Industrial Nuclear Company, Inc.
Ten Hole Source Changer
Model IR–THSC

A Presentation to the
US Nuclear Regulatory Commission

January 12, 2011

INDUSTRIAL NUCLEAR CO., INC

Agenda

- *Introduction*
- *Description of IR–THSC Package*
- *Materials of Construction*
- *IR–THSC Payload Description*
- *Certification Test Plan*
- *Schedule*
- *Summary*

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Description of IR–THSC Package

- *Enclosed, Right Circular Cylinder*
  - *12-3/4” OD x 14-1/2” High*
- *Welded Stainless Steel Construction*
- *Depleted Uranium Gamma Shield*
- *Titanium Source Tubes/Hub*
- *Gross Weight: Approximately 310 lbs*

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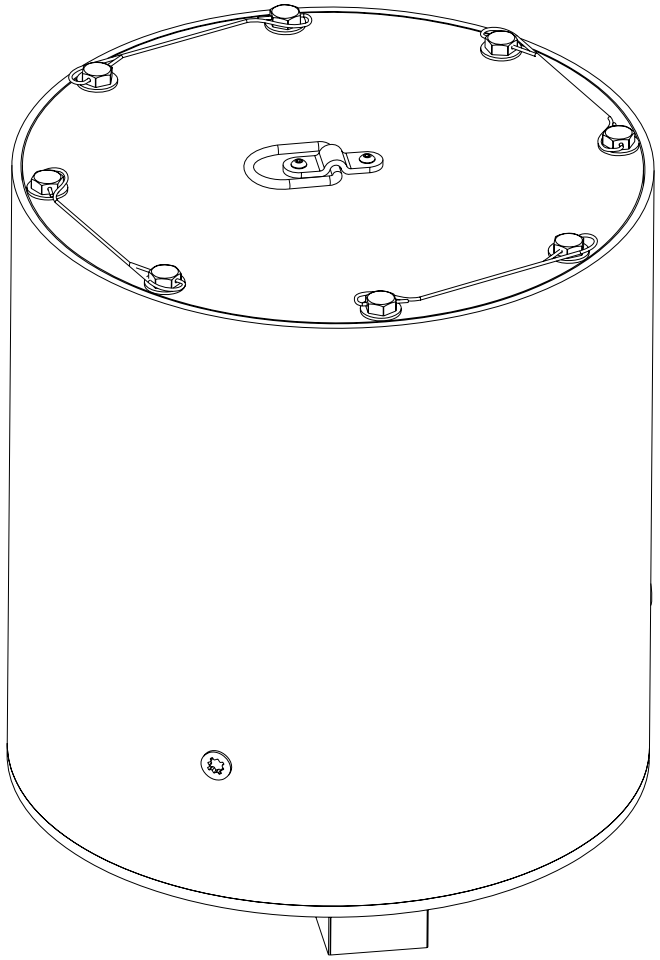
Description of IR–THSC Package (con't)



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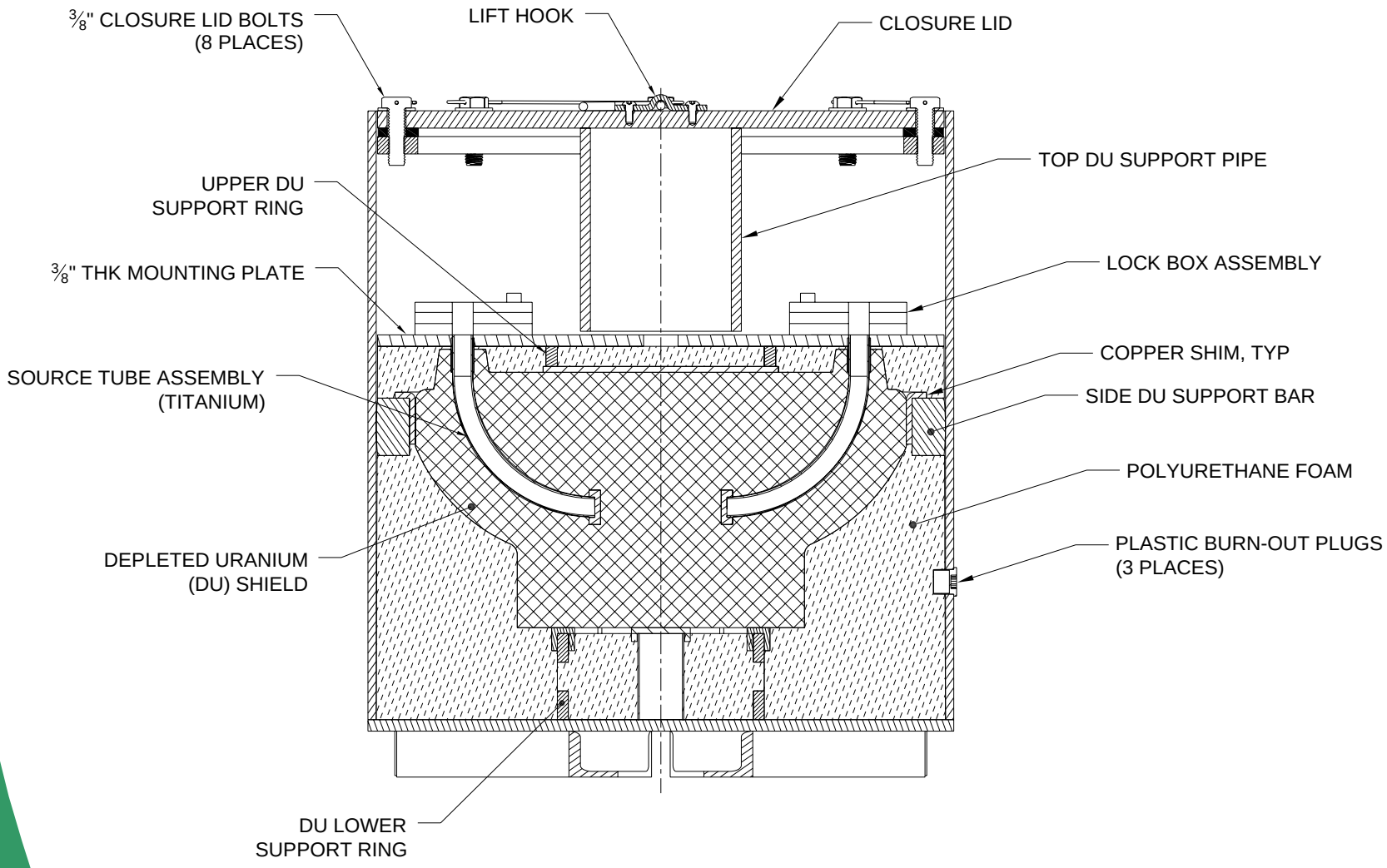

