Australian Nuclear Science and Technology Organisation

HIFAR QMS, Characterisation & Transition Scheduling

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Outline

- Scheduling for Transition
- Radiological Characterisation
- HIFAR Quality Management System

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Scheduling for Transition

- Phase A – Closure
  - Part 1 – Shutdown Activities
  - Part 2 – Preliminary Dismantling
  - Part 3 – Refurbishment
- Phase B – Care and Maintenance
- Phase C – Decommissioning
- Phase D – Green Field

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Where are we at?

- November 2007 – Shutdown activities nearing successful completion
- Planning for dismantling and refurbishment underway – focus on QMS revision, safety analysis, characterisation, dismantling, design of refurbished systems and waste handling

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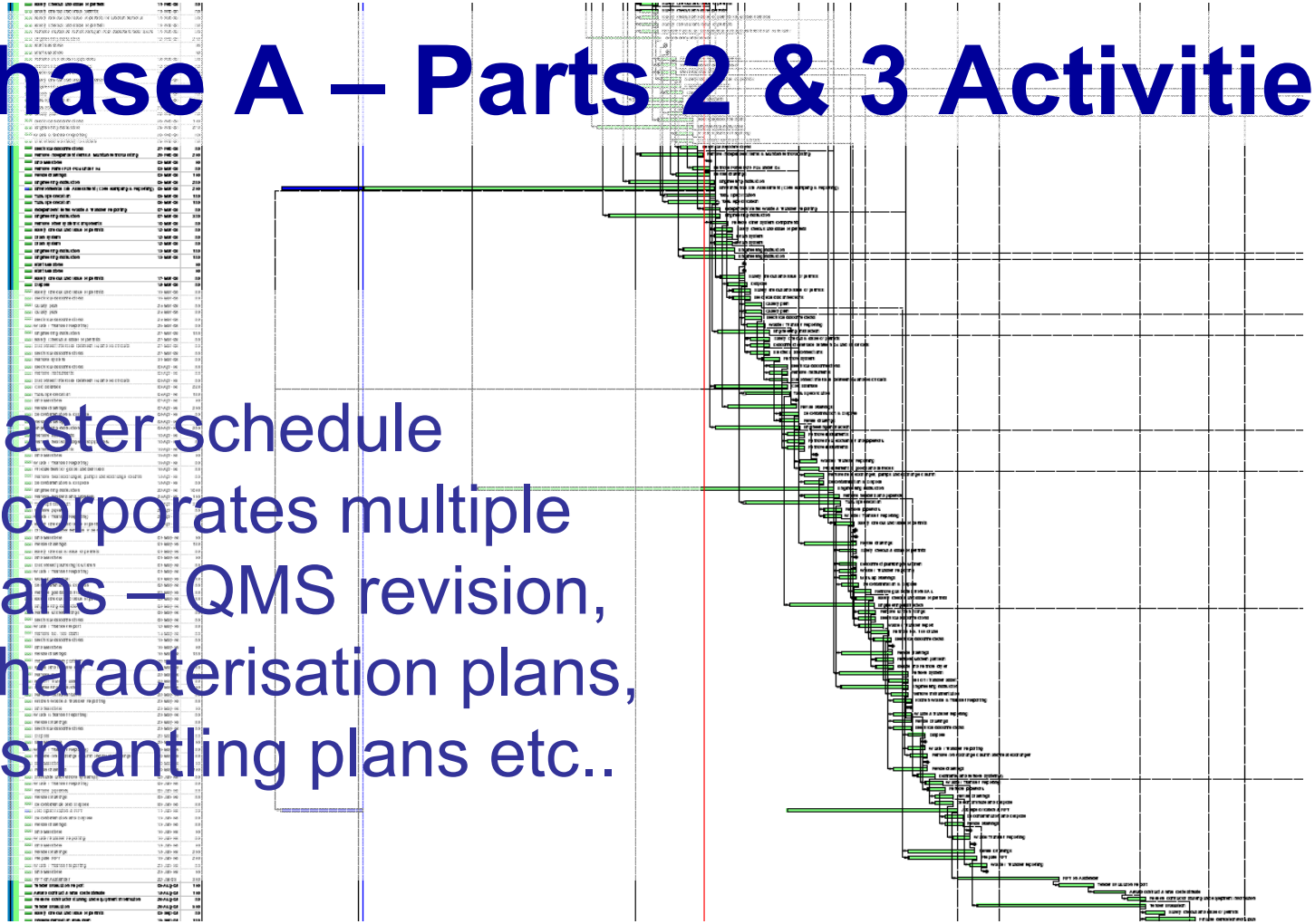
Phase A – Parts 2 & 3 Activities



