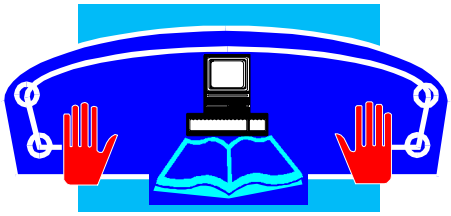

Mining Training In The Northwest Territories - Developing A Strategy: A Discusion

Type of Study: Plans/strategies

Date of Report: 1989

Author: Arctic College, Yelllowknife

Catalogue Number: 6-3-82

6-3-82

MINING TRAINING IN THE NORTHWEST TERRITORIES

DEVELOPING A STRATEGY
A DISCUSSION

ARCTIC COLLEGE,
YELLOWKNIFE, N.W.T.

MINING TRAINING IN THE N.W.T.

EXECUTIVE SUMMARY

"Where are we?" and "Where do we want to be?" are the two questions that have to be answered in the development of a Northern Mining Training Strategy.

"WHERE ARE WE?"

The mining sector is the number one, non-government industry in the Northwest Territories. Mineral production has almost reached $800 million. Exploration has exceeded $80 million annually. Of the 1745 people employed in mining, 66% are northerners and 9% are native. Of the up to 350 people employed in exploration the proportion of northern employment is even lower. Neither the government, nor the mining industry supports any formal training or education in the mining industry.

"WHERE ARE WE GOING?"

While the mining industry plays a key role in the economy, its potential for supplying increased benefit to the north is large:

- The mining industry can contribute substantially to the increased employment of northerners.

- It can provide substantially more economic wealth by developing the largely untapped mineral wealth of the north.

"HOW DO WE GET THERE?"

Training and education are required.

Training will supply workers with the skills they require for meaningful employment in the mining industry. Technical training should occur in two areas: mining and exploration. The success of previous programs elsewhere, combined with the requirements of the northern mining industry suggest that training should be provided in the following areas:

Exploration:
- Prospector
- Geophysical Operator
- Geological Technician

Mining:
- Pre-employment Mining
- Mill Operator

This technical training must be augmented with instruction in first aid and safety; life skills and adult upgrading may also be provided where required.

Education of the general public will improve the public's perceptions and knowledge of the mining industry. A knowledgeable, well-informed public can favorably influence future mining growth. This will be especially important for developing mining within the recently introduced concept of sustainable development. Education should occur on two levels: at the grade school level, through public school educational programs, and at the adult level through promotional campaigns.

Government financial assistance may be required to link training and employment. Financial assistance programs used previously include employer subsidies and prospector assistance grants.

Training is required to increase the employment of northerners in the mining industry. Coupled with education and promotion, this increased employment will improve northerners' perceptions of the mining industry. Implementation **of such a strategy will promote the industry's growth, and enhance its future economic contributions to the Northwest** Territories. To ensure the success of such a northern mining training strategy, it is recommended that the mining industry become a major partner early in its development.

INTRODUCTION

In September, 1989, it was agreed that Arctic College would present to the Mine Training Committee a conceptual mining training strategy for the Northwest Territories. The following report summarizes data gathered from various sources by Arctic College staff, and then proposes for discussion, a general mining training strategy for the Northwest Territories.

This study consists of four parts: in Part I, a need for mining training is justified; in Part II, mining jobs and training are identified; in Part III, training programs are recommended; and in Part IV methods of enhancing mining employment are proposed. Sources of information are found in Appendix I.

Note that references made to the mining industry refer to mining and exploration.

PART I: JUSTIFYING A NEED FOR TRAINING

In developing any northern training strategy, the fundamental question that must be asked is "Why deliver training?" In the N.W.T., especially, the answer is to enhance employment of northerners, and indirectly benefit northern society by contributing to:

- an increase in the standard of living,
- an increase in education, training and skills,
- a reduction in social problems and their costs to society.

