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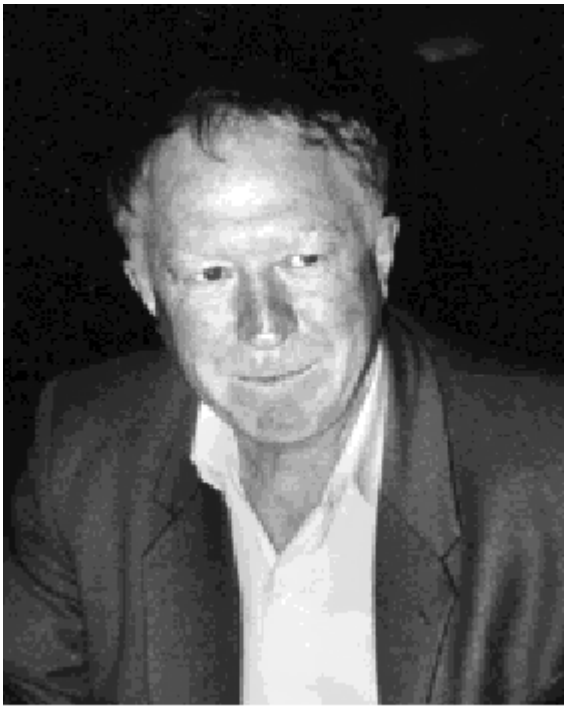
# Nuclear and other high toxic wastes disposal near a surface of the Sun.



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The problem of radioactive waste disposal is causing that the time of their disintegration is so great.. Any ways of their disposal near a surface of the ground, at the bottom of the seas and oceans and even is deep under the ground, in effect, do not solve a task of their reliable isolation from biosphere of the Earth and non-authorized access to them. Traditional technologies of disposal, at the best occasion, solve a task of isolation radioactive waste on rather small intervals of time whereas time of disintegration of the most dangerous long-living waste achieves tens and even hundred millions years. During their disintegration, there is an uncountable technical, geological and space accidents set.. As a result, the climate of a planet varies, on thousand kilometers continents move, there are conditions for ill-intentioned use of dangerous concentration of waste products, for example, for creation so-called " dirty bombs " or is simple acts of terrorism. Therefore, these technologies are more correct to name preservation radioactive waste for the subsequent generations as outflow and their accumulation in biosphere of the Earth conducts to dangerous and irreversible consequences.

At the end of **XX** century in the world there was in operation more than 400 atomic power stations and still a lot of nuclear installations and devices of military purpose. Requirements for an atomic energy continue to grow.

New power installations and devices are developed and under construction. Steady the total of radioactive waste products grows also. For their isolation, more and more capacious and expensive burial grounds are under construction, which, in process of their filling, become more and more dangerous attribute of our life.. Only from atomic power stations for second half of past century the mankind has saved up 250 000 tons radioactive waste products, switching 2 500 tons especially dangerous. It is considered, that the gain of the nuclear waste products most dangerous only annually made 100 tons..

Objective estimations of total expenses on a disposal place of the radioactive waste products including alienation of territories, creation of access roads, protection and the control of disposal places, support them in working order, losses from indefinitely long storage and their influence on health and life of people practically do not meet.

Not better affairs with destruction of fighting poisoning chemical substances which periods of storage have expired are. Further, their storage practically is not possible, and destruction not only is expensive, but also rather dangerous. There are problems and around of the biological weapon. Development of new manufactures and technologies can entail new kinds of waste products, which destruction can appear a serious problem.

To solve the problem of reliable isolation of various kinds of high toxic waste products could be possible with creation of permanent channels of their transportation to the Sun. P. L Kapitsa was stated this idea in 1959 yet. The sun is very big plasma sphere with temperature of a surface of 6000 degrees and weight 99, 86 % from weight of Solar system, i.e. the weight of all planets of Solar system, including the Earth, makes only - 0,14 %! On this background, the weight of highly toxic waste products is represented epsilon squared amount. Therefore, waste products for the Sun or Solar system cannot represent threat and then - is direct on the Sun waste products, most likely, will not get. Under influence of high-temperature radiation of the Sun and at a great distance from its surface waste products will turn in plasma and restrained with a powerful gravitational field, become a component of natural processes on many millions year..

Danger of traditional technologies of nuclear-waste disposal was acknowledging in the USSR. Therefore, at the end of 80th years attempt took place to put in to practice the idea of disposal waste products in Space with the help of rockets - carriers " Zenith” and "Energy".. But for regular and scale transportation waste products in Space rockets were poorly suitable.

Meanwhile, in a nature enormous weights move on ballistic trajectories without any power plants and with such accuracy, that on their movement measured and checked time. There were obviously for some tasks ballistic

launchers could become serious alternative of rockets.. From the beginning of 60th years in USA were intensively developing two ways of acceleration of weights until space speeds to orbit cargoes in space round the Earth: electromagnetic and fluid dynamic.. Electromagnetic launchers allow to receive necessary speeds for small weights, but installations are rather complex also expensive. Fluid dynamic or so-called light-gas launchers appeared more suitable for heavier weights. Therefore, in Livermore Laboratories for weights 1-4 tons were received speeds 7..1– 4..7 km/c accordingly. However for overcoming a gravitational field of the Earth these speeds are not sufficient.

