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DEPARTMENT OF GEOLOGICAL ENGINEERING

A THESIS REPORT ENTITLED

PETROGRAPHY AND GEOCHEMISTRY OF ROCKS IN A PROSPECT SOUTHWEST OF PRESTEA-GHANA

TO COMPLEMENT STREAM SEDIMENTS AND SOILS GOLD ANOMALY IN THE AREA

BY

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN GEOLOGICAL ENGINERRING

THESIS SUPERVISORS

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TARKWA, GHANA

JANUARY, 2020

DECLARATION

I declare that this thesis is my own work. It is being submitted for the Degree of Master of Science in Geological Engineering at the University of Mines and Technology (UMaT), Tarkwa. It has not been submitted for any degree or examination in any other University.

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(Signature of Student)

Submitted this ……………….. day of …………… (year) ……………..

ABSTRACT

Forty three (43) stream sediments and seven hundred and forty three (743) soil data were used to delineate gold anomalies. This was followed by thin and polished section petrography and XRF geochemistry of 17 rock samples to produce geological and gold prospectivity map for a prospect located in the Birimian Supergroup, southwest of Prestea, Ghana.

The thinly foliated rocks are strongly deformed and partially to strongly altered. Mineralogical composition is plagioclase, amphibole, chlorite, sericite, epidote, quartz, pyrite, arsenopyrite, marcasite, magnetite, pyrrhotite and trace gold. The rocks are quartz chlorite schist, chlorite amphibole schist and quartz schist. Peak metamorphism is to amphibolite facies and retrograde metamorphism is to greenschist facies. Though primary textures were destroyed, geochemical variation plots classified the protoliths as rhyolite, dacite and andesite.

XRF analysis of SiO_2 ranges from (59.50 – 77.00 wt %), Al_2O_3 (14.20 – 21.10 wt %), Na_2O (0.69 – 2.52 wt %), CaO (0.01 – 1.56 wt %), Total FeO (0.65 – 13.45 wt %), TiO_2 (0.53 – 0.82 wt %) and MgO (0.14 – 2.44 wt %).

Gold concentration is higher in soils from metamorphosed dacite and rhyolite with assay values ranging from 50 – 630 ppb than in soils from metamorphosed andesite (50 – 90 ppb). Consequently, prospectivity map shows that two gold anomalous zones occur at the contact between the metamorphosed dacite and metamorphosed rhyolite or metamorphosed andesite with stream sediments values 43 – 987 ppb and 43 – 985 ppb respectively. Therefore, exploration for gold in this area must target the contact between the metamorphosed dacite and metamorphosed rhyolite or metamorphosed andesite.

DEDICATION

To my daughters: Nana Agyenimaa, Maame Mesere Nyame, and Maame Afua

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CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem

Gold occurs in all types of rocks. It is found in shale at Tilkerode, Harz, Germany (Cabral and Rosiere, 2013) and in Archean volcanic rocks at Eqi East prospect in West Greenland (Stendal *et al.*, 1999). Gold in orebodies hosted by greenschist facies has been linked to retrograde amphibolite facies rocks (Pitcairn *et al.*, 2006). Orogenic gold bearing quartz carbonate veins have been found in metamorphic rocks (Phillips and Powell, 2010).

In Ghana, the Birimian covers the southwestern and northern Ghana. The Birimian Palaeoproterozoic rocks outcrop in the southeastern portion of the Man-Shield of the West African Craton and spread across part of Mauritania, Senegal, Côte d'Ivoire, Burkina Faso and Niger (Abouchami *et al*., 1990). The rocks are mainly made up of metasedimentary rocks comprising dacitic volcaniclastics, wackes and argillitic sediments whilst the metavolcanic rocks comprise metamorphosed basaltic and andesitic lavas (Leube *et al*., 1990). Trashliev (1972), Asihene and Barning (1975) and Leube *et al*. (1990) believed that both Birimian metavolcanic rocks and metasedimentary rocks are connected in origin and were deposited synchronously. Their views ended the previous disagreement on the relationship of the Birimian rocks of Ghana where the Anglophone geologists considered the metasedimentary rocks to be older than the metavolcanic rocks but Francophone geologists changed the stratigraphy (Tagini, 1971; Papon, 1973; Bessoles, 1977; Attoh, 1980). According to Leube *et al.* (1990), in southwestern Ghana, the Birimian is characterised by five parallel, evenly spaced NE striking, volcanic belts separated by basins containing metasedimentary rocks (Figure 1.1). The Birimian is also intruded by various granitoids with those occurring in the volcanic areas, known as belt granitoids, whilst those occurring within the basins as basin granitoids.

The Ashanti belt is one of the main volcanic belts in Ghana. The belt strikes NE – SW and extends from Axim to the Voltaian units near Konongo. Gold mineralisation in the Ashanti belt is associated with extensive regional fissures and sheared zones (Cooper 1934; Junner 1934; Kesse, 1985; Leube *et al.*, 1990; Hirdes *et al*., 1993; Mücke and Dzigbodi-Adjimah, 1994). Gold deposits hosted in the Ashanti belt include Obuasi, Konongo, Prestea, Bogosu, Damang, Akyem, Salman, Anwia, Wassa, Mampon, Sian, Tarkwa, Abosso, Teberebie and

Iduapriem (Oberthür *et al.*, 1997; Griffis *et al.*, 2002). Geochemistry has proven to be one of the most successful and cost effective techniques for gold exploration within the Birimian of Ghana (Griffis *et al.*, 2002). Geochemical techniques in mineral exploration such as stream sediment geochemistry, whole rock geochemistry, and soil geochemistry could be used to make significant discoveries in mineral exploration (Oke et *al.,* 2014). Usually, most samples from stream sediments and soil geochemical surveys within the tropics have gold concentrations below or equal to the detection limit and so make delineation of anomalies extremely erratic and difficult, leading to poor estimation of the gold potential of an area at the early stages of prospecting (Bellehumeur and Jebrak, 1993). However, soil geochemical dispersion and pathfinders of gold in the Birimian had been conducted successfully to delineate gold anomalies. Chon and Hwang (2007) defined two gold and arsenic anomalous areas in soil as promising prospects for gold occurrences at Kineaba area in Mali. Nude *et al.* (2012) also used soil samples to show that Fe, Mn, Pb, Ag, As and Cu could be pathfinders for gold in Ghana on the Wa-Lawra gold belt in Ghana.

Stream sediment and soil geochemical surveys remain cost effective methods in exploration. However, Grunsky *et al. (*2009) cautioned that stream and soil data in mineral exploration are prone to errors due to transportation of soils and leaching of elements and so metal values may not indicate enrichment of the underlying rocks in the area. The study area of this research is located south of Fura Forest Reserve, within the Nzema East Municipal Assembly of the Western Region of Ghana. It is about 15 km southwest of Prestea.

Exploration activities conducted by three different companies in the study area during the last twelve years included stream sediment survey where two gold anomalous zones have been delineated (Adjei, 2005). None of these companies continued exploration after the stream sediment survey. The reason of which is not documented, though the study area is strategically located at about 2 km west of the Ashanti belt (Oberthür *et al.*, 1997; Griffis *et al.*, 2002).

Therefore, there is the need to reinvestigate the distribution of gold in soils at a prospect southwest of Prestea and integrate the data with petrographic and geochemical studies to assess the relationship of rocks, mineral assemblages, and geochemistry to gold.

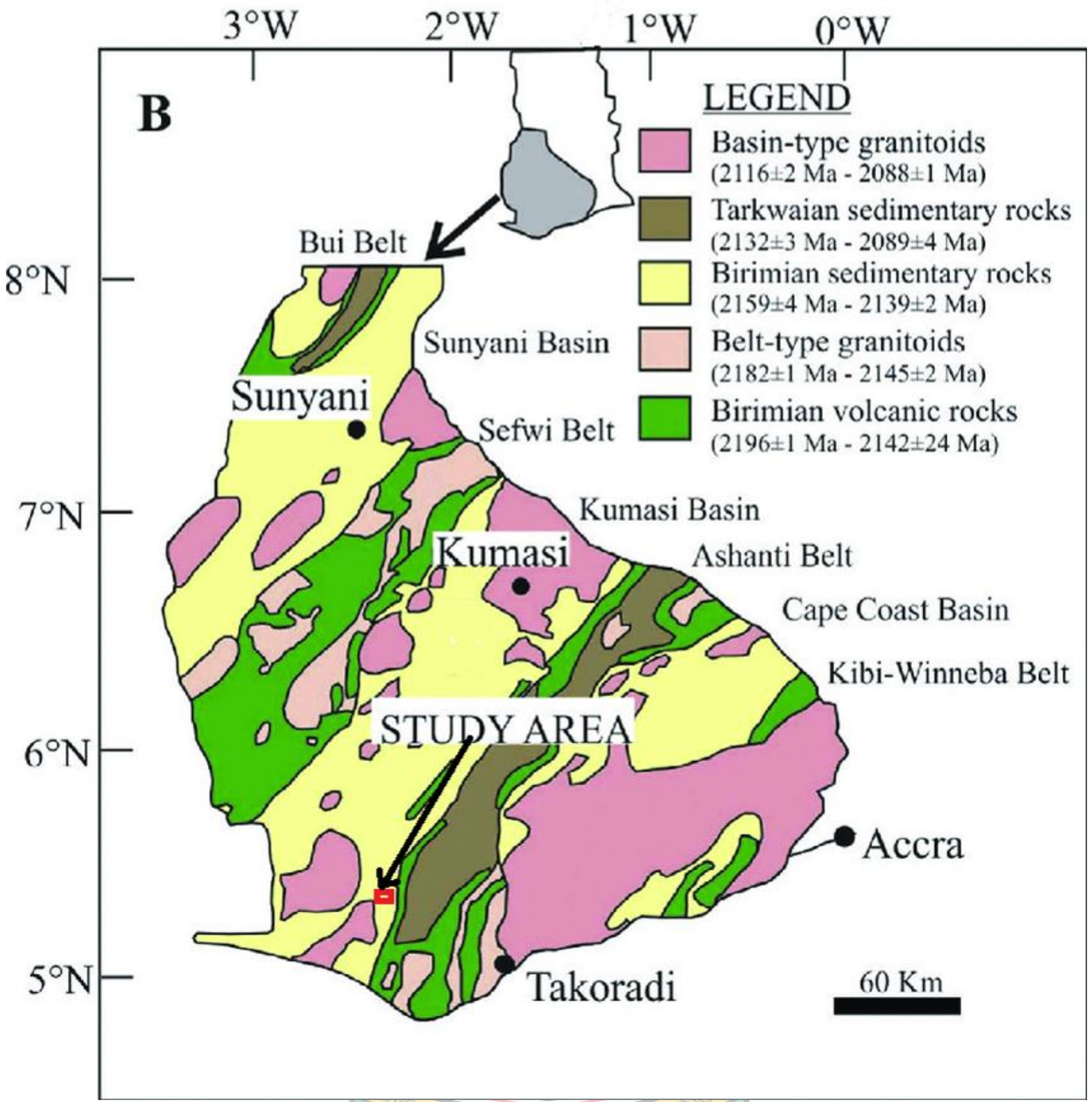

Figure 1.1 Geological Map of Southwestern Ghana showing the location of the Study Area (after Leube *et al*., 1990).

1.2 Thesis Objectives

The objectives of this study were to:

i. determine the type of rocks and their mineralogical composition that could be associated with the geochemical anomalies;
ii. delineate gold anomalies from stream and soil geochemical datasets; and
iii. produce a geological and gold prospectivity maps.

1.3 Methods Used

Methods used in this study include;

i. Geochemical analyses of stream sediments and soils in the area;
ii. Geological mapping of the outcrops within the study area;
iii. Delineation of gold anomalies from stream and soil geochemical data using GIS application;
iv. Petrography of rocks in thin section and ore minerals in reflected light;
v. Conduction of whole rock XRF analysis of outcrop samples.

1.4 Facilities Used

Facilities that were employed include;

i. Library and Internet facilities at UMaT, Tarkwa;
ii. MapInfo and ArcMap facilities at Bayswater Contract Mining in Accra;
iii. Petrological Microscope at UMaT, Tarkwa;
iv. XRF facilities at the ALS laboratory in Kumasi.

1.5 Organisation of Thesis

This thesis consists of six chapters. Chapter one is the introduction containing the statement of the problem, objectives, and methods used. Chapter two entails a literature review about the study area with regards to the location, accessibility, physiography, vegetation and infrastructure, previous works, regional geology, local geology, and gold mineralisation. Chapter three describes the methods used. Chapter four presents the results. Chapter five contains the discussions. Chapter six presents the conclusion and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Location and Accessibility

The study area is situated at about 15 km southwest of Prestea, bounded approximately by latitudes 5°17'15" N - 5°20'45" N and longitudes 2°18'45" W - 2°15'00" W. It is about 2 km west of the Sika Ne Asem village.

It covers an area of 37.2 km^2, located on part of field sheet number 0503 D4 (Figure 2.1). The first class Accra – Takoradi road affords convenient access to the concession via the contiguous Tarkwa – Prestea road and then Prestea – Sika Ne Asem road. However, close to the gold concession, access from Prestea through Sika Ne Asem is by dirt bumpy road and a network of footpaths.

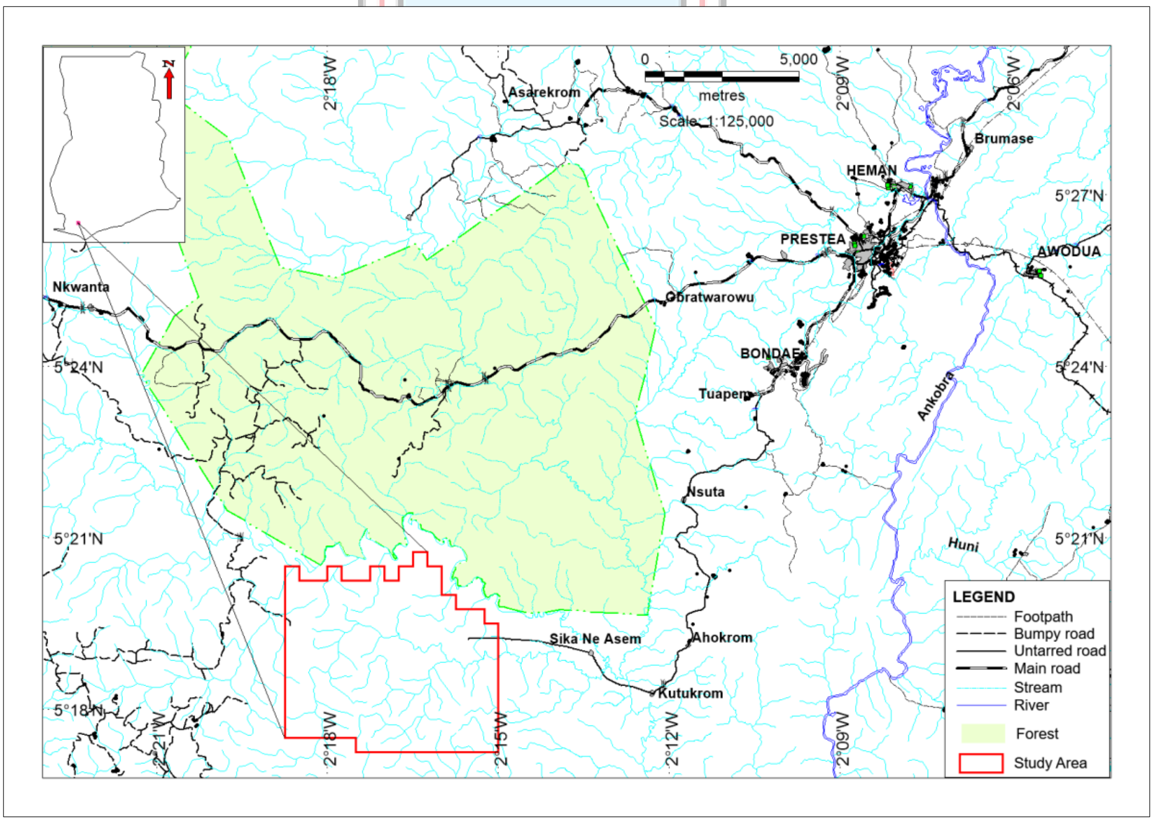

Figure 2.1 Map showing the location of the Study Area in Southwest of Prestea.

2.2 Physiography

Topography in the area is very rugged, with elevations reaching 200 m above Mean Sea Level.

The study area falls within the wettest region of Ghana, with a double maximum rainfall between April to June and September to October. Annual rainfall figures fall between 1,450 mm and 1,850 mm, averaging 1,625 mm (Adjei, 2005). At peak period Ankasa and Fure rivers overflow their banks, cutting off surrounding villages.

The study area is generally warm, with the highest average temperature of 31 °C in February and March; the coldest months are usually August to September, with an average of 24 °C; the relative humidity is very high averaging between 75% to 85% in the rainy season and 70% to 80% in dry weather (Adjei, 2005).

The study area falls largely within the High Rain Forest Vegetation Zone. The Fure River primary forest occurs within approximately 900m outside the northern confines of the study area; while to the south (4.3 km) is the Draw River Forest Reserve; cocoa is the main cash crop cultivated in the area (Adjei, 2005).

2.3 Infrastructure

The nearest administrative centre from the study area is Prestea, with a population of about 30,000. Owing to years of mining activity the town is rife with infrastructural amenities. A number of banks are established and doing a brisk business in this town buzzing with a collection of business activities. A number of hotels and guest houses cater for guests visiting the town for business and recreational purposes. A hospital and other smaller health posts take care of the medical needs of the town and surrounding communities. Potable water is made available by the Ghana Water Company, and power to the town and environs is supplied by the Ghana National Grid Company. Telecommunication is facilitated by the availability of numerous communication networks.

Various schools take care of the educational needs of the town to the Senior High level. These infrastructures have been tested by years of mining and other activities, and are proven to be capable of supporting potential future operations emanating from this programme.

2.4 Previous Gold Exploration

Available records show that three companies including Asempa Mining Limited, Prince of Wales International and Castle Peak Mining have at various times in the past years conducted exploration activities to cover part of the study area. However, only the reports of activities conducted by Prince of Wales International are accessible (Adjei, 2005).

Prince of Wales International conducted an intensive geological mapping (Figure 2.2) contemporaneously with stream sediment sampling programme in 2005. A total of 10 grab samples and 46 stream sediment samples were collected. Spatial distribution of the stream sediments results revealed two anomalous zones with the most prominent of the two anomalies, trending NW-SE with an average strike length of about 3.5 km, whilst the other trends NE - SW with a strikes length of 3 km (Adjei, 2005).

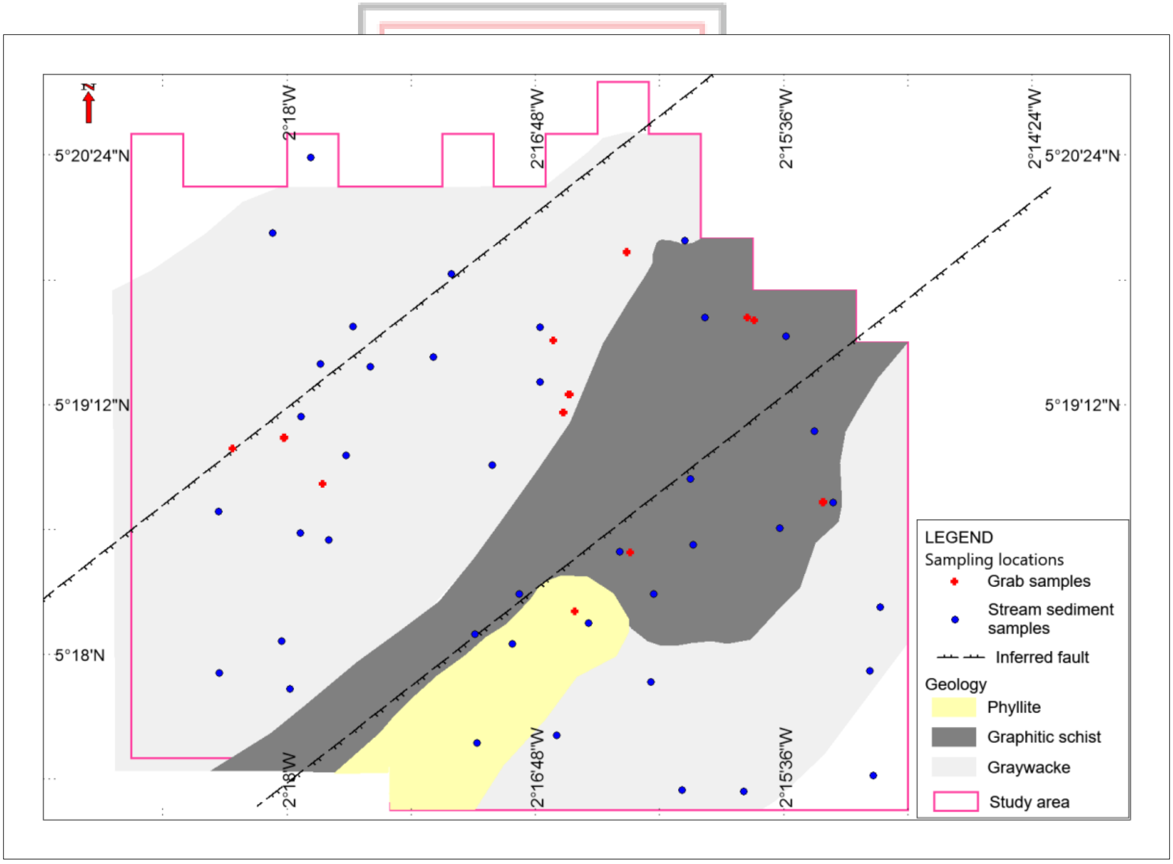

Figure 2.2 Geological Map of Study Area showing sample locations of previous work (modified after Adjei, 2005).

2.5 Regional Geology

According to Mawaleda *et al.* (2017), gold in the schist at Rumbia Complex, southeast arm of Sulawesi, Indonesia is associated with deformed metamorphic rocks affected by hydrothermal deposits. In the Gossan Hill prospect, six vein types and alterations have been associated with gold mineralisation with pervasive silica alteration that overprints earlier shear hosted rocks disseminated by pyrite and chalcopyrite (Dunn and Gagne, 2014).

The Man-Shield of the West African Craton consists of the Archean and Birimian Palaeoproterozoic rocks. Archean rocks are of Liberian, Leonian and pre-Leonian ages (3.1-2.75 Ga) (Wright *et al.*, 1985) and covers the western portion of the Man Shield whereas the Birimian Palaeoproterozoic rocks outcrop in the southeastern portion of the Man-Shield of the West African Craton and spread across part of Mauritania, Senegal, Ivory Coast, Burkina Faso and Niger (Abouchami *et al.*, 1990; Leube *et al.*, 1990). In Ghana, the Birimian covers the southwestern portion and part of northern Ghana (Figure 2.3).

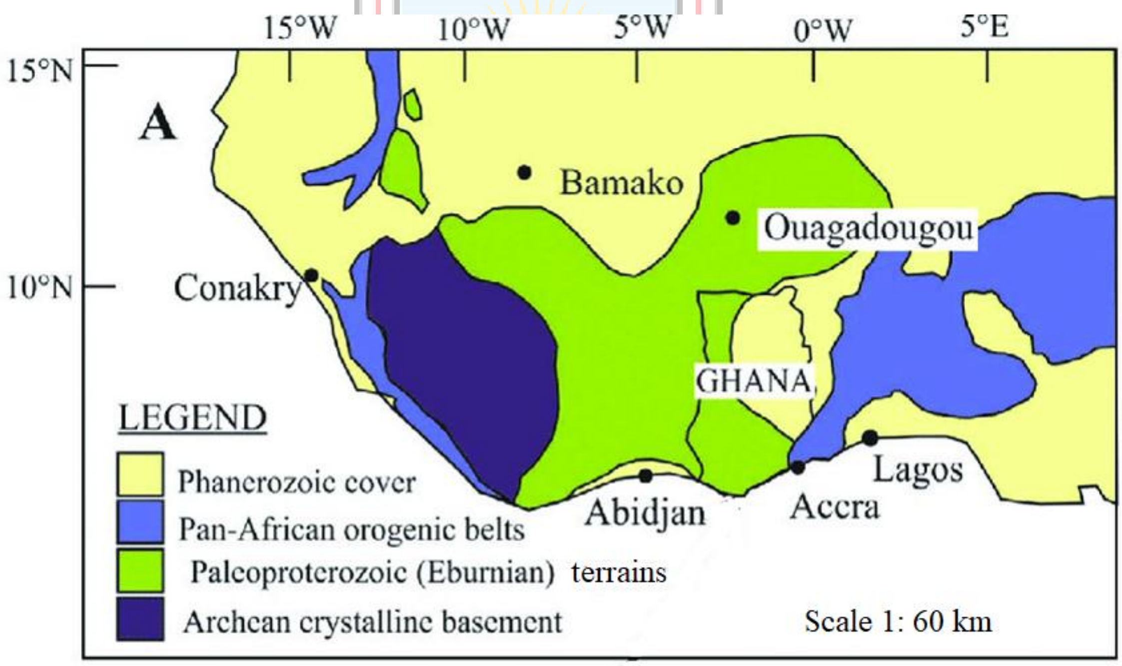

Figure 2.3 Geological Map of West Africa (after Abouchami *et al*., 1990).

Leube *et al*. (1990) described the Birimian rocks as five evenly northeast – southwest striking metamorphosed volcanic belts separated by sedimentary basins containing metasedimentary rocks. Birimian metasedimentary and metavolcanic rocks were intruded by basin type and belt type granitoids respectively. The Birimian metasedimentary rocks are mainly composed of dacitic volcaniclastics, wackes and argillitic sediments whereas the metavolcanic rocks are usually metamorphosed basaltic and andesitic lavas (Leube *et al*., 1990). Zircon in the metavolcanic rocks suggests ages ranging from 2162 ± 6 Ma and 2266 ±2 Ma whiles Zircon in the metasedimentary rocks also shows ages varying from 2180 and 2130 Ma (Perrouty *et al*., 2012). Different geologists have expressed diverse views about the stratigraphy of the Birimian (Nyame, 2013). In Ghana, Anglophone geologists such as Junner (1935, 1940) initially divided the Birimian rocks into Lower Birimian (metasedimentary rocks) and Upper Birimian (metavolcanic rocks) with the metasedimentary rocks being the oldest whereas Francophone geologists from West Africa also postulated that the metavolcanic rocks were older than the metasedimentary rocks (Papon, 1973; Hottin and Quedraogo, 1975). However, Leube *et al*. (1990); Asihene and Barning (1975) later suggested that both Birimian metavolcanic rocks and metasedimentary rocks are connected in origin and were deposited synchronously as a lateral facies equivalents. The views of Leube *et al*. (1990); Asihene and Barning (1975) put to rest the previous disagreement on the relationship of the Birimian rocks of Ghana where the Anglophone geologists were of the view that the metasedimentary rocks were older than the metavolcanic rocks but Francophone geologists changed the stratigraphy (Tagini, 1971; Papon, 1973; Bessoles, 1977 and Attoh, 1980).

Birimian metasedimentary rocks such as wacke, turbidites, volcaniclastics, chemical sediments are in the basins that separate the metavolcanic belts (Leube *et al*., 1990; Hirdes *et al*., 1993). The basins have breadths ranging from about 60 to 70 km from southern Ghana but narrows toward the north (Griffis *et al*., 2002). The Birimian metasedimentary rocks are divided into: Volcaniclastic rocks; Turbidite related wacke; Argillitic rocks and Chemical sediments (Leube *et al*., 1990) based on their environment of deposition and are regarded as lithofacies. Thus the turbidite related wacke facies are observed at lower slopes of volcanic ridges; the argillite facies are located at the centre of the basins; and chemical facies characterised by cherts, manganiferous and carbon-rich sediments, Fe-Ca-Mg carbonates, and sulphide mineral disseminations marks the transitional zone between the belt volcanic and the basin sediments (Leube *et al*., 1990; Griffis *et al*., 2002).

Birimian Metavolcanic Belts in Ghana

Birimian metavolcanic belts in Ghana include: Kibi-Winneba Belt; Ashanti Belt; Manso Nkwanta/Asankrangwa Belt; Sefwi Belt; Bui Belt; Bole-Navrongo Belt (Fig. 1); Wa-Lawra Belt (Leube *et al*., 1990; Griffis *et al*., 2002; Smith *et al*., 2016). With exception of Wa-Lawra Belt (Figure 2.4), all the Birimian metavolcanic belts (the greenstone belts) trend in northeast - southwest direction and are approximately parallel to each other with widths ranging from 10 to 60 km and lengths stretching into about hundreds of kilometres along strike but separated by sedimentary basins containing metasedimentary rocks (Leube *et al*., 1990; Griffis *et al*., 2002). The belts mainly composed of tholeiitic lavas comprising of metamorphosed basalt and andesites with some mafic rocks and intercalated with dacite, rhyodacite and pyroclastics (Berge, 2011). Highest ratio of lava/pyroclastic are found in the Ashanti belt and the least lava/pyroclastic is associated within the Sefwi Belt where the belt granitoids are intense (Leube *et al*., 1990).

