



**Overview of the
U.S. Nuclear Regulatory Commission's
Initiatives on the Use of Cesium-137 Chloride Sources**

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What is a Cesium-137 Source?

- Definition of Source: radioactive material in a closed capsule to be used for a technological purpose
- Cesium-137 Source: contains the radioactive isotope Cs-137
- Cs-137 is emitter of gamma radiation – feature utilized in irradiators
- Use of Cesium-137 Chloride (CsCl)
 - Ideal energy spectrum (670 keV)
 - Long half life (30 years)
 - Readily available



Properties of CsCl

- Used in a chemical form of cesium chloride (CsCl)
 - Similar to table salt (i.e. sodium chloride)
 - Soluble in water
- Used in a physical form of compressed powder
 - Similar in consistency to tic-tac candy
 - When pulverized, powder spreads as an aerosol
- mechanical configuration
 - Compressed powder pellets double-encapsulated in stainless steel capsules
 - Both welded shut



Areas of Usage

- Low activity usage (in mCi to few Ci quantities):
 - Moisture density gauges for road and foundation construction
 - Leveling gauges in chemical tanks
 - Well-logging devices for oil exploration
 - Brachytherapy sources in radiation medicine
- High activity usage (in 100's and 1,000's Ci quantities):
 - Blood irradiators for blood sterilization
 - Biomedical research for cancer, immunology, drugs, DNA, genetics
 - Calibration of instruments measuring radiation and personal exposure rates

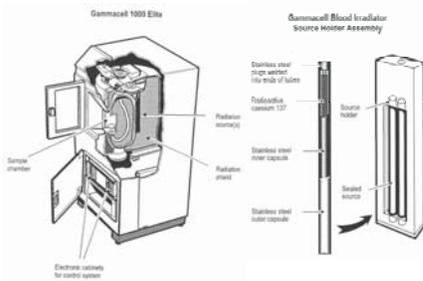


Gammacell 40 irradiator





Typical Blood Irradiator





Outside view of Blood irradiator



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Loading of Irradiator



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J.L. Shepherd - Category 1 Irradiator



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Hopewell Designs, Inc. calibrator


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Use of Irradiators in the U.S.

Application	IAEA Category	# of Licensees	# of Devices	% of Total Curies
Blood Irradiators	1-2	327	575	33.65
Research Irradiators	1-2	265	526	66.00
Calibrators	2	61	104	0.35

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Current Status

- CsCl radiation sources perform critical functions
 - in blood sterilization,
 - in medical and industrial research, and
 - in instrument calibrations
- The security and control of radioactive sources has been significantly enhanced per NRC and Agreement State requirements
- Integrated and comprehensive program in place in the U.S. for management and control of radioactive sources
- Continuing to work closely with domestic and international partners to improve security worldwide

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History of NRC's CsCI Work

- 2005 The Energy Policy Act of 2005
 - Radiation Source Protection and Security Task Force is to be established
 - NRC is to fund a study by the National Academy of Science
- 2006 Task Force 1st Report issued
- 2008 National Academy study completed
- 2009 CsCI Working group report completed (cont'd)



History of NRC's CsCI Work (cont'd)

- 2008 Public Workshop on the use of Cs-137
- 2009 ACMUI report (ML083030593)
- 2010 Task Force 2nd report issued (ML102230141)
- 2010 Draft Policy Statement published in *Federal Register* (75 FR 37483)
- 2010 Nov. 8-9: Public Meeting on Draft Policy



2010 Task Force Report

- Issued in Aug. 2010 (accessible as ML102230141)
- Four main topical areas/chapters:
 - Coordination and communication
 - Advances in the security and control of radioactive sources
 - Status of recovery final disposition of radioactive sources
 - Progress in the area of alternative technologies
- 11 recommendations
 - 4 directly related to CsCI sources (#s 3, 4, 10, 11)
 - 1 indirectly related to CsCI sources (# 9)



2010 Draft Policy Statement

- Published in the Federal Register (75 FR 37483), June 29, 2010:
 - to solicit public input
 - to announce a public meeting November 8-9, 2010
- 8 major statements
- discussion of specific issues:
 - Security and control of sources
 - Areas use
 - Disposal
 - NRC's perspectives on further security enhancements



2010 Public Meeting, Nov. 8-9, 2010

- 6 technical issues were discussed:
 - NRC's role, licensees' responsibilities
 - Security requirements
 - Design improvements and alternatives
 - Alternate forms of Cs-137
 - Fields of use: blood irradiation, biomedical research, calibration
 - Status of Disposal
- Records available at:
<http://www.nrc.gov/materials/miau/licensing.html#cc>



(Draft) Summary of Comments Received

- Comments to *Federal Register* notice:
 - 11 submissions
 - Representing manufacturers, users, organizations
- Public Meeting comments:
 - 28 panel presentations
 - Audience comments



Next Steps

- Public Meeting comments and written submissions will be summarized
- NRC staff submits proposed final Policy Statement to the Commission – scheduled for April 2011
- Commission issues Policy Statement (will be published in *Federal Register*)



References

- Draft Policy Statement: www.regulations.gov, search for NRC-2010-0209
- Public Meeting: www.nrc.gov/materials/miau/licensing.html#cc
