5 Advices for ASM measures

5.1 Outline of field investigation

The targets of ASM field investigation in the Project are coal mines distributed in the north of Malawi and ceramic clay (kaolinite) deposits existed at Linthipe in the middle of Malawi. The study team conducts the field investigation for these ASM sites and advises the improvement of safety and environmental issues and effective utilization of mineral resources. Also, the team reviews the ASM policy of Malawi.

The field investigations were carried out on kaolinite deposits at Linthipe and three coal mines at Livingstonia in the 2nd On-site Works in Malawi in 2014, and on two coal mines at Karonga in the 4th On-site Works in Malawi in 2015. The outline of sites investigated is shown in Table 5-1 and Figure 5-1. The check list on mine safety used at the field investigation is shown in Table 5-2. Investigation results in each site are described respectively from Section 5.2 to 5.7.

The study team also visited the Lilongwe office of MALCOAL Mining Ltd. operating the Nkhachira coal mine at Karonga district, where the team made the investigation. Meeting contents are shown in Section 5.8.

Additionally, the study team participated in a symposium on ASM policy held by WB and related organizations at Lilongwe on November 11th and 12th, 2014. Outlines of the symposium are described in Section 5.8.

(1) Kaolinite

Kaolinite deposits suitable for ceramics are distributed at Dedza and Ntcheu in the middle of Malawi. Clay deposits were created by weathering of meta-anorthothite and exist under the surface soil in the area of several km^2 with 1 to 2 m thickness.

The GSD has the tenement of kaolinite as ceramic clay at Linthipe and settles Linthipe Ceramic Station (office and ceramics factory). The study team visited the Station and mining site of kaolinite in the end of October 2014, and investigated the situation of usage of kaolinite and mineral resources deposits. Then, the study team considers the effective utilization of clay to increase value added.

Paragon Ceramics Ltd., which owns the factory and sales shop of pottery product at Dedza, has the tenement of kaolinite adjacent to the GSD tenement.

(2) Coal

Coal deposits are distributed in the sedimentary rocks of Karoo and Post-Karoo systems from Mesozoic to Paleozoic in the north and south end of Malawi. Several small-scale coal mines are operating in Livingstonia to Karonga in the north of Malawi.

In the beginning of November 2014, the field investigations for mining safety were carried out on three coal mines, (i) Mchenga, (ii) Mean Jalawe and (iii) Kaziwiziwi, which are operating in the Livingstonia area in the Rumphi District. Wearing of protecting gears, supports of mining gallery, settle of guard fence, management system on mining safety and so on were investigated.

In the end of May 2015, the same field investigations for mining safety as implemented in 2014 were carried out on two coal mines, (i) Nkhachira and (ii) Mwaulambo, which are operating in the Karonga area in the Karonga District. In fact, Mr. Chilumanga, acting director of DoM, requested the investigation on three coal mines; Nkhachira, Mwaulambo and Lisikwa in Karonga district in the second JCC meeting. However, Lisikwa mine was excluded after the following meeting at Mzuzu office of DoM.

[Meeting]

- Date: May 27th 2015
- Place: Mzuzu regional office of Department of Mines, Mzuzu
- Member of DoM
  - ✓ Mr. George J. Maneya: Chief Mining Engineer
  - ✓ Mr. Vitumbiko Mkandawire: Regional Mining Engineer
  - ✓ Mr. Silver Mapunda: Assistant Mining Inspector of Environment
- Contents
  - ✓ As Lisikwa Coal Mine had been closed several years ago, it is not available to contact the responsible person in the mine. Therefore, this mine is not suitable for investigation and should be excluded.
  - ✓ DoM already informed the investigation to other two mines. Mr. Mkandawire and Mr. Mapunda will accompany the JICA team.
  - ✓ JICA study team requested another coal mine for investigation. However, there was no suitable mine in Karonga area, then the team gave up the further investigation.
  - ✓ JICA study team also asked the availability of the visit on Kayelekera Uranium mine. However, it is necessary to apply the visit directly from MNREM or JICA to the mining company. Then the team gave up the visit as not having enough time for the request at that moment.

Table 5-1 Sites of ASM field investigation

Site Name	Latitude Longitude (deg)	Owner	Operation method	Remarks
Linthipe Kaolinite Mine	14.16782 S 34.10155 E	GSD	Open-pit	Government had operated from 1995
Mchenga Coal Mine	10.69907 S 34.14920 E	Mchenga Coal Mines Ltd.	Underground	Government had held before 1999
Mean Jalawe Coal Mine	10.74434 S 34.13648 E	Mean Jalawe Coal Mine Ltd.	Underground (suspended)	Opened in 2005
Kaziwiziwi Coal Mine	10.64587 S 34.09185 E	Kaziwiziwi Mining Company Ltd.	Underground	Government had operated during 1985 to 2002
Nkhachira Coal Mine	10.00077 S 33.67365 E	MALCOAL Mining Ltd.	Open-pit	Opened in 2006
Mwaulambo Coal Mine	9.80638 S 33.81574 E	Eland Coal Mining Company	Open-pit	Opened in 2007

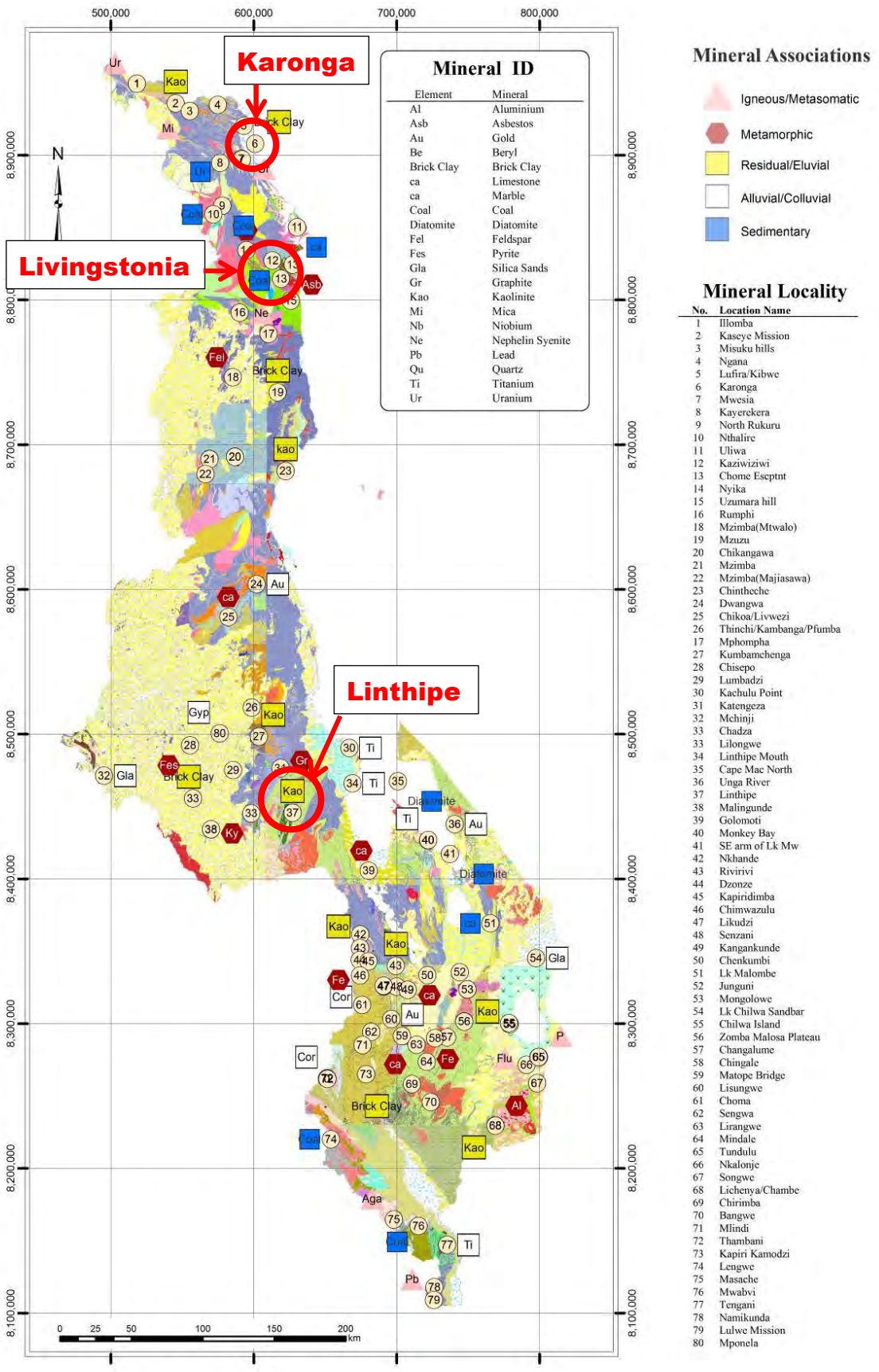


Figure 5-1 Location of ASM field investigation

Table 5-2 Check list on mining safety (prepared by the study team)

Mine Safety Item	Main Check Items	Yes: Y No: N	Remarks
(1) Mining method	(a) Underground (UG)/ Open Pit(OP) ? (b) Outline of mine (c) List of mining equipment	(a) (b) (c)	(a) (b) (c)
(2) Wearing of personal protection equipments	(a) Safety helmet (b) Safety boots (c) Working clothes (d) Dust respirator (e) Others	(a) (b) (c) (d) (e)	(a) (b) (c) (d) (e)
(3) Support condition in the underground	(a) Type of support (b) Distance of support (c) Corrosion (d) Rock strength (e) Others	(a) (b) (c) (d) (e)	(a) (b) (c) (d) (e)
(4) Roof condition in the underground	(a) Type of support (b) Distance of support (c) Corrosion (d) Rock strength (e) Others	(a) (b) (c) (d) (e)	(a) (b) (c) (d) (e)
(5) Open space in the underground	(a) Size (b) Distance from others	(a) (b)	(a) (b)
(6) Rock drill method	(a) Type of rock drill (b) Situation of utilization (c) Maintenance record (d) Others	(a) (b) (c) (d)	(a) (b) (c) (d)
(7) Conveyer	(a) Type of conveyer (b) Situation of utilization (c) Maintenance manual and records (d) Others	(a) (b) (c) (d)	(a) (b) (c) (d)
(8) Ventilation	(a) Type of ventilation (b) Maintenance manual and records (c) Others	(a) (b) (c)	(a) (b) (c)
(9) Explosives	(a) Management method (b) Operation manual (c) Others	(a) (b) (c)	(a) (b) (c)
(10) Gas	(a) Mine gas (b) Measuring method (c) Others	(a) (b) (c)	(a) (b) (c)
(11) Safety consciousness	(a) Safety manual (b) Training/meeting for safety (c) Records of training/meeting for safety (d) Safety patrol (e) Others	(a) (b) (c) (d) (e)	(a) (b) (c) (d) (e)
(12) Disasters	(a) Number of disasters (b) Management method for disaster control (c) Records of meeting for safety (d) Others	(a) (b) (c) (d)	(a) (b) (c) (d)
(13) Management method	(a) Slope failures (b) Handling of dust (c) Disposal of waste(tailings), slag, precipitates etc. (d) Handling of explosives (e) Keep a ventilation (f) Drainage (g) Noise and vibration (h) Sanitation (health) (i) Patrol and inspection (j) Face and the surrounding (k) Others	(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k)	(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k)

5.2 Kaolinite mine at Linthipe

The study team investigated GSD's Linthipe Ceramic Station (office and ceramics factory) and mining site of kaolinite, which are located at Linthipe town in the Dedza District in the middle of Malawi. The mining site is located in about 4 km northeast from the office. Linthipe town is located in about 40 km southeast from Capital Lilongwe. Interviewees from GSD at the investigation are listed below.

GSD Linthipe Ceramic Station
- ✓ Ms. Doreen Malimba: Laboratory Technician

GSD Headquarters (came from Zomba to attend the investigation)
- ✓ Mr. Charles Missi: Principal Chemist
- ✓ Ms. Linda Banda: Chemist

After the receipt of explanations on outlines of the Ceramic Station from Ms. Malimba, the inspection on facilities in the station and the mining site of china clays were carried out. Outlines of investigation result are described below.

- The facilities (photo 1 in Figure 5-1) were established in 1986, and eleven staffs (4 chemists and other researchers including assistants) are working therein at this stage. China clay in surface layer has been mined and utilized since 1995.
- Major works of this station are manufacturing china wares (including insulator) (photos 2 and 3 in Figure 5-2), guidance on technologies and development of human resources (photo 4 in Figure 5-2), etc. for manufacturing china ware to inhabitants living around there.
- The manufacture of china ware is firstly to reduce the particle size down to 250μm by the secondary crushing (photo 5 in Figure 5-2) and grinding of mainly (i) kaolinite, (ii) feldspar, (iii) marble stone, (iv) quartz, (v) kyanite. Then, they are mixed with water and pottery clay is prepared by kneading and shaping by means of pottery lathe (photo 4 in Figure 5-2). Ms. Malimba has bought materials except for kaolinite clay at Blantyre.
- China wares and insulators after shape formed are naturally dried for approximately one (1) week (photo 3 in Figure 5-2) and then biscuit fired at around 900 °C and finally fired at approximately 1200 °C. However, it is informed that almost firing furnaces are now out of order due to damages (photo 6 in Figure 5-2).
- The number of products is 5,000 pieces per month, and it was noticed that approximately forty percent (40%) of total production are large size flower pots and the production of insulators is less than ten percent (10%) of total production.
- Upon the inspection of kaolinite mining site by GSD (photo 7 in Figure 5-2), the study

team pointed out that chemical analysis and particle size distribution analysis are very important in order to find out the effective utilization of kaolinite, and the sample of china clay (Sample No. ML141029-01) was collected from the mining site (photo 8 in Figure 5-2). The GSD should conduct chemical analysis and particle distribution analysis of this clay sample in GSD laboratory in Zomba. The study team considers and discusses other utilization of kaolinite clay after the receipt of analytical results.

- Ms. Malimba guided the study team to visit Paragon Ceramics Company in Dedza city situated at approximately 30km south-east from Linthipe (photo 1 in Figure 5-3). This company owns a factory and a selling shop in its site, and manufactures china wares with high artistic illustration (photo 2 in Figure 5-3). Many tourists from Europe and South Africa visit this company by sightseeing buses and buy products of the company as souvenirs.

1：GSD Linthipe Ceramic Station

2：Insulator manufactured by GSD

3：Earthen ware manufactured by GSD (being dried)

4：Shape forming by spinning lathe

Figure 5-2 Photos of investigation at Linthipe (1/2)

5：Crusher

6：Electric oven (out of order)

7：State of mining site

8：Sampling site (○mark in left photo)

Figure 5-3 Photos of investigation at Linthipe (2/2)

1：Factory of Paragon Ceramics

2：Selling shop of Paragon Ceramics

Figure 5-4 Photos of investigation at Dedza

5.3 Mchenga coal mine

The study team investigated Mchenga coal mine owned by Mchenga Coal Mines Ltd., which is located in Livingstonia area of the Rumphi District in the north of Malawi. The mine is located in about 365 km north from Capital Lilongwe. When the study team investigated three coal mines (Mchenga, Mean Jalawe and Kaziwiziwi) in the Livingstonia area, Mr. Silver Mapnnda (Assistant Mining Inspector) of Mzuzu regional office of the Department of Mines accompanied the study team. Interviewees at the investigation are listed below.

Mchenga Coal Mines Ltd.

- ✓ Mr. Johnson Dandadzi: Mine Manager
- ✓ Mr. Wongani Simwaka: Assistant Human Resources Officer
- ✓ Other four persons

Upon the receipt of explanation on outlines of this coal mine by Mr. Dandadzi, the mining gallery was inspected. Outlines of investigation results are described in the following.

- This coal mine had been commenced its development in 1987 by the cooperation of the Malawi Government and the Government of France. During the period of 1988 to 1995, this mine had been owned by MIDCOR Company (a mining company managed by the Provincial Government), and then the Government of Malawi became a major owner until 1999. Mchenga Coal Mines Ltd. has owned this mine from 1999, and presently produces sub bituminous coal of 2,400 tons/month only by underground mining (room and pillar method) and ships to domestic and foreign companies. Although it is noted that the life of this mine is approximately nine months at the time of November 2014, the company has continuously explored new coal deposits around the mine.
- The numbers of employee is 246. Inhabitants lived in the area around the mine have been employed positively. Working hours in the mine are (i) 06:00~14:00, (ii) 14:00~22:00 and (iii) 22:00~06:00 in three shifts/day system. The underground mining work is carried out in the maximum eight mining faces at a time. The organization chart of this company is shown in Figure 5-4.
- The company constructed facilities in the mining area such as clinic, etc. (photo 7 in Figure 5-6) and one medical doctor is employed. A serious patient who cannot be treated for remedy in this clinic should be transported to a public hospital in Rumphi.
- Although the safety training was said to be carried out periodically, records of such training were not presented at that time. Thus the details are unknown.

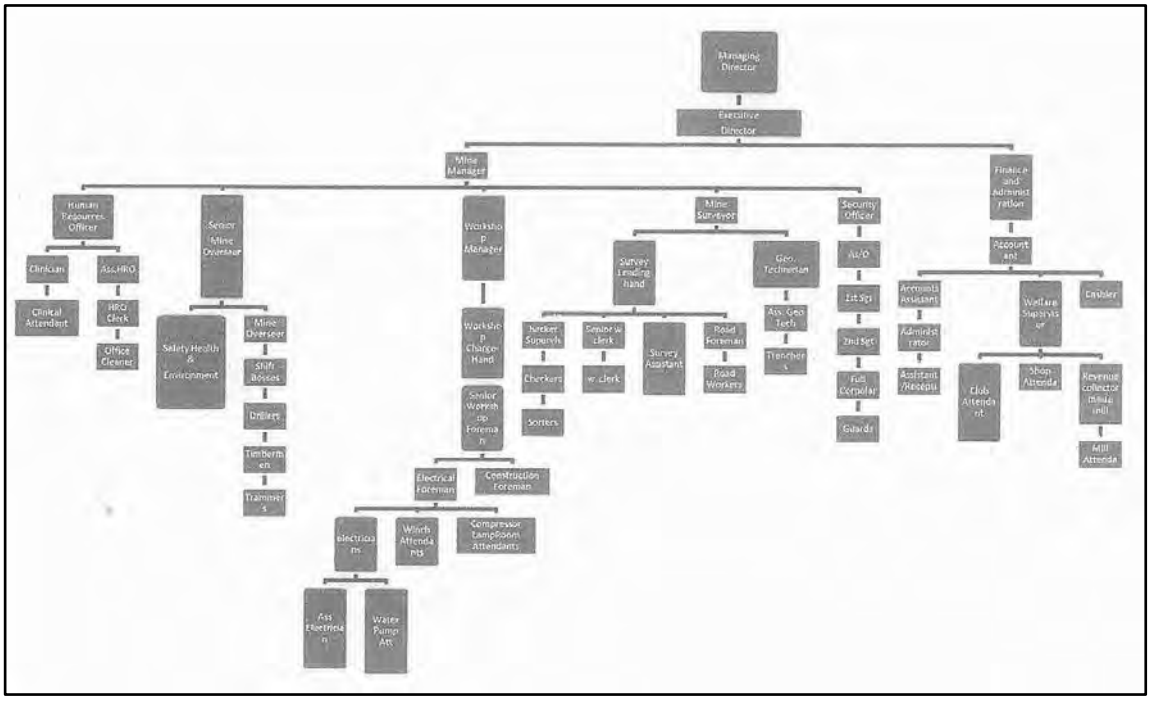


Figure 5-5 Organization chart of Mchenga Coal Mines Ltd.

- The inspection on insides of mining galleries was carried out by the guidance of Mr. Dandadzi. Main results of investigation are described in the following.
  - ✓ Inside Space of Mining Gallery: There are two galleries in this mine, i.e. one is for conveyor and another is a main gallery for mining (photos 2 and 6 in Figure 5-5). The size of gallery is around 2.5m width x around 2m height in general and it becomes narrower to around 2m width x around 1.5m height as approaching to the mining face. The gallery for conveyor has a path of approximately 70cm in width between conveyor and gallery wall, and the width seems to be insufficient (photo 3 in Figure 5-5). However, the surface of path is comparatively cleaned by removing pieces of coals and debris (photo 5 in Figure 5-5).
  - ✓ Supports of Mining Pit Insides: In the gallery for mining work, log made support pillars are installed at every intervals of approximately 1.5m, and supporting pillars assembled with logs and rocks of 3m length x 2m width x 2m height are installed at the wider area such as the intersection of two galleries (photo 5 in Figure 5-5). Tow surplus log pillars are installed at respective areas specifically determined for the purpose of detecting the change in location of cave due to the rock pressure. In addition, there are several sections of gallery without supporting pillars for the maximum length of approximately ten meters.
  - ✓ Roof of Gallery: The roof of gallery is generally composed of naked bedrock and

protecting measures against the roof were not found. However, there were a few logs to prevent from roof fall (photos 3 and 5 in Figure 5-5).

- ✓ Method of Excavation: Drilling and excavation are carried out by the jack hummer. Workers did not wear ear plugs.
- ✓ Ventilation of Mining Gallery Insides: It is said that any kind of poisonous gas have not been found out and that the natural ventilation caused by air transfer of jack hummer used at the mining face is sufficient accordingly. Although it is noticed that the measurement of gases in the gallery has periodically been carried out, details are unknown since measuring instruments and the record of measures could not be confirmed.
- ✓ Transportation: Coals mined at the mining face are transported out to the mouth of gallery by the conveyor (photo 2 in Figure 5-5), and the transportation of coal to the yard for dressing of coal is conducted by truck vehicles. Final products are transported by means of trailer vehicles of approximately 20 tons capacity (photos 8 to 10 in Figure 5-6).
- ✓ Protective Tools and Equipment: Wearing of dust protecting mask was not sufficient. Some workers at the mining face did not wear working cloths with long sleeves either. Workers carrying out drilling work without wearing ear plugs (photo 4 in Figure 5-5).
- ✓ Others: It was confirmed that spring water existed in gallery. Such spring water was discharged by means of drainage pump of approximately ten liters per second (10 liters/sec) in capacity. The floor of gallery at the area around mining face was especially slippery due to a steep inclination as well as to the existence of spring water on the surface of floor.

- ➢ No measures indicating “Off Limit”, “No Entrance”, etc. could be found in the gallery. It was proposed and recommended by the delegation through Mr. silver Mapnnda – Assistant Mining Inspector that measures to stop entering into the off limit area by means of logs, etc. were immediately required.

1：Office of Mchenga Coal Mine

2：Entrance of conveyor gallery

3：Conveyor gallery

4：Mining face

5：Mining gallery

6：Mining gallery inlet

Figure 5-6 Photos of investigation on Mchenga Coal Mine (1/2)

7：Clinic of the mine
(Local people can use this clinic)

8：Coal storage yard

9：State of coal transportation

10：State of coal transportation

Figure 5-7 Photos of investigation on Mchenga Coal Mine (2/2)

5.4 Mean Jalawe coal mine

The study team investigated Mean Jalawe coal mine owned by Mean Jalawe Coal Mines Ltd., which is located in Livingstonia area of the Rumphi District in the north of Malawi. The mine is located in about 360 km north from Capital Lilongwe. Interviewees at the investigation are listed below.

Mean Jalawe Coal Mines Ltd.

- ✓ Mr. Henry Mughogho: Mine Manager
- ✓ Mr. Hiitop Mwalwimba: Mine Captain & Safety Officer

Upon the receipt of explanation on outlines of this coal mine by Mr. Mughogho, the mining gallery was inspected. Outlines of investigation result are described in the following.

- ➢ The development of this coal mine had been commenced from 2005 mainly by underground mining (room and pillar method). Although the coal mined in this mine might be exported to a cement manufacturer in Tanzania from around 2007, the mining work is not implemented at present due to the earthquake occurred in 2009. Mean Jalawe Coal Mine Ltd. owned this coal mine from 2012, and produces sub bituminous coal of 120 tons/month only by hand sorting and dressing in the coal storage yard. The coals are delivered mainly to cement manufacturers in Malawi.
- ➢ The number of employees is forty four persons. Inhabitants living in areas around the mine have been positively employed. Working hours in the mine are (i) 06:00~14:00 and (ii) 14:00~22:00 in two shifts/day system.
- ➢ No medical doctor is employed in the mine. The medical first aid kit is prepared in the site office for preliminary treatment, since most of workers are not engaged in the underground mining work and their work is mainly in hand sorting and dressing work at the coal storage yard (photos 1 and 2 in Figure 5-7).
- ➢ The safety training for workers was said to be carried out periodically. However, details and records on the training were not presented.
- ➢ Confirmation on the inside situation of the gallery was carried out by the guidance of Mr. Mughogho though the underground mining work is not carried out at present. Main results of investigation are described below.
  - ✓ Space in Gallery: As the size of gallery in general is around 2m in width x around 1.5m in height, people are forced to walk by bending forward in the gallery in some cases. The surface of floor in gallery is not in a safer state since pieces of coal and debris are scattered on the gallery floor (photos 7 to 10 in Figure 5-8).
  - ✓ Supports in Gallery: At the area around the entrance of gallery, it was found and

confirmed that log made pillars were installed at every intervals of approximately 1m and supporting pillars assembled with logs and rocks of 3m in length x 2m in width x 1.5m in height were installed at the wider area such as the intersection of two galleries, etc. (photo 7 in Figure 5-8). However, the section of maximum approximately 5m in length without support exists at the gallery in deeper portion.

- ✓ Roof Rock of Gallery: The protective measures against roof fall by logs are installed at the roof around the inlet of gallery as same as supports in gallery (photo 8 in Figure 5-8). However, corrosions on logs can be recognized in general.
- ✓ Method of Drilling: Presently, drilling and excavation work are not carried out.
- ✓ Ventilation in Gallery: Although it was said that any kind of poisonous gas have not been found, the measuring instrument and results of measurement could not be confirmed. Thus methods of management and control on such poisonous gas are unknown. It was said that the natural ventilation was sufficient to secure appropriate ventilation in the galleries though mining work was not carried out at this stage.
- ✓ Transportation: Coals classified by hand sorting and dressing are transported and collected to the storage yard (photo 4 in Figure 5-7). It was said that the shipment was carried out by four truck vehicles of 30tons capacity.
- ✓ Protective Tools and Equipment: Some workers are working by bare hands and wearing sandals. The use of protective tools is not sufficient in general (photos 3 and 4 in Figure 5-7).
- ✓ Others: Many collapsed areas due to the influence of earthquake could be seen in gallery. As no measures indicating “Off Limit”, “No Entrance” to dangerous areas, etc. could be found particularly in the inlet of gallery, it was proposed and recommended by the delegation that measures to stop entering into the off limit area by means of logs, ropes, etc. were immediately required (photos 9 and 10 in Figure 5-8).

- ➢ Mr. Silver Mapnnda (Assistant Mining Inspector of DoM) proposed that the inlet part of gallery in the abandoned mine should immediately be closed by logs as measures to indicate “Off Limit” or “No Entrance” since there was a possibility that the collapse, etc. of unstable base rock might occur (photo 5 in Figure 5-7).

1：Office of Mean Jalawe Coal Mine

2：Medical Instruments in the office

3：State of hand sorting and dressing

4：State of hand sorting and transportation

5：State of mouth of abandoned gallery

6：Inlet of gallery

Figure 5-8 Photos of investigation on Mean Jalawe Coal Mine (1/2)

7：State of supports near gallery inlet

8：State of roof rock near gallery inlet

9：State of gallery

10：State of gallery

Figure 5-9 Photos of investigation on Mean Jalawe Coal Mine (2/2)

5.5 Kaziwiziwi coal mine

The study team investigated Kaziwiziwi coal mine owned by Kaziwiziwi Coal Mines Ltd., which is located in Livingstonia area of the Rumphi District in the north of Malawi. The mine is located in about 370 km north from Capital Lilongwe. Interviewees at the investigation are listed below.

Mean Jalawe Coal Mines Ltd.

- ✓ Mr. Nick Stals: Acting General Manager
- ✓ Mr. Beforce Nynrend: Administrator
- ✓ Mr. Marco Hewucaun: Maintenance Manager

Upon the receipt of explanation on outlines of this coal mine by Mr. Stals, the mining gallery was inspected. Gallery map of this mine is shown in Figure 5-9. Outlines of investigation result are described in the following.

Figure 5-10 Map of mine gallery in Kaziwiziwi coal mine

- ➢ Kaziwiziwi Mining Company Ltd. had commenced its production from 2007 mainly by underground mining (room and pillar method) (photo 1 in Figure 5-10). The company has

produced sub bituminous coal of approximately 60 tons/day. Mr. Stals has visited the mine periodically from Zimbabwe to conduct the consulting work in regard to the development and the exploration of this mine.

- The number of employees in this mine is 238 persons. Inhabitants living around the mine have been positively employed. One hundred eighty four persons among them are engaged to work for underground mining and the other fifty four persons work at outside of mining gallery. Working hour is (i) 06:00~14:00, (ii) 14:00~22:00 and (iii) 22:00~06:00 in three sift system. The underground mining work is presently carried out at four mining faces at a time (photo 6 in Figure 5-10).

- As to medical facilities, the first aid kit is prepared and kept near the inlet of gallery for coal transportation, and in addition, a building serving for taking a rest as well is built at the area near the coal storage yard (photos 9 to 10 in Figure 5-11). However, no medical doctor is employed.

- It was said that the safety training to workers has been periodically carried out on Monday and Friday in every week. However, details, records, etc. of such training could not be presented.

- This coal mine possesses in-house hydroelectric power generation by own dams and power generator. The capacity of hydroelectric power generation is 350 KW (photos 11 to 12 in Figure 5-11). It was said that approximately 17,000 liters/month of fuel oil could be reduced by using this power generator.

- Inspection of mining gallery inside was carried out by the guidance of Mr. Stals. Main results of investigation are described below.

  - ✓ Inside Space of Mining Gallery: There are two main galleries in this mine, i.e. one is for transportation of coal and another is a gallery for mining (photos 2 and 3 in Figure 5-10). The size of gallery is around 2.5m width x around 2m height in general and it becomes narrower to around 2m width x around 1.5m height partially. The surface of floor in gallery is comparatively cleaned by removing pieces of coal and debris (photo 4 in Figure 5-10).

  - ✓ Supports of Mining Gallery Insides: In the gallery for mining work, log made support pillars are installed at every intervals of approximately 1m, and supporting pillars assembled with logs and rocks of 3m in length x 2m in width x 2m in height are installed at the wider area such as the intersection of two galleries, etc. Protective measures against falling rocks from wall are prepared (photos 4 and 5 in Figure 5-10).

  - ✓ Roof of Gallery: The roof rock of gallery is protected by supports of log pillars installed at every intervals of around 1 m as protective measures against the roof fall (photo 5 in Figure 5-10).

- ✓ Method of Excavation: Drilling and excavation are carried out by the jack hummer (photo 6 in Figure 5-10). Workers did not wear ear plugs.
- ✓ Ventilation of Mining Gallery Insides: It is said that any kind of poisonous gas have not been found out and that the natural ventilation caused by air transfer of jack hummer used at the mining face is sufficient. It was said that the measurement of gases in the gallery had been periodically carried out. Although the measuring instrument was shown, details were unknown since the result of measurement could not be confirmed. The measurement has been carried out to detect concentrations of carbon mono-oxide (CO), hydrogen sulfide (H_2S), oxygen (O_2) and methane gas (CH_4) respectively (photo 8 in Figure 5-11).
- ✓ Transportation: Coals mined at mining face are transported through gallery to the primary coal storage yard located near the inlet of gallery by one wheel hand cart (photo 7 in Figure 5-11).
- ✓ Protective Tools and Equipment: Wearing of dust protecting mask was not sufficient. Some workers at the mining face did not wear working cloths with long sleeves either. Workers carrying out drilling work without wearing ear plugs (photo 6 in Figure 5-10).
- ✓ Others: It was confirmed that spring water existed in gallery. Such spring water was discharged by means of drainage pump of 500 liters/minute in capacity, for approximately eight hours/day (photo 4 in Figure 5-10). The floor of gallery at the area around mining face was especially slippery due to a steep inclination as well as to the existence of spring water on the surface of floor.

- ➢ No measures indicating “Off Limit”, “No Entrance”, etc. could be found in the gallery. It was proposed and recommended by the delegation through Mr. silver Mapnnda – Assistant Mining Inspector that measures to stop entering into the off limit area by means of logs, etc. were immediately required.

1：Office of Kaziwiziwi Coal Mine

2：Inlet of gallery for transport

3：Inlet of gallery for workers

4：State of gallery

5：State of gallery

6：State of mining face

Figure 5-11 Photos of investigation on Kaziwiziwi Coal Mine (1/2)

7：Coal transportation

8：Gas measuring equipment

9：Medical instruments
stored in gallery inlet

10：Building for medical purpose

11：Generator building

12：Dam for water power generation

Figure 5-12 Photos of investigation on Kaziwiziwi Coal Mine (2/2)

5.6 Nkhachira coal mine

The study team investigated Nkhachira coal mine owned by MALCOAL Mining Ltd., which is located in Karonga area of the Karonga District in the north of Malawi. The mine is located in about 25 km west from Karonga city and in about 450 km north from Capital Lilongwe. When the study team investigated two coal mines (Nkhachira and Mwaulambo) in the Karonga area, Mr. Vitumbiko Mkandawire (Mining Engineer) and Mr. Silver Mapnnda (Assistant Mining Inspector) of Mzuzu regional office of the Department of Mines accompanied the study team. Interviewees at the investigation are listed below.

MALCOAL Mining Ltd.

- ✓ Mr. Malizgani Thindwa: Mine Operations Manager
- ✓ Mr. Blessing Chinjoka: Safety Officer
- ✓ Mr. Bligh Frank Pindani: Mining Superintendent
- ✓ Mr. Butta Simukonda: Nursery Supervisor

Upon the receipt of explanation on outlines of this coal mine by Mr. Pindani, the mining facilities were inspected. Outlines of investigation results are described in the following.

- This coal mine had commenced its operation in 2006 and mainly bituminous coal (Approx. 6,000 ~ 7,000 kcal/kg) of approximately thirty tons per day has been produced and shipped. The exploration activities continuously have been carried out.
- Inhabitants living around the mine are positively employed as employees in the mine. Approximately thirty persons of them are employed at all times, also there may be a case or cases that the maximum approximately twenty persons may additionally and temporarily be employed. The working hours are two shifts working system of (i) 06:00-18:00 and (ii) 18:00-06:00.
- Major heavy machines possessed and used in MALCOAL Mining Ltd. are two sets of dump tracks (loading capacity; 17t), one of wheel loader, one of dozer, one of excavator, etc. (refer to photos 3 and 4 in Figure 5-12).
- It was said that the training on safety and security for workers was periodically carried out. However, details of training items as well as the record of training, etc. are unknown since they could not be confirmed.
- Inspection of this mine inside was carried out by the guidance of Mr. Pindani, etc. Major results of investigation are as described in the following.
  - ✓ Mining Method: Open pit mining is carried out in this mine. Excavation, transportation by means of heavy machines such as wheel loader, etc. without using blasting (photo 7 in Figure 5-12) as well as hand sorting of coal (photo 9 in Figure 5-

12) are carried out.

- ✓ Transportation: Coal mined out at working face (photos 5 and 6 in Figure 5-12) in the mine is to be transported out by means of heavy machines such as wheel loader, etc. to coal storage yard (photo 10 in Figure 5-12). Final products are transported by means of dump track having a loading capacity of 17 tons (photo 3 in Figure 5-12).
- ✓ Slope Remained after Mining: Generally, the berm of slope is not sufficiently ensured and particularly loose rocks and/or stones as well as collapse are found here and there accordingly (photos 6 and 7 in Figure 5-12). The installation of protective fences, etc. is not sufficient (photo 5 in Figure 5-12).
- ✓ Protective Equipment: Protective equipment is appropriately used. Especially, it could be recognized that workers at mining face are satisfactorily using the protective equipment (photo 8 in Figure 5-12). However, it was found the fact that some of workers in the hands sorting process did not wear safety shoes and/or long sleeve working cloth.
- ✓ Others: Roads in the mine are comparatively prepared and have not evident unevenness and/or roughness on their surfaces. It was said that the water sprinkling would sufficiently be carried out as countermeasures against dust dispersion (photo 2 in Figure 5-12). The break rooms as well as the medical first aid kit are prepared (photos 9 and 10 in Figure 5-12).

- ➢ In addition, the plant cultivation yard possessed by the mine exists in the coal mine. It was informed that 5,000 nursery trees are planted for the tree planting after back filling (photos 11 and 12 in Figure 5-12).
- ➢ However, it was found and confirmed that inhabitants living around the mine were freely moved in the mine even during mine operation. It is considered as the urgent countermeasures to prepare the exclusive by-pass road and/or safety road so that activities of inhabitants required for their daily life may not be obstructed.

1：Office of Nkhachira Coal Mine

2：State of road

3：Dump truck

4：Heavy machines; excavator and dozer

5：Old mining pit

6：Active mining pit and mine face

Figure 5-13 Photos of investigation on Nkhachira Coal Mine (1/3)

7：Mining work in the pit

8：State of mining works

9：Hand sorting work

10：Stock pile

9：Buildings for rest and break

10：Medical equipment

Figure 5-14 Photos of investigation on Nkhachira Coal Mine (2/3)

11：Plant cultivation yard
used for mine rehabilitation

12：Plant cultivation
grown in the yard shown in left photo

Figure 5-15 Photos of investigation on Nkhachira Coal Mine (3/3)

5.7 Mwaulambo coal mine

The study team investigated Mwaulambo coal mine owned by Eland Coal Mining Company, which is located in Karonga area of the Karonga District in the north of Malawi. The mine is located in about 20 km north from Karonga city and in about 460 km north from Capital Lilongwe. Interviewees at the investigation are listed below.

Eland Coal Mining Company

- ✓ Mr. Leon Rademeyer: Mine Manger

Upon the receipt of explanation on outlines of this coal mine by Mr. Rademeyer, the mining facilities were inspected. Outlines of investigation results are described in the following.

- This coal mine commenced its operation in 2007, and started its mechanization from 2010. The maximum approximately 250 tons/day and average approximately 140 tons/day of subbituminous to bituminous coal (Average calorific value; Approx..6,000 kcal/kg) have mainly been produced and shipped. The exploration of new deposits has continuously been carried out.

- Numbers of employees are approximately fifty persons, and inhabitants living around the mine have positively been employed. Working hours are three shifts system, i.e., (i) 06:00-14:00, (ii) 14:00-22:00 and (iii) 22:00-06:00.

- Major heavy machines presently possessed and used are 4 sets of dump tracks (loading capacity: 30t), 2 sets of wheel loaders, one set of grader, 2 sets of excavators, etc. (photos 2 and 3 in Figure 5-13).

- It was advised that the safety training, etc. for workers are to be periodically carried out and that those who wish can participate in taking the training course on the environment and on security to be held in Karonga. However, as details of such training could not be confirmed, details of the same are unknown. Other than the above, medical treatment building as well as medical first aid kits are prepared in the mine (photo 4 in Figure 5-13).

- Inspection of this mine inside was carried out by the guidance of Mr. Rademeyer. Major results of investigation are as described in the following.

  - ✓ Mining Method: The open pit mining is employed (photos 5 and 6 in Figure 5-13). No blasting with dynamite is used and mining has been carried out mainly by using the auger machine (photos 7 and 8 in Figure 5-13). The discharging work of accumulated water in the open pit during rainy season is presently prepared, and the mining work is temporarily stopped accordingly. It is told that the discharging of accumulated water in open pits will take approximately one week. It is also told that the mine is to be operated from May to January in next year and the period from February to April is for

maintenance in accordance with the average year time schedule.

- ✓ Transportation: Mined out coal is to be transported out to the coal storage yard by means of heavy machines such as wheel loader, etc. (photo 9 in Figure 5-13). The final coal products are to be transported by means of dump track having its loading capacity of approximately 30 tons after treatment in coal dressing and sorting process (photo 10 in Figure 5-13).
- ✓ Remained Wall and/or Slope after Mined: Although details of remained wall and/or lope are unknown since pit inside is submerged at present and however the existence of partial collapse(s) of slope as well as insufficiency of protective fences installed can be recognized (photos 5 and 6 in Figure 5-13).
- ✓ Protection Equipment: Details are unknown since pit insides are submerged and mine operation is stopped at this stage.
- ✓ Others: As roads and pits in the mine are submerged and the mine is not in operation at this stage, details are unknown. However, the existence of gully erosion due to rain fall was found at several portions.

1：Office of Mwaulambo Coal Mine

2：Heavy machines

3：Work shop

4：Building for medical treatment

5：Open pit of mine

6：Mining pit (submerged at this time)

Figure 5-16 Photos of investigation on Nkhachira Coal Mine (1/2)

7：Auger machine for mining

8：Drill bit of auger

9：Stock pile and coal sorter

10：Stock pile and coal sorter

Figure 5-17 Photos of investigation on Nkhachira Coal Mine (2/2)

5.8 Office of MALCOAL Mining Ltd. in Lilongwe

The study team made a courtesy visit to Lilongwe Office of MALCOAL Mining Ltd. operating Nkhachira Coal Mine on June 8th 2014 and collected necessary information (Figure 5-14). The interviewee is shown below. Outlines of meeting are described below.

MALCOAL Mining Ltd.

- ✓ Mr. Eugene Khoriyo: Country Manger

- Mr. Onuma, the study team leader, explained the outline of the JICA Project and the contents of ASM study. The study team visited Nkhachira Coal Mine in the end of May 2015 with inspectors of DoM, MNREM and implemented the investigation of mining safety and environment. Special thanks for the acceptance of the investigation were given.
- Mr. Khoriyo told that he had received the request for the investigation in advance.

- MALCOAL Mining Ltd. is a joint venture enterprise established cooperatively with Intra Energy Corporation (hereinafter abbreviated as "IEC") which is an Australian enterprise and with Consolidated Mining Industries Limited (hereinafter abbreviated as "CMI") which is an enterprise in Malawi. This enterprise is managed under the capital contribution ratio of 90% owned by IEC and 10% by CMI. In addition, TANCOAL, an enterprise in Tanzania, is established as well and annually 40,000 tons of coal are produced and shipped. As outlines of IEC including in both countries are stated in the home page of IEC (Figure 5-15), please refer to it (following WEB address).
  http://www.intraenergycorp.com.au/irm/content/malawi-projects.aspx?RID=289

- As the field investigation team was requested to provide their comments of the inspection on Nkhachira Coal Mine operated by MALCOAL Mining Ltd., Mr. Tsuda of JICA team in charge of ASM study provided the following four comments from the view point of mine security.
  - ✓ State in usage of protection equipment is excellent. However, it was found that some of workers did not wear safety shoes and/or long sleeve working cloths.
  - ✓ As the berm on remained embankment does not sufficiently be kept, loose rocks and stones as well as collapsed parts can be seen in several parts around the mining face. Also, it was found that the installation of protective fence was not sufficient.
  - ✓ It was found and confirmed that inhabitants living around mine were moving freely in the mine even during operation. It is deemed to be necessary as the matter of urgency that the exclusive bypass road and/or safety road required for daily activities of inhabitants should be prepared.

- ✓ The plant cultivation yard is possessed by the coal mine. Five thousands nursery trees were planted and it is advised that the mine is making their efforts for the tree planting at the area after back filling. It would be desirable to continue these efforts.

➢ As to items to be improved as pointed out by the field investigation team, the response that the mine is under consideration, preparation and planning on the same was obtained as a reply from the mine.

Figure 5-18 Meeting at Lilongwe office of MALCOAL Mining Ltd.

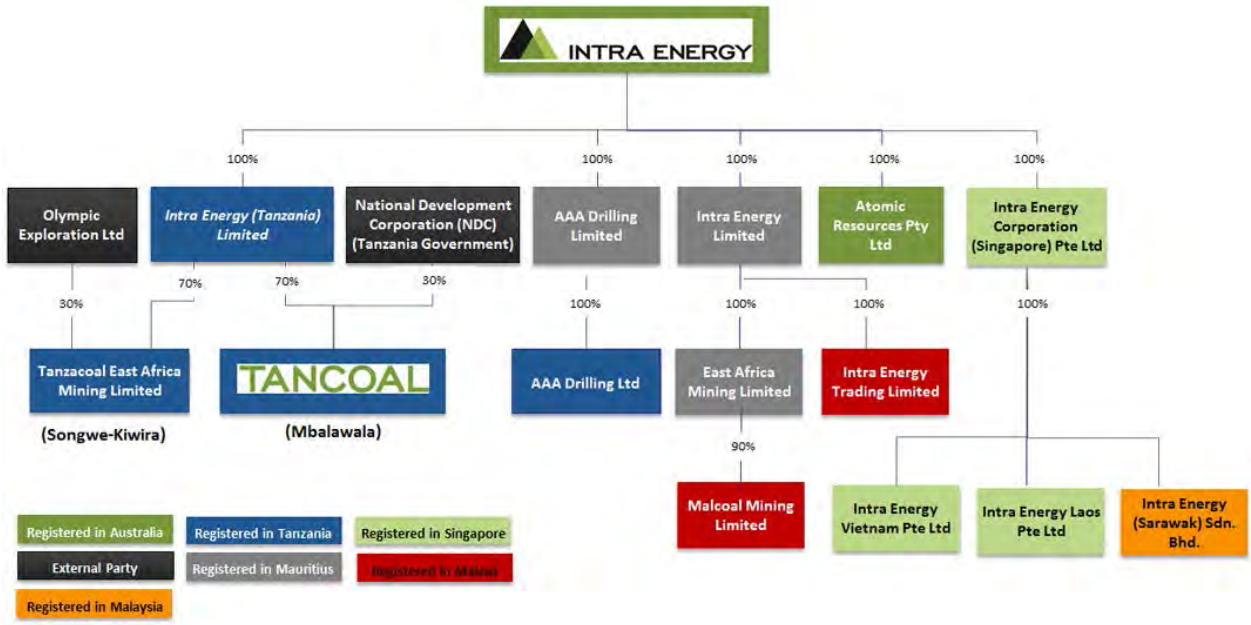


Figure 5-19 Organization chart of Intra Energy Corporation

5.9 ASM Symposium

"The Artisanal and Small Scale Mining Policy Constructive Symposium" hosted by WB and related organizations was held in Lilongwe on November 11th and 12th, 2014 in the end of the 2nd On-site Works in Malawi. Three members of the study team participated in the symposium.

Approximately three hundred persons as officers of the Malawi Government and MNREM, ASM workers and authorized persons of banks and consultants attended to the symposium (photos 2 and 3 in Figure 5-17). The program of the symposium is shown in Figure 5-16.

Main presentations are as follows. Presentation data are shown in Appendix 5-1 to 5-5.

(a) Presentation (Item no. 15): Appendix 5-1

Ms. Karen Hayes, on behalf of Pact which has the actual experience of its activities for forty three years based in Washington DC, reported the state in the world in connection of ASM as well as the present state of Malawi in which she is under activities from 2007. The essential point is that the ensuring and management to maintain appropriate working environment and mine safety, etc. at mining site are important, and that the marketing for maximizing the profit of products by ASM is important as well since the income by ASM is unavoidably necessary for workers at site.

(b) Presentation (Item no. 16): Appendix 5-2

Mr. Mbewe, ASM representative in Malawi, passionately made a presentation. Clay, lime stone and river sand are produced by hand mining as a rule without using heavy machines as well as the case of jewels and precious stone. It is necessary that mining companies in Malawi should be cooperated in order to perform the optimization and the high efficiency of work since ASM will become a key for the development of Malawi. The policy to be taken in future is to collect the information of markets outside of Malawi and to plan realistic strategy to the market, etc.

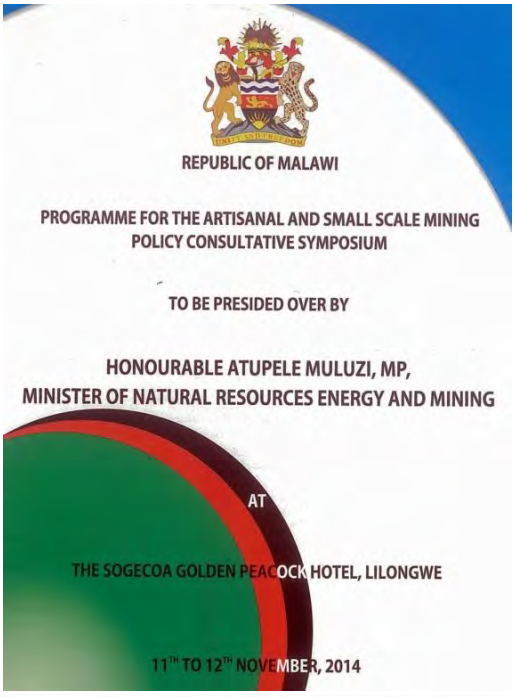
(c) Presentation (Item no. 18): Appendix 5-3 and 5-4

The MNREM reported the concept in regard to mainly policies of ASM. The draught on ASM policy (Appendix 5-5) reflected from the result of discussions in this symposium was distributed. The essential point of this report is to carry out the stake-holder meeting with persons concerned [i.e. the person engaged in ASM, leaders in the area, officials of the government, persons from the mining company, members of local assembly, persons engaged in education, persons from financial business, etc.] aiming at the economic development of Malawi and at the minimization of poverty through sustainable ASM activities.

Items to be discussed as priority matters in the stake-holder meeting are listed below.

- Morals of enterprise and promotion on employment

- Promotion for acquiring experience in regard to sustainable environmental protective mining
- Promotion for acquiring technologies for generating a higher added value
- Actions to solve social issues on employment of men and women in relation to ASM
- Increase of profit according to acquiring technologies for high added value
- Role of legal system in regard to acquirement of technologies for high added value



DAY ONE TUESDAY 11 TH NOVEMBER, 2014		
DIRECTOR OF CEREMONY : Mr. Gusto Mabvuto, MNREM		
Item No.	Approx. Time	Activity
1.	7:45 hrs.	All Arrangements are completed at Sogecoa Golden Peacock Hotel, Lilongwe;
2.	7:45 hrs.	Registration ;
3.	8:30hrs	All invited guests get seated
4.	8:45 hrs.	Honourable Atupele Muluzi, Minister of Natural Resources Energy and Mining arrive at Sogecoa Golden Peacock Hotel, Lilongwe;
5.	9:00 hrs.	Guest of Honour arrive at Sogecoa Golden Peacock Hotel, Lilongwe;
Met by:	Ben Botolo, Secretary for Natural Resources, Energy and Mining; Dr. Yanira Ntupanyama, Secretary for Environment and Climate Change; Ms. N.T. Nthambala,Secretary for Energy; Mrs. Emma Adam, President of Malawi Women in Mining; Willie Chipondera, His Lordship, , The Mayor, Lilongwe City Council Mr. Charles Kalemba, District Commissioner, Lilongwe Mr. Phillip Madinga, Managing Director, , FDH Bank Mr. Clive Bacon, the Country Director, PACT Malawi Mr. Greshom Sichinga, World Bank Malawi Country office The Head of Delegation, European Union Ms. Mia Seppo, The Resident Representative, UNDP Hon. Wellan Chilenga, Chairman of Parliamentary Committee on Natural Resources and Climate Change	
THE Guest of Honour is briefed in the VIP Lounge;		
THE Guest of Honour is conducted on a tour of Exhibition mounted by Artisanal and Small Scale Miners and other sponsoring companies		
The Guest of Honour proceeds to the Main Hall;		
6.	10:00 hrs.	Prayer by Rev
Welcome Remarks by the Director of Ceremony		
7.	10:15 hrs.	Statement by Emma Adams, President of Malawi Women in Mining (MAWIMA)
8.	10:25 hrs.	Statement by Mia Seppo, UNDP Resident Representative
9.	10:50 hrs.	Performance by : Chindime
10.	11:10 hrs.	Statement by European Union Representative
11.	11:20 hrs	Statement by Phillip Madinga, Managing Director, FDH Bank
12.	11:30 hrs.	Remarks by Ben Botolo, Principal Secretary, Ministry of Natural Resources Energy and Mining;
13.	11:50 hrs.	Speech by the Guest of Honour; Honourable Atupele Muluzi, MP, Minister of Natural Resources Energy and Mining.
14.	11:50hrs	The Guest of Honour and all invited guests proceed outside the Conference Hall for a group photograph.
	12.00 to13:30hrs	**LUNCH IS SERVED**
15.	13:30hrs	Presentation on the Overview of ASM globally – putting Malawi's ASM sector in context by; Karen Hayes, PACT USA Presentation on The Status of ASM sub-sector in Malawi by; Charles Kaphwiyo, Director Department of Mines (DoM)
16.	13:45hrs	Presentation by I. Mbewe, Artisanal and Small Scale Miners representative
17.	14:00hrs	Discussion 40 Mins
	14:40hrs	**HEALTH BREAK**
18.	15:00hrs (30 mins)	Presentation on Overview of the draft Artisanal and Small Scale Mining Policy by; Atileni Wona;Deputy Director, Department of Mines (DoM)
19.	15:30hrs (1hr 20mins)	Group discussions on the four ASM Policy priority Areas (focusing on any relevant inputs and recommendations)
20.	16:50hrs	Closing Remarks and Summary of the Meeting by Karen Hayes, PACT USA
DAY TWO WEDNESDAY 12 TH NOVEMBER, 2014		
DIRECTOR OF CEREMONY : Ms. Stabene Majamanda, FDH Bank		
21.	8:30hrs (1 hour) 15mins 15mins 15mins 15mins	Group Work Presentation on Policy Priority Area 1: Mineral Development Policy Priority Area 2: Investment Climate in the minerals sector Policy Priority Area 3 : Environmental Management Policy Priority Area 4: Socio-economic Issues.
22.	9:30hrs (45 mins)	Discussion
	10:15hrs	**HEALTH BREAK 15 mins**
23.	10:30hrs (1 hour 30 mins) 20 mins present & 10 mins discuss 20 mins present & 10 mins discuss 20 mins present & 10 mins discuss	Presentations: Access to Financial Services by; Stabene Majamanda, FDH Bank Access to Markets by; Clive Bacon, PACT USA Overview of interventions, activities, programs that could be relevant to ASM in Malawi: Department of Mines (DoM)

Figure 5-20 Program of ASM symposium

1：Signboard of ASM Symposium

2：Panoramic view of venue

3：Participants

4：Presentation

5：Major presenters
Center two persons are Directors of MNREM

6：Invitees (Paramount chiefs, etc.)

8：Group discussion

Figure 5-21 Photos of ASM Symposium (1/2)

9：Exhibition of ASM products outside venue (building materials, jewelry, pottery, etc.)

10：Pottery

11：Building materials, stones

12：Tiles and materials

13：Jewelry and precious stones

Figure 5-22 Photos of ASM Symposium (2/2)

5.10 Review of ASM policy

As a review of ASM policy, (i) Development of mineral resources in ASM sector, (ii) Investment environment in ASM sector, (iii) Safety and environment of working places and environmental management and (iv) Social problems were extracted. These are summarized in Table 5-3 to Table 5-6.

Table 5-3 Review of ASM policy (1/4)

Policy statement	Responsibility	Schedule 2014	2015	2016	2017	2018	2019	Advice
Policy priority Area 1: Mineral Development in ASM Subsector								
1.1: Government will develop new legislation for ASM subsector which can be easily understood and relevant to the ASM miners.	MNREM/MOJ/DOM/COM/LC							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
1.2: Government will streamline and simplify licensing procedures for ASM subsector.	MNREM/DOM							・Periodic training and retraining is to be consecutively carried out for the related officials of the related organization, and successful case examples as well as achieved case examples are to be jointly possessed.
1.3: Government will facilitate the formation and strengthening of ASM cooperatives.	MNREM/DOM/MOIT							・Periodic training and retraining is to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
1.4: Government will facilitate provision of technical training and other forms of assistance on sustainable development of ASM in order to ensure optimal exploitation of mineral resources.	MNREM/DOM/MOE							・Periodic training and retraining is to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
1.5: Government will coordinate and promote demand driven mineral research and dissemination of results to relevant stakeholders.	MNREM/MOIT/OVOP							・The investigation on the best practice in other countries is to be carried out and the result obtained from the same is to be introduced. ・Successful case examples and achieved case examples are to be jointly possessed, and they are to be dispersed through the periodic training and retraining.
1.6: Government will facilitate creation of an enabling environment for easy access to information and technology; and plant and equipment for mining and value addition for ASM.	MNREM/MOIT							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
1.7: Government will promote provision of training to ASM in downstream processing of minerals.	MNREM/MOIT							・The investigation on the best practice in other countries is to be carried out and the result obtained from the same is to be introduced. ・Successful case examples and achieved case examples are to be jointly possessed, and they are to be dispersed through the periodic training and retraining.

Table 5-4 Review of ASM policy (2/4)

Policy statement	Responsibility	Schedule 2014	2015	2016	2017	2018	2019	Advice
1.8: Government will facilitate provision of support infrastructure in the subsector.	MNREM/DOM/MOE							・Successful case examples and achieved case examples are to be jointly possessed, and they are to be infiltrated to workers through the periodic training and retraining.
1.9: Government will facilitate establishment of mineral marketing centres.	MNREM/MOIT							・The investigation on best practice in other countries is to be carried out and the result of the same is to be introduced.
1.10: The policy will promote the growth of both competitive local and export mineral markets for ASM products.	MNREM/MOIT/MCFTC							・The investigation on best practice in other countries is to be carried out and the result of the same is to be introduced.
1.11: Government will promote and facilitate participation of artisanal and small scale miners in exhibitions, trade fairs and through foreign missions.	MNREM/DOM/MOIT							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
1.12: Government will put in place mechanisms to monitor the whole marketing chain for mineral sales.	MNREM/MOIT/MOF/MRA/MPS/MITC							・The investigation on best practice in other countries is to be carried out and the result of the same is to be introduced.
1.13: Government will facilitate the creation of an enabling environment that will support and encourage co-existence of both ASM and large scale mining operations.	MNREM/DOM/GSD							・The investigation on best practice in other countries is to be carried out and the result of the same is to be introduced.

Policy statement	Responsibility	Schedule 2014	2015	2016	2017	2018	2019	Advice
Policy priority Area 2: Investment climate in ASM subsector								
2.1: Government will review royalty rates and develop appropriate fiscal and taxation regime for ASM subsector.	MNREM/MOF/MRA/DOM							・Partnership (network) between respective ASM areas in Malawi is to be constructed. ・Successful case examples as well as achieved case examples are to be jointly possessed and infiltrated.
2.2: The policy will promote and facilitate access to finance by linking ASMs to financial institutions and organizing them into cooperatives etc..	MNREM/FI/MOF/RBM/MOT/MEDI							・Partnership (network) between respective ASM areas in Malawi is to be constructed. ・Successful case examples as well as achieved case examples are to be jointly possessed and infiltrated.
2.3: Government will endeavor to lobby with lending institutions to have lower interest rates for the ASM subsector.	MNREM/MOF/FI							・Partnership (network) between respective ASM areas in Malawi is to be constructed. ・Successful case examples as well as achieved case examples are to be jointly possessed and infiltrated.

Table 5-5 Review of ASM policy (3/4)

Policy statement	Responsibility	Schedule						Advice
		2014	2015	2016	2017	2018	2019	
Policy priority Area 3: Environmental Management, Occupational Safety and Health								
3.1: The policy will support the provision of training in environmental management.	MNREM/EAD/DOM							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
3.2: Government will facilitate monitoring and enforcement of compliance of mining environmental standards in ASM.	MNREM/EAD/DOM							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
3.3: Government will facilitate provision of training in Occupational Safety and Health (OSH) standards to both inspectors and ASM miners.	MNREM/DOM/MOL/EAD							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
3.4: Government will set up mechanisms for routine monitoring and inspection of ASM operations.	MNREM/DOM/MOL/EAD							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
3.5: Government will enforce proper decommissioning and rehabilitation of mined out areas.	MNREM/EAD							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.

Table 5-6 Review of ASM policy (4/4)

Policy statement	Responsibility	Schedule 2014	2015	2016	2017	2018	2019	Advice
Policy priority Area 4: Social Issues								
4.1: The policy will encourage equal participation in the ASM subsector.	MNREM/MGCD/MOL							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
4.2: Government will enforce regulations against child labour and abuse.	MNREM/MOL/MOE/MOJ							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
4.3: The policy will facilitate sensitisation and awareness campaigns about child labour issues.	MOL/MCTU/ECAMA/MOM							・Successful case examples and achieved case examples are jointly possessed, and model works are to be established.
4.4: Government will provide more educational infrastructure in remote areas where ASM activities are taking place.	MNREM/MEST							・Measures for supplementary training and/or correspondence course of training are to be considered. ・Successful case examples and achieved case examples in respective ASM areas of Malawi are jointly possessed, and model works are to be established.
4.5: The policy will facilitate HIV and AIDS awareness campaigns.	MNREM/DNHA/NAC							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.
4.6: Government will facilitate training in HIV and AIDS.	DNHA							・Periodic training and retraining are to be consecutively carried out for the related parson in respective ASM areas of Malawi, and successful case examples as well as achieved case examples are to be jointly possessed.

<Abbreviations>
MNREM: Ministry of Natural Resources, Energy and Mining/DOJ: Ministry of Justice/DOM: Department of Mines/GSD: Geological Survey Department/COM: Commissioner of Mines/LC: Law Commission/MOIT: Ministry of Industry and Trade/MOE: Ministry of Education/OVOP: One Village one product/MCFTC: Malawi Competition and Fair Trading Commission/MRA: Malawi Revenue Authority/MPS: Malawi Police Service/MITC: Malawi Investment and Trade Centre/RBM: Reserve Bank of Walawi/MEDI: Malawi Entrepreneurial Development Institute/EAD: Environmental Affairs Department/MOL: Ministry of Labour/MGCD: Ministry of Gender and Child Development/MCTU: Malawi Congress of Trade Union/ECAMA: Economic Association of Malawi/DNHA: Department of Nutrition and HIV and AIDS/NAC: National AIDS Comission

5.11 Proposal for ASM measures

(1) ASM policy

The results of review on ASM policy is summarized in Tables 5-3 to 5-6. In addition, the following three points are proposed in order to keep sustainable development of mining in Malawi.

- The Ministry of Natural Resources, Energy and Mining (MNREM) in the Republic of Malawi, as a center organization, corresponds to the matter of ASM operation on respective areas in cooperation with other related organizations and agencies.
- MNREM disseminates examples of successful cases accomplished for respective areas of ASM operation through the stakeholder meeting to relevant persons (i.e. governmental officials, persons being engaged in ASM, regional leaders, relating persons in the mining company, local assemblymen, relating persons in education and financial institution, etc.).
- MNREM summarizes the progress of respective issues in policy at least once per annum. MNREN makes relating persons know thoroughly the result of the progress and the target to be performed until next confirmation of the progress at the stake-holder meeting.

(2) Kaolinite deposits in Linthipe

The JICA study team collected one sample (No. ML150520) for chemical analysis at the mining site of ceramic clay in Linthipe and provided for assay. This assay result and analytical value of kaolinite on typical usage are shown in Table 5-7.

According to the field investigation and assay result, the followings are proposed for the usage of clay deposits in Linthipe.

- As this material contains a higher content of iron oxides from the result of chemical analysis, the best way is to utilize for production of refractory bricks and materials as well as earthen ware to be decorated with a higher design.
- As this material is composed of comparatively fine particles form the result of particle size analysis, it is considered to utilize for gardening goods and environment cleaning materials from the point of their higher absorption characteristics. However, the specific surface area has to be measured prior to use in such purpose.
- As the number of sample collected is only one, it is necessary to conduct field survey in whole area of the clay deposits in Linthipe and to evaluate the deposits. It is possible to carry out the survey based on the experience of the geochemical survey in

this Project.

Table 5-7 Chemical analysis of kaolinite clay in Linthipe

(UNIT: %)

Samples	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	Na_2O	K_2O	LOI
ML150520 (in this study)	46.2	34.7	**3.39**	0.81	0.76	0.23	0.30	0.27	13.2
Example: for paper manufacture	71.47	22.17	0.87	–	3.64	0.36	–	–	4.61
Example: for coating (USA)	44.32	39.42	0.67	1.29	0.68	0.21	–	–	13.95
Example: for pottery (KOREA)	46.32	38.54	0.55	–	0.60	0.31	–	–	13.50

(3) Coal mines in Livingstonia and Karonga regions

As a result of investigations on five coal mines in Livingstonia and Karonga regions, the followings are proposed.

- In order to carry out the security training until every workers have sufficient knowledge and consciousness on security, the mining company (i.e. the holder of mining right) would carry out periodic training and retraining as well as preparation and keeping of realizable plans and records, etc.
- Regardless of inside or outside of mining pit and/or shaft, perfect wearing of protective equipment and/or tools (i.e. helmet, safety shoes, working clothes, ear plug, etc.).
- Thoroughly clear notification on the entrance restricted area and the wearing of protective equipment and tools, etc. has to be indicated.
- In order to ensure the safety on environment at the underground mining work, detection of poisonous gas in the mining pit has to be carried out in due course.
- Both the mining company (i.e. holder of mining right) and workers have to keep the safety rules and regulations.
- In case of the open pit mining, the ensuring of safety for the remaining slope (i.e. securing of berms and installation of protective fences, etc.) is to be thoroughly carried out, and the rehabilitation of land such as planting of indigenous plants, etc. is to be carried out.
- In case that the coexistence with living space of inhabitants in and around the mining area is required, countermeasures such as preparation of detours for exclusive use and safety roads, etc. are indispensable.

In addition, the followings are proposed in order to keep sustainable development of mining in Malawi.

- In Japan, the basis of preservation of security is on the concept, which is called "Independent Safety Measures", that workers secure themselves, and considerably successful result on preservation of security has been obtained as the result of efforts made for a long years by manager side and workers. This is caused by not only the instruction provided from the manager side but that the manager carried out to keep safety rules and regulation by himself and consequently workers would have thorough consciousness to keep safety rules and regulations for carrying out the preservation of security (Figure 5-23).
- There is a way to improve the preservation of security by developing security technology in Malawi. Firstly, "What is of security?" and "What is preservation of security?" are to be taught and trained for all workers, and it is considered that the result of preservation of security will evidently be improved when it reached to the step of independent preservation of security.

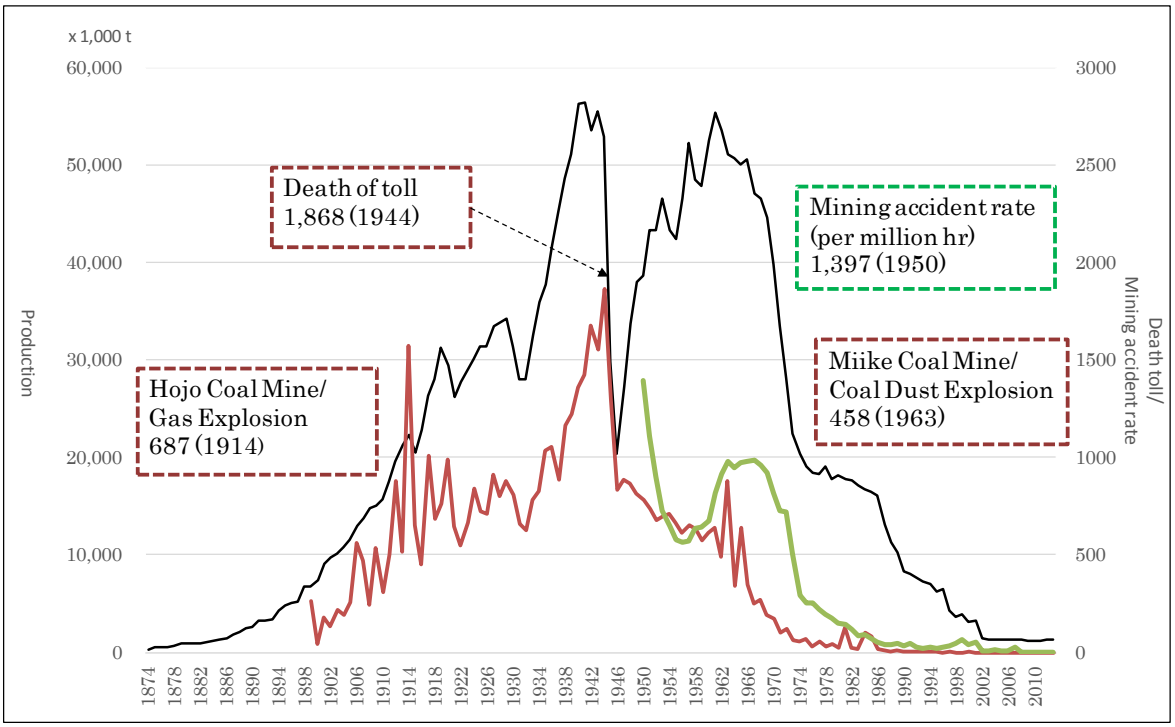


Figure 5-23 Trends of coal production and disaster in Japan (1874 to 2013)

(4) Capacity building by training

Supposing the training inside and outside of Malawi, the following two points are proposed for the purpose to contribute to capacity building necessary to maintain the sustainable

development of mining.

- The training in Malawi is carried out at MNREM in Lilongwe and respective its regional offices as well as respective sites, etc. Target persons are mainly composed of stakeholders (governmental staffs, persons who engaged to work for ASM, regional leaders, persons relating mining companies, etc.). Also, instructors and lecturers will be dispatched to make them obtain higher knowledge in technology for security and safety as well as the system for management and control, etc.
- As the training in Japan, participating to the security and safety training course at the coal mine being operated, trainees obtain the knowledge for policy on security and safety in coal mine in Japan from specialists. Target persons are to be mainly persons of governmental organizations.

6 Monitoring of the Project

The Joint Coordination Committee (JCC) whose chairman is Mr. Ben Botolo, the Principal Secretary of the Ministry of Natural Resources, Energy and Mining was settled to monitor and confirm the project progress. The first JCC was planned to be held on the middle August 2014 in the 1st On-site Works in Malawi. However, PS Botolo was appointed by the Malawi Government just before, and was so busy that he could not take time to hold the JCC. Therefore, the study team just visited him, and submitted the Work Plan and explained the outline of the Project on 19 August 2014. The first JCC was finally held in the end of the 2nd On-site Works in Malawi.

The Technical Coordination Committee (TCC) was also settled with the similar objectives as JCC, which is composed of Director and staffs of GSD. The responsible person of TCC is Mr. Jalf Salima, the Deputy Director of GSD. The TCC members discuss the confirmation and consideration of the project plan, the confirmation of the project progress, the issues on technical aspect, problem in the project and the future plan. Then, the study team makes the feedback on the project as necessary.

6.1 JCC

(1) The first JCC

(a) Date and time: 10 November 2014 (Monday), 17:30 to 18:00

(b) Place: Conference room at MNREM in Lilongwe

(c) Attendees: PS Botolo, Mr. Kaphwiyo Director of DoM, Director of OCM, Principal geologists of GSD (Mr. Chiwona and Mr. Dombola), JICA Malawi office (Mr. Shimoda, Mr. Kubo and Mr. Chiona), JICA study team (Mr. Onuma, Mr. Momose and Mr. Tsuda)

(d) Contents:

- Opening remarks: PS Botolo
- Report 1: Explanation of the Project contents

  Mr. Onuma, leader of JICA study team, explained the outline of the Project.

  - ✓ Objectives, outcome
  - ✓ Contents: Five activities, (i) implementation of geochemical survey, (ii) integration of survey results into GIS database, (iii) support for ASM measures, (iv) long-term

training in Japan and (v) monitoring of the project

- ✓ Schedule, personnel
- ✓ Provided equipment

- ➢ Report 2: Report of the Project progress

  Mr. Onuma, leader of JICA study team, explained the progress of the Project.

  - ✓ Geochemical survey: completed survey in five areas, collected 319 samples, held the training seminar how to use XRF analyzers donated
  - ✓ ASM study: visited clay deposits in Linthipe and three coal mines in Livingstonia (Mchenga, Mean Jalawe, Kaziwiziwi), made interview and inspection about facilities, operating situation, safety and environmental measures and others
  - ✓ GIS database: creating GIS data of geochemical survey results

- ➢ Discussion 1: Explanation of the Project contents

  - ✓ Overall schedule of the Project and JCC schedule as 2 times/ year were confirmed.
  - ✓ The second JCC should be held on February 2015 in the 3rd On-site Works in Malawi. Date of next JCC will be decided later.
  - ✓ The results of the 1st year program will be reported in the second JCC.

- ➢ Remarks: Mr. Shimoda, Deputy Resident Representative of JICA Malawi office
- ➢ Closing remarks: PS Botolo

The fifth person from right is PS Botolo.

Figure 6-1 Attendees of the first JCC

(2) The second JCC

(a) Date and time: 21 May 2015 (Wednesday), 10:00 to 11:00

(b) Place: Conference room at MNREM in Lilongwe

(c) Attendees: PS Botolo, Mr. Kaphwiyo/ Director of OCM, Mr. Wona/ Director of DoM, Mr. Mabvuto/ Director of Finance, Mr. Salima/ Director of GSD, Mr. Chilumanga/ Acting director of DoM, Mr. Banda/ Principal geologist of GSD, JICA study team (Mr. Onuma, Mr. Tashiro and Mr. Tsuda)

(d) Contents:

- Opening remarks: PS Botolo
- Report 1: Report of the results of the first year program (2014)

  Mr. Onuma, leader of JICA study team, reported the results of the first year program.

  - ✓ Objectives, schedule, personnel
  - ✓ Results of five activities: (i) results of geochemical survey, (ii) results of ASM investigation on coal mines, (iii) creation of GIS database, (iv) start of long-term training in Japan and (v) holdings of JCC and TCC.
  - ✓ Geochemical survey: completed survey in three model areas with 319 samples, explanation of analytical results of assay results in each area
  - ✓ ASM study: visited clay deposits in Linthipe and three coal mines in Livingstonia (Mchenga, Mean Jalawe, Kaziwiziwi), made interview and inspection about facilities, operating situation, safety and environmental measures and others
  - ✓ GIS database: created GIS data of geochemical survey results
  - ✓ Explained provided equipment
- Report 2: Explanation of study plans in the second year program (2015)

  Mr. Onuma, leader of JICA study team, explained the study plans of the second year program.

  - ✓ Schedule, personnel
  - ✓ Activities: (i) geochemical survey, (ii) ASM investigation on coal mines, (iii) creation of GIS database, and (iv) holdings of JCC and TCC.
  - ✓ Geochemical survey: collect 700 samples in five model areas in the middle of Malawi, explanation of geological map and sampling site in each area

- ✓ ASM study: visit coal mines in Karonga District in the north of Malawi, make the same interview and inspection as the first year program
- ✓ GIS database: create GIS data of geochemical survey results
- ✓ JCC and TCC: TCC was held yesterday at Zomba.

➢ Closing remarks: PS Botolo

Figure 6-2 The second JCC

(3) The third JCC

(a) Date and time: 1 February 2016 (Monday), 9:00 to 11:00

(b) Place: Conference room at MNREM in Lilongwe

(c) Attendees: Mr. Kaphwiyo/ Director of DoM, Mr. Mabvuto/ Director of Finance, Mr. Salima/ Director of GSD, Mr. Banda/ Principal geologist of GSD HQ, Mr. Sakhuta/ Senior geologist of GSD Lilongwe office, Mr. Hamella/ Principal economist, Mr. Chiwambo/ Senior mining engeneer of DoM, JICA Malawi office (Mr. Wada/ Deputy Resident Representative, Mr. Kubo/ Assistant Resident Representative, Mr. Millinyu/ Program Officer), JICA study team (Mr. Onuma, Mr. Tashiro, Mr. Momose and Mr. Tsuda)

Note: Principal Secretary of MNREM was replaced from Mr. Botolo to Mr. Kaphaizi on 1st February 2016. Both of them could not attend the JCC because of this sudden change.

Figure 6-3 The third JCC

(d) Contents:

- Opening remarks: Mr. Kaphwiyo, DDoM
- Opening speech: Mr. Wada/ Deputy Resident Representative of JICA Malawi office
- Report 1: Report of the outline of the Project

  Mr. Onuma, leader of JICA study team, explained the outline of the Project.

  - ✓ Objectives, outputs
  - ✓ Contents: Five activities, (i) implementation of geochemical survey, (ii) integration of survey results into GIS database, (iii) support for ASM measures, (iv) long-term training in Japan and (v) monitoring of the project
  - ✓ Schedule, personnel

- ✓ Technology Transfer Seminar for geochemical survey, Workshop to report overall results of the Project

- Report 2: Report of the final results of the Project

  Mr. Onuma, leader of JICA study team, reported the final results of the Project.

  - ✓ Geochemical survey: completed survey in eight model areas with 1,029 samples, obtained all assay results, extracted four promising areas based on the statistical analysis results.

  - ✓ ASM study: visited clay deposits in Linthipe and five coal mines in Livingstonia and Karonga districts, made interview and inspection about facilities, operating situation, safety and environmental measures and others, proposed the usage of clay deposits based on its assay result.

  - ✓ GIS database: created GIS data of geochemical survey results,
    The JICA study team intended to integrate this GIS data into existing GIS database created in the previous JICA Project on 29th January. However, it was confirmed that two external hard disks, which had been previously donated and stored the database, were not accessible (possibly broken). The JICA team guessed this reason to be unconnected hard disks from UPS.

  - ✓ Long-term training in Japan: Five engineers have studied in Master degree's program in Japanese universities. Two of them are from GSD, two from DoM and one from private sector.

  - ✓ Proposal for future cooperation: The JICA study team proposes (i) detailed geochemical survey on promising areas selected in this Project and (ii) capacity building for more advanced geochemical survey and mineral resources exploration as a follow-up project.

- Report 3: Report of the final results of geochemical survey

  Mr. Tashiro of JICA study team in charge of geochemical survey reported the final results of geochemical survey.

  - ✓ Survey contents: 1,029 stream sediment samples were collected in eight model areas (GC01 to GC11) and chemical analysis was conducted in the laboratory.

  - ✓ Survey results: Based on the statistical analysis of assay results, distinctive geochemical anomaly was extracted in each model area.

  - ✓ Evaluation: Four promising areas were selected. (i) REE in Mzimba area, (ii) Cu and Co in Chitipa area, (iii) Cu and Au in Nsanje area, (iv) Cu-Co, REE and P in Balaka area.

- ✓ Proposal: (i) detailed survey in the promising areas, (ii) nationwide geochemical survey and (iii) survey in new model areas are proposed for the future.

- Report 4: Report of the final results of ASM study

  Mr. Tsuda of JICA study team in charge of ASM study reported the final results of ASM study.

  - ✓ Review of ASM policy: made review of implementation plan and framework of monitoring and evaluation.
  - ✓ Inspection results: visited five coal mines in Livingstonia and Karonga districts and clay deposits in Linthipe, made interview and inspection about facilities, operating situation, safety and environmental measures and others.
  - ✓ Proposal 1: collected one clay sample and conducted its chemical analysis,
    It is difficult to find other usage than pottery because the content of iron oxides is high.
  - ✓ Proposal 2: The sufficient implementation of safety education and treatment, the enactment and observance of safety regulations and the environmental remediation are highly proposed to coal mines.

- Report 5: Report of GIS database

  Mr. Momose of JICA study team in charge of GIS database reported the current situation of GIS database.

  - ✓ Data contents: GIS data created in this Project is composed of description data and photos in sampling sites, assay results of samples, results of statistical analysis and geochemical maps.
  - ✓ Database structure: Geochemical maps, geochemical data and geochemical survey manual are stored in each three folders.
  - ✓ Database integration: It is planned that GIS data created in this Project should be integrated into the existing GIS database created in the previous JICA Project. However, it was recognized that the external hard disks donated to GSD were out of order. Therefore, the GIS database of this Project is temporally provided to GSD and the JICA study team will send the hard disk storing the integrated GIS database which the team will create after returning to Japan.

- Closing speech: Mr. Wada/ Deputy Resident Representative of JICA Malawi office
- Closing remarks: Mr. Kaphwiyo, DDoM

6.2 TCC

(1) The first TCC

(a) Date and time: 21 August 2014 (Thursday), 9:00 to 11:00

(b) Place: Meeting room at 2nd floor of GSD HQ in Zomba

(c) Attendees: GSD (Mr. Salima, Deputy Director, Mr. Dombola, Mr. Kaonga, Mr. Missi, Ms. Kalebe), JICA study team (Mr. Onuma and Mr. Suzuki)

Note) The reason why the attendees of GSD were only five was that six geologists were engaged in the geological survey at that moment, which JOGMEC had conducted in the north of Malawi.

Figure 6-4 Attendees of the first TCC
(from left; Kaonga, Kalebe, Dombola, Salima, Onuma, Missi)

(d) Contents:

- Self-introduction of every attendees
- Explanation of the Project outline
  Mr. Onuma, leader of JICA study team, explained the outline of the Project based on "Work Plan" using a projector.
- Discussion and selection of the model areas of geochemical survey
  The TCC members discussed geology, mineral resources potential, accessibility, weather and others on 17 candidate areas (900 km^2 area in each) which the JICA study team selected in advance based on existing GIS data of geology and mineral resources and several areas which GSD requested at this moment. Ten candidate areas as model areas were finally selected.

- Confirmation of the procedure to obtain the permission for the field survey
  It is necessary to submit the official documents to the District and police offices prior to the filed geochemical survey and to obtain the permission for the field works. The GSD should make and send the documents in advance.

- Confirmation of the provided equipment
  The equipment and materials and their amount which JICA would donate to GSD were checked and confirmed.

- Selection of C/Ps participating the geochemical survey
  Malawian C/Ps who will participate in the field geochemical survey are not decided yet.

(2) The second TCC

(a) Date and time: 31 October 2014 (Thursday), 8:40 to 9:00 and 15:30 to 16:00

(b) Place: Deputy Director's room at 2nd floor of GSD HQ in Zomba

(c) Attendees: GSD (Mr. Salima, Deputy Director, Mr. Chiwona, Principal geologist), JICA study team (Mr. Onuma and Mr. Tsuda)

(d) Contents:

- Report of the progress of geochemical survey
  The geochemical survey in Chitipa and Mzimba areas was completed and the progress is well as planned. The number of samples will be around 300. Mr. Onuma thanked that geologists and assistants had worked hard and well.

- Training seminar for XRF analyzers
  The training seminar for handheld type XRF analyzers donated by JICA is held at 9:00 on 31 October. The teacher is an engineer of the company which sells this analyzer in South Africa. Any engineers of GSD can participate in this seminar.

- Confirmation of the procedure to obtain the permission for export of samples
  As being necessary to send geochemical samples to the laboratory in South Africa, the study team confirms the procedure to export samples and requests the cooperation by GSD. The procedure is to create a document in Lilongwe regional office of GSD and to obtain the signature of the Director of DoM in the document.

- Request for the measurement of geochemical samples by XRF analyzers
  The study team requests GSD to store remaining samples of chemical analysis in GSD HQ, also requests that engineers of GSD should measure those samples using handheld type XRF analyzer after the team leave Malawi. The objectives are as follows.

- ✓ Consideration of the effectiveness of XRF analyzer: To consider the effectiveness of handheld type XRF analyzer by the comparison of chemical analysis between laboratory and XRF analyzer using same samples.
- ✓ Improvement of the accuracy of XRF analyzer: To improve the analytical accuracy using the assay results of laboratory because the XRF analyzer has the correction program of measured value.
- ✓ Capacity building of GSD engineers: It is expected that GSD will use sustainably the XRF analyzer in own project through mastering the right use of the handheld type XRF analyzer.

- Report of ASM survey at Linthipe

  The study team visited the Linthipe Ceramic Center of GSD, and inspected facilities and interviewed the working situation and issues in the Center. The team also visited the mining site of clay minerals owned by GSD.

  Ms. Malimba of the Center guided the study team to visit the private company in Dedza city, which makes pottery in its factory and sells them in its shop.

- Confirmation of ASM survey at Livingstonia

  The study team will visit the coal mines in Livingstonia area for ASM study on 5 and 6 November. The team confirmed the officer of Mzuzu regional office of DoM who would accompany in the survey and his contact information. The team confirmed the rough location of three coal mines to be visited.

(3) The third TCC

(a) Date and time: 18 February 2015 (Wednesday), 9:00 to 11:00

(b) Place: Meeting room at 2nd floor of GSD HQ in Zomba

(c) Attendees: GSD (Mr. Salima/ Director, Mr. Banda, Mr. Chiona, Mr. Dombola, Mr. Manda, Mr. Adam, Ms. Kamanga, Mr. Chirwa, Mr. Chikalamo, Mr. Kabuwe, Mr. Banda, Mr. Gondwe, Mr. Missi), JICA study team (Mr. Onuma and Mr. Tashiro)

(d) Contents:

- Report 1: Report of the results of the first year program (2014)

  Mr. Onuma, leader of JICA study team, reported the results of the first year program.

  - ✓ Objectives, schedule, personnel
  - ✓ Results of five activities: (i) results of geochemical survey, (ii) results of ASM investigation on coal mines, (iii) creation of GIS database, (iv) start of long-term

training in Japan and (v) holdings of JCC and TCC.

- ✓ Geochemical survey: completed survey in three model areas with 319 samples, explanation of analytical results of assay results in each area
- ✓ ASM study: visited clay deposits in Linthipe and three coal mines in Livingstonia (Mchenga, Mean Jalawe, Kaziwiziwi), made interview and inspection about facilities, operating situation, safety and environmental measures and others
- ✓ GIS database: created GIS data of geochemical survey results
- ✓ Explained provided equipment

➢ Report 2: Explanation of study plans in the second year program (2015)

Mr. Onuma explained the study plans of the second year program.

- ✓ Schedule, personnel
- ✓ Activities: (i) geochemical survey, (ii) ASM investigation on coal mines, (iii) creation of GIS database, and (iv) holdings of JCC and TCC.
- ✓ Geochemical survey: collect 700 samples in five model areas in the middle of Malawi, explanation of geological map and sampling site in each area
- ✓ ASM study: visit coal mines in Karonga District in the north of Malawi, make the same interview and inspection as the first year program

➢ Report 3: Explanation of geochemical survey results in the first year program (2014)

Mr. Tashiro, in charge of geochemical survey of JICA study team, explained the methods of geochemical data analysis and its results.

- ✓ Pre-treatment of assay results
- ✓ Calculation of basic statistics of each element
- ✓ Decision of threshold value of geochemical anomaly (based on figures of histogram and cumulative frequency)
- ✓ Creation of geochemical maps
- ✓ Factor analysis (multivariate statistical analysis) and interpretation of analytical results
- ✓ Noticeable elements (REE in Mzimba area, Cu and Nb in Chitipa area)
- ✓ Summary of the survey results in the first year, 2014

Figure 6-5 The third TCC

(4) The fourth TCC

(a) Date and time: 20 May 2015 (Wednesday), 9:00 to 10:00

(b) Place: Meeting room at 2nd floor of GSD HQ in Zomba

(c) Attendees: GSD (Mr. Salima/ Director, Mr. Banda, Mr. Chiona, Mr. Dombola, Mr. Eliyasi, Mr. Chisambi, Mr. Chisenga), JICA study team (Mr. Onuma, Mr. Tashiro and Mr. Tsuda)

Figure 6-6 The fourth TCC

(d) Contents:

- Report: Explanation of study plans in the second year program (2015)

  Mr. Onuma, leader of JICA study team, explained the study plans of the second year program.

  - ✓ Schedule, personnel

- ✓ Activities: (i) geochemical survey, (ii) ASM investigation on coal mines, (iii) creation of GIS data of study results, and (iv) holdings of JCC and TCC.
- ✓ Geochemical survey: explain the field geochemical survey and the specification of analysis, collect 700 samples in five model areas in the middle of Malawi, explanation of geological map and sampling site in each area
- ✓ ASM study: visit coal mines in Karonga District in the north of Malawi, make the same interview and inspection as the first year program

(5) The fifth TCC

(a) Date and time: 20 May 2015 (Wednesday), 9:00 to 10:00

(b) Place: Meeting room at 2nd floor of GSD HQ in Zomba

(c) Attendees: GSD (Mr. Salima/ Director, Mr. Chirwa, Ms. Kamanga, Ms. Kabuwe, Mr. Mumba, Mr. Manda, Mr. Masumba, Mr. Kaunde), JICA study team (Mr. Onuma, Mr. Tashiro, Mr. Momose and Mr. Tsuda)


Figure 6-7 The fifth TCC

(d) Contents

- ➢ Self-introduction of all attendees
- ➢ Opening remarks: Mr. Salima, Director of GSD
  - ✓ Introduction of outline and circumstances of the JICA Project.
  - ✓ Seminar is held on 26 and 27 January and Workshop on 28 January.
  - ✓ JCC is set from 9am on 1st February.
- ➢ Report 1: Report of the outline of the Project

Mr. Onuma, leader of JICA study team, explained the outline of the Project.

- ✓ Objectives, outputs
- ✓ Contents: Five activities, (i) implementation of geochemical survey, (ii) integration of survey results into GIS database, (iii) support for ASM measures, (iv) long-term training in Japan and (v) monitoring of the project
- ✓ Schedule, personnel
- ✓ Technology Transfer Seminar for geochemical survey, Workshop to report overall results of the Project

➢ Report 2: Report of the final results of the Project

Mr. Onuma, leader of JICA study team, reported the final results of the Project.

- ✓ Geochemical survey: completed survey in eight model areas with 1,029 samples, obtained all assay results, extracted four promising areas based on the statistical analysis results.
- ✓ ASM study: visited clay deposits in Linthipe and five coal mines in Livingstonia and Karonga districts, made interview and inspection about facilities, operating situation, safety and environmental measures and others, proposed the usage of clay deposits based on its assay result.
- ✓ GIS database: created GIS data of geochemical survey results,
  The JICA study team intended to integrate this GIS data into existing GIS database created in the previous JICA Project on 29th January. However, it was confirmed that two external hard disks, which had been previously donated and stored the database, were not accessible (possibly broken). The JICA team guessed this reason to be unconnected to hard disks from UPS.
- ✓ Long-term training in Japan: Five engineers have studied in Master degree's program in Japanese universities. Two of them are from GSD, two from DoM and one from private sector.
- ✓ Proposal for future cooperation: The JICA study team proposes (i) detailed geochemical survey on promising areas selected in this Project and (ii) capacity building for more advanced geochemical survey and mineral resources exploration as a follow-up project.

➢ Report 3: Report of the final results of geochemical survey

Mr. Tashiro of JICA study team in charge of geochemical survey reported the final results of geochemical survey.

- ✓ Survey contents: 1,029 stream sediment samples were collected in eight model areas (GC01 to GC11) and chemical analysis was conducted in the laboratory.
- ✓ Survey results: Based on the statistical analysis of assay results, distinctive geochemical anomaly was extracted in each model area.
- ✓ Evaluation: Four promising areas were selected. (i) REE in Mzimba area, (ii) Cu and Co in Chitipa area, (iii) Cu and Au in Nsanje area, (iv) Cu-Co, REE and P in Balaka area.
- ✓ Proposal: (i) detailed survey in the promising areas, (ii) nationwide geochemical survey and (iii) survey in new model areas are proposed for the future.

➢ Report 4: Report of the final results of ASM study

Mr. Tsuda of JICA study team in charge of ASM study reported the final results of ASM study.

- ✓ Review of ASM policy: made review of implementation plan and framework of monitoring and evaluation.
- ✓ Inspection results: visited five coal mines in Livingstonia and Karonga districts and clay deposits in Linthipe, made interview and inspection about facilities, operating situation, safety and environmental measures and others.
- ✓ Proposal 1: collected one clay sample and conducted its chemical analysis,
  It is difficult to find other usage than pottery because the content of iron oxides is high.
- ✓ Proposal 2: The sufficient implementation of safety education and treatment, the enactment and observance of safety regulations and the environmental remediation are highly proposed to coal mines.

➢ Report 5: Report of GIS database

Mr. Momose of JICA study team in charge of GIS database reported the current situation of GIS database.

- ✓ Data contents: GIS data created in this Project is composed of description data and photos in sampling sites, assay results of samples, results of statistical analysis and geochemical maps.
- ✓ Database structure: Geochemical maps, geochemical data and geochemical survey manual are stored in each three folders.

➢ Closing remarks: Mr. Salima, Director of GSD

7 Technology transfer

7.1 Geochemical survey

During two periods from September to November 2014 and from May to September 2015, four members of JICA study team had implemented the geochemical survey in cooperation with five geologists of GSD. The JICA team had carried out overall field works in pairs with GSD geologists during 290 days in total and had given the technology transfer and capacity building to them through OJT. The contents of technology transfer are survey preparation (documentation, courtesy calls), planning (accessibility, time schedule), sample collection (sampling site selection, photography), geological observation (geological description, structural measurement), sample preparation (drying, reduction), data input and so on.

As a result, it is said that five GSD geologists (Adam, Chirwa, Gondwe, Mtonda, Zungu) obtained the techniques to be engaged in the same geochemical survey as a survey group leader.

Upper: OJT in the field (how to describe observation matters in the sheet)
Lower left: OJT on sample preparation Lower right: group photo in Mzimba

Figure 7-1 Technology transfer for geochemical survey

7.2 ASM study

The study team investigated five coal mines located in the north of Malawi in cooperation with the mining engineer and the assistant mining inspector of Mzuzu regional office of the Department of Mines on early November 2014 and late May 2015.

The JICA study team taught them how to investigate and important matters in situ. As a result of investigation, the team also taught them the following issues and solutions.

- ✓ Wearing of protecting goods is not sufficient: Order the improvement to the company
- ✓ Indication of "No Trespassing" is not sufficient: Order the improvement to the company
- ✓ Ventilation: Measuring record of gas is not recognized: Order to store the record
- ✓ Record of safety education to workers is not recognized: Order to store the record
- ✓ Residents are accessing in the mine site: Order to settle the safety passage

It is desired that the mining company should conducts the safety education to workers and environmental measures, and that the mining engineers of government should obtain the training and education.

UL: Hearing from responsible person
UR: Checking environmental measures
LL: Checking safety management in mine
LR: Checking safety instruments

Figure 7-2 Technology transfer for ASM study

7.3 Technology transfer seminar

The technology transfer seminar on geochemical survey for the purpose of human resource development of GSD engineers and technology transfer was held at GSD Headquarters in Zomba on February 2015 and January 2016.

7.3.1 The first technology transfer seminar

(1) Date and time: 19th and 20th February 2014, 9:00 to 16:00

(2) Place: Cartographic room at GSD HQ (OJT room in the previous JICA Project)

(3) Participants: 10 engineers of GSD (see Table 7-1)

(4) Lecturers: JICA study team, Mr. Tashiro (in charge of geochemical survey) and Mr. Onuma (Project leader)

(5) Equipment: Desktop PC (five), ArcGIS software (5 licenses), projector and screen (those were donated in the previous JICA Project),
software of statistical analysis and drawing (those are donated in the this Project)

(6) Contents

Mr. Tashiro of JICA study team in charge of geochemical survey explained how to analyze statistically the assay results and how to draw geochemical maps while using the necessary software about the following items.

- ✓ Pre-treatment for statistical analysis on assay results
- ✓ Drawing of histogram (using the software provided)
- ✓ Preparation treatment to draw a cumulative frequency diagram
- ✓ Drawing of cumulative frequency diagram (using the software provided)
- ✓ Evaluation of statistical analysis results based on geochemical view points
- ✓ Drawing of geochemical maps based on the above results (using the software provided in the previous Project)

(7) Others

The JICA study team conducted the version-up operation of ArcGIS software from V10.0 to V10.2.2.

Table 7-1 Participant list of the first Technology Transfer Seminar

Organization	Name	Position
GSD Zomba HQ	Elias B. Adam	Geologist
	Hilton Banda	Geologist
	Elias E. Chikalamo	Geologist
	Joseph Chirwa	Geologist
	Steven C. Gondwe	Geologist
	Evance Kabuwe	Geologist
	Yankho Kalebe	Geologist
	Tamara F. Kamanga	Geologist
	Brave Manda	Geologist
	Ruth Mumba	Geologist

Figure 7-3 The first Technology Transfer Seminar

7.3.2 The second technology transfer seminar

(1) Date and time: 26th January 2016, 8:30 to 16:00 and 27th January 2016, 9:00 to 16:00

(2) Place: Cartographic room at GSD HQ (OJT room in the previous JICA Project)

(3) Participants: 14 engineers of GSD (see Table 7-2, four person from Lilongwe office)
Seven of 14 participants are duplicated in the first seminar

(4) Lecturers: JICA study team, Mr. Tashiro (in charge of geochemical survey) and Mr. Momose (in charge of GIS)

(5) Equipment: Desktop PC (five), ArcGIS software (5 licenses), projector and screen (those were donated in the previous JICA Project),

software of statistical analysis and drawing, handheld XRF analyzers and sampling goods of stream sediments (those are donated in the this Project)

Table 7-2 Participant list of the second Technology Transfer Seminar

Organization	Name	Position
GSD Lilongwe regional office	Samson Chihje	Geologist
	Fumuyane Gondwe	Geologist
	Yankho Kalelse	Geologist
	MacDonald Mtonda	Geologist
GSD Zomba HQ	Elias B. Adam	Geologist
	Joseph Chirwa	Geologist
	Steven C. Gondwe	Geologist
	Evance Kabuwe	Geologist
	Tamara F. Kamanga	Geologist
	Brave Manda	Geologist
	Samson Mhanga	Geologist
	Ruth Mumba	Geologist
	Milton Kaunde	Senior Technical Assistant
	William S. Masumba	Technical Assistant

(6) Contents

Mr. Tashiro of JICA study team in charge of geochemical survey explained the planning, implementation and data analysis, and implemented the practice to collect stream sediments and to measure by handheld XRF analyzer. The Drainage Geochemical Survey Manual (Appendix 3-6) was provided to all participants in order to proceed the lecture smoothly.

- ✓ Outline and methods of geochemical survey
- ✓ Practice and demonstration to collect stream sediments near the GSD HQ
- ✓ Practice to measure samples by handheld XRF analyzer (two counterpart geologists of GSD demonstrated and explained how to use it)
- ✓ Practice on planning of stream sediment sampling
- ✓ Practice on planning of nationwide geochemical survey
- ✓ Basics and analytical methods of statistical analysis of assay results (using the PCs and software provided in JICA Projects)

- ✓ Drawing of geochemical maps based on the above results (using the PCs and software provided in JICA Projects)
- ✓ Evaluation of analytical results
- ✓ Practice of measurement by handheld XRF analyzer (two counterpart geologists of GSD demonstrated and explained how to use it)

(7) Others

Mr. Kubo and Mr. Moses of JICA Malawi office who are in charge of this Project observed the seminar in the afternoon on 27th January 2016.

(8) Contents of seminar and photos

a) Outline and methods of geochemical survey

The methods of geochemical survey on stream sediments carried out in this Project were schematically explained to young geologists of GSD in order to commoditize the techniques among staffs of GSD.

Figure 7-4 The second Technology Transfer Seminar (1/5)

b) Method and practice to collect stream sediments

After explaining how to collect stream sediments, all participants went to the stream near GSD HQ and observed the practice of sampling. All of them experienced the description to the sheet at the same time. Counterpart geologists and assistants who joined the geochemical survey in this Project explained the describing manner to others.


Figure 7-5 The second Technology Transfer Seminar (2/5)

c) Measuring practice and usage of handheld XRF analyzer (donated equipment)

Mr. Gondwe, counterpart geologist of GSD, demonstrated the measurement by XRF analyzer and explained how to measure samples. Mr. Chiewa, counterpart geologist of GSD, explained how to use XRF analyzer and demonstrated the data transfer from the analyzer to PC.


Figure 7-6 The second Technology Transfer Seminar (3/5)

d) Practice on planning of stream sediment sampling and nationwide geochemical survey

The conception and planning in case of nationwide geochemical survey on stream sediments were explained. Based on the actual topographic map, planning of sampling location considering river system and topography were explained. Participants considered the implementation plan and schedule of nationwide geochemical survey.

e) Basics and analytical methods of statistical analysis of assay results

Using data measured by handheld XRF analyzer, the following items lectured in the first seminar were explained and practiced.