- Master schedule incorporates multiple plans – QMS revision, Characterisation plans, dismantling plans etc..

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Dismantling and Refurbishment

- 24 Major Dismantling Projects
- 10 Major Refurbishment Projects

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Typical Dismantling/Refurbishment Project

- Projects follows existing Project Management protocol involving hold points to allow independent safety and regulatory assessment
- Project engineer defines resource and expenditure requirements
- Cost, durations & deadlines stipulated
- Project plan is incorporated into master schedule – any inter-dependencies are resolved

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Typical Dismantling/Refurbishment Project

- Quality plan
- Task specification
- Project plan & schedule
- Conceptual design, cost estimate & review
- Detailed design and drawings
- Safety analysis and submission
- Engage contractors
- Purchasing and installation
- Testing & Commissioning
- Waste Management Report
- Update manuals, drawings, procedures, training
- Completion submission and checklist

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Dependencies

- Majority of dismantling projects are somewhat independent from other projects outside of accessibility issues
- Otherwise:
  - Availability of waste route (major waste processing facility unavailable until 2009)
  - Refurbished electrical systems reliant on new power supply

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Major Milestones for Phase A

- Completion of Phase A, Part 1 (May 2008)
- Clear out Cooling Tower site (November 2008)
- New electrical power supply system (April 2009)
- New HVAC system (August 2009)
- Completion of Phase A (January 2010)

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Major Milestones for Phase A

- Electrical refurbishment projects (new power supply and HVAC) are on critical path for the majority of Phase A

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Why Perform Characterisation Work?

- Determine the amount of radioactive waste to be generated
- Do you have a place to put it?
- Can you handle it? What doses are expected?
- Help assess risk, assess costs
- Determine site remediation work

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Project-based Characterisation

- Project-based characterisation for preliminary dismantling
- Based on known history, potential transport of radioactive material, neutron activation fields and maintenance of systems, waste routes are available for the majority of systems planned for dismantling
- Large contaminated items will have to wait until 2009 when a new waste facility is commissioned

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Dismantling

- Tritium contamination is a low energy beta emitter and is easily shielded
- Simple dosimeter measurements may not suffice

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Cooling Towers Site Remediation

- Biased sampling of pond concrete, surroundings and pipework based on known events and operation
- Check for migration of hazmat to underlying strata
- Conformance to state-based environmental legislation

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Cooling Towers Site Remediation

- Groundwater and air sampling carried out on a regular basis
- Groundwater at site is ~35 Bq/L (Nov 05) (Aus Drinking Water Guideline is 7600 Bq/L)
- Review of monitoring history

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Radiological Characterisation Plan for HIFAR

- Cumulative flux at site of activation (by in-situ measurements and analytical methods)
- Calculate and then verify calculations with radiological surveys and information from similar reactors

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Radiological Characterisation Plan for HIFAR

- Review of historical information to determine megawatt days, abnormal occurrences
- Estimates made by scaling results obtained from Danish DIDO class reactor DR-3 characterisation
- Sampling plan to be prepared after a review of sampling plans conducted for other DIDO class reactors
- Majority of activity due to ^{60}Co
- Follow principles from MARSSIM
- Develop site remediation plan

