## AGES **Radioactivity monitoring of** meat and animal feeds and emergency preparedness in Austria

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Vienna, 17.10.2016

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Federal Ministry of Agriculture, Forestry, Environment and Watermanagement

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- Radioactivity Monitoring in Austria
- Monitoring Results
- Emergency Prepardness
- Specific Countermeasures

## General Situation in Austria



- Austria is a country without NPP
- Austria has no nuclear energy program
   Constitutional Law on a Nuclear-free Austria in 1999
- One nuclear installation: TRIGA Mark II research since 1962, Atomic Institute in Vienna (250 KW)
- Centralized radioactive waste management facility (Nuclear Engineering Seibersdorf)
- Other installations and institutes: accelerator (medical, research), irradiation facilities, research laboratories - e.g. IAEA, hospitals (teletherapy, gamma knifes) & industry

# Regulatory bodies in radiation protection

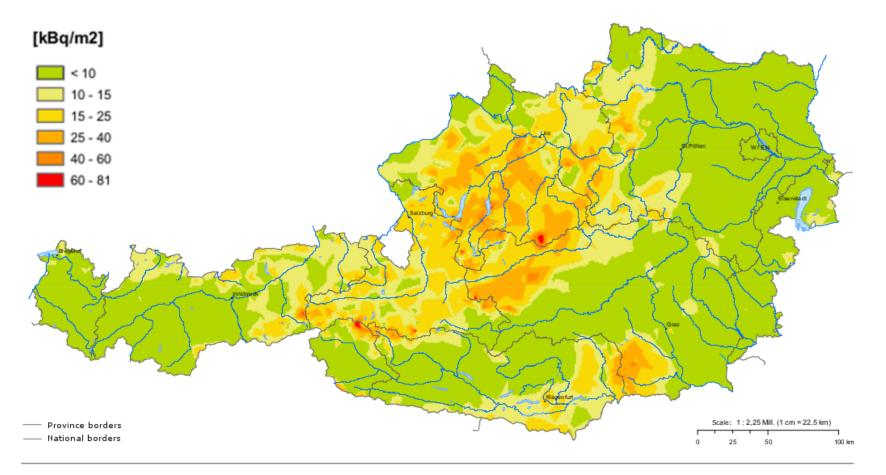


Legislative and executive bodies is divided between the Federal State (Bund) and the provinces (Länder)

- Radiation protection concerning low-risk activities (industries, medical x-ray devices)
   → provincial authorities
- Radiation protection concerning higher risk activities
   → federal state

## Cs-137 contamination in soil (May 2016)





Quelle: BORIS Datenbank Bearbeitung: Umweltbundesamt; März 2016

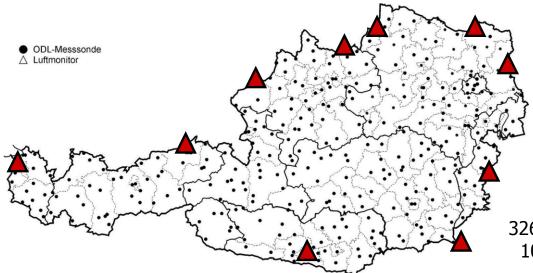
umweltbundesamt<sup>®</sup>

**Radiation Monitoring Program** 



Large scale monitoring of radioactivity is based on the Austrian Radiation Protection Act (§ 37):

AUTOMATIC RADIATION EARLY WARNING SYSTEM







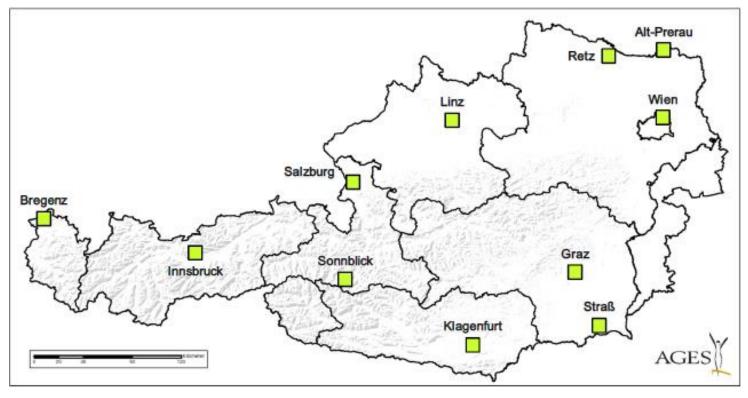
326 doserate stations (~15 km grid) 10 aerosol monitor stations

