

House of Representatives Standing Committee
on Industry and Resources

30 APR 2003

Submission No: *113*

Date Received: *8 May 2003*

Secretary: *[Signature]*

Denis J. Rafty
6 Kintore Place
Padbury WA 6025

29th April 2002

The Hon. Geoff Prosser, MP
The Chairman
Inquiry into the Social, Fiscal and Environmental hurdles to Exploration
82 Blair Street
Bunbury WA 6230

Dear Mr Prosser

**Re: Inquiry into the Social, Fiscal and Environmental hurdles to
Exploration**

I am writing to you on how the social impact of the current down turn in exploration has affected geologists. I was motivated to respond to you after two recent articles were published in the Business section of the West Australian newspaper (2nd April – page 49, 3rd April 2003- page 45). These two articles outlined the devastating downturn in exploration and the proposals for tax incentives to reinvigorate investor interest in exploration. These proposals were in a report handed to Federal Resources Minister Ian Macfarlane whom it is reported as having commissioned your inquiry into exploration impediments. My letter will outline to you issues which are a continual embarrassment to the Australian Mining Industry. Consequently these issues would not have been alluded to in the Mining Industry submissions.

I am a geologist (52 yrs old) of some 26 years post graduate experience in exploration. At least 22 years of my career could be considered as continuous employment in the exploration industry. At least the last 4 years could be considered as continuously unemployed – semi employed in the exploration industry. I have a wife and 4 children (ages of 19 yrs, 18 yrs, 15 yr and 11ys) to support. Consequently their future prospects have depended on my job security as I am the only breadwinner in the family.

In April 1999 the company group (Nexus Minerals NL / Reefton Mining NL/ Conquest Mining NL) I had been working for under contract since 1994 could no longer employ me because of the failure to raise capital to continue exploration. At the time most explorers were in a similar situation resulting from the Dot.Com boom, falling commodity prices, Native Title restricting access and the Asian economic crisis effects. **Consequently for the first time in the history of the Australian Mining Industry a large sector of its**

workforce was without work – in particular geologists and drillers engaged in exploration.

On the 9th April 1999 I attended an historic meeting in Perth between geologists and politicians to discuss the crisis in exploration. Several hundred people attended the meeting which resulted in a self help group (AGSEAN) of geologists being formed. AGSEAN sponsored fortnightly meetings and lobbied politicians to raise the awareness of the plight facing the Australian Exploration Industry. At this historic meeting I was **visibly shocked** to see my fellow unemployed colleagues – many of whom I had worked under, alongside and even attended university with them or listen to them giving scientific papers at conferences. I realised then this down turn in exploration was going to be long and severe – like no other in the so called “commodity cycle”.

I registered for unemployment benefits in April 1999 and was only able to secure part time cleaning work of a few hours/ week to supplement the Newstart allowance. From April 1999 to July 2000 I continued to look for geological positions without success whilst receiving Newstart which was supplemented by limited cleaning work . In July 2000 I secured approximately a weeks geological work with Conquest Mining but it was “too little - too late” as the saying goes.

In June 2000 I had decided to go back to university to undertake a Graduate Diploma of Science(Information Technology) majoring in multimedia at Edith Cowan University. I had decided to become a multimedia producer and web page designer. I commenced the course in July 2000 and graduated in December 2001. Whilst undertaking the course I managed part time cleaning and received Austudy covering 2 out of the 3 semesters of the course.

At the beginning of 2002 there were signs of an improvement in commodity prices; Native Title issues were being streamlined; and investment was returning to the Australian Mining industry as a result of the Dot Com Bust which meant my study was ill timed. I had missed the” multimedia boat” and was \$7,000 out of pocket for my efforts.

The improved outlook for exploration in the early part of 2002 gave me the opportunity for 3 weeks contract geological work with Pilbara Chromite Pty Ltd from March – April 2002. Unfortunately poor geological employment conditions returned until the middle of 2002. Between April – July 2002 I was receiving Newstart allowance which was being supplemented by limited cleaning work.

In July 2002 I obtained further contract geological work with Wedgetail Exploration NL until October 2002. The work was supposed to continue to December but the company had money problems and was forced to cancel the contract. The continuing improvement in exploration activities gave me the

opportunity of further contract geological work with WMC – Exploration from late October – early December 2002.

