Release of Buildings and Sites at VKTA Rossendorf

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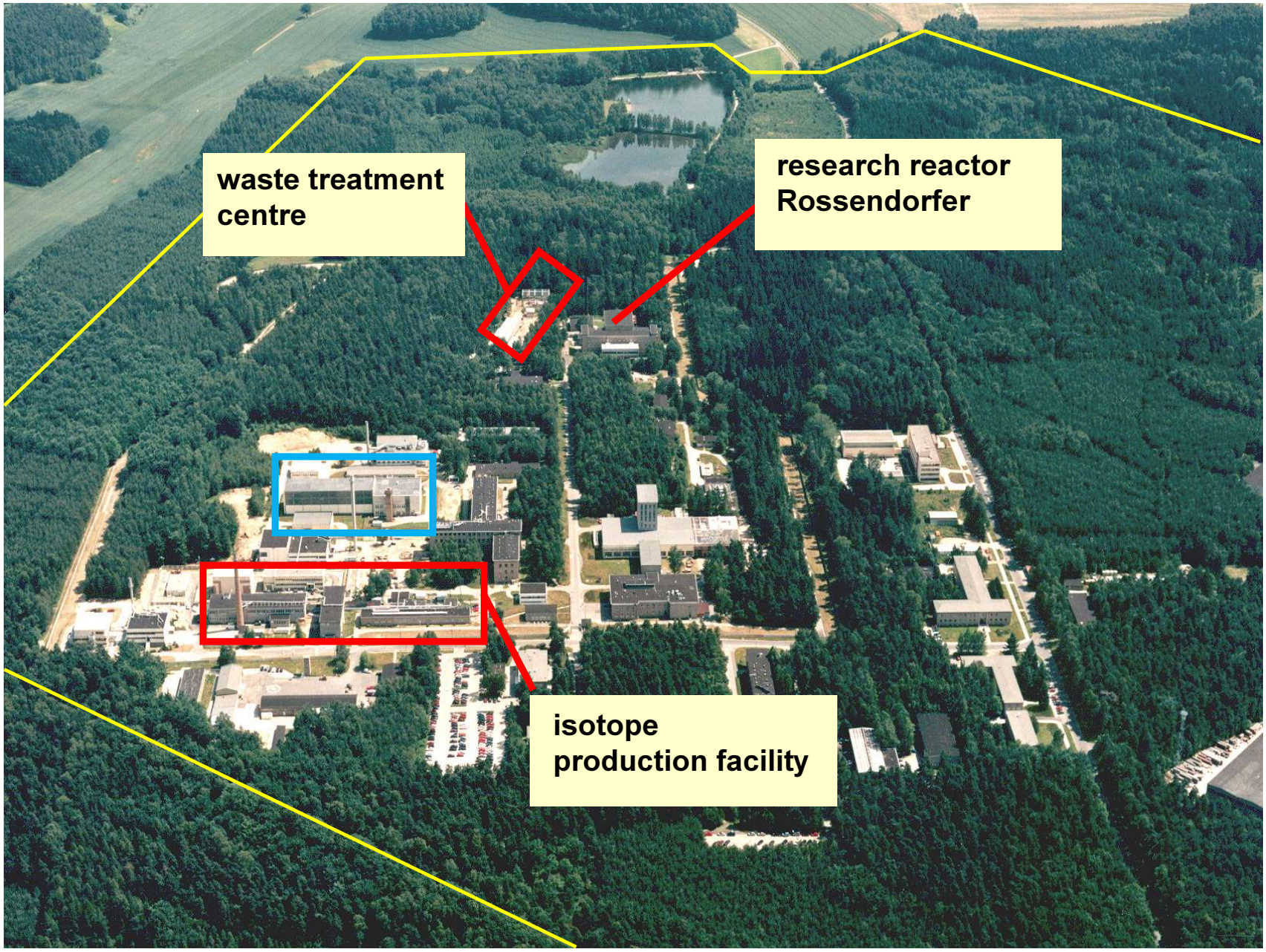
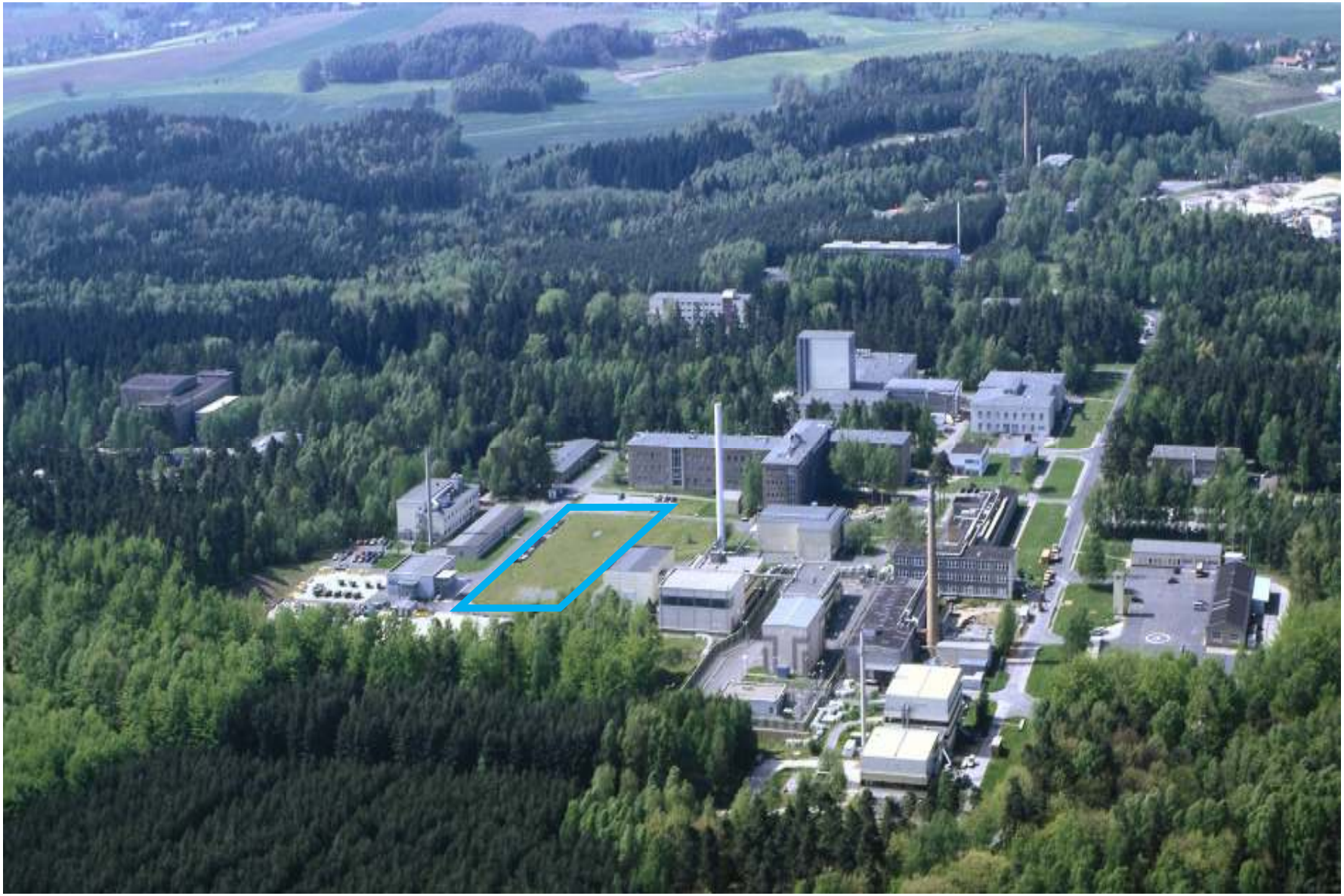
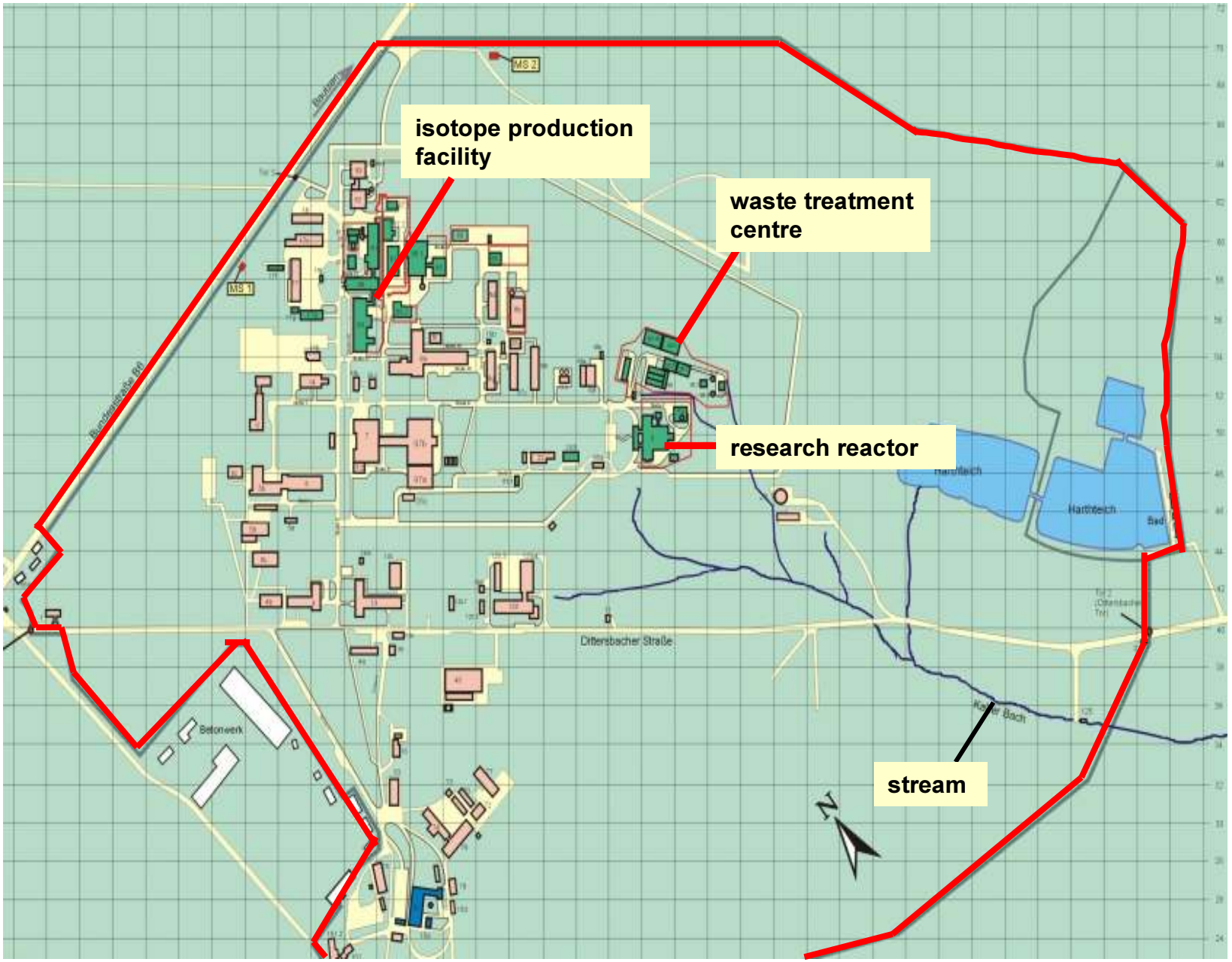

