



Final release of the “Radiochemistry Hot Laboratory” at the *Joint Research Centre* in JRC-Ispra, Italy



Living with Radiation - Engaging with Society



13 - 18 May 2012 ■ SECC ■ Glasgow ■ Scotland



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...

Nuclear Decommissioning Unit

Radiation Protection Sector

DG OF EUROPEAN COMMISSION

5 SITES

7 INSTITUTES

3500 WORKERS

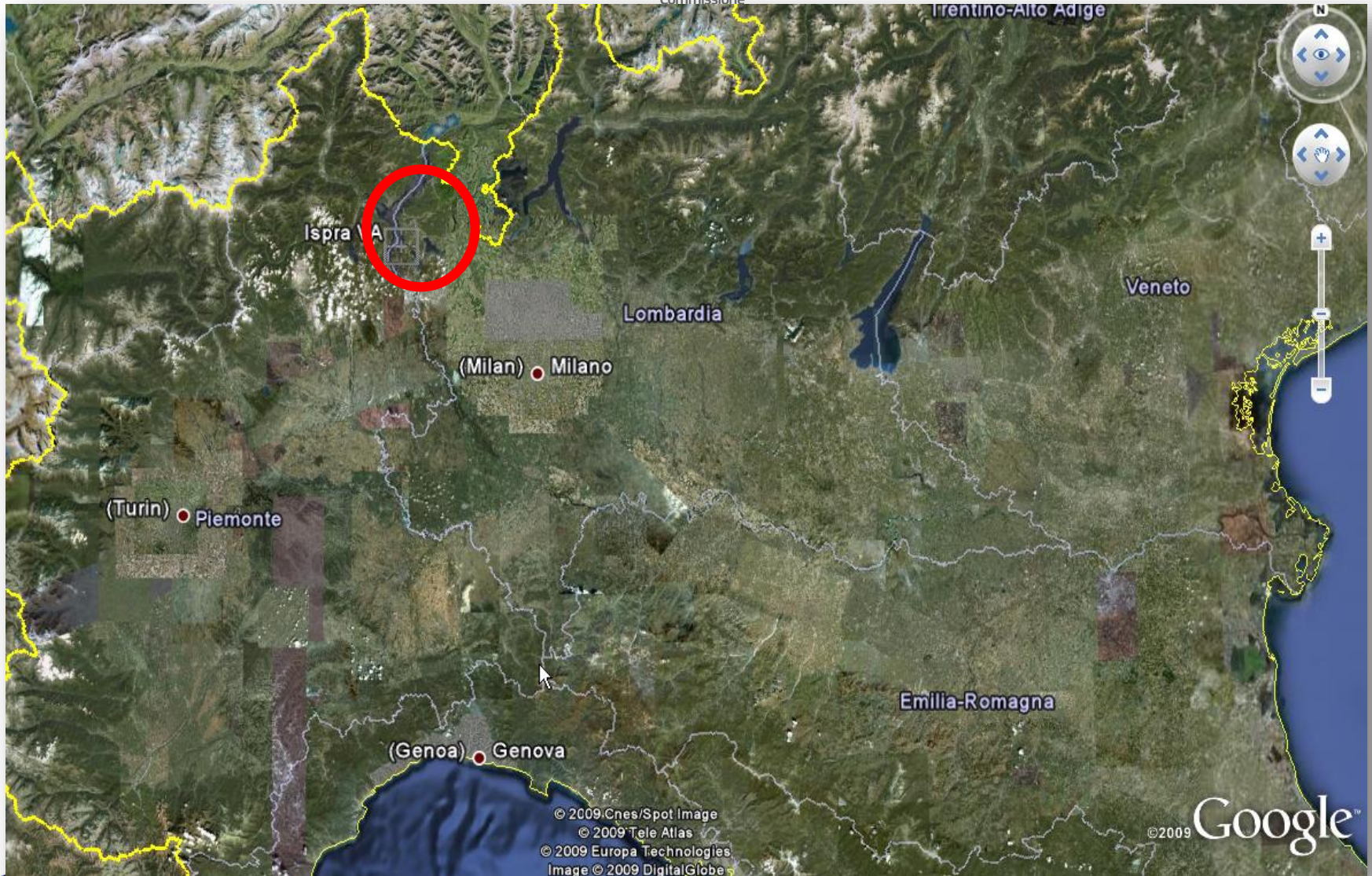


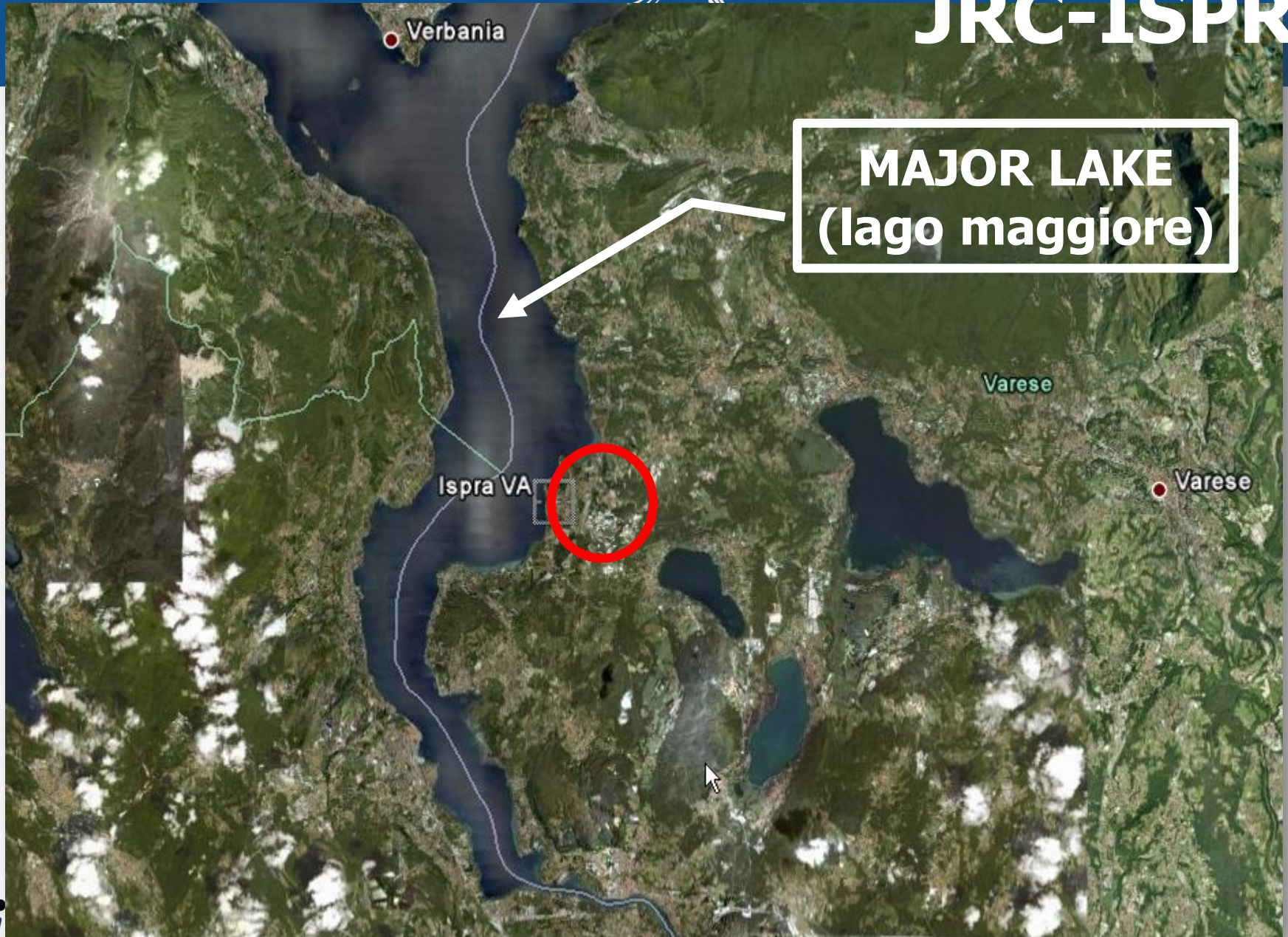


Joint Research Centre - ISPRA



JRC-ISPRA





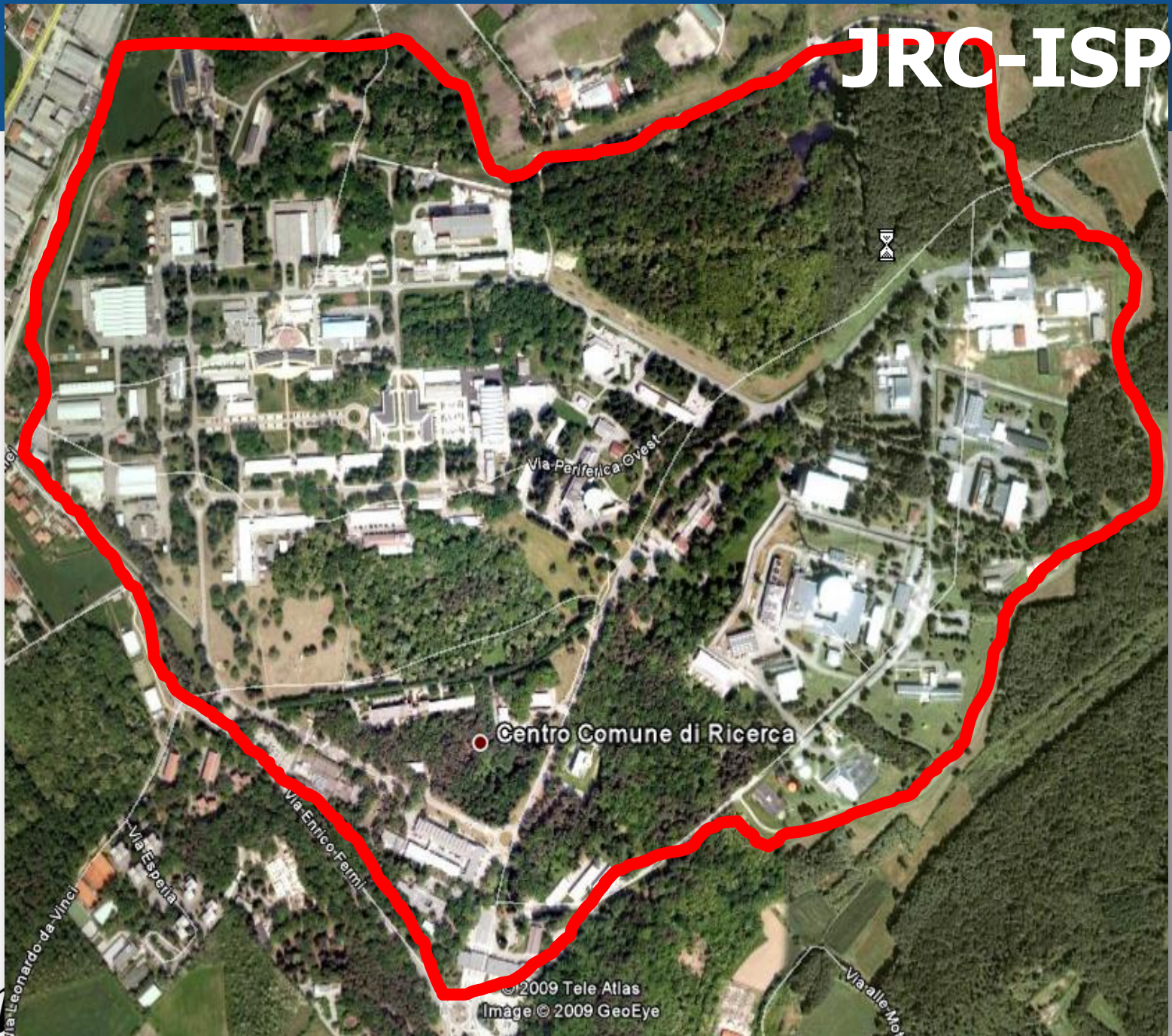
**MAJOR LAKE
(lago maggiore)**

Ispra VA

Varese

Varese

JRC-ISPRA



● Centro Comune di Ricerca

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Image © 2009 GeoEye



NUMBERS

167 HECTARES

PERIMETER: 6 km

36 km OF ROADS

250 BUILDINGS

2500 WORKERS



21 "NUCLEAR" LICENSES

14 CONTROLLED ZONES

12 SURVEILLED ZONES

~380 EXPOSED WORKERS

3 RESEARCH REACTORS

HOT CELLS, WASTE MANAGEMENT

AND ONE RADIOCHEMISTRY FACILITY

RELEASE?

