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Training at the Namibian Uranium Institute

Schedule and Course Overview for 2019

Radiation Safety and

Occupational Medicine

Education and Training Services

"We scientists recognize our inescapable responsibility to carry to our fellow citizens an understanding of the simple facts of atomic energy and its implications for society." (by Albert Einstein)



Thank you for your interest in our training facilities. Whether you want to develop your own understanding, train your workforce, or simply ensure you comply with the latest Namibian legislation, the Namibian Uranium Institute (NUI) can help you achieve your goals.

Our portfolio of courses is delivered throughout the year at our training centre in Swakopmund, enabling you to learn about health and all aspects of radiation safety. The NUI's education and training programs have been created to equip you with the skills needed to make informed decisions regarding radiation safety in the workplace.



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1. Radiation Safety Training

Why do I need Radiation Safety Training?

The answer is simple. Training is a legal requirement for any radiation worker. Attending an appropriate radiation safety course may assist participants meet their licensing or registration requirements with their relevant regulatory authorities. The courses are also highly valuable to those wanting to improve their knowledge on radiation protection principles and practices. Please read the course outlines below for details and costs.





All Radiation Safety Courses were developed by VO Consulting:



VO Consulting – independent Namibian energy, environment and radiation consultants

VO CONSULTING

P.O. Box 8168 Swakopmund Namibia

Phone/Fax: +264 (64) 402 966

Email: voconsulting@afol.com.na

Internet: www.voconsulting.net

NUI – RAD 1: Radiation Safety Officer (Part I)

- Course Outline of a 6-Day Course -

Introduction to Ionising Radiation

- atomic structure
- isotopes
- radioactivity
- uranium and fission
- nuclear stability
- radiation
- types of radiation
- half---life
- decay chains

- activity
- units
- secular equilibrium
- interaction of radiation with matter
- sources of radiation in the mining environment
- biological effects of radiation
- typical radiation doses, and associated effects
- exercises

Radiation exposure

- natural sources of radiation
- man---made sources of radiation
- occupational sources of radiation
- radiation detection devices
- personal dosimetry: devices used
- exposure pathways

Contamination

- internal contamination
- exposure pathways and dose calculation
- contamination and contamination control

Statistics

- scientific notation
- precision and accuracy
- how many digits?
- significance
- error

- external radiation: time, distance, shielding, scattering
- sources of radiation in mining
- internal radiation: sources, types, mechanisms of contamination
- long---lived alphas, short---lived alphas
- exercises
- radwaste
- transport
- exercises

- normal distribution and standard deviation
- probability
- limit of detection
- statistical tests

Health Effects

- principles of safety, occupational medicine and occupational hygiene
- basic anatomy, physiology and biochemistry
- radiobiology
- epidemiology
- Legal Framework
 - Atomic Energy and Radiation Protection Act
 - National Radiation Protection Authority
 - The Radiation Management Plan
 - Exercises

Instrumentation & Practical Radiation Dosimetry

- conceptualization
- occupational dosimetry
- public/environmental monitoring

- the concept of risk
- health risk assessment
- national health profile
- occupational cancer in the uranium exploration and mining sector
- exercises

- instrumentation
- monitoring
- analysis
- exercises

Costs:

N\$ 11 890.- (minimum of 7 candidates)

NUI – RAD 2: Radiation Safety Officer (Part II)

- Course Outline of a 5-Day Course -

Monitoring radon – theoretical background

- Historical background
- properties
- short---lived progeny
- equilibrium factor
- units and unit conversions
- dose calculations

Taking grab samples of radon progeny (Kusnetz method)

Radon progeny and LLRD sampling (DoseManPro & MyRIAM)

Monitoring long---lived radioactive dust (LLRD)

- taking grab samples of LLRD
- taking and counting out wipe tests
- contamination monitoring

Urine Bioassay

Gamma area monitoring

Introduction to the following instruments:

