515 West Point Avenue
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March 30, 1979

To: U.S. Department of Energy

Secretary James Schlesinger
Assistant Secretary for Environment Ruth Clusen
General Counsel Lynn R. Coleman

U.S. Nuclear Regulatory Commission

Chairmen Joseph M. Hendrie
Commissioners Victor Gilinsky, Richard T. Kennedy,
Peter A. Bradford, and John F. Ahearne
General Counsel Leonard Bickwit

From: Kay Drey

This letter is being submitted as a formal request that an environmental impact statement be prepared on the proposed U.S. Department of Energy chemical decontamination experiment at the Commonwealth Edison Dresden Nuclear Power Plant, Unit One -- or at least, an environmental assessment. I believe that an analysis of questions perhaps similar to those listed in the enclosed letter of March 19, 1979, are essential in order to determine whether this proposed federal action will have a significant impact on the health and safety of the human environment. I understand such environmental reviews are required under the National Environmental Policy Act of 1970, as implemented by 40 CFR Parts 1500 through 1508 (Federal Register, November 29, 1978, Vol. 43, No. 230, p. 55978).

Thank you.

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To: President Jimmy Carter, and to Messrs. Douglas Costle(Administrator, Environmental Protection Agency), Jacob Dumelle(Chairman, Illinois Pollution Control Board), Joseph Hendrie(Chairman, Nuclear Regulatory Commission), Charles Percy(U.S. Senator from Illinois), James Schlesinger (Secretary, Department of Energy), William Scott(Attorney General of Illinois), Adlai Stevenson(U.S. Senator from Illinois), James Thompson (Governor of Illinois), and Charles Warren(Chairman, President's Council on Environmental Quality)

From: Kay Drey, 515 West Point Avenue, University City, Missouri 63130

✓A PLEA FOR AN ENVIRONMENTAL IMPACT STATEMENT ON A MAJOR FEDERAL ACTION PROPOSED FOR THIS SPRING, 1979, IN ILLINOIS:

The U.S. Department of Energy is presently contributing $8.2 million toward the first of a series of decontamination experiments designed to dissolve and flush out radioactive corrosion products from nuclear reactors. In April or June(?), 85,000 gallons of a proprietary Dow Chemical solvent are to be flushed through an estimated five miles of piping for 100 hours within our nation's oldest active commercial reactor(Commonwealth Edison's 200-megawatt Dresden plant, Unit One, near Morris and Joliet, Illinois, on the Kankakee River).

This solvent may be chemically similar to, even identical with, the very compounds which have been found to be causing the unexpectedly rapid migration of radionuclides out of the Oak Ridge burial trenches and possibly into the human food chain.

The claim contained in a letter I received last month from the Department of Energy that there is "reasonable evidence that it(the solvent) will not contribute to the escape of the radioactive material, nor will it cause migration of radioactive substances through the environment" is not convincing. Once the Dow Chemical solvent has bound the radioactive materials, we may lose all hope of keeping those substances isolated from the biosphere.

I have obtained information and suggestions from professors of geochemistry, physics, biophysics, biology, biochemistry and radiation oncology. Every one of them is as concerned about this experiment as I am. They have helped formulate(and explain) the questions that follow, and all believe that an environmental impact assessment is imperative. To quote one of the men from a letter dated March 9, 1979:

> "I think it is unacceptable that the DOE assure you that their chelating preparation is environmentally safe and, at the same time, refuse to divulge the nature of the material. We still know relatively little about the movement of radio nuclides in the environment, but there is increasing evidence that natural ligands may contribute to the process. I should think that one would need to take care that the artificial ligands provided by Dow would not enhance the mobility of nuclides in the biosphere and result in their concentration in the food chain."

Before this action is undertaken the public is entitled to the assurance that physical and biological scientists who are not financially and/or emotionally committed to this project will have studied questions similar to those which follow, and will have conclusive evidence that the proposed Dresden experiment can be performed without jeopardizing the human environment. If not, the project should not proceed.

1. First, is it possible that an environmental impact assessment and a negative declaration have already been written regarding the proposal to decontaminate Dresden Unit One? I have asked this question several times of the DOE, but have not received an answer. If an assessment was made, which individuals of the Department of Energy made the decision that this project will not affect the quality of the human environment, and therefore did not require an environmental impact statement under 40 CFR 1500? That is, was a negative declaration made by the DOE, and if so, by whom and when? Is a copy available? Did it address the following questions?:

2. What do field or laboratory tests demonstrate to be the migration potential of radioactive wastes entrapped in the Dow Chemical solvent, assuming some were to escape from buried containers into the environment?

