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**SD PROPERTY, NWT  
Geochemical Assessment Report  
SD Claim Group**

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April 8, 1996 - April 7, 1997

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**James River - Coronation Gulf Area  
NTS: 76M/5, /12**

**Lat.: 67° 30'N  
Long.: 111° 47'W**

**District of Mackenzie  
Northwest Territories**

DEPARTMENT OF INDIAN AND  
NORTHERN AFFAIRS

**JUL 7 1997**

MINING RECORDER

YELLOWKNIFE, N.W.T

*prepared for:*

**BENACHEE RESOURCES INC.  
SNOWPIPE RESOURCES LTD.**

*prepared by:*

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ENGINEER OF MINES FOR  
CHIEF, NORTH, NON-RENEW  
RESOURCES BRANCH

DATE: 15 AUG 1997

THIS REPORT HAS BEEN EXAMINED AND  
APPROVED AS TO TECHNICAL WORTH UNDER  
SECTIONS 6 & 7 OF SCHEDULE II OF THE  
CANADA MINING REGULATIONS AND  
VALUED IN THE AMOUNT OF \$ 46,500.00

*John Sharp*

July 1997



## **Executive Summary**

The SD Property, located in the extreme northern portion of the Slave Structural Province, Northwest Territories, consists of 22 claims with a combined acreage of 54,628 acres. The property has been actively explored for diamonds since 1993.

During the period 1993 - 1996, a total of 408 till samples had been collected and processed. A detailed airborne geophysical program consisting of 1,878.3 line kilometers was carried out by Geotrex Limited, Ottawa, Ontario. These activities and expenditures were detailed in the 1993 - 1995 Assessment Report on the SD claims by Canamera Geological Ltd. The 1996 - 1997 exploration activities included the collection and processing of an additional 40 reconnaissance till samples.

No kimberlite pipes have been discovered on the property to date, however, an interesting heavy mineral indicator train may be developing. A number of geophysical anomalies particularly in the northern part of the claims have massive sulphide characteristics. These anomalies occur within the volcanic and sedimentary units of the Yellowknife Assemblage; in particular the Aniak River volcanic belts. These anomalies have not been investigated but should be the focus of exploration in the near future.

Further till sampling in the up-ice direction of minor and significant anomalous samples may result in developing and refining additional dispersion trains. Existing geophysical anomalies should be investigated for their base metal and/or gold potential.

This report consists of one volume detailing the geochemical sampling program, including maps, figures and results, for the work completed during the 1996 - 1997 time period.

# TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY .....	i
TABLE OF CONTENTS.....	ii
List of Figures .....	iv
List of Maps.....	iv
1. INTRODUCTION.....	1
2. LOCATION AND ACCESS .....	1
3. TOPOGRAPHY AND CLIMATE .....	4
4. CLAIM STATUS .....	5
5. GEOLOGY .....	5
5.1 Introduction.....	5
5.2 Archean Geology .....	5
5.2.1 Early Pre-Yellowknife Supergroup Assemblage.....	7
5.2.2 Yellowknife Supergroup.....	7
5.2.3 Subvolcanic Rocks.....	7
5.2.4 Metavolcanic Rocks.....	8
5.2.5 Metasedimentary Rocks.....	8
5.2.6 Post-Yellowknife Supergroup Assemblage .....	9
5.2.7 Proterozoic Geology .....	9
5.3 Structural Geology.....	10
5.4 Economic Geology.....	11
5.5 Property Geology.....	12
5.6 Pleistocene Geology.....	14
6. PREVIOUS EXPLORATION .....	14
7. CURRENT EXPLORATION (1996-1997) .....	14

7.1 Overview of Previous Exploration .....	14
8. GEOCHEMISTRY .....	16
8.1 Introduction.....	16
8.2 Field Collection .....	16
8.3 Sample Processing .....	17
8.4 Producing a Heavy Mineral Concentrate.....	17
8.5 Results and Interpretation .....	18
9. CONCLUSIONS AND RECOMMENDATIONS .....	19
REFERENCES AND BIBLIOGRAPHY .....	20
LIST OF APPENDICES	
Appendix A - Statement of Costs.....	A-1
Appendix B - Claim Data.....	B-1
Appendix C - Geochemical Data.....	C-1
Appendix D -List of Assessment Reports .....	D-1
Appendix E - List of Personnel .....	E-1
Appendix F - Statement of Qualifications.....	F-1

## List of Figures

Figure	Page
1 SD Claims - Location Map.....	2
2 SD Claims - Position within Slave Province and Known Kimberlitic Pipes .....	3
3 SD Claims - Regional Geology .....	6
4 SD Claims - Mineral Occurrences within the Slave Province .....	13
5 SD Claims - Property Geology.....	15

## List of Drawings

Drawing	Page
1 SD Claims - Sample Coverage and Results (1:100,000).....	(back pocket)
2 SD Claims - Claim Map (1:100,000) .....	(back pocket)

**SD Property, NWT**

**Geochemical Assessment Report - SD Claim Group**  
**Benachee Resources Inc. / Snowpipe Resources Ltd.**  
**April 8, 1996 to April 7, 1997**

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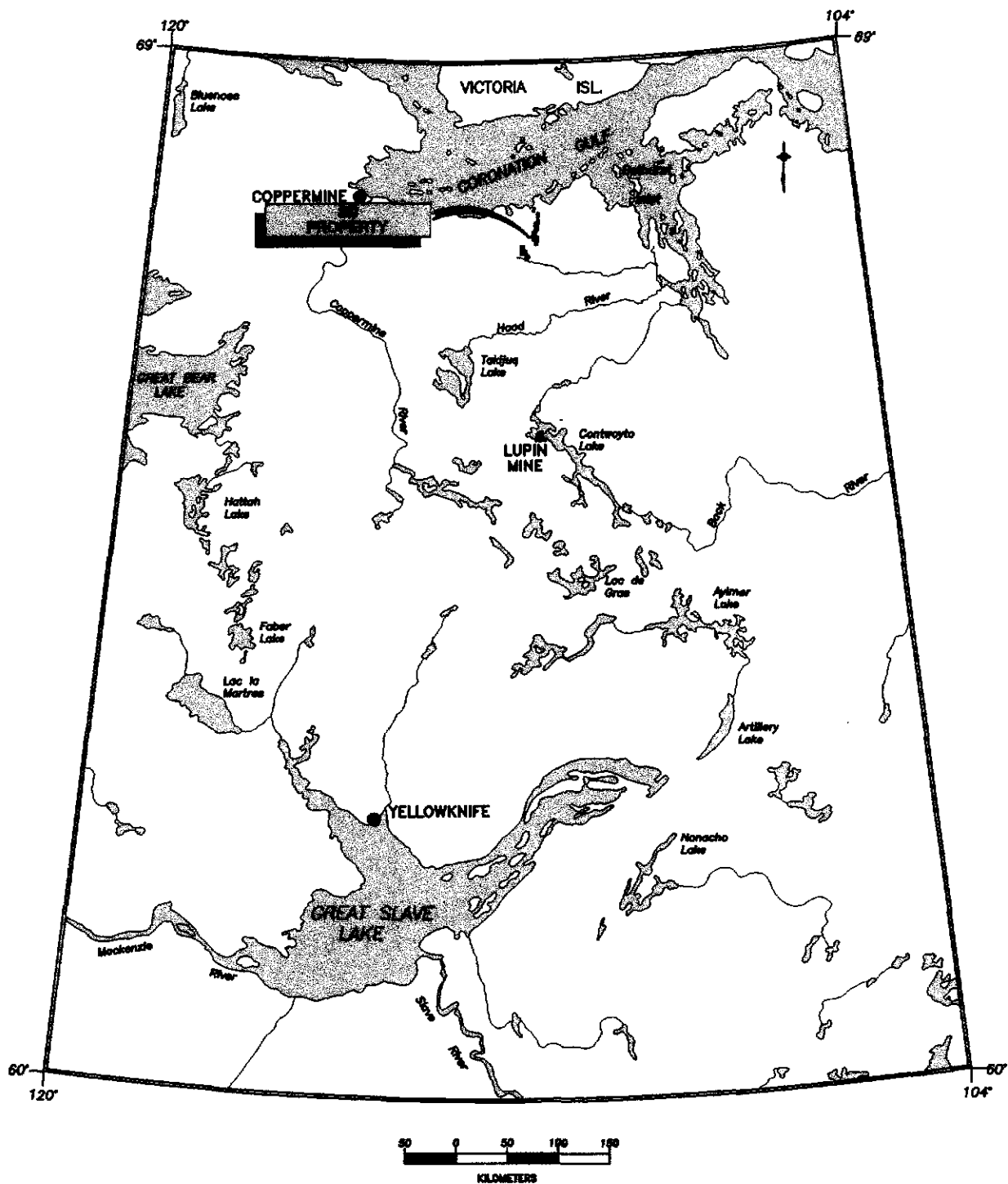
## **1. Introduction**

