MAR 20100008: BLACK BUTTE

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PART B

ASSESSMENT REPORT
For
Black Butte Volcanic Complex,
Possible Source of Potassium Fertilizer
Metallic and Industrial Mineral Permit Number
9306031172

And

PART C

APPENDICES
For
Black Butte Volcanic Complex,
Possible Source of Potassium Fertilizer
Metallic and Industrial Mineral Permit Number
9306031172

Black Butte Volcanic Complex,
Possible Source of Potassium Fertilizer
(Township 1, Range 8 west of the 4th Meridian)
NTS: 72E

For

SandSwamp Exploration Ltd.

Submitted by:
Lester B. Vanhill

April, 2010

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PART B – TECHNCIAL REPORT

Summary:

There are seven outcrops of volcanic potassic rocks in the Milk River area of southern Alberta. These rocks have been collectively labelled the "Sweet Grass Intrusives". This assessment report focuses only on one occurrence of the potassic outcropping rocks known as Black Butte or the Black Butte Volcanic Complex. Black Butte is a large volcanic oval dome, which penetrated through the surrounding Oldman Formation. It rises approximately 35 m above the surrounding country landscape. The main surface expression of Black Butte is 450 m by 200 m. This main surface exposed volcanic body is orientated in a southwest, northeast direction.

Kjarsgaard, B.A. 1994 (GSC); described Black Butte as, " All exposed outcrops are dark to light grey minette intrusives, with weak to moderate flow textures. This grey minette intrusive is composed of phlogopite + diopside phenocrysts in a groundmass of mica (phlogopite - biotite) + salite + sanidine + magnetite + apatite +/- analcime +/- calcite."

Ground prospecting and test pitting conducted during a past assessment period was coupled in April of 2008 with a review of existing public airborne magnetic data, to show that the main Black Butte body has been intruded by no less than three distinct narrow dykes. The author has classed hand samples of these weathered dykes as an olivine minette or possibly a fine-grained kimberlite. Whole rock photography of selected samples were taken in March of 2010 and used to compare these two similar but distinct rock types. The olivine minette shows a similar mineral assemblage as the above-mentioned grey minette with the addition of olivine and various kimberlite indicator minerals. These olivine minette dykes within Black Butte are finer grained and more magnetic than the surrounding grey minette material. The grey minette material is more magnetic than the surrounding country rock of the Oldman Formation.

Although past exploration of Black Butte has been focused on diamonds and precious metals, most assessment work completed on this mineral permit for this term has focused on the potential of the Black Butte grey minette rock material being a suitable low-cost, slow release source of potassium fertilizer for the local agricultural industry.

Geochemistry of Black Butte published by Kjarsgaard, B.A. 1994; and confirmed by the author in a past assessment period, indicated a K_20 content of approximately 6%. Potassium along with nitrogen and phosphate are the main components of agricultural forage fertilizer in Alberta. Normally potassium is supplied from potash salt obtained from mines in Saskatchewan. With the increasingly high transportation costs and raising costs associated with world demand for Saskatchewan potash salt, a local non-salt source of potassium could greatly benefit the farming and ranching operations of the Milk River area.

In an effort to determine if the Black Butte volcanic complex minette was indeed a potential source of potassium fertilizer, a small scale, multi-year bench grow experiment was conducted from April of 2008 to March of 2010. Phlogopite rich samples of the Black Butte minette were selected from archived rock samples collected by the author. These rocks were ground down to a minus 2mm fraction and concentrated

in a modified fanning mill. Various dark brown soil samples from the permit area in southern Alberta were mixed together and placed in individual growing pots (10L pails). 15 orchard grass seeds were placed in each growing pot and allowed to germinate. At approximately 4 weeks after germination, selected growing pots had a variety of fertilizer treatments added. The results and suggested follow up actions are documented in the results portion of this report.

Introduction:

The Black Butte Volcanic Complex has been known about for over 100 years. It has been explored for diamonds, gold, uranium and as a source of kitty litter. Microdiamonds have been found in Black Butte samples but the source of these diamonds did not correspond to the mineral assemblage of the main outcropping rock unit, minette. The author of this report has held the mineral permit # 9306031172 on the Black Butte Volcanic Complex since March of 2006. Recent prospecting has identified several olivine minette dykes that cross cut the main volcanic body. These dykes may be the mysterious source rocks of the microdiamonds and kimberlite indicator minerals. Although these dykes are of interest, the main focus of this report is to document the use of the Black Butte minette material as a possible local source of potassium fertilizer for forage crops and pastures of the area.

Location & Access:

The Black Butte Volcanic Complex is located within Township 1, Range 8 west of the 4th Meridian in Map Sheet 72E. The southern part of the property is located 3.1 kms north of the Canada / US border and is road accessible by an all weather county road which cuts through part of the north section of the outcropping complex. The area south of the road is currently used as a crown owned grazing lease for a local cattle ranching operation. The north side of the road has been under cultivation for at least 10 years.

