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Research Sites Restoration Ltd

Case Study 1: Tank Characterisation

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Harwell Oxford Campus

Science, innovation and business campus

Owned and managed by joint venture: UK Atomic Energy Authority, Science and Technology Facilities Council, Goodman

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Harwell Lifetime Plan

Near term focus:

- *Legacy waste processing*
- *Groundwater clean-up*
- *Campus development facilitation*

Long term focus:

- *Complete decommissioning*

>>The work is supported by the Nuclear Decommissioning Authority (NDA)<<

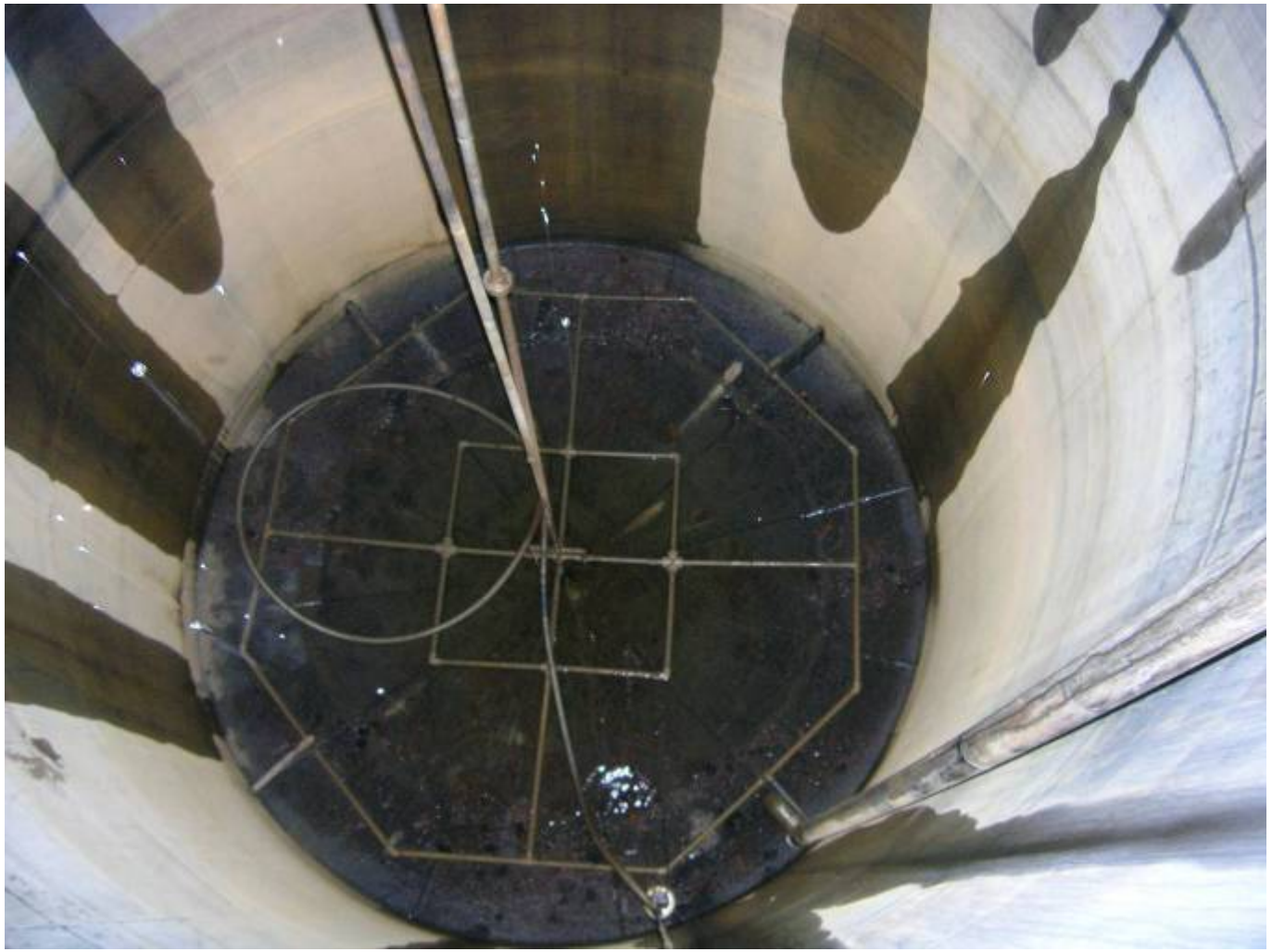
LETP Decommissioning

LETP Decommissioning Programme

- ***Useful life of Liquid Effluent Treatment Plant coming to an end***
  - *Very low amount of liquids release from site*
  - *Small replacement plant under construction*
- ***Two phase decommissioning project planned***
  - *Phase 1: Above ground buildings and structures*
  - *Phase 2: Below ground buildings and structures*
