Operation of the Register on High Activity Sealed Sources in Germany – four years of experience

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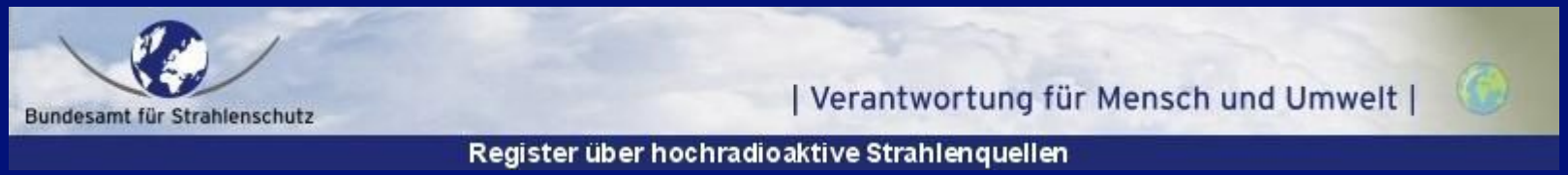


1. Introduction

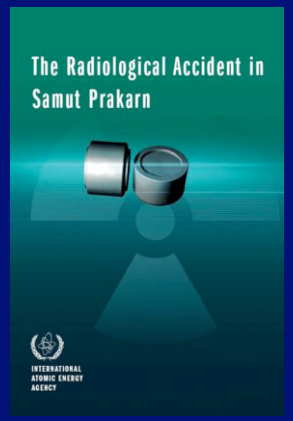
Sources with high activity ⇨ high radiological risk
(accidents, orphaned sources, malicious acts, „dirty bombs“)

- **Industrial applications**
  radioisotope thermoelectric generator (RTG),
  radiography, sterilisation/food irradiation,
  well logging, level/density gauges
- **Medical applications**
  teletherapy, blood irradiation,
  afterloading brachytherapy

Am-241/Be neutron source
for oil well logging

Various high energy gamma sources

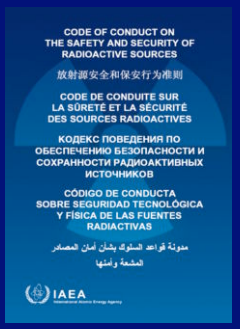
Risks from radioactive material



- **Accidents**
  - Severe injuries by temporary loss of a radiography source, i.e. Ranquil radiography accident (2005)
- **Orphaned sources**
  - Deaths and injuries by unintended damage of an orphaned source, i.e. Samut Prakarn orphaned source (2000)
- **Malicious acts**
  - Deliberate poisoning with radioactive material, i.e. London radiological homicide (2006)
- **„Dirty bomb“**
  - Use of a stolen source together with explosive material by terrorists

International efforts to strengthen control of Sealed Radioactive Sources

2. German Regulations



IAEA recommendations

- Code of Conduct on the Safety and Security of Radioactive Sources (IAEA 2004) with additional
- Guidance on the Import and Export of radioactive Sources

  ⇨ recommendations, but political commitment expressed by states

European regulations

- Council Directive 2003/122/EURATOM of 22.12.2003 (Official Journal L 346, 31/12/2003 P. 0057 - 0064)

  ⇨ „HASS Directive“
- Adoption into national provisions is obligatory
- Regulations concern sources with an activity ≥ $A_1/100$ = high-activity sealed radioactive sources (HASS)

European Council Directive 2003/122/EURATOM

Main prescriptions

- Use of HASS requires license (precautions for source disposal)
- System to ensure source traceability
  ⇨ Registration of HASS using the standard record sheet
  (owner, license, source characteristics, application, control, …)
- Regular inspection of source and container (source user)
- Unique identification and documentation of HASS
- Precautions for an appropriate management of orphaned sources
- Financial precautions (orphaned sources)

German Regulations

2 legal provisions for the control of HASS

- Atomic Energy Act (Atomgesetz, AtG)
- Radiation Protection Ordinance (Strahlenschutzverordnung, StrlSchV)