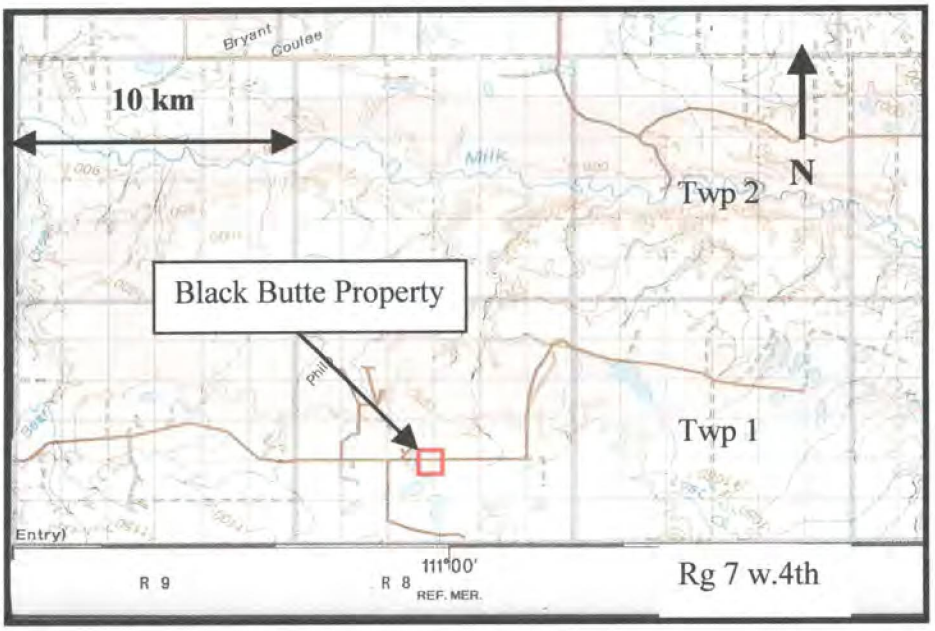
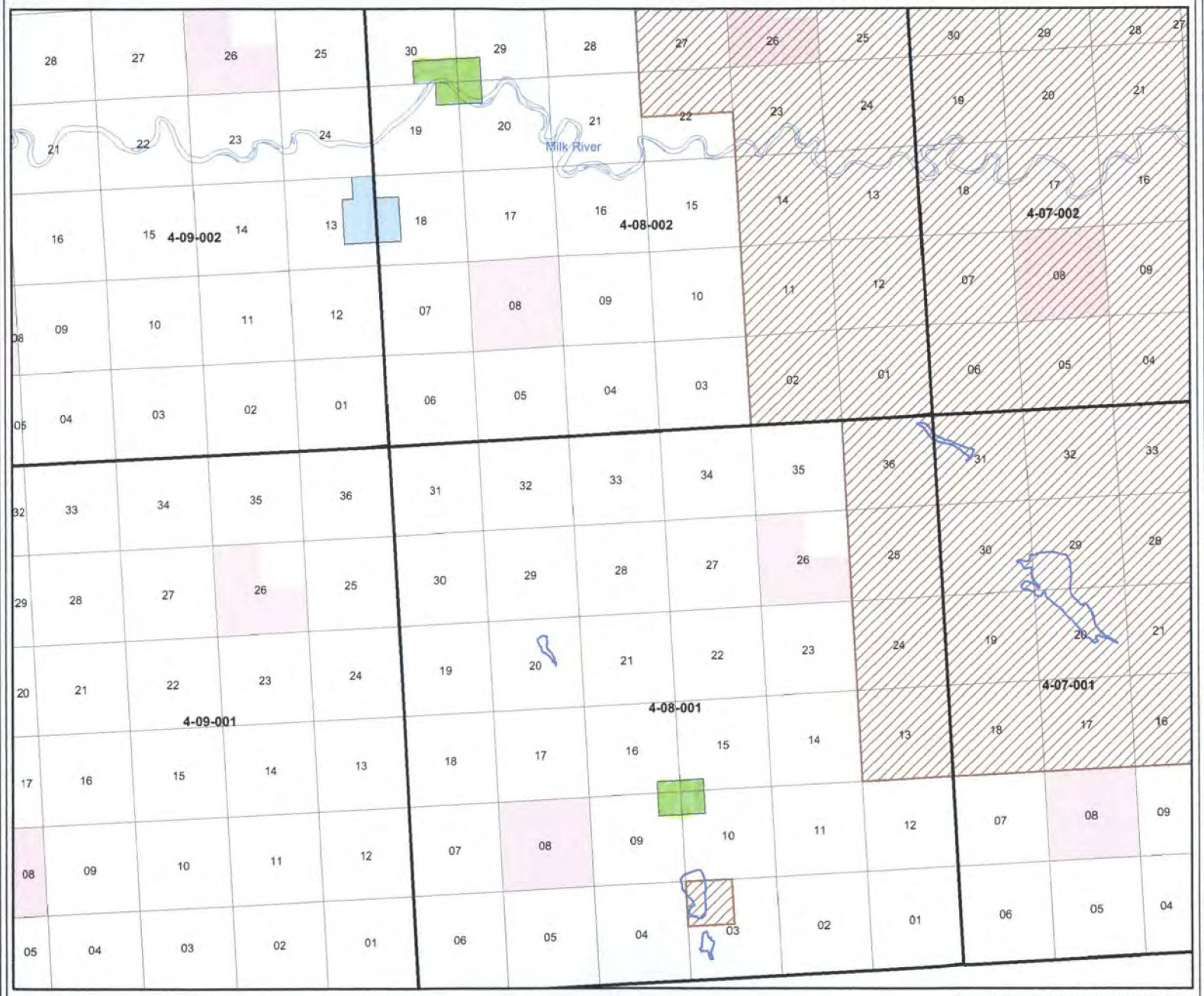


Figure 1: Location Map of Black Butt Volcanic Complex Property.

Permit # 9306031172



Legend

- Alberta Boundary
- Meridian
- Township
- Section
- Major River
- Major Lake
- Major Road
- 30 Day Pending
- Reserved/Withdrawn - Restrictions
- No Surface Access - Restrictions
- Subject To - Restrictions
- Other - Restrictions
- Municipality
- Special Lease - 037
- Phosphate Exploration - 069
- Permit - 093
- Other - 042
- Natural Gas Storage - 036
- Lease - 094
- Application Special Lease - A37
- Application Phosphate Exploration - A69
- Application Permit - A93
- Application Other - A42
- Application Natural Gas Storage - A36
- Application Lease - A94
- Mineral Ownership Undetermined
- Minerals Not Owned by the Alberta Crown
- Parks and Protected Areas
- National Park

June 3, 2010

Map center: 49° 4' 34" N, 111° 1' 24" W

DISCLAIMER: Information presented on this map originates from various sources and is for general use only. Please be advised that some information may have been added, amended and deleted since this map was created.

Base Data Provided by Spatial Data Warehouse Ltd. Copyright of Government of Alberta.

