The Best Utilization of Nuclear Breeze

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ABSTRACT

The purpose of this paper is to introduce a new method for wastes protection in deep repository. In this paper we discuss the problems of radioactive wastes in deep repository, the sources of bulk gases which are produced in repository, repository protection devices, the amount of natural uranium decay energy in per year in the world, the sources of fuel and gas and finally the best utilization of nuclear breeze.

INTRODUCTION

In this paper we first provide a brief information about supplies of nuclear fuel and the Global Uranium Market: Supply and Demand 1992–2010; originating from the Uranium Institute report, July 1994. Then we study the Nirex report, 1993 and the Royal Society report, 1994 concerning the Sallifield repositories; followed by our opinions about subjects mentioned above. Finally we introduce a new method for protection of nuclear wastes in deep repositories.

Uranium Institute:

According to the report, the global energy demand will be 50 percent higher in 2020 than in 1990. The world nuclear capacity will grow by 19 percent by 2010. Western world uranium production capacity could increase by 23 percent by 2000. Nuclear power is already playing a substantial role in electricity generation, and our report foresees a continued increase in nuclear capacity by 2010. Nuclear power offers substantial environmental advantages over other forms of large-scale power generation. It does not add to the green house effect; does not contribute to acid rain or does it affect the ozone layer.

Uranium is in plentiful supply; at the end of 1992 the world's total nuclear generating capacity was 324 GWE. It is expected to expand to 361 GWE by 2000 and 397 GWE by 2010.

According to the report the institute based its analysis on information available from individual utilities where this is available. The institute's updated computer model for forecasting reactor requirements is also largely based on information provided by individual utilities.

According to the model, total world requirements will grow by 2.2 percent per annum from 54500 tons natural uranium equivalent (Tu) in 1992 to 64200 Tu in 2000.

Nirex and Royal Society:

In nuclear industry, the two issues that will not go away are the disposal of nuclear waste and decommissioning of stations.

Sir Michael Atiyah, president of royal Society, says they were approached in 1993 by Nirex (the UK government body charged to find solutions to the deep disposal problems).

Sir Michael spells out the crux of the issue and the brief that faces Nirex (or any other such body).

"The safe permanent disposal of radioactive waste in both politically controversial and technically very difficult. It is also urgent; by the end of the century, in addition to High Level Waste (HLW), UK will have 100,000 cubic meters of intermediate and Low Level Waste (LLW) in temporary surface storage and by 2030 this could be 300,000 cubic meters.

Much of the waste comes from the power generation industry.

All consumers of electricity therefore have a direct interest in resolving the question of safely disposing of the waste. Current government policy requires Nirex to demonstrate that such a strategy is unlikely to cause harm to communities living in the vicinity of the repository over the very long term, a million years or more, that the wastes remain dangerous. The scientific challenges in this are formidable".

The Royal Society report comes to certain conclusions, which can be usefully spelt out before looking at some of the technical detail. While they were looking at the particular issue of the UK and Sella field and a repository for intermediate and some Low Level Waste (ILW and LLW), the principles apply internationally. Even more so as Sella field is home of THORP, the intended global reprocessing plant. The committee is fulsome in its praise for they way Sweden has set about the problem. It took evidence from a number of countries, government, scientific and lobbying bodies and interested parties on

all sides of the issue. It also says that proposed deep storage repositories in a number of countries for HLW are not only perhaps more friendly, for geological and other reasons, but well researched.

Having said that, the report expresses concern that urgency is not matched by the progress of research. A positive suggestion for the industry is that perhaps a two stage process can be put in place at Sallifield: start with one UK repository for short-lived waste disposal to allow a more extended program for the disposal of long-lived waste. The report is not in favor of the Sallifield site nor does reject it. It retains "an open mind", but does say that while the site could prove to work for short – lived wastes it may be "more difficult" to demonstrate safety for long-lived wastes.

It goes on to suggest consideration of an extension further west of the site for long-lived wastes "where currently available information indicates that the high salinity of the ground water and longer flow paths may result in lower level of radioactivity moving towards the ground surface". The report says that the two- stage repository would share common underground access. This proposal might also permit consideration for disposal of high level waste, "for which no solution is currently being developed in the UK". The society supports the Nirex proposal to build a Rock Characterization Facility (RCF) tunneled in the rock where the repository might be built, "which it sees as vital to assessing the performance of a potential repository and which should proceed as soon as possible".

