# REPORT OF

## GOLD, ZIRCON AND TITAN DEPOSIT EXPLORATION IN PT AURUM PERSADA KHATULISTIWA IUP LOCATED SEPAUK DISTRICT, SINTANG REGENCY WEST KALIMANTAN

**EXPLORATION METHOD**
**ACCORDING TO JORC STANDARD**


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## Preface

This report is prepared in accordance with the data collected from exploration result within the area of Mining Business Permit (IUP) Exploration of PT Aurum Persada Khatulistiwa (APK) with total of 1000 Ha. The exploration is aimed to obtain data regarding gold, zircon, and titan minerals. The period of data collection through report preparation was during Juli – November 2013.

PT Bhineka Citra Tomosindo that is appointed by PT Aurum Persada Khatulistiwa as the executor of exploration has investigated the area of 130 Ha being previously explored. The exploration reveals that 47.6 Ha of such area can be potentially developed for gold, zircon, and titan minerals.

The expert force team of PT Bhineka Citra Tomosindo involved from data collection in field through report preparation is:

Yunasri
Geologist, 25 years of experience

Thamryn Simanjuntak
Geologist, 5 years of experience

Rano Vera
Mine Geologist, 5 years of experience

Umar Sirait MAusIMM
Geologist, 30 years of experience

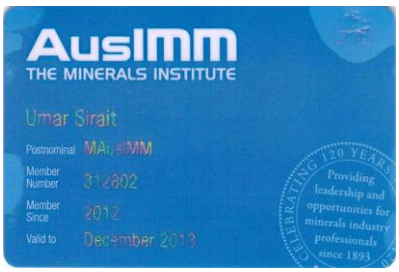
Data evaluation, data collection in field, calculation of gold, zircon, and titan resources in sedimentary alluvial were carried out by referring to the Standard of Joint Ore Reserve Comitte (JORC).

As an authorized signatory of the report in accordance with JORC Standard, the signatory of this report also supervises, evaluates, and is fully responsible for the content of this report.

Jakarta, 2 December, 2013

Umar Sirait MAusIMM

Member No. 312802




## Preface

Indonesia is gifted with beautiful, lovely, nature and rich of natural resources. From Sabang to Merauke, there are countless treasures bestowed by The Creator to this many races nation. Sumatra with its mountains and basins is full of mineral and energy raw materials, such as oil and coal. Java with its fertile land contains metal mineral beneath its southern islands. Celebes with its ultra-base minerals (nickel, chromites, and iron ore). Papua with its prolific land has become one of the biggest gold and copper mines in the world.

Borneo is one of the oldest islands in archipelago, through natural process, namely corrosion, erosion, and sedimentation; it has provided sediment required by human beings. Sedimentary coal and alluvial contains minerals like gold, zirconium (zircon), and titanium (titan).

Such sedimentary alluvial has been traditionally managed by community. Using vacuum and then poured onto sluice box and panned is a common work for the community up to now. From several studies, that kind of work did not optimally catch gold grain and other mineral grain.

PT Aurum Persada Khatulistiwa who obtained Mining Business Permit (IUP) from government of Regency of Sintang, has opportunity to manage Borneo's natural treasure to be better, more efficient, and more maximum. The method of mining carried out by this company will catch more gold grains and other mineral grains in the future.

Furthermore, the existence of this medium to large scaled mine, later, is expected to increase PAD of local Regency and provide work for the people around the site.

This report is prepared in accordance with Standar Joint Ore Reserve Comitte (JORC). The signatory of this report is the member of *Australian Institute Mining and Metalurgist* (AusIMM), Number 312802.

Jakarta, December 2013

Author

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# CHAPTER I
# INTRODUCTION

## 1.1. Background

In accordance with the Decree of the Regent of Sintang No.545/60/KEP-DPE/TAHUN 2013, dated 18th February 2013 on Mining Exploration Right (IUP Eksplorasi) for Gold and its Accessory Minerals, the IUP isconferred to PT. Aurum Persada Khatulistiwa. The location of the IUP Eksplorasi is the area of alluvial deposit which is located around the Kapuas River. It is included in the administrative area of the Sukau Bersatu Village, Sepauk Sub-District, Sintang Regency, West Kalimantan Province. The width of PT. Aurum Persada Khatulistiwa's IUP Eksplorasi area is 1,000 ha.

Such decree is the underlying document of the exploration work, which is aimed to find economically valuable minerals in the alluvial deposit. The objective of the exploration is to determine the potential of gold, zircon and titanium deposits in the IUP area.

In order to determine this potential in the 300 Ha area within the IUP Eksplorasi area, PT. Aurum Persada Khatulistiwa is chosen to do a detailed exploration. Exploration activities which have been undertaken include geological mapping, test pit sampling, and hand auger. The depth of the taken sampling is within 2-3 meters.

In order to know the potential of gold, zircon and titanium in the greater depth of the alluvial deposits, PT. Aurum Persada Khatulistiwa has also performed the geophysical work (geoelectrical survey). The capability or below-the-surface reading ability of this method can reach 50 meter depth.

Referring to the result of the geophysical exploration method,a drilling work has also been carried out on 10 (ten) points in which the depth is 45-55 meters. From

the drilling work result, a sampling was carried out, i.e. by dividing a half of the drill core (core) to be analyzed. The selected laboratory is Mineral Laboratory of PT. Intertek Teknik Services. The elements analyzed are the targeted exploration elements, namely gold (Au), zircon (Zr) and titanium (Ti).

After the analysis was drawn, the next exploration activities are the mapping of detailed exploration area surface topography and preparation of the report.

The prepared report will refer to Joint Ore Reserve Committee (JORC) Standard. Then, the report drafting team appointed by PT.Aurum Persada Khatulistiwa is PT.Bhinneka Citra Tomosindo. The top management of PT. Bhinneka Citra Tomosindo is the Competent Statement Signatory of JORC, the Member of the *Australian Institute of Minerals and Metalurgical* (AusIMM), Member Number 312308.

## 1.2. Aims and Objectives

The purpose of the exploration activities in the IUP Eksplorasi location of PT. Aurum Persada Khatulistiwa is to know the condition of the gold and accessory mineral deposit in the IUP in a more detailed way. The intended condition may include the area and width of distribution, thickness and content of the elements deposit, which is the aim of the exploration in every ton.

The purpose of this exploration is to determine the magnitude of the targeted potential resources and mineral deposit within the area of IUP Eksplorasi of PT. Aurum Persada Khatulistiwa, i.e. gold, zircon and titanium. The report prepared by the Competent Statement Signatory of JORC has a higher level of reliability, so it can be used as a primary data source for the next step – to make a geological model, design a mine plan, or other purposes such as submission to financial institutions.

## 1.3. Exploration Area Location

The IUP Eksplorasi area of PT. Aurum Persada Khatulistiwa (width: 1,000 Ha) administratively includes the administrative areas of 3 (three) sub-districts, namely Tempunak Sub-district (80%), Belitang Hulu Sub-district (15%), and Sepauh Sub-district (5%), Sintang Regency, West Kalimantan Province.

Such IUP area is geographically bounded by the coordinates as shown in the following Table I-1.

**Table I-1.**
**Coordinates of The IUP Eksplorasi Area of**
**PT. Aurum Persada Khatulistiwa**

| No. of Point | East Longitude (E) | | | | North Latitude (N) | | | |
|---|---|---|---|---|---|---|---|---|
| | ° | ' | " | E | ° | ' | " | N |
| 1 | 111 | 17 | 46 | E | 0 | 6 | 14 | N |
| 2 | 111 | 17 | 46 | E | 0 | 7 | 34 | N |
| 3 | 111 | 17 | 37 | E | 0 | 7 | 34 | N |
| 4 | 111 | 17 | 37 | E | 0 | 7 | 49 | N |
| 5 | 111 | 17 | 27 | E | 0 | 7 | 49 | N |
| 6 | 111 | 17 | 27 | E | 0 | 7 | 59 | N |
| 7 | 111 | 17 | 19 | E | 0 | 7 | 59 | N |
| 8 | 111 | 17 | 19 | E | 0 | 8 | 30 | N |
| 9 | 111 | 17 | 57 | E | 0 | 8 | 30 | N |
| 10 | 111 | 17 | 57 | E | 0 | 8 | 14 | N |
| 11 | 111 | 19 | 8 | E | 0 | 8 | 14 | N |
| 12 | 111 | 19 | 8 | E | 0 | 6 | 44 | N |
| 13 | 111 | 18 | 39 | E | 0 | 6 | 44 | N |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14 | 111 | 18 | 39 | E | 0 | 6 | 14 | N |

From Jakarta to the location of the exploration area, the following route can be taken:

| Route | Mode of Transportation | Time Travel |
|---|---|---|
| Jakarta - Pontianak | Aircraft<br>(Garuda Indonesia, Lion Air, Sriwijaya) | 1 hour 15 minutes |
| Pontianak - Sintang | Aircraft (Kalstar)<br>Car | 50 minutes<br>14 hours |
| Sintang - location | Boat *(long* boat) | 2 hours 30 minutes |

## 1.4. Research Methods and Tools

Exploration activities in order to determine the potential of gold and other economic mineral deposits within the IUP Eksplorasi location of PT. Aurum Persada Khatulistiwa were performed by these following work stages:

- Study of literature relating to the alluvial gold potential around the IUP area.
- Geological mapping, with a focus on the sediment deposit structure specifically gold and other economic mineral carrier sediment.
- Geophysical research by applying a geoelectrical method which is aimed to know the underground sediment structure on the studied location.
- Drilling activity, i.e. a drilling in ten points within 300 meter area. The depth of the drilling ranges from 40 to 54 meters.
- Laboratory analysis in order to determine the content of gold, zircon and titanium in (grams/ton).
- To evaluate the results and conclusions of the work carried out in the form of exploration reports.

The tools and equipment used in the exploration activity are:

- Geological equipment (basic map, GPS, compass, hammer, tray, camera, loupe, meter and 0.1 N HCL solution).
- 2 meter capacity hand auger.
- Geoelectrical method tools and equipment (Ares tools and accessories).
- Jackro 175 Drill Machine.
- Storage box (core box) for the results of drilling work and sample bags.
- Field car (2 units)
- And other supporting equipment.

## 1.5. The Research Team

The secondary gold exploration activity within the IUP Eksplorasi Area of PT. Aurum Persada Khatulistiwa is performed by the Field Geological Team ofPT. Aurum Persada Khatulistiwa. The details are as follows:

1. Person in charge / Team Leader : Ir. Nur Hidayat
2. Field Coordinator : Ir. Sukendro
3. Geological Mapping Team : a. Ir. Harry Hariyanto
   b. Agus Priadi
   c. Roni Kurniawan
   d. Herlina
4. Test Pit and Hand Auger Manager : a. Herlina, ST
   b. Tantowi
5. Geophysics, Geoelectric Manager, and Surveyor : a. Syarifuddin
   b. Yogi Sugiana
   c. Ramdani Hikmawan

The secondary gold, zircon, and titanium exploration fieldwork was performed in the IUP location of PT. Aurum Persada Khatulistiwa in April-June 2013.