- ✓ Pre-treatment for statistical analysis on assay results
- ✓ Calculation of basic statistics

- ✓ Drawing of box plots
- ✓ Drawing of histogram
- ✓ Preparation treatment to draw a cumulative frequency diagram
- ✓ Drawing of cumulative frequency diagram and decision of threshold value
- ✓ Correction of graphs of basic statistics
- ✓ Multivariate statistical analysis: explanation of factor analysis results

f) Creating methods of geochemical maps

Based on the GIS database of this Project, participants practiced the creation of geochemical maps on measurement values by handheld XRF analyzer. The expression manner of bubble plots by ArcGIS was actually guided. All five groups could create the geochemical maps with similar accuracy. Mr. Kubo and Mr. Moses of JICA Malawi office observed the lecture.

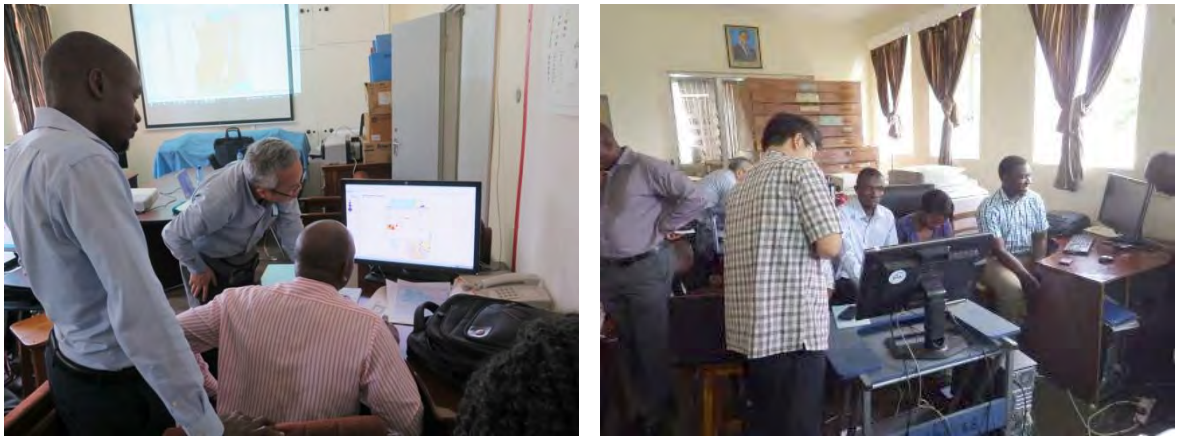


Figure 7-7 The second Technology Transfer Seminar (4/5)

g) Evaluation of analytical results

It is mentioned that the interpretation of statistical analysis and geochemical maps should be referred to the Drainage Geochemical Survey Manual (Appendix 3-6). The explanation of geochemical survey results reported in the TCC is also good to be referred.

h) Practice of measurement by handheld XRF analyzer (two counterpart geologists of GSD demonstrated and explained how to use it)

Mr. Gondwe and Mr. Chiewa, counterpart geologists of GSD, explained how to use XRF analyzer and demonstrated the measurement of rock specimen and stream sands and the data transfer from the analyzer to PC. Mr. Kubo and Mr. Moses of JICA Malawi office observed the lecture.

Figure 7-8 The second Technology Transfer Seminar (5/5)

7.4 Workshop

The workshop was held in the last On-site Works in Malawi in order to report overall study results of this Project to relevant person. The JICA study team requested three counterpart geologists to make presentations, who joined the geochemical field survey, considering that this workshop was also the opportunity of capacity building.

(1) Date and time: 28th February 2016, 9:00 to 16:00

(2) Place: Conference room at Masongola Hotel in Zomba

(3) Participants: 51 persons

(4) Organizations of participants: MNREM, staffs of GSD HQ and regional offices, governmental offices in Zomba, students and teachers in Malawi University (Chancellor College), relevant private company, media (TV and newspaper), JICA Malawi office, JICA study team

Figure 7-9 Workshop

(5) Contents: Presentations of study results and outputs of JICA Project and Q & A

- Self-introduction of each participant
- Achievements of JICA Projects on mining sector in Malawi/ Director Salima, GSD
- Opening speech of JICA/ Mr. Kubo, JICA Malawi office

- Outline of the Project/ Mr. Onuma, JICA Project leader
- ASM study results/ Mr. Tsuda, JICA study team
- Outline and results of geochemical survey/ Mr. Tashiro, JICA study team
- GIS database: Mr. Momose, JICA study team
- Experience of geochemical field survey/ Mr. Mtonda, GSD
- Results of geochemical survey/ Mr. Gondwe, GSD
- Measuring results of handheld XRF analyzer/ MR. Chirwa, GSD
- Introduction of JICA long-term training/ Mr. Onuma, JICA Project leader
- Closing speech/ Director Salima, GSD

Upper left: Director Salima　　Upper right: Mr. Mtonda
Lower left: Mr. Gondwe　　Lower right: Mr. Chirwa

Figure 7-10 Presentations by GSD in Workshop

(6) Question and answer (Q: question, A: answer, C: comment)

Q (Department of Mines): What kind of survey is necessary in recommended four areas in the future?

A (Tashiro, JICA): To focus the mineralization zone by geological survey and rock geochemical survey is efficient in the Chitipa area (GC01) where the copper mineralization is recognized. In Nsanje area (GC11) where the copper and gold mineralization are recognized, the detailed geochemical survey on stream sediments is efficient.

Q (Department of Mines): What is the prospect for the future continual project?

A (Tashiro, JICA): As JICA evaluated that the geochemical survey through OJT in this Project was efficient for the capacity building in Malawi, I think that JICA is considering the follow-up project.

A (Onuma, JICA): The JICA study team hopes the continual project to JICA, but it is not decided what kind project will be realized.

Q : Why analytical results between handheld XRF analyzer and ICP-MS in laboratory are different?

A (Onuma, JICA): The lower detection limits of two methods are different as to gold. As the limit is 1ppm in handheld XRF analyzer and 0.002ppm in laboratory, the precision between two methods is different. Thus, mapping results of them become different.

Q : How danger is handheld XRF analyzer as it uses X-ray?

A (Salima, DGSD): The handheld XRF analyzer emits the X-ray beam through narrow window in its front. If it is used to measure in direct contact with materials without anyone within 1m range, it is not harmful for human body including the user. Of course, it is dangerous to irradiate directly to human body.

C (Eliyasi, GSD): As the equipment is handheld type, there is an advantage to use it in the field survey.

Q : Did you include the existing geochemical data in this Project?

A (Onuma, JICA): As I have not confirmed the existing data with coordination, I did not use it.

C : There must be the survey results in 1990's.

Q : There is a method of geochemical survey using vegetation. Don't you use this method in Malawi?

A (Salima, DGSD): It is known that the plants to detect copper concentration. We do not implement this method in Malawi.

Q : What should be implemented after coal mine closure?

A (Tsuda, JICA): The rehabilitation by local vegetation is necessary. It is necessary for mining companies, Department of Mines and Department of Environment to monitor the water quality and environmental issues.

Q : Even if kaolinite deposits in Linthipe have much iron contents, can it be used for papermaking or cosmetics?

A (Tsuda, JICA): To remove iron oxides from clay is not realistic, because it is expensive and there are cheaper products of foreign countries. I think it is better to consider the application for pottery with high grade design and environmental purification material.

Q : Is it necessary to provide equipment for targeting mines to be mechanized?

A (Tsuda, JICA): As the targeting mines are small scale in ore resources, they will be mined out soon by mechanization. Therefore, the priority is to implement the regular education for safety and environment while maintaining the framework of the current situation. It is necessary for workers and managers to understand the working environment.

A (Salima, DGSD): It is known that the plants to detect copper concentration. We do not implement this method in Malawi.

8 Issues, device and lesson on the Project implementation

8.1 Issues

(1) Accessibility in geochemical survey areas

The accessibility in some part of mountainous areas was worse than expected and even the 4x4 vehicle was not effective in some case. Therefore, some sampling locations had to be changed from original plan, by giving the priority to survey efficiency and safety management.

The detailed survey plan is created by judging the accessibility from the existing maps and satellite images. However, it is normally recognized on arriving at the site whether the 4x4 vehicle can really pass the road which was expected to be passed. Thus each member needs to judge the change of sampling location in the field as necessary.

The geochemical survey efficiency in three model areas is shown below. The efficiency means that total number of samples is divided by total number of days which every member are engaged in geochemical survey including preparatory work and sample preparation and excluding transfer between model areas.

(i) Chitipa area (GC01 and GC02) : 3.3 sample/day

(ii) Rumphi area (GC03 and GC04) : 5.0 sample/day

(iii) Mzimba area (GC05) : 3.6 sample/day

(iv) Kasungu area (GC06) : 3.8 sample/day

(v) Lilongwe area (GC07) : 4.0 sample/day

(vi) Mangochi area (GC08) : 3.8 sample/day

(vii) Balaka area (GC09 and GC10) : 3.8 sample/day

(viii) Nsanje area (GC11) : 3.4 sample/day

◆ Average of eight areas : 3.8 sample/day (1,029samples/272days)

In fact, the accessibility in GC02/Chitipa area was very bad and its efficiency became worse. The accessibility in a part of Nsanje area was also bas. On the other hand, road condition in Rumphi area was better. The average value of 3.8 sample/day is almost same as expected.

(2) Field geochemical survey

The GSD created the official documents to obtain the permission for the field work prior to the filed geochemical survey. Then, the study team and Malawian counterparts visited the District and police offices prior to the field work to explain the survey plan, and finally obtained the permission for the field work. Furthermore, the survey team also visited Paramount Chiefs, Traditional Authority and/or Group Village Headman as Malawi has the traditional tribal governance districts, then got the permission for survey implementation. This procedure prior to the filed survey is very important to avoid troubles with local people.

(3) Electric power condition

The electric power condition is bad in Malawi and the electric outage often occurs. The measures for power failure were to charge batteries frequently while the electric power had been supplied. However, the power failure forced the lecture to be interrupted at the moment of the seminar held in GSD HQ. In case of installation of equipment requiring the power supply, it is necessary to prepare the measures for the power failure.

8.2 Device

(1) Program for capacity building

As the main objective of this Project is the capacity building, the JICA study team planned and implemented not only the OJT as technology transfer in the field works but also the following programs for capacity building.

- ✓ Technology Transfer Seminar: see details in section 7.3
- ✓ Workshop (report of project results): see details in section 7.4
- ✓ Training on handheld XRF analyzer by outsourced lecturer : see details in section 3.10

(2) Geochemical field survey

The JICA study team changed the access route and arranged the survey schedule depending on the field situation and the health condition of survey members. The JICA team members entrusted field works to counterpart geologists as possible and trained them to work independently through OJT. They tried to communicate enough among all survey members in order to implement the field works smoothly.

(3) Upgrade of software

The software of ArcGIS Ver10 with five licenses was donated in the previous JICA Project on June 2012 in the beginning stage of the Project. The maintenance period of this software is one year and the expire date of the maintenance was the end day of June 2013.

The maintenance includes free update and support within its period. Some expenses are necessary in order to update and continue the maintenance. Therefore, some expenses should be recorded in budget every year in order to use continuously the provided software with the latest version for a long period. However, this kind of after-care program is rare in aid projects including other donors.

The latest version of ArcGIS was Ver10.2 on August 2014, when the current Project was started. If the manual for the latest ArcGIS version which the study team uses is created, the interface and function may differ from the old version which is used in GSD and the inconvenience should occur. Therefore, “update of maintenance of ArcGIS expired” was procured as provided equipment and the study team implemented upgrade of ArcGIS software. In fact, version-up works were carried out in cooperate with several counterparts after the first technology transfer seminar mentioned above. The latest version was Ver10.2.2 at this moment and the expiry date is the end day of June 2015.

8.3 Lesson

(1) Digital data storage

It is absolutely indispensable to set the UPS for use of desktop PC, because the electric power supply is very unstable in Malawi and the electric outage often occurs. In the previous JICA Project, five desktop PCs, two external hard disks with LAN connection and six UPSs, which were used to create GIS data and store the database, were donated and settled in one room of GSD HQ. Five UPSs were connected to respectively five PCs and one UPS was connected to two external hard disks in order to prevent the equipment damage and data loss at the moment of power failure. The GIS database was stored in two external hard disks, one of which was prepared for data back-up.

The GIS data created in this Project was planned to be integrated into the existing database stored in these external hard disks. The JICA study team completed the GIS data in the final On-site Works in Malawi on January 2016, and tried to input it in the external hard disks for the integration on 29th January 2016. However, it was recognized that two hard disks were not accessible at all. The team members tried to find out this reason and noticed that two hard disks were unconnected to UPS and connected directly to power supply tap. It means that the electricity had been supplied always to two hard disks and they repeated OFF/ON of power

supply by the power failure. The power of all UPSs had been put off and the user needed to put the power of UPSs and PCs.

If the power of hard disk is cut by the proper procedure or the power cable is suddenly unplugged, it is well know that the data stored in the hard disk might be damaged. The reason why two hard disks were not accessible is presumed to be the influence of frequent power failure by disconnection from UPS. The reason of disconnection is that this UPS was used for a new desktop PC of the staff.

It becomes a lesson that UPS is necessary for the external hard disk as well as desktop PC and that the risk of data corruption by the power failure should be disseminated to related persons. As the GIS database was kept in the SRED Company, this accident did not become a big problem fortunately.

(2) Capacity building

It is evaluated that the promising engineers have been trained in this Project as described in the chapter 7.

It can be said that they originally have higher capability. However, it is thought to have trained them that the JICA study team members evaluated their works in the field, took the approach to lead them to the next step and motivated them. In that sense, Japanese OJT system seems to be effective.

9 Achievement of project purpose

The Project purpose is “The Ministry of Natural Resources, Energy and Mining obtains nationwide geochemical survey plan, geochemical data of model areas and upgraded geological database, and its human capacity is enhanced on sustainable development of mining through field survey and long-term training”.

The JICA study team thinks that the project purpose has been achieved sufficiently in all activity items as implementation performances are described below.

(1) Nationwide geochemical survey plan in Malawi

The JICA study team prepared a several draft plans, described them in the progress report and explained them in the TCC meeting. Then, GSD understood these plans.

Many engineers of GSD calculated the schedule on nationwide geochemical survey plans and considered the specification of the plan which can be realized.

(2) Geochemical data of model areas

The JICA study team obtained the geochemical data of 61 elements on 1,029 samples in eight model areas (about 5,729km^2 area). These data was assembled in the GIS database and provided to GSD.

(3) Geological GIS database upgraded by geochemical data of model areas

The JICA study team integrated the geochemical data described above into the existing GIS database and upgraded it. The JICA study team stored the updated GIS database in an external hard disk and provides it to GSD.

(4) Capacity building to promote the sustainable development of mining sector through the field survey

The JICA study team implemented the technology transfer through OJT and capacity building in the geochemical field survey. Also, the team held the training on handheld XRF analyzer, technology transfer seminar and workshop in order to implement further capacity building. As a result, the personnel was trained, who can carry out the geochemical survey as GSD own project and who can use the handheld XRF analyzer at will and analyze its data. As these talented persons have the capability to educate other staffs, the sustainable development of technology is expected. It is anticipated that they will become candidates for the long-term

training in Japan described below.

(5) Capacity building by long-term training in Japan

“Project on Capacity Development in Mining Sector” is composed of this program described in this report and the long-term training in Japan.

As the long-term training, five Malawian engineers have studied in Master’s degree course in Japanese universities from 2014 to now.

10 Proposal for the achievement of the overall goal

The overall goal of the Project is “Sustainability, health and safety in mineral resources development is improved in Malawi”.

The JICA study team proposes the followings to achieve the overall goal.

- In operating mines, mining companies are required to take various measures in consideration with safety and environment and to perform a proper treatment. Of course, it is most important that administrators and workers have a problem consciousness on safety and environment to perform properly.
- It also becomes an effective means that the Malawi government develops the laws and regulations, such as the Mine Safety Act.
- It is also effective to introduce a framework conforming to international standards which will lead to continuous improvement of health and safety. For example, ISO14001 (Environmental Management System) and OHSAS18001 (Occupational Health and Safety Management System).
- On the other hand, it is also essential to educate and train the governmental engineers who manage and supervise mines. For this purpose, it is necessary and effective that engineers of related government agency are trained in mines and facilities in Japan.
- In the support program by international donors, such an attitude that government organizations make more aggressively human resources investment will lead to sustainable development.
- In terms of sustainable mining development, the JICA study team believes that the technology transfer and capacity building in the geochemical field survey, training of users and safety managers for handheld XRF analyzer, preparation of manuals and capacity building by technology transfer seminar in this project should contribute to it. However, unless the techniques obtained will not be used, technical capabilities will be reduced and it becomes meaningless. Therefore, it is necessary to improve the technical capabilities of trained personnel and to train new human resources by continuous implementation of the mineral resources exploration project.
- In order to discover such projects above, the government needs not only to invest in mining sector but to disseminate the information of mineral resources. Therefore, it is required to construct the internet system and to manage and disseminate properly the information.

11 Appendix

Appendix 1-1 PDM
Appendix 1-2 Personnel plan
Appendix 1-3 Provided equipment

Appendix 3-1 Assay results
Appendix 3-2 Basic statistics
Appendix 3-3 Figures of statistical analysis
Appendix 3-4 Geochemical maps
Appendix 3-5 Measurement practice of handheld XRF analyzer
Appendix 3-6 Drainage geochemical survey manual
Appendix 3-7 Handheld XRF maintenance manual

Appendix 4-1 Integration manual for JICA GIS database

Appendix 5-1 Report in the ASM symposium
Overview of Artisanal and Small-scale Mining: the Global Context and Pact's Work
Appendix 5-2 Report in the ASM symposium
Artisanal and Small Scale Mining Operations, a Tool for Social Economic Development
Appendix 5-3 Report in the ASM symposium
Status of ASM Sub-sector in Malawi
Appendix 5-4 Report in the ASM symposium
National Artisanal and Small-scale Mining Policy
Appendix 5-5 Report in the ASM symposium
Draft: National Artisanal and Small Scale Mining Policy

Project Design Matrix ver.2.0
Project on Capacity Development in Mining Sector

Project Implementation Period: From June 2014 to December 2019

Implementation Agency: Ministry of Mining, Geological Survey Department

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement
Overall Goal Sustainability, health and safety in mineral resources development is improved in Malawi.	1. Data which collected and analyzed by GSD is utilized in policies and measures for mineral resources development in Malawi. 2. Detailed and precise information on mineral resources in Malawi is provided to foreign as well as local investors. 3. Labor environment of ASM workers is improved. 4. Institutional arrangement is well prepared for sustainable use and management of mineral resources in Malawi.	1. Project reports, policy papers / documents, interview 2. Information in the GIS database 3. Survey 4. Survey		Geochemical data was integrated into the existing database. Overall results of the Project were reported in public workshop. The proposal to improve labor environment was reported to companies and MNREM. The manuals for geochemical survey, equipment management and GIS database management were created.
Project Purpose Geochemical data is acquired, geological database is upgraded with geochemical data, the capacity is enhanced with field survey and long-term training.	1. Geological maps, geochemical data, and satellite data are integrated into a single database and functioning properly. 2. Management capacity is upgraded to promote sound development of the mining sector.	1. Project reports, GIS database, interview 2. Project reports, evaluation by experts, interview	- Counterpart personnel (C/Ps) are continuously and actively engaged in mining sector in Malawi.	Geochemical data was created. Geological GIS database was upgraded with geochemical data. The capacity was enhanced with field survey. The capacity has been enhanced with long-term training.

Output				
1. Capacity in geochemical survey is strengthened.	1-1 Essential technologies in geochemical survey are transferred to and acquired by the C/Ps. 1-2 Analytical instruments are operated and maintained in proper manner by the C/Ps. 1-3 Standard operating procedure of geochemical survey and maintenance manual of analytical instruments are prepared. 1-4 Capacity is improved in planning / implementing of geochemical survey and integrating the survey results into GIS database. 1-5 Some C/Ps are reached to the level to actively transfer the geochemical survey technologies acquired through the Project to others.	1-1 Evaluation by experts, examination 1-2 Records of operation and maintenance, evaluation by experts, practical examination 1-3 Procedure manual 1-4 Project reports, evaluation by experts, interview 1-5 Project reports, evaluation by experts, interview	- Mechanism is established for implementing geochemical surveys in accordance to the survey plan.	The C/Ps obtained essential techniques through OJT in the field. The C/Ps have operated and maintained XRF analyzers properly. Many GSD staffs obtained the geochemical survey techniques in technology transfer seminars. Manuals for geochemical survey, equipment management and GIS database management were created. Some C/Ps can actively transfer the geochemical survey technologies acquired through the Project to others.
2. Capacity in integrating geochemical survey results into GIS database is developed.	2-1 GIS database with geochemical information is developed. 2-2 Capacity in updating and properly maintaining the database is improved. 2-3 Mechanism is established for updating and maintaining the database.	2-1 Project reports, GIS database, evaluation by experts 2-2 Project reports, records of updating and maintenance of the database, evaluation by experts 2-3 Procedure manual, project reports		GIS database with geochemical information was developed. GIS database manual was created.
3. Environment for ASM*1 is enhanced.	3-1 At least 3 cases of advises are made for ASM*2 3-2 Measures are taken for improving environment for ASM according to the roadmap.	3-1 Roadmap, project reports 3-2 Project reports, interview 3-3 Project reports, interview		ASM policy was reviewed. Advises of labor safety and environment for coal mines were made and some improvements were done.
4. Government officers are well trained for establishing information infrastructure and ore geology, mining engineering, etc.	4-1 Personnel who obtained master's degree through the Project are actively working for the Ministry of Mining. 4-2 Personnel who obtained doctoral degree through the Project are actively working for the Ministry of Mining.	4-1 Project reports 4-2 Project reports		Four government officers have been studying in master's degree course.

*1 ASM: Artisanal and Small-scale Mining

*2 Target figure (i.e. number of cases) can be reviewed and increased during the implementation period of the Project.

Activities	**Inputs (Japanese side)**	**(Malawian side)**	**Important Assumption**
1-1 Review previous survey and establish the plan of nationwide geochemical survey 1-2 Consider and procure the necessary equipment of the Project 1-3 Set model areas for geochemical survey based on the other related information 1-4 Prepare geochemical survey procedure manual and schedule for survey in the model areas 1-5 Implement geochemical survey for the model areas through on-the-job training (OJT) 1-6 Review and revise the plan of nationwide geochemical survey 1-7 Establish the roadmap of upgrading geochemical laboratory	**1. Dispatch of Japanese Experts** *Fields of Experts* - Mining Development / Team leader - Geochemistry - GIS Database Development - ASM measurement / Mining Environment **2. Counterpart training in Japan** *Field of training* - Ore Geology - Petroleum Geology - Geochemistry - Mining Engineering - Geophysics, etc. **3. Equipment/Facilities** - Handheld XRF (X-ray Fluorescence) analyzer - GPS（Global Positioning System）receiver - Other necessary equipment (Hummer, Loupe, Sieve etc.) **4.Expense** - Vehicles and fuels for project activities - Other necessary expenses	**1. Assignment of Counterpart Personnel** *（Principal Geologist, Principal Chemist, Chemist, Geologist）* **2. Provision of facilities for the Project implementation** - Office space - Office facilities **3. Equipment** Necessary equipment for project implementation **4. Expense** - Cost for office space / facilities (including cost for electricity, water, communication, etc.)	Local community do not prevent the activity of this project.
2-1 Prepare a plan for integrating geochemical survey results into GIS database 2-2 Develop a procedure manual for integrating geochemical survey results into GIS database 2-3 Integrate geochemical survey results into GIS database through OJT 2-4 Review and revise the plan for integrating geochemical survey results into GIS database based on the nationwide geochemical survey			
3-1 Review the ASM Policy and prepare the implementation plan of the Project 3-2 Provide advices for the improvement of ASM 3-3 Support for technology in environment and safety matters of ASM			**Preconditions** -Necessary budget is allocated by Malawian side. -C/Ps are properly assigned to the Project. -Majour C/Ps including Project Director is not changed from the original plan -Policy for mining sector in Malawi is not changed significantly.
4-1 Implement long-term training of government officers in Japan 4-2 Implement internship program in Japanese organizations / companies			

* ASM: Artisanal and Small-scale Mining

Personnel Plan

	Responsible job	Name	Ogranization	2014 8	9	10	11	12	2015 1	2	3	4	5	6	7	8	9	10	11	12	2016 1	2	3	Days in total
Works in Malawi	Leader/ Mine development	Takumi ONUMA	SRED	14	8/17-30		10/26-11/15 21			14	2/14-27			5/17-6/11 26							1/18-2/5 19			94
	Sub-leader/ Mine development	Ioki SUZUKI	SRED	14	27	8/17-30 9/14-10/10										57	7/18-9/12							98
	Geochemistry	Toshiharu TASHIRO	SRED		42	9/14-10/25				14	2/14-27			78	5/17-8/2						1/18-2/5 19			153
	GIS database construction	Atsushi MOMOSE	MMTEC			10/5-11/13	40								84		6/21-9/12				1/22-2/5 15			139
	ASM and mine environment measures	Kazuhiro KADOSHIMA	MMTEC				10/26-11/15 21							5/17-6/11 26							1/22-2/5 15			62
Works in Japan	Leader/ Mine development	Takumi ONUMA	SRED	1	1				1		1		1				2			1				8
	Sub-leader/ Mine development	Ioki SUZUKI	SRED	1	1				1				1											4
	Geochemistry	Toshiharu TASHIRO	SRED		1					5	1						1			8				16
	GIS database construction	Atsushi MOMOSE	MMTEC		1					1							1			2		1		6
	ASM and mine environment measures	Kazuhiro KADOSHIMA	MMTEC							2							1					1		4
			Reports	△ Project plan			△ Work plan		△ Progress report-1								△ Progress report-2						△ Final report	584

Provided equipment (Handed over finally)

Item	Quantity	Procurement	Carrying
Handheld type XRF analyzer and accessories	2 sets	Japan	done
GPS: GPSMAP 62STC (English version)	3	Japan	done
Battery charger for rechargeable battery (200V, AA×4)	3	Japan	done
Rechargeable battery (AA)	38	Japan	done
Electric plug-BF type	3	Japan	done
Laptop PC (English keyboard)	1	Japan	done
Software of statistical analysis: XLSTAT-Pro	2	Japan	done
Software of graphics: Grapher	2	Japan	done
Maintenance of ArcGIS software (donated by JICA in 2013), including version-up	5 licenses	Japan	done
Mobile printer (A4 size): HP	1	Japan	done
Printer ink (color and black): HP	1 sets	Japan	done
Digital camera (dustproof and waterproof)	3 sets	Japan	done
Stainless sieve (sieve, pan, lid): φ200mm－H60mm－30mesh	4 sets	Japan	done
Trowel for sampling	5	Malawi	
Plastic container	35	Malawi	
Geologic hammer: Estwing	3	Japan	done
Hammer case	3	Japan	done
Hand lens (x10)	2	Japan	done
Compass: SUUNTO	2	Japan	done
Field back pack (large size)	3	Japan	done
Field back pack (middle size)	3	Malawi	
Camping goods (head lamp, flash light)	4 each	Japan	done
Survey goods for Malawian C/Ps (field boots and clothes)	5 sets	Malawi	done
Consumables			
Plastic bag for sampling (middle size)	100	Japan	done
Sealable plastic bag for assay (small size)	20	Japan	done
Plastic bag for storage (large size)	41	Japan	done
Hand glove for sampling	9	Japan	done
Field note	10	Japan	done
Writing utensils: ball point pen, marker pen	4 each	Japan	done
Clip board (A4 size)	3	Japan	done
Packing tape	1	Japan	done
Printer paper (A4 size)	300	Malawi	

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Johannesburg is a SANAS Accredited Testing Laboratory, No: T0387

CERTIFICATE JB14175566

Project: Malawi 2014

This report is for 200 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 17-NOV-2014.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

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Signature: 

Martin Stone, Laboratory Manager, Johannesburg

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53 Angus Crescent
Long Meadow Business Park, East Entrance
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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
AT01		0.12	0.001	<0.01	4.92	1.7	860	0.94	0.05	1.68	0.03	163.0	36.4	325	0.27	22.8
AT02		0.14	0.001	<0.01	6.50	1.4	590	1.47	0.06	0.48	<0.02	133.0	13.7	24	0.56	17.8
AT03		0.16	<0.001	<0.01	7.48	1.5	1160	1.05	0.04	0.63	0.04	112.0	7.4	22	0.32	9.1
AT04		0.15	0.002	<0.01	7.46	2.2	1810	0.84	0.05	0.40	0.03	90.3	10.4	51	0.37	17.5
AT05		0.15	0.001	0.12	8.59	1.6	2300	1.57	0.04	0.30	0.02	59.2	11.2	49	1.66	9.8
AT06		0.12	0.001	0.08	9.09	2.0	810	2.28	0.06	1.83	0.06	153.0	33.8	92	1.45	42.6
AT07		0.12	0.001	0.27	6.22	2.5	990	1.05	0.06	0.57	0.03	118.5	11.9	37	0.32	14.9
AT08		0.12	0.001	<0.01	4.55	2.5	660	1.41	0.04	2.01	0.05	141.0	40.4	478	0.36	33.3
AT09		0.13	0.001	0.05	4.49	0.9	470	0.84	0.05	2.45	0.05	102.5	38.7	295	0.35	27.4
AT10		0.12	0.001	0.08	5.70	1.4	530	1.14	0.03	2.08	0.04	155.0	55.0	822	0.36	42.2
AT11		0.12	0.001	0.03	5.20	1.4	710	1.00	0.03	2.02	0.05	120.5	29.1	93	0.23	20.3
AT12		0.20	0.001	<0.01	5.82	0.9	690	1.31	0.04	2.07	0.03	90.5	19.5	218	0.37	18.5
AT13		0.20	0.001	<0.01	5.84	0.9	550	1.02	0.07	2.63	0.06	125.0	31.9	293	0.36	27.3
AT14		0.12	0.001	<0.01	4.89	0.9	500	1.35	0.04	1.20	0.02	102.0	18.1	144	0.41	21.0
AT15		0.14	<0.001	<0.01	7.25	2.2	2420	1.17	0.07	0.93	0.03	186.0	18.5	31	0.81	16.5
AT16		0.12	<0.001	0.42	3.24	3.3	1010	0.95	0.10	1.23	0.06	155.0	28.4	30	0.51	44.3
AT17		0.12	0.003	0.05	4.10	1.4	590	0.92	0.03	1.91	0.04	131.5	39.2	243	0.30	33.3
AT18		0.13	0.001	0.02	6.11	0.7	810	1.16	0.03	2.89	0.05	131.5	32.0	83	0.30	21.4
AT19		0.14	0.004	0.10	4.15	1.2	460	0.92	0.03	1.73	0.04	106.5	35.1	199	0.28	29.7
AT20		0.14	0.001	0.22	7.22	1.7	730	1.12	0.05	3.33	0.07	142.0	44.5	105	0.38	41.4
AT21		0.17	0.001	0.13	4.74	1.7	520	0.99	0.04	2.25	0.05	127.0	37.6	269	0.34	41.6
AT22		0.17	0.001	0.14	4.58	1.3	460	0.84	0.07	2.48	0.05	105.0	48.1	176	0.31	44.8
AT23		0.15	0.001	0.10	7.35	<0.2	460	0.61	0.13	5.41	0.08	63.1	62.3	348	0.33	38.0
AT24		0.16	0.001	0.05	4.51	0.9	560	1.12	0.13	1.52	0.03	73.6	13.1	51	0.77	17.0
AT25		0.17	0.001	0.08	6.95	0.9	280	0.90	0.16	5.26	0.08	72.4	39.9	167	0.48	30.9
AT26		0.17	0.001	0.09	7.18	0.9	690	0.87	0.10	2.82	0.05	71.1	45.2	380	0.53	46.9
AT27		0.16	0.001	0.12	5.54	1.1	350	0.76	0.04	4.67	0.11	79.2	79.0	377	0.18	39.5
AT28		0.17	0.001	0.07	5.27	0.8	550	0.83	0.03	2.94	0.06	81.6	39.5	284	0.19	27.1
AT29		0.17	0.001	0.12	4.91	1.3	680	1.01	0.02	2.57	0.05	88.1	32.8	172	0.20	26.2
AT30		0.15	0.001	0.09	5.42	0.7	410	0.97	0.04	3.20	0.06	89.6	33.3	130	0.22	31.8
AT31		0.15	0.001	0.05	5.63	0.7	420	0.74	0.07	3.60	0.06	70.2	41.5	168	0.22	32.3
AT32		0.16	<0.001	0.10	5.81	1.3	1040	1.39	0.08	1.05	0.03	148.5	20.4	35	1.23	17.9
AT33		0.13	0.001	<0.01	2.78	1.1	610	0.77	0.06	0.24	<0.02	70.4	4.9	22	0.76	8.1
AT34		0.17	0.001	0.89	5.62	2.7	1280	1.14	0.06	0.90	0.03	196.0	15.7	51	0.42	18.5
AT35		0.12	<0.001	<0.01	7.05	2.3	1470	1.96	0.05	1.98	0.07	199.5	27.3	51	0.49	15.6
AT36		0.12	0.001	<0.01	6.99	1.6	1150	1.61	0.04	2.00	0.06	167.0	29.4	83	0.44	21.7
AT37		0.14	0.002	<0.01	6.92	2.5	990	1.27	0.03	2.24	0.07	117.0	39.9	145	0.48	25.5
AT38		0.12	0.001	<0.01	6.59	0.8	480	1.07	0.09	3.15	0.08	100.0	26.9	139	0.39	38.5
AT39		0.17	0.001	0.05	8.84	0.7	630	0.96	0.11	5.11	0.11	116.5	44.8	106	0.44	40.2
AT40		0.15	0.001	<0.01	6.20	0.4	420	1.30	0.05	2.00	0.05	89.7	40.5	147	0.36	54.7

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2014

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
AT01		8.38	14.55	0.10	7.0	0.067	1.43	45.1	3.7	1.08	7240	1.15	1.14	315	47.8	310
AT02		11.45	23.9	0.16	5.6	0.118	3.25	45.5	4.0	0.22	6170	2.32	2.21	407	7.7	260
AT03		7.20	24.3	0.24	3.1	0.105	4.67	36.0	2.7	0.27	6690	1.54	2.59	349	5.3	580
AT04		8.03	28.3	0.21	4.3	0.127	4.13	32.4	2.7	0.15	7710	1.33	2.98	375	6.9	200
AT05		11.15	31.3	0.25	5.9	0.037	6.95	22.2	5.4	0.17	2400	1.37	1.18	202	9.5	190
AT06		6.80	28.2	0.25	4.3	0.082	2.58	71.3	11.9	0.83	1610	1.62	1.06	108.5	63.6	380
AT07		9.66	26.1	0.26	5.9	0.140	3.60	43.3	3.3	0.22	8700	1.96	1.84	430	10.5	300
AT08		8.45	16.65	0.30	2.8	0.081	0.94	32.6	3.8	1.40	5770	1.39	1.20	333	63.2	370
AT09		6.79	15.40	0.23	1.7	0.058	0.68	29.3	3.7	1.46	2090	0.95	1.21	76.8	57.6	470
AT10		8.56	17.30	0.25	2.3	0.062	0.59	34.5	5.2	1.22	2810	1.35	0.90	62.4	76.5	340
AT11		3.55	13.85	0.15	1.1	0.037	0.82	32.0	4.2	0.75	1590	0.77	1.54	24.4	32.3	390
AT12		3.10	14.30	0.17	1.7	0.042	1.46	38.0	5.5	1.30	798	0.94	1.32	41.5	55.4	260
AT13		7.94	16.25	0.26	2.9	0.048	1.14	55.5	4.7	1.95	2070	0.78	1.50	113.5	65.4	310
AT14		3.57	14.30	0.16	2.6	0.044	1.08	33.8	5.8	0.66	870	1.42	0.87	63.5	33.8	170
AT15		6.50	22.6	0.25	3.4	0.072	4.00	47.5	4.8	0.34	3980	1.50	2.10	168.0	10.8	1160
AT16		17.55	13.50	0.41	4.0	0.120	1.38	60.0	3.7	0.47	8450	1.87	0.99	262	12.6	1480
AT17		8.32	14.15	0.21	3.2	0.063	0.82	30.2	3.5	1.16	2360	1.71	0.98	59.7	48.9	550
AT18		5.46	15.35	0.19	0.9	0.050	0.98	37.9	3.6	1.18	1940	0.71	1.76	20.8	33.1	870
AT19		6.90	13.40	0.21	1.8	0.051	0.58	26.1	3.3	0.95	1760	1.16	0.89	30.8	46.7	530
AT20		11.50	23.5	0.30	4.6	0.094	1.08	37.3	4.6	1.37	2280	2.19	1.73	67.2	43.4	570
AT21		7.62	16.60	0.21	2.8	0.067	0.69	37.7	4.3	1.26	1560	1.30	1.20	36.3	63.6	630
AT22		8.70	16.50	0.17	2.7	0.067	0.66	26.8	4.3	1.51	1660	1.81	0.86	37.6	63.3	510
AT23		10.50	20.0	0.18	0.9	0.062	0.63	23.3	4.9	3.97	1640	0.59	1.54	19.8	128.0	340
AT24		2.53	14.90	0.10	1.8	0.061	1.73	22.3	5.7	0.46	491	1.07	0.70	29.3	20.9	130
AT25		5.88	20.7	0.17	1.1	0.076	0.53	28.0	7.3	2.52	1180	0.60	0.81	22.4	93.0	110
AT26		5.41	16.25	0.16	1.7	0.052	1.36	26.4	7.0	2.42	935	1.06	0.79	34.7	158.5	110
AT27		10.90	18.20	0.25	1.0	0.072	0.47	23.5	5.1	3.98	2330	0.67	1.15	27.2	129.5	450
AT28		5.38	14.20	0.16	1.2	0.045	0.76	23.4	3.2	1.63	1230	0.80	1.41	19.4	66.0	350
AT29		5.43	15.40	0.17	1.4	0.050	1.02	26.3	3.0	1.39	1400	0.69	1.35	47.4	46.1	440
AT30		5.40	17.50	0.15	1.2	0.063	0.65	31.8	3.8	1.39	1160	1.01	1.07	29.2	48.2	350
AT31		7.28	16.85	0.18	0.8	0.060	0.65	25.3	4.0	1.90	1500	0.72	1.13	17.6	65.0	370
AT32		6.66	19.85	0.23	2.4	0.062	2.24	47.8	5.5	0.46	1810	1.53	1.67	85.2	14.7	850
AT33		1.61	7.60	0.15	1.3	0.018	1.62	26.9	2.7	0.11	543	0.87	0.62	31.6	5.7	70
AT34		9.34	21.6	0.31	6.3	0.100	3.34	52.8	2.7	0.33	8180	2.45	1.69	>500	11.1	560
AT35		9.46	23.7	0.26	2.9	0.097	2.59	46.7	3.8	0.82	2560	2.10	2.30	183.0	17.4	1210
AT36		9.38	23.1	0.32	4.6	0.077	2.71	38.0	3.3	1.00	2930	1.92	2.04	227	26.2	620
AT37		8.66	20.1	0.31	3.3	0.071	2.04	34.0	4.5	1.38	3400	1.18	1.91	247	54.0	520
AT38		5.73	17.60	0.29	1.1	0.068	0.78	42.2	5.6	1.05	1100	0.59	1.05	23.2	40.9	260
AT39		11.80	26.1	0.40	1.5	0.120	0.82	52.5	5.6	1.79	1900	0.82	1.37	23.2	40.8	490
AT40		8.81	17.60	0.31	1.2	0.069	0.81	35.8	5.1	1.10	1380	0.58	0.78	28.3	49.0	560

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
AT01		14.8	25.9	<0.002	0.01	0.34	11.9	3	1.9	179.5	15.10	0.07	12.9	4.27	0.09	2.4
AT02		10.1	47.6	<0.002	0.01	0.12	10.2	3	4.6	103.0	20.3	0.10	10.2	4.48	0.09	3.7
AT03		10.2	48.2	<0.002	0.02	0.12	7.6	3	3.1	138.0	17.95	0.09	8.1	4.89	0.09	2.6
AT04		11.7	50.7	<0.002	0.01	0.11	9.0	4	2.6	239	18.25	0.11	11.5	5.43	0.08	3.7
AT05		10.5	203	<0.002	0.01	0.14	3.1	2	2.3	742	4.46	0.10	13.1	1.910	0.23	4.8
AT06		14.6	111.5	<0.002	0.02	0.18	20.5	2	2.0	547	4.82	0.06	12.2	1.385	0.21	3.6
AT07		12.0	45.7	<0.002	0.01	0.14	9.0	5	3.5	183.5	22.7	0.13	16.1	5.45	0.10	3.5
AT08		13.4	23.1	<0.002	0.01	0.14	16.3	4	1.7	252	20.3	0.12	10.3	4.30	0.09	1.2
AT09		9.6	21.2	<0.002	0.01	0.12	16.6	2	1.3	263	4.21	0.06	3.8	2.09	0.09	0.9
AT10		11.9	22.9	<0.002	0.01	0.16	17.8	2	1.5	239	3.02	0.05	7.7	2.04	0.10	1.6
AT11		10.6	24.6	<0.002	0.01	0.08	10.8	1	0.9	362	1.27	<0.05	3.6	0.608	0.11	0.5
AT12		10.8	51.7	<0.002	0.01	0.06	15.2	1	1.3	289	2.22	<0.05	9.3	0.398	0.15	1.1
AT13		10.5	38.4	<0.002	0.01	0.08	18.4	2	1.3	339	4.12	0.06	48.8	1.860	0.12	5.5
AT14		10.5	48.2	<0.002	0.01	0.08	11.6	1	1.3	214	2.79	0.05	13.2	0.697	0.13	2.3
AT15		16.1	69.9	<0.002	0.01	0.12	8.1	4	2.0	389	10.40	0.06	9.7	3.54	0.19	2.0
AT16		17.0	32.1	<0.002	0.01	0.17	15.9	9	3.0	195.0	17.40	0.05	11.0	>10.0	0.13	2.9
AT17		10.1	22.8	<0.002	0.01	0.10	14.7	3	1.6	227	3.34	0.05	4.4	2.83	0.09	0.9
AT18		10.2	24.5	<0.002	0.01	0.08	15.2	1	1.1	435	1.15	0.05	3.1	0.914	0.11	0.6
AT19		9.0	17.3	<0.002	0.01	0.13	13.4	2	1.3	220	1.61	0.07	3.2	1.685	0.07	0.7
AT20		12.8	34.1	0.002	0.01	0.09	21.3	4	2.2	480	3.24	0.07	6.8	3.61	0.12	1.6
AT21		9.9	21.9	<0.002	0.01	0.10	16.6	2	1.6	278	1.97	0.07	6.9	1.835	0.09	0.8
AT22		10.5	21.5	<0.002	0.01	0.11	18.3	2	1.8	225	2.05	0.08	3.7	2.04	0.08	0.8
AT23		7.3	16.3	<0.002	0.01	0.07	32.0	2	1.1	454	1.07	0.06	2.2	1.275	0.06	0.4
AT24		18.7	85.5	<0.002	0.01	0.07	14.2	1	2.1	205	1.91	<0.05	5.4	0.339	0.26	1.7
AT25		10.9	21.2	<0.002	0.01	0.09	34.9	1	1.4	431	3.65	<0.05	4.3	0.733	0.08	0.9
AT26		12.8	41.4	<0.002	0.01	0.09	26.4	1	0.9	196.0	1.88	0.07	5.3	0.484	0.15	0.7
AT27		7.6	12.6	<0.002	0.01	0.09	31.9	4	1.1	252	1.55	0.07	2.7	2.37	0.05	0.5
AT28		8.6	20.6	<0.002	0.01	0.06	17.2	1	1.0	348	1.04	<0.05	2.2	0.764	0.09	0.5
AT29		8.6	29.2	<0.002	0.01	0.08	17.6	2	1.4	300	2.77	<0.05	3.9	1.180	0.10	0.9
AT30		10.7	22.4	<0.002	0.01	0.07	22.2	2	1.4	340	1.48	<0.05	4.8	1.000	0.09	0.8
AT31		8.3	17.1	<0.002	0.01	0.11	22.5	2	1.2	324	1.00	0.05	2.7	1.090	0.07	0.5
AT32		12.3	54.1	<0.002	0.01	0.09	9.6	2	2.4	190.0	5.16	0.05	11.4	1.810	0.18	2.6
AT33		15.2	52.5	<0.002	0.01	0.05	2.5	1	1.0	82.5	1.68	<0.05	11.2	0.344	0.21	1.7
AT34		17.5	65.2	<0.002	0.01	0.12	8.2	6	4.1	383	56.2	0.25	18.0	6.67	0.14	3.6
AT35		8.6	49.9	<0.002	0.01	0.15	13.0	4	4.2	460	12.50	0.07	8.2	3.48	0.13	2.8
AT36		9.0	57.6	<0.002	0.01	0.14	13.2	3	3.9	473	15.45	0.09	9.2	2.56	0.13	2.8
AT37		8.6	49.1	<0.002	0.01	0.13	16.2	4	3.4	429	16.80	0.11	9.1	3.15	0.15	1.9
AT38		8.9	25.0	<0.002	0.01	0.07	21.4	2	1.4	388	1.29	0.05	4.1	0.751	0.11	0.6
AT39		9.4	23.2	<0.002	0.02	0.07	33.1	3	2.1	566	1.62	0.06	3.4	1.785	0.10	0.8
AT40		6.3	27.9	<0.002	0.01	0.06	17.7	2	1.4	229	1.55	0.08	4.6	1.285	0.12	0.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
AT01		175	1.2	17.9	142	284	3.86	2.36	1.52	4.35	0.75	0.34	36.7	10.25	6.18	0.65
AT02		130	1.8	20.3	136	209	4.82	2.79	1.50	4.95	0.90	0.40	40.3	11.10	7.23	0.77
AT03		104	1.8	14.1	125	122.5	3.61	1.89	1.87	4.49	0.66	0.25	34.3	8.94	6.11	0.63
AT04		120	1.7	10.5	125	207	2.78	1.51	1.91	3.31	0.50	0.24	28.9	7.89	4.82	0.47
AT05		594	1.2	9.6	128	375	1.94	1.38	0.59	1.98	0.40	0.32	16.3	4.75	2.69	0.31
AT06		204	1.7	25.3	71	178.5	5.46	3.06	2.19	6.51	1.01	0.42	54.3	15.15	9.16	0.92
AT07		128	2.4	16.0	163	230	4.01	2.29	1.77	4.44	0.75	0.36	36.7	10.30	6.29	0.66
AT08		182	1.9	14.5	111	114.0	3.30	1.84	1.41	3.80	0.59	0.25	29.9	7.97	5.40	0.56
AT09		192	1.4	16.1	59	61.3	3.33	1.86	1.32	3.96	0.62	0.25	28.5	7.44	5.38	0.58
AT10		254	1.0	15.9	70	101.5	3.47	1.98	1.33	3.99	0.64	0.28	30.8	8.37	5.63	0.59
AT11		109	0.5	12.4	29	43.7	2.68	1.43	1.10	3.17	0.49	0.19	25.8	7.02	4.60	0.46
AT12		85	0.7	14.5	35	75.1	2.82	1.59	0.99	3.18	0.51	0.22	27.6	7.92	4.71	0.46
AT13		251	1.2	16.9	64	140.5	3.45	1.99	1.18	3.92	0.64	0.34	35.6	10.25	5.98	0.58
AT14		97	0.9	12.4	27	126.0	2.32	1.38	0.85	2.66	0.45	0.21	24.1	6.97	4.00	0.39
AT15		150	1.4	19.2	66	128.5	4.91	2.65	3.33	6.23	0.88	0.34	44.6	11.55	7.94	0.87
AT16		387	2.0	28.0	153	155.5	6.92	3.31	4.76	9.73	1.25	0.40	55.9	14.30	10.80	1.29
AT17		269	1.2	15.5	79	132.0	3.37	1.87	1.35	4.01	0.63	0.26	28.3	7.42	5.45	0.57
AT18		162	0.6	19.2	54	35.5	4.23	2.28	1.73	5.28	0.78	0.29	35.7	9.10	6.70	0.73
AT19		210	1.3	13.7	57	73.7	2.77	1.53	1.14	3.33	0.51	0.21	26.0	6.81	4.84	0.47
AT20		430	0.8	17.8	122	185.0	4.01	2.25	1.71	4.84	0.76	0.33	35.2	9.11	6.60	0.68
AT21		261	1.4	15.4	76	107.0	3.38	1.77	1.41	4.32	0.60	0.25	35.1	9.07	6.34	0.59
AT22		287	1.4	16.3	80	106.0	3.41	1.92	1.38	3.92	0.65	0.27	26.4	6.78	5.27	0.57
AT23		311	1.0	15.0	79	31.6	3.07	1.65	1.35	3.72	0.57	0.21	25.7	6.46	5.13	0.51
AT24		71	0.9	16.2	20	62.2	2.95	1.90	0.92	3.08	0.58	0.31	20.2	5.51	3.93	0.46
AT25		169	0.7	17.7	35	39.7	3.24	1.87	1.30	3.61	0.62	0.28	26.8	6.99	5.13	0.52
AT26		135	1.2	12.0	43	75.3	2.40	1.37	0.95	2.74	0.46	0.20	21.2	6.04	3.77	0.40
AT27		311	1.0	18.7	82	37.9	3.68	2.16	1.38	3.97	0.71	0.29	25.9	6.57	5.30	0.59
AT28		153	0.5	12.7	45	36.4	2.56	1.38	1.03	3.09	0.47	0.20	23.0	5.97	4.36	0.42
AT29		163	0.6	15.3	49	45.9	3.27	1.77	1.32	3.95	0.60	0.24	27.7	7.24	5.30	0.55
AT30		155	0.7	17.2	52	48.2	3.41	1.86	1.43	4.11	0.62	0.25	31.6	8.25	6.02	0.57
AT31		208	0.5	15.5	65	27.4	3.04	1.67	1.24	3.63	0.57	0.22	25.6	6.62	5.06	0.49
AT32		149	1.1	19.4	45	87.7	4.74	2.29	2.28	6.24	0.80	0.30	45.9	12.10	8.48	0.85
AT33		36	0.5	10.0	17	58.8	1.99	0.99	0.63	2.60	0.34	0.14	20.9	6.13	3.74	0.36
AT34		142	3.7	29.7	123	221	7.75	4.19	2.94	8.29	1.38	0.56	52.9	13.80	10.40	1.28
AT35		230	1.4	26.6	86	97.7	6.96	3.47	3.68	8.43	1.28	0.45	49.4	11.45	9.26	1.24
AT36		190	1.7	23.3	88	155.0	6.11	3.13	2.57	7.07	1.14	0.41	38.7	9.23	7.48	1.06
AT37		197	1.6	22.3	95	109.5	5.61	2.84	2.45	6.52	1.04	0.35	34.5	8.18	6.76	0.99
AT38		162	0.5	20.8	45	52.6	4.24	2.12	1.98	5.60	0.80	0.27	38.4	9.37	6.84	0.77
AT39		301	0.6	33.5	80	48.5	7.96	3.94	3.69	10.50	1.50	0.45	59.0	13.20	11.10	1.43
AT40		219	0.6	16.1	51	51.6	3.63	1.81	1.81	4.95	0.67	0.22	32.2	8.00	5.74	0.67

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
AT01		0.34	2.11
AT02		0.39	2.48
AT03		0.27	1.61
AT04		0.22	1.45
AT05		0.24	1.76
AT06		0.42	2.61
AT07		0.32	2.16
AT08		0.25	1.57
AT09		0.26	1.57
AT10		0.27	1.70
AT11		0.20	1.20
AT12		0.22	1.37
AT13		0.30	1.94
AT14		0.20	1.31
AT15		0.34	2.10
AT16		0.45	2.57
AT17		0.26	1.60
AT18		0.30	1.79
AT19		0.21	1.33
AT20		0.32	1.97
AT21		0.24	1.51
AT22		0.27	1.64
AT23		0.21	1.35
AT24		0.28	1.83
AT25		0.26	1.70
AT26		0.19	1.20
AT27		0.30	1.84
AT28		0.19	1.20
AT29		0.24	1.51
AT30		0.25	1.56
AT31		0.22	1.36
AT32		0.30	1.84
AT33		0.14	0.82
AT34		0.57	3.51
AT35		0.48	2.90
AT36		0.42	2.60
AT37		0.39	2.32
AT38		0.28	1.71
AT39		0.50	2.91
AT40		0.24	1.38

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Appendix 3-1

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
AT41		0.17	0.004	<0.01	5.69	1.0	510	1.14	0.04	2.63	0.06	107.5	35.7	90	0.22	32.1
AT42		0.17	0.004	0.06	6.24	1.2	470	1.22	0.05	2.29	0.05	110.5	47.0	107	0.40	39.9
AT43		0.17	0.003	<0.01	8.06	0.7	630	0.98	0.09	4.34	0.12	123.0	33.4	200	0.44	34.3
AT44		0.17	0.002	0.03	7.97	1.0	550	0.82	0.08	4.29	0.12	159.5	33.9	108	0.41	30.5
AT45		0.17	0.002	0.01	8.50	0.9	380	0.77	0.05	5.62	0.11	139.5	47.9	121	0.28	41.7
AT46		0.13	0.002	0.04	7.78	1.9	460	0.93	0.05	5.03	0.11	165.5	47.8	127	0.31	36.4
AT47		0.17	0.002	0.03	7.90	0.6	370	0.77	0.21	6.03	0.14	160.0	48.4	257	0.45	40.7
AT48		0.13	0.002	<0.01	7.74	1.2	700	1.96	0.08	3.09	0.04	147.5	27.5	46	0.36	24.9
AT49		0.13	0.001	0.27	5.91	0.9	680	1.62	0.08	2.50	0.06	174.5	26.6	110	0.77	24.5
AT50		0.13	0.001	0.08	6.62	1.3	820	2.77	0.19	1.98	0.11	179.5	17.2	44	1.06	19.8
AT51		0.13	0.001	<0.01	4.60	0.9	460	1.73	0.33	1.18	0.06	372	12.4	58	3.10	24.9
AT52		0.16	0.002	<0.01	3.95	0.9	550	0.98	0.21	1.21	0.06	>500	9.4	54	1.97	16.7
AT53		0.13	0.001	<0.01	6.55	0.4	800	2.64	0.20	1.29	0.07	134.5	11.3	34	1.80	15.4
AT54		0.13	0.001	<0.01	7.62	0.9	540	3.18	0.13	1.23	0.04	196.0	22.1	47	0.97	25.5
AT55		0.16	0.001	<0.01	7.23	1.4	1450	1.84	0.06	1.88	0.06	167.5	26.1	53	0.40	20.5
AT56		0.16	0.001	0.08	7.18	1.9	1560	1.68	0.06	2.05	0.06	174.0	25.5	56	0.36	20.3
AT57		0.16	0.001	<0.01	7.00	1.2	720	3.10	0.16	1.22	0.06	198.5	14.9	38	1.46	15.8
AT58		0.16	0.001	<0.01	7.64	0.9	560	3.16	0.12	1.69	0.07	183.5	22.3	40	0.68	23.0
AT59		0.16	0.002	<0.01	7.01	1.1	860	1.44	0.03	2.92	0.08	132.0	42.4	133	0.35	44.8
AT60		0.12	0.002	<0.01	6.29	0.8	700	1.13	0.04	2.09	0.06	116.0	38.4	130	0.40	39.4
BS01		0.12	0.003	0.07	4.16	0.9	990	1.21	0.14	0.55	0.03	397	17.8	87	1.49	23.4
BS02		0.13	0.001	<0.01	3.97	1.6	750	0.87	0.14	0.90	0.05	239	21.1	101	2.02	20.6
BS03		0.12	0.002	0.03	3.73	1.0	220	0.78	0.23	2.00	0.06	437	26.4	435	1.25	22.1
BS04		0.13	0.005	<0.01	3.75	1.0	380	0.95	0.15	0.26	0.03	326	11.1	84	3.13	17.2
BS05		0.12	0.001	<0.01	3.75	1.0	490	1.08	0.10	0.24	0.03	142.0	14.6	64	1.62	23.8
BS06		0.16	0.001	0.04	3.86	1.2	420	0.80	0.13	1.33	0.07	180.0	28.9	125	0.99	18.8
BS07		0.16	0.001	0.03	4.51	1.1	610	1.25	0.12	1.21	0.05	130.5	19.3	79	1.02	21.7
BS08		0.12	0.001	0.20	3.94	1.2	470	1.31	0.16	1.07	0.07	187.0	27.0	80	0.98	19.2
BS09		0.10	0.001	0.67	5.06	0.2	360	1.41	0.18	3.24	0.12	145.0	39.0	281	0.53	23.3
BS10		0.12	0.001	0.09	6.16	<0.2	670	1.11	0.13	3.83	0.08	128.5	40.4	139	0.69	27.8
BS11		0.16	0.001	0.08	5.69	<0.2	700	1.04	0.13	3.00	0.08	165.0	32.2	99	0.62	24.6
BS12		0.15	0.001	0.32	3.48	0.6	420	0.51	0.12	2.39	0.09	159.5	49.4	605	0.47	25.0
BS13		0.17	0.012	0.11	5.53	<0.2	680	0.91	0.13	3.10	0.08	136.0	37.1	156	0.66	27.4
BS14		0.17	0.002	0.06	3.68	0.6	590	0.69	0.15	1.96	0.07	53.6	23.3	150	0.54	26.8
BS15		0.12	0.002	0.19	5.23	0.3	470	0.69	0.12	4.08	0.11	150.0	45.6	224	0.32	27.8
BS16		0.14	0.002	0.13	6.18	0.6	670	0.87	0.06	3.30	0.09	93.1	37.8	193	0.40	37.6
BS17		0.15	0.002	0.13	1.75	0.2	280	0.43	0.03	0.18	0.03	186.5	17.2	320	0.37	12.9
BS18		0.13	0.001	0.11	2.99	0.3	280	0.55	0.10	0.79	0.04	240	8.6	38	0.19	9.1
BS19		0.13	0.002	0.02	2.17	0.3	440	0.45	0.01	0.23	0.04	87.0	5.5	64	0.40	7.7
BS20		0.19	0.001	0.02	1.87	0.2	400	0.38	0.02	0.24	0.04	95.1	7.4	73	0.41	7.2

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
AT41		7.68	16.45	0.33	1.0	0.066	0.78	35.2	3.0	0.85	1580	1.21	1.26	24.4	26.6	850
AT42		12.20	21.0	0.40	2.3	0.083	1.10	41.8	4.2	0.92	1600	0.93	0.93	55.8	33.4	590
AT43		9.02	23.7	0.35	1.4	0.120	0.95	52.5	5.0	1.23	1920	1.20	1.16	31.5	55.0	430
AT44		11.15	24.7	0.40	1.4	0.140	0.70	67.6	4.6	1.01	2970	0.58	1.28	37.9	34.3	670
AT45		12.50	26.1	0.44	1.1	0.131	0.47	60.9	3.7	1.50	2900	0.85	1.19	34.4	47.3	1100
AT46		14.15	26.5	0.45	1.4	0.144	0.52	66.9	3.1	1.11	3720	0.86	1.30	48.0	37.2	1150
AT47		11.55	26.5	0.40	1.3	0.150	0.50	67.7	4.3	1.65	3000	1.06	1.11	25.8	65.1	700
AT48		8.59	26.6	0.35	2.9	0.105	1.34	52.0	3.0	0.89	1760	1.53	2.80	106.0	19.0	740
AT49		21.7	26.1	0.53	5.8	0.081	1.39	65.9	4.5	1.11	1760	2.39	1.82	93.7	26.1	890
AT50		7.94	21.7	0.34	5.5	0.108	2.97	54.9	6.0	0.66	1080	1.80	1.81	99.0	17.3	580
AT51		5.61	14.40	0.46	3.5	0.047	1.55	176.5	10.4	0.53	867	1.38	0.92	22.3	20.7	370
AT52		4.24	13.30	0.75	4.0	0.035	1.53	347	7.0	0.49	730	0.43	0.77	12.9	15.5	550
AT53		4.24	19.50	0.24	2.4	0.065	2.48	48.6	6.9	0.50	753	0.79	2.21	59.4	13.4	280
AT54		8.57	27.0	0.36	7.0	0.116	2.48	62.5	6.4	0.58	1240	2.71	2.01	146.0	19.5	380
AT55		11.65	24.9	0.39	4.3	0.099	2.23	47.4	3.6	0.79	2150	1.82	2.42	136.5	18.1	1190
AT56		12.40	25.6	0.39	4.6	0.099	2.38	44.3	2.9	0.89	2420	2.31	2.50	157.0	17.0	1330
AT57		5.75	22.1	0.28	4.1	0.097	2.74	61.8	6.3	0.54	982	1.74	2.14	110.5	14.7	310
AT58		7.87	26.5	0.34	5.2	0.108	2.31	62.1	5.2	0.76	1190	2.67	2.55	146.5	18.2	340
AT59		5.82	15.70	0.24	1.2	0.057	1.02	39.6	4.7	1.29	1880	0.59	1.82	25.7	45.5	520
AT60		5.49	15.30	0.25	1.7	0.061	0.86	38.7	5.2	1.03	1890	1.46	1.22	32.0	48.4	550
BS01		9.08	15.20	0.46	3.8	0.045	2.21	180.5	5.7	0.46	851	1.00	0.61	39.5	25.1	510
BS02		7.33	13.75	0.28	2.5	0.051	1.81	108.5	6.3	0.64	1040	0.99	0.61	52.8	24.6	440
BS03		9.06	15.15	0.58	1.6	0.042	0.73	206	11.0	2.21	1290	1.43	0.61	12.5	67.0	350
BS04		4.36	13.20	0.42	2.0	0.037	1.33	155.5	12.5	0.42	534	0.53	0.29	12.7	24.1	260
BS05		3.70	11.35	0.29	2.2	0.042	1.13	62.2	7.5	0.48	731	1.57	0.17	34.4	22.9	250
BS06		12.00	17.65	0.44	3.9	0.085	0.97	75.0	4.9	0.80	1210	1.32	0.47	58.2	33.0	300
BS07		5.73	15.45	0.29	3.1	0.082	1.54	52.4	5.0	0.60	968	1.97	0.67	84.5	21.7	340
BS08		20.0	23.5	0.51	11.2	0.107	1.29	78.2	4.8	0.44	1580	1.66	0.49	106.5	22.9	360
BS09		19.30	24.2	0.42	6.3	0.127	0.90	57.4	4.2	0.88	1320	2.20	0.90	94.7	41.7	580
BS10		8.14	18.20	0.30	1.8	0.088	1.17	53.6	6.0	1.92	1260	0.70	1.20	22.5	53.5	630
BS11		9.84	18.30	0.36	1.6	0.101	1.17	68.4	5.0	0.92	1270	1.48	0.89	24.5	26.5	460
BS12		25.2	17.70	0.61	3.6	0.101	0.79	69.3	3.2	0.68	1760	0.72	0.40	24.6	61.9	340
BS13		9.09	17.20	0.35	1.7	0.091	1.25	58.4	5.0	1.22	1270	1.15	0.85	22.0	39.5	470
BS14		5.06	10.70	0.19	1.4	0.045	1.08	23.3	3.1	0.54	1030	0.51	0.56	15.8	28.4	290
BS15		14.90	19.90	0.47	1.9	0.118	0.73	65.6	3.1	1.02	1760	1.29	0.73	22.4	33.2	450
BS16		10.70	17.50	0.31	1.3	0.087	0.87	38.5	4.5	1.46	2780	0.82	1.00	32.0	43.9	780
BS17		15.80	27.6	0.51	2.4	0.026	0.73	87.3	5.7	0.15	615	1.07	0.21	5.8	51.1	190
BS18		4.10	8.84	0.36	2.5	0.030	1.17	112.0	2.8	0.43	518	0.69	0.63	40.0	11.7	280
BS19		3.36	7.63	0.20	1.3	0.015	1.06	40.3	6.5	0.14	256	0.33	0.32	5.2	13.6	110
BS20		4.15	7.32	0.18	1.1	0.014	0.85	40.4	5.1	0.17	470	0.97	0.22	5.6	14.5	100

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
AT41		5.8	24.2	<0.002	0.01	0.07	16.5	3	1.4	341	1.35	0.05	3.5	1.395	0.11	0.7
AT42		5.9	35.5	<0.002	0.01	0.07	17.8	3	2.0	306	3.71	0.06	7.3	2.01	0.11	1.3
AT43		10.3	26.2	<0.002	0.01	0.08	30.6	3	2.3	501	2.34	0.05	3.6	1.785	0.11	0.7
AT44		9.9	20.1	<0.002	0.01	0.07	30.6	5	2.3	515	2.53	0.06	5.1	3.63	0.09	1.0
AT45		8.8	15.2	<0.002	0.01	0.07	34.3	5	2.1	659	2.05	<0.05	3.6	3.59	0.06	0.7
AT46		11.9	17.3	0.002	0.01	0.09	31.2	6	2.5	652	2.78	0.06	4.8	4.47	0.08	1.0
AT47		14.3	18.0	<0.002	0.01	0.11	36.6	5	2.2	666	1.58	<0.05	3.9	3.33	0.09	1.1
AT48		6.2	31.9	0.002	0.01	0.09	18.7	3	3.2	607	7.35	0.06	8.0	1.875	0.08	2.1
AT49		7.6	38.4	<0.002	0.01	0.09	14.1	3	3.0	388	6.67	0.08	12.7	1.465	0.12	3.0
AT50		16.2	96.0	<0.002	0.01	0.11	14.0	3	6.7	185.0	6.86	0.06	19.4	1.175	0.40	5.4
AT51		16.5	69.6	<0.002	0.01	0.06	11.0	3	2.1	121.0	1.78	<0.05	75.7	0.755	0.35	9.8
AT52		17.0	61.1	0.003	0.01	<0.05	9.5	3	1.2	129.5	1.18	<0.05	204	0.547	0.29	15.2
AT53		16.2	88.3	0.002	0.01	0.06	10.7	2	3.7	166.0	4.09	<0.05	19.0	0.602	0.39	3.4
AT54		12.7	80.1	<0.002	0.01	0.11	13.5	3	6.7	146.0	9.96	0.08	18.6	1.265	0.25	6.3
AT55		7.0	44.5	<0.002	0.01	0.10	12.8	4	4.1	454	9.53	0.07	9.5	2.89	0.12	3.1
AT56		7.2	45.5	<0.002	0.01	0.11	12.9	4	4.5	477	11.40	0.08	10.0	3.55	0.11	3.5
AT57		12.9	81.5	<0.002	0.01	0.08	10.4	2	5.7	159.5	7.57	0.05	19.8	0.902	0.29	5.2
AT58		8.6	67.2	<0.002	0.01	0.11	13.6	3	6.7	197.5	9.88	0.07	16.7	1.355	0.18	6.1
AT59		10.0	27.6	<0.002	0.01	0.09	16.1	2	1.0	477	1.35	0.05	4.0	0.905	0.12	0.7
AT60		9.0	26.8	<0.002	0.02	0.09	15.6	2	1.2	297	1.72	0.05	5.3	1.035	0.11	0.8
BS01		16.3	69.8	<0.002	0.01	0.08	9.3	2	2.3	152.0	2.76	<0.05	66.5	0.892	0.37	6.7
BS02		12.8	64.3	0.002	0.01	0.11	10.6	2	2.5	135.5	3.63	<0.05	33.0	1.140	0.31	4.5
BS03		10.4	35.9	0.002	0.01	<0.05	20.3	3	1.6	64.8	1.07	<0.05	86.9	0.848	0.19	7.3
BS04		13.6	72.2	<0.002	0.01	0.06	8.9	2	1.7	52.5	0.87	<0.05	67.2	0.457	0.36	6.7
BS05		16.4	60.6	<0.002	0.01	0.05	9.7	2	1.7	52.4	2.10	<0.05	24.1	0.596	0.33	3.9
BS06		12.2	35.2	<0.002	0.02	0.06	16.3	2	3.2	127.0	4.09	0.07	22.3	0.902	0.18	3.9
BS07		16.1	53.2	<0.002	0.01	0.08	14.9	2	3.9	144.0	6.00	0.07	16.9	1.015	0.26	4.5
BS08		17.0	45.1	<0.002	0.01	0.09	14.6	3	4.8	110.0	8.20	0.09	27.7	1.290	0.22	7.5
BS09		14.4	30.7	<0.002	0.01	0.08	26.3	2	4.4	309	6.36	0.08	7.0	1.200	0.11	4.1
BS10		13.6	36.7	<0.002	0.01	0.05	26.0	2	1.9	399	1.47	<0.05	4.2	1.105	0.17	2.2
BS11		14.5	37.8	<0.002	0.01	<0.05	22.8	2	2.2	371	1.67	<0.05	4.7	1.195	0.16	2.5
BS12		11.4	22.3	0.002	0.02	0.05	20.8	3	1.9	237	1.85	0.06	5.7	1.920	0.09	2.4
BS13		14.1	38.2	0.002	0.02	0.05	23.4	2	1.9	348	1.48	<0.05	4.4	1.195	0.16	2.1
BS14		15.5	32.1	<0.002	0.01	0.06	13.5	1	1.1	291	1.47	<0.05	3.3	1.155	0.13	1.3
BS15		13.0	18.2	<0.002	0.02	0.06	27.1	3	2.1	432	1.49	0.05	2.9	1.915	0.08	1.4
BS16		15.4	20.8	<0.002	0.01	0.06	25.4	4	2.0	341	1.84	0.08	1.9	3.61	0.10	1.0
BS17		12.3	24.1	0.002	<0.01	<0.05	5.4	1	1.8	42.5	0.30	<0.05	33.7	0.455	0.11	3.4
BS18		7.9	36.1	<0.002	<0.01	<0.05	8.0	2	1.8	76.6	2.31	<0.05	56.2	1.125	0.11	4.5
BS19		12.9	36.3	<0.002	0.01	<0.05	3.5	<1	1.2	71.2	0.26	<0.05	17.6	0.258	0.15	1.4
BS20		10.6	29.1	<0.002	<0.01	<0.05	4.3	<1	1.2	46.6	0.25	<0.05	17.1	0.343	0.12	1.2

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Johannesburg is a SANAS Accredited Testing Laboratory, No: T0387

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
AT41		192	0.5	20.7	44	42.5	4.50	2.20	2.15	6.11	0.83	0.25	36.5	8.50	6.80	0.82
AT42		279	0.8	20.2	58	88.1	4.92	2.38	2.24	6.23	0.89	0.29	40.5	9.83	7.25	0.89
AT43		229	0.6	34.1	70	55.5	8.13	3.93	3.98	11.15	1.51	0.44	59.1	13.30	11.45	1.51
AT44		270	0.6	39.7	92	58.0	9.65	4.53	5.01	13.75	1.78	0.48	76.4	16.90	14.45	1.80
AT45		289	0.6	39.3	87	45.2	8.91	4.19	4.54	12.35	1.65	0.44	70.2	15.45	13.60	1.63
AT46		322	0.9	41.6	91	58.4	10.10	4.72	4.98	13.95	1.84	0.50	76.2	16.90	14.65	1.87
AT47		316	0.5	44.3	75	46.9	10.15	5.10	4.82	13.60	1.90	0.68	75.6	16.55	14.85	1.83
AT48		199	1.2	30.3	59	93.8	7.78	3.71	3.72	10.05	1.42	0.42	56.4	12.90	10.70	1.44
AT49		265	1.2	34.1	77	188.5	8.84	4.26	4.06	11.35	1.62	0.52	65.7	15.25	12.50	1.64
AT50		154	1.0	57.8	64	174.0	13.10	7.86	3.20	13.05	2.64	1.08	57.8	13.60	12.00	2.14
AT51		112	1.0	41.6	37	112.5	11.85	4.08	4.12	21.4	1.79	0.41	144.0	36.9	25.0	2.67
AT52		93	0.5	62.8	25	122.5	20.2	5.81	6.92	40.8	2.89	0.42	293	74.7	51.8	4.81
AT53		83	0.7	28.2	48	81.0	6.39	3.35	1.90	7.65	1.20	0.45	44.7	11.00	8.30	1.13
AT54		178	1.3	37.5	71	234	8.35	4.80	2.27	8.94	1.64	0.71	57.2	14.65	10.30	1.42
AT55		235	1.2	26.4	91	141.0	6.99	3.52	3.77	8.75	1.30	0.47	49.1	11.60	9.29	1.25
AT56		259	1.3	29.1	87	147.5	7.59	3.95	3.92	9.03	1.40	0.52	48.6	11.15	9.52	1.35
AT57		115	1.1	31.9	51	133.0	7.27	3.88	2.15	8.59	1.36	0.55	55.4	14.15	9.77	1.29
AT58		169	1.4	40.3	61	163.5	9.61	5.34	2.73	10.35	1.86	0.73	60.6	14.95	10.90	1.62
AT59		193	0.8	18.8	53	54.6	4.42	2.31	1.87	5.65	0.83	0.29	35.7	8.60	6.22	0.81
AT60		157	0.9	17.8	53	81.3	3.83	2.03	1.78	5.05	0.73	0.26	33.6	8.22	5.69	0.71
BS01		191	1.0	36.9	45	126.0	11.20	3.83	4.07	19.60	1.71	0.39	149.0	38.7	24.6	2.41
BS02		167	1.2	25.9	47	89.0	6.86	2.59	2.79	10.95	1.11	0.30	89.5	23.1	14.30	1.39
BS03		257	0.6	44.7	63	54.9	13.55	3.91	4.74	25.4	1.95	0.25	172.0	44.5	31.0	3.09
BS04		89	0.7	31.2	42	74.6	9.42	2.51	3.20	18.00	1.30	0.18	133.0	33.1	22.9	2.17
BS05		79	0.7	17.2	35	92.9	3.93	1.58	1.46	6.01	0.64	0.19	50.5	13.10	8.46	0.80
BS06		211	0.7	24.9	48	130.5	6.36	2.76	2.71	9.44	1.10	0.34	68.2	17.05	11.95	1.27
BS07		126	0.9	25.7	43	114.0	5.92	3.07	2.09	7.66	1.10	0.42	49.4	12.25	8.59	1.08
BS08		261	1.1	33.5	71	393	8.05	4.63	2.54	9.42	1.56	0.74	70.1	17.50	11.85	1.40
BS09		305	1.2	39.8	57	190.5	7.99	4.14	3.34	9.12	1.48	0.57	60.9	17.15	12.75	1.34
BS10		209	0.7	27.5	60	49.9	5.19	2.49	2.83	7.37	0.94	0.34	55.6	15.80	10.75	0.95
BS11		222	0.7	26.8	48	43.3	5.32	2.42	3.29	8.06	0.93	0.32	71.5	19.65	12.65	0.98
BS12		408	0.7	27.3	75	96.0	5.83	2.69	3.26	8.62	1.03	0.37	71.2	19.60	13.05	1.08
BS13		209	0.7	26.6	59	48.0	5.39	2.49	3.07	7.80	0.94	0.33	62.1	16.90	11.25	0.99
BS14		137	0.7	16.3	42	42.9	2.69	1.42	1.18	3.34	0.50	0.23	23.0	5.95	4.67	0.45
BS15		323	0.6	32.8	73	51.2	6.73	3.08	3.89	9.85	1.18	0.40	71.4	19.05	13.50	1.25
BS16		261	0.8	26.8	106	36.4	5.43	2.60	2.72	7.10	0.98	0.34	41.6	10.20	8.76	0.96
BS17		322	0.4	19.2	137	67.0	4.99	1.55	1.61	9.18	0.72	0.17	72.7	21.7	13.25	1.09
BS18		105	0.8	34.0	19	75.1	7.85	2.50	1.72	11.80	1.19	0.23	88.3	27.3	16.35	1.57
BS19		70	0.1	9.3	34	43.0	2.24	0.66	0.88	3.97	0.33	0.07	32.0	9.09	6.06	0.48
BS20		95	0.2	9.6	26	35.6	2.38	0.70	0.88	3.92	0.34	0.07	32.1	9.20	6.05	0.49

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
AT41		0.28	1.64
AT42		0.31	1.88
AT43		0.49	2.84
AT44		0.56	3.19
AT45		0.52	2.91
AT46		0.58	3.30
AT47		0.67	4.17
AT48		0.47	2.75
AT49		0.56	3.29
AT50		1.13	7.03
AT51		0.47	2.53
AT52		0.58	2.74
AT53		0.46	2.86
AT54		0.70	4.47
AT55		0.49	2.94
AT56		0.53	3.29
AT57		0.54	3.45
AT58		0.75	4.69
AT59		0.31	1.84
AT60		0.27	1.62
BS01		0.46	2.43
BS02		0.32	1.92
BS03		0.37	1.70
BS04		0.24	1.12
BS05		0.20	1.19
BS06		0.35	2.16
BS07		0.43	2.65
BS08		0.68	4.53
BS09		0.56	3.79
BS10		0.32	2.14
BS11		0.31	2.05
BS12		0.35	2.31
BS13		0.32	2.11
BS14		0.20	1.43
BS15		0.39	2.51
BS16		0.34	2.18
BS17		0.17	1.05
BS18		0.27	1.48
BS19		0.07	0.42
BS20		0.07	0.44

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
BS21		0.16	0.002	0.09	2.71	0.8	310	0.60	0.06	0.23	0.05	>500	11.4	138	1.29	15.9
BS22		0.17	0.001	0.53	3.12	0.9	810	0.46	0.03	0.82	0.07	247	9.0	36	0.32	8.7
BS23		0.13	0.001	0.31	3.04	1.1	540	0.84	0.08	1.18	0.07	>500	18.3	109	0.48	15.0
BS24		0.17	0.002	0.11	5.09	0.2	700	0.94	0.11	2.51	0.08	131.0	19.4	113	1.01	19.9
BS25		0.16	0.002	<0.01	3.77	0.4	530	0.83	0.05	0.79	0.05	307	14.4	76	0.62	17.0
BS26		0.17	0.002	0.02	3.41	0.6	840	0.78	0.06	0.63	0.05	364	15.1	83	0.84	18.5
BS27		0.17	0.002	0.03	3.52	1.8	720	0.62	0.07	1.21	0.06	73.7	14.3	85	0.53	18.7
BS28		0.17	0.001	0.01	5.24	0.9	780	0.96	0.12	1.69	0.06	78.3	18.4	89	1.03	26.5
BS29		0.17	0.002	0.05	5.63	1.1	710	0.90	0.06	2.06	0.07	60.3	29.4	107	0.99	36.8
BS30		0.17	0.002	0.06	6.57	1.2	790	1.29	0.09	2.46	0.08	111.5	21.6	106	1.37	27.8
BS31		0.17	0.002	0.07	5.67	0.2	640	0.94	0.07	3.07	0.07	91.5	20.4	87	0.74	25.7
BS32		0.17	0.001	<0.01	4.78	2.2	900	0.89	0.07	1.23	0.06	50.1	9.3	46	0.66	10.4
BS33		0.17	0.002	0.08	3.93	1.4	480	0.61	0.05	2.34	0.06	177.5	19.6	105	0.48	18.3
BS34		0.16	0.002	<0.01	5.38	0.7	810	0.99	0.06	1.90	0.07	69.8	15.1	55	0.89	25.3
BS35		0.13	0.002	0.04	7.20	0.5	860	1.27	0.18	3.07	0.10	80.4	25.8	85	2.22	40.6
BS36		0.16	0.001	0.03	3.68	0.3	410	0.85	0.05	0.37	0.04	149.5	9.7	75	1.62	16.1
BS37		0.17	0.002	0.14	2.24	1.0	130	0.49	0.14	0.71	0.05	479	14.8	171	0.64	20.5
BS38		0.13	0.002	0.03	3.24	0.4	680	0.75	0.11	0.43	0.04	230	9.5	103	1.82	14.9
BS39		0.17	0.001	0.32	5.40	1.1	840	1.30	0.06	1.06	0.06	209	28.5	97	1.00	30.5
BS40		0.13	0.001	0.06	2.38	0.4	230	0.53	0.08	0.82	0.05	259	13.9	176	0.75	15.6
BS41		0.17	0.001	0.05	6.19	1.5	910	1.65	0.17	2.28	0.08	92.4	16.3	70	2.42	18.5
BS42		0.15	0.002	0.11	5.79	1.5	780	1.29	0.17	2.60	0.09	170.5	30.7	121	1.97	29.1
BS43		0.16	0.001	0.01	5.74	1.9	800	1.29	0.09	0.92	0.04	85.8	11.6	35	1.31	18.0
BT01		0.14	0.002	0.06	5.24	0.7	450	0.90	0.18	3.20	0.08	197.0	45.9	206	0.65	29.5
BT02		0.16	0.001	0.09	4.88	0.6	550	0.90	0.16	1.82	0.05	104.5	38.4	72	1.17	29.6
BT03		0.14	0.001	0.17	7.81	1.1	430	2.17	0.10	0.34	0.03	171.5	34.1	74	1.32	46.3
CM01		0.16	0.001	0.17	3.14	1.0	350	1.29	0.03	0.21	0.02	>500	12.1	268	0.54	21.5
CM02		0.17	0.001	0.05	4.99	0.3	620	1.55	0.02	0.64	0.03	103.5	5.0	17	0.43	7.0
CM03		0.16	0.002	0.05	6.48	0.5	1120	1.85	0.02	0.37	0.04	130.5	3.9	10	0.48	6.0
CM04		0.17	0.002	0.03	4.89	0.7	1390	0.90	0.02	0.20	0.03	62.2	2.8	11	0.30	5.3
CM05		0.16	0.002	0.06	6.74	0.4	1170	2.10	0.02	0.39	0.04	91.2	6.1	14	0.56	7.6
CM06		0.17	0.002	0.63	6.99	1.9	1540	1.85	0.04	0.48	0.05	104.5	8.3	23	0.44	16.9
CM07		0.16	0.002	0.24	8.91	1.1	1150	1.46	0.02	0.37	0.04	106.5	3.6	13	0.49	7.3
CM08		0.16	0.002	0.37	6.60	1.2	680	1.71	0.03	0.60	0.06	480	10.8	73	0.81	14.1
CM09		0.17	0.002	0.09	5.65	0.6	770	0.91	0.02	0.15	0.03	62.5	2.9	19	0.48	6.1
CM10		0.17	0.001	0.06	5.92	0.3	500	1.92	0.02	1.81	0.05	107.5	13.5	62	0.92	14.7
CM11		0.17	0.002	0.04	4.95	0.5	470	1.74	0.02	1.09	0.03	87.3	11.0	43	0.76	12.1
CM12		0.16	0.002	0.04	5.24	0.9	400	1.64	0.02	1.72	0.04	230	21.2	115	0.91	20.0
CM13		0.16	0.002	0.06	4.56	0.7	370	1.29	0.04	1.68	0.04	185.0	20.6	94	0.81	20.1
CM14		0.16	0.001	0.08	4.59	0.5	320	1.28	0.02	1.09	0.04	>500	18.0	166	0.73	18.4

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
BS21		7.99	15.45	0.72	3.3	0.032	0.92	245	9.7	0.33	714	1.27	0.24	14.0	25.6	390
BS22		6.22	10.20	0.40	15.3	0.090	2.34	115.5	3.0	0.38	1600	1.40	0.49	333	8.9	330
BS23		12.05	18.40	1.24	7.8	0.056	1.20	510	3.4	0.53	1340	2.00	0.60	75.4	21.5	1040
BS24		7.01	16.00	0.31	2.1	0.081	1.39	56.8	5.3	0.90	922	0.82	0.86	37.2	27.9	390
BS25		5.43	12.65	0.45	2.6	0.047	1.24	138.0	4.6	0.49	808	1.55	0.57	55.2	21.2	500
BS26		5.44	11.90	0.48	3.3	0.038	1.60	169.5	4.9	0.49	858	0.81	0.45	43.6	22.2	460
BS27		3.96	9.61	0.19	1.9	0.041	1.66	32.4	6.2	0.35	882	1.60	0.47	12.8	19.0	150
BS28		4.17	13.75	0.21	2.0	0.047	1.79	34.3	7.3	0.65	852	0.50	0.82	18.0	27.5	280
BS29		5.28	13.85	0.21	1.3	0.045	1.74	26.4	8.0	0.90	1080	1.20	0.94	14.2	36.5	280
BS30		5.21	17.65	0.30	1.7	0.059	1.70	51.9	13.2	1.24	886	0.56	1.34	13.3	41.5	650
BS31		5.09	15.50	0.27	1.2	0.059	1.24	40.7	6.6	1.30	852	1.34	1.27	12.3	33.3	620
BS32		2.63	11.80	0.17	1.5	0.041	2.40	22.6	9.3	0.42	488	1.53	0.72	10.0	15.3	180
BS33		7.58	12.55	0.38	2.4	0.046	1.14	82.7	6.1	1.02	1460	1.29	0.71	22.6	26.5	540
BS34		3.88	13.20	0.21	1.3	0.037	1.93	32.8	7.6	0.80	742	0.50	1.19	23.6	23.9	360
BS35		6.60	18.95	0.29	1.4	0.086	2.03	36.2	12.6	1.52	1290	1.27	1.36	23.8	46.0	2230
BS36		3.50	11.35	0.27	1.5	0.032	1.25	70.2	11.2	0.46	543	0.52	0.41	9.8	23.9	170
BS37		12.45	15.05	0.75	3.7	0.035	0.41	231	7.9	0.59	1500	1.58	0.26	27.4	30.0	360
BS38		5.67	10.35	0.36	3.4	0.029	1.82	105.5	7.7	0.33	652	0.62	0.41	24.5	17.5	230
BS39		9.17	19.15	0.42	3.4	0.065	1.64	89.3	6.4	0.75	1420	1.72	0.79	91.0	30.1	670
BS40		6.17	11.90	0.44	1.4	0.025	0.70	121.0	8.6	0.91	744	0.50	0.30	8.6	34.4	240
BS41		4.12	16.45	0.24	2.0	0.055	1.66	42.2	14.6	1.16	694	0.54	1.37	13.6	27.1	330
BS42		7.55	17.80	0.38	2.2	0.066	1.44	80.0	12.2	1.23	1040	1.06	1.32	16.2	35.6	750
BS43		3.17	13.65	0.49	3.2	0.040	2.13	38.9	12.1	0.36	549	0.62	1.20	12.5	12.2	230
BT01		17.70	20.9	0.34	5.0	0.127	0.84	85.4	4.7	0.82	1840	1.45	0.50	29.0	30.0	430
BT02		12.35	15.90	0.19	2.7	0.088	1.07	44.7	6.5	0.57	1210	1.80	0.42	28.0	20.9	370
BT03		6.61	23.2	0.31	3.1	0.104	0.97	62.7	8.0	0.37	1130	2.15	0.29	134.0	36.8	580
CM01		8.93	18.45	0.65	5.5	0.042	1.45	239	4.4	0.18	1500	0.88	0.53	144.5	28.8	390
CM02		1.71	11.70	0.33	1.5	0.040	2.80	40.1	4.6	0.26	424	1.75	1.42	55.0	6.6	190
CM03		1.66	14.85	0.46	1.4	0.047	3.93	46.3	5.6	0.14	455	1.20	1.91	61.4	5.2	180
CM04		1.18	10.30	0.45	1.1	0.029	4.09	17.3	3.4	0.07	361	1.41	0.91	39.2	4.3	130
CM05		1.69	15.70	0.54	0.8	0.043	4.11	35.3	5.5	0.16	543	0.98	1.93	47.9	7.2	240
CM06		10.10	18.45	0.48	10.8	0.078	3.93	37.1	4.4	0.18	6000	4.15	2.50	377	6.3	330
CM07		4.56	20.9	0.66	3.3	0.063	5.50	37.3	3.9	0.14	2590	1.75	3.12	190.5	5.3	170
CM08		8.51	22.5	0.86	9.9	0.083	3.30	217	6.2	0.29	3430	3.43	2.02	254	14.4	390
CM09		1.49	13.65	0.46	2.6	0.031	4.35	24.2	4.1	0.07	697	0.98	1.33	55.4	5.1	130
CM10		3.27	14.40	0.50	1.4	0.049	1.49	47.7	7.3	0.64	690	1.58	1.45	18.6	17.8	230
CM11		2.57	11.70	0.43	1.3	0.037	1.38	40.4	7.5	0.40	615	0.70	1.04	36.1	11.7	160
CM12		5.53	15.10	0.44	1.7	0.053	1.14	115.0	7.4	0.68	894	1.39	1.13	22.7	22.6	240
CM13		4.89	12.90	0.37	2.4	0.047	0.95	91.7	6.5	0.65	806	1.72	0.97	24.3	20.4	230
CM14		7.90	19.20	0.77	1.8	0.056	0.92	266	6.8	0.47	1130	0.57	0.47	37.7	21.2	660

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
BS21		15.1	47.9	0.003	<0.01	<0.05	7.8	3	2.4	41.3	0.98	<0.05	98.0	0.961	0.21	10.2
BS22		12.0	63.0	0.002	<0.01	<0.05	9.9	4	2.8	76.5	15.15	0.14	49.4	3.15	0.22	6.6
BS23		18.1	35.2	0.005	0.01	0.06	11.4	5	3.5	128.0	5.46	0.06	162.5	1.760	0.13	14.3
BS24		14.9	51.1	<0.002	0.01	0.05	19.6	1	2.3	287	2.43	<0.05	9.6	0.776	0.22	2.5
BS25		16.1	45.7	0.002	0.01	0.05	9.6	2	2.4	110.0	3.61	<0.05	53.5	0.987	0.19	5.2
BS26		16.7	53.8	0.002	0.01	0.05	8.7	2	1.9	145.0	2.79	<0.05	54.4	1.000	0.23	6.3
BS27		15.2	44.8	<0.002	<0.01	0.09	10.0	1	1.1	212	0.79	<0.05	8.5	0.826	0.19	1.7
BS28		18.9	63.4	<0.002	0.01	0.06	13.7	1	1.3	266	1.17	<0.05	7.1	0.770	0.25	1.9
BS29		16.7	59.7	<0.002	0.01	0.08	14.9	1	1.2	327	0.92	<0.05	3.9	1.045	0.25	1.0
BS30		14.0	61.6	<0.002	0.01	0.10	17.4	1	1.6	326	0.90	<0.05	8.4	0.712	0.28	1.7
BS31		10.0	37.7	<0.002	0.01	0.07	19.2	1	1.5	344	0.79	<0.05	4.1	0.697	0.14	1.0
BS32		13.9	66.1	<0.002	0.01	0.10	10.2	1	1.2	240	0.65	<0.05	4.1	0.408	0.26	2.3
BS33		10.2	29.3	<0.002	0.01	0.11	15.1	2	1.6	257	1.31	<0.05	26.9	1.700	0.12	3.2
BS34		12.4	59.2	<0.002	0.01	0.09	12.9	1	1.4	276	1.20	<0.05	6.0	0.587	0.20	1.0
BS35		17.5	79.1	<0.002	0.01	0.10	21.5	2	1.7	307	1.51	<0.05	6.3	1.195	0.30	2.4
BS36		15.7	65.6	<0.002	0.01	<0.05	7.9	1	1.6	64.4	0.60	<0.05	30.3	0.400	0.28	3.1
BS37		11.0	21.2	0.003	<0.01	<0.05	10.1	4	2.3	29.5	2.37	<0.05	97.0	1.870	0.10	11.2
BS38		15.9	70.6	<0.002	0.01	0.10	7.1	1	2.0	108.0	1.67	<0.05	37.7	0.712	0.30	6.0
BS39		14.9	56.3	<0.002	0.01	0.07	14.1	3	2.6	169.5	5.52	0.07	25.8	1.655	0.21	5.0
BS40		12.4	34.8	<0.002	<0.01	<0.05	9.5	1	1.5	43.3	0.57	<0.05	61.1	0.604	0.15	4.8
BS41		14.8	74.7	<0.002	0.01	0.27	13.4	1	1.8	334	0.98	<0.05	7.2	0.488	0.36	1.9
BS42		15.1	63.5	<0.002	0.02	0.17	18.8	2	3.2	293	1.17	<0.05	11.5	0.879	0.30	2.3
BS43		16.7	69.8	<0.002	0.02	0.14	9.9	1	1.4	242	0.84	<0.05	13.9	0.628	0.30	2.5
BT01		16.1	31.4	0.002	0.01	0.08	29.0	4	2.3	332	1.75	<0.05	5.5	2.12	0.15	2.9
BT02		16.4	44.4	<0.002	0.01	0.09	19.9	2	1.7	197.5	1.77	<0.05	7.8	1.490	0.20	2.9
BT03		19.1	53.5	<0.002	0.01	0.10	18.7	3	3.6	61.2	14.55	0.09	14.2	1.230	0.28	8.7
CM01		21.6	48.1	0.003	<0.01	0.07	6.6	4	2.7	49.8	7.57	0.10	134.5	1.365	0.20	9.8
CM02		13.1	74.6	<0.002	<0.01	<0.05	5.0	<1	1.8	88.0	3.12	0.05	12.5	0.293	0.27	1.5
CM03		16.1	91.7	<0.002	<0.01	0.05	3.7	<1	1.5	145.5	3.13	0.06	12.6	0.291	0.31	1.4
CM04		14.7	74.5	<0.002	<0.01	0.06	2.2	<1	0.9	80.7	2.22	<0.05	5.2	0.240	0.24	0.8
CM05		17.1	101.0	<0.002	<0.01	0.06	3.6	<1	1.8	130.0	2.77	0.05	9.5	0.264	0.31	1.0
CM06		15.6	78.1	<0.002	<0.01	0.10	5.2	6	3.1	197.0	22.7	0.21	40.2	3.59	0.21	4.8
CM07		13.8	84.9	<0.002	0.01	0.07	4.0	3	1.1	154.5	9.31	0.12	14.4	1.365	0.23	1.6
CM08		26.7	77.8	0.002	<0.01	0.08	7.4	5	2.1	136.5	11.85	0.15	136.0	1.635	0.26	5.1
CM09		13.5	89.3	<0.002	<0.01	0.07	2.3	<1	0.9	74.1	2.68	0.06	16.6	0.375	0.27	1.2
CM10		16.8	60.8	<0.002	<0.01	0.06	12.3	1	2.2	164.5	0.98	<0.05	21.4	0.241	0.25	0.9
CM11		12.7	55.5	<0.002	<0.01	0.06	8.8	<1	1.5	118.5	1.45	0.05	17.7	0.200	0.21	0.5
CM12		17.4	53.9	<0.002	<0.01	0.05	13.0	1	1.9	146.5	0.98	0.05	50.4	0.528	0.24	1.0
CM13		14.5	46.6	<0.002	0.01	0.06	11.6	1	1.9	134.0	0.84	0.06	41.1	0.483	0.21	0.9
CM14		23.8	54.4	0.003	0.01	<0.05	13.0	3	2.6	77.3	2.33	0.06	172.5	0.773	0.25	3.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
BS21		167	0.6	52.5	56	91.7	14.65	3.72	5.61	26.2	1.99	0.26	199.5	60.3	36.0	3.22
BS22		109	3.6	50.7	78	428	11.15	5.22	2.62	14.90	1.95	0.77	96.6	28.4	18.15	2.05
BS23		256	1.3	87.0	53	215	26.4	7.62	10.40	57.0	3.71	0.72	391	116.5	66.3	5.78
BS24		163	0.8	26.9	51	62.5	5.41	2.45	2.71	7.95	0.94	0.32	53.2	15.60	10.30	1.02
BS25		132	0.9	34.3	49	79.6	8.67	2.87	3.52	15.45	1.29	0.29	116.5	34.9	20.4	1.87
BS26		134	1.2	31.8	40	101.5	8.36	2.61	3.63	15.15	1.23	0.28	133.0	40.6	21.7	1.79
BS27		117	1.1	15.9	37	73.7	2.77	1.39	1.01	3.97	0.50	0.21	28.2	7.67	5.35	0.51
BS28		123	0.7	18.4	41	65.4	3.28	1.67	1.37	4.32	0.60	0.25	29.8	8.06	5.66	0.59
BS29		149	0.8	18.0	51	43.8	3.13	1.60	1.27	3.89	0.58	0.24	24.3	6.41	4.90	0.55
BS30		138	0.7	26.4	61	58.0	4.76	2.32	2.09	6.39	0.85	0.33	45.0	13.45	8.29	0.85
BS31		141	0.5	23.2	48	34.7	4.06	1.99	1.95	5.38	0.73	0.28	37.4	11.20	7.26	0.73
BS32		71	1.0	15.7	33	56.3	2.62	1.32	1.14	3.40	0.48	0.20	20.9	5.49	4.20	0.46
BS33		229	1.3	27.8	57	82.0	5.76	2.40	2.22	8.94	0.96	0.31	71.1	21.1	12.40	1.15
BS34		113	0.8	19.2	45	49.8	3.20	1.62	1.20	4.03	0.59	0.24	26.8	7.30	5.16	0.56
BS35		151	1.4	31.5	91	46.9	5.41	2.82	2.30	6.65	1.02	0.39	36.0	9.18	7.70	0.94
BS36		76	0.5	18.0	46	48.9	4.11	1.16	1.64	7.14	0.57	0.11	56.7	17.65	10.25	0.88
BS37		290	1.3	46.1	68	101.5	13.45	3.45	5.26	24.8	1.83	0.27	184.5	55.9	33.2	3.05
BS38		135	0.9	21.4	66	107.0	5.23	1.72	2.09	9.29	0.76	0.21	82.2	25.5	13.30	1.10
BS39		199	1.4	29.4	71	97.9	6.66	2.79	3.12	9.95	1.11	0.36	78.3	23.1	13.40	1.31
BS40		153	0.4	29.6	59	43.6	7.36	2.01	2.63	13.40	1.03	0.17	98.9	30.3	18.75	1.62
BS41		104	0.9	21.1	50	64.1	3.45	1.75	1.42	4.50	0.63	0.27	34.6	9.51	6.15	0.62
BS42		179	0.9	28.7	56	68.4	5.24	2.64	2.31	7.15	0.96	0.39	63.8	19.15	9.91	0.96
BS43		84	0.8	18.9	32	118.5	3.95	2.08	1.13	5.56	0.72	0.35	37.2	9.09	6.68	0.75
BT01		332	0.7	36.8	69	163.0	8.31	4.11	4.53	12.20	1.54	0.53	91.1	23.2	16.20	1.61
BT02		237	0.8	23.4	53	91.8	5.18	2.69	2.31	6.92	1.00	0.36	47.5	12.30	8.56	0.96
BT03		159	2.0	28.7	63	118.5	6.53	3.41	2.50	8.09	1.22	0.42	57.1	15.80	9.98	1.20
CM01		149	1.1	55.3	59	171.0	16.60	5.20	3.72	31.0	2.51	0.43	210	59.5	41.1	3.77
CM02		26	0.3	15.0	29	43.8	3.52	1.83	0.85	4.55	0.67	0.24	33.9	9.70	5.53	0.64
CM03		15	0.4	13.3	42	45.2	3.06	1.58	1.03	4.55	0.57	0.23	35.2	10.60	5.57	0.58
CM04		17	0.3	7.6	24	36.7	1.66	0.91	0.61	2.13	0.33	0.16	13.8	3.91	2.39	0.29
CM05		21	0.3	13.1	38	25.5	2.88	1.49	1.03	3.82	0.56	0.22	26.8	8.01	4.56	0.54
CM06		36	2.3	20.7	91	>500	4.07	2.53	2.25	4.63	0.83	0.46	28.0	8.41	5.13	0.71
CM07		18	1.1	9.9	55	151.0	2.33	1.18	1.49	3.63	0.43	0.21	28.8	8.72	4.67	0.45
CM08		73	1.7	37.8	88	436	10.45	3.85	2.37	22.0	1.65	0.52	175.5	50.4	29.0	2.47
CM09		21	0.5	9.3	24	107.0	1.85	1.03	0.51	2.61	0.37	0.18	18.7	5.72	3.22	0.36
CM10		81	0.4	18.5	44	49.8	4.07	1.97	1.08	5.60	0.76	0.25	38.3	10.75	6.76	0.79
CM11		63	0.5	12.7	34	49.3	2.81	1.43	0.85	3.80	0.52	0.19	27.1	8.37	4.66	0.52
CM12		150	0.5	20.5	46	56.7	4.93	2.16	1.43	8.76	0.85	0.27	75.2	22.6	11.40	1.04
CM13		145	0.5	16.4	44	79.9	3.79	1.75	1.21	6.86	0.68	0.23	61.4	18.30	8.91	0.79
CM14		261	0.6	31.9	62	55.7	10.75	2.68	2.20	30.9	1.40	0.27	251	68.0	45.9	3.02

