ENERGY*SOLUTIONS*

26 July 2012
EL&P-027-12

Mr. Pierre Saverot
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Amendment Requests for Certificate of Compliance No. 9204 for the Model 10-160B Package and No. 9168 for the Model 8-120B Package
Docket No. 71-9204 and 71-9168

Dear Mr. Saverot:

Energy*Solutions* submitted amendment requests on June 25 for the 8-120B and 10-160B casks. Due to issues with the format of the electronic media provided, these requests were rejected by NRC Document Control. These requests were replaced in their entirety by our submittals of July 20, 2012. Please discard the June 25 submittals.

Should you or members of your staff have questions about this request, please contact me at mswhittaker@energysolutions.com or Mirza Baig at mibaig@energysolutions.com.

Sincerely,

MirzaBaig for Mark Whittaker

Mark Whittaker
Sr. Health Physicist, Radiological Services

Suite 100, Center Point II
100 Center Point Circle
Columbia, South Carolina 29210

NMSS01

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SUBJECT: Amendment Request for Certificate of Compliance No. 9204 for the Model 10-160B Package
Docket No. 71-9204

Dear Mr. Saverot:

Per our discussion, Energy*Solutions* provides the attached revisions of the Table of Contents and Chapter 7 of the 10-160B Safety Analysis Report (SAR), Consolidated Revision 4 as a replacement for these two documents provided with our July 20 submittal. Please discard the July 20 versions of the ToC and Chapter 7 and substitute the documents provided in this submittal.

Should you or members of your staff have questions about this request, please contact me at mswhittaker@energysolutions.com or Mirza Baig at mibaig@energysolutions.com.

Sincerely,

MFanBaig for Mark Whittaker

Mark Whittaker
Sr. Health Physicist, Radiological Services

Attachments:
- SAR Table of Contents and Chapter 7

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100 Center Point Circle
Columbia, South Carolina 29210

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ACRONYMS AND ABBREVIATIONS

CSI ..	Criticality Safety Index
HAC	Hypothetical Accident Conditions
ID	Inside Diameter
MCNP	Monte Carlo N-Particle (computer code)
NCT.	Normal Conditions ofTransport
OD...	Outside Diameter
SAR.	Safety Analysis Report (for packaging)
SS	Stainless Steel

7.0 OPERATING PROCEDURE

This chapter describes the general procedure for loading and unloading of the 10-160B cask.

An optional steel insert may be used to shield the contents of the cask. The appropriate thickness of insert that should be used is determined from calculations and experience with previous, similar shipments. However, the insert must be thick enough so that dose rates on the exterior of the cask do not exceed the limits of 10 CFR 71.47, but must be no thicker than the maximum permissible size described in section 1.0.

The maximum permissible activity, for gamma emitting radionuclides, is the maximum activity in gammas/sec, determined per Attachment 1. For other radionuclide contents, the maximum activity is that which meets the decay heat limit of 200 watts. Radioactive contents are to be transported as exclusive use, per 10 CFR 71.4.

The maximum permissible payload of the cask is 14,250 pounds, including contents, secondary containers, shoring, and optional steel insert (if used).

For contents that could radiolytically generate combustible gases, the criteria of Section 4.8 must be addressed. For DOE TRU waste, compliance with the 5% hydrogen concentration limit shall be demonstrated by the methods discussed in Appendix 4.10.2. For other contents, which exceed the 5% concentration limit, the procedures in Section 7.4 can be used to satisfy the criteria of Section 4.8.

Powdered solids shipments require the cask to be leaktight. The most recent periodic leak test must meet the requirements of Chapter 4, Section 4.9, Periodic Verification Leak Rate Determination for Leaktight Status.

7.1 Procedure for Loading the Package

7.1.1 Initial Preparation

7.1.1.1 Remove Impact limiter and Secondary Lid Thermal Shield

7.1.1.1.1 Loosen and disconnect ratchet binders from upper impact limiter.

7.1.1.1.2 Using suitable lifting equipment, remove upper impact limiter. Care should be taken to prevent damage to impact limiter during handling and storage.

7.1.1.1.3 Remove the three pins from secondary lid lift lugs.

7.1.1.1.4 Using suitable lifting equipment, remove the secondary lid thermal shield. Care should be taken to prevent damage to thermal shield during handling and storage.

7.1.1.2 Determine if cask must be removed from trailer for loading purposes. To remove cask from trailer:

7.1.1.2.1 Disconnect cask to trailer tie-down equipment.

7.1.1.2.2 Attach cask lifting ears and torque bolts to 200 ft-lbs ± 20 ft-lbs lubricated.

7.1.1.2.3 Using suitable lifting equipment, remove cask from trailer and lower impact limiter and place cask in level loading position.