- Electra
- FH 40 G
- Automess
- TLD
- EPD
- RadEye PRD
- HandECount

Practical at a uranium mine site

- Radon area sampling
- Surface contamination measurements
- Surface smears
- LLRD sampling

- smear filters
- Gilair pumps
- DoseManPro
- DoseMan
- MyRIAM
- AlphaGuard & AlphaPM (if available)
- Area gamma monitoring
- Drum scanning
- Container scanning
- Data analysis (training room with computers required for this, software to be installed)

Costs:

N\$ 10 780.- (minimum of 6 candidates)

NUI – RAD 3: Radiation Safety Officer (Part III)

- Course Outline of a 3-Day Course -

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Atomic Energy and Radiation Protection Act

- Overview
- Step-by-step introduction
- Atomic Energy Board
- Authorisations, licensing and • registrations
- National Radiation Protection Authority
- Overview of general provisions
- Exercises

Radiation Protection and Waste Disposal Regulations

- Overview
- Step-by-step introduction
- Applicability and exemptions
- Radiation protection performance requirements
- Management requirements
- Verification of protection and safety
- Occupational exposure protection •

Radiation Management Plan: Planning, Content, Implementation

- Introduction
- Background •
- Pre-Operational Safety Assessment •
- Organisational Arrangements
- Occupational Radiation Protection • Program
- Medical Exposure Control

- Public Exposure Monitoring Program •
- Waste Management Program .
- **Emergency Preparedness and Response** • Plan
- **Transport Plan** •
- Safety and Security of Radiation Sources •
- Exercises

Reporting

- Statutory requirements
- Exercises

Costs:

N\$ 7 895.- (minimum of 5 candidates)

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- Public exposure protection Requirements for the safety and security of •
 - sources
- Transport requirements
- Requirements for emergency intervention ٠
- **Disposal of waste**
- Exercises •

NUI – RAD 4: Radiation Technician Course (Assistant Radiation Safety Officer)

(Same as RSO I course)

Course Outline of a 6-Day Course –

Introduction to Ionising Radiation

- atomic structure
- isotopes
- radioactivity
- uranium and fission
- nuclear stability
- radiation
- types of radiation
- half-life
- decay chains
- activity

- units
- secular equilibrium •
- interaction of radiation with matter
- sources of radiation in the mining • environment
- biological effects of radiation
- typical radiation doses, and associated • effects
- exercises

Health Effects

- principles of safety, occupational medicine and occupational hygiene
- radiobiology
- concept of risk
- health risk assessment
- exercises

Radiation exposure and control

- natural sources of radiation
- man-made sources of radiation
- occupational sources of radiation
- radiation detection devices
- personal dosimetry: devices used
- exposure pathways

- external radiation: time, distance,
- shielding, scattering
- sources of radiation in mining
- internal radiation: sources, types, mechanisms of contamination
- long-lived alphas, short-lived alphas
- •

Contamination

- internal and external contamination
- exposure pathways and dose calculations
- contamination and contamination control
- hierarchy of controls
- radioactive waste
- transport of radioactive materials •
- exercises •

- exercises

Statistics

- scientific notation
- precision and accuracy
- significant digits
- probability

- normal distribution and standard deviation
- limit of detection
- percentiles
- excercises

Instrumentation and practical radiation dosimetry

- occupational dosimetry
- public/environmental monitoring
- instrumentation

- dose assessments
- elementary analysis
- exercises

Costs:

N\$ 11 890.- (minimum of 7 candidates)

NUI – RAD 5: Radiation Safety for Managers

- Course Outline of a half day course -

Introduction to Radiation

- What is radiation and radioactivity?
- What are ionising radiation, radiation dose, pathways and units?
- Uranium

Biological Effects and Risks of Radiation

- How much radiation is too much?
- Biological effects
- Linear No Threshold Hypothesis
- Health Risks from cancer
- Sequence of events from ionising radiation

