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UNITED NATIONS UNIVERSITY
Geothermal Training Programme

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GUIDELINES ON WRITING REPORTS

by

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ABSTRACT

An abstract should be informative but not descriptive. It should be short, usually 100-300 words. The purpose of the abstract is to give the reader a brief overview of the content of the report, with an emphasis on the main theme, results and conclusions. The abstract should not just list what the report contains - that information is given in the list of Contents. The abstract is best written last, when the bulk of the report has been completed. An abstract should be so interesting that the reader is eager to read the whole report.

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INTRODUCTION

The writing of reports is an integral part of being a professional. For this reason, there is an emphasis on report writing at the UNU Geothermal Training Programme. Although the Fellows may already have experience in writing technical reports, there is always reason to review the main elements of typical report writing.

In the Introduction the writer sets the stage for the main topic of the report. It provides information for the reader about the report, without giving the details of the work and conclusions. The Introduction should be written in such a way that the reader feels that an interesting door has been opened, through which he or she wants to pass to explore what is on the other side - the following pages.

Often the Introduction is used to put the report into perspective, by stating how it relates to other technical and institutional work. The Introduction should not be too long, one-half to one page being typical in short reports, such as Excursion Reports. In final Technical Reports the Introduction can range from one page to several pages.

REVIEW MATERIAL

General

A section on Review Material is optional. Whether to include it or not depends on the nature of the report and what has been said in the Introduction. In some instances a few paragraphs in the Introduction will suffice to cover what otherwise would have been under Review Material.

Selected Topic

This section states the main reasons for spending time on the selected topic or problem; in some cases the section defines the problem to be investigated. The length of this section can range from one-half a page and up to several pages.

The specific topic, problem or theory will most likely dictate what main sections are required in a report. The sections used in the current Guidelines were selected to try to show what sections a typical report might have. It should be kept in mind, nevertheless, that short reports usually need fewer sections that long reports. Reports are divided into sections to organize the material for the convenience of the reader.

Literature Review

In science and engineering studies the literature is reviewed for several reasons; for example, to learn from the work of others, to give credit to similar and relevant studies, to help the reader in further study of the topic, problem, theory. In professional work it is essential to make it clear what contributions have been made by others, and what the current work has achieved and contributed to further understanding. The reader must never be in doubt what has already been established in the literature before, and what the reported study has contributed.

It follows, therefore, that it is very important to make reference to publications from where information and ideas are taken. In the text of a report this is usually done by naming the author and the year of publication. If there is just one author the form is Jónsdóttir (1987). If there are two authors the form is Jónsdóttir and Gudmundsdóttir (1987). And when there are three or more authors, the form is Jónsdóttir et al. (1987). The "et al." is Latin and stands

for "et alia" which means "and others". It should be noted that there is no period after the word "et". References may also be at the end of a sentence or paragraph. Then the form is: (Jónsdóttir, 1987; Jónsdóttir and Gudmundsdóttir, 1987; Jónsdóttir et al., 1987).

In some publications each reference is identified by a number, for example Jónsdóttir[1]. This method can be cumbersome when writing, especially when numbers have been assigned in a first draft; the first reference mentioned being 1, the second 2, etc. The "etc." is Latin and stands for "et cetera" which means "and so forth". The inclusion of a new reference will change the numbering of all following references.

A Literature Review should not be a laundry list, meaning that it should not be a listing of unrelated items. A Literature Review should be a coherent review of the main ideas and results of published materials, as they relate to the Topic or Problem of the report being written. The length of Literature Review is highly variable; from a paragraph to a few pages.

DESCRIPTION OF WORK

General

In the section Description of Work the author states what he or she did, and nothing else. Great care must be exercised in not mixing together what others have done, and what the author did. The detail of Description of Work should be such that other engineers and scientists should be able to repeat independently the work described. It is important in this section not to start analyzing and discussing the material - keep that until later. This section is normally the main section of a report, and is often divided into several sub-sections.