- ***Final condition:***
  - *Nuclear Licence terminated, available for redevelopment*
  - *Completed by 2020*

Phase 1 Decommissioning - Overview

Whessoe Sludge Tanks

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Whessoe Tanks Decommissioning

Why ?

- *Removes the hazard associated with the plant and buildings;*
- *Prevents the inadvertent spread of chemical or radioactive contamination;*
- *Avoids high care and maintenance costs; and*
- *Progresses the LETP Decommissioning Programme.*

How?

- *Size reduction of each tank to floor slab;*
- *Segregation, packaging and transportation for metals recycling;*

When?

- *By 31 March 2013*

Characterisation is Key

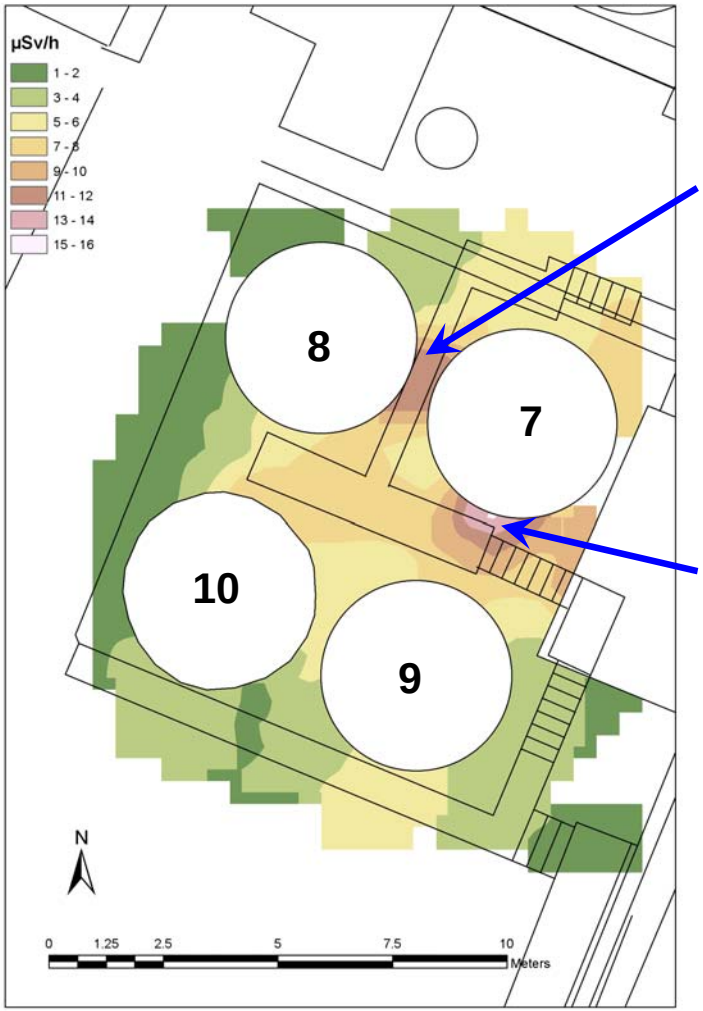
Non-destructive –
efficient & overall picture

Destructive – slow & costly

Non-destructive radiological characterisation

1. *Establish the internal radioactive distribution*
   - A series of dose-rate reading on the outside using a Teletector
2. *High Resolution Gamma Spectrometry*
   - To quantify in Bq/g the gamma emitting radionuclides

