

**UNIVERSITY OF MINES AND TECHNOLOGY (UMaT), TARKWA  
REPORT OF THE COMMITTEE ON THE USE OF EQUIPMENT  
IN THE UNIVERSITY**

**1.0 INTRODUCTION**

On 28th May, 2015, the University constituted a Committee on the use of equipment in the University. The essence for the constitution of the Committee was that the University will soon take delivery of an eight million, six hundred thousand euros (€8.6 million) environmental monitoring laboratory equipment from a Danida mixed tied credit facility.

In light of the fact that the University will have to repay the loan at eight hundred and sixty two thousand, six hundred and thirty euros (€862,630) per year from 2017 to 2025, the Committee is to reconsider the charges for the use of equipment in the University.

**2.0 COMPOSITION OF THE COMMITTEE**

The Committee is made up of the following members:

Prof N. Amegbey	-	Chairman
Prof R. K. Amankwah	-	Member
Mr E. Appiah-Kubi	-	Member
Dr Samuel Ndur	-	Member
Mr S. Agbomadzi	-	Member
Dr Eric Agorhom	-	Member
Dr Ishmael Quaicoe	-	Member
Mr E. Normanyo	-	Member
Dr Michael Affam	-	Member
Mr Francis Nyarko	-	Mem/Secretary

**3.0 TERMS OF REFERENCE**

The Committee was given the following terms of reference:

- i. To determine realistic charges for the use of the environmental monitoring laboratory equipment yet to be received by the University;
- ii. To review and propose realistic charges for the use of all equipment and facilities in the University for consultancy and other purposes; and
- iii. To make recommendations on all matters incidental to the work of the Committee and on the use of equipment in the University.

**4.0 MODUS OPERANDI OF THE COMMITTEE**

The Committee adopted the following for its operations:

- i. Identify and list all equipment with consultancy capabilities in the Departments in the University;
- ii. Identify all the tests/analyses that would be done with these equipment;
- iii. Obtain charges for test/analysis from UniSA Laboratory (Australia), SGS Laboratory Services, Tarkwa and Intertek Minerals Limited, Tarkwa and come out with charges by the University;
- iv. Develop modalities for the submission of the samples and payment by the client; and
- v. Categorize charges for commercial (foreign clients and entities in Ghana) and non-commercial clients (Staff and students from UMaT and other Universities (See section 5.3).

## **5.0 FINDINGS**

### **5.1 Identification of Equipment with Consultancy Capabilities**

The Committee collated all the equipment with consultancy capabilities in the various Departments including the equipment yet to be received by the University. The Committee further listed all the test/analysis these equipment would render (see Appendix 1).

### **5.2 Charges for Test/Analysis**

The Committee sought for charges for test/analysis from similar entities in the country and outside the country. Based on this, the Committee came out with charges for the test/analysis by the University (see Appendix 1).

### **5.3 Sample Submission Sheet**

The Committee came up with a sample submission sheet (see Appendix 2) which would be filled by the client requesting for a laboratory test/analysis.

### **5.4 Categories of Charges for the Laboratory Test/Analysis**

The Committee divided the charges for clients into commercial and non-commercial

#### **(a) Commercial Clients**

The Commercial clients consist of the foreign clients (including international entities and students) and other entities in Ghana. These clients would be required to pay 100% of the recommended charges as outlined in Appendix 1 for the use of the equipment.

#### **(b) Non-Commercial Clients**

The non-commercial clients consist of staff and students in UMaT and staff and students in other Universities.

##### **(i) Staff (UMaT)**

In the case of the UMaT Staff, the University Statute 41(c) shall apply. The Committee further recommends that in addition to what is stated in Statute

41(c), the staff who uses the University equipment would be required to pay 50% of the recommended charges (Table 1).

(ii) Undergraduate Students (UMaT)

In the case of undergraduate students in UMaT, the Committee recommends that a Laboratory maintenance fee approved by the University as part of the Academic Facility User Fee (AFUF) should be charged and payable by all students except students of CENCES. Any undergraduate student whose project work involves a laboratory analysis above US\$200.00 would be required to pay 20% of the recommended charges but not above US\$1000.00 for any additional test/analysis conducted.