Radiation Safety

- Radiation Management Plan
- Occupational exposure
- System of Radiological Protection
- Standards
- Radiation Control
- Sources of radiation
- Personal monitoring

- Half-life
- Background radiation
- Introducing radiation control

- Types of biological effect
- Cellular sensitivity to radiation
- Effects of cellular damage
- Whole body sensitivity factors
- Typical doses and effects
- Area monitoring and contamination monitoring
- Transport
- Shipment

Costs:

- Emergency Procedures
- The RMP as an active Management Tool

N\$ 1 495.- (minimum of 6 candidates)

NUI – RAD 6: Introduction to Radiation Safety in Emergency Situations

- Course Outline of a half day course -

Emergency Scenarios

- purpose of the course
- incidents and accidents

- legal obligations
- outline

Introduction to Radiation

- radiation a fact of life
- low energy radiation
- high energy radiation
- the structure of matter the atom
- radioactivity
- ionising radiation
- types of radiation
- exposure pathways

Emergency Response

- roles and responsibilities
- from notification to action

- uranium
- measuring radiation
- natural background radiation
- background radiation in the Erongo Region
- man-made sources of radiation
- international and local radiation dose limits
- exposure doses low and high levels of radiation
- on-site arrival, clean-up, finalisation
- reporting

Health/Medical Response

- first things first
- medical evaluation

- laboratory tests
- follow up management

Instrumentation PRD & Electra

- RadEye PRD/Electra
- uses of the RadEye PRD/Electra
- handling the RadEye PRD/Electra
- limitations of the RadEye PRD/Electra
- practical do's and don'ts.

Costs: N\$ 1 495.- (minimum of 6 candidates)

NUI – RAD 7: Introduction to Radiation and uranium for members of the public

- Course Outline of a half day course -

Introduction to Radiation

- radiation a fact of life
- overview of the different types of radiation
- history of the discovery of radioactivity
- structure of matter
- atomic structure
- forces in the atom
- radiation from the nucleus
 alpha radiation
 - beta radiation
 - o gamma radiation
- ionising and non---ionising radiation
- electromagnetic radiation

- exposure pathways
- uranium
- decay chains
- half-life
- measuring radiation
- measuring the effects of radiation
- natural background radiation
- background radiation in the Erongo Region
- man---made sources of radiation
- exposure doses
- relative and absolute risks of exposure to ionising radiation

Biological Effects and Risks

- living tissue
- biological effects to radiation (general)
- effectiveness of radiation damage
- biological responses to radiation
- estimating biological effects
- linear no---threshold hypothesis

- biological effects to ionising radiation
- external radiation and its effects
- internal radiation and its effects
- cellular and organ sensitivity to radiation
- direct and indirect effects

Costs: free of charge

NUI – RAD 8: Radiation Safety for Transporters of Radioactive Materials

- Course Outline of a one day course -

Introduction to Radiation & Radioactivity

- Radiation a fact of life
- Low & high energy radiation
- Radioactivity
- Types of radiation
- Ionising radiation
- Sources of radiation

Exposure to radiation & Exposure Doses

- Exposure pathways
- Exposure doses low and high levels of radiation
- International and Namibian radiation dose limits radiation control
- Natural background radiation
- Exposure doses low and high levels
- Measuring exposure doses

Radiation Safety

- Introduction to radiation safety
- Key concepts of radiation safety
- The concept of ALARA
- Radiation safety when handling radioactive materials

Transporting Radioactive Materials

- Introduction to transport requirements for radioactive materials
- Namibian Law
- International Atomic Energy Agency's Transport Regulations
- Classifying radioactive materials for transport
- Labeling, placarding and packaging radioactive materials for transport
- Radiation safety in transport

Emergency Management

- Incidents and accidents
- Roles and responsibilities in an emergency
- From notification to action
- First things first urgent and important actions
- On-site arrival
- Clean-up
- Finalization of an emergency
- Reporting

