

**UNIVERSITY OF MINES AND  
TECHNOLOGY  
TARKWA**

**FORMAT FOR  
THE PRESENTATION OF  
THESES AND PROJECT REPORTS**

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## **1 INTRODUCTION**

This format is intended for students who are preparing project reports, dissertations or theses. The intention is to provide a concise guide covering all aspects of research documents. It does not, however, aim to provide comprehensive information on detailed stylistic features. There are in addition usages which are specific to a given branch of engineering. Candidates should therefore consult their supervisors about the specific requirements of their topic and discipline.

The word 'thesis' is used in this document for simplicity, but the information given applies to theses, dissertation and project reports.

## **2 THE STRUCTURE AND FORM OF THESES, DISSERTATIONS AND PROJECT REPORTS**

This chapter does not aim to provide comprehensive information on all matters relating to form and structure in thesis writing. For a detailed guide on presentation the candidate is advised to consult a standard text on the subject.

### **2.1 The Structure and Form of a Thesis - Preliminaries**

The following essential elements of a thesis are presented in the order in which they should normally appear:

- Title and Title page
- Candidate's Declaration
- Abstract
- Dedication (Optional)
- Acknowledgements
- Table of Contents
- List of Figures
- List of Tables
- List of Symbols (Optional)
- Nomenclature (Optional)
- Introductory Chapter
- Central Chapters
- Concluding Chapter
- References
- Appendices

### 2.1.1 Title and Title Page

A specimen title page is shown in Appendix A. The following information is given on the title page.

#### *Title*

The title should indicate the contents and scope of the thesis in as few words as possible. Phrases like 'a report on investigations into...' and 'observations on some aspects of ...' add nothing significant to the title and should be avoided. While the title should be as brief as possible it should be accurate, descriptive and comprehensive, clearly indicating the subject of the investigation. It is most important that the title of a thesis be an accurate description of the contents of the work.

The title is best printed in capitals.

#### *Author's name*

The full forenames followed by the surname are usually given under the title.

#### *Thesis statement*

The following are examples of the correct wording:

Doctor of Philosophy:

'submitted in fulfilment of the requirement for the award of the degree of Doctor of Philosophy in .....

Master of Philosophy:

'submitted in fulfilment of the requirement for the award of the degree of Master of Philosophy in .....

Master of Science:

'submitted in partial fulfilment of the requirements for the award of the degree of Master of Science in .....

Bachelor of Science:

'submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Science in .....

#### *Year when the thesis was completed*

This lowest line should be no more than 25 mm from the foot of the page, and should include the place and date of completion of the thesis, e.g. Tarkwa, 2010.

## 2.1.2 Candidate's Declaration

An example of the conventional form of declaration is as follows:

### **DECLARATION**

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

.....  
(Signature of candidate)

..... day of ..... (year) .....

This declaration should appear on a separate page and each copy of the thesis should be individually signed by the candidate.

## 2.1.3 Abstract

The abstract is a brief information or summary of not more than 250 words for a project report or master's thesis and not more than 500 words for a doctorate thesis. It outlines the objective of the thesis, the research methods and procedure employed, as well as the major results and conclusions. The abstract should always start with a topic sentence that is a central statement of the major theme of the thesis.

The abstract is extremely important. It should give as concisely as possible the significant facts, especially anything new, the main conclusions and any recommendations. The reader can then decide whether or not he/she is interested in reading further. An abstract should be written in normal and not telegraphic style.

## 2.1.4 Dedication

This is a brief, optional statement paying tribute to the writer's spouse, family, or other associated person. It is typed centrally on a separate page starting on the chapter line and does not require a heading, e.g.

In memory of my mother

Leticia Aggrey

## 2.1.5 Acknowledgements

Assistance received in carrying out the work in preparing the thesis should be acknowledged, although it is not usual to acknowledge routine checking, minor assistance or general advice. It is, however, usual to acknowledge the assistance of a supervisor, financial assistance,

permission to publish, as well as special facilities offered by a company, university or research institution.

#### 2.1.6 Table of Contents

The contents should be given on separate sheets and follow the plan of the structure of the thesis (Section 2.1) and the headings in the thesis itself. The contents should only contain the first three levels of headings in the thesis. It must also include the relevant page numbers.

(A specimen contents page is shown in Appendix B.)

#### 2.1.7 List of Figures

A list of figures follows the contents on a new page, and precedes a list of tables. (A specimen list of figures is shown in Appendix C.)

#### 2.1.8 List of Tables

A list of tables follows the list of figures on a new page. (A specimen list of tables is shown in Appendix D.)

#### 2.1.9 List of Symbols

A list detailing the symbols for physical quantities used may be provided when necessary and may be optional. A specimen list of symbols appears in Appendix E. Symbols vary from discipline to discipline and candidates should consult their supervisors with regard to the correct symbols for their field of research.

#### 2.1.10 Nomenclature

Authors should avoid jargons, abbreviations and acronyms which are not in common use in the field or which have not been defined. If there are acronyms or unusual technical terms, these should be defined in alphabetical order in a list of nomenclature. In any case, each symbol or unusual term should be defined when it first occurs in the text.

### 2.2 Body of the Thesis

In most theses the chapters may readily be divided into three categories: the introductory chapter or chapters; the central chapters comprising the major report of the study, divided into logical chapter divisions; and the concluding chapter, which should contain the findings, conclusions, and recommendations of the thesis.

#### 2.2.1 Introductory Chapter

The first chapter should contain the following items:

- Problem Definition/Definition of the Problem/Statement of the Problem;
- Objectives of Research;
- Methods Used;

- Organisation of Thesis/Report.

### 2.2.2 Central Chapters

#### *Chapters 2 and 3*

Chapter 2 of the thesis should be a résumé of the history and present status of the problem by means of a literature survey comprising a brief critical review of previous investigations of this and closely related problems. The contribution of each of these to the topic should be made clear, together with the fact that the current investigation arises from the inadequacies of earlier studies or that the current investigation is adopting an existing methodology for a different situation or that a new approach and direction are being presented.

Chapter 3 should be statement of the source of data, the method of procedure (experimental techniques) and the treatment of the findings. In a thesis of an experimental nature, a separate chapter is ordinarily devoted to these topics. In a case study, relevant information about the project area will constitute this chapter.

The elements of Chapters 2 and 3 may be reversed depending on the topic. For example, for a case study, the relevant information may be the second chapter of thesis with the third chapter being dedicated for literature review or experimental procedures.

#### *Other central chapters*

It is impossible to give specific directions for organising all the studies and findings, because of the wide variety of topics investigated, techniques employed, and kinds of data accumulated. It suffices to say that the chapters of this portion of the thesis constitute the candidate's contribution to knowledge. All other portions of the manuscript are subordinate to what actually has been discovered and is here being made known. The candidate should, therefore, take great pains to present his/her material in a clear and orderly fashion, in terms that will be readily understood.

