Radiation Protection Initiatives for D-Pit Waste Sludge Desalination Facility

Mitsubishi Heavy Industries, Ltd.

Mitsubishi Heavy Industries, Ltd. carried out construction work to install a temporary pump for the purpose of transferring the supernatant in a pit that stores high dose rate waste sludge generated since the 2011 earthquake to the underground floor of the main processing building. The work site inside the main processing building has extremely poor working conditions, has high γ-ray and β-ray dose rates, and high radioactive contamination. The measures and radiation protection initiatives implemented to address these issues are described in this report.

1 Exposure dose Reduction Measures

1.1 Improving the work environment

- L-shaped temporary shieldings were installed at the main work site to reduce the environmental dose rate.
- Efforts were made to reduce exposure when traveling within the site by clearly sectioning the travel path using fluorescent tape, putting up warning signs for high dose rate places, and by placing travel path indicator arrows on the floor surface.

1.2 Implementing prevention measures for β-ray overexposure

- Overexposure to β-rays was prevented by placing rubber mats at places with a high β-ray dose rate among the main work areas and by making workers wear thick rubber gloves.

1.3 Implementing exposure dose reduction measures for supervisors

- Exposure dose of supervisors was reduced by installing remote control cameras to enable remote monitoring of operations and doses at the main work areas and by checking and giving instructions using communication devices.

1.4 Reducing operation time at high dose rate places

- The operation time for the actual work was reduced by carrying out training for 1 month prior to the commencement of construction under the conditions simulating the actual work conditions of the work site.
- The amount of work at high dose rate places was reduced by adopting a method to assemble the temporary pump in a low dose area and to move the assembled pump to the installation location using a crane.

2 Measures to prevent body contamination during work in a high contamination area

2.1 Providing education based on previous experiences for radiation protection and personal protective equipment (PPE) put-on/removal training

- Incidents of failed radiation protection were prevented by educating workers based on previous incidents and experiences.
- Body contamination was prevented by providing training in which workers put on and removed PPE.

2.2 Specifying PPE put-on/removal areas and ensuring sufficient allocation of helpers

- Body contamination was prevented by securing separate areas for PPE put-on and PPE removal, and by ensuring sufficient allocation of helpers at such areas.

3 Measures to prevent internal exposure due to high air contamination

- Internal exposure was prevented by requiring workers wear an air purifying respirator with a special hood over a full face mask.
- Operation time control was carried out by setting the maximum operation time since the air of

the work environment had a high radioactive concentration and there was a concern over the dust particles leaking through the mask filter, etc.

4 Summary

Failed radiation protection incidents were prevented by implementing various measures and educating workers about radiation protection. However, the radiation protection staff engaged in carrying out on-site survey had higher dose exposures, MHI would like to examine the environmental survey by remote control in the next construction phase.

Additionally, regarding measures against high β-ray dose rate, further considerations will be given on ideal control methods. MHI will continue employing creative and original approaches for future operations as well to realize maximum radiation protection for workers.