



# Mode Of Contamination And Other Factors Affecting Decontamination Decision Making

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# Aim

- Define Decontamination
- Describe Primary Factors
- Critical Questions
- Secondary Factors
- Processes and Interfaces

# What Is Decontamination?

Put simply;-

*“Mobilisation of a contaminating species from a substrate in part or in full in a controlled way to support a business driver or safety requirement.”*

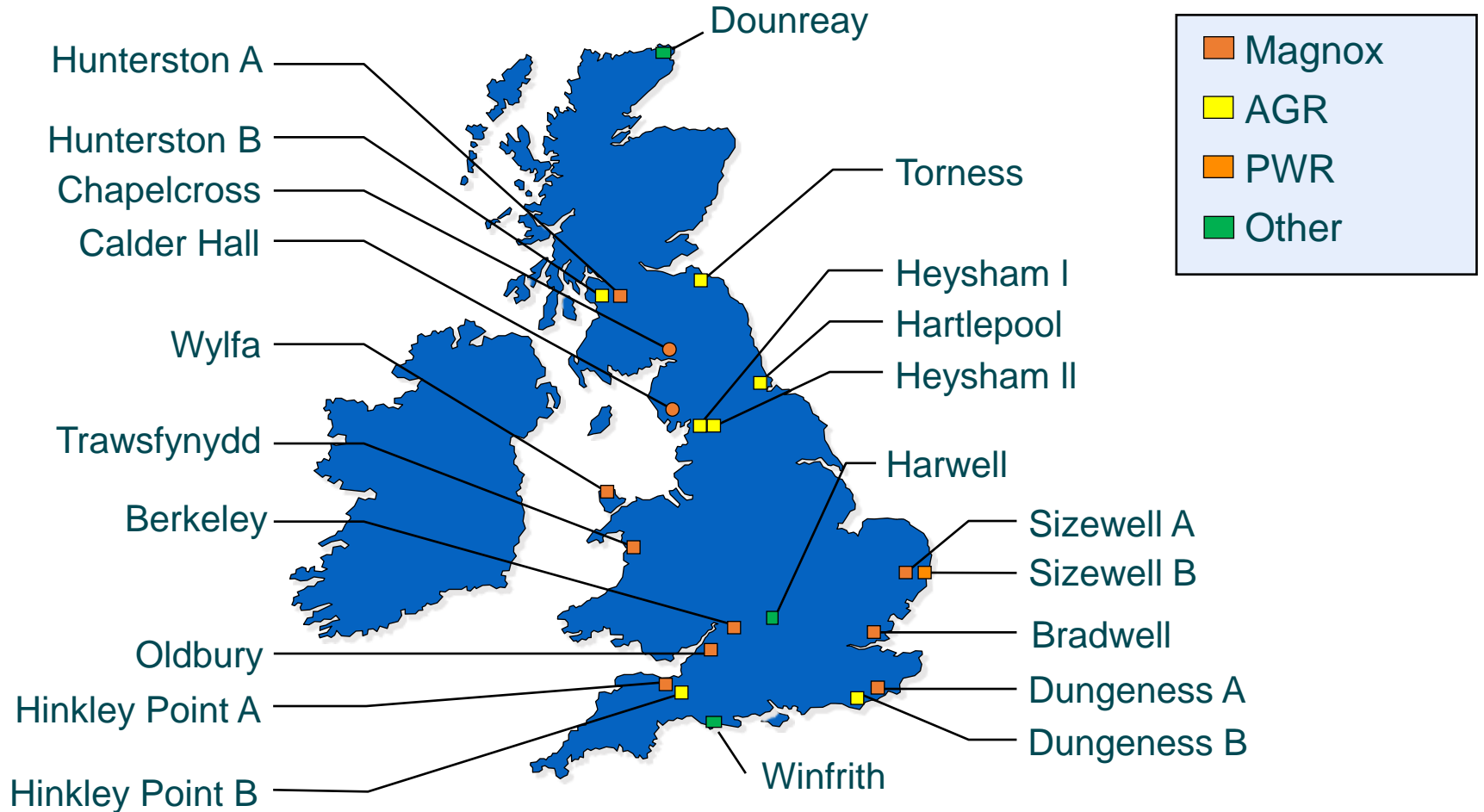
- Many other permutations.
- This is **not** restricted to radiological contamination.

