, B.C. The KL 1-3 claims were staked by Noranda Exploration in 1988 to secure attractive gossans believed to be associated with pyritic felsic pyroclastics. The KL-4 claim was staked in 1991 to secure a small gap to the west of the KL-1 claim. The Treaty-12 claim was staked for Ross Resources in 1989 and was subsequently optioned to Noranda Exploration in 1990. This report describes the geological, geochemical, geophysical and diamond drilling programs undertaken by Noranda in August and September of 1991 to evaluate the economic potential of the claims. Diamond drilling which was contracted to J.T. Thomas Diamond Drilling Ltd. of Smithers, B.C.

2.1 LOCATION AND ACCESS

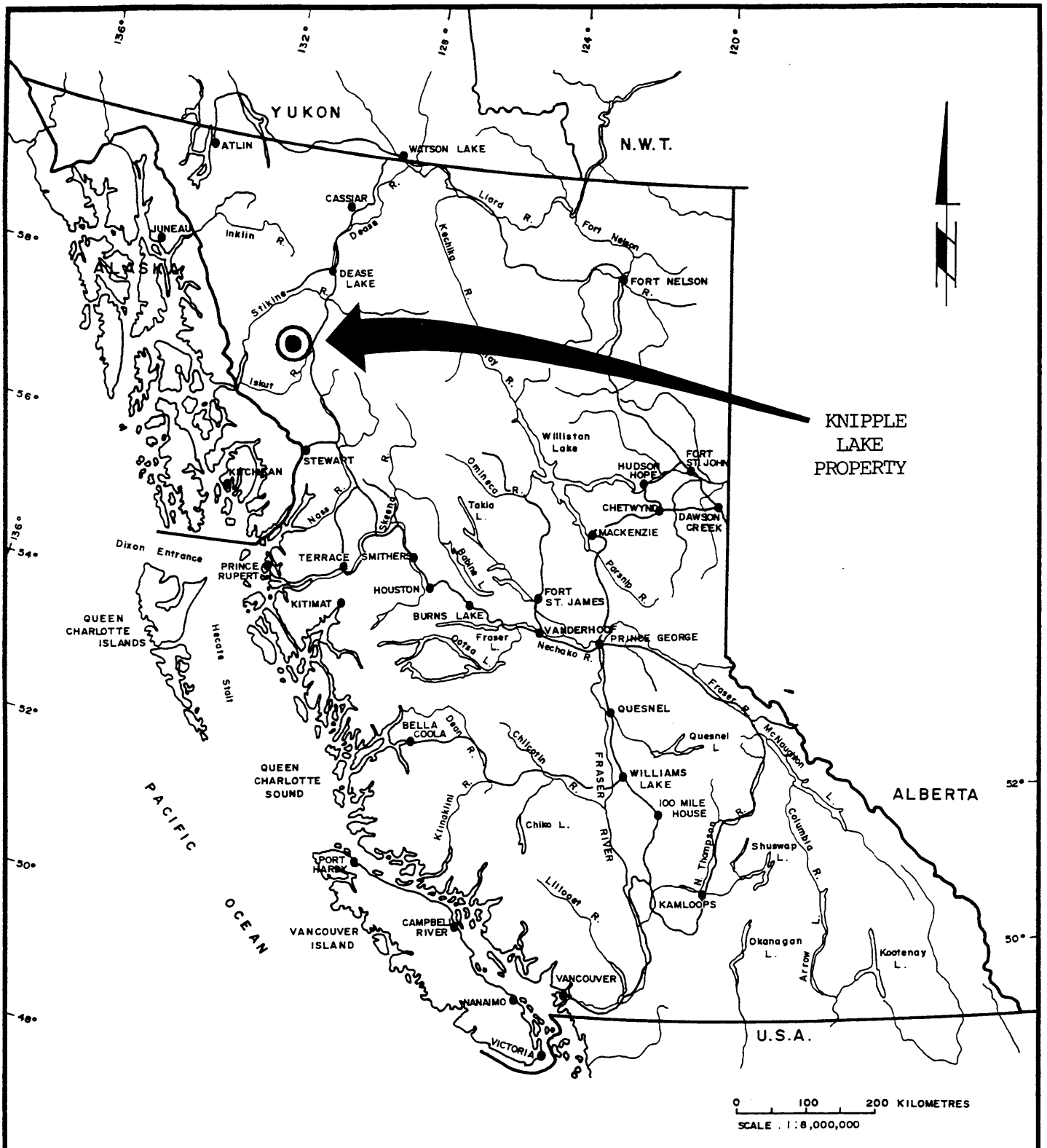
The Knipple Lake Property is located approximately 60 kilometres north of Stewart, B.C. and 25 kilometres southwest of the Stewart-Cassiar Highway (figure 1). At present, the property is accessible only by helicopter. A gravel airstrip connected by a road-barge link to the Stewart Cassiar Highway lies just 1 kilometre south of the property.

A tent camp was established on the property and was utilized for the duration of the 1991 program. A Hughes 500D helicopter chartered from Vancouver Island Helicopters was based at the camp during the drill program.

2.2 PHYSIOGRAPHY AND VEGETATION

The property is contained within the Boundary Ranges of the rugged Coast Mountains. Elevations range from about 450 metres in the Bowser River Valley at the south end of the property to over 1890 metres on the northwest trending ridge on the north end of the property. The east, north, and west sides of the property are bounded by thick, crevassed glaciers.

About 90% of the claims can be easily traversed. The remainder consists of steep cliffs and glaciers. Treeline lies at about 1500 metres, however receding glaciers have left large treeless areas as low as 1000 metres. Alpine areas are covered with grasses and brush typical of a cool, wet coastal alpine



REVISED	KNIPPLE LAKE PROPERTY
	LOCATION MAP
PROJ. No.	SURVEY BY: DATE: Jan 1991
N.T.S.	DRAWN BY: S.K.B. SCALE: 1:8,000,000
DWG. No. 1	**NORANDA EXPLORATION**
	OFFICE: PRINCE GEORGE, B.C.

VANCAL 11927

environment. Below treeline mature stands of spruce, fir and hemlock dominate.

2.3 CLAIM DATA

The property is comprised of the following modified grid claims. Upon acceptance of this report, they will be in good standing until the indicated date. A plan of the claims is provided in figure 2.

Table 1. Claim Data

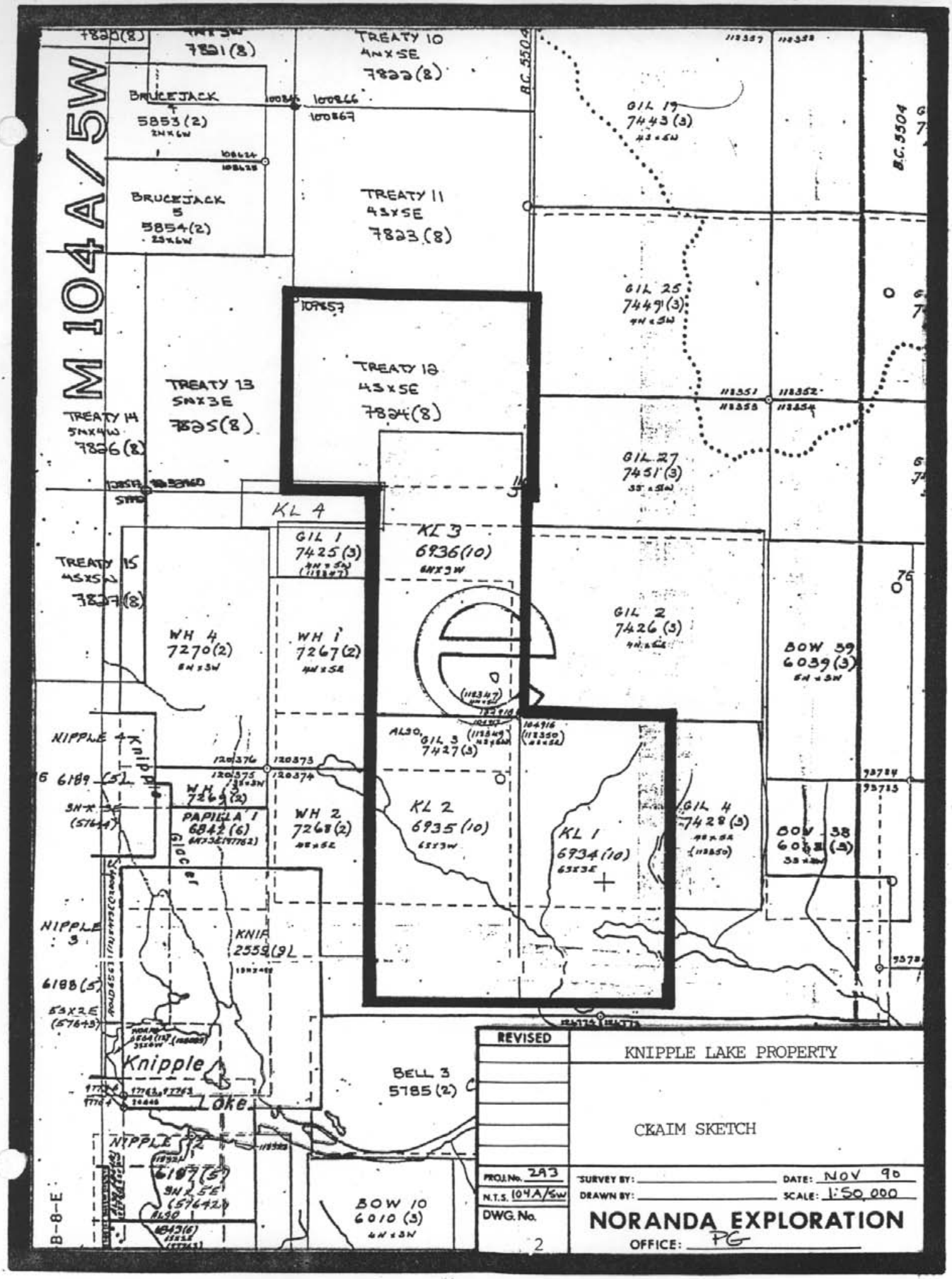
Name	Units	Record #	Record Date	Expiry Date
KL-1	18	6934	10/25/88	10/25/94
KL-2	18	6935	10/25/88	10/25/94
KL-3	18	6936	10/25/88	10/25/94
KL-4	3	304308	09/13/91	09/13/92
TREATY-12	20	7824	08/26/89	08/26/94

