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RSRL ANNUAL TECHNICAL REPORT 2011

SUMMARY

This Annual Technical Report provides details of any changes in RSRL’s technical governance and assurance arrangements and any significant in-year changes to the technical baseline and R&D requirements. It includes R&D successes and failures along with estimated annualised costs relating to R&D work for the previous and forthcoming financial year.

This document should be read in conjunction with:

- Technical Management Summary – This sets out RSRL’s technical governance and assurance arrangements as at 31st March 2011.
- Process Wiring Diagrams – These highlight planned technologies and their current maturity
- Research and Development table – This describes how RSRL plans to resolve technical issues underpinning delivery of the Life Time Plan (LTP).

These four documents encompass RSRL’s Technical Baseline and Underpinning Research and Development (TBuRD) requirements as required in NDA Doc No. EGG10 Rev 3 (Feb 2011).

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1 INTRODUCTION

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- Process Wiring Diagrams – This highlights planned technologies and their current maturity
- Research and Development table – This describes how RSRL plans to resolve technical issues underpinning delivery of the Life Time Plan (LTP).

These four documents constitute RSRL's Technical Baseline and Underpinning Research and Development (TBUrd) requirements as needed in NDA Doc No. EGG10 Rev 3 (February 2011).

The RSRL TBUrd is intended to provide transparency of the technologies that underpin the operation and/or decommissioning of individual facilities or groups of facilities and demonstrate that appropriate R&D activities have been identified and are being progressed.

1.1 Research Sites Restoration Ltd Overview

The Harwell and Winfrith sites are two former UK Atomic Energy Authority (UKAEA) nuclear research sites which have been undergoing decommissioning and restoration since the early 1990s. Following the formation of the Nuclear Decommissioning Authority (NDA) in April 2005, UKAEA continued to manage the decommissioning of the Harwell and Winfrith sites. As part of the process to allow the NDA to compete the management of all its sites, UKAEA was restructured and RSRL was formed to manage the newly combined Harwell and Winfrith sites for the NDA. RSRL commenced operations on 2nd February 2009.

RSRL is currently operating as a separate wholly owned subsidiary of UKAEA Ltd (owned by Babcock International Group), with its own employees, assets and liabilities. RSRL holds the nuclear site licences, discharge authorisations and other regulatory approvals necessary to operate the Harwell and Winfrith sites. The contract from the NDA for the management and operation of the sites is with RSRL who in turn have a parent body agreement with UKAEA Ltd. The NDA also has a parent body agreement with UKAEA Ltd pending competition for the ownership of RSRL.

The work described in the LTP to deliver the RSRL programme and achieve the site end-points for Harwell and Winfrith is covered by key phases, as follows:

- Care and maintenance (Winfrith only)
- Interim end state (Harwell and Winfrith)
- Site closure (Harwell and Winfrith)

The plan is to:

- Make radioactive waste passively safe and/or transfer it off each site
- Make redundant facilities safe for a period of care and maintenance
- Decommission redundant nuclear facilities
- Remediate contaminated land and groundwater
- Demolish redundant buildings
- De-license each site

2 CHANGES TO TECHNICAL GOVERNANCE AND ASSURANCE ARRANGEMENTS

There have been some minor changes to RSRL’s technical governance and assurance arrangements since production of RSRL’s Technical Management Summary (NDA/038/TBuRD/TMS Issue 1 – March 2011) and these are summarised below.

- Production of an updated Harwell Decommissioning Strategy – document reference RSRL/EXCOM (11) P295.
- Production of an updated Winfrith Decommissioning Strategy – document reference RSRL/EXCOM (11) P296.
- Formation of a ‘Harwell Effluent Management Group’ (a sub-group of the RSRL Waste Strategy Group) to review and endorse the Harwell effluent strategy, agree actions to be taken, exchange information and lessons learned and work together to enable drains on site to be decommissioned in a timely manner, thereby allowing closure of the LETP and use of RETP as the sole effluent treatment plant.
- Production of new Waste Strategy procedures:
 - ♦ PRC0191 – Management of Letters of Compliance, Periodic Reviews of ILW Packages and Radioactive Waste Management Cases
 - ♦ PRC0192 – Waste Strategy Management
- Production of Local Working Instructions (LWIs) to support procedures.

