

INTRODUCTION

Workers in Nuclear Power Plants (NPPs) are likely to receive radiation exposure during routine operation, maintenance and Refueling Outages (RFOs). Therefore, protection and safety of workers is a main concern at NPPs. This exposure can be controlled by effective regulatory control, licensee's measures to control radiation exposure e.g. improved plant design, culture of As low As reasonably Achievable (ALARA), job plans, training/retraining of workers etc.

REGULATORY MECHANISM FOR OCCUPATIONAL RADIATION PROTECTION



Regulatory Framework



Review and Assessment



Regulatory Inspections



Review of Periodic Occupational Exposure Reports

LICENSEE'S MECHANISM FOR OCCUPATIONAL RADIATION PROTECTION

Pakistan Nuclear Regulatory Authority (PNRA) is the nuclear regulatory body in Pakistan. The prime responsibility for radiation protection and safety of workers lies with the licensee. PNRA requires the licensees to submit different documents e.g. Safety Analysis Report, Radiation Protection Program (RPP) etc. for review and assessment of PNRA. To verify compliance of regulatory requirements, the licensee performs occupational exposure assessment and submits periodic reports to PNRA.

NATIONAL REGULATIONS ON RADIATION PROTECTION - PAK/904 (REV.1)

PNRA has established a robust regulatory framework for radiation protection and safety. PNRA Regulations-PAK/904 (Rev.1) specifically describes the requirements for occupational radiation protection.

REQUIREMENTS FOR OCCUPATIONAL RADIATION PROTECTION IN REGULATIONS-PAK/904 (REV.1)



TREND ANALYSIS OF DOSES AT NPPS IN PAKISTAN

PNRA evaluates periodic dose reports submitted by licensee to check the occupational radiation protection situation, also to verify the implementation of regulatory limit i.e. 20 mSv/y. The Maximum Individual Dose (MID) received during 2017-2021 is presented below:

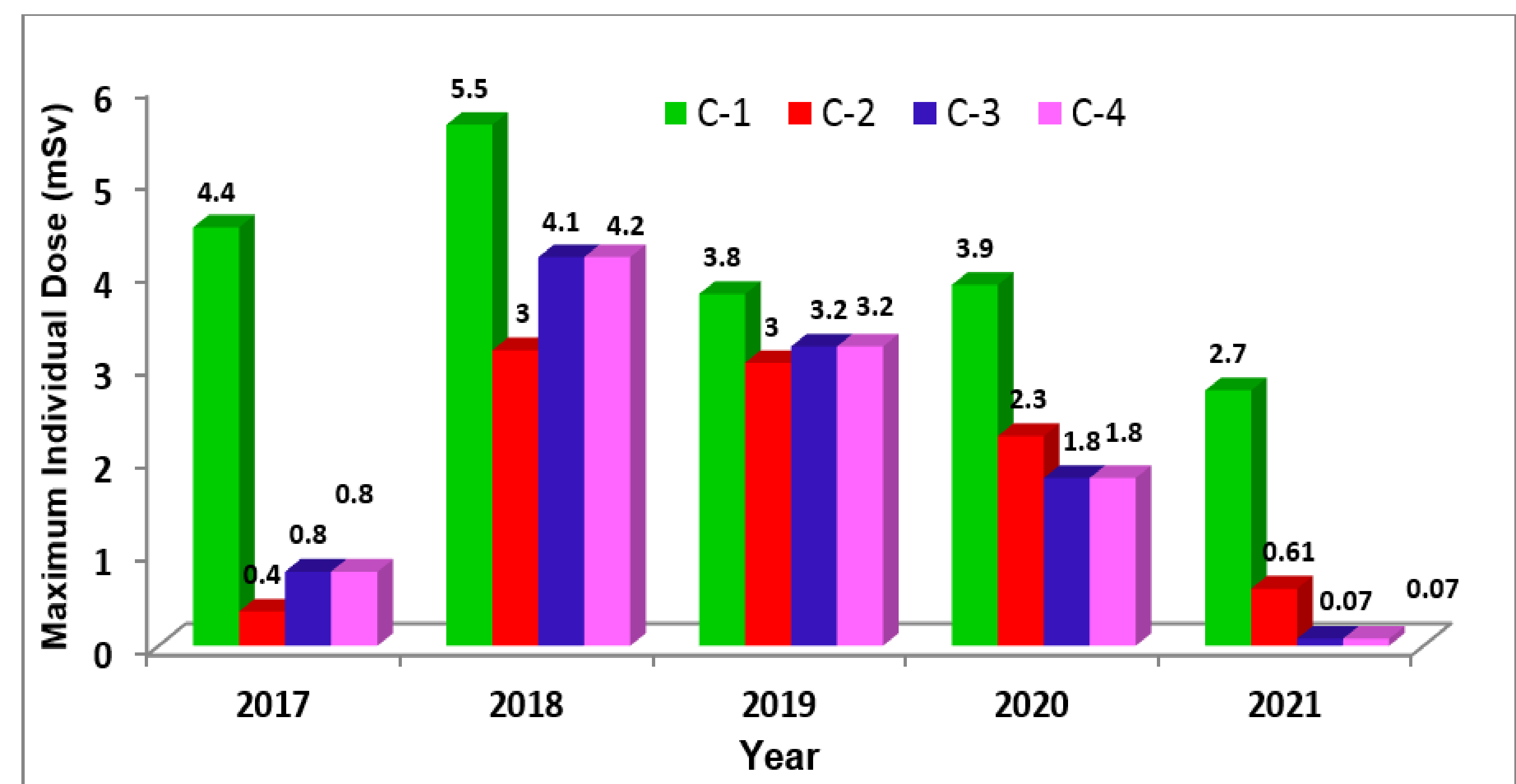


Figure 1: CNPGS Maximum Individual Dose Trend from 2017 - 2020

The dose variation depends upon type and number of jobs performed involving radiation exposure. MID of C-3 & C-4 NPPs is comparatively lower due to the fact that no major maintenance jobs were performed during RFOs. It may also be noted that no individual received doses higher than regulatory limit i.e. 20 mSv/y.

