



Magnox

# Fukushima Response Programme – Human Factors

# Background and Context of Magnox FRP

- The events at Fukushima Dai-ichi following the 11<sup>th</sup> March 2011 Great East Japan Earthquake and consequent tsunami revealed weaknesses in plant design, emergency preparedness, accident management. Within the identified issues, human and organisational lessons were revealed.
- Magnox immediately established a Fukushima Dai-ichi Response Programme

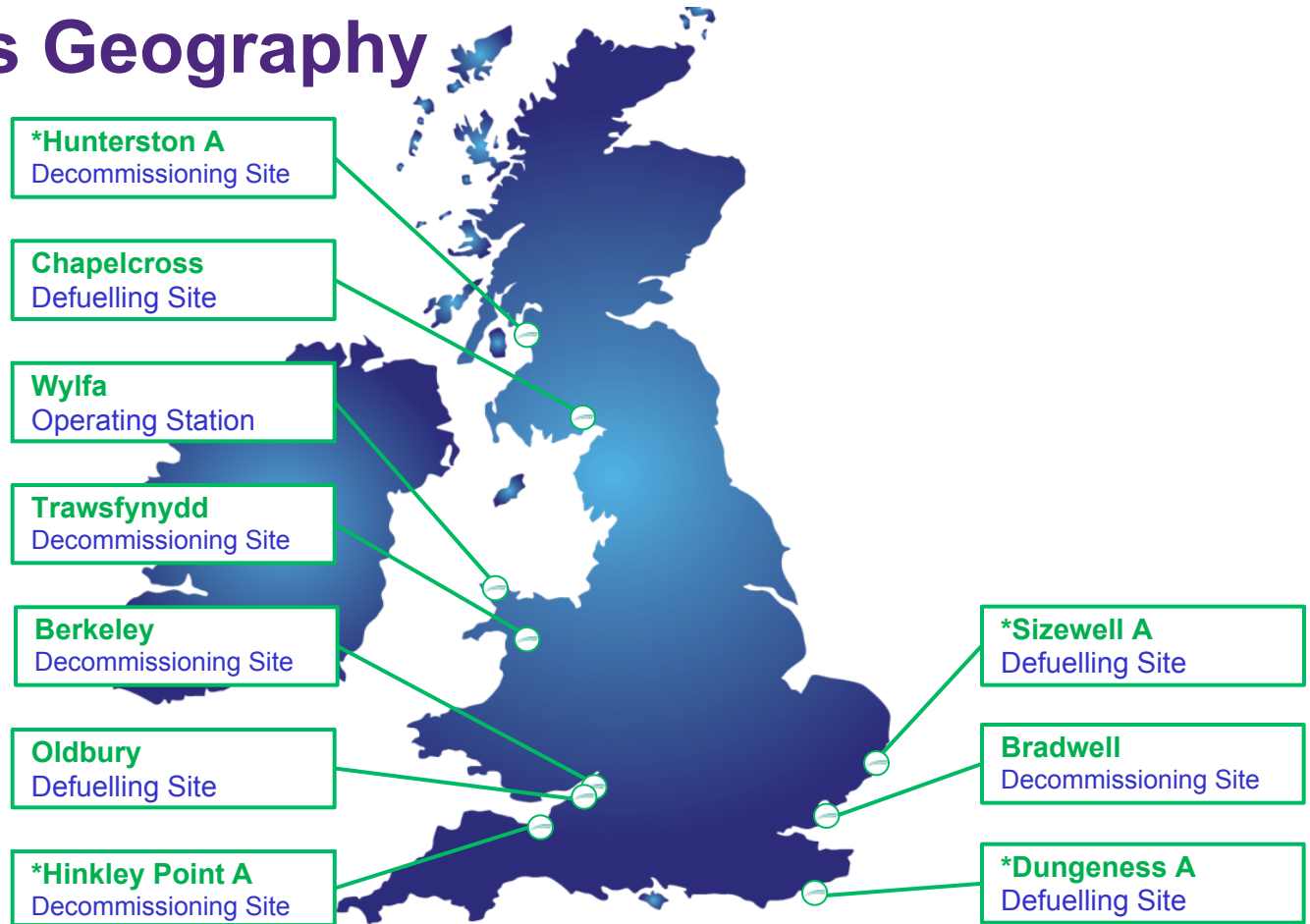
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# Magnox Ltd

- Decommissioning all but 1 of the Magnox reactors built in the 1950s, 1960s.
- 10 Sites in various stages of decommissioning
- 1 generation site
- All sites have a different Human Factors profile determined by their stage in the decommissioning ie from generation, fuelled sites, waste storage to preparation for care and maintenance and with organisational differences ie Majority Magnox employees on site, through to majority being contractors from multiple companies.