2.4 PREVIOUS WORK

The property lies within the Stewart-Iskut belt of mineralization which has seen considerable exploration activity in recent years. The area of the claims has been staked several times by different interests previous to Noranda however there is no record of work in the public domain and no evidence of any serious exploration was observed during the 1990 program.

1989 : Discovery of numerous quartz-calcite-sulfide vein and breccia float boulders with abundant galena, sphalerite, chalcopyrite and pyrite. Values up to 0.521 oz/t Au, 0.50 oz/t Ag, 0.14% Cu, 3.03% Pb, and 9.02% Zn were obtained. The source area was presumed to be up slope on either the KL-3 or TREATY-12 claim.

1990 : Noranda established a grid concentrating on the areas thought to be the most likely source areas of the mineralized float. This grid was soil sampled at 25 m spacing, mapped and prospected. Three moderate strength multi-element geochem anomalies were delineated and a variably silicified and quartz veined felsic volcanic unit was mapped out. This unit is evidence of intense hydrothermal activity in the area of the mineralized boulders. The source of the mineralized boulders was not discovered.


M 104A/5W
TREATY 10
ANX SE
7822(8)
7821(8)
BRUCEJACK
5853(2)
2NX6W
BRUCEJACK
5
5854(2)
2SX6W
TREATY 11
4SXSE
7823(8)
TREATY 13
5NX3E
7825(8)
TREATY 14
5NX4W
7826(8)
TREATY 18
4SXSE
7824(8)
KL 4
KL 3
6936(10)
6NX3W
GIL 1
7425(3)
4NX5E
TREATY 15
4SX5W
7827(8)
WH 4
7270(2)
6NX3W
WH 1
7267(2)
4NX5E
GIL 19
7443(3)
4SX6W
GIL 25
7449(3)
4NX5W
GIL 27
7451(3)
3SX5W
GIL 2
7426(3)
4NX5E
BOW 39
6039(3)
5NX3W
GIL 3
7427(3)
4SX6W
KL 2
6935(10)
6SX3W
KL 1
6934(10)
6SX3E
GIL 4
7428(3)
4SX6E
BOW 38
6038(3)
3SX3W
NIPPLE 4
6189(5)
3NX3E
(51644)
PAPILLA 1
6842(6)
WH 3
7269(2)
WH 2
7268(2)
4SX5E
NIPPLE
3
6188(5)
5SX2E
(57643)
KNIP
2559(9)
Knipple
Lake
NIPPLE 2
6187(5)
3NX2SE
(57642)
BELL 3
5785(2)
BOW 10
6010(3)
4NX3W
B.C. 5504
B-8-E
REVISED
KNIPPLE LAKE PROPERTY
CKAIM SKETCH
PROJ. No. 293
N.T.S. 104A/5W
DWG. No. 2
SURVEY BY:
DRAWN BY:
DATE: NOV 90
SCALE: 1:50,000
NORANDA EXPLORATION
OFFICE: PG

3.0 GEOLOGY

3.1 REGIONAL GEOLOGY

The area lies near the western edge of the Intermontane Belt of the Canadian Cordillera, where it parallels the Coast Plutonic Complex. Recent work by both the Geological Survey of Canada and the Geological Services Branch of British Columbia provides a useful framework of the complex geology of this rugged area. The area includes four, unconformity bounded, tectonostratigraphic assemblages: 1) Paleozoic Stikine Assemblage; 2) Triassic-Jurassic volcano-plutonic complexes of Stikinia; 3) Middle and Upper Jurassic Bowser overlap assemblage; and 4) Tertiary Coast Plutonic Complex.(Anderson, 1989) This section of the Intermontane Belt forms the west limb of the "Stikine Arch," a roughly horseshoe shaped area of Upper Triassic to Jurassic stratigraphy that hosts most of the significant mineral deposits in northwest B.C. and also the Toodoggone gold camp.

Paleozoic Stikine Assemblage

This is the oldest assemblage and it is comprised of three distinct, mainly volcanic-carbonate mappable divisions: Early Devonian limestones and intermediate to felsic volcanics, Mississippian bioclastic limestones, and Permian fragmental volcanics and limestone. These rocks are generally highly metamorphosed and deformed.

Triassic-Jurassic volcano-plutonic complexes (Stewart Complex)

Comprises both the Triassic Stuhini Group and the Jurassic Hazleton Group. The Stuhini Group consist of limestones and bimodal to mafic volcanics deposited in island arc environments. These rocks host the Snip and Johnny Mountain deposits. Hazleton Group rocks comprise andesitic breccias and lavas, felsic tuffs and breccias, maroon-green volcanic siltstone, greywacke, conglomerate, calcareous siltstone, and black shale also with island arc affinities. These rocks host the Eskay Creek deposits.

Middle and Upper Jurassic Bowser Overlap Assemblage

These are predominantly turbidite black clastics deposited in the Bowser Basin, a result of uplift to the west due to emplacement of the Coast Range Intrusives.

Tertiary Coast Plutonic Complex

Tertiary, post-tectonic, felsic plutons characterize the Coast Plutonic Complex. Eastward younging of strata from west to east and local zones of high strain attest to intrusion and uplift of the complex.

Locally Tertiary to Recent subaerial volcanics cover low lying areas of the above strata.

Sub-volcanic intrusions accompany most of the volcanic centres of the Mesozoic island arc complexes. These range from Alaskan type ultramafics to felsic dykes. Distinctive porphyritic dykes link Upper Triassic and Lower Jurassic volcanics with their plutonic equivalents. Many of the significant mineral deposits in the Stewart Complex are found to have a close association with volcanic centres.

3.2 PROPERTY GEOLOGY

Geological mapping was concentrated in the area thought to be the most likely source area of the mineralization found in float described above. A 1:2500 scale geological plan of this area is presented on figure 3. Topographical control was provided by the survey grid described in the next section.

In 1991 detailed mapping was undertaken mainly in the area extending from the mineralized boulder field in the grid west area centered about the 11000W tieline to the north end of the grid. This is the area containing the soil geochem anomalies outlined last year and covered with I.P. surveys this year. The results of this work are shown on figure 3.

Surficial Geology

Most of the bedrock exposures are found along the top and west sides of the north to northwest trending ridge that dominates the Treaty-12 and KL-3 claim. North and northeast of this ridge the slope abruptly drops forming inaccessible cliffs that end at glacial ice. The mapped area forms a relatively consistent west facing slope averaging about 30 degrees that ends at a wide south flowing receding glacier. The slope is covered with a thin to moderately thick apron of fine talus, minor moraine outwash and poorly developed, slumping alpine soil. Vegetation has stabilized most of the area at lower elevations. The glacier to the west of this slope has receded approximately

50 metres vertically from its maximum size and has left a 100 to 200 metre wide strip underlain with a semi-consolidated basal till which is in places covered with coarse and loose lateral and medial moraine and talus that is still unvegetated. The edge of this strip is indicated on figure 3. The east-west trending 600 to 700 metre wide zone shown in the south grid area is dominated by more recent coarse moraine and outwash from the small receding icefields at the southeast corner of the map.

Bedrock Lithologies

The mapped area is underlain by two packages of volcanic rocks: an extensive sequence of interbedded andesitic flows and tuffs (Unit # 1), agglomerates (Unit # 2), and a less dominant unit of felsic tuffs and flows (Unit # 3).

Unit 1 consists of dark brown, maroon, grey and green vaguely layered, subrounded to subangular clasts of andesitic rocks of unit 2 in a darker very fine matrix. In areas of sufficient outcrop mappable beds in the order of 25 to 100 metres thick can be traced over several hundred metres. The unit was further subdivided to include two mappable beds of grey-brown agglomerate (unit 1b) and maroon tuffs (unit 1c).

Unit 2 has been subdivided into four mappable divisions:
2a) Massive, dark varicoloured, feldspar porphyritic flows.
2b) Vaguely layered, fine lithic tuff +/- feldspar phenocrysts.
2c) Massive, dark amygdaloidal feldspar porphyritic flows.
2d) Massive, dark greenish brown chloritic flows. Minor dark grey dolomitic sediments are shown as subunit 2e.

