**The original documents are located in Box 25, folder "Nuclear Waste (1)" of the James M. Cannon Files at the Gerald R. Ford Presidential Library.**

Pendu

January 13, 1976

M E M O R A N D U M

TO: The Vice President

FROM: Edward Teller E.T.

SUBJECT: Disposal of Radioactive Wastes

Construction of nuclear reactors is an important portion in our program for energy self-reliance. The program is technically well conceived, economic and safe. It is under strong attack, which recently has been waged by using initiatives of voters. The general public, being generally less informed, can be more easily scared. The first initiative will come up for a vote in California on June 6th, and the outcome of the issue is in doubt.

One of the most effective argements used against nuclear reactors is connected with the disposal of radioactive wastes. There are a number of good and inexpensive solutions available. A selection among these has not been made as yet. This circumstance has been used by Nader and others to cast doubt on the safety of the methods of disposal.

It is of great importance that a choice be made among the several methods. A very hopeful approach for disposal is deep in underground locations in solid salt structures, like salt domes or bedded salt.

In making early determination, ERDA, NRC, and the environmental agencies CEQ and EPA have to participate. It is suggested that early action be taken to encourage a quick resolution of this question at least for the next five years. Lack of action will be construed by the voters as lack of safety.

REQUESTED

THE WHITE HOUSE

WASHINGTON

February 4, 1976

MEMORANDUM FOR: JIM CANNON

FROM: DICK LIVINGSTON

VIA: GLENN SCHLEEDE

SUBJECT: NUCLEAR WASTE MANAGEMENT

Question

1. What steps is the Administration taking to solve the problem of radioactive wastes from nuclear power plants?

2. Should the Domestic Council play a more active role in the resolution of outstanding issues concerning agency roles and interagency coordination of radioactive waste management?

Background

When an atom of uranium or plutonium is split to yield energy in a nuclear reactor, the remaining matter forms two or more new atoms of different elements, referred to as fission products. The fission products contain a certain proportion of every chemical element and isotope. Many of these are radioactive, and thus decay into other elements, so that the mixture of fission products is always changing over time.

As a fuel rod is used in a nuclear power plant for a period of three to four years, the fission products build up to a point that reduces the reactor's ability to produce energy. The spent fuel rod is then removed and stored in a holding tank at the power plant for at least several months to allow the fission product radioactivity to decay to a level that permits convenient handling for transportation. The plan is that spent fuel will be transported to a reprocessing plant where the plutonium and unused uranium content is separated from the fission products with the intent of recycling it back into the reactor. There are currently no NRC licensed commercial reprocessing or recycle facilities. Consequently, recycling cannot be now performed.

The fission product mixture left behind after the reusable fuel is extracted is what is known as high level waste, because it gives off a high level of radiation as well as heat. Over a period of one or two hundred years, the most intensely radioactive and heat-generating elements in the waste gradually die out, leaving behind inert elements, along with elements of low radiation intensity, but extremely long radioactive periods (up to 100,000 - 1 million years). Thus, after the first centuries, the immediate hazard is much less. However, there is the danger that the long-lived elements, if they were to get into the environment, and accumulate in human tissue, could over a period of years, cause cancer or genetic damage. Therefore, the high-level wastes must be kept isolated from the environment for up to a million years.

(It should also be noted that the production of plutonium for nuclear weapons has, over the last 30 years, resulted in radioactive wastes essentially the same as those from commercial nuclear power plants. Acceptable means for the long-term storage of these wastes must also be found. Radioactive wastes generated to date in connection with the weapons program, amount to over five times the amount of wastes that will be generated by the expansion of the commercial nuclear power industry through the year 2000. What this really means is that we have a radioactive waste problem even if opponents of nuclear power were successful with the proposed moratorium.)

Status of Technology

There are basically three different methods to deal with the long-term storage (really disposal) of these wastes:

- store it in a solid, chemically insoluble form such as glass, cement or ceramic in a geological structure that will be stable over several million years.

- convert it into less radioactive forms through further nuclear reactions (transmutation).