⇨ Act on the Control of High-Activity Radioactive Sources, 12.08.2005
Changes to comply with the HASS Directive:

- Identification and documentation required for HASS
- Obligation for manufacturers to recycle or dispose sources
- Financial precautions (orphaned sources)
- Central registration of all HASS at the Federal Office for Radiation Protection (BfS) ⇨ HASS Register
  - Notification of receipt, transfer and control of a HASS by licensees
  - Notification of im- and export by Federal Office for Economics and Export Control (BAFA)
  - Information accessible for security agencies (Federal and State Police, Secret services, …)

German Regulations – Specific conditions

Federal structure of radiation protection administration in Germany

- 16 different states (Bundeslaender) are responsible
- differ in organizational structure
- take responsibility for licenses

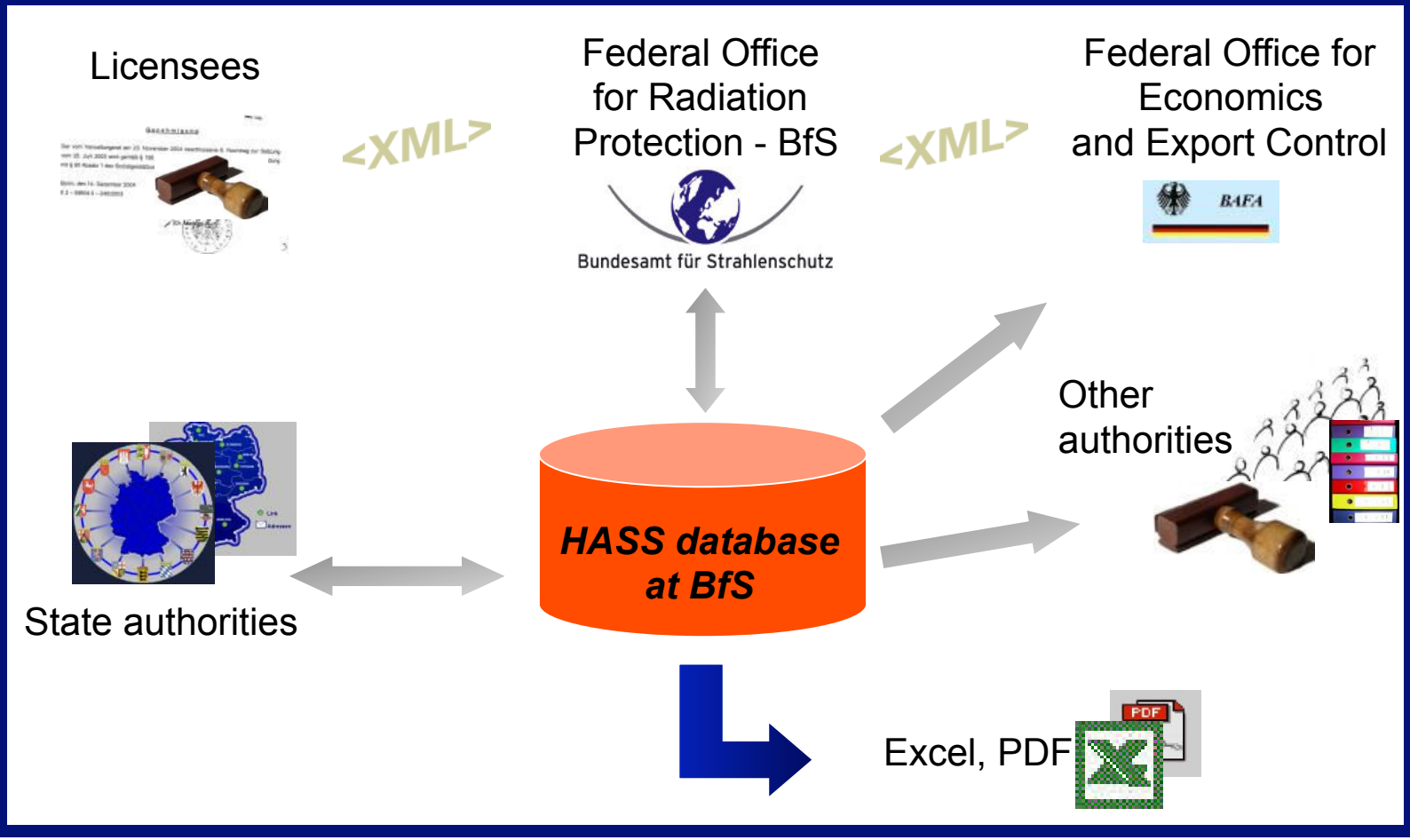
⇨ **Verification of HASS data possible by person in charge at the authority of the corresponding Bundesland**