Unit 3 has been subdivided into two mappable divisions:
3a) Massive to vaguely layered, variably silicified and quartz veined pale grey to brown, feldspar porphyritic lapilli tuff.
3b) Massive pale grey to buff, aphyric siliceous rhyolite.

These rocks are interpreted to have been rapidly deposited in dominantly submarine environment proximal to a volcanic centre. The felsic volcanics may indicate the youngest eruptive event. They are considered part of the Lower Jurassic Hazleton Group. Units 1 and 2 may correlate with the Betty Creek Formation and unit 3 with the Mt. Dilworth Formation.

Structure

Where layering is discernable two general attitudes were measured. In the central east portion of the mapped area, attitudes are found to trend from about 060 to 090 degrees and dip moderately to steeply southward. Several hundred metres south of this area the dominant trend is found to be around 180 degrees with a variable westward dip.

Two 070 degree trending faults are interpreted to cross the gridded area as shown on figure 3. The interpretation is based on strong contrasts in magnetic relief indicated from a ground magnetic survey completed later in the program and on the presence of strongly foliated and brecciated rocks in the vicinity of Line 10100 N, 10350 W.

Alteration

There is very little alteration in the gridded area other than Unit 3a which is variably silicified and laced with a pervasive network of white quartz stingers and veinlets. Disseminated pyrite is common. Another notable area of alteration is around the galena barite showing located at 9600N / 11125W. There is silicification, quartz veining and 1-2 % pyrite associated with this showing. Weakly chloritized andesitic rocks are found scattered throughout the east-central grid area. In the moraine fields on the grid south area numerous boulders of strongly quartz-sericite-pyrite altered felsic porphyritic intrusive are derived from exposures on the main ridge immediately east of the KL-3 claim. This intrusive is believed to be the source of the hydrothermal system that produced the observed alteration.

Mineralization

A boulder field at the southwest grid corner from 11000W, 8700N to 11250W, 9225N contains over one hundred boulders of quartz-calcite breccia and vein material containing coarse sphalerite, galena, pyrite, and chalcopyrite (figure 3). There are often recrystallized and silicified wall rock material within and adjacent to the quartz-calcite-sulphide mineralization. The boulders are subrounded to subangular and range in size from about 10 to 100 centimetres in diameter. Of forty-eight samples analyzed, all have anomalous gold values, and 18 have values greater than 4 gm/t Au and 8 greater than 8.5 gm/t Au. Base metal values average 0.18% Cu, 0.89% Pb, and 3.14% Zn; silver averages 9.3 gm/t. Intense prospecting failed to locate the

source of the boulders on the largely overburden covered slopes above, however the presence of minor sulphide bearing clots and quartz veins with anomalous gold values (up to 1260 ppb) suggests the source is within the grid area.

Prospecting in 1991 extended the boulder field as far north as 9220N, 11310W where similar float contained Au values to 7930 ppb Au. Narrow quartz-carbonate veins (less than 1 metre wide) found in outcrop near 9400N, 11150W and 9600N, 11050W contain spotty sulphides and low Au values (to 240 ppb). Silicified felsic tuffs laced with a network of fine quartz veins are common in the central grid area however chip samples returned a maximum of 52 ppb Au and very low base metals.

A subangular boulder approximately 0.5 metres in diameter located at 10290N, 11365W of coarse, milky white quartz contains irregular patches of coarse sulphides and returned values of 4,780 ppb Au, 36,688 ppm Pb and 69,518 ppm Zn (#113856). This is the most significant result obtained from outside the boulder field, which lies about 2 km to the south. Only one mineralized boulder was found even though the area is covered with thousands of moraine and felsenmeer boulders and very little vegetation. The style of mineralization in the boulder field to the south is noticeably different and it is thought that the source areas are distinct.

4.0 DIAMOND DRILLING

The 1991 diamond drilling program consisted of 346.5 m of BDBGM core in six holes. The first three holes were drilled to test weak to moderate strength IP chargeability anomalies located upslope and up ice from the mineralized boulder field. The first hole was also coincident with a galena-carbonate showing at the upslope edge of a multielement geochem anomaly. The fifth hole was drilled to test the central area of the main soil geochem anomaly and the sixth hole was drilled to test a VLF anomaly. The drill hole locations are plotted on Figure 3 and the drill logs are in appendix VII. Cross sections displaying geology, analytical results and topography are shown on Figures 22-26.

A unitized, helicopter transportable, hydraulic wireline drill using thin wall BDBGM rods was utilized. The core is currently stored at the campsite on the property.

KN-91-01 : Located at 9600N / 11050W, drilled at a dip of -45° and bearing of 290°. This hole tested a moderate IP chargeability anomaly coincident with a galena-carbonate showing at the upslope edge of the largest multielement soil geochem

anomaly. It was drilled to a depth of 84.12 m and intersected 10.97 m of overburden and 73.15 m of maroon lapilli tuffs and agglomerates. No significant mineralization was encountered. The I.P. response is attributed to intensely fractured zones lined with clayey selvages and seams.

KN-91-02 : Located at 9400N / 10800W, drilled at a dip of -60° and a bearing of 290°. This hole was drilled to test a moderate IP chargeability anomaly. It was drilled to a depth of 93.27 m and intersected 7.92 m of overburden and 83.35 m of interbedded green andesitic volcanics and maroon agglomerate. No significant mineralization was encountered. The I.P. response is attributed to intensely fractured zones lined with clayey selvages and seams.

KN-91-03 : Located at 9000N / 10600W, drilled at dip of -45° and a bearing of 110°. This hole was abandoned at 15.84 m due to seizing rods in fractured rocks.

KN-91-03a : Located at 9000N / 10600W, drilled at a dip of -80° and a bearing of 110°. This hole was drilled to test a moderate IP chargeability anomaly. It was drilled to a depth of 67.06 m and intersected 6.70 m of overburden and 60.36 m of interbedded green andesitic volcanics and maroon agglomerate. No significant mineralization was encountered. The I.P. response is attributed to intensely fractured zones lined with clayey selvages and seams.

KN-91-04 : Located at 9600N / 11275W, drilled at dip of -45° and a bearing of 110°. This hole was drilled to test the center of the multielement soil geochemistry anomaly north and up ice of the mineralized boulder field. It was drilled to a depth of 57.91 m and intersected 1.52 m of overburden and 56.39 m of maroon agglomerate. The hole had to be abandoned at 57.91 m due to poor ground conditions. No significant mineralization was encountered up to this point.

KN-91-05 : Located at 9080N / 11140W, drilled at dip of -45° and a bearing of 080°. This hole was drilled to test the VLF anomaly coincident with the mineralized boulder field. It was drilled to a depth of 29.87 m and was unable to penetrate further due to seizing rods and casing in poor ground conditions. This hole intersected 29.87 m of badly broken green andesitic volcanics with abundant sand and clay layers. The target depth was never reached. No significant mineralization was encountered up to this point.

Geochem analyses on selected intervals returned a maximum of 100 ppb Au from a zone of brecciation and quartz flooding in hole

#1. No significant base metal values were received.

The drilling program was stopped prematurely due to cost overruns resulting from poor drilling conditions. Numerous open, sand and gravel filled fractures inhibiting water return and lubrication led to excessive bit wear, downhole equipment destruction, and unbudgeted servicing costs.

5.0 CONCLUSIONS

The program was unsuccessful in locating the source of the mineralized boulder field. It is still believed that they have not been transported very far and their source is somewhere on the KL-3 or Treaty 12 mineral claims.

6.0 RECOMMENDATIONS

No further work is recommended at this time. The Treaty 12 claim should be returned to the vendor before the next payment is due (Aug. 31, 1992).

APPENDIX I

STATEMENT OF QUALIFICATIONS

APPENDIX I

STATEMENT OF QUALIFICATIONS

I, Michael Savell, of the City of Prince George, Province of British Columbia, do certify that:

1. I am a geologist residing at 3507 Rosia Road, Prince George, British Columbia.

2. I am a graduate of Dalhousie University, Halifax, Nova Scotia with a Bachelor's of Science (Honours) degree in Geology.

3. I am a member in good standing of the Geological Association of Canada, the Prospector's and Developer's Association and the B.C.-Yukon Chamber of Mines.

4. I presently hold the position of Sr. Project Geologist with Noranda Exploration Company, Limited and have been in their employ since 1980.

Michael Savell
Sr. Project Geologist
Noranda Exploration Co., Ltd.
(no personal liability)

STATEMENT OF QUALIFICATIONS

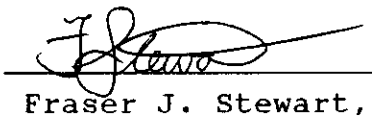
I, FRASER J. STEWART, hereby certify that:

1. I am a geologist residing at 302 - 1910 Renwick Crescent, Prince George, B. C.

2. I graduated from the University of Alberta in April 1989, with the degree of Bachelor of Science in Geology.

3. I have been employed by Noranda Exploration Company, Limited as a geologist since May 1989.

4. I personally took part in the surveys described in this report and that this report is based upon a personal knowledge of the property.



