Case study 1: Demolition progress and $^{137}$Cs radioactivity in dust

Resuspended $^{137}$Cs: focus on “Yonomori District” located SRRB in the Difficult-to-return zone of Tomioka Town, Fukushima Prefecture during May 27 to August 18 in 2020

Address: “Yonomori District” located SRRB in the Difficult-to-return zone of Tomioka Town, Fukushima Prefecture

Subject (structure): a wooden, mortared and slate-roofed apartment with two-stories

Building area: 209.66 m² (a total floor: 371.48 m²)

Construction date: Dec 15, 2009

Demolition completion date: Oct 22, 2020

$^{137}$Cs: 0.35 mBq/m³

Scaffolding material collapses on the east side

(temporarily cease operations)

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--------|--------|---------|-----------|----------|--------|----------|
| 25     | 26     | 27      | 28        | 29       | 30     |          |
|        |        |         | Carrying heavy machinery |          |        |          |
|        |        |         | $^{137}$Cs: 0.17 mBq/m³ |          |        |          |
| 31     | 6/1    | 2       | 3         | 4        | 5      | 6        |
|        | Cleaning rooms | Demolition of interior materials |          |          |        |          |
|        | $^{137}$Cs: 0.51 mBq/m³ | $^{137}$Cs: 0.18 mBq/m³ |          |        |        |          |
| 7      | 8      | 9       | 10        | 11       | 12     | 13       |
|        |        |         | Scaffolding work |          |        |          |
|        | $^{137}$Cs: 0.32 mBq/m³ | $^{137}$Cs: 0.45 mBq/m³ |          |        |        |          |
| 14     | 15     | 16      | 17        | 18       | 19     | 20       |
|        |        |         | Demolition of a roof and window frames |          |        |          |
|        | $^{137}$Cs: 0.28 mBq/m³ | $^{137}$Cs: 0.20 mBq/m³ |          |        |        |          |
| 21     | 22     | 23      | 24        | 25       | 26     | 27       |
|        |        |         |            |          |        |          |
|        |        |         |            |          |        |          |

$^{137}$Cs: 0.17 mBq/m³

Carrying heavy machinery

$^{137}$Cs: 0.18 mBq/m³

Demolition of interior materials

$^{137}$Cs: 0.47 mBq/m³

Scaffolding work

$^{137}$Cs: 0.45 mBq/m³

N/A

Demolition of a roof and window frames

$^{137}$Cs: 0.20 mBq/m³

Removing interior materials

$^{137}$Cs: 0.10 mBq/m³

No photo

1. The Specified Reconstruction and Revitalization Base (SRRB) is an area where it has become possible to lift the evacuation order due to specific decontamination efforts and to determine that it will be possible to live in the restricted areas (difficult-to-return zone) in the near future.
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--------|--------|---------|-----------|----------|--------|----------|
|        |        |         |           |          |        |          |
| 28     | 29     | 30      | 7/1       |          |        |          |
|        |        |         |           |          |        |          |
|        |        |         | Re-scaffolding work |          |        |          |
|        |        |         | 137Cs: 0.12 mBq/m³ |          |        |          |
|        |        |         |          |          |        |          |
| 5      | 6      | 7       | 8         | 9        | 10     | 11       |
|        |        |         |           |          |        |          |
|        |        |         | Removing walls and roof materials |          |        |          |
|        |        |         | 137Cs: N.D. |          |        |          |
|        |        |         |           |          |        |          |
| 12     | 13     | 14      | 15        | 16       | 17     | 18       |
|        |        |         |           |          |        |          |
|        |        |         |          |          |        |          |
|        |        |         | Demolition of the body on the east side by heavy machinery |          |        |          |
|        |        |         | 137Cs: 0.23 mBq/m³ |          |        |          |
|        |        |         |           |          |        |          |
| 19     | 20     | 21      | 22        | 23       | 24     | 25       |
|        |        |         |           |          |        |          |
|        |        |         | Demolition of the body on the west side by heavy machinery |          |        |          |
|        |        |         | 137Cs: 0.16 mBq/m³ |          |        |          |
|        |        |         |           |          |        |          |
| 26     | 27     | 28      | 29        | 30       | 31     | 8/1      |
|        |        |         |           |          |        |          |
|        |        |         | Bagging up the demolition waste (specially managed radioactive waste) |          |        |          |
|        |        |         | 137Cs: N.D. |          |        |          |
|        |        |         |           |          |        |          |
| 2      | 3      | 4       | 5         | 6        | 7      | 8        |
|        |        |         |           |          |        |          |
|        |        |         | Demolition and removing the foundation made of concrete by heavy machinery |          |        |          |
|        |        |         | 137Cs: 0.42 mBq/m³ |          |        |          |
|        |        |         |           |          |        |          |
| 9      | 10     | 11      | 12        | 13       | 14     | 15       |
|        |        |         |           |          |        |          |
|        |        |         |          |          |        |          |
|        |        |         | Ambien dose rates on 23 points around “Building G” (survey by MOE) |          |        |          |
|        |        |         | ²measured at 1 m above the ground using a survey meter |          |        |          |

²Cease operations (holiday)
³An unexpected accident (no wounded)
Positive relationship was not clear between the advection of low-level air masses and $^{137}$Cs activity on the site of "Building G". In other words, it was suggested that $^{137}$Cs detected in this case study may be driven from the area around "Building G" in the difficult-to-return zone. Rather, it may be not the resuspended $^{137}$Cs accompanied with the demolition works of "Building G", but the resuspended $^{137}$Cs due to the decontamination works such as removal of concrete on the site of "Building G". Further investigation is needed.
at 1200 JST 19 Jun 20
$^{137}$Cs: 0.10 mBq/m³

Omnidirectional 0.1-2.7 m/s
9.0 mm

at 1200 JST 22 Jun 20
$^{137}$Cs: 0.35 mBq/m³

WSW~N 0.2-1.0 m/s
0.0 mm

at 1200 JST 03 Jul 20
$^{137}$Cs: 0.12 mBq/m³

ESE~NE 0.2-1.2 m/s
0.0 mm

at 1200 JST 07 Jul 20
$^{137}$Cs: N.D.

SSE~S 0.7-2.6 m/s
0.0 mm

at 1200 JST 17 Jul 20
$^{137}$Cs: 0.23 mBq/m³

N~SSE 0.5-0.8 m/s
0.0 mm

at 1200 JST 20 Jul 20
$^{137}$Cs: 0.16 mBq/m³

NW~ESE 0.1-0.9 m/s
0.0 mm

at 1200 JST 22 Jul 20
$^{137}$Cs: 0.21 mBq/m³

NW~SSE 0.2-2.8 m/s
7.5 mm
at 1200 JST 30 Jul 20
$^{137}$Cs: N.D.

SE~SW 0.4-2.5 m/s
0.0 mm

at 1200 JST 04 Aug 20
$^{137}$Cs: 0.42 mBq/m$^3$

S~SSE 2.2-4.3 m/s
0.0 mm

at 1200 JST 06 Aug 20
$^{137}$Cs: 0.62 mBq/m$^3$

SSE~SSW 2.6-4.1 m/s
0.0 mm

*NOAA HYSPLIT Trajectory Model (https://www.ready.noaa.gov/HYSPLIT_traj.php)

**wind direction, wind speed and precipitation on the ground from 900 to 1700 JST in Hirono town next to Tomioka town (the Japan Meteorological Agency, https://www.jma.go.jp/jma/en/Activities/observations.html)