Notes: Permit # 9306031172 in Green

Geology of the Black Butte Vocanic Complex:

Kjarsgaard, B.A. 1994; described Black Butte as, " All exposed outcrops are dark to light grey minette intrusives, with weak to moderate flow textures. This grey minette intrusive is composed of phlogopite+diopside phenocrysts in a groundmass of mica (phlogopite-biotite)+salite+sanidine+magnetite+apatite+/-analcime+/-calcite."

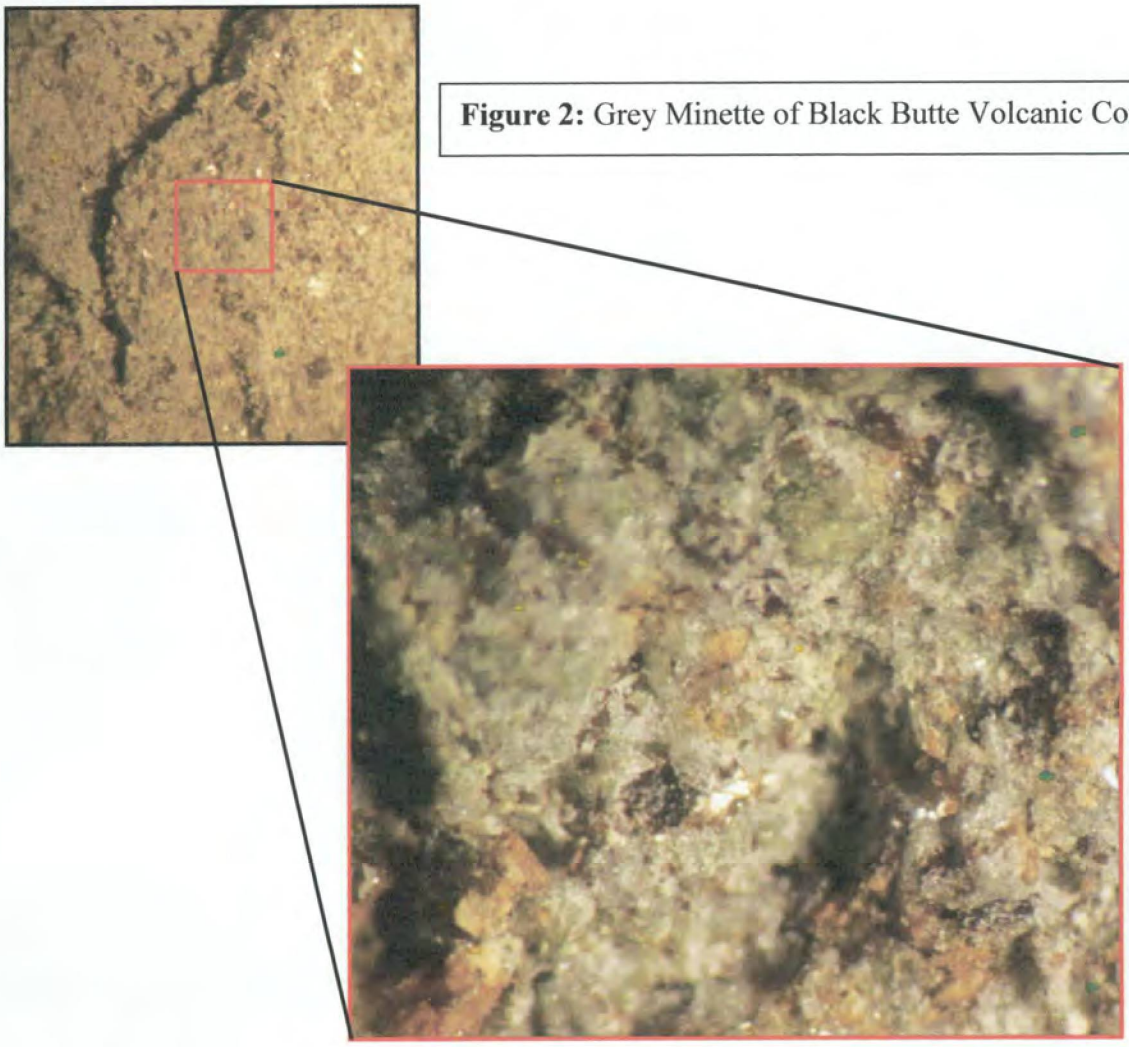


Figure 2: Grey Minette of Black Butte Volcanic Complex

Ground prospecting and test pitting coupled with a review by the author of existing public airborne magnetic data, (Marum Resources, 1994) has shown the main Black Butte volcanic complex to have been intruded by no less than three distinct narrow dykes. The author classes hand samples of these weathered dykes as olivine minette or fine-grained kimberlite. They show similar mineral assemblage as the above-mentioned grey minette with the addition of olivine. Of interest to diamond exploration, the olivine

minette phase of the Black Butte Volcanic Complex contains numerous suspected (not confirmed by microprobe) kimberlite indicator minerals such as pyrope garnet, chrome diopside, eclogitic garnet, picroilmenites and dark blue corundum (sapphire). It is this phase of the Black Butte Volcanic Complex that may have contributed to the diamond content of prior exploration by previous property owners.

