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National Physical Laboratory

A Survey of Requirements for Standards and Guidance for Radioactivity Measurements in Site Decommissioning

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Overview

- Background to survey
- Aims of survey
- Organisations consulted
- Findings
- Conclusions and plans

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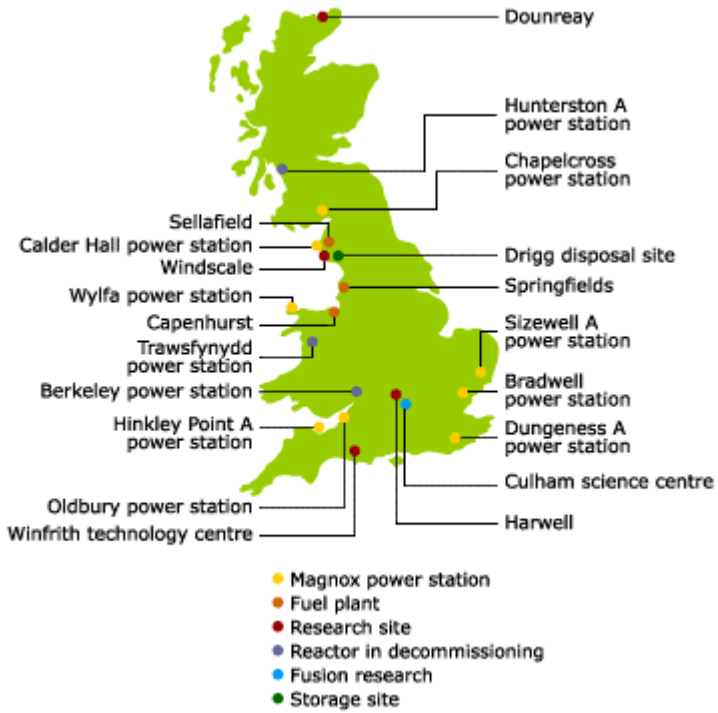
Background to survey (1)

- Decommissioning is a worldwide problem – estimated global liability of $900 billion over next 50 years

- In UK, have 'Nuclear Legacy':
  - UKAEA/BNFL facilities
  - Magnox stations
  - JET

- Nuclear Decommissioning Authority (NDA) will assume responsibility for 'clean–up' from April 2005

- Estimated cost £48 billion



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Background to survey (2)

- At NPL, feedback from users:
  - Need for techniques and procedures in support of measurements for partitioning waste
- NPL proposal to DTI (for 2004-2007 programme):
  - 'Measurement Infrastructure for Nuclear Decommissioning'
- Draft scope of infrastructure should be:
  - Develop Reference Materials to support CEWG Code of Practice
  - Run NPL Workshop on metrology for decommissioning
  - Contribute to development of Code of Practice
- NPL to contact users prior to new programme to clarify needs

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Aims of survey

- Gain overall picture of metrology in decommissioning in the UK:
  - Matrices
  - Radionuclides
  - Measurement techniques
- Identify requirements for standards and Reference Materials
- Identify requirements for guidance
- Review existing guidance

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Organisations consulted

- AEA Technology, Winfrith
- AWE Aldermaston
- BIL, Sellafield
- BNFL, Risley and Sellafield
- Canberra Harwell Ltd, Harwell IBC
- G E Healthcare, Amersham
- NIRAS, Warrington
- NNC Limited, Winfrith
- RWE NUKEM, Harwell and Winfrith
- UKAEA, Dounreay, Harwell and Windscale