Process	Procedure	Local Working Instruction
Strategic Direction	PRC0192 Waste Strategy Management	RSRL/PO/3.07 Use of RSRL Trend and Change Logs to update LTP Strategic Technical documents
Programme Management	PRC0092 Management of LTP Submission	RSRL/PO/3.08 Management and Update of TBUrd
Waste Management	PRC0191 Management of Letters of Compliance, Periodic Reviews of ILW Packages and Radioactive Waste Management Cases	N/A

Table 1 – Structure of new Waste Strategy Procedures and Local Working Instructions

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3 CHANGES TO THE TECHNICAL BASELINE

Changes to the RSRL technical baseline are made throughout the year. Table 2 below provides a summary of the changes affecting the technical baseline for LTP 2010-2011 along with their impact to the LTP.

In order to ensure consistency with the LTP submission, the TBUrD is produced based on the frozen data-set presented to NDA at the end of January 2011. Therefore changes that were approved after this time will not be included in the current version of TBUrD. Table 2 reflects those changes that were approved prior to issue of the TBUrD for 2011 and those that were approved post-issue.

Changes to the approved baseline must be agreed with NDA prior to inclusion in the LTP. Procedure PRC0014 'Trending and Change Control' describes RSRL's process for managing emerging trends and changes to the baseline. Local Working Instructions support the procedure to ensure that any changes to the technical baseline are reflected in technical documents (e.g. TBUrD, IWS etc).

Change Description	Cost Impact	Safety Impact	Security Impact	Environmental Impact	Programme Impact
CHANGES APPROVED PRIOR TO ISSUE OF TBUrD 2011					
Tube Store Decontamination Equipment Deferral RSRL-10-006	-	-	-	-	✓
LETP Buildings Decommissioning Phase 2 RSRL-10-008	✓	-	-	-	✓
B220 Decommissioning Cost Re-estimate RSRL-10-010	✓	-	-	-	-
Deferral of OMAD Legacy Waste RSRL-10-012	-	-	-	-	✓
Beta/Gamma SDD Processing RSRL-10-014	✓	-	-	-	✓
Deferral of WSA Difficult Waste Disposal RSRL-10-018	-	-	-	-	-
Inclusion of OMAD Decommissioning RSRL-10-019	✓	-	-	-	✓
Deferral of B462 3 rd Shift RSRL-10-022	✓	-	-	-	✓
Development of Special Nuclear Material Opportunity RSRL-10-029	✓	-	-	-	✓
Update Winfrith Historic Waste Inventory RSRL-10-058	✓	-	-	-	✓
Trade Drains Re-prioritisation RSRL-10-065	-	-	-	-	✓
Deferral of HVLA Management Option RSRL-10-080	-	-	-	-	-

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Change Description	Cost Impact	Safety Impact	Security Impact	Environmental Impact	Programme Impact
CHANGES APPROVED POST ISSUE OF TBURD 2011					
H10 Irradiation Cell Acceleration RSRL-10-063	-	-	-	-	✓
B462 Processing of CHILW for ES & ACB RSRL-10-076	✓	-	-	-	-
Acceleration of 3 rd shift operations RSRL-10-082	✓	-	-	-	✓
Special Nuclear Materials Opportunity – Added scope RSRL-10-083	✓	-	-	-	✓
B459 Processing of RHILW from ES RSRL-10-085	✓	-	-	-	-
Winfrith Closure Plan RSRL-10-094	✓	-	-	-	✓
Decommissioning of A5 Complex RSRL-10-104	-	-	-	-	-
B220 Acceleration RSRL-10-106	-	-	-	-	✓
B466 POCO Acceleration RSRL-10-113	-	-	-	-	✓
B521 Decommissioning Acceleration RSRL-10-114	-	-	-	-	✓
B551 Decommissioning Acceleration RSRL-10-115	-	-	-	-	✓
OMAD B353 Area Acceleration RSRL-10-116	-	-	-	-	✓
Sodium Disposal Acceleration RSRL-10-119	-	-	-	-	✓

Table 2 – In-Year changes to the Technical Baseline

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4 R&D SUCCESSES & FAILURES

4.1 In-Year R&D successes:

Table 3 below provides a summary of R&D progress against the baseline including changes to Technology Readiness Levels.

