10-160B License Amendment Request Pre-submittal Meeting

NRC Headquarters, Rockville MD

June 26th, 2013

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Overview

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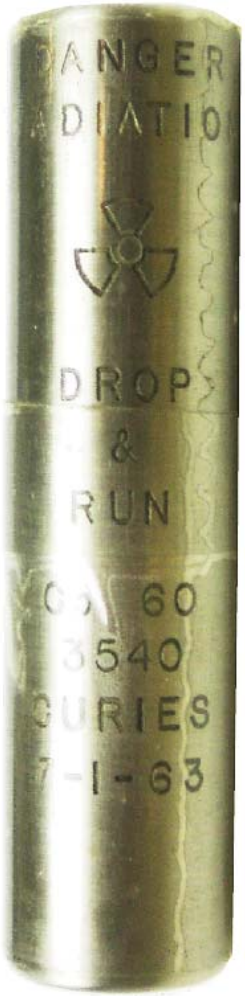
- Purpose for License Amendment Request
- Proposed changes
  - Add a new addendum for a variant of the existing 10-160B ^{60}Co shield insert
    - New insert designated “Shield Insert B”
    - To be used for dry loaded sources (same, but no drain)
    - Intended for source recovery (OSRP program)
    - Handled as a new SAR addendum, since radiological qualification and operational procedures are different.
  - Various revisions to existing ^{60}Co shield insert addendum
  - Changes to the SAR
  - Requested changes to the CoC
- Proposed schedule

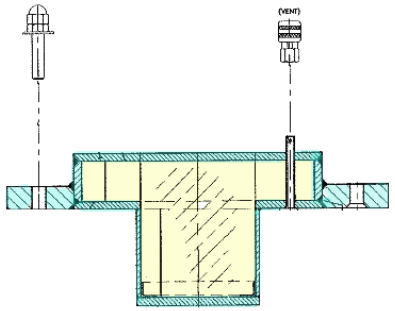
Purpose

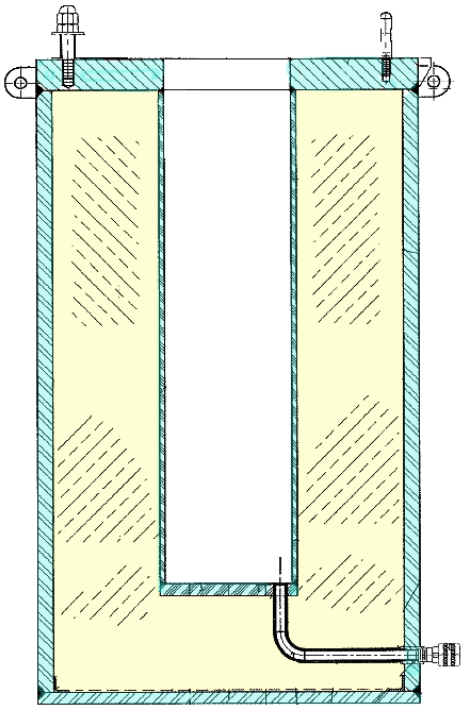
- Initial end-user is the Off-site Source Recovery Project (OSRP)
  - U.S. Government activity sponsored by the National Nuclear Security Administration's (NNSA) Office of Global Threat Reduction
  - Mission is to remove excess, unwanted, abandoned, or orphan radioactive sealed sources that pose a potential risk to health, safety, and national security.
- OSRP will require 10-160B shipments for
  - wet-loaded ^{60}Co sources (using the existing 10-160B shield insert, currently qualified for pencil-type ^{60}Co sources),
  - other sources of varying sizes and isotopes (hence the need for the new insert).



Background

- CoC revision 20 (August 2012) added a shielded insert for a 10,000 Ci ^{60}Co payload and engineered steel cribbing designed to support the insert for NCT & HAC.
- Insert was intended for a Sandia disposal shipment of cobalt pencils (single-use application).
  - OSRP planned to expand the qualification of this insert for different source isotopes and sizes.
  - Decision was made to instead add a drainless model for physically smaller sources.