### 2.2.3 Conclusions and Recommendations

The concluding chapter should be a summary, restating the developments of previous chapters and showing succinctly the more important findings and conclusions of the whole study. The author may list unanswered questions that have occurred to him/her but which require research beyond the limits of the undertaking reported. Recommendations may be offered for the solution of the problem.

## 2.3 References and Bibliography

References should be chosen and cited to:

- indicate the source of the writer's statements;
- acknowledge another person's work;
- provide a source of additional information.

The relevance of any reference should be carefully considered and the number of references kept to a necessary minimum. All references appear together at the end of the thesis/project. The citations must be given in sufficient detail for easy retrieval of the information.

### 2.3.1 Referencing Systems

There are a number of different referencing systems. The two most commonly used in scientific literature are the Harvard system and the Numerical system. You should note that styles for citations vary tremendously from discipline to discipline, and that not all the points mentioned (e.g. title of paper, or inclusive pagination) may be necessary. In this University, the Harvard style is adopted.

#### *Harvard system*

The references are cited in the text by the author's surname followed by the year of publication separated by a comma and are listed in alphabetical order by year of publication in the list of references [e.g. (Cobblah, 1997)]. If a number of articles by the same author are cited for a given year the letters a, b, c are used to distinguish the articles. In each case full-page numbers for the articles must be given in the reference list [e.g. (Amegbey, 1990a) and (Amegbey, 1990b)].

If there are more than three authors, only the first (senior) author's name is given in the text followed by '*et al.*' [e.g. (Temeng *et al.*, 2000)]. The full list of names is given in the reference list. Note the recommended layout of the reference list.

#### *Specimen text (Harvard system)*

At present Ghana produces gold, bauxite, manganese and diamonds for export. Other minerals that can be exploited to advantage include iron ore, limestone, brown clay, kaoline and salt (Kesse, 1985). The general trend of gold production from 1880 to 1990 reveals three gold booms (Mireku-Gyimah and Suglo, 1993). Tsidzi and Adofo (1993) and Dzibodi-Adjimah (1996) have further discussed the visual and chemical impacts of mining in Ghana.

## REFERENCES

Dzibodi-Adjimah, K. (1996), "Environmental Concerns of Ghana's Gold Boom: Past, Present and Future", *Ghana Mining Journal*, Vol. 2, No. 1, pp. 21 – 26.

Kesse, G. O. (1985), *The Mineral and Rock Resources of Ghana*, A. A. Balkema Publishers, Rotterdam, 610 pp.

Mireku-Gyimah, D. and Suglo, R. S. (1993), "The State of Gold Mining in Ghana", *Trans. Instn. Min. Metall. (Sec. A: Mining Industry)*, Vol. 102, pp. A59 – A67.

Tsidzi, K. E. N. and Adofo, R. A. (1993), "Some Environmental Aspects of Mining and Related Activities in Ghana", *Proceedings of the National Seminar on Current Developments in the Minerals Industry of Ghana*. Tsidzi, K. E. N. (ed.), IMME, KNUST, Kumasi, Ghana, pp. 126 – 131.

### *Numerical system*

The references are numbered in ascending order in the text, and are listed in that order in the list of references. In the text itself, the numerals are typed slightly above the list of the text.

### *Specimen text (Numerical system)*

At present Ghana produces gold, bauxite, manganese and diamonds for export. Other minerals that can be exploited to advantage include iron ore, limestone, brown clay, kaoline and salt (Kesse<sup>(1)</sup>). Mireku-Gyimah and Suglo<sup>(2)</sup> have reviewed the general trend of gold production from 1880 to 1990 and have defined three gold booms in the past. Tsidzi and Adofo<sup>(3)</sup> and Dzigbodi-Adjimah<sup>(4)</sup> have discussed the visual and chemical impacts of mining in Ghana.

## **REFERENCES**

1. Kesse, G. O., *The Mineral and Rock Resources of Ghana*, A. A. Balkema Publishers, Rotterdam, 1985, 610pp.
2. Mireku-Gyimah, D. and Suglo, R. S., “The State of Gold Mining in Ghana”, *Trans. Inst. Min. Metall. (Sec. A: Mining Industry)*, Vol. 102, 1993, pp. A59 – A67.
3. Tsidzi, K. E. N. and Adofo, R. A., “Some Environmental Aspects of Mining and Related Activities in Ghana”, in *Proceedings of the National Seminar on Current Developments in the Minerals Industry of Ghana*. Tsidzi, K. E. N. (ed.), IMME, KNUST, Kumasi, Ghana, 1993, pp. 126 – 131.
4. Dzigbodi-Adjimah, K., “Environmental Concerns of Ghana’s Gold Boom: Past, Present and Future”, *Ghana Mining Journal*, Vol. 2, No. 1, 1996, pp. 21 – 26.

### 2.3.2 Citations

The order in which items in the references are listed is as follows:

#### *Books/Thesis/Project Reports/Lecture Notes*

- Authors’ names;
- Year of reference;
- *Title of book, thesis, project report or lecture notes* (in italics);
- Name of publisher/type of thesis/project report/lecture notes and name of School
- Location of publisher (in the case of a book);
- Edition numbers of book or report number of report;
- Year of reference (numerical system);
- Inclusive page numbers of book, thesis, project report, or lecture notes.

#### *Examples of books:*

Kesse, G. O. (1985), *The Mineral and Rock Resources of Ghana*, A. A. Balkema Publishers,

Rotterdam, 610 pp.

Kuma, J. S., Younger, P. L. and Bowell, R. J. (2002), "Hydrogeological Framework for Assessing the Possible Environmental Impact of Large-Scale Gold Mines", *Mine Water Hydrogeology and Geochemistry*, The Geological Society Special Publications 198, Younger, P. L. and Robins, N. S. (eds.), pp. 121 – 136.

Sweigard, R. J. (1992), "Materials Handling: Loading and Haulage", In Chap. 9.3 of *SME Mining Engineering Handbook*, Hartman, H. L. (ed.), 2<sup>nd</sup> edition, Vol. 1, SME, Port City Press, Inc., pp. 761 – 782.

*Examples of thesis, project reports or lecture notes:*

Eshun, P. A. (1998), "Accounting for Risks in Economic Evaluation of Gold Mining Projects in Ghana", *Unpublished BSc Project Report*, University of Mines and Technology, Tarkwa, 83pp.

Adetunde, I. A. (2010), "Experimental Design", *Unpublished BSc Lecture Notes*, University of Mines and Technology, Tarkwa, 72pp.