# Magnox Sites Geography



\* next to generating EDF Station

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# Magnox Fukushima Response Programme – Objectives

## Objectives of Magnox Fukushima Dai-ichi Response Programme:

- To consider implications for the Magnox sites and identify lessons to be learned
  - Magnox in-house learning – site workshops
  - Discussions with other UK licensees
  - ONR Interim & Final Reports
  - IAEA Mission Reports
  - EU Stress Tests (ONR National Report)
  - WANO SOERs
  - INPO lessons learned report
- To initiate work programmes to apply relevant lessons to Magnox sites as appropriate
- To respond to information requests from stakeholders

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# Magnox Fukushima Response Programme – Structure

## Programme Structure:

- Work programmes are being implemented primarily through sites with assistance from central specialists
- Central co-ordination (Engineering Function) under the leadership of senior programme manager
- (Almost) all parts of the company are involved
- Reports to a Director-level Project Implementation Board
  - Chaired by the Chief Nuclear Officer and attended by Chief Operating Officers for decommissioning sites, EHSS&Q Director and Emergency Planning Strategy Lead
- Magnox Executive is kept informed
- Close working relationship maintained with other licensees through SDF subgroup and other topic-specific groups

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# Post-Fukushima Enhancements – Overview

- Seeking enhancements that deliver real safety improvements swiftly and pragmatically across all 10 sites and support functions
- Recognise that there is widely differing nuclear safety risk across the fleet
  - limited remaining period of reactor operation at Wylfa, only one operating reactor
  - fuel remains at Oldbury & Sizewell A (reactors and ponds)
  - no longer any fuel at Chapelcross, Berkeley, Hinkley Point A, Dungeness A, Bradwell, Hunterston A & Trawsfynydd but active waste material still remains (ILW/LLW)

# Human Factors Programme

## HF and Plant

*On Decommissioning sites Plant and environment can change daily*

1. Review of emergency equipment required through workshops and meetings eg
  - i. pumps and emergency cupboards relocated.
  - ii. Identification of critical parameters and installation of resilient methods to maintain situational awareness.
  - iii. Refurbished and increased stocks of Flu pandemic stores.  
*(inc. chemical toilets, emergency rations, camp beds)*
  
2. HF Walkdown of new installed Fukushima Equipment – operability, access, training –scheduled later this year on all equipment commissioned.

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# Post-Fukushima Enhancements – Overview

- Significant resilience enhancements have already been delivered
  - Additional pumps, generators, consumable stocks and supplies (water, diesel fuel, CO<sub>2</sub>, etc.) procured and strategically located (particularly Wylfa and Oldbury)
  - Site access/debris clearance and other emergency equipment procured
  - New emergency pond water filling lines at Oldbury and Sizewell A, pond repair equipment and PPE
  - Iso containers of emergency equipment.



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# Post-Fukushima Enhancements – Overview

- Wylfa Beyond Design Basis Equipment Compound
  - Designed/located to be resilient against hazards



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# Equipment Considerations



Wireless transmitters



Paperless recorders

How trained to operate?