- shoot it into space.

Complete transmutation is not now technically feasible. Shooting the wastes into space may be technically feasible but safety and economics are less certain. Thus, efforts have been concentrated on geologic storage.

Several techniques have been developed to convert the wastes into a glassy or calcine form. The question is to find a place to put it that won't be disturbed by earthquakes, volcanic activity, groundwater flows, or human activity for the next several million years. Salt formations have been favored because they are stable, mining technology is simple and cheap and, if the structure is sound, they are usually isolated from water. However, other rock formations are also being considered. Storage on the deep-sea bed or under the Antarctic ice cap has also been proposed, but these involve more technical problems, as well as infringing on international treaties.

Government Actions

The AEC gave the long-term nuclear waste management problem a low priority, partly because at that time there was no commercial waste to speak of, and because it was felt that the wastes could be temporarily stored until a final decision had to be made -- at least 10 to 20 years. The first solution to the long term disposal problem proposed by AEC was to store the wastes in an abandoned salt mine near Lyons, Kansas. However, inadequate knowledge of the salt mine's structural integrity, plus public outcry in Kansas over becoming the Nation's dumping ground, forced the AEC to drop this location. The next proposal was to store the wastes for the interim in a retrievable form in surface facilities. However, the Environmental Impact Statement (EIS) for this project received much criticism for not adequately considering alternatives and not providing a long-range solution, and the plan was shelved by ERDA.

In the last year, the waste management question has received much more attention due to the founding of NRC and to the growing public concern because a long-term solution was not in hand. Special attention was given to this in the 1977 Budget, resulting in a request for $85 million for ERDA (compared to $16 million in 1976).

Critical events ahead include:

- ERDA must submit a report to Congress on the technical alternatives for waste management on March 31, 1976.

- ERDA will prepare a draft EIS on the plan for public release and comment on July 1, 1976.

- ERDA plans to conduct public hearings on this EIS and release a final EIS in February, 1978.

- NRC plans to issue draft waste management regulations by October 1977. This will probably also require an EIS.

- ERDA plans the test operation of a pilot plant waste disposal facility in a geologic formation by 1980.

- ERDA anticipates having a full scale terminal storage facility in operation by 1983.

By way of contrast to other stages in the nuclear fuel cycle, there is general acceptance of the idea that the Federal Government should retain the responsibility for the long-term management or disposal of high-level radioactive wastes.

Evaluation and Coordination of Agencies Waste Management Activities

There now is general recognition by OMB and the agencies with principal interest and responsibility for radioactive waste management (ERDA, NRC, CEQ, EPA) that there should be created an interagency group with OMB, and perhaps Domestic Council, participation to:

- sort out and clarify the roles of the agencies principally involved.

- work out procedures and means for coordinating the work of these agencies so as to minimize or avoid gaps, conflicts and unnecessary overlap in functions.

This was discussed within OMB during the preparation of the 1977 Budget and the responsibility for getting the group organized and functioning was left primarily to OMB.

There is some feeling, particularly in OMB that there is also a need for an evaluation of the soundness, thrust, and direction of ERDA's waste management R&D program. While not disagreeing with the need, our view is that such an evaluation should not be attempted by an interagency group. Instead, it should be undertaken by the new OSTP, scientific and technical advisory committees, or an OMB contractor.

We have not pushed for a major role in this undertaking for the Domestic Council principally because of:

1. The significant amount of staff time that would be required to lead the effort.

2. The fact that two agencies with independent regulatory roles (NRC and EPA) are involved.

3. The principal problems and questions are organizational and procedural -- areas in which OMB has statutory roles.

This study should get going soon. If you wish, we could consider taking the lead in this area, subject to:

. a prior check with the White House Counsel to see whether the independent regulatory agency question is a controlling factor;

. obtaining staff on detail so that the job can be done right.

OMB staff have developed an issue paper on the matter of leadership for the interagency group -- which paper is pending with Jim Mitchell. The principal options for leadership considered in that paper are: (1) OMB -- about which Jim Lynn seems to have some reservations, and (2) OMB and CEQ co-chairmanship -- with CEA included because of its EIS role and the need to make sure that the results are environmentally acceptable and perceived that way be environmentalists.