waste treatment centre
research reactor Rossendorfer
isotope production facility




isotope production facility
waste treatment centre
research reactor
stream
MS 2
MS 1
Bundesstraße 6
Dittersbacher Straße
Betonwerk
Hartteich
N

Decommissioning complexes

- **Complex 1**: Reactors
  - Rossendorf Research Reactor (RFR)
  - Rossendorf Ring Core Reactor (RRR)
  - Rossendorf Assembly for Critical Experiments (RAKE)

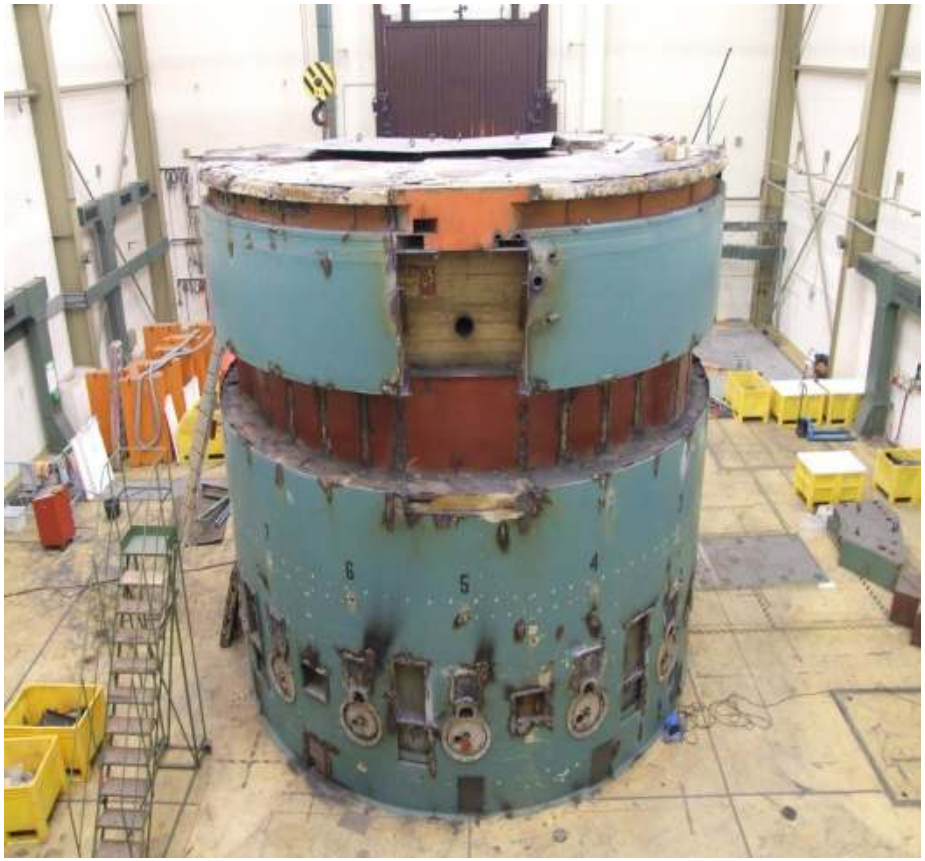
- **Complex 2**: Isotope production facility

- **Complex 3**: Waste treatment centre

Rossendorf Research Reactor

- light water modulated and cooled tank reactor (SU)
- 10 MW_{therm}
- 10^{14} $ncm^{-2}s^{-1}$
- 1957 – 1991 (105 115 h operating time)
- purposes:
  - nuclear physics
  - reactor physics
  - safety research
  - neutron activation
  - production of neutron transmutation doped silicon

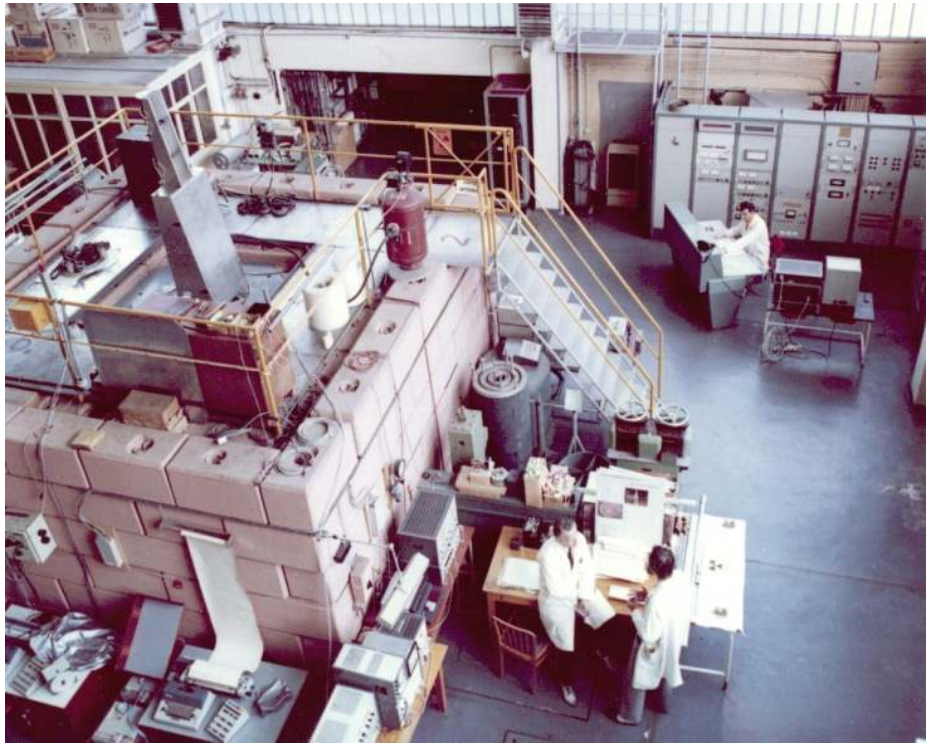
Rossendorf Research Reactor (RFR)



Rossendorf Research Reactor (RFR)

Rossendorf Ring Core Reactor (RRR)

1962 –1991 **maximal 1 kW**



Isotope production facility

- AMOR – Anlage zur Molybdän-Rückgewinnung
  (facility for molybdenum recovery)
  - product: Mo-99 (decay to Tc-99m for radiopharmaceuticals)
- various nuclides for tracer experiments in industry
- sealed sources