## 1.6. General Situation and Environment

### 1.6.1. Population

Based on the projected population of 2011, the population of the Sintang Regency is 371,322 persons or the average residents per village administrative unit is 1,296 persons. Compared with the population of 2010, the increase of residents per village administrative unit is 25 persons. Compared with the area width of the Sintang Regency, and the number and increase as referred to above, the Sintang Regency can be categorized as a low-populated regency.

The number of sub-districts in the Sintang Regency is 14 sub-districts and the IUP area of PT. Aurum Persada Khatulistiwa is located in two sub-districts, i.e. Sepauk and Tempunak Sub-districts. From the observation on the Sintang Regency population in 2011, the Sepauk Sub-district is the second place in terms of the most populated area. Its population is 47,237 persons in which 24,550 residents are male and the remaining 22,687 are female. The population growth percentage is 1.79%. Meanwhile, the Tempunak Sub-district is on the sixth place with 27,255 persons, in which 14,281 residents are male and the remaining 12,974 are female. Its population growth percentage is 1.47%. The density of the Sepauk sub-district is 26 persons per $km^2$ and 1,431 persons per village. Furthermore, the density of the Tempunak sub-district is 27 persons per $km^2$ and 1,136 persons per village.

The religions practiced by the residents of Sintang Sub-district are Islam, Christian, Catholic, Hindu, Buddha, Confucianism and others. The followings are the details of the Sepauk Sub-district residents' religions Islam (17,720 persons), Christian (6,743 persons), Catholic (21,735 persons), Hindu (1 persons), Buddha (169 persons), Confucianism (39 persons), Others (10 persons). Meanwhile, the details for the Tempunak Sub-district are: Islam: 10,922 persons; Christian: 4,159 persons; Catholic: 11,705 persons, Hindu: 38 persons; Buddha: 6 persons; Confucianism: 9 persons; Others: 21 persons.

### 1.6.2. Education

The Sintang Sub-district has various educational institutions, ranging from kindergarten, elementary school, junior high school, senior high school/vocational school to university. According to the collected data, the following is the detail of educational facilities in the Sintang Sub-district in 2011.

| Educational Institutions | Number of institutions | Number of students |
|---|---|---|
| Kindergarten | 78 | - |
| Elementary School | 38 | 61,496 people |
| Junior High School | 91 | 16,432 people |
| Senior High School | 41 | 10,559 people |
| Higher Education (6 institutions) | Universitas Kapuas (University of Kapuas) | |
| | Sekolah Tinggi Ilmu Keguruan Ilmu Pendidikan (STKIP / Institute of Teacher Education) | |
| | Akademi Perawat (AKPER / Academy of Nursing Education) | |
| | Sekolah Tinggi Teologi Khatulistiwa (STTK / Khatulistiwa Institute of Theological Studies) | |
| | Sekolah Tinggi Agama Islam Ma.arif (STAIMA / Ma.arif Institute of Islamic Studies) | |
| | Sekolah Tinggi Ilmu Kesehatan (STIKES) Kapuas Raya (Kapuas Raya Institute of Health Sciences) | |

Educational institutions located in the Sepauk Sub-district in 2011 are Elementary School (42 schools);Junior High School (10 schools); and Senior High School (3 schools). Educational institutions located in the Tempunak Sub-district in 2011 are

Elementary School (26 schools);Junior High School (7 schools); and Senior High School (1 school).

### 1.6.3. Public Health

The government of the Sintang Regency always pays attention and work to improve the public health degree or level due to humanity factor. Constructions of public health facilities in Sintang in 2011 consist of 254 units, i.e. 2 Hospitals, 14 Polyclinics, 20 Public Health Centre, 107 Village Polyclinics (Polindes), and 110 Village Health Units (Poskedes).

Four diseases which are largely suffered by the residents of Sintang are hypertension, heart disease, diabetes mellitus and upper respiratory tract infections.

### 1.6.4. Social Welfare

In terms of the development, the government of the Sintang Regency does not only aim the physical development but also focus on the social welfare development. The social welfare level has been increased to a higher level. The government tries to improve the social welfare by educating poor people, isolated people, prostitutes, disabled people, and orphanages.

According to the note of Social and People's Empowerment Agency of the Sintang Regency, there are 1,511 physically disabled people, 665 mentally disabled people and 180 physically and mentally disabled people in 2011.

## 1.7. Agriculture

The Sintang Regency government develops four elements in the agricultural areas in 2011, namely crops, plantations, fishery, and forestry.

### 1.7.1. Crop

In terms of the crop development, the Sintang Regency pays attention to the cultivation of rice, crops, vegetables, and fruits. Rice, which is the staple food of the Sintang residents, is targeted as a strategic commodity.

In 2011, the production of paddy fields in the Sintang area is 94,445 tons and the planting area width is 36,566 ha, or the average production is 25.83 quintals/ha. Meanwhile, the rice yield is 72,164 tons from 22,377 ha area or the average production is 32.25 quintals/ha.

For crops planted in 2011, there are peanuts, soybeans, green beans, and cassava.

### 1.7.2. Plantation

Plantations in the Sintang Regency is aimed to support industrial needs, i.e. rubbers and oil palms. The rubber and oil palms plantations are managed by people in the People's Principal Plantation (PIR) method and companies.
In 2011, the rubber production of the Sintang Regency reaches 35,101.39 tons from 34,829 ha plantations.
For the oil palm plantation in 2011, the production yield reaches 127,031.70 tons from 33.221 ha.

Other plantation crop is coffee, but the production is still relatively insignificant.

### 1.7.3. Livestock and Fisheries

The farms in the Sintang Regency are as follows.

- Pig : 69,775
- Goat : 10,740
- Cow : 9,486
- Buffalo : 512
- Chicken : 242,531
- Free-range chicken : 153,201
- Duck : 5,740

In terms of fishery, the 2011 production is solely common carp fishes in which the figure is 108.26 tons.

### 1.7.4. Forestry

The Sintang Regency is regency which has a relatively wide forest area, i.e. 21.99% of the territory. According to the Decree of the Minister of Forestry No. 259/KPS-11/2000 issued on 23rd August 2000, the Sintang Regency consists of:

- National Park : 68,603 Ha.
- Protection Forest : 446,799 Ha.
- Limited Production Forest : 623,505 Ha.
- Regular Production Forest : 188,465 Ha.
- Tourist Forest : 1,334 Ha.

The IUP area of PT. Aurum Persada Khatulistiwa which is located on the APL area (*areal pemanfaatan lain*–other utilization area) can be seen in figure 3.

## 1.8. Climate

The Sintang Regency is known as a high intensity wet area. The 2011 rainfall data shows that the average rainfall in the Sintang Regency is 236.76 mm per month or the average of rainy days of each month is 17 days.

The high intensity of rainfall in the Sintan Regency is caused by two possibilities. The first possibility is 53.50% of the Sintang Regency territory is hills. The second possibility is the influence of tropical forests and high humidity.

In 2011, the month which has the highest average rainfall is November. The rainfall is up to 375.8 mm and the number of rainy days is 19 days. Meanwhile, the month with the lowest rainfall is June which is 78.1 mm and the number of rainy days if 8 days.

When the rain intensity is high, it is usually followed with high speed winds. It affects people's activities.

# CHAPTER II

# GEOLOGY

## 2.1. General Geology

In general, the geology of the West Kalimantan area is composed from rocks of sediment, igneous and metamorphic rocks. The ages of the rocks, starting from the oldest, are Early Cretaceous (pre-Tertiary), Tertiary to Recent rocks (alluvial sediments).

If it is outlined based on the type of rocks, West Kalimantan can be divided into 3 (three) areas, i.e. south, central and north areas.

- The South area is composed by the domination of volcanic and intrusion rocks which are Late Cretaceous and alluvial sediments which are Recent.
- The Central area is composed by the domination of Late Cretaceous – Oligocene (Tertiary) igneous and sediment rocks, Carboniferous metavolcanic rocks and Recent alluvial sediments.
- The North area is composed by the domination of Carboniferous-Triassic sediment, mélange, and metamorphic rocks and Recent alluvial sediment.

According to the above areas distribution, the IUP location of PT. Aurum Persada Khatulistiwa is located on the Central area, i.e. Oligocene sediments rocks.

### 2.1.1. Regional Stratigraphy

The regional stratigraphy surrounding the IUP Eksplorasi of PT. Aurum Persada Khatulistiwa is composed by sediment rocks which are summarized in these following rock formations (from the earliest):

- Alluvial Sediment (Qa)
- Tebidah Formation (Tot)

- Payak Formation (Teop)
- Ingar Formation (Teu)
- Selangkai Group (base rocks)

Alluvial Sediment (Qa): the composing materials are sand, gravel, mud and plant.

Tebidah Formation (ToT): the rock units are greyishmudstone and siltstone on the lower layer, intersection of greyish, reddish and greenish lithic sandstone and mudstone on the upper layer. In some parts, coal seams are found.

Payak Formation (Teop): the rock units are intersections of sandstone, mudstone, siltstone; local is richof fossil. The sandstone directional bunds are shown by dots.
Ingar Formation (Teu): Silat shards, Dangkan Sandstone, and Ingar Formation (non-differentiable).

Selangkai Formation (Kse): base rocks surrounding the IUP area. The rock units are mudstone, sandstone, lime siltstone, and non-limestone; several sandstone/mudstone neatly covered by layered streaks, *berakalan* mudstone, multi-materials conglomerate, limestone; local fossils. Experienced some tectonic activities so various rocks were formed, and mélange or formation was damaged. The sandstone directional bund is shown by dots.

### 2.1.2. Regional Geological Structure

According to the data observed in the *Peta Geologi Lembar Sintang, Kalimantan (Geological Map of Sintang Sheet, Kalimantan*) by Reryanto, R., et. al. (1993), a regionally geological structural map is made. Some are covered by alluvial sediments (Qa). Materials in these alluvial sediments consist of mud, silt, sand and gravel, which are mentioned to be beach, river and swamp sediments. Referring to the surrounding area, i.e. the western and northern area of the IUP location of PT. Aurum Persada Khatulistiwa, the general direction of the layer tends to be west to northwest – east to southeast. The geological structure which is referred

to develop surrounding the location is the folds which have southwest-southeast relatively general direction.

## 2.2. Local Geology and Measurement of Gold Sediment Resources

### 2.2.1. Stratigraphy

Based on the data observed in the *Geological Map of Sintang Sheet, Kalimantan* by Reryanto, R., et. al. (1993), the rocks lithology description on the IUP location of PT. Aurum Persada Khatulistiwa consists of, from the upper layer:

- Alluvial sediment (Qa): the materials are sand, gravel, mud and plant. It was accumulated on the Quarter Period.
- Tebidah Formation (Tot): the rock units consist of greyish mudstone and siltstone on the lower layer, intersection of greyish, reddish and greenish lithic sandstone and mudstone on the upper layer.

### 2.2.2. Local Geological Structure

The presence of alluvial sediment (Qa) and Tebidah Formation sediment (Tot), and morphology which tends to be lands, makes the observation on the geological structure in the research location, difficult. The research location is the IUP location of PT. Aurum Persada Khatulistiwa.

