DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 2008/64

Hainan Island ilmenite

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Contents

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Survey of Titanium Resources in China II: Hainan Island

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Summary

A previous report (McLimans, 2007) is a literature survey of titanium ores in mainland China. Combining all sources of titanium, China hosts the world's greatest volume of known reserves. The reserves are dominated, however, by ilmenite and titano-magnetite in igneous and metamorphic rocks wherein their TiO_2 content is near 50%. In placer or sand ores derived from such sources, the TiO_2 grade of ilmenite and titano-magnetite is likewise near 50% or less. The largest potential of high grade ore is within the ultra high pressure (UHP) regions where eclogites and amphibolites host rutile but the volume of reserves, though likely large, is unproven. Erosion that exposed rocks in the UHP regions may have yielded placer deposits containing rutile, as yet undiscovered. The only known source to date of high grade ilmenite or leucoxene ore is located offshore China, on Hainan Island. Reserves are on the order of 7 million tons ilmenite. The heavy mineral grade in the ground is 1-3% with zircon being a high per cent. There are several small scale mining operations on the island. This report describes the titanium ores and potential on Hainan Island.

Abstract

Hainan Island contains the only known source of high grade ilmenite sand deposits in China. The onshore marine placers on the east coast of Hainan Island contain high-grade ilmenite (TiO_2 > 60 %), whereas the ilmenite in the other parts of the island is lower grade. The kaolinized terraces in the south-western part of the island contain ilmenite with elevated TiO_2 content (ca. 58 – 60 %).

The onshore placers cover a rather large area, but the total resource of ilmenite is moderate (ca. 1 million tons contained ilmenite) according to Geological Survey of Hainan (HNGS). The relative proportion of zircon to ilmenite and other heavy minerals is reported by HNGS to be high, which has been confirmed by the present study. The overall heavy mineral (HM) grade in the ground is low (ca 1 to 3.2 %).

The largest resources of ilmenite on the island are in "slope" deposits, which are laterite deposits located on the slopes on the southeastern part of the island. These types of ilmenite deposits are reported to hold combined reserves of 5.7 million tons of ilmenite. The sample taken at one locality contained 5 % ilmenite, 2 % titano-magnetite, and 4 % magnetite.

Introduction

DuPont Titanium Technologies is currently developing plans for a titanium dioxide plant in China based on Dupont chlorination technology and operation of deep wells. The ore feed to the plant will primarily be altered ilmenite with elevated TiO_2 content, well above 50%. As described in the earlier report, there are no known ilmenite ore sources on mainland China that have TiO_2 contents near 60%. However, Hainan Island, offshore China, does have ilmenite-bearing sand deposits of grades near 60%. This report describes and gives the present status of those reserves. The work was accomplished via networking between the geological surveys of Denmark (GEUS), China (CGS), HNGS, and DuPont.

Hainan Island was visited in may 2007 by Christian Knudsen (Geological Survey of Denmark and Greenland, GEUS) together with a field party consisting of Dr. Zhuang & Ms. Bai Hainan (CGS), Dir. Liao Zheng Wei, Chief geologist Liao Xiang Jun, Deputy chief geologist, Hainan Geological Survey (HNGS) and Mr. Cao, Qindao Institute of Marine Geology (QIMG).

Twenty samples were collected, five of which are offshore material collected by HNGS during a regional geochemical study.

The samples were analyzed at GEUS using computer controlled scanning electron microscopy (CCSEM).

Objective

The objective of the work is to describe the nature of the higher grade ilmenite deposits on Hainan Island, the only known source of high grade ilmenite in China. The study is accomplished via help from the Hainan Geological Survey. Collected samples were analyzed at GEUS via computer controlled scanning electron microscopy (CCSEM) to obtain mineralogical, chemical, and physical properties data.

Geological setting of Hainan Island

Hainan Island, China's second largest island, is located off the southern coast of South China (Fig. 1). It is a continental-type island separated from the mainland by the Qiongzhou Strait. The Baoban Complex (Li et al. 2006), which was intruded by the 1.43 Ga granitoids (see Fig. 2) is the oldest basement rock in the southwest part of the island. The island is part of the Cathaysia block that collided with the Yangtze block by 1000–900 Ma and remained part of that block (e.g., Li et al. 2006). Granitoid rocks account for about 40% of the island's land area, with about 60% of them of Indosinian (Triassic) age and the remainder of Yanshanian (Jurassic and Cretaceous) age. The Indosinian granitoids are mainly nonfoliated, medium to coarse-grained monzogranite with abundant K-feldspar megacrysts and outcrop mainly in the central part of the island. They are named the Qiongzhong and Danxian batholiths in the southeast and northwest, respectively, and are separated by the Cretaceous Baisha Basin. Strongly foliated granitoids outcrop over an area of 800 km^2 in theWuzhishan Range within the Qiongzhong batholith (Fig. 2). Here they are identified as Wuzhishan Orthogneiss, which was previously misidentified as the "Shang'an migmatite" of unknown age. The gneissic foliations, defined by parallel-oriented K-feldspar phenocrysts and biotite flakes (Fig. 3), have dominant NE to ENE strike directions and dip at medium angles toward the southeast. The Wuzhishan Orthogneiss is composed predominantly of biotite granite and granodiorite, consisting of the rock-forming minerals of quartz, K-feldspar, plagioclase, biotite, hornblende, and pyroxene as well as accessory minerals including zircon, apatite, allanite, titanite, magnetite, and ilmenite. Mafic magmatic enclaves occur sporadically in the orthogneiss. Some highly felsic granitic samples contain 1%– 2% garnet. In the Tongza area, the Wuzhishan Orthogneiss was intruded by the Indosinian Qiongzhong granite, and the orthogneiss occurs as enclaves in sizes from several tens of centimeters up to 10 m inside the coarse-grained, K-feldspar megacryst-enriched monzogranite.

Figure 1. *Location of Hainan Island, offshore China.*

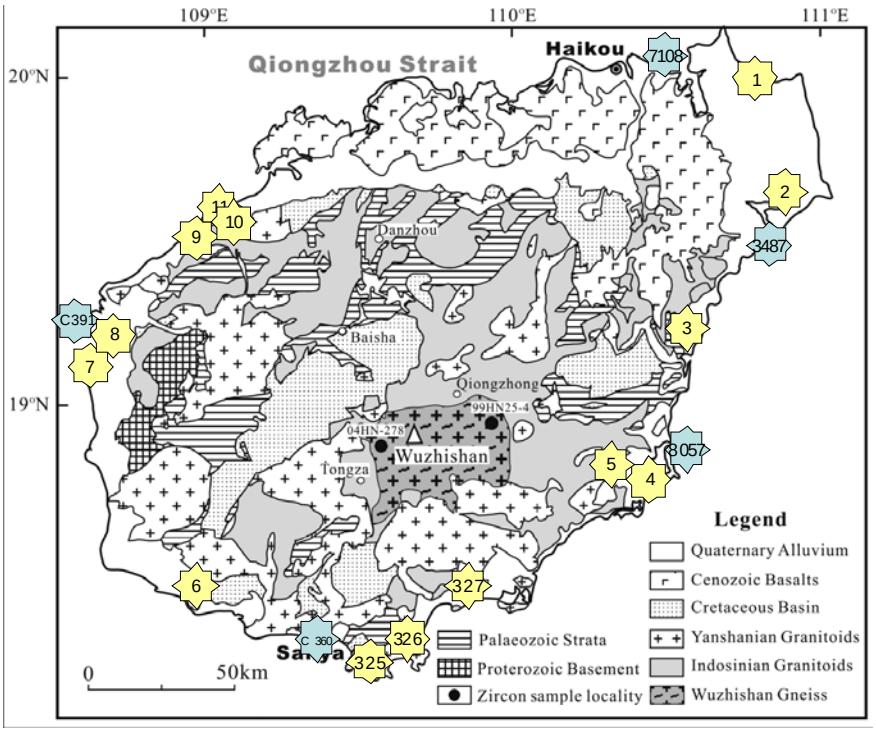

Figure 2. *Geological map of Hainan (Li et al. 2006).*

Localities are marked and blue indicates a marine sample.

An active continental margin existed along the coast of Southeast China during the Mesozoic time that produced extensive magmatism in the region. However, there is little constraint as to when this active margin was first initiated. Work at GEUS has determined SHRIMP U-Pb zircon ages and Sr-Nd isotopic data for the syntectonic granites on Hainan Island. The data demonstrate that these rocks, dated at 267–262 Ma, are typical of calc-alkaline I-type granites formed in continental arc environments. The age of this magmatic arc coincides with a sudden change in sedimentary environments in South China during the Permian time, suggesting that the South China Indosinian Orogeny was likely contemporaneous with the onset of continental arc magmatism (Li et al. 2006).

Locality descriptions (referenced to Fig. 2)

The locations below are marked on the map in Figure 2 Descriptions of locations and samples follows and analytical data is summarized in the following section.

Location 1: Pugian (Figs. 3-4)

The area contains 8 deposits with a total of 884.000 tons of ilmenite and 360.000 tons of zircon in a 10 km long, 1.8 km wide and about 8 m thick area. The grade is 6 kg/m^3 ilmenite and 2.5 kg/m3 zircon. The deposit visited had 7 ponds where the mining was conducted by pumping to spiral concentrators. The production is 4 tons of concentrate per day per pond. A total of 42 people are employed. The lease is 2 km^2 and owned by Hainan Qiaoyou Mining Company (private) who also is the owner of the separation mill where magnetic, electrostatic and gravity separations are used to produce final products. This area potentially contains about 100 million m^3 of sand, and the total resource may therefore be considerably larger than indicated by the local geologists. However, the content of heavy minerals in the sand is low.

The ilmenite at this locality is high-grade but grade decreases downwards in the deposit, indicating that the uppermost part of the deposit has been more intensely leached.

There is a hardpan layer in the deposit about 20 cm thick. The deposit contains black clay that apparently builds up in the pond.

Sample 1: **4 m of the raw sand stratigraphy.**
Sample 2: **The tailings.**
Sample 3*:* **The concentrate.**

Figure 3. *Pond with spiral concentrator.*

Figure 4. *Hard pan occurrence in the sands.*

Figure 5. *Tailings pond. There is about 1 % heavy minerals in the tailings.*

Location 2: Dongjiao Town, Shangpuo Village

The deposit is ca 2-3 m thick and is not now mined. A sample was taken through 1 m of the deposit. Below the deposit are basic volcanics. The deposit contains about 20.000 tons of zircon with a grade of 0.5 % zircon.

Figure 6. *Dongjiao sample locality; the deposit is not being mined.*

Sample 4: A one meter section of the Dongjiao deposit.

Location 3: Boao Town

At this location the mining is conducted by washing the sand down with a hose and then pumping the sand to the spiral concentrator on land. There is abundant white clay in this deposit (kaolinite?). They produce about 1 ton of concentrate per day. On average the deposit is 2 to 3 m thick but locally up to 10 m.

Figure 6. *Water hoses responsible for producing slurry for the spiral concentrator.*

Figure 7. *Concentrate on a tarp waiting for the lorry to come and bring it to the dry mill. Spirals in the background.*

Sample 5: The sample represents about 2 m of the mined deposit.

Location 4: Baolong

At this location, mining is done from a floating pump station. Spiral concentrators are on shore.

Figure 8. *Profile in the pond where mining is active.*

Figure 9. *Sand profile where sample 6 was taken.*

Sample 6: **The sample represents 2 m of the top of the sequence.**

Location 5: Chang An

Chang An is an example of one of the “slope type deposits”. There is no production at the moment because of problems with the processing of this ore. There is a lack of water in the area, and it is likely that dewatering of the tailings will constitute a problem. Ilmenite grade is in the mid-sixties and reserves are calculated to be 5.7 million tons of ilmenite and 0.13 million tons of zircon. The grade of the deposit is 10 to 60 kg ilmenite/m^3.

Figure 10. *Lateritic soil with ilmenite as dark bands in the soil.*

Sample 7: The sample is a 2 m section of the soil. The colour is reddish brown and seems to be a clay-rich laterite.

Location 6: Jiusuo

The deposit is located about 4 km inland and is slightly lithified with signs of kaolinization. The reserves of ilmenite have not been calculated. Zircon is estimated at 190.000 tons at 0.75 kg/m3.

Figure 11. *Profile at sample site 8.*

Sample 8: The sample is 2 m collected at the top of the deposit in a water well (water level about 3m below the surface). Not being mined.

Location 7: Dongfang

The Dongfang location is a recent beach. The sand is very coarse (sand and gravel).

Figure 12. *Sample site 9 at Dongfang.*

Sample 9: The sample is the uppermost 10 cm of the sand about 20m from the shoreline. The sample is taken about 200 m from a rocky point.

Location 8: Dongfang N.

This location is a small sand quarry. There is extensive quarrying of sand in the hinterland of Dongfang, likely in alluvial deposits. There is no heavy mineral mining and no heavy mineral deposits are described from this area.

Figure 13. *Kaolinized sand in small sandpit.*

Sample 10*:* **The sample is 1.5 m from what is described as the "second terrace", a slightly kaolinized sand located about 7 km NNE of sample 9.**

Location 9: Haitou

Haitou location is in a small bay just inland form the small harbour of this village. There is not abundant sand and the sample was not analyzed.

Sample 11: The sample is the uppermost 10 cm of the sand occurrence.

Location 10: Haitou Beach

This location is at the active beach (Figure 14) and the sand is stratified with layers of gravel. There is an old dead reef just off the coast (20 m). The beach is narrow.

Sample 12: The sample is about 10 cm of sand section.

Figure 14. *Sample site at the beach.*

Location 11 Haitou N

The Haitou N location is in dunes just 100 m inland from sample 12. The active dunes are about 8 m high. There are visible heavy minerals in the sand. The area is dry with cactus and is not very fertile. This may represent an old dune system along the coast and a possible prospect.

Sample 13: The sample is a 1 m section in the dune system stretching parallel to the coast.

Analytical Results

Samples were analyzed at GEUS following the standard heavy mineral sand protocol. About 100 g of sample is sieved on 0.045 mm and 0.71 mm screens, and the >0.045 fraction < 0.71 mm is then separated using heavy liquid (bromoform at 2.68 g/cm^3). The heavy fraction is mounted in epoxy, cut, and polished and analyzed using the GEUS standard CCSEM procedure. The data is stored in the Ore Geochemistry database.

The grain size and the heavy mineral content of the samples are tabulated below.

Table 1. List of samples, the content of fine and coarse material and the content of heavy minerals**. (0,9 = 0.9)**

Sample	GEUS nr	Total sample < 0.045mm	Total sample > 0,71mm	% HM in fract. >0.045mm <0,71mm	% HM in total sample
1	2003556	0,9	0,4	0,79	0,78
2	2003557	0,7	0,2	1,26	1,24
3	2003558	1,5	0,1	80,97	79,71
4	2003559	1,4	0,4	0,59	0,58
5	2003560	16,7	16,8	1,37	0,91
6	2003561	1,5	0,8	1,18	1,16
7	2003562	87,3	0,5	91,56	11,14
8	2003563	12,6	11,6	0,27	0,2
9	2003564	0,2	47,1	0,62	0,32
10	2003565	9,3	42,9	0,29	0,14
11	2003566	8,5	30,9	3,92	2,38
12	2003567	1,1	11,3	3,69	3,23
13	2003568	1,3	0,8	1,76	1,72
325	2003569	0,9	10,4	6,35	5,64
326	2003570	2,2	2,9	1,48	1,41
327	2003571	0,9	2,1	0,35	0,34
7108	2003572	0,7	14,7	0,46	0,39
3487	2003573	84,7	2,0	2,32	0,31
8057	2003574	6,1	56,1	1,75	0,66
C 391	2003575	5,9	2,6	1,2	1,1
C 360	2003576	4,4	0,4	2,07	1,97

In Table 1, it can be seen that two samples are very fine-grained, one (no. 7) is from the ”slope type” deposits and is likely a laterite. The sample is also characterized by a very high content of heavy minerals (11 %). The other very fine-grained sample (3487) is a marine clay sample taken offshore. Samples 1, 2, and 3 are from one locality (#1, Pugian) and sample 3 is a heavy mineral concentrate from the wet mill (spirals).

Ilmenite Grade

In Figure 15 the grade of the ilmenite (% TiO2) is given by the colored dots.

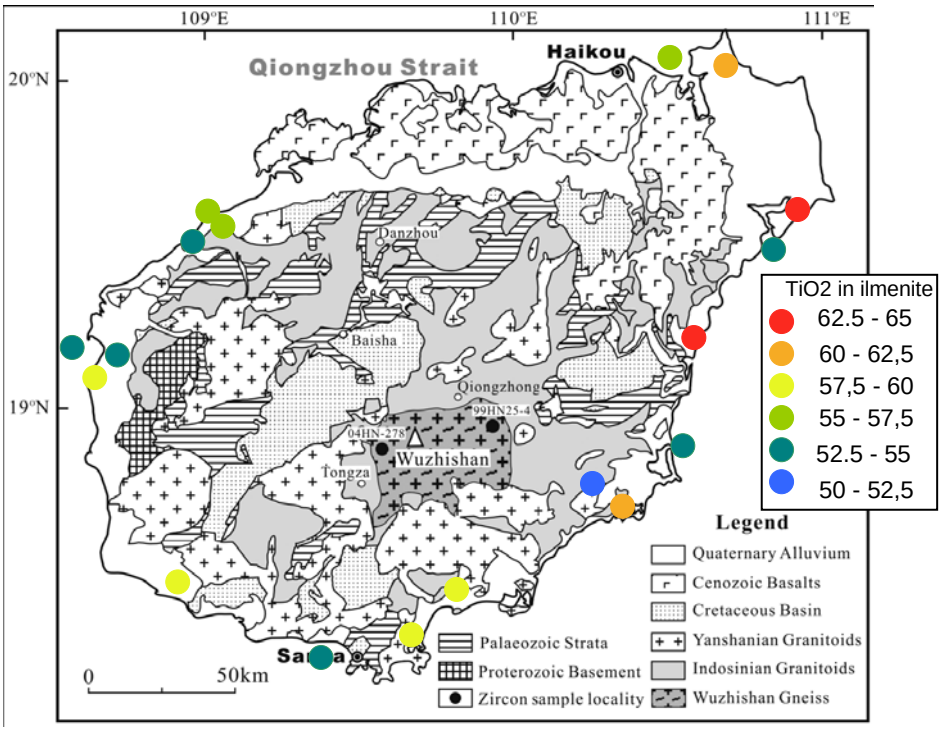

Figure 15. *Grades of ilmenite from collected samples.*

High-grade ilmenite (> 60 % TiO2) occurs on the east coast of Hainan Island. The marine sands just offshore from these deposits do not contain the same high-grade ilmenite, indicating that the onshore sands have a unique alteration history. The marine sample off the north coast just east of Haikou has elevated titanium in the ilmenite, indicating that the marine sands there contain a component of altered ilmenite. The electron microscopy results for the samples are given below in Table 2.

Table 2. Results from CCSEM* analyses.
(69,5 = 69.5)

Locality no	GEUS no	% TiO2 in ilmenite	% TiO2 in all Ti min. ex. rutile	% TiO2 in all Ti min	% zircon in HM fraction	% HM in raw sand
1	2003556	63,2	64,7	69,5	9,8	0,8
1	2003557	61,5	64,7	68,5	2,1	1,2
1	2003558	61,0	61,4	65,5	21,0	79,7
2	2003559	63,9	70,5	83,4	15,3	0,6
3	2003560	63,6	64,8	68,4	12,4	0,9
4	2003561	60,4	64,8	69,5	2,9	1,2
5	2003562	50,0	43,9	44,0	0	11,1
6	2003563	58,1	60,8	64,9	32,2	0,2
7	2003564	59,1	60,1	81,0	0,6	0,3
8	2003565	53,6	58,4	64,3	4,1	0,1
9	2003566	53,9	54,2	56,0	3,3	2,4
10	2003567	55,9	58,5	64,9	0,2	3,2
11	2003568	55,3	56,2	59,7	5,1	1,7
326	2003570	54,4	60,6	63,3	0,6	1,4
327	2003571	58,2	64,1	64,1	0	0,3
7108	2003572	57,1	61,3	62,1	0,6	0,4
3487	2003573	54,3	55,5	63,5	2,9	0,3
8057	2003574	53,0	55,2	56,0	0,4	0,7
C 391	2003575	53,6	58,4	64,3	4,1	1,1
C 360	2003576	53,3	57,0	59,2	1,5	2,0

*Computer Controlled Scanning Electron Microscopy.

Sample Notes, Tables 1 and 2

Samples 1, 2 and 3 are from Pugian (Loc. 1). Sample 1 represent the uppermost 4 m of the raw sand in the deposit. The content of heavy minerals in this sample is low, and may not be representative. Sample 2 is from the spiral concentrator tailings, and it is clear that a large amount of the HM fraction is still in the tailings. The analyses show that the tailings contain 0.4 % ilmenite, leucoxene and rutile. The amount of zircon in the tailings is low, indicating that the recovery of zircon is good. Sample 3 is a concentrate from the plant.

Sample 4 is from Dongjiao (Loc. 2). The ilmenite is high grade (64.7% TiO_2) indicating extensive leaching as for the Pugian location. Zircon is a high per cent of the total HM but the HM total is low (0.6%).

Sample 5 is from Boao Town (Loc). The ilmenite is also high in TiO_2. This is consistent with the associated occurrence of kaolinite indicating extensive leaching of the sand. This sample also has a high zircon content and somewhat higher total HM (0.9%).

Sample 6 is from Baolong (Loc. 4) and also contains high grade ilmenite fitting the pattern of high grade ilmenites occurring on the east coast.

Sample 7 is from Chang An (Loc. 5). The ilmenite is very low grade (50%) but the HM content is relatively high, 11%. The contrast in ilmenite grade at this location (50%) to that from localities 1-4 (>60%) indicates very different alteration histories and further study cold lend itself to understanding the distribution of the high grade deposits.

Discussion

Examination of the sample data and field relations shows that the sandy deposits on the east coast are marine/beach and likely have been reworked several times. Those sands contain substantial heavy mineral accumulation. In contrast, the west coast sands are fluvial, or from an area with a very narrow beach. The east coast sands, at some locations, have undergone substantial leaching or alteration resulting in high grade (60+ % TiO2) ilmenites. To date, those deposits are the only known high grade sand ilmenite deposits in China.

References

McLimans, R. K., 2007, Survey of Titanium Resources in China: Dupont Technical Report No. 2007-DTT-09.

Xian-Hua Li, Zheng-Xiang Li, Wu-Xian Li, and Yuejun Wang. 2006: Initiation of the Indosinian Orogeny in South China: Evidence for a Permian Magmatic Arc on Hainan Island. *Journal of Geology*, 114, 341–353

Titanium Report - Page 1/3

Sample GEUS #: 2003556

Sampler's sample#: 1 1 Pugian

Description: Represent 4 m of the raw sand stratigraphy

Country: CHINA

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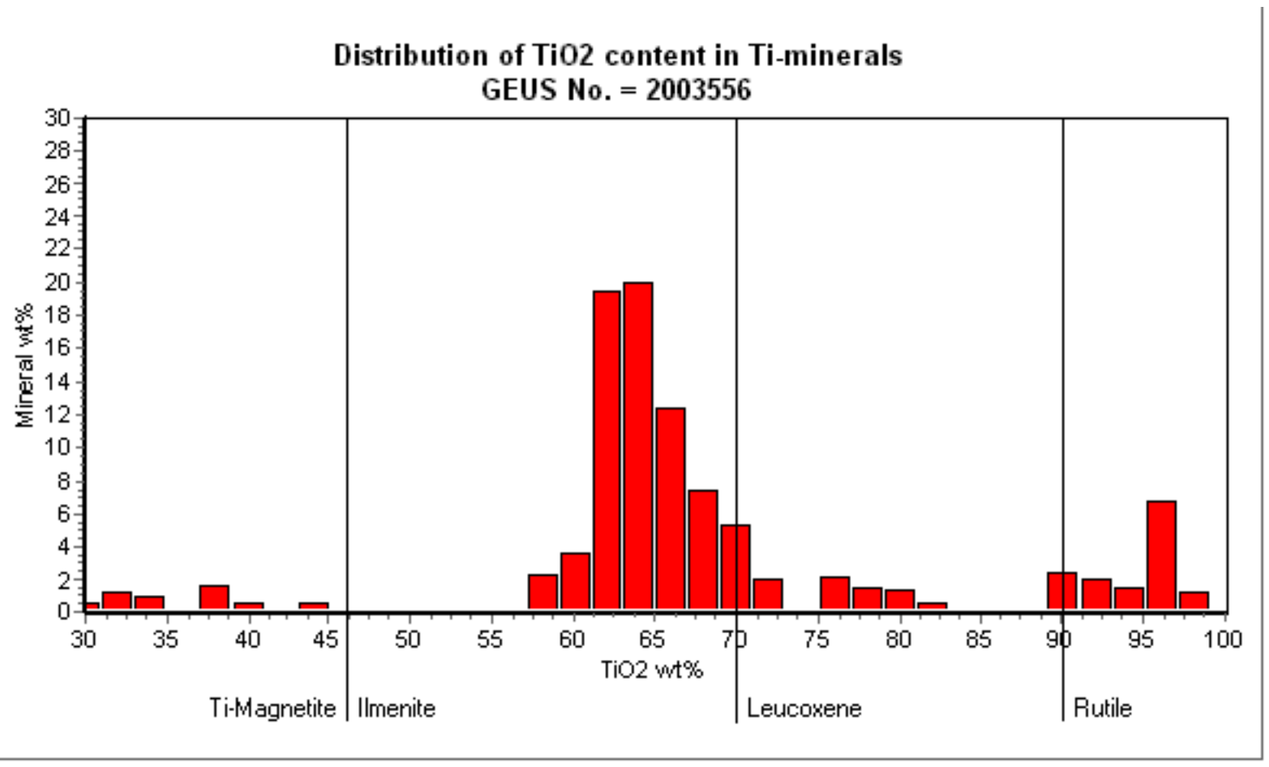
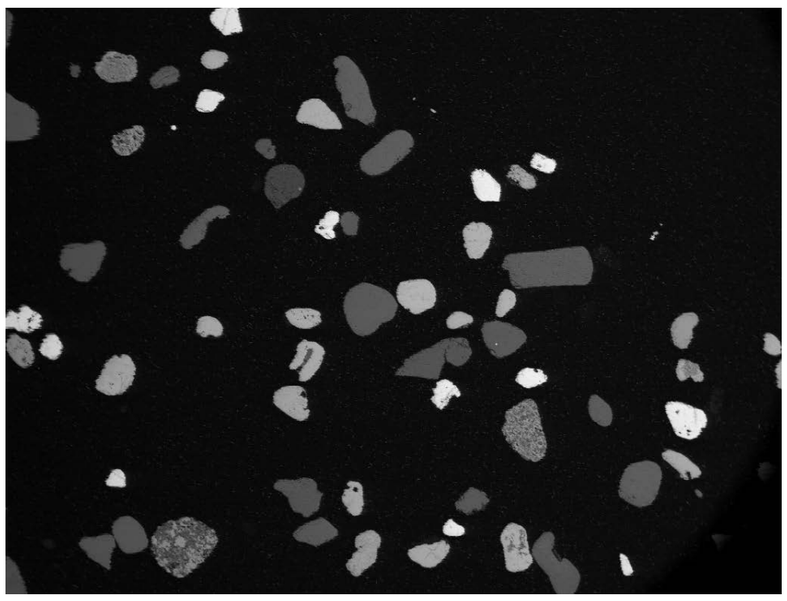




Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.01	0.14	1.17	2.14	0.23	0.03	0.19	63.23	0.13	2.39	29.64	0.1	0.11	0.08	0.29	0.05	0.02	0.04	0.0	219
leucoxene	0.0	0.11	1.71	6.38	0.33	0.09	0.2	73.61	0.17	1.35	14.8	0.12	0.12	0.09	0.69	0.12	0.04	0.07	0.0	40
rutile	0.02	0.08	0.75	2.19	0.25	0.05	0.15	94.38	0.2	0.11	0.83	0.11	0.13	0.07	0.51	0.1	0.0	0.06	0.0	40
Ti magnetite	0.0	0.37	6.86	19.34	0.23	0.05	0.13	39.79	0.0	2.47	22.77	0.02	0.07	6.75	0.78	0.14	0.08	0.15	0.0	3
magnetite	0.13	1.26	0.92	7.35	0.23	0.29	1.87	2.76	0.23	0.2	83.11	0.38	0.73	0.04	0.16	0.0	0.1	0.24	0.0	8
chromite	0.0	9.27	14.33	0.0	0.21	0.08	0.23	2.38	38.78	1.48	32.82	0.02	0.0	0.0	0.0	0.39	0.0	0.0	0.0	1
spinel	0.0	25.37	64.94	1.23	0.27	0.11	0.07	0.18	0.22	0.18	3.46	0.09	0.0	0.0	0.73	1.78	1.22	0.19	0.0	2
zircon	0.0	0.06	0.03	31.82	0.02	0.01	0.03	0.13	0.06	0.07	0.2	0.14	0.05	58.88	5.64	0.01	2.68	0.16	0.0	103
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.05	0.05	55.08	37.93	0.64	0.09	0.03	0.14	0.06	0.09	0.33	0.1	0.09	0.1	1.44	1.63	2.05	0.08	0.0	27
staurolite	0.46	2.66	42.17	38.55	0.71	0.08	0.59	0.78	0.07	0.19	11.23	0.1	0.05	0.03	0.84	0.6	0.8	0.1	0.0	18
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	1.24	5.82	27.8	42.42	0.75	0.04	1.21	0.99	0.08	0.12	14.47	0.16	0.1	0.04	1.84	0.84	2.01	0.07	0.0	7
feldspar	6.38	0.0	22.36	58.05	1.44	0.0	1.64	0.52	0.0	0.06	0.44	0.1	0.04	1.27	2.79	0.0	4.5	0.42	0.0	1
silicate-other	1.09	3.38	36.12	40.85	0.89	0.04	0.72	0.78	0.07	0.12	10.38	0.1	0.08	0.03	1.91	1.35	2.01	0.09	0.0	274
quartz	0.0	0.0	0.05	90.06	2.82	0.0	0.0	0.13	0.07	0.08	0.08	0.09	0.09	0.0	5.61	0.77	0.0	0.15	0.0	8
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.52	1.31	29.1	0.82	0.0	1.82	0.0	0.0	0.0	0.0	0.12	0.05	3.27	2.23	30.57	6.69	23.55	0.0	2
xenotime	0.0	0.0	1.39	2.65	0.0	0.0	0.23	0.0	0.0	0.0	0.0	0.83	0.48	7.08	0.0	36.82	25.74	24.8	0.0	1
phosphate	0.0	0.0	34.34	12.69	1.22	0.0	0.25	0.0	0.0	0.0	0.43	0.56	0.47	2.83	0.0	32.64	2.91	11.67	0.0	1
carbonate	0.0	0.08	0.19	0.49	0.21	0.0	96.5	0.08	0.78	0.0	0.32	0.9	0.0	0.0	0.0	0.0	0.44	0.0	0.0	1
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.01	0.2	6.8	44.53	1.04	0.03	0.13	6.72	0.08	0.15	1.88	0.17	0.11	28.78	5.3	0.58	3.2	0.29	0.0	71

P2O5 budget of ore in Ti-minerals: 0.016

P2O5 budget of ore in bulk sample: 0.134

Sample GEUS #: 2003556

Sampler's sample#: 1 1 Pugian

Description: Represent 4 m of the raw sand stratigraphy

Country: CHINA

This document was created on: Mon Sep 08 13:13:14 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	45.3	10.8	10.2	1.7	0.0	19.5	7.9	4.6

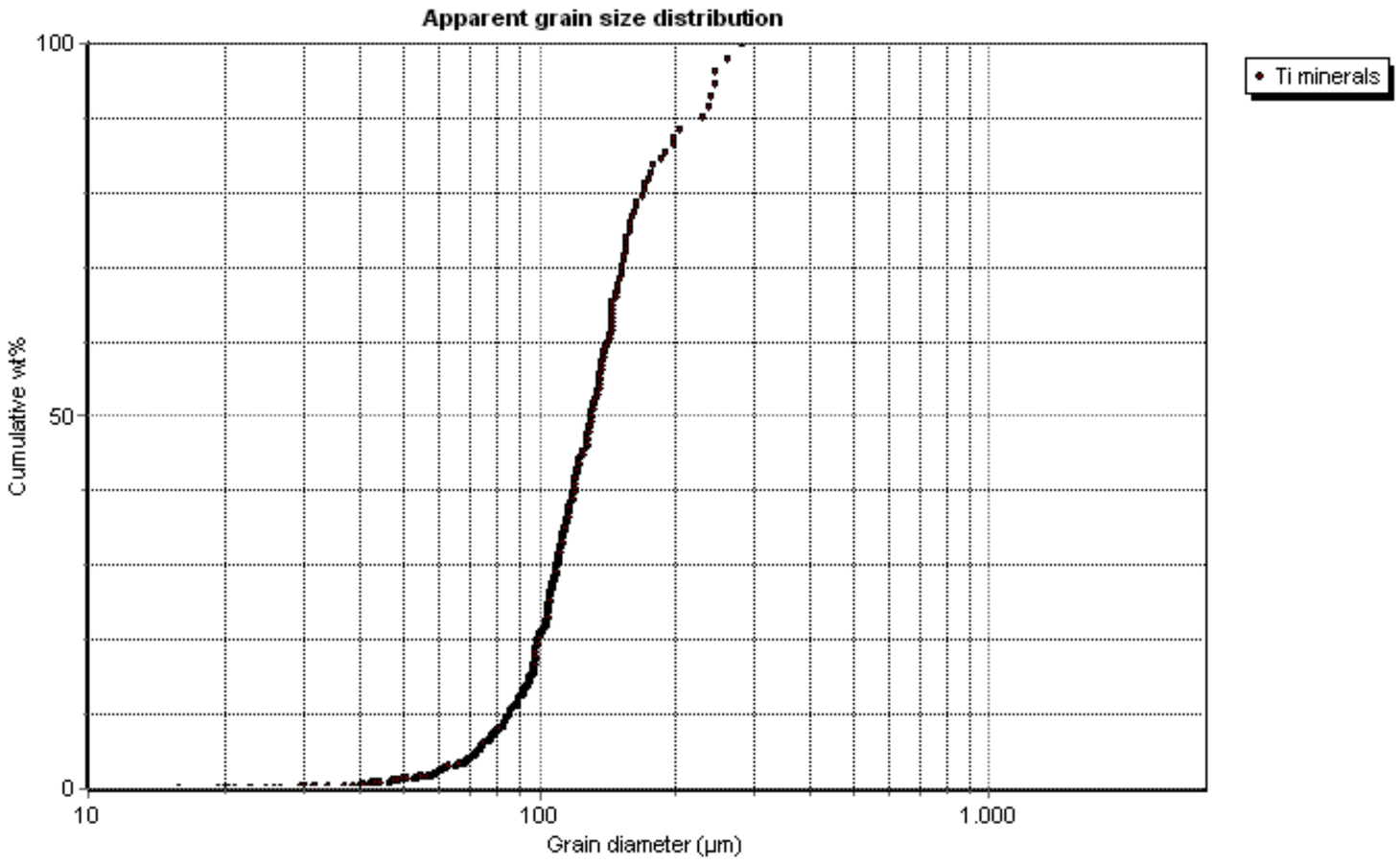
Normalised average content of the valuable Ti-bearing minerals

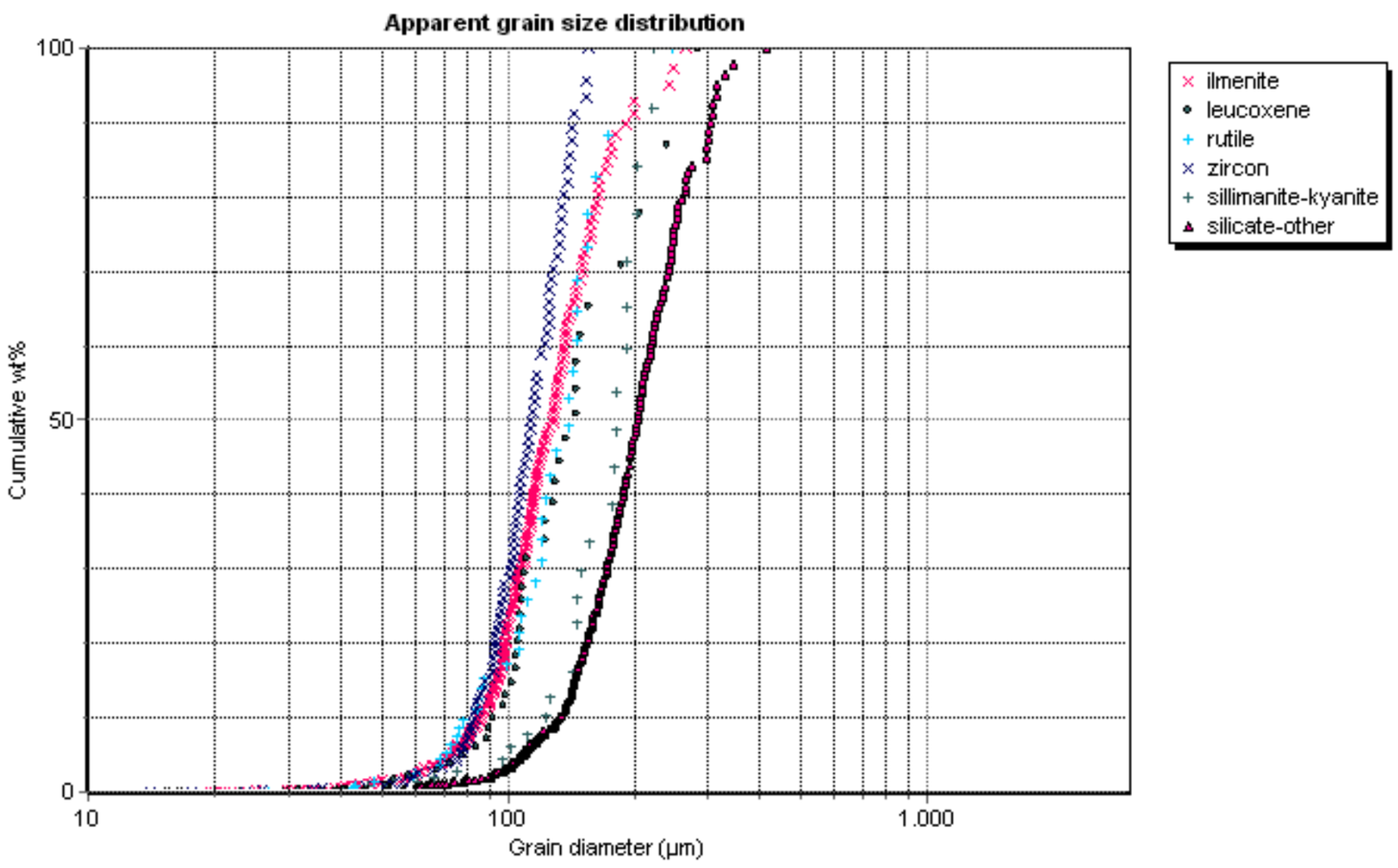
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	63.8	74.8	95.6	40.4
Fe2O3 wt%	29.9	15.0	0.8	23.1
Mno wt%	2.4	1.4	0.1	2.5
Cr2O3 wt%	0.1	0.2	0.2	0.0
SiO2 wt%	2.2	6.5	2.2	19.6
Al2O3 wt%	1.2	1.7	0.8	7.0
MgO wt%	0.1	0.1	0.1	0.4
CaO wt%	0.2	0.2	0.2	0.1
ZrO2wt%	0.1	0.1	0.1	6.9

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	69.1
Average TiO2 content of all the TiO2 minerals excl. Rutile:	64.6

Titanium Report - Page 3/3
Sample GEUS #: 2003556
Sampler's sample#: 1 1 Pugian
Description: Represent 4 m of the raw sand stratigraphy
Country: CHINA
This document was created on: Mon Sep 08 13:13:15 CEST 2008

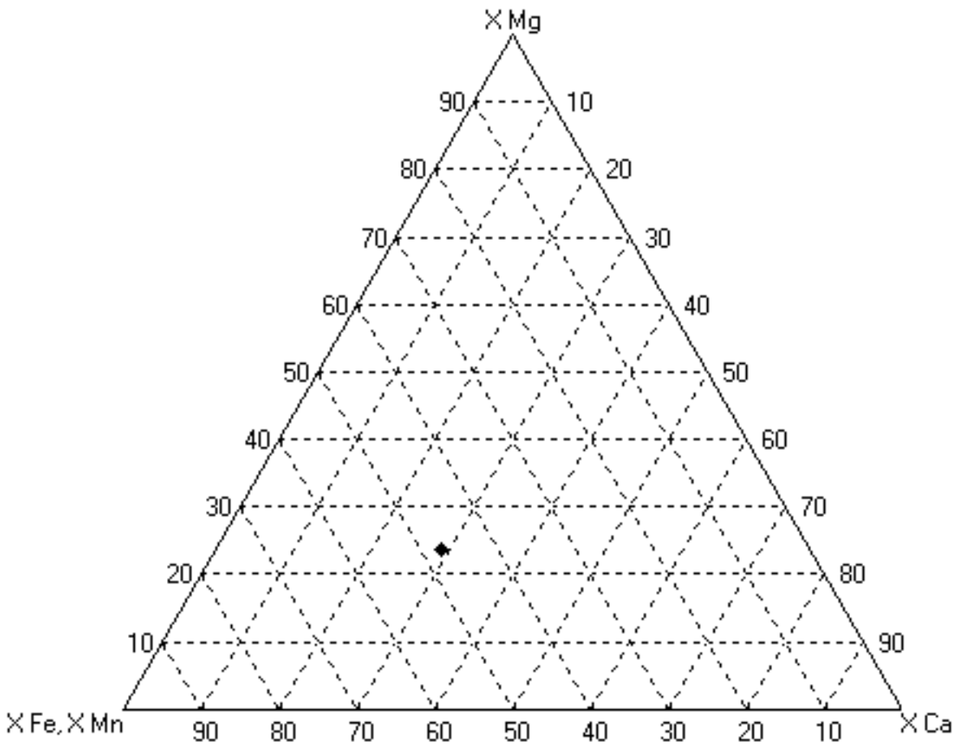


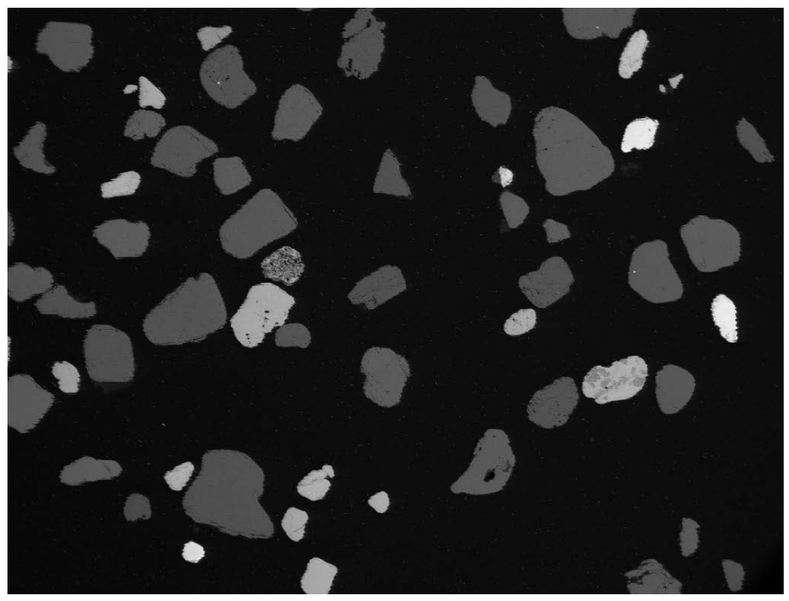


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.5	1.5	393.0	135.1	9342.7	219
leucoxene	-	-	1.6	1.7	477.5	173.6	12170.2	40
rutile	-	-	1.7	1.7	439.0	162.5	10325.7	40
Ti magnetite	0.9	0.0	2.2	2.6	869.5	370.0	23927.9	3
magnetite	0.9	0.0	2.3	3.1	242.0	105.3	2350.6	8
chromite	0.9	0.0	1.1	1.3	373.6	115.3	8245.2	1
spinel	0.9	0.0	1.7	1.6	607.3	224.5	21530.6	2
zircon	0.9	0.0	1.4	1.5	376.0	127.4	8292.7	103
sphene	0.9	0.0	0	0	0	0	0	0
garnet	0.9	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.9	0.0	1.8	1.8	604.7	228.6	18283.4	27
staurolite	0.9	0.0	1.6	1.6	435.8	150.5	13804.7	18

Weight percent and average grain parameters on a mineral basis								
mica	0.9	0.0	0	0	0	0	0	0
mafic silicates	0.9	0.0	1.7	1.7	617.6	227.6	21276.8	7
feldspar	0.9	0.0	1.3	1.4	244.2	78.4	3426.5	1
silicate-other	0.9	0.0	1.6	1.6	614.7	218.8	22457.3	274
quartz	0.9	0.0	1.8	1.8	375.8	144.8	8455.4	8
corundum	0.9	0.0	0	0	0	0	0	0
monazite	0.9	0.0	2.1	2.1	375.8	152.7	5410.9	2
xenotime	0.9	0.0	1.4	1.6	377.5	137.8	7024.7	1
phosphate	0.9	0.0	1.0	1.2	142.6	35.7	1347.1	1
carbonate	0.9	0.0	0.9	1.2	313.8	78.4	6509.3	1
pyrite	0.9	0.0	0	0	0	0	0	0
unclassified	0.9	0.0	1.6	1.6	391.2	144.0	9732.8	71

Garnet Report - Page 1/3
Sample GEUS #: 2003557
Sampler's sample#: 2 1 Pugian
Description: Represent the tailings
Country: CHINA
This document was created on: Mon Sep 08 13:17:16 CEST 2008



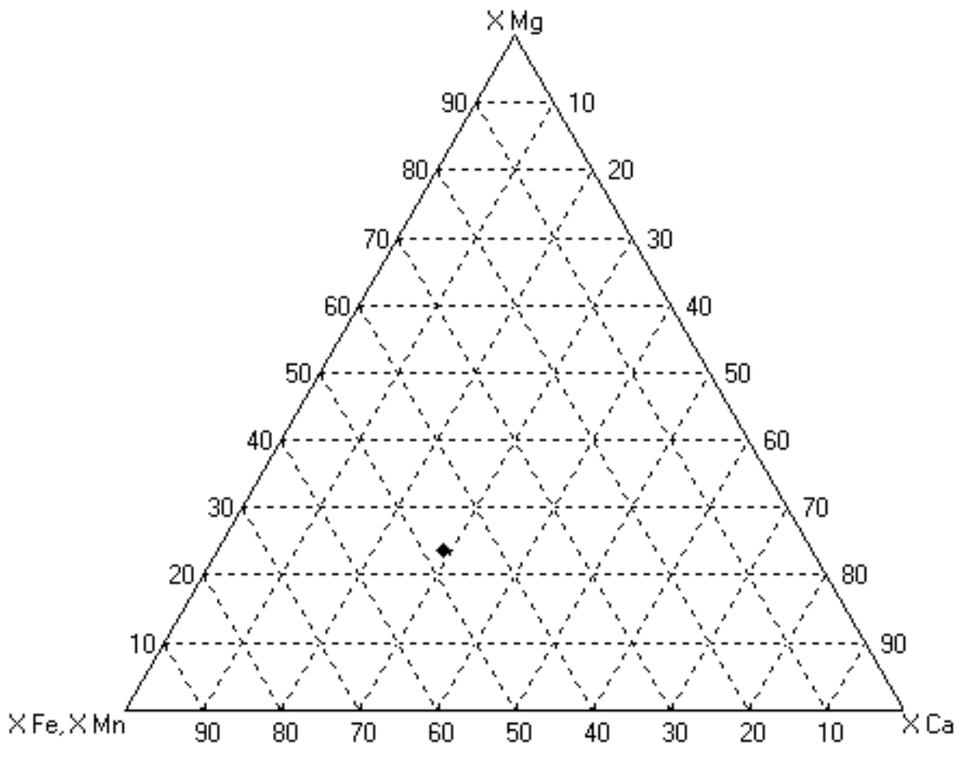


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.6	1.6	430.9	155.1	10540.1	217
leucoxene	-	-	1.8	1.8	517.3	193.5	14429.9	59
rutile	-	-	1.8	1.8	451.3	173.3	10375.6	39
Ti magnetite	0.7	0.0	2.6	3.0	1199.2	527.9	40297.2	2
magnetite	0.7	0.0	1.2	1.4	265.5	87.3	4387.8	3
chromite	0.7	0.0	0	0	0	0	0	0
spinel	0.7	0.0	0	0	0	0	0	0
zircon	0.7	0.0	1.5	1.5	330.5	111.8	6674.8	37
sphene	0.7	0.0	0	0	0	0	0	0
garnet	0.7	0.0	1.3	1.4	308.9	103.3	5282.7	1
sillimanite-kyanite	0.7	0.0	1.8	1.8	565.3	216.6	16192.9	60
staurolite	0.7	0.0	1.9	1.9	661.6	254.5	22770.0	20
mica	0.7	0.0	4.4	2.9	145.1	63.5	572.8	1
mafic silicates	0.7	0.0	1.9	2.0	592.4	226.3	17488.4	34
feldspar	0.7	0.0	1.0	1.1	58.2	14.6	237.2	1
silicate-other	0.7	0.0	1.7	1.7	615.5	227.8	20351.9	459
quartz	0.7	0.0	1.7	1.8	701.9	272.8	24843.8	7
corundum	0.7	0.0	0	0	0	0	0	0
monazite	0.7	0.0	1.6	1.4	385.9	127.3	8360.9	1
xenotime	0.7	0.0	0	0	0	0	0	0
phosphate	0.7	0.0	1.7	1.5	398.5	135.3	8656.0	1
carbonate	0.7	0.0	0	0	0	0	0	0
pyrite	0.7	0.0	1.5	1.6	79.4	26.9	321.1	6
unclassified	0.7	0.0	2.0	2.2	497.9	201.3	12434.0	85