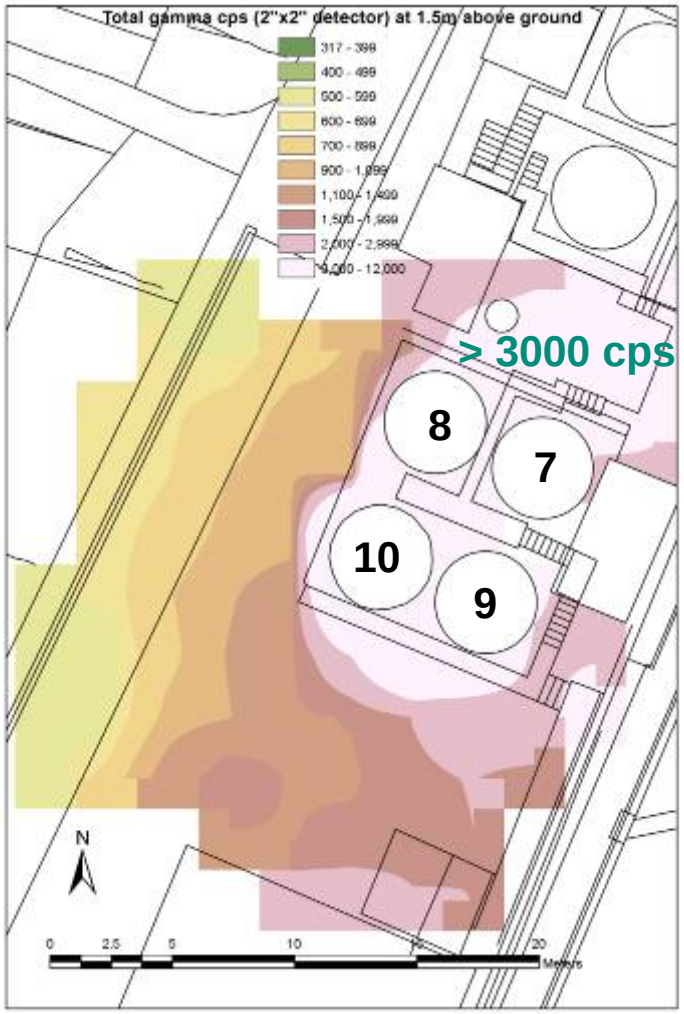
Health Physics Survey data (µSv/h)



11 µSv/h

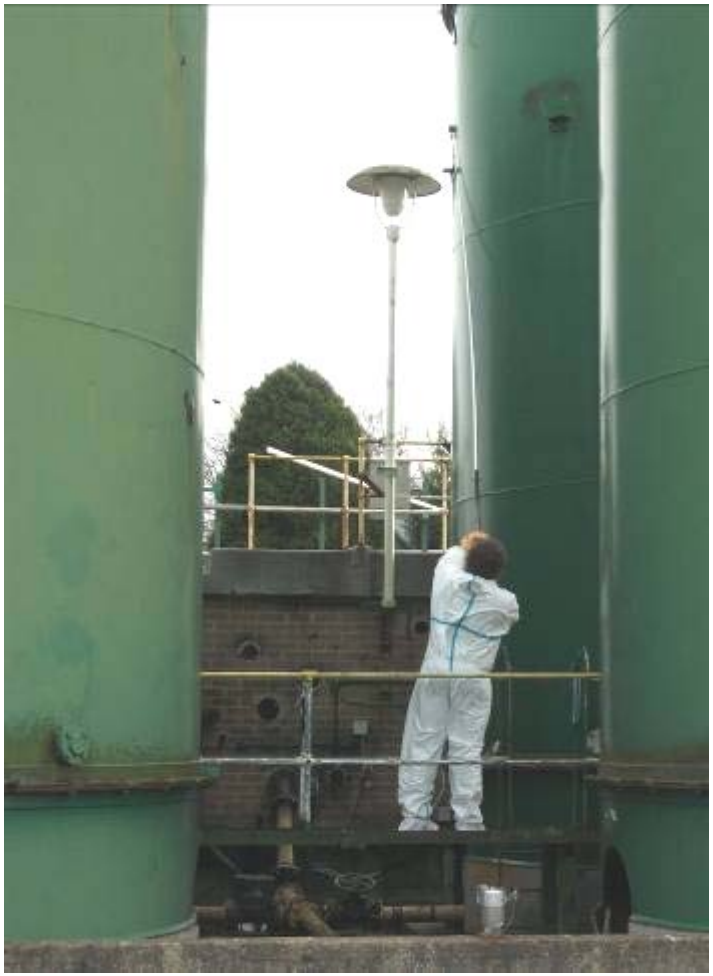
15 µSv/h

Groundhog survey (cps)

