# Challenges and Issues in the sustainable management of Disused Sealed Radioactive Sources

# Why we must be concerned?

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*Lisbon, 11. 10. 2010*

# Pluses and minuses of Sealed Sources

- Sealed sources are useful
- Benefit from their use outweighs associated risk
- But once user stops using them ...
- ... and forgets about them,
- … very big damage could be caused!

**Next examples try to explain reasons for worries**

# Goiania, Brasil, 1987

- An interesting piece of metal was found in an abandoned medical clinic
- It was very strong source with Cesium 137 (1300 Ci)
- It was altogether only **20 gram!**
- The guy who found it took it home
- The family and neighbors were very excited over the powder that was shining in the dark!
- Acute radiation syndrome developed very soon
- Only after two weeks medical doctors recognized the radiological accident

# Goiania, Brasil, 1987

- 6 deaths
- 12 seriously ill
- 250 people contaminated

- Enormous decontamination and cleaning process

- **3500 $m^3$** of radioactive waste generated
- (In Slovenia after 25 years of operation of the nuclear power plant we have only about 2300 $m^3$)

# Goiania, Brasil, 1987

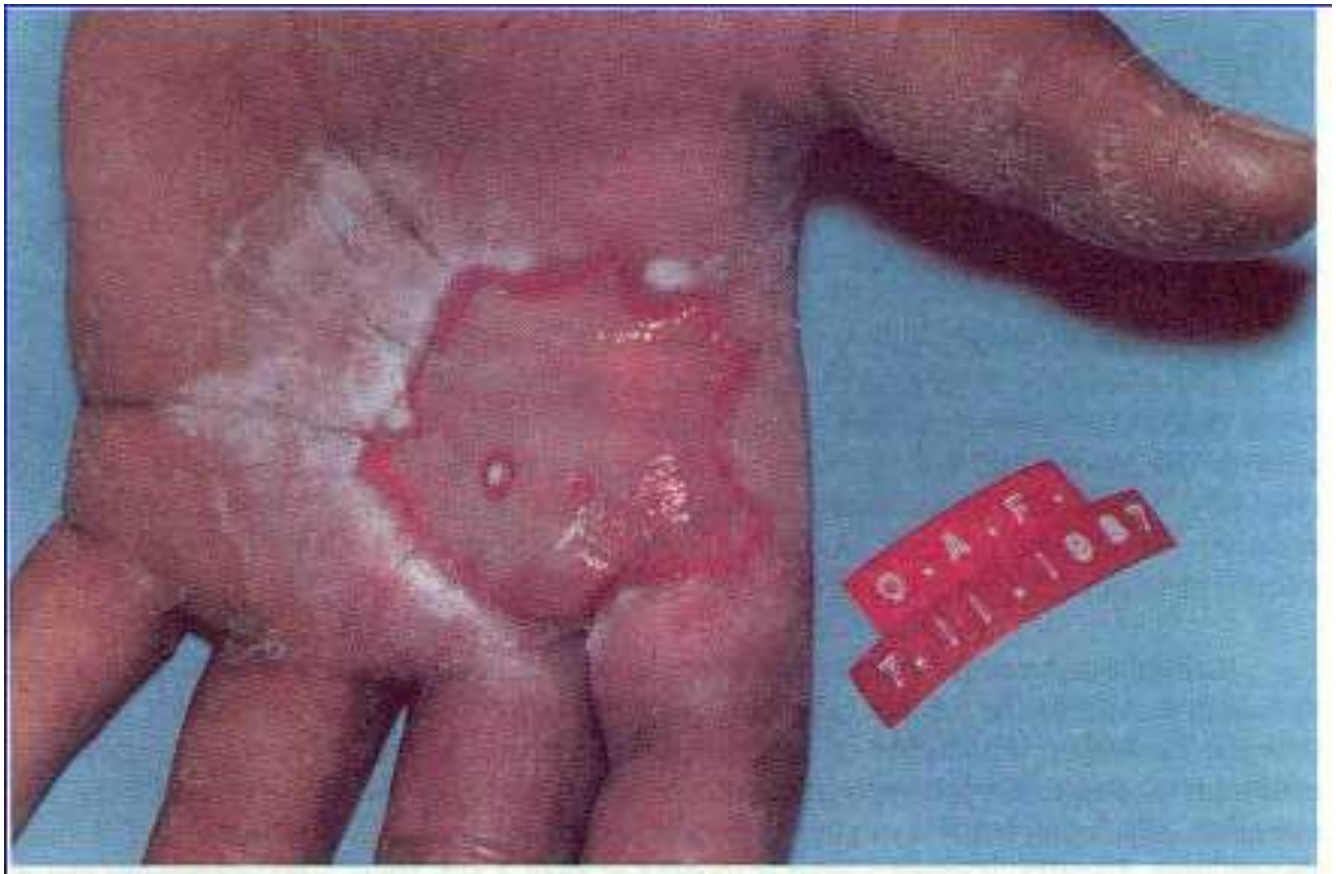


*FIG. 9.3. 3–30 days after exposure. The skin was excised. A raw reddish surface is covered with a delicate layer of fibrinous exsudate. Note the centripetal character of the healing process and the attempt of re-epithelialization.*

