PROFESSIONAL GEOSCIENTISTS ONTARIO

GENERAL PROFESSIONAL PRACTICE GUIDELINES FOR GEOPHYSICISTS

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This guideline was developed by the PGO's Geophysics Subcommittee

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TABLE OF CONTENTS

PROFESSIONAL GEOSCIENTISTS ONTARIO

General Professional Practice Guidelines for Geophysicists

Summary of Key Points

- Professional geoscience services are required for a broad set of geophysical programs.
- Programs requiring the practice of a P.Geo. must be under their supervision.
- The P.Geo. can use previous work but it must be based on sound science while ensuring proper documentation.
- Ensure that quality control procedures are in place and that the documentation is present to support the results.
- Records must be kept for all work performed and must be consistent between different personnel.
- Data should be appropriately processed and have reasonable explanations.
- Ongoing review of the work should be done to allow for possible changes to the program.
- A report should be produced documenting the geophysical work completed and presented in an appropriate manner.
- All work must follow laws and regulations while respecting communities as well as health and safety.

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1. Introduction

These guidelines have been prepared by Professional Geoscientists Ontario (PGO) to assist Professional Geoscientists (P.Geo.) in the planning and execution of geophysical programs. These guidelines have also been prepared to assist Professional Engineers (P.Eng.) who are qualified to practice professional geoscience in accordance with The Professional Geoscientist's Act, 2000.

Geophysical programs that require professional geoscience services can include, but are not limited to, activities such as identification of groundwater resources, investigation of contaminated sites, locating buried infrastructure, archaeological investigations, non-destructive testing, oil and gas exploration, mineral exploration and geologic mapping for civil and geotechnical projects.

Geophysical programs that require the practice of professional geoscience must be conducted under the supervision of a P.Geo. who will be responsible and accountable for the planning, execution and interpretation of all investigation activities as well as the implementation of quality control (QC) and quality assurance (QA) programs and reporting and therefore should have the relevant geophysical training associated with his/her Professional designation.

These general practice guidelines have been developed to result in a consistent quality of work that will maintain public confidence and protect human health and safety and the natural environment with due regard for the PGO Code of Ethics Regulation (O.Reg. 69/01).

These professional practice guidelines are also recommended for use in the planning and execution of geophysical programs where there is a regulatory provision for a Qualified Person (QP).

The P.Geo. may base the geophysical program on such geoscientific premises and interpretation of existing information as the P.Geo. decides to be appropriate, based on relevant experience and professional judgement. In planning, implementing and supervising geophysical programs, the P.Geo. should ensure that the geophysical practices are generally accepted in the industry and/or can reasonably be justified on scientific grounds.

These guidelines are not intended to inhibit the original thinking or application of new approaches that are relevant to geophysical work. These guidelines recognize that geophysics is a discipline that is evolving along with new or innovative technologies and methodologies employed by Professional Geoscientists.

2. Geoscientific Concept

The geoscientific concept on which the geophysical program work is based, including the geological, hydrological, hydrogeological, geochemical, meteorological and geophysical settings, should be supported by relevant, program-specific data and a scientific approach. As data are gathered and interpreted, the program-specific concept may be altered depending on the findings. The geoscientific concept provides the foundation for the geophysical discussions concerning the program and should be presented in documents and reports.

3. Quality Control and Quality Assurance

Throughout the process of conducting all geophysical work, the P.Geo. should ensure that a quality assurance program is in place and that quality control and assurance measures are implemented.

QC/QA programs should be systematic and apply to all types of procedures and data acquisition, across the full range of values measured.

The QC/QA program should confirm the validity of the data that are used in the production of technical material including reports, maps, charts and drawings. The data verification exercise should be documented and the document(s) maintained with the project files. Geophysicists, where practical should be the persons making QC/QA decisions on geophysical data.

4. Field Methods & Data Collection

The P.Geo. supervising the geophysical work should confirm that work by employees, contractors or consultants is undertaken by competent personnel and that appropriate QC/QA programs are practiced.

The geophysical techniques and data collection method(s) selected by the P.Geo. should be appropriate to the objective(s) of the program, the geoscientific concept under consideration, the expected geologic media and local conditions being investigated, and any regulatory guidance or requirements that are applicable.

All geophysical work should be carried out in a careful and diligent manner using scientifically established practices that are designed and tested to ensure that the results are repeatable and reliable.

Professional judgement requires that the geophysical program should be designed to address the resolution requirements of the geoscientific problem. The survey(s) should be designed to avoid aliasing within a data segment and limit aliasing between segments.

5. Field Records and Data Verification

The planning and execution of the geophysical program(s) should be accompanied by detailed record keeping. The record keeping should include information such as authorship of the record, a list of field staff, a description of the procedures followed, the field conditions encountered and other pertinent information obtained. A photographic record of the field program is also recommended.

Data should be properly recorded and documented at spatial and temporal scales and with accuracy appropriate to the investigation. The study area and all data points should be accurately located with respect to known horizontal and vertical reference points.

Whenever several persons carry out similar duties or when data has been collected by different persons over a period of time, care should be taken to verify that the quality and consistency of the data are maintained in accordance with the established QC/QA program.

6. Data Processing, Presentation and Storage

Data processing and presentation should be appropriate to the type of data collected and the parameters being analysed. This does not limit the use of proprietary algorithms or formula that are applied to data for the visual or analytical enhancement of data.

Data processing should be accompanied by a statement of the applied methods. This does not require the divulging of proprietary algorithms or formula. Data should be duplicated and stored on a suitable media at separate and secure locations for an appropriate period of time.

7. Data Analysis, Interpretation and Technical Reporting

Comprehensive and on-going compilation, analysis and interpretation of all the geophysical data are essential activities throughout the project. These activities should be undertaken to assess the results of the work, refine the geoscientific concept and modify or recommend modification of the work program as appropriate. Changes in working hypotheses, objectives or work programs should be documented.

The format and style of the technical report or geophysical component of a larger report will vary depending upon the objectives and scope of the work program. All reports should document the program objectives and scope of work, the geoscientific concept and rationale for the investigative program, field and analytical methodology, results, and conclusions or findings. Any changes in objectives and scope of work should be documented. The report should state whether recommendations are provided either in the report or under separate cover.

The results of the geophysical program should be presented in graphical format appropriate to the data set such as cross-sections, plan views, 3-D images, temporal plots, etc.

Data interpretation should be based on all of the information collected, and if available, an analysis of pre-existing data. Technical reports should describe and document the interpretation and discuss information that appears at variance with the selected interpretation. The adequacy of the collected data should be critically assessed as to its ability to support any qualitative and quantitative conclusions that are reported. In addition, any known limitation of the geophysical program, or geophysical method(s) utilized, should be clearly communicated in technical reports.

Estimation or delineation of geological formations or geological physical properties can be fundamental steps in project development. The methodology used for estimation or delineation and the associated uncertainties must be documented.

Where cost estimates are provided, the assumptions used in developing the cost estimate should be documented.

8. Natural Environment, Safety and Community Relations

All geophysical work should be conducted in a safe, professional manner in accordance with applicable regulatory requirements and with due regard for the natural environment and the concerns of local communities.

Generally accepted Health, Safety, Environment, and Community practices for the specific geophysical sector should be followed.