

Fire involving Am-241 smoke detectors

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Fire involving Am-241 smoke detectors

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OVERVIEW

1. Prior to the fire on 20 November 2007
2. Emergency response to the fire
3. Making the site safe
4. Cleaning the site and waste disposal
5. Lessons



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Introduction

Prior to fire on 20 November 2007

Gloucester, UK



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Storage of smoke detectors

Company permitted to store
500,000 x Am-241 (33 – 37 KBq)

275,000 on site in Nov 2007

Total = 10.2 GBq



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HSE inspection prior to fire

1. Storage generally satisfactory
2. No risk assessment for small and large fires
3. Advice required from a Qualified Expert

US 1977 NEA manufacturing standard:

Fire temperature	Maximum release per detector	Maximum release 500,000 detectors	Maximum release 275,000 detectors
600 °C	200 Bq	100 MBq	55 MBq
1200 °C	1 %	185 MBq	101 MBq

ICRP Dose coefficients:

Inhalation = 2.7×10^{-5} 0.1% of 185 MBq = 5 Sv

Ingestion = 2.0×10^{-7} 0.1% of 185 MBq = 37 mSv

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Emergency response to fire

1. Fire Service attended from early evening and following day.
2. Let fire burn for overnight in controlled manner to reduce ground water contamination.



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Emergency response to fire

3. Radiation experts from nearby nuclear power station and UK Health Protection Agency attended to take measurements and samples.
4. No activity detected in air or ground deposits off site.



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Evaluation of risks

1. Dangerous overhead structures.
2. Fire still smouldering in parts of building.
3. Low levels of Am-241 detected in water run-off.
4. Most ash very dry and dusty – susceptible for spread by winds.
5. Chemical contamination.



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Making the site safe

1. Security fencing immediately constructed around perimeter.
2. 24-hour security guards.
3. Continuous air monitoring for radioactivity.
4. Front and rear entrance wind protected.
5. Contaminated area on forecourt covered with tarpaulin.
6. Radiological assessment on-site.



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Cleaning site and waste disposal

1. Two expert firms presented proposals for removing waste:
2. Options:

Cover entire structure in tenting to protect from weather and operate inside.

Quickly disassemble structure and remove ash.

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Cleaning site and waste disposal

Smoke detector foil sources removed from debris.



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Cleaning site and waste disposal



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Cleaning site and waste disposal

Keeping ashes damp



Contamination monitoring



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Cleaning site and waste disposal

Examination of source of fire



Waste sorting



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Cleaning site and waste disposal

Present situation



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Audiences to learn lessons

- 1. Ionisation chamber smoke detector (ICSD) industry Manufacturers**
 - Importation and distribution storage
 - Transportation
 - Storage at point of sale/ local distribution
 - Waste disposal (WEEE)?

- 2. Radiation protection community**
 - Regulators
 - Radiation protection advisors and health physicists
 - Decommissioning & waste contractors
 - Advisory bodies

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Audiences to learn lessons

3. Emergency responders and civil contingencies

- Emergency services
- Local Authorities
- Civil contingency/ security planners

4. Others

- Fork-lift truck manufacturers and operators
- Insurance industry