**RP, for the environment
and the population**

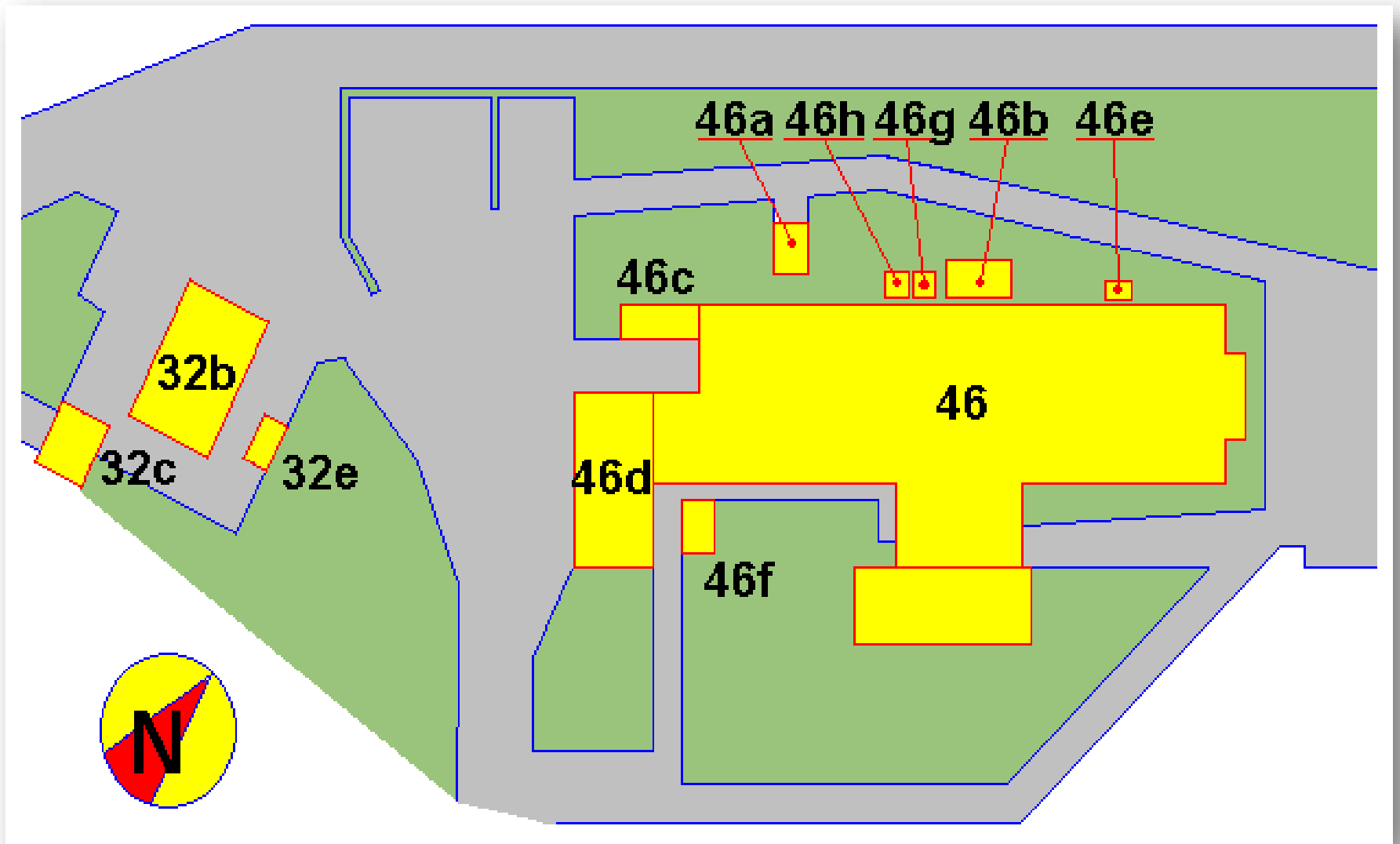
endpoint of Decommissioning process



Commissione



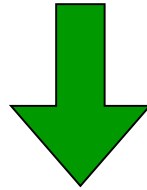
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Building	Surface (m ²)	Volume (m ³)	Levels	Main Uses
46	1.896	13.003	3	Laboratory
46d	307	2.525	3	Laboratory
32b	245	862	2	Stabularium
32c	48	83	1	Active liquid waste Store
32e	12	30	1	Warehouse
46f	13	33	1	Warehouse
46g	14	33	1	Warehouse
46h	14	33	1	Warehouse
TOTAL	2.652	16.890	-	-

Decommissioning steps

In the frame of the D&WM Programme, the goal of this project was the decommissioning of the RCHL up to the so-called “brown field” status without any radiological constraints.