The Analysis of the results received by Livermore Laboratory, has shown, that for the further increase of initial speeds it is required to solve two scientific and technical problems as a minimum:

- Prevention of break of hyper sound streams of easy gases,
- To provide stability of movement of dispersed weights in the channel of a trunk (to remove so-called levitation).

The found technical decisions of these and some other adjacent problems enable to create reliable, ecologically safe and highly effective fluid dynamics ballistic launchers, which really will solve a problem of reliable isolation of high toxic waste products and even in view of requirements of prospect.

Study of a problem at a level of the technical offer has shown - such launchers could have the following technical characteristics:

- Weight of a cargo sent at each start-up 1 - 3 tons, initial speed of the transport block-20 km /c, length of a line of acceleration no more than 500 m, a working body hydrogen,
- Start-up vertical, almost does not depend from geographic latitude, for orientation in a direction of the Sun existential position the Earth in Space is used,
- Launcher can be placed in vertical mine or on a floating platform,
- The opportunity of the control launcher condition allows to provide reliability of start-up and to make it above then reliability of rockets-carriers and the atomic power station,
- Operation is harmless to an atmosphere of the Earth and the earth’s space and does not create some detonating gas.

There are ideas how to improve these parameters.

Sending of one ton of a payload into a geostationary orbit with help of the rockets - carriers (RC) only costs in 50 million dollars. The expected cost price of sending one ton of waste products on the Sun with the help fluid dynamics ballistic launchers (BL) will make 10-20 thousand dollars. Thus,

these expenses will have single and final character, and in process of perfection of technology will decrease.

In comparison with RC, it is possible to explain rather high economic efficiency BL as follows:

- Starting weight RC is maximal, initial speed is equal to zero. On overcoming of a gravitational field of the Earth RC is spent a lot of time and the amount of energy.. In result, RC performance index is low.. The contrary the starting weight BL is minimal, initial speed is maximal, time on overcoming of a gravitational field of the Earth is much less.. Therefore performance index is tens times higher..
- RC moves a payload, the power plant and a necessary stock of fuel.. BL moves a payload only.
- Power plant RC collapses after each start-up and is not subject to restoration.. Power plant BL does not collapse and use in the further operation.
- RC most intensively use the power plants in an atmosphere of the Earth, leaving in it the basic volume products of rocket fuel combustion, which at regular operation RC conducts to dangerous pollution of an atmosphere.. BL in an atmosphere of the Earth throw out basically hydrogen, and partial oxidation of it is conducted only a small amount steam. Detonating gas to be formed has not time because of the big initial speed of hydrogen exceeds speed of a detonation.
- For increase of draft of power plant RC, leave in the earth's space fulfilled steps of rockets and others not the necessary fragments of the equipment. It conducts to pollution of the earth's space for struggle with which all is spending more than means. Payload BL quickly and almost silently passes a terrestrial atmosphere and the earth's space, nothing leaving.
- Technical complexity PC reduces their reliability and raises cost.. BL - structurally is easier, cheaper, are accessible to the control and repair. It also enables to make their operation extremely reliable.

The ballistic technology of waste elimination products assumes to unite some launchers in a starting complex, which should settle down in areas of formation or storages of waste products, for example, in areas of processing of the fulfilled nuclear fuel. For creation of national system of elimination of waste products of Russia it is required 2-3 complexes, for service of other countries - it is possible to create the international agency based on such 4-5 complexes. Efficiency of ballistic technology of elimination of highly toxic waste products, including sale of transport services is roughly estimated 10-12 billion dollars per one year and on rather significant interval of time.

Prospective expenses for creation of an industrial sample of Launcher 300 - 400 million dollars.

The front of works only on problems of ecology is practically boundless and continues to grow. However, ballistic Launchers can be used and as a vehicle for moving compact cargoes not sensitive to big acceleration. For example, for transportation raw and account material or decrease of expenses for studying and an outer space exploration. So the significant part of tasks under the control condition of the Sun, on which Senate of USA has allocated 500 billion dollars, could be executing with the help of ballistic installations and it is possible even in passing.

Many states are interested in elimination nuclear and other high toxic wastes, therefore the decision of this problem could become a basis for the international programs of economic, scientific and technical cooperation. Creation of the constant, reliable channel of elimination of highly toxic waste products will improve common ecological conditions not only in Russia, but also on the Earth. It will remove restrictions in development of nuclear energy; will close a problem of return of radioactive waste products of other countries after processing. It will allow starting elimination of other kinds of highly toxic waste products, including the future manufactures.

*Y.G.Cherkashin*

Endurances from a brief response on technical offer Y.G. Cherkashin
Saint Petersburg Scientific Research Centre Ecological Safety Russian Academy Scientist:

"Y. G. Cherkashin offers to break off a flawed chain: development of economy - growth of loadings on a nature"

"The motivation of the offer on waste disposal for limits of a gravitational field of the Earth deserves complete support"

The offer "opens a new direction in development of engineering and it can be necessary in a basis of the long-term state research-and-production Program. From the point of view of a problem of ecological safety as an element of national safety as a whole, realization of such Program, certainly, represents extreme interest for Russia".