

June 13, 2017

Radioactive contamination at Plutonium Fuel Research Facility (PFRF) in Oarai  
Research and Development Center (Follow-up 3)

Japan Atomic Energy Agency

Below is the situation after the press release issued on June 12 of the radioactive contamination at Plutonium Fuel Research Facility (PFRF) occurred on June 6 (Tue), 2017. (Added information is underlined.)

1. Main measures taken by JAEA so far

During inspection work of storage container containing nuclear fuel materials, the resin bag filled with the container containing nuclear fuel material in the storage container was broken, and radioactive contamination of 5 workers was confirmed. As a result of body contamination check, 24 Bq ( $\alpha$  ray) at a maximum in nasal cavity was confirmed. (June 6 press release)

Because  $2.2 \times 10^4$  Bq (Pu-239) was confirmed at most by lung monitor measurement of the 5 workers at Nuclear Fuel Cycle Engineering Laboratories, the workers were sent to the National Institute of Radiological Sciences (NIRS), the National Institutes for Quantum and Radiological Science and Technology (QST), re-decontamination of body surface, lung monitor, etc. were carried out.

On the other hand, survey about the contamination situation inside Room No. 108 of PFRF set as an entry restricted area was conducted. (June 6 press release)

JAEA gave a detailed description of the accident at the Secretariat of the Nuclear Regulation Authority. (June 12 press release)

2. Situation of workers exposed to radiation

The 5 workers (one in 50's, two in 40's, one in 30's one in 20's: five in total) left NIRS today (June 13).

(1) Health condition: No abnormality

(2) The interview with the discharged workers is summarized in Attachment 1.

To the press: We would appreciate it if you would refrain from interviewing with the workers in order to prevent a strain on them

### 3. Situation of the spot

#### (1) Situation of the hood

The storage container with a lid covered is set still in the hood, being monitored continuously by TV camera.

#### (2) Contamination situation inside Room No. 108, etc.

- On June 7, measurement was conducted at 14 spots, and at a maximum 55 Bq/cm<sup>2</sup> ( $\alpha$  ray) and 3.1 Bq/cm<sup>2</sup> ( $\beta$  ( $\gamma$ ) ray) were measured. (June 9 press release)
- Currently, means to collect dispersed materials, decontaminate the room of the accident and move forward with investigation is being examined.

#### (3) Radiation Monitors, etc.

- There is no change in the indicated value of Pu dust monitor in Room No. 108, the indication of radioactive material density in the air is staying within the normal range.
- There is no change in indication with low values of the ventilation dust monitor and area monitor compared with before the incident. (Attachment 2)

### 4. Following action

Situation and measures taken will be reported to the NRA by June 19.

### 5. JAEA received documents from the following municipalities.

- ① Ibaraki prefecture: "Radioactive contamination and exposure accident of workers at "Plutonium Fuel Research Facility" in Oarai Research and Development Center, Japan Atomic Energy Agency" (June 8)
- ② Oarai town: "Emergency requests concerning the accidental incident occurred in Oarai Research and Development Center, Japan Atomic Energy Agency" (June 8)
- ③ Mito city: "Emergency requests concerning the accidental incident occurred in Oarai Research and Development Center" (June 8)
- ④ Hokota city: "Emergency requests concerning the radioactive contamination and exposure accident of workers at Plutonium Fuel Research Facility in Oarai Research and Development Center, Japan Atomic Energy Agency" (June 9)
- ⑤ Ibaraki town: "Emergency requests concerning the accident occurred in Oarai Research and Development Center, Japan Atomic Energy Agency" (June 9)
- ⑥ Hokota city council: "Requests" (June 9)
- ⑦ Oarai town council: "Emergency requests concerning the radioactive contamination and exposure accident of workers at Plutonium Fuel Research

Facility in Oarai Research and Development Center, Japan Atomic Energy Agency” (June 9)

- ⑧ Omitama city: “Emergency requests concerning the radioactive contamination and exposure accident of workers at Plutonium Fuel Research Facility in Oarai Research and Development Center, Japan Atomic Energy Agency” (June 9)
- ⑨ Ibaraki town council: “Requests concerning the accident occurred in Oarai Research and Development Center, Japan Atomic Energy Agency” (June 13)

### Summary of the interview with the discharged workers

The five workers were divided in three groups and interview with them was held led by the Director General and Deputy Director General of Oarai Research and Development Center.