HASS register manages information between

- licensees
- local state authorities and
- central administration at BfS

3. Operation of the HASS Register

Communication system via encrypted internet connection between licensees, state authorities and BfS



Exchange of HASS data with xml-files

based on standard record sheet acc. to European HASS Directive (adopted to German regulations)

Anlage XV
(zu den §§ 70, 70a und 71)

Standarderfassungsblatt für hochradioaktive Strahlenquellen (HRQ)

(1) HRQ-Identifizierungsnummer:[a]	(2) Inhaber der Genehmigung (Besitzer) Name: Anschrift:[b] Land:[c] Hersteller:[d] ☐ Lieferant:[e] ☐ Nutzer:[d] ☐	(3) Standort der HRQ (Nutzung oder Lagerung) falls abweichend von (2) Name: Anschrift: ortsfeste Nutzung: ☐ Lagerung (mobil):[f] ☐
(4)[g] Registrierung Erstmalig registriert am: Archivierung der Registrierungs-unterlagen am:	(5) Genehmigung *Nummer:* *ausgestellt am:* *abgelaufen am:*	(6) Operationelle Kontrolle der HRQ[h] Datum: Datum: Datum:
(7) HRQ-Merkmale Radionuklid: Radioaktivität zum Zeitpunkt der Herstellung: Zeitpunkt der Herstellung oder des ersten Inverkehrbringens: Hersteller/Lieferant:[k] Name: Anschrift: Land: Physikalische und chemische Merkmale: *Quellentyp:* *Kapsel:* *ISO-Einstufung:* *ANSI-Einstufung:* *Bescheinigung über besondere Form [o]:*	(8) Eingang der HRQ Eingang am:[i] erhalten von: Name: Anschrift: Land: Hersteller: ☐ Lieferant: ☐ anderer Nutzer: ☐ (9) Weitergabe der HRQ weitergegeben am:[l] Weitergabe an: Name: Anschrift: Land: Hersteller:[d] ☐ Lieferant:[e] ☐ anderer Nutzer:[d] ☐ anerkannte Einrichtung[p]: ☐	Datum: Datum: Datum: Datum: Datum: Datum: Datum: Datum: Datum: Datum: (10) Sonstige Angaben *Verlust:* ☐ *Datum:* ☐ *Diebstahl:* ☐ *Datum:* ☐ *ja* ☐ *nein* ☐ *wieder aufgefunden:*[m] *Datum:* *Ort:* *Sonstige Bemerkungen:*[n]

[a] Identifizierungsnummer der hochradioaktiven Strahlenquelle nach § 68 Abs. 1a
[b] Postadresse inklusive Telefonnummer und E-Mail-Adresse
[c] Deutschland und Bundesland
[d] Inhaber einer Genehmigung zum Umgang mit hochradioaktiven Strahlenquellen nach § 9 AtG oder § 7 StrlSchV
[e] Inhaber einer Genehmigung nach § 3 AtG oder § 19 Abs. 1 Satz 1 StrlSchV
[f] Angabe, sofern es sich um einen ortsveränderlichen Umgang handelt und die HRQ nicht länger als vier Wochen an einem anderen Ort verbleibt
[g] wird von der registerführenden Stelle ausgefüllt
[h] Datum der Prüfung auf Unversehrtheit oder Dichtheit nach § 70 Abs. 1 Satz 3 StrlSchV
[i] Datum des Erlangens der Sachherrschaft
[k] Ist der Hersteller der Strahlenquellen außerhalb der Gemeinschaft niedergelassen, ist zusätzlich der Name und die Anschrift des Verbringers oder Lieferanten anzugeben
[l] Datum der Aufgabe der Sachherrschaft
[m] auch Fund einer HRQ
[n] Angaben über die Verwendung der hochradioaktiven Strahlenquellen, z. B. als Teil einer Bestrahlungsvorrichtung oder zur Werkstoffprüfung
[o] Angaben über Datum der Erteilung einer „special form" -Zulassung und ggf. deren Verlängerungen
[p] Landessammelstelle oder Anlage des Bundes zur Sicherstellung und zur Endlagerung radioaktiver Abfälle nach § 9a Abs. 3 Satz 1 AtG