I began the year 2003 in an optimistic frame of mind believing the exploration downturn was now over and an upswing in exploration activity was underway. Since the beginning of the year to the present day there have been over 50 exploration geologist positions advertised in addition to an equal number of mining geologist positions advertised. Almost without exception these positions were for work in Western Australia. Consequently I have applied for the exploration positions. One would have thought considering my extensive exploration background my services would be highly sought. On the contrary I have been rejected for all exploration positions advertised and applied for.

The common denominator for my rejection was my age and experience for the position advertised which called for geologists with 0 - 7 years experience with an anticipated age range of 21- 31yrs. I had concluded age and experience discrimination is widespread throughout the mining industry. Remuneration rates have no bearing on the issue as I have agreed to work at the rate being offered under the same conditions as for a junior geologist. In recent weeks there has been an ironic twist with substantial increases in the rates for junior geologists being offered prompted by the lack of available juniors on the market.

On the 2nd April 2003 all my suspicions as to what is going on in the mining industry has been confirmed by a telephone call from Mining People International personnel consultant Heather McIntyre. Apparently the market is currently drained of any available geologists in the 0-10 years experience. There are “stacks” of jobs around but companies only want to employ people with 0 - 10 years experience at rates below \$300/ day on contract with no allowances. Heather said 12 months ago they were flooded with people with all experience levels seeking work. But now the only people left actively seeking work are seniors mostly with >20 years experience.

It appears most geologists seeking work have now switched careers and are either real estate agents; insurance agents; human resources consultants; teachers; business proprietors of lawn mowing rounds, newsagent, milk rounds etc; computer technicians and programmers; teachers; brickies labourers; taxi drivers, couriers and truck drivers and even cleaners like myself.

Heather was ringing to inform me of the outcome of a position I had applied for 2 weeks earlier. Heather said Perilya Ltd had rejected my application for a 2 week mapping assignment as I had too much experience. They only wanted a junior geologist. Heather said the problem stems from wide spread retrenchments/ takeovers in the industry since 1997 resulting in **relatively inexperienced and personally immature geologists being promoted into**

management positions previously filled by high calibre senior geologists. These “junior managers” in their early 30’s are now protecting their positions by refusing to hire senior people whom they regard as a continuing threat to their newly elevated role. Consequently us seniors are “off the menu” with our geological careers very abruptly & rudely finished. I thought it was me as to why I am being continually rejected. Heather assured me it wasn’t as it is happening to a large sector of us senior geologists. **“Employment assassination” is now being practised by a large number of junior – mid level geologists to prevent senior geologists re entering the industry.**

In conversation Heather said they have experienced problems with the placing of 0-10 years geologists. Many of these geologists quit jobs when a new and better offer comes their way. A lot of the time this happens is a week into a contract. Mining People International have to bear the cost of finding a replacement which means the hiring of another 0-10 years experienced geologist who is likely to do a “runner” as well.

You can now understand just what a “joke” the entire employment issue has become. Heather said finding available 0-10 years experienced geologists for their clients is proving not to be economically viable for her company. Consequently they are now informing clients that unless they are prepared to have the position filled by a more senior person then they cannot help them. I never thought such action by a labour hire company firm would ever happen but it is.

Heather’s comments have been echoed by employment consultant Ted Hansen of mining labour hire firm Cube Consulting Pty Ltd. Ted said exploration and mining companies have yet to “squeal louder” before they will consider hiring senior people to do the work they want juniors to undertake. Until then he advised me to keep pestering them and just one day someone will take the giant leap and hire me. Till then it is cleaning and the dole for me.

The Social Impact of Unemployment for the Australian Mining Industry

The ramifications of **age and experience discrimination practices** coupled with **cyclical downturns** in exploration has critically weakened the future contribution of the Australian Mining & Exploration Industry to the Australian economy. Movable mineral resources are finite entities requiring “upstream” exploration for new sources to replace the mined out “downstream” ore bodies.

The Australasian Institute of Mining & Metallurgy, Australian Institute of Geoscientists, The Chamber of Mines, The Association of Mining & Exploration Companies, The Strategic Leaders Group and other geoscientific organisations have all made submissions to Federal Resources Minister Ian Macfarlane on impediments to exploration. An interesting and overlooked

component of these submissions is the human contribution to the exploration and mining development cycle.