Principal Problem:

The report said: The principal problem is the migration of bulk gases, such as Hydrogen (H2) produced by the anaerobic corrosion of steel (of which there may be some 300,000 tons in the repository) and to a lesser extent carbon dioxide (CO2) and methane (CH4) produced by microbial degradation of organic wastes (of which there may be some 20,000 tons). Bulk gases have the potential to disrupt the repository itself, and to affect the ground water flow. The society study group spelled this out by saying that, not just at Sella field but internationally there are no sets of postulated future evolutions of conditions in and around such repositories and this was an unsatisfactory position. For example, examination will be needed on how far the use of cementitious backfill at Sallifield will be effective in relation to groundwater flow and leaching. A further concern is how quickly the chemical containment will be established after repository closure.

Society Opinion:

The Society has studied the Nirex report by biochemical formulas and said: "Bulk gases, such as H_2 , will be produced by the anaerobic corrosion of steel and CO_2 and CH_4 will be produced by microbial degradation of organic wastes."

Here The Questions Are:

1- Can anaerobic and aerobic microbes live under the radiation of the nuclear breeze in the repository?
2- How many tons of steel must be corroded to produce 300,000 tons H_2 gas?
3- What is the sum or amount of organic wastes for producing CO_2 and CH_4 gases by microbial degradation?
4- Are the organic wastes there naturally in the repository or they left by men in it?
5- Is there enough Oxygen (O_2) in the repository for breathing and reactions of aerobic microbes in the repository?

The Answers Of These Questions:

1- We know that the radioactive radiation destroy all anaerobic and aerobic microbes. So, the report is not right in this case.
2- For calculating the sum of steel we must introduce the society's view by a biochemical formula and calculate the steel amount. In this formula we supposed, steel has 98% Fe, 1% Sn and 1% C.

$$Fe + H_2O \xrightarrow[\text{anaerobic corrosion}]{\text{Catalyst}} FeO\downarrow + H_2\uparrow \qquad (1)$$

here, H2O is the leakage water in the repository. As society said if here the sum of H2 gas be 300,000 tons, so, the amount of Fe mass will be:

$$\begin{array}{ccc} \frac{Fe}{56} + H_2O \longrightarrow FeO\downarrow + \frac{H_{2n}}{2}\uparrow & & \\ x \qquad\qquad\qquad\qquad 300{,}000 & & (2) \end{array}$$

$$x = Fe(\text{mass}) = \frac{56 \times 300{,}000}{2} = 8{,}400{,}000 \text{ tons}$$

And the amount of steel will be 2% more or will be 8,568,000 tons.

It can be seen that in reality there is not such a great amount of steel in the repository, which through corrosion would produce 300,000 tons H_2 gas. In fact the shields of the wastes are made out of stainless steel and are therefore anti-corrosive so the sum of steel in the repository is much less than the amount derived above. Thus the report is not correct in this case either.

3- For calculating the sum of organic wastes we must introduce the society's view by a biochemical formula and for the fluency of calculation we suppose the organic waste is C_2H_6 gas, so we have:

$$\frac{C_2H_6}{30} + \frac{3/2\ O_2}{3/2\times 32} \xrightarrow[\text{aerobic degredation}]{\text{Catalyst}} \frac{CO_2\uparrow + CH_4\uparrow + H_2O}{(44+16)=60}$$

$$x_1 \qquad x_2 \qquad\qquad 20{,}000 \text{ tons}$$

$$x_1 = \text{organic waste amount} = \frac{30\times 20{,}000}{60} = 10{,}000 \text{ tons} \tag{3}$$

$$x_2 = \text{oxygen or air amount} = \frac{3/2\times 32\times 20{,}000}{60} = 16{,}000 \text{ tons}$$

And we know that, the radiation will not allow the aerobic microbes to react in the repository and so, the report is not right in this case either.

4 & 5- There are not enough natural organic wastes or enough air in the repository for reactions and breathing of the aerobic microbes and the report is not right in this case either.

Our Opinions:

However misleading the report may be, the fact remains that there are a large amount of bulk gases in the repository, and the question is, what is its source? In other words what is the real principal problem?

The most reasonable answer according to us is that these bulk gases are produced by means of degradation of artificial wastes (which have been left on purpose in the repository) under the effects of radioactive radiation. The easiest case formula is:

$$C_2H_6 + 2H_2O \xrightarrow[\text{radioactive radiation}]{\text{Catalyst}} CO_2\uparrow + CH_4\uparrow + H_2\uparrow \tag{4}$$

These wastes are left in repository by men for absorbing the radioactive radiation and making secure the repository building against the radioactive effects.