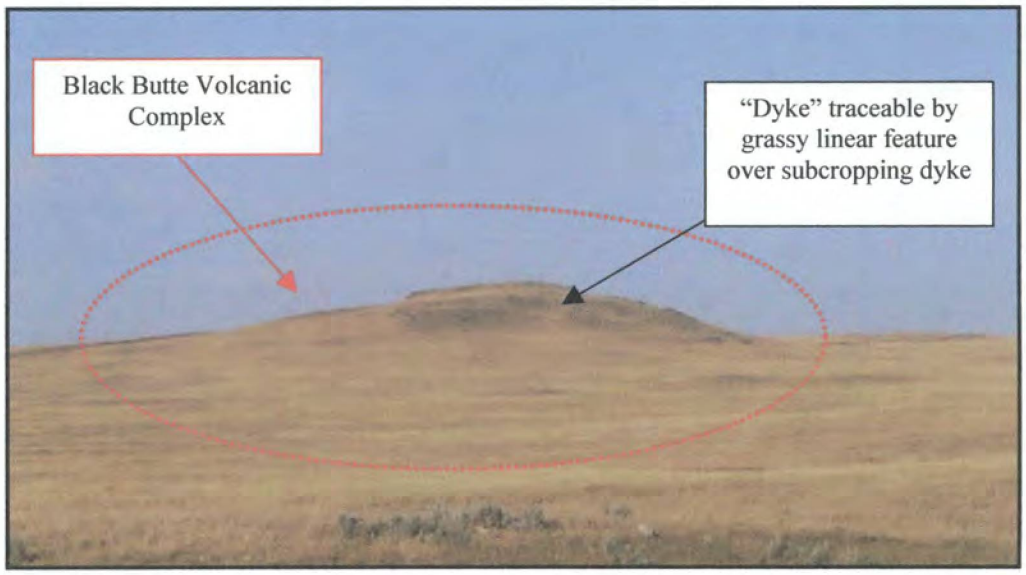


Figure 3: View of the Black Butte Volcanic Complex

Figure 4: Outcropping grey minette rocks on Black Butte with Sweet Grass Hills Eastern Butte (Montana) in background.

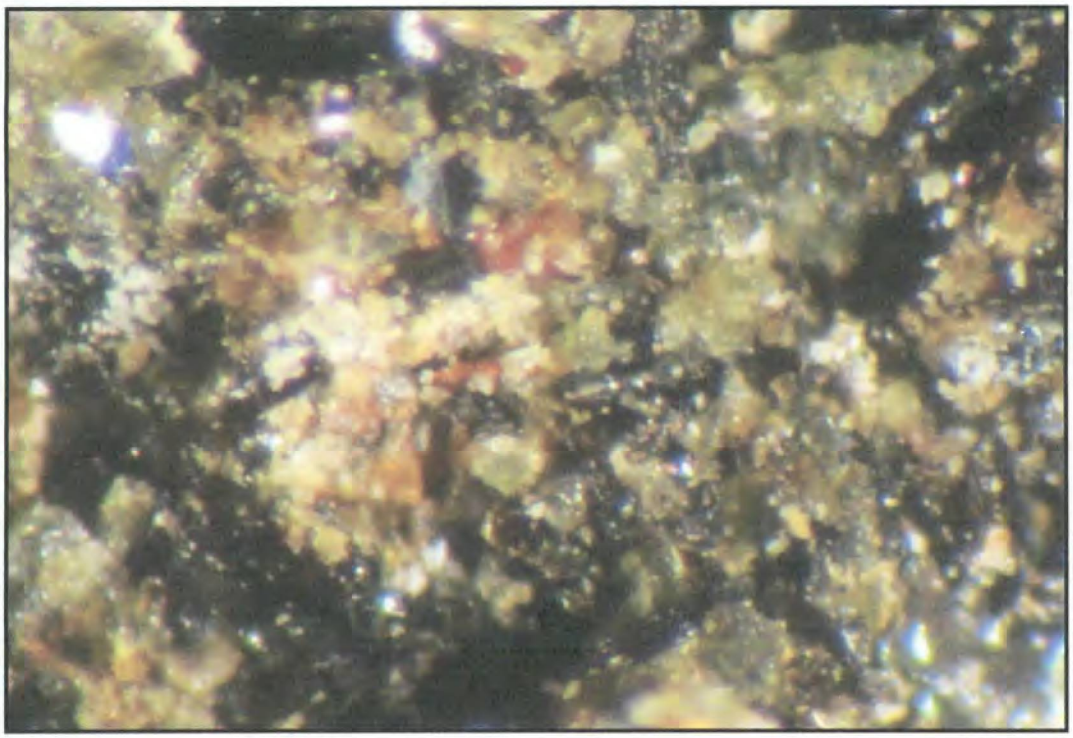


Figure 5: ~40x view of olivine minette material "whole rock" from narrow dyke

These olivine minette dykes within Black Butte are finer grained and more magnetic than the surrounding grey minette material. The grey minette material is more magnetic than the surrounding country rock of the Oldman Formation.

Work Performed:

During the second term of mineral exploration permit # 9306031172, the assessment work performed was limited to three main topics. The first and most time consuming topic was to research if the highly potassic (6% K_20) Black Butte minette rock would act as a substitute for potash salts as a suitable source of potassium fertilizer. This topic involved researching available literature on the subject, promoting the idea to various agricultural research organizations for proper testing and a two-year plant growth bench test conducted by the author; detailed in latter sections of this report.

The second topic of exploration for this assessment period was to conduct a visual mineral grain inspection of selected rock material from the volcanic complex. This material consisted of the main grey minette body of Black Butte and available samples of the subcropping narrow dykes that intrude into the main volcanic body. Samples of both rock types were viewed under a binocular microscope and cross-referenced to available published data of the same rocks. Selected samples were transported to Copper Creek

Geological Consulting, where selected whole rock mineral grain groups were isolated and photographed; some of these photographs have been included within this report. The weather susceptible, olivine minette phase of the Black Butte Volcanic Complex has never been documented in published literature and appears to have been overlooked by both the Geological Survey of Canada (GSC) and the Alberta Geological Survey (AGS) during their respective research in the 1990's. Mineral grain inspection of the olivine minette phase, suggests that it may be the rock unit source of microdiamonds and diamond indicator minerals from the Black Butte locale.

The third topic of exploration for this property was to evaluate the extent and possible volume of the olivine minette phase contained within the Black Butte Volcanic Complex. One of the olivine minette dykes was discovered during a prospecting trip to the property. Float rock was traced upslope to a grassy linear feature. A shallow test pit revealed a buried weathered dyke. The true thickness of this dyke was unable to be determined at that point in time. A follow-up stereoscope air photograph inspection revealed no less than three grassy linear features 1.5 m to 3 m wide (including the original pit tested feature) cutting through the Black Butte Volcanic Complex. These features coincide with three linear magnetic trends. These trends crosscut the magnetic anomaly associated with the main Black Butte body and appear to extend away from the main Black Butte body. Although these dykes may contain some diamonds, they appear to be uneconomical based on mineral grain textures and size distributions as well as overall olivine size ratios.