Garnet Report - Page 2/3
Sample GEUS #: 2003557
Sampler's sample#: 2 1 Pugian
Description: Represent the tailings
Country: CHINA
This document was created on: Mon Sep 08 13:17:17 CEST 2008

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.12	1.34	1.67	0.24	0.05	0.14	61.47	0.15	2.53	31.56	0.1	0.11	0.09	0.29	0.08	0.03	0.03	0.0	217
leucoxene	0.0	0.08	2.69	8.27	0.43	0.14	0.22	73.9	0.21	0.83	12.14	0.11	0.12	0.07	0.51	0.16	0.06	0.08	0.0	59
rutile	0.0	0.08	1.34	2.65	0.33	0.05	0.19	92.84	0.24	0.08	1.15	0.1	0.14	0.08	0.49	0.06	0.01	0.17	0.0	39
Ti magnetite	0.0	1.12	8.9	15.49	0.29	0.02	0.22	40.14	0.22	0.91	20.9	0.0	0.14	9.84	1.18	0.41	0.27	0.0	0.0	2
magnetite	0.0	0.4	6.04	4.93	0.29	0.09	0.0	9.84	0.13	0.17	77.48	0.17	0.1	0.11	0.14	0.0	0.0	0.09	0.0	3
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.04	0.17	32.01	0.03	0.01	0.03	0.17	0.07	0.1	0.25	0.17	0.03	59.2	4.92	0.19	2.45	0.15	0.0	37
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0.0	6.56	22.3	37.96	0.7	0.0	7.5	0.22	0.04	0.56	20.63	0.2	0.0	0.0	1.31	0.46	1.38	0.17	0.0	1
sillimanite-kyanite	0.1	0.06	55.21	37.66	0.6	0.09	0.06	0.19	0.1	0.08	0.26	0.13	0.14	0.03	1.46	1.85	1.86	0.13	0.0	60
staurolite	0.35	2.36	44.07	35.41	0.88	0.06	0.5	0.86	0.07	0.14	11.52	0.15	0.04	0.03	1.18	1.09	1.19	0.11	0.0	20
mica	0.0	0.0	3.15	49.3	1.43	5.87	0.3	14.51	0.0	0.0	11.37	13.03	1.05	0.0	0.0	0.0	0.0	0.0	0.0	1
mafic silicates	1.05	4.44	29.2	38.97	0.89	0.1	3.55	0.74	0.12	0.21	14.95	0.09	0.05	0.0	2.09	1.34	2.17	0.06	0.0	34
feldspar	4.35	0.0	16.28	59.28	4.03	0.41	6.06	0.43	0.32	0.0	3.24	0.33	0.0	0.0	1.75	0.75	2.5	0.27	0.0	1
silicate-other	1.24	3.25	35.77	40.31	0.98	0.05	0.61	0.7	0.07	0.12	10.42	0.09	0.06	0.01	2.24	1.62	2.36	0.08	0.0	459
quartz	0.08	0.05	0.11	88.37	3.28	0.0	0.0	0.14	0.01	0.01	0.27	0.05	0.06	0.0	6.34	0.91	0.0	0.31	0.0	7
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	3.2	6.41	0.57	0.0	2.52	0.0	0.0	0.0	0.0	0.0	0.66	10.56	0.0	36.34	9.66	30.09	0.0	1
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0.0	0.0	39.26	2.6	3.83	0.01	1.94	0.0	0.0	0.0	0.84	0.3	0.29	5.82	0.0	30.41	5.94	8.77	0.0	1
carbonate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pyrite	0.0	0.16	3.0	1.9	64.93	0.15	1.18	0.22	0.02	0.14	28.01	0.12	0.1	0.0	0.07	0.0	0.0	0.0	0.0	6
unclassified	1.25	0.58	17.53	43.73	2.41	0.26	0.56	13.32	0.13	0.2	2.63	0.18	0.16	9.75	3.37	1.44	2.17	0.33	0.0	85



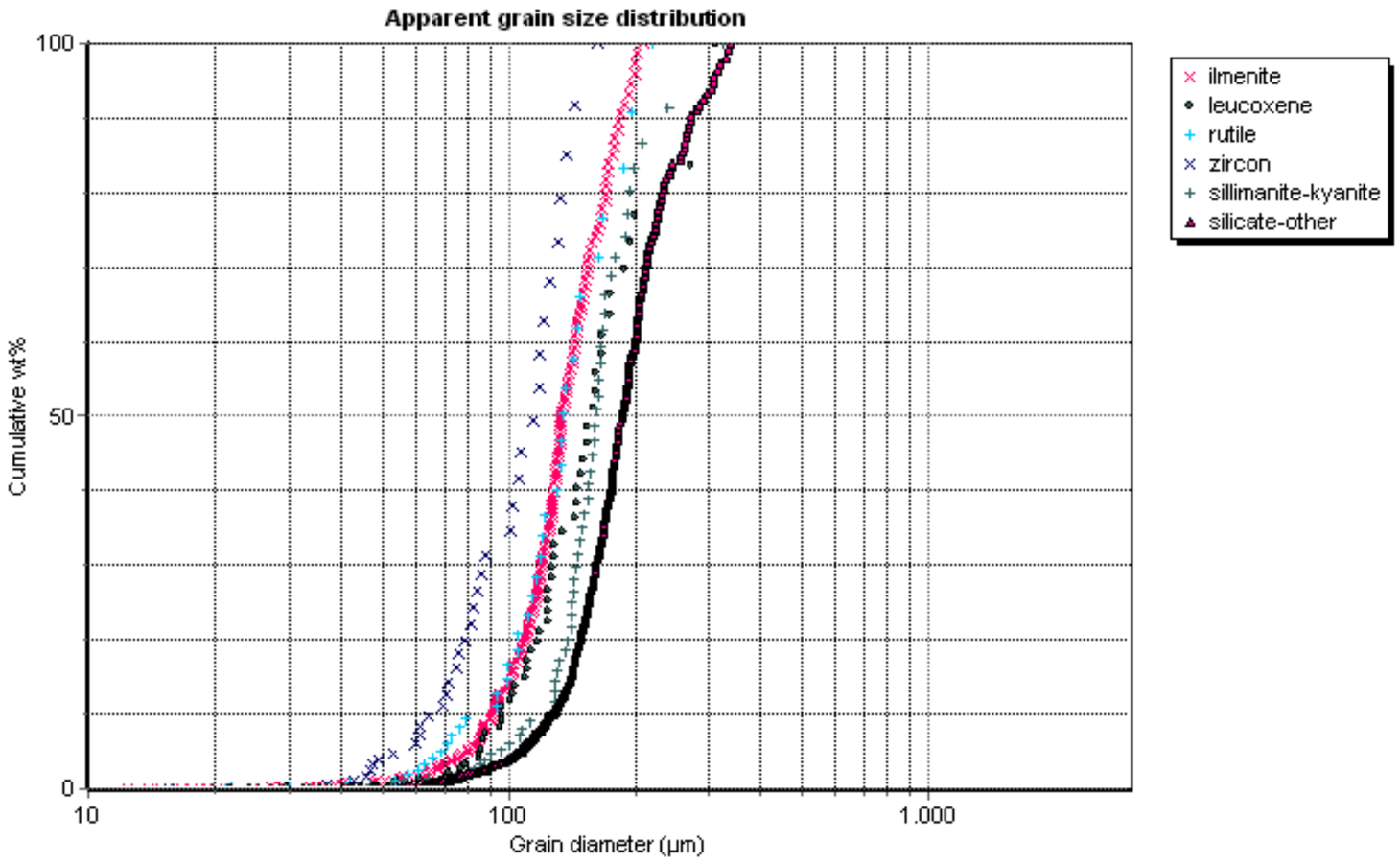
Sample GEUS #: 2003557

Sampler's sample#: 2 1 Pugian

Description: Represent the tailings

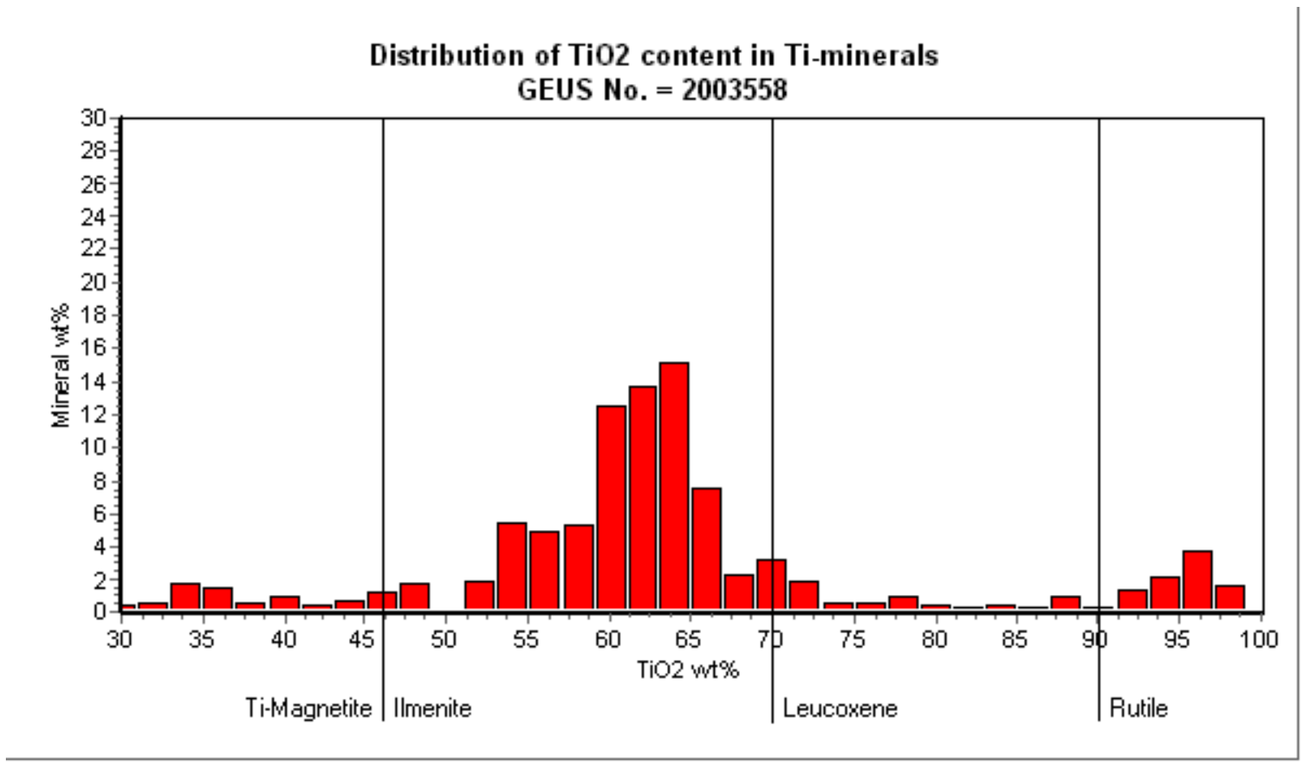
Country: CHINA

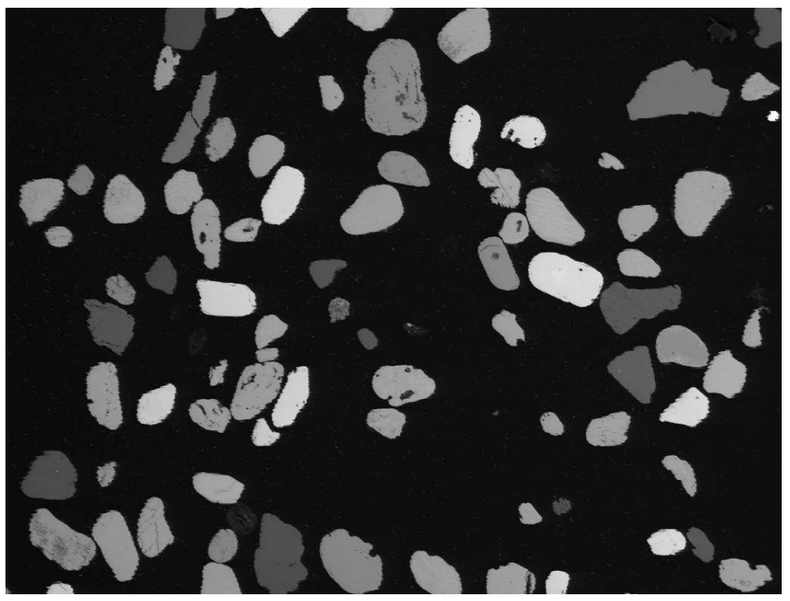
This document was created on: Mon Sep 08 13:17:17 CEST 2008



Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.6	1.6	430.9	155.1	10540.1	217
leucoxene	-	-	1.8	1.8	517.3	193.5	14429.9	59
rutile	-	-	1.8	1.8	451.3	173.3	10375.6	39
Ti magnetite	0.7	0.0	2.6	3.0	1199.2	527.9	40297.2	2
magnetite	0.7	0.0	1.2	1.4	265.5	87.3	4387.8	3
chromite	0.7	0.0	0	0	0	0	0	0
spinel	0.7	0.0	0	0	0	0	0	0
zircon	0.7	0.0	1.5	1.5	330.5	111.8	6674.8	37
sphene	0.7	0.0	0	0	0	0	0	0
garnet	0.7	0.0	1.3	1.4	308.9	103.3	5282.7	1
sillimanite-kyanite	0.7	0.0	1.8	1.8	565.3	216.6	16192.9	60
staurolite	0.7	0.0	1.9	1.9	661.6	254.5	22770.0	20
mica	0.7	0.0	4.4	2.9	145.1	63.5	572.8	1
mafic silicates	0.7	0.0	1.9	2.0	592.4	226.3	17488.4	34
feldspar	0.7	0.0	1.0	1.1	58.2	14.6	237.2	1
silicate-other	0.7	0.0	1.7	1.7	615.5	227.8	20351.9	459
quartz	0.7	0.0	1.7	1.8	701.9	272.8	24843.8	7
corundum	0.7	0.0	0	0	0	0	0	0
monazite	0.7	0.0	1.6	1.4	385.9	127.3	8360.9	1
xenotime	0.7	0.0	0	0	0	0	0	0
phosphate	0.7	0.0	1.7	1.5	398.5	135.3	8656.0	1
carbonate	0.7	0.0	0	0	0	0	0	0
pyrite	0.7	0.0	1.5	1.6	79.4	26.9	321.1	6
unclassified	0.7	0.0	2.0	2.2	497.9	201.3	12434.0	85

Titanium Report - Page 1/3
Sample GEUS #: 2003558
Sampler's sample#: 3 1 Pugian
Description: Represent the concentrate
Country: CHINA
This document was created on: Mon Sep 08 13:18:17 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.13	1.01	1.28	0.18	0.03	0.11	60.96	0.13	2.58	32.59	0.09	0.12	0.34	0.31	0.07	0.02	0.05	0.0	452
leucoxene	0.0	0.12	2.44	5.66	0.33	0.09	0.21	75.22	0.18	0.97	13.42	0.1	0.13	0.26	0.6	0.17	0.04	0.06	0.0	48
rutile	0.02	0.1	1.04	1.89	0.18	0.08	0.11	94.36	0.22	0.07	0.84	0.09	0.12	0.07	0.58	0.04	0.02	0.18	0.0	65
Ti magnetite	0.0	0.95	12.39	15.15	0.21	0.33	0.08	36.6	0.05	0.94	32.84	0.12	0.03	0.05	0.28	0.0	0.0	0.0	0.0	4
magnetite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
chromite	3.78	8.49	14.22	0.39	0.28	0.09	0.12	1.49	41.88	1.86	26.06	0.39	0.0	0.19	0.07	0.3	0.22	0.2	0.0	2
spinel	0.0	15.31	76.57	1.26	0.06	0.17	0.0	0.03	0.12	0.0	1.47	0.0	0.0	0.05	0.0	3.28	1.38	0.32	0.0	2
zircon	0.0	0.04	0.07	31.82	0.02	0.01	0.02	0.2	0.07	0.1	0.19	0.14	0.05	59.23	5.71	0.0	2.19	0.14	0.0	255
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.1	0.08	55.92	38.18	0.6	0.11	0.02	0.16	0.08	0.08	0.28	0.08	0.1	0.01	1.04	1.37	1.63	0.17	0.0	10
staurolite	0.34	2.25	43.78	36.9	0.63	0.05	0.27	0.77	0.07	0.18	11.16	0.09	0.05	0.0	1.15	0.91	1.26	0.14	0.0	14
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	0.13	5.25	23.18	38.03	0.63	0.02	8.72	0.46	0.13	0.51	19.87	0.04	0.07	0.02	1.17	0.46	1.25	0.06	0.0	45
feldspar	0.0	0.0	31.89	48.4	5.23	2.19	4.89	3.01	0.0	0.43	3.28	0.68	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
silicate-other	1.19	3.02	36.1	40.6	1.02	0.07	0.64	0.86	0.09	0.15	10.75	0.09	0.07	0.03	1.93	1.42	1.91	0.08	0.0	108
quartz	0.0	0.05	0.14	89.2	3.01	0.0	0.0	0.11	0.07	0.09	0.16	0.19	0.05	0.0	5.48	0.99	0.27	0.18	0.0	24
corundum	0.0	0.0	91.16	0.0	0.0	0.13	0.07	1.25	0.38	0.16	1.06	0.0	0.0	0.0	0.0	4.63	1.03	0.12	0.0	1
monazite	0.0	0.08	10.02	2.22	0.36	0.0	1.28	0.0	0.0	0.0	0.01	0.32	0.08	9.3	0.0	36.94	8.11	31.3	0.0	4
xenotime	0.0	0.0	2.26	8.04	0.0	0.0	3.58	0.0	0.0	0.0	0.0	0.62	0.03	6.77	2.14	39.42	9.03	28.08	0.0	1
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pyrite	0.0	0.01	2.13	1.63	62.98	0.04	0.49	0.54	0.05	0.23	29.55	0.07	0.14	0.0	1.96	0.2	0.0	0.0	0.0	3
unclassified	0.1	0.34	4.57	43.2	1.39	0.2	0.5	10.24	0.25	0.25	3.3	0.18	0.08	26.51	5.16	0.62	2.9	0.21	0.0	137

P2O5 budget of ore in Ti-minerals: 0.024
P2O5 budget of ore in bulk sample: 0.183

Sample GEUS #: 2003558

Sampler's sample#: 3 1 Pugian

Description: Represent the concentrate

Country: CHINA

This document was created on: Mon Sep 08 13:18:18 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	54.3	5.9	8.5	1.8	0.0	26.9	1.5	1.1

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	61.5	76.4	95.6	37.0
Fe2O3 wt%	32.9	13.6	0.9	33.2
Mno wt%	2.6	1.0	0.1	0.9
Cr2O3 wt%	0.1	0.2	0.2	0.1
SiO2 wt%	1.3	5.7	1.9	15.3
Al2O3 wt%	1.0	2.5	1.1	12.5
MgO wt%	0.1	0.1	0.1	1.0
CaO wt%	0.1	0.2	0.1	0.1
ZrO2wt%	0.3	0.3	0.1	0.1

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	65.3
Average TiO2 content of all the TiO2 minerals excl. Rutile:	61.4

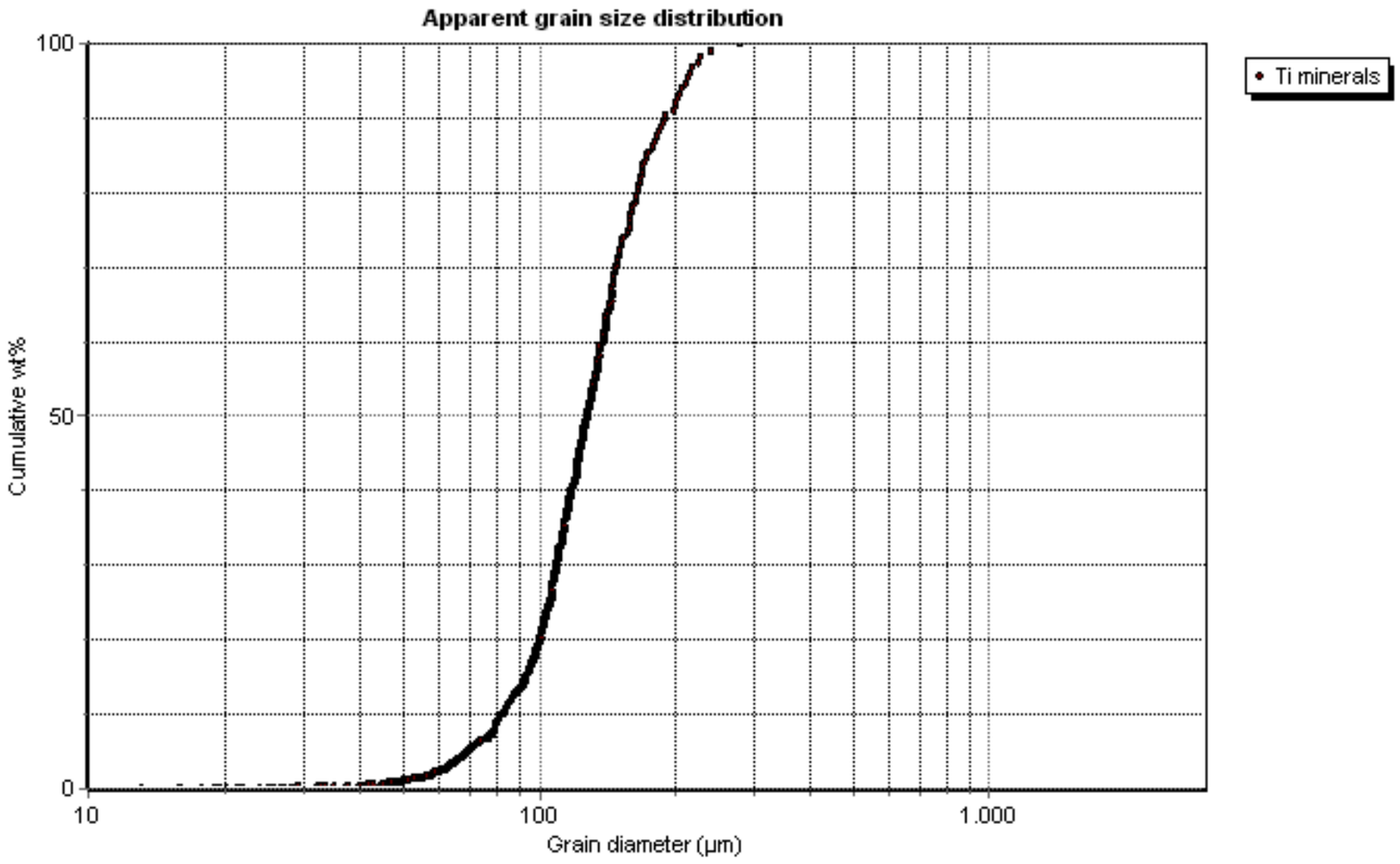
Sample GEUS #: 2003558

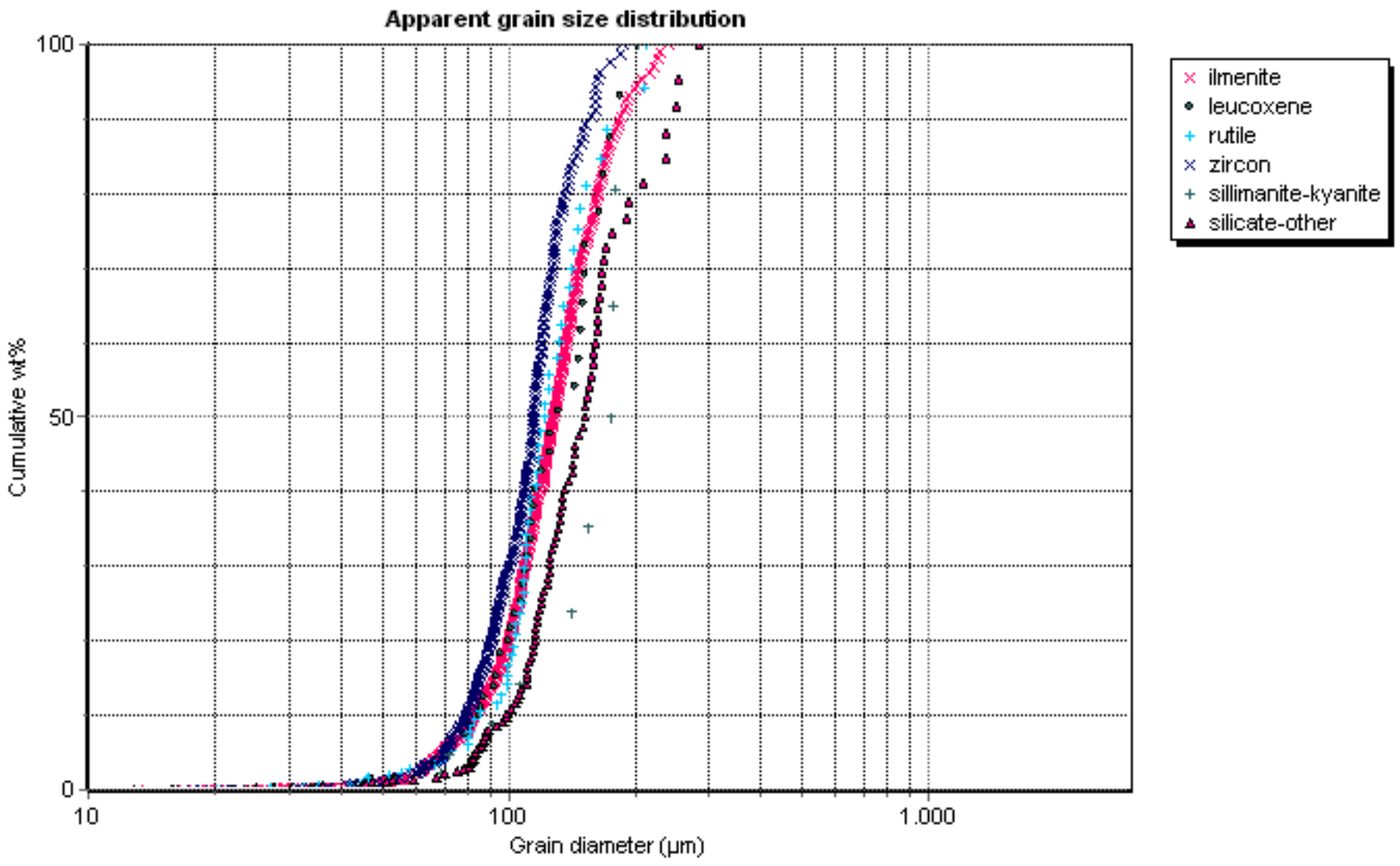
Sampler's sample#: 3 1 Pugian

Description: Represent the concentrate

Country: CHINA

This document was created on: Mon Sep 08 13:18:18 CEST 2008

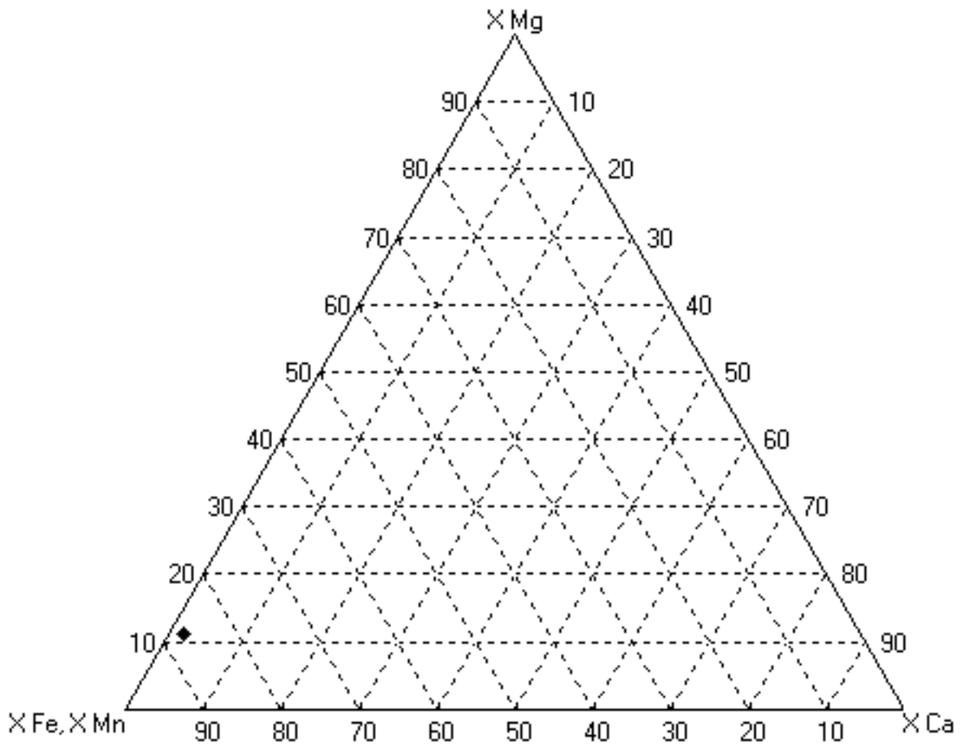


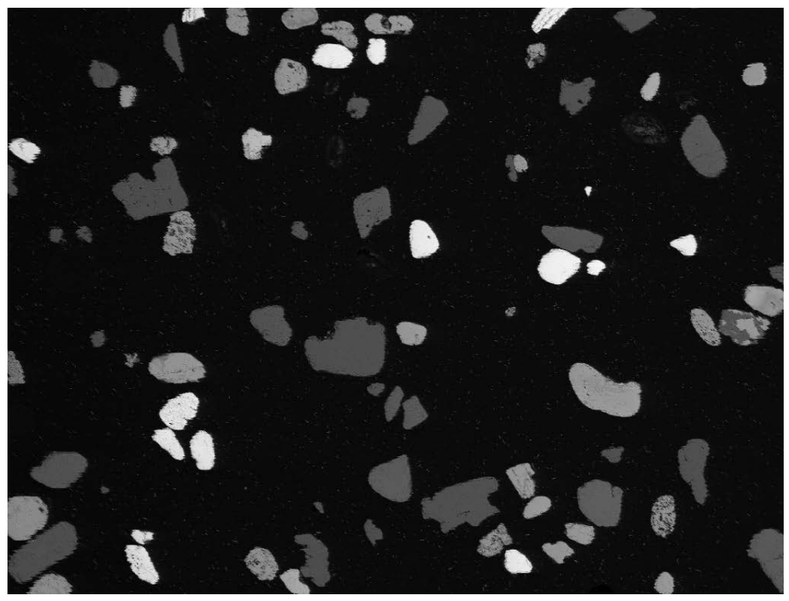


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.7	421.9	154.3	9488.8	452
leucoxene	-	-	1.8	1.9	448.4	172.3	9755.1	48
rutile	-	-	1.6	1.6	400.2	141.8	9281.3	65
Ti magnetite	1.4	1.1	2.4	3.2	1117.5	500.7	33347.3	4
magnetite	1.4	1.1	0	0	0	0	0	0
chromite	1.4	1.1	1.5	1.6	433.3	151.4	9874.5	2
spinel	1.4	1.1	1.5	1.6	377.7	143.0	10298.4	2
zircon	1.4	1.1	1.5	1.5	376.8	130.6	8059.5	255
sphene	1.4	1.1	0	0	0	0	0	0
garnet	1.4	1.1	0	0	0	0	0	0
sillimanite-kyanite	1.4	1.1	1.8	1.8	585.9	227.1	16280.6	10
staurolite	1.4	1.1	1.5	1.6	350.3	128.0	7522.8	14

Weight percent and average grain parameters on a mineral basis								
mica	1.4	1.1	0	0	0	0	0	0
mafic silicates	1.4	1.1	2.0	2.0	464.3	186.4	10372.7	45
feldspar	1.4	1.1	4.3	4.1	149.5	68.4	434.0	1
silicate-other	1.4	1.1	1.6	1.6	460.5	167.4	12510.7	108
quartz	1.4	1.1	1.6	1.7	362.5	136.3	7362.5	24
corundum	1.4	1.1	1.2	1.4	97.0	31.0	542.5	1
monazite	1.4	1.1	1.5	1.4	425.0	136.9	10446.1	4
xenotime	1.4	1.1	0.8	1.0	74.5	18.6	446.0	1
phosphate	1.4	1.1	0	0	0	0	0	0
carbonate	1.4	1.1	0	0	0	0	0	0
pyrite	1.4	1.1	2.0	2.0	119.4	47.1	782.2	3
unclassified	1.4	1.1	1.9	2.0	450.2	180.0	9874.7	137

Garnet Report - Page 1/3
Sample GEUS #: 2003559
Sampler's sample#: 4 2 Dongjiao Tow
Description: The sample represent 1 m of the deposit.
Country: CHINA
This document was created on: Mon Sep 08 13:19:29 CEST 2008



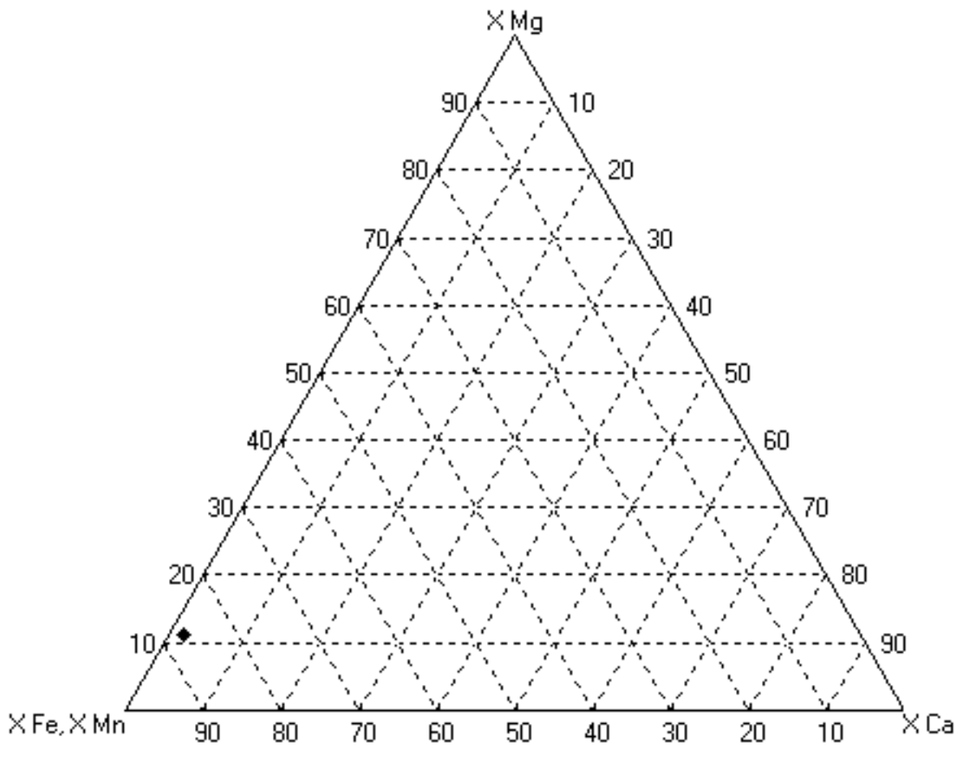


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	8.1	0.0	1.6	1.6	301.2	109.4	5115.4	86
leucoxene	8.1	0.0	1.7	1.7	301.0	112.2	4841.0	85
rutile	8.1	0.0	1.7	1.6	291.2	105.0	4641.3	197
Ti magnetite	8.1	0.0	0	0	0	0	0	0
magnetite	8.1	0.0	2.8	2.6	117.9	47.3	642.1	5
chromite	8.1	0.0	1.4	1.5	249.6	88.0	3240.6	2
spinel	8.1	0.0	2.4	2.3	802.7	333.2	22718.4	1
zircon	8.1	0.0	1.5	1.6	305.7	106.3	5178.5	156
sphene	8.1	0.0	0	0	0	0	0	0
garnet	8.1	0.0	0.8	1.0	50.4	12.6	208.9	1
sillimanite-kyanite	8.1	0.0	1.8	1.9	426.2	166.2	9035.9	52
staurolite	8.1	0.0	1.8	1.8	438.1	162.9	9655.2	14
mica	8.1	0.0	0	0	0	0	0	0
mafic silicates	8.1	0.0	1.9	2.0	376.1	144.0	7338.8	14
feldspar	8.1	0.0	1.4	1.6	154.1	58.5	1458.6	2
silicate-other	8.1	0.0	1.8	1.8	411.3	156.0	8698.2	215
quartz	8.1	0.0	1.8	1.8	399.3	153.3	8035.4	58
corundum	8.1	0.0	0	0	0	0	0	0
monazite	8.1	0.0	0	0	0	0	0	0
xenotime	8.1	0.0	1.2	1.3	247.8	75.5	3652.5	1
phosphate	8.1	0.0	1.7	1.7	449.4	166.8	9659.5	1
carbonate	8.1	0.0	1.3	1.5	58.2	20.4	176.8	1
pyrite	8.1	0.0	0	0	0	0	0	0
unclassified	8.1	0.0	1.8	1.9	288.3	112.1	4604.5	282

Garnet Report - Page 2/3
Sample GEUS #: 2003559
Sampler's sample#: 4 2 Dongjiao Tow
Description: The sample represent 1 m of the deposit.
Country: CHINA
This document was created on: Mon Sep 08 13:19:29 CEST 2008

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.17	1.55	3.29	0.19	0.04	0.15	63.89	0.15	1.78	27.85	0.1	0.11	0.32	0.25	0.08	0.03	0.05	0.0	86
leucoxene	0.0	0.1	1.93	4.74	0.28	0.06	0.27	77.6	0.2	0.49	13.04	0.11	0.13	0.4	0.35	0.16	0.04	0.08	0.0	85
rutile	0.0	0.06	0.9	2.21	0.18	0.04	0.14	93.86	0.23	0.1	1.34	0.1	0.09	0.11	0.37	0.1	0.02	0.15	0.0	197
Ti magnetite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
magnetite	0.0	1.4	4.2	20.41	0.8	0.26	0.77	1.27	0.64	0.03	64.92	2.93	0.66	0.0	0.41	1.11	0.0	0.2	0.0	5
chromite	0.0	9.93	17.71	2.26	0.08	0.02	0.15	4.42	34.84	1.34	27.98	0.43	0.0	0.0	0.26	0.21	0.41	0.0	0.0	2
spinel	0.0	26.11	59.73	2.73	0.0	0.1	0.0	0.54	0.0	0.15	7.26	0.0	0.0	0.0	0.0	1.76	1.3	0.33	0.0	1
zircon	0.0	0.04	0.05	32.18	0.01	0.01	0.02	0.21	0.08	0.1	0.2	0.14	0.05	58.8	5.41	0.07	2.49	0.16	0.0	156
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0.0	0.33	18.82	42.31	0.0	0.53	2.65	3.81	0.19	0.17	29.27	0.34	0.0	0.0	0.0	0.0	0.0	1.58	0.0	1
sillimanite-kyanite	0.06	0.04	55.67	37.79	0.62	0.1	0.05	0.31	0.09	0.08	0.46	0.11	0.11	0.04	1.14	1.6	1.58	0.17	0.0	52
staurolite	0.09	2.23	44.76	36.44	0.78	0.04	0.24	0.68	0.07	0.16	11.0	0.17	0.03	0.0	1.13	1.12	0.97	0.1	0.0	14
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	1.33	3.03	26.29	42.62	0.76	0.1	1.51	1.21	0.39	0.11	18.31	0.28	0.08	0.0	1.58	0.86	1.5	0.08	0.0	14
feldspar	2.45	0.0	21.89	57.23	1.03	7.81	2.44	0.21	0.13	0.26	0.24	0.0	0.0	0.75	2.21	0.0	3.28	0.11	0.0	2
silicate-other	1.33	3.32	35.12	41.23	0.96	0.05	0.69	0.87	0.09	0.12	10.35	0.1	0.07	0.02	2.05	1.5	2.04	0.09	0.0	215
quartz	0.01	0.05	0.05	89.09	3.23	0.0	0.0	0.13	0.05	0.06	0.15	0.1	0.15	0.0	5.78	0.92	0.03	0.19	0.0	58
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0.0	0.0	0.29	3.81	0.0	0.0	2.24	0.0	0.0	0.0	0.0	0.0	0.43	7.77	0.0	41.14	9.31	35.01	0.0	1
phosphate	0.0	0.0	40.66	2.83	3.53	0.0	3.09	0.0	0.0	0.0	0.0	0.35	0.14	5.2	0.0	31.7	3.27	9.23	0.0	1
carbonate	0.0	0.47	0.31	1.4	0.0	0.0	93.5	0.33	0.11	0.44	0.27	0.53	0.0	0.0	0.87	0.28	1.47	0.0	0.0	1
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.11	0.27	4.53	58.59	1.95	0.45	0.6	9.39	0.14	0.15	2.52	0.2	0.23	11.98	4.9	0.82	2.92	0.24	0.0	282



Sample GEUS #: 2003559

Sampler's sample#: 4 2 Dongjiao Tow

Description: The sample represent 1 m of the deposit.

Country: CHINA

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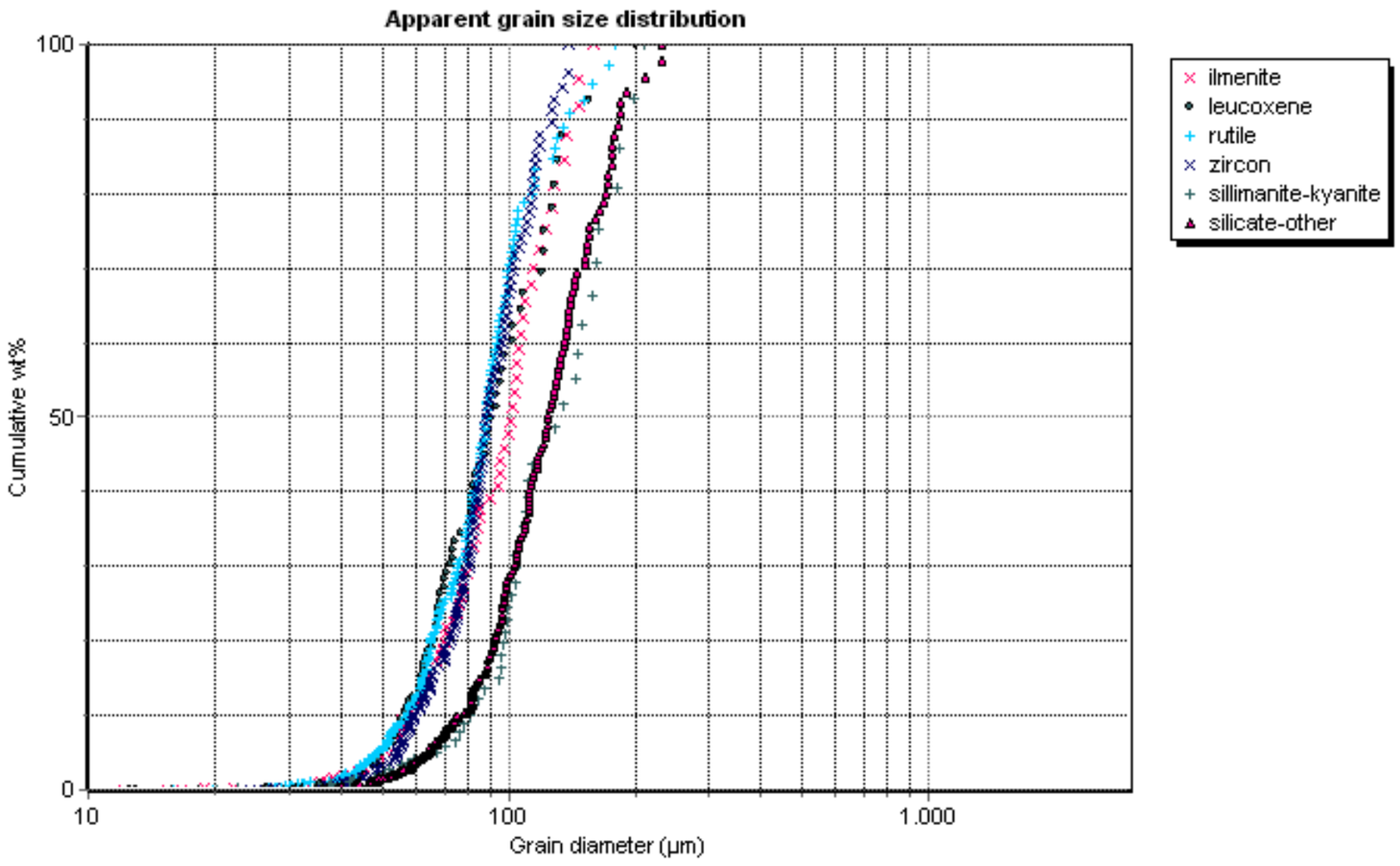

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	8.1	0.0	1.6	1.6	301.2	109.4	5115.4	86
leucoxene	8.1	0.0	1.7	1.7	301.0	112.2	4841.0	85
rutile	8.1	0.0	1.7	1.6	291.2	105.0	4641.3	197
Ti magnetite	8.1	0.0	0	0	0	0	0	0
magnetite	8.1	0.0	2.8	2.6	117.9	47.3	642.1	5
chromite	8.1	0.0	1.4	1.5	249.6	88.0	3240.6	2
spinel	8.1	0.0	2.4	2.3	802.7	333.2	22718.4	1
zircon	8.1	0.0	1.5	1.6	305.7	106.3	5178.5	156
sphene	8.1	0.0	0	0	0	0	0	0
garnet	8.1	0.0	0.8	1.0	50.4	12.6	208.9	1
sillimanite-kyanite	8.1	0.0	1.8	1.9	426.2	166.2	9035.9	52
staurolite	8.1	0.0	1.8	1.8	438.1	162.9	9655.2	14
mica	8.1	0.0	0	0	0	0	0	0
mafic silicates	8.1	0.0	1.9	2.0	376.1	144.0	7338.8	14
feldspar	8.1	0.0	1.4	1.6	154.1	58.5	1458.6	2
silicate-other	8.1	0.0	1.8	1.8	411.3	156.0	8698.2	215
quartz	8.1	0.0	1.8	1.8	399.3	153.3	8035.4	58
corundum	8.1	0.0	0	0	0	0	0	0
monazite	8.1	0.0	0	0	0	0	0	0
xenotime	8.1	0.0	1.2	1.3	247.8	75.5	3652.5	1
phosphate	8.1	0.0	1.7	1.7	449.4	166.8	9659.5	1
carbonate	8.1	0.0	1.3	1.5	58.2	20.4	176.8	1
pyrite	8.1	0.0	0	0	0	0	0	0
unclassified	8.1	0.0	1.8	1.9	288.3	112.1	4604.5	282

Titanium Report - Page 1/3

Sample GEUS #: 2003560

Sampler's sample#: 5 3 Boao Town

Description: The sample represent ca 2 m of the mined deposit.

