NEW TRENDS OF NUCLEAR WASTE STORAGES

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ABSTRACT

This thesis is focused on radioactive waste disposal in the Czech Republic and the world. Thesis contains data on final repository, repository of low-level waste. This work deals with the problem of radioactive waste and their liquidity. Work treats about the future of deep repositories in the country.

KEY WORDS

Radioactive waste, final repository, low-level waste, repository waste, waste incineration, high-pressure molding

1. INTRODUCTION

In this paper I will discuss how to reduce the capacity of radioactive waste, to maximize storage utilization. There are several ways to reduce the capacity of radioactive waste. Some of us already use it and others would also come into consideration, but the question remains, however, the effective use of funds compared with the benefits of the method. A possible combination of some methods of treatment of radioactive waste would reduce the capacity of waste deposited.

A good way of radioactive waste would be underground storage. Its construction is contingent on finding suitable sites, several years of research and development and, of course, sufficient funds for its construction. Deep storage must be constructed so that it is resistant to climatic and seismic conditions, as well as human intervention.

2. RADIOACTIVE WASTE

2.1. Rise radioactive waste

In a nuclear reactor gives rise to various radioactive substances. The vast majority of them are about 99% of fission products contained in fuel cells. The remaining radioactive materials arising out of the fuel cells, in particular the absorption of neutrons, a very small proportion of these substances after adjustment discharge into the atmosphere and water courses, which further diluted. Other radioactive substances produce a radioactive reactor waste to be processed and then finally save so they can not penetrate into the environment in quantities that could endanger the current and future population. Radioactive waste means any material which is planned for no other use and the nature and level of radioactivity are such that, for radiation safety does not allow its immediate dispersion into the environment. The producers of these wastes may not only nuclear energy, as well as healthcare and certain other industries.

2.2. Processing radioactive waste

Treatment and processing of radioactive waste before it depends on the type and state of the waste. The main purpose of treatment is to reduce the waste capacity, convert the radioactive nuclides into stable insoluble form and enclose them in suitable packaging to prevent any future leakage of these substances into the environment.

Another possible procedure for the treatment of nuclear waste reprocessing and reuse. Unfortunately, despite achievements in the development of technology showed that the prices obtained from reclaimed uranium and plutonium will not cover processing costs. Therefore, the reprocessing of high-level waste can afford only some countries (France, Great Britain, and Russia).

2.3. Capacity savings of storage space

This section indicates the quantity of tanks, which can potentially save the method and takes into account the usefulness of tanks due to its space and size, which for the method used. The usable capacity of tanks used in packaging today is around 325 m^3. Changing packaging forced some methods result in reduced usability of wells - for example by using the HIC containers up to one third.

Table 1 – Projected savings revised radioactive waste

The process of reprocessing radioactive waste	Expected to save the additional capacity of condensate from the use of sealants in pits EDU	
	40 years	60 years
	with concentrate	with concentrate
CW	3,10	3,90
HPP	5,50	8,00
containers HIC	3,80	6,60
CW saving in HIC	4,90	8,50
CW + HPP	6,16	9,15
HPP + CW	6,05	8,95

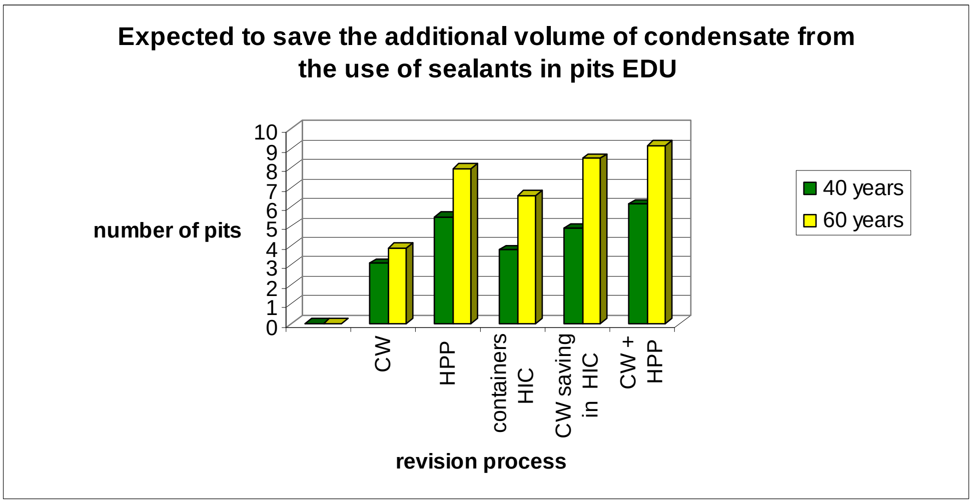

Figure 1 – Savings in a revised capacity of waste in pits

I was thinking about the possibilities of a priority waste incineration and an additional pressing (CW + HPP) and vice versa (HPP + CW) recalculation percentage composition of the waste when the savings will increase depending on the composition of radioactive waste. The HIC containers are not counted Grouting of condensate EDU, because when you use this package does not.