*Journal/Bulletin*

- Authors' names;
- Year of reference;
- Title of article;
- *Name of journal, bulletin* (in italics);
- Volume number, issue number, month (abbreviated);
- Inclusive page numbers of journal/bulletin.

*Examples of a journal/bulletin/article:*

Dzigbodi-Adjimah, K. (1996), "Environmental Concerns of Ghana's Gold Boom: Past, Present and Future", *Ghana Mining Journal*, Vol. 2, No. 1, pp. 21 – 26. .

Kuma, J. S. and Younger, P. L. (2004), "Water quality trends in the Tarkwa gold mining district, Ghana", *Bulletin of Engineering Geology and the Environment* 63, pp. 119 – 132.

Suglo, R. S., Frimpong, S. and Muirhead, I. R. (2003), "System Drivers in the Performance of Auxiliary Ventilation Systems", *CIM Bulletin*, Vol. 96, No. 1069, pp. 110 – 115.

Mireku-Gyimah, D. and Suglo, R. S. (1993), "The State of Gold Mining in Ghana", *Trans. Inst. Min. Metall. (Sec. A: Mining Industry)*, Vol. 102, pp. A59 – A67.

*Conference/Seminar Proceedings/Transactions*

- Authors' names;
- Year of reference;
- Title of article;
- Name of conference/transactions or proceedings;

- Name of editor;
- Location of conference;
- Inclusive page numbers of journal.

*Examples of conference proceedings/transactions:*

Eshun, P. A. and Mireku-Gyimah, D. (2002), "Small Scale Mining in the Tarkwa District: A Review of its Impacts", SWEMP 2002, *7th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production*, Sardinia, Italy, pp. 877 – 884.

Tsidzi, K. E. N. and Adofo, R. A. (1993), "Some Environmental Aspects of Mining and Related Activities in Ghana", *Proceedings of the National Seminar on Current Developments in the Minerals Industry of Ghana*. Tsidzi, K. E. N. (ed), IMME, KNUST, Kumasi, Ghana, pp. 126 – 131.

*Information from Webpages/Committee Reports/Reports from Organisations*

Committee reports and information from webpages do not usually have a specific author but many authors who are often unknown. Thus these are referenced as "Anon." for "Anonymous". The Referencing format for such sources is:

- Authors' names (if known) or "Anon." or "Anon" (if author(s) is/are unknown);
- Year of reference;
- Title of article;
- Name of webpage address (University of Mines and Technology, Tarkwa webpage);
- Webpage address;
- Date on which the information on the webpage was accessed.

*Examples of a webpage information/Committee Reports/Reports from Organisations:*

Anon. (1993), *Caterpillar Performance Handbook*, 24<sup>th</sup> ed., Caterpillar Inc., Peoria, USA, pp. 4-107 - 4-129.

Anon. (2007), "The Global Mining Initiative", [www.globalmining.com](http://www.globalmining.com). Accessed: November 11, 2007.

Hutson, S. S., Barber, N. L., Kenny, J. F., Linsey, K. S., Lumia, D. S., Maupin, M. A. (2004), Estimated use of water in the United States in 2000. US Geol Surv Cir 1268, [www.pubs.usgs.gov/circ/2004/circ1268](http://www.pubs.usgs.gov/circ/2004/circ1268). Accessed: December 19, 2005.

*Meaning of page referencing:*

*Examples:*

1. Kesse, G. O., *The Mineral and Rock Resources of Ghana*, A. A. Balkema Publishers, Rotterdam, 1985, 610pp.

*Meaning:* The "610pp." means that the number of pages in the book are 610 and that the

references were taken from various sections of the entire book. Occasionally, “610p.” could be used in place of the “610pp.”

2. Kuma, J. S. and Younger, P. L. (2004), “Water quality trends in the Tarkwa gold mining district, Ghana”, *Bulletin of Engineering Geology and the Environment* 63, pp. 119 – 132.

*Meaning:* The “pp. 119 - 132” means that the references were taken from pages 119 to 132 of the Bulletin of Engineering Geology and the Environment 63.

### 2.3.3 Punctuation Guidelines

The following guidelines are noteworthy:

- A comma is inserted after author's surname, but full stops are inserted after author's initial(s);
- A comma separates each item of the reference;
- The name title of article, report, thesis or dissertation, are put in inverted commas;
- The following are italicised to show the source of information:
  - *The title of a book;*
  - *The type of thesis/project report or dissertation/lecture notes;*
  - *Name of Journal;*
  - *Name of conference, transactions or proceedings.*

### 2.3.4 Bibliography

Any supplementary literature not directly referred to in the text, but considered to be relevant and of interest, may be put after the references in a bibliography. In this University, however, bibliography is not to be used.

## 2.4 Appendices

Appendices are convenient places for recording complicated mathematical or other formulae, descriptions of experiments or apparatus, and any other specialised or lengthy material such as computer programme listings, copies of spectra or other instrumental outputs that would otherwise detract from the readability of the text. The reader should be able to study or refer to these later, and only if he/she wishes to do so, after he/she has read the main work. Appendices must be numbered or lettered consecutively to facilitate their location in the text. Each appendix must start on a new page. The appendices should be placed immediately after the list of references.

## 3 HEADINGS AND NUMBERING

The arrangement of headings of various levels (hierarchical positions) reflects the organisation of the contents of the thesis.

The levels of headings may be indicated by typeface and format alone. For example, the heading '**ENVIRONMENTAL ECONOMICS**' is recognisably of higher level than '**Environmental Economics**'.

The decimal numbering of such headings further clarifies the importance, sequence and interrelation of the portions of text under each heading. Thus the headings '**2 ENVIRONMENTAL ECONOMICS**' and '**2.3 Environmental Economics**' are even more informative than the corresponding unnumbered headings. Numbering also facilitates cross-referencing within the text.

### **3.1 Rules of Numbering**

The following are the rules of numbering:

- Arabic numerals should be used throughout;
- First level headings (usually chapter headings of a thesis) are numbered continuously beginning with 1. In this University, the chapter heading will be centred and written below the chapter number (see Appendix G). Each new chapter will start on a new page;
- Each main division of text (chapter) may be divided into any reasonable number of sub-divisions, having second level headings which are also continuously numbered. This method of division and numbering can, in principle, be continuous to any level, but tends to become clumsy and confusing at the fourth level and beyond;
- Numbering should thus be confined to the first three levels. Further (unnumbered) levels of headings may be identified by typeface and format (see Section 3.2);
- The numbers designating headings of different levels are separated by full stops (the present document serves as an example). No full stop appears after the last number.

### **3.2 Typeface and Format**

The typeface and format of all headings should reflect their levels, independently of number. The typographical details of the system of headings will be dictated largely by the printing system that is used in final production of the thesis. Whatever the typography, it is essential that the system be logical and that it be applied consistently.