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
BS21		0.33	1.65
BS22		0.69	4.76
BS23		0.77	4.26
BS24		0.31	2.02
BS25		0.32	1.87
BS26		0.28	1.67
BS27		0.19	1.32
BS28		0.23	1.60
BS29		0.22	1.50
BS30		0.31	2.06
BS31		0.27	1.80
BS32		0.18	1.22
BS33		0.30	1.96
BS34		0.22	1.47
BS35		0.38	2.50
BS36		0.12	0.67
BS37		0.33	1.70
BS38		0.20	1.25
BS39		0.35	2.25
BS40		0.19	1.01
BS41		0.24	1.67
BS42		0.36	2.45
BS43		0.31	2.16
BT01		0.55	3.43
BT02		0.37	2.33
BT03		0.47	2.97
CM01		0.55	2.84
CM02		0.26	1.63
CM03		0.22	1.48
CM04		0.14	0.92
CM05		0.21	1.37
CM06		0.40	2.83
CM07		0.18	1.22
CM08		0.48	3.05
CM09		0.16	1.09
CM10		0.27	1.67
CM11		0.20	1.26
CM12		0.29	1.79
CM13		0.24	1.47
CM14		0.29	1.51

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
CM15		0.13	0.002	0.04	4.53	0.2	260	1.36	0.02	1.44	0.04	74.0	16.8	63	0.58	20.0
CM16		0.13	0.002	0.06	5.28	0.5	320	1.37	0.02	1.79	0.04	>500	23.3	265	0.86	29.6
CM17		0.14	0.002	0.03	4.27	0.5	330	1.05	0.02	1.15	0.04	92.4	10.6	52	0.86	59.7
CM18		0.13	0.002	0.03	4.06	0.6	350	1.35	0.02	0.25	0.02	247	15.4	300	0.98	14.5
CM19		0.16	0.002	0.14	4.50	0.5	550	1.20	0.04	0.88	0.04	>500	19.9	465	0.94	18.3
CM20		0.13	0.002	0.05	3.93	0.4	560	0.90	0.03	0.40	0.03	373	15.0	167	1.11	19.8
CM21		0.16	0.002	0.04	3.43	0.2	720	0.68	0.02	0.33	0.03	84.0	8.1	66	0.77	11.5
CM22		0.16	0.002	0.08	7.63	0.9	780	2.12	0.05	0.60	0.05	129.5	18.7	73	2.64	21.0
CM23		0.16	0.001	0.08	8.70	0.3	450	0.99	0.02	0.65	0.04	178.0	5.5	7	0.38	7.5
CM24		0.16	0.002	0.31	6.79	0.8	840	1.57	0.03	0.56	0.04	276	7.6	24	0.83	9.7
CM25		0.17	0.002	0.27	6.24	0.8	1050	2.00	0.03	0.76	0.03	214	7.6	15	0.43	9.1
CM26		0.16	0.002	0.04	4.81	0.5	610	1.35	0.03	0.48	0.03	89.0	8.5	80	0.84	15.4
CM27		0.17	0.001	0.04	5.22	<0.2	370	1.26	0.04	0.97	0.04	135.5	16.3	111	1.37	22.9
CM28		0.16	0.002	0.04	3.89	0.4	330	1.24	0.02	1.25	0.05	92.1	14.8	85	0.67	18.6
CM29		0.17	0.002	0.05	5.85	<0.2	350	1.51	0.03	1.44	0.05	97.6	17.7	79	1.10	25.0
CM30		0.17	0.002	0.05	5.99	0.3	430	1.29	0.02	1.25	0.05	160.0	21.4	138	1.15	33.8
CM31		0.13	0.002	0.02	4.97	<0.2	520	1.46	0.02	0.63	0.03	69.3	12.8	79	0.95	18.0
CM32		0.15	0.002	0.21	5.15	1.1	510	1.74	0.06	0.90	0.05	133.0	15.8	69	0.74	19.4
CM33		0.15	0.003	0.25	4.28	2.2	510	1.54	0.03	0.46	0.03	>500	20.0	352	0.72	27.8
CM34		0.15	0.002	0.08	4.04	0.4	580	0.98	0.02	0.57	0.03	278	11.5	123	0.59	13.7
CM35		0.16	0.003	0.03	4.67	0.6	520	1.49	0.02	0.32	0.03	79.6	12.4	81	0.90	16.3
CM36		0.16	0.002	0.33	5.84	1.3	980	1.11	0.02	0.90	0.03	114.5	13.8	49	0.51	18.0
CM37		0.15	0.001	0.06	8.14	1.1	1260	1.14	0.02	0.24	0.02	83.1	2.9	10	0.74	5.7
CM38		0.16	0.002	0.90	5.63	1.4	1250	1.49	0.01	0.66	0.04	82.5	8.3	9	0.52	12.5
CM39		0.16	0.001	0.39	7.69	1.3	1830	2.13	0.02	0.68	0.04	104.0	8.7	10	0.92	10.2
CM40		0.16	0.002	0.29	7.21	1.1	1210	2.55	0.01	0.62	0.04	133.5	8.4	13	1.13	9.6
CM41		0.17	0.002	0.27	6.03	1.0	640	3.17	0.01	0.46	0.02	71.8	4.1	11	0.46	6.1
CM42		0.17	0.001	0.36	5.31	1.9	970	1.32	0.02	0.84	0.04	174.5	16.3	16	0.72	19.0
CM43		0.17	0.002	0.11	9.47	1.0	1090	2.73	0.02	0.53	0.02	107.5	5.1	6	1.05	6.9
CM44		0.16	0.001	0.13	6.70	0.9	620	2.31	0.02	0.87	0.03	96.7	12.4	35	0.95	14.8
CM45		0.17	0.002	0.43	3.49	2.0	340	1.71	0.04	0.83	0.04	>500	29.9	273	0.65	28.6
CM46		0.16	0.002	0.44	5.07	1.6	640	1.31	0.02	1.65	0.07	139.0	44.9	93	0.89	35.5
CM47		0.17	0.001	0.23	9.24	0.9	1510	2.30	0.02	0.35	0.05	76.9	5.0	6	1.40	6.5
CM48		0.17	0.001	0.49	8.12	1.4	970	3.16	0.05	0.37	0.04	91.7	5.1	9	1.27	6.7
CM49		0.17	0.002	0.33	6.57	1.4	610	1.69	0.02	1.42	0.07	62.3	35.6	58	1.02	31.9
CM50		0.16	0.001	0.15	7.99	0.8	820	1.41	0.02	2.85	0.07	77.4	20.7	25	1.04	25.5
CM51		0.15	0.001	0.06	4.45	0.7	500	1.39	0.02	0.50	0.03	45.8	9.1	41	0.88	11.5
DM01		0.16	0.001	0.25	4.13	1.3	1190	0.64	0.01	0.35	0.03	72.8	4.1	8	0.22	5.9
DM02		0.15	0.001	0.41	7.19	1.8	1180	1.10	0.03	0.33	0.03	124.0	6.8	15	0.27	8.9
DM03		0.17	0.001	0.16	6.78	0.9	1280	1.02	0.02	0.42	0.03	114.0	5.2	17	0.64	6.9

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
CM15		3.38	10.80	0.28	1.2	0.042	0.69	31.9	6.4	0.51	703	1.45	0.71	12.6	17.3	140
CM16		11.60	26.5	0.75	2.2	0.067	0.87	232	6.0	0.83	1040	0.52	0.86	22.2	39.6	1210
CM17		2.92	9.78	0.28	1.0	0.052	0.84	36.3	6.1	0.43	659	1.38	0.52	12.0	17.4	320
CM18		8.83	16.00	0.39	2.3	0.036	1.50	104.0	4.0	0.28	509	0.46	0.59	12.1	38.1	220
CM19		8.11	20.4	0.66	3.5	0.055	1.51	247	6.9	1.25	1190	1.42	0.98	80.8	83.9	470
CM20		6.17	17.15	0.50	1.8	0.043	1.65	164.5	7.9	0.40	787	0.63	0.43	24.8	29.2	370
CM21		2.32	8.12	0.32	0.9	0.030	1.93	36.5	5.8	0.26	545	1.46	0.48	17.7	18.2	180
CM22		4.77	19.45	0.49	1.2	0.079	2.60	57.8	16.7	0.54	1740	1.15	1.05	37.0	32.4	500
CM23		2.78	20.8	0.59	3.0	0.072	5.79	52.8	3.3	0.19	1060	1.99	2.57	140.5	5.2	190
CM24		4.91	20.3	0.64	2.1	0.110	3.71	85.2	6.7	0.26	1340	2.68	1.47	241	8.9	260
CM25		4.15	16.80	0.65	2.6	0.072	3.18	93.2	4.2	0.24	1040	1.65	1.64	215	6.1	310
CM26		2.12	11.45	0.47	0.9	0.036	2.41	36.3	8.9	0.27	356	2.51	0.77	23.5	33.1	210
CM27		4.75	15.70	0.41	1.2	0.047	1.17	59.0	9.3	0.58	731	0.43	0.61	12.5	30.4	340
CM28		3.57	10.20	0.32	1.0	0.036	0.85	39.4	5.8	0.55	730	1.55	0.66	12.6	20.4	220
CM29		4.16	14.50	0.37	1.2	0.063	1.01	42.4	10.6	0.79	789	0.52	0.50	13.7	27.9	260
CM30		5.92	16.65	0.42	1.2	0.057	1.25	70.5	8.1	0.83	957	1.28	0.72	19.5	38.6	430
CM31		2.77	12.55	0.39	1.1	0.036	1.59	28.8	8.3	0.45	584	0.52	0.60	11.6	29.5	170
CM32		5.26	14.95	0.46	2.4	0.046	1.54	56.6	7.1	0.52	1420	2.13	1.50	123.5	24.2	410
CM33		9.89	38.4	2.26	4.0	0.057	1.70	980	6.9	0.40	1750	1.15	0.61	127.0	53.0	1300
CM34		4.34	15.15	0.51	2.0	0.032	1.89	136.0	5.4	0.29	879	1.47	0.64	40.7	22.1	300
CM35		2.89	13.15	0.34	1.0	0.034	1.51	38.2	8.1	0.36	562	0.55	0.50	12.4	31.5	200
CM36		5.51	16.45	0.56	3.0	0.053	3.38	48.9	3.9	0.33	1900	2.31	1.29	175.5	11.8	350
CM37		1.95	18.75	0.47	0.9	0.043	5.74	31.6	4.4	0.12	472	1.24	1.70	61.2	4.9	120
CM38		7.43	14.55	0.56	6.5	0.057	4.06	43.5	5.1	0.27	4120	2.78	1.13	448	3.9	590
CM39		4.13	18.65	0.78	3.1	0.056	4.87	53.2	8.7	0.34	1700	1.52	1.33	237	5.5	630
CM40		3.57	16.55	0.77	5.3	0.043	4.37	65.6	8.3	0.34	1590	2.10	1.57	217	7.6	500
CM41		2.74	13.20	0.63	3.9	0.028	3.30	36.3	3.1	0.14	915	1.03	1.98	202	4.2	250
CM42		6.44	15.05	0.67	3.0	0.050	2.85	76.7	5.3	0.28	2140	1.60	1.25	183.0	6.8	370
CM43		2.05	20.4	0.56	1.8	0.040	6.46	34.3	8.6	0.17	613	1.81	2.78	105.0	4.1	200
CM44		2.93	15.20	0.59	1.9	0.038	2.23	41.0	8.7	0.56	554	1.69	1.85	65.9	15.8	410
CM45		11.35	28.6	1.75	8.5	0.049	1.06	670	5.3	0.36	2210	1.60	0.49	152.0	35.1	970
CM46		9.79	16.55	0.42	3.8	0.064	1.42	59.4	6.8	0.81	2470	1.28	1.05	158.0	32.2	410
CM47		2.29	18.20	0.57	3.1	0.031	6.00	34.4	12.1	0.20	835	2.11	2.63	156.5	3.4	300
CM48		3.32	18.75	0.74	8.7	0.039	5.43	36.7	9.1	0.21	1310	2.69	2.43	277	4.2	280
CM49		12.90	20.6	0.05	2.1	0.075	2.03	27.2	9.5	0.78	2440	1.65	0.90	177.0	29.0	330
CM50		5.50	18.80	0.55	1.3	0.056	2.15	35.3	7.5	1.01	1080	0.72	1.45	60.2	14.1	2630
CM51		1.94	10.60	0.50	1.3	0.028	2.48	20.7	7.7	0.26	356	1.64	0.49	34.6	15.5	120
DM01		3.19	13.70	0.59	4.2	0.039	3.03	26.4	2.8	0.08	1400	1.12	0.87	118.5	2.8	280
DM02		7.73	27.5	0.69	3.5	0.074	4.60	46.6	7.6	0.12	2950	2.13	1.82	218	5.5	330
DM03		2.75	23.0	0.75	3.8	0.051	4.87	52.3	5.8	0.15	1440	1.03	1.59	110.0	5.9	660

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
CM15		10.7	39.5	<0.002	<0.01	0.06	11.5	<1	1.7	88.7	0.65	0.05	13.8	0.255	0.18	0.4
CM16		27.4	51.5	0.003	<0.01	<0.05	14.1	4	3.8	102.0	1.46	0.07	152.5	1.135	0.25	3.4
CM17		12.3	51.9	<0.002	<0.01	0.05	13.5	1	1.7	82.3	0.66	0.06	18.2	0.361	0.25	0.5
CM18		23.8	63.3	0.002	<0.01	<0.05	5.8	1	2.0	59.1	0.79	0.06	60.6	0.409	0.29	4.2
CM19		27.1	56.7	0.003	<0.01	0.13	12.1	4	2.5	111.5	2.29	0.07	105.0	0.838	0.26	7.5
CM20		29.2	65.3	0.002	0.01	<0.05	7.7	2	1.9	77.8	1.12	0.05	74.6	0.474	0.31	4.8
CM21		25.6	64.2	<0.002	<0.01	0.05	4.9	<1	1.2	80.8	0.52	0.05	14.6	0.228	0.28	1.2
CM22		27.9	140.0	<0.002	0.02	0.08	13.7	2	3.7	122.0	1.70	0.07	16.2	0.447	0.66	1.6
CM23		19.0	78.0	<0.002	0.05	0.05	5.5	1	0.9	147.0	5.82	0.11	12.8	0.571	0.26	1.0
CM24		24.3	95.8	<0.002	0.01	0.06	9.0	3	1.8	121.5	9.77	0.15	24.5	1.045	0.37	1.5
CM25		18.1	79.1	<0.002	<0.01	<0.05	7.6	3	2.5	198.5	10.15	0.15	32.0	1.055	0.28	2.6
CM26		16.4	84.2	<0.002	0.01	0.05	6.3	<1	2.3	73.5	1.38	<0.05	13.7	0.221	0.34	1.0
CM27		20.0	67.9	<0.002	<0.01	0.06	9.6	1	2.3	92.0	0.73	<0.05	24.8	0.419	0.32	1.5
CM28		13.0	41.6	<0.002	0.01	<0.05	9.4	<1	1.6	88.9	0.52	<0.05	13.2	0.289	0.18	0.6
CM29		15.6	64.7	<0.002	0.01	0.06	16.9	1	2.3	83.0	0.76	<0.05	16.9	0.370	0.33	0.8
CM30		19.9	74.8	<0.002	0.01	<0.05	13.2	1	2.7	101.0	1.00	0.06	29.9	0.589	0.36	1.4
CM31		21.4	67.4	<0.002	<0.01	<0.05	7.7	<1	1.8	95.7	0.55	<0.05	12.5	0.262	0.32	0.8
CM32		22.2	59.8	<0.002	0.01	0.19	8.0	1	2.2	311	4.65	0.09	17.4	0.655	0.24	2.1
CM33		51.0	64.4	0.009	<0.01	0.11	11.9	13	2.8	118.0	2.58	0.12	460	1.360	0.29	19.0
CM34		29.9	65.6	<0.002	<0.01	0.17	7.0	2	1.6	111.0	1.36	0.05	69.4	0.681	0.29	3.2
CM35		20.0	64.3	<0.002	<0.01	0.06	7.0	<1	1.8	78.9	0.64	<0.05	15.3	0.361	0.30	1.1
CM36		16.7	77.5	<0.002	<0.01	0.10	8.7	4	2.2	172.5	10.40	0.12	23.4	2.03	0.24	2.4
CM37		18.9	83.2	<0.002	<0.01	0.08	4.9	<1	1.1	92.5	2.99	0.05	9.8	0.271	0.37	0.8
CM38		11.8	102.5	<0.002	<0.01	0.08	6.0	6	3.1	220	30.6	0.26	24.9	3.11	0.24	3.6
CM39		15.2	127.0	<0.002	0.01	0.10	7.0	3	2.5	278	16.05	0.15	21.0	1.175	0.33	2.5
CM40		16.5	130.5	<0.002	<0.01	0.11	5.6	3	2.2	300	17.05	0.16	42.9	1.180	0.35	4.8
CM41		12.8	105.5	<0.002	<0.01	0.08	3.8	2	3.0	175.0	17.90	0.15	160.0	0.671	0.29	9.7
CM42		16.2	79.9	<0.002	<0.01	0.09	8.2	8	2.3	189.0	12.65	0.12	39.6	3.44	0.24	3.2
CM43		16.1	168.5	<0.002	<0.01	0.12	2.7	<1	1.8	312	7.30	0.08	14.0	0.278	0.39	2.0
CM44		13.8	94.2	<0.002	0.01	0.08	9.1	1	2.3	215	5.37	0.06	18.9	0.433	0.34	1.9
CM45		41.1	47.4	0.007	<0.01	0.09	12.1	9	2.6	89.0	10.75	0.13	391	1.715	0.20	15.9
CM46		15.1	55.2	<0.002	<0.01	0.11	15.4	7	2.8	203	10.00	0.13	31.2	3.37	0.21	2.4
CM47		16.6	151.0	<0.002	<0.01	0.09	2.2	1	3.3	500	12.25	0.10	16.9	0.513	0.34	3.1
CM48		15.8	194.0	<0.002	<0.01	0.11	2.8	2	2.5	309	24.0	0.22	58.3	0.787	0.39	6.6
CM49		11.1	71.2	<0.002	0.01	0.10	17.2	3	2.6	226	12.85	0.05	14.8	4.58	0.26	1.7
CM50		12.0	73.1	<0.002	0.01	0.19	13.9	3	1.7	478	4.04	0.06	8.4	1.015	0.23	0.8
CM51		13.6	101.5	<0.002	<0.01	0.07	5.6	<1	1.6	77.2	2.89	0.05	11.4	0.196	0.31	1.1
DM01		11.3	79.9	<0.002	<0.01	0.05	1.9	3	1.5	370	6.81	0.09	9.2	1.215	0.25	1.7
DM02		13.1	91.5	<0.002	<0.01	0.09	2.9	5	3.9	346	10.65	0.13	11.0	1.805	0.22	1.4
DM03		11.2	110.5	<0.002	<0.01	0.08	2.9	3	1.4	355	5.21	0.09	14.6	1.020	0.30	1.9

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
CM15		90	0.3	11.6	38	39.7	2.55	1.32	0.83	3.53	0.49	0.17	25.2	7.45	4.29	0.49
CM16		408	0.3	38.7	108	69.6	13.35	3.25	2.24	34.9	1.74	0.27	244	66.3	49.3	3.66
CM17		70	0.3	19.7	44	34.6	4.08	2.41	0.91	5.65	0.81	0.36	36.9	9.99	6.99	0.78
CM18		136	0.4	22.6	40	69.9	7.00	2.11	1.74	15.40	1.03	0.18	100.0	27.1	20.5	1.71
CM19		186	0.8	45.4	73	112.5	14.80	3.94	3.41	31.5	2.06	0.32	213	60.1	40.5	3.67
CM20		154	0.5	27.0	65	58.5	9.12	2.16	2.49	21.7	1.20	0.20	149.5	41.2	27.6	2.43
CM21		42	0.5	8.9	29	31.9	2.51	0.87	0.99	4.51	0.38	0.12	30.7	8.83	5.71	0.57
CM22		61	0.9	25.1	72	41.3	5.57	2.91	2.02	7.46	1.06	0.37	49.9	13.95	8.76	1.05
CM23		27	0.4	10.8	40	124.5	2.66	1.35	0.76	4.58	0.50	0.23	38.7	11.80	5.63	0.52
CM24		45	1.1	27.1	79	72.9	7.16	3.24	1.55	10.95	1.28	0.38	80.5	22.1	13.40	1.44
CM25		49	0.8	24.5	45	81.4	5.97	2.88	1.61	8.98	1.08	0.39	73.6	21.1	11.55	1.19
CM26		37	1.0	14.2	34	35.2	3.12	1.60	0.82	4.24	0.59	0.21	28.5	8.58	5.07	0.58
CM27		110	0.7	14.1	62	38.3	4.01	1.39	1.19	7.64	0.61	0.16	55.2	14.90	9.76	0.94
CM28		97	0.3	10.1	46	33.7	2.35	1.08	0.72	3.87	0.41	0.14	28.9	8.68	4.84	0.49
CM29		110	0.3	14.1	55	39.6	3.55	1.52	1.10	5.55	0.60	0.19	38.1	10.85	6.96	0.73
CM30		141	0.4	18.7	67	37.8	5.19	1.82	1.30	9.33	0.80	0.21	65.6	17.75	11.85	1.17
CM31		57	0.4	8.8	46	37.0	2.12	0.95	0.86	3.47	0.37	0.13	24.3	7.10	4.52	0.44
CM32		80	0.9	18.9	54	83.0	3.91	1.98	1.51	6.19	0.71	0.30	45.1	11.95	7.04	0.81
CM33		203	1.9	174.5	93	127.5	52.2	13.90	8.20	114.5	7.40	0.89	808	215	140.0	13.25
CM34		94	0.5	21.4	51	65.1	6.16	1.79	1.54	15.80	0.86	0.22	113.0	29.8	19.60	1.69
CM35		56	0.4	10.3	50	34.3	2.51	0.96	0.88	4.74	0.40	0.13	31.3	8.58	5.48	0.59
CM36		98	1.1	18.7	54	103.0	4.34	2.03	1.52	6.78	0.76	0.33	43.9	11.30	7.48	0.91
CM37		12	0.5	7.8	33	32.6	1.78	0.86	0.86	3.13	0.31	0.16	22.1	6.40	3.51	0.38
CM38		55	2.6	16.9	71	274	3.34	1.94	1.28	4.53	0.65	0.41	32.2	9.25	5.15	0.64
CM39		40	1.5	17.5	65	118.0	3.59	1.94	1.71	5.37	0.67	0.37	39.9	11.10	6.14	0.72
CM40		40	1.6	17.1	47	224	3.86	1.77	1.22	6.93	0.65	0.35	51.4	13.80	8.07	0.88
CM41		24	1.3	15.5	27	131.5	3.03	1.66	0.87	4.41	0.56	0.31	29.2	8.16	5.16	0.62
CM42		176	1.9	18.7	53	98.1	4.61	1.91	1.58	9.57	0.75	0.32	68.4	17.75	11.55	1.12
CM43		22	0.8	8.7	33	86.2	1.75	0.99	0.72	2.93	0.34	0.22	19.2	6.07	2.84	0.36
CM44		59	0.7	13.9	39	68.5	2.87	1.48	0.97	4.39	0.53	0.25	29.5	8.51	4.89	0.58
CM45		231	1.9	97.5	62	271	31.6	7.57	5.61	78.0	4.01	0.74	547	145.5	93.0	8.63
CM46		278	1.4	21.4	69	124.0	4.82	2.20	1.46	8.12	0.84	0.36	53.1	13.45	9.01	1.03
CM47		23	1.1	9.3	40	143.0	1.73	1.05	0.73	2.67	0.35	0.24	19.2	5.99	2.90	0.34
CM48		23	2.0	16.9	49	445	2.80	2.02	0.79	3.63	0.60	0.48	22.7	6.92	3.65	0.52
CM49		540	2.6	12.6	90	76.5	2.55	1.38	1.12	3.52	0.49	0.21	22.1	6.23	3.99	0.46
CM50		127	1.0	16.3	65	45.0	3.46	1.71	1.89	5.37	0.64	0.24	33.8	8.69	5.93	0.73
CM51		41	0.8	8.1	20	45.9	1.67	0.82	0.56	2.49	0.30	0.14	15.7	4.35	2.74	0.34
DM01		42	0.6	13.1	43	170.0	2.87	1.55	1.31	3.92	0.55	0.30	24.9	6.61	4.31	0.56
DM02		68	0.9	19.8	111	155.5	4.86	2.34	1.65	6.70	0.88	0.34	44.8	11.90	7.46	0.97
DM03		36	0.6	16.1	56	149.0	3.89	1.69	2.07	6.51	0.67	0.27	50.3	12.85	7.67	0.84

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
CM15		0.18	1.15
CM16		0.33	1.61
CM17		0.36	2.40
CM18		0.23	1.20
CM19		0.40	2.09
CM20		0.22	1.18
CM21		0.11	0.74
CM22		0.40	2.52
CM23		0.20	1.34
CM24		0.43	2.58
CM25		0.40	2.47
CM26		0.22	1.43
CM27		0.17	1.03
CM28		0.15	0.91
CM29		0.21	1.30
CM30		0.23	1.39
CM31		0.13	0.80
CM32		0.28	1.84
CM33		1.32	5.60
CM34		0.21	1.22
CM35		0.12	0.74
CM36		0.28	1.90
CM37		0.12	0.85
CM38		0.31	2.23
CM39		0.29	2.05
CM40		0.26	1.88
CM41		0.25	1.82
CM42		0.27	1.82
CM43		0.16	1.15
CM44		0.21	1.44
CM45		0.76	3.89
CM46		0.32	2.08
CM47		0.17	1.28
CM48		0.35	2.71
CM49		0.21	1.36
CM50		0.24	1.48
CM51		0.12	0.83
DM01		0.24	1.66
DM02		0.33	2.08
DM03		0.23	1.49

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
DM04		0.16	0.002	1.61	5.46	2.3	780	1.06	0.02	0.16	0.04	310	3.7	14	0.27	13.5
DM05		0.17	0.002	0.62	6.16	1.5	920	0.97	0.02	0.13	0.04	133.5	4.0	15	0.45	9.8
DM06		0.17	0.001	0.43	8.02	1.9	3250	0.98	0.01	0.65	0.05	71.9	6.8	11	0.30	13.7
DM07		0.17	0.002	1.81	4.63	1.8	1880	0.79	0.01	0.36	0.08	137.5	9.0	14	0.21	20.0
DM08		0.17	0.001	0.65	6.13	1.9	2630	1.40	0.02	0.42	0.05	176.5	8.7	36	0.59	17.9
DM09		0.17	0.002	4.87	3.41	3.3	450	1.32	0.02	0.14	0.05	267	7.6	15	0.22	18.5
DM10		0.17	0.001	0.15	2.63	0.6	710	0.40	<0.01	0.05	0.03	164.0	1.6	10	0.13	3.5
DM11		0.13	0.001	0.04	4.06	0.7	1160	0.55	0.01	0.07	0.03	172.5	1.5	7	0.19	3.9
DM12		0.17	0.001	0.16	9.71	1.0	3840	1.04	0.01	1.03	0.05	92.7	3.7	6	0.16	4.6
DM13		0.16	0.001	1.17	7.69	1.7	1820	1.71	0.02	0.77	0.06	115.5	9.2	10	0.36	13.6
DM14		0.16	0.001	0.15	8.41	0.6	1210	2.10	0.02	0.65	0.04	139.0	8.5	5	0.51	15.7
DM15		0.16	0.001	0.12	6.20	1.1	1050	2.47	0.03	0.23	0.07	385	4.8	18	0.60	8.0
DM16		0.16	0.001	0.07	4.50	0.7	570	1.58	0.06	0.42	0.03	109.0	4.6	26	1.09	10.2
DM17		0.16	0.001	0.15	8.19	2.1	660	2.50	0.17	0.26	0.11	468	13.0	30	2.08	17.1
DM18		0.16	0.001	0.09	5.29	0.7	1000	1.31	0.02	0.22	0.04	254	7.2	17	0.84	7.8
DM19		0.16	0.002	1.05	7.66	1.7	4540	1.44	0.02	1.65	0.09	370	14.2	17	0.35	9.0
DM20		0.14	0.002	0.43	12.40	3.1	1800	3.18	0.99	0.30	<0.02	297	31.6	41	2.26	67.9
DM21		0.15	0.002	0.87	11.60	1.7	3530	1.81	0.04	0.28	0.07	374	17.1	15	1.24	9.4
DM22		0.16	0.001	0.26	9.85	1.6	3990	1.50	0.05	0.62	0.08	101.0	6.7	8	0.49	7.8
DM23		0.17	0.001	0.41	8.40	0.6	1530	1.51	0.01	1.31	0.06	91.1	14.1	3	0.30	9.3
DM24		0.16	<0.001	0.49	9.07	0.6	1100	1.15	0.01	0.36	0.05	192.0	3.2	4	0.24	4.3
DM25		0.16	0.001	0.35	12.15	1.4	1580	3.13	0.07	0.31	0.09	342	16.0	3	1.41	12.4
DM26		0.16	0.001	0.21	8.27	0.4	1330	1.77	0.03	0.12	0.04	274	7.1	3	1.07	4.8
DM27		0.17	0.001	0.31	9.00	1.7	1320	3.43	0.04	0.41	0.10	>500	6.7	2	1.17	7.5
DM28		0.17	<0.001	0.13	5.13	0.9	660	1.67	0.04	0.47	0.06	120.5	10.4	52	0.72	12.4
DM29		0.17	<0.001	0.14	5.24	0.9	680	2.76	0.05	0.41	0.03	141.5	12.6	34	0.71	8.9
DM30		0.18	<0.001	0.06	3.86	0.2	560	1.36	0.02	0.10	0.03	113.0	1.4	5	0.24	3.1
DT01		0.16	<0.001	0.05	3.94	0.2	900	0.59	0.01	0.11	<0.02	136.5	2.1	12	0.16	3.6
DT02		0.17	0.001	0.05	3.76	0.7	480	0.81	0.01	0.63	0.02	102.5	8.0	89	0.40	11.2
DT03		0.19	<0.001	0.10	4.89	<0.2	810	1.06	0.01	0.32	0.03	173.0	4.0	40	0.18	6.6
DT04		3.16	0.001	0.03	3.14	<0.2	420	0.74	0.01	0.25	0.02	147.5	9.5	120	0.60	13.2
DT05		0.20	<0.001	0.06	3.16	0.3	470	0.59	0.03	0.64	0.03	45.7	3.7	29	0.49	4.1
DT06		0.20	<0.001	0.25	3.43	0.5	680	0.56	0.01	0.15	0.04	259	6.3	67	0.30	9.4
DT07		0.15	0.001	0.04	3.80	0.5	530	0.72	0.01	0.35	<0.02	96.9	8.1	73	0.36	11.6
DT08		0.18	<0.001	0.62	4.77	2.0	870	1.09	0.01	0.83	0.02	118.0	20.8	21	0.38	20.0
DT09		0.15	<0.001	0.23	7.31	0.7	1480	2.09	0.01	0.96	0.05	146.0	9.8	11	0.57	9.1
DT10		0.17	<0.001	0.14	7.57	0.7	1000	2.02	0.05	0.70	0.02	121.0	9.8	63	1.17	15.3
DT11		0.15	<0.001	0.08	4.30	0.5	550	1.01	0.04	0.36	0.02	95.9	7.0	49	0.96	11.3
DT12		0.19	<0.001	0.07	7.80	0.7	1060	1.08	0.01	0.28	0.03	105.5	3.0	14	0.41	4.3
DT13		0.20	<0.001	0.09	9.22	0.2	880	1.09	0.02	0.30	0.03	84.5	4.6	10	0.38	8.1

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
DM04		11.25	26.2	0.84	23.2	0.115	3.58	140.0	4.0	0.05	6390	3.08	1.72	>500	3.6	290
DM05		5.50	23.5	0.80	9.8	0.072	4.55	55.6	4.5	0.06	3010	2.76	1.62	330	5.5	200
DM06		5.65	22.5	0.79	2.2	0.066	5.92	30.6	3.6	0.17	2960	2.07	2.03	241	4.8	290
DM07		17.70	20.0	0.27	18.6	0.121	3.23	67.7	3.8	0.12	13750	7.48	1.13	>500	3.9	300
DM08		9.08	23.3	0.72	7.0	0.064	3.89	80.3	6.4	0.17	3560	3.40	1.32	317	8.8	530
DM09		27.1	27.6	0.78	110.0	0.158	2.32	134.5	3.7	0.05	10200	10.80	0.92	>500	3.8	360
DM10		1.43	10.10	0.59	1.1	0.046	2.56	36.1	2.1	0.01	506	1.79	0.22	78.0	3.3	80
DM11		1.26	14.10	0.62	0.5	0.053	3.74	52.6	2.3	0.02	331	1.96	0.50	35.9	3.7	70
DM12		2.71	25.7	0.81	1.2	0.061	4.96	43.4	4.1	0.14	1260	0.79	3.38	93.1	2.6	350
DM13		8.89	25.8	0.70	10.1	0.102	4.51	41.1	5.2	0.29	4570	2.58	2.27	470	4.5	340
DM14		3.63	22.2	0.53	2.2	0.052	5.06	47.7	7.3	0.19	845	1.34	2.32	113.0	5.4	480
DM15		3.31	24.0	0.94	1.6	0.157	3.53	182.5	6.6	0.10	1000	2.82	0.93	67.3	11.0	370
DM16		1.75	13.30	0.53	3.4	0.062	2.68	40.9	6.5	0.21	406	1.43	1.01	54.7	9.8	190
DM17		7.85	29.8	1.22	1.8	0.226	2.09	280	12.5	0.30	935	4.95	0.36	80.3	16.9	690
DM18		3.53	16.40	0.61	1.1	0.106	2.91	104.5	7.8	0.18	1340	1.64	0.59	44.1	10.4	310
DM19		15.00	28.3	0.96	19.7	0.089	3.90	124.0	4.1	0.26	4080	2.96	1.89	>500	4.8	810
DM20		7.55	33.8	0.81	7.5	<0.005	2.46	130.5	18.8	0.29	2420	2.29	0.87	208	28.4	1790
DM21		8.71	29.2	0.86	15.4	0.140	2.74	152.5	11.4	0.11	1870	2.86	0.41	>500	7.1	1310
DM22		5.40	24.8	0.62	2.9	0.080	5.34	43.6	7.2	0.21	2420	1.97	2.16	207	4.9	1140
DM23		8.62	22.3	0.72	3.6	0.089	4.49	35.2	4.7	0.44	3930	2.30	2.52	269	2.8	1530
DM24		5.68	25.5	0.86	7.4	0.072	5.15	71.2	3.8	0.12	2980	2.30	3.41	337	2.7	440
DM25		7.08	35.8	1.14	5.5	0.149	2.30	139.0	15.9	0.22	1610	3.25	0.97	205	5.0	1970
DM26		4.20	23.9	0.80	5.2	0.107	3.47	100.5	7.6	0.10	994	1.93	0.90	129.0	3.1	660
DM27		10.25	34.6	1.41	3.0	0.252	2.78	271	12.0	0.16	3010	3.85	1.10	150.5	3.5	1180
DM28		4.11	17.40	0.76	4.9	0.092	2.96	44.8	6.5	0.15	786	1.68	1.00	95.9	15.3	420
DM29		3.02	16.90	0.79	3.2	0.104	3.16	63.1	9.4	0.17	1760	2.21	1.12	84.6	13.0	460
DM30		0.93	12.30	0.54	1.4	0.048	3.05	44.2	4.0	0.03	397	1.17	0.78	33.0	2.8	130
DT01		1.14	11.35	0.54	0.6	0.048	3.21	32.3	3.1	0.04	292	0.80	0.94	27.4	4.9	100
DT02		2.80	10.90	0.55	1.2	0.043	1.38	39.5	4.3	0.30	552	1.43	0.75	28.1	22.5	220
DT03		2.26	12.40	0.61	0.6	0.059	2.47	43.5	3.5	0.14	546	0.77	1.71	49.5	11.6	110
DT04		3.17	10.90	0.64	1.2	0.026	1.11	61.9	5.7	0.27	434	1.15	0.42	7.1	27.6	200
DT05		1.44	7.86	0.45	2.0	0.041	1.78	14.2	4.1	0.21	447	0.56	0.72	33.7	9.2	140
DT06		3.54	13.15	0.83	1.4	0.055	2.52	90.4	3.5	0.08	1100	1.56	0.62	144.5	13.1	160
DT07		2.22	10.00	0.61	1.0	0.030	1.49	39.3	4.8	0.23	525	0.45	0.74	15.2	19.0	200
DT08		9.30	13.50	0.65	2.0	0.084	2.42	48.2	6.1	0.29	3650	2.21	0.99	384	11.8	1070
DT09		4.23	18.40	0.84	3.1	0.056	3.83	54.8	6.2	0.31	1660	1.26	1.97	162.5	6.5	940
DT10		3.22	17.65	0.76	1.7	0.041	3.14	51.3	12.7	0.42	726	1.10	1.77	74.0	22.7	580
DT11		2.04	10.05	0.51	1.6	0.034	2.00	40.5	7.5	0.22	583	0.53	0.65	38.9	15.0	330
DT12		1.53	21.4	0.63	1.5	0.052	5.27	37.2	4.4	0.09	627	0.79	2.57	45.7	5.1	260
DT13		2.12	25.0	0.79	1.2	0.058	6.44	32.0	4.6	0.09	769	1.39	2.72	49.5	6.1	290

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
DM04		14.0	69.4	0.002	<0.01	0.15	3.8	8	2.7	106.0	34.0	0.43	58.5	3.04	0.18	8.0
DM05		11.8	90.9	<0.002	<0.01	0.08	2.9	4	1.9	111.5	14.80	0.21	19.0	1.350	0.25	3.4
DM06		15.1	73.1	<0.002	<0.01	0.07	6.3	5	1.5	309	13.60	0.16	6.0	2.09	0.25	0.8
DM07		11.6	47.6	<0.002	<0.01	0.08	8.8	8	2.9	182.5	76.3	0.28	26.1	9.94	0.15	5.1
DM08		19.3	101.0	<0.002	<0.01	0.08	8.4	7	3.0	216	18.00	0.18	42.4	3.38	0.29	4.8
DM09		18.9	57.7	0.004	<0.01	0.10	10.9	15	5.9	89.4	76.6	1.01	81.3	6.45	0.13	26.9
DM10		14.1	62.0	<0.002	<0.01	0.06	1.8	<1	0.5	32.8	3.35	<0.05	8.9	0.230	0.22	0.4
DM11		16.0	87.7	<0.002	<0.01	<0.05	2.4	<1	0.6	58.7	1.39	<0.05	9.6	0.120	0.32	0.3
DM12		16.8	55.9	<0.002	<0.01	0.08	3.1	3	2.6	984	4.65	0.06	4.5	1.105	0.13	0.7
DM13		14.1	84.2	<0.002	<0.01	0.08	10.4	7	2.9	299	25.5	0.28	15.2	2.88	0.21	2.9
DM14		14.0	94.1	<0.002	0.01	0.06	4.1	2	4.2	371	7.71	<0.05	12.3	0.755	0.29	1.6
DM15		27.4	120.5	0.002	0.01	0.05	7.4	4	3.6	63.9	3.12	<0.05	30.2	0.241	0.47	1.3
DM16		18.5	103.5	<0.002	<0.01	<0.05	4.9	1	3.5	68.3	3.65	0.06	17.0	0.211	0.49	1.6
DM17		25.4	123.0	<0.002	0.02	0.09	12.7	5	5.8	39.8	3.66	0.05	42.4	0.354	0.61	2.3
DM18		19.6	91.9	<0.002	0.01	<0.05	6.5	2	2.4	54.0	1.95	<0.05	19.7	0.232	0.45	0.8
DM19		13.7	59.3	0.002	<0.01	0.11	3.5	8	6.6	2530	54.9	0.17	34.8	4.30	0.09	5.8
DM20		2990	110.0	0.002	0.03	10.40	9.5	5	>500	845	12.10	0.09	17.6	1.520	0.32	3.0
DM21		17.4	59.7	<0.002	0.01	0.10	4.4	5	8.2	1430	46.5	0.13	21.3	2.58	0.22	3.1
DM22		17.0	65.6	<0.002	0.01	0.08	6.8	4	2.8	421	11.50	0.05	8.2	2.04	0.24	1.3
DM23		13.1	80.8	<0.002	<0.01	0.05	10.9	5	3.5	492	15.50	0.07	8.3	4.09	0.18	1.3
DM24		8.3	66.0	<0.002	<0.01	<0.05	3.9	3	2.2	198.0	14.05	0.11	14.4	1.515	0.18	2.1
DM25		24.4	92.6	0.003	0.03	0.12	6.5	5	6.7	507	13.45	0.10	17.2	1.315	0.33	3.6
DM26		23.2	117.0	<0.002	0.01	0.09	4.3	3	4.0	332	8.80	<0.05	19.1	0.749	0.34	2.7
DM27		29.4	133.5	0.002	0.04	0.07	10.9	7	6.6	288	9.80	0.05	40.6	0.530	0.47	2.5
DM28		25.7	108.0	<0.002	0.01	0.09	6.3	3	4.5	173.0	5.36	0.05	16.0	0.735	0.44	2.0
DM29		16.7	122.5	0.002	0.01	0.07	4.1	3	7.2	139.5	5.25	0.07	16.9	0.374	0.51	2.2
DM30		15.4	100.0	<0.002	<0.01	<0.05	1.8	1	2.2	42.8	1.76	<0.05	11.6	0.087	0.37	0.8
DT01		14.7	72.9	<0.002	<0.01	<0.05	2.2	1	0.8	54.3	1.18	<0.05	9.4	0.136	0.27	0.2
DT02		14.2	47.3	<0.002	<0.01	<0.05	6.5	1	1.7	83.3	1.34	<0.05	17.3	0.402	0.20	0.9
DT03		15.7	55.7	<0.002	<0.01	<0.05	3.8	1	1.2	75.8	2.17	<0.05	12.6	0.298	0.21	0.4
DT04		15.3	49.6	<0.002	<0.01	<0.05	5.6	1	1.9	60.2	0.47	<0.05	32.6	0.293	0.22	1.6
DT05		13.2	52.4	<0.002	<0.01	<0.05	5.0	1	1.4	61.9	1.69	<0.05	7.3	0.258	0.22	0.8
DT06		18.6	65.7	<0.002	<0.01	<0.05	4.4	3	1.6	49.8	6.87	0.05	47.2	1.035	0.25	1.5
DT07		18.6	50.3	<0.002	<0.01	<0.05	4.6	2	1.8	128.0	0.89	<0.05	18.3	0.436	0.23	0.8
DT08		16.5	67.1	<0.002	0.01	0.07	8.6	8	3.6	268	27.1	0.08	13.1	6.95	0.22	1.1
DT09		15.9	107.5	<0.002	0.01	0.12	5.3	4	2.6	443	10.20	0.05	16.2	1.615	0.25	1.7
DT10		24.8	110.0	<0.002	0.01	0.05	6.4	2	2.5	305	3.73	<0.05	29.5	0.479	0.40	2.3
DT11		17.9	74.2	<0.002	0.01	0.07	5.7	1	1.6	80.2	2.03	<0.05	20.8	0.325	0.31	1.4
DT12		12.0	74.8	<0.002	<0.01	<0.05	3.0	1	1.1	149.5	2.27	<0.05	7.2	0.221	0.26	0.7
DT13		12.7	69.2	<0.002	<0.01	<0.05	3.8	1	1.2	161.5	2.47	<0.05	5.7	0.371	0.30	0.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Johannesburg is a SANAS Accredited Testing Laboratory, No: T0387

Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
DM04		27	1.8	58.7	152	>500	12.70	6.70	2.63	17.30	2.38	1.17	119.5	32.0	19.35	2.51
DM05		28	1.1	24.0	72	325	5.33	2.93	1.57	7.24	1.02	0.54	51.6	13.45	8.05	1.04
DM06		52	1.1	13.1	77	79.7	3.05	1.45	2.80	4.62	0.53	0.29	31.4	8.52	5.38	0.63
DM07		70	6.5	33.4	210	>500	6.32	4.21	2.60	7.53	1.33	0.81	56.4	15.90	9.07	1.03
DM08		81	2.6	30.9	113	269	6.96	3.06	3.13	11.00	1.20	0.51	73.7	19.05	12.40	1.50
DM09		87	4.5	139.0	286	>500	20.3	16.25	2.81	18.40	4.67	3.63	104.5	28.0	18.80	3.29
DM10		5	0.3	14.6	42	48.3	3.46	1.90	0.90	5.37	0.66	0.31	31.6	8.74	5.23	0.68
DM11		3	0.1	15.9	45	16.5	3.81	1.76	1.27	6.59	0.67	0.27	48.2	12.55	7.14	0.80
DM12		35	0.4	11.6	48	33.9	2.89	1.27	2.95	5.10	0.49	0.29	38.7	10.45	6.16	0.63
DM13		48	1.4	31.9	109	424	6.35	3.78	2.83	7.83	1.25	0.67	44.9	11.55	8.28	1.19
DM14		59	0.7	17.9	52	65.6	4.22	2.17	1.41	5.98	0.73	0.26	41.5	11.40	7.18	0.88
DM15		13	0.3	61.6	112	32.9	13.15	6.96	3.39	20.3	2.34	0.81	154.5	41.1	24.4	2.75
DM16		21	0.6	17.6	59	95.6	3.73	2.08	0.87	5.18	0.70	0.29	35.8	9.52	6.32	0.77
DM17		35	0.7	77.6	152	39.4	17.50	8.81	5.18	28.5	3.08	1.01	234	62.4	35.7	3.76
DM18		19	0.3	31.0	80	27.7	7.18	3.75	2.09	11.45	1.25	0.44	88.5	23.9	14.00	1.51
DM19		324	1.1	55.9	144	>500	12.85	6.51	6.80	18.20	2.21	0.70	139.5	36.3	22.9	2.64
DM20		119	1.8	39.0	167	279	8.43	4.29	4.64	13.05	1.46	0.49	102.5	29.1	16.15	1.77
DM21		129	1.0	42.9	98	>500	10.40	5.20	5.67	15.65	1.77	0.55	131.0	36.3	20.1	2.19
DM22		50	1.2	15.2	78	112.0	3.18	1.67	3.42	4.84	0.56	0.27	36.0	9.41	5.89	0.68
DM23		115	1.3	20.1	92	131.0	4.23	2.33	2.31	5.93	0.77	0.31	36.0	8.83	6.72	0.86
DM24		18	0.9	15.2	71	340	3.20	1.99	1.48	5.31	0.59	0.37	49.6	14.85	6.74	0.68
DM25		78	2.0	50.6	150	171.0	11.15	5.63	5.93	17.15	1.91	0.61	132.5	35.1	21.3	2.40
DM26		31	0.8	29.0	92	185.5	6.85	3.58	3.34	11.05	1.20	0.44	88.2	24.1	14.15	1.48
DM27		13	0.6	109.5	175	79.4	23.4	12.25	7.71	34.7	4.13	1.33	253	67.1	40.8	4.90
DM28		75	0.7	26.4	87	153.5	5.40	3.30	1.30	6.77	1.01	0.45	40.5	10.50	7.51	1.04
DM29		30	0.7	32.2	78	96.7	6.48	3.70	1.44	8.37	1.20	0.47	53.8	14.80	9.67	1.27
DM30		1	0.2	21.4	32	32.8	4.27	2.48	0.89	5.70	0.79	0.32	37.1	9.80	6.57	0.84
DT01		6	0.1	10.8	27	14.5	2.70	1.40	0.80	4.15	0.47	0.18	27.0	7.28	4.62	0.54
DT02		53	0.2	14.9	35	34.5	3.48	1.69	0.97	5.44	0.58	0.21	34.8	8.97	6.49	0.75
DT03		21	0.2	15.9	46	15.3	3.72	2.00	0.97	5.59	0.66	0.25	35.6	9.64	6.14	0.76
DT04		64	0.1	14.1	38	34.5	3.91	1.31	1.00	7.89	0.56	0.11	53.3	14.40	9.80	0.98
DT05		26	0.2	9.9	28	53.9	2.03	1.33	0.49	2.45	0.39	0.20	13.1	3.33	2.64	0.39
DT06		52	0.4	21.1	67	39.8	5.73	2.51	1.21	12.50	0.87	0.37	83.2	22.1	15.30	1.46
DT07		41	0.2	9.0	36	28.4	2.36	0.95	0.85	5.04	0.35	0.11	34.0	8.84	6.22	0.60
DT08		133	2.9	21.3	112	62.4	4.61	2.49	1.80	7.06	0.83	0.31	45.8	11.55	8.18	0.99
DT09		53	1.5	21.3	67	111.0	4.61	2.39	2.04	6.74	0.82	0.33	47.3	12.20	7.93	0.94
DT10		59	0.7	16.0	54	54.0	3.84	1.69	1.35	6.33	0.62	0.19	43.3	11.75	7.64	0.88
DT11		44	0.5	12.3	34	48.9	3.19	1.31	0.83	5.35	0.47	0.15	35.0	9.17	6.21	0.70
DT12		13	0.3	9.6	40	46.3	2.35	1.21	1.04	3.89	0.41	0.17	30.5	8.29	4.93	0.51
DT13		25	0.3	8.4	36	35.8	2.11	1.03	1.06	3.40	0.36	0.15	26.5	7.02	4.21	0.45

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
DM04		0.99	6.68
DM05		0.44	3.07
DM06		0.21	1.45
DM07		0.67	4.79
DM08		0.43	2.81
DM09		2.79	20.6
DM10		0.27	1.75
DM11		0.24	1.52
DM12		0.18	1.34
DM13		0.57	3.89
DM14		0.28	1.67
DM15		0.88	5.00
DM16		0.28	1.71
DM17		1.10	6.15
DM18		0.47	2.63
DM19		0.81	4.63
DM20		0.55	3.10
DM21		0.65	3.63
DM22		0.23	1.47
DM23		0.32	1.89
DM24		0.28	1.95
DM25		0.69	3.83
DM26		0.46	2.65
DM27		1.52	8.44
DM28		0.45	2.71
DM29		0.48	2.86
DM30		0.32	1.96
DT01		0.18	1.01
DT02		0.21	1.23
DT03		0.26	1.48
DT04		0.12	0.65
DT05		0.19	1.16
DT06		0.33	1.95
DT07		0.12	0.68
DT08		0.31	1.85
DT09		0.32	1.97
DT10		0.20	1.07
DT11		0.16	0.89
DT12		0.15	0.93
DT13		0.14	0.79

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Appendix 3-1

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175566

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

REE's may not be totally soluble in this method.

Applies to Method: ME-MS61r

ACCREDITATION COMMENTS

Not SANAS Accredited

Applies to Method:				
Au-TL43	LOG-22	ME-MS61r	SCR-41	
WEI-21				

LABORATORY ADDRESSES

Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.

Applies to Method:				
Au-TL43	LOG-22	ME-MS61r	SCR-41	
WEI-21				

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE JB14175567

Project: Malawi 2014

This report is for 119 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 17-NOV-2014.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

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Signature:

Martin Stone, Laboratory Manager, Johannesburg

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2014

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
DT14		0.21	0.002	<0.01	9.01	1.3	860	2.57	0.04	1.05	0.07	271	20.4	30	0.78	15.3
DT15		0.21	0.002	<0.01	9.21	0.6	980	2.31	0.07	0.41	0.05	181.0	11.1	18	0.73	8.5
DT16		0.18	0.001	<0.01	4.51	0.4	1130	2.42	0.01	0.13	0.04	198.0	1.6	8	0.38	0.7
DT17		0.18	0.002	<0.01	2.09	1.1	260	1.27	0.03	0.28	0.05	56.1	18.3	94	0.38	<0.2
DT18		0.20	0.001	<0.01	3.80	0.7	870	2.51	0.02	0.18	0.06	167.0	1.6	4	0.55	<0.2
DT19		0.21	0.001	<0.01	5.11	1.0	960	3.40	0.05	0.21	0.07	299	1.6	3	0.67	1.5
ET01		0.14	0.001	0.04	4.47	6.5	820	2.27	0.23	0.93	0.06	>500	7.2	19	1.12	<0.2
ET02		0.14	0.001	<0.01	5.03	0.6	910	2.12	0.11	0.80	0.03	>500	3.8	20	1.63	1.3
ET03		0.13	0.002	<0.01	6.21	<0.2	850	3.01	0.11	0.93	0.04	97.8	4.3	27	2.27	9.6
ET04		0.14	0.002	<0.01	5.59	0.8	860	3.11	0.20	0.65	0.03	>500	7.0	72	2.97	19.2
ET05		0.15	0.001	0.02	5.13	0.8	1040	1.90	0.04	0.93	0.03	356	4.1	24	0.93	3.9
ET06		0.13	0.001	0.04	3.67	1.8	600	1.14	0.18	0.52	0.03	>500	3.0	16	1.01	3.8
ET07		0.22	0.001	<0.01	4.66	1.4	990	1.63	0.12	0.84	0.04	>500	2.3	17	1.03	1.7
ET08		0.13	0.001	0.01	5.99	0.2	970	3.25	0.08	0.90	0.04	91.2	6.3	43	2.48	6.6
ET09		0.12	0.002	<0.01	4.63	10.3	650	2.31	0.10	0.71	0.05	>500	6.3	43	2.16	2.6
ET10		0.15	0.001	0.02	4.50	1.5	610	1.43	0.13	0.67	0.04	>500	4.4	18	1.94	5.4
ET11		0.15	0.002	0.01	3.43	1.0	560	1.14	0.09	0.64	0.04	>500	3.9	26	1.21	4.6
ET12		0.16	0.001	0.01	4.56	0.2	550	0.74	0.09	0.24	<0.02	>500	1.2	5	1.63	2.6
ET13		0.17	0.001	0.40	3.21	2.5	700	0.66	0.03	0.56	0.02	>500	5.9	32	0.50	6.5
ET14		0.17	0.001	0.01	3.67	0.2	490	1.99	0.01	0.70	<0.02	111.0	2.7	14	0.39	7.1
ET15		0.13	0.002	0.02	3.99	<0.2	380	1.71	0.02	0.93	<0.02	163.0	5.0	21	0.88	6.7
ET16		0.15	0.001	0.02	3.38	<0.2	480	0.85	0.02	0.86	0.02	370	5.2	25	0.47	9.9
ET17		0.14	0.001	0.01	3.96	<0.2	760	0.95	0.01	0.65	<0.02	122.5	5.2	21	0.44	12.1
ET18		0.16	0.001	0.01	3.30	0.4	600	0.76	0.01	0.43	<0.02	258	3.9	18	0.34	6.8
ET19		0.15	0.002	0.09	2.97	0.6	580	0.68	0.02	0.60	<0.02	>500	9.8	111	0.43	13.1
ET20		0.16	0.001	0.06	3.17	0.8	650	0.47	0.02	0.41	<0.02	>500	7.5	72	0.29	11.4
ET21		0.13	0.001	0.02	5.19	<0.2	1100	0.72	0.01	0.80	<0.02	59.7	5.7	22	0.44	6.9
ET22		0.12	0.001	<0.01	3.27	0.5	570	0.79	0.03	0.64	<0.02	335	2.8	14	0.47	4.6
ET23		0.14	0.001	0.01	4.88	<0.2	510	1.35	0.02	1.12	0.02	98.3	5.7	30	0.60	6.6
ET24		0.14	0.002	<0.01	3.28	<0.2	800	0.30	0.01	0.26	<0.02	44.3	4.4	31	0.29	9.8
ET25		0.14	0.002	0.01	3.66	0.4	410	1.11	0.04	1.08	0.03	262	5.8	42	0.49	8.0
ET26		0.13	0.001	0.01	3.93	0.3	740	0.55	0.02	0.46	<0.02	322	5.6	33	0.52	11.2
ET27		0.12	0.001	0.01	3.68	1.4	470	0.73	0.31	0.66	0.02	>500	11.4	110	0.56	11.6
ET28		0.14	0.001	<0.01	3.09	0.9	370	0.52	0.04	0.52	0.02	309	8.2	71	0.46	9.7
ET29		0.14	0.002	<0.01	5.82	0.2	670	0.10	<0.01	0.94	<0.02	5.95	0.8	61	0.21	0.6
ET30		0.15	0.002	<0.01	3.09	0.5	520	0.66	0.03	0.57	<0.02	260	4.6	29	0.45	7.2
ET31		0.16	0.001	0.01	3.85	0.3	710	0.89	0.02	0.74	<0.02	181.0	3.4	16	0.65	4.7
ET32		0.15	0.001	0.01	3.47	<0.2	620	0.90	0.02	0.71	<0.02	109.5	3.1	15	0.50	6.0
ET33		0.15	0.001	<0.01	2.93	<0.2	560	0.73	0.04	0.56	<0.02	156.0	2.2	12	0.59	5.9
ET34		0.17	0.001	0.15	2.90	<0.2	470	0.56	0.02	0.52	<0.02	162.0	4.1	26	0.63	6.4

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2014

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
DT14		7.35	27.1	0.43	2.1	0.141	3.80	99.6	17.4	0.47	2700	1.84	1.89	171.5	20.4	1000
DT15		4.68	25.0	0.40	2.1	0.116	4.11	84.4	14.7	0.20	1240	1.39	1.87	97.3	14.1	640
DT16		1.40	13.70	0.28	2.0	0.077	3.24	70.1	6.3	0.03	430	0.93	0.86	57.8	3.2	110
DT17		12.80	12.20	0.35	8.2	0.084	1.49	28.3	6.6	0.12	2350	1.30	0.17	215	13.5	130
DT18		2.60	13.10	0.27	14.6	0.089	2.57	66.5	10.1	0.02	1470	1.12	0.45	266	1.2	130
DT19		2.20	17.70	0.43	5.0	0.113	2.79	135.5	11.9	0.05	809	2.95	0.71	81.5	1.1	270
ET01		3.40	37.9	5.29	73.5	0.042	2.63	1950	11.1	0.18	1220	0.18	0.88	27.4	6.6	2300
ET02		1.05	12.45	0.81	6.6	0.014	3.30	261	13.2	0.23	283	0.10	0.99	7.9	7.4	540
ET03		1.09	11.95	0.25	3.1	0.019	3.45	43.6	18.5	0.24	259	0.12	1.27	4.9	10.9	250
ET04		2.22	16.50	1.06	9.2	0.026	3.22	346	24.2	0.36	469	0.27	0.75	10.6	23.4	640
ET05		1.07	11.05	0.56	6.1	0.015	2.92	164.5	11.9	0.23	312	0.17	1.03	4.4	8.1	390
ET06		0.81	17.80	2.45	20.9	0.009	2.48	920	8.7	0.12	375	0.42	0.77	4.6	6.4	1320
ET07		0.75	15.40	1.54	15.0	0.015	3.39	560	11.4	0.16	333	0.08	0.80	3.4	5.3	1300
ET08		1.68	12.50	0.26	1.3	0.022	3.42	41.6	25.0	0.36	371	0.21	1.00	4.4	15.3	260
ET09		1.75	61.3	9.62	22.4	0.024	4.13	3380	17.5	0.35	431	0.21	0.74	5.2	14.5	3790
ET10		1.51	12.90	0.79	8.7	0.016	2.69	352	10.6	0.18	944	0.29	0.91	7.0	7.4	700
ET11		1.36	10.50	0.73	5.8	0.012	1.85	332	7.3	0.20	866	0.36	0.68	4.2	9.1	650
ET12		0.39	12.55	0.60	4.0	0.007	4.32	254	7.4	0.04	198	0.24	0.66	2.8	2.7	540
ET13		3.81	20.4	2.23	36.6	0.050	1.87	1020	5.4	0.14	1120	0.39	0.51	31.7	6.6	1420
ET14		0.89	7.74	0.17	3.8	0.014	1.62	53.0	4.2	0.13	262	0.24	0.91	4.3	6.1	190
ET15		1.36	9.37	0.24	2.1	0.020	1.26	78.3	5.7	0.24	452	0.36	0.90	5.0	10.1	330
ET16		1.73	9.63	0.48	4.1	0.023	1.28	175.5	5.3	0.25	730	0.35	0.64	5.4	7.3	460
ET17		1.65	9.28	0.20	0.9	0.022	1.96	59.8	6.4	0.20	498	0.34	0.58	4.8	7.4	250
ET18		1.23	8.56	0.33	2.7	0.018	1.69	123.0	5.8	0.13	336	0.49	0.47	4.8	8.2	260
ET19		7.73	17.60	0.71	7.2	0.059	1.61	244	5.7	0.19	1360	0.68	0.44	21.6	12.5	500
ET20		3.59	13.80	0.97	20.7	0.049	2.06	359	6.1	0.24	626	0.56	0.34	19.8	10.8	1670
ET21		1.68	10.90	0.10	0.6	0.023	3.02	30.0	8.7	0.23	393	0.41	0.71	3.8	8.7	190
ET22		0.92	8.18	0.41	4.2	0.013	1.61	158.5	4.6	0.11	285	0.39	0.68	3.5	5.7	330
ET23		1.75	10.75	0.20	2.0	0.026	1.53	45.6	5.7	0.28	616	0.42	0.99	5.5	10.6	260
ET24		1.59	7.62	0.13	0.6	0.029	2.15	22.0	5.7	0.14	420	0.32	0.33	7.8	6.7	130
ET25		2.97	9.95	0.39	4.6	0.023	1.22	122.5	4.5	0.25	1080	0.34	0.82	10.8	8.8	530
ET26		1.66	10.40	0.38	2.4	0.024	2.13	151.5	7.1	0.15	317	0.36	0.50	7.1	10.1	330
ET27		4.96	20.4	1.61	4.9	0.057	1.37	700	8.2	0.32	1040	0.46	0.57	26.5	19.1	1030
ET28		3.20	10.00	0.40	4.2	0.048	1.11	145.0	8.4	0.26	888	0.44	0.43	22.2	14.0	310
ET29		2.64	0.95	<0.05	0.2	<0.005	2.05	2.9	1.1	0.38	577	<0.05	0.72	0.8	1.2	290
ET30		1.60	8.23	0.32	3.2	0.025	1.45	122.5	6.8	0.15	507	0.32	0.54	8.8	8.3	270
ET31		1.15	8.24	0.25	2.8	0.015	1.96	87.3	8.1	0.15	370	0.31	0.68	2.8	5.7	240
ET32		0.95	7.47	0.18	1.3	0.013	1.69	51.8	6.3	0.13	259	0.32	0.67	2.5	5.2	160
ET33		0.79	6.67	0.25	2.2	0.012	1.61	76.1	7.7	0.09	269	0.27	0.58	3.0	4.9	190
ET34		1.55	7.23	0.25	2.4	0.019	1.33	77.4	6.1	0.17	606	0.28	0.58	4.4	7.3	290

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
DT14		19.0	97.8	<0.002	<0.01	0.14	20.4	4	3.0	230	7.94	0.07	13.0	1.410	0.28	1.2
DT15		15.8	99.0	<0.002	<0.01	0.06	16.1	3	2.0	182.5	4.51	<0.05	12.6	0.871	0.28	1.0
DT16		22.0	104.0	<0.002	<0.01	<0.05	3.9	2	1.9	47.1	3.08	<0.05	15.0	0.168	0.39	1.6
DT17		16.2	71.5	<0.002	<0.01	<0.05	9.5	4	4.4	25.6	12.55	0.07	15.9	3.57	0.26	3.0
DT18		20.3	93.6	<0.002	<0.01	<0.05	4.8	3	2.5	28.8	14.00	0.07	15.9	0.953	0.37	3.9
DT19		25.6	118.0	<0.002	0.01	<0.05	6.2	3	3.1	40.7	3.86	<0.05	26.9	0.264	0.50	2.3
ET01		92.8	106.5	0.021	<0.01	<0.05	13.6	20	1.3	159.0	2.13	0.05	1240	1.955	0.44	124.5
ET02		55.9	135.0	0.002	<0.01	<0.05	5.0	4	1.1	118.0	0.61	<0.05	187.5	0.251	0.64	18.8
ET03		58.8	145.0	<0.002	<0.01	<0.05	5.1	2	1.5	128.5	0.43	<0.05	31.0	0.137	0.71	5.2
ET04		58.8	152.5	0.004	<0.01	<0.05	7.3	5	2.3	122.5	0.99	<0.05	241	0.429	0.82	24.5
ET05		45.1	104.5	<0.002	<0.01	<0.05	5.2	3	1.3	131.5	0.37	<0.05	99.9	0.153	0.48	9.6
ET06		59.5	86.3	0.007	0.01	<0.05	3.9	7	0.6	110.0	0.44	<0.05	600	0.221	0.38	65.4
ET07		57.0	122.5	0.005	<0.01	<0.05	5.5	6	0.9	143.0	0.38	<0.05	365	0.120	0.55	29.8
ET08		46.8	148.5	<0.002	<0.01	<0.05	6.7	2	1.6	117.5	0.43	<0.05	22.4	0.124	0.76	2.6
ET09		157.5	395	0.035	<0.01	<0.05	8.8	26	0.9	198.0	0.77	<0.05	2030	0.280	0.69	214
ET10		44.5	117.5	0.002	0.01	0.05	6.5	4	0.9	119.0	0.76	<0.05	188.5	0.322	0.51	25.4
ET11		32.8	74.2	0.002	0.01	<0.05	6.8	3	0.6	105.0	0.40	<0.05	147.5	0.197	0.33	21.0
ET12		60.8	220	<0.002	0.01	<0.05	1.5	3	0.6	96.2	0.24	<0.05	171.0	0.048	1.00	21.5
ET13		52.0	63.9	0.006	0.01	<0.05	9.9	7	2.6	86.4	2.74	<0.05	610	1.405	0.26	39.3
ET14		24.3	59.6	<0.002	0.02	<0.05	3.8	1	0.7	104.5	0.30	<0.05	32.6	0.130	0.25	3.0
ET15		24.5	58.4	<0.002	0.01	<0.05	5.8	1	1.0	111.0	0.40	<0.05	42.7	0.160	0.27	4.4
ET16		23.2	48.7	<0.002	0.01	<0.05	7.3	2	0.9	91.0	0.42	<0.05	94.6	0.235	0.21	5.9
ET17		24.1	75.0	<0.002	0.02	<0.05	5.3	1	0.9	106.5	0.29	<0.05	29.3	0.164	0.33	1.2
ET18		31.3	62.1	<0.002	0.01	<0.05	4.4	2	0.7	81.0	0.32	<0.05	66.8	0.144	0.27	3.7
ET19		29.0	58.4	0.002	0.01	<0.05	8.5	3	2.9	75.8	1.54	<0.05	143.5	0.966	0.26	5.1
ET20		36.5	71.9	0.003	0.01	<0.05	8.7	2	2.2	75.7	1.50	<0.05	34.9	0.854	0.25	12.8
ET21		35.8	117.0	<0.002	0.01	<0.05	6.0	1	0.5	150.5	0.23	<0.05	13.7	0.145	0.53	0.5
ET22		27.4	58.0	<0.002	0.01	<0.05	3.4	2	0.6	94.6	0.29	<0.05	84.3	0.103	0.24	7.2
ET23		28.1	63.7	<0.002	0.01	<0.05	6.5	1	1.3	119.5	0.43	<0.05	23.9	0.205	0.29	2.2
ET24		26.6	81.5	<0.002	0.01	<0.05	5.1	1	1.2	89.2	0.48	<0.05	10.4	0.237	0.38	0.5
ET25		27.7	47.1	<0.002	0.01	<0.05	8.0	2	1.0	96.1	0.87	<0.05	72.0	0.645	0.22	6.0
ET26		29.8	84.9	<0.002	0.02	<0.05	5.1	2	1.3	102.0	0.49	<0.05	81.6	0.273	0.37	3.8
ET27		47.2	52.4	0.005	0.01	<0.05	11.9	5	5.0	83.7	2.37	<0.05	427	1.020	0.23	24.1
ET28		26.6	41.2	<0.002	0.01	<0.05	10.3	2	4.6	62.4	1.88	<0.05	81.1	0.772	0.18	6.4
ET29		2.5	6.2	<0.002	0.01	<0.05	0.8	<1	<0.2	7.5	0.05	<0.05	0.7	0.480	0.03	0.1
ET30		29.4	54.5	<0.002	0.01	<0.05	5.9	2	1.6	84.3	0.62	<0.05	67.2	0.280	0.23	5.1
ET31		30.8	75.3	<0.002	0.01	<0.05	5.0	2	0.6	105.0	0.25	<0.05	52.0	0.100	0.33	3.0
ET32		27.2	61.9	<0.002	0.01	<0.05	3.4	1	0.5	97.0	0.19	<0.05	29.7	0.079	0.26	2.0
ET33		23.2	60.9	<0.002	0.01	<0.05	2.8	1	0.5	79.9	0.23	<0.05	36.4	0.109	0.26	3.5
ET34		19.9	52.6	<0.002	0.01	<0.05	6.5	2	0.8	71.0	0.31	<0.05	36.2	0.152	0.24	2.9

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53 Angus Crescent
Long Meadow Business Park, East Entrance
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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
DT14		98	1.0	32.2	117	66.9	7.34	3.43	3.14	11.10	1.29	0.49	75.2	21.7	12.25	1.38
DT15		69	0.7	22.1	86	62.9	5.11	2.35	2.35	7.80	0.90	0.36	59.1	17.50	9.07	0.94
DT16		6	0.3	24.3	54	41.7	4.99	2.64	1.39	6.68	0.94	0.41	47.6	14.40	7.75	0.92
DT17		405	1.9	25.0	126	222	5.24	3.29	0.66	5.31	1.05	0.58	23.3	6.79	4.82	0.85
DT18		7	0.8	33.5	113	350	6.14	4.13	1.35	6.80	1.27	0.79	48.9	14.65	8.08	0.96
DT19		5	0.5	46.0	94	120.0	9.53	4.99	2.36	13.60	1.78	0.74	95.2	28.5	15.50	1.73
ET01		43	1.3	308	28	>500	95.9	22.4	12.95	220	12.30	1.87	1885	571	337	21.7
ET02		20	0.5	40.9	13	180.5	12.40	2.85	2.24	29.8	1.60	0.27	206	63.2	37.6	3.09
ET03		24	0.4	11.0	17	75.0	2.82	0.96	1.04	5.60	0.42	0.16	33.8	10.00	6.35	0.64
ET04		44	1.1	63.8	26	231	18.80	4.58	3.09	40.7	2.48	0.35	282	84.1	50.8	4.41
ET05		20	0.2	28.0	15	171.5	7.83	2.03	1.81	17.95	1.04	0.24	129.5	37.9	23.7	1.85
ET06		11	0.5	169.5	10	>500	43.3	9.43	4.57	102.5	5.37	0.69	819	261	147.0	12.05
ET07		14	0.3	90.9	10	402	25.4	6.22	3.71	59.6	3.36	0.53	484	145.5	84.6	6.08
ET08		33	0.4	10.2	27	35.2	2.58	0.94	1.14	4.74	0.40	0.13	31.4	9.28	5.69	0.56
ET09		33	0.9	403	17	>500	156.5	33.5	26.8	396	19.50	1.84	3780	>1000	634	40.5
ET10		23	0.6	76.2	16	241	20.3	5.58	3.55	37.6	2.60	0.55	313	84.7	54.6	4.65
ET11		21	2.1	74.0	20	164.5	19.30	5.81	3.34	34.5	2.64	0.55	274	75.5	46.3	4.29
ET12		6	0.2	37.3	5	111.0	10.90	2.24	1.90	25.1	1.24	0.14	229	63.1	38.6	2.79
ET13		87	5.3	112.0	33	>500	37.3	7.72	4.93	100.0	4.07	0.84	929	249	165.5	9.97
ET14		15	0.2	11.1	10	116.0	2.72	0.87	0.77	5.92	0.36	0.13	44.2	12.25	8.00	0.68
ET15		23	0.4	14.4	16	72.3	3.77	1.16	0.97	8.60	0.48	0.16	64.5	18.55	11.45	0.97
ET16		29	0.6	23.2	19	135.0	6.91	1.91	1.51	18.60	0.84	0.27	156.0	41.8	26.6	1.89
ET17		25	0.2	9.8	23	30.7	2.29	0.93	0.94	5.46	0.35	0.14	47.5	13.00	7.93	0.57
ET18		19	0.2	13.4	15	90.4	4.19	1.10	1.13	13.10	0.48	0.15	108.0	29.4	18.65	1.25
ET19		188	0.6	26.8	52	221	8.01	2.48	1.44	22.0	1.06	0.34	218	59.2	34.0	2.16
ET20		78	0.7	34.8	43	>500	10.25	2.93	2.30	33.2	1.25	0.48	347	91.0	56.5	2.96
ET21		27	0.1	10.5	24	21.2	2.02	1.05	1.15	3.04	0.35	0.16	23.9	6.59	4.20	0.38
ET22		12	0.2	29.7	11	139.0	8.50	2.09	1.86	18.60	1.03	0.20	140.5	37.6	24.4	2.12
ET23		29	0.3	14.0	21	66.3	2.89	1.23	0.89	5.44	0.43	0.20	38.6	10.45	7.33	0.66
ET24		22	0.1	10.0	42	21.7	1.86	0.98	0.75	2.58	0.33	0.15	17.5	4.84	3.16	0.35
ET25		61	0.4	26.1	22	141.5	6.82	2.42	1.26	14.95	0.94	0.35	109.5	30.0	19.40	1.69
ET26		36	0.3	15.6	31	84.8	4.84	1.25	1.66	13.45	0.58	0.15	132.5	36.6	20.8	1.34
ET27		123	2.6	71.4	64	139.5	24.1	5.13	4.01	73.9	2.68	0.55	650	173.5	116.0	6.78
ET28		68	1.2	30.2	60	130.5	7.24	2.72	1.27	15.25	1.03	0.38	131.5	35.4	22.3	1.68
ET29		63	0.1	0.9	36	6.0	0.16	0.08	0.07	0.24	0.03	0.01	2.2	0.62	0.39	0.03
ET30		30	0.2	20.6	33	106.0	5.54	1.72	1.27	13.65	0.72	0.22	110.0	29.5	18.80	1.45
ET31		17	0.2	16.6	12	93.0	4.29	1.43	1.10	9.96	0.58	0.19	72.9	20.7	13.15	1.07
ET32		15	0.2	10.3	11	44.6	2.37	0.80	0.76	5.54	0.32	0.12	41.8	11.50	7.53	0.59
ET33		10	0.5	14.6	9	68.5	3.87	1.06	0.95	8.68	0.48	0.14	62.1	17.80	11.15	0.98
ET34		21	0.2	21.3	19	80.9	4.87	1.79	1.14	8.93	0.69	0.24	64.9	18.35	11.60	1.09

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Johannesburg is a SANAS Accredited Testing Laboratory, No: T0387

Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method / Analyte / Units / LOR	ME-MS61r *Tm ppm 0.01	ME-MS61r *Yb ppm 0.03
DT14		0.45	2.83
DT15		0.32	2.05
DT16		0.36	2.43
DT17		0.50	3.48
DT18		0.63	4.48
DT19		0.70	4.52
ET01		2.13	10.65
ET02		0.28	1.45
ET03		0.13	0.89
ET04		0.42	2.04
ET05		0.22	1.35
ET06		0.80	4.31
ET07		0.60	3.23
ET08		0.12	0.75
ET09		2.76	11.50
ET10		0.62	3.58
ET11		0.64	3.68
ET12		0.19	0.86
ET13		0.81	4.90
ET14		0.11	0.77
ET15		0.15	0.95
ET16		0.24	1.84
ET17		0.13	0.84
ET18		0.14	0.87
ET19		0.31	1.94
ET20		0.39	2.72
ET21		0.14	0.95
ET22		0.24	1.26
ET23		0.18	1.26
ET24		0.14	0.91
ET25		0.33	2.19
ET26		0.14	0.88
ET27		0.54	3.20
ET28		0.36	2.36
ET29		0.01	0.08
ET30		0.22	1.37
ET31		0.18	1.12
ET32		0.11	0.69
ET33		0.13	0.81
ET34		0.23	1.49

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method / Analyte / Units / LOR	WEI-21 *Recvd W kg 0.02	Au-TL43 *Au ppm 0.001	ME-MS61r *Ag ppm 0.01	ME-MS61r *Al % 0.01	ME-MS61r *As ppm 0.2	ME-MS61r *Ba ppm 10	ME-MS61r *Be ppm 0.05	ME-MS61r *Bi ppm 0.01	ME-MS61r *Ca % 0.01	ME-MS61r *Cd ppm 0.02	ME-MS61r *Ce ppm 0.01	ME-MS61r *Co ppm 0.1	ME-MS61r *Cr ppm 1	ME-MS61r *Cs ppm 0.05	ME-MS61r *Cu ppm 0.2
ET35		0.16	0.001	0.03	3.56	1.8	660	0.87	0.04	0.85	0.03	>500	3.1	9	0.46	3.7
ET36		0.15	0.001	0.01	3.91	<0.2	790	0.92	0.01	0.73	<0.02	113.0	1.5	6	0.50	2.9
ET37		0.12	0.001	0.01	2.93	<0.2	560	0.76	0.03	0.56	<0.02	23.9	2.1	11	0.49	5.3
ET38		0.13	0.001	0.01	4.09	<0.2	690	1.00	0.03	0.79	<0.02	134.5	3.6	20	0.68	5.7
ET39		0.12	0.002	0.01	3.45	2.7	480	0.82	0.04	0.50	<0.02	>500	3.2	16	0.75	4.8
ET40		0.12	0.001	<0.01	4.14	0.3	530	1.07	0.05	0.64	<0.02	408	3.9	18	1.41	7.0
ET41		0.10	0.009	<0.01	3.43	1.4	650	1.20	0.17	0.86	<0.02	329	11.2	31	1.24	14.6
ET42		0.12	0.001	0.01	3.36	0.2	680	1.33	0.06	0.72	<0.02	112.5	3.3	16	1.15	5.9
ET43		0.19	0.001	<0.01	4.14	1.7	920	1.33	0.07	1.20	0.03	272	13.0	27	0.92	18.2
ET44		0.12	0.001	<0.01	6.81	1.5	1390	4.76	0.10	0.58	0.04	296	11.5	25	2.60	6.4
ET45		0.12	0.001	0.22	3.54	0.8	500	1.07	0.12	0.93	0.03	>500	15.4	63	0.99	16.9
ET46		0.13	0.001	0.05	4.87	1.8	850	2.08	0.09	0.83	0.04	>500	19.8	56	1.40	<0.2
ET47		0.14	0.001	0.05	4.30	1.4	1320	2.85	0.21	0.83	0.05	>500	8.4	29	2.38	<0.2
ET48		0.17	0.001	<0.01	3.43	2.2	1100	1.72	0.09	0.37	0.03	>500	4.1	17	0.71	<0.2
ET49		0.17	0.002	<0.01	4.74	1.7	690	3.21	0.15	1.20	0.06	>500	11.8	31	1.41	<0.2
ET50		0.16	0.001	<0.01	3.52	0.2	520	1.35	0.15	0.53	0.02	140.0	7.8	19	1.19	9.7
ET51		0.17	0.001	0.01	4.66	1.0	1000	1.67	0.03	0.64	0.05	>500	3.7	14	0.76	1.2
ET52		0.12	0.001	0.01	4.68	0.8	870	1.91	0.05	1.16	0.06	>500	3.0	14	0.95	2.7
ET53		0.13	0.001	<0.01	4.60	1.2	890	1.31	0.02	0.55	0.05	>500	2.9	14	0.79	2.5
ET54		0.14	0.001	<0.01	4.43	1.3	810	1.69	0.04	0.93	0.05	>500	5.6	37	0.58	0.8
ET55		0.18	0.001	<0.01	4.83	3.0	730	2.78	0.17	0.81	0.05	>500	5.8	27	2.36	3.3
ET56		0.13	0.001	<0.01	4.91	1.3	920	2.80	0.22	1.03	0.04	>500	8.5	30	3.13	0.2
ET57		0.16	0.001	<0.01	4.87	1.3	820	2.25	0.08	0.57	0.04	>500	3.9	17	2.67	2.2
ET58		0.13	0.001	<0.01	3.76	2.5	680	2.08	0.18	0.63	0.04	>500	4.1	23	1.71	1.3
ET59		0.16	0.001	<0.01	5.08	1.1	1590	3.72	0.14	0.97	0.05	412	7.1	15	2.47	0.5
EM01		0.13	0.001	<0.01	1.98	1.6	520	0.97	0.08	0.10	0.03	>500	1.7	16	0.60	<0.2
EM02		0.14	0.001	0.03	3.31	<0.2	520	0.87	0.03	0.25	<0.02	123.5	2.8	13	1.34	5.0
EM03		0.12	0.001	<0.01	3.82	3.0	940	1.30	0.06	0.29	0.02	>500	2.6	26	1.20	1.2
EM04		0.14	0.001	0.01	3.78	7.9	650	2.22	0.17	0.30	0.03	>500	6.6	50	1.92	<0.2
EM05		0.15	0.001	0.01	3.87	6.2	780	1.97	0.12	0.27	0.03	>500	5.0	29	1.48	1.9
EM06		0.18	0.001	0.07	3.53	2.5	1210	2.28	0.14	0.61	0.04	>500	10.7	46	1.47	<0.2
EM07		0.13	0.001	0.17	5.45	3.1	780	4.92	0.15	0.42	0.03	>500	13.3	96	3.48	9.0
EM08		0.11	0.001	<0.01	5.20	1.3	950	3.27	0.06	0.26	0.03	>500	6.7	26	2.21	6.6
EM09		0.12	0.001	0.05	7.25	1.6	1080	6.61	0.10	0.57	0.03	>500	7.7	28	4.25	7.0
EM10		0.14	0.001	0.13	3.76	1.6	940	3.00	0.14	0.51	0.05	>500	8.0	42	2.04	1.7
EM11		0.17	0.001	0.01	3.58	3.3	890	1.89	0.11	0.39	0.04	>500	5.9	32	1.94	1.3
EM12		0.14	0.001	0.10	2.91	4.4	420	1.79	0.95	0.49	0.07	>500	11.2	62	1.68	<0.2
EM13		0.14	0.001	0.03	2.87	2.7	570	1.08	0.40	0.45	0.03	>500	3.8	18	1.69	4.3
EM14		0.12	0.001	0.04	4.42	3.5	720	2.68	0.20	0.46	0.03	>500	9.9	46	2.81	7.3
EM15		0.14	0.001	<0.01	4.48	0.5	760	1.81	0.05	0.58	0.02	64.0	2.7	11	1.45	2.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
ET35		1.34	15.20	1.51	14.9	0.021	1.93	630	3.9	0.11	705	0.25	0.76	5.4	4.3	1070
ET36		0.56	7.83	0.18	2.2	0.012	2.31	53.8	3.5	0.06	193	0.26	0.81	1.8	3.5	160
ET37		0.64	6.19	0.09	0.7	0.009	1.62	11.1	8.9	0.08	207	0.30	0.64	1.3	4.7	100
ET38		1.04	8.94	0.21	4.4	0.016	2.01	64.7	7.0	0.16	298	0.31	0.82	4.0	8.5	230
ET39		1.43	17.85	1.94	13.1	0.018	2.13	850	5.9	0.14	699	0.33	0.59	5.7	5.9	1320
ET40		1.09	10.70	0.44	2.9	0.019	2.24	192.0	7.0	0.20	281	0.31	0.83	4.5	8.6	530
ET41		5.26	10.90	0.49	4.5	0.041	2.17	145.5	7.2	0.20	1580	0.71	0.58	55.0	10.5	1640
ET42		0.83	7.21	0.20	2.2	0.012	1.52	54.3	7.3	0.16	218	0.33	0.71	3.2	6.8	240
ET43		7.59	16.40	0.53	2.8	0.090	1.92	118.5	6.7	0.36	2430	1.08	0.79	137.5	11.2	780
ET44		3.24	16.35	0.51	4.1	0.043	3.68	129.5	34.5	0.19	1140	0.81	0.71	24.6	9.5	1030
ET45		8.17	15.85	1.04	5.5	0.065	1.47	323	10.3	0.35	1920	1.46	0.78	82.7	15.9	870
ET46		7.93	16.20	0.86	5.9	0.088	2.11	244	25.0	0.43	2010	1.74	0.55	116.5	20.9	760
ET47		5.37	14.15	0.83	12.8	0.064	2.47	247	24.1	0.18	2420	0.50	0.55	71.6	6.4	2210
ET48		2.49	19.25	2.12	8.9	0.067	2.58	820	15.3	0.06	1490	0.56	0.42	74.8	3.0	1560
ET49		4.69	17.00	1.16	11.6	0.063	2.58	375	21.0	0.37	1490	0.79	0.80	64.0	12.6	1760
ET50		3.21	8.75	0.27	3.2	0.031	2.25	60.6	7.9	0.15	967	0.71	0.61	47.2	7.1	510
ET51		1.28	13.75	1.11	14.6	0.033	2.84	360	11.0	0.15	380	0.12	0.68	6.4	4.7	620
ET52		1.07	12.85	0.85	13.7	0.036	2.46	283	10.8	0.14	349	0.19	0.94	5.0	4.9	1060
ET53		0.90	14.95	1.38	8.4	0.017	2.95	429	12.4	0.13	195	0.13	0.68	5.3	4.4	750
ET54		2.09	16.30	1.54	14.2	0.030	2.22	520	11.7	0.23	655	0.12	0.82	11.7	7.3	940
ET55		1.67	24.3	2.76	12.8	0.023	2.21	1020	21.0	0.26	517	0.15	0.90	9.8	8.9	1590
ET56		3.69	14.20	0.82	9.8	0.039	2.18	262	27.1	0.36	1030	0.27	0.78	29.8	9.7	1480
ET57		1.07	14.20	0.99	4.8	0.017	3.80	357	18.4	0.20	338	0.10	0.79	6.5	5.5	820
ET58		1.28	17.15	2.05	15.6	0.019	2.19	730	15.7	0.21	546	0.09	0.70	6.6	6.8	1190
ET59		4.24	14.55	0.73	8.9	0.063	3.39	174.0	26.6	0.21	1620	0.53	0.63	33.1	4.7	2690
EM01		0.85	8.15	0.99	2.9	0.030	1.72	293	8.5	0.02	325	0.17	0.23	17.9	1.6	530
EM02		1.22	6.86	0.23	0.8	0.013	2.57	57.2	9.0	0.11	227	0.44	0.49	6.7	4.4	280
EM03		1.60	18.70	2.43	9.4	0.016	3.13	770	11.9	0.10	354	0.12	0.60	11.0	4.6	1260
EM04		4.14	41.4	6.20	20.3	0.044	2.81	2000	23.9	0.18	1200	0.25	0.45	11.4	8.7	1880
EM05		3.28	35.5	5.36	13.8	0.029	2.72	1630	17.6	0.13	938	0.20	0.50	10.7	6.4	1770
EM06		8.41	19.25	1.81	16.3	0.065	2.47	550	15.9	0.15	3100	0.44	0.34	88.8	8.1	2480
EM07		6.33	28.5	2.63	17.0	0.087	2.77	880	41.0	0.41	1700	0.56	0.59	62.9	20.5	1630
EM08		1.97	16.35	1.13	10.3	0.032	3.44	385	26.3	0.27	494	0.36	0.45	19.8	11.1	780
EM09		2.79	21.6	1.16	7.5	0.047	3.70	352	51.8	0.36	644	0.42	0.78	29.6	10.5	820
EM10		4.94	15.40	1.24	10.6	0.065	2.19	350	23.1	0.14	1800	0.47	0.38	51.6	7.3	1590
EM11		2.10	20.4	2.57	11.1	0.024	2.23	920	18.8	0.26	700	0.17	0.50	18.3	12.2	1360
EM12		5.86	24.6	3.37	34.4	0.042	1.57	1180	17.3	0.16	2350	0.16	0.47	42.7	7.5	1900
EM13		1.24	21.1	3.49	20.6	0.010	1.66	1430	9.3	0.14	703	0.28	0.41	5.8	5.9	1960
EM14		4.22	23.3	2.39	12.9	0.055	2.33	870	26.2	0.32	995	0.28	0.59	31.6	11.1	1370
EM15		0.68	8.59	0.21	1.8	0.010	3.19	29.9	12.8	0.14	180	0.06	0.79	2.9	4.5	330

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
ET35		38.7	62.0	0.005	0.01	<0.05	6.2	6	0.6	103.5	0.51	<0.05	314	0.372	0.25	25.9
ET36		30.6	76.7	<0.002	0.01	<0.05	2.2	2	0.3	115.0	0.13	<0.05	29.5	0.053	0.31	3.1
ET37		25.0	60.7	<0.002	0.01	<0.05	2.7	2	0.3	86.4	0.10	<0.05	4.8	0.037	0.25	0.6
ET38		31.8	76.9	<0.002	0.01	<0.05	4.2	2	0.8	108.5	0.31	<0.05	32.1	0.129	0.32	2.9
ET39		62.9	88.4	0.006	0.01	<0.05	7.1	7	0.8	91.4	0.61	<0.05	560	0.182	0.39	53.9
ET40		39.3	106.5	<0.002	0.01	<0.05	4.1	2	1.2	107.5	0.38	<0.05	110.5	0.131	0.46	11.3
ET41		33.2	101.0	<0.002	0.01	<0.05	8.5	5	3.3	93.2	4.26	0.06	81.8	2.16	0.44	12.9
ET42		27.8	56.6	<0.002	0.01	<0.05	3.1	2	0.6	107.5	0.28	<0.05	25.6	0.107	0.24	3.4
ET43		20.8	70.9	0.002	0.01	0.05	11.0	6	3.3	137.0	8.13	0.08	59.9	3.72	0.30	8.3
ET44		38.2	198.0	<0.002	<0.01	<0.05	10.2	3	4.0	115.0	1.91	0.05	73.3	0.486	0.98	7.3
ET45		26.1	54.2	0.002	<0.01	<0.05	11.8	4	3.2	83.2	6.02	0.05	190.5	3.30	0.28	19.6
ET46		26.2	103.5	0.003	<0.01	0.05	19.7	6	4.8	107.0	8.07	0.06	130.5	4.45	0.44	9.4
ET47		38.0	103.0	0.003	<0.01	<0.05	16.6	6	5.6	138.5	4.45	0.06	131.0	1.950	0.50	15.8
ET48		56.2	105.0	0.007	<0.01	<0.05	12.8	8	5.1	151.5	4.13	0.05	460	1.830	0.49	26.1
ET49		32.6	131.0	0.005	<0.01	<0.05	14.2	7	4.4	102.5	4.79	0.07	225	2.09	0.63	21.5
ET50		22.2	93.5	<0.002	<0.01	<0.05	5.7	1	2.2	73.5	3.28	<0.05	35.5	1.635	0.42	7.0
ET51		39.6	96.8	0.004	<0.01	<0.05	7.7	4	1.3	115.0	0.50	<0.05	222	0.289	0.43	17.3
ET52		37.2	89.9	0.002	<0.01	<0.05	7.5	4	1.6	147.0	0.42	<0.05	156.0	0.155	0.41	13.0
ET53		49.5	109.0	0.004	<0.01	<0.05	4.4	4	1.5	122.5	0.41	<0.05	299	0.130	0.55	20.0
ET54		39.8	75.8	0.004	<0.01	<0.05	9.7	5	1.8	128.0	0.91	<0.05	301	0.514	0.35	17.4
ET55		53.4	96.5	0.009	<0.01	<0.05	7.7	10	2.3	136.5	0.89	<0.05	560	0.353	0.48	55.7
ET56		32.9	95.8	0.002	<0.01	<0.05	10.5	5	2.9	126.5	2.14	0.05	136.0	1.260	0.46	11.9
ET57		51.7	169.5	0.003	<0.01	<0.05	5.2	4	1.5	139.0	0.60	<0.05	200	0.204	0.84	18.6
ET58		43.8	85.8	0.007	<0.01	<0.05	7.3	9	1.2	104.0	0.68	<0.05	390	0.347	0.41	45.1
ET59		42.0	153.0	0.002	<0.01	<0.05	13.8	4	3.2	168.0	1.98	0.05	99.6	1.250	0.75	12.9
EM01		30.5	65.6	0.003	<0.01	<0.05	4.4	5	2.1	43.1	1.09	<0.05	186.0	0.556	0.33	11.8
EM02		26.3	98.5	<0.002	<0.01	<0.05	2.9	<1	1.6	71.0	0.38	<0.05	33.5	0.170	0.53	2.3
EM03		51.4	120.5	0.008	<0.01	<0.05	4.5	10	2.7	111.5	0.78	<0.05	520	0.357	0.55	35.4
EM04		93.5	140.0	0.022	<0.01	<0.05	12.8	22	1.4	140.0	0.92	0.07	1460	1.070	0.64	123.0
EM05		71.2	130.0	0.020	<0.01	<0.05	8.7	19	1.7	124.0	0.83	0.05	1160	0.889	0.59	68.2
EM06		43.7	100.5	0.005	<0.01	<0.05	17.3	8	4.8	115.5	5.45	0.10	364	2.41	0.48	24.6
EM07		55.7	169.0	0.009	<0.01	<0.05	17.0	11	6.3	103.0	4.52	0.12	560	1.505	0.82	63.5
EM08		49.4	179.5	0.004	<0.01	<0.05	8.0	5	2.8	115.5	1.32	0.07	240	0.398	0.91	26.0
EM09		53.1	210	0.003	<0.01	<0.05	12.4	6	4.2	152.5	2.15	0.06	216	0.560	1.11	25.4
EM10		38.3	102.5	0.004	<0.01	<0.05	13.0	6	4.9	101.0	3.23	0.10	247	1.465	0.51	18.6
EM11		50.5	75.8	0.009	<0.01	<0.05	7.5	12	1.9	123.5	1.33	<0.05	440	0.697	0.36	45.4
EM12		49.4	68.0	0.013	<0.01	<0.05	17.0	16	2.1	90.0	3.79	0.07	580	3.05	0.34	73.7
EM13		44.4	57.2	0.008	<0.01	<0.05	4.9	10	1.0	69.4	0.83	<0.05	800	0.349	0.26	79.2
EM14		43.4	103.5	0.008	<0.01	<0.05	14.8	11	2.6	99.1	3.08	0.07	404	1.320	0.47	45.8
EM15		40.5	126.0	<0.002	<0.01	<0.05	3.1	1	1.1	117.0	0.23	<0.05	15.5	0.073	0.61	2.4

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
ET35		19	0.3	103.0	12	425	33.5	7.20	4.95	81.1	3.74	0.74	597	158.5	109.5	8.65
ET36		7	0.1	14.0	7	75.4	3.70	1.12	0.98	6.92	0.48	0.14	46.3	12.50	8.80	0.85
ET37		8	0.1	6.2	6	24.6	1.04	0.52	0.50	1.35	0.18	0.08	8.9	2.49	1.68	0.19
ET38		17	0.2	13.2	15	149.5	3.33	1.13	1.10	7.08	0.45	0.16	53.2	14.50	9.25	0.81
ET39		17	0.4	127.0	12	342	39.1	8.64	4.87	94.1	4.52	0.67	770	209	140.0	10.10
ET40		18	0.3	30.4	16	93.9	8.57	2.11	1.86	18.40	1.03	0.17	162.5	45.7	26.6	2.11
ET41		115	2.1	51.1	39	142.5	12.60	4.51	2.72	19.90	1.85	0.46	137.0	36.9	24.7	2.63
ET42		14	0.6	13.0	11	75.7	3.41	0.96	1.08	6.44	0.45	0.11	43.9	12.10	8.06	0.79
ET43		122	4.0	46.9	75	94.6	12.65	4.24	3.01	19.70	1.79	0.40	120.5	31.1	22.4	2.62
ET44		57	1.5	36.5	41	125.5	8.87	3.45	2.29	13.45	1.43	0.35	104.5	30.5	18.35	1.68
ET45		198	3.2	62.2	71	170.0	16.30	4.42	3.19	33.6	2.22	0.43	273	86.5	44.1	3.93
ET46		180	4.1	44.8	100	184.0	12.50	3.95	3.14	25.5	1.82	0.39	201	60.7	34.3	2.90
ET47		119	2.1	69.4	48	388	16.60	5.92	3.45	30.5	2.57	0.65	206	61.7	38.8	3.56
ET48		60	1.3	94.4	41	266	26.8	7.02	5.54	56.2	3.69	0.54	668	209	100.0	6.10
ET49		105	2.2	91.2	57	359	22.9	7.31	4.48	40.2	3.44	0.63	326	96.6	56.8	4.80
ET50		74	1.4	23.6	30	110.5	4.04	1.56	0.90	6.11	0.64	0.19	49.0	16.20	9.11	0.78
ET51		22	0.3	60.2	16	411	17.50	4.53	2.88	39.1	2.33	0.46	322	94.0	58.6	4.15
ET52		17	0.3	58.3	15	392	15.05	4.55	3.10	27.9	2.16	0.40	229	69.2	41.2	3.19
ET53		15	0.2	50.0	14	244	16.20	3.49	2.99	42.4	2.02	0.28	392	116.0	69.3	4.12
ET54		43	0.5	60.3	30	401	18.50	4.47	3.79	48.2	2.36	0.49	467	138.0	79.5	4.60
ET55		31	1.5	163.0	21	334	48.2	11.60	9.53	95.0	6.51	0.67	885	270	150.0	10.70
ET56		66	1.7	54.9	42	290	14.40	4.69	2.69	27.2	2.17	0.45	208	62.2	37.4	3.15
ET57		20	0.5	48.5	17	144.5	14.05	3.41	2.77	28.1	1.86	0.26	272	83.4	45.0	3.19
ET58		23	0.8	132.5	14	426	37.5	9.27	5.98	70.3	5.06	0.60	607	183.0	106.5	8.30
ET59		89	1.5	58.6	43	286	12.90	5.40	3.28	20.5	2.16	0.59	147.5	41.8	27.5	2.52
EM01		21	0.8	57.5	7	86.6	17.00	4.56	3.66	32.0	2.42	0.22	263	76.5	45.5	3.68
EM02		22	3.4	11.2	11	25.7	2.35	0.71	0.67	4.43	0.35	0.08	43.1	14.60	7.10	0.52
EM03		26	0.8	166.5	13	267	48.4	12.65	9.34	88.6	6.72	0.61	750	223	132.0	10.50
EM04		84	1.7	377	38	>500	119.0	31.4	18.85	238	16.65	1.57	2160	649	384	25.3
EM05		59	1.3	321	34	397	100.0	27.7	22.2	203	14.30	1.29	1820	540	298	21.4
EM06		173	2.5	112.5	57	482	29.8	9.39	6.80	55.6	4.47	0.72	506	150.0	85.6	6.38
EM07		120	3.1	171.0	75	478	47.5	13.35	8.56	86.5	6.75	0.82	774	234	133.5	10.30
EM08		33	1.6	72.4	33	295	18.95	5.45	3.72	33.2	2.73	0.39	316	94.6	52.3	3.97
EM09		58	2.0	78.4	41	214	20.0	6.31	4.12	34.0	2.98	0.51	307	92.0	52.4	4.08
EM10		100	2.7	78.5	50	334	19.75	6.44	3.92	36.5	2.98	0.50	329	96.5	56.9	4.15
EM11		41	1.9	191.0	21	312	52.5	15.05	9.73	91.5	7.66	0.78	774	234	130.0	11.00
EM12		142	3.1	229	42	>500	67.3	16.70	10.90	137.0	9.01	1.33	1075	322	192.0	14.80
EM13		19	2.0	238	11	>500	65.8	13.65	6.25	148.5	7.94	0.93	1195	373	208	17.50
EM14		86	4.2	165.5	43	359	48.6	12.60	10.90	87.8	6.66	0.71	742	221	126.0	10.60
EM15		13	0.2	6.6	12	56.0	1.63	0.57	0.82	2.73	0.25	0.08	22.1	6.56	3.92	0.33

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	*Tm	*Yb
	Units	ppm	ppm
	LOR	0.01	0.03
ET35		0.78	4.39
ET36		0.14	0.89
ET37		0.08	0.53
ET38		0.15	0.95
ET39		0.85	4.28
ET40		0.20	1.00
ET41		0.52	3.03
ET42		0.11	0.62
ET43		0.48	2.66
ET44		0.42	2.44
ET45		0.44	2.75
ET46		0.45	2.61
ET47		0.74	4.45
ET48		0.67	3.65
ET49		0.82	4.57
ET50		0.20	1.34
ET51		0.49	2.96
ET52		0.48	2.87
ET53		0.33	1.62
ET54		0.49	3.05
ET55		1.01	4.79
ET56		0.53	3.17
ET57		0.32	1.69
ET58		0.84	4.17
ET59		0.68	4.06
EM01		0.40	1.80
EM02		0.07	0.48
EM03		1.13	4.92
EM04		2.85	11.95
EM05		2.49	10.10
EM06		0.97	5.11
EM07		1.28	6.24
EM08		0.54	2.81
EM09		0.68	3.71
EM10		0.68	3.72
EM11		1.36	6.18
EM12		1.67	8.93
EM13		1.12	5.78
EM14		1.14	5.43
EM15		0.07	0.46