Black Butte Soil Zone Characteristics:

The agricultural area surrounding the Black Butte Volcanic Complex is listed by Alberta Agriculture as being within the "Area 1: Brown Soil Climatic Zone". The Alberta soil survey lists the soil within this zone as a brown chemozemics, as such it generally has adequate usable sulphur content and micronutrients for most common forage crops but like other soils of Alberta, lacks the available natural useable nitrogen, phosphorus and potassium for long term forage crop production. High salinity in soils has been an obstacle to forage production in some areas of the brown soil climatic zone. This salinity in soils issue complicates the use of, and sometimes completely restricts, potash salts as a source of potassium fertilizer. Potash salt is the widest used source of potassium fertilizer used in Western Canada. The author, in the course of researching this report, has identified no other current commercial source of potassium outside of potash that is economically viable for southern Alberta.

The brown soil climatic zone is characterized by an annual precipitation of approximately 30 to 35 cm. Selected fields within this zone are irrigated. A field visit to the Black Butte area noted several intensive forage production operations on thin stripes of irrigated lands along the Milk River valley. The author of this report feels that it is

these irrigated lands that would best benefit from soil fertility upgrading by the application of Black Butte potassium rich material.

Need for Potassium (K_2O) in Soil:

Potassium (K_2O) is a nutrient needed for proper plant growth. It aids plants in disease resistance, root development, yield and winter hardiness. Symptoms of forages deficient in potassium exhibit signs of slow or stunted growth, weak stems, stem breakage due to wind, white spots on older leaves and lack of winter survival.

In a typical Alberta forage-harvesting operation, potassium is removed from the field in large quantities; 21 kgs/tonne of dry matter harvested, (Canadian Fertilizer Institute). Once soil testing indicates that a soil's potassium content is less than 250 kg/ha within the root zone depth, potassium fertilizer should be supplemented to the soil.

Growth Experiment of Orchardgrass with Black Butte Material:

In an effort to determine if the Black Butte volcanic complex minette is a potential source of potassium fertilizer, a small scale, multi-year bench grow experiment was conducted. Phlogopite ($KMg_3(AlSi_3O_{10})(OH)_2$) rich samples of the Black Butte minette were selected from archived rock samples collected by the author. These rocks were ground down to a minus 2mm fraction and concentrated in a modified fanning mill. Various dark brown soil samples from southern Alberta were mixed together and placed in individual growing pots (10L pails). 15 orchardgrass (See: Orchardgrass Section of this report for details), seeds were placed in each growing pot and allowed to germinate. These orchardgrass seeds were from selected from a bulk supply of seeds grown near Lethbridge, Alberta. At approximately 4 weeks after germination the growing pots were labelled and treated with a variety of fertilizer treatments, as follows:

(A) No fertilizer treatment (control)
(B) No phlogopite but 75lb/acre nitrogen
(C) 12.5 grams of phlogopite but no nitrogen
(D) 12.5 grams of phlogopite and 75lb/acre nitrogen
(E) No phlogopite and 125lb/acre nitrogen
(F) 25.0 grams of phlogopite and 125lb/acre nitrogen

During the growth period of 2008 no noticeable differences were noted in samples A, B, C or D. Samples E and F died due to an apparent nitrogen oversupply.

The orchard grass samples were grazed in late summer by a marauding tame ground hog named "Gordon", that lives under the author's front deck. This grazing was not planned as part of this experiment but acted to mimic natural pasture grazing conditions of southern Alberta.

A cool spring and very dry summer, followed by a cool wet fall, marked the growing period of 2009. In 2009, no additional fertilizer was provided to the test subject plants. Samples D and C appeared to have better top vegetative growth and a quicker growth response to natural moister (rain). Samples B and A continued to grow and appeared healthy but were slightly less responsive in terms of overall leaf growth to the equal amounts of moister received by samples C & D.

The 2009-2010 winter had little protective snow cover and harsh winds. Although the growing experiment was conducted north of Edmonton, Alberta the environmental weather conditions appeared to partly mimic the weather conditions of the Milk River area of southern Alberta.

In the spring of 2010, samples C & D were green and starting to regrow, from earlier ground hog grazing, by the 20th of April. Samples A & B were dead and appeared to have been winter killed. Ground hog grazing appeared to be equal on all test pots and is not suspected as the cause of the winter killing of Samples A & B.

Although the addition of potassium, in the form of Black Butte Minette, to soil growing orchardgrass, did not appear to drastically benefit the average overall growth of test subject plants, it did appear to allow for a quicker growth in response to moisture and it appeared to aid the test plants to increase winter hardiness. Black Butte minette did not appear to affect the palatability of the tested grass (based on the appetite of one fat ground hog).

A dissection of root material from test plants A, B, C & D was conducted for this report and is outlined below.

Figure 6: Test plant root inspection (April 20th 2010)

Overall root mass is similar but does slightly decrease from samples A to D. This result was not expected but may be a function of fewer roots needed due to availability of required nutrients. To note, the size of root mass on these young orchardgrass plants demonstrates the importance of orchardgrass during dry or drought conditions to Alberta's agricultural economy.

Orchardgrass:

Orchardgrass (Dactylis glomerata L.) is a native grass of North Africa, Asia and Europe. It is a bunchgrass with erect stems reaching approximately 95 cm in height. The leaves of Orchardgrass are basal with smooth open sheaths. When expanded, the leaves are flat or "V" shaped. It has no auricles, but does have large ligule, up to 7 mm long. The root system of orchardgrass is extensive, fibrous and dense but contains no rhizomes and will not form a continuous sod. It is this root system that allows orchardgrass to be partly drought tolerant without becoming sod bound over time.