Country: CHINA

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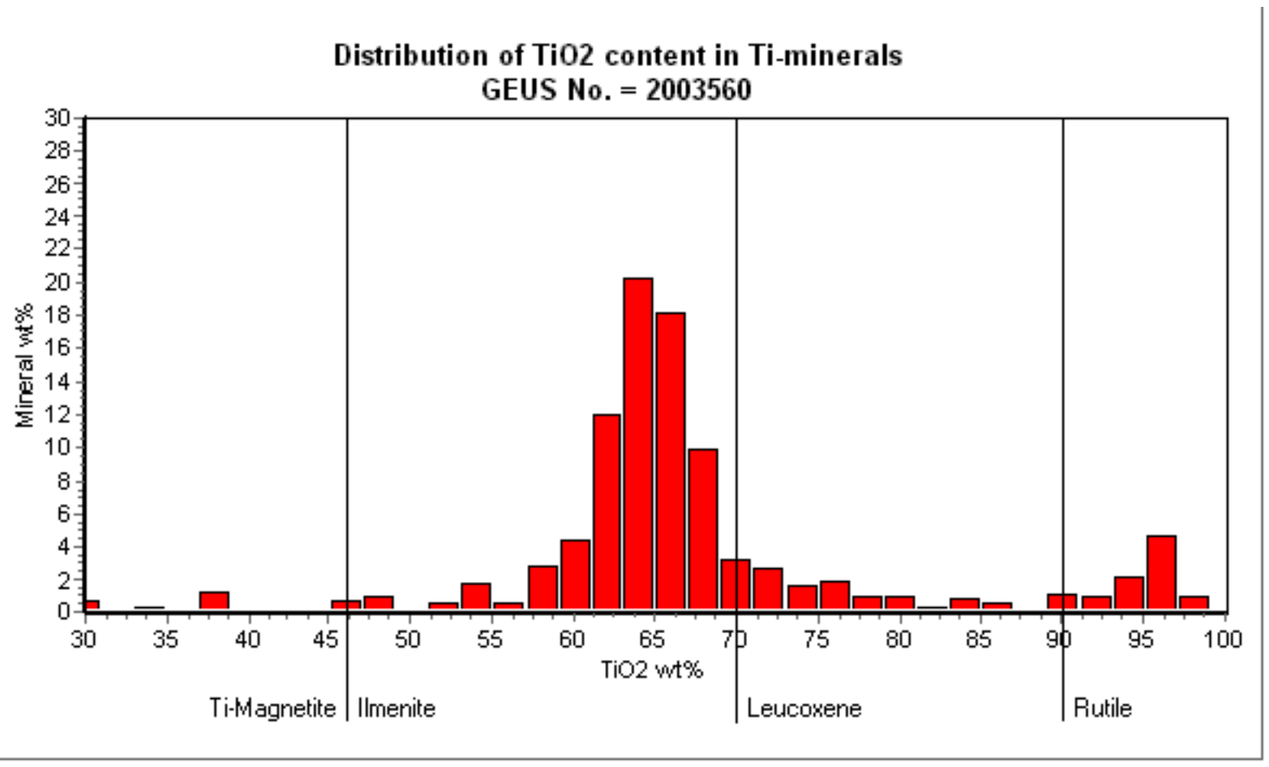
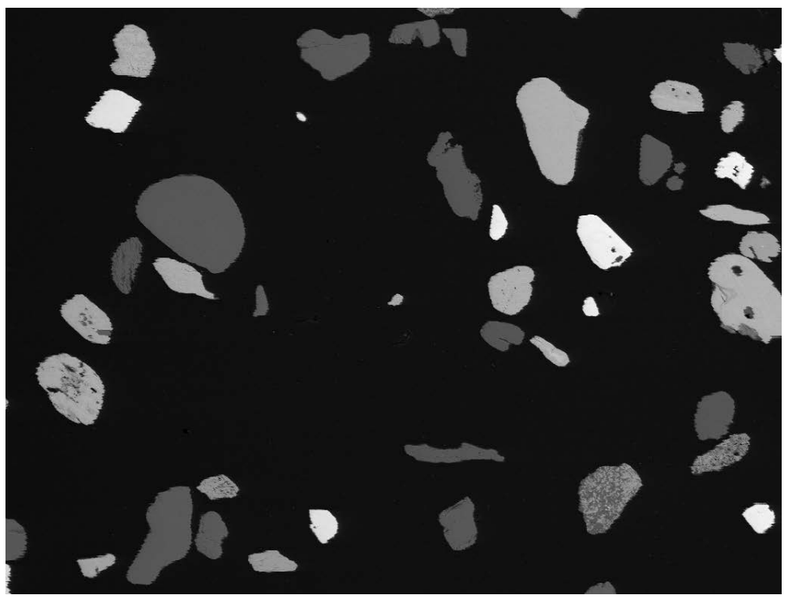




Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.14	0.99	1.53	0.15	0.04	0.09	63.56	0.14	1.91	30.65	0.1	0.1	0.21	0.24	0.08	0.03	0.04	0.0	434
leucoxene	0.0	0.07	1.98	4.88	0.19	0.08	0.14	75.17	0.17	0.91	15.54	0.1	0.13	0.06	0.37	0.15	0.03	0.03	0.0	65
rutile	0.01	0.06	0.98	1.51	0.2	0.04	0.11	94.56	0.29	0.08	0.91	0.1	0.13	0.14	0.62	0.06	0.03	0.18	0.0	75
Ti magnetite	0.0	1.03	7.74	29.49	0.63	0.0	0.48	38.27	0.0	1.04	19.67	0.0	0.26	0.0	1.01	0.22	0.18	0.0	0.0	2
magnetite	0.0	0.0	11.86	3.26	0.48	0.08	0.62	0.4	0.33	0.58	78.94	0.41	0.01	0.0	0.0	3.03	0.0	0.0	0.0	1
chromite	0.0	3.02	7.29	0.0	0.0	0.09	0.0	0.68	54.39	2.55	31.39	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1
spinel	0.0	27.79	62.67	5.29	0.0	0.15	0.09	0.18	0.01	0.01	0.28	0.0	0.0	0.0	0.09	2.15	1.09	0.19	0.0	1
zircon	0.01	0.04	0.07	31.84	0.02	0.01	0.03	0.18	0.08	0.08	0.16	0.14	0.05	59.27	5.71	0.0	2.18	0.15	0.0	152
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.09	0.09	55.19	37.82	0.75	0.13	0.05	0.2	0.08	0.08	0.35	0.12	0.08	0.0	1.3	1.76	1.82	0.1	0.0	26
staurolite	0.34	2.7	43.29	37.43	0.76	0.05	0.48	0.85	0.12	0.13	10.69	0.09	0.1	0.0	1.02	0.79	1.11	0.06	0.0	8
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	1.4	3.69	29.5	40.46	1.09	0.51	3.75	1.44	0.05	0.14	14.01	0.13	0.08	0.0	1.42	0.85	1.42	0.07	0.0	8
feldspar	0.76	1.93	19.02	56.66	3.83	5.15	2.82	1.1	0.19	0.05	7.63	0.07	0.19	0.0	0.43	0.14	0.0	0.07	0.0	2
silicate-other	0.78	4.32	35.71	41.75	0.91	0.06	1.15	1.02	0.13	0.11	8.6	0.08	0.08	0.02	1.89	1.28	1.98	0.12	0.0	221
quartz	0.0	0.03	0.23	89.48	3.02	0.0	0.02	0.15	0.09	0.11	0.15	0.12	0.19	0.0	5.21	0.99	0.04	0.17	0.0	39
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	0.94	2.56	0.59	0.0	3.2	0.0	0.0	0.0	0.0	0.02	0.18	8.83	0.48	39.56	10.43	33.22	0.0	4
xenotime	0.0	0.44	1.34	5.46	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	7.81	0.0	38.56	8.13	37.17	0.0	1
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.14	0.23	3.18	61.95	1.97	0.35	1.14	7.68	0.11	0.18	1.63	0.16	0.27	11.56	5.34	0.98	2.94	0.19	0.0	161

P2O5 budget of ore in Ti-minerals: 0.029

P2O5 budget of ore in bulk sample: 0.193

Sample GEUS #: 2003560

Sampler's sample#: 5　3 Boao Town

Description: The sample represent ca 2 m of the mined deposit.

Country: CHINA

This document was created on: Mon Sep 08 13:20:15 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	56.6	9.7	8.9	1.1	0.0	17.5	5.1	1.1

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	64.1	76.0	95.9	39.2
Fe2O3 wt%	30.9	15.7	0.9	20.1
Mno wt%	1.9	0.9	0.1	1.1
Cr2O3 wt%	0.1	0.2	0.3	0.0
SiO2 wt%	1.5	4.9	1.5	30.2
Al2O3 wt%	1.0	2.0	1.0	7.9
MgO wt%	0.1	0.1	0.1	1.1
CaO wt%	0.1	0.1	0.1	0.5
ZrO2wt%	0.2	0.1	0.1	0.0

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	68.3
Average TiO2 content of all the TiO2 minerals excl. Rutile:	64.8

Titanium Report - Page 3/3

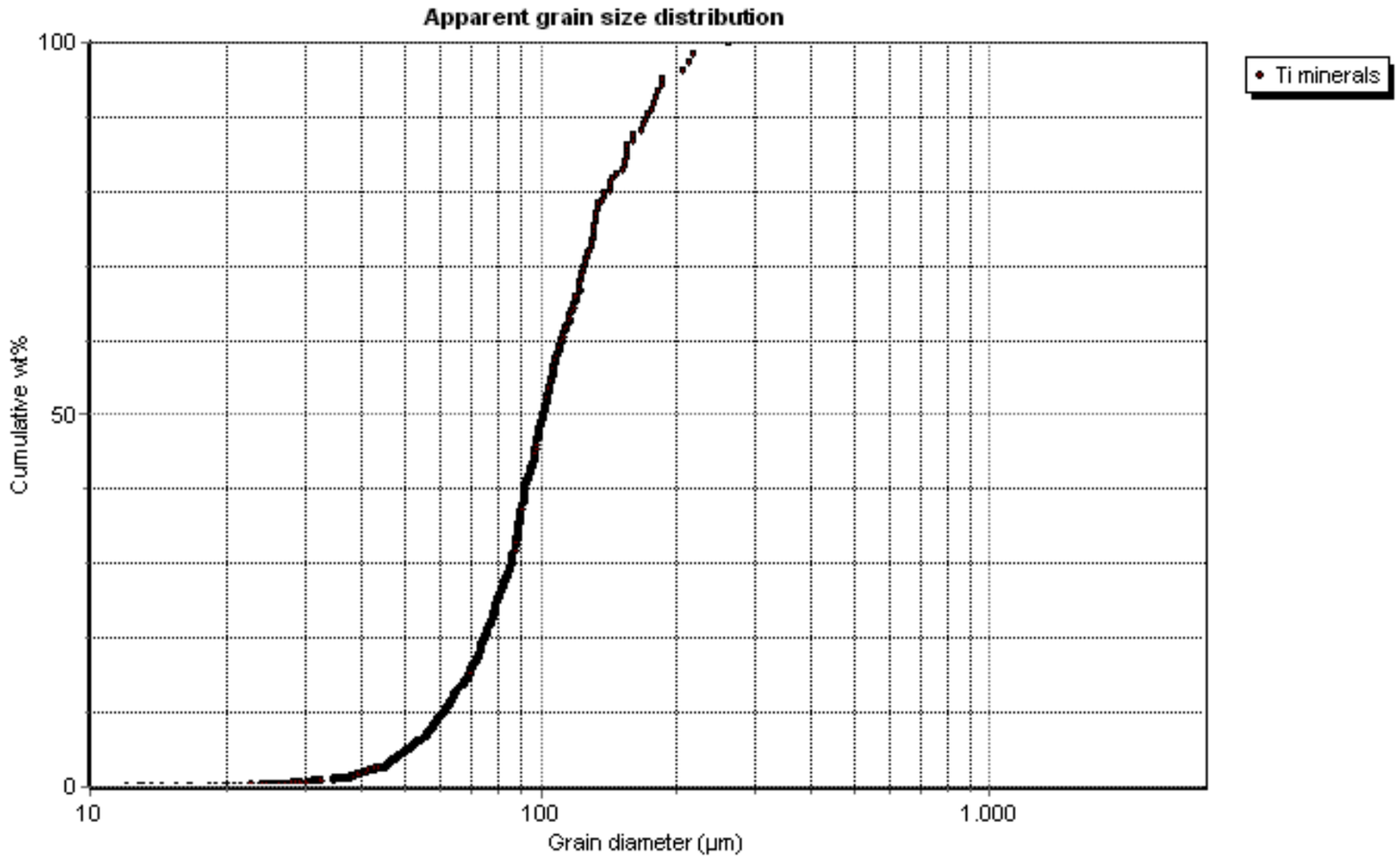
Sample GEUS #: 2003560

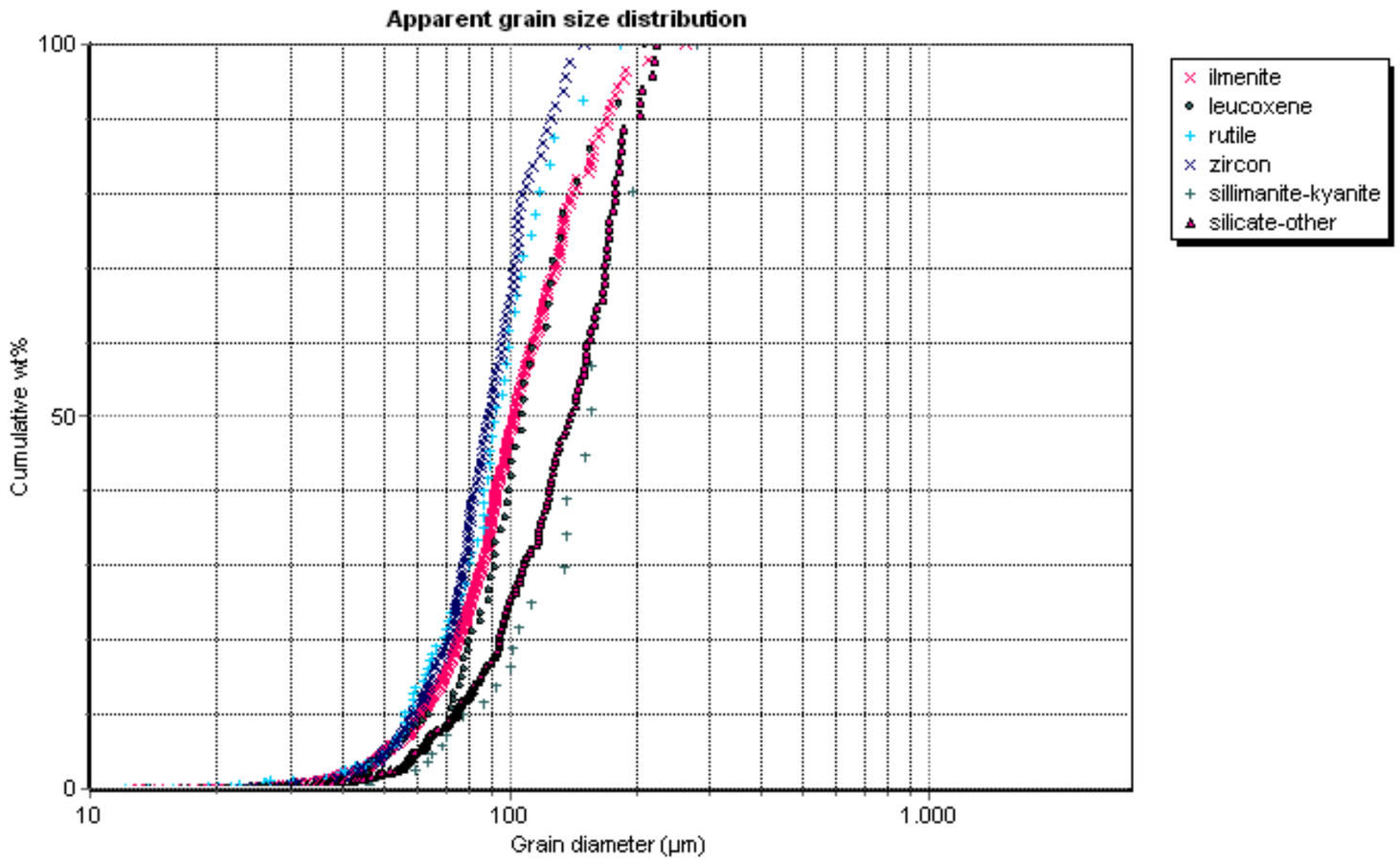
Sampler's sample#: 5 3 Boao Town

Description: The sample represent ca 2 m of the mined deposit.

Country: CHINA

This document was created on: Mon Sep 08 13:20:15 CEST 2008

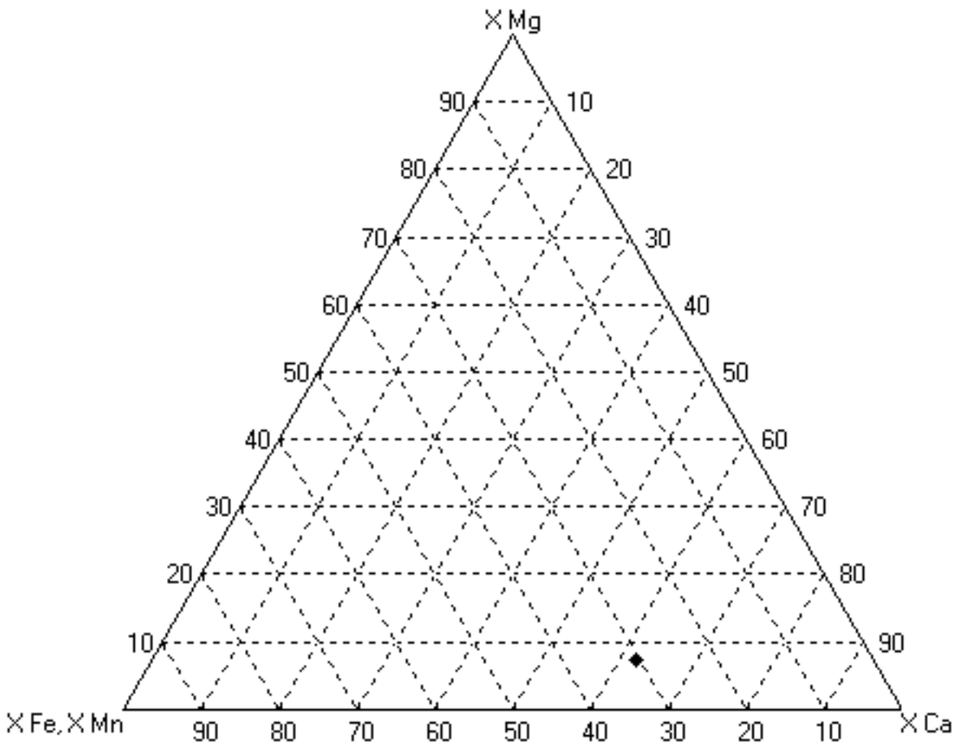


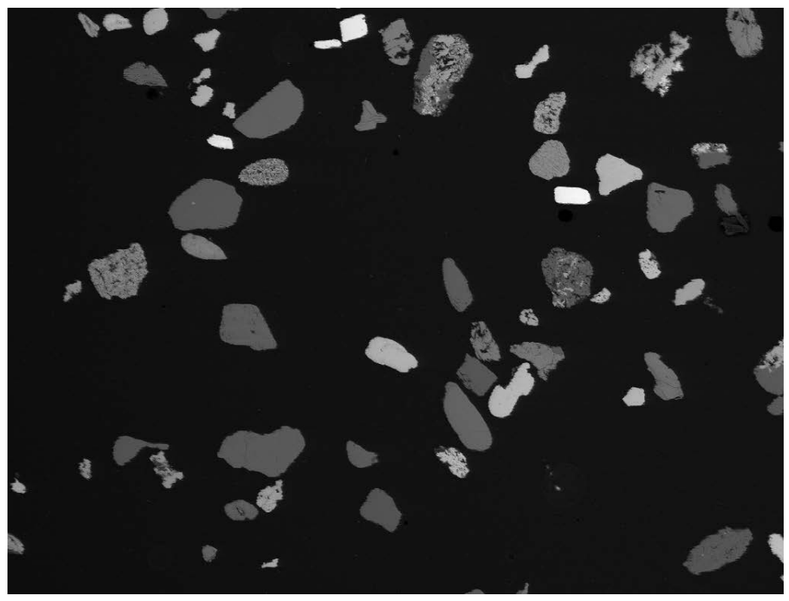


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.6	310.1	111.4	5676.9	434
leucoxene	-	-	1.8	1.7	337.8	123.8	6493.5	65
rutile	-	-	1.7	1.7	281.1	101.4	4663.8	75
Ti magnetite	0.8	0.0	2.9	3.6	948.9	431.2	21803.2	2
magnetite	0.8	0.0	2.1	2.0	243.4	96.9	2407.0	1
chromite	0.8	0.0	1.3	1.4	293.1	91.2	5048.0	1
spinel	0.8	0.0	2.6	2.3	259.2	108.0	2332.4	1
zircon	0.8	0.0	1.5	1.6	290.8	100.5	4849.4	152
sphene	0.8	0.0	0	0	0	0	0	0
garnet	0.8	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.8	0.0	1.8	1.8	471.2	180.2	11906.9	26
staurolite	0.8	0.0	2.0	1.9	327.4	124.5	6890.9	8

Weight percent and average grain parameters on a mineral basis								
mica	0.8	0.0	0	0	0	0	0	0
mafic silicates	0.8	0.0	1.7	1.6	338.4	120.0	9520.7	8
feldspar	0.8	0.0	2.5	2.7	126.6	54.9	576.0	2
silicate-other	0.8	0.0	1.7	1.7	380.6	139.2	8613.4	221
quartz	0.8	0.0	1.7	1.8	295.8	112.5	4748.4	39
corundum	0.8	0.0	0	0	0	0	0	0
monazite	0.8	0.0	1.2	1.3	197.9	59.3	2511.2	4
xenotime	0.8	0.0	1.1	1.4	253.2	82.0	3654.2	1
phosphate	0.8	0.0	0	0	0	0	0	0
carbonate	0.8	0.0	0	0	0	0	0	0
pyrite	0.8	0.0	0	0	0	0	0	0
unclassified	0.8	0.0	1.9	1.9	287.0	112.0	4623.2	161

Garnet Report - Page 1/3
Sample GEUS #: 2003561
Sampler's sample#: 6　4 Baolong
Description: The sample represent 2 m of the top of the sequence.
Country: CHINA
This document was created on: Mon Sep 08 13:21:18 CEST 2008



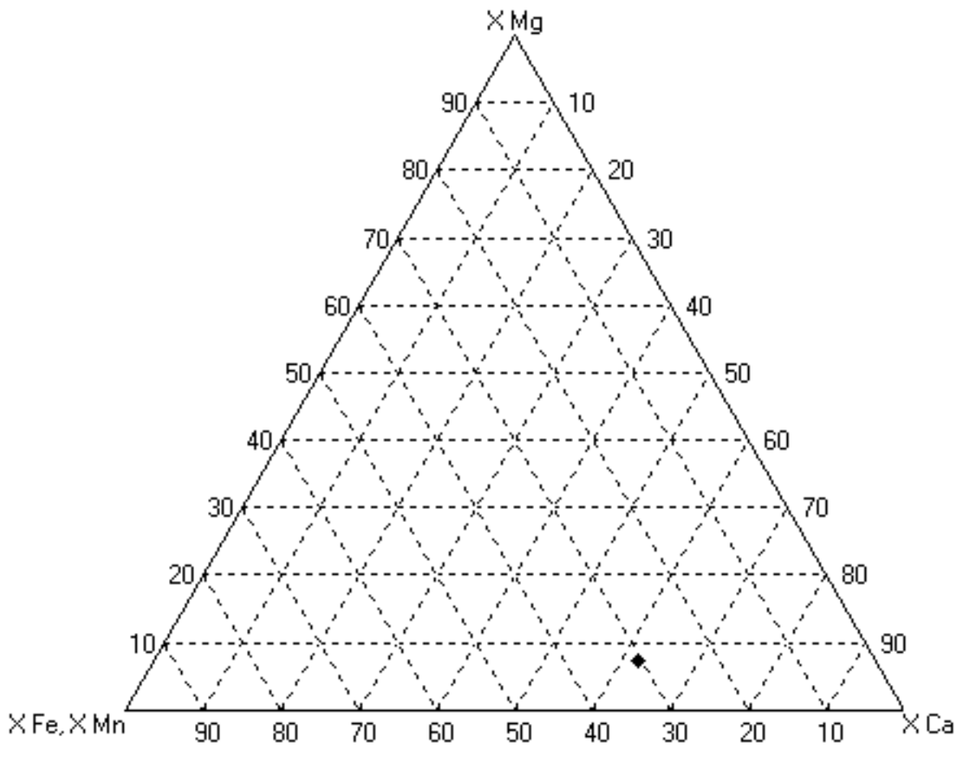


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.8	1.8	333.6	126.7	5809.4	206
leucoxene	-	-	1.8	1.9	382.1	147.1	7383.3	95
rutile	-	-	1.8	1.8	278.5	104.6	4272.5	67
Ti magnetite	1.7	0.0	2.3	2.7	586.1	253.6	11441.3	7
magnetite	1.7	0.0	1.9	1.6	388.2	147.2	10867.0	2
chromite	1.7	0.0	0	0	0	0	0	0
spinel	1.7	0.0	0	0	0	0	0	0
zircon	1.7	0.0	1.6	1.6	293.9	103.8	4582.2	31
sphene	1.7	0.0	2.1	2.4	553.3	232.1	10402.9	2
garnet	1.7	0.0	2.7	3.3	811.7	361.4	16068.4	1
sillimanite-kyanite	1.7	0.0	1.7	1.8	342.4	128.8	6941.9	26
staurolite	1.7	0.0	2.6	2.4	400.2	164.2	6021.4	7
mica	1.7	0.0	3.0	2.5	423.3	175.5	8794.8	9
mafic silicates	1.7	0.0	2.1	2.1	448.4	181.3	9310.0	92
feldspar	1.7	0.0	2.3	2.5	423.4	176.1	10057.3	10
silicate-other	1.7	0.0	1.8	1.9	433.3	164.8	10243.8	166
quartz	1.7	0.0	1.8	2.0	496.7	191.9	12195.0	2
corundum	1.7	0.0	0	0	0	0	0	0
monazite	1.7	0.0	1.7	1.7	351.0	131.8	5762.0	1
xenotime	1.7	0.0	1.7	1.6	224.2	80.4	2551.5	1
phosphate	1.7	0.0	0	0	0	0	0	0
carbonate	1.7	0.0	0	0	0	0	0	0
pyrite	1.7	0.0	0	0	0	0	0	0
unclassified	1.7	0.0	2.1	2.2	393.4	163.7	7548.1	122

Garnet Report - Page 2/3
Sample GEUS #: 2003561
Sampler's sample#: 6　4 Baolong
Description: The sample represent 2 m of the top of the sequence.
Country: CHINA
This document was created on: Mon Sep 08 13:21:19 CEST 2008

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.18	1.89	4.34	0.23	0.05	0.16	60.33	0.14	2.13	29.81	0.11	0.13	0.08	0.28	0.07	0.04	0.03	0.0	206
leucoxene	0.0	0.15	2.44	9.05	0.3	0.06	0.16	75.88	0.18	0.72	10.13	0.08	0.11	0.11	0.4	0.1	0.06	0.06	0.0	95
rutile	0.01	0.07	1.19	3.03	0.21	0.05	0.13	93.06	0.2	0.08	1.1	0.07	0.13	0.1	0.39	0.05	0.02	0.11	0.0	67
Ti magnetite	0.0	0.93	13.08	13.2	0.47	0.69	1.1	36.17	0.02	1.32	29.99	0.15	0.04	0.29	0.23	1.54	0.19	0.57	0.0	7
magnetite	0.0	0.49	10.04	12.41	0.21	0.79	0.13	0.86	0.13	0.29	72.56	0.18	0.13	0.0	0.46	1.38	0.0	0.0	0.0	2
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.02	0.35	31.88	0.02	0.0	0.05	0.24	0.1	0.09	0.24	0.08	0.01	59.04	5.06	0.23	2.48	0.11	0.0	31
sphene	0.0	0.0	1.79	28.57	0.25	0.0	26.68	39.65	0.68	0.0	1.18	0.15	0.0	0.0	0.33	0.0	0.74	0.0	0.0	2
garnet	0.0	17.19	18.31	40.84	1.04	0.1	2.78	0.69	0.37	0.27	16.29	0.0	0.19	0.0	0.89	0.83	0.0	0.21	0.0	1
sillimanite-kyanite	0.02	0.03	56.58	37.14	0.8	0.11	0.07	0.36	0.09	0.08	0.52	0.1	0.09	0.08	0.96	1.49	1.31	0.16	0.0	26
staurolite	0.36	0.84	51.22	30.4	0.48	0.1	0.13	0.7	0.05	0.38	13.65	0.06	0.04	0.02	0.43	0.47	0.53	0.16	0.0	7
mica	0.1	1.61	30.1	43.58	0.81	8.02	0.26	1.39	0.05	0.18	8.79	0.06	0.13	0.14	1.59	0.85	2.16	0.17	0.0	9
mafic silicates	0.14	7.54	13.04	46.05	0.89	0.46	10.18	1.38	0.25	0.31	16.67	0.08	0.13	0.05	1.47	0.37	0.86	0.13	0.0	92
feldspar	3.29	0.01	20.07	59.35	1.53	4.37	2.98	0.24	0.09	0.07	1.78	0.08	0.2	0.0	2.79	0.91	2.13	0.12	0.0	10
silicate-other	0.86	3.5	34.11	42.15	1.01	0.14	2.18	0.9	0.11	0.1	8.87	0.09	0.08	0.02	2.11	1.49	2.16	0.11	0.0	166
quartz	0.0	0.0	0.0	87.74	4.17	0.0	0.0	0.18	0.01	0.01	0.38	0.13	0.0	0.0	6.28	1.08	0.0	0.04	0.0	2
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	38.82	1.48	0.7	0.0	0.77	0.0	0.0	0.0	0.05	0.0	0.0	6.35	0.0	33.54	3.76	14.53	0.0	1
xenotime	0.0	0.0	1.26	6.3	0.0	0.0	3.19	0.0	0.0	0.0	0.0	0.24	0.74	6.97	0.0	40.08	9.58	31.64	0.0	1
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.11	0.81	10.0	43.63	1.42	0.51	2.62	23.48	0.14	0.22	3.91	0.16	0.14	6.24	3.15	1.23	2.05	0.2	0.0	122



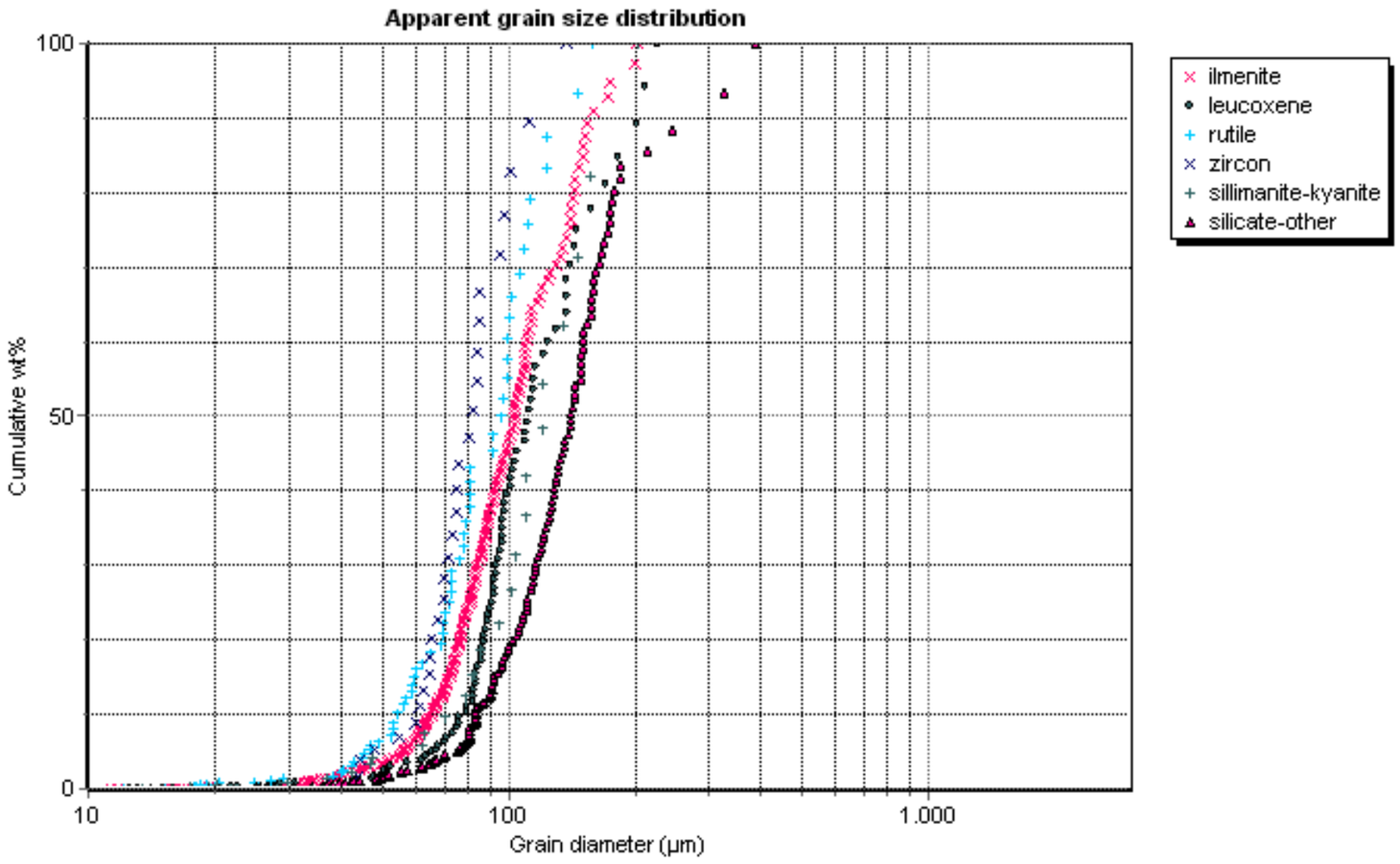
Sample GEUS #: 2003561

Sampler's sample#: 6 4 Baolong

Description: The sample represent 2 m of the top of the sequence.

Country: CHINA

This document was created on: Mon Sep 08 13:21:19 CEST 2008



Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.8	1.8	333.6	126.7	5809.4	206
leucoxene	-	-	1.8	1.9	382.1	147.1	7383.3	95
rutile	-	-	1.8	1.8	278.5	104.6	4272.5	67
Ti magnetite	1.7	0.0	2.3	2.7	586.1	253.6	11441.3	7
magnetite	1.7	0.0	1.9	1.6	388.2	147.2	10867.0	2
chromite	1.7	0.0	0	0	0	0	0	0
spinel	1.7	0.0	0	0	0	0	0	0
zircon	1.7	0.0	1.6	1.6	293.9	103.8	4582.2	31
sphene	1.7	0.0	2.1	2.4	553.3	232.1	10402.9	2
garnet	1.7	0.0	2.7	3.3	811.7	361.4	16068.4	1
sillimanite-kyanite	1.7	0.0	1.7	1.8	342.4	128.8	6941.9	26
staurolite	1.7	0.0	2.6	2.4	400.2	164.2	6021.4	7
mica	1.7	0.0	3.0	2.5	423.3	175.5	8794.8	9
mafic silicates	1.7	0.0	2.1	2.1	448.4	181.3	9310.0	92
feldspar	1.7	0.0	2.3	2.5	423.4	176.1	10057.3	10
silicate-other	1.7	0.0	1.8	1.9	433.3	164.8	10243.8	166
quartz	1.7	0.0	1.8	2.0	496.7	191.9	12195.0	2
corundum	1.7	0.0	0	0	0	0	0	0
monazite	1.7	0.0	1.7	1.7	351.0	131.8	5762.0	1
xenotime	1.7	0.0	1.7	1.6	224.2	80.4	2551.5	1
phosphate	1.7	0.0	0	0	0	0	0	0
carbonate	1.7	0.0	0	0	0	0	0	0
pyrite	1.7	0.0	0	0	0	0	0	0
unclassified	1.7	0.0	2.1	2.2	393.4	163.7	7548.1	122

Titanium Report - Page 1/3

Sample GEUS #: 2003562

Sampler's sample#: 7 5 Chang An

Description: The sample represent 2 m.

Country: CHINA

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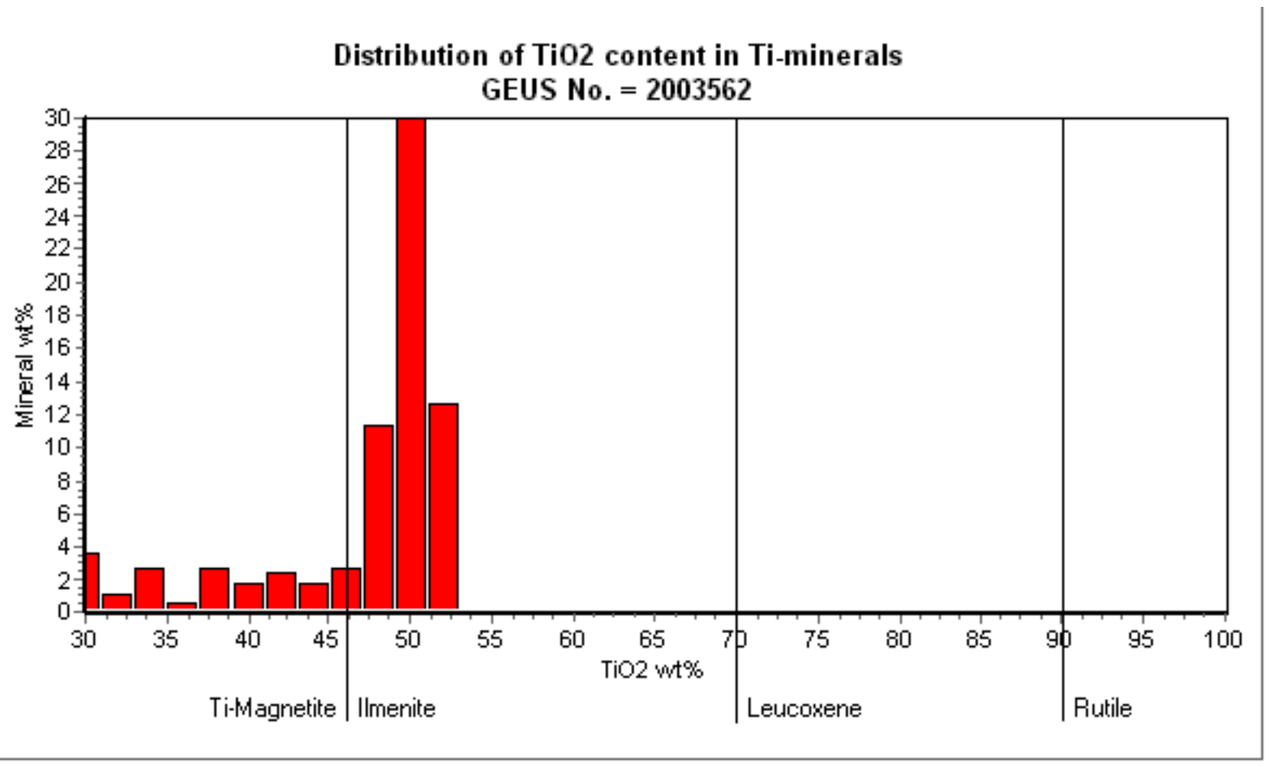
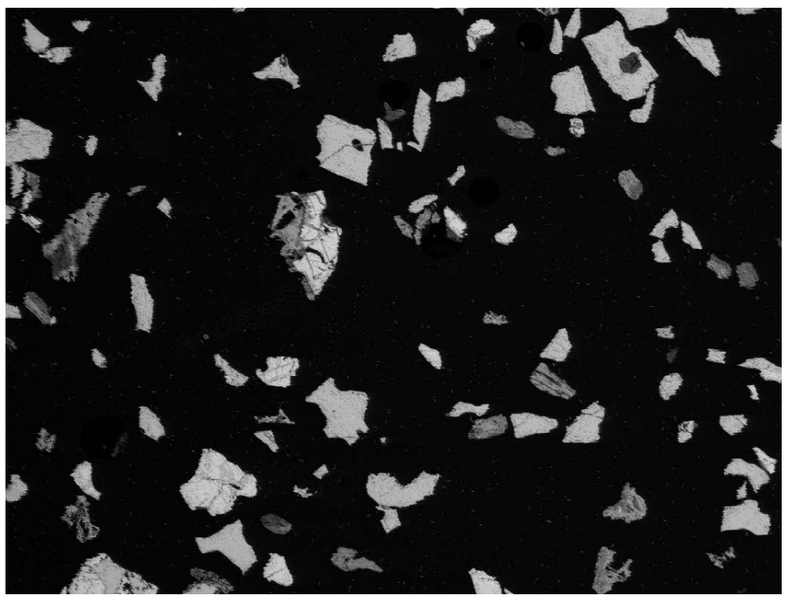




Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.1	0.53	1.37	0.19	0.03	0.07	49.97	0.07	1.95	45.08	0.09	0.12	0.13	0.17	0.08	0.03	0.03	0.0	562
leucoxene	0.0	0.0	3.56	2.89	0.82	0.06	0.91	69.14	0.0	0.49	18.68	0.0	0.0	0.72	0.53	1.68	0.52	0.0	0.0	1
rutile	0.0	0.0	0.5	0.96	0.0	0.17	0.06	95.91	0.48	0.02	1.02	0.0	0.37	0.07	0.43	0.0	0.0	0.0	0.0	1
Ti magnetite	0.03	0.08	2.47	2.82	0.26	0.03	0.08	32.78	0.11	1.23	59.18	0.13	0.12	0.16	0.15	0.27	0.04	0.05	0.0	135
magnetite	0.04	0.09	7.13	3.78	0.51	0.05	0.2	3.88	0.1	0.22	80.92	0.16	0.13	0.26	0.31	2.02	0.08	0.11	0.0	365
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	0.0	0.11	30.63	37.63	1.35	0.05	0.2	1.83	0.11	0.04	22.86	0.13	0.07	0.25	1.22	1.94	1.51	0.08	0.0	14
feldspar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
silicate-other	0.0	0.07	35.57	46.28	1.13	0.02	0.1	0.57	0.08	0.07	9.01	0.08	0.12	0.0	2.18	1.82	2.81	0.1	0.0	11
quartz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	3.23	0.91	22.02	32.8	1.38	0.06	0.49	2.08	0.04	0.16	29.91	0.14	0.11	0.68	1.21	2.89	1.47	0.4	0.0	45

P2O5 budget of ore in Ti-minerals: 0.041

P2O5 budget of ore in bulk sample: 0.041

Sample GEUS #: 2003562

Sampler's sample#: 7 5 Chang An

Description: The sample represent 2 m.