Kesse (1985) identified three types of granitoids within the Birimian based on their mineralogy, chemistry, age and the environments within which they occurred and these are: the basin type granitoids, belt type granitoids and Bongo type granitoids. The basin type granitoids are dominated by two-mica granites, belt type granitoids dominated by hornblende-bearing granite and the Bongo type granitoids is predominantly rich K feldspars.

The basin and belt type granitoids are usually found in southern Ghana and are of Paleoproterozoic age (Griffis *et al*., 2002; Yao *et al*., 2001). The basin type granitoids are well foliated, muscovite-biotite rich granites characterised by presence of areas enclaved with schists and gneisses (Kesse, 1985; Perrouty *et al*., 2012). Though, the belt type granitoids are non-foliated quartz and hornblende diorite, whiles K-rich granitoids are associated with hornblende and microcline which are also non-foliated (Kesse, 1985).

The Tarkwaian Rocks

The Tarkwaian rocks of Ghana are commonly found in Tarkwa area at the Southwestern part of Ghana. They mostly outcrop in the northeast-southwest trending Ashanti belt that stretches from close to Axim to the edge of voltaian basin near Agogo (Figure 2.4) (Kesse, 1985). Eisenlohr and Hirdes (1992) suggested that the Tarkwaian rocks overlie the Birimian metasedimentary and metavolcanic rocks and also are fragments of the Birimian that uplifted and eroded after the Eburnean Tecto-Thermal Event. Tarkwaian rocks also be found on Bui belts (Figure 2.4). Junner *et al*. (1942) divided the Tarkwaian group into: Kawere Group; Banket Series; Tarkwa Phyllites; Huni Sandstones and Dompim Phyllites. The southwestern Ghana Tarkwaian rocks (2102 - 2097 Ma) are less deformed and metamorphosed as compared to Birimian rocks. (Wright *et al*., 1985; Perrouty *et al*., 2012; Adadey *et al*., 2009 and Oberthür *et al*., 1998).

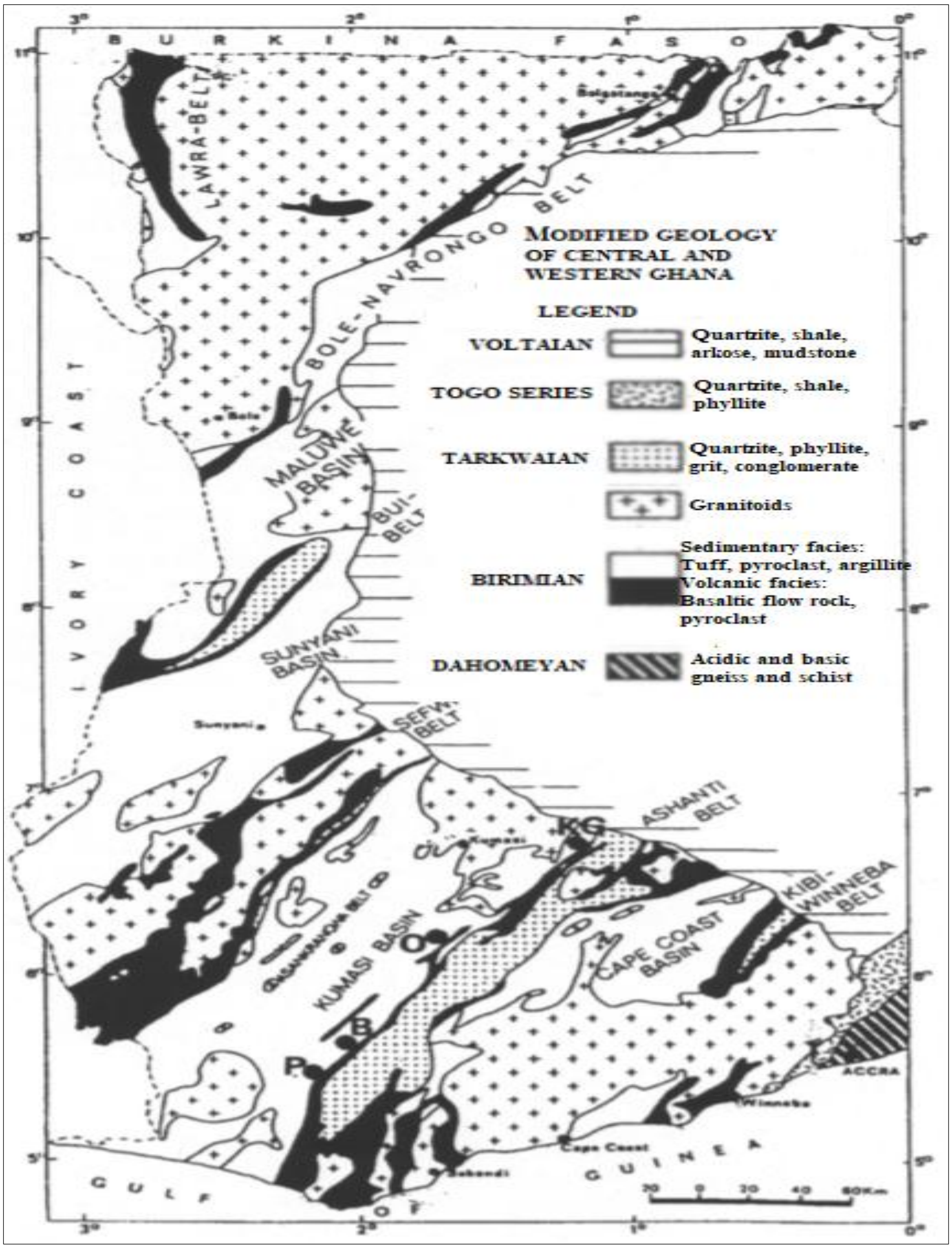

Figure 2.4 Geological map of Ghana showing the position of the Prestea (P), Bogosu (B), Obuasi (O) and the Konongo (KG) gold deposits along northwestern margin of the Ashanti volcanic belt (Modified after Leube *et al.*, 1990).

2.6 Local Geology

According to Adjei, (2005) the study area is underlain by Birimian metasedimentary rocks such as tuffs, greywackes, phyllites and graphitic schist intercalated with greywacke. The rocks are strongly foliated and sheared. The phyllites are usually fine grained and vary in colour from light grey to black. In certain areas the black phyllites are graphitic in nature. The rocks in the area are steeply dipping (between 60° to 80° to the east).

The three types of gold occurrences associated within the Birimian Supergroup are: lode (veins, stock works and /or crush zones), laterite and alluvial deposits (Junner, 1935; Leube *et al*., 1990; Bowell *et al*., 1993). All these three types of gold occurrence could be present within the concession (Adjei, 2005). Quartz vein gold mineralisation locally contains free gold. Obuasi, Konongo and Prestea provide examples of this style of mineralisation. Gold mineralisation hosted within phyllites and graphitic mylonites (crush zones) with associated finely disseminated pyrite and arsenopyrite (sulphide ores) is, generally, lower in grade than the quartz vein style of mineralisation. The Obuasi, Bogosu, Mampon and Buesichem deposits are all examples of "sulphide ores" (Junner 1932; Hirdes and Leube, 1989; Leube *et al*., 1990; Milesi *et al*., 1991; Mumin *et al*., 1994; Oberthür *et al*., 1994). A third style of mineralisation – gold-bearing stock systems hosted in intermediate granites has been exploited at the former AGC- Ayanfuri mine and reported at Chirano.

2.7 Stream Sediment Geochemistry

Geochemical techniques such as stream geochemistry, whole rock geochemistry, and soil geochemistry could be used to make significant discoveries in mineral exploration (Oke et *al.,* 2014). Geochemistry has also proven to be the most successful and cost effective technique for gold exploration within the Birimian of Ghana (Griffis *et al.*, 2002). Stream sediment sampling have been used globally to identify several areas with high mineralisation potential (Gubins, 1997). Sampling of active channel sediments from streams as a way of delineating gold potential targets for further exploration have been very effective in the southwestern Ghana resulting in the discovery of many gold deposits including Konongo, Obuasi, Bogosu, Prestea, Damang and Kenyasi gold deposits (Nude and Arhin, 2009).

2.8 Soil Geochemistry

Soil geochemistry has proven to be an effective method for gold exploration (Mazzucchelli, 1996). It has been used to delineate mineralisation potentials of kimberlites at Attawapiskat (Hattori *et al*., 2009). Cook and Dunn (2007) also recommended soil geochemical surveys as an essential part of any property-scale exploration program at Central British Columbia. However, the sampler's ability of making appropriate observations with respect to the type of material and the origin to be sampled (B horizon) is required (Cook and Dunn, 2007).

2.9 Geochemistry in the Birimian

Geochemistry is a useful exploration method in exploration within the Birimian (Griffis *et al.*, 2002; Nude and Arhin, 2009). Geochemical data from stream sediment and soil sampling are prone to errors due to transportation of soils and leaching of elements, therefore metal values may not indicate enrichment of the underlying rocks in the area (Grunsky *et al.*, 2009). Distributions of trace elements, major elements and mineral occurrences in an area can indicate mineralisation (Dzigbodi-Adjimah, 1993). Areas along the Birimian gold belts with dense vegetation covers and thick weathering profiles were recognised by Dzigbodi-Adjimah (1993) as one of the factors which make gold exploration challenging. The Ashanti belt is one of the Birimian gold belts (Leube *et al*., 1990; Griffis *et al*., 2002; Smith *et al*., 2016).

The study area occurs in the Birimian, about 2 km west of the Ashanti belt and has a thick tropical vegetation covers and dense weathering profile. There is therefore the need to employ petrography and geochemical studies to investigate the distribution of gold in the soils in the study area.

CHAPTER 3

METHODS USED

The procedures and techniques used in the sample selection, sample preparations and analyses include:

i. Geological mapping of the outcrops within the study area;
ii. Geochemical analyses of stream sediments and soils sampled from the area;
iii. Delineation of gold anomalies from stream and soil geochemical data using GIS application;
iv. Petrography of rocks in thin section and ore minerals in reflected light microscopy;
v. Conduction of whole rock XRF analysis of outcrop samples.

3.1 Geological Mapping

The geological mapping was done by traversing along roads, footpaths, soil grid, dried-up stream beds with the aid of a base map (1: 50,000 scale). Sampling and outcrop mapping were conducted along these traverses. A total of fifty-seven (57) outcrops were encountered. At each location (Figure 3.1) where outcrops were encountered (Appendix A):

i. Coordinates were taken using hand-held GPS;
ii. Geological observations were made and recorded;
iii. the outcrop was photographed; and
iv. A rock sample was collected.

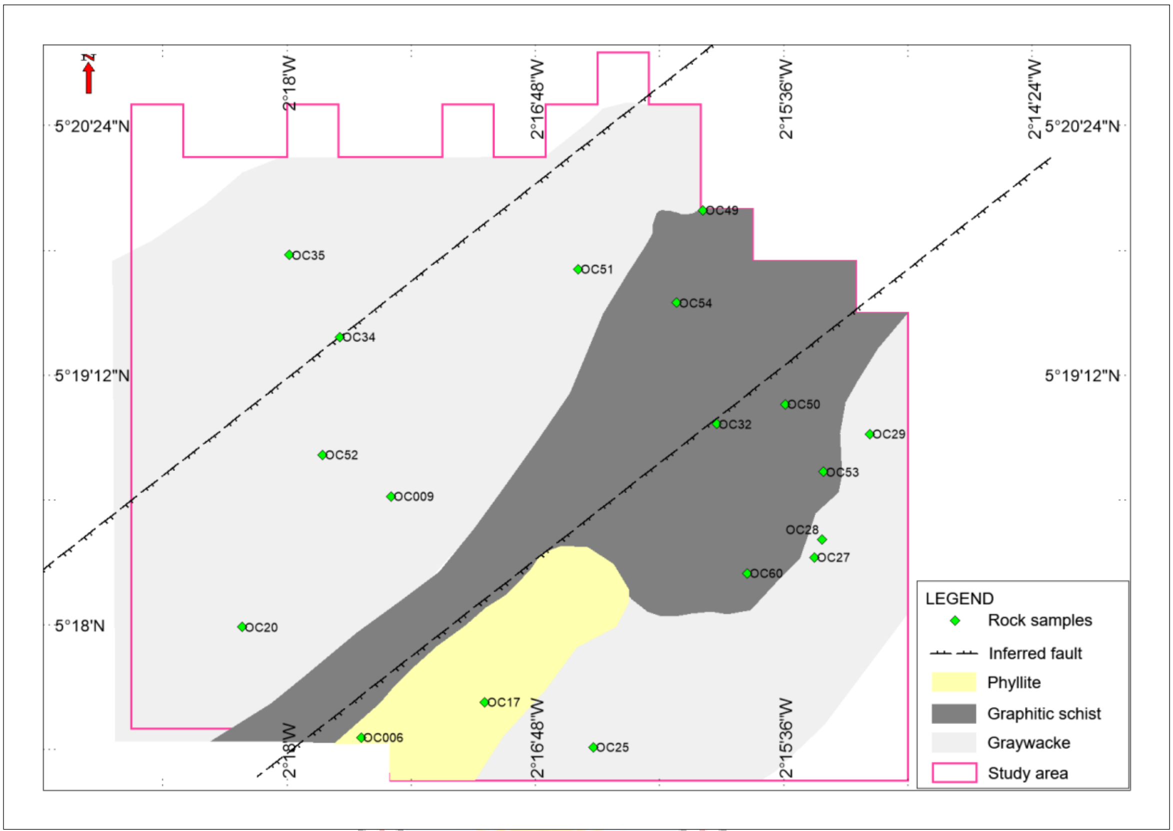

Figure 3.1 Geological Map of Study Area showing sample locations of current work (modified after Adjei, 2005).

3.2 Stream Sediment Sampling and Analyses

A total of 43 composite stream sediment samples (including two field duplicates) were collected mainly from first and second order streams within the study area using a sampling density of about 0.9 km^2 per sample (Figure 3.2). The sampling points were located on a topographic map (1: 50,000 scale) and the coordinates fed into the GPS to aid in locating sampling points. At each sampling location:

i. five “sub-samples” of fine sediments from the active parts of streams were taken at a constant interval within a distance of about 25 m and composited into a single sample;

ii. the composite sample was sieved to discard organics and other materials;

iii. after sieving, the fine sediments were allowed to settle in a bucket before the water was decanted to recover the fine sediments;

iv. sample description, site features, GPS location, presence or absence of outcrops within the vicinity relating to the sample site were carefully noted;

v. about 3 kg of the fine sediments were bagged and labelled (Appendix B).

A total of 43 stream sediment samples (including two duplicates) was submitted to the SGS laboratory to be analysed for gold by BLEG (BLE61N).

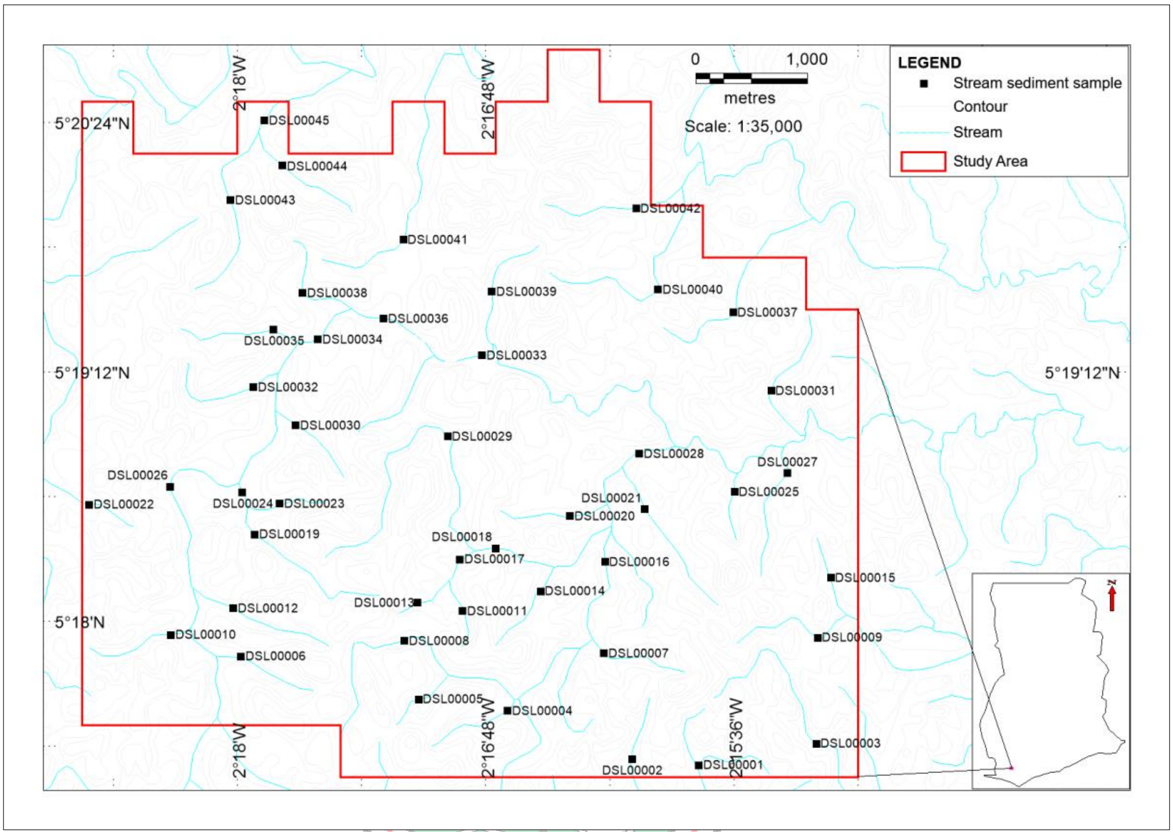

Figure 3.2 Map showing the locations of Stream Sediment Samples.

3.3 Soil Sampling and Analyses

A total of 74.9 km of gridlines and 8.7 km of baseline at 144° and 54° magnetic respectively were cut on the defined stream anomalies (Figure 3.3) for soil sampling at a grid of 400 m by 50 m (Figure 3.4). The lines were pegged prior to soil sampling. At each proposed soil sample station:

i. a small pit of a diameter of about 20 cm was dug to a depth of about 50 cm;

ii. approximately 3 kg of soil was collected from the B-horizon, bagged and labelled;

iii. spatial and non-spatial information were recorded (Appendix C).

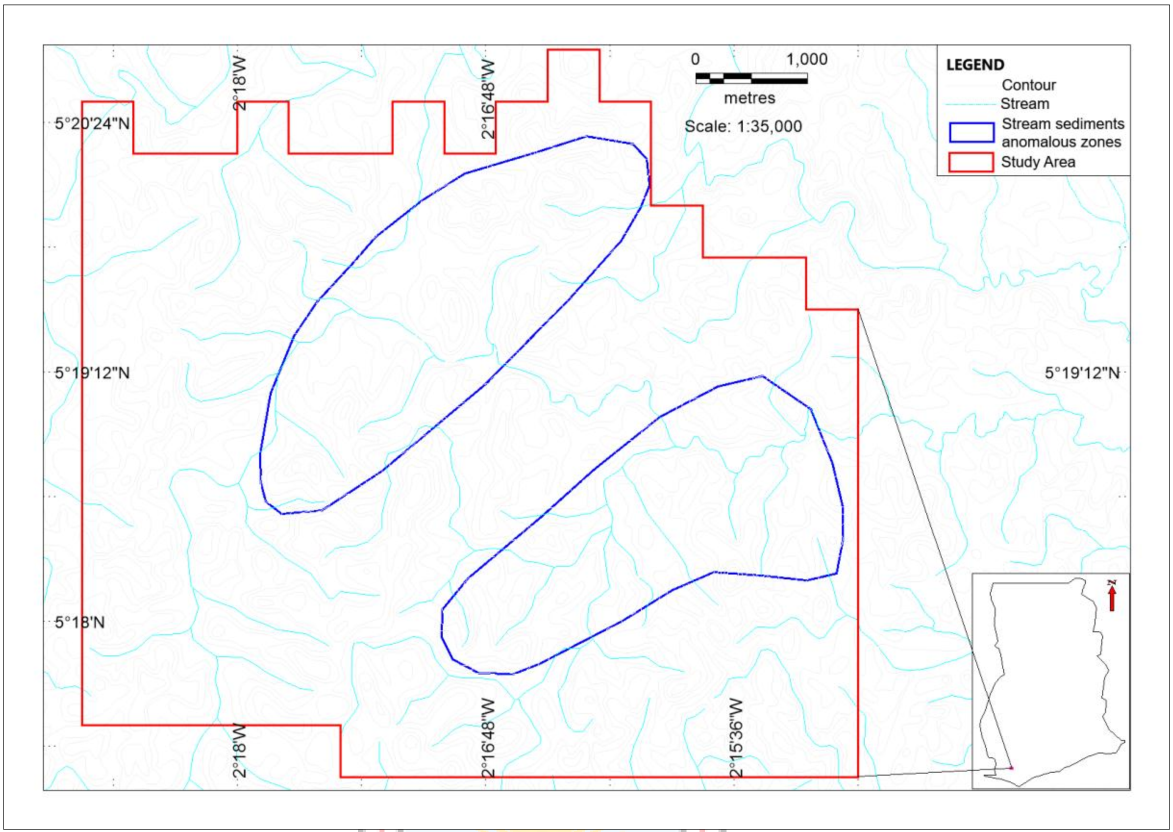

Figure 3.3 Map showing Anomalous Zones generated from Stream Sediment Sampling.

However, at every 20th sample station, 6 kg of soil was mixed thoroughly, coned and quartered before collecting a duplicate sample. Blank sample was inserted after every 29th soil sample. Hence for every 40 samples, there were 37 original soil samples, 2 duplicates samples, and one blank sample. A total 743 soil samples (including 34 duplicates and 24 blanks) were analysed for gold by BLEG analysis at the Intertek laboratory in Tarkwa.

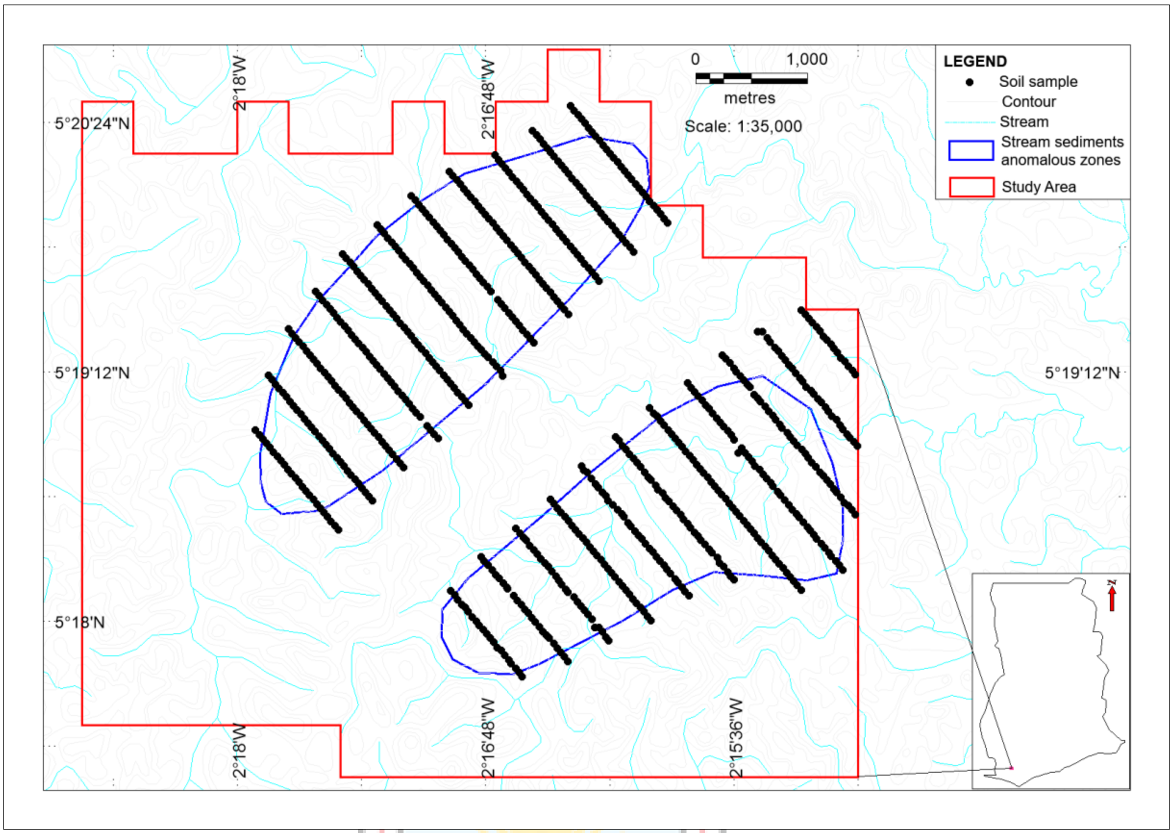

Figure 3.4 Map showing Soil Sample locations and Stream Sediments Anomalous Zones.

3.4 Delineation of Gold Anomaly

Probability plot was generated from the stream sediment and soil results obtained from soil sampling to determine the threshold value (Appendixes D and E). The threshold value was used as the cut-off value. Gold values below the threshold were classified as background values while the values greater than the threshold were considered anomalous. A thematic map was produced using MapInfo software and the areas where stream sediments and soil samples returned high gold values (greater than the threshold value) were considered anomalous and delineated as targets (Figures 4.16 and 4.17).

3.5 Thin and Polish Section Preparation

Sixteen (16) out of the fifty seven (57) outcrops samples from the study area were selected and sampled for preparation of thin and polished sections. The rock type and sample selections were done based on the location of outcrops, alteration and sulphide mineralisation observed. The selected samples were then prepared by the laboratory technician at the Department of Geological Engineering, UMaT, Tarkwa.

Preparations of thin sections were done using the standard methods in Hutchison (1974) and studied with the aid of the SM Lux Leitz microscope at the Geological Engineering Laboratory at the University of Mines and Technology (UMaT), Tarkwa. The prepared thin sections were used in identifying the constituent minerals of the rocks, their texture, modal percentages as well as other properties such as pleochroism, bireflectance, and anisotropy.

Polished sections preparations were also done according to the standard outlined in Hutchison (1974). The identification and characterisation of the opaque phases in the samples and their textural relationship were conducted. Identification of minerals and textural relationship were done using the various techniques adopted by Picot *et al*. (1982) and Spy and Gedlinske (1987). The mineral abbreviations (Appendix F) were after Whitney and Evans (2010).

3.6 Whole Rock Geochemical Analyses

Seventeen (17) representative samples from the study area were sent to Associated Laboratory Services (ALS) in Canada for whole rock geochemical analysis. Sample preparations were made based on standard procedures. Weighed samples were crushed to about 70% below 2mm and then split using the riffle splitter and pulverised and split again to 85% to pass through <75µm. Powdered samples were obtained by mechanical crushing and pulverisation using an agate mortar. The specimens were analysed for major elements on fused discs through automated XRF-60 at Associated Laboratory Services (ALS), Canada. 50% lithium tetraborate ($Li_2B_4O_7$) and 50% lithium borate ($LiBO_2$) were used to prepare the specimens prior to addition of a calcined or ignited sample (0.9g) and 0.9g of lithium borate flux (50% - 50% $Li_2B_4O_7$ - $LiBO_2$) and well mixed before they were fused in an auto fluxer between 1050 - 1100˚C to get a flat molten glass disc. This disc was then analysed by X-ray fluorescence spectrometry. The lower detection limit was 0.01%.

For trace elements analysis, specimens were prepared using hydrofluoric (HF) acid, nitric acid (HNO_3) and perchloric acid ($HClO_4$) digestion and hydrochloric acid (HCl) leach. Two grams of each sample was digested with perchloric, nitric, hydrofluoric and hydrochloric acid and analysed by inductively coupled plasma-atomic emission spectrometry (ICP-AES). The lower detection limits (in ppm) for the minor and trace elements are 10.0 (Cr), 5(V), 2 (Zr), 1 (W, Sn), 0.5 (Ba), 0.2 (Hf, Nb, Rb), 0.1(Ce, Ga, La, Ta, Nd, Sr, Y), 0.01 (Ho, Cs, Lu, Tb, Tm), 0.03 (Er, Eu, Pr, Sm, Yb), and 0.05 (Dy, Gd, Th, U).

3.7 Carbon Content Analyses

Two of the rock samples (OC53 and OC49) which were initially mapped as graphitic schist which were analysed at UMaT for total carbon content using Carbon/Sulphur CS-2000 Analyser at Environmental Monitoring Laboratory, UMaT due to their dark grey colour.