Orchardgrass is one of the favourite grasses used by the author of this report on his own small farming operation. In 2009 it resisted the invasion of Grasshoppers better that other tame grasses (timothy & meadow brome). In the upcoming years, which are predicted to have higher fuel costs and lower than normal precipitation, the author believes a winter hardy variety of orchardgrass will become one of the top five most important grasses used in the Alberta forage crop industry. A selected list of advantages of orchardgrass is provided below to qualify the above statement.

Excellent plant regrowth	Good mid to late summer yield
Very palatable to livestock	Partly resistant to grasshopper infestations
Deep root system	Drought tolerant
Does not become root bound	Shade tolerant
Tolerant to spring flooding	Good hay when in mix
Easy to cut for hay (bunchgrass)	Can be stockpiled for late fall grazing
High seeds/lb = low seeding cost	Adapted to growth in a variety of soils
Vigorous seedlings	High yield with precipitation

The single most disadvantage of orchardgrass as an Alberta forage crop is its lack of winter hardiness when subjected to direct cold winter winds.

The application of a slow release form of Potassium (K_2O) on a forage crop of orchardgrass mixed with a nitrogen-fixing legume, such as alfalfa, may aid to increase the total forage production, total longevity and overall winter hardiness of such a forage crop. In the Milk River area of Alberta, the Black Butte Volcanic Complex contains over 25 million tonnes (400m x 200 m x 100 m x 2.7) of useable rock material at approximately 6% K_2O content.

Suggested Follow-Up Research:

Future larger scale, follow-up testing under controlled conditions is recommended for proper evaluation of the potential benefits of this rock product on southern Alberta forage crops. It is advised that an independent academic institution or federal government research facility conduct any future testing of this rock product for use as a fertilizer. The property should be taken to lease to protect it from being removed from the useable mineral land base.

Air Photograph of the Black Butte Volcanic Complex:

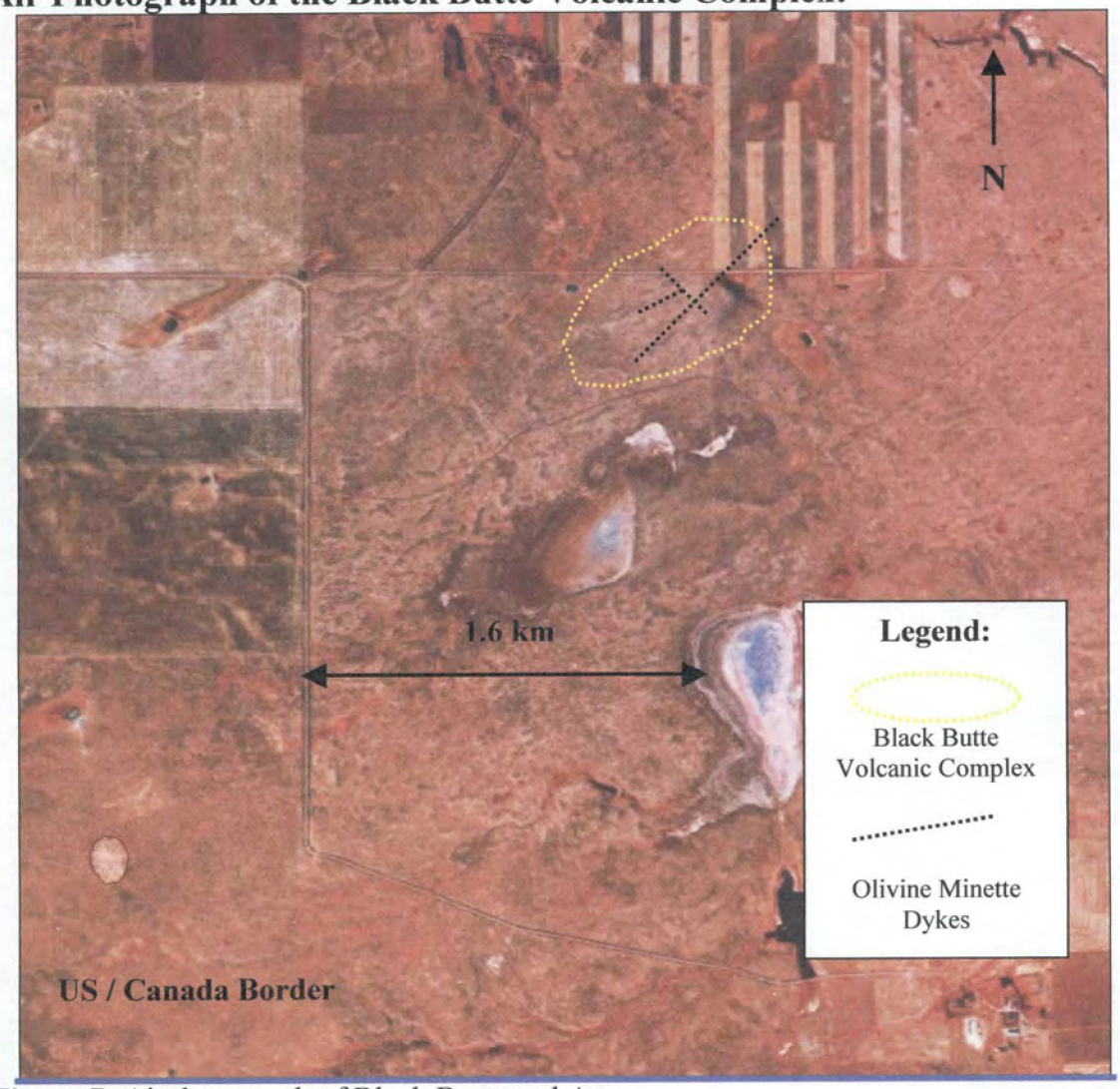


Figure 7: Airphotograph of Black Butte and Area

Author's Qualifications:

I, Lester B. Vanhill, of Dapp, Alberta, Canada do hereby certify that:

1. I am a prospector with; and sole owner of; SandSwamp Exploration Ltd.

2. I am a graduate of the Northern Alberta Institute of Technology (N.A.I.T.) with an honours diploma in Geological Technology (2003) and a diploma in Business Administration (1997).

