Learning Outcomes for E&T Programs for RPOs for open sources

A German-Dutch Comparison

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Introduction / contents

› New learning outcomes for E&T Programs (NL)
  • Old and Adapted Dutch model for E&T in Radiation Protection
  • Qualification Descriptors for RPOs responsible for dispersive RA material (‘open sources’)
› Towards German-Dutch comparison
  • Why and why now?
  • Preliminary results
Old Dutch system

<table>
<thead>
<tr>
<th>Level of Expertise</th>
<th>Purpose</th>
<th>Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Low risk &amp; few sources (RPO)</td>
<td>A / B</td>
</tr>
<tr>
<td>4</td>
<td>Moderate risk (RPO)</td>
<td>A / B</td>
</tr>
<tr>
<td>3</td>
<td>Significant risk (RPE/RPO)</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>High risk / complex licenses (RPE)</td>
<td>-</td>
</tr>
</tbody>
</table>

> ‘problem’: RPO is not application specific as required by EU-BSS
### Adapted Model Dutch educational system RPO

<table>
<thead>
<tr>
<th>Sector</th>
<th>Medical</th>
<th>Nucl</th>
<th>Industry &amp; Research</th>
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</thead>
<tbody>
<tr>
<td>Type of specialisation</td>
<td>Rad</td>
<td>De</td>
<td>Vet</td>
</tr>
<tr>
<td>EQF level</td>
<td>4/5</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Topics</td>
<td></td>
<td></td>
<td>NFC</td>
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<tr>
<td>Technical</td>
<td></td>
<td></td>
<td>Os</td>
</tr>
<tr>
<td>Radiation physics and</td>
<td>B5</td>
<td>B5</td>
<td>B6</td>
</tr>
<tr>
<td>interaction with matter,</td>
<td></td>
<td></td>
<td>B6</td>
</tr>
<tr>
<td>dosimetry and detection,</td>
<td></td>
<td></td>
<td>B6</td>
</tr>
<tr>
<td>risks and effects</td>
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<td></td>
<td>B4</td>
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<tr>
<td>Supervisory</td>
<td></td>
<td></td>
<td>4/6</td>
</tr>
<tr>
<td>General role and duties RPO,</td>
<td>B5</td>
<td>B5</td>
<td>4/6</td>
</tr>
<tr>
<td>legislation, dose limits, O.P.A,</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>safety assessment, ALARA,</td>
<td></td>
<td></td>
<td>4</td>
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<tr>
<td>environment etc</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Specific</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td>Rad</td>
<td>De</td>
<td>Vet</td>
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<td>Technical knowledge,</td>
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<td>operation and maintenance,</td>
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<td>specific risks, shielding,</td>
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<td>Acc</td>
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<td>measurement, storage,</td>
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<td>IR</td>
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<tr>
<td>packing and transport,</td>
<td></td>
<td></td>
<td>GT</td>
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<tr>
<td>waste and discharges.</td>
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<tr>
<td>Supervisory</td>
<td>Rad</td>
<td>De</td>
<td>Vet</td>
</tr>
<tr>
<td>Specific tasks RPO, specific</td>
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<td></td>
<td>Os</td>
</tr>
<tr>
<td>legislation, licences/reports</td>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>incidents, supervising</td>
<td></td>
<td></td>
<td>Acc</td>
</tr>
</tbody>
</table>

**Basic**

- Technical:
  - Radiation physics and interaction with matter, dosimetry and detection, risks and effects

- Supervisory:
  - General role and duties RPO, legislation, dose limits, O.P.A, safety assessment, ALARA, environment etc

**Specific**

- Technical:
  - Technical knowledge, operation and maintenance, specific risks, shielding, measurement, storage, packing and transport, waste and discharges.