The Carbon/Sulphur Analyser, CS-2000 features a resistance furnace; temperature was selected in steps of 1 °C up to 1350°C. The samples were weighed in ceramic boats. The sample was then placed directly in the furnace for combustion, without accelerators. The analysis time was 74 seconds. The combustion gases pass through the infrared cells for detection. The signals were evaluated and the results displayed automatically.

CHAPTER 4

RESULTS

The rocks are highly altered (Figure 4.1), making it difficult to identify most minerals, even in thin and polished sections (Section 4.1). Table 1 shows the modal percentage of some minerals identified.

4.1 Petrography

Figure 4.1 Photographs of Outcrops at the Study Area showing; a) shearing in two main directions marked by thin quartz veins b) partially weathered rock.

4.1.1 Chlorite-Amphibole Schist

The rock is light grey to dark grey, fine to medium grained, moderately sheared with sulphides alteration (e.g. OC006, OC27, OC32, OC54, 17, 18and OC60). In thin section, the rock is fine to medium grained and shows the relationship between drawn-out plagioclase and later plagioclase (Figure 4.2 a). Chlorite marks foliations and appears dark green along plagioclase markings (Figure 4.2 a). Recrystallised plagioclase is at a high angle to zoned plagioclase. Modal percentages of the minerals are shown in Table 1. Quartzofeldspathic vein marks the hinge of an isoclinal fold with its limb strongly sheared into medium grained texture. Fine plagioclase which is strongly sheared occurs at the isoclinal fold. The isoclinal fold is transposed at the limb (Figure 4.2 b). Amphiboles are strongly sheared and twisted and are preserved near quartzofeldspathic clusters near hinge zones of folds that are sheared. There was an initial shear marked amphiboles cut by later pervasive shear mark chlorite. Amphibole alternates with plagioclase such that there are plagioclase-rich and amphibole-rich foliations (Figure 4.2 c). Elsewhere, the plagioclase is subhedral and partially altered to fine sericite and quartz, and aligned with amphibole which is partially altered to chlorite and epidote. Quartz and epidote overprint the earlier foliation and are irregularly aligned (Figure 4.2 d). Granular quartz appear to be a relict amygdule (Figure 4.3 a- b).

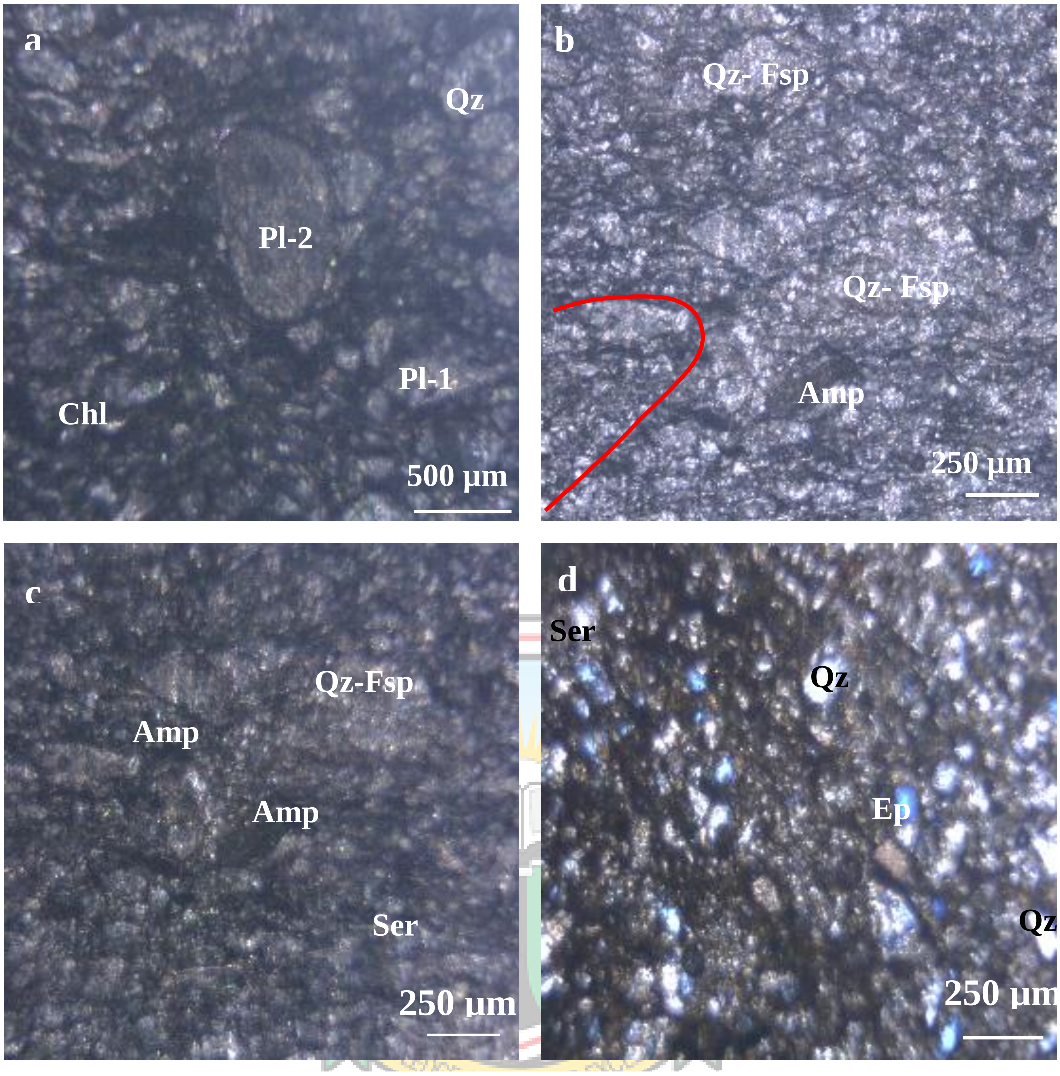

Figure 4.2 Photomicrograph of Chlorite-Amphibole Schist (sample OC006, OC27, OC32, OC35, and OC60) in Thin Section under; a), c) and d) Crossed Nicols b) Plane Polarised Light.

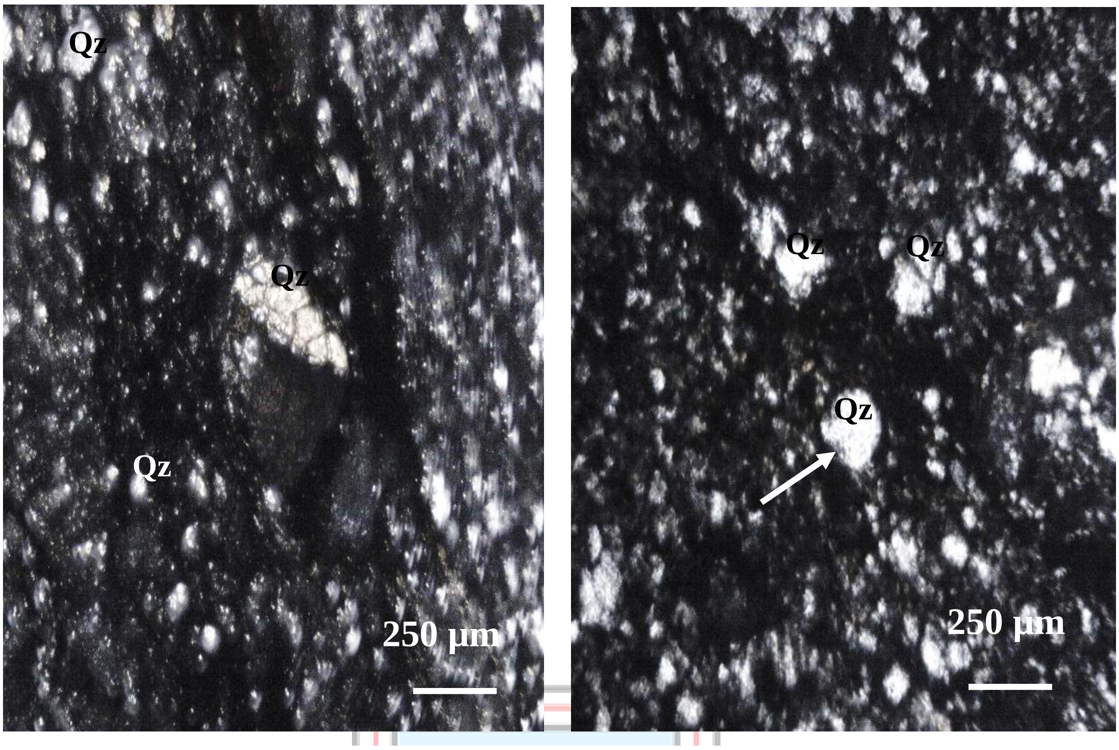

Figure 4.3 Photomicrograph of Chlorite-Amphibole Schist (sample OC54) in Thin Section under Plane Polarised Light with Relict Amygdules (?) filled with quartz (arrowed).

In thin section (Figure 4.4), the rock is fine to medium grained with irregular alignment of plagioclase and weakly foliated with foliations marked by sheared amphibole and chlorite (Figure 4.4 a). The rock is strongly sheared with strong alignment of quartz and plagioclase (Figure 4.4 a). It appears that there was an earlier foliation which is at an acute angle to the strong shear of 54^{o} (Figure 4.4 b). The core of fold which is partially shown in Figure 4.4 b is marked by plagioclase. Ore minerals comprise arsenopyrite, pyrite, marcasite, and haematite. Elsewhere, both arsenopyrite and marcasite are partially altered to hematite (Figure 4.4 c). Modal percentages of the minerals are shown in Table 1.

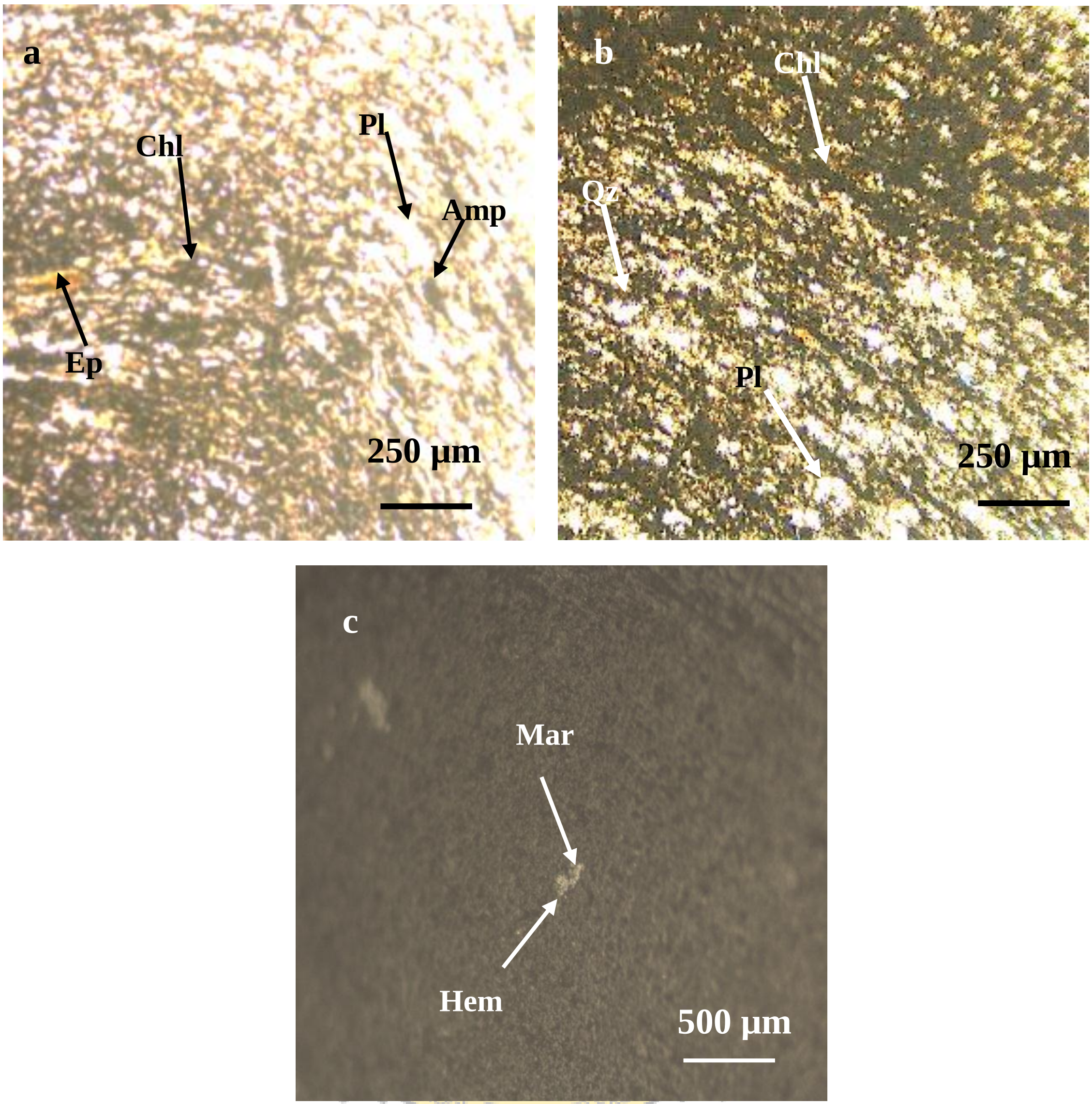

Figure 4.4 Photomicrograph of Chlorite-Amphibole Schist (sample OC32) in a) Thin Section under Plane Polarised Light b) Thin Section under Crossed Nicols c) Polished Section under Reflected Light.

4.1.2 Quartz-Chlorite Schist

Also, quartz-epidote vein (OC17) cuts across initial fabric (Figure 4.5 a). The quartz-epidote vein is sheared and the shearing is marked by strongly sheared amphibole and plagioclase (Figure 4.5 b). Late quartz overprints plagioclase. Quartz is parallel to foliation and fold turns into cross fault. The relationship suggests that cross fault occurred in the study area (Figure 4.5 c – d).

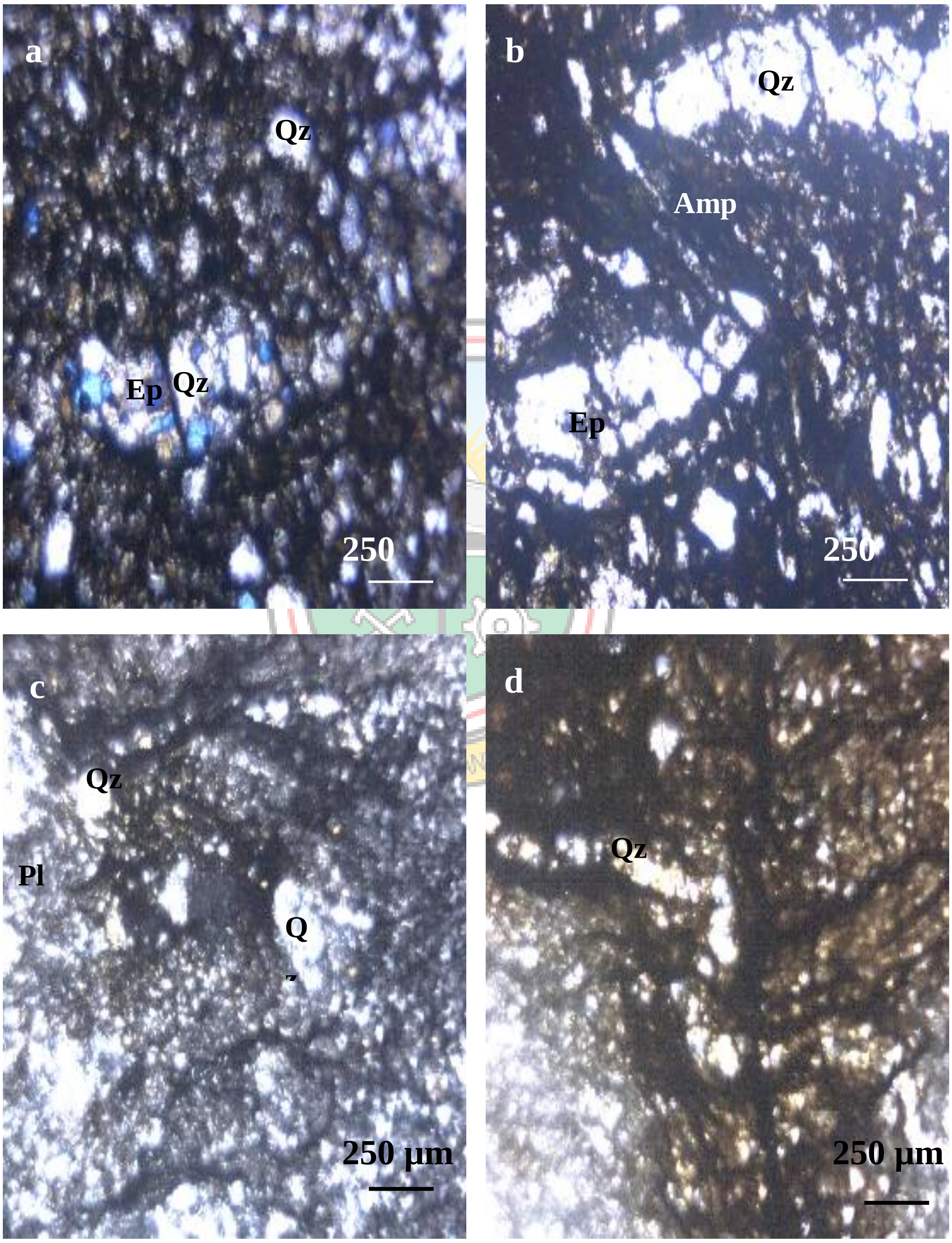

Figure 4.5 Photomicrograph of Quartz-Chlorite Schist (sample OC17 and OC53) in Thin Section under; a) and d) Crossed Nicols; b) and c) Plane Polarised Light.

Ore minerals comprise pyrite, arsenopyrite, marcasite, magnetite, pyrrhotite, and traces of gold (Figure 4.6 a – b). Arsenopyrite is creamy white, sub-rounded to anhedral and isotropic. Pyrite is pale yellow, subhedral and not sheared, shows ex-solution of magnetite and is partially altered to pyrrhotite (Figure 4.6 a). Under cross nicols, marcasite shows birefringence (Figure 4.6 a).

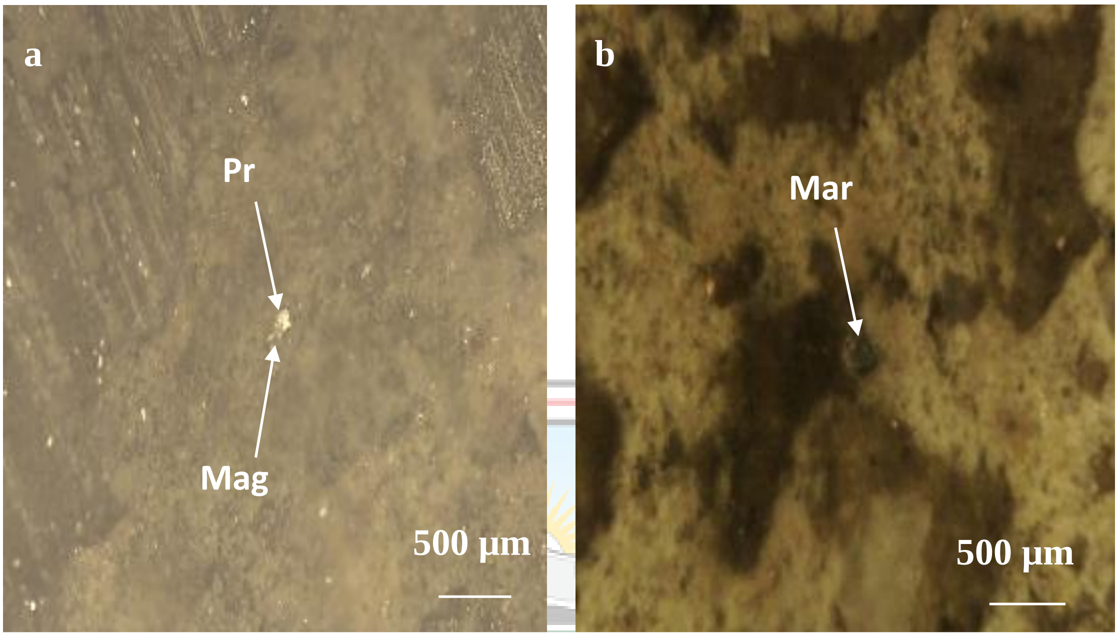

Figure 4.6 Photomicrograph of Quartz-Chlorite Schist (sample OC17) in Polished Section under Reflected Light; a) Plane Polarised Light b) Crossed Nicols.

4.1.3 Quartz Schist

In thin section (Figure 4.7), the rock is medium to coarse grained, with irregular aligned subhedral to anhedral plagioclase with occasional alignment. Foliations are marked by ore minerals (Figure 4.7 b). Ore minerals that mark foliations also show quartz inclusion. After formation of ore minerals, continues cross vein of ore mineral is off-set by a shear that is subparallel to original shear. This later shear is marked by quartz veins and epidote. Plagioclase is medium grained, dusty with opaque minerals and alteration minerals. It is subhedral and shows relict albite twinning with extinction angles of 13.5 degrees and 41.5 degrees. It is partially altered to sericite and fine quartz. The margins are corroded by quartz.

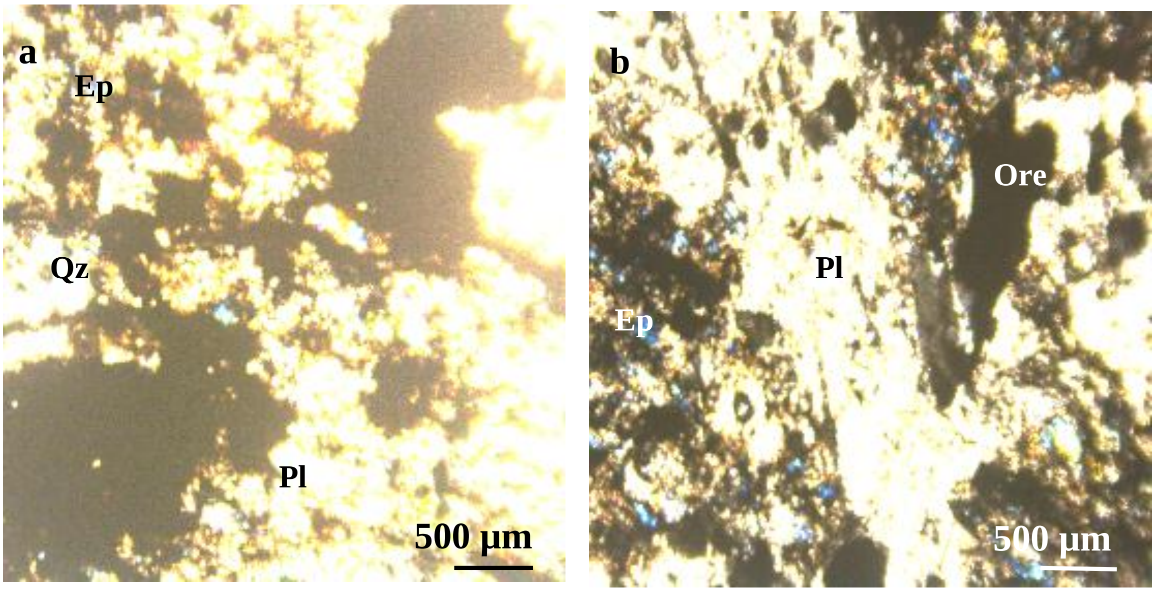

Figure 4.7 Photomicrograph of Quartz Schist (sample OC51) in Thin Section under; a) Plane Polarised Light b) Crossed Nicols.

Table 4.1 Modal Percentages for the Rock Samples from the Study Area at Southwest of Prestea.

Mineral	Chlorite-Amphibole Schist						Quartz-Chlorite Schist						Quartz Schist
	OC006	OC27	OC32	OC54	OC28	OC49	OC17	OC35	OC53	OC34	OC29	OC60	OC51
Amphibole	25	45	20	40	25	28	39				20	15	
Plagioclase	40	20	25	33	20	35	30	15	15	15	5	15	15
Sericite	5	5	5					5	5	5	5	5	3
Chlorite	15	10	20	10	5	10	10	30	25	18	10	30	5
Epidote		10	5	5	5	12	5	20	10	15	2	5	
Quartz	13	8	10	10	15	10	15	20	25	20	38	15	75
Pyrite	1	1	2	1	20	2	0.5	3	5	17	10	6	0.5
Arsenopyrite		1	6		4	1	0.2	3	8	5	4	3	0.5
Marcasite	1		4	1	3	1	0.1		4	3	3	3	0.5
Gold trace			1		1		0.1	2			1		
Pyrrhotite			2		2	1	0.1	2	3	2	2	3	0.5
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

4.2 Geochemistry

4.2.1 Carbon Content

The total carbon content of two rock samples (OC49 and OC53) is shown in Table 4.2 and ranges from 0.164 – 0.509 wt %.

Table 4.2 Total Carbon Contents in rock samples (OC49 and OC53).

Sample Id	Weight (mg)	Carbon %
OC49	330	0.164
OC53	326	0.509

4.2.2 Whole Rock Geochemistry

From the whole rock geochemical analysis results (Appendix G), silica concentration ranges from (59.50 – 77.00 wt %), aluminium oxide (Al_2O_3) concentration ranges from (14.2 – 21.1 wt %), sodium oxide (Na_2O) ranges from (0.69 – 2.52 wt %), CaO (0.01 - 1.56 wt %) , Total FeO (0.65 – 13.45 wt %), TiO_2 (0.53 – 0.82 wt %), MgO (0.14 – 2.44 wt %), K_2O (1.64 – 3.13 wt %), Cr_2O_3 (0.027 – 0.064 wt %), MnO (<0.01 – 0.03 wt %), P_2O_5 (0.01 – 0.14 wt %), SrO (0.01 – 0.04 wt %), BaO (0.04 - 0.13 wt %), LOI (2.42 – 13 wt%), Ba (390 – 1145 wt%), Cr (210 – 520 wt%), Rb (52.3 – 94 wt%), Zr (129 – 189 wt%), Nd (12.1 – 70.6 wt%). Silica concentration is highest (77 wt%) in quartz - chlorite schist (sample OC29) but lowest (59.5 wt%) in quartz-chlorite schist (sample OC32). Al_2O_3 is highest (21.1 wt%) in sample OC006 but least (14.2 wt%) in sample OC29. Total FeO is highest (13.45 wt%) in sample OC53 but low (0.65 wt%) in sample OC009. MgO is highest (2.44 wt%) in sample OC49 and least (0.14 wt%) in sample OC009. Na_2O is highest (2.52 wt%) in sample OC54 and least (0.69 wt%) in sample OC32. The highest K_2O (3.13 wt%) content is sample OC32 and the least (1.64 wt%) is in sample OC20. TiO_2 is highest (0.82 wt%) in sample OC006 and lowest (0.53 wt%) in sample OC29.

Variation diagrams of some major oxides and trace elements have been plotted against SiO_2 wt % to show the distribution trends of major oxides and trace elements in the different rocks (Figures 4.8 to 4.13).

Alteration Box

Alteration box plot refers to a plot of the Ishikawa alteration index (AI) against the chlorite-carbonate-pyrite index (CCPI) (Large *et al.*, 2001). Although this plot was initially intended for volcanic hosted massive sulphides (VHMS), it has been extended to other igneous rocks (Kumral *et al.*, 2016). With the observance of possible amygdules of in the rocks in the study area metamorphosed to greenschist facies; the protoliths could be volcanic rocks. The plots were used to assess the extent of chlorite and other alteration types in the rocks (Fig. 4.9).

The Ishikawa alteration index is given by:

$$AI = \frac{100(K_2O+MgO)}{CaO+MgO+K_2O+Na_2O} \quad (1)$$

The chlorite-carbonate-pyrite index is given by:

$$CCPI = \frac{100\ (Mgo+FeO)}{(MgO+FeO+\ Na_2O+K_2O)} \quad (2)$$

Since AI used alone does not discriminate between sericite and chlorite alterations, the CCPI was plotted (Figure 4.9c) to cater this limitation. The CCPI in addition caters for carbonate alteration which is not considered by AI.

