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SAFARI-1 Research Reactor

# Research Reactor Utilisation: A Justification for Existence?

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# QUESTION?

If I can say:

"I have a Research Reactor able to provide Medical Isotopes, and have In-core Irradiation and Material Testing Rigs and Beam Port facilities for educational and R&D opportunities, etc..."

Is my Research Reactor justified?

# ANSWER

“Your existence is only justified if your Stakeholders say so!”

Stakeholders:

“Person(s) and/or Institution(s) that have a direct or indirect interest or involvement in the operation of the facility”.

# TYPICAL STAKEHOLDERS

- Government
- Upper Management
- Academic Institutions
- Commercial and Industrial Clients
- Regulatory Body
- Personnel
- Public
- IAEA....

# 10 POINT EVALUATION

## JUSTIFICATION FOR SUSTAINED OPERATION

1. OPERATIONAL ABILITY (Technical Resources / Funding)
2. SAFETY
3. COMMERCIAL
4. INSTITUTIONAL
5. RERTR
6. SECURITY (Physical Protection)
7. ENVIRONMENTAL RESPONSIBILITY
8. WASTE (Back end Storage / Disposal)
9. REFURBISHMENT (Life Extension)
10. D & D Liability.

# OPERATIONAL ABILITY

- TECHNICAL RESOURCES
  - Personnel
  - Equipment
  - Support services
- FINANCIAL RESOURCES
  - Funds For Operation
    - Stakeholder provision / subsidy
    - Self sustaining.

# SAFETY

- **NUCLEAR SAFETY**
  - Regulatory Control (Operational/Radiological)
  - Safety Analysis Report
  - PRA
- **CONVENTIONAL SAFETY**
  - Occupational Safety Acts
  - Industrial Safety (Design, etc.).

# COMMERCIAL

- ISOTOPE MANUFACTURE
  - Supporting Processing Facilities
  - Marketability
  - Profitable
- IRRADIATION SERVICES
  - Target Irradiation
  - Materials Testing.

# INSTITUTIONAL

- **ACADEMIC RESPONSIBILITY**
  - Educational - Tertiary
  - Post Graduate Research
- **GOVERNMENTAL / INDUSTRIAL**
  - Assistance Programs
  - Beneficial R&D.

# RERTR

- U ENRICHMENT (HEU...LEU)
  - Fuel & Control Rods
  - Targets
  - Flux and operational impacts
- OPPORTUNITIES TO CONVERT
  - IAEA
  - ANL.

# SECURITY (Physical Protection)

- THEFT:
  - U Materials (Proliferation)
  - Irradiated Materials (Dirty Bombs!)
- SABOTAGE:
  - Environmental Impact
  - Continuity of Operation.

# ENVIRONMENTAL RESPONSIBILITY

- CLEAN OPERATION
  - Gaseous Discharge
  - Liquid Effluent
  - Solid Waste control
- PUBLIC ACCEPTANCE
  - Media Cooperation
  - ISO 14001.

# WASTE

## (Backend - Storage / Disposal)

- SPENT FUEL STORAGE
  - Spent fuel pool
  - Dry storage (cask / pipe)
- DISPOSAL ABILITY
  - US Take back program
  - Processing to LLW
  - National / Regional Depository.

## REFURBISHMENT (Life Extension)

- MAINTENANCE (Continuous)
  - Nuclear Instrumentation
  - Mechanical Plant
  - Electrical Plant
- IN-SERVICE-INSPECTION
  - Vessel
  - Core Components / etc.

## D & D Liability

- **DECOMMISSIONING PLAN (REGULATORY)**
  - Entombment (Not encouraged by IAEA)
  - Long Term Storage (Deferment)
  - Immediate Dismantling
- **DECOMMISSIONING LIABILITY**
  - Main Stakeholder (Government)
  - Financial and Regulatory Responsibilities.