DECISION

_____ Continue working with OMB to get an interagency group established under OMB or OMB-CEQ leadership.

_____ Develop proposal for Domestic Council Committee to undertake the effort, checking first with Buchen's office. Discuss with OMB to see if there are any serious objections.

_____ See Me.

THE WHITE HOUSE

WASHINGTON

March 4, 1976

MEMORANDUM FOR: JIM LYNN

FROM: JIM CANNON JMC

SUBJECT: Nuclear Waste Management

Glenn Schleede and I have been discussing the need to proceed with a major interagency study on how we should manage radioactive wastes.

I understand that your OMB staff, led by Jim Mitchell, has been actively studying this matter, but that a question has come up about who should take the lead.

Schleede and I feel that this effort should be led by OMB. Domestic Council would like to be involved, and we will be helpful where we can. But our view is that this issue is principally one of management and organization, so we think the direction of this interagency effort should rest with OMB.

THE WHITE HOUSE

WASHINGTON

February 4, 1976

MEMORANDUM FOR: JIM CANNON

FROM: DICK LIVINGSTON

VIA: GLENN SCHLEEDE

SUBJECT: NUCLEAR WASTE MANAGEMENT



Question

1. What steps is the Administration taking to solve the problem of radioactive wastes from nuclear power plants?

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THE WHITE HOUSE

WASHINGTON

May 3, 1976



MEMORANDUM FOR: GLENN SCHLEEDE

FROM: JIM CANNON

SUBJECT: ERC Paper on Nuclear Wastes

The imprecision and duplication in this paper will probably give the opponents of nuclear power a strong boost.

What we need, it seems to me, is a page and a half that says:

1. What we know about storing wastes.

2. Why it is safe to store them.

3. How they can be stored safely, i.e., in what solid form and kind of holes.

4. When we are going to start storing them.

I suppose we cannot say where we would store them with any precision, but couldn't we at least say we plan to store them under ground the U.S. government now owns?

Would you draft a clear and direct statement along these lines?

Many thanks.

Attachment

THE WHITE HOUSE

WASHINGTON



MEMORANDUM FOR: JIM CANNON

FROM: GLENN SCHLEEDE

SUBJECT: ERC PAPER ON NUCLEAR WASTES

Here is the latest draft of the ERC paper that I mentioned. My problems with it are as follows:

- The organization and tone of the paper are poor. For example, it still follows the basic approach where the Federal Government is telling people "Don't worry. We assure you everything is OK." The right approach is to tell people why everything is OK.

- There is no reference in the paper to the word "plutonium." This may be inadvertent but it would likely be interpreted by critics as an attempt to avoid the issue.

- "Low level" wastes are mentioned only briefly and there are problems that reasonable people are worried about.

- There is not enough in the way of identifying actions that will be taken -- in the way of commitments in either the low or high level waste areas.

I have consulted with Hans Mark on this. Points 1, 3 and 4 above are mine and he agrees with them. Point 2 is his.

My prefered course of action:

- Let ERC discuss and approve the paper in concept but not content. Get approval for a significant rewrite.

- I'll devote effort to rewrite as soon as possible.

Zausner may want to push this through the ERC just to show progress for his nuclear subcommittee. I'm more concerned that it have the effect were looking for.

P.S. I've sent a copy of the ERC draft to Jack Veneman for comment.

# Management of Radioactive Nuclear Wastes

# A Status Report



Draft

Published by the Federal Energy Resources Council
with participation by:

Council on Environmental Quality
Department of Commerce
Department of the Interior (U.S.Geological Survey)
Environmental Protection Agency
Energy Research and Development Administration
Federal Energy Administration

## FOREWORD

The President's Energy Resources Council (ERC) has the responsibility for coordination of Administration policies and programs relating to energy. Because of the important role envisioned for nuclear power in the next decade and beyond and the growing public concern over questions of nuclear safety, economics, and environmental effects, the ERC established a nuclear subcommittee to coordinate Federal nuclear policy and programs.