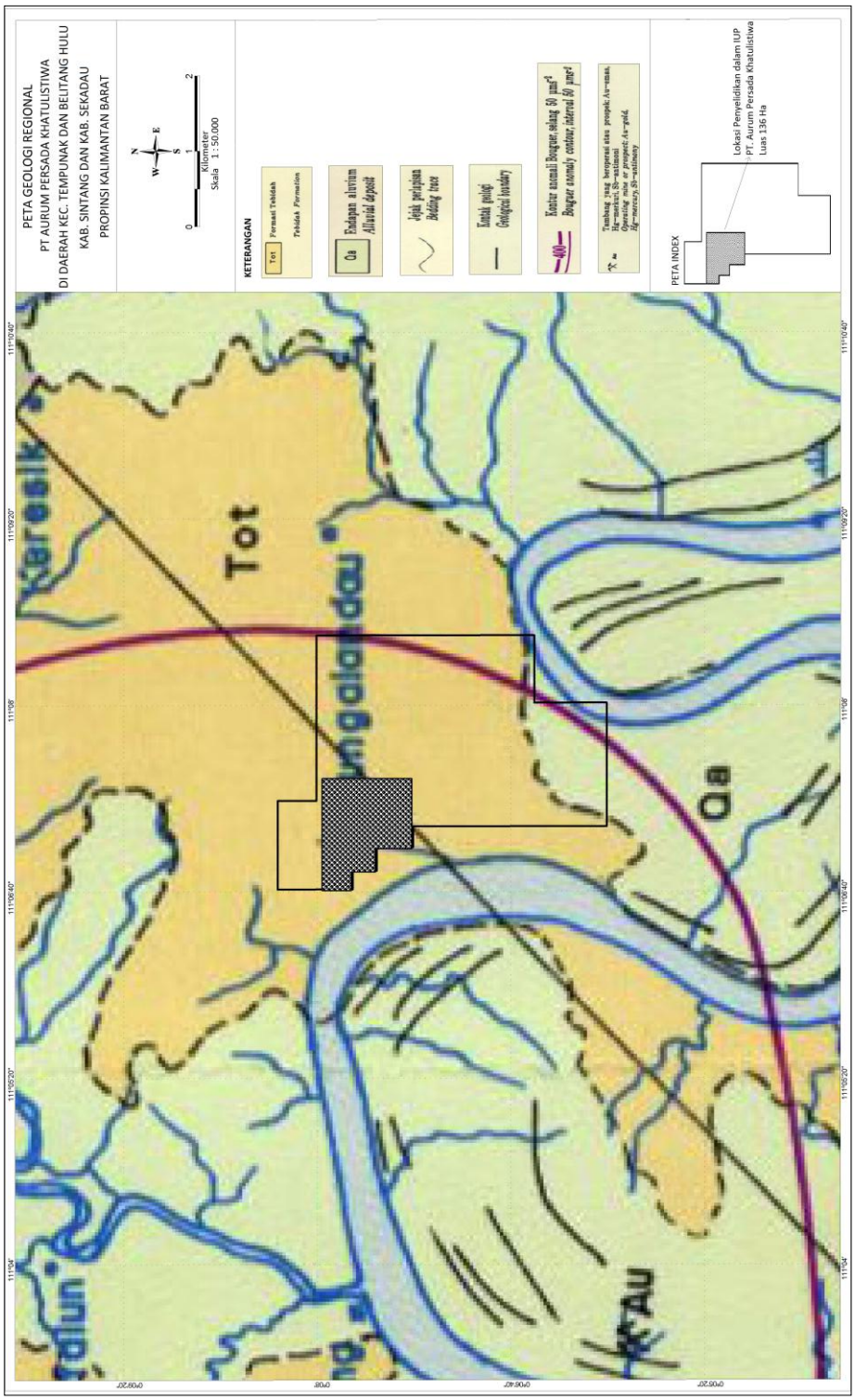


Figure 2.2. Regional Stratigraphy Condition of the Tarakan Concave, the location of OP IUP of PT. Aurum Persada Khatulistiwa.

### 2.2.3. Secondary Gold Deposit

A secondary gold deposit or widely known as alluvial gold is a gold deposit accumulated along with sediment materials which were brought by river flow or sea waves. It is a common characteristic which is easily found and mined.

The alluvial gold deposit is characterized by a free sediment condition which contains gold in grains, can be mined and processed by physical gold segregation method.

#### 2.2.3.1. Distribution

The deposits which are the target of research are the presence of gold in the alluvial sediment (secondary gold deposit). For such purpose, the research priority is given to areas which have thick alluvial deposits and the presence of base rocks which are the base of gold deposits. Usually the presence of gravels and pebbles can also be found on such deposits.

This research measures three minerals, i.e. gold, zircon and titanium. However, the main target is to found gold deposits which is economically valuable for mining.

#### 2.2.3.2. Measurement of Alluvial Gold Resource

In order to calculate the significance of gold deposit resources (measured, observable and predictable) in the explored location, the approach taken is drill position, depth and laboratory analysis. It is performed in order to know the gold content in each ton. The laboratory used by the arranging team is Laboratory of Intertek Services Utama (ITS).

The resources clarification applies the Joint Ore Reserve Committee (JORC) method, i.e.:

1. Measured resource : 0 – 250 meters from the information point.
2. Observable resource : 250 – 500 meters from the information point.
3. Estimable resource : 500 – 1000 meters from the information point.

In order to calculate the gold resource in the alluvial sediment or sediment rocks, two phases are taken, i.e. measurement of alluvial sediment or sediment rocks (S) ton and measurement of secondary gold deposits in three resources (measured, $SD_{Terukur}$; observable, $SD_{Terunjuk}$; and estimable, $SD_{Tereka}$).

The formula applied in the measurement of alluvial sediment or sediment rocks ton is:

**S = A x T x SG x G**

Notes:

S = Alluvial Sediment or Sediment Rocks Ton (ton)

A = Area width in accordance with the category ($m^2$) which is circle formed. ($A = \pi r^2$). R is radius (diameter). The radius of measureable resource is 250 meters; observable resources radius is 500 meter; and estimable resources radius is 1,000 meters.

T = thickness, the vertical thickness of alluvial sediments and sediment rocks (m)

SG = Specific gravity (density) of the alluvial sediment or sediment rocks, i.e. 2.62 – 2.75 (Hary Cristiady, 1992, Mekanika Tanah).

G = Geological Loses (10%)

The formula applied in the measurement of alluvial sediment or sediment rocks (S) ton is:

$SD_{Terukur}$ = S(measured) x gold content

$SD_{Terunjuk}$ = S(observable) x gold content

$SD_{Tereka}$ = S(estimable) x Gr

Notes:

$SD_{Terukur}$ = Gold deposit resources for 250 meter radius width

$SD_{Terunjuk}$ = Gold deposit resources for 500 meter radius width

$SD_{Tereka}$ = Gold deposit resources for 1,000 meter radius width

S = ton of the alluvial sediment or sediment rocks

Gr = grade, gold content for 2 meter thickness in gram/ton.

Then, in order to measure the gold deposit resources, it can be calculated in accordance with its resources.

## 2.3. Researchers and Previous Research Results

The previous researchers to conduct a study within the IUP location of PT. Aurum Persada Khatulistiwa are public and private institutions.

Several scientific publications and previous reports which come from the studies within the IUP location of PT. Aurum PersadaKhatulistiwa are as follows.

1. Supriatna, S. et. al. 1993.Systematically geological mapping in Kalimantan and published "*Peta Geologi Indonesia, Lembar Singkawang"* – Indonesian Geological Map, Singkawang Sheet, scaled 1 : 1,000,000, Pusat Penelitian dan Pengembangan Geologi, Bandung.

2. Heryanto, R. et. al., 1993, Systematically geological mapping in Kalimantan and published "*Peta Geologi Lembar Sintang, Kalimantan"* – Geological Map, Sintang Sheet, Kalimantan, scaled1 : 250,000, Pusat Penelitian dan Pengembangan Geologi, Bandung.

# CHAPTER III

# RESEARCH ACTIVITIES

The series of work phases in the alluvial gold exploration within the IUP location of PT. Aurum Persada Khatulistiwa, includes a study of literature on the research area and field preparation, geological mapping and test pit construction and shallow drilling by using hand auger, geoelectrical and drilling works, and laboratory analysis.

## 3.1. Study of Literature

Prior to the field research, some preparations on the IUP Location of PT. Aurum Persada Khatulistiwa are performed, among others: study of literature on the research area, basic map procurement for field activities, i.e. topographic map scaled 1 : 5,000, Geological Map, Sintang Sheet, Kalimantan, scaled 1 : 250,000, geological field tools and other equipment.

The field geological tools and equipment usually used in the exploration, including repeated exploration in the IUP location of PT. Aurum Persada Khatulistiwa, are: Jacro 175 drill machine, basic map (atopographic map scaled 1 : 5,000), Navigational GPS (Garmin, GPSmap 60 CSx), geological compass, geological hammer, suuntho azimuth, suuntho clino, digital camera, meter (5 m), coal sampling bags, digging tools (crowbar, hoe, etc.), stationary, medicine (first aid), field bags, field tent tools (flying camp), boots, rain coats, etc.

## 3.2. Field Research

The width of the IUP location of PT. Aurum Persada Khatulistiwa is 1,000 Ha. The research in the IUP location of PT. Aurum Persada Khatulistiwa applies two research methods. First, whole areas of PT. Aurum Persada Khatulistiwa's IUP location apply a geological mapping method. Meanwhile, the 300 Ha area located on the northern party of the PT. Aurum Persada Khatulistiwa's IUP location applies

a semi-detailed exploration. The report preparation refers to the Joint Ore Reserve Committee (JORC) Standard.

In the 300 Ha area, the exploration works are:

- ✓ Geological mapping
- ✓ Geophysics work (geoelectrical method)
- ✓ Test pit construction and shallow drilling by using a hand auger,
- ✓ Drilling work, and
- ✓ Topographic mapping.

### 3.2.1. Geological Mapping

The geological mapping is performed by a line method in which lines traces hills and river flows. The rock exposure tracing and observation is performed on the river flow, top soil openings and other exposures. Every information on exposures or other observations found is used to determine the geographical positions and elevation. The observation and coordinate setting of the observation location is recorded by a global positioning system (GPS) tool.

Matters performed in every observation on the exposures found are:

- ➢ Measurement on geological structures: rock layers position (directional angle and declivity angle), rock layers thickness, structural indication, such as spreads, faults, folds, and alignments
- ➢ *Pemerian* of rocks exposures: record colour, texture, structure and type of existing mineral (specifically metal and mineral contents)
- ➢ Observation on the rock layers position: roofs and floors, and layers observation on the main layers to be assumed to contain gold deposits.
- ➢ Measurement of rock layers thickness: aimed to make a stratigraphic display profile
- ➢ Alluvial sediment sampling to be sent to a laboratory to be analyzed
- ➢ Establishment of an observation location in east longitude, north latitude and relative elevation.

