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Decommissioning Activities on the KRR in 2007

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1. Introduction

In 2007, under the KRR Decommissioning Project, Most activities of the decommissioning were completed in the out side area in KRR site. The dismantling the stack, the decontamination of the liquid waste treatment facility, the treatment the used filter and lead waste were accomplished. The dismantled waste was classified according to the criteria which approved from the regulatory body, and were temporally store in the site. Among them, the radioactive waste will be transferred to the national LLW repository and others will be treated for the reuse or self disposal according to the safe result of the dose assessment. There is no exposure dose for the workers who supported these decommissioning activities.

2. Decommissioning Activities

2.1 Dismantling the stack

Total 5 stacks were installed near the KRR-2, among them 4 stacks were dismantled. The main stack which was used for the ventilation systems for the KRR-2 reactor hall and RI production facility was dismantled. The stack has the height of 25m, the diameter of 1.5 m bottom and 1.0 m of the top and the thickness of 9 mm as of carbon steel. This main stack were connected the duct, the first work should to disconnected from the stack. For this activity the crane was needed. It is being used the crane, top area was fixed by crane, and then rounding cut the point which was 0.5m from the bottom. This bottom area was covered by protection vinyl for the protection the release of the radioactive material to the environment. The cut stack was sleep down in the green house for next treatment. Total 3 times of the decontamination the inside of the stack was accomplished. The 1st used clean water, 2nd used chemical production and final, clean the scale of the inside. After decontamination activities, the contamination was decreased under the MDA. The table 1 shows the contamination and result of the decontamination.

Table. 1 Result of the decontamination

Description		Before Decon.	1st Decon	2nd Decon	3rd Decon
Contamination (Bq/㎡)	α	<MDA	<MDA	<MDA	<MDA
	β	3,840	869	302	<MDA

The stack was cut to 21 pieces by using the flame cut in the green house. The other 3 stacks were dismantled and cut by same way of the main stack. Only one stack was remained for the ventilation the KRR-2 reactor hall which is used for the temporally storage of the radioactive waste containers. The figure 1 show the stack dismantling

Figure 1. The stack dismantling

2.2 The liquid waste treatment facility

This facility was used for the treatment the low level liquid waste. It composed the demineralization device with 360 liter of the treatment capacity, 2 liquid waste collection tanks, and the ion exchanger. And for the treated liquid waste storage, 4 carbon steel tanks, each 10 m^3 volume, which coated the lead plate on the inside, were founded. Under the floor, there are emergency collection tank and concrete pond was installed. The ion exchanger was cut and separated the pipes and pumps, and then it was cut by small pieces for the storage in the container. The stainless steel part was cut by using the plasma arc torch. The 4 tanks were cut by nibbler first, but it failed because of the two different material properties, which is lead and carbon. So it should be removed the coated lead plate first, and then cut the tanks by frame cutting method. The surface of the concrete pond, which was contaminated, was removed by scabbler and grinder. The embedded pipe and trench area were dismantled by hydraulic jack hammer.

Figure 2. The liquid waste treatment facility dismantling

2.3 The waste treatment of the used filter

During the operation the KRR, many filters were used for the ventilation of the facilities. At that time, it is impossible that the used filter could not be transferred to the Daejeon head quarter of the KAERI for waste treatment or disposal. So, the used filters had to be stored in KRR site, steel now. The filter is two kinds, one is pre-filter and the other is hepa-filter. There are 720 ea of pre-filter and 141 ea of the hepa-filter. For the removal the filters, it should be installed the green house with ventilation system for the protection the release of the radioactive material to the environment, which is dust style. And also it should be prepared the full scale gasmask for the workers breath. The figure 3 shows the preparation the filter removal work.

Figure 3. The preparation work for filter removal

The pre-filter has the size of 620 mm × 530 mm × 50 mm and the hepa-filter, 760 mm × 620 mm × 300 mm. The pre-filter was composed the aluminum case, fiber cloth and wire mesh for fixing. The hepa-filter has the same aluminum case and there are so many aluminum sheets between the papers. These materials were all separated each and be store in the vinyl pack. The filter removal activity was used only hand-on devices. Then these packs were put into the 200 liter drum and are compacted for the volume reduction. The following figure 4 shows the filter wastes.

Figure 4. The used filter wastes after removal

The result of the 11 times of the volume reduction ratio was achieved for one 200 liter drum, average. It is found that the separation activity has got the much effectiveness for the waste volume reduction than the whole packaging the filters. Total 965 kg of the filter waste were removed and among them 821 kg of the radioactive waste, which has the concentration with 0.6 ~ 552.1 Bq/g, were packed into the 200 liter drums and 144 kg of the non-radwastes, which has the concentration with 0.02 ~ 0.27 Bq/g, were packed into the 20” container for the next treatment, such as self disposal.

2.4 The lead waste treatment

Total 21.096 kg of the lead waste were treated. These lead wastes are used as of the shielding material from the inside of the thermal column liner, lead hot cells in RI production faculty and for other experimental activities. Almost lead waste has the shape of the brick. Most lead wastes are contaminated than activated. It was very difficult to decontaminate the radioactive material from the lead surface. It’s also hard to take the specimen. Finally, the electric drill bit was used to get the specimen than scraper. All classified lead waste were temporally store in the KRR-2 reactor hall. The table 2 shows the result of the lead waste treatment.

Table 2. The result of the lead waste treatment

Description	Treatment (kg)	Concentration (Bq/g)	Dose rate (μSv/hr)
Radwaste	4,261	0.686 ~ 18.232	BKG ~ 83.7
Conditional	9,841	0.014 ~ 0.173	BKG
Non-Radwaste	6,994	ND ~ 0.007	BKG
계	21,096		

3. Conclusion

Except these 4 decommissioning activities, the decontamination of the old solid waste store building, concrete hot cell decommissioning, decontamination of the ceiling of the RI production facility and cleaning of the utility room were completed. Total 31,453 man-hours were consumed during 245 working days with 14 workers. The 7,350 items of decommissioning work were achieved. The 70,596 kg of dismantled waste were treated and among them, 13.3%, 9,395 kg of radioactive waste were classified.

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