Country: CHINA

This document was created on: Mon Sep 08 13:21:57 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	68.7	0.0	0.2	31.1	0.0	0.0	0.0	0.0

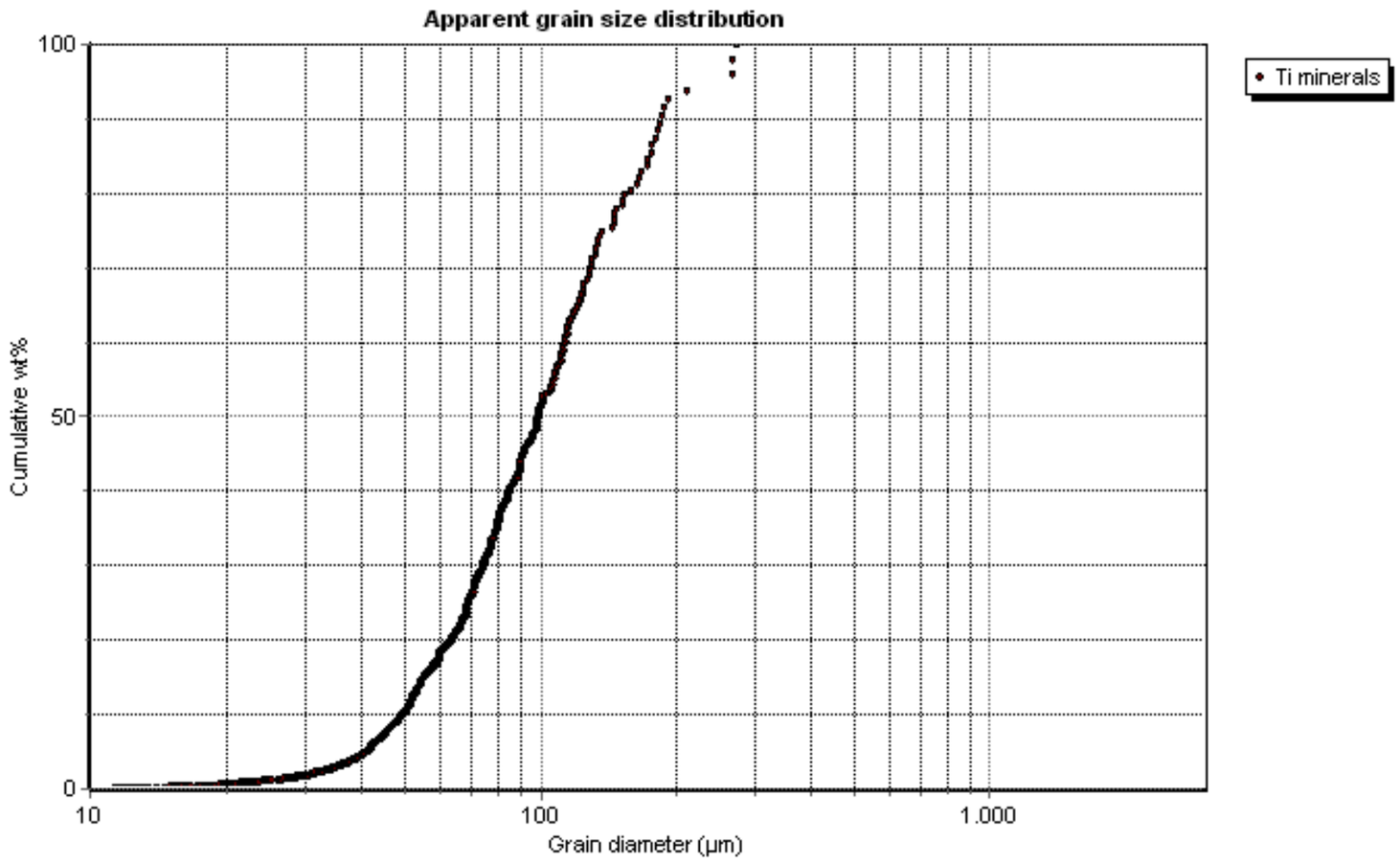
Normalised average content of the valuable Ti-bearing minerals

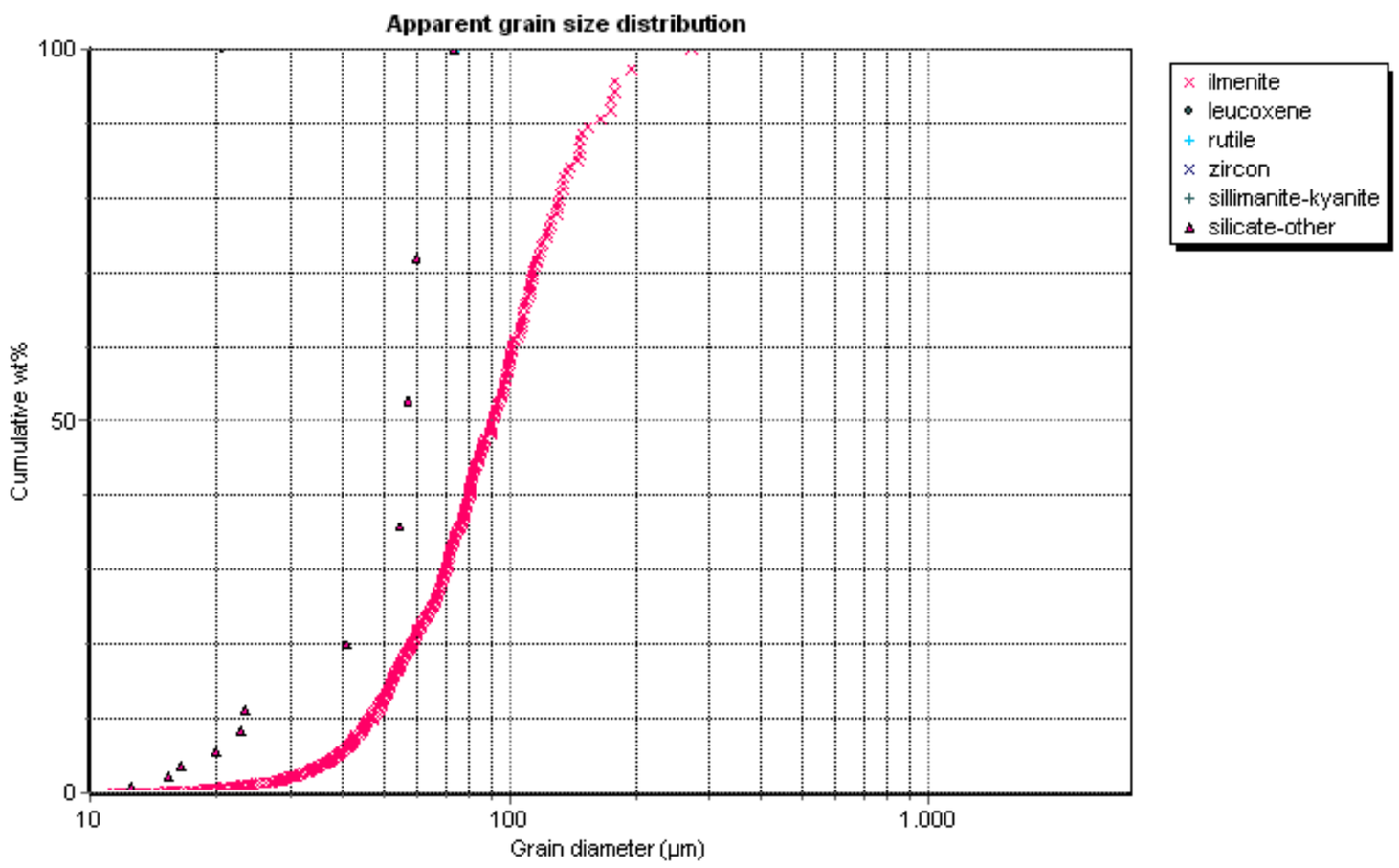
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	50.3	71.7	96.9	33.1
Fe2O3 wt%	45.4	19.4	1.0	59.8
Mno wt%	2.0	0.5	0.0	1.2
Cr2O3 wt%	0.1	0.0	0.5	0.1
SiO2 wt%	1.4	3.0	1.0	2.9
Al2O3 wt%	0.5	3.7	0.5	2.5
MgO wt%	0.1	0.0	0.0	0.1
CaO wt%	0.1	0.9	0.1	0.1
ZrO2wt%	0.1	0.7	0.1	0.2

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	44.0
Average TiO2 content of all the TiO2 minerals excl. Rutile:	43.9

Titanium Report - Page 3/3
Sample GEUS #: 2003562
Sampler's sample#: 7 5 Chang An
Description: The sample represent 2 m.
Country: CHINA
This document was created on: Mon Sep 08 13:21:57 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.9	2.0	260.3	103.6	3488.6	562
leucoxene	-	-	1.8	1.8	85.5	32.5	331.7	1
rutile	-	-	1.6	1.5	290.5	100.5	4495.1	1
Ti magnetite	19.8	2.2	2.1	2.3	369.4	155.3	6194.4	135
magnetite	19.8	2.2	1.9	2.0	246.2	97.8	3452.6	365
chromite	19.8	2.2	0	0	0	0	0	0
spinel	19.8	2.2	0	0	0	0	0	0
zircon	19.8	2.2	0	0	0	0	0	0
sphene	19.8	2.2	0	0	0	0	0	0
garnet	19.8	2.2	0	0	0	0	0	0
sillimanite-kyanite	19.8	2.2	0	0	0	0	0	0
staurolite	19.8	2.2	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	19.8	2.2	0	0	0	0	0	0
mafic silicates	19.8	2.2	1.8	1.7	151.8	55.8	1241.5	14
feldspar	19.8	2.2	0	0	0	0	0	0
silicate-other	19.8	2.2	2.0	1.9	163.9	65.0	1362.0	11
quartz	19.8	2.2	0	0	0	0	0	0
corundum	19.8	2.2	0	0	0	0	0	0
monazite	19.8	2.2	0	0	0	0	0	0
xenotime	19.8	2.2	0	0	0	0	0	0
phosphate	19.8	2.2	0	0	0	0	0	0
carbonate	19.8	2.2	0	0	0	0	0	0
pyrite	19.8	2.2	0	0	0	0	0	0
unclassified	19.8	2.2	2.1	2.1	276.5	112.3	5298.2	45

Titanium Report - Page 1/3

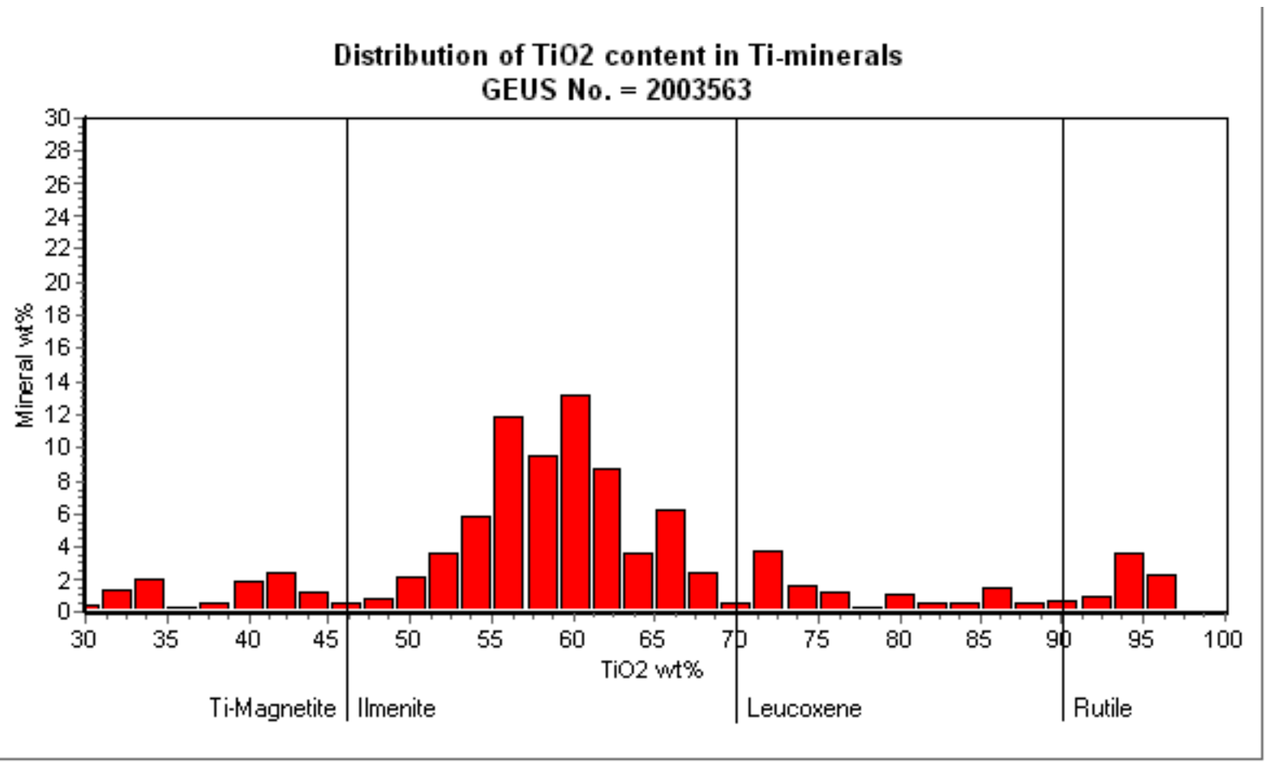
Sample GEUS #: 2003563

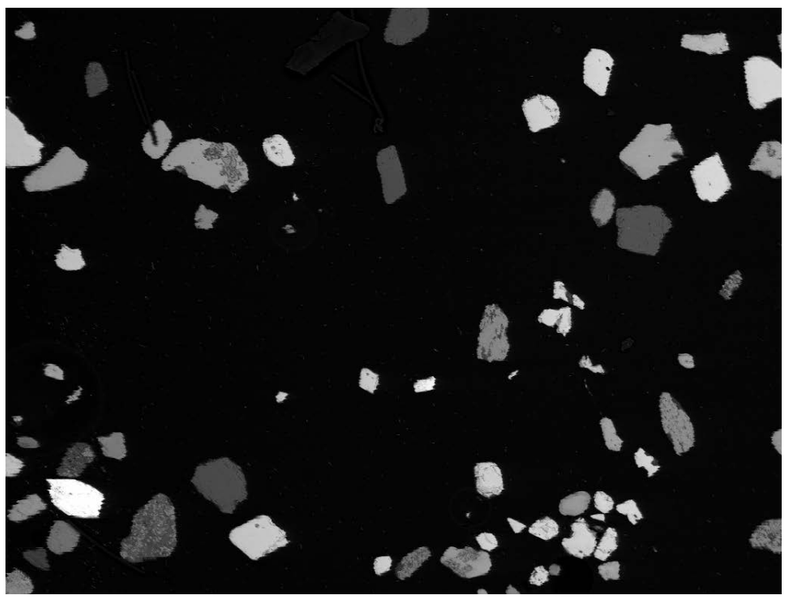
Sampler's sample#: 8 6 Jiusuo

Description: The sample represent ca 2 m of the top of the deposit

Country: CHINA

This document was created on: Mon Sep 08 13:22:55 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.1	2.03	4.17	0.23	0.11	0.12	58.11	0.14	3.75	30.38	0.1	0.11	0.18	0.32	0.06	0.05	0.04	0.0	252
leucoxene	0.02	0.15	3.25	12.19	0.34	0.24	0.16	73.03	0.22	1.03	7.9	0.13	0.17	0.05	0.69	0.11	0.14	0.18	0.0	52
rutile	0.02	0.09	1.2	2.8	0.2	0.06	0.11	93.31	0.18	0.12	0.81	0.09	0.13	0.07	0.73	0.03	0.01	0.04	0.0	49
Ti magnetite	0.0	0.03	3.44	11.3	0.36	0.1	0.13	37.08	0.12	1.85	37.21	0.19	0.0	7.18	0.67	0.02	0.02	0.33	0.0	4
magnetite	3.87	0.18	5.02	9.38	0.79	0.22	1.19	1.76	0.21	0.23	72.84	0.88	0.4	1.07	0.43	0.67	0.24	0.62	0.0	12
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.04	0.15	32.08	0.1	0.01	0.04	0.17	0.08	0.08	0.27	0.15	0.03	59.11	5.08	0.18	2.26	0.15	0.0	316
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.01	0.04	54.73	38.23	0.66	0.12	0.06	0.1	0.08	0.11	0.78	0.1	0.05	0.0	1.29	1.66	1.89	0.12	0.0	22
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mafic silicates	0.08	2.45	23.41	40.0	0.59	0.1	16.32	0.53	0.32	0.24	12.4	0.1	0.11	0.05	1.22	0.41	1.61	0.07	0.0	28
feldspar	0.0	0.0	20.33	58.41	0.87	13.24	0.05	0.26	0.2	0.06	0.41	0.17	0.05	0.0	2.0	1.14	2.81	0.0	0.0	3
silicate-other	0.68	3.15	34.45	44.03	1.11	0.31	1.05	1.01	0.1	0.13	8.35	0.11	0.1	0.03	1.96	1.3	1.97	0.16	0.0	59
quartz	0.0	0.09	0.44	88.16	2.95	0.0	0.0	0.15	0.16	0.05	0.12	0.1	0.02	0.0	5.78	1.79	0.0	0.2	0.0	5
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.07	4.66	9.62	0.4	0.58	0.51	0.0	0.0	0.0	0.16	0.1	0.24	6.52	0.4	35.15	6.6	35.01	0.0	5
xenotime	0.0	0.0	3.19	2.14	0.0	0.0	0.0	0.07	0.02	0.0	1.23	0.35	0.0	7.49	0.0	36.89	47.5	1.15	0.0	2
phosphate	0.0	0.15	1.74	6.17	0.51	0.0	0.1	0.39	0.0	0.0	1.19	0.0	0.0	9.27	0.0	32.86	46.78	0.88	0.0	2
carbonate	0.0	0.32	0.43	1.74	1.16	0.21	90.84	0.99	0.0	0.0	0.11	0.49	0.0	0.0	1.27	1.03	0.66	0.75	0.0	1
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	1.49	0.18	3.82	38.38	1.0	0.41	0.32	10.55	0.22	0.21	2.68	0.33	0.15	31.15	5.03	1.02	2.69	0.37	0.0	334

P2O5 budget of ore in Ti-minerals: 0.025

P2O5 budget of ore in bulk sample: 0.243

Sample GEUS #: 2003563

Sampler's sample#: 8 6 Jiusuo

Description: The sample represent ca 2 m of the top of the deposit

Country: CHINA

This document was created on: Mon Sep 08 13:22:56 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	39.3	8.4	5.7	0.4	0.0	43.3	2.9	0.0

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	58.7	74.5	94.5	37.7
Fe2O3 wt%	30.7	8.1	0.8	37.8
Mno wt%	3.8	1.1	0.1	1.9
Cr2O3 wt%	0.1	0.2	0.2	0.1
SiO2 wt%	4.2	12.4	2.8	11.5
Al2O3 wt%	2.1	3.3	1.2	3.5
MgO wt%	0.1	0.2	0.1	0.0
CaO wt%	0.1	0.2	0.1	0.1
ZrO2wt%	0.2	0.1	0.1	7.3

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	64.3
Average TiO2 content of all the TiO2 minerals excl. Rutile:	60.8

Titanium Report - Page 3/3

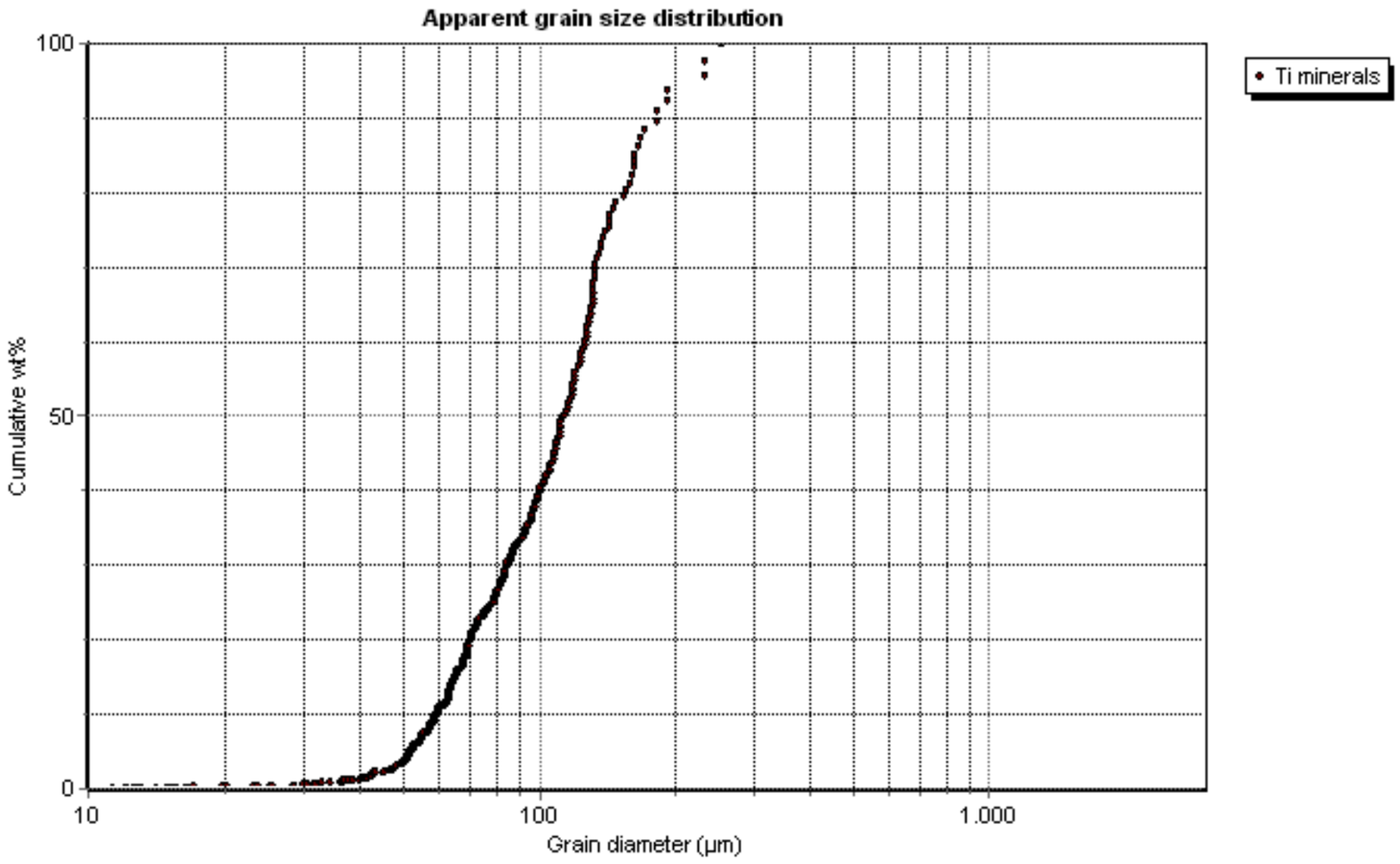
Sample GEUS #: 2003563

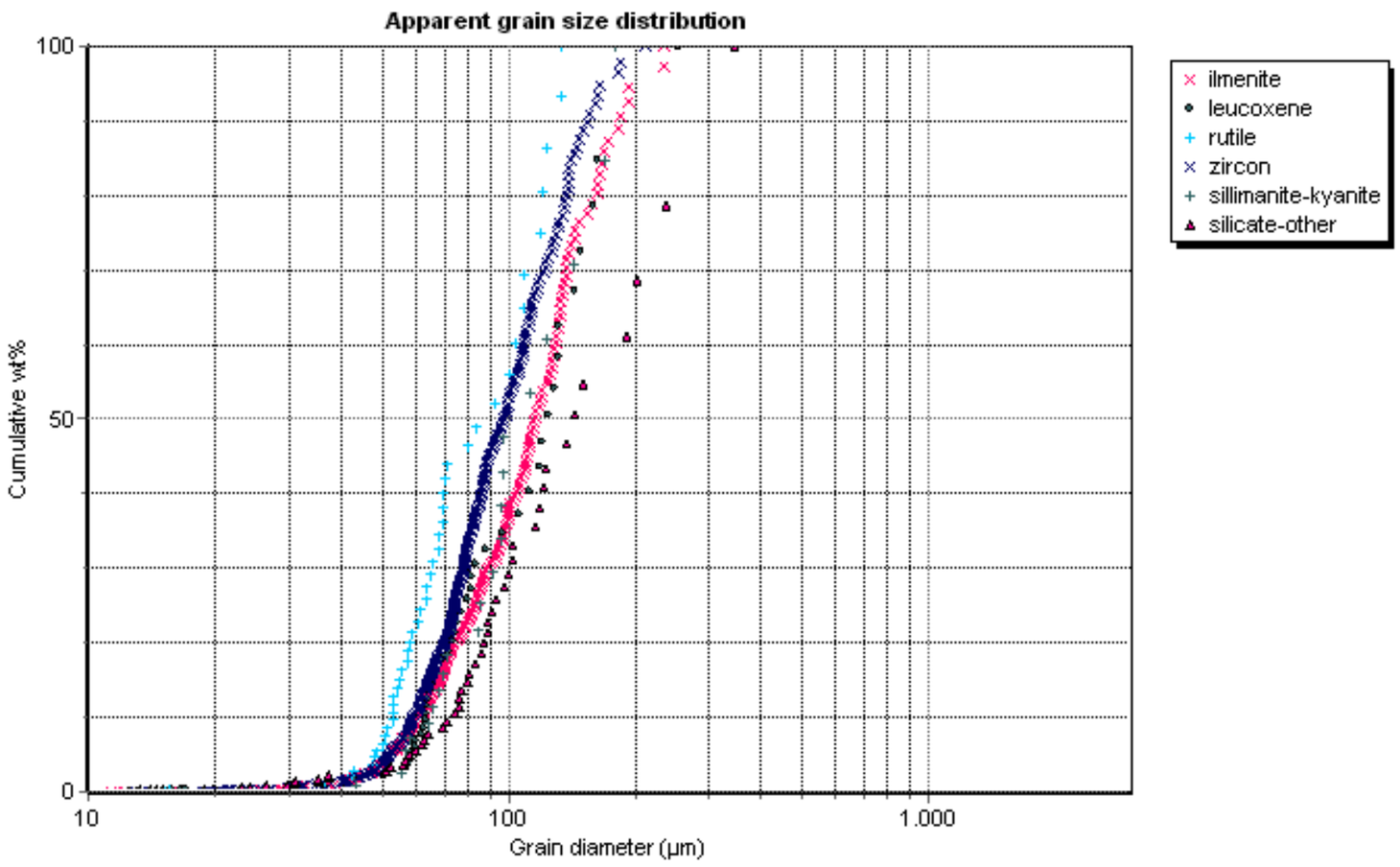
Sampler's sample#: 8 6 Jiusuo

Description: The sample represent ca 2 m of the top of the deposit

Country: CHINA

This document was created on: Mon Sep 08 13:22:56 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.6	315.7	112.6	6157.3	252
leucoxene	-	-	1.7	1.6	315.3	114.3	6402.4	52
rutile	-	-	1.6	1.6	270.0	97.3	4138.6	49
Ti magnetite	0.3	0.0	1.7	1.9	273.9	108.0	3741.8	4
magnetite	0.3	0.0	2.1	2.5	223.4	90.8	3193.7	12
chromite	0.3	0.0	0	0	0	0	0	0
spinel	0.3	0.0	0	0	0	0	0	0
zircon	0.3	0.0	1.5	1.6	297.8	104.4	5236.7	316
sphene	0.3	0.0	0	0	0	0	0	0
garnet	0.3	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.3	0.0	1.8	1.7	367.7	136.3	7337.1	22
staurolite	0.3	0.0	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	0.3	0.0	0	0	0	0	0	0
mafic silicates	0.3	0.0	1.7	1.7	306.7	113.9	5688.1	28
feldspar	0.3	0.0	1.2	1.3	196.0	60.8	2972.7	3
silicate-other	0.3	0.0	1.7	1.8	315.7	117.9	7396.1	59
quartz	0.3	0.0	1.6	1.6	293.6	107.1	4402.1	5
corundum	0.3	0.0	0	0	0	0	0	0
monazite	0.3	0.0	1.6	1.5	335.2	115.3	6087.2	5
xenotime	0.3	0.0	1.5	1.5	204.8	70.4	2329.2	2
phosphate	0.3	0.0	1.9	1.7	282.2	106.1	3817.0	2
carbonate	0.3	0.0	0.9	1.3	55.9	14.6	194.8	1
pyrite	0.3	0.0	0	0	0	0	0	0
unclassified	0.3	0.0	1.7	1.7	249.1	92.7	3941.3	334

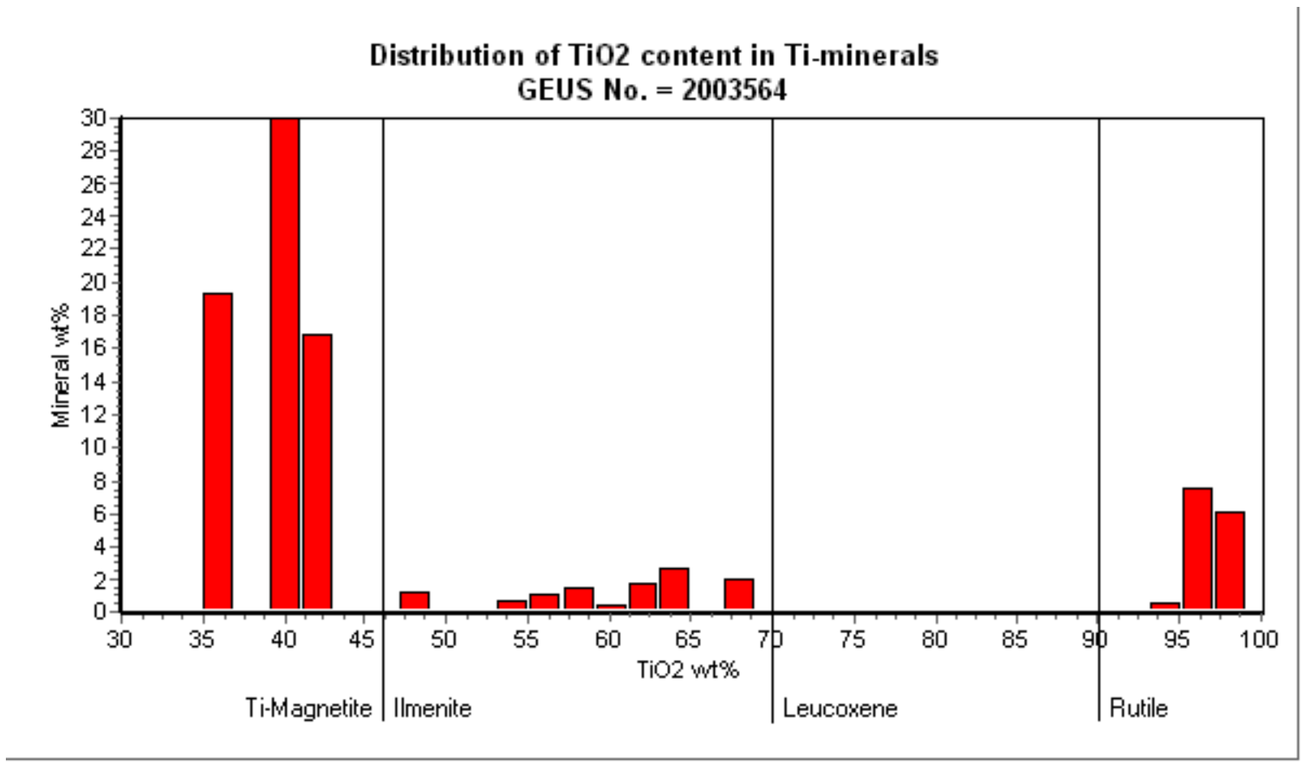
Sample GEUS #: 2003564

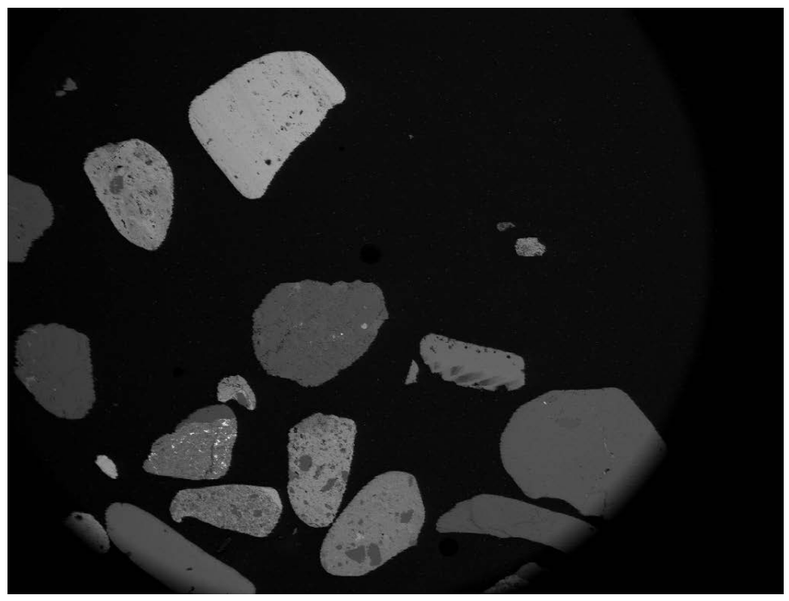
Sampler's sample#: 9 7 Dongfang

Description: The sample represent the uppermost 10 cm of the sand ca 20 from the shoreline.

Country: CHINA

This document was created on: Mon Sep 08 13:23:35 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.1	0.64	4.75	0.22	0.02	0.09	59.05	0.12	2.1	32.14	0.09	0.11	0.04	0.35	0.13	0.01	0.05	0.0	11
leucoxene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rutile	0.0	0.06	0.65	1.43	0.21	0.0	0.14	95.9	0.29	0.09	0.5	0.06	0.02	0.05	0.19	0.16	0.05	0.22	0.0	6
Ti magnetite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
magnetite	0.0	1.06	6.99	16.17	0.77	0.65	1.62	0.41	0.03	0.45	70.9	0.07	0.27	0.0	0.17	0.42	0.0	0.02	0.0	5
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.06	0.09	32.09	0.0	0.01	0.0	0.29	0.13	0.11	0.23	0.21	0.0	58.6	5.41	0.0	2.5	0.26	0.0	3
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.0	0.02	51.71	37.83	0.64	0.85	0.07	0.32	0.08	0.06	1.22	0.06	0.08	0.09	1.74	2.22	2.92	0.08	0.0	9
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0.0	0.39	22.01	60.42	1.61	7.79	0.07	0.27	0.13	0.19	1.64	0.1	0.12	0.31	2.28	0.43	1.93	0.34	0.0	3
mafic silicates	0.0	8.1	7.5	44.86	0.83	0.67	4.83	0.58	0.15	0.4	29.97	0.07	0.12	0.07	1.12	0.32	0.4	0.04	0.0	16
feldspar	3.99	0.0	23.27	54.93	1.06	4.49	0.94	0.22	0.15	0.2	1.97	0.0	0.0	0.0	3.07	1.7	3.89	0.13	0.0	1
silicate-other	0.52	1.41	40.97	42.94	0.86	0.83	1.17	0.43	0.08	0.04	4.87	0.08	0.08	0.0	1.81	1.66	2.13	0.14	0.0	11
quartz	0.0	0.0	0.0	89.8	2.98	0.0	0.0	0.29	0.2	0.03	0.08	0.1	0.0	0.0	5.01	1.18	0.0	0.35	0.0	1
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0.27	0.08	0.63	1.8	0.42	0.06	94.22	0.24	0.15	0.17	0.5	0.2	0.18	0.0	0.15	0.03	0.63	0.28	0.0	20
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.16	0.71	6.14	49.32	2.16	0.65	16.91	7.32	0.07	0.21	9.26	0.15	0.3	0.25	2.85	0.92	2.42	0.2	0.0	25

P2O5 budget of ore in Ti-minerals: 0.028

P2O5 budget of ore in bulk sample: 0.028

Sample GEUS #: 2003564

Sampler's sample#: 9 7 Dongfang

Description: The sample represent the uppermost 10 cm of the sand ca 20 from the shoreline.

Country: CHINA

This document was created on: Mon Sep 08 13:23:35 CEST 2008

Valuable Heavy Minerals								
Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	7.0	0.0	9.4	0.0	0.0	2.2	81.5	0.0

Normalised average content of the valuable Ti-bearing minerals				
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	59.6	0	96.8	0
Fe2O3 wt%	32.5	0	0.5	0
Mno wt%	2.1	0	0.1	0
Cr2O3 wt%	0.1	0	0.3	0
SiO2 wt%	4.8	0	1.4	0
Al2O3 wt%	0.6	0	0.7	0
MgO wt%	0.1	0	0.1	0
CaO wt%	0.1	0	0.1	0
ZrO2wt%	0.0	0	0.1	0

TiO2 Content	
Average TiO2 content of all the TiO2 minerals :	81.0
Average TiO2 content of all the TiO2 minerals excl. Rutile:	60.1

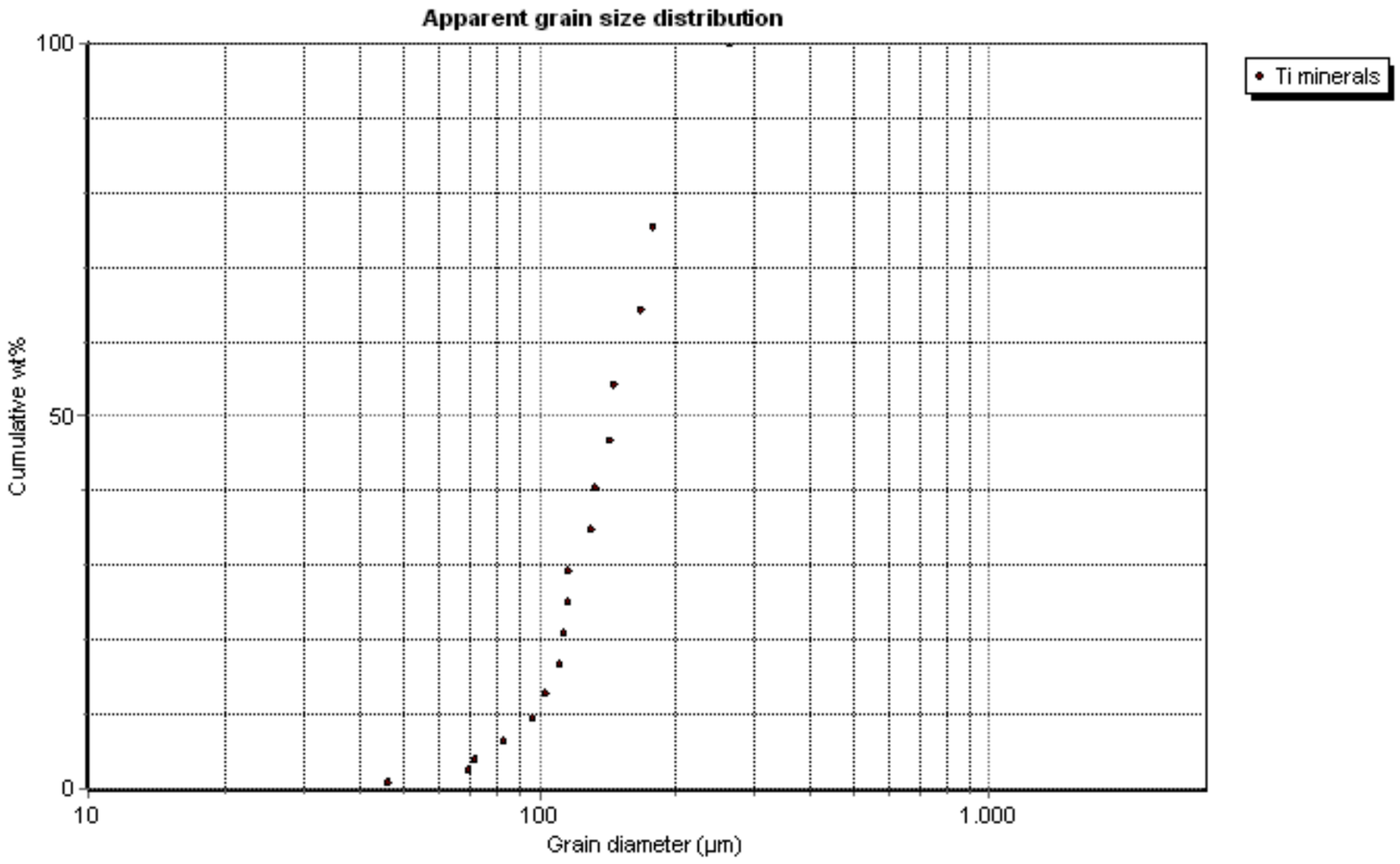
Sample GEUS #: 2003564

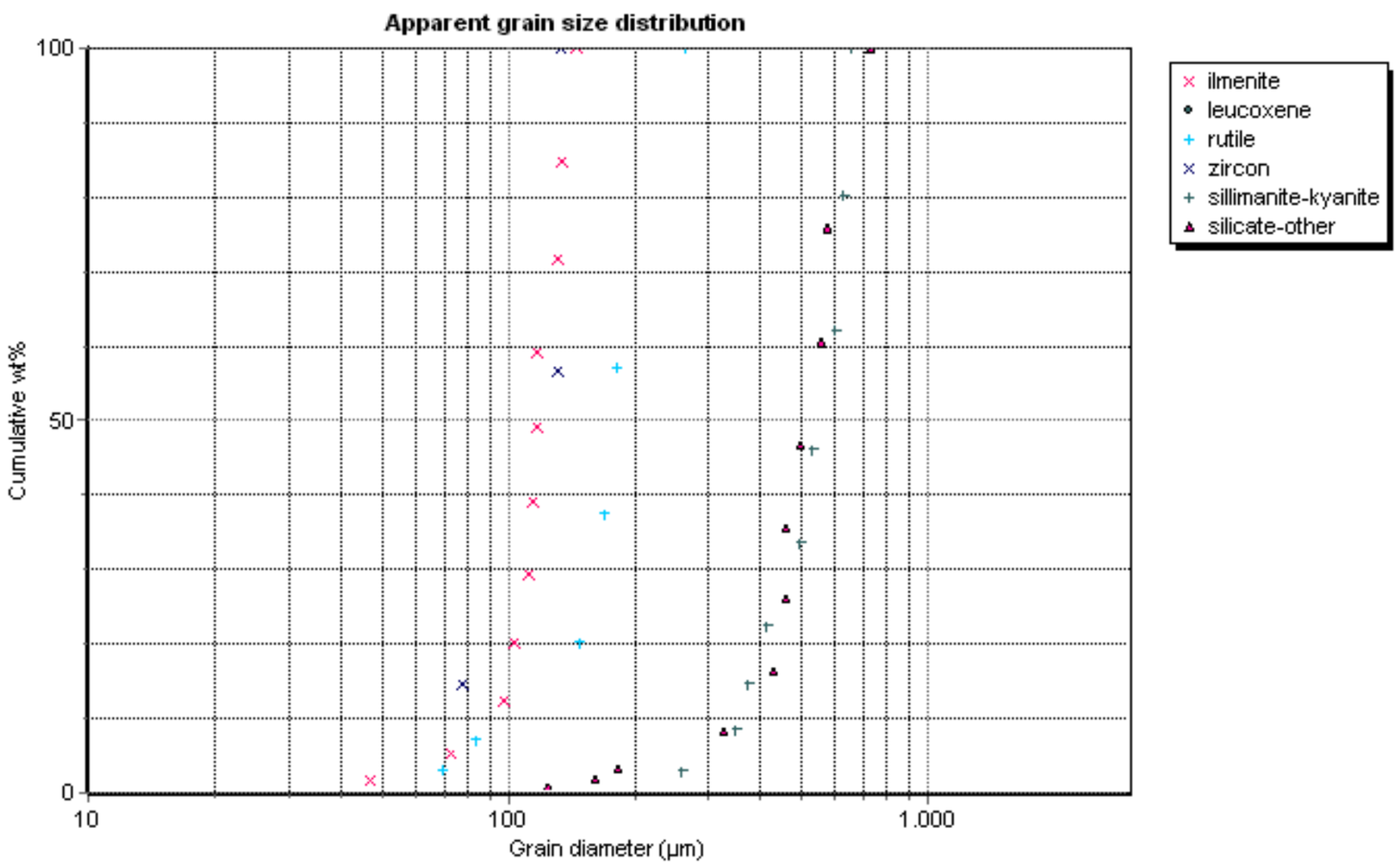
Sampler's sample#: 9 7 Dongfang

Description: The sample represent the uppermost 10 cm of the sand ca 20 from the shoreline.

Country: CHINA

This document was created on: Mon Sep 08 13:23:35 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	1.8	0.0	1.4	1.4	406.3	133.1	9738.4	11
leucoxene	1.8	0.0	0	0	0	0	0	0
rutile	1.8	0.0	1.4	1.4	568.2	180.9	21579.9	6
Ti magnetite	1.8	0.0	0	0	0	0	0	0
magnetite	1.8	0.0	2.5	2.1	1573.4	636.8	113072.9	5
chromite	1.8	0.0	0	0	0	0	0	0
spinel	1.8	0.0	0	0	0	0	0	0
zircon	1.8	0.0	1.3	1.5	431.2	142.0	10698.9	3
sphene	1.8	0.0	0	0	0	0	0	0
garnet	1.8	0.0	0	0	0	0	0	0
sillimanite-kyanite	1.8	0.0	2.2	2.2	2150.9	852.6	192915.8	9
staurolite	1.8	0.0	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	1.8	0.0	1.8	1.7	275.3	96.3	3664.5	3
mafic silicates	1.8	0.0	1.7	1.6	774.4	282.8	51650.8	16
feldspar	1.8	0.0	0.8	1.3	121.0	30.3	932.2	1
silicate-other	1.8	0.0	2.1	1.9	1709.1	644.8	156813.1	11
quartz	1.8	0.0	1.5	1.4	463.3	155.4	11845.4	1
corundum	1.8	0.0	0	0	0	0	0	0
monazite	1.8	0.0	0	0	0	0	0	0
xenotime	1.8	0.0	0	0	0	0	0	0
phosphate	1.8	0.0	0	0	0	0	0	0
carbonate	1.8	0.0	2.8	2.2	1335.7	550.2	77629.9	20
pyrite	1.8	0.0	0	0	0	0	0	0
unclassified	1.8	0.0	1.8	1.8	997.3	386.9	79111.2	25

Sample GEUS #: 2003565

Sampler's sample#: 10 8 Dongfang N.

Description: The sample represent 1½ m in what is describe as the ¿second terrace¿, a slightly kaolinised sand.

Country: CHINA

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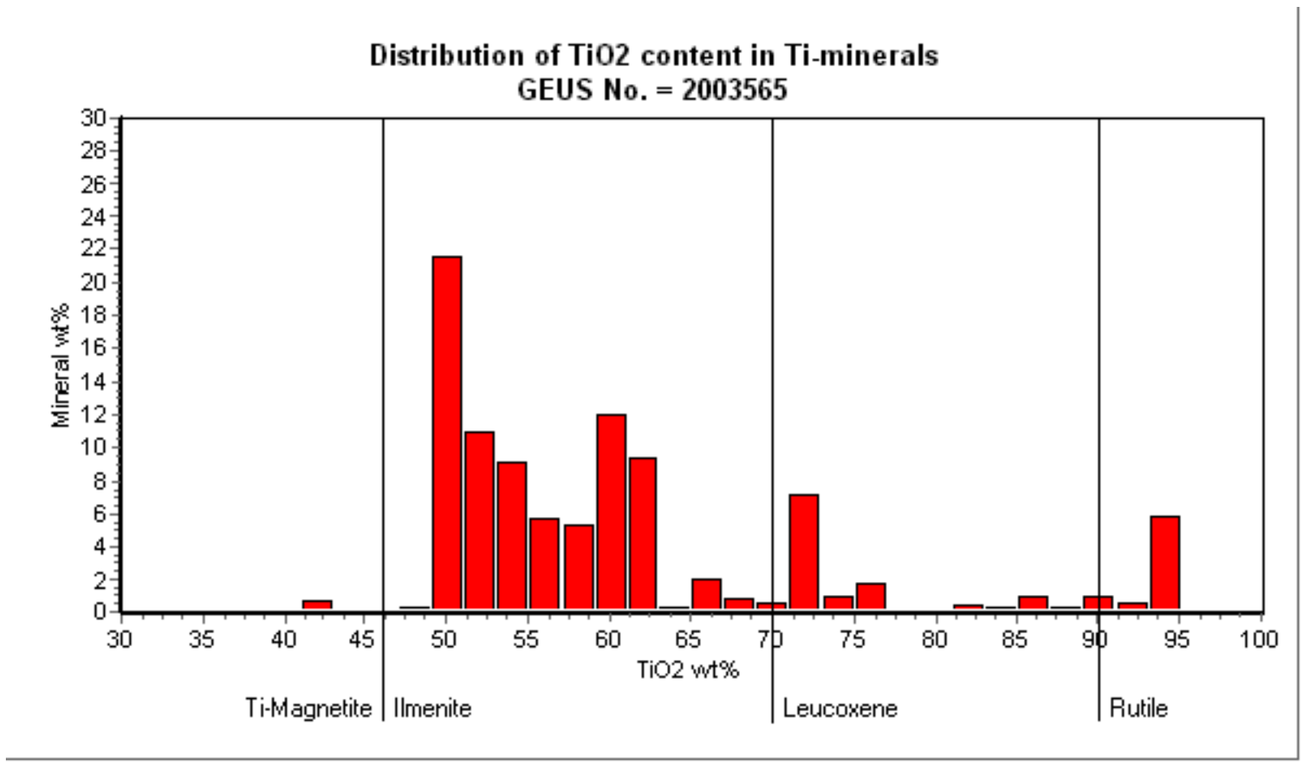

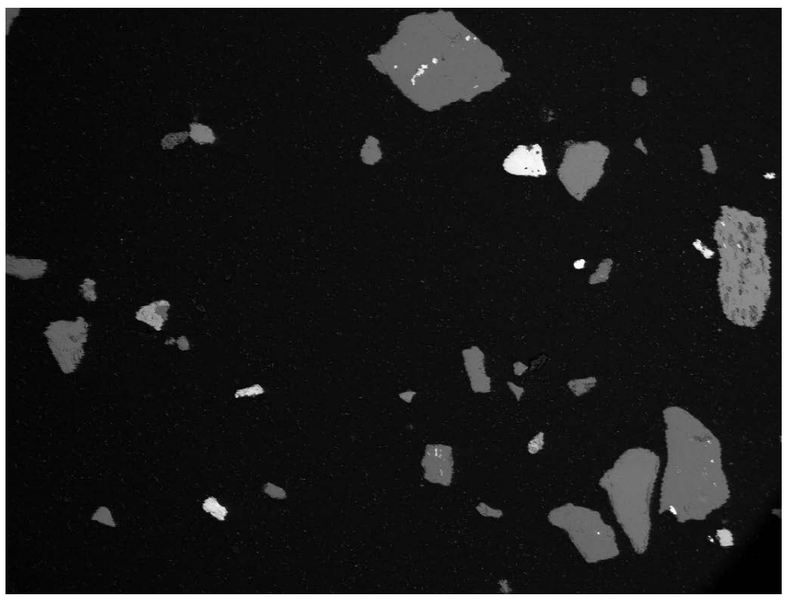

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.11	1.04	4.47	0.21	0.04	0.1	56.37	0.12	2.3	34.69	0.09	0.11	0.06	0.21	0.02	0.0	0.06	0.0	40
leucoxene	0.0	0.07	3.38	14.03	0.33	0.3	0.18	73.67	0.22	0.32	6.55	0.06	0.11	0.03	0.5	0.13	0.09	0.04	0.0	12
rutile	0.0	0.11	1.37	4.12	0.23	0.11	0.16	91.78	0.18	0.05	0.99	0.12	0.17	0.07	0.43	0.0	0.0	0.13	0.0	11
Ti magnetite	0.0	0.4	1.23	4.62	1.17	0.17	0.05	18.91	0.0	1.07	68.51	0.88	0.31	0.68	0.71	0.0	1.3	0.0	0.0	1
magnetite	0.05	0.79	5.73	11.09	0.52	0.25	2.68	1.92	0.47	1.12	72.84	0.0	0.64	0.4	0.22	0.0	0.25	1.04	0.0	8
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.04	0.34	32.26	0.0	0.01	0.02	0.05	0.16	0.03	0.26	0.26	0.01	58.1	6.56	0.0	1.88	0.04	0.0	8
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.01	0.05	54.95	38.56	0.67	0.24	0.08	0.24	0.07	0.07	0.62	0.1	0.12	0.15	0.98	1.25	1.66	0.18	0.0	110
staurolite	0.34	2.12	43.11	37.65	0.52	0.1	0.5	0.81	0.04	0.22	11.32	0.09	0.07	0.04	0.95	0.89	1.08	0.15	0.0	17
mica	0.0	0.0	39.21	45.28	0.66	8.33	0.0	0.6	0.0	0.0	2.11	0.0	0.0	0.0	1.39	1.02	1.24	0.17	0.0	1
mafic silicates	0.65	4.65	7.74	54.48	1.25	0.84	9.29	0.87	0.14	0.18	17.54	0.44	0.35	0.02	0.6	0.0	0.89	0.08	0.0	7
feldspar	5.13	0.0	22.82	55.86	1.03	0.28	6.63	0.17	0.07	0.55	1.17	0.27	0.11	0.0	2.08	1.39	2.44	0.0	0.0	1
silicate-other	1.46	1.56	39.66	45.33	0.82	0.42	0.63	0.62	0.08	0.08	4.88	0.15	0.1	0.1	1.3	1.0	1.65	0.16	0.0	84
quartz	0.08	0.07	0.37	91.05	2.17	0.0	0.0	0.14	0.15	0.1	0.21	0.04	0.03	0.0	3.84	0.1	1.49	0.14	0.0	8
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	0.61	4.74	0.0	0.0	3.35	0.0	0.0	0.0	0.0	0.0	0.7	7.72	1.14	40.67	6.78	34.29	0.0	1
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0.0	0.0	0.0	1.92	1.02	0.03	95.25	0.78	0.0	0.0	0.37	0.0	0.0	0.15	0.0	0.0	0.0	0.47	0.0	1
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	1.28	0.6	9.27	53.59	1.37	0.83	0.88	8.71	0.18	0.24	6.42	0.24	0.31	9.29	3.03	0.57	2.79	0.4	0.0	57

P2O5 budget of ore in Ti-minerals: 0.0040

P2O5 budget of ore in bulk sample: 0.115

Sample GEUS #: 2003565

Sampler's sample#: 10 8 Dongfang N.

Description: The sample represent 1½ m in what is describe as the ¿second terrace¿, a slightly kaolinised sand.

Country: CHINA

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Valuable Heavy Minerals								
Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	16.3	3.1	2.3	0.0	0.0	1.2	68.7	8.3

Normalised average content of the valuable Ti-bearing minerals				
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	56.8	74.8	92.9	19.8
Fe2O3 wt%	34.9	6.7	1.0	71.8
Mno wt%	2.3	0.3	0.1	1.1
Cr2O3 wt%	0.1	0.2	0.2	0.0
SiO2 wt%	4.5	14.3	4.2	4.8
Al2O3 wt%	1.0	3.4	1.4	1.3
MgO wt%	0.1	0.1	0.1	0.4
CaO wt%	0.1	0.2	0.2	0.1
ZrO2wt%	0.1	0.0	0.1	0.7

TiO2 Content	
Average TiO2 content of all the TiO2 minerals :	62.7
Average TiO2 content of all the TiO2 minerals excl. Rutile:	59.1

Titanium Report - Page 3/3

Sample GEUS #: 2003565

Sampler's sample#: 10 8 Dongfang N.

Description: The sample represent 1½ m in what is describe as the ¿second terrace¿, a slightly kaolinised sand.

