

Marking the Location of Radioactive Waste Disposals – a UK Perspective

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(#15912029)

Status of site marking in the UK

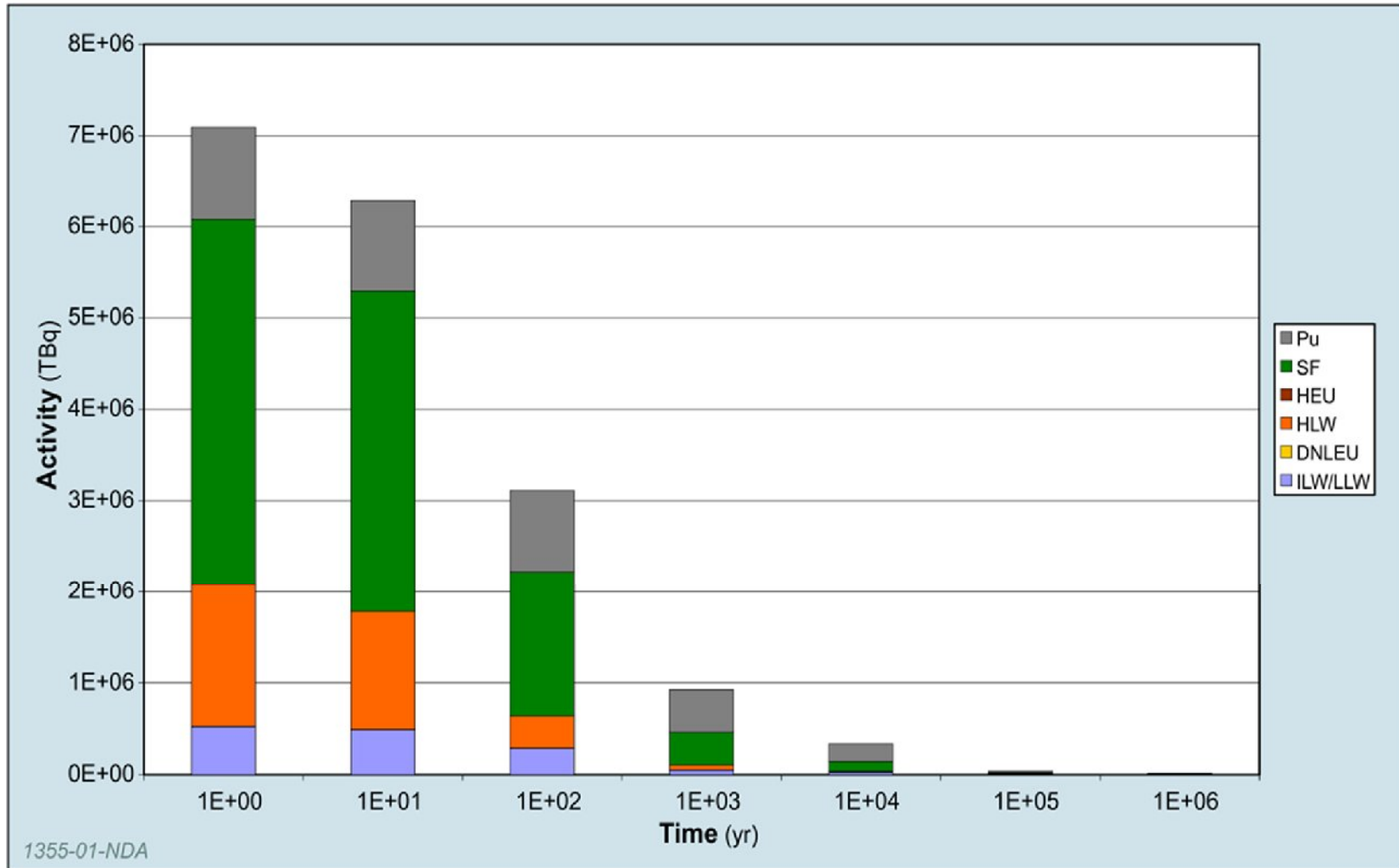
UK statements about site marking:

- **Regulatory bodies: no guidance (non-prescriptive framework)**
- **Developer (NDA): not covered in system specification**

