

Interpreting Tolerability and Reasonableness in the Context of Risk Management for Decommissioning and Legacy Management

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Outline

- Background to “tolerability” in RP
- UK regulatory interpretation
- Legacy risk management, example from Sellafield
- Observations

Sizewell Public Inquiry

Could a PWR be operated safe at Sizewell, UK?

- **1982–1985: extensive** analysis/public discussion of risks
- Conclusion: ok to build (it was + has operated since 1995)

However, the judge also said in 1987 report:

- The level of **tolerability** should, so far as is **practicable**, reflect the public's views in the light of a full understanding of the **nature and size of the risks and benefits**
- The HSE (*executive body over nuclear safety regulation*) should formulate and publish guidance on **tolerable levels of individual and societal** risk to workers and public from nuclear power stations

Frank Layfield,
<https://discovery.nationalarchives.gov.uk/details/r/C7081>

1987: Parliamentary discussion of nuclear safety

Belt and braces (ceinture et bretelles) safety

- {based on data presented to Parliament} a man who wears belt and braces will suffer simultaneous failure and lose his trousers once in 36,500 years!
- “**At the individual level this risk is acceptable.** However, there are 25 million men in Great Britain, so that even if all of them did wear belt and braces, 685 men would lose their trousers every year. **It is not acceptable at national level** that so many men should be so embarrassed”

Viscount Mersey quoting Woffinden, House of Lords, 8 July 1987



ICRP 60: 1990

Key words for three levels of exposure:

- Unacceptable
- Tolerable - not welcome but tolerated because of the benefits)
- Acceptable - nothing more to do if protection is optimised

A dose limit represents a selected boundary in the region between “unacceptable” and “tolerable” in planned situations

- *No discussion of likelihood of exposure as an element of risk!*
- *No indicated end to process of optimisation*
- *ICRP recommended values of dose limits – (i.e. confident enough to identify where this boundary is...)*

ICRP 103 does not mention the word tolerable

UK regulatory interpretation, 1992

The tolerability of risk from nuclear power stations, HSE, 1992

Key concepts:

- Unacceptable
- Tolerable – if risk is as low as reasonably practicable (ALARP) and undertaken because of the desired benefits
- Broadly acceptable – no need for detailed work to demonstrate ALARP

