

# Solutions for **Nuclear Healthcare**



**INSTRUMENTS**



**SYSTEMS**



**SERVICES**



**NUVIA** offers a full catalogue of highly reliable instruments which can be tailored on request. Our components are manufactured in our workshops and are the result of our Research and Development processes.

From modelling to implementation, **NUVIA** applies exclusive know-how and state-of-the-art technologies in its systems. Being a strong partner in system deliveries, **NUVIA** provides tailor-made solutions personalised to the requirements of the customer.

**NUVIA** is a leading international provider of world-class radiation protection services. Our expertise has been developed over many years and is supported by a highly trained, committed workforce and a wide range of specialist resources.



NUVIA offers a unique array of technologies and services for the **application of ionising radiation** in **nuclear healthcare**

NUVIA Healthcare  
specialises in  
**Radiodiagnostics**  
**Radiotherapy**  
**Nuclear medicine**  
**Radiopharmacy**

#### UNIQUE **VERTICAL INTEGRATION**

For each project, NUVIA has an exclusive work approach to meet the needs of the customer through a vertical integration of expertise, encompassing the design, manufacturing, qualification and on-site implementation of instruments or measuring systems. We are also able to provide our customers with various services related to nuclear healthcare: modelling studies, surveys, simulations and calculations, measurement, radiation shielding, radioactive waste management, radiation protection, maintenance and regulatory audits.

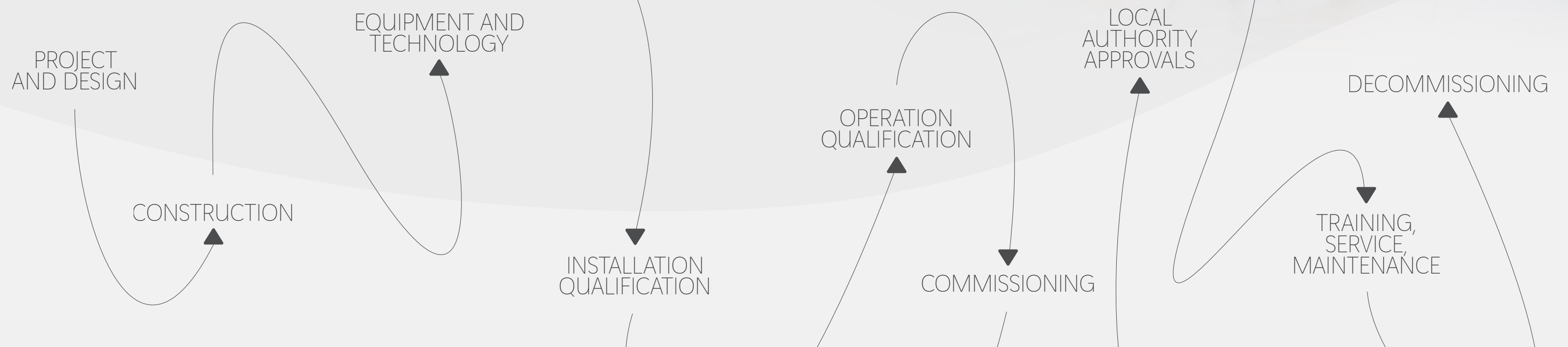
Since all the necessary skills are grouped together within the NUVIA Group, our clients can have the answer to all their nuclear healthcare problems from one single provider. This reduces the number of interfaces and subcontractors whilst benefiting from better control of risks, deadlines, quality and costs.





# ▶ EPC projects

Providing comprehensive EPC projects, **NUVIA** profits from long term engineering and project management experience. Our project coordination and realisation abilities comprise a complete spectrum of activities from the preparation of final design up to the handover of a final product. Our main goal during realisation of such large projects is not only the supply itself, but also the establishment of a good partnership that forms firm foundations for further projects. This is our priority, while making our way to success and long time prosperity.



NUVIA provides support and supplies for all stages of the healthcare facility lifecycle. Using our network of partners and suppliers, we can take charge of the whole project of a new nuclear healthcare facility or a refurbishment / adjustment of a recent facility according to latest requirements and standards. Being part of VINCI Construction, one of the biggest construction companies in the world, NUVIA is a unique partner for comprehensive project – from the beginning to the end, from design to decommissioning.



# ► Systems and solutions

NUVIA offers a full catalogue of highly reliable instruments which can be tailored on-request. Our components are manufactured in our workshops and are the result of our R&D processes.