NB Decommissioning is the removal of items.

# Where Are The UK Challenges?

- Civil Nuclear Industry (Sellafield, Dounreay, Harwell..)
- UK Weapons Programme (AWE, MoD)
- State based legacy items
- “Public” owned items (Radium, Victorian items)
- CBRN(e) events

# UK Civil Reactor Sites



# Nuclear Pipes





# Primary Factors

## Characterisation:

- Knowing what we have and where it is

## Deployment:

- The tools needed to access the cell, vessel, pipe to deliver the required technology / technique

## Decontamination

- Which technique to use. Water Jetting, fixing, chemicals, scabbling...

## Waste Routes:

- What waste routes are available? Will the wastes generated be acceptable?



# Critical Questions

## What are you aiming for?

- Waste classification change? ILW to LLW or OOS? Offers costs savings.
- What are the target dose / contamination levels?
- Can you reliably measure?
- Can you prove its OOS?
- How quickly is a solution required?



ILW – Intermediate Level Waste

LLW – Low Level Waste

OOS – Out of Scope

# When & Why To Decontaminate?

## When?

- Operational Support – keep plants going.
- POCO – move solids and activity with existing plant infrastructure.
- Decommissioning – make it easier, safer, faster, cheaper.
- Waste Treatment – make best use of facilities.

## Why?

- Contamination Control
- Dose Reduction
- Waste Re-Categorisation
- Include segregation by scabbling e.g. concrete.

POCO – Post Operational Clean Out

# Mode Of Contamination?



## How did it get there?

- Activation
- Impact / ground in
- Chemically entrained
- Chemically bound on surface
- Absorption
- Adsorption
- Loose particulate / deposition

This determines the how aggressive the process needs to be.

# What & Where Is The Contamination?

## What Is It?

- Is it a blockage?
- Is it solid? Floc?
- Metallic, nitrate or oxide?
- Cs Vs Pu Vs Ru?
- Etc.