The mining industry is the largest non-government contributor to the economy. Statistics indicate that it is an attractive market for training:

- it produces nearly $800 million from mining annually,
- it spends an additional $80 million annually on exploration,
- it employs 1745 people in mining, and up to 350 people in exploration,
- it delivers few, if any, comprehensive training programs for northerners,
- it hires only 66% northern residents for mining; less in exploration,
- it hires only 9% natives.

In summary, the low rates of northern **employment,** and the lack of training and education in an industry as large as the mining industry clearly indicates that a need for mining **education,** training, and subsequent employment exists in the Northwest Territories.

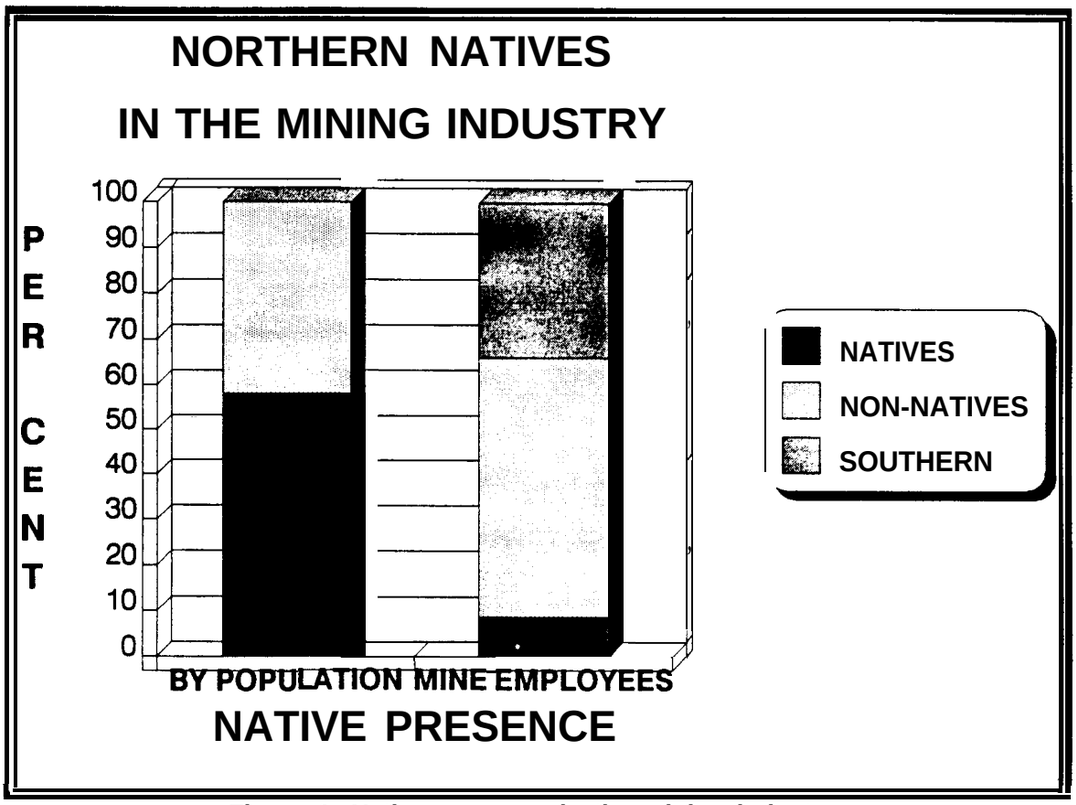

Figure 1: Native presence in the mining industry.

PART II: MINING EMPLOYMENT AND TRAINING IDENTIFIED

I. IDENTIFYING THE EMPLOYERS

The northern mining industry is broken into two areas of employment: mining and exploration. Broadly speaking, they differ in their size, the living and working conditions under which each is conducted, and the permanence of each operation. Mines are small communities, while exploration takes place at relatively small bush camps: living and working conditions at each is quite different. While mining is relatively independent of minor commodity price fluctuations, exploration is very sensitive to market fluctuations. Thus, mining has a relative permanence that is not reflected in exploration.