The Slave Structural Province of the Northwest Territories is an Archean segment of the North American Craton. It is underlain by metasedimentary and metavolcanic rocks of the Yellowknife Supergroup and by Archean granites and gneisses. The discovery of diamonds at Lac De Gras, through the use of geochemical tracking of kimberlitic indicator minerals, has fueled the exploration activities within the region. Many junior companies staked out large land positions and carried out detailed geochemical exploration programs. Benachee Resources Inc. and Snowpipe Resources Ltd. were among the early participants in this activity by the staking of several properties including the SD claims.

The property has undergone at least two major episodes of glaciation that scoured the terrain and deposited a layer of till. Exploration for kimberlite pipes has consisted primarily of glacial till sampling in search of a specific assemblage of minerals associated with kimberlites. These samples are processed and examined for traces of these minerals whose chemical composition distinguishes them as being unique to an upper mantle origin. The geographical positions of these indicator minerals in the glacial dispersion train are noted and followed "up ice" to the kimberlite source. Airborne magnetics and EM surveys are used, in conjunction with sampling, to pinpoint various geophysical responses associated with weathered pipe structures.

## **2. Location and Access**

The SD claims are located in the Mackenzie District of the Northwest Territories (Figures 1 & 2). The center of the SD claims is located at 67° 30' N; 111° 47' W and lies about 110 kilometers north of the Arctic Circle. The center of the property lies 565 kilometers N13°E of Yellowknife. The claim blocks are roughly located between the Tree and Anialik



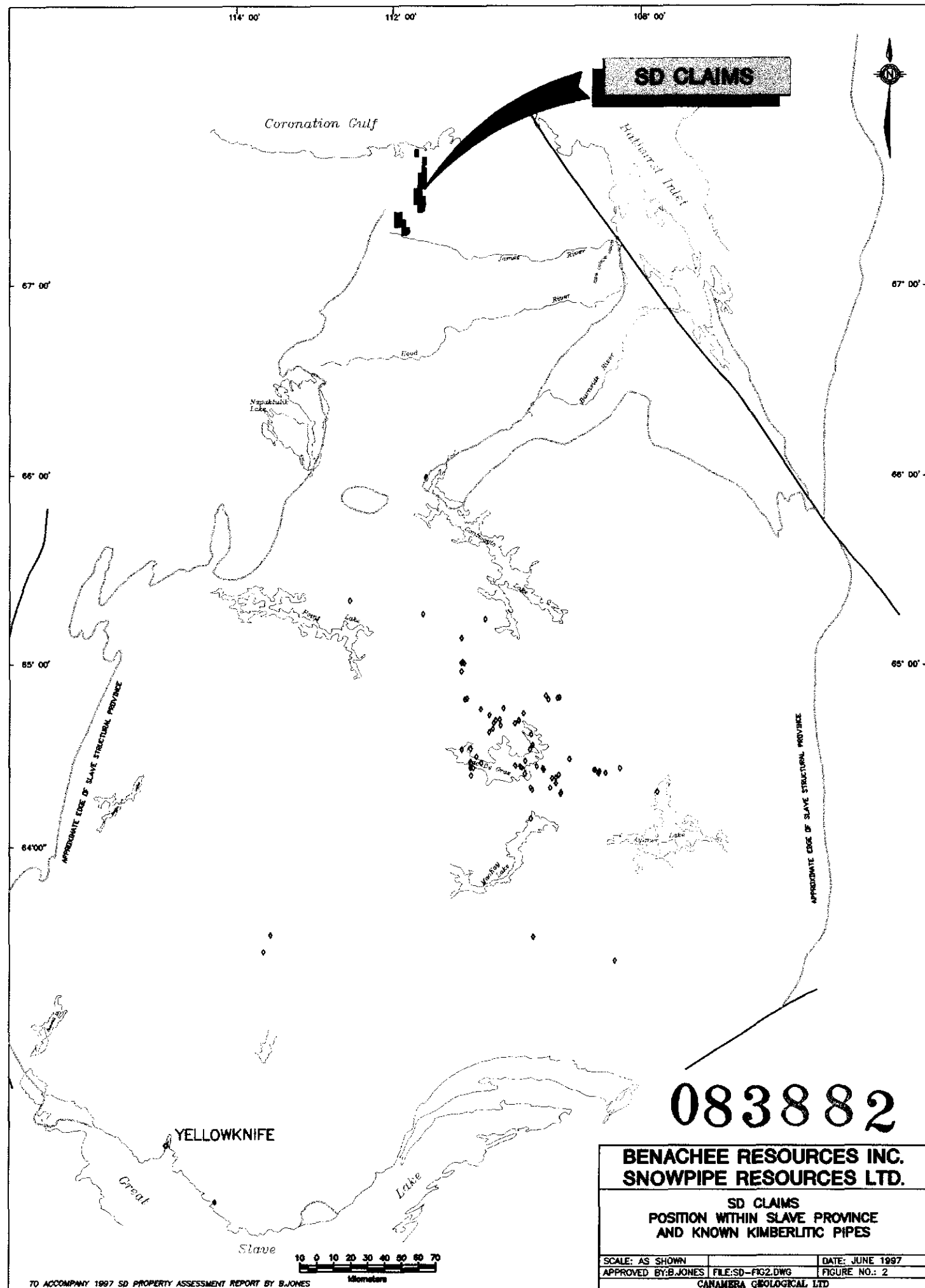
083882

**BENACHEE RESOURCES INC.  
SNOWPIPE RESOURCES LTD.**

**SD CLAIMS**

**LOCATION MAP**

SCALE: AS SHOWN	DATE: JUNE 1997	FIGURE NO.1
APPROVED BY: B.J.	FILE: SD-FIG1.DWG	
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ivers and stretch from the Coronation Gulf to south of the James River and may be located on NTS maps 76 M/5, /12.