Proposed Changes – New Shield Insert

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- Add a new “Shield Insert B” SAR addendum.
  - Physically the same as existing insert, but without a drain line, and with some minor fabricability and user enhancements (discussed later).
    - Eliminating drain line minimizes streaming impact for small sources.
  - Same steel cribbing design (drawings revised- discussed later).
  - New addendum generally cloned from existing addendum
    - Chapter 1 descriptions changed, and new insert drawings included (same cribbing).
    - Chapter 5 has new shielding analyses for more general form sources.
    - Chapter 7 changed to remove wet loading operations.
    - Chapter 8 changed to allow reuse.

Shielding Approach

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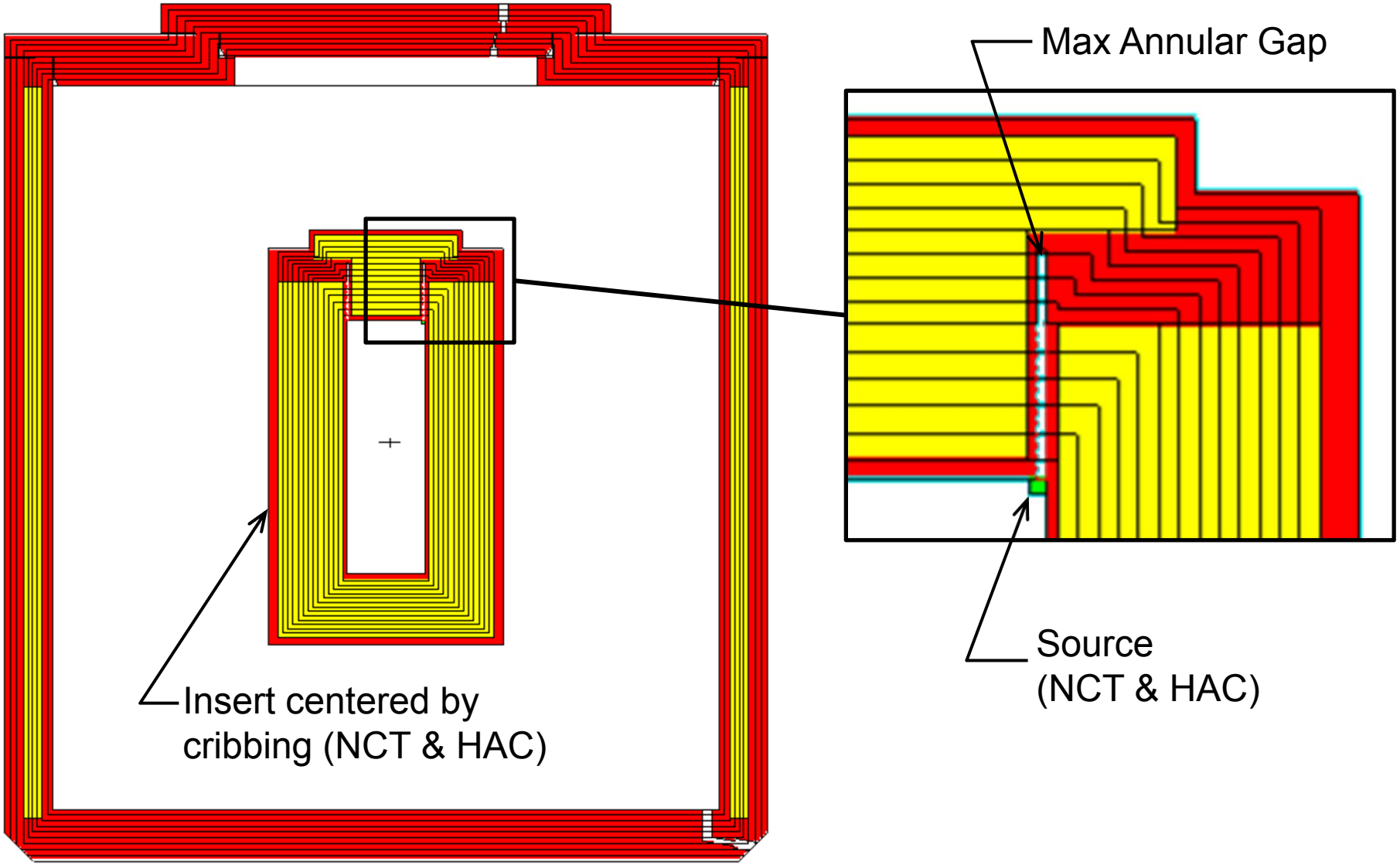
- Standalone from base SAR. Compliant with RIS 2013-04.
- Specific source isotope is not specified in SAR
  - Suites of MCNP runs done for common nuclides (^{60}Co, ^{137}Cs) and various energies (0.5 MeV to 4.0 MeV) like the 8-120B.
  - Significant beta emitters (e.g.,^{90}Sr) handled using equivalent gamma approach like the 8-120B.
  - Results used in sum-of-parts fashion like the 8-120B.
- No credit taken for source self-shielding
- MCNP source modeled as a 1cm x1cm cylinder.
  - Sources that fit within the envelope of a 1 cm high by 1 cm diameter cylinder must be encapsulated in a sealed metallic enclosure with no external dimension less than 1 cm in length.