A. Mines

Northern mines can be subdivided into three somewhat distinct groups of employers:

1. The first group consists of the old, established, and unionized Yellowknife gold mines. These mines have made no formal commitment to hiring northerners. Their hiring standards are the highest in the N.W.T. and they wish to hire workers with a minimum grade 12 vocational diploma. They have little problem finding qualified applicants, and hire many second and third generation sons and daughters of past employees. Employee turnover at these mines is low, as is the demand for pre-employment type training.

2. The second group consists of the newer, non-unionized operations of Nanisivik, Polaris, and Lupin. These mines have made either formal or informal commitments to hiring northerners. Because they have had difficulty finding highly qualified native northerners, these mines will hire workers with lower educational backgrounds. Employee turnover rates are moderate to high, and pre-employment training will be of value to them.

3. The third group comprises new mines. At present, this group is represented solely by the Colomac Mine; however it may be augmented shortly by up to 5 new mines. Mines in this group are distinct from those of the second in that, being new, they have a large need for trained personnel to fill the many positions vacant at start-up. If new mines make the same commitment to hiring local northerners as Colomac Mine has (at least 25%), the demand for pre-employment training will be greatest in this group.

B. Exploration Companies

Exploration companies are employers quite distinct from mines. These companies are predominantly based in southern Canada but conduct exploration in the north on a seasonal basis, They have no formal commitment to hire northerners. The majority of their employees consist of geology and geophysics graduates, students from university and technical schools, prospectors, and self-taught, “wilderness wise”, semi-skilled

labourers. Demand for trained exploration workers can be relatively high, but is dependant on the commodity market.

II. IDENTIFYING THE JOBS

In 1988, the Department of Education and the N.W.T. Chamber of Mines sponsored the Mining Labour Force Survey. This survey identified the numbers and types of jobs available in the mining industry and the essential qualifications required for each job. While the numbers of employees in each job area good guide for estimating training needs, the Mining Labour Force Survey, in itself, was not viewed as a training needs survey.

Jobs in the mining industry cover a wide spectrum, ranging from entry level labourers to tradespeople to professionals. Essential qualifications range from grade 8 to trades certificates to university degrees.

The mining jobs identified by the Labour Force Market Survey and within the scope of this strategy consist of the following:

Mining
- underground, eg., miners, trammers, etc.
- open pit, eg., drillers, blasters
- mill, eg., operators
- geological, mining, and survey technicians, plus assistants

Exploration:
- prospectors
- diamond drillers and drill helpers
- geophysical operators
- geological technicians & technologists

Exploration jobs were not accurately accounted for in the Mining Labour Force Survey due to a poor response from exploration companies. To help correct this, the N.W.T. Chamber of Mines, in cooperation with Arctic College, is presently polling these companies to determine their needs for prospectors, geophysical operators, and geological technicians.

III. IDENTIFYING THE TRAINING NEEDS

Two surveys have identified specific mining training needs.

A. Arctic College Surveys

In 1989, Arctic College researched various training programs offered on site by several mines, as well as those offered by other training institutions. The organizations contacted, and the training they offer are found in the Appendix.

Past training successes and general industry opinion indicate that mining training programs in pre-employment mining, mill operating, prospecting and geophysical surveying will have the greatest probability of success; the viability of underground

mining training is somewhat lower. All organizations indicate that safety must form a strong component of any training program.

B. Mining Safety Survey

As a result of tragic accidents in 1988, the Department of Justice commissioned a study to assess mine safety training needs in the N.W.T. The study recommended and outlined ways in which the N.W.T. Government could ensure that safety becomes a high priority in the mining industry.

Amongst its findings, the review expressed opinions that the N.W.T. Government might be able to play a role in preparing employees for mining employment by providing training in the same areas outlined by Arctic College's research. As well, the safety review suggests that the government might also sponsor training in the areas of helicopter safety, maintenance functions, and pre-employment training in life skills and literacy upgrading.

The study was quick to point out that although the government might find useful roles to play, training for jobs such as underground miner is best conducted by mine persomel, on site.

