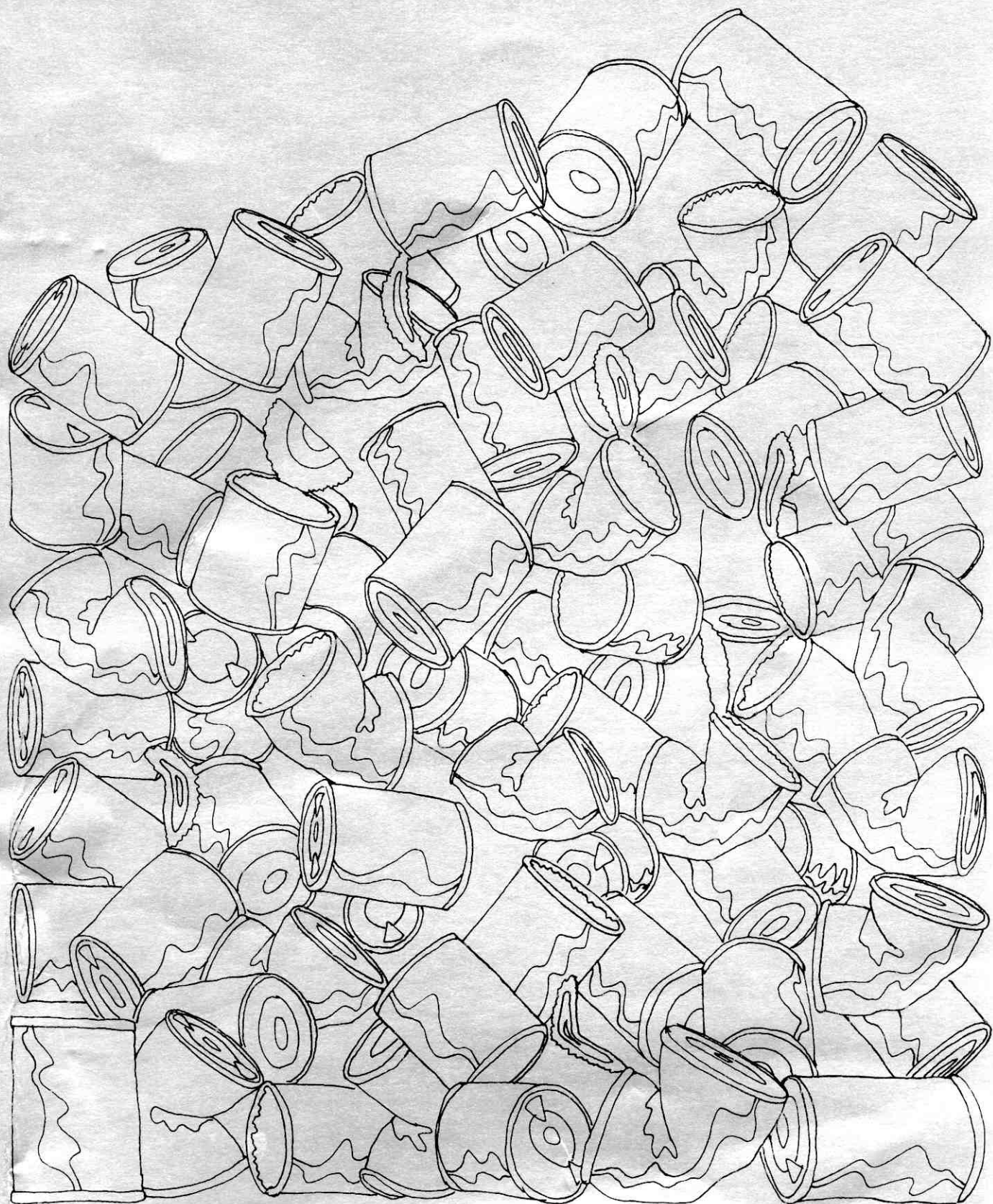


HYSTERESIS

1972



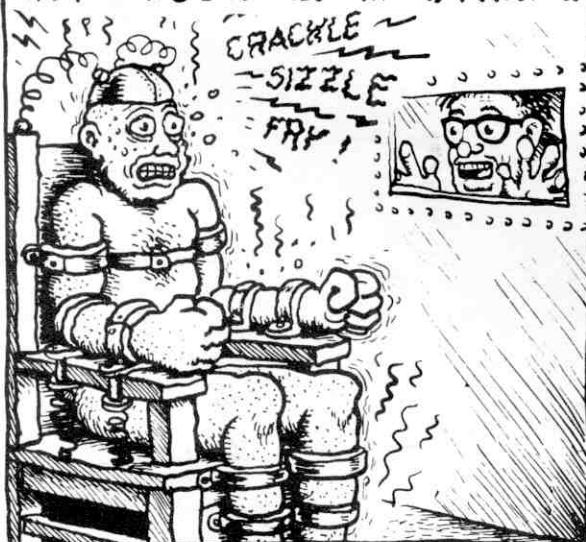
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HYSTERESIS

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engineers

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Alan Locke, B.Eng. (Mech) Hon II, 30 years, is Manager of CSR's Vinyl Flooring factories at Concord, Sydney. Since his graduation in 1963 he has held the positions of Design Engineer, Factory Superintendent and Engineer, Special Duties. CSR selected him to attend the University of Pittsburgh, U.S.A. in 1970 and while overseas he also carried out investigations for the company. As Factory Manager, Mr. Locke controls plant worth \$6 million and is responsible for the work of 135 employees.

All company officers may at times be required to work interstate or elsewhere, wherever the Company's activities are located.



CSR126.86

A BLUEPRINT FOR SURVIVAL

Reprinted from *The Ecologist*,
Vol. 2 No. 1, January 1972

The principal defect of the industrial way of life with its ethos of expansion is that it is not sustainable. Its termination within the lifetime of someone born today is inevitable—unless it continues to be sustained for a while longer by an entrenched minority at the cost of imposing great suffering on the rest of mankind. We can be certain, however, that sooner or later it will end (only the precise time and circumstances are in doubt), and that it will do so in one of two ways: either against our will, in a succession of famines, epidemics, social crises and wars; or because we want it to—because we wish to create a society which will not impose hardship and cruelty upon our children—in a succession of thoughtful, humane and measured changes. We believe that a growing number of people are aware of this choice, and are more interested in our proposals for creating a sustainable society than in yet another recitation of the reasons why this should be done.

Radical change is both necessary and inevitable because the present increases in human numbers and *per capita* consumption, by disrupting ecosystems and depleting resources, are undermining the very foundations of survival. At present the world population of 3,600 million is increasing by 2 per cent per year (72 million), but this overall figure conceals crucially important differences between countries. The industrialised countries with one-third of the world population have annual growth rates of between 0.5 and 1.0 per cent; the undeveloped countries on the other hand, with two-thirds of the world population, have annual growth rates of between 2 and 3 per cent, and from 40 to 45 per cent of their populations is under 15. It is commonly overlooked that in countries with an unbalanced age structure of this kind the population will continue to increase for many years even after fertility has fallen to the replacement level. As the Population Council has pointed out: "If replacement is achieved in the developed world by 2000 and in the developing world by 2040, then the world's population will stabilise at nearly 15.5 billion (15,500 million) about a century hence, or well over four times the present size".

The *per capita* use of energy and raw materials also shows a sharp division between the developed and the undeveloped parts of the world. Both are increasing their use of these commodities, but consumption in the developed countries is so much higher that, even with their smaller share of the population, their consumption may well represent over 80 per cent of the world total. For the same reason, similar percentage increases are far more signifi-

cant in the developed countries; to take one example, between 1957 and 1967 *per capita* steel consumption rose by 12 per cent in the US and by 41 per cent in India, but the actual increases (in kg per year) were from 568 to 634 and from 9.2 to 13 respectively. Nor is there any sign that an eventual end to economic growth is envisaged, and indeed industrial economies appear to break down if growth ceases or even slows, however high the absolute level of consumption. Even the US still aims at an annual growth of GNP of 4 per cent or more. Within this overall figure much higher growth rates occur for the use of particular resources, such as oil.

The combination of human numbers and *per capita* consumption has a considerable impact on the environment, in terms of both the resources we take from it and the pollutants we impose on it. A distinguished group of scientists, who came together for a "Study of Critical Environmental Problems" (SCEP) under the auspices of the Massachusetts Institute of Technology, state in their report the clear need for a means of measuring this impact, and have coined the term "ecological demand", which they define as "a summation of all man's demands on the environment, such as the extraction of resources and the return of wastes". Gross Domestic Product (GDP), which is population multiplied by material standard of living appears to provide the most convenient measure of ecological demand, and according to the UN *Statistical Yearbook* this is increasing annually by 5 to 6 per cent, or doubling every 13.5 years. If this trend should continue, then in the time taken for world population to double (which is

Blueprint for Survival cont. . .

estimated to be by just after the year 2000), total ecological demand will have increased by a factor of six. SCEP estimate that "such demand-producing activities as agriculture, mining and industry have global annual rates of increase of 3.5 per cent and 7 per cent respectively. An integrated rate of increase is estimated to be between 5 and 6 per cent per year, in comparison with an annual rate of population increase of only 2 per cent".

It should go without saying that the world cannot accommodate this continued increase in ecological demand. *Indefinite* growth of whatever type cannot be sustained by *finite* resources. This is the nub of the environmental predicament. It is still less possible to maintain indefinite *exponential* growth—and unfortunately the growth of ecological demand is proceeding exponentially (i.e. it is increasing geometrically, by compound interest).

The implications of exponential growth are not generally appreciated and are well worth considering. As Professor Forrester explains it, "... pure exponential growth possesses the characteristic of behaving according to a 'doubling time'. Each fixed time interval shows a doubling of the relevant system variable. Exponential growth is treacherous and misleading. A system variable can continue through many doubling intervals without seeming to reach significant size. But then in one or two more doubling periods, still following the same law of exponential growth, it suddenly seems to become overwhelming".

Thus, supposing world petroleum reserves stood at 2,100 billion barrels, and supposing our rate of consumption was increasing by 6.9 per cent per year, then as can be seen from Figure 1, demand will exceed supply by the end of the century. What is significant, however, is not the speed at which such vast reserves can be depleted, but that as late as 1975 there will appear to be reserves fully ample enough to last for considerably longer. Such a situation can easily lull one into a false sense of security and the belief that a given growth rate can be sustained, if not indefinitely, at least for a good deal longer than is actually the case.* The

* It is perhaps worth bearing in mind that the actual rate of petroleum consumption is

same basic logic applies to the availability of any resource including land, and it is largely because of this particular dynamic of exponential growth that the environmental predicament has come upon us so suddenly, and why its solution requires urgent and radical measures, many of which run counter to values which, in our industrial society we have been taught to regard as fundamental.

If we allow the present growth rate to persist, total ecological demand will increase by a factor of 32 over the next 66 years—and there can be no serious person today willing to concede the possibility, or indeed the desirability, of our accommodating the pressures arising from such growth. For this can be done only at the cost of disrupting ecosystems and exhausting resources, which must lead to the failure of food supplies and the collapse of society. It is worth briefly considering each in turn.

Disruption of ecosystems

We depend for our survival on the predictability of ecological processes. If they were at all arbitrary, we would not know when to reap or sow, and we would be at the mercy of environmental whim. We could learn nothing about the rest of nature, advance no hypotheses, suggest no "laws". Fortunately, ecological processes *are* predictable, and although theirs is a relatively young discipline, ecologists have been able to formulate a number of important "laws", one of which in particular relates to environmental predictability: namely, that all ecosystems tend towards stability, and further that the more diverse and complex the ecosystem the more stable it is; that is, the more species there are, and the more they interrelate, the more stable is their environment. By stability is meant the ability to return to the original position after any change, instead of being forced into a totally different pattern—and hence predictability.

Unfortunately, we behave as if we knew nothing of the environment and had no conception of its predictability,

increasing by 6.9 per cent per year, and according to the optimistic estimate of W. P. Ryman, Deputy Exploration Manager of the Standard Oil Company of New Jersey, world petroleum reserves (including deposits yet to be discovered) are about 2,100 billion barrels.

treating it instead with scant and brutal regard as if it were an idiosyncratic and extremely stupid slave. We seem never to have reflected on the fact that a tropical rain forest supports innumerable insect species and yet is never devastated by them; that its rampant luxuriance is not contingent on our overflying it once a month and bombarding it with insecticides, herbicides, fungicides, and what-have-you. And yet we tremble over our wheatfields and cabbage patches with a desperate battery of synthetic chemicals, in an absurd attempt to impede the operation of the immutable "law" we have just mentioned—that all ecosystems tend towards stability, therefore diversity and complexity, therefore a growing number of different plant and animal species until a climax or optimal condition is achieved. If we were clever, we would recognise that successful long-term agriculture demands the achievement of an artificial climax, an imitation of the pre-existing ecosystem, so that the level of unwanted species could be controlled by those that did no harm to the crop-plants.

