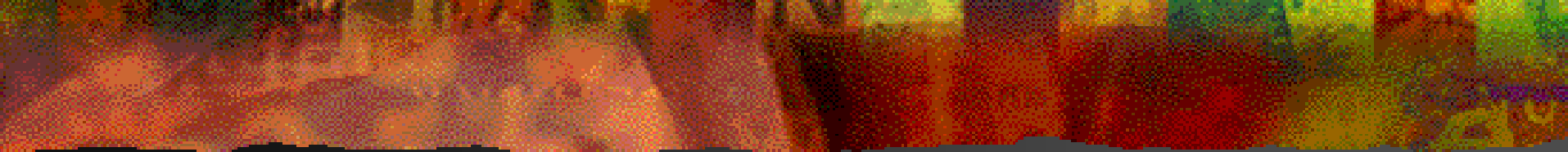




Radiation Sources at Recycling Facilities



James G. Yusko, CHP, DABR
Regional Manager,
Radiation Protection
Dept. Environmental Protection



For presentation at the
DEP – ISRI
Radiation Protection in Recycling Workshop
Harrisburg, Pennsylvania
October 20, 2005

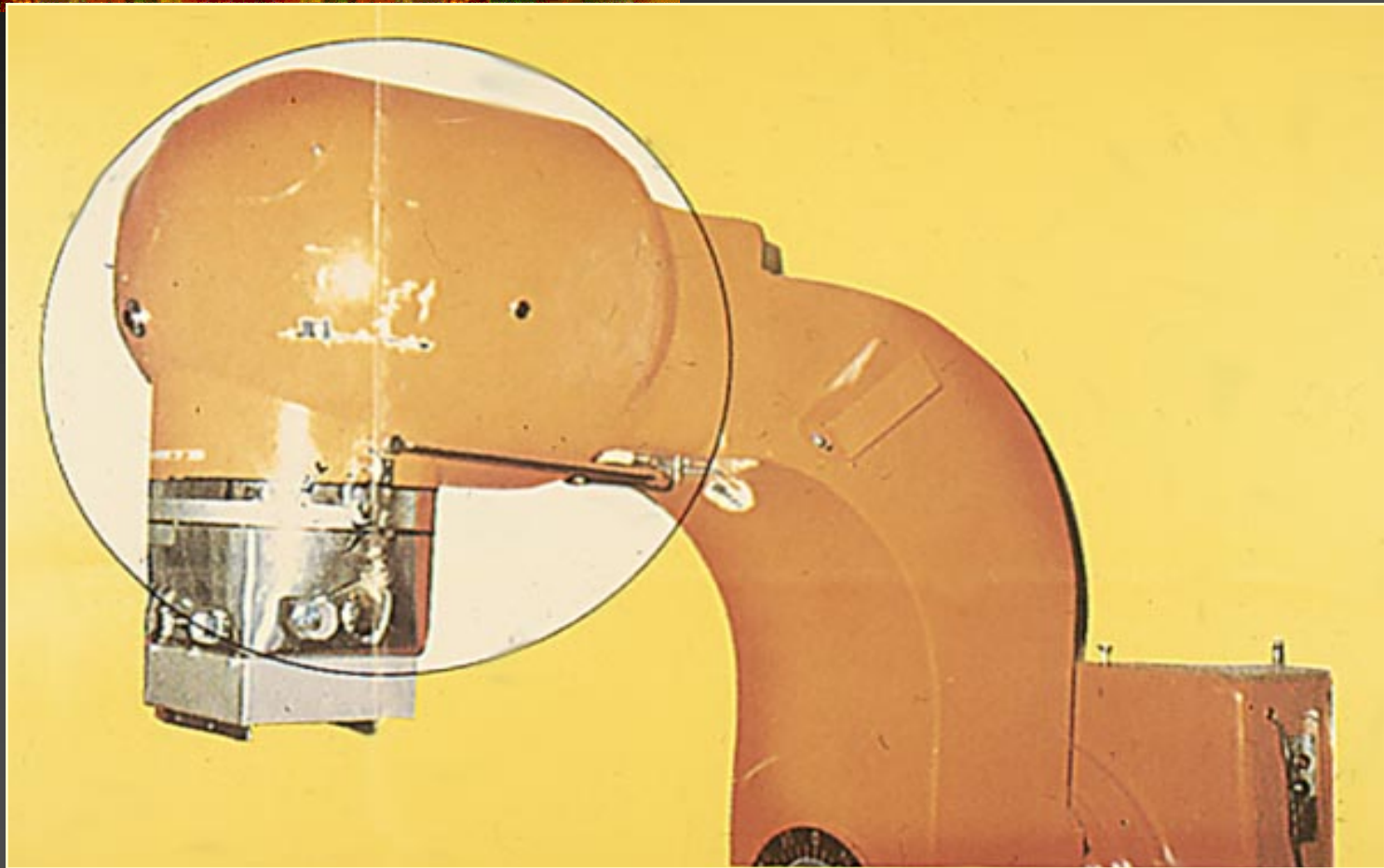
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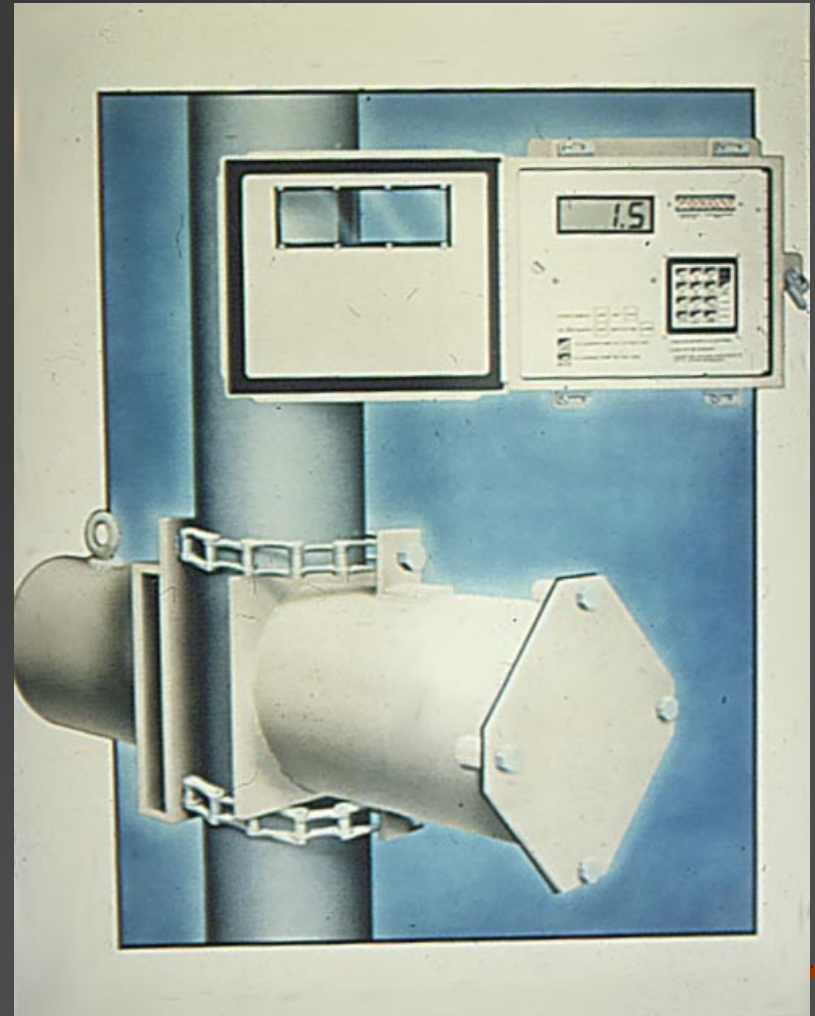
Find the radiation source