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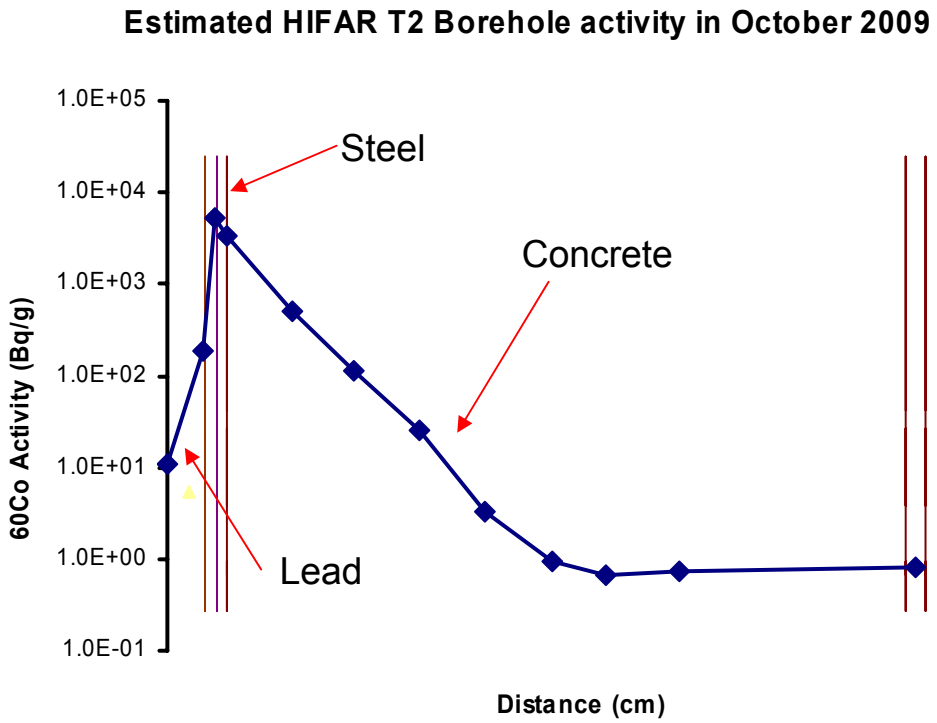
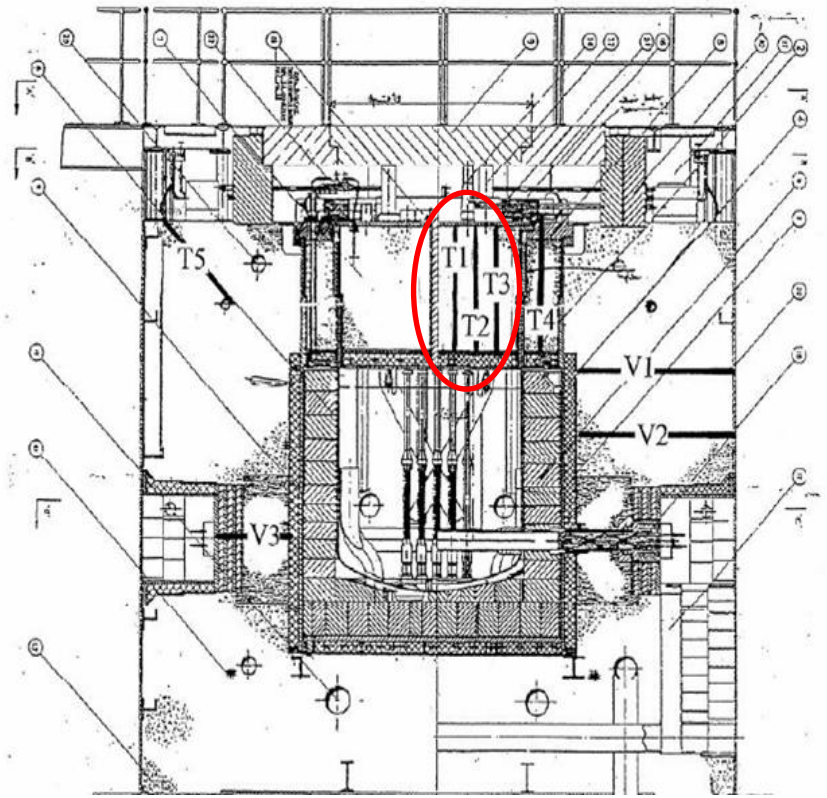
Scaling of DR-3 Analysis