Modern practice favours left-hand justification, rather than centred headings. Note also that no full stop appears at the end of a heading.

### **3.3 Examples of Systems of Headings**

#### **1 FIRST LEVEL HEADING**

##### **1.1 Second Level Heading**

###### **1.1.1 Third Level Heading**

*Fourth level heading*

*Fifth level heading:* Which leads into the text on the same line.

## 4 STYLE AND PUNCTUATION

### 4.1 Text Structure

A good thesis should be comprehensive and precise. To be concise at the same time the writer must watch his/her presentation carefully. He/she should read through his/her draft critically and eliminate unnecessary material.

The following are some of the techniques that will help:

- Break down complex statements into lists;
- Use the active voice where appropriate;
- Do not use pompous words or jargons where simpler words are equally effective;
- Avoid empty phrases such as 'it is interesting to note that...';
- Avoid unnecessary words, e.g. 'the precipitate was found to be in a wet condition'; which means simply that 'the precipitate was wet'.

#### 4.1.1 Word Choice

The argument against using personal pronouns in theses is that the subject matter is the important thing and not the author. This is basically sound as long as it is not carried to excess. When, however, it leads to vagueness in phrases like 'it is considered' or to ponderous writing 'the author is of the opinion', then it is better to use a personal pronoun, e.g. 'I consider' or 'I think'.

#### *Technical language and jargon*

Technical language is a necessary part of scientific writing. The writer must, however, be certain that his/her audience will understand the language he/she uses. Where there is doubt, he/she should define his/her terms, either in the text or in a glossary.

For example, 'The hydrostatic loss appears to be responsible for dumping (or weeping) from sieve places...' is acceptable in a thesis intended for people familiar with distillation terms and concepts, but the statement becomes a mere jargon where the potential readers may not be experts in the field.

Jargon is often created by introducing strange and unnecessary new words. For example, though colonise, oxidise and analyse are acceptable through general usage, blendorise, insolubilised and solubilisation are not: however frequently they may be used in a chemical laboratory they are unknown outside it.

#### 4.1.2 Tenses

A guide like this cannot cover the ramifications of the uses of tenses in thesis writing. The following points may help, however, to avoid the more common errors:

- Reports of work done are usually written in the past tense (past perfect or past participle);

- Where universal truths such as natural laws are stated, the present tense is generally used;
- Do not change tenses in a sentence unless there is good reason for it. For example, if we say, 'The balloon rose because the hydrogen inside it was lighter than air', we may mean that this might apply only under the observed conditions' or we may mean that the gas used is inherently lighter than air. To make the meaning clear we must mix tenses within the sentence, e.g. 'the balloon rose because hydrogen is less dense than air'. But complications arise when tenses are changed without the writer having had a specific intention in mind.

#### 4.1.3 Sentence Structure

##### *Active and passive voice*

Traditionally technical writers have regarded the passive voice as the only acceptable form of presentation. In modern writing, however, the active voice is used far more often. Phrases like 'Economy justifies the procedure', are preferred to 'the procedure may be justified in the interest of economy'.

##### *Sentence length*

Long sentences with a number of dependent clauses are difficult to follow, particularly if the subject is complex. Reading tests have shown that sentences with more than 25 words are generally difficult to comprehend. Unless you are master of the use of the English language, avoid long sentences.

#### 4.1.4 Paragraphing

Paragraphs are there to help the reader. They do so by breaking up the text into manageable sections. The following guidelines will assist in organising paragraphs:

- A paragraph should consist of a central statement supported by a group of details;
- In technical writing the main statement is usually at or near the beginning. For arguments of persuasion, however, the central statement is often placed at the end as a climax to the supporting details;
- The transition between paragraphs should be smooth, with some form of connecting link in the text;
- Long unbroken sections of the text are discouraging to the reader and therefore paragraphs should not be unduly long. If your writing has many paragraphs exceeding 100 words, you should examine it critically.

#### 4.1.5 Headers and Footers

Headers and Footers are not allowed.

## **4.2 Conventions**

### **4.2.1 Capitals**

There is much confusion about the use of capitals and authorities differ considerably. The modern trend, however, is to use capitals sparingly. The following are some general guidelines:

- The first word in a sentence and in a direct quotation are capitalised; proper nouns are capitalised and common nouns such as river and company are also capitalized when they form part of a name e.g. River Amazon.
- Common nouns are capitalized when they are used with a number or letter to designate a specific thing, e.g. Laboratory D.

### **4.2.2 Acronyms**

An acronym is a word formed from the initial letters of a name or by combining initial letters, or parts of a series of words, e.g. 'radar': RA(dio) D(etecting) A(nd) R(anging). Certain acronyms like, 'radar' have become dictionary words. In general, however, use acronyms sparingly and when using them for the first time, spell them out. Where the acronym is not an accepted dictionary one it should be in capitals e.g. United Nations (UN), University of Mines and Technology (UMaT) and Random Access Memory (RAM).

### **4.2.3 Spelling**

In a language as complex as English there is no simple set of rules. When in doubt (e.g., when to use 's' and when 'z') consult the Shorter Oxford English Dictionary which gives the accepted standard of English spelling (preferred to the American) or the Oxford Dictionary for Writers and Editors. This dictionary, in addition to guidance on spelling, gives useful information on punctuation. In this era of information technology one can exploit the capability of the computer to his/her advantage. In this University, the British English will be adopted. However, one should be very consistent when the American English is used.

### **4.2.4 Abbreviations**

Use only generally accepted abbreviations and symbols.

### **4.2.5 Punctuation**

There are some 36 chief marks of punctuation. However, many of these are used only in specialised linguistic contexts and all should be used sparingly. For a concise guide to the use of the more common punctuation marks see other relevant literature.

### **4.2.6 Pagination**

Pagination should run consecutively through the thesis with all pages in Arabic numerals except items preceding the introductory chapter. These are numbered with Roman numerals. The page number should be in the footer and aligned right or centre.

## **5 EXTRA-LINGUISTIC MATERIAL**

The customary medium of communication is language. However, in the sciences and engineering extra-linguistic material such as numbers, symbols, mathematics, tables, graphs and illustrations of various kinds are frequently used. A cardinal principle for such material is that it should be used only when it is the most effective means of communication and understandable to the target audience.