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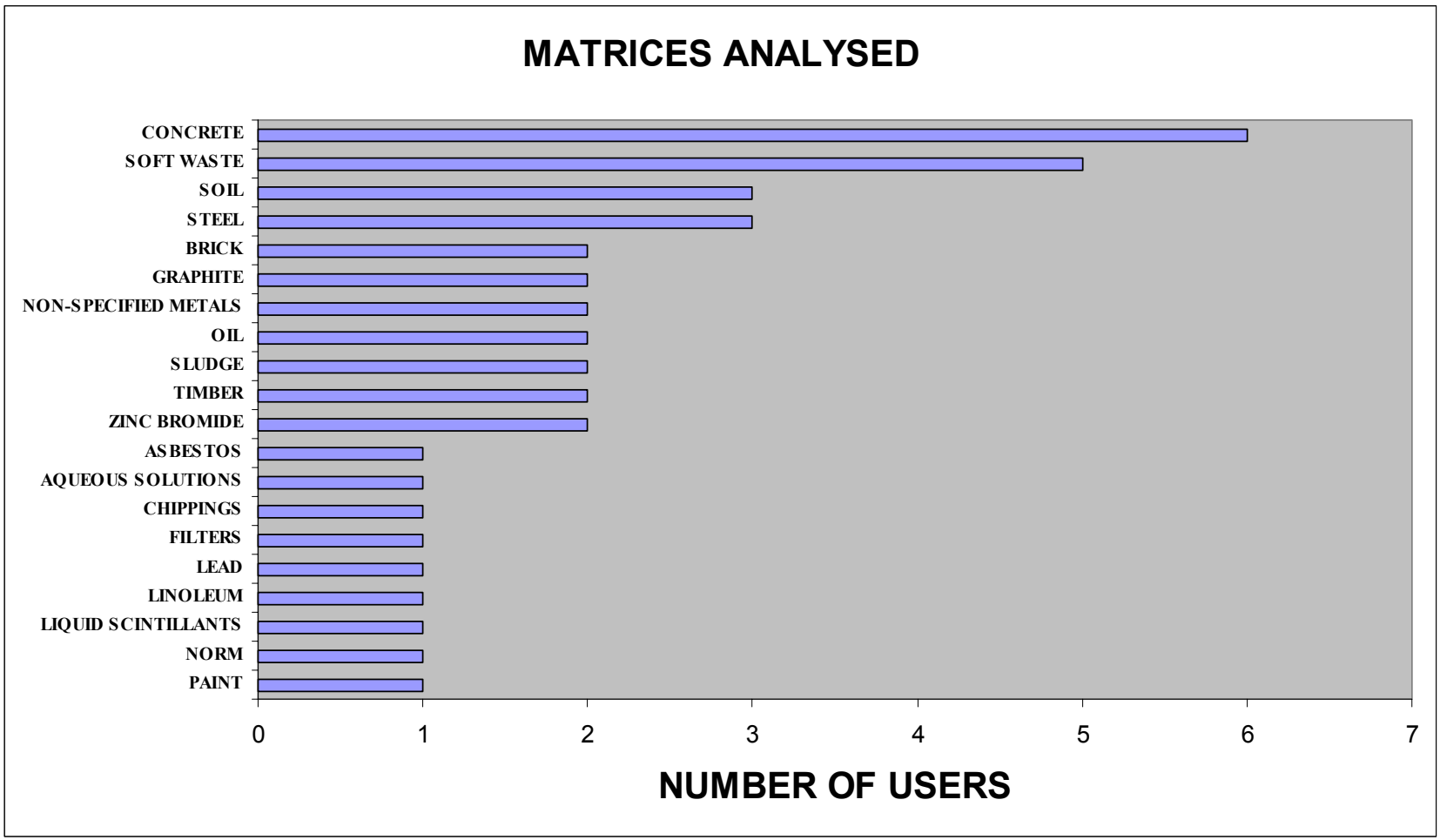
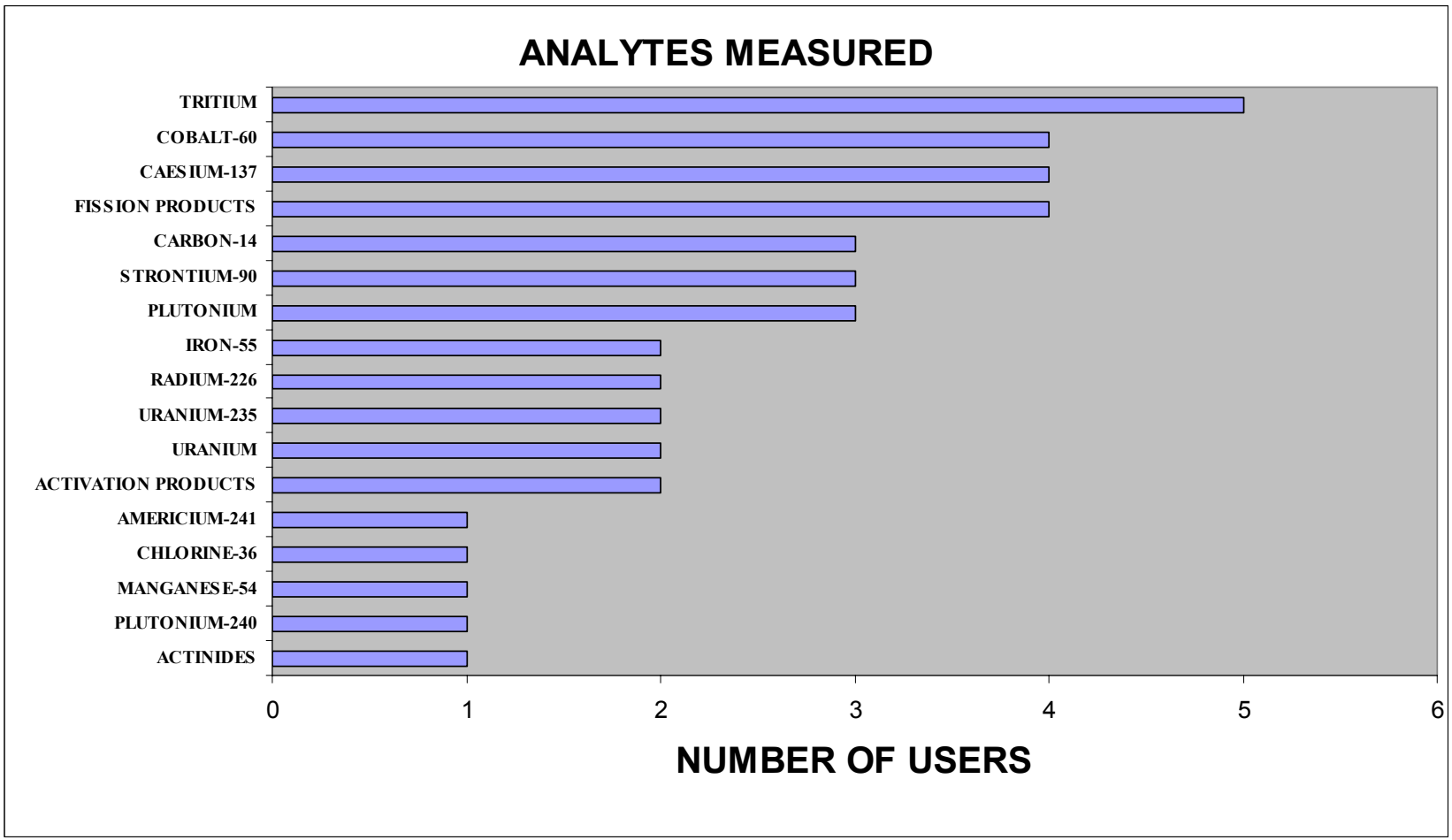