R&D Reference	R&D Activity	Progress during FY10/11	Previous TRL	New TRL
Harwell Radiochemical Facility				
99.2.05.B0504/T5	Undertake option studies to develop a suitable method for decommissioning of cells in line with ALARP principles. Work needs to include a method for the removal and size reduction of contaminated box liners and may involve remote handling techniques.	Initial options considered and historic information gathered.	5	6
Harwell Active Handling Facility				
99.2.05.B0604/T8	A Letter of Compliance is required for the processing and packing of decommissioning ILW	Waste has the same fingerprint as existing ILW which already has a LoC therefore significant additional work is unlikely to be required.	5	8
99.2.06.B0604/T9	Radiation and contamination levels need to be established to determine exact decommissioning techniques.	Surveys have been completed and identified that remote techniques will be required in order to reduce contamination levels sufficiently to allow man-entry. Cross reference to R&D entry 99.2.06.B0604/T10	5	9
Harwell Balance of Site Structures				
99.2.11.B1105/T1	The final method for the decommissioning of the New Main Active Drain has yet to be agreed.	Options study and materials testing completed. Trial pulls on actual pipe were successful and adopted as the preferred methodology	7	9
99.2.11.B1106/T1	The final strategy and method for the decommissioning of the Harwell Discharge Pipeline is yet to be determined. Any proposed method must be in line with BAT guidelines.	Initial options study on Harwell Discharge Pipeline decommissioning has been completed.	5	7
Harwell Solid Waste Complex				
99.2.10.B1002/T10	A Letter of Compliance authorisation is required for the processing and packing of GLEEP fuel.	FLOC for GLEEP fuel processing and packing has been received from RWMD	8	9

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R&D Reference	R&D Activity	Progress during FY10/11	Previous TRL	New TRL
Harwell Liquid Effluent Treatment Plant				
99.2.11.B1104/T5	The final method for the decommissioning and demolition of the HLA Encapsulation plant and holding tanks needs to be determined.	The initial option study for decommissioning of the HLA facility has been completed. Further feasibility studies will need to be completed prior to decommissioning of each tank given the uncertain nature of the secondary and tertiary bunds.	5	6

Table 3 – In-Year R&D Progress

4.2 Innovation and Good Practice

The majority of RSRL’s R&D programme relates to development work rather than traditional research in to novel techniques. RSRL therefore has an excellent record of “on-the-job” innovation resulting in improvements to the baseline.

Innovations and good practice adopted during 2010/2011 are summarised in Table 4 below.

Innovation/Good Practice	Benefit to Baseline
Harwell	
Design and adaptation of water recovery system for SWC Tube Stores	Negated the need to return to the affected array at a later date hence saving cost and time. Able to continue waste recoveries to agreed schedule.
Use of brick acid cleaner for decontamination of concrete walls.	Savings in cost and time. Increase in contamination removed. Use of remote cleaning techniques results in reduced exposure to operators.
Use of GLEEP concrete LLW as backfill in ISOs	Savings in cost. Good practice.
Use of IMAGES-GIS	Future knowledge management.
No need for grout cap on LETP encapsulated sludge drums	Savings in cost and time.
Re-use of washings at LETP	Reduction in total effluent discharge.
Commissioning of IP-1 rated Flexible Intermediate Bulk Container (“Builders Bag”)	Savings in cost.
Winfrith	
Load-bearing removable liner for use in 200 litre drums.	Savings in cost. Increase packing fraction in ISOs. Negates the need to supercompact the waste.
Size reduction of Dragon tanks in-house and using the tanks themselves as containment	Savings in cost. Full control over waste processing and minimisation.
Conversion of EAST slurry into solid tiles.	Waste disposed of as VLLW rather than LLW. Savings in cost and time.
Use of A59 LLW as backfill in ISOs	Savings in cost. Good practice.