Instead we have put our money on pesticides, which although they have been effective, have been so only to a limited and now diminishing extent: according to SCEP, the 34 per cent increase in world food production from 1951 to 1966 required increased investments in nitrogenous fertilisers of 146 per cent and in pesticides of 300 per cent. At the same time they have created a number of serious problems, notably resistance—some 250 pest species are resistant to one group of pesticides or another, while many others require increased applications to keep their populations within manageable proportions—and the promotion of formerly innocuous species to pest proportions, because the predators that formerly kept them down have been destroyed. The spread of DDT and other organochlorines in the environment has resulted in alarming population declines among woodcock, grebes, various birds of prey and seabirds, and in a number of fish species, principally the sea trout. SCEP comments: "the oceans are an ultimate accumulation site of DDT and its residues. As much as 25 per cent of the DDT compounds produced to date may have been transferred to the sea. The amount in the marine biota is estimated to be in the

order of less than 0.1 per cent of total production and has already produced a demonstrable impact upon the marine environment... The decline in productivity of marine food fish and the accumulation of levels of DDT in their tissues which are unacceptable to man can only be accelerated by DDT's continued release to the environment..."

There are half a million man-made chemicals in use today, yet we cannot predict the behaviour or properties of the greater part of them (either singly or in combination) once they are released into the environment. We know, however, that the combined effects of pollution and habitat destruction menace the survival of no less than 280 mammal, 350 bird, and 20,000 plant species. To those who regret these losses but greet them with the comment that the survival of *Homo sapiens* is surely more important than that of an eagle or a primrose, we repeat that *Homo sapiens* himself depends on the continued resilience of those ecological networks of which eagles and primroses are integral parts. We do not need to utterly destroy the ecosphere to bring catastrophe upon ourselves: all we have to do is to carry on as we are, clearing forests, "reclaiming" wetlands, and imposing sufficient quantities of pesticides, radioactive materials, plastics, sewage, and industrial wastes upon our air, water and land systems to make them inhospitable to the species on which their continued stability and integrity depend. Industrial man in the world today is like a bull in a china shop, with the single difference that a bull with half the information about the properties of china as we have about those of ecosystems would probably try and adapt its behaviour to its environment rather than the reverse. By contrast, *Homo sapiens industrialis* is determined that the china shop should adapt to him, and has therefore set himself the goal of reducing it to rubble in the shortest possible time.

Failure of food supplies

Increases in food production in the undeveloped world have barely kept abreast of population growth. Such increases as there have been are due not to higher productivity but to the opening up of new land for cultivation. Unfortunately this will not be possible for much longer: all the good land in

the world is now being farmed, and according to the FAO, at present rates of expansion none of the marginal land that is left will be unfarmed by 1985—indeed some of the land now under cultivation has been so exhausted that it will have to be returned to permanent pasture.

For this reason, FAO's programme to feed the world depends on a programme of intensification, at the heart of which are the new high-yield varieties of wheat and rice. These are highly responsive to inorganic fertilisers and quick-maturing, so that up to ten times present yields can be obtained from them. Unfortunately, they are highly vulnerable to disease, and therefore require increased protection by pesticides, and of course they demand massive inputs of fertilisers (up to 27 times present ones). Not only will these disrupt local ecosystems, thereby jeopardising long-term productivity, but they force hard-pressed undeveloped nations to rely on the agro-chemical industries of the developed world.

Whatever their virtues and faults, the new genetic hybrids are not intended to solve the world food problem, but only to give us time to devise more permanent and realistic solutions. It is our view, however, that these hybrids are not the best means of doing this, since their use is likely to bring about a reduction in overall diversity, when the clear need is to develop an agriculture diverse enough to have long-term potential. We must beware of those "experts" who appear to advocate the transformation of the ecosphere into nothing more than a food-factory for man. The concept of a world consisting solely of man and a few favoured food plants is so ludicrously impracticable as to be seriously contemplated only by those who find solace in their own wilful ignorance of the real world of biological diversity.

We in Britain must bear in mind that we depend on imports for half our food, and that we are unlikely to improve on this situation. The 150,000 acres which are lost from agriculture each year are about 70 per cent more productive than the average for all enclosed land³, while we are already beginning to experience diminishing returns from the use of inorganic fertilisers. In the period 1964-9, applications

of phosphates have gone up by 2 per cent, potash by 7 per cent, and nitrogen by 40 per cent, yet yields per acre of wheat, barley, lucerne and temporary grass have levelled off and are beginning to decline, while that of permanent grass has risen only slightly and may be levelling off. As *per capita* food availability declines throughout the rest of the world, and it appears inevitable it will, we will find it progressively more difficult and expensive to meet our food requirements from abroad. The prospect of severe food shortages within the next thirty years is not so much a fantasy as that of the continued abundance promised us by so many of our politicians.

Exhaustion of resources

As we have seen, continued exponential growth of consumption of materials and energy is impossible. Present reserves of all but a few metals will be exhausted within 50 years, if consumption rates continue to grow as they are (see Figure 2). Obviously there will be new discoveries and advances in mining technology, but these are likely to provide us with only a limited stay of execution. Synthetics and substitutes are likely to be of little help, since they must be made from materials which themselves are in short supply; while the hoped-for availability of unlimited energy would not be the answer, since the problem is the ratio of useful metal to waste matter (which would have to be disposed of without disrupting ecosystems), not the need for cheap power. Indeed, the availability of unlimited power holds more of a threat than a promise, since energy use is inevitably polluting, and in addition we would ultimately have to face the problem of disposing of an intractable amount of waste heat.

Collapse of society

The developed nations consume such disproportionate amounts of protein, raw materials and fuels that unless they considerably reduce their consumption there is no hope of the undeveloped nations markedly improving their standards of living. This vast differential is a cause of much and growing discontent, made worse by our attempts at cultural uniformity on behalf of an expanding market economy. In the end, we are altering people's aspirations without providing the means for them to be satisfied. In the rush to industri-

Continued on page 21



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'BULL'

This year Prof. Bull was appointed Deputy Chairman of the Australian Universities Commission. He left us to take up duties in Canberra at the end of June. As "Prof." to over 500 students, he was a popular and respected man. As an engineer, the respect he commands in the profession and the community is evidence of his dedication, his energy, and his talent.



F. B. Bull, M.A. (Cantab.), B.Sc., B.E., F.I.E. Aust.

- 1937 B.Sc.(Eng.) London 1st Class Honours (at Nottingham University College).
- 1937-39 Draughtsman for Dorman Long at Middlesbrough.
- 1939-43 Lecturer in Structural Engineering, Constantine Technical College, Middlesbrough.
- 1943 Final Exams—Institution of Structural Engineers and Andreas Prize Winner 1943.
- 1943-47 Senior Technical Experimental Officer at Admiralty in charge of 20 naval architects, scientists, and engineers investigating stresses in ship's structures. For papers arising from this work awarded a Premium of the Institute of Naval Architects and a Gold Medal of the N.E. Coast Institution of Shipbuilders and Engineers.
- 1947-52 Demonstrator and Lecturer in Engineering at Cambridge University under Prof. J. F. Baker, responsible for teaching theory and design of structures.
- 1952 Professor of Civil Engineering, University of Adelaide.
- 1970 Member, Royal Commission of Inquiry into the Failure of West Gate Bridge.
- 1972 Deputy Chairman, Australian Universities Commission.

We are all sorry to see you leave, Prof. but wish you every success in Canberra.

Sam,

You have asked me to write a personal, unofficial, biography of Prof. Bull. I usually reckon that men's reminiscences are a bore until you have reason to be interested in the subject of their memories. If anyone is interested in what an alleged autocrat is like when he is not doing his thing they might go on reading.

Some time in 1951 I went to have lunch with my old Uni. teachers, Taffy and Robby. The subject of conversation on this occasion was not, "What should be the height of a lavatory seat from floor level?", or, "A critical appraisal of the two and three pin suspension system for nappies" but; "I wonder what this new young Pommy Professor will be like?" "Well, from the photo in the paper, he seems to have a pretty decent sort of grin!"

You might think that when you go for an interview for a job the most important thing is whether your prospective boss will like you. The converse is just as critical for the applicant. I remember being apologetic about my lack of interest in higher mathematics and he said, "The Universities are full of good Engineers turning themselves into bad Mathematicians. I want Professional Engineers to teach their profession". He never changed his mind about that.

The easy, natural, enthusiastic way Prof. took part in the Leigh Creek Survey Camp for Final Year Civil's convinced me that his idea of leadership and the exercise of authority was not the same as that of many men of power. We were talking one day about the Australian idea of

equality and I said, "Well, my idea is that, whilst I have great respect for the man who occupies the Chair of Civil Engineering, Frank Bull, as a bloke, is just another bloke", to which he replied, "That's the way I like it". He believed in the delegation of executive authority to get things done, but he disliked deference to himself. I wonder how many of our pommy forefathers came here because they had the same feeling about a deferential society. There is even a story that he refused an invitation to be made a member of the Adelaide Club, saying, "How could I, I'm a socialist?" We warned him that he was likely to ruin his chances of a knighthood. With an amiable grin he said, "Ah! well, I'm resigned to that too, my wife would never let me accept one". "Why not?" "She refuses to be called Lady Bull".

But I started talking about Survey Camp. The first camp held at Leigh Creek was in late November, 1953. A lousy time of the year to be "up North", with the average daily maximum temperature around 100°F.

One wild Sunday a strong North wind loaded with dust changed at 8 p.m. into a thunderstorm, raining mud out of the sky, and a Westerly "change" was announced very forcefully by a wind which actually recorded 100 m.p.h. at the Leigh Creek airfield. The students were in tents so Prof. decided that we had better go and see how things were. Guided by lightning flashes, hanging on to each other against the force of the wind, tripping over wires on the ground which we hoped weren't "alive", and soaked to the skin we found the tents more or less as expected — mostly blown down. We had one large room available as a student's work room and staff bedroom. About 20 people slept on its floor that night, with no space for putting a foot wrong without danger of a punch in the head.

Boredom overcame the boss the next Saturday night. He got tired of beating me at card games and suggested we raid the tent lines for a little amusement. We sneaked over by moonlight, passed between two tents and nearly ran into another party of "raiders". Four students who had decided not to go to the picture show were busy removing all the beds from the tents and had them stacked up into a very high and unstable

tower. Avoiding them we did our dirty work, which was simply to put a small piece of paper in the socket of each light bulb. That was the second power failure for that camp!

We should have known better. Of course their revenge was equally effective. A couple of days later the truck was not going quite as well as it had been. I was doing a lot of gear work, fiddling with the choke, even stopped and looked under the bonnet, with no good effect; until a note from "Anonymous" was handed to Prof. from the back telling us the correct firing order.

I don't know if you've ever tried to identify stars using a star chart. The only way to do it is to lie on your back on the ground, hold the star chart in one hand, a torch in the other, and try and make a blue, oval shaped diagram with white dots on it look like the sky over your head. One poor student was doing his best to concentrate on this mental conjuring trick when he found himself being "shelled" by little bits of gravel. Being a man of few words who liked to concentrate on the business in hand he announced, without turning his head, that whoever the bastard was who was annoying him he had better stop or he would knock his bloody block off. Roars of laughter from his "friends" made him sit up and discover Prof. about to launch another missile. The poor bloke spent the rest of the camp trying to apologise while Prof., with equal insistence, kept on saying, "Forget it, if I behave like a bastard I deserve to be called one".

He also thought he was something in the way of a card trickster and received dutiful applause from a number of generations of students, and groans from the staff, who had seen it all before. The end of his career in that line was swift and certain. Henry Chan watched him one night till his show was finished and, sweeping up Prof's stacked deck just as they were said, "Have you seen this one?" We hadn't and we didn't! Prof. was dazzled and curious. "Show me how you do it, Henry?" "O.K. Prof. — watch!" And he carefully showed him every move, with the boss saying "Yes!" "Yes!", right to the last when he did it again, right under his nose, and so slickly that the only thing left to

say was "You blighter!" I really believe Prof. thought Henry was actually going to show him how to do that trick. But Henry learned from his Grandfather and wasn't for passing on the family secrets.