Find the radiation source



Find the radiation source



Find the radiation source



Find the radiation source

- Now, suppose it's one of these...
- About $\frac{1}{4}$ " (6 mm) dia.
- About 1" (25 mm) long...
- And it's here



Find the radiation source



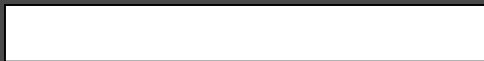
Find the radiation source



Find the radiation source

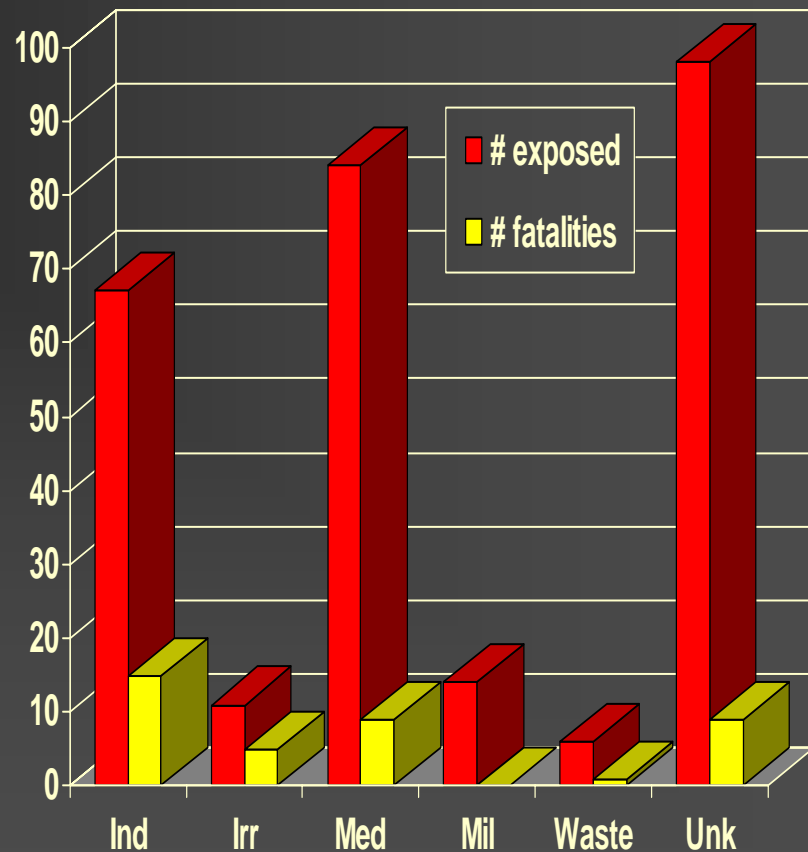


Find the radiation source



Why I am concerned

Since 1955, at least 63 orphan source accidents have occurred, resulting in 280 individuals exposed, and 39 fatalities.



Why I am concerned

- Borrowing from IAEA, a “severe” radiological accident involves whole body dose ≥ 0.25 Gy (25 rad), or a localized (e.g., extremity) dose $\geq \sim 3$ Gy (300 rad)
- Severe economic consequences possible: Goiania, Brazil, 1987 - ~ 15 M\$ (US), both in actual costs and revenue losses.

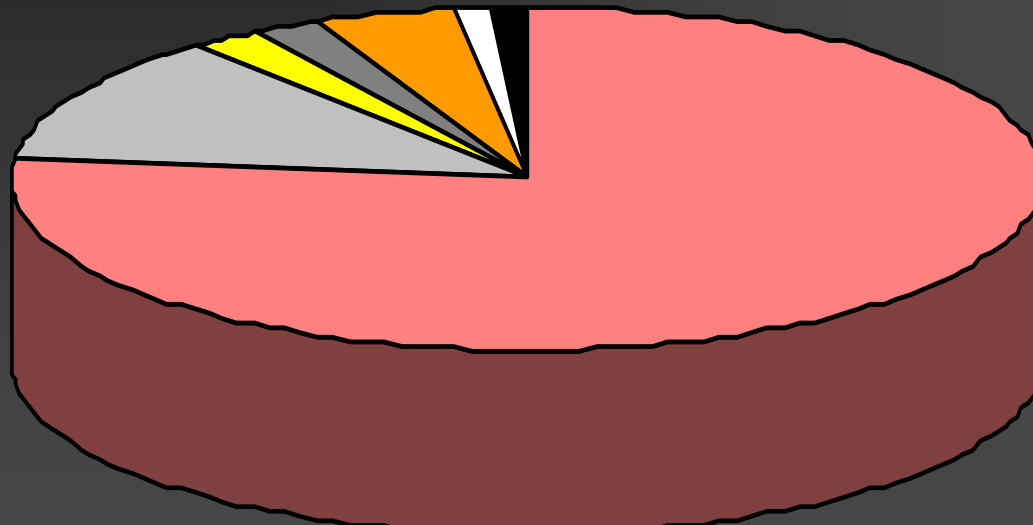
Why I am concerned

- Unlike other severe accidents, ***orphan source accidents expose the public.***

