8. Accurate, economically-feasible filtering and monitoring technologies do not exist for some of the major reactor by-products, such as radioactive hydrogen (tritium) and noble gases, such as krypton and xenon. Some liquids and gases are retained in tanks so that the shorter-lived radioactive materials can break down before the batch is released to the environment.

9. Government regulations allow radioactive water to be released to the environment containing "permissible" levels of contamination. **Permissible does not mean safe.** Detectors at reactors are set to allow contaminated water to be released, unfiltered, if below the "permissible" legal levels.

10. The regulatory agencies rely upon self-reporting and computer modeling from reactor operators to track radioactive releases and their projected dispersion. A significant portion of the environmental monitoring data is extrapolated – virtual, not real.

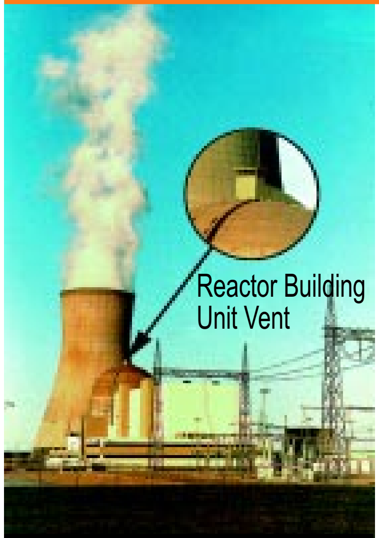
11. Accurate accounting of all radioactive wastes released to the air, water and soil from the entire reactor fuel production system is simply not available. The system includes uranium mines and mills, chemical conversion, enrichment and fuel fabrication plants, nuclear power reactors, and radioactive waste storage pools, casks, and trenches.

12. Increasing economic pressures to reduce costs, due to the restructuring of the electric power industry, could further reduce the already unreliable monitoring and reporting of radioactive releases. Deferred maintenance can increase the radioactivity released – and the risks.

13. Many of the reactor's radioactive by-products continue giving off radioactive particles and rays for enormously long periods – described in terms of "half-lives." A radioactive material gives off hazardous radiation for at least ten half-lives. One of the radioactive isotopes of iodine (iodine-129) has a half-life of 16 million years; technetium-99 = 211,000 years; and plutonium-239 = 24,000 years. Xenon-135, a noble gas, decays into cesium-135, an isotope with a 2.3-million-year half-life.

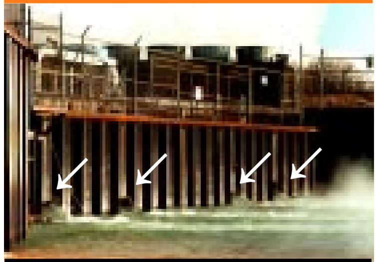
14. It is scientifically established that every exposure to radiation increases the risk of damage to tissues, cells, DNA and other vital molecules. Each exposure potentially can cause programmed cell death (apoptosis), genetic mutations, cancers, leukemia, birth defects, and reproductive, immune and endocrine system disorders.

Nuclear Plant Releases to Air, Water and Soil



A Reactor Building vent at a typical 1000-megawatt pressurized-water reactor.

It does not take an accident . . .



Water discharge area at Palisades Nuclear Power Plant on Lake Michigan. Note the flow from four big ejection outlets.

Typical discharge points for gaseous and liquid releases to air, water and soil

from nuclear power plants including:

planned releases from the reactor's routine operation

and

unplanned releases from leaks and accidents.

RADIOACTIVE RELEASES FROM NUCLEAR POWER PLANTS IN THE GREAT LAKES BASIN

WHAT ARE THE DANGERS?

Nuclear Information and Resource Service
World Information Service on Energy - Amsterdam

1424 16th St., N.W., Suite 404, Washington, D.C. 20036
202-328-0002, FAX 202-462-2183 • nirsnet@nirs.org
www.nirs.org • www.antenna.nl/wise

June 2002

What you *ARE NOT* supposed to know:

1. **It doesn't take an accident** for a nuclear power plant to release radioactivity into our air, water and soil. All it takes is the plant's everyday routine operation, and national governmental regulations permit these radioactive releases.

2. Radioactivity is measured in "curies" or "becquerels." A large medical center, with as many as 1000 laboratories in which radioactive materials are used, may have a combined inventory of only about <u>two</u> curies. In contrast, an average operating nuclear power reactor will have approximately 16 <u>billion</u> curies in its reactor core. This is the equivalent long-lived radioactivity of at least 1,000 Hiroshima bombs.

3. A reactor's fuel rods, pipes, tanks and valves can leak. Mechanical failure and human error can also cause leaks. As a nuclear plant ages, so does its equipment – and leaks generally increase. The risk of severe accidents also increases.

4. Some contaminated water is intentionally removed from the reactor vessel to reduce the amount of the radioactive and corrosive chemicals that damage valves and pipes. This water is filtered and then either recycled back into the cooling system or released into the environment.

5. A typical 1000-megawatt pressurized-water reactor (with a cooling tower) takes in 20,000 gallons of river, lake or ocean water per minute for cooling, circulates it through a 50-mile maze of pipes, returns 5,000 gallons per minute to the same body of water, and releases the remainder to the atmosphere as vapor. A 1000-megawatt reactor without a cooling tower takes in even more water – as much as one-half million gallons per minute. The discharge water is contaminated with radioactive elements in amounts that are not precisely tracked, but are potentially biologically damaging.

6. Some radioactive fission gases, stripped from the reactor cooling water, are contained in decay tanks for days before being released into the atmosphere through filtered rooftop vents. Some gases leak into the power plant buildings' interiors and are released during periodic "purges" or "ventings." These airborne gases contaminate not only the air, but also soil and water.

7. Radioactive releases from a nuclear power reactor's routine operation often are not fully detected or reported. Accidental releases may not be completely verified or documented.

NUCLEAR POWER PLANTS IN THE GREAT LAKES BASIN

United States

10 sites with a total of 13 reactors

1. FitzPatrick
2. Nine Mile Point 1 & 2
3. Ginna
4. Perry
5. Davis-Besse
6. Fermi Unit 2
7. Palisades
8. Cook Units 1 & 2
9. Point Beach 1 & 2
10. Kewanee

Canada

3 sites with a total of 20 reactors

11. Bruce A & B (8 reactors)
12. Pickering A & B (8 reactors)
13. Darlington (4 reactors)

TOTAL REACTORS OF THE GREAT LAKES BASIN: 33

The four reactors at Pickering A and the four at Bruce A were closed in 1997 because of safety and performance problems. The schedule for each reactor's restart is being contested.