The speed at which Prof. could do anything was a bit of a legend. Eating food was a waste of time. He only ate meat and potatoes and would have been quite happy if he could have pulled up at a bowzer and say, "Fill her up!", and be on his way as quickly as possible. In fact, at eating, shaving, showering, dressing and even bogging, I've never seen his equal. We could both go into the lavatory at the same time and while I stood to the wall he would have been into a cubicle, done his daily, and be out washing his hands before I was doing up my zip. In fact I timed him one day — just over 30 seconds. I assured him that any normal bloke would take that long just to drop his pants.

At Leigh Creek his special passion was hunting for gold. Any excuse was good enough for leaving the survey parties to it and heading off towards the Boolooroo gold diggings for an hour or so's fossicking. "If I could only find a bit as big as a pin head I'd be satisfied", he would say as he used a precious Survey Store tomahawk to break up a 30 lb. lump of quartzite he had lugged a half a mile to the truck.

All high hills and mountains were made, not so much to admire, as to be climbed. As you know, Prof. never looked all that fit, and, dressed in the inevitable coat and tie (I'd swear he wore that tie to bed — but I have no photographic proof!) we would arrive at say, Mt. Aroona, or Mt. Serle, and he'd say, "Right! who's coming?" With visions of superior fitness, moral defeat, and/or failure in the exams, the mob would trail after him and I quail to think of the sufferings of some who made it and some who didn't. Only once I beat him to the top of a mountain. He swears he didn't see me, and said that, if I insisted I could take another five years' notice (Notice of dismissal was always cumulative. By the time he resigned I think mine stood at about 200 years).

One year Malcolm Kinnaird and I had the misfortune to have to "nurse" our chief through an attack of 'flu. He got a raging

headache, stayed in bed for over a week, didn't sleep, wouldn't eat; just sat hunched up reading book after book with a blanket over his head, his face and eyes getting hollower and his whickers longer. Offered aspirin he sneered and said, "If your old man had been chief chemist of a firm of manufacturing pharmacists you wouldn't take patent medicine either". Offered food he just said "NO!" and when we dared to offer sympathy by saying "How are you Prof.?" the answer was "Bog!" It took us quite a while to work that one out, but it eventually dawned on us that it was as near as an Englishman and a Gentleman could get to saying, "Up to shit!"

In his spare time Prof. was a model railway enthusiast, a stamp collector with very low ethical standards when it came to adding to his collection from our mail, a house builder whose wife despaired of him ever actually finishing anything, honorary consultant for nearly every good stunt the engineering students pulled off, and a keen bushman who never ever knew where North was so far as I know. "But look Prof.", we would say, "you can always tell North by the sun". "How should I know that?" was the answer, "I never saw the thing where I was brought up, and anyway, it would have been that way", pointing vaguely South.

Although Prof. was a real urger, his patience and gentleness with students has been an inspiration to me. He avoided that intellectual arrogance which is the greatest occupational hazard of teaching and I don't know any student who came out of his presence feeling belittled.

Should I write about his faults? I don't think so! Men like Prof. are not simple, uncomplicated people without inner tensions and outward prejudices. I know that he is a delight to his friends but a terror to his enemies. Nothing made him more angry than when he thought bad engineering was being practised by people who pretended to be competent. And he would say it was his public duty to do something about it.

Nineteen years is a fair while to work for one boss. When he left all I could think to say was, "See you later, cobbler", and reflect later that that was a compliment to him and a comment on my good luck.

D.H.T.



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VL5UV

On June 28, 1972, The University of Adelaide changed. You didn't notice? Admittedly there was nothing so dramatic as abolishing fees, or reforming the examination system, but nevertheless its potential for education and communication with its community dramatically increased.

In short, Radio University, VL5UV went on the air.

It is in these early months a modest operation, especially compared with some Adelaideans' notions of it doing an instant Open University. Before looking at its long-term possibilities, your reporter takes the rare opportunity of describing the merchandise behind the new top spot on the transistor radios of S.A.

Its essential parts are studio and control room, and transmitter and mast. People do help, of course, and unfortunately to this time the complement is drastically low in numbers. But they do get to use efficient equipment. The studio, deep in the Barr-Smith complex on campus, houses a 10 channel production desk, fit for the wildest Goon-Show-like production imaginable. It combines 3 microphone inputs, 2 turntables, 2 tape decks, 1 cartridge-tape record/replay unit, a general purpose socket, and a feed from the control room. And it succeeds in its design purpose of being operable by a layman.

The control room has a smaller desk unit, but a very flexible one. A basic four channel mixer can be fed by almost any permutation of 4 microphones (studio), a desk microphone (control room), 2 tape decks and 3 cartridge-tape-replay decks, and a feed from the studio desk itself. (At this point your reporter, one of said layman-operators, is beginning to wonder how indeed it can be so simple in practice, and yet so confusing to describe—next time an engineering student writes the article).

On top of each unit's flexibility the whole production area has interchangeability. For instance, VL5UV can go to air from either control room or studio, while the other is in use for production. On a human note, the studio is designed to feel warm and wel-

coming, unlike some clinical looking cages with good acoustics. The University's studio combines good 'live' acoustics and an environment to soothe the savage breasts of nervous academics.

The transmitter itself is about six miles away, at the slightly misnamed Dry Creek. In winter, it is so remote from "dry" that it's three inches under water—lousy conditions for maintenance engineers, but great for transmitting. Seven miles of copper wire underground radiates from the mast to provide an "earthmat". A 500 watt transmitter powered to 300 watts puts the signal up a 125' mast, and the system is working with such efficiency that some people don't believe it. Compare an anticipated 30 miles north and south reception area with coverage of Eyre and Yorke Peninsula, the Mid-North, down through the ranges to Victor Harbour and it is understandable.

Skywave propagation conditions must have been close to optimal in June and July too, for VL5UV has received 'good reception' reports from all states except Tasmania, as well as two from New Zealand.

Before moving to the programme material emanating from the equipment, it is necessary to describe the technicalities of the University's radio station licence. Officially, VL5UV is a fixed station, frequency 1630 khz, from private correspondence to receiving stations operated by registered students of the University of Adelaide. The licence is issued under The Wireless Telegraphy Act, and not the Broadcasting and Television Act, and it imposes these limitations:

(a) the Station shall be used only for the purpose of transmitting lecture material (other than music) relating to courses at The University of Adelaide:

(b) the transmissions shall be directed solely to registered students of the University.

All this means the station leads a somewhat schizophrenic existence. 1630 khz is so close to the broadcast band that 9 out of 10 transistor radios receive it without any adjustment, and so the public

no doubt think of it as a radio station like all the rest. But the University cannot use it like one, even within our educational format.

Giving the station more programming flexibility possibly involved changing international regulations, and the Broadcasting and Television Act, and who knows what else.

Meanwhile, there is plenty to go on with inside the course-format limitations, and it appears that there are needs to be met in the community. The first seven courses to go to air give some idea of the areas that can be covered by VL5UV. They were—

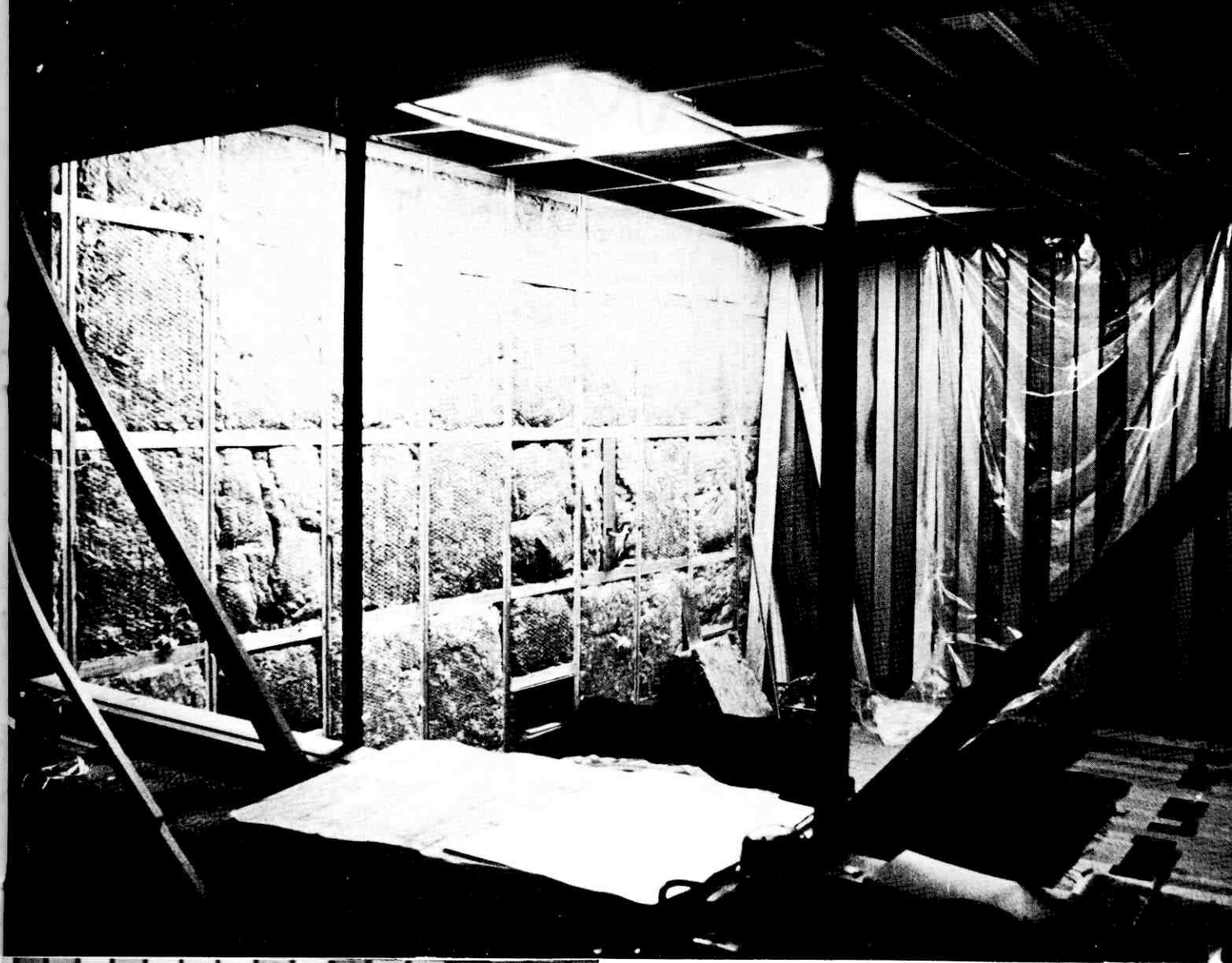
- The Future of the Flinders Ranges
- Conversational German I
- Women Today
- Shakespeare's Tragedies
- Major Australian Poets
- Managing People in Organisations
- Coastal Navigation

Over 800 people paid between \$5 and \$12 to enrol and receive 'notes for students' to accompany the course-units, and a further 200 have become 'general students' as members of the Radio University Guild, a subscription scheme.

The station will venture into undergraduate supplementary teaching in 1972 as well, with final year medical students serviced by revision seminars on air. The Institution of Engineers in South Australia was quick to see the station's potential for getting through to the profession. The management course was conducted in association with the Institution, and already other extension courses are under consideration.

Courses conducted by students as part of their course work, or in interdisciplinary fields for campus and for public consumption are on the 'things-to-do' list. It's a long list. Lack of funds and staff will keep Radio University's operation small for perhaps years, but it has already added another facet to the University's image in the community, and boosted its potential as an educational institution.

Keith Conlon



FU



SURVEY CAMP

Far to the north of Adelaide, lying serenely between the rugged North Flinders and the vast shores of Lake Torrens, is the pleasant little mining village of Leigh Creek. It was to this desert oasis that the Final Year Civils travelled during the May vacation to take part in two weeks of heroic activity modestly known as the final year Survey Camp.

The hardier members of the group made the arduous trip by bus, but the remainder managed the journey in the spacious comfort and quiet reliability of private transport.

