

# Safety Analysis of the Transportation of Radioactive Waste to the Konrad Final Repository – Waste Data and Scenarios

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- The KONRAD site is a disused iron ore mine within the city boundaries of Salzgitter in Lower Saxony



# Licensing procedure

- KONRAD is licensed since 2002 for the disposal of waste with negligible heat generation
- Licensing procedure more than 20 years
- start 31. August 1982
- licensed 22. May 2002
- last court decision 26. March 2007

# Konrad transport study

The Federal Minister of the Environment and Reactor Safety (BMU), commissioned the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS), Cologne, to conduct a study that examines the shipment of radioactive waste to the Konrad final repository.

# Konrad transport study

In Germany Konrad will be the final repository for all types of negligible heat-generating low and medium radioactive waste from

- nuclear power plants,
- nuclear facilities,
- industry,
- scientific research centers and
- medicine use of radioactive nuclides.

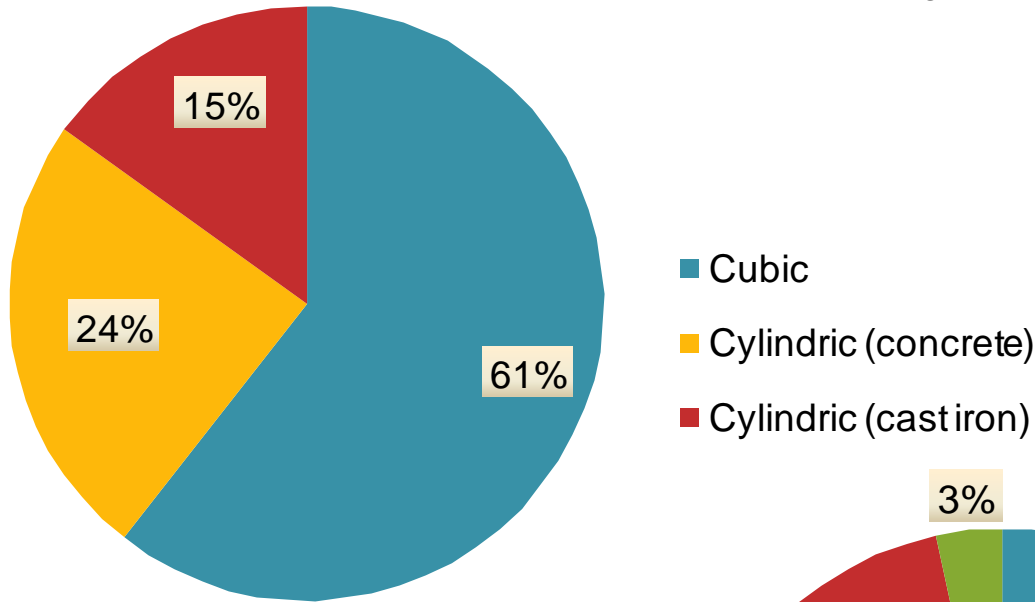
# Konrad transport study

Within this safety analysis two main topics will be discussed,  
the assessment of potential radiation exposures from normal (incident-free) transportation,  
and  
the assessment of risks from transport accidents.