NOTE **THE CABLES USED FOR LIFTING THE CASK MUST HAVE A TRUE ANGLE, WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 60°.**

7.1.2 Loosen and remove the twenty-four bolts (24, 1¾" – 8 UN) which secure the primary lid to cask body.

7.1.3 Remove primary lid from cask body using suitable lifting equipment and the three lifting lugs on the secondary lid. Care should be taken during lid handling operations to prevent damage to cask or lid seal surfaces.

NOTE **THE CABLES USED FOR LIFTING THE LID MUST HAVE A TRUE ANGLE, WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 45°.**

NOTE **IN CERTAIN CIRCUMSTANCES, LOADING MAY BE ACCOMPLISHED THROUGH THE SECONDARY LID AND THE PRIMARY LID WILL REMAIN ON. IN THIS CASE, THE FOLLOWING ALTERNATE (A) STEPS WILL BE USED:**

7.1.1.A (ALTERNATE) REMOVE THE IMPACT LIMITER CENTER COVER PLATE. THIS WILL PROVIDE ACCESS TO THE SECONDARY LID AND LIFTING LUGS.

7.1.1.1.A (ALTERNATE)REMOVE THE THREE PINS FROM THE SECONDARY LID LIFT LUGS.

7.1.1.2.A (ALTERNATE)USING SUITABLE LIFTING EQUIPMENT, REMOVE THE SECONDARY LID THERMAL SHIELD. CARE SHOULD BE TAKEN TO PREVENT DAMAGE TO THE SHIELD DURING HANDLING AND STORAGE.

7.1.2.A (ALTERNATE) WORKING THROUGH THE CENTER HOLE IN THE UPPER IMPACT LIMITER, LOOSEN AND REMOVE THE 12 1¾" – 8 UN LID BOLTS WHICH SECURE THE SECONDARY LID TO THE PRIMARY LID.

7.1.3.A (ALTERNATE) REMOVE THE SECONDARY LID USING SUITABLE LIFTING EQUIPMENT AND THE THREE LUGS ON THE LID. CARE SHOULD BE TAKEN DURING LID HANDLING OPERATIONS TO PREVENT DAMAGES TO SEAL SURFACES OR THE LID

7.1.4 Visually inspect accessible areas of the cask interior for damage, loose materials, or moisture. Clean and inspect seal surfaces. Replace seals when defects or damage is noted which may preclude proper sealing.

NOTE **RADIOACTIVELY CONTAMINATED LIQUIDS MAY BE PUMPED OUT, REMOVED BY USE OF AN ABSORBENT MATERIAL, OR VIA DRAIN LINE. REMOVAL OF ANY MATERIAL FLOW INSIDE THE CASK SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED HEALTH PHYSICS (HP) PERSONNEL WITH THE NECESSARY HP MONITORING AND RADIOLOGICAL HEALTH SAFETY PRECAUTIONS AND SAFEGUARDS.**

NOTE **WHEN SEALS ARE REPLACED (INCLUDING SEALS ON THE OPTIONAL VENT AND DRAIN PORTS), LEAK TESTING IS REQUIRED AS SPECIFIED IN SECTION 8.2.2.1.**

7.1.5 Check the torques on the cavity vent and drain line cap screws to determine that the cap screws are properly installed using O-rings. This step is not required if the cask does not have the optional vent and drain lines, or if the tamper seals on the vent or drain lines have not been removed. Torque the cap screws to 20 ± 2 ft-lbs.

7.1.6 Place radwaste material, disposable liners, drums, or other containers into cask and install shoring or bracing, if necessary to restrict movement of contents during transport.

7.1.7 Clean and inspect lid seal surfaces.

7.1.8 Replace the primary lid and secure the lid to the cask body by installing the 24 lid bolts. Ensure that the lid orientation stripe is in alignment with the cask stripe. Torque bolts to 300 ± 30 ft-lbs.

7.1.8.A (Alternate) Replace secondary lid (if removed) and secure to the primary lid with 12 bolts. Ensure that the lid orientation stripe is in alignment with the stripe on the primary lid. Torque the bolts to 300 ± 30 ft-lbs.