During the winter, the area is accessible by ski-equipped aircraft. In the summer, there is a window of approximately two to two and a half months (early July to mid-September) in which lakes suitable for float-equipped aircraft can be used to transport men and supplies to the property. Larger aircraft can land on the 6,000 foot gravel airstrip at the Lupin mine site, 193 kilometers S8°E from the center of the claim block. During freeze-up and break-up, September and June respectively, access to the property is by helicopter only.

The Echo Bay Mines' winter road, which links Yellowknife to the Lupin mine site on Contwoyto Lake, passes within 190 kilometers on a S7°E bearing from the center of the property.

### **3. Topography and Climate**

The SD property is located on the treeless tundra of the barren grounds. Topography is variable from rolling hills and ridges to relatively flat with lakes of various sizes, shapes and depths interspersed with some areas of low lying muskeg. Numerous small drainage systems and several larger unnamed lakes are located in the northern half of claims area. Local relief ranges from sea level in the extreme north end along the Coronation Gulf to 415 meters above sea level in the area north of the James River.

Climatic conditions on the barren grounds are extreme. Winter temperatures reach -45° Celsius occasionally accompanied by high winds creating extreme wind chill conditions and extensive drifting snow; summer temperatures can reach the high 20's Celsius. However, the weather is highly variable and storms can occur at any time of the year. Average annual snowfall rarely exceeds one meter, most of which falls during autumn and spring storms.

With the onset of summer, black flies and mosquitoes infest all areas of the barren grounds. Other wildlife includes: caribou, musk oxen, Arctic wolves, Arctic foxes, barren ground

grizzlies, wolverines, Arctic hare and ptarmigan. Lake trout and Arctic char abound in the local lakes and rivers.

#### **4. Claim Status**

The current SD property comprises 22 claims totaling 54,628.00 acres (Drawing 2, back pocket). The property consists of two irregular shaped, unattached claim blocks. Benachee Resources Inc. and Snowpipe Resources Ltd. are co-holders of title on all 22 claims. The statement of exploration expenditures is listed in Appendix A. A complete list of claim information, including those claims being allowed to lapse, is attached in Appendix B.

#### **5. Geology**

##### **5.1 Introduction**

The SD property is located in the northern portion of the Slave Structural Province stretching between the James River area and the Coronation Gulf. The Slave Structural Province (Figure 3) is an Archean granite-greenstone terrain containing belts of 2.70 to 2.67 Ga metasedimentary and metavolcanic rocks that were intruded extensively by syn- to post-volcanic granitic plutons between ca. 2.70 and 2.58 Ga (Relf 1992).

##### **5.2 Archean Geology**

Archean rocks within the Slave Structural Province are located between Great Slave Lake to the south and Coronation Gulf to the north. The Archean rocks are overlain by Proterozoic strata of the Wopmay Orogen on the west. The eastern side of the province can be roughly delineated by: the early Proterozoic Thelon deformation and metamorphic zone which occurs along its southeastern edge, the western edge of the Proterozoic deformation between the Bathurst and McDonald faults, and the eastern limit of Archean migmatites to the northeast (Fyson and Padgham 1993).

Rocks within the Slave Structural Province are assigned to three lithotectonic assemblages identified as: an early assemblage of gneisses, granitic rocks and quartz arenites; Yellowknife Supergroup greywackes, mudstones, volcanic rocks and synvolcanic intrusions; and a

# GEOLOGY OF THE SLAVE STRUCTURAL PROVINCE

A tectonically oriented geological map of the Slave craton drafted in AutoCAD

## LITHOLOGIES

### PROTEROZOIC-PALEOZOIC

cover rocks

ARCHEAN (supracrustal rocks are metamorphosed)

### Younger Assemblage

polymict conglomerate, feldspathic gneiss  
granitoid rocks

### Yellowknife Assemblage

migmatite and gneiss (may include older rocks)  
supracrustal rocks identified  
plutonic and undifferentiated rocks  
metagreywacke-mudstone; minor conglomerate (s),  
calc-arenite, carbonate, and iron formation  
intermediate-felsic volcanic rocks  
mafic-intermediate and undifferentiated volcanic  
rocks  
gabbro-diorite and gneissic granitoid rocks,  
partly syrvolcanic

### Older Assemblage

quartz arenite and felsic volcanic rocks, zircons  
older than 2.8 Ga; commonly associated with iron-  
formation and ultramafic rocks  
gneiss and granite, partly with zircon ages >2.8 Ga;  
includes undifferentiated younger rocks

Boundary of Slave Structural Province

Geological contacts approximate, gradational

Structural trends

folds

foliation in migmatite and granitoid rock

cleavage oblique to folds

shear zone

fault

Scale 1:1,000,000

SD CLAIMS

Coronation Gulf

BATHURST FAULT

WOPMAY FAULT

McDONALD FAULT

0838882

BENACHEE RESOURCES INC.  
SNOWPIPE RESOURCES LTD.

SD CLAIMS  
REGIONAL GEOLOGY

MODIFIED FROM FYSON & PADGHAM 1993-8

SCALE: AS SHOWN NTS: DATE: JUNE 1997  
APPROVED BY: B. JONES FILE: FYSONX.DWG FIGURE: 3

CANAMERA GEOLOGICAL LIMITED

younger sedimentary-plutonic assemblage of clastic sediments and granitic rocks. Approximately two-thirds of the province is underlain by post-Yellowknife Supergroup granitic rocks. Deformation and greenschist to amphibolite facies metamorphism affect all volcanic and sedimentary rocks (Fyson and Padgham 1993).

#### **5.2.1 Early Pre-Yellowknife Supergroup Assemblage**

The early assemblage of pre-Yellowknife Supergroup rocks generally occurs west of 112° west, along the western edge of the Yellowknife supracrustal domain and between Point Lake and Coronation Gulf. It contains two groups: granites and gneisses of variable composition (tonalitic gneiss to potash granite), and a quartz arenite-felsic volcanic group. The quartz arenite-felsic volcanic association also includes distinctive magnetite iron formations and ultramafics and appear to be intimately tied to granitic basement rocks (Fyson and Padgham 1993).

#### **5.2.2 Yellowknife Supergroup**

The Yellowknife supracrustal-plutonic assemblage consists of three distinct assemblages: granite and gneisses; volcanic and metasediments; and interbedded turbidites. In the Point Lake - Contwoyto Lake area, the Yellowknife Supergroup is comprised of five formations: two distinct belts of metavolcanic rocks known as the Point Lake Formation and the Central Volcanic Belt; metaturbidites of the Contwoyto and Itchen formations; and conglomerates and related clastic sedimentary rocks of the Keskarrah Formation.

#### **5.2.3 Subvolcanic Rocks**

This subdivision consists of foliated gabbroic, granitic and gneissic rocks and have a field relationship which infers that older rocks may be included within this group. There are however, radiogenic ages (2.7 - 2.65 Ga) suggesting that part of the group is synvolcanic with supracrustal rocks included with the Yellowknife Supergroup (Fyson and Padgham 1993).

#### **5.2.4 Metavolcanic Rocks**

Volcanic belts within the Yellowknife Supergroup display a wide variation in composition - basaltic to rhyolitic, and appear in most volcanic belts within the assemblage. Dikes, sills and larger bodies (gabbroic and felsic) have intruded the volcanics. Volcanogenic sandstones, conglomerates, and iron formations occur as thin sedimentary units within the volcanics (Fyson and Padgham 1993).