### 3.2.2. Test Pit Construction and Shallow Drilling

The test pit construction is aimed to find the alluvial sediment layers from the surface to the end depth of the pit. The size of the pit is 2 x 2 meters and the depth is 3-4 meters. In addition to the lithological structure of rocks on the pit wall, material on such wall is taken and panned. The number of gold grains on the panning will be an indication whether the area is prospective.

The shallow drilling has the same purpose with the test pit construction. The difference is only the materials taken by hand augers are limited and observations on the rock lithology are only observed via materials taken by hand augers. The depth of hand auger drilling is limited, i.e. 2-3 meters only.

### 3.2.3. Geoelectrical Research

A geoelectrical research is a research method usually applied on the underground water survey. The underground water storage media is easily detected by using a geoelectrical method. For the same purpose (in the secondary gold exploration in this alluvial deposit), the geoelectrical work is aimed to know the sand deposit layer position. The depth position and thickness of the sand sediment is the target to be accomplished in the geoelectrical work.

Such geophysics work (geoelectrical method) is the guide for the next exploration work, i.e. drilling work, in which the drill position and drilling depth target are conclusions expected from this geoelectrical work.

### 3.2.4. Drilling

The exploration drilling work to be performed within the OP IUP area of PT. Aurum Persada Khatulistiwa applies a full coring method, i.e. a drilling by taking a coring from the commencement of the drilling up to the end depth of the drilling work. The drill used is a win, i.e. a drill completed by cables to raise and lower the core barrel without raising the already planted drilling pipe.

In the drilling activity, the drill machine is operated by a drill operator assisted by several assistants. Meanwhile, the supervision of the drilling work is conducted by a geologist who acts as a well site.

The drill core (core) which is a rock layer taken from the drilling work, is divided into 2 (two) parts. One part will be filed and the other party will be sent to a laboratory.

## 3.3. Laboratory Analysis

A laboratory work holds an important role in every gold exploration, either primary or secondary. The capacity and accreditation of the laboratory used for analyzing research targeted elements are keys of reliability rate on the exploration result.

There is no many mineral laboratories in Jakarta which have a national and international accreditation. Several mineral laboratories which hold national and international accreditation is CCIC, which is located at the vicinity of the cargo area of the Soekarno-Hatta Airport, Cengkareng and Laboratory (Lab) of PT. Intertek Utama Services, which is located at Jalan Raya Cimanggis KM 28, East Jakarta.

In order to analyze elements which are this research's target, i.e. gold (Au), zircon (Zr) and titanium (Ti), the research team uses Intertek Lab.

### 3.3.1. Topographic Mapping

The topographic mapping is aimed to get coordinates (East Longitude or Easting and North Latitude, Northing) and elevation of each measured point. The coordinate and elevation measurement must be conducted by a high accuracy rate in order to avoid systematic and accumulative errors. Therefore, a theodolite is used. The model of tools used for the topographic mapping is Total Station (TS).

The topographic mapping measures every drilling point, i.e. 10 (ten) drilling points and map 163 Ha or 300 Ha area which is assumed to have potential on the alluvial gold deposits. Such locations are on the northern part of the PT. Aurum Persada Khatulistiwa's IUP block.

The topographic map scale is 1 : 2,000 and 1 : 1,000. The 1 : 2,000 scale is applied for the imaging of a geological map of the research area exploration and the 1 : 1,000 scale is applied for making a mining plan.

# CHAPTER IV

# FIELD INVESTIGATION RESULT

The field works related to exploration to gain information regarding potential Sedimentary Gold within the location of IUP PT Aurum Persada Khatulistiwa has been conducted, including geological mapping, test pit works, hand auger works, geo-electrical works, drilling works, laboratory analysis, and topographic mapping. The result of such phases is summarized in this report, to be evaluated for drawing the conclusion.

## 4.1 Geological Mapping

This will be explained in the following subchapters: geomorphology, stratigraphy, geological structure, and surface observation for potential gold within the location of IUP PT Aurum Persada Khatulistiwa.

### 4.1.1 Geomorphology

The location of IUP PT Aurum Persada Khatulistiwa is around the meander of Kapuas River, so the morphology of research location is linked to the history of Kapuas River flow. The water level of Kapuas River in the site is about 20-22 meter above sea level. The meander of this longest river in Indonesia circles the site.

From the observation of topographic map and image map, the research site can be classified into two morphological units, they are River Plain Morphological Unit and Wavy-Slope Hills Morphological Unit.

### 4.1.2 River Plain Morphological Unit

This morphological unit occupies 35% of the area of IUP PT Aurum Persada Khatulistiwa and lies around Kapuas River. It is about 25-35 m above sea level.

Structure of lithology of this unit is Quarter Sedimentary alluvial consisting of sand, clay, pebble, and gravel.

#### 4.1.2.1 Wavy-Slope Hills Morphological Unit

This morphological unit occupies 65% of the area of IUP PT Aurum Persada Khatulistiwa, the areas rather far from Kapuas River. This unit is marked with wavy-slope hills lies at its center. It is about 18-39 m above sea level.

Structure of lithology of this unit is sandstone, silt, and mudstone sediments.

### 4.1.3 Stratigraphy

Based on field research conducted within the area of IUP PT Aurum Persada Khatulistiwa, particularly from drilling works, there are 3 (three) units of stone found, they are (from oldest to the youngest) Sedimentary alluvial unit, sandstone unit, and Mudstone unit.

#### 4.1.3.1 Sedimentary alluvial Unit

Sedimentary alluvial unit occupies the bank of Kapuas River and basins at the center of site. The materials composing this unit are pebble, gravel, sand, silt, and clay.

Sedimentary alluvial unit covers 70% of surface area of IUP PT Aurum Persada Khatulistiwa.

#### 4.1.3.2 Sandstone Unit

The sandstone unit lies beneath Sedimentary alluvial. In several spots, sandstone outcrops occur as a result of lifting. This unit occupies 20% of IUP area.

The sandstone unit is composed by grayish, yellowish, reddish, and brownish sand with soft to hard grain. Some silt is also found, with brittle to hard rigidity.

#### 4.1.3.3 Mudstone Unit

The Mudstone unit lies beneath sandstone unit. In several spots, sandstone outcrops occur as a result of lifting. This unit occupies 10% of IUP area.

The Mudstone unit is composed by grayish, yellowish, reddish, and brownish clay-silt mineral with brittle to hard rigidity.

### 4.1.4 Geological Structure

From the structure of stratigraphy found in the site, the estimated geological history occurs within the area of IUP PT Aurum Persada Khatulistiwa and surrounding is Mudstone unit that was precipitated during Oligocene era. Based on the stone observation, it is presumed that precipitation was occurred in land. During the same era, Oligocene, sandstone was also precipitated. The relation of both unit precipitations is consistent.

At the end of Oligocene-Miocene era, lifting occurred as a result of batholith granite intrusion, followed by granodiorite and diorite intrusions (Sintang, Toms Intrusions) transporting gold mineralization and its trailing mineral. Such intrusions induce fold and fault.

### 4.1.5 Potential Alluvial Sedimentary Gold

The indication of Sedimentary Gold availability within the area of IUP PT Aurum Persada Khatulistiwa has been proven by the presence of gold miners. Generally, they use spraying machine and sluice box, a 1-2 meter carpet-layered board.

The method of such gold mining goes with the following stages. First, spraying the wall or any part allegedly contains alluvial gold grain. Slowly, the material will collapse and fall down with the water from the sprayer and becomes sediment that brings mud-to-chunk-size material. The materials will be collected in pits previously prepared.

Second, the materials collected in the pits are sprayed to sluice box using other spraying machine. The sluice box must be equipped with screen as a separator. The lump is disposed to the rear part while the small parts are down through the screen and then to sluice box. Gold grains, as mineral with high specific gravity (19.32), is expected to keep flowing by penetrating vertically and caught by carpet's fibers.

Third, the material trapped in carpet will be panned afterward to separate gold grain from other impurities. The gold obtained that way is secondary gold. Naturally it has 60%-90% degree so it can be cashed out or sold to the receivers usually come to pick it up.

The existence of alluvial Sedimentary Gold within the area of IUP PT Aurum Persada Khatulistiwa is also expected to have the same potential with the other mining areas. The observation of test pits as well as material panning out of such test pits indicating the existence of gold grain in each panning.

To find out the potential more exactly (real), the next exploration works is to conduct geo-electrical inspection, take samples with hand auger, and run laboratory analysis as to Sedimentary Gold content and other desirable minerals (Zr dan Ti).

## 4.2 Geo-electrical Inspection

The result of geo-electrical inspection is summarized in form of section figure and goes with the names Sin-20, Sin-21, Sin-22, Sin-25 and Sin-27.

The result presented in Sin-20 is the interpreted result of the combination among test pits, hand auger, and geo-electrical works. It is estimated that the alluvial Sedimentary Gold lies at 10-16 m depth and is assumed as sand sediment. The drilling point is L2-E130.

The result presented in Sin-21 is the interpreted result of the combination among test pits, hand auger, and geo-electrical works. It is estimated that the alluvial Sedimentary Gold lies at 0-2 m depth and is assumed as Sedimentary alluvial. The drilling point is L-21-80.

The result presented in Sin-22 is the interpreted result of the combination among test pits, hand auger, and geo-electrical works. It is estimated that the alluvial Sedimentary Gold lies at 0-2 m depth and is assumed as Sedimentary alluvial. The drilling point is L-22 E160.

The result presented in Sin-25 is the interpreted result of the combination among test pits, hand auger, and geo-electrical works. It is estimated that the alluvial Sedimentary Gold lies at 0-2 m depth and is assumed as Sedimentary alluvial. The drilling point is L-25 E 150.

The result presented in Sin-27 is the interpreted result of the combination among test pits, hand auger, and geo-electrical works. It is estimated that the alluvial Sedimentary Gold lies at 0-2 m depth and is assumed as Sedimentary alluvial. There are 2 (two) drilling points; L27 E80 and L-27 E 80 + 100 M/127-130.

## 4.3 Drilling Works

Drilling works for alluvial Sedimentary Gold exploration within the area of IUP PT Aurum Persada Khatulistiwa have been carried out in 10 (ten) drilling points. The coordinates and elevation of the drilling points are presented in the Table 4.1 below.