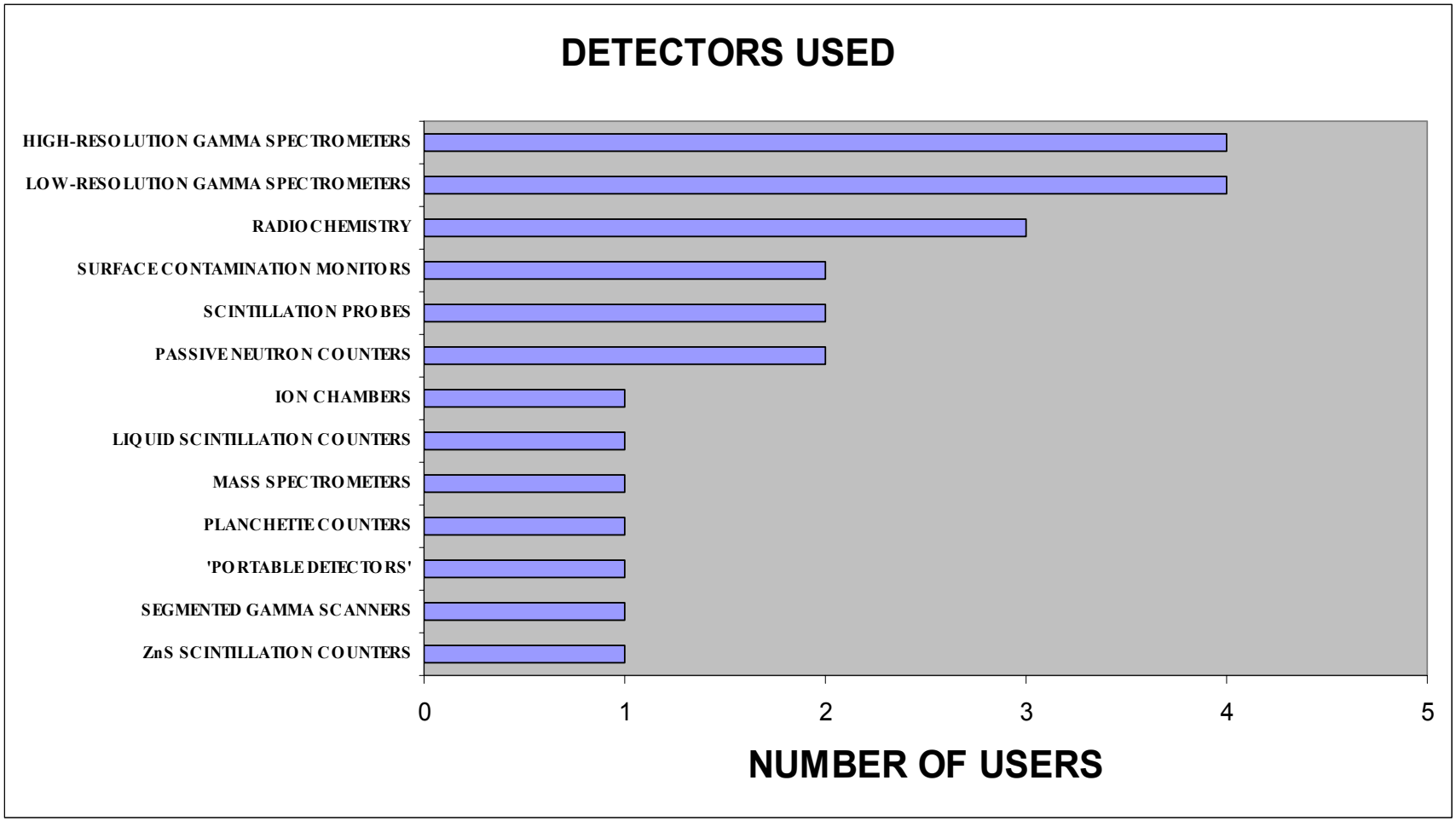
Findings (1)