3. I have been an active prospector within the Yukon, NWT, Nunavut and Alberta at various times since 1994.

4. I do not belong to any professional association(s).

5. I currently hold 100% beneficial interest in this property.

6. I am not currently aware of any geological facts or information that have been omitted from this report.

7. The contents of this report are based on information and observations deemed to accurate and complete at the time of it's printing.

Lester B. Vanhill
Sign at: Dapp, Alberta, Canada
April 21, 2010

References:

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MINERAL ASSESSMENT
EXPENDITURES BREAKDOWN BY TYPE OF WORK

Actual Expenditure (for Part A of Report)

Project Name: Black Butte Volcanic Complex

1.	Prospecting	$_____
2.	Geological Mapping & Petrography	$ 269.00 Airphoto work
3.	Geophysical Surveys a. Airborne	$_____
	b. Ground	$_____
4.	Geochemical Surveys	$_____
5.	Trenching and Stripping	$_____
6.	Drilling	$_____
7.	Assaying & whole rock analysis	$ 325.00 whole rock grain photography
8.	Other Work: Plant Growth Test (2 years)	$ 371.00
	SUBTOTAL	$ 965.00
9.	Administration (up to 10% of subtotal)	$_____
10.	Assessment Report Preparation	$ 390.00
	TOTAL	$ 1355.00

[redacted]

SUBMITTED BY: Lester B. Vanhill

April 21, 2010
DATE:

PART C

APPENDICES
For
Black Butte Volcanic Complex,
Possible Source of Potassium Fertilizer
Metallic and Industrial Mineral Permit Number
9306031172

Black Butte Volcanic Complex,
Possible Source of Potassium Fertilizer
(Township 1, Range 8 west of the 4th Meridian)
NTS: 72E

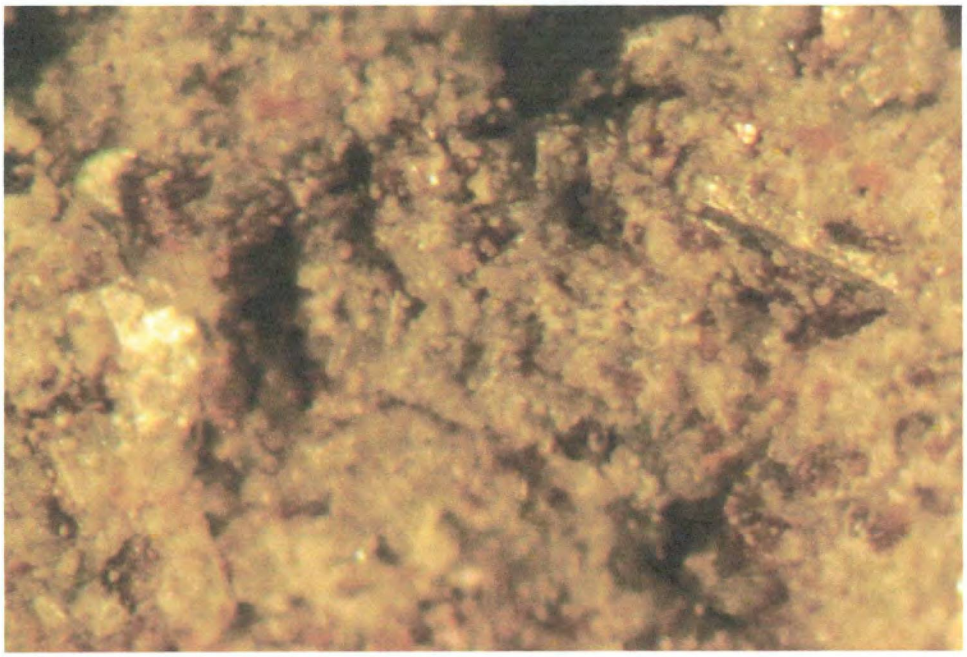
For

SandSwamp Exploration Ltd.