NOTE **PERFORM PRESSURE DROP LEAK TEST OF THE CASK PRIMARY LID, SECONDARY LID, VENT LINE, OR DRAIN LINE (AS APPLICABLE) IN ACCORDANCE WITH SECTION 8.2.2.2 PRIOR TO SHIPMENT OF PACKAGE LOADED WITH LARGE QUANTITIES OF LSA MATERIALS OR TYPE B QUANTITIES OF NON-LSA MATERIAL.**

7.1.9 If upper impact limiter was not removed, proceed as follows to install anti-tamper seals and Secondary Lid Thermal Shield

7.1.9.1 Install anti-tamper seals to the designated lid bolts, or to vent and/or drain line plugs (if applicable).

7.1.9.2 Using suitable lifting equipment, lift, inspect for damage and install the secondary lid thermal shield.

7.1.9.3 Install the three secondary lid thermal shield retaining pins into the secondary lid lift lugs.

7.1.10 If cask has been removed from trailer, proceed as follows to return cask to trailer:

7.1.10.1 Using suitable lifting equipment, lift and position cask into lower impact limiter on trailer in the same orientation as removed.

7.1.10.2 Unbolt and remove cask lifting ears.

7.1.10.3 Reconnect cask to trailer using tie-down equipment.

7.1.11 If upper impact limiter was removed, proceed as follows to install anti-tamper seals, secondary lid thermal shield, and upper impact limiter

7.1.11.1 Install anti-tamper seals to the designated lid bolts, or to vent and/or drain line plugs (if applicable).

7.1.11.2 Using suitable lifting equipment, lift, inspect for damage and install the secondary lid thermal shield.

7.1.11.3 Install the three secondary lid thermal shield retaining pins into the secondary lid lift lugs.

7.1.11.4 Using suitable lifting equipment, lift, inspect for damage and install upper impact limiter on cask in the same orientation as removed.

7.1.12 Attach and hand tighten ratchet binders between upper and lower impact limiters.

7.1.13 Cover lift lugs as required.

7.1.14 Install anti-tamper seals to the designated ratchet binder.

7.1.15 Replace center plate on the upper impact limiter (If Removed).

7.1.16 Inspect package for proper placards and labeling.

7.1.17 Complete required shipping documentation.

7.1.18 Prior to shipment of a loaded package the following shall be confirmed:

(a) That the licensee who expects to receive the package containing materials in excess of Type A quantities specified in 10 CFR 20.1906(b) meets and follows the requirements of 10 CFR 20.1906 as applicable.

(b) That trailer placarding and cask labeling meet DOT specifications (49 CRF 172).

(c) That the external radiation dose rates of the 10-160B are less than or equal to 200 millirem per hour (mrem/hr) at the surface and less than or equal to 10 mrem/hr at 2 meters in accordance with 10 CFR 71.47. Perform sufficient surveys to ensure that a non-uniform distribution of radioactivity does not cause the surface or 2m limit to be exceeded.

(d) That all anti-tamper seals are properly installed.

(e) For powdered solids shipments, the most recent periodic leak test demonstrated the cask was leaktight.

7.2 Procedure for Unloading Package

In addition to the following sequence of events for unloading a package, packages containing quantities of radioactive material in excess of Type A quantities specified in 10 CFR 20.1906(b) shall be received, monitored, and handled by the licensee receiving the package in accordance with the requirements of 10 CFR 20.1906 as applicable.

7.2.1 Move the unopened package to an appropriate level unloading area.

7.2.2 Perform an external examination of the unopened package. Record any significant observations.

7.2.3 Remove anti-tamper seals.

7.2.4 Removing Impact limiter and Secondary Lid Thermal Shield

7.2.4.1 Loosen and disconnect ratchet binders from upper impact limiter.

7.2.4.2 Using suitable lifting equipment, remove upper impact limiter. Care should be taken to prevent damage to impact limiter during handling and storage.

7.2.5 Removing Secondary Lid Thermal Shield

7.2.5.1 Remove the three pins from secondary lid lift lugs.

7.2.5.2 Using suitable lifting equipment, remove the secondary lid thermal shield. Care should be taken to prevent damage to thermal shield during handling and storage.

7.2.6 If cask must be removed from trailer, refer to Step 7.1.1.2.

7.2.7 (Optional if vent port installed). Vent cask cavity removing plugs from the vent line.

7.2.8 Loosen and remove the twenty-four (24) 1¾" – 8 UN primary lid bolts.

7.2.9 Using suitable lifting equipment, lift lid from cask using care during handling operations to prevent damage to cask and lid seal surfaces.

NOTE: THE CABLES USED FOR LIFTING THE LID MUST HAVE A TRUE ANGLE WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 45°.

