

Suggested Changes to STW Presentation Material
June 2006

- I. Introduction.** Expanded “Selected Moments”
- 1895 Wilhelm Roentgen discovers X Rays
 - 1896 Henri Becquerel discovers emission of rays from uranium
 - 1897 JJ Thomsen discovers the electron
 - 1898 Pierre and Marie Curie discover and isolate radium and polonium
 - 1898 British Army using mobile X-ray machine for battle casualties

 - 1903 Ernest Rutherford discovers the atomic nucleus
 - 1905 Albert Einstein develops Theory of Relativity, mass-energy relationship
 $E=mc^2$
 - 1913 Niels Bohr introduces “mini solar system” model of the atom
 - 1932 James Chadwick discovers the neutron

 - 1938-39 Otto Hahn, Fritz Strassman, Lisa Meitner et al. discover nuclear fission and demonstrate the chain reaction.
 - 1942 Manhattan Project begins
 - 1945 Atomic bombs built and used on Hiroshima and Nagasaki
 - 1951 First production of electricity from nuclear energy: EBR-1 at Idaho Falls

 - 1953 President Eisenhower proposes Atoms for Peace Program
 - 1954 First nuclear submarine, Nautilus, is launched
 - 1957 First large-scale nuclear power plant, Shippingport, PA
 - 1963 US and USSR sign Limited Test Ban Treaty
 - 1968 Nuclear Nonproliferation Treaty is signed by U.S. and USSR.

 - 1979 Three-Mile Island Reactor destroyed in partial-meltdown accident
 - 1986 Chernobyl nuclear reactor explosion and fire
 - 1987 Yucca Mountain, NV designated candidate high-level nuclear waste site
 - 1990 USDA approves irradiation of poultry to reduce food poisonings
 - 2002 US House of Reps approves Yucca Mountain as Final disposal site for spent nuclear fuel.

II. FUNDAMENTALS OF RADIATION

At end of “Radiation Detection”) NEW SLIDE

Some More Recent Developments

Semiconductor detectors for alpha, beta, and gamma rays. Extremely small sizes, high energy resolution, and ruggedness. Compatible with modern digital data processing.

Pocket-sized or smaller electronic dosimeters measuring dose rate and accumulated dose, with audible alarms and wireless readout to central record keeping

III. EXPOSURE TO RADIATION IN MODERN LIFE

(After existing slide “Food Irradiation”) NEW SLIDE

Food Irradiation

Now used in 37 countries

USDA approved for meat and produce, also surgical supplies

Could wipe out Salmonella and E. Coli in fish and poultry

(Presently 10 million cases of food poisoning annually in U.S.)

Could reduce Third World loss of 50% of all produce to spoilage.

(After existing slide “Accidents”) NEW SLIDE

Other Accidents

Rocky Flats Plant Fires 1957, 1969. No Casualties. Some Plutonium release.

Criticality Accidents: 24 in 40 years. Los Alamos, Oak Ridge, Soviet Union

Los Alamos: 1 metal assembly, 1 solution tank, 1 fatality each

Oak Ridge: Solution in processing plant. No injuries or release

FSU: Recent, Weapons metal assembly. 3 fatalities

Japan 2000: Plutonium solution, fuel fab. 3 fatalities

IV. Cellular Biology and Radiation Effects

I recommend that a task group of bio and medical types go over this section. My thoughts: some of the terminology may be a little heavy for our intended audience. Also, we should simplify and reduce the three risk bar graphs to one or two, removing some of the social and controversial items from the charts.

V. Radioactive Waste Management

Request that you bring this section up to date with respect to the present status of Yucca Mountain and the Texas efforts to handle its low-level waste problem. Recommend that you include material from the March 1, 2006, testimony of Dade Moeller at a U.S. Senate hearing on waste management policy.

VI. Radiation Safety/Health Physics

I recommend the addition of three subsections to this chapter:

- Who regulates radiation in Texas and in the U.S?
- Nongovernmental national and international bodies.
- Emergency assistance available.

1. Texas is an Agreement State for control of radioactive material. This means that the U.S. government has ceded control of these materials within the state to Texas. The agreement calls for state regulation to be as protective as Federal rules. The responsible agency is the Texas Department of Health, which also regulates all non-nuclear sources of radiation.

The U.S. Nuclear Regulatory Commission (NRC) retains direct supervision of all nuclear power, research, or other reactors.

The National Nuclear Security Agency (NNSA) is responsible for the Pantex Plant, for transportation of nuclear weapons and weapon-related material, and for other nuclear defense activities not in the hands of the Department of Defense.

The U.S. Department of Defense is responsible for deployed nuclear weapons and other nuclear materials/radiation sources on its facilities.

The U.S. Department of Transportation regulates all commercial interstate shipment of radioactive material.

The U.S. Environmental Protection Agency has authority over waste disposal and other activities which may impact the environment.

2. Non-governmental Bodies

U.S. Organizations

National Council on Radiation Protection and Measurement

An independent but government-supported agency of representatives from educational and medical bodies plus interested Federal agencies which performs technical studies and recommends protective standards.

Health Physics Society: an organization of professionals engaged in the practice of radiation protection.

American Board of Health Physics: an organization which sets standards for, examines, and certifies health physicists.

International Bodies:

International Commission on Radiation Protection (ICRP). This body makes recommendations which are followed by many nations.

International Commission on Radiation Units and Measurements established and maintains the system of radiation units used worldwide.

3. Emergency Assistance.

Local: Most county and municipal jurisdictions either have or have access to a Hazardous Materials (HAZMAT) Unit which should have equipment and instructions for dealing with a radiation emergency. Dial 911

Most hospitals have a nuclear medicine program. Their Radiation Safety Officer could be a source of advice or assistance in a pinch.

Texas Department of Health would normally be contacted by local authorities. In an emergency or for advice, call 1-800-----

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Federal assistance or advice is available through the Albuquerque Operations Office of the National Nuclear Security Agency (NNSA/DOE) at (505) 845-4667 24 hr/day, 7 days/week. Capabilities include the Radiological Assistance Program (RAP), the Aerial Measuring System (AMS), the Atmospheric Release Advisory Capability (ARAC), the Accident Response Group (ARG), the Nuclear Emergency Search Team (NEST), and the Federal Radiological Monitoring Assistance Center.