C. Successful Mining Training - A Consensus

The surveys and studies reveal a consensus for training in the exploration industry in prospecting and geophysical operating, and in the mining industry in milling and pre-employment mining. The surveys all stress that first aid and safety training must be included in all training programs.

PART III: RECOMMENDED TRAINING PROGRAMS

It is recommended that training be offered to northerners in the areas of exploration and mining.

I. EXPLORATION TRAINING

It is recommended that training programs be developed and offered to students who wish to become prospectors and/or geophysical operators. These two courses can form the basis for a future geological technician program, should industry demand warrant it (Fig. 2).

A. Prospector

The prospector course will give the student the necessary skills to effectively carry out prospecting programs either on his own, or while employed by mining or mineral exploration companies. Basic prospecting procedures that will be taught include camp construction, staking, establishing control grids, blasting, and sampling. Technical instruction will be given in rock and mineral identification, structural geology, mineral

deposits, use of the various types of maps and aerial photographs, geological mapping, and report writing. In addition, the student will receive training in safety, first aid and CPR, and life skills. The prospector course will provide a firm foundation for the geophysical operator course.

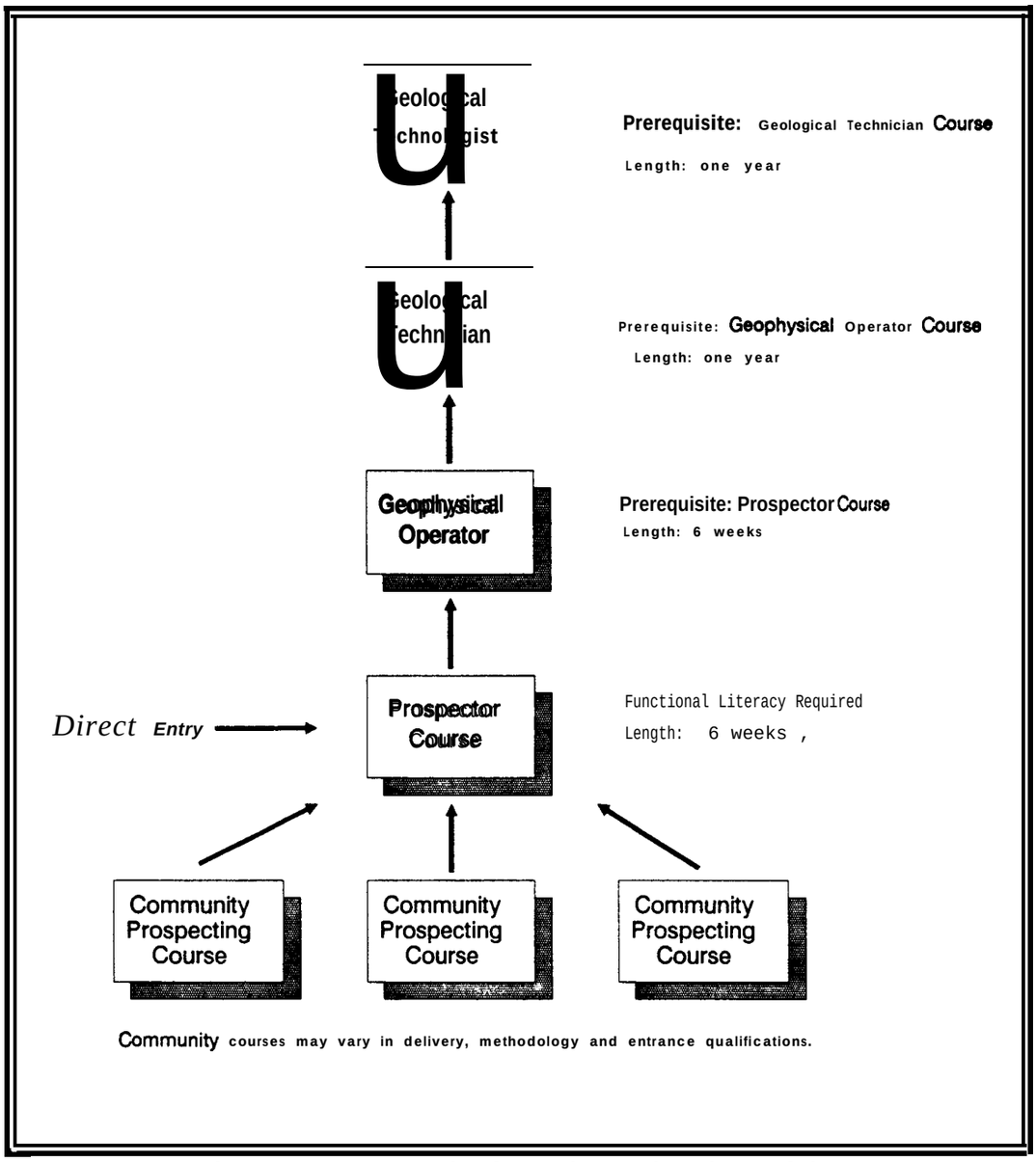

Figure 2: A proposed scheme for exploration training.

B. Geophysical Operator

The geophysical operator course will provide the prospector with training in the physical properties of rocks and minerals, elementary physics, (magnetism, electrical conductivity and resistivity), geophysical instruments and their use, the elements of a geophysical target, geophysical models, survey grid construction, conducting various geophysical surveys, including magnetic, VLF-EM, gravity, and self-potential surveys. Students would be taught how to hand plot data, as well as how to transfer digital data to computer.

II. MINING TRAINING

It is recommended that mining training courses be offered in pre-employment mining and milling. Pre-employment training would provide a good foundation for advancement into mill operator training.

A. Pre-employment Mining

Pre-employrnent mining training would better prepare northerners for employment in operating mines. Students would be taught the nature of the mining industry, and the various methods of mineral extraction. Basic instruction would be given in the use and operation of basic mining equipment such as pumps, motors, piping, valves, and conveyors. Introductory milling theory would be taught in crushing and grinding. To complement this technical training, students would receive training in life skills, first aid and safety, CPR, and hazardous materials handling.

