

COSHH Risk Assessment Form

1) Department: MRI

Ref no:

Substance / Activity

Substance: United Imaging Healthcare MRI phantoms. Please inform MRI Physics if any vendor phantoms are not included in this list.

Table 1: United Imaging Health MRI phantom solutions separated into Nickel-free (left) and Nickel-based (right) solutions. Boxes with a grey background require vomiting to be induced if ingested.

Nickel-free solutions:	Nickel-based solutions:		
D250 phantom	BRC phantom		
	High-density BRC phantom		
	FAC phantom		
	D150 phantom		
	D30 phantom		
	HNC phantom		
	SPC phantom		
	WRC phantom		

Work Activity: MRI scanner quality control measures using sealed phantom / test objects which contain the above substances

Is there a safe system of work for the activity?	Yes
Can the hazardous substance be substituted with a safer alternative?	No

Product / Trade Name / Mixture etc	Hazard Classification (Corrosive, Irritant, Toxic, Hazardous to the environment, Health Hazard, Explosive, Oxidising, etc)	Chemical Nature (Aerosol, dust, fume, gas, liquid, powder, etc)	Route of Entry / Exposure (Absorption, Ingestion, Inhalation, Injection, Splash)
BRC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion

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High-density BRC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
FAC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
D250 phantom Mineral oil	Toxic (may be fatal if swallowed or enters airways)	Liquid	Inhalation, absorption or ingestion
D150 phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
D30 phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
HNC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
SPC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion
WRC phantom NiSO ₄ ·6H ₂ O, NaCl, H ₂ O	Toxic in large quantities, irritant and hazardous to the environment	Liquid	Inhalation, absorption or ingestion

Individuals or groups exposed	Radiographers, Healthcare Support Workers, Physicists, Domestics
Duration of exposure eg. hours / day	Work activity lasts <2mins per day. Exposure should not occur. Exposure will only occur if sealed source used during the work activity is compromised i.e. the test object is broken.
Estimated level of exposure*	Low

*Contact Occupational Hygienist / Health & Safety Practitioner for advice if required

Does the substance have a Workplace Exposure Limit? (WEL)	No
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*Contact Health & Safety Practitioner for advice if required

Is a Safety Data Sheet Available?	Yes
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2) Existing Precautions

Summarise current controls in place Include any procedures for Storage, Transport, Handling, Disposal and Maintenance as well as the general use of the substance.	Describe how they might fail to prevent adverse outcomes.
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Phantom liquid is in a sealed container. Exposure would only occur if container is damaged. Damaged phantoms must not be used. Any spillages to be highlighted to all staff in immediate vicinity until spillage is removed such as to avoid slips and falls Leaking or damaged phantoms will be reported to the manufacturer with a view to obtaining a replacement. Ensure staff are aware of how to safely dispose of the test object and its contents should it become be damaged or broken. This might be through MR local rules, separate guidance (e.g. a SOP) or educational briefing.	Adverse outcomes would only be possible if the phantom develops a leak or is damaged (e.g. dropped). However, this is not in itself an adverse outcome. The following would need to also occur in addition to the above for an adverse outcome to occur. The appropriate disposal and cleaning protocol was not known or was not followed. Personal protective equipment used during disposal failed. Someone was able to ingest the liquid.
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Emergency Procedures	
<u>First Aid</u> Remove contaminated clothing at once. Seek medical assistance immediately if allergic reaction is observed, particularly in the respiratory tract. Show the relevant safety data sheet to the doctor in attendance. Inhalation: Get some fresh air. If irritations, dizziness or nausea occur, seek medical assistance. Skin contact: Wash thoroughly with soap and water. If symptoms persist, seek medical assistance. Eye contact: Flush with plenty of water while holding eyelids apart for at least 15 minutes. Seek medical assistance. Ingestion: For solutions shaded in grey in Table and all Nickel-based solutions, excluding Immediately drink plenty of water. Induce vomiting. Seek medical assistance For all other phantoms, do not induce vomiting: • seek medical attention immediately.	<u>Spillages</u> Avoid skin and eye contact as well as the inhalation of aerosols (use appropriate PPE). Take up with sand, sawdust or all-purpose binder. Wash after with water. Do not allow to enter sewage system, groundwater or soil. To prevent entering into sewage system, water sources or surface water, establish a barrier of sand, earth or other appropriate measures. Inform the local authorities if the entering cannot be avoided. Ensure compliance with disposal regulations.