Table 4.1

Coordinates of Drilling Points, Elevation, and Depth of Each Drilling Pits

| No. | Auger Number | East Longitude | North Latitude | Elev (m) | Total Depth (m) |
|---|---|---|---|---|---|
| 1 | L -20 EL 80 | 111° 17′ 55,97″ | 0° 7′ 53,70″ | 55 | 50 |
| 2 | L -20 EL 84 | 111° 17′ 53,25″ | 0° 7′ 55,49″ | 58 | 50 |
| 3 | L -20 EL 130 | 111° 17′ 57,04″ | 0° 7′ 54,87″ | 53 | 50 |
| 4 | L -21 EL 80 | 111° 17′ 52,02″ | 0° 7′ 48,22″ | 53 | 50 |
| 5 | L -20 EL 160 | 111° 17′ 48,08″ | 0° 7′ 44,77″ | 47 | 45 |
| 6 | L -25 EL 90 | 111° 17′ 45,72″ | 0° 7′ 55,03″ | 42 | 54 |
| 7 | L -25 EL 150 | 111° 17′ 46,94″ | 0° 7′ 56,30″ | 50 | 50 |
| 8 | L -27 EL 100 | 111° 17′ 57,69″ | 0° 8′ 3,37″ | 60 | 50 |
| 9 | L -27 EL 130 | 111° 17′ 55,29″ | 0° 8′ 5,62″ | 56 | 50 |
| 10 | L Quarry 2 | 111° 17′ 53,90″ | 0° 7′ 55,65″ | 58 | 51,5 |

### 4.3.1 Result of Drilling L-20 EL 80

Structure of lithology obtained from drilling with Auger No. L-20 EL80 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 6.5 m) ;
- Siltstone (6.5 – 12 m) ;
- Mudstone (12 – 28.8 m) ;
- Siltstone (28.8 - 34 m) ;
- Mudstone (34 – 48 m); dan
- Siltstone (48 – 50 m).

### 4.3.2 Result of Drilling L-20 EL 84

Structure of lithology obtained from drilling with Auger No. L-20 EL84 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 8.5 m) ;
- Siltstone (8.5 – 18 m) ;
- Mudstone with coal insertion (18 – 19.6 m) ;
- Siltstone (19.6 - 44 m) ; and
- Sandstone (44 – 50 m).

### 4.3.3 Result of Drilling L-20 EL130

Structure of lithology obtained from drilling with Auger No. L-20 EL130 from the surface to ultimate depth is:

- Sedimentary alluvial (0 - 6 m) ;
- Sandstone (6 – 17 m) ;
- Siltstone (17 – 28 m) ;
- Mudstone (28 - 40 m) ;
- Sandstone (40 – 42 m) ; and
- Mudstone (42 – 50 m).

### 4.3.4 Result of Drilling L-21 EL 80

Structure of lithology obtained from drilling with Auger No. L-21 EL80 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 5.5 m) ;
- Siltstone (5.5 - 25 m) ; and
- Mudstone (25 – 50 m).

### 4.3.5 Result of Drilling L-20 EL 160

Structure of lithology obtained from drilling with Auger No. L-20 EL160 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 6.5 m) ;
- Siltstone (6.5 – 23 m) ;
- Sandstone (23 – 27 m) ;
- Siltstone (27 - 33 m) ; and
- Sandstone (33 – 45 m).

### 4.3.6 Result of Drilling L-25 EL90

Structure of lithology obtained from drilling with Auger No. L-25 EL90 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 3.5 m) ;
- Siltstone (3.5 – 11 m) ;
- Mudstone (11 – 17.5 m) ;
- Siltstone (17.5 - 32 m) ; and
- Mudstone (32 – 54 m).

### 4.3.7 Result of Drilling L-25 EL 150

Structure of lithology obtained from drilling with Auger No. L-25 EL150 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 8.5 m) ;
- Siltstone (8.5 – 18 m) ;
- Mudstone with coal insertion (18 – 19.6 m) ;
- Siltstone (19.6 - 44 m) ; and
- Sandstone (44 – 50 m).

### 4.3.8 Result of Drilling L-27 EL100

Structure of lithology obtained from drilling with Auger No. L-27 EL100 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 23.2 m) ;
- Siltstone (23.2 – 27.8 m) ;

- Mudstone (27.8 – 38 m) ;
- Siltstone (38 – 42.6 m) ; and
- Mudstone (42.6 – 50 m).

### 4.3.9 Result of Drilling L-27 EL130

Structure of lithology obtained from drilling with Auger No. L-27 EL130 from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 5.2 m) ;
- Siltstone (5.2 – 11.3 m) ;
- Mudstone (11.2– 15.3 m) ;
- Siltstone (15.3 - 24 m) ;
- Sandstone (24 – 28 m) ; and
- Mudstone (28 – 50 m).

### 4.3.10 Result of Drilling Lquarry

Structure of lithology obtained from drilling with Auger No. L Quarry from the surface to ultimate depth is:

- Sedimentary alluvial (0 – 1 m) ;
- Siltstone (1 – 21 m) ; and
- Mudstone (21 – 51.5 m).

### 4.3.11 Retaking Samples

Retaking samples is conducted to obtain better samples, considering all samples taken from previous works, it was obtained very low contents of gold (Au), zirconium (Zr), and titanium (Ti).

The selected location is part of 130 Ha previously explored. The target of this sample retaking is to choose location that is exactly a recent sedimentary alluvial.

From this re-exploration, it is found 39.9 Ha of alluvial plain at the center of 130 Ha previously explored. This sedimentary is stretched from east to west, overgrown by bush, and sandwiched by mass rubber plantation.

The tools used to take sedimentary alluvial samples are hand auger and water auger. Hand auger can reach its maximum depth up to 8.5 meter. The tool must be spun by the 4 operators operating it on the selected location. The alluvial taken by the hand auger will be the sample to be taken its concentrate. Whereas for water auger, the pressure of water caused by the tool will push the material to the surface and will be the sample to be further processed. Afterward, materials obtained from both tools will be weighted, panned, and taken its concentrate. The concentrate from panning will be weighted then and used as data in calculating the quantity of reserves.

## 4.4 Result of Element Analysis

There are 150 samples delivered to the laboratory of PT Intertek Utama Services. Those samples were taken up to 30 meter depth, one sample for every 2 (two) m. That is why there are 15 (fifteen) samples for each drilling pit, or 150 samples for 10 (ten) drilling pits. The analysis can be seen in Table 4.2 – Table 4.12.

The analysis from 130 samples revealed that the gold content is very low, while the zirconium and titanium contents are higher than the gold content.

On the bases of condition above, exploration is to be repeated. The re-exploration area is 45.3 Ha with 36 samples taken and 100-250 m interval. The samples were taken from the alleged location of old river basin. The analysis from those three elements (Au, Zr, and Ti) can be seen in Table 4.1 below.

## Gold (Au)

For gold content within 47.6 Ha area, the highest amount is from pit number APK-CST-70 (155 ppm or gram/ton), while the lowest amount is from pit number APK-CST-15A (0.023 ppm). The average amount of gold content in concentrate within the research site is 5.3 gram/ton.

## Zirconium (Zr)

The total area explored for zirconium is 45.3 Ka. The analysis to determine zirconium content is conducted toward zirconium dioxide ($ZrO_2$) and zirconium element (Zr). The highest amount of $ZrO_2$ is from the concentrate taken from pit number APK-CST-72 (41.4% or 414,000 ppm or gram per ton), while the lowest amount is from several pits, among others, number APK-CST-36 (0.03% or 300 ppm). The average amount of $ZrO_2$ content within the research site is 2.346% or 23.4460 gram/ton.

## Titanium (Ti)

Similar to zirconium, the analysis is conducted toward titanium dioxide ($TiO_2$) and titanium element (Ti). The highest amount of $TiO_2$ or Ti content is from pit number APK-CST-63 (2,65% or 26.500 ppm or gram per ton), while the lowest amount is from several pits, among others, number APK-CST-32 (0,14% or 1,400 ppm). The average amount of $TiO_2$ content within the research site is 0.8847% or 8.847 gram/ton.

From the lab analysis of gold (Au), zirconium dioxide (ZrO2), and titanium dioxide (TiO2), it is obtained data for the highest content, the lowest content, and average content of each mineral. Such data along with the quantity of resources for those three minerals can be seen in the table 4.4 below.

**Tabel 4.6**
**The content of each mineral within the research area of 47.57 Ha and calculation of resources for Au, $ZrO_2$ and $TiO_2$.**

| No. | Mineral | Highest content gram/ton | Lowest Content gram/ton | Average Content gram/ton | Resources/ Reserves (ton) | Resources/ Hectare (ton) |
|---|---|---|---|---|---|---|
| 1 | Gold (Au) | 155 | 0,023 | 5,3 | 683,6 | 14,37 |
| 2 | Zirconium ($ZrO_2$) | 414.000 | 300 | 23.460 | 1.079,3 | 22,7 |
| 3 | Titanium ($TiO_2$) | 26.500 | 1.400 | 8.847 | 2.629,7 | 55,2 |