Radiation Monitoring & Using Radiation Monitoring Instruments

- RadEye PRD/Electra
- Uses of the RadEye PRD/Electra
- Handling the RadEye PRD/Electra
- Limitation of the RadEye PRD/Electra
- Practical do's and don'ts RadEye PRD/Electra
- PRD's finder mode and locating radioactive materials

Multiple Choice Test (30 minutes)

Costs:

N\$ 1 995.- (minimum of 7 candidates)

NUI – RAD 9: Radiation Safety for Sealed Sources

- Course Outline of a one day course -

The basic course curriculum includes the following 7 parts:

- 1. Part I Introduction to Radiation Sources
- 2. Part II Radiation Exposure & Exposure Doses
- 3. Part III Radiation Safety Basics
- 4. Part IV Radiation Monitoring & Dosimetry
- 5. Part V Legal Framework & Requirements
- 6. Part VI Transporting, Storing & Safety
- 7. Part VII Emergencies & Emergency Procedures

If required, the course can be adapted to meet specific requirements, for example to include training on monitoring instruments or radiation safety procedures.

Costs: N\$ 1 995.- (minimum of 7 candidates)



2. Medical Training

Spirometry Training

Making a Difference

Spirometry Training Course

- 1.0 BASIC ANATOMY AND PHYSIOLOGY OF THE RESPIRATORY SYSTEM
 - 1.1 Structure and function
 - 1.2 Upper respiratory tract
 - 1.3 Lower respiratory tract
 - 1.4 The mechanism of respiration
 - 1.5 Defence mechanisms

2.0 INTRODUCTION TO SPIROMETRY

- 2.1 Indication for doing spirometry
- 2.2 Lung volume and sub divisions
- 2.3 Lung capacities

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- 2.4 Definitions of variables2.5 Flow volume loop
- 2.6 Volume time curve

SETTING UP A SPIROMETRY TEST FACILITY

- 3.1 The office
- 3.2 Testing area

4.0 FLOW SENSING SPIROMETER

- 4.1 Spirometer measured information
- 4.2 Choose the right spirometer

5.0 CALIBRATION

- 5.1 Definition of calibration and calibration check
- 5.2 Accuracy
- 5.3 Precision
- 5.4 Calibrated 3 litre syringe
- 5.5 Calibration quality control
- 5.6 Calibration check
- 5.7 Daily volume calibration

6.0 INFECTION CONTROL

- 6.1 Testing room
- 6.2 Consumables
- 6.3 Medical waste

7.0 REQUIREMENTS FOR SPIROMETRY MANOEUVRE

- 7.1 Competent operator using the spirometer
- 7.2 Contraindications to spirometry testing
- 7.3 Medical history
- 7.4 Spirometer preparation
- 7.5 Patient demographic data
- 7.6 Reference values
- 7.7 Patient information data on report

SPIROMETRY TEST MANOEUVRE 8.0

- 8.1 Operator's role
- 8.2 Patient instructions before to test procedure
- 8.3 Patient preparation
- 8.4 Test instructions

9.0 CHARACTERISTICS OF ACCEPTABLE FLOW VOLUME LOOP

- 8.1 Characteristics of acceptable volume-time curve
- 8.2 Characteristics of unacceptable flow volume loop
- 9.3 Evaluation of spirograms
- 9.4 Repeatability criteria

- 5.8 Weekly linearity check
- 5.9 Quarterly range calibration
- 5.10 When to calibrate
- 5.11 Ambient conditions
- 5.12 Calibration procedure
- 5.13 Wrong perception
- 5.14 Quality control check
- 5.15 Common problems
- 5.16 Quality control in the
- workplace
- 5.17 Gas laws
- 5.18 ATPS to BTPS correction factor
- 5.19 Temperature correction table
- 6.4 Spirometer
- 6.5 Sterilizing equipment



- 9.5 Best test criteria
- 9.6 Usability criteria
- 9.7 Summary of ATS/ERS 2005 spirometry standard
- 9.8 Reporting spirometry results