The main worker opened the lid of the brought-in storage container and inspected the inside situation. The roles of the five workers are as below.

#### 【Role】

Worker A (Assistant worker): Support the work at the left rear of the Worker B

Worker B (Keeping record): Take photos of the inside of the containers and do a sketch of respective containers at the right of the Worker E

Worker C (Assistant worker): Measure smear at the right of the Worker E and carry the container from the Room No. 110

Worker D (Assistant worker): Support the work at the Right of the Worker E

Worker E (Main worker): Open the container and inspect the inside

#### 【Summary of the interview】

When the Worker E slowly removed the four of the six bolts fastening the container diagonally and then loosened the other two, he heard hiss like the one made when gas comes out. He collected the smear from the lid and all the circumferences of the gaps and confirmed that there was no contamination. Because in the past air came out in the situation where the room temperature was high, and no smear contamination was confirmed, the Worker E decided to continue work.

When the Worker E removed the remaining two bolts holding the lid with one hand, the resin bags burst. Then he put the lid in the hood.

At the time of the burst, the Worker E sensed wind pressure in the stomach, and all the other workers heard the sound of burst. Mist-like leakage was observed coming from the burst container. Though wearing a mask, the Worker E confirmed no abnormal odor. Though wearing rubber gloves, he touched the metal container and confirmed no rise of temperature. The Worker E, paying attention to the situation of the inside of the container, inspected the room for more than one hour to confirm that there was no signs of progress in the accident, etc. and replaced the outside rubber gloves with new ones. After that, thinking it is better to put the lid on the container and close the shutter of the hood, he did so.

Immediately after the burst, judging that it was a serious incident and all the workers and plutonium contamination must be contained inside the room, he ordered to lock the entrance of the Room No. 108 from inside and seal up the gaps of emergency exit of the room.

Communication with people outside has continuously made with the telephone installed in the Room No. 108 by the Worker D.

Each of the workers checked contamination and confirmed that high dose levels were detected with people who were near the hood. To prevent expansion of contamination to the entrance door and emergency exit, they stayed at the place where they were at the time of the accident, and to prevent body contamination by sweat, they stood still.

They took photos of the inside of the container, etc. after the accident with the digital camera they had brought in the room for recording the work, which they left in the greenhouse.

They had checked situation of the items such as the half-faced mask and rubber gloves and wearing condition of them before starting work as an indispensable process. During the work and after the occurrence of an accident became obvious, no one put off the half-faced mask to prevent internal exposure.

