Minor accidents occurred at the Isotope Science Center, the University of Tokyo from FY2020 to FY2023

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Introduction

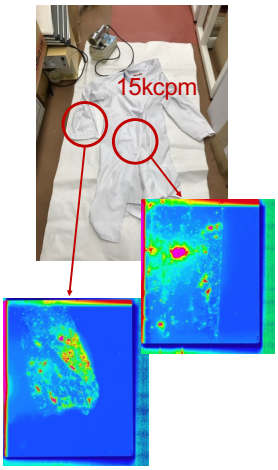
- In Japan, major incidents or accidents related to radiation are made public on the web portal each time the Nuclear Regulation Authority of Japan (NRA) receives a report. The criteria of major accidents are outlined in the guidelines provided by NRA. The number of such incidents from fiscal years 2013 to 2023 has been 46, which is not particularly high.
- Following Heinrich's triangle, it can be assumed that behind these major incidents or accidents, there are many more minor accidents or near-miss cases. Sharing these minor accidents or near-miss cases among managers and radiation workers is highly effective in improving radiation safety education, as it enables preventive measures to be taken to avoid major incidents or accidents. However, in the field of radiation in Japan, it is difficult to learn about the numerous minor accidents or near-miss cases occurring in other radiation facilities. Therefore, there is a need for a nationwide mechanism to compile information on minor accidents or near-miss cases.
- To address this need, the committee of the Japanese Society of Radiation Safety Management has been conducting a project to collect minor accidents or near-miss cases since 2021. This initiative has been further developed, with projects receiving JSPS KAKENHI Grant starting from fiscal year 2022.
- **Here, we present some minor accidents that occurred at the Isotope Science Center, the University of Tokyo from fiscal years 2020 to 2023.**

The web portal of the Nuclear Regulation Authority of Japan (written in Japanese).

Examples

Contamination of human body with ^{111}In and ^{177}Lu

- Contamination was detected on a worker's body after animal experiments using radioisotopes in the radiation-controlled area. After confirming that contamination had been removed through 19 rounds of HFC checks, the worker was able to exit.
- Contamination was not only found on the lab coat worn by the worker but also on the sleeves of the lab coat worn by another.
- An imaging plate was used to examine the contamination of the lab coat, revealing contamination spreading around both sleeves and scattered across the front of body.
- Based on interviews with the workers involved, it was inferred that the cause of contamination spread was due to neglecting to conduct contamination checks on gloved fingers during and after the experiment.



Contamination of human body with ^{211}At

- Astatine-211 is an α-emitter and easily dispersed.
- After a labeling experiment with ^{211}At, contamination with α radiation source: 108 cpm (BG: 0 cpm) was detected on the clothing around the right chest to the neck of a worker using a survey meter.
- No contamination was detected on the user's skin. It was estimated that the cause was the lack of containment within a fume hood during the labeling experiment.

A man wearing a Tyvek suit

- The following month, contamination with α radiation source: 149 cpm (BG: 0 cpm) was detected on the left arm near the elbow of the same worker.
- In this case, the labeling experiment was conducted within a fume hood.
- The worker wore an activated carbon mask, Tyvek suit, and arm cover during the experiment, but the area under the Tyvek suit was short-sleeved.
- It is assumed that contamination occurred on the skin when the arm cover was removed for work. By washing three times, allowing the worker to exit.

Water Leakage from a Ceiling

- Water leakage was observed along the wall and air supply vents in a laboratory on the 4th floor. The area directly above is an open rooftop where outdoor units of air conditioners are installed.
- Upon investigation, it was discovered that the rooftop drainage outlet was clogged with debris such as fallen leaves, causing rainwater to accumulate.
- After the drainage outlet was cleaned, proper drainage was ensured, and subsequently, the leak was resolved.
- However, the following year, water leakage was once again observed in the same laboratory due to the stacking of the drainage outlet.

Water Leakage from a Liquid Scintillation Counter

- In the summer of 2023, water leakage was discovered from the tank that collects drain water from a low-frequency-use liquid scintillation detector with a cooling function installed in a laboratory.
- The leaked water remained confined to a portion of the laboratory, and there was no leakage to the lower floor, which is outside the radiation-controlled area.
- The leaked water was sampled and measured using a liquid scintillation counter, but no radioactive isotopes such as tritium were detected.
- The record-breaking heatwave during the summer of 2023 was presumed to have contributed to the increased moisture content in the air, leading to the leakage.

Conclusions

- Some of these minor incidents concerning contamination were specifically highlighted during re-educational training courses at the Isotope Science Center at the University of Tokyo.
- However, similar minor incidents continue to occur consecutively.
- Merely hearing about such incidents during training may not sufficiently convey their potential relevance to individuals, thus necessitating the repetition and reinforcement of education and training efforts.

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