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Table 4 – In-Year Innovations and Good Practice

4.3 In-Year R&D failures:

There have been no significant issues where the R&D programme has resulted in negative outcomes or delays.

4.4 In-Year significant changes to R&D programmes:

During review of the R&D needs identified in TBUrd 2010, and as part of the change in format of the TBUrd for 2011, a number of new R&D needs/risks/opportunities were identified and some rationalisation of R&D, particularly in the out-years, was undertaken.

A summary of the new R&D needs, risks or opportunities included for 2011 is given in Table 5 below.

R&D Reference	R&D Activity	Current TRL
Harwell Radiochemical Facility		
99.2.06.B0504/T6	A Letter of Compliance authorisation is required for the processing and packing of decommissioning CHILW from B220	8
Harwell Balance of Site Structures		
99.2.11.B1106/T2	There is an opportunity to survey the Discharge Pipeline in order to optimise decommissioning such that potentially some sections of the pipeline can remain in-situ with or without decontamination or grouting.	5
Winfrith Balance of Site Structures		
99.2.07.B0707/T2	There is an opportunity to decontaminate the Winfrith sea pipeline, grout and leave in-situ.	5
99.2.07.B0707/T3	There is an opportunity to rationalise the Winfrith Active Liquid Effluent System to reduce maintenance and operation costs and to mitigate the risk of failure to ageing plant	5
Harwell Solid Waste Complex		
99.2.10.B1002/T18	A Letter of Compliance authorisation is required for the processing and packing of non-gaseous RHILW NDS sources	5
99.2.10.B1002/T19	In order to reduce security costs at Harwell a business case is being developed for an opportunity to send special nuclear material (Dragon Fuel, CHILW drums, CLDs and LEU) to alternative sites for processing rather than treating and storing at Harwell.	7
99.2.10.B1002/T20	To reduce the risk of having to keep B220 operational beyond the end of March 2012 there is an opportunity to process radium cans in the SWC using a polymer with a longer curing time.	8
Winfrith Waste & Nuclear Materials Management		
99.2.10.B1010/T3	There is the potential to use the existing TRS facility at Winfrith for the storage of ILW instead of commissioning a new store.	5
99.2.10.B1010/T4	There is an opportunity not to store ILW on the Winfrith site but to transfer it to Harwell for long-term storage. This would enable early decommissioning and closure of the Winfrith site.	5

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R&D Reference	R&D Activity	Current TRL
99.2.09.B0903/T7	A Letter of Compliance authorisation is required for the processing and packing of ILW CLDs in the SGHWR ILW Processing Facility.	5
99.2.09.B0903/T8	In order to process and pack thorium bars the SGHWR ILW Processing Facility will need to be modified.	5
99.2.09.B0903/T9	There is an opportunity to sell thorium to a third party rather than processing on site.	4
99.2.10.B1010/T5	At the present time this waste is being managed as ILW a full review of characterisation data against LLWR Conditions for Acceptance could result in an opportunity to challenge previous assumptions in relation to SGHWR sludges.	7
Harwell Environmental Remediation & Restoration		
99.2.13.B1302/T1	Due to the associated chemical hazard of the WSA LLW currently stored in 200 litre drums there is a need to establish a suitable route for disposal.	7
99.2.13.B1302/T2	There is an opportunity to close out the Groundwater Treatment Plant and associated monitoring regime earlier than planned.	7

Table 5 – In-Year Significant Changes to R&D Programmes

5 R&D COSTS

RSRL's estimated annualised expenditure on R&D is provided in Table 6. It should be noted that, as the majority of the R&D activities undertaken by RSRL are development rather than research led, some of the expenditure includes management and support costs.

Site	Estimated R&D Expenditure
FY 10/11	
Harwell	£316k
Winfrith	£12k
FY 11/12	
Harwell	£574k
Winfrith	£173k