

NORM management in the Netherlands - 2016 -

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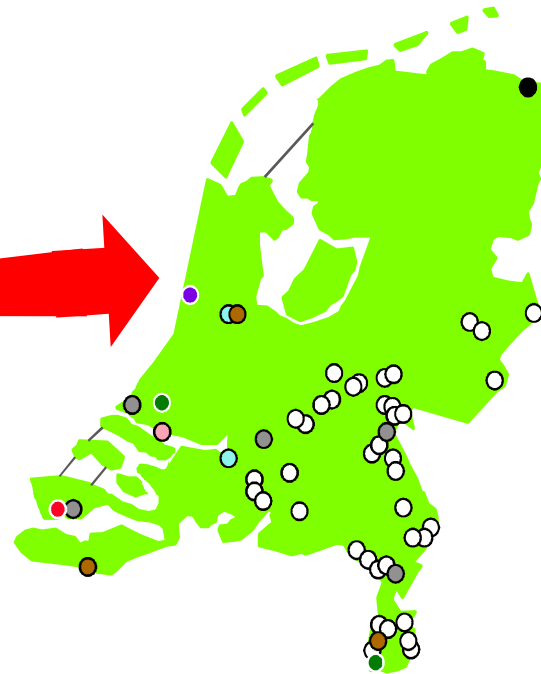
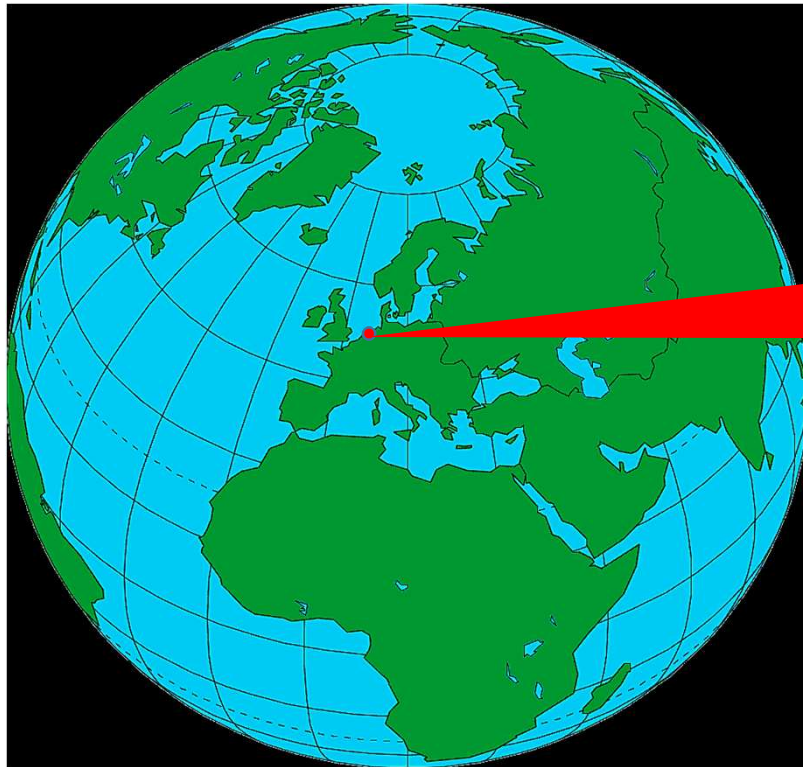
Rio de Janeiro, Brazil



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Overview of NORM industry in the Netherlands



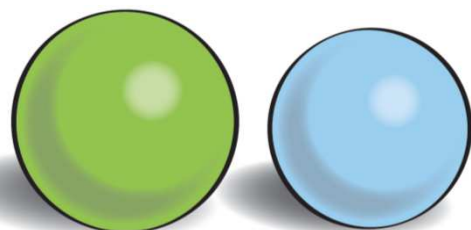
- elementary P
- Titanium
- steel
- cement
- fertilizer
- Mineral sand
- Coal fired plant
- Ceramics
- Oil & gas

NORM waste stored at COVRA (WMO)

2013

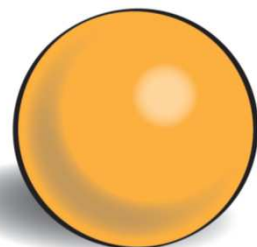
Volume 31,195 m³

NORM	LILW	HLW
(57.4%)	(42.3%)	(0.3%)