• LABORATORY BASED MONITORING  $\rightarrow$  AGES

## **Aerosol Samplers**



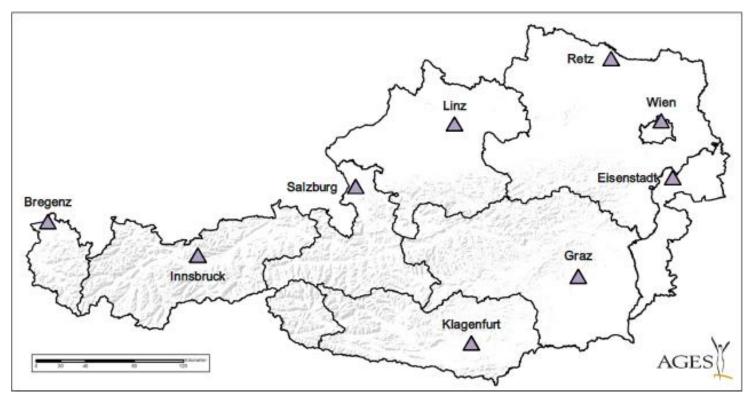
- 11 sampling stations
- Measured weekly
- 572 samples per year



## **Deposition Samplers**



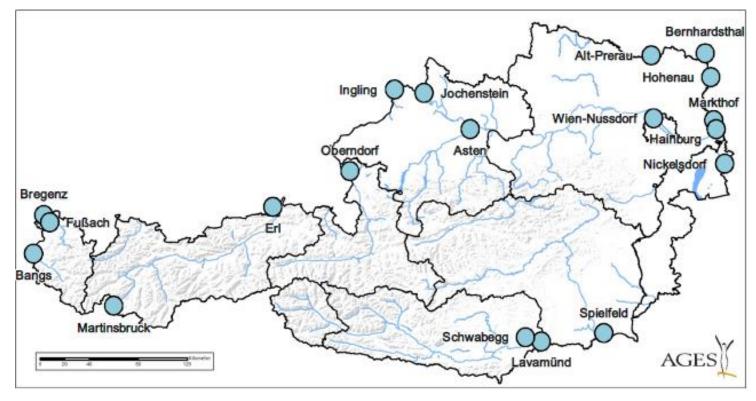
- 9 sampling stations
- Measured monthly
- 108 samples per year



## Surface Water Sampling



- 19 sampling stations
- Measured monthly
- 228 samples per year





Aerosol Sampler 88 Nm<sup>3</sup>/h Glass microfiber filter GF/A





High Volume Aerosol Sampler 780 – 1000 Nm<sup>3</sup>/h Polypropylen G-3



Iodine Sampler 4.5 Nm<sup>3</sup>/h Carbon Cartridge, Glass fiber filter

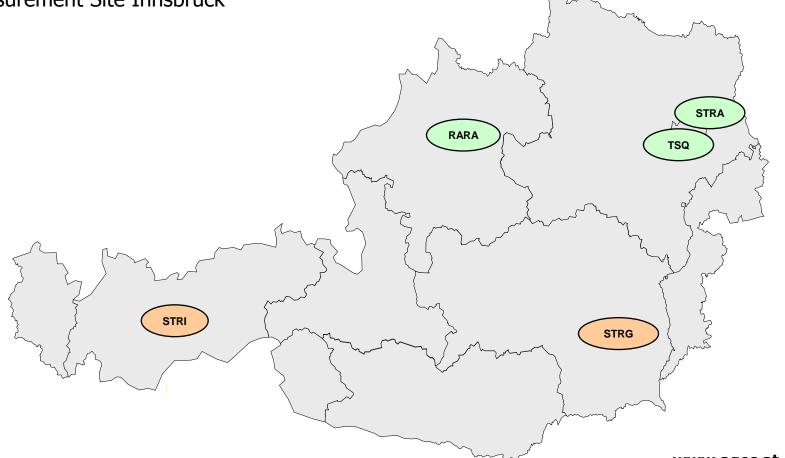


**Deposition Sampler** 

## Laboratory AGES

- Radon and Radioecology (Linz)
- Radiation Protection and Radiochemistry (Vienna)
- Measurement Site Graz
- Measurement Site Innsbruck





## Laboratory Equipment



- High Resolution Gamma Spectrometry
- In-situ Gamma Spectrometry
- Alpha Spectrometry
- Low Level Liquid Scintillation Counting
- Portable Liquid Scintillation Counter
- ICP-MS

## **Rapid Methods**



- Plutonium in food- and feedstuff with ion-exchange and ICP-MS (<sup>239</sup>Pu) or alpha spectrometry
- Portable Liquid Scintillation Counter for gross alpha and gross beta measurements
- <sup>90</sup>Sr batch method with extraction chromatographic resin
- Method for transuranium elements with extraction chromatographic resin

## Laboratory - Emergency



- National sampling plan
- sampling-plan to generate dose-forecasts
- Number of specific samples per sample type and region depending of time-phase (pre-contamination, contamination, end of deposition, after deposition)
- Sampling orders
- Detailed regulations concerning the performance of sampling:
- Specification of sampling coordinates, sample transport
- Measurement-capacity of competent laboraties
- Measurement and sample treatment instructions
- communication and data processing





Database transfered to authorities via Excel and e-mail. Published every (second) year <u>http://www.strahlenschutz.gv.at</u>

Emergency: results transfered to the official Situation Reporting System via Excel