Country: CHINA

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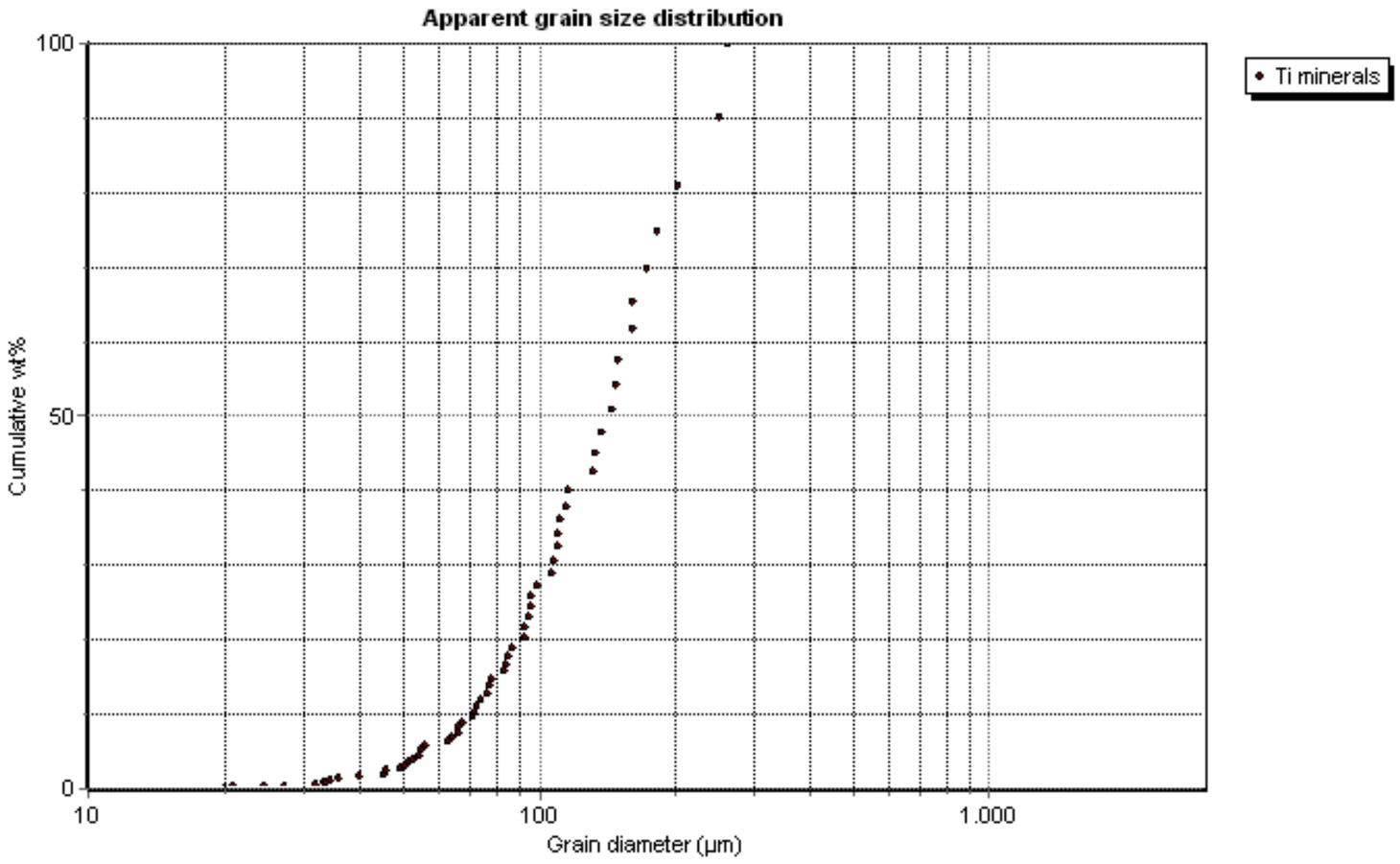

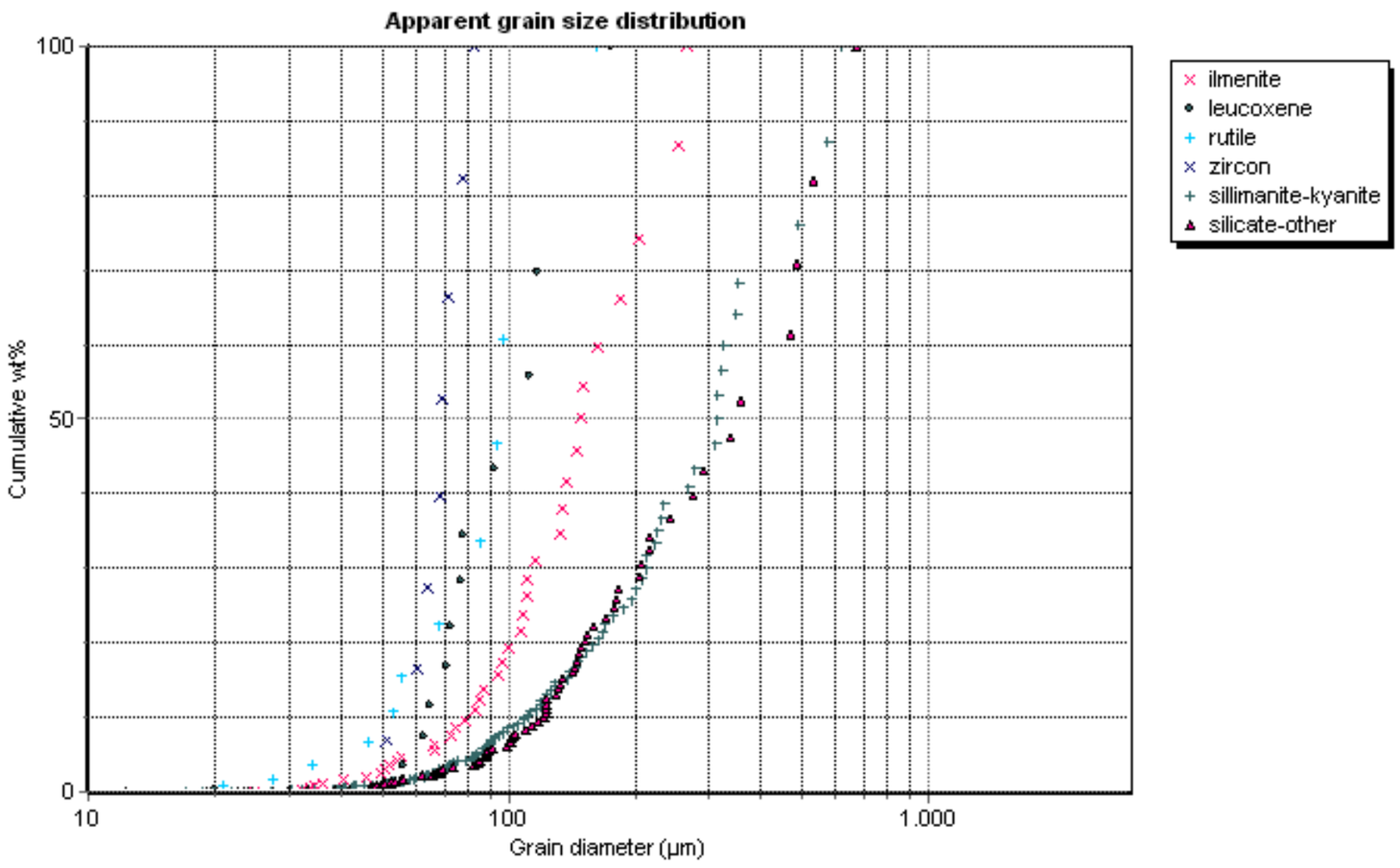

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.6	1.5	385.7	134.3	10158.2	40
leucoxene	-	-	1.6	1.6	333.3	119.2	6467.2	12
rutile	-	-	1.5	1.5	269.0	96.3	4736.5	11
Ti magnetite	0.0	0.0	1.5	1.7	81.9	30.6	316.4	1
magnetite	0.0	0.0	2.0	2.7	217.7	89.6	1958.5	8
chromite	0.0	0.0	0	0	0	0	0	0
spinel	0.0	0.0	0	0	0	0	0	0
zircon	0.0	0.0	1.5	1.6	268.8	94.8	3740.6	8
sphene	0.0	0.0	0	0	0	0	0	0
garnet	0.0	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.0	0.0	1.7	1.7	524.2	199.1	21527.4	110
staurolite	0.0	0.0	1.5	1.5	443.1	159.0	14464.1	17

Weight percent and average grain parameters on a mineral basis								
mica	0.0	0.0	1.4	1.3	315.1	95.3	5930.7	1
mafic silicates	0.0	0.0	1.8	2.0	115.4	44.4	635.4	7
feldspar	0.0	0.0	1.2	1.4	193.7	63.6	2115.5	1
silicate-other	0.0	0.0	1.8	1.8	551.9	214.3	23478.8	84
quartz	0.0	0.0	1.8	1.7	278.5	105.7	4312.4	8
corundum	0.0	0.0	0	0	0	0	0	0
monazite	0.0	0.0	2.3	1.9	243.2	95.2	2513.3	1
xenotime	0.0	0.0	0	0	0	0	0	0
phosphate	0.0	0.0	0	0	0	0	0	0
carbonate	0.0	0.0	3.9	3.3	469.2	208.9	5370.2	1
pyrite	0.0	0.0	0	0	0	0	0	0
unclassified	0.0	0.0	1.9	2.0	289.9	116.3	5799.7	57

Titanium Report - Page 1/3

Sample GEUS #: 2003566

Sampler's sample#: 11 9 Haitou

Description: Sample represent uppermost 10 cm of the sand

Country: CHINA

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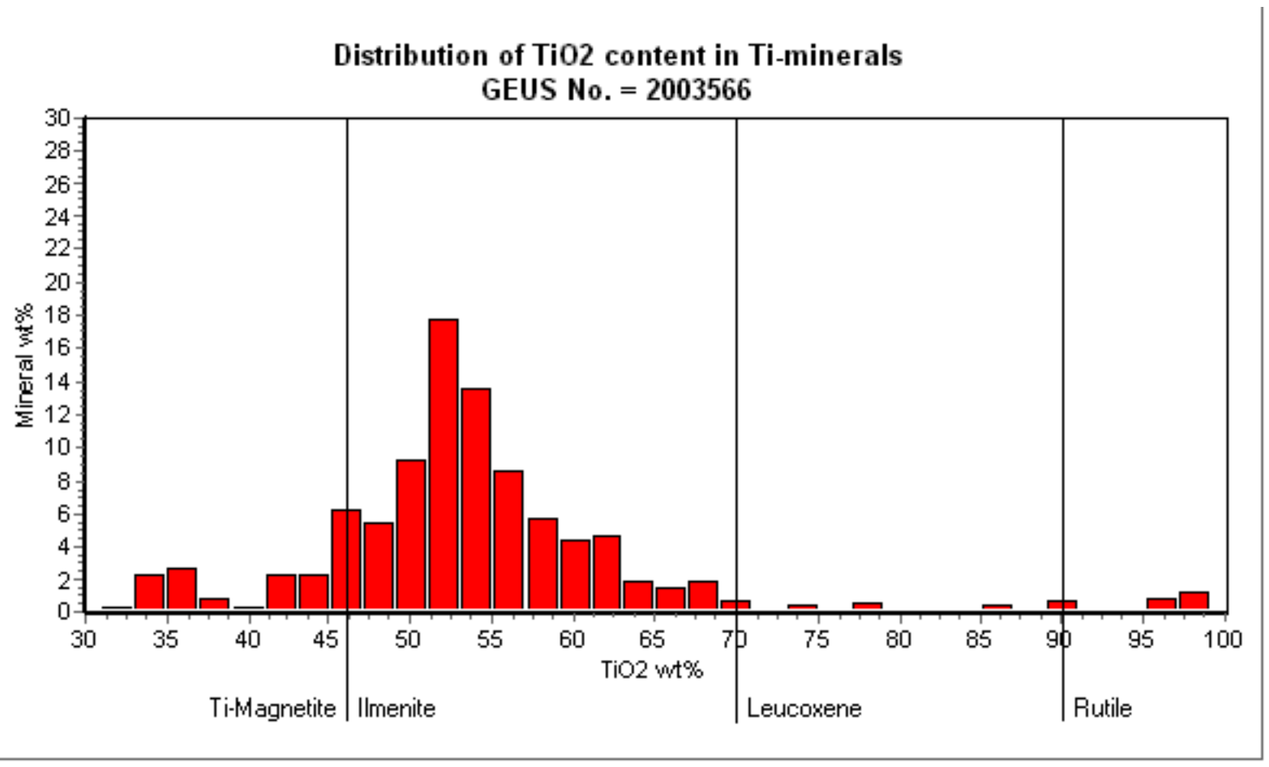

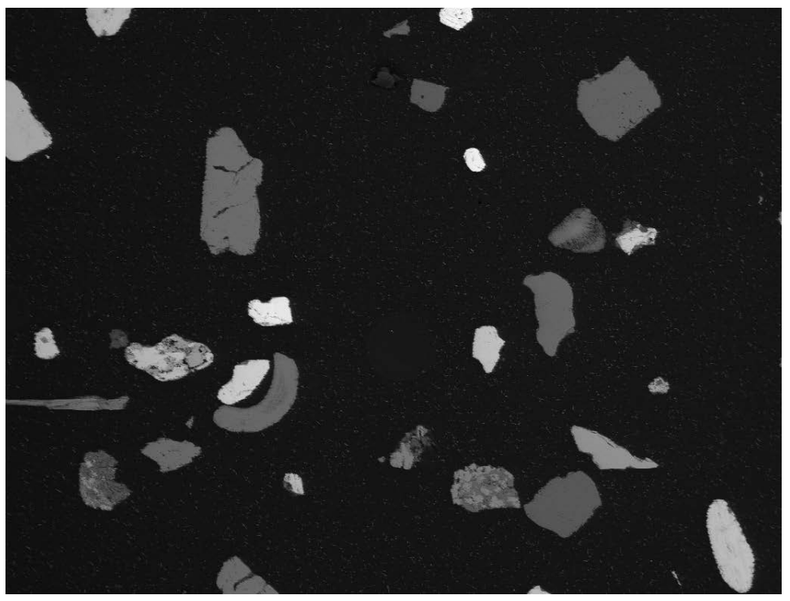

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.18	0.86	2.31	0.13	0.04	0.2	53.86	0.1	2.57	39.3	0.08	0.1	0.04	0.16	0.03	0.02	0.03	0.0	323
leucoxene	0.0	0.66	3.1	9.05	0.26	0.31	0.27	74.2	0.17	0.98	10.04	0.07	0.03	0.05	0.55	0.13	0.0	0.13	0.0	19
rutile	0.0	0.1	0.81	2.35	0.27	0.06	0.17	94.14	0.13	0.02	1.1	0.12	0.13	0.12	0.39	0.02	0.0	0.06	0.0	16
Ti magnetite	0.0	0.89	2.33	11.16	0.2	0.11	1.23	39.28	0.12	1.75	41.42	0.12	0.09	0.74	0.38	0.02	0.14	0.01	0.0	23
magnetite	0.0	0.5	7.52	5.31	0.51	0.19	0.33	4.07	0.11	0.14	78.74	0.14	0.1	0.33	0.24	1.56	0.15	0.04	0.0	44
chromite	0.0	10.67	27.37	1.39	0.0	0.0	0.21	0.3	38.62	1.32	18.75	0.02	0.0	0.0	0.14	0.7	0.23	0.29	0.0	1
spinel	0.0	24.13	53.86	0.45	0.0	0.15	0.07	0.0	8.08	0.0	10.36	0.49	0.0	0.0	0.0	1.66	0.76	0.0	0.0	1
zircon	0.0	0.05	0.14	32.07	0.0	0.03	0.05	0.19	0.07	0.07	0.36	0.15	0.04	58.88	5.76	0.0	1.98	0.15	0.0	36
sphene	0.06	0.22	2.6	28.64	0.3	0.04	24.8	39.1	0.49	0.06	2.06	0.14	0.03	0.0	0.58	0.15	0.69	0.04	0.0	9
garnet	0.0	2.41	21.88	36.68	0.55	0.05	1.03	0.04	0.07	3.83	31.14	0.07	0.03	0.0	0.98	0.37	0.86	0.04	0.0	6
sillimanite-kyanite	0.0	0.01	56.51	37.45	0.77	0.1	0.06	0.16	0.06	0.08	0.59	0.13	0.13	0.01	0.94	1.41	1.45	0.13	0.0	27
staurolite	0.0	4.88	39.0	44.17	0.69	0.01	0.98	0.78	0.0	0.04	7.83	0.0	0.0	0.0	0.38	0.0	0.89	0.35	0.0	1
mica	0.18	4.9	23.24	43.79	0.9	7.95	0.27	2.74	0.08	0.15	12.39	0.05	0.08	0.11	1.23	0.41	1.49	0.04	0.0	21
mafic silicates	0.02	7.21	12.63	46.34	0.8	0.5	12.42	0.74	0.28	0.42	15.85	0.11	0.11	0.05	1.2	0.26	0.99	0.07	0.0	124
feldspar	1.82	0.0	20.11	59.35	0.97	11.69	0.08	0.12	0.07	0.07	0.68	0.09	0.14	0.05	2.05	0.66	1.98	0.07	0.0	17
silicate-other	0.54	1.88	32.63	43.44	0.94	0.24	5.52	0.78	0.13	0.16	8.95	0.07	0.1	0.12	1.55	0.98	1.91	0.07	0.0	60
quartz	0.0	0.03	0.27	89.61	3.0	0.0	0.0	0.1	0.03	0.13	0.25	0.07	0.05	0.0	5.09	0.91	0.26	0.24	0.0	14
corundum	0.0	0.1	90.3	1.36	0.0	0.34	0.07	0.2	0.0	0.29	0.58	0.0	0.03	0.0	0.28	5.18	0.98	0.32	0.0	2
monazite	0.0	0.2	1.83	5.53	0.12	0.0	1.85	3.63	0.0	0.0	2.2	0.08	0.35	8.15	0.22	34.62	7.44	33.79	0.0	11
xenotime	0.0	0.0	0.62	4.32	0.0	0.0	2.83	0.0	0.0	0.0	0.0	0.0	0.0	7.98	0.0	42.92	8.8	32.53	0.0	1
phosphate	0.0	0.08	0.27	2.37	0.17	0.09	54.01	0.12	0.0	0.0	0.43	0.02	0.05	5.81	1.24	31.12	3.84	0.4	0.0	4
carbonate	0.04	0.13	0.76	2.52	0.8	0.06	92.89	0.3	0.14	0.17	0.67	0.22	0.25	0.02	0.21	0.05	0.52	0.23	0.0	129
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	2.25	3.32	8.09	43.11	1.34	1.43	14.74	5.86	0.12	0.37	5.67	0.12	0.11	6.65	2.94	1.36	2.3	0.2	0.0	138

P2O5 budget of ore in Ti-minerals: 0.0090

P2O5 budget of ore in bulk sample: 0.421

Sample GEUS #: 2003566

Sampler's sample#: 11　9 Haitou

Description: Sample represent uppermost 10 cm of the sand

Country: CHINA

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Valuable Heavy Minerals								
Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	74.7	3.6	3.7	6.3	1.1	5.5	5.0	0.1

Normalised average content of the valuable Ti-bearing minerals				
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	54.2	75.3	95.1	39.7
Fe2O3 wt%	39.5	10.2	1.1	41.9
Mno wt%	2.6	1.0	0.0	1.8
Cr2O3 wt%	0.1	0.2	0.1	0.1
SiO2 wt%	2.3	9.2	2.4	11.3
Al2O3 wt%	0.9	3.1	0.8	2.4
MgO wt%	0.2	0.7	0.1	0.9
CaO wt%	0.2	0.3	0.2	1.2
ZrO2wt%	0.0	0.1	0.1	0.7

TiO2 Content	
Average TiO2 content of all the TiO2 minerals :	55.9
Average TiO2 content of all the TiO2 minerals excl. Rutile:	54.1

Titanium Report - Page 3/3

Sample GEUS #: 2003566

Sampler's sample#: 11 9 Haitou

Description: Sample represent uppermost 10 cm of the sand

Country: CHINA

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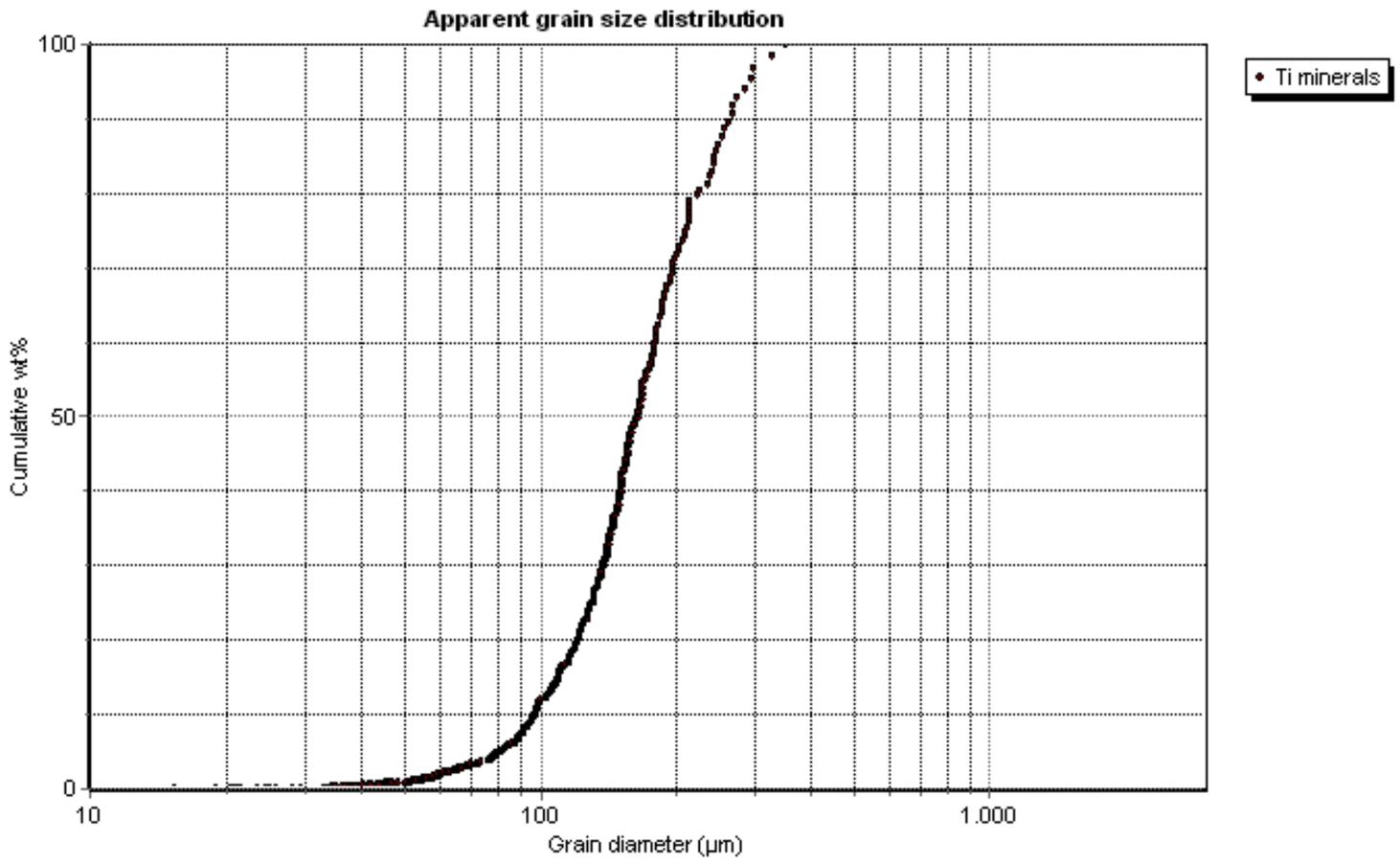

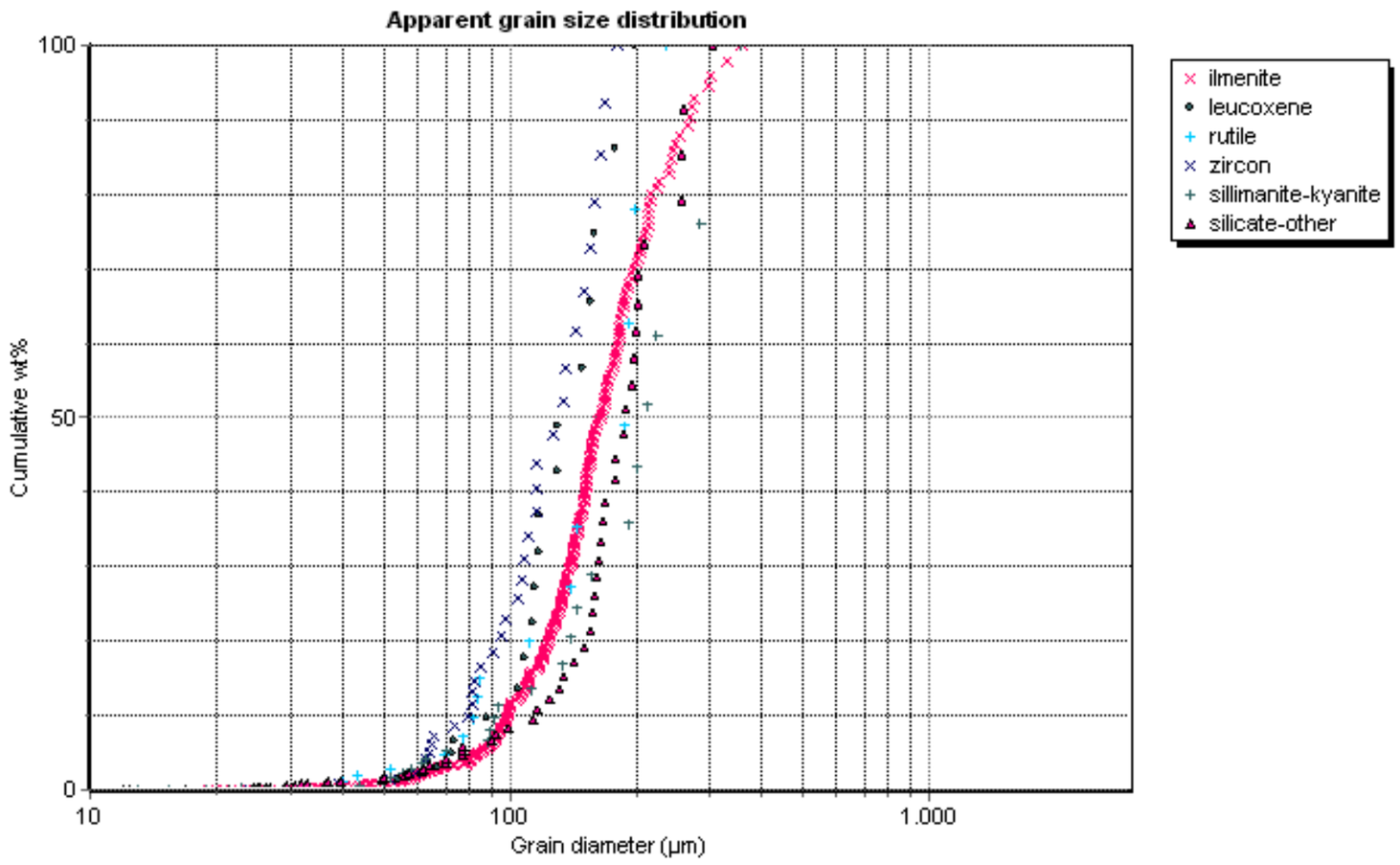

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.8	1.7	499.6	186.5	14087.8	323
leucoxene	-	-	1.9	1.8	481.0	182.2	11495.6	19
rutile	-	-	1.7	1.6	448.2	164.7	12663.3	16
Ti magnetite	3.7	0.1	2.0	2.2	612.0	256.4	15618.6	23
magnetite	3.7	0.1	1.7	1.7	345.3	124.3	9273.1	44
chromite	3.7	0.1	2.1	1.8	642.5	249.8	17836.4	1
spinel	3.7	0.1	1.5	2.1	1680.0	681.1	108227.9	1
zircon	3.7	0.1	1.5	1.6	397.8	143.2	9054.0	36
sphene	3.7	0.1	1.9	2.0	608.2	240.4	19723.6	9
garnet	3.7	0.1	2.0	1.9	529.3	205.2	12922.2	6
sillimanite-kyanite	3.7	0.1	1.9	1.9	497.4	196.0	15502.9	27
staurolite	3.7	0.1	1.6	1.5	346.2	122.0	6236.1	1

Weight percent and average grain parameters on a mineral basis								
mica	3.7	0.1	2.7	2.2	268.5	108.8	3299.8	21
mafic silicates	3.7	0.1	2.1	2.0	434.6	173.7	11168.6	124
feldspar	3.7	0.1	1.8	1.8	261.7	101.6	3535.7	17
silicate-other	3.7	0.1	1.8	1.8	480.2	185.4	14220.9	60
quartz	3.7	0.1	2.0	2.0	523.6	213.4	18010.3	14
corundum	3.7	0.1	2.0	1.9	959.7	377.5	41503.1	2
monazite	3.7	0.1	1.7	1.7	413.5	154.2	8770.4	11
xenotime	3.7	0.1	1.4	1.5	350.3	122.5	6445.1	1
phosphate	3.7	0.1	1.6	1.5	119.5	39.2	940.2	4
carbonate	3.7	0.1	2.3	2.3	427.8	181.9	11020.0	129
pyrite	3.7	0.1	0	0	0	0	0	0
unclassified	3.7	0.1	1.9	2.1	357.0	144.0	8434.4	138

Titanium Report - Page 1/3

Sample GEUS #: 2003567

Sampler's sample#: 12 10 Haitou N.

Description: The sample represent ca 10 cm.

Country: CHINA

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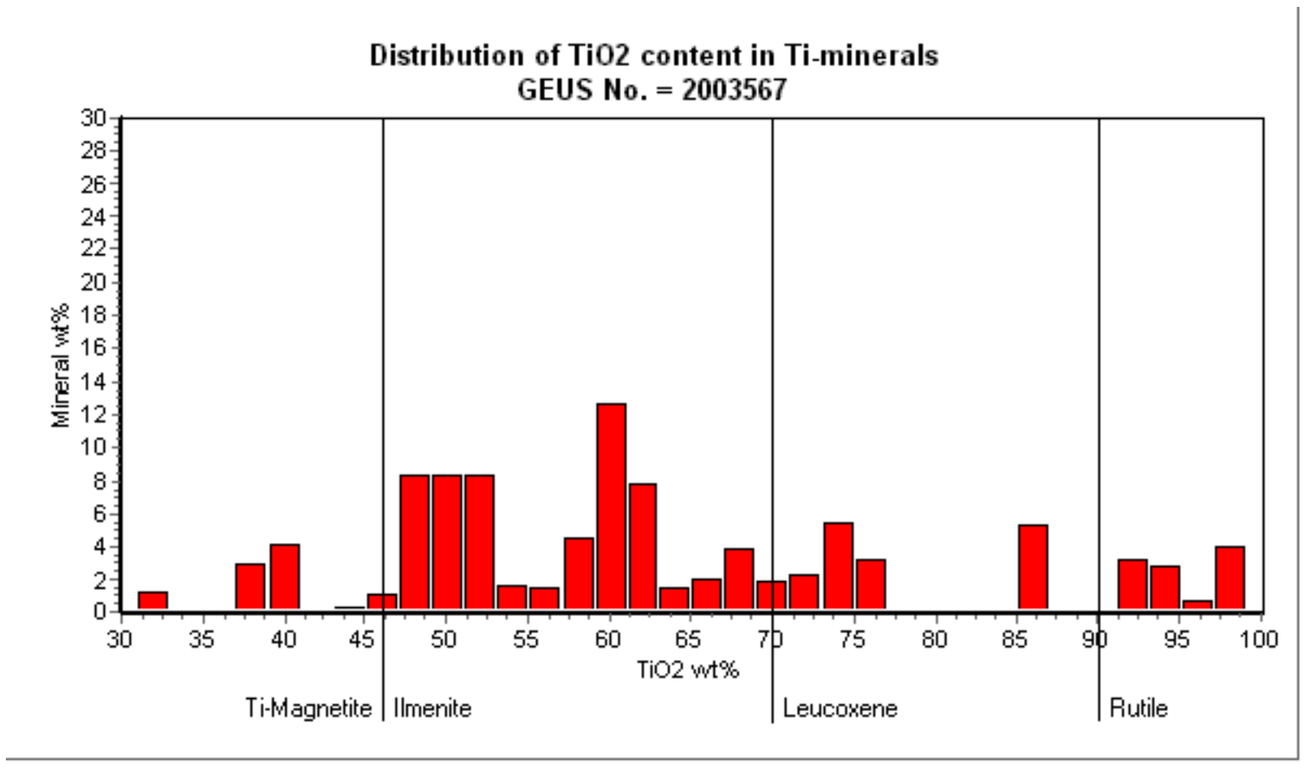

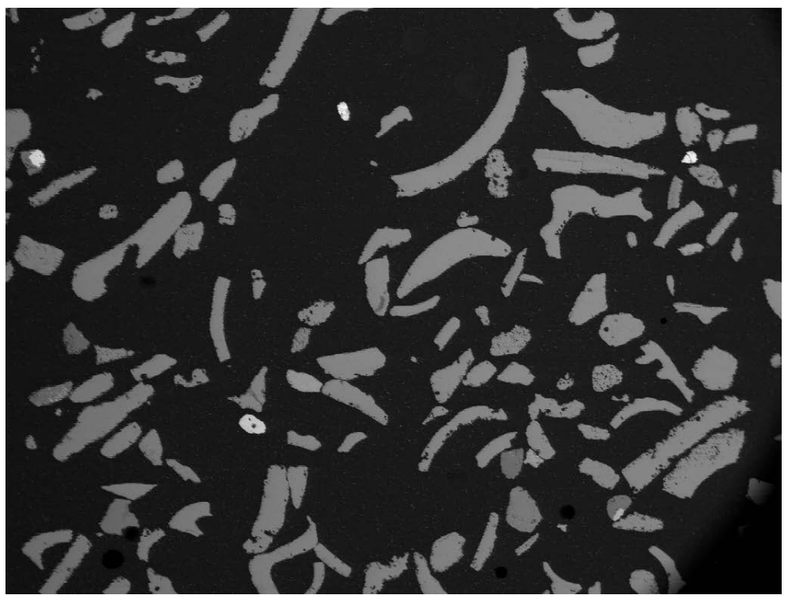

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.27	0.91	5.29	0.21	0.08	0.55	55.89	0.12	2.21	33.59	0.09	0.13	0.2	0.34	0.04	0.09	0.01	0.0	37
leucoxene	0.25	1.2	3.14	6.38	0.2	0.4	0.71	72.26	0.29	1.14	13.66	0.05	0.19	0.04	0.09	0.0	0.0	0.04	0.0	6
rutile	0.0	0.03	0.47	1.99	0.17	0.07	0.63	94.84	0.22	0.09	1.01	0.07	0.02	0.08	0.27	0.0	0.0	0.04	0.0	7
Ti magnetite	0.0	0.04	0.0	13.11	0.0	0.01	0.09	37.56	0.18	2.54	25.58	0.0	0.0	19.09	1.8	0.0	0.0	0.0	0.0	1
magnetite	0.0	0.05	4.5	5.64	0.5	0.01	1.19	1.44	0.16	0.26	82.8	0.22	0.1	0.3	0.23	2.54	0.0	0.09	0.0	4
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.09	0.03	32.28	0.0	0.02	0.05	0.12	0.03	0.07	0.36	0.12	0.0	58.66	5.33	0.0	2.71	0.14	0.0	4
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.0	0.1	54.26	37.51	0.65	0.26	0.3	0.06	0.1	0.07	0.6	0.09	0.02	0.2	1.46	1.57	2.57	0.2	0.0	7
staurolite	0.0	1.86	38.78	43.06	1.03	0.01	0.39	0.17	0.04	0.1	11.76	0.28	0.0	0.03	0.89	1.06	0.57	0.0	0.0	1
mica	0.0	5.52	21.05	39.91	0.92	6.42	0.93	3.21	0.0	0.11	18.36	0.0	0.13	0.0	1.36	0.74	1.32	0.05	0.0	2
mafic silicates	0.07	7.3	12.18	47.28	0.86	0.47	12.41	0.86	0.26	0.37	15.02	0.07	0.11	0.04	1.27	0.33	0.99	0.1	0.0	65
feldspar	1.4	0.63	22.06	56.39	0.59	11.0	1.07	0.14	0.09	0.0	1.05	0.21	0.45	0.31	1.77	0.0	2.76	0.12	0.0	2
silicate-other	0.69	3.2	32.77	42.15	0.9	0.2	5.0	0.77	0.09	0.14	8.76	0.11	0.04	0.13	1.78	1.04	2.14	0.1	0.0	33
quartz	0.0	0.0	0.51	89.05	2.13	0.0	0.0	0.24	0.08	0.0	0.38	0.0	0.0	0.0	5.92	1.68	0.0	0.0	0.0	1
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0.26	0.12	0.14	1.28	0.83	0.02	54.47	0.08	0.03	0.0	0.45	0.09	0.09	5.66	0.98	32.23	2.93	0.34	0.0	5
carbonate	0.08	0.1	0.39	1.61	0.63	0.04	94.79	0.21	0.12	0.13	0.32	0.21	0.25	0.01	0.19	0.05	0.62	0.25	0.0	959
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.64	2.9	4.09	24.49	1.44	0.81	44.96	7.04	0.12	1.1	4.48	0.12	0.22	2.28	1.71	1.62	1.79	0.19	0.0	62

P2O5 budget of ore in Ti-minerals: 0.0010

P2O5 budget of ore in bulk sample: 0.0010

Sample GEUS #: 2003567

Sampler's sample#: 12 10 Haitou N.

Description: The sample represent ca 10 cm.

Country: CHINA

This document was created on: Mon Sep 08 13:26:38 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	53.5	11.4	10.8	2.8	0.0	6.7	13.4	1.4

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	56.4	73.1	95.5	38.3
Fe2O3 wt%	33.9	13.8	1.0	26.1
Mno wt%	2.2	1.2	0.1	2.6
Cr2O3 wt%	0.1	0.3	0.2	0.2
SiO2 wt%	5.3	6.5	2.0	13.4
Al2O3 wt%	0.9	3.2	0.5	0.0
MgO wt%	0.3	1.2	0.0	0.0
CaO wt%	0.6	0.7	0.6	0.1
ZrO2wt%	0.2	0.0	0.1	19.4

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	63.5
Average TiO2 content of all the TiO2 minerals excl. Rutile:	58.5

Titanium Report - Page 3/3

Sample GEUS #: 2003567

Sampler's sample#: 12 10 Haitou N.

Description: The sample represent ca 10 cm.

Country: CHINA

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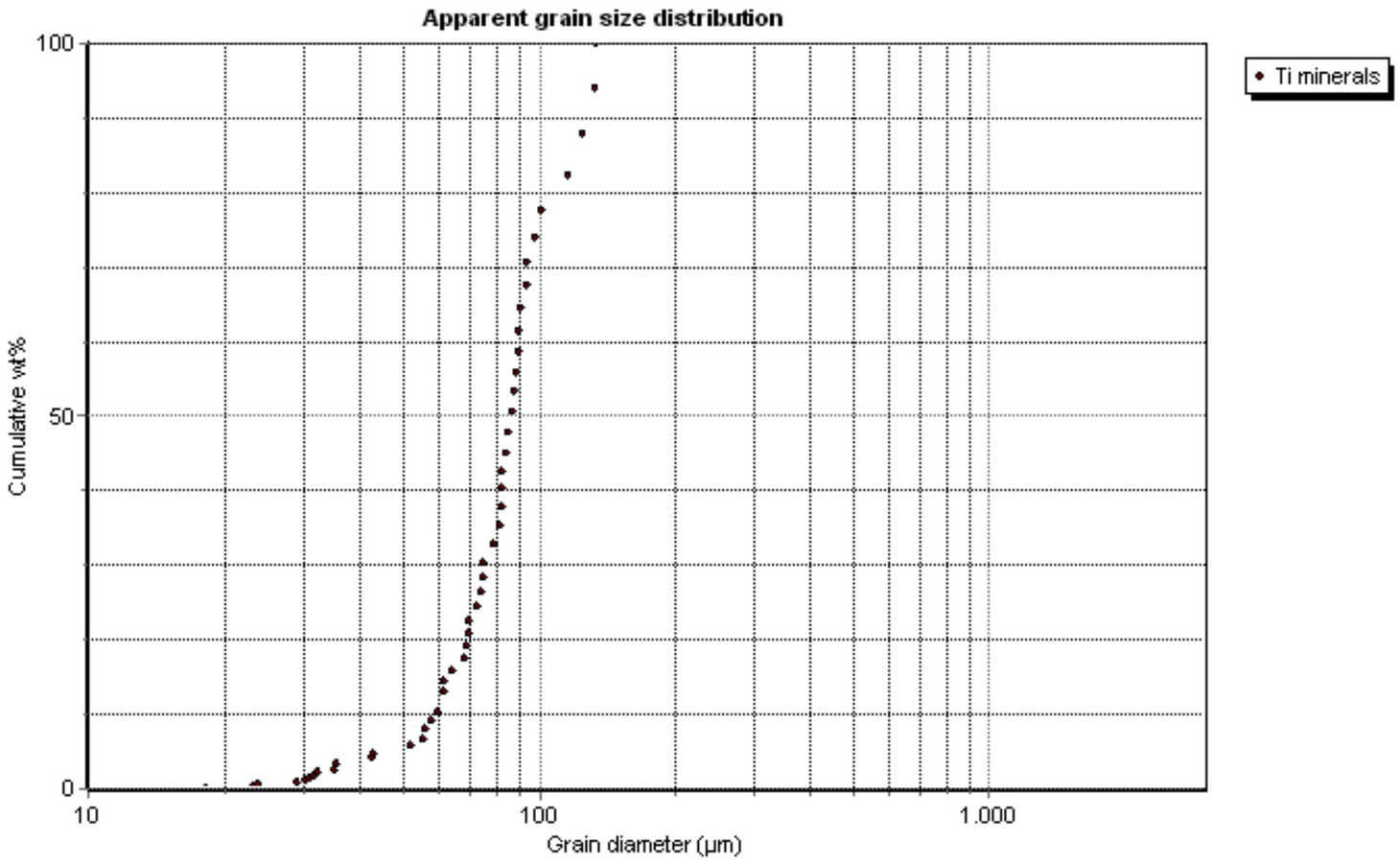

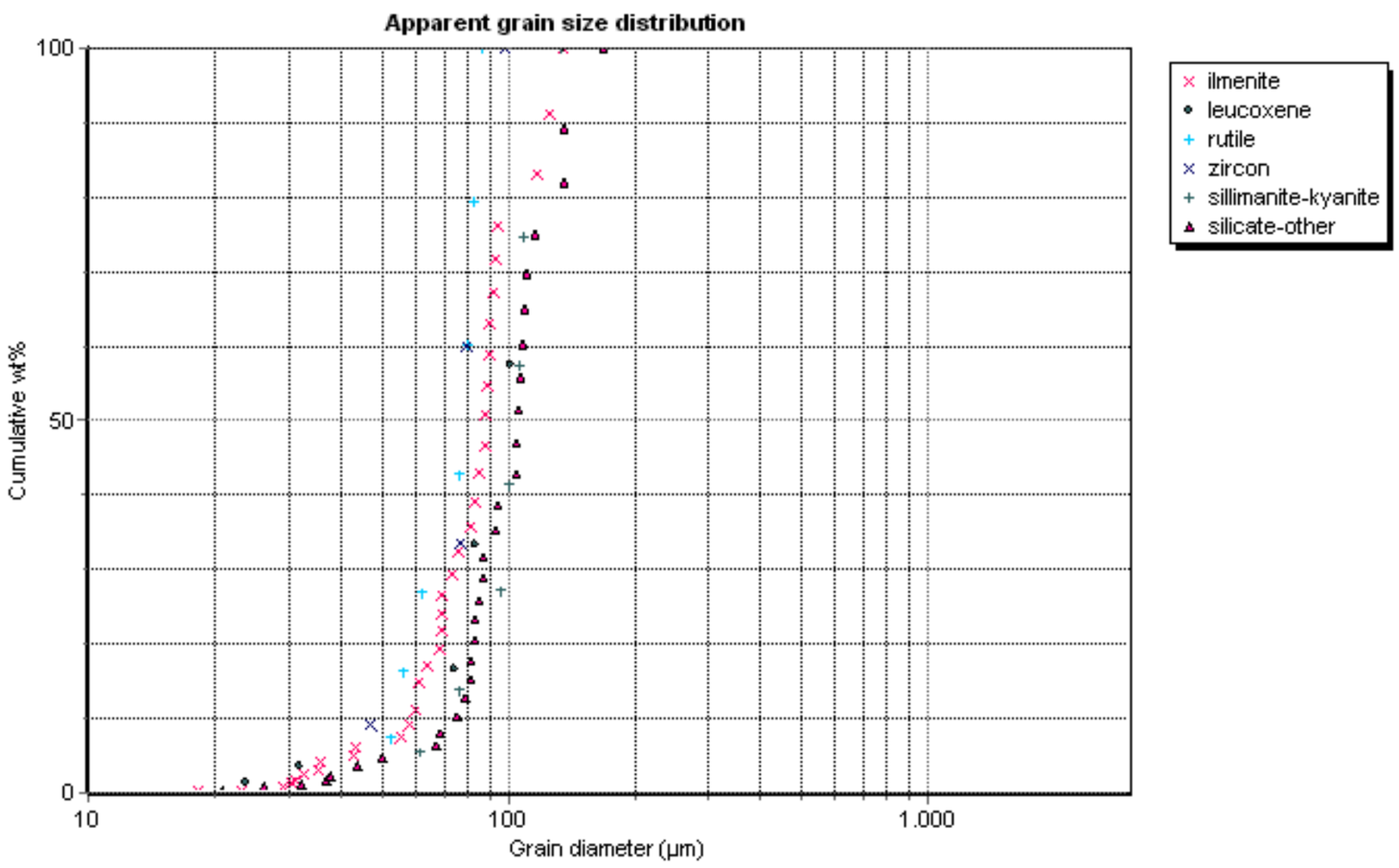

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.6	1.5	264.7	91.2	4210.5	37
leucoxene	-	-	1.4	1.5	288.2	98.4	5546.5	6
rutile	-	-	1.5	1.6	276.5	95.5	4036.1	7
Ti magnetite	0.1	0.0	2.0	2.6	497.8	213.2	7603.3	1
magnetite	0.1	0.0	1.1	1.3	146.3	42.4	1412.6	4
chromite	0.1	0.0	0	0	0	0	0	0
spinel	0.1	0.0	0	0	0	0	0	0
zircon	0.1	0.0	1.4	1.5	291.3	98.7	4728.3	4
sphene	0.1	0.0	0	0	0	0	0	0
garnet	0.1	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.1	0.0	2.2	2.1	437.0	176.3	7731.1	7
staurolite	0.1	0.0	1.4	1.6	304.2	108.9	4710.2	1

Weight percent and average grain parameters on a mineral basis								
mica	0.1	0.0	3.5	2.8	447.3	197.3	7738.9	2
mafic silicates	0.1	0.0	2.1	1.9	383.3	147.8	6986.8	65
feldspar	0.1	0.0	2.4	2.4	305.2	129.2	3286.3	2
silicate-other	0.1	0.0	1.8	1.8	347.2	131.4	6167.4	33
quartz	0.1	0.0	2.2	2.4	292.6	123.0	2865.9	1
corundum	0.1	0.0	0	0	0	0	0	0
monazite	0.1	0.0	0	0	0	0	0	0
xenotime	0.1	0.0	0	0	0	0	0	0
phosphate	0.1	0.0	2.2	1.7	244.8	79.7	3348.7	5
carbonate	0.1	0.0	2.5	2.4	592.7	249.2	15150.5	959
pyrite	0.1	0.0	0	0	0	0	0	0
unclassified	0.1	0.0	1.8	2.0	430.8	178.2	8841.9	62

