COMMONWEALTH OF AUSTRALIA

Technical Officers in Geology and Geophysics Areas

K.A. Townley

Bureau of Mineral Resources,
Geology & Geophysics
August 1970

TECHNICAL OFFICERS IN GEOLOGY AND GEOPHYSICS AREAS

by

K.A. Townley
Bureau of Mineral Resources

The Commonwealth Public Service Board has recently concluded a review of qualifications, training, and definition of Technical Officers in the science area, including geology and geophysics.

Their recommendations are now being put into effect, and are summarized below.

1. Work

In most situations Technical Officers (Science) provide support for geologists and geophysicists engaged in research, experiment, field surveys, or a wide range of tests and analyses. (Those engaged in such areas as the design and testing of major equipment are more properly placed in the Technical Officer (Engineering) Group).

Work in the geoscience area can include:

(a) Laboratory functions: tests and analyses of rocks, minerals, and fossils; preparation, mounting, cataloguing, and indexing of specimens; development of laboratory techniques and operation maintenance and development of laboratory equipment.

(b) Field functions: provision of assistance to geoscientists by operating and maintaining field equipment; planning and conducting field geophysical surveys; identifying samples, taking measurements, and maintaining a field laboratory; preparing associated reports.

(c) Data: collection and collation of information from published and unpublished reports and raw data; retrieval of stored data; maintenance and indexing of collections.

(d) Observatories: operation, installation and maintenance of geophysical and vulcanological observatory equipment.

(e) Tests and measurements of properties of natural materials.

(f) Research - general assistance in research projects.

2. Plan for Technical Officers

The work outlined above is to be considered as being undertaken at a level requiring a Technical College certificate or equivalent. (The Technical College Certificate is a level of Tertiary qualification lying above the skilled tradesman qualifications but below a Diploma or Degree from a College of Advanced Education or University).

Five levels of classification are laid down:

Senior Technical Officer Grades 3, 2, and 1, and Technical Officer Grades 2 and 1.

It is not envisaged that there will be many positions at the two highest levels.

Qualifications are prescribed and training courses introduced:

(a) the grade of Trainee Technical Officer is introduced; such trainees undertake a 4-year period of training, part of which is the achievement of a relevant Technical College Certificate, and the remainder consists of in-service training conducted by the Bureau of Mineral Resources.

(b) on satisfactory completion of training, advancement to Technical Officer Grade 1 is automatic.

(c) For those of mature age wishing to enter the T.O. structure, an eligibility test will be given: it will approximate to the final examinations of a Technical College, but will be conducted by the Public Service.

3. It is to be noted that below the Technical Office structure there is another structure of Technical Assistants Grade 1 and 2, which requires no tertiary qualifications. In normal circumstances the Assistant Grade 2 is a terminal grade (and is remunerated as such), but provision is made for suitable Technical Assistants to undertake the necessary training to achieve the Technical Officer level.

4. Appendixes: Appendix 1 is a copy of part of a report by the Commonwealth Public Service Board that sets out the philosophy in which the review was approached.

Appendix 2 sets out the definitions and features of the structure as a whole and of each grade within it.

Appendix 3 tabulates the type of work considered to be appropriate to the three larger grades in geology and geophysics.

APPENDIX 1 :

EXTRACT FROM P.S.B. CIRCULAR NO. 1968/29 - "REVIEW OF DRAFTING GRADES"

PART B - TECHNICAL SUB-PROFESSIONAL WORK

The Technical and Drafting Grades were established in 1956. The Technical Grades were formed by an amalgamation of a number of different designation groups previously used in various laboratories and other establishments. Those working in the drafting field were absorbed into a new Drafting Grade structure which paralleled the Technical Grade structure for the first six work levels. A close association between the two groups was established in the Board Memorandum of 16th November, 1956 which introduced the new structures. The Memorandum was entitled "Introduction of Sub-professional Grades" and referred to "a new approach to professional and technical work designed to ensure that professional staffs generally are engaged in duties which require professional qualifications and that greater use is made of the capacity of non-professional staff for technical duties which are within their competence".

Since 1956 there have been marked changes in optimum employment patterns in technical disciplines which significantly affect sub-professional work and necessitate a re-evaluation of this area of the Service.

In recent years it has been well recognised, particularly in industrialised countries, that technical sub-professional effort is becoming increasingly important. This is associated with the rapidly increasing rate of progress in science and technology, and the fact that more and more of the world's manpower resources are being devoted to these fields.

Those employed at professional level find it increasingly difficult to keep abreast of, and participate in, advanced technological developments in their disciplines, and, at the same time, to continue performing those functions which involve mainly the application of "accepted practices".

It is necessary that support be provided by people trained to a fairly high level of technical knowledge and understanding, substantially above skilled trades, to whom professionals can devolve and transfer functions as they assume more of an "accepted-practice" character. Unless a competent workforce is available for this purpose, it is inevitable that professionals will be engaged on functions which do not require the use of their professional qualifications. This situation can, and does arise, and is a matter for serious concern.

