

UKAEA's Decommissioning & Liabilities Management Tools

Val Drake, Decommissioning Project Support

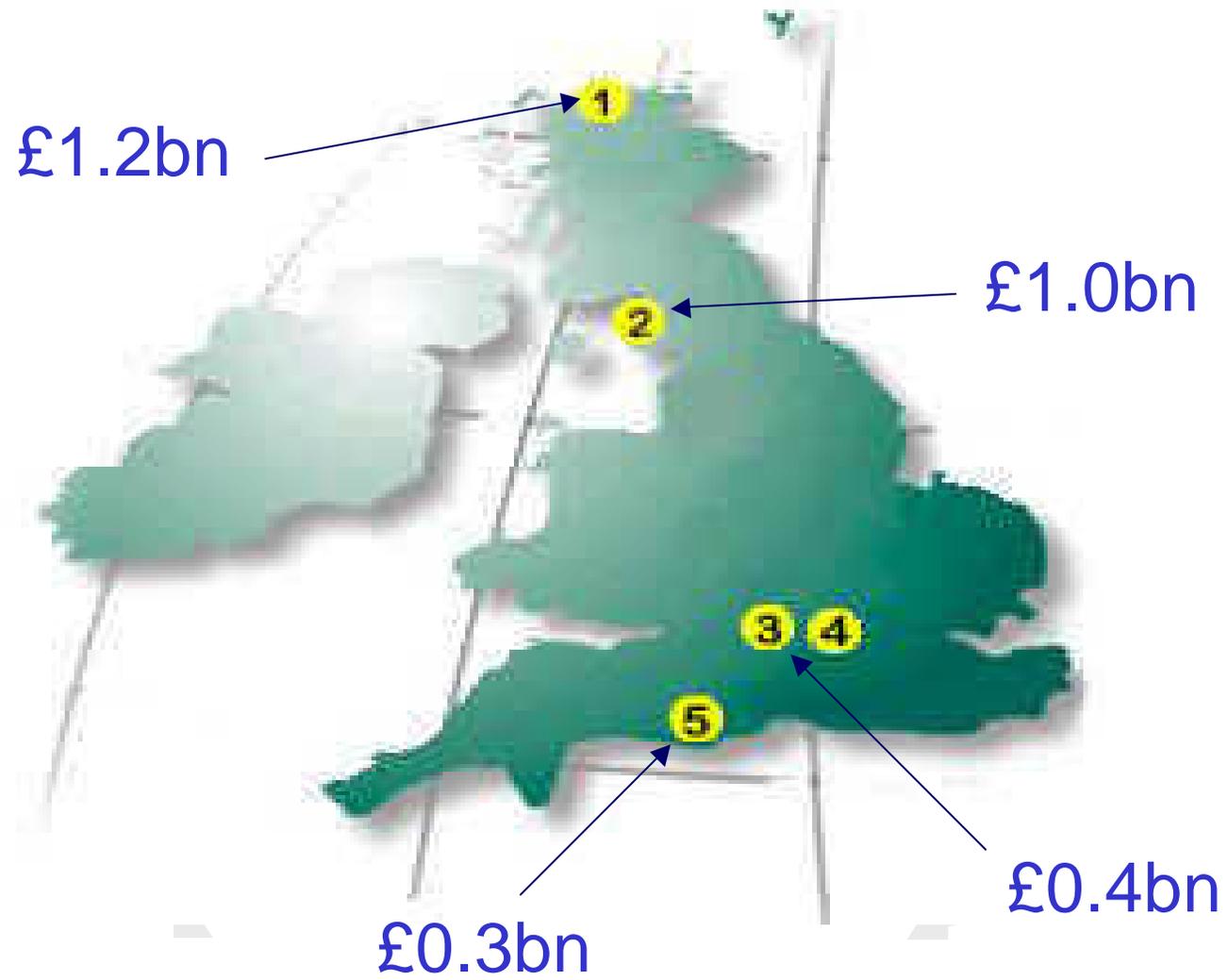
Technical Services Group

Planning, Performance & Engineering Division

United Kingdom Atomic Energy Authority

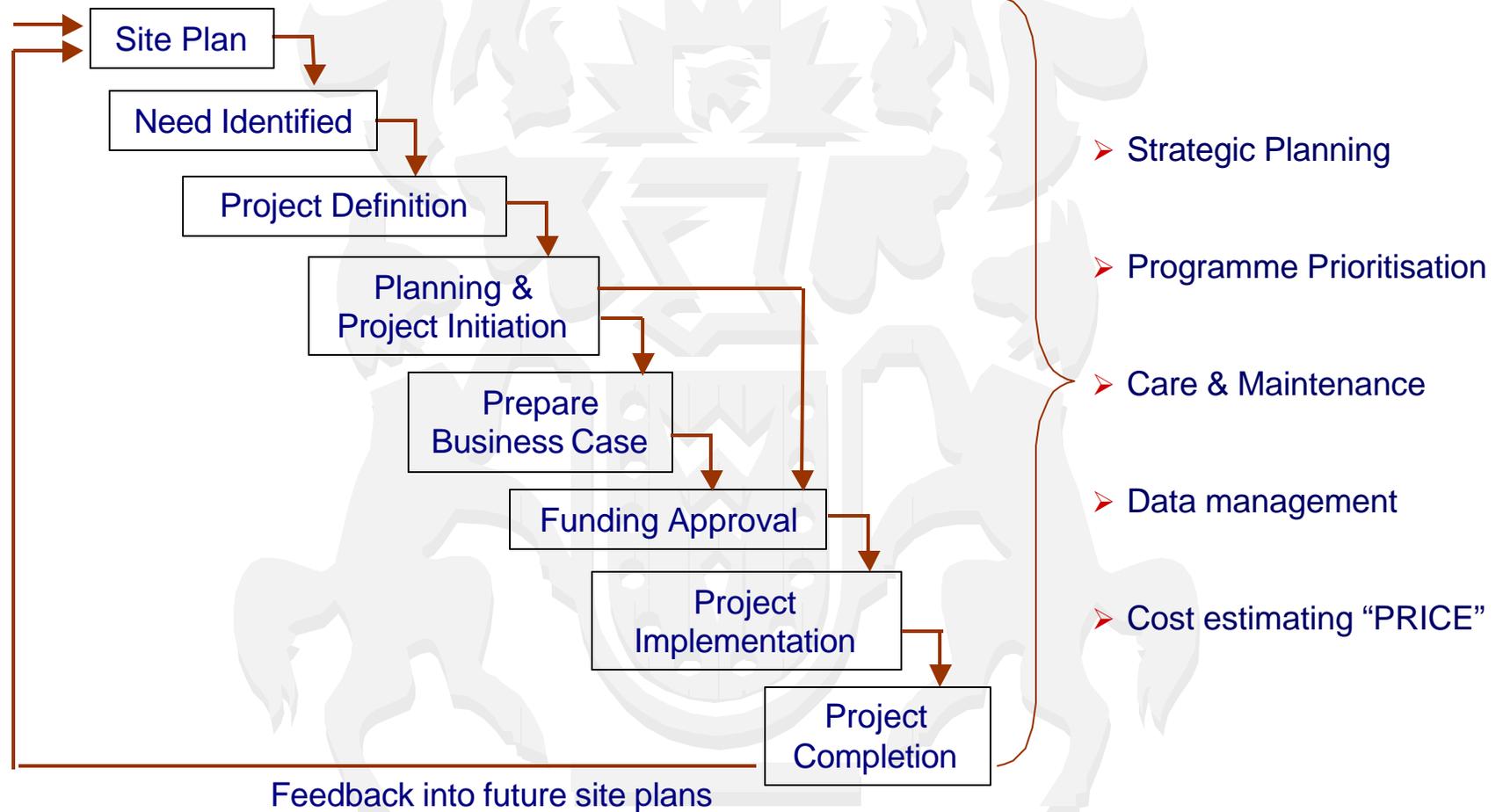
Harwell, Oxfordshire, OX11 0RA

Distribution and Magnitude of Decommissioning Costs



Planning needs during the Programme and Project Life Cycle

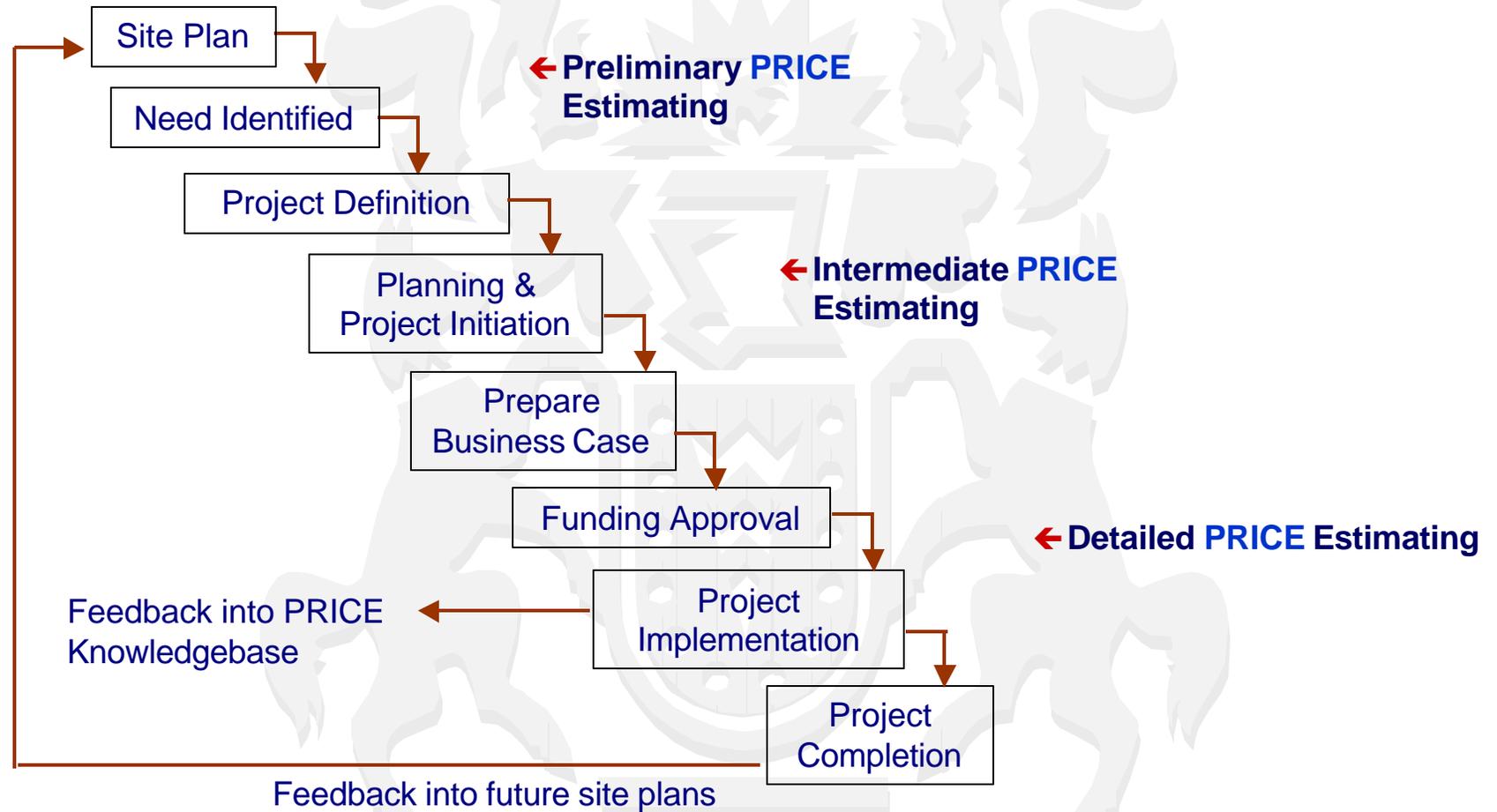
Corporate Plan, Policies and Business Needs



The Tools

- A parametric cost estimating database - “PRICE”
- A care and maintenance guidance document and methodology- “AECIP 1085”
- A programme prioritisation methodology
- Strategic planning system software - “SPS”
- Data management - IMAGES

Fit For Purpose



The Estimating System

Parametric Data
“Knowledgebase”

Project Specific
Information

Component Manpower
requirements “Norms”
Labour Rates “Unit Rate”