### **5.1 Numerals**

The rules for the correct use of numbers are simple and are in the main based on common sense. The following are noteworthy:

- In the text use words rather than numerals for integers below ten. Exceptions to this rule occur in illustrations and tables, or when integers are associated with unit symbols. For numerals above ten, use whatever provides optimum clarity and good appearance;
- Where it is necessary to have decimal fractions these should be expressed in numerals, e.g. 'The original design required 2.7 times as many components as were finally used'. Do not use numerals for numbers which are only approximations. Do not begin a sentence with a numeral. This can lead to confusion and is in any event displeasing to the eye;
- Ordinals from 'first' to 'tenth' should be written out. For higher ordinals the author should once again use his/her discretion;
- Avoid writing out large and small numbers by using either accepted prefixes or exponential notation, e.g.  $253 \times 10^9$  or  $0.253 \times 10^{12}$ . Where large numbers must be written out these should be separated by a small space into groups of three counting from the left of the decimal sign, e.g. 5 241.2 or 0.52465. They must never be separated by a comma, point or any other means. For numbers less than unity, a zero should precede the decimal sign, e.g. 0.352 not .352. When listing numbers - as in a table - always align them on the decimal sign.

### **5.2 Mathematics**

Mathematics included in a text should form an integral part of the argument and should be intelligible to the intended readers. Detailed derivations and mathematics beyond the interest of the majority of readers should be put in an appendix.

Mathematics must be carefully presented using printed symbols. The units and symbols used should be consistent and follow international practice.

The form of presentation of a mathematical expression should be such that it:

- brings out clearly the structure of the expression;

- is as simple as possible and
- introduces minimum disturbance in the appearance of the printed page.

To comply with the last two points, algebraic fractions in the text should make use of a solidus and not a horizontal bar. Thus write  $(ax + b)/(cx + d)$  and not  $\frac{ax + b}{cx + d}$ .

However, note that careless use of the solidus can lead to ambiguities. Thus  $a + b/y$  means  $a + \frac{b}{y}$  and not  $\frac{a+b}{y}$ .

Such ambiguities can generally be overcome by the use of parentheses, as in  $(a + b)/y$ ,  $\log(a/b)$  and  $(\sqrt{3})x$ . Be sure that all parentheses and brackets occur in pairs. Exponential expressions should be set up as  $e^{2\pi/3y}$  or  $\exp(2\pi x/3y)$ .

However, with more complicated expressions the foregoing rules may violate the conditions above. It may then be necessary to simplify the expression or set it out on a line all to itself. For example in chapter five, the first equation should be numbered as:

$$q = \frac{L(t_0 - t_3)}{\frac{1}{2\pi r_1 h_1} + \frac{1}{2\pi k} \ln \frac{r_2}{r_1} + \frac{1}{2\pi r_2 h_2}} \quad (5.1)$$

And the second equation can also be set out as:

$$q = L(t_0 - t_3) / \Sigma R_t \quad (5.2)$$

where,  $\Sigma R_t = (1/2\pi r_1 h_1) + (1/2\pi k) \ln(r_2 r_1) + (1/2\pi r_2 h_2)$

$L$  = length

$t_0$  and  $t_3$  = initial time and final time respectively

$k$  = constant

$h_1$  and  $h_2$  = initial height and final height respectively

$r_1$  and  $r_2$  = initial radius and final radius respectively

$R_t$  = radius of sphere at time  $t$

Vertical alignment of all equal signs should be achieved where practicable. Where the right hand side of an equation is too long to fit on one line, a break should be made before an operational sign (e.g. + or -) or at some other logical point, but preferably not within a bracketed statement. The next line, starting with an operational sign, should then be placed just to the right of the equal sign. It may, however, not always be possible to avoid breaking a statement within a bracket. In this case the above rule should be observed as far as possible, as illustrated in **equation (5.3)**:

$$\begin{aligned} \Delta\omega = (i/y) & \left[ \int f(v_1 A_1) \phi_1 \phi_2 dV + \int f(v_1 A_2) \phi_1 \phi_2 dV \right. \\ & \left. + \int f(v_2 A_1) \phi_1 \phi_2 dV + \int f(v_2 A_2) \phi_1 \phi_2 dV \right] \end{aligned} \quad (5.3)$$

where,  $y = f(\phi_1\phi_2 + \phi_1\phi_2)dV$

Particular care is required in the use of subscripts and superscripts. They should be placed next to the main symbol and half a space below or above it respectively. Where both are used they must line up vertically, *i.e.*  $A_s^2$  not  $A_s^{\text{2}}$ . Thus  $e^{x^2}$  should become  $\exp(x^2)$  and  $E_{I,A}$  becomes  $E_{I,A}$ . Periods are generally omitted in abbreviations, e.g.  $T_{\max}$  not  $T_{\text{max}}$ . Standard symbols should be used wherever possible and the recognised literature in the field consulted for references to these.

### 5.3 SI Units

See Appendix F for a list of SI units. The magnitude of any physical quantity must always be stated as the product of a pure number and an SI unit (Physical quantity = number x unit). The following rules should be applied in the use of symbols with SI units.

1. Leave a space between the numerical value and the unit (80 cm);
2. Do not use a full stop after a symbol unless it comes at the end of a sentence;
3. Never add s to a symbol: cm = centimetre or centimeters;
4. Do not leave a space between a prefix and a symbol: milli-second = ms;
5. Leave a space between the symbols when two or more symbols are combined to indicate a derived unit: metres per second =  $m\text{s}^{-1}$  (or m/s). Acceleration is indicated as  $\text{m/s}^2$  (not as  $\text{m/s/s}$ );
6. Do not leave a space between the degree sign and the letter C but leave a space between the degree sign and the preceding numeral: 20 °C instead of 20°C or 20° C;
7. Symbols for physical quantities are printed in italics. Symbols for units are printed in Roman type. If, on a graph, potential difference (V) measured in volts (V) is to be plotted against current (I) in millamps (mA), the axes should be labelled: either  $V/V$  and  $I/\text{mA}$  or V in volts and I in millamps.
8. Symbols for vector quantities are printed in bold face italic type (e.g.  $\mathbf{F}$  for force).

### 5.4 Tables

Tables are best used when a number of numerical values are to be compared or contrasted. They should be used only where data cannot be clearly presented in graphical form. For example, discrete data sets can frequently be compared more effectively by using a bar chart than table.

In one sense a table is a form of graphical presentation. As such it should be kept simple and clear. Only relevant information or conclusions should be included. There is no need to put in all intermediate steps or results – they only cloud the main issues.

Tables can be arranged either horizontally or vertically. Horizontal tables are those which can be read when a page is in the normal position. Clearly they are the most convenient to read. Where possible they should be arranged to fit into a single page of the document. Vertical tables are used where their size is such that they cannot be fitted into the width of the printed page.

Each table should have a heading and be numbered with Arabic numerals. Tables in theses should be numbered as follows: first by the number of the main text division (chapter) in which they occur, and secondly, by Arabic numerals running consecutively through that text division. The two numbers are separated by a full stop. Thus, the first table in Chapter 2 is **Table 2.1**, the second table in Chapter 2 is **Table 2.2**, etc. the same principle holds for lettered appendices, but the full stop is omitted. Thus the third table in Appendix E is **Table E3**. Tables should be referred to in the text by means of the table number.