Why I am concerned

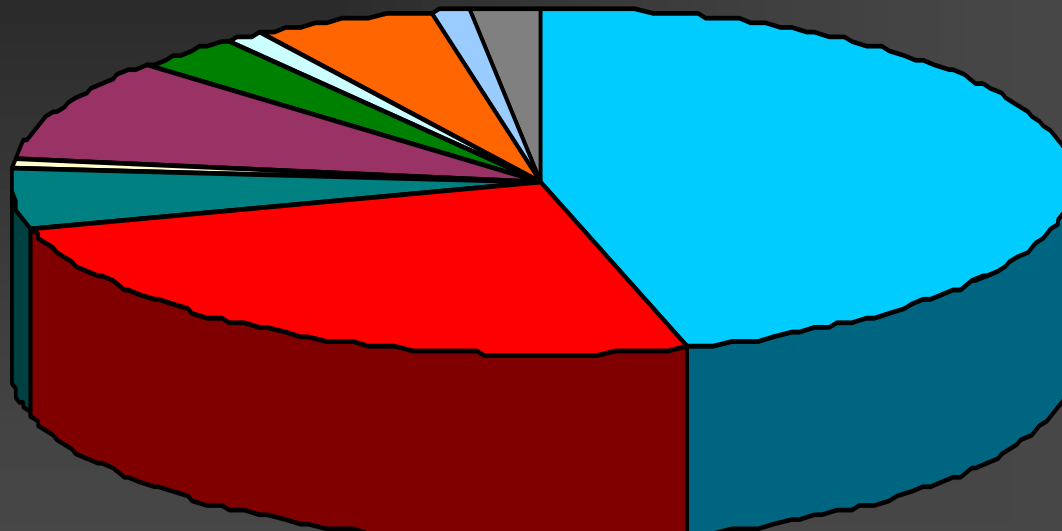
- 35* meltings reported in the U.S. since 1983
- 10-12 mega\$/melt -- 23 M\$ max. (US)
- Industry buys expensive monitoring systems (to protect themselves) and often gets stuck with the sources they find(!)
- Hundreds (literally!) of radioactive orphan sources found by monitors at recyclers.
- * Latest melting August, 2005 @ Nucor Steel, TX

Why I am concerned



■ Steel ■ Aluminum ■ Gold ■ Lead ■ Copper ■ Zinc

Why I am concerned



■ Cs-137

■ Co-60

■ Th

■ Ir-192

■ Am-241

■ U

■ Pu

Why I am concerned

- Radioactively contaminated products – and by-products – found many times.
- Products included reinforcing rods, auto parts, fence materials, wristwatches, lead aprons, shovels, cooking pots, chair pieces, table bases, pipe fittings, etc.

Why I am concerned

- 300+ Lost, Stolen or Abandoned Sources/devices reported *each year*.
- “300+” is the # reported; actual number may be more!

The Reporting Chain

- Need to know you have a source;
- Need to know it's missing;
- Need to know to make a report;
- Need to make the actual report.

- If any of these are missing, then **NO** report of a lost/stolen/abandoned source occurs.

Why I am concerned

- Since the earliest discoveries, recyclers installed costly radiation monitors to protect themselves from finding rogue radiation sources.
 - Since the events of September 11, 2001, this concern has spread to encompass the potential for “dirty bombs.”
 - Detection can never can be 100% effective.
-

Why I am concerned

Detection category	Avg. Response
“easy” (≤ 6 ” cm frag)	100%
“moderate” (7”–13”)	100%
“hard” (14”–16”)	84%
“very hard” (17”–19”)	69%
“extremely hard” (20”-22”)	6%
“almost impossible” (≥ 23 ”)	0%

1996 SMA test results

Why I am concerned

“It’s _____ o’clock.

Do you know where your sources are?

Why I am concerned

“It’s _____ o’clock.

Do you know where your sources are?

If your answer is “no,” **WHAT ARE YOU DOING ABOUT IT?**

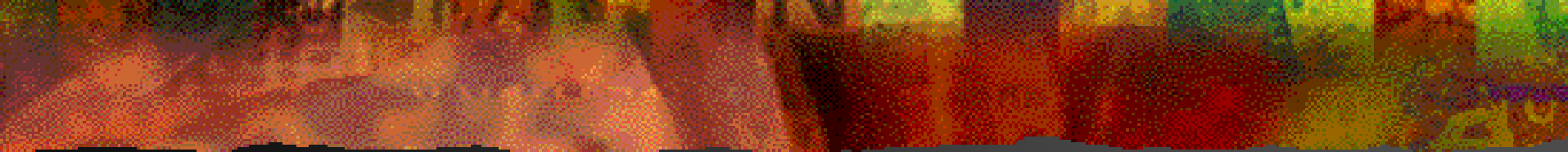
Why I am concerned

- Those are some of the reasons why I am concerned about orphan radioactive sources.

- Are you concerned?

Questions?





James G. Yusko, CHP, DABR
PA Dept. Environmental Protection
400 Waterfront Drive
Pittsburgh, PA 15222-4745
412.442.4000
412.442.5246 – fax
JYusko@state.pa.us