



RTS RESEARCH PAPER - Sam Rieck, Chief Nuclear Officer - srieck@raisuns.com

Nuclear AI as the Key to Part 53

Using AI Agents to Implement Risk-Informed, Performance-Based Licensing

TAKEAWAY: Agentic AI makes Part 53's performance-based licensing practical for applicants on a tight project schedule.

2002 + 2026

Performance-based method first published in guidance (NUREG/BR-0303) and Part 53 arrives

§53.230(a)

The single primary safety function that anchors the entire hierarchy: limit radioactive release

Prevention + Mitigation

Both sides of defense-in-depth may be needed — prevention (OH) and mitigation (PRA)

KEY FINDINGS

01 Read it as a decision architecture.

§53.230(a) anchors an objectives hierarchy: **Primary safety function** → **Supporting functions** → **Systems and components** → **Evidence**

02 AI changes feasibility, not theory.

The method has existed since 2002. What's new in 2026: AI can perform preliminary decomposition, traceability, and iteration at project speed.

03 It complements PRA but it doesn't replace it.

Hierarchy covers prevention, PRA covers mitigation. AI can assist in both.

WHAT WE RECOMMEND

→ Anchor the licensing basis in the primary safety function and use AI to define the hierarchy that follows from it.

→ Build agentic tooling based on defined inputs, with a human in command and not just a human in the loop.

→ Close the training-data gap using curated datasets in ADAMS and consider a topical report on this topic.