On arriving in Leigh Creek or "The Gateway to the North" as it, in conjunction with all the towns from Port Augusta to Marree, is alternatively named, we found that we were bunked down in the older of the single men's quarters for the miners. The staff, Lelde, and other undesirables, were kept safely in the hostel further down the road.

On the first afternoon, Prof. Bull took us out in the truck on a tour of the area we would be surveying and also of the countryside further to the East. We saw a good deal of country, plenty of dust, a couple of old mines, one hollow tree fitted with stone deflectors, several Euros and one extremely rare Mountain Butch (*Stomachalis barbarus*). The latter is a large rotund hairy animal which appears to hunt Euros and which has a surprising turn of speed over rough hillsides.

On Monday morning work began in earnest. We were all taken about a mile or so out of town and under the guidance and inspiration of Mr. Cumming we began to tackle our first survey. Unfortunately, that afternoon, due to a slight motivational hitch, work in earnest ceased.

During the day we worked in groups of four and social activities were somewhat limited, so it was not until we returned at night that we could get down to the really important task of enjoying ourselves. This was achieved by prolonged bouts of drinking, gambling, toast-making, card playing, mouse-hunting, roulette and playing cards. In fact the whole fortnight might have turned into a really pleasant holiday but for the unwarranted intrusion of astron-

omy exercises and other work.

As might be expected, Glen Trebilcock was off to a blistering start with his astronomy and by the end of the second night he was culminating. Next night he culminated three times. This became rather infectious and very soon the still Leigh Creek nights were filled with the sound of enthusiastic culmination. Important sounding names such as Arcturus, Alpha Bootes and Glen were banded about with an air of knowledgeable respect and prolonged discussions were held over whether Standard Chronometer Time was more reliable than either Co-ordinated Universal Time or International Atomic Time. The latter matter was resolved when Standard Chronometer Time took the day off in the middle of the week. All this talk of culmination may appear exciting to the uninitiated, but as one who has made it I can safely say that there is nothing so disillusioning as waiting $2\frac{1}{2}$ hours for a star to culminate and then to run out of theodolite travel just at the crisis. In fact general disillusionment with astronomy set in rapidly and we all began searching further afield for entertainment. Down at the pub we located a couple of miners who were subsequently invited back for a game of cards. One of them enjoyed his visit so much that he made a point of dropping round each morning at 7.00 a.m. to enquire the whereabouts of our Buccaneers.

Everybody was immensely amused. It was also discovered that the official roulette game was played on Friday nights just down the road. That Friday several gentlemen, notably Pele, went down a packet playing the wheel.

The meals in the canteen were expensive, but the salad was surprisingly good. Graham Burton set what is probably a world record by piling it to a height of three feet and John Bowley almost starved when they began enforcing the rule that you had to buy a meal before you could have any.

After a week of hard work with stadia traverses and levels, the weekend came and with it the much vaunted football match against the Leigh Creek team. Our team, made up from players skilled in all facets of basketball,

soccer, rugby and spectating, came onto the field confidently to the defiant strains of "Daniel Boone was a man" and they definitely looked good in the pre-match play. They faded badly, however when the Leigh Creek team came onto the field. Leigh Creek, fresh from their win over Marree, put up a convincing display and despite an excellent game by Chas at centre, some clever dribbling by Steve, and some fine 20-yard runs by Doc Hutton, the team was defeated by six or seven goals.

Next morning we set off on a sightseeing trip to Aroona Dam and then went on to a barbecue lunch at the Hearshe's place at Leigh Creek Station. This was followed by a devastating round of tennis on the Hearshe's court.

Top seed, Butch, was in fine form and hit many unplayable 40-yard returns. Prof. Bull convincingly downed Mrs. Bull in the semi-mixed doubles and at the end of the day the Greeks, Italians, Malaysians and Australians had all managed to beat the Poms.

The next afternoon we were taken on a tour of the coalfields. In the pre-tour lecture our guide managed, with the help of a specially constructed wooden jigsaw model, to prove that:

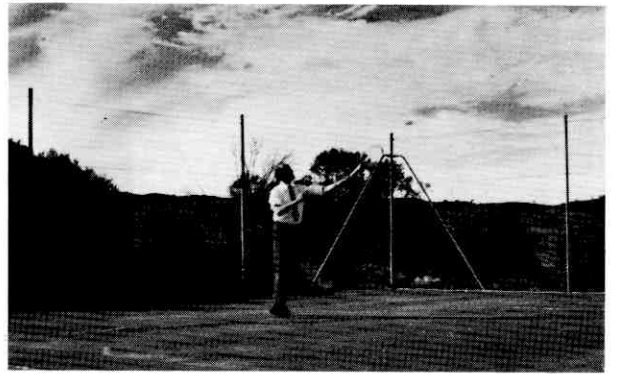
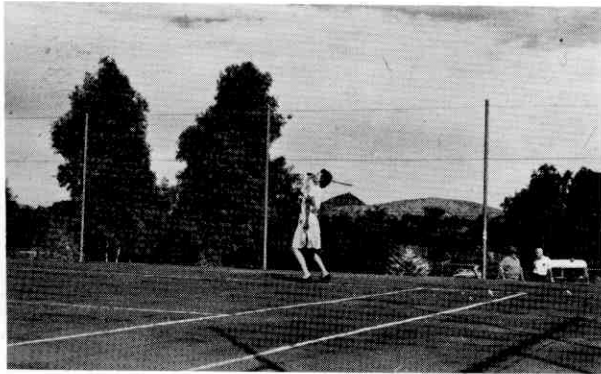
- (a) It was not possible for the coal to be there in the first place.
- (b) That it was impossible to get it out if it was.
- (c) Any attempt to put it back was foolhardy.

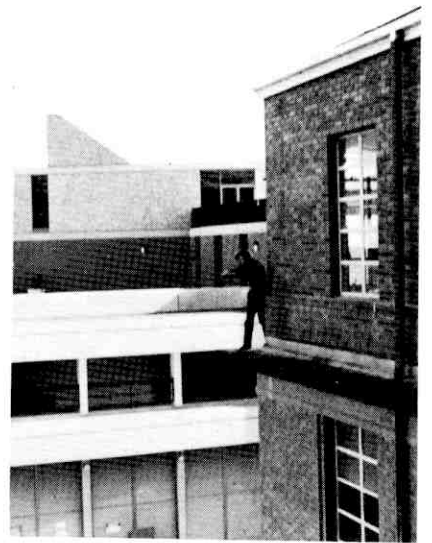
With this in mind we found the tour of the open-cut coalfields both puzzling and impressive.

Despite all the other activities that went on, the most significant part of our stay and the one to which we devoted most of our time, was the surveying itself. Working in the quiet of the Flinders with only you, your theodolite and a few incapable colleagues, is surely as near to heaven as we are all likely to get.

Therefore, when Saturday came, it was with regret and nostalgia that we kicked out all our precisely positioned pegs, removed the odd crown point from the odd bush, loaded our instruments into the van and started out again on the long trip to Adelaide.

A. F. CLOSE





The A.U.E.S. Committee:

Tony Gunn, Lelde Vitols, Chas. Allen, Bruce Smith, Tom Grose, Dave Wilson, John White, Mark Gilbert, Andy Close and Jeff Packer (both seated).



PRESIDENT'S REPORT

LOOKING BACK

I sometimes wonder whether I gained more from the A.U.E.S. than it gained from me. Other times I am sure.

Maybe it was McMahon's tight economic policy, but things seemed a little difficult this year. Six hundred odd Engineers chanting "we want more beer" and not offering all that much for it, has produced a somewhat embarrassing loss on a couple of occasions. However, with a bit of help from the Clubs and Societies Council, we could be as financially healthy as ever.

Choice of functions is always a problem, and I think especially so this year. Undoubtedly there has been an excessive tendency to attempt to follow in the footsteps of the previous committee, which did set an exceptional standard. Typical of this was the Ball. A handful of people approached me early in the year and asked me when it was going to be held. But, where were all their friends on the day? We did have a large attendance, but considering the fantastic value for money offered, and the incredibly heavy publicity campaign, something fundamental was wrong! If it is necessary to hammer people to persuade them to come (and still not get enough) surely you should not have had the show in the first place.

But, what's wrong with these Engineers. Why don't they support their Society? I felt a little hostility when, discussing the problems of disproportionate Civil patronage with a friend (another Mechanical), he suggested that Mechanicals had better things to do, whereas Civils didn't! That was a long time ago, but now I can see his point—a little. The Civil prominence is no problem at all, until it becomes dominance. What is dominance, and what is prominence? I'll say 1972 was prominence but I could understand others disagreeing. Throughout the Mechanical department, there is a slight feeling that the A.U.E.S. is in practice the Civil's society, so they do not feel obliged to support it. They feel no more reason to go to the Engineering Ball than the Architectural Ball. Clearly this problem is self generating, with an initial condition that (in my opinion) there is a greater fraternity among Civils than Mechs. or Elecs., but possibly not Chemicals who for some obscure (?) reason insist on having their own society. The considerable fraternity of the Civils leads to "Class Parties", with the natural vehicle being the A.U.E.S. Maybe this is an oversimplification, but

I think it is worth some thoughts, especially by some of the 1973 Executive, which at this stage appears bent on turning prominence to dominance. It was very noticeable to me, that when separate departments were effectively given invitations viz., the football carnival, attendance was both high and relatively uniform. There were probably more Chemicals there than were members of the A.U.E.S. After my year as President I can look back at this, and I think it was our best effort. It was certainly the most gratifying to me. Needless to say, the Civil side won for the nth year in succession; I think they took the lead when the Chemicals picked as their captain, for the final, an Asian who must have been more familiar with the round ball.

The car trial, chiefly organized by Tony Gunn, who just happens to be President of the A.U. Car Club, was good due to his excellent efforts in layout of the course. It was a little milder than usual and no-one suffered my fate of the year before. The course was designed so that nearly everyone would arrive before dark. The results made me wonder how some people manage to make it to the bus stop each morning. The winning driver was Chris Nettle, one of Tony's class mates!

Possibly the most amusing amazement this year was the wine bottling. On the first attempt, the wine forgot to arrive, which led to some very dry humour indeed! At the second try we bottled some and drank the rest. Much to many people's amazement, the wine was quite good, and the emergency flagons of assorted reds, purchased by a nervous President, were not really required. The labels were designed by Any and Lomas, and printed on the very best of papers available, at great expense to the Society. Fortunately for Mark Gilbert it was a sunny day, so the 'work' was done in the backyard of his inner-city residence, thus saving the house. The thirty-odd guests (and some were very odd!) had the sense to purchase over half the bottles as they left. The remainder were quickly snapped up.

The choice of just less than half of the Engineers who attended the dinner to bring girls was interesting, controversial, etc. Only a small proportion of the large number of Civils who attended brought girls, but I'll say no more, except that you really have no idea how jealous I was when I heard of the small group that went to the Trocadero afterwards!

Now that I have all the wowers'

blood up, I'd like to recall the winery tour. At considerable effort and expense, a tour of Chateau Yaldara was arranged. FIVE starters!!!? When I think of all the things that I can't remember of the great tour of '69 I just cannot understand why there was a mass epidemic of stropperitis that Friday afternoon.

"The way to become a true Engineer is not inside M105, C101, E202 (etc.), but rather inside a bus to Yaldara". (MAO adapted)

The smallest show we had this year was undoubtedly the Cricket Carnival. The freshers were to play the second and third years, with the second game between final years and postgraduate teams. However, an oval could not be found and it was cancelled.

I have already mentioned our biggest show, the Ball. Financially it was a disaster, but typical of a show where you get more than your money's worth, most people enjoyed themselves.

LOOKING FORWARD

Everyone, or at least every Committee would like to have had a show 'bigger than Woodstock'. This may sound a little (or a lot) absurd but to want to have a big Ball is natural. Certainly big shows are not always the best. The simple shows, the Footy carnival and the Car Trial showed the most enthusiasm, and I think various sports should be given more patronage in the future.

This is being written after the 1972 A.G.M., but we are hoping to make print before 1973's. The A.U.E.S. does present great possibilities if you care to try. Despite our efforts, there is still a good reserve of money. If you think it doesn't do things that it should, don't storm Government House or bomb John Martins—stand for election.

Bruce Smith



PLANT TOUR

This year it was Melbourne's turn to entertain the fifteen final year Chem Engees, who arrived tired from all-night bridge and poker one May morning. Realizing our resources we stayed at the cheapest hotel in Melbourne, namely the Spencer Private, thus enabling us to spend our money on more enterprising needs.