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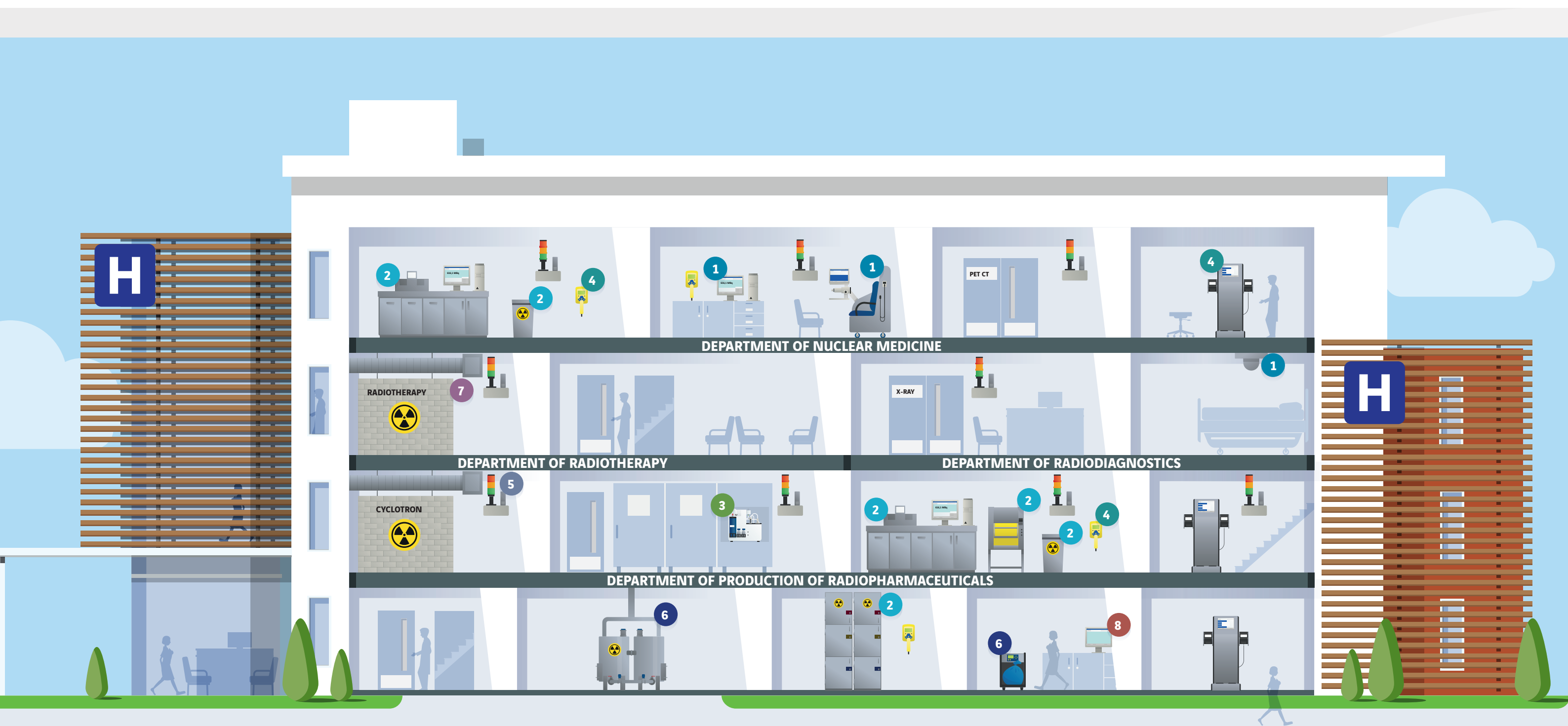
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# Nuclear medicine Instrumentation

As **NUVIA** measurement and instrumentation technology is used directly or indirectly on patients, the highest quality and reliability must be ensured. We operate an extensive quality management system according to standard certifications.