In the Point Lake - Contwoyto Lake region, a dominantly mafic metavolcanic and related intrusion referred to as the Point Lake Formation have mid-ocean-ridge basaltic affinities. Intermediate volcanoclastic rocks similar to those found in modern island arc settings are assigned to the Central Volcanic Belt. In this area plutonic rocks, of which the Wishbone monzogranite is the largest body, intruded between 2,667 and 2,650 million years ago. The Wishbone intrusive, outcropping approximately 20 kilometers southwest of the Lupin mine, has been interpreted as a synvolcanic intrusion related to the Central Volcanic Belt (Relf 1992).

#### **5.2.5 Metasedimentary Rocks**

Interbedded greywackes, siltstones and mudstones, which have been interpreted as turbidites, make up the largest aerial extent of supracrustal rocks in the province. Included within this group of turbidites are two formations located between Contwoyto Lake and Point Lake which are distinguished by the presence of interbedded iron formation (Contwoyto Formation) and the absence of iron formation (Itchen Formation) (Bostock 1980).

Other sedimentary rocks within this sequence include locally prominent conglomerates which have been derived from nearby volcanic rocks or from older granitic rocks (Point Lake area). A synvolcanic association is inferred in areas where greywackes and mudstones are interlayered with thin felsic and mafic volcanics. This assemblage also includes auriferous iron formations interbedded with fine grained siltstones and mudstones. Thinly bedded carbonates are associated with felsic volcanics in the Back River area (Fyson and Padgham 1993).

### **5.2.6 Post-Yellowknife Supergroup Assemblage**

Post-Yellowknife Supergroup granitic rocks of varying composition (diorite, tonalite, granodiorite, K-rich granite) underlie a large part of the province. Conglomerates and feldspathic sandstones within or adjacent to volcanic belts also contain clasts of post-volcanic granites (Fyson and Padgham 1993).

In the Point Lake area, polymictic conglomerates and other clastic sedimentary rocks of the Keskarrah Formation represent the youngest Archean rocks. These rocks outcrop at Keskarrah Bay, on Point Lake, and unconformably overlie both the Point Lake Formation and the pre-Yellowknife assemblage. Between 2,608 and 2,585 Ga, calc-alkaline rocks of diorite to granodiorite composition and peraluminous granites were emplaced (Relf 1992). Rocks of this suite underlie approximately half of the Point Lake - Contwoyto Lake region.

### **5.2.7 Proterozoic Geology**

Proterozoic metasedimentary cover rocks, having limited aerial extent in the Slave Structural Province, are located near Rockinghorse Lake and northeast of Contwoyto Lake, straddling the Burnside River, and extending to Bathurst Inlet. These rocks comprise the Goulburn and Epworth groups and represent cratonic and marginal geosynclinal environments and lie unconformably on Archean basement (Bostock 1980).

Regionally, four swarms of Proterozoic diabase dikes are recognized; two belts of diabase dikes belonging to the Mackenzie dike swarm occur in the Point Lake - Contwoyto Lake region. One belt occurs north of Contwoyto Lake; the second belt is located 60 kilometers to the west between Point Lake and Itchen Lake. The dikes are up to 150 meters thick, generally steeply dipping and strike north-northwesterly. The rocks are coarse grained, dark grey to green in color (Bostock 1980) and form areas of local positive relief where they intrude easily eroded lithologies such as the metaturbidites and negative relief in areas where they are juxtaposed with granites and gneisses.

### **5.3 Structural Geology**

Several structural elements are noted in the Slave Structural Province. Folding is most evident in sedimentary sequence, while narrow volcanic belts along the margins of these sedimentary domains appear as steep homoclines dipping towards the sediments. In the southern part of the map area where the volcanics are marginal to or located within wider sedimentary domains. Felsic centers (Back River area) are relatively broad and tend to have shallower dips. Folds tend to be steeply inclined and align parallel to contacts with volcanic and granitic rocks. They are truncated and deformed by younger intrusions indicating a syndeformational association. The last generation of large scale folds trend northward (Fyson and Padgham 1993).

The alignment of volcanic belts or belt segments illustrate the structural trends. Lineaments formed by the volcanic belts and at the granite margins change from northwestward in the eastern part of the province to north-northwest and northeast in the area north of 66° N. Sharp contrasts in the structural trend occurs in the southwestern part of the province where volcanic belts and intrusion margins which trend northwest, northeast, and north are juxtaposed and develop an angular pattern. This angular orientation of volcanic belts suggests control of volcanism and structure by an underlying system of crustal-scale fractures (Padgham and Fyson 1992).

Foliation in migmatitic metasediments tend to parallel bedding and along tight fold lines in weakly metamorphosed rocks. Foliation in granites is variable. Cleavage/schistosity is steeply inclined and generally oblique to the axial traces of large scale earlier folds. South of 66° N, cleavage is usually oriented north to northeast postdating cleavage that strike northwest. This suggests a reorientation of regional stresses.

Major shear zones are recognized as zones of high strain ductile deformation restricted to rock boundaries of contrasting competency. Movement along the McDonald and Bathurst faults occurred mainly during the Proterozoic. Most faults within the province are Proterozoic brittle fracture zones, some of which produce prominent topographic lineaments.

## **5.4 Economic Geology**

The claims area is underlain by Archean volcanic and sedimentary rocks of the Yellowknife Assemblage and younger granitic rocks. This felsic/mafic volcanic package forms a linear belt extending from Izok lake to High Lake and beyond. The SD claims are characterized by auriferous iron formations hosted by turbidites and/or gold in quartz veins within intrusions (Padgham and Fyson 1992).

The deposit, at Izok Lake, is a cluster of zinc-copper-lead-silver volcanogenic massive sulphide lenses occurring near the top of a sequence of pyroclastic, felsic metavolcanic rocks of the Point Lake Formation. This deposit is located approximately 190 kilometers southwest of the center of the SD claims area and is currently held by Inmet Mining Corporation. Estimated minable reserve of the deposit are 16.5 million tonnes grading 11.4% Zn, 2.2% Cu, 1.1% Pb and 60g/t Ag (published by Department of Energy, Mines and Petroleum Resources 1995).

The Ulu occurrence is located southeast of the SD claims and is host to precious metal vein mineralization. Two types of occurrences within Archean volcanics are noted: polymetallic quartz veins contain pyrite, pyrrhotite, minor sphalerite and arsenopyrite; and quartz veins with acicular arsenopyrite. The best values obtained to date are: 54.94 g/t Au over 0.95 meters which included visible gold within pyrite-filled fractures. This intersection occurs at the sediment / volcanic contact.

The High Lake copper-zinc massive sulphide deposit of Kennecott Canada Inc. is located east of the SD claim blocks. Estimated reserves are 5.3 million tonnes grading 4.05% Cu, 2.36% Zn, 31.73 g/t Ag and 1.76 g/t Au. This deposit and numerous other mineral showings are located within the Anialik River-High Lake greenstone belt. The Canuc/Orofino (Arcadia) gold deposit is located just east of the SD claims on Coronation Gulf. Estimated reserves are 780,000 tons grading 7.5 g/t Au.

The Lupin mine, operated by Echo Bay Mines Ltd. and located on Contwoyto Lake, is the only producing mine in the area. The ore body at Lupin consists of tightly folded, gold



bearing pyrrhotite-hornblende iron formation within the metaturbidites of the Contwoyto Formation (Yellowknife Supergroup). These iron formations have been the subject of numerous exploration programs, however, the Lupin operation is the only economically viable deposit discovered to date. Major mineral occurrences are shown in Figure 4.

