The New German Landscape of Radiation Protection and Waste Management

Transposition of Directive 2013/59/Euratom:
"StrlSchG"

New Responsibilities in Waste Management:
"EntsorgFondsG"
"Entsorgungsübergangsgesetz"

Dr. B. Lorenz
Mülheim-Kärlich, Mai 2017

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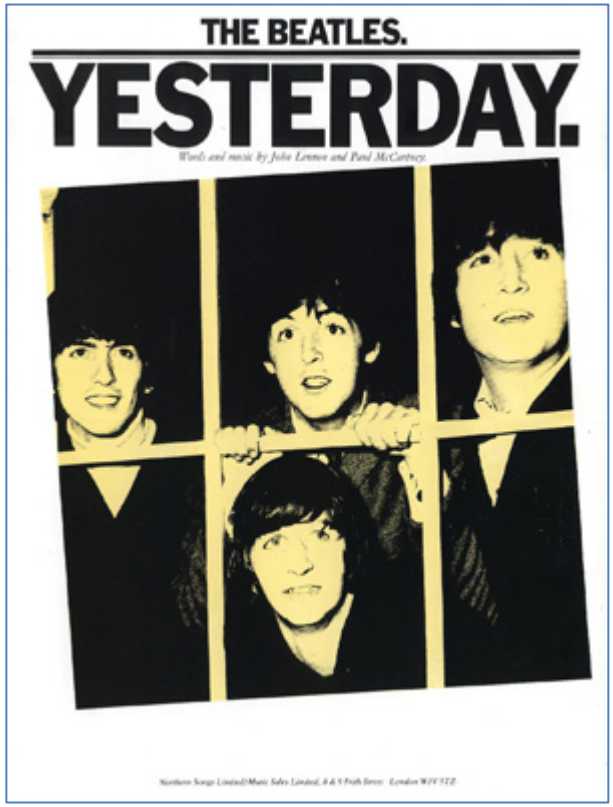
One thing is for sure



The topics

- Background
- Paradigm
- Why StrlSchG?
- The Process
- What is new?
- Solving the struggle about disposal
  - EntsorgFundG
  - Entsorgungsübergangs gesetz

Mind „the writing on the wall“ and a little bit of self advertising.

Background StrlSchG

First of all, we leave Germany and look what happened in the world.

The Paradigm

Three electric guitars, drums and a few wild boys: that‘s the rock&roll paradigm.

The Paradigm in Radiation Protection

„ A science paradigm is a bundle of theoretical principles, questions, and methods that are shared by many scholars, which lasts longer historical periods in the development of a science“