Shielding Model



Shielding Results

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- NCT Preliminary Results

Isotope/ Gamma Energy (MeV)	Limiting Gamma Source (gammas/s)	Peak Surface Gamma Dose Rate (mrem/hr)			
		Package Side Surface	Package Top Surface	Package Bottom Surface	Plane 2m from 8' Trailer Side
Co-60	9.99E+14	2.8	200.0	4.7	0.13
Cs-137	6.49E+17	2.5	200.0	0.03	0.11
0.5	9.69E+19	2.9	200.0	0.0	0.14
0.7	3.01E+17	2.4	200.0	0.1	0.11
0.9	1.74E+16	2.2	200.0	0.7	0.09
1.17	1.77E+15	2.0	200.0	3.2	0.10
1.5	3.45E+14	5.4	200.0	7.5	0.27
1.83	1.26E+14	9.0	200.0	11.1	0.47
2.25	5.47E+13	11.7	200.0	13.8	0.66
2.75	2.89E+13	13.2	200.0	15.8	0.75
3.5	1.59E+13	11.8	200.0	15.5	0.72
4.0	1.27E+13	11.4	200.0	14.9	0.70
10CFR71 Dose Limit		200	200	200	10

Very low since limits are driven by conservative source placement.

Shielding Results

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- HAC Preliminary Results

Isotope/ Gamma Energy (MeV)	Limiting Gamma Source (gammas/s)	Peak Surface Gamma Dose Rate (mrem/hr)		
		Side One Meter Surface	Top One Meter Surface	Bottom One Meter Surface
Co-60	9.99E+14	0.4	93.0	2.2
Cs-137	6.49E+17	0.5	86.9	0.02
0.5	9.69E+19	0.6	84.0	0.0
0.7	3.01E+17	0.5	88.1	0.0
0.9	1.74E+16	0.4	89.0	0.3
1.17	1.77E+15	0.4	91.7	1.4
1.5	3.45E+14	0.8	93.6	3.5
1.83	1.26E+14	1.4	94.8	5.4
2.25	5.47E+13	1.9	96.3	6.7
2.75	2.89E+13	2.2	95.9	7.7
3.5	1.59E+13	2.1	96.5	7.8
4.0	1.27E+13	2.0	95.4	7.5
10CFR71 Dose Limit		1000	1000	1000

All 1/10th of limit or less.

Shielding Results

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- This list of the 5 most common OSRP radionuclide sources shows that heat or A_2 governs, not shielding.

Isotope	Maximum Allowable Activity (Ci)	Peak Dose Rate Fraction	Heat Generation (watts)	Total A_2	Max NCT Dose Rate (mrem/hr)	Max HAC Dose Rate (mrem/hr)
Co-60	12,970	0.961	**200**	1179	192.2	89
Cs-137	40,568	0.002	**200**	2536	0.4	small
Ir-192	32,626	0.001	**200**	2039	small	small
Se-75	82,988	0.000	**200**	1025	small	small
Sr-90	24,300	0.389	163	**3000**	77.8	37
Maximum Allowable Value =		1.000	200	3000	200	1000