Fraser J. Stewart, (B.Sc.)

APPENDIX II

ANALYTICAL PROCEDURE

Soils, Silts, Rocks

The samples are dried and screened to -80 mesh. Rock samples are pulverized to -120 mesh. A 0.2 gram sample is digested with 3 ml of $HClO_4/HNO_3$ (4 to 1 ratio) at 203° C for four hours, and diluted to 11 ml with water. A Leeman PS 3000 is used to determine elemental contents by I.C.P. Note that the major oxide elements and Ba, Be, Ce, Ga, La and Li are rarely dissolved completely from geological materials with this acid dissolution method.

For Au analyses, a 10.0 gram sample of -80 mesh material is digested with aqua regia and determination made by A.A.

Heavy Mineral Concentrates

The entire concentrate is digested in aqua regia solution, and elemental concentrations of Au, Ag, Cu, Pb, and Zn are determined by A.A.

APPENDIX III

ANALYTICAL RESULTS

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER B.C. V6A 1R6 PHONE(604)253-3158 FA 04)253-1716

GEOCHEMICAL ANALYSIS CERTIFICATE

Kwipple (JS) DD#91-02,03,04

Noranda Exploration Co. Ltd. PROJECT 9109-091 293 File # 91-4632

1050 Davie St., Vancouver BC V6E 1M4

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb
040826 DR	1	5	2	113	.1	4	18	1540	5.62	3	5	ND	1	24	.2	2	2	104	1.98	.090	2	21	1.62	455	.14	5	2.92	.04	.43	1	7
040827 DR	1	6	2	101	.2	3	16	1249	4.77	4	5	ND	1	104	.5	2	2	77	3.36	.090	6	11	1.68	696	.14	2	2.32	.05	.34	1	2
040828 DR	1	1	2	99	.1	3	17	961	4.38	2	5	ND	1	113	.8	2	2	42	2.35	.081	4	9	1.52	1842	.10	3	2.29	.05	.37	1	2
040829 DR	1	36	5	104	.5	3	14	1711	3.81	9	5	ND	1	205	.2	2	2	46	6.68	.075	8	16	1.55	1988	.06	4	2.65	.02	.56	1	6
RE 040834 DR	1	13	2	104	.3	3	18	1315	5.30	2	5	ND	1	110	.9	2	2	76	3.69	.077	4	12	1.53	988	.13	2	2.71	.06	.34	1	2
040830 DR	1	14	3	94	.3	3	14	1236	3.78	2	5	ND	1	99	1.3	2	2	44	4.17	.084	7	6	1.47	407	.08	2	2.13	.03	.31	1	3
040831 DR	1	4	2	79	.1	2	14	927	4.27	2	5	ND	1	128	.2	2	2	44	3.10	.074	5	11	1.14	647	.11	3	1.96	.04	.43	1	4
040832 DR	1	4	2	95	.1	3	16	1116	4.79	2	5	ND	1	121	.4	2	2	55	3.71	.076	3	14	1.42	765	.15	3	2.26	.05	.36	1	2
040833 DR	1	8	3	99	.2	3	16	1097	5.26	2	5	ND	1	91	.5	2	2	63	3.34	.081	2	14	1.41	394	.17	2	2.39	.06	.38	1	4
040834 DR	1	11	2	105	.1	3	18	1298	5.28	2	5	ND	1	107	1.1	2	2	73	3.66	.076	5	13	1.53	943	.13	2	2.65	.06	.35	1	1
040835 DR	1	36	8	112	.2	4	20	1273	5.50	3	5	ND	1	57	.5	2	2	74	1.68	.078	4	16	1.76	908	.14	2	2.91	.06	.33	1	6
040836 DR	1	21	6	115	.4	4	19	1188	5.89	6	5	ND	1	48	.8	2	2	82	1.58	.087	5	9	1.90	542	.16	3	2.89	.05	.27	1	7
040837 DR	1	31	6	104	.4	2	16	1585	5.13	4	5	ND	1	120	.3	2	2	80	5.48	.071	6	5	1.90	709	.15	2	2.72	.04	.22	1	5
040838 DR	1	8	4	135	.7	3	14	1381	4.91	3	5	ND	1	68	.5	2	2	70	1.94	.092	12	12	.96	509	.08	3	1.86	.01	.46	1	3
040839 DR	1	7	7	76	.5	2	15	1317	3.39	17	5	ND	1	73	.3	2	2	36	4.58	.102	12	8	.30	2036	.03	5	1.30	.01	.60	1	5
040840 DR	1	6	5	71	.3	2	11	2471	2.30	26	5	ND	1	141	.3	2	2	28	11.48	.086	13	6	.47	1095	.02	2	1.19	.01	.44	1	2
040841 DR	1	5	10	72	.2	1	10	3026	3.18	14	5	ND	1	197	.4	2	2	36	11.51	.096	15	5	.54	1029	.06	3	1.30	.02	.42	1	4
040842 DR	1	9	6	91	.4	2	12	1556	3.41	59	5	ND	1	114	.5	4	2	43	5.99	.100	13	3	.58	1169	.04	3	1.30	.01	.38	1	4
040843 DR	2	15	25	125	.5	3	17	1862	4.66	5	5	ND	1	136	.2	2	2	62	7.44	.080	11	10	.94	295	.06	4	1.90	.01	.52	1	3
040844 DR	1	4	13	85	.4	4	13	1904	3.89	4	5	ND	1	188	.2	3	2	64	8.67	.070	12	10	.63	1197	.07	4	1.45	.01	.46	1	6
040845 DR	1	172	5	184	3.1	19	13	1416	3.51	4	5	ND	1	81	3.3	2	2	33	4.15	.075	11	22	.64	685	.03	4	1.32	.01	.35	164	8
040846 DR	1	30	43	112	3.4	4	18	1296	3.27	56	5	ND	1	139	1.2	3	2	16	5.67	.085	12	7	.34	402	.07	4	.97	.03	.39	5	2
040847 DR	1	65	19	35	.8	4	7	1374	2.51	29	5	ND	2	132	.3	2	2	16	7.34	.086	11	8	.16	191	.07	3	.72	.02	.46	2	2
040848 DR	1	4	8	57	.5	3	10	1418	3.06	10	5	ND	3	174	.7	2	2	51	7.25	.080	11	7	.50	588	.05	2	1.07	.03	.41	1	2
040849 DR	1	9	8	56	.2	3	11	1146	2.77	7	5	ND	2	152	.4	2	2	42	5.77	.093	11	4	.57	656	.05	2	1.11	.02	.39	1	1
040850 DR	1	17	11	100	.1	5	16	1282	3.48	3	5	ND	1	99	.5	2	2	47	4.95	.076	11	6	1.06	144	.06	2	1.42	.01	.25	1	1
040901 DR	1	11	13	66	.3	7	10	1306	3.55	11	5	ND	2	40	.3	4	2	46	1.53	.082	17	17	.58	216	.07	2	1.03	.02	.26	1	2
040902 DR	1	10	5	70	.7	7	13	1417	3.46	6	5	ND	3	147	.2	4	2	56	3.17	.087	16	22	1.04	1634	.05	2	1.43	.04	.24	1	2
040903 DR	1	7	2	72	.2	10	11	1329	3.56	9	5	ND	1	99	.6	6	2	31	3.28	.086	15	25	.60	279	.06	2	1.08	.01	.36	1	1
040904 DR	1	8	9	69	.1	8	12	1228	3.28	9	5	ND	1	106	.2	6	2	53	3.90	.092	18	25	.97	580	.08	2	1.35	.02	.37	1	3
040905 DR	1	26	31	40	1.5	4	13	1066	3.45	74	5	ND	1	68	.2	13	2	61	3.00	.084	13	7	.17	463	.07	4	.75	.01	.39	2	27
040906 DR	1	46	17	50	1.4	4	12	1063	3.68	69	5	ND	1	65	.3	12	2	60	3.58	.089	15	7	.17	392	.05	2	.78	.01	.39	3	100
040907 DR	1	43	10	85	.8	5	16	1148	4.17	12	5	ND	1	85	.2	3	2	67	3.99	.088	13	8	.46	509	.05	2	1.19	.01	.42	1	7
040908 DR	1	132	5	105	.5	4	17	1567	3.68	31	5	ND	1	202	.7	5	2	54	6.07	.082	12	7	.97	1257	.06	2	1.61	.01	.43	1	20
040909 DR	1	22	16	71	.4	4	12	1303	3.43	51	5	ND	1	124	.7	7	2	43	4.28	.104	15	10	.60	548	.05	5	1.37	.01	.57	1	1
STANDARD C/AU-R	19	61	39	130	7.3	69	32	1029	3.92	43	19	6	39	53	18.6	17	20	60	.47	.087	38	59	.87	175	.08	33	1.91	.06	.14	13	460

RECEIVED
SEP 27 1991

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND LIMITED FOR NA K AND AL. AU DETECTION LIMIT BY ICP IS 3 PPM.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
SAMPLE TYPE: CORE AU* ANALYSIS BY ACID LEACH/AA FROM 10 GM SAMPLE. Samples beginning 'RE' are duplicate samples.