For those not acquainted with the Plant Tour, it is designed to give the student the opportunity to see plant equipment and layout previously only seen in books. Ten process plants are visited, and from these visits thoughts are clarified, and information gathered to hopefully design a better plant during third term's Plant Design Project. To remind us of this intent of the tour, Dr. Keith King accompanied us.

After a quick settling in we were off to the first plant that afternoon. The tour itinerary for the week was:

Commonwealth Serum Laboratories
(penicillin production; extracts from blood)

ICI/ANZ (Nobel)
(production of explosives and associated chemicals)

Monsanto
(production of cumene, aspirin, moulding powders)

Altona Petrochemical Company
(production of ethylene, propylene, butadiene)

Australian Synthetic Rubber
(synthetic rubbers production)

Union Carbide
(production of low density polyethylene)

Carlton and United Breweries
(beer production)

The companies supplied us with lunch, and some even paid our taxi fares, for which we were very grateful. These visits would take up most of the day, but we still had the nights to follow.

To start the night off we usually went to one of Melbourne's many dining-out establishments, where a good meal with several beers could be obtained. The John Curtin in Lygon St. was the usual pub visited, due to its atmosphere and excellent counter meals. The pub is located next door to the ACTU and opposite the AWU. For those who liked pizza, you could take your beer 50 yards up the street to Universal's where, apart from delicious pizzas, there is a 10% discount for students. The Asians in our group encouraged some of us to try the Chinese restaurants in Little Bourke Street; and finally the Cortez Bistro in Queen Street can also be recommended.

Having satisfied our inner-selves, we then continued the night in our own way: boozing on, visiting relations, seeing movies, womenizing, and the rest took their beer back to the Spencer Private for further bridge and poker. No animal acts of any note occurred; we seemingly being a more responsible group than some of the other departments. One notable quotation was "You are a much nicer group of individuals than last year's final years."

By the end of the plant tour we were tired, but full of spirit, knowing that the brewery and subsequent tasting were still to come. In the tasting room, whilst admiring the amber liquor, we all remarked at how clean and delicious the beer was, and it was explained to us the

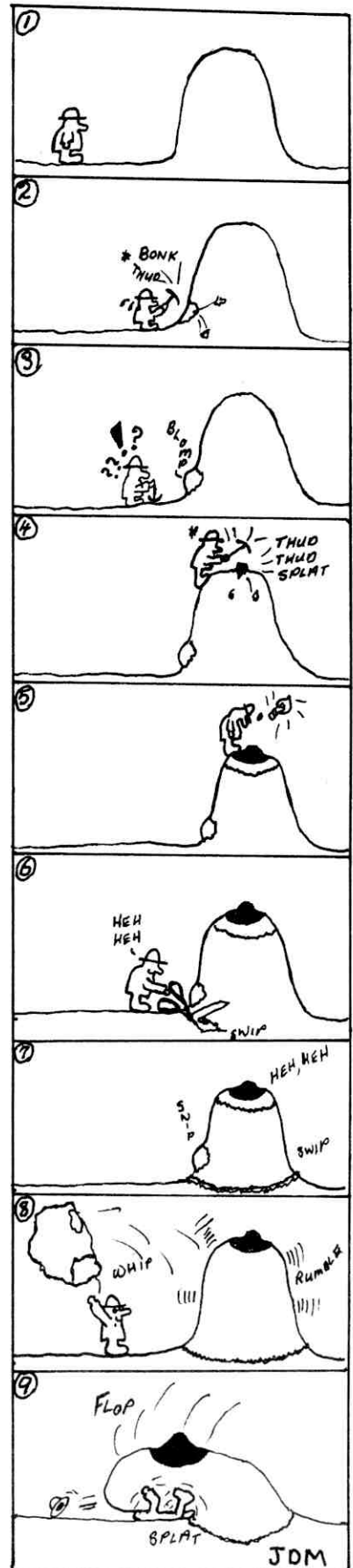
reasons why:

- (1) Beer should be served fresh at 38°F,
- (2) it should be tapped through very clean equipment,
- (3) after a week's solid drinking we had got Adelaide beers out of the system, and were now accustomed to C & U brews.

Further to these enlightening facts, the following thoughts were to be remembered from the 1972 Plant Tour.

- (1) C & U beer surpasses any Adelaide beer.
- (2) The ethane pipeline to APC is best under the bay.
- (3) Monsanto makes all the aspirin used in Australia.
- (4) Levitation is "thermodynamically impossible".
- (5) Sleep on the Overland is virtually impossible.
- (6) "Oh! He's got the Mazurka beat."

Plant of the Tour was awarded to C & U Breweries, not only for their product, but also for their cleanliness of operation. Our thanks to 'card-sharp' King for his participation.



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with Coke



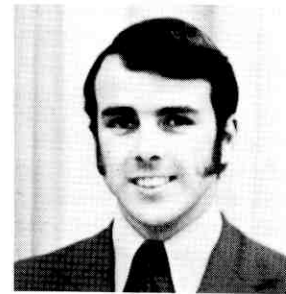
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A GUIDE FOR NEW STUDENTS

by BILL SHAKESPEARE

"You . . . have sworn for three years' terms to live with me, my fellow scholars, and to keep those statutes that are recorded in **this schedule here**" (see below!).

"Come on then; I will swear to study so to know the thing I am forbid to know; as thus: to study where I well may dine, when I to feast expressly am forbid: Or study where to meet some mistress fine, when mistresses from common sense are hid".

"Study is like the heaven's glorious sun that will not be deep-searched with saucy looks; small have continual plodders ever won, save base authority from others' books".

(Advice to the Staff)

"Too much to know is to know

nought".

(Advice for Third Term)

"So for you to study now — it is too late".

The Schedule of Statutes

1. "No woman shall come within a mile . . . on pain of losing her tongue . . . and . . ."
2. "If any man be seen to talk with a woman within the term of three years, he shall endure such public shame as the rest . . . can possible devise".
3. "One day in a week to touch no food and but one meal in every day beside"
4. "To sleep but three hours in the night, and not be seen to wink of all the day".

"And, so to study, three years is but short . . . with a wench".

With Acknowledgement to the Bard ("Loves Labour's Lost" Act I Scene I).

Extracted D.B.C.



alise we break up communities, so that the controls which formerly regulated behaviour are destroyed before alternatives can be provided. Urban drift is one result of this process, with a consequent rise in anti-social practices, crime, delinquency, and so on, which are so costly for society in terms both of money and of well-being.

At the same time, we are sowing the seeds of massive unemployment by increasing the ratio of capital to labour so that the provision of each job becomes ever more expensive. In a world of fast diminishing resources, we shall quickly come to the point when very great numbers of people will be thrown out of work, when the material compensations of urban life are either no longer available or prohibitively expensive, and consequently when whole sections of society will find good cause to express their considerable discontent in ways likely to be anything but pleasant for their fellows.

It is worth bearing in mind that the barriers between us and epidemics are not so strong as is commonly supposed. Not only is it increasingly difficult to control the vectors of disease, but it is more than probable that urban populations are being insidiously weakened by overall pollution levels, even when they are not high enough to be incriminated in any one illness. At the same time international mobility speeds the spread of disease. With this background, and at a time of widespread public demoralisation, the collapse of vital social services such as power and sanitation, could easily provoke a series of epidemics—and we cannot say with confidence that we would be able to cope with them.

At times of great distress and social chaos, it is more than probable that governments will fall into the hands of reckless and unscrupulous elements, who will not hesitate to threaten neighbouring governments with attack, if they feel that they can wrest from them a larger share of the world's vanishing resources. Since a growing number of countries (an estimated 36 by 1980) will have nuclear power stations, and therefore sources of plutonium for nuclear warheads, the likelihood of a whole series of local (if not global) nuclear engagements is greatly increased.

Conclusion

A fuller discussion of ecosystems and their disruption, of social systems and their disruption, of population and food supply, and of resources and their depletion, can be found in Appendices A, B, C and D, respectively. There will be those who regard these accounts of the consequences of trying to accommodate present growth rates as fanciful. But the imaginative leap from the available scientific information to such predictions is negligible, compared with that required for those alternative predictions, laughably considered "optimistic", of a world of 10,000 to 15,000 million people, all with the same material standard of living as the US, on a concrete replica of this planet, the only moving parts being their machines and possibly themselves. Faced with inevitable change, we have to make decisions, and we must make these decisions *soberly* in the light of the best information, and not as if we were caricatures of the archetypal mad scientist.

By now it should be clear that the main problems of the environment do not arise from temporary and accidental malfunctions of existing economic and social systems. On the contrary, they are the warning signs of a profound incompatibility between deeply rooted beliefs in continuous growth and the dawning recognition of the earth as a space ship, limited in its resources and vulnerable to thoughtless mishandling. The nature of our response to these symptoms is crucial. If we refuse to recognise the cause of our trouble the result can only be increasing disillusion and growing strain upon the fragile institutions that maintain external peace and internal social cohesion. If, on the other hand, we can respond to this unprecedented challenge with informed and constructive action the rewards will be as great as the penalties for failure.

We are sufficiently aware of "political reality" to appreciate that many of the proposals we will make in the next chapter will be considered impracticable. However, we believe that if a strategy for survival is to have any chance of success, the solutions must be formulated in the light of the problems and not from a timorous and superficial understanding of what may or may not be immediately feasible.

If we plan remedial action with our eyes on political rather than ecological reality, then very reasonably, very practicably, and very surely, we will muddle our way to extinction.

A measure of political reality is that government has yet to acknowledge the impending crisis. This is to some extent because it has given itself no machinery for looking at energy, resources, food, environmental disruption and social disruption as a whole, as part of a general, global pattern, preferring instead to deal with its many aspects as if they were self-contained analytical units. Lord Rothschild's Central Policy Review Staff in the Cabinet Office, which is the only body in government which might remedy the situation, appears not to think it worthwhile: at the moment at least, they are undertaking "no specific studies on the environment that would require an environmentalist or ecologist". There is a strong element of positive feedback here, in that there can be no appreciation of our predicament unless we view it in totality, and yet government can see no cause to do so unless it can be shown that such a predicament exists.

Possibly because government sees the world in fragments and not as a totality, it is difficult to detect in its actions or words any coherent general policy, although both major political parties appear to be mesmerised by two dominating notions: that economic expansion is essential for survival and is the best possible index of progress and well-being; and that unless solutions can be devised that do not threaten this notion, then the problems should not be regarded as existing. Unfortunately, government has an increasingly powerful incentive for continued expansion in the tendency for economic growth to create the need for more economic growth. This it does in six ways:

Firstly, the introduction of technological devices, i.e. the growth of the technosphere, can only occur to the detriment of the ecosphere, which means that it leads to the destruction of natural controls which must then be replaced by further technological ones. It is in this way that pesticides and artificial fertilisers create the need for yet more pesticides and artificial fertilisers.

Secondly, for various reasons, industrial growth, particularly in its earlier

phases, promotes population growth. Even in its later phases, this can still occur at a high rate (0.5 per cent in the UK). Jobs must constantly be created for the additional people—not just any job, but those that are judged acceptable in terms of current values. This basically means that the capital outlay per person employed must be maintained, otherwise the level of “productivity” per man will fall, which is a determinant of both the “viability” of economic enterprise and of the “standard of living”.

Thirdly, no government can hope to survive widespread and protracted unemployment, and without changing the basis of our industrial society, the only way government can prevent it is by stimulating economic growth.

Fourthly, business enterprises, whether state-owned or privately owned, tend to become self-perpetuating, which means that they require surpluses for further investment. This favours continued growth.

Fifthly, the success of a government and its ability to obtain support is to a large extent assessed in terms of its ability to increase the “standard of

living” as measured by *per capita* gross national product (GNP).

Finally, confidence in the economy, which is basically a function of its ability to grow, must be maintained to ensure a healthy state of the stock market. Were confidence to fall, stock values would crash, drastically reducing the availability of capital for investment and hence further growth, which would lead to further unemployment. This would result in a further fall in stock-market values and hence give rise to a positive-feedback chain-reaction, which under the existing order might well lead to social collapse.