# 100 10

1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012

#### Cäsium-137 in Aerosolen (Klagenfurt)

## **Results**

 $\mu Bq/m^3$ 

1000

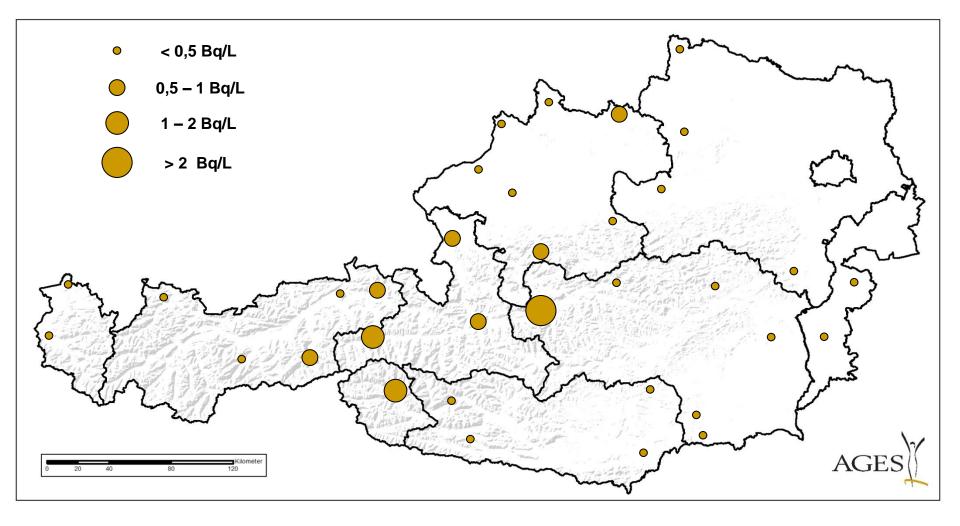
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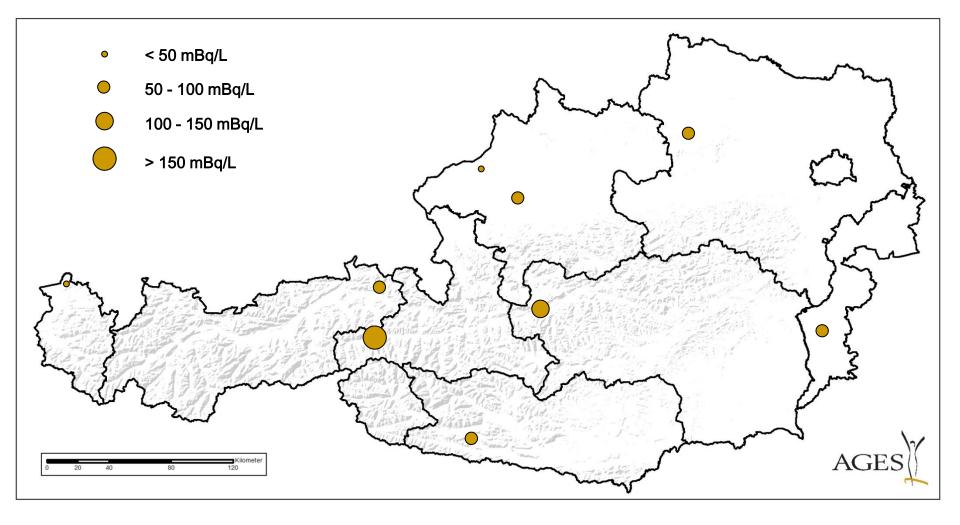
## Cs-137 in Milk 2013/14