(iii) Postgraduate Students (UMaT)

In the case of postgraduate students in UMaT, the Committee recommends that a Laboratory maintenance fee equivalent to a module fee should be charged and payable by all postgraduate students. A postgraduate student would be required to pay 20% of the recommended charges but not above US\$1000.00 for any laboratory analysis toward thesis using the equipment.

(iv) Staff and Students from other Universities

For staff from other Universities, the Committee recommends that such staff who use the equipment for tests/analyses be required to pay 75% of the recommended charges (Table 1).

Table 1 shows the recommended charges by the Committee for the use of the equipment in the University for Laboratory test/analysis.

**Table 1: Charges on the Laboratory Test/Analysis**

TYPE OF CLIENT	RECOMMENDED CHARGES
<b>Commercial Client</b> Foreign Clients(including international students and entities) and entities in Ghana	100% recommended charges (see Appendix 1)
<b>Non-Commercial Client</b> Staff (UMaT)	University Statute 41(c) shall apply Also, 50% of the recommended charges for use of equipment.
Undergraduate Students (UMaT)	Recommended Laboratory Maintenance Fee (Payable by all undergraduate students). Laboratory analysis for project work up to USD\$200 will attract no charges. 20% of recommended charges payable but not above US\$1000.00.
Postgraduate Students (UMaT)	Recommended Laboratory Maintenance Fee charges equivalent to the Module fee (Payable by all Postgraduate students) 20% of recommended charges payable for laboratory work towards Thesis but not above US\$1000.00.
Staff and Students from Other Universities	75% of the recommended charges

### 5.5 Administrative Set Up and Procedure for the Submission of Sample and Payment by Clients

In determining the procedure for the submission of samples and the charges to be levied, members recommended the following:

(a) Personnel Required:

The following personnel who will be directly engaged in the laboratory test/analysis should be appointed:

- A University Laboratory Co-ordinator responsible for monitoring all the Departmental laboratory services in the University;
- Departmental Laboratory Officer for every Department. He/She may be a Lecturer given less teaching load and responsible for supervising the laboratory work;
- Technicians in the various Departments will be required to perform or assist in the laboratory works; and
- A Specialist, who depending on the type of laboratory tests/analyses required

will assist or undertake the services.

(b) Procedure for conducting test:

- Step 1: The client will be required to fill the sample submission form issued by the Department for the test or should be downloaded from the University website;
- Step 2: All samples must be accompanied with a submission form to the Department;
- Step 3: The samples received are to be recorded in a log book (see Appendix3) and also feed into the computer (indicating the time and date of receipt);
- Step 4: The completed form should be returned to the Departmental Laboratory Officer for the attention of Head of Department (HOD) and the University Laboratory Co-ordinator;
- Step 5: Based on the request, proforma invoice prepared by the Departmental Laboratory Officer (using the recommended charges) in consultation with the HOD be issued to the client with copy to the University Laboratory Co-ordinator;
- Step 6: Payment is made by the client to the University;
- Step 7: After payment, test is conducted based on the client's request; and
- Step 8: After completion of the test, the results shall be signed by the Departmental Laboratory Officer.

### **5.6 Allowances**

The Committee further recommends that allowances laid down in Appendix 4 be applicable and paid to key personnel who will be directly involved in the laboratory work.

### **6.0 RECOMMENDATION**

- (a) The Committee recommends that the charges outlined in Table 1 and Appendix 1 be adopted.
- (b) The Committee recommends that the administrative set up and procedure outlined in section 5.5 should be adopted.
- (c) To ensure that the equipment runs effectively and efficiently to compete with other laboratory service providers, the Committee recommends that:
- Adequate funds be generated from the services rendered to purchase the reagent for the test analysis when it runs out of stock;
  - A fast track system be instituted to procure the reagent as and when needed to ensure a smooth operation of the equipment; and
  - Routine maintenance works be carried out on the equipment to avoid breakdowns.

