

## **Nuclear Institute Central England Branch**

# **Young Generation Network Speaking Competition**

**31 March 2016**

### **INTRODUCTION**

Five candidates were selected for this 2016 Central England Regional Final. The key objective of the event was to demonstrate communication skills before a live audience, with emphasis on presentation rather than overall content.

Marks were awarded for four aspects: Synopsis, Oral Presentation, Clarity and Use of Visual Aids and Ability to Explain to a Non-Technical Audience. The judges decided that aspects two and three were the most important in the context of the key objective and weighted the marking accordingly (5, 10, 10, 5) giving a maximum possible score of 30. The target presentation time was 10 minutes.

In the spirit of continued professional development, a private and confidential feedback report has been provided to each candidate. First, second, third and fourth-equal places were awarded.

The judges and the audience were very impressed by the quality of all the presentations. Marks scored by the five candidates were very close and it was difficult to choose between them. All presentation timings were excellent and all speakers demonstrated good audience rapport. In addition, all the presentations were very interesting, capturing and holding the attention of the audience. We congratulate each of competitors on a job very well done.

Relevant sections of this report have been agreed with the competitors concerned. The overall report has been approved for publication on the Nuclear Institute website by Dr. Mehdi Askarieh, Chairman of Central England Branch of the Nuclear Institute.

### **PRESENTATIONS AND RESULTS**

#### **1st: Stevie Wray, UKAEA**

##### **Grid Scale Energy Storage - What Are Our Options?**

**Presentation synopsis:** Energy storage is one part of the solution to the challenges facing the UK's, and the world's, electricity system. These challenges will exist with either an intermittent renewables generation mix or a continuous nuclear dominated mix, both of which are viable low carbon futures of electricity generation.

There are various types of energy storage suitable for electricity grid connection including pumped hydro, solid state batteries, flow batteries, super-capacitors, compressed gas, molten salt and flywheels. They all have their advantages and disadvantages but the focus recently has been on batteries, mainly due to the price of lithium based batteries dropping.

The world has seen several grid scale batteries being installed with a few examples based in the UK, but they pale in comparison to the current pumped storage capacity installed.

It looks economically viable to run an energy storage facility with the current market setup, but the business case is marginal. In the future we may see a lot of energy storage on the grid, but the market conditions need to be right to attract the investment required to make it happen.

**Observations by the judges:** Stevie's synopsis showed good understanding of his subject, providing a well presented outline of the technologies and the challenges. The text was appropriately non-technical and gave helpful background to the topic. Oral presentation included nice 'welcome' remarks. It was also directly relevant to the topic and well timed, with good delivery and pace, together with a clear and logical structure. Speaking style was confident, 'chatty' and addressed the audience, with good rapport at all times. Stevie provided a very clear and helpful run through the various grid scale storage energy options available. The technical and non-technical balance was fine. He was also able to answer all questions, achieving good interaction with the questioners. Presentation was very good and was given in a manner that was interesting, easy to listen to and would be readily understood by a non-technical audience. Stevie worked well with his visual aids and the quantity was just right, enabling him to retain rapport with his audience. The level of interest achieved was such that a follow up talk on the viability of each method would be welcomed.

## **2nd: Saralyn Thomas, Areva RMC**

### **"D' oh": The Sound of Safety Culture in Springfield**

**Presentation synopsis:** As a nuclear safety consultant, I am often compared to Homer Simpsons by friends. Homer works as a Safety Inspector at the Springfield Nuclear Power Plant, has an IQ of 55, is disengaged from his job and is incompetent in the role.

As the main character in "The Simpsons", Homer can be regarded as a representation of safety culture in Springfield. He should embody the values, attitudes and behaviours of what is required to develop a strong safety culture in the industry that we work; however, this is not the case.

The different elements that contribute to a strong safety culture (an informed, reporting, learning, flexible and just culture) will be identified and explored through examples of poor safety culture in "The Simpsons", with potential improvements identified. These examples include Homer's secondment to India to train new employees and how he secured his job as a Safety Inspector.

Safety culture in the context of major incidents is discussed. This will involve exploring key mistakes that were made at incidents like Fukushima and Chernobyl, in relation to the identified elements of a safety culture. This presentation concludes that safety culture is the responsibility of the industry as a whole, including senior management and regulators.

**Observations by the judges:** Saralyn provided good background to the topic in a humorous way, clearly stating what the talk would address. This was an amusing approach to a difficult area and was very good at getting her points across. Saralyn interacted well with her audience, having a strong and confident voice and achieving some good laughs. This was a very inventive and entertaining approach, through the use of a TV programme for comparative information. It was a good way of getting over issues to those members of the public who are outside the nuclear industry. A serious and important subject was presented in a way that was light-hearted, relevant and humorous. All questions were answered well and were addressed to the questioners. Visual aids were good, being the right quantity, clear and relevant. This novel approach was good and relevant for a non-technical audience. Explanations used non-technical phrases and an easy to follow structure. The question and answer session was also appropriately non-technical. It was good to use Homer in order to capture the interest of the general public.