7.2.10 Remove contents to disposal area.

NOTE: RADIOACTIVELY CONTAMINATED LIQUIDS MAY BE PUMPED OUT, REMOVED BY USE OF AN ABSORBENT MATERIAL, OR VIA DRAIN LINE. REMOVAL OF ANY MATERIAL FROM INSIDE THE CASK SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED HEALTH PHYSICS (HP) PERSONNEL WITH THE NECESSARY HP MONITORING AND RADIOLOGICAL HEALTH SAFETY PRECAUTIONS AND SAFEGUARDS.

7.2.11 Assemble package in accordance with loading procedure (7.1.7 through 7.1.17).

7.3 Preparation of Empty Packages for Transport

The Model 10-160B cask requires no special transport preparation when empty. Loading and unloading procedures outlined in this chapter shall be followed as applicable for empty packages. The requirements of 49 CFR 173.428 shall be complied with.

NOTE: EACH PACKAGE USER WILL BE SUPPLIED WITH A COMPLETE DETAILED OPERATING PROCEDURE FOR USE WITH THE PACKAGE.

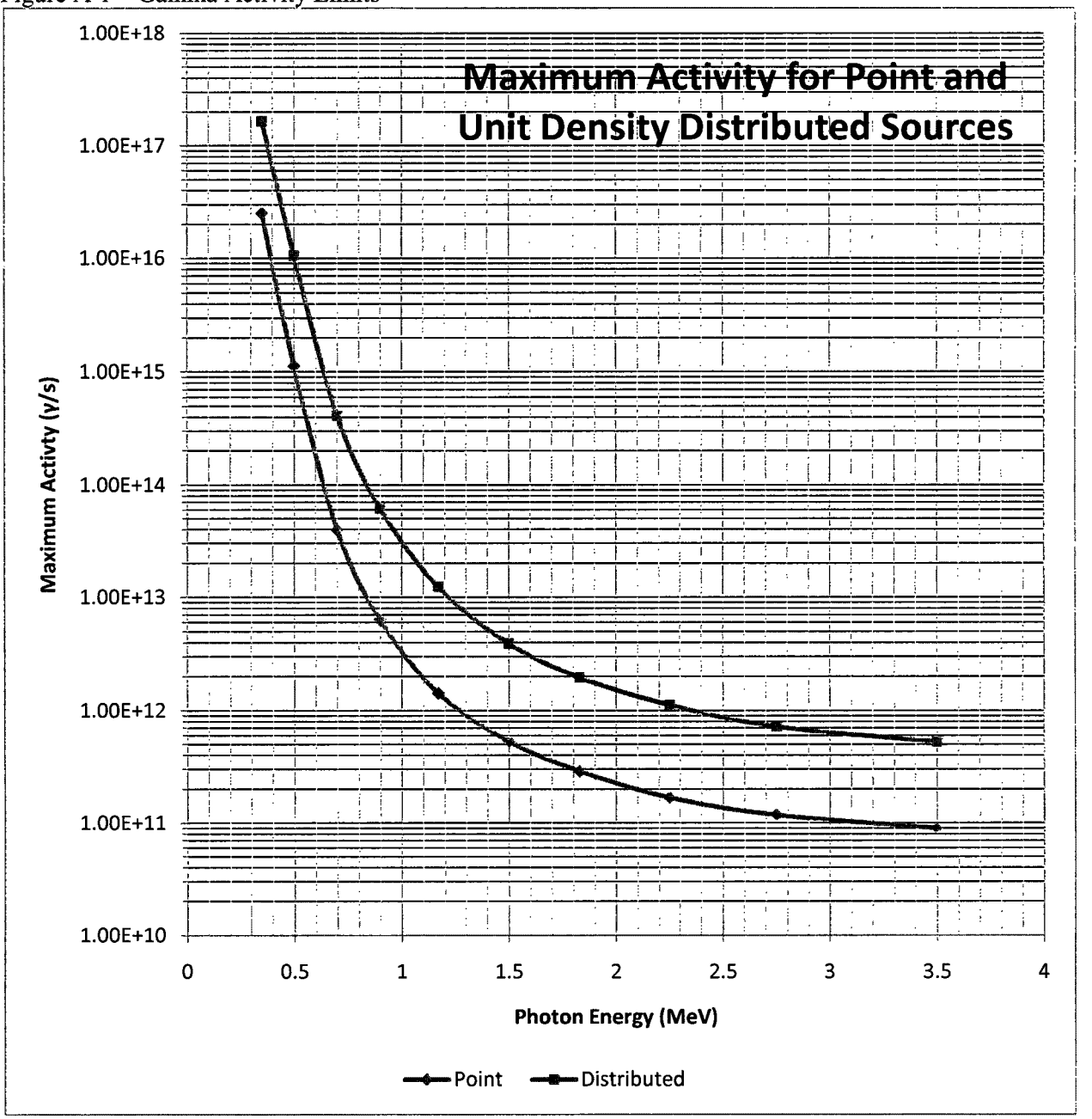
Attachment 1
Determination of Acceptable Activity
(see Chapter 5 for the derivation of the gamma activity limits)