B. Mill Operator Training

Graduates of this course would be prepared for employment in most mills. Students would be introduced initially to the nature of the mining industry, and how the role of milling is crucial to its success. This would be followed by technical training in all aspects of mill operations from crushing and grinding to flotation and dewatering. Instruction would culminate in overviews of the various mills in the N.W.T. with special note given to their differences. The mill operator training program would be complemented with training in life skills, first aid and safety, CPR, and WHMIS.

PART IV: ENHANCING MINING EMPLOYMENT

The provision of appropriate training is only the first step in successfully employing northerners in the mining industry. Fluctuating market conditions, changing training requirements, public perceptions, and the availability of financial assistance, are some of the factors that will affect the successful employment of northerners in the mining industry. To enhance the employment of northerners, these factors must be addressed.

I. TARGETING APPROPRIATE EMPLOYERS

The success of a training program is measured by the number of its graduates that find employment. To assess the ability of employers to hire trained graduates, one must consider their need for employees, their employee turnover rates, and the essential qualifications these companies require of applicants. For example,

- Older mines have relatively low employee turnover rates and hire few people; on the other hand, new mines require large numbers of employees to fill positions vacant at start-up.

- Most mines in the N.W.T. have low non-native employee turnover rates, but high native employee turnover rates.

- Mines in Yellowknife require grade 12 graduation; mines outside Yellowknife will accept lower qualifications.

II. IMPROVING THE MINING INDUSTRY'S IMAGE

Supplying training and jobs in the mining industry will not guarantee successful employment of northerners. To attract students into mining training programs, students must perceive the mining industry as being a good place in which to work. There is some doubt that the majority of northerners perceive the industry as such.

The recent survey by the Mining Association of Canada indicates that while Canadians generally recognize mining as being economically important, a large portion of the public perceive mining as unsafe and environmentally unfavorable. These perceptions are present in the north as well: the industry has been plagued by several tragic mining accidents and, the proposed development of a uranium mine in the Baker Lake area is being challenged because of environmental concerns. For the mining industry to maintain its position as the cornerstone of the northern economy, it is important that it improve its image.