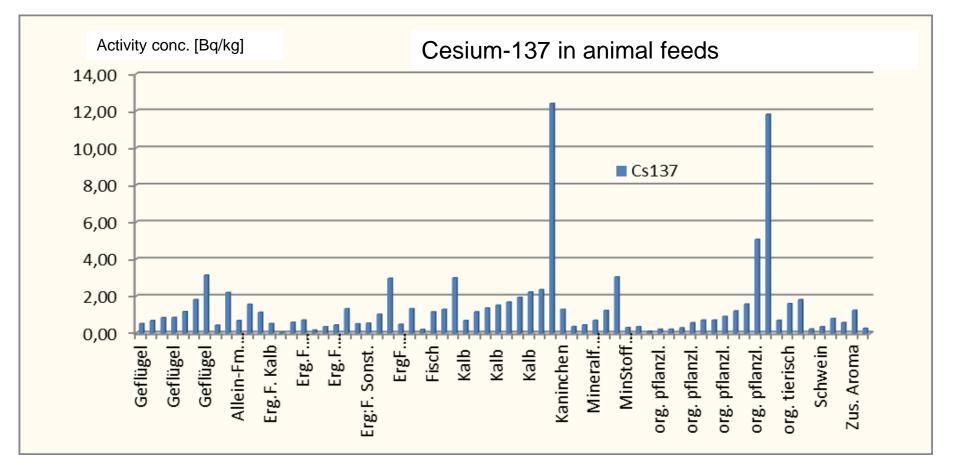
## Sr-90 in Milk 2013/14



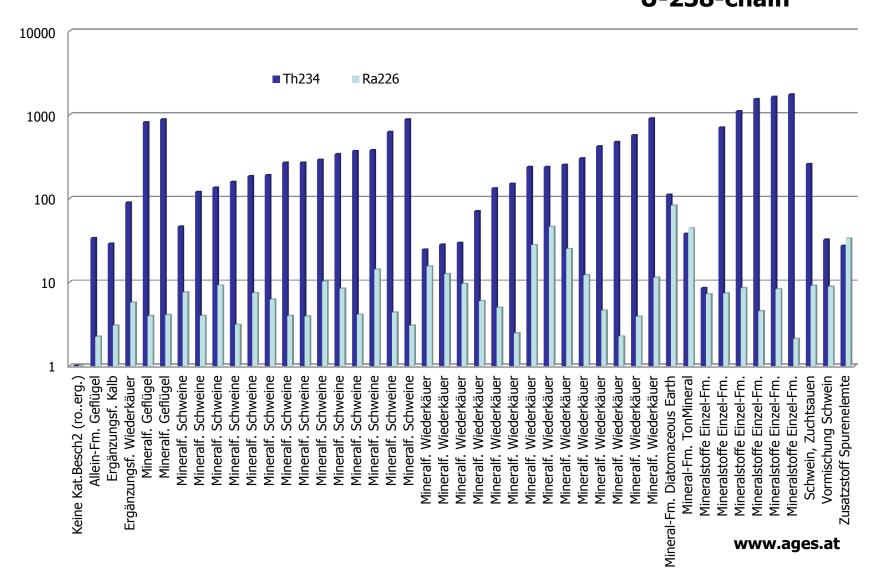


## Results – Cesium-137 in animal feeds





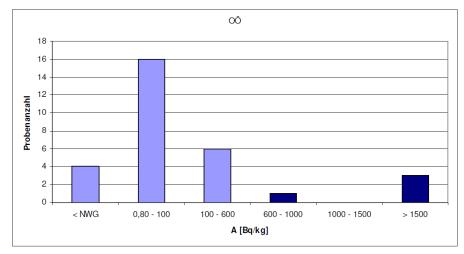
## Natural Radionuclides in Animal Feeds Activity conc. [Bq/kg]. U-238-chain



## Cs-137 in Game



## Wild boar in large forests



	Samples	Minimum	Maximum	Median	
Austria	972	0	1974	3,74	
Vienna	27	0,66	40,45	1,01	
Lower Austria	264	<0,54	356,7	1,54	
Upper Austria	219	<0,65	1974	4,66	
Burgenland	58	<0,84	921,3	1,98	
Styria	189	<0,75	531,6	8,68	
Carinthia	77	0,49	364,4	12,11	
Tirol	61	0,83	201,1	23,18	
Vorarlberg	16	1,65	91,28	3,19	
Salzburg	60	<1,3	1117	42,67	

#### Game samples from routine monitoring



### EMERGENCY PREPAREDNESS AND RESPONSE

#### **Overview**

- Possible nuclear and radiological emergencies
- Regulations in radiation protection and EPR
- Responsibilities and information channels
- International co-operation
- Plans and documents