**TABEL 4.2**

**SEDIMENTARY ALLUVIAL SAMPLE AND ANALYSIS OF ELEMENTS TOWARD THEIR CONCENTRATES**

**WITHIN THE AREA OF IUP PT AURUM PERSADA KHATULISTIWA, KECAMATAN SEPAUK, KAB. SINTANG - KALBAR**

| No. | Sample Code | COORDINATES | | | | | | Elevation | Alluvial Thickness | Sample Weight | Sample Concentrate Weight | ANALYSIS RESULT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BT | | | LS | | | | | | | Au | Ag | $ZrO_2$ | $TiO_2$ |
| | | ° | ' | " | ° | ' | " | (m) | (m) | (kg) | (kg) | ppm | ppm | % | % |
| 1 | APK-CST- 1 | 111 | 17 | 51 | 0 | 8 | 6,3 | 43 | 1,5 | 21 | 1,5 | 0,067 | <1 | 0,05 | 0,33 |
| 2 | APK-CST- 2 | 111 | 17 | 56,6 | 0 | 8 | 8,2 | 43 | 2 | 23 | 2 | 0,054 | <1 | 1,01 | 2,33 |
| 3 | APK-CST- 11 | 111 | 17 | 58,2 | 0 | 8 | 5,3 | 47 | 1,5 | 32 | 2 | 0,064 | <1 | 0,05 | 0,37 |
| 4 | APK-CST- 14 | 111 | 17 | 23 | 0 | 7 | 9,5 | 24 | 3,2 | 10 | 0,3 | 0,047 | <1 | 0,04 | 1,86 |
| 5 | APK-CST- 15A2 | 111 | 17 | 44,4 | 0 | 7 | 54,5 | 32 | 6 | 28 | 1,1 | 0,023 | <1 | 0,58 | 0,55 |
| 6 | APK-CST- 16 | 111 | 17 | 49,1 | 0 | 7 | 55,7 | 30 | 4 | 6,5 | 2 | 0,033 | <1 | 0,12 | 0,36 |
| 7 | APK-CST- 17 | 111 | 17 | 54 | 0 | 7 | 57 | 63 | 3 | 19,1 | 1,5 | 1,06 | <1 | 0,09 | 1,57 |
| 8 | APK-CST- 18 | 111 | 17 | 58,9 | 0 | 7 | 56,9 | 51 | 0,6 | 2,5 | 0,9 | 0,039 | <1 | 0,07 | 0,21 |
| 9 | APK-CST- 23 | 111 | 17 | 41,9 | 0 | 7 | 49,9 | 29 | 1 | 0 | 0 | 0,26 | <1 | 0,03 | |
| 10 | APK-CST- 24 | 111 | 17 | 48 | 0 | 7 | 50,3 | 38 | 3 | 18,5 | 1 | 1,46 | <1 | 0,38 | 1,57 |
| 11 | APK-CST- 25 | 111 | 17 | 52 | 0 | 7 | 52,4 | 54 | 2 | 19,5 | 1,5 | 0,055 | <1 | 0,05 | 0,21 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | APK-CST- | 31 | 111 | 17 | 41,8 | 0 | 7 | 44 | 24 | 2 | 4 | 0,25 | 0,096 | <1 | 0,03 | 0,14 |
| 13 | APK-CST- | 32 | 111 | 17 | 49,7 | 0 | 7 | 47,6 | 61 | 4 | 22,5 | 2,25 | 1,98 | <1 | 0,37 | 1,62 |
| 14 | APK-CST- | 32B | 111 | 17 | 49,9 | 0 | 7 | 46,9 | 60 | 1 | 27 | 2,75 | 0,041 | <1 | 0,05 | 0,47 |
| 15 | APK-CST- | 36 | 111 | 17 | 41,7 | 0 | 7 | 38 | 16 | 2,3 | 1,5 | 1,5 | 0,23 | <1 | 0,03 | 0,56 |
| 16 | APK-CST- | 50 | 111 | 17 | 28,6 | 0 | 7 | 47,3 | 37 | 5,3 | 30,5 | 4,5 | 0,083 | <1 | 0,09 | 0,38 |
| 17 | APK-CST- | 51R | 111 | 17 | 30,3 | 0 | 7 | 48,8 | 20 | 3,2 | 18 | 1,2 | 0,05 | <1 | 0,03 | 0,4 |
| 18 | APK-CST- | 52 | 111 | 17 | 29,7 | 0 | 7 | 49,8 | 20 | 6,15 | 68,65 | 6 | 0,076 | <1 | 0,13 | 0,81 |
| 19 | APK-CST- | 53 | 111 | 17 | 32 | 0 | 7 | 49,2 | 16 | 6,7 | 44,45 | 5,5 | 0,063 | <1 | 0,1 | 0,46 |
| 20 | APK-CST- | 54 | 111 | 17 | 32,5 | 0 | 7 | 51,7 | 19 | 4,7 | 14,5 | 1,8 | 0,047 | <1 | 0,07 | 0,43 |
| 21 | APK-CST- | 55 | 111 | 17 | 34,6 | 0 | 7 | 50,9 | 22 | 3 | 4,5 | 0,5 | 0,096 | <1 | 0,05 | 0,43 |
| 22 | APK-CST- | 57 | 111 | 17 | 37,2 | 0 | 7 | 53,9 | 19 | 2 | 14,75 | 1,2 | 0,11 | <1 | 0,16 | 0,73 |
| 23 | APK-CST- | 58 | 111 | 17 | 35,4 | 0 | 7 | 52,7 | 24 | 2,3 | 15,5 | 1,2 | 0,087 | <1 | 0,05 | 0,7 |
| 24 | APK-CST- | 59 | 111 | 17 | 38,5 | 0 | 7 | 54,3 | 26 | 2 | 13,5 | 1,2 | 0,1 | <1 | 0,05 | 0,44 |
| 25 | APK-CST- | 60 | 111 | 17 | 40,2 | 0 | 7 | 53,3 | 21 | 3 | 16,5 | 1 | 0,17 | <1 | 0,15 | 1,2 |
| 26 | APK-CST- | 61 | 111 | 17 | 41,8 | 0 | 7 | 54,2 | 27 | 2,5 | 12 | 1,3 | 0,13 | <1 | 0,21 | 0,76 |
| 27 | APK-CST- | 62 | 111 | 17 | 42,8 | 0 | 7 | 52,5 | 27 | 2,3 | 28 | 2,7 | 0,15 | <1 | 0,08 | 0,81 |
| 28 | APK-CST- | 63 | 111 | 17 | 44,3 | 0 | 7 | 53,3 | 28 | 2,3 | 19 | 2 | 0,12 | <1 | 1,69 | 2,65 |
| 29 | APK-CST- | 64 | 111 | 17 | 45,9 | 0 | 7 | 52,3 | 28 | 3 | 15 | 1,8 | 0,089 | <1 | 0,07 | 0,35 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | APK-CST- | 65 | 111 | 17 | 47,2 | 0 | 7 | 53 | 31 | 2,2 | 23 | 1,5 | 0,084 | <1 | 0,56 | 1,53 |
| 31 | APK-CST- | 66 | 111 | 17 | 47,9 | 0 | 7 | 53,7 | 31 | 2,1 | 20,5 | 2,4 | 0,13 | <1 | 0,32 | 1,1 |
| 32 | APK-CST- | 67 | 111 | 17 | 47,9 | 0 | 7 | 53,7 | 31 | 3 | 21 | 1,5 | 0,12 | <1 | 1,14 | 1,74 |
| 33 | APK-CST- | 70 | 111 | 17 | 54,1 | 0 | 7 | 47,4 | 29 | 3 | 15 | 1,8 | 0,089 | <1 | 0,07 | 0,35 |
| 34 | APK-CST- | 71 | 111 | 17 | 59,2 | 0 | 7 | 49,3 | 30 | 2,2 | 23 | 1,5 | 0,084 | <1 | 0,56 | 1,53 |
| 35 | APK-CST- | 72 | 111 | 17 | 56,4 | 0 | 7 | 42,4 | 32 | 2,1 | 20,5 | 2,4 | 0,13 | <1 | 0,32 | 1,1 |
| 36 | APK-CST- | 73 | 111 | 17 | 49,9 | 0 | 7 | 41,6 | 33 | 3 | 21 | 1,5 | 0,12 | <1 | 1,14 | 1,74 |

## 4.5 Sedimentary Alluvial Resources (Au, $ZrO_2$ dan $TiO_2$)

Considering that the previous exploration reveals very low analysis result, retaking samples is conducted. Therefore, the data used for calculating sedimentary alluvial resources, namely for the elements being the target of this research (Au, $ZrO_2$ dan $TiO_2$) is the data from the re-exploration.

The samples are calculated by parameters of width, sedimentary alluvial thickness, specific gravity, and analysis result for each element. The multiplication between width and thickness will result sedimentary alluvial volume, while the multiplication between volume and specific gravity of sedimentary alluvial will result the weight of such sedimentary alluvial. The specific gravity used is 2.6 gram/$cm^3$ (Hary Cristiady, 1992 Mekanika Tanah). The weight of sedimentary alluvial is then converted into the weight of sedimentary alluvial concentrate, which is divided by the amount of sedimentary alluvial being taken and multiplied by the weight of each sample concentrate. The result of multiplication and division is then multiplied by the content of each element or oxide obtained from lab.

The total area of IUP PT Aurum Persada Khatulistiwa is 1,000 hectares. But the total area being thoroughly explored is 47.57 Ha. The samples being analyzed and its result being the basis of resource calculation is 36 samples for gold (Au), 35 for zirconium dioxide ($ZrO_2$), and 32 for titanium dioxide ($TiO_2$).

The result of calculation of resources that can also be called as reserves can be seen in Table 4.3, Table 4.4 and Table 4.5.

### 4.5.1 Gold (Au) Resources

The quantity of sedimentary alluvial resources within the research site (47.57 Ha) is 683,613.045 gram or 683.6 kg or for every hectare of research site there are 17,756.183 gram of gold (Au) or 14.37 kg.

### 4.5.2 Zirconium Dioxide (ZrO2) Resources

The quantity of sedimentary ZrO2 resources within the research site (47.57 Ha) is 1,079.3 ton or for every hectare of research site there are 22.7 Ton of $ZrO_2$.

### 4.5.3 Titanium Dioxide (TiO2) Resources

The quantity of sedimentary TiO2 resources within the research site (47.57 Ha) is 2,629.7 ton or for every hectare of research site there are 55.3 ton of $TiO_2$.