For all these reasons, we can expect our government (whether Conservative or Labour) to encourage further increases in GNP regardless of the consequences, which in any case tame “experts” can be found to play down. It will curb growth only when public opinion demands such a move, in which case it will be politically expedient, and when a method is found for doing so without creating unemployment or excessive pressure on capital. We believe this is possible only within the

framework of a fully integrated plan.

The emphasis must be on integration. If we develop relatively clean technologies but do not end economic growths then sooner or later we will find ourselves with as great a pollution problem as before but without the means of tackling it. If we stabilise our economies and husband our non-renewable resources without stabilising our populations we will find we are no longer able to feed ourselves. As Forrester and Meadows convincingly make clear, daunting though an integrated programme may be, a piecemeal approach will cause more problems than it solves.

Our task is to create a society which is sustainable and which will give the fullest possible satisfaction to its members. Such a society by definition would depend not on expansion but on stability. This does not mean to say that it would be stagnant—indeed it could well afford more variety than does the state of uniformity at present being imposed by the pursuit of technological efficiency. We believe that the stable society, the achievement of which we shall discuss in the next chapter, as well as removing the sword of Damocles which hangs over the heads of future generations, is much more likely than the present one to bring the peace and fulfilment which hitherto have been regarded, sadly, as utopian.

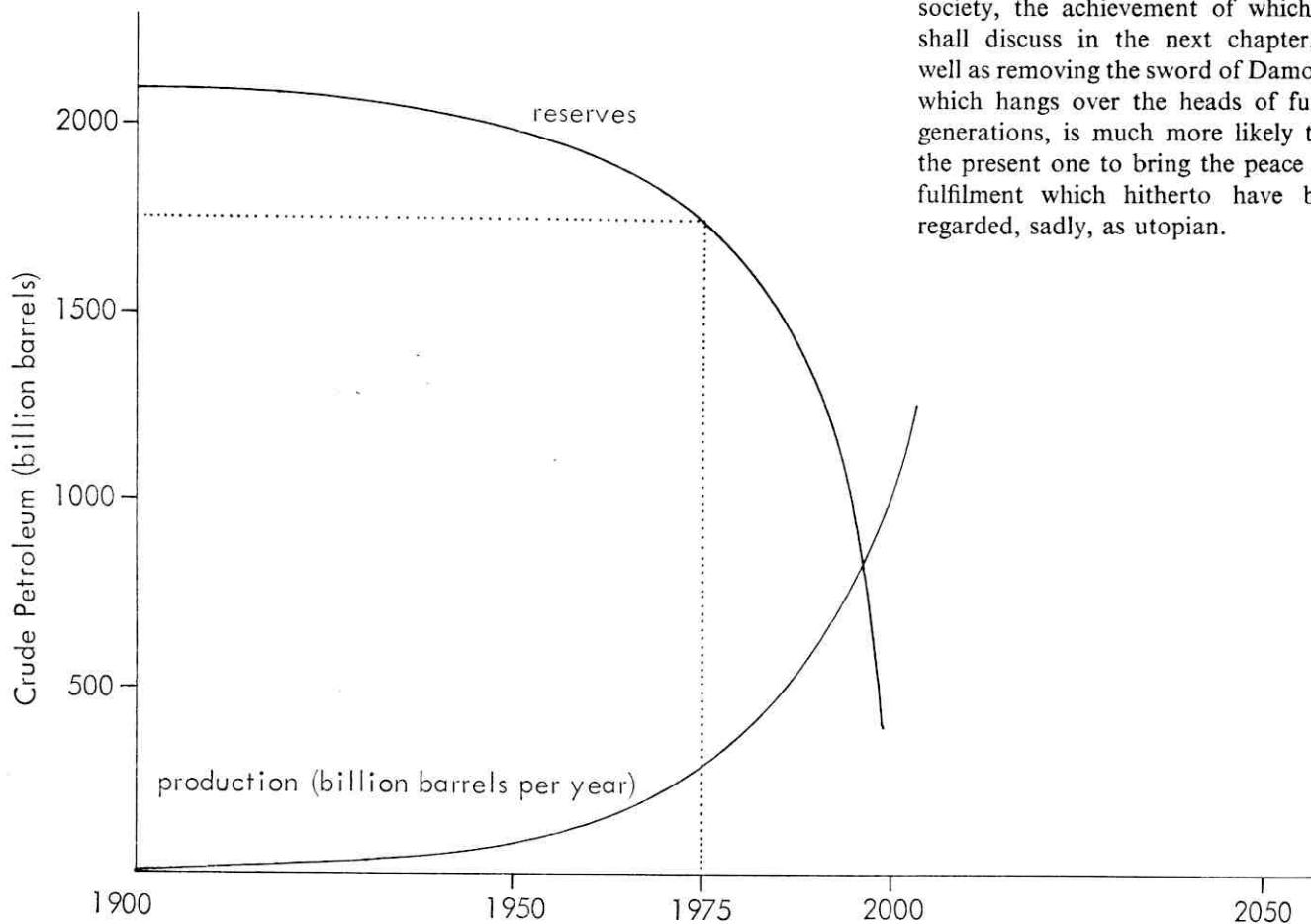


Figure 1. World reserves of crude petroleum at exponential rate of consumption.
Note that in 1975, with no more than 15 years left before demand exceeds supply the total global reserve has been depleted by only 12½ per cent.

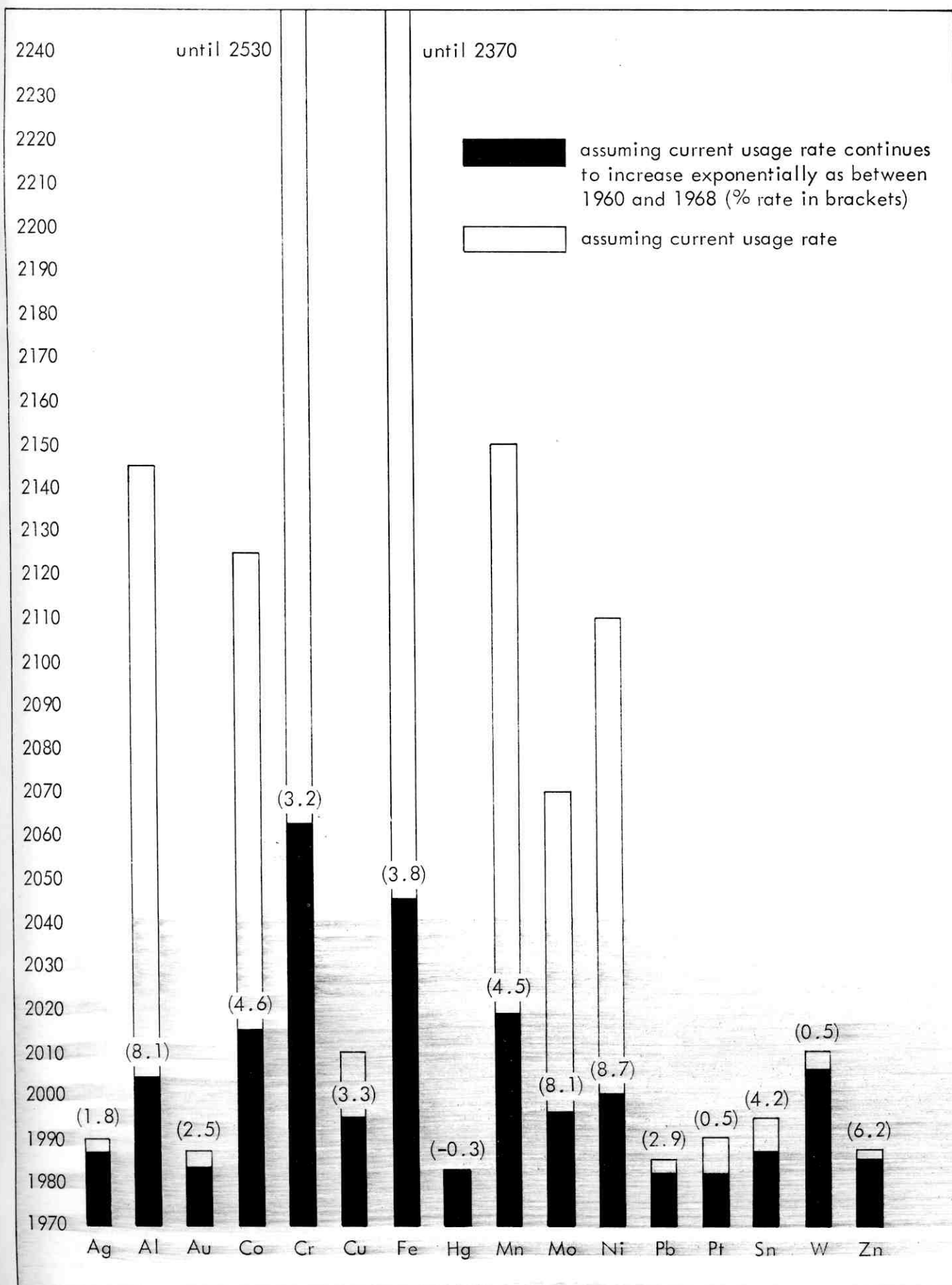


Figure 2. Mineral resources: static and exponential reserves.



On the left: Mr. Karl F. Schuller, noted Western Australian Estate Planner. Originally from Austria, Mr. Schuller immigrated to Australia where he has developed, over 14 years, an extensive practice. His files are full of testimonial letters from grateful clients. He is seen here explaining to a client some new proposals to improve an estate situation.

“FINANCIAL PLANNING” By David Hughes-Jones

FINANCIAL PLANNING SERVICES
6-7 DEQUETTEVILLE TCE.,
KENT TOWN, S.A. 5067
PH. 42 5777

PERKS FOR MEN AT THE TOP

For a \$15,000 per year Senior partner in a Company, Walter Thomson was miserably inept at managing his own money.

The mess of shares he and his wife had accumulated over the years were earning less than bank interest and after taxation and inflation had taken its effect — his capital was shrinking in fact, year by year.

His Will made out 20 years ago when he and Joan were first married was hopelessly out of date, there being several children resulting from the marriage and the executor named had died five years ago. In addition, there was no exclusion clause in the documents which meant that if both Walter and Joan had died in a car accident, his estate would have been subjected to double estate duties.

To top it all, it was discovered that his substantial investment in life assurance—a policy taken out primarily for its tax advantages, was owned by him personally and consequently would increase the burdens of death duties. The real problem of protection of income and assets was still largely unsolved.

An introduction to Financial Planning Services disclosed the above situation which strange to say, is not uncommon.

It has been suggested that a sort of mental aberration stops people from handling their own money effectively; another possibility is that after a hard day at the office dealing with other people's problems, they cannot find the time or inclination to apply themselves to the task of planning their own affairs. Nor are they properly equipped to do so, as usually they do not have access to the necessary information.

After a thorough analysis of the family situation and establishing goals, and for a modest fee of \$2 per \$1,000 of his net estate, he was advised to:—

1. Update both his Will and create a Will for his wife with exclusion clauses.
2. Set up an Investment Company to handle his investments.
3. Rationalise his investments and sell them to the Investment Company.
4. Create a Trust for the children through the Company.
5. Arrange an adequate life assurance programme to pay estate taxes.

The result of these recommendations after implementation resulted in:—

1. Less taxes — despite the fact that he had more cash to spend.
2. A stabilised and controlled estate which is already pre-administered thereby obviating unnecessary costs upon the death of himself or his wife — and no double taxation.
3. A saving of at least \$30,000 in death duties by re-arrangement of assets.
4. Provision of an adequate income through life assurance either to Mrs. Thomson should he die before retirement and a supplemental income to them both should he live to see retirement.

Walter Thomson (not his real name) is just one of a growing number of business and professional men who are turning to a completely new financial counselling organisation specialising in estate and financial planning.

Starting from scratch and examining a man's total situation including all forms of investment and with no pre-conceived ideas, the analysis invariably reveals opportunities to greatly benefit the client and his family.

Mr. David Hughes-Jones of Financial Planning Services commenting on this new service, made a point of mentioning that the service was not designed to destroy any relationship between a client and his accountant or solicitor. On the contrary, he said, we regard our services as an extension to the professional services. Frequently, despite genuine attempts to do so, they simply cannot find the time to conduct the 'in depth' analysis so urgently needed by their clients because of the tremendous pressures placed upon them in other areas of their practices.

FINANCIAL PLANNING SERVICES

A South Australian Organisation has been formed to extend to the South Australian public the same facilities which were available only to a limited clientele in S.A.