## Where Is It?

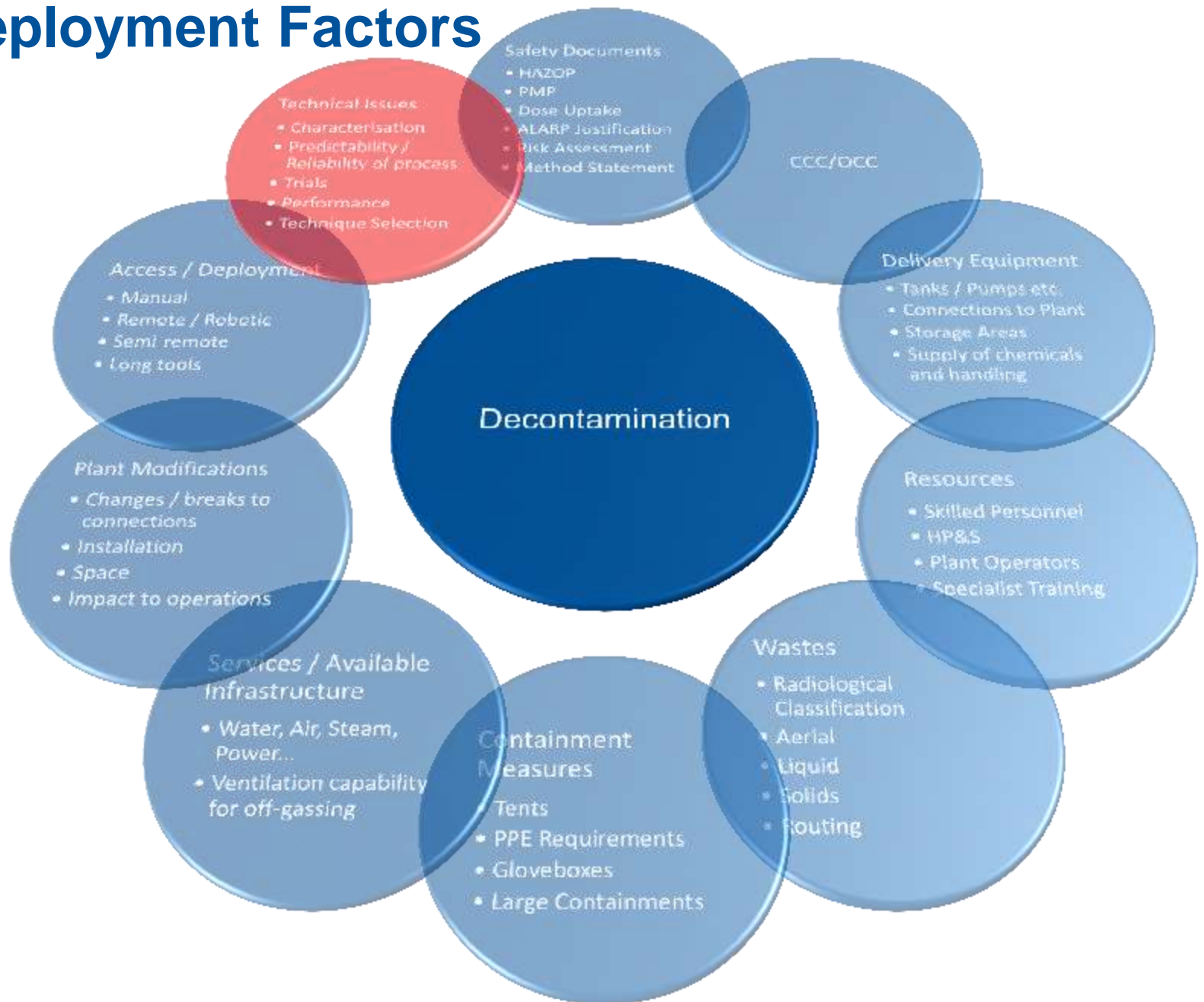
- Pipework
- Vessels
- Tanks
- Cell Walls
- Building Structures
- Gloveboxes
- Etc..

## On What?

- Mild Steel
- Stainless Steel
- Painted surfaces
- Concrete
- Brick
- Glass
- Etc..

Still not selected a technique yet!

# Deployment Factors



# Access Challenges

Remote vs Semi-remote vs manual deployment

Is it outside?

Temporary facility / coverage?

Working at height?

In-Cell?

- LA
- MA
- HA

Within pipework, how to break into the line (& extract)?

Simple or complex geometry surfaces?

Physical barriers

Can this be done elsewhere on your site?



LA – Low Active MA – Medium Active HA – High Active

# Processes and Interfaces

Decommissioning must consider;-

- Which methods to employ?
- How to deploy technologies for removing and cleaning plant, e.g. hydraulic cutters, scabbling
- Remotely or manually deployed?
- Waste forms and routes, e.g. ILW:LLW:OOS:PCM split.
- Cost of implementation
- All considered through an 'optioneering' exercise and other regulatory exercises.



# Processes and Interfaces

- Focus on High Hazard reduction (older facilities)
- Legislation e.g. BATs, Licence Instruments
- Clearance for new plants
- Cash constrained delivery - Sellafield has limited funding from BEIS (via NDA).
- Must maintain safe conditions, therefore control the number of workfaces.
- Availability of downstream plants, e.g. liquid effluent plants.
- Stakeholders inputs, ONR, EA, local community etc..

NDA – Nuclear Decommissioning Authority   ONR – Office For Nuclear Regulation   EA – Environment Agency

# Any Questions?

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