This paper draws on the technical, economic, and environmental expertise of the Federal agencies who are ERC members to provide a brief but comprehensive review of radioactive wastes and our ability to dispose of them safely.

Several additional papers on other important aspects of nuclear power will be forthcoming shortly.

ELLIOT RICHARDSON
CHAIRMAN
ENERGY RESOURCES COUNCIL

# THE MANAGEMENT OF RADIOACTIVE NUCLEAR WASTES - A STATUS REPORT

## SUMMARY


- To achieve energy independence, the United States must expand all of its conventional sources of energy supply -- coal, oil, gas, and nuclear -- while cutting its historic energy growth rate in half. This is indicated in FEA's February 1976 National Energy Outlook.

- Because our ability to expand oil and gas production is limited, use of domestic coal and nuclear fuel must increase very substantially. The National Energy Outlook indicates that nuclear power needs to expand from 9 percent of electric generation today to roughly 25 percent by 1985.

- Radioactive wastes are an inevitable byproduct of nuclear energy production.

  - Highly radioactive and long lived wastes are small in volume, but must be carefully processed, handled and stored.


D R A F T
April 23, 1976

Many thousands of years are required for radioactivity levels of some of these wastes to fall to levels of naturally occurring materials.

- Low-level wastes include those categories of waste generated directly by fission or indirectly by activation. They are of short-lived radioactivity usually not dangerous, provided continuous contact with the public is prevented.

o The ERC and the participating agencies have concluded that safe waste management is technically feasible. This conclusion is based on:

- Extensive federal experience with waste management over the past 20 years.

- The massive base of technology accrued through research, development and demonstration documented in ERDA's soon to be released comprehensive report titled, "Alternatives for Managing Wastes

From Reactors and Post-Fission Operations in the LWR Fuel Cycle". This document indicates the existence of technology to solidify high-level nuclear wastes to a stable form such as glass, to encapsulate the solid and then store the containers in known stable geologic formations such as salt beds.

- An interagency task force is now coordinating the remaining steps needed to have the needed disposal systems in operation by the mid-eighties when significant quantities of high-level waste will be in need of storage. These steps include: environmental assessments, impact statements, selection of one of the specific alternate solidification technologies, selection and qualification of several disposal sites, and completion of the necessary environmental, safety and related regulatory reviews to assure acceptable radioactive waste management practices.

CATEGORIES AND SOURCE OF RADIOACTIVE WASTES

- Nuclear power generation produces several types of wastes which can be classified as: (1) high-level and transuranic (elements whose radioactivity is intense and penetrating and/or long-lived) wastes, and (2) low level wastes.

- High-level and transuranic wastes are produced largely in the fuel elements, and remain contained in spent fuel.

- Spent fuel elements may be reprocessed to extract useable fuels. NRC is in the process (technical reviews, specific studies, impact statements) of rendering a final decision on the permissibility of recycle of plutonium.

  - Reprocessing results in separation of high-level wastes from useable fuels. If no reprocessing takes place, spent fuel elements themselves would constitute high-level waste and could be put into terminal storage.

- High-level wastes require careful handling, processing, storage and eventual terminal disposal.

o Low-level wastes are produced in a number of nuclear power facility operations. Such wastes include categories of materials having short-lived radioactivity usually not requiring much shielding or involving public hazard unless ingested or not kept from continuous contact with the public.

## TECHNOLOGY AND EXPERIENCE AVAILABLE FOR THE MANAGEMENT OF RADIOACTIVE WASTES

o The ERC believes that the needed base technology has been accrued to meet future nuclear waste requirements.

o The technical alternatives available to achieve each step of management are detailed in a new and comprehensive ERDA report on technical alternatives. For the management of high-level wastes produced from reprocessing, for example, the ERDA report indicates that:

- Reprocessed commercial waste can be solidified to a stable solid form such as glass, or calcined. This capability has already been demonstrated by pilot plant solidification of simulated waste.

