Plasma-Gasification-Melting System (PGM) for Treatment of Low and Intermediate Level Radioactive Waste (LILRW) Generated by Nuclear Power Plants (NPP's).

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Solid LILRW generated by NPP's is treated by various methods of Volume Reduction and Stabilization / Immobilization before disposal at suitable Storage Sites for Radioactive Waste.

PGM Technology thermally treats such solid LILRW achieving maximum volume reduction and efficient stabilization of radionuclides of the waste in a Vitrified (glassy) solid residue, slag.

Since such LILRW is made of a large variety of different materials, organic and inorganic, the PGM Process gasifies and pyrolizes the organics while the inorganics are melted and vitrified.

In the PGM reactor, embodying the core technology, all three processes, pyrolysis, gasification and vitrification, are occurring simultaneously in a counter-flow fashion, in this basically vertical shaft "furnace". The vitrified slag is intermittently tapped-out from the melting chamber, located at the lower part of the reactor, into metal containers with 12 to 15 l volume, where the molten slag solidifies and cools down, before placing them into concrete 1 to 2 m^3 cubical units, for disposal at a storage site.

The products of pyrolysis and gasification, Product-gas, are evacuated from the upper part of the reactor to be combusted in an Afterburner and the resulting Off-gas is cleaned in an Air-Pollution-Control system (APC) to level of compliance with Radioactive and Environmental Regulations.

The PGM system and treatment process are described and the characteristics of the radioactive waste, the product-gas and the off-gas are presented in quantitative terms, in the PGM presentation. The data shown represents the accumulated experience in operation of PGM Technology application in SIA Radon Institute for over 10 years. The core technology originates in the RRC "Kurchatov Institute" in Moscow, since satisfactory process for disposal of LILRW produced continuously during the institute's activity, was not available 25 years ago as well as today.

The Radon facility with 80 kg/h capacity and the newly commissioned scaled-up plant with 250 kg capacity, accepts and processes LILRW produced, in addition to NPP's, also from research reactors, educational institutions, research institutes and medical institutions, all located in the Moscow district.

EER LTD., an Israeli Company with Russian, Japanese and Korean shareholders, was involved in the recently commissioned larger plant in Radon, designed to treat also LILRW, and in co-operation with Russian scientist, is presently developing the PGM Technology in treatment of additional waste types, such as Municipal Solid Waste (MSW) and Biomedical

Waste (MW). Presently a still larger demonstration facility is under construction in Israel to be used for demonstration of the PGM Technology in the treatment of MSW to world players in the waste management field. Incidentally, the current plan is that after completion of its purpose, demonstration with MSW, EER plans to modify the system to be implemented commercially for the treatment of MW, for which activity the capacity, while small for commercial plant for MSW, is just right.

The unique feature of PGM, compared to other Plasma based systems, includes the lowest possible fraction of radionuclides exiting from the reactor, for example Cs^{137} with over 90 % retention in the reactor to be encapsulated in the vitrified slag. The 90:10 percentage partition of radionuclides between the vitrified slag and the fly-ash is the highest of all thermal treatment methods for LILRW. The fraction of radionuclides exiting the reactor with the product gas and later the off-gas, is captured in the off-gas cleaning system. The HEPA Filter at the end of the cleaning system, contaminated with radionuclides is returned into the rector and the also contaminated effluent sludge is then stabilized by cementation, bituminization or similar method.