Employment consultants live by the motto “people are your most important resource”. The underlying and subtle message being delivered by all the mining industry submissions is “mining & exploration people are expendable and can be easily obtained when needed”.

The human contribution starts in High Schools where students are taught the very basics of geology and the contribution of Australia's mineral resources to the economy and to our standard of life in Australia. At TEE level students are adept enough to start to investigate the long term potential of career paths opened to them. The re employment of geologists into the teaching profession has provided students with an accurate source of information to give them the facts on what a life lies ahead of them in the mining & exploration industry. It is highly unlikely students will be given glowing reports of a career in the mining & exploration industry by their mentors; or from researching newspaper articles; or viewing electronic media on the current status and prognosis for the Australian Mining & Exploration industry.

The current cyclical down turn and age discrimination practices has given prospective university geology students a clear picture of a limited career spanning 10 years after graduation. No geologist in their early thirties with a young family would like to be made redundant simply because they had accrued more than 10 years experience. **Consequently TEE students are switching their attentions to other professions where there is some guarantee of a career path beyond 10 years and even beyond 20 years.** I have two children studying at UWA and neither of them intend to pursue a career in the mining industry and have opted for courses guaranteeing them a stable and long career path outside the mining industry.

The switching of career interests has seen a dramatic fall off in geology student numbers at universities throughout Australia since 1997 which marked the beginning of the current downturn in exploration. Some universities have closed their Science Faculty geology departments (i.e. at UNSW) whilst others have trimmed their geology departments offering only servicing units in other faculties like Engineering (i.e. at UWA). **The end result is an ever shrinking pool of graduate geologists throughout Australia since 1997.** Unemployed academic geologists have swelled the ranks of the unemployed seeking employment in the mining and exploration industry. Many of these academics are senior geologists with international reputations. Consequently they have been sidelined by “Industry” as they pose a greater threat to the junior managers than “mainstream” geologists.

Under the backdrop of reduced numbers of senior people to guide and instruct new geology graduates many skills are not being passed on or

errors corrected in the working practices of new geology graduates.

Consequently an overall lowering of geological standards is occurring generating errors costing industry millions of dollars. Overall since 1997 a generation of "first hand" geological knowledge has been lost with the "sidelining" of experienced senior geologists. My "first hand" knowledge of a multitude of geological prospects is not being utilised in any capacity. Consequently many duplications in field work and prospect evaluations are occurring throughout Australia simply because previous workers in the field are not being engaged in dialogue or employed. **A wealth of geological knowledge and expertise is being ignored in the politics of employment.**

The current shortages of suitably qualified and experienced Australian geologists in the 0 – 10 year experience bracket has meant any anticipated upswing in exploration and mining has to be sourced from overseas. International company corporate takeovers of Australian companies has generated an influx of overseas geologists on working visas. In addition seasonal "backpacking" overseas geology graduates on working visas have added to the employment pool.

The overseas geologists have successfully filled the needs of companies at the expense of unemployed senior Australian geologists. Consequently the prognosis for the unemployed senior Australian geologist remains grim unless the Federal Government invokes restrictions on the entry of overseas geologists and introduces laws to prevent age discrimination based on experience levels.

The demographics of the mining and exploration industry has changed considerably since 1997. Kalgoorlie is regarded as the hub and barometer of the mining and exploration industry in Western Australia. Since 1997 Kalgoorlie has seen an outflow of residents to Perth or other capital cities and rural centres interstate as a direct result of mining and exploration retrenchments. Real estate prices have fallen with a corresponding increase in the number of available owner occupied and rental properties on the market. **All facets of the Kalgoorlie community life have suffered.** Schools have lost students, businesses have lost trade and family breakdowns have occurred resulting in the splitting of families. My former university class mate Gill is driving a haul pack dump truck in Kalgoorlie whilst his divorced wife and children live in Perth. Gill is a "broken man" resigned to the fact he may never return to his chosen profession. It is ironic when companies source junior geologists from Perth to live and work in Kalgoorlie there are senior geologists like Gill who are denied consideration for these positions.

