

Optimization Strategy in Nuclear Medicine

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Optimization takes part in different stages:

- **Inspections and Audits**
- **Instrumentation**
- **Performance of Diagnostic and Therapy**
- **Education of the Players (e.g. regular renewal of knowledge, Integration of MPE etc.)**
-

Inspections and Audits

- **Must be performed on a regular basis**
- **Radiation protection based on a legal framework**
- **Authorities must have power to carry their duties through**
- **System of support and advice at various levels is existing**

Instrumentation

- **Instrumentation complies with good medical practise**
- **Appropriate quality control starting with installation**

Helpful Publications for QC in Nuclear Medicine

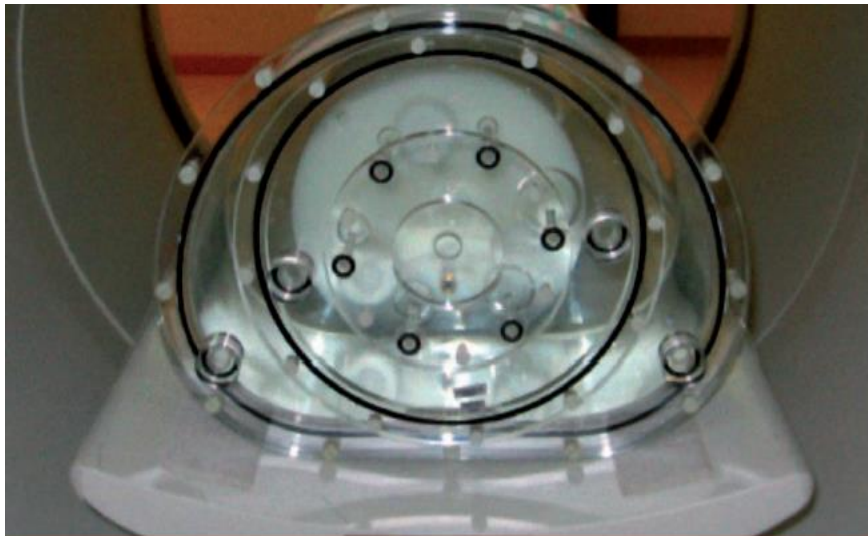
EUROPEAN COMMISSION

RADIATION PROTECTION N° 162

Criteria for Acceptability of Medical Radiological Equipment used in Diagnostic Radiology, Nuclear Medicine and Radiotherapy

Directorate-General for Energy
Directorate D — Nuclear Safety & Fuel Cycle
Unit D4 — Radiation Protection
2012

Helpful Publications for QC in Nuclear Medicine



IAEA HUMAN HEALTH SERIES

No. 1

Quality Assurance for
PET and PET/CT Systems

IAEA Library Cataloguing in Publication Data

Quality assurance for PET and PET/CT systems. — Vienna : International Atomic Energy Agency, 2009.

p. ; 24 cm. — (IAEA human health series, ISSN 2075-3772 ; no. 1)

STI/PUB/1393

ISBN 978-92-0-103609-4

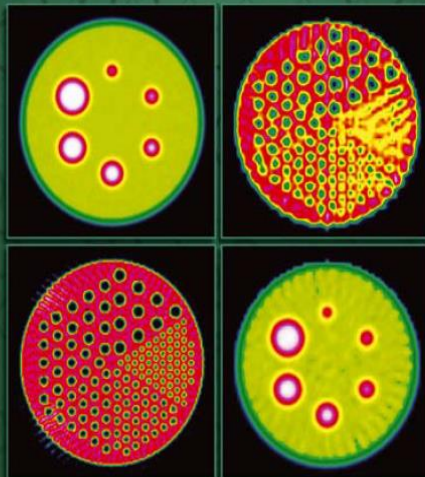
Includes bibliographical references.

1. Tomography — Quality control. 2. Radiography, Medical — Instruments — Quality control. I. International Atomic Energy Agency. II. Series.



Helpful Publications for QC in Nuclear Medicine

IAEA Quality Control Atlas for Scintillation Camera Systems



IAEA Library Cataloguing in Publication Data

IAEA quality control atlas for scintillation camera systems / [compiled by E. Busemann Sokole]. — Vienna : International Atomic Energy Agency, 2003.

p. ; 24 cm.