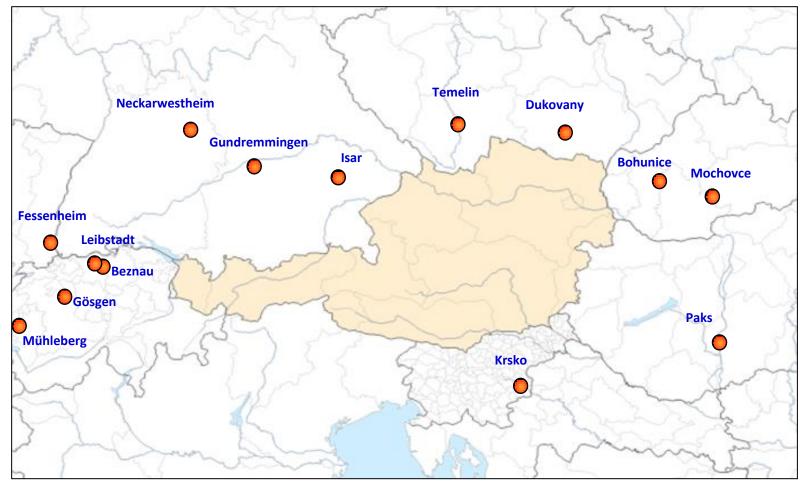


### POSSIBLE NUCLEAR AND RADIOLOGICAL EMERGENCIS

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### NUCLEAR POWER PLANTS IN NEIGHBORING COUNTRIES



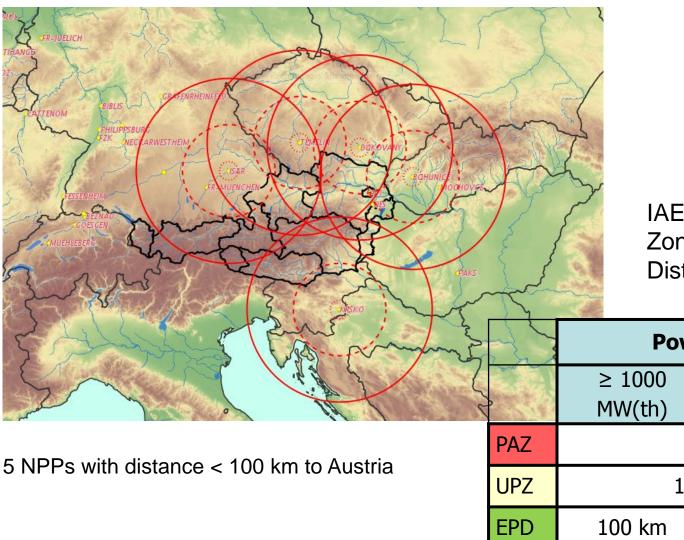
14 NPPs (26 reactors) with distance < 200 km to Austria

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## NPPS IN NEIGHBORING COUNTRIES





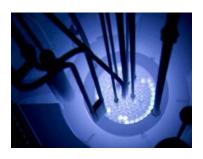
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IAEA Emergency Zones and Planning Distances

Ser C	Power MW(th)						
	≥ 1000 MW(th)	100 to 1000 MW(th)					
AZ	31	3 to 5 km					
IPZ	15 t	15 to 30 km					
PD	100 km	50 km					
CPD	300 km	100 km					



## POSSIBLE RADIOLOGICAL EMERGENCIES IN AUSTRIA



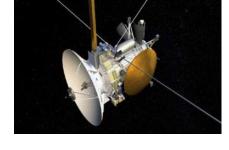


## Nuclear/ RA waste management installations:

- TRIGA Mark II Research Reactor (250 KWth)
- Centralized radioactive waste management facility (Low and Intermediate Level Rad. Waste)

#### Other practices:

- Irradiation facilities
- Research laboratories (eg IAEA)
- Hospitals (teletherapy, gamma knife)
- Industry (weld testing)





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Satellite re-entry with radioactive sources

Radiological terror2("Dirty Bomb")

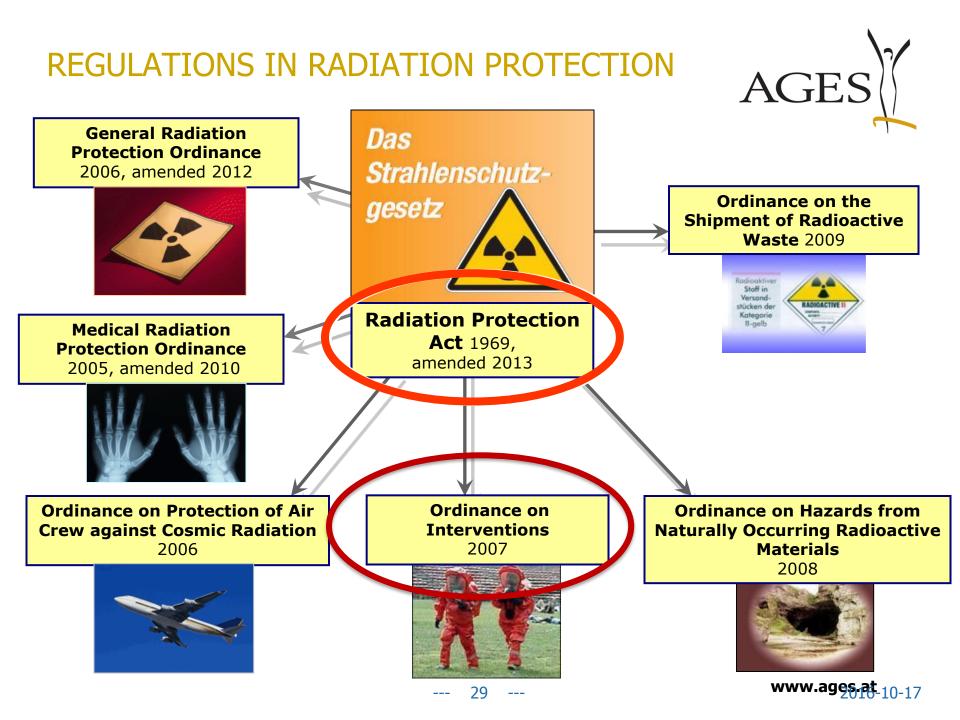


EP Category	Facilitiy / Practice					
III	<ul> <li>TRIGA Mark II research reactor, Technical University of Vienna, research reactor with power level &lt; 2 MWth</li> </ul>					
	<ul> <li>Nuclear Engineering Seibersdorf central treatment and interim storage facility for LILW</li> </ul>					
	Nuclear Material Laboratory of IAEA, research laboratory					
	<ul> <li>MediScan, irradiation facility for sterilization</li> </ul>					
	<ul> <li>Seibersdorf Laboratories, research laboratory with rad. sources</li> </ul>					
	<ul> <li>Hospitals, teletherapy and gamma knives</li> </ul>					
IV	• Mobile dangerous sources (typically of IAEA category 2-4)					
	<ul> <li>Satellite re-entry with radioactive material on board</li> </ul>					
V	NPP in neighboring countries					



