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Three Mile Island

Twenty Questions on Nuclear Fuel Releases by the Three Mile Island Nuclear Plant

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1. Do nuclear plants release nuclear fuel?
2. What is nuclear fuel ? What are the transuranics? What are the melting points? the boiling points? Did plutonium and uranium boil during the TMI meltdown?

3. Did TMI release nuclear fuel? If so, how much?

Was there evidence of releases of core materials and nuclear fuel at TMI? When TMI shut down on March 28, 1979 the pressure relief valve opened at a tremendous primary coolant pressure of over one ton per square inch and the valve remained stuck open. Some local residents in the Goldborough area were awakened at 4:15 in the morning by the sound of gases escaping under very high pressure. One eye-witness described the valley filling with a somewhat irridescent orange haze. The uncontrolled releases in the first two plumes that morning were not monitored. Plant personnel at first estimated a dose rate of 40 rads per hour for people in Goldsborough.

4. How toxic is nuclear fuel and the transuranics? The official estimate.
5. Is there evidence that nuclear fuel is more toxic than the official estimate?
6. What are the health effects of exposure to nuclear fuels and the transuranics?
7. Are nuclear fuels and transuranics released into the air?
8. Are nuclear fuels and the transuranics released into the water?
9. Are nuclear fuels and transuranics concentrated in the food chain?
10. Were tests done to determine the amounts of plutonium, uranium, curium, americium and other transuranics in the emissions in the exhaust plume at TMI?
11. Were tests done of contamination of surface dust with plutonium, uranium, curium, americium, and other transuranics in the areas around TMI?
12. Have the official agencies supported tests of surface dust contamination around nuclear plants before?

13. Besides the nuclear fuels, plutonium 239 and uranium 235, how many other transuranics are there of importance in nuclear fuel and high level nuclear waste?
14. Is it true that a single nuclear reactor like TMI produces as much fallout radionuclides in four hours as were produced by the Hiroshima bomb? The fuel in nuclear plants is similar to the fuel in nuclear bombs. The Hiroshima bomb contained $12\frac{1}{2}$ kilograms, or about 28 pounds of uranium. Only a pound of uranium actually fissioned, equivalent to a detonation of 25 million pounds of TNT. The other 27 pounds were vaporized and the metallic fumes of uranium blown over thousands of square miles. The bomb at Nagasaki contained plutonium.

Each reactor core at TMI contains 100 tons or 200,000 pounds of uranium, together equivalent in explosive power equivalent to a total of 14,000 Hiroshima bombs. About one-third of the uranium must be replenished each year. Each reactor core makes more than 100 pounds of plutonium each year. The single reactor core fissions the amount of uranium in the Hiroshima bomb every four hours, six each day, converting it to some 1800 different radioactive gases and particulates. About 500 of these are of potential importance in the assessment of contamination around nuclear plants. Forty of these include the nuclear fuel itself and very similar transuranic isotopes. The 500 radioisotopes include the radioisotopes of all the trace elements of importance in nutrition. These are selectively absorbed and concentrated in the food chain and in the human body.

15. How injurious is alpha radiation and does a nuclear plant release any? Alpha radiation is 20 times more damaging than other types of radiation.
16. Which isotopes of nuclear plant fuel and other transuranics are most important as a source of alpha radiation? A uranium fueled reactor produces over 100,000 curies of alpha-emitting plutonium, and 380,000 curies of the very radiotoxic alpha-emitting curium. For a uranium-plutonium fueled reactor, 3.6 million curies of curium are released each year along with 680,000 curies of alpha-emitting plutonium and 113,000 curies of alpha-emitting americium.
17. Where are plutonium, americium, curium and other transuranics found in the body, and how long do they stay there?
18. When do leukemia and cancer cases occur after exposure?
19. When are genetic effects likely to occur?
20. What should be done at TMI?