

To the NUCLEAR WASTE MANAGEMENT ORGANIZATION
49, Jackes Avenue,
Toronto, Ontario, Canada.
M4T 1E2

from Robert Griffiths

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THOUGHTS ON NUCLEAR WASTE

INTRODUCTION

The writer attended most of the meetings arranged by the Seaborn Committee that were held in the Toronto area, the N.W.M.O. meetings, one held about a year ago and the recent Novotel meeting. When called on by Blair Seaborn to start off one of the first discussion groups, Bob responded by saying "No one in his right mind want to have nuclear waste buried under or near his home, therefore it must be determined by a management decision. But, as all management decisions are wrong, we are in a bit of a mess aren't we"? I am still of the same opinion. Just to remind you, in the final report the Seaborn Committee stated the deep burial plan was technically feasible, but socially unacceptable. The Seaborn commission seemed to come to an end, when transportation of waste nuclear fuel bundles, needed a new special road from Toronto into Manitoba. This is from where most of the nuclear waste is created, to where it was originally planned to bury it. Having driven from Whitby to Winnipeg I appreciated the problem. In management studies over fifty years ago, I was taught to how to locate the site of a factory. It was based on where, the raw materials were acquired and the location of the market. It was intended to minimized transportation costs. This general approach seems to me as applicable, for the location of nuclear waste sites as a factory.

THE NUCLEAR WASTE MANAGEMENT ORGANIZATION DRAFT STUDY REPORT

After reading Part 1 draft Study Report, I have high hopes that the suggested program will be quickly implemented. However, the planned timing does appear to be too long. The plan is sufficiently flexible that it can rectify mistakes, and plans finally to use safe permanent buried waste sites. It is general agreement with how I would plan such an operation. The use of an intermediate temporary storage site may prove necessary.

THE BURIAL SITE

From prior statements, the writer is obviously in favour of a main sites (note the plural) for deep burial to be sufficiently north of Toronto, where there are a now small populations. The decision where, should be made as soon as possible. This would avoid the problems that could arise with the present real estate activity. Near Toronto a new house was sold because it had a wonderful view of a golf course, then the new occupants got upset because, they now objected to being hit by golf balls.

I still think it will be difficult to find a willing host community to accept the deadly waste. But was very encouraged by the success and favourable outcome of some experiences with finding low radiation waste sites, that were reported at the meeting of the 16th July in the Novotel Hotel. Despite all the rhetoric in the draft report, the writer fears the site will have to be determined by a government decision. This type of action has been used many times before. The Pickering Airport is an example that has been on the go for over thirty years. This project is continually changing and was rejuvenated again recently.

When N.A.S.A. developed the rocket test site in Southern Mississippi, the Federal U.S. Government confiscated all dwellings within ten miles of the rocket test stand. In some villages it was possible to see the curvature where the ten-mile radius had caused homes to be demolished. The problem there was noise. For a time, I lived about twenty-five miles away, and when a Shuttle Rocket Engine was tested it rattled the house windows. The ten mile limit was fixed for the Saturn Moon Rocket.

The close proximity of Pickering and Darlington Nuclear Power Stations, the Port Hope refinery and the proposal for the experimental Fusion plant, indicated little thought had been given to 'what if something goes wrong'. It is like the Scarborough Chemical Ally, where there has been frequent fires and pollution problems. But

this time it's a more risky Nuclear Ally. Approval for such a conglomeration so close together is an indicator that something is wrong with the geographical planning process.

FLEXIBILITY

Regarding flexibility, we are bound to make some mistakes that will need to be rectified. We must keep in touch with other countries that are following the same path, and learn from any mistake any one of them may make. Study their thoughts and experimental experiences. It is much cheaper to learn from the mistakes of other, than repeat them ourselves. This is a problem where international cooperation could be very beneficial. Engineers have always progressed along these lines. This has been helped by conducting preliminary tests, and a general development program.

As any thought been given to the critical mass of bringing large quantities of radioactive materials together, and the effect of radiation on the storage structures. There is data on how metals and plastics are effected by radiation. Metals loose their ductility and this would affect their ability to withstand impact drop tests. The writer is of the opinion the location of the burial and storage sites need not be in the hardest of the rocks of the Canadian Shield. Ground stability and containment of radiation can be achieved by the design of concrete structures. The safe operation of nuclear power stations depend on this approach.

I was pleased when some one brought up the question of other species that inhabit the planet. With our dominant influence we must be expected to be the stewards of the environment.

MATHEMATICAL MODELS

I like to comment about complex mathematical formulae and numerical analysis being a non-convincing argument. Although I attribute my success in engineering to my study of advanced mathematics, I still like your comments. It is for this reason these comments have been included, and because this aspect had a pronounced influence on my life. In the English Midlands the technical director of a gas turbine company encouraged me to do quick calculations in my head. This enabled problems, to be pinpointed and even settled during the meeting. When the problems like the structural aspects of main gas turbine components have been repeated many times, this is not difficult. There were many short cuts to determine standard stress values for some standard type components. These techniques were shared in England amongst the Private competitive Gas Turbine Companies that were represented on the Gas Turbine Collaboration Committee. My assessments done in my head usually took about fifteen minutes, after which the other workers in the Stress Office took up to six months using computer methods to confirm my conclusions. At times I was questioned about my in the head analysis, there was some obviously someone else checking my results as I passed my comments during the fifteen minutes. Old Europe still has its qualities to offer the New World, even if some of us do not realize this. When arriving in Canada, the writer joined a company that boasted of it's advanced technology, I soon started running into difficulties because there was no good written explanation, and no one prepared to give reliable advice on how to use the numerical methods correctly. So some engineers guessed how to input the data. Some of the computer outputs were totally absurd, but management liked computer answers. After receiving much unwarranted abuse I began to wonder if the laws of nature were different this side of the Atlantic. However the test of time and test results always satisfied me that my methods and computer outputs were correct, but the die was cast. Fortunately airframes and engines are tested before being certified for use in commercial flight. Then after having been left twenty-five years, I meet the latest group running the show, they were pleased to see me, having hear of me and seen the work examples left behind. As it was company policy to discard calculations after ten years I am suprised they were aware of my existence and work. I have a fear that the use of standard computer programs will have a tendency to stifle initiative, and restrict the advancement of or design techniques.