Excursion Report

The main purpose of the Excursion Report is to give Fellows an opportunity to write a short report, in preparation for the later Technical Report. Another purpose is to make sure that Fellows make full use of the Field Seminars and Excursion - knowing that a report has to be written means that notes must be kept and papers studied.

The Excursion Report should not exceed 15 pages in total length; that is, text, tables and figures. Although the Excursion Report should be short, the intention is that it should have the main sections of a full-length report. Two copies of this report are to be submitted 10 days after the end of the Field Seminars and Excursion.

The Fellows select what topic to write about in the Excursion Report. The topic can be anything geothermal the Fellows find of interest and is related to the Field Seminars and Excursion. Also, the topic does not have to be within the specialization of the Fellow; indeed, it may be better to write about something new.

Technical Report

The main purpose of the Technical Report is that Fellows write about their project work in a professional manner. Furthermore, this report is a requirement stipulated by the United Nations University, to manifest the advanced training that took place at the UNU Geothermal Training Programme. Fellows will not be awarded a Certificate unless he or she satisfactorily completes a Technical Report.

The report should be the work of the Fellow, from start to finish. It should focus on the specialized training and project work carried out by the Fellow, emphasizing any new methods, developments and findings. It should be recognized

that the topic of a Technical Report may range from experimental to theoretical, from practical to speculative, from laboratory to field. Whatever the project work of a Fellow, it will be carried out in close cooperation with his or her advisor.

In some cases a Fellow may want to include general material about his or her field of study in the Technical Report. This may provide valuable information to geothermal engineers, managers and scientists worldwide, because all reports are published and sent to previous Fellows and many other individuals, institutions and companies. Fellows will receive ten copies of their own report, and one copy of their fellow Fellow's reports. Dissemination of information is an important element of the work of the United Nations University.

The total length of the Technical Report should not exceed 75 pages, including text, tables and figures. Such material as data and computer print-outs may be added as appendices, subject to approval by the Fellow's advisor. A Fellow must type the text of his or her report, and make all tables and figures, using the computer and other facilities of the UNU Geothermal Training Programme. In some cases a map and other figures can be drawn in the main drawing office of the National Energy Authority, subject to approval by the Fellow's advisor.

The completed Technical Report is due in one original copy one week before the last official day of the current session of the Geothermal Training Programme. All computer programs and data files etc. should be turned-in on a diskette along with the completed Technical Report.

Headers and Numbers

The headers (titles of sections and sub-sections) used in Excursion and Technical Reports can be done as in the present

Guidelines. Sections in **CAPITALS AND BOLD** and sub-sections in **Lower Case and Bold** where the first letter is capital. When it is not possible to use bold, an alternative would be to use underlining.

In many kinds of reports it is not necessary to number sections and sub-sections. This is more applicable to short reports than long reports. If a Fellow wants to number his or her sections, Arabic numbers should be used; that is, 1, 2, 3 etc., but not Roman numbers; I, II, III etc. Sub-sections in Arabic numbering style are usually 1.1, 1.2, 1.3 etc. Note that no period is used after the numbers in sub-sections.

The first page of a report is where the Introduction starts, that is page number 1. The pages in front of the Introduction are numbered using lower case Roman numbers; that is, i, ii, iii etc.

Tables and Figures

Tables and figures are numbered using Arabic numbers: 1, 2, 3 etc. They follow the References in the report, tables first and then figures. In reports it is good practice to have just one table or figure on each page. Each figure and table should be able to stand on its own; that is, there should be enough information on it for the reader to understand it without having to consult other information.

It is very important to have large figures, to make them more legible. When making figures, use large lettering so that they can be read when reduced in size; for example, in later presentations and publications. When specific tables and figures are mentioned in the text of a report, the first letter should be capital; for example, Table 1 and Figure 1.