STI/PUB/1141

ISBN 92-0-101303-5

Includes bibliographical references.

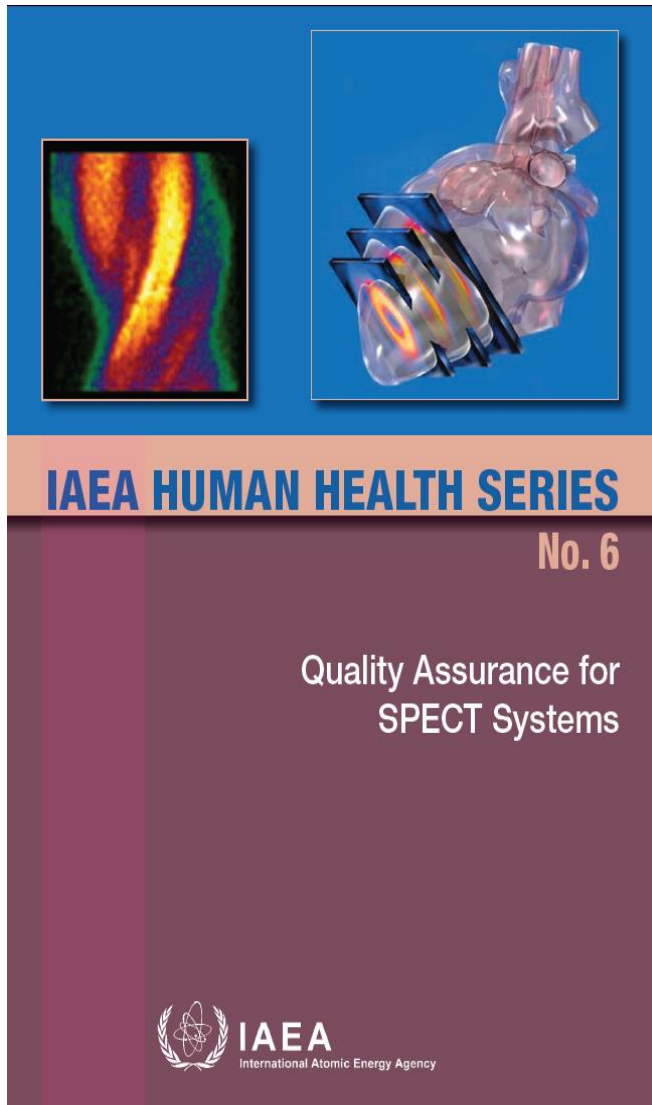
1. Nuclear medicine — Equipment and supplies — Quality control.
2. Scintillation cameras.
3. Imaging systems in medicine. I. Busemann Sokole, E. II. International Atomic Energy Agency.

IAEAL

03-00312



Helpful Publications for QC in Nuclear Medicine



IAEA Library Cataloguing in Publication Data

Quality assurance for SPECT systems. — Vienna : International Atomic Energy Agency, 2009.

p. ; 24 cm. — (IAEA human health series ; ISSN 2075-3772 ; no. 6)

STI/PUB/1394

ISBN 978-92-0-103709-1

Includes bibliographical references.

1. Single photon emission computed tomography — Quality control.

I. International Atomic Energy Agency. II. Series.

IAEAL

09-00585



Helpful Publications for QC in Nuclear Medicine

IAEA-TECDOC-1599

Quality Control Procedures Applied to Nuclear Instruments

*Proceedings of a Technical Meeting
Vienna, 23–24 August 2007*



IAEA
International Atomic Energy Agency

September 2008

QUALITY CONTROL PROCEDURES APPLIED TO NUCLEAR INSTRUMENTS

IAEA, VIENNA, 2008

IAEA-TECDOC-1599

ISBN 978-92-0-108308-1

ISSN 1011-4289

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November 2008

Basis of the quality control work are e.g.