DATE RECEIVED: SEP 20 1991 DATE REPORT MAILED: Sept 25/91. SIGNED BY ..... D.TOYE, C.LEONG, J.WANG; CERTIFIED B.C. ASSAYERS

APPENDIX IV

DRILL LOGS

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-01
Grid System : KNIPPLE
Collar Eastings : 11050.000
Collar Northings : 9600.000
Collar Elevations : 1394.000
Collar Bearing : 298.00
Grid Baseline : 20.00

Collar Inclination : -45.00
Grid Bearing : 110.00
Final Depth : 84.12
Claim No. :

PAGE : 1

Logged by : FRASER STEWART
Date : SEPT. 9/91 - SEPT. 11/91
Downhole Survey : ACID
Drillec By : J.T. THOMAS
Core Size : BD

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	10.97	OVRBDN	OVERBURDEN very badly broken felsenmeer comprised of silic. maroon feld. lapilli tuffs w wk carb alteration *	40901	10.50	13.40	2.90	2	.3	11	13	66	11	4
10.97	28.00	MFTUFF	MAROON FELDSPAR LAPILLI TUFF - this unit is a silic. maroon feldspar lapilli tuff w common wk cnl alt of feldspars and few cnl stringers - few small carb. vnlts @ 20-60 to CA - few narrow zones of brecciation and carb +/- qtz flooding - unit is generally very badly broken averaging 75 % recovery - commonly the carb +/- qtz flooding is associated w tensional gashes around small faults - common zones of sandy material and clay (gouge) are interpreted to be faults - tr-0 % sulfides - lower contact sharp @ 60 to CA *											
10.97	22.60	carbfl	- very badly broken grey maroon feld. lapilli tuff w wk carb flooding, few qtz stringers - approx. 50 % recovery *	40902	21.00	25.30	4.30	2	.7	10	5	70	6	4
22.60	23.40	brx'd	- breccia zone altered to lt green color w strong carb flooding - approx. 70 % recovery *											
23.40	26.82	bleach	- strongly bleached to a lt grey green color (qtz-sericite ?)											

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			- common carb +/- qtz stringers @ 30-45 CA											
			*											
26.82	28.00	qtzstr	- maroon feld. lapilli tuff w common qtz stringers @ 10-15 to CA and others at random orientations											
			*											
28.00	84.12	AGGLOM	MAROON AGGLOMERATE	40903	35.66	39.32	3.66	1	.2	7	2	72	9	6
			- greyish maroon silic. carb. rich agglomerate comprised primarily of subrounded maroon tuff clasts											
			- wkly brecciated and subsequently carb +/- qtz flooded so that carbonate comprises about 5 % of rock											
			- averages about 70 % recovery											
			*											
39.40	39.90	bleach	- washed out to a lt grey color (dueteric) around a small fault (1 cm wide) that consists of coarse sand and gouge											
			*											
43.28	43.40	fault	- fault gouge with maroon volc. frags											
			*											
44.90	45.00	fault	- fault gouge w small maroon volc. frags	40904	45.05	50.80	5.75	3	.1	8	9	69	9	6
			*											
47.00	47.05	fault	- fault gouge w maroon volc. frags											
			*											
47.24	47.40	fault	- fault gouge w maroon volc. frags											
			*											
47.70	47.90	fault	- fault gouge w maroon volc. frags											
			*											
48.77	56.99	brx'd	Breccia Zone - this zone is intensely brecciated w v strong to int. qtz flooding comprising 20-30 % of rock with large fragments of maroon volcanics (5-10 cm)	40905	50.80	54.50	3.70	27	1.5	26	31	40	74	13
				40906	54.50	57.50	3.00	100	1.4	46	17	50	69	12
			*											
			52.42 - 52.50 : fault gouge w maroon volc. fragments											
			*											
			53.95 - 55.78 : sand and gouge w common very rounded fragments (due to											

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			reaming?)											
			*											
56.99	71.50	agglom	- maroon agglomerate w very abundant clasts of lt grey green feld porph. volc (unit 2a) and less commonly rounded maroon tuff fragments	40907	57.50	60.50	3.00	7	.8	43	10	85	12	3
				40908	69.10	72.20	3.10	20	.5	132	5	105	31	5
			- clasts/fragments vary from subrounded to angular and in size from less than 1 cm to 10's of cms											
			- there is a late stage of carb +/- qtz stringers @ 35-50 to CA that crosscuts everything											
			- approx. 100 % recovery											
			*											
71.50	84.12	agglom	- maroon agglomerate comprised primarily of maroon tuff clasts/fragments and less commonly lt green volcanic fragments	40909	79.10	82.10	3.00	1	.4	22	15	71	51	7
			- clasts are subrounded to subangular and 0.5-1.0 cm on average											
			- carbonate rich matrix											
			- approx. 100 % recovery											
			*											
			78.64 - 0.5 cm wide carb vnlt tr galena and 1 % pyrite											
			*											
			EOH = 84.12 m											

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-02
Grid System : KNIPPLE
Collar Eastings : 10800.000
Collar Northings : 9400.000
Collar Elevations : 1392.000
Collar Bearing : 296.00
Grid Baseline : 20.00

Collar Inclination : -60.00
Grid Bearing : 110.00
Final Depth : 93.27
Claim No. :

Logged by : FRASER STEWART
Date : SEPT. 11/91 - SEPT.12/91
Downhole Survey : ACID
Drilled By : J.T. THOMAS
Core Size : BD

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	7.92	OVRBDN	OVERBURDEN - badly broken med green lapilli tuff - approx. 30 % recovery *											
7.92	22.20	GRTUFF	MEDIUM GREEN LAPILLI TUFF - comprised of subangular to subrounded clasts of feldspar, maroon tuff and less less commonly dark green mafics (pyrx.) - common zones of carb. rich matrix - few random orient. carb stringers - several zones where carb. has been leached out to leave open spaces - badly broken w about 75 % recovery *	40826	11.85	14.10	2.25	7	.1	5	2	116	3	2
12.90	14.20	carb	- carbonate pods (?) up to 2 cm; resembles carbonate replacement of certain lapilli clasts *											
22.20	30.00	AGGLOM	MAROON AGGLOMERATE - comprised of subangular to subrounded clasts (5-30 cm) of maroon tuff in a lt grey green matrix resembling the green lapilli tuff *	40827	22.90	27.00	4.10	2	.2	6	2	101	4	2
26.40	26.80	fault	- fault zone w gouge and angular fragments of maroon agglomerate *											
30.00	93.27	GRTUFF	MEDIUM GREEN LAPILLI TUFF - comprised of 5-30 % subrounded/angular felospar crystals in a med green matrix w common carbonate rich zones, less common are the maroon tuff clasts 0.25-											

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			2.0 cm, subrounded											
			*											
31.10	31.50	fault	- fault zone wkly brecciated w fault gouge and coarse sand											
			*											
35.50	35.70	fault	- fault zone with gouge, coarse sand and angular fragments of green volcanics											
			*											
39.00	39.30	fault	- fault zone w gouge and angular fragments											
			*											
41.85	42.20	agglom	- zone containing large (10 cm) clasts of maroon felc. lapilli tuff											
			*											
42.30	42.35	fault	- fault w angular clasts and gouge	40828	43.00	45.00	2.00	2	.1	1	2	99	2	2
			*											
43.40	43.50	fault	- fault w gouge and angular fragments											
			*											
43.90	44.90	fault	- fault w gouge and angular fragments											
			*											
45.50	45.70	fault	- fault zone w gouge and carb vn (2 cm) @ 20 to CA											
			*											
47.10	47.15	fault	- fault w gouge and angular fragments											
			*											
49.22	49.30	fault	- fault w gouge and angular fragments											
			*											
51.00	52.00	fault	- fault zone w gouge and angular fragments and some wk ep alt in a sheared zone 5 cm wide @ 40 to CA	40829	53.00	56.50	3.50	6	.5	36	5	104	3	2
			*											
53.10	53.50	fault	- fault zone w gouge and subangular frags - some evidence of shearing (gashes) - wk carbonate alt											
			*											
54.10	54.35	shear	- shear zone w perv carb alt											
			*											
57.80	58.00	carovn	- large carb veins @ 40-50 to CA	40830	62.90	65.53	2.63	3	.3	14	3	94	2	2
			*											
63.70	64.10	fault	- fault zone w gouge and angular frags											
			*											
64.80	65.60	fault	- fault w gouge and some wk ep alt	40831	68.00	72.85	4.85	4	.1	4	2	79	2	2

NORANDA EXPLORATION CO. LTD.
DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-02

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			*	40832	73.80	76.60	2.80	2	.1	4	2	95	2	2
				40833	78.00	81.00	3.00	4	.2	8	3	99	2	2
78.35	78.36	cave	- cave with strongly ep alt fragment	40834	82.30	85.20	2.90	1	.1	11	2	105	2	2
			*											
82.80	83.00	fault	- fualt zone w gouge and angular fragments											
			*											
84.73	92.63	fault	- fault zone w intensely broken up frags	40835	85.20	87.80	2.60	6	.2	36	8	112	3	2
			and abundant gouge, common carbonate	40836	87.80	90.50	2.70	7	.4	21	6	115	6	2
			*	40837	90.50	93.27	2.77	5	.4	31	6	104	4	2
90.63	93.27	brx'd	- wkly brecciated and carb flooded											
			*											
			EOH = 93.27 m											

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-03
Grid System : KNIPPLE
Collar Eastings : 10600.000
Collar Northings : 9000.000
Collar Elevations : 1295.000
Collar Bearing : 116.00
Grid Baseline : 20.00

Collar Inclination : -45.00
Grid Bearing : 110.00
Final Depth : 15.84
Claim No. :

PAGE : 1

Logged by : FRASER STEWART
Date : SEPT. 12/91 - SEPT. 13/91
Downhole Survey : NONE
Drilled By : J.T. THOMAS
Core Size : BD

INTERVAL (m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL (m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	10.67	OVRBDN	OVERBURDEN *											
10.67	15.84	GRTUFF	MEDIUM GREEN FELDSPAR LAPILLI TUFF - this unit is comprised dominantly of subrounded to angular felospar crystals fragments and a few small maroon tuff fragments in med green f.gc. matrix * EOH = 15.84 m Hole abandoned due to seizing rods in badly broken ground, no water return.											