- ☠ physical and radiological characterisation
 - ☠ dismantling activities
 - ☠ waste management activities
 - ☠ final radiological survey
 - ☠ final official release of the facility



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Before and after....



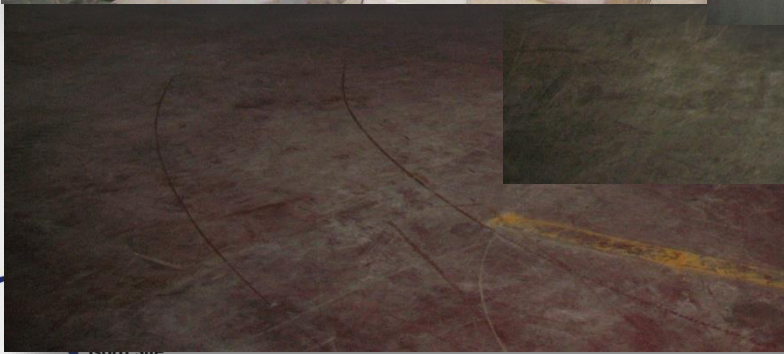


Before and after....





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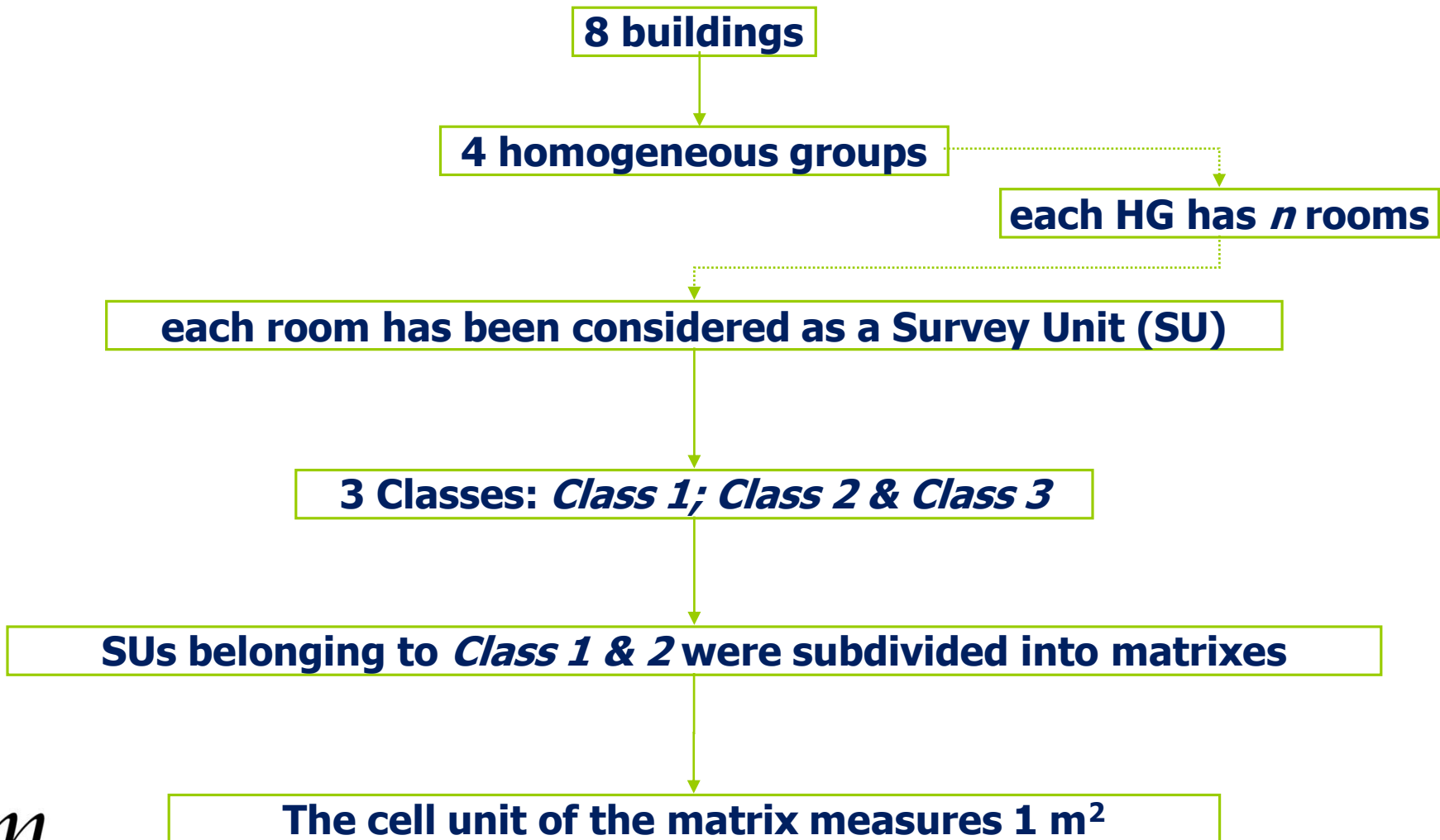