(d) The Committee further recommends the certification of the Laboratory.

### 7.0 APPRECIATION

Members of the Committee wish to take the opportunity to express their heartfelt appreciation to the University Council for the opportunity offered them to serve the University



**Prof Newton Amegbey**  
Chairman



**Prof R. K. Amankwah**  
Member



**Mr E. Appiah-Kubi**  
Member



**Dr Samuel Ndur**  
Member



**Mr S. Agbomadzi**  
Member



**Francis Nyarko**  
Member/Secretary




**Mr E. Normanyo**  
Member



**Dr Michael Affam**  
Member



**Dr Ishmael Quaicoe**  
Member



**Dr Eric Agorhom**  
Member

*Appendix 1*

**UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA**  
**Consultancy Charges for Field and Laboratory Test works**

<b>ENVIRONMENTAL AND SAFETY ENGINEERING DEPARTMENT</b>	
<b>TYPE OF ANALYSIS</b>	<b>CHARGES(US\$)</b>
<b>Testing For Oil in Water</b>	
Oil/Grease (TOG)	55.00
Total Organic Carbon (TOC)	55.00
Dissolve Organic Carbon	55.00
<b>Testing for Toxicity</b>	
EP Toxicity (As, Ba, Cd, Cr, Pb, Se, Ag)	300.00
<b>Testing for Heavy Metals in Water</b>	80.00
<b>Water Analysis</b>	
pH, TSS, BOD, TOG	90.00
<b>Volatile Acid Testing</b>	40.00
<b>Physico-Chemical Analysis</b>	
pH	5.00
Temperature	5.00
Conductivity	8.00
Alkalinity	45.00
BOD	45.00
COD	45.00
Total CN	50.00
Dissolved Oxygen (DO)	10.00
Hardness	12.00
Turbidity	10.00
Salinity	10.00
Acidity	16.00
Colour – True	12.00
Colour – Apparent	12.00

Total Dissolve Solids (TDS)	15.00
Total Suspended Solids (TSS)	20.00
Total Solids	20.00
Total Volatile Solids	20.00
Total Settleable Solids	16.00
EC (Salinity)	4.00
SAR (Sodium Adsorption Ratio, Ca, Mg, Na)	5.00
Nitrate-N (Chromotropic acid)	6.00
Nitrate-N (Cadmium reduction (Lachat))	8.00
Ammonium-N (Salicylate method (Lachat))	8.00
NO3-N + NH4-N (Flow Injection Analysis (Lachat))	10.00
Total N	10.00
Total organic C (Non-purgeable organic carbon)	10.00
TN + TOC	12.00
Total P (Persulfate digest)	12.00
Cl (Chloride)	8.00
HCO3 (Bicarbonate)	5.00
<b>Trace Metals</b>	15.00
Sampling Preparation (Including Filtration)	60.00
Low-Level Mercury (Water)	80.00
Trace Metal Package Price 5 Analytes (As, CN, Cr, Hg, Pb)	100.00
Trace Metal Package Price 8 Analytes (As, CN, Cr, Hg, Pb, Ag, Se, Ba)	150.00
32 elements test Package (Na, Ca, Mg, K, Sr, B, Br, S, Li, Be, Ba, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Al, Si, As, Sb, Sn, Cd, Se, Mo, Hg, P (PO4), Pb, I)	300
<b>Particle Size Analysis</b>	
Includes Total Suspended Solids Using 0.45micro filter to quantify the fractions – laser particles size analysis full size range down to 0.1micro	110.00
<b>XRF Analysis</b>	90.00
<b>Dust Analysis</b>	