The various submissions placed before the government to review all draw references to more than 3,000 geologists across Australia as having left the profession since 1997. On average most of these geologists would probably gross \$60,000 per annum in salary translating to **\$180 million** in lost salary

earnings for the profession. Most of the 3,000 + geologists have now switched careers and would have had their average annual earnings slashed by at least half to match average earnings across Australia. This translates to at least **\$90 million** net loss in gross earnings from the Australian economy. For my own situation my average earnings were above the average for geologists prior to 1997 but have plummeted to just above the so called “poverty line” from 1999 – 2002. Contract geological work in the later half of 2002 has meant my average earnings returned to the Australian average earnings level.

The industry submissions to the government on impediments to exploration would have mentioned the domino effect generated by the loss of geologists from the income/ job generation cycle for ancillary industries – such as in the chemical assaying, drilling, fuel supply, field equipment, vehicle sales & hire; and catering industries. Government tax revenues have been affected as well with substantial decreases in personal tax, GST, and mineral royalties with declining mineral production. **Consequently job losses in the associated industries have resulted in changing demographics in the mining industry workforce – particularly affecting small regional towns relying on mining incomes for their populations.**

The Mining Industry submissions have claimed job losses in the mining industry are a direct result of the combination of three independently operating factors since 1997. These factors are:

1. Native Title
2. Poor Commodity prices
3. Redirection of Speculative Investment from Exploration to IT industries

An improvement in the exploration prognosis began in 2002 with the acceptance of the reality of Native Title forcing negotiations coupled with improving commodity prices and a return of speculative capital to the exploration industry after the collapse of the “IT boom”. Industry rationalisation with take overs and the re emergence of “junior” exploration activities has been heralded by the advertising of more geologists positions in both exploration and mining spheres. **Unfortunately many geologists laid off from 1997- 2002 have had to take alternative work to feed themselves and their families over a 5 year period of forced unemployment. They have commitments to these alternative jobs and fear the insecurity of the mining industry if they return to work.**

Unemployed geologists like myself having more than 20 years experience and being more than 45 years of age are part of the “baby boomer generation” now representing a major socio economic problem for the Australian Government as we near retirement age. We “baby boomer” geologists started our geological training in the late 1960’s – early 1970’s at a time when Australian exploration was experiencing a lot of activity in iron ore and nickel.

I started university in 1970 when there were over 400 students studying 1st year geology at the University of NSW. I graduated at the end of 1976 from a class of 30 geology students which was an average geology graduate number for most universities throughout Australia. Consequently from 10 universities throughout Australia approximately 300 geology graduates have entered the mining industry each year since the mid 1970's. Many Australian graduate geologists gained work overseas whilst the remainder were inducted into the local mining industry. Regular "boom" and "bust" cycles have culled numbers preventing a glut of geologists servicing the mining industry.

The irony with my present situation is that I entered the mining industry at the end of the base metal boom of the late 1960's to early 1970's and was caught up in the diamond boom of the late 1970's and was ideally positioned for the 1980's gold boom. The recession in the early 1990's affected geologists in the same way the current down turn in exploration has affected our employment prospects. I was fortunate to gain work in iron ore exploration during the early 1990's to insulate myself from the devastating effects of long term unemployment. In the mid 1990's I was able to move from iron ore to gold exploration catching the next "gold boom" till it finally crashed in April 1999.

I first became aware of significant employment problems within the Australian Mining Industry during the recession of the early 1990's **prompting me to write** to the editor of the Australasian Institute of Mining and Metallurgy's Bulletin magazine. My letter appeared in the **October 1992 issue of the Bulletin** magazine (copy attached) in the section dedicated to letters to the editor.

My letter outlined problems and offered solutions for debate. The letter focused on employment structure and the hiring of junior geologists in preference to more senior geologists. Re discovering my letter nearly 11 years later has made me aware **my warnings of the dire consequences had fallen on "deaf ears" and age discrimination practices are still rampant today as they were then**, prejudicing the employment prospects of thousands of men and women geologists over the age of 45 years. Unfortunately the unemployment problem is now 3 times worse than it was in 1992.

Attaching Employment Conditions to any Proposed Tax Incentives for Exploration

I strongly support the submissions before the Federal Resources Minister Ian Macfarlane for tax incentives to stimulate exploration **on one condition**. This **condition** involves the written guarantee of any company wishing to participate in any tax incentive program offered by the Australian Government that they (the company) will not practise age discrimination based on experience levels when hiring geologists. To give this written guarantee some credibility the

company participating in the tax incentive scheme must employ on staff a currently registered unemployed Australian senior geologist > 45 years of age.