## **REGULATIONS IN RADIATION PROTECTION AND EPR**

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## **ORDINANCE ON INTERVENTIONS 2007**



#### **Main topics**

- Intervention levels for urgent protective measures for the public
- Protective actions for different phases of an emergency
- Structure and content of emergency plans (federal and provincial level)
- Emergency workers (education, training, dose reference levels, protection,..)
- Information of the public
- Emergency exercises

. . . . .

• **Notification** of rad. emergencies in Austria

#### **BUNDESGESETZBLATT** für die republik österreich

Jahrgang 2007	Ausgegeben am 26. Juni 2007	Teil II
145. Verordnung:	Interventionsverordnung – IntV	
	[CELEX-Nr.: 31989L0618, 31996L0029]	

145. Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über Interventionen bei radiologischen Notstandssituationen und bei dauerhaften Strahlenexpositionen (Interventionsverordnung – IntV)

Auf Grund der §§ 361 Abs. 3 sowie 37 Abs. 5 Z 6 des Strahlenschutzgesetzes (StrSchG), BGBI. Nr. 227/1969, zuletzt geändert durch das Bundesgesetz BGBI. I Nr. 13/2006, wird verordnet:

Inhaltsverzeichnis

iet nal

1. Teil

Allgemeine Bestimmungen

Ziel und Geltungsbereich

§ 1. (1) Ziel dieser Verordnung ist der Schutz der Gesundheit von Personen vor den Ge fahren durch ionisierende Strahlung im Fall radiologischer Notstandssituationen oder im Fall einer dauerhaften Exposition auf Grund der Folgen einer radiologischen Notstandssituation oder auf Grund eines früheren Umgangs oder früherer Arbeiten mit Strahlenquellen.

(2) Durch diese Verordnung werden

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§ 2. § 3.

§ 4. § 5. § 6. § 7. § 8. § 9. § 10. § 11. § 12.

§ 13. § 14. § 15. § 16.

\$ 17.



### AMENDMENT OF ORDINANCE ON INTERVENTIONS

Amendment of Ordinance on Interventions to implement the EURATOM BSS (2013) and IAEA GSR Part 7

Draft now in the parlamentary process

#### Focus on:

- Emergency Exposure Situations and
- Existing Exposure Situations after an emergency or caused by past activities that were not subject to regulatory control

#### Main changes in EPR:

- Reference levels and optimized protection strategies
- Operational intervention criteria
- International co-operation in transboundary emergencies (consequence assessment, protective actions, public information)



### **RESPONSIBILITIES AND INFORMATION CHANNELS**

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### ROLES AND RESPONSIBILITIES IN EPR



- 1. Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
  - National Competent Authority
  - Radiological assessment & decision on protective actions (co-operation with BMG)
  - Information of the public

#### 2. Ministry of Health (BMG)

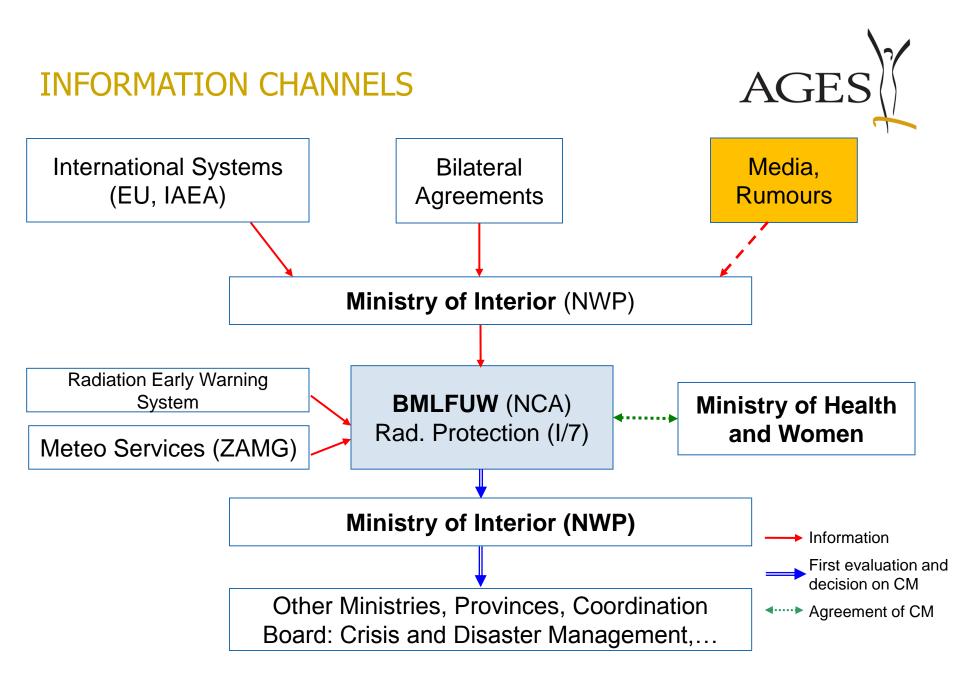
- Involvement in decision on protective measures
- Foodstuff monitoring, Iodine Thyroid Blocking (distribution of tablets)