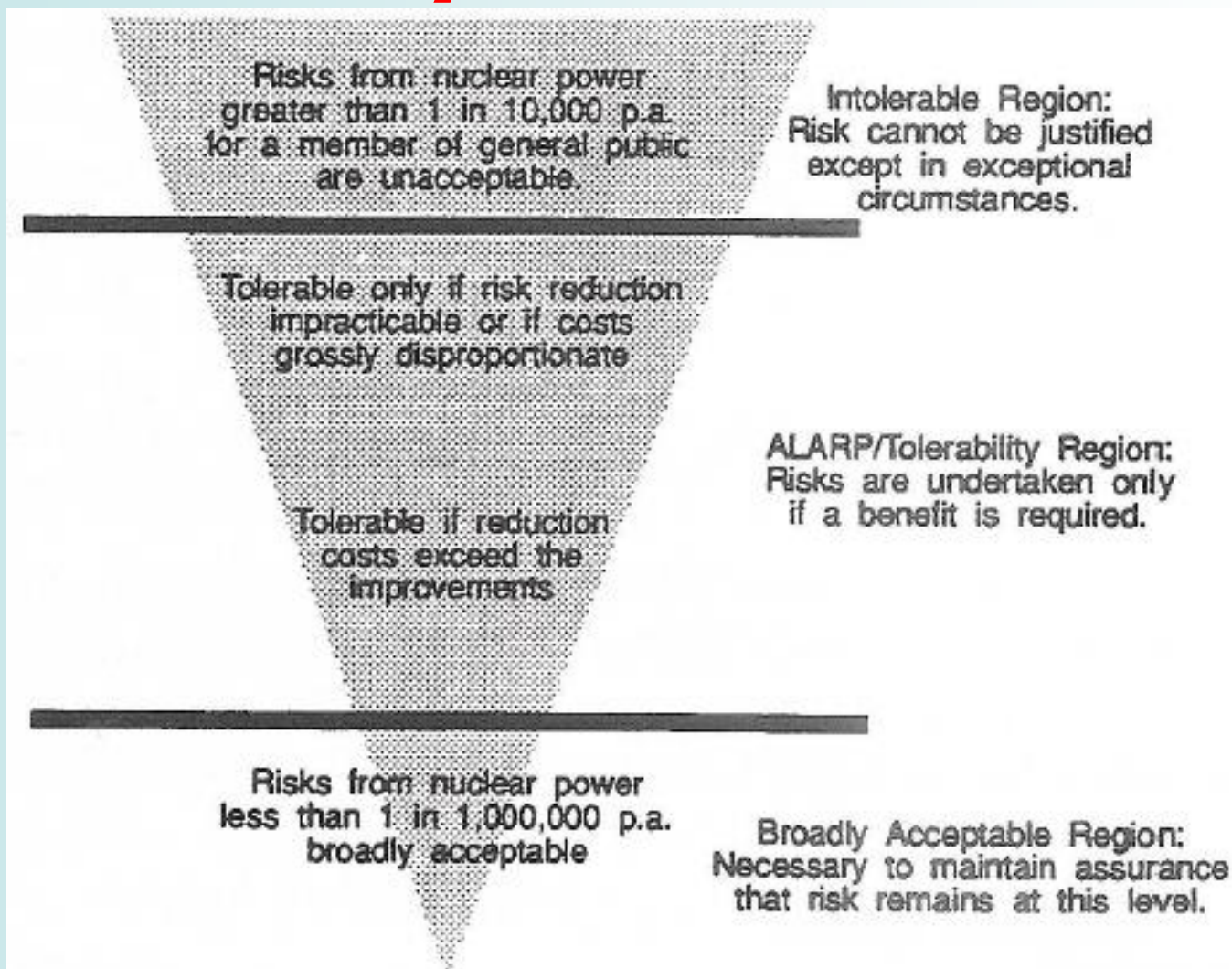
For certain hazards (e.g. radiation, asbestos, lead...)

- fix a level of personal exposure that can be regarded as just tolerable, but must not be exceeded; and
- each employer must do better by reducing exposure and so the risk to the lowest level that is reasonably practicable.

Gives regulatory scope to

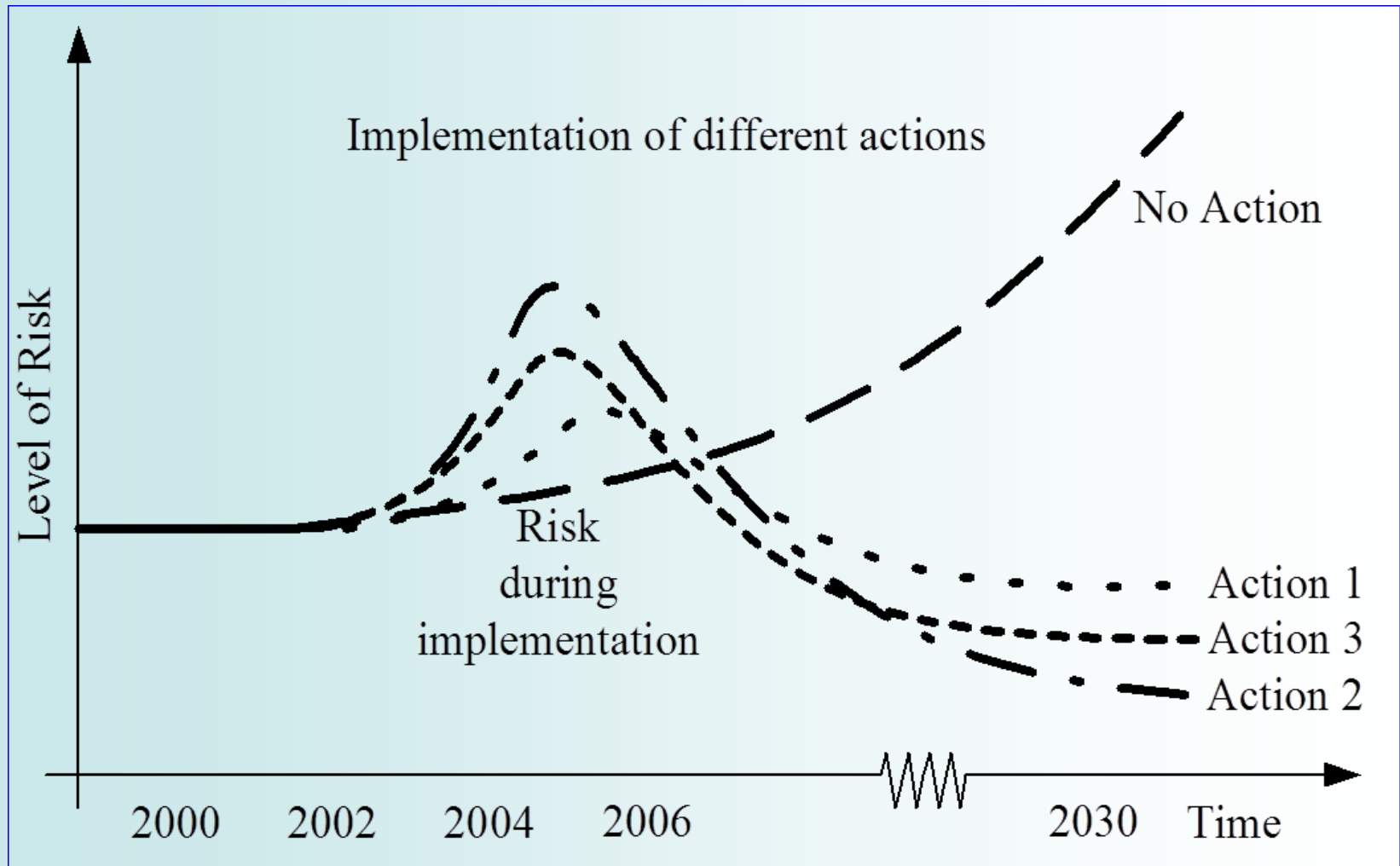
- *argue for improvements while also*
- *providing mechanism to end endless speculation on doing better*