ICRP INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

UNSCEAR

IAEA-BSS

EU-BSS

COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation

National Regulations

Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

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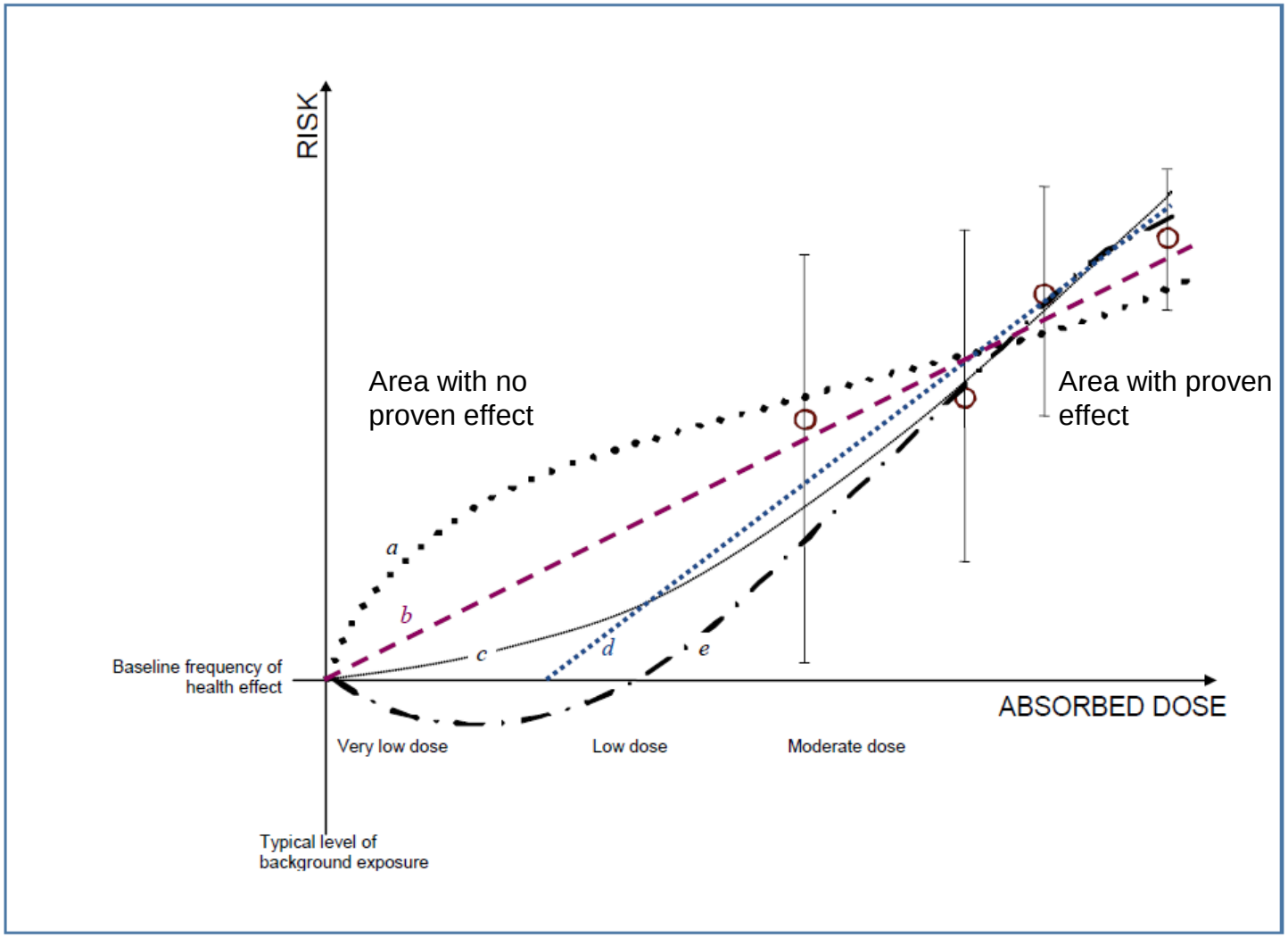
Deterministic radiation effect (tissue reactions)

- Those effects are manifested when a certain dose above a threshold is exceeded. Below the threshold nothing detrimental happens. Protection: **remaining below the threshold**.
- Examples:
  - cataract of the lens of the eye,
  - radiation burns (erythema, skin reddening, necrosis),
  - acute radiation sickness (after high doses due to an accident or after radiation therapy).
- Deterministic effects do not play a role in the public debate although they really occur by accident.
- IAEA: between 1945 and 2000 in average **7 death victims per year,** including Chernobyl and medical mistreatment**.** Source: CEJOEM 2001, Vol.7. No.1.:3-14
- The number of deadly accidents at work for Germany is **818 in 2015**. Source: DGUV

Stochastic radiation effects

- This effect is always there as soon as a radiation exposure occurs. It is independent of the dose. This is the consequence of the LNT-Hypothesis which follows the **precautionary principle**.
- The possible results can be cancer, non-cancer diseases or genetic defects.
- But: **the effect is not causal, it is of a statistical nature** and predictable only for large groups of people, never for an individual.
- If a dose X is applied to a (large) population, Y detrimental effects are theoretically expected.
- From this statement a risk factor (5 % per Sv) is derived. It sums up all detrimental effects .
- If one belongs to the collective of people exposed one can suffer from the detriment or remain healthy.
- This normally is hard to understand.
- Protection: **remain below dose limits and use ALARA**.