- Supervisory:
  - Specific tasks RPO, specific legislation, licences/reports incidents, supervising

** Courtesy of Barbara Godthelp (ANVS) **
RPO-DRM

› RPO Dispersive Radioactive Material (RPO-DRM)
  • Three levels (depending on amount of activity)
    • RPO-DRM B: E&T Program for RPE
    • RPO-DRM C: EQF Level 5 (modest activity)
    • RPO-DRM D: EQF Level 4 (low activity)

› Qualification Descriptors RPO-DRM C/D
  • 3 Core Competences for all RPO’s (‘Basic’)
  • 1 Core Competence for RPO-DRM (‘Specific’)

RPO-DRM

Qualification Descriptors ➔ Learning Outcomes
- Table with keywords/subjects ranked according to Knowledge, Skills and Competences K<S<C

Concluding remarks RPO-DRM
- RPO-DRM C: similar to old level 4B
- RPO-DRM D: similar to old level 5B
- RPO-DRM D also recommended for Radiation Workers
Towards a German-Dutch comparison

› Why and why now?
  • Opportunity to harmonize learning outcomes for a dedicated group of RPOs (D-NL) → mutual recognition?
  • Facilitate employers in mutually ‘recognizing’ instruction programs
  • NL is (a little) ahead of Germany in implementing EU-BSS
    • Comparison of new Dutch learning outcomes with old German ones feasible
    • Recommendations to ANVS (NL) and BfS (D)
The German-Dutch comparison

5B course → RPO-DRM D → S 4.1 module

- Handling of open sources with low activity
- Module GH: Handling of sealed radioactive sources with low activity
- Module OG: Handling of unsealed radioactive sources with low activity

-> Comparison of the learning subjects
Analysis: Scheme

- Keywords
- Content

Gaps

Conformity

1. 2. 3.
1. Analysis: Content

Germany:
- Rule of thumb: average energy of β-emitters
- Rule of thumb: β- and γ-dosimetry

Netherlands:
- Maintenance of the equipment
- Neutron dosimetry
- Radiation passport
2. Analysis: Equivalence

-> The contrast between content wise identical subjects

“Practical skills in release of contaminated people” K < S < C

> No. 368 OG (2) mention
> No. 371 OG (2) execute
> No. 372 OG (2) estimate
> No. 369 OG (2) evaluate
> No. 370 OG (2) mention

Extent: Netherlands < Germany  Extent: Germany < Netherlands

The various lecture times might falsify this analysis slightly!
3. Analysis: Legislation reference

German learning objectives

- German RP ordinance reference: 202
- Other German legislation references: 25
- Subjects: Regulation knowledge: 7
- No legislation reference

Legislation related topics

- Legislation: 12
- Organization: 38
- Practical aspects: 5
- Waste handling: 42
- Knowledge and practical skills of different cordon off levels
- Dose terms and units
Experiments:

- Energy spectra β-, γ-emitters
- Interaction mechanisms for γ-emitters
- Bremsstrahlung
- Interaction mechanisms for β emitters
- Liquid scintillation counters
- Dead time
- Counting efficiency
- Inversion chambers
- Geiger-Müller counters
- Inverse square law
- Half-thickness
- NaI-detector
- Rules of thumb: penetration of beta-emitters
- γ-dosimetry
- Principle protection regulations
- Interpretation of measurements
- Choice of material for shielding as a function of photon energy
- Calculation of radiation scattering by objects
- Practical skills in contamination measuring
- Energy spectra β-, γ-emitters
- Interaction mechanisms for γ-emitters
- Bremsstrahlung
- Liquid scintillation counters
- Dead time
- Counting efficiency
- Minimal detectable activity / counting rate
- Spectrometry, pulse height analysis
- Source constant
- Build-up factor for non-composite materials

Keep in mind that:
Sufficient practical experience is required to become an RPO in Germany!
Conclusions: Additional training

Analysis: Legislation reference

- Legislation
- Organization
- Practical aspects

Analysis: Content

- Maintenance of the equipment
- Neutron dosimetry
- Radiation passport

- Rule of thumb: Average energy of β-emitters
- Rule of thumb: β- and γ-dosimetry

The equivalence analysis accounts no noticeable gaps.
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  • Barbara Godthelp
Thank you for your attention