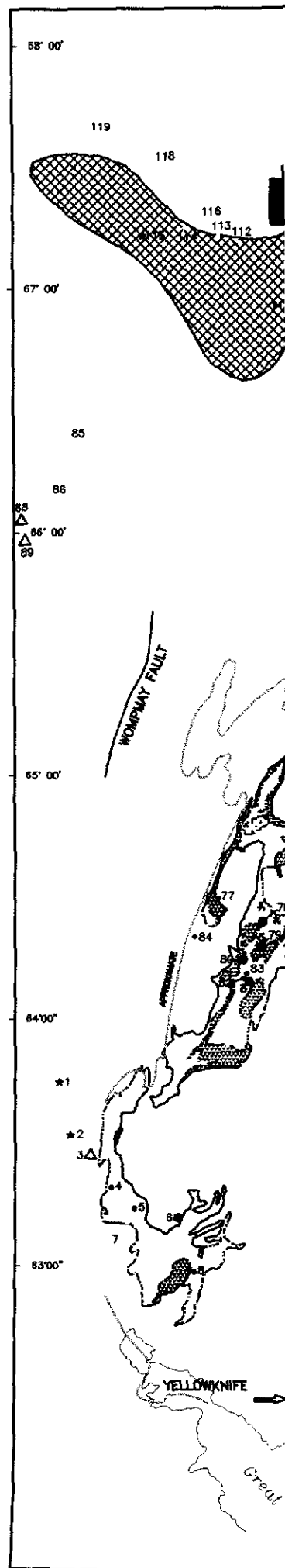
Many diamond exploration programs are currently in progress within the Slave Province; a region which only recently has been recognized as an environment favorable for the emplacement of kimberlite pipes. One such project is the BHP-Dia Met joint venture in the Lac De Gras-Exeter Lake area. BHP, the project operator, produced a 1,193 dry metric tonne bulk sample from the Koala pipe which returned 893 carats at an averaged value of US \$82/tonne (GCNL No. 132, July 12, 1994).

Underground sampling at the Panda pipe, located 1.2 kilometers from Koala, returned 2,557 carats from a 2,835 tonnes sample for an average grade of 0.90 cts/dmt (as of December 12, 1994). At the Fox pipe, the underground bulk sampling program has been completed. A total sample of 6,915 tonnes of kimberlite produced 11,960 diamonds weighing 166 carats for an overall grade of 0.26 cts/dmt. The average value per carat for this sample is about US \$120. The proposed BHP/Dia Met development plan, based upon the on-going bulk sampling program, has expanded to include the: Panda, Misery, Koala, Fox and Leslie diamondiferous pipes.

Project construction is slated to begin in 1996 with commercial production anticipated by the third quarter of 1997 (Dia Met Minerals Ltd. Company News Release, December 12, 1994).

### **5.5 Property Geology**

The property geology for the SD claims is dominated by the volcanics and related rocks of the Yellowknife Supergroup, referred to as the Anialik River Volcanic Belt in this area. The dominant rock type throughout is the metasediments which make up about 65% of the rocks underlying the claims. Intermediate to felsic volcanics occur along the eastern edge of the claims in two locations and constitute less than 1% of the geology within the claim group. Mafic to intermediate volcanics represent about 10% of the rocks underlying the claims. The



# **LEGEND**

## **BASE METALS (Cu,Pb,Zn)**

- > 10 MT
- 4 MT - 10 MT
- < 4 MT

## **PRECIOUS METALS (Au,Ag,Pt)**

- > 2,000,000 oz.
- 200,000 - 2,000,000 oz.
- < 200,000 oz.
- ★ RARE EARTH DEPOSITS (U,Ba,Li,etc.)
- KNOWN KIMBERLITE PIPES

- ▨ ARCHEAN VOLCANICS
- ARCHEAN SEDIMENTS
- ▤ HIGH URANIUM POTENTIAL
- ▥ INTRUSIVE ROCKS
- ▲ PRODUCING MINES
- △ EX-PRODUCING MINES

MODIFIED FROM E.G.S. 1994-05 BY P.L.BEALES

083882

**BENACHEE RESOURCES INC.**

**SNOWPIPE RESOURCES LTD.**

**MINERAL OCCURENCES  
IN THE  
SLAVE PROVINCE**

SCALE: AS SHOWN

DATE: JUNE 1997

APPROVED BY: B.JONES

FILE: SD-FIG4.DWG

FIGURE

4

supracrustal rocks, included in the Yellowknife Supergroup and make up 5% of the rocks, are located in the most southerly part of the claim blocks. Granitic rocks, assigned to the younger assemblage and located along the western side, cover about 20% of the claims.

Foliation, noted within the metasediments roughly parallel the long axis of the belt. Few other structural features are observed. Claim block geology is detailed in Figure 5.

### **5.6 Pleistocene Geology**

Reconnaissance mapping of surficial deposits and ice direction indicators on the SD claims was carried out by M.J. Millard of the Saskatchewan Research Council, using airphoto interpretation and field investigations, as part of the BK project (Milliard 1993).

Till is the most abundant quaternary deposit, occurring as a thin veneer (less than two to three meters thick) or as till blanket (>3 meters thick). It is generally very poorly sorted, from boulder size clasts of widely varying size to granules, with a coarse sand to silt size matrix. There are two genetically different types of till deposits that have been recognized: basal or subglacial till which is deposited primarily from active ice and generally contains more locally revired material and ablation or englacial till which occurs as a product of gentle release during the ablation processes by stagnant ice (Milliard 1993).

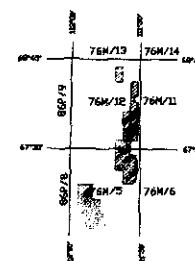
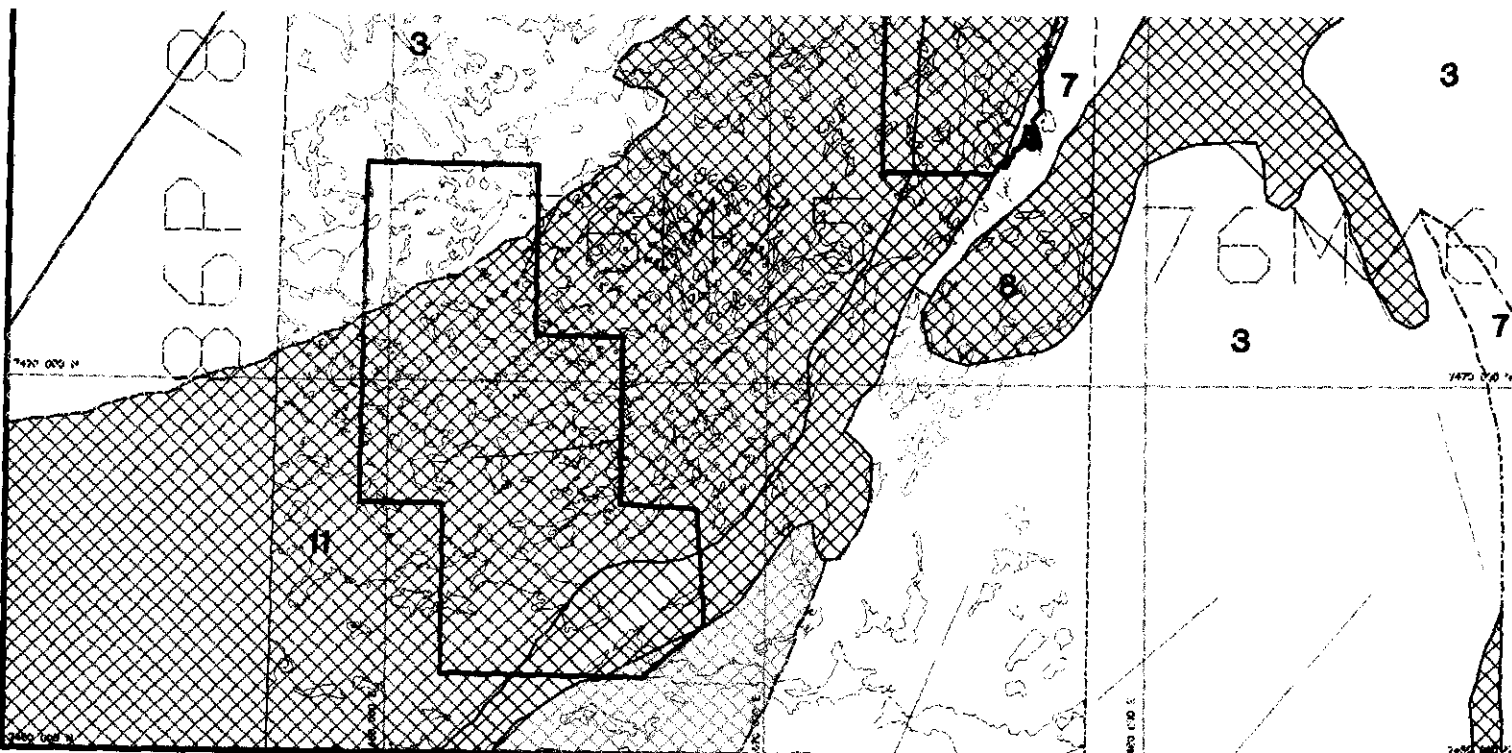
Northwest to north-northwest trending eskers occur along the northern banks of the James River. This orientation is general thought to indicate the ice flow direction in the area of the claim blocks.

