Australian Government

Australian Nuclear Science and Technology Organisation

IAEA CONFERENCE on RR

Safe Management & Effective Utilization

Topic: Overview of RESEARCH REACTOR DECOMMISSIONING

John Rowling / Manager/ Facilities Management

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Overview of decommissioning of Research Reactor

Statistics of Research Reactors

- Global View
- Major Concerns
- National Policy & Strategy Factors
- Pending Issues
- Management & Planning
- Conclusions & Recommendations

From the First IAEA Report on Decommissioning in Vienna 1975

"There are no insurmountable technical problems to decommissioning at any stage but considerations with respect to policy, planning, timing, costs, waste disposal, safety criteria and regulatory aspects need further development"

Reference: Technical Report #446

Statistics of Research Reactors

From IAEA documentation:

Total number of research reactor = 832

Operating = 287 (205 are greater then 40 years old)

Shutdown = 114

Under construction = 10

Planned = 10

Decommissioned = 410

207 unrestricted use

18 planned for decommissioning

44 in progress

26 safe enclosure

Remainder either unknown or undecided 115 + 114 = 229

Future of Research Reactors

The world of Research Reactors is radically changing.

- **RR will be more economically competitive and safety conscious.**
- **RR must be actively managed, planned, researched, financed and marketed.**

Issue:

There are high number of old research reactors and that are well past their time, both environmentally and financially.

Global Picture

- Over the past 5 to 10 years the demands for nuclear research has reduced.
- Over the next 10 years the number of redundant reactors will increase.
- Experiences in the decommissioning of research reactors is growing. There is more attention now on decontamination and dismantling.

“Do nothing” is not an acceptable strategy.

There are <u>three</u> recommended strategies:
Immediate dismantling/ safe enclosure/ entombment.

Major Concerns

IAEA have raised as major concerns;

Lack of attention to decommissioning by operating organisations, regulatory bodies and decision makers.

Lack of funding for infrastructure, inadequate management, potential understaffing and inadequate exchange of information.

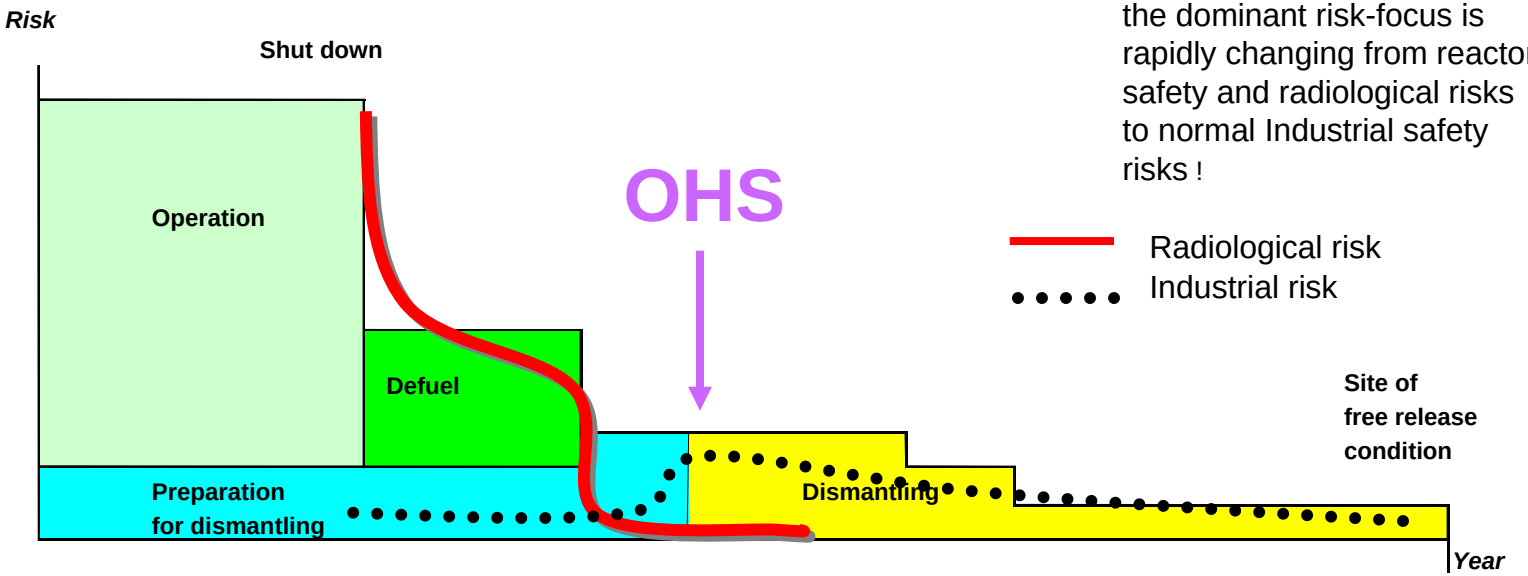
Lack of focus on the need for planning of decommissioning activities that follow shutdown operations in a timely manner.