Facility Information
WBS
Components and their
Quantities

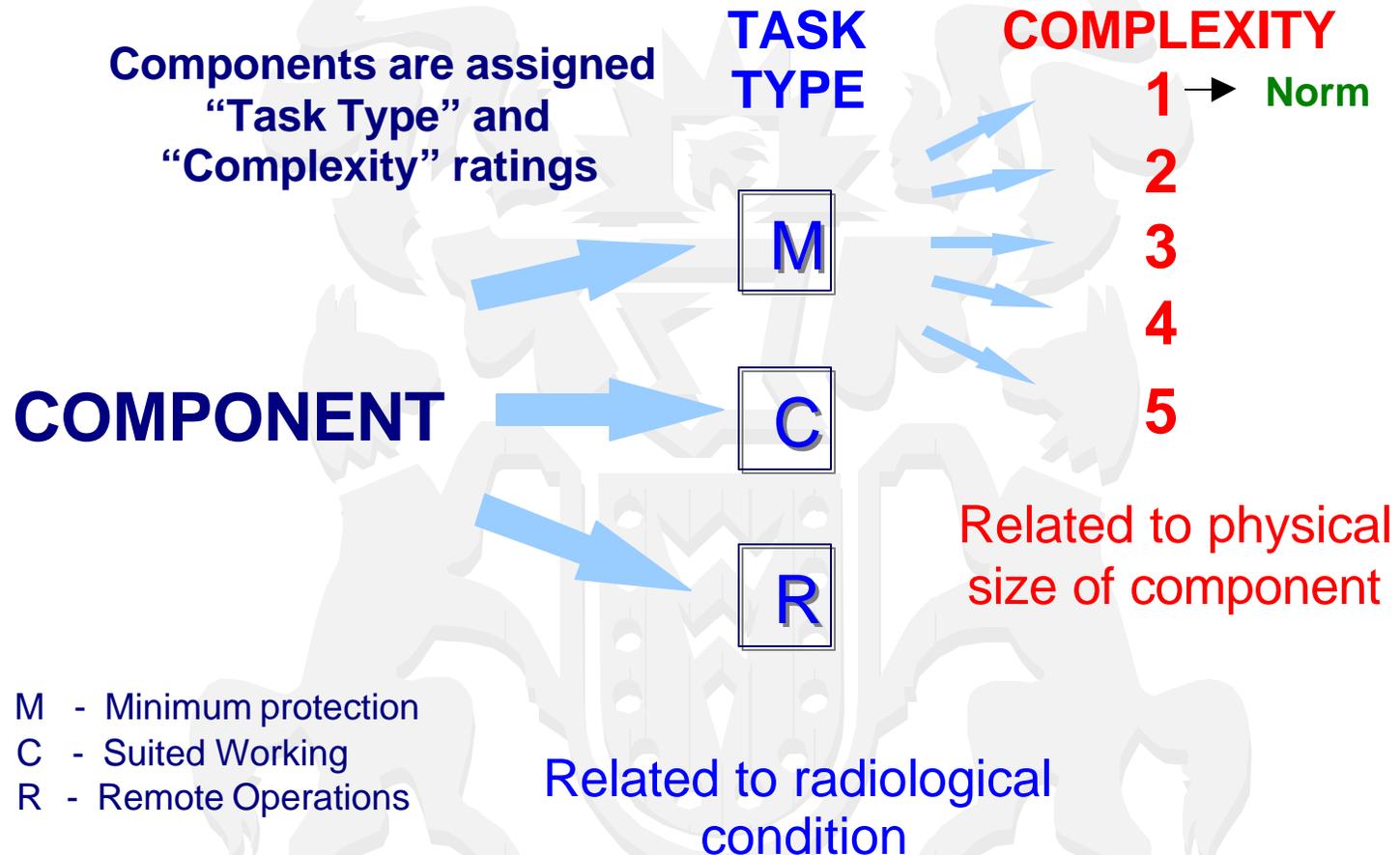


$$\text{£} = \text{Norm} \times \text{Rate} \times Q$$

Estimate
Reports



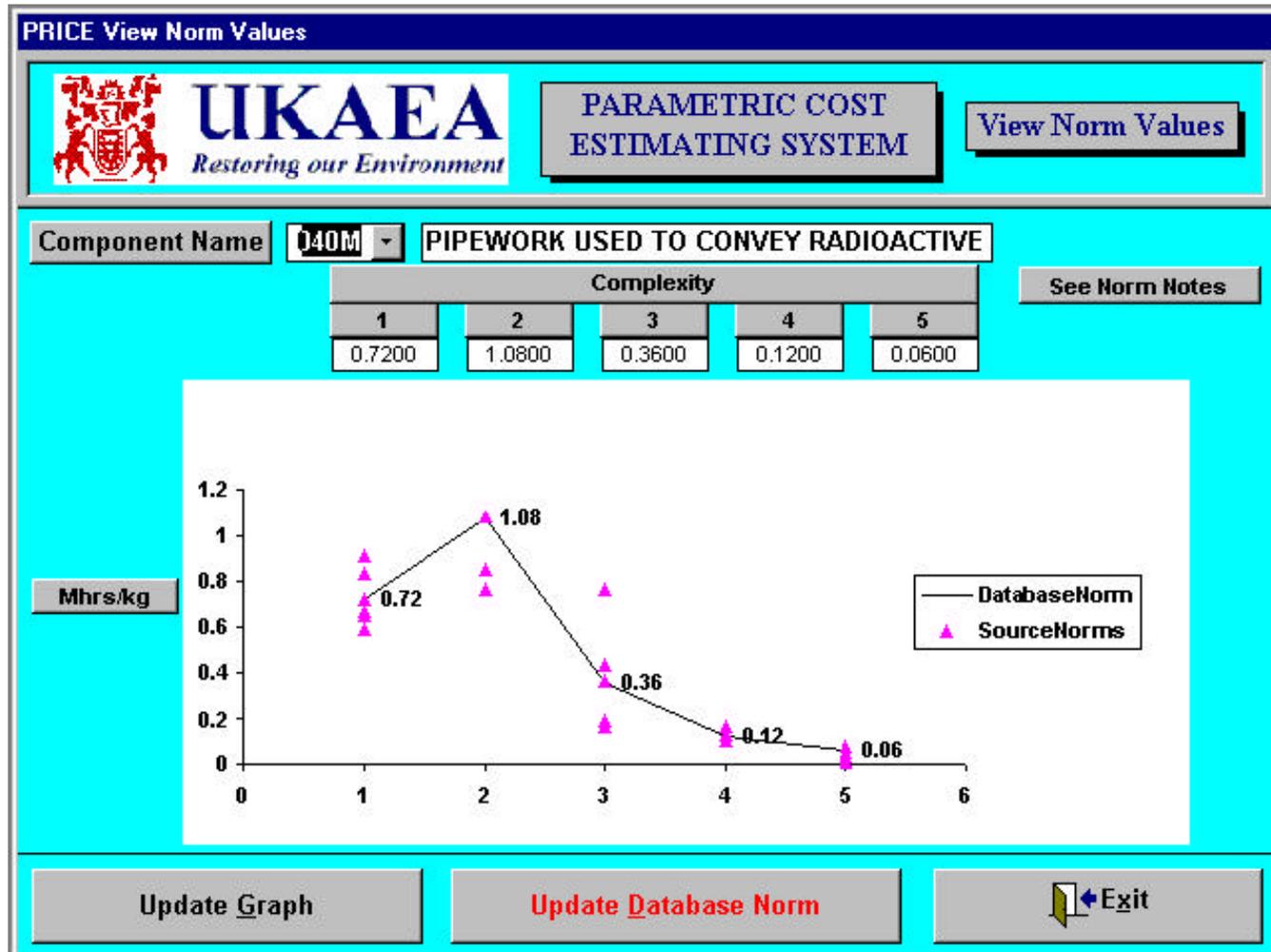
Component Codes & Task Descriptions



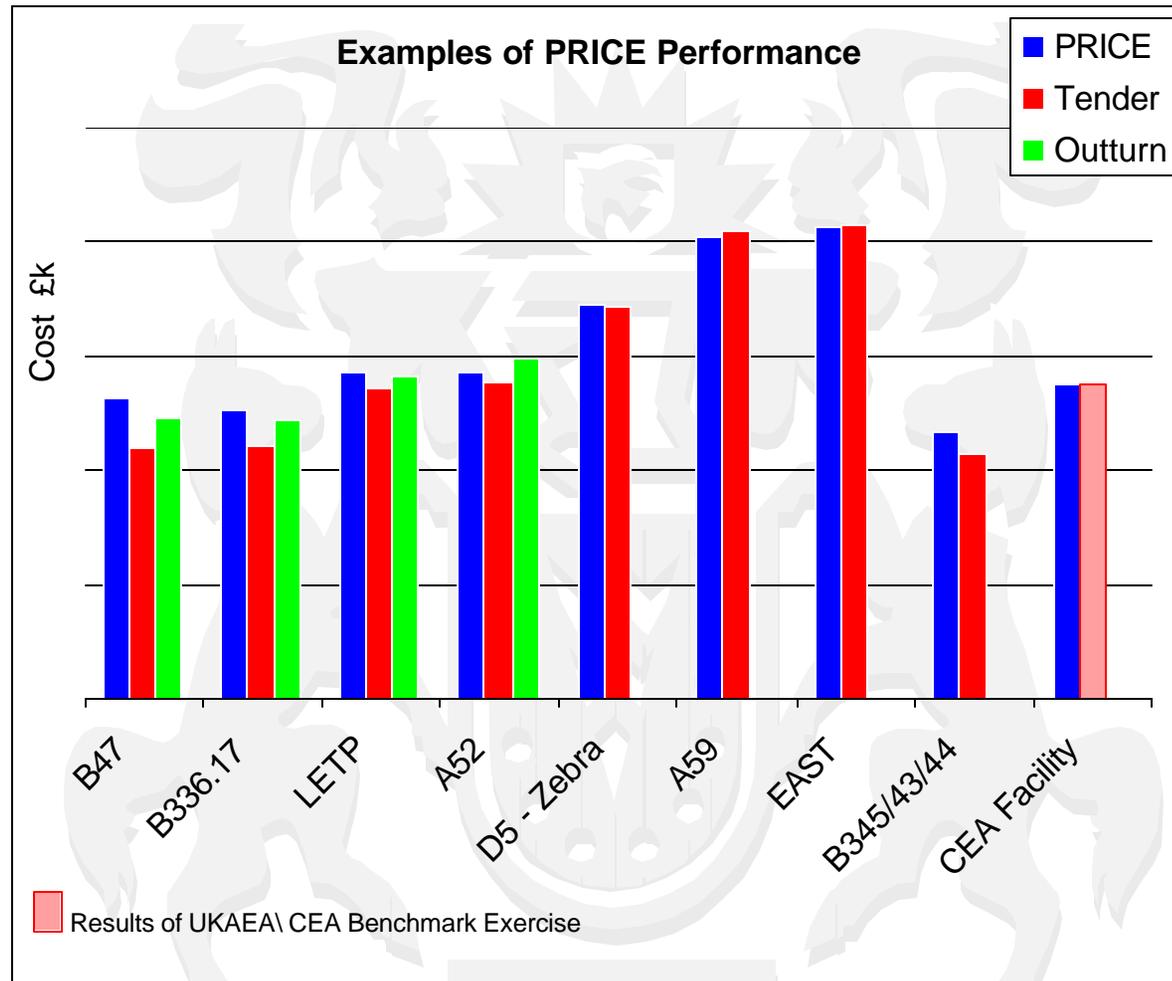
- M - Minimum protection
- C - Suited Working
- R - Remote Operations