   According to an article published in Science, Vol. 200, 30 June 1978, by Jeffrey Means, David Crerar and James Duguid, chelating agents were found to be the very substances responsible for the mobilization of radionuclides

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from disposal pits and trenches in the Oak Ridge National Laboratory. In a personal communication from Dr. Crerar, the environmental implications are described as follows:

> "While chelates are used because of their powerful metal-binding properties, it is this same characteristic which may have undesirable environmental consequences. For example, EDTA, which is used in nuclear decontamination operations, is causing the migration of some ^{60}Co from intermediate-level liquid waste disposal pits and trenches in the Oak Ridge National Laboratory burial grounds. Because it forms extremely strong complexes with rare earths and actinides, EDTA and similar chelates may also be contributing to mobilization of these radionuclides from various terrestial radioactive waste disposal sites around the country. EDTA is relatively resistant to decomposition by radiation, thermally stable up to about 200-250° C, and rather slowly biodegradable. Consequently, it is persistent in the environment. Indeed, the presence of significant concentrations of EDTA in 12 to 15 year old radioactive waste at ORNL attests to its persistence. Therefore, wherever EDTA and similar compounds have been introduced into the natural environment, the aqueous transport of transition metals, rare earths, and transuranics, which characteristically form the most stable complexes with chelates, will be expected to occur. ...
>
> Degradation rates of all three chelates(NTA, EDTA, and DTPA) were not rapid enough, even under ideal laboratory conditions, to preclude concern about their release to the environment. Heavy metal mobilization can occur at extremely low chelate concentrations, as witnessed at ORNL. Biodegradation, if slow or incomplete, may be an inadequate barrier to their various undesirable environmental consequences. Destruction of chelates by thermal or chemical means (such as ozonation) prior to environmental discharge appears to be much more efficient than biodegradation after discharge."

3. For how many years have radioactive corrosion products, bonded with the proposed Dow Chemical solvents, remained free of water after being solidified by the Dow Chemical polymer process?

According to Dow Chemical's publication entitled "Solidification Process for Low-Level Radioactive Wastes", (Form No. 173-1026-78), only a few descriptions of the solidification process, which I understand is to be used for the Dresden wastes, are included:

> "The Dow Solidification Process consists of the combination of a binder -- a modified vinyl ester resin -- with small amounts of a catalyst and a promoter. The process encapsulates the low-level radioactive wastes into a stable, solid and homogeneous matrix. ...
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> The Process, using polymer chemistry, dictates that it must solidify aqueous and slurry wastes, including ion exchange resins, evaporator bottoms, spent decontamination solutions, and filter sludges.
>
> The Dow Process solidifies radioactive waste with no free liquid. ... The Dow definition of 'free liquid' is liquid in or on the specimen or in the container upon completion of solidification or after 3-7 days of aging."

a. Has the Dow solidification process been tested on reactor corrosion products comparable to those which will result from the Dresden experiment? What assurance is there that the encapsulated waste is going to be low-level?

b. When did Dow Chemical first develop its solidification process for low-level radioactive wastes? What is the longest duration period for one of its "monoliths" or matrixes -- that is, how long has such a solidified Dow substance remained free of liquid? What would be the long-term stability of the solid polymer over a period of thousands of years?

c. What is the leach rate of the polymer under burial conditions, or the potential for diffusion and release of encapsulated radionuclides, solvents, etc.?

d. During the evaporation step, is the solvent volatile, and if so, will an ion exchange resin completely scrub chelated radionuclides from the evaporate? (I am told by one person that his experience indicates it will not).

4. For how many years have the barrels designed for burying the solidified wastes been found to remain resistant to corrosion from both the proposed contents and from surrounding environmental impacts?

a. According to a letter I received from Mr. Paul Pettit(Light Water Reactor Section, Division of Nuclear Power Development, DOE) dated February 6, 1979, the solidified wastes from the Dresden experiment are to be shipped in drums to a commercial low-level waste disposal site. Since additional wastes are no longer being accepted at the nearby Sheffield, Illinois burial site(in fact, the licensee has just walked away, with the NRC in hot pursuit), will the wastes be shipped to Nevada, South Carolina, or Washington? Were the drums designed to comply with the Department of Transportation's packaging and shipping regulations for low-level or high-level wastes(49 CFR Parts 170-178), or to comply with the NRC transit regulations for fissile materials(10 CFR 71 and 73)? And/or were the drums designed for indefinite burial?

b. What is the estimated lifespan of the barrels? What precautions are going to be taken at the life-end of the barrels to ensure continued containment of the residual radioactivity? Have any metals been found that will resist the corrosive action of the proposed contents for even a decade? Is there apt to be any chemical reaction between the compounds going into the barrels and the materials of which the barrels are composed?

c. In the June 30, 1978 Science article, Dr. Crerar and colleagues describe the accelerated dispersal through the groundwater and the increased uptake by vegetation of the radionuclides when bonded to nonbiodegradable chelates. If the buried drums with the solidified Dresden effluent were to corrode and the matrix were to come into contact with water, would the radionuclide-chelate complex not become soluble again? Could this solution then migrate through the environment in the same manner found at the Oak Ridge burial site?

d. If chelates are to be used, can they be deactivated thermally, chemically, or biologically before evaporation and solidification?