Dose effect projections



Source: UNSCEAR

The radiation protection system

- Justification
  - Benefit of using radiation must outweigh its detriments.
  - **Do more good than harm**.
- Optimization
  - Each radiation exposure needs to be **as low as reasonably achievable (ALARA)**, social and economic factors taken into account.
  - **New**: Optimization below prefixed **dose constraints**.
- Dose limits
  - In any case exposure needs to be below dose limits.
  - **20 mSv/a for workers, 1 mSv/a for members of the public**.

Implementing the latest ICRP Basic Recommendations on Radiation Protection

2007

ICRP INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

UNSCEAR

2011

IAEA-BSS

COUNCIL DIRECTIVE 2013/59/EURATOM of 5 De g down basic safety standards for protection against the da exposure to ionising radiation

2013

EU-BSS

Bunde für Um und Re

2018

National Regulations

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Do we need a StrlSchG [radiation protection law]?

BMUB / Government say: yes.

- The Atomic Energy Act will loose its importance (no longer Atomic (Nuclear) Energy in Germany after 2022).
- Radiation Protection is needed much longer.
- And there are international obligations (EU-Directive 2013/59/Euratom).

"*The draft law serves to transpose the directive into German law. It also fulfills the mandate from the coalition agreement for the 18th legislative period to modernize radiation protection law and to conceptually develop the radiological emergency protection for the management of catastrophes in nuclear facilities based on the experiences of Fukushima.*"

Source BMBU

BMUB informs about StrlSchG

© BMUB/Inga Wagner

- *" Radiation protection is of great importance for human health and relevance for many areas of life. With the modernized and expanded regulations we have a reliable basis for a comprehensive protection of the citizens against ionizing radiation. In the case of emergency radiological protection, we are creating a modern management system with which we can cover a large number of emergency scenarios - including major accidents in nuclear power plants."* Source BMBU

- Do you believe in a severe accident in German NPPs?
- But perhaps Germans don't believe in the safety of foreign NPPs?

StrlSchG: the process in progress

- 20.01. 2017 decision of government about draft law
- Goes to Bundestag (parliament) and Bundesrat (Federal Council) in parallel.
  - 9./10.03. 1.reading Bundestag: goes to committees
  - 10.03.2017 Bundesrat
  - 27.04.2017 2.und 3. reading Bundestag [22.45 – 23.15 = half an hour: this was the plan. The reality: 23.15-23.20, 3x voting]
  - 12.05.2017 Bundesrat, final decision
- 10.03.2017 Bundesrat (recommendation for changes):
  - approx. 70 proposals for a change; mostly accepted by government
  - Nothing fundamental from operators point of view
  - Bund-Länder-competencies [also a question of money]
  - Editorial corrections
- *„ Emergency provisions will come into force as early as 2017, three months after the promulgation of the Radiation Protection Act. The other new regulations are to come into force mostly by the end of 2018, at the same time as concretising guidelines to be implemented at the level of legal regulations.“*

Source BMBU

StrlSchG: More Protection acc. FAQ of BMUB

- *"The Radiation Protection Act provides for an effective radiation protection adapted to the current state of scientific knowledge. Directive 2013/59 / Euratom extends the scope of application of radiation protection legislation, thereby providing greater protection for citizens against the harmful effects of ionizing radiation. This is illustrated by the following new regulatory areas:"*