The columns in a table should be arranged for easy comparison, related information being brought together. Each column should carry a brief heading and include consistent units where relevant. The same symbols, units, and abbreviations should be used in the text. The title is placed on top of the table and may be in title case format. Table 5.1 illustrates some of these rules.

In column headings avoid using expressions like  $\times 10^{-3}$  m, as these are ambiguous. It is not clear whether the figures in the column have already been multiplied by  $10^{-3}$  or must be multiplied by  $10^{-3}$ . Rather use the recognised metric prefixes, e.g. ‘mm’. Where this is not possible, make sure the heading is unambiguous even if it appears clumsy.

For example, use ‘Capital cost R millions’ rather than ‘ $\times 10^6$  = Capital cost in R’

**Table 2.4 Summary of Taxes, Royalties and Allowances**

Item	Rate (%)
Royalty	3-6
Income Tax	35
Additional Profit Tax	25
Capital Allowance: First year	75
Subsequent years	50
Investment Allowance	5

(Source: Anon, 1986)

## 5.5 Illustrations

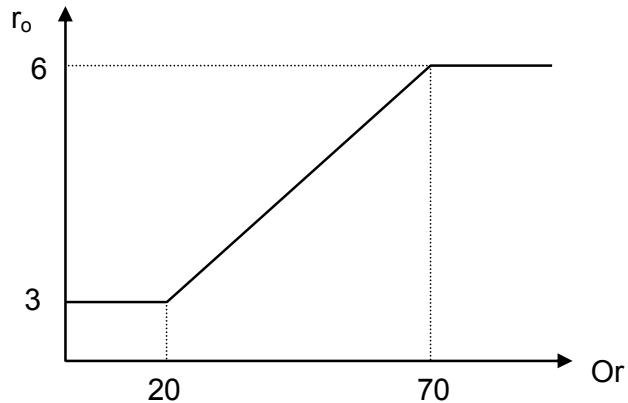
All illustrations (graphs, photographic plates, drawings and diagrams) are referred to as **Figures (or Figs.)**. Each has a number and a descriptive title which should be placed below the illustration. Numbering follows the same principles as those for tables (see Section 5.3). Thus, the first figure in Chapter 2 is **Figure 2.1 (or Fig. 2.1)**, the second **Figure 2.2 (or Fig. 2.2)**, etc. The third figure in Appendix E is **Figure E3 (of Fig. E3)**. ***One should be consistent when using Figure or Fig.***

### 5.5.1 Graphs

Graphs can take on a number of different forms, e.g. bar charts, divided circles, pictographs, or line graphs. The appearance of a graph is its major attribute. It is therefore up to the writer, in choosing one of these forms, to decide on the impression he/she wishes to convey. As line graphs are most frequently used in scientific and technical work, attention here will be directed primarily to this type. Line graphs are mainly used to show the relationship between a continuously varying independent variable and one or more of its dependent variable. Wherever possible use should be restricted to this purpose. In preparing graphs for inclusion in a thesis the following should be borne in mind:

- The graphs should illustrate clearly the point which the writer wishes to make;
- The scale chosen should be such that only the relevant parts of the curve are presented, that is, the grid should not be extended unnecessarily beyond the limits of the curve to be shown;
- If it is necessary to suppress the zero this should be clearly shown;
- The choice of grid size depends on the accuracy required;
- The scale should be easy to read and be restricted to multiples and submultiples of 10;
- Units should be clearly stated and written so that they can be easily read;
- The caption should be brief but self-explanatory and be positioned underneath the graph; any notes or supporting documents, if necessary should be placed below the title;
- To ensure clear reproduction graphs should not be overburdened with detail.

Fig. 5.1 is an example of a good graph.



**Fig. 5.1 A Graph of Royalty Rate ( $r_o$ ) Versus Operating Ratio (Or)**

### **5.5.2 Drawings, Diagrams and Photographs**

Line drawings and diagrams are made up of lines, words and a few special symbols. They must, as far as possible, be kept simple and uncluttered with details; working drawings are normally not acceptable. Unless they serve to clarify the verbal content of the report, or express an idea more vividly than words, drawings or diagrams serve no purpose. Only generally accepted graphic symbols should be used.

The inclusion of photographs may occasionally prove useful and sometimes even necessary. As a rule photographs should not be used unless they show something unusual or include features which cannot easily be expressed in words or by means of line drawings. If they are to be used they should be taken with care. Cluttered backgrounds and views of unrelated equipment should be avoided. Adequate contrast should be provided, and care taken so that important details do not fall into shadows or become obscured by the glare of highlights. Some sort of scale should be included so that the size of the object is shown. Lettering on prints may be necessary, but care should be taken to ensure that the letters stand out.

Any illustrative material which cannot effectively be reduced to A4 format, but which is relevant may be included in a pocket on the inside back cover of the thesis.

## **6 PRODUCTION OF THE THESIS**

### **6.1 Word Processing**

#### **6.1.1 Paper Type**

A good quality white bond paper of A4 size should be used and text must be printed on one side only.

#### **6.1.2 Paper Size**

The Paper Size should be A4 (8.27 in  $\times$  11.29 in.). When you open a new Microsoft Word document, the default Paper Size is Letter, ensure that you choose the correct Paper Size (i.e. A4).

#### **6.1.3 Page Layout**

The main body of the text should be set in one and half or double spacing and generous margins should be allowed. Text should be aligned at a distance from the top and the page. (A specimen page layout is shown in Appendix G)

The following are suggested dimensions of margins:

Top, bottom and right: 2.54 cm or 1"

Left: 3.05 cm or 1.2" (to allow for binding)

Gutter: 0 cm or 0"

Header: 0.0 cm

Footer: 0.0 cm

All work should be justified to the margin and should not be indented. Avoid right justification of text as it reduces the readability of the thesis. Use a triple space to indicate a new paragraph. (See Section 3 for suggested layout and format of the thesis headings and paragraphs.)

#### 6.1.4 Setting the Copy

Use a clear font type such as Times New Roman, CG Times, Arial, Tahoma or Courier and italic script or other unusual typefaces should generally be avoided unless they are necessary to emphasise words. In this case use italics or bold to emphasize. A font size of 12 pt is recommended. Chapter Number should be given 14 pt and Chapter headings should be given a font size of 12 pt.

### 6.2 Illustrations

Illustration forms a very important part of a thesis and should be carefully prepared. Whatever method of reproduction is to be used for their presentation in the thesis, the essential requirements are that a table or illustration should be neat, concise, legible and, above all comprehensible. Originals of photographs are not necessarily required but it is essential that any reproduction, such as a photocopy, be clear.