## Dose calibrators and counters for nuclear medicine

**NUVIA manufactures and delivers highly-advanced instruments for activity measurement of radiopharmaceuticals at nuclear medicine departments.**

- ▷ Dose calibrators designed for fast and accurate determination of activity or activity volume of radiopharmaceuticals used in nuclear medicine
- ▷ Semi-automated syringe filling systems for PET nuclides as a supplement to the dose calibrators
- ▷ Management tools for the entire area of radiochemistry, radiopharmacy, and nuclear medicine
- ▷ Laboratory counters such as well-counters for nuclide-specific measurements



**Dose calibrator NuMED ISOMED 2010**  
Fast and precise activity determination of all radiopharmaceuticals used in nuclear medicine with well-type measuring chambers with a USB connection



**Syringe filling system NuMED SAM 2010**  
Semi-automated syringe filling system for PET nuclides as a supplement to the dose calibrator

**NUVIA provides a comprehensive solution, including measuring devices, additional shielding, acquisition and control software, and connectivity to other systems on location.**



**Thyroid uptake counter NuMED ISOMED 2162**  
designed to determine activity of  $^{131}\text{I}$  in thyroids in the radiotherapy ward

## Patient monitoring

**Our systems enable various ways to monitor patients after application of a radiotherapy dose of a radionuclide.**

- ▷ On-line system NuMED PADOS installed above/ near a bed, measuring activity levels of a patient
- ▷ Counters for the measurement of  $^{131}\text{I}$  uptake in a radioiodine therapy ward

**Monitoring system NuMED PADOS**  
Provides on-line data of the radioactivity content in the patient's body, as well as its evolution in time without disturbing the patient



# Laboratory equipment



**NUVIA** supplies custom-built laboratories and offices. We offer our expertise from A to Z, from the design of the facility, to the technical processing and implementation, and the subsequent customer service. This can be completed with unusual and specific products upon requirements of the end-user.

## Hot laboratories

**To work with radiopharmaceuticals and other types of radioactive substances as safely and comfortably as possible, NUVIA brings dozens of products and solutions providing high standard radiation protection:**

- ▷ Stainless steel, shielded laboratory benches, hatches and casks
- ▷ Shielded bins and boxes for radioactive material
- ▷ Transport containers, syringe shieldings and carriers



**Stainless steel laboratory bench**  
Consists of a stable steel frame construction that can stand heavy objects (up to 850 kg/m<sup>2</sup>), e.g. lead shielding, Tc-generators, etc.

**Double-shell laboratory fume hood**  
Designed for operations both in radiochemical and chemical laboratories



**Shielded containers and cabinets**  
Tailor-made containers of various sizes and lead thickness

## Laboratory planning and delivery

**We plan the laboratory according to your specific requirements, including requested measurement instruments:**

- ▷ Custom-built laboratories and offices based on comprehensive technical analyses
- ▷ Design of laboratory and office furniture, professional installation and follow-up customer services
- ▷ Advanced laboratory technologies: double-shell laboratory fume hoods, laminar boxes, safety cabinets



# Automation for radiopharmacy and radiochemistry

**NUVIA** specifically works on nuclear medicine projects based on automation and microfluidic technology, in the research, development and production of radiopharmaceuticals. We offer innovative technologies and unique solutions tailored to our customers' needs.

# Radiation protection

**NUVIA** systems provide contamination screening solutions for both personnel and equipment, at the perimeters of controlled areas, as well as internal screening, irradiation and contamination mapping systems within the ALARA principle.

## Separation and labelling

Our automatic radiochemistry platforms enable:

- ▷ Quantitative and safe dissolution of solid targets
- ▷ Radiochemical separation and extraction of the radionuclide from the matrix
- ▷ Different techniques of radiochemical labelling and formation of final radiopharmaceuticals

Apart from radiochemical processes, solutions cover safe transport, handling and management of irradiated targets using specifically-designed tools, accessories and systems.



**NuARP OCTOPUS**  
Device for processing  $^{176}\text{Lu}$ -enriched oxide targets to prepare  $^{177}\text{Lu}$  radionuclide precursor for radiolabelling



**NuARP CRAB**  
Versatile system enabling radiochemical processes on metal radionuclides – including separation / extraction from the cyclotron target



**NuHP HFC monitor**  
Hand-foot-clothing contamination monitor with innovative detector technology



**NuHP CoMo-170 MF**  
Stationary contamination monitor



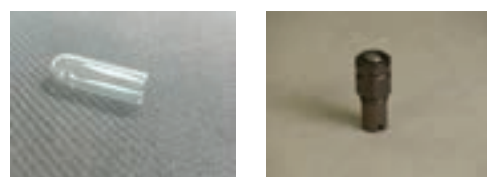
**NuHP CoMo Wall station**

## Stationary contamination monitors

- ▷ Stationary hand-foot-clothing contamination monitors to check the personnel working in a controlled area
- ▷ Stationary contamination monitors with plastic scintillation detectors
- ▷ Wall stations to check hands on a specific period
- ▷ A wide range of models and versions