2.4. Effect of composition of the waste, while using a method with high-pressure

Using high-pressure press is an effective method for saving are available, and is larger than the actual use of incinerators for waste scale, which can be pressed high-pressure is wider than the range of combustible waste.

I took into account only the combination of combustibles wastes (CW) and high-pressing (HPP), one method shall be determined as a priority, i.e. that this method will take precedence over the other one, so combustible, which are compressible when the priority of waste incineration ash. Of the total amount of 100% of waste can be approximately 40% of the press, either very good or worse and 10% can burn.

The estimates of the proportion gradually I thought that 10% of the combustible waste is 90% (25, 50, 75 and 100%) ready to press, it follows that for pressing me to stay 39% (37.5, 35, 32.5, 30%) 9% (7.5, 5, 2.5, 0%) combustible waste from the total amount of waste and 1% (2.5, 5, 7.5, 10%) were either burned or by compressing the selected priorities.

Savings of both methods can replenish dressing EDU condensate, which will further increase savings in the capacity of radioactive waste. This saving is always constant, for this reason I did not include this option in graphs (Fig. 2)

Table 2 – Comparison of estimated proportions of SO and VTL

Comparison of estimated proportions of CW and HPP				
Priority revision process, the percentage ratio of waste	**40 years**		**60 years**	
	not concentrate	**with concentrate**	**not concentrate**	**with concentrate**
HPP 1%	4,49	6,49	7,71	9,71
CW 1%	4,51	6,51	7,75	9,75
HPP 2,5%	4,33	6,33	7,43	9,43
CW 2,5%	4,38	6,38	7,53	9,53
HPP 5%	4,05	6,05	6,95	8,95
CW 5%	4,16	6,16	7,15	9,15
HPP 7,5%	3,78	5,78	6,48	8,48
CW 7,5%	3,94	5,94	6,78	8,78
HPP 10%	3,50	5,50	6,00	8,00
CW 10%	3,73	5,73	6,40	8,40

From table 2 and the following diagram (Fig. 2) shows that, if used as a method of burning priority is saving more, which results from a diverse mix of waste and myself as defined proportions of combustible waste and ready to press

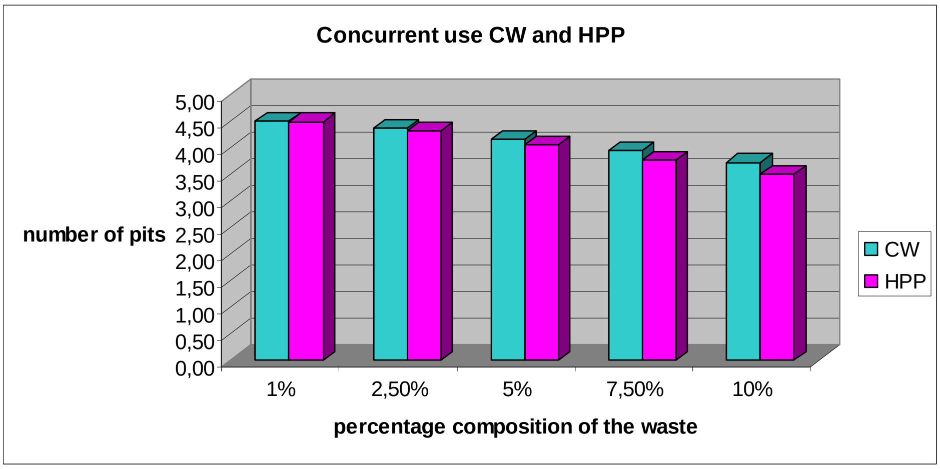

Figure 2 – Simultaneous use of HPP and SO

3. CONCLUSIONS

High-pressure pressing depends on the composition of the waste in terms of compressibility and using this method would be using a larger container resources. For waste incineration method can be used only a portion of waste, ranging between 5-15% of the total. Using HIC containers for storing radioactive waste in our country has been rejected once and for safety. In violation of the HIC is not a waste container bound matrix and no further risk of escape of radioactive isotopes. Due to the size of containers, the HIC also decreases utility sink, but selecting the proper size based on the optimization analysis is possible to increase the usability of pocket.

Saving capacity for each method, which shows that the greatest opportunity to save the applications of high-pressure molding of containers and using HIC. As a preferable method for high-pressure method seems to me that is very easy to combine the methods of incineration and dressing condensate EDU. Other methods not listed in the final scale of such a large capacity of savings.

Concomitant use of waste incineration and high pressure molding is possible, but the total savings capacity greatly influences the composition of waste. For this reason, I counted the number of possible variants that are able to cover most possible cases which may arise operation of nuclear power plants. Of these options, based on the best option, in which we think as a priority waste incineration method, whilst the heart rate of the waste in the use of priority methods of high pressure presses, a difference of only about 150 m^3.

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