### 6.3 Number of Copies Required

For BSc project reports, two (2) unbound copies should be submitted for examination and for MSc/MPhil thesis, three (3) unbound copies should be submitted for examination. For the degree of PhD, five (5) unbound copies of the thesis are required for examination.

### 6.4 Binding

Two copies of project reports and three copies of theses should be bound (i.e. BSc Projects = 2 bound copies; MSc/MPhil Thesis/PhD Thesis = 3 bound copies)

The covers of bound theses should have the following format:

UNIVERSITY OF MINES AND TECHNOLOGY  
TARKWA

FACULTY OF MINERAL RESOURCES TECHNOLOGY  
MINING ENGINEERING DEPARTMENT

FORMULATION OF AN  
ENVIRONMENTAL MANAGEMENT PLAN IN GHANA  
- A CASE STUDY

BY  
PETER ARROJA ESHUN

MPhil  
JUNE 2001

## 7 EDITING AND REVISING

### 7.1 Checking, Rectifying and Polishing

Editing the first draft is the author's responsibility; he/she cannot expect his/her supervisor or any outside person to:

- determine the accuracy of the information;
- clarify ambiguities;
- emphasise important issues;
- check spelling.

The editing process is essentially one of critical evaluation of the manuscript against the requirements set by the objectives of the research. The main requirements are those of content, or orientation to the reader and of accuracy, brevity and clarity in the functional writing style. The author should evaluate each chapter of his/her thesis and check whether it:

- has real content;
- is free from inaccuracies, ambiguities and biases;
- emphasises important issues and is free from verbosity, irrelevances and unnecessary detail;
- can be understood readily;
- is appropriate to the situation.

Before starting the process of checking, rearranging and polishing, the writer should preferably leave his/her draft for a few weeks so that he/she can mentally switch to the role of

a critical reader.

The editing consists of three operations which should be done separately. These are:

- The integrity edit;
- The logical progression edit;
- The text and language edit.

#### 7.1.1 Integrity Edit

The contents page should be examined and the following points checked:

- Are the headings and sub-headings clear description of what is covered?
- Do they form a recognisable logical pattern and the numbering system used a reflection of this pattern?
- Are the headings grammatically parallel?

Next the text should be checked page by page for the following:

- Are the headings and numbers identical to those used in the list of contents?
- Are the tables and figures properly numbered and in sequence, and do they have informative headings and captions?
- Are tables, figures and references correctly cited in the text?

#### 7.1.2 Logical Progression Edit

Each chapter should be skimmed to:

- check that the objective is clearly stated and that the concluding section shows whether or not the objective was achieved;
- check that the logical thread is apparent; any jumps or gaps in the progression are usually an indication of faulty organisation; mark these, but do not correct at this stage;
- check in particular whether sections contain anything which does not belong there.

The conclusions list should arise from the discussion. Structural defects must be corrected before the text and language edit.

#### 7.1.3 Text and Language Edit

Only when one is satisfied with the basic format of the report should one concentrate on the structure of the text and the use of language. The text may include nonverbal components such as graphs and illustrations. These should be evaluated as part of the text.

The criteria for evaluating writing, mentioned before are:

- (i) Content criteria

- Accuracy – sufficient for the needs of the reader;
- Brevity – leaving out irrelevancies and at the same time covering the essential adequately;
- Clarity – avoiding vagueness and ambiguity;
- Emphasis – drawing attention to significant information.

(ii) Tonal or attitude criteria

- Appropriateness to the situation;
- Concern for the needs of the reader;
- Serious treatment of the subject matter;
- Authoritative without being writer-centered.

The specific aspect of language usage discussed in Section 4 should be consulted.

## 7.2 Graphic Material

Essentially the same criteria used in the language edit, *viz* accuracy, brevity, clarity and emphasis can be applied to graphic communications. One of the main reasons for using graphics is their ability to give an overall view and show relationships. Any graphic material which fails in these important areas probably does not justify the extra effort of using it.

## 7.3 Validity of Data in Time and Space

Most theses are prepared for consideration within a short time. However, once accepted, a thesis becomes part of the body of scientific literature. Writers should therefore draw attention to information that is only valid for a short time. Cost data are also subject to relevant variation by place and in time, and monetary exchange rates and other relevant factors may have to be specified to make matters clear.

## 7.4 The External Viewpoint

The author may feel himself to be objective. Usually he/she, is not – at least, not to the extent required for a good manuscript. Therefore an external readers viewpoint is needed. This can be provided by the supervisor or critical colleague who does not have to be an expert in the subject of the manuscript, but who must be able to place himself/herself in the position of the intended audience. He/she should be skilled in recognising the errors authors make and should annotate the manuscript accordingly and, in addition, suggest ways of improvement.

The best manuscripts are produced by co-operative interaction of authors, supervisors and independent editor.

## 7.5 Rewriting

Of all tasks, rewriting a text is the most unpopular, yet if we wish to develop a clear style it is usually essential. Editing tends to concentrate on the correction of errors rather than elegance of diction. Rewriting all or substantial part of the text is usually the only way of getting an elegant well-balanced text.

**APPENDIX A**  
**SPECIMEN TITLE PAGE**

UNIVERSITY OF MINES AND TECHNOLOGY  
TARKWA  
FACULTY OF MINERAL RESOURCES TECHNOLOGY  
DEPARTMENT OF MINING ENGINEERING

A THESIS REPORT ENTITLED

FORMULATION OF AN  
ENVIRONMENTAL MANAGEMENT PLAN IN GHANA  
- A CASE STUDY

BY  
PETER ARROJA ESHUN

SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF  
THE DEGREE OF MASTER OF PHILOSOPHY IN MINING ENGINEERING

THESIS SUPERVISOR

.....  
PROF. D. MIREKU-GYIMAH

TARKWA, GHANA  
JUNE 2001

**APPENDIX B**  
**SPECIMEN CONTENTS OF THESIS PAGES**  
**TABLE OF CONTENTS**

Contents	Page
<b>DECLARATION</b>	i
<b>ABSTRACT</b>	ii
<b>ACKNOWLEDGEMENTS</b>	iii
<b>TABLE OF CONTENTS</b>	iv
<b>LIST OF FIGURES</b>	vii
<b>LIST OF TABLES</b>	viii
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Statement of Problem	1
1.2 Objectives of Thesis	1
1.3 Methodology and Scope of Study	3
1.4 Facilities Employed	4
1.5 Report Organisation	4
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>5</b>
2.1 Impact of Industrial Activities on the Environment	5
2.1.1 Air Pollution	5
2.1.2 Water Pollution	13
2.1.3 Noise Pollution	20
2.1.4 Soil Degradation	24
2.1.5 Waste Management and Disposal	25
2.1.6 Flora and Fauna Destruction	30
2.1.7 Social Impacts	33
2.2 Environmental Planning and Environmental Management	35
2.3 Environmental Impact Assessment (EIA) in Ghana	36
2.3.1. EIA Procedures and Project Registration in Ghana	36
2.2.3 Environmental Audit	47
2.2.3 Environmental Reports	48
<b>CHAPTER 3 PHYSICAL ENVIRONMENT, FACILITIES AND OPERATIONS OF BOST DEPOTS</b>	<b>49</b>
3.1 The Accra Plains Depot	49
3.1.1 Physical Environment	49
3.1.2 Facilities and Operations	51
3.2 The Mami Water Depot	51
3.2.1 Physical Environment	51
3.2.2 Facilities and Operations	53