- flush mouth with water, danger of aspiration and seek medical assistance.
- For all others immediately drink plenty of water and seek medical assistance.

Self-protection of the first aider: Avoid skin contact.

Information to physician: Phantoms containing Nickel Sulphate (listed on the right of Table 1): may cause sensitization by inhalation and skin contact.

Phantoms containing Mineral Oil (if aspirated into the lungs, the preparation may cause chemical pneumonitis.

3) Level of Risk

Is the control of this risk adequate? Give more than one risk level if the assessment covers a range of circumstances. You can use the 'matrix' to show how 'likelihood' and 'consequences' combine to give a conclusion. Also, be critical of existing measures: if you can think how they might fail, or how they could be improved, these are indications of a red or orange risk.

Risk Matrix

<u>Likelihood</u>	<u>Impact / Consequences</u>				
	Negligible	Minor	Moderate	Major	Extreme
Almost Certain	Medium	High	High	V High	V High
Likely	Medium	Medium	High	High	V High
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	<u>Low</u>	Medium	Medium

Very High
 High
 Medium
 Low

Health Surveillance / Atmospheric Monitoring	
Is Health Surveillance or Atmospheric Monitoring of staff required? (If yes, contact the Occupational Health Service/ Occupational Hygienist)	No

New & Expectant Mothers	
Are additional control measures required for new & expectant mothers?	Yes
If yes, please specify: New and Expectant Mothers should not clean up any spillages due to (albeit low) risk of aerosols.	

4) Action Plan - if risk level is High (Orange) or Very High (Red)

Use this part of the form for risks that require action. Use it to communicate, with your Line Manager or Risk Coordinator or others if required. If using a copy of this form to notify others, they should reply on the form and return to you. Check that you do receive replies.

Describe the measures required to make the work safe. Include hardware – engineering controls, and procedures. Say what you intend to change. If proposed actions are out with your remit, identify them on the plan below but do not say who or by when; leave this to the manager with the authority to decide this and allocate the resources required.

Proposed actions to control the problem	By Whom	Start date	Action due date
List the actions required. If action by others is required, you must send them a copy			

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5) Action by Others Required - Complete as appropriate: (please tick or enter YES, name and date where appropriate)

Report up management chain for action	
Report to Estates for action	
Contact advisers / specialists	
Alert your staff to problem, new working practice, interim solutions, etc	

	Designation	Initial Review Date	Review
Assessor	Clinical Scientist (MRI Physics)		As per QPulse record
Manager John McLean	Deputy Head of MRI Physics		

6) Staff Information and awareness

Processes for ensuring staff are aware of the COSHH Risk Assessment. Confirm which will apply:

- Induction processes
- Departmental training
- Departmental meetings
- Health and Safety Committee
- Other local processes (please specify):
 - Put onto the QPulse System and MRI Physics website. MRI modality lead radiographers to be informed and to cascade information to all relevant staff.

Additional United Imaging Healthcare (UIH) MRI Phantoms

The following UIH MRI phantoms are used in quality assurance testing. Each phantom is sealed. Exposure is only possible if the phantom is damaged.

Phantom Name	Volume	Contents
BRC phantom	2115.1 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
High-density BRC phantom	1450 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
FAC phantom	2730 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
D250 phantom	8200 mL	Mineral oil
D150 phantom	1760 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
D30 phantom	21 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
HNC phantom	8200 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
SPC phantom	4200 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O
WRC phantom	1100 mL	NiSO ₄ ·6H ₂ O, NaCl, H ₂ O

Hazard Notes:

- All NiSO₄·6H₂O-based phantoms: Irritant and sensitising by inhalation or skin contact.
- D250 (mineral oil): Aspiration risk — may cause chemical pneumonitis.
- In case of damage, handle with PPE and follow existing emergency procedures outlined in this COSHH form.