

Resolving the Nuclear Waste Issue on the Road to Sustainability

World Federation of Scientists

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By

Pollution

Permanent Monitoring Panel

*Professor Frank L Parker, Vanderbilt University and
Chancellor Lorne G. Everett, Lakehead University*



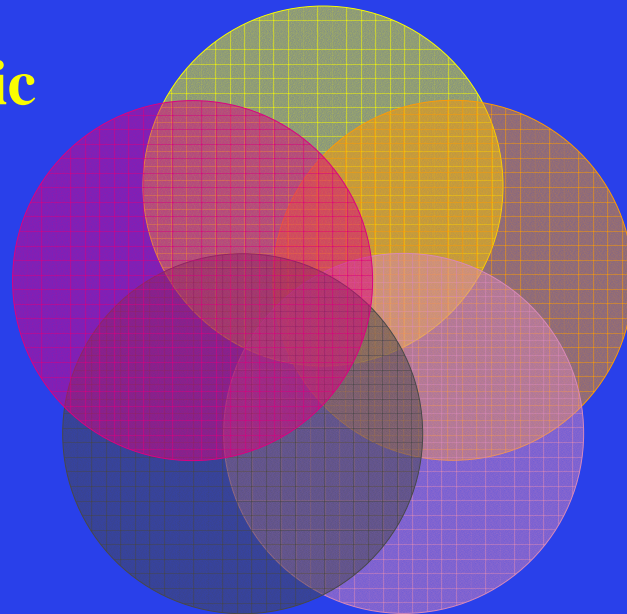
Nuclear Waste Issue Considerations



Long-Term Waste Disposal/Pollution

Technical/Public
Acceptance

Cost



Sustainability

Nuclear Proliferation

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Statement of Objectives

Nuclear energy is a strong candidate for one of the practically sustainable energy sources. A number of problems may limit its implementation including resolving nuclear waste management issues.

The public is concerned about waste because it believes it is a permanent threat. Therefore, what do we owe future generations?

Transportation is an issue because it impacts so many people. How best to allay these fears?

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Sustainability

Our Common Future, Report of the World Commission on Environment and Development to the United Nations, 4 August 1987
Chair: Gro Harlem Brundtland



“Sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs.”

p. 25

“But the problem of nuclear waste disposal remains unsolved. Nuclear waste technology has reached an advanced level of sophistication” (P. 186, Ref 50, F.L. Parker et al, 1984, F.L. Parker et al, in press)



What Do we Owe Future Generations?

- “[1] preserve the gains of culture and civilization...,
[2] maintain intact those just institutions that have been established...,
[3], put aside in each period of time a suitable amount of real capital accumulation.” (Just Savings, Rawls)
- "principle of intergenerational equity"-each generation leave to its successor a planet in at least as good a condition as that generation received it. (Brown)
- Implicit in this is that each succeeding generation should have the option to make its own decisions and in any case will.



Rawls, J.: *A Theory of Justice* (Cambridge: Harvard, 1971).

Weiss, E.: *In Fairness to Future Generations: International Law, Common Patrimony, and Intergenerational Equity* (New York: Transnational Publication and the United Nations University, 1989).

Front End and Back End of Fuel Cycle Technological Impacts



We should note that we, PMP Pollution, are only dealing with the pollution problems but need to put them in context, hence the brief discussion of the contrasts between the front and back ends of the fuel cycle. These are judgmental characterizations.

Weapons-Nuclear and “Dirty Bombs”

Nuclear Weapons- Devastating- Physically and
Psychologically-Nationally and Internationally

“Dirty” Bombs-Devastating Locally

Accidents-High Energy Content- same as Nuclear Weapons

-Low Energy Content-Local Impact

Waste- High Energy Content- same as “Dirty Bombs”

-Low Energy Content-Local Impact



Front End and Back End of Fuel Cycle Problems



High Energy Content-Potentially Major Consequences

Fuel in Reactor- Uncontrolled Criticality

Irradiated Fuel-Criticality

Spent Fuel Reprocessing-Criticality

Low Energy Content-Potentially Major Consequences

Mill Tailings-Radon, Local

-Radium, Uranium-Leachability & Atmospheric Release

High Level Radioactive Waste-Radiation-Leachability & Atmospheric Release

Low Level Radioactive Waste-Leachability

Transportation- Potentially Major Consequences- Function of Contents and Severity of Accident



Public Nuclear Liabilities & Assets



	Normal Use	Accidents	Security Concerns
1. Nuclear Weapons	Extreme	Extreme	Extreme
2. "Dirty" bombs	Extreme	Extreme	Extreme
3. Wastes			
High Level	Little	Extreme	Extreme
Low Level	Little	Little	Little



Public Nuclear Liabilities & Assets



	Normal Operations	Accidents	Security Concerns
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4. Operations

Reactors	Little	Extreme	Extreme
Reprocessing	Little	Extreme	Extreme
Transportation	Medium	Extreme	Extreme
Disposal- Waste			
Spent Fuel	Extreme	Extreme	Extreme
High Level	Extreme	Extreme	Extreme
Low Level	Medium	Medium	Medium

The public locally may perceive some benefit from front end activities such as electricity and jobs but perceives little benefit from the back end, disposal and transportation



Presentations-John Ahearne

We shall try to answer some of these questions by the presentations from the following distinguished colleagues:

- ◆ **Dr. John Ahearne, a member of United States National Academies' Committee on America's Energy Future: Technology Opportunities, Risks, and Trade-offs. Dr. Ahearne will discuss whether the problem of radioactive waste disposal could be the Achilles' heel of the renaissance of nuclear power.**



Presentations-James Rispoli

- ◆ **Mr. James Rispoli, is responsible for the cleanup of the United States Department of Energy (DOE) and other sites contaminated during the development and manufacture of nuclear weapons. These sites have historically been the cause of the major nuclear waste contamination in the United States. Mr. Rispoli will review the progress in cleaning up these sites and the significant problems remaining.**



Presentations-Rudolf Alexakhin



◆ **Dr. Rudolph Alexakhin has participated in many of the site cleanups of the Former Soviet Union sites and will discuss those efforts and the work remaining. Dr. Alexakhin is Director of the Russian Institute of Agricultural Radiology and Agroecology.**

Dr. Alexakhin will discuss the remediation of some of the most contaminated sites in the Former Soviet Union.

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Presentations-Charles McCombie



- ◆ **Dr. Charles McCombie is leading the effort to establish an international repository for high-level waste Dr. McCombie was formerly scientific and technical director of NAGRA, the Swiss Cooperative for the Disposal of Radioactive Waste.**



Statement of Objectives



- ◆ **Dr. Rainer Friedrich is a leading researcher in ExternE, the European Union's research project on Externalities of Energy. Dr. Friedrich will discuss their research so that some of the shortcomings (i.e., looking only at market costs of energy production) can be avoided. Dr. Friedrich is Professor at the Institute for Energy Systems and Rational Use of Energy, University of Stuttgart.**



Statement of Objectives



Thus, these Pollution PMP presentations shall provide an overview of the pollution resulting from nuclear power and weapons systems and the disposal of their wastes and the public concerns.

The hope is that this information will help us avoid some of the mistakes and reduce some of public anxieties about the environmental problems of the past that were associated with nuclear energy.