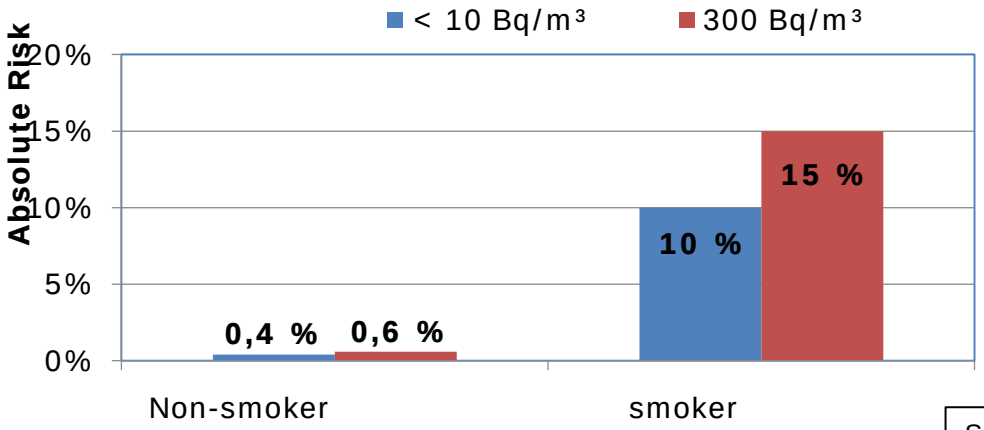
Source BMBU

  - *1. Radon*
  - *2. Managing radioactive contaminated sites*
    - Contaminated sites are contaminations from completed human activities if the exposure caused by it exceeds the reference value of the effective dose of 1 Millisievert per year.
  - *3. Radioactivity in building materials*
    - Measurements of the specific activity are required so as to check whether the exposure caused by radionuclides contained therein falls below the reference value of 1 Millisievert per year.
  - *4. Use of X-rays or radioactive substances in humans for the purpose of early detection of diseases*
    - In the future further detection methods may be permitted.

There might be a little bit of „German Angst“ too.

Perhaps the most challenging topic: RADON

- **Exposition through Radon indoors**
  - *§ 124 The reference level for the annual average air Radon-222-activity concentration indoors is 300 Becquerel per cubic meter.*
- EU-BSS, IAEA-BSS: 300 Bq/m³, before that 600 Bq/m³
- FS AKnat position:
  - 300 Bq/m³ is appropriate, at least.
  - 100 Bq/m³ not reliable measurable.
  - 300 Bq/m³ may trigger anxiety and costly corrective actions in 200 000 homes?



Source FS-Kompakt

General Impression

- Do a law needs to be nice?
  - No, but it would be nice to understand it.
- The new Law + X(?) ordinances.
  - 30 or more times there is a reference to an ordinance to come.
  - Many text to say what is to regulate but not how.
  - 152 pages (with explanations/rationales 600 pages). The existing StrlSchV has 228 pages and regulates nearly anything.
- The language: The layman wonders, the lawyer is acquainted to that.
  - Internationally „plain language“ is sought.
  - The draft law is rather a unsuccessful attempt.
- The explanations are, however, easy to read.
- It is advisable to read the explanations.

Remember…

SISYPHUS

There have been difficult tasks ever since.

State of Science and Technology or State of Technology?

- The State of S&T *[to protect against the detriments from ionizing radiation]* was a precondition to get a license acc. to the StrlSchV (§ 9 (5)).
- The State of T was a precondition to get a license acc. to the RöV (§ 3 (5)).
- Today it would be sufficient to follow the state of T, say FS and other parties.
- But nothing changed.

- The new NORM-Regulation follows the state of T.

- The topic will remain an issue in licensing procedures and the origin of many debates with authorities and expert organizations.

Optimization: a pillar in RP

- FS and other parties suggested to incorporate the word „Optimisation“ into the law.
- Heringsdorf 2016: Mr. Junkersfeld, BMUB, used it in his presentation manifold.
- Optimisation is still not mentioned in the law. That‘s a pity.
- The focus is still on reduction, but this is not optimization.

§ 8 Avoid unnecessary exposure and dose reduction

(1) Anyone planning, exercising or exercising an activity is obliged to avoid any unnecessary exposure or contamination of man and the environment.
(2) Anyone planning, exercising or exercising an activity is obliged to keep any exposure or contamination of man and the environment as low as possible below the limit values. For this purpose he has to take into account all the circumstances of the individual case

1. to observe the state of science and technology in the case of activities pursuant to Section 4 (1), first sentence, points 1 to 7 and 9,
2. in the case of activities pursuant to Article 4 (1), first sentence, points 8, 10 and 11, the state of the art must be observed.

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Topics of interest: **Justification**

- Also a pillar in the ICRP-System: *„Do more good than harm“.*
- At the time non-justified activities are listed in Annex XVI StrlSchV and Annex 5 RöV.
- Now much more is regulated in the StrlSchG (§ 6).
- A process is defined in § 7:
  - Authorities ask the BfS about justification of a new technique.
  - BfS investigates within 12 month (!).
  - Recommendation to accept or reject.
- An ordinance will regulate the details.

