Burying Treasure – Radioactive Waste Package Records

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Radioactive Waste Management (RWM)

• Our mission
  – Deliver a Geological Disposal Facility (GDF) and provide radioactive waste management solutions

• Created wholly-owned subsidiary of NDA (April 2014)
  – Currently employs around 200 staff (expected to continue to rise)
  – Continue development to become a Site Licence Company and Permit Holder

• Mission encompasses Higher Activity Waste (HAW)
  – HLW – High Level Waste from reprocessing operations
  – ILW – Intermediate Level Waste
  – Some LLW – Low Level Waste (not suitable for LLWR)

• Radioactive materials also considered in design and safety cases
  – Spent Fuel – includes fuel from new build reactors
  – Plutonium and uranium – product of reprocessing and residue of enrichment
Geological disposal of radioactive waste

• ‘Nuclear nation’ since the late 1940s
• Wastes from power stations, medicine, industry, research and defence
• Radioactivity in wastes decays over variable timescales – some wastes will be hazardous for many 1,000s of years
• Geological disposal is the internationally adopted solution for the long-term management of HAW
• GDF to be available in 2040’s
• Safe, interim storage up to 100 years
• Scottish Govt. policy is for near-site, near-surface, rather than geological disposal
Disposability Assessment and records

• The problem:
  – Regulator-driven requirement to improve safety for historic (legacy) wastes
  – Operational wastes still being produced
  – GDF not available for decades
• What should be done?
  – Package waste for disposal as soon as appropriate
  – Retrieval and treatment requires significant investment
• Manage risks to future management and disposal of packaged wastes
  – Waste package not maintained in suitable condition
  – Loss of data and information (or inability to access)
• The solutions to identified risks
  – Disposability Assessment and associated endorsement
  – Waste package records and associated assurance/knowledge management activities, managed through NDA Information Governance Programme (IGP) arrangements
Purpose of Waste Package Records

• Waste Package Record
  – Collated and structured data and information relating to a waste package, fulfilling requirements for long-term management and disposal, as defined by RWM

• Data and information required to demonstrate:
  – Compliance with Transport Regulations to allow consignment
  – Compliance with the Waste Acceptance Criteria (WAC) for a GDF (or other facility)
  – General confidence in the properties and performance of waste packages
  – Potentially enable alternative waste management strategies
  – ‘Information-informed’ design and safety case development for GDF

• Underpin confidence in the quality/veracity of data and information, and assumed properties and performance
  – Distinguish from ‘contemporaneous’ operations; recognise the ‘time gap’ for a GDF
  – Engagement and auditing of operations must be done in advance
Structure of Waste Package Records

A - Underpinning and Justification
- A1 Background, nature and origin of the waste
- A2 Waste package development
- A3 Container development
- A4 Data and information recording system
- A5 Storage, monitoring and inspection
- A6 Management system arrangements, including Quality Plan

B - Specification
- B1 Disposability Record Specification
- B2 Waste Product Specification
- B3 Criticality Compliance Assurance Documentation
- B4 Transport package design

C - Compliance
- C1 Waste package identifier
- C2 Specification and compliance
- C3 Container compliance
- C4 Waste compliance
- C5 Processing compliance
- C6 Waste package compliance
- C7 Waste package management
- C8 Resolution of non-compliance
- C9 Other package-scale records

Letter of Compliance Submission and RWM Assessment

Packaging Operations
Records Retention and Management

- Records collated by waste packagers
- Structure and completeness tested by RWM (assessment and approval)
- Ultimately expect to transfer to NDAAL Nucleus – arrangements under development
- Practical distinction between ‘electronic’ and ‘digital’ records
  - Electronic = data and information, including narrative, held as pdf-type scans
  - Digital = sub-set of data required in accessible/manipulable ‘numerical’ format
- Principal challenges
  - Transfer of responsibility to archive vs. continued ownership by licensee
  - Prioritisation of collation and structuring vs. immediate (limited) demands for access
  - Tension between delivery/completion and necessary conservatism in scope
  - Extraction of ‘digital data’ from diverse range of sources
- Need to bring together end-user (RWM) and delivery (licensees)
Current position and challenge

- Waste packages already exist and expected final total will be 100,000’s of packages
- Challenge not too broad (only 100,000’s packages), but deep (lots of detail)
- Data and information generated over past 50+ years and continuing for next 150+ years
- Data and information held in diverse and often historic formats
  - Narrative documents, including ‘buried’ data and information
  - Hand-completed forms (some 30-40 years old)
  - Printed forms from diverse electronic systems
  - Retained data held in aging, extensive and diverse electronic systems
  - No consistency in data formatting, units, style etc.
  - May be physical dispersed
- Seeking opportunities to simplify and/or use alternative arrangements, and to adopt better practice for future operations
Drivers for ‘semi-active’ records

• Continued interim storage and Asset Management
  – Environmental monitoring
• Monitoring and inspection of packages during interim storage
  – Identified individual waste packages (surrogates)
  – Test samples, dummy packages
• Management of non-conforming packages
  – Ongoing monitoring
  – Repair and remediation of damaged/unacceptable waste packages
• Regulatory changes and additional information demands
  – Transport regulations (radioactive and Carriage of Dangerous Goods)
  – GDF design and safety case evolution
  – Evolution of digital platforms and information exchange mechanisms
  – Confirmation of waste acceptance requirements
• Completion of interim products and/or final packaging (eg spent fuel)
Waste package storage (Magnox)
Challenges for ‘semi-active’ records

• Insertion of additional data and information arising from continuing activities
  – No direct correspondence to waste packages (often linked to stores)
  – Arrangements at NDAAL Nucleus for package records not yet in place
  – Proposal is to establish separate, ‘live’ records for the continuing activities such as monitoring and inspection
  – Use metadata and systems in NDAAL Nucleus to provide links
• Parallel management of ‘electronic’ and ‘digital’ systems
  – Possible future changes to scope of ‘digital’ records requirements
• Future changes in systems
• ‘Interim products’
  – partially completed packages (not yet disposable)
  – extensive further action expected, with consequent records creation (50/50 split)
Summary

• Collation of waste package records is an exercise in ‘treasure-hunting’
• Records are essential for the future management of waste (packages)…
• …but are not the glamorous end of the business!

• Waste package records have to be designed for use in several decades time, with limited insight into the requirements that will need to be fulfilled
• Many records will include extensive historic data and information not designed for that purpose, across multiple platforms, formats, styles etc
• Confidence in quality must be built-in; it cannot be gained through direct interaction at the time records are to be used
• Data and information will continue to be generated after package production, driven by the ‘time gap’ and, for interim products, by delayed completion