

Radiation protection at a reprocessing plant

Jim Bishop
Head of Radiological Protection
Sellafield

A Nuclear Management Partners company operated under contract to the NDA



Sellafield Ltd

Sellafield

- 2 km long
- 10,000 employees
- 3,000 contractors
- 7,000 classified (Cat A) workers.
- 200 Nuclear facilities
- Complex interactions between facilities
- Facilities close together
- 50 different isotopic fingerprints



A Nuclear Management Partners company operated under contract to the NDA



Sellafield Ltd

Sellafield

- Wide range of different processes.
- Construction, Operation and Decommissioning side by side.
- Facilities of very different ages >60yrs
- Design standards have evolved.
- ALARA and a flexible approach is essential.

Start of nuclear defence work
Civil nuclear power (Magnox and AGR)
Start of modern design standards
Commercial Reprocessing
Waste treatment and storage
Decommissioning

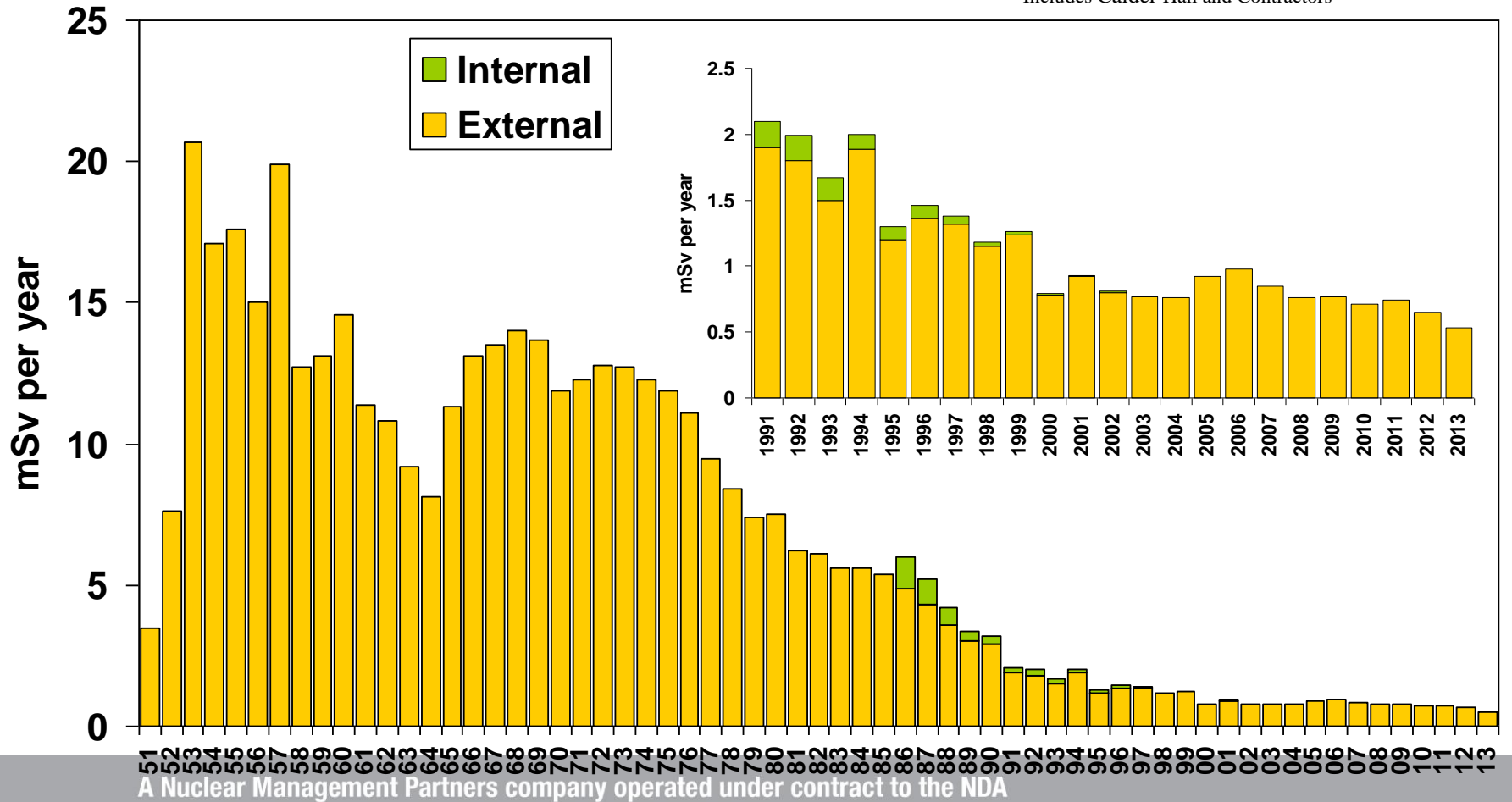


A Nuclear Management Partners company operated under contract to the NDA

Average Sellafield radiation exposure

1951 to 2013

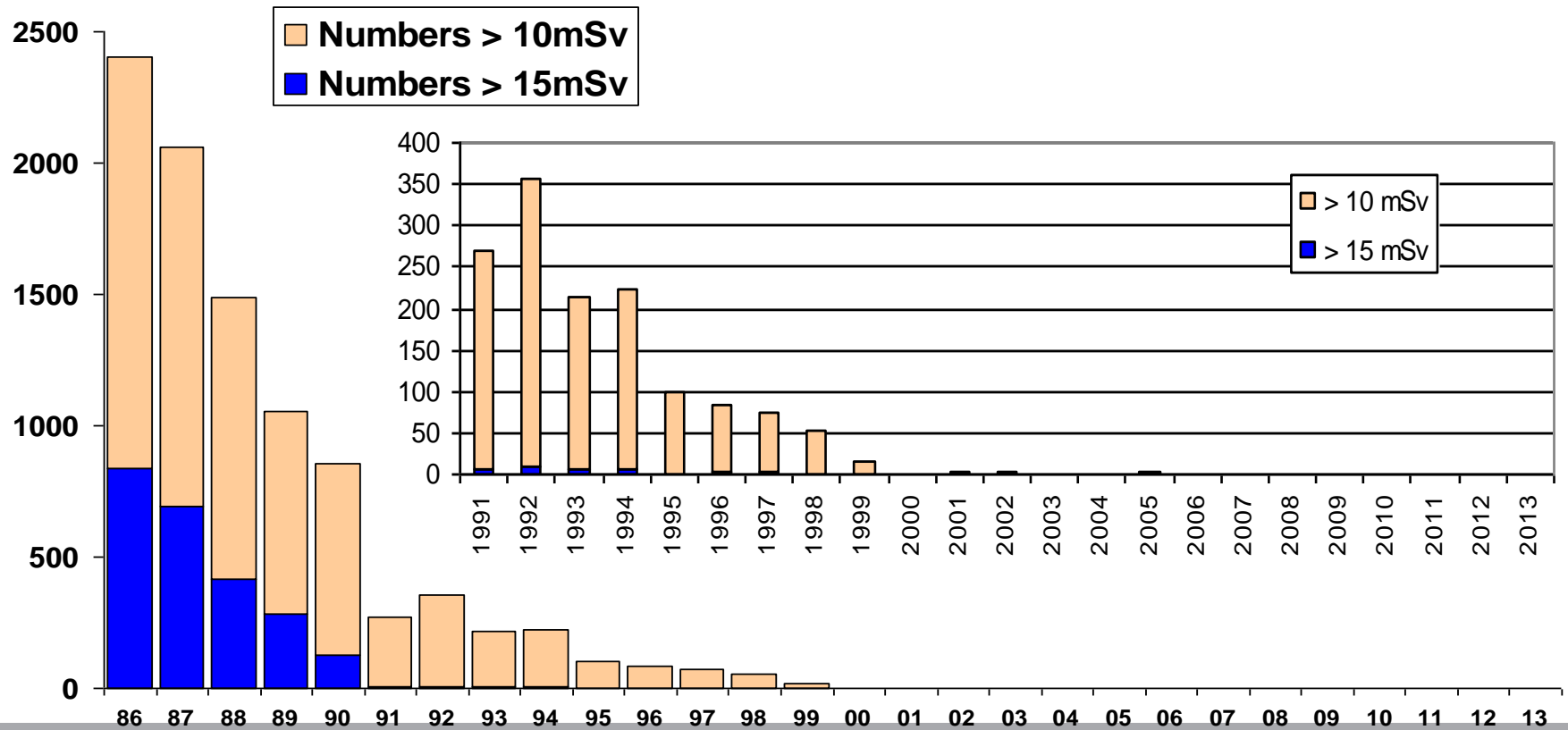
Includes Calder Hall and Contractors