# Goiania, Brasil, 1987

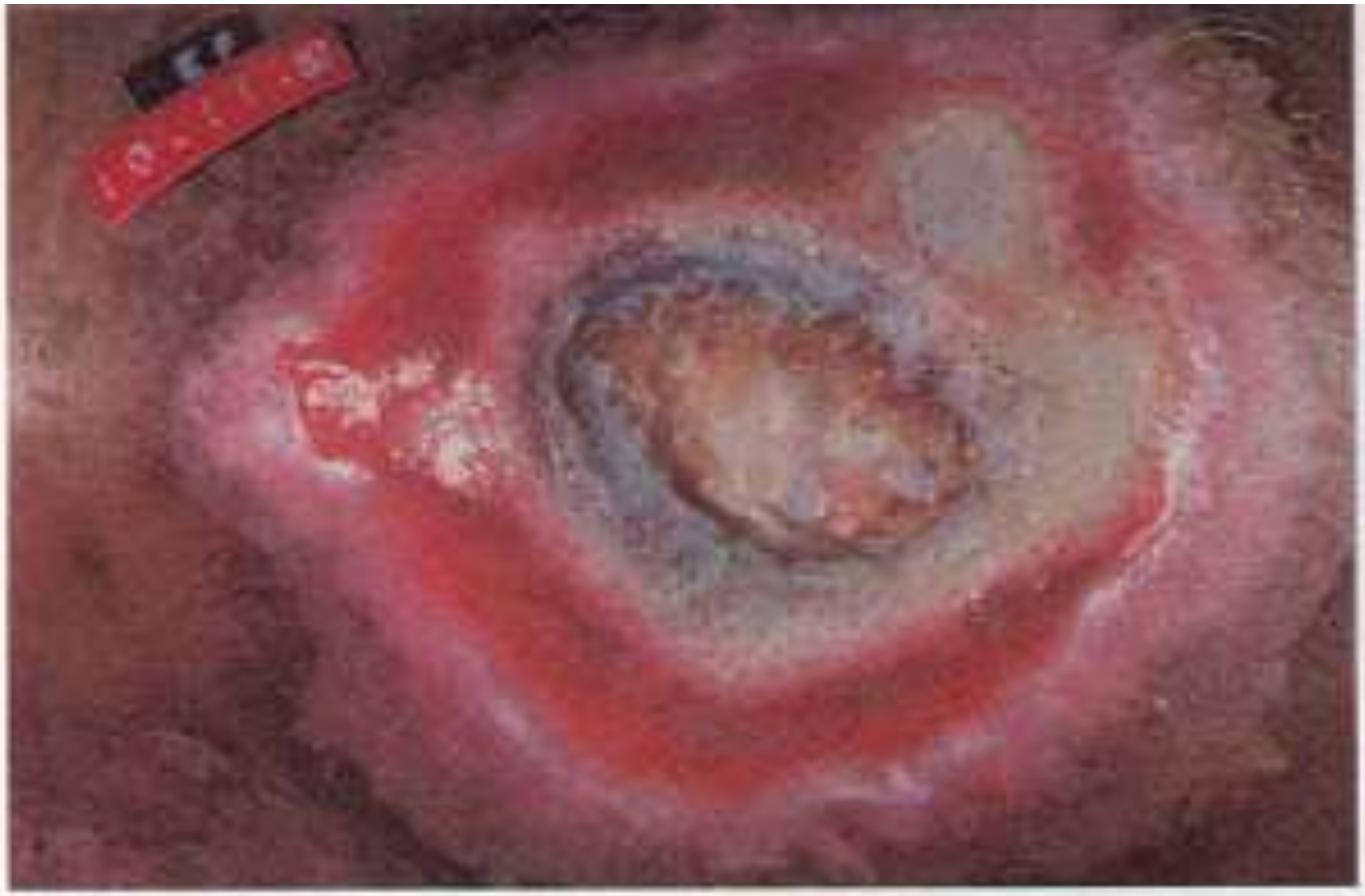