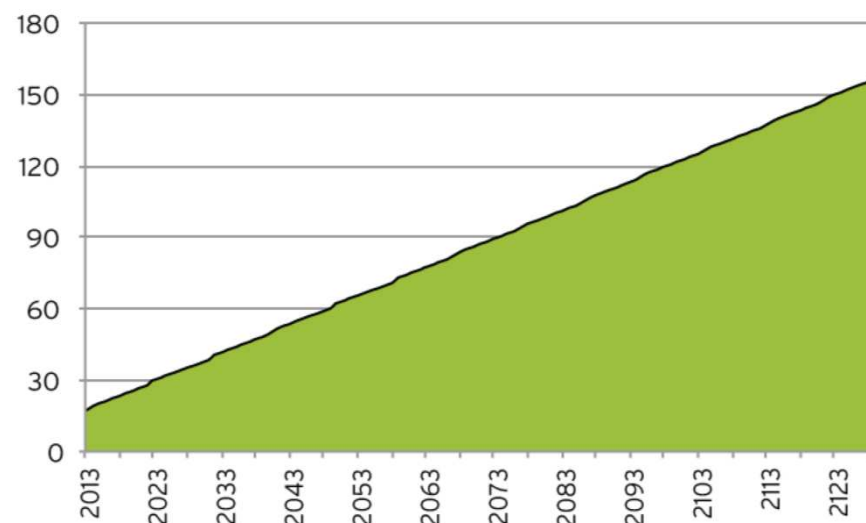


Activity 2.374 PBq

NORM	LILW	HLW
(0.02%)	(0.13%)	(99.9%)



NORM waste assessed at 2130 in m³

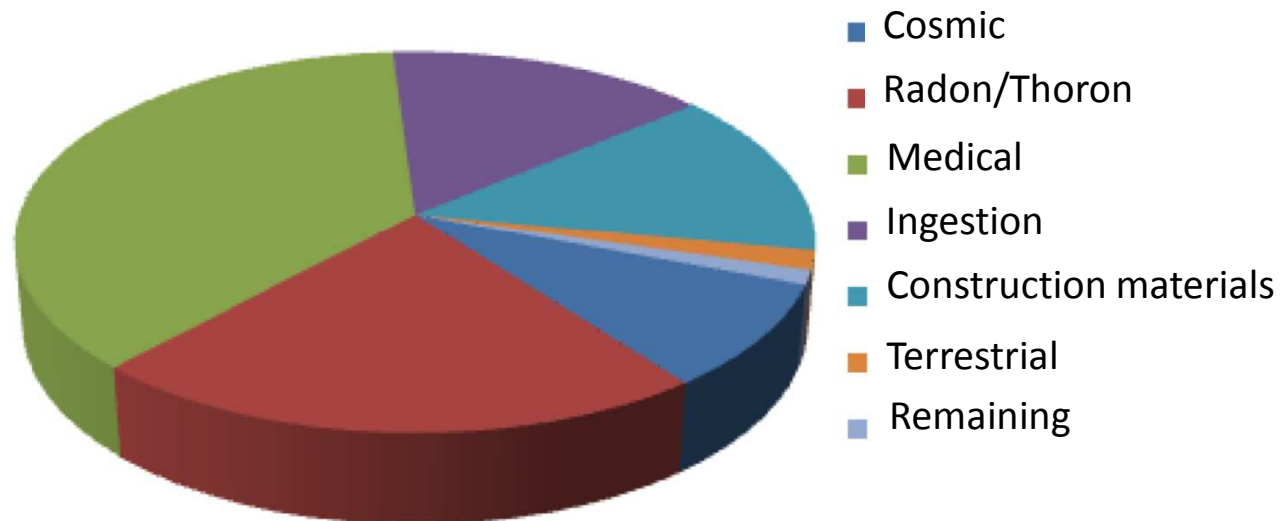


In the case that NORM will not be allowed in the future to be reused, recycled or send to a landfill the volume will increase with 40.000 m³ a year.

Average received dose in the Netherlands

Average received dose in the Netherlands (source RIVM)

2011 (prevailing)
2,5 mSv/y



NORM legislation in the Netherlands

Introduction

The Netherlands has a long history of dealing with NORM starting end of the seventies of the last century. In the past decades, the procedures for working with NORM in the industry as well as the regulations have been gradually developed on gained experiences. These procedures and regulations can be considered as one of the matures and well established ones worldwide.

Key aspects of “the process from NORM awakening to maturity” will be presented. It is evident that these key aspects include topics as regulations, regulatory controls and inspections, radiological characterization of NORM material, disposal routes, training, etc. for building a (more) sustainable NORM industry.

NORM legislation in the Netherlands (cont.)

The process can be divided in roughly six periods:

1. Awakening period (1975 – 1985);
2. Basic document Radon (1985 – 1991);
3. European directive 1996/29/EURATOM (1991 – 1996);
4. Implementation of EU 96/29 directive in National legislation (1996 – 2002);
5. Implementation of National legislation into practice (2002 – 2011);
6. Evaluation & Future (2011 -) and lessons learned. Further, it is expected that the implementation of the EU BSS 2013/59/EURATOM will change the legislation (e.g. exemption and clearance criteria for NORM) and especially on the consequences of NORM (by)products concerning application aspects and NORM releases during demolition of constructions.