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Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Recvd W	*Au	*Ag	*Al	*As	*Ba	*Be	*Bi	*Ca	*Cd	*Ce	*Co	*Cr	*Cs	*Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
EM16		0.13	0.001	0.02	4.27	4.3	640	1.84	0.25	0.69	0.04	>500	4.7	13	1.44	<0.2
EM17		0.13	0.002	0.03	3.49	3.2	510	0.84	0.15	0.39	0.03	>500	3.5	14	0.85	5.5
EM18		0.13	0.001	<0.01	6.28	4.2	1120	3.35	0.22	0.55	0.04	>500	6.6	20	2.84	2.0
EM19		0.14	0.001	<0.01	4.89	1.7	1000	1.51	0.07	0.46	0.04	291	1.4	6	1.09	4.8
EM20		0.15	0.001	<0.01	4.53	0.6	870	1.31	0.13	0.61	0.05	>500	2.4	16	1.86	2.6
EM21		0.14	0.001	<0.01	4.89	0.6	830	0.75	0.12	0.56	0.05	>500	2.8	30	1.47	3.2
EM22		0.12	0.001	0.02	6.47	0.7	840	1.91	0.26	0.69	0.03	>500	4.7	15	3.76	5.1
EM23		0.14	0.001	0.02	4.22	0.9	850	1.47	0.10	0.42	0.05	>500	4.3	19	1.96	5.6
EM24		0.12	0.001	<0.01	4.43	0.5	900	0.77	0.08	0.72	0.03	>500	3.5	18	1.01	2.8
EM25		0.15	0.001	0.01	5.73	0.5	870	1.78	0.21	0.78	0.04	>500	4.6	22	2.14	3.9
EM26		0.16	0.001	<0.01	5.70	0.5	860	1.97	0.28	0.81	0.03	>500	4.1	18	2.11	3.5
EM27		0.14	0.001	0.04	3.74	0.7	440	1.01	0.04	0.42	0.03	371	14.6	52	0.83	9.2
EM28		0.12	0.001	0.14	5.76	0.7	520	1.54	0.06	0.49	0.05	>500	23.3	84	1.08	16.5
EM29		0.14	0.001	0.10	7.12	0.8	920	3.52	0.21	0.80	0.06	155.5	29.1	61	2.55	19.1
EM30		0.14	0.001	0.06	4.86	1.0	620	1.85	0.05	0.53	0.04	>500	11.3	37	1.33	9.0
EM31		0.14	0.001	0.04	6.07	0.3	840	2.19	0.04	1.33	0.05	306	9.4	47	1.17	6.9
EM32		0.16	0.001	0.02	5.31	0.4	620	1.67	0.05	0.92	0.04	174.0	7.5	39	1.62	6.6
EM33		0.13	0.001	0.03	4.87	0.8	550	1.44	0.15	0.42	0.04	>500	5.8	26	3.50	6.6
EM34		0.16	0.001	0.02	4.21	0.8	360	1.18	0.09	0.50	0.03	379	4.8	19	2.40	4.0
EM35		0.16	0.002	0.08	4.22	1.9	730	0.57	0.08	0.37	0.03	>500	7.4	13	1.08	3.6
EM36		0.14	0.001	0.06	5.11	1.5	920	1.44	0.11	0.72	0.03	>500	7.7	19	2.39	5.4
EM37		0.13	0.001	<0.01	5.68	0.7	990	1.31	0.06	0.47	0.02	>500	5.2	16	2.03	4.3
EM38		0.16	0.001	0.04	5.84	2.3	900	1.24	0.09	0.65	0.03	>500	9.9	33	1.90	10.9
EM39		0.14	0.001	0.08	4.84	3.9	800	1.43	0.29	0.87	0.04	>500	10.1	41	1.69	4.5
EM40		0.14	0.001	0.02	7.02	0.7	790	2.15	0.15	0.59	0.03	>500	2.9	11	3.10	3.9
EM41		0.14	0.002	0.02	5.35	0.9	770	1.85	0.10	1.01	0.05	>500	5.8	30	1.21	3.6
EM42		0.18	0.001	0.03	4.33	1.7	630	1.20	0.07	0.89	0.04	>500	11.3	122	0.86	8.9
EM43		0.13	0.001	0.03	6.77	0.6	860	3.99	0.18	0.67	0.03	404	8.1	36	2.95	9.0
EM44		0.14	0.011	0.07	5.38	0.6	770	1.71	0.07	1.20	0.06	>500	9.2	44	1.15	7.6
EM45		0.15	0.008	0.02	5.10	0.3	680	4.69	0.04	0.83	0.04	142.0	6.6	25	0.62	6.4
EM46		0.15	0.010	0.01	4.11	1.8	600	1.00	0.02	0.63	0.05	>500	6.1	27	0.50	4.2
EM47		0.14	0.006	0.01	6.64	0.4	860	2.53	0.17	0.92	0.05	325	11.7	44	4.24	8.7
EM48		0.13	0.004	0.14	9.49	0.7	740	4.53	0.50	0.56	0.08	132.0	24.1	82	8.90	32.0
EM49		0.15	0.006	0.02	5.51	0.6	860	0.94	0.05	0.58	0.03	>500	5.7	15	1.70	4.1
EM50		0.14	0.005	0.04	6.04	0.7	690	1.68	0.09	0.79	0.03	>500	5.9	22	2.42	5.3
EM51		0.12	0.005	0.02	5.04	0.3	1080	2.12	0.08	0.78	0.02	115.0	5.9	13	2.26	7.0
EM52		0.13	0.003	<0.01	3.82	0.5	630	1.56	0.09	0.37	0.02	338	5.6	20	2.14	5.4
EM53		0.02	0.004	0.07	2.63	1.0	460	0.51	0.04	0.14	0.03	>500	3.0	95	1.01	5.4
EM54		0.20	0.002	0.01	5.73	0.3	960	0.69	0.06	0.63	0.05	191.5	1.9	11	1.82	2.9

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2014

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Fe	*Ga	*Ge	*Hf	*In	*K	*La	*Li	*Mg	*Mn	*Mo	*Na	*Nb	*Ni	*P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
EM16		1.96	27.8	3.83	25.2	0.018	2.90	1370	13.7	0.16	831	0.07	0.79	5.2	5.1	1460
EM17		1.93	21.2	3.37	10.2	0.018	2.31	1270	6.8	0.08	813	0.34	0.71	14.7	3.8	1870
EM18		2.53	25.6	2.91	18.6	0.034	3.47	980	25.2	0.18	775	0.31	0.90	23.9	10.0	1610
EM19		0.99	7.58	0.14	3.3	0.011	3.69	900	7.2	0.08	455	0.31	0.99	5.5	2.3	1470
EM20		1.61	9.57	0.45	3.7	0.013	3.19	1090	6.3	0.17	652	0.28	0.74	4.4	3.3	1520
EM21		2.25	8.75	0.67	3.5	0.012	3.14	1270	6.1	0.28	819	0.31	0.70	4.3	4.5	1830
EM22		1.30	16.30	0.75	8.9	0.025	4.11	342	17.9	0.22	393	0.13	0.95	6.6	6.6	830
EM23		1.23	13.20	1.06	8.6	0.014	3.09	460	11.5	0.18	452	0.16	0.56	7.3	6.4	1060
EM24		0.78	11.95	0.85	10.9	0.018	3.31	395	6.6	0.21	274	0.11	0.66	4.7	8.9	1130
EM25		1.25	14.10	0.84	13.9	0.021	3.41	351	12.2	0.20	406	0.14	1.13	7.5	7.4	600
EM26		1.07	12.85	0.58	7.6	0.015	3.33	225	11.6	0.19	326	0.14	1.15	6.2	7.0	430
EM27		3.18	10.80	0.46	3.5	0.035	0.75	165.5	10.0	0.25	861	0.32	0.28	19.9	17.4	440
EM28		4.55	20.6	1.32	8.6	0.068	0.90	610	16.2	0.33	892	0.27	0.20	22.9	28.8	1110
EM29		4.59	17.70	0.34	1.3	0.046	1.31	71.6	34.5	0.50	1850	0.24	0.30	12.7	29.1	1060
EM30		2.32	19.20	1.80	10.7	0.032	1.55	860	19.8	0.26	890	0.18	0.67	15.4	14.3	1280
EM31		2.36	14.15	0.44	3.4	0.030	1.99	133.0	15.3	0.50	1020	0.13	1.13	8.7	15.2	460
EM32		1.83	11.75	0.30	2.6	0.024	2.48	76.5	12.5	0.38	449	0.10	1.00	6.8	12.2	360
EM33		1.65	14.40	0.85	7.7	0.021	2.80	404	16.4	0.20	326	0.17	0.69	8.3	9.4	790
EM34		1.44	10.60	0.49	2.7	0.013	2.28	166.0	14.1	0.14	489	0.15	0.91	8.5	5.9	350
EM35		3.24	21.2	2.35	9.6	0.019	3.50	1320	7.2	0.12	918	0.14	0.57	31.6	6.3	1830
EM36		2.92	21.1	1.98	15.4	0.025	3.57	1110	10.6	0.21	939	0.18	0.83	25.9	7.5	1840
EM37		1.55	15.75	0.86	7.3	0.023	3.67	404	13.1	0.22	410	0.44	0.77	10.4	7.2	750
EM38		2.46	28.7	2.92	23.4	0.033	3.51	1630	11.9	0.37	616	0.29	0.69	12.0	15.7	2480
EM39		4.28	34.7	4.50	52.2	0.034	3.27	2510	10.4	0.33	1310	0.22	0.82	17.5	13.9	2200
EM40		0.89	19.55	0.91	6.0	0.023	5.29	377	16.0	0.16	221	0.12	1.24	9.0	5.0	970
EM41		1.93	16.55	1.16	19.7	0.034	2.58	490	9.2	0.21	671	0.16	1.05	14.2	8.0	840
EM42		4.03	25.7	2.96	19.7	0.030	1.87	1510	9.5	0.55	890	0.28	0.66	14.2	24.9	2020
EM43		2.01	16.50	0.51	7.7	0.037	2.76	174.0	19.8	0.31	398	0.21	0.81	10.4	14.2	410
EM44		3.36	15.25	0.76	20.0	0.039	2.26	319	9.4	0.40	1210	0.28	1.08	17.1	12.0	930
EM45		1.63	11.40	0.29	2.1	0.027	2.03	62.0	7.6	0.33	386	0.10	1.00	7.4	11.8	240
EM46		1.82	24.6	2.97	22.5	0.028	1.92	1510	7.8	0.23	587	0.17	0.65	9.9	7.5	2060
EM47		2.02	15.95	0.45	4.8	0.031	3.11	142.5	23.9	0.58	611	0.30	1.13	8.3	17.6	410
EM48		5.79	23.9	0.35	1.9	0.063	2.23	61.8	50.7	0.88	1060	0.60	0.49	16.1	37.1	1500
EM49		1.80	16.15	0.99	3.7	0.021	4.12	460	9.8	0.21	490	0.15	0.87	14.4	6.9	890
EM50		1.61	17.60	1.09	7.2	0.028	3.67	490	14.7	0.29	693	0.16	1.00	9.9	8.7	1170
EM51		1.45	11.30	0.28	1.1	0.021	2.80	50.2	17.7	0.29	261	0.27	0.78	8.8	7.9	510
EM52		1.58	10.30	0.44	2.7	0.021	2.05	144.5	19.2	0.20	330	0.22	0.45	10.1	6.1	370
EM53		10.95	11.10	1.17	3.7	0.013	2.30	4070	4.9	0.07	898	0.59	0.22	9.4	4.8	1650
EM54		0.90	7.93	0.06	3.0	0.014	4.23	90.4	5.4	0.15	334	0.35	0.88	3.2	3.4	770

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*Pb	*Rb	*Re	*S	*Sb	*Sc	*Se	*Sn	*Sr	*Ta	*Te	*Th	*Ti	*Tl	*U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
EM16		73.4	124.0	0.014	<0.01	<0.05	7.5	15	0.4	120.5	0.44	0.05	870	0.906	0.61	86.6
EM17		51.2	72.8	0.010	<0.01	<0.05	5.6	11	0.9	80.8	1.51	<0.05	710	0.742	0.31	81.7
EM18		44.7	140.0	0.011	<0.01	<0.05	8.4	14	2.6	90.7	2.05	<0.05	490	0.993	0.61	39.7
EM19		29.7	106.0	<0.002	0.01	0.06	1.8	3	0.5	77.6	0.42	<0.05	72.2	0.558	0.41	6.9
EM20		41.0	152.5	<0.002	0.01	<0.05	2.7	4	0.6	102.5	0.46	<0.05	143.0	0.801	0.71	17.9
EM21		39.7	117.5	0.002	0.01	<0.05	3.9	5	0.6	110.5	0.52	<0.05	176.5	0.853	0.52	29.3
EM22		70.0	208	0.002	0.01	<0.05	6.3	4	1.9	136.0	0.61	<0.05	185.5	0.232	0.97	37.6
EM23		58.3	155.5	0.003	0.01	<0.05	5.2	5	1.4	103.5	0.67	<0.05	270	0.290	0.74	37.6
EM24		57.2	138.0	0.002	0.01	<0.05	4.2	4	1.0	138.0	0.36	<0.05	243	0.149	0.61	21.8
EM25		65.5	140.5	0.002	0.01	<0.05	5.6	4	1.4	136.0	0.66	<0.05	196.5	0.295	0.61	25.0
EM26		56.9	138.0	<0.002	0.01	<0.05	4.7	3	1.3	137.0	0.52	<0.05	114.0	0.196	0.58	16.3
EM27		20.8	41.7	<0.002	0.01	<0.05	10.8	3	1.8	62.1	1.16	<0.05	74.7	0.832	0.20	3.8
EM28		41.9	60.8	0.004	0.02	<0.05	16.2	4	3.1	71.0	1.44	0.05	340	1.180	0.33	18.2
EM29		26.9	112.0	<0.002	0.03	<0.05	13.5	2	2.3	107.5	0.97	0.05	24.7	0.345	0.58	2.5
EM30		53.3	83.9	0.007	0.02	<0.05	10.0	5	2.1	96.3	1.22	<0.05	500	0.458	0.39	38.9
EM31		29.0	91.0	<0.002	0.02	<0.05	11.7	2	1.6	149.0	0.54	<0.05	64.6	0.279	0.40	5.7
EM32		37.2	110.5	<0.002	0.01	<0.05	7.5	2	1.6	114.5	0.62	<0.05	35.2	0.219	0.47	4.8
EM33		53.0	143.5	0.003	0.01	<0.05	5.6	4	1.5	96.7	0.72	<0.05	226	0.327	0.67	29.8
EM34		39.8	124.0	<0.002	0.01	<0.05	3.5	3	1.1	82.5	0.68	<0.05	74.1	0.363	0.55	13.6
EM35		95.2	156.5	0.009	0.01	<0.05	3.8	8	1.3	107.5	2.46	<0.05	910	2.07	0.71	109.0
EM36		80.4	161.0	0.009	0.01	<0.05	5.8	8	1.6	152.5	1.89	0.05	680	1.495	0.74	75.2
EM37		65.9	167.0	0.002	0.01	<0.05	5.0	3	2.1	134.5	0.88	<0.05	252	0.377	0.83	27.8
EM38		96.2	167.5	0.012	0.01	0.05	9.2	9	3.7	140.5	1.10	<0.05	1050	0.628	0.76	110.5
EM39		124.0	142.0	0.021	0.01	<0.05	10.4	17	0.8	124.5	1.44	0.05	1580	2.16	0.57	217
EM40		85.5	271	0.003	0.01	<0.05	4.0	4	2.0	131.5	0.68	<0.05	253	0.185	1.31	48.9
EM41		56.4	107.0	0.005	0.01	<0.05	9.4	5	2.2	126.5	1.09	<0.05	335	0.505	0.44	34.5
EM42		77.2	76.0	0.013	0.01	<0.05	11.0	8	1.4	101.0	1.51	<0.05	920	0.805	0.32	71.9
EM43		47.0	141.0	<0.002	0.01	<0.05	9.2	3	2.3	117.0	0.76	<0.05	95.9	0.312	0.64	13.2
EM44		41.4	94.5	0.003	0.01	<0.05	11.5	4	2.1	129.5	1.34	0.05	166.0	0.820	0.42	19.8
EM45		29.7	85.9	<0.002	0.01	<0.05	6.6	2	1.8	118.5	0.40	<0.05	30.6	0.205	0.36	2.3
EM46		87.4	80.7	0.014	0.01	<0.05	7.7	7	1.2	112.5	0.89	<0.05	1050	0.367	0.34	83.0
EM47		47.2	159.0	<0.002	0.01	<0.05	8.5	3	2.5	129.0	0.82	<0.05	77.4	0.217	0.73	12.9
EM48		36.4	195.0	<0.002	0.03	<0.05	19.4	3	4.4	80.0	1.59	0.05	22.9	0.407	0.98	5.9
EM49		73.5	194.0	0.003	0.01	<0.05	4.4	4	1.6	135.0	1.08	<0.05	297	0.732	0.92	37.9
EM50		72.5	181.5	0.004	0.01	<0.05	7.3	4	2.2	131.5	0.76	<0.05	311	0.281	0.82	47.1
EM51		35.9	135.0	<0.002	0.01	<0.05	5.0	2	1.7	148.0	0.67	<0.05	21.6	0.185	0.64	3.2
EM52		30.4	106.0	<0.002	0.01	<0.05	6.1	3	1.4	99.1	0.74	<0.05	80.2	0.362	0.48	10.5
EM53		41.5	122.0	0.002	0.01	<0.05	2.6	5	2.6	52.6	0.70	<0.05	1970	0.888	0.55	28.0
EM54		48.0	155.5	<0.002	0.01	<0.05	3.0	2	0.8	129.0	0.32	<0.05	53.2	0.153	0.68	7.4

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	*V	*W	*Y	*Zn	*Zr	*Dy	*Er	*Eu	*Gd	*Ho	*Lu	*Nd	*Pr	*Sm	*Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
EM16		31	0.8	227	19	>500	64.6	15.95	9.61	126.0	8.74	1.07	1210	370	206	14.35
EM17		33	5.0	274	15	256	80.0	17.85	12.00	163.0	9.97	1.07	1170	366	208	20.2
EM18		40	1.4	206	24	>500	63.9	15.70	9.32	118.0	8.61	0.84	898	264	162.0	14.20
EM19		16	0.3	29.6	8	>500	7.67	2.24	1.80	17.10	1.13	0.15	121.0	33.2	21.4	2.02
EM20		25	0.4	49.8	17	>500	13.45	3.79	2.38	31.0	1.97	0.25	225	62.6	39.1	3.58
EM21		40	0.5	66.3	25	470	19.00	5.15	3.44	40.8	2.74	0.33	296	81.8	50.8	4.88
EM22		21	1.1	68.8	19	314	18.25	4.88	3.53	33.8	2.41	0.41	310	90.0	52.5	4.22
EM23		22	0.7	85.4	20	285	27.5	5.84	4.81	59.7	3.29	0.41	459	130.5	80.2	6.99
EM24		16	0.3	71.3	10	384	18.40	5.29	3.60	35.9	2.50	0.47	360	106.0	58.1	4.20
EM25		24	0.7	70.8	14	465	20.2	5.11	3.61	40.9	2.57	0.50	332	93.8	58.4	4.89
EM26		20	0.6	44.9	13	267	12.00	2.92	2.26	23.1	1.52	0.30	201	57.3	35.3	2.84
EM27		68	0.8	17.8	57	115.0	4.40	1.56	1.35	11.25	0.65	0.23	134.5	39.6	20.7	1.05
EM28		115	1.1	52.5	72	293	16.70	4.17	4.86	52.3	2.05	0.53	590	165.0	89.0	4.67
EM29		67	1.1	22.8	69	47.8	4.35	2.14	1.54	6.52	0.75	0.31	56.4	15.65	9.62	0.85
EM30		42	0.7	76.6	38	355	28.2	5.97	6.25	90.4	3.28	0.63	852	238	135.5	8.50
EM31		45	0.3	25.9	33	127.0	5.82	2.38	1.16	12.00	0.92	0.33	110.5	32.6	18.90	1.31
EM32		38	0.3	16.5	28	95.6	3.86	1.35	0.90	7.12	0.56	0.19	60.9	17.25	10.95	0.86
EM33		34	0.5	69.3	23	271	19.40	4.79	3.73	39.3	2.47	0.37	364	106.5	60.0	4.64
EM34		28	0.6	29.0	15	99.0	7.88	1.90	1.69	15.45	0.98	0.18	135.5	40.6	24.3	1.91
EM35		48	0.9	148.5	26	280	52.5	11.80	7.97	136.0	6.46	0.68	1215	354	195.5	13.50
EM36		49	1.1	158.0	28	499	52.8	12.85	9.64	128.0	6.82	0.80	1000	288	159.5	13.15
EM37		25	0.3	54.7	26	240	16.15	3.83	3.19	36.0	2.04	0.28	347	103.0	55.1	4.07
EM38		38	0.7	200	33	>500	70.8	16.90	11.60	176.5	9.00	1.11	1505	437	245	17.90
EM39		73	1.5	374	34	>500	149.0	32.9	17.95	324	17.60	2.00	2470	696	436	38.9
EM40		14	0.6	63.9	17	202	18.00	3.85	2.68	38.4	2.16	0.30	349	102.0	60.2	4.46
EM41		45	0.6	90.7	21	>500	28.0	7.41	4.54	64.7	3.54	0.86	500	139.5	86.6	7.13
EM42		79	0.6	148.0	29	>500	64.8	11.40	11.75	221	7.04	0.96	1580	435	286	19.45
EM43		39	0.6	29.4	30	265	7.60	2.36	1.57	16.85	1.03	0.34	146.0	43.6	26.0	1.88
EM44		60	0.6	61.4	37	>500	16.20	5.43	3.11	35.6	2.26	0.75	291	82.0	50.5	3.97
EM45		26	0.3	12.5	28	83.5	2.72	1.10	0.85	5.46	0.43	0.17	51.9	14.50	9.11	0.60
EM46		33	0.4	125.0	17	>500	53.0	9.05	8.48	194.0	5.65	0.81	1590	440	278	16.25
EM47		35	0.4	28.0	34	173.5	7.52	2.07	1.49	14.65	0.99	0.24	116.5	35.2	21.1	1.79
EM48		77	1.6	22.6	91	67.3	4.72	2.03	1.39	7.13	0.77	0.30	49.3	13.60	9.28	0.94
EM49		28	0.5	61.4	21	129.0	17.75	4.08	3.25	38.2	2.26	0.29	395	119.0	60.7	4.44
EM50		30	0.5	80.7	22	247	23.3	5.71	3.98	48.9	2.96	0.45	442	129.5	72.4	5.74
EM51		27	1.0	12.5	22	39.2	2.82	1.09	1.08	5.05	0.44	0.14	41.2	11.45	7.29	0.61
EM52		34	1.1	28.2	16	101.0	6.65	2.22	1.46	12.60	0.96	0.24	119.0	35.9	20.4	1.51
EM53		206	1.0	87.8	32	>500	25.9	7.29	5.11	62.6	3.82	0.33	473	129.0	83.8	7.02
EM54		15	0.2	18.6	13	225	4.18	1.56	1.04	8.92	0.66	0.19	73.9	21.5	12.60	1.05

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Johannesburg is a SANAS Accredited Testing Laboratory, No: T0387

Project: Malawi 2014

CERTIFICATE OF ANALYSIS JB14175567

Sample Description	Method Analyte Units LOR	ME-MS61r *Tm ppm 0.01	ME-MS61r *Yb ppm 0.03
EM16		1.48	6.98
EM17		1.53	7.50
EM18		1.37	6.34
EM19		0.22	1.09
EM20		0.37	1.77
EM21		0.48	2.46
EM22		0.49	2.70
EM23		0.53	2.65
EM24		0.57	3.16
EM25		0.55	3.22
EM26		0.31	1.85
EM27		0.21	1.43
EM28		0.47	3.10
EM29		0.30	1.95
EM30		0.60	3.53
EM31		0.32	2.16
EM32		0.18	1.18
EM33		0.46	2.49
EM34		0.20	1.18
EM35		0.97	3.95
EM36		1.15	5.00
EM37		0.36	1.90
EM38		1.51	6.65
EM39		3.00	13.75
EM40		0.34	1.81
EM41		0.85	5.23
EM42		1.01	4.81
EM43		0.30	2.03
EM44		0.71	4.61
EM45		0.15	1.05
EM46		0.78	3.78
EM47		0.23	1.43
EM48		0.28	1.84
EM49		0.36	1.74
EM50		0.55	2.89
EM51		0.14	0.87
EM52		0.25	1.54
EM53		0.65	2.61
EM54		0.19	1.18

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CERTIFICATE OF ANALYSIS JB14175567

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: ME-MS61r

REE's may not be totally soluble in this method.

ACCREDITATION COMMENTS

Applies to Method: Au-TL43 LOG-22 ME-MS61r SCR-41 WEI-21

Not SANAS Accredited

LABORATORY ADDRESSES

Applies to Method: Au-TL43 LOG-22 ME-MS61r SCR-41 WEI-21

Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

CERTIFICATE JB15141326

Project: Malawi 2015

This report is for 200 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 16-SEP-2015.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature: Colin Ramshaw, Vancouver Laboratory Manager

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
FT01		0.16	0.001	0.02	4.93	<0.2	700	0.67	0.06	1.23	0.03	23.6	8.0	28	0.83	7.0
FT02		0.13	0.001	0.02	7.37	0.7	1520	1.35	0.15	1.01	0.02	79.2	11.7	26	2.15	16.9
FT03		0.09	0.001	0.07	7.14	1.8	1130	1.88	0.44	1.27	0.05	55.2	29.0	165	6.79	48.3
FT04		0.11	0.001	0.02	7.28	0.7	1040	1.24	0.39	2.36	0.07	35.2	9.1	34	1.76	15.0
FT05		0.14	0.001	0.03	7.04	0.9	1080	1.40	0.25	1.99	0.05	38.5	12.4	69	3.00	17.6
FT06		0.09	0.111	0.04	5.41	1.8	1270	1.21	0.42	1.22	0.03	24.4	12.9	97	3.37	11.4
FT07		0.11	0.004	0.02	5.14	2.5	940	1.27	1.92	2.03	0.06	26.4	30.0	135	2.01	29.3
FT08		0.11	0.002	0.06	8.14	8.2	1000	1.56	0.31	1.69	0.05	38.6	21.6	83	8.14	39.9
FT09		0.13	0.001	0.05	5.83	1.3	920	1.32	0.34	1.21	0.04	24.0	13.7	89	3.11	13.4
FT10		0.07	0.001	0.03	4.79	1.1	580	0.80	0.13	1.30	0.03	14.05	9.6	149	1.91	9.3
FT11		0.10	0.001	0.04	5.87	1.5	960	1.33	0.28	1.40	0.04	22.6	14.3	108	3.81	13.3
FT12		0.13	0.001	0.03	5.90	4.8	820	1.67	0.52	2.14	0.08	28.7	17.2	146	3.98	15.9
FT13		0.08	0.001	0.06	6.54	7.9	750	1.82	0.20	1.62	0.07	39.4	15.8	106	4.71	20.6
FT14		0.12	0.001	0.05	7.89	11.1	580	2.79	0.34	0.79	0.04	123.5	31.2	124	8.35	42.6
FT15		0.09	0.002	0.05	6.44	2.9	740	1.53	0.36	3.13	0.07	38.2	25.3	316	3.20	15.6
FT16		0.11	0.003	0.02	6.41	2.8	910	1.27	0.25	0.95	0.02	102.0	17.0	59	3.17	19.6
FT17		0.13	<0.001	0.03	6.75	0.3	860	1.36	0.16	0.89	0.04	290	15.2	42	2.62	17.2
FT18		0.10	0.013	0.04	7.09	1.9	690	1.25	0.25	1.67	0.06	36.7	20.4	127	3.71	27.9
FT19		0.10	0.004	0.04	6.56	2.7	440	1.46	0.24	3.21	0.13	52.3	25.7	259	1.55	18.3
FT20		0.10	0.016	0.05	7.17	3.3	760	1.62	0.17	2.18	0.05	48.7	17.8	166	2.04	19.1
FT21		0.11	0.001	0.06	5.74	1.7	480	1.39	0.20	2.64	0.14	70.2	26.9	107	0.90	18.5
FT22		0.09	0.002	0.02	5.27	1.3	680	1.02	0.29	2.54	0.08	32.4	18.7	152	2.27	15.7
FT23		0.14	0.001	0.03	6.83	1.0	1380	1.48	0.33	1.92	0.03	29.2	17.7	146	3.74	20.5
FT24		0.09	0.001	0.04	4.15	2.9	500	0.82	0.22	1.75	0.08	103.5	27.4	161	1.16	17.3
FT25		0.10	0.004	0.05	7.11	5.8	410	1.31	0.25	3.17	0.10	45.3	31.9	124	1.50	24.9
FT26		0.13	0.006	0.05	7.31	6.3	990	1.45	0.20	1.44	0.03	46.8	22.5	102	4.98	28.9
FT27		0.10	0.133	0.03	5.92	6.5	600	0.96	0.19	2.37	0.07	30.7	20.6	232	3.32	17.6
FT28		0.08	0.001	0.03	4.29	1.6	480	0.74	0.20	1.38	0.05	19.90	19.2	312	2.29	15.3
FT29		0.10	0.001	0.02	6.68	1.4	1080	1.34	0.25	2.13	0.05	20.2	13.5	97	2.66	13.2
FT30		0.10	0.001	0.03	5.91	4.3	1080	0.91	0.15	1.38	0.04	22.6	14.5	119	2.07	18.5
FT31		0.12	0.003	0.03	6.39	23.8	640	1.14	0.28	3.18	0.09	48.7	26.6	188	2.28	27.9
FT32		0.09	0.001	0.03	7.76	1.1	1230	1.83	0.36	2.72	0.06	25.7	15.7	92	2.93	16.7
FT33		0.12	0.001	0.03	6.66	0.7	930	1.32	0.37	2.94	0.08	18.95	19.5	89	1.82	15.5
FT34		0.09	0.007	0.03	7.64	1.7	1000	1.88	0.17	4.18	0.08	36.8	29.7	99	1.98	23.3
FT35		0.14	<0.001	0.01	7.56	0.7	1520	1.76	0.11	1.40	0.04	142.0	14.7	67	1.80	14.0
FT36		0.17	0.001	0.02	7.49	1.7	790	1.78	0.29	2.60	0.10	77.7	27.4	196	3.41	30.6
FT37		0.13	0.001	0.02	6.00	1.7	550	1.57	0.18	2.95	0.12	190.5	28.6	161	1.89	22.6
FT38		0.14	<0.001	0.02	5.66	1.5	430	1.52	0.23	2.54	0.09	125.5	22.5	160	1.95	15.9
FT39		0.15	<0.001	0.02	7.37	1.1	1250	1.92	0.08	2.24	0.06	155.5	20.4	51	0.83	10.7
FT40		0.12	0.001	0.02	6.09	1.9	700	1.42	0.30	2.94	0.11	78.6	22.6	116	1.61	17.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
FT01		2.81	8.62	0.11	2.1	0.031	1.59	10.8	4.7	0.34	1140	0.38	1.67	15.2	8.6	200
FT02		2.59	14.10	0.16	1.8	0.026	3.63	35.4	5.5	0.31	490	0.42	1.53	7.7	12.2	440
FT03		4.67	16.45	0.16	2.3	0.053	1.82	25.1	18.5	1.21	936	0.60	0.93	9.4	90.5	710
FT04		3.18	13.35	0.15	1.0	0.054	2.08	14.9	4.4	0.68	789	0.66	2.32	4.2	14.5	340
FT05		3.05	13.30	0.14	1.6	0.042	2.39	17.2	8.2	0.74	608	0.53	1.79	7.3	27.9	350
FT06		4.68	11.85	0.12	1.6	0.021	2.29	10.1	6.0	0.45	663	1.27	1.68	19.2	25.6	290
FT07		7.97	14.60	0.12	2.2	0.056	1.71	10.6	4.4	1.00	1020	6.55	1.63	25.9	54.4	320
FT08		5.44	17.50	0.15	1.8	0.055	2.09	16.9	18.5	0.71	717	0.94	1.26	11.6	37.1	430
FT09		3.93	13.20	0.12	1.9	0.029	2.06	8.9	8.7	0.51	606	0.69	1.64	26.5	30.3	260
FT10		2.93	8.88	0.11	1.3	0.018	1.22	5.5	7.6	0.51	426	0.52	1.58	15.2	30.2	180
FT11		3.94	12.95	0.11	1.8	0.028	1.94	8.4	10.8	0.67	615	0.50	1.87	13.8	32.8	270
FT12		4.73	13.15	0.13	2.4	0.047	1.77	11.3	12.5	1.03	769	0.58	1.43	21.8	52.5	480
FT13		3.50	13.25	0.14	1.4	0.038	1.42	17.6	15.9	0.67	640	0.45	1.70	15.3	39.4	340
FT14		6.50	18.75	0.22	2.4	0.071	1.70	58.3	28.5	0.75	1310	0.71	0.69	33.4	53.9	510
FT15		6.48	14.30	0.16	2.2	0.053	1.67	16.9	11.5	1.92	1100	0.67	1.77	70.0	72.7	410
FT16		3.37	13.50	0.20	1.7	0.039	2.50	45.7	14.1	0.55	944	0.58	1.18	19.9	22.6	290
FT17		3.12	15.30	0.39	3.3	0.037	3.32	137.0	11.8	0.42	720	0.34	1.04	23.2	17.6	500
FT18		4.48	14.60	0.15	2.4	0.049	1.89	12.9	13.3	0.79	759	0.43	1.43	15.7	40.0	230
FT19		7.36	15.70	0.16	2.8	0.055	1.59	19.8	8.1	1.70	1600	0.76	1.89	64.6	43.9	370
FT20		4.53	14.75	0.17	3.3	0.045	2.29	20.3	8.2	0.97	1020	0.65	2.02	50.9	34.2	260
FT21		10.75	13.05	0.19	14.7	0.065	1.49	29.6	5.2	1.22	3230	0.81	1.58	90.5	28.0	500
FT22		8.99	13.05	0.13	1.0	0.059	1.41	12.8	6.8	1.28	845	0.63	1.26	8.4	45.9	580
FT23		4.09	14.65	0.15	1.2	0.058	2.39	10.7	9.4	0.97	590	0.45	1.19	11.8	54.5	410
FT24		11.70	11.70	0.18	4.6	0.052	1.24	46.0	4.8	0.84	2020	1.13	1.05	69.5	34.6	280
FT25		8.58	18.35	0.15	2.2	0.072	1.79	16.7	7.1	1.73	1400	1.14	1.97	38.2	49.2	350
FT26		4.12	15.95	0.16	1.6	0.051	2.19	18.7	14.0	0.72	735	0.84	1.18	12.0	46.5	460
FT27		6.52	13.45	0.13	1.6	0.042	1.59	10.9	10.4	1.18	896	0.46	1.67	18.7	57.3	480
FT28		8.45	10.95	0.10	2.3	0.029	1.19	7.9	7.5	0.63	853	0.53	1.21	20.3	47.5	280
FT29		3.04	13.55	0.14	2.1	0.039	2.59	8.4	7.4	0.83	611	0.40	1.88	9.1	31.7	270
FT30		4.53	11.05	0.13	2.4	0.031	2.42	9.4	7.2	0.52	713	0.37	1.27	12.3	26.4	380
FT31		6.91	15.45	0.16	4.9	0.056	1.70	21.5	9.1	1.48	1320	0.61	1.44	18.6	56.2	470
FT32		4.11	16.90	0.16	1.8	0.045	2.75	10.6	7.6	1.07	725	0.57	2.03	11.4	35.3	500
FT33		6.04	14.90	0.13	3.5	0.053	1.91	7.4	5.1	1.11	990	0.56	1.74	14.7	32.2	350
FT34		6.49	18.95	0.16	5.3	0.068	2.09	13.5	6.7	2.11	1140	1.01	1.91	20.3	39.0	1080
FT35		4.11	17.10	0.18	1.9	0.048	4.09	50.0	8.9	0.53	849	0.53	1.09	33.9	20.3	840
FT36		6.96	17.25	0.12	6.1	0.064	2.01	27.3	14.4	1.35	1240	1.00	1.40	44.9	68.5	410
FT37		8.43	15.80	0.22	3.9	0.061	1.69	81.2	10.8	1.73	1900	0.66	1.30	49.6	57.3	500
FT38		6.23	14.00	0.16	4.1	0.054	1.53	53.9	10.6	1.56	1640	0.82	1.15	39.3	51.4	290
FT39		10.55	22.6	0.21	3.7	0.050	2.75	67.9	7.5	0.79	1960	0.45	2.04	50.0	22.9	430
FT40		6.94	15.50	0.13	3.5	0.059	1.66	30.8	7.4	1.23	1480	0.89	1.43	33.0	41.3	410

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53 Angus Crescent
Long Meadow Business Park, East Entrance
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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
FT01		11.2	39.8	<0.002	0.01	0.21	7.2	1	0.8	245	0.85	<0.05	3.6	1.370	0.17	2.0
FT02		16.9	105.5	<0.002	0.09	0.22	8.1	1	0.8	306	0.55	0.05	17.9	0.570	0.36	2.5
FT03		24.8	101.0	<0.002	0.02	0.42	19.6	2	1.4	281	0.61	<0.05	8.1	0.587	0.61	2.2
FT04		17.6	58.7	<0.002	0.02	0.25	16.4	1	0.9	308	0.29	0.07	13.4	0.325	0.25	2.2
FT05		18.0	72.1	<0.002	0.01	0.32	12.6	1	0.9	352	0.53	<0.05	7.9	0.501	0.31	1.8
FT06		25.2	67.0	<0.002	<0.01	0.81	6.2	1	0.8	382	1.27	<0.05	4.0	1.090	0.34	1.4
FT07		17.3	47.4	<0.002	0.01	1.02	12.8	2	1.3	350	1.73	0.16	11.6	1.410	0.22	2.9
FT08		17.7	79.4	<0.002	0.02	0.72	16.6	1	1.3	541	0.75	0.11	6.7	0.777	0.44	2.1
FT09		26.0	72.2	<0.002	0.01	0.53	7.4	1	0.9	315	1.61	0.06	3.9	1.020	0.33	1.5
FT10		12.3	36.6	<0.002	<0.01	0.80	5.7	1	0.6	284	0.81	<0.05	2.6	0.548	0.15	1.0
FT11		25.7	63.1	<0.002	0.01	1.14	7.8	1	0.9	359	0.92	<0.05	3.9	0.959	0.30	1.3
FT12		21.6	64.9	<0.002	<0.01	1.07	13.8	1	1.8	420	1.81	<0.05	4.5	0.793	0.29	2.2
FT13		15.1	59.6	<0.002	0.02	0.70	13.0	2	1.6	333	1.08	<0.05	5.6	0.557	0.25	1.7
FT14		16.8	119.5	<0.002	0.03	0.45	20.3	2	2.8	141.0	2.43	<0.05	21.7	1.335	0.49	3.8
FT15		14.8	56.9	<0.002	0.01	1.07	19.6	2	2.1	348	3.81	<0.05	7.0	1.315	0.25	1.7
FT16		26.1	96.0	<0.002	<0.01	0.32	9.9	1	1.3	195.5	1.41	<0.05	21.2	0.823	0.37	3.5
FT17		41.1	140.5	<0.002	0.07	0.10	9.8	2	1.2	184.5	1.54	<0.05	78.6	0.853	0.58	7.0
FT18		17.0	76.8	<0.002	0.01	1.05	16.9	1	1.9	334	1.17	<0.05	12.0	0.830	0.31	2.3
FT19		12.9	49.5	<0.002	<0.01	0.88	22.7	2	2.5	228	6.60	<0.05	9.3	1.735	0.18	3.5
FT20		15.6	72.5	<0.002	0.01	0.68	15.5	1	1.8	289	5.49	<0.05	9.4	0.996	0.27	2.3
FT21		15.9	46.0	<0.002	0.01	0.34	24.7	4	2.3	199.5	10.40	<0.05	27.7	5.73	0.16	11.0
FT22		13.3	43.8	<0.002	0.01	0.73	19.4	1	1.6	305	0.58	<0.05	6.6	0.674	0.21	1.1
FT23		18.8	80.2	<0.002	0.01	1.11	16.3	1	1.7	345	0.80	0.05	5.2	0.523	0.39	1.7
FT24		13.7	37.5	<0.002	<0.01	0.54	15.1	3	1.7	190.5	4.79	<0.05	37.1	5.41	0.16	5.3
FT25		12.4	53.0	<0.002	<0.01	0.49	22.8	2	2.2	237	2.68	<0.05	8.1	2.27	0.21	2.0
FT26		17.9	91.7	<0.002	0.01	0.93	16.2	1	1.6	337	0.83	0.06	9.5	0.647	0.39	2.6
FT27		12.3	55.2	<0.002	<0.01	0.92	13.6	1	1.3	336	1.21	<0.05	4.1	0.977	0.22	1.5
FT28		12.3	40.7	<0.002	<0.01	0.83	8.0	1	1.0	220	1.31	<0.05	4.1	1.410	0.15	1.3
FT29		20.8	85.2	<0.002	0.01	0.45	12.0	1	1.1	386	0.65	<0.05	4.7	0.462	0.33	1.8
FT30		18.4	71.7	<0.002	0.02	0.43	10.4	1	0.8	348	0.82	<0.05	4.7	1.020	0.25	1.4
FT31		15.1	56.7	<0.002	0.01	0.64	21.6	2	1.7	330	1.27	0.07	9.4	1.315	0.23	2.5
FT32		31.7	94.4	<0.002	<0.01	0.30	16.8	1	1.4	525	0.79	<0.05	6.0	0.678	0.39	2.4
FT33		20.9	55.7	<0.002	<0.01	0.34	19.2	1	1.3	376	1.13	0.06	3.9	0.821	0.23	2.4
FT34		15.5	57.9	<0.002	<0.01	0.55	27.0	1	2.0	506	1.51	<0.05	9.0	1.025	0.17	4.5
FT35		42.1	162.5	<0.002	0.01	0.13	10.7	1	3.3	274	2.07	<0.05	26.8	1.130	0.66	1.6
FT36		17.7	70.5	<0.002	0.01	0.22	20.7	2	2.4	358	2.86	0.07	13.4	1.810	0.31	3.1
FT37		15.4	59.9	<0.002	0.01	0.25	22.7	2	2.4	239	3.50	<0.05	36.4	3.05	0.26	5.1
FT38		16.3	59.8	<0.002	0.01	0.16	18.2	1	2.1	194.5	2.84	<0.05	24.7	2.32	0.26	4.1
FT39		18.2	80.5	<0.002	<0.01	0.14	11.6	2	2.3	489	3.33	<0.05	35.1	3.19	0.31	4.6
FT40		18.8	54.9	<0.002	0.01	0.24	19.4	1	2.2	316	2.35	<0.05	24.2	1.970	0.24	5.2

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
FT01		85	0.5	12.9	40	65.1	2.29	1.36	0.83	2.44	0.46	0.21	11.8	2.84	2.63	0.37
FT02		79	0.6	14.6	26	54.0	3.14	1.38	0.83	4.10	0.53	0.22	29.3	8.30	5.40	0.58
FT03		132	0.9	21.9	62	75.6	4.14	2.20	1.42	4.87	0.79	0.31	25.7	6.71	5.48	0.72
FT04		96	2.1	18.0	36	30.0	3.14	2.04	0.91	3.35	0.66	0.38	16.3	3.98	3.65	0.51
FT05		87	2.2	14.7	37	49.1	2.77	1.57	0.87	3.05	0.54	0.25	16.3	4.15	3.39	0.46
FT06		126	7.3	9.1	31	54.1	1.71	0.95	0.72	2.00	0.34	0.14	10.7	2.60	2.28	0.29
FT07		193	58.2	16.4	51	79.2	3.00	1.75	1.02	3.06	0.60	0.27	13.2	3.06	3.13	0.48
FT08		157	3.2	17.3	49	56.7	3.32	1.88	1.08	3.63	0.65	0.28	18.1	4.40	3.93	0.55
FT09		107	1.6	10.0	35	64.5	1.80	1.03	0.67	1.88	0.37	0.17	9.2	2.26	2.01	0.29
FT10		86	0.7	7.8	23	46.9	1.39	0.81	0.51	1.42	0.29	0.13	6.3	1.52	1.48	0.23
FT11		109	1.0	10.0	37	60.2	2.09	1.05	0.67	1.93	0.37	0.16	9.0	2.20	2.04	0.30
FT12		129	2.6	19.3	43	77.0	3.49	2.09	0.98	3.35	0.71	0.31	13.8	3.27	3.28	0.54
FT13		100	1.6	15.1	39	48.3	2.94	1.56	1.04	3.27	0.56	0.23	17.5	4.35	3.65	0.49
FT14		157	3.3	27.2	63	84.2	6.07	2.69	1.79	7.98	1.07	0.36	52.8	13.85	9.48	1.15
FT15		164	2.3	19.4	59	59.3	3.70	2.16	1.14	3.85	0.73	0.30	19.0	4.51	4.26	0.60
FT16		88	1.3	14.3	36	53.7	3.62	1.34	1.24	5.29	0.57	0.17	39.3	10.80	6.85	0.74
FT17		76	0.7	23.7	38	113.5	6.99	1.96	1.95	14.30	0.96	0.22	115.5	32.0	20.8	1.70
FT18		135	4.2	15.9	46	76.9	3.12	1.76	0.93	3.29	0.61	0.26	14.1	3.44	3.27	0.51
FT19		195	3.1	28.9	74	89.5	5.39	3.06	1.32	5.35	1.06	0.45	22.0	5.36	5.30	0.87
FT20		118	2.9	20.3	49	138.0	3.80	2.28	1.13	3.91	0.77	0.36	18.9	4.83	4.12	0.62
FT21		184	6.5	45.8	90	>500	8.49	5.09	1.47	8.70	1.69	0.86	34.3	8.57	8.59	1.40
FT22		254	0.9	20.6	53	32.9	3.63	2.26	0.85	3.35	0.76	0.35	14.2	3.40	3.45	0.56
FT23		117	1.4	17.4	38	38.5	3.14	1.91	0.90	2.98	0.64	0.29	12.6	2.95	3.16	0.48
FT24		239	4.5	27.3	81	163.5	6.20	2.65	1.15	8.51	1.04	0.37	46.4	12.00	9.98	1.20
FT25		242	2.8	24.5	83	66.9	4.77	2.66	1.53	4.96	0.94	0.38	20.9	4.93	5.08	0.79
FT26		134	1.8	19.3	44	49.7	3.61	2.08	1.13	3.89	0.72	0.31	19.8	4.83	4.26	0.58
FT27		176	1.9	19.0	53	52.5	3.52	2.11	1.03	3.37	0.73	0.31	13.8	3.20	3.32	0.55
FT28		240	1.3	11.5	43	70.7	2.26	1.36	0.66	2.26	0.47	0.21	8.8	2.10	2.15	0.36
FT29		93	1.1	12.6	34	59.9	2.37	1.48	0.71	2.27	0.49	0.25	9.2	2.19	2.26	0.37
FT30		133	1.2	10.2	37	81.9	2.02	1.24	0.73	2.04	0.42	0.20	9.0	2.27	2.08	0.32
FT31		188	2.3	25.2	65	164.5	5.23	2.94	1.40	5.56	1.03	0.44	23.0	5.98	5.45	0.87
FT32		133	1.2	14.9	44	50.4	2.89	1.76	0.91	2.93	0.59	0.28	12.0	2.86	2.94	0.45
FT33		190	0.9	16.9	45	94.6	3.11	2.03	0.90	2.85	0.66	0.35	9.8	2.18	2.64	0.47
FT34		220	1.3	24.6	65	180.5	4.96	2.92	1.46	5.11	1.00	0.45	18.7	4.29	4.95	0.79
FT35		105	0.7	27.7	42	53.8	6.46	2.87	2.08	8.39	1.14	0.31	52.7	13.70	10.50	1.19
FT36		176	2.4	25.4	63	195.5	5.32	3.07	1.52	5.71	1.06	0.48	27.7	7.38	6.33	0.88
FT37		186	22.2	36.0	80	116.0	9.32	3.78	1.90	12.90	1.53	0.49	74.6	20.1	15.30	1.83
FT38		142	2.2	28.1	59	123.5	6.91	3.07	1.57	8.94	1.20	0.43	53.2	13.90	10.75	1.29
FT39		212	1.2	24.1	78	124.5	6.41	2.31	1.59	10.25	0.98	0.28	63.0	17.00	13.05	1.39
FT40		173	1.8	26.8	59	112.5	5.76	3.14	1.50	6.71	1.09	0.47	31.8	8.64	7.54	1.00

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
FT01		0.20	1.31
FT02		0.19	1.24
FT03		0.32	2.01
FT04		0.32	2.22
FT05		0.24	1.51
FT06		0.14	0.88
FT07		0.27	1.76
FT08		0.28	1.74
FT09		0.16	1.02
FT10		0.13	0.80
FT11		0.16	1.03
FT12		0.32	2.01
FT13		0.23	1.40
FT14		0.37	2.19
FT15		0.31	1.94
FT16		0.17	1.04
FT17		0.24	1.35
FT18		0.26	1.64
FT19		0.45	2.81
FT20		0.35	2.24
FT21		0.79	5.30
FT22		0.34	2.22
FT23		0.29	1.85
FT24		0.38	2.37
FT25		0.39	2.48
FT26		0.31	1.96
FT27		0.32	1.99
FT28		0.21	1.39
FT29		0.23	1.57
FT30		0.18	1.24
FT31		0.43	2.81
FT32		0.27	1.74
FT33		0.32	2.14
FT34		0.44	2.86
FT35		0.37	2.14
FT36		0.46	3.09
FT37		0.50	3.12
FT38		0.44	2.83
FT39		0.30	1.81
FT40		0.47	2.94

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
FT41		0.16	0.001	0.11	9.16	5.4	610	2.90	0.36	1.36	0.09	93.6	39.2	164	7.39	52.7
FT42		0.12	<0.001	0.04	7.58	0.9	860	2.56	0.24	1.35	0.04	155.5	22.0	78	3.80	24.6
FT43		0.14	<0.001	<0.01	4.61	0.5	730	1.50	0.26	0.96	0.03	114.5	12.4	48	1.69	11.9
FT44		0.14	<0.001	<0.01	3.96	1.4	750	1.22	0.22	1.27	0.03	>500	22.7	65	1.11	17.1
FT45		0.13	<0.001	0.01	3.65	0.6	660	1.15	0.17	1.62	0.07	242	24.8	98	0.68	15.7
FT46		0.14	<0.001	<0.01	2.15	0.7	480	0.73	0.12	1.08	<0.02	84.1	29.4	116	0.47	17.0
FT47		0.13	<0.001	0.01	2.89	1.1	520	0.88	0.24	2.28	0.08	307	33.5	94	0.39	17.8
FT48		0.11	0.001	0.02	7.26	1.7	910	1.74	0.27	2.62	0.09	110.0	21.3	118	2.56	20.2
FT49		0.14	0.001	0.03	7.74	1.0	520	2.35	0.19	1.67	0.05	225	23.1	141	2.55	33.6
FT50		0.14	0.001	0.03	7.50	0.4	600	1.76	0.18	1.49	0.05	133.5	20.7	100	2.04	31.6
FT51		0.15	0.001	0.03	6.97	1.4	660	2.09	0.35	2.79	0.10	341	25.1	138	2.72	24.1
FT52		0.13	<0.001	0.01	7.42	0.2	1050	2.16	0.09	2.06	0.04	95.3	10.3	25	1.43	13.6
FT53		0.15	<0.001	0.01	6.81	<0.2	830	1.55	0.08	1.54	0.03	284	18.8	53	0.91	15.2
FT54		0.12	<0.001	<0.01	5.98	1.4	970	2.07	0.20	3.03	0.09	232	19.3	40	1.21	14.6
FT55		0.12	<0.001	0.02	7.10	0.3	1000	2.03	0.08	1.60	0.04	156.5	12.5	26	1.59	13.8
FT56		0.13	<0.001	0.01	5.72	1.2	900	1.88	0.16	1.66	0.05	189.5	24.0	77	1.16	17.4
FT57		0.13	0.001	0.11	9.82	1.3	760	3.37	0.76	0.82	0.07	86.8	25.3	99	7.52	47.6
FK01		0.14	0.001	0.03	6.28	3.1	610	1.64	0.21	1.59	0.04	54.9	17.2	95	8.13	22.2
FK02		0.13	0.001	0.06	7.39	5.1	980	1.67	0.30	1.34	0.06	49.8	24.6	134	8.00	41.2
FK03		0.14	<0.001	0.02	7.00	1.0	1350	1.33	0.12	0.99	0.02	31.5	8.8	36	1.69	10.9
FK04		0.16	0.001	0.02	5.59	2.2	570	1.05	0.11	1.19	0.03	22.4	14.4	95	2.14	19.7
FK05		0.16	<0.001	0.02	6.56	0.6	1080	1.39	0.13	1.38	0.05	40.4	9.7	33	1.80	11.4
FK06		0.16	<0.001	0.04	4.64	1.1	520	0.91	0.16	1.10	0.04	26.6	10.8	60	3.08	11.6
FK07		0.16	0.001	0.04	4.33	1.0	280	1.05	0.25	1.15	0.04	31.9	11.2	124	2.07	11.6
FK08		0.11	<0.001	0.01	2.87	2.2	180	0.82	0.26	0.78	0.03	>500	11.9	145	1.08	5.5
FK09		0.13	0.001	0.06	5.12	1.8	340	0.97	0.19	1.33	0.05	25.8	16.2	161	2.45	18.1
FK10		0.12	0.001	0.02	5.34	2.4	650	1.15	0.22	1.41	0.03	22.6	13.0	212	2.96	11.2
FK11		0.13	<0.001	0.02	6.33	1.8	890	1.58	0.18	1.52	0.03	27.3	10.7	159	2.52	7.0
FK12		0.11	0.001	0.03	7.14	3.1	750	1.74	0.30	1.89	0.05	56.4	26.2	126	4.30	30.7
FK13		0.13	0.001	0.04	7.89	1.2	1410	1.82	0.18	0.87	0.04	37.6	17.3	39	3.55	19.4
FK14		0.12	0.001	0.05	7.12	0.9	910	1.57	0.16	1.39	0.05	42.6	16.1	57	3.05	21.5
FK15		0.14	<0.001	0.04	8.66	0.7	1440	1.90	0.12	0.86	0.03	74.0	13.2	38	2.74	19.3
FK16		0.12	<0.001	0.02	7.70	0.4	1670	1.79	0.15	0.81	<0.02	42.8	7.9	21	1.70	9.0
FK17		0.14	<0.001	0.01	7.53	0.9	1260	2.10	0.09	1.30	0.02	24.9	5.1	14	2.18	3.7
FK18		0.11	0.001	0.11	8.94	3.5	1030	2.53	0.36	1.11	0.06	93.1	27.6	98	5.50	39.2
FK19		0.13	0.001	0.08	9.30	2.9	1360	2.20	0.18	1.16	0.08	97.7	24.1	57	2.94	30.0
FK20		0.13	0.001	0.02	7.31	1.6	1370	1.45	0.07	1.09	0.06	71.5	16.5	44	1.09	13.0
FK21		0.13	0.001	0.04	7.78	2.4	520	1.97	0.25	1.16	0.03	60.1	20.4	95	3.19	28.2
FK22		0.11	0.001	0.02	7.07	1.7	1440	1.31	0.09	0.67	0.02	32.6	13.6	54	2.21	19.8
FK23		0.11	0.001	0.04	7.98	3.4	610	2.43	0.28	3.06	0.12	111.0	31.9	306	5.60	33.3

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
FT41		7.17	23.8	0.12	2.6	0.080	1.63	40.3	35.5	1.19	2560	1.22	0.61	29.0	83.6	730
FT42		5.34	19.50	0.17	3.3	0.066	2.40	60.2	23.2	0.80	1130	0.75	0.89	44.9	32.3	1180
FT43		3.60	10.45	0.16	2.7	0.037	2.06	47.7	8.6	0.38	960	0.64	0.75	56.1	16.7	460
FT44		14.60	18.40	1.04	16.0	0.090	1.94	490	6.1	0.30	4420	0.94	0.63	158.5	15.7	2660
FT45		21.8	26.9	0.30	17.3	0.093	1.61	95.3	6.3	0.37	3150	1.80	0.68	118.0	19.6	2120
FT46		30.8	25.2	0.18	17.6	0.161	1.02	23.9	4.3	0.20	6050	1.48	0.33	186.0	18.3	1880
FT47		28.2	31.0	0.41	18.7	0.093	1.10	114.5	3.9	0.37	3470	2.39	0.47	147.5	20.9	3350
FT48		5.67	16.45	0.14	2.0	0.053	2.35	46.7	10.2	1.31	1180	0.56	1.57	20.6	45.7	410
FT49		5.28	17.60	0.21	7.9	0.047	2.38	98.2	11.0	1.08	1050	0.73	1.41	22.9	51.4	420
FT50		4.82	15.50	0.15	3.0	0.041	1.78	56.5	14.0	0.75	987	0.57	1.50	33.9	34.9	300
FT51		7.64	17.80	0.31	6.8	0.070	1.69	148.5	13.1	1.61	1490	0.90	1.52	82.5	50.5	630
FT52		3.34	16.70	0.17	4.0	0.041	2.85	36.5	10.7	0.46	798	0.70	1.75	33.1	10.8	1430
FT53		7.95	18.70	0.30	16.6	0.041	3.02	123.5	7.1	0.48	1240	0.43	1.54	21.5	14.6	460
FT54		8.51	18.85	0.33	4.3	0.081	2.06	77.8	8.3	0.54	2070	1.54	1.35	98.2	16.3	4540
FT55		5.44	16.90	0.23	13.4	0.046	3.04	64.0	12.8	0.44	1290	0.56	1.35	37.1	11.2	1130
FT56		9.37	16.60	0.22	6.3	0.060	2.10	78.8	8.1	0.55	1960	1.06	1.13	125.0	22.3	870
FT57		6.82	27.0	0.15	2.3	0.104	2.23	37.6	34.6	0.86	1290	1.09	0.48	44.3	50.0	1190
FK01		4.45	14.90	0.10	1.8	0.043	1.49	22.2	23.9	0.89	766	0.52	1.44	19.4	42.1	670
FK02		4.86	16.95	0.10	1.7	0.050	1.62	21.1	22.7	0.84	841	0.78	0.97	14.6	62.3	500
FK03		3.21	14.35	0.11	2.9	0.032	3.85	10.9	8.0	0.29	860	0.41	1.33	20.8	13.4	320
FK04		3.94	11.55	0.08	1.5	0.033	1.37	9.4	12.2	0.61	834	0.37	1.10	11.2	46.8	200
FK05		2.41	13.35	0.11	1.4	0.033	2.27	14.7	8.8	0.42	635	0.48	1.79	11.5	14.9	510
FK06		2.90	9.67	0.08	1.6	0.030	1.18	10.9	10.6	0.41	489	0.29	1.10	7.4	22.6	290
FK07		3.09	8.64	0.06	1.7	0.025	0.74	13.9	11.4	0.51	468	0.35	1.05	8.9	41.0	190
FK08		10.50	12.30	0.81	7.2	0.039	1.44	339	5.3	0.29	1450	0.57	0.63	50.7	17.5	630
FK09		3.53	9.92	0.06	1.4	0.024	0.63	11.0	12.5	0.76	788	0.37	1.39	8.9	61.6	270
FK10		3.95	10.40	0.06	2.0	0.025	1.34	7.4	8.0	0.65	636	0.36	1.78	7.6	42.1	210
FK11		3.16	13.55	0.09	3.0	0.026	2.52	11.6	9.7	0.72	744	0.37	1.62	17.2	41.5	370
FK12		6.76	17.80	0.11	2.5	0.070	1.66	23.2	20.3	0.85	1560	0.75	1.12	39.9	46.8	400
FK13		3.25	18.60	0.13	1.5	0.034	4.44	16.1	14.9	0.34	1410	1.11	1.15	15.1	29.0	470
FK14		3.26	16.90	0.12	1.8	0.039	2.35	19.7	16.8	0.66	1000	0.54	1.38	10.0	34.0	500
FK15		2.70	20.6	0.15	1.5	0.037	3.85	34.8	15.4	0.41	772	0.87	1.39	11.8	18.5	630
FK16		1.65	16.75	0.14	4.8	0.023	4.63	19.2	13.4	0.20	451	0.76	1.55	9.6	10.4	210
FK17		1.67	17.35	0.10	1.7	0.020	4.13	9.7	7.7	0.16	330	0.29	2.21	15.0	5.0	370
FK18		6.17	23.5	0.20	2.1	0.093	2.07	38.9	29.9	0.69	1100	1.53	1.04	26.1	53.7	780
FK19		6.14	24.9	0.20	1.3	0.107	2.28	42.7	21.8	0.55	1450	1.34	1.08	24.7	31.4	800
FK20		9.76	23.1	0.13	2.2	0.128	2.63	18.7	11.7	0.36	2370	1.40	1.55	70.3	15.9	540
FK21		5.16	20.7	0.13	2.2	0.066	1.51	28.2	26.7	0.67	1200	0.64	1.05	19.4	55.4	370
FK22		3.27	16.30	0.12	1.2	0.043	3.26	12.0	13.1	0.17	759	0.67	1.14	18.3	24.9	200
FK23		6.52	21.4	0.19	4.6	0.102	2.00	44.4	24.6	2.63	1210	0.72	1.33	20.0	64.7	580

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
FT41		18.5	141.0	<0.002	0.07	0.50	26.8	1	2.7	169.0	1.89	0.05	13.4	0.869	0.64	3.9
FT42		25.9	143.5	<0.002	0.02	0.25	17.9	2	3.6	183.5	2.78	<0.05	22.0	1.350	0.61	3.3
FT43		26.5	77.3	<0.002	0.01	0.16	7.7	1	2.2	164.0	3.72	<0.05	27.7	1.475	0.33	3.8
FT44		33.2	79.0	<0.002	<0.01	0.19	22.8	7	7.1	145.0	10.35	<0.05	355	6.81	0.33	14.8
FT45		20.5	58.1	<0.002	<0.01	0.11	19.3	3	6.5	133.5	7.19	<0.05	46.9	5.44	0.22	7.5
FT46		13.9	40.5	<0.002	<0.01	0.12	33.9	3	15.1	82.9	9.79	<0.05	11.2	8.40	0.16	4.2
FT47		16.2	37.6	<0.002	<0.01	0.13	20.3	5	8.8	102.0	8.62	0.06	60.1	6.69	0.15	8.7
FT48		24.5	80.9	<0.002	0.01	0.27	18.9	1	1.7	382	1.51	<0.05	25.4	1.330	0.36	3.6
FT49		35.9	119.0	<0.002	0.01	0.14	18.5	2	1.6	150.5	1.53	<0.05	66.8	0.989	0.50	6.7
FT50		26.7	85.8	<0.002	0.01	0.12	15.0	1	1.0	150.5	2.18	<0.05	38.8	1.135	0.37	3.2
FT51		21.5	68.2	<0.002	0.01	0.18	22.7	3	2.4	253	5.83	<0.05	82.7	1.745	0.28	13.0
FT52		26.6	110.5	<0.002	<0.01	0.10	10.0	1	2.8	251	1.92	<0.05	14.4	1.095	0.47	2.3
FT53		35.2	113.0	<0.002	<0.01	0.10	11.6	2	2.2	227	1.17	<0.05	90.1	2.04	0.48	6.9
FT54		22.4	86.4	<0.002	<0.01	0.12	18.4	4	6.4	315	5.67	<0.05	33.9	3.35	0.36	3.6
FT55		30.2	128.5	<0.002	<0.01	0.12	11.6	2	2.6	187.0	2.13	<0.05	35.7	1.690	0.53	3.6
FT56		24.6	77.4	<0.002	<0.01	0.27	13.2	3	4.4	213	8.29	<0.05	30.7	3.77	0.30	4.4
FT57		22.8	159.0	<0.002	0.02	0.18	24.1	2	3.2	145.0	2.61	<0.05	15.2	0.826	0.83	6.8
FK01		20.4	82.5	<0.002	0.05	1.34	12.4	1	1.6	340	1.27	<0.05	9.8	0.910	0.39	1.9
FK02		21.7	97.4	<0.002	0.02	0.62	17.9	1	1.5	398	0.93	0.05	7.8	0.815	0.58	1.6
FK03		23.8	134.0	<0.002	0.01	0.27	6.4	1	1.1	351	1.44	<0.05	9.6	1.120	0.55	2.0
FK04		12.7	56.5	<0.002	0.03	0.66	9.3	1	1.0	230	0.74	<0.05	3.4	0.747	0.26	0.8
FK05		15.3	69.5	<0.002	0.01	0.24	8.4	1	1.1	345	0.68	<0.05	4.2	0.590	0.29	1.8
FK06		13.5	50.9	<0.002	<0.01	0.56	7.8	<1	0.9	185.5	0.50	<0.05	7.4	0.472	0.21	1.2
FK07		11.1	41.3	<0.002	0.01	0.48	7.8	1	1.1	167.5	0.61	<0.05	8.0	0.539	0.18	1.6
FK08		26.6	61.6	<0.002	<0.01	0.56	8.8	6	5.3	92.0	4.35	<0.05	251	3.46	0.23	16.4
FK09		10.3	42.5	<0.002	0.01	0.83	10.0	1	0.8	196.0	0.60	<0.05	3.7	0.563	0.17	1.2
FK10		15.7	56.4	<0.002	<0.01	0.92	8.3	1	0.9	252	0.56	<0.05	3.9	0.576	0.26	1.0
FK11		19.0	101.0	<0.002	0.01	0.60	6.6	1	1.1	361	1.17	<0.05	15.7	0.833	0.41	2.9
FK12		16.3	81.9	<0.002	0.01	1.42	20.7	2	1.8	241	2.68	<0.05	6.8	2.14	0.36	2.4
FK13		31.5	180.5	0.002	0.02	0.41	7.5	1	1.4	374	1.13	0.05	6.6	0.555	0.80	2.3
FK14		17.8	88.8	0.002	0.01	0.54	10.5	1	1.2	306	0.77	<0.05	6.8	0.532	0.40	1.8
FK15		20.4	129.5	<0.002	0.01	0.26	8.7	1	1.5	367	1.00	<0.05	9.6	0.455	0.52	2.6
FK16		22.4	136.5	<0.002	<0.01	0.11	5.1	1	1.0	495	0.79	<0.05	13.8	0.449	0.51	3.4
FK17		26.5	147.0	<0.002	<0.01	0.18	2.2	<1	1.2	459	1.17	<0.05	6.3	0.439	0.64	2.6
FK18		21.3	117.5	0.002	0.09	0.68	20.8	2	1.9	204	1.67	0.08	11.6	1.050	0.59	3.6
FK19		19.5	94.0	<0.002	0.02	0.51	21.1	2	2.0	240	1.46	0.06	6.6	0.978	0.42	1.5
FK20		22.6	65.5	<0.002	0.01	0.37	14.9	2	2.9	272	4.50	0.07	2.9	3.70	0.29	0.7
FK21		16.0	82.7	<0.002	0.08	0.33	14.3	1	1.7	217	1.26	<0.05	7.8	0.906	0.43	2.0
FK22		22.6	95.4	<0.002	0.01	0.31	9.3	1	1.1	248	1.15	<0.05	3.3	0.715	0.44	0.8
FK23		18.7	121.0	0.002	0.06	0.40	30.5	2	2.6	174.5	1.46	<0.05	15.6	0.748	0.60	3.9

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
FT41		176	2.4	29.2	93	79.4	6.15	3.21	1.89	7.13	1.18	0.44	37.6	10.35	8.08	1.05
FT42		132	1.1	33.6	73	105.0	7.84	3.63	2.36	9.89	1.41	0.44	59.9	15.85	12.05	1.41
FT43		86	1.9	18.9	33	92.1	4.95	1.92	1.39	7.00	0.80	0.21	45.3	12.25	9.02	0.98
FT44		331	2.7	114.0	87	>500	34.6	10.10	4.91	60.3	4.85	0.84	464	132.0	89.4	7.71
FT45		574	2.5	72.0	96	495	16.65	7.89	4.56	21.1	2.96	1.02	108.5	27.0	25.0	3.07
FT46		820	2.6	56.4	128	>500	11.95	6.48	2.92	12.80	2.32	0.89	44.4	9.67	12.60	2.01
FT47		781	2.7	115.5	92	>500	26.8	12.55	6.96	33.1	4.71	1.47	151.5	36.8	37.6	4.77
FT48		147	2.1	21.9	56	58.2	5.17	2.41	1.38	7.06	0.90	0.33	43.8	11.65	8.89	0.98
FT49		145	1.0	28.1	52	225	7.43	2.87	1.47	11.80	1.18	0.38	79.1	23.1	15.45	1.58
FT50		109	1.0	16.9	53	98.4	4.41	1.76	1.31	7.25	0.71	0.26	49.8	13.80	9.78	0.92
FT51		182	2.4	47.5	73	210	13.05	4.64	3.05	20.0	2.01	0.53	131.5	36.4	26.5	2.73
FT52		96	0.7	37.0	43	131.5	8.26	4.16	2.45	9.43	1.56	0.50	44.4	11.00	10.30	1.41
FT53		267	0.4	35.2	55	>500	9.61	3.49	2.16	14.70	1.50	0.44	104.5	29.8	21.0	1.96
FT54		228	1.7	88.0	67	140.0	20.0	9.43	5.31	25.0	3.62	0.99	115.0	27.9	27.7	3.53
FT55		166	0.6	38.8	52	438	8.59	4.22	2.16	10.70	1.58	0.55	62.6	16.55	13.05	1.54
FT56		219	1.8	42.4	60	202	10.20	4.86	2.97	12.70	1.79	0.59	75.7	19.90	15.30	1.84
FT57		127	1.6	28.2	105	75.2	6.80	3.59	2.18	7.75	1.28	0.49	43.2	11.15	8.65	1.16
FK01		114	3.2	16.4	51	57.3	3.72	1.89	1.19	4.42	0.68	0.26	22.3	5.77	5.21	0.65
FK02		127	1.6	18.9	55	56.7	3.96	2.22	1.36	4.57	0.78	0.31	21.9	5.47	5.01	0.67
FK03		75	0.9	11.7	44	92.7	2.40	1.33	0.88	2.61	0.46	0.20	11.7	2.96	2.89	0.41
FK04		105	0.8	9.8	37	49.2	2.01	1.16	0.69	2.15	0.40	0.17	10.2	2.53	2.38	0.34
FK05		69	0.6	16.9	34	44.4	3.37	1.92	1.19	3.61	0.67	0.29	16.5	4.01	3.86	0.57
FK06		87	0.6	11.1	28	53.7	2.23	1.21	0.62	2.48	0.44	0.19	11.1	2.84	2.73	0.39
FK07		92	0.8	10.3	26	51.2	2.26	1.14	0.62	2.80	0.41	0.18	13.3	3.47	3.28	0.42
FK08		281	3.7	85.5	40	141.5	33.0	7.21	2.88	64.4	3.89	0.57	356	99.8	96.1	8.65
FK09		101	1.0	11.3	34	48.2	2.25	1.27	0.73	2.44	0.44	0.20	11.2	2.79	2.68	0.37
FK10		115	1.2	9.3	29	57.2	1.86	1.11	0.60	1.89	0.38	0.21	8.4	2.05	2.12	0.30
FK11		77	1.2	12.6	35	93.6	2.51	1.37	0.94	2.89	0.49	0.21	13.0	3.20	3.31	0.43
FK12		177	3.4	28.3	79	74.3	5.82	3.26	1.90	6.14	1.15	0.47	27.1	6.63	6.52	0.96
FK13		72	1.4	10.7	45	45.2	2.14	1.07	0.94	2.71	0.39	0.15	16.4	3.96	3.44	0.39
FK14		83	0.6	16.9	46	57.6	3.03	1.74	1.08	3.41	0.62	0.26	19.8	4.84	4.24	0.51
FK15		70	0.8	21.6	46	46.0	3.98	2.19	1.49	4.66	0.78	0.32	33.8	8.44	6.33	0.66
FK16		54	0.6	15.9	24	168.0	2.71	1.65	1.01	3.06	0.55	0.30	20.1	4.93	4.21	0.45
FK17		38	0.6	6.1	26	50.4	1.28	0.56	0.76	1.81	0.23	0.09	11.3	2.65	2.46	0.25
FK18		124	4.1	37.1	90	59.8	7.35	3.87	2.40	8.45	1.44	0.55	44.3	10.25	9.84	1.21
FK19		116	1.4	48.0	103	37.2	9.54	4.92	3.27	10.75	1.87	0.66	54.0	11.75	12.40	1.57
FK20		130	3.5	24.1	125	62.6	5.04	2.67	2.19	5.29	1.01	0.39	24.9	5.43	5.88	0.82
FK21		126	0.9	23.1	64	67.5	4.48	2.36	1.49	5.33	0.87	0.32	29.5	7.00	6.45	0.75
FK22		71	1.0	12.0	34	39.9	2.30	1.24	1.25	2.50	0.46	0.19	13.8	3.20	3.13	0.38
FK23		159	1.2	40.8	89	148.5	8.38	4.36	1.81	9.47	1.58	0.62	48.0	11.50	11.10	1.43

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
FT41		0.45	2.87
FT42		0.49	2.94
FT43		0.24	1.45
FT44		1.11	5.63
FT45		1.10	6.65
FT46		0.92	5.72
FT47		1.69	10.05
FT48		0.34	2.20
FT49		0.38	2.42
FT50		0.25	1.63
FT51		0.58	3.50
FT52		0.57	3.37
FT53		0.45	2.73
FT54		1.23	7.00
FT55		0.59	3.63
FT56		0.68	3.99
FT57		0.50	3.25
FK01		0.27	1.71
FK02		0.32	2.08
FK03		0.19	1.27
FK04		0.18	1.12
FK05		0.29	1.84
FK06		0.19	1.20
FK07		0.17	1.11
FK08		0.78	4.09
FK09		0.19	1.20
FK10		0.18	1.27
FK11		0.21	1.33
FK12		0.48	3.07
FK13		0.16	1.00
FK14		0.25	1.70
FK15		0.33	2.08
FK16		0.27	1.83
FK17		0.08	0.55
FK18		0.55	3.52
FK19		0.70	4.14
FK20		0.38	2.47
FK21		0.33	2.07
FK22		0.18	1.21
FK23		0.63	4.03

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
FK24		0.11	<0.001	0.02	6.75	2.3	860	1.75	0.20	1.22	0.05	68.8	12.2	56	3.06	14.8
FK25		0.14	0.001	0.02	8.19	1.8	1740	2.07	0.31	1.98	0.08	64.1	14.1	44	2.92	14.3
FK26		0.17	0.001	0.04	4.82	3.1	470	1.10	0.20	2.05	0.06	37.0	19.9	169	2.64	15.1
FK27		0.14	0.001	0.03	7.29	3.8	1020	1.61	0.19	1.54	0.04	48.1	18.1	77	3.65	25.7
FK28		0.17	0.001	0.01	4.62	1.9	760	0.97	0.18	0.64	0.03	33.0	10.5	83	2.84	13.0
FK29		0.13	0.001	0.08	8.77	2.5	690	2.63	0.29	1.15	0.10	113.5	30.3	90	8.14	58.5
FK30		0.11	<0.001	<0.01	5.35	0.6	870	0.77	0.12	0.37	0.02	233	10.0	37	2.27	10.3
FK31		0.11	0.001	0.03	6.23	0.6	700	1.27	0.36	0.25	0.02	332	13.6	45	4.03	18.3
FK32		0.13	<0.001	0.01	4.80	0.4	650	0.84	0.10	0.38	0.02	321	15.9	49	3.00	17.8
FK33		0.15	<0.001	0.02	5.97	0.8	910	1.36	0.12	1.02	0.03	>500	14.7	53	2.09	13.9
FK34		0.10	<0.001	0.01	6.54	0.7	800	2.06	5.91	0.88	0.04	459	13.2	45	3.55	12.5
FK35		0.13	0.004	0.01	5.83	0.7	720	1.35	0.27	0.41	0.02	420	11.4	43	3.68	14.5
FK36		0.12	0.001	0.08	9.01	4.0	800	3.52	0.26	0.75	0.07	160.5	36.3	62	5.77	37.2
FK37		0.15	<0.001	0.02	5.56	0.5	920	1.32	0.12	1.17	0.04	347	9.2	40	1.50	8.3
FK38		0.12	0.001	0.02	4.43	0.9	820	0.95	0.11	0.84	0.02	139.0	9.4	168	1.42	8.8
FK39		0.12	0.001	0.03	4.32	1.0	630	0.70	0.15	1.13	0.05	19.40	13.3	276	2.22	15.9
FK40		0.13	0.001	0.02	6.50	4.1	870	1.21	0.14	1.88	0.06	81.1	20.8	113	2.28	21.0
FK41		0.14	0.001	0.03	6.65	1.8	410	1.24	0.17	3.71	0.13	40.2	35.2	131	2.27	28.9
FK42		0.19	<0.001	<0.01	2.31	2.2	470	0.78	0.34	0.72	0.05	>500	29.3	48	0.66	7.7
FK43		0.15	<0.001	0.01	7.15	0.4	1540	2.33	0.22	1.15	0.04	92.6	9.0	44	2.29	9.6
GT01		0.13	<0.001	0.03	6.69	3.0	750	3.96	0.10	0.37	0.03	42.8	2.0	3	6.26	2.0
GT02		0.12	<0.001	0.01	7.64	2.7	200	4.67	0.14	0.09	<0.02	37.2	2.2	4	11.05	3.3
GT03		0.13	<0.001	0.04	9.37	6.4	200	9.03	0.10	0.21	0.02	60.9	1.9	5	16.90	6.0
GT04		0.12	<0.001	0.03	7.90	1.6	280	3.19	0.24	0.24	0.03	72.4	1.0	3	5.99	2.1
GT05		0.13	<0.001	0.02	8.09	2.7	290	6.04	0.25	0.14	<0.02	47.2	1.7	2	7.63	1.8
GT06		0.13	<0.001	0.01	6.54	2.2	500	2.67	0.31	0.60	0.02	37.7	1.8	8	3.63	1.6
GT07		0.13	<0.001	0.01	7.51	4.4	410	2.74	0.28	0.37	0.02	22.5	1.3	6	8.13	1.2
GT08		0.13	<0.001	0.03	7.64	2.0	900	3.79	0.19	0.98	0.05	84.1	6.1	5	5.61	2.5
GT09		0.12	<0.001	0.02	6.81	1.3	880	3.54	0.14	0.82	0.03	60.1	3.5	5	3.70	2.1
GT10		0.12	<0.001	0.03	8.32	3.5	1000	3.89	0.20	0.87	0.03	79.2	3.8	3	5.48	2.4
GT11		0.13	<0.001	0.03	7.42	2.3	390	3.52	0.26	0.28	0.04	53.5	1.6	3	5.60	2.1
GT12		0.12	<0.001	0.05	8.97	4.4	170	10.20	0.33	0.19	0.02	84.7	3.4	5	9.08	2.7
GT13		0.13	<0.001	0.04	9.46	2.9	220	14.05	0.17	0.20	0.02	82.3	2.0	4	11.60	3.2
GT14		0.14	<0.001	0.03	8.45	3.7	270	10.80	0.50	0.21	<0.02	52.4	1.5	3	10.10	2.0
GT15		0.11	<0.001	0.03	8.41	2.6	290	9.22	0.33	0.15	<0.02	34.8	1.1	3	8.80	1.4
GT16		0.10	<0.001	0.01	7.30	2.1	620	3.02	0.11	0.17	<0.02	42.0	0.9	2	9.77	1.2
GT17		0.12	<0.001	0.05	8.21	2.7	830	4.08	0.27	0.28	<0.02	134.5	4.1	4	6.58	3.2
GT18		0.09	<0.001	0.02	6.62	0.8	850	1.84	0.07	0.24	<0.02	26.4	0.7	2	2.75	0.9
GT19		0.13	<0.001	0.06	8.68	1.6	700	6.01	0.23	0.15	<0.02	96.1	5.0	11	6.19	5.2
GT20		0.13	<0.001	0.04	8.62	2.2	230	13.35	0.14	0.18	<0.02	55.6	2.2	5	11.90	3.4

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
FK24		2.95	15.65	0.14	2.1	0.038	3.22	30.8	14.9	0.50	541	0.40	1.33	18.3	19.8	290
FK25		4.82	20.4	0.16	2.0	0.078	3.54	21.7	11.2	0.69	1180	1.20	2.32	33.4	18.1	590
FK26		6.37	11.80	0.12	1.8	0.046	1.18	15.9	10.3	1.09	1170	0.49	1.29	24.4	48.2	420
FK27		4.07	16.50	0.12	2.2	0.055	2.32	20.3	15.6	0.66	841	0.61	1.52	17.0	36.3	390
FK28		2.90	9.95	0.10	1.6	0.026	1.98	12.0	9.7	0.20	548	0.45	0.82	13.8	24.6	170
FK29		5.91	23.6	0.19	1.8	0.081	2.33	51.7	36.0	0.89	1300	0.91	0.52	21.0	49.2	1140
FK30		2.95	12.20	0.30	2.1	0.028	3.81	115.0	10.5	0.25	801	0.34	0.54	23.6	10.6	360
FK31		4.34	16.50	0.37	4.3	0.051	2.71	160.0	16.7	0.27	789	0.68	0.41	50.4	19.0	430
FK32		3.98	12.40	0.37	3.2	0.038	2.64	152.5	10.1	0.27	720	0.45	0.38	35.0	20.0	430
FK33		4.75	16.30	0.67	13.4	0.055	3.19	280	10.1	0.45	1080	0.46	0.87	48.9	18.4	840
FK34		4.74	17.35	0.53	4.4	0.051	3.77	219	12.7	0.35	1070	0.57	1.01	72.5	14.7	680
FK35		3.80	15.00	0.45	3.1	0.036	3.63	201	14.3	0.28	715	0.51	0.53	57.4	16.4	490
FK36		8.32	24.6	0.19	2.5	0.113	2.15	89.4	24.8	0.58	1340	4.01	0.92	86.0	35.7	1730
FK37		3.32	13.20	0.41	4.0	0.036	3.40	164.5	6.9	0.39	824	0.42	1.12	40.0	15.1	730
FK38		4.92	9.85	0.19	2.9	0.029	2.29	71.2	6.5	0.31	661	0.28	0.96	65.1	21.1	250
FK39		5.64	10.10	0.08	1.7	0.027	1.32	6.5	9.4	0.50	524	0.26	0.97	8.7	40.6	210
FK40		6.31	14.70	0.14	2.4	0.058	2.20	35.4	11.1	0.86	1100	0.47	1.17	34.8	30.9	440
FK41		9.45	18.10	0.12	1.4	0.078	1.19	16.7	13.4	1.75	1660	0.58	1.47	35.5	52.3	630
FK42		18.95	22.8	2.77	19.4	0.115	1.23	1220	4.6	0.30	5960	0.97	0.53	>500	12.0	2040
FK43		2.81	14.70	0.18	1.8	0.036	4.66	41.4	8.9	0.35	855	0.64	1.55	37.7	11.8	450
GT01		1.54	19.45	0.15	15.0	0.051	5.02	21.0	24.0	0.08	254	0.32	1.24	15.2	1.4	270
GT02		0.84	28.1	0.15	8.5	0.036	5.35	15.8	13.7	0.03	134	0.41	1.07	19.3	2.8	280
GT03		1.23	37.5	0.23	8.3	0.056	5.24	17.3	31.1	0.05	328	0.79	1.78	33.2	2.7	740
GT04		0.63	24.0	0.31	7.4	0.065	4.78	42.6	17.8	0.04	165	0.33	2.05	7.8	1.2	200
GT05		1.41	26.3	0.31	8.9	0.055	5.44	24.1	27.0	0.05	262	0.35	2.08	11.6	1.1	420
GT06		2.11	17.20	0.30	44.9	0.039	5.03	19.0	12.7	0.10	246	0.99	1.59	8.3	2.0	190
GT07		0.71	26.1	0.28	17.0	0.041	5.30	11.5	18.8	0.07	165	0.26	2.38	13.7	1.3	120
GT08		2.62	22.7	0.34	8.3	0.095	3.59	36.4	34.5	0.26	613	0.89	1.45	15.1	2.0	580
GT09		1.72	18.25	0.26	7.1	0.070	3.73	28.2	24.3	0.17	383	0.47	1.47	10.5	1.5	400
GT10		1.94	24.3	0.32	11.1	0.079	4.62	38.7	37.8	0.19	511	0.65	1.90	13.2	1.3	340
GT11		0.85	22.3	0.31	5.3	0.051	4.98	29.2	18.5	0.06	221	0.30	1.79	7.6	1.3	210
GT12		1.56	33.4	0.35	17.6	0.083	5.05	33.0	29.5	0.07	257	0.35	1.61	17.5	3.3	440
GT13		1.81	36.5	0.31	17.3	0.058	5.06	29.9	44.3	0.06	248	0.64	1.89	29.0	2.2	610
GT14		1.57	27.8	0.29	13.3	0.052	5.56	27.6	26.6	0.05	262	0.28	2.34	16.5	1.2	290
GT15		1.38	26.2	0.27	15.8	0.049	5.84	16.7	32.8	0.04	175	0.34	2.25	13.5	0.9	190
GT16		0.52	23.4	0.28	19.7	0.038	5.47	17.0	18.3	0.03	97	0.20	1.36	12.8	0.8	120
GT17		1.43	23.3	0.35	5.8	0.063	5.33	58.1	36.4	0.12	906	0.30	0.82	10.0	1.7	460
GT18		0.39	15.00	0.25	7.6	0.027	5.96	12.2	7.2	0.02	96	0.19	1.29	5.5	0.7	140
GT19		1.63	25.3	0.33	4.5	0.074	3.81	54.7	35.5	0.09	322	0.57	0.24	13.1	5.8	680
GT20		3.59	35.0	0.26	25.5	0.069	5.19	20.7	20.5	0.04	323	0.56	1.93	31.0	2.0	460

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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
FK24		32.2	147.0	<0.002	0.01	0.28	9.6	1	1.1	199.5	1.20	<0.05	14.5	0.628	0.68	3.0
FK25		23.6	89.0	<0.002	0.01	0.63	14.4	2	2.6	324	2.34	0.05	13.4	1.240	0.41	2.6
FK26		12.5	47.8	<0.002	0.02	1.35	13.7	1	1.5	246	1.72	<0.05	8.3	1.670	0.22	1.6
FK27		18.3	80.5	<0.002	0.02	0.54	14.2	1	1.4	298	1.21	<0.05	6.1	0.735	0.38	1.6
FK28		17.8	71.1	0.002	0.01	0.49	6.3	<1	0.9	196.0	1.00	<0.05	8.7	0.777	0.34	1.6
FK29		23.3	189.5	<0.002	0.03	0.24	22.8	2	2.8	133.5	1.51	<0.05	16.6	0.663	0.85	3.6
FK30		41.2	156.5	<0.002	<0.01	<0.05	7.0	1	0.8	129.0	1.71	<0.05	54.7	0.974	0.66	6.0
FK31		31.9	148.5	<0.002	0.01	<0.05	10.9	2	1.6	110.0	3.54	<0.05	69.8	1.625	0.65	8.8
FK32		31.0	128.0	<0.002	0.07	<0.05	8.9	2	0.9	105.0	2.60	<0.05	75.6	1.400	0.55	7.9
FK33		43.1	120.5	0.002	0.01	<0.05	11.3	4	1.9	177.5	3.58	<0.05	158.5	2.11	0.52	14.6
FK34		48.6	159.0	0.002	<0.01	<0.05	9.6	3	1.5	168.5	5.28	<0.05	102.5	2.05	0.68	15.8
FK35		51.1	161.0	<0.002	<0.01	<0.05	7.7	3	1.4	125.5	4.01	<0.05	90.3	1.695	0.69	12.9
FK36		18.3	144.5	0.002	0.24	0.07	17.7	2	2.8	114.5	4.92	<0.05	18.7	0.626	0.58	11.3
FK37		39.4	114.5	<0.002	<0.01	<0.05	7.4	2	1.5	188.5	2.74	<0.05	80.6	1.160	0.50	8.0
FK38		23.8	69.7	<0.002	<0.01	0.41	6.1	1	0.9	189.5	3.89	<0.05	29.0	1.475	0.29	4.4
FK39		11.9	40.5	<0.002	<0.01	0.36	7.8	1	1.0	218	0.64	<0.05	4.4	0.651	0.18	1.2
FK40		18.5	73.0	<0.002	0.01	0.37	15.5	1	1.4	221	2.67	<0.05	15.1	1.935	0.28	2.6
FK41		10.0	48.4	<0.002	0.01	0.30	24.6	2	1.8	230	2.68	<0.05	4.3	2.71	0.21	1.2
FK42		43.7	36.0	0.005	<0.01	0.09	16.0	16	3.0	91.0	40.5	0.07	363	>10.0	0.15	88.3
FK43		50.0	138.0	<0.002	0.01	<0.05	6.6	1	1.1	248	2.58	<0.05	13.2	0.713	0.54	2.8
GT01		24.6	261	<0.002	0.01	0.16	3.9	2	4.1	97.2	1.39	<0.05	13.6	0.155	1.15	6.4
GT02		34.6	440	<0.002	<0.01	0.30	1.9	2	5.2	29.5	1.98	<0.05	22.3	0.094	2.13	5.5
GT03		32.9	540	0.002	0.02	0.47	1.9	3	9.7	31.0	3.26	<0.05	37.8	0.086	2.35	8.1
GT04		21.9	164.0	<0.002	0.01	0.26	3.2	2	2.8	46.4	0.72	<0.05	15.2	0.113	0.88	4.9
GT05		32.1	319	<0.002	0.01	0.38	2.2	2	4.5	47.4	1.15	<0.05	26.2	0.082	1.60	6.3
GT06		22.1	190.5	<0.002	<0.01	0.28	4.4	2	2.6	101.0	0.93	<0.05	31.2	0.250	0.89	11.4
GT07		42.2	370	<0.002	<0.01	0.17	2.2	1	3.1	76.7	1.21	<0.05	21.9	0.132	1.81	5.9
GT08		22.8	161.5	<0.002	0.02	0.36	10.1	3	4.1	161.5	1.36	<0.05	12.4	0.359	0.83	6.5
GT09		20.0	147.0	<0.002	0.01	0.22	7.6	2	3.0	150.5	0.94	<0.05	9.8	0.245	0.70	5.2
GT10		25.0	180.0	<0.002	0.01	0.38	7.4	2	3.4	150.5	1.15	<0.05	11.5	0.255	0.84	6.7
GT11		21.6	197.5	<0.002	0.01	0.24	3.0	2	2.6	59.7	0.69	<0.05	18.2	0.136	0.97	4.5
GT12		35.2	334	<0.002	0.02	0.33	3.4	4	6.2	26.9	1.56	<0.05	26.0	0.229	1.86	10.9
GT13		40.1	448	<0.002	0.02	0.42	2.7	3	9.9	39.5	3.03	<0.05	33.9	0.097	2.35	10.5
GT14		39.5	381	<0.002	0.01	0.68	2.1	2	5.8	48.4	1.82	<0.05	25.4	0.082	2.07	8.9
GT15		37.6	394	<0.002	0.01	0.51	2.0	2	5.0	47.2	1.41	<0.05	33.4	0.075	1.96	8.3
GT16		32.1	305	<0.002	<0.01	0.26	2.9	2	3.2	74.2	1.21	<0.05	14.7	0.122	1.83	6.6
GT17		29.0	226	<0.002	0.01	0.41	5.7	3	3.2	103.0	0.90	<0.05	13.7	0.189	1.15	6.5
GT18		25.9	171.0	<0.002	<0.01	0.23	2.1	1	1.2	87.5	0.48	<0.05	5.2	0.113	1.04	3.1
GT19		28.4	177.0	<0.002	0.01	0.38	7.4	2	3.6	76.5	1.19	<0.05	19.8	0.279	0.98	7.0
GT20		40.4	440	<0.002	0.01	0.48	2.0	3	10.2	36.8	3.42	<0.05	58.4	0.128	2.28	12.6

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
FK24		69	0.7	15.5	34	62.9	3.54	1.62	1.26	4.96	0.64	0.23	29.3	7.32	6.21	0.68
FK25		95	1.9	35.0	67	56.2	6.98	3.91	2.33	7.44	1.40	0.55	30.7	6.90	7.67	1.15
FK26		165	1.5	18.2	50	53.6	3.59	1.96	1.00	4.21	0.71	0.32	18.8	4.41	4.71	0.63
FK27		102	1.2	18.6	51	66.4	3.74	2.02	1.44	4.34	0.73	0.30	22.4	5.21	5.13	0.67
FK28		77	1.3	7.5	24	49.6	1.62	0.77	0.55	2.03	0.30	0.13	12.2	3.04	2.68	0.30
FK29		135	1.7	33.5	105	54.9	6.50	3.35	2.09	7.89	1.24	0.44	50.5	12.60	10.50	1.11
FK30		53	0.5	17.6	29	67.9	5.27	1.59	1.90	11.15	0.72	0.20	89.1	23.9	16.85	1.32
FK31		87	1.2	31.4	43	143.5	9.43	2.67	2.50	16.70	1.33	0.30	130.0	34.1	25.0	2.10
FK32		80	0.7	20.2	37	100.5	6.22	1.74	1.85	14.15	0.82	0.22	120.5	31.8	22.6	1.61
FK33		87	1.3	52.1	54	447	15.35	4.39	3.57	31.6	2.09	0.52	246	66.9	49.3	3.68
FK34		81	1.5	45.9	48	147.0	13.65	3.83	2.92	23.8	1.92	0.39	178.5	46.8	35.5	3.04
FK35		77	1.1	32.9	35	98.1	10.75	2.50	2.66	20.3	1.37	0.21	163.0	42.5	31.7	2.52
FK36		90	2.4	44.8	103	82.3	8.32	4.85	2.42	9.07	1.70	0.73	61.8	16.30	11.60	1.34
FK37		75	0.8	37.4	33	135.5	10.25	3.24	2.75	18.30	1.50	0.33	138.0	35.6	27.3	2.31
FK38		112	1.2	18.0	29	102.5	4.82	1.59	1.22	8.20	0.73	0.20	56.2	14.50	11.35	1.07
FK39		155	0.7	9.4	34	56.8	1.87	1.11	0.56	1.82	0.37	0.17	8.1	1.86	1.95	0.29
FK40		151	1.7	21.2	58	70.4	4.72	2.18	1.48	6.25	0.85	0.30	34.9	8.60	7.66	0.88
FK41		246	1.5	25.6	87	35.1	4.95	2.71	1.72	5.30	1.00	0.38	22.6	5.06	5.81	0.79
FK42		172	11.3	234	129	>500	83.3	17.40	15.55	154.0	10.50	1.12	>1000	343	232	19.45
FK43		52	1.1	15.8	29	67.1	3.75	1.66	2.13	5.25	0.64	0.25	36.0	9.24	7.04	0.72
GT01		13	1.5	70.2	36	352	10.15	7.42	0.59	7.59	2.27	1.43	25.6	6.03	6.95	1.38
GT02		9	1.8	57.7	26	163.0	8.34	6.55	0.18	6.12	1.91	1.32	19.9	4.87	5.74	1.17
GT03		9	3.8	89.1	51	167.0	14.15	10.45	0.14	9.92	3.20	1.83	24.5	5.58	7.81	1.94
GT04		6	1.0	47.5	51	198.5	8.97	5.47	0.32	8.45	1.86	0.87	41.3	10.90	9.07	1.43
GT05		8	1.3	59.6	51	188.5	9.69	6.87	0.25	7.65	2.12	1.20	27.7	7.01	7.37	1.40
GT06		20	15.6	54.8	34	>500	8.25	7.13	0.47	5.41	1.98	1.79	19.1	4.99	4.77	1.08
GT07		10	0.8	48.6	36	308	7.17	6.26	0.26	4.22	1.74	1.36	12.5	3.17	3.45	0.89
GT08		28	1.5	82.8	66	220	15.55	9.64	1.80	14.05	3.24	1.47	53.6	12.45	14.20	2.39
GT09		19	1.0	55.4	45	191.5	10.30	6.20	1.26	9.49	2.12	0.91	37.5	8.90	9.56	1.60
GT10		17	1.4	75.0	59	294	12.95	8.24	1.48	11.60	2.78	1.29	45.2	11.10	11.25	1.99
GT11		9	1.0	43.3	42	141.5	7.79	4.72	0.36	6.85	1.62	0.72	29.8	7.75	7.08	1.19
GT12		20	1.6	125.5	58	375	22.1	14.35	0.37	19.10	4.67	2.28	54.1	12.30	17.20	3.44
GT13		9	1.8	112.0	56	320	16.75	12.40	0.24	12.85	3.77	2.43	39.9	9.72	11.50	2.38
GT14		7	1.5	88.4	66	260	13.40	10.20	0.26	10.30	3.07	2.00	34.3	8.49	9.61	1.90
GT15		7	1.2	61.5	57	323	9.00	7.37	0.17	6.18	2.11	1.60	19.2	4.84	5.32	1.20
GT16		9	1.3	56.5	19	422	8.78	6.92	0.40	6.06	2.05	1.55	19.6	4.91	5.49	1.22
GT17		13	1.7	88.1	53	156.0	15.90	9.79	1.49	14.75	3.29	1.37	65.0	16.60	14.95	2.52
GT18		6	0.5	23.4	14	193.5	4.03	2.87	0.34	3.25	0.87	0.51	12.6	3.25	3.16	0.59
GT19		20	1.8	74.4	51	117.0	15.20	8.87	1.65	14.55	3.03	1.20	65.8	16.55	15.90	2.41
GT20		17	2.5	104.0	63	470	15.25	12.40	0.17	9.93	3.58	2.77	26.1	6.44	7.93	2.03

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
FK24		0.23	1.48
FK25		0.59	3.63
FK26		0.30	2.00
FK27		0.30	1.87
FK28		0.11	0.77
FK29		0.49	2.93
FK30		0.20	1.26
FK31		0.33	1.86
FK32		0.22	1.38
FK33		0.56	3.32
FK34		0.45	2.57
FK35		0.26	1.35
FK36		0.73	4.65
FK37		0.40	2.19
FK38		0.21	1.32
FK39		0.16	1.11
FK40		0.31	1.93
FK41		0.39	2.58
FK42		1.63	7.68
FK43		0.23	1.57
GT01		1.25	8.57
GT02		1.15	8.27
GT03		1.76	12.40
GT04		0.88	5.45
GT05		1.17	7.75
GT06		1.40	10.10
GT07		1.21	8.68
GT08		1.57	9.73
GT09		0.99	5.99
GT10		1.36	8.24
GT11		0.78	4.72
GT12		2.35	14.70
GT13		2.24	15.20
GT14		1.83	12.40
GT15		1.38	9.63
GT16		1.32	9.33
GT17		1.52	9.18
GT18		0.48	3.11
GT19		1.38	8.33
GT20		2.34	16.45

