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Human Performance and Lessons Learned from TRUPACT-III Fabrication

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TRUPACT-III – Easy Loading and Unloading of Transuranic Wastes

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TRUPACT-III

TRUPACT-III Requirements

- Design approved by NRC under the provisions of 10 CFR Part 71 (Certificate of Compliance Issued)
- Verbatim compliance with NRC Certificate of Compliance and the associated SAR (including drawings) is required – this includes fabrication, maintenance and operations
- Puncture and pressure requirements of 10 CFR Part 71 are challenging for rectangular packages. The Package may look pretty simple but it is a highly complex design. For example:
  - Must withstand substantial normal and hypothetical accident loads that include a 30-foot drop onto unyielding surface, a drop onto a 6-inch puncture bar, internal and external pressure requirements, etc.

TRUPACT-III Unit 1

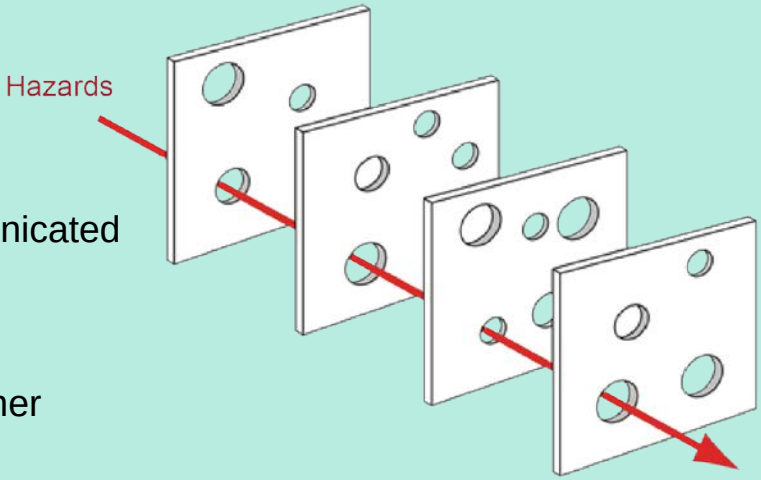
- Package delivered to SRS with a noncompliant dimension with the shear lip between the lid and the packaging. (Slightly thicker than specified in SAR)
- NRC was notified of the nonconforming condition and Unit 1 taken out of service for repair

Extent of Condition

- **5 additional TRUPACT-III's were in various stages of fabrication.**
- **A revalidation of all dimensions on all TRUPACT-III's was performed. Additional noncompliant conditions were found and had to be corrected.**
- **Bottom line: Schedule delays, penalties, and extra costs were incurred for all involved.**
- **Ultimate goal was achieved: very useful packages that met all requirements were delivered and put into service.**
  - A very painful experience to get to the finish line.

Ineffective Key Barriers

- **Cost of the project not properly developed**
  - Contract negotiated at a price that was not possible
  - Project bid by both fabricator and supplier underpriced
- **Fabrication Drawings**
  - Critical dimensions not clearly identified and communicated
- **QA & Technical Oversight**
  - Lack of coordination among Oversight staff
  - Inadequate flow-down of hold/witness points and other project/certification requirements



- **Nonconformance (NCR) & Corrective Action**
  - NCR “Use-As-Is” dispositions resulted in design changes that needed NRC approval
  - Sub-contractor did not perform corrective action as directed in NCRs
- **Fabrication Data Package**
  - Inefficient resources assigned to review the as-built fabrication data packages
- **Issuance of Certificate of Conformance**
  - Reconciliation of the as-built condition not performed in according with Licensing procedures to ensure the requirements of the NRC Certificate of Conformance had been met

Root Cause

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- Management did not monitor and ensure that Quality Assurance program controls were being effectively implemented. Assumptions made regarding staff capability without recognizing that drivers had changed. Project planning and execution were insufficient to ensure success.

Contributing Factors

- Budget pressure
- Schedule pressure
- Oversight weaknesses
- Licensing weakness
- Subcontractor performance issues

Corrective Actions

- **Revised procedures**
  - Assigned PM in charge of SAR reconciliation
  - Formalized the review process when the SAR is revised
- **Implemented recovery plan**
  - Shared lessons learned
  - Implemented training
- **Created new procedures**
  - Fabrication readiness review
- **Improved fabrication drawings**
  - Critical dimensions included fabrication drawings

Conclusions

- Don’t get into a contractual situation where you will force employees to cut corners.
- There is no substitute for early planning on projects.
- Strong communications between all parties is necessary throughout the life of the project.
- Transparency within organization from the bottom to the top must be assured to allow early problem reporting and the allocation of appropriate resources to address problems in a timely fashion.
- Reinforce procedure adherence constantly.
- Trust but verify.
- Own the work, whether it is performed by your organization or a subcontractor.