## **6. Previous Exploration**

## **7. Current Exploration (1996-1997)**

### **7.1 Overview of Previous Exploration**

The focus of initial exploration efforts on the SD property was reconnaissance level sampling of esker and glacial till material. An extensive airborne geophysical survey was carried out in conjunction with the sampling. Between 1993 and 1996, a total of 408 geochemical samples



BASEMAP CREATED USING NORTH AMERICAN DATUM (NAD) 1987.  
SAMPLE LOCATIONS PLOTTED FROM INDIVIDUAL GPS READINGS &  
TOPOGRAPHIC FEATURES.



**BENACHEE RESOURCES INC.**  
**SNOWPIPE RESOURCES LTD.**

SD CLAIMS  
PROPERTY GEOLOGY

SCALE: AS SHOWN	NTS: 76M/5, 12	DATE: JUNE 1997
APPROVED BY: B.J.	FILE: SD-FIGS.DWG	FIGURE: 5
CANAMERA GEOLOGICAL LTD		

were collected and 1,878.3 line-kilometers of airborne magnetics and EM had been flown by Geotrex Limited (see previous assessment report - PSHC PROPERTY). The 1996-1997 exploration program included the collection of an additional 40 till samples.

## **8. Geochemistry**

### **8.1 Introduction**

During the 1996-1997 exploration program on the SD property, 40 till samples were collected by Canamera Geological Ltd. for Benachee Resources Inc., Snowpipe Resources Ltd. and Inukshuk Capital Ltd. The samples were processed for kimberlitic indicator minerals, pyrope and eclogitic garnet, chrome diopside, picro-ilmenite, chromite, and olivine, in the North Vancouver laboratory of Canamera Geological Ltd. The results derived from these samples form the body of this report (Drawing 2, Appendix C).

The sampling crew is a 13 man crew consisting of eight samplers, camp manager, assistant manager, camp maintenance man and helicopter support crew. The camp was mobilized from Yellowknife via fixed wing Twin Otter aircraft. Helicopter support was Bell Jet Ranger 206 B and A-Star. Fuel and supplies were transported periodically from Yellowknife and samples back-hauled.

### **8.2 Field Collection**

Frost-boils are the ideal sampling material. Frost-boils are quite numerous and easy to locate and represent underlying till material that has been reworked by fluid movement to produce a higher concentrations of sand-sized particles. The next best sample medium is glacial till. The till layer varies from a veneer of less than two meters thick to a thin blanket (two to ten meters thick) over most of the claim area (Aylsworth *et al.* 1988).

Once a site has been located and the sample collected, sample material is passed through a six or ten mesh wire screen (3.36 to 1.70 mm) into a collection basin. This screening process is carried out with the aid of water. The oversize is examined for kimberlite fragments and discarded if none are found. The material collected in the basin is submerged in water and

agitated to liberate the majority of the fine clay and silt particles. The water, with the suspended particles, is then poured off leaving behind only the granular material. This screening and washing process is continued until approximately 15 kilograms of screened and washed material remains. The residual material is transferred to a 15 litre plastic bucket with sealable lids for transport.

For detailed follow-up, sample lines are selected to provide fill-in information where needed. These samples are usually taken dry, then washed and screened at a water source prior to shipment to the lab for processing. The sample density in an area is somewhat dependent on surficial features, *i.e.*, rock outcrops, boulder fields, bogs, eskers, *etc.*, and material availability.

### **8.3 Sample Processing**

Till samples, collected from the SD property, were processed in the Canamera's lab facilities located in North Vancouver. Gravity concentration methods and procedures were used in handling initial stages of mineral processing.

### **8.4 Producing a Heavy Mineral Concentrate**

#### *Stage 1*

Screening of sample material into four size fractions using a vibratory Sweco unit.

Size categories are:

- 1) 10 mesh - 1.7 mm
- 2) 20 mesh - 0.85 mm
- 3) 40 mesh - 0.425 mm
- 4) 60 mesh - 0.250 mm

#### *Stage 2*

Simple gravity separation of the -20 to +40 fraction using Wilfley tables to produce two products: low density material and high density material. Only the high density product is processed further.

### *Stage 3*

Heavy density product is magnetically separated at two settings to produce three distinct products; an ilmenite rich magnetic concentrate and a garnet-chrome diopside rich concentrate. The remaining material is the non-magnetic fraction.

### *Stage 4*

Both the ilmenite and garnet-chrome diopside concentrates are further refined using a Magstream dense magnetic media separation.

### *Stage 5*

Trained mineral sorters examine each final concentrate for kimberlitic pyrope garnet, chrome diopside, eclogitic garnet, ilmenite, chromite and olivine grains using binocular microscopes. Questionable grains are examined by the senior mineralogist and / or sent out for microprobe analysis.

At each stage of screening, separation, and concentration, a record of weights is maintained for all fractions. All sample splits are repackaged separately and kept in archives.

## **8.5 Results and Interpretation**

Forty till samples were collected from the southern group for SD claims during the 1996 - 1997 reporting period (Drawing 2, Appendix B). Three samples returned possibly hyperbysal indicator minerals.

- 066211 in SD 12 - 1 ilmenite grain;
- 066304 in SD 24 - 2 chromite grains;
- 066306 in SD 30 - 1 chromite grain.

Samples 066304 and 066306 lie close to anomalous samples 019089 and 037790 collected during 1995 - 1996 (see 1995 - 1996 Assessment Report on SD Claims, Drawing 1, back pocket). This cluster of anomalous samples requires additional sample follow-up

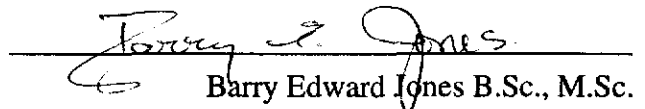
immediately up ice in claim SD 25. There does not appear to be a dispersion train down ice (northwesterly) from the cluster.