Adoption of harmonised clearance criteria.

Attention to safety related issues during transition.

Decommissioning

There is a change in the Risk Profile



Under the transition from an operating reactor to the ”Green field” the dominant risk-focus is rapidly changing from reactor safety and radiological risks to normal Industrial safety risks !

Radiological risk

Industrial risk

The regulation and requirements from the regulators must follow and harmonise with the actual risk, to guide the operator through the transition and the dynamic decommissioning process

Reasons for Decommissioning

USA / "Oak Ridge" (ORR) **- particular research program was obsolete**

"*HFIR*" - operations assessed & will continue with neutron scattering research

Germany ***"FRG-1"*** **- will continue to to 2010**

"*FRG-2*" - past useful life

Australia ***"MOATA"*** **- past useful life**

"*HIFAR*" - replaced by "OPAL" with enhanced capabilities

UK ***"JASON"*** **- area required for other purposes**

Russia **9 Reactors in Moscow – Public pressure**

National Policy, Strategy Factors & Challenges

Regulatory Frame work

– National regulatory bodies

Resourcing

– Human, technical & financial resources

Reutilization

– better use of land & facilities

National Policy, Strategy Factors & Challenges Cont'd

Waste Management

- waste conditioning and storage

Stakeholder acceptance

– enhanced scrutiny by Regulator, Governments & Public

Safeguards

– nuclear materials & related activities

Expertise

– *Stakeholder acceptance* – reactors – Public pressure

Management & Planning Factors

Decommissioning strategy **– Immediate dismantling/ Safe enclosure/ Entombment**

Strategy studies **– Best value for money, environmentally and socially acceptable safe**

Sustainability **– good decommissioning practices**

Release/clearance criteria **– prerequisite to successful planning & implementation**

Final survey ***– release of the facilities***

Fuel management **– early defuelling**

Planning for decommissioning ***– start in the design stage of*** **new reactors – structured approach**

Waste Management Techniques

Important strategic / preparatory techniques

Decommissioning techniques

Decommissioning waste management

Information Exchange

- Information dissemination
- National & International working groups
- Provision of practical assistance and training of decommissioning personnel
- Organisation of conferences and seminars
- Databases

Costs & Funding

Decommissioning cost estimates

Provision of decommissioning funds

HIFAR Shell (Non nuclear)