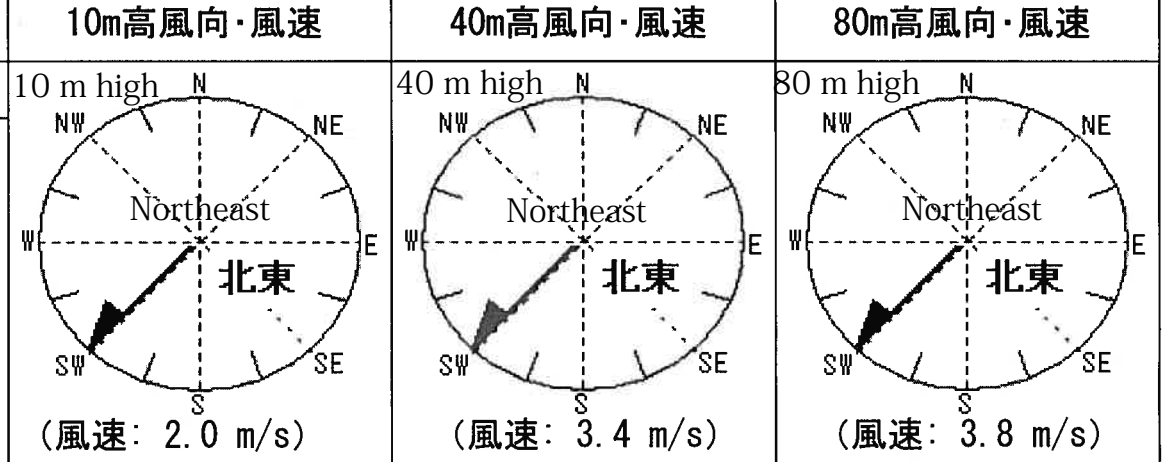
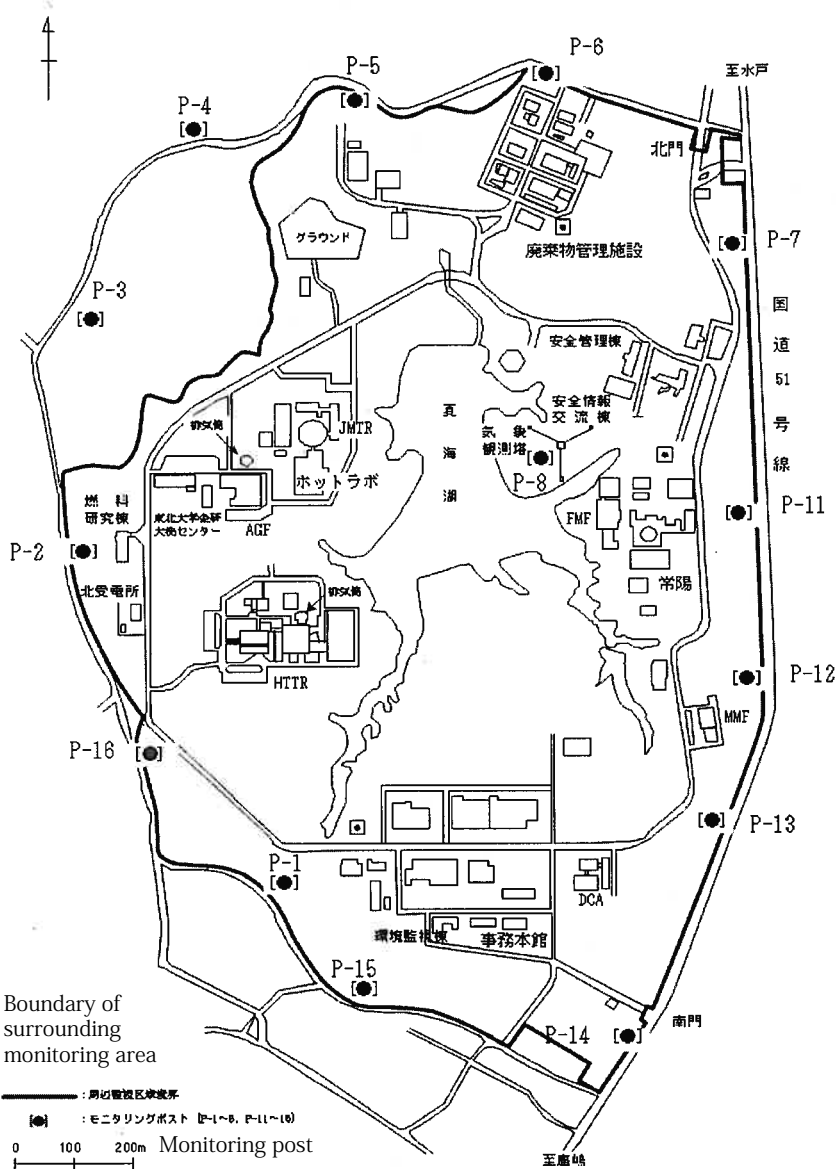
When leaving the room, the Worker E suggested that in order to prevent the contamination in the greenhouse, the workers leave the room in an order of less contamination based on the contamination situation of the five workers, and the other workers agreed.

The Worker E feels responsible for causing a serious accident, and feels sorry for causing inconvenience to many people.

While waiting in the room, all the five workers knew that many people were making effort outside the room by setting a greenhouse, etc. and were calm rather than anxious.