Strahlenschutzkommission

Geschäftsstelle der
Strahlenschutzkommission
Postfach 12 06 29
D-53048 Bonn
<http://www.ssk.de>

Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit
Referat Bundesaufsicht im Strahlenschutz, Az. RS II 3 – 14260/4

Datum: 3. November 2017

Abnahmeprüfung und Festlegung von Bezugswerten nach § 83 Absatz 5 der Strahlenschutzverordnung für nuklearmedizinische Systeme

[Mindestanforderungen an Abnahmeprüfungen nuklearmedizinischer Geräte nach Strahlenschutzverordnung]

Quality Control of Nuclear Medicine Equipment – Definition
of Action Levels and Tolerance Limits

Recommendation of the Commission on Radiological Protection

Classification of Phantoms

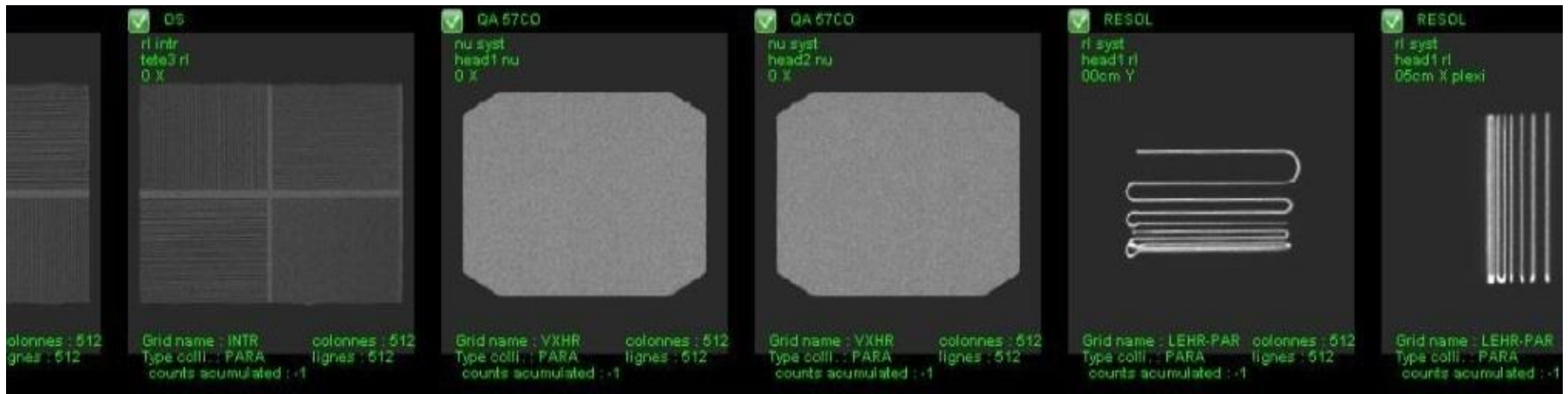
1. **Phantoms required to assess performance parameters specified in detail in standard specifications such as those published by the IEC or by NEMA.**
2. **Phantoms used for internal quality control procedures, that is routine quality control performed by the user in order to ensure proper working conditions of the equipment.**
3. **Phantoms used for inter-laboratory comparison purposes. Phantoms of this type are designed either to test the imaging quality of a gamma camera or to test the quality with which a particular nuclear medicine procedure is being performed.**
4. **Phantoms to test software, which may consist either of programs used to analyze patient studies, reconstruction software or morphological (e.g. brain) or dynamic phantoms (e.g. dynamic heart phantom) that simulate organs to be analyzed.**