Isotope production facility

Isotope production plant

Hot cell

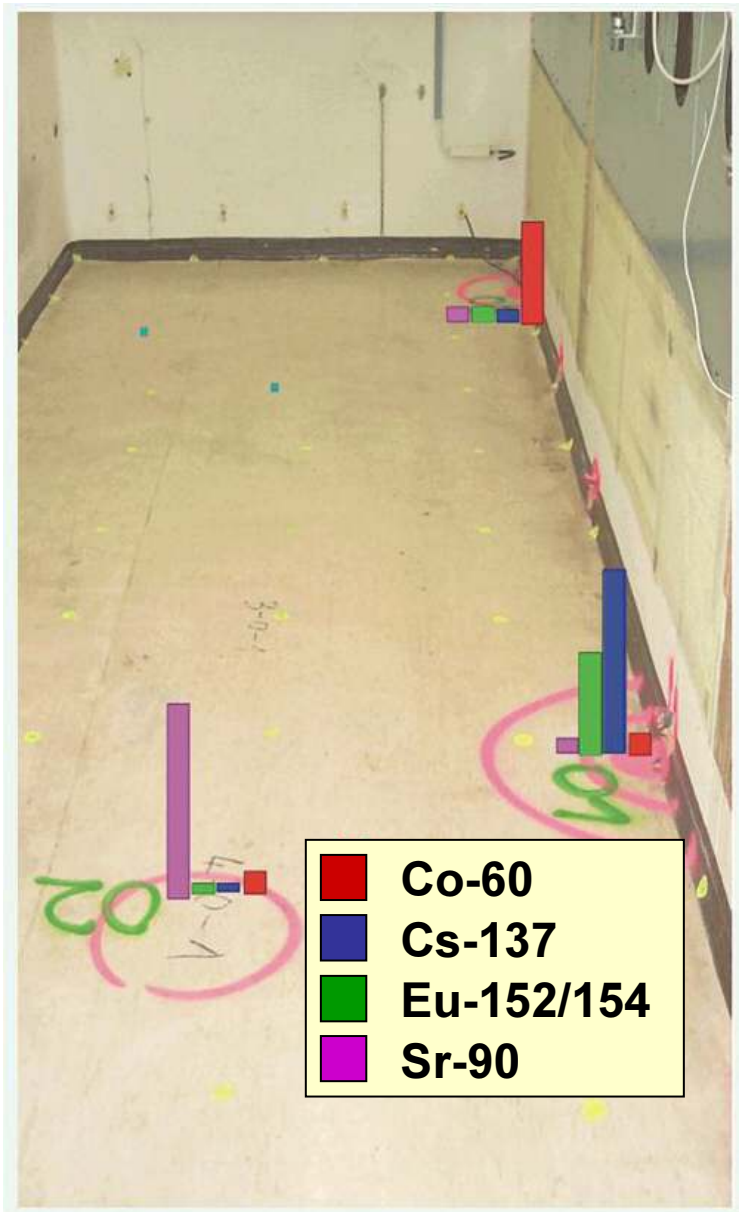
Isotope production facility

Isotope production facility

Isotope production facility

Relevant Radionuclides

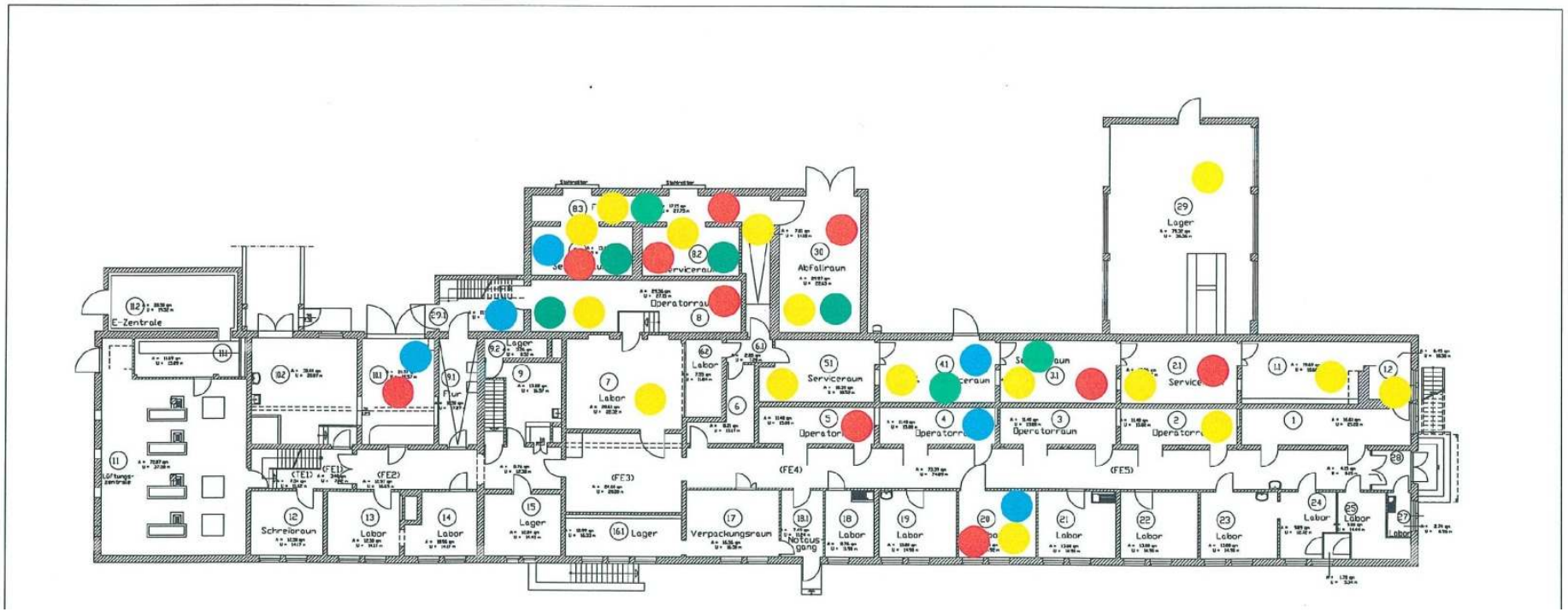
alpha	beta	gamma
Ra-226	H-3	Na-22
U-isotopes	C-14	Co-60
Pu-isotopes	Cl-36	Cs-134
Am-241	Fe-55	Cs-137
	Ni-63	Ba-133
	Sr-90/Y-90	Eu-152
		Eu-154
		Eu-155



Isotope production facility

Legende:
unzulässige Kontamination wurde festgestellt ...

- im Baukörper mittels Direktmessung mit LB122/123
- im Baukörper mittels In-situ-Gammascanning
- in der Bodenplatte/Betonfußboden durch Laboranalysen
- im Boden unter der Bodenplatte durch Laboranalysen