Tolerability of risk framework



note: the wider the triangle, the greater the benefits from reducing risks relative to the costs

Risk management and legacies



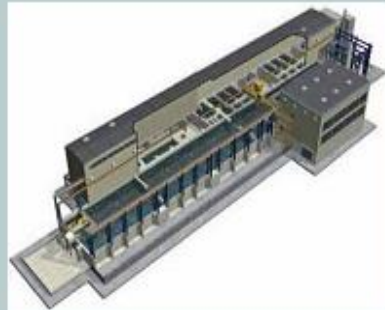
Legacy Ponds & Silos

Pile Fuel Storage Pond



- Constructed 1948-1952 to store Windscale fuel for reprocessing. Waste consists of sludge, fuel, intermediate and low level level waste.

First Generation Magnox Storage Pond



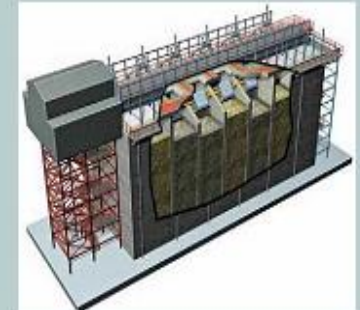
- Constructed in 1950s and 1960s to store Magnox fuel for reprocessing. Waste consists of sludge, fuel, intermediate and low level level waste