- The solidified waste can then be containerized in engineered storage vaults or containers.

- Solidified, containerized waste can be stored underground in a variety of known stable geologic formations such as salt beds, salt domes, shales, granites, etc.

o Such multiple stable barrier storage systems provide confidence that high-level wastes can be isolated from the public in a manner not needing intense surveillance.

- High-level and long-lived nuclear waste volumes are small compared to other wastes produced by our society. Thus, even substantial sums that could be required for careful disposal of such wastes will not have substantial impact on the cost of electricity.

- Multiple waste form container and storage site options will be maintained as long as possible to assure program flexibility. This does not reflect uncertainties over the feasibility of technology, but is aimed at assuring development of the most acceptable program.

- Storage sites can be dispersed to minimize transportation requirements.

o Commercial low-level wastes are more voluminous than high-level wastes but can be safely disposed of through solidification and burial in properly selected and controlled land burial sites. Current federal efforts seek to improve site selection, management procedures and regulation.

o Thirty years of experience have been accrued in managing radioactive wastes. The record includes both favorable experience and cases where technical and administrative problems that occurred. While there have been no discernible health or safety effects on the public from these activities, both the good experience and the problems have been factored into future planning, to minimize problems when large scale commercial operations begin.

GOVERNMENT REGULATION

- Several agencies of the federal government have responsibilities for waste management as follows:

  - The Energy Research and Development Administration is responsible for development of waste management technology and for establishing and managing high-level waste repositories.

  - The Nuclear Regulatory Commission establishes safety criteria, licenses and maintains surveillance over handling, processing and storage facilities.

  - The U. S. Geological Survey advises on and assists in providing the needed geologic and hydrologic data for waste storage sites.

  - The Environmental Protection Agency establishes general environmental standards which must be met in connection with waste activities.

  - States, pursuant to agreements with NRC, have surveillance over low-level wastes and disposal and storage facilities.

WASTE MANAGEMENT PROGRAM IMPLEMENTATION

- The federal government has established and is coordinating the activities of all involved federal agencies directed toward providing needed waste solidification facilities and terminal disposal sites when they are needed, assure they are environmentally sound and safely operated and maintained. This coordination is being pursued by an interagency task force. Selection and implementation of the most appropriate of the existing and improved technologies will require:

  - The thorough reviews mandated by the National Environmental Policy Act.

  - The promulgation and satisfactory compliance with environmental standards and criteria issued by the Environmental Protection Agency.

  - Compliance with licensing criteria and requirements of the Nuclear Regulatory Commission.

- Full public participation in regulatory hearings.

o The commitment to provide adequate resources to achieve these high-level and other waste management program objectives has been made by the Administration.

o The comprehensive federal program for implementation of high-level waste management is shown in Figure 1.

o The continuing federal waste program will:

- Assure site selection, qualification, licensing design and construction and startup of waste terminal storage operations by the end of 1984.

- Make possible the initiation of waste solidification operations in 1982.