1. Determine the total activity in the contents.
2. Determine if the content should be considered a distributed source. A distributed source is one that meets the definition of "distributed throughout" from NUREG-1608 and has a volume of at least 7.5 ft^3. If the content is a distributed source, determine the density (ρ) of the content, in g/cm^3.
3. Calculate the total gamma/sec for the contents by photon energy. Determine the photons per second for each photon energy, ignoring photon energies below 0.3 MeV. If any photons have energies above 4.0 MeV, the material is unacceptable for transport in the cask. For contents with a large number of gammas, the gammas may be grouped into energy groups and the photons per second determined for the group. Typical energy groupings (in MeV) are: 0.3-0.4, 0.4-0.6, 0.6-0.8, 0.8-1.0, 1.0-1.33, 1.33-1.66, 1.66-2.0, 2.0-2.5, 2.5-3.0, and 3.0-4.0.
4. Determine the unit density gamma activity limit for each photon energy (or for each energy group using the limit at the maximum energy of each photon group) from Step 4 using the plot in Figure A-1. Use the point source or the distributed source limit as appropriate from Step 2.
5. If the content is a distributed source, calculate the Density Correction Factor (DCF) and multiply the unit density gamma limit by the DCF to determine the specific density gamma limit.

   $$DCF = 0.7\ln(\rho)+0.98$$

6. Calculate the sum of fractions, i.e., divide the gamma/sec for each photon energy (or for each energy group) by the limit for that energy (or group) and sum the fractions.
7. If the sum is less than 1.0, the contents meet the activity limits of the CoC.
   Caution: To ensure compliance, a sum of less than 0.9 is recommended.

Figure A-1 – Gamma Activity Limits



Example 1 - Determine the acceptability of a 50 Ci Cs-137 source. The source is a metal capsule 2 cm in diameter and 10 cm long.

Step 1 The activity is 50 Ci

Step 2 The content is not a distributed source

Step 3 Cs-137 produces 0.85 gammas per decay with an energy of 0.66 MeV. The total gamma/sec is 3.7E+10 d/sec per Ci x 0.85 gamma/d x 50Ci = 1.57E+12 gamma/sec. All the gamma would be in energy group 0.6-0.8MeV.

Step 4 The limit for energy group 0.6-0.8 (mid-point energy = 0.7MeV) for a point source is 3.96+13.

Step 5 NA

Step 6 Sum = 1.57E+12 / 3.96E+13 = 0.04
Step 7 Sum is less than 1. The content meets the activity limits.

Example 2 – Determine the acceptability of a secondary container containing 100 ft^3 of solidified process waste. The activity is homogeneously distributed. The measured weight of the waste is 13,100 lbs. The isotopic activity, determined by analysis of samples of the waste, is: ^{60}Co-5 Ci, ^{137}Cs-10 Ci, ^{55}Fe-50 Ci, ^{54}Mn-4 Ci, ^{90}Sr-8 Ci

Step 1 The activity is 77 Ci
Step 2 The contents are a distributed source. The calculated density is 2.1 g/cm^3.
Step 3 See Table below
Step 4 See Table below
Step 5 DCF = $0.7\ln(\rho)+0.98$
DCF = 1.50
Step 6

Group No.	Group Mid-Point Energy (MeV)	Activity (photons/sec)	Unit Density Limit (photons/sec)	Specific Density Limit (photons/sec)	F
1	0.35	0.00E+00	1.66E+17	2.49E+17	0.00E+00
2	0.50	0.00E+00	1.05E+16	1.58E+16	0.00E+00
3	0.70	3.15E+11	4.12E+14	6.18E+14	5.10E-04
4	0.90	1.48E+11	6.18E+13	9.28E+13	1.60E-03
5	1.17	1.85E+11	1.23E+13	1.85E+13	9.99E-03
6	1.50	1.85E+11	3.93E+12	5.89E+12	3.14E-02
7	1.83	0.00E+00	1.97E+12	2.95E+12	0.00E+00
8	2.25	0.00E+00	1.12E+12	1.68E+12	0.00E+00
sum					4.35E-02

Step 7 F is less than 1. Thus, the contents meet the activity limits.