- **Why this attention?**
- So far it was not an issue.
- **Which criteria are valid for justification?**
  - Switzerland demands that there is no non-radiological alternative.

StrlSchG: Radiological Emergency Preparedness

- The law demands harmonized planning between „Bund und Ländern“.
- All Emergency Plans have the same basic Reference Scenarios.
- Optimized protection strategies.
- „Verzahnungsansatz“: interlocking of measures
- **radiological situation management centre** (Bund)
- Harmonized situation description (“Lagebild”)
- Spatial network
- *„The legal and administrative framework for emergency care and emergency management is further developed with the new emergency management system of the Federal Government and the Länder in such a way that all authorities and relief organizations involved in the emergency response act as well as possible in the event of emergency decisions and appropriate protection measures in time.”*

Quotation BMBU

The beauty of the new law

is still hidden.

Topics of interest: **Exemption and release**

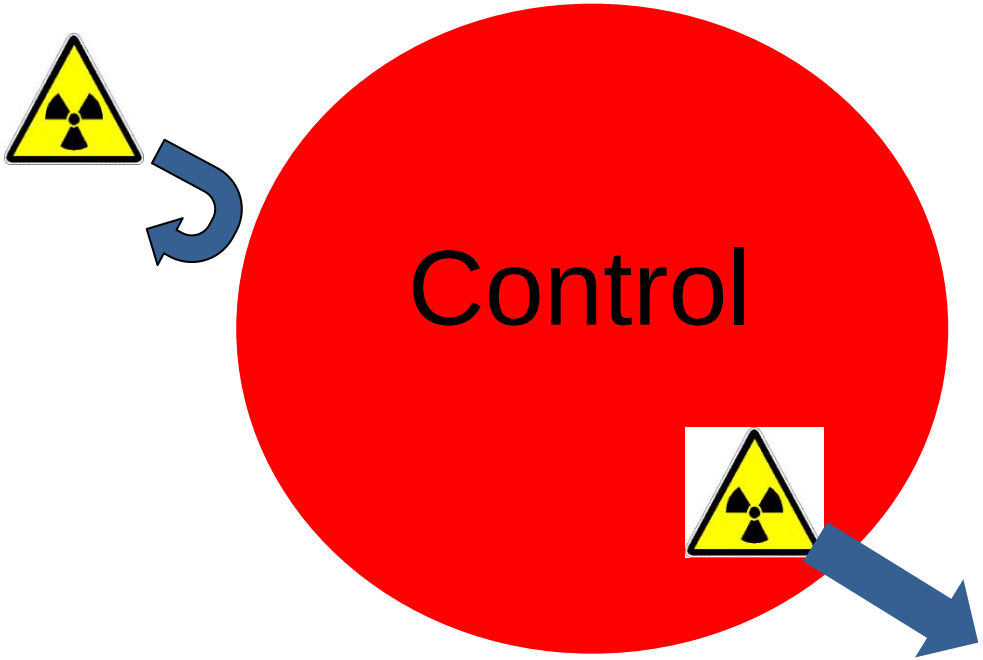
- Instead of EU-based values now turn to IAEA RS-G-1.7
- New: (lower) exemption values for unlimited quantities. StrlSchV Annex III Column 3 replaced by Column 5
- *„The release will continue to be permissible and regulated in an ordinance. The Act contains an authorization for this purpose. The existing rules will be adapted to the requirements of Directive 2013/59 / Euratom. There will be no further fundamental changes in the release of radiologically harmless radioactive substances. "*

Quotation BMBU

- Parts of the new regulation have been presented by BMUB in 2016 already.
- ***„What is possible today, should be possible tomorrow.“***
- Acceptance remains a problem and will probably become a major one in the future.

Exemption and release / clearance

- Exemption = radioactive material is out of control.



- Release/clearance = control of radioactive material is no longer warranted.
- *Same criterion: exposure < 10 µSv/a.*

The acceptance of clearance

„The Grumbachers got up early this Tuesday to make themselves heard. In its municipality near Dresden, the first cargo of rubble from the decommissioned Stade nuclear power station in Lower Saxony has been stored since Tuesday. “

SMUL took great efforts to clear up, but "no-one came”.