In addition to the well-established sub-professional role of providing direct support to professionals, there is an ever-increasing volume of technical work which in the past was frequently regarded as professional work, but which, in the framework of current standards of professional training, should now be identified with the sub-professional level. This the sub-professional can perform in his own right, and is an important component of his work.

APPENDIX 2 :

TECHNICAL OFFICER (SCIENCE)

TECHNICAL OFFICER (SCIENCE), GRADES 1 & 2
SENIOR TECHNICAL OFFICER (SCIENCE), GRADES 1 - 3

GROUP DEFINITION

Technical Officer (Science) work involves the application, within a framework of established techniques and practices, of a recognised level of technical knowledge, to activities associated with the physical earth sciences (primarily physics, chemistry, metallurgy, geology and geophysics) or the life sciences (primarily agricultural science, veterinary science, forestry, arboriculture, horticulture and biology) examples of which are provided below under the heading "Technical Officer (Science) Activities". These activities include the conduct of, or assistance with laboratory or field tests, experiments, trials, investigations, analyses, surveys and associated functions such as the development of equipment and methods, extension work, participation in the management of field experimental stations, and the collection, assembly, analysis and presentation of data.

The performance of this work requires -

(a) a qualification at the standard of an approved Certificate from a Technical College or Institute of Technology, or an equivalent qualification, or a pass in a test of knowledge and competence prescribed by the Board in the functions and duties of the office, together with appropriate experience; and

(b) skill and initiative in the application of technical knowledge.

GROUP FEATURES

In most situations Technical Officers (Science) provide close technical support to professional staff engaged on research programmes, laboratory experiments and analyses, field trials and investigations, and the provision of extension services. The work may include the control of staff and particularly at the senior levels, management responsibility.

TECHNICAL OFFICER (SCIENCE), GRADE 1

DEFINITION

Under technical direction as to method of approach and requirements, undertakes technical work which is in a field of science, and which frequently involves the performance of a variety of tasks.

FEATURES OF WORK LEVEL

This level includes a Technical Officer (Science) who initially may have limited experience and may work under comparatively close technical direction. The extent of direction decreases and his contribution increases with successive years of experience.

May supervise staff.

TYPICAL DUTIES

The duties listed below are typical of this work level.

Laboratory Functions

* Perform laboratory tests, examination, analyses, determinations, measurements, standardisations and/or calibrations which are relatively straightforward but not of a routine nature; interpret results and prepare associated reports.

* Control a small laboratory or section of a laboratory in which is performed a limited range of routine laboratory tests and analyses; train staff in laboratory techniques and the use of laboratory equipment.

* Assist in the conduct of major experiments and research programmes; observe, record and analyse data.

* Participate in investigations into new or improved methods of analysis and testing; undertake straightforward development of laboratory equipment.

* Control the care and maintenance of laboratory equipment; undertake work associated with the maintenance of complex laboratory equipment.

* Prepare and mount samples, sections and specimens where critical standards are involved and special techniques are required.

Field Investigations, Surveys and Trials

* Undertake and report on less difficult field investigations, surveys and trials; assist with more difficult investigations and research programmes and major surveys; operate and maintain complex equipment in the field; undertake straightforward development of equipment required for field projects.
* Control personnel engaged on standardised field surveys; plan such surveys.
* Supervise the transport, testing, installation and dismantling of equipment required for field surveys; determine requirements and initiate ordering action for technical supplies and equipment.
* Operate and maintain a mobile laboratory; prepare and identify samples in the field.
* Supervise field trials relating to such projects as experimental forests, nurseries, growth plots, pastures, and fodder crops, including the control of such work as sowing, planting, cultivation and harvesting; record data and prepare reports.
* Exercise technical judgement in the field in the application of relevant acts and/or ordinances.

Extension Services

* Provide agricultural, pastoral, forestry, or horticultural extension services in the form of advice and demonstration to primary producers on such matters as pasture and crop establishment and management, animal husbandry, the keeping of farm records, the use of farm machinery, and farm forestry (including fire prevention); liaise with State Government and other bodies on extension service matters.

* Control a mobile field extension unit.

TECHNICAL OFFICER (SCIENCE), GRADE 2

DEFINITION

Under general direction as to method of approach and requirements, undertakes technical work which is in a field of science, and which frequently involves the performance of a variety of activities that require initiative and judgement in the limited selection from, and subsequent application of, established principles, techniques and methods.

FEATURES OF WORK LEVEL

This level includes the experienced Technical Officer (Science) who undertakes technical work without close supervision.

May control staff.

TYPICAL DUTIES

The duties listed below are typical of the work level.

Laboratory Functions

* Perform less straightforward tests and analyses or those for which set procedures have not been developed; evaluate the properties or performance of materials or prototypes.
* Control a laboratory, or section of a laboratory, in which is performed a limited range of tests, determinations and analyses, generally following set procedures.
* Undertake laboratory investigations and experiments requiring the application of specialised techniques; interpret results.
* Undertake more difficult technical work involved in the conduct of major experimental and research programmes; perform more complex calculations and analyses of data.
* Develop and implement improved methods of analysis and testing; undertake less straightforward development of laboratory equipment.