**TABLE 4.3**

**CALCULATION OF SEDIMENTARY GOLD RESERVES WITHIN THE RESEARCH AREA OF 39.9 HA**

**IN THE LOCATION OF IUP PT AURUM PERSADA KHATULISTIWA, KECAMATAN SEPAUK, KAB. SINTANG – KALBAR**

| No. | Sample Code | Total Impact Area ($m^2$) | Alluvial Thickness (m) | Volume ($m^3$) | Specific Gravity ($gr/cm^3$) | Alluvial Weight (ton) | ANALYSIS RESULT | | | Concentrate Weight (ton) | RESERVES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample Weight (kg) | Concentrate (kg) | Au ppm | | Au (gold) (gram) |
| 1 | APK-CST- 1 | 40.000 | 1,5 | 60.000 | 2,6 | 156.000 | 21 | 1,5 | 0,067 | 11.143 | 746,571 |
| 2 | APK-CST- 2 | 18.750 | 2 | 37.500 | 2,6 | 97.500 | 23 | 2 | 0,054 | 8.478 | 457,826 |
| 3 | APK-CST- 11 | 17.500 | 1,5 | 26.250 | 2,6 | 68.250 | 32 | 2 | 0,064 | 4.266 | 273,000 |
| 4 | APK-CST- 14 | 19.687 | 3,2 | 62.998 | 2,6 | 163.796 | 10 | 0,3 | 0,047 | 4.914 | 230,952 |
| 5 | APK-CST- 15A2 | 7.500 | 6 | 45.000 | 2,6 | 117.000 | 28 | 1,1 | 0,023 | 4.596 | 105,718 |
| 6 | APK-CST- 16 | 7.500 | 4 | 30.000 | 2,6 | 78.000 | 6,5 | 2 | 0,033 | 24.000 | 792,000 |
| 7 | APK-CST- 17 | 22.500 | 3 | 67.500 | 2,6 | 175.500 | 19,1 | 1,5 | 1,06 | 13.783 | 14.609,686 |
| 8 | APK-CST- 18 | 22.500 | 0,6 | 13.500 | 2,6 | 35.100 | 2,5 | 0,9 | 0,039 | 12.636 | 492,804 |
| 9 | APK-CST- 24 | 3.125 | 3 | 9.375 | 2,6 | 24.375 | 18,5 | 1 | 1,46 | 1.318 | 1.923,649 |
| 10 | APK-CST- 25 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 19,5 | 1,5 | 0,055 | 9.000 | 495,000 |
| 11 | APK-CST- 31 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 4 | 0,25 | 0,096 | 7.313 | 702,000 |
| 12 | APK-CST- 32 | 8.750 | 4 | 35.000 | 2,6 | 91.000 | 22,5 | 2,25 | 1,98 | 9.100 | 18.018,000 |
| 13 | APK-CST- 32B | 3.750 | 1 | 3.750 | 2,6 | 9.750 | 27 | 2,75 | 0,041 | 993 | 40,715 |
| 14 | APK-CST- 36 | 22.500 | 2,3 | 51.750 | 2,6 | 134.550 | 1,5 | 1,5 | 0,23 | 134.550 | 30.946,500 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | APK-CST- | 50 | 10.000 | 5,3 | 53.000 | 2,6 | 137.800 | 30,5 | 4,5 | 0,083 | 20.331 | 1.687,485 |
| 16 | APK-CST- | 51R | 8.500 | 3,2 | 27.200 | 2,6 | 70.720 | 18 | 1,2 | 0,05 | 4.715 | 235,733 |
| 17 | APK-CST- | 52 | 10.000 | 6,15 | 61.500 | 2,6 | 159.900 | 68,65 | 6 | 0,076 | 13.975 | 1.062,118 |
| 18 | APK-CST- | 53 | 7.500 | 6,7 | 50.250 | 2,6 | 130.650 | 44,45 | 5,5 | 0,063 | 16.166 | 1.018,453 |
| 19 | APK-CST- | 54 | 12.500 | 4,7 | 58.750 | 2,6 | 152.750 | 14,5 | 1,8 | 0,047 | 18.962 | 891,217 |
| 20 | APK-CST- | 55 | 9.375 | 3 | 28.125 | 2,6 | 73.125 | 4,5 | 0,5 | 0,096 | 8.125 | 780,000 |
| 21 | APK-CST- | 56 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 12 | 1 | 0,12 | 1.625 | 195,000 |
| 22 | APK-CST- | 57 | 5.625 | 2 | 11.250 | 2,6 | 29.250 | 14,75 | 1,2 | 0,11 | 2.380 | 261,763 |
| 23 | APK-CST- | 58 | 9.375 | 2,3 | 21.563 | 2,6 | 56.063 | 15,5 | 1,2 | 0,087 | 4.340 | 377,608 |
| 24 | APK-CST- | 59 | 12.500 | 2 | 25.000 | 2,6 | 65.000 | 13,5 | 1,2 | 0,1 | 5.778 | 577,778 |
| 25 | APK-CST- | 60 | 12.500 | 3 | 37.500 | 2,6 | 97.500 | 16,5 | 1 | 0,17 | 5.909 | 1.004,545 |
| 26 | APK-CST- | 61 | 12.500 | 2,5 | 31.250 | 2,6 | 81.250 | 12 | 1,3 | 0,13 | 8.802 | 1.144,271 |
| 27 | APK-CST- | 62 | 5.625 | 2,3 | 12.938 | 2,6 | 33.638 | 28 | 2,7 | 0,15 | 3.244 | 486,542 |
| 28 | APK-CST- | 63 | 12.500 | 2,3 | 28.750 | 2,6 | 74.750 | 19 | 2 | 0,12 | 7.868 | 944,211 |
| 29 | APK-CST- | 64 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 15 | 1,8 | 0,089 | 2.340 | 208,260 |
| 30 | APK-CST- | 65 | 3.750 | 2,2 | 8.250 | 2,6 | 21.450 | 23 | 1,5 | 0,084 | 1.399 | 117,509 |
| 31 | APK-CST- | 66 | 3.125 | 2,1 | 6.563 | 2,6 | 17.063 | 20,5 | 2,4 | 0,13 | 1.998 | 259,683 |
| 32 | APK-CST- | 67 | 6.250 | 3 | 18.750 | 2,6 | 48.750 | 21 | 1,5 | 0,12 | 3.482 | 417,857 |
| 33 | APK-CST- | 70 | 22.500 | 6 | 135.000 | 2,6 | 351.000 | 230 | 2,3 | 16 | 4.596 | 56.160,000 |
| 34 | APK-CST- | 71 | 22.500 | 4 | 90.000 | 2,6 | 234.000 | 180 | 2,4 | 2,1 | 24.000 | 6.552,000 |
| 35 | APK-CST- | 72 | 22.500 | 5 | 112.500 | 2,6 | 292.500 | 200 | 2,2 | 155 | 12.636 | 498.712,500 |
| 36 | APK-CST- | 73 | 22.500 | 6 | 135.000 | 2,6 | 351.000 | 220 | 2,5 | 10,2 | 993 | 40.684,091 |

**TABLE 4.4**

**CALCULATION OF SEDIMENTARY ZIRCONIUM DIOXIDE ($ZrO_2$) RESERVES WITHIN THE RESEARCH AREA OF 39.9 HA**

**IN THE LOCATION OF IUP PT AURUM PERSADA KHATULISTIWA, KECAMATAN SEPAUK, KAB. SINTANG – KALBAR**

| No. | Sample Code | Total Impact Area ($m^2$) | Alluvial Thickness (m) | Volume ($m^3$) | Specific Gravity ($gr/cm^3$) | Alluvial Weight (ton) | ANALYSIS RESULT | | | | Weight | RESERVES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample Weight (kg) | Concentrate (kg) | ZrO2 (%) | ZrO2 (gram/ton) | Concentrate (ton) | ZrO2 (ton) |
| 1 | APK-CST- 1 | 40.000 | 1,5 | 60.000 | 2,6 | 156.000 | 21 | 1,5 | 0,05 | 500 | 11.143 | 5,571 |
| 2 | APK-CST- 2 | 18.750 | 2 | 37.500 | 2,6 | 97.500 | 23 | 2 | 1,01 | 10100 | 8.478 | 85,630 |
| 3 | APK-CST- 11 | 17.500 | 1,5 | 26.250 | 2,6 | 68.250 | 32 | 2 | 0,05 | 500 | 4.266 | 2,133 |
| 4 | APK-CST- 14 | 19.687 | 3,2 | 62.998 | 2,6 | 163.796 | 10 | 0,3 | 0,04 | 400 | 4.914 | 1,966 |
| 5 | APK-CST- 15A2 | 7.500 | 6 | 45.000 | 2,6 | 117.000 | 28 | 1,1 | 0,58 | 5800 | 4.596 | 26,659 |
| 6 | APK-CST- 16 | 7.500 | 4 | 30.000 | 2,6 | 78.000 | 6,5 | 2 | 0,12 | 1200 | 24.000 | 28,800 |
| 7 | APK-CST- 17 | 22.500 | 3 | 67.500 | 2,6 | 175.500 | 19,1 | 1,5 | 0,09 | 900 | 13.783 | 12,404 |
| 8 | APK-CST- 18 | 22.500 | 0,6 | 13.500 | 2,6 | 35.100 | 2,5 | 0,9 | 0,07 | 700 | 12.636 | 8,845 |
| 9 | APK-CST- 24 | 3.125 | 3 | 9.375 | 2,6 | 24.375 | 18,5 | 1 | 0,38 | 3800 | 1.318 | 5,007 |
| 10 | APK-CST- 25 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 19,5 | 1,5 | 0,05 | 500 | 9.000 | 4,500 |
| 11 | APK-CST- 31 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 4 | 0,25 | 0,03 | 300 | 7.313 | 2,194 |
| 12 | APK-CST- 32 | 8.750 | 4 | 35.000 | 2,6 | 91.000 | 22,5 | 2,25 | 0,37 | 3700 | 9.100 | 33,670 |
| 13 | APK-CST- 32B | 3.750 | 1 | 3.750 | 2,6 | 9.750 | 27 | 2,75 | 0,05 | 500 | 993 | 0,497 |
| 14 | APK-CST- 36 | 22.500 | 2,3 | 51.750 | 2,6 | 134.550 | 1,5 | 1,5 | 0,03 | 300 | 134.550 | 40,365 |
| 15 | APK-CST- 50 | 10.000 | 5,3 | 53.000 | 2,6 | 137.800 | 30,5 | 4,5 | 0,09 | 900 | 20.331 | 18,298 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | APK-CST- | 51R | 8.500 | 3,2 | 27.200 | 2,6 | 70.720 | 18 | 1,2 | 0,03 | 300 | 4.715 | 1,414 |
| 17 | APK-CST- | 52 | 10.000 | 6,15 | 61.500 | 2,6 | 159.900 | 68,65 | 6 | 0,13 | 1300 | 13.975 | 18,168 |
| 18 | APK-CST- | 53 | 7.500 | 6,7 | 50.250 | 2,6 | 130.650 | 44,45 | 5,5 | 0,1 | 1000 | 16.166 | 16,166 |
| 19 | APK-CST- | 54 | 12.500 | 4,7 | 58.750 | 2,6 | 152.750 | 14,5 | 1,8 | 0,07 | 700 | 18.962 | 13,273 |
| 20 | APK-CST- | 55 | 9.375 | 3 | 28.125 | 2,6 | 73.125 | 4,5 | 0,5 | 0,05 | 500 | 8.125 | 4,063 |
| 21 | APK-CST- | 56 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 12 | 1 | 0,12 | 1200 | 1.625 | 1,950 |
| 22 | APK-CST- | 57 | 5.625 | 2 | 11.250 | 2,6 | 29.250 | 14,75 | 1,2 | 0,16 | 1600 | 2.380 | 3,807 |
| 23 | APK-CST- | 58 | 9.375 | 2,3 | 21.563 | 2,6 | 56.063 | 15,5 | 1,2 | 0,05 | 500 | 4.340 | 2,170 |
| 24 | APK-CST- | 59 | 12.500 | 2 | 25.000 | 2,6 | 65.000 | 13,5 | 1,2 | 0,05 | 500 | 5.778 | 2,889 |
| 25 | APK-CST- | 60 | 12.500 | 3 | 37.500 | 2,6 | 97.500 | 16,5 | 1 | 0,15 | 1500 | 5.909 | 8,864 |
| 26 | APK-CST- | 61 | 12.500 | 2,5 | 31.250 | 2,6 | 81.250 | 12 | 1,3 | 0,21 | 2100 | 8.802 | 18,484 |
| 27 | APK-CST- | 62 | 5.625 | 2,3 | 12.938 | 2,6 | 33.638 | 28 | 2,7 | 0,08 | 800 | 3.244 | 2,595 |
| 28 | APK-CST- | 63 | 12.500 | 2,3 | 28.750 | 2,6 | 74.750 | 19 | 2 | 1,69 | 16900 | 7.868 | 132,976 |
| 29 | APK-CST- | 64 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 15 | 1,8 | 0,07 | 700 | 2.340 | 1,638 |
| 30 | APK-CST- | 65 | 3.750 | 2,2 | 8.250 | 2,6 | 21.450 | 23 | 1,5 | 0,56 | 5600 | 1.399 | 7,834 |
| 31 | APK-CST- | 66 | 3.125 | 2,1 | 6.563 | 2,6 | 17.063 | 20,5 | 2,4 | 0,32 | 3200 | 1.998 | 6,392 |
| 32 | APK-CST- | 67 | 6.250 | 3 | 18.750 | 2,6 | 48.750 | 21 | 1,5 | 1,14 | 11400 | 3.482 | 39,696 |
| 33 | APK-CST- | 70 | 22.500 | 6 | 135.000 | 2,6 | 117.000 | 230 | 2,3 | 15,57 | 155700 | 1.170 | 182,169 |
| 34 | APK-CST- | 71 | 22.500 | 4 | 90.000 | 2,6 | 78.000 | 180 | 2,4 | 17,15 | 171500 | 1.040 | 178,360 |
| 35 | APK-CST- | 72 | 22.500 | 5 | 112.500 | 2,6 | 35.100 | 200 | 2,2 | 41,4 | 414000 | 386 | 159,845 |