Anomalous sample 066211 lies near sample 050615 collected during 1995 - 1996 (see 1995 - 1996 Assessment Report on SD Claims, Drawing 1, back pocket). Both of these samples lie on the northern shore of an elongate East-West trending lake (Drawing 2). Numerous samples located immediately east of these two anomalous samples have returned "barren" results. However, due to the presence of the lake, no sampling has been done immediately up ice from the anomalous sites.

## **9. Conclusions and Recommendations**

The combined results of the 1995 - 1996 and 1996 - 1997 sampling have defined two weak clusters of anomalous sample sites - one at the four-way junction of claims SD 24, 25, 30 and 31, and one in the north portion of claim SD 12. Both clusters require detailed follow-up sampling, possibly backed-up by detailed ground magnetic surveys.

Report by:

  
Barry Edward Jones B.Sc., M.Sc.  
July 3, 1997



## **References and Bibliography**

- Aylsworth, J.M. and W.W. Shilts. 1988. Glacial Features Around the Keewatin Ice Divide: District of Mackenzie. Geological Survey of Canada. Map 24-1987.
- Bostock, H. H. 1980. Geology of the Itchen Lake area, District of Mackenzie. Geological Survey of Canada. Memoir 391.
- Fyson, W.K. and W.A. Padgham. 1993. Geology of The Slave Structural Province, 1 Map. EGS 1993-08.
- Millard, M.J. 1993. Reconnaissance Surficial Geology of the BK Project, District of Mackenzie, Northwest Territories. Confidential Saskatchewan Research Council Report.
- Padgham, W.A. and W.K. Fyson. 1992. The Slave Province: a distinct Archean craton. Canadian Journal of Earth Science. 29: pp. 2072-2086.
- Relf, C. 1992. Two Distinct Shortening Events During Late Archean Orogeny in the West-Central Slave Province, Northwest Territories, Canada, Canadian Journal of Earth Science, Volume 29.

**Appendix A**  
**Statement of Costs**

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**SD CLAIMS**  
**GEOCHEMICAL EXPENDITURES**  
**FOR PERIOD: APRIL 4, 1995 - APRIL 3, 1997**

<u>SAMPLE COLLECTION</u>	<b>TOTAL</b>
	<b>\$</b>
<u>PROJECT PREPARATION</u>	\$724
<u>PERSONNEL</u>	
Camp Geologist, Assistant, Cook and samplers	\$3,429
<u>CAMP BUILDING AND MOBILIZATION</u>	\$1,567
<u>DEMOBILIZATION AND CLEANUP</u>	\$439
<u>FIELD SUPPLIES</u>	\$422
<u>PERSONNEL BOARD</u>	\$669
<u>PERSONNEL ROOM</u>	\$1,254
<u>COMMUNICATIONS</u>	\$137
<u>SAMPLING EQUIP RENTAL</u>	\$669
<u>SAMPLING SUPPLIES</u>	\$179
Fuel Caching	\$344
Twin Otter	\$5,157
Helicopter (DRY)	\$12,196
<u>FUEL CONSUMPTION</u>	
HELICOPTER Fuel	
Jet B	\$2,009
CAMP Fuel	
p-50 stove	\$342
p-40 diesel	\$65
CAMP Fuel	
Propane	\$151
<u>SAFETY EQUIPMENT</u>	\$239
<u>SAMPLE SHIPPING</u>	\$2,006
<u>TOTAL FIELD COLLECTION EXPENDITURES</u>	
summer      40	\$32,000
winter        0	
<u>SAMPLE PROCESSING EXPENDITURES</u>	
40      samples @ \$300/sample	\$12,000
(including screening, tabling, magnetic separation, magstream, and mineral sorting )	
<u>TOTAL SAMPLE EXPLORATION COSTS</u>	
40      samples collected      40	\$44,000

**SPECIAL LABORATORY SAMPLE COSTS**

Special lab work - 1 samples @ \$300/sample

Coarse Grain	0	\$300
Excess -20+40	0	\$300
Fine Grain -40 / +50	0	\$300
Fine Grain -50 / +60	0	\$300
Half Sort Raised to Full	0	\$300
Quality Resort	0	\$300
Resort	0	\$300
O/B -20 / +40	0	\$300

**TOTAL GEOCHEMICAL ANALYSES EXPENDITURES****\$44,000****REPORT WRITING****\$2,500****TOTAL GEOCHEMICAL EXPEDITURES****\$46,500**

**Appendix B**  
**Claim Data**

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## SD PROPERTY - FORM 9 ATTACHMENT

03-Jul-97

CLAIM NUMBER	CLAIM NAME	OWNER(S)	NTS SHEET(S)	AREA (ACRES)	NEW WORK	EXISTING EXCESS USED:	NEW EXCESS CREDIT	YEARS APPLIED	RECORDED	NEW ANNIVERSARY
Z01820	SD 10	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2302.3	5,253.03	44.00	692.43	1	4/08/1993	4/08/1998
Z01821	SD 11	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.43	49.35	776.78	1	4/08/1993	4/08/1998
Z01822	SD 12	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.42	49.35	776.77	1	4/08/1993	4/08/1998
Z01834	SD 24	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.43	49.35	776.78	1	4/08/1993	4/08/1998
Z01835	SD 25	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.42	49.35	776.77	1	4/08/1993	4/08/1998
Z01836	SD 26	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.43	49.35	776.78	1	4/08/1993	4/08/1998
Z01840	SD 30	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.42	49.35	776.77	1	4/08/1993	4/08/1998
Z01841	SD 31	BENACHEE RESOURCES INC. / SNOWPIPE RESOURCES LTD.	076-M-05 / - / - / -	2582.5	5,892.42	49.35	776.77	1	4/08/1993	4/08/1998

*total # of acres =* **20,379.80**

*total amount of new work =* **\$46,500.00**

*total # of claims =* **8**

*total existing excess credit used =* **\$389.45**

*total amount of new excess credit =* **\$6,129.85**

**Appendix C**  
**Geochemical Data**

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# CANAMERA GEOLOGICAL LTD.