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Responsibilities

Licensee

- Notification of receipt, transfer and control of a HASS (incl. loss, finding)

State authority

- Verification of the data notified by the licensee
- Notification of finding or loss of a HASS
- Reports and analysis

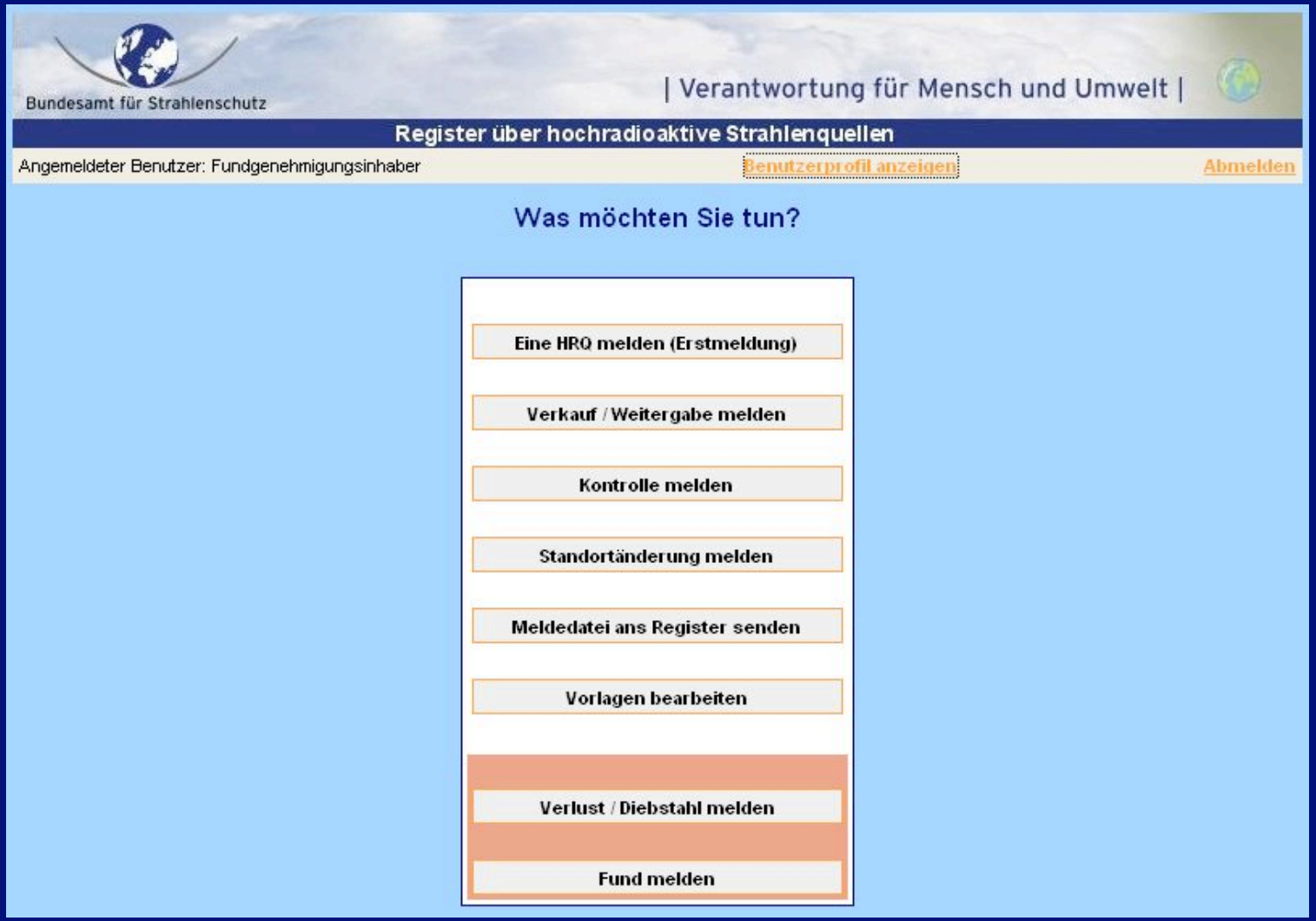
Federal Office for Radiation Protection (BfS)