Would be nice if this could help!

Transport: looses its special role

- Transport will be treated in the future as a normal „practice“.
- There will be:
  - A responsible person.
  - A radiation protection officer with special knowledge about radiation protection (Fachkunde). The commissioner for dangerous goods knows not enough about RP.
  - Same preconditions for a license as for any other use of radioactive sources.
  - A conflict with the new exemption values is on the horizon.
- We would not have expected this, as the EU-Initiative for a „registration of carriers“ had failed.
  - In view of the extensive transport regulations, the low level of personnel and population exposure, and the high degree of accident safety, transport could also be excluded as a practice.
  - The Bundesrat even proposed that the transport-RPO should supervise all parties involved in the transport.

The new features summarized

- The law has a completely new and unique structure
  - Does not follow the EU-BSS and does not follow StrlSchV or RöV.
- StrlSchV and RöV merge; practices and activities [Tätigkeiten und Arbeiten] also.
  - But there are also differences.
- The ordinance will become a law, guidelines will become ordinances, thus the system will be more stringent.
- RPO gets more power and protection, transport needs a RPO.
- New limit for the lens of the eye 20 mSv/a (former 150 mSv/a).
- Dose constraints for the first time in the German law.
- Justification upgraded and formalized with a new process.
- Emergency preparedness under the leadership of the Bund.
- New provisions about Rn, mainly to implement by the Länder.
- Regulations for contaminated sites.
- **Many authorizations for further regulations: we will see!**

Not anything is bad…

- Even if some items are unclear, the text is not easier to read, and numerous ordinances will follow, it is not anything bad what is written so far.
- And many of the existing regulation will survive.
- That's what we hope for the forthcoming ordinances.
- Remember the old Russian proverb:

Эакон дураками нет.

The law is not made for fools.

But remember „The Situation“

Some figures (German government report 2014)

- **0,07 mSv/a** average for all monitored
- **0,5 mSv/a** average for monitored with reading
- **20 mSv/a** limit for occupationally exposed
- **<100 mSv** no proven effect [UNSCEAR]

The real exposure is far from being a thread.

We are switching now.

- Radiation protection is out/over/done.
- We are now dealing with final repository or the **endless story.**

German struggle about disposal

1977: 15 000 demonstrators against the planned waste management centre at Gorleben.

Albrecht: Prime Minister Lower Saxony: technically feasible but politically not to impose.

Not In My Backyard!