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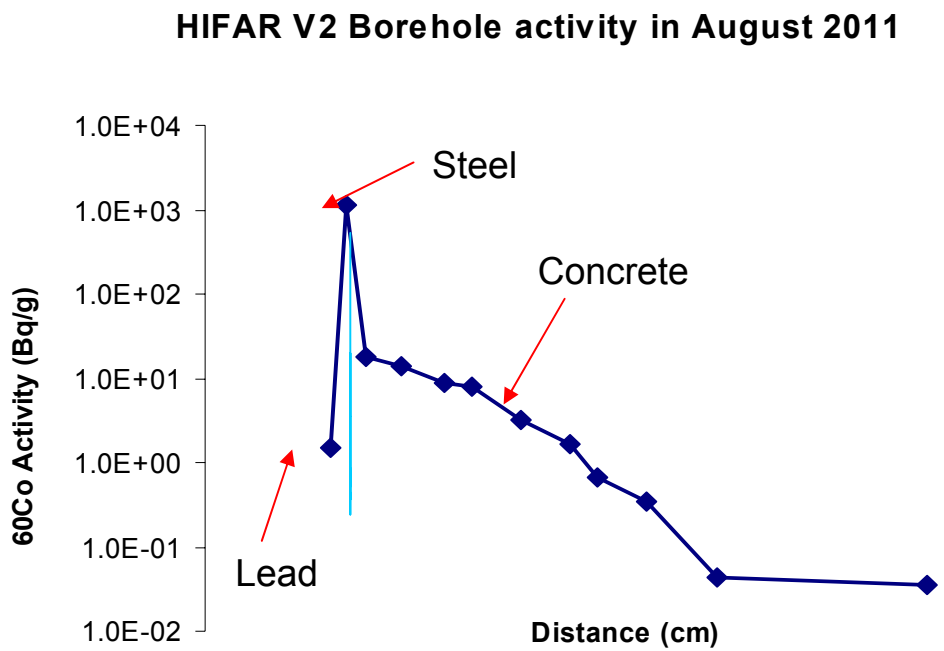