- Operation and maintenance of the database, reports and analysis
- Control of data (reasonableness check) and registration of notification
- User service and consultation
- Development of soft- and hardware

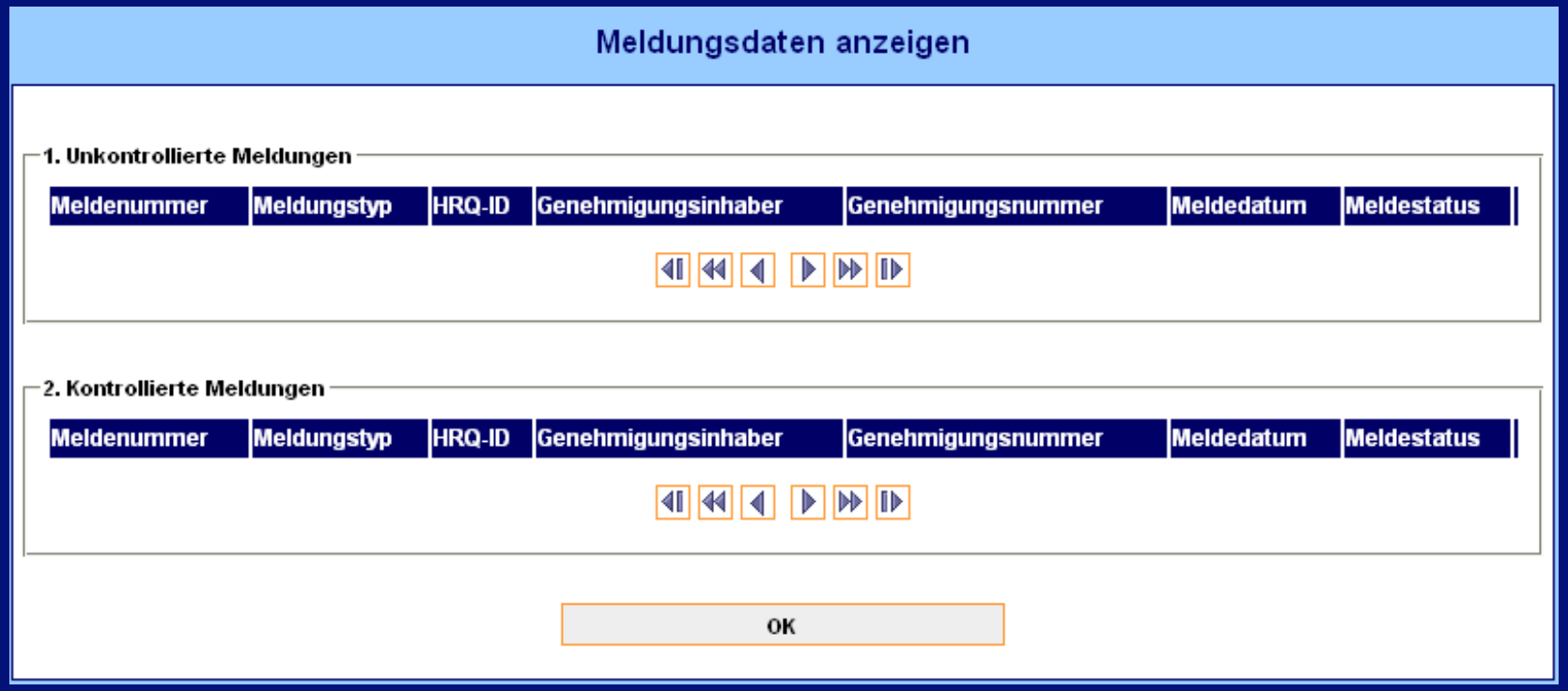
Other authorities (Security)