The more registered unemployed Australian senior geologists >45 years of age are employed on staff the greater the tax incentive granted to the company.

In addition the participating company must not advertise for specific experience levels when seeking employees. The specific seeking of an experienced level (say 5-7 years experience) candidate is a “backdoor” reference to age discrimination. All advertising must only list duties and minimum qualifications.

The Australian Mining Industry has severe problems with the structuring of employment. These problems have been ignored for decades and have cost industry and the Australian Government lost incomes and opportunities. The “throwing” of tax payer’s monies at exploration and mining companies through tax incentive schemes will not fix these flaws in employment structures unless the Government takes the initiative by forcing the Australian Mining Industry to finally do something about these problems. **Attaching employment conditions to the tax incentive schemes is the most effective way of dealing with the issue of unemployed Australian mining professionals > 45 years of age.** It is the “dose of good medicine” the Australian Mining Industry urgently needs!

If the Australian Government allows for the tax incentive schemes to go ahead without employment conditions then the extra investment flowing into exploration will not put back to work senior geologists laid off over the period 1997- 2003. **Instead companies will advertise overseas for junior – mid level geologists to man field programs ignoring the sizeable pool of Australian senior geologists >45years of age being laid off and either unemployed on the dole or working in alternative jobs.** Consequently unemployed Australian senior geologists like myself will never be able to return to our careers- being condemned to a life on the dole or in a lowly paid job. The loss to Australia is not only measured in lost incomes but also lost knowledge to keep Australia competitive and ultimately affecting the Australian standard of living.

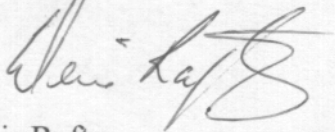
The Australian Government is being given the opportunity to address the issue of unemployment for the over 45 years of age in a most direct political manoeuvre demonstrating to the electorate it has a forward lateral thinking approach to the aged employment problem.

The tax incentive approach with employment conditions could be applied to all industries to keep Australia’s aging workforce in work and off social security. The mounting social security bill we baby boomers are accruing as we grow old will force governments on both sides of politics to implement policies to lessen the impact on taxpayers. Sooner or later our social security

system will have to be seriously dismantled or modified to contain costs. Industry needs a mechanism whereby it is encouraged to keep aging Australians at work.

I look forward to your comments on my letter and of the Australian Government's final position on the tax incentives for exploration.

Yours faithfully

A handwritten signature in cursive script, appearing to read "Denis Rafty". The signature is written in dark ink and is positioned above the printed name.

Denis Rafty

GERMANY SUPPORTS REDUCTION OF CARBON DIOXIDE

Though I agree with most of Don Curruthers' remarks on the 'Significant of the 1992 United Nations Conference on Environment and Development for Australia' (No 3, May 1992), I feel a few remarks may be added.

Not only does Austria and New Zealand stand by Australia as far as the reduction of carbon dioxide is concerned. The German government - most of the time an environmental front-runner - has the goal stipulated as: reduction by 25 - 30 per cent by 2005, based on the emission of 1987. This goal will be especially difficult to achieve as in Germany there exists a very violent opposition to nuclear power.

The warning against a greenhouse effect is much older than most people think.

It was in the summer of 1959 that Professor Helmcke of the Technical University of Berlin told his students of mining and geology that the continued use of fossil fuels will inevitably lead to a warming up of the earth's atmosphere. One of the first signs that this is happening would be: more precipitation over the Antarctic!

On the other hand he pointed out that the deposition of carbon in sediments, as well as coal of all sorts, natural oil and gas since millions of years and still going leads, if continuing, to a reduction of carbon dioxide in the atmosphere and thereby depriving plants of an essential nutrient. Indeed for the earth's plants the increase of carbon dioxide in the atmosphere would be very beneficial. Every medal has two sides.

I hope this letter arrives before the dire predictions of - not only the Australian - media of the imminent flooding of Australia's coastal civilisation become true.