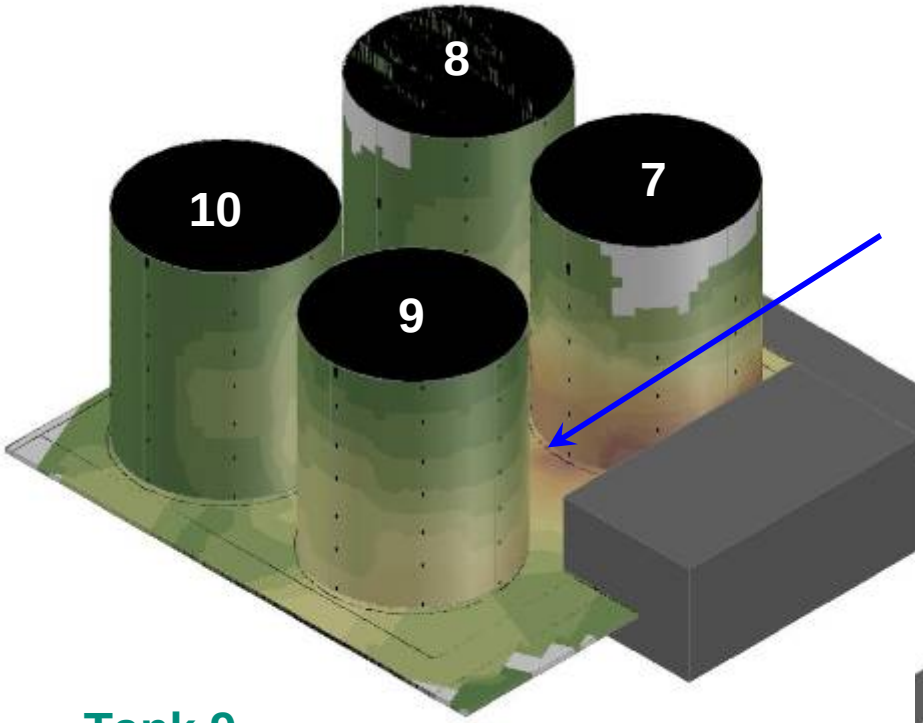


Teletector dose-rate measurements

56 measurements per tank



GIS – Specialised 3D visualisation & analysis package



Tank 9

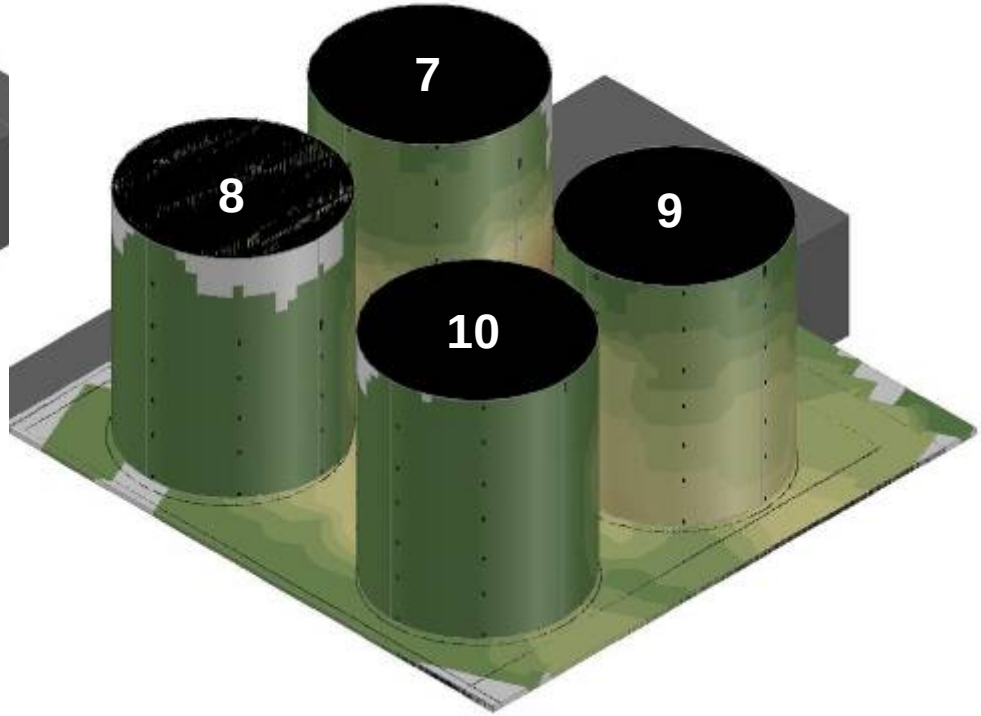