There are several ways in which northerners' perceptions of the mining industry will improve:

- Increased employment of northerners,
- Increased mining and safety education to promote industry knowledge and reduce mining accidents,
- Campaigns promoting the benefits of the mining industry, and
- Education at the school level (K through 12), to promote the mining industry by educating students in geology and mining. (Note: Such classes were taught at several N.W.T. high schools in the late 1960's and early 1970's.)

III. TAILORING TRAINING NEEDS

Culturally, northerners are a different group than southerners. They have closer ties to the land, to their communities, and to their families. As a result, many native northerners have difficulties leaving their surroundings for any great length of time.

These cultural differences have adversely affected the success of past training and employment programs. Many students (and employees) would not stay away from their families, communities, and land activities for long periods of time. As a result, they abandoned their jobs and studies to return home.

Most styles of formal instruction do not allow students to leave after only a short period of study. Students who abandon their studies receive little except feelings of failure, frustration and disappointment.

The State of Alaska is having considerable success with the delivery of short, modular training (Fig. **3).**

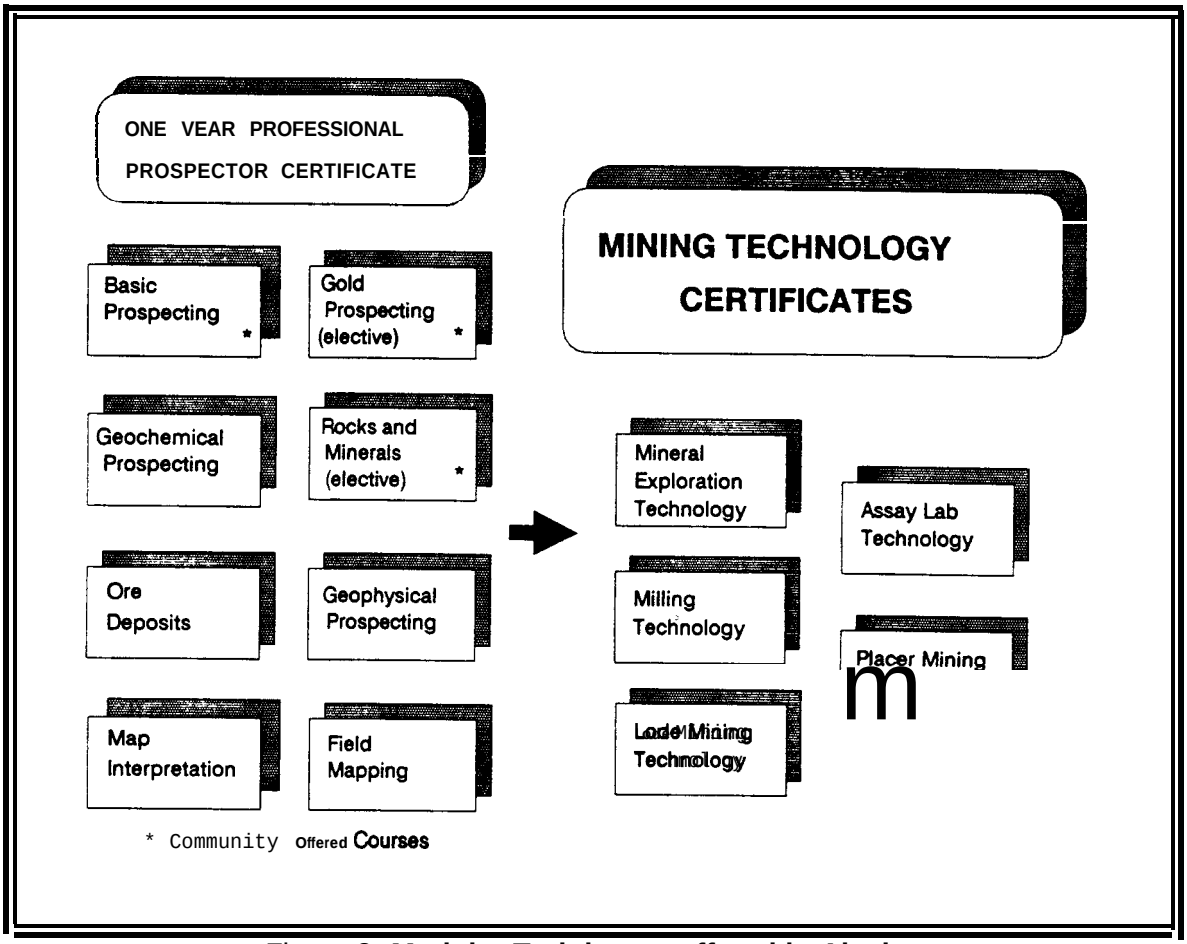

Figure **3: Modular Training as offered in Alaska.**

There are several advantages to Alaska's style of training:

- Short training periods allow students to return to their settlements, families, or jobs more quickly.
- Modular training gives a person with a lower educational level the opportunity to enter a study program. With upgrading, the student can move onto subsequent modules.

- Short modules allow more programs to be delivered at the community level.

The net benefit of short, modular training is that students continue to enrol in, and complete training programs. Eventually, they acquire enough modular certificates of completion to receive a diploma.

The modular style of mining training that Alaska offers maybe applicable to the Northwest Territories, given their cultural and geographical similarities.

IV. SUPPLYING FINANCIAL ASSISTANCE

Government financial assistance maybe necessary to provide a link between training and employment.

Wage subsidy programs, such as those sponsored by Employment and Immigration Canada and the G.N.W.T. at the Colomac Mine, can help defray the extra costs incurred by employers during training.

Prospector assistance grants can help to defray expenses incurred by the self-employed, independent prospector. Many provincial governments place great importance on maintaining an active prospecting community in their provinces. To assist in this, these governments provide prospectors with financial assistance grants. Prospector assistance grants have not been available in the N.W.T. since 1985.

