




## SAFKEG-HS 3977A

### SAR Update Matrix for Addition of Liquid I-131

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## 1 Notes on methodology and content

This Update Matrix (CTR 2015/17) details the changes in the SAFKEG-HS 3977A SAR in updating from Rev 5 to Rev 6.

The update to SAR Rev 6 is to allow I-131 in liquid form to be carried in the steel insert, as listed in Contents Type 5. It also allows the correction of minor errors in the SAR and the alteration of the O-ring grooves in the containment vessel.

This Update Matrix (CTR 2015/17) provides the following.

- Justification for the changes in the SAFKEG-HS 3977A SAR in updating from Rev 5 to Rev 6
- Details of SAR changes - List of all changes to the SAR - Table 1
- Question and Response Matrix Table – Table 2 [Blank at this stage]
- List of SAR page changes [Appendix B]

It is proposed that this document (CTR 2015/17) will be updated to include responses to any further questions and will thereby fully document all issues including any questions and responses for the entire SAR update.

## 2 Justification for the changes in the SAFKEG-HS 3977A SAR in updating from Rev 5 to Rev 6

MURR wish to carry liquid I-131 in the stainless steel insert. The update to SAR Rev6 is to allow the inclusion of I-131 to the contents list of contents Type 5. While the SAR is being updated the opportunity is taken, to relax the tolerance on the containment seal the groove sizes and clarify the replacement of damaged keg studs.

### 3 SAR Changes

This table contains notes on all the SAR Page Changes and supporting Document Changes for Rev 6 (from Rev 5).

**Table 1 Summary of SAR Page Changes and Supporting Document Changes for Rev 6**

Summary of SAR Page Changes and Supporting Document Changes for Rev 5			
SAR Page or Doc	Location	Change	Reason for Change
Chapter 0 - Contents			
All pages	Header	Page Rev status amended to Rev 6  All changes are shown in red and sidelined.	Changes required solely to record the current issue status of SAR pages and references.
Page 0-2	Table	Name amended	Editorial/Update.
Page 0-2	Date box	Date amended	Update.
Page 0-5	Documents in section 1.3.3	The drawings have been updated; the changes made are discussed in Croft change control document M869, attached to this application. The main change of note is the change to the tolerance of the O-ring grooves on the containment vessel lid.	This change is required due to issues experienced during manufacture. The change will not affect containment, indeed the current non conforming units have been pressure and helium leak tested and passed, demonstrating their containment ability.
Chapter 1 - General Information			
Page 1-12	Table 1-1	The mass of the steel insert has been altered along with the maximum mass of the insert plus contents. The final column has been removed from the table	The mass of the steel insert given in the table was incorrect. The final column was removed because this was confusing to users.

<b>Summary of SAR Page Changes and Supporting Document Changes for Rev 5</b>			
<b>SAR Page or Doc</b>	<b>Location</b>	<b>Change</b>	<b>Reason for Change</b>
Page 1-13	Figure 1-5c	Figure 1-5c has been updated.	The design of the steel insert has been altered to accommodate liquid I-131 contents.
Page 1-14	Table 1-2	The title of the steel insert has been altered	The steel insert internal dimensions have altered; this caused the name of the insert to change.
Page 1-19	Table 1-3-6	Leak testing after loading was removed from the table. Name of insert was altered	This is discussed on the page 7-4 line.
Page 1-30	Table 1-4-5	I-131 was added to the liquid contents table	MURR would like to carry liquid I-131 in the HS package.
Page 1-36	Section 1.3.2	Calculation drawing was added for the updated stainless steel insert	To include drawing of the stainless steel insert
Page 1-37	Section 1.3.3	A licensing drawing for the stainless steel insert was added to the drawing list.	The liquid I-131 contents will be contained in the stainless steel insert.
<b>Chapter 2 - Structural Evaluation</b>			
Page 2-25	Section 2.3.2	O-ring test removed	During the original application the O-ring material was changed and therefore this test should have been removed. This error is corrected in this application.
<b>Chapter 3 - Thermal Evaluation</b>			
Page 3-15	Section 3.3.2	Gas generation calculations for liquid I-131 added.	The gas generation rates are provided to allow the inclusion of I-131 liquid.

<b>Summary of SAR Page Changes and Supporting Document Changes for Rev 5</b>			
<b>SAR Page or Doc</b>	<b>Location</b>	<b>Change</b>	<b>Reason for Change</b>
Page 3-15a	Section 3.3.2	Extra page added to allow for the text regarding hydrogen generation.	The gas generation rates are provided to allow the inclusion of I-131 liquid.
Page 3-19	Section 3.4.3	Inclusion of hydrogen pressure in the HAC pressure calculation.	This pressure is required to demonstrate the addition of I-131 will not increase the pressure above the design pressure.
Page 3-22	Section 3.5.2	MURR report added.	This report provides hydrogen generation rates for the MURR I-131 liquid.
Chapter 4 - Containment Evaluation			
None		None	
Chapter 5 - Shielding Evaluation			
5-3	Figure 5-4	Title altered and drawing updated.	The cavity of the steel insert has been altered causing a change to the title and drawing.
5-5	Table 5-1	Outer surface of the truck added to table.	Added to make clear where the dose point measurement is taken. This was left blank in revision 5
5-6	Section 5.3.1	Addition of shielding report for I-131 in a steel insert	This allows the inclusion of I-131 onto the approved contents list.
5-7	Section 5.4.1	Addition of I-131 shielding calculation.	This allows the inclusion of I-131 onto the approved contents list.
5-8	Section 5.4.1	Addition of I-131 shielding calculation.	This allows the inclusion of I-131 onto the approved contents list.
5-10	Figure 5-6	Change to figure title.	To clarify this figure is for a

