Name:_____

Student Number:_____

UNIVERSITY OF TORONTO

FACULTY OF APPLIED SCIENCE AND ENGINEERING

THE LASSONDE MINERAL ENGINEERING PROGRAM

FINAL EXAM
APRIL 20, 2001; 2:00 p.m. - 4:30 p.m.

MINERAL EXPLORATION MIN - 401 H1 S

EXAMINER: Dr. A. P.G. ABRAHAM

NOTES:

- This is a closed book exam. All questions refer to mining / mine sites.
- All answers should be completed in the book(s) provided.
- The question sheets and any booklets must be returned at the end of the exam.

PART A: SHORT ANSWERS (40 marks total - estimated time required 60 minutes)

Answer any four of the following (10 marks each). Point form can be used but make sure your points are complete thoughts, particularly for definitions. The use of examples is encouraged.

A1 The process of exploration, development and closure require certain studies and reviews that take into account risk factors. Part of today's process includes sustainable development. Provide five activities you would include prior to and throughout a diamond program in Nunavut and an aggregates program near Vancouver.

(10 marks)

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A2 Gold, and for that matter, diamond deposits are notoriously difficult when it comes to accurate determination of the true grade of a deposit. A thorough evaluation of the basis upon which the estimates for resources and reserves are prepared, an audit, must be undertaken prior to deciding to take a project to the next stage.

- What two aspects of geology are critical to grade determination? (2 marks)
- What is the nugget effect, how would you recognize it in assay data from an epithermal gold-quartz vein deposit. (4 marks)
- Are statistical methods such as inverse distance squared or polygonal methods usable when dealing with nuggety deposits. Provide reasons? (4 marks)

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A3 With Bre-X the Red Flags were abundant, as the Strathcona and Freeport due diligence teams discovered. The Mining Standards Task Force Report (MSTF) and NI 43-101 were designed to combat abuse and correct the technical inadequacies of professional personnel and inaccurate and inconsistent corporate reporting.

- Using Bre-X as the model, what problems/red flags might one foresee in the exploration for PGE deposits? (5 marks)
- In light of the Pt and Pd price variation over the past six months, briefly outline some of the current disclosure rules required to address the needs of this highly evolving arm of mineral exploration? (5 marks)

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A4 Exploration models are a powerful tool. However, blind reliance on a rigid model is a dangerous game.

- What is the principal deficiency in exploration models that are widely used by both explorationists and researchers? (3 marks)
- List three key points that models should be based on and how they might evolve over time. (3 marks)
- Provide an example of exploration for a PGE deposit where the discovery

would not have been predicted by rigid adherence to conventional deposit models.

(4 marks)

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A5 NI 43-101 will have a definite impact on the way we all do business in the mineral exploration and mining industry.

- Apart from the CIM Standards, what foreign codes are also acceptable for mineral resources and reserves? (2 marks)

- What key distinction separates inferred and Indicated minerals resources from measured mineral resources.

(2 marks)

- When is a technical report by an Independent QP required? (2 marks)

- Which types of reports are required to support financings and mergers and acquisitions and when would you submit an assessment report and for what purpose?

(4 marks)

A6 An exploration program manager with a limited budget has to identify cost effective means of sending samples for assaying and make some compromises. Answer all of the following points.

- List three acceptable compromises that will have a minimal impact on the project. (3 marks)

The chosen laboratory does not carry out fire assay for gold and uses AR-MIBK.

- What problems can arise from using this technique? (2 marks)

- What are the analytical assay challenges for PGE exploration? (3 marks)

QA-QC programs are essential at all stages of exploration.

- What is considered the most important stage in the acquisition of data and why? (2 marks)

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PART B MAJOR QUESTIONS (20 marks each - estimated time required **90 minutes**)
Prepare an answer to 3 of the following. Point form can be used as long as the points are complete thoughts, particularly for definitions. Please use headings to separate topics. The use of examples is encouraged.

B1 You are conducting a technical audit as part of the requirements of a due diligence for financing for a well-publicized PGE exploration project in Brazil. The work to date, including RC and core drilling, sample assaying, trenching and geological mapping, has outlined thin, steeply-dipping, tectonically modified mineralized zones within a troctolitic and gabbroic intrusive complex.

Outline the key criteria you would include in your check list, in the field and at the assay labs. In addition, what supporting documentation would you insist on obtaining and which items would you consider the most important in assuring validation of the exploration data.

• (10 marks)

The company in question uses combined Pt, Pd and Au assay values and has been reporting grades as gold equivalents. Discuss the issues and/or problems associated with this style of reporting.

. (10 marks)

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B2 In the past few years, exploration of and for highly fractionated, complex rare-metal granitic pegmatites has seen a resurgence in North America and elsewhere worldwide.

Briefly discuss the reasons why these intrusions have become such an important target in today's exploration climate. In your discussion, provide examples of what exploration methods are best used to identify these targets, at least two examples of exploration targets in Canada, who the key players are worldwide, what controls and affects the price of some of the obtained commodities, and where financing for such projects is obtained.

. (20 marks)

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B3 In Ontario, industrial mineral production, especially construction materials such as gypsum, aggregates and dimension stone, is a significant source of revenue for the Province.

Outline the critical steps you would take in exploring for and/or acquiring a gypsum operation in Ontario. In particular, address the considerations required when preparing an exploration program, the current and future impacts on project viability and what sources of information you would use. In addition, briefly discuss the pros and cons of developing standard versus specialty end products, the importance of value added vertical integration for your company and whether you would concentrate on local or North American markets in general.

. (20 marks)

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B4 Discuss how supply and demand factors and commodity prices impact on the exploration cycle for PGE's and zinc. Provide examples of the sources of supply, how the reality and perception of a commodity price increase affects a company's ability to develop exploration

and mining projects for these commodities and the role of currency exchange rates.

- (20 marks)

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End of Exam