5. Is it possible that any of the solvent with or without dissolved radionuclides may remain after the principal effluent and first rinse water have been removed for evaporation and solidification -- and then be flushed into the Illinois River? If so, might the radionuclides absorbed by the river's sediment near the plant's cooling water outfall in years past become resuspended and migrate into the food chain?

a. How much radioactivity and residual chelating agent are expected in the first rinse? How many additional rinses will there be? Scientists have told me that they did not think that chelated, radioactive metal ions would be removed by a demineralizer; although demineralizers have a high affinity for naked metal ions, I have been informed that they generally do not remove chelated forms. Or will the chelating agent perhaps be charged, and thereby be removable by the demineralizing step? People with whom I have spoken seem surprised to learn that the purification of the first rinse -- the removal of the residual chelating agents and chelated metal ions -- was to be done with a demineralizer. What is the explanation for this apparent departure from traditional practice?

b. According to Mr. Pettit's letter of February 6, 1979, "the formulation of the Dow Chemical solvent is known to DOE staff, but is protected from release to the public by a proprietary agreement." Solvents used for decontamination purposes at nuclear facilities have been described elsewhere, however, by

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DOE, Dow and Commonwealth Edison representatives as being "chelating agents" (pronounced key-lay-ting) -- that is, a chemical compound(typically organic) capable of forming clawlike multiple bonds with a metal ion. Typically these agents are also non-irritating to skin or eyes, a characteristic of the solvent which Mr. Pettit happened to mention.

Assuming the components of the solvent fit the definition of a chelating agent, is there any likelihood that there will be enough residual after the primary effluent and first rinse water have been removed, that some might be flushed into the Illinois River along with future routine releases of the coolant water? (The coolant-water discharge canal empties into the Illinois River at the confluence of the Des Plaines and Kankakee Rivers at Illinois River Mile 272.4). How tightly does the solvent bond metals? That is, if some were to pass through the sediment near the canal's discharge point, might it leach out additional radionuclides which have accumulated in the sediment near the outfall? Or if it is a relatively weak agent, might the sediments attract radioactive metals out of the chelate solution, thereby increasing the amount of radionuclides in the sediment and the potential for further contamination of the benthos? (The EPA report entitled "Radiological Surveillance Studies at a Boiling Water Nuclear Power Reactor", BRH/DER 70-1, describes the contents of the Dresden Unit One liquid waste effluents during tests in 1967 and 1968. Two later companion studies at reactors in Massachussettes and Connecticut describe the significance of the concentration of radionuclides in the sediments).

6. What will be the impact of the solvent on the future safe operation of the Dresden plant?

According to the book, Dangerous Properties of Industrial Materials, by N. Irving Sax, published in 1963:

> "One fallacy in the initial concept of stainless steel or other 'impervious' surfaces is that they are truly impervious. This has been shown to be false. Stainless steel after one vigorous cleaning is found to deteriorate in that more and more material may be absorbed or adsorbed and retained on the surface. Successive cleanings have been found to become more difficult and to require more vigorous methods of decontamination." (p. 149)

a. I understand that the NRC is responsible for making certain that this project will not compromise the integrity of the reactor vessel and its parts. What assurances, however, does either the NRC or the DOE have that this massive cleaning effort will not increase the surface fouling of the reactor system in the future, causing an acceleration in the buildup of crud in its many nooks, crannies and blind holes? Will even stronger chelating agents be needed at Dresden Unit One for future decontamination efforts, assuming the stainless steel properties quoted above from the Sax book are correct?

b. Could an acceleration in the rate of buildup of crud after the decontamination project increase the potential for pipe cracking or rupture? And also increase the radiation hazards to workers?

7. What assurances are there that the men who participate in the Dresden decontamination experiment will not suffer from exposure to the combination of the solvent and the radioactive materials suspended in the solvent in either the aqueous or gaseous forms?

One of the possible reasons for the increased incidence of leukemia and cancer at Portsmouth and other naval shipyards which Drs. Thomas Najarian and Theodore Colton mention in their communication published in The Lancet, May 13, 1978, is that: "Other factors(asbestos, smoking, industrial solvents) may have interacted synergistically with radiation to cause more deaths from cancer and leukemia than radiation alone would have caused." (emphasis added). I realize that one of the primary reasons for trying to develop an effective decontamination process is to reduce the accumulation of gamma-emitting corrosion products which in turn cause high radiation fields within operating nuclear power plants, and thereby necessitate the hiring of excessive numbers of repair and maintenance workers.

a. According to a letter dated March 13, 1979, from Mr. A. David Rossin(System Nuclear Research Engineer, Commonwealth Edison), thirty workers will be needed during the presently proposed 100-hour project. And although I was told by Mr. Paul Pettit of the DOE that his agency is not concerned about the toxicity of the Dow solvent itself during the decontamination operation, what hazards may it pose to workers when it is in combination with radioactive materials?

b. What procedures are to be taken to make certain that the radionuclide-chelating agent is totally contained and will not in fact come in contact with the workers? What is the radiation dose expected per hour at one meter from the reactor containment vessel, the effluent piping, the evaporation and solidification equipment, and the drums preparatory to and during shipping? What shielding will be erected to protect the workers?

These are questions of profound import. To proceed with the Dresden experiment while they remain unanswered would be egregious folly. For the safety of the public and the workers, and for the protection of our country, can we count on you to demand that a full environmental impact statement be prepared immediately?