Increasing from top to bottom

1 – 6 µSv/h

Tanks 8 & 10

Uniform distribution

1 – 2 µSv/h



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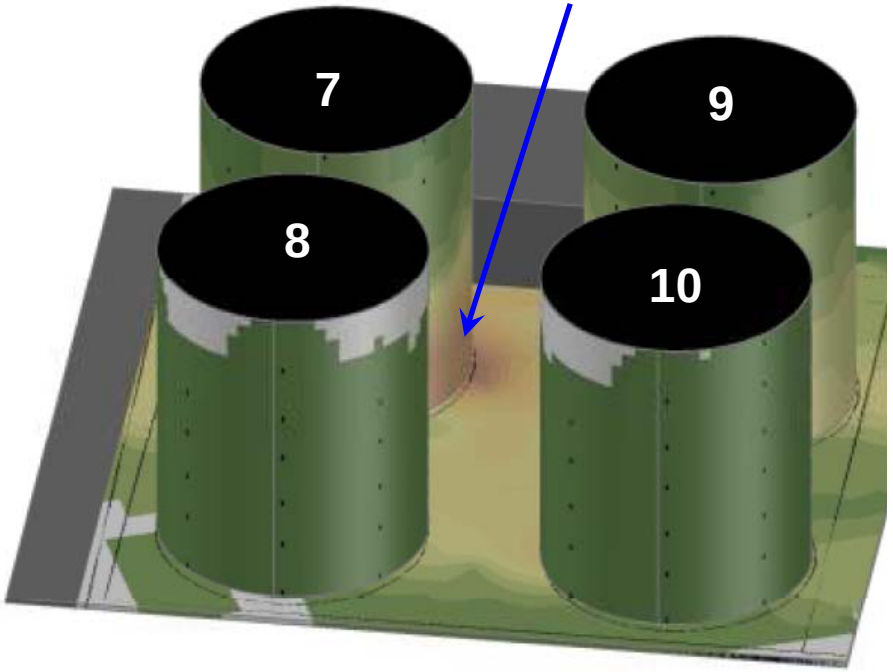
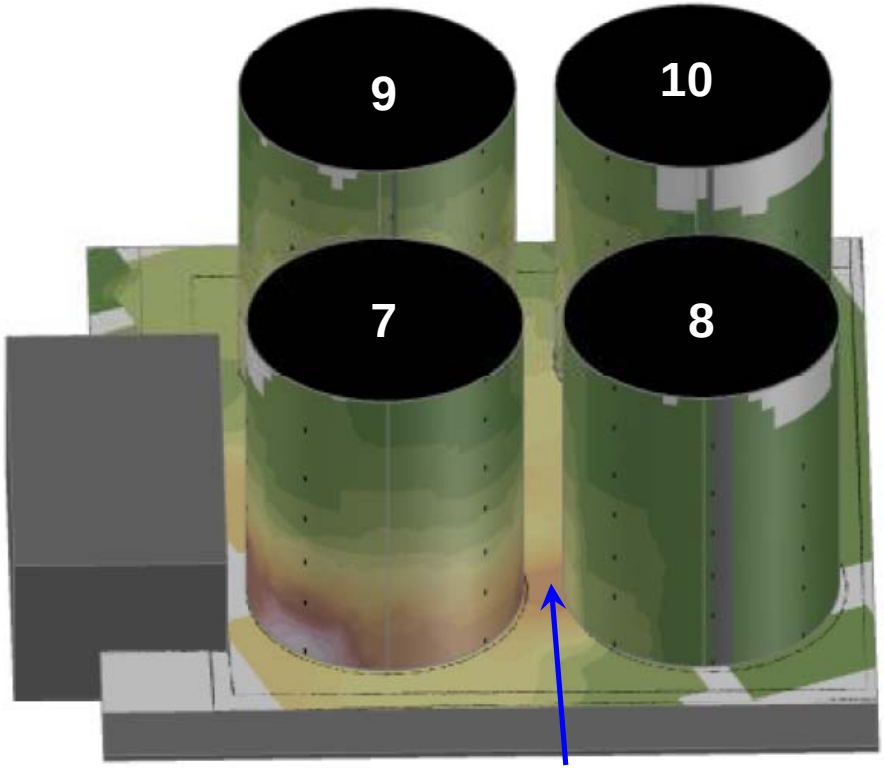