- Reports and analysis in case of security issues (read access)

Main menu for a licensee



Overview for the local state authority – several notifications by licensees



Security measures

- No direct access to the database for a licensee,
  access via SSL, login with username and password to a communication client only
- Access for state authority via SSL and certificate,
  login with username and password,
  read and write access
- Access for other authorities via SSL and certificate,
  login with username and password,
  only read access
- Staff at BfS working with HASS database signs secrecy agreement
- Computers at BfS for the work with HASS database have restricted access

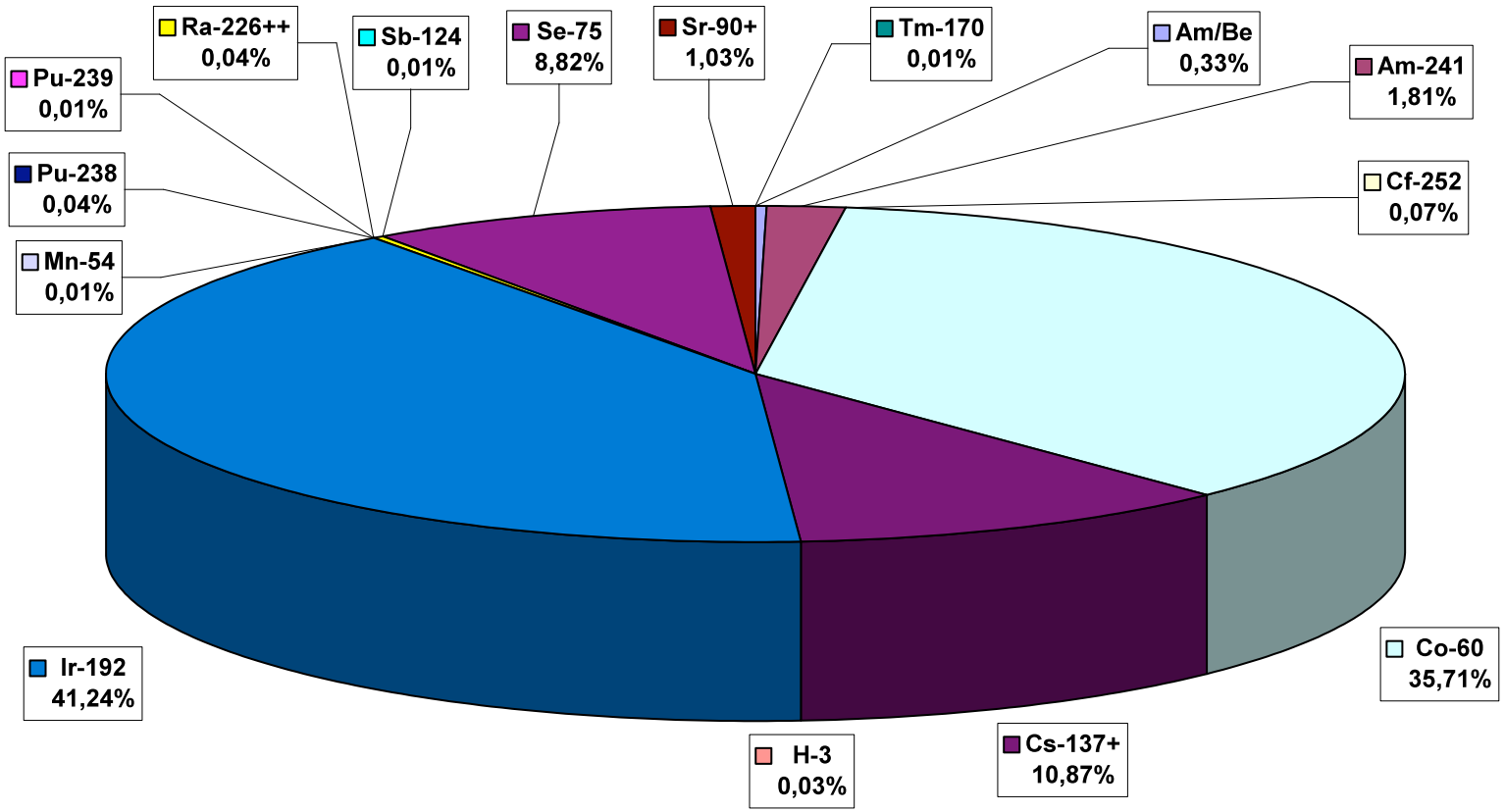
The HASS Register is operating since 2006