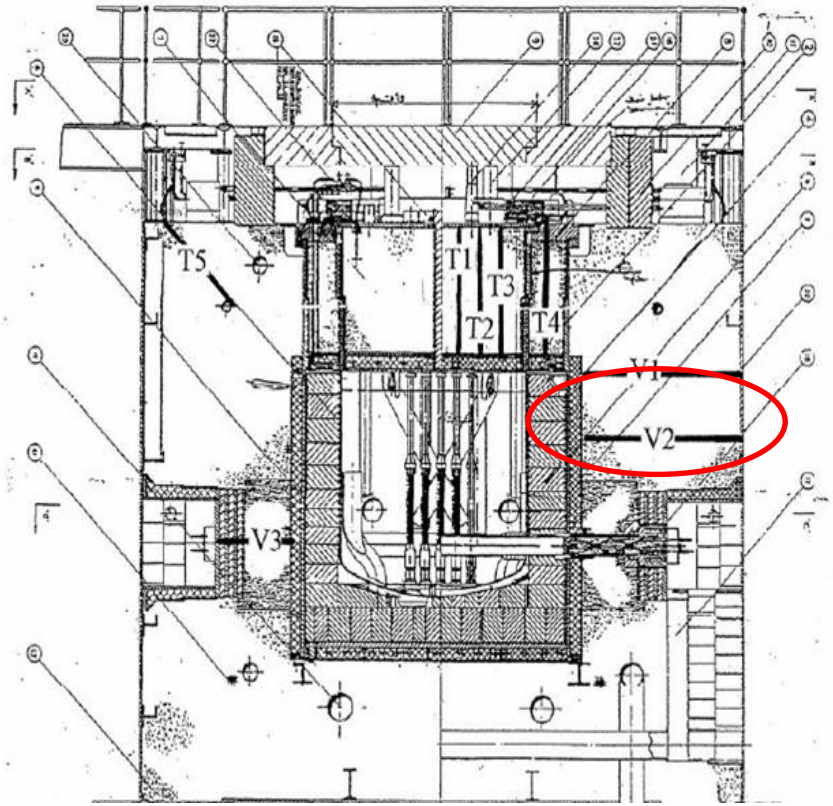

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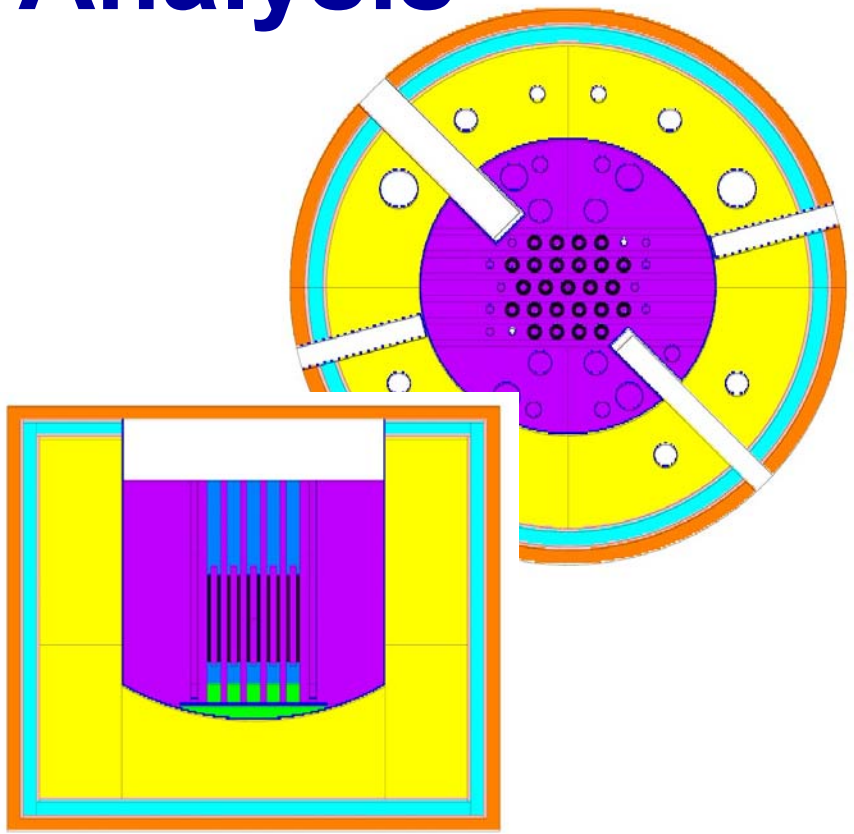
Radiological Analysis

- Monte-Carlo analysis of 3D model of HIFAR to determine flux
- Subsequent analysis to determine activation and decay



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Long-term characterisation – Waste Estimates

- Final decommissioning dependent on National Waste Repository
- 2005 waste estimates for decommissioning of HIFAR:

Type of waste	Amount of material (t)	
	Transition Work	Decommissioning
Inactive	196	5,300
LLW	130	460
Long-lived ILW	1.9	499

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Are all the Nasties Covered?

- Don’t forget non-radiological characterisation for decommissioning and remediation: hazardous materials such as asbestos, PCBs, lead, heavy metals, other chemicals etc..

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HIFAR Quality Management System (QMS)

- Safety Procedures
- Operating Instructions
- Definition of staff hierarchy and authorities
- Maintenance Instructions
- Project Management Protocol

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Why use a QMS?

- Ordered system by which staff can work by
- If something goes wrong, recording systems may track down cause of the problem
- Consistency
- Serves as a knowledge bank
- Enforces a culture of safety and responsibility

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Revision of QMS for Transition

- Revised QMS developed after study and consensus is reached with relevant parties
- New staff structure is defined
- Authorities are defined internal and external to the immediate group including maintenance, safety, waste handling
- New limits and conditions are defined (rad & tritium monitors, health physics surveillance, rad stack discharge, building DAC, admin of hazmat)

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Revision of QMS for Transition

- Revised QMS is simpler to reflect the simpler nature of the plant → about 180 out of over 800 procedures kept
- QMS revision can be a large undertaking and requires some level of rationalisation

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QMS for Transition

Good QMS = Good Management

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Summary

- 3 years in transitionary work after shutdown
- Characterisation work: project-based for transitionary work and major plan to determine final decommissioning and remediation
- QMS revision: an important management task