(In the paper are more details presented per period.)

NORM regulation in the Netherlands (cont.)

Current legislation

The responsible regulatory body is the “Dutch Authority for Nuclear Safety and Radiation Protection (ANVS)”. ANVS is an independent governmental organization which falls under the political responsibility of the Ministry of Infrastructure and Environment. The legislation for NORM is equal to that of artificial radioactive sources.

- ICRP publication 60 and 103;
- IAEA BSS;
- EURATOM;
 - Regulations and directives;
 - BSS;
 - Exemption / clearance in Bq, Bq/g;
- Dutch Nuclear Energy Act;
- Radiation Protection Decree;
- NORM Ordinance (NABIS).

NORM regulation in the Netherlands (cont.)

Current legislation: Radiation Protection Degree

- List of justifiable applications;
- Licensing;
- Risks analyses;
- Radiation Protection Expert;
 - (RPE, RPO);
- Dose registration;
- NORM (notifiable) to licensed landfill sites or;
- NORM (licensable) as radioactive waste to the licensed WMO.

NORM regulation in the Netherlands (cont.)

Current legislation: NORM Ordinance (NABIS)

- Positive list: Based upon scenarios (normal and worst case);
- Notification (registration or licensing);
 - Web based notification;
 - Chain control (first one notifies authorities);
- Summation of radionuclides;
- Method of measurements: Discharges to air and water;
- NORM waste disposal options: Landfill or COVRA (WMO).

NORM predisposal management

Generic approach

“Lansink’s ladder”

- Prevention
- Reuse
- Recycling
- Incineration
- Disposal



Occurrence of NORM



Detection of notifiable or licensable NORM-materials

- Contamination monitors:

Calculated (ingestion)

- * Ra-226 scale 1 Bq/cm²
- * Pb-210 scale 1 Bq/cm²

Practical

- * Onshore 2 x background
- * Offshore 3 x background

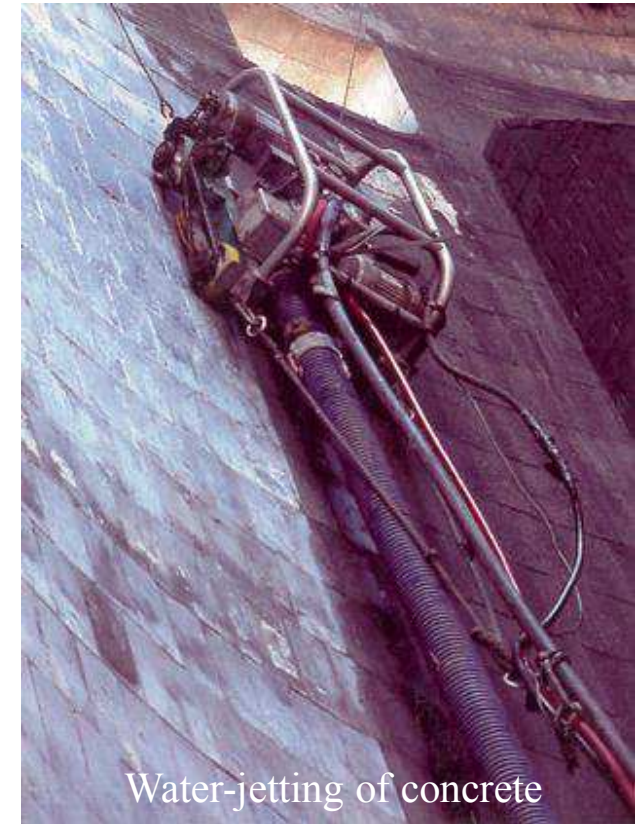
Legal

4 Bq/cm² β-activity

- Gamma spectroscopy: If work activities are on “positive list” and the activity is > “Exemption levels (EL)” THEN notification or if > 10*EL licensing.

Reuse of NORM contaminated materials (installation parts)

Decontamination



Recycling of NORM

Metal scrap; melting,
Siempelkamp Germany



Sinters in road construction
or dikes.



