



SETUP FOR ELECTROCHEMICAL DECONTAMINATION OF METAL SURFACE

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The decontamination of metal surfaces by classic chemical way with water solutions provides greater amount of secondary liquid radioactive wastes. Electrochemical decontamination is considered as a more effective and low-waste method in contrast to chemical methods. Electrochemical decontamination is the dissolution of the thin layer of metal surface that contained radioactive nuclides into electrolyte under the influence of electric current. But at present this method is restricted because of the equipment disadvantages. The most of well-known devices do not permit application of easily-recyclable electrolytes and/or to collection of spent electrolyte immediately after its use to eliminate the surfaces recontamination. So the main goal of the work is the development of new equipment for highly effective electrochemical decontamination.

Electrode for decontamination

The electrode for electrochemical decontamination was designed. Working surface of the electrode consists of the fiber filled tubes. The part of the tubes are used for supply the decontaminating areas with electrolyte and other of them for collection of the spent electrolyte. The working area of experimental electrode is 100 cm². Decontamination could be provided manually or remotely with special devices.

Advantages of electrode in contrast to prototypes:

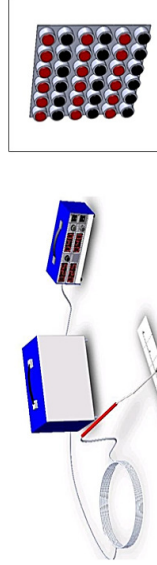
Effective spent electrolyte collection;

High decontamination factors;

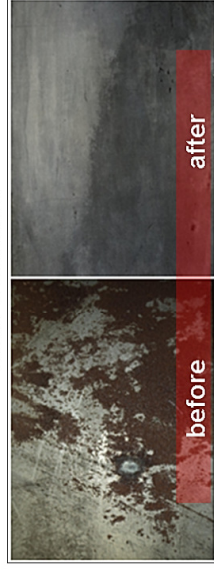
Utilization for horizontal, slant and inverted surfaces;

Low voltage;

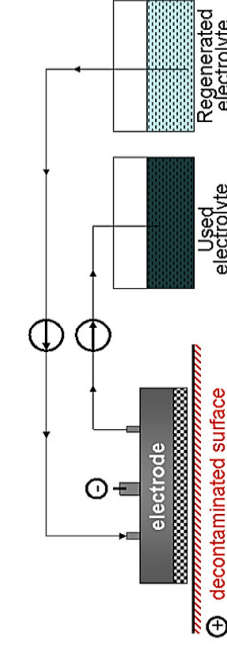
Electrolyte – easily recyclable organic acids.



Example of the rust metal surface before and after treatment

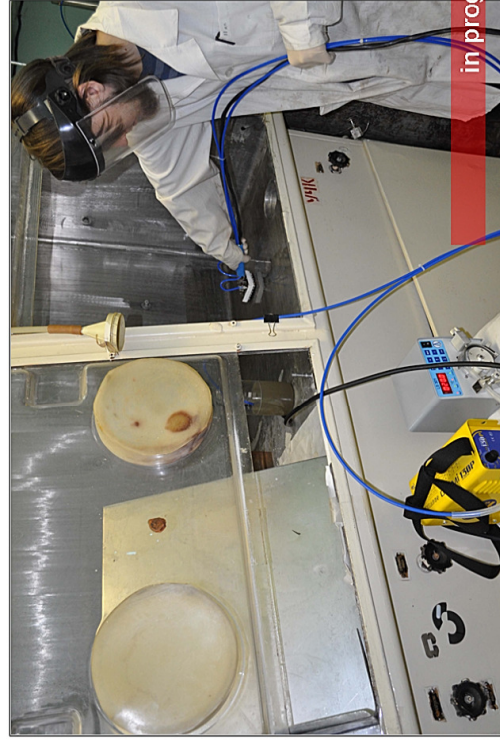


The electrode testing in real industrial conditions



Experimental setup with the designed electrode is tested now in the Khlopin Radium Institute. The items to be decontaminated were contacted with real and model spent nuclear fuel before (Glove boxes, hot cells, equipment).

Parameters of the process: power consumption about 0,3 kW·hr/m²; Volume of solidified radioactive waste less than 0,5 dm³/m²; Decontamination factors achieved during the tests are 50-2000.



The spent electrolyte is regenerated by distillation. The bottoms after distillation are solidified into the concrete at the inclusion degree of about 15-20 %.



Also we are investigating the possibility of the bottoms solidification into the iron-phosphate compounds.

The large-scale equipment for electrochemical decontamination including electrolyte-recycling and gas-off systems will be designed in 2015 year.