Titanium Report - Page 1/3

Sample GEUS #: 2003568

Sampler's sample#: 13 11 Haitou N Dune

Description: The sample represent ca 1 m

Country: CHINA

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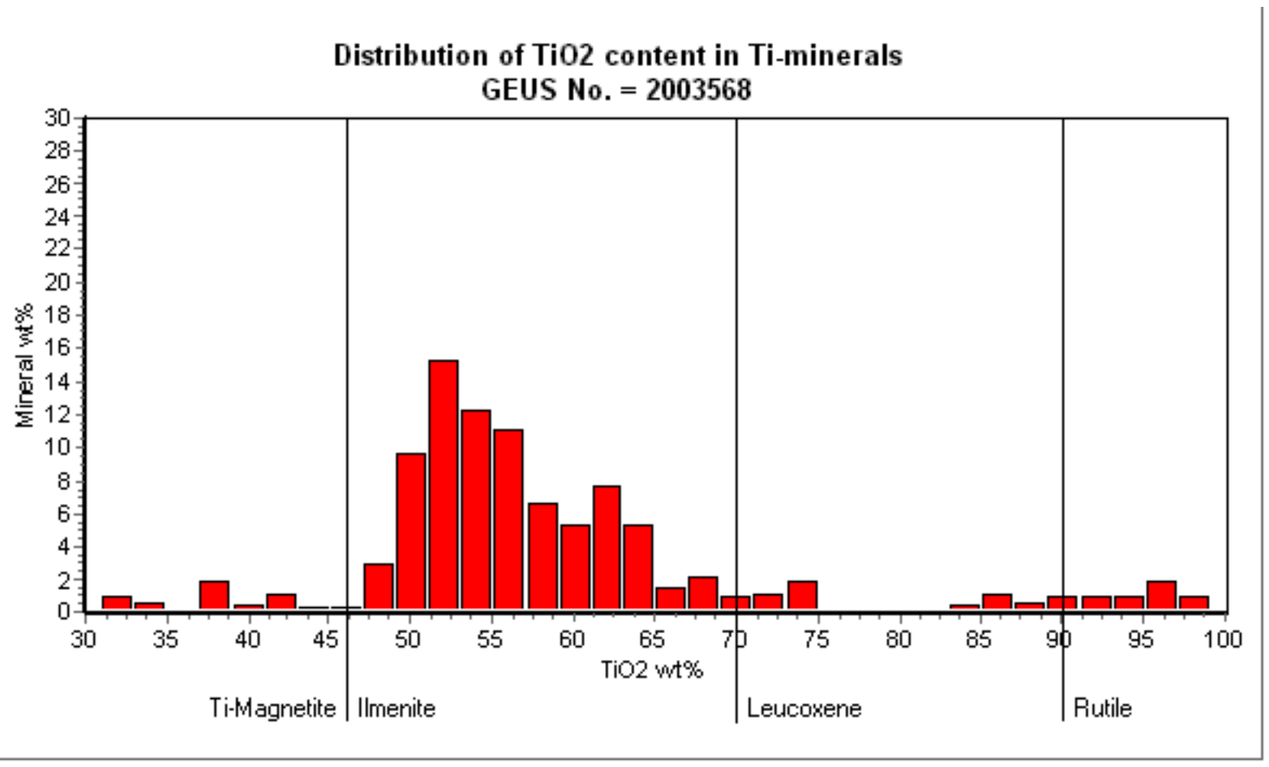

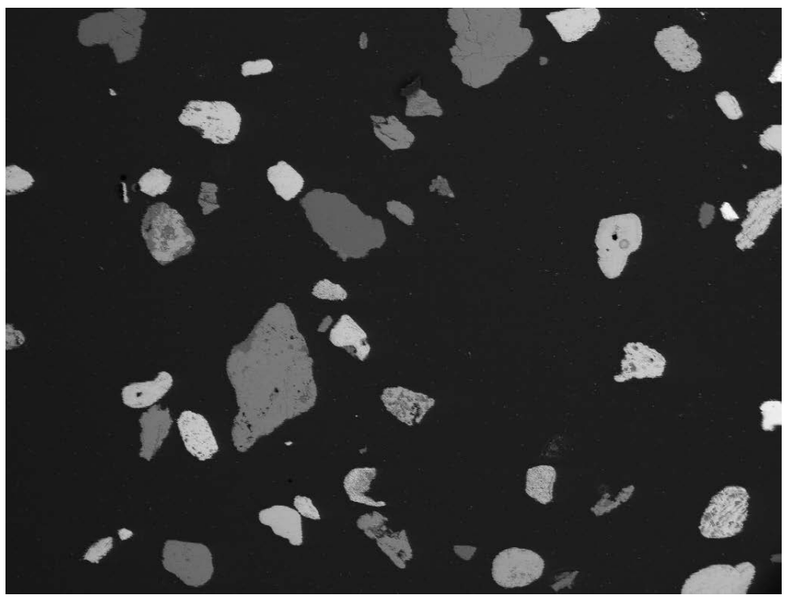

Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.15	0.98	1.61	0.13	0.04	0.14	55.3	0.11	2.69	38.32	0.09	0.1	0.05	0.18	0.06	0.02	0.03	0.0	379
leucoxene	0.0	0.28	2.78	6.52	0.15	0.37	0.17	73.88	0.14	0.85	13.13	0.09	0.08	0.06	0.31	0.53	0.1	0.55	0.0	25
rutile	0.0	0.11	1.03	2.25	0.19	0.09	0.09	93.79	0.24	0.07	1.09	0.14	0.11	0.12	0.51	0.02	0.03	0.14	0.0	30
Ti magnetite	0.0	1.26	4.33	10.12	0.26	0.23	2.69	36.91	0.14	1.29	42.0	0.13	0.07	0.04	0.29	0.09	0.13	0.04	0.0	14
magnetite	0.04	0.62	3.28	4.57	0.15	0.27	0.35	6.28	0.12	0.31	83.35	0.18	0.11	0.07	0.08	0.2	0.01	0.03	0.0	54
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.01	0.05	0.28	31.71	0.02	0.01	0.11	0.11	0.08	0.08	0.31	0.14	0.02	59.09	5.33	0.08	2.43	0.14	0.0	55
sphene	0.0	0.09	2.94	27.52	0.28	0.03	24.91	40.5	0.64	0.04	1.66	0.16	0.0	0.0	0.54	0.18	0.4	0.11	0.0	5
garnet	0.0	1.76	21.1	35.85	0.53	0.01	1.06	0.14	0.04	4.12	32.08	0.08	0.07	0.0	1.3	0.68	1.14	0.05	0.0	3
sillimanite-kyanite	0.0	0.03	54.97	36.81	0.86	0.22	0.05	0.19	0.07	0.05	0.66	0.14	0.04	0.08	1.46	2.1	2.14	0.16	0.0	38
staurolite	0.37	1.84	41.53	37.83	0.98	0.94	0.69	0.91	0.05	0.17	12.02	0.09	0.0	0.04	1.01	0.64	0.83	0.07	0.0	8
mica	0.56	0.54	19.97	56.16	1.26	7.64	0.07	3.6	0.04	0.32	4.84	0.15	0.05	0.0	2.42	0.91	1.47	0.0	0.0	11
mafic silicates	0.07	6.46	14.62	45.19	0.79	0.32	12.74	0.92	0.3	0.47	14.98	0.1	0.13	0.02	1.35	0.38	1.07	0.1	0.0	150
feldspar	3.58	0.14	22.36	56.88	1.19	4.44	3.48	0.22	0.11	0.15	1.35	0.1	0.07	0.09	2.36	0.95	2.5	0.05	0.0	21
silicate-other	0.62	2.83	34.24	42.15	0.98	0.18	2.41	0.79	0.09	0.16	9.66	0.09	0.06	0.0	2.09	1.4	2.12	0.13	0.0	100
quartz	0.0	0.04	0.15	88.66	2.93	0.0	0.0	0.13	0.05	0.21	0.57	0.03	0.17	0.0	5.96	0.81	0.0	0.3	0.0	6
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.13	1.62	3.95	0.17	0.05	2.88	2.31	0.0	0.0	0.28	0.06	0.33	8.1	0.0	37.6	7.57	34.98	0.0	6
xenotime	0.0	0.17	1.94	7.88	0.0	0.0	2.08	0.0	0.0	0.0	0.19	0.26	0.43	7.09	0.0	39.06	8.47	32.44	0.0	3
phosphate	0.0	0.0	0.76	1.72	0.0	0.01	53.85	0.0	0.0	0.0	0.99	0.0	0.0	4.57	1.33	32.63	3.87	0.28	0.0	1
carbonate	0.0	0.11	1.14	1.69	0.76	0.07	93.4	0.3	0.01	0.08	0.69	0.33	0.16	0.0	0.35	0.11	0.57	0.22	0.0	5
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.08	0.62	7.51	52.53	1.51	1.69	2.31	8.96	0.11	0.53	4.68	0.14	0.11	11.08	4.41	1.02	2.41	0.27	0.0	109

P2O5 budget of ore in Ti-minerals: 0.025

P2O5 budget of ore in bulk sample: 0.36

Sample GEUS #: 2003568

Sampler's sample#: 13 11 Haitou N Dune

Description: The sample represent ca 1 m

Country: CHINA

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Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	66.1	4.1	5.7	2.3	0.6	8.4	10.1	2.6

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	55.7	75.5	94.9	37.4
Fe2O3 wt%	38.6	13.4	1.1	42.5
Mno wt%	2.7	0.9	0.1	1.3
Cr2O3 wt%	0.1	0.1	0.2	0.1
SiO2 wt%	1.6	6.7	2.3	10.2
Al2O3 wt%	1.0	2.8	1.0	4.4
MgO wt%	0.2	0.3	0.1	1.3
CaO wt%	0.1	0.2	0.1	2.7
ZrO2wt%	0.1	0.1	0.1	0.0

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	59.0
Average TiO2 content of all the TiO2 minerals excl. Rutile:	56.2

Titanium Report - Page 3/3
Sample GEUS #: 2003568
Sampler's sample#: 13 11 Haitou N Dune
Description: The sample represent ca 1 m
Country: CHINA
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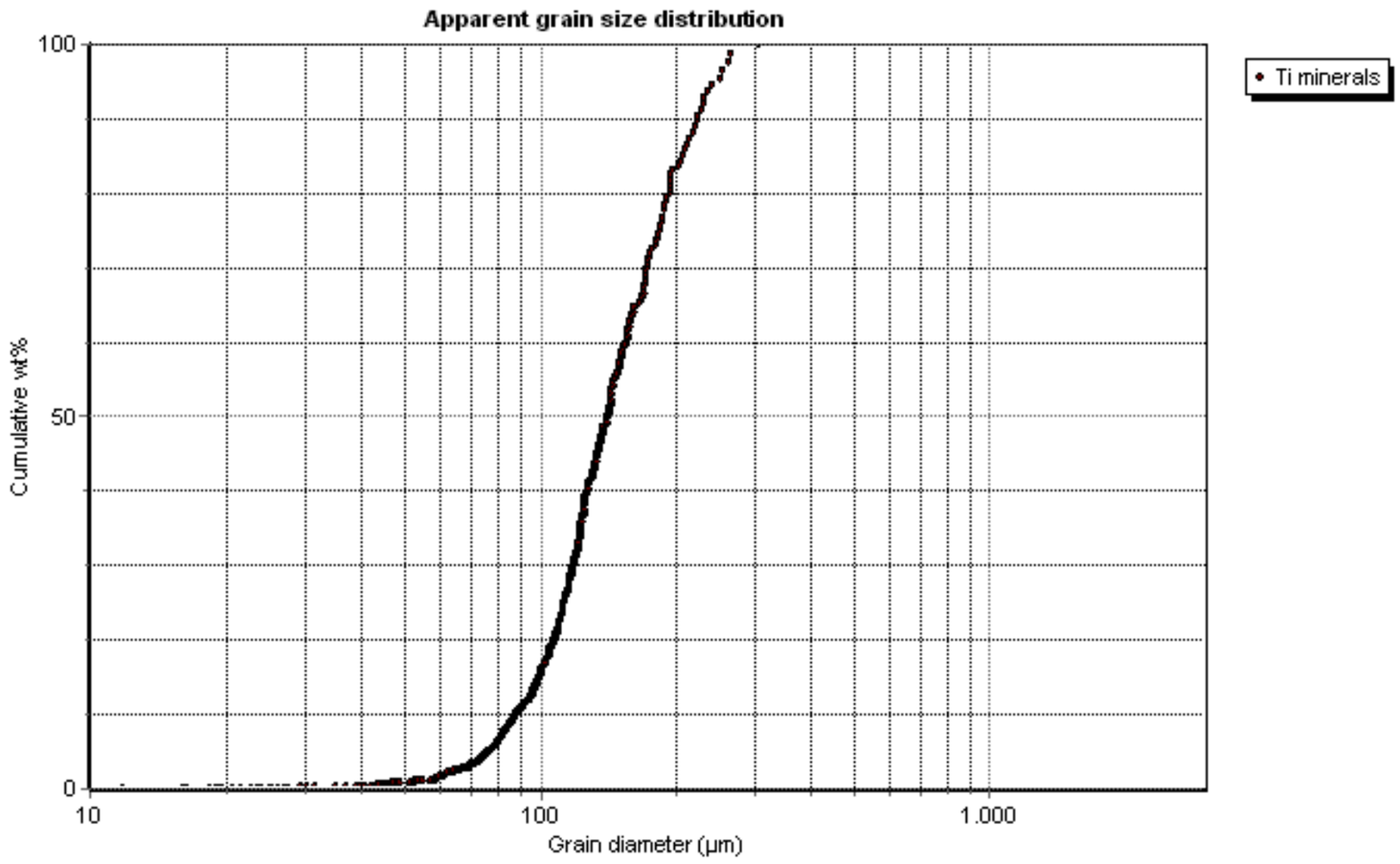
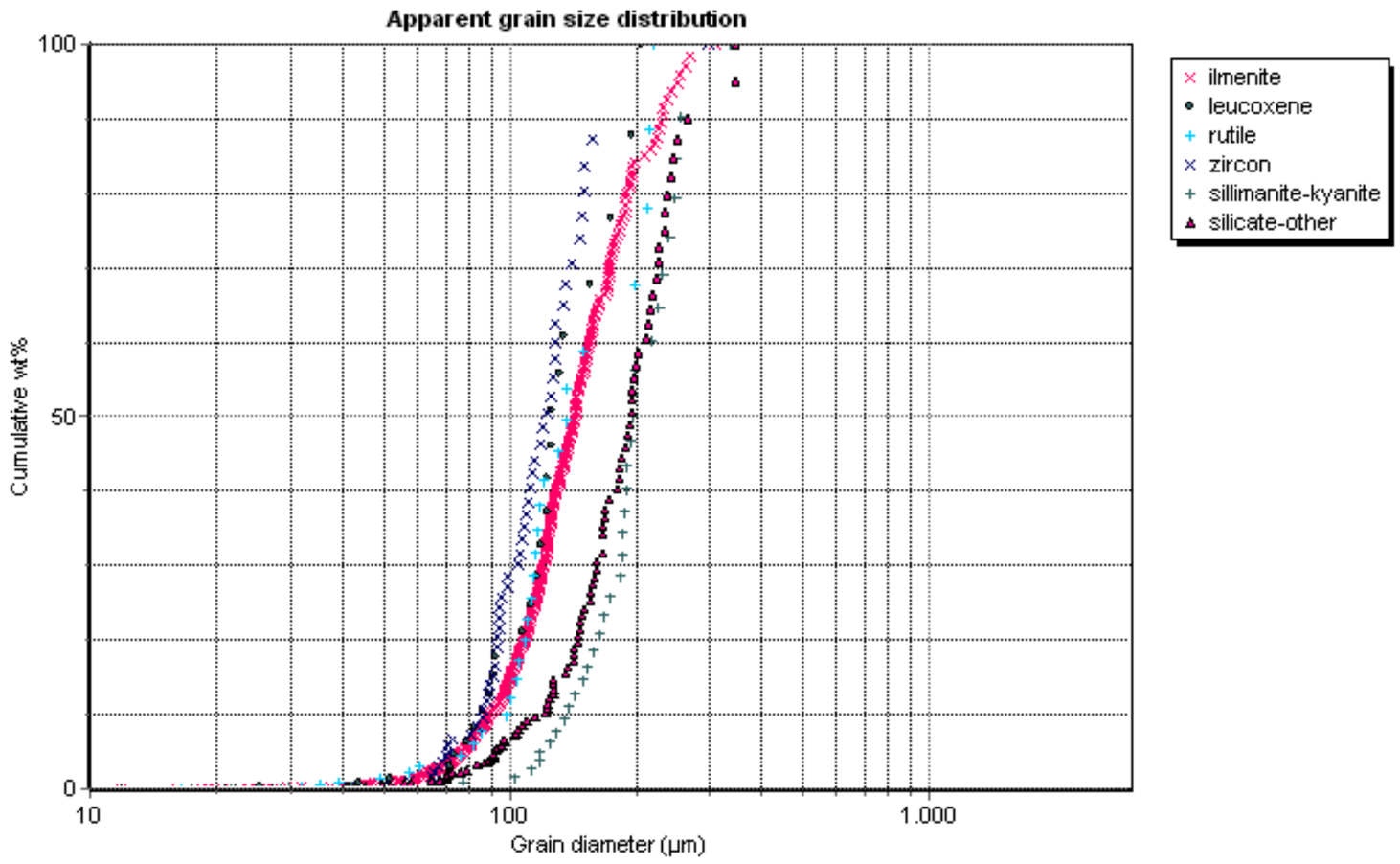
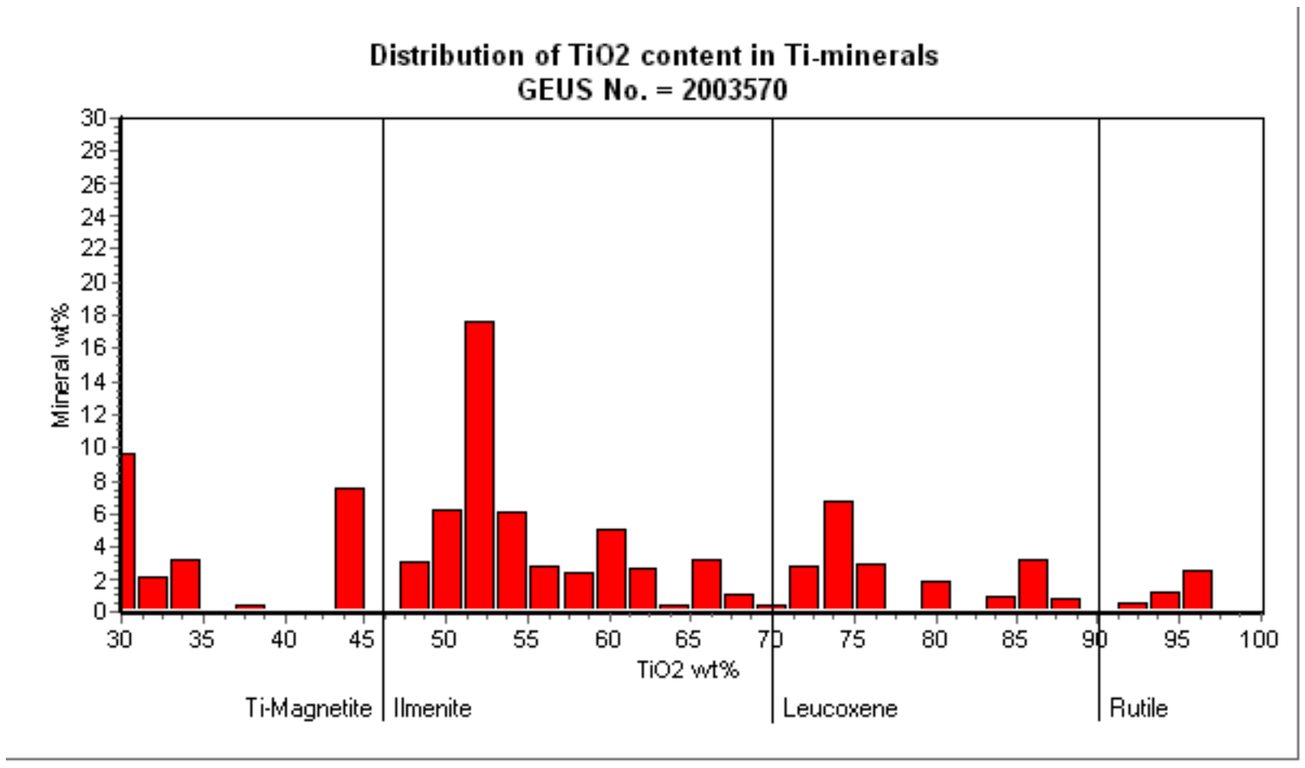


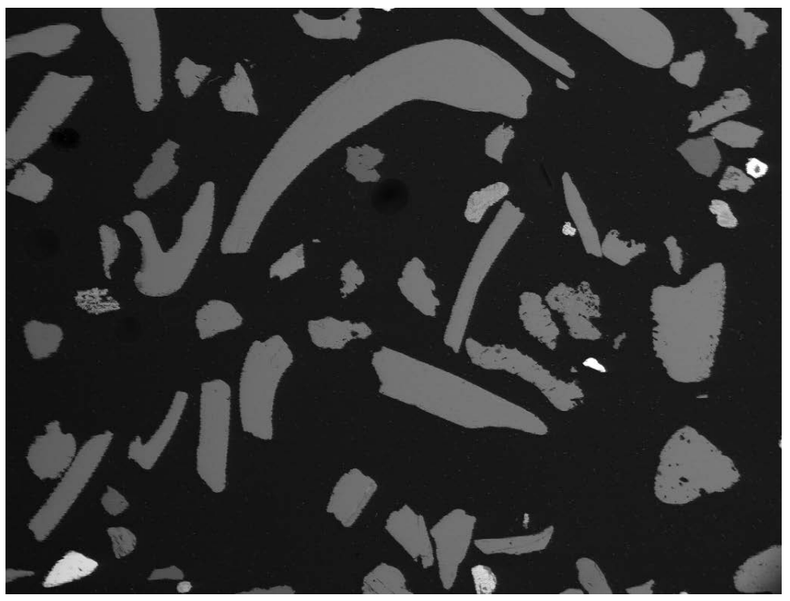


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.7	452.2	165.2	11508.5	379
leucoxene	-	-	1.7	1.7	451.1	164.8	10807.7	25
rutile	-	-	1.7	1.7	446.5	166.3	11292.7	30
Ti magnetite	1.4	0.0	1.6	1.8	437.1	166.4	10405.9	14
magnetite	1.4	0.0	1.6	1.6	455.5	162.8	12359.7	54
chromite	1.4	0.0	0	0	0	0	0	0
spinel	1.4	0.0	0	0	0	0	0	0
zircon	1.4	0.0	1.5	1.6	417.3	148.3	9797.5	55
sphene	1.4	0.0	1.5	1.6	528.3	191.9	15203.5	5
garnet	1.4	0.0	2.1	1.9	533.3	212.3	14471.0	3
sillimanite-kyanite	1.4	0.0	1.9	1.9	696.6	268.1	24268.4	38
staurolite	1.4	0.0	2.0	1.8	576.5	214.9	25514.5	8

Weight percent and average grain parameters on a mineral basis								
mica	1.4	0.0	1.7	1.7	260.5	94.2	3534.2	11
mafic silicates	1.4	0.0	2.0	1.9	484.5	189.2	13510.2	150
feldspar	1.4	0.0	1.7	1.7	240.4	91.9	3266.4	21
silicate-other	1.4	0.0	1.8	1.8	592.3	224.9	18815.9	100
quartz	1.4	0.0	1.6	1.7	269.8	100.6	4203.6	6
corundum	1.4	0.0	0	0	0	0	0	0
monazite	1.4	0.0	1.8	1.9	597.5	229.5	15387.1	6
xenotime	1.4	0.0	2.3	1.7	495.0	185.0	11680.2	3
phosphate	1.4	0.0	2.0	2.1	299.4	122.0	3379.1	1
carbonate	1.4	0.0	3.4	2.6	320.4	137.1	3347.8	5
pyrite	1.4	0.0	0	0	0	0	0	0
unclassified	1.4	0.0	1.8	1.9	430.6	168.0	11373.4	109

Titanium Report - Page 1/3
Sample GEUS #: 2003570
Sampler's sample#: 326 13 Tielugang
Description: Taken by CGS
Country: CHINA
This document was created on: Mon Sep 08 13:37:37 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.25	0.99	3.62	0.19	0.07	0.35	54.33	0.11	2.14	37.26	0.07	0.08	0.07	0.33	0.06	0.04	0.04	0.0	66
leucoxene	0.0	0.42	4.36	13.26	0.36	0.32	0.49	74.21	0.26	0.45	4.71	0.08	0.08	0.1	0.59	0.27	0.04	0.02	0.0	17
rutile	0.0	0.17	1.35	1.95	0.2	0.14	0.31	93.17	0.32	0.11	1.1	0.2	0.1	0.13	0.46	0.08	0.02	0.18	0.0	10
Ti magnetite	0.0	0.3	1.32	5.05	0.3	0.04	0.31	44.92	0.09	2.52	44.37	0.0	0.32	0.1	0.37	0.0	0.03	0.0	0.0	2
magnetite	0.0	0.38	2.89	8.35	0.3	0.23	1.17	2.55	0.1	0.37	82.75	0.14	0.14	0.04	0.16	0.22	0.15	0.05	0.0	15
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.1	0.14	31.77	0.08	0.02	0.27	0.13	0.08	0.17	0.27	0.08	0.02	60.11	4.59	0.18	1.91	0.1	0.0	14
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.07	0.05	55.19	37.54	1.32	0.11	0.05	0.18	0.12	0.07	0.4	0.15	0.27	0.09	1.35	1.84	1.2	0.04	0.0	4
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0.0	1.26	24.66	51.26	1.21	7.98	0.31	0.31	0.12	0.06	5.46	0.07	0.22	0.0	2.54	1.9	2.22	0.42	0.0	6
mafic silicates	0.15	6.98	12.43	44.91	0.9	0.37	13.24	0.95	0.28	0.52	16.5	0.1	0.17	0.03	1.33	0.29	0.79	0.07	0.0	70
feldspar	3.36	0.54	22.0	56.08	1.16	3.75	4.61	0.2	0.09	0.05	1.82	0.09	0.1	0.0	2.52	1.24	2.32	0.06	0.0	5
silicate-other	1.42	2.44	29.48	42.26	0.97	0.09	7.96	0.6	0.1	0.09	8.58	0.1	0.05	0.03	2.18	1.33	2.23	0.09	0.0	32
quartz	0.0	0.09	0.14	89.1	3.16	0.0	0.0	0.1	0.04	0.1	0.12	0.08	0.15	0.0	5.59	0.97	0.21	0.15	0.0	15
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0.19	0.11	0.37	0.7	0.49	0.04	95.58	0.25	0.12	0.13	0.35	0.22	0.24	0.01	0.21	0.06	0.67	0.25	0.0	819
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.07	0.91	2.89	51.52	1.94	1.12	19.11	5.0	0.19	0.17	2.24	0.17	0.18	6.31	4.12	1.35	2.45	0.27	0.0	126

P2O5 budget of ore in Ti-minerals: 0.01
P2O5 budget of ore in bulk sample: 0.01

Sample GEUS #: 2003570

Sampler's sample#: 326 13 Tielugang

Description: Taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:37:38 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	53.7	25.0	6.8	0.4	0.0	10.8	3.3	0.0

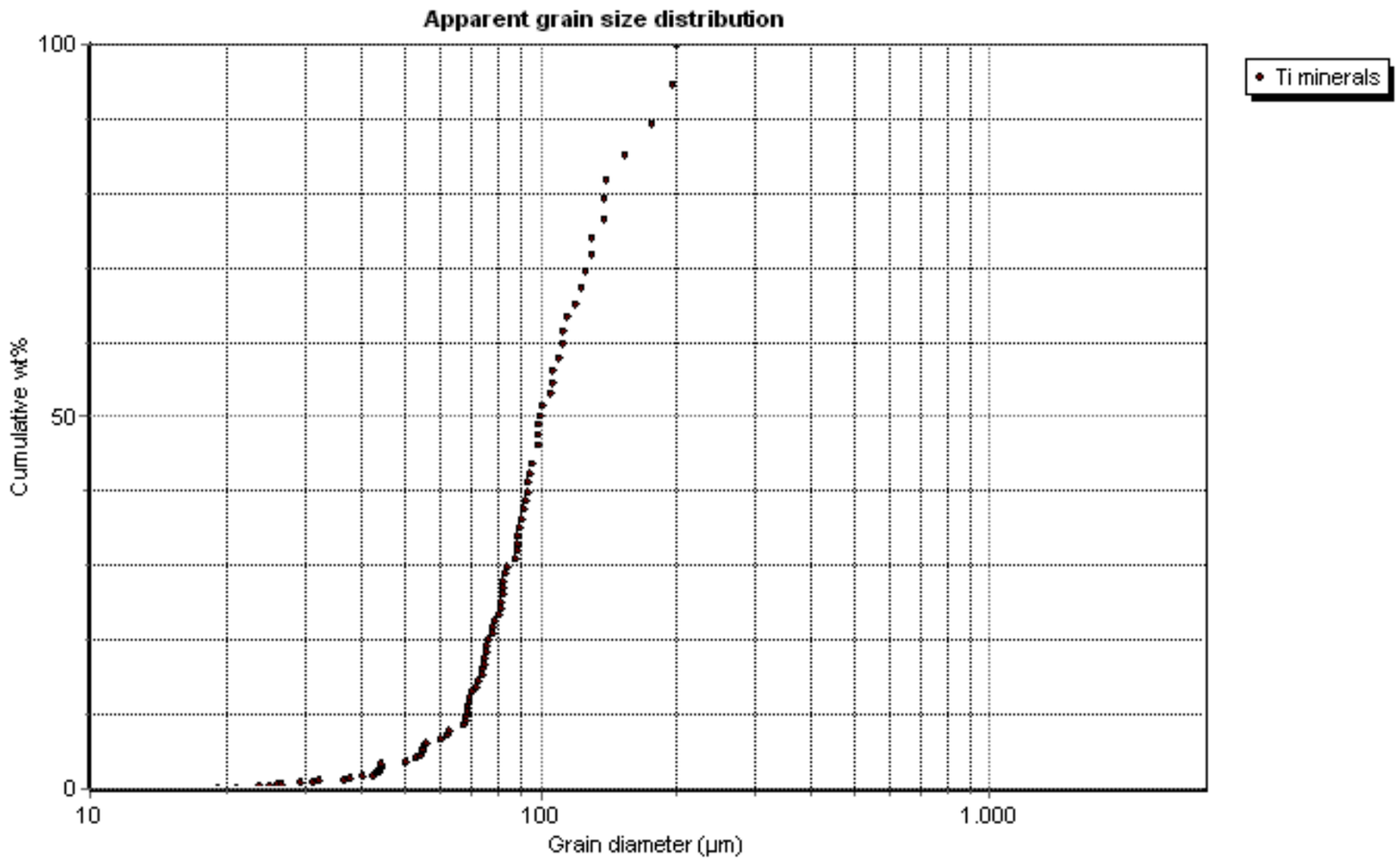
Normalised average content of the valuable Ti-bearing minerals

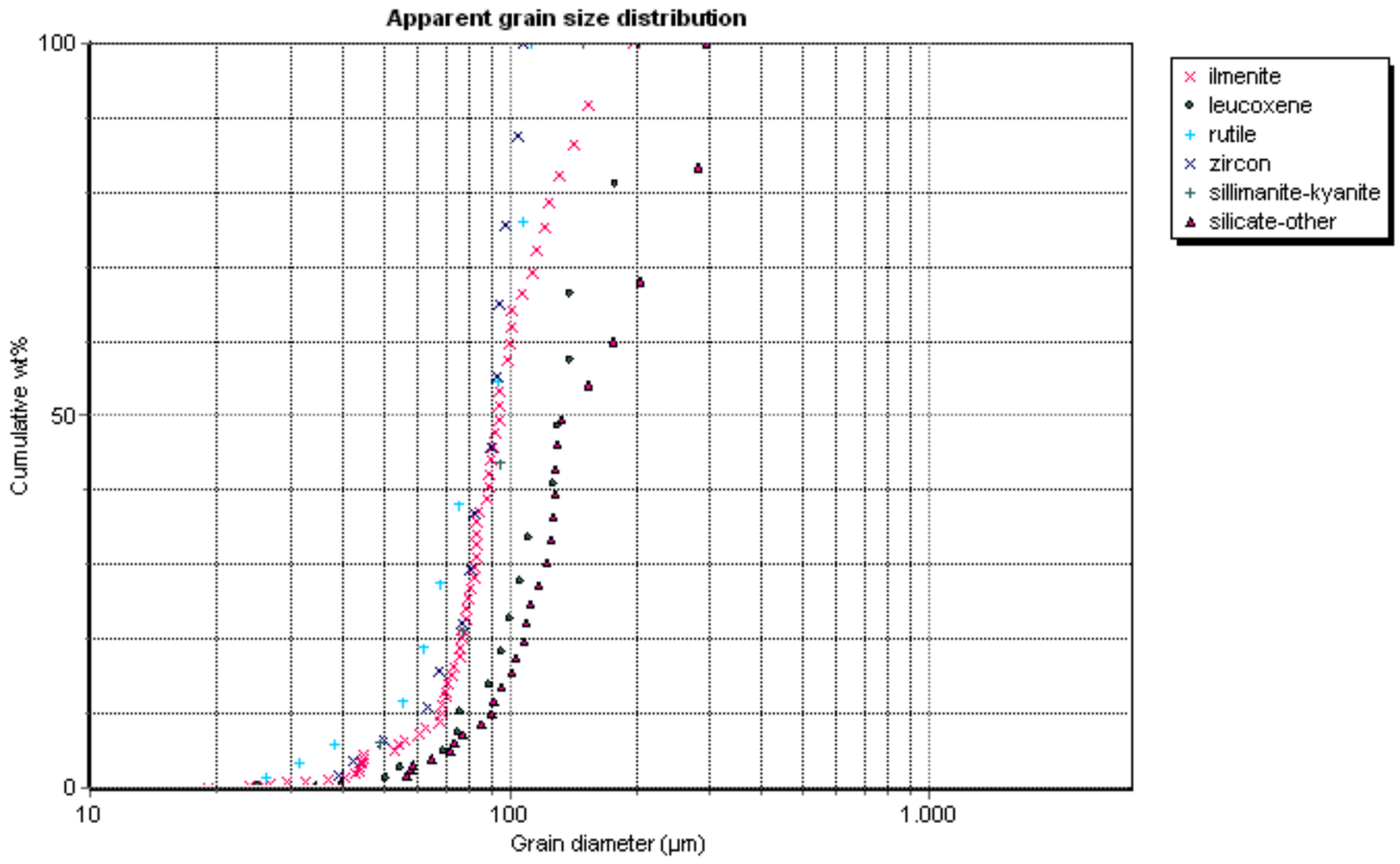
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	54.8	75.5	94.5	45.4
Fe2O3 wt%	37.6	4.8	1.1	44.8
Mno wt%	2.2	0.5	0.1	2.5
Cr2O3 wt%	0.1	0.3	0.3	0.1
SiO2 wt%	3.7	13.5	2.0	5.1
Al2O3 wt%	1.0	4.4	1.4	1.3
MgO wt%	0.3	0.4	0.2	0.3
CaO wt%	0.4	0.5	0.3	0.3
ZrO2wt%	0.1	0.1	0.1	0.1

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	63.2
Average TiO2 content of all the TiO2 minerals excl. Rutile:	60.6

Titanium Report - Page 3/3
Sample GEUS #: 2003570
Sampler's sample#: 326 13 Tielugang
Description: Taken by CGS
Country: CHINA
This document was created on: Mon Sep 08 13:37:38 CEST 2008

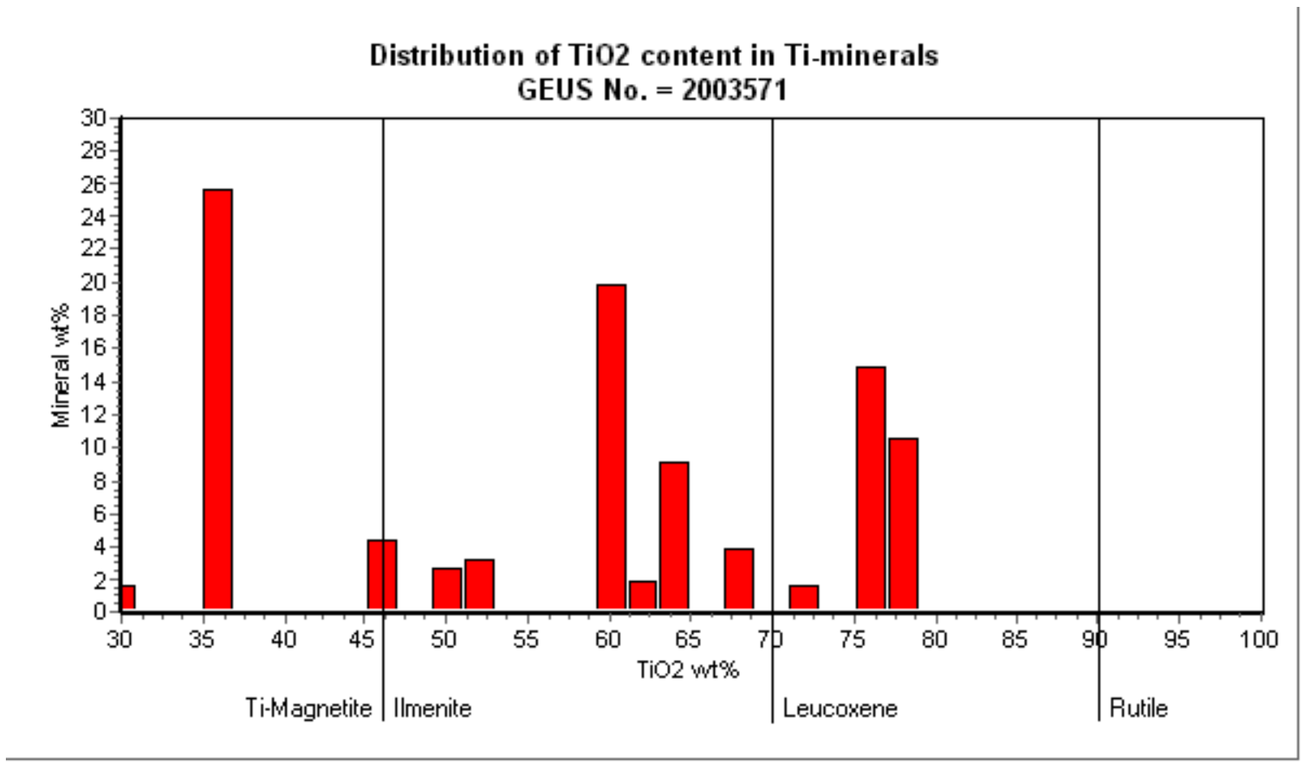


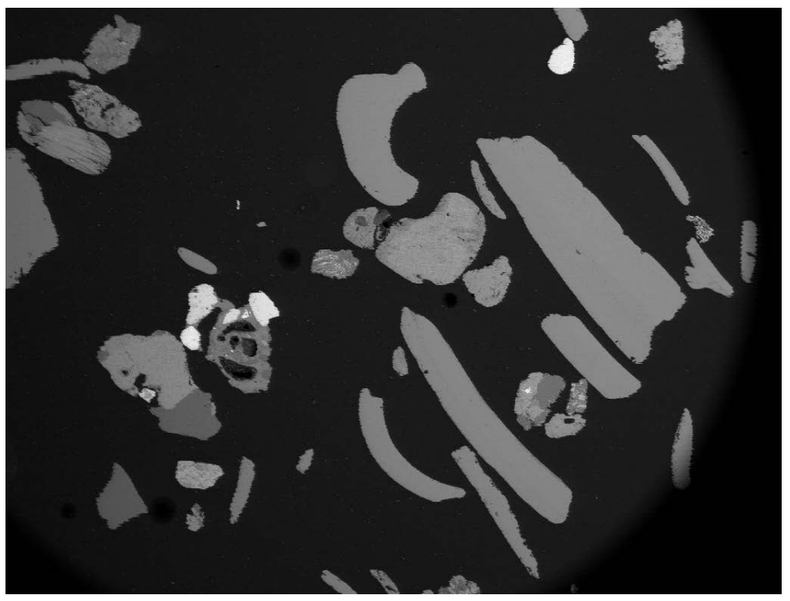


Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.7	324.4	121.0	5562.9	66
leucoxene	-	-	2.1	2.0	465.3	184.8	10049.1	17
rutile	-	-	1.8	1.7	276.9	103.0	4167.1	10
Ti magnetite	0.0	0.0	1.3	1.4	140.7	44.2	1380.0	2
magnetite	0.0	0.0	2.1	2.4	312.7	127.7	4032.5	15
chromite	0.0	0.0	0	0	0	0	0	0
spinel	0.0	0.0	0	0	0	0	0	0
zircon	0.0	0.0	1.7	1.6	311.9	112.8	5119.4	14
sphene	0.0	0.0	0	0	0	0	0	0
garnet	0.0	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.0	0.0	1.8	1.8	379.5	141.3	7743.2	4
staurolite	0.0	0.0	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	0.0	0.0	1.2	1.2	129.3	35.1	2083.0	6
mafic silicates	0.0	0.0	2.1	2.0	403.8	161.0	7495.7	70
feldspar	0.0	0.0	1.5	1.6	213.1	78.7	3533.0	5
silicate-other	0.0	0.0	1.9	2.0	515.2	205.0	12666.3	32
quartz	0.0	0.0	1.9	1.8	381.7	141.5	8522.5	15
corundum	0.0	0.0	0	0	0	0	0	0
monazite	0.0	0.0	0	0	0	0	0	0
xenotime	0.0	0.0	0	0	0	0	0	0
phosphate	0.0	0.0	0	0	0	0	0	0
carbonate	0.0	0.0	2.7	2.5	729.0	309.4	21218.3	819
pyrite	0.0	0.0	0	0	0	0	0	0
unclassified	0.0	0.0	2.1	2.3	596.6	252.0	15033.2	126

Titanium Report - Page 1/3
Sample GEUS #: 2003571
Sampler's sample#: 327 14 Yingzhou
Description: Taken by CGS
Country: CHINA
This document was created on: Mon Sep 08 13:38:50 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	1.84	7.02	14.04	0.52	0.24	2.35	58.04	0.25	1.1	12.63	0.11	0.1	0.0	0.47	1.32	0.0	0.0	0.0	6
leucoxene	0.0	1.28	4.43	6.63	0.48	0.01	1.2	72.77	0.38	1.83	9.31	0.09	0.13	0.18	0.26	0.95	0.0	0.09	0.0	6
rutile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ti magnetite	0.0	0.63	3.97	19.74	0.0	0.3	8.04	35.33	0.21	1.04	26.92	0.0	0.0	2.88	0.57	0.36	0.0	0.0	0.0	1
magnetite	0.0	0.17	0.43	17.46	0.79	0.07	2.55	0.99	0.11	0.41	75.49	0.04	0.24	0.06	0.35	0.31	0.52	0.0	0.0	3
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sphene	0.0	0.13	2.56	29.7	0.27	0.03	27.5	37.28	0.55	0.0	0.25	0.14	0.0	0.0	0.71	0.0	0.89	0.0	0.0	1
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0.0	5.31	21.17	41.59	0.79	7.94	0.16	2.46	0.07	0.14	15.85	0.05	0.1	0.09	1.49	0.93	1.53	0.31	0.0	17
mafic silicates	0.16	9.4	7.61	50.42	1.02	0.52	9.37	1.08	0.22	0.32	17.37	0.08	0.17	0.01	1.43	0.18	0.47	0.14	0.0	59
feldspar	0.0	0.0	7.71	71.38	2.49	0.0	9.75	0.0	0.15	0.11	4.62	0.0	0.47	0.0	3.14	0.0	0.0	0.2	0.0	2
silicate-other	2.04	1.74	16.8	49.06	1.49	0.83	15.3	0.63	0.27	0.08	6.84	0.05	0.13	0.25	2.1	0.57	1.76	0.09	0.0	6
quartz	0.0	0.03	0.0	89.53	3.03	0.0	0.0	0.01	0.07	0.04	0.14	0.3	0.06	0.0	5.28	0.56	0.62	0.33	0.0	5
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0.13	0.08	0.26	0.8	0.47	0.04	95.76	0.24	0.11	0.12	0.31	0.22	0.24	0.02	0.23	0.05	0.67	0.25	0.0	154
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.27	1.98	8.0	42.88	1.21	1.77	17.66	11.96	0.24	0.22	9.47	0.13	0.08	0.5	1.86	0.43	1.23	0.12	0.0	43

P2O5 budget of ore in Ti-minerals: 0.048
P2O5 budget of ore in bulk sample: 0.048

Sample GEUS #: 2003571

Sampler's sample#: 327 14 Yingzhou

Description: Taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:38:51 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	49.1	42.0	0.0	8.9	0.0	0.0	0.0	0.0

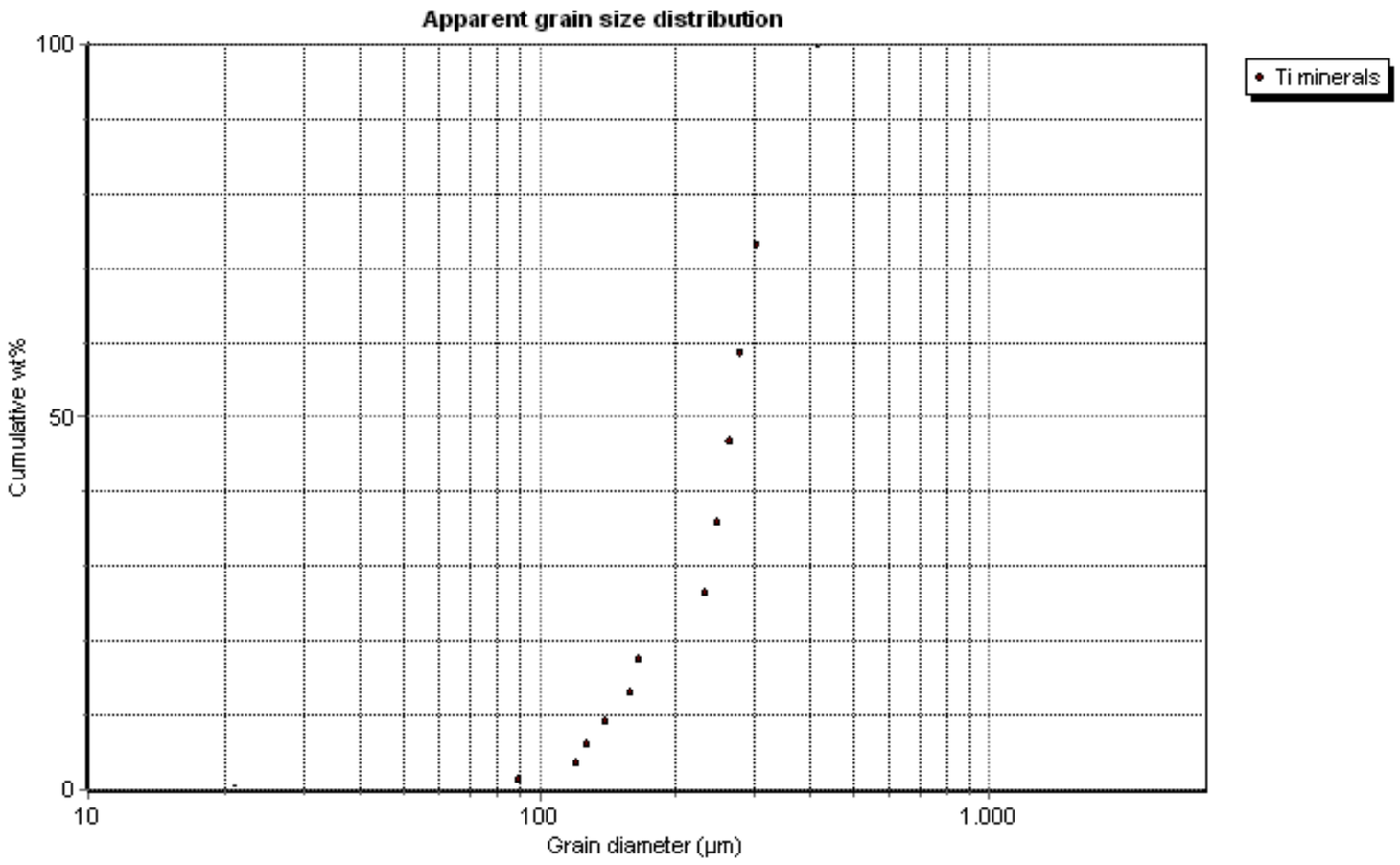
Normalised average content of the valuable Ti-bearing minerals