⇨ almost 4 years experience

- System is established and accepted by licensees and authorities
- System manages currently (October 2009)
  - 40,000 notifications about 16,000 sources
    (37% decayed, 12% exported ⇨ no HASS formally)
  - access of 580 licensees and 100 authorities
- Current software revision 2, updated in August 2009

⇨ German HASS register complies with the requirements of the European HASS Directive and the IAEA Code of Conduct

Current distribution of nuclides in the HASS database



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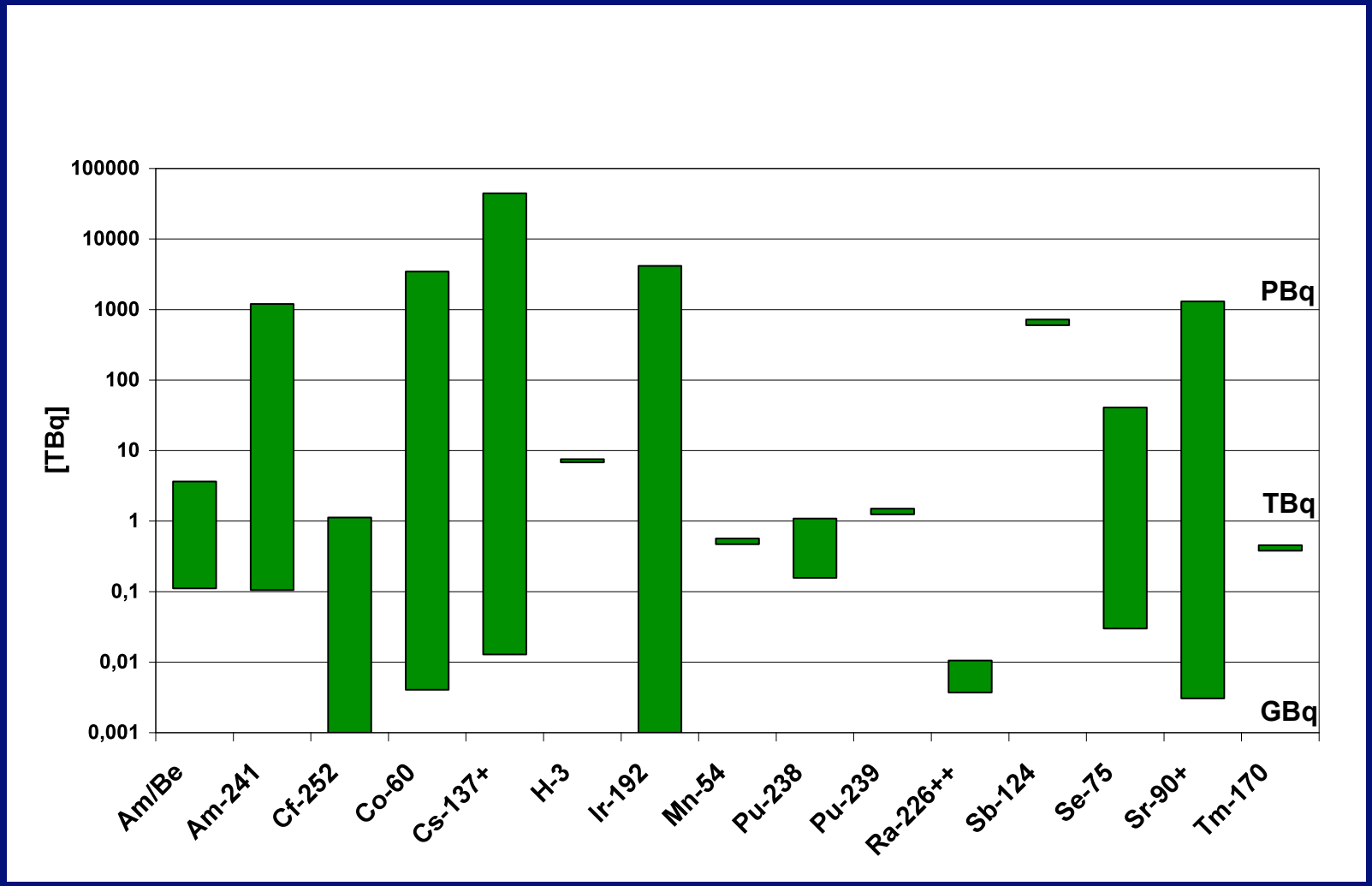
Current distribution of activity in the HASS database