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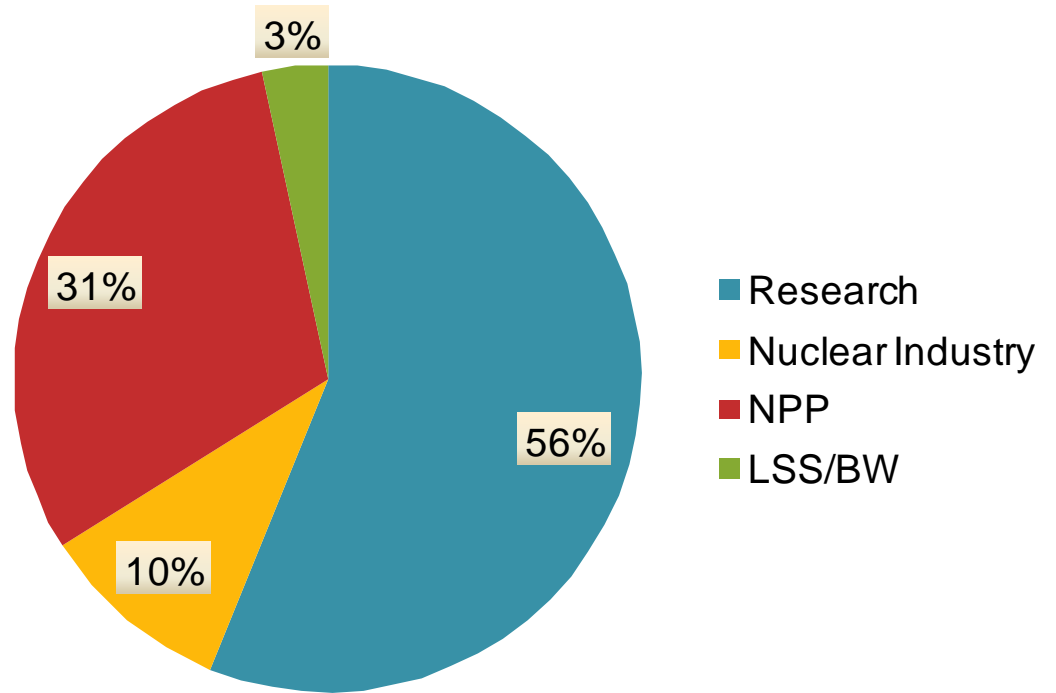
- The maximum volume of radioactive waste for the final repository Konrad will be 303 000 cubic meters,
- 100 000 cubic meters should be shipped within the first ten years,
- nearly 10 000 cubic meters per year.
- At least this will be an amount of 50 shipments of standardized shipping units per week.

normalized to 2300 shipping units



- Cubic
- Cylindric (concrete)
- Cylindric (cast iron)

Figure 1. Percentages of waste **volume** by different origins (on the left) and of container types (on the right, **normalized** to the annual waste transport amount)