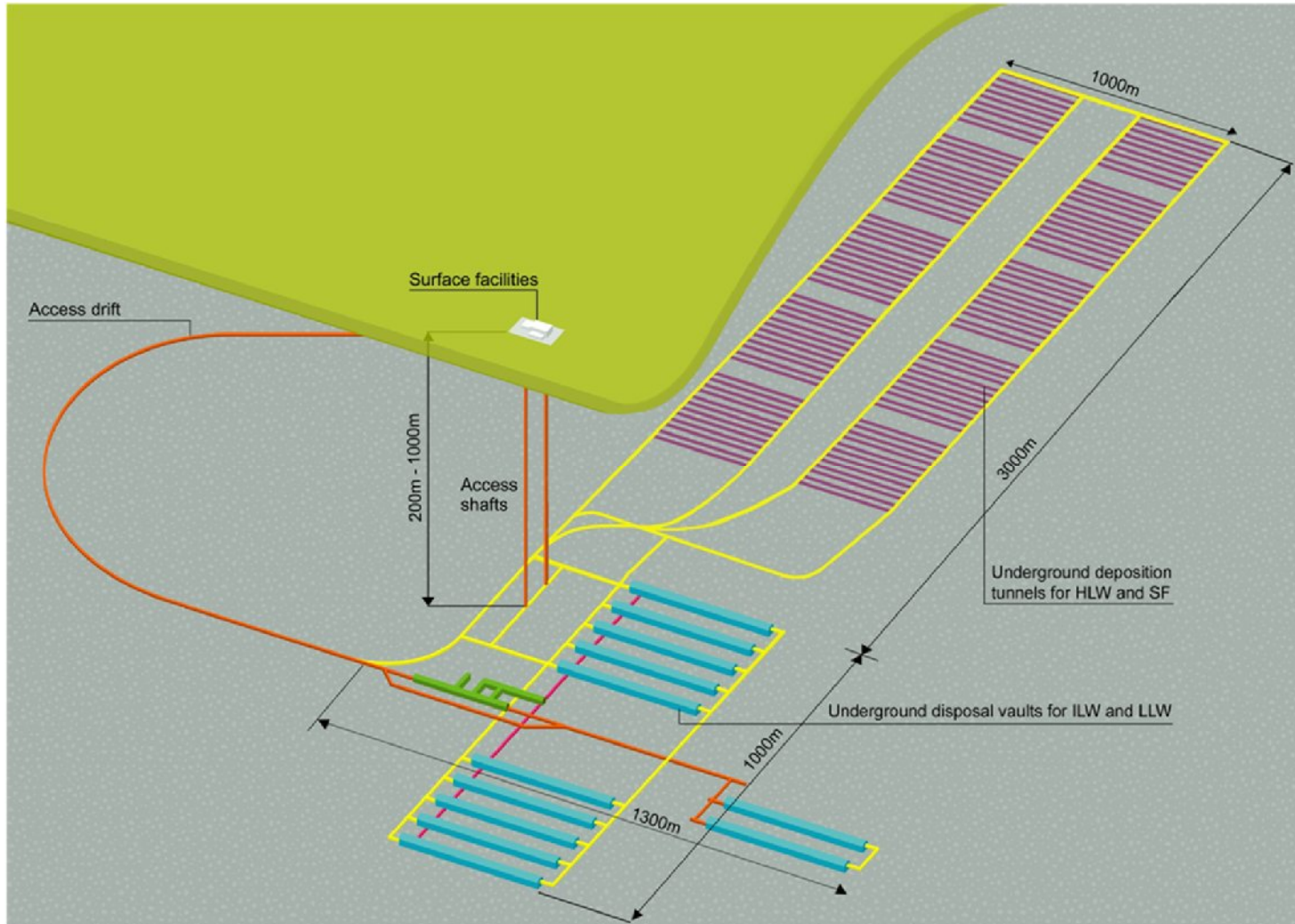
Possible purpose(s) of marking a site:

- **Avoid direct human exposure to radioactive materials**
- **Prevent actions that bypass important geological barriers**
- **Discharge ethical responsibility**