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
GT21		0.12	<0.001	0.07	8.59	2.1	270	13.50	0.53	0.17	<0.02	126.0	2.6	8	10.55	3.7
GT22		0.17	<0.001	0.01	5.68	2.1	790	1.21	0.14	1.85	0.06	73.4	2.2	15	2.86	3.6
GT23		0.13	<0.001	0.03	7.09	1.6	360	5.74	0.24	0.08	0.02	37.0	0.7	4	7.66	2.3
GT24		0.16	<0.001	0.04	7.95	5.0	280	13.40	0.89	0.23	<0.02	45.7	1.4	2	8.37	2.3
GT25		0.15	<0.001	0.02	7.12	2.3	430	2.49	0.22	0.20	<0.02	61.3	1.6	5	8.21	1.9
GT26		0.15	<0.001	0.01	5.64	1.3	370	1.32	0.14	0.06	<0.02	8.30	0.4	2	4.26	0.8
GT27		0.13	<0.001	<0.01	6.13	2.3	750	2.73	0.22	0.64	0.04	40.4	0.8	2	1.87	0.8
GT28		0.14	<0.001	0.01	6.32	1.0	1100	1.69	0.07	0.52	0.03	23.8	1.3	2	1.75	0.8
GT29		0.15	<0.001	0.01	5.80	0.8	700	2.16	0.09	0.72	0.04	31.0	1.1	2	2.22	0.9
GT30		0.11	<0.001	0.04	8.34	1.6	770	3.44	0.15	1.06	0.08	74.9	5.0	4	5.41	3.6
GT31		0.12	<0.001	0.05	8.62	1.4	740	4.64	0.19	0.69	0.04	102.5	4.8	5	7.47	4.4
GT32		0.13	<0.001	0.02	7.09	3.6	430	1.63	0.20	0.30	0.02	78.9	1.4	11	3.47	1.7
GT33		0.13	<0.001	0.03	6.22	2.4	430	1.38	0.16	0.12	0.02	93.7	4.9	6	3.10	3.5
GT34		0.13	<0.001	0.02	7.69	2.6	400	3.01	0.24	0.43	0.02	37.3	0.9	4	3.74	1.8
GT35		0.12	<0.001	0.01	6.56	1.6	400	1.94	0.11	0.48	<0.02	17.95	0.6	7	2.24	1.0
GT36		0.14	<0.001	0.01	6.67	2.1	500	1.94	0.08	0.37	0.02	23.1	0.9	6	2.61	0.8
GT37		0.12	<0.001	0.04	9.13	8.9	360	6.81	0.49	0.20	0.04	148.5	4.0	6	9.25	2.5
GT38		0.11	<0.001	0.08	8.42	23.5	350	3.62	0.61	0.85	0.19	134.0	5.6	12	10.05	7.1
GT39		0.12	<0.001	0.08	6.78	5.3	430	5.82	0.49	0.20	0.04	139.5	2.7	8	5.57	12.6
GT40		0.13	<0.001	0.02	7.35	3.4	410	4.05	0.19	0.18	<0.02	41.1	1.8	3	5.86	1.7
GT41		0.12	<0.001	0.05	8.87	2.6	700	3.95	0.16	0.28	0.04	86.2	6.0	15	5.62	5.0
GT42		0.14	<0.001	0.01	6.28	0.8	880	1.26	0.06	0.39	0.02	14.30	1.2	2	1.63	1.4
GT43		0.15	<0.001	0.01	6.56	2.0	720	2.21	0.13	0.31	0.02	22.7	1.5	3	2.70	2.3
GT44		0.13	<0.001	0.02	7.34	2.1	110	3.50	0.37	0.13	0.02	10.05	0.6	2	4.44	1.4
GT45		0.10	0.001	0.01	6.63	1.5	350	2.26	0.27	0.16	<0.02	11.10	0.9	3	5.47	1.6
GT46		0.13	0.001	0.07	8.10	6.7	650	5.73	0.59	0.57	0.07	130.0	12.5	15	9.22	9.3
GT47		0.11	0.001	0.06	8.24	5.3	400	4.95	0.20	0.64	0.07	193.5	6.5	19	9.09	9.5
GT48		0.13	<0.001	0.02	7.30	3.7	360	6.18	0.30	0.20	0.02	31.3	0.9	3	5.63	1.7
GT49		0.12	<0.001	0.01	3.57	1.4	570	0.54	0.04	0.10	<0.02	14.50	1.1	4	1.38	1.3
GT50		0.16	<0.001	0.01	4.67	1.3	940	0.83	0.04	0.21	<0.02	15.60	1.2	3	1.68	1.4
GT51		0.13	<0.001	0.01	3.90	4.4	760	0.49	0.08	0.07	<0.02	23.9	1.9	6	2.35	1.7
GT52		0.13	<0.001	0.05	8.63	2.1	910	2.84	0.16	0.35	0.02	67.7	4.4	9	6.16	6.2
GT53		0.14	<0.001	0.01	5.51	1.9	850	1.32	0.08	0.31	<0.02	38.0	2.1	5	2.43	2.3
GT54		0.13	<0.001	0.04	7.82	6.7	840	3.55	0.18	0.62	0.02	95.9	6.7	8	4.53	4.1
GT55		0.12	0.001	0.13	9.94	22.7	340	8.90	0.77	0.25	0.05	125.5	15.6	38	9.17	16.6
GT56		0.17	<0.001	0.04	5.53	16.2	380	1.73	0.36	0.17	0.02	48.8	5.5	26	4.47	9.5
GT57		0.14	<0.001	0.01	4.62	2.8	550	0.30	0.03	0.36	<0.02	14.50	1.2	4	0.83	2.0
GT58		0.13	<0.001	0.03	6.82	3.8	550	2.48	0.12	0.19	<0.02	74.8	6.1	10	4.49	3.9
GT59		0.12	<0.001	0.02	6.11	12.1	930	1.29	0.11	1.84	0.06	80.1	5.6	33	2.18	8.9
GT60		0.10	<0.001	0.02	5.44	3.0	590	1.26	0.14	0.82	0.05	55.0	5.1	59	3.40	9.7

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
GT21		1.41	31.4	0.29	5.4	0.088	2.69	54.8	81.7	0.08	254	0.47	0.65	21.0	2.7	580
GT22		1.32	19.35	0.27	5.2	0.090	3.93	30.4	5.4	0.10	212	0.32	1.16	7.1	2.0	320
GT23		0.41	23.7	0.23	9.2	0.035	5.47	13.9	14.2	0.02	53	0.18	0.88	14.1	1.4	190
GT24		1.18	25.5	0.25	16.0	0.044	5.19	20.9	23.4	0.06	364	0.22	2.26	14.1	1.2	380
GT25		0.96	19.00	0.23	22.2	0.049	5.39	26.9	14.9	0.06	233	0.20	1.30	8.4	1.5	180
GT26		0.19	13.65	0.20	15.2	0.008	4.62	3.6	5.5	0.01	27	0.12	0.75	3.7	0.6	60
GT27		1.02	15.65	0.26	54.3	0.058	4.64	15.9	11.6	0.05	164	0.36	1.62	12.7	0.5	120
GT28		0.76	14.00	0.21	6.7	0.047	5.04	11.3	11.5	0.07	153	0.41	1.36	8.5	0.5	130
GT29		0.78	14.15	0.20	17.3	0.043	4.24	14.7	12.5	0.07	139	0.34	1.37	6.8	0.6	140
GT30		2.24	26.2	0.29	2.3	0.100	3.57	39.6	48.6	0.34	336	0.54	1.60	12.0	2.2	440
GT31		2.19	26.4	0.23	2.7	0.088	3.57	53.1	69.5	0.30	415	0.51	1.17	12.8	2.1	540
GT32		0.86	17.20	0.24	12.9	0.040	5.20	36.5	14.1	0.06	115	0.23	1.32	4.9	1.6	180
GT33		1.36	16.55	0.26	3.0	0.041	4.39	42.7	17.9	0.04	575	0.42	0.42	5.0	2.9	450
GT34		0.60	21.2	0.24	5.3	0.045	5.31	19.4	18.9	0.06	182	0.25	2.13	11.2	0.9	250
GT35		0.39	15.70	0.17	8.9	0.025	4.91	8.5	8.1	0.06	57	0.15	1.90	4.1	0.9	60
GT36		0.53	16.70	0.19	19.9	0.027	4.93	11.0	9.9	0.04	138	0.21	1.64	4.8	0.9	70
GT37		2.86	33.3	0.33	9.4	0.107	4.11	67.3	61.1	0.12	610	0.56	1.17	17.8	2.3	510
GT38		2.70	29.7	0.30	4.0	0.108	3.24	62.9	69.6	0.20	1620	1.14	1.26	14.1	4.8	1050
GT39		1.31	19.75	0.20	3.5	0.052	3.54	45.3	19.7	0.08	186	1.22	0.82	12.3	9.2	760
GT40		1.00	20.5	0.15	11.4	0.043	4.80	12.4	28.0	0.07	326	0.20	1.84	10.6	1.1	120
GT41		2.27	27.6	0.24	1.9	0.095	4.16	40.1	36.9	0.13	654	0.88	0.44	15.7	4.1	900
GT42		0.55	13.25	0.14	2.4	0.029	5.02	6.5	5.8	0.06	136	0.16	1.24	4.7	0.8	140
GT43		0.56	16.10	0.16	15.5	0.033	5.35	11.0	11.2	0.05	175	0.39	1.28	6.2	1.4	190
GT44		0.71	27.9	0.16	45.4	0.062	4.68	2.7	7.8	0.01	125	0.23	2.45	12.2	0.7	80
GT45		0.59	25.1	0.14	19.5	0.031	4.73	4.2	14.2	0.05	82	0.32	2.09	22.8	1.5	80
GT46		2.47	26.9	0.26	2.1	0.089	3.43	50.9	53.1	0.27	2680	0.85	1.05	14.5	9.1	660
GT47		2.87	28.6	0.34	5.0	0.107	3.40	104.0	43.7	0.13	275	0.31	1.40	8.2	11.1	490
GT48		0.59	19.15	0.19	18.4	0.027	5.45	15.3	27.2	0.05	140	0.25	1.68	8.7	1.2	120
GT49		0.47	6.25	0.16	7.1	0.016	3.60	6.7	4.6	0.02	124	0.33	0.28	3.7	0.7	110
GT50		0.55	7.98	0.16	5.1	0.019	4.52	8.4	6.7	0.04	120	0.40	0.44	4.2	0.8	180
GT51		0.80	8.10	0.16	7.4	0.026	3.14	11.6	7.0	0.03	156	0.62	0.17	7.2	1.7	210
GT52		1.51	21.4	0.23	1.9	0.058	3.45	33.3	26.9	0.14	153	1.00	0.74	13.7	4.7	390
GT53		0.86	11.00	0.17	8.2	0.032	3.83	16.2	12.2	0.06	143	0.57	0.62	7.7	1.8	270
GT54		3.23	22.1	0.27	3.7	0.087	3.54	42.4	34.8	0.17	622	0.77	1.15	14.7	3.1	620
GT55		3.32	38.9	0.29	5.1	0.144	1.95	45.5	58.5	0.15	440	1.40	0.58	31.0	23.6	1000
GT56		1.67	15.60	0.18	6.7	0.053	2.33	24.3	21.9	0.09	148	1.35	0.35	11.8	14.0	320
GT57		0.41	7.41	0.11	1.2	0.013	3.43	7.5	4.0	0.03	148	0.29	1.01	2.2	1.2	80
GT58		1.96	17.40	0.19	4.5	0.048	4.04	31.2	33.5	0.06	535	0.76	0.42	11.5	4.0	660
GT59		2.35	16.40	0.25	2.5	0.072	1.83	37.7	11.7	0.21	291	0.66	1.23	8.2	6.4	330
GT60		1.71	12.60	0.22	2.3	0.045	2.17	29.0	36.7	0.36	233	0.44	1.17	6.3	16.4	230

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
GT21		29.1	204	<0.002	0.01	0.46	5.6	4	9.4	40.6	2.40	<0.05	40.9	0.171	1.15	13.5
GT22		26.4	157.0	<0.002	<0.01	0.42	15.3	2	2.9	283	0.59	<0.05	7.7	0.282	0.74	4.6
GT23		32.3	301	<0.002	<0.01	0.25	1.5	1	3.8	43.6	1.46	<0.05	21.0	0.112	1.68	5.5
GT24		30.0	346	<0.002	0.01	0.31	1.9	2	5.4	54.1	1.55	<0.05	40.2	0.074	1.74	9.7
GT25		25.5	175.5	<0.002	0.01	0.30	3.7	2	2.6	66.8	0.83	<0.05	20.7	0.199	0.98	6.8
GT26		34.9	221	<0.002	<0.01	0.15	1.0	1	0.8	46.9	0.39	<0.05	11.8	0.090	1.59	4.3
GT27		22.1	181.0	<0.002	<0.01	0.20	6.6	2	3.8	146.5	1.71	<0.05	272	0.230	0.72	26.8
GT28		22.1	125.5	<0.002	<0.01	0.18	4.3	1	2.1	148.5	0.76	<0.05	8.5	0.185	0.58	3.8
GT29		22.3	154.5	<0.002	<0.01	0.16	5.7	1	2.2	139.5	0.82	<0.05	20.7	0.195	0.68	6.3
GT30		21.1	160.5	<0.002	0.01	0.28	10.9	3	3.5	171.0	0.90	<0.05	8.0	0.340	0.75	5.3
GT31		19.8	185.5	<0.002	0.01	0.26	9.5	3	4.0	124.5	1.09	<0.05	13.4	0.327	0.87	5.8
GT32		26.1	162.0	<0.002	<0.01	0.19	3.6	2	1.3	72.7	0.42	<0.05	8.6	0.104	0.79	6.1
GT33		22.6	122.5	<0.002	0.01	0.19	3.4	2	1.1	50.8	0.36	<0.05	8.8	0.113	0.66	3.2
GT34		27.7	237	<0.002	<0.01	0.20	2.1	1	2.1	76.9	1.17	<0.05	10.6	0.102	1.11	4.7
GT35		24.7	160.0	<0.002	<0.01	0.17	2.3	1	1.2	92.8	0.44	<0.05	19.9	0.066	0.78	4.3
GT36		26.8	145.0	<0.002	<0.01	0.17	2.4	1	1.2	76.6	0.45	<0.05	24.9	0.111	0.90	6.1
GT37		32.4	236	<0.002	0.01	0.24	5.7	3	4.5	59.4	1.43	<0.05	28.1	0.187	1.28	10.1
GT38		24.8	171.0	<0.002	0.03	0.29	6.1	3	4.2	94.4	1.24	<0.05	34.3	0.198	0.98	9.4
GT39		26.8	188.0	0.002	0.02	0.20	3.4	3	2.8	56.1	1.20	<0.05	19.9	0.143	0.83	7.6
GT40		32.4	247	<0.002	<0.01	0.27	2.3	2	3.9	69.8	1.25	<0.05	64.5	0.087	1.31	8.3
GT41		26.3	172.5	<0.002	0.02	0.15	6.7	3	2.8	83.7	1.03	<0.05	11.5	0.273	0.78	4.6
GT42		24.2	121.5	<0.002	<0.01	0.10	2.4	1	0.7	104.5	0.33	<0.05	3.3	0.138	0.57	1.7
GT43		27.7	211	<0.002	<0.01	0.09	2.7	2	1.1	90.0	0.48	<0.05	20.1	0.091	0.80	5.7
GT44		36.5	264	<0.002	<0.01	0.11	1.6	3	2.3	22.2	0.94	<0.05	54.7	0.216	1.41	14.7
GT45		40.5	334	<0.002	<0.01	0.10	1.5	2	2.2	43.6	1.20	<0.05	51.0	0.065	1.45	8.9
GT46		21.6	190.5	<0.002	0.02	0.18	8.6	4	3.4	90.6	0.95	<0.05	16.2	0.237	0.89	5.6
GT47		16.4	142.0	<0.002	0.01	0.28	11.6	4	3.0	83.5	0.56	<0.05	17.3	0.251	0.62	5.3
GT48		33.7	329	<0.002	<0.01	0.18	2.1	2	2.8	61.7	0.93	<0.05	35.8	0.076	1.35	12.9
GT49		14.7	116.5	<0.002	<0.01	0.19	1.9	1	0.9	59.0	0.37	<0.05	13.9	0.165	0.41	3.6
GT50		18.4	134.0	<0.002	<0.01	0.21	2.1	1	1.0	92.0	0.42	<0.05	3.5	0.143	0.44	2.4
GT51		14.8	85.6	<0.002	<0.01	0.17	2.8	1	1.3	63.3	0.55	<0.05	5.9	0.257	0.32	3.4
GT52		21.3	149.0	<0.002	0.03	0.40	8.0	2	3.0	108.5	1.12	<0.05	11.8	0.362	0.62	4.8
GT53		17.7	126.5	<0.002	<0.01	0.25	4.6	1	1.6	97.8	0.65	<0.05	7.4	0.205	0.47	3.8
GT54		20.3	159.0	<0.002	0.01	0.29	8.7	4	3.0	110.5	1.07	<0.05	11.0	0.321	0.68	5.1
GT55		33.1	173.5	0.002	0.03	0.59	11.5	6	6.0	43.1	2.06	<0.05	27.8	0.310	1.07	13.6
GT56		23.1	149.5	<0.002	0.01	0.59	6.5	2	2.0	53.4	0.92	<0.05	11.6	0.281	0.65	5.2
GT57		12.7	66.2	<0.002	<0.01	0.27	1.8	1	0.4	107.0	0.16	<0.05	1.8	0.169	0.27	0.9
GT58		28.2	179.0	<0.002	0.02	0.26	4.0	2	2.4	69.1	0.92	<0.05	14.6	0.232	0.80	7.4
GT59		18.0	55.6	<0.002	<0.01	0.43	17.0	2	2.0	267	0.55	<0.05	7.5	0.402	0.21	4.1
GT60		17.1	82.7	<0.002	0.01	1.48	8.3	2	1.5	151.0	0.48	<0.05	7.3	0.244	0.37	3.7

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
GT21		13	2.7	109.5	85	118.0	19.00	12.05	0.73	16.00	4.01	1.77	59.5	15.35	15.00	2.86
GT22		66	0.9	46.9	13	114.0	9.11	5.40	1.71	8.97	1.85	0.80	41.5	10.05	9.90	1.46
GT23		7	0.9	47.4	25	189.5	7.72	5.68	0.18	5.70	1.73	1.06	17.3	4.29	5.09	1.08
GT24		6	1.8	81.3	42	335	11.95	9.66	0.21	8.45	2.78	2.05	25.7	6.37	7.45	1.62
GT25		11	1.1	60.2	46	>500	9.92	7.99	0.41	7.26	2.30	1.72	28.0	7.17	6.86	1.36
GT26		5	0.4	23.7	6	328	3.25	3.24	0.09	1.66	0.84	0.92	3.9	0.99	1.18	0.38
GT27		15	1.6	76.4	16	>500	13.40	8.89	1.28	10.45	2.81	1.77	25.8	5.81	9.03	1.99
GT28		12	0.7	29.3	17	192.0	5.29	3.42	0.61	4.44	1.13	0.55	14.9	3.51	4.16	0.79
GT29		17	0.8	38.2	17	493	6.89	4.51	0.82	5.95	1.47	0.78	20.1	4.67	5.44	1.03
GT30		28	1.4	76.0	81	66.1	13.65	8.00	1.78	12.95	2.78	1.05	52.0	12.25	12.75	2.16
GT31		20	1.7	80.4	88	70.1	14.30	8.57	1.80	13.50	2.94	1.19	58.6	14.90	13.65	2.25
GT32		14	0.5	57.5	29	356	10.10	6.81	0.54	9.62	2.22	1.17	40.3	9.80	9.35	1.56
GT33		10	0.6	38.1	38	84.0	7.24	4.32	0.59	7.79	1.49	0.65	44.3	11.35	9.09	1.21
GT34		6	1.1	32.3	35	123.5	4.96	3.42	0.19	4.26	1.10	0.58	18.9	4.95	4.13	0.74
GT35		9	0.5	20.8	14	227	3.44	2.70	0.19	2.44	0.80	0.57	8.8	2.27	2.18	0.47
GT36		8	33.4	35.6	17	475	5.57	4.75	0.25	3.54	1.36	1.11	11.4	2.95	3.01	0.72
GT37		15	1.8	105.0	116	219	19.30	12.00	0.73	17.25	4.00	1.81	69.3	18.30	16.80	2.96
GT38		14	1.7	80.9	130	99.5	15.35	8.88	0.68	15.20	3.16	1.22	66.1	16.90	15.35	2.47
GT39		13	1.1	71.1	45	87.9	12.60	8.01	0.69	12.00	2.65	1.12	52.7	13.55	11.70	2.00
GT40		7	1.0	44.9	37	268	6.77	5.80	0.17	3.97	1.64	1.26	12.2	3.28	3.14	0.86
GT41		20	1.3	56.1	75	55.3	11.15	6.44	1.02	10.85	2.27	0.83	46.2	11.65	10.15	1.81
GT42		12	0.3	13.5	13	71.9	2.56	1.59	0.29	2.18	0.55	0.25	7.4	1.83	1.95	0.39
GT43		7	0.4	36.7	25	380	6.29	4.59	0.34	4.48	1.44	0.80	12.4	3.09	3.43	0.87
GT44		6	34.2	83.8	32	>500	12.70	15.10	0.09	4.71	3.61	3.50	5.2	1.14	2.31	1.26
GT45		6	0.7	47.7	34	373	7.27	7.06	0.14	3.26	1.88	1.53	5.5	1.36	1.92	0.82
GT46		25	2.0	88.0	116	61.4	15.60	9.72	1.40	14.50	3.30	1.33	61.2	15.45	13.45	2.46
GT47		39	1.6	79.8	95	154.5	15.35	9.13	1.09	16.00	3.13	1.36	92.9	25.1	16.65	2.51
GT48		5	1.2	55.8	35	430	8.05	7.11	0.21	5.23	1.95	1.68	16.2	4.21	4.32	1.05
GT49		8	0.4	14.5	7	209	2.46	1.85	0.28	1.91	0.55	0.40	6.4	1.66	1.64	0.36
GT50		10	0.5	12.9	10	177.5	2.29	1.51	0.33	1.97	0.49	0.31	7.8	2.03	1.86	0.34
GT51		14	0.9	16.9	13	224	3.01	2.17	0.39	2.60	0.67	0.46	11.0	2.90	2.52	0.46
GT52		34	1.7	42.3	44	65.9	8.17	4.83	1.30	7.78	1.69	0.70	38.8	9.92	8.33	1.29
GT53		16	0.6	26.6	22	282	4.73	3.17	0.64	4.09	1.01	0.58	17.0	4.42	3.98	0.72
GT54		29	1.0	77.5	71	118.5	14.25	8.58	1.77	13.50	2.97	1.19	54.9	13.50	12.55	2.27
GT55		52	1.9	140.5	145	87.1	24.4	15.90	1.34	19.90	5.25	2.25	62.5	15.15	16.30	3.63
GT56		36	1.3	35.6	38	123.5	5.87	4.05	0.65	5.11	1.27	0.75	23.1	6.41	5.00	0.89
GT57		14	0.2	6.9	6	38.6	1.29	0.80	0.21	1.32	0.27	0.13	6.7	1.80	1.41	0.21
GT58		21	0.7	32.9	41	117.5	6.36	3.88	0.58	5.92	1.30	0.62	28.1	8.10	6.17	0.99
GT59		90	0.8	38.4	25	68.3	7.74	4.15	1.99	8.33	1.50	0.55	43.7	11.00	8.93	1.30
GT60		46	0.7	24.9	31	73.2	4.95	2.84	0.96	5.26	0.99	0.40	26.9	7.47	5.62	0.84

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
GT21		2.01	12.20
GT22		0.84	5.17
GT23		1.04	6.76
GT24		1.80	12.30
GT25		1.49	10.35
GT26		0.66	5.11
GT27		1.54	10.35
GT28		0.56	3.49
GT29		0.75	4.77
GT30		1.24	7.09
GT31		1.36	8.06
GT32		1.13	7.17
GT33		0.69	4.19
GT34		0.57	3.63
GT35		0.49	3.38
GT36		0.92	6.44
GT37		1.97	11.95
GT38		1.39	8.22
GT39		1.22	7.51
GT40		1.04	7.30
GT41		0.93	5.50
GT42		0.25	1.55
GT43		0.73	4.77
GT44		2.99	21.0
GT45		1.31	9.26
GT46		1.44	8.62
GT47		1.37	8.55
GT48		1.30	9.48
GT49		0.32	2.31
GT50		0.28	1.74
GT51		0.38	2.66
GT52		0.75	4.54
GT53		0.53	3.46
GT54		1.27	7.63
GT55		2.45	14.70
GT56		0.68	4.65
GT57		0.13	0.81
GT58		0.61	3.92
GT59		0.58	3.45
GT60		0.43	2.56

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
GT61		0.11	0.001	0.09	8.37	4.9	610	11.25	0.22	0.69	0.07	187.5	9.4	12	6.77	7.6
GT62		0.12	<0.001	0.09	9.08	3.3	660	6.53	0.22	0.25	0.06	183.5	3.6	8	7.53	5.0
GT63		0.12	<0.001	0.08	8.27	2.8	680	5.32	0.20	0.43	0.13	179.0	5.9	13	7.14	8.5
GT64		0.14	0.001	0.05	7.72	14.0	820	3.10	0.22	0.32	0.02	140.0	5.1	15	5.60	6.5
GT65		0.14	<0.001	0.02	5.69	2.1	600	1.85	0.14	0.81	0.05	32.1	1.1	3	2.26	1.1
GT66		0.14	<0.001	0.02	5.98	1.9	790	1.77	0.12	0.45	0.02	23.2	0.8	4	1.93	1.2
GT67		0.11	<0.001	0.15	8.11	2.4	630	4.46	0.46	0.74	0.07	123.0	11.7	7	7.01	7.5
GT68		0.17	<0.001	0.02	4.34	1.4	680	1.17	0.17	0.37	0.02	20.6	2.1	16	1.91	1.9
GT69		0.14	<0.001	0.02	5.36	1.7	580	1.77	0.25	0.37	0.03	28.0	1.0	7	2.16	1.6
GT70		0.13	<0.001	0.06	6.58	1.9	660	2.13	0.29	0.31	<0.02	63.1	3.5	30	3.51	6.5
GT71		0.14	<0.001	0.01	6.12	1.3	710	1.72	0.13	0.22	<0.02	17.45	0.9	4	1.95	1.6
GT72		0.12	0.001	0.14	9.31	6.9	570	7.19	1.12	0.31	0.22	219	16.5	11	6.14	10.0
GT73		0.13	<0.001	0.01	5.56	1.9	750	1.67	0.10	0.53	0.04	24.5	1.2	4	2.08	0.7
GT74		0.11	<0.001	0.01	6.07	1.8	740	1.98	0.19	0.77	0.05	30.3	2.9	5	2.85	1.5
GT75		0.12	<0.001	0.01	5.47	1.8	780	1.86	0.13	0.69	0.04	29.1	1.3	3	2.24	0.7
GT76		0.14	<0.001	0.01	5.47	1.8	800	1.74	0.18	0.96	0.05	34.1	1.0	3	1.90	0.7
GT77		0.12	0.001	0.01	5.69	2.4	620	2.07	5.04	0.58	0.03	47.7	2.7	4	3.09	1.4
GT78		0.15	<0.001	0.01	5.10	2.3	600	1.51	0.19	0.30	0.02	19.45	0.9	6	2.29	0.7
GT79		0.15	0.001	0.07	7.48	9.2	530	3.64	0.46	0.24	<0.02	88.4	7.2	19	6.67	4.6
GT80		0.14	<0.001	0.01	5.03	3.8	320	1.79	0.21	0.20	<0.02	16.50	1.0	6	5.50	1.5
GT81		0.12	<0.001	<0.01	4.65	3.6	600	2.11	0.13	0.60	0.02	110.5	4.4	8	1.47	1.3
GT82		0.13	<0.001	0.01	6.02	1.7	640	2.42	0.18	0.61	0.02	28.1	1.3	2	2.11	1.0
GT83		0.10	0.001	<0.01	5.13	1.4	580	1.53	0.16	0.60	0.04	25.6	1.2	3	1.34	0.7
GT84		0.14	<0.001	<0.01	5.46	1.2	660	1.53	0.09	0.56	0.04	26.3	0.9	2	2.21	0.9
GT85		0.11	<0.001	0.03	7.48	1.1	580	2.95	0.22	1.34	0.08	74.8	9.3	74	4.36	5.5
GT86		0.14	<0.001	0.01	6.21	0.9	400	2.08	0.09	2.67	0.11	32.5	11.9	181	1.61	1.9
GM01		0.13	<0.001	0.01	5.19	1.4	720	1.03	0.07	0.21	0.02	14.80	0.6	2	2.77	0.8
GM02		0.13	<0.001	0.01	6.57	1.8	1130	1.58	0.09	0.25	0.02	18.80	0.8	2	3.25	0.8
GM03		0.10	<0.001	0.01	7.02	1.9	1060	1.89	0.08	0.38	0.02	24.3	1.0	2	3.49	0.7
GM04		0.09	<0.001	<0.01	6.19	1.2	990	1.62	0.06	0.64	0.04	32.8	1.8	4	3.07	0.9
GM05		0.13	<0.001	0.01	5.46	1.2	720	1.63	0.09	0.46	0.04	22.3	2.8	19	3.26	0.8
GM06		0.14	<0.001	0.01	5.01	0.5	1150	0.59	0.03	1.85	0.04	16.85	1.7	11	1.31	7.9
GM07		0.13	<0.001	0.06	8.67	1.6	880	1.87	0.07	0.43	0.03	85.6	9.7	24	5.88	13.0
GM08		0.09	<0.001	0.01	4.59	0.3	1050	0.54	0.01	0.29	0.03	17.75	0.4	2	1.34	0.4
GM09		0.13	<0.001	0.03	11.15	2.2	700	3.99	0.27	0.36	<0.02	97.3	26.2	30	8.17	6.6
GM10		0.13	<0.001	0.08	9.08	2.6	570	3.64	0.34	0.53	0.05	81.2	14.6	22	6.81	9.2
GM11		0.13	<0.001	0.02	5.57	1.0	680	2.21	0.09	0.26	<0.02	97.2	3.6	14	3.61	3.4
GM12		0.10	<0.001	0.01	5.65	1.1	780	1.14	0.03	0.37	0.02	31.7	2.8	7	2.45	1.2
GM13		0.11	<0.001	<0.01	4.77	0.5	690	0.93	0.05	0.33	0.02	22.3	1.7	12	3.28	1.3
GM14		0.11	<0.001	0.01	7.22	1.2	740	2.80	0.14	1.54	0.10	57.2	2.5	6	2.07	1.0

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
GT61		3.67	30.1	0.37	3.2	0.121	2.87	95.1	62.9	0.26	1260	0.65	1.19	16.3	6.0	1290
GT62		1.82	31.2	0.37	4.1	0.110	4.64	91.2	44.8	0.15	259	0.45	1.15	17.2	3.7	460
GT63		1.98	27.3	0.35	4.1	0.098	3.35	73.5	56.5	0.25	304	0.55	1.27	13.7	6.5	470
GT64		1.78	19.15	0.29	3.4	0.059	4.54	54.4	27.6	0.16	302	0.79	1.34	12.2	4.7	330
GT65		1.06	14.20	0.21	26.3	0.052	3.86	15.0	11.4	0.08	181	0.35	1.50	7.3	0.6	130
GT66		0.94	13.35	0.19	10.6	0.039	4.75	11.8	9.0	0.05	86	0.22	1.44	6.3	1.0	110
GT67		3.38	24.8	0.31	2.9	0.082	2.94	56.9	51.3	0.36	2080	0.73	1.05	13.0	3.4	1390
GT68		0.43	8.38	0.18	2.6	0.017	2.91	8.1	5.9	0.05	104	0.24	1.04	4.7	2.6	100
GT69		0.49	11.20	0.17	4.7	0.018	3.62	10.4	8.3	0.04	102	0.31	1.53	5.8	1.2	80
GT70		0.86	14.55	0.22	1.7	0.033	3.23	25.8	17.5	0.09	180	0.52	0.91	9.0	8.8	440
GT71		0.35	11.65	0.18	2.0	0.016	4.52	7.2	6.6	0.02	82	0.37	1.58	5.4	1.1	120
GT72		3.92	29.7	0.38	2.0	0.071	2.63	91.3	61.8	0.21	1340	0.97	0.67	12.8	5.9	1470
GT73		1.31	12.40	0.21	42.4	0.034	4.55	11.5	8.6	0.05	344	0.32	1.22	8.6	0.6	100
GT74		2.43	14.95	0.21	15.1	0.033	4.37	15.1	12.9	0.14	374	0.54	1.61	14.1	1.6	430
GT75		0.84	13.10	0.21	21.1	0.041	3.90	12.9	11.6	0.09	185	0.31	1.26	7.3	0.8	140
GT76		0.83	14.50	0.22	36.6	0.054	4.04	13.0	10.6	0.06	177	0.35	1.24	6.9	0.6	110
GT77		4.75	16.00	0.20	50.1	0.040	4.16	23.6	14.7	0.08	531	1.37	1.41	11.8	0.8	160
GT78		0.53	10.90	0.18	16.3	0.022	3.97	8.6	6.4	0.04	79	0.16	1.34	4.6	1.7	70
GT79		2.01	22.1	0.22	3.4	0.065	2.85	37.4	37.3	0.15	380	0.36	1.07	11.0	10.1	560
GT80		0.48	13.70	0.20	4.5	0.019	4.23	7.3	7.4	0.04	81	0.17	1.19	5.6	1.9	60
GT81		3.48	11.95	0.31	106.0	0.051	3.48	39.2	7.4	0.08	1410	0.93	1.02	27.0	1.0	280
GT82		0.78	15.50	0.21	23.6	0.038	3.91	14.0	15.3	0.07	153	0.55	1.51	8.8	0.8	140
GT83		0.92	11.75	0.20	43.4	0.033	3.79	9.3	6.6	0.05	288	0.36	1.22	7.1	0.6	100
GT84		0.64	12.85	0.21	19.1	0.032	3.98	9.9	11.0	0.06	108	0.32	1.29	5.8	0.6	100
GT85		2.32	21.3	0.22	5.7	0.063	3.26	32.0	32.4	0.52	837	0.65	1.54	8.9	16.8	620
GT86		2.41	14.95	0.16	5.8	0.049	2.50	13.8	12.4	1.45	550	0.33	1.74	6.0	29.8	170
GM01		0.40	10.40	0.17	11.5	0.016	4.28	8.1	6.0	0.02	82	0.15	0.96	4.0	0.5	90
GM02		0.53	12.65	0.17	9.3	0.018	4.34	11.4	12.0	0.05	86	0.20	1.53	5.3	1.0	110
GM03		0.73	14.60	0.18	10.3	0.024	5.15	14.3	15.3	0.06	134	0.20	1.91	6.4	0.7	100
GM04		0.99	14.55	0.20	9.9	0.037	4.50	16.8	14.6	0.11	240	0.25	1.59	8.2	0.9	150
GM05		1.49	11.65	0.19	26.2	0.023	4.47	10.5	10.2	0.14	306	0.37	1.13	8.9	2.0	310
GM06		0.94	10.85	0.17	0.8	0.035	4.01	9.8	4.8	0.12	483	0.33	0.84	6.6	3.1	2040
GM07		2.88	24.4	0.23	0.9	0.084	2.83	38.6	35.1	0.22	370	0.71	0.76	11.5	10.6	790
GM08		0.37	9.22	0.16	2.3	0.026	4.46	7.8	1.9	0.01	70	0.10	0.88	2.3	0.4	50
GM09		4.35	32.2	0.19	2.6	0.077	2.74	26.9	42.6	0.15	2200	0.67	0.80	15.3	8.1	220
GM10		4.75	25.0	0.20	2.2	0.055	2.24	39.6	48.1	0.21	737	0.76	0.82	9.1	7.7	1870
GM11		1.09	13.85	0.20	2.2	0.031	2.78	41.1	19.2	0.07	226	0.84	0.22	7.4	4.0	870
GM12		1.26	11.90	0.18	22.8	0.017	4.92	14.6	9.8	0.09	340	0.43	0.69	8.7	1.9	210
GM13		0.62	9.70	0.15	5.0	0.018	3.84	9.1	7.3	0.04	60	0.20	0.74	3.4	2.4	50
GM14		1.85	20.7	0.23	6.1	0.103	3.46	24.6	15.7	0.12	282	0.54	2.23	7.7	1.3	760

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
GT61		23.2	176.5	0.002	0.03	0.53	8.9	6	4.7	109.0	1.22	<0.05	20.8	0.307	0.80	11.3
GT62		30.5	250	<0.002	0.01	0.45	7.8	6	4.3	80.9	1.33	<0.05	21.4	0.251	1.15	8.6
GT63		24.5	193.5	<0.002	0.01	0.47	8.9	5	3.9	100.5	1.00	<0.05	18.4	0.296	0.86	7.2
GT64		22.8	204	<0.002	0.01	0.58	6.4	3	3.0	96.4	0.99	<0.05	16.6	0.293	0.92	6.8
GT65		17.7	147.5	<0.002	<0.01	0.26	6.2	2	2.3	127.0	0.63	<0.05	19.0	0.233	0.58	8.4
GT66		19.5	144.0	<0.002	<0.01	0.27	3.8	2	1.9	113.5	0.60	<0.05	6.1	0.123	0.60	4.3
GT67		16.5	185.0	<0.002	0.03	0.38	8.8	4	4.1	120.0	0.97	<0.05	12.9	0.341	0.80	5.6
GT68		10.8	99.6	<0.002	<0.01	0.42	2.7	1	1.1	124.0	0.41	<0.05	4.1	0.159	0.39	2.0
GT69		13.8	135.0	<0.002	<0.01	0.35	2.5	1	1.4	119.5	0.55	<0.05	15.2	0.170	0.51	2.9
GT70		14.2	127.0	<0.002	0.02	0.41	5.6	2	2.1	93.9	0.80	<0.05	9.4	0.249	0.50	3.6
GT71		14.5	154.0	<0.002	0.01	0.18	1.3	1	1.1	102.5	0.54	<0.05	3.8	0.108	0.57	1.7
GT72		20.5	163.0	<0.002	0.02	0.43	7.4	5	3.6	71.1	0.98	<0.05	21.5	0.235	0.69	10.8
GT73		19.2	157.5	<0.002	<0.01	0.36	5.2	1	2.3	121.0	0.93	<0.05	57.8	0.610	0.65	13.5
GT74		19.4	166.0	<0.002	<0.01	0.33	5.6	1	2.9	138.5	1.32	<0.05	25.1	0.647	0.72	8.3
GT75		16.6	130.5	<0.002	<0.01	0.25	5.9	2	2.3	125.0	0.75	<0.05	20.4	0.204	0.58	8.6
GT76		18.4	127.0	<0.002	<0.01	0.24	8.2	2	3.3	134.5	0.77	<0.05	40.4	0.168	0.57	11.2
GT77		19.5	166.5	<0.002	<0.01	0.34	5.7	2	3.4	104.5	1.10	<0.05	74.7	0.996	0.74	16.3
GT78		15.8	163.5	<0.002	<0.01	0.45	2.9	1	1.5	94.0	0.49	<0.05	7.6	0.106	0.71	4.8
GT79		17.9	172.5	<0.002	0.01	1.18	7.8	2	4.1	67.9	0.91	<0.05	14.6	0.230	0.88	4.9
GT80		21.6	236	<0.002	<0.01	0.58	1.9	1	1.5	50.0	0.56	<0.05	13.6	0.070	1.16	2.5
GT81		19.3	117.0	<0.002	<0.01	0.27	10.0	5	2.6	106.5	2.27	<0.05	750	2.93	0.46	61.2
GT82		18.7	145.0	<0.002	<0.01	0.23	5.0	1	2.3	109.0	0.89	<0.05	21.2	0.218	0.61	7.6
GT83		17.6	118.5	<0.002	<0.01	0.22	5.9	2	1.2	97.8	0.57	<0.05	51.1	0.544	0.48	11.6
GT84		16.7	129.5	<0.002	<0.01	0.20	4.5	1	1.3	102.0	0.49	<0.05	6.6	0.156	0.53	5.1
GT85		18.8	163.5	<0.002	0.01	0.22	10.8	2	2.4	155.0	0.78	<0.05	8.2	0.294	0.69	4.5
GT86		14.5	92.9	<0.002	<0.01	0.20	14.8	1	2.0	197.0	0.55	<0.05	6.4	0.266	0.40	2.9
GM01		18.2	138.5	<0.002	<0.01	0.36	2.2	1	1.2	90.9	0.41	<0.05	28.9	0.116	0.77	4.2
GM02		19.5	136.5	<0.002	<0.01	0.40	2.3	1	1.5	131.5	0.61	<0.05	7.1	0.120	0.92	3.8
GM03		18.2	148.0	<0.002	<0.01	0.43	3.0	1	2.2	146.5	0.72	<0.05	31.3	0.146	0.86	5.8
GM04		15.5	142.0	<0.002	<0.01	0.37	4.8	1	2.4	154.0	0.86	<0.05	12.0	0.238	0.65	5.5
GM05		17.0	168.5	<0.002	<0.01	0.23	4.2	1	2.1	97.1	0.97	<0.05	11.6	0.756	0.77	9.2
GM06		12.9	102.0	<0.002	0.01	0.20	3.6	<1	0.5	174.5	0.42	<0.05	2.0	0.220	0.47	0.8
GM07		15.7	107.0	<0.002	0.01	0.42	13.0	2	2.1	96.6	0.75	<0.05	8.1	0.437	0.57	3.0
GM08		15.2	126.5	<0.002	<0.01	0.09	2.3	<1	0.3	93.5	0.18	<0.05	1.4	0.058	0.62	0.8
GM09		27.6	135.0	<0.002	<0.01	0.32	13.4	1	4.3	79.3	1.50	<0.05	25.5	0.545	1.07	8.6
GM10		17.5	123.0	<0.002	0.02	0.28	12.7	1	3.3	94.0	0.94	<0.05	17.5	0.349	0.76	6.3
GM11		15.2	102.0	<0.002	0.02	0.20	4.9	1	1.6	54.2	0.63	<0.05	9.3	0.224	0.59	3.0
GM12		15.9	150.5	<0.002	<0.01	0.23	3.6	1	1.2	90.3	1.00	<0.05	15.6	0.403	0.66	6.6
GM13		13.6	140.0	<0.002	<0.01	0.16	3.7	1	0.9	70.3	0.33	<0.05	4.9	0.128	0.64	2.2
GM14		19.6	107.5	<0.002	<0.01	0.19	12.2	2	2.7	187.0	0.65	<0.05	4.9	0.198	0.44	4.0

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	ME-MS61r V ppm 1	ME-MS61r W ppm 0.1	ME-MS61r Y ppm 0.1	ME-MS61r Zn ppm 2	ME-MS61r Zr ppm 0.5	ME-MS61r Dy ppm 0.05	ME-MS61r Er ppm 0.03	ME-MS61r Eu ppm 0.03	ME-MS61r Gd ppm 0.05	ME-MS61r Ho ppm 0.01	ME-MS61r Lu ppm 0.01	ME-MS61r Nd ppm 0.1	ME-MS61r Pr ppm 0.03	ME-MS61r Sm ppm 0.03	ME-MS61r Tb ppm 0.01
GT61		28	2.7	142.5	119	88.1	25.2	15.45	2.13	24.3	5.27	2.11	109.0	27.3	23.9	4.03
GT62		23	2.8	127.0	77	110.5	24.4	14.25	2.00	23.1	4.96	1.79	105.5	27.2	23.3	3.92
GT63		28	2.0	109.0	89	110.5	19.40	11.25	1.98	19.30	3.93	1.46	87.8	21.9	19.30	3.16
GT64		28	2.1	64.9	48	92.3	12.40	7.25	1.37	12.35	2.51	0.98	59.4	15.60	12.55	2.04
GT65		16	1.1	44.5	17	>500	7.49	5.41	0.84	6.03	1.65	1.11	18.9	4.57	5.12	1.10
GT66		11	1.0	28.1	14	308	4.87	3.39	0.42	3.85	1.07	0.61	12.7	3.21	3.33	0.72
GT67		29	2.4	87.2	105	89.3	14.80	9.42	1.80	14.05	3.15	1.31	62.9	16.25	13.45	2.38
GT68		17	1.3	11.5	10	75.9	2.00	1.30	0.28	1.83	0.42	0.22	8.0	2.14	1.80	0.31
GT69		12	1.7	15.2	13	138.0	2.77	1.72	0.35	2.49	0.58	0.31	10.6	2.78	2.45	0.43
GT70		25	2.0	28.4	27	49.9	5.55	3.12	0.91	5.73	1.12	0.41	26.7	7.44	5.91	0.94
GT71		9	1.8	9.0	8	60.7	1.58	1.00	0.21	1.46	0.33	0.16	6.6	1.74	1.43	0.25
GT72		31	6.9	96.4	118	53.5	17.85	10.35	1.84	18.40	3.62	1.40	92.9	24.8	18.85	2.93
GT73		14	0.8	47.8	11	>500	6.99	5.70	0.81	5.46	1.63	1.50	14.3	3.42	4.50	0.99
GT74		38	1.5	32.7	21	436	5.31	3.87	0.92	4.73	1.18	0.78	17.7	4.29	4.50	0.78
GT75		15	1.1	37.8	14	>500	6.21	4.51	0.82	5.46	1.38	0.92	17.6	4.17	5.04	0.93
GT76		16	1.0	55.9	11	>500	9.30	6.61	1.11	7.89	2.04	1.41	21.8	4.88	6.81	1.36
GT77		29	8.6	67.3	27	>500	10.25	8.25	0.98	7.76	2.39	2.08	24.9	6.53	6.77	1.41
GT78		9	0.7	23.5	4	439	3.53	2.85	0.38	2.81	0.81	0.71	9.6	2.46	2.61	0.49
GT79		30	2.0	57.4	47	84.2	10.10	6.48	1.18	9.81	2.11	1.02	42.5	10.75	10.35	1.58
GT80		9	0.7	17.0	8	90.1	2.68	1.98	0.22	2.19	0.61	0.41	7.8	2.02	1.97	0.38
GT81		40	44.0	148.5	31	>500	25.2	17.65	2.39	21.3	5.47	3.63	59.6	14.25	19.25	3.71
GT82		12	1.2	43.7	15	>500	7.15	5.34	0.78	5.67	1.63	1.13	17.6	4.27	4.98	1.00
GT83		16	0.8	62.4	10	>500	9.77	7.80	0.84	6.76	2.29	1.81	15.6	3.47	5.41	1.32
GT84		11	0.8	35.8	11	>500	5.81	4.32	0.58	4.68	1.31	0.88	14.4	3.31	4.08	0.82
GT85		39	1.8	56.9	56	158.0	9.78	6.26	1.40	9.45	2.09	0.93	39.0	9.55	9.43	1.54
GT86		65	1.0	33.8	38	167.0	6.04	3.82	0.91	5.72	1.28	0.61	20.1	4.63	5.41	0.92
GM01		5	0.5	18.2	5	329	2.97	2.27	0.36	2.37	0.68	0.53	7.7	1.98	2.05	0.42
GM02		7	1.0	14.5	8	277	2.36	1.74	0.43	2.09	0.53	0.41	9.3	2.53	2.16	0.36
GM03		9	1.0	18.9	10	316	3.16	2.13	0.57	2.93	0.68	0.49	12.7	3.37	3.07	0.48
GM04		13	0.8	23.0	17	304	4.07	2.66	0.76	4.04	0.86	0.52	16.6	4.33	4.04	0.63
GM05		21	1.2	28.0	19	>500	4.33	3.50	0.58	3.62	1.01	0.91	12.0	2.97	3.23	0.61
GM06		18	0.5	8.4	27	21.9	1.72	0.90	0.47	2.01	0.33	0.13	9.7	2.43	2.10	0.29
GM07		48	1.6	43.5	58	22.1	8.52	4.75	2.01	9.92	1.70	0.62	47.2	11.35	10.65	1.44
GM08		6	0.1	10.5	2	62.3	2.04	1.22	0.46	2.15	0.42	0.20	9.2	2.25	2.21	0.33
GM09		69	2.7	23.9	54	66.9	5.03	2.98	1.04	5.30	1.03	0.49	28.0	7.35	6.09	0.83
GM10		85	3.0	40.8	91	59.2	6.96	4.36	1.37	7.78	1.47	0.72	38.7	10.10	8.41	1.13
GM11		20	2.2	39.5	22	72.1	6.31	3.86	1.30	7.21	1.32	0.51	39.6	10.40	7.83	1.06
GM12		24	0.7	24.9	14	>500	4.08	3.02	0.60	3.68	0.89	0.69	15.9	4.11	3.92	0.60
GM13		24	0.5	14.1	5	149.5	2.58	1.73	0.44	2.39	0.55	0.34	10.1	2.61	2.42	0.40
GM14		23	1.0	64.3	25	182.5	11.95	7.15	1.41	11.70	2.47	0.94	40.9	9.23	11.10	1.91

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
GT61		2.31	13.75
GT62		2.06	11.95
GT63		1.65	9.64
GT64		1.07	6.30
GT65		0.89	6.09
GT66		0.54	3.58
GT67		1.42	8.47
GT68		0.21	1.35
GT69		0.28	1.84
GT70		0.46	2.73
GT71		0.16	0.99
GT72		1.54	9.16
GT73		1.06	7.94
GT74		0.67	4.52
GT75		0.76	5.28
GT76		1.14	7.95
GT77		1.50	11.15
GT78		0.51	3.82
GT79		1.03	6.69
GT80		0.35	2.43
GT81		3.01	21.1
GT82		0.94	6.57
GT83		1.43	10.20
GT84		0.74	5.19
GT85		0.96	6.01
GT86		0.60	3.93
GM01		0.39	2.95
GM02		0.31	2.26
GM03		0.38	2.66
GM04		0.43	3.01
GM05		0.65	4.82
GM06		0.13	0.76
GM07		0.69	4.13
GM08		0.18	1.19
GM09		0.48	3.06
GM10		0.71	4.63
GM11		0.57	3.40
GM12		0.53	3.81
GM13		0.30	2.05
GM14		1.04	6.14

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141326

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

REE's may not be totally soluble in this method.
Applies to Method: ME-MS61r

LABORATORY ADDRESSES

Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.
Applies to Method: LOG-22 WEI-21

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
Applies to Method: Au-TL43 ME-MS61r SCR-41

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

CERTIFICATE JB15141808

Project: Malawi 2015

This report is for 200 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 16-SEP-2015.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature: Colin Ramshaw, Vancouver Laboratory Manager

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
GM15		0.12	<0.001	0.01	7.15	0.8	800	2.87	0.13	1.06	0.06	48.5	2.8	4	2.28	2.3
GM16		0.13	<0.001	0.03	7.43	1.1	990	3.68	0.08	0.53	0.05	60.8	4.0	5	3.68	2.0
GM17		0.07	<0.001	0.01	6.28	0.9	740	1.92	0.05	0.25	0.02	19.40	1.0	2	2.52	0.9
HT01		0.13	<0.001	<0.01	2.54	2.1	310	1.26	0.09	0.35	<0.02	>500	30.6	124	0.95	14.0
HT02		0.13	<0.001	0.02	7.03	0.7	1120	1.87	0.07	1.79	0.02	>500	16.8	106	1.77	12.0
HT03		0.15	<0.001	0.01	7.59	1.2	1220	3.24	0.04	2.14	0.02	411	8.4	59	2.18	7.5
HT04		0.14	<0.001	<0.01	5.50	1.9	830	1.81	0.04	0.49	<0.02	>500	15.4	86	2.13	16.9
HT05		0.11	<0.001	0.01	3.73	2.2	670	0.96	0.12	1.10	0.07	>500	30.9	198	1.31	15.4
HT06		0.06	<0.001	0.03	6.90	0.7	360	0.89	0.11	4.53	0.11	56.0	33.4	132	0.37	20.8
HT07		0.06	<0.001	0.02	8.15	0.4	670	2.62	0.06	4.03	0.08	145.5	22.1	78	0.96	13.0
HT08		0.12	<0.001	0.03	7.97	0.5	1500	2.87	0.04	1.63	0.02	74.8	6.8	31	2.62	5.9
HT09		0.15	<0.001	0.03	6.86	0.9	660	2.40	0.07	3.72	0.07	436	27.4	107	1.06	13.8
HT10		0.14	<0.001	0.02	8.17	0.5	450	1.94	0.08	4.38	0.07	150.5	27.3	103	1.65	15.0
HT11		0.13	<0.001	0.03	7.21	1.1	780	2.09	0.09	2.50	0.06	>500	14.1	97	1.61	11.4
HT12		0.13	<0.001	0.01	6.60	0.8	1220	1.95	0.04	1.51	0.03	>500	16.6	74	1.18	10.9
HT13		0.12	<0.001	<0.01	6.48	0.8	500	2.90	0.10	3.00	0.07	>500	22.3	89	1.05	9.5
HT14		0.16	<0.001	<0.01	7.30	1.2	1040	3.09	0.05	1.11	0.02	>500	8.5	42	2.57	6.2
HT15		0.11	<0.001	0.03	7.66	1.4	1420	1.78	0.12	1.79	0.06	85.5	11.4	65	3.30	12.1
HT16		0.13	<0.001	0.02	7.12	1.6	1370	1.30	0.17	0.97	0.03	305	8.1	39	1.97	11.5
HT17		0.15	0.001	0.04	7.67	2.9	1290	1.22	0.10	0.96	0.06	204	11.1	58	2.16	18.3
HT18		0.13	<0.001	<0.01	7.82	1.5	1200	4.28	0.13	1.00	0.02	337	7.1	25	3.21	5.7
HT19		0.13	<0.001	<0.01	8.89	1.0	710	4.91	0.11	2.47	0.05	93.5	9.1	26	2.47	4.3
HT20		0.13	<0.001	<0.01	7.81	0.6	820	2.37	0.10	2.88	0.04	167.0	17.4	71	1.63	8.6
HT21		0.06	<0.001	<0.01	8.62	1.1	890	4.63	0.04	2.01	0.03	116.5	16.1	38	2.26	13.7
HT22		0.13	<0.001	0.01	8.44	0.8	670	3.63	0.06	2.89	0.05	66.9	14.5	47	1.57	9.4
HT23		0.15	<0.001	0.01	8.46	0.8	1360	4.03	0.05	2.24	0.03	236	11.7	38	2.49	11.9
HT24		0.15	<0.001	<0.01	7.53	0.7	550	3.57	0.06	2.06	<0.02	260	18.0	66	0.86	7.5
HT25		0.14	<0.001	<0.01	7.93	0.9	1070	3.33	0.03	1.43	0.02	342	6.6	29	2.23	4.3
HT26		0.14	<0.001	0.01	6.75	0.9	900	1.97	0.07	0.84	0.03	172.0	11.3	44	2.01	7.5
HT27		0.08	<0.001	<0.01	7.71	1.2	900	3.56	0.05	1.88	0.05	>500	14.8	100	2.10	10.3
HT28		0.15	<0.001	0.01	7.95	0.7	1440	1.95	0.06	1.15	0.05	139.5	8.3	37	3.20	7.7
HT29		0.17	<0.001	0.01	3.98	0.9	580	1.22	0.12	0.59	<0.02	>500	27.3	140	1.90	12.3
HT30		0.12	<0.001	0.01	8.75	0.4	1250	1.37	0.04	0.81	<0.02	46.5	6.2	31	1.53	5.7
HT31		0.16	<0.001	0.02	7.75	0.8	1180	1.54	0.05	1.06	0.04	427	13.9	85	1.97	11.2
HT32		0.13	<0.001	<0.01	6.01	0.4	1280	1.25	0.03	1.11	0.06	>500	21.6	100	0.50	8.8
HT33		0.16	<0.001	0.02	5.85	0.6	1150	1.21	0.02	1.56	0.11	>500	25.4	155	0.38	8.7
HT34		0.16	<0.001	0.01	7.90	0.3	1400	1.71	0.04	1.53	0.03	337	11.3	68	1.12	8.4
HT35		0.13	<0.001	0.02	7.77	0.5	1440	2.19	0.04	1.54	0.05	>500	12.2	80	1.08	10.0
HT36		0.17	<0.001	0.04	8.04	0.5	950	1.33	0.06	1.48	0.07	411	15.4	85	1.00	20.7
HT37		0.16	<0.001	<0.01	4.82	1.0	880	0.91	0.02	1.32	0.06	>500	27.8	95	0.17	6.5

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
GM15		1.42	18.80	0.21	5.0	0.072	3.67	21.5	18.1	0.13	432	0.80	2.06	9.2	1.2	640
GM16		1.50	19.40	0.21	4.8	0.056	4.36	28.3	29.8	0.14	419	0.72	1.17	10.7	1.9	490
GM17		0.63	14.30	0.19	10.1	0.030	5.52	9.8	9.2	0.05	169	0.23	1.32	6.5	0.9	110
HT01		20.3	33.7	2.44	206	0.322	1.54	1210	6.1	0.23	4460	6.79	0.36	393	12.8	1650
HT02		11.10	28.1	0.59	6.4	0.089	3.47	261	7.1	0.53	1580	0.99	1.89	37.9	19.7	590
HT03		3.57	23.2	0.48	4.6	0.059	3.22	189.5	10.2	0.57	1020	0.63	2.09	38.2	17.0	1330
HT04		5.99	29.1	2.62	20.0	0.078	2.52	1240	10.2	0.31	1160	1.97	0.63	73.1	22.9	1830
HT05		16.80	56.2	5.17	45.7	0.261	2.15	1930	6.8	0.44	3330	2.33	0.61	171.5	23.2	3020
HT06		15.45	26.4	0.14	2.3	0.119	0.57	23.4	7.2	2.24	2390	1.16	1.98	17.4	35.7	900
HT07		9.16	25.8	0.20	7.4	0.089	1.59	70.5	17.5	1.66	1620	1.20	2.71	36.6	26.5	1400
HT08		1.90	22.4	0.15	3.0	0.034	4.98	36.4	9.9	0.41	603	0.72	2.09	20.3	12.5	710
HT09		14.15	28.5	0.44	10.0	0.109	1.44	221	16.2	1.52	2100	1.39	2.01	65.4	28.4	2010
HT10		8.42	23.6	0.21	5.6	0.084	1.24	74.0	14.2	2.16	1380	0.86	2.33	18.2	44.8	810
HT11		5.55	24.1	0.72	5.6	0.075	2.47	252	6.5	0.88	1020	0.85	2.00	24.0	22.4	1240
HT12		7.82	24.3	1.01	9.5	0.089	3.52	411	8.1	0.42	1930	1.30	1.73	102.5	17.9	1760
HT13		9.58	28.3	0.97	15.0	0.114	2.01	440	12.5	1.45	2510	1.27	1.86	173.0	26.5	1770
HT14		4.27	27.1	0.96	17.4	0.074	4.58	480	7.8	0.25	1560	1.63	1.61	229	8.3	950
HT15		3.56	20.1	0.18	3.2	0.059	4.62	35.3	6.4	0.57	860	1.69	1.57	29.6	20.4	610
HT16		2.36	19.50	0.39	4.7	0.041	4.58	145.0	5.2	0.36	481	0.80	1.30	20.0	14.7	500
HT17		2.84	20.2	0.30	4.2	0.048	3.59	96.7	8.4	0.43	480	0.85	1.32	11.7	25.3	420
HT18		3.64	25.5	0.36	23.9	0.055	4.64	163.5	10.8	0.28	1380	2.04	1.51	164.5	6.7	850
HT19		3.27	23.7	0.17	8.6	0.058	3.48	47.9	17.6	0.67	893	1.40	2.54	83.6	9.1	240
HT20		5.52	22.5	0.25	7.2	0.062	3.39	81.3	8.9	1.24	1260	1.50	1.86	67.3	25.3	670
HT21		5.33	24.7	0.21	11.5	0.067	3.49	57.8	14.1	0.68	1740	1.78	2.31	143.0	16.6	890
HT22		5.06	21.9	0.15	6.6	0.054	2.32	31.2	14.4	0.98	1260	0.88	2.47	44.0	16.6	560
HT23		4.06	26.2	0.31	6.8	0.060	3.06	120.0	22.2	0.78	830	0.64	2.34	33.0	18.1	1750
HT24		7.49	23.9	0.33	25.0	0.104	3.27	132.0	7.8	0.93	1400	2.07	2.55	118.0	15.5	500
HT25		2.98	24.9	0.41	14.7	0.067	4.99	173.5	6.8	0.33	992	1.22	2.05	138.5	6.8	670
HT26		5.10	20.5	0.26	20.0	0.099	5.13	84.5	6.5	0.33	1460	1.87	1.23	104.5	10.9	410
HT27		5.66	30.6	1.12	16.1	0.083	2.90	440	16.7	0.72	1300	1.02	2.12	54.8	32.1	1140
HT28		2.67	21.7	0.22	5.4	0.050	4.86	58.3	9.6	0.35	657	1.06	1.39	37.9	11.3	610
HT29		22.5	40.0	1.00	47.9	0.251	2.95	490	7.7	0.30	3660	4.06	0.50	234	19.0	870
HT30		1.69	22.5	0.14	1.0	0.036	5.82	25.3	9.0	0.21	363	0.54	1.43	11.6	11.7	270
HT31		6.73	25.2	0.49	13.3	0.108	5.24	204	7.7	0.38	1430	2.18	1.32	96.4	19.1	520
HT32		11.90	36.8	2.07	14.5	0.259	3.63	900	5.4	0.43	1780	4.41	1.30	208	15.0	1390
HT33		16.60	35.7	0.94	3.5	0.279	2.68	356	7.7	0.55	2230	3.88	1.40	159.5	22.9	1340
HT34		4.84	23.5	0.40	4.7	0.084	4.93	166.0	7.4	0.48	961	1.17	1.63	51.5	16.7	710
HT35		5.43	30.2	1.11	4.8	0.097	3.91	460	7.9	0.54	864	1.31	1.70	41.9	20.9	1180
HT36		5.53	22.6	0.62	1.8	0.086	2.68	188.5	8.6	0.81	910	0.98	1.69	20.0	30.4	830
HT37		15.90	39.0	2.59	10.4	0.352	2.26	1110	5.6	0.41	1960	8.06	1.24	325	12.6	2740

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
GM15		18.1	122.5	<0.002	0.01	0.20	7.8	2	2.9	156.0	0.79	<0.05	8.5	0.217	0.49	4.0
GM16		21.4	150.5	<0.002	0.02	0.22	5.6	1	3.1	129.5	1.11	<0.05	8.3	0.242	0.68	4.1
GM17		21.9	177.5	<0.002	<0.01	0.20	2.5	1	1.3	84.8	0.55	<0.05	4.6	0.244	0.81	3.4
HT01		41.9	81.7	0.004	<0.01	0.13	27.2	12	38.7	93.4	20.2	<0.05	1050	>10.0	0.32	110.0
HT02		31.7	104.0	<0.002	0.01	0.13	13.9	2	7.6	320	2.39	<0.05	95.6	1.870	0.53	3.9
HT03		32.7	134.0	<0.002	0.01	0.14	9.4	3	5.1	608	2.96	<0.05	109.5	1.270	0.60	7.2
HT04		61.8	101.0	0.003	0.01	0.12	13.2	7	12.0	156.5	5.79	<0.05	720	3.26	0.56	52.5
HT05		61.7	76.8	0.005	<0.01	0.20	28.6	21	11.6	231	14.35	0.07	1040	7.48	0.31	90.7
HT06		7.1	11.7	<0.002	0.01	0.13	34.0	2	2.8	372	1.12	<0.05	5.3	2.08	0.07	0.7
HT07		17.1	53.5	<0.002	<0.01	0.09	24.3	2	5.9	581	2.63	<0.05	65.5	1.665	0.29	4.4
HT08		44.4	177.5	<0.002	0.01	0.10	5.7	1	5.7	629	1.71	<0.05	17.0	0.386	0.93	2.7
HT09		18.1	56.3	<0.002	0.01	0.10	23.4	3	8.7	601	4.33	<0.05	173.5	3.21	0.28	7.3
HT10		13.1	50.0	<0.002	0.01	0.11	26.9	1	3.3	342	1.71	<0.05	46.1	1.330	0.26	3.6
HT11		28.7	84.0	0.003	0.01	0.15	13.9	5	3.7	397	1.67	<0.05	125.5	1.210	0.35	7.4
HT12		37.9	132.0	0.003	0.01	0.10	12.3	4	7.7	693	6.06	<0.05	380	3.85	0.54	16.8
HT13		26.4	97.0	0.002	0.01	0.18	25.9	5	7.4	366	14.35	<0.05	325	3.07	0.36	25.0
HT14		40.9	224	<0.002	<0.01	0.31	11.0	4	4.6	295	21.8	<0.05	353	2.53	0.94	20.0
HT15		41.5	163.0	<0.002	0.01	0.13	9.9	1	4.7	356	2.40	<0.05	16.9	0.692	0.99	3.3
HT16		48.6	154.5	<0.002	0.01	0.12	6.8	1	2.1	304	1.64	<0.05	82.9	0.539	0.79	6.8
HT17		46.0	133.5	<0.002	0.01	0.14	9.1	1	1.4	249	0.86	<0.05	45.3	0.352	0.71	3.9
HT18		37.0	194.0	<0.002	<0.01	0.30	7.3	2	4.6	289	18.25	<0.05	192.5	1.750	1.17	21.1
HT19		23.3	177.0	<0.002	<0.01	0.21	12.5	1	3.2	307	9.27	<0.05	54.0	0.641	0.66	6.7
HT20		22.6	137.0	<0.002	<0.01	0.14	16.1	1	3.4	355	5.16	<0.05	43.9	1.450	0.56	5.6
HT21		19.5	167.0	<0.002	0.01	0.16	13.2	2	3.7	399	11.45	<0.05	97.9	1.745	0.61	12.0
HT22		15.3	108.0	<0.002	0.01	0.14	15.7	1	3.0	443	4.25	<0.05	31.4	1.205	0.45	5.8
HT23		26.4	136.0	<0.002	0.01	0.12	10.9	2	5.1	780	2.28	<0.05	100.0	1.015	0.67	7.8
HT24		15.0	148.0	<0.002	0.01	0.10	16.6	4	15.5	205	7.84	<0.05	139.0	2.61	0.50	11.8
HT25		31.6	244	<0.002	<0.01	0.25	9.6	2	4.3	303	15.95	<0.05	113.0	1.655	0.85	12.8
HT26		29.1	238	<0.002	<0.01	0.12	9.7	2	12.0	195.5	6.89	<0.05	84.7	1.780	1.01	9.2
HT27		32.9	129.5	0.002	0.01	0.09	13.0	6	6.5	436	3.32	<0.05	311	1.750	0.48	21.9
HT28		42.9	173.5	<0.002	0.01	0.35	5.7	1	4.4	430	2.82	<0.05	48.4	0.658	1.29	6.4
HT29		32.3	128.5	<0.002	<0.01	0.18	21.4	5	33.7	134.5	14.60	<0.05	480	6.18	0.63	23.2
HT30		36.1	195.0	<0.002	<0.01	0.10	4.6	1	2.4	239	0.80	<0.05	5.6	0.229	1.33	0.6
HT31		38.4	188.0	<0.002	<0.01	0.13	12.5	2	8.1	324	5.53	<0.05	109.0	2.51	0.95	6.6
HT32		39.7	103.5	0.002	<0.01	0.08	22.3	6	9.6	377	10.80	<0.05	430	6.90	0.44	12.7
HT33		25.3	74.2	<0.002	0.01	0.07	36.1	5	3.8	324	7.68	<0.05	161.5	5.33	0.32	2.9
HT34		35.4	164.5	<0.002	0.01	0.09	11.8	2	5.3	416	2.99	<0.05	92.8	1.610	0.84	4.1
HT35		41.4	129.0	<0.002	0.01	0.06	14.4	4	4.0	498	2.35	<0.05	247	1.595	0.57	11.5
HT36		39.3	99.6	<0.002	0.02	0.06	16.2	2	3.0	378	1.12	0.05	77.8	0.838	0.47	4.9
HT37		28.3	59.7	0.003	<0.01	0.06	32.5	7	7.3	353	15.95	<0.05	421	>10.0	0.23	6.4

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53 Angus Crescent
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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
GM15		18	0.7	46.0	39	149.5	8.34	5.24	0.96	7.87	1.78	0.75	28.2	6.76	7.44	1.29
GM16		17	1.3	43.4	39	128.5	7.83	4.90	1.04	7.78	1.63	0.71	32.1	8.11	7.72	1.23
GM17		10	0.6	22.6	13	243	3.86	2.68	0.35	3.28	0.84	0.51	10.7	2.67	2.88	0.57
HT01		393	5.0	266	238	>500	59.9	28.0	5.20	118.0	10.20	5.69	>1000	315	196.0	13.20
HT02		264	1.6	37.4	92	181.5	9.70	3.75	2.53	19.20	1.57	0.46	210	60.1	31.9	2.14
HT03		77	5.8	43.3	45	131.0	11.60	3.95	2.74	22.1	1.77	0.42	171.5	47.6	32.3	2.58
HT04		113	4.0	109.0	109	>500	40.7	8.14	4.59	132.5	4.61	0.76	>1000	328	222	12.20
HT05		346	8.0	272	167	>500	94.0	20.5	10.35	235	12.15	1.76	>1000	561	376	25.6
HT06		439	0.8	39.0	123	61.5	7.12	4.59	1.91	8.21	1.52	0.67	33.4	7.70	7.81	1.20
HT07		251	1.2	42.3	101	230	7.43	4.43	2.10	9.47	1.51	0.65	61.8	17.30	11.55	1.34
HT08		38	0.8	20.3	25	94.4	3.93	2.15	1.70	5.06	0.76	0.29	32.3	8.69	6.26	0.71
HT09		388	2.4	53.1	140	293	10.75	5.33	2.60	17.25	1.96	0.66	160.0	47.3	25.2	2.15
HT10		225	1.4	41.5	92	162.5	7.75	4.49	1.87	10.10	1.53	0.63	66.0	17.90	12.25	1.38
HT11		144	3.3	66.5	61	195.0	16.60	5.38	3.32	33.0	2.51	0.55	262	67.3	45.1	3.81
HT12		196	5.2	69.0	107	331	17.15	5.87	3.24	36.3	2.64	0.62	351	98.7	59.1	3.97
HT13		228	5.5	82.5	130	465	18.20	8.03	3.25	34.0	3.13	1.20	353	100.5	51.4	3.89
HT14		97	3.7	76.8	67	>500	17.55	7.33	3.38	37.5	2.85	1.07	392	115.5	63.4	4.11
HT15		81	1.7	24.5	53	88.2	4.67	2.87	2.24	5.60	0.94	0.43	33.8	8.87	6.71	0.80
HT16		47	3.4	24.8	40	139.0	6.17	2.48	2.26	14.90	0.96	0.33	132.0	35.8	23.7	1.52
HT17		56	1.8	28.0	49	134.5	6.10	2.72	2.29	11.50	1.07	0.35	89.8	24.1	16.50	1.33
HT18		69	4.2	52.9	59	>500	10.25	6.04	2.16	15.35	1.98	1.15	131.5	38.1	22.8	1.97
HT19		72	3.2	28.9	52	231	5.06	3.45	1.35	5.53	1.06	0.66	36.9	10.75	6.82	0.84
HT20		143	2.7	31.7	68	200	6.01	3.66	1.80	8.05	1.25	0.61	64.4	18.35	11.00	1.08
HT21		105	25.3	38.6	74	351	6.33	4.21	1.68	7.40	1.34	0.78	47.4	13.25	9.12	1.05
HT22		121	2.0	27.1	61	178.0	4.62	3.01	1.35	5.28	0.98	0.50	29.7	7.93	6.09	0.78
HT23		81	1.7	37.8	66	213	7.44	3.77	2.69	11.65	1.37	0.49	101.0	27.8	16.85	1.47
HT24		170	2.1	84.0	74	>500	15.30	9.79	1.87	17.35	3.21	1.58	104.5	30.3	19.55	2.58
HT25		82	2.3	46.7	45	418	9.35	5.19	2.13	15.05	1.77	0.92	134.5	39.2	22.3	1.83
HT26		83	1.3	46.5	65	>500	8.33	5.62	1.60	9.90	1.75	1.03	66.6	19.20	12.10	1.44
HT27		121	16.4	99.2	69	>500	26.2	8.24	3.47	52.2	3.92	0.87	414	113.5	76.6	6.11
HT28		51	2.9	25.9	54	161.0	5.31	2.99	1.73	7.11	1.01	0.43	50.3	14.15	9.50	0.98
HT29		363	3.8	103.5	234	>500	23.2	10.45	2.94	42.9	4.02	1.55	407	120.0	66.0	5.11
HT30		30	0.5	16.4	19	30.9	3.06	1.88	1.84	3.53	0.62	0.24	19.7	5.30	4.01	0.53
HT31		145	2.0	41.6	92	442	9.66	4.16	2.64	19.60	1.64	0.57	175.5	48.7	30.0	2.17
HT32		297	2.7	77.0	168	407	21.3	7.28	3.75	62.3	3.18	0.99	826	231	123.5	5.50
HT33		353	1.3	73.1	162	111.0	16.70	7.59	2.93	31.8	2.95	0.99	345	92.9	48.6	3.52
HT34		108	1.1	36.9	67	146.0	8.22	3.81	2.92	15.50	1.43	0.49	142.5	39.1	23.5	1.78
HT35		134	1.3	51.1	70	156.0	13.65	4.45	4.12	39.3	2.01	0.54	442	119.5	72.4	3.64
HT36		118	0.7	38.3	88	65.0	9.20	3.88	3.05	18.40	1.52	0.51	182.5	47.8	28.8	2.07
HT37		355	2.4	94.4	212	328	25.6	8.70	3.27	74.8	3.84	1.06	>1000	293	153.0	7.33

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
GM15		0.80	4.86
GM16		0.74	4.63
GM17		0.43	2.98
HT01		4.64	32.8
HT02		0.50	2.92
HT03		0.51	2.76
HT04		0.90	4.93
HT05		2.25	11.60
HT06		0.63	4.37
HT07		0.61	4.27
HT08		0.29	1.96
HT09		0.68	4.48
HT10		0.59	4.05
HT11		0.65	3.74
HT12		0.74	4.18
HT13		1.18	7.60
HT14		0.95	6.76
HT15		0.41	2.82
HT16		0.31	2.06
HT17		0.35	2.30
HT18		0.93	6.92
HT19		0.52	4.04
HT20		0.53	3.93
HT21		0.63	4.84
HT22		0.43	3.06
HT23		0.48	3.22
HT24		1.40	9.93
HT25		0.76	5.68
HT26		0.82	6.20
HT27		1.01	5.86
HT28		0.43	2.91
HT29		1.38	9.48
HT30		0.26	1.69
HT31		0.52	3.68
HT32		0.99	6.02
HT33		1.05	6.60
HT34		0.49	3.21
HT35		0.59	3.56
HT36		0.57	3.49
HT37		1.14	6.69

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Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
HT38		0.15	<0.001	0.01	6.35	0.5	1360	1.46	0.09	0.99	<0.02	181.5	7.3	36	3.46	6.3
HT39		0.15	<0.001	0.02	7.25	0.5	1100	1.46	0.09	1.92	0.11	132.0	12.9	67	0.74	16.1
HT40		0.16	<0.001	0.03	9.48	0.4	1690	1.76	0.01	2.64	0.07	75.3	9.3	27	0.25	7.2
HT41		0.20	<0.001	0.01	7.85	0.9	1420	0.96	0.01	2.11	0.20	>500	17.8	83	0.15	8.0
HT42		0.17	<0.001	0.02	8.50	0.8	1300	1.67	0.02	2.39	0.09	>500	12.6	51	0.26	7.0
HT43		0.14	<0.001	0.01	9.13	0.7	1770	1.28	0.02	2.27	0.09	486	11.4	40	0.27	6.8
HM01		0.16	<0.001	0.05	5.13	1.2	430	1.66	0.09	1.61	0.07	>500	25.0	116	0.93	8.3
HM02		0.12	<0.001	0.03	7.91	0.6	580	2.40	0.09	3.24	0.08	149.5	21.3	88	1.04	7.7
HM03		0.12	<0.001	0.02	7.20	0.6	980	1.60	0.04	0.97	0.04	87.6	14.3	43	1.08	5.2
HM04		0.13	<0.001	0.03	8.47	1.1	1050	2.15	0.06	2.79	0.07	104.5	15.4	53	1.44	12.8
HM05		0.11	0.001	0.04	3.87	1.0	290	1.37	0.07	1.79	0.08	440	33.8	234	0.56	10.9
HM06		0.12	0.001	0.02	7.55	1.5	750	3.54	0.07	1.25	<0.02	>500	13.0	82	2.32	10.9
HM07		0.11	0.001	0.04	7.55	0.8	910	2.09	0.13	2.33	0.09	288	17.7	93	3.17	10.8
HM08		0.13	0.001	0.02	8.75	0.7	1170	1.69	0.08	2.61	0.07	42.9	16.8	61	0.77	16.5
HM09		0.12	0.001	0.02	9.45	1.0	470	4.37	0.09	1.79	0.04	99.7	16.7	52	3.80	20.1
HM10		0.14	0.001	0.05	8.04	1.9	800	2.74	0.17	1.70	0.11	415	19.1	61	2.27	20.5
HM11		0.06	0.001	0.03	6.31	1.3	670	2.51	0.13	2.37	0.06	>500	24.0	108	1.64	11.7
HM12		0.15	0.001	0.03	3.75	0.9	570	1.21	0.08	2.05	0.09	378	38.7	261	0.67	15.3
HM13		0.18	0.001	0.03	4.62	1.0	560	1.76	0.08	1.94	0.08	>500	26.7	185	0.82	9.5
HM14		0.12	0.001	0.03	4.91	1.4	540	2.30	0.12	1.86	0.07	>500	24.1	131	1.61	12.0
HM15		0.09	0.001	0.02	7.81	0.7	750	2.73	0.06	2.55	0.06	286	16.8	85	1.72	9.5
HM16		0.13	0.001	0.04	7.97	2.0	1050	2.02	0.17	2.00	0.09	145.0	17.2	95	3.24	20.4
HM17		0.08	<0.001	0.04	5.16	1.4	400	1.87	0.09	3.79	0.10	165.0	30.7	170	0.72	9.6
HM18		0.18	<0.001	0.03	6.71	2.5	670	2.94	0.13	3.43	0.14	406	33.0	169	1.05	14.4
HM19		0.14	<0.001	0.07	5.16	3.4	610	2.88	0.13	3.13	0.16	280	37.0	142	0.87	15.5
HM20		0.12	0.001	0.04	8.58	1.4	870	2.27	0.13	0.63	0.03	347	14.4	52	2.93	19.1
HM21		0.15	<0.001	0.04	6.64	1.3	730	2.13	0.05	0.60	0.04	267	23.2	55	1.10	12.9
HM22		0.18	<0.001	0.12	1.55	0.9	210	0.71	0.05	0.29	<0.02	>500	30.5	90	0.34	6.9
HM23		0.14	0.001	0.03	7.53	1.1	900	2.20	0.12	1.21	0.06	365	16.8	64	2.84	16.1
HM24		0.12	0.001	0.07	2.98	1.1	380	1.15	0.06	0.66	0.03	>500	29.3	121	0.71	7.0
HM25		0.17	0.001	0.05	3.99	1.4	630	1.46	0.15	1.56	0.02	>500	34.6	215	1.34	16.6
HM26		0.12	<0.001	0.03	8.74	1.6	1400	2.60	0.08	2.36	0.06	289	15.8	90	1.23	18.5
HM27		0.12	<0.001	0.04	9.26	1.5	990	2.84	0.05	2.82	0.08	173.5	21.2	96	0.83	15.5
HM28		0.13	0.001	0.03	7.56	1.9	780	2.56	0.05	1.90	0.06	>500	27.6	271	1.39	17.0
HM29		0.15	0.002	0.06	5.68	10.8	1230	3.57	0.36	2.05	0.15	>500	43.7	219	1.01	23.5
HM30		0.18	<0.001	0.05	7.35	4.0	840	4.31	0.11	3.43	0.11	382	31.3	153	1.38	19.6
HM31		0.12	0.001	0.02	7.88	1.1	1110	2.27	0.14	2.49	0.08	353	17.7	97	1.13	21.3
HM32		0.16	0.001	0.02	7.95	0.6	1290	1.75	0.07	1.56	0.06	>500	15.1	94	1.15	19.9
HM33		0.14	<0.001	<0.01	4.96	1.2	930	1.09	0.05	1.21	0.05	>500	30.2	157	0.39	9.6
HM34		0.14	<0.001	<0.01	7.43	0.8	1620	1.27	0.03	2.12	0.12	485	22.2	98	0.18	7.1

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
HT38		3.13	17.80	0.25	5.2	0.044	4.35	80.7	12.7	0.35	427	0.63	1.02	38.2	9.1	550
HT39		4.75	19.45	0.24	1.5	0.085	2.94	63.8	7.1	0.84	1060	0.72	1.63	17.0	20.2	740
HT40		2.58	25.4	0.24	0.6	0.060	3.96	31.0	7.7	0.55	452	0.43	3.06	8.7	11.7	500
HT41		9.91	24.8	0.96	1.2	0.156	2.75	412	9.7	0.76	1490	2.25	2.09	141.0	11.1	1200
HT42		6.21	28.3	0.81	1.7	0.117	3.59	326	8.4	0.60	926	2.59	2.56	76.5	11.4	1590
HT43		5.20	26.5	0.59	1.5	0.091	3.89	221	10.5	0.45	763	1.56	2.54	68.1	10.0	1130
HM01		22.2	31.1	0.69	13.0	0.166	1.97	263	8.5	0.96	3260	4.41	1.00	145.5	16.3	790
HM02		8.50	23.8	0.27	3.9	0.112	3.11	63.1	13.0	1.52	1320	1.38	2.04	46.7	19.6	1200
HM03		9.55	24.6	0.22	6.1	0.105	4.63	39.5	9.0	0.41	1740	3.75	1.16	123.5	11.1	510
HM04		3.98	21.9	0.24	2.0	0.070	4.27	43.5	10.2	0.92	925	1.07	2.18	28.5	21.6	800
HM05		29.3	36.0	0.47	12.4	0.159	1.19	208	7.2	1.15	2520	5.08	0.86	156.5	31.8	800
HM06		10.05	45.1	2.55	21.9	0.081	4.11	1380	15.1	0.47	1180	2.31	1.78	63.3	20.3	1870
HM07		6.62	21.2	0.34	8.7	0.063	3.13	136.0	9.3	1.03	1420	1.08	2.00	36.2	29.3	890
HM08		6.08	21.3	0.16	1.6	0.057	1.91	18.3	6.6	0.91	1200	0.60	3.22	12.9	23.1	590
HM09		4.79	26.8	0.21	4.6	0.074	3.34	44.4	15.2	1.00	709	1.40	2.03	27.0	20.1	540
HM10		9.08	27.5	0.51	5.7	0.123	3.91	184.5	15.4	0.84	1780	3.04	1.48	84.6	24.5	1330
HM11		13.35	28.5	0.72	11.7	0.113	3.19	281	12.6	0.92	2150	2.29	1.51	87.4	25.9	2270
HM12		28.6	30.6	0.47	12.5	0.133	1.24	171.5	5.9	1.09	3420	1.97	1.03	82.3	40.8	1900
HM13		23.3	33.2	0.74	22.5	0.132	2.02	339	6.8	1.08	2840	2.35	1.22	97.1	30.8	1040
HM14		17.75	30.3	1.27	62.0	0.162	2.11	570	11.4	0.98	3780	2.90	1.26	187.5	23.4	1470
HM15		6.60	22.8	0.36	5.4	0.065	2.66	133.0	10.1	1.04	1320	1.15	2.31	32.4	23.5	490
HM16		7.96	22.4	0.25	2.4	0.079	2.84	63.1	10.0	0.89	1110	1.61	2.12	19.9	31.5	650
HM17		20.4	27.2	0.28	10.7	0.177	2.18	68.6	9.0	1.77	2710	6.18	1.02	169.0	33.3	780
HM18		15.35	27.5	0.48	5.2	0.155	2.23	175.5	10.2	1.91	2240	2.93	1.65	123.5	35.8	1970
HM19		19.35	27.5	0.36	6.6	0.201	2.28	121.0	9.3	1.60	2960	6.61	1.01	231	33.2	3200
HM20		7.97	28.0	0.44	7.4	0.140	4.33	159.0	17.0	0.39	1520	2.11	0.87	71.9	29.7	480
HM21		13.85	28.8	0.36	14.3	0.176	4.08	129.5	10.3	0.28	2200	9.95	0.76	234	17.6	990
HM22		28.3	31.4	0.66	39.6	0.327	0.95	302	4.2	0.24	4980	13.90	0.19	430	13.0	560
HM23		9.06	27.2	0.44	8.1	0.128	4.90	165.0	12.2	0.50	1640	2.60	1.11	76.5	18.9	700
HM24		28.8	38.1	0.57	20.7	0.192	1.91	283	6.0	0.38	3310	8.50	0.47	250	17.8	820
HM25		24.2	36.3	0.71	18.5	0.163	2.22	277	5.6	0.85	3280	3.02	0.76	158.0	32.2	1520
HM26		5.97	24.9	0.40	2.8	0.089	3.95	128.5	9.3	0.89	858	2.00	1.80	39.0	28.0	900
HM27		5.52	25.8	0.27	1.5	0.088	2.94	75.4	15.3	1.26	929	1.65	2.25	21.6	32.6	760
HM28		13.65	37.4	0.95	3.2	0.121	2.44	369	14.5	1.12	1370	3.41	1.47	40.8	51.7	1590
HM29		17.15	31.2	0.87	6.2	0.170	2.85	367	23.9	1.29	4220	13.20	1.23	151.5	54.6	2900
HM30		11.50	27.4	0.47	5.1	0.125	2.50	160.0	15.6	1.77	1770	2.16	1.87	77.4	43.0	3160
HM31		6.85	23.3	0.35	2.2	0.110	3.24	161.5	9.0	1.19	1280	1.42	1.58	28.5	34.1	920
HM32		6.10	24.4	0.67	2.9	0.096	3.67	328	8.1	0.66	1170	1.45	1.52	41.1	28.5	920
HM33		17.35	35.9	1.42	5.3	0.276	2.55	770	5.3	0.66	2030	5.96	0.94	189.5	24.1	1460
HM34		10.80	23.2	0.46	1.6	0.168	3.19	220	7.2	0.90	1500	3.30	1.81	151.5	16.7	950

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
HT38		31.5	153.5	<0.002	0.01	0.17	5.3	1	4.1	365	2.99	<0.05	45.3	1.070	1.02	4.5
HT39		32.0	95.2	<0.002	0.04	0.13	15.7	1	2.9	338	0.98	<0.05	18.0	0.650	0.47	1.8
HT40		24.0	85.9	<0.002	<0.01	0.07	11.1	1	1.0	396	0.40	<0.05	4.7	0.315	0.41	0.2
HT41		26.0	57.6	0.002	<0.01	0.05	31.2	5	1.3	306	5.89	<0.05	197.5	5.48	0.25	1.6
HT42		26.4	88.8	0.002	0.01	<0.05	16.9	3	2.3	336	3.48	<0.05	152.0	2.45	0.39	1.8
HT43		32.3	87.8	0.002	<0.01	<0.05	15.0	2	1.3	468	3.07	<0.05	81.9	2.34	0.35	1.2
HM01		21.9	77.9	<0.002	0.01	0.13	22.9	3	20.8	121.0	9.05	<0.05	191.5	5.36	0.39	9.9
HM02		21.0	129.5	<0.002	0.01	0.16	21.3	2	8.1	242	2.87	<0.05	22.2	1.730	0.57	2.1
HM03		28.7	163.0	<0.002	<0.01	0.12	10.8	1	7.5	238	6.48	<0.05	17.2	2.79	1.00	2.4
HM04		26.8	169.5	<0.002	0.67	0.09	13.3	2	3.4	383	1.67	<0.05	8.6	0.704	0.73	1.4
HM05		13.4	49.0	<0.002	0.01	0.11	22.9	3	19.3	124.5	10.00	<0.05	125.0	6.27	0.24	5.4
HM06		58.3	198.0	0.004	<0.01	0.89	10.1	10	8.8	253	4.83	<0.05	1020	1.435	0.82	73.0
HM07		31.9	110.5	<0.002	0.01	0.05	14.7	2	3.8	362	2.59	<0.05	85.0	2.14	0.66	8.3
HM08		13.9	40.0	<0.002	0.01	0.06	14.5	1	2.2	322	0.82	<0.05	11.2	1.105	0.18	0.8
HM09		30.6	195.0	<0.002	0.01	0.06	14.0	2	4.9	147.0	1.49	<0.05	12.0	0.725	1.00	2.1
HM10		32.3	166.0	<0.002	0.02	0.05	17.8	3	5.2	249	4.75	<0.05	86.5	1.830	0.81	6.2
HM11		29.3	133.5	<0.002	0.01	0.09	16.7	4	8.2	264	5.74	<0.05	225	2.38	0.61	15.1
HM12		13.6	36.3	<0.002	<0.01	0.11	22.5	4	10.9	191.0	5.32	<0.05	104.0	5.84	0.18	9.7
HM13		20.8	66.4	<0.002	<0.01	0.05	22.3	4	11.5	166.5	7.04	<0.05	226	4.48	0.30	16.2
HM14		36.3	86.3	0.003	<0.01	<0.05	23.6	7	13.6	196.5	13.80	<0.05	510	6.68	0.40	56.2
HM15		26.9	106.0	0.002	<0.01	<0.05	15.3	2	3.1	333	2.42	<0.05	125.5	1.605	0.51	11.4
HM16		27.7	94.7	<0.002	0.01	0.09	17.1	2	3.4	260	1.35	<0.05	25.9	1.200	0.53	3.6
HM17		15.0	76.1	<0.002	0.02	0.13	25.8	3	12.2	189.5	9.38	<0.05	31.4	5.43	0.38	4.0
HM18		23.0	82.5	0.002	0.02	0.13	30.9	4	10.7	297	7.11	<0.05	114.0	3.88	0.39	6.0
HM19		21.0	82.9	<0.002	0.01	0.39	27.1	4	11.6	262	12.00	<0.05	80.2	5.48	0.40	7.4
HM20		31.7	187.0	<0.002	0.01	0.06	13.4	2	7.8	151.0	3.87	<0.05	78.3	1.765	0.89	5.9
HM21		25.9	180.0	<0.002	0.01	0.10	15.4	3	8.2	207	13.10	<0.05	68.3	5.35	0.74	5.6
HM22		15.7	38.1	0.002	<0.01	0.05	19.6	5	20.2	48.9	20.0	<0.05	180.5	>10.0	0.18	14.6
HM23		33.9	215	0.002	0.01	0.38	12.9	3	6.9	191.5	4.17	<0.05	78.2	1.670	0.98	7.2
HM24		18.6	76.7	<0.002	<0.01	0.10	15.3	3	15.1	104.0	13.50	<0.05	166.0	6.87	0.35	11.1
HM25		24.0	81.5	0.002	0.01	0.20	20.7	5	18.3	185.0	10.80	0.05	230	5.81	0.40	18.3
HM26		40.1	144.0	<0.002	0.04	0.05	16.8	2	3.5	502	2.27	<0.05	62.2	1.120	0.69	3.5
HM27		28.2	98.6	<0.002	0.01	0.05	19.2	2	3.3	383	1.00	<0.05	22.0	0.672	0.44	1.3
HM28		28.1	100.0	0.002	0.01	0.13	22.9	4	7.1	281	1.95	<0.05	218	1.370	0.47	6.0
HM29		129.0	94.2	0.002	0.01	1.09	26.8	5	8.1	427	6.43	0.11	157.5	2.93	0.43	6.0
HM30		24.4	90.2	<0.002	0.03	0.25	23.9	4	6.0	418	3.90	0.05	82.4	1.765	0.44	4.4
HM31		32.8	117.0	<0.002	0.02	0.15	22.2	2	4.1	380	1.59	<0.05	82.5	0.905	0.54	3.3
HM32		40.0	126.5	<0.002	0.13	0.15	16.8	2	3.7	379	2.39	0.05	192.5	1.195	0.55	8.5
HM33		32.6	73.6	0.003	<0.01	0.12	35.4	5	8.9	230	9.44	<0.05	421	7.48	0.32	10.9
HM34		23.4	70.4	<0.002	<0.01	0.10	32.7	3	1.9	331	6.39	<0.05	72.3	5.69	0.30	1.0

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method Analyte Units LOR	ME-MS61r V ppm 1	ME-MS61r W ppm 0.1	ME-MS61r Y ppm 0.1	ME-MS61r Zn ppm 2	ME-MS61r Zr ppm 0.5	ME-MS61r Dy ppm 0.05	ME-MS61r Er ppm 0.03	ME-MS61r Eu ppm 0.03	ME-MS61r Gd ppm 0.05	ME-MS61r Ho ppm 0.01	ME-MS61r Lu ppm 0.01	ME-MS61r Nd ppm 0.1	ME-MS61r Pr ppm 0.03	ME-MS61r Sm ppm 0.03	ME-MS61r Tb ppm 0.01
HT38		70	1.2	19.3	42	159.5	4.36	2.15	1.59	8.58	0.76	0.33	75.0	20.4	13.10	0.97
HT39		91	0.6	32.6	94	55.4	6.91	3.75	2.10	7.86	1.37	0.53	57.9	14.75	10.75	1.12
HT40		56	0.1	26.7	42	15.7	5.76	3.10	2.64	6.05	1.13	0.41	32.6	8.03	7.01	0.93
HT41		222	0.4	93.9	184	33.6	19.55	10.10	2.77	32.6	3.74	1.51	403	108.0	59.1	3.75
HT42		140	0.4	73.9	84	50.7	16.60	7.59	2.84	29.1	2.98	0.93	296	83.1	48.8	3.38
HT43		117	0.4	42.6	90	44.4	10.05	4.81	3.01	17.95	1.87	0.69	199.0	53.4	31.3	2.00
HM01		604	3.3	66.5	153	431	14.75	7.66	2.02	23.2	2.78	1.12	244	64.2	41.7	2.77
HM02		223	1.5	51.9	92	136.5	10.85	6.18	2.16	11.35	2.23	0.83	68.9	17.15	14.10	1.75
HM03		199	2.2	29.0	104	217	6.16	3.56	2.28	6.25	1.23	0.54	38.4	9.98	7.60	0.98
HM04		87	0.9	38.2	66	62.9	7.73	4.37	2.19	8.29	1.54	0.58	49.2	11.90	10.25	1.26
HM05		866	3.3	57.0	193	400	12.30	6.52	1.83	16.45	2.43	0.97	164.0	44.3	26.3	2.22
HM06		165	5.0	186.5	82	>500	53.3	15.20	4.03	105.0	7.69	1.32	>1000	332	185.5	12.65
HM07		151	2.3	36.8	80	298	9.02	3.89	2.14	14.30	1.55	0.51	119.0	30.9	21.5	1.83
HM08		143	0.8	21.1	74	46.1	4.24	2.40	2.04	4.56	0.88	0.37	22.2	5.27	4.97	0.69
HM09		102	1.4	38.6	68	161.0	8.55	4.45	1.85	9.37	1.67	0.58	48.9	11.90	10.55	1.43
HM10		153	2.1	55.2	126	205	14.05	6.08	3.07	22.1	2.43	0.78	175.0	44.2	32.8	2.80
HM11		262	2.4	73.6	123	414	17.90	7.54	3.78	30.4	3.00	0.96	258	72.2	47.6	3.68
HM12		732	3.2	52.8	154	412	12.90	5.71	2.70	19.65	2.26	0.77	159.0	40.9	29.1	2.53
HM13		519	9.0	82.2	131	>500	19.70	8.27	3.06	31.1	3.36	1.17	290	83.0	48.4	3.82
HM14		356	7.8	142.5	157	>500	36.1	13.30	3.14	62.4	5.76	1.86	563	150.0	98.3	7.74
HM15		161	4.4	40.7	62	178.5	9.78	4.15	1.95	14.65	1.70	0.53	116.0	30.5	21.9	1.94
HM16		160	2.2	29.8	74	76.4	6.77	3.45	2.69	9.25	1.26	0.47	64.7	16.30	12.65	1.24
HM17		478	3.9	52.5	208	369	11.25	6.64	1.93	11.50	2.31	1.03	73.0	18.60	14.50	1.78
HM18		411	3.0	95.3	181	171.0	19.10	9.87	3.55	24.5	3.66	1.41	178.0	44.8	34.7	3.41
HM19		405	6.0	96.5	251	254	18.55	10.70	3.73	19.45	3.81	1.54	124.5	31.5	24.7	2.98
HM20		121	2.0	41.2	85	274	10.15	4.73	2.50	16.25	1.81	0.64	140.0	36.2	25.4	2.03
HM21		254	5.0	44.7	176	>500	9.91	5.20	2.68	12.45	1.94	0.79	108.0	28.9	18.65	1.74
HM22		453	7.7	62.8	332	>500	14.25	6.75	1.78	24.3	2.56	1.19	254	73.3	42.0	2.89
HM23		144	2.2	43.5	107	286	10.40	4.96	2.47	16.35	1.88	0.70	146.5	38.1	26.2	2.01
HM24		550	4.5	50.1	238	>500	12.55	5.64	2.08	21.3	2.22	0.85	221	63.0	35.8	2.56
HM25		534	4.1	88.6	173	>500	23.0	8.29	3.80	37.9	3.64	1.01	273	74.7	53.9	4.85
HM26		133	35.3	37.6	74	86.8	9.11	4.20	2.89	14.50	1.63	0.58	118.5	30.5	21.7	1.77
HM27		124	1.1	41.7	73	47.4	9.07	4.56	3.15	11.50	1.74	0.59	72.8	17.85	14.80	1.65
HM28		398	38.0	81.4	143	99.1	20.5	7.76	5.33	44.7	3.32	0.97	424	107.0	74.0	4.89
HM29		378	4.8	101.0	275	219	24.2	10.00	8.56	41.4	4.09	1.26	348	96.8	64.1	5.00
HM30		269	2.8	85.0	144	178.5	17.10	8.44	4.06	22.3	3.22	1.08	163.5	40.8	31.6	3.07
HM31		138	1.4	48.5	87	72.4	10.25	5.39	2.74	15.80	1.92	0.76	139.5	37.8	24.1	1.97
HM32		147	1.2	42.5	85	99.0	10.85	4.31	3.49	26.7	1.72	0.56	285	78.5	48.5	2.65
HM33		455	2.2	89.9	170	162.0	26.2	8.58	4.59	62.4	3.82	0.90	711	197.0	115.0	6.76
HM34		283	0.7	64.6	141	44.0	13.60	7.66	2.58	19.40	2.70	1.09	188.5	52.2	29.0	2.48

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method Analyte Units LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
HT38		0.30	2.11
HT39		0.56	3.55
HT40		0.44	2.78
HT41		1.48	9.35
HT42		1.03	6.18
HT43		0.69	4.37
HM01		1.14	7.34
HM02		0.90	5.76
HM03		0.54	3.48
HM04		0.62	3.80
HM05		0.97	6.18
HM06		1.70	9.07
HM07		0.53	3.30
HM08		0.36	2.37
HM09		0.64	3.94
HM10		0.86	5.29
HM11		1.04	6.42
HM12		0.81	4.98
HM13		1.18	7.43
HM14		1.80	11.30
HM15		0.56	3.52
HM16		0.50	3.16
HM17		1.04	6.66
HM18		1.46	9.38
HM19		1.59	10.05
HM20		0.66	4.19
HM21		0.74	4.81
HM22		1.01	7.07
HM23		0.73	4.56
HM24		0.82	5.24
HM25		1.08	6.53
HM26		0.62	3.91
HM27		0.65	3.97
HM28		1.05	6.42
HM29		1.39	8.43
HM30		1.20	7.49
HM31		0.78	5.04
HM32		0.57	3.63
HM33		1.03	6.04
HM34		1.08	7.04

