From Operations to Decommissioning

– Decline into fear –

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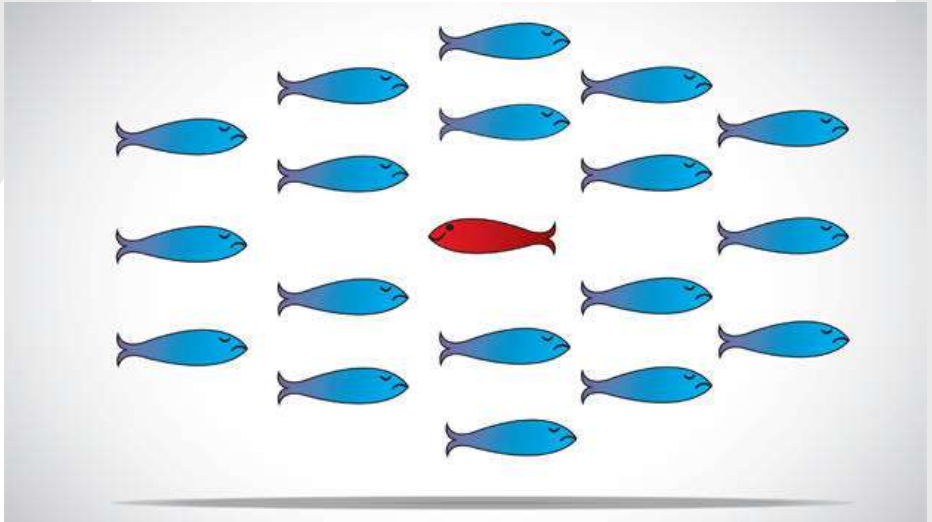
Disclaimer

- For the next 15 minutes you will learn nothing new
  - ❑ No new research
  - ❑ No new guidelines
  - ❑ No new practices
- But maybe
- ... just maybe ...
- you will think a bit
- differently
- 15 minutes => simplistic and negative hyperbole



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What is *safety?*

– IAEA Safety Glossary –

- *For the purposes of this publication, **safety** means the protection of people and the environment against radiation **risks**, and the safety of facilities and activities that give rise to radiation risks (…)*

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What is *risk?*

– IAEA Safety Glossary –

- **Risk**: *A multiattribute quantity expressing hazard, danger or chance of harmful or injurious consequences associated with actual or potential exposures (…)*

$$R = \{S_i | p_i | X_i\}$$

where S_i is a description of a scenario i, p_i is the probability of that scenario and X_i is a measure of the consequence of the scenario.

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Expectations vs. Reality

- Decommissioning is the removal of activity
- Intuitively, this reduces risk
  - ❑ In reality, only the source term is affected
  - ❑ The introduction of new risk factors

$$R = \{S_i | p_i | X_i\}$$

- New situations *[i]*, and new descriptions *[S]* and probabilities *[p]*

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Changing the factors

- When you change the conditions, you void the existing habits, and hereby safety
- One of two things can happen:
  1. You define new instructions for new steady-state
  2. The workers develop their own habits, either
     1. more strict (unbased fear, need for guidance)
     2. less strict (lack of knowledge)
- You propably only do proper risk assessment on larger projects
  - ❑ Accidents happen on minor operations and ”everyday”-work, because that’s where the majority of the time is spend

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Summary

– Apparent solutions –

- You are *tearing away reality*
- Decommissioning requires a constant reassessment of safety
  - ❑ Source, *i*
  - ❑ Situation, *S*
  - ❑ Risk, *p*
  - ❑ Consequence, *X*
- <u>After</u> every operation, consider the effect on *steady-state safety*
- Training of staff, especially workers, is a constant process
- Beware ”academic ignorance”
- You already have the tools: **training** + **EHS**

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Pt 190
0.014
6.5 · 10¹¹ a
Pt 191
2.8 d
Pt 192
0.782
Pt 193
50 a
Pt 194
32.967
Pt 195
33.832
Pt 196
25.242
Pt 197
18.3 h
Pt 198
7.163
Pt 199
30.8 m
Hg 196
0.15
Hg 197
Hg 198
0.97
Hg 199
Hg 200
23.10
Hg 201
13.18
Au 195
186.1 d
Au 196
Au 197
100
Au 198
2.6943 d
Au 199
3.139 d
Au 200
48.4 m
Ir 189
13.3 d
Ir 190
11.8 d
Ir 191
37.3
Ir 192
73.83 d
Ir 193
62.7
Ir 194
19.15 h
Ir 195
2.5 h
Ir 196
52 s
Ir 197
5.8 m
Ir 198
8 s
Os 184
0.02
Os 187
1.96
Os 188
13.24
Os 189
16.15
Os 190
26.26
Os 191
15.4 d
Os 192
40.78
Os 193
30.11 h
Os 194
6.0 a
Os 195
6.5 m
Re 183
71 d
Re 185
Re 187
62.60
Re 188
16.98 h
Re 189
24.3 h
Re 190
3.1 m
Re 191
9.8 m
W 182
26.50
W 185
W 186
28.43
W 187
23.72 h
W 188
69 d
Ta 184
Ta 185
49 m