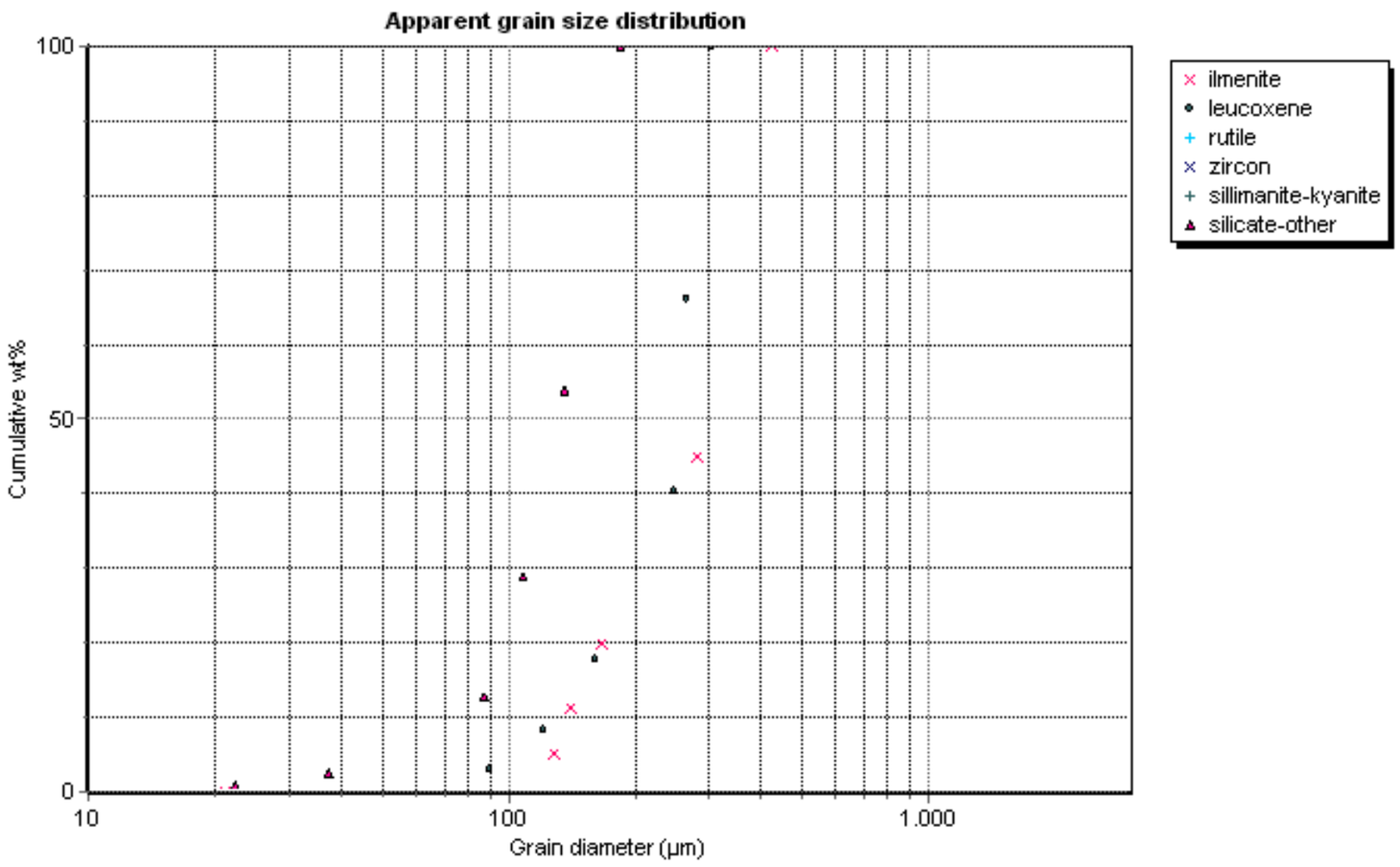
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	59.7	74.2	0	35.8
Fe2O3 wt%	13.0	9.5	0	27.3
Mno wt%	1.1	1.9	0	1.1
Cr2O3 wt%	0.3	0.4	0	0.2
SiO2 wt%	14.4	6.8	0	20.0
Al2O3 wt%	7.2	4.5	0	4.0
MgO wt%	1.9	1.3	0	0.6
CaO wt%	2.4	1.2	0	8.1
ZrO2wt%	0.0	0.2	0	2.9

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	64.0
Average TiO2 content of all the TiO2 minerals excl. Rutile:	64.0

Titanium Report - Page 3/3
Sample GEUS #: 2003571
Sampler's sample#: 327 14 Yingzhou
Description: Taken by CGS
Country: CHINA
This document was created on: Mon Sep 08 13:38:51 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.9	2.1	897.0	358.4	41925.5	6
leucoxene	-	-	1.7	1.8	844.3	323.0	35901.3	6
rutile	-	-	0	0	0	0	0	0
Ti magnetite	0.5	0.0	2.4	2.4	1137.7	479.0	43053.2	1
magnetite	0.5	0.0	2.2	2.9	202.0	88.3	1121.8	3
chromite	0.5	0.0	0	0	0	0	0	0
spinel	0.5	0.0	0	0	0	0	0	0
zircon	0.5	0.0	0	0	0	0	0	0
sphene	0.5	0.0	1.3	1.5	153.6	52.1	1287.1	1
garnet	0.5	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.5	0.0	0	0	0	0	0	0
staurolite	0.5	0.0	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	0.5	0.0	3.1	2.5	895.0	376.7	34956.8	17
mafic silicates	0.5	0.0	2.6	2.4	827.5	346.5	29778.2	59
feldspar	0.5	0.0	2.8	3.1	1718.8	761.6	76205.1	2
silicate-other	0.5	0.0	1.8	2.1	467.2	189.3	9649.4	6
quartz	0.5	0.0	1.6	1.7	376.4	134.2	8055.6	5
corundum	0.5	0.0	0	0	0	0	0	0
monazite	0.5	0.0	0	0	0	0	0	0
xenotime	0.5	0.0	0	0	0	0	0	0
phosphate	0.5	0.0	0	0	0	0	0	0
carbonate	0.5	0.0	3.2	2.6	1177.1	500.7	55078.3	154
pyrite	0.5	0.0	0	0	0	0	0	0
unclassified	0.5	0.0	2.2	2.4	1178.8	494.9	63699.6	43

Titanium Report - Page 1/3

Sample GEUS #: 2003572

Sampler's sample#: 327 14 Yingzhou

Description: Marine sample taken by CGS

Country: CHINA

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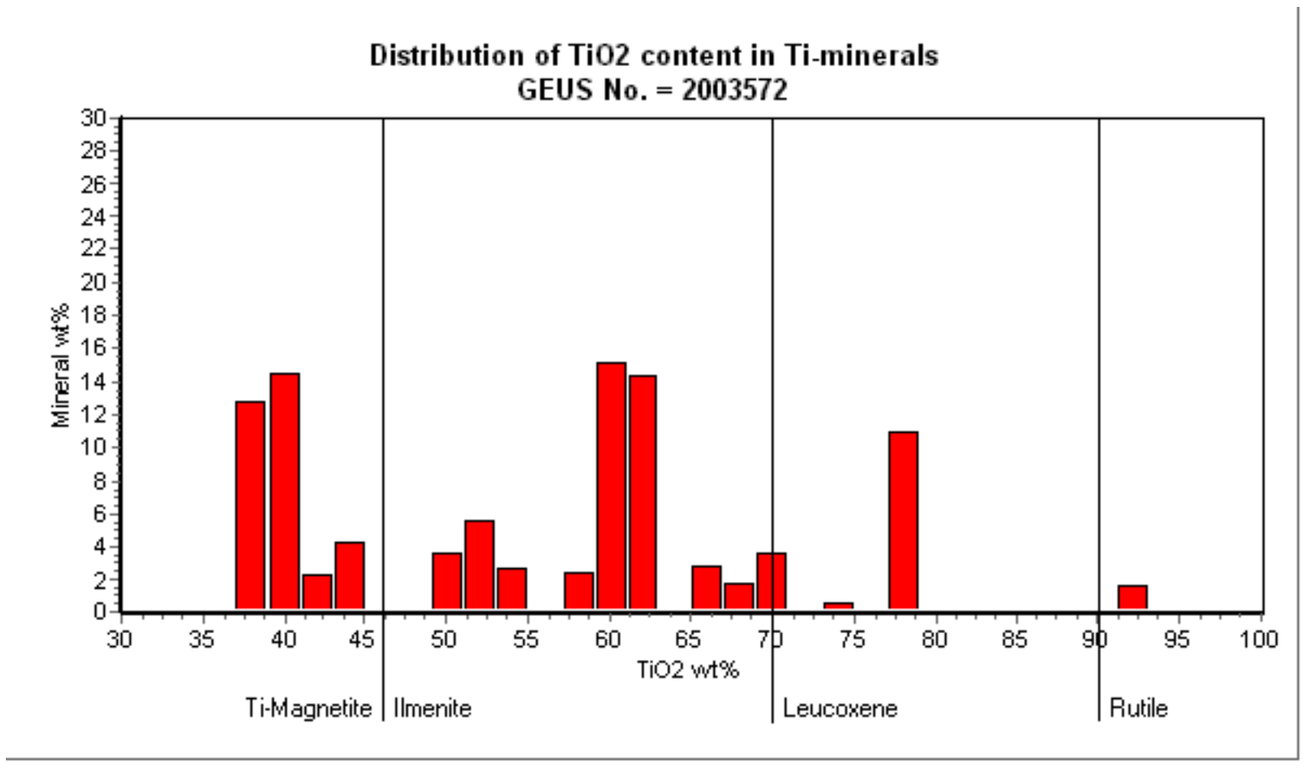


Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.35	1.02	2.93	0.18	0.06	0.42	57.11	0.16	2.24	34.9	0.07	0.07	0.06	0.29	0.13	0.01	0.01	0.0	23
leucoxene	0.0	0.34	5.79	12.46	0.26	0.47	0.47	71.09	0.36	0.5	7.21	0.07	0.02	0.05	0.35	0.39	0.09	0.06	0.0	5
rutile	0.0	0.29	0.87	4.24	0.0	0.14	0.2	92.09	0.54	0.0	1.29	0.02	0.2	0.0	0.16	0.0	0.0	0.0	0.0	2
Ti magnetite	0.0	1.34	6.4	22.44	0.75	0.11	0.21	31.3	0.1	2.57	32.63	0.03	0.23	0.03	0.57	0.62	0.55	0.14	0.0	3
magnetite	0.0	1.93	10.41	12.55	0.64	0.22	1.47	0.66	0.12	0.52	69.78	0.15	0.15	0.19	0.15	0.84	0.15	0.06	0.0	31
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.0	0.06	32.07	0.0	0.0	0.04	0.16	0.06	0.05	0.32	0.05	0.03	59.72	5.13	0.11	2.07	0.14	0.0	7
sphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.02	0.04	56.48	37.64	0.7	0.37	0.15	0.18	0.09	0.09	0.78	0.12	0.15	0.05	0.78	1.16	1.08	0.13	0.0	10
staurolite	0.0	4.35	38.02	41.16	1.26	0.0	0.86	0.69	0.0	0.08	8.29	0.0	0.06	0.0	1.8	1.16	2.01	0.24	0.0	1
mica	0.11	6.01	21.88	40.81	0.81	7.84	0.23	2.32	0.11	0.21	16.26	0.08	0.05	0.14	1.12	0.47	1.47	0.08	0.0	18
mafic silicates	0.08	4.32	15.04	42.43	1.05	0.57	6.96	1.08	0.17	0.21	25.16	0.1	0.11	0.15	1.26	0.54	0.71	0.08	0.0	46
feldspar	2.3	0.13	22.54	59.42	1.46	0.55	6.32	0.12	0.14	0.0	1.57	0.06	0.15	0.17	2.45	0.74	1.81	0.1	0.0	6
silicate-other	0.98	2.31	33.12	41.37	0.85	0.37	6.03	0.54	0.11	0.14	8.49	0.09	0.07	0.06	1.92	1.33	2.2	0.04	0.0	47
quartz	0.0	0.11	0.31	89.15	3.26	0.0	0.0	0.31	0.03	0.08	0.59	0.04	0.18	0.0	5.14	0.83	0.0	0.0	0.0	4
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
carbonate	0.05	0.08	0.51	1.69	0.5	0.04	94.47	0.21	0.12	0.12	0.6	0.25	0.22	0.02	0.22	0.04	0.58	0.27	0.0	139
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	0.06	1.41	6.63	41.06	1.52	1.12	20.38	6.41	0.11	0.42	10.72	0.16	0.12	3.4	2.66	1.29	2.18	0.37	0.0	75

P2O5 budget of ore in Ti-minerals: 0.015

P2O5 budget of ore in bulk sample: 0.015

Sample GEUS #: 2003572

Sampler's sample#: 327 14 Yingzhou

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:39:22 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	50.8	15.2	1.9	2.9	0.0	7.7	16.3	5.2

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	57.6	72.3	92.5	32.3
Fe2O3 wt%	35.2	7.3	1.3	33.6
Mno wt%	2.3	0.5	0.0	2.6
Cr2O3 wt%	0.2	0.4	0.5	0.1
SiO2 wt%	3.0	12.7	4.3	23.1
Al2O3 wt%	1.0	5.9	0.9	6.6
MgO wt%	0.4	0.3	0.3	1.4
CaO wt%	0.4	0.5	0.2	0.2
ZrO2wt%	0.1	0.1	0.0	0.0

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	62.1
Average TiO2 content of all the TiO2 minerals excl. Rutile:	61.3

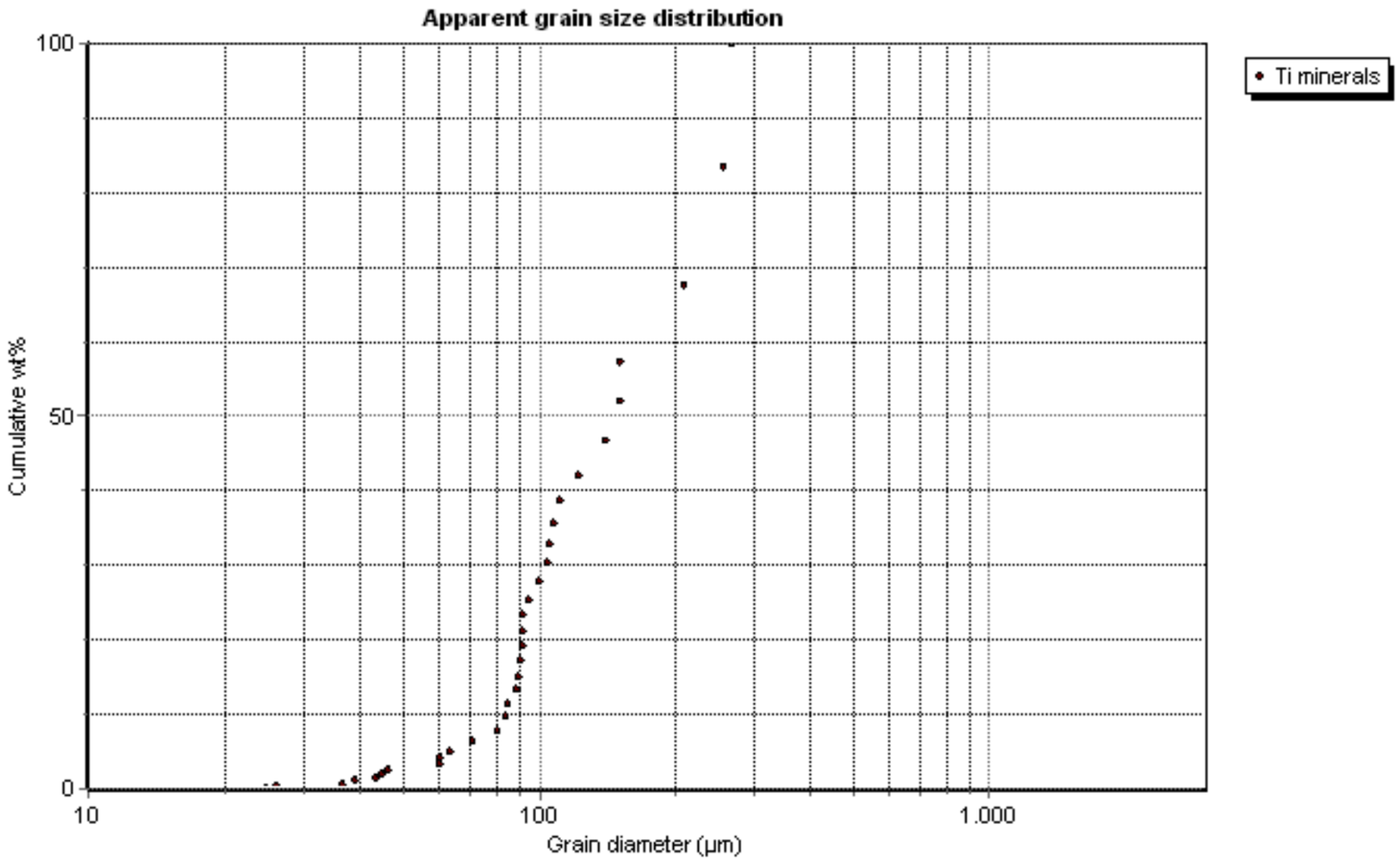
Sample GEUS #: 2003572

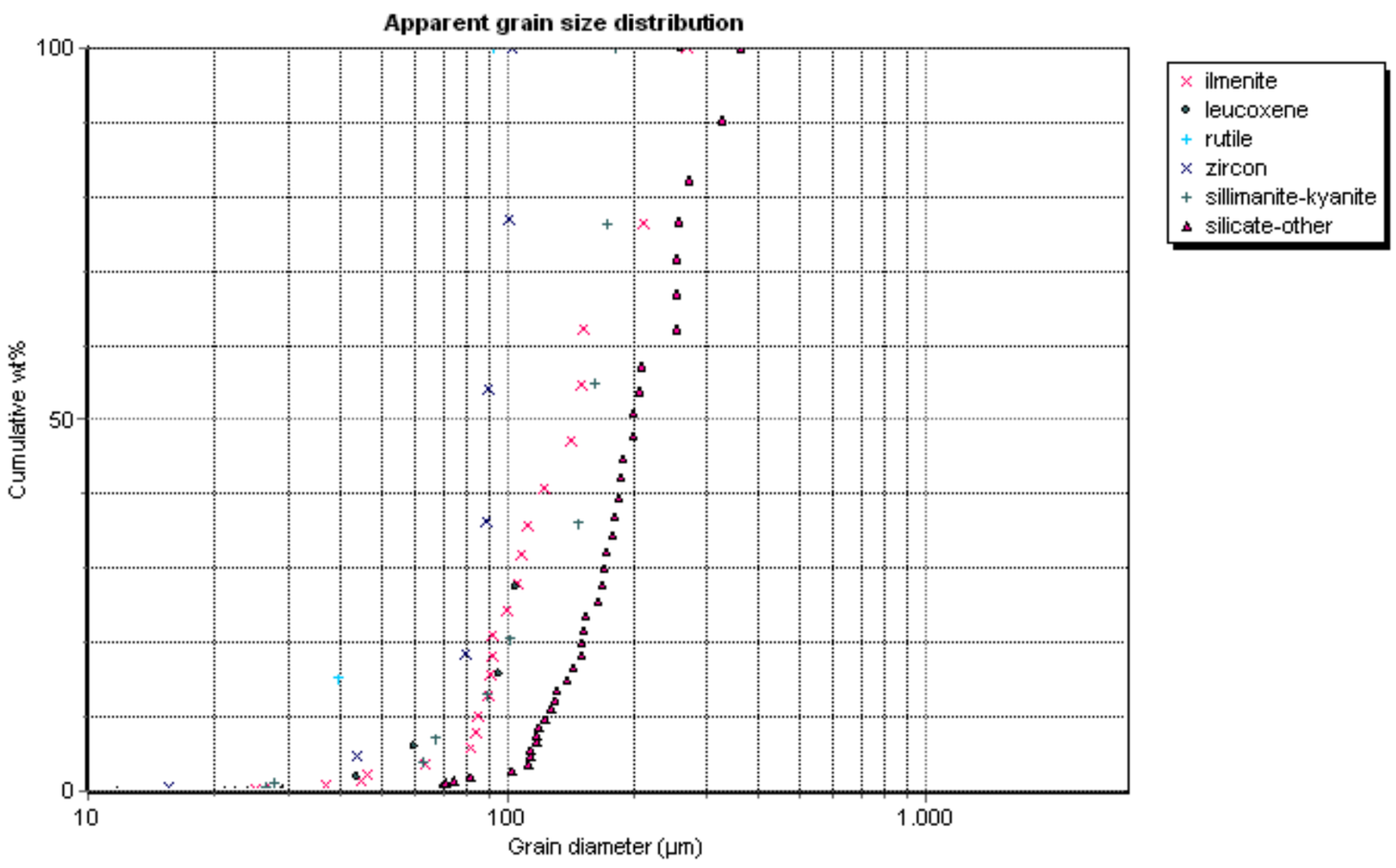
Sampler's sample#: 327 14 Yingzhou

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:39:22 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.6	406.6	146.5	10525.4	23
leucoxene	-	-	1.6	1.8	464.9	171.1	14517.6	5
rutile	-	-	5.5	2.2	288.1	112.9	3982.5	2
Ti magnetite	0.2	0.0	2.2	2.2	337.2	136.3	4390.8	3
magnetite	0.2	0.0	1.8	1.8	555.0	216.1	18779.4	31
chromite	0.2	0.0	0	0	0	0	0	0
spinel	0.2	0.0	0	0	0	0	0	0
zircon	0.2	0.0	1.3	1.4	280.3	90.0	5078.3	7
sphene	0.2	0.0	0	0	0	0	0	0
garnet	0.2	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.2	0.0	1.6	1.7	424.1	158.1	10761.2	10
staurolite	0.2	0.0	2.0	1.6	764.2	274.7	29509.0	1

Weight percent and average grain parameters on a mineral basis								
mica	0.2	0.0	3.1	2.5	572.9	248.2	14272.8	18
mafic silicates	0.2	0.0	1.9	2.0	725.4	293.9	34009.9	46
feldspar	0.2	0.0	2.3	2.2	739.4	308.5	26575.3	6
silicate-other	0.2	0.0	1.6	1.7	615.2	226.5	22212.0	47
quartz	0.2	0.0	1.6	1.6	451.5	162.0	10679.4	4
corundum	0.2	0.0	0	0	0	0	0	0
monazite	0.2	0.0	0	0	0	0	0	0
xenotime	0.2	0.0	0	0	0	0	0	0
phosphate	0.2	0.0	0	0	0	0	0	0
carbonate	0.2	0.0	3.1	2.8	898.1	392.8	30420.4	139
pyrite	0.2	0.0	0	0	0	0	0	0
unclassified	0.2	0.0	1.9	2.1	479.9	196.2	14087.1	75

Titanium Report - Page 1/3

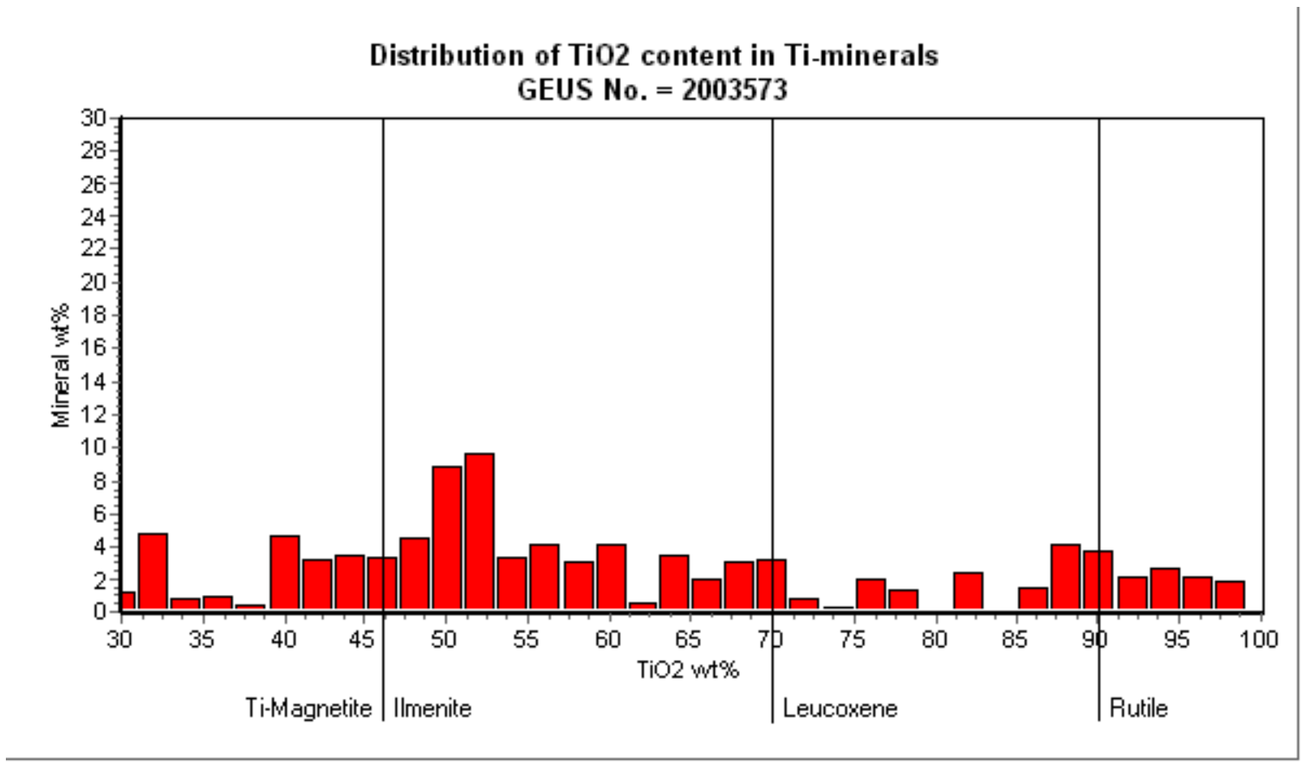
Sample GEUS #: 2003573

Sampler's sample#: 3487 16 Qinglan Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:40:05 CEST 2008



Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.27	1.3	3.61	0.82	0.08	0.61	54.22	0.13	2.57	35.74	0.07	0.08	0.09	0.28	0.06	0.02	0.04	0.0	78
leucoxene	0.0	0.35	3.76	11.99	0.41	0.37	0.71	73.32	0.27	0.41	7.28	0.08	0.09	0.09	0.58	0.12	0.12	0.05	0.0	30
rutile	0.0	0.14	1.4	2.82	0.16	0.07	0.28	92.53	0.14	0.07	1.33	0.1	0.19	0.1	0.4	0.07	0.02	0.19	0.0	24
Ti magnetite	0.0	0.33	1.11	12.2	1.84	0.05	2.33	39.23	0.06	3.78	37.21	0.1	0.05	0.22	0.42	0.89	0.14	0.03	0.0	11
magnetite	0.31	0.51	6.75	11.33	1.29	0.28	1.05	1.33	0.09	0.55	74.85	0.12	0.14	0.07	0.36	0.66	0.25	0.07	0.0	49
chromite	0.0	9.71	15.1	0.52	0.15	0.0	0.13	0.87	44.08	1.04	26.61	0.64	0.09	0.0	0.32	0.37	0.0	0.39	0.0	1
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.05	0.27	31.71	0.17	0.0	0.1	0.16	0.1	0.14	0.43	0.1	0.02	59.27	5.22	0.17	1.98	0.14	0.0	24
sphene	0.0	0.05	2.27	29.58	0.3	0.0	25.52	38.97	0.6	0.08	0.79	0.01	0.0	0.0	1.05	0.01	0.77	0.0	0.0	3
garnet	0.0	10.94	21.02	35.96	1.7	0.36	0.27	0.13	0.19	0.52	26.75	0.26	0.05	0.27	0.74	0.0	0.82	0.0	0.0	1
sillimanite-kyanite	0.0	0.02	55.62	37.97	0.62	0.06	0.11	0.23	0.09	0.04	0.36	0.12	0.1	0.23	1.09	1.41	1.85	0.1	0.0	5
staurolite	1.71	5.37	37.78	41.23	0.83	0.0	0.27	0.36	0.0	0.01	8.02	0.0	0.0	0.0	1.64	0.96	1.82	0.0	0.0	1
mica	0.06	3.6	24.27	44.71	1.23	7.9	0.2	2.07	0.07	0.15	11.11	0.07	0.12	0.25	1.6	0.76	1.76	0.07	0.0	57
mafic silicates	0.07	6.9	15.7	42.78	0.97	0.58	10.1	0.94	0.23	0.45	18.36	0.06	0.13	0.07	1.23	0.39	0.96	0.09	0.0	129
feldspar	1.89	0.13	22.52	55.66	1.19	7.78	3.7	0.24	0.08	0.12	1.62	0.12	0.07	0.13	1.79	0.63	2.28	0.05	0.0	20
silicate-other	0.42	1.43	28.17	45.59	1.49	0.29	9.19	0.52	0.14	0.1	7.75	0.12	0.1	0.13	1.76	0.83	1.83	0.13	0.0	50
quartz	0.0	0.05	0.4	89.37	2.93	0.0	0.19	0.11	0.07	0.12	0.41	0.15	0.07	0.0	5.11	0.8	0.0	0.21	0.0	20
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	2.37	2.77	0.0	0.0	0.95	2.12	0.0	0.0	0.0	0.1	0.0	5.48	0.69	39.29	5.59	40.67	0.0	2
xenotime	0.0	0.0	0.83	2.53	0.0	0.0	2.78	0.0	0.0	0.0	0.0	0.0	0.34	7.8	0.0	40.1	11.32	34.31	0.0	1
phosphate	0.0	0.1	14.59	6.61	0.14	0.4	32.41	0.05	0.03	0.0	0.69	0.12	0.06	5.67	0.7	31.36	3.74	3.33	0.0	5
carbonate	0.03	1.15	0.54	1.45	1.59	0.07	91.31	0.28	0.13	0.3	1.19	0.21	0.26	0.04	0.37	0.16	0.65	0.28	0.0	120
pyrite	0.0	0.16	0.76	2.09	61.95	0.1	4.45	0.14	0.05	0.08	29.5	0.08	0.07	0.0	0.52	0.02	0.01	0.0	0.0	179
unclassified	0.27	1.78	3.84	21.72	22.98	0.68	25.27	4.09	0.11	0.42	14.51	0.11	0.11	0.83	1.57	0.6	0.97	0.15	0.0	391

P2O5 budget of ore in Ti-minerals: 0.017

P2O5 budget of ore in bulk sample: 0.116

Sample GEUS #: 2003573

Sampler's sample#: 3487 16 Qinglan Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:40:06 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	39.9	13.5	15.0	10.3	0.2	17.0	3.7	0.4

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	55.0	74.7	93.6	40.7
Fe2O3 wt%	36.3	7.4	1.3	38.6
Mno wt%	2.6	0.4	0.1	3.9
Cr2O3 wt%	0.1	0.3	0.1	0.1
SiO2 wt%	3.7	12.2	2.9	12.6
Al2O3 wt%	1.3	3.8	1.4	1.2
MgO wt%	0.3	0.4	0.1	0.3
CaO wt%	0.6	0.7	0.3	2.4
ZrO2wt%	0.1	0.1	0.1	0.2

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	62.5
Average TiO2 content of all the TiO2 minerals excl. Rutile:	55.5

Titanium Report - Page 3/3
Sample GEUS #: 2003573
Sampler's sample#: 3487 16 Qinglan Bay
Description: Marine sample taken by CGS
Country: CHINA
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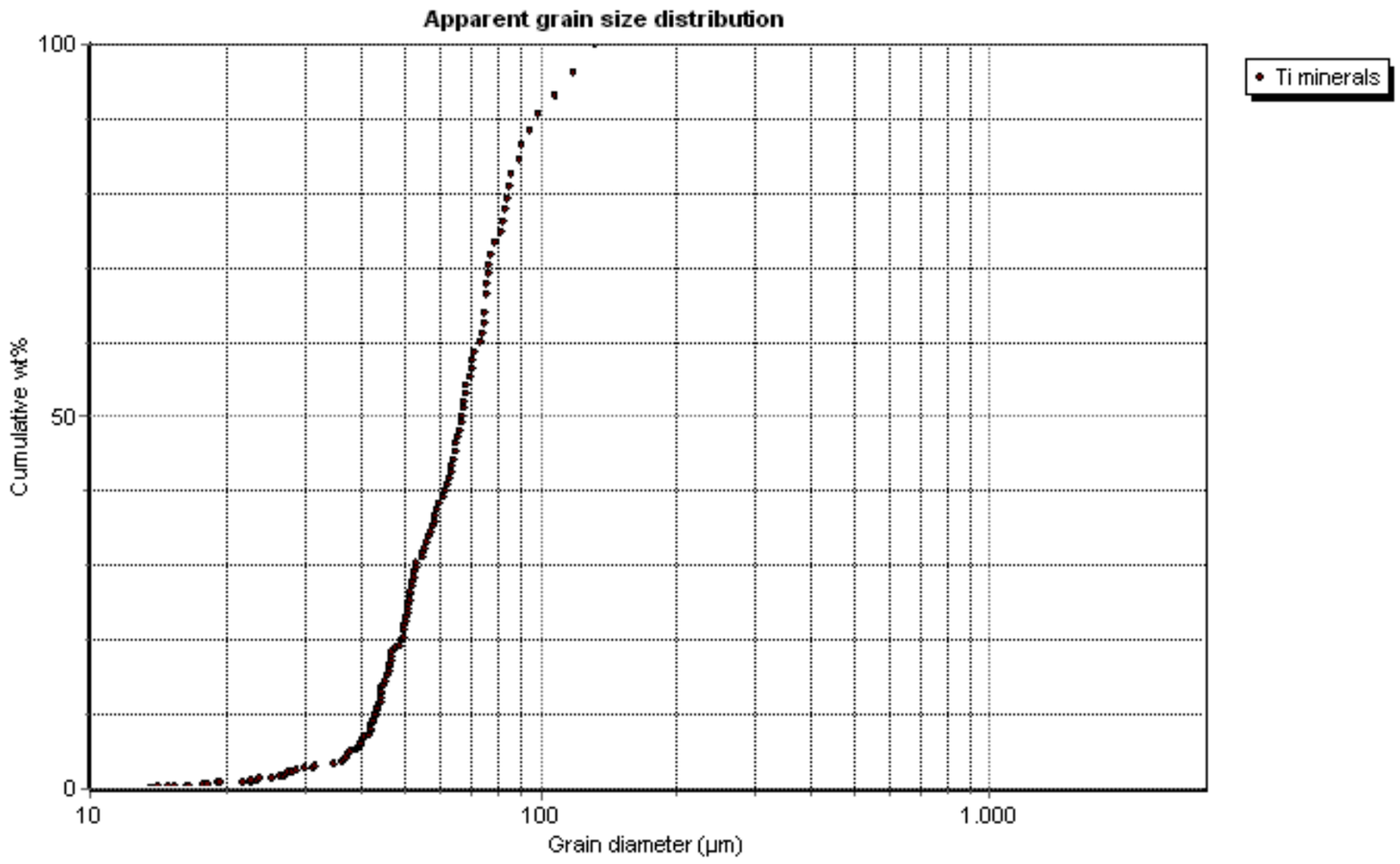

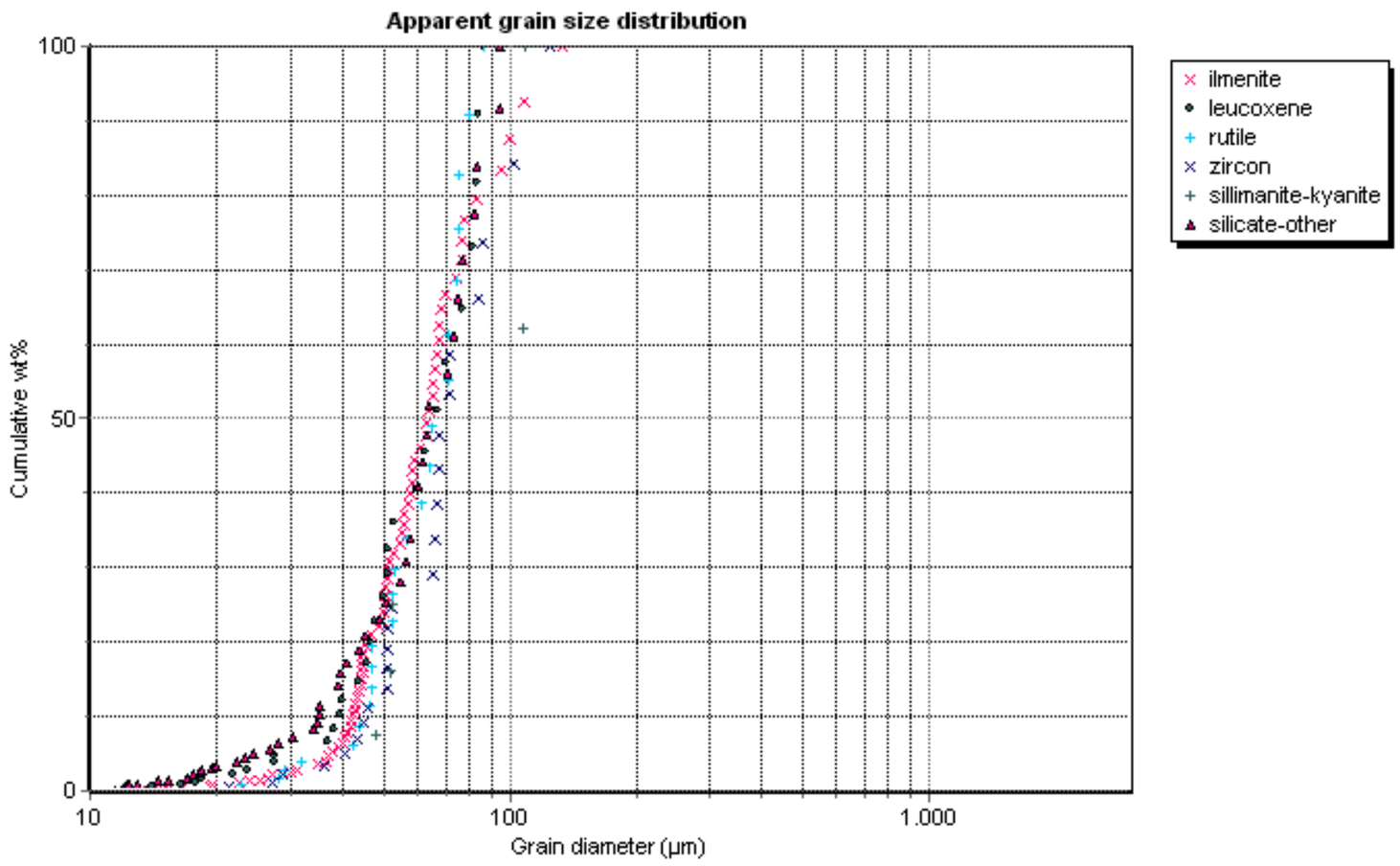

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.8	1.8	215.0	80.4	2373.6	78
leucoxene	-	-	1.8	1.7	197.5	75.3	2089.2	30
rutile	-	-	1.9	1.9	239.1	91.9	2619.9	24
Ti magnetite	1.7	0.0	2.5	2.5	333.3	140.8	4072.5	11
magnetite	1.7	0.0	1.6	1.7	178.3	67.0	2867.0	49
chromite	1.7	0.0	1.5	1.7	181.9	68.9	1517.2	1
spinel	1.7	0.0	0	0	0	0	0	0
zircon	1.7	0.0	1.8	1.7	241.4	88.3	3183.4	24
sphene	1.7	0.0	2.2	1.8	146.4	55.0	1032.1	3
garnet	1.7	0.0	2.7	1.9	140.8	55.3	838.3	1
sillimanite-kyanite	1.7	0.0	1.6	1.6	296.0	106.5	4811.4	5
staurolite	1.7	0.0	1.2	1.3	192.1	55.2	2255.3	1

Weight percent and average grain parameters on a mineral basis								
mica	1.7	0.0	2.8	2.2	143.2	58.5	869.7	57
mafic silicates	1.7	0.0	2.1	2.0	189.4	74.0	1783.9	129
feldspar	1.7	0.0	2.1	2.0	165.7	65.0	1342.6	20
silicate-other	1.7	0.0	1.8	1.9	174.7	67.1	1732.7	50
quartz	1.7	0.0	1.9	1.9	221.2	85.5	2475.4	20
corundum	1.7	0.0	0	0	0	0	0	0
monazite	1.7	0.0	1.5	1.5	196.2	67.5	2080.4	2
xenotime	1.7	0.0	1.3	1.4	171.8	53.5	1733.3	1
phosphate	1.7	0.0	1.5	1.6	192.8	67.4	2031.0	5
carbonate	1.7	0.0	2.2	2.0	215.6	87.2	4846.8	120
pyrite	1.7	0.0	2.1	2.4	215.6	85.0	2546.7	179
unclassified	1.7	0.0	2.0	2.1	253.2	99.1	3934.2	391

Titanium Report - Page 1/3

Sample GEUS #: 2003574

Sampler's sample#: 8057 17 Xiaohai

Description: Marine sample taken by CGS

Country: CHINA

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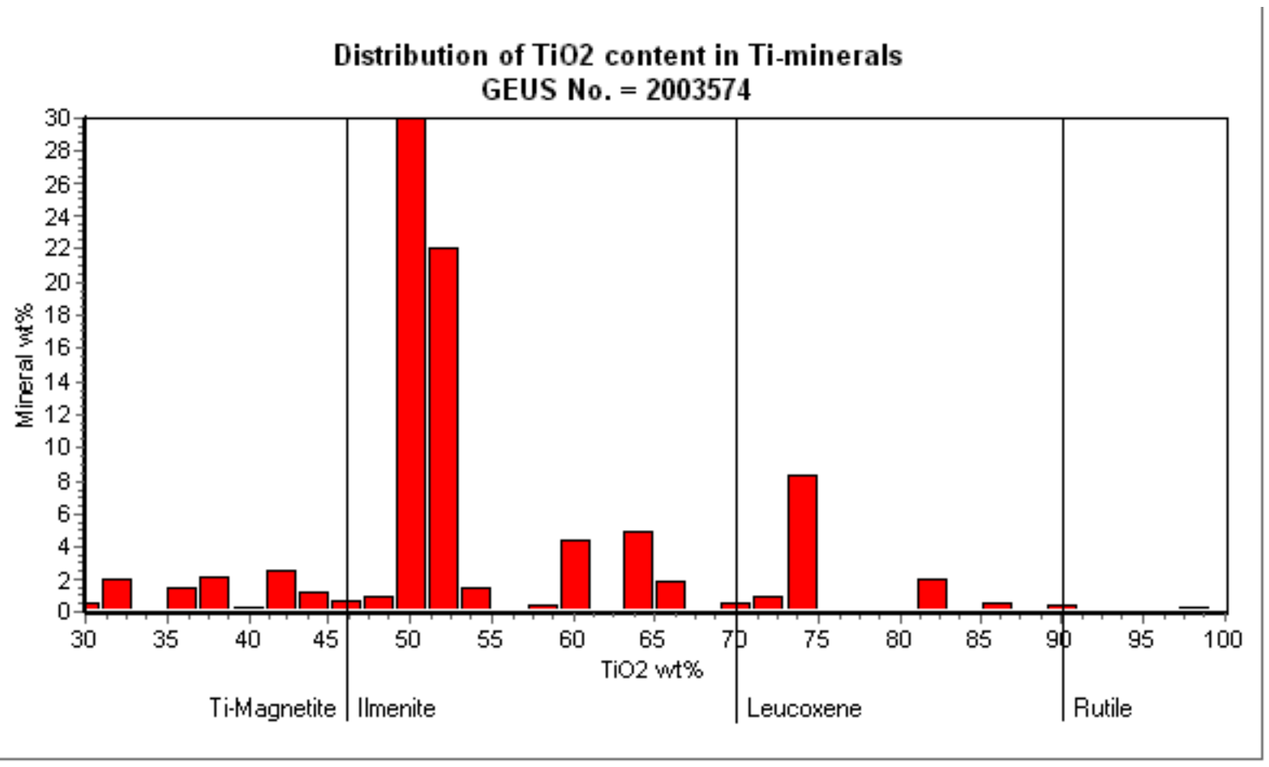
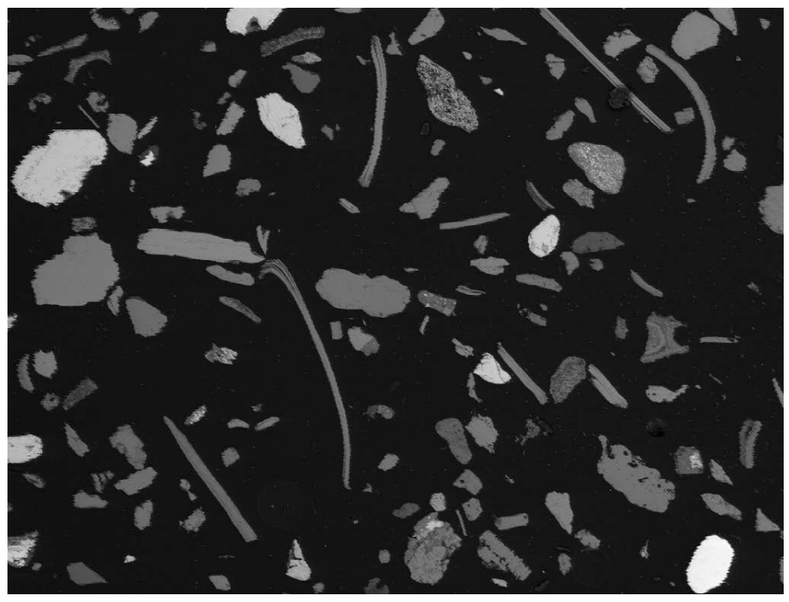




Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.0	0.26	1.36	4.45	0.22	0.15	0.57	52.95	0.09	1.81	37.4	0.11	0.11	0.05	0.25	0.11	0.07	0.03	0.0	70
leucoxene	0.0	0.87	6.05	6.65	0.9	0.19	2.06	72.5	0.17	0.31	8.4	0.15	0.14	0.27	0.05	1.28	0.0	0.01	0.0	11
rutile	0.0	0.13	1.83	2.81	0.03	0.03	0.35	92.4	0.17	0.18	1.69	0.0	0.14	0.0	0.16	0.04	0.0	0.06	0.0	4
Ti magnetite	0.97	2.34	6.09	14.69	0.15	0.11	1.07	38.62	0.12	1.41	30.7	0.13	0.15	2.83	0.5	0.04	0.0	0.1	0.0	4
magnetite	0.14	0.83	6.44	8.2	0.81	0.43	3.15	1.56	0.23	0.5	75.21	0.21	0.37	0.09	0.41	0.97	0.34	0.1	0.0	25
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.03	0.0	31.35	0.27	0.0	0.07	0.37	0.05	0.06	0.44	0.33	0.02	58.87	5.64	0.0	2.17	0.33	0.0	5
sphene	0.0	0.0	2.03	28.74	0.23	0.0	26.21	39.11	0.38	0.03	1.41	0.07	0.0	0.0	0.53	0.14	0.93	0.2	0.0	4
garnet	0.0	9.96	19.65	35.13	0.88	0.26	1.45	1.45	0.08	7.12	21.87	0.0	0.0	0.0	1.01	0.53	0.6	0.01	0.0	4
sillimanite-kyanite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
staurolite	0.0	3.31	38.68	44.29	1.13	0.14	0.94	0.84	0.2	0.0	7.61	0.07	0.03	0.0	0.84	0.88	0.92	0.14	0.0	2
mica	0.06	5.1	21.48	42.1	0.82	7.72	0.31	2.71	0.06	0.18	16.14	0.09	0.11	0.21	1.19	0.44	1.2	0.09	0.0	73
mafic silicates	0.02	8.99	9.0	48.17	0.87	0.59	10.99	0.94	0.28	0.33	17.58	0.08	0.14	0.02	1.14	0.15	0.64	0.08	0.0	413
feldspar	1.3	0.37	23.01	55.56	1.4	6.45	4.01	0.25	0.06	0.1	2.77	0.11	0.06	0.03	1.88	0.62	1.97	0.05	0.0	19
silicate-other	0.27	1.48	25.22	50.45	1.29	1.07	8.17	0.41	0.14	0.13	7.14	0.12	0.09	0.17	1.65	0.42	1.63	0.15	0.0	35
quartz	0.0	0.04	0.09	90.66	2.3	0.0	0.0	0.22	0.06	0.08	0.64	0.24	0.16	0.0	4.75	0.51	0.0	0.26	0.0	4
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	0.56	4.25	0.0	0.0	2.32	0.0	0.0	0.0	0.05	0.0	0.0	9.16	0.0	39.04	7.69	36.92	0.0	1
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0.0	0.0	0.59	1.81	0.0	0.01	53.54	0.22	0.07	0.0	0.53	0.05	0.29	4.8	1.21	33.78	2.85	0.3	0.0	2
carbonate	0.03	0.44	0.85	1.73	0.92	0.07	93.08	0.32	0.13	0.13	0.83	0.22	0.23	0.02	0.21	0.04	0.46	0.28	0.0	366
pyrite	0.0	0.29	0.31	1.86	60.35	0.11	1.29	0.0	0.0	0.4	35.39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
unclassified	0.11	2.83	11.45	37.6	1.99	2.12	20.32	5.74	0.14	0.25	11.34	0.35	0.38	0.31	2.13	0.82	1.78	0.33	0.0	158

P2O5 budget of ore in Ti-minerals: 0.021

P2O5 budget of ore in bulk sample: 0.053

Sample GEUS #: 2003574

Sampler's sample#: 8057 17 Xiaohai

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:40:48 CEST 2008

Valuable Heavy Minerals								
Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	77.5	13.9	1.3	4.2	0.7	1.7	0.0	0.5

Normalised average content of the valuable Ti-bearing minerals				
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	53.5	74.5	92.8	39.5
Fe2O3 wt%	37.8	8.6	1.7	31.4
Mno wt%	1.8	0.3	0.2	1.4
Cr2O3 wt%	0.1	0.2	0.2	0.1
SiO2 wt%	4.5	6.8	2.8	15.0
Al2O3 wt%	1.4	6.2	1.8	6.2
MgO wt%	0.3	0.9	0.1	2.4
CaO wt%	0.6	2.1	0.4	1.1
ZrO2wt%	0.1	0.3	0.0	2.9