Derivation of Norm Values



Cost Comparison of PRICE as an Estimating Tool



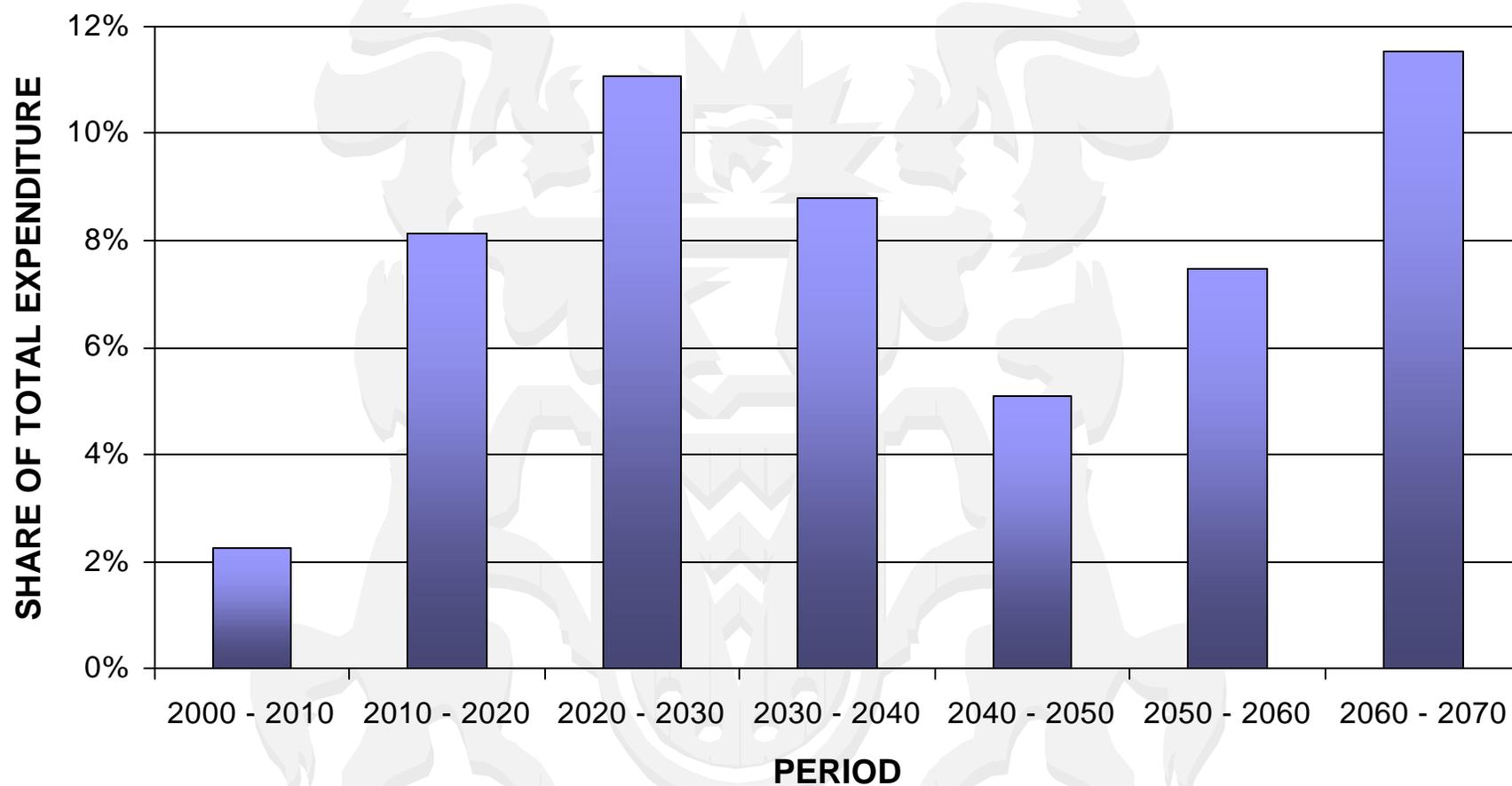
Benchmarking

Sharing best practice

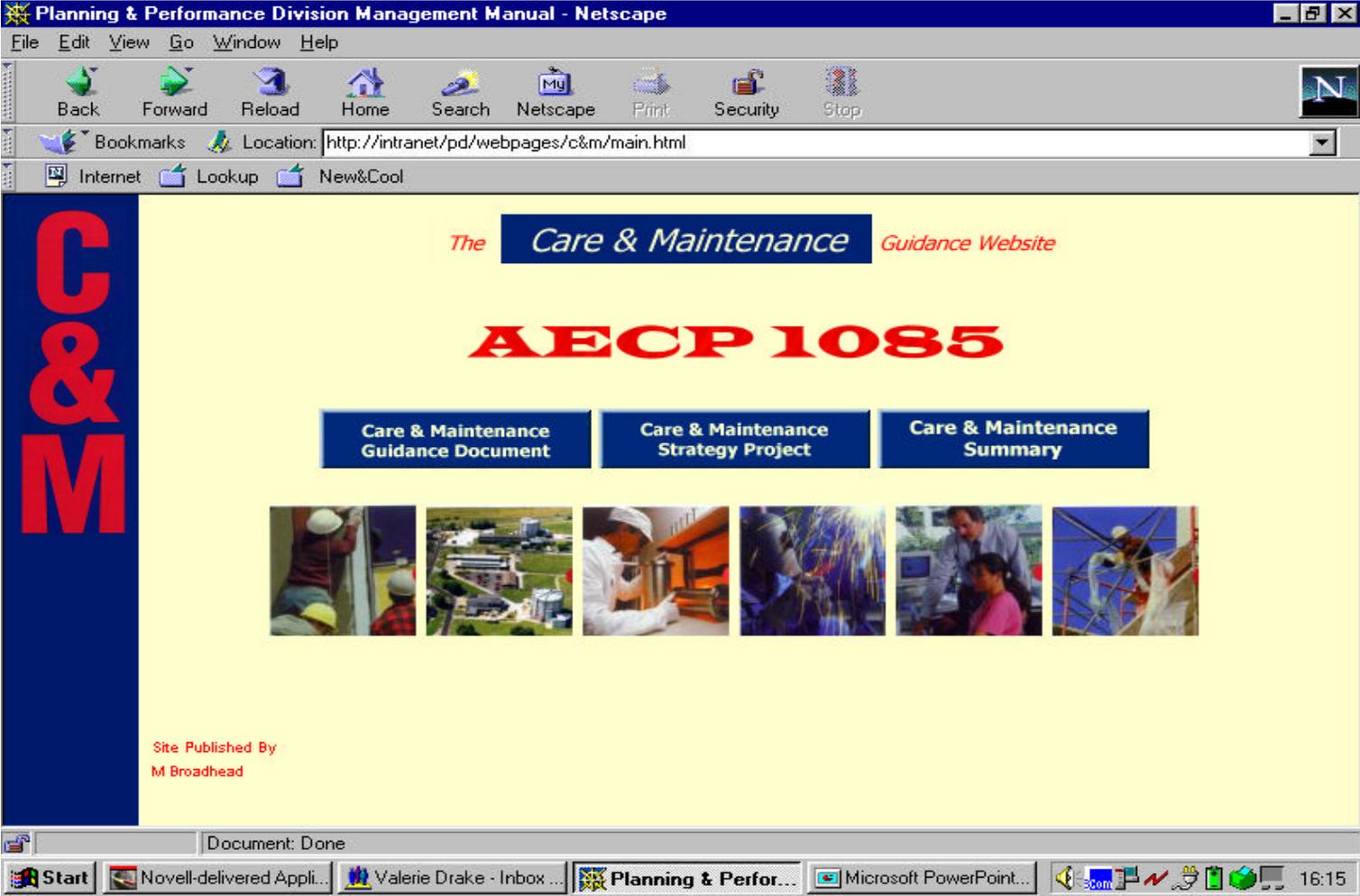
- CEA
- BNFL & MoD
- EU Contractors
- AECL



SPEND ON CARE & MAINTENANCE



Code of Practise



Care & Maintenance Electronic Notebook

CARMEN - Care and Maintenance Electronic Notebook -  **UKAEA**
Restoring our Environment

Data: Winfrith B55 Workshop Version 2.3e

Site: Winfrith

Facility: B 55 Treated ILW Radwaste Store

Buttons: New Facility, Delete Facility

Scenario: Pre-operational C&M

Check for missing answers when moving between forms

Buttons: New, Freeze, Copy, Delete

Table of Contents:

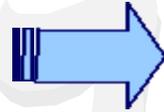
- B1.1 Option Definition
- B1.2 Definition of Baseline
- B1.3 Options for Reduction of Hazards in Facility
- B1.4 Review of Systems
- B2.1 Radiation and Contamination Control
- B2.2 Radiological Monitoring System
- B2.3 Fire Monitoring and Risk Reduction
- B2.4 Building Structural Condition Monitoring
- B2.5 Temperature Control
- B2.6 Humidity Control
- B3.1 EMIT Activities on Priority Systems
- B3.2 Assessment of EMIT Reduction Measures
- B3.3 Preferred Option for Each Priority System
- B3.4 Preferred Options Summary
- B4.1 Acceptability of Potential Waste Minimisation Options
- B4.2 Assessment of Waste Minimisation Options
- B5.1 Skills that may be required
- B5.2 The Procurement of a Care and Maintenance Skill or Service

Buttons: Go To First Selected Section, Preview selected sections, Print selected sections, Print all sections, EXIT DATABASE

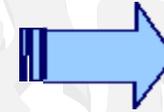


The Process

AECP 1085



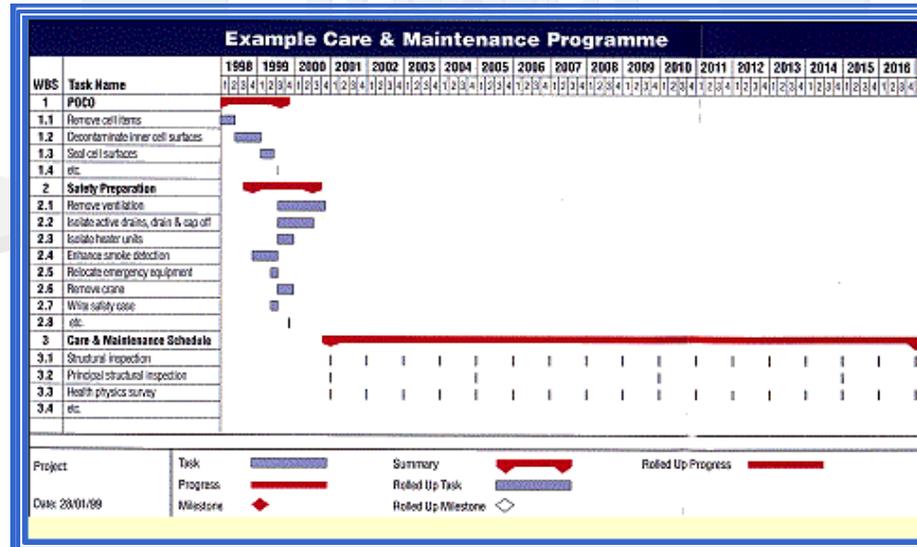
C&M Plan



**Revise
Facility
Safety Case**



Care & Maintenance Programme



Who has the most essential project?



Prioritisation Interview Record

Project Prioritisation Database - [Drivers]

File Reports Help

Print Send to File **Prioritisation Interview Record** Delete Abandon Save

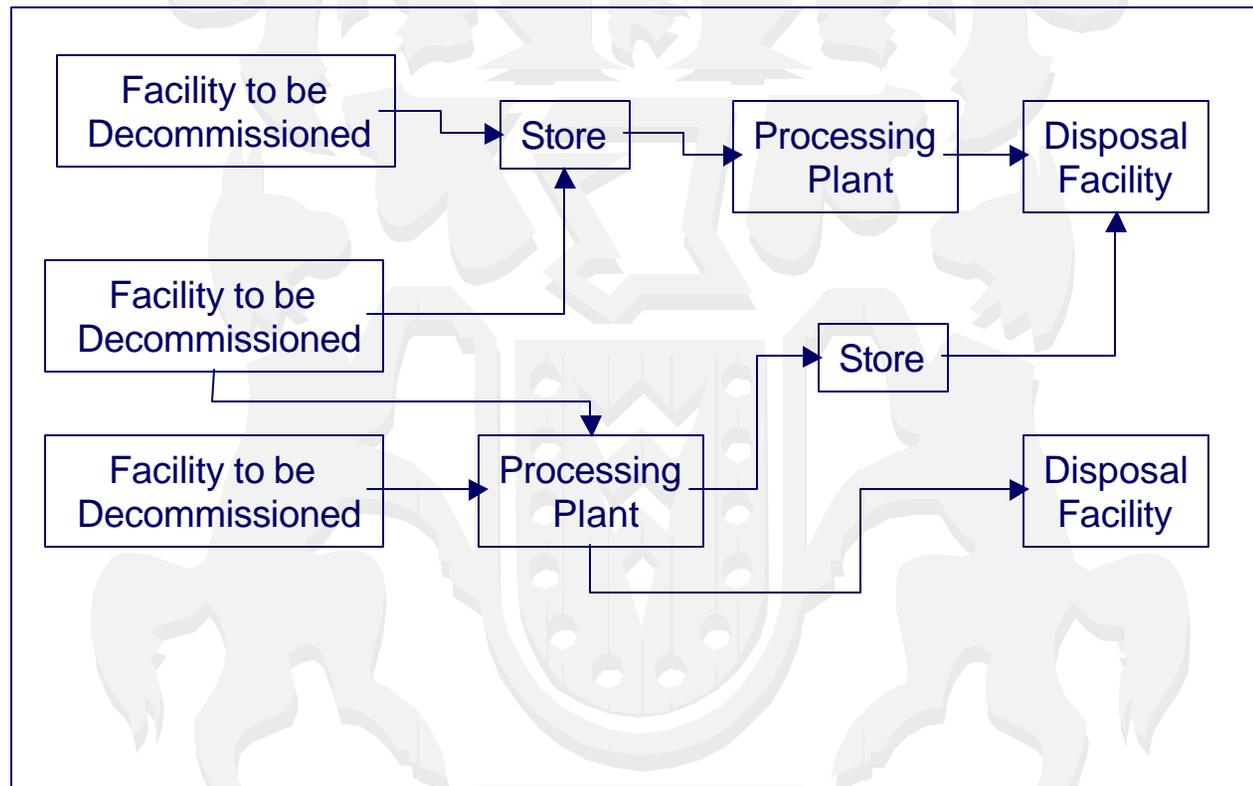
Project Number: Project Title:

Interview Date: Interview Personnel:

Driver	Score	Comments
<input type="text" value="Safety and Security"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Environmental Factors"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Value for Money"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Public Perception"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

PPD Version 2.5

Schematic Waste Flow Diagram



Process Operations Input Screen

Processing Plant Operations

Facility LLW Processing Plant Site Site MV Year Default: 1998/99

Process Plant Data

Earliest Start of Operations: JAN 2005 Overall Duration (yrs): 25 Maximum Throughput (m3/yr): 1000 Waste or Fuel: Waste Total Fixed Cost: 180.00

Process Input Data

Process: LLW Processing Definitive List No.: 1002 Start of Operations: JAN 2005 Duration (yrs): 25 Throughput (m3/yr): 1000

Input Category: LLW Waste Category: LLW

Fixed Operating Cost: 180.00 £k per year Variable Processing Cost: 1.20 £k per m3

Adjustment Factor: 1.00 Secondary Destination: Total: 25 yrs

Process Output Data

Waste/Fuel Category	Conditioning/Conversion Factor	Destination for Waste/Fuel	Priority
LLW W	1.00	LLW Repository	

Operations Comments

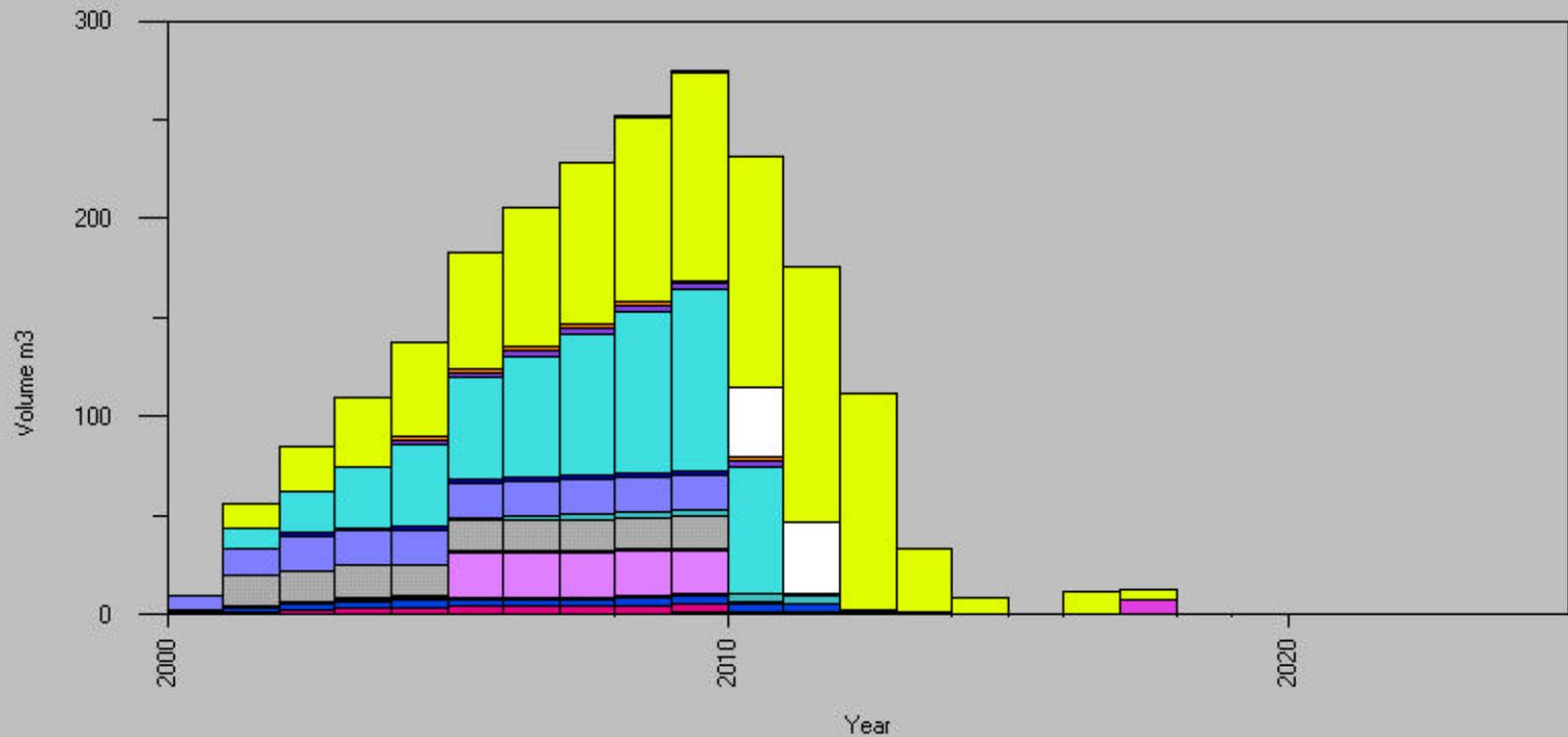
Operational Arisings New Process Delete Process