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
HM35		0.15	<0.001	<0.01	4.34	0.3	1010	0.72	0.05	0.27	<0.02	115.0	7.1	45	1.86	4.7
HM36		0.13	<0.001	<0.01	3.81	0.7	720	1.23	0.06	0.35	<0.02	>500	21.0	72	1.45	10.8
HM37		0.13	0.001	0.15	10.75	1.0	830	4.00	0.72	0.53	0.08	170.5	25.8	58	5.49	33.6
HM38		0.12	0.001	<0.01	6.00	1.4	690	2.07	0.14	0.51	<0.02	>500	24.0	58	2.57	13.2
HM39		0.14	0.001	0.07	9.37	1.0	920	3.61	0.77	0.63	<0.02	301	21.0	64	5.66	29.1
HM40		0.13	<0.001	<0.01	3.22	0.8	550	0.86	0.05	0.47	<0.02	327	38.6	58	0.32	4.9
HM41		0.13	<0.001	<0.01	5.91	1.2	960	1.50	0.05	1.39	0.02	>500	23.8	143	0.86	9.7
HM42		0.13	<0.001	<0.01	5.13	0.7	640	1.60	0.05	0.90	0.03	128.5	33.9	86	0.60	9.6
HM43		0.14	<0.001	<0.01	3.41	2.0	600	1.29	0.06	0.50	0.03	>500	31.2	172	0.66	8.4
HM44		0.13	<0.001	0.02	8.07	0.8	1150	2.53	0.04	1.55	0.05	285	22.6	102	1.19	16.4
HM45		0.12	<0.001	<0.01	6.47	1.4	920	1.86	0.07	2.54	0.08	>500	29.8	220	0.53	13.6
HM46		0.12	0.001	<0.01	4.63	1.7	630	1.37	0.12	1.08	0.06	>500	32.0	238	0.60	14.6
HM47		0.15	<0.001	0.03	8.74	0.8	1290	2.45	0.07	2.75	0.08	109.0	19.2	122	1.05	12.0
HM48		0.15	<0.001	0.02	8.79	0.3	940	2.45	0.04	2.31	0.03	112.0	16.3	78	0.93	9.4
HS01		0.12	0.001	0.03	7.63	0.5	1250	1.18	0.05	1.14	0.07	119.0	10.8	74	1.06	15.8
HS02		0.13	0.001	0.02	7.53	0.8	1310	1.23	0.04	1.12	0.11	149.0	9.5	84	0.97	15.0
HS03		0.17	0.001	<0.01	5.06	1.2	720	0.87	0.06	0.94	0.08	>500	28.3	156	0.35	11.6
HS04		0.16	<0.001	0.01	8.23	0.6	1400	2.16	0.05	1.69	0.03	154.5	8.7	58	1.33	8.8
HS05		0.13	<0.001	<0.01	4.93	1.4	730	1.67	0.10	1.34	<0.02	>500	22.2	143	1.42	7.3
HS06		0.16	0.001	0.03	8.33	1.1	1160	2.52	0.07	2.77	0.04	83.3	12.0	82	2.36	17.5
HS07		0.15	<0.001	<0.01	5.75	1.0	970	1.60	0.11	1.81	0.03	>500	15.2	82	2.81	6.6
HS08		0.13	<0.001	0.02	7.29	0.9	1150	2.32	0.07	0.98	<0.02	316	10.6	74	4.19	10.5
HS09		0.13	<0.001	0.01	7.69	0.4	1010	2.23	0.06	1.58	0.02	366	11.2	56	2.23	11.8
HS10		0.13	0.001	0.02	6.88	1.2	1070	2.51	0.08	2.43	0.02	403	11.4	53	4.40	12.5
HS11		0.13	<0.001	<0.01	5.45	1.4	710	1.86	0.09	1.31	<0.02	>500	19.1	133	1.47	7.2
HS12		0.14	<0.001	<0.01	7.71	1.0	870	3.42	0.07	1.30	<0.02	480	20.4	72	1.90	10.7
HS13		0.14	<0.001	<0.01	6.89	0.7	790	2.58	0.07	1.66	<0.02	490	24.4	125	1.41	9.7
HS14		0.17	<0.001	0.02	8.80	1.6	1510	4.65	0.12	1.26	<0.02	175.5	18.5	54	4.33	16.7
HS15		0.13	<0.001	0.01	8.90	0.4	1160	3.65	0.06	1.94	0.02	85.4	12.7	46	2.57	6.4
HS16		0.14	<0.001	<0.01	2.76	2.1	430	1.06	0.07	0.57	<0.02	>500	32.4	284	0.76	6.9
HS17		0.16	<0.001	<0.01	4.82	1.7	680	1.62	0.11	0.98	0.02	>500	26.1	142	1.81	9.9
HS18		0.11	<0.001	<0.01	7.85	0.5	1610	1.19	0.02	1.70	0.08	>500	14.2	64	0.31	8.5
HS19		0.13	<0.001	0.02	7.53	0.5	1380	1.65	0.04	1.43	0.03	>500	14.1	54	1.04	7.5
HS20		0.11	<0.001	<0.01	6.50	1.0	1790	3.27	0.05	1.46	0.03	484	8.7	40	0.85	3.5
HS21		0.10	<0.001	0.01	7.70	2.2	1930	3.08	0.05	1.24	0.07	365	25.9	15	1.12	5.7
HS22		0.14	<0.001	<0.01	7.87	0.8	1500	2.95	0.04	1.38	0.04	275	6.4	14	0.79	3.0
HS23		0.08	<0.001	<0.01	7.84	0.8	1480	2.15	0.05	1.88	0.05	268	14.1	40	0.50	6.2
HS24		0.14	<0.001	<0.01	7.68	0.7	1430	2.31	0.05	2.24	0.07	239	15.1	45	0.41	6.0
HS25		0.11	<0.001	0.01	8.44	0.5	2010	2.30	0.03	1.35	0.04	87.9	5.3	16	1.13	4.0
HS26		0.14	<0.001	<0.01	5.23	1.8	1310	2.66	0.07	2.39	0.05	197.0	13.8	54	0.55	6.8

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
HM35		3.96	11.00	0.18	9.6	0.058	3.99	50.1	5.2	0.10	1060	1.05	0.45	69.4	7.3	320
HM36		18.40	25.3	0.52	42.1	0.237	3.34	271	8.7	0.17	5270	3.48	0.54	255	9.4	490
HM37		4.68	34.9	0.24	2.8	0.111	3.46	67.1	27.7	0.45	2150	1.14	0.38	36.7	38.2	1200
HM38		11.80	29.4	1.03	49.8	0.174	3.12	550	10.3	0.27	3450	3.33	0.48	197.0	16.0	1020
HM39		5.61	28.8	0.32	7.7	0.108	3.38	135.0	24.4	0.54	1330	1.56	0.51	50.7	36.7	1000
HM40		24.4	31.2	0.31	25.1	0.324	2.57	150.5	4.7	0.29	7910	9.48	0.51	368	13.3	450
HM41		13.65	32.4	0.85	8.1	0.141	3.40	440	6.6	0.61	1980	3.38	1.17	126.5	21.3	1100
HM42		23.0	39.1	0.22	4.8	0.222	3.34	48.3	7.2	0.61	2390	8.73	0.61	190.0	22.0	480
HM43		24.2	43.9	1.27	16.4	0.297	2.30	590	6.0	0.28	3690	9.04	0.47	318	24.3	1200
HM44		7.04	23.2	0.30	4.4	0.096	3.36	129.5	11.1	0.65	1250	1.45	1.33	63.1	30.1	1020
HM45		14.30	34.9	0.85	5.1	0.203	2.54	404	7.0	1.32	2000	2.98	1.51	98.9	39.4	1850
HM46		22.5	56.3	3.46	8.1	0.263	1.58	2040	5.4	0.80	2370	4.27	0.75	189.0	29.9	3040
HM47		4.49	23.1	0.18	1.9	0.071	3.88	48.1	7.7	1.22	903	1.19	2.05	22.7	31.4	820
HM48		4.69	22.8	0.17	1.7	0.068	3.17	48.4	10.8	0.86	649	0.83	2.03	24.6	26.3	630
HS01		3.94	18.15	0.17	1.3	0.055	3.63	53.9	6.0	0.64	729	0.90	1.31	9.7	27.4	600
HS02		4.38	17.95	0.19	1.9	0.063	3.42	68.5	5.6	0.75	811	1.05	1.24	11.5	26.8	610
HS03		15.50	30.4	1.75	13.5	0.294	2.03	900	4.7	0.73	2220	6.28	0.91	265	21.3	1420
HS04		4.28	23.7	0.22	4.0	0.065	5.01	67.2	7.9	0.60	621	1.04	1.79	27.5	16.1	720
HS05		15.45	31.1	0.82	48.4	0.167	3.21	438	7.9	0.58	3100	3.29	0.96	206	20.9	1110
HS06		3.27	22.5	0.17	3.7	0.062	4.67	32.6	10.2	0.62	631	1.54	1.71	20.8	31.2	560
HS07		9.40	23.7	0.53	21.1	0.109	4.45	271	10.4	0.51	1900	1.67	0.92	112.5	13.7	880
HS08		4.63	25.0	0.34	12.4	0.072	4.79	137.0	15.9	0.33	835	1.03	1.24	42.4	16.9	580
HS09		3.40	22.6	0.38	5.4	0.072	2.98	156.0	17.8	0.45	799	0.47	1.84	18.7	17.2	610
HS10		4.13	21.4	0.42	9.4	0.082	4.29	171.5	17.0	0.36	861	0.71	1.00	43.4	14.8	550
HS11		11.50	32.1	1.07	22.1	0.230	2.88	500	10.7	0.53	2390	1.51	1.27	109.5	20.7	1070
HS12		6.30	24.5	0.41	10.1	0.123	3.27	239	17.2	0.61	1840	2.02	1.31	108.5	23.1	770
HS13		11.80	26.6	0.45	24.3	0.133	3.16	246	14.4	0.87	1870	2.61	1.32	111.0	27.3	800
HS14		5.57	24.8	0.21	6.8	0.091	4.40	74.7	11.3	0.54	1340	1.80	1.23	78.9	22.3	970
HS15		2.82	24.5	0.17	3.5	0.052	4.87	33.4	14.8	0.70	606	0.68	1.96	25.1	17.2	390
HS16		25.1	49.6	2.82	76.5	0.293	1.55	1580	6.9	0.36	3930	4.48	0.51	259	24.9	2310
HS17		15.95	23.9	0.62	49.0	0.171	2.73	322	6.4	0.54	3010	3.16	0.83	197.0	21.1	770
HS18		8.00	24.9	0.94	2.0	0.134	3.43	490	7.1	0.39	1180	2.94	1.93	142.0	11.5	1630
HS19		6.20	22.8	0.59	7.4	0.102	4.02	289	6.7	0.37	1380	1.70	1.76	97.4	11.7	840
HS20		10.80	26.1	0.44	23.2	0.139	3.21	241	7.4	0.32	2620	2.56	1.82	207	7.0	990
HS21		6.40	26.5	0.34	6.0	0.110	3.55	169.5	12.5	0.32	5950	2.91	1.78	170.5	9.5	1310
HS22		5.01	25.5	0.30	6.7	0.095	4.09	127.0	6.4	0.28	1620	2.06	2.40	156.5	4.2	490
HS23		6.41	22.5	0.31	4.3	0.098	3.16	130.0	7.4	0.46	1770	1.73	2.22	152.0	9.7	640
HS24		8.19	23.9	0.28	8.7	0.138	2.81	112.5	7.2	0.58	2230	2.60	2.38	194.5	9.0	960
HS25		2.00	22.0	0.16	2.7	0.042	4.81	42.8	7.5	0.20	540	0.67	2.23	36.8	6.3	470
HS26		16.65	24.3	0.28	11.6	0.126	2.35	87.4	5.3	0.50	3340	3.64	1.58	226	8.5	3980

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
HM35		33.5	148.0	<0.002	<0.01	0.13	7.1	1	7.5	226	4.35	<0.05	38.4	2.09	0.66	4.3
HM36		34.5	156.0	<0.002	<0.01	0.15	21.7	4	31.3	165.5	14.05	<0.05	355	8.13	0.68	26.0
HM37		35.6	220	<0.002	0.02	0.21	19.0	3	6.1	138.5	2.53	<0.05	30.4	0.716	1.23	3.3
HM38		38.0	166.5	<0.002	0.01	0.15	22.3	7	17.5	153.0	14.10	<0.05	375	6.48	0.71	23.1
HM39		35.6	205	<0.002	0.01	0.22	18.1	3	5.6	178.0	2.91	<0.05	78.5	1.175	1.01	5.9
HM40		18.8	93.4	<0.002	<0.01	0.15	21.7	3	16.6	126.5	17.95	<0.05	98.0	>10.0	0.39	7.7
HM41		32.3	117.5	0.002	<0.01	0.13	18.9	4	10.7	293	7.34	<0.05	301	4.40	0.52	9.3
HM42		19.4	124.5	<0.002	<0.01	0.21	21.7	2	7.8	152.0	9.73	<0.05	22.6	5.21	0.54	1.8
HM43		31.8	90.1	0.003	<0.01	0.27	25.6	7	16.7	160.5	15.65	<0.05	375	7.71	0.40	15.2
HM44		29.3	126.0	<0.002	0.01	0.18	18.6	2	5.0	329	3.06	<0.05	52.9	2.01	0.55	3.2
HM45		28.8	80.5	0.002	0.01	0.15	30.8	4	11.4	319	5.39	0.05	251	4.22	0.36	7.7
HM46		52.1	57.2	0.005	0.01	0.13	33.1	9	14.2	273	11.45	0.05	970	7.90	0.27	45.5
HM47		38.7	116.5	<0.002	0.01	0.14	16.5	2	3.3	508	1.41	<0.05	20.7	0.696	0.57	1.7
HM48		28.1	113.0	<0.002	<0.01	0.11	14.2	1	3.2	355	1.31	<0.05	16.8	0.735	0.50	0.9
HS01		49.5	126.5	<0.002	0.02	0.09	12.7	1	1.3	344	0.59	<0.05	21.8	0.377	0.65	1.7
HS02		49.6	117.0	<0.002	0.02	0.09	16.8	2	0.8	402	0.68	<0.05	27.4	0.442	0.59	2.3
HS03		32.7	62.8	0.003	0.01	0.09	36.6	6	8.8	222	12.40	<0.05	411	9.14	0.29	18.8
HS04		43.3	172.0	<0.002	0.01	0.10	10.0	1	3.8	431	1.70	<0.05	36.7	0.774	0.75	3.1
HS05		35.7	134.5	<0.002	<0.01	0.32	18.3	5	14.8	277	12.15	<0.05	318	6.13	0.58	23.3
HS06		38.9	179.5	<0.002	0.03	0.14	10.2	1	3.0	391	1.42	<0.05	15.0	0.405	0.92	2.2
HS07		34.4	201	<0.002	0.01	0.25	11.7	3	10.7	283	7.13	<0.05	193.0	3.41	0.88	12.2
HS08		49.7	222	<0.002	0.01	0.19	7.5	2	5.1	320	2.92	<0.05	102.0	0.888	1.10	11.1
HS09		38.9	133.0	<0.002	0.01	0.14	10.5	2	3.4	370	1.09	<0.05	94.3	0.782	0.64	6.0
HS10		51.5	195.5	<0.002	0.02	0.21	9.5	3	5.0	277	3.03	<0.05	171.5	1.265	0.91	56.0
HS11		40.5	115.0	<0.002	<0.01	0.16	22.9	8	13.7	222	7.18	<0.05	280	4.30	0.50	20.5
HS12		37.1	157.5	<0.002	0.01	0.17	16.8	3	8.7	351	6.49	<0.05	161.0	2.73	0.72	6.9
HS13		34.6	137.5	<0.002	0.01	0.14	21.1	3	13.3	281	7.17	<0.05	155.5	4.02	0.62	11.5
HS14		40.7	199.5	<0.002	0.01	0.22	12.3	2	7.3	521	5.52	<0.05	94.1	1.860	0.84	6.2
HS15		43.7	212	<0.002	0.01	0.14	9.3	1	3.5	491	1.96	<0.05	13.8	0.540	0.95	2.3
HS16		56.9	65.9	0.003	<0.01	0.16	30.5	14	26.1	161.0	15.95	0.05	880	8.89	0.31	68.3
HS17		37.5	123.5	0.002	<0.01	0.22	23.5	4	14.8	227	12.05	0.05	323	7.81	0.56	27.9
HS18		29.6	82.7	<0.002	<0.01	0.13	23.5	4	1.1	396	5.72	<0.05	218	4.74	0.31	3.4
HS19		33.5	138.5	<0.002	<0.01	0.16	14.2	2	4.2	411	5.26	<0.05	145.0	3.50	0.57	5.7
HS20		23.0	95.0	<0.002	<0.01	0.17	12.4	3	5.8	425	12.05	<0.05	221	3.56	0.36	15.9
HS21		24.7	114.5	<0.002	0.01	0.24	10.6	3	3.9	341	9.46	<0.05	57.8	2.05	0.44	3.3
HS22		23.4	114.0	<0.002	<0.01	0.15	9.0	2	4.1	310	8.79	<0.05	60.6	1.900	0.42	5.2
HS23		21.2	84.5	<0.002	<0.01	0.13	14.9	2	3.4	377	8.15	<0.05	47.3	3.93	0.31	2.9
HS24		19.4	70.8	<0.002	<0.01	0.14	19.5	2	4.1	369	10.25	<0.05	40.9	4.76	0.27	3.7
HS25		32.3	145.5	<0.002	<0.01	0.12	5.4	1	1.9	502	2.10	<0.05	11.4	0.615	0.60	1.5
HS26		17.5	65.0	<0.002	<0.01	0.22	15.4	3	6.0	400	13.40	<0.05	65.3	5.44	0.24	9.7

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
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Edenvale - Johannesburg GAUTENG 1610
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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
HM35		82	1.9	16.5	56	312	3.48	1.94	1.12	4.95	0.66	0.36	41.9	11.50	7.03	0.67
HM36		316	7.8	61.8	232	>500	13.75	6.85	1.78	22.4	2.44	1.18	211	61.7	33.9	2.78
HM37		77	2.3	68.4	112	95.0	15.10	8.30	2.78	16.05	2.98	1.03	79.8	20.3	16.85	2.55
HM38		233	4.5	136.0	166	>500	35.3	13.55	3.35	56.7	5.52	1.67	489	138.0	85.9	7.57
HM39		94	2.1	52.9	107	257	11.35	5.61	2.64	16.00	2.09	0.74	118.0	31.9	21.4	2.17
HM40		360	6.0	44.5	301	>500	9.39	5.14	1.47	12.55	1.81	0.90	118.0	33.8	18.45	1.70
HM41		341	2.1	77.8	129	279	22.4	6.93	4.03	46.7	3.29	0.64	387	106.0	71.5	5.36
HM42		507	4.1	37.3	203	174.5	8.00	4.58	1.92	8.51	1.59	0.64	49.7	13.00	9.89	1.35
HM43		446	6.8	103.0	289	>500	31.1	9.36	5.19	67.3	4.34	1.00	607	165.5	109.5	7.77
HM44		179	2.3	40.0	90	153.0	9.12	4.18	2.95	14.45	1.65	0.55	111.5	30.5	19.90	1.86
HM45		413	1.9	80.2	158	159.0	20.5	8.33	4.06	41.5	3.38	0.92	387	107.0	67.4	4.54
HM46		578	63.4	133.5	196	264	45.1	11.00	8.80	144.0	5.55	1.10	>1000	497	282	13.50
HM47		102	1.4	30.5	59	60.1	6.31	3.49	2.33	7.20	1.22	0.48	45.6	11.90	8.76	1.08
HM48		118	0.5	31.0	55	61.9	6.42	3.59	2.21	7.70	1.26	0.49	46.8	12.20	9.20	1.13
HS01		67	0.5	25.9	64	46.0	5.34	2.94	2.08	6.96	1.03	0.42	48.5	13.00	8.87	0.97
HS02		67	0.6	34.9	61	64.4	6.78	3.93	2.10	8.54	1.38	0.58	62.4	16.35	11.15	1.21
HS03		414	3.3	86.4	221	409	26.1	8.23	5.36	74.8	3.60	1.04	860	236	143.0	7.32
HS04		80	0.8	29.2	59	126.0	6.57	3.19	2.07	8.74	1.20	0.40	62.1	16.50	11.60	1.22
HS05		340	3.8	77.2	165	>500	18.70	8.13	2.52	37.3	3.09	1.29	381	108.0	63.3	4.13
HS06		71	1.2	24.2	49	117.5	5.29	2.94	1.84	5.95	1.04	0.43	32.2	8.87	6.87	0.90
HS07		192	2.7	49.9	114	>500	12.35	5.46	2.28	22.7	2.08	0.81	223	62.7	36.6	2.67
HS08		100	1.8	45.1	50	360	12.10	4.23	2.12	20.1	1.86	0.52	132.0	34.6	26.2	2.61
HS09		81	0.9	47.9	51	172.0	13.55	4.47	2.93	25.3	2.05	0.47	154.5	41.0	32.1	3.10
HS10		96	3.6	55.5	59	287	15.35	5.30	2.49	27.0	2.36	0.56	167.0	44.5	34.0	3.39
HS11		260	3.5	136.5	99	>500	39.5	12.30	4.16	70.7	5.76	1.13	503	135.5	98.7	9.04
HS12		133	2.2	51.8	111	357	12.45	5.29	2.16	19.20	2.13	0.62	179.0	52.8	28.8	2.50
HS13		303	2.7	61.5	121	>500	14.55	6.43	2.25	22.4	2.52	0.88	193.0	55.1	33.2	2.96
HS14		130	4.6	38.7	85	227	7.96	4.31	2.37	9.38	1.52	0.58	65.2	17.65	12.05	1.42
HS15		69	1.6	22.9	42	99.8	4.58	2.59	1.65	5.08	0.92	0.36	28.8	7.98	6.09	0.78
HS16		643	6.1	258	208	>500	76.2	22.8	7.81	154.5	11.30	2.15	>1000	402	244	18.20
HS17		416	5.7	75.0	176	>500	17.65	8.09	2.30	32.1	3.03	1.31	277	78.0	47.5	3.76
HS18		173	0.6	60.9	118	66.8	14.70	6.98	2.97	34.4	2.57	1.01	455	126.5	67.9	3.23
HS19		152	1.7	37.6	100	231	9.87	3.91	2.68	22.2	1.56	0.53	250	69.3	38.3	2.30
HS20		113	2.1	60.4	137	>500	13.70	6.55	4.20	19.65	2.44	0.93	185.5	52.7	29.0	2.57
HS21		49	1.6	44.5	133	176.5	10.35	4.97	3.95	15.70	1.85	0.65	145.0	40.0	23.7	1.98
HS22		52	1.4	38.2	105	195.5	8.85	4.20	2.80	13.15	1.58	0.58	113.0	30.8	18.95	1.69
HS23		150	2.1	31.3	116	129.0	7.49	3.36	2.71	12.05	1.28	0.45	110.0	30.6	18.15	1.48
HS24		178	2.3	42.6	159	269	9.42	4.90	3.33	12.60	1.75	0.73	99.6	27.1	17.10	1.69
HS25		31	0.7	18.5	51	84.0	4.21	2.06	2.64	5.43	0.76	0.29	38.6	10.25	7.09	0.76
HS26		258	2.9	48.3	143	348	10.75	5.46	3.81	14.05	2.00	0.72	96.1	24.3	18.20	1.93

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
HM35		0.30	2.17
HM36		1.02	7.23
HM37		1.14	7.05
HM38		1.73	10.85
HM39		0.77	4.92
HM40		0.77	5.38
HM41		0.77	4.32
HM42		0.66	4.25
HM43		1.08	6.55
HM44		0.58	3.68
HM45		1.05	6.33
HM46		1.22	6.90
HM47		0.50	3.28
HM48		0.51	3.28
HS01		0.43	2.78
HS02		0.58	3.79
HS03		1.05	6.60
HS04		0.43	2.71
HS05		1.15	7.79
HS06		0.43	2.83
HS07		0.76	5.07
HS08		0.53	3.32
HS09		0.53	3.15
HS10		0.63	3.75
HS11		1.35	7.74
HS12		0.68	4.13
HS13		0.86	5.55
HS14		0.61	3.92
HS15		0.38	2.45
HS16		2.51	14.20
HS17		1.17	8.00
HS18		0.99	6.38
HS19		0.51	3.29
HS20		0.90	5.84
HS21		0.68	4.24
HS22		0.59	3.77
HS23		0.45	2.82
HS24		0.69	4.56
HS25		0.29	1.85
HS26		0.74	4.68

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Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
HS27		0.17	0.001	0.03	5.48	1.7	750	2.78	0.07	1.44	<0.02	>500	14.4	56	0.59	5.9
HS28		0.15	<0.001	<0.01	3.44	1.6	800	1.81	0.07	1.50	0.02	393	15.4	69	0.36	6.3
HS29		0.09	0.001	<0.01	5.86	0.9	1290	2.15	0.05	1.50	0.09	471	12.8	48	0.52	6.8
HS30		0.10	<0.001	<0.01	7.99	1.4	2540	4.13	0.05	2.58	0.07	234	7.0	29	0.91	3.1
HS31		0.13	<0.001	0.01	6.90	1.3	1360	4.77	0.06	2.45	0.05	>500	18.6	248	1.86	12.2
HS32		0.12	<0.001	<0.01	8.46	0.6	1780	3.70	0.03	1.71	<0.02	225	7.7	65	1.62	5.0
HS33		0.12	<0.001	0.01	8.79	1.5	1950	5.15	0.05	2.47	0.02	254	13.8	126	3.46	11.6
HS34		0.11	<0.001	0.01	8.37	0.5	1240	2.88	0.05	1.71	0.03	247	12.3	64	1.95	6.5
HS35		0.11	<0.001	0.02	9.09	0.5	2160	3.45	0.03	1.43	0.03	75.6	8.0	55	2.34	7.8
HS36		0.13	<0.001	0.01	8.41	0.9	1560	2.98	0.04	1.81	0.05	>500	13.1	81	1.68	9.3
HS37		0.13	<0.001	0.03	8.76	0.3	1630	1.57	0.05	1.92	0.08	103.5	9.8	53	0.80	15.1
HS38		0.14	<0.001	0.01	8.59	0.9	1870	2.49	0.03	1.95	0.04	142.0	7.3	33	0.93	5.2
HS39		0.10	<0.001	<0.01	3.78	1.3	390	1.22	0.05	1.32	0.09	>500	42.5	127	0.21	7.5
HS40		0.12	<0.001	<0.01	8.54	1.0	2420	3.69	0.05	1.85	0.03	136.5	5.4	16	0.91	2.1
HS41		0.16	<0.001	<0.01	9.16	0.8	2700	3.56	0.03	1.31	0.02	74.1	3.9	10	1.05	1.9
IM01		0.13	0.001	0.03	5.03	5.4	290	1.61	0.22	2.96	0.22	463	34.1	77	1.38	17.9
IM02		0.13	<0.001	<0.01	3.95	3.1	170	1.09	0.12	2.67	0.14	216	47.4	119	0.65	16.2
IM03		0.13	0.001	0.01	7.33	2.7	450	1.68	0.16	2.82	0.19	171.5	23.4	72	1.57	28.8
IM04		0.14	<0.001	<0.01	5.65	1.6	270	0.89	0.09	2.23	0.10	457	21.5	59	0.50	15.5
IM05		0.15	0.001	0.01	6.59	1.3	510	1.13	0.13	4.71	0.08	87.3	24.9	53	0.28	21.0
IM06		0.14	<0.001	<0.01	5.37	1.6	260	1.33	0.12	2.50	0.14	>500	27.1	104	0.84	19.1
IM07		0.14	<0.001	<0.01	5.14	3.2	240	1.12	0.12	2.53	0.16	339	30.6	119	0.45	18.7
IM08		0.13	<0.001	0.01	5.86	1.4	360	1.48	0.18	2.57	0.27	375	24.2	130	0.76	23.3
IM09		0.16	<0.001	0.02	7.98	4.8	280	0.87	0.08	2.92	0.11	86.6	19.9	36	0.80	25.7
IM10		0.17	<0.001	<0.01	6.94	4.6	210	1.09	0.14	4.26	0.19	105.5	28.1	93	0.61	21.7
IM11		0.16	<0.001	0.04	7.67	3.6	210	0.91	0.11	4.15	0.25	145.0	29.8	70	0.34	34.9
IM12		0.12	<0.001	0.03	7.63	5.2	220	1.09	0.12	3.71	0.25	62.7	24.9	57	0.50	28.8
IM13		0.12	0.001	0.03	6.74	1.7	150	0.54	0.10	3.21	0.13	126.5	29.3	61	0.39	35.0
IM14		0.14	0.001	0.04	6.95	4.7	160	0.84	0.13	4.46	0.20	42.6	37.3	86	0.26	35.5
IM15		0.14	<0.001	0.03	8.54	0.9	210	1.06	0.09	4.02	0.16	56.3	25.4	59	0.35	27.6
IM16		0.15	<0.001	0.03	8.67	7.5	240	1.19	0.09	3.47	0.14	50.6	19.8	43	0.54	29.8
IM17		0.13	<0.001	0.03	8.26	4.5	220	1.01	0.11	3.73	0.17	156.0	25.7	54	0.43	29.9
IM18		0.14	<0.001	0.03	8.50	1.9	260	1.17	0.10	3.66	0.15	188.0	26.0	54	0.57	35.1
IM19		0.15	0.001	0.04	7.11	1.1	430	1.48	0.08	3.15	0.10	74.0	30.6	91	1.75	34.9
IM20		0.13	0.001	0.04	7.03	1.5	370	1.57	0.07	3.45	0.12	92.9	35.7	98	1.10	34.5
IM21		0.16	<0.001	0.03	8.05	2.2	250	1.60	0.13	4.87	0.13	60.9	30.9	89	0.55	26.5
IM22		0.12	0.001	0.03	7.38	3.2	280	1.32	0.09	3.86	0.11	72.0	28.6	76	0.67	30.8
IM23		0.13	<0.001	0.03	8.86	0.9	140	0.68	0.08	3.01	0.17	24.9	15.4	29	0.31	30.1
IM24		0.14	0.001	0.02	7.47	0.9	110	0.61	0.10	4.07	0.20	27.7	29.5	51	0.23	27.7
IM25		0.17	<0.001	0.02	8.00	0.7	100	0.53	0.06	4.90	0.09	38.4	31.0	65	0.31	32.4

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
HS27		18.90	31.2	0.51	24.8	0.156	1.86	264	7.4	0.66	2980	4.69	1.95	255	9.8	970
HS28		22.4	23.7	0.37	29.1	0.158	1.52	194.0	3.8	0.34	5300	3.68	1.01	353	7.9	2480
HS29		10.55	20.9	0.51	12.9	0.178	2.51	201	5.8	0.69	3900	1.93	1.24	341	8.1	1060
HS30		5.12	27.1	0.32	5.5	0.163	4.08	95.8	7.8	0.53	1340	1.69	2.20	98.0	7.9	2030
HS31		12.50	34.2	0.51	43.3	0.128	3.68	328	11.8	0.99	1460	1.36	1.73	82.9	39.3	3690
HS32		3.66	23.3	0.28	11.9	0.069	5.00	118.0	8.6	0.54	723	0.61	2.08	37.1	17.5	1500
HS33		3.88	25.0	0.33	6.5	0.070	4.89	127.5	15.0	1.04	818	0.70	2.11	34.6	40.8	3840
HS34		4.73	23.9	0.30	10.8	0.072	4.55	122.5	13.4	0.58	984	1.15	1.85	57.0	17.4	580
HS35		1.96	22.4	0.18	1.3	0.038	5.44	37.2	10.7	0.50	344	0.45	2.08	11.7	23.5	780
HS36		5.32	26.8	0.63	11.2	0.102	4.28	271	9.1	0.57	1020	1.11	2.07	55.1	21.7	1800
HS37		3.73	22.3	0.20	1.0	0.057	4.18	51.2	7.0	0.58	620	0.97	1.99	14.0	19.0	600
HS38		3.07	23.2	0.20	1.6	0.065	4.23	68.5	8.2	0.52	622	0.83	2.35	40.5	11.8	870
HS39		20.2	21.1	1.19	43.6	0.393	1.60	520	5.5	0.91	3470	7.70	0.90	336	19.4	1420
HS40		4.05	26.1	0.23	5.6	0.117	4.55	60.5	6.8	0.34	1160	2.29	2.51	94.7	4.2	760
HS41		1.59	26.0	0.18	1.3	0.050	5.10	35.4	7.4	0.17	602	1.91	2.86	47.5	3.9	400
IM01		15.65	19.95	0.47	1.9	0.106	0.63	210	8.9	1.00	2910	1.37	1.47	177.5	28.7	2370
IM02		23.9	19.10	0.25	2.2	0.137	0.39	96.0	6.9	0.79	4150	1.79	1.04	286	28.9	3200
IM03		9.18	18.65	0.23	1.7	0.081	1.04	78.3	10.1	1.00	1870	1.54	2.38	86.3	29.8	1840
IM04		13.25	19.85	0.44	1.8	0.088	0.50	207	5.1	0.65	2180	0.86	1.87	66.8	17.4	970
IM05		9.01	18.30	0.16	3.3	0.089	0.91	33.8	4.5	1.40	1940	2.07	2.21	50.5	27.2	4110
IM06		12.90	18.75	0.57	2.0	0.106	0.57	262	7.4	0.84	2480	1.25	1.81	134.5	31.9	1590
IM07		14.95	17.65	0.36	1.9	0.125	0.50	156.0	5.5	0.65	2710	1.50	1.57	184.5	28.9	1960
IM08		11.25	17.05	0.41	1.9	0.109	0.68	171.5	7.6	1.00	2280	1.46	1.87	98.6	45.2	1820
IM09		5.86	17.80	0.15	0.5	0.068	0.63	35.2	11.5	1.15	1500	0.48	2.53	15.1	26.9	550
IM10		11.00	17.85	0.16	1.0	0.090	0.56	43.1	9.0	1.77	2310	1.24	1.94	73.5	43.5	1240
IM11		10.50	17.15	0.29	0.8	0.088	0.42	62.0	8.4	1.93	3020	1.31	1.84	30.0	45.8	780
IM12		8.87	17.45	0.16	0.7	0.078	0.44	25.6	6.7	1.57	2530	1.23	2.23	31.0	33.7	690
IM13		13.10	17.45	0.29	0.5	0.099	0.26	49.1	6.2	1.65	2400	0.80	2.02	23.6	26.9	410
IM14		11.10	18.20	0.14	2.1	0.101	0.34	17.5	8.2	2.09	2580	0.75	1.62	46.3	43.0	1050
IM15		6.94	18.30	0.16	0.7	0.064	0.41	24.1	9.4	1.68	1580	0.73	2.59	14.3	39.7	510
IM16		6.30	18.60	0.16	0.4	0.064	0.49	20.6	10.4	1.19	1430	0.56	2.79	17.3	27.0	490
IM17		8.55	19.70	0.29	0.6	0.075	0.49	63.6	10.9	1.46	2150	0.62	2.40	19.6	33.8	1040
IM18		7.35	20.6	0.35	0.7	0.070	0.53	77.8	12.1	1.46	1730	0.57	2.66	23.3	34.5	910
IM19		7.93	18.10	0.15	0.8	0.065	0.83	29.6	13.9	1.63	1350	0.33	1.56	20.9	50.8	960
IM20		9.22	19.50	0.19	0.9	0.075	0.84	38.8	12.4	1.61	1430	0.43	1.71	20.0	57.9	1760
IM21		8.33	20.6	0.16	1.2	0.076	0.64	21.8	10.1	1.98	1340	1.03	2.45	27.7	55.6	2000
IM22		10.65	19.30	0.18	1.1	0.077	0.73	24.9	11.0	1.43	1440	0.80	2.10	26.2	40.1	1740
IM23		4.80	16.55	0.12	0.3	0.074	0.22	9.8	4.6	1.17	1050	0.53	3.94	4.7	18.4	280
IM24		9.70	17.70	0.13	0.7	0.102	0.24	11.0	5.5	2.12	2390	0.78	2.43	19.3	30.5	830
IM25		10.90	21.4	0.12	0.6	0.117	0.21	14.9	5.1	2.27	2300	0.92	2.19	15.4	30.2	1210

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Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
HS27		20.6	57.7	<0.002	0.01	0.19	15.4	5	9.3	264	14.25	0.05	212	4.80	0.21	14.6
HS28		17.4	43.6	<0.002	<0.01	0.23	17.3	4	7.4	242	21.4	0.05	159.5	8.48	0.16	16.3
HS29		24.2	71.0	<0.002	0.01	0.14	24.1	4	6.0	255	21.0	0.05	104.0	5.26	0.29	8.2
HS30		24.3	107.0	<0.002	0.01	0.15	17.1	3	5.7	545	5.31	<0.05	27.0	1.035	0.42	3.7
HS31		34.1	147.5	<0.002	0.01	0.13	20.4	3	12.9	589	5.37	<0.05	263	2.23	0.63	17.2
HS32		38.9	179.0	<0.002	<0.01	0.12	9.7	2	6.2	643	2.41	<0.05	86.5	0.978	0.80	6.0
HS33		37.8	201	<0.002	0.01	0.14	12.4	2	6.4	941	2.17	<0.05	75.7	0.873	0.94	4.2
HS34		39.0	189.5	<0.002	0.01	0.13	11.1	2	5.4	424	3.53	<0.05	71.3	1.565	0.83	5.9
HS35		51.0	185.5	<0.002	0.01	0.11	6.0	1	2.1	819	0.68	<0.05	7.0	0.300	0.90	0.8
HS36		38.5	149.5	<0.002	0.01	0.13	12.3	3	6.2	641	3.24	<0.05	159.5	1.760	0.69	9.7
HS37		41.1	120.5	<0.002	0.02	0.09	11.4	2	1.3	397	0.73	<0.05	15.9	0.443	0.56	1.1
HS38		29.3	119.0	<0.002	0.01	0.12	9.2	2	2.3	569	2.20	<0.05	16.8	0.797	0.51	1.2
HS39		22.8	53.1	0.002	<0.01	0.13	48.1	9	18.2	143.0	17.70	<0.05	235	>10.0	0.21	17.8
HS40		23.6	123.5	<0.002	<0.01	0.15	10.7	2	5.2	532	5.14	<0.05	24.4	1.215	0.47	3.9
HS41		25.5	139.0	<0.002	<0.01	0.14	4.0	1	3.5	565	2.84	<0.05	8.9	0.416	0.54	2.6
IM01		9.8	23.0	<0.002	0.07	1.50	21.6	4	4.0	326	11.70	0.14	43.0	5.89	0.12	8.1
IM02		5.5	12.0	<0.002	0.02	0.90	26.8	4	4.2	263	19.60	0.07	24.6	9.49	0.06	5.8
IM03		11.3	39.1	<0.002	0.16	0.60	20.0	3	2.8	374	5.60	0.19	19.8	2.47	0.19	4.5
IM04		8.5	15.1	<0.002	0.06	0.29	24.9	4	2.8	267	4.31	0.06	53.5	3.51	0.07	10.1
IM05		8.3	18.4	<0.002	<0.01	0.22	26.2	3	3.3	453	3.05	<0.05	9.1	3.58	0.06	3.3
IM06		10.5	20.9	<0.002	0.09	0.53	23.1	5	3.2	296	8.81	0.08	69.0	4.72	0.09	12.8
IM07		8.5	15.5	<0.002	0.01	1.00	27.5	3	4.2	298	12.20	0.06	29.3	5.81	0.06	6.6
IM08		12.1	24.8	<0.002	0.28	0.29	26.7	4	3.2	309	6.81	0.19	44.2	3.51	0.12	8.9
IM09		7.9	17.6	<0.002	0.05	0.19	21.8	2	0.9	310	1.04	0.08	6.4	1.685	0.08	1.4
IM10		6.8	14.5	<0.002	0.03	1.14	30.9	3	3.1	317	4.74	0.06	9.5	3.43	0.06	2.9
IM11		7.5	9.7	0.002	0.06	0.19	39.9	3	1.5	239	2.11	0.09	14.2	3.39	0.05	2.8
IM12		7.3	11.7	<0.002	0.08	0.23	32.7	3	1.6	300	2.15	0.11	5.2	3.03	0.06	1.5
IM13		3.9	5.6	<0.002	0.01	0.25	36.9	3	1.7	149.0	1.45	0.09	5.4	3.20	0.03	1.0
IM14		5.0	6.6	<0.002	0.03	0.31	40.0	3	1.8	223	3.04	0.14	1.9	2.71	0.04	0.8
IM15		6.8	10.1	<0.002	0.08	0.13	28.4	2	1.0	308	0.97	0.06	5.7	1.325	0.04	1.2
IM16		7.2	13.8	<0.002	0.07	0.16	24.1	2	1.0	329	1.07	0.07	4.0	1.475	0.06	0.9
IM17		7.5	11.8	<0.002	0.03	0.22	32.0	3	1.3	298	1.29	0.08	12.0	1.880	0.05	2.9
IM18		7.5	16.0	<0.002	0.08	0.13	27.2	3	1.3	354	1.50	0.08	14.8	2.02	0.06	2.9
IM19		8.9	43.9	<0.002	0.01	0.35	18.1	2	2.1	391	1.27	<0.05	6.4	1.545	0.18	1.4
IM20		8.0	37.3	<0.002	0.02	0.34	21.3	2	2.6	409	1.24	<0.05	7.1	1.650	0.13	1.7
IM21		8.4	18.9	<0.002	0.04	0.74	25.8	3	2.7	445	1.81	<0.05	4.1	1.705	0.06	1.9
IM22		7.7	24.2	<0.002	0.03	1.07	23.8	2	3.3	345	1.65	<0.05	4.6	2.03	0.08	1.7
IM23		4.0	4.1	<0.002	0.02	0.15	21.5	1	0.9	217	0.29	0.09	0.9	0.590	0.02	0.2
IM24		3.1	4.0	<0.002	0.01	0.21	41.7	2	1.4	191.0	1.16	0.11	1.2	1.925	0.02	0.4
IM25		2.2	2.4	<0.002	<0.01	0.23	34.6	2	1.6	270	0.90	<0.05	1.5	2.31	<0.02	0.3

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
HS27		259	2.3	88.6	170	>500	20.9	9.50	3.59	30.7	3.59	1.26	226	61.6	42.3	3.99
HS28		315	3.7	69.1	205	>500	14.30	7.54	3.77	19.30	2.68	1.16	161.0	45.0	27.1	2.57
HS29		106	2.9	84.1	182	336	19.40	9.24	4.30	31.3	3.43	1.25	221	57.3	44.5	3.84
HS30		42	1.8	61.9	127	146.5	14.55	6.83	4.61	19.10	2.60	0.81	121.0	30.2	24.6	2.64
HS31		236	5.1	75.7	121	>500	15.35	8.22	4.02	20.2	2.89	1.20	212	63.5	30.7	2.68
HS32		67	1.1	34.7	53	401	7.83	3.82	2.72	11.10	1.42	0.50	93.0	25.7	15.45	1.46
HS33		85	7.6	46.7	69	227	10.30	5.00	3.56	14.10	1.87	0.60	111.0	30.1	19.35	1.88
HS34		105	1.7	32.9	65	351	7.54	3.56	2.20	11.35	1.32	0.49	96.1	27.1	16.00	1.46
HS35		42	0.6	14.4	38	41.1	3.27	1.57	2.40	4.53	0.60	0.20	31.3	8.77	5.98	0.61
HS36		123	1.9	59.6	87	328	16.15	5.96	3.21	30.5	2.52	0.63	256	69.7	44.8	3.52
HS37		70	0.4	26.1	62	32.7	5.50	3.21	2.45	6.76	1.10	0.45	46.2	12.25	8.33	0.93
HS38		55	0.6	25.6	62	47.7	5.84	3.00	2.79	7.84	1.08	0.39	63.0	16.65	10.50	1.03
HS39		453	8.1	156.5	229	>500	40.8	16.45	2.05	63.9	6.82	2.07	534	148.0	94.6	8.33
HS40		39	1.1	38.2	97	164.0	8.80	4.32	3.54	10.70	1.61	0.55	68.3	17.25	13.40	1.53
HS41		18	0.7	15.0	46	29.4	3.54	1.79	2.63	4.35	0.65	0.25	30.1	8.52	5.80	0.62
IM01		336	3.1	70.6	113	67.5	18.70	7.29	6.07	27.9	3.05	0.75	191.0	52.2	35.3	3.73
IM02		501	2.2	47.5	154	74.7	11.60	5.15	4.11	16.25	2.02	0.58	102.5	25.8	19.70	2.19
IM03		217	1.3	38.3	96	58.3	9.43	4.19	3.31	13.55	1.64	0.48	84.4	20.9	16.75	1.82
IM04		371	1.0	57.0	94	58.0	16.40	5.44	5.52	29.8	2.50	0.52	215	54.7	40.6	3.51
IM05		267	0.9	58.6	96	86.4	11.65	6.62	3.77	12.55	2.31	0.94	53.4	12.35	12.85	1.90
IM06		314	1.8	71.7	96	67.4	21.0	6.65	7.76	37.9	3.10	0.58	277	72.7	53.9	4.50
IM07		353	1.9	58.9	100	68.7	14.35	6.31	5.34	21.9	2.47	0.73	156.0	40.6	29.0	2.80
IM08		237	1.5	58.2	82	66.9	15.45	5.94	5.12	25.5	2.48	0.63	176.0	45.4	34.1	3.13
IM09		116	0.6	28.1	75	13.2	6.39	3.24	1.63	9.26	1.15	0.46	51.5	11.85	11.35	1.21
IM10		252	1.2	60.6	89	26.6	12.40	7.15	3.03	13.40	2.45	0.99	61.0	14.30	14.25	2.02
IM11		197	0.6	64.7	105	17.8	12.75	7.23	2.00	15.30	2.50	1.08	85.9	20.1	18.75	2.16
IM12		182	0.7	51.8	93	16.7	9.39	5.93	1.70	9.14	1.99	0.91	38.4	8.57	9.26	1.45
IM13		377	0.8	37.0	106	10.2	9.62	3.78	3.22	18.65	1.50	0.55	92.3	19.30	23.8	2.14
IM14		294	0.7	44.0	103	34.4	8.04	5.03	2.01	7.08	1.69	0.77	24.7	5.50	6.54	1.19
IM15		156	0.4	36.4	75	15.7	7.13	4.03	1.65	7.51	1.42	0.58	34.7	7.88	8.13	1.13
IM16		134	0.5	31.5	71	10.5	6.19	3.53	1.62	6.93	1.22	0.53	31.7	7.39	7.70	1.02
IM17		211	0.8	51.5	88	14.0	11.40	5.34	2.25	16.65	2.03	0.74	93.0	21.2	20.8	2.18
IM18		153	0.5	46.8	91	18.0	11.20	4.80	2.37	18.25	1.87	0.64	115.0	26.6	24.8	2.26
IM19		201	0.5	32.6	70	21.7	6.65	3.47	2.26	7.68	1.27	0.44	39.2	9.28	8.54	1.13
IM20		238	0.5	40.6	78	24.4	8.47	4.25	3.03	10.20	1.58	0.53	53.1	12.65	11.70	1.47
IM21		222	0.7	51.6	79	27.9	10.25	5.57	3.27	10.45	2.00	0.74	42.2	9.05	10.75	1.66
IM22		270	0.7	51.7	81	29.0	10.30	5.51	3.10	10.90	1.99	0.74	46.9	10.45	11.35	1.68
IM23		148	0.2	13.2	76	5.7	2.80	1.46	1.01	3.83	0.52	0.23	16.4	3.46	4.32	0.52
IM24		286	0.6	36.3	105	13.4	6.44	4.15	1.58	5.92	1.37	0.65	20.3	4.17	5.64	0.97
IM25		310	0.5	32.8	96	10.3	6.27	3.76	1.79	6.85	1.28	0.60	26.1	5.50	6.92	1.03

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
HS27		1.27	8.06
HS28		1.09	7.23
HS29		1.29	8.13
HS30		0.90	5.52
HS31		1.17	7.67
HS32		0.52	3.28
HS33		0.67	4.03
HS34		0.49	3.15
HS35		0.21	1.33
HS36		0.72	4.27
HS37		0.46	3.00
HS38		0.41	2.59
HS39		2.12	13.10
HS40		0.59	3.72
HS41		0.25	1.58
IM01		0.90	5.22
IM02		0.67	3.98
IM03		0.53	3.29
IM04		0.63	3.52
IM05		0.95	6.14
IM06		0.76	4.15
IM07		0.83	5.00
IM08		0.74	4.36
IM09		0.45	2.96
IM10		1.01	6.66
IM11		1.09	7.27
IM12		0.92	6.14
IM13		0.54	3.57
IM14		0.77	5.14
IM15		0.59	3.94
IM16		0.54	3.52
IM17		0.77	4.95
IM18		0.68	4.28
IM19		0.49	3.06
IM20		0.60	3.76
IM21		0.82	5.16
IM22		0.82	5.15
IM23		0.22	1.52
IM24		0.62	4.22
IM25		0.57	3.85

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
IM26		0.15	<0.001	0.03	6.12	1.0	160	0.46	0.10	3.56	0.16	67.3	25.0	39	0.12	19.6
IM27		0.16	0.001	0.02	8.22	0.6	150	0.61	0.07	4.23	0.17	23.1	26.4	49	0.18	21.7
IM28		0.12	<0.001	0.02	7.12	0.4	190	0.69	0.06	2.72	0.08	27.1	16.6	29	0.20	15.2
IM29		0.17	<0.001	0.03	8.85	2.2	270	1.21	0.06	3.23	0.08	30.1	16.1	32	0.34	21.9
IM30		0.14	<0.001	0.02	8.97	0.3	480	1.05	0.09	3.91	0.08	52.8	8.4	20	0.20	7.9
IM31		0.15	<0.001	0.01	8.10	1.2	540	1.30	0.04	2.73	0.05	19.95	11.5	28	0.76	11.6
IM32		0.13	0.002	0.09	3.61	24.1	240	1.38	0.26	3.71	0.22	310	21.0	77	0.98	13.9
IM33		0.12	0.001	0.03	7.60	5.3	340	1.71	0.16	4.05	0.19	89.0	19.3	69	1.23	22.6
IM34		0.13	<0.001	0.01	8.83	0.5	870	1.43	0.04	2.86	0.04	23.5	9.4	10	0.48	8.8
IM35		0.12	<0.001	0.01	9.08	0.6	460	1.30	0.15	5.88	0.13	55.1	18.1	34	0.25	15.0
IM36		0.12	<0.001	0.01	10.10	<0.2	760	1.50	0.04	3.22	0.03	16.65	5.9	7	0.36	6.4
IM37		0.14	<0.001	0.02	8.54	0.2	460	1.31	0.17	5.20	0.12	68.4	21.0	43	0.39	26.0
IM38		0.13	<0.001	0.01	9.36	<0.2	500	1.41	0.09	5.02	0.09	54.8	15.1	33	0.30	17.9
IM39		0.15	<0.001	0.02	9.40	0.4	560	1.36	0.07	4.05	0.07	33.9	10.3	19	0.43	14.9
IM40		0.15	<0.001	0.01	8.78	0.2	180	0.72	0.06	4.21	0.13	20.1	15.9	32	0.07	6.3
IM41		0.15	<0.001	0.01	7.65	<0.2	220	0.60	0.10	3.98	0.12	37.7	18.5	54	0.12	13.7
IM42		0.13	<0.001	0.01	6.60	0.4	200	0.43	0.06	3.33	0.09	24.6	21.3	30	0.20	20.6
IM43		0.13	<0.001	0.03	7.97	0.6	240	0.65	0.05	3.24	0.11	41.7	19.0	35	0.20	23.1
IM44		0.14	0.001	0.03	9.45	0.6	410	0.79	0.03	2.79	0.07	27.6	19.5	32	0.48	37.0
IM45		0.12	0.001	0.02	7.65	2.3	170	0.41	0.06	4.46	0.15	23.9	34.8	43	0.07	28.3
IM46		0.10	<0.001	0.02	9.41	0.4	210	0.71	0.05	3.68	0.08	12.10	12.7	21	0.17	10.5
IM47		0.11	<0.001	0.02	9.15	0.5	90	0.59	0.08	5.67	0.16	23.8	26.8	43	0.07	15.9
IM48		0.16	<0.001	0.02	8.21	0.5	90	0.43	0.06	4.33	0.18	29.0	24.5	34	0.08	18.1
IM49		0.11	<0.001	0.01	8.91	0.6	200	0.65	0.03	5.75	0.08	12.15	15.1	26	0.15	14.2
IM50		0.10	0.001	0.02	7.34	0.6	100	0.48	0.05	4.03	0.15	30.4	25.3	37	0.11	13.6
IM51		0.12	0.004	0.01	9.15	0.5	130	0.74	0.06	4.12	0.07	17.40	20.7	47	0.10	25.2
IM52		0.17	0.001	0.02	8.49	0.4	130	0.60	0.07	5.18	0.10	25.6	24.7	63	0.06	11.8
IM53		0.14	0.001	0.02	7.67	0.4	110	0.60	0.10	4.19	0.19	41.1	26.4	58	0.13	22.4
IM54		0.12	<0.001	0.01	9.99	<0.2	590	1.44	0.08	3.71	0.05	28.3	7.4	15	0.33	12.8
IM55		0.10	<0.001	0.02	9.87	0.6	560	1.22	0.11	5.74	0.12	90.8	11.2	17	0.36	18.8
IM56		0.13	0.001	0.02	7.63	2.9	210	0.92	0.10	4.44	0.15	27.1	25.2	77	0.28	20.1
IM57		0.10	0.001	0.02	9.06	<0.2	160	0.67	0.05	4.75	0.14	20.2	23.0	49	0.06	13.3
IM58		0.13	<0.001	0.02	9.26	0.3	180	0.48	0.02	5.90	0.10	10.65	20.6	24	0.07	10.3
IM59		0.11	0.023	0.04	6.22	1.0	110	0.37	0.04	3.26	0.18	165.5	33.8	36	0.08	28.0
IM60		0.14	0.001	0.01	8.38	0.4	150	0.56	0.03	4.39	0.19	29.2	26.0	40	0.07	21.3
IM61		0.13	<0.001	0.02	9.82	0.2	190	0.67	0.01	4.15	0.07	10.30	14.1	18	0.11	8.7
IM62		0.13	<0.001	0.02	9.75	0.5	230	0.76	0.04	4.17	0.06	20.2	15.9	31	0.30	16.9
IM63		0.13	<0.001	0.02	8.56	4.2	270	1.22	0.09	3.70	0.10	45.9	21.9	69	0.58	21.8
IM64		0.16	0.001	0.02	8.53	0.4	160	0.70	0.08	4.23	0.12	22.4	19.4	41	0.14	16.0
IM65		0.13	<0.001	0.02	7.55	4.0	300	1.18	0.09	3.90	0.11	22.3	21.5	85	0.43	17.4

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
IM26		11.50	14.55	0.17	1.3	0.101	0.20	26.4	3.1	0.76	3780	0.89	1.54	64.4	13.3	1320
IM27		9.03	18.40	0.10	0.5	0.091	0.21	9.3	3.9	1.73	2570	0.69	2.98	15.5	29.3	720
IM28		5.17	13.90	0.12	0.4	0.049	0.25	11.2	4.7	0.69	1650	0.37	2.41	19.5	15.5	480
IM29		3.45	19.30	0.12	0.4	0.038	0.50	12.5	7.9	0.90	731	0.45	3.27	5.4	24.6	500
IM30		3.60	20.3	0.14	0.6	0.065	0.67	24.1	3.3	0.47	847	0.30	3.53	14.6	9.0	890
IM31		3.04	16.40	0.10	0.6	0.032	0.90	8.6	6.7	0.76	730	0.26	3.21	9.2	17.3	260
IM32		15.75	18.70	0.40	3.4	0.108	0.58	139.5	7.2	0.69	1650	1.29	0.89	155.0	24.3	2890
IM33		6.60	19.05	0.18	1.3	0.079	0.83	38.7	12.0	1.28	1400	0.92	2.36	42.8	36.6	1150
IM34		3.35	20.2	0.11	0.9	0.040	1.33	10.1	7.4	0.52	626	0.26	3.64	13.7	9.6	650
IM35		4.93	23.8	0.17	0.9	0.097	0.74	22.2	4.9	1.29	1030	0.98	3.20	29.4	26.4	2720
IM36		1.66	21.6	0.12	0.3	0.031	0.96	7.4	5.9	0.37	294	0.12	4.34	5.1	7.9	400
IM37		6.46	22.5	0.18	1.4	0.097	0.83	28.9	5.9	1.31	1530	1.27	2.95	47.4	27.9	1990
IM38		4.24	24.1	0.17	0.6	0.087	0.81	23.7	5.3	1.15	906	0.62	3.54	16.8	22.8	1270
IM39		3.56	21.2	0.13	0.6	0.061	0.80	13.4	5.6	0.61	817	0.49	3.70	23.8	11.5	2020
IM40		5.67	20.2	0.11	0.5	0.100	0.37	7.5	3.3	1.01	1710	0.38	3.29	11.8	14.5	560
IM41		8.90	18.70	0.12	0.8	0.104	0.33	15.5	3.2	1.02	2130	0.50	2.65	18.2	16.5	660
IM42		7.50	12.70	0.15	0.8	0.059	0.16	9.5	3.1	0.75	2800	0.64	1.58	27.7	14.9	530
IM43		6.96	15.15	0.13	0.5	0.063	0.35	18.2	3.6	0.76	2410	0.60	2.55	32.3	17.6	690
IM44		4.22	18.35	0.11	0.4	0.064	0.42	11.0	5.4	0.68	1480	0.37	2.68	6.3	22.2	600
IM45		12.20	16.55	0.13	0.5	0.111	0.17	9.5	3.6	1.78	3580	0.52	1.99	22.0	20.6	1070
IM46		4.91	19.05	0.10	0.4	0.073	0.47	4.2	4.4	0.91	1320	0.30	3.85	6.6	11.7	340
IM47		8.72	21.3	0.12	0.6	0.127	0.24	8.7	4.4	2.19	2130	0.38	2.50	8.8	22.5	820
IM48		11.95	17.50	0.13	0.6	0.121	0.20	10.8	3.5	1.59	3250	0.60	2.23	26.7	17.5	450
IM49		4.00	17.80	0.09	0.3	0.055	0.24	4.3	3.5	1.05	1660	0.32	3.33	4.8	16.0	570
IM50		12.90	17.50	0.14	0.9	0.124	0.23	11.9	3.9	1.20	3770	0.94	2.33	41.2	19.5	790
IM51		5.71	19.20	0.10	0.5	0.067	0.19	5.8	3.5	1.39	1260	0.38	3.18	8.2	22.4	470
IM52		8.75	19.20	0.12	0.6	0.121	0.18	9.3	2.5	1.76	2500	0.82	2.64	22.5	26.5	1040
IM53		7.30	18.30	0.13	0.7	0.092	0.23	17.2	4.3	1.97	1660	0.51	2.56	11.3	30.0	390
IM54		2.09	22.6	0.12	0.3	0.037	0.77	12.2	5.3	0.53	402	0.25	4.34	7.1	12.4	720
IM55		4.13	28.1	0.21	0.5	0.125	0.77	35.3	6.1	0.74	939	0.47	3.49	15.8	13.8	3040
IM56		7.77	19.45	0.12	0.8	0.099	0.47	10.8	5.7	2.10	1770	0.83	2.42	18.8	31.0	520
IM57		6.14	19.25	0.11	0.5	0.091	0.27	6.8	2.7	1.76	1740	0.46	3.00	11.1	26.8	680
IM58		5.27	17.70	0.10	0.4	0.065	0.29	3.4	3.2	1.48	1800	0.34	2.89	5.2	18.0	750
IM59		17.05	16.20	0.23	1.3	0.101	0.17	77.8	2.4	0.97	5200	0.91	1.58	71.2	18.7	950
IM60		10.90	18.40	0.12	0.8	0.109	0.27	11.3	3.1	1.36	4470	0.76	2.61	32.5	23.4	1250
IM61		3.75	19.95	0.08	0.3	0.055	0.37	3.5	3.3	0.97	947	0.16	3.59	4.8	16.7	530
IM62		3.99	19.75	0.12	0.5	0.067	0.40	8.4	4.2	1.07	1340	0.31	3.29	4.4	17.9	650
IM63		5.58	20.4	0.14	0.6	0.068	0.65	18.8	8.4	1.48	1140	0.57	2.82	13.4	33.5	450
IM64		6.00	19.80	0.12	0.4	0.096	0.43	8.9	4.1	1.56	1510	0.57	2.99	6.6	21.7	520
IM65		5.52	18.30	0.09	0.8	0.070	0.60	8.9	5.6	1.86	1180	0.98	2.54	17.8	30.5	460

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
IM26		5.5	4.5	<0.002	<0.01	0.22	34.2	4	2.0	250	4.01	<0.05	5.1	5.91	0.02	1.2
IM27		3.2	3.1	<0.002	<0.01	0.20	31.6	2	1.5	237	0.97	<0.05	0.8	2.04	0.02	0.2
IM28		5.1	7.2	<0.002	0.01	0.13	19.8	2	1.0	245	1.22	<0.05	2.4	1.825	0.03	0.5
IM29		9.2	12.3	<0.002	0.04	0.14	14.1	1	0.7	403	0.37	0.07	1.9	0.440	0.05	0.5
IM30		10.0	10.6	<0.002	<0.01	0.13	16.0	1	1.5	690	0.97	<0.05	5.4	1.095	0.04	1.1
IM31		10.3	17.4	<0.002	0.01	0.14	10.4	1	0.7	427	0.59	<0.05	1.5	0.596	0.06	0.5
IM32		10.5	23.8	0.002	0.06	4.28	17.2	5	7.3	242	9.65	0.08	37.3	3.91	0.10	9.1
IM33		11.0	29.3	<0.002	0.06	1.70	22.8	3	3.1	358	2.97	0.07	9.0	1.540	0.12	3.2
IM34		13.7	24.8	<0.002	<0.01	0.17	9.0	1	1.2	637	0.90	<0.05	2.2	0.901	0.09	0.8
IM35		12.1	11.3	<0.002	<0.01	0.22	25.6	3	2.7	728	1.99	<0.05	3.1	1.445	0.05	2.3
IM36		12.1	17.2	<0.002	<0.01	0.12	6.6	1	0.8	848	0.32	<0.05	1.2	0.257	0.07	0.5
IM37		12.5	16.3	<0.002	<0.01	0.24	25.4	3	2.9	646	3.05	<0.05	4.3	2.98	0.07	2.5
IM38		10.0	13.0	<0.002	<0.01	0.10	22.5	2	2.0	800	1.17	<0.05	3.5	0.797	0.06	1.7
IM39		10.3	16.5	<0.002	<0.01	0.12	13.8	1	1.6	778	1.50	<0.05	2.0	1.080	0.06	1.1
IM40		4.5	4.4	<0.002	<0.01	0.11	26.6	2	1.7	301	0.77	<0.05	1.0	1.290	0.02	0.4
IM41		5.5	5.1	<0.002	<0.01	0.15	29.4	2	2.1	327	1.14	<0.05	2.6	2.58	0.03	0.7
IM42		3.5	4.2	<0.002	<0.01	0.23	24.4	2	1.1	213	1.63	<0.05	1.2	2.78	0.02	0.4
IM43		4.0	8.8	<0.002	<0.01	0.13	24.9	3	1.4	223	1.94	<0.05	3.1	2.36	0.04	0.5
IM44		4.3	14.3	<0.002	0.01	0.14	22.0	2	0.9	252	0.36	<0.05	1.0	0.461	0.05	0.2
IM45		2.7	2.3	<0.002	<0.01	0.21	40.1	2	1.8	204	1.38	<0.05	0.9	2.83	<0.02	0.3
IM46		4.1	6.1	<0.002	<0.01	0.13	22.0	1	1.4	257	0.43	<0.05	0.5	0.847	0.03	0.2
IM47		2.0	2.3	<0.002	<0.01	0.15	48.6	2	1.5	240	0.55	<0.05	0.7	1.150	<0.02	0.3
IM48		1.7	2.3	<0.002	<0.01	0.14	47.1	3	1.9	216	1.66	<0.05	0.9	3.25	<0.02	0.3
IM49		2.4	3.4	<0.002	0.01	0.11	18.5	1	0.8	372	0.31	<0.05	0.3	0.618	0.02	0.1
IM50		3.1	3.0	<0.002	<0.01	0.23	43.2	4	2.3	212	2.58	<0.05	1.0	5.01	0.02	0.4
IM51		2.5	2.8	<0.002	<0.01	0.12	28.0	1	1.0	283	0.51	<0.05	0.6	0.781	<0.02	0.2
IM52		2.2	2.0	<0.002	<0.01	0.17	39.3	3	2.0	277	1.39	<0.05	0.7	2.08	<0.02	0.3
IM53		4.0	2.9	<0.002	<0.01	0.10	31.7	2	1.2	194.0	0.73	0.06	3.1	1.380	0.02	0.8
IM54		10.7	12.6	<0.002	<0.01	0.07	9.9	1	1.1	907	0.55	<0.05	1.9	0.328	0.06	1.0
IM55		10.8	14.4	<0.002	<0.01	0.15	25.0	2	2.6	991	1.02	<0.05	4.4	0.669	0.06	2.0
IM56		4.7	9.9	<0.002	0.02	0.18	34.7	2	2.1	228	1.34	<0.05	2.2	1.490	0.05	1.1
IM57		3.0	3.2	<0.002	<0.01	0.12	32.7	2	1.9	257	0.70	<0.05	0.6	0.998	0.02	0.3
IM58		2.3	2.6	<0.002	<0.01	0.10	27.7	1	0.8	291	0.34	<0.05	0.4	0.570	<0.02	0.1
IM59		3.3	2.2	<0.002	<0.01	0.23	45.8	4	2.0	187.0	4.52	<0.05	7.7	7.07	<0.02	0.8
IM60		2.4	3.6	<0.002	<0.01	0.14	48.5	4	2.0	250	2.06	<0.05	1.1	3.66	<0.02	0.3
IM61		3.4	3.6	<0.002	<0.01	0.08	19.0	1	0.7	352	0.24	<0.05	0.3	0.428	0.02	0.1
IM62		3.6	8.7	<0.002	0.01	0.09	22.7	1	0.9	365	0.28	<0.05	6.2	0.380	0.04	0.5
IM63		7.9	16.6	<0.002	0.01	0.18	22.1	2	1.7	343	0.90	<0.05	4.3	1.070	0.07	1.2
IM64		4.0	4.9	<0.002	<0.01	0.10	33.3	2	1.4	210	0.46	0.07	0.9	0.727	0.03	0.4
IM65		6.6	15.0	<0.002	0.03	0.19	25.6	1	2.0	247	1.28	<0.05	2.5	0.971	0.08	1.5

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
IM26		239	1.2	73.1	105	32.9	12.75	8.66	2.31	11.65	2.80	1.48	44.8	9.76	11.00	1.91
IM27		260	0.4	28.9	110	10.1	5.28	3.38	1.44	4.86	1.11	0.54	15.6	3.22	4.50	0.79
IM28		109	0.5	30.0	52	8.3	5.30	3.52	1.28	4.47	1.16	0.58	15.5	3.49	4.08	0.78
IM29		89	0.2	16.0	49	10.5	3.33	1.75	1.55	3.82	0.63	0.25	17.1	3.85	4.21	0.58
IM30		94	0.2	23.6	33	11.4	4.68	2.54	1.60	5.39	0.90	0.38	27.2	6.66	6.11	0.79
IM31		78	1.3	11.0	34	17.9	2.10	1.20	0.89	2.20	0.42	0.19	10.0	2.37	2.36	0.35
IM32		318	2.8	97.0	78	109.5	21.9	10.45	5.12	26.9	3.89	1.25	151.5	38.3	32.5	3.88
IM33		165	1.3	51.9	62	36.6	10.25	5.80	2.66	10.60	2.01	0.82	48.3	11.35	11.25	1.67
IM34		75	0.2	17.9	39	25.9	3.34	1.95	1.24	3.36	0.69	0.29	13.3	3.01	3.42	0.52
IM35		148	0.3	60.4	61	15.1	11.20	6.49	3.54	10.90	2.26	0.90	37.7	8.05	10.20	1.74
IM36		39	0.1	8.9	25	6.0	1.64	0.89	0.79	1.84	0.32	0.14	8.9	2.09	2.13	0.27
IM37		169	0.7	61.7	80	28.3	11.70	6.68	3.46	11.40	2.33	0.93	42.2	9.39	10.80	1.85
IM38		121	0.1	35.7	58	11.0	7.00	3.86	2.51	7.52	1.36	0.52	32.3	7.72	7.98	1.14
IM39		82	0.2	29.5	47	13.0	5.72	3.10	2.05	6.00	1.10	0.44	22.4	4.77	6.12	0.94
IM40		147	0.2	50.0	60	8.8	7.79	6.02	1.45	5.67	1.82	1.05	13.5	2.74	4.38	1.04
IM41		284	0.3	41.5	75	20.1	7.10	4.83	1.80	6.39	1.59	0.83	22.4	4.95	5.79	1.04
IM42		197	0.7	41.5	74	17.9	6.83	5.16	1.51	5.35	1.57	0.93	16.2	3.48	4.48	0.95
IM43		145	0.6	55.8	71	12.2	8.49	6.78	1.35	6.52	2.03	1.24	23.4	5.35	5.71	1.14
IM44		89	0.2	34.4	68	10.3	6.08	3.94	1.32	5.33	1.29	0.63	16.8	3.55	4.62	0.92
IM45		353	0.3	37.2	107	10.1	5.99	4.32	1.31	5.26	1.36	0.78	16.6	3.44	4.90	0.89
IM46		125	0.1	33.7	56	6.6	4.98	4.01	0.97	3.66	1.20	0.79	8.4	1.70	2.80	0.67
IM47		236	0.1	47.1	111	9.8	8.15	5.19	1.83	7.05	1.73	0.83	17.2	3.40	5.83	1.21
IM48		277	0.3	43.4	120	13.2	7.28	5.21	1.53	6.75	1.62	0.93	21.7	4.39	6.49	1.09
IM49		102	0.1	20.7	56	5.8	3.51	2.32	0.98	2.98	0.76	0.40	8.0	1.66	2.51	0.52
IM50		299	0.6	71.9	115	19.2	11.10	8.55	1.93	8.58	2.59	1.65	22.5	4.57	7.03	1.53
IM51		164	0.2	25.1	72	12.1	4.37	2.72	1.25	3.98	0.93	0.45	11.4	2.35	3.46	0.67
IM52		224	0.3	58.4	92	12.8	9.39	6.85	2.04	7.44	2.15	1.24	19.2	3.81	6.01	1.33
IM53		221	0.2	31.0	105	17.4	6.15	3.25	1.91	7.28	1.19	0.47	26.8	5.79	7.65	1.07
IM54		53	0.1	14.4	32	4.7	2.74	1.48	1.27	3.25	0.53	0.21	16.3	3.77	3.84	0.49
IM55		95	0.1	38.8	52	8.2	7.87	3.90	4.21	9.73	1.44	0.50	49.8	11.20	11.50	1.39
IM56		228	0.5	35.5	97	16.6	6.31	4.10	1.64	5.75	1.35	0.64	17.9	3.86	5.27	0.97
IM57		161	0.2	38.5	89	10.1	6.61	4.32	1.58	5.72	1.41	0.69	15.2	2.99	4.88	0.99
IM58		114	0.1	25.4	81	6.6	4.31	2.82	1.01	3.72	0.94	0.46	8.2	1.55	2.87	0.65
IM59		335	1.0	74.7	167	28.5	11.20	9.03	2.03	10.10	2.69	1.77	74.6	19.80	12.45	1.57
IM60		216	0.5	101.5	128	14.7	14.80	12.30	1.68	8.31	3.70	2.28	19.2	4.09	5.58	1.75
IM61		80	0.2	19.7	67	6.1	3.47	2.20	0.94	3.04	0.73	0.35	7.5	1.48	2.50	0.51
IM62		92	0.1	25.7	71	10.2	4.81	2.76	1.34	4.61	0.96	0.40	13.8	2.89	4.05	0.76
IM63		165	0.4	23.4	68	14.0	5.01	2.56	1.61	6.23	0.92	0.36	27.1	6.29	6.88	0.91
IM64		170	0.1	39.3	80	7.5	6.88	4.53	1.66	5.91	1.49	0.73	15.1	3.19	4.83	1.04
IM65		179	0.6	25.2	74	17.3	4.84	2.86	1.44	4.57	0.99	0.42	13.9	3.04	4.16	0.77

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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Sample Description	Method Analyte Units LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
IM26		1.37	9.53
IM27		0.52	3.48
IM28		0.56	3.83
IM29		0.25	1.65
IM30		0.39	2.57
IM31		0.18	1.20
IM32		1.47	9.04
IM33		0.86	5.63
IM34		0.29	1.98
IM35		0.95	6.26
IM36		0.13	0.89
IM37		1.00	6.43
IM38		0.56	3.60
IM39		0.46	2.93
IM40		0.98	6.77
IM41		0.77	5.33
IM42		0.83	6.03
IM43		1.11	7.79
IM44		0.60	4.09
IM45		0.69	4.84
IM46		0.68	4.85
IM47		0.80	5.24
IM48		0.83	5.81
IM49		0.37	2.47
IM50		1.42	10.10
IM51		0.43	2.82
IM52		1.12	7.66
IM53		0.49	3.12
IM54		0.21	1.35
IM55		0.54	3.39
IM56		0.64	4.12
IM57		0.66	4.45
IM58		0.44	2.92
IM59		1.53	10.70
IM60		2.07	14.30
IM61		0.33	2.21
IM62		0.41	2.61
IM63		0.37	2.39
IM64		0.70	4.74
IM65		0.43	2.83

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141808

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

REE's may not be totally soluble in this method.
Applies to Method: ME-MS61r

LABORATORY ADDRESSES

Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.
Applies to Method: WEI-21

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
Applies to Method: Au-TL43 LOG-22 ME-MS61r SCR-41

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

CERTIFICATE JB15141816

Project: Malawi 2015

This report is for 200 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 16-SEP-2015.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature: Colin Ramshaw, Vancouver Laboratory Manager

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
IM66		0.13	<0.001	0.01	10.40	<0.2	760	1.42	0.05	3.57	0.06	20.8	7.9	15	0.43	9.0
IM67		0.12	<0.001	0.02	6.67	1.1	130	0.71	0.07	3.94	0.18	49.8	30.3	88	0.11	14.5
IM68		0.13	<0.001	0.01	8.48	0.6	190	0.67	0.05	5.05	0.16	35.3	25.7	53	0.07	14.9
IM69		0.16	<0.001	0.03	7.81	1.2	180	1.12	0.10	5.22	0.18	40.5	29.9	92	0.17	16.1
IM70		0.17	<0.001	0.03	3.17	19.0	100	0.59	0.13	2.89	0.13	167.5	19.9	152	0.32	9.5
IM71		0.15	<0.001	0.03	7.88	5.3	320	1.54	0.16	4.40	0.14	82.7	20.4	84	1.05	17.3
IM72		0.14	<0.001	0.03	7.12	1.6	380	1.65	0.15	3.26	0.15	>500	18.5	85	1.37	23.9
IM73		0.15	0.001	0.03	7.73	1.3	240	0.82	0.08	3.25	0.12	41.5	22.2	43	0.54	31.1
IM74		0.15	<0.001	0.03	7.06	6.8	260	1.26	0.09	3.21	0.13	112.0	14.1	35	0.58	13.7
IM75		0.13	0.001	0.04	4.55	7.8	180	0.89	0.13	2.01	0.12	454	18.3	78	0.54	18.5
IM76		0.13	<0.001	0.01	10.05	0.4	440	1.25	0.03	4.35	0.07	20.4	15.0	37	0.25	14.8
IM77		0.16	0.001	0.04	5.03	8.3	320	1.75	0.18	2.98	0.19	202	22.3	66	1.22	13.0
IM78		0.12	<0.001	0.02	7.69	9.6	530	2.82	0.15	3.23	0.17	61.3	12.5	45	1.21	12.7
IM79		0.13	0.001	0.03	7.59	1.0	380	1.02	0.11	4.39	0.10	65.6	22.1	50	0.37	18.2
IM80		0.14	0.001	0.03	8.56	0.7	390	1.30	0.07	4.61	0.11	28.3	19.2	43	0.25	18.6
IM81		0.13	<0.001	0.02	7.90	2.2	510	1.77	0.11	4.63	0.09	74.3	19.9	46	0.51	17.1
IM82		0.12	<0.001	0.03	8.34	1.5	640	1.93	0.09	4.50	0.08	80.9	12.9	31	0.57	17.6
IM83		0.13	<0.001	0.02	9.42	1.2	680	2.10	0.06	3.59	0.07	40.7	9.2	20	0.60	12.7
IM84		0.13	<0.001	0.02	9.04	0.6	440	1.15	0.05	3.95	0.07	27.0	12.8	29	0.31	16.8
IM85		0.14	<0.001	0.02	8.59	1.8	650	1.76	0.09	5.35	0.10	101.0	13.6	21	0.56	21.1
IM86		0.15	<0.001	0.02	7.71	1.3	560	1.70	0.07	4.46	0.10	85.6	15.2	21	0.37	18.0
IM87		0.13	<0.001	0.02	6.78	1.4	350	0.97	0.08	2.86	0.07	119.5	18.0	47	0.43	15.5
IM88		0.13	<0.001	0.02	7.31	1.7	640	1.71	0.07	4.38	0.08	103.5	18.5	43	0.36	13.7
IM89		0.13	<0.001	0.02	9.16	0.8	650	2.02	0.05	4.81	0.10	66.5	11.6	21	0.42	13.7
IM90		0.13	<0.001	0.02	8.50	1.0	580	1.98	0.06	5.77	0.13	86.4	16.5	30	0.24	10.8
IM91		0.12	<0.001	0.02	7.92	0.7	560	1.68	0.05	4.81	0.10	70.8	18.5	31	0.24	10.3
IM92		0.13	<0.001	0.04	5.74	1.4	360	1.55	0.08	5.15	0.16	120.0	31.4	52	0.16	16.0
IM93		0.12	<0.001	0.03	6.10	1.1	380	1.19	0.06	5.49	0.13	82.3	26.7	56	0.20	14.8
IS01		0.14	<0.001	0.01	6.85	1.7	90	0.99	0.04	3.71	0.03	39.5	30.8	390	0.23	4.2
IS02		0.15	<0.001	0.03	7.95	2.3	200	1.35	0.12	5.13	0.14	59.5	23.8	175	0.51	19.8
IS03		0.14	0.002	0.02	8.70	2.0	190	0.70	0.05	3.98	0.12	29.4	30.7	103	0.19	42.1
IS04		0.13	0.035	0.02	8.39	1.1	220	0.62	0.03	3.62	0.07	15.30	24.2	62	0.18	14.6
IS05		0.13	0.001	0.02	9.22	1.4	210	0.82	0.04	3.82	0.11	19.70	26.0	103	0.30	38.4
IS06		0.12	<0.001	0.02	8.23	0.9	210	0.57	0.04	3.90	0.11	18.30	27.9	72	0.16	25.6
IS07		0.14	<0.001	0.01	8.75	0.6	130	0.61	0.02	2.92	0.06	15.95	14.1	34	0.20	10.1
IS08		0.13	<0.001	0.01	8.93	0.9	100	0.55	0.02	3.26	0.06	13.30	15.7	53	0.20	12.9
IS09		0.12	0.001	0.02	8.67	1.8	240	1.17	0.09	4.66	0.12	54.2	20.4	70	0.56	28.2
IS10		0.13	<0.001	0.01	9.06	1.7	260	0.85	0.09	6.12	0.12	33.1	19.0	25	0.20	10.1
IS11		0.12	0.001	0.03	8.88	2.9	340	1.30	0.07	3.45	0.09	50.2	26.1	159	1.02	42.3
IS12		0.13	<0.001	0.02	8.81	1.9	240	1.04	0.07	4.31	0.09	34.6	19.5	130	0.56	22.6

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
IM66		2.65	22.7	0.12	0.3	0.048	1.10	8.8	5.7	0.52	557	0.21	4.36	11.0	11.5	760
IM67		13.45	17.00	0.15	1.9	0.109	0.33	19.5	4.4	1.75	3190	1.01	1.81	43.5	32.7	880
IM68		8.36	19.75	0.13	0.9	0.119	0.28	13.2	3.0	1.89	2710	0.65	2.66	18.6	30.1	1630
IM69		10.35	20.4	0.14	1.3	0.126	0.53	14.5	5.5	2.25	2530	1.08	2.22	30.5	41.2	2110
IM70		15.80	15.55	0.23	2.2	0.090	0.31	76.9	3.6	0.78	1510	0.88	0.61	63.9	28.3	630
IM71		6.73	20.7	0.15	1.4	0.098	0.79	34.6	8.0	1.41	1180	0.86	2.43	40.5	37.6	1350
IM72		8.25	21.5	0.80	3.0	0.087	0.79	323	8.2	1.02	1300	1.09	2.33	33.5	29.2	1640
IM73		6.62	16.90	0.11	0.6	0.073	0.39	18.3	5.5	1.36	1530	0.65	2.77	16.3	22.6	740
IM74		6.45	17.45	0.19	1.0	0.067	0.66	48.9	4.8	0.76	1300	0.50	2.50	35.8	13.9	810
IM75		14.40	18.60	0.57	3.1	0.114	0.47	200	3.7	0.47	2510	0.75	1.42	92.6	17.7	740
IM76		3.73	21.3	0.12	0.5	0.043	0.62	8.4	4.5	1.20	730	0.53	3.95	7.9	25.3	910
IM77		12.90	18.20	0.30	2.3	0.088	0.78	88.9	7.1	0.62	1620	1.28	1.44	131.0	21.0	1810
IM78		4.59	19.85	0.14	1.4	0.057	1.51	25.3	6.9	0.61	646	1.04	2.55	52.7	20.1	1250
IM79		9.06	20.8	0.16	1.7	0.091	0.63	26.1	4.8	1.34	2370	1.42	2.73	40.0	22.3	2270
IM80		5.10	19.25	0.14	0.9	0.080	0.65	10.1	5.1	1.60	1120	1.08	3.24	14.5	31.5	1710
IM81		7.83	21.9	0.20	2.0	0.110	0.92	25.2	7.7	1.27	1510	2.11	2.98	34.2	22.4	3600
IM82		4.57	19.85	0.27	1.4	0.082	1.17	30.1	7.8	0.85	1030	2.31	3.20	28.0	15.2	3940
IM83		2.49	20.6	0.16	0.6	0.059	1.30	16.2	7.8	0.68	540	1.25	3.90	16.8	11.3	1220
IM84		3.36	18.35	0.12	0.5	0.067	0.66	10.8	5.8	1.03	811	0.49	3.70	7.8	17.9	1180
IM85		4.80	21.2	0.27	2.3	0.095	1.11	35.1	9.4	0.94	1050	1.80	3.13	21.1	15.2	4940
IM86		6.67	19.45	0.26	1.4	0.095	1.04	29.4	6.7	0.74	1720	1.72	2.89	19.1	12.3	3110
IM87		10.15	17.40	0.23	1.6	0.081	0.60	52.6	4.7	0.68	1680	0.81	2.61	49.7	15.5	1060
IM88		9.26	19.55	0.25	1.9	0.092	1.06	40.2	6.4	0.77	2040	1.71	2.75	44.2	14.0	6330
IM89		3.73	21.7	0.25	0.9	0.083	1.21	25.9	7.2	0.87	839	1.24	3.60	17.9	13.8	4310
IM90		4.92	22.2	0.28	1.3	0.102	1.14	31.1	6.0	1.40	1040	1.89	3.14	18.4	20.5	4890
IM91		8.46	20.4	0.24	1.8	0.096	0.99	26.6	5.8	1.16	1830	1.42	2.96	22.4	16.7	3860
IM92		14.90	22.2	0.34	1.9	0.149	0.72	38.4	5.4	1.56	3200	3.25	1.94	72.7	23.5	6940
IM93		13.35	19.80	0.27	3.0	0.117	0.74	27.9	5.0	1.48	2810	2.15	2.08	52.6	21.5	8750
IS01		6.89	17.25	0.15	0.9	0.079	0.31	17.0	8.3	3.76	812	0.19	2.48	5.0	183.5	630
IS02		8.74	21.9	0.22	2.3	0.117	0.54	23.1	6.2	1.90	1740	1.24	2.50	48.5	49.1	1850
IS03		9.96	19.90	0.14	0.8	0.092	0.37	11.8	4.7	2.12	1430	0.57	2.58	8.9	36.7	580
IS04		7.38	17.45	0.11	0.6	0.080	0.37	6.2	3.6	1.51	2310	0.42	2.88	7.6	23.5	220
IS05		8.03	20.4	0.12	0.9	0.085	0.52	7.7	6.0	1.83	1270	0.73	2.62	7.0	43.6	370
IS06		11.25	17.85	0.13	0.8	0.090	0.43	7.7	3.9	1.87	2010	0.60	1.98	8.9	23.6	300
IS07		6.52	18.75	0.10	0.4	0.088	0.32	6.1	3.1	0.73	1210	0.47	3.28	7.3	12.8	210
IS08		6.00	17.55	0.10	0.5	0.075	0.28	5.3	2.7	0.98	1230	0.73	3.33	5.2	18.8	190
IS09		5.74	22.5	0.18	0.9	0.094	0.60	20.7	5.6	1.58	1130	1.04	2.83	23.3	31.5	1430
IS10		5.87	27.6	0.14	0.7	0.122	0.44	12.3	5.1	1.53	1630	0.36	2.73	7.4	15.9	2130
IS11		6.27	20.4	0.15	1.6	0.084	0.82	22.2	10.3	1.99	1180	0.79	2.37	12.0	83.5	680
IS12		4.86	21.3	0.14	0.8	0.083	0.53	13.9	7.3	1.80	949	0.52	2.92	15.5	68.2	1010

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
IM66		13.5	19.0	<0.002	<0.01	0.08	10.7	1	1.3	867	0.78	<0.05	1.4	0.576	0.08	0.6
IM67		3.3	5.9	<0.002	0.01	0.19	39.5	4	3.0	197.5	2.85	<0.05	4.0	4.90	0.02	1.1
IM68		2.3	3.5	<0.002	<0.01	0.13	42.1	3	1.8	250	1.19	<0.05	1.4	1.805	0.02	0.3
IM69		4.5	10.4	<0.002	0.01	0.18	42.8	3	3.4	256	2.05	<0.05	2.9	2.41	0.04	1.3
IM70		5.5	10.0	<0.002	<0.01	2.72	20.9	4	6.8	156.0	4.14	<0.05	22.0	3.59	0.04	3.2
IM71		10.4	24.5	<0.002	0.04	1.28	25.1	2	3.2	412	2.93	0.08	9.1	1.350	0.10	3.1
IM72		15.5	25.6	0.002	0.11	0.27	21.3	6	2.8	400	2.38	0.11	100.5	1.945	0.14	20.8
IM73		6.3	9.6	<0.002	0.07	0.17	27.9	1	1.2	258	1.09	0.09	3.3	0.946	0.06	0.7
IM74		9.1	20.3	<0.002	0.04	1.57	18.0	2	2.6	271	2.42	0.07	14.6	1.430	0.07	2.3
IM75		9.7	17.0	<0.002	0.07	1.21	26.9	4	5.5	194.5	6.61	0.11	53.4	4.46	0.07	9.4
IM76		9.9	8.8	<0.002	<0.01	0.10	14.3	1	1.0	821	0.55	<0.05	1.2	0.540	0.04	0.5
IM77		10.3	27.2	<0.002	0.04	2.82	15.3	4	5.1	275	8.80	0.07	21.4	3.98	0.12	5.7
IM78		16.7	44.0	<0.002	0.13	2.38	9.5	2	3.0	419	3.74	0.10	6.3	1.090	0.18	2.7
IM79		6.9	13.1	<0.002	0.02	0.21	27.3	3	2.9	407	2.73	0.05	5.9	2.32	0.06	2.6
IM80		10.5	10.2	0.002	<0.01	0.18	19.3	2	1.5	642	0.96	<0.05	1.7	0.992	0.10	1.1
IM81		11.4	18.0	<0.002	<0.01	0.28	24.8	3	2.8	554	2.30	<0.05	6.4	1.865	0.12	3.4
IM82		13.0	24.7	<0.002	<0.01	0.20	15.0	3	2.4	625	2.07	<0.05	4.2	1.315	0.12	3.3
IM83		14.1	26.4	<0.002	<0.01	0.17	10.8	2	1.8	686	1.41	<0.05	2.7	0.528	0.12	1.9
IM84		8.5	10.7	<0.002	<0.01	0.14	14.3	1	0.9	661	0.53	<0.05	1.5	0.452	0.06	0.6
IM85		11.2	23.0	0.002	<0.01	0.16	18.5	4	1.9	683	1.42	<0.05	4.3	1.035	0.10	2.8
IM86		10.8	18.8	<0.002	<0.01	0.12	17.5	4	0.8	599	0.93	<0.05	3.3	2.31	0.08	2.1
IM87		8.7	13.7	<0.002	0.01	0.30	16.5	2	2.3	417	3.40	<0.05	13.8	2.97	0.07	2.7
IM88		10.9	19.7	<0.002	<0.01	0.19	16.5	4	2.8	601	2.85	<0.05	3.9	4.28	0.08	2.0
IM89		11.4	23.6	<0.002	<0.01	0.15	17.3	3	1.9	710	1.20	<0.05	4.4	0.906	0.11	1.7
IM90		10.0	18.2	<0.002	<0.01	0.14	25.4	3	2.3	626	1.20	<0.05	3.7	0.927	0.08	2.0
IM91		9.3	15.6	<0.002	<0.01	0.09	20.9	3	1.0	615	1.14	<0.05	2.9	2.67	0.07	1.5
IM92		7.3	10.2	0.002	<0.01	0.15	30.8	6	5.0	386	4.76	<0.05	4.4	6.45	0.05	2.4
IM93		6.6	11.5	<0.002	<0.01	0.10	27.1	4	2.6	445	3.38	<0.05	2.8	5.39	0.05	1.8
IS01		2.2	5.8	<0.002	<0.01	0.21	28.2	2	1.4	185.0	0.30	<0.05	2.4	0.686	0.04	0.3
IS02		6.6	12.2	<0.002	0.01	0.41	26.6	3	3.2	430	3.03	<0.05	4.4	2.23	0.07	1.5
IS03		3.5	5.6	<0.002	<0.01	0.23	33.5	1	1.3	230	0.50	0.08	1.4	0.945	0.02	0.2
IS04		3.3	5.1	<0.002	<0.01	0.17	25.7	1	1.0	206	0.44	<0.05	0.4	0.806	0.03	0.1
IS05		4.4	12.7	<0.002	0.01	0.20	30.4	2	1.3	242	0.47	0.07	0.7	0.753	0.05	0.2
IS06		2.7	6.2	0.002	<0.01	0.15	37.3	2	1.1	181.0	0.51	<0.05	1.0	0.860	0.03	0.1
IS07		2.8	3.9	<0.002	<0.01	0.13	20.4	1	1.0	176.0	0.39	<0.05	0.4	0.875	0.02	0.1
IS08		2.5	3.1	<0.002	<0.01	0.14	23.2	1	1.1	163.0	0.29	<0.05	1.7	0.861	0.02	0.1
IS09		6.2	16.3	<0.002	0.02	0.20	23.8	3	2.4	466	1.48	<0.05	4.4	1.165	0.07	1.4
IS10		5.2	5.2	<0.002	<0.01	0.31	23.3	2	1.6	696	0.48	<0.05	0.9	0.812	0.04	0.4
IS11		6.2	29.5	<0.002	0.02	0.29	23.9	2	1.8	287	0.72	<0.05	6.2	0.742	0.12	1.0
IS12		5.4	14.0	<0.002	0.01	0.22	19.2	1	1.5	494	0.92	0.05	2.9	0.723	0.06	0.6

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
IM66		57	0.1	16.7	37	5.8	3.01	1.75	1.18	3.11	0.60	0.27	12.6	2.86	3.34	0.49
IM67		312	0.9	69.1	115	36.3	11.40	7.91	2.06	9.39	2.54	1.33	31.2	7.22	8.43	1.64
IM68		201	0.3	69.8	120	15.2	11.50	8.04	2.18	9.27	2.58	1.31	25.9	5.28	7.83	1.61
IM69		252	0.6	72.6	115	28.3	12.65	8.20	2.61	10.50	2.73	1.30	28.0	6.07	8.85	1.85
IM70		419	1.7	62.5	62	63.5	12.60	6.60	3.01	15.35	2.36	0.91	85.2	21.5	18.75	2.23
IM71		184	1.2	48.3	64	39.9	9.58	5.27	2.60	10.40	1.89	0.74	46.3	11.05	11.10	1.60
IM72		217	1.0	94.7	62	98.7	26.8	8.05	7.69	47.8	3.86	0.71	351	90.5	71.7	6.08
IM73		215	0.5	21.3	76	17.3	4.14	2.29	1.47	4.75	0.80	0.38	22.9	5.33	5.53	0.70
IM74		181	0.9	37.8	53	30.2	8.26	3.87	2.40	11.70	1.46	0.52	61.4	14.90	14.25	1.61
IM75		374	1.9	66.8	84	94.3	18.30	6.32	5.40	32.3	2.77	0.69	228	57.7	49.0	3.96
IM76		100	0.2	17.4	55	11.7	3.27	1.80	1.41	3.66	0.65	0.25	13.9	2.98	3.82	0.56
IM77		289	2.1	65.4	72	73.0	14.35	6.71	4.32	18.25	2.57	0.84	100.5	24.9	22.0	2.64
IM78		112	1.2	36.4	39	43.0	7.27	4.12	2.22	7.40	1.43	0.57	30.9	7.71	7.83	1.19
IM79		263	0.9	46.8	93	43.1	8.92	5.02	2.79	9.76	1.72	0.75	42.2	9.46	10.55	1.50
IM80		139	0.3	29.7	77	20.6	5.78	3.18	2.04	6.06	1.18	0.47	21.3	4.39	5.83	0.93
IM81		235	0.6	54.8	89	49.3	10.65	5.81	3.47	11.65	2.16	0.90	50.6	10.85	12.60	1.73
IM82		136	0.4	54.4	60	34.1	10.60	5.74	3.43	11.20	2.14	0.88	51.4	11.40	12.30	1.72
IM83		71	0.3	30.7	43	13.7	5.85	3.36	1.73	6.13	1.20	0.49	26.9	6.06	6.52	0.95
IM84		91	0.2	19.4	53	14.6	4.01	2.25	1.44	4.17	0.80	0.34	16.7	3.69	4.22	0.64
IM85		143	0.2	61.1	66	59.0	12.25	6.50	4.15	13.45	2.46	0.98	60.9	13.80	14.25	2.00
IM86		175	0.3	61.6	85	39.9	12.05	6.38	3.99	13.10	2.38	0.93	57.3	12.70	14.10	1.98
IM87		277	0.9	29.8	71	45.0	6.88	3.07	2.16	9.41	1.23	0.42	55.4	14.35	11.45	1.30
IM88		230	0.5	56.6	107	48.9	11.15	5.97	3.92	12.60	2.23	0.87	62.1	14.55	14.40	1.87
IM89		102	0.3	47.8	62	21.4	9.34	4.93	3.11	10.05	1.82	0.74	43.2	9.59	10.55	1.51
IM90		143	0.2	70.2	78	25.7	13.35	7.36	4.08	14.40	2.75	1.06	59.2	12.75	14.90	2.20
IM91		210	0.4	52.7	102	50.3	10.25	5.57	3.22	11.30	2.07	0.79	47.6	10.30	11.90	1.69
IM92		350	0.8	99.4	161	44.1	19.90	10.75	5.94	21.4	4.02	1.55	82.4	17.85	21.6	3.23
IM93		330	0.6	71.1	145	73.8	13.65	7.40	4.09	14.95	2.75	1.05	59.8	12.50	15.45	2.24
IS01		199	0.1	29.4	44	21.5	5.56	3.18	1.56	5.62	1.16	0.47	24.2	5.45	5.90	0.88
IS02		230	0.9	55.9	93	65.6	11.00	6.31	3.23	10.80	2.27	0.90	40.0	8.67	10.40	1.76
IS03		335	0.2	27.3	98	20.1	5.10	3.18	1.22	4.81	1.12	0.54	18.8	4.10	4.61	0.76
IS04		236	0.1	25.6	73	14.7	4.53	3.11	0.90	3.60	1.03	0.60	10.2	2.17	2.83	0.64
IS05		259	0.2	25.1	85	21.8	4.61	2.81	1.13	4.14	0.98	0.46	13.3	2.85	3.68	0.71
IS06		335	0.2	37.6	84	20.0	6.14	4.36	0.94	4.53	1.46	0.81	11.4	2.52	3.19	0.82
IS07		140	0.2	33.3	71	10.7	5.54	3.97	0.99	4.09	1.30	0.73	10.3	2.17	3.08	0.75
IS08		141	0.1	34.5	64	10.8	5.52	4.19	0.94	3.84	1.33	0.74	8.4	1.79	2.58	0.73
IS09		169	0.4	44.4	84	20.2	8.88	4.96	2.51	9.00	1.81	0.69	32.9	7.21	8.50	1.41
IS10		158	0.2	38.8	97	11.1	7.60	4.03	3.09	7.98	1.54	0.58	27.9	5.48	8.00	1.22
IS11		165	0.3	30.8	79	47.6	6.26	3.52	1.61	6.34	1.25	0.54	27.9	6.55	6.32	0.97
IS12		129	0.3	29.0	78	19.1	5.72	3.17	1.85	5.85	1.19	0.46	22.0	4.85	5.61	0.92

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
IM66		0.27	1.74
IM67		1.26	8.48
IM68		1.26	8.38
IM69		1.27	8.42
IM70		0.98	6.33
IM71		0.80	5.00
IM72		0.94	5.02
IM73		0.35	2.35
IM74		0.56	3.44
IM75		0.79	4.73
IM76		0.26	1.66
IM77		0.95	5.80
IM78		0.62	3.90
IM79		0.76	4.97
IM80		0.47	2.94
IM81		0.90	5.65
IM82		0.85	5.70
IM83		0.50	3.18
IM84		0.32	2.09
IM85		0.98	6.12
IM86		0.95	6.09
IM87		0.43	2.71
IM88		0.88	5.63
IM89		0.76	4.75
IM90		1.07	6.96
IM91		0.81	5.17
IM92		1.58	10.10
IM93		1.07	6.81
IS01		0.47	2.99
IS02		0.95	6.01
IS03		0.50	3.30
IS04		0.51	3.51
IS05		0.45	2.86
IS06		0.71	4.87
IS07		0.65	4.41
IS08		0.67	4.60
IS09		0.73	4.55
IS10		0.60	3.66
IS11		0.52	3.46
IS12		0.49	3.00