環境監視結果 (2017年06月13日13時30分)

記入者 [Redacted]



大気安定度 A B C **D** E F G  
Atmospheric stability

感雨 有    
Rain No

モニタリングポスト測定値 (※)

ポストNo.	測定値 (nGy/h)	平常値 (nGy/h)	異常	ポストNo.	測定値 (nGy/h)	平常値 (nGy/h)	異常
P-1	66	63 55~80	有(無)	P-11	114	105 91~121	有(無)
P-2	67	65 58~81	有(無)	P-12	95	92 81~105	有(無)
P-3	55	54 46~67	有(無)	P-13	74	69 58~84	有(無)
P-4	60	59 52~68	有(無)	P-14	59	58 50~82	有(無)
P-5	57	57 51~70	有(無)	P-15	65	65 56~78	有(無)
P-6	53	55 49~68	有(無)	P-16	51	53 45~66	有(無)
P-7	76	78 69~91	有(無)	特記事項: 平常値の欄の上段の数值はH29年3月の1時間平均値。下段の数值は1分値の最小~最大値を使用。			
P-8	60	58 51~71	有(無)				

備考欄  
H23年3月以降、福島第一原子力発電所事故の影響により事故前に比べ高い線量率で推移している。  
(※)緊急事態発生時において実効線量に換算する場合、環境放射線モニタリング指針に基づき換算係数1(Sv/Gy)を適用する。

測定値は通常値と比較して変化はない。

### Monitoring post measured values (※)

Post No.	Measured value (nGy/h)	Normal value (nGy/h)	Abnormality	Post No.	Measured value (nGy/h)	Normal value (nGy/h)	Abnormality
P-1	62	63 55-80	No	P-11	110	105 91-121	No
P-2	67	65 58-81	No	P-12	97	92 81-105	No
P-3	52	54 46-67	No	P-13	69	69 58-84	No
P-4	61	59 52-68	No	P-14	59	58 50-82	No
P-5	56	57 51-70	No	P-15	65	65 56-78	No
P-6	51	55 49-68	No	P-16	55	53 45-66	No
P-7	78	78 69-91	No	Notes: Upper values in “Normal value” columns are average values per hour in March, 2017. Lower values are minimum-maximum values in 1 minute.			
P-8	58	58 51-71	No				

#### Remarks

After March 2011, because of the influence of Fukushima Daiichi nuclear power plant accident, dose rates have been higher than before.

(※)When converting to effective dose at the time of emergency situation occurrence, conversion factor 1 (Sv/Gy) should be adapted based on the environmental radiation monitoring guidelines.

Measured values are no change from the normal values.

PFRF Radiation Monitor Data  
(Radiation Protection Report No. 60)