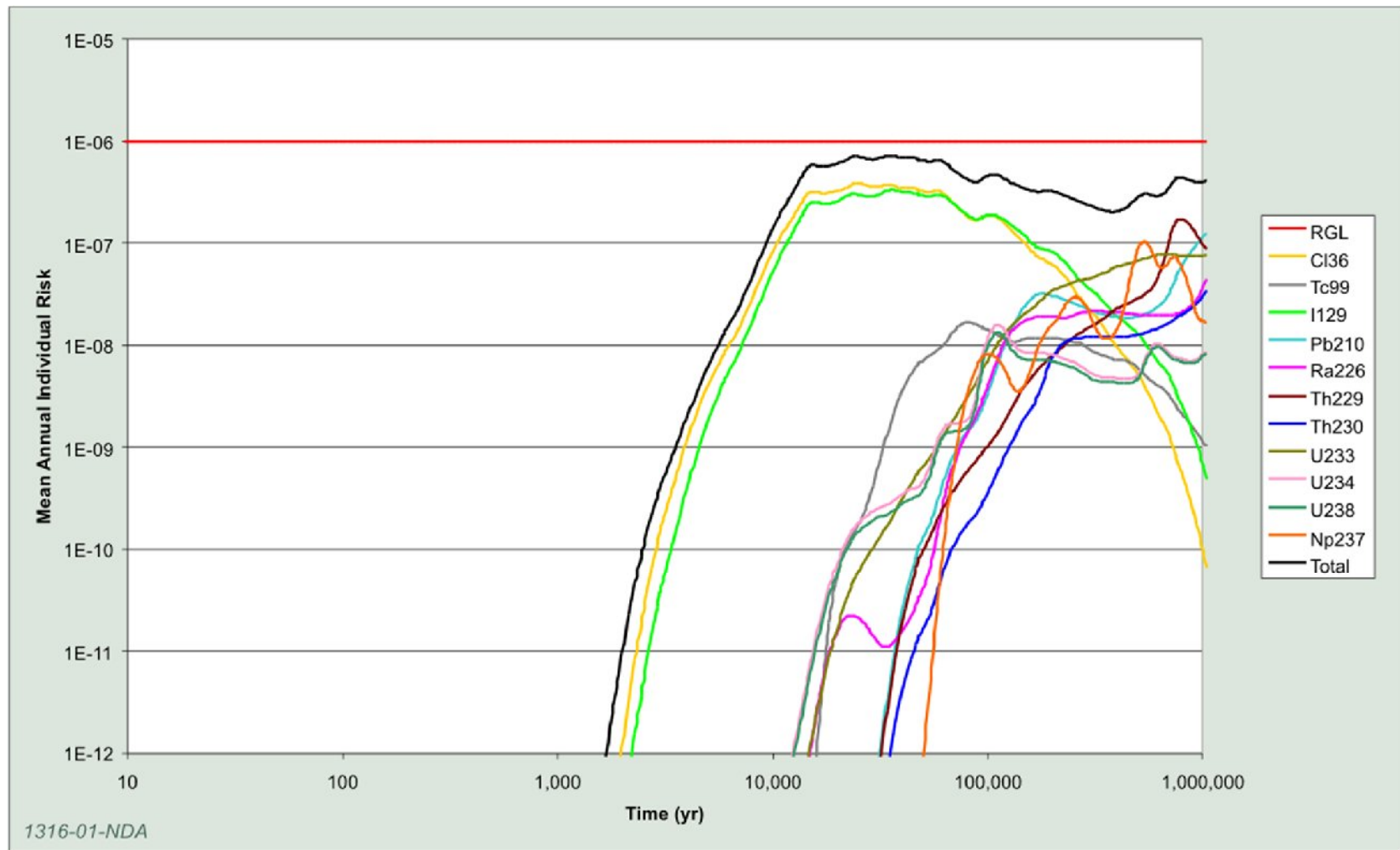
UK disposal inventory



Geological Disposal Facility

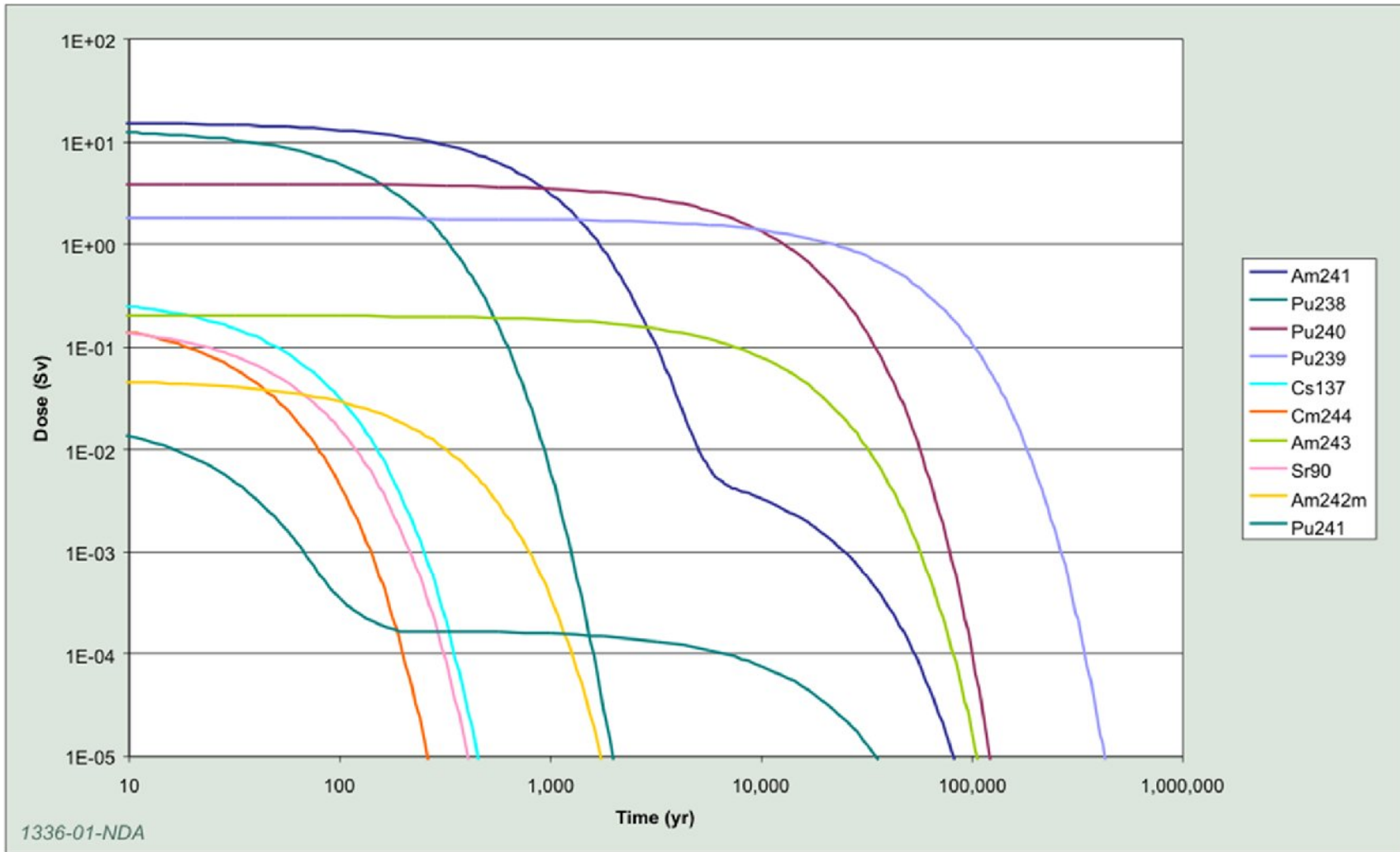


Groundwater pathway risk (ILW)



1316-01-NDA

Human intrusion (PWR canister)



Interpreting ancient features

Stonehenge:

- Completed 4,000 years ago
- Uses remain uncertain



Avebury:

- 5,000 years old
- Use unknown!

Interpreting ancient features

Silbury Hill:

- Man made
- 250,000 m³
- More than 4000 years old
- Use highly debated



Significant uncertainties

- Nature of the message
- Some locations completely lost
- Survival of materials:
 - Woodhenge, decay poor choice!
 - Mediaeval castles plundered for building materials



Intentional 'dual track' approach

Active: 'Planned records transfer'

AND

Passive: 'Speaking directly to the future'

- Relay / chain – always vulnerable
- Direct message – time for a new approach?



Relay approach

- **Active methods are vulnerable to economic and social change:**
 - Retention with understanding (a low probability event?)
 - Can only conclude that the chain of information will inevitably be broken
- **Vulnerability to organisational change – changes can be rapid**
- **Example from UK public library services:**
 - Being offered to local communities
 - Local library closures

Direct approach

- **Take credit for the nature of the facility:**
 - Steel / cast iron represents a magnetic anomaly
 - Density represents a gravitational anomaly
 - Residual surface features likely
 - Conclude that site is self marked!
- **Place records ‘out of harms way’ – geostationary satellites / periodic broadcast of information?**