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-04
Grid System : KNIPPLE
Collar Eastings : 11275.000
Collar Northings : 9600.000
Collar Elevations : 1304.000
Collar Bearing : 116.00
Grid Baseline : 20.00

Collar Inclination : -45.00
Grid Bearing : 110.00
Final Depth : 57.91
Claim No. :

Logged by : FRASER STEWART
Date : SEPT. 14/91 - SEPT. 15/91
Downhole Survey : NONE
Drilled By : J.T. THOMAS
Core Size : BD

INTERVAL (m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL (m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	1.52	OVRBDN	OVERBURDEN *											
1.52	57.91	AGGLOM	MAROON AGGLOMERATE - deep maroon colored subrounded to round clasts in a darker maroon f.gd. matrix - less common lt green tuff clasts (rounds) - sizes vary from 0.25-10.00 cm - common zones of carbonate +/- qtz flooding (qtz rare) - approx. 100 % recovery *	40846	9.60	12.60	3.00	2	3.1	172	5	184	4	
12.40	12.45	qzcovn	- qtz-carb vein with maroon fragments *											
13.60	13.90	dtralt	- washed out to a lt grey - dueteric alt ? *											
14.60	15.40	carb	- carbonate rich matrix *	40847	14.63	18.20	3.57	2	.8	65	19	35	29	
17.60	17.65	fault	- fault with grey brown gouge *											
26.30	26.31	qtzvn	- quartz vein @ 90 to CA *	40848	28.60	31.60	3.00	2	.5	4	8	57	10	
29.85	29.86	qzclvn	- quartz-chlorite vein @ 90 to CA *	40849	35.90	39.60	3.70	1	.2	9	8	56	7	
40.80	46.00	agglom	- medium grey green feldspar lapilli tuff clasts and frags become very abundant * 43.45 - 43.50 : qtz-carb flooding *											
46.00	51.20	fltzn	46.00 - 57.91 : rock becomes very badly broken with what appears to be fault splays (?) * 46.25 - 46.30 : fault 46.94 - 46.95 : fault	40850	48.30	51.50	3.20	1	.1	17	11	100	3	

NORANDA EXPLORATION CO. LTD.
DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-04

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	SEDCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			49.00 - 49.05 : fault											
			49.20 - 49.25 : fault											
			51.00 - 51.20 : fault zone											
			*											
			EOH = 57.91 m											
			Hole abandoned due to very bad ground conditions, no water return.											

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-25
Grid System : KNIPPLE
Collar Eastings : 11140.000
Collar Northings : 9080.000
Collar Elevations : 1143.000
Collar Bearing : 88.00
Grid Baseline : 20.00

Collar Inclination : -45.00
Grid Bearing : 110.00
Final Depth : 29.87
Claim No. :

Logged by : FRASER STEWART
Date : SEPT. 15/91 - SEPT. 17/91
Downhole Survey : NONE
Drilled By : J.T. THOMAS
Core Size : BD

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	14.32	OVRBDN	OVERBURDEN - a mixture of maroon and green lapilli tuffs - most likely a basal till *											
14.32	29.87	GRTUFF	MEDIUM GREEN LAPILLI TUFF - very badly broken green lapilli tuffs with approximately 60 % recovery - very common intermittent sand and clay layers *											
14.32	15.85	clysnd	- very badly broken green lapilli tuff w very common clay and sand layers *											
15.85	24.38	tuff	- very badly broken green lapilli tuff w/o any clay or sand - could have been washed away during the several hours of reaming up hole *											
			23.46 - bedding contact between green lapilli tuff and green aphyric tuff @ 50 to CA *											
24.38	29.87	clysnd	- v badly broken green lapilli tuff with very common clay and sand layers - approx. 50 % recovery *											
			EOH = 29.87 m Hole abandoned due to seizing rods and casing in very poor ground, no water return.											

NORANDA EXPLORATION CO. LTD.

DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-03A
Grid System : KNIPPLE
Collar Eastings : 10600.000
Collar Northings : 9000.000
Collar Elevations : 1295.000
Collar Bearing : 116.00
Grid Baseline : 20.00

Collar Inclination : -80.00
Grid Bearing : 116.00
Final Depth : 67.06
Claim No. :

Logged by : FRASER STEWART
Date : SEPT. 12/91 - SEPT. 14/91
Downhole Survey : ACID
Drilled By : J.T. THOMAS
Core Size : BD

INTERVAL (m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL (m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
0.00	6.70	OVRBDN	OVERBURDEN											
			*											
6.70	29.87	BRTUFF	MEDIUM GREEN FELDSPAR LAPILLI TUFF - this unit is comprised dominantly of subrounded to subangular feldspar crystals and few small (0.25 cm) maroon tuff fragments in a med green f.gd. matrix - few zones have coarser fragments of green tuff w carb stringers - there is an average of 75 % recovery											
			*											
9.75	10.36	fault	- fault zone w gouge and angular green tuff fragments											
			*											
10.97	11.10	epalt	- lt green ep alt of sheared green tuff											
			*											
14.60	14.75	fault	- fault zone w gouge and angular green tuff fragments											
			*											
22.55	25.30	brx'd	- breccia zone (?), agglomeritic origin ? - large green feld tuff clasts in carb. rich matrix (appears to be a breccia, but has gradational contacts with lapilli tuff - agglomeritic origin ?).	40838	24.05	29.87	5.82	3	.7	8	4	135	3	2
			*											
28.00	28.20	fault	- fault with gouge and angular fragments of green tuff											
			*											
29.87	56.70	AGGLOM	MAROON AGGLOMERATE - comprised of subrounded to angular clasts (0.25-15.00 cm) of lt to dark maroon feldspar tuffs in a dirty grey											

INTERVAL (m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL (m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			green matrix - common zones of larger angular clasts (5-10 cm) w perv carb flooding - averages 75 % recovery *											
29.87	32.92	dtralt	- contact zone is rusty (deuteric alt ?) - appears to be washed out and is a light possanous color *	40839 40840	29.87 33.50	33.50 34.13	3.63 0.63	5 2	.5 .3	7 6	7 5	76 71	17 26	2 2
33.52	33.85	carost	- common carb stringers interstitial to large fragments; possibly late stage carbonate flooding * - 35.0 bedding contact @ 60 to CA *											
35.62	42.50	brx'd	Breccia zone - comprised of angular frags of maroon feldspar tuff w interstitial carb stringers/vnlts * 42.00 - 42.10 : fault at 20 to CA. with gouge and coarse sand *	40841	40.50	43.00	2.40	4	.2	5	10	72	14	2
45.70	46.00	fault	- fault w gouge and subangular frags of maroon agglomerate clasts *	40842	47.85	54.55	6.70	4	.4	9	6	91	59	4
53.30	53.40	sand	- sand (?) possibly from all the reaming taking place up hole *											
56.70	67.06	TUFF	MEDIUM GREEN FELDSPAR LAPILLI TUFF - same as previously described - averages 50 % recovery *											
57.38	57.91	fault	- fault w gouge and subangular to rounded fragments green tuff *	40843 40844	57.80 63.40	60.35 64.61	2.55 1.21	3 5	.5 .4	15 4	25 13	125 85	5 4	2 3
64.50	64.92	fault	- fault/smear zone w wk chl alt. very broken w poor recovery *	40845	64.61	67.06	2.45	8	3.1	172	5	184	4	2
65.30	67.06	fault	- fault zone with gouge, sand and angular fragments, badly broken rock averaging											

NORANDA EXPLORATION CO. LTD.
DIAMOND DRILL LOG

PROPERTY : KNIPPLE LAKE
HOLE No. : KN-91-03P

INTERVAL(m) FROM	TO	MAJOR/MINOR UNITS	DESCRIPTION	SAMPLE NUMBER	INTERVAL(m) FROM	TO	SAMPLE WIDTH	GEOCHEMICAL SAMPLES Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
			50 % recovery											
			EOH = 67.06 m											

Abbreviations:

alt - altered
approx - approximate
CA - core axis
carb - carbonate
chl - chloritic
cm - centimetre
ep - epidote
f - fine
feld - feldspar
frags - fragments
gd - grained
int - intense
lt - light
med - medium
orient - orientated
perv - pervasive
porph - porphyritic
pyrx - pyroxene
qtz - quartz
silic - silicified
tr - trace
v - very
vnlts - veinlets
volc - volcanics
w - with
wk - weak
wkly - weakly
w/o - without

