

## Comments for the PowerPoint presentation of

### “Nuclear safety, radiation, waste management and Fukushima”

H. Douglas Lightfoot, April 28, 2011

**Slide 1:** Title

**Slide 2:** Nuclear has the lowest immediate fatalities. Injuries are very close to the lowest. Evacuation is high because of Chernobyl. Why so many people were relocated is now under question.

**Slide 3:** The red line is the level of radiation in a wide area around Chernobyl. It was necessary to move people away from the immediate vicinity around the plant. Note that people in the Rocky Mountain States in the US live their lives in higher radiation levels. People in Sweden and southwest France are subject to much higher levels. People live healthy lives in areas where radiation is 700 mSv per year. Background radiation surrounds us. (mSv = milliSieverts).

**Slide 4:** This is a nuclear fuel bundle. The uranium is in pellets sealed in zirconium tubes. When the uranium 235 is consumed, some of the by-products are decaying and producing a small amount of heat. The fuel bundle is placed in a swimming pool to keep it cool until the radioactive material decays sufficiently that the bundle can be stored dry in a metal cask.

**Slide 5:** This is a description of the storage process for spent fuel.

**Slide 6:** A description of what happened at Fukushima. The tsunami wall was 6.5 metres high and the tsunami was 10 metres high. The water knocked out the diesels supplying emergency electricity to the cooling water pumps. The reactors overheated and the cores melted. The spent fuel also overheated and the zirconium reacted with the oxygen in the water leaving hydrogen. The hydrogen mixed with air and exploded. It blew the walls out to the building but left the steel structure. Currently, the reactors are being cooled sufficiently and the plant is under control. There were no radiation deaths or serious injuries.

**Slide 7:** This is the area around the Fukushima Daiichi nuclear plant affected by radiation. The tsunami also hit the towns along the coast. “A” is the closest town to the nuclear plant, “B” and “C” are approximately the same distance away and “D” is the farthest away.

**Slide 8:** Radiation levels from March 11 to April 7, 2011. Note that these levels are measured in microSieverts per hour,  $\mu\text{Sv/hr}$ , which are one thousand times smaller than a milliSievert, mSv. The highest level was approximately 45  $\mu\text{Sv/hr}$  on March 15. The levels have dropped rapidly and are now approximately 1  $\mu\text{Sv/hr}$  in most areas. This level is 8.8 mSv, which is approximately the level around Chernobyl. See Slide 3.

**Slide 9:** The earthquake and Tsunami knocked out 21 plants generating electricity plus one hydro plant. Currently, 20% of electricity capacity is out of service. Rolling blackouts make

it very difficult for industry. Approximately 30% of Japanese electricity came from nuclear. Japan is third in the world in terms of actual electricity produced annually from nuclear.

**Slide 10:** Examples of why we radiation surrounds us.

**Slide 11:** The nuclear industry is one of the safest in which to work.

**Slide 12:** References to show where some of the information presented came from.

**Slide 13:** The Lightfoot Institute logo, mission statement, and web site address.