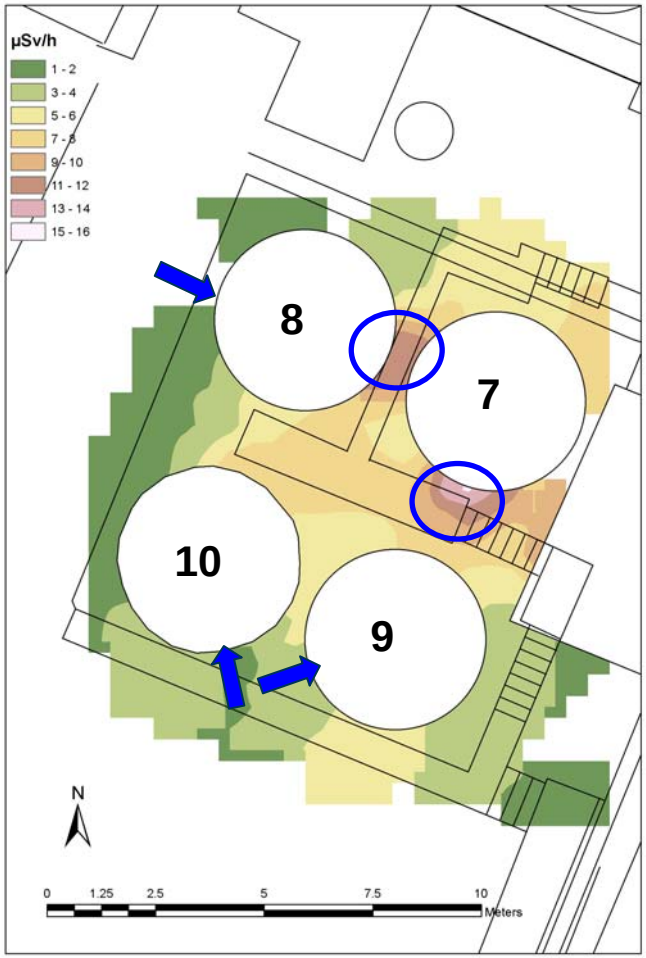
Tank 7

Increasing from top to bottom

1 – 13 µSv/h

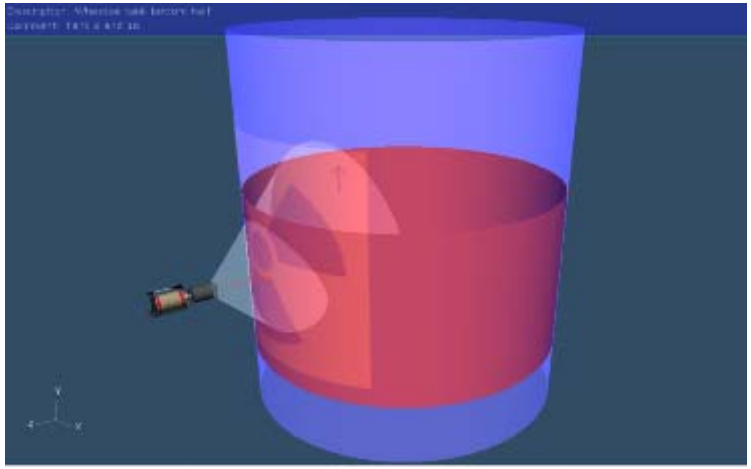


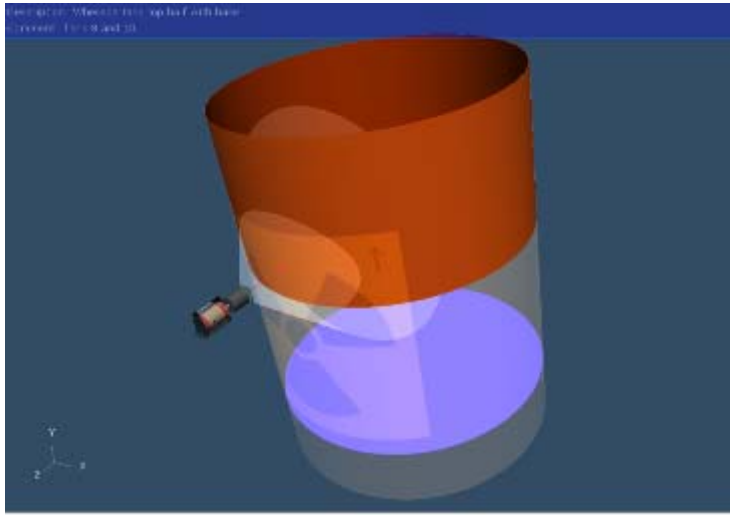
High Resolution Gamma Spectrometry



In-Situ Object Counting System (ISOCS)

- *Gamma-ray interactions are well understood*
- *Exploit this knowledge to use mathematical models to generate efficiency corrects based on physical parameters*
- *Complex pipe model with activity associated with the ebonite*

