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Decontamination with wet blasting of components in nuclear power station for service or free release.

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Summary

This report looks at the method of wet blasting radioactive components in nuclear power stations. Fagerström Industri Konsult AB and their division DECO Systems supply the wet blasting cabin in focus. These cabins are today in operation in the Nordic countries and in China.

At decontamination for service purposes, blast media of pearl shaped glass beads with the dimensions of 150-250 μm mixed with water as blasting media. This size of glass beads allows blasting on metal surfaces without, from a functional consideration, damaging the surface or structure of the material.

Decontamination for release of material used abrasives of alumina oxide to produce a stronger felling.

The improved design, providing outer operator's positions with proper radiation protection and more efficient blasting equipment has resulted in a lesser dose taken by the operators. The main reason to decontaminate components in nuclear power plants is to enable service on these components or for free classification.

On components like valves, pump shafts, pipes etc. oxides forms and bind radiation. These components are normally situated at some distance from the reactor core and will mainly suffer from radiation from so called activation products. Activation products are small fragments of metal, which is loose in the reactor system, and when they pass the reactor core they are exposed to neutron radiation and become radioactive. The components, which in some cases are highly radioactive, are handled by specialists at the in-house decontamination department where the components are washed and treated to remove the oxide bound radiation. All nuclear power plants in in the Nordic countries have special decontamination departments to de-contaminate radioactive components.

When a component is to be decontaminated it can be decontaminated to a radioactive level where it will be declassified. If the component can be declassified it can be used freely outside the power plant. In Sweden and internationally the level at which declassification is granted varies. This report has found levels ranging from 150-1000 Bq/kg allowing declassification of radioactive materials. This difference is found between different countries and different organisations.

Wet blasting is one way to remove the oxide bound radiation that is found on components in nuclear power stations. When compared with the other main options available, high pressure cleaning, electro polishing and chemical bating, wet blasting provides comparable or better decontamination factors leaving a derived waste easier to handle and store. The report also looks at the levels of waste generated using wet blasting. This is done by tracking the contamination to determine where it collects. It is either collected in the water treatment plant

or collected in the blasting media. Examples of waste levels, from decontaminating 800 components in one year, results in a waste volume of about 0,250 m³.

The wet blasting equipment could also be used to better control the levels of radioactivity on components being sent for melting.