Isotope production facility

Isotope production facility

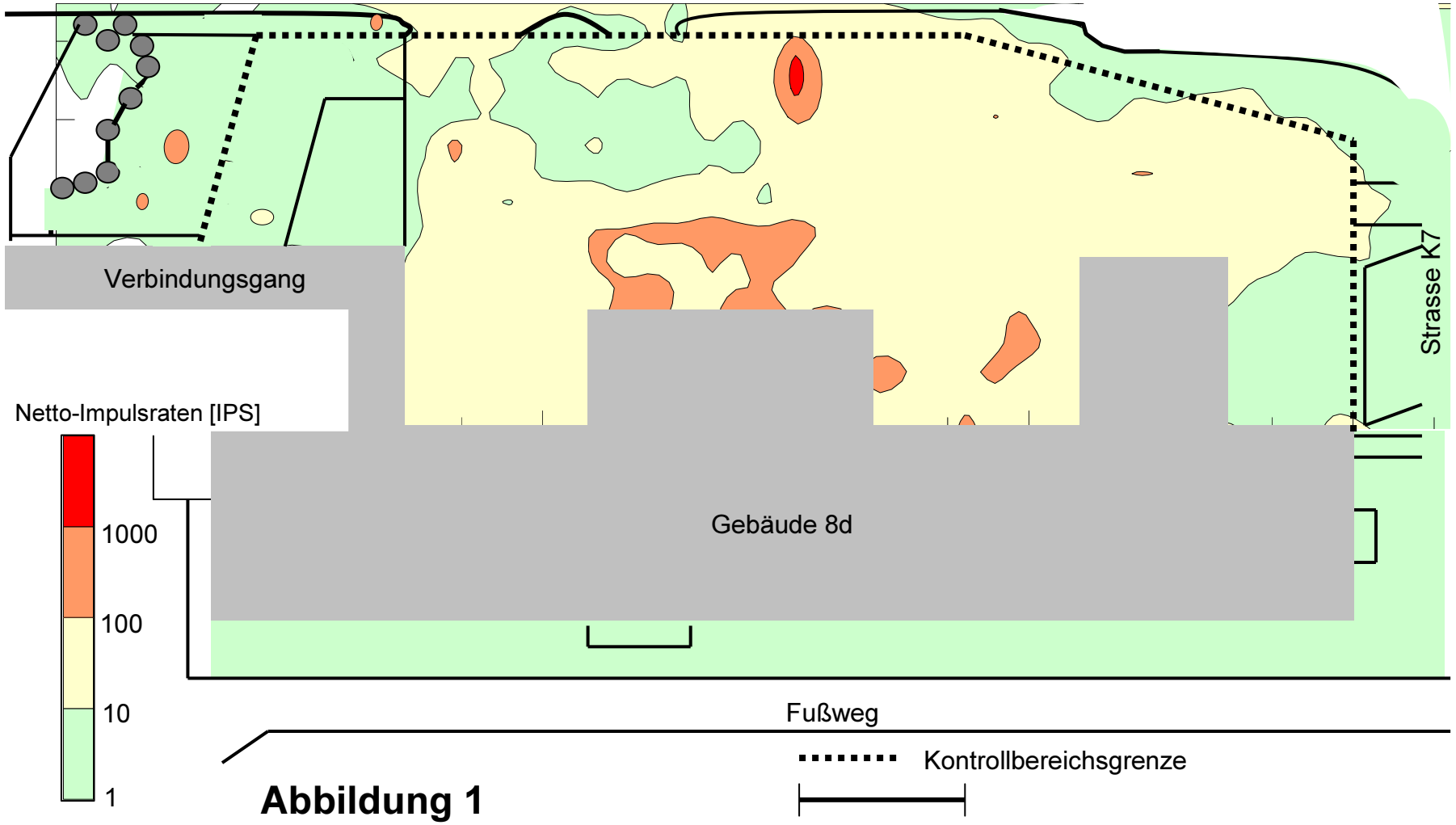


Abbildung 1

Isotope production facility

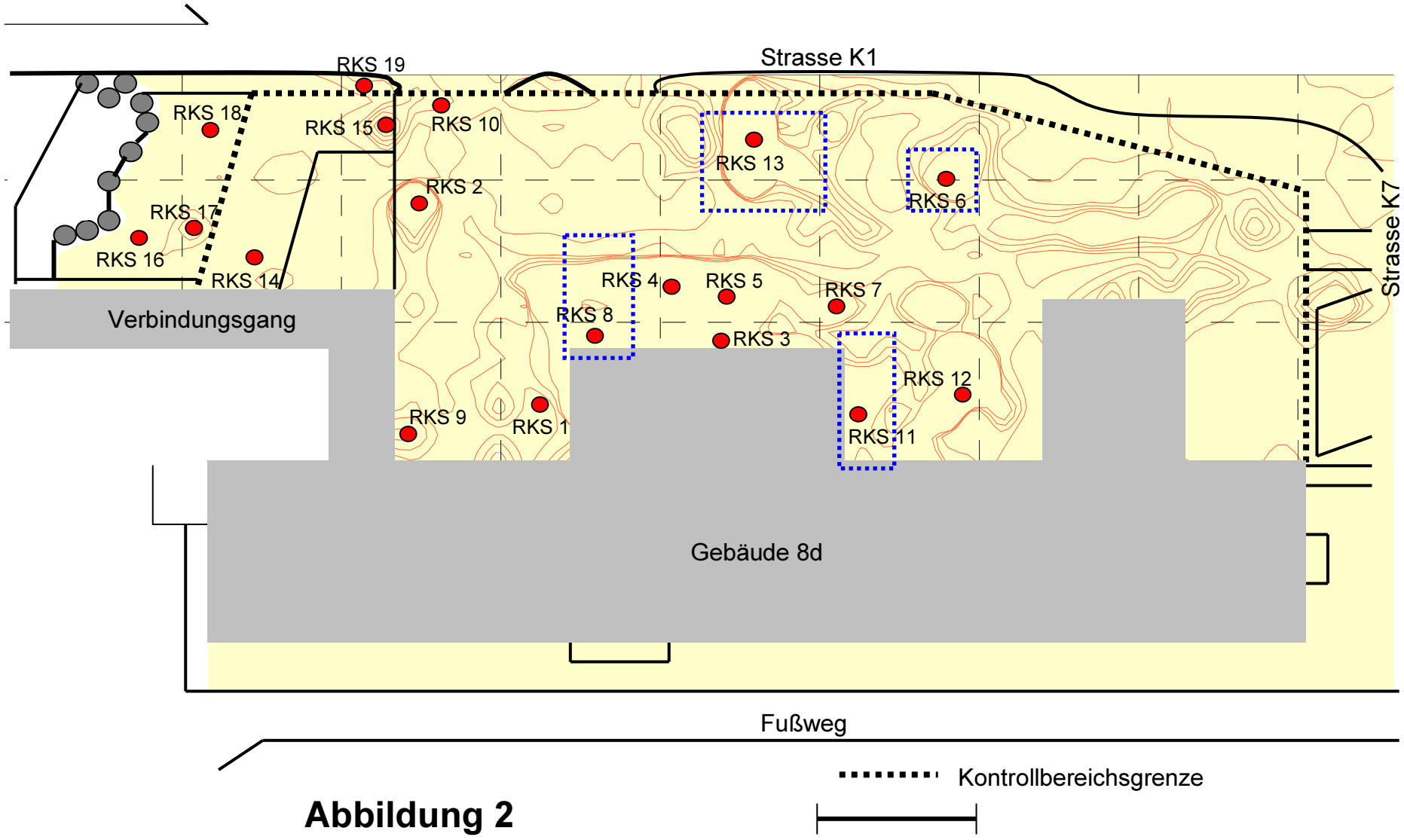
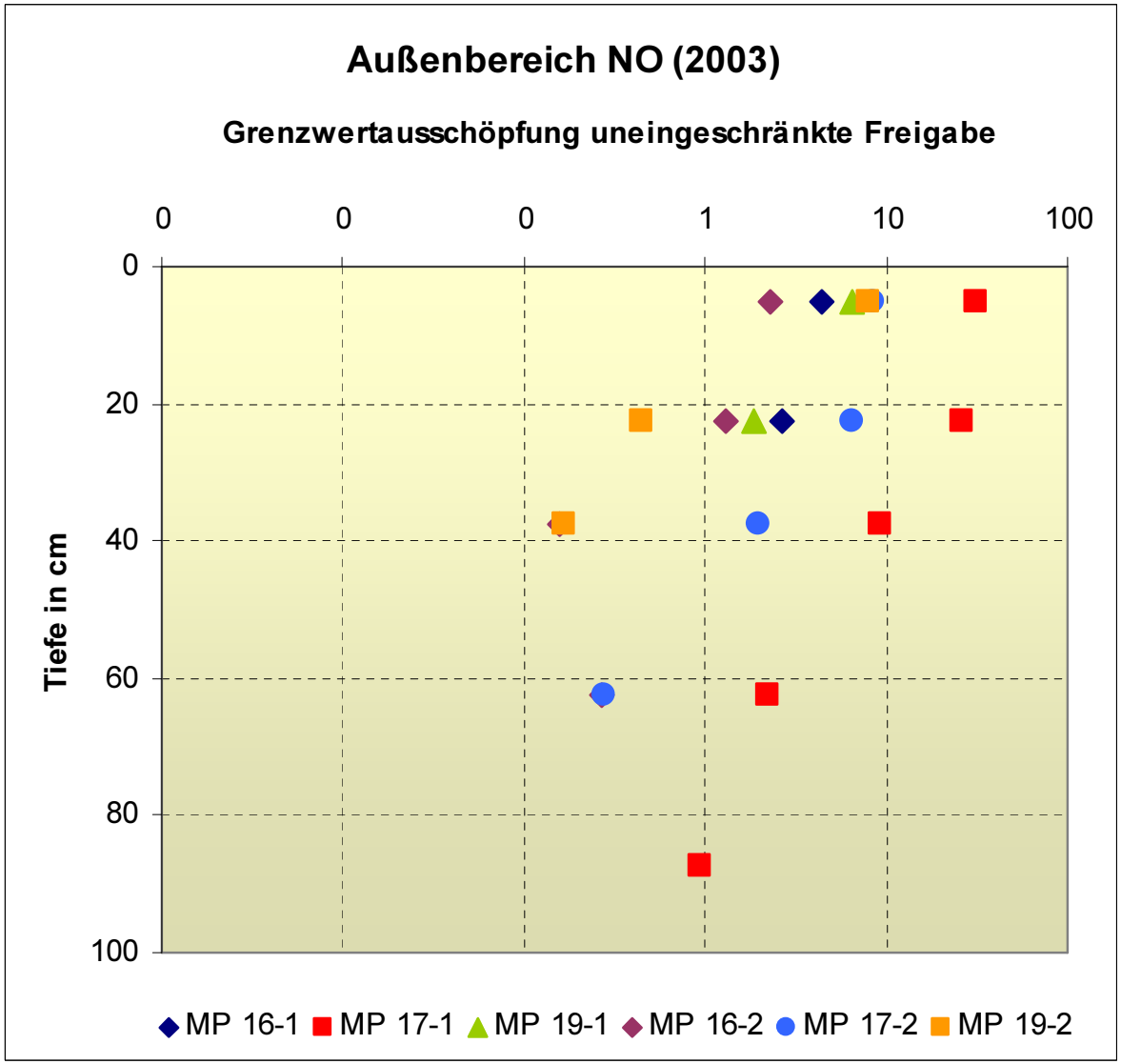