## Irradiation

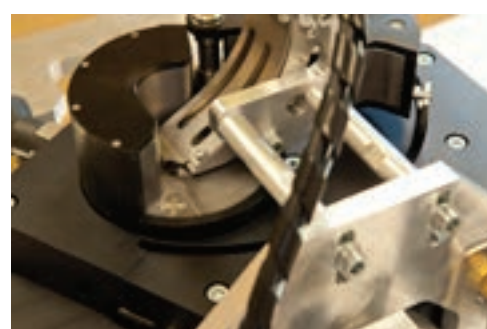
- ▷ Systems performing automatic and semi-automatic loading and unloading of targets
- ▷ Accessories for irradiation in a nuclear reactor or a cyclotron



In-house designed stainless steel ampoule with quartz insert intended for irradiation in a nuclear reactor followed with processing at OCTOPUS device

## Transportation

- ▷ Pneumatic systems connecting an irradiation facility with a hot laboratory
- ▷ Gadgets, tools and accessories enabling safe transport of irradiated materials



Solid target automatic unloading system for cyclotron targets together with shielded transportation container



## Portable contamination monitors

- ▷ The most modern instruments in the field of surface contamination
- ▷ Single-hand instruments with thin layer plastic scintillation detectors and a large LCD display
- ▷ Floor trolley to control large floor surfaces

**NuHP CoMo 170**  
Single-hand instrument for surface contamination monitoring, both  $\alpha$  and  $\beta/\gamma$  sensitive



**NuHP CoMo Floor bogey**



# Radiation monitoring systems

**NUVIA** systems also include continuous monitoring of processes with high performance equipment set for specific applications.

Alarm monitor – stationary dose rate monitoring system with external detectors

- ▷ Tailor-made radiation monitoring network
- ▷ Stationary online dose rate monitoring system with external detectors
- ▷ Possible connection to door locks, gates and card systems
- ▷ Universal use and compatibility – integration of particular devices specific to end-user needs, including previously installed systems
- ▷ Various measure, display and control units of the radiation monitoring network with LCD touch screens



**Area monitoring system NuRMS ALMO**  
Dose rate monitoring system available in special clean room versions or to be integrated into networks for central measuring value display and alarm indications



Customised radiation monitoring systems

From design to commissioning, **NUVIA** can prepare a comprehensive bespoke solution for the radiation monitoring of a facility. Following requirements given by legislation, end users and good practices, we deliver whole systems including individual measurement probes, control and acquisition units and overall software enabling on-line access to all measured data.



**NuRMS AREA MSU**  
Measure, signal and display unit with large display

# Radioactive waste management

**NUVIA** offers solutions for all types of waste measurement and characterisation: on-site storage, final disposal or free release according to the local legal framework. The innovative equipment integrated into our measurement systems enables precise and selective levels of measuring.

Radioactive waste measurement

- ▷ Various release counter systems for monitoring of material to be released from the controlled area
- ▷ Waste water counters to determine nuclide activity in single samples, from waste water decay containers of nuclear-medical institutes



**Waste water counter NuWM ISOMED 2151**  
For the measurement of the activity of radionuclides contained in the waste water produced in nuclear-medical facilities and radioiodine wards.

Safe and controlled release of radioactive waste is an essential responsibility of every operator within a facility. Measurement of the released materials must respect dozens of safety standards as well as various legislative requirements



Liquid radioactive waste systems

- ▷ System for the storage of liquid radioactive waste, contaminated with short-lived radionuclides
- ▷ Tailor-made bespoke solution following given specification of every particular facility
- ▷ Meeting all legislation and safety standards
- ▷ Operating in automatic and semi-automatic mode
- ▷ On-line overviews of the status of liquid radioactive waste on a facility





# Shielding constructions for radiation protection

**NUVIA** offers calculation, design, installation and commissioning of shielding constructions such as walls, mazes or whole bunkers. A modular concrete-based system is used, enabling quick and dry erection of the shielding elements.



**NuRAD 8200**  
Concrete-based modular system  
for shielding constructions

## Quick and effortless shielding solution

The solution is ideal for existing facilities, where access to heavy machinery and noisy works can be a problem while operating, as well as for new facilities, where parts of the shielding elements are expected to be flexible and easy to move.

- ▷ Easy to implement – no heavy machinery needed
- ▷ Simple readjustment, dismantling and decommissioning
- ▷ Variable density of the material from 2.4 to 5 t/m<sup>3</sup>
- ▷ Optional boron content to shield neutrons.