MATRICES ANALYSED
CONCRETE
SOFT WASTE
SOIL
STEEL
BRICK
GRAPHITE
NON-SPECIFIED METALS
OIL
SLUDGE
TIMBER
ZINC BROMIDE
ASBESTOS
AQUEOUS SOLUTIONS
CHIPPINGS
FILTERS
LEAD
LINOLEUM
LIQUID SCINTILLANTS
NORM
PAINT
0
1
2
3
4
5
6
7
NUMBER OF USERS

Findings (2)


ANALYTES MEASURED
TRITIUM
COBALT-60
CAESIUM-137
FISSION PRODUCTS
CARBON-14
STRONTIUM-90
PLUTONIUM
IRON-55
RADIUM-226
URANIUM-235
URANIUM
ACTIVATION PRODUCTS
AMERICIUM-241
CHLORINE-36
MANGANESE-54
PLUTONIUM-240
ACTINIDES
0
1
2
3
4
5
6
NUMBER OF USERS

Findings (3)


DETECTORS USED
HIGH-RESOLUTION GAMMA SPECTROMETERS
LOW-RESOLUTION GAMMA SPECTROMETERS
RADIOCHEMISTRY
SURFACE CONTAMINATION MONITORS
SCINTILLATION PROBES
PASSIVE NEUTRON COUNTERS
ION CHAMBERS
LIQUID SCINTILLATION COUNTERS
MASS SPECTROMETERS
PLANCHETTE COUNTERS
'PORTABLE DETECTORS'
SEGMENTED GAMMA SCANNERS
ZnS SCINTILLATION COUNTERS
0
1
2
3
4
5
NUMBER OF USERS

Findings (4)

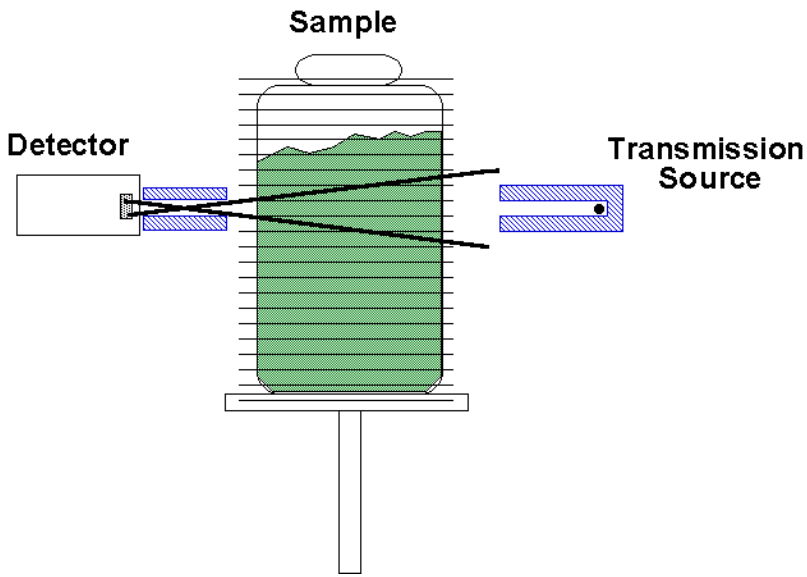
User calibration procedures:

(i) γ-detectors

a) Point sources
b) Sub-sampling
c) Transmission sources
d) ISOCS software/manufacturers' calibrations

(ii) portable detectors

a) Point sources
b) Large-area sources



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Findings (5)

User requirements for standards:

a) Comparison exercises or proficiency tests

Suggested formats:

- **200 L drums**
- **1m^3 Jencons bags**
- **80 – 90 L cylinders**
- **HEPA filters**

Suggested activity concentrations: **0.4 – 1000 Bq g^{-1}**

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Findings (6)

User requirements for standards (continued):

b) Reference Materials
c) γ-emitting calibration ‘pads’
d) Low-energy α-standards
e) Coated large-area sources
f) Large-area sources at sentencing levels

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Findings (7)

User requirements for guidance:

a) Statistical methods for sampling
b) Sampling and analysis of specific radionuclides or radionuclide types
c) Very low-level measurements with portable detectors
d) Analytical techniques for unfamiliar matrices

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Findings (8)

Review of existing guidance:

a) CEWG Code of Practice
b) NPL GPGs (14, 29, 30, 34 and 49)
c) IAEA publications
d) ISO standards
e) SRP Workshops

Conclusions and future plan

i. Predominant matrices, radionuclides and detectors identified but priority calibration requirements not clear

→ establish priorities at NPL Workshop

ii. CEWG Code of Practice an important industry document for clearance work

→ NPL to continue contributing to its development

iii. A number of relevant guidance documents available but are needs for guidance in other areas

→ establish priorities at NPL Workshop

iv. SRP Workshops an important industry initiative

→ NPL to contribute if possible

→ SRP to be involved in NPL Workshop

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