3.6	The Buipe Depot	62
3.6.1	Physical Environment	62
3.6.2	Facilities and Operations	64
3.7	The Bolgatanga Depot	64
3.7.1	Physical Environment	64
3.7.2	Facilities and Operations	66
<b>CHAPTER 4 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL IMPACTS</b>		<b>67</b>
4.1	Air Pollution	67
4.2	Water Pollution	68
.	.	.
4.5	Flora and Fauna destruction	68
4.6	Fire Hazard	68
4.7	Occupational Accidents, Injuries and Diseases	69
<b>CHAPTER 5 AUDITING OF EXISTING ENVIRONMENTAL FACILITIES AND PRACTICES</b>		<b>70</b>
5.1	Prevention and Mitigation of Air Pollution	70
5.2	Prevention and Mitigation of Water Pollution	70
.	.	.
5.7	Pipeline Protection and Security	74
5.8	Waste Management and Disposal	75
<b>CHAPTER 6 ASSESSMENT OF CURRENT ENVIRONMENTAL IMPACTS OF THE DEPOTS</b>		<b>76</b>
6.1	Ambient Air Quality	76
6.2	Water Quality	76
6.3	Soil Type and Quality	78
6.4	Noise Level	80
<b>CHAPTER 7 THE BOST ENVIRONMENTAL POLICY</b>		<b>82</b>
7.1	Policy Statement	82
7.2	Specific Objectives	83
<b>CHAPTER 8 THE BOST ENVIRONMENTAL MANAGEMENT PLAN</b>		<b>85</b>
8.1	Objectives	85
8.2	Against Air Pollution	85
8.8	Bulk Oil Spill Contingency Plan	94
8.9	Big Fire Contingency Plan	97
8.10	Decommissioning Plan	101

<b>CHAPTER 9 CONCLUSIONS</b>	<b>102</b>
<b>REFERENCES</b>	<b>104</b>
<b>APPENDICES</b>	<b>108</b>
APPENDIX A LIST OF UNDERTAKINGS REQUIRING REGISTRATION	109
APPENDIX B LIST OF UNDERTAKINGS FOR WHICH EIA IS MANDATORY	118
⋮	⋮
APPENDIX E RESULTS OF SOIL SAMPLE ANALYSES AT BOST DEPOTS	136
APPENDIX F BOUNDARY NOISE LEVELS AT BOST DEPOTS	138

## **APPENDIX C**

### **SPECIMEN LIST OF FIGURES**

#### **LIST OF FIGURES**

<b>Figure or Fig.</b>	<b>Title</b>	<b>Page</b>
1.1	Map of Ghana Showing Locations of BOST Depots	2
2.1	Context of Environmental Assessment in Project Development	37
2.2	The EIA Procedure in Ghana	39
3.1	Site Plan of Accra Plains Depot: Installations and Facilities	50
.	.	.
3.6	Site Plan of Kumasi Depot: Installations and Facilities	61
3.7	Site Plan of Buipe Depot: Installations and Facilities	63
3.8	Site Plan of Bolgatanga Depot: Installations and Facilities	65

**APPENDIX D**  
**SPECIMEN LIST OF TABLES**

**LIST OF TABLES**

<b>Table</b>	<b>Title</b>	<b>Page</b>
2.1	Typical Impacts of Activities on Flora and Fauna	31
2.2	Illustrative Types of Social Impacts	34
.	.	.
.	.	.
6.3	Summary of Soil Sample Analyses at BOST Depots	80
6.4	Summary of Noise Levels at BOST Depots	81

**APPENDIX E**  
**SPECIMEN LIST OF SYMBOLS**  
**LIST OF SYMBOLS**

Avogadro constant	L
Boltzmann constant	K
Elementary charge (charge on proton)	e
Faraday constant	F
Gravitational constant	g
Mass of electron	m
Molar gas constant	R
Planck constant	h
.	.
.	.
.	.

## APPENDIX F

### INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

<b>Quality</b>	<b>Unit</b>	<b>Symbol</b>
Length	millimetre (0.001 m)	mm
	centimetre (0.01 m)	cm
	metre	m
	kilometre (1000 m)	km
Area	square centimetre	cm <sup>2</sup>
	square metre	m <sup>2</sup>
	hectare	ha
Volume	cubic centimetre	cm <sup>3</sup>
	cubic metre	m <sup>3</sup>
Capacity	millilitre (0.001 l)	ml
	litre	l
Mass	gramme (0.001 kg)	g
	kilogramme	kg
	tonne (1000 kg)	t
Density	kilogramme per cubic metre	kg/m <sup>3</sup>
	second	s
Time	minute (60 s)	min
	hour (3600 s)	h
	day (86400 s)	d
Speed, Velocity	metre per second	m/s
	kilometre per second	km/s
Plane angle	radian	rad
Solid angle	steradian	sr
Frequency	hertz	Hz
Force	newton	N
Pressure	pascal	Pa
Energy, work, quantity of heat	joule	J
Electric current	ampere	A

## APPENDIX F (Cont'd)

<b>Quality</b>	<b>Unit</b>	<b>Symbol</b>
Power, energy flux	watt kilowatt	W kW
Electric charge	coulomb	C
Electric potential	volt	V
Electric resistance	ohm	$\Omega$
Electric conductance	siemens	S
Electric capacitance	farad	F
Magnetic flux	weber	Wb
Magnetic flux density	tesla	T
Inductance	henry	H
Luminous flux	lumen	Im
Illuminance	lux	Ix
Luminous intensity	candela	cd
Luminance	candela per square metre	cd/m <sup>2</sup>
Thermodynamic temp. (T)	kelvin	K
Temperature (t)	degree Celsius	°C
Amount of substance	mole	mol
Concentration	mole per cubic metre	mol/m <sup>3</sup>

**APPENDIX G**

**SPECIMEN PAGE LAYOUT**