## **3rd: Stephen Blaxland, AWE Aldermaston**

### **Machine Learning Within Nuclear Forensics**

**Presentation synopsis:** Nuclear forensics is the practice of examining the "nuclear fingerprints" of a

material to determine its identity and provenance. Historically, nuclear forensics has relied upon experimental techniques performed and analysed by experts, however, times are changing.

There is a recent growth in machine learning algorithms that can successfully learn how to determine the origin of a source by analysing patterns in historical data. These algorithms have the potential to greatly aid experts to determine the origin of a new, unknown sample. Moreover, the accuracy of these algorithms when applied to historical data provide a measure of the uncertainty associated with the findings.

This work focuses on the recent discovery of a glass jar simply labelled “gamma source”. It describes how the Australian nuclear science and technology organisation used experimental techniques paired with novel machine learning approaches to investigate the provenance of this mysterious finding.

**Observations by the judges:** Stephen provided a very interesting synopsis that was clear, well set out and to the point. It also offered a helpful background to the topic and included a good description of the problem that was to be addressed. Stephen captured the attention of the audience from the start, by launching straight in to his presentation, through a confident and lively style, linking well to his visual aids. There was good audience rapport, offering relevant explanations of the benefits of machine learning. Stephen was able to answer all questions and addressed the questioners. The approach was good, being helpfully clear, with the whole machine learning process being well explained. Visual aids were clear, simple and well linked to the oral presentation. Overall, Stephen offered easy to understand non-technical explanations of nuclear forensics and of machine learning algorithms.

#### **4th equal: Eva Belonohy, Culham Centre for Fusion Energy**

##### **The Joint European Torus(JET): A Gateway to Fusion Energy**

**Presentation synopsis:** A little sun is created every 20 minutes near Oxford just along the A34 in the Joint European Torus (JET). This fusion experiment is the largest in the world and is run in a perfect collaboration of the European fusion laboratories for the better part of the last 30 years.

JET is as much an engineer’s dream challenge separating one of the universe’s hottest (10 times the core of the Sun) and coldest (4 degrees above absolute zero) temperatures with a unique inside wall material as it is a physicist’s dream where experiments still pave the way before theory.

Being the only fusion experiment that can presently use the optimal fusion fuel mixture, JET is developing the best achievable fusion performance scenarios to be used in the first ever experimental fusion reactor being built in the South of France that can prove that fusion energy is a cheap, safe alternative nuclear energy source that can provide a possible solution to the world’s energy problem.

**Observations by the judges:** Eva's synopsis provided good background to the topic and a good description of the challenge presented by nuclear fusion. She achieved audience rapport and well-judged presentation timing. The introduction was fine, using very helpful analogies and including humour as part of a positive and lively presentational style. The overall content benefited from mentioning 'ITER' as the next phase of the fusion programme. The question and answer session was well handled - addressing answers to the questioners. Eva's use of visual aids was good, having a very helpful introductory slide on the fusion road map, well-chosen images and summary texts. The right quantity of slides had been selected for the presentation. Although the subject was a technical topic, effective use of analogy helped make it relevant to a non-technical audience. The issues and challenges of fusion were well explained. Eva gave an enthusiastic and clear explanation of the 'open' fusion community and a concise non-technical description of JET as 'a small sun'.

#### **4th equal: James Pearson, AMEC Foster Wheeler**

##### **The Concept of Deep Borehole Disposal for Nuclear Waste**

**Presentation synopsis:** Radioactive waste comes in a wide variety of forms, ranging from contaminated concrete and metals, to highly active liquor from the re-processing of spent fuel. The radioactive properties of these wastes can remain hazardous for thousands of years, and produce large levels of heat, both of which require careful management over a time period that cannot be maintained from man-made stores.

Drilling of deep boreholes is being explored for the disposal of radioactive wastes, and is the subject of renewed research interests and testing in the USA. The method of using deep boreholes involves drilling into crystalline basement rocks that could reach depths of around 5 km, a technique that is becoming more viable with recent technological advances from the oil industry. The significant depth is thought to provide a solution that is totally isolated from human activity, with little potential of radioactive substances returning to the surface.

But would this design provide a practical solution to disposal of radioactive wastes and spent nuclear fuel? And would the design result in total isolation from the surface? This presentation provides an overview of the design, the programme being undertaken in the USA, and thoughts on how this concept could be utilised.

**Observations by the judges:** James provided a very good synopsis, stating the background to and content of the presentation and posing the questions that would be addressed. He offered a well-structured text that was logical and clearly explained, including an outline of the range of waste forms. The presentation benefited from a good introduction and effective contact with the audience from the start. James showed that he knew his subject and explained it in a well-structured manner. All questions were answered, demonstrating good interactions with the questioners. The introductory slide describing the content of the talk was very useful. The right quantity of visual aids was provided and they were very informative. Although the topic was technical, the presentation offered a good balance and would be understood by a non-technical audience. Good explanations were provided of the technical challenges.

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