The comprehensive solution may include additional features and components:

- ▷ Automatically controlled shielding door
- ▷ Ceiling and floor additional shielding
- ▷ Seismic reinforcement
- ▷ Steel items connecting the bricks to bigger easy-to-operate pieces



To build, improve or reinforce a bunker or other shielding constructions, NUVIA provides:

- ▷ Design preparation, including radiation calculations
- ▷ Material manufacturing and delivery
- ▷ Installation and construction works
- ▷ On-site supervision
- ▷ Construction team training

# Software solutions



**NUVIA** provides complete solutions for the design, realisation and supply of information systems focused on different fields of application of ionising radiation. As well as our standard products, we provide customised development of software according to the specifications of a particular project.

## Bespoke software solutions

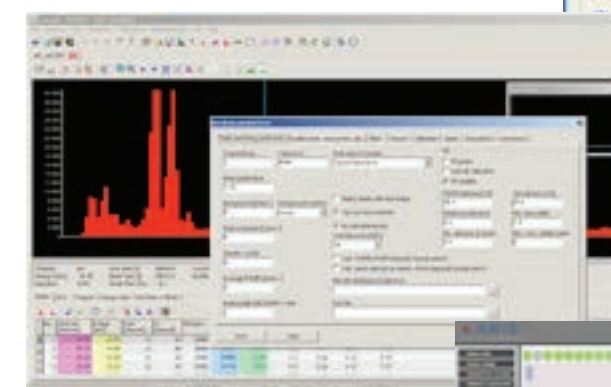
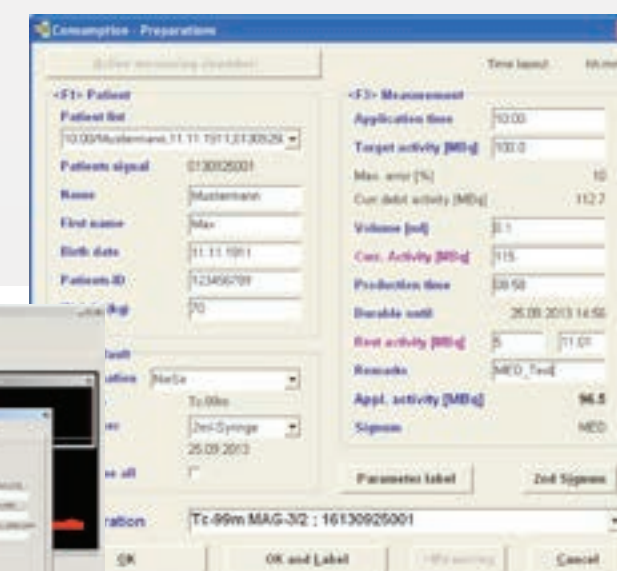
Our advantage is vast knowledge of the following areas: metrology, radiometry, chemistry, radiochemistry, spectrometry, non-destructive examinations, controlled ageing and processing, waste management, laboratory technologies and industrial automation.

Reliability of our products is proven by years of operation in the demanding environments of European nuclear energetics or the automotive industry. Customers' current infrastructure and ICT standards are respected during development and supply of our solutions.

NUVIA has developed the PET Management System, software designed to cover all the research, development and production agenda of a PET Centre featuring the following characteristics:

- ▷ Compatible with local management software
- ▷ Data acquisition, evaluation, storage, database
- ▷ User interface in web browser

- ▷ Software as an efficient tool for radiation control inside buildings and personal dosimetry
- ▷ Radioactive waste management software for all waste producers that simplifies and optimises all activities like processing, moving, recording, tracking and reporting
- ▷ Laboratory information management system for chemical and radiometric laboratories
- ▷ All data from all network appliances always transferred to one database





# Services

**NUVIA** provides a wide range of related services in healthcare activities which lead to satisfied clients and easier ways to master important processes in radiation protection and safety at radiotherapy, nuclear medicine, radiopharmacy and radiodiagnostic workplaces.

# Personal dosimetry

**NUVIA** continues its long tradition of providing services for personal dosimetry. Results and evaluation of the measurements allow our partners to monitor the level of exposure of radiation workers in accordance with the principles of radiation protection and regulatory requirements.

NUVIA provides support and supplies for all stages of the healthcare facility lifecycle. Using our network of partners and suppliers, we can ensure the whole project of a new nuclear healthcare facility, or the refurbishment/adjustment of a recent facility according to latest requirements and standards.