<b>Summary of SAR Page Changes and Supporting Document Changes for Rev 5</b>			
<b>SAR Page or Doc</b>	<b>Location</b>	<b>Change</b>	<b>Reason for Change</b>
			tungsten insert
5-10a	Figure 5-7	New figure added.	This figure shows the source locations for the steel insert shielding calculations.
5-11	Section 5.4.1	Addition of the word tungsten.	Clarifies which shielding report is being discussed.
5-12	Section 5.4.2	Addition of I-131 shielding calculation.	Allows MURR to ship liquid I-131.
5-13	Section 5.5.1	Addition of I-131 shielding calculation.	This allows the inclusion of I-131 onto the approved contents list.
5-14	Section 5.5.3	Addition of I-131 shielding calculation.	This allows the inclusion of I-131 onto the approved contents list.
5-16	Section 5.5.4.1.2	Addition of I-131 shielding calculation.	This allows the inclusion of I-131 onto the approved contents list.
5-16a	Table 5-12 and Table 5-13	Addition of I-131 shielding calculation results.	This allows the inclusion of I-131 onto the approved contents list.
5-17	Table 5-14	Addition of I-131 to table	This allows the inclusion of I-131 onto the approved contents list.
5-19	Section 5.5.6	Addition of I-131 shielding report to supporting documents list.	Added on this application to allow the addition of I-131 to the approved contents list.
Chapter 6 - Criticality Evaluation			
None		None	
Chapter 7 - Operating Procedure			
7-4	Section 7.1.2	Leak testing of the insert when	Bubble leak testing an insert with

<b>Summary of SAR Page Changes and Supporting Document Changes for Rev 5</b>			
<b>SAR Page or Doc</b>	<b>Location</b>	<b>Change</b>	<b>Reason for Change</b>
		loading liquids is now prior to loading the contents. This allows leak testing to be carried out without active contents.	loaded radioactive liquid contents presents an unnecessary risk to operators. Leak testing prior to loading demonstrates that the sealing system is effective. The inserts have match marks to ensure that they are correctly closed so there is no mechanism to lead to the contents leaking.
Page 7-4a	Section 7.1.2	Extra page	Accommodating the change on page 7-4 required an extra page.
Chapter 8 - Acceptance Tests & Maintenance Program			
Page 8-7	Section 8.2.3.2	Page Rev status amended to Rev 6  Addition of the use of an equivalent threadlocker Loctite 263 to position the studs.  Allow the replacement of any damaged keg closure studs	Loctite 270 is difficult to source in the US so we have allowed the use of Loctite 263. Loctite 263 has the same properties as Loctite 270.  The keg studs can be replaced if damaged in accordance to section 8.2.3.2 (8), however MURR requested that we clarified the replacement of studs by adding this extra sentence.
Page 8-7a		Page Rev status amended to Rev 6 Extra page added	Accommodates the change added in point 4



#### 4 NRC Questions and Croft Responses

This section is provided to document all NRC Questions and Croft Responses.

**Table 2 - Question and Response Matrix Table**

<b>Q#</b>	<b>Review Question</b>	<b>Croft Response</b>	<b>Changed Item</b>
	None at this stage.		

**Appendix A          New or edited SAR pages provided in the SAR at Rev 6**

<b>Chapter</b>	<b>Pages</b>
0	All (0-1 to 0-13)
1	12-14, 19, 30, 36-37
2	25
3	15, 15a, 19
5	3, 5-8, 10-14, 16-19
7	4, 4a
8	7, 7a

**Appendix B New or edited Supporting Documents provided in the SAR at Rev 6**

Related SAR Section or Doc	Document Reference		Title
<b>Chapter 1 - General Information</b>			
<b>Documents in Section 1.3.2, Computational Model Drawings</b>			
Addition	3C-6852	B	HS-55x128-SS Insert Design No.3987 (Construction)
<b>Documents in Section 1.3.3, Licensing Drawings<sup>1</sup></b>			
Update	1C-5940	F	Cover sheet for Safkeg-HS design No. 3977A (licensing drawing)
Update	0C-5941	E	Keg design no.3977A (licensing drawing)
Update	0C-5942	C	Keg Design No.3977 (licensing drawing)
Update	1C-5945	D	Containment vessel lid (licensing drawing)
Update	1C-5946	E	Containment vessel body (licensing drawing)
Update	2C-6176	D	HS-55x128-SS insert design no 3987 (licensing drawing)
<b>Documents in Section 1.3.4 Supporting Documents</b>			
Update	PCS 036	E	Package Contents Specification for Safkeg-HS - Package Design No 3977A
<b>Chapter 3 – Containment</b>			
<b>Documents in Section 4.5.2</b>			
Addition			Hydrogen Generation Analysis – MURR Technical Note
<b>Chapter 5 – Shielding Evaluation</b>			
<b>Documents in Section 5.5.2</b>			
Addition	AMEC/CRM3732 7/TN_001	1	HS Container Shielding Assessment with I-131

<sup>1</sup> Information regarding the drawing changes can be found in M869 Issue A attached to this application