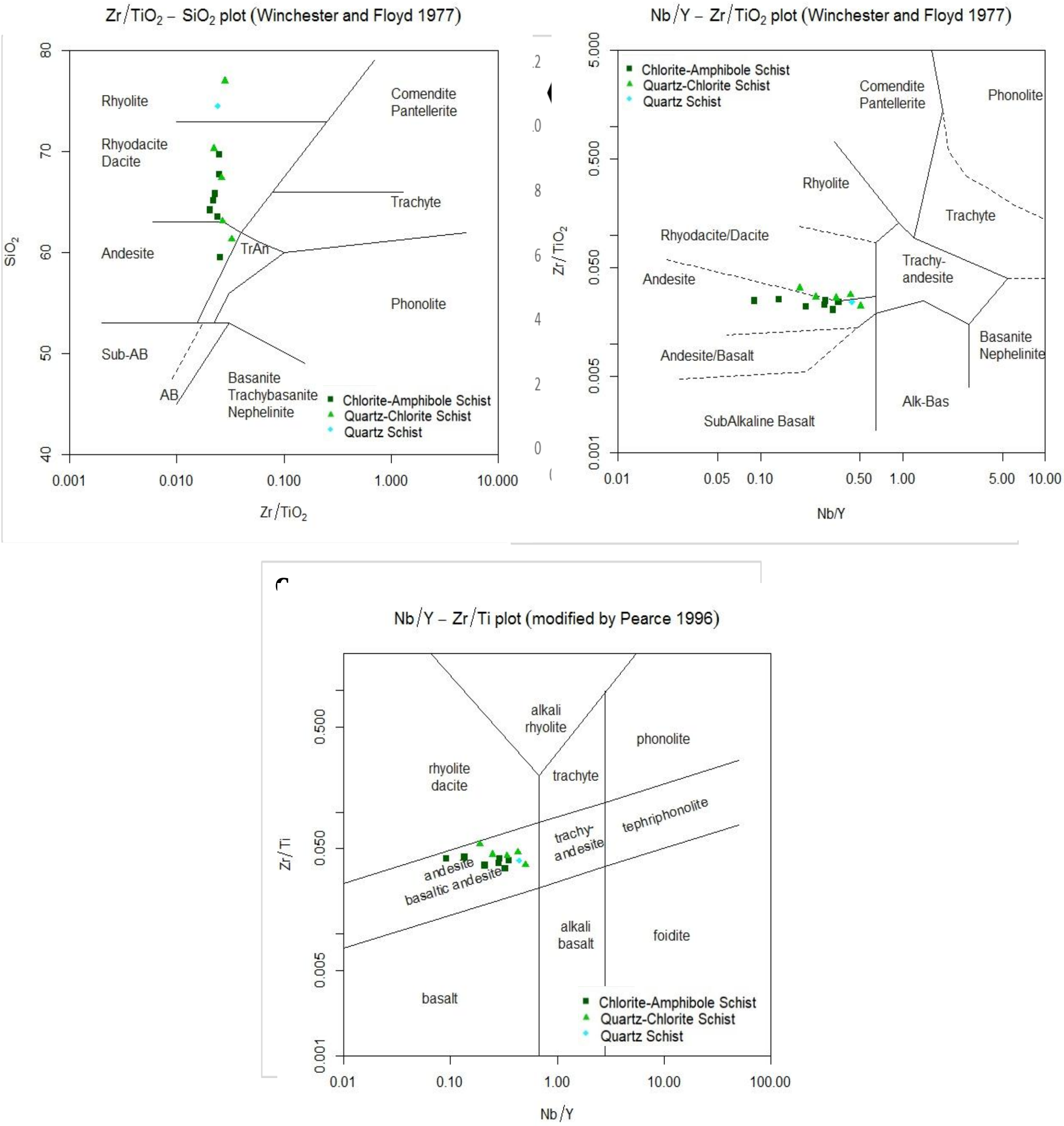

Figure 4.8 Geochemical Plots of Volcanic Rocks from Study Area: a) Zr/TiO_2 – SiO_2 plot (Winchester and Floyd, 1977) b) Nb/Y-Zr/TiO_2 plot (Winchester and Floyd, 1977) and c) Nb/Y–Zr/Ti plot (modified by Pearce, 1996).

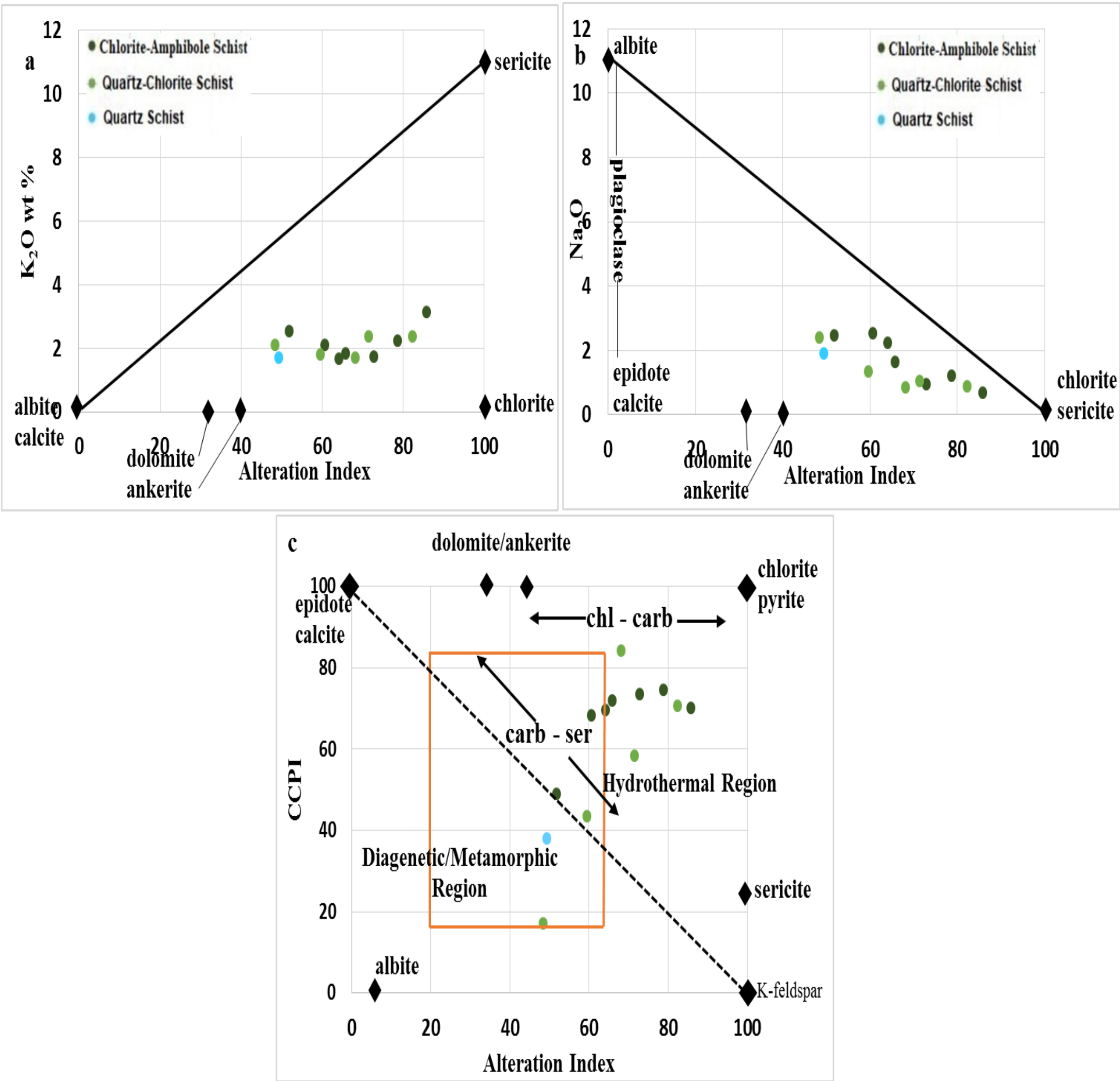

Figure 4.9 Alteration Box Diagrams showing Trends of Ishikawa Alteration Index (AI) against a) K_2O wt% b) Na_2O wt% and c) CCP index.

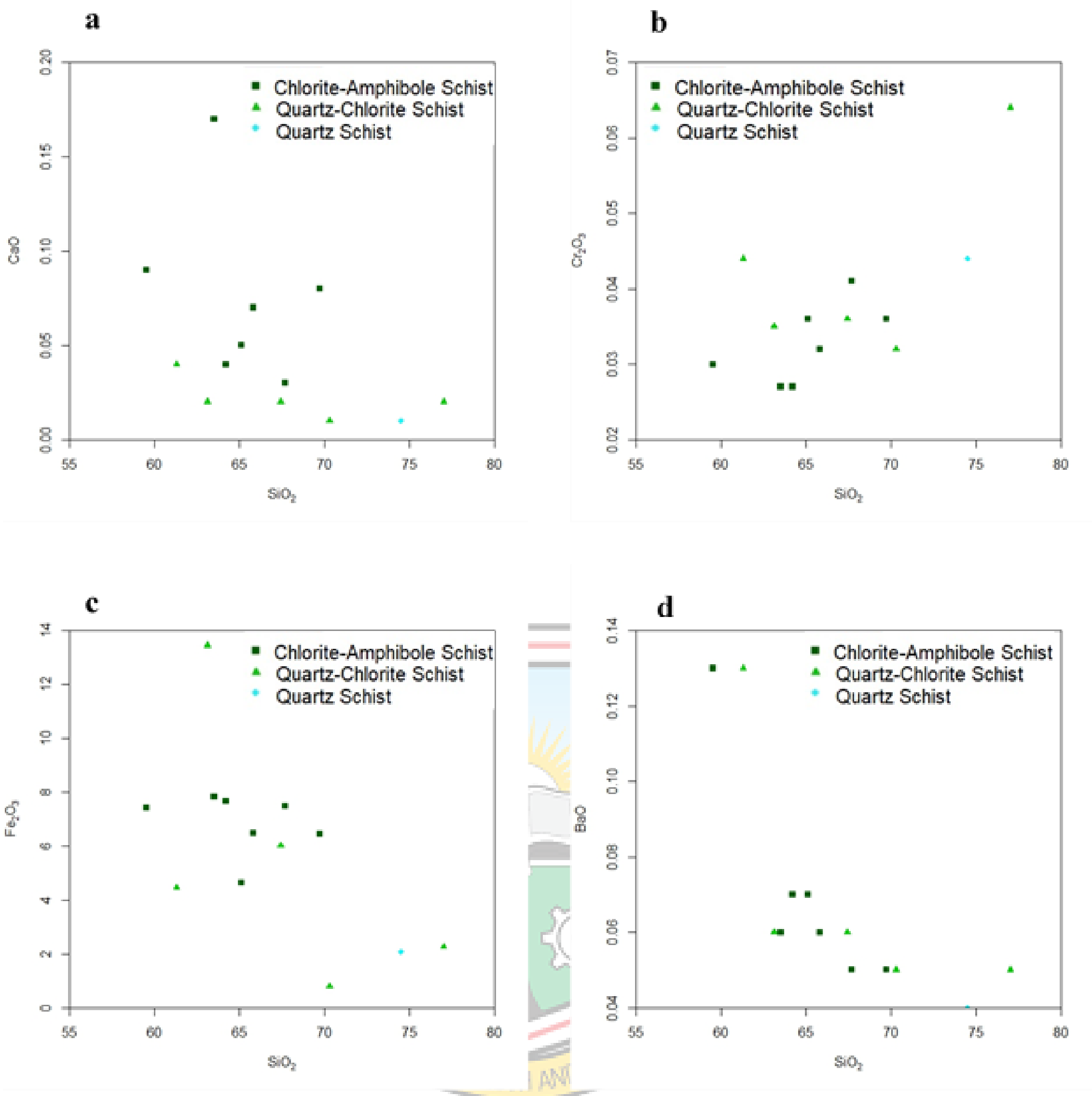

Figure 4.10 Variation Diagrams of some Major Elements from Volcanic Rocks from the Study Area showing: a) SiO_2 against CaO; b) SiO_2 against Cr_2O_3; c) SiO_2 against Fe_2O_3 and d) SiO_2 against BaO.

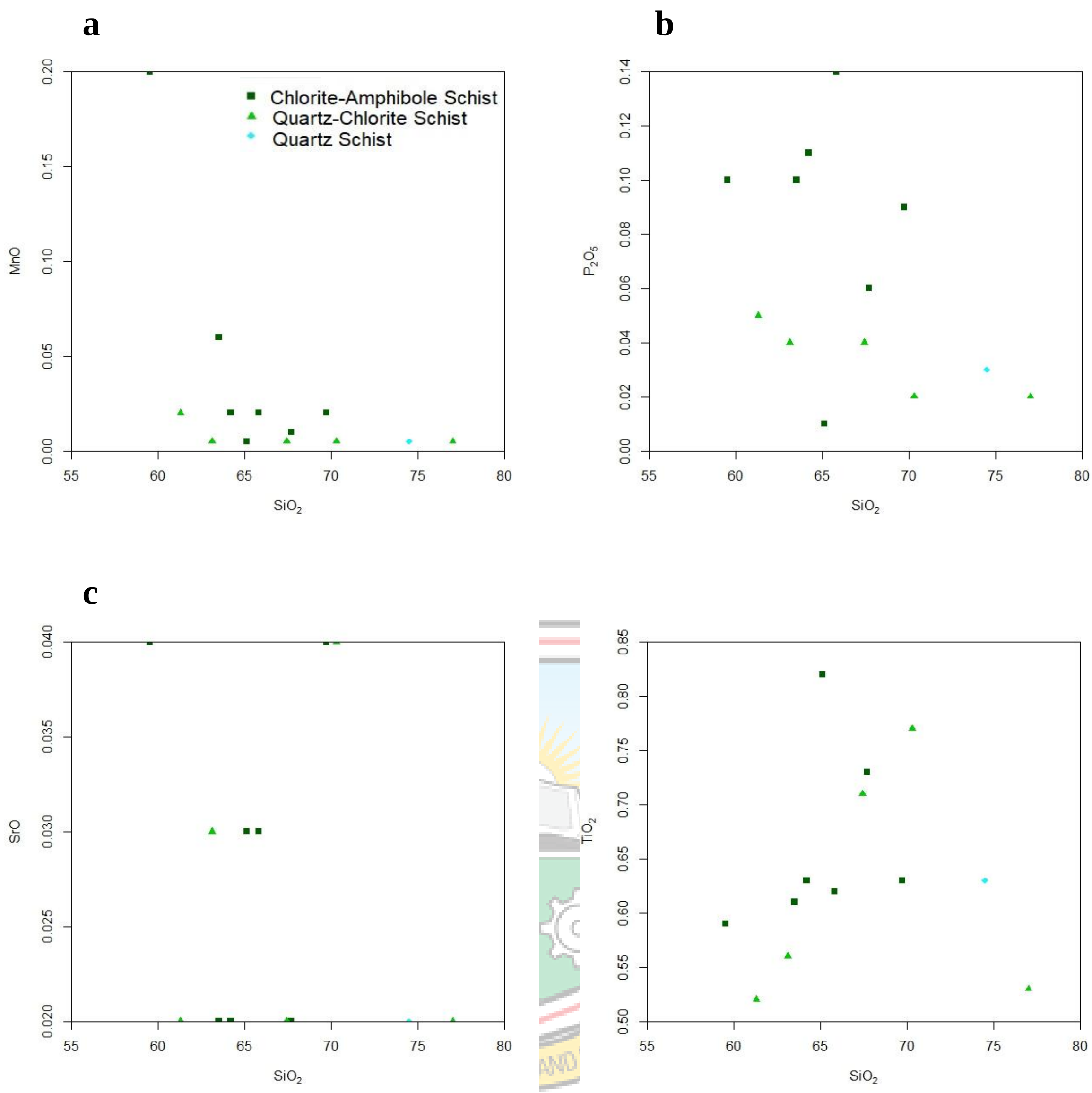

Figure 4.11 Variation Diagrams of some Major Elements from Volcanic Rocks from the Study Area showing; a) SiO_2 against MnO; b) SiO_2 against P_2O_5; c) SiO_2 against SrO and d) SiO_2 against TiO_2.

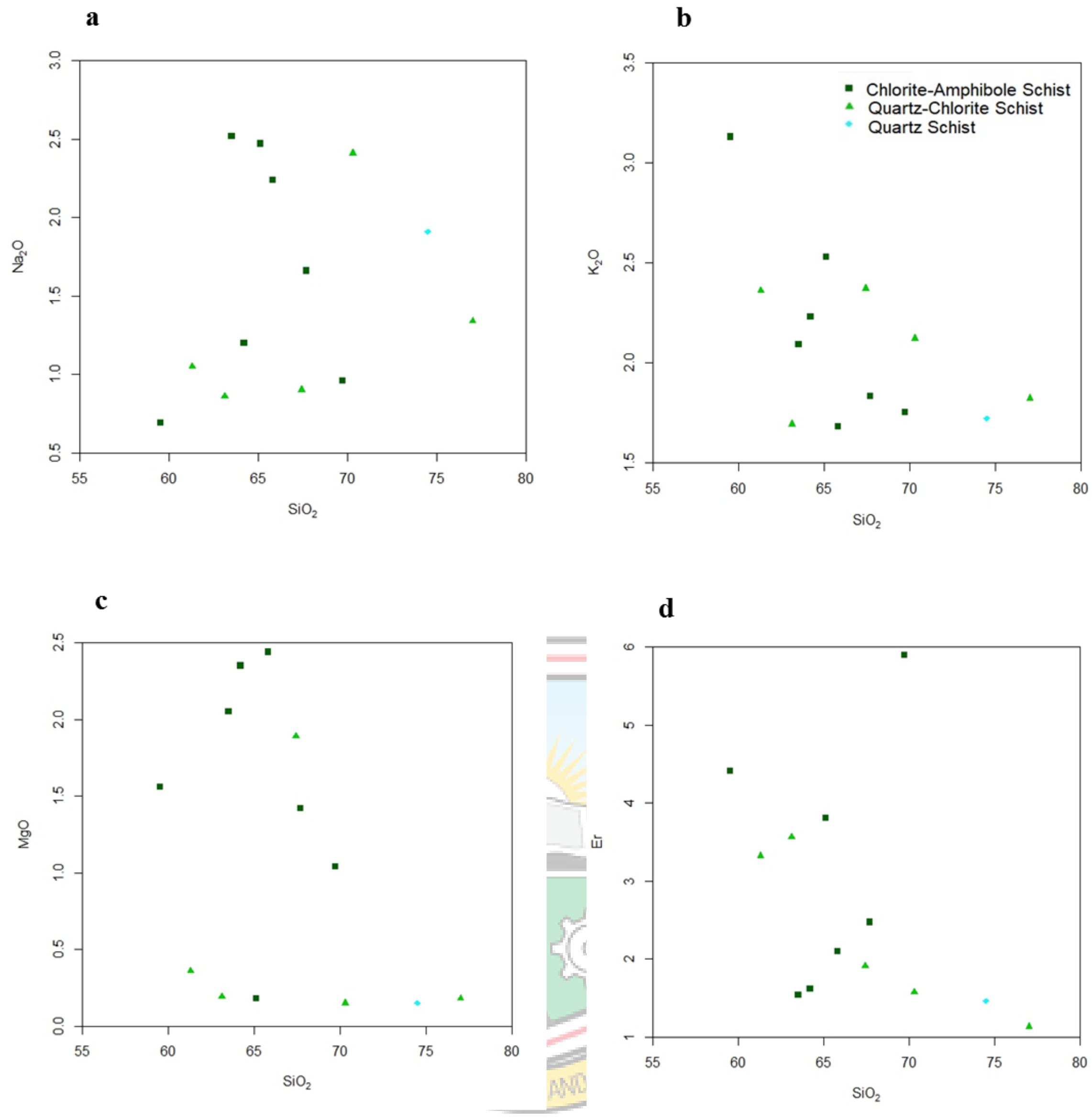

Figure 4.12 Variation Diagrams of some Major and Trace Elements from Volcanic Rocks from the Study Area showing: a) SiO_2 against MnO; b) SiO_2 against P_2O_5; c) SiO_2 against K_2O and d) SiO_2 against Er.

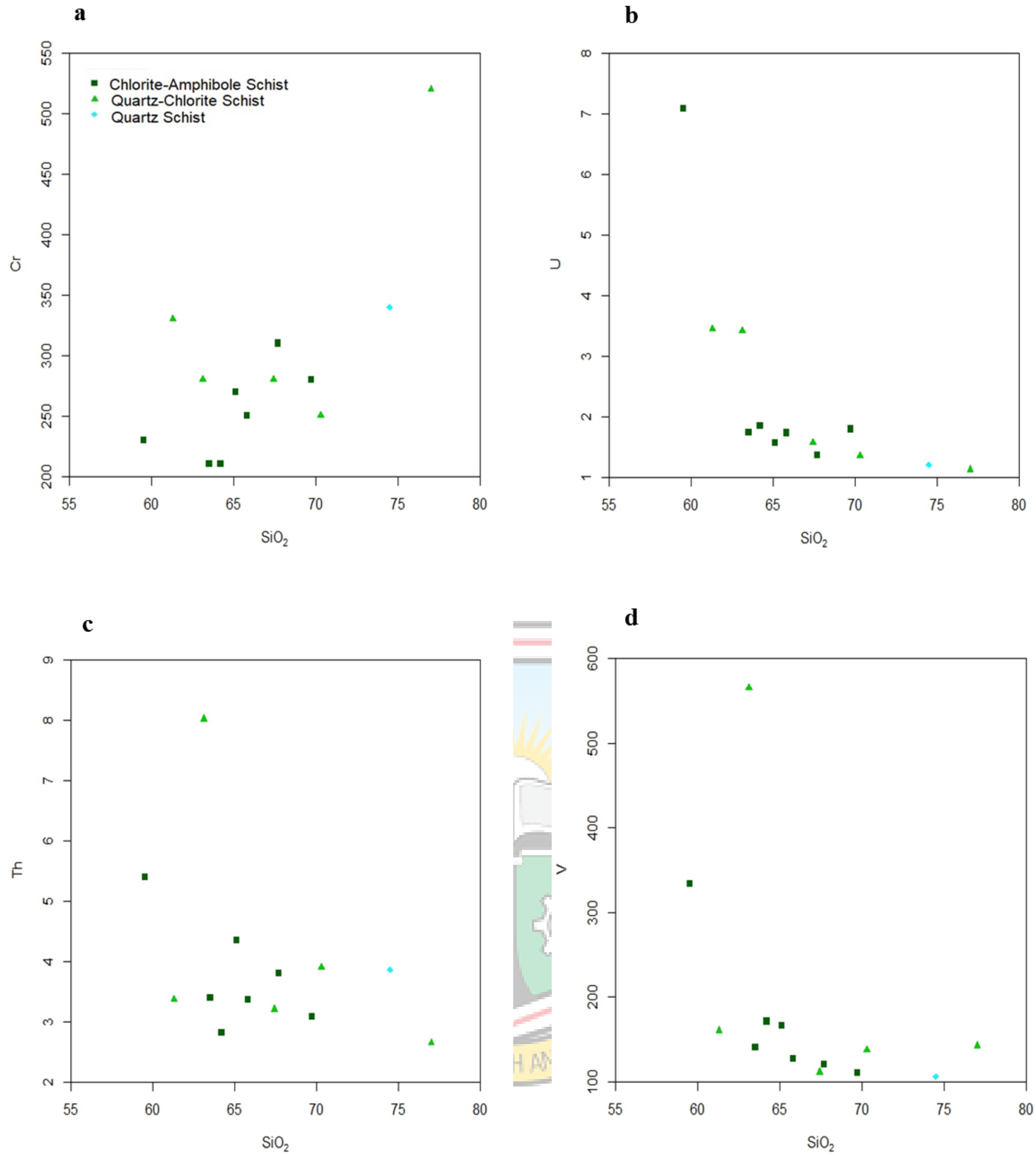

Figure 4.13 Variation Diagrams of some Trace Elements from Volcanic Rocks from the Study Area showing: a) SiO_2 against U; b) SiO_2 against V c) SiO_2 against Th and d) SiO_2 against Cr.

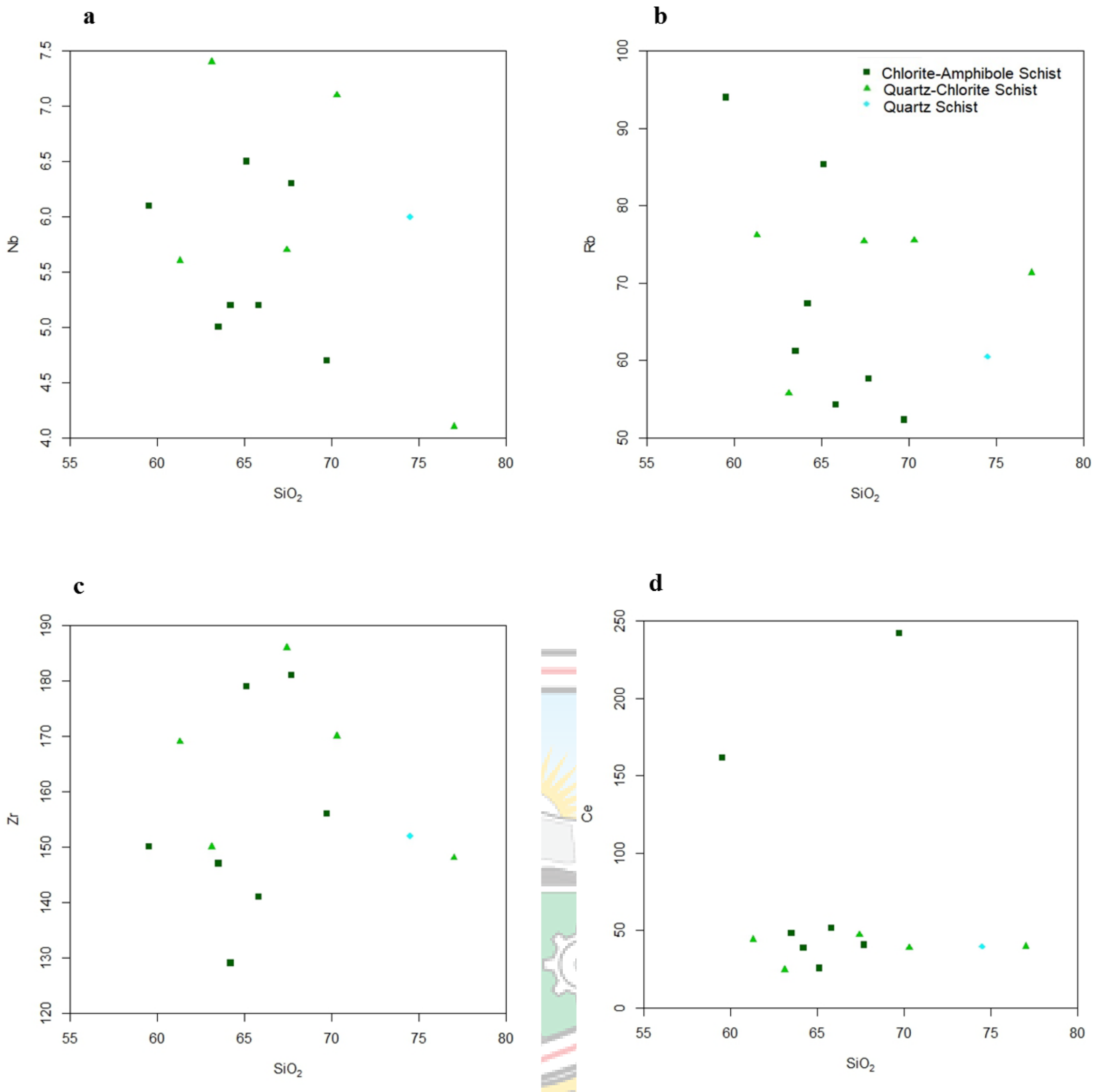

Figure 4.14 Variation Diagrams of some Trace Elements from Volcanic Rocks from the Study Area showing: a) SiO_2 against Rb; b) SiO_2 against Zr c) SiO_2 against Nb and d) SiO_2 against Ce.