JRC-ISPRA clearance levels

Italian safety authority (I.S.P.R.A.)

<i>RN (i)</i>	<i>Materiali metallici (c_M)</i>		<i>Materiali cementizi (c_C)</i>		<i>Altri materiali (c_A)</i>
	<i>Massa (Bq·g⁻¹)</i>	<i>Superficie (Bq·cm⁻²)</i>	<i>Massa (Bq·g⁻¹)</i>	<i>Superficie (Bq·cm⁻²)</i>	<i>Massa (Bq·g⁻¹)</i>
<i>Simbolo</i>	<i>Materiali metallici (c_{II})</i>		<i>Materiali cementizi (c_{II})</i>		<i>Altri materiali (c_{II})</i>
	<i>Massa (Bq·g⁻¹)</i>	<i>Superficie (Bq·cm⁻²)</i>	<i>Massa (Bq·g⁻¹)</i>	<i>Superficie (Bq·cm⁻²)</i>	<i>Massa (Bq·g⁻¹)</i>
³ H					1
¹⁴ C	1	10000	1	10000	1
²² Na	1	1000	1	1000	0.1
³⁶ Cl	1	1	0.1	10	1
⁵⁴ Mn	1	100	1	100	0.1
⁵⁵ Fe	1	10	0.1	1	1
⁵⁹ Ni	1	1000	1	10000	1
	1	1	1	10000	

Preliminary characterisation methodology (MARSSIM)




Preliminary characterisation methodology

Each room of the HG represented a Survey Unit (SUs) each of them subdivided into three different classes of measurements:


 **Class 1:** areas which are potentially contaminated with values above the release levels


 **Class 2:** areas where the radioactive residual contamination measured is below the release levels



*Floors
Walls up to
two meters
high*

*Ceilings
Walls above two
meters high
(Floor)*



 **Class 3:** areas where there is no residual radioactivity or, at most, the amount is equal to some fraction of the release levels

Radiological Final Survey

Non Destructive Analyses



*Berthold LB 124
SCINT
(Hot spots)*



*ISOCS (IGSS Canberra)
(Average residual activity)*

Destructive Analyses



*Samples analyses off-site (α , β & γ)
On dubious samples and hot spots
Samples analyses on-site (α , β & γ)
On unforeseen samples*



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Radiological Final Survey

Analyses (NDA)

d walls up to 2 meters high every 1 m²



Radiological Final Survey

Non Destructive Analyses (NDA)

☠ Scanning: surface of the floors and walls up to 2 meters high every 1 m²



Class 1: 100% of the surface

Class 2: 70% of the surface



Radiological Final Survey

Non Destructive Analyses (NDA)

☠ *Surface mode:* the detector IGSS collimated for measurements of large surfaces (walls, ceilings)



Class 3: a measurement point every 20 m² ceiling, wall and, where applicable, floor

Class 1 & 2: 76 measurements



☠ *Near Surface mode:* the detector IGSS properly collimated for measurements with a distance of 30 cm from the measuring point



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Radiological Final Survey

 *Identification of the DA points and assistance to sampling*





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Radiological Final Survey

 *Assistance to surfaces' final cleaning*



Radiological Final Survey

Difficulties found during site work

1. Building structural limitations: IGSS weights 100kg and is supported in a wheeled cart (stairs, differently levelled rooms, sloping floors, irregular soil, sandy or gravelled pavement, etc.)
2. Potentially contaminated soil or areas: the instrument had to be properly protected (cover the wheels, avoid spreading potential contamination)



