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Notes for Testimony on Spent Fuel Pool of the Zimmer Nuclear
Power Station, Moscow, Ohio

by

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Moscow Elementary School, K through 6, only 800 meters
from Spent Fuel Pool (SFP).

Sensitivity of humans to radiation varies by almost 10 fold,
the younger the individual, the more sensitive. (1,2,3,4)

ALARA requires that exposures to population be kept to a
minimum achievable, a requirement which will not be
met if fuel is stored for extended periods of time.

Indeed, there will be no off site storage facilities in
the foreseeable future, not before 1992, according to
DOE officials. (5,6).

In the meantime, numerous plants have been faced with a
variety of difficulties as a result of large accum-
ulations of spent fuel:

1975, AEC said two plants would have to be closed due
to inadequate storage space. (7)

1976, ERDA claimed five plants would have to be shut
by 1978 without additional storage. (8).

1978, a nuclear plant in N W England got permission
for compaction, increasing # of fuel assemblies fr
880 to 2320 , using Boron carbide fuel racks. (9)

1978, Due to a leak in the recirculating system,
the reactor had to be emptied of fuel assemblies,
but could not do so due to inadequate space in
SFP. (10)

1979, Requests were made by several utilities to shuffle
around spent fuel assemblies from plants which were
saturated to newer plants with some space to spare.
(11, 12).

In each of these cases, crucial degrees of freedom have been
sacrificed due to accumulation of spent fuel, limiting
the ability of the stations in question to react to

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(cont)
abnormal occurrences.

Such inability to react in emergency situations dramatically increases the probability that off site radiation levels will increase. Since adequate storage facilities off site would ease this problem, ALARA requirements are clearly being violated, particularly since claims are repeatedly being made that storage problems are solvable.

At the very least, Zimmer's license should be restricted such that at that point when the total amount of fuel on site is equal to the capacity of the SFP, no additional fuel should be permitted to be shipped on site.

A consideration of the Zimmer SFP reveals a number of short comings:

Since radioactive decay continues to produce heat after removal from the core, cooling is crucial to the safe storage of SF.

Yet the cooling and clean-up functions of the SF handling system are considered non-essential, and have been subjected to no inspection or testing. (13)

The fuel racks in the Zimmer design are fabricated from aluminum, yet the recent developments in the field of spent fuel storage suggest that boron carbide is a more appropriate substance due to increased absorption of neutrons. (9)

Yield mass curves show that Kr-85 and Xe-133 figure prominently in the composition of spent fuel. (14)
These two fission products are particularly difficult to control due to their non-reactiveness.

According to AEC data, 99.9% of these fission products can be removed prior to release of gaseous waste. Indications are that the Zimmer design will not meet such retention criteria. (15)

These isotopes pose a problem in spent fuel because, although their formation does not continue after removal from the reactor, their release from the fuel rods must be expected to continue.

Indeed, any releases of these gases are generally traced to defects in the cladding. (16)

One must therefore expect that leakage of these gases from spent fuel stored will be proportional to the amount of spent fuel stored and the length of storage. "Some of the gaseous products diffuse out of (the) pellets and remain trapped in the plenum in in each fuel tube." (17)

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Zimmer Spent Fuel Pool Considerations (cont).

Once large numbers of ^{spent} fuel assemblies are in place, it will be impossible to determine which may be the source of any leakage into the pool.

While krypton is a Noble gas, there are indications that it can form associations with hemoglobin, and perhaps fatty tissues (18) and therefore cannot be entirely ruled out as an internal source.

Upon decay, it yields beta, and occasionally gamma rays. Generally immersion is considered to be the prominent pathway of exposure (19).

Importance of storing Spent Fuel on site:

There is no argument that it is safer to store SF on site for a period of up to 6 months. Levels of radioactivity are significantly reduced during such a cooling period, (20) as indicated by the heat content decay curve.

Levels of short lived radionuclides will drop during such storage periods. (21)

Constipation of Nuclear Industry as result of difficulty in disposing of highly radioactive waste.