CONCLUSIONS

The Northwest Territories is naturally endowed with an abundance of geology that has created a viable, productive mining industry. The largely untapped resources of the north will lead to increased growth in the industry, and a concomitant increase in the need for trained workers. The increasing influence of native groups will add to this need for mining training.

At present, there are no formal mining training programs in the Northwest Territories. Statistics partially reflect this: only 66% of mine employees are northerners, and only 9% are native northerners. The current size of the mining industry alone warrants dedicated mining training programs; the projected growth of the industry will tax this need for training even more.

Only through a strategy that combines the delivery of dedicated mining training programs with the promotion of mining awareness through education, will northerners and the mining industry receive the interest to help one another develop a mining industry that is truly northern. Industry and the public must seethe mining industry and the training of northerners for employment in it, as good for the Northwest Territories.

APPENDIX - SOURCES OF INFORMATION

Abele, Frances, 1989, Gathering Strength: Training Programs for Native Employment in the Northwest Territories; Komatik Series 1, The Arctic Institute of North America of the University of Calgary.

Alaska; Various educational programs for all levels of the education. Alaska has taken a firm stance on providing mining education to all levels of students from kindergarten to post-graduate. The University of Alaska, Mining Extension offers a wide range of mining classes state wide: at the Northwest College in Nome, at the university's Applied Mining Technology Program and School of Mineral Engineering at the Institute of Mining Technology. Some programs are especially designed for high school/college entry level training; others offer vocational training in mineral exploration, explosives, mine safety, and surface and underground operations. The Alaska Miners Association Education Committee and the Alaska Department of Commerce and Economic Development developed a mineral and energy resource curriculum for use in primary and secondary schools. The Alaska Department of Education directed and coordinated teacher development and disseminated materials.

British Columbia Chamber of Mines; The chamber conducts an evening class study program in introductory prospecting. U.B.C. professors and students assist in general geology instruction, while industry geologists teach economic geology. Graduates of this program can go onto take the B.C. government's advanced course described below.