- **Accept that we can only do our best:**
 - An advanced society will cope
 - A degraded one has more serious problems ...

Residual landscape features

Design features:

- Bund wall to preserve visual amenity
- Altered water courses
- Access routes – road and rail
- All will leave scars on the landscape – visual clues to previous activity

Example: Maiden Castle – 2500 years old



Future states of society

- **More developed (understanding of radioactivity persists):**
 - cure for cancer
 - deliberate retrieval for re-use
- **Same as today (note nuclear power is a transient industry):**
 - aerial and surface surveys (visual, magnetic, gravitational)
 - borehole logging – ‘behind the bit’ γ probes in sedimentary rocks
- **Degraded:**
 - life expectancy falls
 - other diseases more important than radiation-induced cancers

Overlay of economic system:

- **Free market economy (drill for profit)**
- **Planned economy (drill for information)**

Site suitability criteria

Example from west Cumbria

Survey of resources:

- coal
- oil and gas
- minerals (hematite)
- significant aquifers

Exclusion zone defined:

- same reasoning should prevent future inadvertent intrusion



Summary and Conclusion

- **No fixed position in the UK on site markers**
- **Accept that we have a duty to try**
- **Propose intentional dual track approach:**
 - Planned records transfer
 - Direct to future (site self marked?)
- **Take another look at societal evolutions:**
 - All outcomes potentially ‘acceptable’?
 - Ethical overlay required
- **Provocative and challenging ... discuss!**