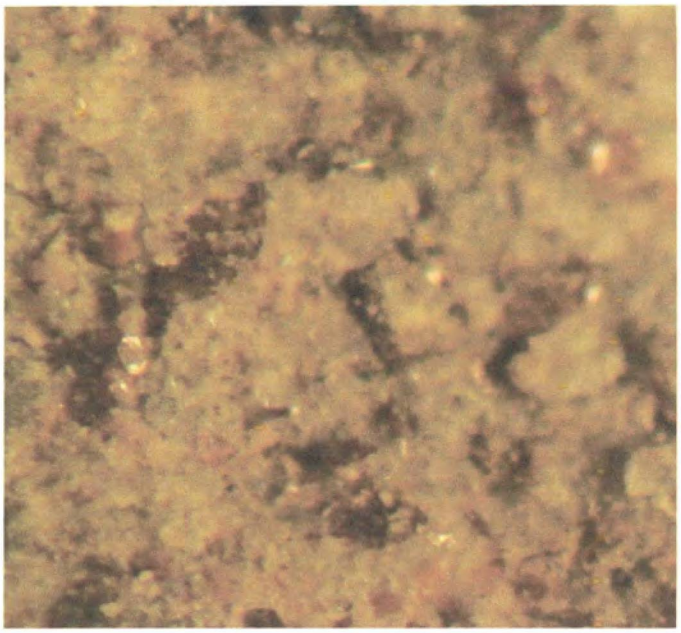
Submitted by:
Lester B. Vanhill

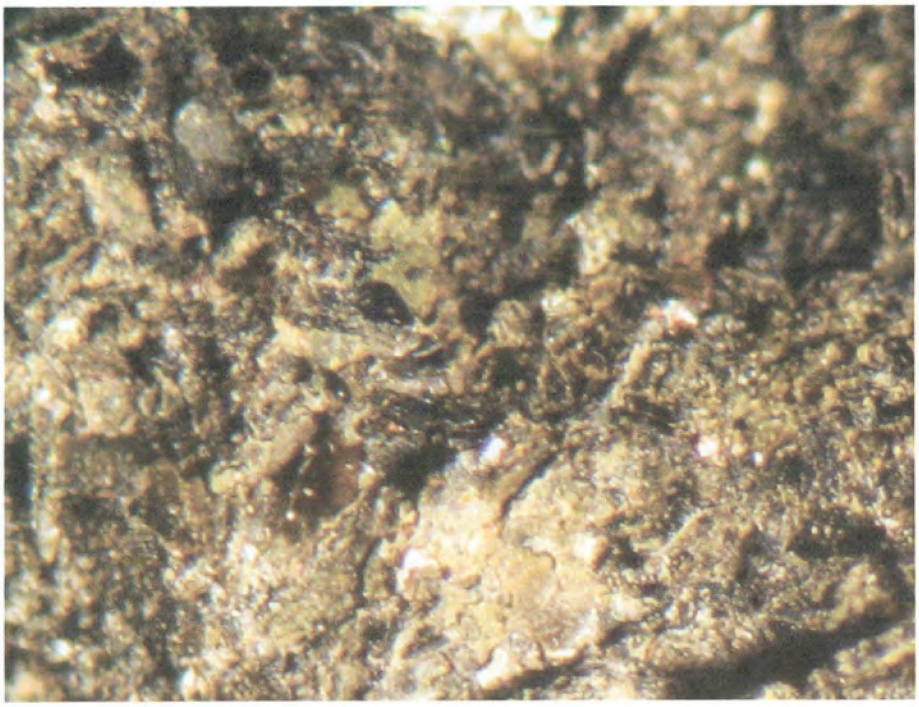
April, 2010

Selected Photographs
of
Whole Rock Grain Samples
from the
Black Butte Volcanic Complex.
(optical view & magnification distorted)



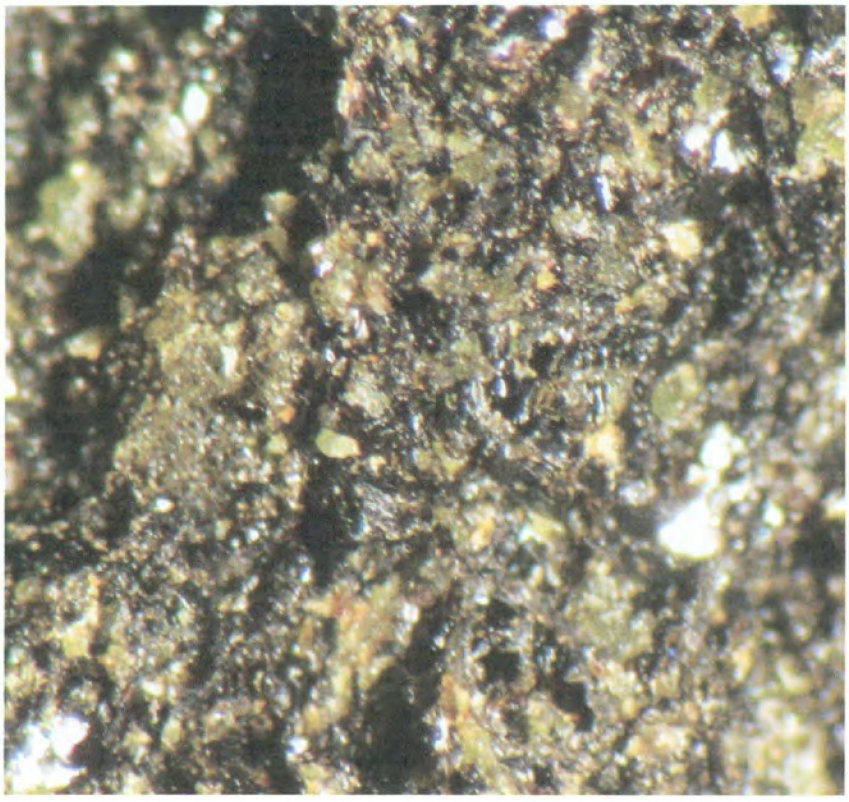
Grey Minette Material

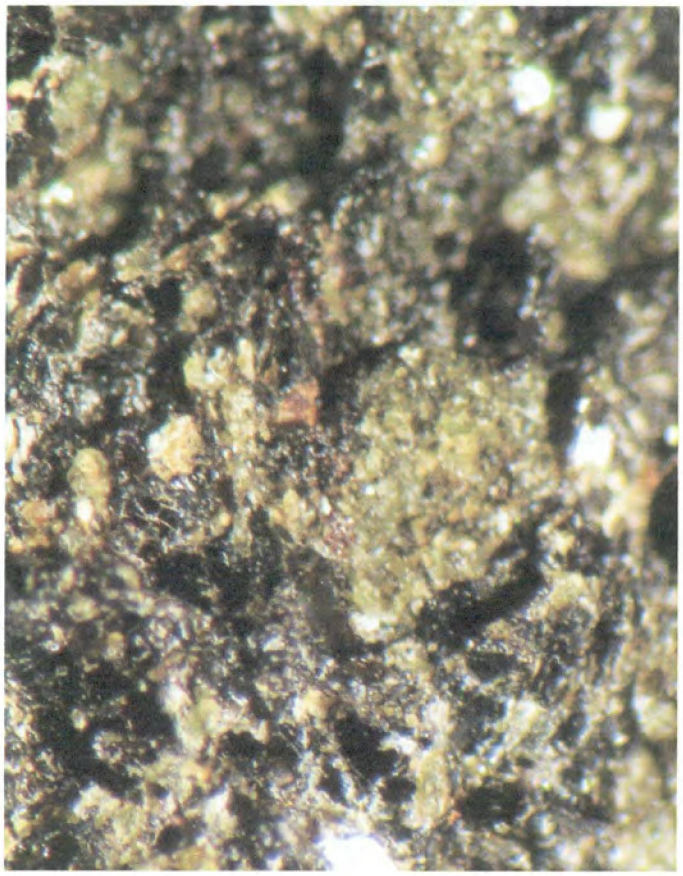




Olivine Minette Coarse-Grained

Olivine Minette Fine Grained





Olivine Minette Fine Grained