Preparing for Regulating Advanced Nuclear Technologies

GIF Symposium, Paris, 16-17 October 2018

Dr Diego Lisbona
New Reactors Division
Office for Nuclear Regulation, United Kingdom
ONR’s Programme to Grow ONR’s Capability in ANT (sponsored by BEIS)

October 2017

Industrial Strategy
Nuclear Strategy
Department for Business, Energy & Industrial Strategy
Innovate UK

Notice
SBRI: nuclear advanced modular reactors, feasibility and development
Published 7 December 2017

June 2018

December 2017
ONR’s regulatory philosophy

• Goal setting – (mostly) non-prescriptive
• Targets developing and sustaining an open and effective dialogue with dutyholders → positive and enabbling approach overall
• Overarching requirements of our regulatory work are ensuring that risks are reduced As Low As Reasonably Practicable (ALARP)
• Use of Relevant Good Practice (RGP) is at the core of the demonstration of ALARP
Objectives of our work on ANTs

Develop ONR capability and capacity

Engage with ANT industry

Increase engagement with international regulators

Advise BEIS’ AMR feasibility and development programme

Review ONR’s guidance and processes

ONR’s objectives for ANTs

Industry engagement event 25 Nov 2017

Key topic sessions
- Feb & March 2018
  - IAEA 2018 MARS
  - UK nuclear safety conference
- UK nuclear regulatory legislation

Group engagement
- Open to all
- Not specific to any one design

1-to-1 engagement
- Closed and confidential
- Specific to each project and design

Stage 1: Opening engagement
- Invitation
- April 2017
- May 2017

Stage 2: Main engagement
- Open to all UK designs
- May 2017

Stage 3: Close-out engagement
- June 2017
- July 2017

In BEIS’s (UK Government) Invitation

Engage with ANT industry
Advice to BEIS

2017
Planning

Development of regulatory criteria (and guidance for vendors) based on our extant regulatory guidance to apply in the context of the AMR feasibility studies

2018

Technology Reports:
- Safety Considerations
- Knowledge gaps
- Priorities

2019

Advice to Government on level of regulatory confidence in the AMR designs being able to meet UK regulatory requirements

Priority Areas
AMR F&D study

• Developing and deploying advanced nuclear technologies... 7 fission designs

• 1 SFRs, 2 LFRs, 3 HTGRs, 1 MSR:
  • Advanced Reactor Concepts LLC
  • Westinghouse Electric Company UK Limited
  • LeadCold
  • U-Battery Developments Ltd
  • Ultra Safe Nuclear Corporation
  • DBD Ltd
  • Moltex Energy Limited;
  • Tokamak Energy Ltd;

Not to be confused with any of the steps of a Generic Design Assessment (GDA)
# Capability building

<table>
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<tr>
<th>Training need family</th>
<th>Training profile</th>
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<tbody>
<tr>
<td><strong>Familiarisation with all 4 design types</strong></td>
<td>AMR feasibility study core team</td>
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<td></td>
<td>Gen IV Training Courses</td>
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<tr>
<td><strong>Targeted learning</strong></td>
<td>Discipline-specific / Reactor Type-specific Training Courses</td>
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<td><strong>Regulatory benchmarking and International Engagement</strong></td>
<td>IAEA SSR 2/1, SMR Regulators Forum Nuclear Energy Agency (NEA) WGSAR CNSC US NRC</td>
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**ANT PROJECT RESILIENCE / INCREASING NEED LONG TERM**

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**INCREASING NEED LONG TERM**
We have developed a **process** to identify **key safety considerations, knowledge gaps** and **priorities** for future regulatory work and training related to ANTts.

We are undertaking a **focused review** of our **guidance** (**SAPs, SyAPs & TAGs**) to ensure that it is **fit for purpose** for the regulation of ANTts.

**The Generic Design Assessment (GDA)** process is being modernised taking account of **learning from previous assessments** and by introducing **greater flexibility** into the process which is important for ANTts.

In order to support UK Government’s **AMR research initiative**, we have developed **regulatory criteria** based on our existing regulatory guidance to apply it in the context of the AMR feasibility studies.

We have developed a **process** that enables us to **engage with the ANT industry**. We are implementing this process via seminars and 1-to-1 workshops over 3 stages.

We actively participate in **ANT international fora**.
Thank You
Following training, completes Contact Record to prescribed structure.

- Monitors actions log, Knowledge Management spreadsheet and report updates.
- Updates the safety considerations with new information or required changes.
- Reviews & challenges recommendations, points to follow up and changes to reports.
- Decides what recommendations need to be captured / taken forward.

**CAPABILITY BUILDING**

- **TRAINING NEED**
  - Horizon scanning
  - F&D submission
  - Knowledge gap

- **TRAINING OPPORTUNITY**

- **Team Members**

- **Audit / Assurance**

- **Report Owners**

- **Expert Panel**

- **Safety Considerations reports:** SFT, LFR HTGR and MSRs

- **ANTs DDS**

- **Owns & maintains** Knowledge Management spreadsheet & actions log.
AMR Safety Consideration Reports

- Informing our current focus on:
  - Material compatibility and structural integrity challenges
  - Fuel incl. TRISO fuel and novel materials
  - Molten Salt reactor chemistry
  - Operational experience including linkage with other Government initiatives
Improvements to the Generic Design Assessment (GDA)

- GDA was originally developed for large & well established / mature reactor designs but, with SMRs, the regulatory landscape is changing.
- As part of continuous improvement, ONR and EA have looked at whether there are elements of the GDA that could be improved to:
  - Add flexibility and better adapt to the differing levels of maturity and development of SMR vendors and their technologies.
  - Capture important lessons learnt from previous and ongoing GDAs.
  - While remaining consistent with previous GDAs.
- Reviews and approvals of the modernisation proposals complete.
- We are currently progressing implementation of the proposals (update of guidance to GDA Requesting Parties and drafting new technical topic specific guidance).
Review of Guidance

- Safety Analysis (ongoing)
- Engineering (ongoing)
- Licensing and Supply Chain (planned for 2019)
- Security (planned for 2019)
- Emergency Planning, Transport, Site Characterisation (under consideration)