

Poster Project – The Radioactivity of the Seas Around Ireland

Sean Alexander 21364546

My contribution to this poster project entailed doing research into understanding the health effects of the different radioisotopes among the waste products released into our seas due to the operation of the Sellafield nuclear power plant in the UK.

My process involved three main steps:

- Identifying the non-ionising properties of the radioisotopes
- Identifying the mechanisms behind the ionising properties of the radioisotopes
- Listing the overall health effects of exposure in a succinct manner

I started off the process by looking into what would be the best sources to detail the health effects. After finding sources for these health effects, I then had to investigate the mechanisms that caused the ionising radiation, those being Beta decay and Gamma decay. In order to fully understand these types of radiation I decided to formulate the nuclear equations for each of the most important decays in the nuclear decay-chains of each of the radioisotopes I was focussing on:

Radio Isotopes	Mode(s) of Decay
Tritium	Beta Decay into Helium-3: ${}^3_1\text{T} \rightarrow {}^3_2\text{He} + \beta^- + \bar{\nu}_e$
Caesium-137	Beta Decay into Barium-137: ${}^{137}_{55}\text{Cs} \xrightarrow{\beta^-} {}^{137}_{56}\text{Ba} + \beta^- + \bar{\nu}_e$ Beta & Gamma Decay into Barium 137: ${}^{137}_{55}\text{Cs} \xrightarrow{\beta^-} {}^{137}_{56}\text{Ba} + \beta^- + \bar{\nu}_e + \gamma$
Iodine-129	Beta Decay into Xenon-129: ${}^{129}_{53}\text{I} \xrightarrow{\beta^-} {}^{129}_{54}\text{Xe} + \beta^- + \bar{\nu}_e$
Strontium-90	Beta Decay into Yttrium-90: ${}^{90}_{38}\text{Sr} \xrightarrow{\beta^-} {}^{90}_{39}\text{Y} + \beta^- + \bar{\nu}_e$
Technetium-99	Beta Decay into Ruthenium-99: ${}^{99}_{43}\text{Tc} \xrightarrow{\beta^-} {}^{99}_{44}\text{Ru} + \beta^- + \bar{\nu}_e$
Plutonium-241	Beta Decay into Americium-241: ${}^{241}_{94}\text{Pu} \xrightarrow{\beta^-} {}^{241}_{95}\text{Am} + \beta^- + \bar{\nu}_e$

I also made a table detailing the increase in risk of cancer per unit consumed of each of the radioisotopes and a paragraph for each of them detailing their health effects. I found that I had gone into too much detail upon sending my information in to those I was cooperating with, but it was useful to have the background information I had acquired when it came to tailoring what made it onto the poster.

Reflection:

I was happy to use this poster project as opportunity to learn some valuable skills in research and further my understanding of nuclear decay processes. It was also interesting to see what it was like to perform research in groups and deciding the division of labour and staying on focus with the purpose of the project. I enjoyed the process of seeing the work we were doing become presentable and eventually actually on the final product that was the poster itself. I decided it was important to detail the health effects of the radioisotopes present within the waste products of Sellafield that we had listed to contextualise the significance of the reality we were presenting which is why I suggested it be a section of the poster. I thought we should be careful not to scare people unnecessarily as I am a proponent of nuclear power, but I think as an intellectually honest proponent of nuclear power, one needs to ensure that information gets out there about its risks so that those operating it are held to the highest of standards to decrease the chance of an eventual lapse in care which would decrease public support of nuclear power. In addition, I had a lot of fun meeting those I was working with in addition to our mentor whom I enjoyed speaking to as a bonus. I understand that posters are an important part of science communication that will be valuable in detailing research I am yet to undergo. It is for that very reason that I'm glad I participated in this research project.