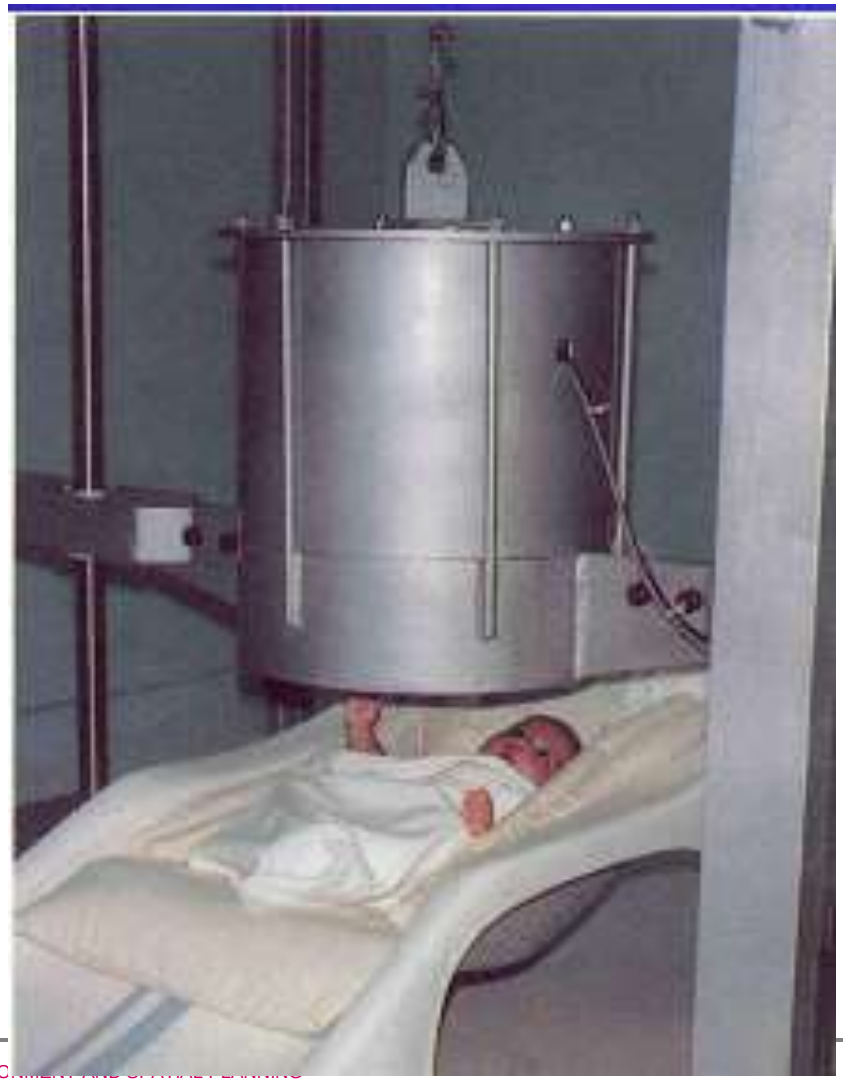