As per Total Suspended Solids (TSS) and Method AS 3580.10.1.8.2.2-1991	25.00
<b>Soil Nutrients</b>	
Dissolved – (Includes Nitrate, Nitrite, Phosphate, Ammonium)	45.00
Total – (Includes Total Nitrogen (TN), Total Phosphate (TP))	55.00
<b>Soil Test</b>	
Partial Nutrient (pH, EC, P, K)	15.00
Macro Nutrient (pH, EC, P, K, NO <sub>3</sub> -N, OM)	22.00
Complete Nutrient (pH, EC, P, K, NO <sub>3</sub> -N, OM, Micronutrients)	30.00
Complete Topsoil (pH, EC, P, K, NO <sub>3</sub> -N, NH <sub>4</sub> -N, SO <sub>4</sub> -S, CaCO <sub>3</sub> , CEC, OM, Micronutrients)	75.00
Complete (pH, EC, P, K, NO <sub>3</sub> -N, NH <sub>4</sub> -N, SO <sub>4</sub> -S, CaCO <sub>3</sub> , CEC, OM, Micronutrients, Total N & C, Texture)	95.00
Compost (pH, EC, SAR, C, N, Moisture)	25.00
pH (Saturated paste)	5.00
EC (Salinity)	5.00
pH, EC (pH and Salinity)	8.00
pH, EC, SAR (pH, Salinity, and Sodium Adsorption Ratio)	15.00
OM (Organic Matter (Walkley-Black) or Loss On Ignition)	6.00
NO <sub>3</sub> -N (1) (Nitrate-nitrogen (Chromotropic acid))	10.00
NO <sub>3</sub> -N (2) (Nitrate-nitrogen (2M KCl))	10.00
NH <sub>4</sub> -N (Ammonium-nitrogen (2M KCl))	11.00
NO <sub>3</sub> -N + NH <sub>4</sub> -N (2M KCl, FIA)	15.00
Total N (Combustion (Leco))	10.00
Total C (Combustion (Leco))	10.00
Total C and N (Carbon to nitrogen ratio)	12.00
P (Phosphorus (Olsen))	8.00
K (Potassium (Olsen))	7.00
SO <sub>4</sub> -S (Sulfate (500 ppm P extraction))	10.00
SO <sub>4</sub> -S (Water soluble)	12.00
Exchangeable Ions (Ca, Mg, K, Na (NH <sub>4</sub> OAc))	14.00

Micronutrients (Zn, Fe, Mn, Cu (DTPA))	9.00
Fe (DTPA)	7.00
CEC (Cation Exchange Capacity)	22.00
CaCO <sub>3</sub> (Calcium carbonate)	9.00
Gypsum (water of hydration method)	15.00
Texture (% Sand, Silt, Clay (Hydrometer))	13.00
Sand Size Fractions	15.00
Gravel (% gravel (by volume))	5.00
Moisture Saturation (% moisture of a saturated paste)	5.00
Moisture 1/3 Bar (% moisture at field capacity)	20.00
Moisture 15 Bar (% moisture at permanent wilting point)	20.00
Biosolid (Total N, Total P, NH <sub>4</sub> -N, NO <sub>3</sub> -N, % Solids)	35.00
Acid Base Potential	45.00
B, As, Se (Boron, Arsenic, Selenium)	11.00
B (Boron (saturated paste))	9.00
Cl (Chloride)	10.00
<b>Total Petroleum Hydrocarbon in Soil</b>	90.00
Sample Preparation (Including drying and ring mill grinding)	11.00
<b>Air Sampling Equipment/Air Quality Monitoring</b>	
Landfill Gas Monitoring	180.00 per day
Toxic Gas Monitoring	40.00 per day
Mould and Moisture	40.00 per day
Gas analysis (CH <sub>4</sub> , CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>2</sub> ,NO <sub>3</sub> , H <sub>2</sub> S etc)	20 per Analyte
Noise Monitoring	150.00 per day
Radiation Monitoring	60.00 per day
Atomic Absorption Spectroscopy	7.00 per Analyte
UV-VIS-NIR Spectroscopy	
Water Level Monitoring	3.00 per day
<b>GEOMATIC ENGINEERING DEPARTMENT</b>	
<b>EQUIPMENT</b>	<b>CHARGES(US\$)</b>
S 86-S Dual frequency GNSS Receivers	100.00