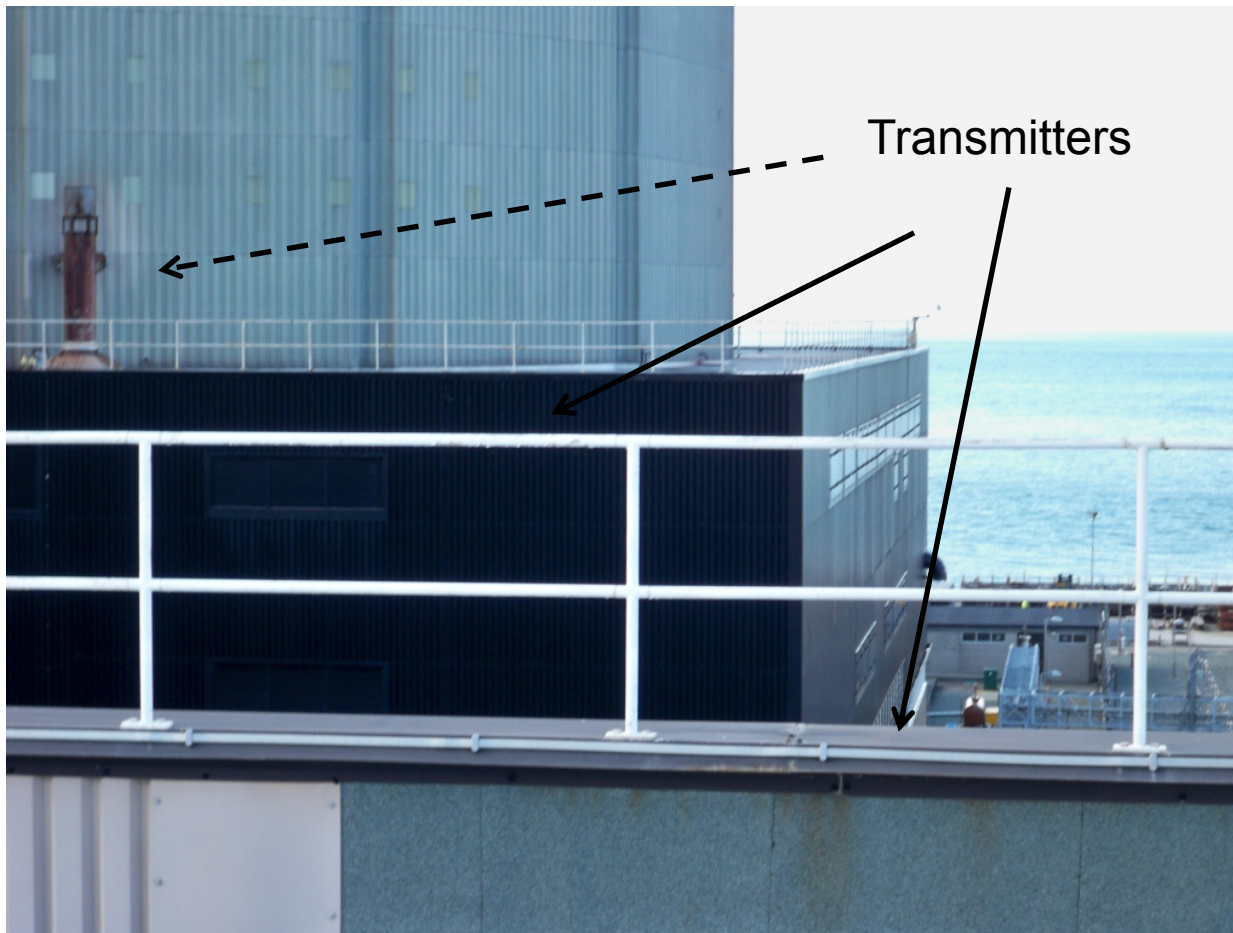
How maintained?

Ongoing care and maintenance

And finally.....

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# Equipment considerations- location and access



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# Human Factors Programme

## People

1. Training of key people – preparedness for extended timescales, consideration of resilience in extreme events, Fatigue management in extended timescales.
2. Welfare if evacuation cannot be achieved
3. On-site first aid and care for injured and distressed.
4. Adaptation of flu pandemic arrangements.
5. Post trauma care
6. **Discussions through supply chain relationship manager to introduce more visibility to emergency response expectations and involvement in discussions around emergency arrangements for contractors.**
7. Fukushima awareness communications.



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# Human factors Programme

## HF in Processes

1. Review of SBERGs and SAGs for Wylfa and Oldbury
2. Continuing review of Fuel sites remaining SBERGs and SAGs
3. Development of Accident Management Guidelines (AMGs) for fuel route and non-fuel sites (ILW sites)
4. Review of emergency exercises
5. Review of Communication arrangements
6. Review of Emergency/Security interfaces

# Conclusions

1. The direct relevance of Fukushima in terms of Nuclear Safety is dependent on the phase of decommissioning, and related to the residual nuclear risk- but emergency response is relevant
2. Local factors and vulnerabilities are key to emergency requirements – Safe evacuation and closedown of site maybe the only actions required.
3. Traditional emergency arrangement structures for generating plant are still relevant but their focus of control changes along with the people who would be required to carryout actions.
4. Extreme external events that affect a site are still required to be planned for with respect to the safety of personnel, general public, and potential environmental emergency response. Most traditional arrangements were designed to respond within limited period of time, this mind set is now changing.

## Challenges in Human and Organisational factors:

**Persuading sites to imagine Fukushima like crises and engaging in planning and resilience development.**

**Involving a wider stakeholder group in developing Emergency Arrangements to recognise the differences of Human and Org factors on a decommissioning site.**

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