Mr. David Hughes-Jones and Mr. John Viney are in charge of operations for the South Australian Branch.

A MESSAGE TO ALL YOUNG PEOPLE WHO INTEND TO MAKE A MILLION

We hope you make it.

We know you can – but if you don't it's nice to have insurance.
Rev. it up! What are you, 20? 22? Man that's young.
We know what it's like when you're young – fast, free,
you're having a ball. Insurance, security, they seem a long way off.
Sure you have ambition and you're still young. Think about
this: –

25 years: Getting married?

30 years: Married with one or two children?

35 years: Education for *your* family, need that family sedan,
paying off the home.

Stop and think! You may never have a million but you'll
never have to worry if you talk now to an AMP man.

An AMP man remembers the good times at 20 but he can see
your future secure and you'll still have your fun.

Insurance is tomorrow's fun. If you buy it now there are low
premiums, adult status, a growing asset.

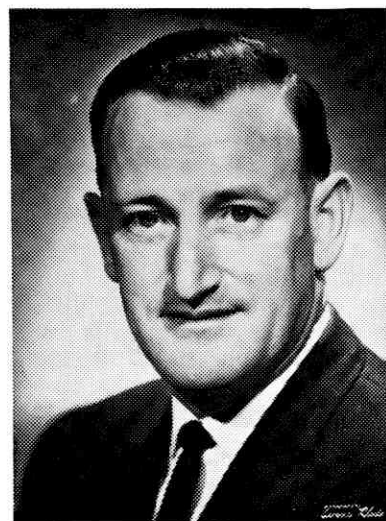
A.M.P. SOCIETY

1 King William Street, Adelaide
Phone 51 0451



AMP

FOR ALL INSURANCE



CONSULT REPRESENTATIVES

MAURICE JARVIS

37 5438

DEAN HENNIG

37 4951

OR **51 0451**

CIVILS



Chas Allen: Chas's tea and toast shop knows no equal. August was an accident-free month for his Mini.

Lieutenant Boswell: Has already finished 1974's hydraulics exercises. Appreciates a good soils lecture.

John Bowley: Believed to have got his end in, this year. Aims to spend his life strumming his guitar in a cabbage farm by the sea. We saw his face for the first time in third term before going for an interview.

Graham Burton: Known to have missed asking questions in two whole seminars. Was that possible?

Craig Campbell: Thank God for Craig. Thank God for the Xerox!

Butch Catalano: Did what he did for Maria and Antoinette and Angela.

Steve Christodoulou: "Pele". Knows every Greek girl in Adelaide, looks worn out at 2.30.

Andy Close: Smooth, terrific, famous, almighty, debonair, suave, handsome, musclebound-friend of the editors.

Sam Gilbert: Sam who? Didn't know we had a guy called that in final year.

Bruce Hilton: Seen the fallacy of love and the delights of stropping. Feels inferior with tall girls.

Mike Hooper: Foundation member of the Brighton Bikies.

Ron Lochert: One of the front row heavies . . . short-sighted, or just a stropper?

Warwick Mehrtens: Strange visitor from the real world. Taller than Bruce.

Bruno Moretti: Da family looks afda Bruno — they're sending him home for a short holiday with his godfather.

Jeff Packer: Best hitchhiker in the class, by necessity. The salty-plum kid, suffering withdrawal symptoms. Dead shit.

Dick Read: Just put a new "donk" in his Renault. Only surveyor among us.

Roy Robinson: Offered a contract by the Bay Ganew after his performance at Leigh Creek. A "gutsy" effort!

Ron Rogers: Lost his mother to the bookmaker earlier on this year. Now going for double or nothing. Upholder of public morals, defender of the fuzzi.

Leigh Shalles: Runs to a tight schedule: Richmond on Friday afternoon, Arkaba Friday night, Saturday night at "Sam's" disco. A quiet Foster's on Sunday and counteries during the week at the Old Queen's Arms.

Bill Shepherd: A pasty, a buttered roll and a coke. Supervises the

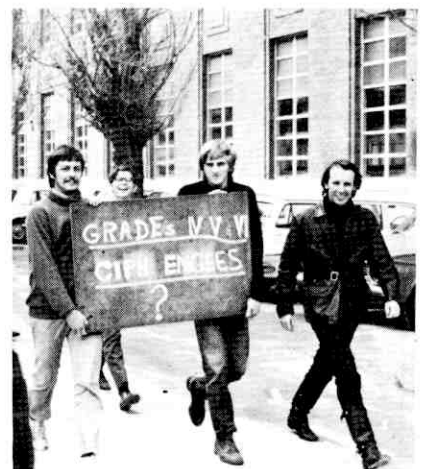
Mitcham Little Boys Club.

Tajul: One of the giants from the north — commonly known as "Peril". Exponent of Asian whist and other exotic delights. Getting fat on cheap Australian rice.

Brian Tattersall: "Balls". Survey camp knew him as "The Lone Rangy".

Glen Trebilcock: Got picked up driving his tractor in town once. Glen tills the soil as Arcturus rises. Hoping for a good fire season.

John White: Does he live in an "IVORY TOWER"?



MECHS



Ben Adamson: If an irrelevant question could be asked in a seminar, Ben asked it! He was usually greeted with cries of "enough, enough" and "Oh! shut up!" Nevertheless, someone likes him. Ben was married last December.

Ross Bower: Class father, having two kids. (He's married too!). He already has a degree from Duntroon (in Elec.) but has decided to get a real degree (Mech.).

Ian Dart: Engaged to Cheryl, but can't marry her, as that would be bigamy — rumour has it he is already married to Lance Davis.

Lance Davis: Otherwise known as Mrs. Dart.

Ho Duong: Apparently not very keen to return to Vietnamese industry.

Dean Foster (Sniffer!): Dean smokes a pipe, and is a heavy in the Brighton Young Liberals.

Dave Furniss: Car enthusiast (hot mini), and answers to Grinning Dave. Hits the big time on the Departmental Staff-Student Committee, where he has been known to question the operation of the Mechanical Department.

Dirty Dave Gillett: Tried to become clean when he had a haircut but being a member of subversive (!) groups like the A.U. Labour club, he didn't have a chance once ASIO checked his record.

Col (stub) Hansen: Smoothest grub in class. Used to be a drunken pig until he met Sue. Now he is reformed into a sober pig. Owns a bike bigger than him and his fiancée combined.

Peter Harrland: Class revolutionary and United heavy. He also has an artistic side, being particularly good at spray painting.

Tom (Y. B.) Hutchinson (Alias Poultry Farmer): Can be seen roaring (?) around town in a cold (viz. hot) ugly Vanguard. Now that Tom may shortly have a job and be able to buy a real car, he can at last be made to admit that it is a heap of faeces. A regular at the Richmond.

Im: Heaviest stroppler in the class — has been known to go to the library between consecutive lectures and was forced to miss a Works Visit early in first term so he could get into his research project (due November).

Adrian Jones (class giant): Never one to get carried away, he decided the design of a gas turbine would keep him busy in 3rd term.

Kang Hong Peng: Kangie seems to like it here (maybe because his wife is here too), but he certainly is taking his time at getting his B.E.

Merv Klemm: The wonder boy from Brinkworth came to the city to make it in the Big Time.

Staci Lambos: Another quiet, keen worker.

Greg Lawrence: Keenest fisherman in the class.

John McNamee: Apart from being married, John is a pretty average Engineer and I can't think of anything rude to say about him.

Shaun Mahoney: Has an aversion to driving green and yellow vehicles.

Kym (F) Martin: When he gets really mad, Kym has been known to swear, as has been known at other times.

John Ridge: Easily the smoothest guy in the class. A one time 'best boy' in the Uni squadron. Keeps a little aloof from many others in the class.

Ian Rischmueller: Not boisterous enough for me to think of anything except that he wore some nice ties on the Whyalla tour.

Rossi: No matter how hard you try to organise a class for a photo, someone will be late.

Rozenlut: Unlike the rest of the

class, usually dresses well.

Bruce Smith: Words fail me!

Se Leong Tan (Theta): It is said that his father's name is Sine and his mother's is Cos. Known as Grubby at Lincoln College. Although he will admit that he is home sick, he has been known to play havoc amongst the Australian women.

A. S. W. (Syd) Thomas: Hides his massive intellect behind a screen of silence and hair. His abilities are varied and include designing wine labels for the A.U.E.S.

Rob Triggs: Class bus driver. Rob is hoping to get a job driving buses for Coates when he gets his B.E. The all-time high in his driving career was taking the final year Mechs. to I.C.I. for the works visit. Despite the fact that we came home via the Osborne pub, rumour says the bus is still in service.

Andy Tyler: Not seen at Uni on a good day when the surf is up. Was considering doing his design project on a supersonic surboard to operate at Mach 3. Plans were dropped.

Joe Walker: Possibly not the keenest member of the class, Joe looked forward to the exams so that he could go skiing afterwards. Joe's tastes must be in a class of its own — his girlfriend was matched with W.D.D. for the Computer Ball.

Len Williams: Class idiot — just gets top D in most subjects, and a disconcerting habit of getting 100% in accounting. Despite all this he has managed to remain quite human.

Ian (Wacker) Wilson: Country boy from Mallala.

Bruce Smith

ELECS

Final year Electrical Engineering has again seen a mixture of students of different histories midst these "hollowed" walls. (White ants they reckon!) Listed below are cryptic comments about each and every one of those, intellectually impoverished baboons!



Christopher Beare: Can be relied upon to do well at whatever he attempts. Hereafter, he shall be known as conscientious father bear.

Terence Bodel: Takes the prize for best dressed student from Elizabeth.

James Braendler: Rumoured has connections with N.A.T.O., S.E.A.T.O., A.S.I.O. and even Richard Nixon through his home town influence in Woomera.

Andrew Bruce: Owns an economical (cheap) sports car. The car helps him to follow the bouncing ball on the football field.

John Cameron: Starry full-back, can be relied upon to lead the team to the pub.

Chong Poh Soon: Nobody knows??

John Clay: The terror of the soccer field, even the ball stays clear of him!

Reg Coutts: Cut backs have gone to his head! It is a pity they haven't improved his supposedly cutting comments!

David Cox: Has been measured at 6' 2" and proved to be the class fuckman.

Paul Drenth, Alias Kikker man: Member of the P.M.G. church.

Dennis Fearnley: Prediction, general manager of Phillips. Phillip's what? You would have to ask Phillip.

Henry Foong: Phantom of Aquinas College.

Dennis Fry: Discovered that an engineer studies for love, not money and marries for not love.

Anthony Gunn: His face is double parked between a towelling hat and a beer mug.

Hong, Le Duc: Wasn't tall enough for the Viet Cong, but he is big enough for us.

Steven Jarvie: Has an open mind on most matters, in fact the intellectual breezes go straight through.

Roger Jefferies: Manager of complaints department. This has earned him a place in the annals of history.

Graham Lovitt: Has a very regular passage from bedroom to lavatory (no laboratory, you fool!).

Kevin Lowndes: Chief vocalist in our team's cheer squad.

Trevor Marshall: Never at lectures, never in labs, never at Uni, that's so sad.

Peter McDonnell: Our 3 letter man, top dog physician who saw the light (electrical that is!).

Michael Moorhen: Last seen heading heading skywards on a 3MHz radio direction finder.

Tim Morris: One of the last produced (some say accident) random noise generators.

Christopher Nettle: Motor cycle mechanic working for the P.M.G. church on the sly.

Clive Nielsen: Better known as Oedipus, Sexus; word has it that he is pregnant

Martin Pearce: Best soccer player ever imported from Birmingham in a transformer crate labelled, E.T.S.A.

Robert Pearce: Plays an amazing goldfish beneath the Uni footbridge (very cryptic!).

Michael Phillips: They have me, they have me not, they have me, they have me not. What will the army do without him.

David Robertson: Theatrical agent for students who have a thing about stages and footlights.

Anthony Rushforth: Like Moses, was found among the bull and like Lazarus, he also came fifth.

George Smithers: See no evil, hear no evil, speak no evil.

Gloria Trenorden: A tenacious fighter against group male chauvinism.

Stephen Wade: Close friend of Cess Pool, but managed to wade free.

Carol Wild: "I think women are on a good thing", quote from the bikey bastion of female individualism herself.

(Date 31-8-72.)

Peter Wright: Year after year, Peter predicts his exam failures which never eventuate. This is indeed a creditability gap!