NL 32 Automatic Level Instrument	20.00
DTM 122A Total Station	60.00
<b>MINING ENGINEERING DEPARTMENT</b>	
<b>EQUIPMENT</b>	<b>CHARGES(US\$)</b>
Gravikon VC 25 Dust Sampler	30.00
<b>MINERAL ENGINEERING DEPARTMENT</b>	
<b>EQUIPMENT</b>	<b>CHARGES(US\$)</b>
Atomic Absorption Spectroscopy (AAS)	10.00
Flotation Unit/Cell	30 per Day
Knelson Concentrator	10.00 per Kg
Sample Preparation to 200 Mesh Crushing, rolling, pulverising	20.00 per Kg
Sieve Analysis (sieves and vibrating unit)	5.00 per Kg
Drying	5.00 per Kg
Bottle roll test	15.00 per Kg
Non-contact Agitation	15.00 per Kg
Smelting	40/200g
<b>GEOLOGICAL ENGINEERING DEPARTMENT</b>	
<b>FIELD/LABORATORY TEST</b>	<b>UNIT PRICE (\$)</b>
Specific Gravity (Soil)	10
In-situ Density Balloon/water/sand replacement method Core cutter method	25 25
Moisture Content (Soil)	10
Compaction Test Standard five points Special sieving Degree of compaction for earthworks (Construction control)	35 50 50
Particle Size Analysis Complete Sieving only, wet Sieving, dry Sedimentation only	25 15 10 18
Atterberg's Limit	25

Shrinkage Limit	10
Tri-axial Test	
Quick undrained	27
Slow, drained, without pore water pressure, measurement 38 mm X 76 mm	55
Direct Shear Box Test (Square specimen)	
60 mm x 60 mm, undisturbed	50
Special sieving, compaction, slow	75
Unconfined Compressive Strength Test	30
Sinking of Test Pits	
Minimum plan area 1 m x 1.5 m from ground level to a depth not exceeding 1.5 m	25
Minimum plan area of 1 m x 1.5 m from 1.5 m to 3 m below ground level	32
Minimum plan area of 1 m x 1.5 m from a depth of 3 m to 5m	40
Consolidation Test	
Manual oedometer	55
Automatic consolidation	220
CBR	210
Bulk Density (Soil)	15
Taking of Undisturbed Samples in Test Pits	11
Taking of Disturbed Samples in Air-tight Containers and Labelling	10
Permeability	
Constant head	20
Falling head	24
Plate Bearing Test	200
Void Ratio	10
Sample Preparation (Rock)	15
Direct Shear Box Test (Rock)	55
Washing/Kg	6
Bulk Density (Rock)	35
Moisture Content (Rock)	20
Crushing of Rocks into Aggregate	40

Uniaxial Compressive Strength (Rock)	30
Tensile Strength (Brazilian)	25
Slaking Potential (Rock)	10
Design of Concrete Mix (Material to be supplied)	100
Cube Strength (Concrete)	10
Making and Curing of Concrete Cubes, Cylinders (Material to be supplied)	20
Testing of Cement Blocks	14
Porosity (Rock)	25
Hardness (Rock)	10
Tri-axial Testing of Rocks	55
Point Load Test	25
Young's Modulus	55
Poisson's Ratio	30
Non-destructive Test of Concrete (PUNDIT)	20
Slump Test	10
Particle Density (Rock)	40
Organic Matter Test	100
Flakiness Test	20
Los Angeles Abrasion Test	150
Aggregate Crushing Value	50
Aggregate Impact Test	60
Rock Classification Test	125
Ultrasonic Pulse Velocity Test (Pocket type)	55
Preparation of slide from an unlithified sediment of soil sample	85
Large rock thin section 5 x 7.5 cm	40
Standard rock thin section 2.5 x 4.5 cm	20
Large polished thin section 5 x 7.5 cm	65
Standard polished thin section 2.5 x 4.5 cm	25
Preparation of slide from wood or other archeological material	85
Preparation of polished section from unlithified soil sediment	85

Preparation of polished section from rock	35
Provided Descriptions and Interpretations	
Single thin section descriptions	100
Single descriptions and interpretations	250
Soil Conductivity Test	50