Field Investigations, Surveys and Trials

* Undertake and report on more difficult field investigations and trials.
* Control field surveys involving the operation, maintenance and testing of complex equipment; operate survey equipment when new or complex procedures are involved.

* Develop a range of field equipment and techniques.

* Control forest arboriculture or horticulture, management activities within a defined geographical or functional area.

* Control the production and presentation of high-quality field survey data.

Extension Services

* Oversee agricultural, pastoral or horticultural extension services within a defined area or relating to a specialised project or activity.

SENIOR TECHNICAL OFFICER (SCIENCE), GRADE 1

DEFINITION

Under limited direction as to approach and with some guidance on special features, undertakes technical work which is in a field of science, and which frequently involves the performance of a wide variety of activities. Is required to exercise significant initiative and technical judgement and in some cases adapt established techniques.

FEATURES OF WORK LEVEL

This level relates to a Technical Officer (Science) of considerable experience who undertakes complex work.

May take charge of a group of technical and other staff.

TYPICAL DUTIES

The duties listed below are typical of this work level.

Laboratory Functions

* Control a laboratory or section of a laboratory in which a wide variety of tests is undertaken, usually to set procedures, or a lesser variety where the activities are not of a routine nature and techniques are not standardised; develop laboratory facilities.

* Undertake or participate in more difficult tests and analyses or those requiring specialised knowledge.

* Undertake more difficult technical investigations, experiments, or projects; prepare associated reports and advise on results of projects; devise experiments.

* Participate in the planning and conduct of experimental programmes; take charge of segments of an experimental programme.

* Develop methods and techniques for problems of considerable complexity; undertake more difficult development of laboratory equipment.

Field Investigations, Surveys and Trials

* Undertake and report on field investigations, surveys and trials involving the development of complex equipment or new techniques, or requiring an ability to undertake independently high grade individual work.

* Control the establishment, maintenance and protection of forestry experimental programme.

Extension Services

* Plan and control a major agricultural, pastoral or horticultural extension service programme.

SENIOR TECHNICAL OFFICER (SCIENCE), GRADE 2

SENIOR TECHNICAL OFFICER (SCIENCE), GRADE 3

Determined on an individual position basis.

GUIDELINE MATERIAL

The omission of detailed Position Classification Standards for these grades is not intended to discourage the use of such positions in cases where a need can be demonstrated.

Position Classification Standards will be prepared at a later date.

APPENDIX 3 :

TECHNICAL OFFICERS (SCIENCE)

Examples of Work Appropriate to Levels - 2. Geology

T.O. 1	T.O.2	S.T.O.1
• undertake grain and mineral counts and grain size analyses: • operate a mobile conodont laboratory; develop equipment and procedures for field operations; • plot and sample deposits of materials required for engineering purposes; plan and direct laboratory tests and analyses and document results; • undertake straightforward petrological examinations of cores and cuttings to determine rock-type percentages; • undertake fossil sampling, preparation and counts.	• undertake straightforward petrographic work involving the identification and naming of rocks, and the provision and interpretation of rock indices; • undertake independently water surveys of some magnitude, involving the plotting of bores and the analysis of flow rates and salinity; • participate in the planning of, and undertake independently, geochemical surveys involving a variety of techniques; • undertake well-logging at drilling sites; • operate and maintain spectrographic and related equipment; design and carry out experiments and trace element analyses; • undertake fossil identifications.	

TECHNICAL OFFICERS (SCIENCE)

Examples of Work Appropriate to Levels - 3. Geophysics

T.O. 1	T.O. 2	S.T.O. 1
• carry out independent field metalliferous surveys; plot and reduce data; maintain complex electronic equipment in the field; • accept responsibility for the quality of field data; operate and maintain a range of complex equipment required for airborne geophysical surveys. • determine on-site operating conditions for field experiments; operate and control the maintenance of, complex equipment for seismic field survey operations; supervise recording and shooting field teams;	• carry out a range of normal scientific observations at a geophysical observatory; process and analyse results; • plan and carry out well-logging surveys; supervise contract operations; initiate and participate in the design, development or improvement of equipment and techniques; • direct the operation of seismic analogue data processing equipment to produce high quality seismic record sections; • participate in oceanographic contract surveys as B.M.R. representative; accept responsibility for the assembly and checkout of navigational and survey systems;	• undertake special investigations relating to field or observatory observations; recommend modifications to procedures as appropriate; • lead a field party performing geomagnetic observations; prepare associated charts and reports.

Technical Officers (Science) contd.

T.O. 1	T.O. 2	S.T.O. 1
• determine operating conditions, and operate seismic analogue data processing equipment to produce high quality seismic record sections; control and as necessary participate in, the maintenance of this equipment; • plan and carry out independently, straightforward independent field gravity surveys; record and reduce data.	• undertake processing of oceanographic data and assist in its preparation for publication; participate in the design and development of oceanographic and survey equipment; • assess data from various gravity surveys; formulate requirements for additional field and processing work; supervise data processing including the use of computer techniques.	