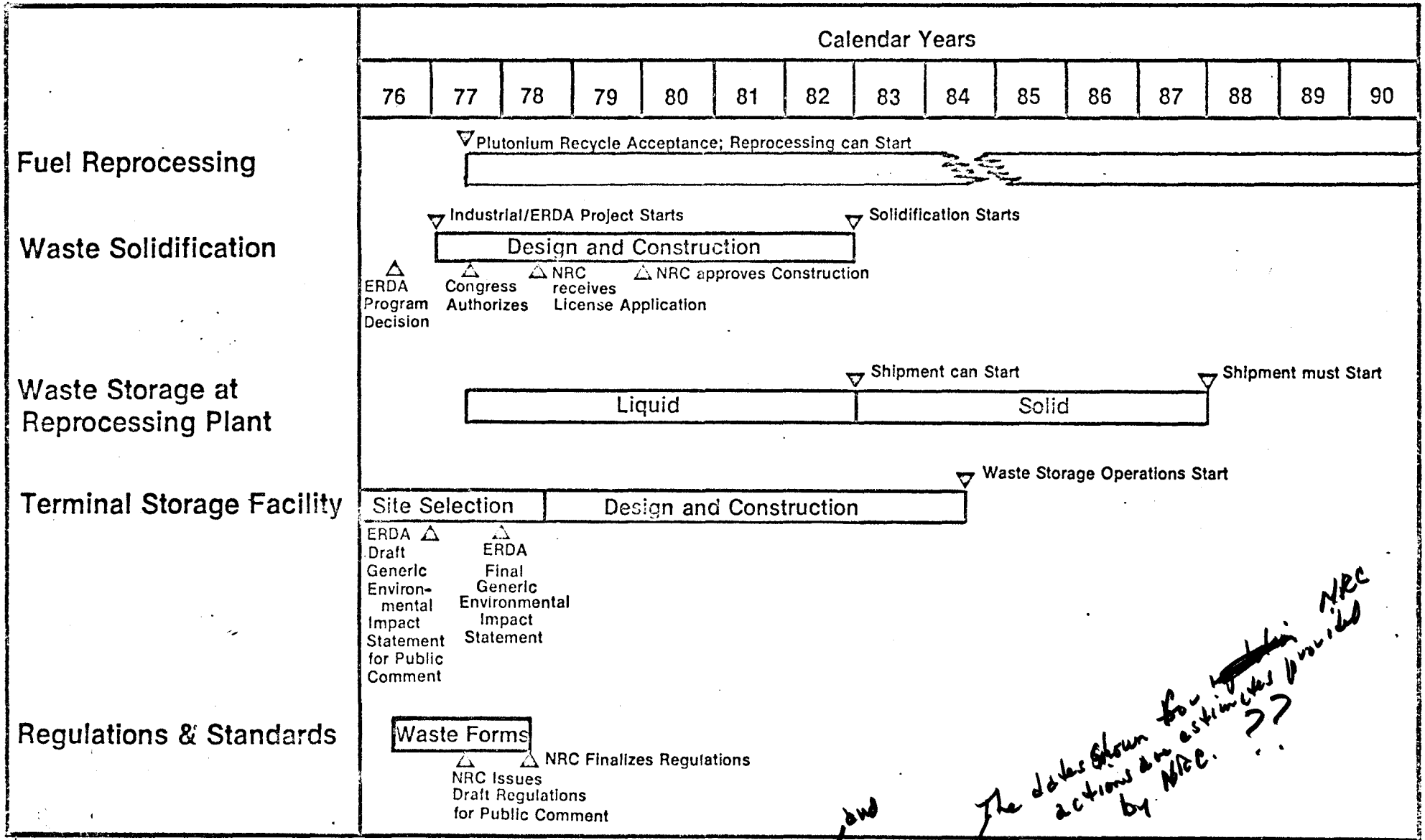
o To achieve this timetable, the ERDA technical alternatives document will be reviewed with the public this summer. Then roughly at the end of

1976, ERDA will issue a preliminary Environmental Impact Statement (EIS), with a final EIS due at the beginning of 1978. The EIS documents will be based on thorough field surveys, geologic and hydrological studies of candidate sites currently underway and soon to be expanded.

- Site selection and regulatory review for the terminal storage pilot plant will then be possible at the end of 1978.

- The federal high-level waste management program shown in Figure 1 also includes establishing regulatory standards and criteria, review and demonstration of technology well in time to meet the needs of the Nation's commercial nuclear program. While decisions by independent regulatory actions are shown, it should be noted that such decisions cannot be predicted nor scheduled. Based on experience with regulatory process lead times, the time allowed in Figure 1 should prove sufficient to allow for full decision-making processes, including public participation.

# Federal High Level Radioactive Waste Management Plan*




*Note: This plan represents the program of the Executive Branch. It requires timely congressional support, public scrutiny, and ~~it projects, but cannot direct, action by independent regulatory agencies~~. Projected dates for such actions are indicated by designated decision points. The time allowed for regulatory review, public hearing, etc., is selected to allow for thorough decision making and public participation.