Disposal options for “notifiable NORM waste”

Operational Landfill sites (licensed for notifiable NORM)

A&G near Rotterdam



Nauerna near Amsterdam



WMO

COVRA near Vlissingen



Disposal options for “licensable NORM waste”

WMO: COVRA near Vlissingen

LL NORM



Scrap



Calcinate



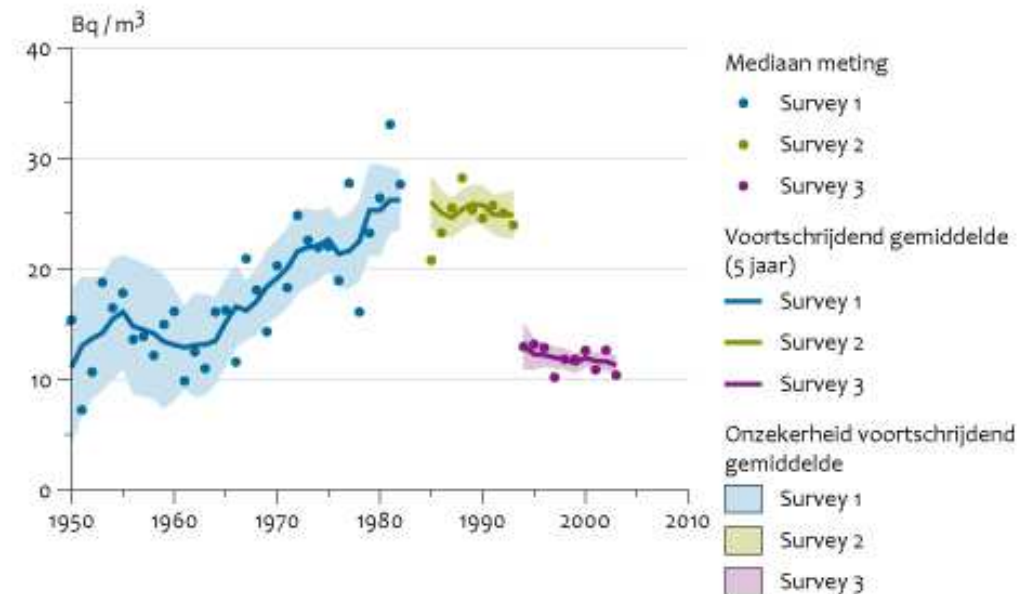
Depleted Uranium (U_3O_8)



Evaluation & Future (2011 -) and Lessons learned

- Investigation by the Regulator how to implement EU BSS 2013/59 EURATOM
- Ongoing R&D in sampling and characterization methods for NORM
- Construction/building materials
 - About 70% of the exposure in houses is from radon;
 - Covenant: standstill exposure situation new built houses;
 - Several studies initiated dealing with the exposure in houses;
 - Contribution indoor exposure due to **Thoron** seems to be higher then assumed
 - New studies have been initiated at Radon and Thoron exposure.

Radonconcentratie in woningen



Bron: RIVM.

PBL/jan11/312
www.compendiumvoordeleefomgeving.nl

NORM legislation in the Netherlands (cont.)

6. Evaluation & Future (2011 -) and Lessons learned

Bankruptcy of a NORM-industry

There was once ...



Creating a legacy:

- ~ Large amounts of NORM
- ~ Sealed sources and devices
- ~ Deposits on plant parts
- ~ Emissions
- ~ Radioactive residues and waste
- ~ Contaminated installation(s)
- ~ Contaminated soil

Consequences:

- ~ Concern on safety
- ~ Care on costs
- ~ Care on responsibilities
- ~ Questions in parliament
- ~ **Demand to take measures to prevent similar situations**

Actions: The Dutch regulator ANVS started an investigation into companies where to expect significant costs on termination of operations due to radioactivity. Classification was performed on low-medium-high costs (category high is ten of few ten's of million Euro's). At this moment no requirements are set with regard to plans and reservations of funds for termination for non-nuclear applications. Commitment to the Minister of Economic Affairs and parliament: i) Prior to licensing a better understanding of costs of termination; ii) Come to reinforce basis through licensed financial security. (Information provided by ANVS –Dutch Regulator-)

Summary

- The Netherlands has for a small country a relative large NORM industry and has to deal with some special NORM wastes e.g. calcinate, DUO;
- The legislation is mature, practicable but severe and more strict than in neighboring countries;
- At this moment there are disposal routes for all produced NORM waste in the Netherlands, licensable as well as notifiable;
- In the case that a “Landfill”-option will not be allowed anymore in the future, the amount of NORM waste to be stored at COVRA (WMO) will increase with about 40000 m³ a year;
- Upcoming challenges are: implementation of EC BSS 2013/59/EURATOM, dose due Radon versus Thoron and due building/construction materials including characterization; identification of practices involving NORM workers and public which cannot be discarded *from a radiation protection point of view*.

References



Ministry of Infrastructure and Environment; The National program for the management of radioactive waste and spent fuel, 2015.

Van Velzen, L.P.M.; Welbergen J.; Building a mature and sustainable NORM industry; NORM VII conference, Talinn 2012.

Welbergen J.; Presentation at IRANOW NORM Conference 2015

www.vangansewinkel-minerals.nl/

<http://english.autoriteitnvs.nl/>

Thank you for your attention,

Questions ?