## Sample Processing Summary For The SD Claims

7/03/1997

COLLECTION			CONCENTRATION		SORTING								
Sample #:	NTS:	Claim:	Tabling Wt/gm:	Conc. Wt/gm:	Sort Wt/gm	Result Class:	Status:	PY	EG	CD	Indicator Recovery Totals:		
											ILM	CR	QL
ANOMALOUS													
066211	76M5	SD 12	7100	168	29	ANOMALOUS	I	0	0	0	1	0	0
066304	76M5	SD 24	8100	289	61	ANOMALOUS	C	0	0	0	0	2	0
066306	76M5	SD 30	9100	286	53	ANOMALOUS	C	0	0	0	0	1	0
3 ANOMALOUS Samples													
BARREN													
065892	76M5	SD 26	7900	944	101	BARREN	C	0	0	0	0	0	0
065893	76M5	SD 26	6900	587	47	BARREN	C	0	0	0	0	0	0
065894	76M5	SD 26	7900	309	44	BARREN	C	0	0	0	0	0	0
065895	76M5	SD 25	8200	360	41	BARREN	C	0	0	0	0	0	0
065896	76M5	SD 25	10400	367	38	BARREN	C	0	0	0	0	0	0
065969	76M5	SD 10	7000	154	51	BARREN	C	0	0	0	0	0	0
065970	76M5	SD 10	7400	184	35	BARREN	C	0	0	0	0	0	0
065971	76M5	SD 10	7400	99	22	BARREN	C	0	0	0	0	0	0
065972	76M5	SD 10	6800	227	37	BARREN	C	0	0	0	0	0	0
065973	76M5	SD 10	8500	352	66	BARREN	C	0	0	0	0	0	0
065974	76M5	SD 10	5900	181	24	BARREN	C	0	0	0	0	0	0
065975	76M5	SD 10	7000	181	25	BARREN	C	0	0	0	0	0	0
065976	76M5	SD 11	8800	554	54	BARREN	I	0	0	0	0	0	0
066022	76M5	SD 30	7700	500	91	BARREN	C	0	0	0	0	0	0
066023	76M5	SD 31	12200	528	75	BARREN	C	0	0	0	0	0	0
066024	76M5	SD 31	9600	310	36	BARREN	C	0	0	0	0	0	0
066025	76M5	SD 31	7900	571	99	BARREN	C	0	0	0	0	0	0
066026	76M5	SD 31	9300	500	98	BARREN	C	0	0	0	0	0	0
066027	76M5	SD 31	6800	521	81	BARREN	C	0	0	0	0	0	0
066028	76M5	SD 31	8200	393	60	BARREN	C	0	0	0	0	0	0
066082	76M5	SD 11	8500	497	84	BARREN	C	0	0	0	0	0	0
066083	76M5	SD 11	9800	159	17	BARREN	C	0	0	0	0	0	0
066085	76M5	SD 11	8500	91	17	BARREN	C	0	0	0	0	0	0
066086	76M5	SD 11	9800	162	24	BARREN	C	0	0	0	0	0	0
066172	76M5	SD 25	8400	943	188	BARREN	I	0	0	0	0	0	0
066173	76M5	SD 30	8800	592	189	BARREN	C	0	0	0	0	0	0
066174	76M5	SD 30	7800	536	160	BARREN	C	0	0	0	0	0	0
066175	76M5	SD 30	8700	452	101	BARREN	C	0	0	0	0	0	0
066176	76M5	SD 30	7900	315	65	BARREN	C	0	0	0	0	0	0
066177	76M5	SD 30	7800	350	56	BARREN	I	0	0	0	0	0	0
066212	76M5	SD 12	9100	1318	70	BARREN	I	0	0	0	0	0	0
066213	76M5	SD 11	7200	245	32	BARREN	C	0	0	0	0	0	0
066214	76M5	SD 11	8100	297	28	BARREN	C	0	0	0	0	0	0

Status Legend: I=initial sort, H=half sort, Q=quarter sort, F=final result, C=complete



COLLECTION			CONCENTRATION		SORTING								
Sample #:	NTS:	Claim:	Tabling Wt/gm:	Conc. Wt/gm:	Sort Wt/gm	Result Class:	Status:	Indicator Recovery Totals:					
								PY	EG	CD	ILM	CR	OL
066215	76M5	SD 11	7700	471	39	BARREN	C	0	0	0	0	0	0
066216	76M5	SD 11	8400	229	24	BARREN	C	0	0	0	0	0	0
066306	76M5	SD 31	8400	610	68	BARREN	C	0	0	0	0	0	0
066307	76M5	SD 31	10700	582	62	BARREN	C	0	0	0	0	0	0
37 BARREN Samples													
Total Samples Processed:													
40													

**Appendix D**  
**List of Assessment Reports**

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**List of Assessment Reports**

Geochemical and Geophysical Assessment Report on the Benachee Resources Inc. / Snowpipe Resources Ltd. PSHC Property; March 1993 - March 1995; 10 volumes; Ken Hicks; June 20, 1995; NTS 76K, 76M, 76N, 86P; *DIAND #083499*.

Geochemical and Geophysical Assessment Report on the Benachee Resources Inc. / Snowpipe Resources Ltd. WOOSUP (IL Claims) Property; March 18, 1993 - March, 17 1995; 12 volumes; Ken Hicks; June 12, 1995; NTS 76E, 86H, 86I; *DIAND #083539*.

**Appendix E**  
**List of Personnel**

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# CANAMERA GEOLOGICAL LTD.

## Samplers working on the SD Claims

05/08/1997

<b>Sampler A. Benitz</b>	<b>Samples Collected</b>
07/27/1996	6
08/29/1996	5
<b>Total Samples Collected by A. Benitz</b>	<b>11</b>

<b>Sampler D. Blunt</b>	<b>Samples Collected</b>
07/27/1996	4
<b>Total Samples Collected by D. Blunt</b>	<b>4</b>

<b>Sampler D. O'Brien</b>	<b>Samples Collected</b>
07/27/1996	8
<b>Total Samples Collected by D. O'Brien</b>	<b>8</b>

<b>Sampler P. Kettles</b>	<b>Samples Collected</b>
07/27/1996	4
<b>Total Samples Collected by P. Kettles</b>	<b>4</b>

<b>Sampler P. Stevenson</b>	<b>Samples Collected</b>
07/27/1996	7
<b>Total Samples Collected by P. Stevenson</b>	<b>7</b>

<b>Sampler S. Burdon</b>	<b>Samples Collected</b>
08/29/1996	5
<b>Total Samples Collected by S. Burdon</b>	<b>5</b>

<b>Sampler S. Rousseau</b>	<b>Samples Collected</b>
07/27/1996	6
08/29/1996	4
<b>Total Samples Collected by S. Rousseau</b>	<b>10</b>

<b>Sampler T. Villeneuve</b>	<b>Samples Collected</b>
07/27/1996	5
<b>Total Samples Collected by T. Villeneuve</b>	<b>5</b>

### Professionnal and Technical Personnel

Names	Addresses	Days
Claude Gaétane	758 Sproule Ave, Coquitlam, B.C., V3G 4L5	2
Jones, Barry	1003 - 1920 Alberni Street, Vancouver, B.C., V6G 1B5	2
Smeeton, Sandy	406 - 2085 Bellevue Avenue, West Vancouver, B.C., V7V 1C1	2

**Appendix F**  
**Statement of Qualifications**

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## STATEMENT OF QUALIFICATIONS

### **Barry Edward Jones**

I, Barry Edward Jones, resident at 1003 - 1920 Alberni Street, Vancouver, British Columbia, V6C 1B4, hereby certify that:

I am employed full time as a geologist by Canamera Geological Ltd., 650 - 220 Cambie Street, Vancouver, B.C.

I received a Bachelor of Science degree in Geology and a Master of Science Degree in Structural Geology from Acadia University, Wolfville, N.S. in 1966 and 1975 respectively.

I have worked full time in the mineral exploration and mining industry since 1966.

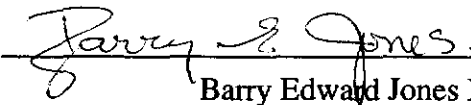
I am familiar with the current state of exploration of the SD claim group.

I have no direct or indirect interest in the northern SD claim group or in the shares of Benachee Resources Inc., or Snowpipe Resources Ltd. nor do I expect any.

Permission is hereby granted for the use of this report, or excerpts thereof, for any legal purposes normal to the business of Benachee Resources Inc. and Snowpipe Resources Ltd. The author reserves the right to approve any summaries or alterations.

Dated at Vancouver, British Columbia, this 3rd Day of July, 1997.

Report by:

  
Barry Edward Jones B.Sc., M.Sc.  
July 3, 1997