

May 26, 2005

MEMORANDUM TO: Brian Thomas, Deputy Director
Licensing and Inspection Directorate
Spent Fuel Project Office, NMSS

FROM: Shawn Williams, Project Engineer */RA/*
Licensing Section
Spent Fuel Project Office, NMSS

SUBJECT: SUMMARY OF MAY 17, 2005, MEETING WITH THE DEPARTMENT OF
TRANSPORTATION AND MDS NORDION TO DISCUSS THE DESIGN
OF THE MODEL NO. F-458 OUTER CONTAINER AND ITS MULTIPLE
INSERTS

Background

MDS Nordion requested, from the U.S. Department of Transportation (DOT), a revalidation of the Canadian Certificate No. CDN/2078/B(U)-96 for import/export use. DOT requested the U.S Nuclear Regulatory Commission (NRC) recommendation concerning this revalidation. At the request of MDS Nordion, a meeting was held on May 17, 2005, in Rockville, Maryland, to present details of the transport packages Model Nos. F-458/F-245, F-458/F-247, F-458/F-251, F-458/F-251MK, F-458/F-318, and F-458/F-448, including testing and combustible gas generation. Certain portions of the meeting were closed to the public because the staff has determined that the information is proprietary in nature.

The meeting was noticed on April 7, 2005, (ML050980372). The meeting attendance list is provided as Attachment No. 1.

Discussion

MDS Nordion presented the new F-458 testing program and the many different package configurations including the different shielding and leak proof inserts. The proprietary portion of the meeting discussion focused on the radiolysis testing previously done for the F-327 package and explanation on how that applies to the current contents for the F-458. The non-proprietary meeting slides are included as Attachment No. 2.

Docket No. 71-3076
TAC No. L23814

Attachment No. 1: Meeting Attendees
Attachment No. 2: Non-Proprietary Meeting Slides

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Attachment No. 1: Meeting Attendees
Attachment No. 2: Non-Proprietary Meeting Slides

Distribution:

NRC Attendees SBagget
G:\SFPO\Shawn\Public Meetings\Meeting Summary\MDS Nordion Meeting Summary May 17.wpd

OFC	SFPO	N	SFPO	C	SFPO	N
NAME	SWilliams		MDebose		RLewis	
DATE	5/25/05		5/25/05		5/26/05	

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**May 17, 2005, Meeting
between
the Department of Transportation
MDS Nordion
and
the Nuclear Regulatory Commission**

MEETING ATTENDANCE LIST

Shawn Williams	NRC/SFPO
Robert Shewmaker	NRC/SFPO
Robert Einziger	NRC/SFPO
Jeremy Smith	NRC/SFPO
Kim Hardin	NRC/SFPO
Nancy Osgood	NRC/SFPO
Ron Parkill	NRC/SFPO
Tze-Jer Chuang	NRC/SFPO
Jill Calverly	NRC/SFPO
Mahendra Shah	NRC/SFPO
Gordon Bjorkman	NRC/SFPO
Fred Ferate	DOT
Marc-Andre Charette	MDS Nordion
Michael Krzaniak	MDS Nordion

Attachment No. 2
Non-Proprietary Meeting Slides



F-458 Family of Packages CDN/2078/B(U)-96 (USA/0697/B(U)-96)

United States Nuclear Regulatory Commission
Rockville, MD
May 17, 2005

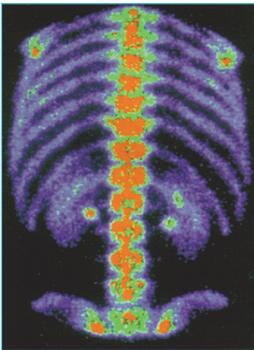


Outline

- Nuclear Medicine in the USA
- F458 Family Description
- Qualification Testing
 - Drop Tests
 - Fire Test
- Radiolysis



Nuclear Medicine



- MDS Nordion is a world leader in the supply of radioisotopes used in Nuclear Medicine
- 14 million nuclear medicine procedures are performed annually in the USA
 - Primarily Mo-99 (Tc-99m), I-131 and Xe-133
 - Used to diagnose heart disease, cancer and bone infections
 - 500,000 people die each year in the USA from coronary heart disease
 - About 100,000 are treated annually using I-131
- The F458 family of packages is key to assuring the future supply of these critical isotopes.