PERSONALITIES

My three years experience in a Nuclear Reactor Design Department was in the infancy of the industry. It was just after President Eisenhower announced the "Atoms for Peace Program". The engineering staff was recruited in a great hurry from anywhere possible. I got a good rise in my salary to join them, despite the Aero industry was being cut back by government policy. This type of work was not advance technology like the aero engineering. However it did require a high standard of engineering. It was a wider scope than my general experience. Thus I had to do a lot of reading and study to satisfy my own conscience. There was no usefully experienced personal with whom to discuss basic background aspects such as metallurgical problems. In the Aero industry there were experts with experience who could give good advice when it was needed. None knows it all, and we were all continuing to learn. The problems were different in the nuclear applications. As far as Nuclear Engineering was concerned there were a group of physicists who had been recruited from Harwell, they were extremely bright and knowledgeable in the basic requirements for design of a Nuclear Furnace. There were also some electric motors experts, who if they did not know the answers would soon

find out. It was the operating equipment with which the engineering designers were concerned, nuts and bolts, gear teeth, ball, roller and plane bearings. The engineering designers had drafting and technology experience, that was generally limited only to rough and ready engineering, they needed a lot of polishing up to meet the standards required for a nuclear reactor machinery. However, there was one key man (as with most organizations) who was on top of every thing, and was well informed in the nuclear field. He had just transferred from the company's gas turbine division, so I presume he had been given some special training for the position he then held. I learned to admire and respect him. Under him there were the managers transferred from other divisions of the company. From their abilities I began to believe that the other divisions must have been pleased to suggest they be transferred. This situation led to a general discontent amongst the experienced engineers. As the pay was good, and the company location was in an inexpensive area in which to live, it was not easy to find other employment. One group used to meet once a week in the lunch break to share their knowledge about new employment opportunities. They were known as the escape committee. It so happened that I followed the trend of the other recruited engineers. I returned to the company I had previously left. The three years taught me how to be self reliant, how to find out how to build up experience in a wider field of engineering than the Aero Industry. These newly learned skills were useful in my new position in the Industrial and Marine Division of Bristol Siddeley Engines. There was a Nuclear Group in the Division that was struggling to survive, they were anxious to learn as much as they could from me.

During my for fifty years working in engineering, I came across professionally qualified Engineers that would interpret test results, in a manner that led them to in my opinion absurd conclusions. It is unfortunate that this type of person quickly inspires to promotions to management positions. This is how they get their own conclusions implemented. As this program proceeds into the future the reins of power must not get into the hands of this type of person. Neither should we forget this aspect when casting our votes for the selection of politicians.

THIS WEEKEND MEETING

On coming away from the weekend discussion I am convinced more than ever that we must build a deep depositories as soon as possible. Hundreds of years is too long a time frame. The burial site must be well marked, say by having the traditional burial site marker, the Egyptian Type Pyramid that will survive through the ages. The approach suggested by Greenpeace I thought to be very evasive, but they were not totally against the plan.

I was concerned about the assumption that we could loose the expertise needed for the implement of this program. However, there are times when I came across current engineers that have lacked basic knowledge related to know how and general engineering experience. I have often wondered who taught them, and who passed them in the final exams. Your statement reflects a lack of hope for the initiative of next generation; but they may be better than best present day engineers. I used to be a member of the British Interplanetary Society in the fifties, in one of the magazine articles a rocket journey to our nearest neighbouring star was described. The main purpose of mentioning this is it illustration of the time span we are considering. It started off under the command of King Canute and arrived under the command of President Truman. This project of Nuclear Waste involves a longer period of time. My own fears related to this topic is, we may be approaching a temporary ceiling for engineering knowledge. This is based on the technical progress made in the last part of my working life. Such a stagnation could continue with little progress until a suddenly it changes with a spurt of new ideas.

As a warning as to what could go wrong , in the 50's there was a spate of movies depicting a society after a nuclear war, it was usually a return to the Stone Age.

FUTURE POWER NEEDS AND THE USE OF NUCLEAR POWER GENERATION.

This issue cropped up in relation to how big a deep storage capacity is needed. Certainly the desire for more comfort to be provided by convenient electrical power may have to be met by nuclear generation of heat. The industries related to transport may have to convert to hydrogen when gas and oil become short and expensive. Hydrogen can only isolated by using electrical power. There is a hope that farm grown products may provide an alternative answer.

WORLD STABILITY

The writer is concerned about the effects of global Warming and the problems it can cause. However, when living in Cincinnati, Ohio, the appeared to be evidence that things had not changed that much yet. This became evident from the Television weather predictions, The snow storms so often predicted did not seem to develop. Then it became evident that my work colleagues were often late due to snow storms because they lived in Dayton. So it was the Dayton T.V. stations that warned us about their own snow storms. It so happens that the last Ice Age Glacier extended to just south of Dayton. Therefore my conclusion is, there is still some stability in what we know about our planet.

CONCLUSION

The program outlined has given me hope that something will be done in the very near future to start the ball rolling. Thus the dangerous stuff will be safely under the ground and back where it belongs. Also safely away from the hands of terrorists that are of such concern today.

I pray that god has guided me, in making the above comments.


Robert Griffiths