TiO2 Content	
Average TiO2 content of all the TiO2 minerals :	55.7
Average TiO2 content of all the TiO2 minerals excl. Rutile:	55.2

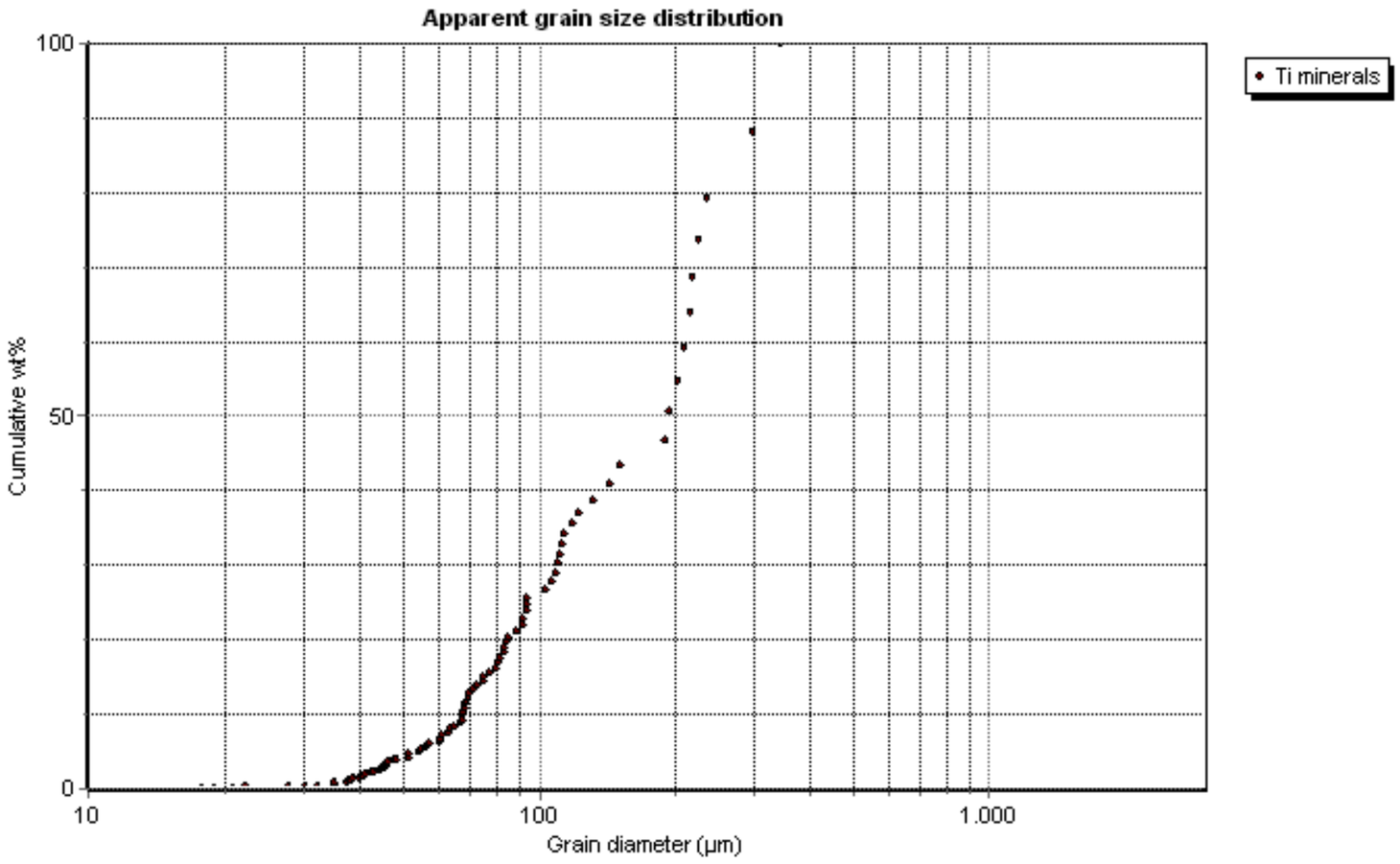
Sample GEUS #: 2003574

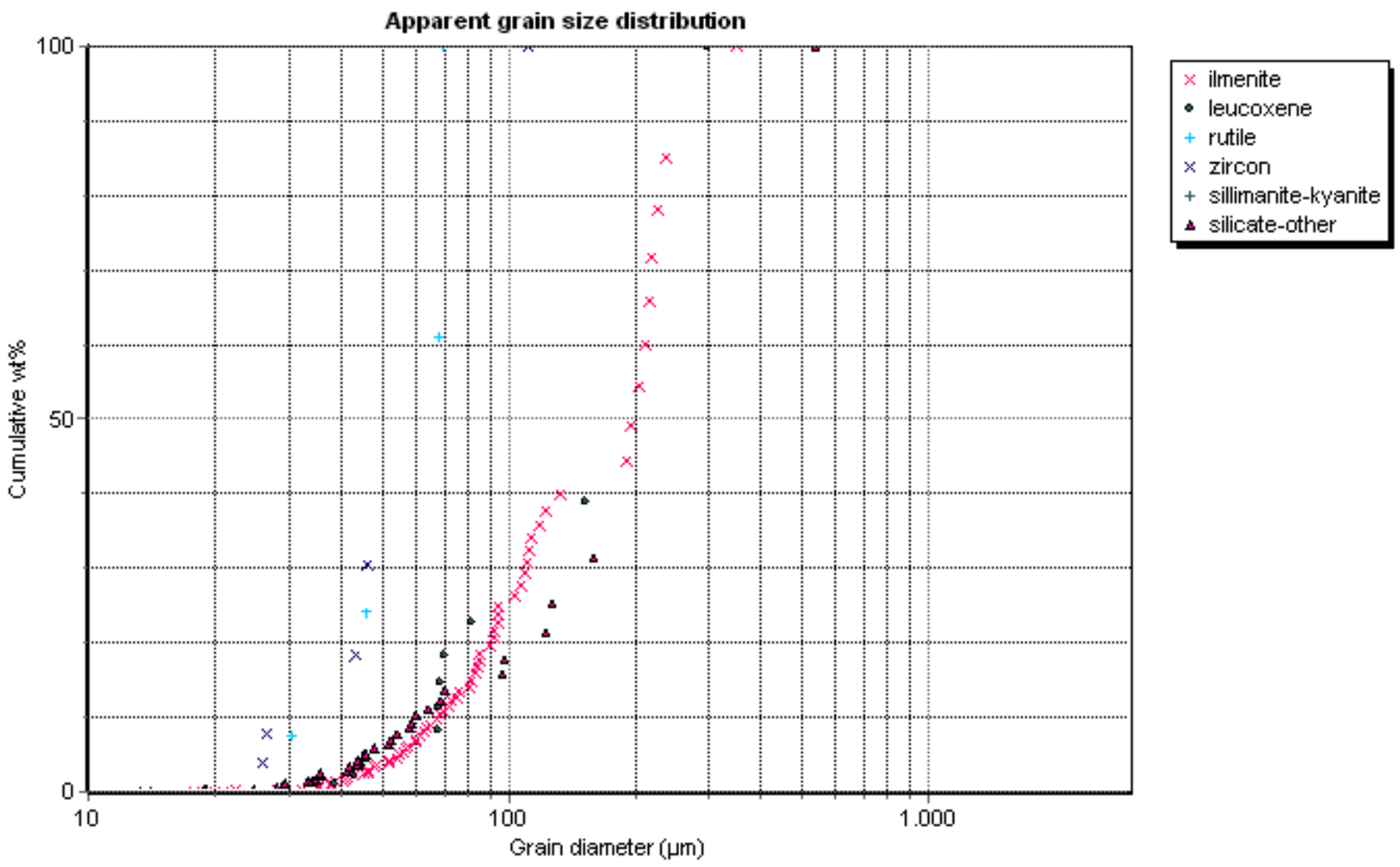
Sampler's sample#: 8057 17 Xiaohai

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:40:48 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.8	1.8	373.3	142.8	9000.6	70
leucoxene	-	-	1.9	2.1	375.7	140.8	10298.7	11
rutile	-	-	1.9	1.9	227.7	87.2	2461.3	4
Ti magnetite	1.1	0.0	2.2	2.5	482.4	207.0	8084.3	4
magnetite	1.1	0.0	2.0	2.0	310.1	121.4	6253.9	25
chromite	1.1	0.0	0	0	0	0	0	0
spinel	1.1	0.0	0	0	0	0	0	0
zircon	1.1	0.0	1.8	1.8	211.7	80.9	2747.8	5
sphene	1.1	0.0	2.1	2.1	287.7	118.6	3896.0	4
garnet	1.1	0.0	2.6	2.2	204.1	83.9	1602.2	4
sillimanite-kyanite	1.1	0.0	0	0	0	0	0	0
staurolite	1.1	0.0	1.6	1.9	221.8	86.8	2395.6	2

Weight percent and average grain parameters on a mineral basis								
mica	1.1	0.0	4.9	3.6	361.8	161.1	3523.3	73
mafic silicates	1.1	0.0	2.3	2.1	237.5	95.2	2774.5	413
feldspar	1.1	0.0	2.2	2.1	183.7	74.3	1410.0	19
silicate-other	1.1	0.0	2.1	2.1	309.8	125.9	9445.5	35
quartz	1.1	0.0	1.8	1.8	203.0	77.7	1997.8	4
corundum	1.1	0.0	0	0	0	0	0	0
monazite	1.1	0.0	1.1	1.4	169.3	52.9	1679.7	1
xenotime	1.1	0.0	0	0	0	0	0	0
phosphate	1.1	0.0	1.6	1.6	182.6	63.9	1750.6	2
carbonate	1.1	0.0	2.7	2.3	258.1	106.5	3559.8	366
pyrite	1.1	0.0	3.8	3.3	323.2	143.8	2556.5	1
unclassified	1.1	0.0	2.7	2.5	217.6	90.9	2014.6	158

Titanium Report - Page 1/3

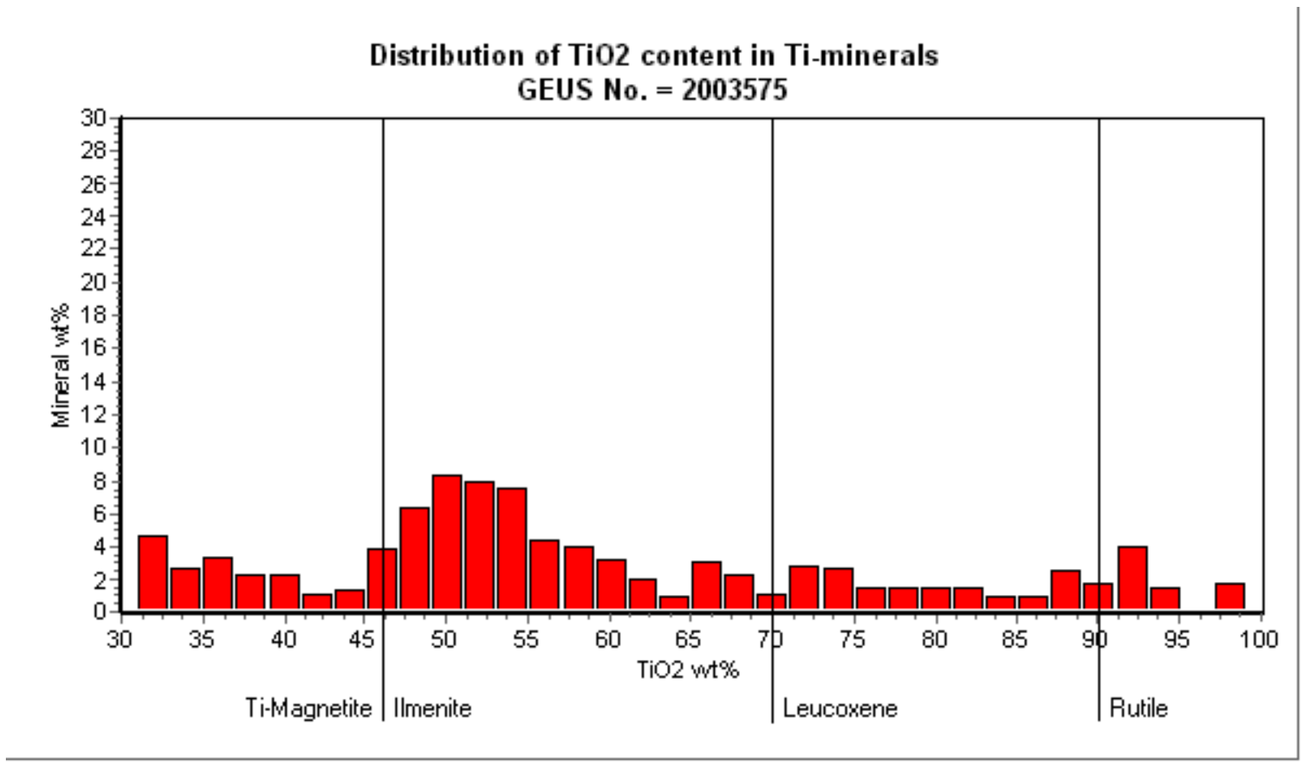
Sample GEUS #: 2003575

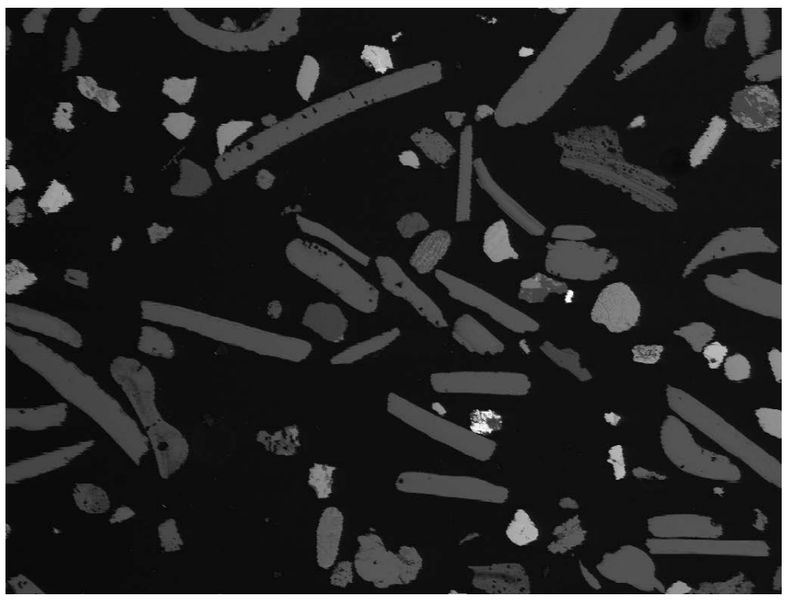
Sampler's sample#: C 391 18 Sanya Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:41:17 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.03	0.4	1.12	4.04	0.2	0.09	0.54	53.6	0.11	3.43	35.79	0.1	0.1	0.06	0.28	0.05	0.03	0.04	0.0	154
leucoxene	0.0	0.9	3.11	11.73	0.38	0.32	0.75	74.06	0.24	0.7	6.18	0.1	0.11	0.4	0.56	0.3	0.06	0.1	0.0	41
rutile	0.0	0.25	1.18	2.91	0.25	0.08	0.38	92.15	0.16	0.14	1.66	0.08	0.1	0.11	0.45	0.03	0.02	0.05	0.0	25
Ti magnetite	0.0	0.65	1.4	11.31	0.38	0.13	3.29	41.33	0.19	2.77	37.5	0.12	0.1	0.08	0.34	0.1	0.13	0.19	0.0	14
magnetite	0.0	0.72	1.88	7.12	0.69	0.28	1.0	0.76	0.09	0.5	85.95	0.14	0.14	0.09	0.35	0.08	0.17	0.05	0.0	34
chromite	0.52	4.33	11.33	0.62	0.07	0.13	0.45	1.73	43.81	1.64	34.7	0.19	0.0	0.1	0.09	0.09	0.1	0.13	0.0	4
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.06	0.11	31.86	0.04	0.02	0.06	0.19	0.1	0.08	0.3	0.15	0.06	59.0	5.5	0.04	2.31	0.11	0.0	63
sphene	0.0	0.06	1.28	20.47	0.32	0.06	37.53	37.34	0.26	0.09	1.2	0.01	0.09	0.0	0.54	0.1	0.67	0.0	0.0	6
garnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sillimanite-kyanite	0.05	0.11	58.54	37.71	0.35	0.13	0.13	0.11	0.13	0.08	0.46	0.21	0.13	0.0	0.46	0.64	0.69	0.09	0.0	8
staurolite	0.74	3.11	45.78	34.93	0.78	0.12	0.53	0.53	0.0	0.25	10.61	0.03	0.0	0.05	0.83	0.47	0.89	0.35	0.0	4
mica	0.0	6.17	20.16	41.94	0.95	7.87	0.32	2.76	0.06	0.37	16.22	0.12	0.05	0.13	1.28	0.58	1.0	0.02	0.0	9
mafic silicates	0.21	6.69	11.54	47.12	0.82	0.24	12.6	0.64	0.2	0.36	16.48	0.06	0.13	0.08	1.35	0.26	1.11	0.11	0.0	75
feldspar	3.26	0.07	19.01	61.96	1.36	4.27	2.98	0.17	0.17	0.1	2.44	0.09	0.15	0.0	2.02	0.7	1.13	0.11	0.0	5
silicate-other	0.87	3.59	30.68	44.95	1.12	0.31	3.97	0.81	0.09	0.17	8.11	0.07	0.1	0.08	1.91	1.27	1.75	0.16	0.0	36
quartz	0.0	0.09	0.22	89.47	2.69	0.0	0.0	0.26	0.1	0.06	0.49	0.17	0.05	0.0	5.18	1.01	0.0	0.23	0.0	7
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.23	1.11	4.07	0.86	0.0	2.72	0.74	0.0	0.0	0.2	0.13	0.31	8.4	1.2	36.37	9.47	34.19	0.0	8
xenotime	0.0	0.0	0.88	4.69	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.16	7.47	0.0	39.23	8.55	37.44	0.0	2
phosphate	0.7	0.67	18.6	6.22	0.73	0.0	28.23	0.06	0.0	0.0	0.57	0.0	0.12	4.02	0.09	33.21	2.99	3.83	0.0	2
carbonate	0.08	0.25	0.45	0.91	0.55	0.05	95.06	0.28	0.12	0.13	0.42	0.2	0.21	0.02	0.23	0.07	0.67	0.29	0.0	561
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	2.69	1.46	4.04	40.58	1.26	0.75	11.43	12.88	0.11	0.57	3.76	0.14	0.17	12.97	3.49	1.36	2.07	0.27	0.0	143

P2O5 budget of ore in Ti-minerals: 0.022

P2O5 budget of ore in bulk sample: 0.329

Sample GEUS #: 2003575

Sampler's sample#: C 391 18 Sanya Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:41:18 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	44.4	15.5	11.8	4.2	0.0	20.2	2.3	1.7

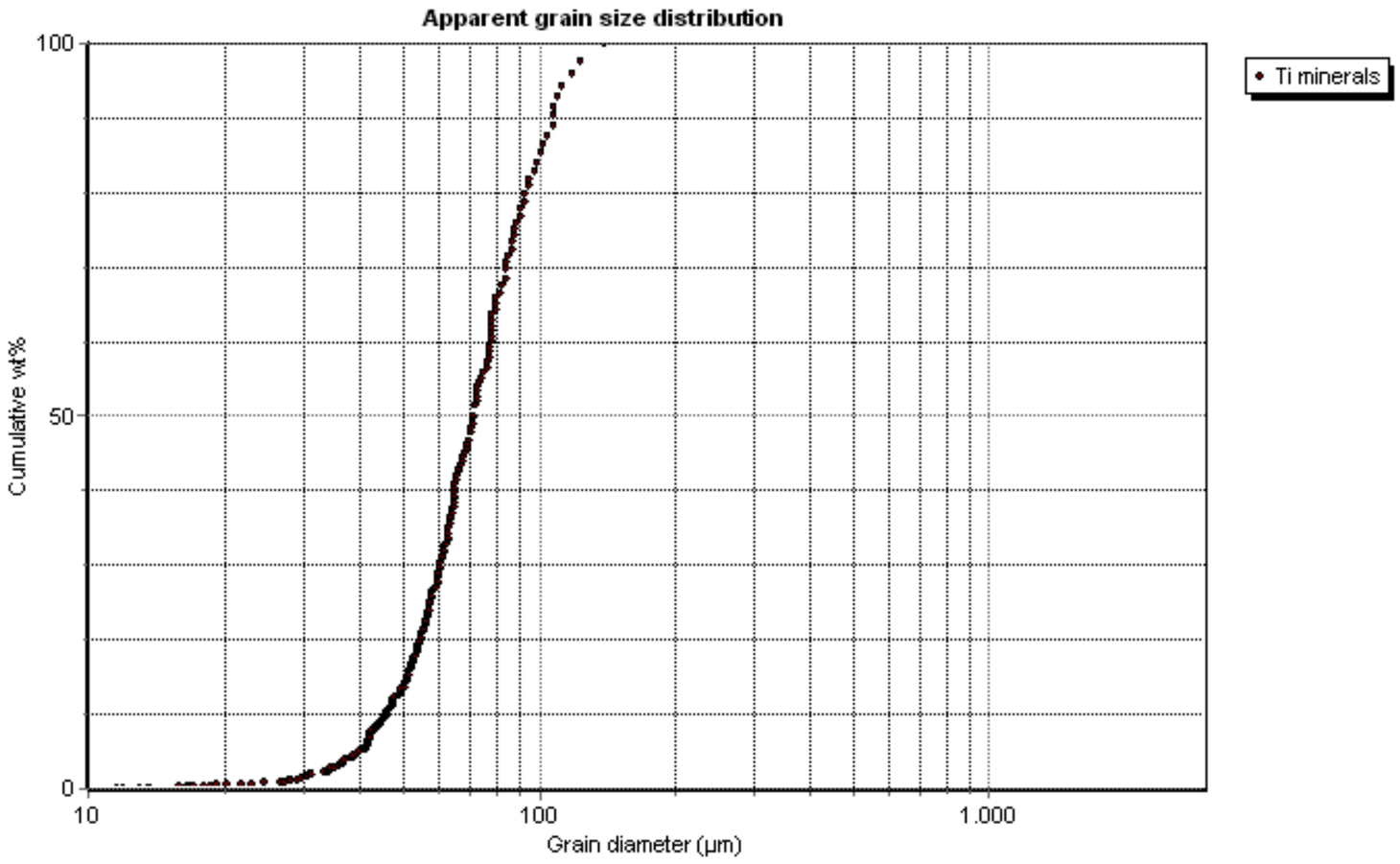
Normalised average content of the valuable Ti-bearing minerals

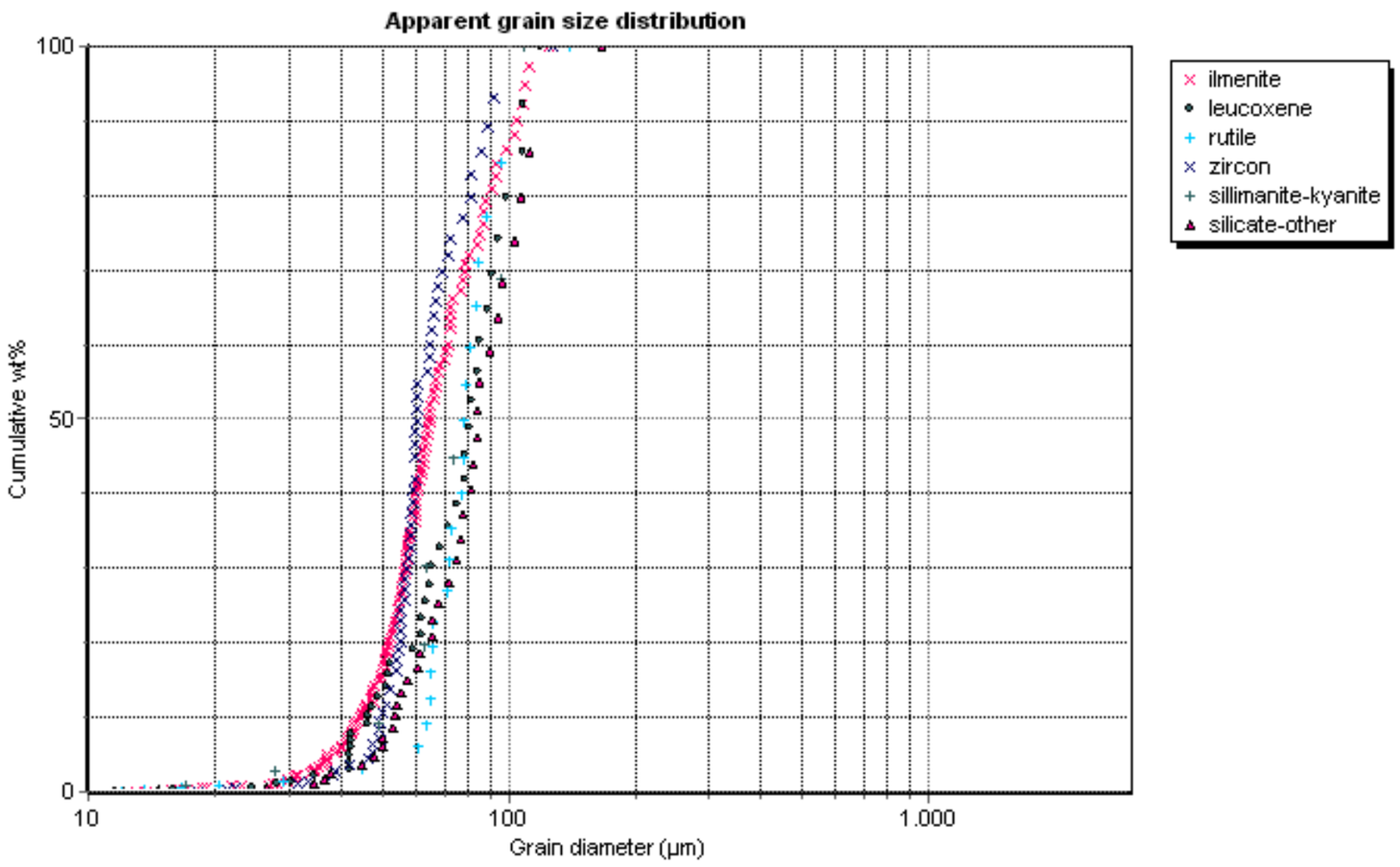
contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	54.1	75.5	93.1	42.0
Fe2O3 wt%	36.1	6.3	1.7	38.1
Mno wt%	3.5	0.7	0.1	2.8
Cr2O3 wt%	0.1	0.2	0.2	0.2
SiO2 wt%	4.1	12.0	2.9	11.5
Al2O3 wt%	1.1	3.2	1.2	1.4
MgO wt%	0.4	0.9	0.3	0.7
CaO wt%	0.5	0.8	0.4	3.3
ZrO2wt%	0.1	0.4	0.1	0.1

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	63.6
Average TiO2 content of all the TiO2 minerals excl. Rutile:	58.4

Titanium Report - Page 3/3
Sample GEUS #: 2003575
Sampler's sample#: C 391 18 Sanya Bay
Description: Marine sample taken by CGS
Country: CHINA
This document was created on: Mon Sep 08 13:41:18 CEST 2008





Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	1.7	1.6	218.2	78.8	2673.6	154
leucoxene	-	-	1.7	1.7	256.1	95.5	3504.3	41
rutile	-	-	1.7	1.7	269.3	101.3	3934.2	25
Ti magnetite	0.8	0.0	1.6	1.7	220.2	80.7	2616.4	14
magnetite	0.8	0.0	2.0	2.0	235.3	92.8	3201.2	34
chromite	0.8	0.0	1.6	1.4	157.0	50.0	1605.2	4
spinel	0.8	0.0	0	0	0	0	0	0
zircon	0.8	0.0	1.5	1.6	229.4	80.5	2886.9	63
sphene	0.8	0.0	3.5	3.9	622.0	283.1	9103.2	6
garnet	0.8	0.0	0	0	0	0	0	0
sillimanite-kyanite	0.8	0.0	1.9	1.7	254.7	94.5	3693.8	8
staurolite	0.8	0.0	1.7	1.7	302.3	112.5	4535.1	4

Weight percent and average grain parameters on a mineral basis								
mica	0.8	0.0	3.0	2.5	347.1	147.7	4484.5	9
mafic silicates	0.8	0.0	1.9	1.9	251.7	97.6	3305.6	75
feldspar	0.8	0.0	2.3	2.4	235.6	97.1	2824.0	5
silicate-other	0.8	0.0	1.7	1.8	290.6	109.4	4274.6	36
quartz	0.8	0.0	1.9	1.9	342.2	131.0	6269.0	7
corundum	0.8	0.0	0	0	0	0	0	0
monazite	0.8	0.0	1.5	1.5	164.4	57.0	1600.4	8
xenotime	0.8	0.0	1.6	1.6	184.5	64.6	1831.8	2
phosphate	0.8	0.0	1.7	1.7	308.3	116.8	4349.9	2
carbonate	0.8	0.0	3.0	2.5	466.1	196.7	8061.0	561
pyrite	0.8	0.0	0	0	0	0	0	0
unclassified	0.8	0.0	2.0	2.1	290.8	117.0	4092.0	143

Titanium Report - Page 1/3

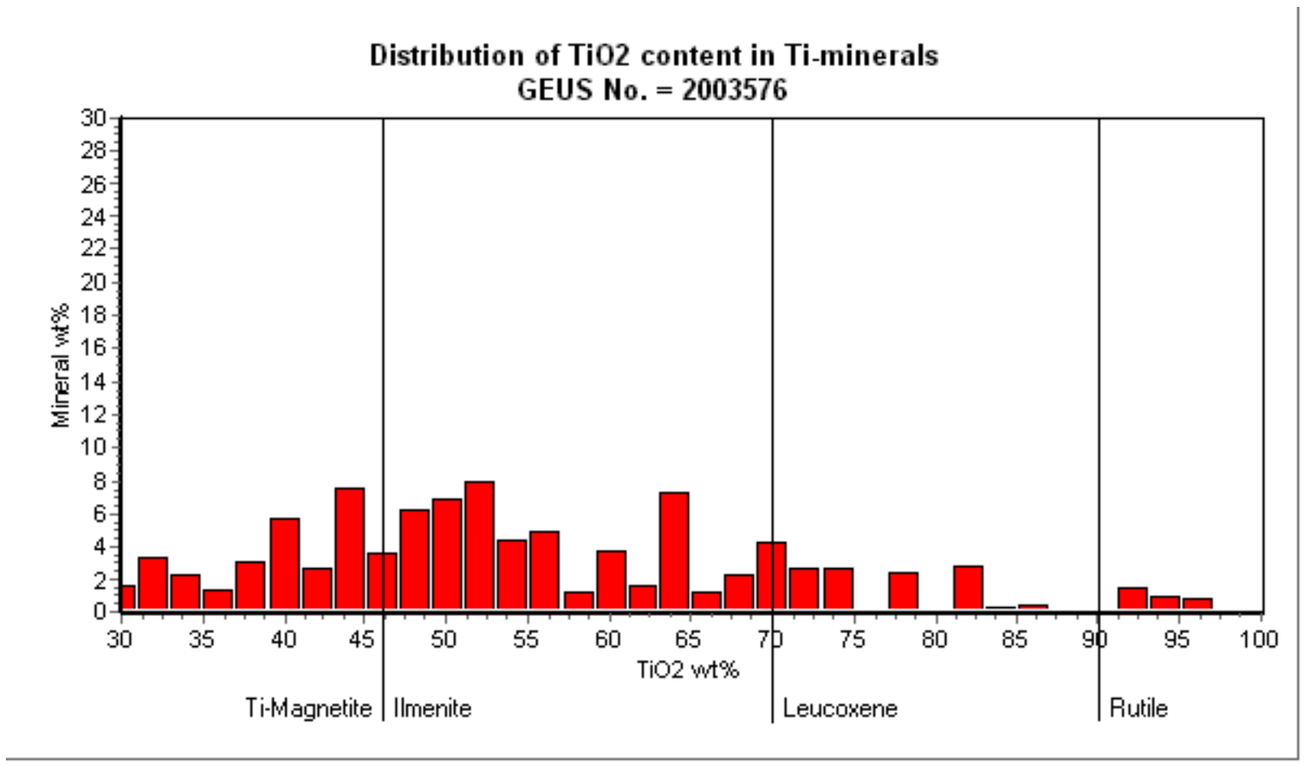
Sample GEUS #: 2003576

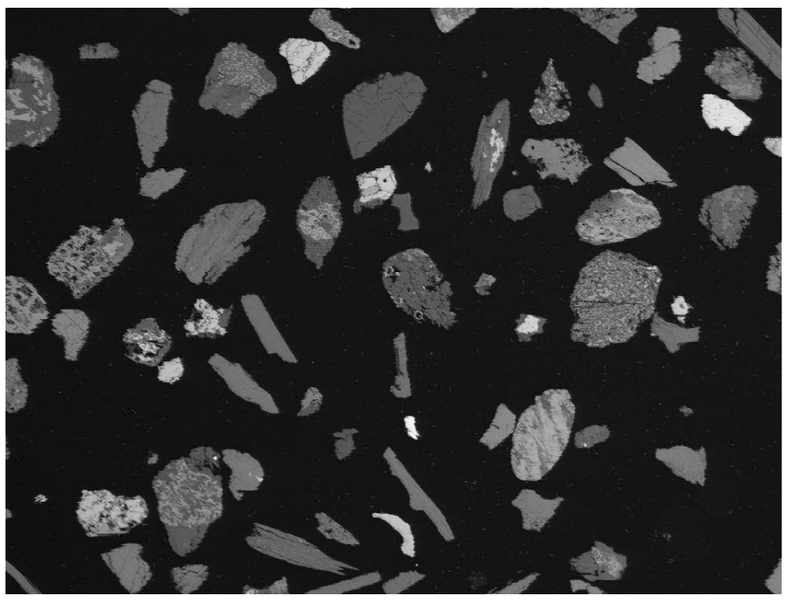
Sampler's sample#: C 360 19 Basuo Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:41:59 CEST 2008





Average Content

Mineral	Na2O	MgO	Al2O3	SiO2	SO3	K2O	CaO	TiO2	Cr2O3	MnO	Fe2O3	NiO	CuO	ZrO2	Nb2O5	P2O5	Y2O3	Ce2O3	SnO	Particles
ilmenite	0.03	0.36	1.73	5.22	0.25	0.15	0.4	53.21	0.08	2.45	35.27	0.08	0.15	0.11	0.26	0.19	0.03	0.04	0.0	108
leucoxene	0.1	0.83	5.34	8.8	0.49	0.39	1.33	72.52	0.17	0.22	7.75	0.08	0.09	0.33	0.34	1.04	0.04	0.13	0.0	34
rutile	0.0	0.4	1.67	3.31	0.05	0.16	0.1	91.77	0.08	0.14	1.49	0.18	0.23	0.03	0.39	0.0	0.0	0.0	0.0	6
Ti magnetite	0.12	1.25	4.57	15.58	0.33	0.46	1.93	29.89	0.11	1.07	43.87	0.09	0.14	0.04	0.38	0.06	0.09	0.01	0.0	18
magnetite	0.06	0.82	4.6	9.85	0.37	0.4	0.34	3.48	0.1	0.23	78.93	0.16	0.12	0.05	0.18	0.19	0.08	0.05	0.0	95
chromite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spinel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
zircon	0.0	0.08	0.17	32.19	0.04	0.01	0.01	0.1	0.07	0.02	0.55	0.19	0.04	58.68	5.62	0.0	2.07	0.14	0.0	18
sphene	0.0	0.12	2.24	29.04	0.35	0.01	26.93	37.84	0.32	0.06	1.28	0.12	0.04	0.09	0.48	0.37	0.72	0.0	0.0	13
garnet	0.0	6.68	19.49	36.12	0.89	0.34	0.43	1.87	0.08	0.83	30.79	0.06	0.08	0.01	1.02	0.48	0.76	0.07	0.0	6
sillimanite-kyanite	0.0	0.2	55.29	37.24	0.69	0.2	0.1	0.54	0.11	0.23	1.21	0.19	0.05	0.0	0.99	1.43	1.36	0.17	0.0	3
staurolite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mica	0.03	3.65	22.38	43.9	0.94	7.46	0.18	3.03	0.08	0.16	14.49	0.06	0.09	0.16	1.37	0.51	1.42	0.08	0.0	122
mafic silicates	0.12	6.62	11.62	46.72	0.9	0.86	9.86	1.05	0.22	0.29	19.38	0.08	0.13	0.04	1.18	0.2	0.66	0.08	0.0	370
feldspar	1.94	0.27	21.46	57.01	0.97	6.54	3.87	0.2	0.11	0.12	2.5	0.13	0.13	0.13	1.89	0.43	2.24	0.06	0.0	22
silicate-other	0.32	0.96	24.15	51.54	1.13	0.88	9.02	0.57	0.17	0.19	6.93	0.09	0.1	0.03	1.79	0.61	1.46	0.08	0.0	65
quartz	0.0	0.01	0.23	89.21	2.87	0.0	0.0	0.24	0.08	0.08	0.31	0.11	0.3	0.0	5.22	1.19	0.0	0.16	0.0	7
corundum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monazite	0.0	0.0	0.19	2.52	0.26	0.0	3.7	0.0	0.0	0.0	0.0	0.63	0.0	9.77	0.0	37.91	11.37	33.66	0.0	1
xenotime	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
phosphate	0.0	0.12	0.32	10.72	0.0	0.0	19.06	0.42	0.01	0.04	0.72	0.14	0.02	6.58	13.88	32.44	3.93	11.6	0.0	3
carbonate	0.23	0.09	0.51	1.58	0.57	0.04	94.36	0.29	0.11	0.13	0.52	0.21	0.21	0.04	0.18	0.05	0.56	0.32	0.0	47
pyrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unclassified	1.32	2.27	9.65	44.67	1.37	1.89	6.23	12.08	0.12	0.44	12.07	0.09	0.16	2.43	2.13	1.08	1.76	0.23	0.0	224

P2O5 budget of ore in Ti-minerals: 0.06

P2O5 budget of ore in bulk sample: 0.093

Sample GEUS #: 2003576

Sampler's sample#: C 360 19 Basuo Bay

Description: Marine sample taken by CGS

Country: CHINA

This document was created on: Mon Sep 08 13:41:59 CEST 2008

Valuable Heavy Minerals

Category	Ilmenite	Leucoxene	Rutile	Ti magnetite	Garnet	Zircon	Kya/Sill	Staurolite
Weight-percent:	51.9	22.2	4.6	9.3	3.4	7.0	1.7	0.0

Normalised average content of the valuable Ti-bearing minerals

contents	Ilminite	Leucoxene	Rutile	Ti magnetite
TiO2 wt%	53.8	74.5	92.7	30.4
Fe2O3 wt%	35.7	8.0	1.5	44.6
Mno wt%	2.5	0.2	0.1	1.1
Cr2O3 wt%	0.1	0.2	0.1	0.1
SiO2 wt%	5.3	9.0	3.3	15.8
Al2O3 wt%	1.8	5.5	1.7	4.6
MgO wt%	0.4	0.9	0.4	1.3
CaO wt%	0.4	1.4	0.1	2.0
ZrO2wt%	0.1	0.3	0.0	0.0

TiO2 Content

Average TiO2 content of all the TiO2 minerals :	58.8
Average TiO2 content of all the TiO2 minerals excl. Rutile:	56.9

Sample GEUS #: 2003576

Sampler's sample#: C 360 19 Basuo Bay

Description: Marine sample taken by CGS

Country: CHINA

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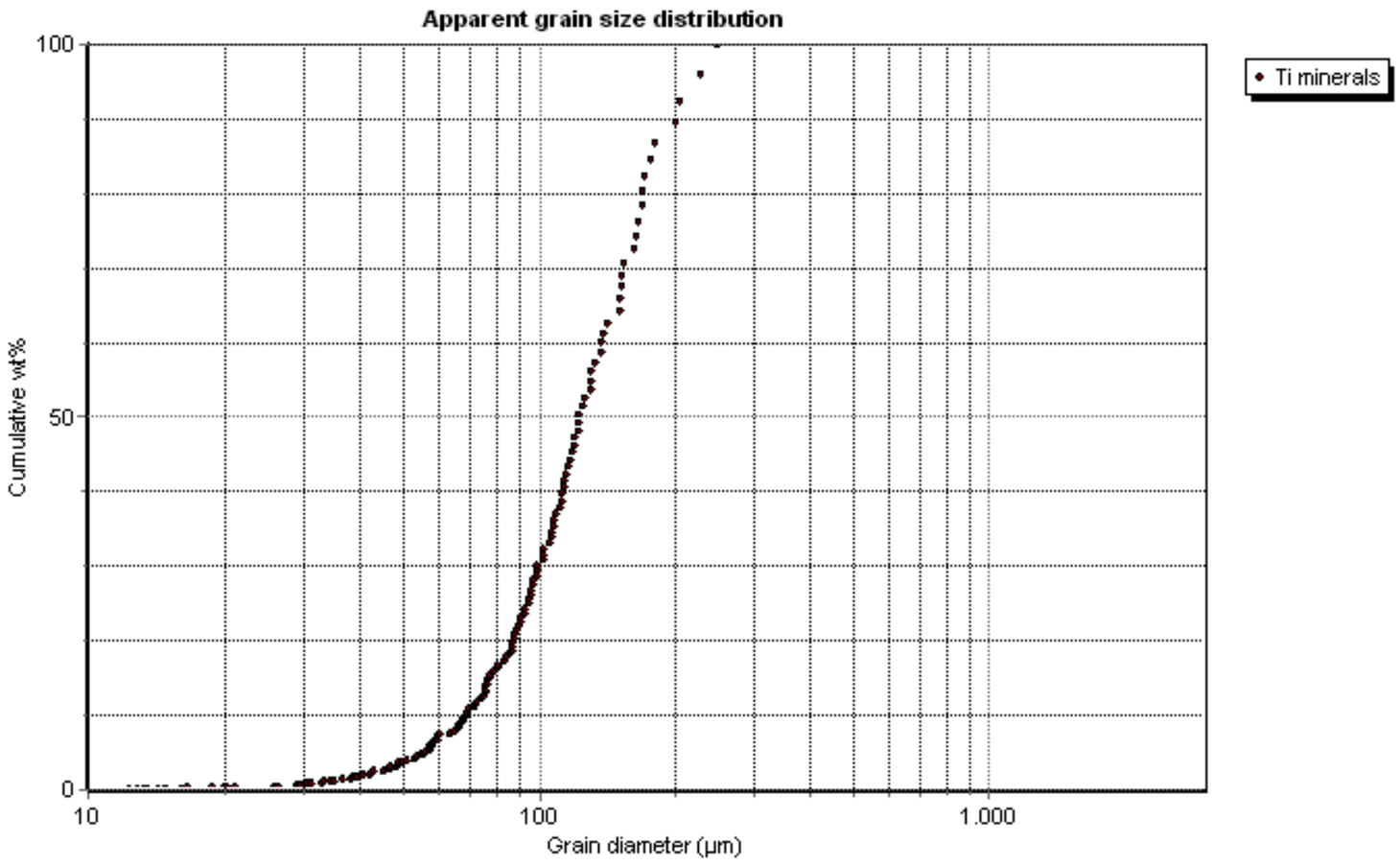

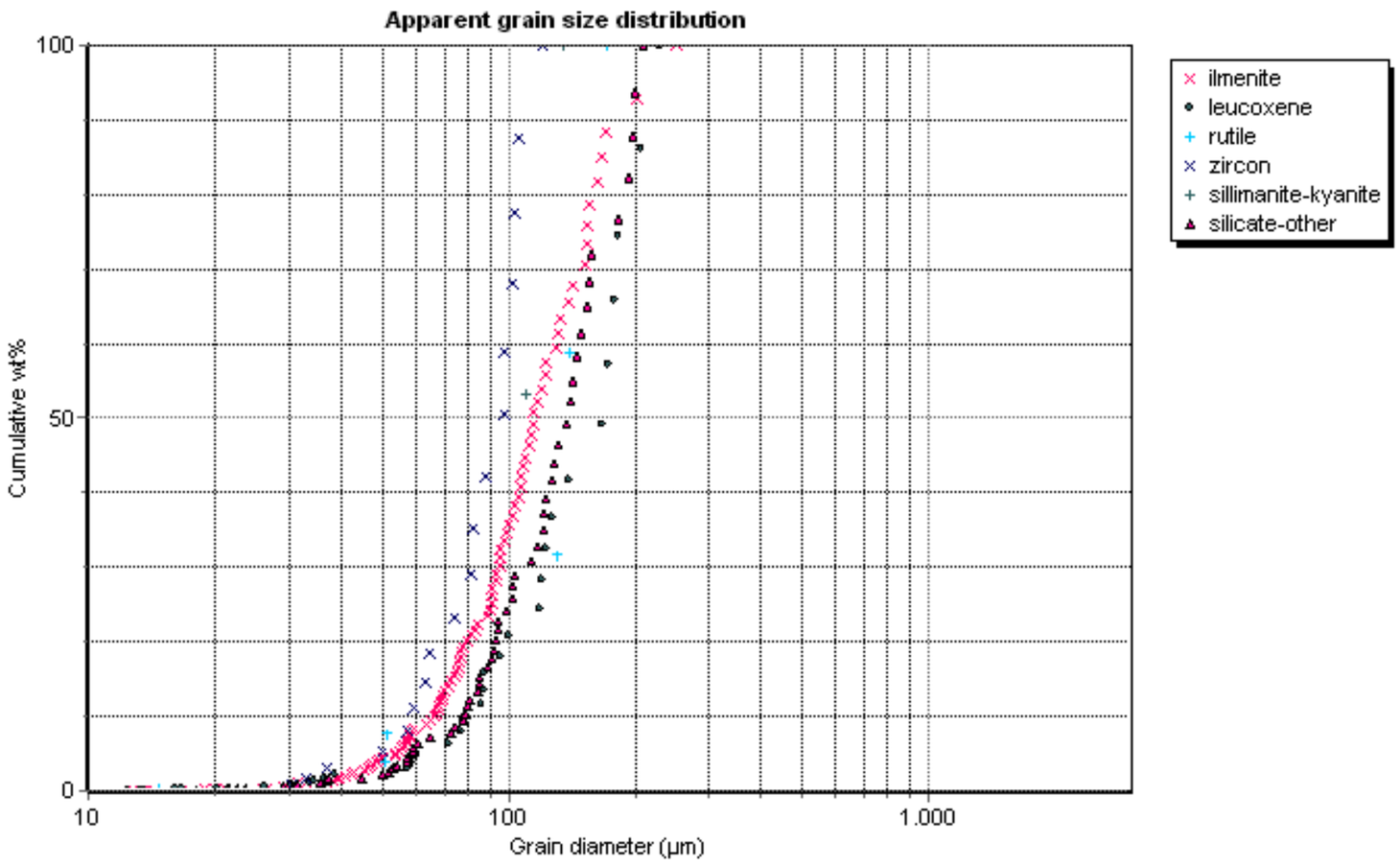

Weight percent and average grain parameters on a mineral basis								
Category	Heavy mineral concentrate wt %	Raw sand wt %	Aspect ratio	Circularity	Perimeter	Length	Area	Total grains
ilmenite	-	-	2.0	1.9	346.7	136.9	6350.7	108
leucoxene	-	-	2.0	2.2	417.2	173.5	8633.9	34
rutile	-	-	1.7	1.9	395.8	151.3	9207.1	6
Ti magnetite	2.0	0.0	2.2	2.6	417.0	175.9	6400.8	18
magnetite	2.0	0.0	2.0	2.0	315.8	123.3	4935.4	95
chromite	2.0	0.0	0	0	0	0	0	0
spinel	2.0	0.0	0	0	0	0	0	0
zircon	2.0	0.0	1.6	1.7	305.4	112.0	4944.2	18
sphene	2.0	0.0	1.6	1.7	236.7	90.0	3123.1	13
garnet	2.0	0.0	3.1	2.4	473.0	198.4	8451.8	6
sillimanite-kyanite	2.0	0.0	2.1	2.3	533.2	219.5	10137.5	3
staurolite	2.0	0.0	0	0	0	0	0	0

Weight percent and average grain parameters on a mineral basis								
mica	2.0	0.0	3.5	2.9	398.4	171.5	6159.3	122
mafic silicates	2.0	0.0	2.3	2.2	412.9	169.4	8123.6	370
feldspar	2.0	0.0	2.1	2.2	352.9	144.9	6700.3	22
silicate-other	2.0	0.0	2.1	2.2	423.1	173.3	8299.3	65
quartz	2.0	0.0	2.3	2.2	432.0	177.2	7928.5	7
corundum	2.0	0.0	0	0	0	0	0	0
monazite	2.0	0.0	0.9	1.2	258.8	64.7	4354.3	1
xenotime	2.0	0.0	0	0	0	0	0	0
phosphate	2.0	0.0	2.2	1.5	115.2	37.6	1088.3	3
carbonate	2.0	0.0	2.8	2.6	511.9	222.5	9623.1	47
pyrite	2.0	0.0	0	0	0	0	0	0
unclassified	2.0	0.0	2.4	2.3	362.7	148.1	6964.3	224