General Linkage A Cost B Cost Risk Factors Arisings Constr

Ok Exit

SPS Modelling of Waste Store Utilisation

B462.27 (NCS ILW [early]) Store Cumulative Waste Quantities



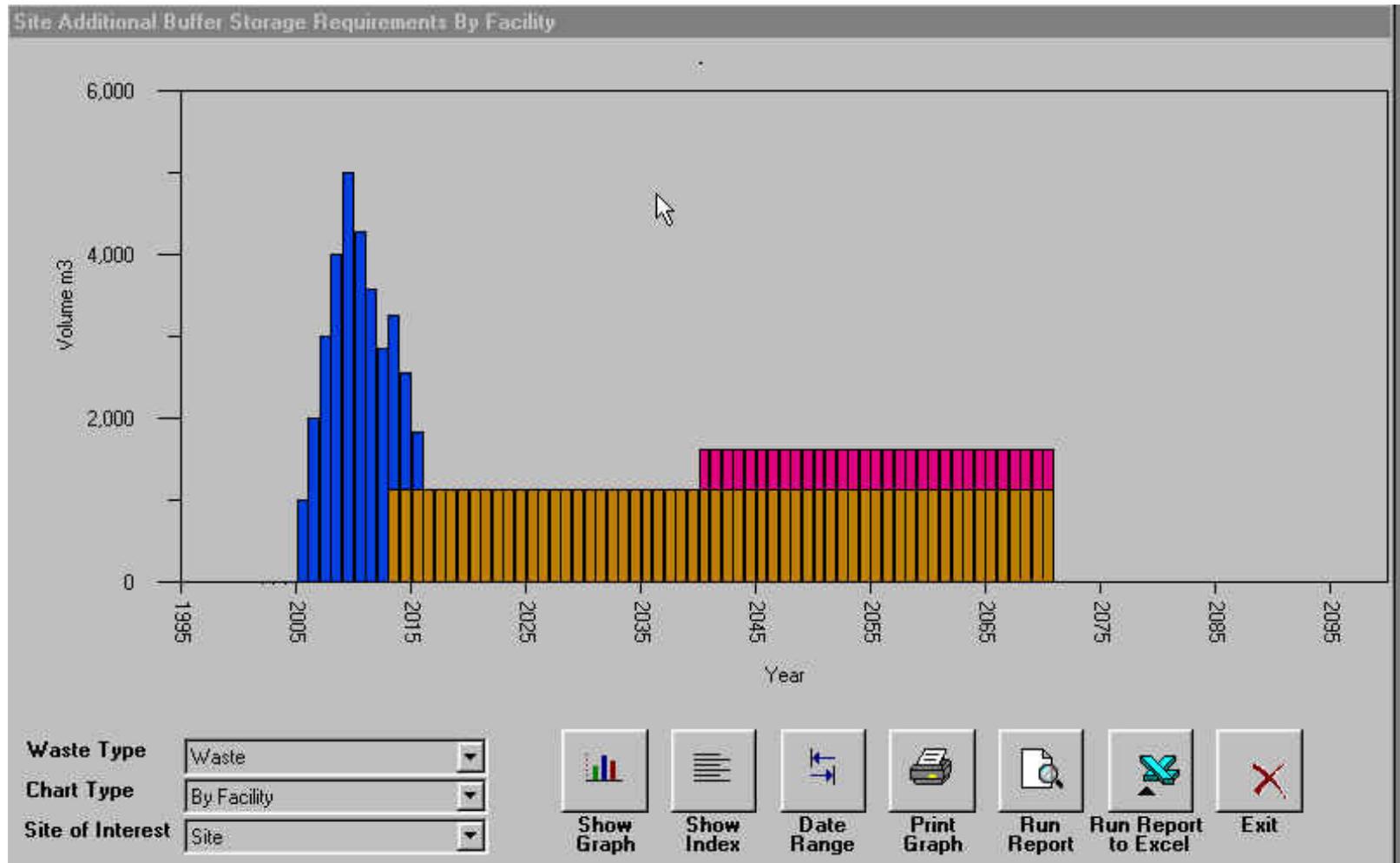
Facility of Interest

Maximum Capacity 1000 m3

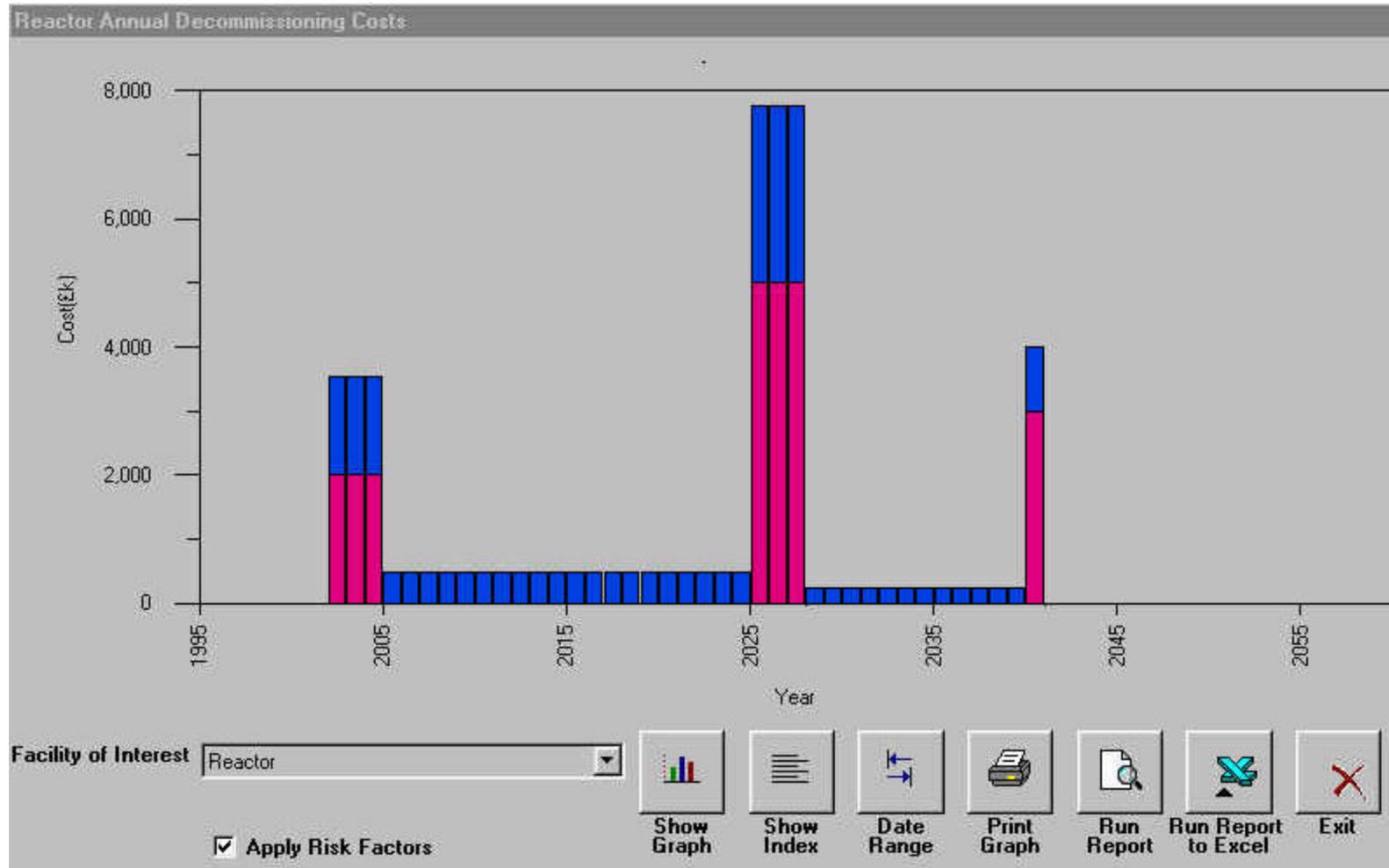
Control panel with the following buttons:

- Show Graph
- Show Index
- Date Range
- Print Graph
- Run Report
- Exit

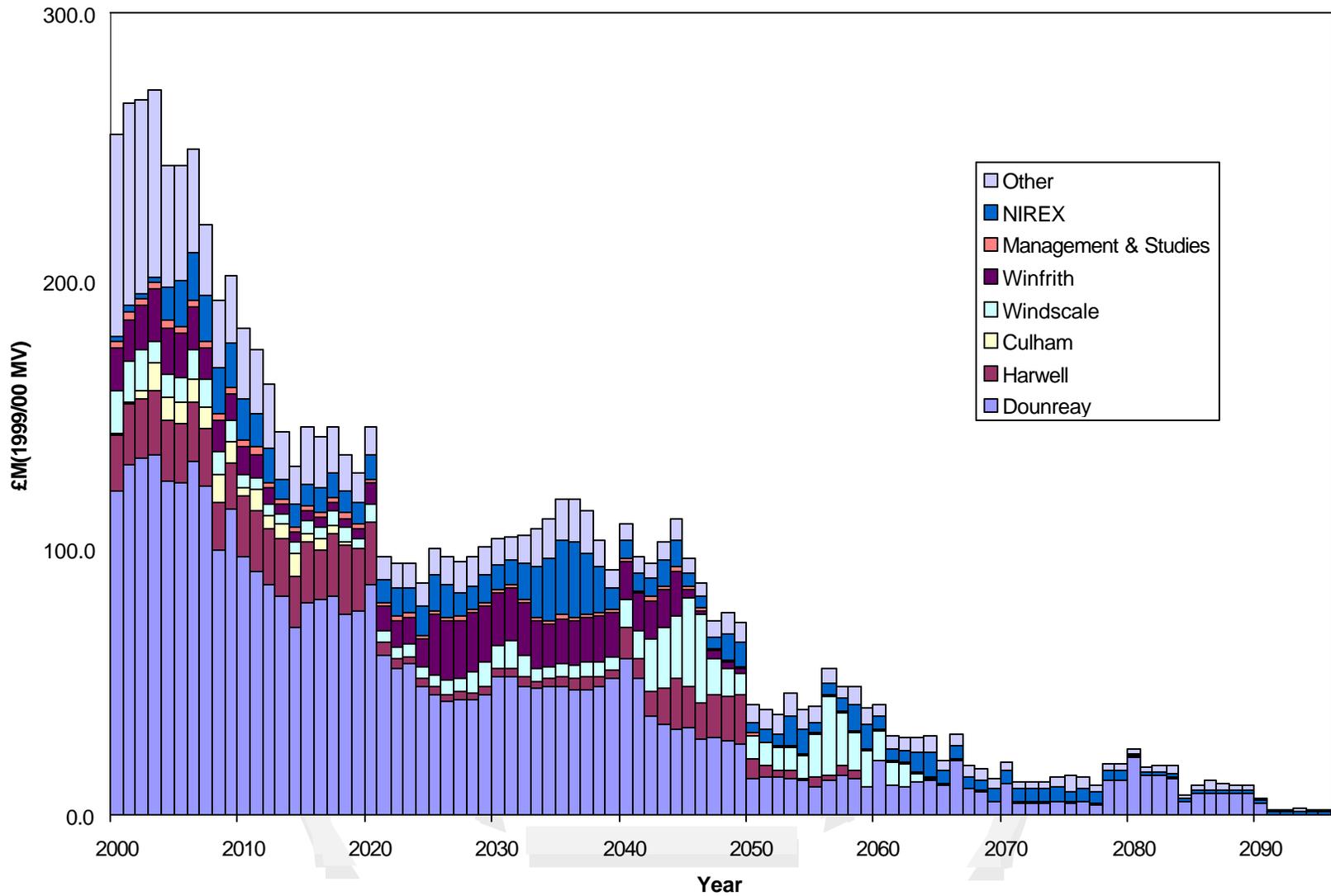