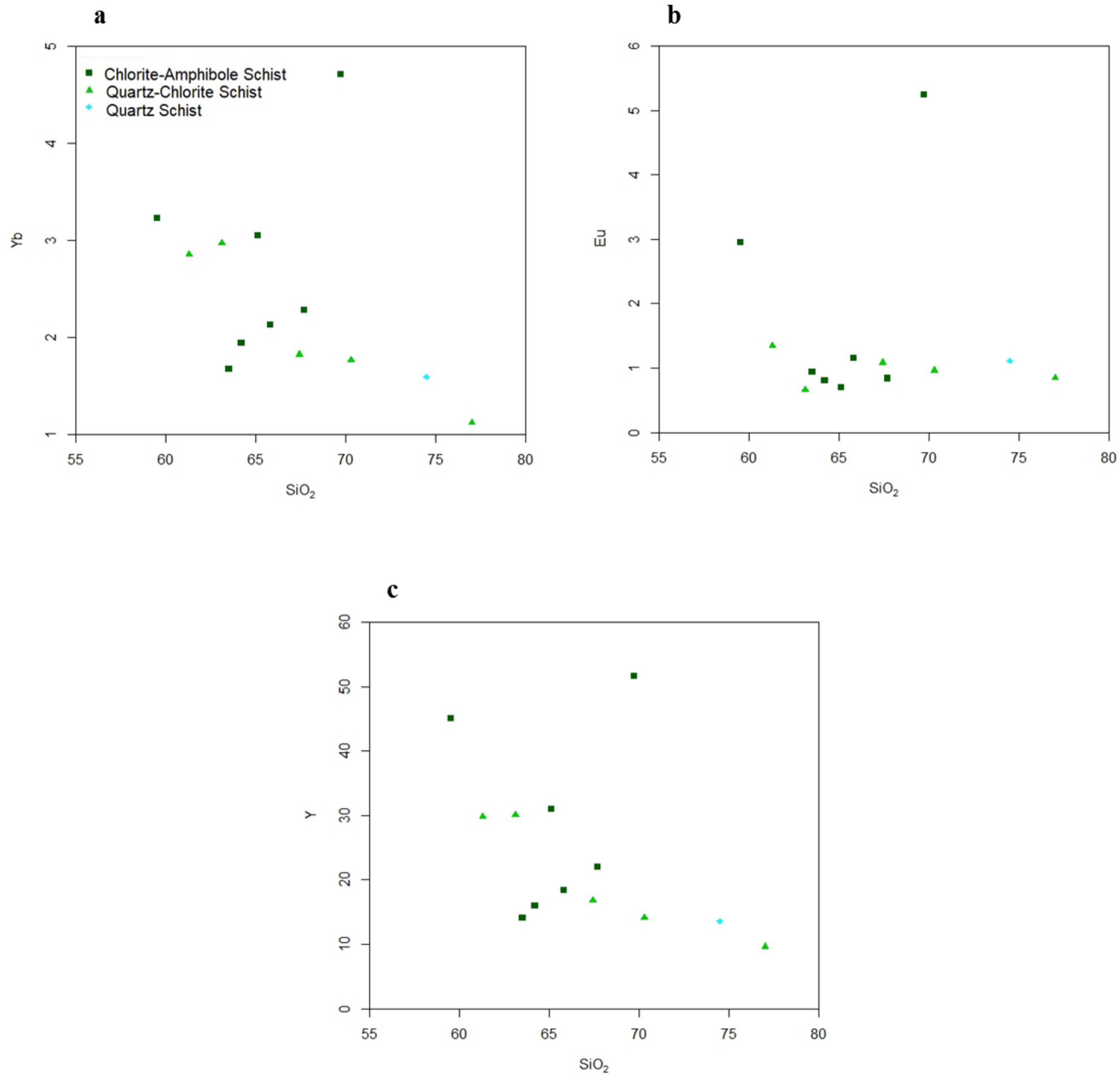

Figure 4.15 Variation Diagrams of some Trace Elements from Volcanic Rocks from the Study Area showing: a) SiO_2 against Eu; b) SiO_2 against Y c) SiO_2 against Yb.

4.2.3 Protoliths of Rocks in the Area using Geochemical Discrimination Diagrams

The rocks in the area were renamed after their protoliths determined using discrimination diagrams after Winchester and Floyd, 1977; Cox et al., 1979; Winchester and Floyd, 1977 and Pearce, 1996 (Figures 4.8 a-c).

The concentration of Al_2O_3 is fairly constant within the rocks, MgO content is high in dacite, moderate in andesite but low in rhyolite. Na_2O is enriched in dacite, rhyolite but low in andesite, K_2O is high in andesite but fairly the same in dacite and rhyolite, TiO_2 is high in dacite but moderate in rhyolite and andesite (Appendix G).

4.2.4 Stream Sediments Sampling

The stream sediment sampling of forty-three (43) samples range from <1 ppb to 987 ppb (Figure 4.16). A threshold of 43 ppb was determined using probability plot. Gold values above 43 ppb are considered as anomalies whiles those below 43 ppb are regarded as background values.

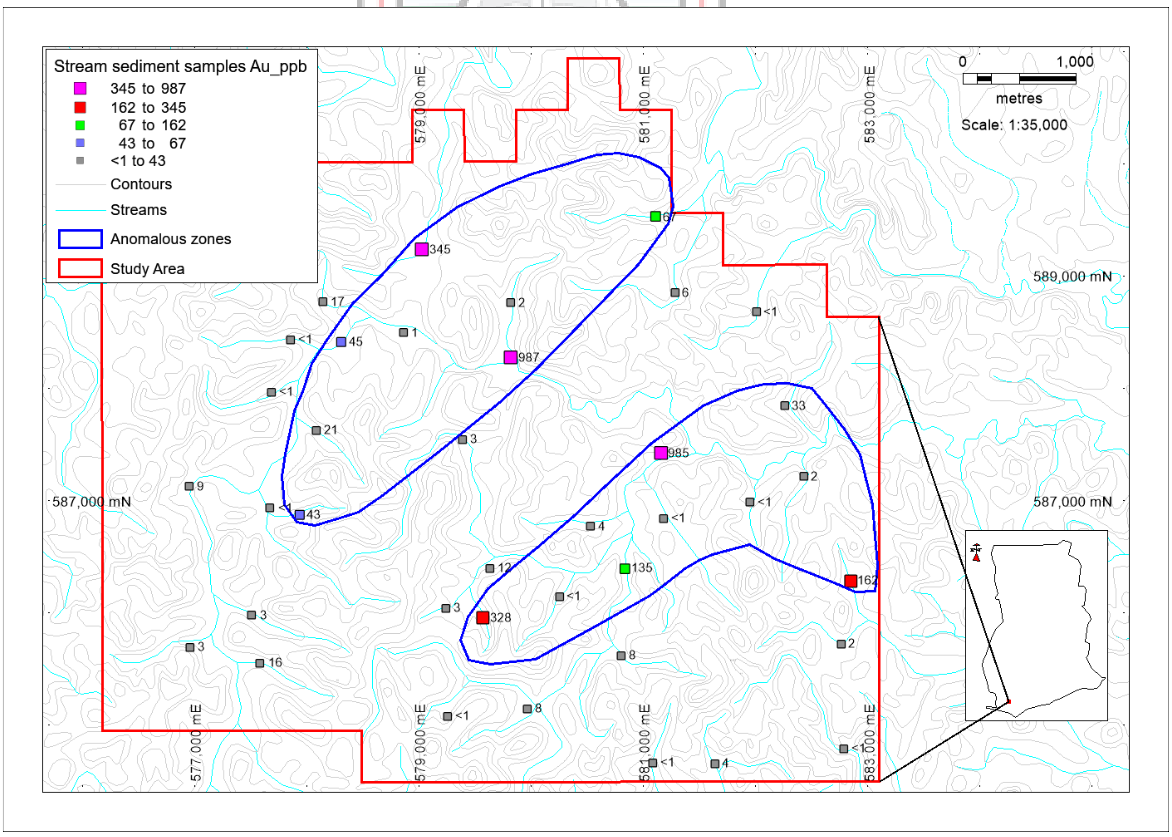

Figure 4.16 Stream Sediment Geochemical Map showing Anomalous Zones.

Table 4.3 Statistical Gold Result of Stream Sediment Samples.

Range (Au_ppb)	Number of Samples	Total (%)
<1 - 43	32	78
43 - 67	2	5
67 - 162	2	5
162 - 345	2	5
345 - 987	3	7

4.2.5 Soil Sampling

Gold assays of soil samples collected from the study area range from < 1 ppb to 650 ppb (Figure 4. 17). From a probability plot, a threshold of 50 ppb was determined. Hence gold values above 50 ppb are considered as anomalies whiles those below 50 ppb are regarded as background values.

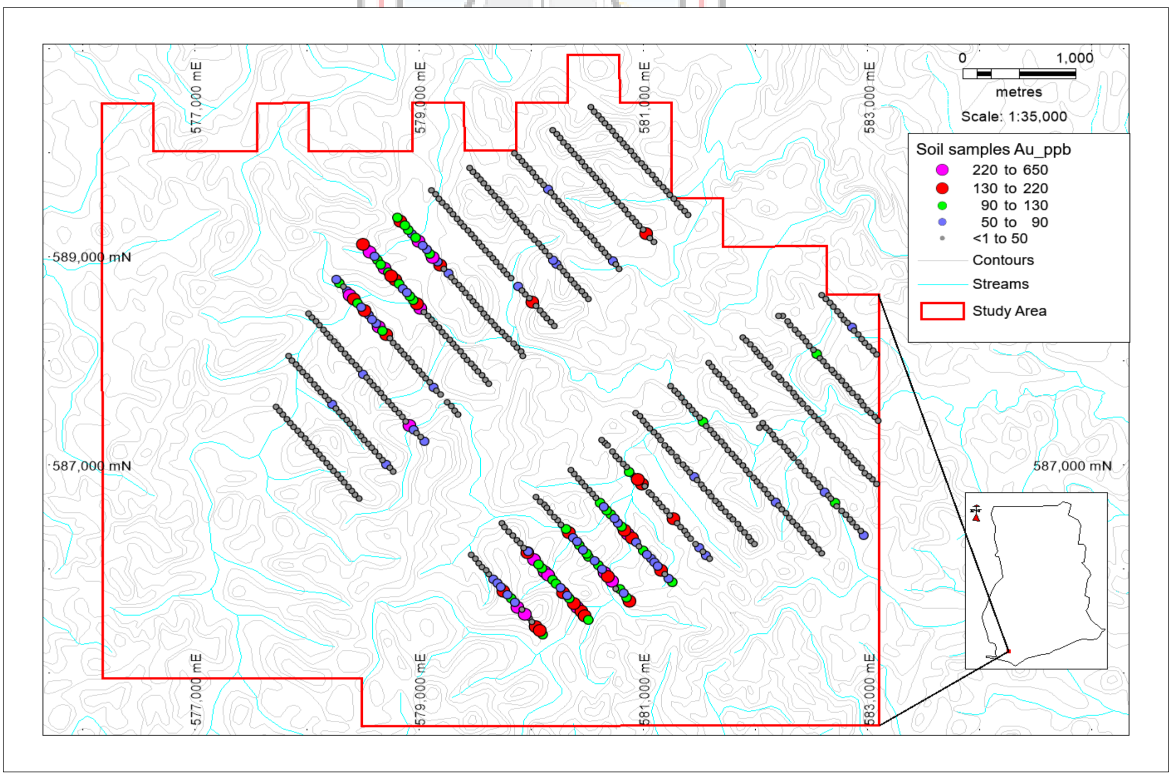

Figure 4.17 Map showing the Gold Values returned by the Soil Samples.

Table 4.4 Statistical Gold Values of Soil Samples.

Range (Au_ppb)	Number of Samples	Total (%)
<1 - 50	544	80
50 - 90	56	8
90 - 130	39	6
130 - 220	28	4
220 - 650	17	2

4.2.6 Geological Mapping

Generally, the outcrops were seen mostly within dried out stream beds and gullies due to thick vegetation and soil cover within the study area. The area is underlain by metamorphosed rhyolite, dacite and andesite (Figure 4.18). The rocks vary in colour from light grey to dark grey and are strongly foliated with foliations marked by sulphides. They mainly comprise of plagioclase, amphibole, chlorite, sericite, epidote, quartz and ore minerals such as pyrite, arsenopyrite, marcasite, magnetite and pyrrhotite. The rocks usually strike NE and dip steeply (60° to 82°).

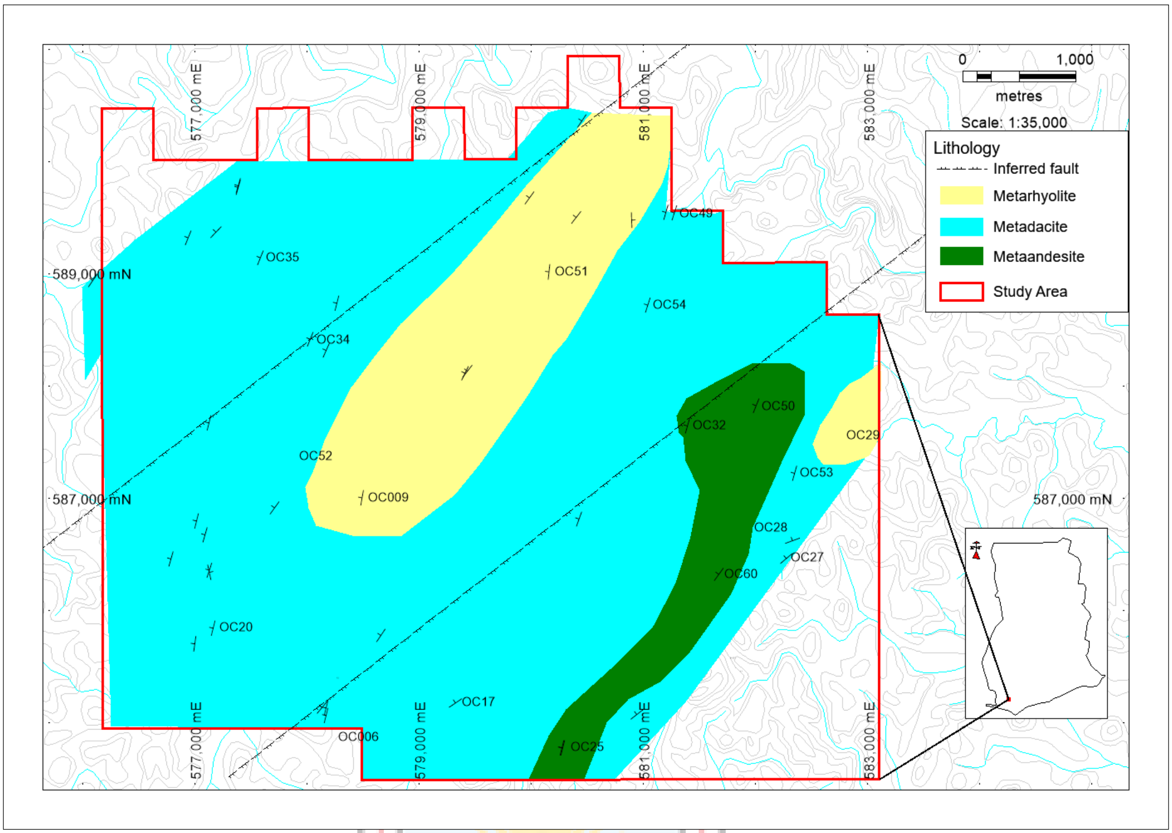

Figure 4.18 Geological Map showing Foliations generally Striking NE.

4.2.6 Gold Prospectivity Map

The gold prospectivity map generated for the study area is shown in Figure 4.19.Using the statistical gold values for stream and soil samples in in the study (Tables 4.3 and 4.4 respectively), concentration of gold is higher in the soils from metamorphosed dacite and rhyolite with assay values ranging from 50 – 630 ppb than soils from metamorphosed andesite. The prospectivity map also shows that gold anomalous zones occur at the contact between the metamorphosed dacite and rhyolite and metamorphosed andesite with stream sediment assay values of 43 – 987 ppb and 43 – 985 ppb respectively. Major oxides and gold values for protoliths of the rocks determined using geochemical discrimination diagrams in the study are summarised in Table 4.5.

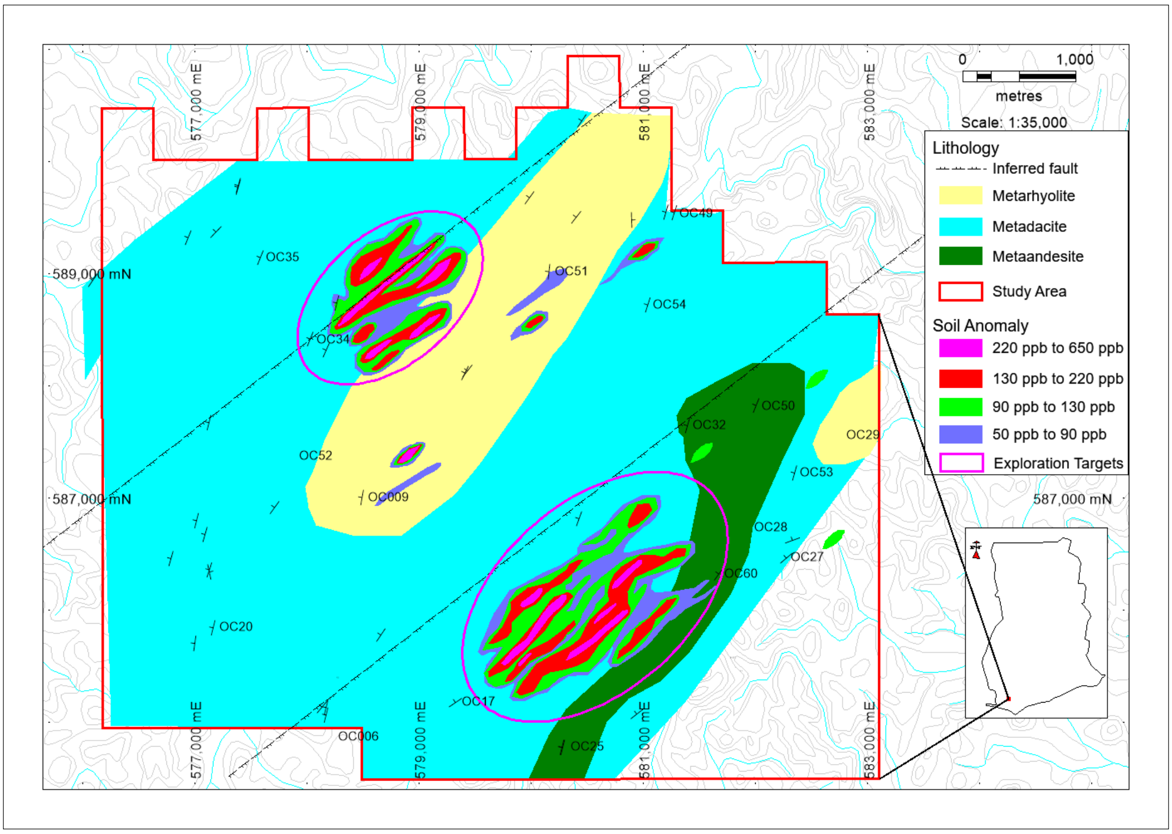

Figure 4.19 Gold Prospectivity Map showing the Geology and Exploration Targets.

Table 4.5 Summary of Major Oxides and Gold Values for Protoliths determined using Geochemical Discrimination diagrams in the Study.

Lithology/wt%	SiO_2	MgO	Na_2O	K_2O	TiO_2	Au_ppb (Stream sediment samples)	Au_ppb (Soil samples)
Rhyolite	74.50 - 77.00	0.14 - 0.18	1.34 - 1.94	1.72 - 1.89	0.53 - 0.77	43.00 - 987.00	50.00 - 560.00
Dacite	63.10 - 67.70	0.15 - 2.44	0.9 - 2.52	1.64 - 2.53	0.56 - 0.82	43.00 - 985.00	50.00 - 630.00
Andesite	59.50 - 62.80	0.36 - 1.56	0.69 - 1.33	2.24 - 3.13	0.52 - 0.68	<2 - 33.00	50.00 - 100.00

CHAPTER 5

DISCUSSION

The rocks in the study area are generally light grey to dark grey, sheared, weathered and foliated, fine to coarse grained (Figure 4.1 a-b). They mainly comprise of plagioclase, amphibole, chlorite, sericite, epidote, quartz and ore minerals such as pyrite, arsenopyrite, marcasite, magnetite, pyrrhotite, and traces of gold. Tetteh and Effisah-Otoo (2017) cited three generations of pyrites in the intrusives into metavolcanic rocks with the third generation being coarse aggregate of subhedral overgrowths with magnetite inclusions. The pyrite in the area is subhedral and not sheared, shows exsolution of magnetite but partially altered to pyrrhotite (Figure 4.5 a). This may be related to pyrite 2 of Tetteh and Effisah-Otoo (2017). Dzigbodi-Adjimah and Asamoah, (2009); Tetteh and Kyei, (2016) recognised arsenopyrite as an alteration mineral associated with hydrothermal alteration that is responsible for gold mineralisation in the Birimian but in this study gold was not found associated with arsenopyrite. The most appropriate metamorphic name is quartz-chlorite schist. Greywacke, phyllite and graphitic schist intercalated with greywacke were field names given by previous workers (Adjei, 2005). The rocks are partially to strongly altered and strongly deformed; hence primary textures are rare but a rock sample (Figure 4.3) contains relict amygdules (?) (vesicle filled with quartz), characteristic of volcanic rocks.
According to Diessel *et al*. (1978); Buseck and Bo-Jun Huang (1985), at low metamorphic grades up to greenschist facies, the organic composition leads to graphitisation. Therefore, total organic carbon composition is required to ascertain presence of graphite in the rocks at the study area.
Metamorphism of the rocks in the area is amphibolite facies typical of Barovian (intermediate temperature/pressure) metamorphism of volcanic rocks (Maruyama *et al*., 1983). John *et al*. (1999) are of the opinion that amphibolite facies occur close to granitoid contacts but that the epidote grew during retrogression. However, the high metamorphism in the study area is not associated to any granitoid intrusive but possibly related to high temperature which accompanied shearing over the general greenschist facies metamorphism in the Birimian (Eisenlohr and Hirdes, 1992; Allibone *et al*., 2002).

Geochemical variation diagrams were therefore used to name those rocks (Figure 4.8 b). Tetteh and Kyei, (2016) determined the protoliths of chlorite schist from Sewum South prospect at southern part of Sefwi belt as volcanic rocks based on presence of relict irregular alignment of primary plagioclase. As the minerals in the individual rocks were partially altered, geochemical variation plots for volcanic rocks were used to classify the rocks (Winchester and Floyd, 1977; Cox et al., 1979; Winchester and Floyd, 1977 and Pearce, 1996). The samples plotted within the regions of dacite, rhyolite and andesite (Figure 4.8 a - d).

The plots of Na_2O, K_2O and the alteration index (AI) are shown in (Figure 4.9 a - b). These plots are necessary to estimate the extent of sericite and chlorite alteration. For higher AI values, sericite alteration is characterised by an increased K_2O. Also, higher AI values with corresponding decreased in K_2O may indicate chlorite alteration. For this study, the rocks plot along the ankerite and chlorite (in the case of K_2O) join, whiles for Na_2O, the alteration is along the ankerite and chlorite-sericite join. The rocks show more affinity to chlorite alteration than sericite alteration. The chlorite-carbonate-pyrite index (CCPI) versus AI plots can be used to investigate the hydrothermal and diagenetic/metamorphic activities that had taken place in rocks under study. The least altered rocks according to Large *et al*. (2001) lies within the ranges of AI values of 20 to 65 and CCPI values of 15 to 45, however, these values are variable. For this study, although some rocks plotted in the least altered and the diagenetic/metamorphic region, the general trend of the rocks are in the hydrothermal region towards the chlorite-pyrite-sericite join. Majority of the rocks are closer to the chlorite-pyrite region than the sericite region. A rock sample from chlorite-amphibole schist (OC006) and quartz-chlorite schist (OC29) show sericite-carbonate alteration.

In the Birimian Supergroup, three types of gold occur in Ghana: lode gold, paleoplacer gold and alluvial gold. Lode gold types occur either in veins (Junner, 1935; Leube *et al*., 1990; Bowell *et al*., 1993), at the contact between the metasedimentary and metavolcanic rocks at Prestea (Dzigbodi-Adjimah and Asamoah, 2009); at the contact of tonalite intrusive with biotite-chlorite schist (protolith of calc-alkaline basalts) (Tetteh and Adu-Gyamfi, 2018); in gabbro and tonalite intrusives in belt granitoids which accompanied metavolcanic rocks (Tetteh and Effisah-Otoo 2017). Huot and Sattran (1987) reported that dacitic and rhyolitic volcanic rocks within the Birimian at Boromo and Huende in Burkina Faso are richer in gold than andesitic counterpart.

In the area studied, soils which occur in the region of dacite and rhyolite returned high gold values ranging from 50 - 630 ppb (Table 4.4) whereas those soil samples collected from areas covered by andesite returned low gold values ranging from 50 – 90 ppb (Figure 4.17). Hence the contact between protolith dacite and rhyolite/andesite which are both metavolcanic rocks are potential sites for gold mineralisation.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

i. The rocks in the study area are partially to strongly altered and strongly deformed; thinly foliated; primary textures were destroyed and so the metamorphic names are quartz-chlorite schists. The mineralogical composition is made up of major plagioclase, amphibole, chlorite, and quartz; minor sericite, epidote, pyrite, arsenopyrite, marcasite, magnetite, pyrrhotite and trace gold. Metamorphism is of amphibolite facies with the metamorphosed rocks rhyolitic, dacitic and andesitic protoliths.

ii. Gold concentration is higher in soils from metamorphosed dacite and rhyolite with assay values ranging from 50 – 630 ppb than in soils from metamorphosed andesite.

iii. Geological and gold prospectivity map (Figure 4.19) shows that gold anomalous zones occur at the contact between metamorphosed dacite and metamorphosed rhyolite or metamorphosed andesite and also, in proximity to inferred NE trending faults.

6.2 Recommendations

i. Felsic metavolcanic rocks (dacite and rhyolite) must be targeted during gold exploration.

ii. The generated gold prospectivity map should be used in further mineral exploration in the area.

iii. Target drilling is recommended to intersect fresh rocks at the contact zones where mineralisation is projected based on the prospectivity map generated from this study.

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APPENDICES

APPENDIX A: DESCRIPTION OF OUTCROPS

ID	Easting	Northing	Strike	Dip	Dip Direction	Rock Type	Description
OC006	578226	584867				Metavolcanics	Grey, fine grained, slightly weathered, strongly foliated with sulphides .
OC009	578491	587006	190	76	E	Metavolcanics	Light gray, fine grained, moderately weathered, sheared and strongly foliated with glassy quartz stringers and traces of weathered sulphides.
OC17	579330	585185	236	66	N	Metavolcanics	Grey, fine grained, moderately weathered and foliated unit. Iron alteration present.
OC20	577167	585848	194	78	N	Metavolcanics	Grey, fine grained, slightly weathered, strongly foliated unit.
OC25	580302	584785				Metavolcanics	Dark grey, fine grained, moderately weathered and foliated unit
OC27	582271	586470	230	74	NW	Metavolcanics	Black, fine grained, moderately weathered and foliated. Iron alteration present.
OC28	582335	586628	250	78	N	Metavolcanics	Grey, fine grained, moderately weathered and foliated unit. Iron alteration and sulphides present.
OC29	582765	587563				Metavolcanics	Light grey, fine grained, moderately weathered, sheared and strongly foliated with weathered sulphides.
OC32	581394	587651	196	66	NW	Metavolcanics	dark grey, fine grained, slightly weathered, strongly foliated and sheared unit with iron alteration in places.
OC34	578033	588418	202	72	W	Metavolcanics	Yellowish brown to dark grey, highly weathered and strongly foliated unit. Iron alteration present.
OC35	577584	589147	202	76	NW	Metavolcanics	Reddish brown to dark grey, moderately weathered and foliated unit. Iron alteration present.
OC49	581272	589545	198	80	W	Graphitic phyllite?	Dark grey, fine grained, slightly weathered and strongly foliated unit with cubic pyrites.
OC50	582006	587826	202	72	NW	Metavolcanics	Grey, fine grained, strongly foliated and slightly weathered unit with iron alteration on foliated planes.
OC51	580159	589023	186	64	W	Metavolcanics	Reddish brown to grey, fine grained, highly weathered andstrongly foliated unit. Iron alteration present.
OC52	577880	587375				Metavolcanics	Grey, fine grained, strongly foliated, slightly weathered unit. Iron alteration present
OC53	582350	587228	196	58	W	Graphitic phyllite?	Dark grey, fine grained, strongly foliated, moderately weathered unit. Iron alteration present
OC54	581039	588725	198	50	W	Metavolcanics	Grey, fine grained, slightly weathered and moderately foliated unit with irone alteration.
OC60	581673	586328	216	68	NW	Metavolcanics	Dark grey, fine grained, strongly foliated unit with stains of iron alteration .