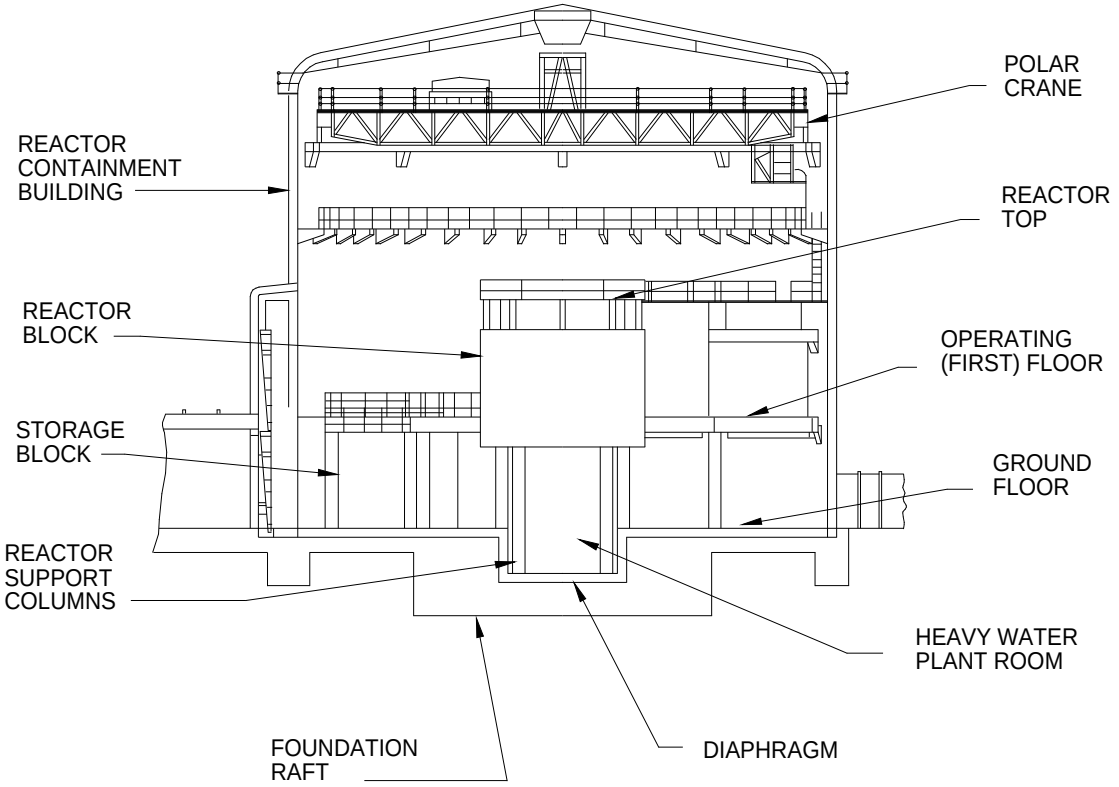
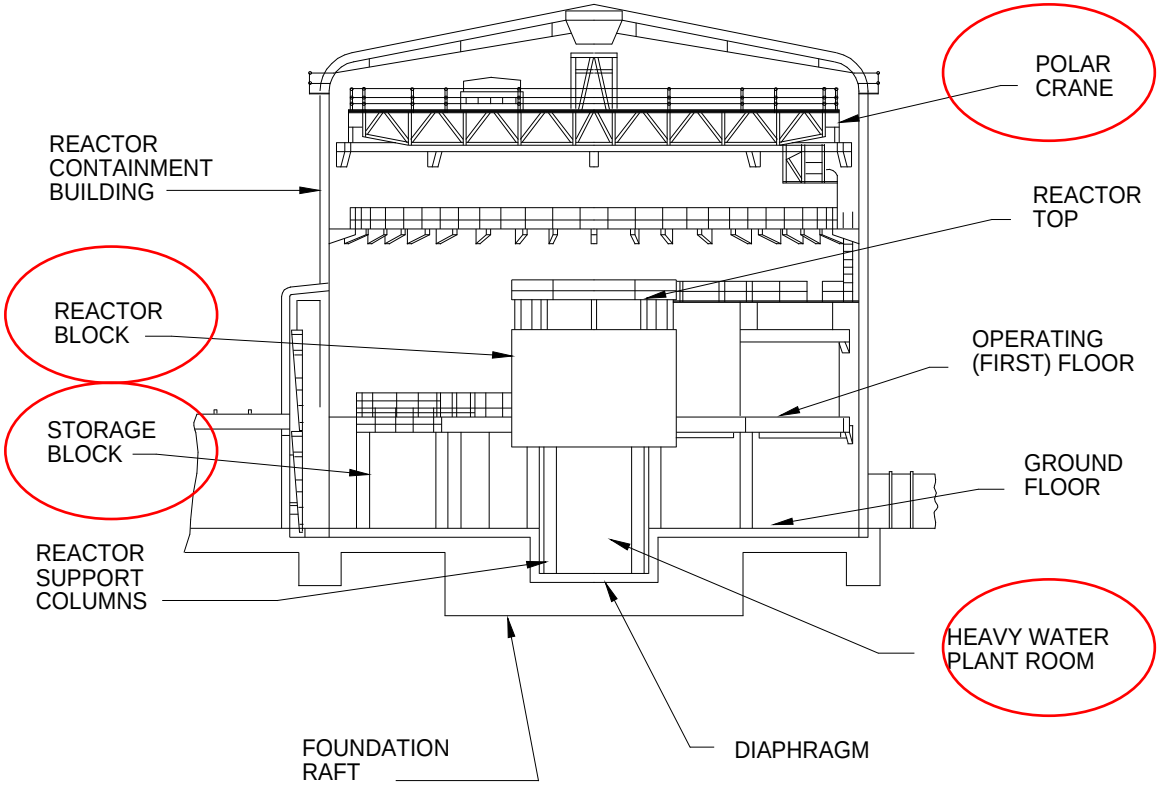