Buffer Storage Report



Decommissioning Cost Output Screen



Total UKAEA Liabilities

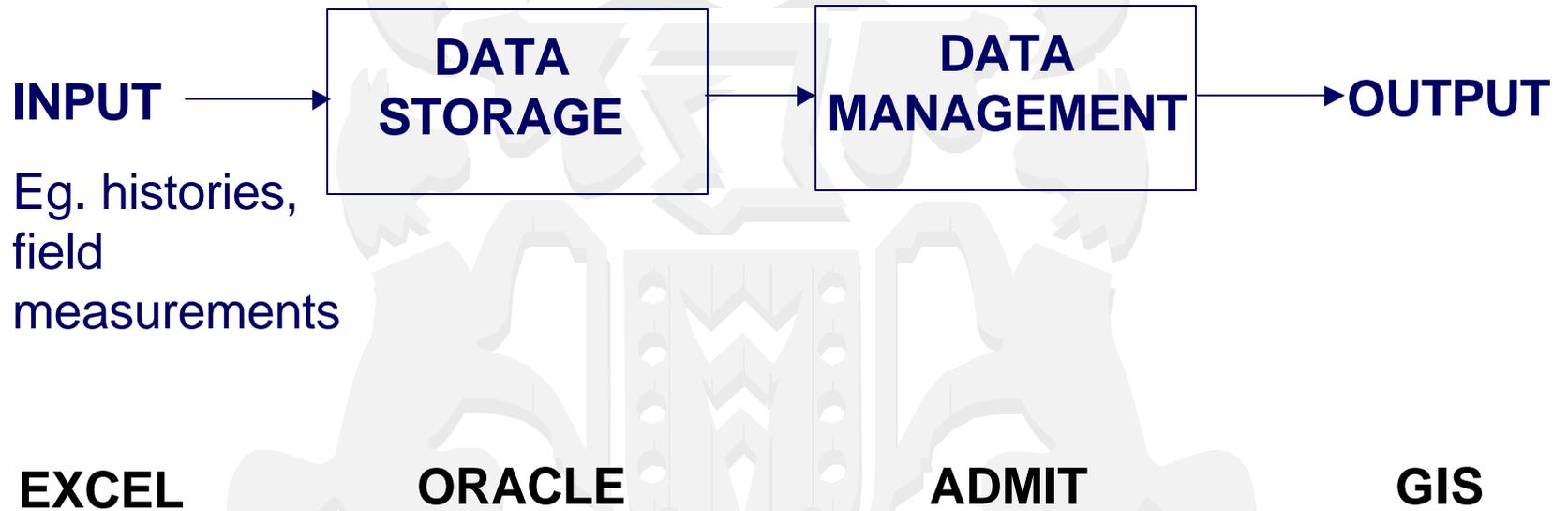


Uses of SPS

- Option studies for UKAEA sites
 - Loss of ILW repository
 - Earlier decommissioning of sites
 - Options for dealing with wastes and fuels
- Calculation of UKAEA's nuclear liabilities
- Modelling of Chernobyl and Rovno sites
- Modelling of AECL's Whiteshell site
- Modelling of NECSA's Pelindaba site