Examples of Phantoms for QC in Nuclear Medicine



Flood-phantom used for

- Homogeneity QC and –correction
- Universal planar source

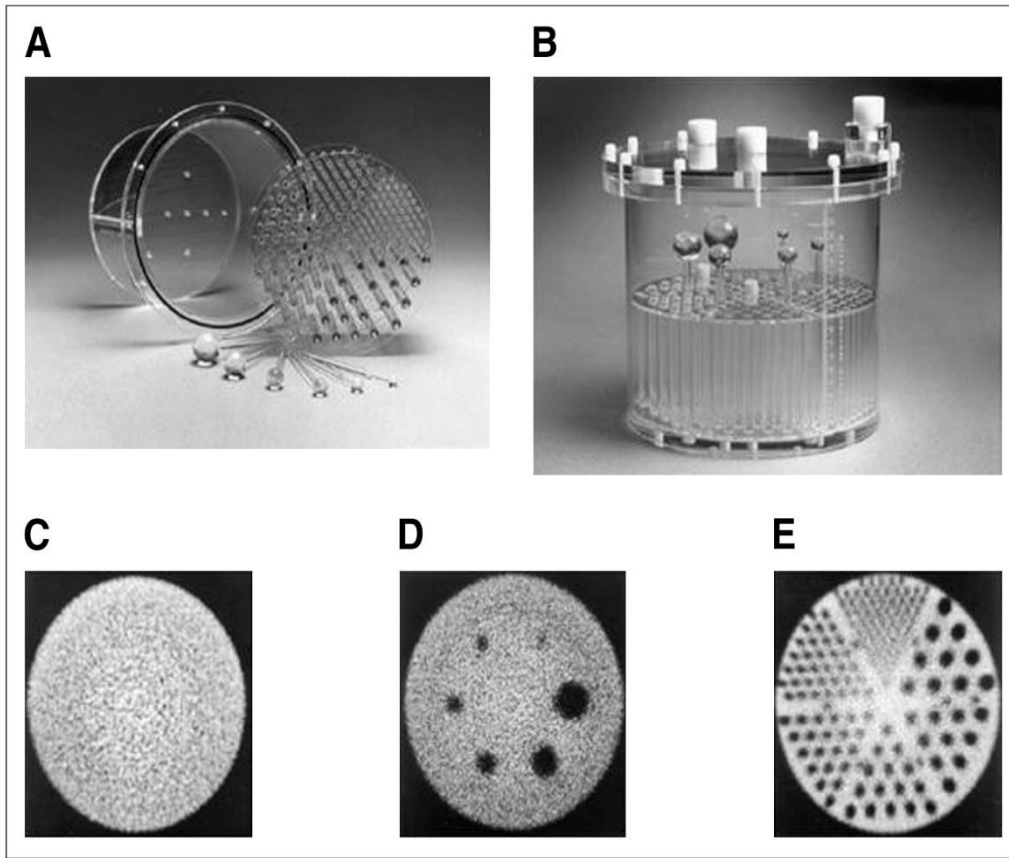


resolution (quadrant bar)
resolution (comb.)

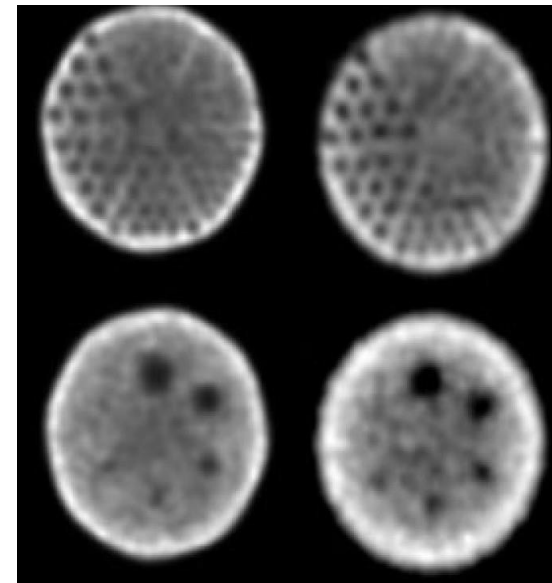
homogeneity

linearity and

Examples of Phantoms for QC in Nuclear Medicine



Jaszczak-phantom used for QC of image quality and reconstruction in SPECT-imaging



Examples of Phantoms for QC in Nuclear Medicine



IEC-phantom with inserts
for PET and SPECT QC

Performance of Diagnostic and Therapy

- **Is ALARA the main tool of optimization?**
- **Are there written working Instructions for EVERY method performed?**
- **Are they appropriate and are they followed?**
- **Are general dose requirements used as constraints?**
- **Is there a documentation for individual deviations from the standards?**
- **Is a follow up system for therapy patients?**
- **Is a CIRS system working?**

Quality control - procedure

The controls from the medical point of view focus on

- .Written procedure manuals for the different studies**
- .Indication of the study**
- .Amount of administered activity**
- .Acquisition**
- .Processing**
- .Reporting with the correct diagnosis**
- .Archiving**

Education of the Players

Is the personell well educated trained and licensed?

Is enough time and support for further instructions?

Is there a physicist that gives advice or has the status of a radiation protection officer?

Are all legal courses been taken part?

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Conclusions

- **Optimization is a multi layer duty**
- **At the moment optimization does not earn money**
- **Optimization leads to a safety culture**
- **Optimization has to be taken as a permanent task**
- **Using constraints on a institutional basis is one of the best methods of reaching the optimization the patient deserves**