APPENDIX V

STATEMENT OF COSTS

CLAIMS : KL-1, KL-2, KL-3, TREATY-12
DATES : SEPTEMBER 1 TO OCTOBER 1, 1991
TYPE OF REPORT : DIAMOND DRILLING

---

1)	WAGES	
	Rate per day : $153.58	
	No. of days : 54	
	Dates : 09/01/91 to 10/01/91	
	TOTAL	$ 8,293.59
2)	FOOD, ACCOMMODATION, AND SUPPLIES	
	Rate per day : $49.72	
	No. of days : 106	
	Dates : 09/01/91 to 10/01/91	
	TOTAL	$ 5,270.32
3)	TRANSPORTATION	
	Rate per day : $298.89	
	No. of days : 106	
	Dates : 09/01/91 to 10/01/91	
	TOTAL	$31,682.50
4)	ANALYSES	
	34 core samples analyzed by ICP (30 elements) and AA (Au) @ $15.00 each :	$ 510.00
5)	CONTRACTORS	
	346.5 metres diamond drilling @ $64.47 per metre	$18,646.80
	Drill pad construction	$ 5,380.00
6)	COST OF PREPARATION OF REPORT	
	Author	$ 500.00
	Drafting	$ 200.00
	Typing	$ 75.00
	TOTAL	$ 775.00
TOTAL COST		**$ 70,558.21**

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

ANALYTICAL RESULTS

SILTS

SAMPLE NO.	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm
103772	20	0.8	27	10	102	8
103773	5	0.2	21	2	94	17
103774	10	0.6	28	15	91	5
103775	10	0.2	29	7	105	8
106652	15	0.8	24	4	107	11
106653	30	0.8	25	2	92	27
106654	20	0.4	22	2	99	17
106675	5	0.2	21	2	100	16
109632	15	0.8	22	5	82	11
109633	65	0.4	15	2	88	9
128467	20	1	25	16	108	6
128468	60	0.8	22	7	94	10
128469	10	1	19	6	113	16
128470	10	0.4	24	7	101	11
128471	5	0.4	17	2	93	2

ROCKS

SAMPLE NO.	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm
36480	2100	1.6	508	142	5335	28	2
36481	620	10.3	2966	6240	21675	156	11
36482	34	2.4	626	250	87	90	3
36483	1680	5.3	1210	9650	27037	81	2
36484	42700	11.2	268	6119	24087	191	4
36485	5750	2.9	141	2551	6735	11	2
95598	390	1.7	91	204	431	163	6
105125	280	0.4	8	77	315	4	2
105149	84	5.6	23	54	95	327	15
105150	49	1.5	12	17	27	48	4
105176	1	0.1	4	4	126	2	2
105177	35	1.3	5	17	14	108	2
105178	25	0.8	7	25	23	33	2
105179	20	1.4	19	29	42	11	2
105180	8	1.3	15	22	24	27	2
105181	350	26.4	49	1231	117	440	23
105182	44	0.4	44	19	26	7	2
105183	320	41.3	85	1704	341	19	8
105184	2650	9.2	1500	24177	24930	241	9
105185	7030	12.5	2830	12777	47086	67	4
105186	70	7.7	3383	2186	8301	183	6
105194	1	0.1	18	7	58	2	2
105195	2	0.1	4	13	23	3	2
105196	4	0.2	14	14	56	14	5
105197	1	0.2	7	5	11	2	2
105198	3	0.1	24	3	73	2	2
105299	6	0.8	15	133	21	7	4
105300	4	0.2	33	7	60	2	2
109031	500	0.5	7	811	223	3	2
109032	420	4.9	865	5952	14827	338	16
109033	10	0.5	37	129	299	7	2
109034	2	0.3	10	8	83	8	2
109035	270	8	1034	17749	30436	76	5
109036	2050	5.9	709	7704	30148	41	2
109037	11200	10.5	853	12477	36228	107	20
109038	27400	10.9	748	8513	14276	55	3
109039	132	1	30	278	1137	119	2
109040	320	0.4	28	175	334	9	2
109041	21	0.4	15	100	50	11	3
109042	6980	6.5	680	6730	21184	277	7
109043	590	8.4	2577	3755	8960	269	5
109044	53	3.3	959	1131	2805	53	4
109045	17500	10.2	593	10036	30775	443	18
109046	4110	3.1	406	2221	10901	53	4
109047	24	8	1657	10937	39800	143	5
109048	63	1.4	20	34	210	215	3
109049	350	2.7	192	5346	18309	35	4
109050	2360	5.5	3594	8949	24740	52	4
109101	8560	6.2	210	2796	18451	14	3
109102	6450	36.2	1636	23597	99999	122	2
109103	13640	14.5	664	20736	86161	259	2
109626	40	0.3	21	263	525	4	2
109627	14	0.4	5	49	133	2	3
109628	10	0.1	1	299	230	2	2
109629	200	6	34	144	371	466	17
109630	1260	6.1	26	548	153	25	7
109631	9	0.4	10	44	74	7	2
109634	65	27.7	19	51	105	88	11
125031	26	0.5	9	26	46	208	6
125032	75	19.4	4261	24950	38595	425	29
125033	2650	5.9	1741	6281	16737	62	4
125034	4560	3.9	1512	3120	14942	80	2
125035	1920	7.9	612	5618	17557	428	25
125036	1340	3	1171	3716	13072	38	3
125037	1020	1.4	204	821	3264	25	2
125038	2130	5.8	524	4789	12480	79	7
125039	5290	4.8	934	3055	20373	257	6
125040	52	17.9	6894	4832	4952	65	3
125041	2280	3.3	325	1257	2118	126	4
125042	10540	15.5	1453	20795	64752	612	26
125043	8660	7	654	17548	26968	36	2
125044	1240	15.5	1070	1586	4692	425	42
125045	1480	2.6	196	2403	1118	118	3
125046	6260	4.9	437	3613	17380	72	2
125047	1350	22.1	849	3469	4078	998	70
125048	4290	3.7	364	5948	22144	30	2
125049	3960	5.8	461	6957	10236	126	2
125050	7580	7.2	1274	4066	39062	454	9
128431	114	4.5	37	254	160	40	2
128432	45	8.3	58	103	31	14	2
128433	6	0.3	4	4	3	5	2
128434	35	8.6	10	40	71	120	3
128435	11	0.4	2	5	16	5	2
128436	6	0.5	26	30	19	432	4
128437	6	0.2	16	15	109	9	5
128472	33	0.2	35	42	147	16	2
128473	14	0.5	20	11	98	16	2
128474	6	0.5	18	33	70	20	2
128475	200	1.4	6	12	43	22	2
128521	4	0.2	4	29	112	17	2
128522	23	0.2	6	39	98	2	2
128523	20	0.1	8	56	175	2	2
128524	3	0.1	11	14	24	2	2
128525	51	0.3	29	59	382	9	2
129770	14	5.5	128	14	84	72	2
129885	2	0.6	10	9	93	19	3
129886	3	0.3	5	9	44	106	13
129887	2	0.7	5	167	67	19	2
129888	100	1.2	1	46	56	41	3

LEGEND

Geology

Lower Jurassic

3 Felsic Volcanics (Mt. Dilworth Fm. Equivalent)
- 3a Pale grey to brown, variably silicified, quartz veined, feldspar-phyric lapilli tuff
- 3b Pale grey to creamy brown, aphyric, siliceous rhyolite

2 Andesitic Volcanics (varicoloured)
- 2a Feldspar-phyric
- 2b Feldspar-phyric and/or tuffaceous
- 2c Feldspar-phyric and amygdaloidal
- 2d Massive chloritic
- 2e Dark grey dolomite

1
- 1a Agglomerate (clasts of andesitic rocks of unit 2)
- 1b Grey-brown agglomerate
- 1c Maroon tuffs

Symbols

Geological Contact — Fault
Bedding Attitude — Vein Attitude
Area of Outcrop — Edge of Glacier
Cliffs — Trench
Gossan — DDH
Edge of Moraine Covered Area

x 129888 Rock Sample Location
⊗ 109633 Float Sample Location
● 125043 Mineralized Float Sample Location
106653 Silt Sample Location

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	Au* ppb
113851	2	31	2955	101	11.2	6	12	105	.96	179	55
113852	6	81	7039	96	33.8	10	49	125	3.93	514	51
113853	5	31	32681	30	56.6	4	9	90	1.36	193	63
113854	2	124	628	637	19.2	7	17	167	3.31	176	470
RE 183026	4	62	30269	60	29.7	4	33	129	2.50	338	230
113855	3	5701	37488	99999	23.9	5	20	71	3.51	102	7930
113856	4	4355	36688	69518	32.8	7	23	2477	7.40	107	4780
182776	1	27	296	358	1.4	5	7	192	2.78	62	32
182777	1	20	277	158	1.8	5	7	164	2.39	61	52
183026	4	63	29609	62	30.1	7	32	127	2.50	337	240
183027	2	22	238	1498	18.0	2	9	144	4.46	2521	8
183028	2	31	202	58	1.8	3	13	117	2.52	151	32
183031	1	8	50	47	1.6	2	7	118	2.60	32	45
183032	2	25	199	84	2.3	2	7	124	3.63	46	4
182778	1	10	20	75	.1	3	5	385	3.91	29	44
183036	2	10	9	10	.8	5	6	114	2.83	77	38
183037	1	7	8	49	.1	4	6	3449	1.68	4	2
RE 183042	1	5	17	6	1.4	3	1	27	1.20	83	7
183038	1	9	12	50	.1	5	11	580	4.86	43	9
183039	1	4	7	48	.1	4	8	755	3.16	25	3
183040	1	3	5	81	.1	4	13	1024	5.17	21	7
183041	1	7	9	45	.1	4	15	281	2.04	29	11
183042	1	4	19	6	1.4	4	1	32	1.25	85	8
183043	1	19	2	88	.1	8	19	532	5.41	3	1
183044	1	10	13	60	.1	2	6	809	2.09	11	2
183033	3	6	20	37	.4	7	4	585	1.68	24	68
183034	1	7	8	25	.3	5	12	1537	3.33	17	19
183035	1	12	33	25	.4	6	12	465	3.89	11	17

0 50 100 150 200 metres
SCALE 1:2500

REVISED
NOV 15/90 PJL
NOV. 30/91 P.J.L.