- 3.3 Equipment
- 3.4 Consumables

3.0

10.0 INTERPRETING SPIROMETRY RESULTS

- 10.1 Characteristics of spirometry test
- 10.2 Algorithm for interpreting spirometry results
- 10.3 Follow algorithm sequence
- 10.4 Bronchodilator
- 10.5 Reversibility
- 10.6 Obstructive pattern

11.0 EXAMPLE OF CASE STUDIES

- 11.1 Quality spirometry in the work place
- 11.2 Conclusion
- 11.3 Quality assessment of spirometry results
- 12.0
 APPENDIX 1
 Checklist to purchase a spirometer

 APPENDIX 2
 Infection control

 APPENDIX 3
 Spirometry unit standard

Costs:

N\$4 950.- (minimum of 7 candidates)

Spirometry Refresher Course



- 2.0 ATS/ERS 2005 SPIROMETRY GUIDELINE
- 2.0 KEY CHANGES TO EQUIPMENT AND TEST PROCEDURE
- 2.1 Spirometer
- 2.2 Accuracy

3.0 CALIBRATION and CALIBRATION CHECK

- 3.1 Definition of calibration
- 3.2 Definition of calibration
- 3.3 Calibrated 3 litre syringe
- 3.4 Calibration quality control
- 3.5 Calibration check
- 3.6 Daily volume calibration
- 4.0 QUALITY CONTROL
 - 4.1 Record keeping
 - 4.2 Patient demographic data
 - 4.3 Variable definitions of the Flow volume

- 3.7 Weekly linearity check
- 3.8 Quarterly range calibration
- 3.9 When to calibrate
- 3.10 Ambient conditions
- 3.11 Calibration procedure
- 4.4 Flow Volume loop
- 4.5 Volume time curve

- 10.7 Non-Obstructive pattern
- 10.8 Spirometry abnormal indices
- 10.9 Interpretation guidelines
- 10.10 Guideline to grade
 - occupational endurance
- 10.11 Misinterpretation

5.0 TEST PROCEDURE

- 5.1 Patient instructions prior to the test
- 5.2 Patient preparation prior to the test
- 5.3 Operator's role

6.0 QUALITY ASSURANCE OF SPIROGRAMS

- 6.1 Summary of ATS/ERS 2005
- 6.2 Characteristics of acceptable flow volume loop
- 6.3 Acceptability errors
- 6.4 Plan of action

7.0 INTERPRETING SPIROMETRY RESULTS

- 7.1 Characteristics of spirograms
- 7.2 Algorithm for interpreting spirometry results
- 7.3 Follow sequence
- 7.4 Bronchodilator

8.0 GUIDELINES FOR GRADING SPIROMETRY RESULTS

- 8.1 SATS guideline to grade severity
- 8.2 Compilation of a Mandatory Code of Practice
- 8.3 Guidance not for Occupational Practitioners
- 8.4 Occupational Diseases in Mine and Works

9.0 INFECTION CONTROL

- 9.1 Testing room
- 9.2 Consumables
- 9.3 Medical waste
- 9.4 Spirometer
- 9.5 Sterilizing equipment
- 10.0 EXAMPLE OF CASE STUDIES

11.0 QUALITY ASSURANCE IN THE WORKPLACE

- 11.1 Spirometry Training Courses
- 11.2 Motivated operator
- 11.3 Operator without skills
- 11.4 Conclusion
- 12.0 APPENDIX 1 Checklist to purchase a spirometer APPENDIX 2 Infection control

Costs:

- 5.4 Test instructions
- 5.5 Test manoeuvre
- 6.5 Communication
- 6.6 Characteristics of repeatability criteria
- 6.7 Characteristics of usability criteria
- 6.8 Characteristics of best test
- 6.9 Reporting results
- 7.5 Reversibility
- 7.6 Obstructive pattern
- 7.7 Non- Obstructive pattern



N\$1 890.- (minimum of 10 candidates)



Professor René Hugo

Audiometry Training Course

The comprehensive 3 day Audiometry certificate course seeks to address particular needs in industry related to hearing health. The course will enable participants to work within the scope of practice of audiometricians: "the determination and evaluation of the range, nature and degree of a person's hearing by means of electro acoustic instrumentation and observation methods and within the framework of a hearing health (conservation) team in industry. The outcome of this course is to generate acceptable and repeatable audiograms according to the SANS10083:2004 guidelines.