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4. Experience and Development

Quality Control of data

Problem: notification of wrong data
(i.e. different source labels “A123” <> ”A 123”)

⇨ huge effort through clarification

⇨ inconsistencies of the database

Solution

- Access of licensees to their data
  - local file management, no direct access !
- Unique identification system for radioactive sources
  - Scientific investigation on sources sold on the German market
  - evt. introducing a barcode identification system
- Periodical screening of source data on inconsistencies
- Information to and instruction of licensees and source manufacturers
  - workshop with German source manufacturers (June 2008)

Software development

Problems

- Access to the system and display of graphics is too slow
- Notification procedure should be simplified
- Overview functionality should be improved

Solution

- Use of a new application server (since last update)
- Improvement of the software
  - better user-friendliness
  - local file management for the licensee

⇨ **Software revision 3 is scheduled for next year**

European data exchange

Problems

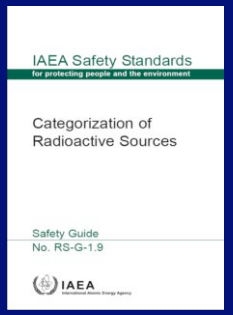
- Directive 1493/93/Euratom (Transfer of sources) does not include detailed information
- Similar regulations within the European Union on the basis of HASS Directive 2003/122/Euratom
- Data exchange on the basis of the standard record sheet is possible in principle, but has not yet taken place

Solution

- Development of conditions for an international data exchange
- International cooperation between HASS registers should be deepened

⇨ **Broad political commitment is needed**

International Harmonization



Problems

- IAEA Code of Conduct (III. No. 11.) requires a national register of sources of category 1 (A > 1000 x D) and category 2 (A > 10 x D)
- IAEA D-value (Dangerous quantities of radioactive material (D-values), IAEA 2006)
- Activity levels differ from HASS Directive (European levels are lower mostly)

Solution

- Harmonization of the European with international regulations
- Problem well known

⇨ **New HASS Directive will probably adopt the D-value regulation of the IAEA (incl. at least category 3)**

5. Summary

National Regulations

- German Act on the Control of High-Activity Radioactive Sources (2005) to implement European Directive 2003/122/Euratom (2003) and regulations of the IAEA Code of Conduct (2004)

German HASS Register operates since July 2006

- Communication system via encrypted internet connection between licensees, state authorities and BfS
- Notification of receipt, transfer and control of a HASS by using xml-files
- Main security measures
  - Encrypted communication via SSL and certificate,
  - No direct access for a licensee

Development

- Improvement of user-friendliness with software revision 3
- Harmonization of European with international regulations
- Deepening international cooperation between HASS registers

Thank you very much for your attention …