**TABLE 4.5**

**CALCULATION OF SEDIMENTARY TITANIUM DIOXIDE ($TiO_2$) RESERVES WITHIN THE RESEARCH AREA OF 39.9 HA IN THE LOCATION OF IUP PT AURUM PERSADA KHATULISTIWA, KECAMATAN SEPAUK, KAB. SINTANG – KALBAR**

| No. | Sample Code | Total Impact Area ($m^2$) | Alluvial Thickness (m) | Volume ($m^3$) | Specific Gravity ($gr/cm^3$) | Alluvial Weight (ton) | ANALYSIS RESULT | | | | Concentrate Weight (ton) | RESERVES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample Weight (kg) | Concentrate (kg) | TiO2 (%) | TiO2 (gram/ton) | | TiO2 (ton) |
| 1 | APK-CST- 1 | 40.000 | 1,5 | 60.000 | 2,6 | 156.000 | 21 | 1,5 | 0,33 | 3300 | 11.143 | 36,771 |
| 2 | APK-CST- 2 | 18.750 | 2 | 37.500 | 2,6 | 97.500 | 23 | 2 | 2,33 | 23300 | 8.478 | 197,543 |
| 3 | APK-CST- 11 | 17.500 | 1,5 | 26.250 | 2,6 | 68.250 | 32 | 2 | 0,37 | 3700 | 4.266 | 15,783 |
| 4 | APK-CST- 14 | 19.687 | 3,2 | 62.998 | 2,6 | 163.796 | 10 | 0,3 | 1,86 | 18600 | 4.914 | 91,398 |
| 5 | APK-CST- 15A2 | 7.500 | 6 | 45.000 | 2,6 | 117.000 | 28 | 1,1 | 0,55 | 5500 | 4.596 | 25,280 |
| 6 | APK-CST- 16 | 7.500 | 4 | 30.000 | 2,6 | 78.000 | 6,5 | 2 | 0,36 | 3600 | 24.000 | 86,400 |
| 7 | APK-CST- 17 | 22.500 | 3 | 67.500 | 2,6 | 175.500 | 19,1 | 1,5 | 1,57 | 15700 | 13.783 | 216,389 |
| 8 | APK-CST- 18 | 22.500 | 0,6 | 13.500 | 2,6 | 35.100 | 2,5 | 0,9 | 0,21 | 2100 | 12.636 | 26,536 |
| 9 | APK-CST- 24 | 3.125 | 3 | 9.375 | 2,6 | 24.375 | 18,5 | 1 | 1,57 | 15700 | 1.318 | 20,686 |
| 10 | APK-CST- 25 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 19,5 | 1,5 | 0,21 | 2100 | 9.000 | 18,900 |
| 11 | APK-CST- 31 | 22.500 | 2 | 45.000 | 2,6 | 117.000 | 4 | 0,25 | 0,14 | 1400 | 7.313 | 10,238 |
| 12 | APK-CST- 32 | 8.750 | 4 | 35.000 | 2,6 | 91.000 | 22,5 | 2,25 | 1,62 | 16200 | 9.100 | 147,420 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | APK-CST- | 32B | 3.750 | 1 | 3.750 | 2,6 | 9.750 | 27 | 2,75 | 0,47 | 4700 | 993 | 4,667 |
| 14 | APK-CST- | 36 | 22.500 | 2,3 | 51.750 | 2,6 | 134.550 | 1,5 | 1,5 | 0,56 | 5600 | 134.550 | 753,480 |
| 15 | APK-CST- | 50 | 10.000 | 5,3 | 53.000 | 2,6 | 137.800 | 30,5 | 4,5 | 0,38 | 3800 | 20.331 | 77,258 |
| 16 | APK-CST- | 51R | 8.500 | 3,2 | 27.200 | 2,6 | 70.720 | 18 | 1,2 | 0,4 | 4000 | 4.715 | 18,859 |
| 17 | APK-CST- | 52 | 10.000 | 6,15 | 61.500 | 2,6 | 159.900 | 68,65 | 6 | 0,81 | 8100 | 13.975 | 113,199 |
| 18 | APK-CST- | 53 | 7.500 | 6,7 | 50.250 | 2,6 | 130.650 | 44,45 | 5,5 | 0,46 | 4600 | 16.166 | 74,363 |
| 19 | APK-CST- | 54 | 12.500 | 4,7 | 58.750 | 2,6 | 152.750 | 14,5 | 1,8 | 0,43 | 4300 | 18.962 | 81,537 |
| 20 | APK-CST- | 55 | 9.375 | 3 | 28.125 | 2,6 | 73.125 | 4,5 | 0,5 | 0,43 | 4300 | 8.125 | 34,938 |
| 21 | APK-CST- | 56 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 12 | 1 | 1,24 | 12400 | 1.625 | 20,150 |
| 22 | APK-CST- | 57 | 5.625 | 2 | 11.250 | 2,6 | 29.250 | 14,75 | 1,2 | 0,73 | 7300 | 2.380 | 17,372 |
| 23 | APK-CST- | 58 | 9.375 | 2,3 | 21.563 | 2,6 | 56.063 | 15,5 | 1,2 | 0,7 | 7000 | 4.340 | 30,382 |
| 24 | APK-CST- | 59 | 12.500 | 2 | 25.000 | 2,6 | 65.000 | 13,5 | 1,2 | 0,44 | 4400 | 5.778 | 25,422 |
| 25 | APK-CST- | 60 | 12.500 | 3 | 37.500 | 2,6 | 97.500 | 16,5 | 1 | 1,2 | 12000 | 5.909 | 70,909 |
| 26 | APK-CST- | 61 | 12.500 | 2,5 | 31.250 | 2,6 | 81.250 | 12 | 1,3 | 0,76 | 7600 | 8.802 | 66,896 |
| 27 | APK-CST- | 62 | 5.625 | 2,3 | 12.938 | 2,6 | 33.638 | 28 | 2,7 | 0,81 | 8100 | 3.244 | 26,273 |
| 28 | APK-CST- | 63 | 12.500 | 2,3 | 28.750 | 2,6 | 74.750 | 19 | 2 | 2,65 | 26500 | 7.868 | 208,513 |
| 29 | APK-CST- | 64 | 2.500 | 3 | 7.500 | 2,6 | 19.500 | 15 | 1,8 | 0,35 | 3500 | 2.340 | 8,190 |
| 30 | APK-CST- | 65 | 3.750 | 2,2 | 8.250 | 2,6 | 21.450 | 23 | 1,5 | 1,53 | 15300 | 1.399 | 21,403 |
| 31 | APK-CST- | 66 | 3.125 | 2,1 | 6.563 | 2,6 | 17.063 | 20,5 | 2,4 | 1,1 | 11000 | 1.998 | 21,973 |
| 32 | APK-CST- | 67 | 6.250 | 3 | 18.750 | 2,6 | 48.750 | 21 | 1,5 | 1,74 | 17400 | 3.482 | 60,589 |

## 4.6 Logistics

IUP PT Aurum Persada Khatulistiwa is located around the bank of Kapuas River, 30 km (straight distance) toward the downstream of Sintang City. Kapuas River around IUP has 200-300 m length and 4-8 meter depth. With that dimension, this river can be used to transport mining tools, future mining products (zirconium dioxide (ZrO2) and titanium dioxide (TiO2)) and other logistics.

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# CHAPTER.V

# CONCLUSION AND SUGGESTION

## 5.1 Conclusion

Some conclusions drawn and included into this temporary re-exploration report are as follows:

1. The area of IUP PT Aurum Persada Khatulistiwa consists of Morphological Unit and River Alluvial Plain and Wavy-Slope Hills
2. Within the area of IUP PT Aurum Persada Khatulistiwa there are sedimentary alluvial unit, sandstone unit, and mudstone unit. Sandstone unit and mudstone unit are included into Tebidah Formation.
3. Geological structure developed within the area of IUP Eksplorasi PT Aurum Persada Khatulistiwa is fold.
4. Sedimentary alluvial unit brings sedimentary gold, zircon, and titanium. Lab result indicates the sandstone and mudstone units, which is part of Tebidah Formation, contain very low sedimentary gold (<0,01 gram/ton).
5. Total area of sedimentary alluvial being the research site is 47.57 Ha. From the drilling works, the thickest sedimentary alluvial is 6.7 m while the thinnest is 1 m with the average of 3.2 m.
6. The highest gold content is 155 gram/ton, the lowest is 0.023 gram/ton. Average content of gold is 5.3 gram/ton. The quantity of resources (reserves) of gold is 683.6 kg or sedimentary gold resource for each hectare within area of 47.57 Ha is 14.37 kg. For the highest, lowest, and average content, see table 5.1 below.

7. The highest zirconium dioxide ($ZrO_2$) content is 41.4% or 414,000 gram/ton, the lowest is 0.03% or 300 gram/ton. Average content of $ZrO_2$ is 2.346% or 23,460 gram/ton. The quantity of resources (reserves) of ZrO2 is 1,079.3 ton or the content for each hectare within area of 47.57 Ha is 22.7 ton. For the highest, lowest, and average content of sedimentary $ZrO_2$, see table 5.1 below.
8. The highest titanium dioxide ($TiO_2$) content is 2.65% or 26,500 gram/ton, the lowest is 0.14% or 1,400 gram/ton. Average content of $TiO_2$ is 0.8847% or 8,847 gram/ton. The quantity of resources (reserves) of TiO2 is 2,629.7 ton or the sedimentary $TiO_2$ resource for each hectare within area of 47.57 Ha is 55.2 ton. For the highest, lowest, and average content of sedimentary $TiO_2$, see table 5.1 below.

Table 5.1

Content of each mineral within the research area of 47.57 Ha and calculation result of Au, $ZrO_2$ and $TiO_2$ resources

| No. | Mineral | Highest Content (gram/ton) | Lowest Content (gram/ton) | Average Content (gram/ton) |
|---|---|---|---|---|
| 1 | Gold (Au) | 155 | 0,023 | 5,3 |
| 2 | Zircon ($ZrO_2$) | 414.000 | 300 | 23.460 |
| 3 | Titan ($TiO_2$) | 26.500 | 1.400 | 8.847 |

9. IUP is located on the bank of Kapuas River. Its capacity can be used as transportation means for future logistics requirements during production stage.
10. The land use within the research site is bush and mass rubber plantation. Socially, the community supports the existence of alluvial mine as planned by PT Aurum Persada Khatulistiwa.

## 5.2 SUGGESTION

Suggestions necessary to be delivered in this report, among others, are:

1. The total area of IUP PT Aurum Persada Khatulistiwa is 1,000 Ha, whereas the research in this report only utilizes 47.57 Ha. Such research site can be made as initial mining works, and then developed to other parts within IUP. The other parts of area are assumed to potentially contain gold, zircon, and titan minerals.
2. IUP PT Aurum Persada Khatulistiwa is located on the bank of Kapuas River. It means that such longest river in Indonesia can be used to transport logistics during the exploration activities of PT Aurum Persada Khatulistiwa in the future.
3. The existence of mine developed by PT Aurum Persada Khatulistiwa is expected to increase PAD of Regency of Sintang and provide work for community around the mine. The management of such Regency of Sintang's natural treasure must consider the environmental factor. That is why good architecture mine must be initialized in Indonesia.

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