- Research
- Nuclear Industry
- NPP
- LSS/BW



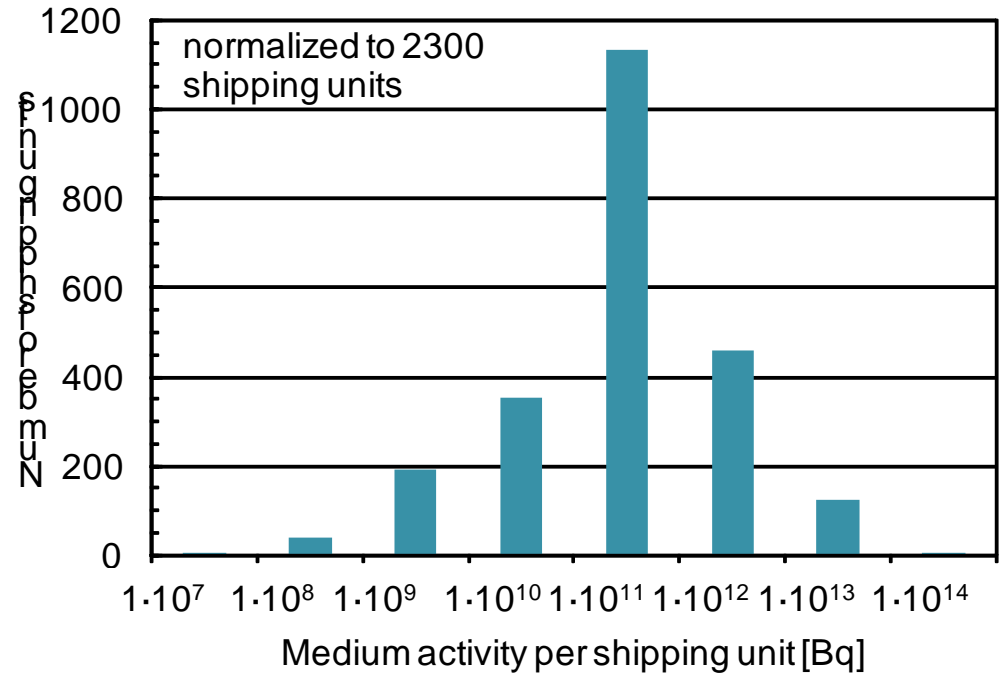
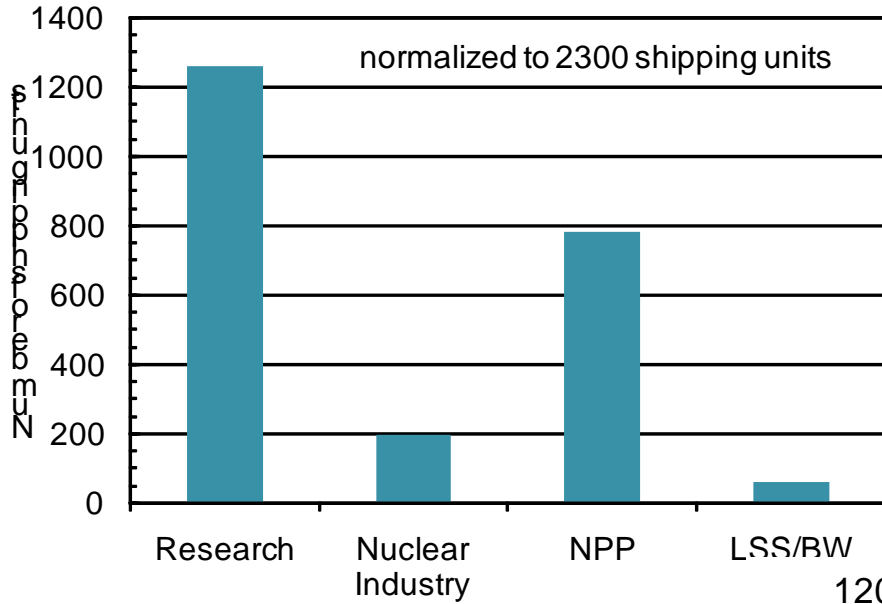