Images

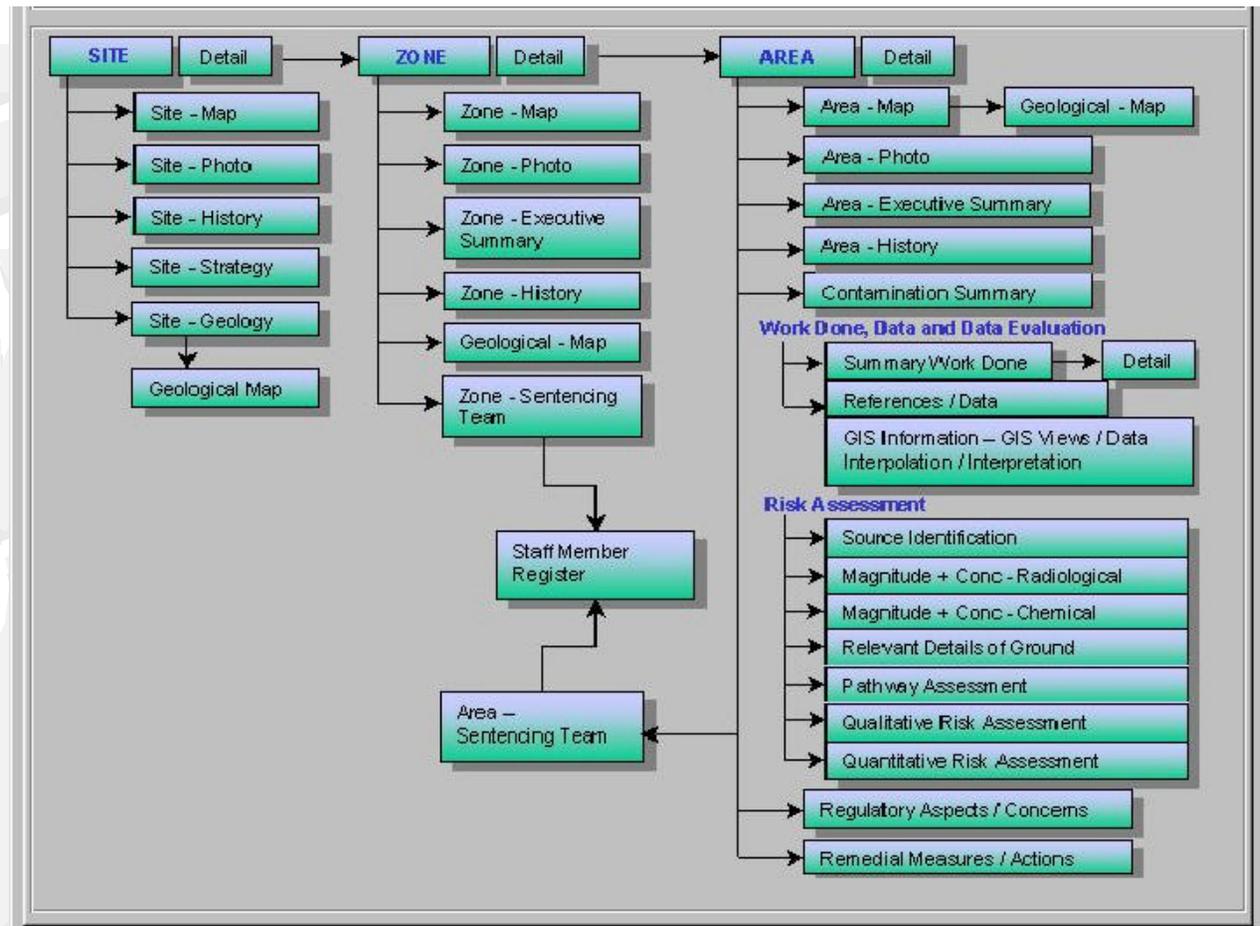


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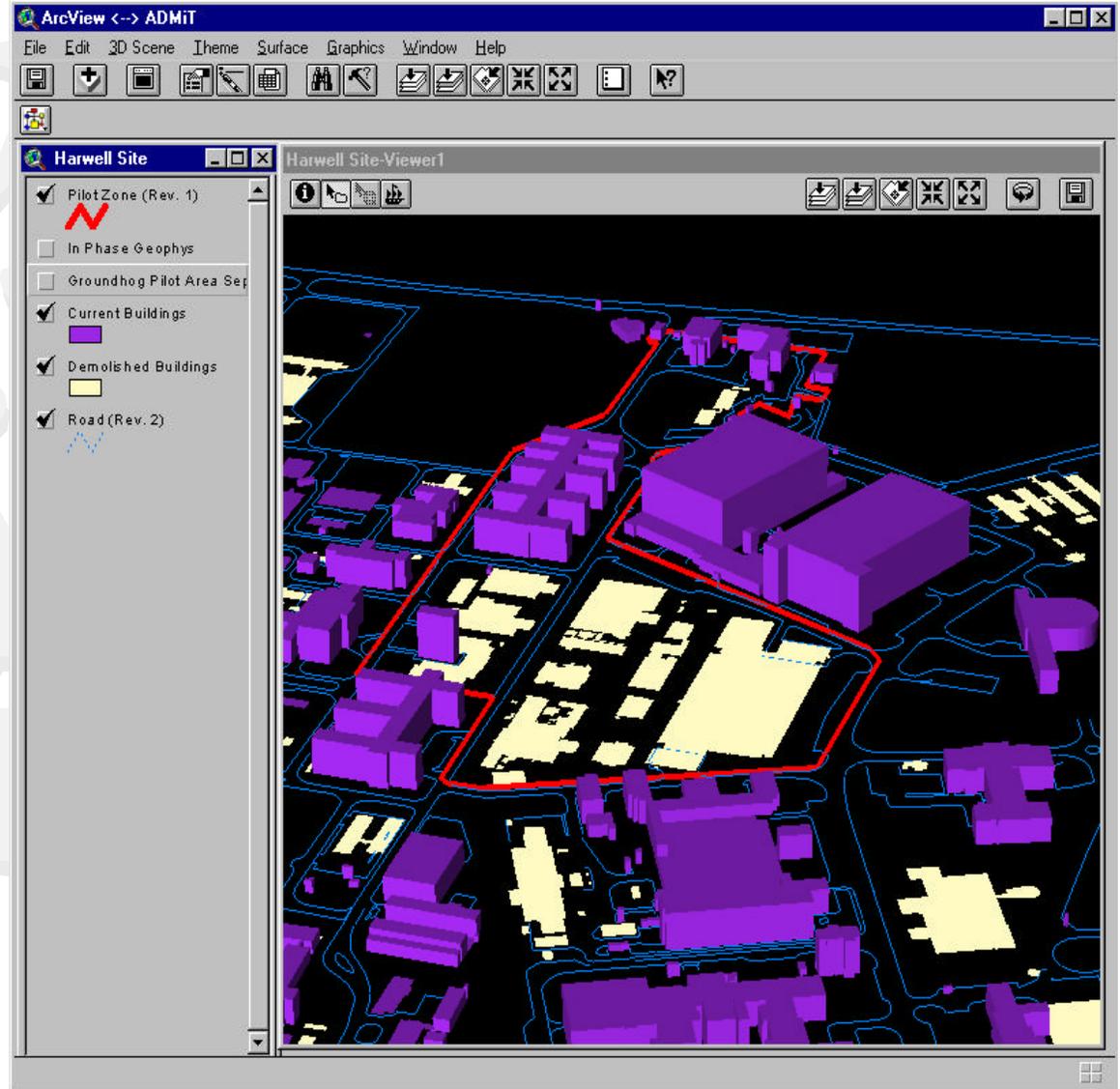
Data Management - Land Quality

- Manages information on areas of contaminated land
- Incorporates Risk Based Assessment
- Links to other information in database
- Includes a links to GIS



Example Area

- 7 ha area undergoing release from NII control
- Land must be fully assessed
- Records must be auditable



Building Histories

Documentary and
Photographic
evidence
collected to
indicate likelihood
of contamination

Chemical and
Radioactive
history recorded

The screenshot shows a software window titled "Search All Building Data" with a menu bar (File, Search) and a toolbar. The main area is divided into several tabs: "Building Details", "Condition Details", "Construction / Fabric", "Additional", "Building Usage Summary", "Building Usage History" (selected), "Associated Refs and Documents", and "Table View".