#### 3. Ministry of the Interior / Disaster Response and Coordination Centre (BMI)

- National Warning Point for international notifications
- Information hub

#### 4. 9 Austrian Provinces

- Implementation of protective measures, regional EPR
- 5. National Crisis and Disaster Protection Management
  - National crisis and disaster co-ordination board



### MECHANISM FOR COORDINATION



#### **1. Preparedness Phase**

- Legal requirements and arrangements (responsibilities and roles)
- Federal and regional emergency plans
- Working groups with involvement of all organizations with a role in EPR

#### 2. Response Phase

- Austrian Radiological Situation Reporting System (urgent)
- Pre-prepared templates for situation evaluation and protective actions (urgent)
- Coordination Board for Crisis and Disaster Management (later)

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### **INTERNATIONAL COOPERATION**



## INTERNATIONAL CO-OPERATION

#### 1. IAEA

Convention on Early Notification in Case of Nuclear Emergencies (1986)

#### 2. European Union

Early information exchange in the event of a radiological emergency (EURATOM regulation, 1987)

#### 3. Bilateral co-operation

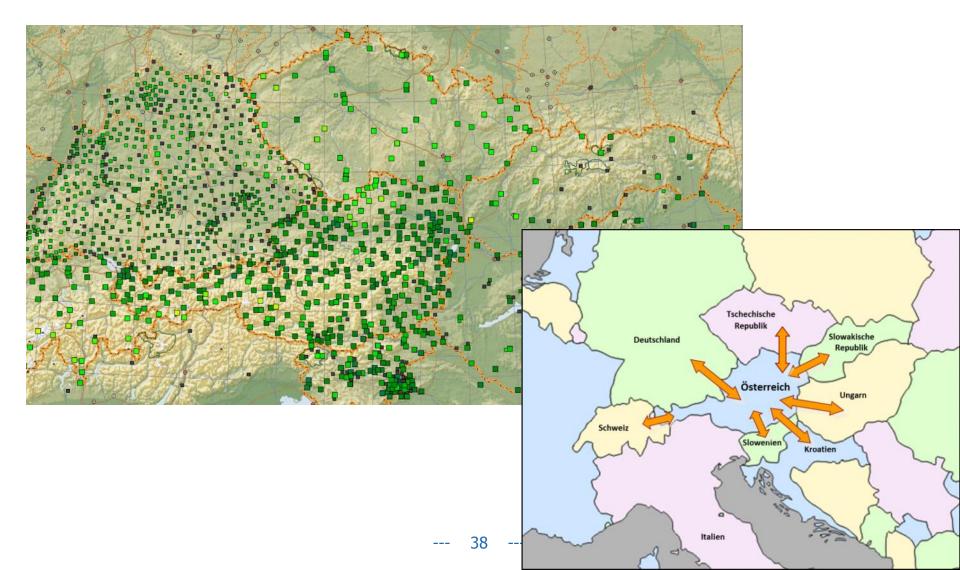
**Bilateral agreements** in the field of nuclear safety and radiation protection

(with all neighboring countries operating NPPs)

- Technical arrangements for real-time data exchange of the automatic monitoring systems
- Arrangements for rapid exchange of emergency relevant data www.ages.at