***** See Appendix Page for comments regarding this certificate *****

Appendix 3-1

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
IS13		0.12	<0.001	0.02	7.99	1.0	120	0.45	0.03	4.07	0.12	13.70	35.2	76	0.12	18.7
IS14		0.14	<0.001	0.02	8.85	1.2	180	0.61	0.03	4.16	0.09	18.50	22.8	76	0.10	17.0
IS15		0.13	<0.001	0.01	7.53	1.1	130	0.73	0.04	4.59	0.09	53.9	31.1	158	0.15	12.8
IS16		0.13	0.001	0.02	7.60	1.5	290	1.44	0.08	5.10	0.09	39.2	29.5	397	0.36	20.1
IS17		0.12	0.001	0.02	7.46	1.5	270	1.18	0.04	4.98	0.08	51.7	30.5	135	0.27	14.3
IS18		0.13	0.001	0.03	8.73	1.2	210	0.84	0.07	4.97	0.11	36.8	22.8	56	0.44	28.6
IS19		0.13	<0.001	0.02	8.27	0.7	170	0.76	0.06	4.70	0.09	35.1	20.4	38	0.29	21.3
IS20		0.13	<0.001	0.01	6.71	0.8	100	0.45	0.10	5.33	0.11	52.4	21.8	38	0.10	12.2
IS21		0.13	<0.001	<0.01	5.29	2.0	190	1.10	0.10	5.31	0.17	68.6	31.5	152	0.13	19.5
IS22		0.13	0.001	0.02	6.42	1.4	260	1.08	0.07	4.72	0.14	48.6	31.1	587	0.20	17.0
IS23		0.13	<0.001	0.01	7.47	2.7	230	1.60	0.15	4.11	0.09	300	26.0	172	0.67	21.1
IS24		0.12	0.001	0.02	8.37	3.4	250	1.03	0.12	4.35	0.11	42.6	22.0	81	0.72	27.3
IS25		0.14	0.001	0.02	8.22	2.2	290	0.97	0.13	4.48	0.14	66.0	23.5	87	0.67	28.7
IS26		0.14	<0.001	<0.01	4.51	1.0	580	0.39	0.05	0.99	0.05	>500	33.4	253	0.22	12.0
IS27		0.13	<0.001	<0.01	5.50	1.4	1090	0.64	0.05	3.26	0.05	372	30.8	126	0.26	5.7
IS28		0.13	<0.001	<0.01	9.27	1.0	2170	1.09	0.03	3.42	0.06	98.2	13.9	59	0.36	4.2
IS29		0.13	<0.001	<0.01	7.27	1.3	850	0.77	0.03	3.71	0.15	161.0	21.6	114	0.20	4.8
IS30		0.12	<0.001	0.03	9.24	1.8	380	0.94	0.03	3.43	0.12	67.2	21.7	93	0.48	25.2
IS31		0.13	<0.001	<0.01	6.67	0.6	390	0.48	0.03	2.26	0.03	57.5	20.4	94	0.15	8.4
IS32		0.12	<0.001	0.01	7.49	0.6	670	0.72	0.04	2.41	0.02	52.9	12.2	56	0.24	7.5
IS33		0.12	<0.001	0.03	6.67	1.1	1420	1.34	0.16	2.51	0.14	>500	26.5	60	0.38	20.5
IS34		0.13	<0.001	0.01	7.21	1.7	600	1.14	0.08	2.96	0.08	454	23.6	49	0.51	26.1
IS35		0.13	<0.001	<0.01	3.46	0.9	120	0.53	0.01	1.24	0.03	130.5	19.9	1220	0.11	6.6
IS36		0.08	<0.001	<0.01	7.37	0.9	250	0.85	0.02	2.40	0.09	82.4	22.9	106	0.19	22.9
IS37		0.09	<0.001	<0.01	3.47	0.7	100	0.42	0.03	1.92	0.03	167.0	26.5	630	0.11	9.9
IS38		0.09	0.001	0.02	6.14	1.5	1990	1.46	0.25	2.21	0.09	>500	27.7	101	0.37	23.8
IS39		0.08	0.001	0.13	6.26	2.6	4160	2.48	0.28	2.21	1.23	>500	34.4	57	0.70	41.3
IS40		0.08	0.001	0.02	8.16	1.0	450	1.57	0.03	3.16	0.04	113.0	18.9	121	0.42	13.2
IS41		0.08	0.001	0.02	8.21	1.4	300	1.11	0.05	3.00	0.12	107.0	24.7	60	0.46	31.1
IS42		0.08	0.001	0.02	7.01	1.8	990	1.40	0.14	1.79	0.17	>500	15.0	28	0.37	25.3
IS43		0.12	0.001	0.09	5.20	<0.2	1870	2.43	0.12	1.69	0.45	>500	32.2	30	0.59	36.3
IS44		0.13	0.001	0.08	8.20	4.4	1780	1.65	0.22	1.51	0.12	>500	25.1	47	1.02	52.2
IS45		0.12	0.001	0.06	7.41	2.7	2030	1.51	0.26	1.46	0.10	>500	22.9	34	0.83	44.6
IS46		0.12	<0.001	0.03	7.47	1.0	480	0.76	0.10	2.60	0.08	>500	10.6	22	0.20	13.4
IS47		0.13	<0.001	0.03	8.30	0.7	370	0.65	0.08	2.73	0.05	254	8.7	14	0.12	10.3
IS48		0.12	<0.001	0.01	9.14	0.7	380	0.54	0.01	3.06	0.06	39.6	12.8	25	0.19	19.4
IS49		0.12	<0.001	0.03	8.64	1.1	260	0.67	0.03	3.73	0.08	37.5	16.6	43	0.18	17.3
IS50		0.12	0.001	0.06	8.01	4.7	610	1.46	0.03	2.48	0.13	73.7	28.6	124	0.75	41.4
IS51		0.12	<0.001	<0.01	6.03	0.6	1350	0.64	0.01	1.95	0.03	378	23.4	144	0.26	6.7
IS52		0.13	0.001	<0.01	7.34	1.2	1590	0.97	0.03	2.24	0.02	295	21.3	91	0.42	9.6

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
IS13		15.70	20.7	0.12	0.8	0.251	0.29	5.0	2.7	1.99	2830	0.98	1.84	8.8	22.8	220
IS14		7.25	16.95	0.12	0.8	0.069	0.34	7.8	3.6	1.66	1710	0.47	2.62	10.0	27.9	420
IS15		13.00	19.50	0.17	1.9	0.088	0.49	23.3	4.9	2.76	2080	1.09	1.92	10.2	60.0	1460
IS16		8.87	21.3	0.17	3.0	0.115	1.22	15.6	5.8	2.64	1200	1.29	2.08	17.3	114.5	2350
IS17		9.28	20.1	0.17	2.7	0.101	1.02	19.0	5.5	2.60	1540	1.06	2.07	13.6	65.3	2630
IS18		7.40	22.6	0.15	0.9	0.091	0.52	14.5	5.3	1.67	1410	0.84	2.63	19.0	26.5	1640
IS19		7.79	21.3	0.17	1.1	0.097	0.40	13.2	4.3	1.42	1440	0.62	2.63	23.7	18.4	1590
IS20		13.10	26.9	0.21	1.0	0.154	0.23	20.3	2.4	1.00	2420	0.73	1.39	32.1	13.7	1290
IS21		16.00	19.80	0.19	3.4	0.141	0.84	22.6	4.1	2.21	1740	2.72	1.38	32.1	48.9	4320
IS22		12.90	19.40	0.17	2.7	0.119	1.11	17.6	4.6	2.36	1400	1.46	1.82	20.5	86.8	2810
IS23		9.02	22.4	0.42	2.5	0.100	0.93	130.0	7.5	1.87	1220	1.68	2.62	46.0	46.0	2040
IS24		6.24	19.05	0.13	0.8	0.071	0.69	16.8	9.2	1.90	1040	1.05	2.70	18.7	35.4	1030
IS25		6.67	19.75	0.14	1.3	0.084	0.78	24.9	10.5	2.05	1220	1.06	2.44	22.0	42.1	1190
IS26		18.35	20.7	0.76	3.2	0.193	1.21	263	3.0	0.74	2470	3.25	0.94	146.5	28.1	1070
IS27		16.05	18.00	0.50	5.0	0.104	1.63	163.5	3.4	1.35	2230	4.01	1.47	142.0	22.9	6160
IS28		3.27	20.6	0.19	1.0	0.040	3.54	40.7	3.5	1.05	690	0.54	2.76	20.1	19.9	2850
IS29		10.80	17.40	0.23	3.5	0.089	1.38	70.2	3.3	1.30	2070	2.87	1.99	103.5	20.9	3080
IS30		5.61	17.10	0.13	0.9	0.057	0.53	28.5	5.5	1.10	1350	1.20	1.90	14.9	30.1	990
IS31		6.17	12.40	0.10	1.1	0.041	0.50	22.7	2.9	0.57	1740	1.08	2.03	28.0	22.0	490
IS32		2.65	14.95	0.11	0.6	0.037	1.02	21.1	3.2	0.43	861	0.43	2.43	14.3	19.6	380
IS33		6.75	39.4	3.54	0.9	0.124	0.97	1840	6.8	0.61	4240	7.42	2.09	48.7	31.2	3010
IS34		5.49	17.15	0.45	0.8	0.061	0.58	185.0	5.6	0.55	2640	2.46	2.33	49.8	27.2	2500
IS35		19.50	15.60	0.20	1.0	0.047	0.19	57.2	2.8	0.92	964	1.23	1.27	53.3	75.0	470
IS36		9.42	17.95	0.16	1.2	0.067	0.47	38.5	4.3	0.88	1620	2.04	2.10	46.0	26.6	390
IS37		19.35	14.15	0.28	1.5	0.062	0.22	72.2	2.9	1.27	1570	2.11	1.10	61.6	61.3	1280
IS38		9.67	38.8	3.61	0.9	0.196	1.22	1620	8.4	0.71	4590	10.80	1.74	68.3	38.8	3310
IS39		10.15	67.8	5.28	1.4	0.499	2.68	3080	38.2	0.95	16400	75.7	1.26	328	45.2	9020
IS40		3.50	16.15	0.15	0.8	0.062	1.21	46.7	8.9	1.32	982	1.22	2.68	26.3	42.8	800
IS41		6.09	17.40	0.18	0.8	0.075	0.66	44.7	7.3	1.16	1650	1.53	2.43	30.6	39.2	1370
IS42		5.41	46.7	4.48	0.7	0.149	1.14	3010	10.5	0.45	3220	8.27	2.29	119.0	16.1	3220
IS43		10.75	179.0	16.75	1.5	0.224	1.54	>10000	32.0	0.86	7240	19.80	1.18	228	32.8	5920
IS44		4.99	22.9	0.71	0.5	0.164	1.51	258	13.3	0.92	3010	7.10	1.48	57.4	34.0	1590
IS45		5.22	20.1	0.94	0.6	0.190	1.21	290	11.6	0.62	4500	6.92	1.45	72.4	22.6	1800
IS46		3.66	17.55	0.69	0.5	0.087	0.70	345	4.9	0.33	2000	2.41	2.50	46.6	9.6	700
IS47		2.13	15.05	0.26	0.3	0.044	0.52	103.5	3.9	0.19	1220	1.41	3.18	22.7	7.7	410
IS48		3.25	14.50	0.08	0.7	0.042	0.56	14.6	4.0	0.52	1250	0.56	3.34	15.5	15.0	320
IS49		5.48	14.90	0.10	0.6	0.063	0.48	13.4	3.7	0.94	1660	0.98	3.09	17.2	20.4	960
IS50		6.71	18.45	0.14	1.7	0.085	0.88	28.4	8.8	1.09	1620	4.35	1.38	23.6	49.5	910
IS51		14.85	18.65	0.43	9.9	0.113	2.62	185.5	2.7	0.76	2480	3.23	1.74	158.5	20.4	1930
IS52		11.10	21.7	0.38	2.9	0.094	3.08	130.5	3.5	0.79	1640	1.93	2.15	76.9	23.6	2570

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
IS13		1.9	2.6	<0.002	<0.01	0.14	43.3	2	1.5	131.0	0.47	<0.05	0.2	1.240	0.02	0.1
IS14		2.8	4.1	<0.002	0.01	0.09	27.7	1	1.0	273	0.71	<0.05	0.9	0.869	0.02	0.1
IS15		3.0	10.1	0.003	<0.01	0.15	30.1	2	2.3	248	0.70	<0.05	16.6	1.775	0.04	0.9
IS16		7.3	40.5	<0.002	<0.01	0.22	31.5	3	5.1	332	1.16	<0.05	7.3	1.155	0.12	1.9
IS17		4.3	26.7	<0.002	<0.01	0.20	31.4	2	3.4	290	0.87	<0.05	7.1	1.360	0.08	1.2
IS18		4.6	10.4	<0.002	0.01	0.21	24.3	3	1.8	457	1.22	<0.05	2.0	1.575	0.05	0.8
IS19		4.0	6.5	<0.002	<0.01	0.21	25.0	2	1.6	404	1.43	<0.05	1.7	1.650	0.04	0.6
IS20		4.3	2.6	<0.002	<0.01	0.27	24.1	3	2.4	484	1.89	<0.05	1.5	4.67	0.02	0.7
IS21		6.7	16.2	<0.002	<0.01	0.41	33.8	3	6.1	245	1.72	<0.05	6.9	3.37	0.04	2.7
IS22		7.1	27.7	<0.002	<0.01	0.24	29.9	2	6.0	281	1.30	<0.05	7.0	1.870	0.06	1.8
IS23		9.1	33.9	0.003	0.03	0.50	24.4	3	5.0	252	2.92	<0.05	39.9	2.03	0.08	7.1
IS24		7.1	19.4	<0.002	0.06	0.32	24.5	2	2.2	329	1.23	<0.05	4.0	1.060	0.06	1.3
IS25		7.1	18.5	<0.002	0.05	0.21	27.1	2	2.2	317	1.49	<0.05	7.0	1.335	0.04	1.8
IS26		14.1	28.8	0.002	<0.01	0.21	28.9	3	12.1	256	7.37	<0.05	137.5	7.58	0.08	3.8
IS27		12.2	34.2	<0.002	<0.01	0.21	19.7	3	8.8	784	7.55	<0.05	41.6	8.13	0.13	2.0
IS28		19.3	64.3	<0.002	0.01	0.12	8.0	1	1.5	1320	1.01	<0.05	2.0	0.865	0.20	0.5
IS29		10.7	24.2	<0.002	<0.01	0.20	18.4	3	3.6	700	5.35	<0.05	10.8	5.66	0.06	1.5
IS30		5.8	19.7	<0.002	0.02	0.19	19.3	1	0.9	335	0.77	<0.05	2.3	0.992	0.05	0.6
IS31		6.4	10.8	<0.002	<0.01	0.14	12.5	1	1.6	367	1.47	<0.05	3.2	2.13	<0.02	0.3
IS32		8.8	19.8	<0.002	<0.01	0.15	9.1	1	1.0	502	0.74	<0.05	2.1	0.779	0.04	0.3
IS33		22.0	21.2	0.003	<0.01	0.11	13.7	3	1.2	799	1.00	<0.05	50.6	1.890	0.04	1.6
IS34		13.0	15.4	<0.002	<0.01	0.25	14.3	3	1.6	439	2.09	<0.05	10.6	2.34	0.03	0.6
IS35		5.2	4.4	<0.002	<0.01	0.29	21.9	1	4.0	115.5	1.80	<0.05	11.9	2.62	<0.02	0.7
IS36		5.8	9.0	<0.002	<0.01	0.20	22.4	1	2.0	240	2.17	<0.05	3.9	1.980	<0.02	0.4
IS37		3.5	5.6	0.002	<0.01	0.23	21.4	2	4.4	123.5	2.21	<0.05	21.0	4.48	<0.02	1.5
IS38		22.1	26.0	0.004	0.01	0.17	16.5	4	2.5	691	1.38	0.05	84.7	2.21	0.04	1.5
IS39		34.2	61.3	0.006	0.01	0.26	14.1	4	6.2	2370	5.65	0.18	41.7	0.670	0.18	3.1
IS40		7.0	33.7	<0.002	<0.01	0.15	16.2	1	1.7	379	0.47	<0.05	9.1	0.376	0.07	0.5
IS41		8.1	19.5	<0.002	0.02	0.17	21.4	2	1.4	384	1.28	0.06	7.6	1.640	0.04	0.7
IS42		19.3	21.8	0.004	0.01	0.18	13.8	3	2.0	787	1.22	0.08	60.1	1.330	0.04	1.1
IS43		23.5	42.4	0.014	<0.01	0.07	16.0	8	0.8	2770	2.20	0.10	20.8	2.46	0.11	3.0
IS44		25.5	41.6	<0.002	0.02	0.29	18.7	2	1.8	670	0.80	0.07	31.7	0.442	0.13	0.5
IS45		25.2	29.7	0.002	0.01	0.25	19.4	2	2.4	518	0.87	0.09	39.7	0.489	0.06	0.5
IS46		9.5	11.3	0.003	<0.01	0.14	13.8	1	1.6	256	0.76	<0.05	12.0	1.015	<0.02	0.3
IS47		7.6	7.6	<0.002	<0.01	0.17	7.6	1	0.8	227	0.31	<0.05	6.0	0.391	<0.02	0.1
IS48		4.4	8.1	0.002	<0.01	0.13	14.4	1	0.7	205	0.63	<0.05	1.3	0.793	<0.02	0.2
IS49		4.3	8.7	<0.002	<0.01	0.14	20.7	1	1.3	277	0.91	<0.05	2.6	1.405	<0.02	0.3
IS50		10.2	30.0	<0.002	0.03	0.32	24.4	2	1.2	321	1.12	<0.05	3.6	1.065	0.20	0.9
IS51		14.7	44.3	<0.002	<0.01	0.17	15.2	3	9.0	690	7.80	<0.05	42.1	7.64	0.13	2.5
IS52		18.1	64.9	<0.002	0.01	0.17	12.4	2	6.6	892	3.94	<0.05	28.9	4.00	0.17	1.7

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
IS13		439	0.1	53.6	123	18.6	8.50	6.54	0.96	5.57	2.13	1.26	9.3	1.92	3.29	1.09
IS14		201	0.2	31.2	75	20.0	5.26	3.67	0.99	4.02	1.21	0.67	11.4	2.55	3.13	0.72
IS15		415	0.2	41.8	104	55.3	7.30	4.93	1.59	6.98	1.67	0.83	30.9	7.20	7.08	1.13
IS16		238	0.3	63.6	89	84.4	11.30	6.91	2.04	9.84	2.44	1.04	26.6	5.63	8.52	1.69
IS17		270	0.3	55.6	82	80.2	10.40	6.12	2.19	10.05	2.18	0.96	37.3	7.94	9.76	1.61
IS18		213	0.3	38.8	100	17.3	7.73	4.30	2.48	7.70	1.57	0.60	27.4	5.73	7.50	1.22
IS19		226	0.3	38.3	100	29.1	7.14	4.11	2.27	7.18	1.51	0.61	24.9	5.15	6.71	1.14
IS20		364	0.3	50.2	114	24.3	9.94	5.11	4.55	10.80	1.97	0.72	40.4	8.07	11.30	1.65
IS21		458	0.7	92.3	103	92.2	16.95	10.45	4.19	16.30	3.51	1.42	47.2	10.00	13.65	2.66
IS22		352	0.4	65.8	99	77.6	12.15	7.60	2.48	11.30	2.47	1.00	31.0	6.71	9.24	1.88
IS23		248	1.1	65.9	75	61.6	13.95	6.97	5.27	19.05	2.55	0.84	136.0	35.5	24.9	2.54
IS24		198	0.6	32.4	78	16.4	6.22	3.51	1.78	6.30	1.21	0.43	24.7	5.67	6.14	0.99
IS25		190	0.5	42.9	85	26.9	8.69	4.78	2.27	9.30	1.72	0.64	39.1	8.87	9.48	1.41
IS26		568	1.8	54.4	190	95.2	13.05	5.79	3.26	26.4	2.16	0.74	276	74.4	42.4	2.79
IS27		391	1.3	51.0	182	171.0	11.05	5.30	4.99	16.20	1.93	0.62	167.0	44.1	25.1	2.02
IS28		68	0.5	20.3	49	31.0	4.65	2.11	3.00	6.43	0.79	0.25	47.2	11.75	8.69	0.84
IS29		215	1.2	47.0	144	111.0	9.28	5.15	3.24	11.35	1.77	0.70	76.0	20.5	13.75	1.61
IS30		140	0.5	36.5	75	24.4	6.94	4.27	1.86	6.91	1.44	0.57	30.3	7.50	6.44	1.09
IS31		173	0.4	20.3	48	37.6	3.43	2.48	1.08	3.23	0.76	0.39	21.8	5.74	3.72	0.52
IS32		67	0.3	17.3	29	18.0	3.24	1.96	1.30	3.50	0.66	0.26	21.2	5.42	4.01	0.51
IS33		157	0.9	47.8	207	30.1	14.70	5.13	27.0	47.2	2.11	0.65	>1000	470	151.0	3.89
IS34		122	1.2	42.8	81	21.9	8.68	4.94	4.93	12.40	1.70	0.69	173.0	49.4	21.2	1.49
IS35		618	0.9	20.0	38	34.6	4.49	2.17	1.72	5.93	0.82	0.25	46.6	12.80	7.62	0.82
IS36		278	0.6	33.2	89	29.6	5.57	3.91	1.25	5.24	1.20	0.63	32.5	8.80	5.86	0.82
IS37		653	1.1	36.1	66	47.6	7.33	3.75	2.40	9.78	1.40	0.51	74.1	19.80	13.30	1.34
IS38		217	1.4	52.6	280	28.2	17.70	5.32	34.0	61.7	2.31	0.69	>1000	474	184.5	4.91
IS39		133	1.0	51.4	1370	62.0	17.65	4.84	33.6	58.9	2.28	0.63	>1000	729	201	4.84
IS40		98	0.7	25.3	56	21.3	5.29	2.69	2.28	7.16	0.98	0.35	44.1	11.65	8.50	0.98
IS41		139	0.6	38.7	89	17.9	7.70	4.58	2.77	9.83	1.52	0.60	50.9	12.45	11.20	1.34
IS42		107	1.1	35.4	286	23.4	13.80	3.65	29.6	51.0	1.64	0.48	>1000	625	175.5	4.07
IS43		159	1.0	92.0	523	61.0	39.0	9.03	93.4	158.0	4.55	1.32	>1000	>1000	549	12.80
IS44		97	0.9	30.1	265	17.8	8.36	3.03	9.46	20.1	1.26	0.38	285	74.3	41.3	2.01
IS45		104	1.0	33.4	288	17.6	9.11	3.31	11.10	22.8	1.35	0.41	381	97.7	51.5	2.21
IS46		82	0.8	35.0	91	13.7	6.47	4.11	5.62	11.15	1.34	0.67	292	86.7	28.4	1.21
IS47		53	0.4	18.0	47	7.9	3.47	2.19	2.29	5.31	0.72	0.36	83.8	25.5	10.05	0.62
IS48		74	0.4	34.5	48	17.0	5.23	4.28	1.07	4.03	1.25	0.72	16.1	4.17	3.32	0.69
IS49		136	0.4	42.3	60	12.9	7.03	5.14	1.35	5.59	1.58	0.85	19.1	4.41	4.67	0.98
IS50		190	1.0	42.6	90	47.3	8.21	4.82	2.03	8.40	1.67	0.63	36.7	8.64	8.01	1.29
IS51		366	1.1	32.1	161	335	7.31	3.40	3.27	12.10	1.25	0.47	141.0	41.1	19.00	1.46
IS52		256	1.1	35.7	128	92.9	8.36	3.57	3.69	13.65	1.41	0.39	129.0	34.6	20.3	1.68

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
IS13		1.10	7.44
IS14		0.60	4.05
IS15		0.75	5.04
IS16		1.05	6.96
IS17		0.93	6.03
IS18		0.63	3.95
IS19		0.60	3.97
IS20		0.76	4.64
IS21		1.45	9.79
IS22		1.05	6.92
IS23		0.93	5.91
IS24		0.48	3.11
IS25		0.66	4.33
IS26		0.76	5.03
IS27		0.68	4.32
IS28		0.28	1.70
IS29		0.70	4.69
IS30		0.56	3.91
IS31		0.35	2.58
IS32		0.28	1.83
IS33		0.61	3.92
IS34		0.68	4.68
IS35		0.27	1.75
IS36		0.56	4.19
IS37		0.53	3.39
IS38		0.62	4.07
IS39		0.50	3.13
IS40		0.36	2.35
IS41		0.61	4.03
IS42		0.40	2.44
IS43		0.90	4.96
IS44		0.39	2.46
IS45		0.42	2.78
IS46		0.60	4.35
IS47		0.33	2.21
IS48		0.63	4.81
IS49		0.78	5.46
IS50		0.65	4.28
IS51		0.44	2.90
IS52		0.46	2.73

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
IS53		0.12	<0.001	<0.01	5.76	1.8	470	0.63	0.08	3.47	0.14	190.0	25.9	151	0.16	6.0
IS54		0.15	<0.001	0.02	8.12	3.4	360	0.84	0.01	3.41	0.13	83.6	20.2	106	0.34	16.0
IS55		0.14	<0.001	<0.01	8.39	2.4	450	0.67	0.02	4.54	0.18	107.5	21.9	114	0.21	7.3
IS56		0.13	0.001	0.02	8.35	1.4	260	1.23	0.07	4.92	0.14	55.2	28.7	102	0.30	28.0
IS57		0.13	<0.001	0.01	6.72	1.2	140	0.81	0.04	4.79	0.08	51.6	31.8	234	0.12	12.7
IS58		0.13	<0.001	0.01	8.76	0.5	180	0.90	0.02	4.60	0.07	32.3	25.6	110	0.13	12.7
IS59		0.13	0.001	0.01	6.62	1.5	150	0.81	0.04	4.19	0.05	36.9	28.7	226	0.17	15.1
IS60		0.12	0.001	0.01	8.21	1.2	300	1.53	0.16	5.10	0.14	85.4	27.3	104	0.81	30.1
IS61		0.14	<0.001	0.01	8.66	0.5	120	0.62	0.08	4.41	0.11	32.1	22.9	53	0.08	17.2
IS62		0.18	<0.001	<0.01	6.31	0.8	110	0.55	0.03	3.75	0.19	51.9	35.1	151	0.05	15.1
IS63		0.15	<0.001	<0.01	3.76	1.4	80	0.32	0.03	2.32	0.07	72.3	34.7	299	0.06	22.3
IS64		0.12	<0.001	0.02	12.05	0.8	300	0.57	0.01	5.67	0.06	44.3	10.4	42	0.20	5.9
IS65		0.15	0.001	<0.01	4.39	1.0	60	0.26	0.14	2.96	0.26	61.6	37.0	45	0.06	25.9
IS66		0.12	0.002	0.02	7.32	2.8	320	1.18	0.14	3.84	0.11	48.7	20.8	84	0.65	26.6
IS67		0.13	<0.001	0.01	6.78	6.9	260	1.15	0.21	5.17	0.16	114.0	25.8	111	0.65	28.0
IS68		0.15	0.001	0.05	8.01	0.9	1380	1.08	0.03	3.61	0.08	129.5	37.2	244	0.71	71.2
IS69		0.14	0.001	0.05	7.16	1.1	2980	1.48	0.07	3.22	0.09	261	39.1	166	1.01	74.2
IS70		0.13	<0.001	0.02	5.13	<0.2	2860	0.81	0.03	5.32	0.10	246	45.1	259	0.20	11.1
IS71		0.14	0.001	0.04	5.54	1.2	1680	1.17	0.06	6.89	0.10	245	40.6	496	0.22	55.6
IS72		0.13	<0.001	0.02	5.92	0.9	3160	0.94	0.03	5.40	0.06	345	38.4	291	0.30	15.7
IS73		0.14	<0.001	0.03	2.83	0.5	1430	0.44	0.03	5.74	0.08	267	63.6	696	0.12	10.0
IS74		0.14	<0.001	0.01	1.83	1.5	900	0.46	0.03	4.77	0.06	491	61.4	695	0.09	6.9
IS75		0.14	<0.001	0.01	7.79	1.2	750	1.60	0.05	4.91	0.10	126.0	24.5	115	0.46	15.1
IS76		0.15	<0.001	0.01	3.04	1.7	1190	0.70	0.04	4.07	0.05	324	54.3	493	0.16	13.2
IS77		0.14	<0.001	0.02	3.99	1.5	2240	0.76	0.03	3.41	0.03	282	52.2	539	0.29	15.1
IS78		0.12	0.001	0.09	6.90	1.2	3030	1.82	0.04	2.79	0.08	287	35.5	192	1.61	74.1
IS79		0.14	<0.001	0.07	7.06	1.9	3540	2.28	0.04	2.76	0.07	427	30.5	101	1.77	37.1
IS80		0.12	<0.001	0.03	4.93	0.7	2300	0.82	0.05	6.22	0.08	430	41.6	377	0.45	22.5
IS81		0.15	<0.001	0.01	4.43	1.4	1980	0.78	0.05	5.99	0.07	>500	44.4	299	0.34	14.2
IS82		0.13	<0.001	0.02	8.07	0.6	550	1.11	0.07	4.12	0.09	39.0	17.8	33	0.34	19.3
IS83		0.13	<0.001	0.03	7.72	1.6	580	1.17	0.09	3.94	0.06	76.5	13.8	31	0.37	17.3
IS84		0.14	0.001	0.03	7.97	0.7	660	1.41	0.08	4.06	0.10	75.7	15.6	31	0.57	19.6
IS85		0.12	<0.001	0.02	8.36	0.6	580	1.25	0.07	4.20	0.07	42.7	17.4	32	0.26	17.8
IS86		0.15	<0.001	0.05	3.12	4.4	1290	1.51	0.10	5.93	0.06	>500	50.4	285	0.35	24.2
IS87		0.16	<0.001	0.02	7.65	1.0	510	1.26	0.10	4.17	0.12	101.5	20.0	57	0.40	21.5
IS88		0.13	<0.001	0.03	5.96	2.3	1500	1.81	0.09	5.14	0.09	477	32.6	148	0.53	18.9
IS89		0.14	0.001	0.04	4.50	2.1	1480	1.01	0.06	4.61	0.06	257	47.9	291	0.30	25.1
IS90		0.15	<0.001	0.02	6.01	1.2	400	1.40	0.08	6.35	0.18	143.0	31.5	82	0.15	19.9
IS91		0.13	<0.001	0.02	8.04	0.2	580	1.72	0.06	4.33	0.11	67.7	23.0	73	0.37	19.4
IS92		0.14	<0.001	0.02	8.64	0.8	730	1.86	0.04	4.94	0.11	74.7	17.7	37	0.39	16.1

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
IS53		14.25	14.60	0.31	5.3	0.115	0.75	81.1	3.0	1.50	2770	2.84	1.31	121.0	21.7	3700
IS54		7.18	18.65	0.14	1.9	0.075	0.76	37.4	4.5	1.44	1390	1.01	2.76	25.0	29.3	1180
IS55		10.55	16.40	0.19	3.2	0.096	0.80	43.9	3.5	1.69	2140	1.81	1.82	77.0	17.1	1900
IS56		7.95	19.75	0.20	1.0	0.085	0.71	20.7	5.7	2.18	1650	1.09	2.69	22.9	50.1	2530
IS57		13.50	19.45	0.20	1.2	0.088	0.55	19.0	4.6	2.81	1640	1.25	2.05	19.9	54.5	2320
IS58		7.14	19.10	0.16	0.9	0.066	0.51	10.4	4.6	2.24	1160	0.42	2.97	8.7	42.6	1070
IS59		12.60	21.0	0.09	1.3	0.073	0.53	16.1	5.2	2.57	1110	1.19	1.84	9.1	51.9	1010
IS60		8.33	20.7	0.24	1.5	0.107	0.95	33.4	9.1	2.33	1490	1.44	2.41	31.5	42.7	2000
IS61		8.38	19.15	0.18	0.6	0.115	0.28	11.4	2.9	1.70	1990	0.55	2.99	15.3	26.4	750
IS62		16.30	17.95	0.19	1.9	0.109	0.31	19.0	3.7	2.12	3660	2.37	1.52	62.0	38.6	1490
IS63		26.5	18.25	0.22	1.3	0.084	0.21	30.3	2.6	1.38	2470	2.69	0.87	39.0	39.7	660
IS64		3.19	20.0	0.13	0.8	0.023	0.34	18.2	4.9	0.56	878	0.67	2.38	17.0	11.5	390
IS65		22.9	14.80	0.23	0.9	0.229	0.10	21.1	2.0	1.16	5090	1.25	0.83	87.4	19.1	1030
IS66		7.02	17.95	0.18	1.1	0.097	0.71	19.1	7.5	1.81	1220	1.39	2.25	27.0	29.5	700
IS67		9.54	18.60	0.26	2.1	0.101	0.74	45.4	9.0	2.38	1760	2.04	1.70	44.3	40.7	1780
IS68		7.05	19.20	0.28	1.1	0.071	1.03	57.3	7.7	2.62	945	0.42	1.78	13.0	128.5	2870
IS69		7.22	19.85	0.39	1.9	0.064	1.89	118.5	9.5	2.07	886	0.53	1.69	14.6	132.0	5350
IS70		12.60	17.20	0.41	3.5	0.087	2.11	102.0	6.3	3.74	1250	1.31	1.62	18.0	136.0	5380
IS71		13.25	19.20	0.43	1.6	0.086	0.87	102.5	4.7	3.67	1540	1.28	1.91	24.4	176.0	9390
IS72		13.50	19.25	0.52	2.5	0.074	2.30	149.0	4.8	2.78	1180	1.64	1.96	14.1	115.0	6380
IS73		19.30	17.30	0.45	3.8	0.104	0.89	111.0	3.7	4.21	1370	1.47	0.81	39.5	265	8020
IS74		27.3	17.70	0.69	5.2	0.123	0.69	191.5	4.1	2.06	2030	4.25	0.57	88.6	179.0	>10000
IS75		7.89	19.90	0.29	1.7	0.090	1.17	51.3	8.0	2.15	1160	0.90	2.89	26.7	46.1	4160
IS76		26.6	22.0	0.50	5.6	0.116	1.06	127.0	5.0	1.73	1930	4.38	0.98	121.5	119.0	>10000
IS77		22.5	20.2	0.46	5.1	0.093	1.74	113.5	4.5	1.48	1640	3.35	1.25	98.1	129.0	8410
IS78		6.54	18.25	0.42	1.8	0.065	2.42	136.0	11.6	2.18	1060	0.48	1.42	16.2	164.5	5420
IS79		6.38	20.3	0.54	3.1	0.062	3.16	198.0	10.7	1.42	1200	0.99	1.62	28.9	84.0	6800
IS80		11.00	17.75	0.63	2.5	0.072	1.72	175.0	5.5	3.36	1210	0.89	1.41	9.6	193.0	8120
IS81		17.25	20.9	0.79	3.5	0.085	1.71	226	4.5	2.02	1360	2.31	1.41	13.9	123.5	8500
IS82		4.59	19.10	0.13	0.7	0.064	0.94	13.7	5.3	1.50	945	0.99	3.13	14.2	26.4	2060
IS83		5.03	18.65	0.18	1.3	0.057	0.87	27.4	5.0	0.92	1080	1.27	3.12	17.3	17.2	3160
IS84		4.53	18.10	0.17	1.0	0.057	1.07	29.5	5.6	1.09	1000	0.97	3.02	25.5	20.9	2510
IS85		5.00	19.05	0.14	1.4	0.056	0.83	13.2	4.4	1.21	1140	0.63	3.27	17.3	21.5	2620
IS86		21.9	23.0	0.82	4.6	0.113	1.15	264	5.3	1.49	2290	5.69	1.03	71.9	94.8	10000
IS87		7.63	18.30	0.16	1.2	0.076	0.83	44.3	4.6	1.44	1400	1.21	2.86	26.0	24.7	2280
IS88		13.35	21.0	0.50	3.1	0.097	1.64	196.5	6.2	2.10	1680	2.58	2.09	17.6	62.7	4660
IS89		22.8	23.2	0.35	3.6	0.101	1.29	105.0	4.9	2.10	1660	4.03	1.38	79.2	89.0	>10000
IS90		13.80	24.0	0.28	1.8	0.149	0.89	55.1	5.3	2.76	2750	1.69	1.92	13.2	38.2	7640
IS91		9.56	22.8	0.19	1.6	0.088	1.14	24.1	8.4	1.69	1520	1.52	2.88	28.0	27.0	2780
IS92		5.39	22.5	0.21	1.1	0.074	1.29	27.8	7.8	1.34	1180	0.90	3.19	15.4	19.5	5430

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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
IS53		6.9	12.5	<0.002	<0.01	0.22	24.3	3	3.2	443	6.45	<0.05	13.4	8.02	0.03	2.2
IS54		7.0	14.9	<0.002	0.02	0.21	23.6	2	1.3	354	1.31	<0.05	6.5	1.780	0.05	0.9
IS55		7.8	14.8	<0.002	0.02	0.22	22.2	3	2.0	450	4.40	<0.05	7.1	5.36	0.05	1.6
IS56		6.2	17.7	0.002	0.01	0.18	29.0	2	2.0	479	1.33	0.06	3.2	1.530	0.06	0.8
IS57		3.0	9.8	0.003	<0.01	0.19	30.2	3	2.7	289	1.24	<0.05	5.1	2.45	0.02	0.7
IS58		3.0	8.0	0.002	0.01	0.11	26.1	1	1.2	335	0.48	<0.05	1.1	1.035	0.03	0.2
IS59		3.6	13.2	0.002	<0.01	0.20	28.5	2	2.7	265	0.62	<0.05	5.5	1.695	0.03	0.6
IS60		7.9	31.2	0.003	0.07	0.25	31.1	3	3.8	324	2.11	<0.05	10.6	1.645	0.13	3.4
IS61		3.0	3.7	<0.002	<0.01	0.12	37.2	3	1.7	266	0.88	<0.05	0.9	1.690	<0.02	0.3
IS62		2.3	3.5	0.002	<0.01	0.14	36.6	3	4.0	181.5	3.42	<0.05	3.7	4.11	<0.02	0.5
IS63		2.8	2.9	0.003	<0.01	0.23	25.0	2	3.9	116.5	2.45	<0.05	7.4	6.01	<0.02	0.5
IS64		4.8	4.3	0.002	0.05	0.11	6.1	1	0.5	506	0.80	<0.05	1.5	1.145	0.04	0.2
IS65		2.1	1.5	0.003	<0.01	0.23	50.1	4	4.1	126.0	5.05	0.06	2.6	>10.0	<0.02	1.0
IS66		6.9	22.7	<0.002	0.06	0.24	26.7	2	2.6	233	1.78	<0.05	8.8	1.645	0.11	2.1
IS67		6.6	20.9	0.003	0.10	0.39	32.0	4	3.6	226	2.95	<0.05	8.4	2.48	0.09	3.9
IS68		13.5	39.0	0.002	0.02	0.12	25.4	2	1.4	710	0.58	<0.05	4.0	0.894	0.13	0.5
IS69		23.9	76.7	<0.002	0.02	0.09	21.3	2	1.3	1240	0.67	<0.05	8.5	0.957	0.18	0.8
IS70		23.6	39.0	0.002	<0.01	0.07	26.1	2	1.6	1545	0.77	<0.05	3.7	2.46	0.06	0.6
IS71		16.0	15.5	<0.002	<0.01	0.10	28.6	2	2.5	1775	1.10	<0.05	6.4	2.06	0.06	1.1
IS72		27.7	44.8	0.002	<0.01	0.05	20.4	2	1.5	1945	0.52	<0.05	7.2	2.29	0.11	1.3
IS73		11.6	16.6	0.002	<0.01	0.07	30.8	3	3.7	1020	1.93	<0.05	5.2	5.03	0.05	0.9
IS74		12.1	13.0	0.003	<0.01	0.15	22.7	4	8.2	674	1.59	<0.05	12.4	8.34	0.03	1.9
IS75		11.5	27.5	<0.002	0.01	0.14	22.7	2	2.5	640	1.58	<0.05	7.8	1.375	0.08	2.0
IS76		15.0	22.8	0.003	<0.01	0.15	23.3	4	7.7	801	6.19	<0.05	11.8	7.94	0.05	2.0
IS77		22.3	38.5	0.002	<0.01	0.14	18.7	3	6.1	1240	5.19	<0.05	36.4	7.77	0.06	5.0
IS78		28.0	104.5	0.002	0.02	0.12	18.6	2	1.2	1205	0.75	<0.05	9.2	0.831	0.23	1.2
IS79		40.2	127.0	0.002	0.01	0.14	14.6	2	1.4	1435	1.34	<0.05	17.4	1.310	0.25	2.3
IS80		20.4	45.9	0.002	<0.01	0.07	23.4	3	0.8	1460	0.37	<0.05	10.8	1.420	0.10	1.1
IS81		21.2	36.7	0.004	<0.01	0.08	18.8	4	1.5	1290	0.44	<0.05	10.4	2.60	0.08	2.1
IS82		7.6	15.3	<0.002	<0.01	0.14	15.8	2	1.5	632	0.85	<0.05	2.2	0.839	0.08	0.9
IS83		8.8	17.6	<0.002	<0.01	0.18	13.8	2	1.7	665	0.91	<0.05	24.3	1.230	0.08	3.1
IS84		9.4	25.0	<0.002	0.04	0.15	12.5	2	1.6	610	1.52	<0.05	6.2	1.145	0.12	1.4
IS85		8.3	14.4	<0.002	<0.01	0.14	14.5	1	1.4	718	0.99	<0.05	2.1	1.060	0.07	0.9
IS86		22.6	28.5	<0.002	<0.01	0.23	17.1	6	4.1	877	2.53	<0.05	21.6	5.35	0.06	5.0
IS87		9.2	16.6	<0.002	0.05	0.17	20.6	2	1.8	519	1.58	0.08	12.6	1.215	0.07	1.9
IS88		22.0	39.5	<0.002	<0.01	0.17	21.1	3	1.3	968	0.56	<0.05	19.5	2.32	0.10	3.5
IS89		15.6	28.5	<0.002	<0.01	0.20	21.5	3	5.8	1215	3.72	<0.05	24.5	5.81	0.06	1.6
IS90		5.4	9.8	<0.002	<0.01	0.12	43.3	4	1.3	324	0.53	<0.05	2.4	1.600	0.05	1.5
IS91		8.8	22.2	<0.002	0.01	0.10	24.8	2	2.4	564	1.72	<0.05	2.6	1.830	0.08	0.9
IS92		17.2	25.4	<0.002	0.01	0.13	21.5	2	1.9	658	0.90	<0.05	3.3	0.932	0.10	1.0

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
IS53		261	1.3	64.1	162	180.0	12.05	7.39	3.37	13.80	2.36	1.06	90.1	23.9	16.45	2.01
IS54		188	0.5	45.7	93	57.9	8.14	5.20	1.76	7.78	1.69	0.76	38.4	9.69	7.69	1.24
IS55		192	1.0	58.9	133	97.1	10.55	6.50	2.58	10.25	2.15	0.93	54.0	13.45	11.10	1.58
IS56		188	0.3	50.8	97	27.2	9.13	5.62	2.45	8.90	1.95	0.85	33.3	7.65	8.28	1.46
IS57		429	0.3	41.8	92	33.3	7.33	4.40	2.03	7.67	1.53	0.65	32.3	6.92	7.94	1.21
IS58		207	0.2	27.3	68	25.2	4.80	2.89	1.33	4.70	1.02	0.44	17.4	3.70	4.55	0.75
IS59		475	0.3	30.0	70	32.5	5.44	3.29	1.44	5.29	1.11	0.51	21.7	4.82	5.58	0.85
IS60		242	0.9	66.6	98	43.0	12.30	7.22	2.83	12.65	2.54	1.03	52.2	11.65	12.15	2.01
IS61		212	0.2	54.7	104	12.8	8.93	6.10	1.80	8.00	1.99	1.00	23.5	4.59	7.01	1.37
IS62		399	0.6	77.0	159	53.7	12.15	8.83	1.89	9.81	2.83	1.55	32.7	7.12	8.07	1.76
IS63		951	0.7	36.8	114	38.6	6.28	4.10	1.49	6.52	1.37	0.69	35.0	9.42	7.10	1.01
IS64		50	0.2	9.4	42	28.6	1.72	1.02	1.52	2.12	0.37	0.16	19.4	4.93	2.99	0.31
IS65		510	0.9	75.6	208	21.9	12.10	8.89	2.41	11.80	2.80	1.62	49.1	9.87	11.90	1.83
IS66		210	1.2	40.0	85	32.4	7.50	4.36	1.90	7.64	1.54	0.64	29.0	6.30	7.42	1.22
IS67		276	1.4	73.6	96	60.3	14.25	7.87	3.46	16.10	2.84	1.11	73.3	16.30	16.45	2.43
IS68		185	0.3	28.5	103	32.9	5.68	2.79	2.92	8.19	1.07	0.36	66.4	15.95	11.05	1.08
IS69		159	0.3	30.2	133	55.8	6.84	2.84	4.45	12.15	1.18	0.33	125.0	31.4	19.10	1.42
IS70		443	0.3	33.2	137	110.0	7.49	2.87	5.11	14.00	1.21	0.31	139.0	32.9	22.7	1.61
IS71		403	0.6	38.0	111	37.7	8.74	3.53	5.46	15.00	1.49	0.38	134.0	30.7	22.0	1.80
IS72		460	0.4	38.6	125	78.7	8.80	3.20	6.46	17.25	1.43	0.34	180.0	43.9	28.2	1.96
IS73		738	0.4	32.5	147	106.5	7.73	2.87	5.45	15.10	1.28	0.28	146.0	35.7	24.0	1.72
IS74		1100	1.1	52.6	209	175.5	12.10	4.52	7.51	23.8	1.94	0.44	261	63.7	40.2	2.64
IS75		212	0.6	45.1	84	54.3	8.75	4.47	3.21	11.10	1.70	0.58	72.4	16.90	13.40	1.60
IS76		1010	1.5	45.3	195	192.5	9.63	4.04	5.42	17.05	1.68	0.46	173.0	41.4	27.5	2.01
IS77		879	0.9	32.2	181	158.5	7.21	2.76	4.94	14.30	1.19	0.29	152.5	37.1	23.9	1.61
IS78		116	0.4	31.5	133	56.1	6.87	2.77	4.59	12.25	1.16	0.32	139.0	34.5	20.5	1.46
IS79		133	0.7	38.3	135	96.1	8.27	3.22	5.79	15.80	1.37	0.37	185.0	48.8	27.1	1.80
IS80		335	0.2	49.1	121	75.0	11.05	4.16	7.65	21.9	1.79	0.42	229	54.8	35.8	2.45
IS81		616	0.5	65.3	155	141.5	14.45	5.44	9.30	28.2	2.36	0.54	304	75.2	47.4	3.19
IS82		119	0.2	28.3	73	17.3	5.50	3.05	2.02	5.97	1.08	0.43	26.7	5.90	6.75	0.94
IS83		158	0.4	43.2	62	36.1	8.14	4.38	2.83	9.23	1.59	0.62	49.3	11.10	11.20	1.43
IS84		111	0.4	29.4	67	31.4	5.94	2.97	2.22	7.02	1.12	0.42	42.5	9.90	8.71	1.05
IS85		136	0.2	26.1	70	40.1	5.05	2.77	1.87	5.54	0.99	0.39	26.0	5.49	6.46	0.84
IS86		751	3.3	85.4	257	158.5	19.30	7.49	11.20	36.8	3.14	0.75	384	96.1	66.9	4.15
IS87		223	0.5	35.1	76	36.1	6.90	3.78	2.27	8.01	1.34	0.55	53.6	13.20	10.25	1.18
IS88		417	0.9	60.6	147	107.5	12.80	5.64	6.38	20.9	2.25	0.69	227	59.3	36.2	2.51
IS89		890	1.8	36.9	166	107.0	8.16	3.39	4.54	13.60	1.39	0.39	137.0	33.9	22.9	1.67
IS90		384	0.3	91.0	148	47.8	16.00	9.23	4.92	18.80	3.27	1.28	91.6	19.75	21.6	2.92
IS91		247	0.4	44.2	112	47.4	7.95	4.55	2.64	9.27	1.62	0.65	45.3	9.69	10.70	1.47
IS92		139	0.2	51.1	89	26.6	9.15	5.16	3.04	11.00	1.86	0.71	51.2	10.65	12.20	1.70

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
IS53		1.04	7.00
IS54		0.74	5.25
IS55		0.92	6.38
IS56		0.88	5.56
IS57		0.68	4.30
IS58		0.44	2.85
IS59		0.48	3.23
IS60		1.09	6.97
IS61		0.97	6.53
IS62		1.44	9.81
IS63		0.66	4.42
IS64		0.16	1.03
IS65		1.48	10.20
IS66		0.67	4.41
IS67		1.19	7.64
IS68		0.39	2.41
IS69		0.37	2.22
IS70		0.37	2.11
IS71		0.45	2.63
IS72		0.42	2.30
IS73		0.37	1.99
IS74		0.56	3.10
IS75		0.64	3.99
IS76		0.54	3.10
IS77		0.35	1.94
IS78		0.37	2.10
IS79		0.43	2.46
IS80		0.53	2.94
IS81		0.70	3.83
IS82		0.45	2.71
IS83		0.64	3.98
IS84		0.43	2.63
IS85		0.40	2.48
IS86		0.95	5.10
IS87		0.56	3.45
IS88		0.77	4.42
IS89		0.44	2.54
IS90		1.35	8.19
IS91		0.68	4.11
IS92		0.76	4.65

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
IS93		0.15	<0.001	0.02	8.88	0.8	650	1.86	0.04	4.39	0.09	67.3	15.1	32	0.30	15.2
IS94		0.13	<0.001	0.01	8.12	1.0	490	1.83	0.06	5.33	0.14	78.3	23.8	69	0.28	12.4
IS95		0.14	<0.001	0.03	8.84	1.0	510	1.31	0.05	4.36	0.12	46.6	22.4	54	0.36	21.6
IS96		0.14	<0.001	0.02	9.24	0.2	450	1.37	0.03	4.58	0.08	22.7	16.6	36	0.17	14.4
IS97		0.17	<0.001	0.01	8.15	0.7	480	1.68	0.02	5.73	0.16	66.8	24.3	64	0.13	13.3
JM01		0.14	0.001	0.02	7.64	0.4	1130	1.61	0.06	0.97	0.02	21.0	4.9	11	1.23	6.3
JM02		0.15	<0.001	0.01	6.44	0.9	1220	1.06	0.07	1.28	0.03	16.40	4.6	15	0.63	5.8
JM03		0.12	<0.001	0.03	7.92	1.2	890	1.25	0.18	1.30	0.03	40.8	20.8	25	1.50	29.3
JM04		0.13	<0.001	<0.01	7.17	0.5	1440	1.38	0.04	1.41	<0.02	18.80	3.9	10	0.74	4.4
JM05		0.14	<0.001	0.01	6.76	1.0	1010	1.70	0.07	1.17	0.02	28.1	5.5	16	1.01	4.6
JM06		0.13	<0.001	<0.01	7.08	2.4	620	1.83	0.16	3.90	0.11	44.6	9.5	26	0.70	6.7
JM07		0.14	<0.001	0.02	6.48	1.9	690	2.13	0.17	3.62	0.12	59.4	12.0	34	0.55	5.8
JM08		0.15	<0.001	<0.01	7.73	0.7	760	1.49	0.07	2.14	0.04	24.5	7.5	24	0.57	7.1
JM09		0.13	<0.001	<0.01	5.61	3.6	1160	3.74	0.12	4.18	0.08	199.0	30.2	135	0.76	18.3
JM10		0.13	<0.001	0.02	8.12	1.1	1050	1.79	0.06	1.51	0.04	35.1	9.5	23	1.50	13.5
JM11		0.13	<0.001	0.01	7.85	0.4	970	1.32	0.02	1.79	0.03	22.0	6.5	15	0.62	9.7
JM12		0.12	<0.001	0.01	8.65	0.9	1240	1.69	0.02	1.81	0.03	27.0	7.0	14	0.86	8.6
JM13		0.12	<0.001	0.01	7.82	0.3	1010	1.40	0.04	1.98	0.04	18.55	6.6	14	0.65	7.4
JM14		0.14	0.002	0.03	8.11	1.6	780	1.89	0.07	3.12	0.10	58.3	17.5	43	1.77	38.7
JM15		0.14	0.001	0.02	7.76	2.2	730	1.94	0.09	3.20	0.14	87.4	21.6	54	1.68	31.7
JM16		0.13	<0.001	<0.01	7.94	0.4	900	1.71	0.06	2.09	0.03	24.7	10.0	22	0.76	10.4
JM17		0.14	<0.001	0.01	6.29	1.6	660	1.73	0.14	3.01	0.14	41.5	17.6	46	0.54	12.7
JM18		0.13	<0.001	0.01	8.11	1.4	930	1.63	0.05	2.37	0.07	28.7	11.4	27	1.15	14.7
JM19		0.13	0.001	0.03	4.14	1.9	270	0.90	0.11	3.02	0.17	156.0	44.6	62	0.39	33.6
JM20		0.13	<0.001	0.02	7.06	1.1	410	1.15	0.08	3.57	0.16	34.0	17.9	37	0.53	19.1
JM21		0.15	0.001	0.02	6.32	1.6	490	1.41	0.11	3.92	0.15	143.5	29.7	71	1.09	36.0
JM22		0.12	<0.001	<0.01	7.21	1.5	770	1.92	0.11	3.51	0.11	51.1	16.4	47	0.60	12.7
JM23		0.13	0.001	0.02	7.59	2.0	720	1.91	0.12	4.81	0.14	108.5	22.0	44	1.36	30.5
JM24		0.15	0.003	0.02	7.89	1.8	660	1.88	0.07	4.69	0.12	60.4	19.2	39	1.13	27.4
JM25		0.13	<0.001	<0.01	6.62	1.9	980	1.93	0.10	3.33	0.12	44.9	12.0	35	0.48	4.9
JM26		0.12	<0.001	0.01	8.88	1.4	1260	2.14	0.06	2.61	0.05	33.0	13.7	38	0.84	6.8
JM27		0.13	<0.001	0.01	8.56	2.5	1420	2.72	0.08	3.05	0.11	58.8	20.1	62	1.06	9.6
JM28		0.13	<0.001	0.03	8.19	1.7	1150	2.12	0.11	1.95	0.08	65.5	12.7	44	2.20	19.8
JM29		0.13	<0.001	0.05	3.98	3.4	410	1.46	0.17	3.58	0.11	104.0	20.2	66	0.43	9.0
JM30		0.13	<0.001	0.01	6.78	1.7	820	1.81	0.11	2.46	0.07	46.6	8.3	33	0.78	9.7
JM31		0.13	<0.001	0.03	7.16	2.0	1120	2.16	0.13	3.20	0.11	67.3	14.6	70	0.96	8.7
JM32		0.14	0.001	0.02	1.62	2.9	1470	0.74	0.10	7.20	0.07	>500	44.9	1340	0.51	25.7
JM33		0.14	0.001	0.03	5.11	2.6	3970	1.74	0.09	8.58	0.11	>500	45.9	428	1.75	55.0
JM34		0.14	<0.001	0.02	8.15	1.8	1530	2.10	0.10	2.10	0.08	50.6	10.3	44	1.58	11.5
JM35		0.14	<0.001	0.02	8.52	1.7	1720	2.37	0.09	2.31	0.08	53.4	12.3	45	1.43	11.6

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
IS93		5.93	22.7	0.21	1.3	0.077	1.18	24.5	7.5	1.02	1160	1.43	3.37	21.9	15.2	3510
IS94		6.90	22.4	0.20	2.0	0.091	0.93	27.2	7.2	2.15	1420	1.35	2.94	22.7	31.7	3620
IS95		7.57	22.0	0.17	1.0	0.090	0.88	17.7	7.6	1.93	1410	0.72	3.19	17.9	29.3	1840
IS96		3.88	20.7	0.11	0.7	0.057	0.69	7.7	4.6	1.57	946	0.26	3.59	5.5	27.5	1200
IS97		7.42	22.2	0.18	1.3	0.114	0.97	23.1	5.9	2.45	1510	0.76	2.85	15.2	30.6	4200
JM01		1.40	16.15	0.20	1.6	0.035	4.79	8.4	4.4	0.18	327	0.87	2.01	10.7	4.5	320
JM02		1.71	13.15	0.17	0.9	0.032	2.57	6.4	2.6	0.18	353	0.51	2.06	12.2	4.5	230
JM03		3.81	17.40	0.17	0.9	0.051	1.42	19.9	9.5	0.37	3130	0.80	1.97	12.3	14.2	580
JM04		1.14	15.10	0.18	1.1	0.030	2.73	7.2	3.1	0.15	229	0.59	2.52	13.7	4.0	310
JM05		1.67	14.25	0.22	1.3	0.052	3.32	11.2	3.8	0.15	321	1.34	1.86	26.4	4.7	470
JM06		3.80	18.65	0.23	3.1	0.110	1.20	14.4	3.9	0.54	527	3.31	2.57	38.5	9.9	2180
JM07		4.34	18.15	0.24	3.4	0.119	1.76	19.4	3.7	0.75	750	3.33	2.22	46.7	11.2	1990
JM08		2.18	17.45	0.14	1.1	0.042	1.89	9.6	3.8	0.44	394	1.11	2.93	14.4	11.7	320
JM09		16.55	22.0	0.29	11.2	0.127	1.69	82.9	6.7	1.67	2510	3.44	2.05	82.4	42.3	6890
JM10		2.56	18.00	0.16	1.0	0.049	3.40	14.8	6.6	0.45	538	1.06	2.28	14.1	10.6	540
JM11		1.62	16.80	0.14	0.3	0.035	1.39	9.1	4.0	0.23	321	0.48	3.00	9.3	6.5	290
JM12		1.75	18.90	0.17	0.6	0.027	1.92	11.4	5.0	0.27	386	0.62	3.35	13.8	7.9	340
JM13		1.92	17.55	0.15	0.5	0.045	1.93	7.1	4.2	0.31	349	0.62	2.97	13.0	6.0	360
JM14		4.65	17.90	0.16	1.2	0.059	1.16	24.5	15.4	1.75	932	0.83	2.25	15.2	29.8	1300
JM15		6.27	19.25	0.17	1.7	0.072	1.17	36.4	13.9	1.85	1180	1.11	2.13	35.8	36.7	1840
JM16		2.14	17.85	0.13	0.6	0.041	2.17	9.4	5.1	0.56	625	1.10	2.98	14.8	13.5	400
JM17		7.53	19.50	0.16	6.1	0.117	2.01	14.9	5.1	0.93	1460	2.26	1.94	42.9	18.7	1460
JM18		3.24	18.65	0.13	0.6	0.055	1.94	11.5	6.4	0.69	621	1.23	2.83	15.2	13.1	600
JM19		27.7	27.3	0.25	1.9	0.117	0.38	64.9	5.0	1.39	3580	1.43	0.94	147.5	29.7	2620
JM20		5.36	15.60	0.11	1.1	0.073	0.69	12.7	6.1	1.38	1500	0.66	2.24	23.4	21.0	1560
JM21		13.35	20.9	0.24	2.7	0.096	0.94	55.8	9.6	1.68	2080	1.24	1.76	42.0	38.0	3050
JM22		6.48	19.60	0.15	2.1	0.090	1.77	17.6	5.0	1.19	1120	2.28	2.53	35.6	19.1	1350
JM23		6.27	20.0	0.24	2.5	0.077	1.39	39.6	10.3	1.75	1240	2.23	2.56	24.8	32.0	3820
JM24		5.94	18.65	0.15	1.4	0.072	1.18	22.9	8.0	1.63	1300	1.47	2.77	36.6	24.4	3160
JM25		4.82	17.60	0.15	2.8	0.100	2.22	14.7	3.5	0.75	806	2.54	2.13	36.4	10.3	1920
JM26		3.14	19.10	0.12	1.1	0.060	2.60	11.0	5.0	0.60	1180	1.44	3.25	24.8	10.1	660
JM27		6.38	22.2	0.16	3.4	0.093	2.63	24.0	7.7	1.09	1540	2.34	2.99	43.0	19.1	1200
JM28		3.99	19.55	0.13	1.3	0.075	2.56	23.4	12.3	0.64	571	1.83	2.37	29.9	13.3	770
JM29		12.80	19.20	0.16	15.0	0.102	1.10	34.7	3.4	0.83	1270	3.89	1.24	72.6	16.1	3100
JM30		2.91	15.80	0.14	1.5	0.076	1.87	17.1	4.3	0.50	427	2.33	2.21	41.4	11.6	980
JM31		7.00	19.55	0.16	5.4	0.100	2.27	25.3	5.5	1.01	986	2.54	2.40	72.5	15.5	1750
JM32		34.1	32.9	0.84	3.7	0.069	0.73	295	2.2	2.03	1440	0.77	0.42	23.9	145.5	>10000
JM33		9.49	19.35	0.78	3.3	0.093	2.27	266	5.1	4.27	1220	0.42	1.44	16.9	194.0	>10000
JM34		3.46	18.80	0.14	2.2	0.064	3.10	19.1	7.5	0.57	563	1.83	2.68	60.2	10.9	1100
JM35		3.65	19.75	0.16	1.3	0.068	3.21	18.7	7.1	0.74	607	1.65	2.90	32.7	14.5	1000

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
IS93		10.6	21.7	<0.002	0.01	0.12	18.8	2	2.3	657	1.30	<0.05	3.1	1.460	0.08	1.3
IS94		9.3	14.0	<0.002	<0.01	0.20	29.2	3	2.6	600	1.43	<0.05	4.4	1.225	0.05	2.0
IS95		8.2	15.6	<0.002	0.01	0.16	27.2	2	1.8	576	1.04	<0.05	14.3	1.160	0.06	2.6
IS96		7.8	5.8	<0.002	0.01	0.12	18.5	1	1.0	730	0.34	<0.05	0.8	0.335	0.03	0.4
IS97		7.2	10.7	<0.002	<0.01	0.09	35.6	3	2.6	546	0.91	<0.05	1.8	0.985	0.04	0.8
JM01		19.0	111.0	<0.002	<0.01	0.14	6.0	1	1.8	236	0.77	<0.05	4.1	0.318	0.31	2.1
JM02		18.5	43.7	<0.002	<0.01	0.19	6.4	1	1.3	359	0.86	<0.05	2.3	0.569	0.15	1.5
JM03		11.2	40.6	<0.002	0.01	0.19	12.7	1	1.5	373	0.86	0.05	4.8	0.663	0.17	1.5
JM04		18.8	46.7	<0.002	<0.01	0.18	5.5	1	1.7	434	0.93	<0.05	2.7	0.490	0.15	2.1
JM05		20.4	87.2	<0.002	<0.01	0.33	7.5	1	3.8	263	1.99	<0.05	6.9	0.919	0.28	5.7
JM06		17.8	30.5	<0.002	<0.01	0.62	21.4	4	4.6	506	2.51	<0.05	6.8	1.785	0.10	6.9
JM07		16.8	39.2	<0.002	<0.01	0.59	23.2	4	6.5	324	3.35	<0.05	8.7	1.915	0.11	9.7
JM08		12.5	40.3	<0.002	<0.01	0.16	8.3	1	2.0	527	0.98	<0.05	3.7	0.565	0.12	1.9
JM09		19.4	43.0	<0.002	<0.01	0.29	26.1	3	7.5	633	4.49	<0.05	46.4	4.63	0.21	10.7
JM10		17.6	88.6	<0.002	0.01	0.18	10.4	1	2.1	311	0.98	<0.05	5.7	0.486	0.27	2.5
JM11		14.7	27.4	<0.002	<0.01	0.15	7.3	1	1.1	486	0.63	<0.05	2.1	0.400	0.10	1.1
JM12		17.2	36.0	<0.002	<0.01	0.16	6.2	1	1.5	557	0.90	<0.05	3.0	0.456	0.12	1.5
JM13		17.3	34.7	<0.002	<0.01	0.16	8.5	1	1.6	463	0.87	<0.05	2.4	0.496	0.10	1.6
JM14		11.9	39.2	<0.002	0.04	0.29	19.9	1	1.4	404	0.92	0.10	6.5	0.618	0.20	1.5
JM15		14.4	37.1	<0.002	0.04	0.31	18.7	2	1.8	402	2.39	0.07	12.3	1.475	0.22	3.1
JM16		13.3	49.0	<0.002	0.01	0.15	8.5	1	2.0	512	0.98	<0.05	3.3	0.431	0.15	1.8
JM17		13.5	39.9	<0.002	<0.01	0.36	25.5	2	4.3	289	2.90	0.05	7.7	2.05	0.12	4.6
JM18		15.4	44.9	<0.002	<0.01	0.23	13.8	1	2.0	433	1.02	0.05	3.8	0.660	0.14	2.1
JM19		6.9	9.6	<0.002	0.01	0.30	33.9	3	3.3	226	9.75	0.17	22.9	5.29	0.06	4.2
JM20		8.5	16.5	<0.002	0.03	0.23	25.6	1	1.4	358	1.50	0.08	3.9	0.980	0.07	1.0
JM21		10.6	27.7	<0.002	0.02	0.50	32.2	3	2.3	371	2.70	0.06	16.2	2.20	0.12	4.2
JM22		13.8	35.3	<0.002	0.01	0.39	22.0	2	4.2	401	2.41	<0.05	6.1	1.555	0.11	4.9
JM23		11.9	40.5	<0.002	0.01	0.38	22.7	3	2.2	544	1.49	<0.05	10.6	1.375	0.21	4.2
JM24		11.8	33.3	<0.002	0.02	0.29	20.8	2	2.6	577	2.28	0.07	6.1	1.240	0.15	2.8
JM25		16.6	45.6	<0.002	<0.01	0.36	20.5	3	4.6	334	2.52	<0.05	6.2	1.715	0.14	6.1
JM26		19.8	55.5	<0.002	<0.01	0.24	14.6	1	3.0	477	1.80	<0.05	6.0	0.819	0.18	4.4
JM27		20.0	59.5	<0.002	<0.01	0.42	22.1	2	4.2	538	2.99	<0.05	14.6	1.420	0.20	6.3
JM28		20.6	84.1	<0.002	0.01	0.37	16.2	2	3.1	365	2.11	<0.05	10.6	1.025	0.28	5.3
JM29		11.7	26.8	<0.002	<0.01	0.59	22.1	3	7.5	192.5	4.74	<0.05	14.7	1.955	0.07	9.7
JM30		17.7	49.0	<0.002	<0.01	0.31	12.9	2	3.3	329	3.56	<0.05	8.1	1.100	0.15	5.1
JM31		16.4	54.0	<0.002	<0.01	0.48	20.1	2	4.6	434	4.91	<0.05	20.2	1.645	0.18	7.6
JM32		10.5	25.5	<0.002	0.02	0.18	17.9	4	1.8	1930	0.35	<0.05	42.7	1.945	0.13	5.1
JM33		22.9	78.9	<0.002	0.01	0.12	26.9	4	0.9	2710	0.62	<0.05	20.7	0.758	0.43	4.6
JM34		21.8	72.2	<0.002	<0.01	0.42	12.8	2	3.3	476	4.46	<0.05	11.8	0.949	0.22	5.4
JM35		21.1	76.5	<0.002	<0.01	0.39	13.9	2	3.0	571	2.09	<0.05	10.6	0.839	0.24	4.7

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
IS93		171	0.2	48.1	81	29.7	8.72	4.96	2.96	9.88	1.75	0.70	46.6	9.78	11.30	1.57
IS94		196	0.4	55.6	106	45.1	10.00	5.78	3.49	11.60	2.02	0.81	54.4	11.65	13.05	1.83
IS95		215	0.3	35.0	98	24.5	6.45	3.64	2.28	7.60	1.27	0.54	32.4	7.06	8.64	1.20
IS96		104	0.1	21.4	66	15.0	3.88	2.24	1.59	4.39	0.79	0.33	17.2	3.41	4.76	0.71
IS97		199	0.1	59.7	112	28.1	10.85	6.19	3.23	12.25	2.20	0.86	51.6	10.40	13.25	1.95
JM01		34	0.5	12.1	22	43.2	2.08	1.36	0.49	1.98	0.43	0.24	9.3	2.26	2.18	0.35
JM02		50	0.4	10.3	20	24.9	1.81	1.15	0.64	1.91	0.38	0.19	8.7	1.92	2.19	0.32
JM03		93	1.2	17.2	50	24.9	3.12	1.89	1.23	3.78	0.65	0.29	22.1	5.17	4.77	0.59
JM04		39	0.6	11.2	15	29.4	1.98	1.23	0.67	2.11	0.41	0.21	9.7	2.17	2.31	0.35
JM05		69	1.2	19.5	19	30.7	3.47	2.23	0.80	3.40	0.74	0.38	15.0	3.37	3.74	0.59
JM06		141	1.9	82.0	33	94.6	14.25	8.67	3.62	14.00	2.97	1.31	42.2	7.88	13.50	2.42
JM07		165	1.8	85.3	52	84.0	15.15	9.28	3.36	14.75	3.13	1.40	49.8	9.86	14.70	2.55
JM08		62	0.4	14.5	28	29.4	2.67	1.57	0.92	3.02	0.54	0.25	14.4	3.13	3.60	0.48
JM09		473	2.7	65.0	130	394	11.95	6.58	4.51	15.25	2.34	0.98	104.0	24.3	20.9	2.24
JM10		64	0.6	19.9	39	26.3	3.52	2.16	0.94	3.62	0.73	0.35	17.5	4.07	4.11	0.61
JM11		50	0.3	10.7	23	7.6	1.93	1.10	0.85	2.18	0.40	0.18	10.8	2.46	2.48	0.35
JM12		50	0.4	11.0	25	18.2	1.95	1.17	0.92	2.20	0.40	0.20	12.9	3.00	2.76	0.34
JM13		56	0.4	12.8	25	10.2	2.19	1.40	0.80	2.28	0.46	0.22	10.0	2.19	2.49	0.37
JM14		125	0.7	17.8	71	42.6	3.48	1.78	1.56	4.75	0.66	0.27	28.7	6.81	6.32	0.70
JM15		147	1.1	22.6	79	64.9	4.91	2.34	2.21	7.29	0.88	0.31	46.8	10.80	9.82	1.02
JM16		59	0.4	14.3	31	14.7	2.54	1.52	0.88	2.68	0.52	0.25	13.3	2.99	3.24	0.44
JM17		202	1.7	50.9	74	202	8.48	5.59	2.25	8.08	1.83	0.98	29.3	5.99	8.24	1.39
JM18		85	0.7	20.7	48	11.8	3.71	2.34	1.22	3.84	0.78	0.37	16.3	3.58	4.12	0.64
JM19		588	1.7	46.2	142	70.5	8.97	4.93	3.51	12.00	1.76	0.72	74.8	17.30	15.85	1.75
JM20		148	0.6	28.2	67	41.3	5.02	3.08	1.74	5.31	1.04	0.48	20.7	4.33	5.64	0.87
JM21		354	25.8	50.1	98	96.6	9.80	5.13	3.32	13.65	1.87	0.74	78.3	17.60	17.75	2.00
JM22		177	1.2	51.4	66	53.7	9.03	5.56	2.53	9.07	1.91	0.87	35.1	7.43	9.59	1.56
JM23		175	0.9	56.3	84	75.5	10.65	5.73	3.75	13.50	2.09	0.85	67.7	14.65	16.10	2.04
JM24		158	1.0	37.2	76	42.7	6.77	3.97	2.39	7.59	1.36	0.59	36.5	8.03	8.74	1.21
JM25		148	1.7	62.1	54	64.8	10.95	6.78	2.64	10.85	2.28	1.00	36.5	7.40	10.85	1.86
JM26		102	1.2	22.7	38	25.9	4.13	2.68	0.98	3.82	0.88	0.45	15.1	3.39	4.01	0.67
JM27		171	2.0	37.2	73	112.0	6.66	4.18	1.91	6.90	1.42	0.69	32.6	7.83	7.93	1.15
JM28		124	1.4	38.8	60	30.0	7.31	4.37	1.76	7.23	1.50	0.65	31.2	7.13	7.90	1.16
JM29		270	6.9	94.7	82	376	17.00	10.20	3.58	16.65	3.43	1.59	65.6	14.45	17.25	2.67
JM30		111	1.1	37.2	35	36.5	6.34	3.90	1.49	5.87	1.33	0.60	26.1	5.45	6.29	1.00
JM31		195	2.0	46.8	67	171.5	8.31	5.19	2.06	8.12	1.75	0.85	40.9	9.66	9.02	1.33
JM32		950	0.6	62.2	111	146.5	15.30	5.47	13.75	32.7	2.43	0.52	399	99.8	62.8	3.40
JM33		220	0.2	65.1	100	113.0	15.60	5.77	12.85	31.1	2.51	0.58	362	91.4	60.1	3.35
JM34		111	1.7	32.2	48	71.1	5.95	3.72	1.42	5.65	1.25	0.61	27.5	6.92	6.16	0.92
JM35		104	1.3	26.8	53	41.6	5.08	3.08	1.34	5.03	1.06	0.51	26.5	6.61	5.76	0.82

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53 Angus Crescent
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Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
IS93		0.75	4.43
IS94		0.85	5.20
IS95		0.54	3.43
IS96		0.34	2.09
IS97		0.93	5.64
;M01		0.22	1.43
;M02		0.18	1.19
;M03		0.29	1.81
;M04		0.19	1.28
;M05		0.36	2.43
;M06		1.38	8.53
;M07		1.46	9.07
;M08		0.25	1.55
;M09		1.01	6.21
;M10		0.35	2.19
;M11		0.17	1.09
;M12		0.18	1.17
;M13		0.22	1.41
;M14		0.27	1.65
;M15		0.34	2.01
;M16		0.25	1.53
;M17		0.92	6.10
;M18		0.36	2.26
;M19		0.75	4.67
;M20		0.48	3.01
;M21		0.77	4.79
;M22		0.87	5.52
;M23		0.86	5.39
;M24		0.60	3.76
;M25		1.05	6.56
;M26		0.43	2.84
;M27		0.67	4.31
;M28		0.67	4.33
;M29		1.55	10.35
;M30		0.61	3.90
;M31		0.83	5.27
;M32		0.66	3.49
;M33		0.71	3.78
;M34		0.59	3.80
;M35		0.49	3.18

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
;M36		0.15	<0.001	0.03	8.01	2.1	1080	2.25	0.10	2.53	0.07	66.4	14.2	51	1.61	15.2
;M37		0.12	<0.001	0.01	8.12	3.1	920	2.24	0.10	3.20	0.10	54.0	15.4	48	1.54	13.3
;M38		0.12	<0.001	0.02	8.77	2.4	910	2.36	0.08	3.31	0.10	45.7	14.9	40	1.48	11.8
;M39		0.11	<0.001	0.03	8.00	2.7	850	2.37	0.09	4.08	0.13	71.7	20.3	81	1.24	14.9
;M40		0.11	<0.001	0.03	7.43	2.0	860	2.66	0.12	3.59	0.14	85.4	21.3	69	1.42	17.5
;S01		0.13	<0.001	0.03	7.63	1.0	330	1.16	0.06	5.13	0.14	61.3	28.4	80	0.20	23.7
;S02		0.13	<0.001	0.04	8.14	1.6	520	1.54	0.07	4.93	0.20	77.9	24.5	97	0.54	26.9
;S03		0.12	<0.001	0.03	6.91	2.3	730	2.11	0.12	5.75	0.19	142.0	24.6	64	0.51	16.1
;S04		0.13	<0.001	0.02	7.41	1.8	1270	2.32	0.12	5.13	0.17	179.5	21.6	80	0.70	14.9
;S05		0.14	<0.001	0.05	4.38	2.7	420	1.81	0.18	5.50	0.21	204	29.8	73	0.45	20.4
;S06		0.15	<0.001	0.04	5.92	1.7	310	1.04	0.07	5.02	0.15	77.1	32.3	100	0.14	21.5
;S07		0.13	<0.001	0.04	5.07	1.7	550	1.61	0.08	3.74	0.12	123.0	26.5	109	0.37	17.2
;S08		0.12	<0.001	0.02	7.39	2.8	2030	2.60	0.14	3.17	0.10	160.5	17.7	86	1.29	14.4
;S09		0.13	0.001	0.03	5.26	2.6	2370	2.15	0.09	6.53	0.08	>500	34.0	331	1.51	30.6
;S10		0.16	0.001	0.03	5.10	3.8	2970	2.43	0.11	7.34	0.08	>500	33.9	246	1.08	27.0
;S11		0.15	<0.001	0.02	7.53	2.3	1370	2.79	0.14	3.80	0.09	143.0	17.9	81	1.22	13.3
;S12		0.13	<0.001	0.03	7.13	1.9	1350	2.58	0.13	3.22	0.09	139.5	21.6	89	1.67	28.1
;S13		0.16	<0.001	0.04	5.40	2.7	720	2.34	0.13	4.55	0.12	172.5	28.1	129	0.55	19.0
;S14		0.13	<0.001	0.05	4.72	2.0	320	1.52	0.18	4.84	0.37	154.0	34.7	154	0.30	33.4
;S15		0.15	<0.001	0.02	6.09	1.6	1370	2.45	0.11	4.42	0.12	213	27.8	133	0.74	23.8
;S16		0.14	<0.001	0.01	7.38	1.4	750	2.35	0.15	5.26	0.17	121.0	22.2	79	0.60	13.0
;S17		0.14	<0.001	0.02	6.46	1.3	2410	2.27	0.09	4.68	0.11	321	27.2	173	1.12	22.9
;S18		0.12	<0.001	0.01	8.60	1.0	780	2.18	0.09	4.26	0.13	56.6	18.6	67	0.67	15.6
;S19		0.13	0.001	0.03	7.59	1.5	740	2.21	0.12	4.20	0.14	101.0	18.7	53	0.62	15.2
;S20		0.15	<0.001	0.02	5.58	2.6	1430	2.35	0.15	6.04	0.12	371	27.3	154	0.60	14.9
;S21		0.15	<0.001	0.03	4.37	3.4	420	1.16	0.16	3.67	0.13	121.5	28.6	62	0.45	22.5
;S22		0.15	<0.001	0.03	5.99	7.2	660	2.09	0.18	4.29	0.10	120.5	24.9	76	0.94	24.0
;S23		0.14	0.001	0.01	5.44	2.4	510	2.20	0.30	7.38	0.20	240	28.5	46	0.51	26.2
;S24		0.14	<0.001	<0.01	7.26	1.7	580	2.17	0.12	4.70	0.11	82.5	17.9	36	0.65	15.2
;S25		0.14	0.006	0.03	6.01	1.6	440	1.52	0.17	4.89	0.13	127.5	29.1	66	0.54	29.9
;S26		0.14	<0.001	0.01	6.57	1.9	860	1.98	0.13	4.44	0.15	158.5	26.5	76	0.71	20.9
;S27		0.15	<0.001	0.01	7.63	1.5	780	2.31	0.13	3.68	0.11	65.6	14.9	44	1.00	11.6
;S28		0.12	<0.001	0.01	6.99	2.4	610	2.14	0.14	4.12	0.11	67.4	17.8	47	0.76	9.6
;S29		0.13	<0.001	0.01	7.98	0.8	900	2.08	0.09	3.17	0.08	48.9	14.5	38	1.20	16.0
;S30		0.15	<0.001	0.01	7.17	0.8	1030	1.57	0.09	2.06	0.05	22.4	8.4	21	0.81	8.6
;S31		0.12	<0.001	<0.01	7.99	1.2	590	2.43	0.15	4.11	0.13	70.9	15.5	41	0.98	12.8
;S32		0.13	<0.001	0.01	8.25	1.3	660	2.46	0.13	4.02	0.15	70.2	16.7	47	0.92	14.1
;S33		0.15	<0.001	0.01	6.98	1.5	700	2.67	0.15	4.77	0.15	102.0	19.8	61	0.84	11.9
;S34		0.13	<0.001	0.01	7.30	1.9	950	3.03	0.14	4.90	0.18	130.5	26.6	125	0.93	20.8
;S35		0.13	<0.001	0.01	8.61	3.4	1360	2.61	0.09	2.23	0.05	78.9	21.5	60	2.53	25.2

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
JM36		4.67	18.60	0.16	2.4	0.069	2.54	25.1	8.0	0.81	1060	1.91	2.67	32.6	15.0	1450
JM37		4.88	21.2	0.16	1.3	0.078	2.28	20.3	8.4	1.13	999	1.51	2.99	27.0	15.5	1710
JM38		4.42	21.8	0.16	0.8	0.080	2.34	16.7	9.7	1.07	973	1.37	3.40	20.1	12.5	1180
JM39		6.25	21.8	0.19	1.7	0.095	1.96	24.4	8.4	1.76	1260	1.47	2.85	25.5	27.0	2780
JM40		8.29	21.5	0.20	4.0	0.109	2.01	32.5	8.8	1.49	1600	2.46	2.61	45.0	23.7	2540
JS01		9.08	22.9	0.16	1.1	0.107	0.65	22.2	5.6	2.50	1740	0.94	2.57	15.5	35.4	3020
JS02		7.93	22.7	0.17	1.4	0.106	1.05	27.4	6.4	2.30	1740	1.71	2.85	25.0	39.5	3720
JS03		8.30	21.5	0.28	2.7	0.130	1.48	50.3	5.8	2.00	1700	2.98	2.41	18.8	28.0	4470
JS04		8.27	21.6	0.30	3.6	0.110	1.86	68.3	5.0	1.59	1540	2.47	2.70	20.9	29.9	4850
JS05		16.40	20.9	0.35	5.8	0.148	0.98	70.8	4.4	1.34	2900	6.65	1.41	104.5	24.1	8840
JS06		15.80	24.2	0.18	1.8	0.126	0.59	26.5	4.8	2.47	2220	2.12	1.97	51.1	37.3	4860
JS07		15.55	22.0	0.22	5.6	0.120	1.20	45.3	5.3	1.58	2460	2.70	1.81	58.0	26.9	4500
JS08		7.06	21.2	0.26	5.2	0.091	2.83	68.5	6.8	1.23	1260	2.12	2.60	33.8	34.1	3630
JS09		14.75	26.4	0.70	3.8	0.076	2.01	239	5.3	2.15	1140	1.17	1.60	4.7	102.5	>10000
JS10		13.50	25.5	0.85	4.9	0.090	2.41	266	4.4	2.07	1120	1.04	1.58	12.4	84.3	>10000
JS11		6.95	22.7	0.26	4.0	0.110	2.09	54.3	6.3	1.30	1060	2.77	2.62	40.0	30.7	3570
JS12		9.85	22.2	0.24	5.5	0.089	2.03	56.9	9.3	1.42	1320	2.28	2.48	39.6	38.8	3610
JS13		15.45	23.4	0.29	7.4	0.127	1.36	65.8	5.9	1.79	2290	3.69	1.96	78.0	34.0	6250
JS14		20.0	24.2	0.29	4.7	0.145	0.76	56.5	4.1	2.16	3510	5.17	1.35	74.3	40.3	5220
JS15		12.95	22.1	0.32	5.0	0.116	1.86	94.8	5.3	1.95	1850	2.85	2.17	28.9	41.5	5180
JS16		8.39	22.7	0.24	3.1	0.136	1.60	46.1	5.6	1.98	1520	2.78	2.62	40.0	25.4	3950
JS17		10.65	23.0	0.44	3.4	0.088	2.40	135.0	5.3	1.84	1270	1.63	2.17	17.7	64.7	7390
JS18		5.09	22.7	0.19	1.2	0.090	1.66	21.6	7.4	1.64	1040	1.75	3.42	25.8	25.8	1180
JS19		7.44	23.2	0.24	2.2	0.114	1.67	37.2	6.2	1.40	1140	3.18	3.03	38.0	18.8	2160
JS20		14.10	24.6	0.49	6.1	0.108	1.72	155.5	4.4	1.86	1470	2.56	1.94	13.1	45.2	8690
JS21		19.40	21.6	0.27	5.6	0.102	0.86	44.8	4.5	1.19	2400	3.04	1.52	56.4	27.0	4600
JS22		8.71	19.10	0.22	4.6	0.078	1.29	43.4	7.2	1.29	1230	3.50	2.16	39.7	33.3	3680
JS23		7.25	19.85	0.44	4.7	0.108	0.98	79.3	4.8	1.69	1310	6.56	1.88	19.6	34.0	3950
JS24		4.73	20.5	0.20	3.0	0.077	1.16	27.5	5.8	1.23	929	2.47	2.93	23.3	23.1	3730
JS25		11.90	20.2	0.21	3.1	0.104	0.69	51.5	5.8	1.51	2240	2.23	2.09	101.0	27.2	4270
JS26		10.40	21.7	0.24	5.2	0.091	1.29	67.5	6.0	1.29	1860	2.76	2.44	38.1	28.0	4310
JS27		5.03	21.4	0.18	2.4	0.102	1.86	24.5	5.7	0.92	793	2.79	2.66	43.0	14.3	2310
JS28		5.97	21.2	0.18	3.2	0.106	1.58	23.0	5.2	1.02	1070	3.37	2.52	50.3	16.0	2790
JS29		3.91	20.9	0.15	1.7	0.072	1.75	18.8	7.2	0.93	690	1.48	2.96	23.4	18.1	1450
JS30		2.27	17.00	0.12	0.7	0.045	2.11	8.6	4.3	0.46	477	0.89	2.63	16.2	9.0	450
JS31		5.14	23.3	0.20	2.2	0.108	1.53	24.5	7.0	1.11	803	3.28	3.03	40.5	17.1	2050
JS32		5.46	23.1	0.14	2.5	0.108	1.62	23.6	7.0	1.16	886	3.02	3.14	37.3	16.9	1970
JS33		6.37	22.5	0.24	3.9	0.127	1.57	37.1	6.3	1.48	1100	3.24	2.43	24.3	23.0	3160
JS34		7.95	24.6	0.24	3.0	0.129	1.64	49.5	7.4	2.07	1310	2.86	2.55	47.3	38.6	4570
JS35		4.90	22.1	0.16	1.6	0.076	2.45	31.0	11.3	0.89	924	1.73	2.63	25.2	24.1	1300

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53 Angus Crescent
Long Meadow Business Park, East Entrance
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
JM36		18.8	70.8	<0.002	<0.01	0.35	15.0	2	3.3	443	2.15	<0.05	17.6	1.500	0.23	4.7
JM37		14.6	64.1	<0.002	<0.01	0.35	18.0	2	2.9	442	1.70	<0.05	9.2	0.949	0.20	3.5
JM38		15.5	59.3	<0.002	<0.01	0.34	17.4	2	2.6	466	1.29	<0.05	6.1	0.694	0.20	3.2
JM39		13.1	54.0	<0.002	0.01	0.28	23.5	3	3.2	470	1.53	<0.05	6.8	1.145	0.20	2.9
JM40		15.4	60.5	<0.002	0.01	0.32	22.4	3	4.8	431	2.73	<0.05	18.6	2.12	0.21	5.7
JS01		6.7	9.4	<0.002	0.01	0.18	32.1	3	1.9	509	0.90	<0.05	1.8	1.470	0.04	1.0
JS02		8.9	23.0	<0.002	0.01	0.19	29.9	3	2.5	542	1.43	0.06	4.7	1.350	0.09	2.0
JS03		11.6	32.7	<0.002	<0.01	0.23	29.9	4	1.9	487	0.87	<0.05	11.7	1.650	0.12	4.7
JS04		16.6	43.5	<0.002	<0.01	0.17	23.0	4	2.0	754	1.03	<0.05	35.6	1.585	0.16	4.9
JS05		9.9	23.8	0.002	<0.01	0.41	27.0	7	8.0	261	6.29	<0.05	18.6	6.74	0.09	8.8
JS06		5.5	6.3	<0.002	<0.01	0.22	32.1	3	2.6	391	3.21	<0.05	3.8	2.64	0.03	1.6
JS07		9.9	27.1	<0.002	<0.01	0.18	23.2	4	5.1	400	3.59	<0.05	21.0	4.26	0.10	4.3
JS08		21.6	72.6	<0.002	0.01	0.36	18.5	2	3.2	866	1.65	<0.05	39.5	1.825	0.28	8.9
JS09		20.4	62.7	<0.002	0.01	0.12	18.3	4	0.7	2010	0.20	<0.05	33.5	1.005	0.31	5.2
JS10		22.2	62.9	<0.002	<0.01	0.18	21.3	5	1.0	2460	0.46	<0.05	32.6	0.764	0.33	7.9
JS11		19.1	58.1	<0.002	<0.01	0.36	21.2	3	4.1	691	2.21	<0.05	24.0	1.935	0.24	8.9
JS12		19.7	62.1	<0.002	0.03	0.30	19.1	3	3.9	682	2.29	<0.05	22.0	1.765	0.25	6.4
JS13		13.7	33.1	<0.002	<0.01	0.29	26.7	5	6.4	452	4.64	0.05	39.9	3.70	0.14	8.3
JS14		11.5	15.0	<0.002	0.01	0.35	36.5	6	5.8	253	4.77	<0.05	21.0	4.80	0.07	7.2
JS15		17.0	42.6	<0.002	0.01	0.18	25.4	4	2.8	784	1.10	<0.05	29.9	2.39	0.21	6.6
JS16		13.6	35.3	<0.002	<0.01	0.22	30.7	4	2.7	464	2.10	<0.05	15.9	1.855	0.14	6.9
JS17		20.8	61.6	<0.002	<0.01	0.11	20.5	3	1.8	1425	0.86	<0.05	24.8	1.260	0.30	5.9
JS18		12.7	32.9	<0.002	<0.01	0.20	23.9	2	3.0	572	1.77	<0.05	8.4	0.964	0.14	3.7
JS19		12.7	37.9	<0.002	<0.01	0.30	26.4	4	4.6	485	2.51	<0.05	11.9	1.535	0.12	6.3
JS20		16.4	36.2	<0.002	<0.01	0.20	25.5	5	1.2	1075	0.51	<0.05	26.6	1.540	0.17	9.7
JS21		8.7	19.5	<0.002	<0.01	0.54	23.8	5	4.1	266	3.23	0.05	9.8	3.97	0.08	5.5
JS22		12.1	40.5	<0.002	0.01	0.99	21.1	3	4.1	423	2.23	0.07	15.4	1.945	0.20	6.4
JS23		11.3	22.4	0.002	<0.01	0.46	28.1	6	2.3	423	0.87	0.07	22.0	1.755	0.10	11.5
JS24		11.4	28.9	<0.002	<0.01	0.26	21.0	3	2.9	535	1.45	<0.05	8.5	1.125	0.10	4.6
JS25		9.5	15.9	<0.002	0.02	0.35	27.7	3	4.0	467	6.86	0.10	14.0	3.53	0.07	4.9
JS26		13.1	33.2	<0.002	<0.01	0.24	24.5	3	2.8	558	1.96	0.07	26.9	2.68	0.13	5.6
JS27		16.3	49.8	<0.002	<0.01	0.33	20.8	3	4.8	401	3.00	<0.05	10.2	1.700	0.17	7.0
JS28		14.0	39.1	<0.002	<0.01	0.44	22.9	3	5.8	365	3.30	<0.05	9.8	1.675	0.13	8.1
JS29		17.5	44.4	<0.002	<0.01	0.28	17.6	2	2.8	500	1.62	<0.05	6.8	0.981	0.16	4.0
JS30		16.1	42.8	<0.002	<0.01	0.20	10.6	1	2.0	424	1.09	<0.05	3.1	0.595	0.14	2.5
JS31		15.5	42.3	<0.002	<0.01	0.42	23.1	2	5.4	483	2.77	<0.05	9.4	1.575	0.15	7.5
JS32		15.2	43.9	<0.002	<0.01	0.36	25.1	3	5.1	454	2.63	<0.05	11.0	1.335	0.16	6.8
JS33		14.0	42.0	<0.002	<0.01	0.21	29.7	3	2.7	407	1.37	<0.05	18.0	1.575	0.16	9.6
JS34		15.7	46.2	<0.002	<0.01	0.27	33.7	3	5.4	548	3.00	<0.05	19.8	1.485	0.20	7.5
JS35		18.6	80.6	<0.002	0.01	0.39	18.5	2	2.8	480	1.67	<0.05	11.9	0.793	0.33	4.2

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	ME-MS61r V ppm 1	ME-MS61r W ppm 0.1	ME-MS61r Y ppm 0.1	ME-MS61r Zn ppm 2	ME-MS61r Zr ppm 0.5	ME-MS61r Dy ppm 0.05	ME-MS61r Er ppm 0.03	ME-MS61r Eu ppm 0.03	ME-MS61r Gd ppm 0.05	ME-MS61r Ho ppm 0.01	ME-MS61r Lu ppm 0.01	ME-MS61r Nd ppm 0.1	ME-MS61r Pr ppm 0.03	ME-MS61r Sm ppm 0.03	ME-MS61r Tb ppm 0.01
JM36		131	1.6	33.4	66	66.9	6.31	3.83	1.69	6.39	1.29	0.63	35.1	8.48	7.24	1.02
JM37		122	1.2	35.7	77	35.9	6.53	3.87	1.72	6.66	1.34	0.61	33.3	7.58	7.29	1.05
JM38		108	1.0	32.8	74	20.0	6.42	3.73	1.61	6.40	1.29	0.58	27.9	6.67	6.68	1.04
JM39		158	1.1	49.0	94	53.3	9.02	5.32	2.39	9.51	1.84	0.81	45.8	10.30	10.20	1.48
JM40		209	1.7	51.6	103	142.0	9.40	5.58	2.38	9.61	1.91	0.89	50.6	11.85	10.75	1.53
JS01		270	0.4	42.1	120	24.9	7.86	4.49	2.33	8.48	1.62	0.67	41.9	9.14	9.30	1.30
JS02		215	0.5	55.3	120	35.9	10.40	5.97	2.88	10.75	2.13	0.92	51.0	11.30	11.60	1.69
JS03		236	0.7	84.5	116	87.7	15.60	8.92	4.69	17.00	3.17	1.37	89.5	20.5	19.45	2.61
JS04		231	0.7	68.7	96	135.0	13.20	7.25	4.59	15.10	2.58	1.09	102.0	24.1	19.65	2.21
JS05		391	2.8	135.0	138	176.5	25.0	14.30	6.76	25.8	5.00	2.18	125.0	28.6	27.6	3.96
JS06		483	0.8	51.7	142	58.2	10.10	5.54	3.12	11.10	2.01	0.79	54.8	11.90	12.30	1.69
JS07		436	2.0	59.2	133	194.0	11.35	6.40	3.29	12.65	2.26	0.96	75.1	17.35	15.15	1.90
JS08		190	1.6	42.5	74	213	8.36	4.71	3.20	10.00	1.63	0.72	81.4	20.1	14.15	1.47
JS09		395	0.4	63.8	105	159.5	14.60	5.84	10.65	28.5	2.45	0.63	303	75.8	50.0	3.15
JS10		342	0.4	82.1	89	197.0	18.65	7.47	14.55	36.0	3.11	0.85	384	95.0	64.2	3.97
JS11		211	1.6	53.7	70	155.5	10.30	6.03	3.24	11.30	2.09	0.94	74.2	17.90	14.10	1.73
JS12		259	1.5	39.6	86	203	7.78	4.22	2.96	9.55	1.52	0.67	70.7	17.60	12.80	1.36
JS13		415	2.2	78.0	129	272	15.05	8.50	4.43	16.85	2.98	1.30	97.7	23.3	19.75	2.53
JS14		518	2.3	102.5	170	158.0	18.65	10.85	5.16	19.25	3.76	1.66	93.6	21.3	20.9	2.97
JS15		340	1.3	64.5	121	185.5	12.30	6.52	4.41	15.30	2.35	0.89	109.5	26.9	20.1	2.15
JS16		247	1.0	80.0	108	90.8	14.65	8.47	4.06	15.05	2.94	1.25	73.2	16.65	16.35	2.34
JS17		279	0.6	53.2	88	129.5	11.05	5.00	6.46	17.65	1.94	0.62	163.5	40.4	27.2	2.19
JS18		154	0.5	40.3	84	26.6	7.42	4.34	2.00	7.52	1.50	0.66	35.5	8.00	7.77	1.20
JS19		213	1.1	67.6	87	52.9	11.90	6.94	3.00	11.85	2.40	1.03	58.6	13.45	12.90	1.89
JS20		365	1.0	85.7	98	221	17.40	8.67	7.72	24.7	3.23	1.17	186.5	45.5	32.5	3.11
JS21		458	1.9	84.4	104	170.0	15.35	8.71	4.66	16.60	3.07	1.25	76.1	16.95	17.65	2.53
JS22		237	2.2	69.0	77	147.0	12.35	7.05	3.75	14.40	2.47	1.04	73.5	16.35	16.05	2.16
JS23		243	1.0	150.5	82	141.0	28.4	15.65	9.33	33.3	5.50	2.27	159.0	34.9	36.4	4.93
JS24		158	0.8	61.8	64	82.2	10.60	6.42	3.29	11.80	2.15	0.99	53.2	11.45	12.30	1.83
JS25		336	1.6	59.7	109	94.7	11.40	6.15	4.25	14.70	2.20	0.87	79.0	17.50	16.85	2.14
JS26		318	1.5	76.8	97	162.5	13.30	7.91	4.32	15.20	2.70	1.23	83.6	19.70	17.20	2.33
JS27		172	1.2	68.3	63	63.6	12.10	7.41	2.99	12.55	2.49	1.13	47.7	10.20	12.20	2.03
JS28		185	1.6	80.5	67	70.4	14.10	8.81	3.48	14.20	2.96	1.36	51.4	10.80	13.55	2.34
JS29		118	1.0	37.5	57	44.1	6.78	4.06	2.04	7.27	1.38	0.64	29.3	6.61	7.37	1.15
JS30		69	0.6	17.7	32	18.0	3.11	1.95	1.00	3.23	0.65	0.31	12.7	2.78	3.25	0.52
JS31		171	1.5	65.8	64	54.2	11.75	7.08	3.09	12.30	2.38	1.09	48.8	10.40	12.15	1.98
JS32		178	1.0	63.5	73	57.7	11.20	6.90	2.86	11.55	2.32	1.07	46.2	9.79	11.45	1.87
JS33		216	1.0	79.1	84	126.0	14.00	8.56	3.75	15.00	2.85	1.35	64.6	14.25	15.05	2.38
JS34		243	1.2	71.6	106	85.8	12.65	7.59	3.99	14.80	2.57	1.18	77.1	17.30	16.45	2.24
JS35		128	1.3	35.6	70	53.4	6.45	3.86	1.92	7.26	1.30	0.63	38.6	9.11	8.02	1.11

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
JM36		0.59	3.78
JM37		0.59	3.77
JM38		0.57	3.61
JM39		0.81	4.99
JM40		0.86	5.53
JS01		0.67	4.18
JS02		0.91	5.72
JS03		1.36	8.51
JS04		1.08	6.77
JS05		2.14	13.60
JS06		0.82	5.11
JS07		0.97	6.04
JS08		0.72	4.51
JS09		0.75	4.22
JS10		0.98	5.52
JS11		0.92	6.04
JS12		0.65	4.06
JS13		1.29	8.08
JS14		1.60	10.25
JS15		0.93	5.70
JS16		1.25	7.86
JS17		0.68	3.99
JS18		0.65	4.14
JS19		1.03	6.53
JS20		1.25	7.54
JS21		1.25	7.84
JS22		1.10	6.72
JS23		2.39	14.50
JS24		1.00	6.15
JS25		0.93	5.63
JS26		1.23	7.67
JS27		1.18	7.19
JS28		1.40	8.63
JS29		0.64	3.99
JS30		0.31	1.97
JS31		1.11	7.03
JS32		1.09	6.74
JS33		1.34	8.46
JS34		1.18	7.30
JS35		0.61	3.81

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141816

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: ME-MS61r
REE's may not be totally soluble in this method.

LABORATORY ADDRESSES

Applies to Method: LOG-22
Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.

Applies to Method: Au-TL43 ME-MS61r SCR-41 WEI-21
Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

CERTIFICATE JB15141821

Project: Malawi 2015

This report is for 110 Sediment samples submitted to our lab in Johannesburg, GAUTENG, South Africa on 16-SEP-2015.

