

DOSE REDUCTION AND MANAGEMENT DURING OVERHAULING OF REACTOR COOLANT PUMP AT CHASHMA NPP-1.

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Abstract

Chashma NPP-1 (C-1) has been in commercial operation since Sep 2000. It is a two loop light water PWR type reactor with rated capacity of 325 MWe. The fuel cycle length is of 14 months and currently 9th operating cycle in progress. The reactor core consists 121 fuel assemblies, 1/3rd of which are replaced in each outage following out-to-in loading pattern. The overhauling of 1st RCP (Reactor Coolant Pump) was scheduled in 6th RFO in May 2010, for which specific decontamination facility including a Hot Workshop equipped with chemical decontamination process and a training mock-up was erected and commissioned by the end of 2009.

The application of chemical decontamination procedure as dose reduction techniques was employed. The procedure itself and decision on its success criteria was a challenge as this was to be attempted for the first time indigenously without any external support. The method of radiological survey of RCP during the decontamination process and analysis of radioactive material leached out from the surface of pump was planned avoiding undue exposure to the personnel involved. After successful decontamination, the equipment was handed over to maintainers for overhauling. Other challenge in optimization of protection was the dose management of the maintainers involved in the work who were well trained on mock up to work with required skill in shortest time keeping their exposure ALARA.

Prior to start decontamination process, a detailed radiological survey was conducted using gamma dose rate meter based on tele-detector. The survey results were inline with the expectations. Considering the case of RCP-B, the dose rate were varying from 113 ~ 28 mSv/h. After successful decontamination process, the dose rates were reduced to 11 ~ 1 mSv/h. Thus the process achieved a decontamination factor varying from 10 ~ 50. Total radioactivity of corrosion product leached out of the surface was 158 GBq. The successful Decon-Process enabled overhauling of the RCP. Application of ALARA principle in dose management techniques resulted in 51 man-mSv collective dose of maintainers against the target of 50 man-mSv.