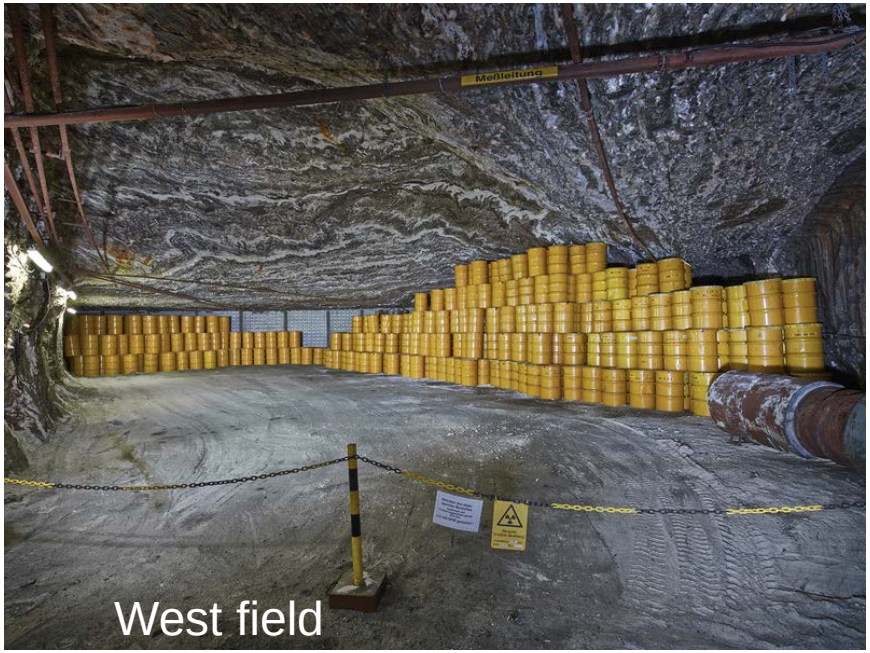
German struggle about disposal

- Disposal was and still is a high ranking political issue.
- Especially the Green Party had blocked ongoing work to finalize a decision about the site.
- For a long time the salt dome of Gorleben seemed to be the right place.
- The resistance against Gorleben site finally succeeded, although
  - The site is very well investigated.
  - Salt is preferred for several reasons.
  - 1,6 billion Euro have already been spent there.
- The Bundestag decided end of March to start a new search for the best place ever.
  - A decision about the site is planned for 2031.
  - The begin of operation is planned for 2050.
  - It will cost again some billions, but at that time the current politicians are no longer responsible.

Disposal facilities in Germany: Konrad

- The former iron ore mine Konrad is a licensed disposal site and the license endorsed by Prime Court [BVerwG].
- It is able to store low and medium active waste; so-called non heat producing waste.
- Currently under construction; operation „not before 2022“.

Disposal facilities in Germany: ERAM



- The former salt mine disposal site of East-Germany.
- Contains mostly waste from East-Germany, but also from West-German plants. Operation was stopped 1998.
- The licence was withdrawn after some disputes before court.
- Now in decommissioning mode. The end point remains unclear.

Disposal Research Facility: Asse

- Also a salt mine, used for testing disposal without a nuclear license (sic).
- 125 000 drums, mostly low active and some medium active waste.
- As a problem arose with water ingress, it became a high ranking political issue.
- According to the “Lex Asse” (2013) the waste needs to be brought to the surface and newly conditioned.
- German SSK and FS say this is not the best option.

The New Deal

- For a waste producing company it is inacceptable to prolong the solution of the disposal over decades with unpredictable costs.
- The deal was:
  - The utilities pay nearly 24 Billion € into a governmental fund.
  - The fund finances all costs for search and construction and operation of the disposal facility.
  - Decommissioning, however, remains in the hands of the utilities.
- This is the purpose of the „Entsorgungsfondsgesetz“.
  - The interim storage of all kinds of waste will be transferred from the utilities to the state.
  - From 1st January 2019 all high active storage facilities.
  - From 1st January 2020 all other medium and low active waste facilities.
  - Excepted are the facilities already run by a state company (Lubmin, Jülich, Karlsruhe) and “Landessammelstellen”.
- This is the purpose of the „Entsorgungsübergangsgesetz”.

A new company is being born

Ahaus

Gorleben

- There will be a new company, the „**BGZ Betriebsgesellschaft für Zwischenlagerung mbH**“ which in the near future operates all facilities on behalf of the state.
- The GNS-owned interim storage facilities in Ahaus and Gorleben will be the core of the new company.
- Beware of interfaces between utilities and BGZ!

Germany‘s Nuclear Sites

Source DAtF

Abb. 3

Standorte in Deutschland

- *Kernkraftwerk*
- *Forschungsreaktor*
- *Zwischenlager nach § 6 Atomgesetz*
- *Kernbrennstoffversorgung*
- *Endlager*
- *Entsorgung (z. B. Konditionierungsanlage, Zwischenlager nach § 7 Strahlenschutzverordnung)*
- *Landessammelstelle*
- *Wiederaufarbeitungsanlage*
- *In Betrieb*
- *Endgültig abgeschaltet, in Stilllegung, Stilllegung abgeschlossen*
- *Errichtung, Planung*
- *Erkundung. Seit 2013 mit dem Standortauswahlgesetz (StandAG) eingestellt*

Quellen: BfS; eigene Angaben

The future is bright

- To bring the new BGZ into operation is a challenge.
- Some of my former colleagues will be part of the story.
- I once was the manager of the Ahaus Interim Storage Facility.
- I can assure you, there is a lot of competence and experience in the teams.
- I am optimistic that they will manage it.

- One issue of severe political dispute has been solved by the new landscape. This is for the better.

- Nevertheless some interfaces remain which could be the reason for new struggle.
- Let‘s also be optimistic in this respect.

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