**Dr - Ing Hermann H Opperman
Karben, Germany**

DEBATE NEEDED TO SOLVE CURRENT CAREER INSECURITY

It was refreshing to read at long last that The Institute has recognised the mining industry is not insulated from the effects of the recession through the offering of an unemployment register outlined in the July issue of *The AusIMM Bulletin*. The admission that there are employment problems is like an alcoholic admitting he has a drink problem and joining alcoholics anonymous to rectify the situation. Unfortunately the employment prospects for ALL members of The Institute is looming to be the most significant issue in recent times as there is no longer much confidence in career security in the mining industry.

There has been much debate on unemployment through print and electronic media. It is now a widely held belief among expert opinions that the employment structure of the workforce has changed in all sectors of industry. In the mining industry there has been a gradual shift over the last ten years to the employment of moderately experienced personnel into management positions with the preferential employment of even lesser experienced personnel underneath those managers. There has been a negative effect from these trends of employment leading to large numbers of unemployed highly experienced personnel as well as an increase in the frequency of professional errors by less experienced employed personnel. It would appear that many companies are prepared to carry the errors created by inexperienced personnel rather than employ more experienced personnel to properly supervise the junior staff. Some companies have gone a step further with inappropriate classifications for inexperienced staff. I have come across instances of geologists with some several years experience being classified as senior geologists. More often than

enough inexperienced personnel are placed in very difficult positions by their company's actions and consequently their failures are because of their inability to handle corporate policies beyond their control. These problems are set upon a back-drop of failing exploration/mining companies offering declining working conditions and remunerations. Commodity demand/supply cycles have aided in the declining employment market conditions experienced by The Institute's members.

The issues pertaining to the employment prospects in the mining industry need to be addressed at a special 'Institute Summit'. I would like other members to air their concerns. The lack of admission that there are problems lies in professional stigma attached to being unemployed. To give members something to ponder I think the following points are worthy for a 'Heated Debate'.

1. Registration of all geoscientists, engineers, metallurgists and surveyors involved in the mining industry.
2. Setting of a Scale of Fees for each profession based on specific gradings within each profession as well as setting minimum working conditions.
3. Setting of educational standards for entry into tertiary institution courses in mining industry subjects. I was astounded to read a recent notice for entry requirements into the geology course at the University of WA. The notice indicated that chemistry, maths and physics were not compulsory entry subject requirements for 1995.
4. Request the Federal Government to restrict the number of overseas mining personnel entering on either work visas or emigration programs till at least the employment situation improves.
5. A major restructuring of post-graduate employment with development of subsidised training programs for the first five years. Graduate intakes only to occur through participating companies willing to properly train a young workforce over a five-year period in order to lay the foundations for a stronger mining industry than at present. This scheme would allow more experienced personnel currently unemployed to move back into the workforce and occupy a far more productive role than at present. Ideally medium-large companies would take up all graduates with the junior companies preferentially taking up highly experienced personnel. Remuneration scales will have to be adjusted to fit budget levels of the companies concerned. There is a strong argument for junior companies to employ highly experienced personnel in preference to recent graduates. It all depends whether the company can afford to carry the errors generated by recent graduates. It has been my experience that the source to many mining and exploration failures lie with employment of junior staff when it was more appropriate to employ senior staff. The denominators in selection were salary costs and mobility of a single status person.
6. The setting of minimum experience levels for management roles. This would stop and reverse the trend of the employment of 'The Junior Exploration Managers' so typical of many companies today. The enforcement of mini-

mum experience levels may need the sanctioning by statutory authorities and the Australian Stock Exchange.

7. The need by companies to employ more junior staff than wisdom should dictate is purely economical. Companies have been forced to financially constrain themselves in order to survive. Unfortunately work still needs to be carried out at increased levels. Employing junior staff in preference to senior staff is more 'financially palatable' for companies to digest. The tightening of raising funds on the open market together with land access restrictions and tougher environmental laws has exacerbated the trend of employing more junior staff at the expense of senior staff. I therefore feel some structural staffing guidelines need to be drawn up by The Institute to give companies wishing to involve themselves in exploration/mining activities a clear perception of what would be an ideal personnel structure for their particular capital base.