Magnox Swarf Storage Silos



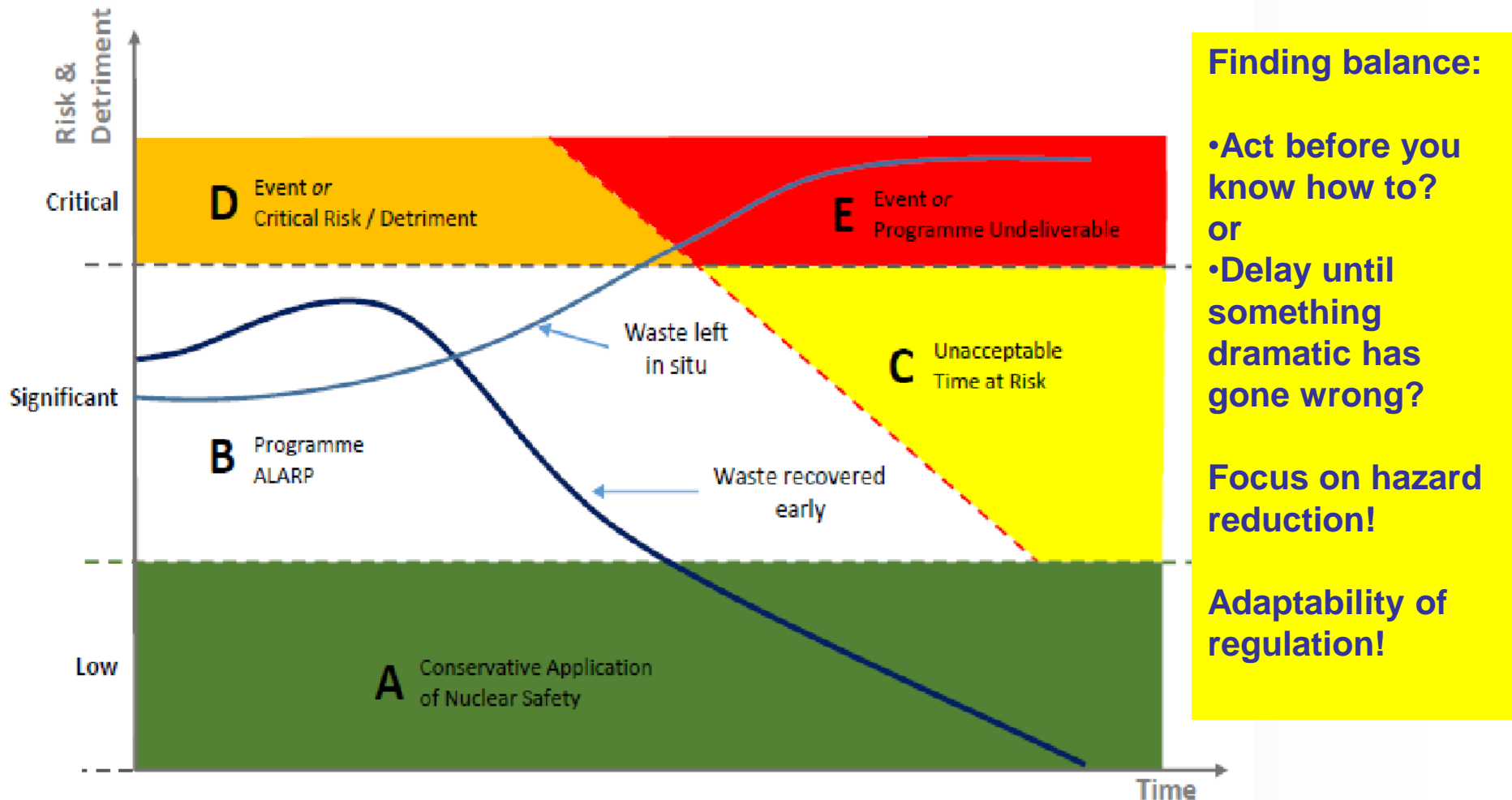
- Constructed 1960s-1980s to hold irradiated fuel canning waste. Received waste until 2000

Pile Fuel Cladding Silo



- Commissioned in 1952, 1st storage facility for intermediate level waste constructed at Sellafield. The silo was filled by 1964

NDA Risk Management Framework



Observations on tolerability

- Is context driven: if your only water supply is above the “limit”... so how to justify prescription of limits of tolerability, and hence prescribe limits to dose?
- Is multi-dimensional: need to consider, and distinguish,
 - individual and societal tolerability
 - identifiable and statistical victims and beneficiaries
 - low dose/high probability exposure from high dose/low probability exposures
- Is closely linked to discussion of optimization but is not just about radiation

Suggestions

- Share experience of who has found what (risks) intolerable and why; what decisions were made in “high” dose/non-emergency situations
- The original thinking was original – is worth to read the literature instead of re-invent the ideas
- ICRP 60 focussed on tolerability in planned situations, not what we now call existing exposure situations - legacies etc.
- Consolidation of TG activities on-going, but results should be integrated with other risk management

Possibly a new thought

- It may be intolerable to deny the chance to the enjoy benefits of an action... Examine from the opposite perspective