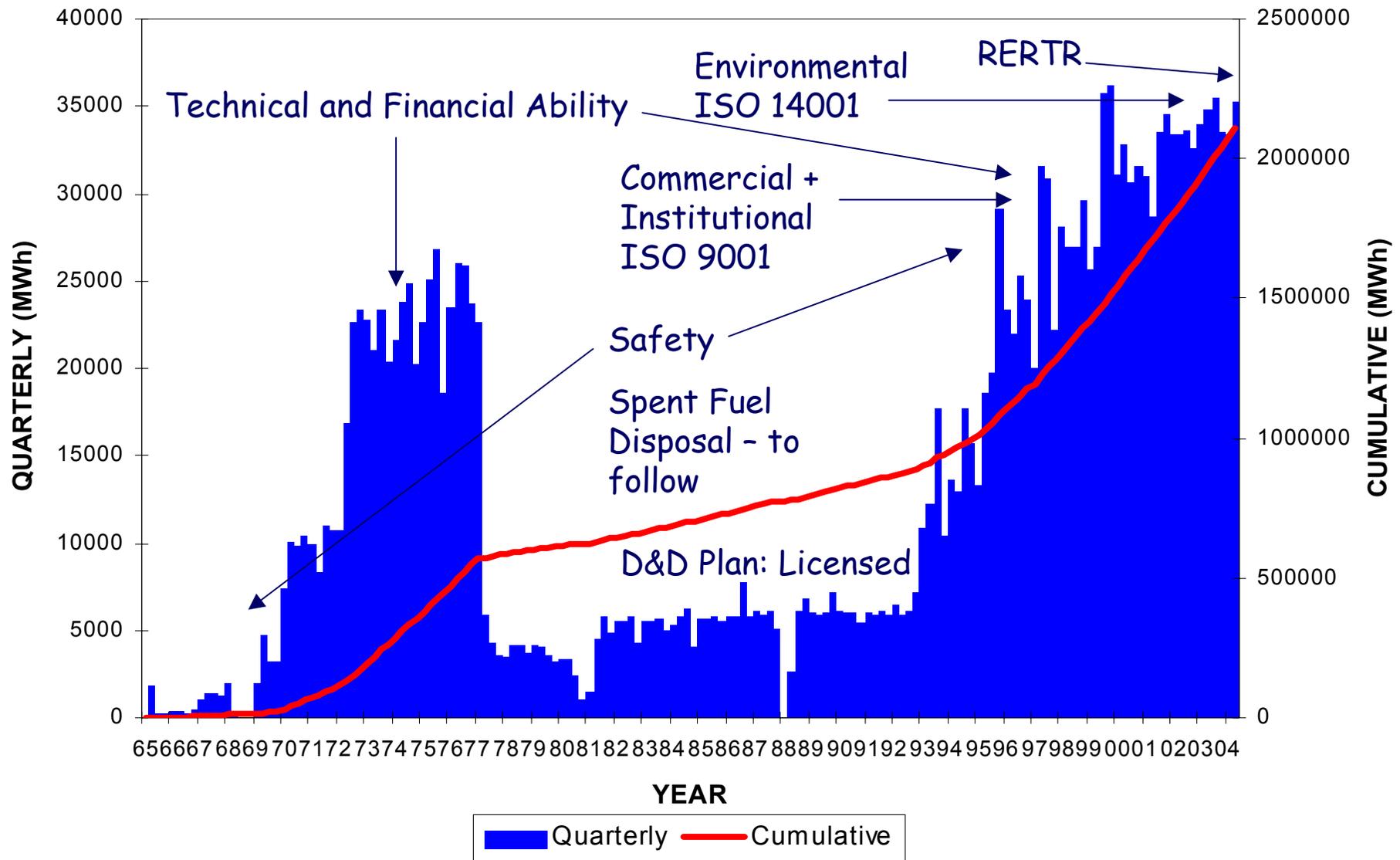
## What Now?

- If any of the responses to these 10 evaluations are negative - then the points should be addressed by means of Specific Objectives / Action Plans in your Strategic Planning process
- If negatives are not addressed - then the justification of existence of your RR could become questionable!

# STRATEGIC PLANNING

- IAEA-TECDOC-1212:  
Strategic Planning for Research Reactors
- IAEA-TECDOC-1234:  
The Application of Research Reactors
- IAEA-Safety Series 35-G1:  
Safety Assessment of Research Reactors and  
Preparation of the Safety Analysis Report
- IAEA-INFCIRC/225:  
Physical Protection of Nuclear Material.

# SAFARI-1 POWER HISTORY



# Summary (1)

- Its no longer sufficient to have an operational, well utilised RR....
- In fact its not enough to also have a safe RR....
- You also need to ensure Compliance with:
  - RERTR needs
  - Physical Security
  - Backend disposal ability
  - Environmental acceptance
  - Life time maintenance ability
  - D&D Liability.

## Summary (2)

- Justification of Sustained Operation - 10 Point Evaluation
- Select Requirements needed to Satisfy Stakeholders according to national / individual standards
- Apply Strategic Planning to focus on requirements
- Make use of IAEA (and other) assistance available.