*FIG.9.4. Detailed view of the bed of an deep ulcer after partial resection. The blackening of surrounding tissue, fat necrosis and skin suffering are clear indications of poor evolution of this injury.*

# Goiania, Brasil, 1987

FIG. 9.5. 75 days after exposure. The wound now limited to a superficial ulceration, is covered with a dense and firm fibrinous exudate.

# Goiania, Brasil, 1987



# Goiania, Brasil, 1987

# Yanango, Peru, 1999

- At the remote construction site the strong Iridium source was not properly stored in the shielding container
- A construction worker found the source, which was in the shape of metallic wire
- He took it into the pocket of his trouses and went home
- Only few hours later the operator of the irradiation device triggered an alarm and the worker was found

- He was later taken to Paris, but did not survive …

# Yanango, Peru, 1999

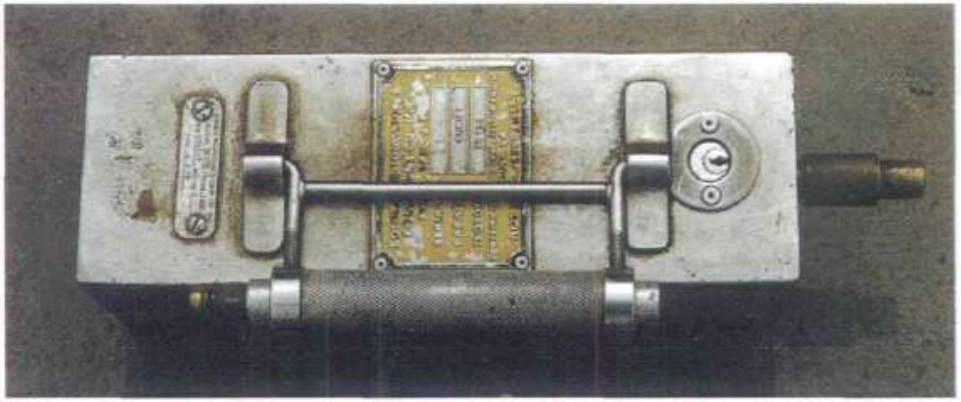


*Photo 3. Radiography camera showing labels and lock.*

# Yanango, Peru, 1999

*Photo 5. Blistering lesion surrounded with large inflammatory halo on the mid-upper line of*

# Yanango, Peru, 1999

*Photo 10. Hyperpigmented reaction of the lesion. The lesion edges are well defined, and the skin is peeling off in some areas surrounding the central lesion (15 March 1999).*

# Yanango, Peru, 1999

*Photo 17. Severely superinfected large ulceronecrotic lesions spreading to the whole perineum (14 December 1999).*

# Ilirska Bistrica, Slovenia, October 2004

- The Cesium source, very similar to the one in Goiania, was found in the abandoned facility of the bankrupt company
- The building was just to be demolished …
- Very easily the Goiania scenario could be repeated.
- The root cause was poor regulatory control in the past

# So, why are we here?

- **To prevent such accidents to occur!**

- They can be prevented by the:
  - State control of the use of sources:
    - Licensing system
    - Registers
    - Strict control at the end of the use
  - Proper management of radioactive waste
  - Monitoring of the environment
  - System for control of risky activities, where orphan sources frequently appear (borders, smelters, scrap yards …)