FIGURE 1.1-2 REACTOR STRUCTURE

- **Strip out all electrical & Instrumentation wiring**
- **Strip out all light water pipework**
- **Remove all non-active material & equipment**
- **Remove old air conditioning systems & ductwork**
- **Install Air Conditioning**

HIFAR Shell



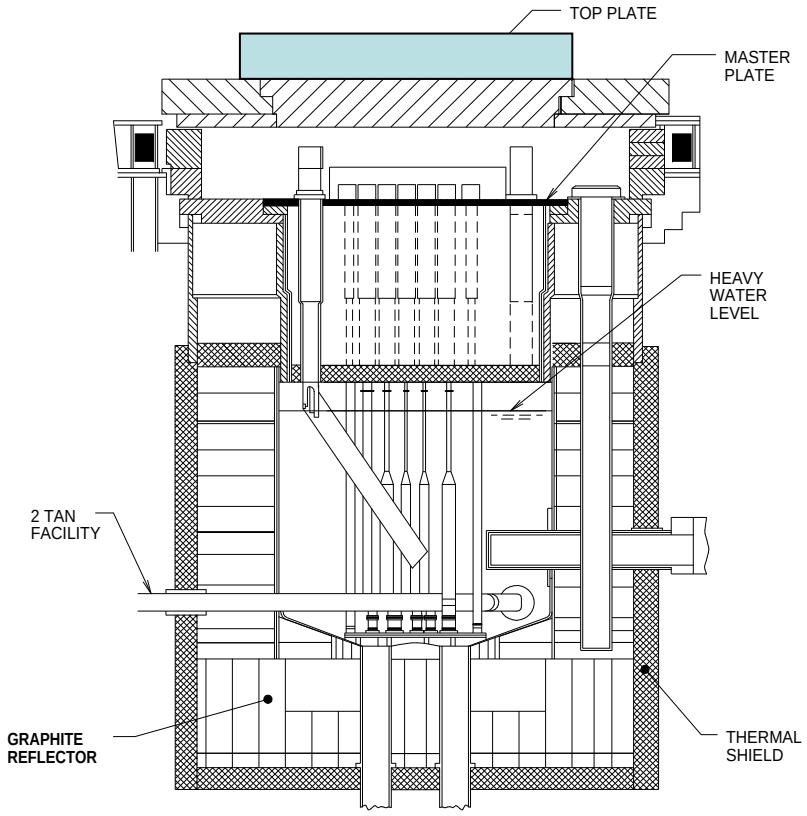
- **Strip out unnecessary minor pipe work**
- **Remove pumps**
- **Upgrade and maintain active extract system**
- **Maintain Main Crane**
- **Cover top plate and storage block with concrete blocks**

Red circles indicate the areas to remain until 2014+

FIGURE 1.1-2 REACTOR STRUCTURE

Following UK experience

Concrete Blocks for shielding



Less than 1uSv/hr

All fuel, CCA's and Safety Rods removed.

Management & Planning - Australia

Selection of decommissioning strategy **– Deferral lack of waste repository**

Release/clearance criteria **– Human, technical & financial resources**

Final survey **– Progressively removal of all associated buildings & structures where there is no contamination. This will reduce financial burden of continuous surveys until the final survey**

Fuel Management **– All HIFAR spent fuel will be removed by end of 2009**

Management & Planning Cont'd

Decommissioning Plan **– This process commenced over 18 months ago.**

Regulatory Interfaces/Licensing **– As the deferred option has been selected the regulator will issue a Procession or Control licence (in progress) as an interim for the care maintenance period prior to a final decommissioning licence.**

Management of Plant Status & change **– Smooth transition from operation to decommissioning.**

Management & Planning Cont'd

Implementation Aspects **– identify most suitable techniques for particular project.**

Decommissioning & Waste Management Techniques **–** ***Development of infrastructure to support the decommissioning programme.***

Radiological characterisation **– This operation will deferred until closer to decommissioning.**

Conclusions & Recommendations

k9

- General Management Issues
- Planning Issues
- Waste & Fuel Issues
- Technology Issues
- Information Exchange
- Costs & Funding Issues

k9 This phase should be carried out under a decommissioning licence.
kph, 2007-02-22

Questions

For further information on “Decommissioning”

Refer to IAEA Documentation TR446

Thank you

Contact: john.rowling@ansto.gov.au