By radio chemical studies this subject gets clearer.

Here the question is: can the radioactive radiation degrade the organic wastes, which left by men in the repository and produce bulk gases?

The radio chemical studies have found that:

Gamma radiation can quickly degrade the heavy and complex molecules of hydrocarbores to a light one such as CH_4, C_2H_6 , C_3H_8, CO_2 and H_2.

Beta particles are able to compound the light molecules of hydrocarbores to a heavy and complex hydrocarbore.

Alpha particles which have a very high energy, when in contact with other materials, a part of their energy will change into heat and the other part is attracted by the crystals of the rock of the repository building and accumulated in them as electrical charges. The rock crystals act as semi-conductor and charges by electricity.

Real Principal Problem:

Due to decay of radioactive elements of nuclear waste, an amount of decay energies charge in rocks crystals of repository building and then discharge by means of mechanical movement (shake) and finally by shock (earthquake), and this is the real principal problem, because, this energy has the potential to disrupt the repository itself, and to affect the ground water flow and so on.

Deep Repository Protective Devices:

Each secure and safe deep repository has three protection devices as below:

1. Cementitious backfill
2. Lead Plates
3. Complex Organic Wastes

Note: Gamma rays break the complex molecules of organic wastes which have been left by men in the repository and change them to light molecules and produce bulk gases, but beta particles compound them again and produce complex molecules of liquid or solid hydrocarbores. These compositions and decompositions are regularly repeated in the period of the half-life of the wastes nuclear elements.

It seems that, a part of this newly produced liquid hydrocarbore is absorbed by cementitious backfill and rocks of the repository and make them isolated against the shocks of electrical charges and discharges. It also prevents from leakage of underground water into the repository.

Thus, it is concluded that, the organic wastes are used for protection of the repository building and safe permanent disposal of radioactive wastes, and by absorbing the radiation helps preventing cancer and other radioactive related diseases common in the area. According to some, the newly spread BSC is in this category.

Natural Uranium Decay Energy:

The natural uranium decay energy in the world is 10^{18} j/year and also the earth's energy release due to earthquakes is about 10^{18} j/year. Therefore, this natural decay energy or wastes decay energy cause periodical earthquakes (Refer to our paper in Conference SMIRT-15, I.D. Number K1-A7-IR)

Source of Natural Fuel and Gases:

As it was mentioned above, the radioactive radiations degrade the organic wastes. It seems that, the botanic and animals corpses which have been buried for centuries have been degraded by means of natural radioactive radiation effects and have produced the natural fuel and gases.

Utilizing the Nuclear Breeze:

In order to utilize of nuclear breeze, it is offered to put an amount of solid organic materials such as "Used Tyres" in the repository. These materials will degrade to liquid hydrocarbores and gases by means of radioactive radiations and will be usable as fuel and gases. This is the best utilization of nuclear breeze.

Note: Where the repository has no organic protection earthquakes may occur in a period of 10 to 50 years in that area. This is called periodic earthquake, which is fully explained in the Kiana Theory in the SmiRT-15 conference.

UFO'S SOURCE

In places which there are uranium mine and waste repository or the amount of natural radioactive elements are high, peoples sometimes observe unknown flying objects in the area sky, people call these "UFO", but in fact these are not UFO and these are a kind of earthquake precursors which are produced by means of charging the air molecules by radioactive radiations.

Note: You will find soon our opinions about the electrical source of periodic earthquakes in the website called: "www.Kiana-earthquake-prediction.com".

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APPPENDIX:

We are very sorry for people whom died, injured and the damaged due to Gojarat earthquake of January 2001. It was told that, the Gojarat and Moharashtra areas have such situations which there are no coincidence between happened earthquakes and what is known by this time, and it means, the Gojarat earthquake of January 2001 and Moharashtra earthquake of 1996 were due to residue radiations. It seems that Indian's repositories have not organic protection and nucleus radiations charge rock crystals of repository buildings and discharge by means of earthquakes. These earthquake occurrences will be continued during the half-life of the residue.

So, these two earthquakes are clear samples of periodical earthquakes, which happened due to residue radiations. For avoiding such earthquakes it is necessary to use organic protection in the repositories.