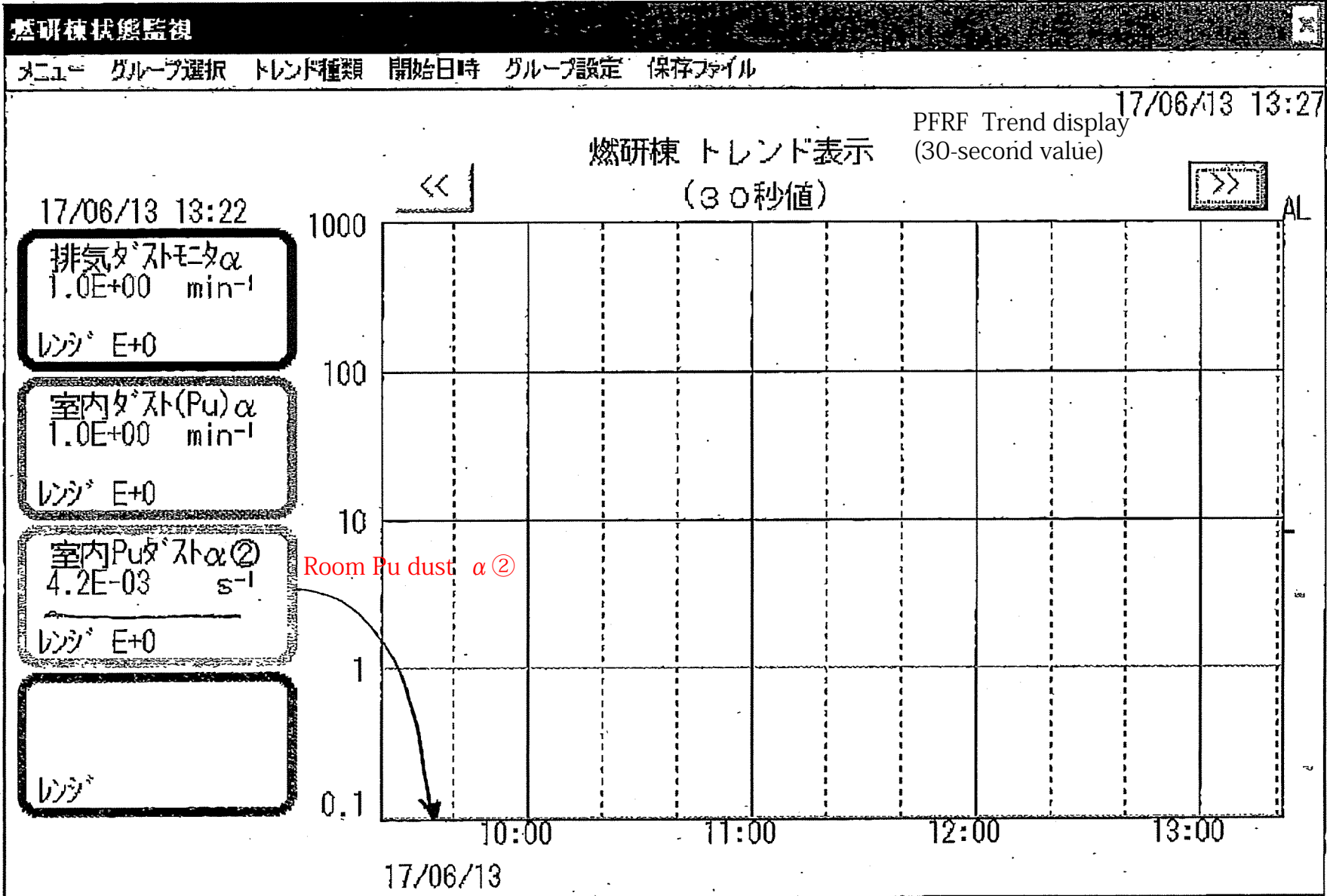
Recipients	General manager of Alpha-Gamma Section, General manager of Radiation Safety Management Section II
Report time	13:30 June 13, 2017

Confirmed time	13:20 June 13, 2017		-
Monitor	Indicated value	Normal indicated value	Judgement
Ventilation dust monitor $\alpha$ ( $\text{min}^{-1}$ )	< 1.0	1.0E+00 ~ 4.1E+00	Within the normal indicated value range
Room dust monitor $\alpha$ ( $\text{min}^{-1}$ )	< 1.0	1.0E+00 ~ 1.7E+00	Within the normal indicated value range
Pu dust monitor No.1 ( $\text{s}^{-1}$ )	< 0.1	~ 1.0E-01	Within the normal indicated value range
Pu dust monitor No.2 ( $\text{s}^{-1}$ )	< 0.1	~ 1.0E-01	Within the normal indicated value range

Monitor		Indicated value ( $\mu\text{ Sv/h}$ )	Normal indicated value ( $\mu\text{ Sv/h}$ )	Judgement
Gamma-ray area monitors	Area monitor No.1	80	80 ~ 110	Within the normal indicated value range
	Area monitor No.2	110	90 ~ 120	Within the normal indicated value range
	Area monitor No.3	79	70 ~ 100	Within the normal indicated value range
	Area monitor No.4	120	90 ~ 120	Within the normal indicated value range
	Area monitor No.5	70	70 ~ 100	Within the normal indicated value range

Confirmed result of radiation monitor	No abnormality
Notices	Area monitors contain radiation sources, so the values indicate around 100 $\mu\text{ Sv/h}$ constantly. Pu dust monitor No.2 indicated value is normal, no change from before the incident.
Attachments	2 sheets (Trends)