A Nuclear Management Partners company operated under contract to the NDA

People receiving more than 10mSv and 15mSv per year at Sellafield

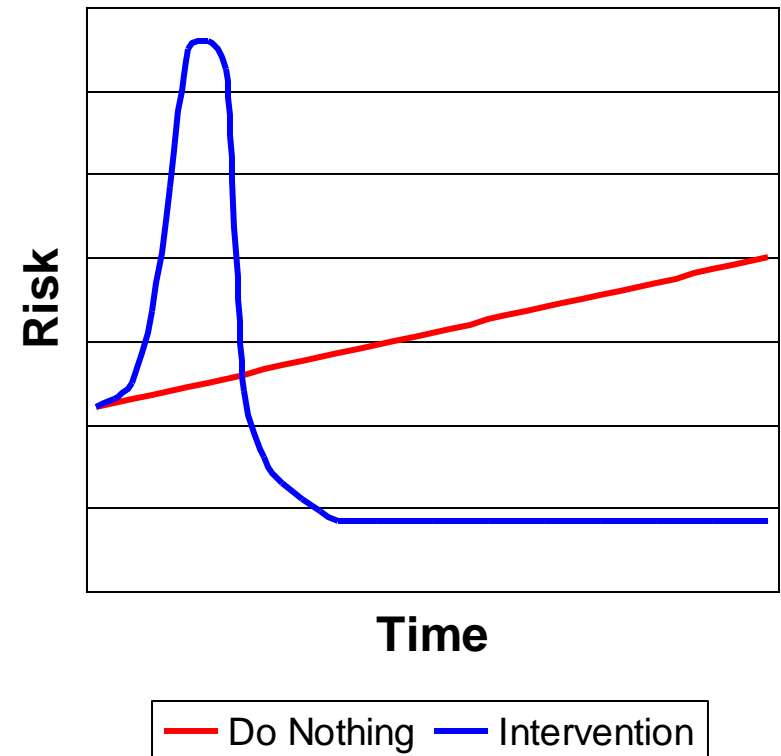
1986 to 2013



A Nuclear Management Partners company operated under contract to the NDA

ALARA

- Balance of Risk
- Perception of Risk
- Short term vs Long term Risks
- Optioneering
- Hazard and Operability Studies
- ALARA Checklists



A Nuclear Management Partners company operated under contract to the NDA

Stargate control levels



SLF 2.03.100 Contractor's Personnel: Annual Dose Management

Info supplied up to w/e:

Main Contractor:

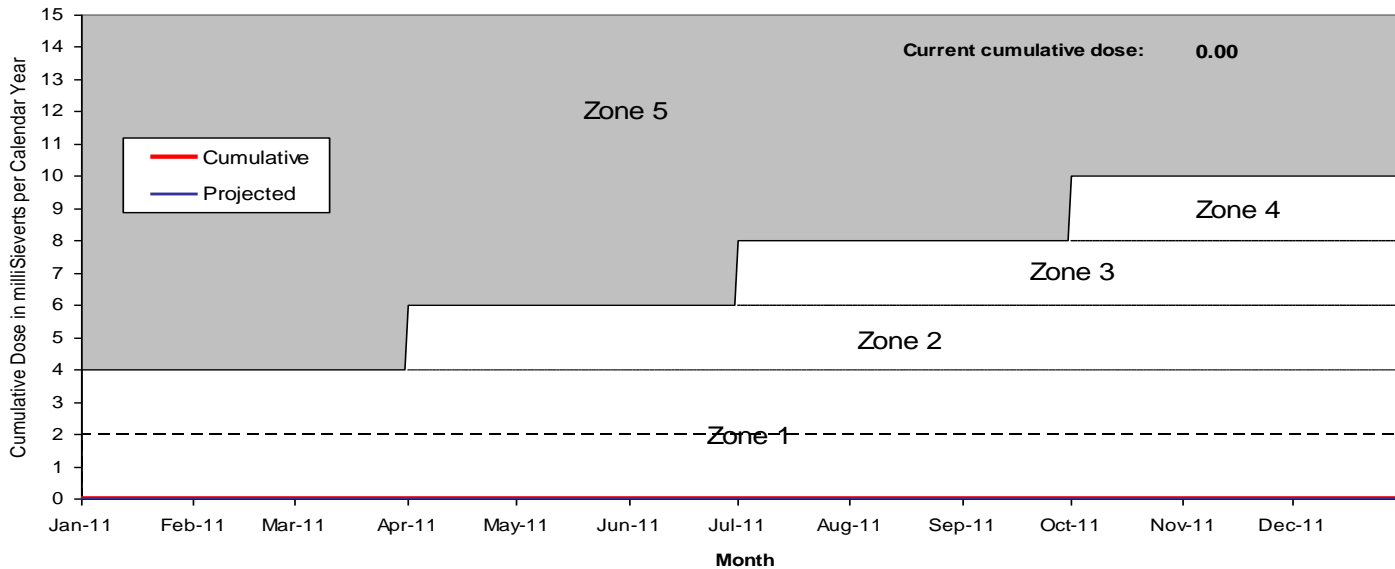
Status of radiation worker:

Peoplesoft Number 0

Full Name of Person:

DOB:

Employer:



Current radiological training or SQEP assessment date:
Competence re-assessment due:
Current Medical date (C/Ps only):
Respirator Fit Test Date:
Radiation Passbook No:
"Fit with conditions"

Actual written dose

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	0	0	0	0	0	0	0	0

A Nuclear Management Partners company operated under contract to the NDA



Legacy PCM filters – ALARA example 1



- >200 Filter stillages
- Dating back to the 1960s
- Dose rates up to 1 mSv/h
- Filters loaded with Pu Oxide as a fine powder
- Containment deteriorating
- Stored in old building
- No ventilation

A Nuclear Management Partners company operated under contract to the NDA

Legacy PCM filters – ALARA example 1



A Nuclear Management Partners company operated under contract to the NDA

Retrieval and treatment of waste – ALARA example 2



- New plant needed to retrieve waste from the older facilities and process it for long term storage.
- Limited space and have to be built around existing plant / equipment.
- Mock ups to test new equipment.



A Nuclear Management Partners company operated under contract to the NDA

Glovebox Cleaning – ALARA example 3

- Perceived wisdom that internal decontamination of glovebox would result in significant dose uptake and could not be maintained.
- Decision was to carry out the work. Gloveboxes were cleaned and doses reduced by 80%.
- New culture was established, workers were proud of the new conditions.



A Nuclear Management Partners company operated under contract to the NDA

Radiological Rollback – ALARA example 4

Before



After



A Nuclear Management Partners company operated under contract to the NDA

Key Messages

- Judgement of what is ALARA is subjective and coloured by individuals perception of risk which depends upon their experience / knowledge, level of control of the risk and perceived benefits from taking that risk.
- Sometimes it is necessary to accept increased risk in the short term to reduce risk in the long term. Waiting for a perfect solution can increase risk.
- Dose estimates need to be realistic as pessimistic dose predictions can rule out good solutions.
- A flexible approach and a range of different techniques and needed to deliver risk reduction.

A Nuclear Management Partners company operated under contract to the NDA