### PETROLEUM ENGINEERING LABORATORY

EQUIPMENT	TEST	CHARGES (US\$)
Viscometer/Fann Thermo-Cup	Rheology	80.00
Static Gel Strength Analyser	Gel Strength Consistency	250.00 200.00
Digital Compressive Strength Tester	Compressive Strength	200.00
Pressurized Curing Chamber	Curing	70.00
Mud Balance	Specific Gravity	30.00
Filter Press	Volume of Filtrate Determination	250.00
Constant Speed Mixer	Mixing of Slurry	15.00
Water Bath	Curing	80.00
Atmospheric Consistometer 1200/1250	Aging	150.00
Stirred Fluid Loss Cell	Free Fluid	500.00
Pressurized Consistometer	Consistency	450.00

### LIST OF EQUIPMENT FOR HIRING

GEOMATIC ENGINEERING DEPARTMENT	
ITEM & SPECS	AMOUNT (US\$) PER DAY
Level	13
Total Station	25
Handheld GPS Receiver	8
Prismatic Compass	3
Tripod	3
Ranging Pole	1
Static GPS Receiver	50 per day/15 per point

Printing Services	AO	4
	A1	3
	A2	2
	A3	1
GIS Lab (15 Computers)		
Reference Data for GPS Surveys		3
Optical Theodolite		8
<b>COMPUTER SCIENCE &amp; ENGINEERING DEPARTMENT</b>		
<b>ITEM &amp; SPECS</b>		<b>AMOUNT (US¢\$) PER DAY</b>
Computers and Space		250

*Appendix 2*



**UNIVERSITY OF  
MINES AND TECHNOLOGY (UMaT),  
TARKWA, GHANA**

**SAMPLE SUBMISSION SHEET**

**CLIENT DETAILS**

Sender's Name:.....	Project No.:.....
Company:.....	Tel./Mobile:.....
Address:.....	Fax No.:.....
	Email:.....
	Invoice to:.....

**DESPATCH DETAILS**

Date: .....	Courier/Carrier Name.....
No. of Packages:.....	

**SAMPLE DETAILS**

Soil  Drill Core  Vegetation  Mobile/Fixed Plant oil  Stream/Sediment  Rock  Food  
 Concentrate type  Percussion Drill Chips  Water/Effluent  Tailings  Pulp Others:.....

**SAMPLE IDENTIFICATION, QUANTITY AND ANALYSES REQUIRED**

SAMPLE NAME/ ID	QUANTITY	ANALYSES REQUIRED



**SAMPLE DISPOSAL INSTRUCTIONS**

<input type="checkbox"/>	Return	Pulps/Residues/As received	(at client expense)	Nominated carrier.....
<input type="checkbox"/>	Store	Pulps/Residues/As received	(charge after 3 months)	
<input type="checkbox"/>	Dump	Pulps/Residues/As received	.....	.....
		<i>(Tick where appropriate)</i>	<i>(Completed &amp; signed by)</i>	<i>Date</i>

*Note: All samples are stored or retained for a period of 3 months free of charge after analysis. Residue storage should be negotiated with the lab manager*

**LAB. USE ONLY**

Sample Received/Checked/Sorted by.....	Date: .....
Sample Unidentified/Missing:.....	Total samples received.....
Sample Analysed by:.....	
Total cost/charge for analysis.....	
Job Approved to commence.....	
Date:.....	
<i>(LAB MANAGER OR DESIGNATED COORDINATOR)</i>	



## *Appendix 4*

### **Payment of Allowances**

To motivate staff that will use the environmental monitoring equipment to generate income for the University, it was projected that 2% of the consultancy fees for the first five years (5 years) and 5% of the consultancy fees for the remaining years be paid as allowance to the staff.

This has been factored in the preparation of the projected cash flow statement.

The Committee has recommended that the allowance arising from the consultancy from the equipment should be shared to staff as stated below:

	%
University Co-ordinator	15
Departmental Laboratory Officer	15
Departmental Laboratory Technician/Specialist	50
Administrator (Departmental Sec, HOD, Dean)	20