British Columbia, Ministry of Energy, Mines and Petroleum Resources; Advanced Prospecting Courses, Prospector Assistance Grants. They offer prospecting courses at the community level. These lead to an advanced prospecting course conducted once a year, for the last 13 years. It is highly regarded by industry.

Cominco Ltd., Polaris Mine; Discussions with mill staff indicate these manuals are site specific, task oriented training manuals, similar to those of other Canadian mines.

Falconbridge Ltd., Copper Cliff, Ontario; Mill Operator Training Manual. This manual consists of site specific, procedural operating instructions for Falconbridge mill staff.

Giant Yellowknife Mines Ltd.; Mill Personnel Training Program; This training program is performance oriented, site specific, and provides detailed checklists for operators to follow when operating Giant's mill equipment.

Into Ltd. in cooperation with Cambrian College; These two groups are developing a pre-employment training program. The course will last 12 months, of which 4 months will be on the job with Into. Students must have at least grade 12, and will be taught in all aspects of mining, including mill and underground operations. Into makes no guarantees to hire graduates, however students with a good

class record as well as work record, will have the greatest chance of being employed by Into.

Lupin Mine; Training manuals are site specific. However, this mine has offered seminars to employees on specific uses and operations of milling equipment. They have agreed to donate this material to any future mill training program.

Madonna, J.A., 1986, Education and the Mining Industry; in, A Guideline Workshop Directed at Developing a Working Model for Implementation of a Mining Technology Program at Whitehorse, Yukon Territory, Canada; a collection of papers and correspondence by J.A. Madonna, Associate Professor, Mining Extension, University of Alaska, Fairbanks.

Madonna, J.A., undated, A Proposal for Modernization of the Mining Extension Program; Mining Extension, University of Alaska, Fairbanks; in, A Guideline Workshop Directed at Developing a Working Model for Implementation of a Mining Technology Program at Whitehorse, Yukon Territory, Canada; a collection of papers and correspondence by J.A. Madonna, Associate Professor, Mining Extension, University of Alaska, Fairbanks.

McKinlay, D.W., 1989, Needs Assessment Review: N.W.T. Mine Safety Training; A study conducted for the Department of Justice, Northwest Territories.

Mining Association of Canada, 1989; Canadians' Perceptions and Attitudes Towards the Mining Industry and Related Policy Issues; a national survey on mining conducted by Angus Reid Associates.

Nanisivik Mines; These manuals are being rewritten. Discussions with mill staff indicate they are site specific training manuals.

Nerco-Con Mine; Modular Training Program for Mill Operators. This training program is task oriented, site specific, and requires that operators be able to show competency in completing specific tasks.

Northwest Territories, Department of Education, 1988, Mining Labour Force Survey; Sponsored by the Department of Education, G.N.W.T. and the N.W.T. Chamber of Mines.

Ontario Geological Survey; Prospector Training, Prospector Assistance Grants.

Ontario Ministry of Skills Development; Milling-Common Core for Basic Mill Process Operations - Mineral Ore; These skill training standards specify the knowledge components of various mill operations, and the minimum performance standards required for each. They are guidelines to help mining companies develop site specific, task oriented training programs.

Saskatchewan Energy, Mines and Resources; Prospector courses for northern natives have been conducted successfully for some years. They have developed a training manual that was used in Rankin Inlet last year.

SIAST (Saskatchewan Institute of Applied Science and Technology); SIAST has developed training manuals for underground miner and mill operator, and

prospector and geophysical assistant. They successfully have offered the underground miner course at Hudson Bay Mining& Smelting Company's Flin Flon mine, as well as the prospector and geophysical assistant courses at various locations.

Yukon Chamber of Mines; Prospector Training, Working group discussions on mining training. Their industry is highly supportive of exploration training and have been pressuring Yukon College to offer instruction introspecting and geophysical operating. The College had planned to teach these courses this past fall, however funding problems prevented this. Some support has also been shown for entry level mill operator training. The Chamber itself has offered introductory prospecting courses to the public.

Yukon, Economic Development: Mines & Small Business; Prospector Assistance Grants, Exploration Incentives Program.