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Materials of Construction

- ***Structural:***
  - ***Type 304 stainless steel plate, bar, and pipe***
  - ***ASTM A320 L7 or L43 Closure Lid Bolts***
  - ***All welded construction encasing gamma shield***
  - ***Copper shims between DU and stainless steel contact points***
  - ***Polyurethane foam for impact mitigation***
  - ***0.44” OD x 0.065” wall titanium source tubes***
  - ***Titanium hub***
- ***Gamma Shielding***
  - ***Cast depleted uranium (DU)***
- ***All materials have been previously used in currently NRC licensed source changers and radiation cameras***

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IR–THSC Payload Description

- **Contents**
  - *Iridium 192 (Ir–192) capsules*
  - *Selenium 75 (Se–75) capsules*
  - *Licensed as Special Form*
- **Contents limits**
  - *1,500 Ci total limit*
  - *Maximum 150 Ci per capsule*
  - *Maximum of 10 capsules per package*

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Certification Test Plan

- ***Objectives***
  - ***To demonstrate that, after a worst–case sequence of free drop and puncture, and thermal tests, no degradation in shielding capability of package occurs***
  - ***To demonstrate retention of special form capsules within the gamma shield***

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Certification Test Plan (con't)

- *Full–scale, prototypic CTUs*
- *Demonstration basis: radiation dose rates comply with 10 CFR 71 radiation limits after full series of free and puncture drops, and thermal test*
  - *Use of actual radioactive source capsules*
  - *Post–test readings versus pre–test readings*
- *Normal speed filming of free drops planned*
- *Tests*
  - *Free Drops*
  - *Puncture Drops*
  - *Thermal Test*

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Certification Test Plan (con't)

- ***Structural evaluations:***
  - ***NCT free drop, and HAC free drop & puncture, by test***
    - ***Total of three free drops and three punctures***
  - ***All other NCT and HAC load cases by analysis***
- ***Thermal evaluation by test***
  - ***Due to presence of DU, thermal test will be performed in an oven in a controlled environment***
  - ***Air supplied directly into oven cavity to preclude oxygen starvation***
  - ***Same test method as used for the IR–100 thermal test***

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Certification Test Plan (con't)

- ***Initial conditions***
  - ***For high-impact drops, temperature will be cold (-20 °F)***
    - ***Bottom down orientation***
  - ***For maximum crush deformation drops, temperature will be ambient***
    - ***Top down, CG–over–corner***
    - ***Side***
  - ***Puncture tests will be at ambient***

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Certification Test Plan (con't)

- One NCT, 4–ft free drop
- Three HAC 30–ft free drops
  - Two focused on impact
  - One focused on deformation
- Three puncture drops
  - Probably in same free drop orientations
  - Final orientations to be determined based on observed free drop damage
- Thermal Test of Most Damaged CTU

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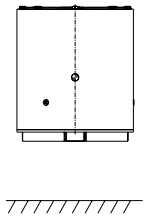
Certification Test Plan (con't)

Free Drop Test	Purpose
Vertical, Bottom Down (cold); NCT & HAC	Max impact to dislodge gamma shield, source capsules
Side (ambient)	Impact to dislodge gamma shield, source capsules
Top Down, CG–over–Corner (ambient)	Max deformation to attempt to damage lock bock assemblies



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Certification Test Plan (con't)

- ***Data collection***
  - ***Temperature of polyurethane foam***
  - ***Normal speed film***
- ***Measurements (pre– and post–test)***
  - ***Crush distance, puncture damage***
  - ***Radiation Dose Rates***
  - ***Photographs***

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Certification Test Plan (con't)

- ***Acceptance Criteria***
  - ***Radiation dose rates comply with 10 CFR §71.51(a)(2)***
  - ***No dislodgement of source capsules***
- ***Discussion***

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Schedule

- *CTU fabrication start – 1st Quarter 2011*
- *Certification testing – November 2011*
- *Submittal of application to NRC for Type B(U)–96 certification – February 2012*
- *Planning on approximately 5 months to first round RAIs*

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IR–THSC Package

- ***Summary Discussion***

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