Under "Building Usage History", the following information is displayed:

- Building No: H35
- Record Owner: MALCOLMCROOK
- Building Name: Uranium and Graphite Machine Workshop
- Permanent:
- Building Demolished?
- Current ATO Holder: M Hills, UKAEA
- Date Demolished: 1994/95
- Building Status: Demolished

The "Present Usage" section contains the following text:

Demolished 1994/95.
All associated tanks and drains were removed from the site.
The building consisted of masonry cavity wall construction with a mixture of pre-cast concrete and structural steel elements with both flat and pitched roofs.
H35 underwent various structural changes during its lifetime as its purpose changed with major refurbishment being carried out in the 1960's. As a consequence of age and varied use the building underwent several internal changes by way of

The "Usage 1946 to Present" section contains the following text:

In 1946 the former RAF workshops of H35 were put into use for machining graphite and later on Uranium to high precision.
On 1/10/52 work began to construct an extension to the Uranium Shop. The work was completed by 1/4/53 and the extension was given the designation H35.8. A new delay tank system was also added in 1953 designated H35.9.
Between 1950 and 1960 H35 housed a carbon shop under the control of Engineering Division and a casting shop managed by Metallurgy

The "Usage from 1935 to 1946" section contains the following text:

H35 was constructed in 1935 as the main workshops for RAF Harwell. The workshops would have been used for repair of all the major mechanical systems associated with an RAF base and in particular engines.

The "Usage Pre 1935" section contains the following text:

Available records show that the area of land destined to become UKAEA Harwell was used mainly for sheep farming due to the chalky soil which made it less suitable for the fruit farming that was so prevalent in the local area. From the end of the First World War (1918) the Air Ministry had established a landing ground to the south of where the Hangars are located that was used mostly by RAF Abingdon for practising night landings. The landing ground consisted of a basic grass runway that continued to be used up until the site was purchased for the RAF in 1935.

On the right side of the window, there is a vertical toolbar with buttons: Filter, Search, Where Used, New, Edit, Copy Like, Validate, Report, Excel Report, Select, Close, Find Docs, Find Building, View in GIS, and Open in GIS.

At the bottom of the window, there is a status bar showing "Record 1 - Search by Example" and "The ADMIT ESK ©esit 1995-2000 - Version 3.4.9.5".

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@ U

Invasive Survey -Template

Boreholes & Trial Pits

Standard EXCEL workbook used to collect invasive survey results

The screenshot shows an Excel spreadsheet titled "Microsoft Excel - Invasive1". The active worksheet is "Invasive Survey Menu Options Ver 2.1a". The spreadsheet content is as follows:

Invasive Survey Menu Options Ver 2.1a	
Select A Worksheet To View ...	
Base Information	Logger Details (name, company etc.) and Borehole Details (elevation, pit width etc.)
Instruments	Instrument Details (probe name and serial no.)
Field Logging	Downhole Logging Data (depth from and to, description, lithocode, comments)
Field Samples	Field Monitoring Measurements (betaGamma cps, betaOnly cps etc.) and Sample Information (sample name, type, method)
Groundwater & Install	Groundwater data (strike time, strike depth, rose to) and Borehole construction (casing depth, depth sealed, pipe id, pipe depth etc.)
Lab Analysis Data	Lab Analysis Data (field and lab sample name, date received etc.) and Analysis Data (radiological, organic and inorganic)
Analysis Method	Analysis Methods (method code, description, reference, comments)
Preservation Method	Preservation Methods (method code, description, reference, comments)

Below the table, there is a section titled "Lab Analysis Data ... From the Lists Provided, Select an Analysis Contaminant and Unit Type to Add". This section contains two input fields:

- Analysis:** Americium-241 Alpha Spec
- Analysis Unit:** Bq/kg

An "ADD.. Lab Analysis Data" button is located to the right of the input fields. The spreadsheet also shows a menu bar at the bottom with options: Menu, Base Info, Instruments, Field Logging, Groundwater and Install, Field Samples, Lab.



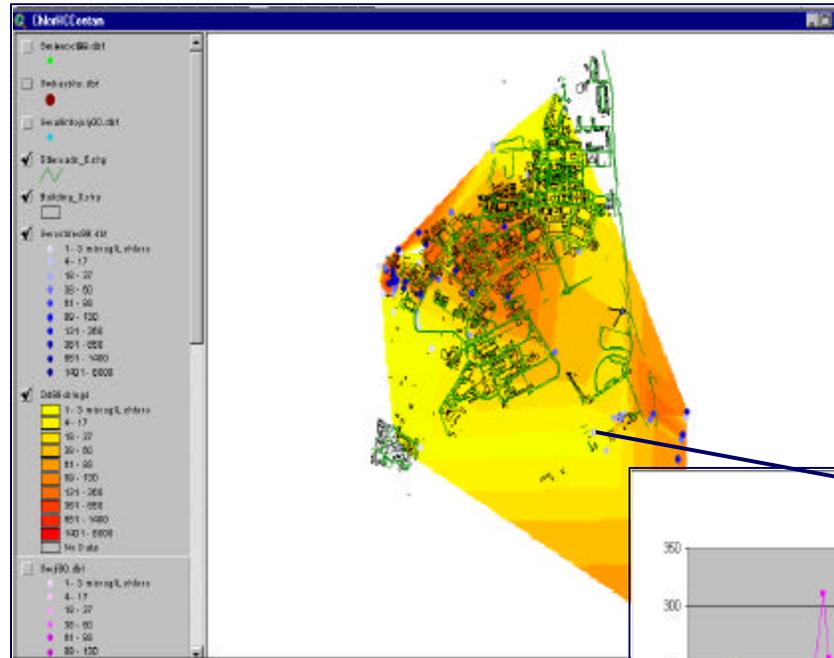
Invasive Survey -Data Capture

Workbooks completed in a consistent manner by contractor

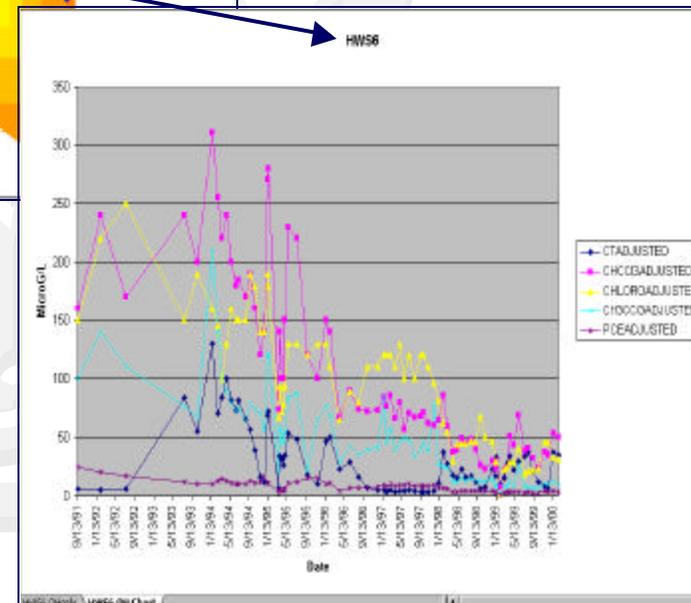
Constraints placed on data format

Main Menu (Return To)									
Lab Analysis									
Required Data				Field Data		Lab Analysis			
Project Reference	Trial Pit / Borehole Number	Sample Information		Depth Interval Referenced from the Surface		Sample Type (S, W, R, FPL)	Date Dispatched to Lab	Date Received by Lab	Date Analysed
		Field Sample Name	Lab Sample Name	Depth from (m)	Depth to (m)				
PZ	BH1	PZ/BH1/0-0.2/210900	IR432	0	0.2	Soil	20-Sep-00	20-Sep-00	
PZ	BH1	PZ/BH1/0.2-1.0/210900	IR433	0.2	1	Soil	20-Sep-00	20-Sep-00	
PZ	BH1	PZ/BH1/1.0-3.0/210900	IR434	1	3	Soil	20-Sep-00	20-Sep-00	
PZ	BH2	PZ/BH2/0-0.2/181000	IR847	0	0.2	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH2	PZ/BH2/0.2-1.0/181000	IR848	0.2	1	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH2	PZ/BH2/1.0-2.2/181000	IR849	1	2.2	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH3	PZ/BH3/0-0.2/210900	IR435	0	0.2	Soil	20-Sep-00	20-Sep-00	
PZ	BH3	PZ/BH3/0.2-1.0/210900	IR436	0.2	1	Soil	20-Sep-00	20-Sep-00	
PZ	BH3	PZ/BH3/1.0-3.0/210900	IR437	1	3	Soil	20-Sep-00	20-Sep-00	
PZ	BH4	PZ/BH4/0-0.2/181000	IR850	0	0.2	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH4	PZ/BH4/0.2-0.5/181000	IR851	0.2	0.5	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH5	PZ/BH5/0-0.2/210900	IR438	0	0.2	Soil	20-Sep-00	20-Sep-00	
PZ	BH5	PZ/BH5/0.2-1.0/210900	IR439	0.2	1	Soil	20-Sep-00	20-Sep-00	
PZ	BH5	PZ/BH5/1.0-3.0/210900	IR440	1	3	Soil	20-Sep-00	20-Sep-00	
PZ	BH6	PZ/BH6/0-0.2/181000	IR852	0	0.2	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH6	PZ/BH6/0.2-1.0/181000	IR853	0.2	1	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH6	PZ/BH6/1.0-2.2/181000	IR854	1	2.2	Soil	19-Oct-00	19-Oct-00	14-Nov-00
PZ	BH7	PZ/BH7/0-0.2/210900	IR441	0	0.2	Soil	20-Sep-00	20-Sep-00	

Groundwater Data



Variation in concentration of contaminants can be viewed over time.



Conclusions

The key advantages of a formalised process:

- Systematic approach
- auditable
- Consistency of approach
- Assessments can be readily updated.
- Systems are centrally maintained