### AUTOMATIC EXCHANGE OF DOSERATE MONITORING DATA

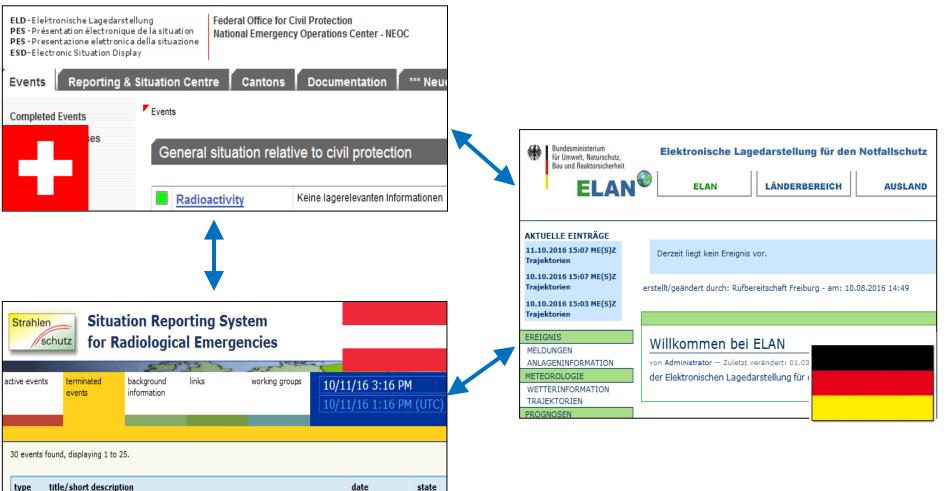


### **RAPID EXCHANGE OF INFORMATION**

type

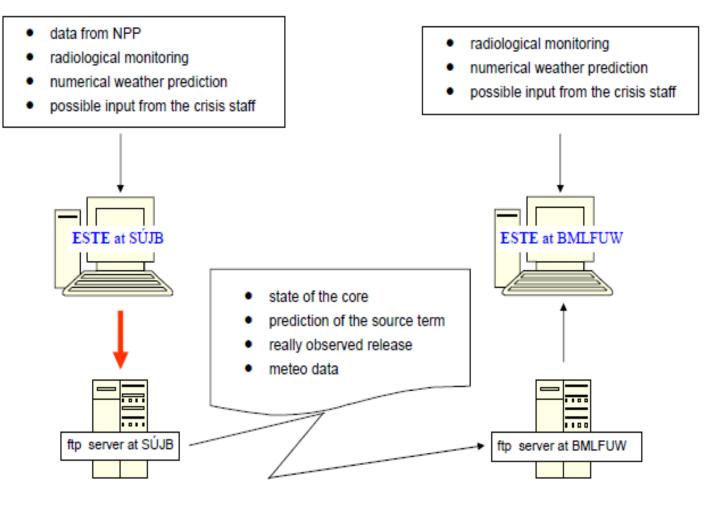
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## INFORMATION EXCHANGE FOR CONSEQUENCE AGES ASSESSMENT AUSTRIA - CZECH REPUBLIC



Prague

www.ages.at

Vienna



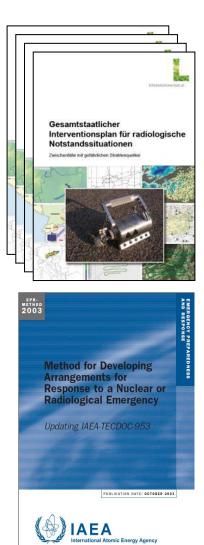
### PLANS AND DOCUMENTS

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## EMERGENCY PLANS ON FEDERAL LEVEL

- 1. Emergencies in nuclear facilities abroad
- 2. Incidents/accidents in Austrian facilities
- 3. Incidents/accidents with dangerous sources
- 4. Medical diagnostics and therapy
- 5. Radiological terror
- 6. Satellite re-entry
- → Based on comprehensive hazard assessment and structured according to: IAEA EPR-METHOD (2003)
- → Basis for regional emergency plans (Austrian Provinces)
- → Tested in large scale **emergency exercises**
- → Currently updated due to additional requirements EURATOM BSS and GSR Part 7



## AUSTRIAN SPECIFIC CATALOGUE OF PROTECTIVE

- Basis for the optimized protection strategy
- Set of inter-coordinated protective actions (PA) for different emergency phases Focus on large scale contamination (NPP accident)
- **Clustering** of PA
  - Practicable and needed
  - Very unlikely (relocation)
  - Excluded/not needed (evacuation)
- Character of PA: Recommendation / legal requirement to the population
- Stakeholder Involvement (especially experts in other Practicability of PA (closing of stables)
- Development of strategies
   PA optimized to reduce (radioactive) waste



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# Relevant Countermeasures for animals and AGE animal feeds

Countermeasure	Reference level			
Moving production animals into stables Closing Stable doors & windows	No reference level, done before plume passage			
	Ground contamination Cs-137 (e.g. for meat):			
Prohibition of grazing	Cow 1.5E+03 kBq/m²,			
	Sheep & goat 2.2E+03 kBq/m <sup>2</sup>			
	Pigs 1250 Bq/kg Cs-134 & Cs-137			
Restrictions of feedstuff	Poultry/lambs/calves 2500 Bq/kg Cs-134 & Cs-137			
	Other 5000 Bq/kg Cs-134 & Cs-137			
	Decontamination factor (e.g.)			
	28 days non-contaminated feed			
Usage of non-contaminated feed	Cow 0.4			
	Pig 0.5			
	Chicken 0.65			
Change time of claughter	No reference level, done before the meat gets			
Change time of slaughter	contaminated			

# Maximum permitted levels for the radioactive contamination of food (Euratom/2016/52)



	Food (Bq/kg)				
Isotope group/Food group	Infant food	Dairy produce	Other food except minor food	Liquid food	
Sum of isotopes of strontium, notably Sr-90	75	125	750	125	
Sum of isotopes of iodine, notably I-131	150	500	2 000	500	
Sum of alpha-emitting isotopes of plutonium and transplutonium elements, notably Pu-239 and Am-241	1	20	80	20	
Sum of all other nuclides of half-life greater than 10 days, notably Cs- 134 and Cs-137	400	1 000	1 250	1 000	



### Thank you for your attention!



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