Spacing and Margins

It is more convenient to use single spacing while typing the report as it gives view of more of the text. In the final copy 1.5 spacing must be used. Three spaces should be used before section headings and two spaces before sub-section headings. In some cases each section should be started on a new page. The style of paragraphs should be block-style; that is, no indentation. For common text use the default margins 10 and 74. Note that two spaces should be typed after a period in text.

Use of Computer

Fellows must type all text and make tables and figures themselves, using the computer and other facilities of the Geothermal Training Programme.

RESULTS

In this section the results are presented, usually in the form of figures, with reference to tables. This is where the results are compared to the problem, topic or theory discussed earlier. In this section the material should be presented to the reader in an organized manner. No new data or information should appear in the report after this section.

It is often difficult to separate the material to be placed in Description of Work and in Results. The Fellow must find the right balance for his or her work. It can similarly be difficult to separate what material to put in Results and what in Discussion. There are no hard and fast rules about what material should be where. As so often in human endeavours; it is difficult to say what should be done; it is much easier to offer advise once something has been done.

It is experience that counts when writing engineering and scientific reports; writing an Excursion Report and a Technical Report should provide the Fellows with valuable experience.

DISCUSSION

This section typically deals with the material of the report in two parts. First, what do the Results mean in terms of the Topic, Problem, Theory? And what are the implications of what was discovered in the report. Second, what uncertainties are there associated with the work reported; what still needs to be done?

CONCLUSIONS

This is where the author states the most important findings of the work being reported. Too many conclusions give the impression of there being no particular conclusions.

RECOMMENDATIONS

This section is optional. Often times the recommendations are hinted of in the Conclusions or perhaps the Discussion. Whether a Recommendations section is included depends much on what kind of report is being written. Recommendations are more common in consulting reports than in other types of reports.

ACKNOWLEDGEMENTS

In this section the author acknowledges the people that made it possible to carry out the work reported, and those that helped with the report. The section should be no more than a paragraph. Keep it short and to the point.

NOMENCLATURE

This section should contain the list of symbols used in the report, giving their name and unit. The symbols should be listed in alphabetical order, followed by Greek symbols. Symbols with subscripts should not be listed separately. S.I. units should be used where possible.

A = Area (m^2)
H_f = Enthalpy fluid (kJ/kg)
k = Permeability (mD)

α = Void fraction (-)
ρ = Density (kg/m^3)
μ = Viscosity (kg/m.s)

REFERENCES

References start on a new page. A list of References is not the same as a bibliography. In References a Fellow lists all the publications he or she makes reference to in the text of the report, usually in alphabetical order. A bibliography is a list of publications that have been compiled for some specific purpose, perhaps to show publications that deal with a topic being studied, often to give the reader an opportunity for further reading on the topic.

In report writing it is important to give as much information about each reference as possible, contrary to what is customary in journal publications where space is at a premium. Therefore, give as complete information as possible; it will help others to find the publication later. The following would be a typical references:

Jónsdóttir, J., (1987): "An Article About Geothermal Energy," Journal of Geothermal Engineering and Sciences, vol. 1, no. 2, pp. 3-13.

Jónsdóttir, J. and Gudmundsdóttir, G., (1987): A Book on Geology of Geothermal Fields, Rock Press Ltd., Reykjavík, 123 pp.

Jónsdóttir, J., Gudmundsdóttir, G. and Björnsdóttir B., (1987): "The Geothermal Report," Report 123, National Energy Authority, Reykjavík, 45 pp.

APPENDIX

The written text of technical reports must be readable; the writer must think about the reader; the text and other material must be presented in a mannner easily understood. Another consideration in technical reports is to present the right amount of information, in the text, in tables and in figures. To achieve both objectives - to write well and present balanced information - is difficult.

One way to include important information in a technical report without making the text hard to read, is to have one appendix or several appendices. Typical materials for appendices are: data sets and calculations, computer program print-outs and figures, descriptions of equipment and proceedures. The material that is not necessary to the understanding of the main theme and results of a report, should be places in an appendix - the kind of material other engineers and scientists need to follow-up and check on the results of the report.