Abbildung 2

Isotope production facility



Isotope production facility

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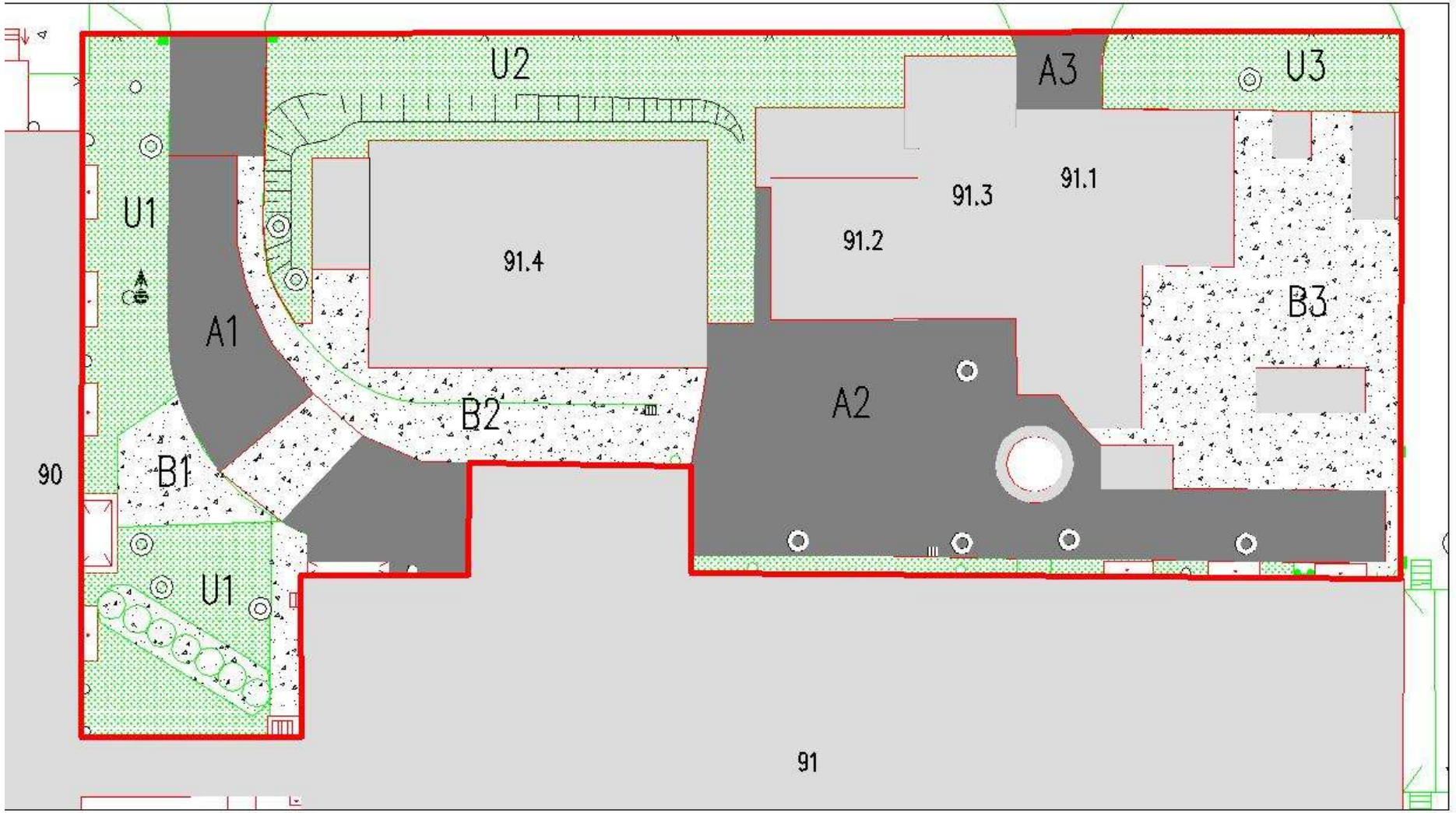
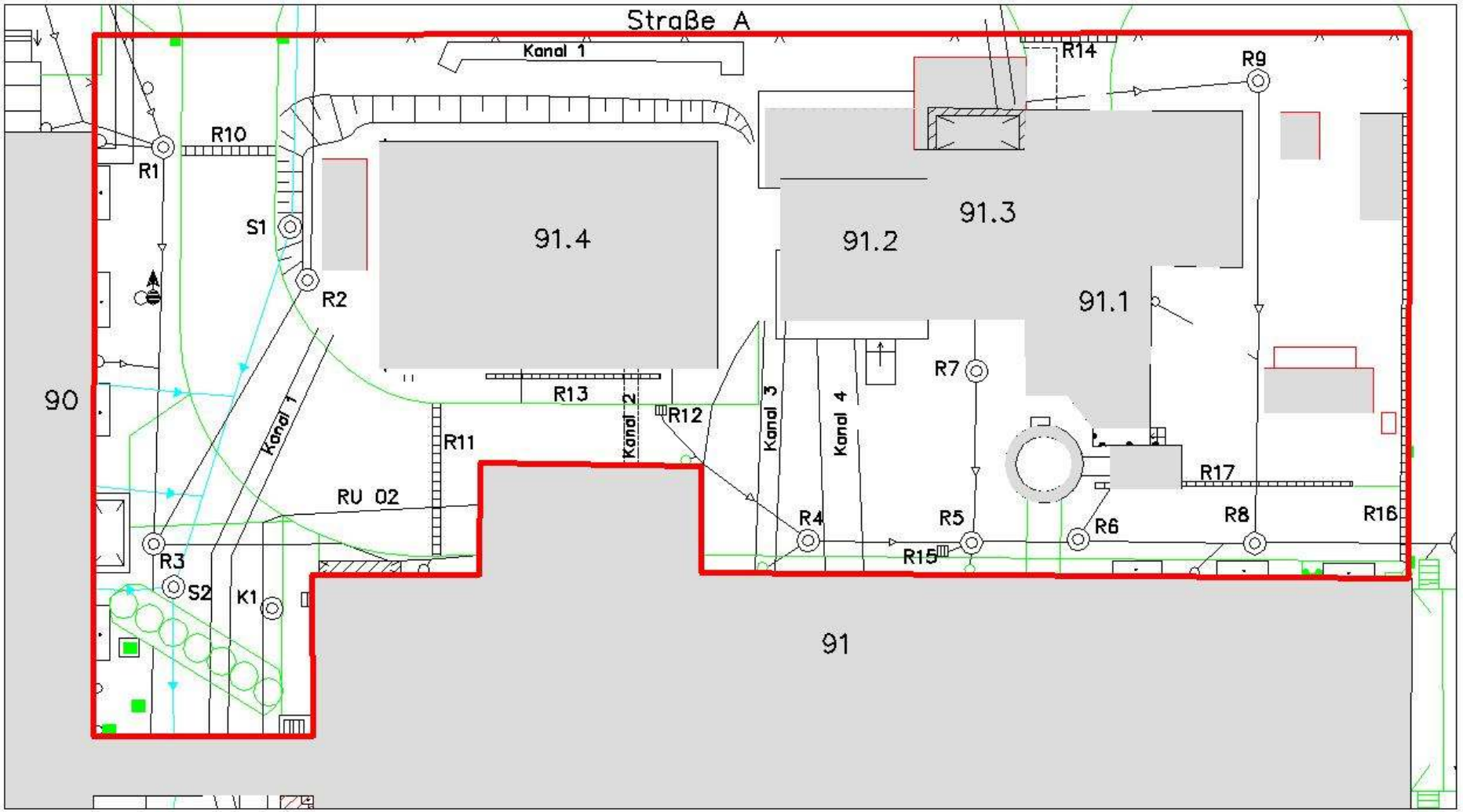
area between buildings

area between buildings

area between buildings

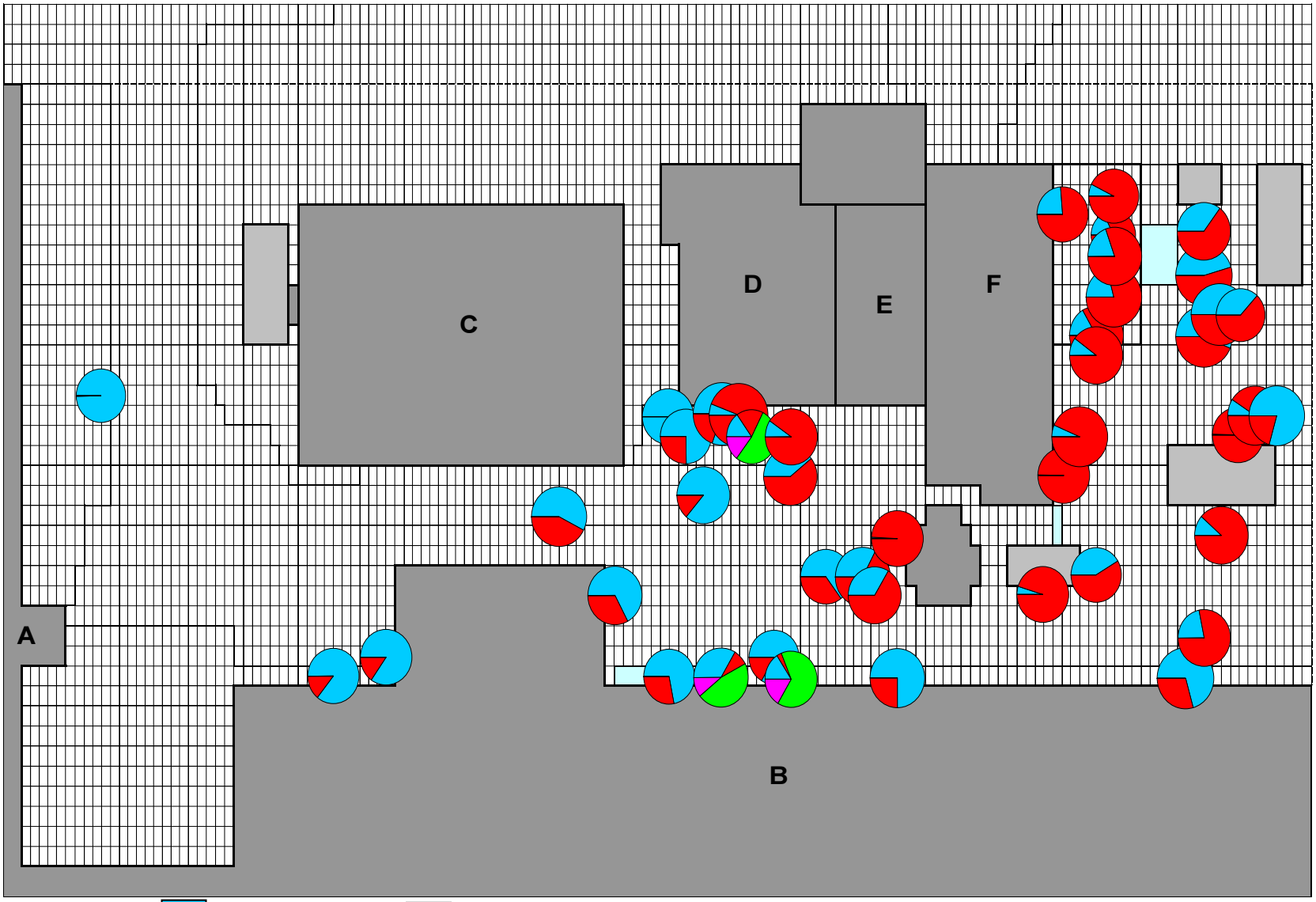


area between buildings



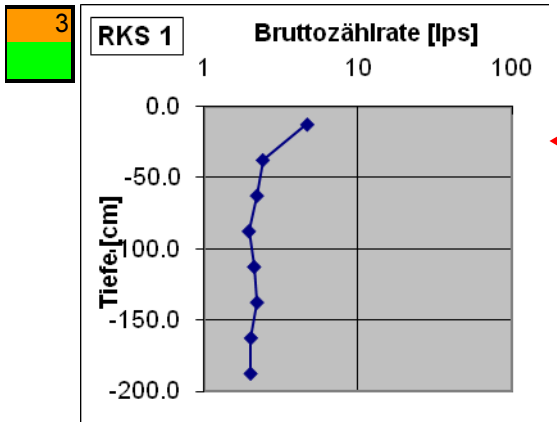
area between buildings: surface contamination measurement