Personal dosimetry  
Consultancy and advising  
Calculations  
Training

- ▷ Our managed and integrated dosimetry packages are specific to each client's individual needs and use the most appropriate technology, systems and proven processes to achieve optimum results.
- ▷ NUVIA provides all main types of dosimeters (TLD, film, OSL, electronic) to measure doses of beta, gamma, and neutron radiation.
- ▷ We can ensure periodical personal monitoring of radiation workers at different facilities according to local legislation requirements.



## Full-body dosimetry

- ▷ Determines the total exposure of the body.

## Eye lens dosimetry

- ▷ Aimed at workers whose eye lenses are exposed to risk from photons and electrons.

## Neutron dosimetry

- ▷ Radiation monitoring for workers operating on sites with a risk of radiation exposure from fast or intermediate neutrons.

## Finger dosimetry

- ▷ Determines the radiation dose on hands.

Having almost 60 years of experience, NUVIA provides legal personal dosimetry services for radiation workers in various fields of application of ionising radiation.

To ensure reliability of our measurements, we regularly participate in interlaboratory comparison projects organised by EURADOS and other organisations.



# ▶ Radiation protection

# Training ◀

Alongside services related to nuclear healthcare, **NUVIA** offers an extra programme for clients who might be newcomers to nuclear medicine and healthcare. For them, and also for more experienced customers, NUVIA can prepare tailored training, dedicated to their specific requirements, together with comprehensive advising.

## Radiation protection consultancy

- ▷ We help clients comply with all statutory obligations by providing radiation protection advisers (RPAs)
- ▷ RPAs can be integrated into existing project teams and ensure the smooth and safe progress of the project
- ▷ We provide supervising services for all stages of a project, from small movements of radioactive materials to large-scale engineering operations which take place within a robust system of radiological protection



## Clinical audits

*As part of a comprehensive approach to Quality Assurance (QA) in the treatment of cancer by radiation, an independent external audit (peer review) is important to ensure adequate quality of practice and delivery of treatment. Quality audits can be of varying types and at various levels, either reviewing critical parts of the radiotherapy process (partial audits) or assessing the whole process (comprehensive audits).*

Comprehensive Audits of Radiotherapy Practices: A tool for Quality Improvement, IAEA, Vienna 2007.

## Comprehensive training programmes

- ▷ Training in the field of radiation protection, basic nuclear engineering, gamma spectroscopy, emergency preparedness and nuclear medicine
- ▷ Training includes theoretical lectures, technical visits and practical exercises
- ▷ All the lecturers are highly specialised and experienced professionals in their field
- ▷ Thanks to its thorough knowledge and cooperation with universities and research centres, NUVIA training includes practical measurements and exercises
- ▷ According to your needs, we can arrange tailor-made training, from one week to 10 weeks long

## Legislative courses

- ▷ To ensure radiation protection on workplaces, it is essential that the persons dealing with ionising radiation sources (the IRS) have appropriate training in the technique used when working with IRS and the necessary knowledge in radiation protection
- ▷ After reaching the required qualifications, continuous education and training of each individual must be ensured
- ▷ This obligation is emphasised in all international documents issued by the ICRP and IAEA EC
- ▷ NUVIA provides legislative training in radiation protection at all required levels

## Radiation safety training

- ▷ NUVIA is one of the leading independent providers of Health Physics, Radiation Health and Safety Courses and Radiation Safety Training Services
- ▷ We offer radiation protection training to clients across industry, in government organisations, multi-national corporations as well as private businesses
- ▷ Our radiation safety training department has a proven track record in providing professional, interactive, quality controlled training which meets all legislative requirements
- ▷ We have recently introduced a new range of health physics and radiation protection training courses to meet the needs of customers from all industry sectors

- ▷ NUVIA is officially authorised by the Czech Ministry of Health to perform radiotherapy clinical audits in the Czech Republic. Using experience from our partners and experts, we can act as a perfect partner for quality improvement of radiotherapeutical facilities and practices

## Nuclear and non-nuclear calculations

- ▷ Our teams of engineers and physics experts have developed a comprehensive tool for nuclear and non-nuclear scientific calculations
- ▷ Computing codes designed by CEA, IRSN, EDF, international codes and our own in-house codes
- ▷ Nuclear calculation fields include:
  - Source terms
  - Health physics, ALARA studies
  - Neutron activation
  - Simulation of nuclear measurements
  - Radiolysis
  - Dispersion/contamination/impact
  - Criticality/neutronics



Hot cell training - Řež Research Centre, Czech Republic.





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