F458 Family of Packages

- F458 “Overpack” provides thermal and impact protection
- Multiple “Shielding Vessels” may be used inside depending on the contents and their activity
- Each shielding vessel may contain a supplemental internal shield – generally only used for Ir-192
- Each shielding vessel includes a containment system
 - For liquids, this is called a leak proof insert (LPI)
 - For some isotopes it includes a sealed source which may be certified as Special Form



Qualification Testing

- Full scale drop testing of enhanced weight prototypes
 - 3 specimens, Five 9 meter drops and Ten 1 meter pin drops
 - Witnessed by CNSC
- Full scale fire test
 - Worst case inner shielding vessel
- Helium leak tests, before & after.



Test Sequence (Serial No 6)

1. 1 m pin drop against the bottom with the F-458 at a 45° angle.
2. 9 m upright free drop against the bottom of the specimen.
3. 1 m pin drop against the bottom with the F-458 at a 45° angle.
4. 1 m pin drop against the side.
5. 1 m pin drop against the side with the F-458 at a 45° angle.
6. 1 m pin drop against the side with the F-458 at a 45° angle.
7. Helium Leak Test

Radiolysis

- Relevant US Certification History
- Regulatory framework
- Pressure Buildup
- Package Safety
- Conclusion

Summary

- USNRC originally raised the issue of flammable gas generation during F327/F448 review. The same considerations apply to the F458 family.
- MDSN submitted additional information that eventually led to the certification of the F327/F448 by USDOT
- Review previous discussion and discuss applicability to F-458

NUREG 1609

- “Nothing contained in this plan may be construed as having the force and effect of NRC regulations”
- “Because of the large variety of packages, and the many different approaches that can be taken to evaluate these package designs, no single review plan can address in detail every situation that might be applicable to a review. Staff may need to modify or expand the guidance in this review plan to adapt to specific package designs”
- NRC has already suggested alternative approach to the one year requirement
 - Not flammable within twice the expected transport period

Containment

- MDSN contends that even if the most conservative flammable gas mixture was present, containment would be maintained under the normal and accident conditions of transport

Conclusion

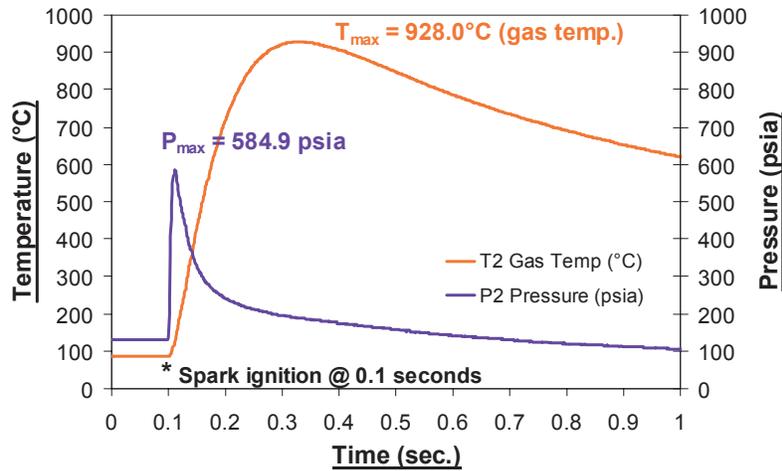
- Worst case assumptions have been used to demonstrate that containment is maintained by the leak proof inserts, even if a worst-case mixture of flammable gas exists, and even if it explodes.
- NRC staff should exercise the discretion allowed by NUREG-1609 to approve alternative means to demonstrate compliance with 10 CFR Pt 71.

What if a spark is present?

- It is not possible for a spark to be present.
- If the mixture is sparked, and if it is flammable, there may be an explosion, with a corresponding pressure and temperature transient
- Energy released is proportional to the amount of hydrogen present
 - Unlikely to be stoichiometric (the worst case)
 - Off-stoichiometric mixtures absorb energy in non-reacting gases

Package Safety

Explosion pressure tests (spark-induced)



Explosion Pressure Summary

- Experiments show a short-duration pressure rise of about 600 psia for a stoichiometric mixture
- A safety margin greater than 150 psi exists under these conditions for all leakproof inserts used in the F-458
 - F-320 tested to more than 750 psi all other inserts are stronger.
- The safety margin is even greater when one considers the likelihood of a stoichiometric mixture