The course will be accredited by the HPCNA for CPD points. Successful candidates will receive a Certificate.

Costs: t.b.a.

Audiometry Refresher Course

The 1 day Audiometry Refresher Course is for successful students who have completed a comprehensive Audiometry course. Students who provide a copy of their Audiometry competency certificate dated 1 January 2005 or later may register for the Refresher course.

Students must bring 3 samples of audiometry tests from their onsite workplace audiometer to be assessed

for quality. Please ensure that subject confidentiality is adhered to on submission of these sample tests.

The course will be accredited by the HPCNA for CPD points. Successful candidates will receive a Certificate.

Costs: t.b.a.



NUI TRAINING REGISTRATION FORM

Kindly complete ALL sections – no booking will be made without the all required information and payment.

Registration forms are to be returned to:

- Email: info@namibianuranium.org
- Fax: 064 402 394 (Tel: 064 402 393)

STUDENT'S PERSONAL DETAILS

Name:		
Surname:		
Sex:		
Identification number:		
Postal Address:		
Physical Address:		
Email Address:		
Cellphone Number:		
Telephone No.:	Fax No.:	
Occupation:		

COURSE DETAILS- Strictly ONE registration form per course

Course Name:	
Course Date/s:	
Price per candidate:	

• The Namibian Uranium Institute reserves the right to reschedule any course.

- We will confirm COURSE DATE & TIME.
 - TERMS AND CONDITIONS apply.

CANDIDATES: Please be aware of the important requirements as outlined in the **TERMS AND CONDITIONS.**

If you are making the booking on behalf of any candidates, please ensure that you make them aware of the requirements.

ALWAYS LEARNING, ALWAYS IMPROVING THE WAY WE WORK

PERSON RESPONSIBLE FOR PAYMENT

Please note; the following is only to be completed if a company is responsible for payment.

Name:
Postal address:
Physical Address
Telephone No.:
CONTACT PERSON:
Email Address:

*Method of Payment (cash deposit/EFT/order number): Please note that you have to provide proof of payment for all payments made.

	Account Name:	The Namibian Uranium Association
BANKING	Bank :	Bank Windhoek
DETAILS	Branch Code:	481772
	Account No.:	8003770837
	*Reference	

*<u>REFERENCE</u> when making payment: surname, initials/invoice number.

TERMS AND CONDITIONS

1. Candidates agree to adhere to the rules and always be on time for classes.

- 2. On the first day of the course, the candidates must bring:
 - A file (preferably ring bind files)
 - An examination pad to take notes
 - A CALCULATOR •
 - And pens and pencils (and everything else you might need)
 - 1 x copy of ID/PASSPORT
- 3. No booking confirmations will be forwarded to the candidate without the order number or proof of full

•

- payment.
- 4. Full course fee paid at least 1 week prior to course
- 5. Should any candidate not attend, the full fee shall be payable if not cancelled within 10 working days of the starting date of the course. All cancellations must be in writing.
 - Refreshments and lunch are provided on the Namibian Uranium Institute premises. If any dietary
 - 6. requirements are to be met, please add them onto the registration form.
 - - 7. We are not legible for any damage or loss of property.
 - 8. Certificates will be issued upon:
 - Passing the course ٠
 - Submission of documentation as per 2. above

By signing this registration form you subjecting yourself to all the terms and conditions.

Authorizing Signature:

Date:

ALWAYS LEARNING, ALWAYS IMPROVING THE WAY WE WORK