



NRPABULLETIN 04 15

The Dosimetry Laboratory at the NRPA

The Dosimetry Laboratory at the Norwegian Radiation Protection Authority (NRPA) is the National Calibration Laboratory for the units gray (Gy), sievert (Sv) and becquerel (Bq). The Secondary Standard Dosimetry Laboratory (SSDL) was founded in 1939 and calibrates dosemeters for users in Norway.



Calibration of reference chamber for radiotherapy dosimetry. Collection of units under test.

National Calibration Laboratory.

The SSDL is a designated National Calibration Laboratory, which works under the framework of the Meter Convention. National standards for ionising radiation are held and maintained by the SSDL.

Calibration and measurement capabilities

SSDL offers calibration of dosemeters for ionising radiation measurements in addition to issuing calibration certificates for the following:

Field	Dosemeter
Radiotherapy	Farmer chambers and
	Plane parallel chambers
X-ray diagnostic	DAP meter, CT and
examination and x-ray	mammography
intervention	chambers
Radiation protection	Handheld monitors and
	personal dosemeters

SSDL's radiation beams for calibration

- 1. Co-60 beam for therapy level calibrations
- 2. X-ray unit 10-320 kV
- with two x-ray tubes
- Source carousel Cs-137, Co-60 and Am-241 for radiation protection



CIPM MRA logo on certificates

Calibrations, performed by the SSDL, meet the requirements of the Mutual Recognition Arrangement (MRA). This is due to



the agreement with Justervesenet (Norwegian Metrology Service) in 2004. The SSDL is therefore authorised to use the CIPM MRA logo on its' certificates.

Proton therapy in Norway?

2014

2020

2000

1990

1980

75 year anniversary of the Norwegian SSDL

200

SSDL refurbished Co-60 unit, xyz-table and source carousel

20

Radiotherapy in Bodø

Radiotherapy in Ålesund

Radiotherapy in Gjøvik

Radiotherapy in Kristiansand

2000

Act on Radiation Protection and Use of Radiation

Radiotherapy in Stavanger

Absorbed dose to water established at the SSDL. New name Norwegian Radiation Protection Authority (NRPA)

1986

Radiotherapy in Tromsø

Radiotherapy in Trondheim

1983

Air kerma calibration established at SSDL

New unit: sievert (Sv)

Dosimetry Laboratory member of IAEA/WHO SSDL Network

1970

1960

1950

1940-

1930 🌢

New unit: grey (Gy) Dosimetry laboratory moves to Østerås First CT-scanner in Norway at Ullevål

The Farmer chamber in graphite developed by Aird

New name National institute of Radiation Hygiene and move to The Norwegian Radium Hospital

1954

The sub-standard (graphite coated Tufnol) chamber developed by Farmer

1942

Radiotherapy at Haukeland hospital (Bergen) in 1500 kV x-ray beam

1939 Statens radiologisk-fysiske laboratorium opens at The Norwegian National Hospital.

1938 Act on Use of X-rays and Radium etc.

Radiotherapy at The Norwegian Radium Hospital

The history of SSDL

The laboratory was founded in 1939. In 1977, it became member of the IAEA/WHO SSDL Network and in 1990 it joined the EURAMET (The European Association of National Metrology Institutes). The Nordic countries have always had close cooperation. See time line.

Competence at international level

The Dosimetry Laboratory is an active member of the Nordic dosimetry group and the EURAMET Technical Committee for Ionising Radiation. Furthermore, it is an observer in The Consultative Committee for Ionizing Radiation CCRI(I) at the BIPM (The International Bureau of Weights and Measures).

Accessory activities at the SSDL

The SSDL supports the administrative regulation in questions concerning dosimetry, and it is the

secretary for the national dosimetry group for quality assurance in radiotherapy (KVIST). The SSDL calibrates electrometers used with ionisation chambers.



Plane parallel chambers for measurement in electron beam are calibrated at hospital using the Bjerke phantom.

Fundamentals of Ionising Radiation

The quantity, absorbed dose, with the unit gray (Gy), is the base unit for ionising radiation. The unit Gy has shown to be robust in terms of physical quantity. In radiotherapy the dosage for treatment of cancer patients is given in the amount of Gys. Risk assessment in diagnostic X-ray is determined using organ dose in Gy.

Dose equivalent

Absorbed dose alone is not sufficient in order to determine the dose related to biological effects. Empirical weighting procedures have been



applied in order to counteract the limited prediction power of absorbed dose. The quantity dose equivalent, with the unit sievert (Sv), is used in radiation protection. This dose equivalent accounts for the difference in biological effectiveness for the different ionising radiations, and is limited to determination of low doses associated with stochastic effects.