APPENDIX B: STREAM SEDIMENT SAMPLES LOGS AND ASSAY RESULTS

Site ID	Sample #	Northing	Easting	RL	Flow Rate	Flow Direction	Stream Width(m)	Stream Depth (m)	Land use	Sample Description	Au_ppb
DSL00001	DS10001	584659	581644	62	Slow	E	0.8	0.2	Cocoa farm	Dark brown, sandy silt material	4
DSL00002	DS10002	584666	581093	60	Slow	SW	0.7	0.1	Cocoa farm	Dark brown, sandy silt material	<1
DSL00003	DS10003	584797	582796	57	Slow	SE	1.6	0.2	Cocoa farm	Black, sandy silt material	<1
DSL00004	DS10004	585152	579973	66	Moderate	N	1	0.08	Cocoa farm	Dark brown, sandy silt material	8
DSL00005	DS10005	585085	579263	87	Slow	E	2	0.1	Cocoa farm	Black, silty material	<1
DSL00006	DS10006	585559	577590	96	Slow	NW	3	0.1	Cocoa farm	Brown, sandy silt material	16
DSL00007	DS10007	585625	580810	64	Slow	N	0.9	0.1	Cocoa farm	Brown, sandy silt material	8
DSL00008	DS10008	579180	585686	94	Moderate	E	1.3	0.1	Cocoa farm	Dark brown, sandy silt material	3
DSL00009	DS10009	585726	582767	55	Slow	E	1	0.1	Cocoa farm	Dark brown silty material	2
DSL00010	DS10010	585699	576963	102	Slow	E	0.7	0.1	Cocoa farm	Dark brown, sandy silt material	3
DSL00011	DS10011	585961	579575	83	Moderate	NW	0.7	0.1	Cocoa farm	Brown, sandy silt material	328
DSL00012	DS10012	585983	577516	98	Slow	W	1	0.1	Cocoa farm	Brown, sandy silt material	3
DSL00013	DS10013	586045	579244	69	Slow	NE	1	0.06	Cocoa farm	Brown, sandy silt material	3
DSL00014	DS10014	586148	580258	56	Slow	E	0.6	0.1	Cocoa farm	Black, silty material	<1
DSL00015	DS10015	586290	582854	55	Slow	S	1	0.2	Cocoa farm	Dark gray, sandy silt material	162
DSL00016	DS10016	586403	580835	53	Moderate	N	3	0.2	Cocoa farm	Dark brown, sandy silt material	135
DSL00017	DS10017	586404	579639	78	Slow	E	1.5	0.1	Cocoa farm	Dark brown, sandy silt material	12
DSL00020	DS10018	586777	580534	58	Moderate	SE	1	0.2	Cocoa farm	Dark gray, sandy silt material	4
DSL00020	DS10019	586777	580534	58					Cocoa farm	Duplicate of DS10018	7
DSL00021	DS10020	586845	581186	54	Slow	S	0.8	0.2	Cocoa farm	Dark gray, sandy silt material	<1
DSL00023	DS10021	586880	577935	81	Slow	E	1	0.1	Cocoa farm	Reddish brown, sandy silt material	43
DSL00024	DS10022	586940	577680	78	Slow	NE	1.5	0.4	Cocoa farm	Reddish brown, silty material	<1
DSL00025	DS10023	586989	581958	42	Slow	N	0.8	0.1	Cocoa farm	Dark gray, sandy silt material	<1
DSL00026	DS10024	587131	576955	79	Moderate	E	4.5	0.3	Cocoa farm	Brown, sandy silt material	9
DSL00027	DS10025	587220	582436	46	Slow	N	1.2	0.1	Cocoa farm	Dark gray, sandy silt material	2
DSL00028	DS10026	587427	581162	45	Slow	E	3	0.5	Cocoa farm	Dark brown, sandy silt material	985
DSL00029	DS10027	587549	579394	68	Slow	W	0.8	0.1	Cocoa farm	Dark brown, sandy silt material	3
DSL00030	DS10028	587631	578088	85	Slow	N	1	0.15	Cocoa farm	Brown, sandy silt material	21
DSL00031	DS10029	587850	582265	45	Slow	SW	1	0.08	Cocoa farm	Brown, sandy silt material	33
DSL00032	DS10030	587973	577689	72	Slow	E	1	0.1	Cocoa farm	Dark brown, silty material	<1

APPENDIX B: STREAM SEDIMENT SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Site ID	Sample #	Northing	Easting	RL	Flow Rate	Flow Direction	Stream Width(m)	Stream Depth (m)	Land use	Sample Description	Au_ppb
DSL00033	DS10031	588282	579822	54	Slow	E	1	0.08	Cocoa farm	Light brown, sandy silt material	987
DSL00034	DS10032	588419	578308	75	Moderate	NE	1	0.08	Cocoa farm	Brown, sandy silt material	45
DSL00035	DS10033	588440	577861	64	Slow	SE	1	0.1	Cocoa farm	Brown, sandy silt material	<1
DSL00036	DS10034	588503	578870	68	Moderate	E	3.5	0.15	Cocoa farm	Brown, sandy silt material	1
DSL00037	DS10035	588690	582014	38	Slow	E	1.5	0.4	Cocoa farm	Dark gray, silty material	<1
DSL00038	DS10036	588775	578150	72	Slow	SE	0.7	0.1	Cocoa farm	Brown, sandy silt material	17
DSL00039	DS10037	588767	579821	58	Slow	SW	1	0.15	Cocoa farm	Dark brown, sandy silt material	2
DSL00040	DS10038	588859	581289	48	Moderate	N	1	0.1	Cocoa farm	Dark brown, sandy silt material	6
DSL00041	DS10039	589243	579028	70	Slow	SE	1	0.1	Cocoa farm	Light brown, sandy silt material	345
DSL00041	DS10040	589243	579028	70					Cocoa farm	Duplicate of DS10039	158
DSL00042	DS10041	589536	581113	49	Moderate	E	2	0.2	Cocoa farm	Brown, sandy silt material	67
DSL00043	DS10042	589601	577434	80	Slow	W	1.5	0.1	Cocoa farm	Dark brown, sandy silt material	4
DSL00045	DS10043	590273	577769	60	Slow	N	1	0.15	Cocoa farm	Dark brown silty material	<1

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0015	577726.51	587562.07	SR	NW	M	0.5	Gr	B			N	F	lg	SS		23
SNA0016	577758.65	587523.77	CC	NW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0017	577790.79	587485.46	CC	NW	M	0.5	Cy	B			N	F	lg	GEL		25
SNA0018	577822.93	587447.16	CC	FL	M	0.5	Cy	Yb			P	D	al	LE	5m S of Aka river	15
SNA0019	577855.07	587408.86	CC	FL	M	0.5	Cy	Yb			P	D	al	LE	6m SE of Aka river	18
SNA0020	577887.21	587370.56	CC	SW	M	0.5	Cy	A			N	R	cy	GEL		20
SNA0021	577919.35	587332.26	CC	SE	M	0.5	Cy	A			N	E	sp	STL		15
SNA0022	577951.49	587293.95	CC	SE	M	0.5	Cy	Bl			N	R	cy	SS		15
SNA0023	577983.63	587255.65	CC	SE	M	0.5	Gr	B			N	F	lg	SS		20
SNA0024	578015.77	587217.35	CC	SE	M	0.5	Cy	B			N	R	cy	SS		15
SNA0025	578047.91	587179.05	CC	SW	M	0.5	Cy	B			N	R	cy	SS		10
SNA0026	578080.05	587140.74	CC	SE	M	0.5	Cy	Yb	5		N	R	cy	STL		25
SNA0027	578112.18	587102.44	CC	SW	M	0.5	Gr	B			N	F	lg	GEL		15
SNA0028	578144.32	587064.14	CF	SW	M	0.5	Gr	B	10		N	F	lg	STL	3m SW of old galamsey pit	10
SNA0029	578176.46	587025.84	CF	SW	M	0.5	Gr	Yb	5		N	F	lg	GEL		13
SNA0030	578208.6	586987.54	SR	S	M	0.5	Gr	B	10		N	F	lg	GEV		5
SNA0031	578240.74	586949.23	SR	SE	M	0.5	Gr	Yb	10		N	F	lg	GEX		15
SNA0032	578272.88	586910.93	CC	SW	W	0.5	Cy	Yb	5		N	R	cy	GEL		13
SNA0034	578305.02	586872.63	CC	NW	M	0.5	Cy	A			N	E	sp	STL		38
SNA0035	578337.16	586834.33	SR	S	M	0.5	Cy	B			N	R	cy	SS		13
SNA0036	578369.3	586796.02	CF	SE	M	0.5	Cy	Yb			N	R	cy	SS		15
SNA0037	578401.44	586757.72	CC	SE	M	0.5	Gr	Yb			N	F	lg	STL		18
SNA0038	578433.58	586719.42	CF	SW	M	0.5	Gr	R			N	F	lg	SS		18
SNA0039	578465.72	586681.12	CC	SE	M	0.5	Gr	B	10		N	F	lg	STL		10
SNA0040	577840.09	588049	CC	FL	M	0.5	Cy	Yb			N	R	gv	LE		5
SNA0041	577872.23	588010.69	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		23
SNA0042	577904.37	587972.39	SR	FL	M	0.5	Sd	Yb			P	D	al	LE	5m N of Aka river	18
SNA0043	577936.51	587934.09	SR	SE	M	0.5	Gr	B			N	R	gv	GEV		18
SNA0045	577968.65	587895.79	CC	SE	M	0.5	Cy	B			N	R	cy	STL		13
SNA0046	578000.79	587857.49	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		10
SNA0047	578032.93	587819.18	CC	SW	M	0.5	Cy	Yb		10	N	R	gv	SS		10

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0048	578065	587781	CC	S	M	0.5	Cy	Yb		5	N	R	cy	STL		13
SNA0049	578097	587743	VL	SE	M	0.5	Gr	B		5	N	F	lg	STL		10
SNA0050	578129	587704	CC	SE	M	0.5	Gr	B			N	F	lg	SS		8
SNA0051	578161	587666	CC	SE	M	0.5	Gr	B	10		N	F	lg	STL		33
SNA0052	578194	587628	CC	E	M	0.5	Cy	B			N	R	cy	GEV		13
SNA0053	578226	587589	SR	SE	M	0.5	Gr	B			N	F	lg	GEL		58
SNA0054	578258	587551	CC	SW	M	0.5	Cy	Yb		10	N	R	gv	GEX		10
SNA0055	578290	587513	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEV		13
SNA0057	578322	587474	SR	SE	M	0.5	Cy	Bd				E	sp	GEV		35
SNA0058	578354	587436	SR	FL	W	0.5	Cy	A			P	D	al	LE		13
SNA0059	578386	587398	CC	SW	M	0.5	Gr	B			N	F	lg	SS		13
SNA0060	578419	587360	CC	SE	M	0.5	Gr	B			N	F	lg	SS		25
SNA0061	578451	587321	CC	SE	M	0.5	Gr	B			N	F	lg	STL		43
SNA0062	578483	587283	CC	SE	M	0.5	Cy	B			N	R	cy	GEL		13
SNA0063	578515	587245	SR	SW	M	0.5	Cy	Yb		5	N	R	gv	GEX		23
SNA0064	578547	587206	SR	SW	M	0.5	Cy	Yb			N	R	cy	GEX		40
SNA0065	578579	587168	SR	SW	M	0.5	Gr	Yb		10	N	R	gv	STL		13
SNA0066	578611	587130	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0067	578644	587091	CF	SE	M	0.5	Cy	B			N	R	gv	SS		13
SNA0068	578676	587053	CF	SE	M	0.5	Cy	B			N	R	cy	SS		15
SNA0069	578708	587015	CC	SW	M	0.5	Gr	B			N	F	lg	STL		60
SNA0070	578740	586977	CF	SE	M	0.5	Cy	Yb			N	R	cy	STL		23
SNA0071	578772	586938	CC	SE	M	0.5	Cy	Yb			N	R	gv	STL		20
SNA0072	578018	588459	CF	SW	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0073	578050	588421	RD	SW	M	0.5	Cy	A			N	E	sp	GEL		3
SNA0075	578082	588383	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		5
SNA0076	578114	588344	SR	FL	M	0.5	Cy	Yb			N	R	cy	LE		8
SNA0077	578147	588306	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		8
SNA0079	578179	588268	SR	NW	M	0.5	Cy	Yb			N	R	cy	STL		20
SNA0080	578211	588230	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		8
SNA0081	578243	588191	CC	NE	M	0.5	Gr	Yb			N	F	lg	STL		15

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0082	578275	588153	SR	NE	M	0.5	Cy	Yb			N	R	cy	GS		15
SNA0083	578307	588115	CF	SW	M	0.5	Cy	Yb			N	F	lg	GEL		3
SNA0084	578339	588076	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0085	578371	588038	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0086	578404	588000	CC	SE	W	0.5	Cy	A			P	D	cy	GEL		8
SNA0087	578436	587961	CC	FL	W	0.5	Cy	Yb			N	R	gv	LE		48
SNA0088	578468	587923	CC	SW	M	0.5	Gr	B		5	N	F	lt	GEX		10
SNA0089	578500	587885	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		50
SNA0090	578532	587846	CC	NE	M	0.5	Gr	B	20		N	F	pg	SS		15
SNA0091	578564	587808	CC	NE	M	0.5	Gr	B			N	F	lg	SS		10
SNA0092	578596	587770	CC	NE	M	0.5	Gr	B			N	F	lt	SS		18
SNA0093	578629	587732	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0094	578661	587693	CC	SE	M	0.5	Gr	Yb			N	F	lg	STL		25
SNA0095	578693	587655	CC	SE	M	0.5	Gr	Yb			N	F	lg	GEL		5
SNA0096	578725	587617	CC	NE	M	0.5	Gr	Yb			N	F	lg	GEX		8
SNA0097	578757	587578	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0098	578789	587540	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		5
SNA0099	578821	587502	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		15
SNA0101	578854	587463	CC	SE	M	0.5	Cy	B			N	R	cy	SS		10
SNA0102	578886	587425	CC	SE	M	0.5	Cy	B			N	R	gv	STL		13
SNA0103	578918	587387	CC	E	M	0.5	Cy	Yb			N	R	cy	GEL		426
SNA0105	578950	587349	CC	FL	W	0.5	Cy	A			P	D	cy	LE		60
SNA0106	578982	587310	CC	NW	M	0.5	Cy	Yb			N	R	gv	STL		23
SNA0107	579014	587272	CC	NW	M	0.5	Cy	Yb			N	R	cy	SS		15
SNA0108	579046	587234	CF	SW	M	0.5	Gr	B			N	F	lg	SS		65
SNA0109	578260	588793	CC	SE	M	0.5	Gr	Yb		10	N	F	lg	GEL		60
SNA0110	578292	588755	SR	SW	M	0.5	Cy	A			N	E	sp	GEL		120
SNA0111	578324	588716	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		30
SNA0112	578357	588678	CC	NE	M	0.5	Gr	Yb		5	N	F	lg	GEL		80
SNA0113	578389	588640	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		280
SNA0114	578421	588602	CC	FL	M	0.5	Sd	Yb			P	D	al	LE		160

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0115	578453	588563	CC	FL	M	0.5	Cy	Yb		5	P	D	cy	LE		90
SNA0116	578485	588525	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		60
SNA0117	578517	588487	CC	W	M	0.5	Cy	Yb			N	R	cy	GEL		140
SNA0118	578549	588448	CC	NW	M	0.5	Gr	Yb		10	N	R	gv	GEL		70
SNA0119	578581	588410	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		50
SNA0120	578614	588372	CC	NW	M	0.5	Cy	Yb			N	R	gv	GS		70
SNA0122	578646	588333	CC	N	M	0.5	Cy	Yb			N	F	lg	GS		260
SNA0123	578678	588295	SR	NW	M	0.5	Gr	Yb			N	F	lg	STL		110
SNA0124	578710	588257	SR	NE	M	0.5	Gr	Yb			N	F	lg	GEL		140
SNA0125	578742	588219	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		45
SNA0126	578774	588180	CC	NW	M	0.5	Gr	Yb			N	F	lg	GS		8
SNA0127	578806	588142	CC	NW	M	0.5	Cy	Yb			N	R	cy	GEL		10
SNA0128	578839	588104	CC	NW	W	0.5	Cy	A			P	D	al	GEL		20
SNA0129	578871	588065	CC	NE	M	0.5	Gr	Yb			N	F	lg	STL		13
SNA0130	578903	588027	CC	NE	M	0.5	Gr	Yb			N	F	lg	SS		15
SNA0131	578935	587989	SR	FL	M	0.5	Cy	B			N	R	cy	STL		10
SNA0132	578967	587950	CC	NE	M	0.5	Gr	B			N	F	lg	SS		40
SNA0133	578999	587912	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0135	579031	587874	CC	NE	M	0.5	Cy	Yb			N	R	gv	GS		13
SNA0136	579064	587835	CC	FL	W	0.5	Cy	Yb			P	D	cy	LE		45
SNA0137	579096	587797	CC	SW	M	0.5	Gr	Yb			N	F	lg	GEL		15
SNA0138	579128	587759	CC	SW	M	0.5	Gr	Yb			N	F	lg	STL		70
SNA0139	579160	587721	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		10
SNA0140	579192	587682	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		<2
SNA0142	579256	587606	CC	NW	M	0.5	Gr	Yb		10	N	R	gv	GEL		43
SNA0144	579289	587567	CC	FL	M	0.5	Gr	B		5	P	D	al	LE		40
SNA0145	579321	587529	CC	FL	M	0.5	Gr	Yb			N	R	gv	GS		25
SNA0146	579353	587491	CC	NW	M	0.5	Cy	B			N	R	cy	STL		23
SNA0147	578502	589127	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		130
SNA0148	578534	589088	CC	SE	M	0.5	Cy	Yb		5	N	R	gv	SS		50
SNA0149	578567	589050	CC	SE	M	0.5	Gr	B		5	N	F	lg	STL		323

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0150	578599	589012	CF	SE	M	0.5	Gr	Yb		10	N	F	lg	GS		80
SNA0151	578631	588974	CC	NE	M	0.5	Gr	B		5	N	F	lg	GEL		100
SNA0152	578663	588935	CC	FL	M	0.5	Cy	B			P	D	cy	LE		90
SNA0153	578695	588897	CC	NW	M	0.5	Gr	Yb			N	R	gv	STL		500
SNA0154	578727	588859	CC	SW	M	0.5	Gr	Yb		5	N	R	gv	SS		90
SNA0155	578759	588820	SR	SW	M	0.5	Gr	Yb		5	N	R	gv	STL		170
SNA0156	578791	588782	CC	SW	M	0.5	Gr	Yb			N	F	lg	GS		210
SNA0157	578824	588744	SR	SE	M	0.5	Cy	Yb			N	R	cy	GEL		120
SNA0158	578856	588705	CC	FL	M	0.5	Gr	Yb			N	R	gv	LE		80
SNA0159	578888	588667	CC	SW	M	0.5	Gr	B			N	F	lg	GEL		50
SNA0160	578920	588629	CC	NE	M	0.5	Gr	B			N	R	gv	GEL		90
SNA0161	578952	588591	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		120
SNA0162	578984	588552	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		200
SNA0163	579016	588514	CC	FL	M	0.5	Cy	Bl			P	D	cy	LE		560
SNA0165	579049	588476	CC	FL	M	0.5	Cy	A			P	D	cy	LE		28
SNA0167	579081	588437	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		10
SNA0168	579113	588399	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		13
SNA0169	579145	588361	CC	FL	M	0.5	Cy	A			P	D	cy	LE		18
SNA0170	579177	588322	CC	FL	M	0.5	Cy	A			P	D	cy	LE		13
SNA0171	579209	588284	CC	FL	M	0.5	Cy	Bl			P	D	cy	LE		18
SNA0172	579241	588246	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		18
SNA0173	579274	588208	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		30
SNA0174	579306	588169	CC	SE	M	0.5	Gr	Yb			N	F	lg	GEL		35
SNA0175	579338	588131	CC	SE	M	0.5	Sd	Yb			P	D	al	GEL		15
SNA0176	579370	588093	CC	SW	M	0.5	Cy	A			N	E	sp	SS		18
SNA0177	579402	588054	SR	SW	M	0.5	Gr	B			N	F	lg	SS		13
SNA0178	579434	588016	CC	FL	M	0.5	Gr	B			N	F	lg	HT		28
SNA0179	579466	587978	CC	NE	M	0.5	Gr	B			N	R	gv	SS		18
SNA0180	579499	587939	CC	NE	M	0.5	Cy	Yb			N	R	cy	GS		38
SNA0181	579531	587901	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		23
SNA0182	579563	587863	CC	SW	M	0.5	Gr	B			N	F	lg	GEL		13

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0183	579595	587824	CC	NW	M	0.5	Gr	B		10	N	F	lg	GS		15
SNA0184	579627	587786	CC	NW	M	0.5	Gr	B		5	N	F	lg	STL		13
SNA0185	578809	589384	CC	NE	M	0.5	Gr	Yb			N	R	gv	STL		90
SNA0187	578841	589346	CC	NE	M	0.5	Cy	Yb			N	R	cy	GS		180
SNA0188	578873	589307	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		90
SNA0189	578905	589269	CC	NE	M	0.5	Gr	B		5	N	F	lg	GEL		100
SNA0190	578937	589231	CC	NE	M	0.5	Gr	B		10	N	F	lg	GEL		80
SNA0191	578969	589192	CC	FL	M	0.5	Cy	Yb			N	R	cy	LE		110
SNA0192	579001	589154	CC	FL	M	0.5	Cy	A			P	D	cy	LE		280
SNA0193	579034	589116	CC	FL	M	0.5	Sd	A			P	D	al	LE		50
SNA0195	579066	589077	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		60
SNA0196	579098	589039	CC	FL	M	0.5	Cy	A			P	D	cy	LE		90
SNA0197	579130	589001	SB	FL	M	0.5	Sd	A		5	P	D	al	LE		370
SNA0198	579162	588963	SB	FL	M	0.5	Cy	Yb			N	R	cy	LE		50
SNA0199	579194	588924	RD	SW	M	0.5	Gr	B			N	R	gv	GEL		150
SNA0200	579226	588886	CC	NW	M	0.5	Gr	B			N	F	lg	STL		40
SNA0201	579259	588848	CC	NW	M	0.5	Gr	Yb			N	F	lg	STL		60
SNA0202	579291	588809	SR	FL	M	0.5	Gr	B		10	N	F	lg	HT		40
SNA0203	579323	588771	SR	NE	M	0.5	Gr	B			N	F	lg	STL		40
SNA0204	579355	588733	CC	NE	M	0.5	Gr	B			N	F	lg	GS		13
SNA0205	579387	588694	SR	SW	M	0.5	Gr	B		5	N	F	lg	GS		8
SNA0206	579419	588656	SR	SW	M	0.5	Gr	B			N	F	lg	STL		13
SNA0207	579451	588618	SR	FL	M	0.5	Gr	Yb			N	F	lg	HT		8
SNA0208	579486	588578	SR	FL	M	0.5	Gr	B		5	N	F	lg	HT		15
SNA0210	579516	588540	CC	NE	M	0.5	Gr	B			N	F	lg	STL		8
SNA0211	579548	588503	CC	NE	M	0.5	Gr	Yb		5	N	F	lg	STL		8
SNA0212	579577	588458	CC	NE	M	0.5	Cy	Yb			N	R	gv	STL		13
SNA0213	579611	588420	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0214	579644	588385	CC	SE	M	0.5	Cy	Yb			N	R	cy	GS		15
SNA0215	579677	588349	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		20
SNA0216	579708	588313	SB	FL	M	0.5	Cy	A			N	D	cy	SW		35

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0217	579741	588278	CC	FL	M	0.5	Cy	Bd			P	D	cy	LE		5
SNA0218	579769	588243	CC	FL	M	0.5	Cy	B			P	D	cy	LE		40
SNA0219	579802	588211	CC	FL	M	0.5	Sd	Yb			P	D	al	LE	4m SE of	30
SNA0220	579843	588168	CC	NE	M	0.5	Gr	B		10	N	F	lg	GEL		18
SNA0221	579875	588131	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		23
SNA0222	579909	588093	CC	NE	M	0.5	Gr	B			N	F	lg	GEL		23
SNA0223	579930	588049	CC	SE	M	0.5	Cy	B			N	R	cy	STL		15
SNA0225	579115	589641	SR	S	M	0.5	Cy	Yb			N	R	cy	STL		5
SNA0226	579147	589603	CC	NW	M	0.5	Cy	Yb			N	E	sp	GEL		23
SNA0227	579179	589564	CC	NW	M	0.5	Cy	Yb			N	R	cy	GEL		15
SNA0228	579211	589526	CC	NW	M	0.5	Cy	Yb			N	E	sp	GS		28
SNA0229	579244	589488	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		15
SNA0231	579276	589449	CC	NW	M	0.5	Cy	Yb			N	R	cy	GEL		18
SNA0232	579308	589411	CC	NW	M	0.5	Cy	Yb			N	R	gv	GS		18
SNA0233	579340	589373	CC	NW	M	0.5	Gr	Yb			N	F	lg	STL		10
SNA0234	579372	589335	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0235	579404	589296	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0236	579436	589258	CC	SW	M	0.5	Gr	Yb		5	N	F	lg	GS		8
SNA0237	579469	589220	CC	SW	M	0.5	Gr	B		5	N	F	lg	GS		5
SNA0238	579501	589181	CC	NE	M	0.5	Gr	Yb			N	F	lg	GEL		10
SNA0239	579533	589143	CC	NE	M	0.5	Gr	Yb		10	N	F	lg	GS		<1
SNA0240	579565	589105	SR	NW	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0241	579597	589066	SR	NW	M	0.5	Gr	Yb			N	F	lg	STL		8
SNA0242	579629	589028	CC	SW	M	0.5	Cy	A		5	N	E	sp	GS		15
SNA0243	579661	588990	CC	W	M	0.5	Cy	Yb			N	R	cy	GEL		10
SNA0244	579694	588952	CC	W	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0245	579726	588913	SR	SW	M	0.5	Gr	b			N	F	lg	GS		13
SNA0246	579758	588875	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		15
SNA0247	579790	588837	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		13
SNA0248	579822	588798	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		8
SNA0250	579886	588722	CC	NW	M	0.5	Gr	Yb			N	F	lg	GS		75

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0251	579919	588683	RD	NW	M	0.5	Cy	Yb			N	R	cy	STL		45
SNA0253	579951	588645	CC	SW	M	0.5	Gr	Yb			N	F	lg	STL		20
SNA0255	579983	588607	CC	SW	M	0.5	Gr	Yb			N	F	lg	GEL		20
SNA0256	580015	588569	CC	W	M	0.5	Gr	Yb			N	F	lg	GS		185
SNA0257	580047	588530	CC	NW	M	0.5	Gr	B			N	F	lg	STL		43
SNA0258	580079	588492	SR	N	M	0.5	Cy	B			N	R	cy	SS		15
SNA0259	580111	588454	CC	NW	M	0.5	Cy	Rb			N	R	cy	SS		13
SNA0260	580144	588415	CC	NW	M	0.5	Cy	B			N	R	cy	SS		18
SNA0261	580176	588377	CC	NW	M	0.5	Gr	B			N	F	lg	SS		13
SNA0262	580208	588339	CC	SE	M	0.5	Cy	Bl			N	R	cy	SS		13
SNA0263	579454	589860	SR	NE	M	0.5	Cy	B			N	R	cy	STL		8
SNA0264	579486	589822	SR	NE	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0265	579518	589783	CC	NE	M	0.5	Gr	Yb		10	N	F	lg	STL		23
SNA0266	579550	589745	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0267	579582	589707	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0268	579614	589668	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0269	579646	589630	CC	NW	M	0.5	Gr	B			N	F	lg	STL		28
SNA0270	579679	589592	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0271	579711	589553	CC	SW	M	0.5	Gr	Yb			N	F	lg	STL		10
SNA0272	579743	589515	SR	SW	M	0.5	Cy	Yb			N	R	cy	STL		13
SNA0273	579775	589477	SR	SW	M	0.5	Cy	Yb			N	R	cy	STL		45
SNA0274	579807	589438	SR	S	M	0.5	Cy	Yb			N	R	cy	STL		30
SNA0276	579839	589400	SR	S	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0277	579871	589362	CL	SE	M	0.5	Cy	Yb			N	R	cy	STL		28
SNA0278	579904	589324	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		20
SNA0279	579936	589285	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		18
SNA0280	579968	589247	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		43
SNA0281	580000	589209	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		43
SNA0282	580032	589170	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		30
SNA0283	580064	589132	CF	NE	M	0.5	Cy	Yb			N	R	cy	STL		15
SNA0285	580096	589094	SR	NE	M	0.5	Gr	B		10	N	F	lg	GEL		43