The following have access to data associated with this certificate:

MR TAKUMI ONUMA	IOKI SUZUKI	TOSHIHARU TASHIRO

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-TL43	Trace Level Au - 25g AR	ICP-MS
ME-MS61r	48 element four acid ICP-MS + REEs	

To: SUMIKO RESOURCES EXPLORATION & DEVELOPMENT CO. LTD
ATTN: MR TAKUMI ONUMA
8-21, 3-CHOME
TORANOMON, MINATO-KU
TOKYO 1050001
JAPAN

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	Au-TL43 Au ppm 0.001	ME-MS61r Ag ppm 0.01	ME-MS61r Al % 0.01	ME-MS61r As ppm 0.2	ME-MS61r Ba ppm 10	ME-MS61r Be ppm 0.05	ME-MS61r Bi ppm 0.01	ME-MS61r Ca % 0.01	ME-MS61r Cd ppm 0.02	ME-MS61r Ce ppm 0.01	ME-MS61r Co ppm 0.1	ME-MS61r Cr ppm 1	ME-MS61r Cs ppm 0.05	ME-MS61r Cu ppm 0.2
JS36		0.12	0.001	0.03	8.34	1.3	2820	2.82	0.15	2.05	0.05	160.0	18.9	88	2.15	24.9
JS37		0.13	0.001	0.02	3.90	3.5	3540	0.92	0.10	8.04	0.08	>500	38.0	324	0.57	28.8
JS38		0.12	0.006	0.02	3.21	2.1	3090	0.84	0.08	8.87	0.09	>500	47.4	620	0.76	39.4
JS39		0.12	0.001	0.01	6.95	2.5	2040	2.86	0.09	3.78	0.06	308	30.1	214	1.29	21.7
JS40		0.12	0.001	0.01	7.14	4.9	2130	3.77	0.14	3.57	0.05	246	22.7	129	2.12	19.8
JS41		0.12	0.001	0.03	6.17	1.5	2580	1.95	0.06	4.80	0.07	>500	31.5	279	0.91	29.1
JS42		0.12	0.002	0.02	4.73	2.1	1040	2.02	0.08	3.05	0.06	277	33.0	320	0.68	14.1
KT01		0.15	0.001	0.04	8.33	0.2	920	2.09	0.05	1.89	0.14	>500	18.6	103	0.92	26.2
KT02		0.14	<0.001	0.01	7.64	0.2	1180	1.86	0.05	1.40	0.09	487	9.9	57	0.86	12.9
KT03		0.13	0.001	0.04	5.81	1.2	780	2.45	0.09	3.84	0.37	>500	26.9	216	0.49	19.8
KT04		0.12	<0.001	0.05	8.46	0.7	970	2.55	0.06	2.49	0.20	377	24.4	136	0.81	25.6
KT05		0.13	<0.001	0.04	7.41	0.8	1100	2.29	0.07	3.11	0.27	>500	20.5	145	0.74	14.1
KT06		0.12	<0.001	0.03	6.33	1.1	630	1.36	0.07	1.52	0.31	>500	29.9	199	0.54	14.1
KT07		0.13	0.001	0.06	8.65	1.0	1110	2.37	0.05	2.42	0.26	443	20.1	145	0.95	27.5
KT08		0.15	0.001	0.02	4.45	1.2	380	0.88	0.12	1.74	0.16	>500	44.0	444	0.48	15.6
KT09		0.12	0.501	0.01	2.85	0.8	190	0.63	0.12	1.32	0.10	>500	47.9	341	0.25	15.4
KT10		0.14	0.001	0.05	7.21	0.7	930	1.98	0.08	4.12	0.14	>500	19.7	149	0.90	22.3
KT11		0.15	0.001	0.03	7.72	1.0	970	1.68	0.07	1.98	0.17	413	24.7	140	0.81	27.2
KT12		0.13	0.001	0.03	6.67	0.4	430	0.61	0.03	3.38	0.08	73.3	52.1	626	0.38	61.5
KT13		0.14	0.001	0.08	7.62	0.3	670	1.17	0.05	0.99	0.22	>500	41.1	289	1.00	41.0
KT14		0.16	0.001	0.03	7.90	0.6	950	1.92	0.06	2.27	0.19	>500	25.2	123	0.98	27.7
KT15		0.13	<0.001	0.04	8.62	1.1	1280	2.04	0.05	2.31	0.18	316	18.3	92	1.02	24.4
KT16		0.13	<0.001	0.06	8.30	0.5	1020	3.48	0.04	1.65	0.12	>500	18.1	73	1.96	20.3
KT17		0.12	0.001	0.05	7.86	0.6	1080	2.45	0.05	2.24	0.21	>500	19.9	115	0.86	24.2
KT18		0.15	0.001	0.09	8.49	0.7	1010	3.33	0.07	3.34	0.53	295	33.9	206	1.78	58.8
KT19		0.13	0.001	0.03	8.70	0.7	1090	1.85	0.04	2.34	0.26	>500	15.7	67	0.75	16.6
KT20		0.14	0.001	0.04	8.07	0.7	1060	3.43	0.08	2.64	0.41	>500	24.5	141	0.87	25.8
KT21		0.14	<0.001	0.03	7.14	0.4	940	1.64	0.04	1.61	0.03	68.0	9.7	67	0.74	11.0
KT22		0.13	<0.001	0.04	7.25	0.8	1010	2.11	0.10	1.63	0.10	313	15.9	101	1.87	20.0
KT23		0.14	<0.001	0.03	8.35	0.7	1010	2.47	0.08	1.16	0.07	106.5	8.9	52	2.65	12.4
KT24		0.13	0.001	0.02	7.19	1.2	940	1.82	0.09	1.25	0.13	500	17.6	89	1.99	21.4
KT25		0.14	<0.001	0.22	4.63	2.4	520	1.60	0.30	1.09	0.10	>500	21.7	299	1.32	11.4
KT26		0.14	0.001	<0.01	8.08	1.9	900	3.41	0.20	1.23	0.09	>500	13.5	102	2.41	14.1
KT27		0.13	<0.001	0.01	6.38	0.4	750	1.57	0.04	1.92	0.07	392	15.3	74	0.81	14.7
KT28		0.13	0.001	0.01	5.51	<0.2	400	1.40	0.08	2.00	0.10	>500	25.7	156	0.67	18.7
KT29		0.14	0.001	<0.01	8.77	0.7	940	3.52	0.10	1.55	0.26	403	11.8	80	2.03	19.9
KT30		0.17	0.001	<0.01	7.37	0.7	1040	2.58	0.12	1.48	0.10	>500	15.6	94	1.68	17.2
KT31		0.14	0.001	<0.01	7.91	0.5	990	2.63	0.13	1.51	0.10	>500	12.4	96	1.45	11.9
KT32		0.14	0.001	0.01	7.20	<0.2	700	1.64	0.05	1.70	0.07	480	16.0	93	0.72	19.5
KT33		0.13	0.001	0.02	8.09	0.4	900	2.77	0.07	1.72	0.15	380	13.0	82	1.28	16.1

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method / Analyte / Units / LOR	ME-MS61r Fe % 0.01	ME-MS61r Ga ppm 0.05	ME-MS61r Ge ppm 0.05	ME-MS61r Hf ppm 0.1	ME-MS61r In ppm 0.005	ME-MS61r K % 0.01	ME-MS61r La ppm 0.5	ME-MS61r Li ppm 0.2	ME-MS61r Mg % 0.01	ME-MS61r Mn ppm 5	ME-MS61r Mo ppm 0.05	ME-MS61r Na % 0.01	ME-MS61r Nb ppm 0.1	ME-MS61r Ni ppm 0.2	ME-MS61r P ppm 10
JS36		5.01	20.8	0.29	2.9	0.058	3.31	73.6	10.5	1.02	853	1.05	2.42	28.9	43.0	2910
JS37		20.7	30.2	1.11	2.7	0.075	1.77	294	3.0	1.95	1190	0.99	1.02	6.0	82.2	>10000
JS38		20.6	29.5	1.15	2.7	0.074	1.57	318	2.7	2.35	1240	0.57	0.70	2.3	134.0	>10000
JS39		11.55	23.0	0.41	5.1	0.091	2.21	144.0	8.0	2.26	1200	1.80	2.27	43.7	77.3	5310
JS40		9.02	22.6	0.36	7.1	0.083	2.55	110.5	11.0	1.75	1140	1.55	2.32	55.9	56.9	4900
JS41		14.05	24.9	0.66	4.9	0.086	2.11	267	5.8	1.97	1170	1.68	2.01	18.7	85.7	9590
JS42		23.7	27.2	0.36	10.1	0.092	1.32	134.5	4.8	1.43	1840	2.32	1.66	67.1	59.6	4250
KT01		5.28	23.6	0.71	4.0	0.066	3.09	363	15.3	0.89	1400	2.30	1.87	72.5	36.3	1160
KT02		3.55	19.50	0.54	3.0	0.046	4.40	225	13.0	0.47	915	0.95	1.45	29.1	14.0	890
KT03		11.75	31.4	2.41	12.5	0.143	1.91	1240	13.1	1.75	3480	4.67	1.22	394	55.7	3570
KT04		6.36	21.7	0.41	2.7	0.078	2.50	176.0	16.9	1.27	2130	1.83	1.97	62.4	46.6	2000
KT05		7.94	23.2	1.04	9.1	0.090	2.56	540	15.2	1.20	2750	2.79	1.88	226	32.9	2930
KT06		13.30	25.7	1.93	12.5	0.147	1.75	930	9.7	1.24	5750	3.34	1.12	431	29.1	2290
KT07		5.75	22.4	0.49	3.3	0.079	3.29	202	14.1	1.09	1980	3.10	2.41	159.0	60.6	1580
KT08		28.4	45.8	2.97	22.4	0.159	1.03	1290	7.0	1.29	3490	3.43	0.58	151.5	50.6	2430
KT09		28.5	44.4	3.65	27.2	0.145	0.54	1610	4.9	1.03	3220	5.36	0.38	173.5	45.3	2990
KT10		6.22	20.7	0.66	3.1	0.081	2.83	273	12.3	1.34	1660	2.07	1.59	65.5	43.4	1280
KT11		7.32	19.00	0.45	2.5	0.095	2.44	188.5	12.9	1.39	1910	1.47	1.29	30.6	39.5	1600
KT12		7.99	15.95	0.17	2.6	0.070	0.82	34.2	8.3	3.93	1460	0.68	0.92	14.5	158.5	730
KT13		9.99	23.6	1.15	7.0	0.119	2.06	510	12.4	1.34	2830	2.49	0.94	147.0	67.6	1470
KT14		7.19	20.9	0.70	4.2	0.094	2.59	290	13.0	1.27	2790	1.80	1.68	101.0	41.9	2560
KT15		4.52	21.4	0.37	3.1	0.061	3.54	134.0	13.2	0.77	1700	2.28	2.40	143.0	45.7	2770
KT16		5.22	23.3	0.91	13.5	0.072	3.19	385	15.5	0.81	1850	1.48	2.22	52.3	19.3	3160
KT17		5.38	22.2	0.83	5.2	0.065	3.18	376	14.4	0.95	1920	3.33	2.16	125.0	44.0	2500
KT18		6.50	23.7	0.36	2.1	0.091	2.42	130.5	30.8	1.73	2000	6.84	2.19	82.7	123.0	2650
KT19		4.96	21.8	0.64	3.9	0.074	4.19	269	10.8	0.75	2680	2.25	2.61	188.5	32.7	3510
KT20		5.97	20.6	0.57	2.7	0.076	2.41	271	15.2	1.06	2510	3.98	2.23	86.0	52.4	3500
KT21		2.21	15.45	0.16	1.2	0.032	3.20	32.7	11.5	0.61	453	0.89	1.72	6.9	21.1	280
KT22		4.16	17.45	0.40	6.8	0.068	2.94	143.0	15.9	0.98	1330	1.59	1.80	52.7	26.0	1900
KT23		2.34	20.5	0.18	1.2	0.038	3.81	44.8	32.7	0.52	874	1.28	2.69	81.0	22.2	480
KT24		4.87	16.85	0.60	7.0	0.065	2.75	242	16.7	0.96	1780	1.67	1.67	42.4	29.9	1590
KT25		21.5	81.1	6.13	37.6	0.112	1.96	3060	10.3	0.57	4070	4.23	1.28	>500	46.1	4140
KT26		6.97	28.9	0.83	14.7	0.081	3.33	447	20.5	0.57	2560	4.70	2.72	>500	32.0	1470
KT27		6.24	16.60	0.49	2.1	0.059	2.47	176.5	11.0	0.93	1520	2.17	1.34	58.2	23.4	750
KT28		12.60	35.2	2.60	6.6	0.122	1.32	1170	9.2	1.60	2350	2.16	0.78	61.8	33.6	2430
KT29		4.41	24.7	0.34	3.6	0.071	3.31	177.0	22.8	0.66	1860	3.98	2.99	327	42.8	2070
KT30		4.51	21.6	0.61	6.6	0.073	3.53	342	14.0	0.70	1700	2.84	2.25	216	30.4	1870
KT31		6.75	25.5	0.80	9.9	0.076	3.68	447	14.7	0.65	2370	3.70	2.55	460	25.4	1530
KT32		4.41	18.05	0.43	2.6	0.058	2.47	210	10.3	0.98	923	0.89	1.44	20.6	30.7	860
KT33		4.00	19.70	0.35	3.0	0.066	3.29	168.5	11.3	0.86	1410	2.00	2.46	163.0	33.3	1710

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
JS36		25.6	93.4	<0.002	0.01	0.22	13.9	1	2.8	1030	1.68	<0.05	17.4	0.927	0.48	3.7
JS37		18.8	39.0	0.002	0.01	0.08	20.9	5	0.8	2950	0.20	<0.05	20.7	1.025	0.23	4.7
JS38		15.1	43.9	0.002	0.01	0.07	22.3	4	0.4	2720	0.08	<0.05	29.3	0.879	0.24	4.2
JS39		23.2	62.2	<0.002	0.01	0.22	24.4	2	3.7	1080	2.22	<0.05	34.4	1.715	0.36	5.5
JS40		23.6	71.8	<0.002	0.02	0.39	18.5	3	5.2	924	3.28	<0.05	52.4	1.455	0.42	9.7
JS41		21.9	57.8	0.002	0.01	0.08	20.6	3	1.9	1580	0.85	<0.05	41.9	1.410	0.33	4.4
JS42		17.3	33.0	<0.002	0.01	0.29	18.1	2	6.0	598	4.19	<0.05	70.0	3.06	0.19	7.5
KT01		40.2	124.5	0.002	0.01	0.13	16.8	2	1.7	361	3.12	<0.05	197.5	1.230	0.69	10.1
KT02		50.6	174.0	<0.002	0.01	0.08	10.3	1	1.0	241	1.50	<0.05	136.5	0.883	1.02	5.8
KT03		39.1	65.7	0.005	0.01	0.28	32.5	7	5.3	390	21.9	0.08	700	5.03	0.35	31.1
KT04		28.8	98.2	<0.002	0.01	0.07	21.1	2	1.8	453	3.45	0.05	68.3	1.150	0.54	5.3
KT05		29.3	85.7	0.002	0.01	0.40	22.5	4	3.9	550	10.40	0.05	231	3.94	0.45	12.9
KT06		43.3	67.7	0.005	0.01	0.08	37.2	6	4.0	303	26.3	0.09	600	6.26	0.35	36.0
KT07		25.8	100.5	<0.002	0.02	0.08	16.4	3	1.9	776	9.80	<0.05	68.0	1.145	0.45	7.2
KT08		39.7	37.1	0.005	<0.01	0.27	34.8	8	12.5	142.5	9.42	0.06	790	5.44	0.17	73.1
KT09		40.4	18.4	0.005	<0.01	0.12	29.7	8	10.7	71.4	12.25	0.13	790	8.93	0.09	108.0
KT10		33.5	99.0	<0.002	0.01	0.17	17.8	3	3.1	301	3.89	0.06	171.0	1.250	0.53	7.9
KT11		29.6	91.0	<0.002	0.01	0.10	27.4	4	2.3	253	1.74	0.07	88.5	1.035	0.47	5.5
KT12		8.1	28.1	<0.002	<0.01	0.08	32.5	1	0.8	157.5	0.81	<0.05	11.6	0.784	0.17	0.8
KT13		31.0	92.5	0.002	0.01	0.10	31.6	3	2.6	223	7.99	<0.05	333	3.56	0.46	18.3
KT14		30.2	107.0	<0.002	0.01	0.12	24.7	3	1.8	458	6.03	0.07	179.5	1.515	0.56	8.6
KT15		22.8	106.0	<0.002	0.01	0.10	12.0	3	1.8	1080	7.91	0.06	14.4	0.856	0.45	1.9
KT16		45.1	175.0	0.002	<0.01	0.10	19.3	3	1.9	242	3.03	<0.05	313	1.240	1.01	16.3
KT17		39.1	115.5	<0.002	0.01	0.10	17.2	4	2.0	668	6.40	<0.05	178.5	1.305	0.58	8.8
KT18		20.8	94.7	0.002	0.03	0.10	20.5	3	1.5	655	3.89	0.07	17.6	0.624	0.49	2.3
KT19		20.3	106.5	0.002	<0.01	0.07	13.5	3	1.3	1500	9.38	0.06	26.8	1.250	0.37	2.7
KT20		30.3	89.8	0.003	0.02	0.08	23.2	4	1.6	439	3.98	0.06	89.5	1.160	0.49	5.8
KT21		27.4	103.0	<0.002	<0.01	0.07	8.0	1	1.1	195.0	0.40	<0.05	7.8	0.257	0.52	0.7
KT22		31.3	116.5	<0.002	0.01	0.11	18.5	2	2.6	310	3.05	0.07	99.1	0.608	0.63	6.6
KT23		21.9	136.5	<0.002	0.01	0.12	6.0	1	2.0	686	3.90	<0.05	9.8	0.254	0.60	2.8
KT24		25.6	113.5	0.002	0.01	0.13	22.4	4	2.0	302	2.75	0.05	151.0	0.623	0.62	10.3
KT25		70.1	65.4	0.012	0.01	0.19	15.0	17	7.8	472	93.6	0.12	1480	2.98	0.25	101.5
KT26		24.5	109.0	<0.002	0.01	0.25	10.4	4	5.6	1140	51.0	0.10	186.0	1.205	0.49	22.2
KT27		17.4	80.1	<0.002	0.01	0.08	13.6	2	3.1	210	3.94	<0.05	77.3	2.80	0.35	3.5
KT28		25.8	51.1	0.004	0.01	0.09	33.9	8	5.2	144.0	3.63	<0.05	620	2.37	0.20	29.9
KT29		16.1	123.5	<0.002	0.02	0.11	9.5	2	3.0	861	20.8	0.05	47.7	0.588	0.37	8.0
KT30		30.9	126.5	<0.002	0.01	0.16	9.8	3	3.9	814	12.85	0.06	157.5	1.195	0.47	12.8
KT31		30.0	118.0	<0.002	0.01	0.12	9.8	3	4.9	990	30.3	0.07	237	1.410	0.38	20.2
KT32		22.9	99.6	<0.002	0.01	0.06	16.5	2	1.6	181.0	1.17	<0.05	103.5	0.797	0.43	5.5
KT33		18.6	116.0	<0.002	0.02	0.07	11.1	2	2.5	922	7.52	0.05	41.1	0.642	0.37	3.5

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
JS36		128	0.8	29.3	63	108.5	6.31	3.29	3.03	8.63	1.13	0.43	73.3	19.00	12.25	1.15
JS37		560	0.5	84.0	87	83.7	20.9	7.85	17.50	41.9	3.32	0.72	446	104.0	69.6	4.50
JS38		575	0.2	78.9	120	103.5	19.90	7.06	16.15	40.7	3.03	0.62	463	108.0	71.3	4.31
JS39		309	1.2	48.1	89	197.0	10.35	5.11	5.08	14.80	1.84	0.64	140.0	36.1	22.3	1.88
JS40		206	1.5	46.1	83	277	10.00	4.89	4.09	13.70	1.76	0.65	114.5	27.7	19.80	1.82
JS41		372	0.8	53.8	92	195.5	12.60	5.27	7.99	22.0	2.04	0.62	246	62.4	35.5	2.50
JS42		608	5.3	47.3	103	385	10.05	5.13	3.93	13.70	1.82	0.71	114.5	31.3	18.80	1.79
KT01		138	1.9	43.5	73	135.5	9.92	4.42	2.69	21.0	1.64	0.59	282	79.3	39.3	2.22
KT02		75	9.9	27.8	49	99.6	6.53	2.86	1.95	14.35	1.07	0.38	197.0	53.2	28.3	1.46
KT03		285	10.9	123.5	179	404	29.2	11.60	6.22	69.8	4.55	1.49	>1000	285	149.0	6.93
KT04		147	1.1	48.9	109	89.4	10.40	5.27	3.07	15.15	1.89	0.68	147.0	40.0	23.2	1.93
KT05		223	2.6	78.2	122	286	16.50	7.99	4.67	30.7	2.83	1.07	423	120.0	59.3	3.41
KT06		295	3.6	131.5	203	397	30.5	13.35	4.95	64.6	4.95	1.79	837	228	125.5	6.73
KT07		129	1.1	47.9	121	109.5	10.50	5.22	3.98	15.80	1.87	0.69	169.5	46.6	25.3	1.97
KT08		987	5.7	128.0	135	>500	36.6	11.75	8.17	109.5	5.06	1.55	>1000	352	211	9.71
KT09		1000	8.9	121.0	157	>500	40.8	9.99	9.35	135.0	4.92	1.18	>1000	429	257	11.85
KT10		161	6.8	49.7	76	110.5	11.40	5.00	2.73	21.7	1.85	0.66	242	64.8	37.2	2.45
KT11		178	1.1	60.5	82	84.4	11.95	6.28	2.50	17.60	2.21	0.89	180.0	46.4	27.6	2.13
KT12		242	0.3	21.7	91	95.5	4.18	2.47	1.19	4.59	0.82	0.33	30.4	7.80	5.56	0.67
KT13		280	2.0	69.2	161	236	16.20	6.79	3.21	35.1	2.57	0.91	480	129.5	71.6	3.58
KT14		163	1.5	69.6	116	140.5	14.40	7.16	3.27	24.2	2.58	0.97	271	72.6	41.5	2.81
KT15		100	0.7	44.3	94	97.6	9.49	4.61	5.51	12.75	1.69	0.52	127.5	33.3	20.0	1.74
KT16		130	1.1	82.2	88	452	18.05	8.72	2.58	31.5	3.11	1.22	368	99.1	55.1	3.62
KT17		140	1.3	62.7	103	164.5	14.05	6.37	4.53	26.0	2.35	0.79	331	91.0	47.9	2.89
KT18		184	0.7	49.3	183	63.4	10.15	5.25	3.96	13.20	1.89	0.66	113.5	31.0	19.20	1.81
KT19		86	0.8	63.0	100	121.0	13.80	6.65	7.97	20.0	2.42	0.75	236	64.3	32.5	2.57
KT20		149	1.9	93.1	113	93.9	18.45	9.85	4.07	23.7	3.45	1.23	228	61.9	35.4	3.18
KT21		55	0.2	14.2	25	37.8	3.03	1.62	1.74	3.99	0.56	0.24	28.4	7.31	5.23	0.55
KT22		94	0.9	52.4	54	226	10.85	5.58	2.69	15.80	1.98	0.80	133.0	35.2	22.3	2.00
KT23		44	0.5	13.5	49	42.4	3.04	1.56	1.68	3.79	0.56	0.23	31.2	8.87	4.94	0.55
KT24		82	1.0	75.1	49	230	15.65	7.80	2.76	24.5	2.77	1.13	227	60.0	38.1	2.98
KT25		349	13.9	282	125	>500	96.5	24.3	21.0	238	12.05	2.02	>1000	759	427	25.1
KT26		99	5.2	75.7	103	>500	19.10	8.07	7.49	29.6	3.12	0.96	357	101.5	51.1	3.77
KT27		159	0.7	32.3	44	65.5	7.66	3.16	2.76	16.10	1.20	0.42	176.0	45.3	28.0	1.69
KT28		321	1.7	165.5	74	205	47.6	14.00	13.00	122.0	6.27	1.49	>1000	341	211	12.35
KT29		97	0.8	43.2	150	133.0	9.16	4.37	4.04	12.75	1.64	0.55	138.0	40.0	20.7	1.71
KT30		92	1.6	53.5	77	224	12.45	4.84	4.88	23.0	1.98	0.57	267	78.4	39.8	2.76
KT31		112	2.4	66.4	96	370	15.70	6.21	6.18	30.0	2.56	0.72	336	100.0	48.8	3.46
KT32		105	0.4	45.4	50	85.7	9.57	4.41	2.66	18.15	1.65	0.60	187.0	52.2	30.3	2.03
KT33		82	0.7	45.4	89	97.3	9.06	4.53	4.31	12.95	1.63	0.58	137.0	38.6	20.6	1.73

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
:S36		0.44	2.94
:S37		0.90	4.96
:S38		0.79	4.45
:S39		0.69	4.44
:S40		0.68	4.45
:S41		0.67	4.09
:S42		0.69	4.57
KT01		0.60	3.96
KT02		0.40	2.57
KT03		1.60	10.00
KT04		0.71	4.83
KT05		1.12	7.32
KT06		1.82	12.20
KT07		0.72	4.63
KT08		1.52	9.77
KT09		1.19	7.25
KT10		0.67	4.46
KT11		0.92	6.18
KT12		0.34	2.28
KT13		0.92	6.08
KT14		1.01	6.54
KT15		0.62	3.85
KT16		1.22	8.16
KT17		0.86	5.42
KT18		0.73	4.55
KT19		0.84	5.34
KT20		1.37	8.74
KT21		0.24	1.61
KT22		0.81	5.40
KT23		0.22	1.47
KT24		1.12	7.76
KT25		2.59	14.00
KT26		1.07	6.66
KT27		0.42	2.75
KT28		1.73	9.99
KT29		0.62	3.82
KT30		0.65	3.81
KT31		0.85	4.92
KT32		0.63	4.00
KT33		0.64	3.84

***** See Appendix Page for comments regarding this certificate *****

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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
KT34		0.13	0.001	0.01	8.38	0.5	1050	3.55	0.07	1.57	0.30	378	13.6	95	1.14	21.2
KT35		0.15	0.001	<0.01	8.18	0.5	1000	2.42	0.05	2.09	0.18	480	14.2	83	2.33	15.2
KT36		0.16	<0.001	<0.01	7.11	0.6	990	2.54	0.09	1.44	0.21	>500	16.8	100	1.11	15.6
KT37		0.13	0.001	<0.01	9.02	0.2	670	2.67	0.04	2.07	0.12	311	10.3	59	1.26	11.3
KT38		0.14	<0.001	<0.01	8.24	0.5	960	2.67	0.08	1.50	0.12	490	13.9	85	1.98	18.8
KT39		0.16	0.001	0.02	8.20	0.4	940	2.11	0.05	2.15	0.18	212	25.8	154	1.34	36.4
KT40		0.14	0.001	<0.01	8.44	0.4	910	2.87	0.07	2.45	0.15	460	12.9	89	1.28	14.8
KT41		0.17	0.001	<0.01	7.02	0.9	1050	1.51	0.08	1.50	0.09	>500	10.5	65	1.05	13.3
KT42		0.17	0.001	<0.01	6.57	0.4	950	1.94	0.14	1.27	0.16	>500	18.8	157	1.54	17.1
KT43		0.14	0.001	0.01	7.25	0.8	610	2.67	0.09	4.23	0.25	>500	23.0	132	0.67	23.6
KT44		0.14	0.001	0.01	5.99	1.1	510	1.70	0.08	2.85	0.15	482	32.0	125	0.71	25.8
KT45		0.15	0.001	0.02	6.82	1.1	680	1.80	0.10	3.16	0.16	248	29.3	93	1.01	27.8
KT46		0.14	0.173	0.04	5.74	2.4	710	1.53	0.34	2.52	0.32	>500	29.2	294	1.52	28.0
KT47		0.14	0.002	0.04	7.73	1.0	780	2.16	0.13	2.47	0.13	139.0	20.7	99	1.78	32.4
KT48		0.14	0.117	0.10	7.24	1.0	880	2.30	0.15	2.21	0.44	289	23.4	144	1.57	31.0
KT49		0.16	0.004	<0.01	7.39	1.4	1170	2.90	0.12	1.68	0.19	>500	15.5	137	1.37	18.8
KT50		0.13	0.001	0.02	7.72	0.6	880	2.13	0.09	2.55	0.23	>500	19.4	120	1.05	21.6
KT51		0.15	0.001	0.05	7.64	1.7	1000	2.42	0.26	2.41	0.23	133.0	16.2	102	2.62	27.2
KT52		0.15	0.001	0.01	7.16	<0.2	1220	1.72	0.06	1.06	0.06	>500	14.7	79	1.07	13.3
KT53		0.16	0.001	0.05	7.86	1.0	850	2.01	0.10	2.73	0.15	194.5	30.6	206	1.48	34.8
KT54		0.15	0.001	0.03	7.35	1.4	870	2.10	0.11	3.76	0.17	100.0	25.7	175	1.65	36.6
KM01		0.16	<0.001	0.01	8.19	0.9	850	1.46	0.05	3.30	0.05	45.1	15.2	59	0.50	12.0
KM02		0.17	<0.001	0.01	8.55	1.8	650	1.01	0.06	4.36	0.09	73.3	23.1	129	0.45	8.8
KM03		0.13	<0.001	0.02	7.84	0.4	530	2.01	0.07	3.77	0.15	68.0	23.8	59	0.52	13.6
KM04		0.14	<0.001	0.01	7.64	1.3	700	1.81	0.08	2.96	0.12	92.1	18.5	80	0.60	19.4
KM05		0.14	<0.001	0.02	7.91	1.8	500	1.39	0.09	4.94	0.15	98.4	25.5	107	0.35	13.7
KM06		0.14	<0.001	0.01	7.69	1.4	700	1.50	0.10	5.04	0.18	107.5	20.4	88	0.57	21.3
KM07		0.15	<0.001	0.01	10.05	0.8	340	0.36	0.04	7.03	0.04	11.95	12.0	98	0.24	4.0
KM08		0.13	<0.001	0.01	10.55	0.8	260	0.40	0.05	5.26	0.07	21.1	22.4	111	0.30	3.2
KM09		0.17	<0.001	0.02	8.87	0.6	80	0.23	0.05	4.36	0.15	8.90	39.1	182	0.14	13.9
KM10		0.14	<0.001	0.02	11.10	1.0	310	0.47	0.05	5.08	0.08	25.8	20.1	115	0.34	6.2
KM11		0.14	<0.001	0.02	9.60	0.8	360	0.64	0.05	4.38	0.08	44.0	24.9	183	0.35	8.0
KM12		0.13	0.001	0.03	8.54	0.8	550	1.28	0.06	4.22	0.16	47.6	17.7	91	0.57	22.2
KM13		0.16	0.001	0.02	7.84	1.5	730	1.56	0.08	4.13	0.09	64.2	17.4	73	0.54	18.5
KM14		0.13	<0.001	0.03	8.04	1.5	590	1.09	0.10	4.97	0.21	72.1	21.8	95	0.57	31.6
KM15		0.15	<0.001	0.01	7.44	2.1	490	1.22	0.11	4.39	0.20	82.8	24.9	96	0.36	14.9
KM16		0.15	<0.001	0.02	7.60	1.8	420	0.92	0.08	3.89	0.23	59.0	26.0	114	0.34	13.9
KM17		0.15	<0.001	0.02	7.13	2.1	510	2.34	0.12	3.87	0.19	101.0	24.3	47	0.67	9.9
KM18		0.15	<0.001	0.02	7.46	0.9	660	2.34	0.07	3.31	0.15	155.0	22.6	46	0.77	17.4
KM19		0.16	<0.001	0.01	7.13	0.6	620	2.79	0.12	4.40	0.17	141.5	29.2	58	0.83	28.1

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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
KT34		4.13	20.3	0.32	2.6	0.071	3.54	152.5	12.4	0.66	1640	5.19	2.93	224	50.6	2340
KT35		6.04	24.3	0.51	5.3	0.080	3.60	227	26.2	0.90	2350	2.31	2.45	310	27.9	5100
KT36		5.59	20.3	0.73	7.7	0.065	3.28	387	11.4	0.55	2410	3.87	2.14	403	32.8	2370
KT37		3.86	22.0	0.32	2.4	0.079	3.38	132.0	9.7	0.71	1670	1.76	3.22	162.5	20.5	2120
KT38		4.74	22.5	0.46	2.7	0.067	3.53	246	17.6	0.76	1560	2.29	2.36	211	36.1	1630
KT39		4.51	19.25	0.22	2.3	0.054	2.72	88.8	20.7	1.00	1850	2.63	2.02	121.5	94.6	1330
KT40		4.80	22.3	0.45	4.1	0.080	3.44	233	12.4	0.98	2200	2.59	2.90	306	33.9	2740
KT41		4.83	19.50	0.66	5.7	0.061	3.29	325	11.8	0.53	1840	1.92	1.99	290	19.1	3050
KT42		10.40	28.3	1.29	12.4	0.097	3.03	730	22.1	0.64	2890	4.34	1.50	447	33.9	1570
KT43		8.11	22.6	0.77	4.4	0.105	2.06	429	10.6	1.84	3830	3.82	1.95	211	54.0	4770
KT44		13.15	18.40	0.44	5.0	0.137	1.42	226	9.1	1.47	3600	3.75	1.30	153.0	37.4	2510
KT45		8.66	17.85	0.28	3.9	0.119	1.85	110.5	9.7	1.48	2490	2.12	1.40	65.8	35.3	2570
KT46		13.90	26.7	1.49	8.7	0.105	1.80	720	12.2	1.30	2440	2.46	0.83	136.5	63.9	2000
KT47		4.88	17.95	0.17	2.6	0.078	2.38	62.0	14.3	1.41	1160	1.05	1.41	16.6	38.5	1250
KT48		6.53	19.30	0.28	3.0	0.118	2.09	133.0	14.7	1.10	1420	1.70	1.58	42.5	55.0	1190
KT49		5.05	22.3	0.62	6.3	0.069	2.93	403	11.0	0.71	1700	4.94	2.26	246	42.9	1360
KT50		6.99	20.1	0.52	3.9	0.099	2.36	277	12.0	1.38	1960	1.89	1.89	72.1	32.3	1700
KT51		3.86	17.65	0.17	2.1	0.054	2.61	58.6	16.1	1.07	875	2.12	1.89	26.0	40.8	1130
KT52		4.99	23.5	1.27	3.6	0.045	3.79	780	7.1	0.47	1800	1.37	1.54	98.0	20.3	1130
KT53		6.03	18.40	0.22	2.5	0.067	2.46	94.8	17.9	1.62	1460	1.41	1.74	41.1	76.4	1780
KT54		4.95	17.15	0.13	1.3	0.070	2.01	42.0	20.6	2.08	1550	0.82	1.74	17.5	97.6	1830
KM01		3.64	17.75	0.12	0.6	0.053	2.20	16.2	6.5	1.11	701	0.34	2.94	8.0	19.5	1130
KM02		6.68	17.80	0.14	1.1	0.057	1.36	29.8	6.2	1.66	1490	0.59	2.55	13.5	32.0	2220
KM03		6.84	21.5	0.14	1.2	0.109	2.20	25.6	9.3	1.56	1240	0.49	2.39	12.0	17.2	1380
KM04		5.83	18.50	0.19	2.5	0.084	2.48	34.3	11.1	1.37	1280	0.74	2.25	16.3	27.5	1860
KM05		7.94	19.90	0.16	1.5	0.099	1.37	36.3	8.0	2.20	1820	0.53	2.36	24.4	31.3	3070
KM06		6.02	18.45	0.20	1.0	0.092	1.77	38.9	8.5	1.89	1400	0.91	2.44	13.7	25.0	4790
KM07		2.25	17.15	0.05	0.4	0.019	0.57	4.3	3.6	1.08	419	0.13	3.55	2.9	34.9	660
KM08		5.77	16.10	0.06	0.5	0.029	0.49	8.5	4.0	1.69	1080	0.20	2.88	5.9	29.4	920
KM09		13.05	13.15	0.06	0.7	0.050	0.20	3.4	4.6	3.36	3580	0.67	1.33	3.9	37.8	560
KM10		4.52	17.50	0.06	0.4	0.027	0.69	10.5	5.5	1.58	954	0.37	3.18	5.0	31.9	880
KM11		7.00	15.95	0.08	0.9	0.047	0.80	19.2	5.1	1.72	1590	0.65	2.54	14.0	35.2	1050
KM12		5.34	17.95	0.10	0.9	0.073	1.36	20.0	8.1	1.65	1260	0.58	2.90	8.6	25.4	1690
KM13		4.36	18.40	0.13	0.8	0.068	2.28	23.0	8.7	1.52	829	0.64	2.60	8.0	24.9	3080
KM14		6.89	16.95	0.15	1.0	0.073	1.37	27.8	7.7	1.78	2000	1.18	2.42	13.9	22.4	2670
KM15		9.42	17.70	0.16	3.5	0.094	1.47	30.8	6.4	1.78	2820	1.32	1.96	33.3	24.8	2570
KM16		10.75	17.00	0.13	3.3	0.104	1.23	23.5	5.7	1.81	2930	1.07	1.84	40.5	25.7	1840
KM17		7.79	22.5	0.19	3.4	0.136	2.18	35.4	8.9	1.44	1980	1.10	2.02	42.3	18.8	3040
KM18		6.83	21.8	0.22	2.0	0.107	2.47	64.6	7.4	1.18	1560	1.38	2.18	30.5	21.2	2400
KM19		8.59	24.4	0.22	2.3	0.151	2.18	56.7	9.1	1.67	1640	1.40	2.06	35.2	29.1	3190

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	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
KT34		16.7	103.5	<0.002	0.04	0.09	9.4	2	2.2	1455	11.45	0.06	20.5	0.693	0.39	2.8
KT35		8.8	126.0	<0.002	0.01	0.08	9.4	3	3.2	1665	19.05	<0.05	27.5	1.095	0.25	5.9
KT36		23.1	105.0	<0.002	0.01	0.11	12.6	4	4.3	856	24.1	0.05	167.0	1.815	0.36	12.2
KT37		14.1	102.5	<0.002	0.01	0.07	7.6	2	1.7	1740	7.42	<0.05	9.0	0.544	0.30	1.8
KT38		22.3	132.5	<0.002	0.01	0.10	10.6	2	2.9	863	13.50	0.05	112.5	0.966	0.47	12.0
KT39		16.3	96.8	<0.002	0.01	0.06	12.7	2	1.1	629	6.62	0.07	22.8	0.643	0.35	2.7
KT40		14.6	104.0	<0.002	0.01	0.08	9.6	2	3.4	1775	17.80	0.05	25.0	1.010	0.28	4.8
KT41		23.8	111.0	<0.002	<0.01	0.12	10.7	4	2.9	1015	21.4	0.08	138.5	1.150	0.38	14.1
KT42		37.4	104.5	0.002	0.01	0.17	15.8	4	4.6	576	27.0	0.10	396	2.21	0.39	34.2
KT43		18.4	69.4	<0.002	<0.01	0.07	25.2	5	2.5	573	11.55	0.08	167.0	1.400	0.26	9.6
KT44		18.2	60.1	<0.002	<0.01	0.15	30.7	3	5.5	220	9.93	0.05	140.5	6.03	0.28	17.9
KT45		21.4	77.8	<0.002	<0.01	0.27	29.5	3	4.0	234	4.03	<0.05	66.0	2.55	0.33	4.7
KT46		32.8	75.6	0.002	0.02	0.50	24.9	5	3.7	212	7.38	0.07	447	2.34	0.39	27.9
KT47		23.3	110.0	<0.002	0.01	0.24	18.2	2	2.3	211	1.00	0.07	28.7	0.541	0.52	2.9
KT48		37.1	93.5	<0.002	0.02	0.15	18.5	2	2.4	301	2.22	0.06	81.2	0.775	0.49	5.9
KT49		38.8	106.0	<0.002	0.01	0.09	12.8	3	2.9	645	9.07	0.09	174.5	0.948	0.48	13.2
KT50		34.9	92.1	<0.002	0.01	0.14	22.7	3	2.3	361	3.79	0.07	169.0	1.260	0.45	8.1
KT51		25.6	109.0	<0.002	0.03	0.58	12.6	2	2.2	333	1.42	0.07	22.0	0.502	0.62	3.3
KT52		52.9	154.5	0.002	<0.01	0.08	10.5	3	1.7	306	4.48	0.07	550	0.970	0.73	20.2
KT53		25.7	99.4	<0.002	0.01	0.39	22.5	2	2.2	408	1.71	<0.05	41.8	0.736	0.43	2.8
KT54		15.6	82.8	<0.002	0.01	0.17	19.5	2	1.5	332	1.05	0.09	15.4	0.395	0.41	2.1
KM01		8.0	58.4	<0.002	0.01	0.11	13.0	1	1.0	704	0.53	<0.05	2.1	0.468	0.22	0.4
KM02		6.3	34.0	<0.002	0.01	0.13	20.9	1	1.3	664	0.80	<0.05	2.2	1.140	0.11	0.9
KM03		12.3	69.4	<0.002	0.01	0.08	27.6	1	1.4	325	0.79	<0.05	4.8	0.947	0.30	1.0
KM04		11.0	77.2	<0.002	0.01	0.13	21.3	2	1.5	407	1.03	<0.05	8.6	0.845	0.32	2.5
KM05		6.0	29.4	<0.002	0.01	0.19	30.8	2	2.0	461	1.52	<0.05	3.9	1.130	0.12	1.3
KM06		8.9	43.0	<0.002	0.01	0.13	24.0	2	1.1	647	0.85	<0.05	4.2	0.863	0.20	1.6
KM07		3.2	2.8	<0.002	<0.01	0.08	5.5	<1	0.2	1085	0.22	<0.05	0.9	0.495	0.03	0.2
KM08		3.5	5.1	<0.002	<0.01	0.09	12.6	<1	0.4	829	0.40	<0.05	0.9	1.545	0.03	0.3
KM09		4.1	2.1	<0.002	<0.01	0.11	42.1	1	0.3	264	0.30	<0.05	0.2	2.23	<0.02	0.2
KM10		4.9	8.9	<0.002	<0.01	0.09	12.4	1	0.4	844	0.32	<0.05	0.9	0.711	0.05	0.2
KM11		5.5	17.3	<0.002	0.01	0.10	19.1	1	0.7	665	0.87	<0.05	5.8	1.705	0.06	0.5
KM12		8.4	32.4	<0.002	0.01	0.09	20.9	1	0.7	508	0.57	<0.05	1.7	0.745	0.14	0.7
KM13		10.6	58.9	<0.002	0.01	0.11	17.7	2	1.1	532	0.52	<0.05	3.3	0.501	0.26	1.1
KM14		9.9	32.4	<0.002	0.02	0.13	26.0	2	0.9	502	0.88	0.12	3.2	1.345	0.13	1.5
KM15		8.9	39.9	<0.002	<0.01	0.18	31.5	3	1.6	344	2.20	<0.05	4.3	2.42	0.15	2.5
KM16		7.0	32.6	<0.002	<0.01	0.13	37.2	3	1.5	319	2.60	<0.05	3.9	2.97	0.12	1.5
KM17		13.1	76.8	<0.002	<0.01	0.16	26.7	3	2.5	256	3.13	<0.05	5.7	1.930	0.31	2.3
KM18		14.4	81.8	<0.002	<0.01	0.09	23.4	3	1.6	293	2.10	<0.05	18.8	1.440	0.34	2.3
KM19		10.1	75.4	<0.002	<0.01	0.09	30.4	3	2.9	349	2.37	<0.05	5.8	1.445	0.29	2.0

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
KT34		102	0.7	44.4	132	76.2	9.29	4.62	6.05	12.30	1.69	0.52	124.0	35.5	18.45	1.72
KT35		85	0.6	60.9	162	180.5	13.25	5.85	8.43	19.10	2.35	0.62	212	59.3	30.3	2.57
KT36		132	1.8	84.9	99	279	18.65	8.17	6.60	31.9	3.20	0.95	326	94.3	50.6	3.77
KT37		45	0.3	36.8	112	66.7	8.09	3.57	6.17	11.65	1.42	0.38	117.5	33.2	17.70	1.58
KT38		99	0.9	45.1	97	96.7	10.25	4.20	4.43	18.00	1.66	0.47	198.0	57.3	30.2	2.19
KT39		94	0.9	35.8	96	77.4	6.68	3.79	2.65	7.81	1.31	0.51	69.3	19.55	10.50	1.15
KT40		71	0.8	54.3	120	143.0	11.30	5.23	6.91	16.05	2.03	0.60	184.5	54.2	26.2	2.17
KT41		73	1.2	73.4	72	199.0	16.60	7.04	6.44	27.6	2.80	0.80	274	80.0	41.9	3.35
KT42		226	3.4	92.0	110	463	23.1	8.20	5.57	54.4	3.51	0.93	600	175.0	94.9	5.59
KT43		156	2.2	122.5	131	159.5	24.1	11.90	6.78	36.3	4.40	1.48	341	101.5	54.5	4.61
KT44		386	1.9	73.7	123	152.5	14.15	7.39	2.62	21.4	2.66	1.01	194.5	54.8	31.8	2.70
KT45		235	1.7	73.8	101	130.5	12.90	7.64	2.52	14.45	2.59	1.08	101.0	26.9	17.80	2.16
KT46		415	46.1	94.9	127	291	23.9	7.93	4.94	64.2	3.43	1.02	700	195.0	117.5	6.18
KT47		116	1.2	40.3	71	87.1	7.32	4.15	1.83	8.15	1.43	0.58	55.0	15.05	10.00	1.24
KT48		169	1.1	38.4	157	101.5	7.77	3.88	2.23	12.25	1.40	0.54	112.0	30.9	18.70	1.52
KT49		127	2.5	59.2	90	262	13.35	5.40	4.67	24.4	2.18	0.64	274	82.9	40.6	2.96
KT50		164	1.4	65.3	96	132.0	12.55	6.24	2.69	20.2	2.28	0.84	219	63.8	33.4	2.47
KT51		122	1.0	27.2	78	68.1	5.14	2.82	1.63	6.18	1.00	0.38	44.7	12.95	7.84	0.90
KT52		107	1.5	63.9	39	132.5	16.75	5.37	4.64	43.0	2.43	0.57	598	179.5	86.2	4.21
KT53		188	0.9	38.9	77	85.6	7.27	3.94	2.15	9.27	1.38	0.52	74.2	20.6	12.70	1.31
KT54		116	0.6	34.8	89	39.4	6.09	3.55	1.53	6.46	1.22	0.49	36.5	10.40	7.38	1.01
KM01		87	0.4	21.2	52	14.6	3.95	2.15	1.73	4.61	0.77	0.29	22.9	5.26	5.27	0.67
KM02		144	0.5	31.7	72	29.9	5.61	3.23	2.21	6.40	1.14	0.46	35.6	9.17	7.27	0.96
KM03		170	0.5	46.1	102	29.9	8.66	4.73	1.99	9.16	1.69	0.58	37.0	9.05	9.44	1.45
KM04		113	0.6	51.8	77	76.6	9.45	5.42	2.27	10.45	1.87	0.74	50.1	11.90	11.20	1.60
KM05		166	0.7	60.4	96	38.0	10.55	6.31	2.90	10.95	2.15	0.89	54.6	12.75	11.70	1.73
KM06		125	0.6	56.2	93	21.3	10.40	5.70	3.49	12.30	2.04	0.74	65.8	14.70	14.40	1.77
KM07		57	0.1	4.3	30	11.3	0.96	0.47	1.40	1.20	0.17	0.06	6.7	1.54	1.51	0.17
KM08		104	0.2	11.3	50	13.8	2.10	1.12	1.96	2.35	0.41	0.15	11.3	2.61	2.52	0.35
KM09		192	0.4	28.1	82	17.6	4.39	2.93	1.23	3.40	1.01	0.44	6.2	1.27	2.08	0.63
KM10		83	0.2	12.9	48	10.3	2.37	1.35	1.72	2.63	0.48	0.19	13.5	3.21	2.78	0.41
KM11		131	0.5	22.9	63	28.2	3.98	2.32	1.89	4.29	0.82	0.33	21.6	5.24	4.42	0.66
KM12		119	0.4	34.6	87	24.2	6.08	3.57	1.90	6.44	1.28	0.51	27.8	6.26	6.44	0.99
KM13		103	0.4	38.0	77	20.4	7.03	3.80	2.20	8.04	1.39	0.50	35.6	8.34	8.47	1.23
KM14		142	0.8	52.8	103	24.6	9.23	5.36	2.55	9.77	1.90	0.81	45.3	10.05	9.81	1.51
KM15		174	1.4	82.1	113	99.4	14.15	8.70	2.92	13.55	3.00	1.24	52.7	11.55	12.10	2.22
KM16		194	1.4	71.9	105	102.0	11.90	7.59	2.23	10.65	2.57	1.12	34.7	8.19	8.77	1.84
KM17		166	2.4	87.5	134	96.2	15.65	8.78	2.67	15.65	3.19	1.14	63.0	13.80	14.75	2.52
KM18		155	1.1	64.4	119	56.3	12.40	6.48	2.61	14.90	2.38	0.82	81.2	19.50	16.65	2.20
KM19		210	1.2	78.2	144	67.3	14.85	8.01	3.19	16.65	2.91	1.00	81.1	18.80	17.35	2.53

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r
	Analyte	Tm	Yb
	Units	ppm	ppm
	LOR	0.01	0.03
KT34		0.63	3.69
KT35		0.77	4.38
KT36		1.12	6.64
KT37		0.47	2.59
KT38		0.57	3.29
KT39		0.56	3.44
KT40		0.72	4.07
KT41		0.94	5.50
KT42		1.06	6.26
KT43		1.67	10.00
KT44		1.07	6.73
KT45		1.13	7.13
KT46		1.07	6.50
KT47		0.62	3.83
KT48		0.57	3.55
KT49		0.71	4.32
KT50		0.89	5.57
KT51		0.42	2.52
KT52		0.66	3.77
KT53		0.56	3.56
KT54		0.52	3.23
KM01		0.31	1.91
KM02		0.47	2.96
KM03		0.66	3.96
KM04		0.79	4.90
KM05		0.91	5.78
KM06		0.81	4.78
KM07		0.06	0.38
KM08		0.16	1.00
KM09		0.43	2.83
KM10		0.18	1.18
KM11		0.32	2.14
KM12		0.52	3.34
KM13		0.52	3.30
KM14		0.78	5.14
KM15		1.26	8.12
KM16		1.10	7.18
KM17		1.22	7.68
KM18		0.88	5.59
KM19		1.09	6.86

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Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	WEI-21	Au-TL43	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Recvd Wt.	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2
KM20		0.16	<0.001	0.01	7.57	0.3	690	2.98	0.11	4.00	0.14	156.5	24.0	53	1.25	25.6
KM21		0.12	<0.001	0.02	7.62	0.5	590	3.45	0.45	2.89	0.21	>500	20.2	65	2.60	17.6
KM22		0.15	0.001	0.05	8.12	4.0	610	2.30	0.20	2.76	0.43	>500	26.7	175	1.78	32.4
KM23		0.15	0.001	0.08	8.40	1.9	700	2.38	0.18	2.14	0.46	287	24.7	146	2.09	37.4
KM24		0.13	0.001	<0.01	7.94	<0.2	510	3.34	0.67	1.99	0.28	>500	13.2	49	2.43	19.6
KM25		0.13	<0.001	0.02	8.02	2.5	730	2.53	0.09	2.97	0.13	74.8	14.1	28	0.81	11.7
KM26		0.14	<0.001	0.02	7.60	0.9	550	2.28	0.08	2.38	0.10	136.0	15.4	42	0.46	7.1
KM27		0.14	<0.001	0.01	6.14	1.1	580	1.95	0.11	2.70	0.14	323	20.4	47	0.45	7.4
KM28		0.14	<0.001	0.01	8.40	0.6	730	2.29	0.07	2.98	0.12	96.7	14.2	32	0.87	15.4
KM29		0.13	<0.001	0.03	6.14	0.6	470	2.49	0.12	3.87	0.18	172.0	31.6	66	0.76	27.9
KM30		0.13	0.001	0.04	9.05	2.8	430	1.45	0.16	2.22	0.74	480	32.0	207	1.54	34.0
KM31		0.14	0.001	0.07	7.76	3.2	850	2.02	0.21	2.31	0.46	447	21.6	174	1.71	32.6
KM32		0.19	<0.001	0.04	5.44	0.9	340	1.55	0.13	3.16	0.15	299	34.5	82	0.54	19.7
KM33		0.14	<0.001	0.05	7.58	0.6	620	3.68	0.56	3.37	0.13	284	18.2	58	1.83	20.3
KM34		0.13	<0.001	0.02	4.48	1.5	590	1.51	0.17	2.00	0.12	175.5	28.5	114	0.53	16.5
KM35		0.14	<0.001	0.02	5.47	1.6	430	1.55	0.14	6.48	0.15	125.5	27.5	74	0.47	14.4
KM36		0.13	<0.001	0.02	7.09	1.0	910	1.53	0.07	2.54	0.09	101.0	16.8	45	0.56	10.0
KM37		0.13	<0.001	0.02	5.66	2.2	460	1.48	0.14	6.14	0.13	100.0	25.7	67	0.44	13.6
KM38		0.13	0.001	0.06	8.31	4.6	880	3.54	0.17	1.68	0.18	348	11.7	68	3.63	17.7
KM39		0.13	0.001	0.04	7.43	2.9	1190	2.34	0.12	1.13	0.10	462	13.4	129	1.77	18.3
KM40		0.14	0.001	0.05	7.37	3.2	1080	2.52	0.25	1.84	0.23	>500	18.1	191	1.07	19.9
KM41		0.15	0.001	0.02	7.01	0.5	910	2.38	0.21	1.56	0.07	>500	12.2	80	1.68	13.5
KM42		0.12	<0.001	0.08	8.50	0.9	600	2.21	0.09	3.81	0.12	62.0	20.9	52	0.80	15.8
KM43		0.15	<0.001	0.03	6.56	1.1	680	2.75	0.16	4.08	0.18	129.0	26.8	62	0.77	18.9
KM44		0.14	0.001	0.06	8.09	3.1	740	2.65	0.45	2.40	0.35	175.5	20.4	146	1.79	36.2
KM45		0.14	0.001	0.05	8.19	1.6	670	2.12	0.16	3.94	0.42	213	28.2	251	1.50	32.6
KM46		0.14	0.001	0.10	8.01	1.2	1210	4.36	0.16	2.62	0.45	358	24.6	163	2.76	43.6
KM47		0.13	0.001	0.04	6.85	1.7	690	3.44	0.23	3.66	0.41	413	25.5	263	1.88	36.1
KM48		0.15	<0.001	0.02	7.26	1.3	850	3.01	0.24	3.22	0.32	472	24.9	255	1.66	32.8
KM49		0.13	<0.001	0.04	6.52	0.9	750	2.30	0.13	2.71	0.12	>500	23.3	198	1.08	21.8

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ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

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CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
KM20		6.42	22.4	0.22	3.8	0.110	2.02	65.2	13.0	1.36	1500	1.63	2.04	54.2	29.3	2850
KM21		9.17	24.1	0.91	11.4	0.124	2.09	480	18.6	1.13	3330	1.85	1.51	64.6	17.8	5260
KM22		9.32	20.4	0.73	2.6	0.116	1.69	412	15.3	1.80	3680	2.80	1.38	63.6	67.0	2470
KM23		6.20	19.05	0.28	1.1	0.080	1.90	137.0	17.0	1.30	1900	2.93	1.76	42.0	76.6	1280
KM24		6.36	45.3	2.97	10.2	0.103	2.52	1680	19.9	0.80	2300	2.49	2.08	>500	21.8	3890
KM25		4.95	21.6	0.16	1.4	0.101	2.91	28.4	9.6	0.89	1040	0.62	2.68	20.0	13.3	2300
KM26		4.91	19.60	0.22	1.7	0.081	3.25	59.8	6.9	0.90	1680	0.40	2.18	16.3	15.7	1280
KM27		8.87	19.30	0.38	7.1	0.121	2.42	140.5	5.9	1.01	2830	1.24	1.78	82.5	16.6	1950
KM28		4.74	23.0	0.18	1.1	0.106	2.49	39.5	10.8	0.90	837	0.61	2.68	16.1	18.7	950
KM29		12.15	24.2	0.24	4.8	0.166	1.74	73.0	10.3	1.62	2630	3.42	1.66	122.5	29.8	2570
KM30		11.25	18.85	0.47	3.8	0.136	1.19	236	19.1	2.57	3390	1.53	1.38	37.0	83.4	1770
KM31		6.61	18.80	0.40	2.3	0.077	1.99	212	17.7	1.37	2270	2.55	1.73	69.9	72.3	1470
KM32		16.05	21.9	0.32	9.5	0.135	1.14	135.5	8.8	1.79	3620	4.44	1.24	181.0	44.5	2140
KM33		5.55	21.5	0.32	5.2	0.091	2.32	132.0	16.5	1.23	1500	1.13	1.95	43.1	24.0	2690
KM34		17.25	21.6	0.20	15.6	0.131	1.86	72.3	5.7	0.86	4390	4.16	0.99	223	32.1	1540
KM35		10.35	18.25	0.19	8.0	0.131	1.67	44.4	7.1	1.58	2680	1.26	1.44	55.7	26.6	2580
KM36		6.79	20.1	0.18	8.0	0.101	3.02	40.7	5.8	0.91	1820	1.25	2.07	45.0	17.7	1470
KM37		9.16	17.55	0.17	5.8	0.122	1.79	38.3	6.6	1.52	2350	1.14	1.52	46.4	25.5	2860
KM38		4.69	22.1	0.31	4.7	0.063	2.94	171.5	17.5	0.57	1460	2.30	2.43	119.5	28.8	1430
KM39		4.10	20.4	0.42	4.7	0.063	3.34	212	10.6	0.47	1470	2.87	1.82	176.5	38.7	900
KM40		7.52	24.7	0.83	6.3	0.086	2.52	540	10.9	0.87	3690	4.45	1.98	>500	43.9	1440
KM41		4.65	18.85	0.55	8.7	0.058	3.72	284	8.5	0.72	1140	1.17	1.66	35.9	20.3	1010
KM42		5.13	21.9	0.13	1.2	0.093	2.40	22.2	11.1	1.16	1340	0.73	2.60	15.8	22.3	1430
KM43		7.61	21.9	0.24	4.7	0.123	2.37	46.3	11.1	1.48	2500	2.20	1.90	80.0	30.1	1670
KM44		5.71	21.0	0.23	4.8	0.076	2.20	82.6	19.7	1.29	1580	2.95	2.11	32.6	73.8	1370
KM45		9.39	18.65	0.50	2.0	0.116	1.57	95.3	20.3	2.48	2850	2.30	1.41	36.8	82.8	1870
KM46		5.12	24.7	0.36	2.1	0.076	2.73	177.0	27.4	1.15	1960	3.83	2.20	78.2	81.9	1740
KM47		10.55	30.0	0.44	5.3	0.086	2.12	210	30.5	1.69	2630	3.14	2.00	402	83.8	2660
KM48		10.00	30.3	0.47	6.1	0.079	2.33	239	24.6	1.45	2440	2.93	2.08	421	85.2	2170
KM49		11.25	28.2	0.98	15.4	0.092	2.11	490	13.2	1.28	2290	2.35	1.76	116.0	47.6	1690

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.5	0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1
KM20		22.2	99.7	<0.002	0.01	0.05	22.0	3	3.5	312	3.37	<0.05	20.6	1.325	0.47	2.9
KM21		34.7	148.5	<0.002	<0.01	<0.05	33.0	6	4.3	226	4.28	<0.05	298	1.800	0.75	34.7
KM22		26.1	83.5	<0.002	0.01	0.08	38.0	6	2.3	244	3.90	0.07	242	0.932	0.41	16.0
KM23		25.4	97.5	0.002	0.01	0.06	24.6	3	1.3	271	3.24	0.08	58.6	0.387	0.46	6.1
KM24		66.6	165.5	0.003	<0.01	0.07	19.2	11	3.3	243	53.2	0.05	1150	1.600	0.80	165.0
KM25		14.7	95.4	<0.002	<0.01	0.13	18.2	3	2.0	353	1.37	<0.05	5.2	0.826	0.40	1.5
KM26		20.1	115.0	<0.002	0.01	0.09	18.9	2	1.1	237	1.12	<0.05	24.4	0.967	0.49	4.1
KM27		15.1	76.1	<0.002	<0.01	0.14	21.8	4	2.5	255	6.51	<0.05	64.6	4.24	0.31	11.8
KM28		17.5	75.6	<0.002	<0.01	0.09	17.3	2	1.0	319	1.03	<0.05	13.2	0.678	0.33	1.7
KM29		10.8	66.3	<0.002	<0.01	0.07	32.0	3	4.6	261	9.08	<0.05	61.9	4.06	0.27	5.1
KM30		16.8	70.0	<0.002	0.02	0.05	50.6	4	1.4	192.0	1.80	0.08	130.0	0.390	0.32	12.8
KM31		24.6	92.4	<0.002	0.03	0.07	24.5	3	1.9	298	4.69	0.08	108.0	0.528	0.45	11.6
KM32		12.4	46.6	<0.002	<0.01	0.10	27.1	4	4.6	192.5	12.80	<0.05	95.6	6.17	0.21	8.6
KM33		28.3	141.5	<0.002	0.01	0.05	19.8	3	4.8	269	2.95	<0.05	76.4	0.988	0.67	12.5
KM34		16.5	74.7	<0.002	<0.01	0.13	24.3	4	5.3	174.5	16.05	<0.05	32.2	6.15	0.32	8.1
KM35		8.8	53.7	<0.002	<0.01	0.15	26.5	3	2.8	277	4.32	<0.05	14.5	3.15	0.21	4.7
KM36		11.5	87.5	<0.002	<0.01	0.14	18.3	3	1.9	321	3.08	<0.05	14.1	2.14	0.33	3.5
KM37		9.3	57.1	<0.002	<0.01	0.15	25.4	3	2.6	285	3.55	<0.05	12.9	2.46	0.21	4.1
KM38		30.8	143.5	<0.002	0.01	0.07	10.7	2	2.8	310	8.64	0.05	63.7	0.910	0.61	7.5
KM39		38.3	148.5	<0.002	0.01	0.07	10.4	3	2.8	574	7.46	0.06	110.0	0.712	0.69	18.8
KM40		31.6	84.9	<0.002	0.01	0.09	21.9	5	4.7	571	24.4	0.10	281	1.350	0.36	30.4
KM41		44.7	193.0	<0.002	<0.01	0.07	11.8	3	3.5	238	2.50	<0.05	216	0.908	0.90	28.1
KM42		14.1	87.9	<0.002	<0.01	0.10	19.9	2	1.9	382	1.05	<0.05	5.3	0.720	0.39	1.3
KM43		20.4	107.5	<0.002	<0.01	0.12	24.3	3	4.8	314	5.36	<0.05	37.4	2.06	0.54	3.5
KM44		26.3	108.0	<0.002	0.02	0.10	22.4	3	1.5	305	1.71	0.05	39.5	0.388	0.60	7.2
KM45		17.0	72.1	0.003	0.01	0.10	43.7	5	1.9	317	1.99	0.05	36.7	0.613	0.38	5.8
KM46		31.2	117.5	<0.002	0.04	0.17	16.7	3	3.6	602	3.82	0.06	32.2	0.586	0.60	4.0
KM47		19.2	88.5	<0.002	0.02	0.21	23.9	4	7.0	596	16.55	0.07	122.5	1.065	0.40	17.6
KM48		21.9	96.8	<0.002	0.01	0.21	21.0	4	6.5	522	16.75	0.05	129.5	1.160	0.42	16.0
KM49		31.8	81.8	<0.002	0.01	0.15	20.1	4	3.5	367	6.36	<0.05	314	1.675	0.42	19.9

***** See Appendix Page for comments regarding this certificate *****

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53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
Phone: +27 11 608 0555 Fax: +27 11 608 3163 www.alsglobal.com

Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r	ME-MS61r
	Analyte	V	W	Y	Zn	Zr	Dy	Er	Eu	Gd	Ho	Lu	Nd	Pr	Sm	Tb
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	1	0.1	0.1	2	0.5	0.05	0.03	0.03	0.05	0.01	0.01	0.1	0.03	0.03	0.01
KM20		146	1.1	64.6	110	125.5	11.85	6.47	2.64	13.35	2.35	0.85	73.7	18.15	14.65	2.04
KM21		145	2.7	136.5	125	396	27.8	12.10	2.82	47.4	4.72	1.46	410	119.0	69.4	5.78
KM22		137	4.4	148.5	131	90.4	27.4	14.80	3.33	40.0	5.28	2.04	338	96.8	55.8	5.05
KM23		117	1.6	67.1	112	42.7	11.90	6.84	2.04	14.00	2.39	0.95	110.0	30.5	18.25	2.07
KM24		96	32.6	191.0	172	379	60.3	13.65	4.75	147.0	7.14	1.23	>1000	417	243	16.65
KM25		97	1.0	55.1	93	38.5	10.25	5.52	2.30	11.20	2.03	0.71	48.0	10.65	11.00	1.76
KM26		104	0.7	47.1	64	52.8	8.82	4.69	1.85	11.15	1.71	0.62	68.7	17.25	13.65	1.61
KM27		146	5.0	77.3	106	231	16.50	7.64	2.78	24.0	2.94	0.98	154.5	40.1	30.0	3.24
KM28		91	0.5	41.0	83	31.5	8.34	4.09	2.41	10.40	1.58	0.50	52.5	12.30	11.15	1.53
KM29		252	3.3	86.5	167	165.0	15.85	8.86	3.10	17.60	3.17	1.20	90.7	22.0	18.70	2.69
KM30		129	0.8	118.0	152	148.0	21.4	11.95	2.15	26.9	4.21	1.69	208	57.5	35.1	3.79
KM31		127	1.5	69.6	118	87.2	13.05	6.87	2.51	20.3	2.47	0.97	177.0	49.7	29.5	2.56
KM32		285	7.8	78.2	160	306	14.75	7.87	2.58	19.00	2.82	1.11	135.0	35.6	23.8	2.71
KM33		119	3.4	61.1	86	163.0	12.25	5.66	2.15	16.95	2.16	0.68	119.5	32.6	21.7	2.42
KM34		353	5.9	74.7	111	>500	13.35	7.84	2.19	14.35	2.73	1.17	81.4	20.1	15.70	2.24
KM35		210	2.6	72.5	103	255	13.15	7.40	2.63	14.10	2.68	1.02	67.8	15.45	14.85	2.20
KM36		118	1.7	51.8	78	272	9.68	5.32	2.24	10.90	1.90	0.73	54.3	13.00	11.65	1.66
KM37		192	2.1	67.2	94	186.5	12.25	6.85	2.45	13.50	2.47	0.91	60.4	13.65	13.65	2.09
KM38		78	2.0	37.9	104	191.5	7.97	3.69	2.15	12.55	1.42	0.49	125.0	36.2	18.80	1.61
KM39		85	1.6	40.1	74	170.5	9.34	3.66	2.69	18.05	1.48	0.45	173.0	49.0	28.2	2.13
KM40		130	3.6	107.0	119	258	21.6	10.40	4.87	39.2	3.88	1.37	395	115.5	63.1	4.45
KM41		115	1.4	54.3	55	319	13.25	4.54	1.96	26.5	1.98	0.55	240	68.2	39.9	3.13
KM42		139	0.5	39.1	78	33.7	7.26	3.98	1.96	7.72	1.45	0.51	32.1	7.61	7.80	1.23
KM43		175	1.5	58.7	99	146.0	11.75	6.06	2.66	12.20	2.17	0.90	60.8	15.15	13.45	1.96
KM44		120	1.5	58.1	104	156.5	11.05	6.10	2.21	10.95	2.08	0.96	70.8	20.0	13.10	1.77
KM45		142	1.9	124.0	119	58.6	21.8	13.15	2.36	19.60	4.35	2.08	99.0	26.1	20.0	3.33
KM46		128	1.6	50.7	153	64.0	10.25	5.09	4.05	12.85	1.85	0.69	121.5	36.3	18.40	1.86
KM47		215	9.9	92.3	181	168.5	17.70	9.20	3.81	19.40	3.23	1.32	153.5	44.6	25.5	2.99
KM48		189	4.0	85.8	162	192.5	16.65	8.83	3.95	19.40	3.08	1.31	175.0	51.5	28.2	2.86
KM49		328	28.1	70.4	89	>500	17.80	6.46	4.05	39.2	2.60	0.91	429	123.0	70.2	4.29

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex South Africa (Pty) Ltd.
53 Angus Crescent
Long Meadow Business Park, East Entrance
Edenvale - Johannesburg GAUTENG 1610
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Project: Malawi 2015

CERTIFICATE OF ANALYSIS JB15141821

Sample Description	Method Analyte Units LOR	ME-MS61r Tm ppm 0.01	ME-MS61r Yb ppm 0.03
KM20		0.90	5.71
KM21		1.59	9.84
KM22		2.12	13.75
KM23		0.99	6.45
KM24		1.55	8.69
KM25		0.75	4.79
KM26		0.63	4.13
KM27		1.03	6.53
KM28		0.56	3.42
KM29		1.23	7.94
KM30		1.72	11.35
KM31		1.00	6.60
KM32		1.11	7.16
KM33		0.75	4.67
KM34		1.13	7.48
KM35		1.05	6.74
KM36		0.75	4.74
KM37		0.96	5.99
KM38		0.50	3.29
KM39		0.50	3.09
KM40		1.47	9.40
KM41		0.59	3.62
KM42		0.54	3.47
KM43		0.91	6.07
KM44		0.93	6.34
KM45		2.05	14.10
KM46		0.72	4.85
KM47		1.37	9.16
KM48		1.35	8.91
KM49		0.92	6.00

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CERTIFICATE OF ANALYSIS JB15141821

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: ME-MS61r

REE's may not be totally soluble in this method.

LABORATORY ADDRESSES

Applies to Method: LOG-22 WEI-21

Processed at ALS Johannesburg located at 53 Angus Crescent, Long Meadow Business Park, East Entrance, Edenvale - Johannesburg, GAUTENG, South Africa.

Applies to Method: Au-TL43 ME-MS61r SCR-41

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Basic statistics (GC01: Chitipa area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.004	0.890	2420.000	3.180	0.330	79.000	822.000	54.700	21.700	347.000	11.900
Minimum	0.001	0.005	280.000	0.610	0.020	4.900	22.000	8.100	1.610	22.200	2.700
Median	0.001	0.030	630.000	1.120	0.060	32.400	107.500	26.650	7.985	39.150	4.400
Mean	0.001	0.071	764.500	1.308	0.077	31.125	146.467	28.317	8.258	49.265	4.692
σ	0.001	0.132	431.232	0.608	0.058	14.492	137.111	10.870	3.461	44.493	1.690
M+σ	0.002	0.203	1195.732	1.916	0.135	45.617	283.578	39.187	11.718	93.758	6.382
M+1.5σ	1.502	1.703	1197.232	3.416	1.635	47.117	285.078	40.687	13.218	95.258	7.882
M+2σ	0.003	0.335	1626.965	2.524	0.192	60.110	420.689	50.057	15.179	138.251	8.072
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	8700.000	2.710	500.000	158.500	1480.000	18.700	6.700	742.000	56.200	10.000	15.200
Minimum	491.000	0.430	12.900	5.300	70.000	5.800	0.900	82.500	1.000	0.339	0.400
Median	1845.000	1.205	57.600	35.750	480.000	10.400	2.000	303.000	3.130	1.798	1.600
Mean	2542.817	1.312	109.747	41.087	535.667	11.002	2.400	333.900	6.783	2.264	2.385
σ	2064.496	0.582	118.953	30.657	316.788	3.159	1.464	157.649	8.760	1.786	2.486
M+σ	4607.313	1.894	228.700	71.744	852.455	14.161	3.864	491.549	15.543	4.051	4.871
M+1.5σ	4608.813	3.394	230.200	73.244	853.955	15.661	5.364	493.049	17.043	5.551	6.371
M+2σ	6671.808	2.477	347.652	102.401	1169.242	17.320	5.328	649.198	24.303	5.837	7.358
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	594.000	3.700	62.800	163.000	375.000	20.200	40.800	293.000	51.800	4.810	7.030
Minimum	36.000	0.500	9.600	17.000	27.400	1.940	1.980	16.300	2.690	0.310	0.820
Median	191.000	1.000	19.000	68.000	95.750	4.235	5.165	36.100	6.650	0.750	1.860
Mean	203.200	1.107	23.333	72.767	110.002	5.501	7.105	46.215	8.516	0.993	2.272
σ	93.787	0.558	11.380	33.224	69.497	3.254	5.752	37.868	6.742	0.708	1.047
M+σ	296.987	1.665	34.713	105.991	179.498	8.754	12.856	84.083	15.258	1.702	3.319
M+1.5σ	298.487	3.165	36.213	107.491	180.998	10.254	14.356	85.583	16.758	3.202	4.819
M+2σ	390.775	2.223	46.093	139.215	248.995	12.008	18.608	121.952	22.000	2.410	4.366

note) σ: Standard deviation, M: Mean

Basic statistics (GC02: Chitipa area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.012	0.670	990.000	2.170	0.230	49.400	605.000	46.300	25.200	510.000	14.600
Minimum	0.001	0.005	130.000	0.380	0.010	5.500	35.000	7.200	2.630	22.600	2.800
Median	0.002	0.060	600.000	0.895	0.105	19.350	98.000	21.150	6.605	67.000	6.250
Mean	0.002	0.104	585.217	0.920	0.105	22.274	128.630	22.124	8.215	91.272	6.948
σ	0.002	0.133	209.541	0.347	0.049	11.355	103.537	8.330	4.982	82.271	3.020
M+σ	0.004	0.237	794.759	1.268	0.154	33.629	232.167	30.454	13.197	173.543	9.968
M+1.5σ	1.504	1.737	796.259	2.768	1.654	35.129	233.667	31.954	14.697	175.043	11.468
M+2σ	0.005	0.370	1004.300	1.615	0.204	44.983	335.704	38.784	18.179	255.815	12.988
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	2780.000	2.200	333.000	67.000	2230.000	19.100	4.800	432.000	15.150	3.610	14.300
Minimum	256.000	0.330	5.200	8.900	100.000	7.900	1.100	29.500	0.250	0.258	1.000
Median	999.000	1.175	23.700	26.800	360.000	14.850	1.900	183.500	1.500	0.994	3.000
Mean	1056.717	1.143	39.561	29.480	440.217	14.352	2.111	196.093	2.629	1.114	4.024
σ	459.097	0.495	52.378	12.459	326.693	2.461	0.852	117.989	3.132	0.664	2.907
M+σ	1515.814	1.639	91.939	41.939	766.910	16.814	2.963	314.083	5.761	1.778	6.931
M+1.5σ	1517.314	3.139	93.439	43.439	768.410	18.314	4.463	315.583	7.261	3.278	8.431
M+2σ	1974.911	2.134	144.316	54.398	1093.603	19.275	3.814	432.072	8.892	2.442	9.839
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	408.000	3.600	87.000	137.000	428.000	26.400	57.000	391.000	66.300	5.780	4.760
Minimum	70.000	0.100	9.300	19.000	34.700	2.240	3.340	20.900	4.200	0.450	0.420
Median	156.000	0.800	26.850	52.000	74.150	5.420	8.075	62.950	11.550	1.080	1.940
Mean	178.000	0.909	28.639	55.522	94.911	6.661	10.635	78.376	13.976	1.334	2.025
σ	80.023	0.523	12.841	20.271	77.872	4.157	8.907	62.988	10.713	0.946	0.938
M+σ	258.023	1.432	41.480	75.792	172.783	10.819	19.542	141.364	24.689	2.280	2.964
M+1.5σ	259.523	2.932	42.980	77.292	174.283	12.319	21.042	142.864	26.189	3.780	4.464
M+2σ	338.047	1.954	54.321	96.063	250.655	14.976	28.449	204.351	35.403	3.227	3.902

note) σ: Standard deviation, M: Mean

Basic statistics (GC03: Rumphi area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.003	0.900	1830.000	3.170	0.060	44.900	465.000	59.700	12.900	980.000	16.700
Minimum	0.001	0.020	260.000	0.680	0.010	2.800	6.000	5.300	1.180	17.300	3.100
Median	0.002	0.080	610.000	1.460	0.020	12.100	58.000	15.400	4.160	46.300	6.700
Mean	0.002	0.174	726.078	1.585	0.025	13.133	84.039	16.818	4.969	101.914	6.749
σ	0.001	0.179	374.690	0.533	0.010	8.335	98.704	9.915	2.971	161.807	2.426
M+σ	0.002	0.354	1100.768	2.118	0.035	21.469	182.743	26.732	7.940	263.721	9.175
M+1.5σ	1.502	1.854	1102.268	3.618	1.535	22.969	184.243	28.232	9.440	265.221	10.675
M+2σ	0.003	0.533	1475.458	2.652	0.045	29.804	281.447	36.647	10.911	425.528	11.602
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	6000.000	4.150	448.000	83.900	2630.000	51.000	3.800	500.000	30.600	4.580	19.000
Minimum	356.000	0.430	11.600	3.400	120.000	10.700	0.900	49.800	0.520	0.196	0.400
Median	894.000	1.460	60.200	17.300	300.000	16.600	2.200	121.500	2.890	0.528	1.600
Mean	1259.039	1.513	103.665	19.255	394.902	19.127	2.131	154.457	6.238	0.950	3.075
σ	1034.668	0.757	100.568	15.247	398.090	7.481	0.668	96.697	6.919	0.995	3.631
M+σ	2293.707	2.270	204.232	34.502	792.992	26.608	2.799	251.154	13.156	1.944	6.705
M+1.5σ	2295.207	3.770	205.732	36.002	794.492	28.108	4.299	252.654	14.656	3.444	8.205
M+2σ	3328.375	3.026	304.800	49.749	1191.083	34.089	3.467	347.850	20.075	2.939	10.336
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	540.000	2.600	174.500	108.000	500.000	52.200	114.500	808.000	140.000	13.250	5.600
Minimum	12.000	0.300	7.600	20.000	25.500	1.660	2.130	13.800	2.390	0.290	0.740
Median	63.000	0.700	16.900	49.000	69.600	3.590	5.370	38.100	6.140	0.730	1.480
Mean	100.353	0.910	22.851	52.706	105.141	6.087	11.984	85.355	14.984	1.420	1.734
σ	100.684	0.629	25.923	19.557	105.351	8.203	19.179	135.635	23.847	2.158	0.861
M+σ	201.036	1.539	48.774	72.263	210.493	14.291	31.162	220.990	38.830	3.578	2.595
M+1.5σ	202.536	3.039	50.274	73.763	211.993	15.791	32.662	222.490	40.330	5.078	4.095
M+2σ	301.720	2.168	74.697	91.820	315.844	22.494	50.341	356.625	62.677	5.735	3.456

note) σ: Standard deviation, M: Mean

Basic statistics (GC04: Rumphi area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.002	4.870	4540.000	3.430	0.990	31.600	120.000	67.900	27.100	280.000	18.800
Minimum	0.001	0.005	260.000	0.400	0.005	1.400	2.000	0.100	0.930	14.200	2.100
Median	0.001	0.150	1000.000	1.320	0.020	7.000	15.000	9.000	3.630	52.600	6.100
Mean	0.001	0.397	1293.673	1.542	0.047	8.212	24.816	10.414	5.610	76.569	6.929
σ	0.001	0.756	969.510	0.799	0.139	5.997	26.128	9.723	4.869	56.380	3.962
M+σ	0.002	1.153	2263.184	2.341	0.186	14.210	50.944	20.137	10.479	132.950	10.891
M+1.5σ	1.502	2.653	2264.684	3.841	1.686	15.710	52.444	21.637	11.979	134.450	12.391
M+2σ	0.002	1.908	3232.694	3.140	0.325	20.207	77.073	29.860	15.348	189.330	14.852
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	13750.000	10.800	500.000	28.400	1970.000	2990.000	500.000	2530.000	76.600	9.940	26.900
Minimum	292.000	0.450	7.100	1.100	70.000	8.300	0.500	25.600	0.470	0.087	0.200
Median	1340.000	1.790	113.000	5.500	330.000	16.200	2.600	161.500	6.810	0.871	1.600
Mean	2122.857	2.152	174.267	8.861	506.939	77.867	13.167	284.294	12.618	1.557	2.516
σ	2450.613	1.746	150.983	6.860	448.081	420.356	70.291	416.784	17.165	1.960	3.830
M+σ	4573.470	3.899	325.250	15.722	955.020	498.223	83.459	701.078	29.783	3.517	6.346
M+1.5σ	4574.970	5.399	326.750	17.222	956.520	499.723	84.959	702.578	31.283	5.017	7.846
M+2σ	7024.083	5.645	476.233	22.582	1403.100	918.579	153.750	1117.862	46.949	5.476	10.176
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	405.000	6.500	139.000	286.000	500.000	23.400	34.700	253.000	40.800	4.900	20.600
Minimum	1.000	0.100	8.400	27.000	14.500	2.030	2.450	13.100	2.640	0.390	0.650
Median	42.000	0.700	21.300	78.000	79.700	4.860	6.740	47.600	7.750	0.940	1.970
Mean	59.020	1.012	29.651	87.612	152.159	6.355	9.252	65.984	10.881	1.282	2.956
σ	71.814	1.137	24.809	51.888	151.996	4.574	6.363	49.444	7.725	0.908	3.025
M+σ	130.834	2.150	54.460	139.500	304.155	10.929	15.615	115.427	18.606	2.190	5.981
M+1.5σ	132.334	3.650	55.960	141.000	305.655	12.429	17.115	116.927	20.106	3.690	7.481
M+2σ	202.648	3.287	79.270	191.388	456.152	15.503	21.977	164.871	26.332	3.099	9.007

note) σ: Standard deviation, M: Mean

Basic statistics (GC05: Mzimba area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.011	0.400	1590.000	6.610	0.950	29.100	122.000	32.000	10.950	4070.000	51.800
Minimum	0.001	0.005	360.000	0.100	0.005	0.800	5.000	0.100	0.390	2.900	1.100
Median	0.001	0.010	740.000	1.440	0.080	5.600	25.000	5.300	1.730	332.000	10.600
Mean	0.002	0.032	750.619	1.719	0.108	6.515	31.478	5.830	2.507	537.403	13.334
σ	0.002	0.052	219.252	1.095	0.116	4.607	23.106	4.855	1.948	658.979	8.985
M+σ	0.003	0.083	969.871	2.815	0.224	11.122	54.584	10.685	4.455	1196.382	22.319
M+1.5σ	1.503	1.583	971.371	4.315	1.724	12.622	56.084	12.185	5.955	1197.882	23.819
M+2σ	0.005	0.135	1189.123	3.910	0.340	15.730	77.690	15.540	6.402	1855.360	31.305
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	3100.000	1.740	137.500	37.100	3790.000	157.500	6.300	198.000	8.130	4.450	217.000
Minimum	180.000	0.025	0.800	1.200	100.000	2.500	0.100	7.500	0.050	0.037	0.100
Median	606.000	0.280	8.800	7.500	820.000	41.500	1.500	110.000	0.740	0.357	17.900
Mean	749.257	0.322	17.458	9.267	988.142	46.366	1.872	109.907	1.298	0.691	28.981
σ	549.910	0.246	22.913	5.800	693.874	22.256	1.290	27.537	1.502	0.797	37.135
M+σ	1299.167	0.568	40.371	15.067	1682.016	68.623	3.162	137.444	2.800	1.488	66.117
M+1.5σ	1300.667	2.068	41.871	16.567	1683.516	70.123	4.662	138.944	4.300	2.988	67.617
M+2σ	1849.077	0.814	63.284	20.867	2375.890	90.879	4.452	164.982	4.302	2.285	103.252
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	206.000	5.300	403.000	100.000	500.000	156.500	396.000	3780.000	634.000	40.500	13.750
Minimum	6.000	0.100	0.900	5.000	6.000	0.160	0.240	2.200	0.390	0.030	0.080
Median	33.000	0.600	54.900	22.000	240.000	16.150	32.000	272.000	45.000	3.580	2.490
Mean	48.221	1.040	79.200	28.204	252.898	23.979	53.203	451.256	77.572	5.794	3.091
σ	42.646	1.066	83.613	18.606	164.033	28.667	66.798	575.906	98.947	7.077	2.537
M+σ	90.867	2.106	162.813	46.810	416.931	52.646	120.001	1027.162	176.519	12.871	5.628
M+1.5σ	92.367	3.606	164.313	48.310	418.431	54.146	121.501	1028.662	178.019	14.371	7.128
M+2σ	133.513	3.173	246.425	65.416	580.964	81.312	186.799	1603.068	275.466	19.947	8.165

note) σ: Standard deviation, M: Mean

Basic statistics (GC06: Kasungu area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.133	0.110	1740.000	3.520	5.910	39.200	316.000	58.500	30.800	1220.000	36.000
Minimum	0.001	0.005	180.000	0.670	0.060	5.100	14.000	3.700	1.650	5.500	3.900
Median	0.001	0.030	810.000	1.450	0.205	17.750	96.000	17.350	4.820	23.550	10.450
Mean	0.004	0.032	850.900	1.545	0.299	18.977	104.550	19.955	6.168	63.835	12.140
σ	0.017	0.022	320.877	0.560	0.598	7.460	64.832	10.328	4.605	137.067	6.900
M+σ	0.021	0.054	1171.777	2.105	0.897	26.437	169.382	30.283	10.772	200.902	19.040
M+1.5σ	1.521	1.554	1173.277	3.605	2.397	27.937	170.882	31.783	12.272	202.402	20.540
M+2σ	0.038	0.076	1492.654	2.664	1.495	33.897	234.215	40.611	15.377	337.969	25.939
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	6050.000	6.550	500.000	90.500	4540.000	51.100	15.100	541.000	40.500	10.000	88.300
Minimum	330.000	0.260	4.200	5.000	170.000	10.000	0.600	82.900	0.290	0.325	0.700
Median	973.500	0.610	23.050	32.250	435.000	19.250	1.600	245.500	1.535	1.020	2.600
Mean	1229.060	0.796	40.183	34.120	629.300	22.222	2.069	261.899	2.804	1.620	4.742
σ	950.547	0.754	56.893	17.686	645.206	9.140	1.883	103.422	4.376	1.687	9.082
M+σ	2179.607	1.550	97.076	51.806	1274.506	31.362	3.952	365.321	7.180	3.307	13.824
M+1.5σ	2181.107	3.050	98.576	53.306	1276.006	32.862	5.452	366.821	8.680	4.807	15.324
M+2σ	3130.153	2.304	153.970	69.492	1919.712	40.502	5.836	468.743	11.556	4.994	22.906
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	820.000	58.200	234.000	129.000	500.000	83.300	154.000	1000.000	232.000	19.450	10.050
Minimum	38.000	0.400	6.100	23.000	30.000	1.280	1.420	6.300	1.480	0.230	0.550
Median	126.500	1.400	20.450	49.000	72.500	4.600	5.290	27.400	6.045	0.790	2.005
Mean	151.660	2.595	28.513	55.110	120.579	6.910	9.863	59.823	12.987	1.357	2.424
σ	117.240	6.134	28.393	24.532	122.697	9.531	17.536	116.014	26.400	2.228	1.540
M+σ	268.900	8.729	56.906	79.642	243.276	16.441	27.399	175.837	39.387	3.585	3.964
M+1.5σ	270.400	10.229	58.406	81.142	244.776	17.941	28.899	177.337	40.887	5.085	5.464
M+2σ	386.139	14.863	85.299	104.174	365.973	25.973	44.935	291.850	65.787	5.813	5.504

note) σ: Standard deviation, M: Mean

Basic statistics (GC07: Lilongwe area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.001	0.150	1150.000	14.050	5.040	26.200	181.000	16.600	4.750	104.000	81.700
Minimum	0.001	0.005	110.000	0.300	0.010	0.400	2.000	0.400	0.190	2.700	1.900
Median	0.001	0.020	640.000	2.490	0.170	2.000	5.000	2.000	1.260	20.700	17.500
Mean	0.001	0.030	617.573	3.580	0.258	3.552	10.534	3.332	1.487	27.130	23.046
σ	0.000	0.029	236.854	3.025	0.506	4.032	20.098	3.168	1.033	21.004	17.431
M+σ	0.001	0.059	854.427	6.605	0.764	7.585	30.632	6.500	2.521	48.134	40.477
M+1.5σ	1.501	1.559	855.927	8.105	2.264	9.085	32.132	8.000	4.021	49.634	41.977
M+2σ	0.001	0.088	1091.281	9.630	1.269	11.617	50.729	9.668	3.554	69.138	57.908
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	2680.000	1.400	33.200	29.800	2040.000	42.200	10.200	283.000	3.420	2.930	61.200
Minimum	27.000	0.100	2.200	0.400	50.000	10.800	0.300	22.200	0.160	0.058	0.800
Median	240.000	0.370	9.000	1.600	250.000	21.600	2.600	93.900	0.910	0.204	5.700
Mean	368.155	0.481	10.816	3.371	378.835	23.201	2.911	97.072	0.978	0.251	7.057
σ	442.306	0.290	6.103	4.673	369.369	7.248	1.889	45.621	0.583	0.304	6.564
M+σ	810.462	0.771	16.918	8.044	748.204	30.449	4.800	142.693	1.561	0.554	13.621
M+1.5σ	811.962	2.271	18.418	9.544	749.704	31.949	6.300	144.193	3.061	2.054	15.121
M+2σ	1252.768	1.061	23.021	12.717	1117.573	37.696	6.689	188.315	2.144	0.858	20.185
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	90.000	44.000	148.500	145.000	500.000	25.200	24.300	109.000	23.900	4.030	21.100
Minimum	5.000	0.100	6.900	2.000	21.900	1.290	1.320	3.900	1.180	0.210	0.760
Median	15.000	1.200	46.900	34.000	189.500	7.830	6.180	24.900	6.090	1.190	6.010
Mean	19.990	2.582	53.139	39.864	235.454	9.132	7.935	31.171	7.591	1.375	6.707
σ	16.237	6.310	32.252	31.508	157.566	5.652	5.256	23.245	5.193	0.886	4.092
M+σ	36.227	8.892	85.391	71.372	393.020	14.784	13.191	54.416	12.784	2.261	10.799
M+1.5σ	37.727	10.392	86.891	72.872	394.520	16.284	14.691	55.916	14.284	3.761	12.299
M+2σ	52.464	15.202	117.643	102.881	550.586	20.436	18.446	77.662	17.976	3.146	14.891

note) σ: Standard deviation, M: Mean

Basic statistics (GC08: Mangochi area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.002	0.150	2700.000	5.150	0.770	43.700	284.000	33.600	29.300	2040.000	27.700
Minimum	0.001	0.005	210.000	0.710	0.010	3.900	10.000	1.900	1.590	18.300	3.800
Median	0.001	0.010	985.000	2.150	0.060	16.650	76.000	9.800	6.790	164.250	8.550
Mean	0.001	0.020	1056.667	2.290	0.082	18.506	90.220	11.011	9.908	274.126	9.855
σ	0.000	0.021	464.956	1.009	0.093	8.892	57.167	5.332	7.050	345.109	4.301
M+σ	0.001	0.041	1521.623	3.300	0.175	27.398	147.387	16.343	16.958	619.235	14.155
M+1.5σ	1.501	1.541	1523.123	4.800	1.675	28.898	148.887	17.843	18.458	620.735	15.655
M+2σ	0.001	0.062	1986.579	4.309	0.268	36.290	204.553	21.674	24.008	964.344	18.456
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	7910.000	13.900	430.000	54.600	3980.000	129.000	38.700	941.000	21.800	10.000	110.000
Minimum	344.000	0.430	8.700	3.900	240.000	7.100	0.800	48.900	0.400	0.229	0.200
Median	1425.000	1.715	80.600	20.150	895.000	31.850	5.750	326.500	5.210	1.885	6.100
Mean	1829.098	2.587	110.310	20.957	1140.152	32.339	7.687	339.820	6.632	3.107	11.519
σ	1257.067	2.435	94.092	10.062	751.077	13.471	6.357	152.844	5.433	2.658	16.647
M+σ	3086.166	5.022	204.402	31.019	1891.229	45.810	14.044	492.664	12.065	5.764	28.166
M+1.5σ	3087.666	6.522	205.902	32.519	1892.729	47.310	15.544	494.164	13.565	7.264	29.666
M+2σ	4343.233	7.457	298.494	41.081	2642.305	59.280	20.402	645.508	17.497	8.422	44.813
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	866.000	63.400	272.000	332.000	500.000	94.000	235.000	1000.000	376.000	25.600	32.800
Minimum	18.000	0.100	14.400	19.000	15.700	3.060	3.530	19.700	4.010	0.530	1.330
Median	146.000	2.200	48.100	98.000	227.000	10.800	17.300	143.750	25.300	2.160	4.425
Mean	213.008	3.970	60.998	115.295	264.317	14.903	27.254	229.591	43.024	3.217	5.370
σ	164.094	7.267	43.556	63.674	167.488	13.122	32.125	242.286	55.252	3.430	3.406
M+σ	377.101	11.237	104.554	178.970	431.805	28.025	59.379	471.877	98.276	6.646	8.776
M+1.5σ	378.601	12.737	106.054	180.470	433.305	29.525	60.879	473.377	99.776	8.146	10.276
M+2σ	541.195	18.504	148.110	242.644	599.293	41.147	91.505	714.164	153.527	10.076	12.183

note) σ: Standard deviation, M: Mean

Basic statistics (GC09: Balaka area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.035	0.130	4160.000	2.820	0.280	63.600	1220.000	74.200	27.300	10000.000	38.200
Minimum	0.001	0.005	60.000	0.260	0.010	5.900	7.000	4.200	1.660	3.400	2.000
Median	0.001	0.020	310.000	1.070	0.070	23.000	59.500	17.950	7.780	25.050	5.300
Mean	0.001	0.023	560.684	1.083	0.078	24.270	106.763	20.447	9.055	155.047	6.174
σ	0.003	0.017	674.980	0.470	0.051	9.583	144.715	11.313	5.028	799.304	3.886
M+σ	0.004	0.039	1235.664	1.553	0.129	33.853	251.478	31.760	14.082	954.351	10.060
M+1.5σ	1.504	1.539	1237.164	3.053	1.629	35.353	252.978	33.260	15.582	955.851	11.560
M+2σ	0.007	0.056	1910.644	2.024	0.180	43.435	396.192	43.073	19.110	1753.655	13.946
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	16400.000	75.700	328.000	265.000	10000.000	40.200	12.100	2770.000	19.600	10.000	20.800
Minimum	294.000	0.120	4.400	7.700	190.000	1.700	0.500	115.500	0.240	0.257	0.100
Median	1555.000	0.985	22.600	27.100	1285.000	7.600	1.850	361.500	1.280	1.620	1.100
Mean	1878.632	1.856	39.279	38.829	2228.158	9.033	2.412	496.068	2.089	2.285	1.776
σ	1431.887	5.718	46.668	37.748	2292.118	6.351	1.746	382.946	2.428	1.970	2.379
M+σ	3310.518	7.575	85.948	76.578	4520.276	15.384	4.158	879.015	4.517	4.255	4.155
M+1.5σ	3312.018	9.075	87.448	78.078	4521.776	16.884	5.658	880.515	6.017	5.755	5.655
M+2σ	4742.405	13.293	132.616	114.326	6812.395	21.735	5.904	1261.961	6.945	6.225	6.534
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	1100.000	3.300	101.500	1370.000	335.000	39.000	158.000	1000.000	549.000	12.800	14.300
Minimum	39.000	0.100	8.900	25.000	4.700	1.640	1.840	7.500	2.130	0.270	0.890
Median	208.500	0.500	40.300	89.000	28.000	8.145	9.270	40.200	9.370	1.415	4.135
Mean	246.821	0.638	44.263	105.558	41.496	8.971	12.270	91.232	19.390	1.622	4.468
σ	174.423	0.544	18.652	107.454	42.112	4.648	14.199	166.534	46.773	1.229	2.110
M+σ	421.244	1.182	62.915	213.012	83.608	13.619	26.469	257.765	66.164	2.851	6.578
M+1.5σ	422.744	2.682	64.415	214.512	85.108	15.119	27.969	259.265	67.664	4.351	8.078
M+2σ	595.667	1.726	81.567	320.466	125.721	18.267	40.668	424.299	112.937	4.080	8.688

note) σ: Standard deviation, M: Mean

Basic statistics (GC10: Balaka area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.006	0.050	3970.000	3.770	0.300	47.400	1340.000	55.000	34.100	318.000	15.400
Minimum	0.001	0.005	270.000	0.740	0.020	3.900	10.000	4.400	1.140	6.400	2.200
Median	0.001	0.020	905.000	2.050	0.105	19.950	61.500	15.400	6.430	27.450	5.750
Mean	0.001	0.020	1122.073	1.988	0.109	20.826	104.220	18.280	8.478	59.807	6.256
σ	0.001	0.011	736.625	0.582	0.043	9.899	169.013	9.547	6.292	74.205	2.485
M+σ	0.002	0.031	1858.698	2.570	0.152	30.725	273.232	27.828	14.769	134.013	8.741
M+1.5σ	1.502	1.531	1860.198	4.070	1.652	32.225	274.732	29.328	16.269	135.513	10.241
M+2σ	0.003	0.043	2595.323	3.152	0.195	40.624	442.245	37.375	21.061	208.218	11.225
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	3580.000	6.650	147.500	194.000	10000.000	25.600	8.000	2950.000	9.750	6.740	11.500
Minimum	229.000	0.420	2.300	4.000	230.000	5.500	0.400	192.500	0.080	0.318	1.000
Median	1175.000	1.830	29.400	24.250	2785.000	15.500	2.850	473.000	1.880	1.463	4.900
Mean	1258.780	2.073	35.294	32.490	3350.732	15.545	3.215	655.811	2.195	1.639	5.148
σ	703.509	1.202	24.283	31.780	2777.432	4.295	1.675	567.606	1.612	1.168	2.540
M+σ	1962.289	3.274	59.577	64.271	6128.164	19.840	4.889	1223.417	3.807	2.807	7.687
M+1.5σ	1963.789	4.774	61.077	65.771	6129.664	21.340	6.389	1224.917	5.307	4.307	9.187
M+2σ	2665.798	4.476	83.860	96.051	8905.596	24.135	6.564	1791.023	5.419	3.976	10.227
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	950.000	25.800	150.500	170.000	394.000	28.400	41.900	463.000	71.300	4.930	14.500
Minimum	34.000	0.200	10.300	15.000	7.600	1.810	1.910	8.700	2.180	0.320	1.090
Median	187.500	1.100	51.150	77.000	78.850	10.025	11.200	50.800	12.275	1.740	4.540
Mean	231.415	1.561	51.888	78.195	104.122	9.939	12.375	83.395	16.081	1.763	5.066
σ	161.088	2.862	27.381	33.152	85.310	5.403	8.752	97.836	15.198	1.016	2.638
M+σ	392.503	4.423	79.269	111.348	189.432	15.342	21.127	181.231	31.279	2.779	7.704
M+1.5σ	394.003	5.923	80.769	112.848	190.932	16.842	22.627	182.731	32.779	4.279	9.204
M+2σ	553.592	7.285	106.650	144.500	274.742	20.746	29.879	279.067	46.477	3.795	10.342

note) σ: Standard deviation, M: Mean

Basic statistics (GC11: Nsanje area)

Element	Au	Ag	Ba	Be	Bi	Co	Cr	Cu	Fe	La	Li
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Maximum	0.501	0.220	1280.000	4.360	0.670	52.100	626.000	61.500	28.500	3060.000	32.700
Minimum	0.001	0.005	80.000	0.230	0.030	8.900	28.000	3.200	2.210	3.400	3.600
Median	0.001	0.020	740.000	2.110	0.090	20.500	100.000	18.900	6.360	168.500	11.500
Mean	0.008	0.030	760.777	2.102	0.121	21.720	126.194	21.018	7.518	282.138	12.844
σ	0.053	0.029	254.336	0.808	0.103	7.984	86.551	10.084	4.369	421.843	5.950
M+σ	0.061	0.059	1015.113	2.910	0.224	29.704	212.745	31.102	11.887	703.981	18.794
M+1.5σ	1.561	1.559	1016.613	4.410	1.724	31.204	214.245	32.602	13.387	705.481	20.294
M+2σ	0.114	0.088	1269.449	3.718	0.327	37.688	299.296	41.186	16.256	1125.824	24.744
Element	Mn	Mo	Nb	Ni	P	Pb	Sn	Sr	Ta	Ti	U
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Maximum	5750.000	6.840	500.000	158.500	5260.000	70.100	12.500	1775.000	93.600	8.930	165.000
Minimum	419.000	0.130	2.900	13.300	280.000	3.200	0.200	71.400	0.220	0.254	0.200
Median	1860.000	2.000	65.500	32.800	1860.000	22.200	2.300	349.000	3.890	1.145	5.800
Mean	2077.573	2.173	124.805	40.444	2056.505	23.273	2.787	495.412	8.243	1.638	12.650
σ	914.463	1.353	136.240	23.995	987.248	12.907	1.954	350.165	12.544	1.531	22.700
M+σ	2992.036	3.526	261.045	64.438	3043.752	36.180	4.741	845.576	20.787	3.169	35.349
M+1.5σ	2993.536	5.026	262.545	65.938	3045.252	37.680	6.241	847.076	22.287	4.669	36.849
M+2σ	3906.499	4.879	397.286	88.433	4031.000	49.087	6.695	1195.741	33.331	4.701	58.049
Element	V	W	Y	Zn	Zr	Dy	Gd	Nd	Sm	Tb	Yb
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Maximum	1000.000	46.100	282.000	203.000	500.000	96.500	238.000	1000.000	427.000	25.100	14.100
Minimum	44.000	0.100	4.300	25.000	10.300	0.960	1.200	6.200	1.510	0.170	0.380
Median	132.000	1.400	60.400	100.000	121.000	11.900	15.800	135.000	21.700	2.170	5.140
Mean	168.485	3.075	66.246	102.602	161.466	14.466	25.195	219.482	40.618	2.998	5.612
σ	137.400	6.275	39.385	36.282	133.963	12.089	32.651	246.149	60.417	3.266	2.765
M+σ	305.885	9.350	105.630	138.884	295.429	26.555	57.845	465.630	101.035	6.265	8.377
M+1.5σ	307.385	10.850	107.130	140.384	296.929	28.055	59.345	467.130	102.535	7.765	9.877
M+2σ	443.285	15.625	145.015	175.165	429.393	38.643	90.496	711.779	161.451	9.531	11.142

note) σ: Standard deviation, M: Mean