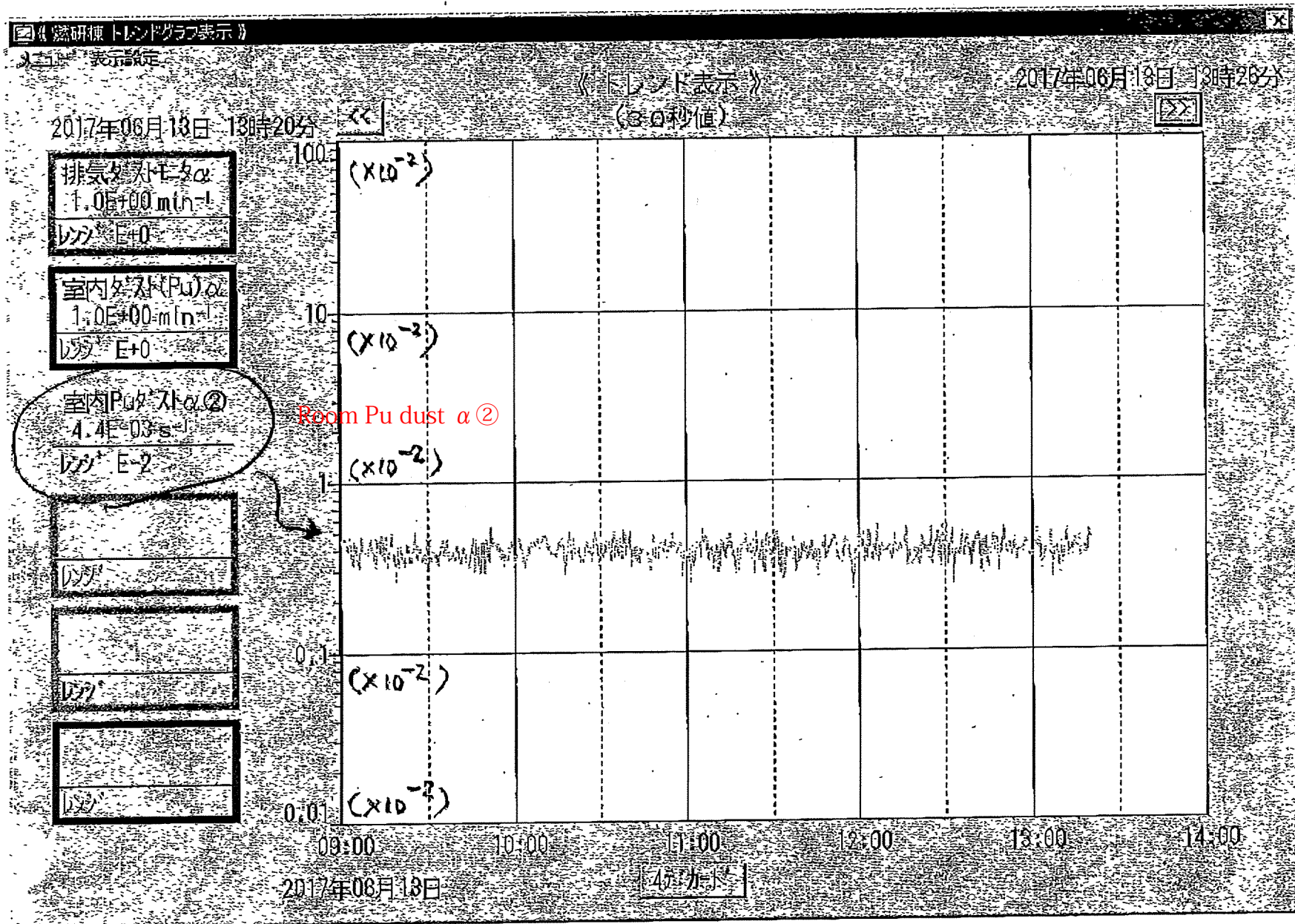




室内Puダストα② 通常指示範囲内 (<0.1 s<sup>-1</sup>)

→縦軸レンジを切り替え → 別添②

Room Pu dust α② Indicated value is within the range of normal (<0.1 s<sup>-1</sup>).  
→Vertical axis range switched. →Attachment②



室内Puがサα② 通常指示範囲内 (<0.1 s<sup>-1</sup>)

Room Pu dust α ② Indicated value is within the range of normal. (<0.1 s<sup>-1</sup>)

## Swell of the Vinyl Bags in the Plutonium Fuel First Development Room at Nuclear Fuel Cycle Engineering Laboratory

### 1. Introduction

In an interview with the Nuclear Regulatory Authority (NRA) on February 9, 2017, JAEA reported that swell occurred on the vinyl bags sealing nuclear fuel materials (stainless steel can) in long-term storage in the glove boxes in the Plutonium Fuel First Development Room (Pu-1).