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0286	580129	589055	CC	NW	M	0.5	Gr	Yb			N	F	lg	GEL		15
SNA0287	580161	589017	CC	NW	M	0.5	Gr	B			N	F	lg	STL		33
SNA0288	580193	588979	CC	FL	M	0.5	Gr	B			N	F	lg	HT		60
SNA0289	580225	588941	SR	SE	M	0.5	Cy	B			N	R	cy	STL		75
SNA0290	580257	588902	SR	NE	M	0.5	Gr	Bl			N	F	lg	STL		20
SNA0291	580289	588864	CC	NE	M	0.5	Gr	Bl			N	F	lg	STL		18
SNA0292	580321	588826	CC	NE	M	0.5	Gr	Yb			N	F	lg	GS		13
SNA0293	580354	588787	CC	W	M	0.5	Gr	B			N	F	lg	GS		13
SNA0294	580386	588749	SR	W	M	0.5	Gr	B			N	F	lg	STL		10
SNA0295	580418	588711	SR	NE	M	0.5	Gr	B			N	F	lg	STL		13
SNA0296	580450	588672	SR	NE	M	0.5	Cy	Yb			N	F	lg	SS		23
SNA0298	580482	588634	SR	NE	M	0.5	Cy	B			N	R	gv	SS		25
SNA0299	580514	588596	CC	NE	M	0.5	Gr	B		5	N	F	lg	STL		23
SNA0300	579856	590002	CC	NW	M	0.5	Cy	B			N	R	cy	SS		33
SNA0301	579889	589964	CC	NW	M	0.5	Cy	B			N	R	cy	SS		18
SNA0302	579921	589925	CC	NW	M	0.5	Cy	B			N	R	cy	SS		20
SNA0303	579953	589887	CC	NW	M	0.5	Cy	B			N	R	cy	SS		25
SNA0304	579985	589849	CC	SE	M	0.5	Cy	B			N	R	cy	SS		23
SNA0305	580017	589811	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		28
SNA0306	580049	589772	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		20
SNA0307	580081	589734	CC	NW	M	0.5	Cy	A			N	E	sp	GS		20
SNA0308	580114	589696	CC	SW	M	0.5	Cy	Yb		5	N	R	gv	GEL		15
SNA0309	580146	589657	CC	SW	M	0.5	Gr	Bl		5	N	F	lg	GS		50
SNA0310	580178	589619	CC	SW	M	0.5	Gr	B			N	F	lg	GS		25
SNA0311	580210	589581	CC	NW	M	0.5	Gr	B			N	F	lg	SS		15
SNA0312	580242	589542	CL	NE	M	0.5	Gr	B			N	F	lg	STL		13
SNA0313	580274	589504	CC	NE	M	0.5	Cy	A			N	E	sp	GS		15
SNA0315	580306	589466	SR	NW	M	0.5	Cy	B			N	R	cy	STL		8
SNA0316	580339	589427	SR	NW	M	0.5	Cy	B			N	R	cy	SS		10
SNA0318	580371	589389	SR	NW	M	0.5	Gr	B			N	F	lg	SS		20
SNA0319	580403	589351	SR	NW	M	0.5	Gr	Yb			N	F	lg	SS		15

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0320	580435	589313	SR	NW	M	0.5	Cy	Yb			N	R	cy	SS		10
SNA0321	580467	589274	RD	FL	M	0.5	Gr	B			N	F	lg	HT		13
SNA0322	580499	589236	CC	S	M	0.5	Gr	B			N	F	lg	SS		5
SNA0323	580531	589198	CC	SE	M	0.5	Gr	B		5	N	F	lg	STL		8
SNA0324	580564	589159	SR	SE	M	0.5	Gr	B			N	F	lg	STL		8
SNA0325	580596	589121	CC	NE	M	0.5	Gr	Yb			N	F	lg	GS		8
SNA0326	580628	589083	CC	NE	M	0.5	Gr	Yb		5	N	F	lg	GS		10
SNA0327	580660	589044	CC	SE	M	0.5	Gr	B		5	N	F	lg	GEL		8
SNA0328	580692	589006	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		15
SNA0329	580724	588968	CC	SE	M	0.5	Gr	B		5	N	F	lg	GEL		78
SNA0330	580756	588930	CC	SE	M	0.5	Gr	B		10	N	F	lg	GEL		13
SNA0331	580789	588891	CC	FL	M	0.5	Gr	A		15	P	D	al	SW		<1
SNA0332	580195	590221	CC	NW	M	0.5	Cy	B			N	R	cy	SS		13
SNA0333	580227	590183	CC	NE	M	0.5	Cy	B			N	R	cy	SS		15
SNA0334	580259	590144	CC	NE	M	0.5	Cy	A			N	E	sp	STL		8
SNA0335	580291	590106	SR	NW	M	0.5	Cy	Yb			N	R	cy	STL		10
SNA0336	580324	590068	SR	NW	M	0.5	Cy	Yb			N	R	cy	SS		30
SNA0337	580356	590029	SR	NW	M	0.5	Cy	B			N	E	sp	SS		8
SNA0339	580388	589991	CC	S	M	0.5	Cy	B			N	E	sp	SS		23
SNA0340	580420	589953	CC	SE	M	0.5	Cy	Yb			N	R	gv	SS		5
SNA0341	580452	589914	CC	SE	M	0.5	Cy	B			N	R	cy	STL		13
SNA0342	580484	589876	SR	SE	M	0.5	Cy	B			N	E	sp	STL		8
SNA0343	580516	589838	SR	NW	M	0.5	Cy	A			N	E	sp	STL		3
SNA0345	580549	589800	SR	NW	M	0.5	Cy	Yb			N	R	cy	SS		8
SNA0346	580581	589761	SR	NW	M	0.5	Cy	Yb		5	N	R	cy	STL		10
SNA0347	580613	589723	CC	NE	M	0.5	Cy	B			N	R	cy	STL		13
SNA0348	580645	589685	CC	NE	M	0.5	Cy	B			N	R	cy	STL		18
SNA0349	580677	589646	CC	NE	M	0.5	Cy	B			N	R	cy	SS		15
SNA0350	580709	589608	CC	S	M	0.5	Cy	B			N	R	cy	SS		5
SNA0351	580741	589570	CC	S	M	0.5	Cy	Yb			N	R	cy	STL		5
SNA0352	580774	589531	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		3

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0353	580806	589493	CC	NW	M	0.5	Cy	B			N	R	cy	STL		3
SNA0354	580838	589455	CC	NE	M	0.5	Cy	B			N	R	cy	STL		13
SNA0355	580870	589416	CC	N	M	0.5	Gr	B			N	R	cy	SS		15
SNA0356	580902	589378	CC	SE	M	0.5	Gr	B			N	R	cy	SS		10
SNA0357	580934	589340	CC	SE	M	0.5	Gr	B			N	F	lg	GS		8
SNA0358	580966	589302	CC	NW	M	0.5	Gr	B		5	N	F	lg	GEL		5
SNA0359	580999	589263	CC	SE	M	0.5	Cy	B			N	F	lg	GS		8
SNA0360	581031	589225	CC	FL	M	0.5	Cy	A			P	D	cy	LE		183
SNA0362	581063	589187	CC	N	M	0.5	Cy	Yb			N	R	gv	GS		3
SNA0363	581095	589148	CC	N	M	0.5	Cy	B			N	R	cy	SS		23
SNA0364	580534	590440	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		5
SNA0365	580566	590401	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		5
SNA0366	580598	590363	CC	NW	M	0.5	Cy	Yb			N	R	cy	GS		5
SNA0367	580630	590325	CC	NE	M	0.5	Cy	B			N	R	cy	GS		5
SNA0368	580662	590286	SR	SW	M	0.5	Cy	A			N	E	sp	STL		3
SNA0369	580694	590248	SR	SW	M	0.5	Cy	A			N	E	sp	SS		5
SNA0370	580726	590210	CC	SW	M	0.5	Gr	B			N	F	lg	SS		8
SNA0371	580759	590172	SR	FL	M	0.5	Gr	B			N	F	lg	HT		3
SNA0372	580791	590133	SR	E	M	0.5	Gr	B			N	F	lg	SS		3
SNA0373	580823	590095	CC	NE	M	0.5	Cy	Yb			N	R	cy	SS		5
SNA0375	580855	590057	CC	NW	M	0.5	Cy	B			N	R	cy	STL		5
SNA0376	580887	590018	CC	NW	M	0.5	Cy	A			N	E	sp	STL		5
SNA0377	580919	589980	CC	NW	M	0.5	Cy	Yb			N	R	cy	SS		8
SNA0378	580951	589942	CC	NW	M	0.5	Cy	B			N	R	cy	SS		8
SNA0379	580984	589903	SR	NW	M	0.5	Cy	B			N	R	cy	SS		3
SNA0380	581016	589865	SR	NW	M	0.5	Gr	B			N	F	lg	SS		3
SNA0381	581048	589827	SR	NW	M	0.5	Cy	B			N	R	cy	SS		3
SNA0382	581080	589789	SR	NW	M	0.5	Cy	B			N	R	cy	SS		13
SNA0384	581112	589750	SR	NE	M	0.5	Cy	B			N	R	cy	SS		8
SNA0385	581144	589712	SR	NE	M	0.5	Cy	B			N	R	cy	STL		8
SNA0386	581176	589674	CC	NE	M	0.5	Gr	Yb			N	F	lg	STL		10

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0387	581209	589635	CC	NE	M	0.5	Gr	B		5	N	F	lg	GS		15
SNA0388	581241	589597	CC	NE	M	0.5	Gr	B		10	N	F	lg	GS		10
SNA0389	581273	589559	CC	NE	M	0.5	Gr	Yb		5	N	F	lg	GEL		8
SNA0390	581305	589520	CC	NW	M	0.5	Cy	Yb			N	R	cy	GEL		15
SNA0391	581337	589482	CC	NW	M	0.5	Cy	B			N	R	gv	GS		38
SNA0392	581369	589444	CC	NW	M	0.5	Cy	B			N	R	cy	GS		18
SNA0393	581401	589405	CC	NW	M	0.5	Cy	B			N	R	cy	GEL		15
SNA0394	579468	586140	CC	FL	W	0.5	Sd	A		10	P	D	al	SW		18
SNA0395	579504	586105	CC	NW	M	0.5	Gr	Yb			N	F	lg	GEL		15
SNA0396	579532	586063	CC	NW	M	0.5	Gr	Yb			N	F	lg	GS		13
SNA0397	579566	586020	CC	SE	M	0.5	Cy	B			N	E	mz	GEL		10
SNA0398	579600	585993	CC	SW	M	0.5	Cy	Bl			N	E	mz	GEL		10
SNA0399	579625	585956	CC	SW	M	0.5	Gr	B			N	F	lg	GS		15
SNA0400	579661	585912	CC	W	M	0.5	Gr	B			N	F	lg	GS		70
SNA0401	579696	585875	CC	W	M	0.5	Gr	B		5	N	F	lg	STL		60
SNA0402	579725	585838	SR	NW	M	0.5	Cy	Bl			N	F	cy	STL		50
SNA0403	579758	585796	SR	NW	M	0.5	Gr	Yb			N	F	lg	STL		130
SNA0405	579788	585762	CC	NE	M	0.5	Gr	B		5	N	F	lg	STL		50
SNA0406	579824	585725	CC	NE	M	0.5	Gr	B			N	F	lg	GS		120
SNA0407	579851	585687	SR	NE	M	0.5	Gr	B			N	F	lg	GS		50
SNA0408	579886	585641	CC	NE	M	0.5	Gr	B			N	F	lg	GEL		290
SNA0409	579923	585616	CC	NW	M	0.5	Gr	B			N	F	lg	GS		40
SNA0410	579953	585573	CC	NW	M	0.5	Gr	B		10	N	F	lg	STL		220
SNA0411	579987	585532	SR	NW	M	0.5	Cy	Yb			N	R	cy	STL		40
SNA0412	580008	585500	SR	SE	M	0.5	Gr	B			N	F	lg	STL		30
SNA0414	580049	585456	CC	SE	M	0.5	Gr	B			N	F	lg	STL		168
SNA0415	580079	585418	CC	SE	M	0.5	Gr	B			N	F	lg	STL		180
SNA0416	580108	585382	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		100
SNA0417	579740	586443	CC	FL	W	0.5	Sd	A			P	D	al	SW		13
SNA0418	579767	586407	CC	SW	M	0.5	Gr	B		5	N	F	lg	STL		13
SNA0419	579802	586367	CC	SW	M	0.5	Gr	B			N	F	lg	SS		18

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0420	579840	586324	CC	FL	M	0.5	Cy	Yb			N	R	cy	HT		23
SNA0421	579872	586285	CC	NE	M	0.5	Gr	Yb			N	F	lg	SS		13
SNA0422	579902	586252	CC	NE	M	0.5	Cy	B			N	R	cy	SS		13
SNA0423	579936	586210	CC	NE	M	0.5	Gr	B			N	R	gv	STL		13
SNA0424	579970	586175	CC	NE	M	0.5	Gr	B			N	F	lg	STL		60
SNA0426	579975	586163	CC	NW	M	0.5	Gr	B		5	N	F	lg	GS		160
SNA0427	580028	586100	CC	NW	M	0.5	Cy	Yb			N	R	cy	STL		290
SNA0428	580065	586056	SR	NW	M	0.5	Gr	B			N	F	lg	STL		90
SNA0429	580097	586018	SR	NW	M	0.5	Gr	Yb			N	R	cy	STL		90
SNA0430	580130	585980	CC	NW	M	0.5	Gr	Yb			N	R	cy	GS		320
SNA0431	580159	585948	CC	NE	M	0.5	Gr	B			N	F	lg	GS		320
SNA0432	580192	585903	CC	SW	M	0.5	Cy	Al			N	R	lg	GS		120
SNA0433	580224	585866	CC	NW	M	0.5	Gr	Yb		10	N	F	lg	STL		100
SNA0434	580258	585827	CC	NE	M	0.5	Gr	B		5	N	F	cy	STL		80
SNA0435	580288	585781	CC	SW	M	0.5	Gr	B			N	F	cy	STL		150
SNA0436	580321	585753	CC	SW	M	0.5	Cy	Yb			N	R	al	SS		80
SNA0437	580345	585726	SR	SW	M	0.5	Cy	Yb			N	R	cy	STL		120
SNA0438	580387	585674	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		140
SNA0439	580419	585635	CC	NE	M	0.5	Sd	A		10	P	D	al	SW		380
SNA0440	580451	585597	CC	NE	M	0.5	Sd	Al			P	D	al	SB		150
SNA0441	580483	585558	CC	NE	M	0.5	Cy	B			N	R	cy	GS		130
SNA0442	580515	585520	CC	FL	M	0.5	Cy	B			N	R	cy	GS		120
SNA0444	580048	586698	CC	NW	M	0.5	Gr	Yb		10	N	F	lg	GEL		13
SNA0445	580086	586655	SR	NW	M	0.5	Gr	Yb			N	F	lg	GS		10
SNA0446	580119	586619	SR	FL	M	0.5	Gr	B			N	F	lg	HT		15
SNA0447	580140	586590	SR	FL	M	0.5	Gr	B		5	N	F	lg	HT		13
SNA0449	580175	586545	SR	FL	M	0.5	Cy	Yb			N	R	cy	HT		15
SNA0450	580210	586504	SR	FL	M	0.5	Gr	B		5	N	F	lg	HT		10
SNA0451	580241	586471	SR	SE	M	0.5	Gr	B			N	F	lg	STL		18
SNA0452	580271	586427	SR	SE	M	0.5	Gr	B			N	F	lg	GS		15
SNA0453	580310	586391	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		110

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0454	580339	586356	CC	FL	M	0.5	Sd	A			P	D	al	LE		130
SNA0455	580371	586314	CC	NW	M	0.5	Gr	B			N	R	gv	GEL		70
SNA0456	580410	586274	CC	FL	M	0.5	Gr	Al		10	P	D	al	LE		60
SNA0457	580433	586235	CC	SW	M	0.5	Cy	B			N	R	cy	GS		120
SNA0458	580458	586196	CC	NE	M	0.5	Gr	B			N	F	lg	STL		60
SNA0459	580496	586158	CC	NW	M	0.5	Cy	B			N	R	cy	STL		90
SNA0460	580515	586129	CC	NE	M	0.5	Cy	B			N	R	cy	STL		110
SNA0461	580566	586086	CC	NE	M	0.5	Cy	Yb			N	R	cy	STL		70
SNA0462	580598	586046	CC	NE	M	0.5	Cy	Yb			N	R	cy	GS		100
SNA0463	580628	586008	CC	FL	M	0.5	Cy	Yb			N	R	cy	GEL		80
SNA0464	580659	585972	CC	FL	M	0.5	Sd	Yb			N	D	al	SB		350
SNA0465	580693	585932	CC	FL	M	0.5	Sd	Bl			N	D	cy	LE		130
SNA0466	580730	585891	SR	SW	M	0.5	Gr	B		5	N	F	lg	GEL		220
SNA0467	580755	585817	SR	SW	M	0.5	Cy	A			N	F	lg	GEL		40
SNA0469	580790	585817	SR	SW	M	0.5	Gr	B			N	F	lg	GS		120
SNA0470	580822	585781	CC	SE	M	0.5	Gr	B			N	F	lg	GS		60
SNA0471	580852	585735	CC	SW	M	0.5	Gr	B			N	F	lg	GS		100
SNA0472	580879	585700	SR	SW	M	0.5	Gr	B			N	F	lg	GS		130
SNA0474	580357	586954	CC	NE	M	0.5	Gr	B			N	F	lg	GS		13
SNA0475	580389	586915	CC	NE	M	0.5	Gr	B		5	N	F	lg	GEL		38
SNA0476	580421	586877	CC	SW	M	0.5	Gr	Bl		10	N	F	lg	GEL		13
SNA0477	580453	586839	CC	SW	M	0.5	Cy	Bl			N	R	gv	GS		15
SNA0478	580485	586800	CC	FL	M	0.5	Gr	A		15	P	D	al	LE		8
SNA0479	580517	586762	CC	FL	M	0.5	Cy	A			P	D	cy	LE		45
SNA0480	580550	586724	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		20
SNA0481	580582	586685	SR	NW	M	0.5	Gr	B			N	F	lg	GS		23
SNA0482	580614	586647	SR	SE	M	0.5	Gr	B			N	F	lg	STL		90
SNA0483	580646	586609	CC	FL	M	0.5	Cy	Bl			P	D	cy	LE		70
SNA0484	580678	586571	CC	FL	M	0.5	Cy	Bl			P	D	cy	LE		110
SNA0485	580710	586532	SR	FL	M	0.5	Sd	Bl			P	D	al	LE		110
SNA0486	580742	586494	CC	SW	M	0.5	Cy	B			N	R	cy	GEL		80

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0487	580775	586456	SR	NE	M	0.5	Cy	B			N	R	cy	GS		80
SNA0488	580807	586417	CC	NE	M	0.5	Cy	Bd			N	R	cy	GS		90
SNA0489	580839	586379	CC	FL	M	0.5	Sd	Bd			P	D	al	LE		130
SNA0490	580871	586341	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		630
SNA0492	580903	586302	CC	FL	M	0.5	Cy	Bd			P	D	cy	LE		150
SNA0493	580935	586264	CC	SW	M	0.5	Cy	A			N	E	sp	GS		50
SNA0494	580967	586226	CC	SW	M	0.5	Cy	B			N	F	lg	SS		40
SNA0495	580999	586188	CC	SE	M	0.5	Gr	B			N	F	lg	SS		100
SNA0496	581032	586149	CC	SE	M	0.5	Cy	B			N	R	cy	STL		60
SNA0497	581064	586111	CC	SE	M	0.5	Gr	Bl		5	N	F	lg	GS		70
SNA0498	581096	586073	CC	SW	M	0.5	Gr	N			N	E	sp	STL		70
SNA0499	581128	586034	CC	FL	M	0.5	Gr	B			N	F	lg	HT		70
SNA0500	581160	585996	CC	NE	M	0.5	Gr	Yb			N	F	lg	STL		130
SNA0501	581192	585958	CC	NE	M	0.5	Gr	B			N	F	lg	GS		<1
SNA0502	581224	585919	CC	NW	M	0.5	Cy	B			N	E	sp	GEL		70
SNA0503	581257	585881	CC	NW	M	0.5	Gr	Bd			N	F	lg	GS		90
SNA0504	580633	587246	SR	SE	M	0.5	Gr	B		5	N	F	lg	GEL		30
SNA0505	580657	587214	SR	S	M	0.5	Gr	B		10	N	F	lg	GS		20
SNA0506	580685	587194	SR	SE	M	0.5	Cy	Yb			P	D	cy	GEL		20
SNA0507	580724	587136	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		15
SNA0508	580758	587091	SR	SE	M	0.5	Gr	B			N	F	lg	GS		23
SNA0509	580783	587057	CC	FL	M	0.5	Sd	B			P	D	al	LE		40
SNA0510	580824	587017	CC	FL	M	0.5	Sd	B			P	D	al	SB		25
SNA0511	580851	586984	CC	FL	M	0.5	Sd	B			P	D	al	SB		35
SNA0514	580872	586943	CC	FL	M	0.5	Sd	B			P	D	al	SB		93
SNA0515	580913	586907	SR	FL	M	0.5	Sd	B			P	D	al	SB		45
SNA0516	580955	586865	CC	FL	M	0.5	Cy	B			P	D	cy	LE		165
SNA0517	580993	586825	CC	FL	M	0.5	Cy	B			P	D	cy	LE		200
SNA0518	581014	586802	VL	SW	M	0.5	Cy	B			N	R	cy	GEL		33
SNA0519	581052	586744	SR	SW	M	0.5	Cy	Yb			N	R	cy	LE		25
SNA0520	581074	586717	CC	SW	M	0.5	Gr	B			N	F	lg	GEL		13

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0521	581115	586672	CC	SW	M	0.5	Gr	B			N	F	lg	GEL		18
SNA0522	581145	586637	SR	NW	M	0.5	Gr	B		10	N	F	lg	GS		20
SNA0523	581174	586602	SR	NE	M	0.5	Gr	B			N	F	lg	STL		18
SNA0524	581206	586563	CC	NE	M	0.5	Cy	B			N	R	cy	STL		20
SNA0525	581239	586521	CF	SE	M	0.5	Cy	B			N	R	cy	STL		23
SNA0526	581272	586486	CC	FL	M	0.5	Cy	B			N	R	cy	STL		133
SNA0527	581304	586448	CC	SE	M	0.5	Gr	B			N	R	gv	GS		23
SNA0528	581335	586411	SR	FL	M	0.5	Sd	B			P	D	al	LE		18
SNA0529	581369	586371	SR	SE	M	0.5	Gr	B			N	F	cy	GEL		38
SNA0530	581395	586336	CC	SE	M	0.5	Cy	B			N	R	gv	GS		38
SNA0531	581426	586296	CC	SE	M	0.5	Cy	B			N	R	cy	GS		18
SNA0532	581468	586247	SR	SW	M	0.5	Gr	B			N	R	gv	STL		15
SNA0533	581498	586217	SR	NE	M	0.5	Gr	B			N	F	lg	STL		55
SNA0535	581535	586174	CC	NE	M	0.5	Cy	B			N	E	sp	STL		38
SNA0536	581557	586140	CC	NE	M	0.5	Cy	B			N	E	sp	STL		65
SNA0537	581596	586102	CC	NW	M	0.5	Cy	B			N	E	sp	STL		20
SNA0538	580936	587506	CC	SE	M	0.5	Cy	Yb			N	R	cy	GS		13
SNA0539	580968	587474	CC	SE	M	0.5	Gr	Yb			N	R	gv	GEL		10
SNA0540	581000	587429	CC	SE	M	0.5	Gr	B			N	F	lg	GEL		5
SNA0541	581031	587395	SB	FL	M	0.5	Cy	A			P	D	cy	SW		8
SNA0542	581063	587355	CC	NW	M	0.5	Gr	Yb			N	F	lg	GEL		8
SNA0544	581098	587315	CC	NE	M	0.5	Cy	Bl			P	D	cy	GEL		28
SNA0545	581131	587283	CC	NW	M	0.5	Cy	Yb			N	R	gv	GEL		18
SNA0546	581158	587242	SR	FL	M	0.5	Cy	Yb			P	D	cy	LE		18
SNA0547	581196	587193	CC	N	M	0.5	Gr	Yb		5	N	F	lg	GEL		8
SNA0548	581230	587154	SR	N	M	0.5	Cy	B			N	R	cy	GS		18
SNA0549	581256	587124	CL	NE	M	0.5	Cy	B			N	R	cy	STL		10
SNA0550	581297	587080	SR	NE	M	0.5	Gr	B			N	F	lg	STL		20
SNA0551	581315	587043	SR	NE	M	0.5	Cy	Yb			N	R	gv	GS		20
SNA0552	581357	587008	CC	NW	M	0.5	Gr	Yb			N	F	lg	GS		8
SNA0553	581384	586970	CC	NW	M	0.5	Cy	B			N	R	cy	STL		15

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0554	581414	586934	CC	NE	M	0.5	Gr	B			N	R	gv	GS		10
SNA0555	581453	586894	CC	SW	M	0.5	Gr	B			N	F	lg	GS		70
SNA0557	581485	586857	CC	SW	M	0.5	Gr	B			N	F	lg	STL		13
SNA0558	581519	586818	CC	SE	M	0.5	Cy	B			N	R	cy	STL		15
SNA0559	581543	586780	SR	SE	M	0.5	Gr	Yb			N	R	lg	STL		13
SNA0560	581582	586740	CC	SE	M	0.5	Gr	Yb			N	F	lg	GS		10
SNA0561	581606	586705	CC	NW	M	0.5	Gr	B		5	N	F	lg	GS		8
SNA0562	581646	586662	CC	NW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0563	581676	586628	CC	NW	M	0.5	Gr	B			N	F	lg	STL		<1
SNA0564	581700	586593	SR	FL	M	0.5	Gr	B			N	F	lg	HT		3
SNA0565	581734	586554	PF	FL	M	0.5	Gr	B			N	F	lg	HT		5
SNA0566	581771	586511	PF	SW	M	0.5	Cy	Yb			N	R	cy	STL		10
SNA0567	581800	586480	PF	SW	M	0.5	Cy	Yb			N	R	gv	STL		8
SNA0568	581846	586438	PF	SE	M	0.5	Gr	B			N	F	lg	GS		5
SNA0569	581866	586393	SR	SW	M	0.5	Cy	B			N	R	cy	STL		38
SNA0570	581904	586359	CC	SW	M	0.5	Cy	B			N	R	gv	STL		15
SNA0571	581939	586314	CC	SW	M	0.5	Cy	B			N	R	cy	SS		10
SNA0572	581964	586276	CC	SW	M	0.5	Cy	B			N	R	cy	SS		38
SNA0574	581996	586243	CC	FL	M	0.5	Cy	B			N	R	cy	HT		15
SNA0575	581243	587765	CC	FL	M	0.5	Sd	B			P	D	al	LE		15
SNA0576	581279	587715	CC	FL	M	0.5	Sd	B			P	D	al	SB		25
SNA0577	581309	587690	CC	FL	M	0.5	Sd	Bl			P	D	al	LE		10
SNA0579	581340	587648	SR	FL	M	0.5	Sd	B			P	D	al	SB	3m SW of	30
SNA0580	581372	587610	CC	FL	M	0.5	Cy	B			P	D	al	LE		10
SNA0581	581405	587572	CC	FL	M	0.5	Sd	B			P	D	al	SB		18
SNA0582	581437	587533	CC	FL	M	0.5	Sd	B			P	D	al	LE		3
SNA0583	581469	587495	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		5
SNA0584	581501	587457	CC	SW	M	0.5	Gr	B		10	N	F	lg	GEL		15
SNA0585	581533	587419	CC	FL	M	0.5	Cy	Yb			P	D	al	LE		98
SNA0586	581565	587380	SR	FL	M	0.5	Sd	B			P	D	al	SB		28
SNA0587	581597	587342	CC	NW	M	0.5	Cy	A			N	E	sp	GS		13

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0588	581629	587304	CC	NW	M	0.5	Gr	Yb		5	N	F	lg	STL		10
SNA0589	581662	587265	CC	NW	M	0.5	Cy	Yb			N	R	gv	STL		13
SNA0590	581694	587227	CC	NE	M	0.5	Gr	B			N	F	lg	SS		5
SNA0591	581726	587189	SR	NE	M	0.5	Cy	B			N	F	lg	SS		13
SNA0592	581758	587150	SR	NW	M	0.5	Cy	Yb			N	R	cy	STL		18
SNA0593	581790	587112	CC	SE	M	0.5	Cy	Yb			N	R	cy	STL		10
SNA0594	581822	587074	SR	SE	M	0.5	Gr	Yb			N	R	gv	GS		13
SNA0595	581854	587035	CC	NE	M	0.5	Cy	Yb			N	F	lg	GS		13
SNA0596	581887	586997	CC	NE	M	0.5	Cy	B			N	R	gv	GEL		23
SNA0597	581919	586959	CC	NE	M	0.5	Cy	Yb			N	R	cy	GEL		8
SNA0599	581951	586921	SR	FL	M	0.5	Cy	Yb			P	D	al	LE		13
SNA0600	581983	586882	CC	SW	M	0.5	Cy	Yb		5	N	R	gv	GEL		25
SNA0601	582015	586844	CC	SW	M	0.5	Gr	Yb			N	R	cy	STL		18
SNA0602	582047	586806	CC	SE	M	0.5	Gr	Yb			N	R	gv	GS		8
SNA0604	582079	586767	CC	NE	M	0.5	Cy	N			N	E	sp	GS		13
SNA0605	582112	586729	CC	NW	M	0.5	Gr	B			N	F	lg	GS		18
SNA0606	582144	586691	CC	NW	M	0.5	Gr	B		5	N	F	lg	STL		28
SNA0607	582176	586652	SR	NE	M	0.5	Cy	B			N	R	cy	STL		78
SNA0608	582208	586614	CC	NE	M	0.5	Cy	B			N	R	cy	STL		30
SNA0609	582240	586576	CC	NE	M	0.5	Cy	B			N	R	cy	STL		23
SNA0610	582272	586538	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		<1
SNA0611	582304	586499	CC	NW	M	0.5	Gr	B			N	F	lg	GS		13
SNA0612	582337	586461	CC	NW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0613	582369	586423	CC	SW	M	0.5	Cy	B			N	R	gv	STL		23
SNA0614	582401	586384	SR	SW	M	0.5	Gr	B			N	F	lg	STL		18
SNA0615	582433	586346	CC	NE	M	0.5	Cy	B			N	R	gv	GS		18
SNA0616	582465	586308	CC	NE	M	0.5	Gr	B			N	F	lg	GS		13
SNA0617	582497	586269	CC	SW	M	0.5	Gr	B			N	F	lg	GS		13
SNA0618	582529	586231	CC	SW	M	0.5	Gr	B		10	N	F	lg	STL		18
SNA0619	582562	586193	CC	SE	M	0.5	Gr	B			N	F	lg	STL		28
SNA0620	582594	586155	CC	SW	M	0.5	Gr	Yb			N	R	gv	GS		15