Decommissioning activities and some numbers

Activities	Days	Start	End
<i>Preparatory activities for licensing downgrading</i>	323	14/11/2005	07/02/2007
<i>Pre-decommissioning</i>	302	08/02/2007	04/04/2008
<i>Dismantling</i>	558	07/04/2008	26/05/2010
<i>Final survey</i>	234	23/12/2009	15/11/2010

☠ Some additional activities on NDAs were carried out

☠ Some additional activities on Das:

30 → samples measured off-site

15 → samples measured in-site as intercomparison

16 → unforeseen samples measured in-site

Decommissioning activities and some numbers



<i>Bld.</i>	<i>SUs</i>	<i>m² tot</i> <i>(floor, ceiling, walls)</i>	<i>N° Matrix Units (MU)</i>	<i>N° scanned MUs</i>	<i>% scanned MUs</i>	<i>% scanned m²</i>
46	70	12594	6038	4481	74.2	35.6
46d	6	714	367	284	77.4	39.8
32b	14	1564	802	620	77.3	39.8
32c	4	280	156	109	69.9	38.9
	94	15152	7363	5494		

Decommissioning activities and some numbers



<i>Bld.</i>	<i>SUs</i>	<i>m² tot</i> <i>(floor, ceiling, walls)</i>	<i>N° NDA</i>	<i>Analysed m²</i>	<i>% analysed m²</i>
46	74	13849	332	6640	47.9
46d	10	1654	58	1160	70.1
32b	15	1564	38	760	48.6
32c	4	280	7	140	50.0
32e	1	64	3	64	100
46f	1	42	2	42	100
46g	1	78	4	78	100
46h	1	78	4	78	100
	111	17609	523	8962	

Decommissioning activities and some numbers

Cost was originally foreseen 2 383 600 €₂₀₁₀ (+10% contingencies).
Final cost was 2 610 805 €₂₀₁₀.

<i>Activity</i>	<i>[€₂₀₁₀]</i>	<i>[%]</i>
<i>Underground Pneumatic Transfer Systems</i>	<i>277 926</i>	<i>11</i>
<i>Dismantling – Radioprotection - Transports</i>	<i>917 845</i>	<i>35</i>
<i>Plant characterization</i>	<i>532 000</i>	<i>20</i>
<i>Final Survey</i>	<i>314 455</i>	<i>12</i>
<i>Basic design and licensing</i>	<i>463 941</i>	<i>18</i>
<i>Supply</i>	<i>104 638</i>	<i>4</i>
<i>TOTAL</i>	<i>2 610 805</i>	<i>100</i>

Decommissioning activities and some numbers

Radioactive Wastes

	Amount estimated in Project Plan	Actual Waste produced
<i>Waste [kg]</i>	<i>101 600</i>	<i>74 615</i>
<i>Clearable material [kg]</i>	<i>153 100</i>	<i>218 300</i>

Personnel integrated doses

During the 5 years of activity, the integrated doses to the staff can be considered negligible compared to the workload.

Calibration verification by Monte-Carlo simulations of a total gamma counting tunnel for clearance purposes

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Clearance Procedures at JRC-ISPRA

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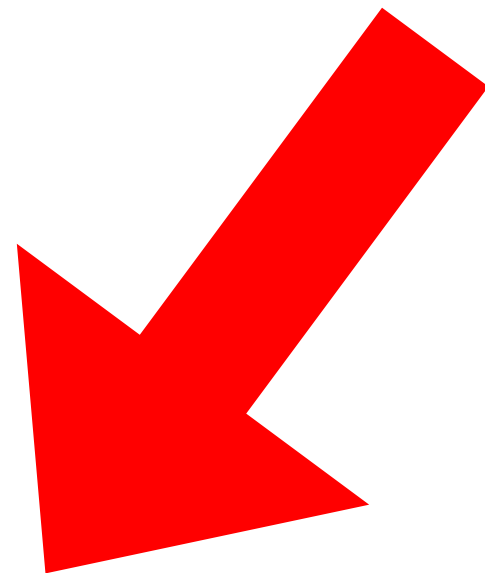
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THANKS FOR YOUR ATTENTION!



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