KNIPPLE LAKE

CLAIMS KLI-3, TREATY 12

GEOLOGY & SAMPLE LOCATION MAP

PROJ. No. 293
N.T.S. 104A/5
SURVEY BY:
DATE:
DRAWN BY: AutoCAD(S.K.B.)
SCALE: 1 : 2500
DWG. No. 3

NORANDA EXPLORATION
OFFICE: PRINCE GEORGE B.C.

9600N

KN-91-01(1394.0)

9600N

11250W 11200W 11150W 11100W 11050W TL 11000W 10950W

1400ELEV

1400ELEV

1350ELEV

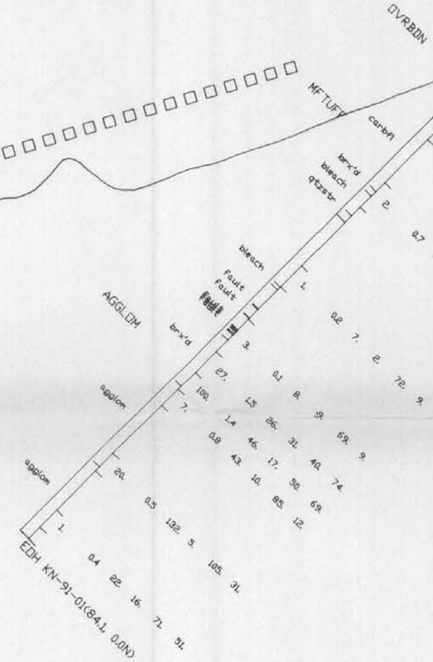
1350ELEV

1300ELEV

1300ELEV

1250ELEV

1250ELEV



LEGEND

Major Units:

AGGLOM - Maroon Agglomerate
GRTUFF - Green Tuff
MFTUFF - Maroon Feldspar Phyric Tuff
OVRBDN - Overburden

Minor Units:

aggLom - agglomerate
bleach - bleached
brx'd - brecciated
carb - carbonate
carbft - carbonate flooded
carbst - carbonate stringers
carbvn - carbonate vein
cavy
clysnd - clay and sand filled fractures
dtralt - deuteric alteration
epalt - epidote alteration
fault
fltzn - fault zone
qzcbvn - quartz, carbonate vein
qzclvn - quartz, chlorite vein
qtzstr - quartz stringers
qtzvn - quartz vein
sand - sand filled fracture
tuff

□□□□□ ZONE OF INCREASED CHARGEABILITY

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

KNIPPLE LAKE PROPERTY

Vertical Section Looking North
DDH KN-91-01
Geology and Geochem Analyses

SECTION 9600N
SCALE: 1:500M
27 NOV 1991

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NORANDA EXPL. PRINCE GEORGE, B.C.

9400N

KN-91-02(1392.0)

9400N

10950W

10900W

10850W

10800W

10750W

1400ELEV

1350ELEV

1300ELEV

1250ELEV

OVRBDN

GRTUFF

AGGLOM

GRTUFF

EOH KN-91-02(93.3, 0.0N)

LEGEND

Major Units:

AGGLOM - Maroon Agglomerate
GRTUFF - Green Tuff
MFTUFF - Maroon Feldspar Phyric Tuff
OVRBDN - Overburden

Minor Units:

agglom - agglomerate
bleach - bleached
brx'd - brecciated
carb - carbonate
carbfl - carbonate flooded
carbst - carbonate stringers
carbvn - carbonate vein
cave
clysnd - clay and sand filled fractures
dtralt - deuteric alteration
epatl - epidote alteration
fault
fltzn - fault zone
qzcbvn - quartz, carbonate vein
qzclvn - quartz, chlorite vein
qtzstr - quartz stringers
qtzvn - quartz vein
sand - sand filled fracture
tuff

□□□□□ ZONE OF INCREASED CHARGEABILITY

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

KNIPPLE LAKE PROPERTY

Vertical Section Looking North
DDH KN-91-02
Geology and Geochem Analyses

SECTION 9400N
SCALE: 1:500M
27 NOV 1991

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NORANDA EXPL. PRINCE GEORGE, B.C.

9000N

KN-91-03A(285.0)

10700W 10650W 10600W 10550W 10500W 10450W

1350ELEV

1300ELEV

1250ELEV

1200ELEV

LEGEND

Major Units:

AGGLOM - Maroon Agglomerate
GRTUFF - Green Tuff
MFTUFF - Maroon Feldspar Phyric Tuff
OVRBDN - Overburden

Minor Units:

agglom - agglomerate
bleach - bleached
brx'd - brecciated
carb - carbonate
carbfl - carbonate flooded
carbst - carbonate stringers
carbvn - carbonate vein
cave
clysnd - clay and sand filled fractures
dtralt - deuteric alteration
epatl - epidote alteration
fault
fltzn - fault zone
qzcbvn - quartz, carbonate vein
qzclvn - quartz, chlorite vein
qtzstr - quartz stringers
qtzvn - quartz vein
sand - sand filled fracture
tuff

□□□□□ ZONE OF INCREASED CHARGEABILITY

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

KNIPPLE LAKE PROPERTY

Vertical Section Looking North
DDH KN-91-03 and KN-91-03A
Geology and Geochem Analyses

SECTION 9000N
SCALE: 1:500M
27 NOV 1991

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NORANDA EXPL. PRINCE GEORGE, B.C.

KN-91-04(1304.0)

9600N

11350 W

11300 W

11250 W

11200 W

11150W

1350ELEV

1300ELEV

1250ELEV

LEGEND

Major Units:

AGGLDM - Maroon Agglomerate
GRTUFF - Green Tuff
MFTUFF - Maroon Feldspar Phyric Tuff
OVRBDN - Overburden

Minor Units:

agglom - agglomerate
bleach - bleached
bre'd - brecciated
carb - carbonate
carbfl - carbonate flooded
carbst - carbonate stringers
carbvn - carbonate vein
cave
clysnd - clay and sand filled fractures
dtralt - deuteric alteration
epatl - epidote alteration
fault
fltzn - fault zone
qzcbvn - quartz, carbonate vein
qzclvn - quartz, chlorite vein
qtzstr - quartz stringers
qtzvn - quartz vein
sand - sand filled fracture
tuff

□□□□□ ZONE OF INCREASED CHARGEABILITY

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

KNIPPLE LAKE PROPERTY

Vertical Section Looking North
DDH KN-91-04
Geology and Geochem Analyses

SECTION 9600N
SCALE: 1:500M
27 NOV 1991

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NORANDA EXPL. PRINCE GEORGE, B.C.

9080N

JN

KN-91-05(1143.0)

11250W

11200W

11150W

11100W

11050W

1200ELEV

1150ELEV

1100ELEV

LEGEND

Major Units:

AGGLOM - Maroon Agglomerate
GRTUFF - Green Tuff
MFTUFF - Maroon Feldspar Phyric Tuff
OVRBDN - Overburden

Minor Units:

agglom - agglomerate
bleach - bleached
brx'd - brecciated
carb - carbonate
carbfl - carbonate flooded
carbst - carbonate stringers
carbvn - carbonate vein
cleve
clysnd - clay and sand filled fractures
dtralt - deuteric alteration
epalt - epidote alteration
fault
fltzn - fault zone
qzctvn - quartz, carbonate vein
qzclvn - quartz, chlorite vein
qtzstr - quartz stringers
qtzvn - quartz vein
sand - sand filled fracture
tuff

□□□□□ ZONE OF INCREASED CHARGEABILITY

AXIS OF VLF ANOMALY

OVRBDN

clysnd

tuff

GRTUFF

clysnd

EOH KN-91-05(29.9, 10.6N)

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,074

KNIPPLE LAKE PROPERTY

Vertical Section Looking North
DDH KN-91-05
Geology and Geochem Analyses

SECTION 9080N
SCALE: 1:500M
27 NOV 1991

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NORANDA EXPL. PRINCE GEORGE, B.C.