



**TRUPACT-II LESSONS LEARNED
AN ENGINEERING PERSPECTIVE**

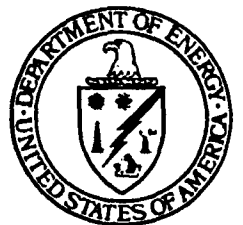
**PHIL GREGORY, PRINCIPAL ENGINEER
WESTINGHOUSE ELECTRIC CORPORATION**

*11/1/81
Phil Gregory
Westinghouse Electric Corporation*

TRUPACT-II LESSONS LEARNED

AN ENGINEERING PERSPECTIVE

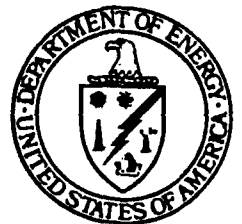
- **Design**
- **Test**
- **Certification**
- **Fabrication**
- **Safety**
- **Operations and maintenance**



TRUPACT-II LESSONS LEARNED

DESIGN

- **Use codes and standards when possible**
- **Accepted materials and processes will reduce certification review time**
- **Conservative design is easier to review**
- **New concepts are possible, but they may take longer to certify**



TRUPACT-II LESSONS LEARNED

TEST

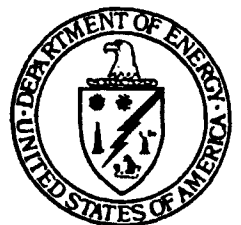
- **Testing may be required for:**
 - **Nonstandard materials**
 - **Unconventional design**
 - **Liberal design**
- **Full-scale testing may be required by:**
 - **Inability to analyze both normal and hypothetical accident conditions**
 - **Soft (deformable) packaging design**
 - **Public perception**
- **Listen to the regulators**



TRUPACT-II LESSONS LEARNED

CERTIFICATION BY TEST

- **Analysis is preferred to test because:**
 - **Analysis predicts a safety factor based on material properties**
 - **Design changes may be analyzed for a new safety factor**
- **Safety factor for a test is one**
- **Regulator's comfort level is important**

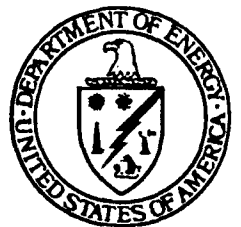


TRUPACT-II LESSONS LEARNED

CERTIFICATION BY TEST

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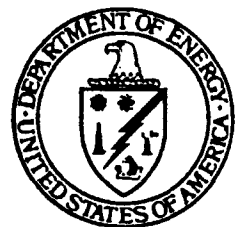
- **Consider initial conditions which will cause maximum damage**
- **Multiple test sequence may be required; comfort level**
- **Test conditions may induce failure not related to the design**
- **Listen to the regulators**



TRUPACT-II LESSONS LEARNED

FABRICATION

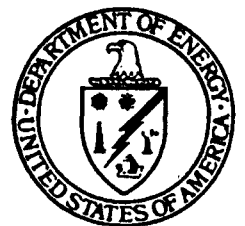
- **Utilize experts to review the process from beginning to end**
- **Don't assume that anything is easy**
- **Understand and follow procedures**
- **Make the QA program part of the team**
- **Identify tolerances on the design drawings and fabricate within them**



TRUPACT-II LESSONS LEARNED

SAFETY

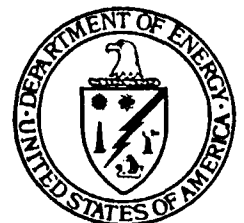
- **NRC safety concerns are primarily sub-criticality, shielding and containment**
- **NRC considers both normal and hypothetical accident conditions**
- **NRC is also concerned about flammable gas/shipping time**
- **Use the NRC regulatory guides**



TRUPACT-II LESSONS LEARNED

OPERATIONS AND MAINTENANCE

- **Design safety into the operation:**
 - **Minimize administrative controls**
 - **Use the ALARA concept**
- **Examples of human engineering:**
 - **Leak test prior to each shipment**
 - **One fixture for lids and payload**
 - **Tiedown u-bolt go/no-go gauge**
- **Maintenance requirements must:**
 - **Be reasonable and achievable**
 - **Have defined acceptance criteria**



TRUPACT-II

PROTECTIVE STAINLESS
STEEL SKIN 3/8" THICK

HONEYCOMB
IMPACT
LIMITER

LYTHERM
INSULATION
1/4" THICK

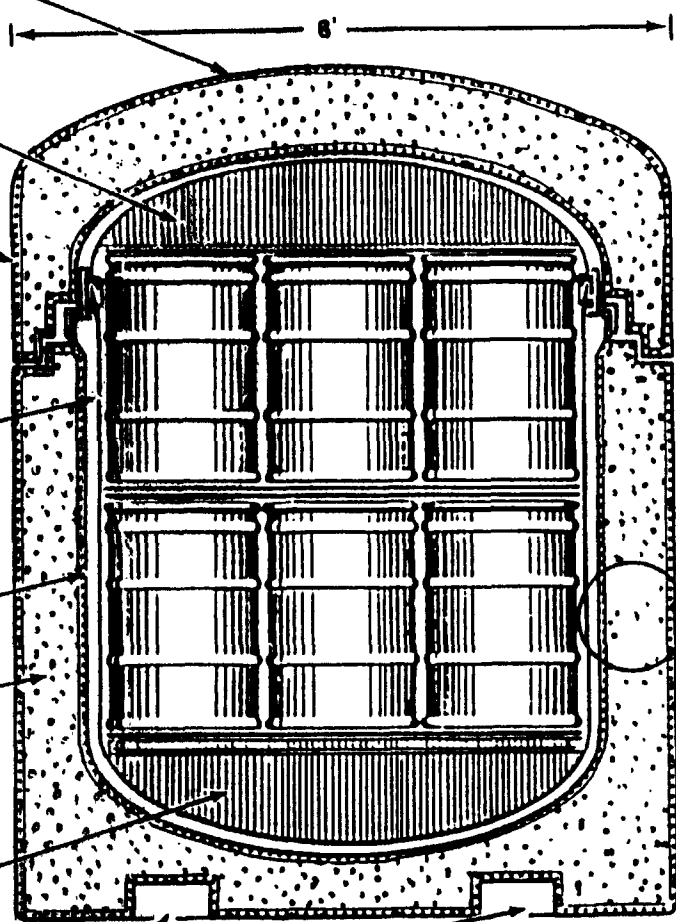
INNER
CONTAINMENT
VESSEL
72.63" I.D.
1/4" THICK

OUTER
CONTAINMENT
VESSEL
73.60" O.D.
1/4" THICK

FOAM
10" THICK

HONEYCOMB
IMPACT
LIMITER

FORKLIFT POCKETS



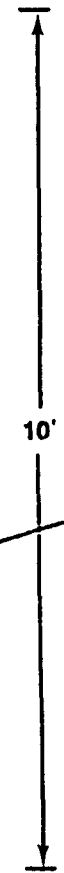
LYTHERM
INSULATION

PROTECTIVE
OUTER SKIN

FOAM

INNER
CONTAINMENT
VESSEL

OUTER
CONTAINMENT
VESSEL



WEIGHT: 11,600 LBS. EMPTY
18,600 LBS. LOADED

MATERIAL: ASTM - A240 TYPE 304
(STAINLESS STEEL)

