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Stewarding a Stockpile of Varying Size

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Optimization Problem

- **Difficult (impossible) to optimize stockpile size**
  - **Multivariable problem**
    - **Reliability**
    - **Safety**
    - **Ability to Deter**
    - **Cost to maintain**
    - **Ability to conduct surveillance**
    - **Prevent common mode failure**
    - **Political considerations**
    - **Etc.**
  - **Non-linear dependent variables**
  - **Biases/Unknowns**

This is why seemingly arbitrary round numbers are pursued through a quasi-backward approach.

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Optimized Stockpile Size

- **Original research effort was to optimize the stockpile by purely focusing on the NWC ability to maintain/surveil.**
  - **No regard to:**
    - **Deterrence**
      - **Hold X number of targets at risk**
      - **Hold Y types of targets at risk**
      - **Etc.**
    - **Military needs**
    - **Political considerations**
    - **Etc.**

Change in focus

- **Original questions to be answered:**
  - **At what levels will safety and reliability begin to be compromised (given current techniques)?**
    - **X% confidence that Y% of weapons will operate as expected.**
    - **A% confidence that B% of accidents will not result in nuclear yield.**
  - **What fundamental changes to maintenance and surveillance will need to take place to continue to lower weapon numbers?**

- **Difficulties with the nature of this topic led to changes in the focus of the paper.**

Change in focus

- **Survey, interviews and research pointed to a common question: In order to steward a stockpile of any (non-zero) size what elements must be present?**
  - **Conclusion:**
    - **Expertise**
    - **Ability to Surveil**
      - **Diagnose technical risks**
    - **Ability to React (Maintain Capability)**
      - **Overcome unexpected changes**

Expertise

- **Why:**
  - **No substitution for those that can 'do'.**
    - **Simulation, Models, Documentation, etc.**
    - **Underestimate the art/craft behind production.**
  - **Impossible to seamlessly turn off and turn on.**
    - **Must maintain understanding of Nuclear Weapon unique components where 'plug and place' expertise isn't available or information is classified.**
      - **Neutron Generators, Physics Package, Batteries, Stronglinks, Gas Transfer systems etc. (Both design and production abilities must be maintained).**
  - **Given sufficient expertise (and resources) any problem can be fixed.**
    - **Necessary to maintain stockpile surveillance and the ability to react to unforeseen circumstances.**

Expertise

- **Questions/Concerns**
  - **How do you attract and retain the best and brightest?**
    - **Production/Maintenance isn't attractive to most experts.**
      - **Always tie broad R&D efforts together with the labs.**
      - **Pursue extensive simulation and modeling advancements.**
    - **Maintain design and production capability in the NWC.**
  - **What break points are there?**
    - **Reduction in stockpile doesn't equate to a reduction in personnel.**
      - **No problem is small with a small stockpile.**

Ability to Surveil

- **Why:**
  - **Need to know the health of a stockpile of any size.**
  - **The stockpile is never completely static.**
    - **Components need to be replaced or upgraded due to aging or unavailability.**
  - **Simulations and Models aren't sufficient to understand the unknowns in aging and other effects.**

Ability to Surveil

- **Questions:**
  - **How low can stockpile numbers go before surveillance methods must change?**
    - **Eliminate destructive testing.**
      - **Surveil the stockpile into extinction.**
  - **When would a new weapon design be necessary to maintain stockpile health?**
  - **At what point do you bring back UGTs?**
    - **How long can we go and how many design changes can be allowed before our confidence in reliability is questioned?**

Ability to React (Capability)

- **Why:**
  - **Mitigate risk from uncontrollable factors.**
    - **Global change**
      - **Nuclear Breakout/Attack.**
        - **Increase production rate if necessary.**
    - **Internal technical problems**
      - **Unexpected reliability/safety issue in the stockpile.**
        - **Re-deploy or produce new warhead**
    - **Surprise external technology**
      - **Next generation weapon**
        - **Understand, design, build or counter**

Ability to React (Capability)

- **Questions:**
  - **How can design/production be maintained at low stockpile numbers?**
    - **Continuous low level production.**
  - **What is the current/future level of transparency and knowledge of foreign stockpiles/capabilities?**
    - **High confidence in intelligence can lead to relaxing maintenance on capabilities.**

Conclusion

- A truly optimized stockpile isn't achievable.
  - It will always be a numbers game.
- There are certain aspects of any stockpile stewardship program that should never be omitted.
- Special care as to the structure of the NWC must be taken to ensure these factors don't slip in effectiveness or fall through the cracks.

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