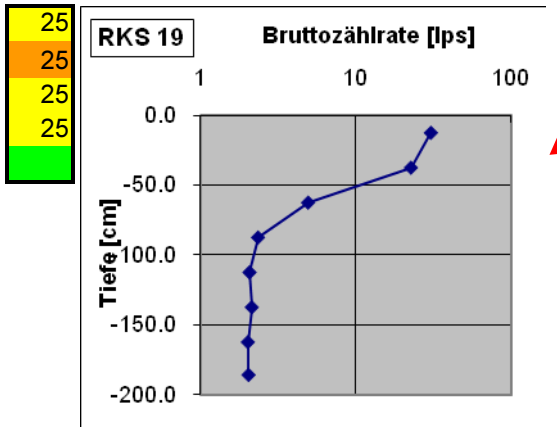
area between buildings: in-situ gamma-spectrometry

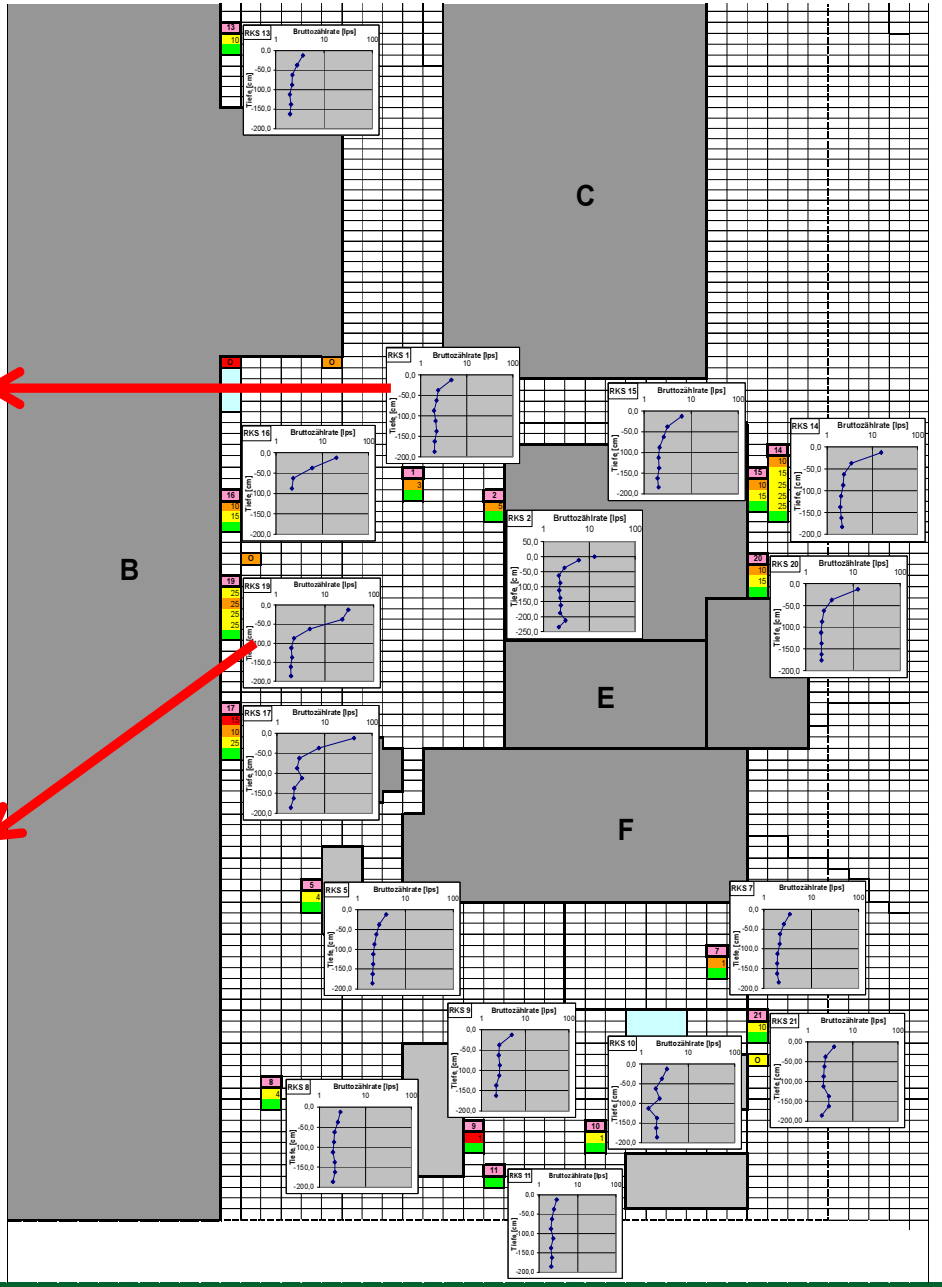


metal chip
with Co-60

area between buildings: gamma-logging, sampling and analysis



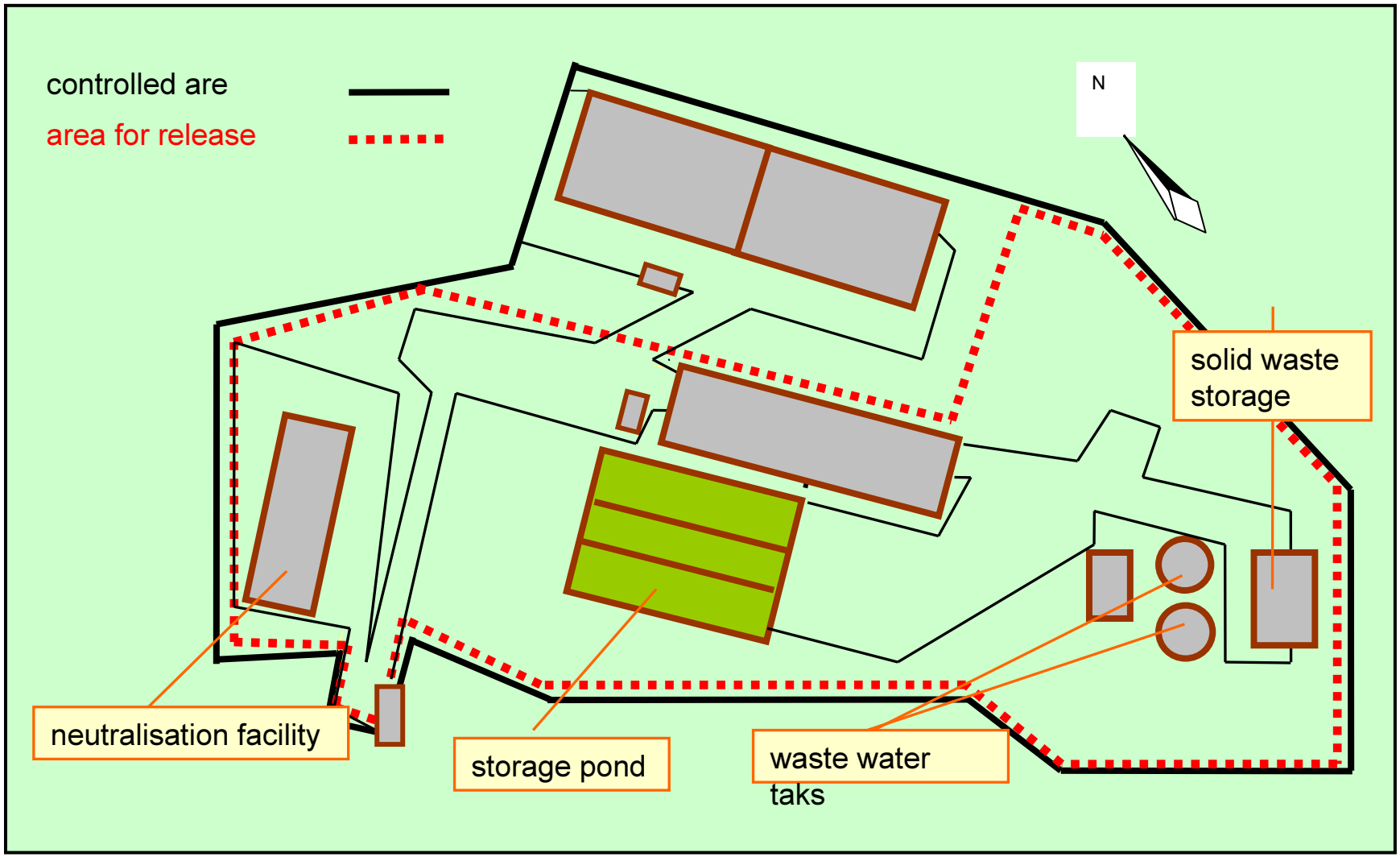




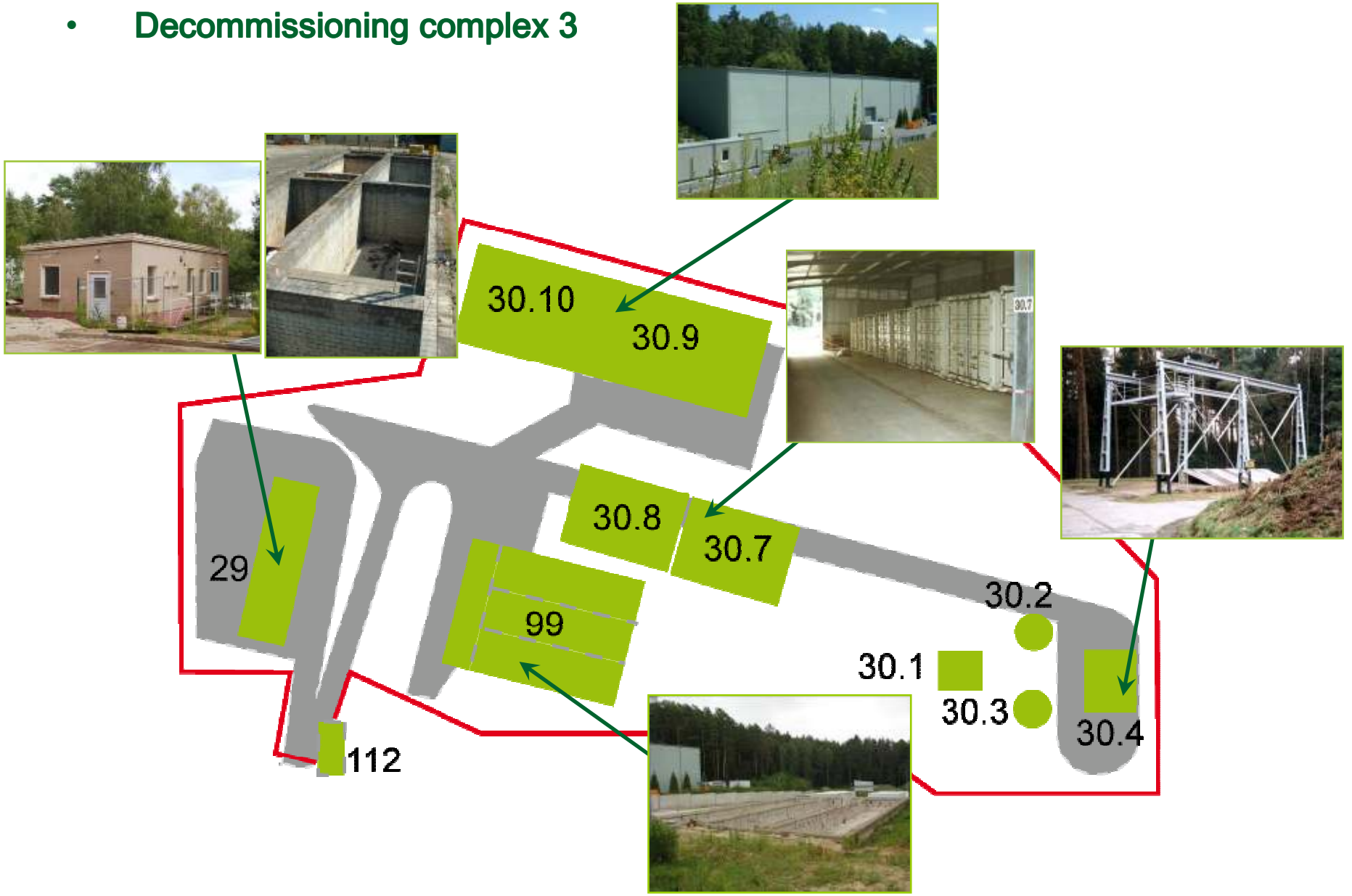
Waste treatment centre

- treatment and storage of solid radioactive waste
- collection, treatment, storage for decay of radioactive waste waters
  - reactors
  - isotope production facility
  - radionuclide laboratories
- in operation 1957 - 1999

waste treatment centre

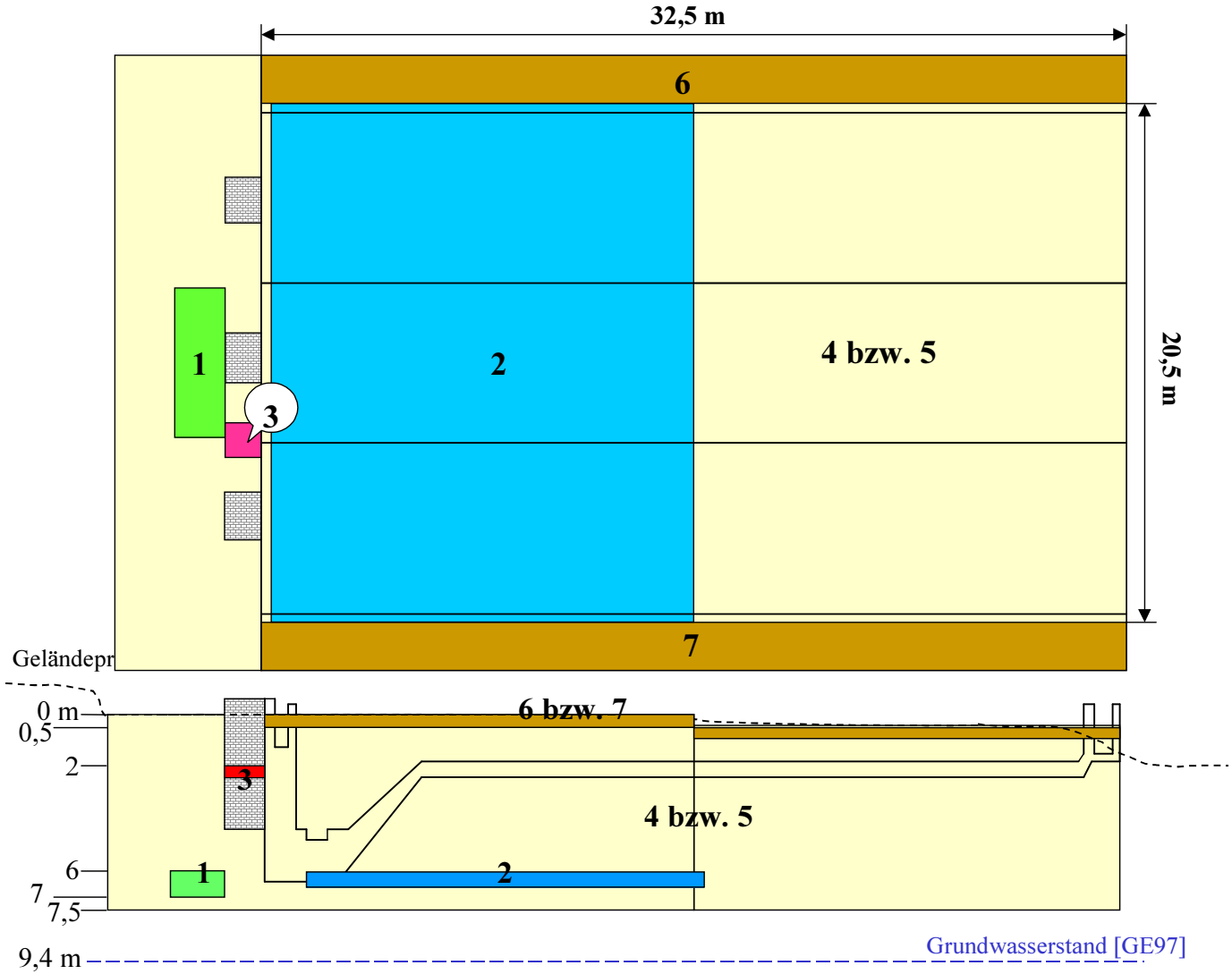