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0621	581582	587985	CC	NE	M	0.5	Gr	B			N	F	lg	GEL		18
SNA0623	581612	587947	CC	SW	M	0.5	Gr	B			N	R	gv	GEL		10
SNA0624	581645	587905	CC	NW	M	0.5	Cy	A			P	D	cy	GEL		8
SNA0625	581676	587871	CC	NW	M	0.5	Gr	B			N	F	lg	GS		10
SNA0626	581712	587831	CC	NW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0627	581742	587790	CC	FL	M	0.5	Cy	B			N	R	gv	HT		13
SNA0628	581772	587757	CC	FL	M	0.5	Gr	B			N	F	lg	HT		10
SNA0629	581805	587716	CC	FL	M	0.5	Gr	B			N	F	lg	HT		5
SNA0630	581839	587677	CC	FL	M	0.5	Gr	B			N	F	lg	HT		10
SNA0631	581871	587637	CC	FL	M	0.5	Gr	B			N	F	lg	HT		15
SNA0632	581902	587602	CC	SE	M	0.5	Gr	B			N	F	lg	STL		10
SNA0634	581937	587565	CC	SE	M	0.5	Gr	B			N	F	lg	GS		10
SNA0635	581969	587524	CC	SE	M	0.5	Gr	B			N	F	lg	GS		20
SNA0636	581995	587486	CC	SE	M	0.5	Gr	B			N	F	lg	GS		45
SNA0637	582035	587366	CC	SE	M	0.5	Gr	B			N	F	lg	GS		15
SNA0638	582065	587410	CC	SE	M	0.5	Gr	B			N	F	lg	GEL		10
SNA0639	582097	587366	CC	FL	M	0.5	Sd	Bd			P	D	al	LE		23
SNA0640	582127	587332	CC	FL	M	0.5	Gr	Yb			N	R	gv	LE		40
SNA0641	582157	587296	CC	FL	M	0.5	Sd	Bl			P	D	al	SB		30
SNA0642	582181	587251	SR	NE	M	0.5	Cy	Yb			N	R	gv	GEL		20
SNA0643	582221	587222	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		15
SNA0645	582257	587178	CC	NW	M	0.5	Cy	Yb		5	N	R	gv	GS		15
SNA0646	582288	587141	CC	NW	M	0.5	Gr	B			P	F	lg	STL		13
SNA0647	582320	587106	CC	NE	M	0.5	Cy	B			N	R	cy	STL		28
SNA0648	582341	587071	CC	FL	M	0.5	Cy	Bl			N	D	cy	LE		40
SNA0649	582385	587026	CC	SW	M	0.5	Cy	B			P	R	cy	GS		20
SNA0650	582410	586996	CC	SE	M	0.5	Cy	Yb			P	R	cy	GEL		20
SNA0651	582447	586949	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		20
SNA0652	582484	586906	CC	FL	M	0.5	Cy	Yb			N	D	cy	LE		15
SNA0653	582515	586867	CC	FL	M	0.5	Cy	A		10	N	D	al	SW		18
SNA0654	582553	586827	CF	SW	M	0.5	Gr	B			N	F	lg	GS		18

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0655	582578	586796	SR	SE	M	0.5	Gr	B			N	F	lg	STL		10
SNA0656	582616	586752	CC	SW	M	0.5	Gr	B		10	N	F	lg	GS		53
SNA0657	582649	586712	CC	SW	M	0.5	Gr	B			N	F	lg	GS		38
SNA0658	582676	586679	RD	SW	M	0.5	Gr	B			N	F	lg	GS		28
SNA0659	582708	586641	CC	S	M	0.5	Gr	B		5	N	F	lg	GS		100
SNA0660	582729	586607	CC	S	M	0.5	Gr	B			N	F	lg	GEL		30
SNA0661	582772	586562	CC	SW	M	0.5	Cy	Yb			N	R	cy	GEL		43
SNA0662	582808	586529	CC	SW	M	0.5	Cy	Yb			N	R	cy	STL		18
SNA0664	582844	586485	CC	SW	M	0.5	Cy	Yb			N	R	cy	SS		25
SNA0666	582863	586454	CC	SE	M	0.5	Cy	Yb			N	R	cy	SS		28
SNA0667	582903	586410	CC	SE	M	0.5	Gr	Yb		5	N	R	gv	GS		25
SNA0668	582937	586371	CC	SE	M	0.5	Cy	B			N	E	sp	GEL		40
SNA0669	582966	586332	RD	SW	M	0.5	Cy	B			N	R	cy	GEL		53
SNA0670	581887	588231	CC	NW	M	0.5	Gr	Yb			N	F	lg	GEL		10
SNA0671	581922	588203	CC	NW	M	0.5	Gr	Yb			N	F	lg	GS		10
SNA0672	581958	588163	SR	SW	M	0.5	Cy	B			N	R	cy	GS		5
SNA0673	581992	588118	CC	FL	M	0.5	Gr	B			N	F	lg	HT		20
SNA0674	582015	588086	CC	NE	M	0.5	Cy	Yb			N	R	cy	GS		15
SNA0675	582048	588048	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		15
SNA0676	582082	588014	SR	SE	M	0.5	Cy	Yb			N	R	gv	GS		25
SNA0677	582111	587977	SR	SE	M	0.5	Gr	B			N	F	lg	GS		15
SNA0678	582136	587949	SR	SE	M	0.5	Cy	Yb			N	R	cy	GEL		18
SNA0679	582174	587884	CC	NE	M	0.5	Cy	Yb			N	R	gv	GS		15
SNA0680	582206	587854	CC	NE	M	0.5	Gr	B			N	F	lg	GEL		18
SNA0681	582232	587820	CC	FL	M	0.5	Cy	A			P	D	cy	SW		23
SNA0682	582275	587779	CC	FL	M	0.5	Cy	B			P	D	cy	LE		20
SNA0683	582306	587739	CC	FL	M	0.5	Gr	Yb			N	R	gv	LE		10
SNA0684	582342	587698	CC	NW	M	0.5	Cy	Yb			N	R	cy	GEL		23
SNA0685	582365	587662	SR	NW	M	0.5	Cy	B			N	R	gv	GS		20
SNA0687	582400	587619	CF	NW	M	0.5	Gr	B			N	F	lg	STL		18
SNA0688	582424	587591	CC	NE	M	0.5	Cy	Yb			N	R	cy	GS		18

APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0689	582470	587548	CF	NE	M	0.5	Cy	B			N	R	cy	STL		20
SNA0690	582495	587512	CC	NE	M	0.5	Gr	B			N	F	lg	GS		10
SNA0691	582528	587471	CC	FL	M	0.5	Sd	Bd			P	D	al	SB		13
SNA0692	582560	587435	CC	FL	M	0.5	Sd	B			P	D	al	LE		20
SNA0694	582599	587398	CC	FL	M	0.5	Cy	Yb			P	D	cy	LE		18
SNA0695	582630	587361	CC	NW	M	0.5	Gr	Yb			N	F	lg	GEL		33
SNA0696	582654	587325	CC	NW	M	0.5	Gr	B			N	F	lg	GEL		18
SNA0697	582689	587280	CC	FL	W	0.5	Gr	A		10	P	D	al	SW		23
SNA0698	582724	587243	CC	FL	M	0.5	Cy	B			P	D	cy	LE		35
SNA0699	582763	587199	CC	SW	M	0.5	Gr	B		5	N	F	lg	GEL		8
SNA0700	582792	587167	SR	SW	M	0.5	Gr	B			N	F	lg	GS		10
SNA0701	582822	587128	SR	SW	M	0.5	Gr	B			N	F	lg	GS		20
SNA0702	582852	587089	CC	SW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0703	582883	587049	SR	SW	M	0.5	Gr	B		5	N	F	lg	STL		8
SNA0704	582911	587021	SR	NW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0705	582950	586976	SR	FL	M	0.5	Gr	B		10	N	F	lg	HT		5
SNA0706	582979	586928	SR	FL	M	0.5	Gr	B		5	N	F	lg	HT		10
SNA0707	583015	586899	CF	SE	M	0.5	Gr	B		5	N	F	lg	STL		10
SNA0708	583047	586864	CC	SE	M	0.5	Gr	Yb			N	F	lg	GS		13
SNA0710	583078	586822	CC	SW	M	0.5	Gr	B			N	F	lg	GS		13
SNA0711	582206	588439	SR	SW	M	0.5	Gr	B			N	F	lg	STL		13
SNA0712	582247	588439	CC	SE	M	0.5	Cy	B			N	R	cy	STL		15
SNA0713	582288	588385	CC	SW	M	0.5	Gr	Yb			N	F	lg	GS		8
SNA0714	582314	588348	CC	SW	M	0.5	Gr	Yb			N	F	lg	STL		10
SNA0715	582357	588304	CC	SW	M	0.5	Cy	B			N	R	cy	STL		18
SNA0716	582389	588268	CC	SE	M	0.5	Gr	B			N	F	lg	STL		13
SNA0717	582419	588230	CC	SE	M	0.5	Cy	Yb			N	R	cy	GEL		13
SNA0718	582451	588190	CC	SE	M	0.5	Gr	Yb			N	R	cy	GEL		10
SNA0719	582485	588150	CC	FL	M	0.5	Cy	Al			P	D	cy	LE		8
SNA0720	582516	588114	CC	FL	M	0.5	Cy	B			P	D	cy	LE		10
SNA0721	582545	588076	CC	SE	M	0.5	Cy	B			N	R	cy	GEL		90

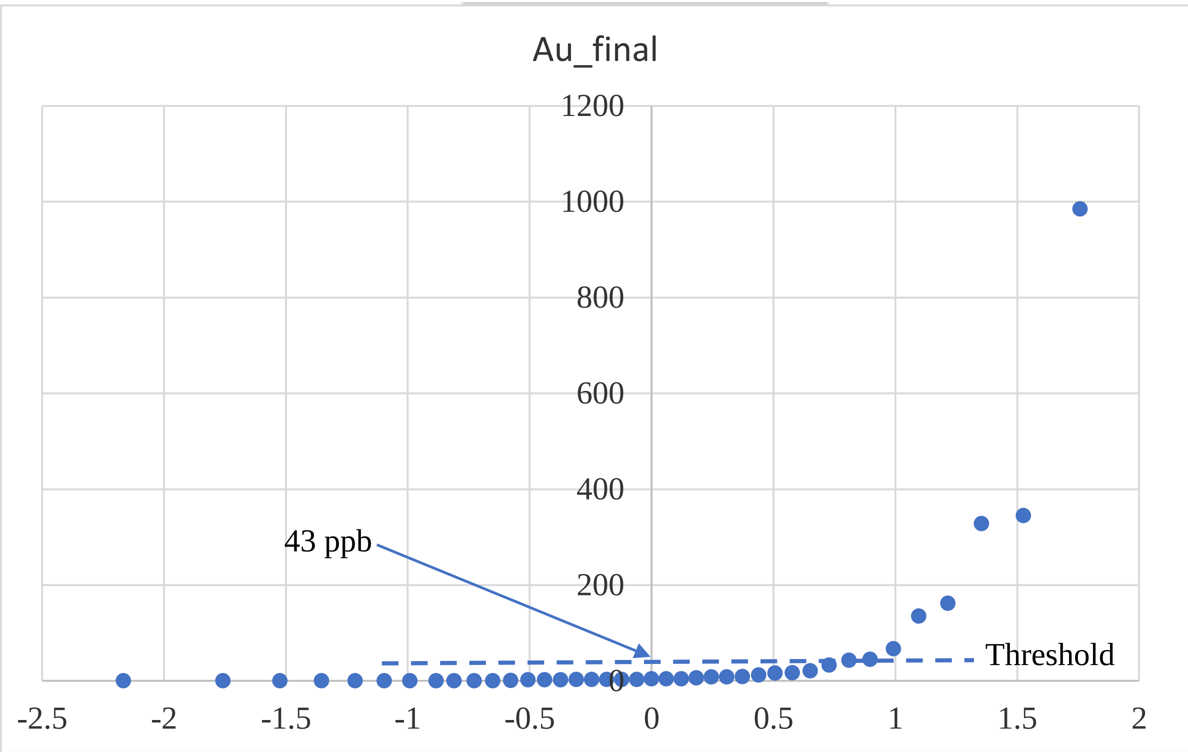
APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0722	582580	588030	CC	FL	M	0.5	Gr	Al			P	D	al	SW		10
SNA0724	582605	587999	CC	NW	M	0.5	Gr	Bl			N	F	lg	GEL		8
SNA0725	582637	587954	CC	NW	M	0.5	Gr	Bl			N	F	lg	GS		8
SNA0726	582683	587921	CC	SW	M	0.5	Gr	B			N	F	lg	STL		15
SNA0727	582705	587889	CC	SW	M	0.5	Gr	B			N	F	lg	SS		13
SNA0728	582743	587848	SR	SW	M	0.5	Cy	B			N	R	gv	SS		28
SNA0729	582772	587815	SR	SE	M	0.5	Cy	Bd			N	R	cy	STL		43
SNA0730	582811	587772	CC	SW	M	0.5	Cy	B			N	R	gv	STL		23
SNA0732	582838	587735	CC	FL	M	0.5	Gr	B			N	F	lg	HT		45
SNA0733	582869	587694	CC	NE	M	0.5	Gr	B			N	F	lg	STL		13
SNA0734	582910	587661	SR	NE	M	0.5	Gr	B		10	N	F	lg	GS		33
SNA0735	582938	587612	SR	NE	M	0.5	Gr	B		5	N	F	lg	GS		25
SNA0736	582965	587579	CC	NE	M	0.5	Cy	B			N	R	gv	GEL		18
SNA0737	583001	587536	CC	NE	M	0.5	Cy	B			N	R	cy	GEL		45
SNA0738	583027	587505	CC	E	M	0.5	Cy	B			N	R	gv	GEL		28
SNA0739	583063	587465	CC	FL	M	0.5	Sd	B			P	D	al	LE		30
SNA0740	583093	587432	SR	FL	M	0.5	Gr	B			N	F	lg	LE		5
SNA0741	582595	588633	SR	SW	M	0.5	Gr	B			N	F	lg	STL		10
SNA0742	582628	588598	CC	SE	M	0.5	Cy	B			N	R	cy	GS		10
SNA0743	582663	588561	CC	NE	M	0.5	Gr	B			N	F	lg	GEL		25
SNA0744	582694	588523	CC	SW	M	0.5	Gr	Yb		10	N	F	lg	GS		<1
SNA0745	582730	588484	CC	SW	M	0.5	Cy	B			N	R	gv	STL		13
SNA0746	582762	588447	CC	SW	M	0.5	Cy	B			N	R	gv	SS		18
SNA0747	582794	588401	CC	SW	M	0.5	Gr	B			N	F	lg	SS		15
SNA0748	582823	588369	CC	SE	M	0.5	Gr	B			N	F	lg	STL		5
SNA0749	582857	588332	CC	SE	M	0.5	Cy	Yb			N	R	gv	STL		58
SNA0750	582885	588296	CC	SE	M	0.5	Gr	B		5	N	F	lg	GS		18
SNA0752	582916	588256	CC	NE	M	0.5	Gr	A			N	F	lg	GS		35
SNA0754	582948	588211	CC	FL	M	0.5	Cy	A			P	D	cy	SW		10
SNA0755	582981	588179	CC	NE	M	0.5	Cy	B			N	R	cy	GS		35
SNA0756	583016	588139	CC	SE	M	0.5	Cy	B		5	N	R	gv	GS		15

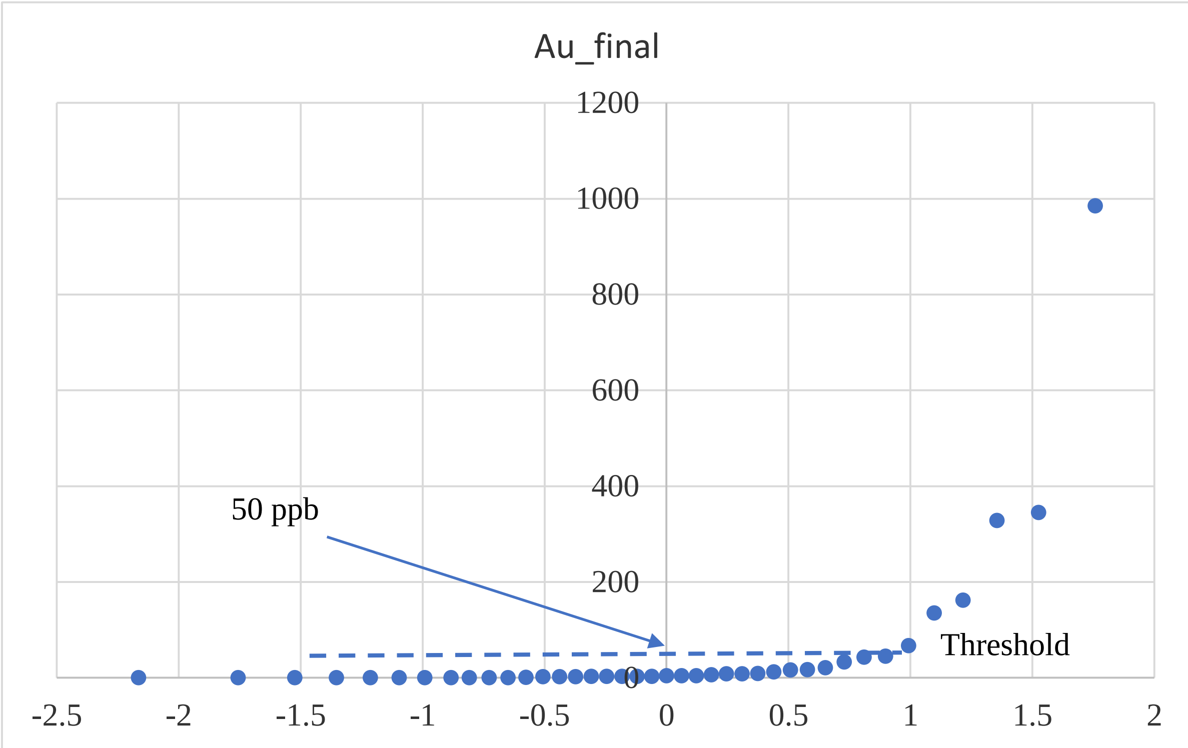
APPENDIX C: SOIL SAMPLES LOGS AND ASSAY RESULTS (CONT'D)

Sample #	UTM_E	UTM_N	Land Use	Slope Dir	Dry/ Wet	depth	Texture	Colour	pls %	qtz %	Drift	Regime	Regolith Material	Land form	Comments	Au_ppb
SNA0757	583051	588102	CC	NW	M	0.5	Cy	B			N	R	cy	STL		10
SNA0758	583079	588063	SR	FL	M	0.5	Cy	B			N	R	gv	HT		13

APPENDIX D: PROBABILITY PLOT FOR DETERMINATION OF THRESHOLD VALUE FROM STREAM SEDIMENTS ASSAY RESULTS



APPENDIX E: PROBABILITY PLOT FOR DETERMINATION OF THRESHOLD VALUE FROM SOIL ASSAY RESULTS



APPENDIX F: SYMBOLOGY

SYMBOL	NAME
Amp	Amphibole
Apy	Arsenopyrite
AI	Alteration index
Chl	Chlorite
CCPI	Chlorite-Carbonate-Pyrite index
Ep	Epidote
Hem	Haematite
Mag	Magnetite
Pl	Plagioclase
Po	Pyrrhotite
Px	Pyroxene
Py	Pyrite
Qtz	Quartz
Ser	Sericite

APPENDIX G: WHOLE ROCKS ANALYS

Sample ID	OC006	OC17	OC28	OC49	OC54	OC52	OC27	OC35	OC53	OC34	OC20	OC29	OC009	OC51	OC32	OC60	OC50
Oxide wt %																	
SiO2	65.10	67.70	64.20	65.80	63.50	64.10	69.70	67.40	63.10	70.30	65.60	77.00	76.60	74.50	59.50	61.30	62.80
Al2O3	21.10	15.95	15.35	16.10	16.60	20.00	15.70	16.80	14.50	19.50	15.85	14.20	16.15	16.35	18.75	14.50	18.45
Fe2O3	4.64	7.49	7.66	6.49	7.83	6.84	6.46	6.02	13.45	0.79	6.35	2.26	0.65	2.08	7.43	4.45	8.58
CaO	0.05	0.03	0.04	0.07	0.17	0.02	0.08	0.02	0.02	0.01	0.04	0.02	0.02	0.01	0.09	0.04	0.04
MgO	0.18	1.42	2.35	2.44	2.05	0.22	1.04	1.89	0.19	0.15	1.64	0.18	0.14	0.15	1.56	0.36	0.85
Na2O	2.47	1.66	1.20	2.24	2.52	1.71	0.96	0.90	0.86	2.41	1.59	1.34	1.94	1.91	0.69	1.05	1.33
K2O	2.53	1.83	2.23	1.68	2.09	2.50	1.75	2.37	1.69	2.12	1.64	1.82	1.89	1.72	3.13	2.36	2.24
Cr2O3	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.05	0.06	0.05	0.04	0.03	0.04	0.04
TiO2	0.82	0.73	0.63	0.62	0.61	0.77	0.63	0.71	0.56	0.77	0.70	0.53	0.77	0.63	0.59	0.52	0.68
MnO	<0.01	0.01	0.02	0.02	0.06	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.20	0.02	0.03
P2O5	0.01	0.06	0.11	0.14	0.10	0.06	0.09	0.04	0.04	0.02	0.01	0.02	0.01	0.03	0.10	0.05	0.12
SrO	0.03	0.02	0.02	0.03	0.02	0.03	0.04	0.02	0.03	0.04	0.01	0.02	0.02	0.02	0.04	0.02	0.04
BaO	0.07	0.05	0.07	0.06	0.06	0.07	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.13	0.13	0.07
LOI	3.66	3.71	4.30	3.18	4.64	4.49	4.81	3.39	4.87	2.74	3.91	2.59	2.42	2.61	6.39	13.00	6.66
Total	**100.70**	**100.70**	**98.21**	**98.90**	**100.28**	**100.84**	**101.37**	**99.66**	**99.41**	**98.93**	**97.46**	**100.09**	**100.71**	**100.09**	**98.63**	**97.84**	**101.93**

APPENDIX G: WHOLE ROCKS ANALYS (CONT'D)

Sample ID	OC006	OC17	OC28	OC49	OC54	OC52	OC27	OC35	OC53	OC34	OC20	OC29	OC009	OC51	OC32	OC60	OC50
Trace Elements (ppm)																	
Ba	610.00	423.00	655.00	504.00	520.00	633.00	471.00	522.00	582.00	486.00	440.00	433.00	440.00	390.00	1145.00	1140.00	602.00
Ce	25.50	40.60	38.80	51.30	48.10	66.10	242.00	46.90	24.40	38.80	46.80	39.60	34.70	39.50	161.50	44.00	62.30
Cr	270.00	310.00	210.00	250.00	210.00	250.00	280.00	280.00	280.00	250.00	320.00	520.00	350.00	340.00	230.00	330.00	300.00
Cs	3.67	2.45	2.76	2.86	2.26	4.19	2.25	4.58	2.96	3.58	2.34	3.29	2.75	3.51	4.38	5.72	4.12
Dy	5.23	3.88	2.85	3.69	2.96	4.65	11.75	3.26	4.61	2.59	3.30	2.07	3.49	2.81	8.34	5.45	3.44
Er	3.81	2.47	1.62	2.10	1.54	2.79	5.90	1.91	3.56	1.57	1.84	1.13	2.18	1.46	4.41	3.32	1.85
Eu	0.70	0.84	0.81	1.15	0.94	1.74	5.24	1.08	0.66	0.96	1.12	0.85	0.78	1.11	2.95	1.34	1.25
Ga	29.90	21.10	19.90	19.60	21.60	26.00	19.30	21.50	21.80	26.60	21.00	18.40	20.90	20.00	23.50	19.30	22.10
Gd	3.54	3.08	3.21	3.74	3.00	4.90	17.60	3.93	3.23	3.39	3.38	3.03	2.91	2.67	11.10	5.69	3.58
Hf	4.90	4.50	3.40	3.70	3.70	4.80	3.90	4.60	3.80	4.40	4.60	3.70	4.30	4.10	4.00	4.20	3.50
Ho	1.09	0.81	0.61	0.56	0.48	0.86	1.81	0.62	0.88	0.51	0.66	0.34	0.74	0.49	1.45	0.95	0.64
La	11.90	20.40	17.90	24.80	22.60	31.10	124.50	22.20	13.20	18.70	22.20	18.00	15.50	17.90	115.50	23.80	22.10
Lu	0.42	0.31	0.28	0.35	0.33	0.39	0.60	0.37	0.47	0.22	0.34	0.17	0.32	0.21	0.52	0.60	0.36
Nb	6.50	6.30	5.20	5.20	5.00	6.50	4.70	5.70	7.40	7.10	6.00	4.10	5.90	6.00	6.10	5.60	6.60
Nd	12.50	18.30	18.40	21.80	21.30	31.70	121.00	21.40	12.10	18.60	21.30	18.90	16.70	17.90	70.60	27.10	23.60
Pr	3.08	4.72	4.87	5.96	5.65	8.32	34.00	5.67	2.82	4.62	5.67	4.61	4.15	4.65	20.30	6.35	5.97
Rb	85.30	57.60	67.30	54.30	61.20	81.10	52.30	75.40	55.70	75.50	52.70	71.30	62.20	60.50	94.00	76.20	76.70
Sm	2.68	3.71	3.44	4.47	4.00	6.94	22.50	4.47	2.37	3.43	4.57	3.60	3.32	4.11	12.90	6.45	4.78
Sn	2.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00
Sr	275.00	181.00	164.00	248.00	168.50	266.00	301.00	169.00	267.00	296.00	112.00	173.00	160.00	158.50	315.00	210.00	335.00
Ta	0.50	0.30	0.60	0.40	0.50	0.60	0.40	0.50	0.60	0.60	0.30	0.40	0.20	0.50	0.60	0.40	0.60
Tb	0.72	0.48	0.58	0.54	0.44	0.75	2.36	0.58	0.60	0.43	0.56	0.36	0.49	0.52	1.49	1.02	0.62
Th	4.35	3.80	2.82	3.36	3.39	4.91	3.08	3.20	8.02	3.90	3.74	2.64	3.08	3.86	5.40	3.36	3.58
Tm	0.51	0.37	0.27	0.27	0.18	0.40	0.77	0.31	0.45	0.25	0.29	0.19	0.33	0.24	0.55	0.43	0.27
U	1.57	1.36	1.85	1.73	1.74	3.27	1.79	1.57	3.41	1.35	1.25	1.12	1.07	1.20	7.09	3.44	3.18
V	166.00	120.00	171.00	127.00	140.00	195.00	110.00	111.00	565.00	137.00	111.00	142.00	124.00	106.00	334.00	160.00	242.00
W	2.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00
Y	31.00	22.00	16.00	18.40	14.10	25.20	51.60	16.80	30.10	14.10	17.00	9.60	19.00	13.60	45.10	29.80	18.00
Yb	3.05	2.28	1.94	2.13	1.67	2.95	4.71	1.82	2.97	1.76	2.17	1.12	1.98	1.59	3.23	2.85	1.78
Zr	179.00	181.00	129.00	141.00	147.00	177.00	156.00	186.00	150.00	170.00	189.00	148.00	169.00	152.00	150.00	169.00	135.00

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