The following states the background to report to NRA, situation in Pu-1 (including swell situation on the vinyl bags) and presence of horizontal dissemination to Oarai Plutonium Fuel Research Facility (PFRF).

### 2. Background to report to NRA

JAEA reported swell on the vinyl bags sealing nuclear fuel materials in Pu-1 to NRA in the process explaining corrective action report about the inappropriate management of nuclear fuel materials pointed out in the 3rd safety inspection in FY 2016. The following is chronology to the interview on February 9.

(1) The 3rd safety inspection in FY 2016 at the Nuclear Science Research Institute (NSRI) in November, 2016

It is confirmed that nuclear fuel materials, etc. had been stored in cells, glove boxes, etc. for a long time called them 'in use', without proper storage or disposal according to the safety regulations. As a result of horizontal dissemination to the Nuclear Fuel Cycle Engineering Laboratories (NCL) afterwards, the same improper management in Pu-1 was found, so the same as in NSRI was pointed out at the 3rd safety inspection in NCL in December, 2016.

(2) Interview with NRA on January 10, 2017

JAEA explained the corrective plan on improper management of nuclear fuel materials in Pu-1, etc. (→There were comments from NRA.)

(3) Interview with NRA on January 26, 2017

JAEA explained the revised corrective action plan at NCL. JAEA explained that "Swell on the vinyl bags in nuclear fuel materials in Pu-1 was found.", "The degree of swell is small." in this interview. (→NRA requested explanation in detail of corrective action plan.)

(4) Interview with NRA on February 9

JAEA explained the corrective action plan at NCL in detail. JAEA explained that "Swell on the vinyl bags is regarded due to radiolysis gas of organic matters contained in."

### 3. Storage situation in Pu-1

- Item (No. 6476) which caused vinyl bag swelling, which is explained NRA in the corrective action plan on February 9, 2017, contained nuclear fuel matters (mixed oxide of U and Pu) in 2-liter cylindrical stainless steel can (with a screw lid, no airtightness), this can was brought into the storage in February, 1995, double sealed with double vinyl bags. Contents are scrap produced in the past fuel fabricating process, mainly powder of oxide.
- After regularly exchange of vinyl bags in August, 1998, when the second vinyl bag exchange in April, 2004, an imperceptible swell was found, so the item was moved into a glove box, have been stored in the glove box afterwards. (So it was pointed out as a nuclear material of long-term storage at the safety inspection.)
- As a result of observing the thermal change by heating the sample, decomposition gas was observed though, because the decomposition was mild (vinyl bags in close contact to the 2-liter SUS can have floated slightly after 5 years.), it is judged there is no danger of spontaneous ignition or explosion. Organic matters such as a binder, etc. are added in the fabricating process, it is resumed these matters disassembled.
- Inspection work of vinyl bags is carried out according to the working manual “inspection of vinyl bags of stored nuclear fuel materials contained with vinyl bags”, the following points are inspected. (Once inspection a year for all items.)
  - Check whether there is abnormality on the soundness (no scratch, crack deterioration nor swell on the surface) of vinyl bags of inspected stored matters.
  - Visual check on change degree of color of vinyl bags comparing with portable color sample (color sample in 1983 by Japan Paint Manufacturers Association)
  - Check presence and degree of rust in container.

### 4. Whether there was a horizontal dissemination to PFRF

The result and document about the swell of vinyl bags in Pu-1 mentioned above were shared in all JAEA at the time of the interview with NRA on January 26, 2017 mentioned in 2. (Dissemination through the safety management departments of related sites including Oarai.)

Incident of the swell of vinyl bags are disseminated inside JAEA. However further review is necessary in the cause investigation whether the risk was recognized sufficiently at the inspection work of stored containers in Oarai PFRF.