- **Decommissioning complex 3**

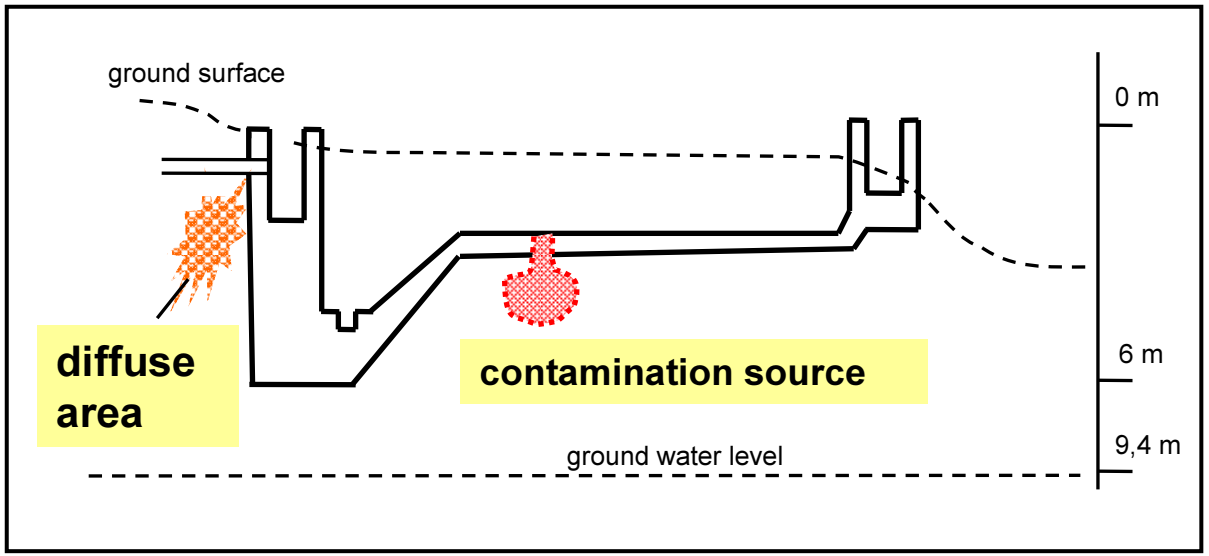


waste treatment centre

contamination at storage pond



situation at storage pond



situation at storage pond

contamination:	deep seated, difficult to access
activity distribution:	very heterogeneous, diffuse areas contamination sources below the building
nuclide vector:	source: relatively uniform soil profile: very variable
total activity in the soil:	ca. 500 MBq

variability of specific activity [Bq/g]		
nuclide	**contamination source**	**diffuse area**
Co-60	0,1 – 4,0	0,08 – 1,0
Sr-90	0,3 – 0,5	0,3 – 9,0
Cs-137	0,2 – 9,0	0,08 – 1,0

options:

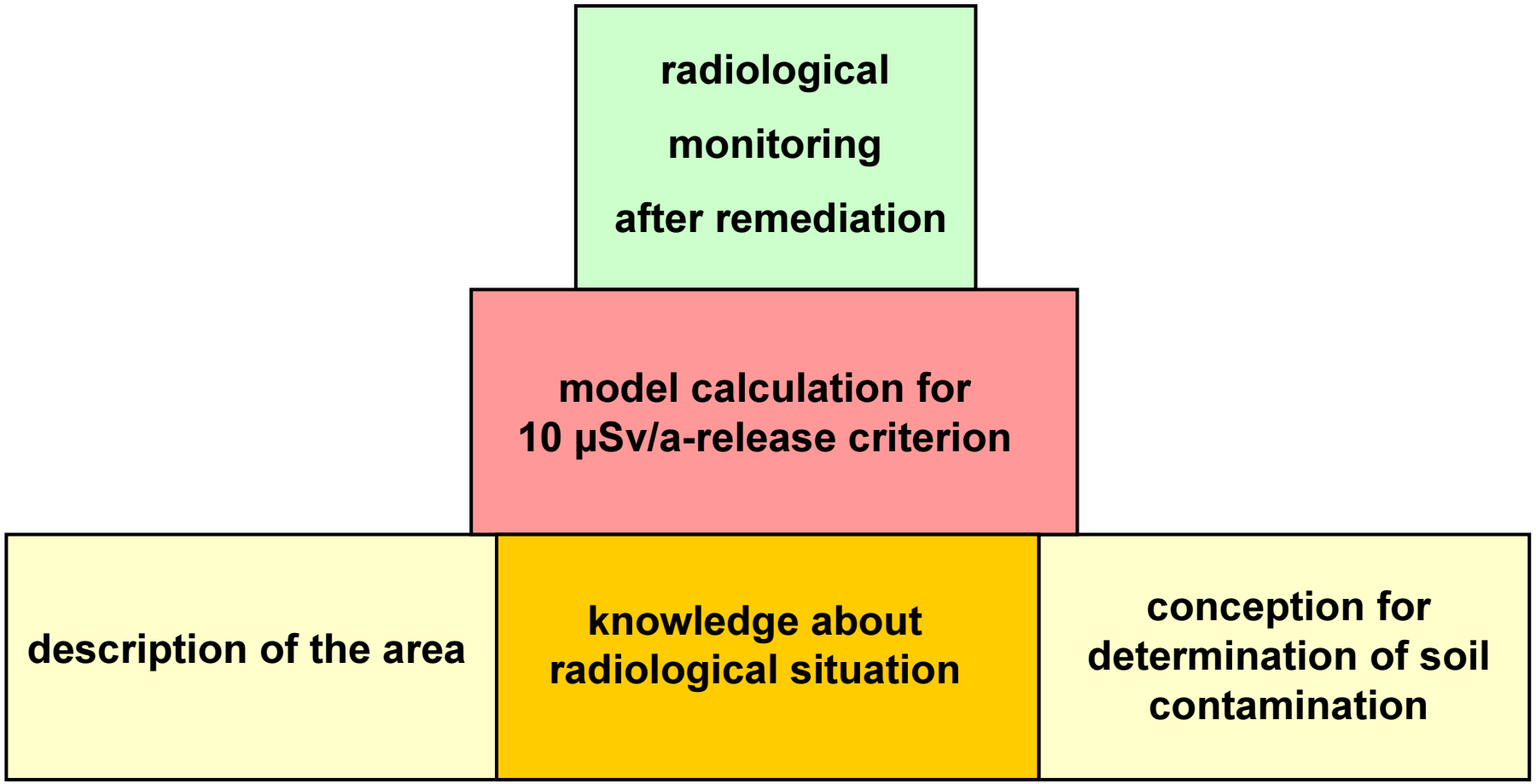
1.according GRPO § 29 (1)

- clearance levels of GRPO Annex III Table 1
- total demolition of building structures
- removal of huge amount of contaminated soil
- release measurements after removal

2.new conception according GRPO § 29 (2)

- release limits according de-minimis conception
- release measurements of buildings in-situ
- release measurements of soil around buildings

establish site specific release limits



establish site specific release values

- additional conditions
  - contouring of the area under consideration of
    - runoff of surface water
    - stability

- evaluation criteria
  - compliance with de-minimis-conception
  - technical feasibility
  - authorisation
  - costs
  - aspects of environmental and radiation protection

establish site specific release limits

conditions in the new conception:

- use limitations for 50 years (e.g. no agriculture)
- removal of all tubes
- release values as **limits** not as guidance
- final status survey
- inventory of Sr-90
- internal release procedure
- covering layer of unaffected soil
- monitoring program for surface water and groundwater

general clearance values and site specific release limits

nuclide	Germ. Rad. Protect. Ordinance		new conception	
	clearance values for unconditional clearance [Bq/g]		release limits for soil in-situ [Bq/g]	
	excavated soil (column 6)	soil surfaces (column 7)	near surface (< 30 cm)	subsurface (> 30 cm)
Co-60	0,09	0,03	0,64	90
Sr-90	2	0,002	0,15	40
Cs-137	0,4	0,06	0,20	2,80

establish site specific release limits

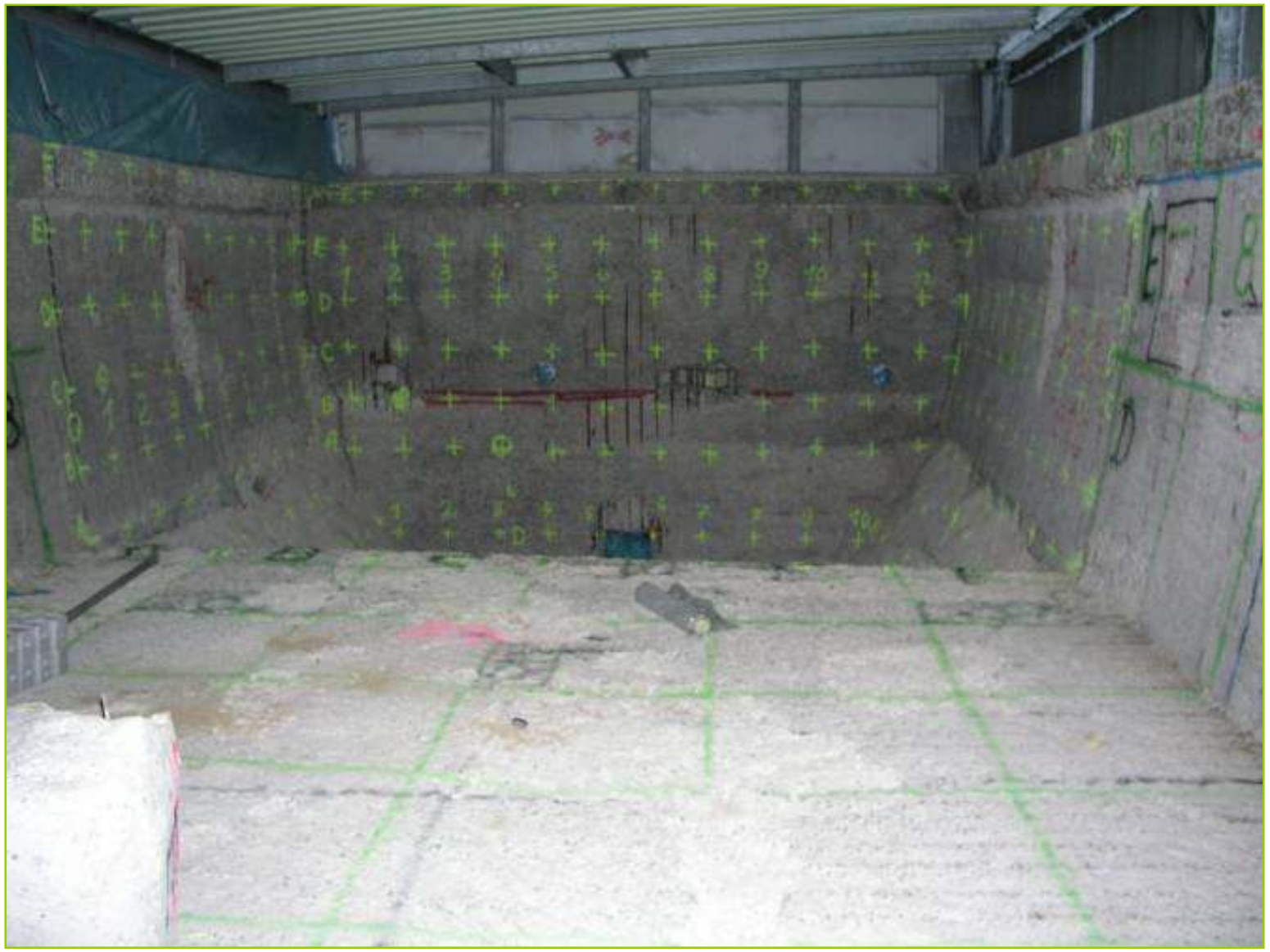
August1999	discovery of contamination under the storage pond
April 2001	conception by VKTA
April 2002	expert opinion
May 2002	application of admission to authority
June 2003	general confirmation from the authority
August 2003	allowance for the first remediation project

waste water neutralisation facility

- 1969 to 1999
- clean radioactive water with ion exchanger

waste treatment centre – storage pond

waste treatment centre – storage pond



waste treatment centre – storage pond

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Thank you for attention!