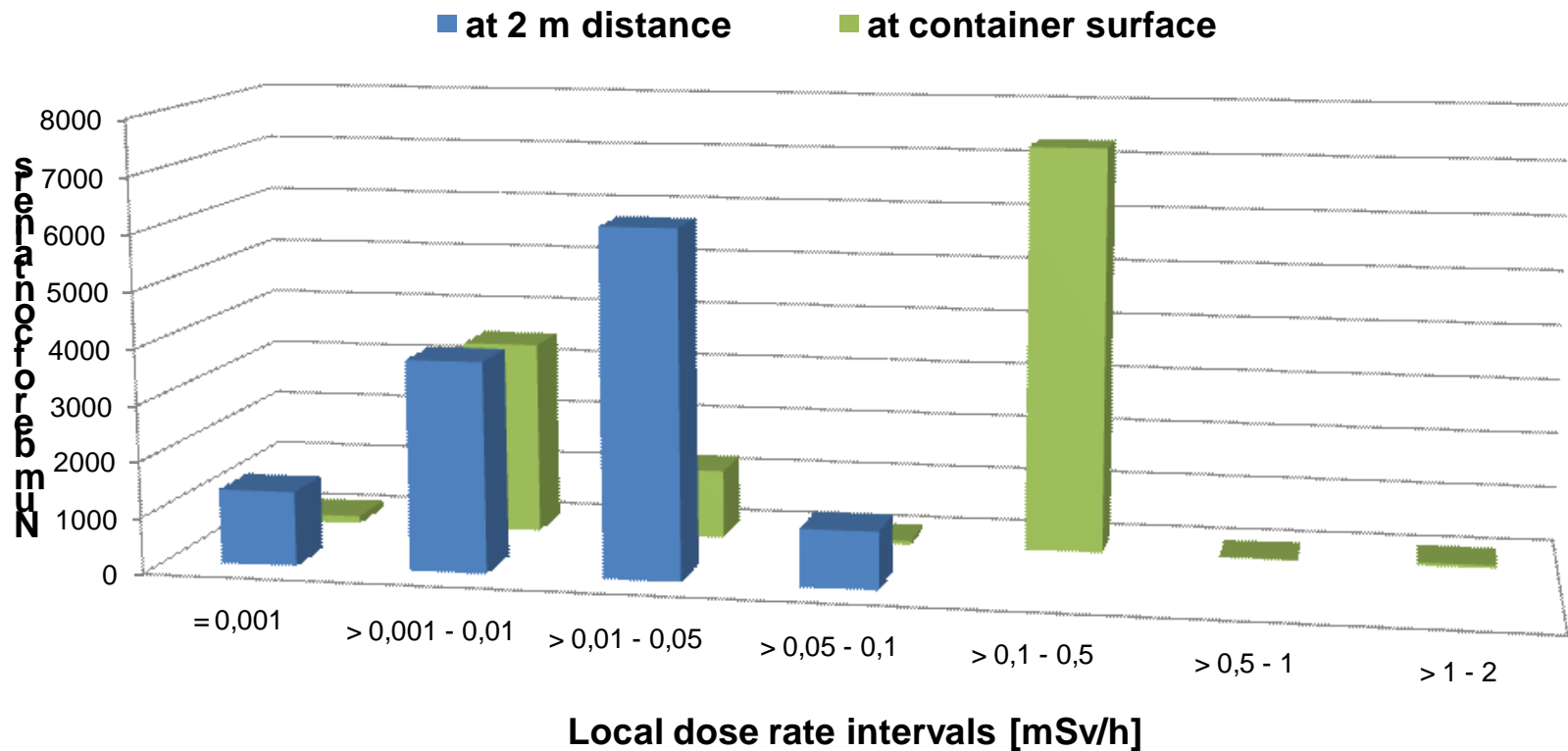
Figure 2. Number of shipping units per year by origin (on the left) and of medium activity per shipping unit (on the right), respectively, normalized to the annual waste transport amount

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- Up to these transport scenarios and arrangements the total weight of one shipping unit (loaded pool pallets and cubical containers) must not exceed 20 metric tonnes.

# Radiation protection

For all these shipments by rail or road the basis for transport safety and radiation protection is given in detail by the relevant national and international transport regulations and the German Radiation Protection Ordinance.



Verteilung der Ortsdosisleistung (Höchstwerte an der Behälteroberfläche bzw. in 2 m Abstand) für quaderförmige Gebinde (Basis: 12 324 Abfallbehälter)

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- What types and quantities of radioactive waste are provided for transportation?
- What are the radiologically relevant characteristics of the waste packages, i.e. the radioactive inventory and the local dose rate?
- Which conveyance are used and on which routes?
- What is the type and extent of the potential radiological consequences from normal (accident-free) transportation?

# “KONRAD Provisional Waste Acceptance Requirements”

- Database
- The “KONRAD Provisional Waste Acceptance Requirements” which were created by the Federal Office for Radiation Protection (BfS) for all types of radioactive waste with negligible heat-generation in Germany
- These requirements contain activity limits for waste packages destined for disposal in conjunction with other requirements concerning the properties of the waste forms and waste containers.

# Transport scenario

- Three main waste shipment scenarios will be analysed within this study:
- 100 % shipments by rail
- 100 % shipments by road
- 80 % shipments by rail and 20 % shipments by road

# Transport Scenarios

- In addition to the reference scenario, a further transport scenario envisaging transportation exclusively by rail (100 % rail) is also investigated.





# Transportation by Road

The transportation of waste by road can generally be assumed to be effected directly from the consignor to the waste disposal site, primarily on main roads and motorways.



# Traffic Volume

- The estimation of the road and rail traffic volume associated with waste transportation is based on the information regarding the quantity of waste provided by the individual waste consignors.
- In addition, the disposal capacity of 50 shipping units (SU) per week or 2.300 shipping units per year, with single-shift operation.

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Thank you very  
much for your  
attention

