Choosing Nuclear Power Plants for the Planet Krypton

The planet Krypton is running out of fossil fuels and has started research work on solar energy and other alternative energy technologies. Unfortunately, these alternatives cannot be developed for 20 to 40 years. In the meantime, Kryptic engineers must use a technology that is already available to tide the planet over until alternative technologies are developed. They have narrowed down their choices to two that they can afford to purchase:

1. Buy some old nuclear plants of an obsolete design from planet Earth. These are reactors of the same design used by the Russians for their nuclear plant in Chernobyl, but with some improvements to prevent an explosion similar to the one that occurred in 1986.

2. Build new plants based on the new but untried Tokamak-type fusion technology. Experimental reactors using this design have worked well, but no large-scale plants have yet been built using this technology.

The Kryptic engineers estimate that the obsolete Russian plants are likely to have a major catastrophe about once every 100 years. They estimate that about 2000 people would be killed in such a catastrophe, including those who might die of cancer many years later.

They estimate that it is impossible for the new Tokamak-type reactors to explode but that the reactors will emit tiny amounts of low-level radiation continuously during normal operation. Because this design is new, there is uncertainty about the amount of radiation. The best estimates are that about 1 to 10 deaths will result from this radiation each year of operation.

Which choice poses the greater risk? What would you recommend? Explain your answer.