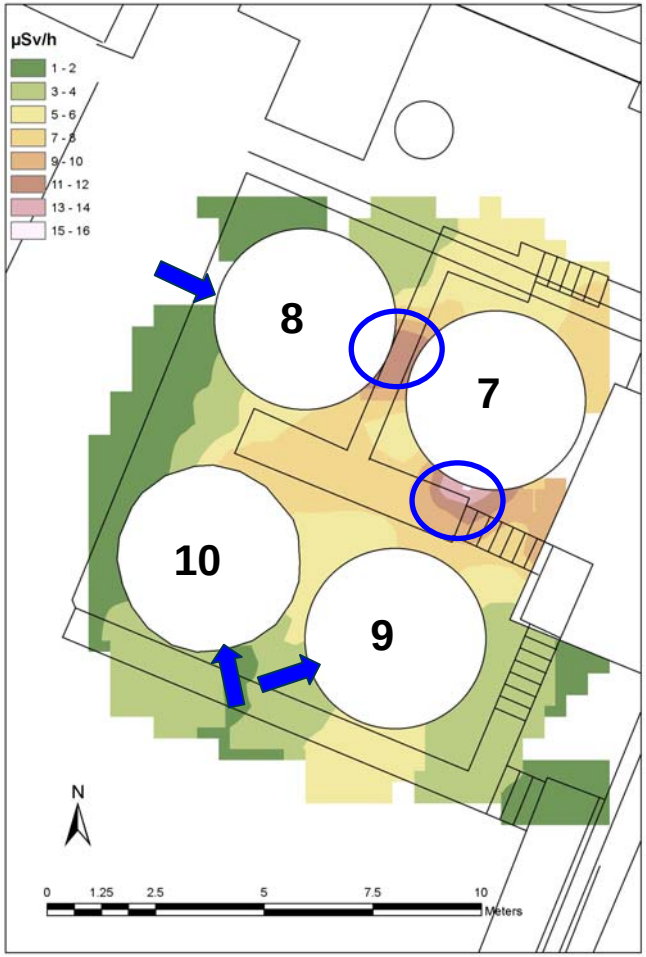




Results

	Bq/g	
	Cs-137	Co-60
Tank 10 top	25	< 0.3
Tank 10 base	39	< 0.3
Tank 8 top	68	< 0.3
Tank 8 base	65	0.5
Tank 9 base	314	1.0

Consider as maximum values due to interference



Preliminary laboratory results

4.5 cm circular sample taken from Tank 7

Middle: 305 Bq/g Cs-137 & 3 Bq/g Co-60

Top: 3 Bq/g Cs-137 & 0.3 Bq/g Co-60

High Resolution Assay Monitor (HIRAM)

Gamma Excavation Monitor (GEM)