Each year 3 million lbs of ^{currently} spent fuel are being accumulated on site at the nations nuclear power plants. (22)

A total of 16 million lbs are presently being stored.

By 1992, when completion of the federal storage site might be realized, assuming any state will permit establishment of such a nuclear dump, there will be 24 to 30 million pounds. (6)

California has already passed a law which ^{construction of} prevents new nuclear plants until adequate disposal techniques have been demonstrated.⁽²³⁾ Such laws are under consideration in a number of states, including Ohio (24).

Rather than slow down the front end of the cycle, the course of action being approved by the NRC is one of compaction, thereby exacerbating the problem, and increasing the danger of contamination at each plant site. (26) Obviously, the danger of spillage is proportional to the quantities of toxic substances being stored.

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Furthermore, it is therefore clear that the danger of exposing Moscow, Ohio residents in general, and the Elementary School children in particular will be increased by the inevitable requests that will come from the Utility to allow compaction at Zimmer. Since it is not the function of the Utility to provide for storage, to allow such an accumulation of spent fuel on site would be in violation of the "As Low As Reasonably Achievable" regulation.

Senator Gary Hart, Dem. from Colorado, and Chairman of the Senate Subcommittee on Nuclear Regulation, has labeled as "scandalous" the accumulation of two decades worth of nuclear waste in the absence of any means of safe disposal. He asks if we do not have a moral obligation to future generations. (25)

If a safety margin is preserved in the Zimmer operation such that no more fuel is permitted on site than a total of two core loads, then we must expect that operations there will have to be shut down in seven to eight years.

Since the demand for electricity has been dramatically slower in its yearly increase than the 10% cited by the utility in its early releases regarding the necessity of the Zimmer station, and since on the coldest day in the history of the region, only 44% of the generating capacity was being used, it is clear that this plant is not urgently needed at this current juncture.

A prudent course for the ASLB would be to disallow start-up of the Zimmer station until the need for additional electricity is clearly defined, thereby preserving that seven to eight years worth of electricity for a genuine emergency.

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Resume:

Dr. David B. Fankhauser

Born November 22, 1941.

Graduated high school from Olney Friends Boarding School, Barnesville, Ohio, 1959.

Graduated from Earlham College, Richmond, Indiana, in 1963 with a B.A. in Chemistry.

Worked as a research technician in the Dept. of Microbiology, U.C. Medical School from 1963 to 1965.

Participated in the Bacterial Viruses course at Cold Spring Harbor, L.I. during summer of 1967.
in mutagenesis

Conducted research in the laboratory of Dr. Bruce Ames, Dept. of Biochemistry, University of California at Berkeley during the summer of 1969. (Dr. Ames has received widespread recognition for the development of the most sensitive test for mutagenesis/ carcinogenesis to date.)

Received a PhD in Biology from the Johns Hopkins University, Baltimore, Maryland, in 1971. His thesis, "The Promotor-Operator Region of the his Operon in Salmonella typhimurium" was researched and written under the advisorship of Dr. Philip E. Hartman. It concerns the effect of mutations which alter the regulation of a set of genes responsible for the synthesis of the amino acid histidine.

Conducted research in human eco-biology relating to lifestyles which have minimum adverse effects on the environment from 1971 to present. This research was conducted on a small 11 acre farm in Clermont County. Key features of the experimentation involve housing with wood, self-sufficiency in milk (goat), and egg, and certain vegetable production, maximum nutrition from simple foodstuffs, reduction of dependence on utilities, etc. The Fankhausers have delivered all three of their children (Gabriel, Silvio Alice and Nadeen) at home. (He married Jill Munroe in 1968.)

Currently teaching Biology at Clermont College, University of Cincinnati, Batavia, Ohio, since 1973. Notable activities there include a study uncovering grossly inadequate sewage treatment facilities and at many of Clermont counties treatment plants, bio-gas generation, and intervention in licensing of the Zimmer Nuclear Power Station, located 11 miles from his home.

He has published papers in the following journals and publications: Genetics, Journal of Bacteriology, Neurospora Newsletter, Health Forum, and the Earlhamite.

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