Changes to the Existing Insert Addendum

Proposed Changes – Existing Insert Addendum

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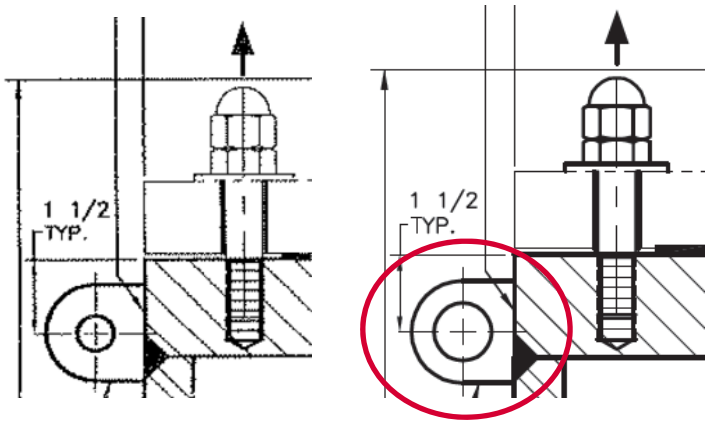
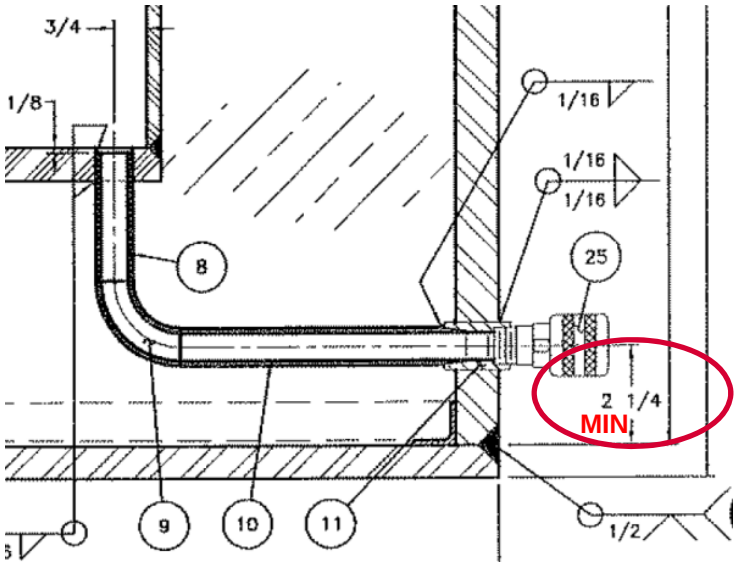
- Change name to “Shield Insert A” since we are adding another insert.
- Revise SAR drawings (insert and cribbing) for fabricability and user issues- no changes to safety bases.
- Allow insert reuse.
- ES corrective action- revise shielding analysis
  - Existing analysis was done for a slightly different drain line geometry - no change to safety bases.
- General editorial and housekeeping corrections.

Proposed Changes – Existing Insert Addendum

- Insert SAR drawing changes:
  - Change lifting lug to allow standard shackle size.
  - Change drain height spec.
  - Modify acorn nut for improved underwater handling.
  - Modify gasket (non-containment).
  - Change lid closure weld backing ring details for fabricability.
  - Revise stenciling.
  - Delete notes 14 & 15





14. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE NOMINAL WITH MAXIMUM TOLERANCES OF ± 1/4", ANGLES ARE ±5°.

15. ALL LISTED MATERIAL AS SHOWN OR AN ENERGYSOLUTIONS APPROVED EQUAL.

Proposed Changes – Existing Insert Addendum

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- Cribbing SAR drawing changes:
  - Remove unnecessary tolerances as appropriate for SAR drawings.
  - No change to safety basis.

Proposed Changes – Existing Insert Addendum

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- Addendum changes:
  - General changes
    - Change name to “Source Insert A”
    - Editorial cleanup
  - Chapter 1
    - Revise SAR drawings for insert and cribbing
  - Chapter 5
    - Replace with revised shielding analysis for “L” shaped drain line.
  - Chapter 8
    - Add maintenance requirements (reusable insert now).
    - Add permission to use threaded inserts for thread repairs (like 8.3.5.1 of the 8-120B SAR).

Changes to the 10-160B Base SAR

Base SAR Changes

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- Editorial cleanups
  - Add permission to use threaded inserts for thread repairs (like 8.3.5.1 of the 8-120B SAR).
  - Section cross references
  - Clarify in Chapter 7 that the vent port leak test is required whether or not seal is broken.

Requested Changes to the CoC

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- Correct maximum payload weight in 5(b)(2)(vi)
  14,500 lbs should read 14,250 lbs

Schedule

- Desired CoC issuance date is on or before December 13, 2013 (5 months).

- Proposed milestone dates:
  - Submit license amendment request July 11, 2013
  - CoC Revision 21 effective December 13, 2013