John Zollo: Fed by a debauched mind, John adds a touch of colour (red mainly) to the class. If it were not for his sick (short for sickle) jokes, we would be bored with sanity!

Epilogue: You have before you the evidence, the decision is yours. Consider your verdict. "Guilty" means banishment from University to relax your way in this hard, cruel money debased world. "Let copulation thrive" by William Shakespeare is our watchword and now a word from our sponsor. Good night and God bless.

CHEMS



(Tune: "Pub with no beer")

We're gathered again
In this old pub to dine,
To release the old brain
At this great festive time,
And so you won't fail
Your exams in this year,
I'll tell you a tale,
Of Chem Engees and beer.

Firstly I'll tell you
Of President Pong (Cox),
He thinks he's a great guy;
He's really a thug,
I tell you he's rough
When he has a bit,
We don't really give a stuff,
Cos he's a shit.

The best of them all
Is a guy named Kev (Miller),
He's a bit of a bullshitter
When he builds up the revs,
He has one or two habits
That cause some concern,
'Cause drinking and bridge
Make it hard to learn.

There's one oriental
With motives of sin
We think there's no doubt,
That I mean dear old Lim;
All Aussie women
Shudder with fright,
When they hear Chia Wah coming,
'Cos he goes the whole night.

There is a Chem Engee
Made a good new year vow
To stay off the women
Its all bullshit now
He wasted no time
But proved a menace
You now know I'm talking
Of the big hairy Pennis (Stefanoff).

I'll sing of a duo
Who are here right now
They're your friends and ours
It's Chua and Chow
The names have a ring
Like a comedy team
Though I'm really not sure
If they are what they seem.

Besides all our beer
Straight out of the fridge
Another game so dear
Is that one called bridge
There's a person each week
Who signals with morse
Called the golden Greek
It's George (Agaliano) of course.

During the bidding
Instead of a pass
You'll find Peter Buchan
Relying on ass,
He peers at his partner
Then table-talk starts,
They both bid four spades
And end up in hearts.

While I'm on bridge schools
One can't take a trick,
When you're playing against
The astuteness of Rick (Goddard),
He passes three times
Then to keep the game square,
He jumps to grand slam
To get points for the pair.

To have a good game
You, of course, need a four,
Against better judgment
Ian (Simmons) makes up the score,
And so they are ready
To play all the tricks,
In a 1 no-trump contract
They go down by six.

I lastly recall
A couple of names
From South East Asia,
They here play their games;
Firstly there's Wong
And next it is clear,
We lastly have Hong,
They both love their beer.

We may hate our work,
As well as our staff,
But engees don't shirk
As we go up the path;
There's two things we like
It now should be clear,
That we can't go without
Our bridge or our beer.

INSTRUMENTATION PRACTICAL

The purpose of this experiment was to determine the operating characteristics of several copying devices in common usage, viz. The Xerox Campbell, Rank Bowley, Gestetner Shepherd and the Roneo Ron Rogers devices.

The Xerox Campbell

This is a highly sophisticated piece of copying hardware developed as an ultra high speed precision copier.

Characterised by its extremely low input and output impedances, this device is able to achieve phenomenal writing speeds of up to 800 pages a minute. This is approaching the theoretical limit of machines of this type and is well above the speed that would be required in general engineering practice.

Unfortunately such high writing speeds tend to make this device extremely difficult to stop, and if unchecked it can easily copy articles two or three times over before this can be rectified.

At maximum speed there is also the danger that Reciprocity failure may occur, but this can sometimes be rectified by post-fogging.

The Rank Bowley

This is another high speed copier, but it has the added advantage that it will sometimes correct spelling and grammatical errors. This tends to reduce the writing speed and therefore this machine is not as fast as the Xerox Campbell.

The display of the Rank Bowley is generally not as good as those of the X.C. with blotches sometimes forming at high speed. Another disadvantage of this device is the unwanted vibration that sometimes develops while it is operating. Also it is troubled by thermal agitation, which in extreme cases can lead to thermal runaway and drift, which tends to decrease the linearity and precision of the device. Drift can usually be restrained by limiting the Operational Period to one or two hours.

The Gestetner Shepherd

The Gestetner Shepherd is a fine example of a Similarity Transcribing Device (S.T.D.).

This machine is programmed to be able to replace most words with their similes and to rearrange sentences and paragraphs and still maintain the basic meaning of the passage.

Also the machine has very good long term stability and has excellent display characteristics. It is, however, rather a slow device with a writing speed of only about 4 pages per minute.

WATER BOARD FILES

Willpipe General Hospital
Casualty Department.

Dear Sir,

I am writing to you on the subject of industrial accidents because, on many occasions recently, I have examined your employees on admittance to the hospital.

The cases I refer to are:

1. Mr. **D.H.T.** (Filter attendant): Chlorine poisoning.
2. Mr. **D.B.C.** (Reservoir keeper): Multiple lacerations.
3. Mr. **F.B.B.** (Labourer): Broken fingers.
4. Mr. **C.S.** (Plumber): Broken leg, concussion and pneumonia.
5. Mr. **R.C.** (Foreman): Dislocated shoulder.

I would suggest that your safety regulations need revising and I should welcome your observations.

Yours faithfully,

I. M. N. Parker,

Senior House Physician,
Willpipe Water Board,

Casualty Department
Willpipe General Hospital.

Dear Dr. Parker,

I appreciate your civic and medical conscience regarding the accidents mentioned in your letter of the 14th June and I feel you deserve some additional information for your case histories. Accordingly, my observations are:

1. Mr. **D.H.T.** (Filter attendant).

Part of **D.H.T.**'s duties is to maintain the chlorination equipment at Silverstone which is an old, but still efficient, Wallace and Tiernan machine with a bell-jar on a pedestal. The bell-jar is removed and cleaned once a fortnight by a safe procedure, the attendant wearing a mask.

Mr. **D.H.T.** suffers from asthma and, for some unknown reason, became convinced that a whiff of chlorine could remedy this condition. Accordingly he removed the bell-jar without either closing down the machine or wearing the mask and inhaled deeply. I understand that, under your care, he should soon be fit to resume work and I should be interested to know whether he is still asthmatical?

2. Mr. **D.B.C.** (Reservoir keeper).

While digging a hole near the shoulder of the embankment, Mr. **D.B.C.** uncovered the end of a disused 18 in. diameter pipe. Instead of making enquiries at head office, he decided to investigate by crawling up it, but in case he could not crawl backwards he attached a rope to his waist and left instructions with two labourers to haul him out if he got stuck.

Unfortunately he forgot to say 'slowly and gently' and when he eventually gave the signal his men pulled him out with such enthusiasm that the internal nodules removed large areas of clothes and skin.

3. Mr. **F.B.B.** (Labourer).

Mr. **F.B.B.** was granted leave of absence to attend his dentist's surgery for an extraction. Mr. **F.B.B.** is a person who refuses the aid of anaesthetic (general or local) and instead takes the strain by entwining his fingers round a 6 in. nail. In this case the nail proved stronger than his fingers.

4. Mr. **C.S.** (Plumber).

Mr. **C.S.** has the reputation of being the Casanova of Willpipe City. Several weeks ago, on standby duty, he was called out on a wet and windy night to carry out an emergency repair at a

customer's house. The man of the house was on night shift, the lady was attractive, willing and in a negligence.

The husband returned unexpectedly and Mr. **C.S.** beat a hasty retreat through the bedroom window clad only in a wrist-watch. He fell into an ornamental pond and it was some while later than an ambulance was obtained.

5. Mr. **R.C.** (Foreman).

Mr. **R.C.** is gullible and bald. While supervising the installation of a cross-country main, the route passing alongside a gypsy encampment, he took his troubles to the matriarch of the tribe and eventually purchased from her a vile smelling concoction which was reputed to possess hair-restoring properties.

He poured this liquid into a bowl on the site (his wife has a sharp and sarcastic tongue) and immersed his head in it. A car backfired and startled him.

In this awkward posture he lost his balance, fell into the trench and dislocated his shoulder. I might mention that he is still bald but has the hairiest ears in the country.

If you are still of the opinion, my dear doctor, that the Board's safety regulations could be rewritten to prevent the above calamities, I should be pleased to have your assistance.

Yours sincerely,
Engineer and Manager
(Extracted **D.B.C.**)



AIRS FROM HEAVEN OR BLASTS FROM HELL

Ghosts gather,
The Pope's geese,
From coops
Sweep and swoop
In loops.
He mopes,
Scoping to cope
With hope,
Deadly dope,
And rippling rope.
But cripes!
While he leaps and weeps
S'pose someone creeps,
To peep.

Lelde Vitols

...AND NOW...

GRAB THE NEAREST HOLY BIBLE,
CAP OF ACID ~ TIBETAN BOOK OF
THE DEAD ~ ECT. ~ AND JOIN US
ALL... IN

THE CLOSING PRAYER

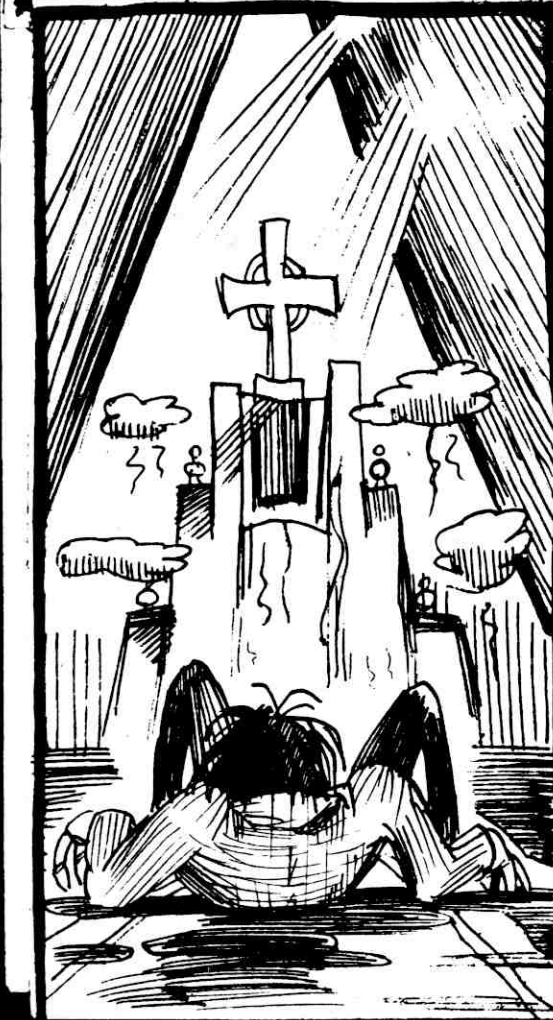
FORGIVE AND
KEEP ME FROM SELFISHLY
TRYING TO OWN, CONTROL
OR CHANGE OTHER SOULS
TO SATISFY MY OWN
SELF DOUBT, GUILT, AND
LACK OF FAITH.

SO MAYBE SOMEDAY
HUMANITY CAN
FEEL A DESIRE TO LIVE
AND THE FEAR OF
FREEDOM WILL
FADE

AND MAKE A WORLD,
GOD, WHERE CHILDREN
OF ALL COUNTRIES CAN
GROW UP TO BE GIVING,
LOVING, INDIVIDUALS,
THAT CAN FEEL A
MEANING TO EXIST
AS A PART OF HUMANITY,
FREE FROM LONELINESS
AND SELF
DESTRUCTION,

AND
DEAR GOD~
KEEP MY LOVED
ONES AND I
FROM STRAYING
INTO SATAN'S
POWERS~
AND FORGIVE
THEM...

AND GOD~
FORGIVE MY
ENEMIES AND MAKE
OUR SOULS SHINE
TOGETHER, AND
MAKE PEACE THROUGH-
OUT THE WORLD,
WITHOUT FEAR, HATE,
OR EMPTINESS, AND
BRING US ALL
TOGETHER, GOD,
AND FORGIVE
ME FOR ~



... FINISHED READING? FEELING A LITTLE WORSE?
TO GO OUT AND FACE THE BIG WIDE WORLD & DO SOMETHING?
WELL, YOU'D BETTER GET OUT THERE AND DO IT THEN, 'CAUSE
IF YOU DON'T, AINT NOBODY GONNA. OF COURSE, THERE
IS AN ALTERNATIVE. JUST ROLL UP ANOTHER JOINT, TURN
UP THE OL' VOLUME A BIT, AND....