My views expressed in this letter are meant to encourage debate and to help find some solutions to the career insecurity currently affecting The Institute's members. I have enjoyed a rather satisfying 15 years as an exploration geologist, attaining financial independence and raising a family. Although there have been some tough times, I have no regrets. It is now unfortunate that the opportunities afforded to me over that time may not be available to future exploration geologists graduating from our universities. It is now up to The Institute to show direction and give confidence to us all. At present a new graduate can look forward to at least ten years of productive career de-

velopment before feeling the effects of unstabilising influences described in my letter. Unless The Institute seriously looks at long-term career development issues for its members then it has a limited future. I have heard of reports that at least 1000 geoscientists across Australia are either unemployed or underemployed (intermittent consulting work). My comments on these issues are in part reinforced by dramatic increased advertising by consultants in The Institute's Bulletin - in particular the July 1992 issue.

**Denis J Rafty
Padbury, WA**

FUTURE OF THE AUSTRALIAN MINING INDUSTRY

After 20 years as a member of The AusIMM, I have just finished reading what I consider to be the most important article on the future of the Australian mining industry.

In the July issue (No 4, 1992) of *The Bulletin*, Andrew Simpson describes how school students' attitudes to mining changed after they attended one day of Paceschool 90 (PACRIM 90 Congress).

A survey of students' attitudes showed that community distrust of the mining industry is thorough and widespread; that mining developments are equated with greed; and that there is a poor linkage between raw materials and products and services consumed by the students as members of society.

Thanks to just one day of exposure to our industry, almost 40 per cent of students changed their attitude from being anti-mining to either neutral or promoting.

We should fully support Andrew Simpson's conclusions, that our corporate and scientific leaders must start communicating to the public. Failure to do

so will cause the industry to 'be burdened by the same dreary cycle of mistrust, misunderstanding and emotionalism'.

I believe that we have to get our spokespeople into every classroom and shopping centre in the nation, so that our positive messages can be understood by all Australians.

As a start, may I suggest that the concept of a student day as held at PACRIM 90 be accepted as being a standard part of all future major AusIMM conferences. While speakers of international renown are assemble, it should be an easy matter for several of them to spend an extra half-hour with student groups, extolling the importance of science and the linkage between mining and society's needs.

I commend Andrew Simpson's article to everyone who is concerned about the future of our industry.

**Bernie Masters
Capel, WA**

FINE GOLD RECOVERY - A MODERN APPROACH

The above mentioned article (No 2, April 1992) was restricted at The AusIMM's request to about 2000 words on a topic that I was to select. I chose to discuss a modern approach to fine gold recovery from a field engineers viewpoint, but with some suggestions for research follow-up. I did not choose to deal exhaustively with any one aspect of the particular topic because of the essential inter-relationship of the many factors involved and the lack of available space to deal with each one individually.

However, the precision of fine gold definitions might have been touched upon briefly. The question of what constitutes 'fine' gold has never been satisfactorily resolved. Different operators apply different standards

but resolution of the problem would still be simple if the sedimentation characteristics of all placer gold particles and their associated heavy and light minerals were the same from deposit to deposit; and if the same methods and equipment for recovery were used by all operators in the same way. But there are significant differences and finely divided gold in one set of circumstances may be relatively coarse in another. Professor Buckenham (Letters, No 4, July 1992) has not given his definition of 'fine' gold, but standards adopted by other authors include:

- Wang and Poling (1983) - finer than 200 mesh (74 microns)
- Zamyatan *et al* (1975) - plus 150 mesh (105) minus 200 mesh (74 microns)
- Tinsley (1989) - finer than 105 microns
- Ulrich (1984) - finer than 420 to 149 microns
- Fricker (1984) - finer than 200 microns (based upon metallurgical efficiency)

My own definition of fine gold is: any gold requiring a more than normally sophisticated process for its efficient (ie 95 per cent plus) recovery. Thus:

- Ackers and Madonna (1985) found 60 mesh (250 micron) particles more difficult to recover than either smaller or larger sizes in their Alaskan operations.
- Wang and Poling (1983) found that, irrespective of size, placer gold of Corey shape factor F_s less than 0.15 is difficult to recover.
- Macdonald (1988) working with a UN Revolving Fund team at San Antonio de Poto in Peru found one intermediate size distribution giving high recoveries at low F_s .

In respect of plant type, Figure 2 of the paper showed the conventionally accepted size range of gold recovery. It was pointed out that these figures