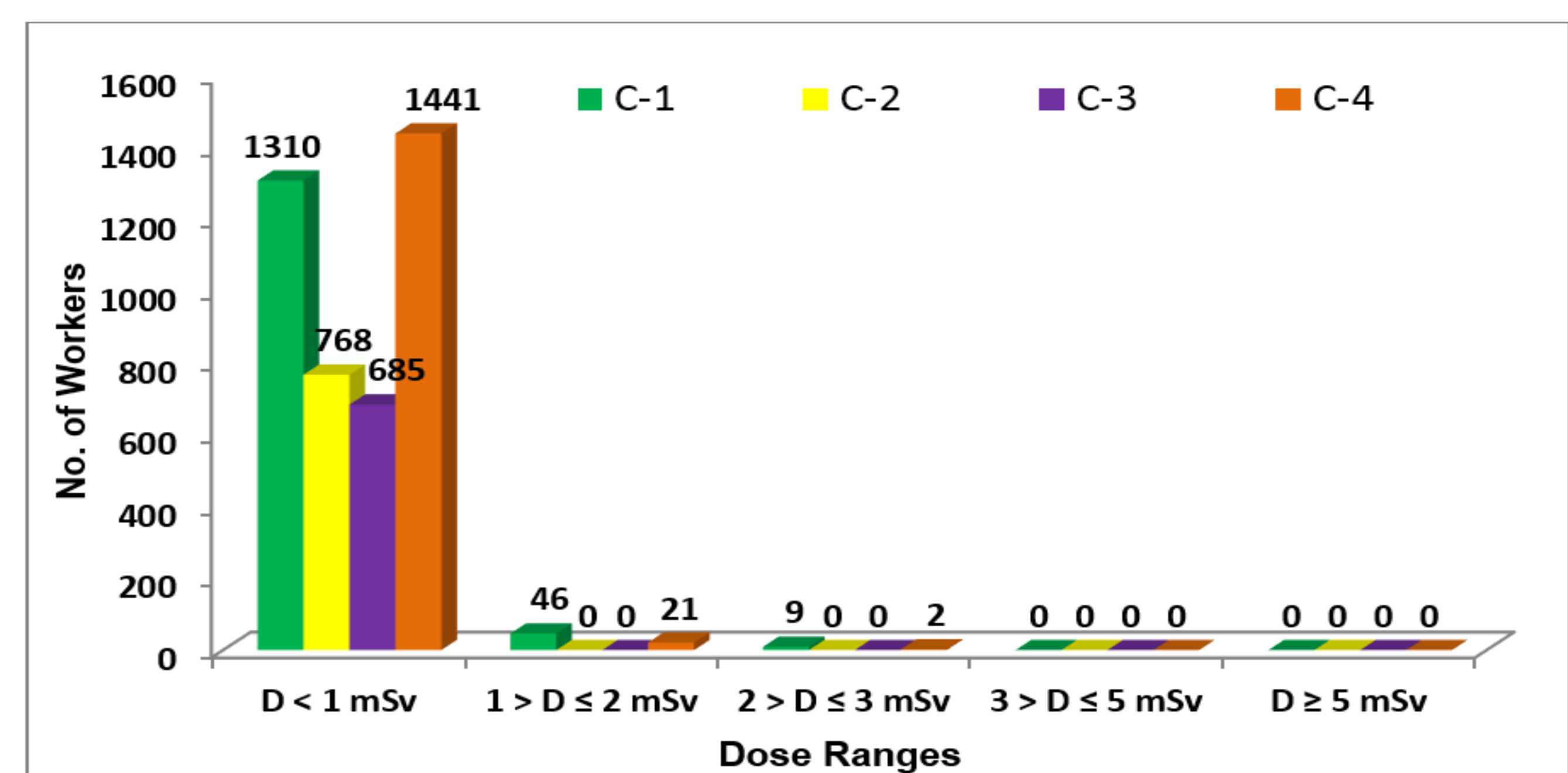


Figure 2: CNPGS Dose Ranges in the Year 2021

Figure 2 presents the number of CNPGS radiation workers that received radiation doses in different ranges. It can be observed that radiation doses of about more than 90 percent workers of C-1 and almost 100 percent workers of C-2, C-3 & C-4 are less than 1mSv in a year. No worker of C-1, C-2, C-3 & C-4 has dose greater than or equal to 3 mSv in the calendar year 2021.

The data analysis presented here show that occupational exposures at NPPs in Pakistan are well within regulatory limits.

CONCLUSION

Pakistan has a well organized regulatory system for occupational radiation protection at NPPs. PNRA undertakes all relevant actions to enforce regulatory requirements effectively. As a result occupational exposure is well within regulatory limit i.e. 20 mSv/y and almost 90 % of workers receive doses of less than 1 mSv/y.